

**EXHIBIT A**  
**PERFORMANCE SPECIFICATION**

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### **ATTACHMENT 1 LIST OF QDMR AND TRANSLINK DOCUMENTS**

## 1 INTRODUCTION

### 1.1 PURPOSE AND INTERPRETATION

- (a) In performing the Project Activities, PPP Co must comply with this Performance Specification.
- (b) A number of the Annexures contained within the Performance Specification are contained in two parts, as Part 1 and Part 2 to that Annexure. Each Part 1 sets out the State's minimum requirements, which must be met or exceeded (subject only to the extent of any Agreed Exceptions) by PPP Co in performing the Project Activities. The corresponding Part 2 of that Annexure incorporates:
- (i) PPP Co's commitments for meeting or exceeding; and
  - (ii) the extent of any Agreed Exceptions which vary, the minimum requirements contained in Part 1 of that Annexure.
- (c) Nothing contained in Part 2 of any Annexure shall operate to limit or exclude:
- (i) PPP Co's obligations under the State Project Documents; or
  - (ii) subject only to the extent of any Agreed Exceptions, PPP Co's obligations to meet or exceed the requirements contained in Part 1 of that Annexure or Part 1 of any other Annexure to the Performance Specification.
- (d) To the extent of any ambiguity, discrepancy or inconsistency between or within Part 1 of any Annexure, and/or Part 2 of any Annexure and/or of any other requirement of the State Project Documents (including any other requirement of the Performance Specification), then, (subject to the Agreed Exceptions, which will prevail) whichever of:
- (i) Part 1 of the Annexure, or part thereof;
  - (ii) Part 2 of the Annexure, or part thereof; and
  - (iii) the other requirement of the State Project Documents (including any other requirement of the Performance Specification),
- provides the greater, higher or more stringent requirement, standard, level of service or scope (as applicable) will prevail.
- (e) Subject to:
- (i) the Agreed Exceptions; or
  - (ii) any express statement in the Performance Specification (Part 1) to the contrary;
- PPP Co must ensure that the standard, quality (including whole of life performance) and maintainability of each Asset Item and Asset Sub Item provided in respect of the NB Works and/or the EWAG Works is no less than the standard, quality (including whole of life performance) and maintainability of the equivalent Asset Item or Asset Sub Item (as applicable) provide in respect of the AL Works.
- (f) Without limiting section 1.1(d) above:
- (i) the State does not accept any risk arising out of, or responsibility for, the Agreed Exceptions; and

- (ii) the inclusion of the Agreed Exceptions in the Performance Specification:
- A does not constitute any warranty, guarantee or representation by the State as to any of the Agreed Exceptions or their adequacy, completeness or fitness for purpose;
  - B will not in any way relieve PPP Co of any of its obligations under the State Project Documents (including to comply with the Performance Specification, except to the extent of any Agreed Exceptions) or any liability.
- (g) The Agreed Exceptions are set out in, and only in, Section 1 – Schedule of Agreed Exceptions in Annexure 1, Part 2.
- (h) The State does not warrant, guarantee or make any representation as to whether:
- (i) preparation of Design Documentation in accordance with the Performance Specification will ensure that PPP Co will be able to sufficiently discharge its obligations in respect of the D&C Activities or will be able to discharge its obligations under the State Project Documents; or
  - (ii) construction in accordance with the Performance Specification will ensure that PPP Co will be able to sufficiently discharge its obligations in respect of the D&C Activities or will be able to discharge its obligations under the State Project Documents; or
  - (iii) operation and maintenance in accordance with the Performance Specification will ensure that PPP Co will be able to sufficiently discharge its obligations in respect of the O&M Activities or will be able to discharge its obligations under the State Project Documents.
- (i) Subject only to section 1.1(d), compliance with a requirement (whether general or specific) in any State Project Document or part of a State Project Document, will not limit or in any way affect PPP Co's obligation to comply with any other requirement (whether general or specific) in any other State Project Document or part of a State Project Document. The State Project Documents (including the Performance Specification) must therefore be read as a whole to determine the totality of the requirements applying to any aspect of the Project Activities.
- (j) PPP Co bears the entire risk that compliance with the Performance Specification will not fulfil PPP Co's obligations under the State Project Documents. PPP Co must carry out any work, tasks and activities additional to that contemplated by the Performance Specification to ensure that it satisfies its obligations under the State Project Documents.
- (k) Reference to any work includes any additional work necessary for the satisfactory completion of that work and full compliance with the requirements of the State Project Documents, notwithstanding that the work may not be expressly mentioned in the Performance Specification.
- (l) PPP Co bears the entire risk, and will not be entitled to make any Claim against the State or its Associates and neither the State nor any of its Associates will have any liability (including by way of contribution) arising out of or in respect of or in connection with the matters referred to in this section 1.1.
- (m) Nothing contained in:
- (i) Part 2 of any Annexure; or
  - (ii) any document prepared under, arising out of or in connection with Part 2 of any Annexure,

is to be construed as imposing a risk, liability, obligation or responsibility on the State or its Associates or the Independent Verifier or its Associates which has not been expressly accepted, retained or undertaken:

- (iii) elsewhere under the State Project Documents; or
  - (iv) otherwise by written notice by the State to PPP Co stated to be issued under this section 1.1(m) and setting out details of the risk, liability, obligation or responsibility.
- (n) Any provision, statement or qualification that indicates or suggests that any drawing, diagram or picture forming part of the Performance Specification is a draft or is not complete, or any words to that effect, will have no effect, whether legal, interpretative or otherwise.
- (o) PPP Co acknowledges and agrees that:
- (i) the initial D&C Program attached to this Performance Specification at Attachment 1 of Part 2 of Annexure 8 is attached for convenience only and does not form part of the State Project Documents; and
  - (ii) other than to the extent expressly agreed by the State in writing pursuant to this clause, nothing in the Performance Specification affects, limits or reduces the role of the Independent Verifier or any of its rights, powers or functions under the State Project Documents.
- (p) Without limiting the requirements of the Documentation Schedule, PPP Co must submit any documents or proposals pursuant to the requirements of this Performance Specification:
- (i) within the time required by the relevant provision of the Performance Specification; and
  - (ii) with due allowance, and at such a rate, so as to enable:
    - A the State, the Independent Verifier and any other relevant Authority the opportunity to review, comment on and perform any other obligations in respect of, the document or proposal effectively and otherwise in accordance with the State Project Documents (including the Performance Specification) and any other relevant requirements; and
    - B any amendment and resubmission of the document or proposal by PPP Co.
- (q) Without limiting section 1.1(d), to the extent that Part 2 of any Annexure contains images or pictures (whether still, digital or otherwise) ("images"), the project Works must comply with the following elements of those images:
- (i) colours;
  - (ii) fixtures;
  - (iii) textures;
  - (iv) fittings;
  - (v) forms;
  - (vi) shapes and sizes;
  - (vii) visual integration with surrounding environment;
  - (viii) quality;

- (ix) features; and
  - (x) design intent.
- (r) Any reference in the Performance Specification to the entity "BrisConnections" is taken to mean "PPP Co" and is to be interpreted in accordance with clause 1.10 of the Project Deed.

## 1.2 TECHNICAL DOCUMENTS

- (a) Subject to clause 9 of the Project Deed or where the context otherwise provides, as a minimum, in performing the Project Activities, PPP Co must comply with the Technical Documents. The version of a Technical Document with which PPP Co must comply is:
- (i) for each QDMR and TransLink publication, that version which is current at the date of Financial Close; and
  - (ii) for each Technical Document other than a QDMR or TransLink publication, unless otherwise expressly stated in this Performance Specification, the version which is current at the time at which the relevant work is undertaken.
- (b) Subject to clause 9 of the Project Deed or where the context otherwise provides, the Project Works must as a minimum meet the standards of Queensland Transport (TransLink), Queensland Rail (QR), Queensland Department of Main Roads (QDMR), Brisbane City Council (Council), AUSTROADS publications, Australian Standards and PIARC publications. If relevant Australian Standards do not exist for the design of any element of the Project Works, PPP Co must use British Standards, or if these do not exist, alternate recognised international standards meeting D&C Best Practices or O&M Best Practices (as applicable).
- (c) The Technical Documents are as follows:
- (i) relevant TransLink publications relating to Busway Stations and Bus Stops (including those documents described in Attachment 1 to the Introduction to this Exhibit A Performance Specification);
  - (ii) relevant QR publications including QR Civil Engineering Technical Specifications;
  - (iii) relevant QDMR publications (including those documents described in Attachment 1 to the Introduction to this Exhibit A Performance Specification);
  - (iv) relevant Council publications;
  - (v) AUSTROADS publications;
  - (vi) Australian Standards;
  - (vii) PIARC publications;
  - (viii) British Standards;
  - (ix) other international standards; and
  - (x) other relevant technical standards, guidelines, technical notes and practice notes issued by recognised industry organisations.
- (d) The hierarchy of Technical Documents will be in the following order (subject to any express contrary intention in the State Project Documents):

- (i) in relation to the NB Project Activities for Busway Stations and Bus Stops only, TransLink publications (including those documents described in Attachment 1 to this Exhibit A Performance Specification);
  - (ii) in relation to Returned Works where the Facility Owner is or will be QR only, QR publications including QR Civil Engineering Technical Specifications;
  - (iii) where applicable in accordance with section 1.2(e) below, QDMR publications (including those documents described in Attachment 1 to this Exhibit A Performance Specification)
  - (iv) where applicable in accordance with section 1.2(e) below, Council publications where appropriate;
  - (v) AUSTRROADS publications;
  - (vi) Australian Standards;
  - (vii) PIARC publications;
  - (viii) British Standards;
  - (ix) other international standards; and
  - (x) other relevant technical standards, guidelines, technical notes and practice notes issued by recognised industry organisations.
- (e) In carrying out the Project Activities, the use of QDMR publications or Council publications shall be determined as follows:
- (i) Council publications must be used for Returned Works where the Facility Owner is or will be Council; and
  - (ii) QDMR publications must be used for all other Project Activities, except where otherwise specified in this Performance Specification (Part 1). Where Council publications would be required by this section 1.2(e), but no appropriate Council publication exists, then QDMR publications shall be used, followed by the hierarchy of Technical Documents specified in section 1.2(d) above.
- (f) QDMR publications may be used in lieu of Council publications for Returned Works where the Facility Owner is or will be Council, where approved by Council.
- (g) Without limiting any other obligations of PPP Co, in carrying out the BAC EWAG Works, PPP Co must comply with all standards, specifications, conditions, methods of working or other requirements of BAC in relation to the carrying out of those BAC EWAG Works or other obligations imposed by BAC in relation to the BAC EWAG Works.
- (h) Where a product is specified within the Performance Specification or a Technical Document, PPP Co can only use that product, or an equivalent as approved by the State.
- (i) Where a subcontractor/supplier is specified within the Performance Specification or a Technical Document, PPP Co can only use that subcontractor/supplier, or a subcontractor/supplier capable of providing the required services to an equivalent standard as approved by the State.
- (j) Where PPP Co is obliged to comply with a Technical Document and that Technical Document provides for a 'desirable' and an 'absolute' design limit, the desirable design limit is to apply unless other design limits are approved in writing by the State or the relevant Authority.

- (k) Where PPP Co is obliged to comply with a Technical Document and where an item, approach or option is referred to in that Technical Document and it is expressed in terms of:
- (i) 'should', 'may be', 'preference', 'recommended', 'suggested', 'desirable', 'preferable', 'general', 'typical', 'normal' or 'advisable', the item, approach or option referred to is deemed to be a requirement of PPP Co; or
  - (ii) 'normally not appropriate' or 'normally not required', the item, approach or option referred to is deemed to be a prohibition on the manner in which PPP Co performs the Project Activities,
- and must not be varied unless the variation is approved in writing by the State.
- (l) Where PPP Co is obliged to comply with the Technical Documents and if a requirement in a Technical Document:
- (i) imposes an obligation on a 'Superintendent' (including testing, sampling, assessment, acceptance, certification, verification, commissioning) or otherwise sets out a process for the approval of a 'Hold Point' or the witnessing of a 'Witness Point', relevant to the Project Activities, that obligation or process is to be detailed in PPP Co's Quality Management Plan;
  - (ii) refers to a contractual document not forming part of the State Project Documents (e.g. 'Contract') or concept or thing within such a contractual document (e.g. 'Site', 'Works', 'Date of Practical Completion', 'Quality System'), then interpretation of that reference for the purposes of the Project Activities is to be detailed in PPP Co's Quality Management Plan;
  - (iii) does not impose an obligation on any particular party, or imposes an obligation on a party not a party to the Project Deed, then it will be deemed to impose an obligation on PPP Co;
  - (iv) imposes an obligation on a 'Principal', then that obligation will be deemed to be imposed on PPP Co unless expressly stated otherwise in the State Project Documents;
  - (v) imposes or would impose an obligation on the State, then that obligation will be deemed to be imposed on PPP Co unless expressly stated otherwise in the State Project Documents; or
  - (vi) imposes an obligation on PPP Co to prepare, develop or otherwise act in relation to a plan relevant to the performance of the Project Activities, then:
    - A carriage of that obligation is to be detailed by PPP Co within its Project Plans; and
    - B in respect of each obligation of the type referred to in section 1.2(l)(vi)A above, PPP Co must demonstrate to the State how carriage of that obligation has been detailed by PPP Co within its Project Plans.
- (m) PPP Co must make its own determination of whether the requirements of the State Project Documents are satisfied by the Technical Documents and whether any additional measures are required. PPP Co must incorporate all additional measures necessary to comply with the State Project Documents;
- (n) Nothing contained in any Technical Document is to be construed as imposing a risk, liability, obligation or responsibility on the State or its Associates or the Independent Verifier or its Associates (including in respect of the payment of costs, reimbursement of any moneys or loss, grant of any indemnity or other

requirement to pay any sum of money to PPP Co or requirement to consider or grant to PPP Co any variation or modification under the terms of the State Project Documents) which has not been expressly accepted, retained or undertaken elsewhere under the State Project Documents.

- (o) The provision of a sample or prototype relating to any part of the Project Activities to the State, the Independent Verifier or any of their Associates, whether in accordance with the Technical Documents or otherwise will not limit the obligations of PPP Co under the State Project Documents. Neither the State nor the Independent Verifier owes a duty of care to PPP Co to review any such sample or prototype provided. No consideration or review of, comments on or failure to consider, review or comment on a sample or prototype provided will relieve PPP Co from, or alter or affect, its liabilities, obligations or responsibilities whether under the State Project Documents or otherwise according to Law or prejudice the State's rights against PPP Co whether under the State Project Documents or otherwise according to Law.

### 1.3 PPP Co's ACKNOWLEDGMENTS

Without limiting section 1.1 above or clause 24 of the Project Deed, PPP Co acknowledges and agrees that:

- (a) nothing in any Part 2 of any Annexure will (or is to be construed to):
- (i) impose or give rise to any risk, liability, obligation or responsibility on the State or its Associates which has not been expressly accepted, retained or undertaken elsewhere under the State Project Documents, or be used as an aid to interpretation of such risks, liabilities, obligations or responsibilities;
  - (ii) subject to any Agreed Exceptions, limit the liabilities, obligations or responsibilities undertaken, or risks accepted or retained, by PPP Co or its Associates elsewhere under the State Project Documents, or be used as an aid to interpretation of such risks, liabilities, obligations or responsibilities to the extent that to do so would limit or derogate from those risks, liabilities, obligations or responsibilities or otherwise alter them to the detriment of the State;
  - (iii) confer rights or remedies on PPP Co or its Associates which are additional to those provided elsewhere in the State Project Documents; or
  - (iv) demonstrate compliance by PPP Co or its Associates with the requirements of any State Project Documents;
- (b) inclusion in Part 2 of any Annexure of:
- (i) any historical information or words of limitation, interpretation, constraints (including geological constraints), assumptions (including design assumptions or criteria), delegations, methodologies, systems, procedures, timing, sequencing, programming or other processes or steps to be implemented by PPP Co or its Associates do not, by their inclusion in the Performance Specification, reflect compliance with the State Project Documents or in any way limit or otherwise affect the scope of PPP Co's obligations under the State Project Documents, and any change in any of those matters or the fact that PPP Co is not able to implement any of those matters (either fully or partially) will not relieve PPP Co of its obligations under the State Project Documents or entitle PPP Co to make any Claim against the State or its Associates except to the extent expressly contemplated by the State Project Documents; and



- (ii) any express or implied delegation of risks, liabilities, obligations or responsibilities by PPP Co to any Associate (including by reference to obligations to be performed under documents other than the State Project Documents) does not constitute approval of such delegation by the State or in any way limit or derogate from the scope of PPP Co's obligations under the State Project Documents, and references to risks, liabilities, obligations or responsibilities assumed or accepted or acknowledgments given by any Associate of PPP Co (whether under the State Project Documents or otherwise) will be construed as assumed or accepted or given (as applicable) by PPP Co under the Project Deed;
- (c) without limiting the requirement to comply with the other obligations of the State Project Documents, where Part 2 of any Annexure states that anything will or has been done, is required, should be done, is proposed to be done, is intended to be done, is needed to be done, that anything will meet or meets a particular requirement or has a particular characteristic, or a particular state of affairs exists, this will be deemed to be an obligation of PPP Co as at the date of signing the State Project Documents that PPP Co will do that thing, ensure that the thing (including where applicable, the final design of the Project Works (as constructed)) meets the relevant requirement or has the relevant characteristics or achieves the relevant state of affairs;
- (d) a statement in Part 2 of any Annexure that any matter is to be agreed, finalised, clarified, reviewed or otherwise addressed as part of detailed design or any other consultation or other process after the signing of the State Project Documents, will be subject to the requirements of the State Project Documents (including clause 13 of the Project Deed concerning review of Design Documentation and including Part 1 of each of the Annexures to the Performance Specification, subject to any Agreed Exceptions);
- (e) any reference in Part 2 of any Annexure to PPP Co's Initial Traffic Model is for the purposes only of identifying the minimum traffic loading, traffic volumes and traffic mixes to be referred to for the purposes of determining PPP Co's compliance with its design obligations under the State Project Documents. For the avoidance of doubt, PPP Co's Initial Traffic Model does not form part of the State Project Documents. No reference to PPP Co's Initial Traffic Model will limit or derogate from the scope of PPP Co's obligations under the State Project Documents or prejudice the rights of the State whether under the State Project Documents or otherwise according to Law;
- (f) the State, its Associates and relevant Authorities owe no duty of care to PPP Co to review any document or proposal submitted by PPP Co pursuant to the requirements of this Performance Specification for errors, omissions or compliance with the State Project Documents (including the Performance Specification);
- (g) no review, comment, agreement, approval, consultation, collaboration with or participation in any committee, meeting or review or approval process or any failure to do so by the Independent Verifier, the State, an Authority or BAC or any of their Associates or any reference in the Performance Specification to any requirement for any of the Independent Verifier, the State, an Authority or BAC or any of their Associates, to review, comment, consult, collaborate or approve or participate in any committee, meeting or review or approval process will in any way:
- (i) relieve PPP Co from, or alter or affect, its liabilities, obligations or responsibilities whether under the State Project Documents (including this Performance Specification) or otherwise according to Law; or

- (ii) prejudice the State's rights against PPP Co whether under the State Project Documents (including this Performance Specification) or otherwise according to Law,

except to the extent expressly stated otherwise in the State Project Documents;  
and

- (h) any reference in Part 2 of any Annexure to, or the existence of, any agreement, consultation or collaboration with any party in relation to the NSBT Project or the Section 1 of the Northern Busway or any proposal or failure to enter into any such agreement, consultation or collaboration will in any way:
  - (i) relieve PPP Co from, or alter or affect, its liabilities, obligations or responsibilities whether under the State Project Documents (including this Performance Specification) or otherwise according to Law; or
  - (ii) prejudice the State's rights against PPP Co whether under the State Project Documents (including this Performance Specification) or otherwise according to Law,
- (i) no review of, comments upon, or notice in respect of, or any failure to review, comment upon or give notice in respect of, any document or proposal submitted by PPP Co pursuant to the requirements of this Performance Specification or any other direction, act or omission of the State, including its Associates or any relevant Authority or reviewer, in respect of any document or proposal submitted pursuant to the requirements of the Performance Specification will in any way:
  - (i) relieve PPP Co from, or alter or affect, its liabilities, obligations or responsibilities whether under the State Project Documents (including this Performance Specification) or otherwise according to Law; or
  - (ii) prejudice the State's rights against PPP Co whether under the State Project Documents (including this Performance Specification) or otherwise according to Law,

except to the extent expressly stated otherwise in the State Project Documents.

#### 1.4 DEFINITIONS

- (a) Unless the context otherwise requires, terms which have a defined meaning in the State Project Documents have the same meaning in this Performance Specification.
- (b) Phrases in the Performance Specification mean as follows:
  - "Agreed Exceptions"** means those exceptions to the Performance Specifications set out in, and only in, Section 1 – Schedule of Agreed Exceptions in Annexure 1 Part 2.
  - "Architectural Panels"** has the same meaning as set out in section 7.7 of Annexure 1 Part 1 to Exhibit A.
  - "ARI"** means the Average Recurrence Interval, as defined in the Australian Rainfall and Runoff, Volumes 1 and 2, I.E. Aust, Canberra.
  - "Asset" or "Assets"** means all components of the Project Works including all Asset Items and Asset Sub Items.
  - "Asset Elements"** are the broader categorisation of the Asset Types, such as, but not limited to, pavement, bridges, drainage, signs, linemarking, ventilation systems, landscaped areas and noise walls.

**"Asset Items"** are single occurrences of any Asset Type, such as, but not limited to, a flexible pavement section, a concrete bridge span, a pump, an axial fan, a warning sign and an artwork panel.

**"Asset Sub Items"** are components of Asset Items which have a Design Life or maintenance requirements which vary from that otherwise applicable for the Asset Item, of which it forms a part such as, but not limited to, fan bearings, fan belt and fan shaft.

**"Asset Types"** are the distinct class of Asset, such as, but not limited to, flexible pavements, rigid pavements, concrete bridges, steel bridges, warning signs advisory signs and directional signs.

**"Australia TradeCoast"** is the strategic alliance between the Port of Brisbane Corporation, Brisbane Airport Corporation, the Queensland Government and Brisbane Marketing – Invest Brisbane to promote the region as the major trade and industry hub on Australia's east coast.

**"AUSTROADS"** means the Association of State, Territory and Federal Road and Traffic Authorities.

**"BMTMC Service Provider"** has the same meaning as set out in section 1.1(f) of Annexure 12 Part 1 to Exhibit A.

**"Building Code of Australia"** or **"BCA"**, means the Building Code of Australia produced and maintained by the Australian Building Codes Board on behalf of the Commonwealth, State and Territory Governments.

**"Bus Lane"** has the same meaning as set out in section 1.6 of Annexure 1 Part 1 to Exhibit A.

**"Bus-only Lane"** has the same meaning as set out in section 1.6 of Annexure 1 Part 1 to Exhibit A.

**"Busway Station"** has the same meaning as set out in section 1.6 of Annexure 1 Part 1 to Exhibit A.

**"Bus Stop"** has the same meaning as set out in section 1.6 of Annexure 1 Part 1 to Exhibit A.

**"City"** refers to the City of Brisbane.

**"Connection Ramps"** has the same meaning as set out in section 1.6 of Annexure 1 Part 1 to Exhibit A.

**"Connection Tunnels"** has the same meaning as set out in section 1.6 of Annexure 1 Part 1 to Exhibit A.

**"Construction Traffic Management Plan"** or **"CTMP"** is a plan prepared for the management of traffic during construction for individual activities that have an impact upon users of roads, Shared Use Paths, railway lines and public transport services.

**"Construction Work Site"** has the same meaning as set out in section 3.1 of Annexure 2 Part 1 to Exhibit A.

**"Design Life"** has the same meaning as set out in section 3.3.1 of Annexure 1 Part 1 to Exhibit A.

**"Diverge Area"** has the same meaning as set out in section 1.6 of Annexure 1 to Exhibit A.

**"Drained"** shall mean that the underground structure permanent works is designed such that any groundwater pressure that would act on the underground

structure is relieved, and the ingress of any groundwater into the underground structure's drainage system is provided for throughout the Design Life of the structure.

**"Emergency Services agencies"** means the Queensland Fire and Rescue Service, the Queensland Ambulance Service, the Counter Disaster and Rescue Services and any other State emergency service that may be required to attend to an emergency on or near the Project Works.

**"Entry-Ramp"** has the same meaning as set out in section 1.6 of Annexure 1 Part 1 to Exhibit A.

**"East-West Arterial Overbridge"** has the same meaning as set out in section 2.3.3(a)(i) of this Exhibit A.

**"Exit-Ramp"** has the same meaning as set out in section 1.6 of Annexure 1 Part 1 to Exhibit A.

**"Fitness to Operate Drills"** has the same meaning as set out in section 1.3(b) of Annexure 4 Part 1 to Exhibit A.

**"Future EWAG Traffic Connections"** has the same meaning as set out in section 3.8.4(a) of Annexure 1 Part 1 to Exhibit A.

**"Incident"** means

In respect of each of the Tollroad, the Busway, EWAG and the Construction Site, any event which:

- (a) prevents the Tollroad, the Busway, EWAG or the Construction Site or any part of the Tollroad, the Busway, EWAG or the Construction Site from being open to the public and construction site personnel as applicable, for the safe, continuous and efficient passage of vehicles; or
- (b) otherwise requires an urgent response to:
  - (i) protect or repair the Tollroad, the Busway, EWAG or the Construction Site, other property, or any person;
  - (ii) provide access to Emergency Services agencies, QPS or traffic control; or
  - (iii) prevent any occurrence which may cause damage to the Tollroad, the Busway, EWAG or the Construction Site or compromise the safety of any person or property.

**"Junction Nose"** has the same meaning as set out in section 1.6 of Annexure 1 Part 1 to Exhibit A.

**"Long Underpass"** means a covered length of road greater than 90m in length.

**"Mainline Tunnels"** has the same meaning as set out in section 1.6 of Annexure 1 Part 1 to Exhibit A.

**"Mainline Busway"** has the same meaning as set out in section 1.6 of Annexure 1 Part 1 to Exhibit A.

**"Merge Area"** has the same meaning as set out in section 1.6 of Annexure 1 to Exhibit A.

**"Residual Design Life"** has the same meaning as set out in section 3.3.3 of Annexure 1 Part 1 to Exhibit A.

“**Shared Use Path**” means a path designed to be used by bicycles and pedestrians.

“**Single Point of Failure**” has the same meaning as set out in section 3.6.1(d) of Annexure 1 Part 1 to Exhibit A.

“**System Availability**” has the same meaning as set out in section 3.8.1(a) of Annexure 1 Part 1 to Exhibit A.

“**Technical Documents**” means the documents set out in section 1.2(c) of this Exhibit A.

“**TransLink**” is the agency of Queensland Transport responsible for coordinating public transport in SEQ.

“**Undrained**” shall mean that the underground structure permanent works is designed as completely watertight, such that there is no ingress of groundwater into the permanent works or any effect on the groundwater table in the long term.

## 1.5 ABBREVIATIONS

Abbreviations contained in the Performance Specification mean as follows:

Abbreviation	Meaning
AADT	Average Annual Daily Traffic
ABCB	Australian Building Codes Board
ACA	Australian Communications Authority
ACMA	Australian Communications and Media Authority
AHD	Australian Height Datum
AID	Automatic incident detection
AL	Airport Link
AM	Amplitude Modulation (broadcast radio signal)
AMS	Assets Management System
ARI	Average recurrence interval (refer section 1.4)
ARR	Australian Rainfall and Runoff (IE Aust)
ASS	Acid Sulfate Soils
ATC	Australia TradeCoast
AVI	Automatic Vehicle Identification
AVL	Automatic Vehicle Location
BAC	Brisbane Airport Corporation
BBA	British Board of Agrément
BCA	Building Code of Australia (refer section 1.4)
BLISS	Brisbane’s Linked Intersection Signal System
BMTMC	Brisbane Metropolitan Transport Management Centre
BOC	Busway Operations Centre (located within the BMTMC)
BPMCS	Busway Plant Monitoring and Control Systems
BTMCS	Busway Traffic Monitoring and Control System
CBD	Central Business District (City of Brisbane)
CCMP	Community and Consultation Management Plan
CCTV	Closed circuit television
CDIMP	Concept Design Impact Management Plan
CDMA	Code Division Multiple Access

Abbreviation	Meaning
CFD	Computational Fluid Dynamics
CMS	Changeable message signs
CO	Carbon Monoxide
CO <sub>2</sub>	Carbon Dioxide
CNG	Compressed Natural Gas
CPTED	Crime prevention through environmental design
CTDS	Comprehensive Tunnel Danger Study
CTMP	Construction Traffic Management Plan (refer section 1.4)
CTSB	Cement Treated Sub-Base
CRCP	Continuous-reinforced concrete pavement
CWS	Construction Work Site (refer section 1.4)
DDA	Disability Discrimination Act 1992
DSQ	Disability Services Queensland
DSRC	Dedicated short-range communication
DWS	Deck Wearing Surface
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency (Queensland)
ESA	Equivalent number of Standard Axles
FEB	Fire Engineering Brief
FHWA	Federal Highway Administration (U.S. Dept of Transportation)
FIP	Fire Indicator Panel
FM	Frequency Modulation (broadcast radio signal)
FSEB	Fire Safety Engineering Brief
FWD	Falling Weight Deflectometer
GMP	General Mechanistic Procedure
GSM	Global System Mobile
HGV	Heavy goods vehicle
HMI	Human-machine interface
HV	High voltage
HWD	Heavy Weight Deflectometer
ICB	Inner City Bypass
IEEE	Institute of Electrical and Electronics Engineers
IFEG	International Fire Engineering Guidelines
IRTP	Integrated Regional Transport Plan
ISO	International Organisation for Standardisation
ITP	Inspection and Test Plan
ITS	Intelligent transport system
IV	Independent Verifier
JRCP	Joint Reinforced Concrete Pavement
LCD	Liquid Crystal Display
LCS	Lane control signs
LCV	Light commercial vehicle
LED	Light Emitting Diode
LHS	Left hand side
LRT	Light Rail Transit

*Handwritten signature*

Abbreviation	Meaning
LV	Low voltage
MCMP	Marketing and Communication Management Plan
MEN	Multiple-earthed Neutral
M/E or M&E	Mechanical and Electrical
METS	Motorist emergency telephone system
MRS	QDMR Main Road Specifications
MTBF	Mean time between failures
MTMP	Maintenance Traffic Management Plan
MTTR	Mean time to repair
MUTCD	Manual of Uniform Traffic Control Devices (Queensland)
NALL	Natural Area Local Law
NCTP	National Counter-Terrorism Plan (Australia)
NCHRP	National Cooperative Highway Research Program
NEPM	National Environment Protection Measures (Australia)
NO <sub>2</sub>	Nitrogen Dioxide
NSBT	North-South Bypass Tunnel
O&M	Operations and Maintenance
OMCMP	Operation and Maintenance Communication Management Plan
PABX	Private Automatic Branch Exchange
PAVDEF	Pavement Deflection
PIARC	Permanent International Association of Road Congresses
PCU	Passenger car unit
PLC	Programmable Logic Controller
PMCS	Plant monitoring and control system
PPV	Peak particle velocity
PSC	Pretensioned Spun Concrete
PSTN	Public Switched Telephone Network
PSTS	QDMR Project Specific Technical Standards
PTIM	Public Transport Infrastructure Manual
PTZ	Pan, Tilt and Zoom
PUP	Public Utility Plant
QDMR	Queensland Department of Main Roads
QFE	Qualified Fire Engineer
QFRS	Queensland Fire and Rescue Service
QML	Queensland Motorway Limited
QPS	Queensland Police Service
QR	Queensland Rail
QT	Queensland Transport
RAPID	Real Time Advanced Priority and Information Delivery
RBH	Royal Brisbane Hospital
RBWH	Royal Brisbane and Women's Hospital
RCH	Royal Children's Hospital
RF	Radio Frequency
RHS	Right hand side
RLM	QDMR Road Landscape Manual

Abbreviation	Meaning
RNA	Royal National Agriculture and Industrial Association of Qld
RPDM	Road Planning and Design Manual
RSA	Road safety audit
RSS	Reinforced Soil Structure
RT	Reaction Time
RTA	Roads and Traffic Authority (NSW)
RTU	Remote terminal unit
SAMI	Strain Alleviating Membrane Interlayer
SCADA	Supervisory control and data acquisition
SEQ	South East Queensland
SEQIPP	South East Queensland Infrastructure Plan and Program
SEQRP	South East Queensland Regional Plan
SI	Systems integration
SID	Safety in design
SLS	Speed limit signs
SMA	Stone Mastic Asphalt
SSA	Safety and security audit
SSD	Stopping sight distance
STREAMS	Synergised Transport Resources Ensuring Advanced Management Systems
TBM	Tunnel boring machine
TCC	Tollroad Control Centre
TCR	Tunnel control room
TCRO	Tunnel control room operator
TMCLG	Traffic Management Construction Liaison Group
TTMCS	Tollroad traffic monitoring and control system
TMCS	Traffic monitoring and control system
TMOLG	Traffic Management Operations Liaison Group
TOD	Transit Oriented Development
TPMCS	Tollroad Plant Monitoring and Control Systems
TPZ	Tilt-Pan-Zoom
TTMCS	Tollroad Traffic Monitoring and Control System
TTMS	Tollroad Traffic Management Strategy
UHF	Ultra High Frequency
UPS	Uninterruptible power supply
VID	Vehicle Identification
VLAN	Virtual Local Area Network
VMS	Variable message signs
VOW	Vehicle over-height detection and warning
VPO	Vegetation Protection Order
VSO	Ventilation station and outlet
VSSS	Variable speed signing system
WHS	Workplace Health & Safety

## 1.6 HEADINGS

Notwithstanding clause 1.2(a) of the Project Deed and except to the extent the context otherwise provides, where a heading in the Performance Specification refers to:

- (a) AL, Airport Link or AL Works, then the provisions of the section to which the heading relates apply to those Project Activities relating to the AL Works and the AL Project Activities;
- (b) Busway, Northern Busway, or NB Works, then the provisions of the section to which the heading relates apply to those Project Activities relating to the NB Works and the NB Project Activities;
- (c) EWAG or EWAG Works, then the provisions of the section to which the heading relates apply to those Project Activities relating to the EWAG Works and the EWAG Project Activities; and
- (d) neither AL, Airport Link, AL Works, Busway, Northern Busway, NB Works, EWAG, or EWAG Works, then the provisions of the section to which the heading relates applies to all of the Project Activities.

## 2 PROJECT DESCRIPTION

### 2.1 BACKGROUND

#### 2.1.1 Airport Link

- (a) The policy basis for transport planning is largely contained within *The Transport Plan for Brisbane 2002-2016*. This plan developed a set of coordinated actions and strategies aimed to achieve a range of transport outcomes for Brisbane to 2016. The Airport Link project (AL Project) is identified as one of the indicated road investment strategy projects.
- (b) The State's *South East Queensland Regional Plan 2005-2026* (SEQRP) and its supporting *South East Queensland Infrastructure Plan and Program* (SEQIPP) establishes a range of desired outcomes, principles and policies to guide the development of SEQ through to 2026. The SEQRP outlines a program of transport infrastructure investment which includes the Airport Link project.
- (c) The *TransApex Strategic Context Report* was released in February 2005, and the *TransApex Prefeasibility Report* was released in March 2005. The Airport Link project was considered as part of this report.
- (d) The *Airport Link Environmental Impact Statement* was released in October 2006. The *Airport Link Environmental Impact Statement - Supplementary Report* was released in April 2007.
- (e) Council and the State have recognised the need for a balanced and integrated response to the traffic and transport issues presently constraining the City's economic, social and physical development. Council and the State have also recognised the need for this response to address future conditions in the City in anticipation of strong and sustained regional population growth.
- (f) The Airport Link project is strategically identified as a solution that provides;
  - (i) A continuation of the North-South Bypass Tunnel (NSBT) north to Kedron and an east-west connection between Kedron and Toombul.
  - (ii) A key connection between other elements of TransApex, such as the NSBT and the Northern Link, Brisbane Airport and other key travel generators in the Australia TradeCoast region.
  - (iii) A degree of secondary connectivity for radial movements providing for City connections.
  - (iv) An opportunity, by diverting cross-city surface traffic to the Airport Link, to free up service road space and thus provide for public transport initiatives such as the Northern Busway, Transit Oriented Developments (TODs) and urban renewal opportunities.

#### 2.1.2 Northern Busway

- (a) The *Brisbane Busway Plan* was initially conceived by Council in 1995 to improve the public transport connectivity across the City and has been developing over the past 11 years. The strategy developed consisted of a network of five busway corridors, including the Northern Busway and also servicing people between rail lines.
- (b) The SEQ *Integrated Regional Transport Plan 1997* (IRTP) broadened the *Brisbane Busway Plan* into the *SEQ Regional Busway Network*. The

- development of the busway network was identified as a significant project in the IRTP.
- (c) The busway strategy is also embraced by the *South East Queensland Regional Plan 2005-2026 (SEQRP)*.
  - (d) Busways have become the backbone of Council's public transport strategy as articulated in the *Transport Plan for Brisbane 2002-2016*.
  - (e) The Northern Busway was identified early in the development of the busway strategy and is an important project in regard to regional land use and transport planning for greater Brisbane.
  - (f) The draft *Concept Design Impact Management Plan for the Northern Busway (Royal Children's Hospital to Kedron)* was released in October 2006. The *Concept Design Impact Management Plan for the Northern Busway (Royal Children's Hospital to Kedron)* was released in May 2007.

### 2.1.3 EWAG

- (a) QDMR has undertaken preliminary planning work on intersection upgrade options at the East-West Arterial Road and Gateway Motorway.
- (b) As part of its preliminary planning, QDMR developed a number of options that were assessed at a strategic level. The outcome of this strategic options review was the identification of the two options detailed in the Notice to Proponents – *EWAG – Preliminary Planning Options*.

## 2.2 PROJECT OBJECTIVES

The objectives of the Projects are outlined below:

### 2.2.1 AL Project

- (a) Transport Network
  - (i) To improve connectivity within Brisbane's northern strategic road network to meet both orbital (CBD bypass) and radial (CBD access) transport needs.
  - (ii) To increase the capacity and level of service of Brisbane's road and transport network through a toll road facility between Bowen Hills, Kedron and Toombul in a safe and efficient manner.

Specifically to:

- (i) Reduce through-traffic on local/suburban roads.
- (ii) Improve accessibility between the CBD, Brisbane Airport and the Australia TradeCoast precinct.
- (iii) Improve north-south accessibility between the CBD and Gympie Road, and east-west accessibility between East-West Arterial and Stafford Road.
- (iv) Provide a high-quality Customer Service facility with an Interoperable Tolling System.

- (b) Environmental Sustainability

- (i) Protect, and where possible enhance, the environment throughout the design, construction and operation of the AL Project.

Specifically to:

- (i) Design, construct, operate and maintain the AL Project in an environmentally sensitive and sustainable manner including, with respect to natural ecosystems, biological diversity, air quality and existing water resources, including flood management.

- (ii) Comply with the Planning Approval.
- (c) Social Amenity
  - (i) Enhance the social amenity and desirability of the AL Project corridor.  
Specifically to:
    - (i) Design, construct, operate and maintain the AL Project in a socially sensitive manner with respect to construction impacts, traffic management, road safety, noise, visual impact, landscape character, cultural heritage, urban design and open space.
    - (ii) Facilitate improved land use opportunities.
    - (iii) Enhance connectivity to and utility of community infrastructure, such as schools, churches, shopping centres, pedestrian and cycle networks, parkland and open space.
- (d) Value for Money
  - (i) Achieve value for money in the design, construction, finance, maintenance and operation of the AL Project.  
Specifically to:
    - (i) Provide an affordable value for money solution for the State.
    - (ii) Provide value for money for Tollroad users through an acceptable tolling regime.
- (e) Timeliness
  - (i) Deliver the AL Project in a timely and coordinated fashion by no later than December 2012.

#### 2.2.2 NB Project

- (a) Transport Network
  - (i) To increase the capacity and patronage of Brisbane's public transport network through the delivery of the NB Project.  
Specifically to:
    - (i) Provide a two lane, bi-directional bus roadway between Section 1 of the Northern Busway, through to a realigned intersection of Federation Street and Lutwyche Road.
    - (ii) Provide a two-way, two-lane, bus in-tunnel roadway between Lutwyche and Kedron, and sections of on-street bus lanes and bus priority measures through to Windsor.
    - (iii) Provide high quality Busway Stations in Lutwyche and Kedron, and Bus Stops designed to be safe, efficient, easy to use, and highly accessible by all patrons.
    - (iv) Reduce bus travel times and improve travel-time reliability and safety between Windsor and Kedron.
    - (v) Maximise bus access onto and off the Busway.
    - (vi) Integrate the Busway with the existing and future bus network.
- (b) Environmental Sustainability
  - (i) Protect, and where possible enhance, the environment through the design, construction and operation of the NB Project.

Specifically to:

- (i) Design and construct the NB Project in an environmentally sensitive and sustainable manner with respect to natural ecosystems, biological diversity and existing water resources including flood management.
- (ii) Comply with findings and recommendations of the Concept Design and Impact Management Plan (CDIMP) for the NB Project.

(c) Social Amenity

- (i) Enhance the social amenity and desirability of the NB Project corridor.

Specifically to:

- (i) Deliver an attractive and viable public transport choice along the corridor and connection to the public transport system across the City.
- (ii) Design and construct the NB Project in a socially sensitive manner including, with respect to construction impacts, traffic management, road safety, noise visual impact, landscape character, cultural heritage, urban design and open space.
- (iii) Support future transport-oriented development around the Busway Stations.
- (iv) Integrate the NB Project with adjoining land uses, buildings and community facilities.

(d) Value for Money

- (i) Achieve value for money in the delivery of the NB Project.

Specifically to:

- (i) Deliver the design, construction and commissioning of the NB Project through a solution that is affordable to the State.
- (ii) Optimise maintenance and operation costs through a whole-of-life approach.

(e) Timeline

- (i) Deliver the NB Project in a timely and coordinated fashion with the AL Project.

2.2.3 EWAG Project

- (a) Improve levels of service, reduce traffic delays and improve safety on the East-West Arterial Road and its connections with the State and local road network;
- (b) Ensure no adverse impact on the level of service of Gateway Motorway and its connections to the East-West Arterial and Nudgee Road;
- (c) Provide for improved access to Australia TradeCoast precincts whilst maintaining local road network connectivity;
- (d) Provide value for money for the State;
- (e) Minimise environmental, economic (including land and business) and social impacts; and
- (f) Enable integrated planning and development of the future road network.

## 2.3 PROJECT SCOPE

### 2.3.1 AL Project

- (a) The AL Works must include a free flowing high capacity Tollroad with at least the following connections:
- (i) Southern connection – connections in Bowen Hills and Windsor to the NSBT, Inner City Bypass (ICB) westbound, Bowen Bridge Road to NSBT/ICB west, O'Connell Terrace and Campbell Street;
  - (ii) North-western connection – surface connections at Kedron to Gympie Road and Stafford Road and an east-west connection from Stafford / Gympie Roads to the East-West Arterial / Sandgate Road; and
  - (iii) North-eastern connection – surface connection at Toombul to Sandgate Road and East-West Arterial.
- (b) The Tollroad must include the following principal elements:
- (i) twin unidirectional road tunnels with sufficient lane capacity and connectivity to the existing surface road network to meet the State's objectives for the AL Project;
  - (ii) a Tolling System which must be fully electronic and Interoperable;
  - (iii) enhanced urban community outcomes at adjacent inner City precincts, including shared use facilities;
  - (iv) traffic management facilities including VMS and fixed signage, roadway lighting, CCTV and radio and mobile telephone rebroadcast capability;
  - (v) environmental management facilities, including environmental monitoring stations, noise amelioration, vibration control, drainage and water treatment facilities;
  - (vi) mechanical and electrical systems including power supplies, non-recirculating tunnel ventilation, communication and security systems;
  - (vii) tunnel ventilation outlets including provision of sufficient space for installation of possible future air filtration systems;
  - (viii) Incident management systems including fire and life safety facilities, smoke control systems and emergency egress provisions;
  - (ix) a Tollroad Control Centre at Windsor, east of Lutwyche Road, including building works and associated facilities and fit-out for performance of O&M Activities, direct electronic data links to the Brisbane Metropolitan Transport Management Centre (BMTMC), and provision of facilities for QPS and Emergency Services agencies;
  - (x) plant monitoring and control systems; and
  - (xi) landscaping and urban design treatments, security and reinstatement works.
- (c) PPP Co must also undertake:
- (i) the financing, design, construction and commissioning of the AL Works;
  - (ii) the operation, maintenance and repair of the Tollroad;
  - (iii) the maintenance and repair of the Maintained Non-Tollroad Works;
  - (iv) the levying of Tolls and imposition of User Charges; and

- (v) the Handover of the Tollroad to the State at the end of the Concession Period,

in accordance with the requirements of the State Project Documents.

### 2.3.2 NB Project

- (a) The NB Works must include the following principal elements:
    - (i) a Busway which consists of a two-lane bidirectional roadway facility, including accesses, that is independent of the local or State controlled road network and is provided for the sole operation of public transport buses (and authorised maintenance vehicles), and QPS and Emergency Services agencies vehicles when using the Busway in emergencies;
    - (ii) new Bus Stops and replacement of existing Bus Stops;
    - (iii) new fully functioning Busway Stations;
    - (iv) bus access points from the local road network to/from the Busway;
    - (v) turn-around facilities for the Busway;
    - (vi) enhanced urban community outcomes including shared use facilities, particularly with regard to Busway Station and Bus Stop access;
    - (vii) traffic management facilities including traffic signals, bus priority signals, fixed signage, roadway lighting, CCTV and radio and mobile telephone rebroadcast capability;
    - (viii) environmental management facilities, including environmental monitoring stations, noise amelioration, vibration control, drainage and water treatment facilities
    - (ix) mechanical and electrical systems including power supplies, non-recirculating tunnel ventilation, communication and security systems;
    - (x) Incident management systems including fire protection facilities, smoke control systems and emergency egress provisions;
    - (xi) an Intelligent Transport System (ITS) which is linked via direct electronic data links to the Busway Operations Centre (BOC) within the Brisbane Metropolitan Transport Management Centre (BMTMC);
    - (xii) plant monitoring and control systems; and
    - (xiii) landscaping and urban design treatments, security and reinstatement works.
  - (b) PPP Co must also undertake:
    - (i) the design, construction and commissioning of the NB Works; and
    - (ii) the handover of the Busway to the State;
- in accordance with the requirements of the State Project Documents.

### 2.3.3 EWAG Project

- (a) The EWAG Works must include the following principal elements:
  - (i) a four lane (two lanes each way) bridge between East-West Arterial Road and Airport Drive grade separated over Nudgee Road and Gateway Motorway (East-West Arterial Overbridge);
  - (ii) provision for the efficient future design and construction of traffic ramps to and from the East-West Arterial Overbridge to the adjoining road network:

- (iii) sufficient lane capacity and connectivity to the existing road network to meet the State's objectives for EWAG;
  - (iv) traffic management facilities including VMS and fixed signage, roadway lighting and CCTV;
  - (v) environmental management facilities including noise amelioration and drainage facilities; and
  - (vi) landscaping and urban design treatments, security and reinstatement works.
- (b) PPP Co must also undertake:
- (i) the design, construction and commissioning of the EWAG Works; and
  - (ii) the handover of the EWAG Works to the State;
- in accordance with the requirements of the State Project Documents.

### 3 GENERAL PROJECT REQUIREMENTS

In performing the Project Activities, PPP Co must comply with the following Annexures forming part of the Performance Specification:

Annexure	Description
<b>Annexure 1</b>	<b>Design Annexure</b>
Part 1	Design Requirements
Part 1 – Attachment 1	QDMR Information
Part 1 – Attachment 2	Modifications to AS5100
Part 1 – Attachment 3	Matters for Resolution to Bridge Design
Part 1 – Attachment 4	Road Geometric Design Definitions
Part 1 – Attachment 5	AL Typical Tunnel Carriageway Envelope
Part 1 – Attachment 6	NB Works Drawings
Part 1 – Attachment 7	Busway Stations
Part 1 – Attachment 8	Light Rail Drawings
Part 2	Design – PPP Co Response
<b>Annexure 2</b>	<b>Construction Annexure</b>
Part 1	Construction Requirements
Part 1 – Attachment 1	Conditions Precedent
Part 2	Construction – PPP Co Response
<b>Annexure 3</b>	<b>AL Customer Service Annexure</b>
Part 1	AL Customer Service Requirements
<b>Annexure 4</b>	<b>AL Operations and Maintenance Annexure</b>
Part 1	AL Operations and Maintenance Requirements
Part 2	Operations and Maintenance – PPP Co Response
<b>Annexure 5</b>	<b>Public Utility Plant Annexure</b>
Part 1	Public Utility Plant Requirements
Part 2	Public Utility Plant – PPP Co Response
<b>Annexure 6</b>	<b>Community and Consultation Annexure</b>
Part 1	Community and Consultation Requirements
<b>Annexure 7</b>	<b>Investigations, Survey and Condition Monitoring Annexure</b>
Part 1	Investigations, Survey and Condition Monitoring Requirements
<b>Annexure 8</b>	<b>D&amp;C Program Annexure</b>
Part 1	D&C Program Requirements
Part 2	D&C Program – PPP Co Response
Part 2 – Attachment 1	Initial D&C Program
<b>Annexure 9</b>	<b>Contract Administration Annexure</b>
Part 1	Contract Administration Requirements
Part 1 – Attachment 1	Project Plans Requirements
Part 1 – Attachment 2	Documentation Schedule
Part 2	Contract Administration – PPP Co Response
Part 2 – Attachment 1	Initial Marketing and Communications Management Plan and Initial Community and Consultation Management Plan
Part 2 – Attachment 2	Initial AL Project and NB Project Design and Construction Environmental Management Plan
Part 2 – Attachment 3	Not Used
Part 2 – Attachment 4	Initial NB Whole of Life Plan
Part 2 – Attachment 5	Initial AL Works Fire and Life Safety Design Plan and Initial NB Works Fire and Life Safety Design Plan
Part 2 – Attachment 6	Initial Quality Management Plan
Part 2 – Attachment 7	Initial NB Works Training Management Plan

Annexure	Description
Part 2 – Attachment 8	Not Used
<b>Annexure 10</b>	<b>Quality Management Annexure</b>
Part 1	Quality Management Requirements
<b>Annexure 11</b>	<b>Environmental Management Annexure</b>
Part 1	Environmental Management Requirements
<b>Annexure 12</b>	<b>AL Traffic Management and Road Network Interfacing Requirements During the O&amp;M Phase Annexure</b>
Part 1	AL Traffic Management and Road Network Interfacing Requirements During the O&M Phase
Part 1 – Attachment 1	Contents of Incident Response Plan
Part 1 – Attachment 2	Traffic Information Requirements
Part 2	AL Traffic Management and Road Network Interfacing Requirements During the O&M Phase – PPP Co Response
<b>Annexure 13</b>	<b>Safety Management Annexure</b>
Part 1	Safety Management Requirements
<b>Annexure 14</b>	<b>Critical Infrastructure Protection Annexure</b>
Part 1	Critical Infrastructure Protection Requirements
<b>Annexure 15</b>	<b>Queensland Rail Annexure</b>
Part 1	Queensland Rail Requirements
<b>Annexure 16</b>	<b>Busway Condition Standards Annexure</b>
Part 1	Busway Condition Standards Requirements
<b>Annexure 17</b>	<b>EWAG Condition Standards Annexure</b>
Part 1	EWAG Condition Standards Requirements

## PERFORMANCE SPECIFICATION – ATTACHMENT 1 LIST OF QDMR AND TRANSLINK DOCUMENTS

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1	QDMR TECHNICAL DOCUMENTS.....	2
2	TRANSLINK TECHNICAL DOCUMENTS.....	6



## 1 QDMR TECHNICAL DOCUMENTS

This list of QDMR documents, which are to be complied with as Technical Documents for the purposes of the Project Activities, is indicative only and is not exhaustive and does not limit PPP Co's obligations under the State Project Documents. The State reserves the right, subject to section 1.2(e)(ii) of Exhibit A Performance Specification, to amend this list in its absolute discretion.

Reference / Document Number	Title
<b>Project Specific Technical Standards (PSTS) and PSTS Annexures</b>	
PSTS01 Aug 06	Introduction to Technical Standards
PSTS02 Aug 06	Provision for Traffic
PSTS03 Aug 06	Drainage, Retaining Structures and Protective Treatments
PSTS04 Aug 06	General Earthworks
PSTS04.1	Annexure PSTS04.1
PSTS05 Aug 06	Unbound Pavements
PSTS06 Aug 06	Reinforced Soil Walls
PSTS06.1	Annexure PSTS06.1
PSTS07A Aug 06	Insitu Stabilised Subgrades Using Quicklime or Hydrated Lime
PSTS07A.1	Annexure PSTS07A.1
PSTS07B Aug 06	Insitu Stabilised Pavements Using Cement or Cementitious Blends
PSTS07B.1	Annexure PSTS07B.1
PSTS07C May 07	Insitu Stabilised Pavements using Foamed Bitumen
PSTS07C.1	Annexure PSTS07C.1
PSTS08 Aug 06	Plant-Mixed Stabilised Pavements
PSTS11 Aug 06	Sprayed Bituminous Surfacing (Excluding Emulsions)
PSTS14 Aug 06	Road Furniture
PSTS15 Aug 06	Noise Barriers
PSTS16 Aug 06	Landscape and Revegetation Works
PSTS17 May 07	Bitumen
PSTS18 May 07	Polymer Modified Binder
PSTS19 May 07	Bitumen Cutter Oil and Flux Oil
PSTS20 May 07	Cutback Bitumen
PSTS21 May 07	Bituminous Emulsion
PSTS22 Jul 07	Supply of Cover Aggregate
PSTS23 Aug 06	Supply and Delivery of Quicklime and Hydrated Lime for Road Stabilisation
PSTS24 May 07	Manufacture of Precast Concrete Culverts
PSTS25 May 07	Manufacture of Precast Concrete Pipes
PSTS26 May 07	Manufacture of Fibre Reinforced Concrete Drainage Pipes
PSTS27 Aug 06	Geotextiles (Separation and Filtration)
PSTS30 Aug 06	Dense Graded Asphalt Pavements
PSTS31 Aug 06	Heavy Duty Asphalt
PSTS34 Aug 06	Open Graded Asphalt Surfacing
PSTS38 Aug 06	Pavement Drains

Reference / Document Number	Title
PSTS39 Aug 06	Lean Mix Subbase for Pavements
PSTS40 Aug 06	Concrete base in pavements - Jointed Unreinforced, Jointed Reinforced, Continuously Reinforced and Steel Fibre Reinforced Pavements
PSTS42 Aug 06	Supply of Wax Emulsion Curing Compound for Concrete
PSTS45 Aug 06	Pavement Marking
PSTS45A Aug 06	Audio Tactile Line Marking
PSTS50 Aug 06	Specific Quality System Requirements
PSTS51 Aug 06	Environmental Management
PSTS57 Aug 06	Geotextiles for Paving Application
PSTS62 Aug 06	Bridge Substructure
PSTS63 Aug 06	Cast-In-Place Piles
PSTS65 Aug 06	Precast Prestressed Concrete Piles
PSTS67 Aug 06	Bitumen Slip Layer on Piles
PSTS68 Aug 06	Dynamic Testing of Piles
PSTS70 Aug 06	Concrete
PSTS71 Dec 06	Reinforcing Steel
PSTS71A Dec 06	Stainless Steel Reinforcing
PSTS72 Aug 06	Manufacture of Precast Concrete Elements
PSTS73 Aug 06	Manufacture of Prestressed Concrete Members and Stressing Units
PSTS74 Aug 06	Supply and Erection of Prestressed Concrete Deck and Kerb Units
PSTS75 Aug 06	Supply and Erection of Prestressed Concrete Girders
PSTS77 Aug 06	Bridge Deck
PSTS78 Aug 06	Fabrication of Structural Steelwork
PSTS79 Aug 06	Fabrication of Aluminium Components
PSTS80 Aug 06	Supply and Erection of Bridge Barrier
PSTS81 Aug 06	Bridge Bearings
PSTS82 May 07	Bridge Deck Expansion Joints
PSTS82.1	Annexure PSTS82.1
PSTS83 Aug 06	Anti-Graffiti Protection
PSTS84 Aug 06	Deck Wearing Surface
PSTS84A Aug 06	Cold Milling Bridge Deck Wearing Surface
PSTS86 Aug 06	Preparation for Bridge Widening
PSTS88 Aug 06	Painting New Work
PSTS88.1	Annexure PSTS88.1
PSTS89 Aug 06	Post Tensioned Concrete
PSTS90 Aug 06	Modular Expansion Joints
PSTS91 May 07	Ducts and Pits
PSTS92 May 07	Traffic Signal & Road Lighting Footings
PSTS93 May 07	Traffic Signals
PSTS94 May 07	Road Lighting
PSTS95 May 07	Switchboards and Cables

Reference / Document Number	Title
PSTS101 Aug 06	Checking subgrade, capping layer, drainage layer, controlled subgrade, working platform, temporary pavement, verge
PSTS201 Aug 06	General Equipment Requirements
PSTS202 Aug 06	Provision of Variable Message Signs
PSTS204 Aug 06	Provision of Vehicle Loop Detectors
PSTS206 May 07	Provision of Variable Speed Limit and Lane Control Signs
PSTS210 Aug 06	Provision of Mains Power
PSTS221 Aug 06	Provision of Help Telephones
PSTS225 Aug 06	Provision of Imaging Equipment
PSTS226 Aug 06	Provision of Telecommunications Field Cabinets
PSTS227 Aug 06	Provision of Changeable Message Signs
PSTS228 Aug 06	Provision of Electric Switchboards
PSTS232 Aug 06	Provision of Field Processors
PSTS234 Aug 06	Provision of Telecommunications Cables
PSTS239 Aug 06	Provision of Mounting Structures for ITS Devices
PSTS245 Aug 06	Principal's Telecommunications Network
PSTS250 Aug 06	Provision of Automatic Number Plate Recognition System
PSTS251 Aug 06	Provision of Traffic Counter/Classifier
<b>Metropolitan District Design Guidelines</b>	
MDDG 0 Rev A 13/11/02	Property Access Treatment Details
MDDG 01 Rev C 08/09/05	Kerbing and Median Treatments
MDDG 02 Rev C 19/08/03	Subsoil Drainage
MDDG 03 Rev B 14/05/01	Batter Slopes, Treatments & Clearances
MDDG 04 Rev A 16/05/02	Guardrail and Other Hazard Treatments
MDDG 07 Rev A 23/05/02	Power Pole Offsets and Treatments
MDDG 08.1 Rev A 16/05/02	Public Utility Services
MDDG 08.2 Rev A 06/04/01	Public Utility Services Notes and Details for Layout Plans
MDDG 10.1 Rev A 23/04/02	Median and Intersection Landscaping Treatments
MDDG 10.2 Rev A 23/04/02	Roundabout Landscaping Treatments
MDDG 10.3 Rev A 23/04/02	Typical Details and Notes for Landscaping
MDDG 11.1 Rev A 23/04/02	Asphalt Pavements Notes and Treatments
MDDG 11.2 Rev A 23/04/02	Asphalt Pavements Taper Treatments
MDDG 20.2 Rev B 21/07/05	Typical Earthworks Work Items – Urban Areas
<b>Metropolitan District Supplementary Specifications</b>	
MDSS120 23/04/2007	Provision for Traffic
MDSS121 04/10/2006	Portable Concrete Barriers Additional Requirements
MDSS200 05/10/2006	Modification of Existing Concrete Access Chambers, Gullies, Service Covers and Pipes
MDSS240 05/10/2006	Tactile Ground Surface Indicators to Concrete Kerb and Channel Crossings
MDSS241 05/10/2006	Replacement of Existing Gully Pit Grates to Bicycle Safe Standard
MDSS273 05/10/2006	Soil Nailing
MDSS278 04/10/2006	Reinforced Soil Structures

Reference / Document Number	Title
MDSS320 04/10/2006	Special Excavation, All Materials – Clearing of Existing Drainage Installations
MDSS330 04/10/2006	Subsoil Drains – Mitre Drains
MDSS351 17/10/2006	Backfill of Stormwater Drainage Trenches
MDSS356 30/10/2006	Backfill of Electrical Pits and Construction of Pit Surrounds
MDSS357 04/10/2006	Supply and Installation of Electrical Pits – Raise Existing Electrical Pits
MDSS360 30/10/2006	Entrances to Private Property – Reinstate
MDSS363 30/10/2006	Hand Placed Concrete Paving to Medians
MDSS364 30/10/2006	Hand Placed Concrete Paving (Stencilled)
MDSS410 30/10/2006	Moisture Control Properties – Unbound Pavement Materials
MDSS500 04/10/2006	Pavement Treatments
MDSS511 23/04/2007	Bituminous Surfacing – Additional Requirements
MDSS540 04/10/2006	Delivery Rate of Asphalt
MDSS544 04/10/2006	Crack Sealing
MDSS595 04/10/2006	Pavement Edge Batter Surface Priming and Sealing
MDSS605 23/11/2006	Construction of Noise Barriers
MDSS610 04/10/2006	Removal and Re-erection of Steel Beam Guardrail
MDSS614 04/10/2006	Removal and Attachment of Signs to Energex Poles
MDSS618 04/10/2006	Fencing – Chainwire
MDSS630 04/10/2006	Linespotting
MDSS635 04/10/2006	Reflectorised Raised Pavement Markers
MDSS661 04/10/2006	Traffic Signal and Road Lighting Footings
MDSS902 04/10/2006	Shoulder Edge Build-Up
MDSS910 12/10/2006	Corrigenda to Standard Specifications
MDSS911 04/10/2006	Relationship Management

## 2 TRANSLINK TECHNICAL DOCUMENTS

This list of TransLink documents, which are to be complied with as Technical Documents for the purposes of the Project Activities, is indicative only and is not exhaustive and does not limit PPP Co's obligations under the State Project Documents. The State reserves the right, subject to section 1.2(e)(ii) of Exhibit A Performance Specification, to amend this list in its absolute discretion.

Reference / Document Number	Title
<b>Specifications for Building Works (Busway Stations and Bus Stops only)</b>	
SBW01 Rev 01, Jun 07	Busway Stations and Bus Stops - General requirements
SBW02 Rev 01, Jun 07	Busway Stations and Bus Stops - Site Preparation and Minor Earthworks
SBW03 Rev 01, Jun 07	Busway Stations and Bus Stops - Hydraulic services
SBW04 Rev 01, Jun 07	Busway Stations and Bus Stops - Cast Insitu Piling
SBW05 Rev 01, Jun 07	Busway Stations and Bus Stops - Small Concrete Works
SBW06 Rev 01, Jun 07	Busway Stations and Bus Stops - Tanking to Retaining Walls
SBW07 Rev 01, Jun 07	Busway Stations and Bus Stops - Structural Steel
SBW08 Rev 01, Jun 07	Busway Stations and Bus Stops - Metal Work
SBW09 Rev 01, Jun 07	Busway Stations and Bus Stops - Protective Coatings
SBW10 Rev 01, Jun 07	Busway Stations and Bus Stops - Exterior Sun Control Devices
SBW11 Rev 01, Jun 07	Busway Stations and Bus Stops - Fibre Cement Products
SBW12 Rev 01, Jun 07	Busway Stations and Bus Stops - Metal roofing and roof plumbing
SBW13 Rev 01, Jun 07	Busway Stations and Bus Stops - Door and door frames
SBW14 Rev 01, Jun 07	Busway Station and Bus Stop - Frameless glazing
SBW15 Rev 01, Jun 07	Busway Stations and Bus Stops - Resilient flooring
SBW16 Rev 01, Jun 07	Busway Station and Bus Stop - Painting
SBW17 Rev 01, Jun 07	Busway Stations and Bus Stops - Signage
SBW18 Rev 01, Jun 07	Busway Stations and Bus Stops - Electrical services
SBW19 Rev 01, Jun 07	Busway Stations and Bus Stops - Landscape Works
SBW20 Rev 01, Jun 07	Busway Stations and Bus Stops - Irrigation
SBW21 Rev 01, Jun 07	Busway Stations - Lift Services Design, Supply & Installation Specification
SBW22 Rev 01, Jun 07	Busway Stations - Ceramic Tiles

**ANNEXURE 1 – PART 1 – ATTACHMENT 1A**  
**QDMR INFORMATION – SUPPLEMENTARY TECHNICAL STANDARDS**

Reference	Title
STS01, June 07	Supplementary Technical Standard – Subgrades
STS02, June 07	Supplementary Technical Standard – Widening of Existing Formation
STS03, June 07	Supplementary Technical Standard – Unbound Pavements
STS04, June 07	Supplementary Technical Standard - Removal and Salvage of Existing Road Furniture and Noise Barrier
STS05, June 07	Supplementary Technical Standard - Nonreflective Raised Pavement Markers
STS06, June 07	Supplementary Technical Standard – Lane Availability
STS07, March 08	Supplementary Technical Standard – Working Platform
STS08, April 08	Supplementary Technical Standard – Forms, Falsework and Centring
STS09, May 08	Supplementary Technical Standard – Pavement Drainage Layers

**1. Introduction**

This Supplementary Technical Standard applies to the preparation of subgrades below pavements.

This Supplementary Technical Standard shall be read in conjunction with QDMR PSTS04 *General Earthworks*.

**2. Subgrade Visible Vertical Movement**

Notwithstanding the requirements of Clause 19.4.1 of QDMR PSTS04 the pavement construction equipment used to assess visible vertical movement is to be a vehicle with a gross vehicle mass of 20 tonnes.

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**Supplementary Technical Standard – Widening of Existing Formation**

**No STS02, Jun 07**

**1. Introduction**

This Supplementary Technical Standard applies to widening of the existing formation to subgrade level of new pavements.

This Supplementary Technical Standard shall be read in conjunction with QDMR PSTS04 *General Earthworks*.

**2. Requirements**

Widening of the existing formation to subgrade level of the new pavement shall be carried out in accordance with Clause 22 of QDMR Standard Specification MRS11.04 *General Earthworks*.



**Supplementary Technical Standard – Unbound Pavements**

**No STS03, Jun 07**

**1. Introduction**

This Supplementary Technical Standard applies to the construction of road pavements using unbound material other than Type 1 material as specified in QDMR PSTS05 *Unbound Pavements*.

This Supplementary Technical Standard shall be read in conjunction with QDMR PSTS05 *Unbound Pavements*.

**2. Material in the Pavement**

Unbound material allowed for use as road pavement in the Project Works, in addition to Type 1 material specified in QDMR PSTS05, shall be Type 2 material specified in QDMR Standard Specification MRS11.05 *Unbound Pavements*.

No other pavement material specified in MRS11.05 is to be used for road pavements in the Project Works.

**3. Other Requirements**

All requirements associated with the use of QDMR Type 2 material as specified in QDMR MRS11.05 shall apply.



**Supplementary Technical Standard – Removal and Salvage of Existing Road Furniture and Noise Barrier**

**1. Introduction**

This Supplementary Technical Standard applies to the removal and salvage of existing road furniture and noise barriers.

This Supplementary Technical Standard shall be read in conjunction with Section 1.9 *Existing QDMR Road Infrastructure and Furniture* and Section 1.10 *Existing Council Road Infrastructure and Furniture* of Annexure 2 Part 1 (Construction Requirements) of the Performance Specification for the Project Works.

**2. Removal and Salvage of Existing Road Furniture**

Removal and salvage of existing road furniture shall be carried out in accordance with Clause 7 of QDMR Standard Specification MRS11.14 *Road Furniture*.

**3. Removal and Salvage of Existing Noise Barrier**

Removal and salvage of existing noise barrier shall be carried out in accordance with Clause 5 of QDMR Standard Specification MRS11.15 *Noise Barriers*.

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**1. Introduction**

This Supplementary Technical Standard applies to the supply and installation of nonreflective raised pavement markers.

This Supplementary Technical Standard shall be read in conjunction with QDMR PSTS45 *Pavement Markings*.

Where appropriate, the use of nonreflective raised pavement markers is allowed for use on roads in the Project Works.

**2. Material Requirements**

Nonreflective raised pavement markers shall be in accordance with Clause 6.3 of QDMR Standard Specification MRS11.45 *Pavement Markings*.

**3. Other Requirements**

All other requirements associated with the supply and installation of raised pavement markers as specified in QDMR PSTS45 shall apply to nonreflective raised pavement markers.



**1. Introduction**

This Supplementary Technical Standard applies to lane availability for traffic requirements during construction of the Project Works.

This Supplementary Technical Standard shall be read in conjunction with the following documents from Exhibit A of the Performance Specification for the Project Works:

- QDMR Supplementary Specification MDSS120 *Provision for Traffic* in Attachment 1C of Annexure 1 Part 1 (Design Requirements); and
- Section 4 *Traffic Management During Construction* of Annexure 2 Part 1 (Construction Requirements).

**2. Time Restrictions**

The time restrictions for lane availability specified in Table 7.3-1 *Temporary Pavements General Minimum Requirements* in QDMR PSTS101 is not required where additional temporary pavements are provided for traffic. The lane availability for traffic must be determined in accordance with Section 4.9 *Minimum Traffic Requirements* of Annexure 2 Part 1 (Construction Requirements).



**1. Introduction**

This Supplementary Technical Standard applies to the construction of a Working Platform in road pavements using inbound material of type 2.1 standard as specified in QDMR standard specification MRS11.05 inbound pavements.

This Supplementary Technical Standard shall be read in conjunction with QDMR PSTS101 'Checking subgrade, capping layer, drainage layer, controlled subgrade, working platform, temporary pavement, verge and QDMR Standard Specification MRS 11.05 unbound pavements.'

**2. Material in the working platform**

The working platform shall be constructed using a material of a standard not less than type 2.1 as specified in QDMR Standard Specification MRS11.05, stabilised in accordance with PSTS07A, PSTS07B or PSTS08 and shall comply with all the additional requirements specified in Clause 4.3 of QDMR PSTS101.

**3. Other requirements**

The working platform shall conform to all the requirements of Clause 4 of QDMR PSTS 101.



**1. Introduction**

This Supplementary Technical Standard applies to forms, falsework and centring.

This Supplementary Technical Standard shall be read in conjunction with QDMR PSTS70 *Concrete*.

**2. Requirements**

Notwithstanding the requirements of Clause 23 of QDMR PSTS70, stripping of forms and removal of formwork may be carried out in accordance with AS5100 Clause 16.6.2.



**1. Introduction**

This Supplementary Technical Standard applies to pavement drainage layers.

This Supplementary Technical Standard shall be read in conjunction with QDMR PSTS101 *Checking subgrade, capping layer, drainage layer, controlled subgrade, working platform, temporary pavement, verge.*

**2. Requirements**

Notwithstanding the requirements of Clause 5.2 of QDMR PSTS101, a no-fines concrete sub-base may be used as a drainage layer under CRCP in tunnels founded on rock subgrades. Where a no-fines concrete sub-base is used, the minimum thickness must be 150mm plus a 30mm dense graded asphalt separation layer, with the no-fines concrete sub-base forming a pavement layer for the in-service structure.

Notwithstanding the requirements of Clause 4 and 6 of QDMR PSTS101, the subgrade treatment under CRCP in Airport Link tunnels founded on rock subgrades must, as a minimum, include the provision of a level and free draining subgrade surface created using a Working Platform consisting of stabilised backfill material that meets the requirements of PSTS05 for a Type 1.2 pavement material, stabilised with a cementitious blend (25 percent fly ash) to achieve a 7 day UCS between 1 and 2MPa and constructed in accordance with PSTS08.



**ANNEXURE 1 – PART 1 – ATTACHMENT 1B  
QDMR INFORMATION – ROAD TRAFFIC NOISE MANAGEMENT: CODE  
OF PRACTICE EXTRACTS**

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Reference	Title
Road Traffic Noise Management: Code of Practice, Chapter 3	Priorities and Criteria
Road Traffic Noise Management: Code of Practice, Chapter 4	Road Traffic Noise Assessment
Road Traffic Noise Management: Code of Practice, Chapter 5	Integrated Noise Barrier Design
Road Traffic Noise Management: Code of Practice, Chapter 5 Appendices	Appendices Integrated Noise Barrier Design
Road Traffic Noise Management: Code of Practice, Glossary	Glossary



**3**

# **Chapter 3 Priorities and Criteria**

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<b>Chapter 3</b> Priorities and Criteria
<b>Chapter 4</b> Road Traffic Noise Assessment
<b>Chapter 5</b> Integrated Noise Barrier Design
<b>Chapter 6</b> Proposed Noise Sensitive Development
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# Priorities and Criteria

## March 2007

### Revision Register

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Issue/ Rev No.	Reference Section	Description of Revision	Authorised by	Date
1	-	Second Edition	Steering Committee	March 2007

# Chapter 3

## Priorities and Criteria

### 3

### 3.1 Introduction

The purpose of this Chapter is to specify the Main Roads road traffic noise performance criteria. For the consideration of noise attenuation treatments, the actual measured, calculated and/or predicted levels shall be assessed against the criteria. Chapter 4 of this CoP details the process by which actual or predicted levels should be assessed against these criteria.

Criteria can be advisory, flexible or fixed as defined in Table 3.1 which compares the advantages and disadvantages of these three approaches.

Main Roads chooses to use fixed criteria when considering the implementation of noise attenuation treatments although it may not always be possible to achieve the criteria in all circumstances.

A full description of the categories and criteria is summarised in Figure 3.1. Categories set within this Chapter are initially based on whether the road project is:

- a new road.
- an upgrade of an existing road.
- an existing road with no roadworks.

In the case of new roads consideration shall be given to the scale of increase in road traffic noise level; the increase shall be in relation to pre-construction noise levels.

The following criteria represent a compromise between the need to improve acoustic amenity, visual amenity and the technical/cost constraints in providing treatments for noise attenuation. Main Roads will determine the work schedule for installing such treatments depending on budget, the total roadwork's program and other considerations. The District Road Traffic Noise Management Strategy will also serve as an important reference document in this process specifically for the "existing road with no roadworks" category. Chapter 4 outlines the methodology behind a District Road Traffic Noise Management Strategy.

Table 1 Comparison of Approaches

Approach	Comment	Disadvantages	Advantages
Advisory	Exceeding the criteria is tolerated on a case-by-case basis whenever compliance is undesirable, impractical, not feasible or not cost effective.	<ul style="list-style-type: none"> <li>• Relatively ineffective</li> <li>• Low level of control by relevant authorities.</li> </ul>	<ul style="list-style-type: none"> <li>• No need to check compliance, as exceeding the criteria is tolerated</li> <li>• Low impact on infrastructure budgets when policy implemented</li> <li>• Low costs for management, as exceeding the criteria is tolerated.</li> </ul>
Flexible	Criteria are set relatively low, but can be adjusted upwards on a case-by case basis if compliance with base criteria is undesirable or impractical.	<ul style="list-style-type: none"> <li>• Relatively complex to implement and manage policy.</li> </ul>	<ul style="list-style-type: none"> <li>• Ensures that noise control must be considered in all situations involving significant noise impact</li> <li>• Allows costs to be managed</li> <li>• Allows negative impacts of noise control measures to be managed.</li> </ul>
Fixed	Criteria must be complied with wherever possible.	<ul style="list-style-type: none"> <li>• Pressure to set high criteria</li> <li>• May lead to high costs</li> <li>• May lead to excessively high noise barriers with associated negative visual and overshadowing impacts</li> </ul>	<ul style="list-style-type: none"> <li>• Relatively simple to monitor compliance</li> <li>• Maintains consistency of standards</li> <li>• Establishes criteria up front in order to manage expectations.</li> </ul>

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### 3.2 Limitation on Use of Categories and Criteria

There are a number of situations where the ability to meet the criteria for the applicable category may be limited, including:

- attenuating the impact of road traffic noise on non-access controlled roads;
- attenuating the impact of road traffic noise on roads with speed limits less than 80 km/h; and
- attenuating the impact of road traffic noise by the provision of treatments outside the road reserve unless in cases of exceptional circumstances or compulsory land acquisition (resumption).

Treatments for noise attenuation (including those for exceptional circumstances) will not normally be considered for non-access controlled roads due to the difficulty in providing effective noise barriers. The need for driveway access, security, vehicle and pedestrian safety, utility service requirements and amenity considerations (streetscape and built environment) can create undesirable, impracticable and ineffective situations for the installation of noise barriers.

Road pavement surface treatments are only beneficial for noise attenuation when the average speed of traffic is at least 60 km/h and free-flowing. The use of Open Graded Asphalt as a pavement surface type also has the following construction limitations:

- free flowing drainage can be obstructed adjacent to kerbs/kerb and channels.
- the pavement must be structurally sound.

- shorter pavement surface life and cannot be overlaid.

In cases of compulsory land acquisition, each noise sensitive site will need to be considered on an individual basis. Treatments for noise attenuation may form part of the compensation package.

### 3.3 Categories and Criteria: Existing Residences

The measurement / calculation / prediction height shall be 1.5 metres above the Finished Floor Level (FFL) or mid window height, whichever is the higher, for each storey of the building. Otherwise, the receptor heights shall be assumed at 1.8 metres and 4.6 metres for the ground and first floors respectively.

#### 3.3.1 Category 1: New Road – Access Controlled

This will apply to cases of new access controlled roads:

- In proposed or existing unused corridors adjacent to existing residences.
- In proposed corridors where formal approval by a local government or other statutory authority for contiguous land development is current at the date of compulsory land acquisition, even if the development is not yet in existence.

When the  $L_{A10}$  (18h) road traffic noise level within the 10 year horizon following the completion date for construction is predicted to be either:

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- A. greater than 63 dB(A), and  
an increase of 3 dB(A) or greater above  
the pre-construction level of greater  
than 55dB(A),  
treatments for noise attenuation will be  
considered within the road reserve as  
part of the initial planning and design  
with the aim of reducing levels to 63  
dB(A) or less; or
- B. greater than 60dB(A),and  
an increase of at least 6 dB(A) above  
the pre-construction level of 55dB(A)  
or less,  
treatments for noise attenuation will be  
considered within the road reserve as  
part of the initial planning and design  
with the aim of reducing levels to 60  
dB(A) or less.

### 3.3.2 Category 2: Upgrading Existing Roads

When the  $L_{A10}$  (18h) road traffic noise level  
within the 10 year horizon following the  
completion date for the upgrading is  
predicted to be:

- greater than 68 dB(A),  
treatments for noise attenuation will be  
considered within the road reserve with  
the aim of reducing levels to 68 dB(A)  
or less.

### 3.3.3 Category 3: Existing Roads - No Roadworks

When the  $L_{A10}$  (18h) road traffic noise level  
within the 10 year horizon following  
assessment is predicted to be:

- greater than 68 dB(A),  
treatments for noise attenuation will be  
considered within the road reserve with

the aim of reducing levels to 68 dB(A)  
or less.

Special consideration may be given to  
treatment in cases where there is a  
sudden increase in traffic volumes, or a  
high percentage of heavy vehicles  
(greater than 20%), particularly at  
night.

The actual priority will be determined  
as an outcome of a District Road  
Traffic Noise Management Strategy.

## 3.4 Categories and Criteria: Educational, Community and Health Buildings

Treatments for noise attenuation will be  
considered on a case-by-case basis, with  
consideration being given to building  
construction and use. In each case, it will be  
necessary to determine an agreed  
apportionment of costs between Main  
Roads and the institution concerned. Main  
Roads will generally only fund treatments  
for noise attenuation within the road  
reserve. Any additional treatment will be  
the responsibility of the educational,  
community or health institution.

However in exceptional circumstances, if  
the external noise criterion level for  
educational, community and health  
buildings is exceeded, and treatment within  
the road reserve is undesirable,  
impracticable or ineffective, treatments  
outside the road reserve may be considered.  
These may include the closing of windows,  
the inclusion of a mechanical ventilation  
system/air-conditioning system for  
ventilation/comfort requirements and  
architectural treatment of the building  
envelope if necessary.

The apportionment of costs provided by Main Roads may be the maximum of the equivalent cost of a required noise barrier to achieve the criterion level or the cost of the inclusion of a mechanical ventilation system/air-conditioning system for ventilation / comfort requirements and architectural treatment of the building envelope if necessary, whichever is the lower.

Main Roads will not contribute to the maintenance/running costs of the architectural treatment and the mechanical ventilation / air conditioning system. These will be the responsibility of the institution concerned.

#### **3.4.1 Category 1: New Road – Access Controlled**

This will apply to cases of new access controlled roads:

- In proposed or existing unused corridors adjacent to existing educational, community or health buildings.
- In proposed corridors when formal approval by local government or other statutory authority for contiguous land development is current at the date of compulsory land acquisition, even if the development is not yet in existence.

When the maximum  $L_{A10}$  (1h) façade corrected road traffic noise level within a 10 year horizon following the completion date for construction during normal operating hours of the facility is predicted to be:

- greater than 55 dB(A),

treatments for noise attenuation will be considered within the road reserve as part of initial planning and design, with

the aim of reducing the external noise level to 55 dB(A) or less.

#### **3.4.2 Category 2: Upgrading Existing Roads**

When the maximum  $L_{A10}$  (1h) façade corrected noise level within the 10 year horizon following the completion date for the upgrading during normal operating hours of the facility is predicted to be:

- greater than 63 dB(A),  
treatments for noise attenuation will be considered within the road reserve as part of initial planning and design, with the aim of reducing the external noise level to 63 dB(A) or less.

#### **3.4.3 Category 3: Existing Roads - No Roadworks**

When the maximum  $L_{A10}$  (1h) façade corrected noise level within the 10 year horizon following assessment during normal operating hours of the facility is predicted to be:

- greater than 63 dB(A),  
treatments for noise attenuation will be considered within the road reserve with the aim of reducing the external noise level to 63 dB(A) or less.

Special consideration may be given to treatment in cases where there is a sudden increase in traffic volumes or a high percentage of heavy vehicles (greater than 20%), particularly at night.

The actual priority will be determined as an outcome of a District Road Traffic Noise Management Strategy.

### **3.5 Rationale and Criteria: Outdoor Educational and Passive**

## Recreational Areas (including Parks)

The recommended maximum traffic noise level for outdoor educational and passive recreational areas (including parks) is 63 dB(A)  $L_{A10}$  (12h) (6am to 6pm) (measured or predicted) over a 10 year horizon as a free field level.

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Treatments for noise attenuation will be considered within the road reserve with the aim of reducing levels to 63 dB(A)  $L_{A10}$  (12h) or less.

All cases shall be determined on a case-by-case basis, taking into consideration the full circumstances surrounding the provision and future use of the outdoor educational or passive recreational areas. For example, in large areas of open space, only a small percentage may be affected by the impact of road traffic noise. Moreover, there is often scope to locate activities away from the influence of road traffic noise. This may also be of benefit from a security perspective and to the road user as it may break the visual monotony of treatment within the road reserve (ie. noise barriers). However, Main Roads recognises that, in some situations, it will be desirable to provide some protection for these areas. This is best resolved by consultation with local government and community groups. The location of the assessment site should reflect the above issues.

The measurement / calculation / prediction height shall be 1.5m above ground level in the free field.

In each case, the minimum area where the Main Roads criterion level is to be achieved shall be 2000 square metres.

## 3.6 Rationale and Criteria: Exceptional Circumstances

When exceptional circumstances prevail, treatments for noise attenuation may be considered outside the road reserve for individual dwellings at the discretion of the District Director.

The range of possible dwelling treatments will be determined by the predicted noise level outside the façade(s) of habitable room(s) within a ten year horizon and based on sustainable development principles such as equity, energy efficiency and economics as follows:

- Where predicted outdoor noise levels do not exceed the criterion level, no treatment of the dwelling will be offered.
- Where predicted outdoor noise levels exceed the criterion level by 1 dB(A) or greater, but less than 3 dB(A), provide mechanical ventilation so that windows can remain closed or partly closed to reduce the noise entering habitable rooms.
- Where predicted outdoor noise levels exceed the criterion level by 3 dB(A) or greater, but less than 10 dB(A), provide air-conditioning and mechanical ventilation so that windows can remain closed to reduce the noise entering habitable rooms.
- Where predicted outdoor noise levels exceed the criterion level by 10 dB(A) or greater, provide building upgrade treatments if necessary, air-conditioning and mechanical ventilation in order to meet an internal noise level at least 10 dB(A) below the external noise criterion level.

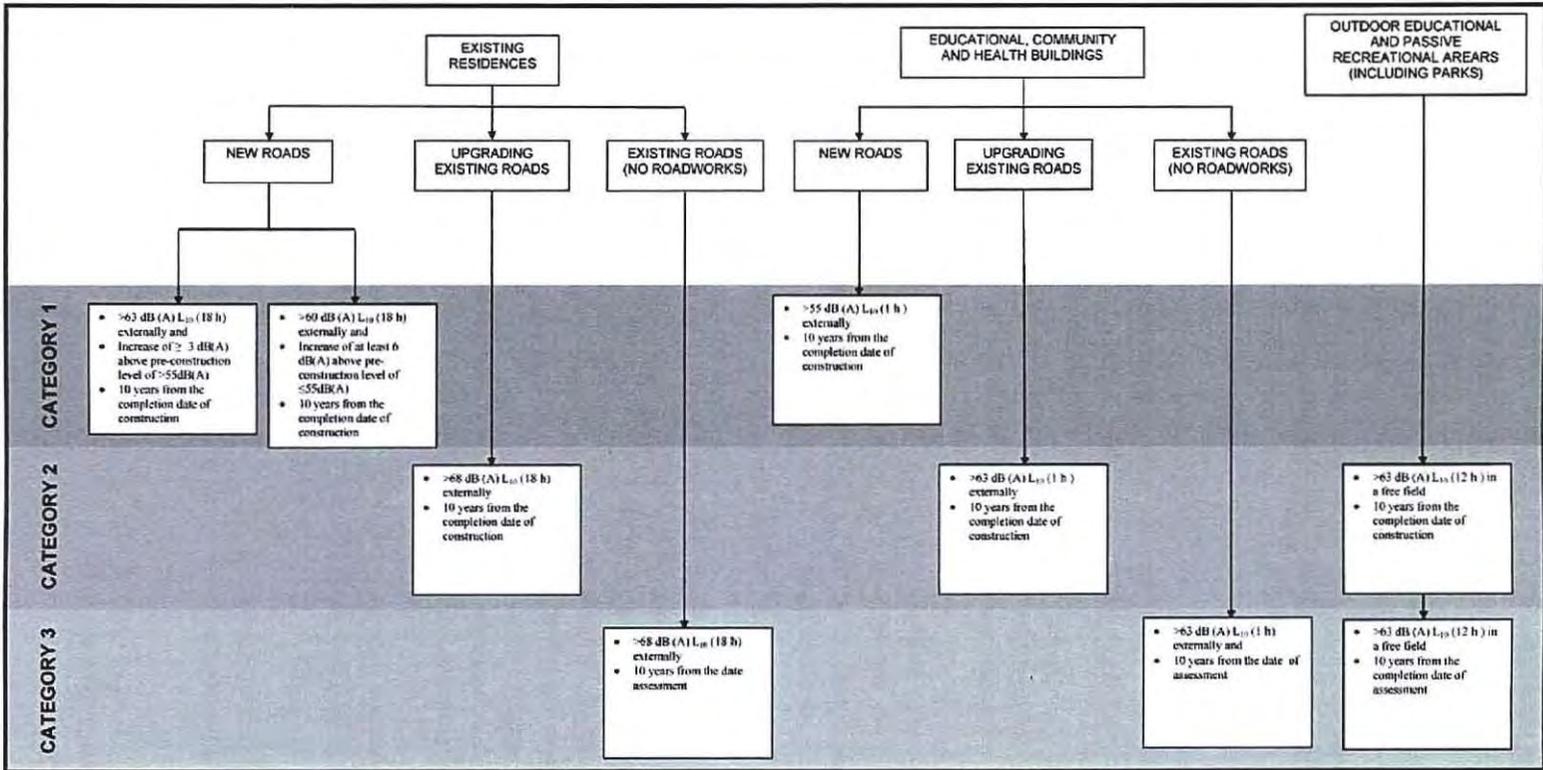


Figure 3.1 Departmental Categories / Criteria

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# Chapter 4

# Road Traffic Noise

# Assessment

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# Road Traffic Noise Assessment

## March 2007

### Revision Register

**4**

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# Chapter 4

## Road Traffic Noise Assessment

### 4

### 4.1 Introduction

Project managers, road design teams, land developers and acoustical consultants should consult this chapter to ensure that a consistent and comprehensive approach is applied when addressing road traffic noise. Figure 4.1(a) and Figure 4.1(b) of this Chapter outlines the processes for assessing the impact of road traffic noise, and conducting an acoustical assessment, respectively.

A road traffic noise assessment can be initiated by recommendations from either the undertaking of a project environmental assessment for a new or upgraded road proposal or a District Road Traffic Noise Management Strategy, as well as in response to an enquiry from an affected property owner or development approval condition.

There are a number of requirements that a Road Traffic Noise Assessment must address. These are specified in Section 4.2 of this Chapter and should form the basis of the acoustical assessment. Section 4.3 of this Chapter outlines the elements of the acoustical assessment and identifies a range of methods and treatments that can be considered for road traffic noise attenuation. The contents and methodology for a District Road Traffic Noise Management Strategy are outlined in Section 4.6 of this Chapter.

When designing treatments for noise attenuation, it is important to note that there

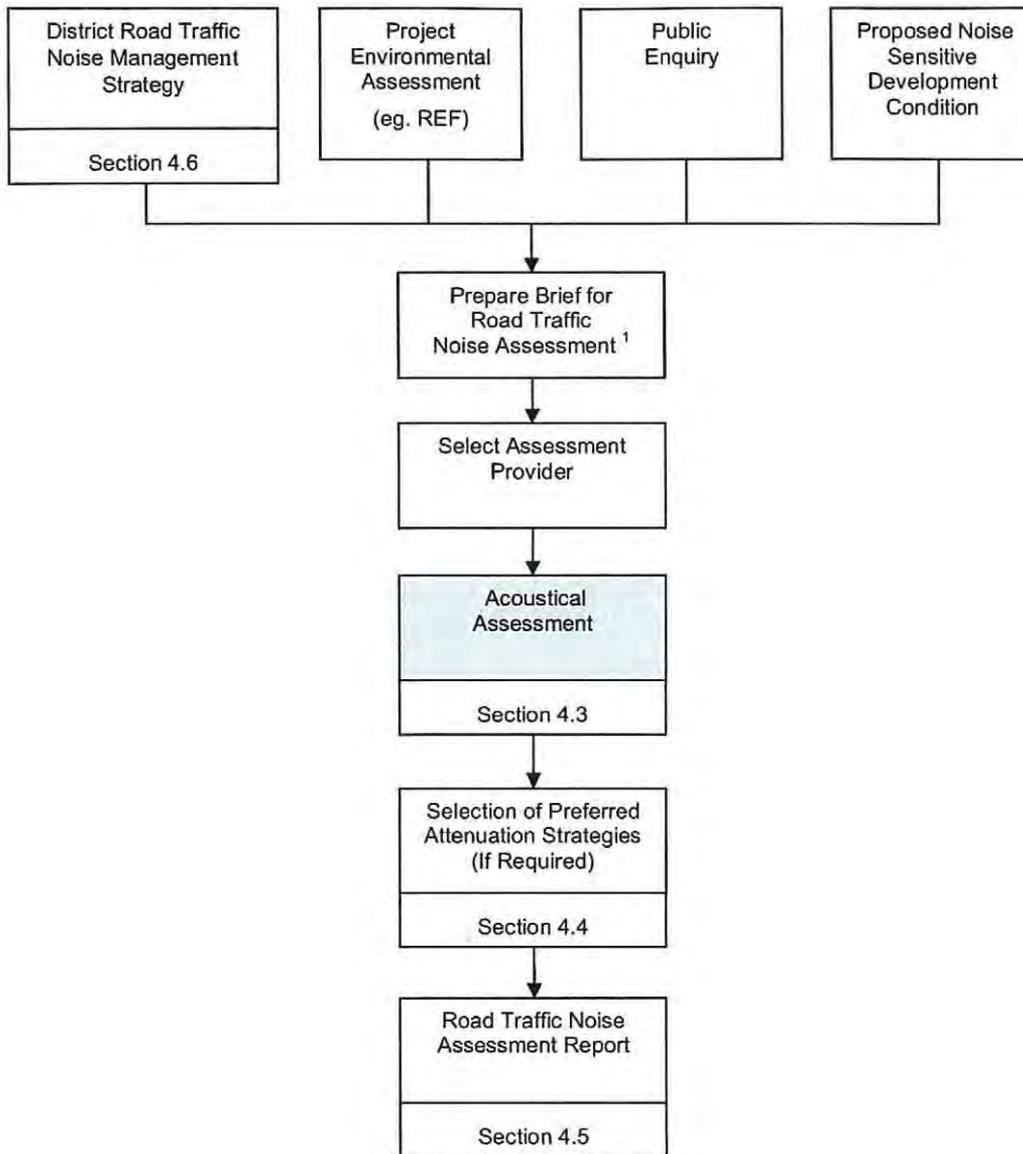
are a number of additional issues to consider, apart from acoustic effectiveness and integration with the road landscape. Issues including safety, maintenance and public amenity with respect to noise barriers are discussed in Chapter 5 of this CoP.

A road traffic noise assessment may be prepared for a given section of road or at an individual site.

The aims of a road traffic noise assessment are twofold:

- To determine the nature and extent of any road traffic noise impacts; and
- To propose appropriate road traffic noise attenuation treatments, including guidance on the integration of these noise attenuation treatments into the road environment.

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<sup>1</sup> The brief for a Road Traffic Noise Assessment shall state that the assessment be conducted in accordance with the Main Roads, Road Traffic Noise Management: Code of Practice.

Figure 4.1(a) Road Traffic Noise Assessment Process

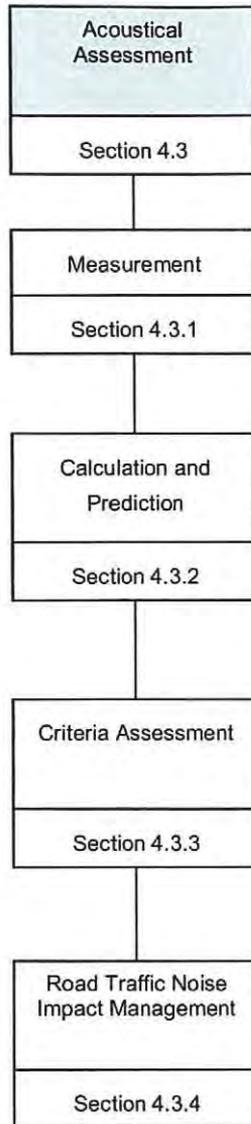


Figure 4.1(b) Acoustical Assessment Process

## 4.2 Assessment Scope and Inputs

The following components outline a general procedure to be adopted when scoping and collating information for a road traffic noise assessment.

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#### Assessment objectives

Specify clearly what road traffic noise is to be assessed and why. Generally this involves identifying the road traffic noise source(s) and the potentially affected receptors.

#### Assessment aim

In most instances, the aim of the assessment is to first determine the levels of a specified road traffic noise descriptor at noise sensitive receptors within an area potentially affected by the noise generated by traffic on the subject road segment. From there the noise impacts are assessed by comparing the values of the measured, calculated or predicted noise descriptors with relevant criteria. Guidance on the noise indices and descriptors and the criteria to be adopted are set out in Chapter 2 and Chapter 3 of this CoP. If required, noise attenuation treatments are then considered.

#### Assessment area

The assessment is conducted over an area that surrounds or is contiguous with the road segment. This area must be carefully specified, yet doing so can often become complex. In a new road proposal, for example, the initial approach might be to constrain the assessment area to the road corridor plus, say, two or three rows of houses on either side of that corridor although, as is often the case, a wider area of influence may be required to determine the existing noise climate for the consideration of potential future community complaints. But if the new road will have

the effect of altering traffic patterns on nearby existing roads, then it might be appropriate to extend the assessment area to include residences on or around these existing roads. Consideration must also be given to other relevant conditions (i.e. terrain) in the possible area and the existence of other noise sources that might interact with the road traffic noise being assessed.

#### Receptor locations

All potentially affected or benefited receptor locations within the assessment area must be located and specified. It may not be necessary, however, to conduct noise measurements, calculations or predictions at each and every receptor location. What is required is to ensure that the noise exposure of all receptors is determined fairly, accurately and representatively..

#### Road and traffic data

For each receptor location, all the relevant road and traffic data must be acquired for the road under investigation and also for any other road nearby that may contribute to the total noise level exposure at the receptor location. This data may be obtained either by direct measurements and observations and/or by obtaining current data from the relevant Authority. The relevant Main Roads District Office should be contacted to ascertain the extent of current data available prior to additional survey/measurement being requested. The data required here include information on factors such as traffic volumes (hourly and daily), traffic compositions (usually expressed as the percentage of heavy vehicles in the traffic), traffic speeds, speed limits, traffic growth rates and/or traffic modelling forecasts, and road pavement surface type.

Note that the values of predicted (future) road traffic noise descriptors shall be based on a 10 year horizon after a new road or

new development is expected to be opened. This 10 year horizon shall also apply after an upgrade of an existing road is completed or after the implementation of noise attenuation treatments to an existing road where no road works are involved. In addition, the existing and proposed road pavement surface types shall be identified and the appropriate pavement surface correction factors for the noise effects of these pavement surfaces shall be adopted in all calculations and predictions. These pavement surface correction factors are documented in Table 4.3.4.1 of this Chapter.

#### **Electronic road design, feature and terrain data**

Road design, feature and terrain data is required as the basis for road traffic noise calculation and prediction modelling.

As a minimum, a 3D digital feature and terrain model of the study area is required when conducting road traffic noise modelling for an existing road segment or along a new road corridor. The data shall be available as dxf files on CD at commencement of the assessment work. The dxf files required for the road traffic noise modelling shall include:

1. the existing digital terrain model (within and outside the road reserve to the extents of the study area);
2. digitised building envelopes;
3. cadastral boundaries (i.e extracted from the DCDB (Digital Cadastral Database));
4. digitised feature data detailing:
  - lane line markings, edge of pavement surface and kerb lines for the subject road segment as well as for service roads, on and off-ramps, and local roads that may contribute to the road

traffic noise environment in the study area; and

- top and bottom edge of existing safety barriers, retaining walls and noise barriers.

Where the subject road segment is proposed to be upgraded or a new road proposal, separate 3D dxf files shall also be provided for each road design option on CD at commencement of the assessment work. The naming convention of the model/layers are to reflect each road design option. The dxf files required for each road design option shall include:

1. a composite 3D digital road design model (within and outside the road reserve to the extents of the study area) created from the road design model and cut into the existing terrain;
2. the boundary of the digital road design model and the existing feature/terrain model; and
3. a composite digital terrain model of the final design and existing terrain contours at suitable intervals.

The removal of irrelevant/unnecessary data from all digital information provided for the purposes of road traffic noise modelling assists in minimising the extent of work required to create the road traffic noise model and limits potential for errors in interpretation of the data. In general, the digital information shall be provided in the following format:

- 3D polylines only or 3D lines (i.e. splines are incompatible);
- Block and external references shall be removed, exploded or deleted;
- Each data type (i.e. layers/models) shall be rationalised in to separate dxf files. All layers and models shall be labelled appropriately;

- All existing digital terrain model layers shall be merged as one (1) layer; and
- Coordinates with z values = -999 shall be removed.

### Road traffic noise exposures

This is done by measurement, calculation or prediction or by various combinations of these. It is important to specify how the exposures were determined and to justify the techniques adopted. Where applicable, model calibration accuracies should be presented and used in a manner similar to that demonstrated for CoRTN and TNM in Section 4.3.2 of this Chapter. The road traffic noise exposures can be specified in terms of the noise descriptors, as identified in Chapter 3 in this CoP, at the various receptor locations.

This does not necessarily mean that a noise level will be provided for each receptor location, particularly when individual locations that are representative of a given area or cluster of residences are used.

### Assess against Criteria

At this stage the road traffic noise exposures at receptor locations are compared with the relevant criteria to establish any exceedences. If the values of the predicted noise levels are greater than the relevant criteria, consideration shall then be given to appropriate noise attenuation treatments to achieve the criteria.

### Suitable noise attenuation treatments

Should the assessment reveal that the road traffic noise exposures are in excess of the relevant criteria, the next step is to consider incorporating noise attenuation treatments by way of a road traffic noise management strategy. Once some treatments have been selected, their effectiveness must be estimated and the resultant noise exposures

predicted. The assessment of varying design options for noise attenuation treatments is repeated until the exposures are deemed to comply with the criteria.

In some instances, the most efficient attenuation treatment cannot be implemented for technical, cost or other relevant factors. Such a situation generally leads to some compromises that are usually negotiated with the community. What should also be pointed out at this stage is that what is referred to here as attenuation treatments is a generic term that covers a wide range of treatment options. Typical examples of traditional road traffic noise attenuation treatments include the provision of roadside noise barriers and the adoption of quieter road pavement surface types. (The effect of road pavement surface type on road traffic noise from Queensland roads is covered in Section 4.3.4.1 and Appendix 4D of this Chapter). The residual noise levels with the attenuation treatments in place shall be documented for the affected receptors.

### Document the assessment outcomes

Documentation of the assessment is obviously an important component of the entire process. The documentation shall cover all of the matters addressed in this CoP.

### Operational noise management

After the assessment of a new road or an upgraded road has been completed and the road becomes operational, it is necessary to conduct what is termed as operational noise management. As a minimum, this involves post construction noise measurements to ensure that the values of road traffic noise descriptors occurring in practice comply with the values finally determined in the assessment. If such compliance is not achieved, then further assessment and remedial treatments may be considered.

### Minimum Assessment Requirements

There are a number of minimum requirements that need to be addressed when conducting a road traffic assessment.

- The road traffic noise assessment shall be conducted in accordance with this CoP and specific project brief. Functional Specification Proforma is provided in Appendix 4A of this Chapter.
  - All noise measurements shall be undertaken in accordance with the guidelines set out in Section 4.3.1 of this Chapter.
  - All hourly results of noise levels and meteorological conditions (particularly wind speed and direction) shall form an attachment to the Road Traffic Noise Assessment Report.
  - The appropriate number of 24 hour measurements to be carried out will depend on the site-specific characteristics on a typical weekday and/or representative period. A minimum of at least one measurement site is required for each side of a road section. A road section is defined as that distance between two intersections or interchanges. However the number of full 24 hour measurement sites needed, will depend upon the outcomes of the site selection process which is documented in Sections 4.3.1.2 and 4.3.1.3 of this Chapter.
  - External noise descriptors shall be measured, calculated or predicted, with either the microphone or the calculation/prediction position located as specified in Section 4.3.1.3 of this Chapter.
- Calculations and predictions of road traffic noise shall be conducted using either CoRTN or TNM. However CoRTN is the preferred calculation and prediction method, depending on the relevant noise descriptor.
  - For existing roads, verification of the noise calculation model shall be undertaken by comparing measured and calculated noise descriptors determined simultaneously at a number of sites. The model may be deemed to be verified if the average difference between the measured and calculated values of the descriptors is no more than  $\pm 2.0$  dB(A). Note that the relevant pavement surface correction factor from Table 4.3.4.1 of this Chapter and the respective calibration factors from Table 4.3.2.1 and Table 4.3.2.2 of this Chapter shall be applied to the calculations prior to verifying the model against the measured noise levels. Subsequently, the relevant correction and calibration factors are to be applied to the noise level calculations and predictions before assessing against the criteria.
  - A common type of road traffic noise assessment situation involves the calculation of the existing values of the noise descriptors and then the prediction of the future values of the noise descriptors. However in this particular assessment situation, the following shall also apply.
    - (a) At noise sensitive receptors along any particular section of roadway, if the average difference between the values of the existing measured and calculated noise descriptors is positive (i.e. on average the measured values exceed the calculated values), then the calculated values shall be

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adjusted upwards by this average difference, prior to determining the predicted values of the noise descriptor.

(b) At noise sensitive receptors along any particular section of roadway, if the average difference between the values of the existing measured and calculated noise descriptors is negative (i.e. on average the calculated values exceed the measured values), then no adjustment shall be made to the calculated values prior to determining the predicted values of the noise descriptor.

(c) When undertaking an assessment for a new road, it is generally not possible to calculate or measure the existing road traffic noise descriptors, principally because there is no existing road. However in some cases there maybe an appropriate existing road within the extent of the new road project, which will suffice for the assessment. Generally for a new road project the assessment can only be based on the calculated and predicted values of the noise descriptors. Notwithstanding the above, background noise levels are required to be measured at representative sites along the proposed new road corridor to determine the existing noise climate and relevant criterion level to be applied.

- In cases of land acquisition or new noise sensitive developments, the relevant Australian Standards such as AS 3671-1989 (Standards Australia 1989) may be used to determine the values of the noise descriptors inside the residence(s).
- All measured, calculated and predicted road traffic noise descriptors shall be presented in tabular format and, additionally, in the form of noise contours and maps where appropriate. It shall be clearly identified as to whether the noise level data are façade corrected

or free field. Noise measurements shall be rounded to one decimal place. Calculated and predicted levels shall be rounded to the nearest whole number (0.4 down, 0.5 up).

- Following the implementation of noise attenuation treatments and the completion of any roadworks and construction activities, a post construction road traffic noise assessment shall be conducted. This particular assessment shall, as a minimum, collect noise measurement data in accordance with Section 4.3.1 of this Chapter.
- Where Main Roads is to undertake a road traffic noise impact assessment along a particular section of road and a private development has been constructed beside this section of road within a 10 year period prior to this assessment, Main Roads will not consider the impact on this development unless the impact had not previously been assessed under the IDAS process. It is assumed that the appropriate noise attenuation strategy would have been put in place as part of this process.
- For the following scenarios:

a condition of development for a residential subdivision required the use of a registrable covenant(s) on the land title(s) and the outcome of this condition was that a building envelope of a floor(s) of a detached dwelling be designed in accordance with AS 3671(1989) to achieve the indoor noise criteria stated in AS 2107 (2000), and ventilation requirements of the Building Code of Australia /comfort requirements (eg. air conditioning) need to be achieved, or

a condition of development for an attached housing development (duplex, town house, unit), educational, community or health building required a building envelope of a floor(s) to be designed in accordance with AS 3671 (1989), to achieve the indoor noise criteria stated in AS 2107 (2000), and ventilation requirements of the Building Code of Australia / comfort requirements (eg air conditioning) need to be achieved;

Main Roads will not consider the impact of road traffic noise on these developments where these conditions have been imposed even if they were not fully implemented by the developer / owner of the building.

Main Roads will consider the impact of road traffic noise if the condition(s) of development did not include reference to AS 3671 (1989), AS 2107 (2000), the Building Code of Australia and comfort requirements, with due consideration being given to the 10 year period prior to the assessment being undertaken by Main Roads.

If a noise sensitive building has an existing mechanical ventilation system / air-conditioning system / architectural treatment of the building envelope installed, the assessment of the impact of road traffic noise shall consider these facts when the assessment is related to internal noise level criteria.

- The assessment provider shall adopt appropriate quality control procedures when conducting the road traffic noise assessment. Specific quality control measures shall be implemented when undertaking road traffic noise level measurements, calculations, verification and predictions.

- The assessment methodology, assumptions, measurement results, calculations, predictions and verification outcomes shall be adequately documented in the road traffic noise assessment report to enable an independent assessment provider to easily review, test and reproduce the assessment outcomes. For highly complex and large scale projects, an audit program is required to be incorporated as part of the assessment process and shall be undertaken by an independent assessment provider (i.e. independent of the assessment provider conducting part or all of the road traffic noise assessment for the project).
- This may be achieved by establishing one or more test case scenarios and having each assessment provider conduct calculations or predictions for each test case review via an independent assessment.

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### 4.3 Acoustical Assessment

When conducting a road traffic noise assessment, there are a number of key elements to be addressed as part of an acoustical assessment. These include Measurement, Calculation and Prediction, Assessment and Management of the Impact of road traffic noise on adjacent noise sensitive land uses.

#### 4.3.1 Measurement

##### 4.3.1.1 Propose

Measurement of road traffic noise levels or of pre-construction noise levels are required to be undertaken for a number of reasons, depending on the project type. Table 4.3.1.1 presents the scenarios under which noise measurements may be undertaken, and the purposes for conducting the measurements at varying stages of a project.

**Table 4.3.1.1 Reasons for conducting noise measurements**

Scenarios	Purposes
Prior to construction	<ul style="list-style-type: none"> <li>To provide the noise climate of pre-construction noise levels</li> <li>To establish baseline data for comparative assessment of pre and post construction noise levels.</li> <li>To determine the relevant assessment criteria to be based on pre-construction noise levels</li> <li>To verify the noise model by comparing measured and calculated noise levels</li> </ul>
During construction	<ul style="list-style-type: none"> <li>Compliant management</li> <li>Spot monitoring on larger scale projects</li> </ul>
After construction	<ul style="list-style-type: none"> <li>To confirm compliance with criteria or project goals</li> <li>To collect data for comparative assessment of pre and post construction noise levels</li> <li>Quality control/assurance regarding attenuation treatments</li> <li>Continual improvement</li> </ul>
Ongoing	<ul style="list-style-type: none"> <li>Quality control/assurance</li> <li>Complaint management</li> <li>Ongoing review of compliance</li> <li>Ongoing review of community exposure, by building a database to track noise level exposures.</li> </ul>

#### 4.3.1.2 General principles

Typically, road traffic noise is measured outdoors in either a free field situation or at the façade of a potentially affected building. It is always important when measuring road traffic noise to ensure that the environmental conditions under which the measurements are conducted are as favourable as possible. Environmental conditions can include factors such as the weather (e.g. wind, temperature, rain, humidity) and the operation of other sources of noise that are not related to the road traffic noise being investigated. The latter can include a multitude of sources like rustling foliage, animals, insects, plant and equipment. Further, it is critical that all relevant conditions and factors that could potentially affect the measurements are both monitored and recorded. While this may at first appear to be an intuitively obvious requirement, it is often both difficult and time consuming to achieve. One key reason for this is that it is often not clear just what conditions and factors are relevant and could affect the measurements.

Well-proven and documented techniques for the measurement of road traffic noise are set out in various documents such as AS2702 (1984) and EPA's Noise Measurement Manual (2000). The process of measuring road traffic noise involves the following:

- Setting objectives and identifying data applications;
  - Establishing sites and measurement locations;
  - Recording all site details
  - Measuring the relevant noise levels and descriptors;
- Monitoring traffic conditions during the measurement period;
  - Monitoring and measuring the weather conditions during the measurement period; and
  - Fully documenting all results,

All components of this process are significant in achieving reliable, suitable and accurate measurement data. Consequent time, resource and financial implications may result if this process is not followed.

#### Objectives and data applications

Clearly establish the objectives and purpose for undertaking the measurements and identify the extent and form in which the measurement data is to be utilised and documented.

#### Sites and measurement locations

Details such as where and when to undertake the measurements are to be determined once the objective and purpose of the monitoring are known. The selection of suitable sites and of the measurement locations within each site, can be a time consuming and unpredictable exercise. This is generally because of externalities such as animals, plant and other external features that have the potential to affect the measurements as demonstrated in the following case study example:

- Traffic noise data would be representative at least seven or eight residential facades that front onto a 3 km section of an urban motorway midway between two interchanges. An initial inspection of the section revealed that there are potentially 12 such residences, but five of them are near to some light industrial sites. Since the industrial noise was clearly audible and

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was also detected by the measurement instrumentation at these five residences, it would interfere with the road traffic noise measurements. Therefore these five potential sites were eliminated. Of the other seven sites, one is almost inaccessible and a vicious, huge dog inhabits another. This leaves only five measurement sites that are suitable.

### Record all site details

This is a critically important procedure that involves measuring and recording all the relevant site data such as those necessary to clearly identify the site and to conduct an accurate road traffic noise calculation and/or prediction. Site diagrams shall be prepared and several photographs taken for each site's identification and all data recorded on the Main Roads standard form template (Refer to Appendix 4B of this Chapter) or similar format of data recording. All data including road traffic noise measurement, weather conditions and pavement surface type (photographs required) shall be recorded for each measurement location. This collection process will also ensure that the measurement data can be confidently applied at any stage of a project.

### Measuring noise levels

For the determination of a daily noise descriptor such as  $L_{A10}$  (18h), noise measurements shall be undertaken over a minimum of two x 24 hour days with due consideration being given to the requirements for monitoring the traffic and weather conditions.

The required noise measurement data shall be collected using appropriate instrumentation systems according to procedures such as those of AS 2702 (1984). It is important to ensure that all instrumentation systems are suitably calibrated and have a current calibration certification. The instrumentation must be

capable of measuring the required noise descriptors, such as the  $L_{A10}$  (1h) or the  $L_{Aeq}$  (1h). Attended measurements (where a competent person(s) is present during the entire measurement period) are always preferred to unattended measurements but the cost of time and labour for attended measurements may be prohibitive. However, as a minimum, a competent person shall attend measurements for at least four representative, one hour periods during a 24 hour measurement period of a day. These four, one hour periods, must not be consecutive and shall be reasonably spread out over the entire 24 hour day. The periods of attendance shall be shown on the standard form template or similar format of data recording. However, if it is intended to undertake a more cost effective measurement program where for example, measurements are undertaken at four sites in close proximity to each other, the length of time for attendance at each site may be reduced accordingly (e.g. to half an hour) as it can be envisaged that the competent person/operator will move between sites more frequently and still maintain the reliability of the measurements.

During the times of attendance, the component person shall note any extraneous noise events, climatic conditions, any vandalism and shall undertake a sampling of the descriptor's over the period for later correlation with the corresponding sample obtained during the long term measurement period; e.g. during one (or half an hour as the case may be) of the hours of attendance at each site per day, a minimum one hour or half an hour as the case may be) 1/3 octave measurement may be conducted using the noise indices,  $L_{max}$ ,  $L_1$ ,  $L_{10}$ ,  $L_{90}$ ,  $L_{min}$  and  $L_{eq}$ . The 1/3 octave measurement shall be tabulated and reported on the standard form template or similar format of data recording.

Measurements shall not be conducted during periods of atypical traffic flows and

patterns, unless it can be otherwise justified, such as when traffic data are measured simultaneously with the noise measurements. Periods of atypical traffic flows and patterns include weekends, school and public holidays. It should be noted that in some areas, such as popular holiday destinations, the use of measurement data for weekends, school and public holidays may be acceptable, based on an analysis of prior traffic data patterns in the area.

Furthermore, measurements shall not be conducted during periods of extraneous noise such as that from nearby construction activity. Noise events identified as extraneous shall be excluded from the computation of the relevant road traffic noise descriptors. Should extraneous noise sources be identified as interfering with the traffic noise data for more than two continuous hours or for more than three non-continuous hours during a 24 hour day, then that day's data shall be discarded and an additional day's data shall be collected.

Where there are up to two continuous or three non-continuous hours during a 24 hour day affected by extraneous noise sources, the measured traffic noise data during these hours shall be discarded and replaced with values determined by simple linear interpolation of other data collected during that day.

When internal noise levels are being measured in terms of one hour descriptors such as the highest  $L_{A10}$  (1h), attended measurements shall be utilised. The period of the measurements shall be during the usual time of use or occupation of the noise sensitive dwelling, institution or space. For example, the measurement period shall be as follows:

- a school shall be 8am to 4pm on normal school days;
- a child care centre shall be 6am to 6pm;

- a church shall be during the time of services and similar activities;
- a medical centre and library shall be during opening hours; and
- a community hall shall be during the typical hours of use.

Consultation with the owner(s) of the noise sensitive buildings will be necessary to determine the representative period for measurement.

If possible, measurements shall be undertaken simultaneously both inside and outside the building, without the influence of normal activities associated with the building. This is required to determine the noise reduction (transmission loss) from outside to inside the building with windows open and closed. It should be noted that the criterion level for these type of land uses is based on an external noise level only. Therefore an external measured noise level would be acceptable only as a last resort. It may also be difficult to measure during the usual time of use. Thus it is acceptable to measure outside normal times of use if the relevant traffic data is available (for example, measure simultaneously, or use historical data) for the period of noise measurement.

#### **Traffic conditions**

The collection of traffic data undertaken during the time of the noise measurement is always preferable to traffic estimates such as the annual average daily traffic (AADT) or average daily traffic (ADT). However, such estimates can be used provided care is taken to ensure that the daily traffic conditions experienced during the measurement period, do not vary significantly from the estimates that have been used.

The monitoring of traffic data requires measuring traffic volumes, speeds and compositions for each hour during the noise

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measurement period. Note that one hour of traffic data are required to calculate the  $L_n(1h)$  level for the relevant road traffic noise descriptors. Generally the nature and format of the traffic data should be aligned with the road traffic noise calculation model to be adopted for the noise assessment process. It must be recognised that events such as road works or traffic accidents may affect the traffic conditions and therefore influence the accuracy of the road traffic noise measurements. The competent person/operator undertaking the noise monitoring shall take all necessary steps to ensure that such events are monitored and adequately documented.

## Weather conditions

Weather conditions shall be monitored and measured locally in conjunction with the road traffic noise measurements. All weather data shall be recorded on the Main Roads standard form template for road traffic noise measurements or similar format of data recording. Particular attention shall be given to wind speed and direction, rain periods and the air temperature. In addition, the location of the weather station/data collection device shall be documented.

Weather conditions can substantially affect the quality and accuracy of road traffic noise measurements. The primary weather conditions that affect traffic noise measurements are wind and rain. For traffic noise measurements conducted over a 24 hour day, the maximum acceptable values of these conditions are as follows:

- average wind speed up to 3m/s
- rainfall up to 0.3mm/h.

Road traffic noise measurements conducted during a 24 hour day shall be discontinued and discarded under the following weather conditions:

- when there are more than two continuous hours of adverse weather conditions, and
- when there are more than three non-continuous hours of adverse weather conditions.

When there are no more than two continuous or three non-continuous hours of adverse weather conditions during a 24 hour day, the measured road traffic noise data during these hours shall be discarded and replaced with values determined by simple linear interpolation of the other data collected during that day.

In some cases, road traffic noise measurements can be conducted for periods shorter than a 24 hour or an 18 hour day. These cases would occur when the objectives of the measurements were to determine shorter time based noise descriptors. Under these situations, the number of hours during which adverse weather conditions of wind and rain is allowable would be proportionately less than those listed above. When noise levels are being measured in terms of one-hour descriptors such as the highest  $L_{A10}(1h)$ , there shall be no rain during the relevant hour and the average wind speed during this hour shall not exceed 3m/s.

In varying seasonal conditions, average wind speeds at some measurement sites may be consistently above the maximum acceptable value. In such cases it might be necessary to further analyse the noise measurement data and it may be necessary to relax this specification somewhat. There are some techniques available to assist in improving the reliability of the measured noise data and these include the following:

- calculate the wind speed vector perpendicular to the road in the direction of the measurement location. If the magnitude of this average wind speed vector does not exceed 3m/s for

more than two continuous or three noncontinuous hours during the measurement period, then the traffic noise measurements may be acceptable (a vector diagram shall be provided)

- use measured noise data from days when the wind was blowing from the road to the measurement location about as much as it was blowing in the opposite direction.
- average the measured noise data at each site over a range of wind conditions, taking care to include as many days when the wind was blowing from the road measurement location about as much as it was blowing in the opposite direction.

#### Documentation

All site, traffic, noise measurement and weather data, along with photographs and any other relevant information, shall be presented in a report document. All noise measurement data shall be recorded to one decimal point.

#### 4.3.1.3 Minimum Measurements Requirements

In addition to the above general principles, there are several specific requirements set out below that must be addressed when road traffic noise measurements are being undertaken by, on behalf of or for review by Main Roads.

#### Site selection

When undertaking road traffic noise measurements along a particular roadway, it is firstly required that the sites of all potential noise sensitive receptors along the roadway be identified. These receptors shall include, but are not limited to, the following:

- all existing dwellings, approved future dwelling locations and proposed

dwellings under a development application, particularly those where it is reasonable to expect that the relevant noise criteria might be exceeded;

- all educational, community and health buildings; and
- all appropriate outdoor educational and passive recreational areas (including parks).

In most cases where road traffic noise measurements are being undertaken along a length of roadway, it is not economically justifiable to conduct noise measurements at the site of every potential noise sensitive dwelling. Effectively, each noise measurement program represents a sample of the noise exposures of the population of potential noise sensitive dwellings. Due consideration shall be given to the location of potential noise sensitive receptors, the surrounding terrain and geometry of the road. Two sampling approaches can be adopted:

- (a) The first is that a cluster of dwellings are considered, by desk top and/or site inspection, to have similar noise exposures. The measured level at one site within this cluster then represents all of the dwellings.
- (b) The other approach involves clustering dwellings by desk top and/or site inspection so that all dwellings in the cluster can be represented by one or more dwellings that are considered to have higher noise exposures than the remainder of dwellings in the cluster. Measurements are then conducted at the site of the one or more of the dwellings predicted to experience the higher noise exposures.

Overall, the guiding principle of site selection is to ensure that there is full spatial coverage of all potential noise

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sensitive receptors along the roadway. To affect this principle, the spatial noise sampling should use the clustering-based site selection processes described immediately above. In this way, measurements will be obtained at a representative number of sites along the roadway of interest.

For noise measurements conducted by or on behalf of Main Roads, advice to the owners/occupiers of selected noise measurement sites in the format of an information letter and 'Notice of Entry' Form (M727) (Refer example in Appendix 4C of this Chapter) shall be prepared by a Main Roads representative and presented or delivered to the site owner/occupier on initial contact at each site.

Written approval by the site owner/occupier (i.e. a signed Form M727) shall be obtained prior to entering the site for noise measurement purposes. Where written approval is not obtained after three (3) days following receipt by the owner/occupier of Form M727, the Main Roads' representative may elect to:

- proceed with entering the site without written approval;
- investigate the availability of other potential noise measurement sites representative of that area; or
- eliminate the measurement site from the measurement program.

Combined, the information letter and 'Notice of Entry' Form (M727) shall outline:

- the purpose for the road traffic noise measurement;
- the proposed duration of the road traffic noise measurement period;
- the process of conducting the road traffic noise measurement;

- household activities that should be avoided during the road traffic noise measurement (i.e. lawnmowing); and
- contact details of the Main Roads representative and noise measurement officer.

### Measurement locations

At each of the sites identified in "Site Selection" above, the road traffic noise measurement shall be undertaken at the appropriate location. For noise sensitive buildings, the measurement location shall be at the façade of the building most exposed to the road traffic noise. Furthermore, the measurement location shall be at the mid window height of the highest storey of the building, with the windows closed. Otherwise it shall be at a minimum of 1.8m for a ground floor and 4.6m for a first floor above the building pad level, which ever is the higher.

The measurement location shall be at a distance of 1m from the building façade. The measurement location for proposed developments shall be at the set back distance complying with local government requirements wherever possible. When a noise measurement is made in the free field at the site of a potential noise sensitive building, it shall have a façade correction of 2.5dB(A) added to the measurement to determine the façade corrected noise level. For schools and other similar sensitive receptors, the measurement location inside the building shall be at the centre of the most exposed room and a height of 1.5m above finished floor level. For open space e.g. outdoor educational and passive recreational areas (including parks), it shall be at a height of 1.5m above ground level in the free-field and the location shall be determined on a case by case basis, taking into consideration the full circumstance surrounding the provision and future use of the open space. (e.g. in large areas of open

space, only a small percentage may be impacted by road traffic noise and there is often scope to locate activities away from the influence of road traffic noise. The minimum area of open space where the Main Roads criterion level is to be achieved shall be 2000 square metres).

For all measurements, it shall be clearly documented as to whether the measurement data is "free field" or "façade corrected".

Where it is not possible or obstructed to measure at the building facade, it is permitted for a measurement to be undertaken in a free field at a location that simulates the "façade corrected" location. The facade corrections can then be added to the free field measurement to establish the façade corrected level.

Reference shall be made to AS 2702 (1984) for the determination of façade corrected and free field locations.

#### **Measurement error**

As with all measurements, road traffic noise has a variation associated with it and this variation is known as measurement error. There are many factors that contribute to this measurement error and these include wind effects (which generate extraneous noise on the microphone and also affect noise propagation) and variations in traffic conditions. In addition instrumentation accuracy and calibration, interference from other noise sources not associated with the traffic, and what is generally termed measurement uncertainty, can also contribute to measurement error.

For any given site, measurements are required to be undertaken for a minimum period of two x 24 hour days to increase reliability of data due to measurement error.

A measured noise level should be compared with a calculated noise level determined simultaneously to aid in the determination of any measurement error.

#### **Quality control**

Road traffic noise measurements have to be conducted according to recognised standards such as AS 2702 (1984). Moreover the measurements must be conducted and interpreted by competent personnel. Particular care must be taken when using unmanned monitoring equipment where the potential for data contamination from extraneous sources not associated with road traffic may exist. Appropriate quality control procedures are required to ensure that the reported road traffic noise levels are, in fact, associated with the subject road source under consideration, and not with extraneous noise sources.

All road traffic noise assessment reports shall state that all measurements have been conducted by competent personnel to the appropriate standards.

#### **Post construction measurements**

Post construction noise measurements shall be conducted upon new and upgraded road segments becoming operational as well as along existing road sections where noise attenuation treatments have recently been constructed. Preferably, post construction noise monitoring shall be undertaken within approximately 3-6 months of the opening/operation of the new/upgraded road or following completion of a noise attenuation works along an existing road section. As a minimum, post construction monitoring shall be carried out at the same representative measurement sites where preconstruction monitoring had been undertaken.

Where feasible, post construction measurement should be accompanied by simultaneous measurements of the traffic volumes, compositions and speeds. In this way the resulting measured noise levels may be subsequently adjusted by a correction (usually upwards) to account for changes in traffic conditions that will occur

# 4

between the time of the measurements and the 10 year horizon for which the assessment of the road traffic noise impact had been conducted. Note that in some cases, a program of installation of roadside noise barriers occurs after the roadway has become operational. In these cases, post construction noise measurements at those locations where the traffic noise levels may change due to the installation of barriers, shall be delayed until these noise attenuation treatments are in place.

#### 4.3.1.4 Measured road traffic noise descriptors

Generally road traffic noise is measured, calculated and predicted utilising noise descriptors such as the  $L_{A10}$  (18h),  $L_{A10}$  (1h) and the  $L_{Aeq}$ (1h) descriptors, as discussed elsewhere in this CoP.

#### A relationship between two key road traffic noise descriptors

In most cases, the relationship between noise descriptors for an existing road should be derived from actual measurement data recorded for the particular location.

However it has been regularly observed in Australian and international studies over several years that there are readily determined correlations between the various road traffic noise descriptors. These typically take the form of empirically determined relationships such as the one below which was reproduced from Samuels and Huybregts (1998).

$$L_{A10}(1h) = L_{Aeq}(1h) + 3.0 \quad (4.3.1.4)$$

It should be noted that this relationship is generally only valid for traffic volumes in the range of 300 to 1100 vehicles per hour. (Abbott and Harris 1999).

#### Screening of measured noise descriptors $L_{A10}$ (1h) and $L_{Aeq}$ (1h)

The relationship in Equation 4.3.1.4 above can be most useful in screening measured

data to ensure that only noise levels arising from road traffic are considered in the subsequent noise assessment process. Since the Equation 4.3.1.4 relationship only applies to road traffic noise, it may be used as a data filter to remove measured data that have been contaminated by extraneous sources. The general principle of this data screening process is to scrutinise the data measured at each site to ensure that the measured  $L_{A10}$  (1h) and  $L_{Aeq}$  (1h) descriptors generally conform to the relationship in Equation 4.3.1.4.

It should also be noted that the constant in Equation 4.3.1.4 is an averaged value which was based on an extensive analysis of substantial data sets. The 95% confidence limits around this constant is close to  $\pm 1$  dB(A) and these limits should be taken into account when determining the conformity of measured data to the relationship of Equation 4.3.1.4. For example, the measured data in any given hour would generally be deemed to comply with this relationship if the difference between the measured  $L_{A10}$  (1h) and  $L_{Aeq}$  (1h) descriptors fell between 2.0 and 4.0 dB(A).

Another application of Equation 4.3.1.4 involves a further quality control check on measured  $L_{A10}$  (18h) traffic noise descriptors. Again this check is aimed at ensuring that the measured data are truly representative of road traffic noise at the site and have not been contaminated by extraneous noise or by adverse weather conditions. With due consideration being given to the information stated in the following, low traffic flow conditions by applying the relationship of Equation 4.3.1.4 to the 18 sets of measured  $L_{A10}$  (1h) and  $L_{Aeq}$  (1h) descriptors over the course of an 18 hour day, measured data not complying with Equation 4.3.1.4 may be eliminated from future use. In this instance the overriding principles are that no more than three of the 18 hourly measurements may be discarded and that of these, no more

than two can from adjacent hours. If these two principles are met, then the three discarded non-continuous or two discarded continuous hours' measurements may be substituted by simple linear interpolation of the remaining data. Furthermore, if more than three non-continuous or two continuous hours data are discarded then the entire days data must also be eliminated from future use.

#### Low traffic flow conditions

The relationship of Equation 4.3.1.4 determined from analyses of data collected at a variety of road types and generally where reasonable traffic volumes occurred.

The generation of road traffic noise is somewhat different under low traffic flow conditions compared to higher or "normal" traffic flow conditions. In particular the  $L_{A10}$  (1h) and  $L_{Aeq}$  (1h) descriptors are most sensitive to variations in traffic flow at low traffic flow conditions (CoRTN 1988). In this context, low traffic flow conditions are those where the traffic flow drops below around 300 vehicles per hour; below about 4000 vehicles per 18 hour (0600 to 2400 hours) or below approximately 4500 vehicles per (24 hour) day. Under these low traffic flow conditions, the rate at which road traffic noise varies with traffic flow is more rapid than under the nominal 'normal' conditions. In addition, the noise/traffic flow relationship also varies with the distance from the roadway, the measurement location and the average speed under low traffic flow conditions.

Therefore when road traffic noise measurements are made under low traffic flow conditions, it is even more important than previously discussed to ensure that extraneous noises do not affect the measured road traffic noise levels.

Consequently, under these conditions data screening then becomes a "manual" type process which would include activities

such as attended monitoring, listening to audio recordings or watching and listening to audio/visual recordings made during the data collection period.

#### 4.3.2 Calculation and Prediction

For the purposes of this CoP, the terms "calculation" and "prediction" of road traffic noise are defined as follows:

- **Calculation** of road traffic noise involves the use of a road traffic noise calculation model to estimate the existing noise levels at or near the subject road segment.
- **Prediction** of road traffic noise involves the use of a road traffic noise calculation model to estimate the future noise levels at or near to the subject road segment.

Any given road traffic noise calculation and prediction model usually involves a series of algorithms that describe and quantify the manner in which noise is generated, propagated and attenuated. There are many road traffic noise calculation and prediction models and associated computer software packages available worldwide. Two road traffic noise calculation and prediction models commonly used in Australia are the Calculation of Road Traffic Noise (CoRTN) and the Traffic Noise Model (TNM).

Scientifically based studies of the CoRTN and TNM models have been conducted in Australia. The process of determining the performance of a model in the calculation of road traffic noise involves a series of scientifically based procedures known as evaluation, calibration and validation.

##### 4.3.2.1 Calculation of Road Traffic Noise (CoRTN).

CoRTN is a widely adopted road traffic noise model originating in the UK. It was

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first released in 1975 and was subsequently updated in 1988. In 1983, a NAASRA (the predecessor of Austroads) Working Group comprehensively evaluated CoRTN under Australian conditions (Saunders et al 1983). CoRTN allows for calculations and predictions of either the  $L_{A10}$  (18h) or  $L_{A10}$  (1h) noise descriptors. CoRTN has been widely used in Queensland by Main Roads and assessment providers.

The accuracy of CoRTN for Queensland conditions statistically has been analysed by Saunders, Samuels, Hall and Leach (1983). These accuracy figures are presented in Table 4.3.2.1. Note that the 1983 factors apply generally across Queensland, with the exception of calculations and predictions

along the Pacific Motorway between the Logan Motorway and Nerang. For this section of the Pacific Motorway, CoRTN has been comprehensively evaluated, calibrated and validated as part of the Pacific Motorway Noise Reassessment Project (2004). The accuracy figures and calibration factors resulting from this analysis are also presented in Table 4.3.2.1. The accuracy figures in Table 4.3.2.1 represent the 95% confidence limits around the calibrated calculations or predictions.

The calibration factors shown in Table 4.3.2.1 shall be added to the calculated or predicted noise level using CoRTN.

Table 4.3.2.1 CoRTN calibration factors and accuracies for Queensland conditions

Road location	Receptor location	Calibration Factor (dB(A))	Accuracy of calibrated calculation or prediction (dB(A))
Across Queensland (Except Pacific Motorway, Logan Motorway to Nerang.) (1983)	Free field	- 0.7 at DGA sites	± 3.6
	1 m in front of building facade	- 1.7 at DGA sites	± 5.0
Along the Pacific Motorway (Logan Motorway to Nerang) (2004)	Free field	- 9.7 at PCC sites - 6.0 at OGA sites	± 6.8 ± 5.2
	1 m in front of building facade	- 9.7 at PCC sites - 6.0 at OGA sites	± 6.8 ± 5.2
DGA (Dense Graded Asphalt) PCC (Portland Cement Concrete) OGA (Open Graded Asphalt)			

The step process documented in the CoRTN Manual does not intend to present a completely exhaustive explanation of the CoRTN calculation process. Rather it sets out a typical, common and rather simple calculation process wherein the major aspects of the CoRTN procedures are covered. Reference should always be made to the CoRTN Manual for further information of how CoRTN addresses additional issues such as the following:

- calculation for low traffic flows
- calculations at the end of a section of upgraded roadway
- allowing for horizontal curvature in the road alignment
- screening and reflection effects from adjacent buildings and other nearby infrastructure including opposite facades
- multiple screening from more than one barrier
- calculations of contributions from segmental angles
- determination of the average height of propagation.

CoRTN does include a procedure for allowing for the effects of pavement surface type on the calculated and predicted noise level. This particular procedure is not adopted in Queensland and in other Australian States.

In Queensland, the effects of pavement surface type are allowed for by application of the factors documented in Table 4.3.4.1 of this Chapter. Note that a similar procedure is also adopted in other Australian States. It is emphasised that these factors (relative to DGA) shall be applied to other calculation and prediction

methods such as TNM when these methods are used in Queensland.

#### 4.3.2.2 Traffic Noise Model (TNM).

The American Federal Highway Administration produced this model after several years of well-publicised research and development. The first version of TNM was released in 1998 (Menge et al 1998) and two updated versions have subsequently been released. These updated versions incorporate enhancements to the TNM software. TNM has also been evaluated in Queensland (Samuels and Batstone 2000, Samuels and Parnell 2002) and in other States across Australia (eg Samuels, Huybregts, Batstone and West 2001). All these evaluation studies showed that TNM performed to a similar degree of accuracy as CoRTN.

On the basis of the information presented in Samuels and Parnell (2002), calibration factors for TNM in Queensland were determined. In this case, the calibration factors apply to free field conditions over a range of pavement surface types. In Table 4.3.2.2 the model calibration factors for Queensland conditions are shown and these shall be added to the calculated or predicted noise level using TNM. Also shown in Table 4.3.2.2 is the sample sizes (i.e. the number of sites at which data were measured and calculated) obtained by Samuels and Parnell (2002) for each pavement surface type. Note that the sample sizes for the pavement surfaces are quite low which means that the calibration factors in Table 4.3.2.2 for these pavement surfaces are not as scientifically robust as those that were determined for use with CoRTN. Nevertheless the calibration factors for these pavement surfaces may be adopted (cautiously) on an interim basis until further data become available.

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The accuracy figures in Table 4.3.2.2 represent the 95% confidence limits around the calibrated calculations or predictions.

The primary reasons for the interest in TNM are firstly that it incorporates some of the latest technological developments in areas such as vehicle noise source types and outputs and in relation to noise propagation theory. In addition, TNM has been configured to calculate and predict the noise descriptor  $L_{Aeq}$ . Any calculation or prediction determined using TNM requires a conversion to the relevant noise descriptor (ie.  $L_{10}$  (18hr) or  $L_{10}$  (1hr)) in order to be assessable against the relevant criteria outlined in Chapter 3 of this CoP. The conversion relationship shall be representative of the conditions at each site as determined by noise measurement. It should be noted that a conversion

relationship introduces an additional factor for uncertainty in the calculation or prediction.

TNM is a computerised model that includes some powerful interactive data input and output routines and using TNM requires running a sophisticated computer package. However, the care to detail in translating any given situation into values of model input parameters necessary to conduct calculations and predictions with CoRTN is also required when using TNM. Indeed such care is necessary when using any traffic noise calculation and prediction model.

With the application of the TNM calibration factors, careful interrogation of the results determined by the modelling needs to be undertaken.

Table 4.3.2.2 TNM (Version 1.1) calibration factors and accuracies for Queensland conditions under free field conditions

Pavement surface type	Calibration factor (dB(A))	Accuracy of calibrated calculation (dB(A))	Sample size
All sites	- 2.5	± 9.0	15
CS sites	- 5.0	± 4.0	5
PCC sites	- 5.5	± 2.2	2
DGA sites	+ 2.3	± 4.4	6
OGA sites	- 7.6	± 2.2	2

#### 4.3.2.3 Calculations and predictions using computer software

When using CoRTN, it is possible to undertake calculations and predictions in a so called “manual” method by reading values off the various charts and tables set out in the CoRTN manual. This process can provide reasonably good calculations and predictions.

A preferred and detailed approach is to employ the algorithms where they are given throughout CoRTN to undertake the calculations or predictions. These algorithms form the basis of the several commercially available computer versions of CoRTN such as SoundPLAN, PEN and TNoise. Several local consultants and other organisations have also developed their “in house” spreadsheet programs for undertaking calculations or predictions with CoRTN.

Irrespective of whether a manual or software based technique using any model is adopted, the most critical aspect of the entire calculations or prediction process is determining the input parameters required and the values of each parameter. This statement is, in fact, valid irrespective of the road traffic noise calculation and prediction model adopted.

#### 4.3.2.4 The accuracy of calculations and predictions

The accuracies of CoRTN and TNM calculations and predictions have been discussed above and accuracy figures have been documented in Table 4.3.2.1 and Table 4.3.2.2. In order for both Main Roads and the community to have confidence in the results of noise calculations and predictions and using models such as CoRTN and TNM, it is necessary to undertake careful, scientifically based studies of the models themselves. The process of determining the performance of a

model in calculating and predicting road traffic noise involves a series of scientifically based procedures known as evaluation, calibration and validation. (Samuels 2005, Samuels Peters and Hall 2004, Samuels and Parnell 2002).

#### 4.3.3 Criteria Assessment

Prior to undertaking any measurement, calculations and predictions, the relevant road traffic noise criteria pertaining to the site should have been established in accordance with Chapter 3 of this CoP. Once the measurements, calculations and predictions are completed, a comparison of the road traffic noise exposures with the established criteria can be conducted.

Where the calculated or predicted exposures are greater than the relevant criteria, the acoustic assessment shall then give consideration to managing the road traffic noise impact at those areas exceeding the criteria. Methods for the management of road traffic noise impact are detailed in Section 4.3.4 of this Chapter.

#### 4.3.4 Road Traffic Noise Impact Management

There are several ways in which the impact of road traffic noise can be reduced (Figure 4.3.4):

- At the source (ie. controlling the noise emitted by the vehicle).
- At the reception point, by means of building location and design to minimise noise transmission into the interior of a building.
- Along the propagation path (ie. attenuating the noise as it travels between the source and reception point by means of noise barriers or buffer zones).

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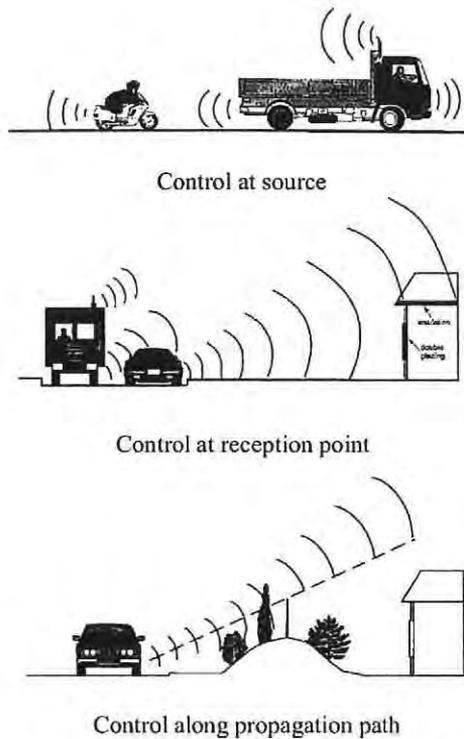


Figure 4.3.4 Methods for the Management of Road Traffic Noise Impact

#### 4.3.4.1 Control at the Source

In the long term, the most equitable method of reducing road traffic noise is through control at the source. This is being constantly addressed in the Australian Design Rules (ADRs), by reducing maximum noise emission levels of new vehicles.

Queensland Transport has been involved in the formulation and administration of these rules and their enforcement is covered under the Transport Operation (Road Use Management) Act 1995. Queensland Transport and Main Roads encourage and support related research and development for quieter vehicles.

The selection of pavement surface type can also have a noticeable effect on road traffic noise levels.

### The sources and control of road traffic noise

Technically, road traffic noise may be regarded as *the aggregation of the noise produced by individual vehicles in the traffic stream* (Houghton 1994). There are several sources of vehicle noise including the engine, the exhaust system, tyre/road interaction, the air intake and the cooling fan. However, with the exception of motorcycles and the like, for just about all vehicles in a reasonable state of maintenance, tyre/road interaction represents the primary source of noise for all constant speeds in excess of around 40 to 50 km/h. The magnitude of tyre/road noise levels generated on roads such as those within the jurisdiction of Main Roads, depends largely on the pavement surface type. Consequently, one very effective means of controlling road traffic noise at the source is to vary the pavement surface type.

### Pavement surface effects on traffic noise

Since pavement surface type is such an important factor in the generation of road traffic noise, much research has been conducted in Australia and internationally on this topic (Samuels 1982, Samuels and Dash 1996, Samuels and Parnell 2002, Sandberg and Ejsmont 2002). The acoustic performances of various pavement surface types that have been scientifically investigated in Queensland are set out in great detail in the *Main Roads Pavement Surface Noise Resource Manual* (Samuels 2005 and Samuels 2006). This Manual primarily focuses on the following pavement surface types which are widely used throughout Queensland and indeed throughout Australia and internationally:

- **Bituminous Seal (BS)** - a thin pavement surfacing comprising a layer

of bitumen onto which cover aggregate has been placed and compacted by a rolling process.

- **Portland Cement Concrete (PCC)** - a cement concrete pavement (reinforced or unreinforced) that may have various surface textures applied by tining or other techniques.
- **Asphalt** – in general, comprised of mineral aggregate in a bituminous binder. Asphalt surfacings differ by the proportion of different size aggregate (crushed rock,) the amount of bitumen added and the presence of other additives and material.
- **Dense Graded Asphalt (DGA)** is a smooth, uniform aggregate graded pavement surfacing. The depth depends on the purpose of pavement surface layer (i.e. structural or surface layer).
- **Stone Mastic Asphalt (SMA)** - an asphalt mix design typically that has a higher proportion of the larger stones and fine particles but relatively few stones of the intermediate size as opposed to the other asphalts mix designs.
- **Open Graded Asphalt (OGA)** - comprised of a porous layer, usually a minimum of 25 to 45 mm thick, which is usually overlaid on a DGA and which provides a water drainage path within

the porous layer. OGA has a higher proportion of the larger stones (compared with DGA) and a smaller percentage of small stones and fine particles. This type of pavement surface is also referred to as an

- Open Graded Friction Course in some references.

#### **The acoustic attributes of Queensland pavement surface types**

The acoustic attributes of Queensland pavement surface types are documented in Appendix 4D of the Chapter. This research work should be referenced where additional interrogation is required to determine the impact of individual pavement surface type on the outcome of the calculations.

#### **Pavement Surface Correction Factors**

With due consideration being given to the outcomes of the investigations into the acoustic attributes of various pavement surface types, it is recommended that the pavement surface correction factors (relevant to DGA) given in Table 4.3.4.1 be adopted for the assessment of the impact of road traffic noise. These pavement surface correction factors are based on an interrogation of the outcomes of Samuels 2005 and Samuels 2006.

Table 4.3.4.1 Pavement Surface Correction Factors.

Pavement Surface Type	Change in Noise Level (dB(A)) <sup>3</sup>
Portland Cement Concrete (PCC)	Increase by 5
16-20mm Bituminous Seal (BS) <sup>1</sup>	Increase by 4-5
5-14mm Bituminous Seal (BS) <sup>1</sup>	Increase by 2-4
Dense Graded Asphalt (DGA)	0
Stone Mastic Asphalt (SMA)	Decrease by 1
Low Noise Stone Mastic Asphalt (LNSMA) <sup>2</sup>	Decrease by 2
Open Graded Asphalt (OGA)	Decrease by 2

Note 1: For a two coat Bituminous Seal, the size of the aggregate in the second coat shall be used to determine the pavement surface correction factor from this table.

Should a more detailed estimate of the pavement surface correction factors be required, reference should be made to Appendix 4D of this Chapter and the Main Roads Pavement Surface Noise Resource Manual (Samuels 2005 and Samuels 2006).

Note 2: Proprietary product not covered by Main Roads Specifications

Note 3: These correction factors are nominally based on the average life of the pavement surface type, for all speeds  $\geq 60$  km/hr.

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#### 4.3.4.2 Control at the Reception Point

Main Roads will consider treatments at the reception point where there are:

- alterations to an existing road which impact on a partially acquired property (forms part of a land acquisition agreement);
- a change in land use or proposed development contiguous to an existing State-controlled road (developer's responsibility); or
- exceptional circumstances.

It is desirable to examine noise issues at all phases of a proposed road project. Planned future land development should also be considered in all road traffic noise investigations.

Proper planning and design at the land use development approval stage should remove the need to attenuate impacts at a later date.

Where dwellings are built after construction of the road, appropriate architectural design and treatment at the reception point can limit the intrusion of road traffic noise. (Refer to Chapter 6 of this CoP)

Measures such as acoustic seals, thickened glass, double glazing of windows and ceiling insulation can be effective means of treatment. These should be applied where effective indoor communication, sleeping and other noise-sensitive activities are required and where other alternatives are not appropriate.

To achieve the internal criterion levels specified in AS2107-2000, architectural treatment shall be designed in accordance with AS3671-1989.

Effective land use planning and design play an important role in abating road traffic noise exposure. The siting of less sensitive land uses in areas likely to be adversely affected can minimise noise impact.

When exceptional circumstances prevail, the assessment of the impact of road traffic noise will include the prediction of noise levels at the façade(s) of every dwelling where the criterion level is likely to be exceeded for a 10 year horizon. This will provide a preliminary list of dwellings which may be eligible for treatment.

Main Roads or its representative will engage the assessment provider which undertook the assessment to conduct an inspection of each dwelling with due consideration being given to the predicted noise level, in order to confirm whether or not the dwelling, and which facades of habitable rooms are eligible for treatment.

Main Roads or its representative will confirm in writing whether or not the dwelling qualifies and, if so, provide indicative details of the proposed treatment.

Once the confirmation has been made that the dwelling qualifies for treatment, and the owner(s) agrees in writing to proceed, the following process shall be put in place:

- Main Roads or its representative will engage a mechanical ventilation/air-conditioning contractor/consultant to inspect the dwelling and prepare a written proposal including scope of works and a schematic design. The contractor/consultant will be requested to provide a written quote to Main Roads or its representative. The contractor/consultant will be accompanied by the nominated project manager who will co-ordinate all aspects of the work.
- The nominated project manager will contact the dwellings owner(s) in writing to provide details of the proposal and seek agreement in writing to proceed with the treatment. A Consent and Agreement Deed (Refer to Appendix E of this Chapter) will be

sent to the dwelling owner(s), which will include the scope of works and a schematic design, for signature by the dwelling owner(s) to indicate that the owner(s) is satisfied with the proposal and wishes to proceed with the treatment.

- When Main Roads or its representative receives the signed agreement, Main Roads or its representative will instruct the contractor/consultant to proceed with the works. The works will be supervised by the nominated project manager.
- On completion of the works, the nominated project manager will request the owner(s) to sign a copy of an Acceptance of Treatment Agreement (refer to Appendix E of this Chapter) to confirm that the work has been satisfactorily completed and has been demonstrated to be operational. The owner(s) will be provided with any manufacturer's warranty details for any air-conditioning/mechanical ventilation system(s) and/or architectural treatment of the building envelope installed.

Main Roads will not contribute to the running/maintenance costs of the treatments. These will be the responsibility of the dwelling owner(s).

#### 4.3.4.3 Control along propagation path

Main Roads, local government and land developers have the greatest scope for control between the source and the reception point. The selection of alignment, grading, and provision of earth mounds and other noise barriers within or outside the road reserve, are some of the design features requiring early consideration in the planning and preliminary design phases. Chapter 5 of the CoP provides guidance for road planners and designers on how to

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integrate such features into the road landscape.

To achieve the external criterion level, in general terms attenuation strategies may include building setback, reduced building heights, landscaped earth mounds and/or landscaped noise fences. Noise fences placed on the property boundary of the State-controlled road reserve shall be:

- landscaped to permit dense screen plantings.
- Located such that the middle of the noise fence post is on the common boundary line of the road reserve and the adjoining property in accordance with the Dividing Fence Act 1953.

Land used outside of the road reserve (including buffer strips) for the purpose of noise fences and landscaped earth mounds shall be owned and maintained by the land owners (private or local government). All noise barriers and landscaping shall be to the satisfaction of Main Roads.

Effective reductions in road traffic noise levels can be achieved through distance alone. However, in an urban environment, applying this method is not sustainable over greater distances from the source due to the cost of land acquisition and maximum lot yield.

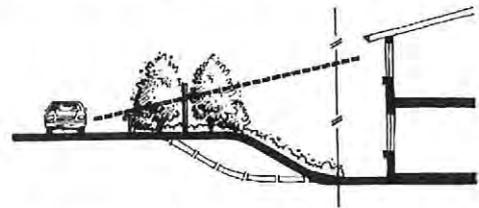
For detailed requirements regarding landscaping, the Main Roads, Road Landscape Manual (2004) should be consulted.

4.3.4.4 Acoustic Effectiveness

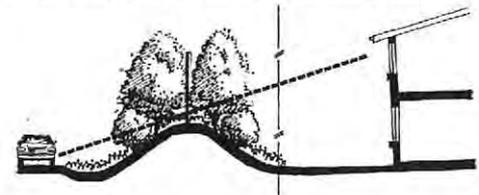
Noise can be attenuated by several treatments. Noise barriers may be constructed as a method of attenuation with or without pavement surface type.

The acoustic effectiveness of noise barriers may be substantially enhanced if the alignment and height of the noise barrier are determined during road or land use

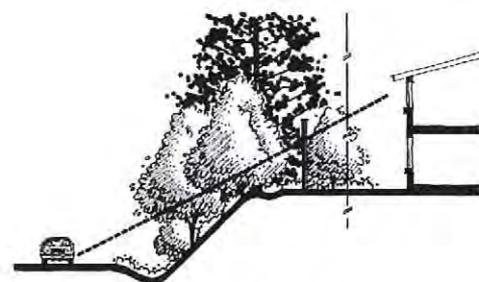
design to maximise noise attenuation. Examples of possible locations for noise barriers are depicted in Figure 4.3.4.4(a).



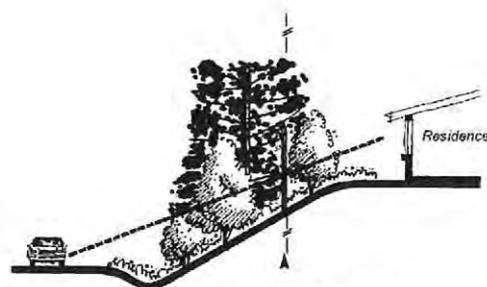
Noise Fence on Widened Embankment



Noise Fence in Combination with Earth Mound



Noise Fence on Top of Cutting)



Noise Fence at the Property Boundary

Figure 4.3.4.4(a) Possible Barrier Locations

Earth mounds and/or noise fences are effective only when the line of sight between the source and reception point is fully interrupted. Therefore, in some cases, their effectiveness is limited and largely dependent on the local topography and height of buildings.

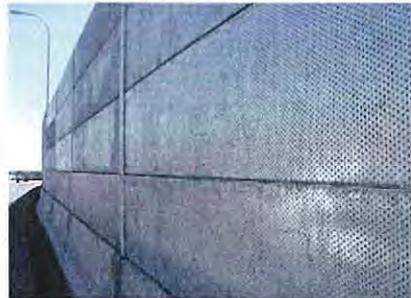
The acoustic properties of noise fences have an important role to play in noise attenuation. These acoustic properties are:

- absorption;
- reflection; and
- dispersion.

Absorptive noise fences contain materials that absorb sound waves. Reflective noise fences force sound waves to reflect back off their surface. Dispersive noise fences contain materials and/or patterns that alter the sound waves that come in contact with the noise fence (Refer Figure 4.3.4.4 (b)).

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### ABSORPTIVE PANEL



### REFLECTIVE PANEL



### DISPERSIVE PANEL



Figure 4.3.4.4 (b) Types of Noise Fences

To achieve full acoustic effectiveness, all noise fences shall be designed and constructed in accordance with the requirements of Main Roads Standard Specification, MRS 11.15 "Noise Barriers".

The type of ground surface over which road traffic noise travels has a substantial effect on noise attenuation, particularly over large distances. Areas covered with grass or other types of ground covers are more absorptive than hard, paved surfaces or bodies of water which tend to reflect noise. Dense plantings of trees with an understorey of

shrubs may result in a reduction of 3 dB(A) per 30 metres of width (Harris, 1988).

Maintained landscaped earth mounds constructed to Main Roads specifications may be considered as an absorptive noise barrier treatment.

#### 4.3.4.5 Landscape Assessment Process

To ensure that the appropriate site and materials for noise barriers are selected, an assessment of the existing and intended landscape vision for a road or a given

section of road should be carried out. The purpose is to ensure that the design of any treatment for noise attenuation is fully integrated into the existing or intended road landscape.

The landscape assessment process is outlined in Figure A2-1 in the Main Roads, Road Landscape Manual (2004). It involves the following steps:

- Describe existing landscape conditions.
- Identify interaction with road proposal.
- Undertake detailed studies (if deemed necessary).
- Undertake a combined assessment of effects.
- Develop strategies to reduce any potential impact that treatments for noise attenuation may have on the visual, ecological and/or cultural environment.

#### 4.4 Selection of Preferred Attenuation Strategies

Recommendations from a Road Traffic Noise Assessment shall include:

- selection of preferred treatments for noise attenuation;
- extent of noise barriers and/or pavement surface type in both chainage and height (if required) or the Sound Transmission Class (STC) requirements for the design of buildings in new or acquired noise sensitive sites. Typical STC levels for different materials are described in *AS3671-1989*.
- selection of materials for noise fences depending on the existing or intended landscape vision for the road. Appendix 4F of this Chapter identifies the typical range of noise barrier types available.

- identification of issues requiring further consideration during the detailed design. These are discussed in Chapter 5 of this CoP (e.g horizontal and vertical alignment).

The correct sitting of noise barriers is a critical determinant in the appearance of roadside areas and the degree of "tunnelling effect" perceived by the motorists. Poor practice includes the creation of monotonous 'tunnels' lacking visual interest or balance.

Sufficient horizontal space should be allowed to set back the noise fence by at least one-and-a-half times its height (where possible). This may require noise fences to be offset from the shoulder.

In general, the preferred noise barrier options for new roads, existing roads or bridges are listed in the following sections. The preferred option on new and existing roads are landscaped earthmounds.

It may be possible to combine a concrete safety barrier, retaining wall, earth mound and noise fence (or various combinations of these) to achieve an acceptable outcome with respect to acoustic issues (noise barrier as close as possible to the source), land acquisition (resumption), engineering or environmental issues (reduction in the footprint width of a mound). Refer to Figure 4.4.1 (a).

##### 4.4.1 New Roads

- the maximum preferred height of a noise fence above the proposed ground level, natural ground level or earth mound level shall be 4.0 metres;
- the minimum offset from the noise fence to the back of any guard rail posts shall be 2.5 metres; see Figure 4.4.1 (b): and

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- the combination of a noise fence on top of a concrete safety barrier is not preferred. However, it may be possible to combine these elements if there are

savings to be made with respect to land acquisition (resumption), engineering or environmental issues etc.

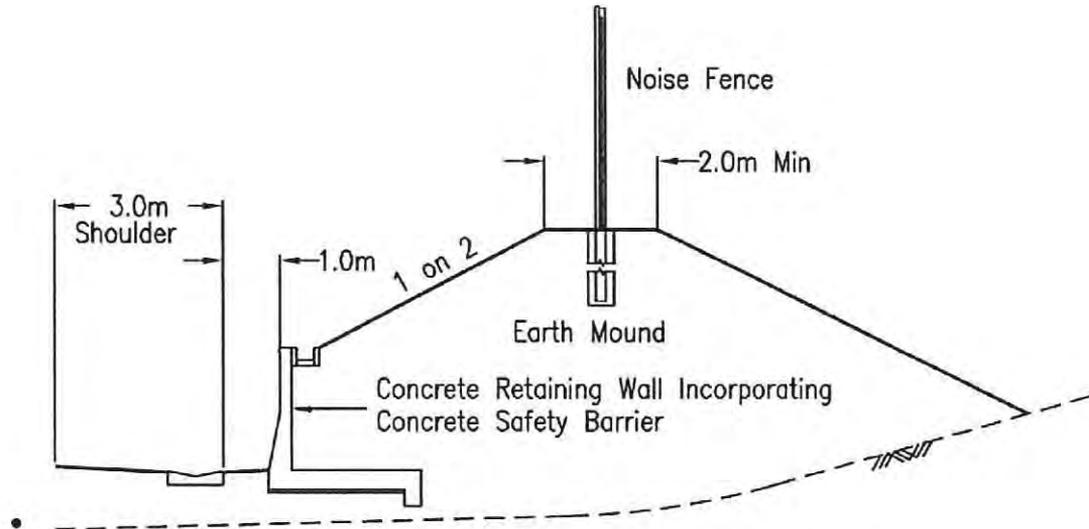


Figure 4.4.1(a) Safety Barrier, Retaining Wall, Earth Mound, Noise Fence Combination

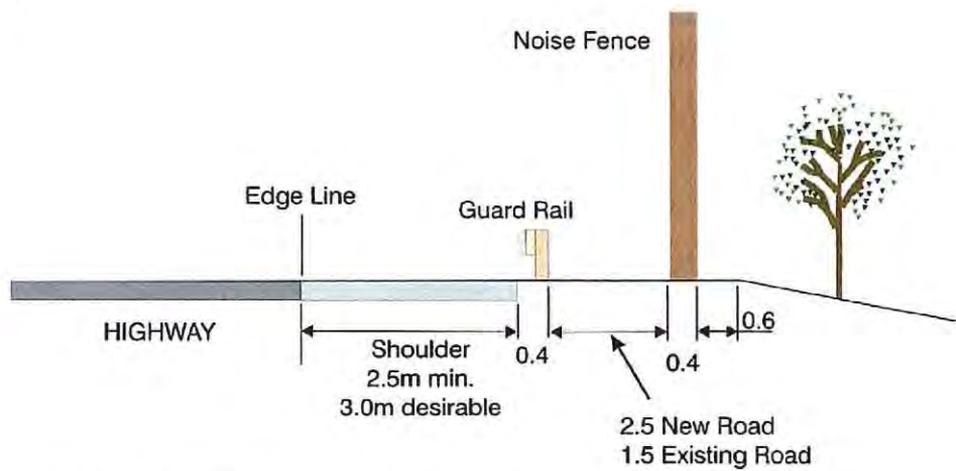


Figure 4.4.1(b) Requirements for Safety Barriers

#### 4.4.2 Existing Roads

- the maximum height of a noise fence above the existing or proposed ground level or earth mound level shall be 6.0 metres;
- the minimum offset from the noise fence to the back of any guard rail posts shall be generally 1.5 metres; Refer Figure 4.4.1(b).
- the maximum height of noise fence combined with a concrete safety barrier shall be 6.0 metres.

#### 4.4.3 Combination of a Noise Fence and Concrete Safety Barrier

In the determination of the most suitable cross section for the combination of safety barriers and noise fences, it is necessary to refer to Clause 7.10.3 of the Main Roads Road Planning and Design Manual. Specific reference is made to Figure 7.22, Working Width. If there is a likelihood that a truck may impact a noise fence due to the pavement surface crossfall (with or without a shoulder), then the decision as to whether a noise fence can be located on top of a concrete safety barrier or behind the concrete safety barrier, is based on a risk assessment with respect to the possibility of the noise fence falling onto a pedestrian or specific sensitive object, for example, light pole, electrical switchboard etc.

If the risk is low, it is considered that the noise fence could be located on top of the concrete safety barrier.

If a precast concrete safety barrier is proposed to be used, then it is recommended that Option A be used. (Refer to Figure 4.4.3 (a))

It is considered that there will be sufficient space for the noise fence post to be placed

behind the precast concrete safety barrier even though it might be close to the hinge point. This can be easily catered for in the structural design.

The noise barrier posts actually support the precast concrete safety barrier.

Note that a gap is permitted below the noise fence in order to ensure that any rubbish that is collected between the precast concrete safety barrier and the noise fence, can fall under the noise fence. The vertical overlap between the precast concrete safety barrier and the noise fence shall be two (2) times the horizontal distance between the top of the precast concrete safety barrier and the noise fence.

If extruded concrete safety barriers are proposed, then it is possible for a number of options to be considered.

In some situations, that is, low noise fences  $\leq 1200\text{mm}$  above extruded concrete safety barrier, it may be possible to fix the noise fence posts to the top of the extruded concrete safety barrier subject to structural considerations. Refer to Option B (Figure 4.4.3 (b)).

For visual amenity reasons, the preference would be to locate the noise fence behind the extruded concrete safety barrier. However, for constructability reasons, if the extruded concrete safety barrier is to be placed after the noise fence, the noise fence posts will need to be located a minimum of 500mm from the toe of the extruded concrete safety barrier. If the extruded concrete safety barrier is to be placed before the noise fence, the noise fence posts will need to be located a minimum of 300mm from the toe of the extruded concrete safety barrier. Refer to Option C (Figure 4.4.3 (c)). It will be necessary to provide a gap of approximately 200mm under the noise fence in these instances to enable rubbish collected between the extruded concrete safety barrier and the

noise fence to be removed under the noise fence. Even if a noise fence post is to be located beyond the hinge point on the fill batter, this can be easily catered for in the structural design.

an extruded concrete safety barrier, a patented proprietary system is available. Refer to Option D (Figure 4.4.3(d)).

As well, for a higher noise fence on top of

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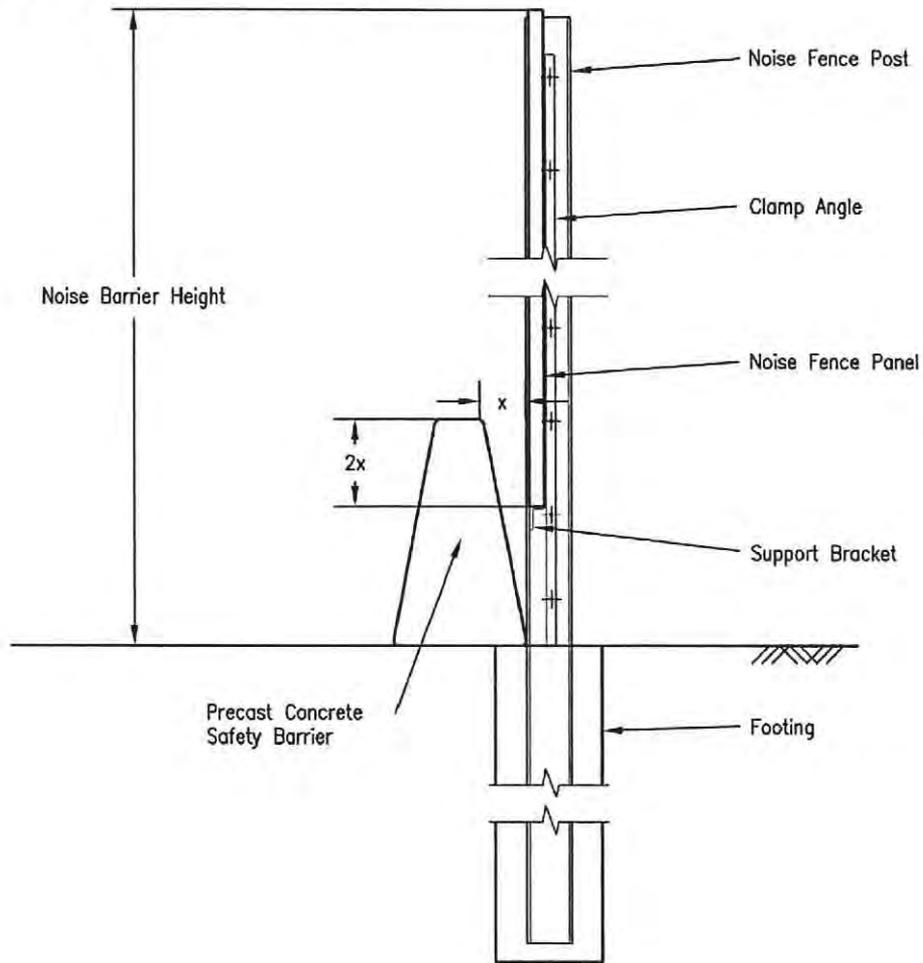


Figure 4.4.3(a) Option A – Precast Concrete Safety Barrier

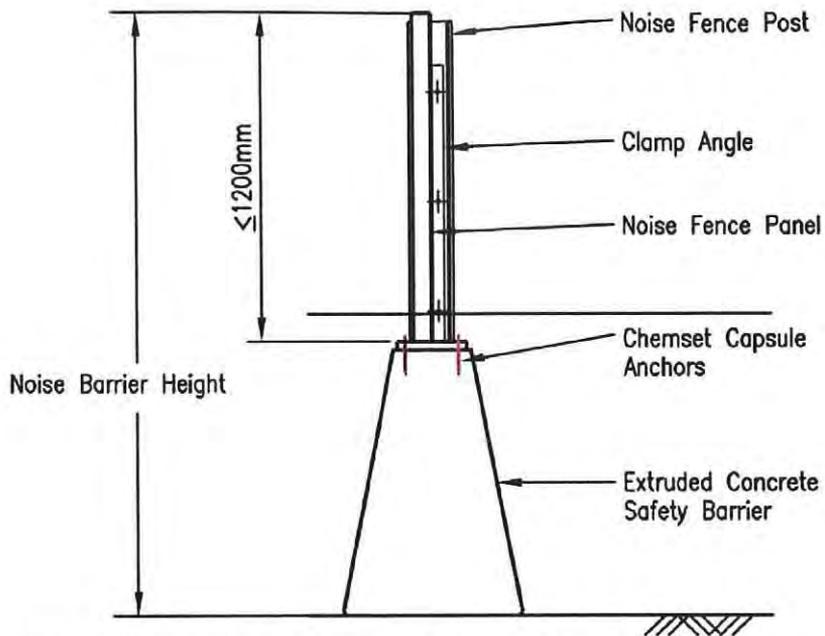


Figure 4.4.3(b) Option B – Extruded Concrete Safety Barrier

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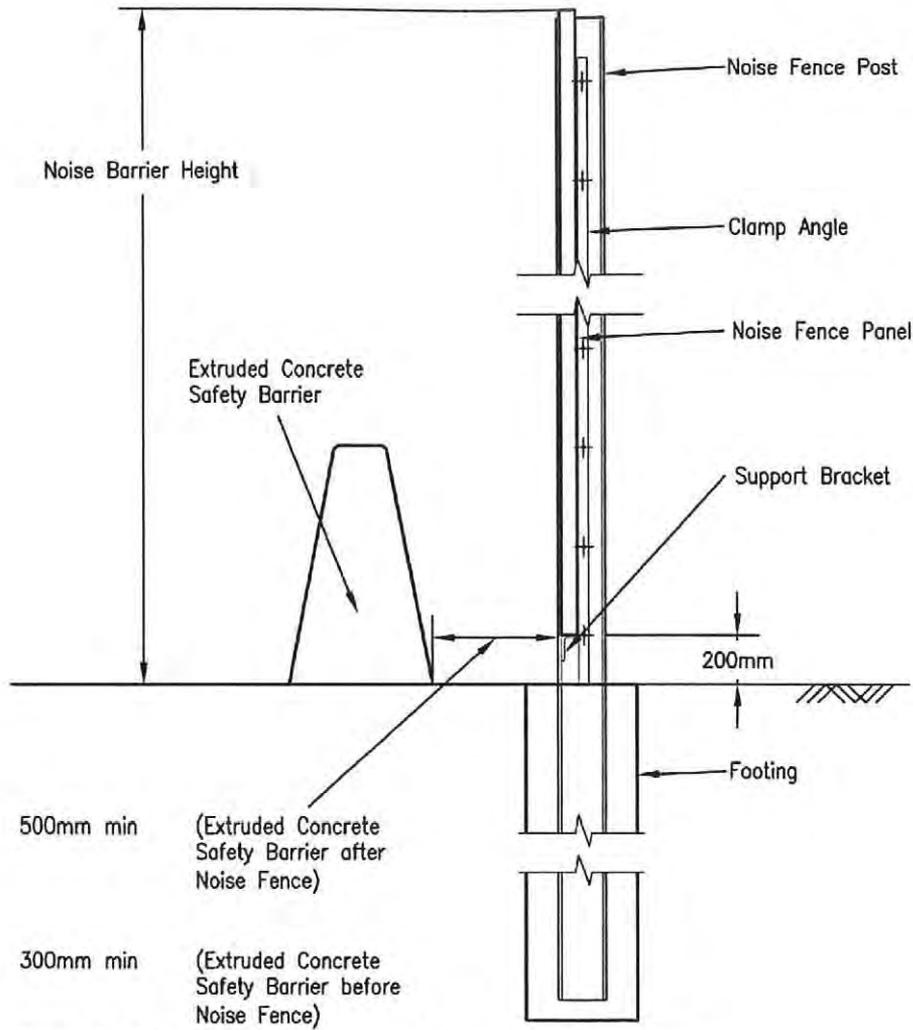


Figure 4.4.3(c) Option C – Extruded Concrete Safety Barrier

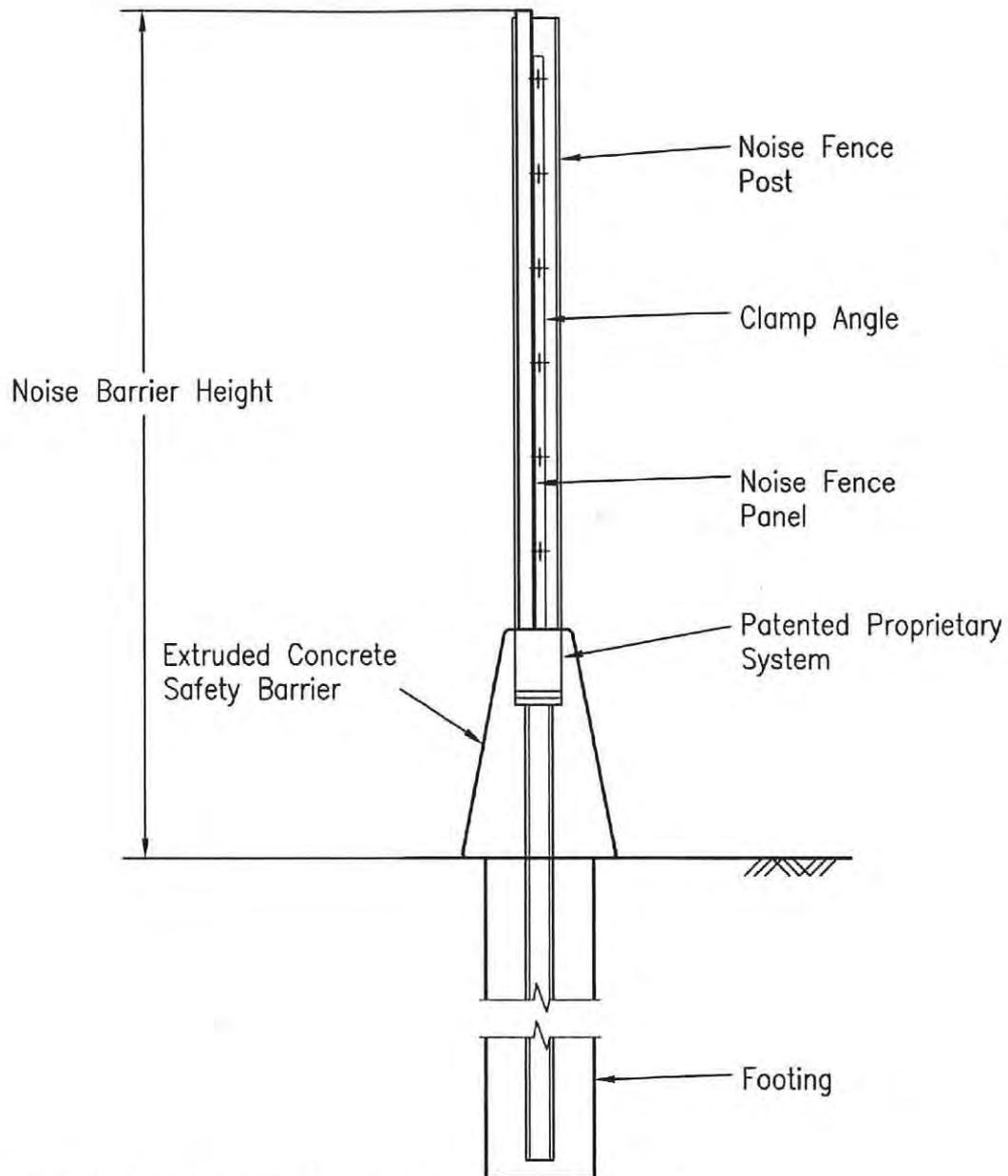


Figure 4.4.3(d) Option D – Extruded Concrete Safety Barrier

#### 4.4.4 Bridges

Being raised above ground level, bridges often present an opportunity for outward views from the road. Transparent noise fences should be considered where there are significant views.

Noise barriers should be offset from the outer edge of the bridge to reduce the tunnelling effect.

Where bridges are located on horizontal curvature, noise barriers should be offset from the outer edge on the inside of the curve to reduce obstruction of sight lines. Where structurally practicable, the minimum offset from the outer edge should be determined according to sight line requirements specified in Chapter 5 of this CoP.

Horizontal alignment of the noise barrier should continue in line with the alignment of the noise fences approaching the bridge (where possible). Generally, elements fixing the noise fence to the bridge should not dominate the design, but should create an integrated appearance.

It is important to note that these recommendations and preferred noise barrier options are based only on acoustic and visual considerations. There are other important design considerations for noise fences, including:

- safety requirements;
- flooding /hydraulic requirements (especially for higher flood levels than the "design" flood where a noise barrier may cut off storm water flow paths).
- public amenity; and
- maintenance requirements.

These considerations are addressed in Chapter 5 of this CoP.

## 4.5 Road Traffic Noise Assessment Report

The road traffic noise assessment report shall adequately document and present all the data inputs, assumptions and assessment results and noise attenuation strategies/options considered as part of the road traffic noise assessment. The report shall contain the following as a minimum:

- Executive summary of the findings and recommendations of the assessment;
- Introduction and description of the road or development proposal;
- Assessment methodology (including the verification process and relevant assessment criteria);
- Summary of the road traffic noise measurement results including a layout plan depicting the site locations and positions of the noise measurements conducted for the assessment;
- Measurement data sheets and site attendance records/site notes taken by the noise measurement officer at each measurement site;
- Documentation of all road traffic noise model input data and assessment criteria adopted;
- Verification results, comparing the measured and calculated road traffic noise levels for existing Year (Include for new road proposal only if an existing road network exists in the vicinity of the new road proposal). All results of measurements, calculations and predictions shall be presented in a tabular format such as that shown in Table 4.5.
- Tabulation of calculated road traffic noise levels for all noise sensitive receptors in the study area for the

assessment year (without noise attenuation treatments);

- Tabulation of predicted road traffic noise levels for all noise sensitive receptors in the study area for the year of road opening/completion and 10 years horizon following assessment year or road opening/completion (without noise attenuation treatments);
- Summary of noise sensitive receptors where the calculated and/or predicted road traffic noise levels exceed the relevant noise criterion levels (without noise attenuation treatments) for the assessment year, year of road opening/completion and 10 years horizon following assessment year or road opening/completion.
- Outline of the investigation process in determining the preferred road traffic noise attenuation strategies/options, if required.
- Tabulation of predicted road traffic noise levels for all noise sensitive receptors in the study area for assessment year, year of road opening/completion and 10 years horizon following assessment year or road opening/completion with suitable noise attenuation treatments/options.
- Noise level contours for calculated and predicted noise levels for assessment year, year of road opening/completion and 10 years horizon following assessment year or road opening/completion with and without noise attenuation treatments (if required) for all scenarios.

Road traffic noise level contours may be produced that cover very wide and extensive areas at or near the road. The road traffic noise level exposures can also be

presented in a format depicting areas where the specified road traffic noise criteria is exceeded or where the road traffic noise levels of noise sensitive receptors fall within a certain noise level range. Which format to adopt will depend on the number of factors/options/criteria considered in the road traffic noise assessment and the type of road or development proposal being assessed.

Note that when presenting noise contours, the figure shall make clear whether the noise levels are façade corrected or free field; and include the calculation/prediction year, the receptor height and pavement surface type assumed. Careful interrogation of noise level contours needs to be undertaken in conjunction with the tabulated noise levels in order to clearly identify any exceedances of the criterion level.

- Text descriptions and layout plan (where appropriate i.e. noise barrier option) of the length, height and location for all existing and recommended noise attenuation treatments/options.

An example of a plan layout prepared for a road traffic noise assessment report is shown in Figure 4.5. This example provides details such as the receptor locations, measurement locations and proposed noise barrier treatment with respect to the vertical and horizontal alignment of the proposed road and adjacent land use/terrain;

- Recommendations and Conclusions;
- Relevant attachments/references;
- Any other explanatory and general notes; and
- All input and output data including modelling data files and noise barrier option coordinates shall be made

available, if requested in electronic •  
format.

Table 4.5 Summary of Results of Acoustical Assessment

Site No.	Site Address	L <sub>A10</sub> (18h), dB(A)				
		Measured	Calculated	Accuracy	Calculated (rounded)	Predicted (10 years)
1		-	69.1	-	69	71
2		-	69.7	-	70	72
3		69.2	69.6	0.4	70	72
4		-	68.8	-	69	71
5		-	69.9	-	70	72
6		-	69.6	-	70	71
7		-	67.2	-	67	69
8		-	66.4	-	66	68

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## 4.6 District Road Traffic Noise Management Strategy

Queensland is experiencing an increase in population and development. This has caused an increase in traffic volumes and a subsequent increase in road traffic noise.

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Road traffic noise generated by traffic on State-controlled roads under the jurisdiction of Main Roads is a major source of noise in urban as well as some rural areas.

A District Road Traffic Noise Management Strategy (DRTNMS) will align with the requirements outlined in Roads Connecting Queenslanders (2002) by helping to realise Main Roads vision for a road system that enhances the social, cultural, economic and environmental well being of Queensland communities.

A DRTNMS may be prepared for all State-controlled roads or for a selective number within a district. The study area for such a DRTNMS will be at the discretion of the District Director and dependent on the land use types considered in the strategy.

The department needs to quantify the current and future road traffic noise levels at noise sensitive land uses adjacent to State-controlled roads within a district by applying a suitable noise prediction methodology. The predicted road traffic noise levels are to be representative of current and forecasted future traffic volumes on these roads and are to be expressed in terms of the relevant noise criterion level described in Chapter 3 of this CoP for "Existing Roads – No Roadworks."

The principal outcome of the strategy is to identify and priorities areas / road segments that are predicted to exceed the relevant noise level criteria within a 10 year horizon. The implementation of these priorities may be subject to social, technical, works priority and cost considerations including

funding limitations. Works may be integrated into the Main Roads "Roads Implementation Program" (RIP).

When determining priorities with the District road network, the following should be considered; but not limited to:

- traffic composition volumes and speed;
- pavement surface and road longitudinal grade;
- noise propagation and receptor data; and
- existing Development Approval Conditions.

Key determinates for prioritising areas/road segments are based on the predicted noise level and the number of affected noise sensitive receptors. All data shall be presented in both a tabulated and graphical format for each road link showing land uses, location of noise measurement sites and other data considered relevant in the strategy development. An example of a plan layout format is shown in Figure 4.6 It should be noted that the preferred presentation of the strategy may vary dependant on the scope of data available, the extent of assessment conducted and specific objectives for each DRTNMS.

It is recommended that a District Road Traffic Noise Management Strategy be revised every five (5) years.

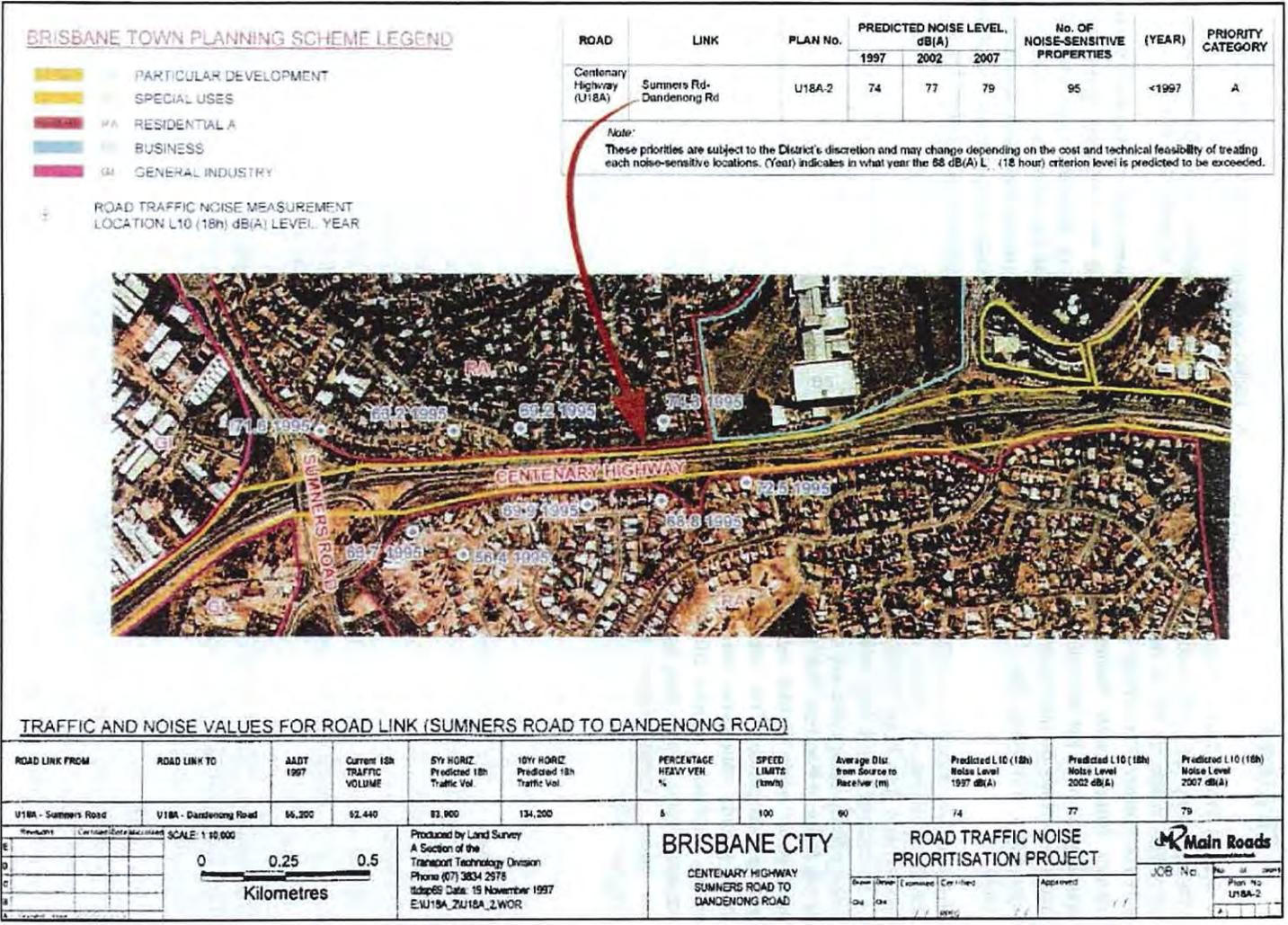


Figure 4.6 Example of District Road Traffic Noise Management Output

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## 4.6.1 Purpose

A district may have already implemented a works program which has resulted in many road traffic noise assessments/noise barrier schemes being undertaken and the subsequent construction of noise attenuation treatments to satisfy the requirements of the current departmental criteria.

The number of noise complaints received by a district is increasing yearly. Added to this, there is better community awareness of environmental issues and therefore a higher expectation that the department will provide noise attenuation treatments when a noise complaint is made. These expectations fail to recognise the question of priority. Given that there is a finite budget for the provision of noise attenuation treatments, other areas may have an existing and greater noise exposure.

The purpose of a DRTNMS is to achieve the following objectives:

- To assist a district in working towards achieving the department's obligations with respect to its "general environmental duty" under the Environmental Protection Act 1994 and its associated policies related to road traffic noise;
- To assist a district with planning of future upgrading of the existing State - controlled road network;
- To identify likely road traffic noise impacted areas with respect to the current and projected road traffic conditions (five (5) and ten (10) year horizons);
- To provide an estimate of the number of residences likely to be impacted by levels of road traffic noise above the departmental criteria resulting from

traffic travelling on State-controlled roads under the jurisdiction of a district;

- To provide a graphical representation of road traffic noise levels for State-controlled roads under the jurisdiction of a district (i.e. presentation in ARMIS GIS format);
- To assist a district to prioritise noise attenuation treatments for areas identified as noise impacted according to the number of residences affected, and level of exposure to noise levels above the criterion level in accordance with this CoP;
- To propose suitable noise attenuation treatments and estimates of costs for the treatments that will achieve the criterion level stated in this CoP.
- To assist in the preparation of an appropriate implementation strategy that meets the department's obligations to provide noise attenuation treatments in accordance with this CoP.

In cases where road upgrades are programmed, priorities determined in a DRTNMS may be subject to change with the provision of noise attenuation treatments being considered as part of the overall planning and design process.

## 4.6.2 Methodology

The methodology for a DRTNMS shall be established prior to commencing the strategy and be customised to meet district objectives. Figure 4.6.2 depicts a generic methodology framework that can be adopted as the basis for the DRTNMS.

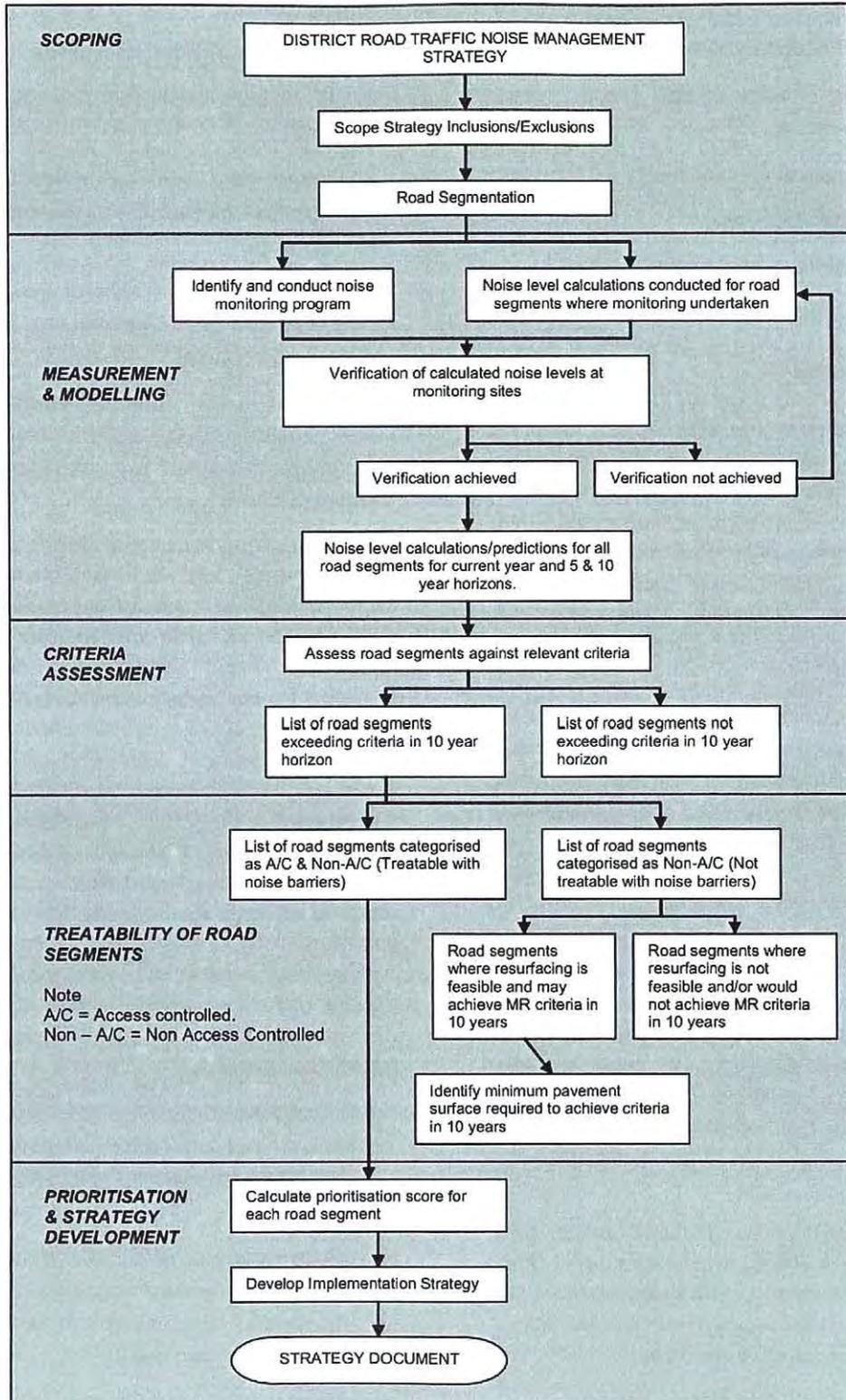


Figure 4.6.2 Generic DRTNMS Methodology Framework

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As a minimum, the methodology shall address the following key elements:

- Scope, study area and road segmentation;
- Measurement & modelling;
- Criteria assessment;
- Treatability of road segments; and
- Prioritisation and strategy development.

## 4.6.3 Scope

When scoping the DRTNMS, the key objectives shall be to identify likely noise problem areas under the jurisdiction of the district as a consequence of current and likely future road traffic noise, and to prioritise those areas requiring noise attenuation treatments, based on the relevant noise criteria outlined in Chapter 3 of this COP.

In order to determine the extent of data input requirements for the strategy, it is first necessary to identify the study area and road network to be assessed. Inclusions/exclusions to consider in determining the study area and road network are discussed below.

### 4.6.3.1 Study Area

In general, the study area for a DRTNMS may encompass existing noise sensitive land uses adjacent to the road network under the jurisdiction of a district, and where noise attenuation treatments are able to be provided within the designated road reserve.

The respective district shall outline and confirm the inclusions/ exclusions with respect to identifying the study area for the strategy. These inclusions/exclusions may include, but are not limited to:

- the State-controlled road network;

- National Roads;
- non-access controlled road segments;
- on/off-ramps/service roads along road segments;
- assessment of existing residential dwellings only adjacent to the subject road network;
- assessment of all existing noise sensitive land uses adjacent to the subject road network;
- assessment of noise sensitive development adjacent to the subject road network that has been constructed within the last ten years.

With significant residential and other noise sensitive land use development being proposed and constructed adjacent to the State-controlled road network in Queensland, the responsibility and provision for noise attenuation treatments should be addressed in the development approval process. Although it is recognised by all stakeholders that the administration of the development approval process is the responsibility of local government; Main Roads in a concurrence role, should ensure that the impact of road traffic noise on all development is adequately assessed and suitable provision made within the development for noise attenuation treatments, if required.

- Road segments where the road traffic noise exposure has recently or will be addressed on a project-by-project basis. For example:
  - Where current construction projects are underway or have recently been completed (i.e. completed within the last ten years); and
  - where funds have been committed in the current Road Implementation

Program for future construction works.

The process of defining the study area shall be undertaken in conjunction with the initial scoping of the strategy. An example of the types of information that would assist with the initial scoping process includes:

- the district's current Road Implementation Program;
- digital topographic maps, aerial photographs, ortho imagery, photogrammetry and the digital road network for the study area, where available;
- current land use data alongside the road network under the jurisdiction of the district, where available;
- the location of current and future road works (including any proposed noise barriers);
- locations within the study area that are deemed unsuitable for the provision of noise attenuation treatments;
- the records of relevant previous correspondence regarding noise complaints;
- any other information considered to be relevant to this study and not determined by a district to be of a confidential nature; and
- detailed noise studies (current and previous). Carried out within the study area.

#### 4.6.3.2 Road Segmentation

For the purposes of assessment, the road network determined within scope of the strategy shall be divided into representative road segments according to changes in road and traffic conditions (i.e. between intersecting roads/interchanges or at

suitable reference points) and grouped into the following categories:

- Access controlled road;
- Non-access controlled road (Treatable with barriers); and
- Non-access controlled road (Not treatable with barriers).

Providing appropriate treatments for noise attenuation along non-access controlled roads may not be practical or technically feasible. With the existence of driveways directly accessing onto these roads, the effective use of noise barriers will be restricted, due to the full angle of view not being adequately obstructed. A significant proportion of these roads also have speed limits less than 80km/h, in which case, the use of pavement surface treatments may not be acoustically effective.

Road segments shall be suitably labelled by road number, chainage and description of intersecting roads etc. Further information (i.e. in addition to that obtained for identifying the study area) required to determine the appropriate segmentation of the study area includes:

- current traffic flow data in both, electronic (where available) and/or hard copy formats (traffic data to include AADT, the percentage of commercial vehicles and the signposted traffic speed);
- pavement surface details along all roads within the study area; and
- the location of existing noise barriers (where available).

#### 4.6.4 Measurement

A minimum number of measurements shall be conducted as part of the strategy for verification of the modelling work. It is recommended that a minimum selection of

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20 sites be measured representing a cross section of the road network's characteristics and land use types (if relevant) within the study area. (More sites would improve the accuracy of the verification of the modelling).

Where a noise monitoring program is incorporated as part of the strategy, the location of noise measurements, the number of measurement locations and the duration of those measurements must be specified and approved by a district prior to any monitoring being undertaken.

The district should make available the results of any noise measurement results obtained within the past five years over the study area. These measurement results shall be documented in the DRTNMS report and on appropriate plan layouts.

All road traffic noise measurements shall be undertaken in accordance with this Chapter Minimum noise level monitoring data requirements may vary dependent on the site and land use.

## 4.6.5 Modelling

The method of modelling adopted for the calculations and predictions shall complement the format and accuracy of data available as well as be consistent with the district's objectives of the strategy.

Relevant pavement surface correction factors shall be applied to the calculations and predictions in accordance with Section 4.3.4 of this Chapter.

### 4.6.5.1 Data Inputs

For each road segment, the following data shall be obtained as a minimum:

- Existing pavement surface type. Where more than one type of pavement surface type exists in a road segment, the highest of the relevant correction factors shall be adopted;

- Existing, 5 and 10 year forecasted AADT volumes;
- Existing, 5 and 10 year forecasted % Commercial vehicles;
- Sign-posted speed limit.

Where greater accuracy of calculated and predicted road traffic noise levels can be achieved through the use of more detailed electronic road design, feature and terrain data, this data should be utilised. However, it is expected that the use of more detailed electronic road design, feature and terrain data would only be necessary where a detailed assessment of a high priority area is conducted based on the outcomes of the DRTNMS.

### 4.6.5.2 Assumptions

The following base assumptions shall be adopted in the calculations and predictions, where no further detailed information is available for each road segment in the study area:

- flat terrain between the road and receptor;
- the distance from the road source to receptor shall be 20m;
- the angle of view to the road shall be 180 degrees;
- receptor Height of 2m;
- the soft ground component of the source/receptor geometry shall be 50%;
- noise level calculation/predictions are to be assessed for the assessment year, 5 and 10 year horizons;
- the 18 hour traffic volume shall be 94% of AADT;
- the road longitudinal grade shall be 5%;
- no existing barriers or screening.

- the speed shall be posted speed limit; and
- the pavement surface type shall be the type with the highest correction factor on the segment.

Although these base assumptions are not likely to be representative in all cases, it provides a consistent approach by which an unbiased priority listing can be determined. It is however important to note that these base assumptions may result in significantly higher noise levels than those in reality. Detailed assessment of the impact of road traffic noise associated with each priority is therefore recommended to cater for any unknown factors, which may influence the level of road traffic noise.

Further detailed assumptions may be considered in the strategy where the additional information is available or obtained/determined necessary for the purposes of the strategy at the district's discretion. These detailed assumptions may include, but are not limited to:

- location, details and acoustic effectiveness of existing noise barriers (constructed on behalf of Main Roads or Private Development);
- actual road longitudinal grades or categorisation of road gradients for each road segments. The longitudinal grade for each road segment may be categorised as 'Level', 'Rolling' or 'Mountainous' as described in Table 4.6.5.2. In cases where more than one longitudinal grade category is contained within a road link, the steepest longitudinal grade shall be used.

**Table 4.6.5.2 Longitudinal Grade Categories**

Longitudinal Grade Category	Longitudinal Road Grade Range	Longitudinal Grade to adopt in assessment for DRTNMS
Level	<5%	2.5%
Rolling	5% - 10%	7.5%
Mountainous	>10%	12.5%

- actual horizontal distance from the road edge line to nearest receptor for each road segment;
- actual relative height between the effective source position and reception point of the nearest receptor for each road segment; and
- actual ground surface type between the road source and nearest receptor (i.e. % of absorptive ground) for each road segment.

#### 4.6.5.3 Calculations

Noise level calculations for the assessment year shall first be conducted using the nominated modelling method for locations where measurement results have been obtained from previous monitoring or measurements conducted for the purposes of the strategy.

Once verification of the measurement locations has been adequately achieved/explained, noise level calculations for each road segment for the assessment shall be undertaken based on the appropriate data inputs and assumptions.

Areas that may have other sources dominating road traffic should be identified. It may be applicable to estimate the relevant contributions from each source in the calculations and predictions.

#### 4.6.5.4 Verification

The methods used for calculation of noise levels must be outlined in the DRTNMS report and verified using previous monitoring results and noise measurements carried out within the study area in accordance with this Chapter.

Additional noise measurements may be required where verification of the modelling with the measurement results is not achieved or cannot be explained in terms of identifying site conditions that would influence the accuracy of the calculations made.

The number and location of measurements will affect the accuracy of results for the strategy. Similarly, calculation methods have inherent inaccuracies. The limitations, due to assumptions, of the noise calculation methods and how they affect their accuracy shall be stated in the strategy report.

The statistical accuracy of the methodology shall be specified in relation to the form of output (eg. the accuracy of locating noise level contour lines for presentation of the strategy outcomes).

#### 4.6.5.5 Predictions

Noise level predictions shall be undertaken for the five and ten year horizons once verification of the modelling is satisfactorily achieved. The noise level predictions shall be based on the relevant traffic data inputs for each design year and same assumptions applied in the calculations.

#### 4.6.6 Criteria assessment

The acoustic descriptors adopted in the strategy shall include the  $L_{A10}(18\text{hour})$  and others as determined relevant based on the scoping of the strategy. Any descriptors must be specified in the DRTNMS report

and should be in accordance with Chapter 3 of this CoP.

The predicted noise levels for each road segment in the ten year horizon are to be assessed against the relevant criteria. Those road segments predicted to exceed the criteria in the 10 year horizon are to be placed in a separate listing for further assessment in the strategy.

#### 4.6.7 Treatability of road segments

For the purposes of the strategy, the treatability of a road segment is initially categorised based on whether a noise barrier can practically be constructed along a road segment given the road reserve features and adjacent land use access conditions. It should be noted that this judgement may only be based initially on information available from a desktop assessment.

Consideration needs to be given to the technical feasibility, cost effectiveness, aesthetics, equity, community engagement and practicality in recommending noise attenuation treatments.

##### 4.6.7.1 Treatable with noise barriers

Road segments identified as exceeding the criteria in the ten year horizon and having potential to attenuate road traffic noise with noise barriers are to be assessed further for prioritisation.

##### 4.6.7.2 Not-treatable with noise barriers

For those remaining road segments exceeding the criteria in the ten year horizon and not having the potential to attenuate road traffic noise with noise barriers, the strategy may give consideration to whether pavement resurfacing is a suitable treatment option.

Where pavement resurfacing is identified as a potential treatment option for road

segments, a final list shall be documented in the DRTNMS report for consideration of those road segments in conjunction with future programmed district overlay activities.

#### 4.6.8 Prioritisation

In order to determine a prioritisation score for the provision of noise attenuation treatments along noise impacted road segments, the following parameters shall be considered as a minimum:

- The level of exposure to road traffic noise levels above the departmental criterion level at the nearest noise sensitive dwelling along the road segment; and
- The number of noise sensitive dwellings along the road segment impacted by road traffic noise levels above the departmental criterion level.

For the purposes of establishing a prioritisation list, the following base ranking tool (Equation 4.6.1) shall be adopted in calculating a prioritisation score for each road segment identified as treatable with noise barriers:

$$\text{Prioritisation Score} = N \times (\text{PNL} - \text{CL}) \quad (4.6.1)$$

where: N= Number of dwellings exceeding criteria (Based on number of dwellings existing at the time of developing the strategy) along the road segment;

PNL= Predicted noise level for the 10 year horizon at the nearest noise sensitive dwelling along the road segment; and

CL= Criterion level for the noise sensitive land use along the road segment.

Where further on-site investigation is conducted or detailed information is available, the following parameters may also be considered in the final prioritisation of road segments for detailed assessment:

- the provision of existing noise barriers;
- the amount of attenuation provided by any proposed noise attenuation treatment;
- the cost-effective, equitable and practical provision of noise attenuation treatments.

#### 4.6.9 Strategy Development

The relative merits, advantages, disadvantages and costs for the different forms of noise attenuation treatments (including road pavement surface type) proposed in the implementation strategy, shall be considered. The typical cross section showing land requirements and landscaping strategy should also be considered where applicable (i.e. noise fence, earth mound). Advice regarding land requirements and landscaping issues may be sought from Engineering and Technology Group specialists.

The priorities for the implementation of noise attenuation treatments can be used to contribute to the preparation of future Roads Implementation Programs. These priorities may need to be separated into those roads which are federally (National Roads) or State funded (Other State-controlled - roads) as being nominated under the appropriate construction and maintenance project types to be consistent with the structure of the Roads Implementation Program.

Indicative budgets shall be determined for the necessary attenuation treatments to reduce noise levels to the departmental criterion level up to the relevant planning horizon. All indicative budgets shall be calculated based on the approximate height and length of noise barriers required to comply with the departmental criterion level.

In order to determine the actual cost and technical feasibility of each treatment for noise attenuation, detailed road traffic noise assessments are recommended.

#### 4.6.10 Presentation of Results

The DRTNMS report shall contain as a minimum, but not limited to the following:

- Executive Summary;
- Strategy Objectives & Scope (including a tabulation of all road segments assessed in the strategy);
- Methodology Framework;
- Documentation of measurement locations and results of all relevant monitoring data conducted as part of the strategy as well as those measurement results obtained from previous road traffic noise assessments and monitoring;
- Findings of any detailed road traffic noise assessments that may have been carried out within the study area;
- Documentation of the modelling method, pavement surface correction factors, data inputs and assumptions adopted for the noise level calculations and predictions;
- Results of the modelling verification and detailed explanations of verification differences where required;
- Tabulation of calculated and predicted road traffic noise levels for all road segments;
- Tabulation of road segments predicted to exceed the relevant criteria in the ten year horizon;
- Tabulation of noise impacted road segments potentially treatable by pavement resurfacing;
- Details of the parameters considered in the prioritisation scores and ranking;
- Prioritisation tabulation of noise impacted road segments potentially treatable with noise barriers;
- Summary of the relevant factors considered for all the noise attenuation types proposed in the implementation strategy;
- Indicative cost estimate of required noise attenuation treatments for prioritised road segments;
- An outline of the recommended implementation strategy;
- Reference to appropriate conditions for development control outlining treatments to minimise noise impacts at new residences in accordance with Charter 6 of this CoP; and
- Noise level predictions and relevant data presented in both a suitable tabulated and computerised graphical form (e.g. noise level contours) for inclusion in a district's Armis GIS programme. Land use data shall form an integral part of the presentation. The final presentation of data shall be at the district's discretion.

An example of a DRTNMS report is provided in Appendix 4F.

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# **Chapter 5**

# **Integrated Noise**

# **Barrier Design**

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# Integrated Noise Barrier Design

March 2007

## Revision Register

**5**

Issue/ Rev No.	Reference Section	Description of Revision	Authorised by	Date
1	-	Second Edition	Steering Committee	March 2007



# Chapter 5

# Integrated Noise Barrier Design

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## 5.1 Introduction

Integrated noise barrier design is a process whereby social, economic and technical factors are considered equally. Additional to the issues discussed in Chapter 4 of the CoP, there are a number of other factors that will influence the design of noise barriers. These issues include:

- Safety Requirements;
- Maintenance Requirements;
- Public Amenity;
- Horizontal and Vertical Alignment;
- Fauna Movements;
- Visual Considerations; and
- Community Art.

Integrated noise barrier design is an iterative process whereby factors influencing a preferred attenuation strategy (ie. Safety, Maintenance Requirements, Public Amenity and Fauna Movements etc.) can alter the recommendation in the Road Traffic Noise Assessment. Additionally if the site conditions between the road source and noise sensitive receptors change, the acoustic effectiveness of treatments for noise attenuation and their integration into the contextual road setting will need to be reviewed.

Figure 5.1 outlines an approach to the integrated design of noise barriers.

Figure 5.1: Integrated Noise Barrier Design Process

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## 5.2 Safety Requirements

This section describes the safety requirements that should be considered when siting noise fences and earth mounds. These requirements should be clearly understood by road planners and designers in the planning, preliminary design and detailed design phases.

Safety requirements are discussed under the following headings:

- Clear zones;
- Sight distance; and
- Lighting.

### 5.2.1 Clear Zones

A clear zone is the roadside area, including the gore area that must be kept free of obstructions. It is generally measured from the edge of the trafficked lane and includes road shoulders and verges that may provide vehicles with a recovery or emergency stopping area.

Figure 5.2.1 and Figure 5.2.2 illustrate the location of a clear zone within a road corridor. The areas that lie beyond the clear zone are the “transition zone” and “undisturbed zone”.

To determine the extent of clear zones for the purpose of siting noise barriers, the following steps should be followed. Chapter 7, Cross Sections, of the Road Planning and Design Manual provides guidance on the use of this process.

**Step 1:** Determine the required clear zone distance relevant to the design vehicle speed, ADT and roadside batter slope.

**Step 2:** Determine whether the proposed noise barrier lies within the required clear zone.

**Step 3:** Omit any non-frangible elements in the clear zone. When utilising the recommended criteria, consideration must also be given to the horizontal road alignment and roadside batter slope, if any.

If the proposed noise barrier is to be sited within the required clear zone, the noise barrier must be protected by safety barriers. Reference should be made to Chapter 8, Safety Barriers and Roadside Furniture, of the Road Planning and Design Manual for design of appropriate safety barrier requirements.

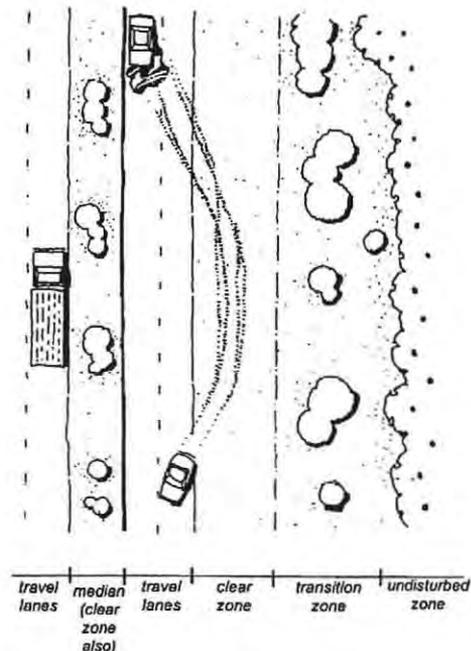


Figure 5.2.1 Clear zone - Plan

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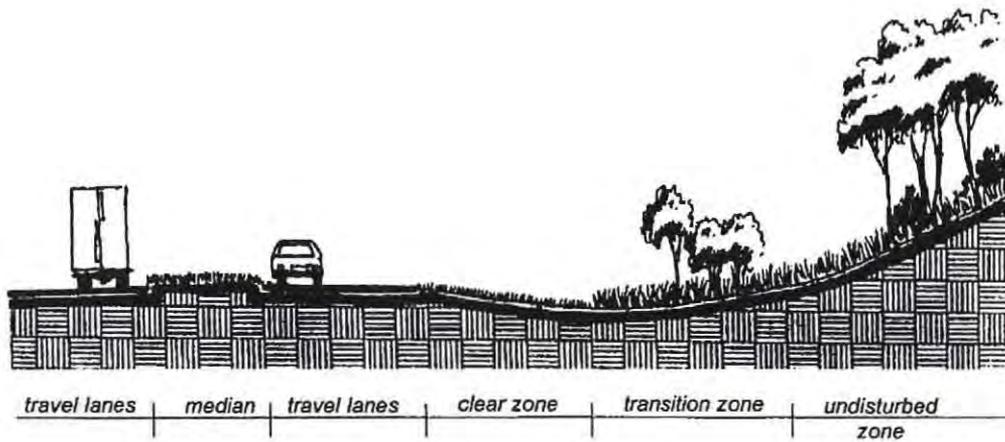


Figure 5.2.2 Clear Zone - Section

### 5.2.2 Sight Distance

Sight distance issues need to be considered when siting noise barriers in the following situations:

- Intersections at grade (Refer Chapter 13, Intersections at Grade, of the Road Planning and Design Manual).
- Roundabouts (Refer Chapter 14, Roundabouts, of the Road Planning and Design Manual).
- Horizontal curvature and pedestrian crossings (Refer Chapter 11, Horizontal Alignment, and Chapter 5, Traffic Parameters and Human Factors, of the Road Planning and Design Manual).
- Signs
- Signs should not be obscured from the driver's line of sight (Refer Section 3, Part 2 of the Manual of Uniform Traffic Control Devices)
- Merging Traffic (Refer to the relevant sections of Chapter 9, Sight Distance, Chapter 13, Intersections at Grade,

Chapter 14, Roundabouts, and Chapter 16, Interchanges, of the Road Planning and Design Manual)

### 5.2.3 Lighting

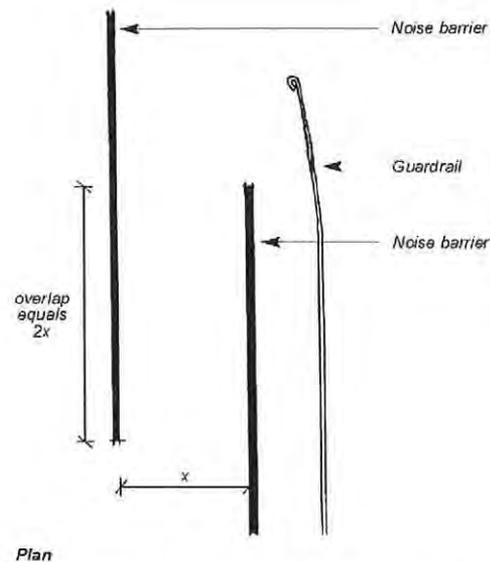
The height of noise barriers should not interfere with overhead lighting, cast undesirable shadows on the road or cause non-uniform illumination of the road.

Standards for lighting are specified in Chapter 17, Lighting, of the Road Planning and Design Manual

### 5.3 Maintenance Requirements

To ensure that sufficient access is allowed for road and roadside maintenance purposes, it may be necessary to provide an overlap between noise barrier sections. These overlaps should be incorporated with sufficient distance between noise barrier section alignments.

As a general guide, the length of this overlap is double the distance between the two noise barrier sections. Figure 5.3 illustrates this application adopted at a cut/embankment interface.



Plan

Figure 5.3 Overlapping of Noise Barriers

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## 5.4 Public Amenity

Public amenity issues that influence the siting of noise barriers include:

- Privacy and Security;
- Shade Effects;
- Air Circulation; and
- Views .and
- Community Engagement.

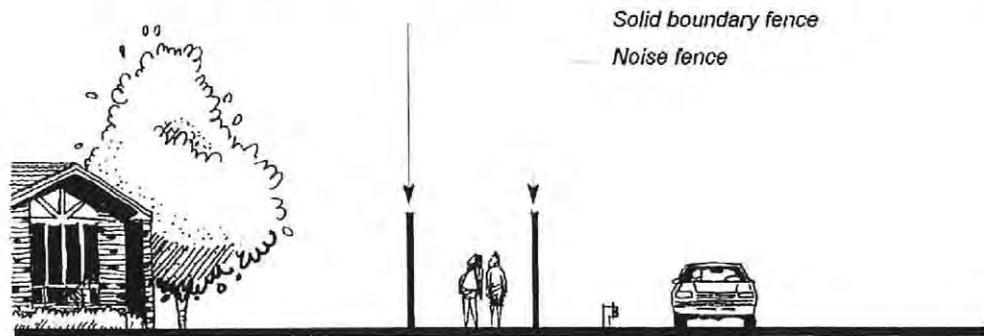
Noise barrier alignments along property boundaries can serve multiple purposes. However, they can also impinge on the amenity of the community.

### 5.4.1 Privacy and Security

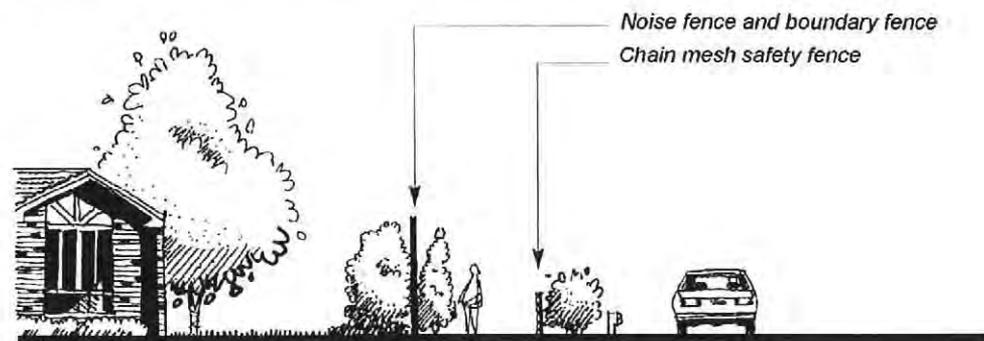
Privacy implies a degree of protection against visual and physical intrusion. Noise barriers can discourage deliberate trespassing, and keep people away from roads that may be dangerous to pedestrians.

Security for adjacent housing, pedestrians and cyclists on shared path systems must be considered when designing noise barriers. Consolidation of fencing along property boundaries can serve the dual purposes of security and noise attenuation (see Figure 5.4.1(a)).

Figure 5.4.1(a) Security Considerations - Boundary Fence and Noise Barrier Alignments



**NOT PREFERRED**  
Avoid narrow, channelised routes where visibility is limited.



**PREFERRED**  
Visibility to pedestrian areas should be high to increase the perception of security.

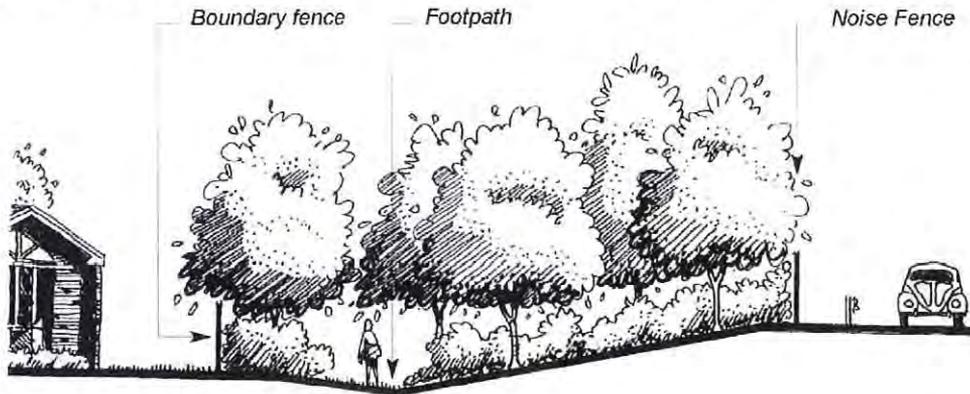
When near pedestrian areas, the vertical and horizontal alignment of noise barriers can play an important role in the perceived level of safety. Long, continuous noise barriers should be avoided to prevent deep shadows being cast.

Boundary fence and noise fence alignments allowing passive surveillance of paths by passing motorists should be encouraged (Figure 5.4.1(b)). Where possible, spill over lighting from road lighting should not be blocked by noise barriers or vegetation.

Additional lighting should be considered to ensure a safe environment for pedestrians and cyclists.

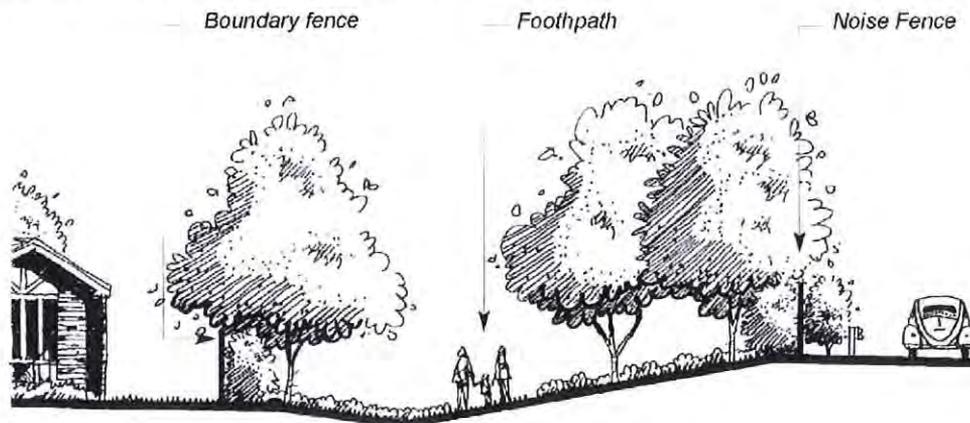
Obscuring or completely blocking views from adjacent land is a primary way to achieve a sense of privacy. Despite this, it may have detrimental effects on views, shade, air circulation and safety. The following sections provide guidance on such issues. For further guidance, road designers should consult a suitably qualified landscape architect.

Figure 5.4.1(b) Figure Security Considerations – Planning Selection



**NOT PREFERRED**

Dense planting can create a high degree of enclosure and low perception of safety. In some situations, dense planting should be avoided for reasons of security.



**PREFERRED**

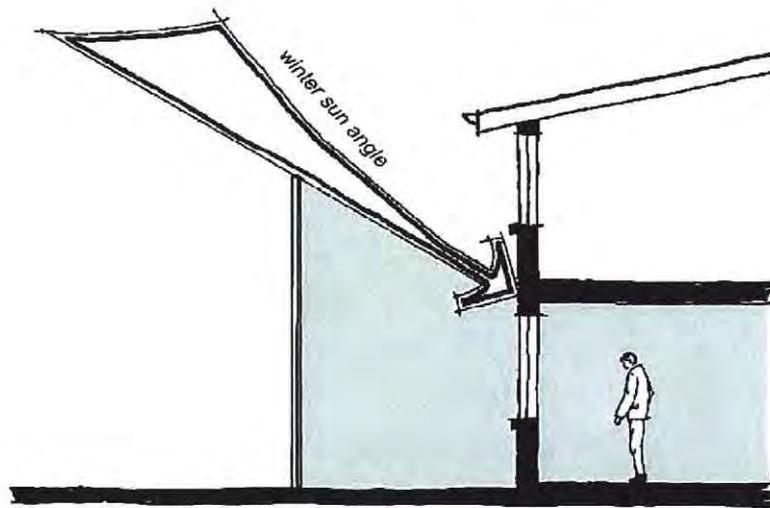
Low groundcovers and canopy trees can allow open views and create a higher perception of safety.

### 5.4.2 Shade Effects

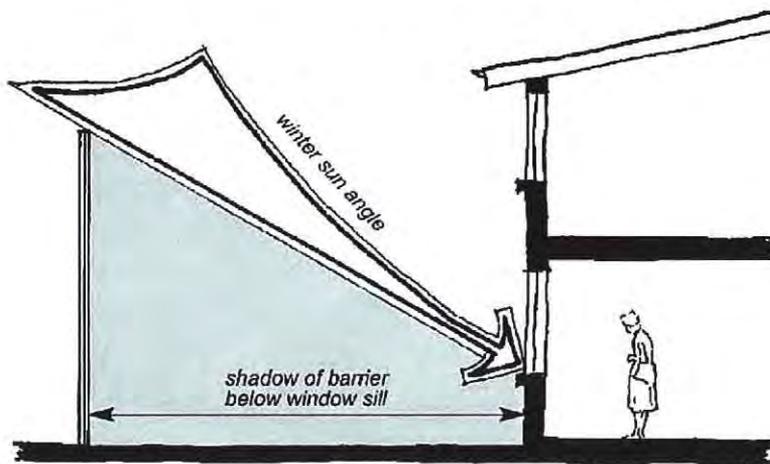
Where noise fences are sited on the northern and eastern property boundaries, there is a potential for shade to dominate the amenity of private areas. This can be further exacerbated when buildings are positioned close to these property boundaries. It is preferred to site noise

fences so that the winter sun may penetrate windows (see Figure 5.4.2).

Due to often conflicting costs and benefits in siting noise fences in such locations, consultation with property owners should take place. This consultation should highlight the trade-off between the benefits of noise attenuation and the negative aspects of shade coverage from the noise fence during winter.



NOT PREFERRED  
Noise barrier blocks winter sun on northern and eastern windows



PREFERRED  
Winter sun should not be blocked at northern and eastern facing windows

Figure 5.4.2 Shade Effects

### 5.4.3 Air Circulation

The alignment of noise barriers can block cooling summer breezes, reducing the amenity of indoor and outdoor spaces of adjacent properties. For noise fences greater than three metres high, noise fences may be

overlapped to create gaps for breezes to be channelled (see Figure 5.4.3). Infill panels of chain mesh fencing at the overlap can ensure that safety is not compromised whilst still allowing air circulation.

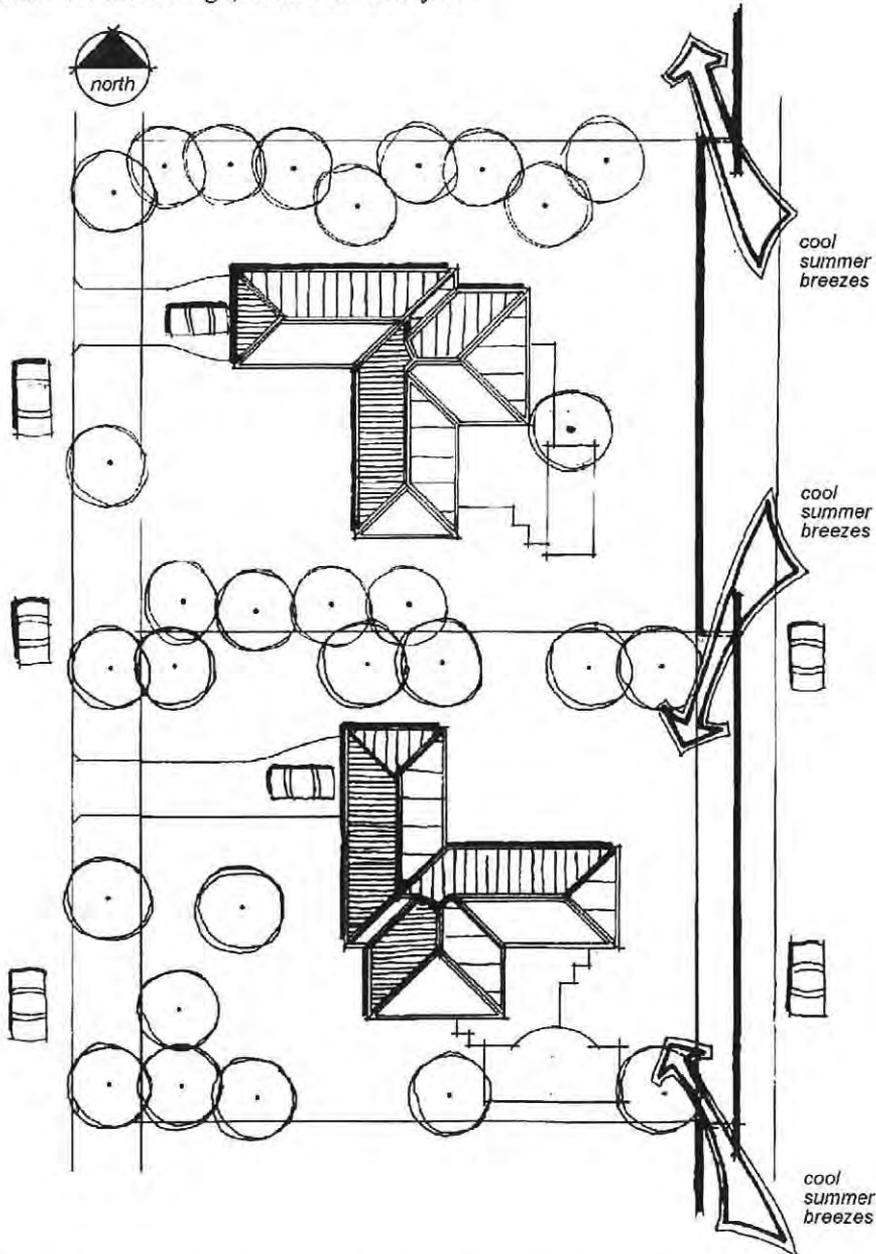


Figure 5.4.3 Overlapping noise barriers allow air circulation while maintaining noise attenuation (for noise fences greater than 3m high).

#### 5.4.4 Views

For views to influence the siting of a noise barrier, the view to be retained must exhibit a characteristic that is recognised as being significant to the area and the community at a local, state or national level.

The significance of a view, or particular element of a view, must be recognised by;

- State or Federal legislation (for example, heritage listed buildings, Wet Tropics Area and so on);
- International convention (for example, World Heritage Areas); or,
- The local community as a benefit (This includes a view or a specific feature that is a permanent part of the landscape. For example, a view of high scenic value such as bay views or scenic views to a hinterland; (Refer to Figure 5.4.4).



**Figure 5.4.4. View of high scenic value**

It is important to note that specific elements of a view may not be recognised in the above criteria as significant for visual amenity, however, they have been recognised by the community in general as significant to preserve for future generations.

Where the proposed noise barrier may substantially obscure the direct line of sight to the view, alternative noise barrier design (i.e. realignment, reduction in height) and material selection (i.e. transparent material)

may be considered in those areas where a resident, who is directly adjacent to a State - controlled road corridor:

- has a view that cannot be lost in the future (that is, future land development could not limit the view).
- has direct uninterrupted line of site from the existing residence, over the road corridor, to the view. (Transparent material will not be considered in a noise fence where a view is obtained across an adjacent residential block of land. This is because the owner of the home has no control over activities his neighbour may undertake. For example: planting a tree, make extensions to his home etc.); and
- has a distinct quantifiable benefit from that view.

##### 5.4.4.1 Transparent Material

Transparent material in noise fences may be considered for the retention of a view, or portion of view as defined above. Public consultation will be undertaken to ascertain the community's opinion with respect to the noise fence design and material selection options.

The inclusion of transparent material in the noise fence design may be considered where it is reasonable and practical to minimise the visual impact of the noise fence to below a point where a noise fence does not substantially obscure the view that is to be conserved.

Transparent material may be considered in areas where the majority of residents are eligible and are in favour of transparent material in the noise fence design. The use of transparent material will not be considered in areas where there is a history of vandalism and graffiti of Main Roads assets, or for preserving the view for the purpose of commercial visibility.

When designing the inclusion of transparent panels in noise fences, the following issues shall be considered:

- Proximity to carriageway and height of material above the ground.
- Glare for motorists.
- Strobging effecting; and
- Environmental issues (for example, birds colliding with the panels)

#### 5.4.5 Community Engagement

The provision of noise barriers can often result in a negotiated outcome balancing acoustic and public amenity for the community. The balance of amenity is highly subjective. To ensure that the most acceptable outcome has been considered, the needs, views and concerns of the community, a program of community engagement shall be undertaken. This program of community engagement shall be carried out in accordance with Main Roads Community Engagement Policy, Principles, Standards and Guidelines.

Engagement may include activities such as one-on-one discussions with affected property owners, public workshops or letter-drops. The aim of this engagement will be to obtain the opinions of the affected community on road traffic noise management strategies / proposals.

From a road traffic noise perspective the following shall apply:

- An appropriate consultation protocol must be implemented to ensure that the community is provided with realistic appraisals of what the post construction noise environment (ie. after construction of noise barriers), will be like for those living near and in the environs of the roadway. It is important to ensure that the expectations of the

community are not raised above what can reasonably be delivered.

- Where post construction complaints arise in relation to road traffic noise impacts, these complaints should be addressed in accord with the principles and requirements set out in the Chapter 4 of this CoP. Note that these principles and requirements are based on robust, scientific theories and practices.

#### 5.4.5.1 Community Engagement Process

It is recommended that the following process be followed with respect to a proposal to construct noise barriers beside a State - controlled road:

- A community engagement process shall be initiated to determine community attitudes to a proposed project.
- Only the owners of residences or other noise sensitive development where the departmental criteria is exceeded will be given the opportunity to provide a response. Tenants and other residents within three rows of the project will be given information on the proposal but will not be given the opportunity to provide a formal response. Experience has shown that the seeking of a formal response from residents where the departmental criteria has not been exceeded, has provided results that did not give appropriate consideration to those residents that were most impacted.
- The owners of residences may be identified from a digital cadastral database (DCDB) and a local government rates database.
- If a noise barrier proposal may impact on road exposure for commercial

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development, the owners of the commercial development shall be specifically contacted for a response. A balance needs to be considered with respect to fairness for both road exposure for the commercial development and noise impact upon noise sensitive development if they co-exist. Each situation shall be considered on a case by case basis. This may require the "exceptional circumstances" rationale and criteria to be considered for the noise sensitive developments.

- An information letter is prepared and distributed to Local, State and Federal Politicians for advice and input. This would include a proposal letter to residents, plan showing the proposed noise barrier heights and locations and resident's proforma information pack. Refer to Appendix 5A.
- Following a response from politicians, distribute the residents information packs, including letter to residents, plan showing the proposed noise barrier heights and location and resident's response form (response form only given to owners of residences where the departmental criteria is exceeded).
- Record the distribution of resident's information packs in tabular format and plan. Refer to Appendix 5B.
- If considered necessary, at the same time as the distribution of the resident's information packs, prepare a public display to be placed at a prominent location within the area of interest. e.g. local shopping centre / library. Liaison with the manager /owner of the location will be required.
- If considered necessary, prior to the required resident's response date, hold

a public meeting at a prominent location within the area of interest e.g. local community hall, to present the proposal in more detail, and to provide residents with the opportunity to question the proposal and provide verbal feed back. The presentation may include display material and power point presentation (including before and after visualisation of proposed barriers via computer software generation).

- Collate and analyse the results of the resident's responses. This may include a summary in a tabulation format and plan. Refer to Appendix 5C. It is recommended that the actual resident's response form be appended to a community engagement report.
- It is recommended that a 75% response rate from the residents be received in order for Main Roads to make an informed decision. The location and response of the residents should be documented on another copy of the distribution plan. If it is considered that there has been an insufficient response from the effected residents, it may be prudent to undertake a second distribution of the resident's information pack to those who have not responded. The first letter to the residents may require some minor rewording to reflect the purpose of second distribution. Refer to Appendix 5D
- Upon analysis of the responses, a consensus of resident's opinions can be determined. It is recommended that, unless there are extenuating circumstances, the majority rules. It should be noted that an examination of the majority rules principle shall consider the possibility that some

sections of a barrier may not be constructed, for example residents on one side of a section of a road do not want barriers while those on the other side do. If this is the case, reflection of road traffic noise shall be considered and the use of absorptive barriers may be required on the side in favour of the barrier.

The outcome of the process shall be conveyed to all owners and tenants by covering letter and appropriate plan. Refer to Appendix 5E.

#### 5.4.5.2 Noise Barrier Construction on Property Boundaries

Following a community engagement process where it is proposed to construct a noise barrier on a property boundary, Main Roads shall enter into an agreement with the property owner. A licence to enter and construct a noise barrier shall be developed. Refer to Appendix 5F for an example of a covering letter and deed of agreement.

#### 5.4.5.3 Replacement of Existing Noise Barriers

When existing noise barriers have to be removed and replaced, the contractor shall propose a community engagement strategy for the management of community expectations when the noise barriers are removed for a period prior to replacement.

### 5.5 Horizontal and Vertical Alignment

Responsive noise barrier design involves providing a design layout that is appropriate to the local setting and road landscape. The horizontal and vertical alignment of barriers should generally reflect the outcomes from previous sections on Acoustic

Effectiveness, Safety Requirements, Public Amenity and Maintenance Requirements.

The following techniques will aid the appropriate horizontal and vertical design of noise barriers.

- Avoid small gaps between continuous lengths of noise fences by constructing infills, as shown in Figure 5.5(a).

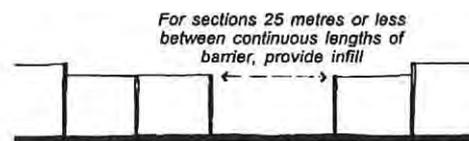
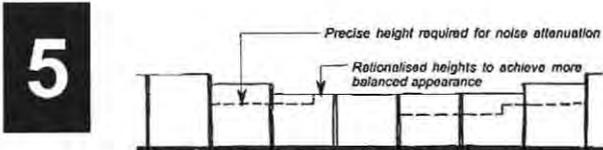


Figure 5.5(a) In-fill Sections of Noise Fences

- Break up the monotonous appearance of straight lengths of noise fences by providing landscaped offsets. Offsets should be a minimum of 1.0 metre with 2.0 metres preferred.
- Rationalise the overall height of noise fences from that required for noise attenuation to more evenly 'stepped' heights, as shown in Figure 5.5(b). A uniform modular approach to stepping noise fences is preferred to a sloping profile. The module size should reflect the scale of the material being used (eg. a single panel / sheet member or proportional steps compatible with the panel type and size).

This rationalisation shall not compromise the minimum noise fence height requirements for noise attenuation (ie. the top of the lowest panel at the steps shall be equal, or greater than the minimum noise fence height requirements. Where a new noise fence is proposed to connect to an

existing noise fence section, the proposed fence shall be designed / stepped etc. to match the existing noise fence section, whilst maintaining the minimum noise fence height requirement.



**Figure 5.5(b) Rationalisation of Noise Fence Heights**

- Where noise fences interface with batters, design vertical and horizontal alignments that do not create awkward transitions in grade. Refer to Figure 5.5(c).

The anticipated noise levels at various receptor points may result in varying height requirements for noise fences. An elevation assessment along the length of the area to be treated shall be undertaken to rationalise their height.

The proposed vertical and horizontal design for a new noise fence shall be checked on site prior to finalising the design and subsequent construction, in order to identify any potential conflicts with existing services / road furniture / terrain variations that may not have been identified / collected on survey / data information.

## 5.6 Fauna Movements

Roads will inevitably cross fauna movement corridors, particularly in association with creeks and rivers. In areas where fauna corridors have been identified, the inclusion of wildlife fencing integrated with noise barriers is preferred. These measures should direct fauna to culverts and bridges. The inclusion of fencing is most appropriate when culverts (or bridges) are greater than 1.2 metres in height.

The preferred fencing is chain mesh, black in colour, and 1.8 m in height. If koalas utilise the corridor, the fencing should be fitted with a 600mm wide metal strip secured to the top of the chain mesh fence. When placed adjacent to watercourses, the fencing should not be placed below the top bank where it may impede normal flow characteristics. The fencing should align with the end of the noise barrier and extend to the transition point of the batter toe and top of the bank, as shown in Figure 5.6.

## 5.7 Visual Considerations

Noise barriers along road corridors should be seen as elements defining and enclosing linear space. Visual perception of basic design elements of planes, mass and texture play an important role in the integrated design (Harris, 1988).

As a general rule, noise barriers should have a simple theme that relegates their structure to the background. This promotes integration with the existing natural or constructed landscape (see Figure 5.7(a)). These integration measures can create a sense of ownership and a reflection of community values. Special features such as community art can reflect contemporary and historical influences, adding another dimension to visual integration. Section 5.8 details the philosophy that should be employed when considering community art.

To ensure that the appropriate message is reflected in noise barrier designs, a suitably qualified landscape architect should be consulted.

The apparent mass of a noise barrier can be minimised by means of stepped barrier sections, staggered alignments, vegetation, shadow lines, colour variation, articulation of forms, material variation and integration with land form.

### Figure 5.7(a) Integration of Noise Barriers

Variations within noise barriers and combinations of noise barrier types and materials will arise as a result of road design, local conditions and community input. Aesthetic surface treatments may be required for concrete, steel and similar materials. This may also be required to ensure that motorists are not being momentarily distracted or blinded by glare from inappropriately textured surfaces (see Figure 5.7(b)).

### Figure 5.7(b) Fine-Textured Surface can cause Unwanted Glare

Colour selection should be complementary to the landscape setting. As a general rule, the further the noise barrier from the road, the darker the colour may be. This may create an illusion of greater depth. The selection of a variety of colours for noise barriers close to the road should complement the adjacent road infrastructure. This will foster a sense of unity among built elements.

Special accent colours with landscape features can contrast with the overall precinct theme. This can create a local identity and 'sense of place' for an area. Further advice on the use of colour can be sought from a suitably qualified landscape architect.

Transitions between noise barriers of different materials, heights and colours can cause disharmony (see Figure 5.7(c)). This practice should be avoided as much as possible. However, overlapping and separating horizontal and vertical alignments can reduce this perception.

**Figure 5.7(c) Transition between Materials Can Cause Disharmony**

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## 5.8 Community Art

Noise barriers present an opportunity to include features within the road landscape. Opportunities also exist for the local community to become involved in noise barrier design.

Features may involve the design of textural patterns, sculptural relief and other methods that symbolise elements of the local, regional landscape character or national identity. Such features should be used to create a unified road landscape.

Community art and accent lighting could be used to reinforce special identities or tell a story at significant locations along the journey. This 'place making' should allow for the integration of community art as individual artistic elements or as part of an overall theme. Art should be used to maximise the sense of community ownership and the individual identity of locations. It should enhance user orientation and produce visual diversity, making travel interesting and stimulating within safety constraints (see Figure 5.7(c)). Community art placed on the barrier face fronting the affected community may also enhance the sense of neighbourhood ownership.

Placement of community art may also be considered to minimise the likelihood of the noise barrier being targeted for graffiti or vandalism.

**Figure 5.8 Community Art**

Acoustic effectiveness of noise barriers should never be compromised by such features. The process for managing the design of features and community art on noise barriers should be directed by a suitably qualified landscape architect.

## 5.9 Detailed Design Issues

Noise fences and earthmounds can be a very effective means of reducing road traffic noise if designed and constructed to the appropriated standards. The design and construction of noise barriers are required to comply with this CoP Standard Specification MRS 11.04, Standard Specification MRS 11.05, and the Road Planning and Design Manual.

Noise barrier design drawings are to depict, detail and consider all design elements of the proposed noise barrier including, but not limited to the:

- adequate survey data extents used as the basis of the design;
- location, height and length as identified from an approved road traffic noise assessment report;
- horizontal and vertical alignment;
- material and construction type;
- post spacing;
- potential conflicts ie. services / existing road furniture / terrain variations / other structures;
- structural details;
- drainage considerations;
- maintenance requirements; and
- safety barrier systems (if required).

The design drawings and documentation are to refer to other relevant Standards Drawings, approved Noise barrier System drawings, Standard Specifications and Supplementary Specifications (if required), as they relate to the project specific requirements.

**5**

# Chapter 5 Appendices

# Integrated Noise Barrier

# Design

5

## Appendix 5A

[date]

[Relevant Local, State, Federal Politicians]

[Address]

### 5

Dear Sir / Madam

Noise Barrier Modifications - Maroochydore Road (Jones Road to Ridge Road)

The Department of Main Roads has received a number of complaints regarding the height of the existing barriers along Maroochydore Road, between Jones Road and Ridge Road. In response, acoustic consultants have been commissioned by the department to assess the performance of the existing barriers against the department's criterion noise level of 68 decibels ( $L_{10}$  (18 hour)). The consultant's report indicates that some of the existing barriers are not achieving the criterion level at two storey residences.

The department proposes modifying the existing barriers in order to achieve the criterion level. This would require replacing some sections of existing barriers with higher barriers. See the map of the proposal attached. The new barriers would be erected in the same position as the existing barriers.

As part of this project, Main Roads will consult with owners of properties that abut this section of the road. The proposed format of this consultation is to be a mail-out to the owners. In the case of people who own property where noise barriers are proposed to be installed, feedback will be actively sought on the proposal. In the case of other property owners along Maroochydore Road, the main purpose is to keep them informed, as they will not be directly affected by the proposal.

If you require any further information, please contact [Name] in the Gympie office, on [Phone No.] It is intended to commence the mail-out on [date]

Yours faithfully

[Name]

District Director

(North Coast Hinterland

Enc (3)

[date]

«Title» «FirstName» «LastName»  
«Address1»  
«City» «State» «PostalCode»

Dear «Title» «LastName»

**Noise Barrier Modifications - Maroochydore Road (Jones Road to Ridge Road)**

The Department of Main Roads has received a number of complaints regarding the road noise along Maroochydore Road. In response, acoustic consultants have been commissioned to assess the performance of the existing barriers against the department's criterion noise level of 68 decibels (L<sub>10</sub> (18 hour)). The consultant's report indicates that in some places (Sunshine Motorway to Ridge Road) the existing barriers are not achieving the criterion at 2-storey residences, and in other places (Jones Road to Sunshine Motorway) some additional barriers are needed.

It is proposed to modify the existing barriers in order to lower the noise level below 68 decibels. This would require replacing some sections of existing barriers with higher barriers and adding in some extra sections of barrier. The new barriers would be erected in the same position as the existing barriers.

However, higher noise barriers may impact on amenities like views and breezes, so your opinions are sought on the proposal before proceeding further. A schematic plan is enclosed showing where the noise barriers are proposed to be modified.

Your views are important to us. Please complete the attached form and return it in the enclosed 'reply paid' envelope by [date]. A postage stamp is not required. If no reply either way is received, it will be assumed that you have no strong feeling.

If you are not in favour of the proposal to modify the existing barriers you may wish to raise your concerns or requirements in the 'Comments' area of the form.

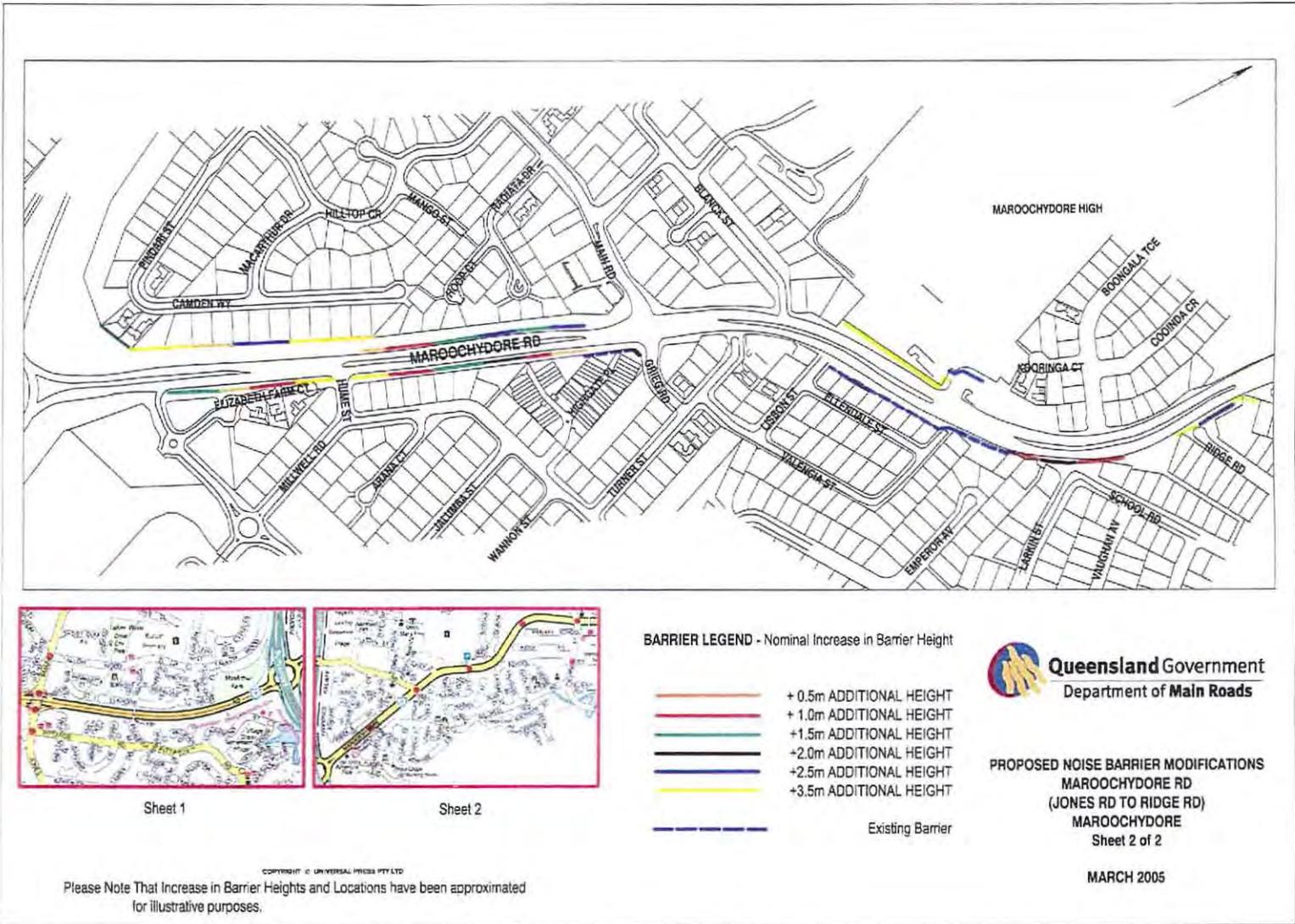
After consulting further with you, if your feelings or views are still not satisfied you will be invited to discuss the matter until you reach an understanding with us.

When consultation is completed you will be informed of Main Roads decision, and the next step in process will be to complete the design, call tenders, and commence construction.

If you have any questions please contact [Name], in the Gympie office, on [Phone No.]

South East Region  
North Coast Hinterland District  
50 River Road  
PO Box 183 Gympie Q4570  
ABN 57 836 727 711

Our ref .....  
Your ref .....  
Enquiries .....  
Telephone .....  
Facsimile .....  
Website [www.mainroads.qld.gov.au](http://www.mainroads.qld.gov.au)



**MAROOCHYDORE ROAD**

**SUNSHINE MOTORWAY TO RIDGE ROAD**

- I am in favour of the proposed noise barriers being modified (increased in height)
- I am against the proposed noise barriers being modified (increased in height)
- I have no strong feeling either way

**(Please tick one box only)**

My comments are as follows:

.....  
.....  
.....  
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**5**

Yours faithfully

\_\_\_\_\_

Name: \_\_\_\_\_

Address: \_\_\_\_\_

\_\_\_\_\_

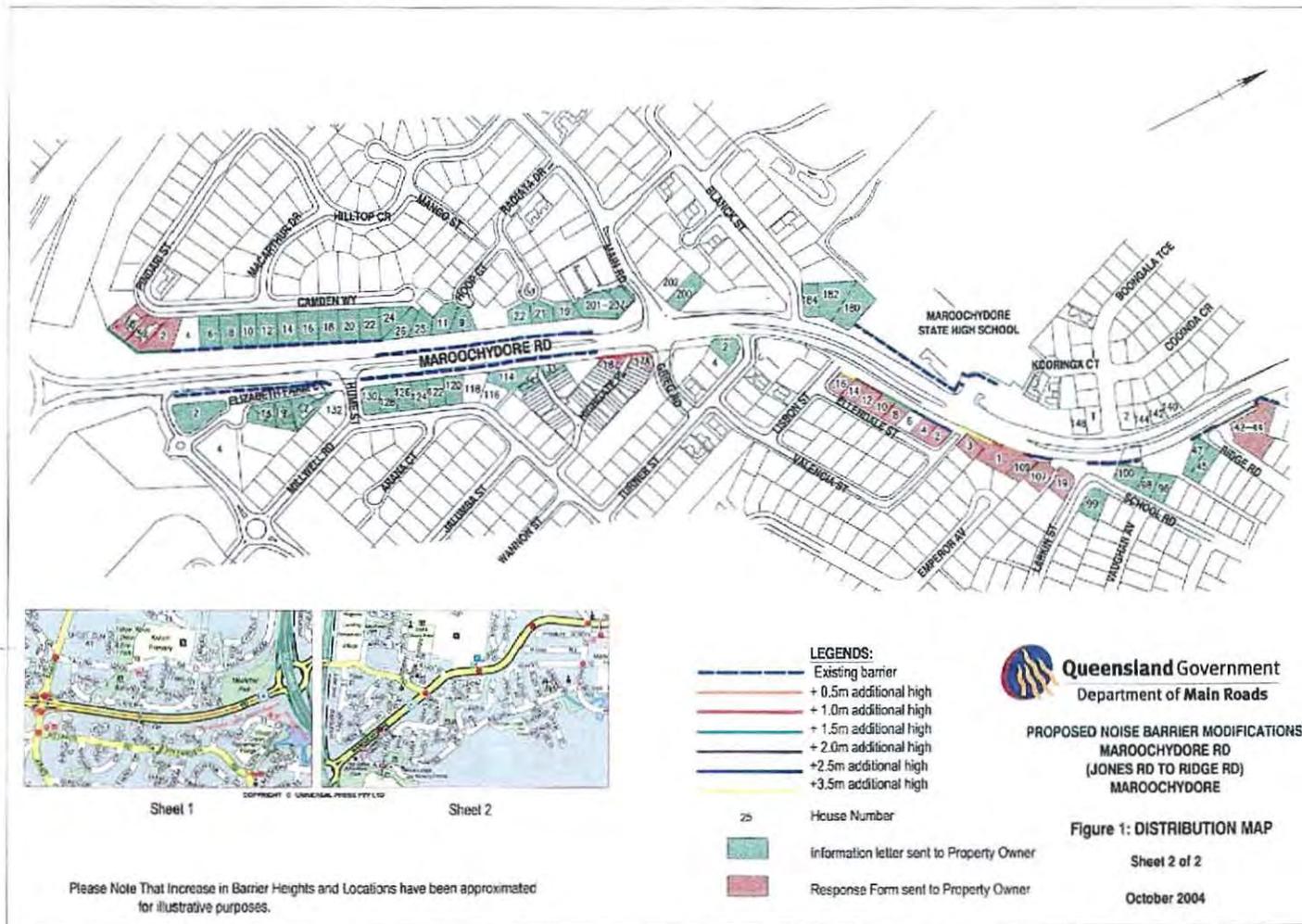
\_\_\_\_\_

Telephone: \_\_\_\_\_

Date: \_\_\_\_\_

The information being collected on this form is for the purpose of determining requests for proposed noise barriers: The information you provide is accessible to authorized departmental officers, and from time to time may be used by contractors/consultants undertaking consultation activities. Your personal details will not be disclosed to a third party without your consent unless required to do so by law.



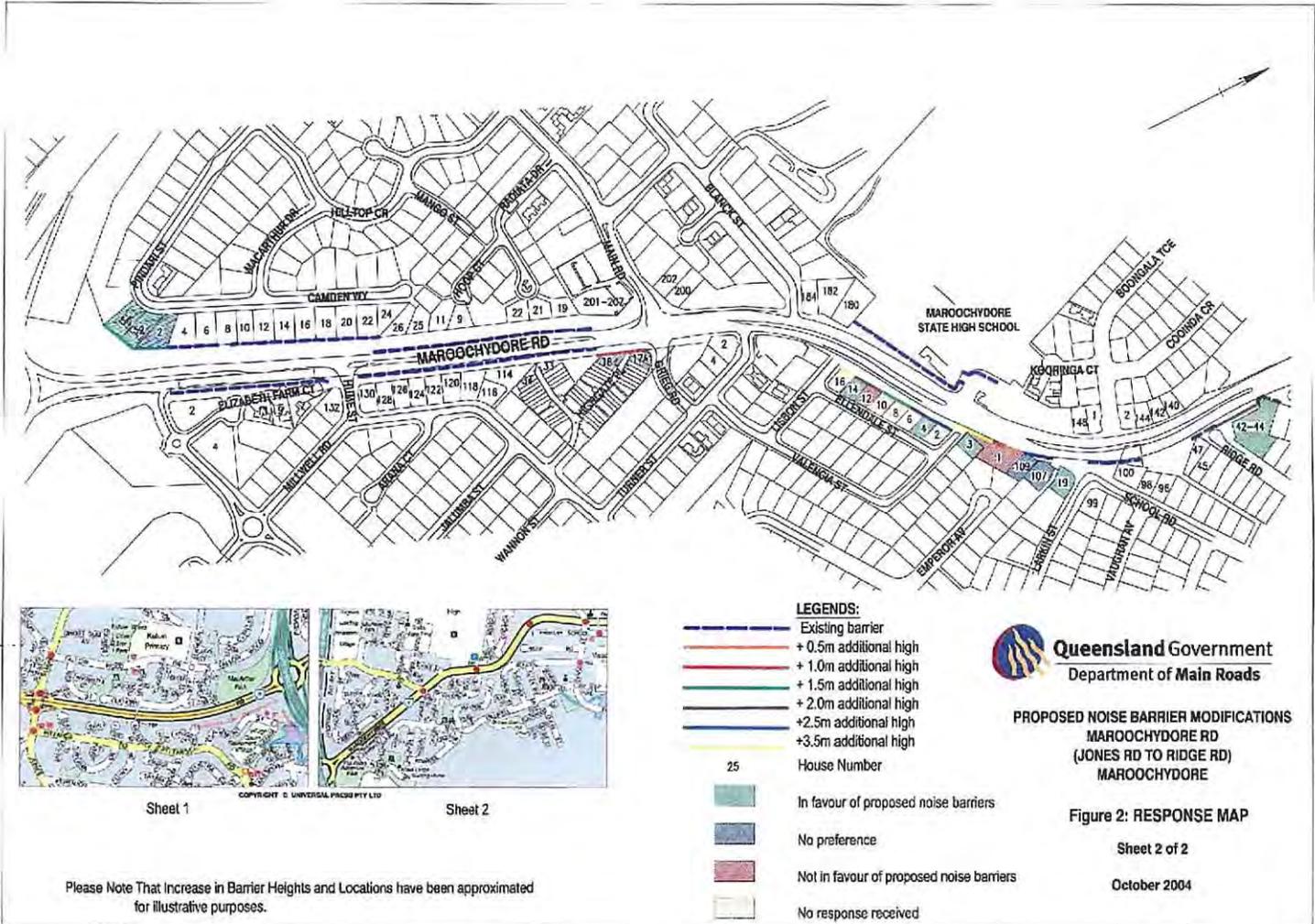


Table

Street Address	Owners	Response	Comment 1	Comment 2	Comment 3	Respondent	Lot	Plan
		No preference						
			Why aren't the barriers located at the footpath, rather than the property boundary					
		In favour	Pleased this is finally happening after complaining over years	Disappointed when earth mound removed and not replaced by barriers				
		In favour	Noise Barrier should be higher for security purposes					
		Concern	Will domestic pets be secure in backyards during construction					
		In favour	Hope barrier will also increase security of backyard and reduce road dust entering house	Hope barrier will stop people throwing things into our pool.				

Table

Street Address	Owners	Response	Comment 1	Comment 2	Comment 3	Respondent	Lot	Plan
		Not in favour	Rusty appearance of noise barrier not acceptable for private properties					
		Not in favour	Existing barrier stops breeze					
		In favour	Unlikely to achieve noise reduction unless proper materials are used.					



## Appendix 5D

[date]

(Title) (First Name) (Last Name)

(Address)

(City) (State)(Post Code)

Dear (Title)(Last Name)

5

### Noise Barrier Modifications - Maroochyore Road (Jones Road to Ridge Road)

The Department of Main Roads is continuing with the public consultation process for the proposed provision of traffic noise barriers along Maroochyore Road between Jones Road and Ridge Road.

It is proposed to modify the existing barriers in order to lower the noise level below 68 decibels. This would require replacing some sections of existing barriers with higher barriers. The new barriers would be erected in the same position as the existing barriers.

In early [date] of this year, I arranged for the distribution of an information brochure. Our records indicate that your household received a copy of the brochure.

Attached to the brochure was a pro-forma, which allowed residents to register their opinion for or against the departments' proposal.

More than [No.] responses were received and these have now been analysed. However, as there has been significant comment both in favour of and against the proposal, it is important that responses be received from all households, and in particular those nearest to Maroochyore Road.

It would appear that a response was not received from your household. Given the proximity of your home to the roadway, I would value your opinion.

I have attached a map of the proposed works, a response form and a pre-addressed envelope for the return of your comments. No postage stamp is required.

I would appreciate your reply by [date].

If you have any questions regarding any issue please contact [Name], in the Gympie office, on [Phone No.].

Yours sincerely

[Name]

**District Director**

**(North Coast Hinterland)**

**5**

## Appendix 5E

[date]

(Name)

(Address 1)

(Address 2)

Dear (Title),

### Consultation about Proposed Noise Barrier Modifications – Maroochydore Road (Jones Road to Ridge Road)

The Department of Main Roads wrote to you on [date], seeking your views about the proposal to modify the existing noise barriers along Maroochydore Road between Jones Road and Ridge Road.

The consultation process showed that the majority of people are in favour of the proposed noise barriers.

In addition, a number of concerns about the noise barriers were raised during consultation. These issues are listed in the table below, together with the action that will be taken to address them.

Concern	Action
Rusty appearance of noise barrier not acceptable for private properties	The side of the noise barrier facing private properties will be painted a green colour (Colorbond "Rivergum" or equivalent) to complement any existing vegetation.
Noise barrier should be higher for security purposes	The height of the noise barriers will be increased to a [height] between Jones Road and Ridge Road. [height] was the barrier height determined for properties near Hoop Court.
Will domestic pets be secure in backyards during construction	Temporary security fencing will be used during construction to secure and separate private properties from the construction area.
Why aren't the barriers located at the footpath, rather than the property boundary	Locating the noise barrier on the property boundary eliminates potential security and maintenance problems that could otherwise occur from having a secluded corridor at the rear of properties. It is also good practice to locate the noise barrier as close to the property boundary as possible, to maximise the effectiveness of the noise barrier on the residence. Therefore, the noise barriers will be installed on the property boundaries.

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Plans for the noise barriers have now been further developed to incorporate the actions listed above. The department will now seek tenders for construction of the barriers. Refer to the attached Plan.

If you have any further questions about the noise barriers, or the road upgrade project in general, please contact [Name], at the Gympie office, on [Phone No.].

Yours sincerely

**5**

[Name]

**District Director**

**(North Coast Hinterland)**

Job Name

Location

Job No.

THIS DEED is made  
by

\_\_\_\_\_  
Owners Name

("The Owner")

of

\_\_\_\_\_  
Street Address of Property

5

#### RECITALS

- a) The Owner is the registered owner/s of the land described in the attached Schedule ("the Land").
- b) The State of Queensland acting through the Department of Main Roads intends to construct and maintain a noise barrier on the existing fence line of the Land.
- c) The Owner has agreed to consent to the department entering onto the Land to remove the existing fence (if required) and to construct and maintain the noise barrier on the terms and conditions mentioned below

#### THIS DEED WITNESSES

##### 1 DEFINITIONS

For the purpose of this Deed -

"Principal" means the State of Queensland (acting through the Department of Main Roads).

"Licence" means this document and all schedules attached to this document.

"Approved Works" means the approved noise barrier to be constructed on the property boundary alignment.

##### 2 GRANT OF LICENCE

The Owner **HEREBY GRANTS** an irrevocable licence to the Principal together with its agents, servants, contractors and other authorised persons with or without necessary plant equipment and machinery, at any time, to enter upon and go to and from the Land and **DOES HEREBY CONSENT** to the said Principal, its agents, servants and contractors constructing and maintaining the Approved Works on the property boundary alignment and to do all such acts and things thereon as are reasonable and necessary to construct and maintain the said Approved Works.

##### 3 OWNERSHIP AND MAINTENANCE OF APPROVED WORKS

The Principal is the owner of the Approved Works and shall be responsible for all the maintenance and repair of the Approved Works. The exceptions to this are:

- d) Any damage or unauthorised work caused by the owner, tenants or persons they have authorised to enter the property; and
- e) The painted surface of the noise barrier on the private property side of the barrier.

**4 CONDITIONS BINDING OWNER**

The Owner shall observe and comply with, and shall ensure that any tenant or lessee of the Land observes and complies with, the following conditions:

- f) No refurbishment of any type, or maintenance, to be carried out on any part, or section, of the Approved Works.
- g) No existing (or future planting of) vegetation is to obstruct the Principal, its agents, servants or contractors in undertaking maintenance of the Approved Works at any time.
- h) No building or structure of any type is to be erected against or adjoining the Approved Works so as to hinder the Principal, its agents, servants or contractors in carrying out repairs or maintenance to the Approved Works.

**5**

**5 NO PREJUDICE**

This licence shall not in any way prejudice or be construed as a waiver of any lawful cause of action that may arise for any damage or injury done or occasioned by means of or in consequence of the construction and carrying out of the said Approved Works.

EXECUTED AS A DEED:

SIGNED, SEALED AND DELIVERED by

\_\_\_\_\_  
(Owner/s Name) \*

\_\_\_\_\_  
(Owner/s Signature) \*

on the \_\_\_\_\_ day of \_\_\_\_\_ 200\_\_\_\_\_

In the presence of:

\_\_\_\_\_  
(Witness' Name)

\_\_\_\_\_  
(Witness' Signature)

All registered owners must sign to provide a valid agreement. (Power of attorney must be attached if used).

**SCHEDULE**

Description of Owner's Land

Lot: ..., RP..... Parish of: ....., County of .....

**5**

## Technical Note BD30.0

### Noise Barrier - Design Methodology FOR WIND LOADS (4/05)

#### Aim

The aim of this document is to explain the relationship of AS/NZS 1170.2 and the wind speed in MRS 11.15.

#### Background

Noise barriers are an option considered for reduction of road traffic noise levels at noise impacted properties in levels in accordance with Main Roads Road Traffic Noise Management: *Code of Practice*.

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#### Risk to Main Roads

Noise barriers are a potential source of wind borne debris to

- i) Road users.
- j) Adjacent buildings.

Main Roads has a duty of care to ensure that noise barriers are not the first structure to fail and become

- a) Air borne debris that threatens life and damages adjacent housing and other property.
- b) A hazard to motorists, or causes blockage to highways that have an urgent post-disaster function.

Noise barriers must therefore be designed for at least the design wind speed for the adjacent buildings.

#### Buildings in the Vicinity of Noise Barriers

Buildings shielded by noise barriers can include

- Single houses
- Multiple dwellings including blocks of units
- Educational facilities
- Medical facilities
- Day Care Centres

#### Importance Level of Buildings in the Vicinity of Noise Barriers

The importance level of buildings adjacent to noise barriers range from Importance Level 2 for single houses to Level 3 for multiple residency, day care centres, halls (AS 1170.0).

Noise barriers must be designed for Level 3 to cover the range of importance levels of buildings in the vicinity of the noise barriers.

At the development stage, the exact nature of buildings in the vicinity of the noise barrier may not have been determined, or may change later. Hence, any reduction in "Importance Level" will not be allowed to reduce barrier design wind speed.

## Design Life of Noise Barriers

MRS 11.15 specifies a 40 year minimum design life.

Therefore the 50 year value in the appropriate tables of AS/NZS 11.70.2.

## Annual Probability of Exceedence for Design Wind Speed for Noise Barriers

Ultimate wind  $V_{1000}$

Permissible wind  $V_{100}$

Serviceability wind  $V_{20}$

**5**

### Reference:

(Design life 50 years, Importance Level 3) AS 1170.0 Table F2 and Table 3.3 (Amend 2).

### Example of Terrain Category 3 / Height / Regions B and C

Height (m)	Ultimate $V_{1000}$ , (m/s)	
	Terrain Category 3 but excluding $M_1$	
	Region B*	Region C <sup>+</sup>
<3	49.8	56
5	49.8	56
10	49.8	62.3

\* Brisbane, Gold Coast, Sunshine Coast

<sup>+</sup> Tropical coastal

### References

AS/NZS 1170.0:2002 including Amendments 1 (1/03) and 2 (11/03) Structural Design Actions.  
Part 0: General Principles

AS/NZS 1170.2:2002, Structural Design Actions. Part 2: Wind Actions.

MRS 11.15 (3/05) Noise Barriers.

### Authors:

Dr John Fenwick, Ross Pritchard.

## Appendix 5F

### Technical Note BD30.1:

#### Noise barriers – wind loadings (4/05)

### Introduction

This Technical Note has been prepared to give engineers guidance in the design or checking noise barriers adjacent to Main Roads controlled roads in accordance with Main Roads Specification 11.15 “Noise Barriers” and Australian Standard 1170.2:2002.

### Structural Height, Noise Attenuation Height and Design Height

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Designers need to ensure they distinguish between:

- structural height - the height of the noise barrier above the ground (refer AS/NZS 1170.2:2002 Fig D1)
- noise attenuation height - the height of the barrier above the edge line, and
- the height with respect to the wind ( $z$ ) used to determine  $Mz_{cat}$  in accordance with AS/NZS 1170.2:2002 Table 4.1 (refer also Section 11 – Topographical Factor -  $Mt$ ).

### Determining $z$

The value of  $z$  can never be less than the height of the noise barrier, however there are situations where the value is greater than the height of the noise barrier such as when the noise barrier is on a mound or an elevated structure (e.g. refer example in section 12.2).

$z$  shall be measured from the height of the general surrounding ground to the top of the barrier.

### Region

Noise barriers in South East Queensland will be in Region B as determined by AS/NZS 1170.2:2002 Figure 3.1 (excerpt shown). Any barrier in Region A (i.e. inland Queensland) shall be designed as if it was in Region B (refer MRS 11.15 Clause 5.6(b)). Any barrier on the coast north of Hervey Bay is in Region C.

### Terrain Category

Clauses 4.2.1 and Section C4 of AS/NZS 1170.2:2002 define the various terrain categories. Determination of terrain category shall consider current and future use and take the worst effect. Terrain categories will generally be either 2 (i.e. open terrain) or 3 (i.e. urban areas). A terrain category of 2.5 may be used in open urban areas. Transitions between adjacent terrain areas (e.g. near ocean at Gold Coast) can be calculated in accordance with Clause 4.2.3 of AS/NZS 1170.2:2002.

Terrain Category 4 (city centers) is not often be used, as noise barriers are not normally constructed in the CBD. Noise structures in a CBD area should be modeled to see if the wind loads are reduced or intensified by the surrounding buildings.

## Shielding

MRS 11.15 Clause 5.6(c) dictates  $M_s$  typically is 1.0.

The exception is in city areas with multi-story buildings. Some form of modeling would be required to ascertain whether the wind load is increased or decreased by the surrounding structures in these situations.

## Wind Speed and Direction

**5**

MRS 11.15 defines the return interval for wind speed as:

- Ultimate ( $V_{1000}$ ) - 1000 years,
- Permissible ( $V_{100}$ ) - 100 years, and
- Serviceability ( $V_{20}$ ) - 20 years.

A directional wind factor,  $M_d = 0.95$  may be applied in accordance with Cl 3.3.2 for posts and foundations. All other elements (i.e. cladding, rails etc) shall be designed using  $M_d = 1.0$ .

The regional wind speed for Region C includes an additional factor,  $FC = 1.05$ , which is applied to the velocity for ultimate design in Region C. This factor has been introduced to allow for uncertainties in the prediction of ultimate wind speeds when they are based on recorded wind speeds in Region C. These factors may be revised following further research based on recorded cyclone tracks.

The design wind speed (ultimate, permissible or serviceability) shall be shown on the drawings in accordance with MRS 11.15 Cl 5.1 so that someone reviewing the design can quickly ascertain what design loads have been used.

## Drag Co-efficient

AS/NZS 1170.2:2002 Appendix D gives different pressure coefficients for different wind incident angles. The worst case is when the wind direction is at 45° to the wall (AS/NZS 1170.2 Table D2) for the end panels, hence we use  $C_{p,n} = 2.4$  in the area 0 to 2h from the end of the wall. The  $C_{p,n} = 1.2$  for internal panels (i.e. > 2h from end). The table below shows how the worst case  $C_{p,n}$  is calculated.

$\theta$	0 - 2h	2h - 4h	> 4h
0°	1.2	1.2	1.2
45°	1.0	0.25	0.25
90°	2.4	1.2	0.3

Where the length of the wall divided by the height of the wall above the ground is less than 5 (i.e.  $b/c < 5$ ), the designer should refer to Appendix D2 of AS/NZS 1170.2 for the design parameters.

## Suction due to Traffic

The 0.65kPa suction load (MRS 11.15 Cl 5.6) applies to serviceability and permissible wind where the noise barriers are within 4m of the road to account for the additional wind loads from passing vehicles. This suction load is not applied to the ultimate wind force as it assumed that vehicle suction and ultimate wind load will not occur together.

Where noise barriers are greater than 4.0m high, the suction force shall only apply to the lower 4.0m in view of the standard height of trucks that cause the suction force.

## Terrain & Structure Height Multiplier - $M_z$ .cat

$M_z$ .cat is generally taken from AS/NZS 1170.2:2002 Table 4.1(A) based on the terrain category and  $z$  (the height visible to the wind). When in Region C,  $M_z$ .cat is taken from table 4.1(B) for the ultimate limit state design.

Where the terrain category changes within 1000m of the structure, AS1170.2:2002 Clause 4.2.3 gives a method for determining terrain category.

## Topographic Factor - $M_t$

The topographic factor ( $M_t$ ) accounts for the concentration of wind, and hence an increase in pressure where the wind encounters a change in topography. If the structure is outside the zone of influence of the hill or the upwind slope is less than 5%  $M_h = M_t = 1.0$ .

Clause 4.4.2 of AS/NZS 1170.2:2002 gives a detailed procedure for calculating the hill shape multiplier based on the geometry of the hill and the height of the barrier and its distance from the top of the hill (as per the parameters shown in Figure 4.2 below) where  $\frac{H}{2L_u} \geq 0.05$ .

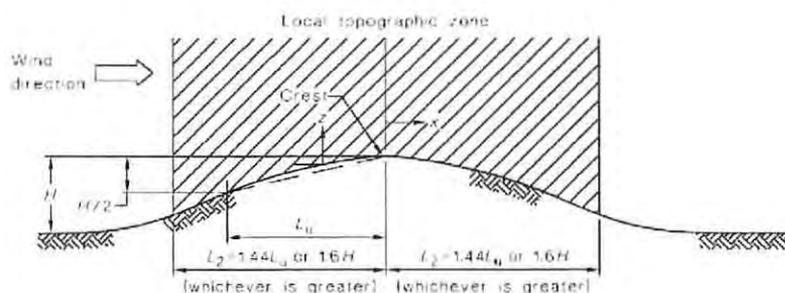


FIGURE 4.2 HILLS AND RIDGES

It is essential that some assessment of the topography be made. Ideally, the designer should visit the site to assess the topography and terrain. Topographic maps or a large-scale survey are also useful to determine  $M_t$  accurately.

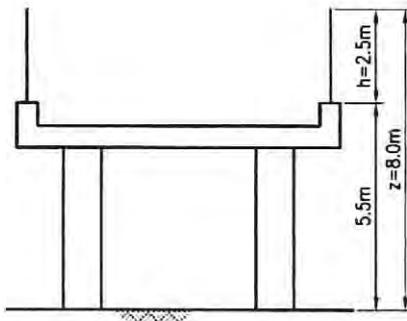
## Case Studies

The topography of the area surrounding the object of interest needs to be considered. The designer should ask the question: “will this object influence the overall topography, or will it be shielded by surrounding objects?” Small objects such as the noise mound that the noise barrier is built on and road embankments are unlikely to affect the topography when trees and other structures surround them. Only large objects that protrude from the landscape (e.g. Kangaroo Point Cliffs or high bridges without surrounding obstructions) should be considered to influence the topography.

The following case studies illustrate the issues that a designer should consider in various typical design situations.

### 5 Noise Barrier on an elevated structure

Consider the case of a noise barrier is on the side of a high bridge or viaduct. For this example, consider the terrain is generally flat, the barrier is 2.5m high and the edge of the kerb that the barrier is on is 5.5m above the ground.



$M_t = 1.0$  (from AS/NZS 1170.2:2002 Clause 4.4 assuming the upwind slope is less than 0.05)

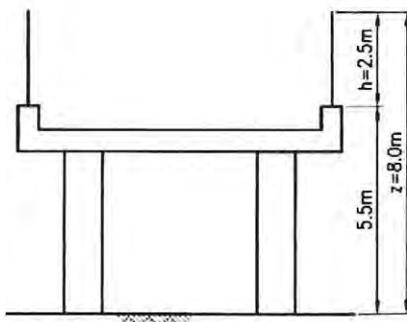
$h = 2.5\text{m}$  = height of noise barrier

Terrain Category = 2.5 (open terrain – AS/NZS 1170.2:2002 Cl 4.2.1)

$z$  = height visible to the wind =  $h$  + height of structure =  $2.5\text{m} + 5.5\text{m} = 8.0\text{m}$

$M_{z,\text{cut}} = 0.92$  (interpolating from AS/NZS 1170.2:2002 Table 4.1(A))

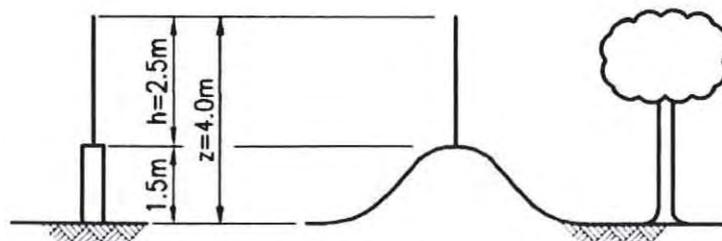
The diagram below shows graphically how the design parameters are measured for a noise barrier on such an elevated structure.



## Noise Barrier on Noise Mound

Consider a common case, where the 2.5m high noise barrier is on a small “noise mound” or on the side of a small road embankment, that is 1.5m high. The surrounding terrain has trees and houses that are as large, or larger than the barrier itself. The mound is small and does not influence the topography. The fact that the barrier is elevated by the mound is accounted for in the increase in the  $z$  parameter.

The photos below show some typical examples noise barriers on mound or concrete barriers.



$M_t = 1.0$  (from AS/NZS 1170.2:2002 Clause 4.4)

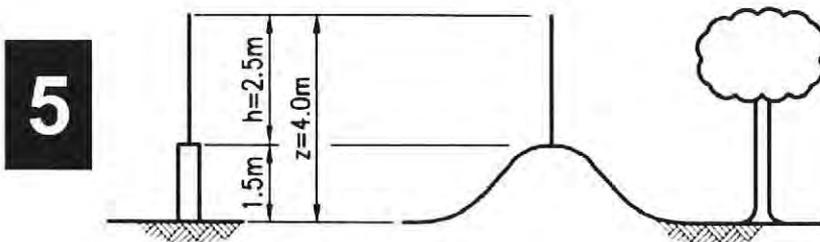
$h$  = height of noise barrier (as defined in AS/NZS 1170.2 D1) = 2.5m

Terrain Category = 3 (urban area – AS/NZS 1170.2:2002 Clause 4.2)

$z = \text{height visible to the wind} = h + \text{height of noise mound} = 2.5\text{m} + 1.5\text{m} = 4.0\text{m}$

$M_{z,\text{cat}} = 0.83$  (from AS/NZS 1170.2 Table 4.1(A))

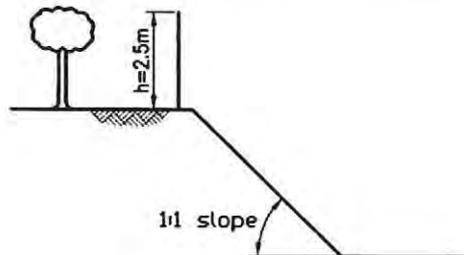
The diagram below shows graphically how the design parameters are measured for a noise barrier a noise mound or a relatively small feature.



### Noise barrier on Dominant Topographical Feature

In this situation the topographical feature is dominant and significant compared to the surrounding houses and trees. Such features are hills, mountains and cliffs, or man made features such as the South East Freeway near Cornwall St.

The diagram below shows graphically how the design parameters are measured for a noise barrier when there is a dominant topographical feature involved.



Refer AS/NZS 1170.2 Suppl:2002 Clause C4.4 for a thorough worked example of how to determine  $M_h$  and  $M_t$  as defined by Clause 4.4 of AS/NZS 1170.2:2002.

Where the topographical effect dominates, the effect of the hill is taken into account by the  $M_t$  rather than the  $z$  as in the previous examples. Situations where we are considering significant topography are rare. In noise barrier designs, we are more likely to be considering cases where the topography is flat (i.e.  $M_t = 1.0$ ).

### Referenced Documents:

AS/NZS 1170.2:2002,

AS1170.1 - 1989 and

MRS11.15 (3/05)

Authors: Ross Pritchard & Martin Kendall

## Technical Note BD 30.2

### NOISE BARRIERS – Structural (04/05)

#### Structural Design of Noise Barriers to MRS 11.15

*This document is intended as a design aid to be used with engineering judgment.*

1. Be certain to distinguish between structural height and noise attenuation height that is measured above the edge line.
2. Design wind speed to be shown on drawings (Clause 6.1).
3. The 0.65 kPa suction load (Clause 5.1) applies only to serviceability and permissible winds.
4. Buckling of UB steel posts:

5

Section 5.6 AS 4100-1998 pages 53-59.

$\phi M = \phi \alpha_m \alpha_s M_s$  = nominal member moment capacity

$\leq \phi M_s$  = nominal section moment capacity

For noise barrier parts laterally unrestrained at top

$\alpha_m = 2.25$  (Table 5.6.2 AS 4100)

$\phi \alpha_s M_s$  &  $\phi M_s$  are published in AISC Design Capacity Tables

in Part 5, Members Subject to Bending for effective length  $l_e$

Table 5.3-5 AS 4100 for UBs

$l_e = k_t k_l k_r l$

$k_t = 1.0$  = twist restraint factor

$k_l = 1.0$  = lateral rotation factor

$k_r = 1.0$  = unless the load is applied to the tension flange

(critical for buckling). NOTE: the load is applied via the angle to the web,

= load height factor

Restraint Arrangement is FU.

full restraint at base

no restraint at top

where  $l$  is the height of the post

5. Minimum section sizes Clause 6.1.9.
  - Steel members – 4mm
  - Timber posts – 100 mm
  - Timber panels – 23 mm for MR jobs. (Other authorities, for example QR have large minimum values)
  - Minimum density of panels: 12.5 kg/m<sup>2</sup>

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6. The panels and posts shall conform to the deflection limits of MRS 11.15.
7. Minimum spacing, edge and end distances for timber:
  - Nails AS 1720.1-1997 Cl 4.2.4 Table 4.4
  - Screws AS 1720.1-1997 Cl 4.3.4 Table 4.8
  - Bolts AS 1720.1-1997 Cl 4.4.4.2-CI 4.4.6
8. Minimum size UB to satisfy edge support of panels: 180UB16
9. Maximum length of panels:
  - Plywood 2680 mm
  - Timber 2700 mm
10. The maximum post spacing on timber and SHS/RHS steel posts shall be such that the panels cover the width (diameter for circular) of the posts.
11. The concrete cover to the posts shall be 75 mm.
12. The 1.5m footing depth is to cater for the lack of control in backfill material and to cater for expansive characteristics of clay backfill.
13. Footing depths in Clause 6.11.3.2 of MRS 11.15 apply to flat ground except the minimum footing depth is 1.5m. For batters, where the noise barrier is not greater than 4.0 metres high and the post is within 5 footing diameters of the batter point, the depth of footing shall be adjusted for the effect of the batter as follows:

Slope of Batter (V:H)	Footing Depth for well compacted road embankment
Flat to 1:5	As for flat ground
1:5 to 1:3	1.25 x Footing depth for flat ground
1:3 to 1:2	1.5 x Footing depth for flat ground
Greater than 1:2	Specialist design required

Notes:

- (a) If the noise barrier is greater than 4.0 metres high, a detailed design shall be undertaken by a geotechnical engineer.
- (b) Factor for adjustment of footing depths where a geotechnical assessment has not been undertaken

If the noise barriers are on poorly compacted ground or noise mound, a geotechnical assessment must be completed to determine the appropriate action.

14. Noise barriers with continuous horizontal rails up to 4.8 m shall consider the continuous span effect of rails because internal posts reactions are larger than simply support rails. Unless noted otherwise on the drawings, all rails shall be considered continuous.

15. Notes on drawings should be based on Standard Drawings 1605-1608.

16. Where a site-specific geotechnical investigation is available and a detailed geotechnical design has been undertaken, these values shall be used instead of the empirical design method.

Referenced Document

MRS 11.15 Noise Barriers (4/05)

AS4100: 1998 Steel Structures

Main Roads Standard Drawings Amendment 32

Authors: Ross Pritchard, Louise McCormick and Evan Sanderson

## **BOULDER RETAINING WALLS**

### **(Draft Standard)**

#### **PREAMBLE**

Various types of earth retaining structures (boulder walls inclusive) abutting the road network have become a common feature. Proprietary wall systems, such as reinforced soil structures, are subject to rigorous design checks and are under the jurisdiction of design codes.

Traditionally, boulder wall designs and their construction control have been very ad hoc, more experience based, but then their heights have been relatively low, say 1 to 2m. In recent times the heights of these walls have increased to levels where they tend to compete with low height engineered wall systems. Also, boulder walls have traditionally been constructed of rounded or semi-rounded rocks of varying sizes.

In this upper range of heights, they could pose a significant public safety risk. Unlike their counterparts, boulder systems by virtue of their more rounded large sizes would have the tendency to roll longer distances in the event of failure and thereby increase the risk to the road user. Therefore, there is no justification to continue to use ad hoc methodologies for their specification, design and construction. At the least, boulder wall systems should be subjected to requirements comparable to those in force for more engineered systems. As they (boulder walls) are currently not contained in design codes, in order to ensure public safety, it is required that they should be engineered construction and consequently would be designed to similar requirements of MRS 11:06- RSS Walls. Hence there is a need to have systems developed by MRD.

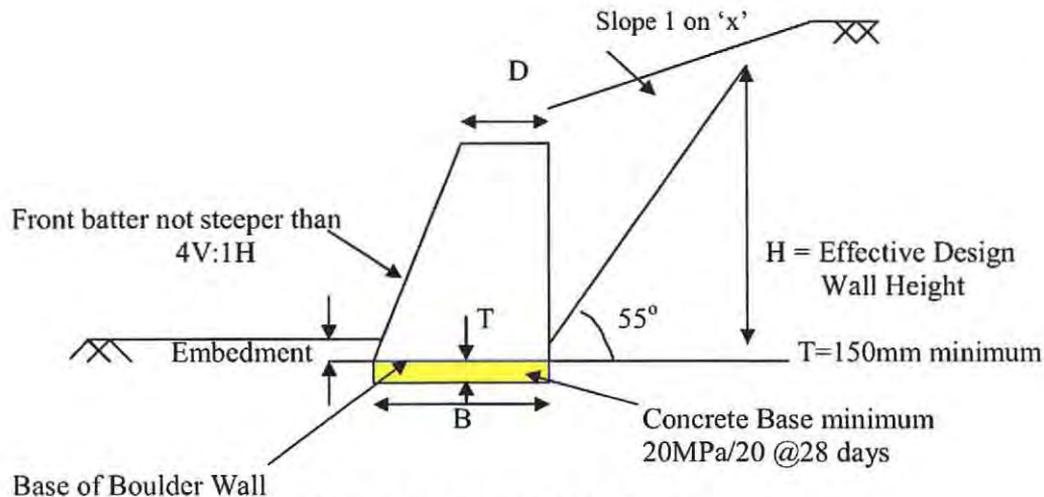
In the absence of specific design codes covering boulder retaining walls, the Department of Main Roads, in general, would not consider wall heights in excess of 4.0m for boulder walls for the present.

Attached herewith, is a guide/ geotechnical supplementary specification /checklist outlining various geotechnical issues, which must be complied with in order to achieve a reliable and safe design for boulder walls in excess of 1.5m in height.

This draft standard only addresses the geotechnical issues and additional items would need to be introduced to make it a general job specification.

## BOULDER RETAINING WALLS (Draft Standard)

### GUIDELINE / SPECIFICATION / CHECKLIST



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## 1 MATERIALS

### 1.1 Rock Boulders:

Rock shall be sound igneous, metamorphic or approved sedimentary rock (as per MRS11.05) that shall meet the minimum requirements of Table 1 below. Rock shall be fresh or slightly weathered and not rounded.

**Source of Boulders:** For the selected source of boulders i.e. quarry, the contractor shall develop a methodology outlining the quality assurance procedures that would be adopted to manage the production of rock boulders meeting the stipulated requirements described in this document.

#### Shape/Size:

- Nearly cubic rock where possible
- Boulders with a ratio of maximum to minimum dimension of not greater than 3
- At least two split faces
- The minimum dimension of a boulder shall be 0.5m.

**Properties:**

Property	Test Method	Limit	Test Results
Density (APD)	Q 109	2.5 t/m <sup>3</sup> minimum	
Rock Material Strength as Is(50)	Q187	2.5 MPa minimum	
Los Angeles Value	Q206	12% maximum	
Sodium Sulphate Soundness (5 cycles)	Q209	5% maximum	
Water Absorption	Q214A/B	1 % maximum	

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**Table 1 Properties of Rock Boulders**

**1.2 Backfill:**

- Friction Angle (Test Method ASTM D3080)  
Selected Backfill (peak friction angle) = ..... deg.  
Note: The **maximum** value adopted in the design shall be 40°.
- Cohesion to be assumed zero
- Grading (Test method Q103A)
- Unit Weight: A nominal allowance for saturated backfill ( $\gamma_{sat}$  of backfill = 20kN/m<sup>3</sup>) to account for situations, which might arise as a result of poor drainage, shall be considered.

**1.3 Drainage Blanket**

A drainage blanket of minimum width 300mm shall be placed behind the boulder wall to act as permanent drainage to the adjacent fill material fill. Material in the drainage blanket shall be sound, durable, fresh, angular and semi-rounded or rounded stone. The rock size shall comply with the following size limitations:

Stone Size (mm)	Percent Finer	Test Results
150	100	
75	90-100	
50	30-60	
26.5	0-5	
19	0-2	

**Table 2 Grading Requirements for Drainage Blanket**

The separator/geosynthetic filter to be used at the drainage blanket/backfill interface shall confirm to MRS11.27.

## 1.4 Packing Stones in Boulder Walls

Packing stones or rock wedges may be needed to bed boulder wall rocks tightly or to level boulders for subsequent courses. This material shall meet the specification for Drainage Blanket (see Section 1.3 and Table 2 above).

## 1.5 Foundation:

- Effective Cohesion Intercept (Q177) = ..... kPa
- Effective Angle of Shearing Resistance (Q177) = ..... deg.
- Undrained Strength = ..... kPa

Select granular fill shall be used to replace unsuitable material under the boulder wall footing if intersected below footing level. The select granular fill shall comply with the following:

- Maximum size 100mm
- Soaked CBR 15%

## 2 DESIGN

### 2.1 Design Life

The design life of the wall shall be 100 years minimum.

### 2.2 Applied Loads

Design live loading as a result of road traffic shall be in accordance with Australian Bridge Design Code and relevant loading statements on the Drawings. The minimum design vertical live load shall be 10 kPa unless noted otherwise. Vertical and lateral loads from earthworks (or other effects) on or adjacent to the boulder wall shall be included in the design.

Traffic impact and safety barrier loads and other superimposed structural loads (e.g. noise barriers) shall be taken into account in the design of the wall.

Compaction induced stresses as discussed under Section 3.3 shall also be taken into consideration.

## 2.3 Minimum Wall Dimensions

### Geometry Specification:

Minimum wall dimensions shall be as per Table below.

Effective Design Wall Height, H (m)	Minimum Wall Base Dimension, B (m)	Minimum Width of Top of Wall, D (m)
1.5	1.40	0.500
2.0	1.50	0.500
2.5	B/H=0.7	0.750
3.0	B/H=0.7	1.000
3.5	B/H=0.7	1.000
4.0	B/H=0.7	1.000

Note: for the definition of effective design wall height, H, refer the typical wall section (Diagram 1) provided at the beginning of this document.

A minimum foundation embedment of 0.5m of the boulder wall into natural ground shall be provided.

Front batter of wall shall not be steeper than 4V:1H.

### Geometry Checklist

- Effective Height of Wall =
- Base Dimension =
- Top Width =
- Embedment =
- Front Batter of Wall =

## 2.4 Stability

### Design Modes of Failure:

The stability of the wall should be checked against the following criteria amongst others as may be warranted depending on particular requirements. Wall friction shall be ignored.

- Sliding (Effective cohesion to be assumed zero. Both total and effective stress calculations for sliding to be carried out). Passive resistance in front of the wall shall be ignored.
- Overturning (Shall meet the requirements of the middle-third rule of structural mechanics)
- Bearing failure (Total stress calculations to be carried out)
- Global failure (Both total and effective stress calculations to be carried out)

The friction angle of rockfill shall be limited to a **maximum** of 36°.

**Factor of Safety:**

Mode of Failure	Required Minimum FOS
Sliding	2.0
Overturning	2.0
Bearing	2.5
Global	1.5

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## 2.5 Design Report and Drawings

A design report, certified by the contractor's RPEQ geotechnical engineer and all relevant drawings shall be submitted to the Principal Engineer (Geotechnical), MRD through Superintendent for approval.

**The design report shall include at least the following:**

- Source of boulders and methodology for production control
- Properties of the boulders
- Properties of the backfill material
- Foundation conditions
- Wall dimensions
- Design calculations

**The drawings shall include the following details:**

- A plan showing the location of the wall along with adjoining structures e.g. buildings.
- Wall Elevation (vertical joints shall be staggered)
- Wall cross sections (showing the thickness of the courses) at every change of wall height > 0.5m and /or B/H ratio.
- Drainage Details. Provide a full height 300mm minimum thickness granular drainage blanket (see Section 1.3) behind the boulders. Continuous geosynthetic filter fabric complying with MRS11.27 shall be provided at the drainage blanket/backfill interface.
- The allowable bearing pressures to be stipulated.

## 3 CONSTRUCTION

Before commencement of construction, the Design Report and Drawings shall have the approval of the Principal Engineer (Geotechnical), MRD.

### 3.1 Foundation Construction Requirements

The foundation of the boulder walls shall be inspected by the Contractor's RPEQ Geotechnical Engineer to ensure that the allowable bearing capacity of the exposed foundation meets the design requirements. Where the exposed foundations have an allowable bearing capacity less

than the design allowable bearing capacity, the weak material shall be excavated and replaced with select granular materials (see Section 1.5) to the extent necessary to provide the required foundation at the base of the boulder wall.

### 3.2 Boulder Wall Placement

Boulders shall be placed so that they interlock with each other. This shall be achieved by the following measures:

- The first row of boulders shall be placed on a blinding layer of 150mm minimum thickness of 20 MPa/20 concrete or better. The boulders within the depth of embedment must be set in concrete.
- All boulders shall be placed with the minimum dimension vertical.
- Not more than two (2) boulders should be placed along the width of wall at any elevation.
- Vertical joints between adjacent boulders, in the longitudinal direction of the wall, shall be staggered between successive courses by a distance not less than 300mm.
- Vertical joints between adjacent boulders, in the cross-section of the wall, shall be staggered between successive courses by a distance not less than 300mm.
- Placement of the boulders shall be progressive along the wall length so as to minimise voids. Packing Stone (see Section 1.4) may be used to correct uneven surfaces and to prevent rocking.
- The extent of contact at any interface between boulders of the adjacent courses in a cross-section shall be not less than 75% of the width of the particular interface in the cross-section.
- Adjacent boulders shall touch.

The face of the wall shall have a uniform appearance for the full visible height by suitable selection from a stockpile. Boulders of similar exposed end dimensions shall be placed as uniformly as practicable along the length and height of the wall.

Placement of boulders shall be subject to daily inspections by the Contractor's RPEQ Geotechnical Engineer.

### 3.3 Backfill Compaction

Compaction of backfill adjacent to the boulder wall/drainage blanket shall conform to the requirements of Table 12, MRS 11.04 with the exception that the compaction of the backfill shall be carried out **with no relaxation** of compaction requirements adjacent to the wall. The wall shall be designed to accommodate this compaction induced thrust as stated in Section 2.1.

### 3.4 Tolerances and Level Control

The horizontal tolerance for the front face of the wall shall be constructed to within ±150mm from the sloping face defined on the drawings.

The thickness of the wall at any cross-section should not be less than that shown on the drawings.

It is the responsibility of the contractor to set out the wall alignment and shape. The contractor shall provide the equipment or tools for the control of the lines and levels (templates, string lines etc.) and this equipment shall remain on site.

### 3.5 Concrete Slurry Fill

The voids between the boulders shall be filled with slurry concrete (slump greater than 100mm) to the level of the adjacent ground where shown on the drawings.

### 3.6 Seepage Drains

Seepage drains using slotted PVC (min. 100mm dia.) shall be placed at not more than 5m centres to link the drainage blanket through the boulder wall to an outlet at the face of the wall.

Backfill around the PVC drain shall be screened gravel of 20mm nominal size and shall completely surround the pipe with a geotextile (as per MRS 11.27) forming the interface with the backfill.

The boulder course above the pipe shall span over the pipe between adjacent boulders.

### 3.7 Surface Runoff Behind the Wall

Positive measures shall be taken to discharge the surface runoff and must not be allowed to infiltrate into the backfill.

### 3.9 Certification at Completion of Construction

The contractor shall submit to the Superintendent a report certified by the contractor's RPEQ Geotechnical Engineer who carried out the design of the wall and supervised the construction, that the wall has been duly constructed as per these specifications and meets all the design requirements including the foundation bearing requirements.

# Glossary

For the purpose of this document, the following definitions apply:

**“AADT” Annual Average Daily Traffic** - the total yearly traffic volume in both directions divided by the number of days in the year.

**“ADT” Average Daily Traffic** - the total number of vehicles in a time period (more than one day and less than a year) divided by the number of days in the period. It is a figure that may be used for a specific time period for purposes relating to that time period.

**“Access Controlled Roads”** - roads where direct access has been effectively restricted by various means e.g. access can only be achieved at an intersection or interchange.

**“Assessment Manager”** - for a development application, the Assessment Manager is:

(a) the local government, where the development is wholly within the local government area unless a different entity is prescribed under a regulation; or

(b) if paragraph (a) does not apply -

- the entity prescribed under a regulation; or
- if no entity has been prescribed, the entity is decided by the Minister for Environment, Local Government, Planning, and Women.

The assessment manager is responsible for the administration of such development applications.” (Integrated Planning Act, 1997)

**“Assessment Provider”** - Suitably qualified acoustical consultant /contractor

or Main Roads project team with demonstrated experience in conducting Road Traffic Noise Assessments, on behalf of Main Roads and / or private land developers.

**“Attenuation”** - reduction in the intensity of a noise level.

**“Australian Design Rules (ADR’s)”** - set out design standards for vehicle safety and emissions. They are developed through a consultative process involving government, industry, employee and consumer representatives and are published by the Commonwealth Department of Transport and Regional Services.

**“BCA”** – Building Code of Australia

**“Building Envelope”** - external façade of a building including external windows, doors, walls, roof, floor etc. through which noise may enter a building.

**“Building Location Envelope”** - a specified location within a lot subject to local government, environmental, acoustical and developer preference etc. requirements. It is an instrument whereby local government can control where a building will be located on a lot and is fixed by a metes and bounds description.

**“Calculated Noise Level”** - the existing noise level at the time of an assessment as estimated by the calculation model.

**“Communal Open Space”** – an area on the Lot used for the recreational uses and social activities of the residents and landscaping where a significant portion of the attached residential development units do not have exclusive access to ground floor private open space as required by the

relevant Planning Scheme for the local government area in which the lot is located. It may contain shared facilities such as a swimming pool, barbecue area, tennis court or children's play equipment.

**“Community Building”** - can be applied to:

- a church,
- a church hall,
- a memorial hall,
- a school of arts,
- a scout hall,
- any other building used by the community for gatherings or meetings (generally non-commercial),
- any emergency services (including police) building used for sleeping and/or training.

**“Concurrence Agency”** - for a development application, means an entity prescribed under a regulation as a concurrence agency for the application, or if the functions of the entity in relation to the application have been devolved, or delegated to another entity, the other entity (Integrated Planning Act, 1997).

**“CoP”** – an abbreviation for this Code of Practice.

**“dB(A)”** - the abbreviation for the unit of measurement of sound. (A) refers to an ‘A’ weighting that represents the response of the human ear to sound.

**“Development”**- is any of the following:

- carrying out building work;
- carrying out plumbing or drainage work;
- carrying out operational work;
- reconfiguring a lot;

- making a material change of use of premises (Section 1.3.2, Part 3, Integrated Planning Act, 1997).

**“Ecologically Sustainable Development, ESD”** - the protection of the environment while allowing for development that improves the total quality of life, both now and in the future, in a way that maintains the ecological processes on which life depends” (Section 3, Environmental Protection Act 1994).

**“Educational Building”** - a school, child care centre, public library, public lecture hall, art gallery (other than for business purposes), museum, sheltered workshop and any other place used or intended for use for the training or teaching of persons.

**“Environment”** – includes:

- ecosystems and their constituent parts, including people and communities; and
- all natural and physical resources; and
- the qualities and characteristics of locations, places and areas, however large or small, that contribute to their biological diversity and integrity, intrinsic or attributed scientific value or interest, amenity, harmony and sense of community; and
- the social, economic, aesthetic and cultural conditions that affect, or that are affected by things mentioned in above (from Environmental Protection Act 1994).

**“Environmental Nuisance”** - any unreasonable interference to an environmental value by noise (eg. road traffic) or air/water contaminants (Section 15, Environmental Protection Act 1994).

**“Environmentally Sustainable Transport”** - transport infrastructure and related services and systems are provided

and managed in a way that accords with the principles of Ecologically Sustainable Development, ESD.

**“Existing Roads - No Roadworks”**- includes no roadworks or rehabilitation works limited to an overlay (bitumen seal or asphalt) or any normal or routine maintenance works.

**“General Environmental Duty”** - a person must not carry out any activity that causes, or is likely to cause, environmental harm unless the person takes all reasonable and practicable measures to prevent or minimise the harm (Section 36, Environmental Protection Act 1994).

In determining the criteria that define reasonable measures, the Act then specifies the following parameters to consider:

- the nature of the harm or potential harm;
- the sensitivity of the receiving environment;
- the current state of technical knowledge for the activity;
- the likelihood of successful application of the different measures that might be taken; and
- the financial implications of different measures as they relate to the type of activity.

**“Good Environmental Management Practices”** - the management of the road network to achieve ongoing minimisation of the impact of road traffic noise through cost-effective measures assessed against the measures currently used nationally and internationally.

**“Habital Room”** – as defined in the BCA, for example, can be applied to a bedroom, living room, dining room, lounge room,

music room, home theatre room, kitchen, sewing room, play room, family room, sun room and study.

**“Health Building”** - premises used or intended mainly for use for the long term or overnight medical or surgical care or treatment of persons and includes institutional residences, mental institutions and doctors surgeries or the like (which provide medical care on an outpatient basis).

**“Heavy Vehicle”** - all vehicles with an unladen weight exceeding 1525 kg.

**“L<sub>A10</sub> Road Traffic Noise Level”**- the level exceeded for 10% of any measurement period; the usual period of measurement is 1 hour. The hourly L<sub>A10</sub> level therefore, is the traffic noise level exceeded for 6 minutes in the hour. The 18 hour L<sub>A10</sub> level (L<sub>A10</sub>(18h)) is the arithmetic average of 18, hourly L<sub>A10</sub> traffic noise levels measured in consecutive hours between 6 am and 12 midnight. The L<sub>A10</sub> (12h) level is the arithmetic average of 12 hourly L<sub>A10</sub> traffic noise levels measured in consecutive hours between 6 am and 6 pm.

**“L<sub>An</sub> (1h) Road Traffic Noise Level”**- the level exceeded for n% of a 1 hour period.

**“L<sub>A90</sub> (8h) Road Traffic Noise Level”** –the arithmetic average of the level exceeded for 90% of each hour between 10pm and 6am.

**“Noise-Sensitive”**- can be applied to:

- a dwelling (detached and attached), reformatory institution, caravan park or retirement village;
- a library, child care centre, kindergarten, school, school playgrounds, college, university, museum, art gallery or other educational institution;

- a community building including a place of public worship;
- a hospital, respite care facility, nursing home, aged care facility, surgery or other medical centre;
- a hotel, motel or other premises which provides accommodation for the public;
- a protected area, or an area identified under a conservation plan as a critical habitat or an area of major interest under the Nature Conservation Act 1992;
- a public park or gardens that is open to the public (whether or not on payment of a fee) for use other than for sport or organised entertainment. (Passive recreation only)

**“Noise”** - unpleasant or unwanted sounds. For the purpose of this code, noise is taken to be the perceived / subjective sound generated by road traffic.

**“New Roads”**- a new access controlled road in a proposed or existing unused corridor adjacent to existing residences or in a proposed corridor where formal approval by a local government or other statutory authority for adjacent land development is current at the date of acquisition, even if the development is not yet in existence. A new road may include the upgrading of a local road (State or local government) to one of a higher functional road hierarchy where there is a marginal increase in the contribution to road traffic noise exposure of at least 3dB(A). The higher functional road hierarchy must be an access controlled road of at least a collector / distributor function. Also new road is applicable to the situation where land acquisition (resumption) is taken beside an existing corridor and all State - controlled road lanes fall outside the existing corridor.

**“Noise Barrier”** - a natural or artificial physical screen located between the source of the noise (road traffic) and a receptor (residence), which interrupts the path of the noise. A specifically located fence/wall and/or earth mound can act as a noise barrier. The physical screen must possess sufficient mass to attenuate the sound.

**“Noise Descriptor”** - specific, commonly used noise indices which are used to express noise levels during particular times of day such as 1 hour (maximum hour during day-time or night time) or 18 hour (6am – 12 midnight) e.g.  $L_n(T)$  or  $L_{eq}(T)$ .

**“Noise Index”** - used to denote a single number measure of the environmental noise level, usually in A-weighted decibels, dB(A) e.g.  $L_n$  or  $L_{eq}$ .

**“Non - access Controlled Roads”** - roads where the adjacent land use has direct access.

**“Predicted noise level”** - the future noise level for the planning horizon as estimated by the calculation model.

**“Private Open Space”** – any area on the Lot used for the recreational needs of the residents as required by the relevant Planning Scheme for the local government area in which the Lot is located and may include decks, balconies, verandahs and covered ground level outdoor recreation areas where the Private Open Space area forms an integral part of a building design.

**“Propagation”** - the wave process whereby sound energy is transferred from one part of a medium to another.

**“Receptor”** - normally a point one (1) metre in front of the most exposed building facade. The height of the receptor is determined on a case by case basis but is at mid window height for each storey but no

less than a minimum of 1.5m above the Finished Floor Level.

**“Retrofitting”** - the addition of treatments designed to attenuate road traffic noise (changes in road surface and/or erection/extension of noise barriers) on an existing road without any significant roadworks.

**“Rw”**- weighted sound reduction index (Refer to Sound Transmission Class).

**“Sound”** - the sensation produced in the ear as a result of fluctuations in atmospheric pressure. The production of sound is always achieved by a vibrating object. The transmission of sound is always through a material medium such as air or water.

**“Sound Energy”** - a sound source will produce a certain amount of sound energy per unit time. The sound energy flows away from the source giving rise to a certain sound pressure.

**“Sound Pressure”** - a vibrating object creates slight pressure fluctuations in atmospheric pressure that expands outwards, travelling through the air and forming a sound wave. This small fluctuation in pressure is called sound pressure which is capable of being detected by the human ear.

**“Sound Transmission Class (STC)”** - for a partition separating two enclosed spaces: a single number evaluation of its ability to attenuate sound passing between the two spaces (from AS1633-1985).

**“State - controlled road”** - a road or a part of road defined under Section 3 and a future State-controlled road pursuant to Section 40 of the Transport Infrastructure Act 1994.

**“Upgrading Existing Road”** - a substantial upgrading such as duplication or additional through lanes within some portion of the existing road reserve. Some

additional lanes may fall outside the existing road reserve where land acquisition (resumption) is required.

**“Vibration”** - vibration may be defined as regularly repeated movement of a physical object about a fixed point. The magnitude of vibration is expressed in terms of Peak Particle Velocity (PPV) expressed in millimetres per second (mm/s). Vibration can be generated by construction equipment and subsequently propagate towards nearby buildings. Such vibration is generated by the interaction of the equipment and the ground surface and by direct transmission of low frequency energy waves through the air. Some of these waves arise as a function of the size, shape and speed of the construction equipment, and others from pressure fluctuations due to engine, exhaust and other noises generated by the equipment.

It has been found that ground vibrations produced by road traffic are unlikely to cause perceptible structural vibration in buildings located near to well-maintained and smooth road pavement surfaces. This aspect does not require further consideration unless there are unusual circumstances under which higher than normal traffic vibration levels may be expected.

There is a much greater potential for generation of vibration during construction. Activities such as piling and blasting should receive careful consideration in order to ensure that the limits set out are complied with. Certain other processes, such as excavation, earth moving and compaction also have the potential to generate significant amounts of vibration.

**“Short-term and Long-term Vibration”**- the effect of vibrations in the ground or in a structure will vary in direct proportion to

the amplitude of the vibratory disturbance and to its duration. Vibratory disturbance is classified as either short-term or long-term vibration depending on whether it is of a type or duration likely to be associated with structural fatigue or resonance of a structure. This approach follows DIN 4150: Part 3: 1999 Structural Vibration - Effects of Vibration on Structures.

Specifically Short-term Vibration is vibration which:

- does not occur often enough to cause structural fatigue and;
- does not produce resonance in the structure.

All other types of vibration are classified as Long-term Vibration.

For example, vibration caused by rock breakers and vibratory rollers are not regarded as short-term vibration, as these may generate a continuous or "steady state" excitation in the structure, and therefore may be associated with resonance and fatigue effects.

"Ground-borne and Structure-borne Noise"-vibration generated by heavy vehicles or by construction activity can sometimes be heard as sound inside in nearby buildings. Typically such sound is manifest as a low frequency "rumbling" sound. Occasionally with sources such as rock-drills, rock-breakers and jackhammers, the noise may have strong components at mid-to-high frequencies. This phenomenon is known as "ground-borne", "regenerated" or "structure-borne" noise. Ground or structure-borne vibration that manifests as mid-to-high frequency noise inside a building, would usually be much more likely to cause annoyance to building occupants than would a lower frequency "rumble" at similar level.

The term ground-borne noise is utilised for noise that is manifested inside a building or structure as a result of vibrations produced by a source located outside the building (and its foundations) and transmitted as ground-vibration between the source and the building.

The term structure-borne noise is utilised to describe the situation where the vibration source and the receptor are located within the same building. A typical example would be vibrations from a hammer drill utilised at the foundations or in the basement of a multi-storey building, evident as noise radiated from lightweight structures throughout the building.

"Temporary Fixed Facilities"- temporary fixed facilities include sites such as depots, plant maintenance and layover areas, batch plants, asphalt plants, crushing and screening equipment, stockpile sites and other materials processing and handling sites established on a short-term or semi-permanent basis, to service the specific requirements of a particular road construction or maintenance project.

For the purposes of determining applicable noise and vibration criteria and controls, temporary fixed facilities are considered part of the road construction or maintenance activity (whether or not the facilities are located in the road reserve).

Other such facilities, whether semi-permanent or permanent, established for the purposes of production or distribution of products to a number of different clients, sites or projects (which may include road projects) are considered to be similar to other activities of an extractive industrial or an industrial nature and are therefore not included in the provisions of this CoP.

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**ANNEXURE 1 – PART 1 – ATTACHMENT 2  
MODIFICATIONS TO AS5100**

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## 1 MODIFICATIONS TO AS5100

The clause numbers used in this Attachment 2 to Annexure 1 Part 1 (Design Requirements) refer to clause numbers used in AS5100. For example, *Clause 12.1 (d)* refers to clause 12.1 (d) in AS5100.

### (i) Section 1 – Scope and General Principles

#### **Clause 12.1 (d) Height of Balustrades:**

This clause states that the balustrade should be 1.3m above the kerb. *Austrroads Guide to Traffic Engineering Practice Part 14 "Bicycles"* clause 7.6.2 states that the balustrade should be 1.4 m above the riding surface.

In order to conform to both documents, a 100mm kerb is required under the balustrade or a special balustrade is required.

#### **Appendix B, Figure B1**

On the left side, third box from bottom:  
"Figures B3.3.1 to B3.3.4" should read "Figures B5 to B8".

### (ii) Section 2 – Design Loads

#### **Clause 6.3 Heavy Load Platform Loads**

The design loads for bridges are the W80, A160, SM1600 and HLP400

The lateral placement of the HLP400 is:

- a) Two marked lane bridge  
± 1.0 m either side of centreline of two marked lanes, or
- b) Three or more marked lanes  
In two marked lanes with the vehicle travelling + 1.0 m either side of centre of any two adjacent marked lanes. Consideration should be given to the most likely path of the vehicle. The code co-existent half SM1600 on the adjacent ramp shall be applied to create the worst effect.
- c) One lane ramp  
Shall be positioned on a one lane ramp so located by the designer. The tolerance on lateral position shall be specified.
- d) The designer location of the HLP400 shall be shown on the General Arrangement drawing.

**Clause 6.7.3(ii)** should be amended to read:

*0.1 for a cover depth of 2 m or more for all loads excluding S1600. For S1600 loads, the dynamic load allowance is zero for covers of 2 m or more.*

(S1600 is a stationary load and has no impact. Table 6.7.2 states that S1600 has zero dynamic load allowance.)

### Figure 7

'For walkways attached to the road or railway bridge superstructure' shall be interpreted as:

- a) "Attached walkway load" shall be designed with simultaneous traffic loads, and
- b) "Independent walkway load" shall be designed with no traffic load

### Clause 8.5.1, 2<sup>nd</sup> paragraph, 2<sup>nd</sup> line

8.5.4 should be 8.5.5'

### Clause 11.2.1

First sentence ambiguous. Replace first sentence by:

'The design criteria, including loads and geometric requirements, provided in this Clause 11 and in AS 5100.1, Clause 10 shall be used for the following:'

### Clause 11.5 Pedestrian Railing Design Loads

The design of pedestrian railing loads without panic loads shall conform to either:

- a) Clause 11.5
- b) Department of Main Roads standards for steel and aluminium balustrade.

### Fig 15.2.1

On horizontal axis, right end, '0.2' should be '2000'

### Fig 17.3

The structure depth 'd' should be replaced by 'D'.

## (iii) Section 4 – Bearings and Deck Joints

### Clause 12.6.8 (c)

'(c) *For plain pads and strips:*' should read:

'For plain pads and strips the value of the compressive strain ( $\epsilon_c$ ) to be used in deriving the compressive deflections ( $d_c$ ) shall be determined as follows:'

### Clause 14.2 2<sup>nd</sup> paragraph

'AS 1449' should be 'ASTM A240/A240M-03b'

### Modular Expansion Joints

Modular joint shall be designed in accordance with Interim Main Roads Specification MRS 11.90.

(iv) **Section 5 – Concrete**

**Additional requirements to AS5100.5 for prestressed members**

Maximum compressive stress at transfer:  $0.6f_{cp}$  (in accordance with Clause 8.1.4.2)

Maximum compressive stress at all other times:  $0.4f_c$

Maximum tensile stress should be  $-0.25 \sqrt{f_c}$  (Clause 8.6.2) and  $-0.25 \sqrt{f_c}$  for transfer and all other times respectively.

The increment in steel stress due to partial prestress in Clause 8.6.2 (a) (ii) is limited to the load case with HLP 400 vehicle.

**Corrections to AS 5100.5 are as follows:**

**Equation 8.1.6(1)**

Should read:

$$dpu = dp.ef + 6200 \times \frac{(dp - kud)}{Lpe}$$

**Clause 8.6.1 (a)**

Delete this clause

**Clause 13.3.2 Third Paragraph**

Replace "0.1L<sub>p</sub>" by "0.1L<sub>pl</sub>".

**Appendix H Figures H1(B) and H1(C)**

On all cross sections the bottom flange thickness is denoted as 1b. It should be tb to be consistent with Tables H2(B)(1) & H2(B)(2)

(v) **Section 6 – Steel**

**Clause 5.1.8.3**

'hybrid' should be 'hybrid'.

**Equation 5.6.1.1(2)**

The version in the standard is:

$$\alpha_s = 0.6 \left[ \sqrt{\left( \frac{M_s}{M_{oa}} \right)^2 + 3} - \left( \frac{M_s}{M_{oa}} \right) \right]$$

The correct formula should be:

$$\alpha_s = 0.6 \left[ \sqrt{\left[ \left( \frac{M_s}{M_{oa}} \right)^2 + 3 \right]} - \left[ \frac{M_s}{M_{oa}} \right] \right]$$

(Error: length of square root sign)

### Equation 5.6.1.2(1)

The version in the standard is:

$$M_o = \sqrt{\frac{\pi^2 EI_y}{L_c^2} \left[ \sqrt{GJ + \left( \frac{\pi^2 EI_w}{L_c^2} \right) + \left( \frac{\beta_x^2 \pi^2 EI_y}{4 L_c^2} \right) + \left( \frac{\beta_x}{2} \sqrt{\frac{\pi^2 EI_y}{L_c^2}} \right)} \right]}$$

The correct equation should be:

$$M_o = \sqrt{\frac{\pi^2 EI_y}{L_c^2} \left[ \sqrt{\left[ GJ + \left( \frac{\pi^2 EI_w}{L_c^2} \right) + \left( \frac{\beta_x^2 \pi^2 EI_y}{4 L_c^2} \right) \right]} + \left( \frac{\beta_x}{2} \sqrt{\frac{\pi^2 EI_y}{L_c^2}} \right) \right]}$$

(Error: length of square root sign)

### Equation 5.6.2

The version in the standard is:

$$\alpha_s = \left[ \sqrt{\left[ \left( \frac{M_s}{M_{ob}} \right)^2 + 3 \right]} - \left[ \frac{M_s}{M_{ob}} \right] \right]$$

The correct equation should be:

$$\alpha_s = 0.6 \left[ \sqrt{\left[ \left( \frac{M_s}{M_{ob}} \right)^2 + 3 \right]} - \left[ \frac{M_s}{M_{ob}} \right] \right]$$

(Error: 0.6 missing)

**Table 5.6.5(A)**

The relationship for factor,  $k_t$ , for case PP, should be:

$$1 + [2(d_f/L) (t_f/2t_w)]/n_w$$

(Error: '2' missing from in front of (d<sub>f</sub>/L))

**Table 5.6.5/B**

Version in the standard is:

Longitudinal position of the load	Restraint arrangement	Load height position	
		Shear centre	Top flange
Within segment	FF, FP, FL, PP, PL, LL, FU, PU	1.0	1.4
		1.0	2.0
At segment end	FF, FP, FL, PP, PL, LL, FU, PU	1.0	1.0
		1.0	2.0

Correct Version is:

Longitudinal position of the load	Restraint arrangement	Load height position	
		Shear centre	Top flange
Within segment	FF, FP, FL, PP, PL, LL,	1.0	1.4
	FU, PU	1.0	2.0
At segment end	FF, FP, FL, PP, PL, LL,	1.0	1.0
	FU, PU	1.0	2.0

(Error: FU and PU values incorrect.)

**Equation 6.4.2.2(5)**

The version in the code is:

$$s_d = 0.018 \left( \frac{L_b}{r_x} \right)^{\frac{1}{2}} \left( \frac{d_w}{t_w} \right)^{\frac{1}{3}}$$

Correct version is:

$$\delta_d = 0.018 \left( \frac{L_h}{r_y} \right)^{\frac{1}{2}} \left( \frac{d_w}{t_w} \right)^{\frac{1}{3}} - 0.4$$

**Appendix A, Equation A4 (3)**

The version in the code is:

$$K = \frac{\sqrt{\pi^2 EI_w}}{GJL^2}$$

Correct version is:

$$K = \frac{\pi}{L} \sqrt{\frac{EI_w}{GJ}}$$

(Error: square root)

**Appendix E, Equation E (5)**

The version in the code is:

$$M_p = f_y [A.d_g - b_f (d_h + d_s) d_h]$$

The version should be:

$$M_p = f_y [A.d_g - b_f (d_h - d_s) d_h]$$

(Error + in bracket)

(vi) **Section 7 - Rating of Existing Structures**

**Appendix A, Figs. A11, A12, A13**

The last three figures are incorrectly located and should be amended as follows:

The diagram of Fig. A11 should be shifted to Fig. A13;

The diagram of Fig. A12 should be shifted to Fig. A11;

The diagram of Fig. A13 should be shifted to Fig. A12;

All three Figures should have two notes: 'Dimensions in metres' and Axle loads in kN'

The title of Fig. A12 should be 'Figure A12 300-A-12 Railway Traffic Loadings Axle Group Spacings'

**Appendix A, Clause A 3.2, first sentence**  
Line 2, 'Figure A12' should be 'Figure A11'  
Line 3, 'Figure A13' should be 'Figure A12'



**ANNEXURE 1 – PART 1 – ATTACHMENT 3**  
**MATTERS FOR RESOLUTION TO BRIDGE DESIGN**

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## 1 MATTERS FOR RESOLUTION FOR BRIDGE DESIGN

The following matters must be confirmed by PPP Co as required by QDMR and each relevant Authority for the design of the Project Works before design commences.

Issue	Applicable to Project
<b>AS 5100.1 Scope and General Principles</b>	
Application of the provisions of this Standard to the design of modifications to existing bridges (see Clause 2)	Bridges over 100m span will have additional special criteria. Modular expansion joints to conform to RTA Specification 316.
Design Life of ancillary elements (see Clause 6.2) that can be easily removed and replaced	Design Life means 95% of bridge exceed the nominate design life.  Light poles, signs on side of bridge and cantilever signs 40 years  Full width gantry signs 100 years  Bearings 100 years  Noise barriers refer QDMR Specification MRS 11.15
Use of non-linear analysis methods (see Clause 6.4)	Non-linear material properties not permitted.  Other non-linear analysis not permitted unless approved by QDMR. Program must be tested and certified.
Other effects, including load effects, to be considered regarding specific additional conditions and requirements (see Clause 6.8)	Some special cases may be required, as specified by QDMR.
Bridge waterway requirements (see Clause 7.1)	Job specific. Refer hydraulic brief. In general, velocities must be kept close to natural velocities.
Determination of environmental requirements including requirements of the waterway authority (see Clause 8)	Drainage from deck on case by case. In general, water to discharge through scuppers unless over road or railway.
Geometric requirements for all bridges (see Clauses 9.1, 9.2 and 9.3)	Safe design speed → min radius as required by rail or waterway authority and QDMR. Geometry should conform to the QDMR Road Planning Design Manual and Austroads Road Design Guide.
Geometric arrangement of railway bridges (see Clause 9.2)	As required by rail Authority
Road bridge carriageway widths (see Clause 9.4)	As per AS 5100
Edge clearances from the edge of the traffic lane to the face of the safety barrier	As per AS 5100

Issue	Applicable to Project
(see Clause 9.5)	
Horizontal clearances to substructure components of bridges over roadways (see Clause 9.6)	Job specific as agreed with QDMR
The minimum vertical clearance of structures over roadways (see Clause 9.7)	Minimum clearance on stand alone footbridge 6.1m. Job specific requirements as agreed with QDMR may override Table 9.7
Vertical and horizontal clearances for bridges over railways (see Clause 9.8)	As required by rail Authority.
The superelevation and widening of the deck surface of a bridge on a horizontal curve (see Clause 9.9)	Job specific as agreed with QDMR
Geometric requirements for walkway and pedestrian bridges (see Clauses 9.10 and 9.11)	Minimum clearance on stand alone footbridge 6.1m
Dimensional requirements for pedestrian subways (see Clause 9.12)	1:33 for disabled access – varies with length
Determination of barrier performance level and barrier type requirements (see Clause 10.2)	Job specific as agreed with QDMR
Acceptance criteria for bridge traffic barriers (see Clause 10.4)	To be confirmed by QDMR Principal Engineer (Bridge Design)
Specification of performance levels for traffic barriers including bridge rehabilitation (see Clause 10.5.1)	Job specific as agreed with QDMR
The need and provision of special performance level barriers (see Clause 10.5.6)	Job specific as agreed with QDMR
The height and profile of parapet type barriers (see Clause 10.6.1)	Job specific as agreed with QDMR
Geometric requirements for post and rail type barriers (see Clause 10.6.2)	Job specific as agreed with QDMR
The extent of transition of the road approach barrier system to the bridge barrier (see Clause 10.6.3)	Job specific as agreed with QDMR
Performance levels for collision protection (see Clause 11.1)	Job specific as agreed with QDMR
Requirements for protection of bridge supports from road traffic collision (see Clause 11.2)	Job specific as agreed with QDMR
Requirements for protection of bridge supports from railway traffic collision (see Clauses 11.3.1, 11.3.2, 11.3.3 and 11.3.4)	Job specific as agreed with QDMR

Issue	Applicable to Project
Requirements for protection of bridge supports from ship collision (see Clause 11.4)	Job specific as agreed with QDMR, normally controlled by pier positioning
Requirements for protection barriers for bridges over electrified railways (see Clause 12.2)	Job specific as agreed with QDMR
Requirements for protection screens to prevent objects falling or being thrown from bridges (see Clause 12.3)	Job specific as agreed with QDMR
Requirements for the attachment of and design loads for noise barriers on bridges (see Clause 13)	Job specific as agreed with QDMR
Drainage requirements for bridge approaches (see Clause 14.1)	Job specific as agreed with QDMR
Attachment of utility services on structures (see Clause 16)	Job specific as agreed with QDMR
<b>AS 5100.2 Design Loads</b>	
Varying loads on the basis of engineering measurements and calculations (see Clause 1)	Design code: AS 5100: 2004 Significant variation from code SM1600 HLP 400 position diagram Design speed Fatigue criteria (for Concrete Railway Bridges, Steel Bridges) Pedestrian load Collision load Wind speed Flood data (velocity, level) Earthquake zone Differential settlement (If Applicable) Barrier performance level Construction method (When Required)
Value of $\gamma_g$ for large segmental cantilever construction for the case when dead load reduces safety (Table 5.2)	Job specific as agreed with QDMR
Value of $\gamma_g$ s to be applied to the nominal superimposed dead load (see Clause 5.3)	2.0
Specification of heavy load platform design load (see Clauses 6.2 and 6.3)	HLP 400. May be higher on specific heavy load routes.
Requirement for design loads and load factors if road bridges are to carry	Job specific as agreed with QDMR

Issue	Applicable to Project
tramway or railway traffic (see Clause 6.4)	
Number of lanes to be included for braking force and calculations (see Clause 6.8.2)	As per AS5100. Taking into future redevelopment.
Number of stress cycles for fatigue load calculation (see Clause 6.9)	As per AS 5100
Design vehicle load for walkway (Clause 7.1)	20kN
Requirement for design for crowd loading (see Clause 7.1)	Job specific as agreed with QDMR. May be higher than AS 5100 where crowd loading expected. Or 5 KPA over whole span, with crowd loading for special events.
Design loads for railway bridges and bridges carrying light rail and the like (see Clause 8.1)	As specified by relevant Authority
Dynamic load allowance for specific structures, track standard and train speeds (see Clause 8.4.7)	As determined by rail Authority
Need for protection beams to protect superstructures of low clearance bridges (see Clause 10.3)	As per Table 10.3
Risk analysis and redundancy levels for determination of alternative load path (see Clause 10.4.2)	As determined by rail Authority
Need for and determination of collision loads on support elements (see Clause 10.4.3)	As determined by rail Authority
Other design requirements for collision loads from railway traffic (see Clause 10.4.6)	As determined by rail Authority
Determination of traffic barrier design loads (see Clause 11.2.2)	Minimum regular. Each case to be confirmed by QDMR Principal Engineer (Bridge Design)
Determination of effective heights of traffic barriers (see Clause 11.2.3)	Job specific as agreed with QDMR
Barrier anchorage requirements (see Clause 11.2.4)	Other method must be approved by QDMR
Requirement for pedestrian barrier design for crowd loading (see Clause 11.5)	Panic load in high profile locations
Criteria for dynamic analysis (see Clause 12.2.3)	Determined on job specific basis
Need for assessment of vibration behaviour for railway bridges (see Clause 12.3)	As required by rail Authority

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Issue	Applicable to Project
Classification of bridges and associated structures that are essential to post-earthquake recovery (see Clause 14.3.2)	Type III includes major stream crossing including Gateway bridge, Captain Cook bridge, Burnett River, Fitzroy river, Burdekin river and any major road where there will be a major deviation. Type II are overpasses as per Clause 14.3.2.
Identification of all requirements for earthquake design for bridges identified as particularly important (see Clause 14.4.1)	Bridge specific requirements
Any changes to the importance level for noise barriers (see Clause 24.2)	Refer QDMR standard specification MRS 11.15
<b>AS 5100.3 Foundations and Soil-Supporting Structures</b>	
Design requirements for foundations for overhead wiring structures (see Clause 2)	Refer relevant Authority design criteria.
Detailed method and formulae to be used for the design of geotechnical or structural elements (see Clause 2)	As per AS 5100
Supervision of site investigation (see Clause 6.1)	Geotechnical engineer unless specified otherwise.
Extent and coverage of preliminary and design investigation (see Clause 5.1)	Unless job specific requirement as agreed with QDMR
Minimum number of bore holes (see Clause 5.2)	One per pier/abutment
Selection of the geotechnical strength reduction factors (see Clause 7.3.4)	As per AS 5100
Requirements for consideration of future development (see Clause 7.8)	Job specific when specified by QDMR
Other durability criteria (see Clause 9.1)	Job specific as agreed by QDMR
Use of treated and untreated timber (see Clause 9.2)	Not permitted for bridges
Requirements for prevention of corrosion of reinforcement (see Clause 9.3)	Consult rail Authority for electrified lines, other areas seek expert advice.
Acceptance of rates of corrosion for steel surface (see Clause 9.4)	Adopt AS 5100 unless better site data provided.
Requirements to minimise corrosion effects of stray currents (see Clause 9.3)	Consult rail Authority for electrified lines, other areas seek expert advice.
Acceptance of slip factor coatings (see Clause 9.5)	Refer QDMR standard specification MRS 11.67
Durability requirements of other materials (see Clause 9.6)	Subject to written approval by QDMR
Design requirements for durability of	As per AS 5100

Issue	Applicable to Project
materials used in shallow foundations (see Clause 10.3.6)	
Requirements for structural design and detailing for shallow footings (see Clause 10.4)	As per AS 5100
Requirements for materials and construction for shallow foundations (see Clause 10.5)	As per AS 5100
Use of timber piles (see Clause 10.3.1)	Temporary works only
Requirements for durability of materials used (see Clause 10.3.4)	As per AS 5100
Requirements for structural design and detailing for construction of piles (see Clause 11.4)	As per AS 5100
Requirements for materials and construction for pile (see Clause 11.5)	As per AS 5100
Requirements for testing of piles (see Clause 11.6)	Dynamic testing in accordance with QDMR standard specification MRS 11.68
Design requirements for durability of anchorages and anchorage components (see Clause 12.3.6)	As per QDMR standard specification MRS 11.03
Requirements for materials and construction for anchorages (see Clause 12.4)	As per AS 5100
Requirements for method of installation and on-site assessment tests for anchorages (see Clause 12.6.1)	As per QDMR standard specification MRS 11.03
Proof load test for anchors (see Clause 12.6.2)	As per QDMR standard specification MRS 11.03
Requirements for anchorage acceptance tests (see Clause 11.6.3)	As per AS 5100
Requirements for design of retaining and abutments (see Clause 13.1)	As per AS 5100
Acceptance of geotechnical strength reduction factor for retaining walls and abutments (see Clause 13.3.1)	As per AS 5100
Design requirements for durability (see Clause 13.3.5)	As per AS 5100
Requirements for structural design and detailing for retaining walls (see Clause 13.4)	As per AS 5100
Requirements for materials and construction for retaining walls and abutments (see Clause 13.5)	As per AS 5100

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Issue	Applicable to Project
Approval of drainage system (see Clause 13.6)	As per AS 5100
Requirements for the design of buried structures (see Clause 14.1)	As per AS 5100
Design requirements for the durability of materials (see Clause 14.3.3)	As per AS 5100
Requirements for structural design and detailing for buried structures (see Clause 14.4)	As per AS 5100
Requirements for materials and construction for buried structures (see Clause 14.5)	As per AS 5100
<b>AS5100.4 Bearings and deck joints</b>	<b>All bearings and deck joints</b>
No entries	
<b>AS 5100.5 Concrete</b>	
Acceptance of the use of new or alternative materials and methods of design or construction (see Clauses 1.5.1 and 1.5.2)	Subject to written approval by QDMR
Design requirements of lightweight structural concrete (see Clause 1.5.4)	Not permitted
Minimum cover at post-tensioning anchorages (see Clause 4.10.2(e))	No reduction permitted
Requirements for control of cracks in columns and tension members (see Clause 10.1.4)	Must comply with Clause 8.6
Determination of proof test load (see Clause 17.3)	Case specific, to be approved by QDMR
<b>AS5100.6 Steel and Composite Construction</b>	
Requirement for members and materials for new and unusual bridge types (see Clause 1.1)	Only with written QDMR approval
Design requirements for structural elements using non-ferrous metals (see Clause 1.1)	Only with written QDMR approval
Requirements for steels for machined parts and for uses in other than structural member elements (see Clause 2.2.4)	Only with written QDMR approval
<b>AS 5100.7 Rating of Existing Bridges</b>	

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Issue	Applicable to Project
Application of performance load testing results to determine the rated load (see Clause 5.4.4)	Must conform to AS 5100
Conditions for amending the dynamic load allowance (see Clause 5.5.1)	Must conform to AS 5100
Approval to the use of a reduced live load factor for load capacity rating of a bridge (see Clause 5.5.2)	Must conform to AS 5100
The load factors to be used when rating a bridge (see Clause 6.1)	Must conform to AS 5100
Approval to modification of load factors for serviceability limit states (see Clause 6.2)	Must conform to AS 5100
Approval to modification of load factors for ultimate limit state (see Clause 6.3.1)	Must conform to AS 5100
Approval to the use of a live load factor which is less than the design value (see Clause 6.3.2)	Must conform to AS 5100
Use of modified live load factors based on probability of overloading (see Clause 6.3.3)	Must conform to AS 5100
Conditions for use of load factors for specific loads (see Table 6.3)	Must conform to AS 5100
Approval to the determination of ratings for fatigue (see Clause 7)	Must conform to AS 5100

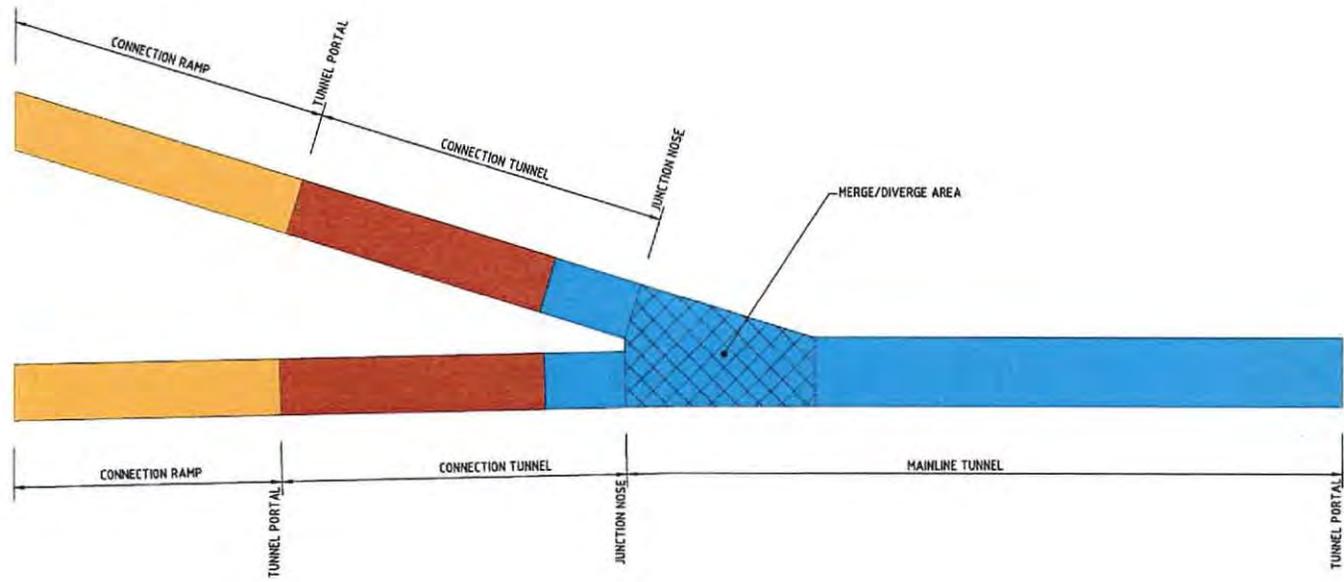


**ANNEXURE 1 – PART 1 – ATTACHMENT 4**  
**ROAD GEOMETRIC DESIGN DEFINITIONS**

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**LEGEND**

	TROUGH STRUCTURE
	CUT AND COVER TUNNEL
	DRIVEN TUNNEL
	MERGE/DIVERGE AREA

- NOTES**
1. THIS DRAWING IS ILLUSTRATIVE ONLY AND SHALL NOT BE CONSTRUED TO BE A CONFORMING OR COMPLIANT REPRESENTATION OF THE PROJECT WORKS IN RESPECT OF THE REQUIREMENTS OF THE PROJECT DEED.
  2. THE PURPOSE OF THIS DRAWING IS TO PROVIDE REFERENCE TO THE DEFINITIONS USED IN THE PERFORMANCE SPECIFICATION ONLY.

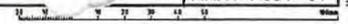
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NOT FOR CONSTRUCTION**

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Rev.	Date	Revision Details		



ANNEXURE 1 – ATTACHMENT 4  
ROAD GEOMETRIC DESIGN  
DEFINITIONS

Client Project No.	25175
Scale	NTS
Sketch No.	Rev.
ANX1-4-001	01



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**ANNEXURE 1 – PART 1 – ATTACHMENT 5**  
**AL ROAD GEOMETRIC DESIGN TYPICAL TUNNEL CARRIAGEWAY**  
**ENVELOPE**

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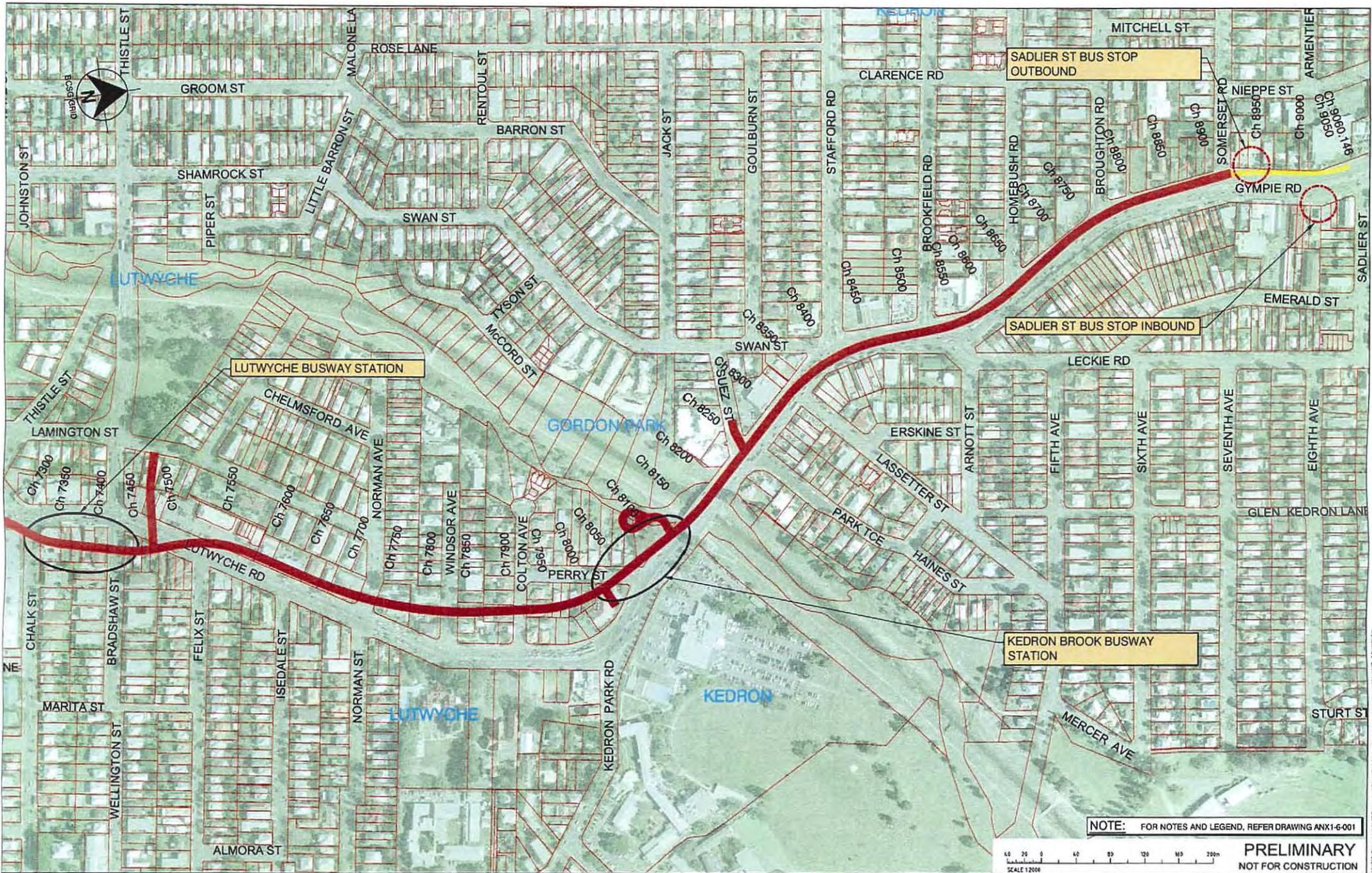
**ANNEXURE 1 – PART 1 – ATTACHMENT 6**  
**NB WORKS DRAWINGS**

Reference	Title
ANX1-6-001 Rev 02	NB Works, Plan 1 of 3
ANX1-6-002 Rev 03	NB Works, Plan 2 of 3
ANX1-6-003 Rev 02	NB Works, Plan 3 of 3
ANX1-6-010 Rev 01	Northern Busway, Section 1 / NB Works Interface Point

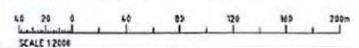








NOTE: FOR NOTES AND LEGEND, REFER DRAWING ANX1-6-001



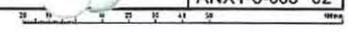
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NOT FOR CONSTRUCTION

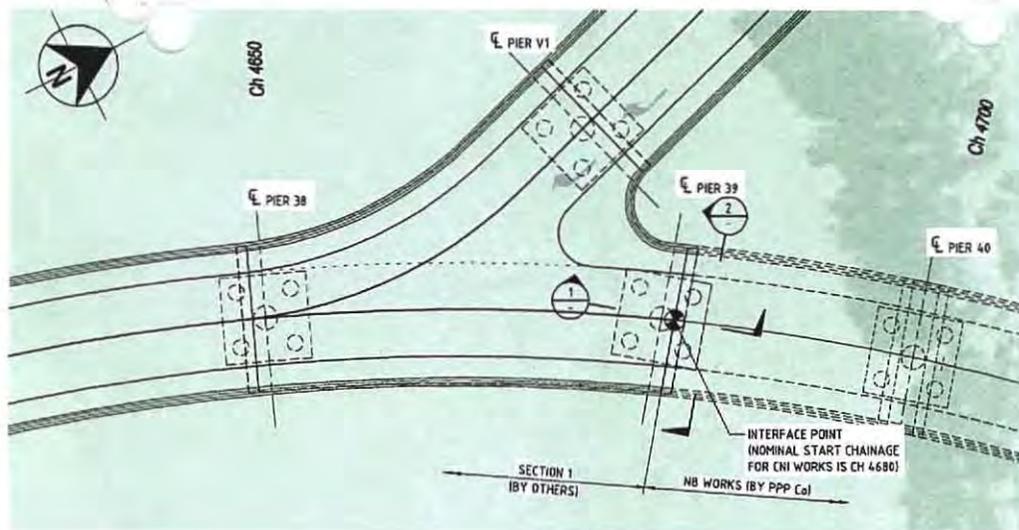
Rev	Date	Revision Details	Author	Checked
02	MAR/08	REVISED NOTES	THB	
01	JUN/07	ON PERFORMANCE SP	THB	



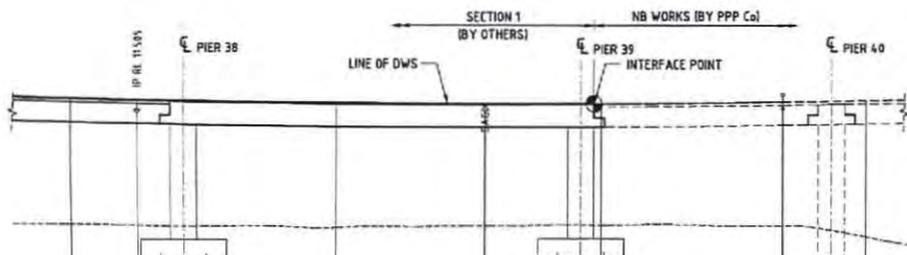
NB WORKS  
PLAN 3 OF 3

EW Project No.	25175
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Sketch No.	Rev
ANX1-6-003 02	





**SECTION 1 INTERFACE**  
SCALE 1:200



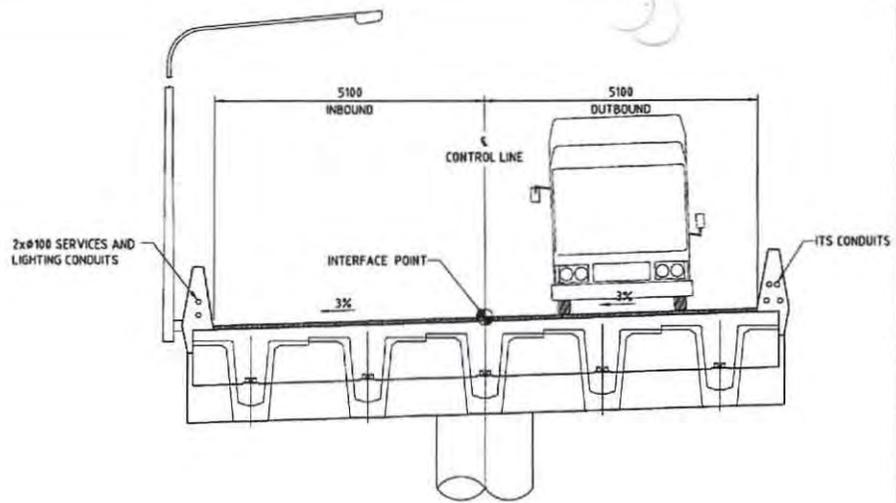
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VERTICAL	-5%		R1500 L97.5		15%				
							R165 A134.841		
HORIZONTAL									
CONTROL LINE	12.393	12.397	12.110	12.067	12.093	12.236	12.330		
CHAINAGE	4640.000	4644.983	4660.000	4671.243	4680.000	4693.743	4700.000		

CONTROL LINE: d align All Pref Opt 1->cl  
SCALE H 1:200  
SCALE V 1:200

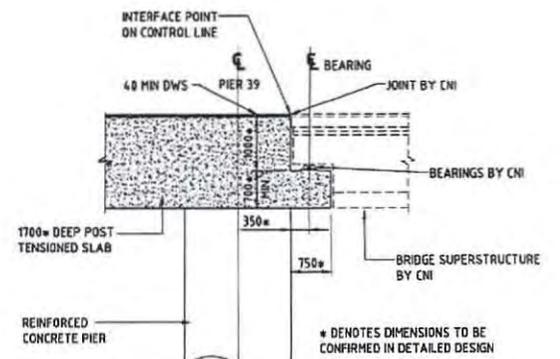
**d align All Pref Opt 1 - cl - CONTROL LINE DETAILS**

PT	CHAINAGE	EASTING	NORTHING	BEARING	RAD/SPIRAL	TANGENT	DEF ANGLE	ARC LEN
CT	4536.750	52889.265	161445.944	94°10'28"				
TC	4619.384	52892.095	161537.740	94°10'28"				
IP10	4677.884	52903.394	161608.287		165.000	71.441	66d49'23"	134.861
CT	4745.227	52962.422	161648.239	55d59'51"				
TC	4812.763	53018.611	161686.097	55d59'51"				

COORDINATE SYSTEM: BRISBANE CITY SURVEY GRID  
DATUM: AHD



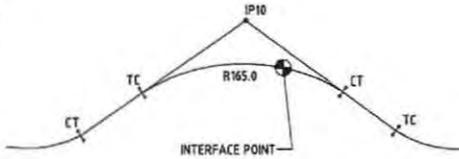
**SECTION 2**  
SCALE 1:50



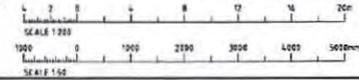
**SECTION 1**  
SCALE 1:50

INTERFACE POINT DETAILS	
EASTING	52916.778
NORTHING	161601.723
RL. DWSL	12.091m
CHAINAGE	4679.483
BEARING (ALONG JOINT FACE)	161°55'7"
HORIZONTAL RADIUS	165m
CROSS FALL	+3% OUTBOUND -3% INBOUND
VERTICAL RADIUS	1500m (SAG)

**NOTE:**  
1. THIS DRAWING IS ILLUSTRATIVE ONLY AND SHALL NOT BE CONSTRUED TO BE A CONFORMING OR COMPLIANT REPRESENTATION OF THE PROJECT WORKS IN RESPECT OF THE REQUIREMENTS OF THE PROJECT DEED.  
2. THE PURPOSE OF THIS DRAWING IS TO PROVIDE REFERENCE TO THE INTERFACE WITH THE NORTHERN BUSWAY SOUTH OF ENOGGERA CREEK DESCRIBED IN THE PERFORMANCE SPECIFICATION



**HORIZONTAL ALIGNMENT SETOUT**  
N.T.S.



**PRELIMINARY**  
NOT FOR CONSTRUCTION

01	03.07	CH PERFORMANCE SPECIFICATION ATTACHMENT DRAWING
Rev	Date	Revision Details



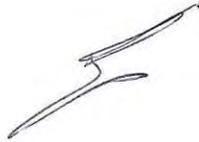
NORTHERN BUSWAY  
SECTION 1 / NB WORKS  
INTERFACE POINT

Project No	25175
Scale	AS SHOWN
Sheet Size	A1
Sketch No	Rev.
ANX1-6-010 01	

ANNEXURE 1 – PART 1 – ATTACHMENT 7A

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NOT USED



**ANNEXURE 1 – PART 1 – ATTACHMENT 7B**  
**BUSWAY STATIONS – ACCOMMODATION, COMPONENT AND PARTS SCHEDULE**

Reference	Title
Table 1, Rev 01, 3 June 07	TransLink Busway Stations
Table 2, Rev 01, 3 June 07	Stations
Table 3, Rev 01, 3 June 07	Platforms
Table 4, Rev 01, 3 June 07	Station Precincts
Table 5, Rev 01, 3 June 07	Schedule of Materials, Finishes and Colours - Legend
Table 6, Rev 01, 3 June 07	Schedule of Materials, Finishes and Colours
Table 7, Rev 01, 3 June 07	Schedule of TransLink Busway Station Colours – Approved Colour Palette
Table 8, Rev 01, 3 June 07	Colour Selection Guide



**TRANSLINK BUSWAY STATIONS**  
**Northern Busway**  
**Kedron Brook and Lutwyche Busway Stations**



**Table 1 -TransLink Busway Stations**  
**Schedule of Station Accommodation, Components and Parts**  
**Revision 1 3-Jun-07**

**Major Categories**

SA	Station Architecture
SS	Station Signage
SF	Station Furniture
IP	Information panels
ITS	Electronic Technology, Devices and Equipment
MISC	Miscellaneous

**Legend**

	Busway Station component to be provided by PPP Co
	Busway Station component to be provided by TransLink
	Provisions for future component (service pits, covers, conduits etc) to be provided by PPP Co
	Information to be provided by TransLink (not yet confirmed or provided)
	Component is to be provided as part of the NB Works
	Busway Station component is not to be provided as part of the NB Works
	Future component to be provided by others.
	Service pits, covers, conduits etc to be provided by PPP Co
	Refer General Note 1
	MF Median fence. Melwire fencing 1650mm high above pavement to match same at existing busway stations. (Colour - black). Refer General Note 5.
	BF Boundary Fence. Melwire fencing 1200mm high above pavement to match same at existing busway stations. (Colour - black)
	M1 1500mm wide median inclusive of black wire fencing, 6m max high post top lighting unless otherwise noted. Light poles and fixtures to match same at existing busway stations (Colour - black)
	M2 2900mm wide median inclusive of black wire fencing, 6m max high post top lighting unless otherwise noted. Light poles and fixtures to match existing busway stations (Colour - black)
	B 1200mm high boundary fencing (Colour - black)
	TBA To be advised by TRANSLINK
	TBC To be confirmed by PPP Co

**General Notes**

- 1 This information shall be read in conjunction with the Performance Specification, in particular Annexure 1 Part 1 (Design Requirements) and Annexure 1 Attachments 7A, 7C and 7D, and the requirements of the specifications referenced in Attachment 1 of the Exhibit A Performance Specification.
- 2 The quantities of Busway Station components and parts detailed in the Tables of this Attachment 7B shall take precedence over the drawings contained within Attachment 7, unless noted otherwise.
- 3 All building components for Busway Stations shall match the design and details provided in Attachments 7C and 7D unless otherwise approved.
- 4 Busway Station furniture must be by Seaciff Pty Ltd - Geebung, (excluding internally illuminated poster display panels) or approved equivalent by the State.
- 5 Median Barrier Fencing - All median barrier fencing shall extend a minimum of 10m beyond the end of platforms inclusive of any future proofed modules. Painted chevron each end of the median must be provided in accordance with MUTCD. The chevron must terminate in line with the start of tapers and Busway lanes. The fence must include the Busway Station regulatory sign 'Do Not Cross' in accordance with Attachment 7C.

**TransLink Busway Station Service Level Summary**

TransLink Busway stations are classified according to the following service frequency and codes. The code is established depending on the following determinants:

**Station size-**

Station type- Service level	LOW, MEDIUM, HIGH	Frequency of service (time)	Minimum covered platform access to vehicles (refer station concept plan for extent)
LOW	No. of routes 1 to 10	30-20 min peak (30 min off peak)	2
LOW TO MEDIUM	10 to 15	20-10 min peak (off peak 20 min)	2
MEDIUM	15 to 20	10-5 min (off peak 10 min)	3
MEDIUM TO HIGH	20 to 30	10-5 min (off peak 5 min)	3
HIGH	> 20	> 5 min (off peak 5 min)	3

**Provision for Future Modules**

F1	1 x future 4.250 m standard module	F4	4 x future 4.250 m standard module
F2	2 x future 4.250 m standard module	F5	5 x future 4.250 m standard module
F3	3 x future 4.250 m standard module	F6	6 x future 4.250 m standard module

PPP Co must provide all services below ground for future platform modules





Table 3 - Platforms  
Schedule of Station Accommodation, Components and Parts  
Revision 1 3-Jun-07

		Platform Components and parts - Description and Quantity (No. per platform - mid point and lead stop unless otherwise noted)																														
Item No.	Major Categories	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65		
		SF	SF	SF	SF	SF	SF	SF	P	P	P	P	ITS	ITS	ITS	ITS	ITS	ITS	SA	SA	ITS	ITS	ITS	ITS	ITS	SA	SA	ITS	SS	SA		
Busway Corridor and Station Name																																
	PLATFORMS - Covered passenger seating (refer Attachment 70 and 71)																															
	PLATFORM 1 - Covered passenger seating - Type S1 (refer specified type)																															
	PLATFORM 1 - Covered passenger seating - Type S2 (refer specified type)																															
	PLATFORM 2 - Covered passenger seating - Type S1 (refer specified type)																															
	PLATFORM 2 - Covered passenger seating - Type S2 (refer specified type)																															
	Covered covered rubbish bins																															
	Signage that incorporates individual or groups with number line at end of platform only																															
	IP - Intensity illuminated display cabinet for busway network map. Cabinets shall match the same at ending busway stations. Cabinets must be lockable (typical)																															
	Busway network map																															
	IP - Intensity illuminated display cabinet for timetable. Cabinets shall match the same at ending busway stations. Cabinets must be lockable (typical)																															
	Timetable real time information																															
	IP - Intensity illuminated display cabinet for advertising poster. Cabinets shall match the same at ending busway stations. Cabinets are to be lockable (typical)																															
	Advertising poster																															
	Integrated poster display location / zone (Provision of ITS Corridor & Information by IPT Co)																															
	Electronic journey planner																															
	Integrated SIP - Emergency Help Point (refer specified type). Help point to be mounted on stainless steel panel adjacent passenger information call point																															
	Integrated SIP - Passenger Information Call Point. Call point to be mounted on stainless steel panel adjacent Emergency Help Point																															
	Real Time Electronic Clock integrated with Real Time Passenger Information Display																															
	Vertical aluminium sunscreens to edge of platform - Elipical louvers as necessary based on sun and site analysis (refer Annexure 1 Part 1 (Design Requirements) and Attachment 70)																															
	Motion Vibration Lighting - generic standard type to match ending busway stations																															
	LED Real Time Passenger Information Displays - 2 sided, suspended from station structure																															
	CCTV - Surveillance Cameras on platform																															
	LED Displays - 2 sided, suspended from station structure for service information and advertising messages																															
	Hearing Augmentation - to comply with AS 1428																															
	Tactile Ground Surface Indicators (TGSIs) to comply with AS 1428 and be consistent with ending busway stations.																															
	Platform Lighting (refer specified type to match same at ending Busway Station including external lighting)																															
	Audible Public Announcements - Platform speakers and control device. To match same at ending busway stations																															
	TransLink Busway station - Directional - Wayfinding, Station Identification Advisory and Regulatory Signs (refer Attachment 71)																															
	Emergency Exit light to comply with BCA and AS2283																															
Northside Busway																																
Lutwyche																																
Kedron Brook																																
Quantities:																																
Lutwyche	No	R	S	10	6	10	6	4	2	2	2	2	3	2	2	2	1	1	2	R	R	1	R	2	R	R	R	R	R	R	R	
Kedron Brook	No	R	8	6	6	10	6	4	2	2	2	2	3	2	2	2	1	1	2	R	R	1	R	2	R	R	R	R	R	R	R	

Table 4 - Station Precincts  
Schedule of Station Accommodation, Components and Parts  
Revision 1 3-Jun-07

	Precinct Components and parts - Description and Quantity - Unless otherwise advised components shall be distributed evenly between precinct entry points																									
	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	
	SA	SA	SA	SA	SA	ITS	IP	IP	SF	SF	MISC	SS	MISC	SA	MISC	MISC	MISC	MISC	MISC	SA	SA	SA	MISC	MISC	MISC	
Busway Corridor and Station Name	<p>Soil and sand landscaping (refer Attachment 7A)</p> <p>Carrievaced Passenger Seating - S1 (support off in situ concrete plating or slabs) Furniture shall have integral skate board deterrent.</p> <p>Carrievaced Passenger Seating - S2 (support off in situ concrete plating or slabs) Furniture shall have integral skate board deterrent.</p> <p>Retail kiosk (Provision of all substructure services including sewerage, water, drainage, ITS/Comms &amp; electrical services by PPP Co for future appointment)</p> <p>Retail kiosk (Fit out by TransLink)</p> <p>Integrated CCTV / Camera Recording - Estimate to the Platform. Conceal all conduits, cables and wiring</p> <p>IP - Internally illuminate display cabinet for advertising posters (refer Specified Type)</p> <p>Advertising Posts (to transit industry client)</p> <p>DFI - Drinking Fountain located in Plaza / Podium (refer General Note 4) Must be DDM compliant inclusion of all services and wastes.</p> <p>Carrievaced covered rubbish bins (external to platform)</p> <p>Architectural Art (provision for external illumination)</p> <p>TransLink Bicycle Station Storage - Refer Attachment 7C and MUTCO (06). Shall include all primary and secondary specific signage matching standard.</p> <p>Utility service (meter) storage tanks to store grey water for non potable use. 10,000L min Jura unless otherwise specified</p> <p>Boundary pathway lighting to match same at existing Busway stations. White light luminaires. Poles - Black finish</p> <p>External Street Lighting - No. of poles. White light luminaires. Poles - black finish</p> <p>MUTCO (06) Signage i.e. cycleway, No Stopping, No Parking, One-way etc</p> <p>Busway staff and service vehicle parking and access</p> <p>Tall stand</p> <p>Short term car parking (no. of spaces) - lots and lots inclusive of no. for disabled persons</p> <p>Bicycle Parking Building - secure bicycle racks (provision of all substructure services including sewerage, water, drainage, ITS/Comms &amp; electrical services to be provided by PPP Co)</p> <p>Secure ITS/Comms and Electrical cupboard. Stand above and/or concealed. Locate one before each side of Busway. Integrate with Wering or IP panels</p> <p>Secure Bicycle Parking Rails (BR - bicycle racks) (refer Attachment 7D)</p> <p>Short term pick up and drop off for Busway Station customers (no. of spaces) - lots and lots compliant grades to AS1128 Part 1: 1994</p> <p>Short term pick up and drop off standing capacity for disabled customers (no. of spaces) - lots and lots compliant grades to AS1128 Part 1: 1994. Shall include all relevant MUTCO signage.</p> <p>Number of toilets</p>																									
Northern Busway																										
Lutwyche	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Kedron Brook	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Quantities:																										
Lutwyche	R	3	6	2	2	R	2	4	2	8	TBA	Y	2	8	8	R	1	2	10	TBA	2	TBA	R	3	24	
Kedron Brook	R	2	4	1	1	R	1	2	2	4	TBA	Y	2	6	9	R	1	2	8	TBA	2	TBA	R	2	12	

TRANSLINK BUSWAY STATIONS

Northern Busway  
Kedron Brook and Lutwyche Busway Stations



Table 5 - Schedule of Materials, Finishes and Colours - Legend  
Schedule of Station Accommodation, Components and Parts  
Revision 1 3-Jun-07

Code	Description	Notes(Unless otherwise documented) description for explanatory use of codes	Refer	Code	Description	Notes(Unless otherwise documented) Description for explanatory use of Codes	Refer
AL	Aluminium	PD		ML	Median Lighting	To match existing busway station component	
AN	Clear Anodised	AL Seal Battens - 3mm arises to edges inclusive of metal end caps. Refer TransLink Busway Station specifications		MS	Metal Screen	PT	
BC	Barge capping	CZ		MT	Metal		
BF	Broom Finish	Refer TransLink Busway Station specifications		MUTCD	Manual of Uniform Traffic Control Devices	MRD QLD	
BG	Box Gutter	Refer Attachment 7D		NT	Natural		
BGL	Box Gutter Lining	CZ		OF	Over Flow	S/S	
BGS	Box Gutter Support	GAL		OX	Coloured Oxide		
BR	Bracing	ST		PCS	Protective Coating System	Refer TransLink Busway Station specifications	
BS	Busway Signage	Refer Attachment 7C		PD	Powder Coated (External Grade)	Refer TransLink Busway Station specifications	
CB	Ceiling Batten	GAL		PFC	Parallel Flange Channel	ST	
CC	Rubberised cork flooring	ComCork		PT	Paint Finish	Colours (refer Table)	
CF	Chain Wire Fence	PVC Coated - Black		RB	Roof Beam	ST	
CO	Coloured Oxide	TBC		RH	Rainwater head	S/S	
CON	Concrete	Refer TransLink Busway Station specifications		RP	Roof Purlin	GAL	
CPV	Concrete Pavers	TBC		RS	Roof Sheeting	CZ	
CRB1	Cantilevered Covered Rubbish Bin			S/S	Stainless Steel	LN/NT	
CTU	Ceramic Tile Underlay (FC)	Hardies / CSR		SCD	Doors	Marine grade solid core /PT	
CZ	Colorbond Zincalume	RS		SCS	Security Camera and Speaker	To match existing busway station component	
DF	Drinking Fountain	DF1		SL	Soffit Lining	PT	
DK	Steel Decking	PC/FT		SN	Star Nosing	AL	
DL	Down Light	To match existing busway station component		SP	Prefabricated Stainless Steel Panel	NT	
DP	Downpipe	S/S		SS	Stair Stringer	ST	
EA	Equal Angle	ST		SSL	Sunshade Louvres	AL/PD/AS complete elliptical 90 mm louvre blades	
EP	Emergency Help Point	Refer TransLink Busway Station specifications		ST	Steel	HZS/PCS/PT	
FB	Fascia Beam	ST		ST	Stanchion	S/S	
FC	Fibre Cement Sheet	Ext. Grade Min. 9mm thick		TF	Trowel Finish	To approved sample	
GAL	Galvanised	Not for exposed ST/MT finishes		TGSI	Tactile Ground Surface Indicators	Granito - Fully vitrified	
GB	Gazeted Balustrade	Pilkington Green body tinted safety glass		TL	Tiles	Granito - Fully vitrified	
GO	Gutter Outlet	S/S		TVM	Ticket Vending Machine	Integrated space/zone on Platform. Machine by TransLink	
GP	Gazeted Panel	ST/Pilkington Green body tinted safety glass		UA	Unequal Angle	ST	
HD	Honed Surface	CON		UB	Universal beam	ST	
HR	Hand Rail	S/S		UC	Universal Column	ST	
HZS	Hot Zinc Spray	ST/PCS		VM	Vending Machine	By TransLink	
ICP	Transit services Information Call Point	ITS					
IP	Internally illuminated information /Advertising Poster Display cabinets	3 per 4.25 platform bay (Unless otherwise noted)		TBA	To be advised by TransLink		
KP	Kicker Plate	S/S		TBC	To be confirmed by PPP Co		
LN	Linished	S/S					
LR	Lighting Rail	AL/PD					
LS	Lead Stop	Refer Attachment 7C					

Colours (Refer Table 7 - TransLink Busway Station Colours - Approved Colour Palette and Table 8 - Colour Selection Guide (Refer Resene Paints (Australia) Pty Ltd)

Primary Station colours - Structural Steel	
Code	Name
BT	Bastille
DRV	Double Revolver
EP	Eclipse
GF	Grey Friars
GN	Gondola
JN	Jon
RV	Revolver
Secondary Station colours - other materials	
RC	Rice Cake
ST	Stack
CG	Cod Grey
TU	Tuna
NR	Neiro
TransLink Signage Colours	
EC	Ecstasy
LA	Limeside
Colorbond Zincalume Colour	
OW	Off White
General	
AS	Aluminium - Dulux Standard Ext. grade Powder coat
BL	Black

Table 6 - Schedule of Materials, Finishes and Colours  
 Schedule of Station Accommodation, Components and Parts  
 Revision 1 3-Jun-07

Primary Station Components and Parts	Secondary Station Components and Parts	Code	Miscellaneous			Floor			Excavation/Soil			Excavation A			Excavation B			Excavation C			Excavation D			Notes/Remarks	
			Material	Finish	Colour	Material	Finish	Colour	Material	Finish	Colour	Material	Finish	Colour	Material	Finish	Colour	Material	Finish	Colour	Material	Finish	Colour		
Arrival Structure	Primary entry awning		CON	T/TC/SI	BL	FC	PT	RC	ST/AL	PCS/PT	TBC	ST/AL	PCS/PT	TBC	ST/AL	PCS/PT	TBC	ST/AL	PCS/PT	TBC	MT	CZ	OW	Profile to match existing busway stations	
	Steel stairs		CON	TL	BL	FC	PT	RC	---	---	---	---	---	---	---	---	---	---	---	---	MT	CZ	OW	PT colour of steel fascia to match all other structural steel	
	Grated excavators (Future Provision)		ST	CC/TC/SI	BL	ST	PCS/PT	JN	GP	---	---	GP	---	---	GP	---	---	GP	---	---	MT	CZ	OW	Provide pits and pit cover, conduits for future services and ITS	
	Grated lift car and shaft		ST/CTU	TL	BL	FC	PT	RC	GP	---	---	GP	---	---	S/S	LN	NT	S/S	LN	NT	---	---	---	Provide integral enclosure and layer finish to doors as per Australian Standards	
Pedestrian Bridge	Typical pedestrian lowers		AL	PD	TBA	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	To arrive structures and finish of platform based on station sun / shade analysis	
			SI	CC/TC/SI	BL	FC	PT	RC	ST/CP	PCS/PT	TBC	ST/CP	PCS/PT	TBC	---	---	---	---	---	---	MT	CZ	OW	Profile to match existing busway stations	
Platform Structure			CON	T/TC/SI	BL	FC	PT	RC	ST	PCS/PT	TBC	GP/ST	PCS/PT	TBC	GP/ST	PCS/PT	TBC	GP/ST	PCS/PT	TBC	MT	CZ	OW		
Station Signage	Refer Attachment 7C																							Refer TransLink Busway Station signage colour selection (Table 8)	
ITS/Comms/Elec. Structure			CON	BP	NT	FC	PT	RC	FC	PT	TBC	FC	PT	TBC	FC	PT	TBC	FC	PT	TBC	MT	CZ	OW	Profile to match existing busway stations (refer secondary station colours in Table 8)	
Retail Structure - Kiosk			CON	TL	BL	FC	PT	TBA	ST/CP	PCS/PT	TBC	FC	PT	TBC	FC	PT	TBC	FC	PT	TBC	MT	CZ	OW	Profile to match existing busway stations (refer secondary station colours in Table 8)	
Bicycle Parking Structure			CON	BP	CC/DK	FC	PT	RC	ST/FC	PCS/PT	TBC	ST/FC	PCS/PT	TBC	ST/FC	PCS/PT	TBC	ST/FC	PCS/PT	TBC	MT	CZ	OW	Profile to match existing busway stations (refer secondary station colours in Table 8)	
Plaza / Pedestrian Structures	Covered pedestrian structure		CON	CPV	PD/TBC	ST/FC	PT	RC	---	---	---	---	---	---	---	---	---	---	---	---	MT	CZ	OW	Profile to match existing busway stations (refer secondary station colours in Table 8)	
	Pedestrian pathways (external to Busway Station)		CON/DD	BR	OK	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
	Structural steel		---	---	---	ST	PCS/PT	JN	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	TransLink Busway Station standards - (refer Table 7)	
Doors	1000mm high 250mm dia. steel balustrade		DR	SCF	PT	TBA	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		
			RD	ST	PCS/PCS/PT	AS	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		
Busway Station Furniture	Carbeneved covered station bins	DRB1	ST/AL	PCS/PT	AS	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	For Busway Station furniture (refer General Note 4)	
	Carbeneved Bench Seat Type 1	B1	ST/AL	NT/PCS/PT	JN	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	For Busway Station furniture (refer General Note 4)	
	Carbeneved Bench Seat Type 2	B2	ST/AL	NT/PCS/PT	JN	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	For Busway Station furniture (refer General Note 4)	
	Drinking fountain - ADA Compliant	DF1	ST/AL	NT/PCS/PT	AS	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	For Busway Station furniture (refer General Note 4)	
	Illuminated information / advertising poster display cabinets - Type 1 (flush mounted)	PI1	ST/AL	NT/PCS/PT	JN	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	For Busway Station furniture (refer General Note 4)	
Carbeneved illuminated information / advertising poster display cabinets - Type 2	PI2	ST/AL	NT/PCS/PT	JN	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		

Handwritten mark resembling a stylized 'P' or 'B'.

TRANSLINK BUSWAY STATIONS



Northern Busway  
Kedron Brook and Lutwyche Busway Stations

Table 7 - Schedule of TransLink Busway Station Colours - Approved Colour Palette  
Revision 1 3-Jun-07

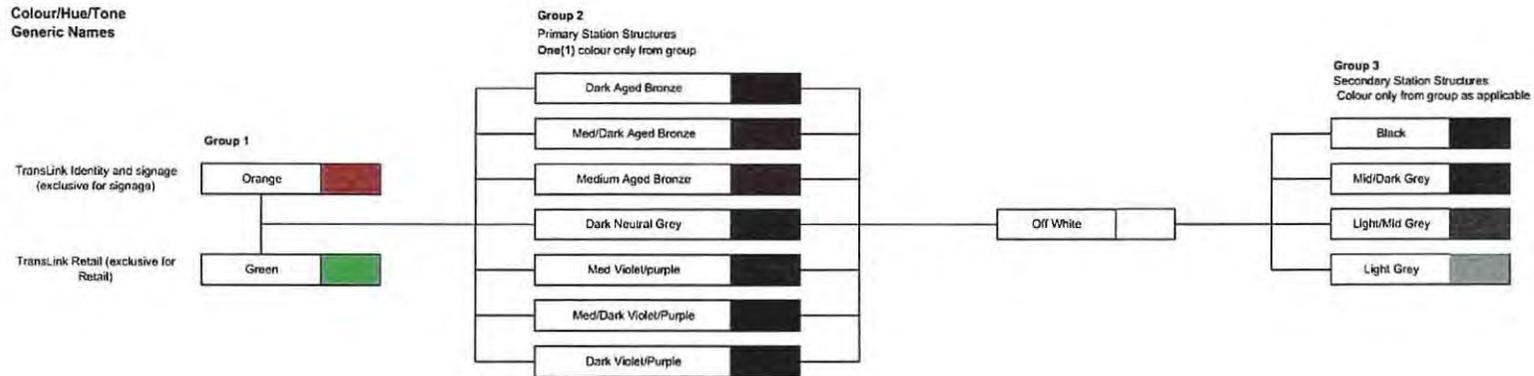
Colour sample	Generic colour name or tone	Colour Name	Solid PMS # coated	RGB#	Resene Total Colour code	Chart	Resene Chart Colour Code	RV (Reflectance Value)	Use
<b>Group 1 / 2 Colours</b>		<b>Primary TransLink Corporate colours</b>							
	Orange	Ecstasy™	PMS 166PC	201 97 56	O61-139-053	Multi-finish (2006)	1.5OR37	29	Transit Station Signage (Primary)
	Green	Limeade™	PMS 370C	95 151 39	G62-123-120	Multi-finish (2006)	12E55	30	Transit Station Retail (Concessions/Vending/Advertising)
		<b>Primary Station colours</b>							
	Mid	Jon™	—	70 61 62	N38-007-359	Multi-finish	2GR30	10	Structural Steelwork/Signage (Secondary)
	Deep	Gondola™	—	55 51 50	N32-004-016	Multi-finish	1GR30	7	
	Deep	Bastille™	—	44 44 50	B29-009-283	Multi-finish (2006)	1GR60	6	
	Mid	Eclipse™	—	63 57 59	N36-006-001	Multi-finish	2GR20	9	
	Mid	Revolver™	—	55 54 63	V34-013-289	Multi-finish (2006)	2GR61	8	
	Deep	Grey Friars	—	49 52 54	N35-004-253	Hi-Glow 2004	1GR16	8	
	Deep	Double Revolver	—	41 39 47	V30-010-291	White & Neutral	1GR62	6	
		<b>Primary Station colours</b>							
	Off White	Rice Cake™	—	239 236 222	G94-010-092	White Finish (2006)	10Y007	85	Station Structures - Ceiling Soffits
<b>Group 3 Colours</b>		<b>Secondary Station colours</b>							
	Light Grey	Stack™	—	133 136 133	N65-003-154	Multifinish (2006)	5GR10	34	Support facilities, IT signage etc
	Mid-dark Grey	Cod Grey™	—	45 48 50	N31-007-245	Multifinish (2006)	1GR40	7	
	Light / Mid Grey	Tuna™	—	70 73 78	N39-008-260	Multifinish (2006)	2GR50	11	
	Black	Nero™	—	37 37 37	N25-001-046	Multifinish (2006)	1GR54	5	
		<b>Station Structures - glazing</b>							
	Toughened /laminated safety glass - green	Pilkington	—						
		<b>Passenger seating</b>							
	Clear Anodised Aluminium	Natural finish	—						
	Silver	Dulux Anotec silver	—						Elliptical Aluminium Louvres

**Table 8 - Colour Selection Guide**

Revision 1

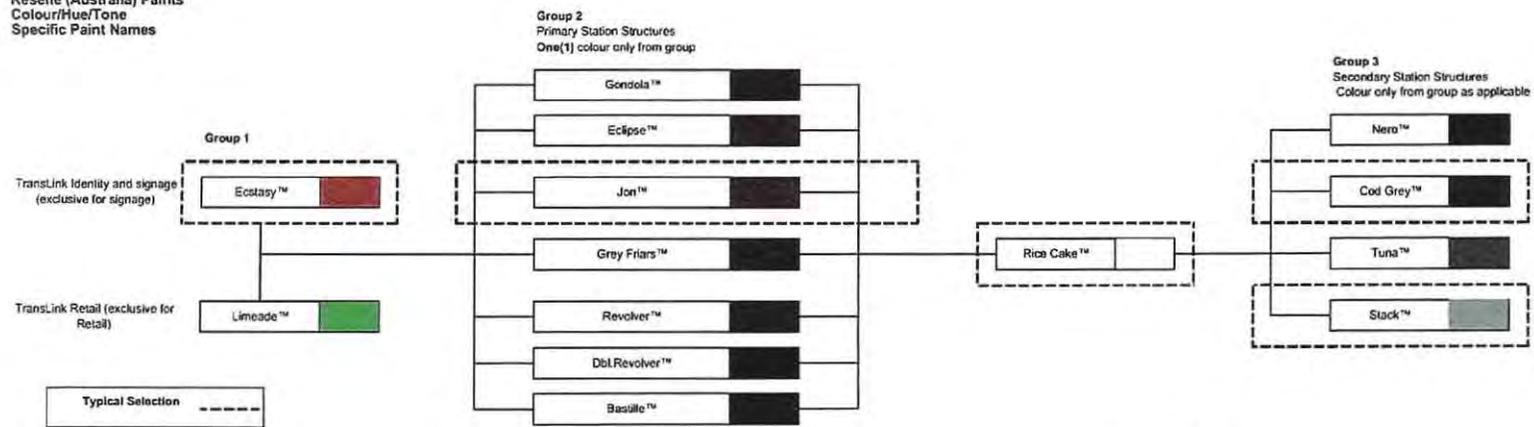
3-Jun-07

Colour/Hue/Tone  
 Generic Names



**Specific Colour Selection Guide**

Resene (Australia) Paints  
 Colour/Hue/Tone  
 Specific Paint Names



**ANNEXURE 1 – PART 1 – ATTACHMENT 7C**  
**BUSWAY STATIONS – SIGNAGE AND GRAPHIC DESIGN DOCUMENTATION**

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Note: Refer Drawing DS-1.1 Rev 01 for full list of Attachment 7C drawings



## SIGNAGE AND GRAPHIC DESIGN DOCUMENTATION

**Drq No. Drawing Title**

DL Drawing List  
G1.1 Graphic Standards  
G1.2 Graphic Standards

**Directional Signs**

DS-1.1 Pole Mount Directional  
DS-1.2 Pole Mount Directional  
DS-1.3 Pole Mount Directional  
DS-1.4 Pole Mount Directional  
DS-2.1 Under Awning Directional  
DS-2.2 Under Awning Directional  
DS-3.1 Suspended Directional Sign  
DS-3.2 Suspended Directional Sign  
DS-4.1 Directional Sign  
DS-4.2 Directional Sign

**Facility Identification**

FI-1.1 Door Panels  
FI-1.2 Door Panels  
FI-2.1 Under Awning Sign  
FI-2.2 Under Awning Sign  
FI-5.1 Facility Sign  
FI-5.2 Facility Sign  
FI-6a.1 Lift Sign  
FI-6a.2 Lift Sign  
FI-6b.1 Lift Sign (Projecting)  
FI-6b.2 Lift Sign (Projecting)

**Information System**

IS-1.1 Welcome Sign  
IS-1.2 Welcome Sign  
IS-2.1 Plaza Information  
IS-2.2 Plaza Information  
IS-4.1 Bus Information  
IS-4.2 Bus Information  
IS-5.1 Platform Information  
IS-5.2 Platform Information

**Drq No. Drawing Title**

IS-6a.1 Bus Promotion Sign  
IS-6a.2 Bus Promotion Sign  
IS-7.1 Bus Stop Sign  
IS-7.2 Bus Stop Sign  
IS-8.1 Information Sign  
IS-8.2 Information Sign

**Primary Identification**

PI-1.1 Large Pylon Sign  
PI-1.2 Large Pylon Sign  
PI-1.3 Large Pylon Sign  
PI-1.4 Large Pylon Sign  
PI-2.1 Standard Pylon Sign  
PI-2.2 Standard Pylon Sign  
PI-2.3 Standard Pylon Sign  
PI-2.4 Standard Pylon Sign  
PI-3a.1 Flagpole Identification Sign  
PI-3a.2 Flagpole Identification Sign  
PI-3a.3 Flagpole Identification Sign  
PI-3a.4 Flagpole Identification Sign  
PI-3a.5 Flagpole Identification Sign  
PI-3b.1 Flagpole Identification Sign  
PI-3b.2 Flagpole Identification Sign  
PI-3b.3 Flagpole Identification Sign  
PI-3b.4 Flagpole Identification Sign  
PI-3b.5 Flagpole Identification Sign  
PI-4.1 Banner Graphic  
PI-4.2 Banner Graphic  
PI-4.3 Banner Graphic  
PI-5.1 Entry Identification Sign  
PI-5.2 Entry Identification Sign  
PI-6a.1 Platform Identification Sign  
PI-6a.2 Platform Identification Sign  
PI-7.1 Badge Sign  
PI-7.2 Badge Sign

**DISCLAIMER**

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**GENERIC STANDARDS FOR TRANS LINK BUSWAY STATIONS 2007 – SIGNAGE AND GRAPHIC DESIGN**

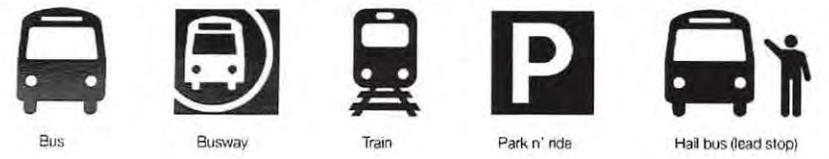
		TRANS LINK BUSWAY STATION ARCHITECT	DT ARCHITECTURE	DRAWN	CHECKED	ORIGINAL ISSUED BY:	DRAWING LIST	SCALE						
		TRANS LINK BUSWAY STATION ARCHITECT				TRANS LINK BUSWAY STATION ARCHITECT			CONTRACT NO. DT DWG NO.					
DATE: / / 2007								REV 1	02/05/07				DRAWING NO. DS-1.1	REVISION
								STATUS	DATE	DETAILS	CHECKED	APPROVED	JOB NO.	ISSUE REV 1
UNLESS OTHERWISE SPECIFIED, DIMENSIONS SHALL BE IN MILLIMETRES												UNLESS OTHERWISE SPECIFIED, DIMENSIONS IN PREFERENCE TO SCALING SHALL CONTROL ALL DIMENSIONS AND DETAILS PRIOR TO CONSTRUCTION		

Photograms, arrows and  
is shown on this page are to be  
other versions will be accepted.

Attention  
Due to this reproduction process the  
colours in this image are not exact  
representations of the final product.



Arrows



Transport pictograms



General pictograms

Also refer  
Performance Specification - Attachment Drawing

 					TRANSLink BUSWAY STATION ARCHITECT ST ARCHITECTURE					DRAWN CHECKED		ORIGINAL SIGNED BY TRANSLink BUSWAY STATION ARCHITECT		DATE		PROJECT TITLE G1 GRAPHIC STANDARDS		SCALE AS NOTED					
					CONSULTANT PROJECT TEAM		APPROVED		TITLE		STATUS		CONTRACT NO.		DRAWING NO. G1.1		REVISION						
LOGOS										REV 1 ISSUE DATE		02/05/07		DESIGN		CHECKED		APPROVED		JOB NO.		ISSUE REV 1	

Only the pictograms, arrows and symbols as shown on this page are to be used. No other versions will be accepted.

Attention  
Due to this reproduction process the colours in this image are not exact representations of the final product.

**ABCDEFGHIJKLMNOPQRSTUVWXYZ  
abcdefghijklmnopqrstuvwxyz 1234567890**

Helvetica Neue 76 Bold Italic

**ABCDEFGHIJKLMNOPQRSTUVWXYZ  
abcdefghijklmnopqrstuvwxyz 1234567890**

Helvetica Neue 66 Medium Italic

**ABCDEFGHIJKLMNOPQRSTUVWXYZ  
abcdefghijklmnopqrstuvwxyz 1234567890**

Helvetica Neue 65 Medium

**ABCDEFGHIJKLMNOPQRSTUVWXYZ  
abcdefghijklmnopqrstuvwxyz 1234567890**

Helvetica Neue 55 Roman

Height of letters for varying viewing distances (AS 1428.2)	
Min height of letters (cap X height)	Required viewing distance
6mm	2m
12mm	4m
20mm	6m
25mm	8m
40mm	12m
50mm	15m
80mm	25m
100mm	35m
130mm	40m
150mm	50m

Also refer  
Performance Specification - Attachment Drawing

GENERIC STANDARDS FOR TRANSLink BUSWAY STATIONS 2007 – SIGNAGE AND GRAPHIC DESIGN

		TRANSLink BUSWAY STATION ARCHITECT	GT ARCHITECTURE	DESIGN	CHECKED	DESIGNED BY	TRANSLink BUSWAY STATION ARCHITECT	G1 GRAPHIC STANDARDS	<table border="1"> <tr> <td>SCALE</td> <td>AS NOTED</td> </tr> <tr> <td>CONTRACT NO</td> <td>GT DWG No</td> </tr> <tr> <td>DRAWING NO</td> <td>REVISION</td> </tr> <tr> <td>REV 1</td> <td>07 05 07</td> <td>DETAILS</td> <td>DESIGNED</td> <td>CHECKED</td> </tr> <tr> <td>DATE</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>STATUS</td> <td></td> <td></td> <td></td> <td></td> </tr> </table>	SCALE	AS NOTED	CONTRACT NO	GT DWG No	DRAWING NO	REVISION	REV 1	07 05 07	DETAILS	DESIGNED	CHECKED	DATE					STATUS				
		SCALE	AS NOTED																											
CONTRACT NO	GT DWG No																													
DRAWING NO	REVISION																													
REV 1	07 05 07	DETAILS	DESIGNED	CHECKED																										
DATE																														
STATUS																														
CONSULTANT PROJECT TEAM	APPROVED	DATE	/ / 2007	TITLE																										

Unless otherwise noted all dimensions in this drawing are in millimetres. Use figured dimensions in preference to scaling. Contractor to confirm all dimensions and details on site prior to manufacture.

**Attention**  
Due to this reproduction process the colours in this image are not exact representations of the final product.

**Graphics Detail**  
FONT  
'Inbound.../Outbound...' = Helvetica Neue 55 Roman  
All other text = Helvetica Neus 65 Medium

**SIZE**  
Single Message  
'Platform' = 40mm cap X height  
Platform number = 130mm cap X height  
'Inbound.../Outbound...' = 23mm cap X height  
Arrow = 130mm high  
Two Messages  
'Platform' = 30mm cap X height  
Platform number = 100mm cap X height  
'Inbound.../Outbound...' = 17mm cap X height  
Arrow = 80mm high

**COLOUR**  
Panel = Resene 'Ecstasy' 061-139-053  
Divider line = Resene 'Jon' N38-007-359 or approved colour  
Arrow = white  
Text = white

**NOTE:** Messages relating directly with transport are to be on Resene 'Ecstasy'. All other messages are on Resene 'Jon' (or approved colour).

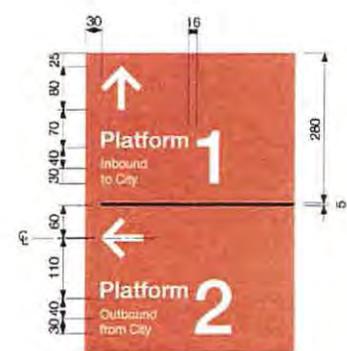


**Typical Location**  
Scale 1:20



**SINGLE MESSAGE**

**Graphic Layout**  
Scale 1:10

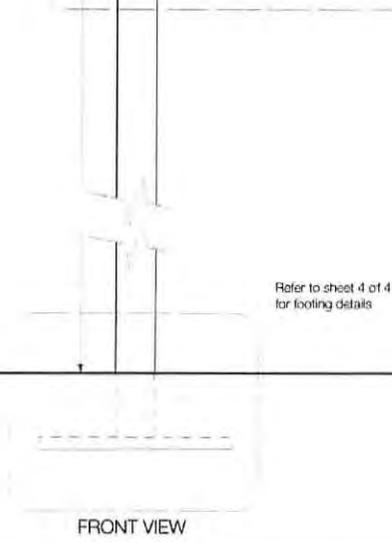
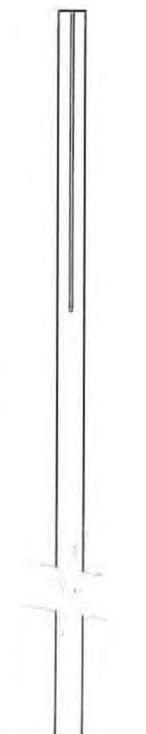
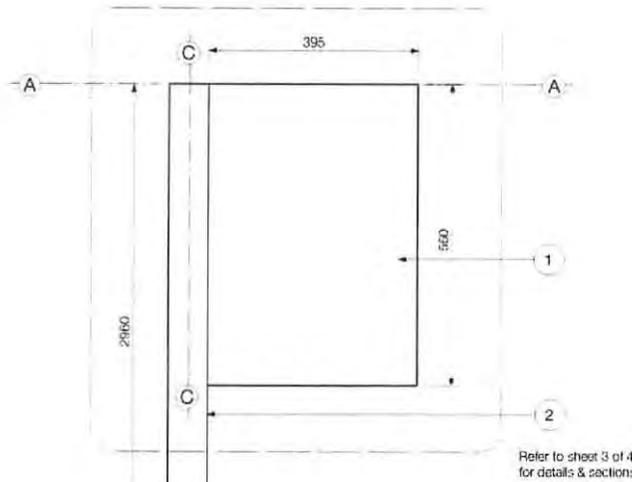
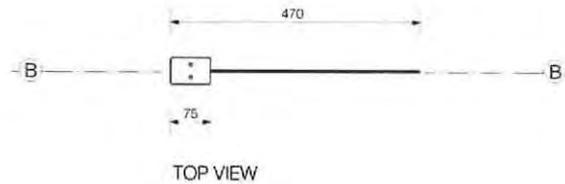


**TWO MESSAGES**

Also refer  
Performance Specification - Attachment Drawing

**GENERIC STANDARDS FOR TRANSLINK BUSWAY STATIONS 2007 - SIGNAGE AND GRAPHIC DESIGN**

		TRANSLINK BUSWAY STATION ARCHITECT	dt ARCHITECTURE	DRAWN	CHECKED	ORIGINAL DESIGNED BY TRANSLINK BUSWAY STATION ARCHITECT	DATE: ... 2007	PROJECT TITLE DS-1 POLE MOUNT DIRECTIONAL	SCALE AS NOTED	CONTRACT NO.	DT DWG No.	DRAWING NO. DS-1.1	REVISION



Unless otherwise noted all dimensions in millimetres. Use figured dimensions in preference to scaling. Contractor to confirm all dimensions and details on site prior to manufacture.

Attention  
Due to this reproduction process the colours in this image are not exact representations of the final product.

**GENERAL CONSTRUCTION NOTES**  
1. Drawings show design intent. Any changes to specification which affects design intent must be approved by TransLink.

2. All structural members, fixings and/or footings to be confirmed by sign maker's engineer.

**Construction Details**

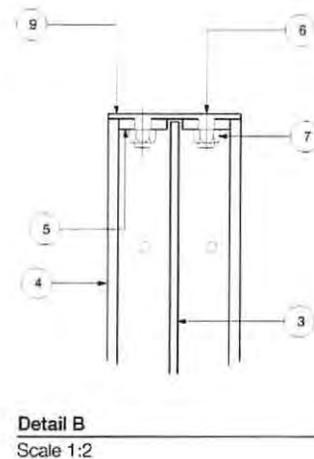
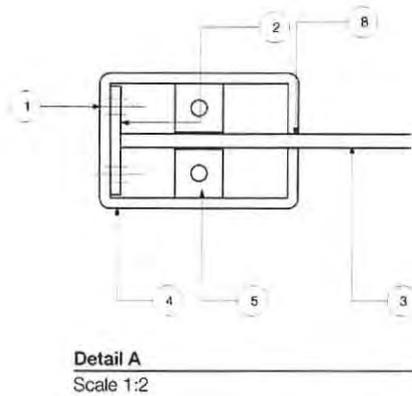
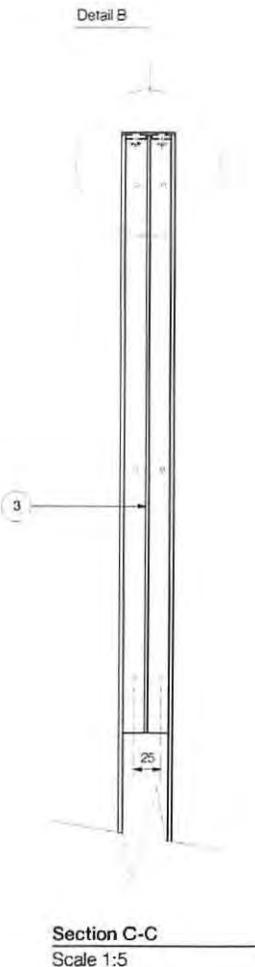
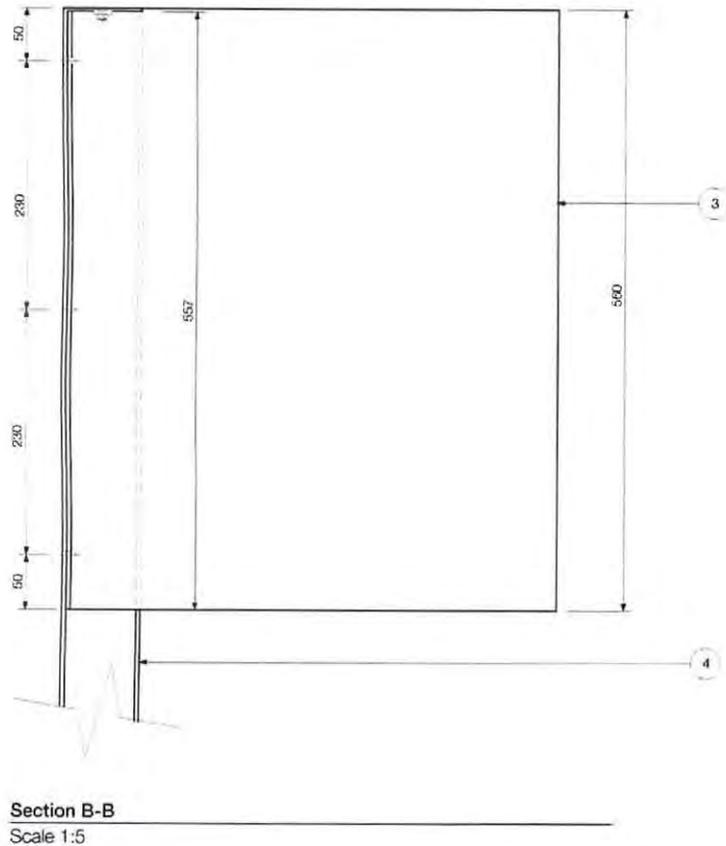
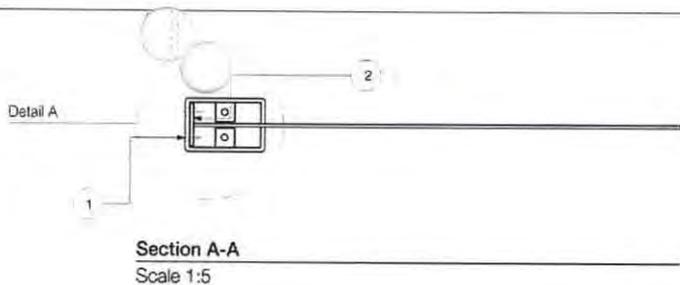
- 1. 5mm aluminium sign panel.
- 2. 75 x 50 x 4mm RHS galvanised steel pole.

Construction Detail  
Scale 1:10

Also refer  
Performance Specification - Attachment Drawing

GENERIC STANDARDS FOR TRANS LINK BUSWAY STATIONS 2007 – SIGNAGE AND GRAPHIC DESIGN

		TRANS LINK BUSWAY STATION ARCHITECT	DT ARCHITECTURE	DESIGN	CHECKED	ORIGINAL DRAWING	DS-1 POLE MOUNT DIRECTIONAL	SCALE AS NOTED								
		TRANS LINK BUSWAY STATION ARCHITECT	TRANS LINK BUSWAY STATION ARCHITECT					CONTRACT NO.	DT DWG No.							
100008		CONSULTANT PROJECT TEAM	APPROVED					REV 1	02 05 07	DATE	DETAILS	DESIGNED	APPROVED	DRAWING NO.	DS-1.2	REVISION
UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS SHALL BE IN MILLIMETRES													JOB NO.	ISSUE	REV 1	



Otherwise noted all dimensions in this drawing are to be used as indicated. Use figured dimensions in preference to scaling. Contractor to confirm all dimensions and details on site prior to manufacture.

Attention  
Due to this reproduction process the colours in this image are not exact representations of the final product.

- Construction Details**
- M6 stainless steel (316) philip head self tapping c/sunk screw.
  - 557 x 50 x 5mm aluminium panel bead welded to 5mm aluminium sign panel.
  - 5mm aluminium sign panel.
  - 75 x 50 x 4mm RHS galvanised steel pole.
  - 18 x 18 x 4mm galvanised steel tabs welded to inside of pole.
  - M6 stainless steel (316) philip head self tapping c/sunk screw, fixing capping to tabs.
  - 2 off M6 nuts welded to tabs.
  - Cutout slot allowing 5mm sign panel to slide into pole. (Clearance fit)
  - 2mm thick galvanised steel capping.

Also refer  
Performance Specification - Attachment Drawing

GENERIC STANDARDS FOR TRANSLink BUSWAY STATIONS 2007 - SIGNAGE AND GRAPHIC DESIGN



TRANSLink BUSWAY STATION ARCHITECT	GT ARCHITECTURE	DRAWN	DESIGNED	ORIGINAL DRAWN BY
				TRANSLink BUSWAY STATION ARCHITECT
				DATE: 1/1/2007

PROJECT TITLE	SCALE
DS-1 POLE MOUNT DIRECTIONAL	AS NOTED
	CONTRACT NO
	OF DWG NO
	DRAWING NO
	REVISION
	DS-1.3
	JOB NO
	ISSUE / REV 1

1.0008  
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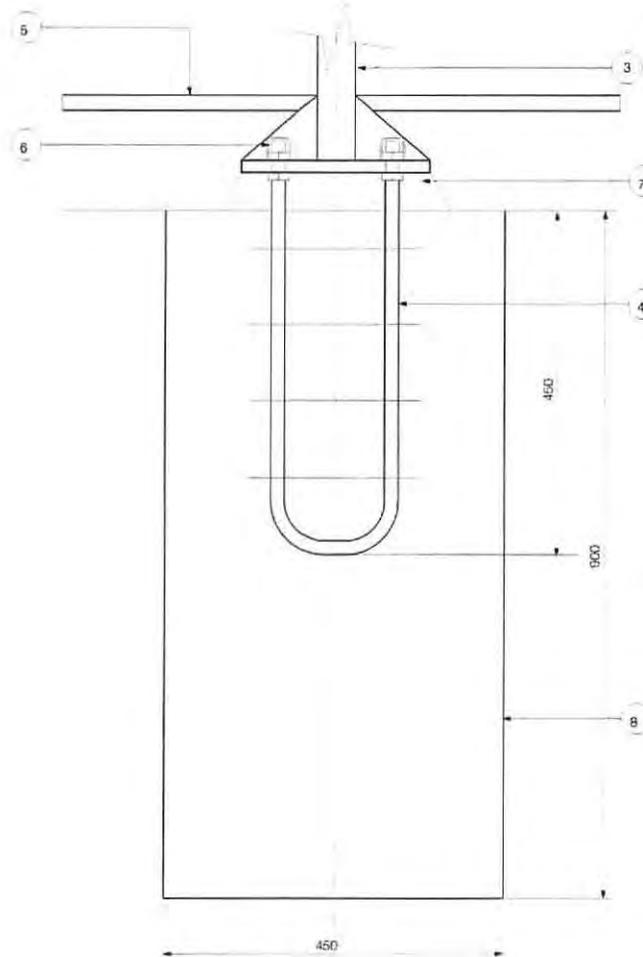
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UNLESS OTHERWISE NOTED ALL DIMENSIONS SHALL BE IN MILLIMETRES  
USE FIGURED DIMENSIONS IN PREFERENCE TO SCALING  
CONTRACTOR SHALL CONFIRM ALL DIMENSIONS AND DETAILS PRIOR TO CONSTRUCTION

Unless otherwise noted all dimensions in millimetres. Use figured dimensions in preference to scaling. Contractor to confirm all dimensions and details on site prior to manufacture.

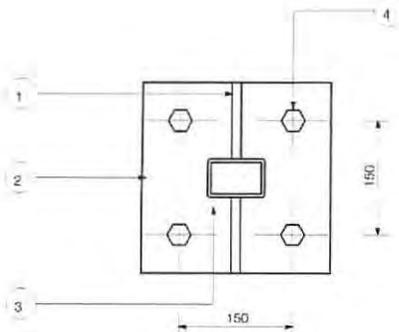
Attention  
Due to this reproduction process the colours in this image are not exact representations of the final product.

- Construction Details**
1. 12mm thick galvanised steel stiffener.
  2. 4 off M16 galvanised steel bolts at 150mm c/c 12mm plate.
  3. 75 x 50 x 4mm RHS galvanised steel pole.
  4. 2 off M16 4.6 S.S. galvanised steel U bolts.
  5. Ground to coordinate with paving.
  6. Plastic bolt cap.
  7. Non-shrink grout pad.
  8. c450mm pier.



SIDE VIEW

**Footing Detail**  
NTS



TOP VIEW

**Base Plate**  
NTS

Also refer  
Performance Specification - Attachment Drawing

GENERIC STANDARDS FOR TRANS LINK BUSWAY STATIONS 2007 – SIGNAGE AND GRAPHIC DESIGN



TRANS LINK BUSWAY STATION ARCHITECT	QT ARCHITECTURE	DRAWN	CHECKED	ORIGINAL SIGNED BY
				TRANS LINK BUSWAY STATION ARCHITECT
				DATE: / / 2007
CONSULTANT PROJECT TEAM	APPROVED			

DS-1  
POLE MOUNT DIRECTIONAL

SCALE				AS NOTED	
CONTRACT NO.				QT DWG No.	
DRAWING NO.				REVISION	
REV 1				DS-1.4	
ISSUE	DATE	DETAILS	CHECKED	APPROVED	JOB NO.
STATUS					ISSUE REV 1

otherwise noted all dimensions in millimetres. Use figured dimensions in preference to scaling. Contractor to confirm all dimensions and details on site prior to manufacture.

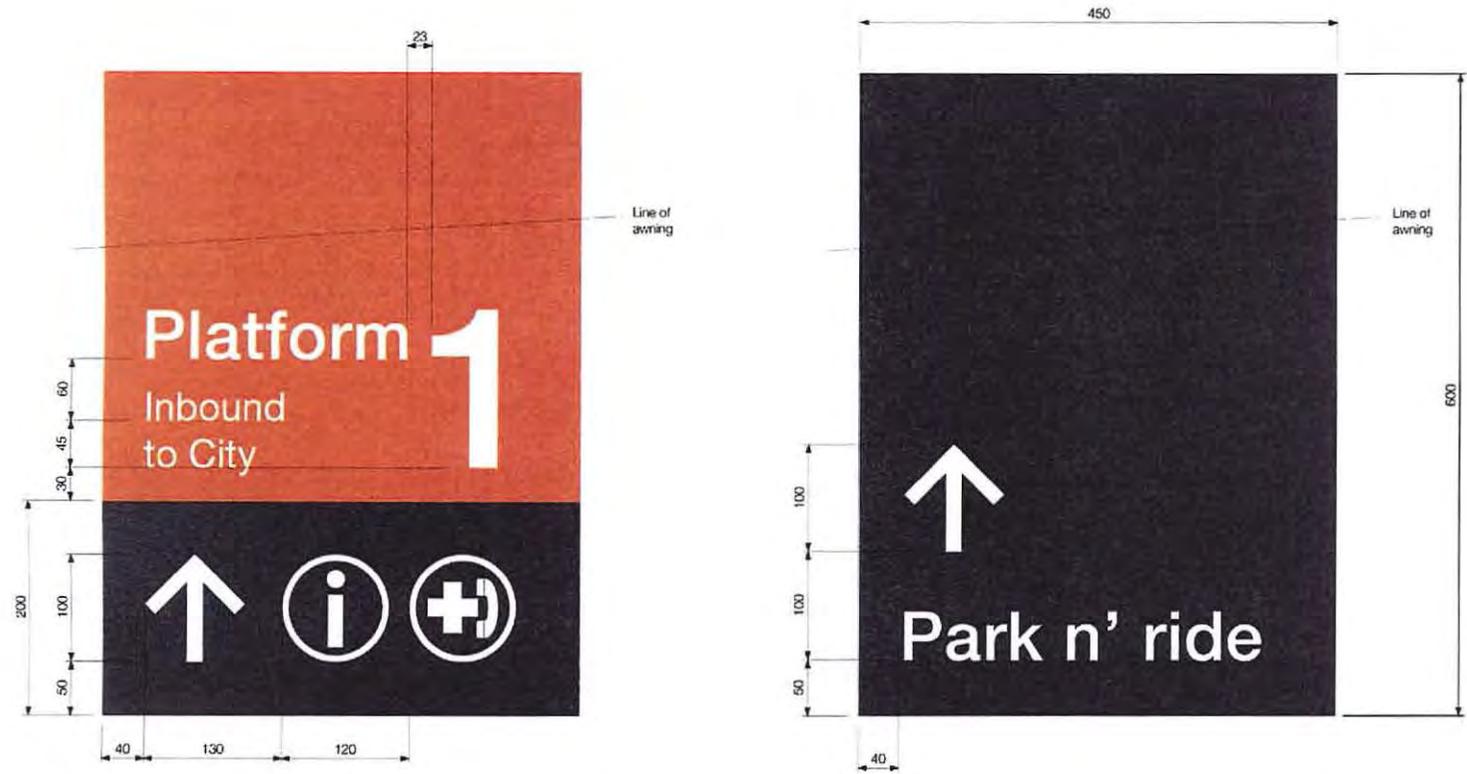
Attention  
Due to this reproduction process the colours in this image are not exact representations of the final product.

**Graphics Detail**  
FONT  
'Inbound.../Outbound...' = Helvetica Neue 55 Roman  
All other text = Helvetica Neue 65 Medium

SIZE  
'Platform' = 45mm cap X height  
'Park n' ride' = 45mm cap X height  
Platform number = 150mm cap X height  
'Inbound.../Outbound...' = 26mm cap X height  
Arrow = 100mm high  
Pictogram = 100mm x 100mm

COLOUR  
Transport panel = Resene 'Ecstasy' 061-139-053  
Other panels = Resene 'Jon' N38-007-359 or approved colour  
Arrow = white  
Text = white  
Pictograms = white

**NOTE:** Messages relating directly with transport are to be on Resene 'Ecstasy'. All other messages are on Resene 'Jon' (or approved colour).



Graphic Layouts  
Scale 1:5

Also refer  
Performance Specification - Attachment Drawing

GENERIC STANDARDS FOR TRANSLINK BUSWAY STATIONS 2007 – SIGNAGE AND GRAPHIC DESIGN



TRANSLINK BUSWAY STATION ARCHITECT	dt ARCHITECTURE	DRAWN	CHECKED	ORIGINAL SIGNED BY
				TRANSLINK BUSWAY STATION ARCHITECT
				DATE: .../.../2007

PROJECT TITLE	DS-2 UNDER AWNING DIRECTIONAL
TITLE	

BOOK #	AS NOTED
CONTRACT NO.	DT DWG No.
DRAWING NO.	DS-2.1
REVISION	
REV 1	02 05 07
ISSUE	DATE
STATUS	DETAILS
	CHECKED
	APPROVED
JOB NO.	
ISSUE	REV 1



otherwise noted all dimensions in millimetres. Use figured dimensions in preference to scaling. Contractor to confirm all dimensions and details on site prior to manufacture.

**Attention**  
Due to this reproduction process the colours in this image are not exact representations of the final product.

**Graphics Detail**  
FONT  
'Inbound.../Outbound...' = Helvetica Neue 55 Roman  
All other messages = Helvetica Neue 65 Medium

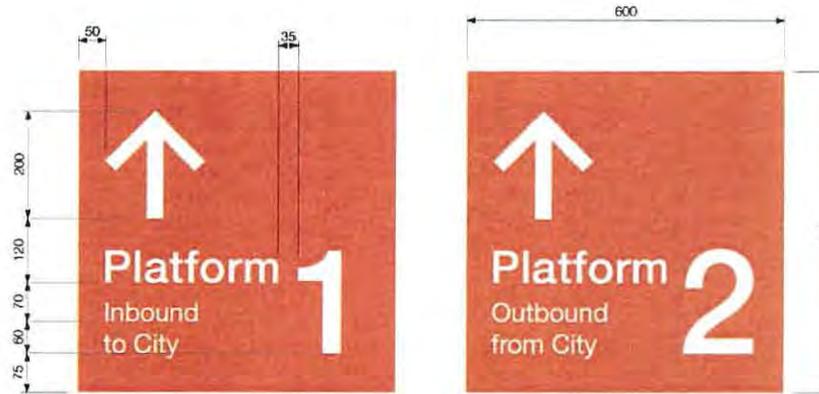
SIZE  
'Platform' = 60mm cap X height  
Platform number = 195mm cap X height  
'Inbound.../Outbound...' = 35mm cap X height  
Arrow = 200mm high

COLOUR  
Panel = Resene 'Ecstasy' 061-139-053  
Arrow = white  
Text = white

**NOTE:** Messages relating directly with transport are to be on Resene 'Ecstasy'. All other messages are on Resene 'Jon' (or approved colour).



Typical Location  
Scale 1:50



Graphic Layout  
Scale 1:10

Also refer  
Performance Specification - Attachment Drawing

GENERIC STANDARDS FOR TRANSLINK BUSWAY STATIONS 2007 – SIGNAGE AND GRAPHIC DESIGN



TRANSLINK BUSWAY  
STATION ARCHITECT

dt ARCHITECTURE

DESIGN

DRAWN

DATE

ORIGINAL SIGNED BY

TRANSLINK BUSWAY  
STATION ARCHITECT

DATE

DS-3  
SUSPENDED DIRECTIONAL  
SIGN

SCALE		AS NOTED	
CONTRACT NO		DT ENG No	
DRAWING NO		REVISION	
REV 1	02.05.07	DETAILS	CHECKED
ISSUE	DATE	DETAILS	CHECKED
STATUS		APPROVED	
JOB NO		ISSUE	
REV 1			

Unless otherwise noted all dimensions in millimetres. Use figured dimensions in preference to scaling. Contractor to confirm all dimensions and details on site prior to manufacture.

Attention  
Due to this reproduction process the colours in this image are not exact representations of the final product.

**GENERAL CONSTRUCTION NOTES**

1. Drawings show design intent. Any changes to specification which affects design intent must be approved by TransLink.

2. All structural members, fixings and/or footings to be confirmed by sign maker's engineer.

**Construction Details**

1. 4 off 50x50x6mm galvanised steel plate with welded nut.

2. 4 off M12 S.S. 316 socket head c'sunk screw & lock nut.

3. Station structure.

4. 50x50x6mm aluminium angle bead welded to aluminium sign panel. All visible welds to be dressed, regular and evenly spaced.

5. 5mm thick aluminium sign panel.

**OPTIONAL FIXING METHOD**

6. Predrill and tap holes to suit M12 stainless steel socket head countersunk screws (application to suit non-accessible internal mounting surface.)



Front Elevation  
Scale 1:5

Side Elevation  
Scale 1:5

Optional Fixing Method  
Scale 1:5

Also refer  
Performance Specification - Attachment Drawing

**GENERIC STANDARDS FOR TRANS LINK BUSWAY STATIONS 2007 – SIGNAGE AND GRAPHIC DESIGN**



TRANS LINK BUSWAY STATION ARCHITECT	dt ARCHITECTURE	DESIGN	DESIGN	DESIGN, DRAWN BY	TRANS LINK BUSWAY STATION ARCHITECT
				DATE	11/2007
CONSULTANT PROJECT TEAM	APPROVED				

DS-3  
SUSPENDED DIRECTIONAL  
SIGN

SCALE				AS NOTED	
CONTRACT NO.				DT DND No.	
DRAWING NO.				DS-3.2	
REVISION					
REV 1	02 03 07	DATE	DETAILS	CHECKED	ISSUE
STATUS					JOB NO.
UNLESS OTHERWISE SPECIFIED				DIMENSIONS SHALL BE IN MILLIMETRES	



Unless otherwise noted all dimensions in millimetres. Use figured dimensions in preference to scaling. Contractor to confirm all dimensions and details on site prior to manufacture.

Attention  
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**GENERAL CONSTRUCTION NOTES**  
1. Drawings show design intent. Any changes to specification which affects design intent must be approved by TransLink.

2. All structural members, fixings and/or footings to be confirmed by sign maker's engineer.

**Construction Details**  
1. 4 of 50x50x6mm galvanised steel plate with welded nut.

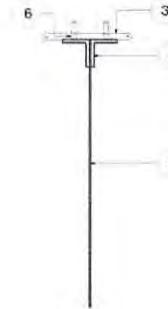
2. 4 off M12 S.S. 316 socket head c/sunk screw & lock nut.

3. Station structure.

4. 50x50x6mm aluminium angle bead welded to aluminium sign panel. All visible welds to be dressed, regular and evenly spaced.

5. 5mm thick aluminium sign panel.

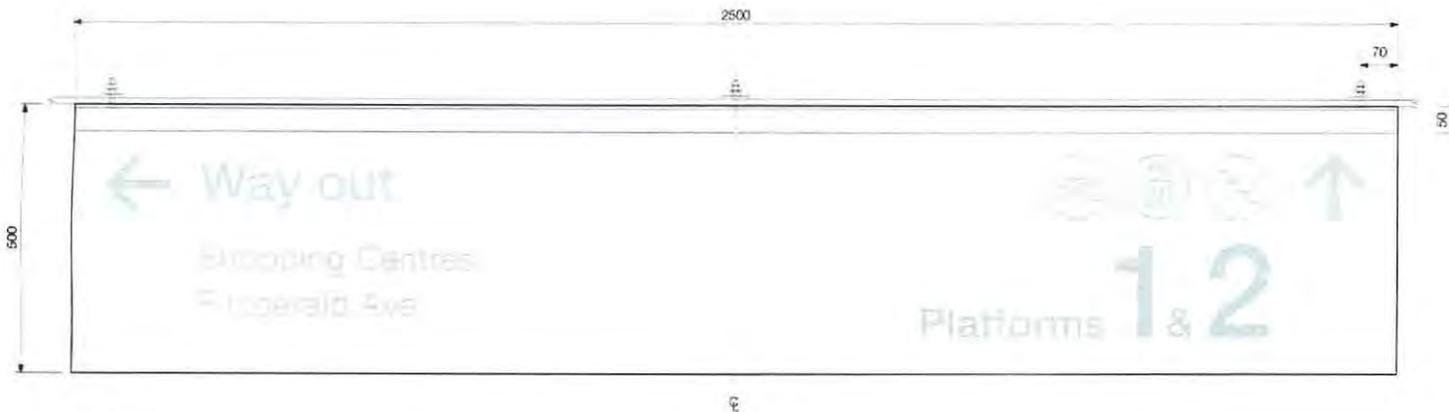
**OPTIONAL FIXING METHOD**  
5. Predrill and tap holes to suit M12 stainless steel socket head countersunk screws (application to suit non-accessible internal mounting surface.)



**Side View - optional fixing method**  
Scale 1:10



**Side View**  
Scale 1:10



**Front View**  
Scale 1:10

Also refer  
Performance Specification - Attachment Drawing

**GENERIC STANDARDS FOR TRANS LINK BUSWAY STATIONS 2007 – SIGNAGE AND GRAPHIC DESIGN**



TRANS LINK BUSWAY STATION ARCHITECT	DT ARCHITECTURE	DESIGN	CHECKED	ORIGINAL SIGNED BY
				TRANS LINK BUSWAY STATION ARCHITECT
				DATE: . . . . . 2007

DS-4  
DIRECTIONAL SIGN

SCALE				AS NOTED	
CONTRACT NO.				DT DWG NO.	
DRAWING NO.				REVISION	
REV 1	02 05 07			DS-4.2	
DATE	DATE	DETAILS	CHECKED	ISSUE	REV 1
STATUS				UNLESS OTHERWISE SPECIFIED DIMENSIONS IN PREFERENCE TO SCALING CONTRACTOR SHALL CONFIRM ALL DIMENSIONS AND DETAILS PRIOR TO CONSTRUCTION	

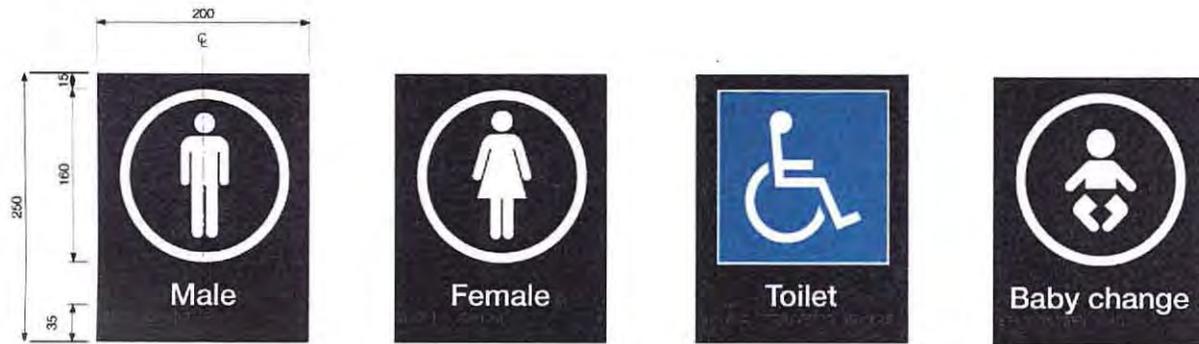
Unless otherwise noted all dimensions in millimetres. Use figured dimensions in preference to scaling. Contractor to confirm all dimensions and details on site prior to manufacture.

**Attention**  
Due to this reproduction process the colours in this image are not exact representations of the final product.

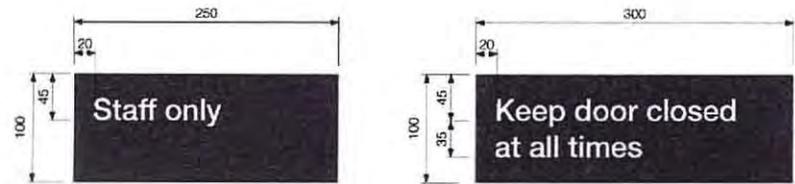
**Graphics Detail**  
FONT  
All text = Helvetica Neue 65 Medium

SIZE  
All text = 20mm cap X height  
Pictogram = 160mm x 160mm

COLOUR  
Panel = Resene 'Jon' N38-007-359 or approved colour  
Text = white  
Pictogram = white  
Access Pictogram = white figure on AS2700 'Ultramarine' background



BRAILLE & TACTILE PANELS



GENERIC DOOR PANELS

Graphic Layouts  
Scale 1:5

Also refer  
Performance Specification - Attachment Drawing

GENERIC STANDARDS FOR TRANSLINK BUSWAY STATIONS 2007 – SIGNAGE AND GRAPHIC DESIGN

		TRANSLINK BUSWAY STATION ARCHITECT	dt ARCHITECTURE	DRAWN	CHECKED	ORIGINAL SIGNED BY TRANSLINK BUSWAY STATION ARCHITECT	PROJECT TITLE FI-1 DOOR PANELS	SCALE AS NOTED	CONTRACT NO.	QT DWD No.
			CONSULTANT PROJECT TEAM	APPROVED	DATE .../.../2007	DRAWING No. FI-1.1		REVISION		
LOGOS	CONSULTANT PROJECT TEAM	APPROVED	TITLE	STATUS	DATE	DETAILS	CHECKED	APPROVED	JOB NO.	ISSUE REV 1



**Elevations - Generic Door Panel**  
Scale 1:5

Unless otherwise noted all dimensions in millimetres. Use figured dimensions in preference to scaling. Contractor to confirm all dimensions and details on site prior to manufacture.

Attention  
Due to this reproduction process the colours in this image are not exact representations of the final product.

**GENERAL CONSTRUCTION NOTES**

1. Drawings show design intent. Any changes to specification which affects design intent must be approved by TransLink.

2. All structural members, fixings and/or footings to be confirmed by sign maker's engineer.

**Construction Details**  
**GENERIC DOOR PANEL**

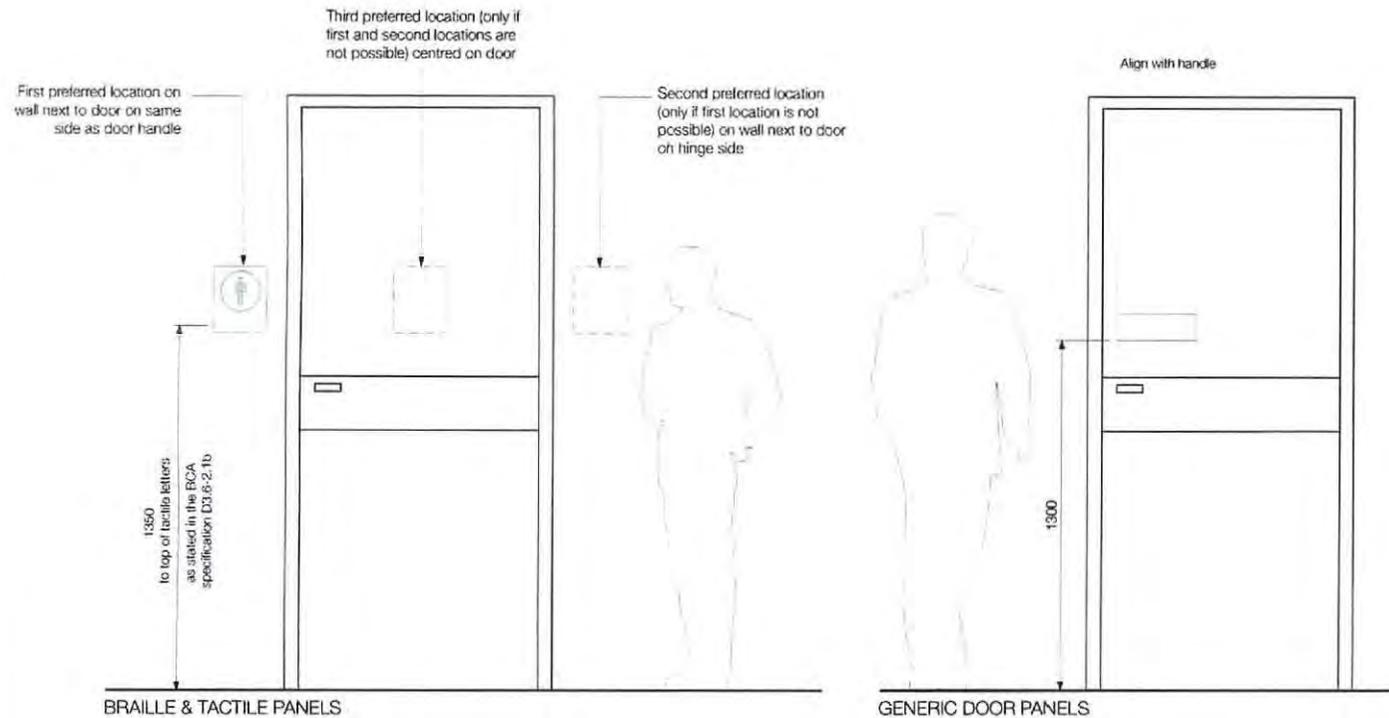
1. 2mm aluminium panel adhered to door with 3M VHB double sided tape and silicon.

2. Mounting surface. Prepare surface free from dust, dirt, oil & grease prior to fixing.

**BRaille AND TACTile PANEL**

3. Braille and tactile sign panel. 'Pictobralle' or similar, 1mm raised tactile pictogram and text, grade 1 braille to BCA and AS1428.1 requirements. Applied to 3mm aluminium panel, all edges rounded.

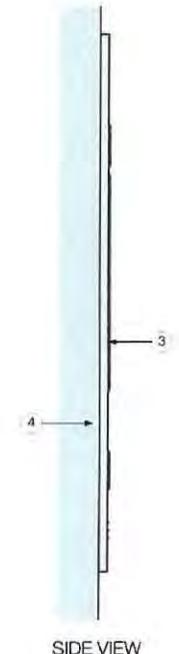
4. Fixed to wall/door with VHB double sided tape and silicone.



**BRaille & TACTile PANELS**

**GENERIC DOOR PANELS**

**Typical Location**  
Scale 1:20



**Braille & Tactile Panel Detail**  
Scale 1:2

Also refer  
*Performance Specification - Attachment Drawing*

**GENERIC STANDARDS FOR TRANSLINK BUSWAY STATIONS 2007 – SIGNAGE AND GRAPHIC DESIGN**



TRANSLINK BUSWAY STATION ARCHITECT	GT ARCHITECTURE	DRAWN	CHECKED	DESIGNED BY
				TRANSLINK BUSWAY STATION ARCHITECT
				DATE: .../.../2007

PROJECT TITLE	F1-1 DOOR PANELS
TITLE	

SCALE	AS NOTED			
CONTRACT NO	GT/OP/16			
DRAWING NO	F1-1.2			
REVISION				
REV 1	02.05.07			
ISSUE	DATE	DETAILS	CHECKED	APPROVED
STATUS				

Unless otherwise noted all dimensions in millimetres. Use figured dimensions in preference to scaling. Contractor to confirm all dimensions and details on site prior to manufacture.

**Attention**  
Due to this reproduction process the colours in this image are not exact representations of the final product.

**Graphics Detail**  
SIZE  
Pictogram = 320mm x 320mm

COLOUR  
Panel = Resene 'Jon' N38-007-359 or approved colour  
Pictogram = white



Graphic Layout  
Scale 1:10

Also refer  
Performance Specification - Attachment Drawing

GENERIC STANDARDS FOR TRANSLINK BUSWAY STATIONS 2007 – SIGNAGE AND GRAPHIC DESIGN



TRANSLINK BUSWAY  
STATION ARCHITECT

QT ARCHITECTURE

DRAWN

CHECKED

DESIGNED BY

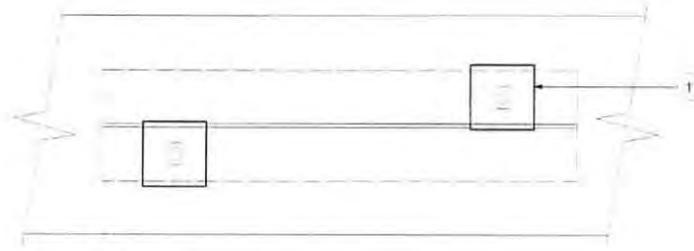
TRANSLINK BUSWAY  
STATION ARCHITECT

DATE

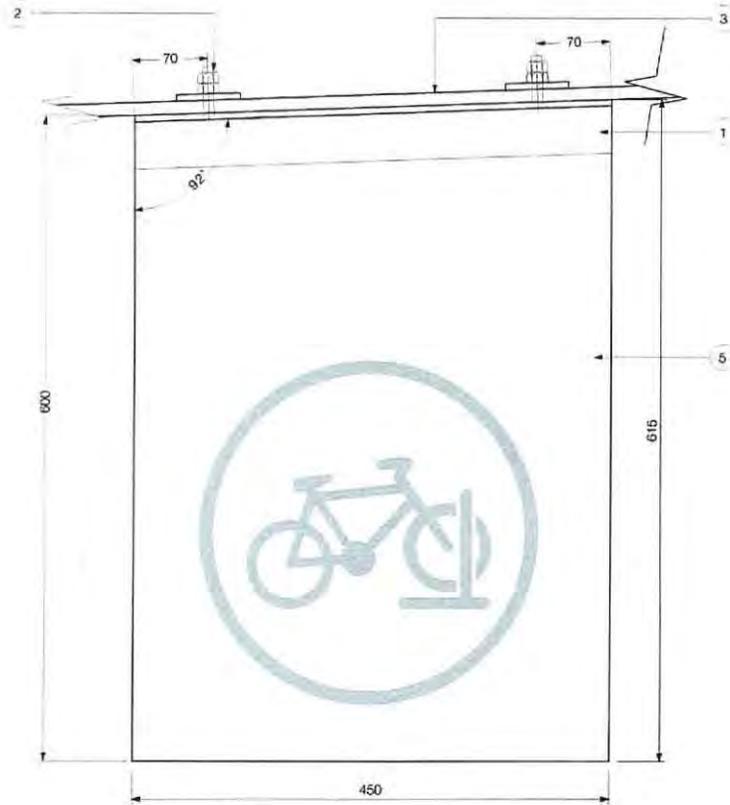
PROJECT TITLE

FI-2  
UNDER AWNING SIGN

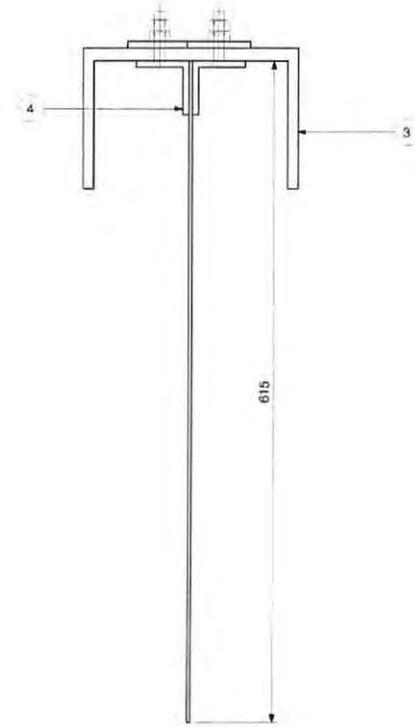
SCALE		AS NOTED	
CONTRACT NO.		QT DWG NO.	
REV 1	02.05.07	ISSUED	CHECKED
ISSUE	DATE	DESIGNED	APPROVED
DRAWING NO.		FI-2.1	
JOB NO.		REVISION	
STATUS		ISSUE	
REV 1		REV 1	



TOP VIEW



FRONT VIEW



RIGHT SIDE VIEW

Elevations  
Scale 1:5

Unless otherwise noted all dimensions in millimetres. Use figured dimensions in preference to scaling. Contractor to confirm all dimensions and details on site prior to manufacture.

Attention  
Due to this reproduction process the colours in this image are not exact representations of the final product.

**GENERAL CONSTRUCTION NOTES**

1. Drawings show design intent. Any changes to specification which affects design intent must be approved by TransLink.

2. All structural members, fixings and/or footings to be confirmed by sign maker's engineer.

**Construction Details**

1. 2 off 30 x 30 x 6mm galvanised steel plate with welded nut.
2. 2 off M12 SS 316 socket head c'sunk screw & lock nut fixing sign panel to station shelter beam.
3. Station shelter beam.
4. 50 x 50 x 6mm aluminium angle.
5. 5mm aluminium panel bead welded to aluminium angle. All visible welds to be dressed, regular and spaced evenly.

Also refer  
Performance Specification - Attachment Drawing

**GENERIC STANDARDS FOR TRANSLINK BUSWAY STATIONS 2007 – SIGNAGE AND GRAPHIC DESIGN**



TRANSLINK BUSWAY STATION ARCHITECT	dT ARCHITECTURE	DRAWN	CHECKED	ORIGINAL DESIGNED BY
				TRANSLINK BUSWAY STATION ARCHITECT
				DATE: 1/1/2007
CONSULTANT PROJECT TEAM	APPROVED			

PROJECT TITLE	FI-2 UNDER AWNING SIGN
TITLE	

SCALE	AS NOTED
CONTRACT NO	QT 040/06
DRAWING NO	FI-2.2
REVISION	
REV 1	02.05.07
ISSUE	DATE
STATUS	DATE
UNLESS OTHERWISE	

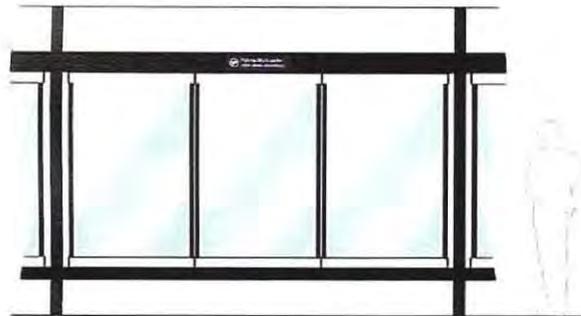
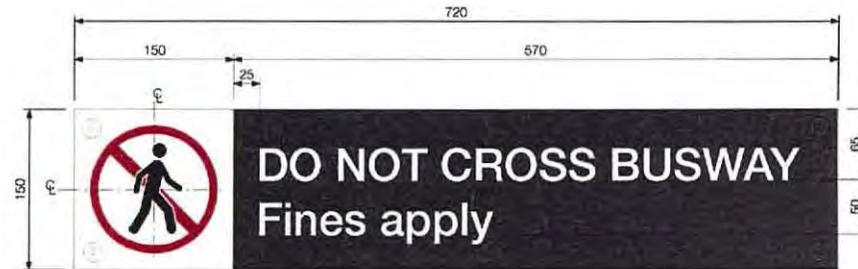
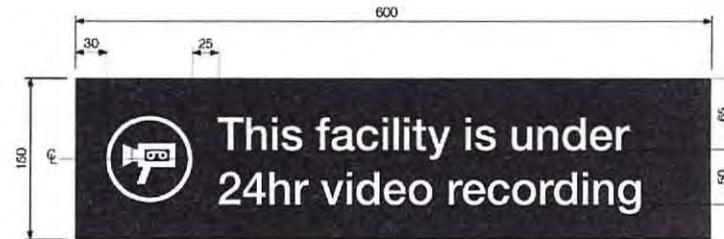
Unless otherwise noted all dimensions in millimetres. Use figured dimensions in preference to scaling. Contractor to confirm all dimensions and details on site prior to manufacture.

**Attention**  
Due to this reproduction process the colours in this image are not exact representations of the final product.

**Graphics Detail**  
FONT  
All text = Helvetica Neue 65 Medium

SIZE  
Text = 30mm cap X height  
'No crossing' pictogram = 120mm x 120mm  
All other pictograms = 80mm x 80mm

COLOUR  
Panel = Resene 'Jon' N38-007-359 or approved colour  
Text = white  
'No crossing' pictogram = black figure on white background with AS2700 Signal Red circle and slash  
All other pictograms = white



Typical Location  
Scale 1:50

Graphic Layouts  
Scale 1:5

Also refer  
Performance Specification - Attachment Drawing

GENERIC STANDARDS FOR TRANSLINK BUSWAY STATIONS 2007 – SIGNAGE AND GRAPHIC DESIGN



TRANSLINK BUSWAY STATION ARCHITECT	GT ARCHITECTURE	DRAWN	CHECKED	ORIGINAL SIGNED BY
				TRANSLINK BUSWAY STATION ARCHITECT
				DATE: / / 2007

PROJECT TITLE	F1-5 FACILITY SIGN
SCALE	AS NOTED
CONTRACT NO.	GT DWG NO.
DRAWING NO.	F1-5.1
REVISION	ISSUE
REV 1	02 05 07
ISSUE	DATE
STATUS	ISSUED

Unless otherwise noted all dimensions in millimetres. Use figured dimensions in preference to scaling. Contractor to confirm all dimensions and details on site prior to manufacture.

Attention  
Due to this reproduction process the colours in this image are not exact representations of the final product.

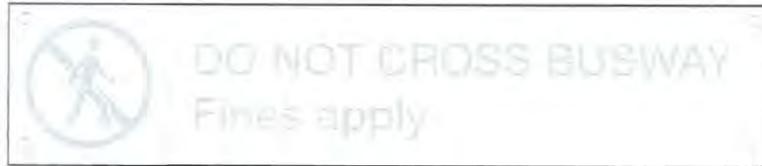
**GENERAL CONSTRUCTION NOTES**  
1. Drawings show design intent. Any changes to specification which affects design intent must be approved by TransLink.

2. All structural members, fixings and/or footings to be confirmed by sign maker's engineer.

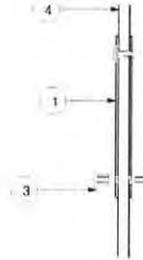
**Construction Details**  
1. 2mm aluminium panel adhered to surface with 3M VHB double sided tape.  
2. Mounting surface. Prepare surface free from dust, dirt, oil & grease prior to fixing.

3. "Demon" fasteners painted to match sign face.

4. Barrier fence.

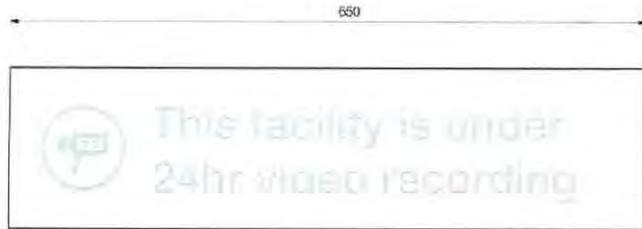


FRONT VIEW



SIDE VIEW

**Construction Detail**  
Scale 1:5



FRONT VIEW



SIDE VIEW

**Construction Detail**  
Scale 1:5

Also refer  
Performance Specification - Attachment Drawing

GENERIC STANDARDS FOR TRANSLINK BUSWAY STATIONS 2007 – SIGNAGE AND GRAPHIC DESIGN



TRANSLINK BUSWAY  
STATION ARCHITECT

dT ARCHITECTURE

SKETCH

CHECKED

ORIGIN: DRAWN BY

TRANSLINK BUSWAY  
WINDOW ARCHITECT

DATE: .../.../2007

FI-5  
FACILITY SIGN

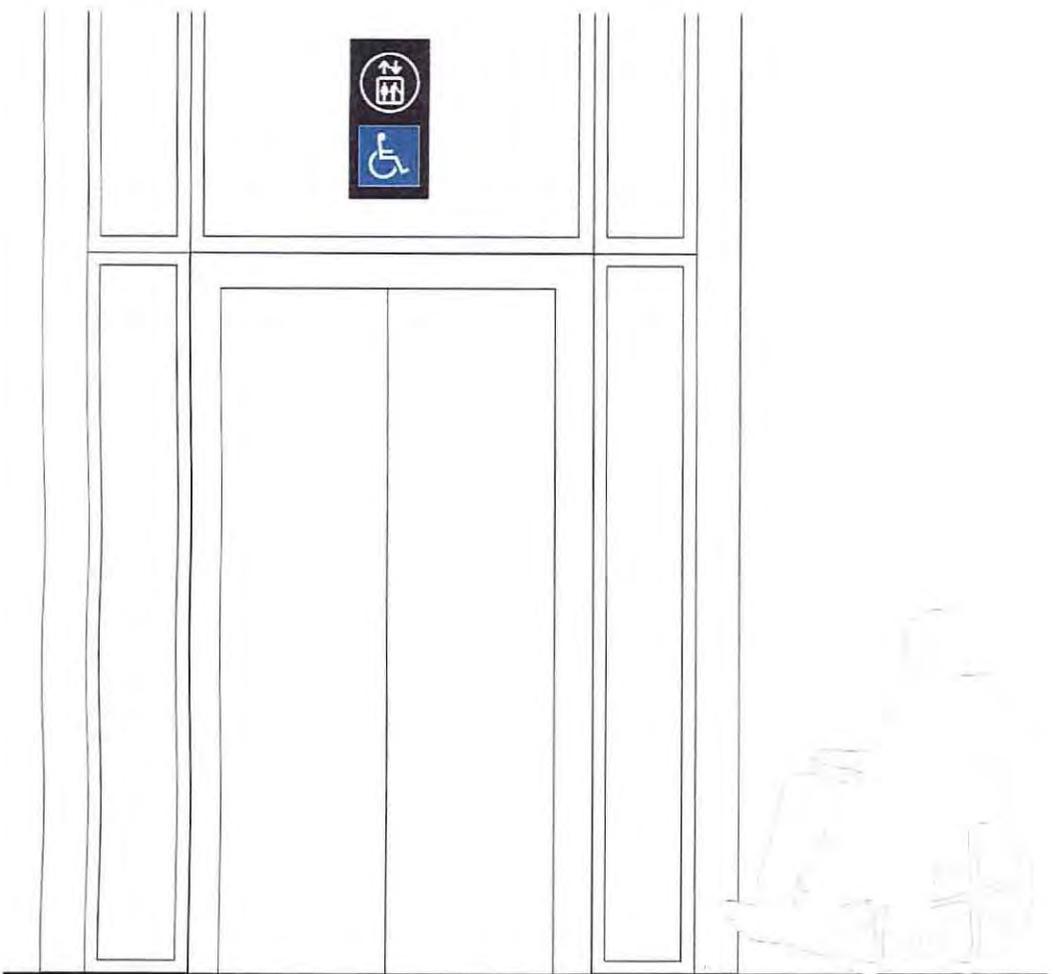
SCALE				AS NOTED	
CONTRACT NO.				DT DWG NO.	
DRAWING NO.				REVISION	
REV 1				FI-5,2	
DATE	02/05/07	DETAILS	CHECKED	APPROVED	
STATUS					
UNLESS OTHERWISE SPECIFIED				DIMENSIONS SHALL BE IN MILLIMETRES	
CONTRACTOR SHALL CONFIRM ALL DIMENSIONS AND DETAILS PRIOR TO CONSTRUCTION					

Unless otherwise noted all dimensions in millimetres. Use figured dimensions in preference to scaling. Contractor to confirm all dimensions and details on site prior to manufacture.

**Attention**  
Due to this reproduction process the colours in this image are not exact representations of the final product.

**Graphics Detail**  
SIZE  
Pictogram = 225mm x 225mm

COLOUR  
Panel = Resene 'Jon' N38-007-359 or approved colour  
Pictogram = white  
Access Pictogram = white figure on AS2700 'Ultramarine' background



Typical Location  
Scale 1:20



Graphic Layout  
Scale 1:5

Also refer  
Performance Specification - Attachment Drawing

GENERIC STANDARDS FOR TRANSLINK BUSWAY STATIONS 2007 – SIGNAGE AND GRAPHIC DESIGN



TRANSLINK BUSWAY STATION ARCHITECT	QT ARCHITECTURE	DRAWN	CHECKED	ORIGINAL SIGNED BY
				TRANSLINK BUSWAY STATION ARCHITECT
				DATE .../.../2007

PROJECT TITLE	FI-6a LIFT SIGN
TITLE	

SCALE	AS NOTED
CONTRACT NO.	QT DWG NO.
DRAWING NO.	FI-6a.1
REVISION	
REV 1	10.05.07
ISSUE	DATE
STATUS	DETAILS
	CHECKED
	APPROVED
	JOB NO.
	DATE
	REV 1

Unless otherwise noted all dimensions in millimetres. Use figured dimensions in preference to scaling. Contractor to confirm all dimensions and details on site prior to manufacture.

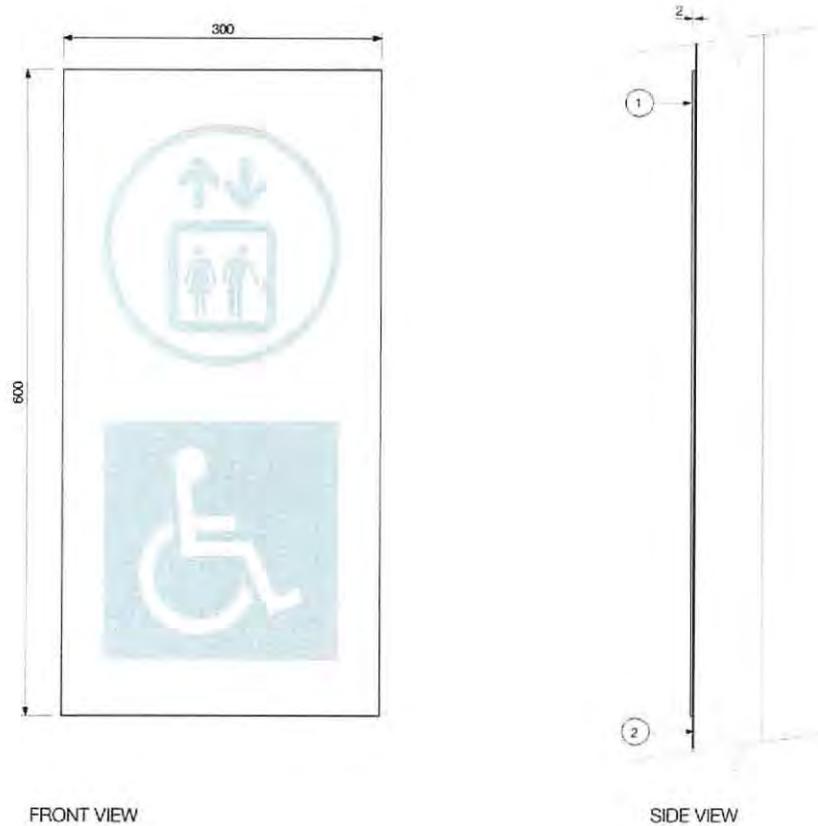
**Attention**  
Due to this reproduction process the colours in this image are not exact representations of the final product.

**GENERAL CONSTRUCTION NOTES**  
1. Drawings show design intent. Any changes to specification which affects design intent must be approved by TransLink.

2. All structural members, fixings and/or footings to be confirmed by sign maker's engineer.

**Construction Details**  
1. 2mm aluminium panel adhered to door with 3M VHB double sided tape and silicone.

2. Mounting surface. Prepare surface free from dust, dirt, oil & grease prior to fixing.



FRONT VIEW

SIDE VIEW

Elevations  
Scale 1:5

Also refer  
Performance Specification - Attachment Drawing

GENERIC STANDARDS FOR TRANSLINK BUSWAY STATIONS 2007 – SIGNAGE AND GRAPHIC DESIGN



TRANSLINK BUSWAY  
STATION ARCHITECT

dt ARCHITECTURE

DRAWN

DESIGNED

ORIGINALLY DESIGNED BY

TRANSLINK BUSWAY  
STATION ARCHITECT

DATE: 11/11/2007

FI-6a  
LIFT SIGN

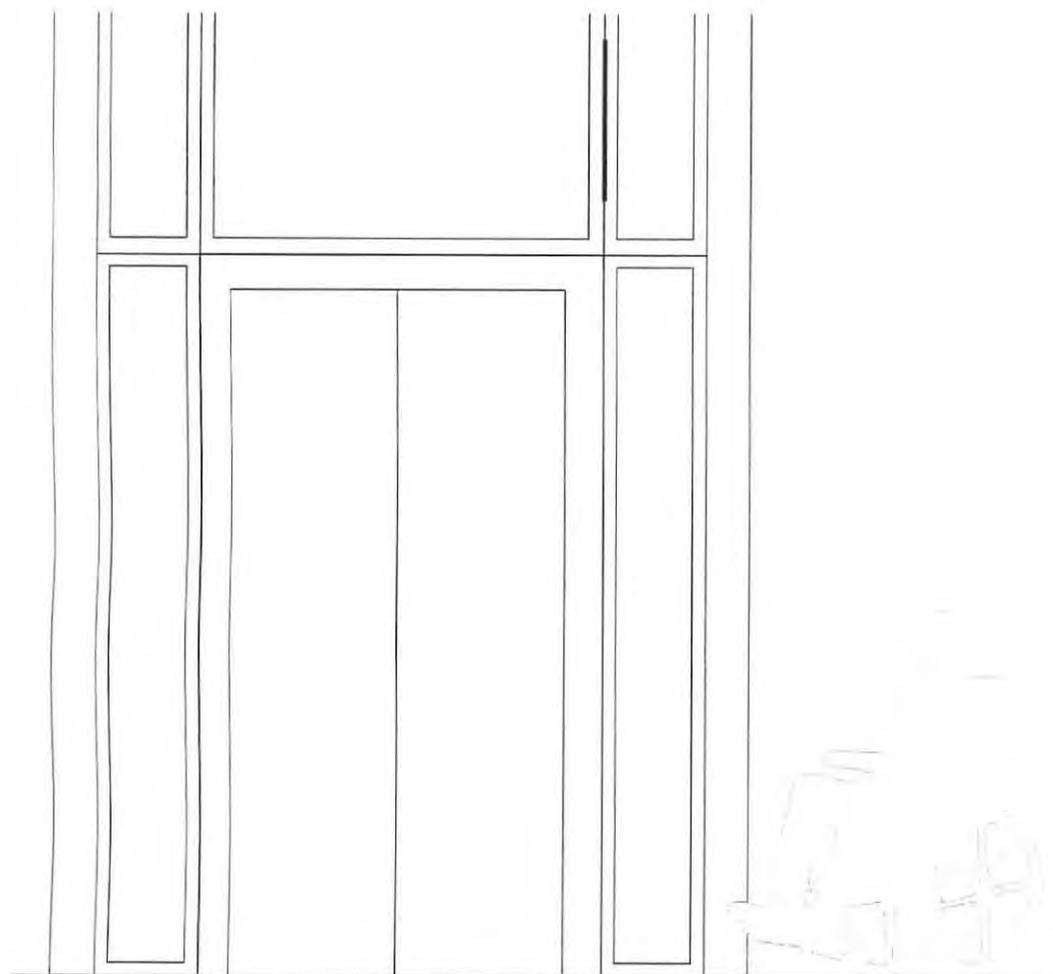
SCALE					AS NOTED	
CONTRACT NO.					DT DWG No.	
DRAWING IT					REVISION	
REV 1	02 05 07				FI-6a.2	
DATE	DATE	DETAILS	CHECKED	APPROVED	ISSUE NO.	ISSUE REV 1
STATUS					UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS SHALL BE IN MILLIMETRES	

Unless otherwise noted all dimensions in millimetres. Use figured dimensions in preference to scaling. Contractor to confirm all dimensions and details on site prior to manufacture.

**Attention**  
Due to this reproduction process the colours in this image are not exact representations of the final product.

**Graphics Detail**  
SIZE  
Pictogram = 225mm x 225mm

COLOUR  
Panel = Resene 'Jon' N38-007-359 or approved colour  
Pictogram = white  
Access Pictogram = white figure on AS2700 'Ultramarine' background



Typical Location  
Scale 1:20

Graphic Layout  
Scale 1:5

Also refer  
Performance Specification - Attachment Drawing

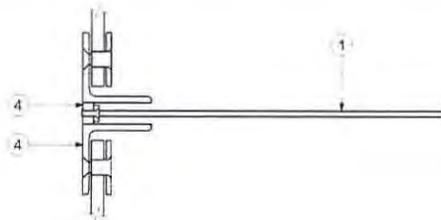
GENERIC STANDARDS FOR TRANSLINK BUSWAY STATIONS 2007 – SIGNAGE AND GRAPHIC DESIGN



TRANSLINK BUSWAY STATION ARCHITECT	dt ARCHITECTURE	DRAWN	DRAWN	DESIGNED BY	TRANSLINK BUSWAY STATION ARCHITECT
				DATE	11/11/07

PROJECT TITLE	FI-6b LIFT SIGN (PROJECTING)
TITLE	

SCALE	AS NOTED
CONTRACT NO.	QT DWG No.
DRAWING NO.	FI-6b.1
REVISION	REV 1
DATE	02/05/07
STATUS	ISSUE
DATE	02/05/07
DETAILS	CHECKED
APPROVED	APPROVED
JOB NO.	
DATE	02/05/07



TOP VIEW



FRONT VIEW

**Construction Detail**

Scale 1:5



SIDE VIEW

Unless otherwise noted all dimensions in millimetres. Use figured dimensions in preference to scaling. Contractor to confirm all dimensions and details on site prior to manufacture.

**Attention**  
Due to this reproduction process the colours in this image are not exact representations of the final product.

**GENERAL CONSTRUCTION NOTES**

1. Drawings show design intent. Any changes to specification which affects design intent must be approved by TransLink.

2. All structural members, fixings and/or footings to be confirmed by sign maker's engineer.

**Construction Details**

1. 5mm thick aluminium sign panel.

2. 5mm aluminium mounting panel welded to sign panel. All welds to be regular and evenly spaced.

3. 2 x M5 S.S. 316 socket head counter sunk screws.

4. Station structure.

Also refer  
Performance Specification - Attachment Drawing

**GENERIC STANDARDS FOR TRANSLINK BUSWAY STATIONS 2007 - SIGNAGE AND GRAPHIC DESIGN**



TRANSLINK BUSWAY STATION ARCHITECT	dt ARCHITECTURE	DESIGN	CHECKED	ORIGINAL DRAWN BY
				TRANSLINK BUSWAY STATION ARCHITECT
				DATE: ... / ... / 2007
CONSULTANT PROJECT TEAM		APPROVED		

Fi-6b  
LIFT SIGN (PROJECTING)

SCALE				AS NOTED	
CONTRACT NO				dt Eng No	
DRAWING NO				REVISION	
REV 1	02/05/07			Fi-6b,2	
ISSUE	DATE	DETAILS	CHECKED	APPROVED	JOB NO
STATUS			JOB NO		

otherwise noted all dimensions in millimetres. Use figured dimensions in preference to scaling. Contractor to confirm all dimensions and details on site prior to manufacture.

Attention  
Due to this reproduction process the colours in this image are not exact representations of the final product.



Typical Location  
Scale 1:20

Also refer  
Performance Specification - Attachment Drawing

GENERIC STANDARDS FOR TRANSLINK BUSWAY STATIONS 2007 – SIGNAGE AND GRAPHIC DESIGN

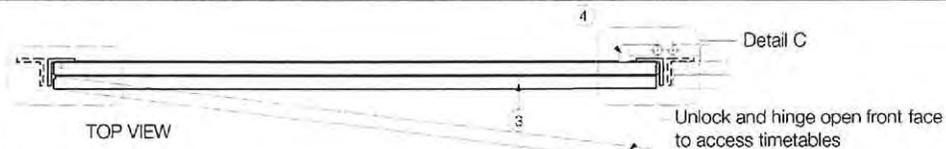


TRANSLINK BUSWAY STATION ARCHITECT	GT ARCHITECTURE	DRAWN	CHECKED	DESIGN CHECKED BY
				TRANSLINK BUSWAY STATION ARCHITECT
				DATE .../.../2007
CONSULTANT PROJECT TEAM	APPROVED			

PROJECT TITLE	IS-1 WELCOME SIGN
TITLE	

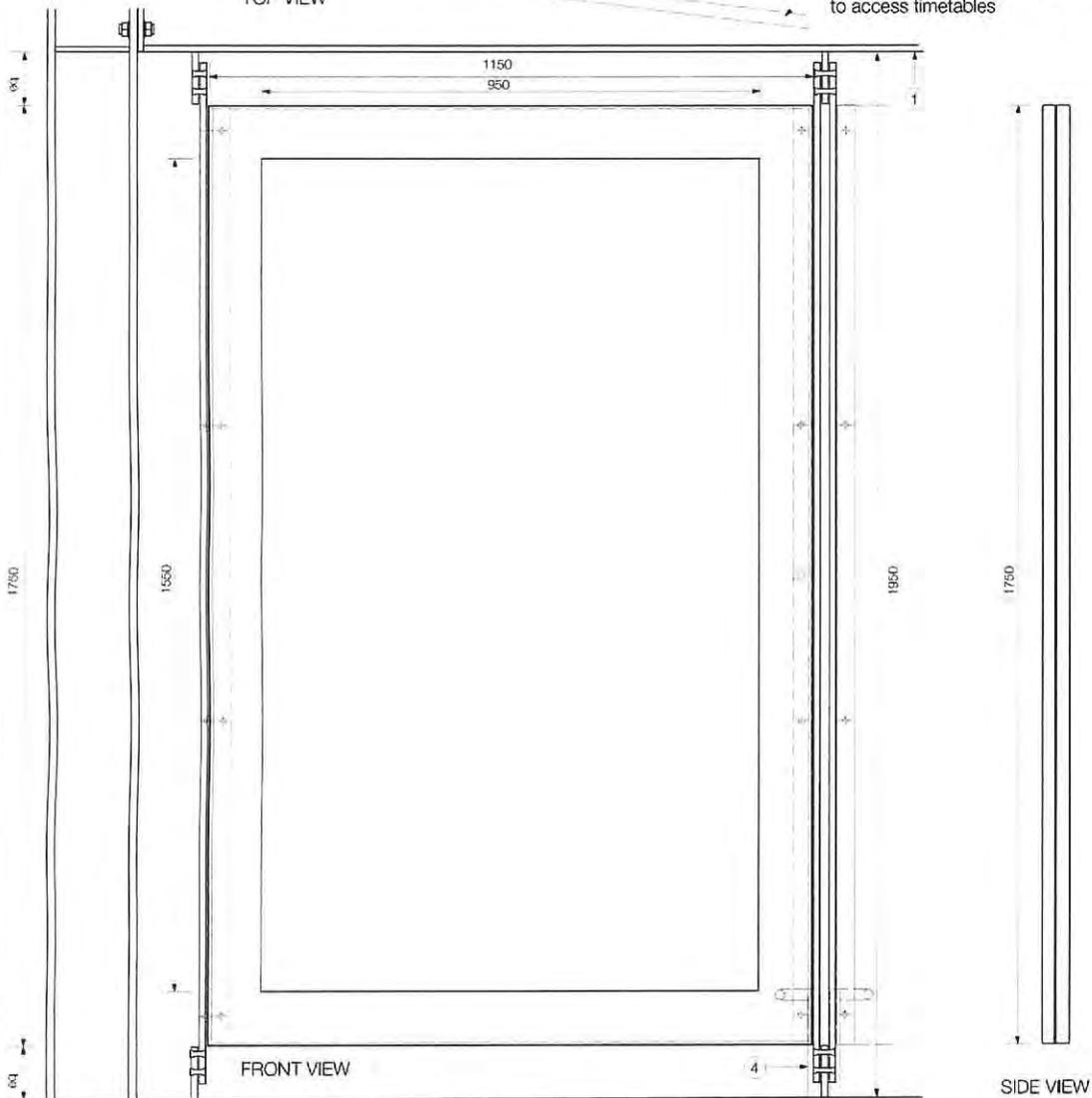
SCALE					AS NOTED	
CONTRACT NO.					GT DWG NO.	
DRAWING NO.					IS-1.1	
REV 1	02.05.07					
ISSUE	DATE	DETAILS	CHECKED	APPROVED		REVISION
STATUS					JOB NO.	
					ISSUE REV 1	

Detail B



TOP VIEW

Unlock and hinge open front face to access timetables



FRONT VIEW

SIDE VIEW

Information Cabinet - Construction Details

Scale 1:10

Unless otherwise noted all dimensions in millimetres. Use figured dimensions in preference to scaling. Contractor to confirm all dimensions and details on site prior to manufacture.

Attention  
Due to this reproduction process the colours in this image are not exact representations of the final product.

**GENERAL CONSTRUCTION NOTES**

1. Drawings show design intent. Any changes to specification which affects design intent must be approved by TransLink.

2. All structural members, fixings and/or footings to be confirmed by sign maker's engineer.

**Construction Details**

1. Station structure.

2. 50 x 50 x 6mm galvanised angle steel support for illuminated information cabinets.

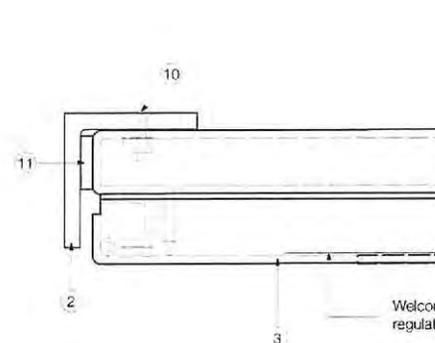
3. Eleven Lighting Starfire 50 OD Outdoor Cabinet illuminated information cabinet, single sided.

4. Power lead to back of cabinet to run inside conduit.

10. M6 stainless steel counter sunk socket machine screw to fasten information cabinet to cabinet supports.

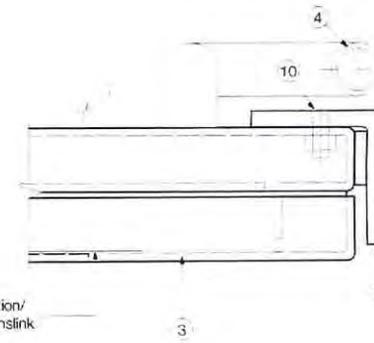
11. Stainless steel spacer.

**NOTE: All dimensions approximate and are to be confirmed.**



Detail B

Scale 1:2



Detail C

Scale 1:2

Welcome information/ regulations by Translink

Also refer  
Performance Specification - Attachment Drawing

**GENERIC STANDARDS FOR TRANSLINK BUSWAY STATIONS 2007 – SIGNAGE AND GRAPHIC DESIGN**



TRANSLINK BUSWAY STATION ARCHITECT	QT ARCHITECTURE	DESIGN	DATE	ORIGINATED BY	DATE
				TRANSLINK BUSWAY STATION ARCHITECT	
				DATE	2007
CONSULTANT PROJECT TEAM	APPROVED				

IS-1  
WELCOME SIGN

SCALE				AS NOTED	
CONTRACT NO				QT OHG No	
DRAWING No				REVISION	
IS-1.2					
REV 1	02.05.07				
ISSUE	DATE	DETAILS	CHECKED	APPROVED	
STATUS			JOB NO		
UNLESS OTHERWISE			DIMENSIONS SHALL BE IN MILLIMETRES		





otherwise noted all dimensions in mm. Use figured dimensions in preference to scaling. Contractor to confirm all dimensions and details on site prior to manufacture.

Attention  
Due to this reproduction process the colours in this image are not exact representations of the final product.

**Graphics Detail**  
FONT  
"Outbound.../Inbound..." = Helvetica Neue 55 Roman  
All other text = Helvetica Neue 65 Medium

**SIZE**  
"Platform" = 60mm cap X height  
"Outbound.../Inbound..." = 35mm cap X height  
Number = 200mm cap X height  
Pictograms = 125mm x 125mm  
Arrows = 125mm high

**COLOUR**  
Platform background = Resene 'Ecstasy' O61-139-053  
All other backgrounds = to be confirmed  
All text = white  
Pictograms = white  
Arrows = white

**NOTE: Sign case by others. Size to be confirmed.**

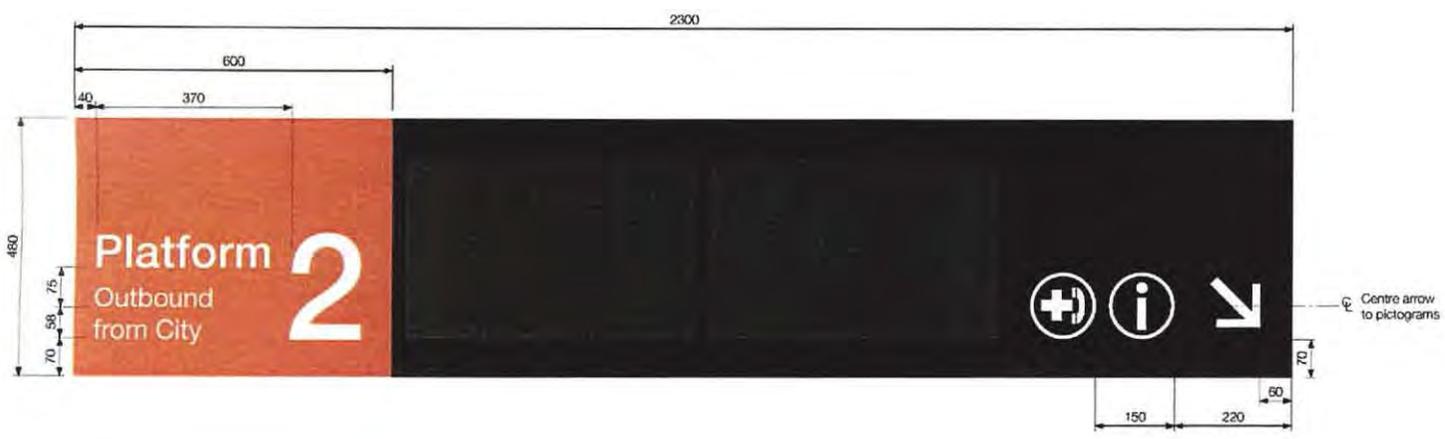


FRONT VIEW



BACK VIEW

**Typical Location**  
Scale 1:50



**Graphic Layout**  
Scale 1:10

Also refer  
Performance Specification - Attachment Drawing

**GENERIC STANDARDS FOR TRANSLINK BUSWAY STATIONS 2007 – SIGNAGE AND GRAPHIC DESIGN**



TRANSLINK BUSWAY STATION ARCHITECT	dT ARCHITECTURE	DRAWN	CHECKED	ORIGINAL DESIGNED BY
				TRANSLINK BUSWAY STATION ARCHITECT
				DATE ... / ... / 2007

PROJECT TITLE	IS-4 BUS INFORMATION			
SCALE	AS NOTED			
CONTRACT NO.	07 ENG 06			
DRAWING NO.	IS-4.1			
REV 1	02 05 07			
SCALE	DATE	DETAILS	CHECKED	APPROVED
STATUS				

LOGOS  
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UNLESS OTHERWISE NOTED ALL DIMENSIONS SHALL BE IN MILLIMETRES

UNLESS OTHERWISE NOTED ALL DIMENSIONS IN PREFERENCE TO SCALING CONTRACTOR SHALL CONFIRM ALL DIMENSIONS AND DETAILS PRIOR TO CONSTRUCTION

Unless otherwise noted all dimensions in millimetres. Use figured dimensions in preference to scaling. Contractor to confirm all dimensions and details on site prior to manufacture.

**Attention**  
Due to this reproduction process the colours in this image are not exact representations of the final product.

**GENERAL CONSTRUCTION NOTES**  
1. Drawings show design intent. Any changes to specification which affects design intent must be approved by TransLink.

2. All structural members, fixings and/or footings to be confirmed by sign maker's engineer.

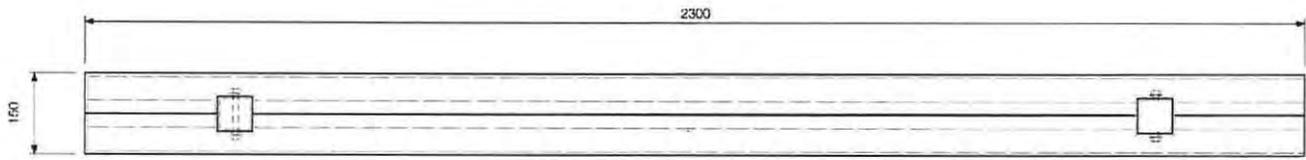
**Construction Details**  
1. 50 x 50 x 3mm steel SHS welded internal frame support for LED box. 75 x 4mm steel SHS sign support sleeve welded to internal frame to fix to 65 x 4mm SHS support from station structure.

2. 65 x 4mm steel SHS welded to bus station structure. Painted to match station structure. Conduit supplying power and data cabling to LED within. Final fixing details to be confirmed.

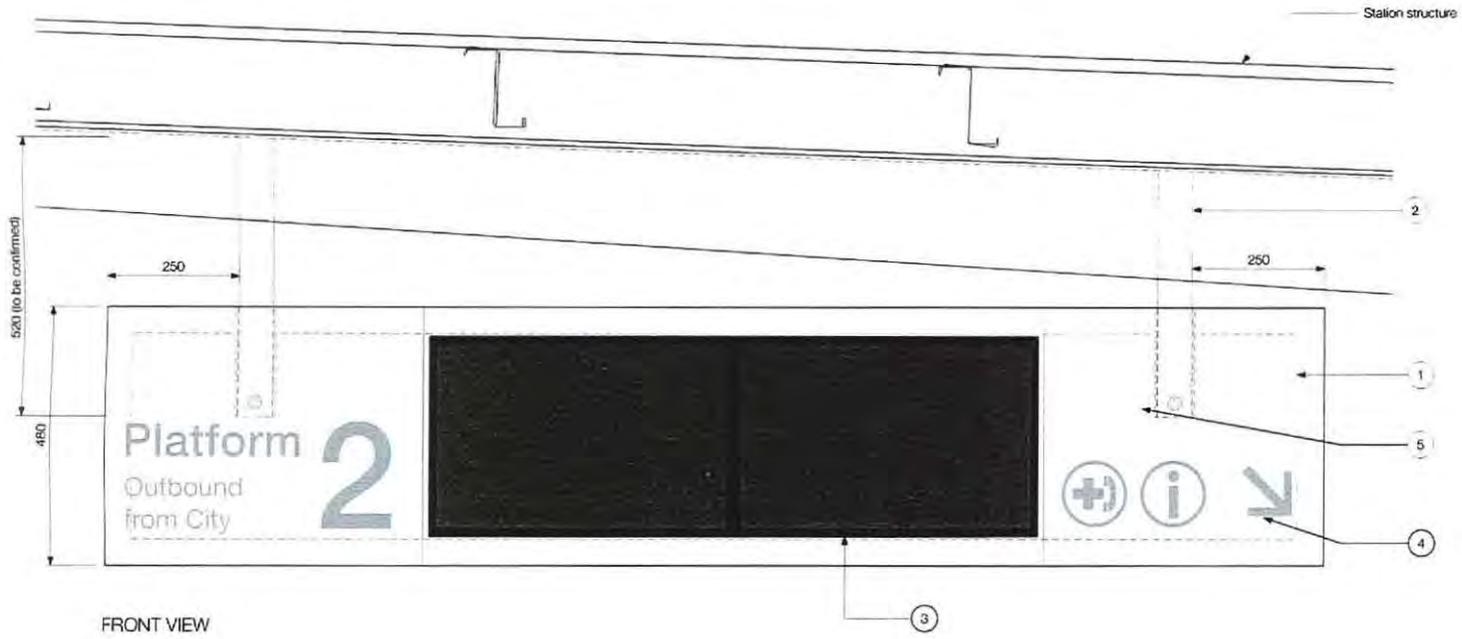
3. LED display box. Final specifications to be confirmed.

4. 2mm thick aluminium cladding with front applied vinyl graphics. Folded returns fixed to internal frame. Removable cladding to allow servicing. Paint out stainless steel fixings to match cladding.

5. M12 Stainless Steel bolts with washers and locking nuts to match.



TOP VIEW



FRONT VIEW

Typical Elevation  
Scale 1:10

Also refer  
Performance Specification - Attachment Drawing

GENERIC STANDARDS FOR TRANSLINK BUSWAY STATIONS 2007 – SIGNAGE AND GRAPHIC DESIGN



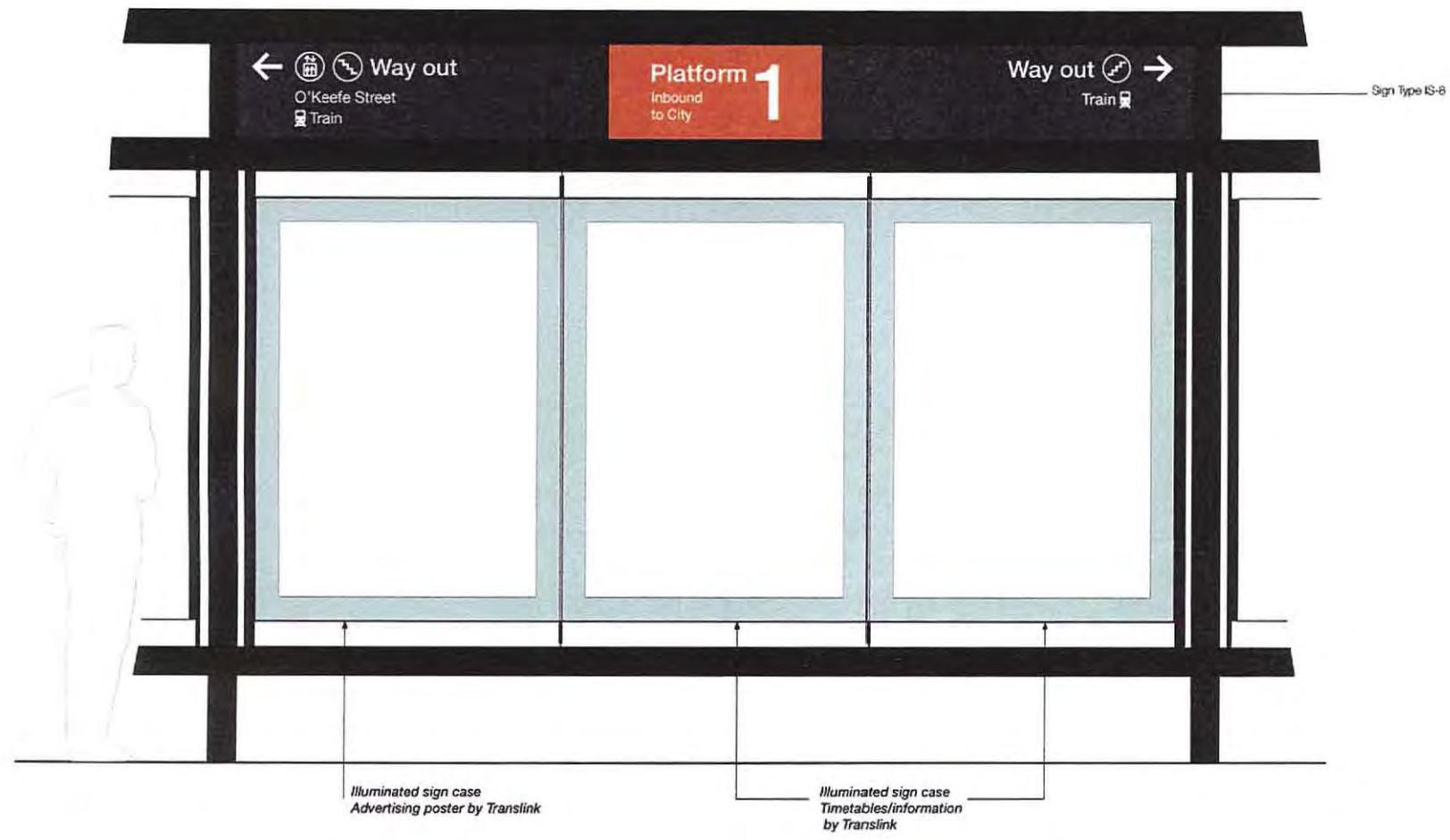
TRANSLINK BUSWAY STATION ARCHITECT	DT ARCHITECTURE	DRAWN	CHECKED	DESIGNED BY
				TRANSLINK BUSWAY STATION ARCHITECT
				DATE: 11/2007
CONSULTANT PROJECT TEAM	APPROVED			

PROJECT TITLE	IS-4 BUS INFORMATION
TITLE	

SCALE				AS NOTED	
CONTRACT NO.				DT DWD No.	
DRAWING No.				REVISION	
IS-4.2					
REV 1	02 05 07				
SIZE	DATE	DETAILS	CHECKED	APPROVED	
STATUS					JOB NO.
ISSUE REV 1					

otherwise noted all dimensions in millimetres. Use figured dimensions in preference to scaling. Contractor to confirm all dimensions and details on site prior to manufacture.

Attention  
Due to this reproduction process the colours in this image are not exact representations of the final product.



Typical Location  
Scale 1:20

Also refer  
Performance Specification - Attachment Drawing

GENERIC STANDARDS FOR TRANSLINK BUSWAY STATIONS 2007 – SIGNAGE AND GRAPHIC DESIGN



TRANSLINK BUSWAY STATION ARCHITECT	GT ARCHITECTURE	DRAWN	CHECKED	ORIGINAL DESIGNED BY TRANSLINK BUSWAY STATION ARCHITECT
CONSULTANT PROJECT TEAM	APPROVED			DATE: / / 2007

PROJECT TITLE	IS-5 PLATFORM INFORMATION
TITLE	

SCALE					AS NOTED	DT DWG No.
CONTRACT NO.						
DRAWING NO.					IS-5.1	REVISION
REV 1	02.05.07					
ISSUE	DATE	DETAILS	CHECKED	APPROVED		ISSUE REV 1
STATUS						

Detail B

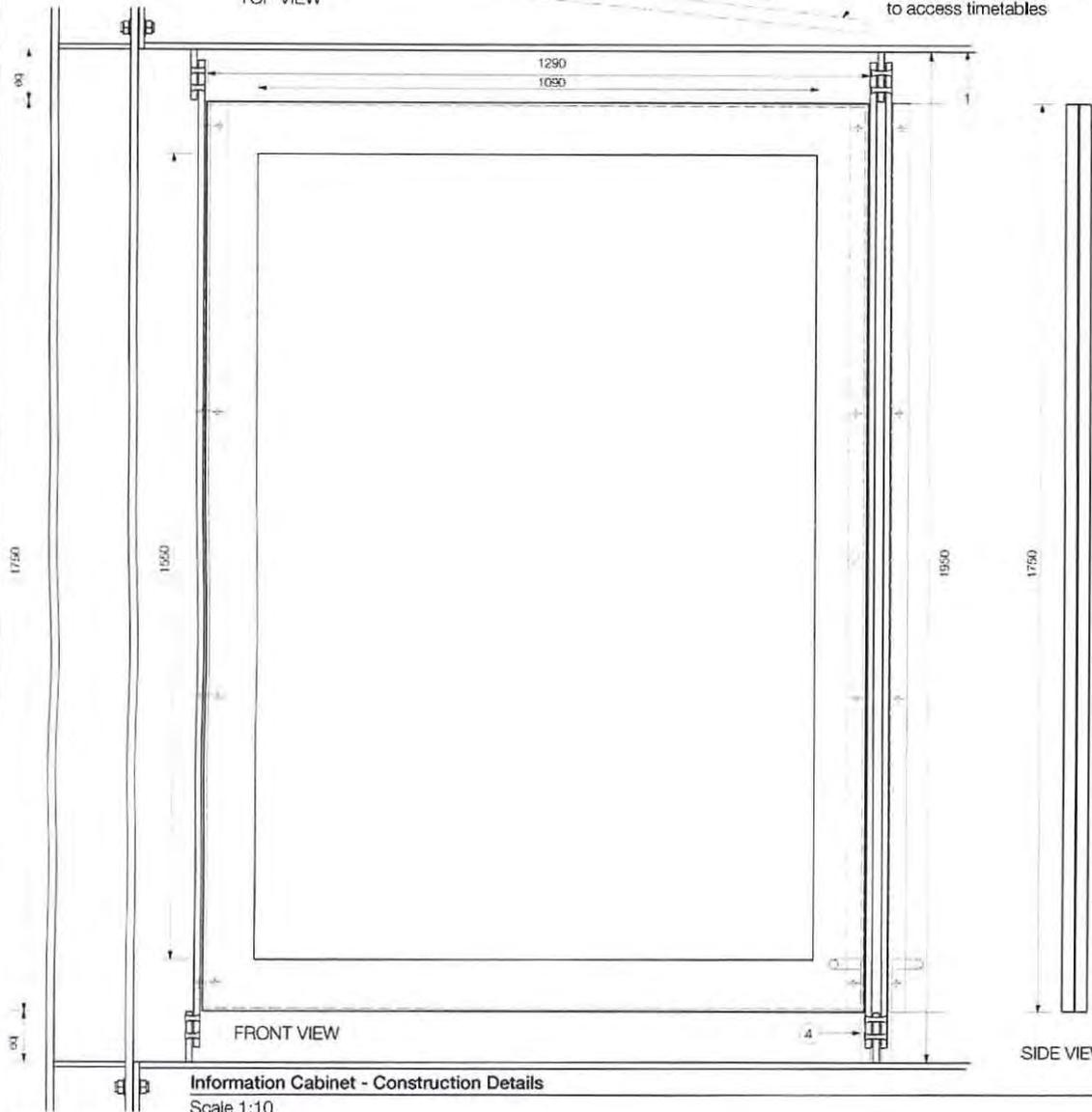
4

Detail C

TOP VIEW

3

Unlock and hinge open front face to access timetables



Information Cabinet - Construction Details

Scale 1:10

Unless otherwise noted all dimensions in millimetres. Use figured dimensions in preference to scaling. Contractor to confirm all dimensions and details on site prior to manufacture.

Attention  
Due to this reproduction process the colours in this image are not exact representations of the final product.

**GENERAL CONSTRUCTION NOTES**

1. Drawings show design intent. Any changes to specification which affects design intent must be approved by TransLink.

2. All structural members, fixings and/or footings to be confirmed by sign maker's engineer.

**Construction Details**

1. Station structure.

2. 50 x 50 x 6mm galvanised angle steel support for illuminated information cabinets.

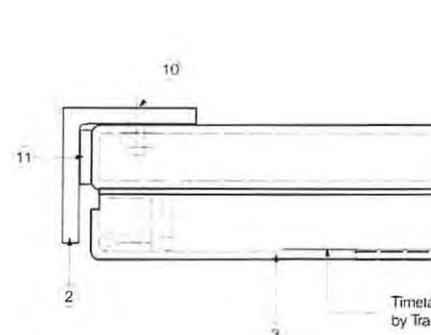
3. Eleven Lighting Starfire 50 OD Outdoor Cabinet illuminated information cabinet, single sided.

4. Power feed to back of cabinet to run inside conduit.

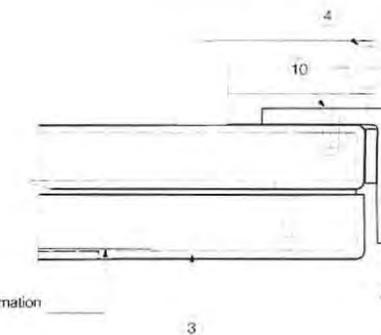
10. M6 stainless steel counter sunk socket machine screw to fasten information cabinet to cabinet supports.

11. Stainless steel spacer.

**NOTE: All dimensions approximate and are to be confirmed.**



Detail B  
Scale 1:2



Detail C  
Scale 1:2

Also refer  
Performance Specification - Attachment Drawing

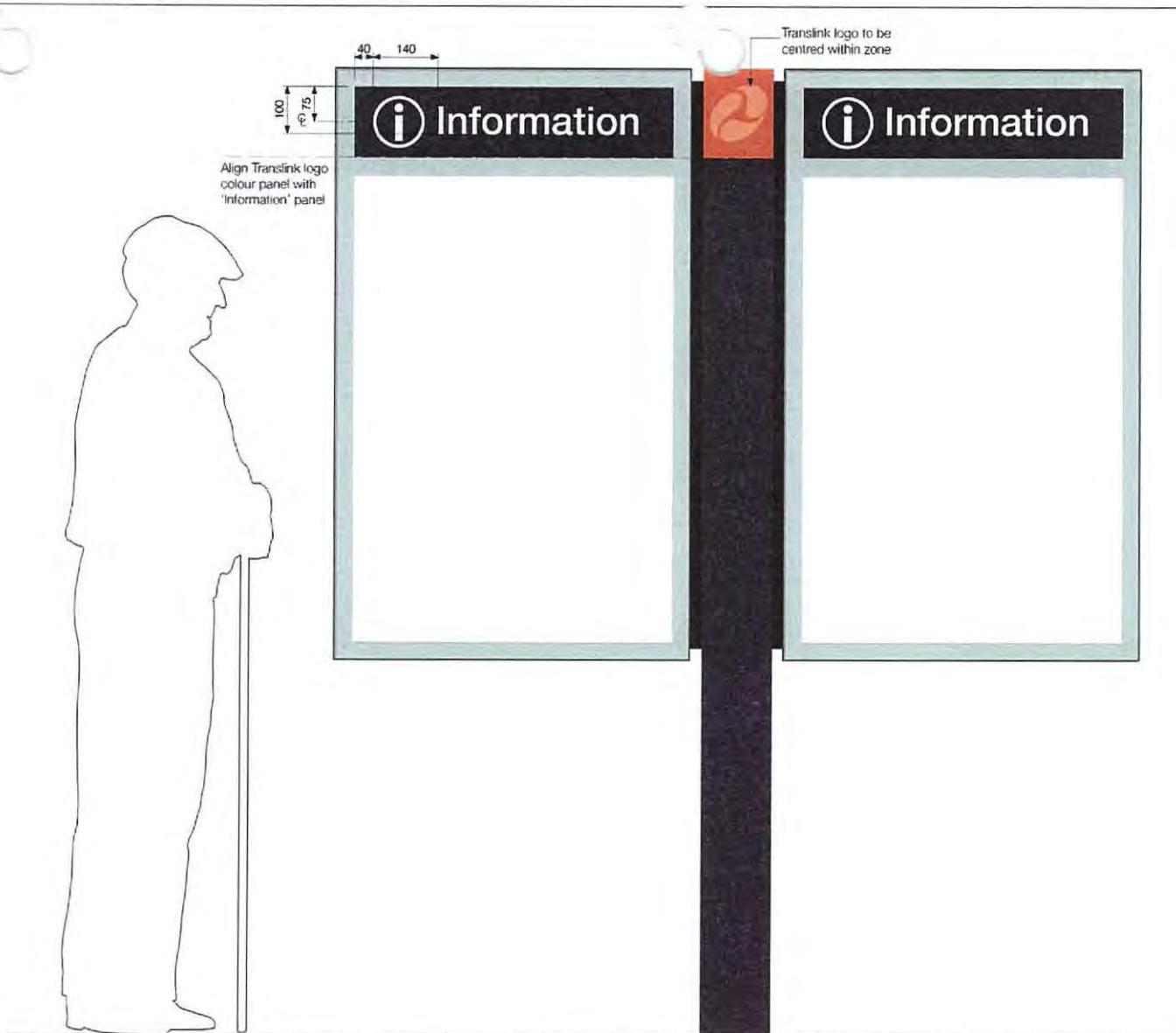
**GENERIC STANDARDS FOR TRANS LINK BUSWAY STATIONS 2007 – SIGNAGE AND GRAPHIC DESIGN**



TRANS LINK BUSWAY STATION ARCHITECT	dT ARCHITECTURE	DRAWN	CHECKED	DESIGN CHECKED BY
				TRANS LINK BUSWAY STATION ARCHITECT
				DATE: / / 2007

PROJECT TITLE	IS-5 PLATFORM INFORMATION
TITLE	

SCALE	AS NOTED
CONTRACT NO	DT DWG No
DRAWING No	REVISION
REV 1	02.05.07
DATE	IS-5.2
STATUS	JOB NO
	REV 1



Otherwise noted all dimensions in mm. Use figured dimensions in preference to scaling. Contractor to confirm all dimensions and details on site prior to manufacture.

Attention  
Due to this reproduction process the colours in this image are not exact representations of the final product.

**Graphics Detail**  
FONT  
All text = Helvetica Neue 65 Medium

SIZE  
'Information' = 60mm cap X height  
Pictogram = 110mm x 110mm  
Translink graphic = 120mm high (proportional width)

COLOUR  
*Panel Backgrounds*  
Translink = Resene 'Ecstasy' O61-139-053  
Translink logo tint = 70% Resene 'Ecstasy' O61-139-053 **(to be confirmed)**  
All other backgrounds = Resene 'Jon' N38-007-359 or approved colour  
Sign structure shadowlines = Resene 'Jon' N38-007-359 or approved colour

Text = white  
Pictogram = white

Graphic Layouts  
Scale 1:10

Also refer  
Performance Specification - Attachment Drawing

GENERIC STANDARDS FOR TRANSLINK BUSWAY STATIONS 2007 – SIGNAGE AND GRAPHIC DESIGN



TRANSLINK BUSWAY STATION ARCHITECT	dT ARCHITECTURE	DRAWN	CHECKED	ORIGINAL FILED BY
				TRANSLINK BUSWAY STATION ARCHITECT
				DATE .../.../2007

PROJECT TITLE	IS-6a BUS PROMOTION SIGN
TITLE	

SCALE	AS NOTED
CONTRACT NO.	DT DWG No.
DRAWING NO.	IS-6a.1
REVISION	REVISION
REV 1	02 05 07
DATE	
STATUS	ISSUE REV 1

Unless otherwise noted all dimensions in millimetres. Use figured dimensions in preference to scaling. Contractor to confirm all dimensions and details on site prior to manufacture.

Attention  
Due to this reproduction process the colours in this image are not exact representations of the final product.

**GENERAL CONSTRUCTION NOTES**

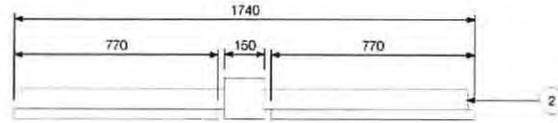
1. Drawings show design intent. Any changes to specification which affects design intent must be approved by TransLink.

2. All structural members, fixings and/or footings to be confirmed by sign maker's engineer.

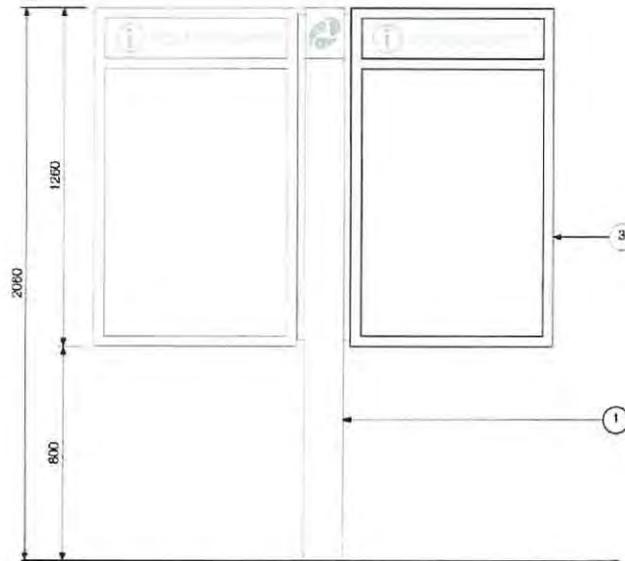
**Construction Details**

1. 150 x 150 SHS post.
2. 75 x 75 SHS steel support frame welded to post. Conduit supplying power within.
3. Eleven Lighting Starfire 50 OD Outdoor Cabinet illuminated information cabinet, single sided.

**NOTE: All dimensions approximate and are to be confirmed.**



TOP VIEW



FRONT VIEW

Elevations  
Scale 1:20

Also refer  
Performance Specification - Attachment Drawing

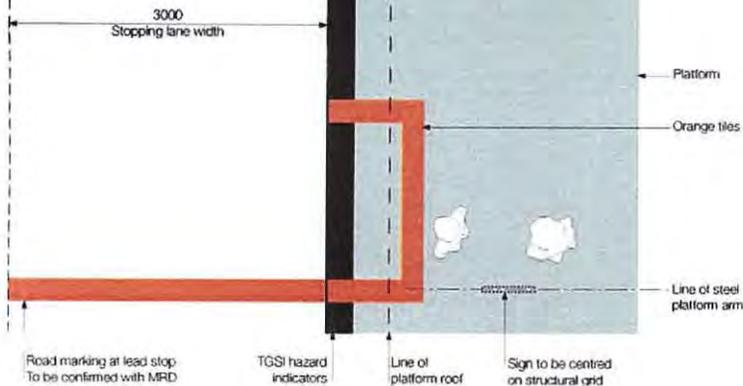
**GENERIC STANDARDS FOR TRANSLINK BUSWAY STATIONS 2007 – SIGNAGE AND GRAPHIC DESIGN**



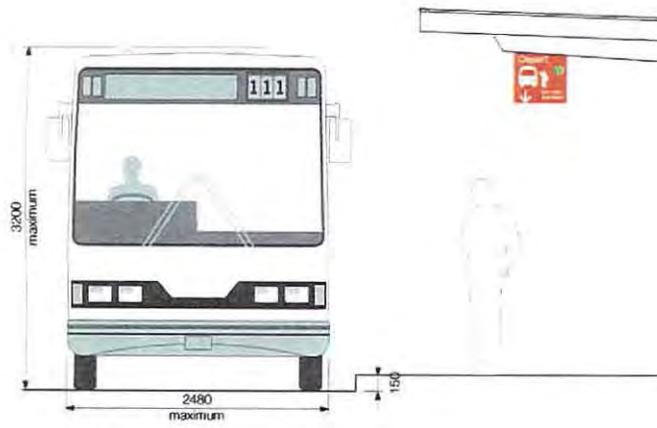
TRANSLINK BUSWAY STATION ARCHITECT	DT ARCHITECTURE	DESIGN	CHECKED	DESIGN DRAWN BY	TRANSLINK BUSWAY STATION ARCHITECT
				DATE	2007
CONSULTANT PROJECT TEAM	APPROVED				

PROJECT TITLE	IS-6a BUS PROMOTION SIGN
TITLE	

SCALE	AS NOTED
CONTRACT NO.	DT ORG NO.
DRAWING NO.	REVISION
IS-6a.2	
REV 1	02.05.07
SIZE	DATE
DETAILS	CHECKED
STATUS	APPROVED
JOB NO.	ISSUE
REV 1	



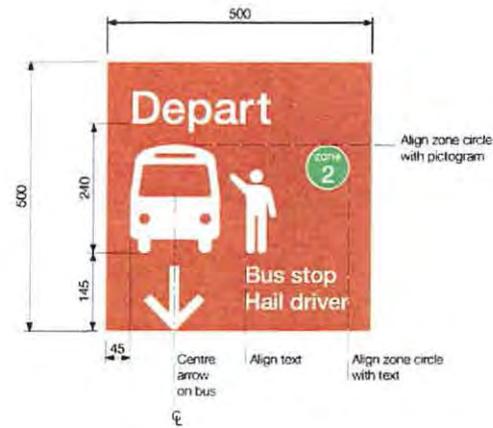
TOP VIEW



FRONT VIEW

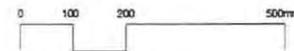
Typical Location

Scale 1:50



Graphic Layout

Scale 1:10



Otherwise noted all dimensions in mm. Use figured dimensions in preference to scaling. Contractor to confirm all dimensions and details on site prior to manufacture.

Attention  
Due to this reproduction process the colours in this image are not exact representations of the final product.

Graphics Detail

FONT  
'Zone' = Helvetica Neue 55 Roman  
All other text = Helvetica Neue 65 Medium

SIZE  
'Depart' = 60mm cap X height  
'Zone' = 16mm cap X height  
Zone number = 32mm cap X height  
All other text = 30mm cap X height  
Pictogram = 200mm high (proportional width)  
Arrow = 120mm high (proportional width)

COLOUR  
Panel background = Resene 'Ecstasy' 051-139-053  
Zone background = to match Pantone 368  
All text = white  
Pictogram = white  
Logo = white

NOTE: Prototype of sign to be produced before final graphics approval.

Also refer  
Performance Specification - Attachment Drawing

GENERIC STANDARDS FOR TRANSLINK BUSWAY STATIONS 2007 – SIGNAGE AND GRAPHIC DESIGN

		TRANSLINK BUSWAY STATION ARCHITECT	dt ARCHITECTURE		ORIGINAL SIGNED BY: TRANSLINK BUSWAY STATION ARCHITECT DATE: .../.../2007	IS-7 BUS STOP SIGN	SCALE AS NOTED					
			DRAWN	CHECKED			CONTRACT NO.	DT DWG NO.				
CONSULTANT PROJECT TEAM	APPROVED	TITLE	STATUS	JOB NO.	ISSUE	REVISION	REV 1 ISSUE DATE	DETAILS	CHECKED	APPROVED	IS-7.1	REVISION

Unless otherwise noted all dimensions in millimetres. Use figured dimensions in preference to scaling. Contractor to confirm all dimensions and details on site prior to manufacture.

**Attention**  
Due to this reproduction process the colours in this image are not exact representations of the final product.

**GENERAL CONSTRUCTION NOTES**

1. Drawings show design intent. Any changes to specification which affects design intent must be approved by TransLink.

2. All structural members, fixings and/or footings to be confirmed by sign maker's engineer.

**Construction Details**

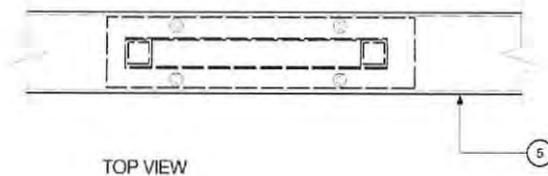
1. Fabricated sign panel from 3mm thick aluminium. Double sided VHB tape fixed to sign frame. Front applied vinyl graphics.

2. Internal frame constructed from 50 x 50 x 3mm aluminium SHS. To take 40 x 40 SHS sleeve support.

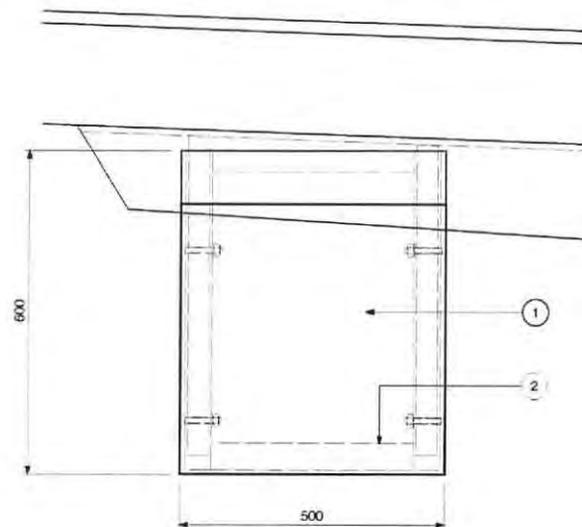
3. 40 x 40mm aluminium SHS sign support sleeve with 6mm thick base plate fixed to roof beam. Location to be coordinated with roof structure.

4. M8 S/Steel countersunk bolt fixing through internal frame.

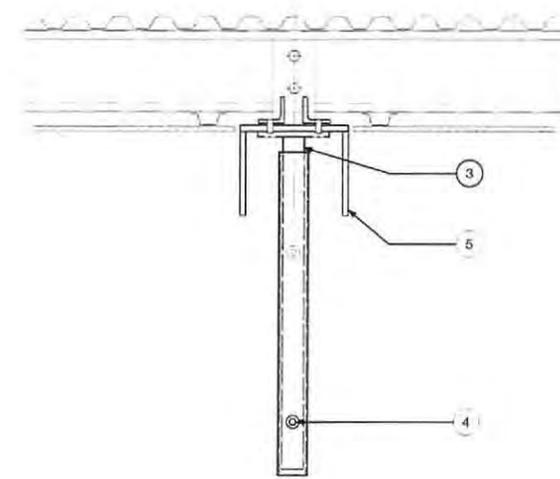
5. Station structure.



TOP VIEW



FRONT VIEW



SIDE VIEW

**Construction Details**

Scale 1:10

Also refer  
Performance Specification - Attachment Drawing

**GENERIC STANDARDS FOR TRANS LINK BUSWAY STATIONS 2007 – SIGNAGE AND GRAPHIC DESIGN**



TRANS LINK BUSWAY STATION ARCHITECT	dT ARCHITECTURE	DRAWN	CHECKED	DESIGN DATE BY
				TRANS LINK BUSWAY STATION ARCHITECT
				DATE: 11/08/07

PROJECT TITLE	IS-7 BUS STOP SIGN
TITLE	

SCALE	AS NOTED
CONTRACT NO	DT DNG 76
DRAWING NO	IS-7.2
REVISION	
REV 1	02.01.07
ISSUE	DATE
STATUS	DETAILS
CHECKED	APPROVED
JOB NO	ISSUE
REV 1	



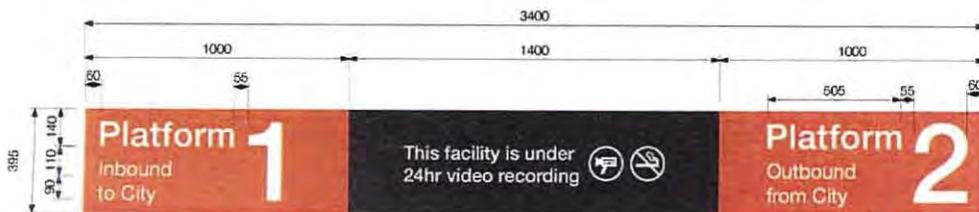
SIGN TYPE IS-2



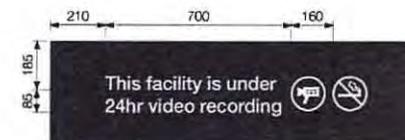
SIGN TYPE IS-5

**Typical Location**

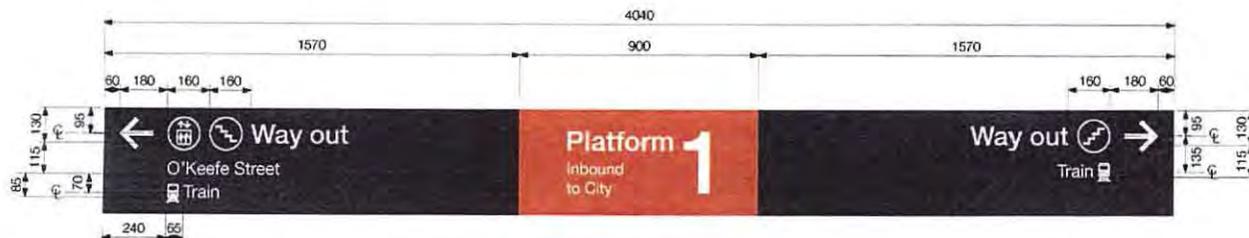
Scale 1:50



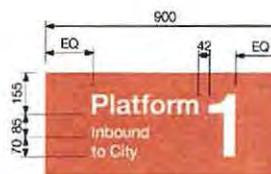
USED FOR SIGN TYPE IS-2



Middle panel layout



USED FOR SIGN TYPE IS-5



Middle panel layout

**Graphic Layouts**

Scale 1:20

Otherwise noted all dimensions in this drawing are in millimetres. Use figured dimensions in preference to scaling. Contractor to confirm all dimensions and details on site prior to manufacture.

**Attention**  
Due to this reproduction process the colours in this image are not exact representations of the final product.

**Graphics Detail**  
FONT  
'Inbound.../Outbound...' = Helvetica Neue 55 Roman  
Sub-messages = Helvetica Neue 55 Roman  
All other text = Helvetica Neue 65 Medium

**SIZE**  
Sign Type IS2 Layout  
'Platform' = 92mm cap X height  
Platform number = 300mm cap X height  
'Inbound.../Outbound...' = 54mm cap X height  
All other text = 50mm cap X height  
Pictogram = 130mm x 130mm

Sign Type IS5 Layout  
'Platform' = 72mm cap X height  
Platform number = 235mm cap X height  
'Inbound.../Outbound...' = 42mm cap X height  
All other text = 46mm cap X height  
Circle pictograms = 125mm x 125mm  
Train pictogram = 70mm height (proportional width)  
Arrow = 125mm

**COLOUR**  
Transport panel = Resene 'Ecstasy' O61-139-053  
Other panels = Resene 'Jon' N38-007-359 or approved colour  
Text = white  
Pictogram = white

**NOTE:** Messages relating directly with transport are to be on Resene 'Ecstasy'. All other messages are on Resene 'Jon' (or approved colour).

Also refer  
Performance Specification - Attachment Drawing

**GENERIC STANDARDS FOR TRANSLINK BUSWAY STATIONS 2007 - SIGNAGE AND GRAPHIC DESIGN**

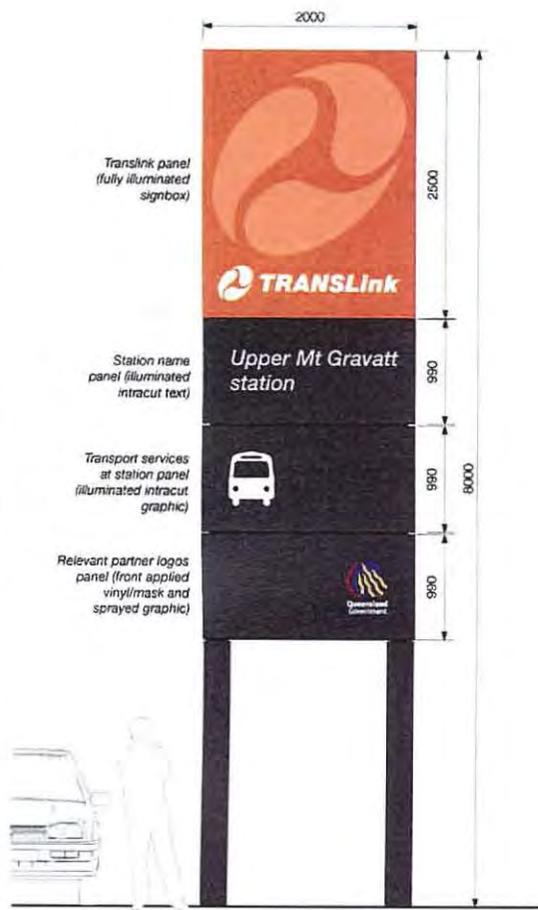


TRANSLINK BUSWAY STATION ARCHITECT	DT ARCHITECTURE	DRAWN	ORDERED	ORIGINAL DESIGNED BY
				TRANSLINK BUSWAY STATION ARCHITECT
				DATE: / / 2007

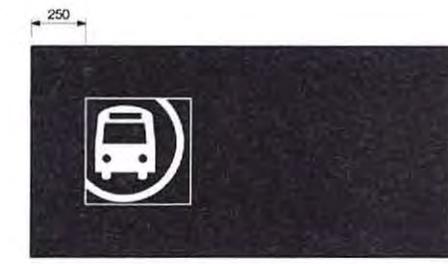
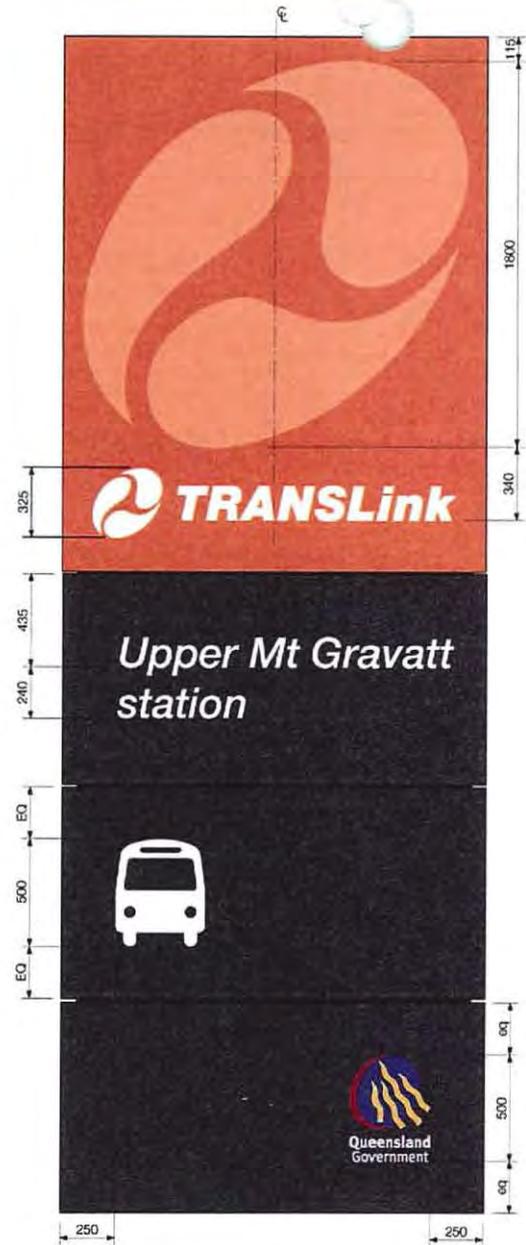
PROJECT TITLE	IS-8 INFORMATION SIGN
TITLE	

SCALE	AS NOTED
CONTRACT NO	QT 0102 No.
DRAWING NO	IS-8.1
REV 1	02.05.07
DATE	
STATUS	
DETAILS	CHECKED
APPROVED	
JOB NO	
ISSUE	REV 1





Typical Location  
Scale 1:50



Alternate panel layout

Graphic Layout  
Scale 1:25

Otherwise noted all dimensions in mm. Use figured dimensions in preference to scaling. Contractor to confirm all dimensions and details on site prior to manufacture.

Attention  
Due to this reproduction process the colours in this image are not exact representations of the final product.

**Graphics Detail**  
**FONT**  
 Station name = Helvetica Neue 66 Medium Italic  
**SIZE**  
 Translink graphic = 1800mm high (proportional width)  
 Translink logo = 325mm high (proportional width)  
 Short station name = 155mm cap X height  
 Long station name = 140mm cap X height  
 Transport pictogram = 500mm x 500mm  
 Old Govt logo = 500mm high (proportional width)

**COLOUR**  
**Panel Backgrounds**  
 Translink = Resene 'Ecstasy' O61-139-053  
 Translink logo tint = 70% Resene 'Ecstasy' O61-139-053 (to be confirmed)  
 All other backgrounds = Resene 'Jon' N38-007-359 or approved colour  
 Sign structure shadowlines = Resene 'Jon' N38-007-359 or approved colour

Translink logo = white  
 Station name = white  
 Transport pictogram = white  
 Old Govt logo = to corporate standard

**NOTE: Prototype of Translink panel to be produced before final graphics approval.**

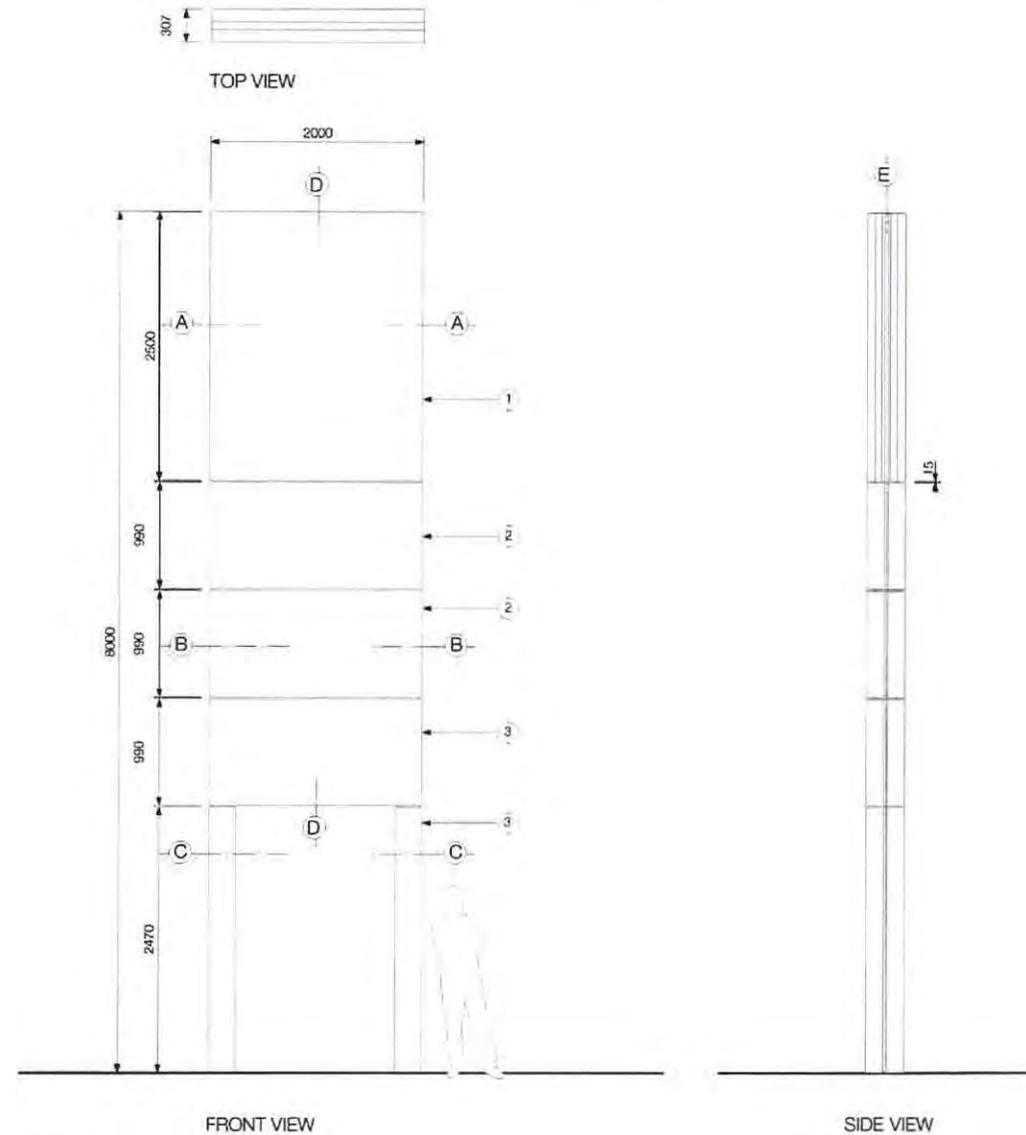
Also refer  
Performance Specification - Attachment Drawing

GENERIC STANDARDS FOR TRANSLINK BUSWAY STATIONS 2007 – SIGNAGE AND GRAPHIC DESIGN



TRANSLINK BUSWAY STATION ARCHITECT	gT ARCHITECTURE	DRAWN	OFFICER	DESIGNED BY
				TRANSLINK BUSWAY STATION ARCHITECT
				DATE: / / 2007

PROJECT TITLE	PI-1 LARGE PYLON SIGN
SCALE	AS NOTED
CONTRACT NO.	QT DWG NO.
DRAWING NO.	PI-1.1
REVISION	REVISION
ISSUE DATE	02.06.07
STATUS	DETAILS CHECKED APPROVED
JOB NO.	
ISSUE	REV 1



Typical Location  
Scale 1:50

Unless otherwise noted all dimensions in millimetres. Use figured dimensions in preference to scaling. Contractor to confirm all dimensions and details on site prior to manufacture.

Attention  
Due to this reproduction process the colours in this image are not exact representations of the final product.

**GENERAL CONSTRUCTION NOTES**

1. Drawings show design intent. Any changes to specification which affects design intent must be approved by TransLink.
2. All structural members, fixings and/or footings to be confirmed by sign maker's engineer.

**Construction Details**

1. Internally illuminated sign panel fabricated from 4.5mm clear polycarbonate sheet.
2. 2mm aluminium sign panel with intracut letters. 2mm opal acrylic letters finishing flush with panel and 3mm clear acrylic backing.
3. 2mm aluminium sign panel with front applied vinyl graphics.
4. 200 x 200 x 6mm galvanised steel pole with 2mm aluminium cladding.

Also refer  
Performance Specification - Attachment Drawing

**GENERIC STANDARDS FOR TRANSLINK BUSWAY STATIONS 2007 – SIGNAGE AND GRAPHIC DESIGN**



TRANSLINK BUSWAY STATION ARCHITECT  
dt ARCHITECTURE  
DRAWN  
CHECKED  
ORIGINAL SAVED BY  
TRANSLINK BUSWAY STATION ARCHITECT  
DATE: ... / ... / 2007

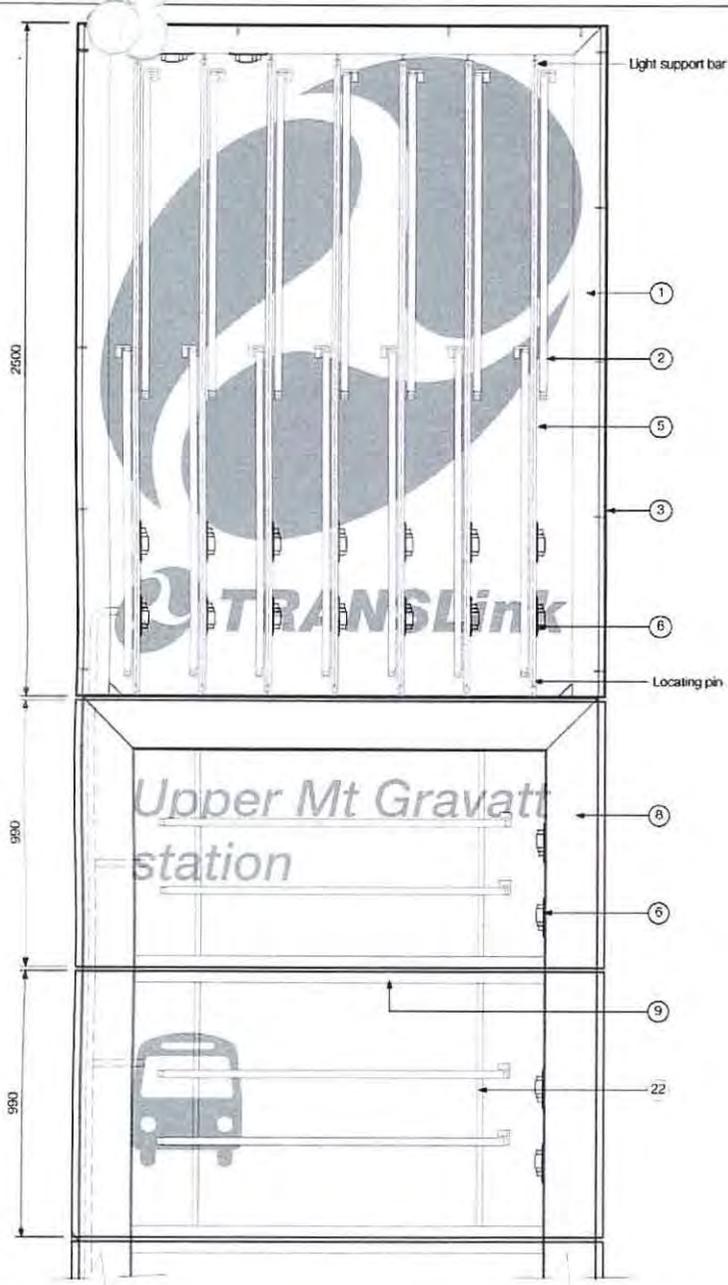
PROJECT TITLE  
PI-1  
LARGE PYLON SIGN

SCALE		AS NOTED	
CONTRACT NO		DT DWG NO	
DRAWING NO		REVISION	
REV 1	02.05.07	PI-1.2	REV 1
ISSUE	DATE	DETAILS	DATE
STATUS	DATE	DETAILS	DATE

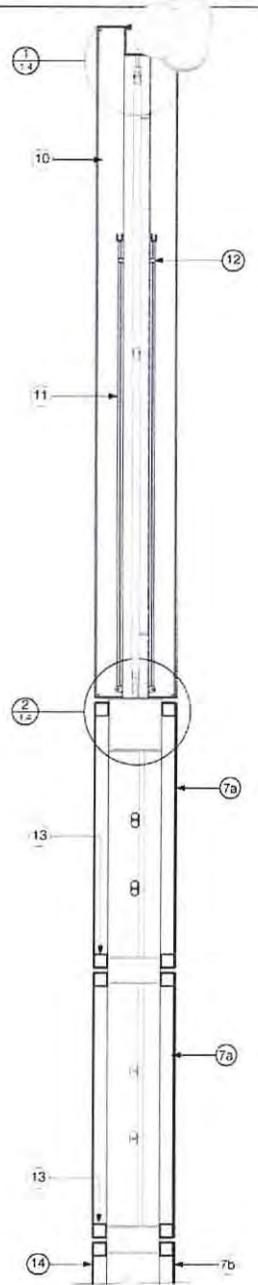
LOGOES  
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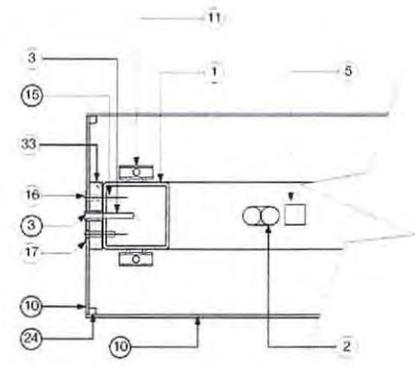
UNLESS OTHERWISE NOTED ALL DIMENSIONS SHALL BE IN MILLIMETRES  
USE FIGURED DIMENSIONS IN PREFERENCE TO SCALING  
CONTRACTOR SHALL CONFIRM ALL DIMENSIONS AND DETAILS PRIOR TO CONSTRUCTION



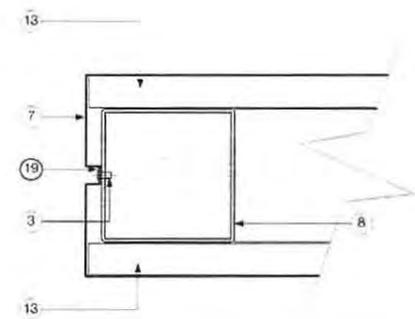
Section E-E  
Scale 1:20



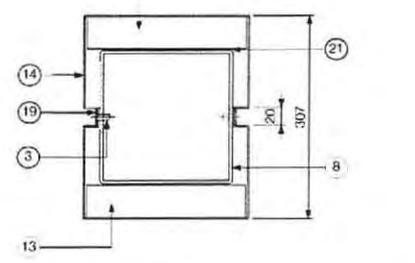
Section D-D  
Scale 1:20



Section A-A  
NTS



Section B-B  
NTS



Section C-C  
NTS

Otherwise noted all dimensions in mm. Use figured dimensions in preference to scaling. Contractor to confirm all dimensions and details on site prior to manufacture.

**Attention**  
Due to this reproduction process the colours in this image are not exact representations of the final product.

**Construction Details**

1. 100 x 100 x 5mm SHS galvanised steel frame.
2. 6500K daylight fluoros mounted to light support frame with tony clips.
3. M6 x 316 stainless steel socket head countersunk screws.
4. 25 x 25 x 1.6mm SHS galvanised steel bracing.
5. 25 x 25 x 3 light support assembly.
6. Ballasts mounted to frame.
- 7a. Illuminated faces:  
2mm aluminium fabricated sign panel with infra-uv letters. 2mm opal acrylic letters finishing flush with panel and 3mm clear acrylic backing.
- 7b. Non illuminated face  
2mm aluminium fabricated sign panel with front applied vinyl graphics.
8. 200 x 200 x 9mm SHS galvanised steel frame.
9. 200 x 100 x 9mm RHS galvanised steel bracing.
10. 4.5mm fabricated clear polycarbonate sign panel.
11. Galvanised steel maintenance support stay for fabricated polycarbonate sign panel.
12. Maintenance support stay clip.
13. 50 x 50 x 1.6mm SHS aluminium welded to 2mm aluminium sign panel.
14. 2mm aluminium cladding.
15. M4 stainless steel socket head countersunk screws.
16. 2mm aluminium cover plate covering polycarbonate sign panel.
17. Neoprene adhered to aluminium cover plate.
18. 2mm aluminium plate fixing aluminium sign panel.
19. 2mm aluminium plate fixing aluminium cladding.
20. 50 x 50 x 1.6mm SHS aluminium welded to aluminium cladding.

Also refer  
Performance Specification - Attachment Drawing

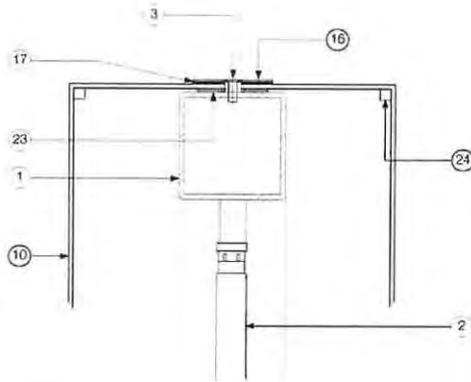
GENERIC STANDARDS FOR TRANSLink BUSWAY STATIONS 2007 – SIGNAGE AND GRAPHIC DESIGN



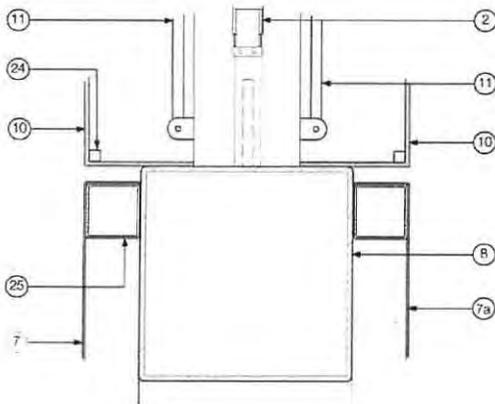
TRANSLink External Station Architect	dt ARCHITECTURE	DRAWN	CHECKED	DESIGNED BY
				TRANSLink External Station Architect
				DATE: J... 2007

PROJECT TITLE	PI-1 LARGE PYLON SIGN
TITLE	

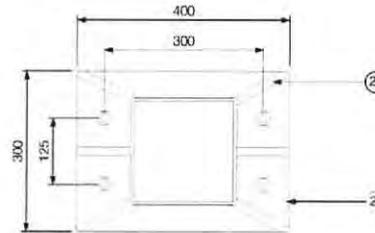
SCALE				AS NOTED	
CONTRACT NO.				DT DWG No.	
DRAWING NO.				PI-1.3	
REV 1	02.05.07	DETAILS	CHECKED	APPROVED	REVISION
STATUS	DATE	DETAILS	CHECKED	APPROVED	JOB NO.



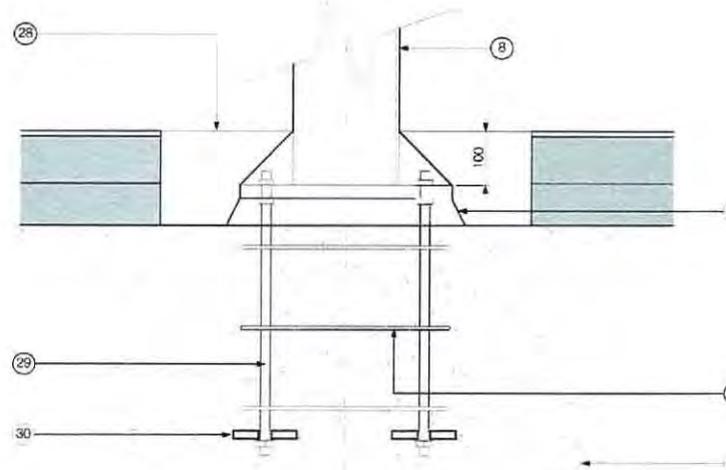
**Detail 1**  
Scale 1:5



**Detail 2**  
Scale 1:5



**Base Plate - Top Elevation**  
Scale 1:10



**Base Plate - Front Elevation**  
Scale 1:10

Unless otherwise noted all dimensions in millimetres. Use figured dimensions in preference to scaling. Contractor to confirm all dimensions and details on site prior to manufacture.

**Attention**  
Due to this reproduction process the colours in this image are not exact representations of the final product.

Refer to PI-2.3 for items 1-20

- Construction Details**
- 21. Neoprene adhered to 50 x 50 x 1.6mm SHS aluminium.
  - 22. 20 x 20 x 1.6mm SHS galvanised steel fluorescent supports.
  - 23. Stainless steel piano hinge.
  - 24. Clear polycarbonate gusset
  - 25. 50 x 50 x 1.6mm SHS aluminium welded to 2mm aluminium sign panel.
  - 26. 400 x 300 x 25mm gr 250 base plate.
  - 27. 16mm thick gr 250 stillener plate.
  - 28. 600sq. mass concrete around base plate (typ.) to be coordinated with paving.
  - 29. 4 off M24 gr 4.6/S bolts with leveling nut 350mm embedment.
  - 30. 100x16mm thick plate with 6mm CFW to bolt all around
  - 31. 50mm thick 32Mpa non shrink grout pad.
  - 32. R8 ties - 150 welded to bolts.
  - 33. 20mm acrylic packer to strengthen fabricated corners. Fix through to frame.
  - 34. Sign makers engineer to specify footing details.

Also refer  
Performance Specification - Attachment Drawing

GENERIC STANDARDS FOR TRANSLINK BUSWAY STATIONS 2007 – SIGNAGE AND GRAPHIC DESIGN



TRANSLINK BUSWAY  
STATION ARCHITECT

dT ARCHITECTURE

DRAWN

CHECKED

ORIGINAL DESIGNED BY

TRANSLINK BUSWAY  
STATION ARCHITECT

DATE: / / 2007

PROJECT TITLE

PI-1  
LARGE PYLON SIGN

SCALE  
AS NOTED

CONTRACT NO. DT DWG NO.

DRAWING NO. PI-1.4 REVISION

REV	NO	DATE	DETAILS	APPROVED	JOB NO.	ISSUE	REV 1
REV 1	02	05	07				

UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS AND DETAILS SHALL BE IN MILLIMETRES

USE FIGURED DIMENSIONS IN PREFERENCE TO SCALING  
CONTRACTOR SHALL CONFIRM ALL DIMENSIONS AND DETAILS PRIOR TO CONSTRUCTION

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otherwise noted all dimensions in mm. Use figured dimensions in drawings to scaling. Contractor to confirm all dimensions and details on site prior to manufacture.

Attention  
Due to this reproduction process the colours in this image are not exact representations of the final product.

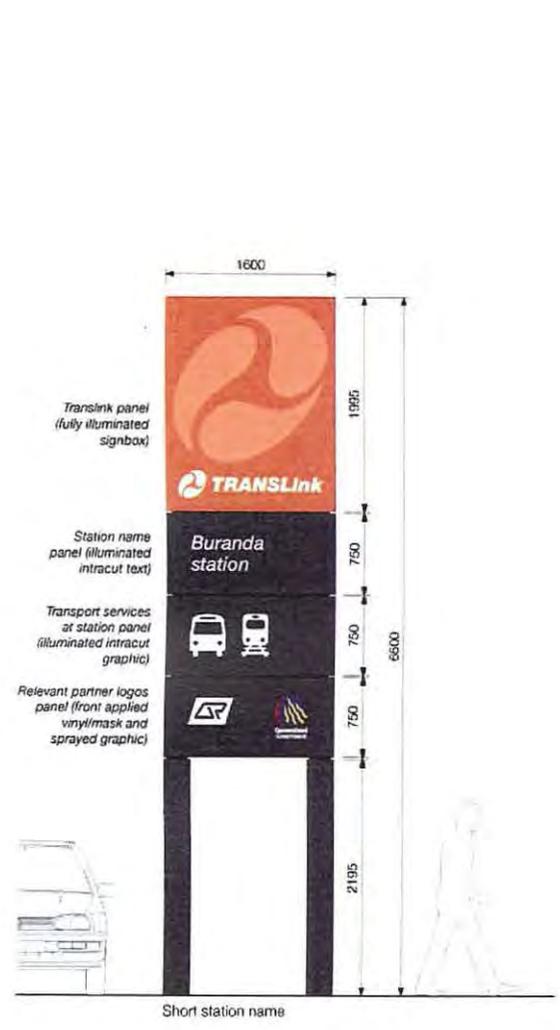
**Graphics Detail**  
FONT  
Station name = Helvetica Neue 66 Medium Italic

SIZE  
Translink graphic = 1440mm high (proportional width)  
Translink logo = 260mm high (proportional width)  
Short station name = 125mm cap X height  
Long station name = 115mm cap X height  
Transport pictogram = 400mm x 400mm  
Old Govt logo = 400mm high (proportional width)  
Supporting partner logo = 250mm high (proportional width)

COLOUR  
*Panel Backgrounds*  
Translink = Resene 'Ecstasy' O61-139-053  
Translink logo tint = 70% Resene 'Ecstasy' O61-139-053 (to be confirmed)  
All other backgrounds = Resene 'Jon' N38-007-359 or approved colour  
Sign structure shadowlines = Resene 'Jon' N38-007-359 or approved colour

Translink logo = white  
Station name = white  
Transport pictogram = white  
Old Govt logo = to corporate standard  
Partner logo = reversed white to corporate standard

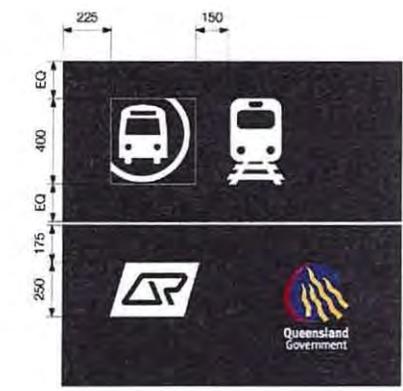
**NOTE: Prototype of Translink panel to be produced before final graphics approval.**



**Typical Location**  
Scale 1:50



**Graphic Layout**  
Scale 1:25



Alternate panel layouts

Also refer  
Performance Specification - Attachment Drawing

**GENERIC STANDARDS FOR TRANSLINK BUSWAY STATIONS 2007 - SIGNAGE AND GRAPHIC DESIGN**

		TRANS LINK BUSWAY STATION ARCHITECT	dT ARCHITECTURE	DESIGN	DATE	ISSUED BY	TRANS LINK BUSWAY STATION ARCHITECT	PI-2 STANDARD PYLON IDENTIFICATION SIGN	SCALE AS NOTED CONTRACT NO. QT DWG No. DRAWING NO. PI-2.1 REVISION
		CONSULTANT PROJECT TEAM	APPROVED	DATE	DATE	DATE	DATE		
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Unless otherwise noted all dimensions in millimetres. Use figured dimensions in preference to scaling. Contractor to confirm all dimensions and details on site prior to manufacture.

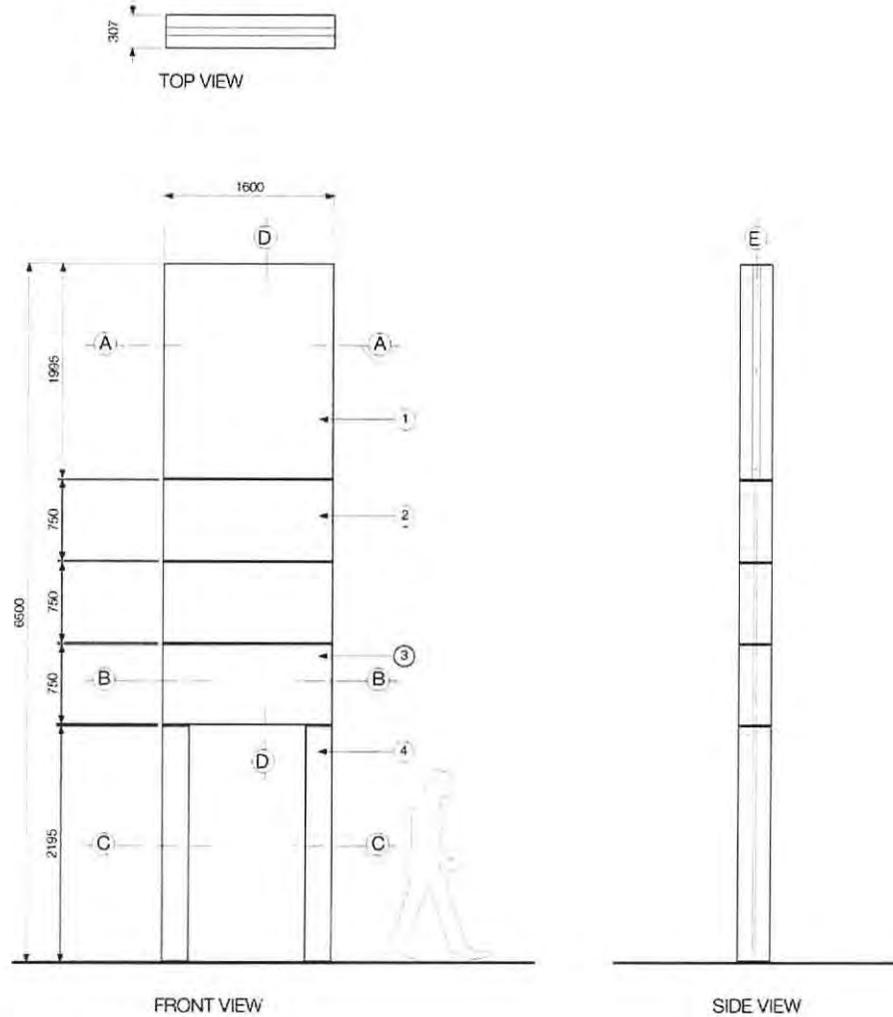
**Attention**  
Due to this reproduction process the colours in this image are not exact representations of the final product.

**GENERAL CONSTRUCTION NOTES**

1. Drawings show design intent. Any changes to specification which affects design intent must be approved by TransLink.
2. All structural members, fixings and/or footings to be confirmed by sign maker's engineer.

**Construction Details**

1. Internally illuminated sign panel fabricated from 4.5mm clear polycarbonate sheet.
2. 2mm aluminium sign panel with intracut letters. 2mm opal acrylic letters finishing flush with panel and 3mm clear acrylic backing.
3. 2mm aluminium sign panel with front applied vinyl graphics.
4. 200 x 200 x 6mm galvanised steel pole with 2mm aluminium cladding.



Typical Elevation

Scale 1:50

Also refer  
Performance Specification - Attachment Drawing

GENERIC STANDARDS FOR TRANSLINK BUSWAY STATIONS 2007 – SIGNAGE AND GRAPHIC DESIGN



TRANSLINK BUSWAY  
STATION ARCHITECT

dT ARCHITECTURE

DRAWN

CHECKED

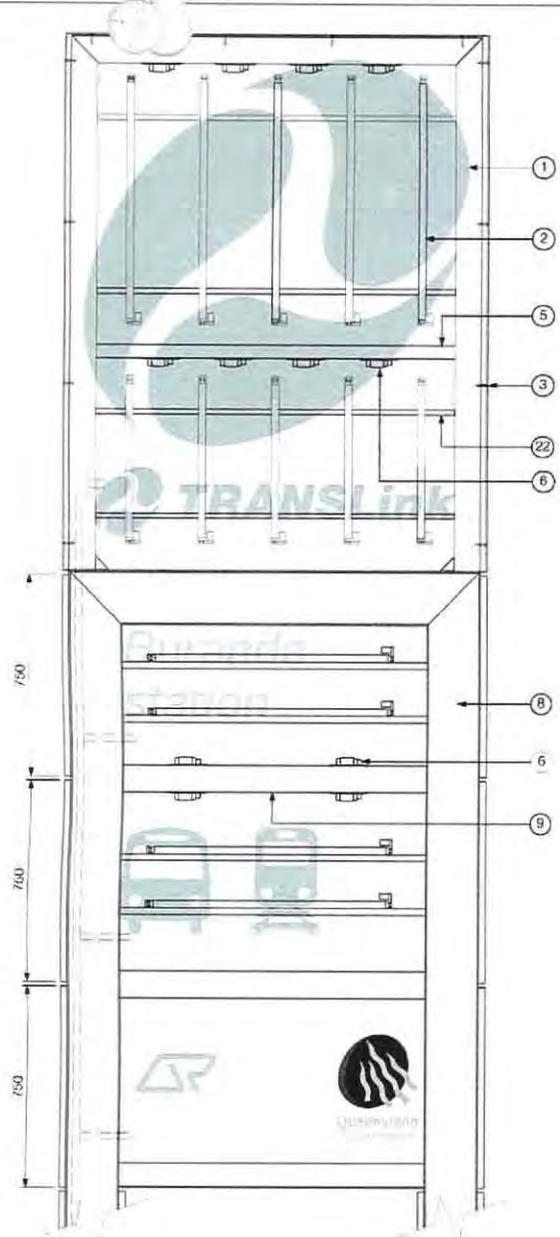
ORIGINE, ISSUED BY

TRANSLINK BUSWAY  
STATION ARCHITECT

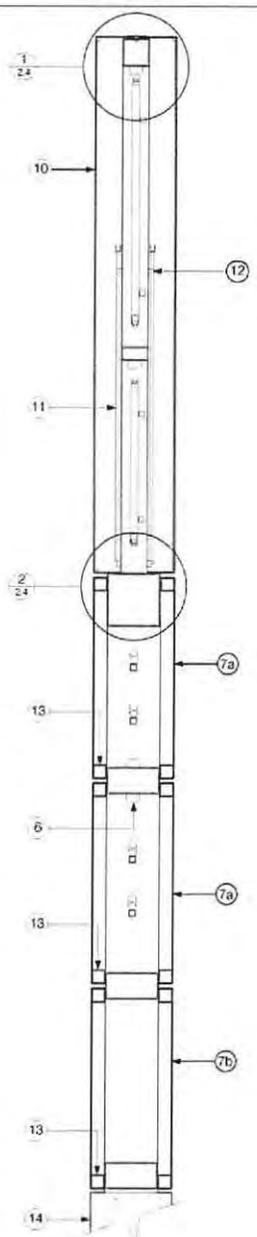
DATE: . . . 2007

PI-2  
STANDARD PYLON  
IDENTIFICATION SIGN

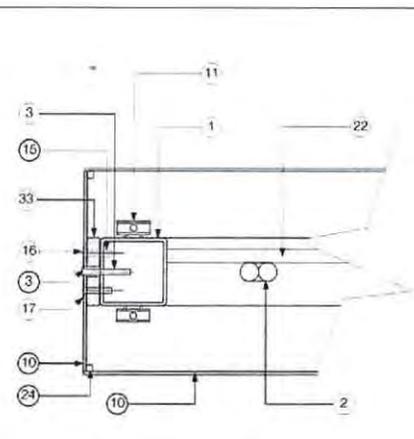
SCALE		AS NOTED	
CONTRACT NO.		DT DWD NO.	
DRAWING NO.		REVISION	
REV 1	02 05 07	PI-2.2	
ISSUE	DATE	DETAILS	REVISED
STATUS		JOB NO.	
UNLESS OTHERWISE		DIMENSIONS SHALL BE IN MILLIMETRES	



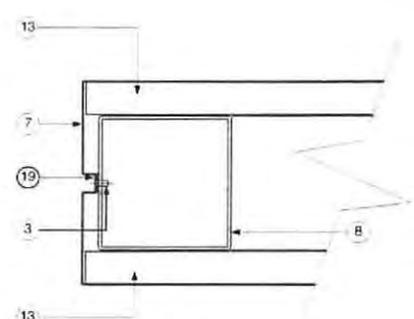
Section E-E  
Scale 1:20



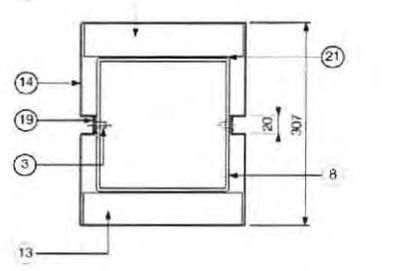
Section D-D  
Scale 1:20



Section A-A  
NTS



Section B-B  
NTS



Section C-C  
NTS

Otherwise noted all dimensions in millimetres. Use figured dimensions in preference to scaling. Contractor to confirm all dimensions and details on site prior to manufacture.

Attention  
Due to this reproduction process the colours in this image are not exact representations of the final product.

- Construction Details**
1. 100 x 100 x 5mm SHS galvanised steel frame.
  2. 6500K daylight fluoros mounted to bracing with Terry clips.
  3. M8 x 316 Stainless steel socket head countersunk screws.
  4. 25 x 25 x 1.6mm SHS galvanised steel bracing.
  5. 100 x 50 x 5mm RHS galvanised steel bracing.
  6. Ballasts mounted to frame.
  - 7a. Illuminated faces  
2mm aluminium fabricated sign panel with intracut letters. 2mm opal acrylic letters finishing flush with panel and 3mm clear acrylic backing.
  - 7b. Non illuminated face  
2mm aluminium fabricated sign panel with front applied vinyl graphics.
  8. 200 x 200 x 5mm SHS galvanised steel frame.
  9. 200 x 100 x 5mm RHS galvanised steel bracing.
  10. 4.5mm fabricated clear polycarbonate sign panel.
  11. Galvanised steel maintenance support stay for fabricated polycarbonate sign panel.
  12. Maintenance support stay clip.
  13. 50 x 50 x 1.6mm SHS aluminium welded to 2mm aluminium sign panel.
  14. 2mm aluminium cladding.
  15. M4 stainless steel socket head countersunk screws.
  16. 2mm aluminium cover plate covering polycarbonate sign panel.
  17. Nooprene adhered to aluminium cover plate.
  18. 2mm aluminium plate fixing aluminium sign panel.
  19. 2mm aluminium plate fixing aluminium cladding.
  20. 50 x 50 x 1.6mm SHS aluminium welded to aluminium cladding.

Also refer  
Performance Specification - Attachment Drawing

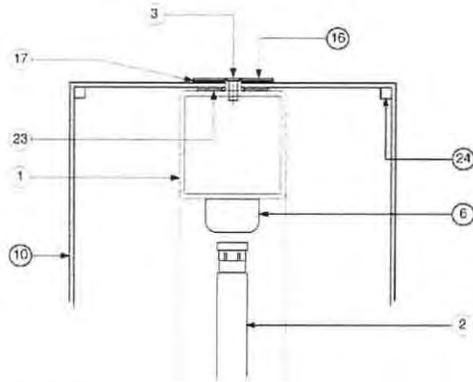
GENERIC STANDARDS FOR TRANSLINK BUSWAY STATIONS 2007 – SIGNAGE AND GRAPHIC DESIGN



TRANSLINK BUSWAY STATION ARCHITECT	GT ARCHITECTURE	DRAWN	CHECKED	ORIGINAL DIGNED BY
				TRANSLINK BUSWAY STATION ARCHITECT
				DATE: 1/1/2007

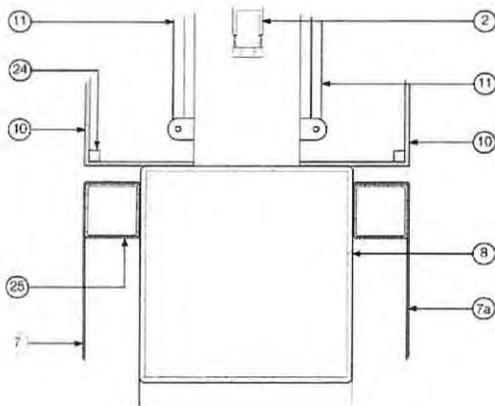
PROJECT TITLE	PI-2 STANDARD PYLON IDENTIFICATION SIGN
TITLE	

SCALE	AS NOTED
CONTRACT NO.	07 DMO No.
DRAWING NO.	PI-2.3
REVISION	
REV 1	02.05.07
FILE	DATE
STATUS	DETAILS
	CHECKED
	APPROVED
JOB NO.	
ISSUE	REV 1



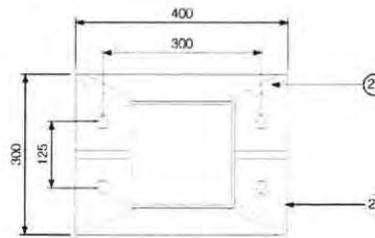
Detail 1

Scale 1:5



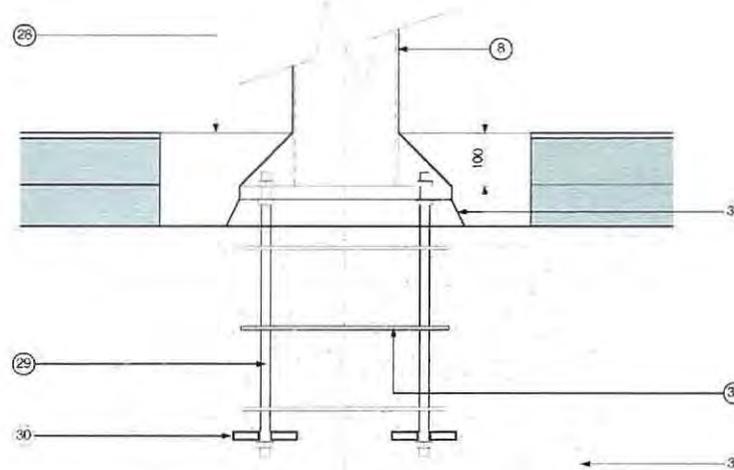
Detail 2

Scale 1:5



Base Plate - Top Elevation

Scale 1:10



Base Plate - Front Elevation

Scale 1:10

Unless otherwise noted all dimensions in millimetres. Use figured dimensions in preference to scaling. Contractor to confirm all dimensions and details on site prior to manufacture.

Attention  
Due to this reproduction process the colours in this image are not exact representations of the final product.

Refer to PI-2.3 for items 1-20

**Construction Details**

- 21. Neoprene adhered to 50 x 50 x 1.6mm SHS aluminium.
- 22. 20 x 20 x 1.6mm SHS galvanised steel fluorescent supports.
- 23. Stainless steel piano hinge
- 24. Clear polycarbonate gusset.
- 25. 50 x 50 x 1.6mm SHS aluminium welded to 2mm aluminium sign panel.
- 26. 400 x 300 x 25mm gr 250 base plate.
- 27. 16mm thick gr 250 stiffener plate.
- 28. 600sq. mass concrete around base plate (typ.) to be coordinated with paving.
- 29. 4 off M24 gr 4.5/S bolts with leveling nut 350mm embedment.
- 30. 100x16mm thick plate with 6mm CFW to bolt all around.
- 31. 50mm thick 32Mpa non shrink grout pad.
- 32. RB ties - 150 welded to bolts.
- 33. 20mm acrylic packer to strengthen fabricated corners. Fix through to frame.
- 34. Sign makers engineer to specify footing details.

Also refer  
Performance Specification - Attachment Drawing

**GENERIC STANDARDS FOR TRANSLINK BUSWAY STATIONS 2007 – SIGNAGE AND GRAPHIC DESIGN**



TRANSLINK BUSWAY  
STATION ARCHITECT

dt ARCHITECTURE

DRAWN

CHECKED

PROJECT NO. BY

TRANSLINK BUSWAY  
STATION ARCHITECT

DATE: / / 2007

PI-2  
STANDARD PYLON  
IDENTIFICATION SIGN

REV	NO	DATE	DETAILS	CHANGED	BY	DATE
REV 1	02	05/07				
ISSUE	DATE	DETAILS	CHANGED	BY	DATE	

SCALE	AS NOTED
CONTRACT NO	DT DWG No
DRAWING NO	PI-2.4
REVISION	
JOB NO	ISSUE REV 1

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CONSULTANT PROJECT TEAM

APPROVED

TITLE

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USE FIGURED DIMENSIONS IN PREFERENCE TO SCALING  
CONTRACTOR SHALL CONFIRM ALL DIMENSIONS AND DETAILS PRIOR TO CONSTRUCTION

Otherwise noted all dimensions in millimetres. Use figured dimensions in preference to scaling. Contractor to confirm all dimensions and details on site prior to manufacture.

Attention  
Due to this reproduction process the colours in this image are not exact representations of the final product.

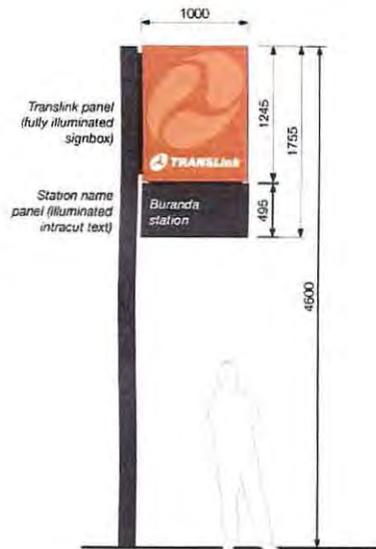
**Graphics Detail**  
FONT  
Station name = Helvetica Neue 66 Medium Italic

SIZE  
Translink graphic = 900mm high (proportional width)  
Translink logo = 160mm high (proportional width)  
Short station name = 85mm cap X height  
Long station name = 75mm cap X height

COLOUR  
*Panel Backgrounds*  
Translink = Resene 'Ecstasy' O61-139-053  
Translink logo tint = 70% Resene 'Ecstasy' O61-139-053 **(to be confirmed)**  
All other backgrounds = Resene 'Jon' N38-007-359 or approved colour  
Sign structure shadowlines = Resene 'Jon' N38-007-359 or approved colour

Translink logo = white  
Station name = white

**NOTE: Prototype of Translink panel to be produced before final graphics approval.**



**Typical Location**  
Scale 1:50



**Graphic Layout**  
Scale 1:20

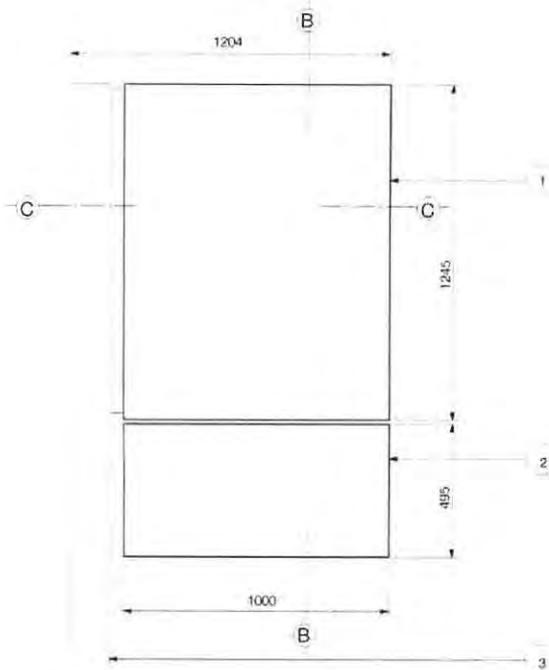
Also refer  
Performance Specification - Attachment Drawing

GENERIC STANDARDS FOR TRANSLINK BUSWAY STATIONS 2007 – SIGNAGE AND GRAPHIC DESIGN

		TRANSLINK BUSWAY STATION ARCHITECT	dT ARCHITECTURE	DRAWN	CHECKED	ORIGINAL SIGNED BY	TRANSLINK BUSWAY STATION ARCHITECT DATE: 11/11/2007	PI-3a FLAGPOLE IDENTIFICATION SIGN	SCALE AS NOTED CONTRACT NO. 01 DWG No. DRAWING NO. PI-3a.1 REVISION			
		CONSULTANT PROJECT TEAM	APPROVED	TITLE STATUS					REV 1 ISSUE DATE 02/05/07 DETAILS CHECKED APPROVED JOB NO. ISSUE REV 1			



TOP VIEW



FRONT VIEW



SIDE VIEW

**Construction Details**  
Scale 1:20

Unless otherwise noted all dimensions in millimetres. Use figured dimensions in preference to scaling. Contractor to confirm all dimensions and details on site prior to manufacture.

**Attention**  
Due to this reproduction process the colours in this image are not exact representations of the final product.

**GENERAL CONSTRUCTION NOTES**

1. Drawings show design intent. Any changes to specification which affects design intent must be approved by TransLink.
2. All structural members, fixings and/or footings to be confirmed by sign maker's engineer.

**Construction Details**

1. Internally illuminated sign panel fabricated from 4.5mm clear polycarbonate sheet.
2. 2mm aluminium sign panel with intracut letters. 2mm opal acrylic letters finishing flush with panel and 3mm clear acrylic backing.
3. 150x100x6mm galvanised steel pole with 2mm aluminium cladding.

Also refer  
Performance Specification - Attachment Drawing

**GENERIC STANDARDS FOR TRANS LINK BUSWAY STATIONS 2007 – SIGNAGE AND GRAPHIC DESIGN**



TRANS LINK BUSWAY STATION ARCHITECT

dt ARCHITECTURE

DRAWN

DESIGNED

ORIGINAL ISSUED BY

TRANS LINK BUSWAY STATION ARCHITECT

DATE 1 / 2007

PI-3a  
FLAGPOLE IDENTIFICATION  
SIGN

REV	NO	DATE	DETAILS	CHANGED	POWER	STATUS	JOB NO	SCALE	REV
REV 1	02	05 07							
							PI-3a.2		
							JOB NO		
							SCALE	REV 1	

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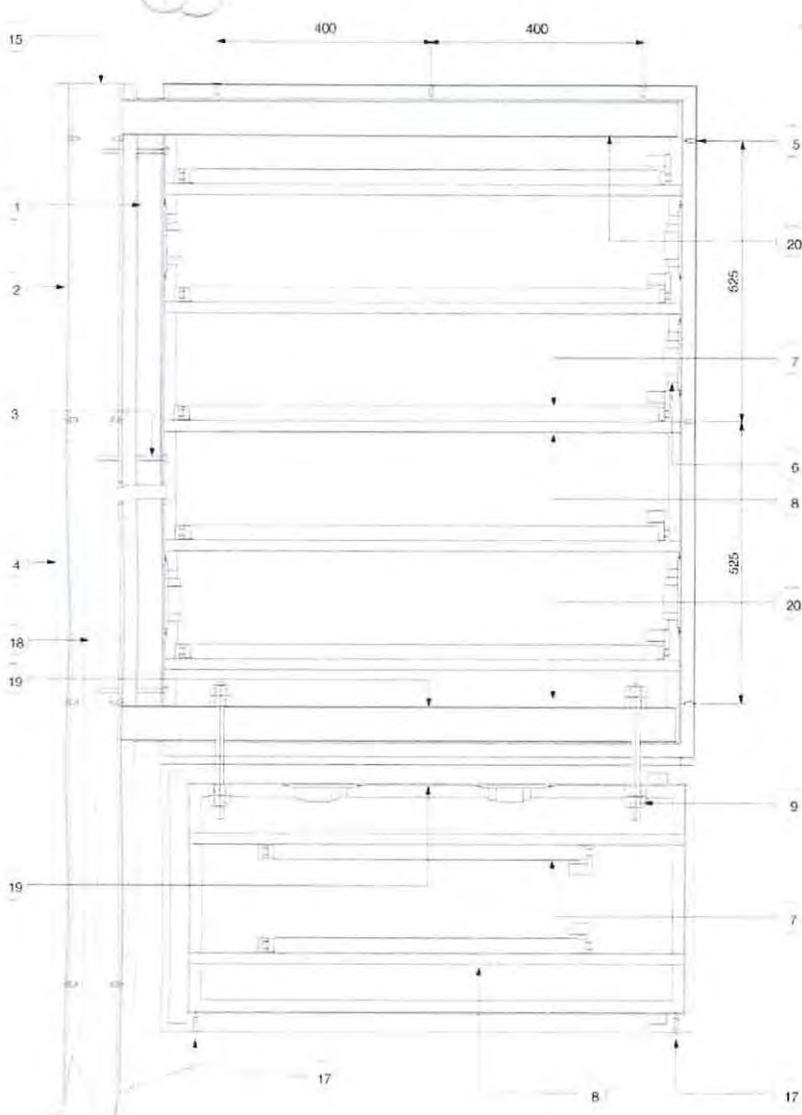
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IF ANY RETRIEVAL SYSTEM OR TRANSMISSION IN ANY FORM OR BY ANY MEANS, WITHOUT PRIOR WRITTEN PERMISSION OF QUEENSLAND TRANSPORT

CONSULTANT PROJECT TEAM

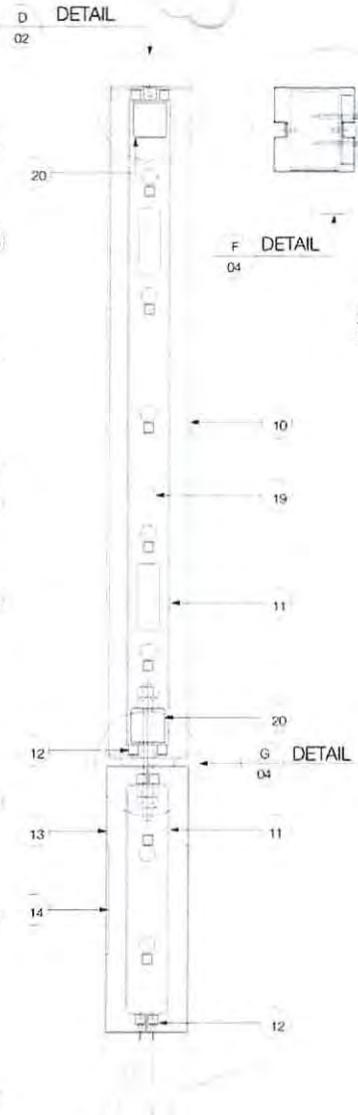
APPROVED

TITLE

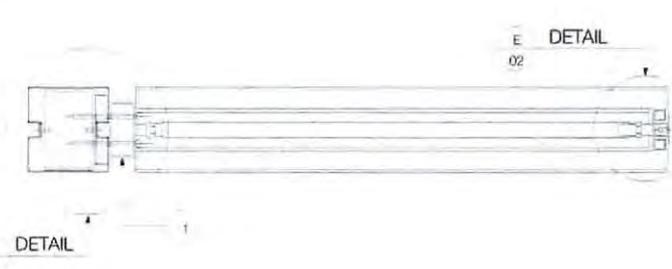
UNLESS OTHERWISE NOTED ALL DIMENSIONS SHALL BE IN MILLIMETRES  
USE FIGURED DIMENSIONS IN PREFERENCE TO SCALING  
CONTRACTOR SHALL CONFIRM ALL DIMENSIONS AND DETAILS PRIOR TO CONSTRUCTION



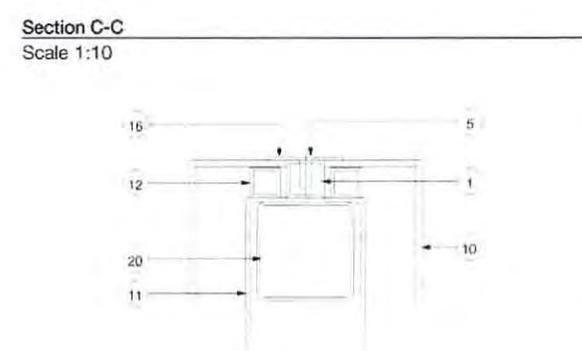
Section A-A  
Scale 1:10



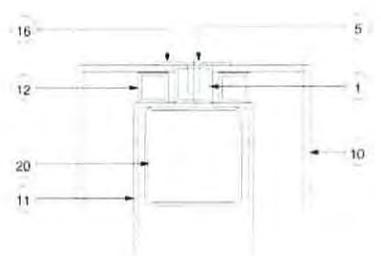
Section B-B  
Scale 1:10



Detail D-02  
NTS



Section C-C  
Scale 1:10



Detail E-02  
NTS

Otherwise noted all dimensions in this drawing are to scaling. Contractor to confirm all dimensions and details on site prior to manufacture.

Attention  
Due to this reproduction process the colours in this image are not exact representations of the final product.

**Construction Details**

1. 100 x 50 x 3mm RHS aluminium spacer with 2mm aluminium capping welded & dressed top & bottom.
2. 150 x 100 x 6mm RHS galvanised steel pole.
3. M10 SS bolts fixing frame to pole.
4. 2mm folded aluminium cladding to pole.
5. M8 SS 316 socket head c/sunk screws fixing panel to frame.
6. Ballasts mounted to frame.
7. 6500K daylight fluoro mounted to bracing with tery clips.
8. 20 x 20 x 3mm SHS aluminium bracing welded to frame.
9. M16 threaded rod and lock nut.
10. 4.5mm fabricated clear polycarbonate sign panel.
11. Welded frame from 80 x 25 x 3mm aluminium channel.
12. 20 x 20 x 3mm SHS aluminium welded to frame.
13. 2mm aluminium sign panel welded from one sheet. Welds on corner edges only.
14. 2mm intracut opal acrylic letters finishing flush with panel surface and 3mm clear acrylic backing.
15. 2mm aluminium cap mitre cut & welded to aluminium cladding. Welds to be dressed.
16. 2mm thick aluminium plate.
17. M8 SS 316 security socket head c/sunk screws fixing aluminium sign panel to frame.
18. Power conduit.
19. Power cable access hole.
20. 65 x 65 x 2mm SHS galvanised steel tube welded to 150 x 150 x 6mm RHS galvanised steel pole.

Also refer  
Performance Specification - Attachment Drawing

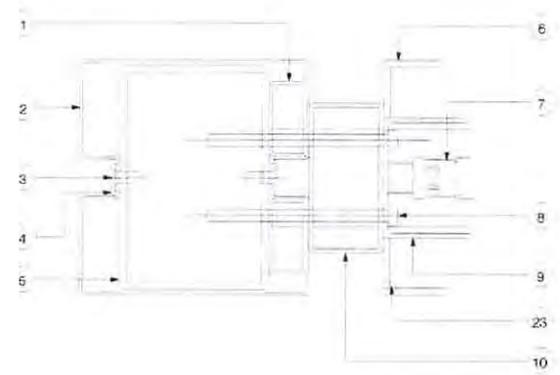


TRANSLink	Queensland Government Connected Transport	TRANSLink BUSWAY STATION ARCHITECT	GT ARCHITECTURE	DRAWN	CHECKED	ORIGINAL SIGNED BY TRANSLINK BUSWAY STATION ARCHITECT	DATE
CONSULTANT PROJECT TEAM			APPROVED				

PROJECT TITLE		SCALE	AS NOTED
PI-3a FLAGPOLE IDENTIFICATION SIGN		CONTRACT NO.	GT DWG NO.
REV 1	02.05.07	DRAWING NO.	PI-3a.3
DATE		REVISION	
STATUS		DRAWN BY	
		CHECKED	
		APPROVED	
		DATE	
		JOB NO.	
		ISSUE	REV 1

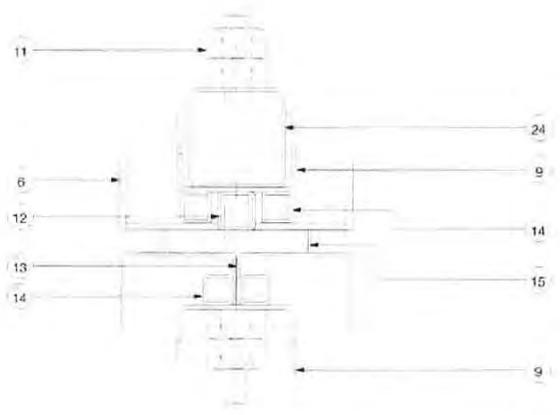
Unless otherwise noted all dimensions in millimetres. Use figured dimensions in preference to scaling. Contractor to confirm all dimensions and details on site prior to manufacture.

**Attention**  
Due to this reproduction process the colours in this image are not exact representations of the final product.

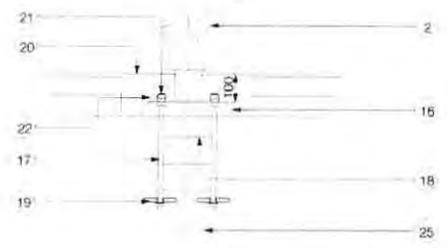


- Construction Details**
1. 50 x 25 x 2.5mm RHS galvanised steel welded to pole.
  2. 2mm folded aluminium cladding.
  3. M8 SS 316 socket head c/sunk screws.
  4. 2mm aluminium cover plate.
  5. 150 x 100 x 6mm RHS galvanised steel pole.
  6. 4.5mm fabricated clear polycarbonate sign panel.
  7. 6500K daylight fluoros mounted to bracing with larry clips.
  8. M10 SS 316 bolts.
  9. Welded frame from 80 x 25 x 3mm aluminium channel.
  10. 100 x 50 x 3mm RHS aluminium spacer welded to frame.
  11. M16 SS threaded rod and lock nut.
  12. 25 x 25 x 2mm SHS aluminium welded to frame.
  13. 1.5mm neoprene adhered to aluminium sign panel.
  14. 20 x 20 x 3mm SHS aluminium welded to frame.
  15. 2mm aluminium welded to aluminium sign panel.
  16. 50mm thick 32MPa non grout pad.
  17. M24 gr4.6/s bolt with leveling nut 350mm embedment.
  18. RB tiles - 150 welded to bolts.
  19. 100 x 16mm thick plate 6 CFW to bolt all around.
  20. 600sq. mass concrete around base plate to be coordinated with paving.
  21. Plastic bolt cap.
  22. 12mm thick 250 stiffener plates.
  23. Clear polycarbonate gusset.
  24. 65 x 675 x 2mm SHS steel tube welded to 150 x 100 x 6mm RHS galvanised steel pole.
  25. Refer to Structure Documentation for footing details.

**Detail F-03**  
NTS



**Detail G-03**  
NTS



**Base Plate Front Elevation**  
NTS

Also refer  
Performance Specification - Attachment Drawing



TRANSLink ELEVATION  
STATION ARCHITECT

dt ARCHITECTURE  
DESIGN  
CHECKED

APPROVED

ORIGINAL SIGNED BY  
TRANSLINK RAILWAY  
STATION ARCHITECT  
DATE: / / 2007

PROJECT TITLE

PI-3a  
FLAGPOLE IDENTIFICATION  
SIGN

SCALE	AS NOTED
CONTRACT NO.	DT CWS No.
DRAWING NO.	REVISION
PI-3a.4	
REV 1	02-05-07
ISSUE	DATE
STATUS	DATE
ISSUE	REV 1

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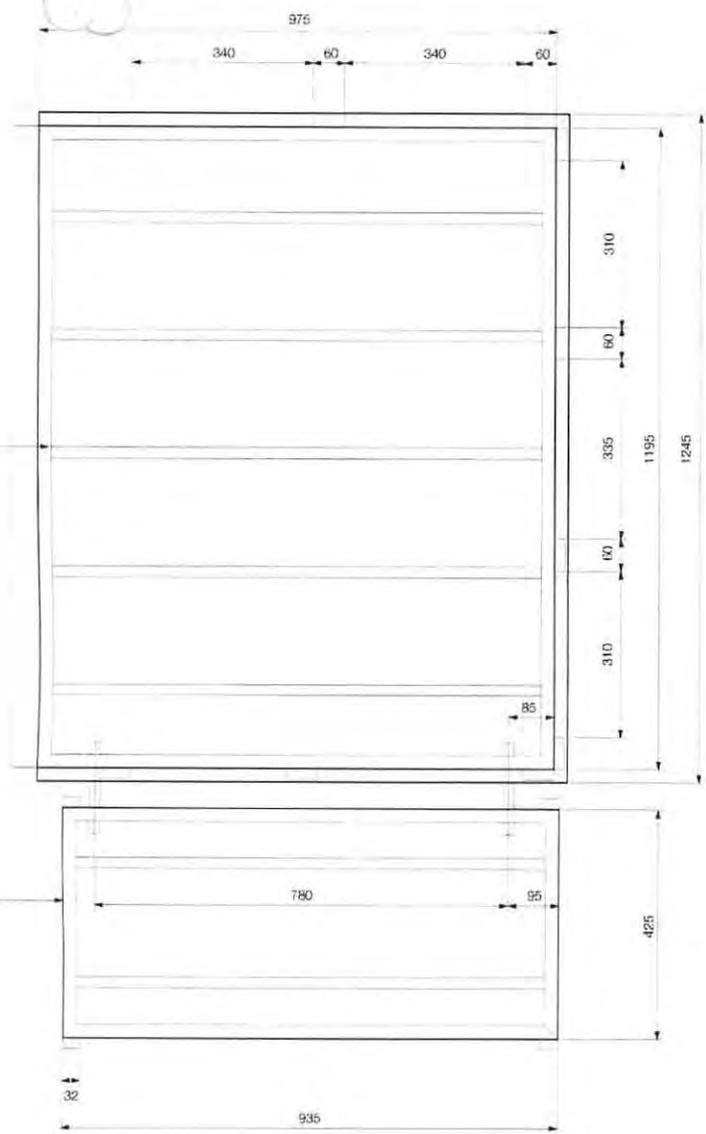
IT - QUEENSLAND TRANSPORT 2007

USE SHALL BE IN MILLIMETRES  
USE FIGURED DIMENSIONS IN PREFERENCE TO SCALING  
CONTRACTOR SHALL CONFIRM ALL DIMENSIONS AND DETAILS PRIOR TO CONSTRUCTION

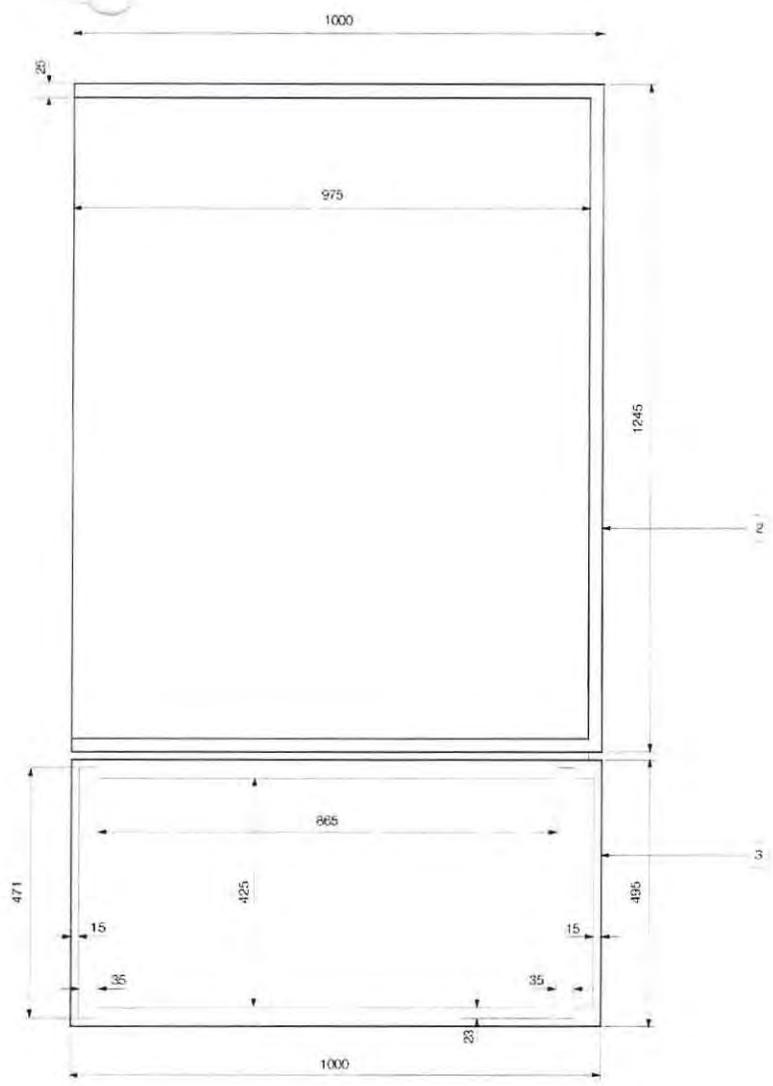
Otherwise noted all dimensions in millimetres. Use figured dimensions in preference to scaling. Contractor to confirm all dimensions and details on site prior to manufacture.

**Attention**  
Due to this reproduction process the colours in this image are not exact representations of the final product.

- Construction Details**
1. Welded frame from 80 x 25 x 3mm aluminium channel.
  2. Internally illuminated sign fabricated from 4.5mm clear polycarbonate sheet.
  3. 2mm aluminium sign panel with intricat letters, 2mm opal acrylic letters finishing flush with panel surface and 3mm clear acrylic backing.



Flagpole Frame Front Elevation  
Scale 1:10



Flagpole Sign Panel Front Elevation  
Scale 1:10

Also refer  
Performance Specification - Attachment Drawing

				TRANSLink BUSWAY STATION ARCHITECT		DT ARCHITECTURE		DRAWN: [ ] CHECKED: [ ]		ORIGINAL SIGNED BY: [ ] TRANSLink BUSWAY STATION ARCHITECT DATE: 11/01/2007		PROJECT TITLE:		SCALE: AS NOTED	
				CONSULTANT PROJECT TEAM		APPROVED: [ ]		TITLE:		P1-3a FLAGPOLE IDENTIFICATION SIGN		CONTRACT NO: [ ] OF DWG NO: [ ]		DRAWING NO: P1-3a.5 REVISION: [ ]	
LOGOS		CONSULTANT PROJECT TEAM		APPROVED		TITLE		STATUS		REV 1 DESIGNED BY: [ ] DATE: 02/05/07 CHECKED BY: [ ] DATE: [ ] DRAWN BY: [ ] DATE: [ ]		JOB NO: [ ]		ISSUE: [ ] REV 1	

Unless otherwise noted all dimensions in millimetres. Use figured dimensions in preference to scaling. Contractor to confirm all dimensions and details on site prior to manufacture.

Attention  
Due to this reproduction process the colours in this image are not exact representations of the final product.

**Graphics Detail**  
FONT  
All text = Helvetica Neue 66 Medium Italic

SIZE  
Translink graphic = 1080mm high (proportional width)  
Translink logo = 195mm high (proportional width)  
Station name = 110mm cap X height  
Transport pictogram = 160mm x 160mm  
'Park n' ride' = 85mm cap X height  
Old Govt logo = 140mm high (proportional width)  
Partner logo = 140mm high (proportional width)

COLOUR  
*Panel Backgrounds*  
Translink = Resene 'Ecstasy' 061-139-053  
Translink logo tint = 70% Resene 'Ecstasy' 061-139-053 **(to be confirmed)**  
All other backgrounds = Resene 'Jon' N38-007-359 or approved colour  
Sign structure shadowlines = Resene 'Jon' N38-007-359 or approved colour

Translink logo = white  
Station name = white  
Transport pictogram = white  
Old Govt logo = to corporate standard  
Partner logo = reversed white to corporate standard

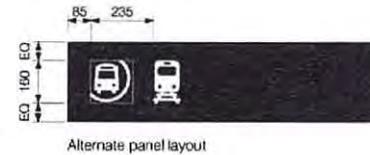
**NOTE: Prototype of Translink panel to be produced before final graphics approval.**



Typical Location  
Scale 1:50



Graphic Layout  
Scale 1:20



Also refer  
Performance Specification - Attachment Drawing

GENERIC STANDARDS FOR TRANSLINK BUSWAY STATIONS 2007 – SIGNAGE AND GRAPHIC DESIGN



TRANSLINK BUSWAY STATION ARCHITECT

GT ARCHITECTURE

DRAWN

CHECKED

ORIGINAL DESIGNED BY

TRANSLINK BUSWAY STATION ARCHITECT

DATE: ... / ... / 2007

PROJECT TITLE

PI-3b  
FLAGPOLE IDENTIFICATION  
SIGN

SCALE					AS NOTED	
CONTRACT NO					GT DMD No	
DRAWING NO					REVISION	
REV 1	02 05 07				PI-3b.1	
DATE	DETAILS	CHECKED	APPROVED	ISSUE NO	ISSUE	REV 1

LOGOS  
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IT - QUEENSLAND TRANSPORT 2007

CONSULTANT PROJECT TEAM

APPROVED

TITLE

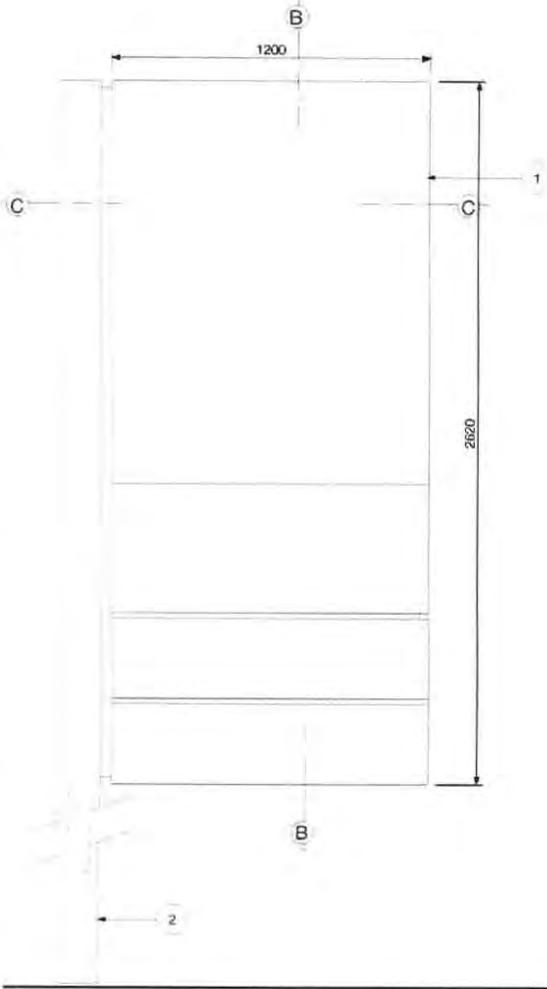
UNLESS OTHERWISE NOTED

ALL DIMENSIONS SHALL BE IN MILLIMETRES

USE FIGURED DIMENSIONS IN PREFERENCE TO SCALING. CONTRACTOR SHALL CONFIRM ALL DIMENSIONS AND DETAILS PRIOR TO CONSTRUCTION.



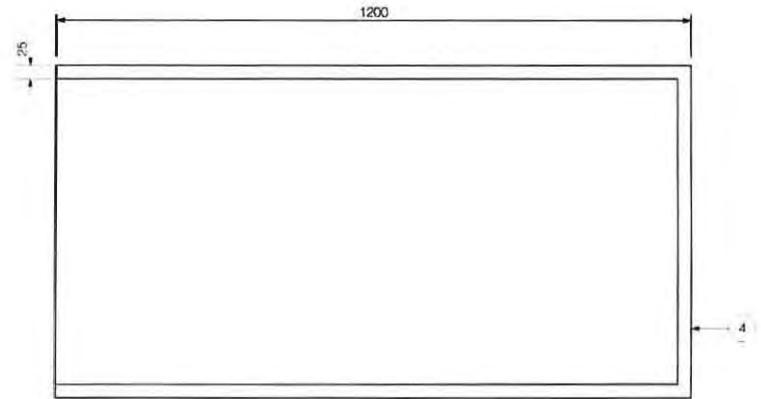
TOP VIEW



FRONT VIEW

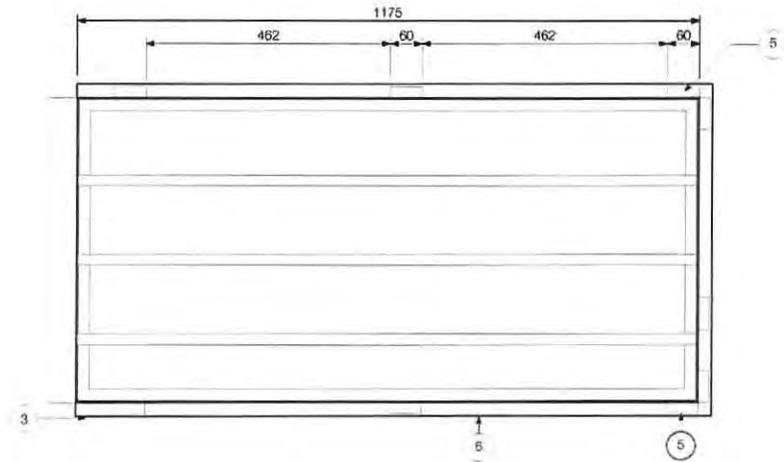


LEFT SIDE VIEW



Flagpole Sign Panel Front Elevation - Secondary sign face

Scale 1:10



Flagpole Frame Front Elevation - Secondary sign face

Scale 1:10

Otherwise noted all dimensions in millimetres. Use figured dimensions in preference to scaling. Contractor to confirm all dimensions and details on site prior to manufacture.

Attention  
Due to this reproduction process the colours in this image are not exact representations of the final product.

**GENERAL CONSTRUCTION NOTES**

1. Drawings show design intent. Any changes to specification which affects design intent must be approved by TransLink.

2. All structural members, fixings and/or footings to be confirmed by sign maker's engineer.

**Construction Details**

1. Internally illuminated sign panel fabricated from 4.5mm clear polycarbonate sheet.

2. 150x100x6mm galvanised steel pole with 2mm aluminium cladding. Cladding with 5mm minimum radius corners.

3. Welded frame from 80 x 25 x 3mm aluminium channel.

4. Internally illuminated sign fabricated from 4.5mm clear polycarbonate sheet.

5. 20 x 20 x 3 aluminium SHS welded to channel.

6. 25 x 25 x 3 aluminium SHS welded to channel.

NOTE. Allow to connect to existing electrical supply including all electrical conduits.

Also refer  
Performance Specification - Attachment Drawing

**Elevations**

Scale 1:20

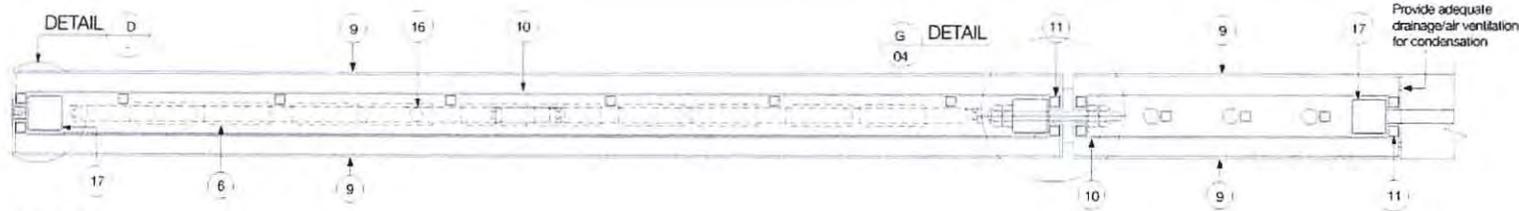
**GENERIC STANDARDS FOR TRANS LINK BUSWAY STATIONS 2007 - SIGNAGE AND GRAPHIC DESIGN**



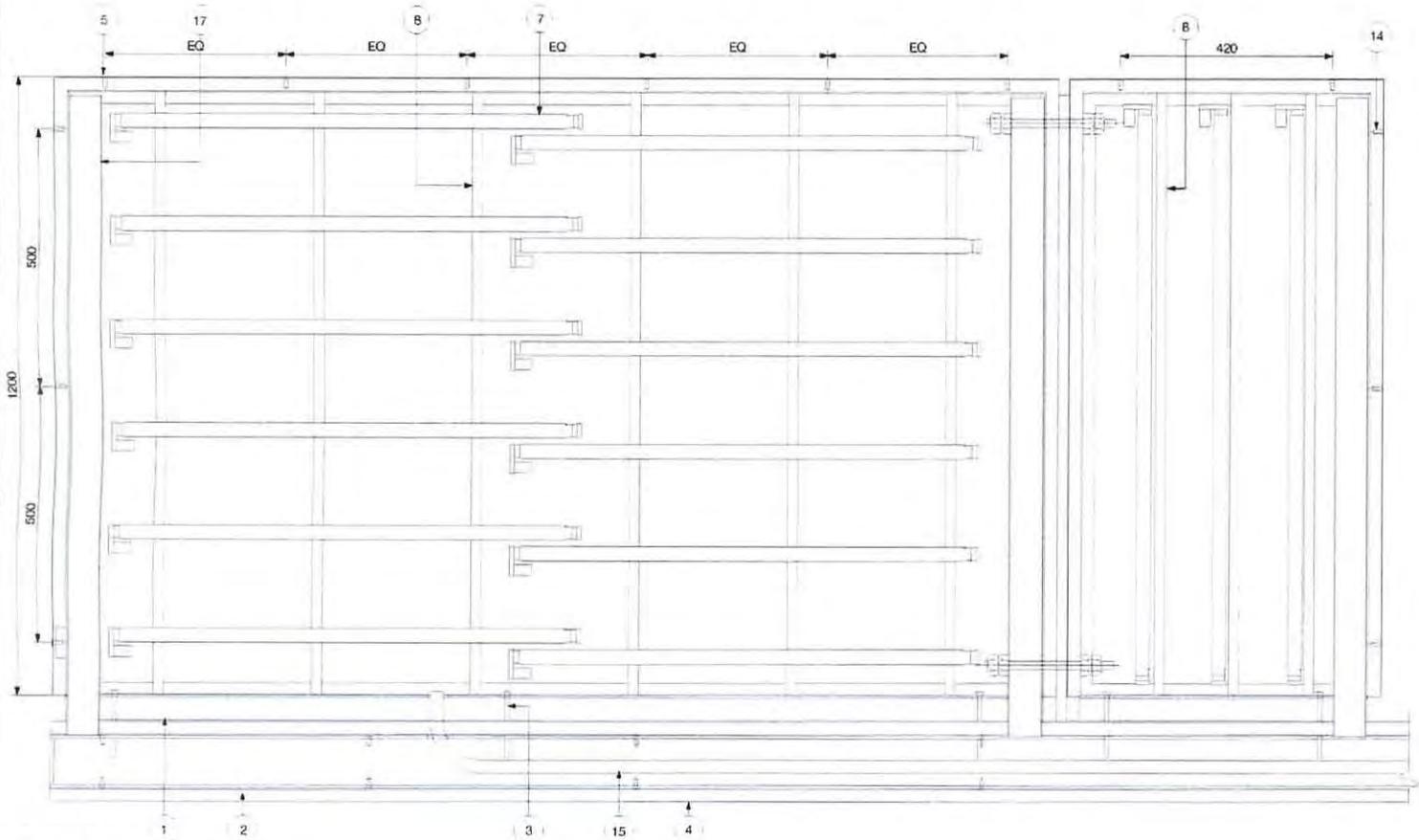
TRANS LINK BUSWAY STATION ARCHITECT	GT ARCHITECTURE	DRAWN	CHECKED	DESIGN / CHECKED BY	TRANS LINK BUSWAY STATION ARCHITECT
CONSULTANT PROJECT TEAM	APPROVED	DATE	DATE		

PROJECT TITLE	PI-3b FLAGPOLE IDENTIFICATION SIGN
TITLE	

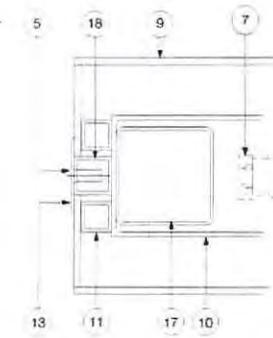
SCALE	AS NOTED
CONTRACT NO	GT DMS No
DRAWING NO	PI-3b.2
REVISION	
REV 1	02.05.07
DATE	DETAILS
STATUS	CHECKED
APPROVED	
JOB NO	
SCALE	REV 1



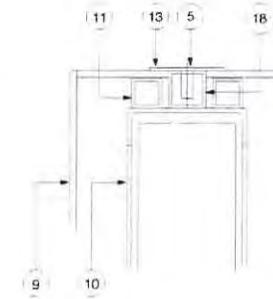
**Section B-B**  
Scale 1:10



**Section A-A**  
Scale 1:10



**Detail D**  
NTS



**Detail E-03**  
NTS

Unless otherwise noted all dimensions in millimetres. Use figured dimensions in preference to scaling. Contractor to confirm all dimensions and details on site prior to manufacture.

Attention  
Due to this reproduction process the colours in this image are not exact representations of the final product.

**Construction Details**

1. 100 x 50 x 3mm RHS aluminium spacer with 2mm aluminium capping welded & dressed top & bottom.
2. 150 x 100 x 6mm RHS galvanised steel pole with welded capping suitable for lifting lugs. 5mm min radius corners.
3. M10 SS bolts fixing frame to pole.
4. 2mm folded aluminium cladding to pole. 5mm minimum radius corners.
5. M8 SS 316 socket head c/sunk screws fixing panel to frame.
6. Ballasts mounted to frame.
7. 6500K daylight fluoros mounted to bracing with terry clips.
8. 20 x 20 x 3mm SHS aluminium bracing welded to frame.
9. 4.5mm fabricated clear polycarbonate sign panel. Provide adequate drainage / ventilation of condensation.
10. Welded frame from 80 x 25 x 3mm aluminium channel.
11. 20 x 20 x 3mm SHS aluminium welded to frame.
12. 2mm aluminium cap mitre cut & welded to aluminium cladding. Welds to be dressed.
13. 2mm thick aluminium plate.
14. M8 SS 316 security socket head c/sunk screws fixing aluminium sign panel to frame.
15. Power conduit.
16. Power cable access hole.
17. 65 x 65 x 2mm SHS galvanised steel tube welded to 150 x 150 x 6mm RHS galvanised steel pole.
18. 25 x 25 x 3 aluminium SHS spacer.

Also refer  
Performance Specification - Attachment Drawing

**GENERIC STANDARDS FOR TRANSLINK BUSWAY STATIONS 2007 – SIGNAGE AND GRAPHIC DESIGN**



TRANSLINK BUSWAY STATION ARCHITECT	dT ARCHITECTURE	DESIGN	CHECKED	ORIGINAL SIGNED BY
				TRANSLINK BUSWAY STATION ARCHITECT
				DATE: / / 2007
CONSULTANT PROJECT TEAM	APPROVED			

PROJECT TITLE	PI-3b FLAGPOLE IDENTIFICATION SIGN
TITLE	

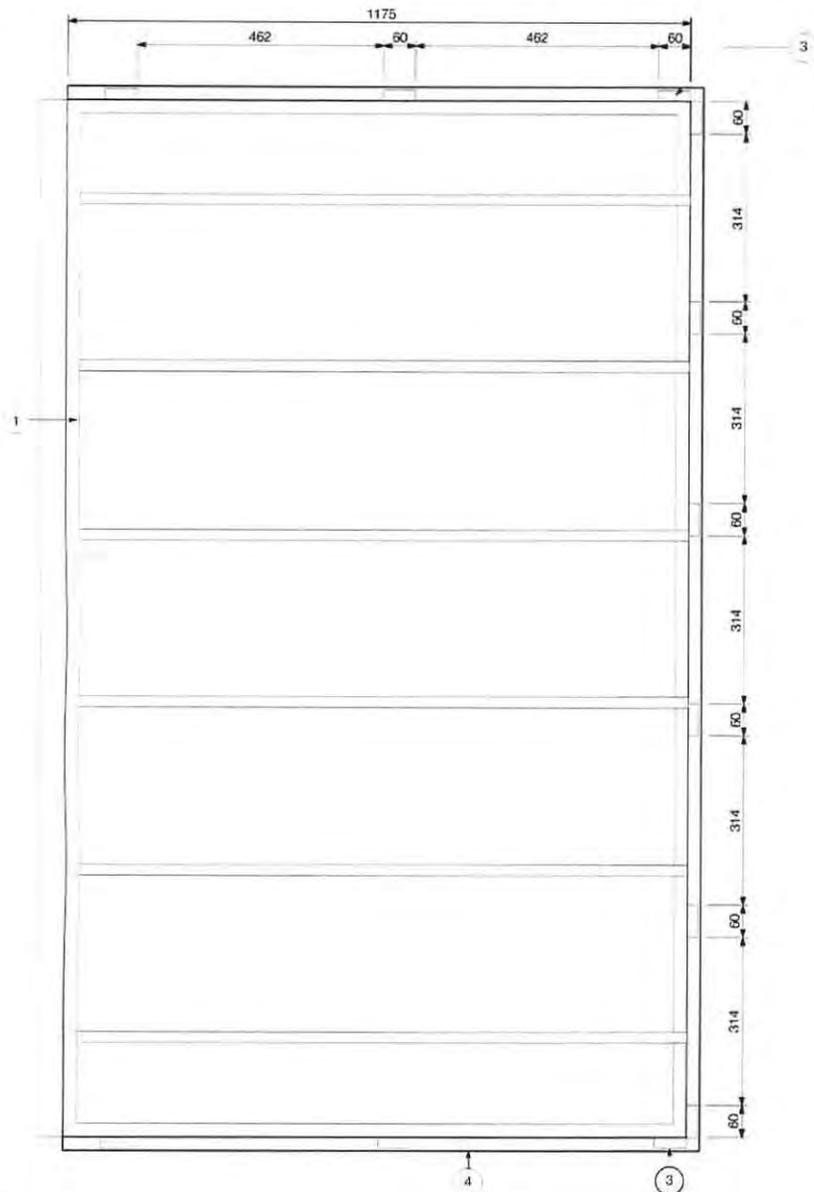
SCALE	AS NOTED
CONTRACT NO	DT 0401/06
DRAWING NO	PI-3b.3
REVISION	
REV 1	02.06.07
DATE	
STATUS	

12608  
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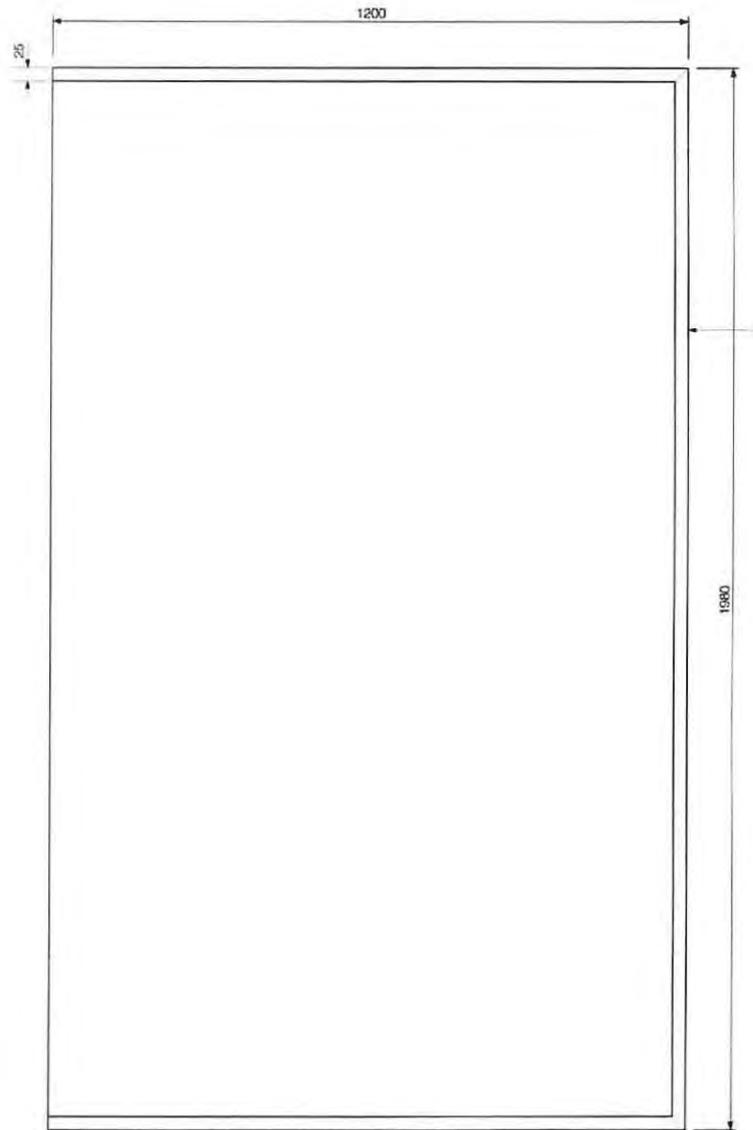
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UNLESS OTHERWISE NOTED ALL DIMENSIONS ARE IN MILLIMETRES  
CONTRACTOR SHALL CONFIRM ALL DIMENSIONS AND DETAILS PRIOR TO CONSTRUCTION





Flagpole Frame Front Elevation - Primary sign face  
Scale 1:10



Flagpole Sign Panel Front Elevation - Primary sign face  
Scale 1:10

Unless otherwise noted all dimensions in millimetres. Use figured dimensions in preference to scaling. Contractor to confirm all dimensions and details on site prior to manufacture.

Attention  
Due to this reproduction process the colours in this image are not exact representations of the final product.

**Construction Details**

1. Welded frame from 80 x 25 x 3mm aluminium channel.
2. Internally illuminated sign fabricated from 4.5mm clear polycarbonate sheet.
3. 20 x 20 x 3 aluminium SHS welded to channel.
4. 25 x 25 x 3 aluminium SHS welded to channel.

Also refer  
Performance Specification - Attachment Drawing

GENERIC STANDARDS FOR TRANSLink BUSWAY STATIONS 2007 – SIGNAGE AND GRAPHIC DESIGN



TRANSLink BUSWAY  
STATION ARCHITECT

dT ARCHITECTURE

DESIGN

CHECKED

ORIGINAL SIGNED BY

TRANSLink BUSWAY  
STATION ARCHITECT

DATE: .../.../2007

PROJECT TITLE

PI-3b  
FLAGPOLE IDENTIFICATION  
SIGN

REV	DATE	DETAILS	CHECKED	APPROVED
REV 1	02.05.07			
STATUS				

SCALE AS NOTED	
CONTRACT NO	QT DWG No
DRAWING NO PI-3b.5	REVISION
JOB NO	SCALE REV 1



Graphic Layouts  
Scale 1:20

Otherwise noted all dimensions in millimetres. Use figured dimensions in preference to scaling. Contractor to confirm all dimensions and details on site prior to manufacture.

Attention  
Due to this reproduction process the colours in this image are not exact representations of the final product.

**Graphics Detail**  
FONT  
Station name = Helvetica Neue 76 Bold Italic

SIZE  
Translink logo = 145mm high (proportional width)  
Station name = 300mm cap X height

COLOUR  
Panel background = Resene 'Ecstasy' O61-139-053  
Bus graphic linework = Top - 75% Resene 'Ecstasy' O61-139-053  
Middle - 60% Resene 'Ecstasy' O61-139-053  
Bottom - 70% Resene 'Ecstasy' O61-139-053

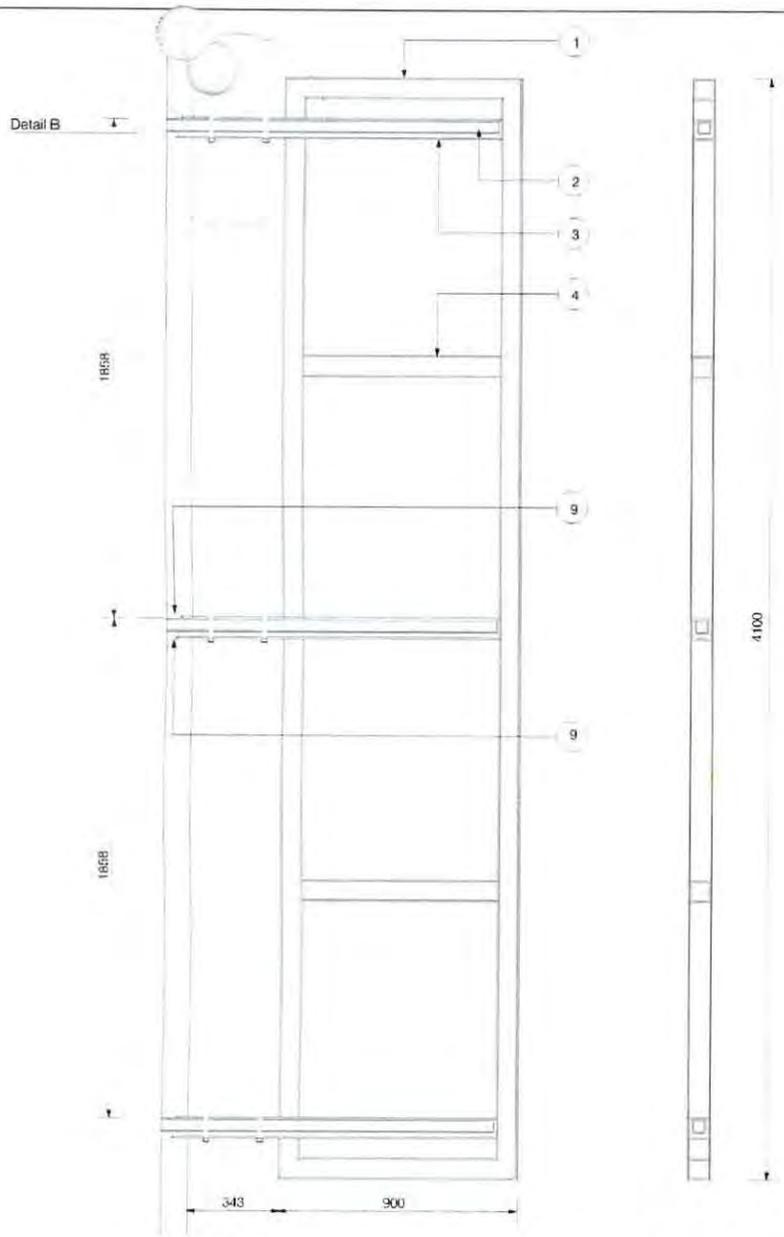
Translink logo = white  
Station name = white

Also refer  
Performance Specification - Attachment Drawing

GENERIC STANDARDS FOR TRANSLINK BUSWAY STATIONS 2007 – SIGNAGE AND GRAPHIC DESIGN

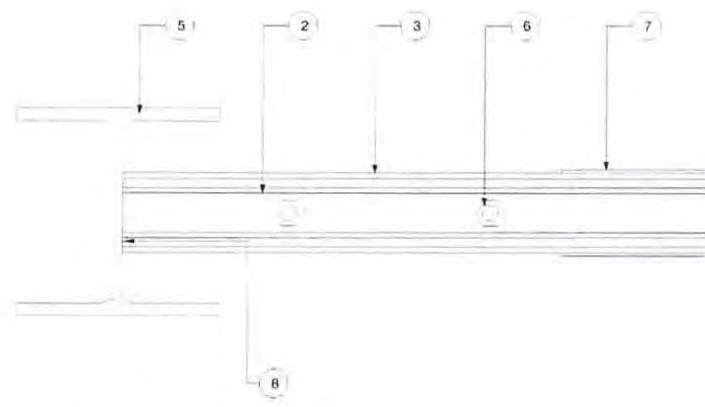
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				UNLESS OTHERWISE NOTED ALL DIMENSIONS SHALL BE IN MILLIMETRES											
CONSULTANT PROJECT TEAM			APPROVED		TITLE		STATUS		REV 1 02.05.07	DATE	DETAILS	CHECKED	APPROVED	DRAWING NO. PI-4.1	REVISION
LOGO'S			APPROVED		TITLE		STATUS		JOB NO.	ISSUE		REV 1		REVISION	



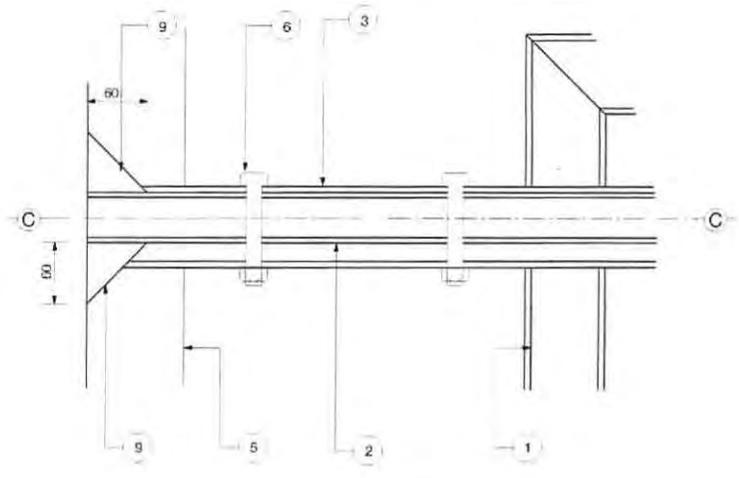


Section A-A  
Scale 1:20

Section B-B  
Scale 1:20



Section C-C  
Scale 1:5



Detail B  
Scale 1:5

Otherwise noted all dimensions in this drawing are in millimetres. Use figured dimensions in preference to scaling. Contractor to confirm all dimensions and details on site prior to manufacture.

**Attention**  
Due to this reproduction process the colours in this image are not exact representations of the final product.

- Construction Details**
1. Frame welded from 80 x 80 x 6mm SHS aluminium.
  2. 65 x 65 x 3mm SHS Durgal support welded to station structure.
  3. 80 x 80 x 6mm SHS aluminium mounting support with pre-drilled holes and cutout slot for gusset. Cutout slot to be clearance fit.
  4. 80 x 80 x 6mm SHS aluminium bracing.
  5. Station structure.
  6. M16 S.S. 316 bolt & lock nut fixing frame to 50 x 50 x 6mm SHS galvanised steel support.
  7. 3mm aluminium panel welded to aluminium frame. All visible welds to be dressed.
  8. CFW (Continuous Fillet Weld).
  9. 8mm gusset welded above and below 65 x 65 x 3mm SHS Durgal support.

Also refer  
Performance Specification - Attachment Drawing

GENERIC STANDARDS FOR TRANS LINK BUSWAY STATIONS 2007 – SIGNAGE AND GRAPHIC DESIGN



TRANS LINK BUSWAY STATION ARCHITECT	GT ARCHITECTURE	DESIGN	CHECKED	DESIGN SUPERVISOR
				TRANS LINK BUSWAY STATION ARCHITECT
				DATE: .../.../2007

PROJECT TITLE	PI-4 BANNER GRAPHIC
TITLE	

SCALE	AS NOTED			
CONTRACT NO	GT DWS 06			
DRAWING NO	PI-4,3			
REVISION				
REV 1	02/05/07			
SCALE	DATE	DETAILS	CHECKED	APPROVED
STATUS				

Unless otherwise noted all dimensions in millimetres. Use figured dimensions in preference to scaling. Contractor to confirm all dimensions and details on site prior to manufacture.

Attention  
Due to this reproduction process the colours in this image are not exact representations of the final product.

**Graphics Detail**  
FONT  
Station name = Helvetica Neue 76 Bold Italic

SIZE  
Station name = 400mm cap X height

COLOUR  
Station name = Resene 'Ecstasy'  
061-139-053

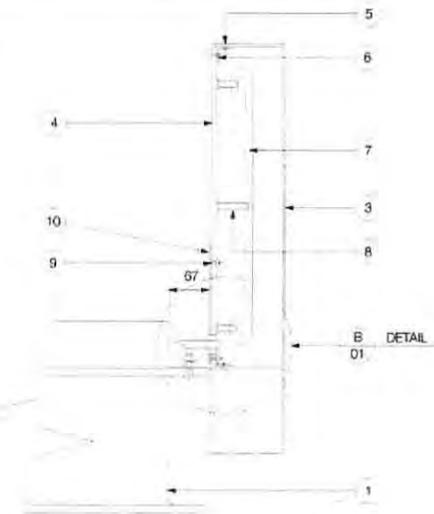


Graphic Layout  
Scale 1:20

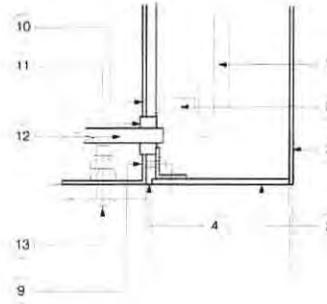
Also refer  
Performance Specification - Attachment Drawing

GENERIC STANDARDS FOR TRANSLINK BUSWAY STATIONS 2007 - SIGNAGE AND GRAPHIC DESIGN

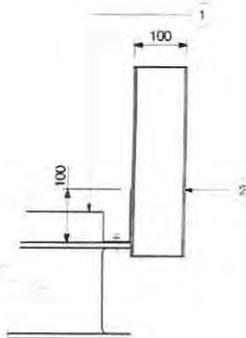
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			TRANSLINK BUSWAY STATION ARCHITECT	TRANSLINK BUSWAY STATION ARCHITECT	DATE / / 2007	CONTRACT NO	DT DWG No				
LOGOS	CONSULTANT PROJECT TEAM	APPROVED	TITLE	REV 1	02.05.07	DETAILS	DEVELOP	ISSUED	DRAWING NO	PI-5.1	REVISION
© COPYRIGHT QUEENSLAND GOVERNMENT - QUEENSLAND TRANSPORT 2007										UNLESS OTHERWISE STATED ALL DIMENSIONS SHALL BE IN MILLIMETRES	UNLESS OTHERWISE STATED ALL DIMENSIONS SHALL BE IN MILLIMETRES



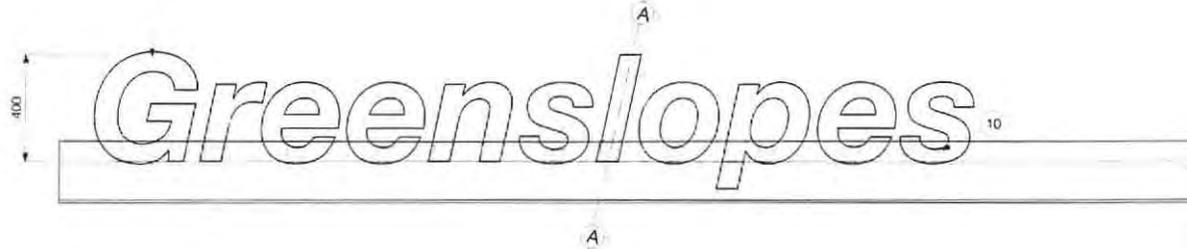
Section A-A  
NTS



Detail B-01  
NTS



Left Side Elevation  
Scale 1:10



Front Elevation  
Scale 1:20

Otherwise noted all dimensions in millimetres. Use figured dimensions in preference to scaling. Contractor to confirm all dimensions and details on site prior to manufacture.

**Attention**  
Due to this reproduction process the colours in this image are not exact representations of the final product.

**GENERAL CONSTRUCTION NOTES**  
1. Drawings show design intent. Any changes to specification which affects design intent must be approved by TransLink.

2. All structural members, fixings and/or fastenings to be confirmed by sign maker's engineer.

**Construction Details**  
1. Station entry roof structure.

2. Fabricated polycarbonate return glued to edge of face. Painted opaque to match SNA aluminium finish.

3. Clear polycarbonate face, applied translucent vinyl.

4. 6mm Unimould PP backing painted to match satin silver. Edges rebated.

5. M4 SS 316 socket head c/sunk screws.

6. Aluminium fixing angle around perimeter of backing.

7. ø12mm Snow white neon. (Neon installation must comply to AS 3832).

8. Plastic neon tube support.

9. M4 SS 316 screw and nut.

10. Fabricated 3mm thick G450 Z350 steel fixing bracket behind each letter. Cut to size to suit profile of each letter.

11. Grommet to suit outdoor application.

12. Power cable connecting neon to transformer. Transformer to be located in existing roof structure (All electrical installation should comply with Australian Standard AS 3832).

13. M10 SS socket head button screw and lock nut fixing sign to existing roof structure.

Also refer  
Performance Specification - Attachment Drawing

GENERIC STANDARDS FOR TRANS LINK BUSWAY STATIONS 2007 - SIGNAGE AND GRAPHIC DESIGN



TRANS LINK BUSWAY  
STATION ARCHITECT

DT ARCHITECTURE

DRAWN

CHECKED

DESIGN DATE: 01/02/07

TRANS LINK BUSWAY  
STATION ARCHITECT

DATE: 1/1/2007

PI-5  
ENTRY IDENTIFICATION SIGN

REV	DATE	DETAILS	CHECKED	APPROVED	STATUS
REV 1	02.05.07				
SCALE					
SCALE AS NOTED					
CONTRACT NO. DT DWG NO.					
DRAWING NO. PI-5.2					
REVISION					
JOB NO.					
ISSUE REV 1					

Unless otherwise noted all dimensions in millimetres. Use figured dimensions in preference to scaling. Contractor to confirm all dimensions and details on site prior to manufacture.

Attention  
Due to this reproduction process the colours in this image are not exact representations of the final product.

**Graphics Detail**

FONT  
Station name = Helvetica Neue 66 Medium Italic

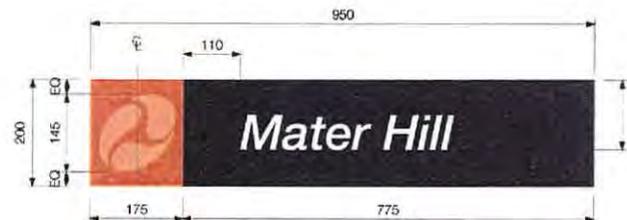
SIZE  
Translink graphic = 145mm high (proportional width)  
Station name = 65mm cap X height

COLOUR  
*Panel Backgrounds*  
Translink = Resene 'Ecstasy' 061-139-053  
Translink logo tint = 70% Resene 'Ecstasy' 061-139-053 **(to be confirmed)**  
All other backgrounds = Resene 'Jon' N38-007-359 or approved colour

Station name = white



Typical Location  
Scale 1:50



Graphic Layouts  
Scale 1:10

Also refer  
Performance Specification - Attachment Drawing

GENERIC STANDARDS FOR TRANSLINK BUSWAY STATIONS 2007 - SIGNAGE AND GRAPHIC DESIGN



TRANSLINK BUSWAY STATION ARCHITECT  
dt ARCHITECTURE  
DRAWN  
CHECKED

ORIGINAL SIGNED BY  
TRANSLINK BUSWAY STATION ARCHITECT  
DATE: / / 2007

PROJECT TITLE  
PI-6a  
PLATFORM IDENTIFICATION  
SIGN

SCALE		AS NOTED	
CONTRACT NO.		DT DWO No.	
DRAWING NO.		PI-6a.1	
REVISION			
REV 1	02 05 07		
ISSUE	DATE	DETAILS	DRAWN
STATUS			JOB NO.
			ISSUE [REV 1]

Otherwise noted all dimensions in millimetres. Use figured dimensions in preference to scaling. Contractor to confirm all dimensions and details on site prior to manufacture.

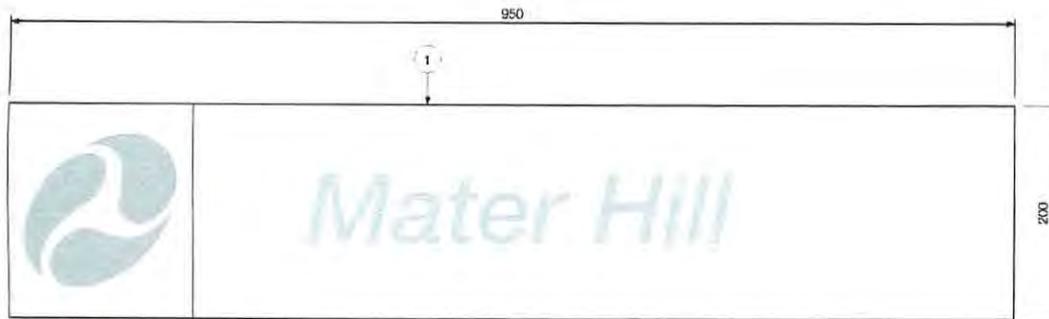
**Attention**  
Due to this reproduction process the colours in this image are not exact representations of the final product.

**GENERAL CONSTRUCTION NOTES**  
1. Drawings show design intent. Any changes to specification which affects design intent must be approved by TransLink.

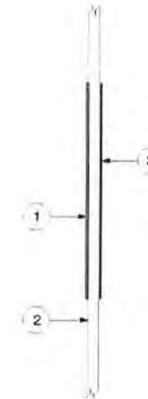
2. All structural members, fixings and/or footings to be confirmed by sign maker's engineer.

**Construction Details**  
1. 950 x 200 x 2mm aluminium sign panel adhered to glass panel with 3M VHB double sided tape.

2. Glass panel  
3. Fix 2mm acrylic panel (painted Resane 'Jon' N38-007-359) to back of glass behind sign panel to conceal fixings. Required only where fixings are visible from behind.



FRONT VIEW



SIDE VIEW

**Elevations**

Scale 1:5

Also refer  
Performance Specification - Attachment Drawing

**GENERIC STANDARDS FOR TRANS LINK BUSWAY STATIONS 2007 – SIGNAGE AND GRAPHIC DESIGN**



TRANS LINK BUSWAY  
STATION ARCHITECT

dT ARCHITECTURE

DRAWN

CHECKED

ORIGINAL SIZES BY

TRANS LINK BUSWAY  
STATION ARCHITECT

DATE: / / 2007

PI-6a  
PLATFORM IDENTIFICATION  
SIGN

SCALE		AS NOTED	
CONTRACT NO.		DT/ONG/IN	
DRAWING NO.		PI-6a.2	
REV 1	02.05.07	DETAILS	CHECKED APPROVED
STATUS	DATE	DETAILS	CHECKED APPROVED
JOB NO.		ISSUE REV 1	

Unless otherwise noted all dimensions in millimetres. Use figured dimensions in preference to scaling. Contractor to confirm all dimensions and details on site prior to manufacture.

**Attention**  
Due to this reproduction process the colours in this image are not exact representations of the final product.

**Graphics Detail**  
**SIZE**  
Translink graphic = 460mm high (proportional width)  
**COLOUR**  
Panel background = Resene 'Ecstasy' 061-139-053  
Translink logo tint = 70% Resene 'Ecstasy' 061-139-053 (*to be confirmed*)

**NOTE:** Final location of sign relative to Sign Type PI-5 to be confirmed.



Typical Location  
Scale 1:20

Also refer  
Performance Specification - Attachment Drawing

GENERIC STANDARDS FOR TRANS LINK BUSWAY STATIONS 2007 – SIGNAGE AND GRAPHIC DESIGN

		TRANS LINK BUSWAY STATION ARCHITECT	dt ARCHITECTURE	DRAWN	DESIGNED	ORIG. DESIGNED BY	TRANS LINK BUSWAY STATION ARCHITECT DATE ... / ... / 2007	PROJECT TITLE	PI-7 BADGE SIGN	SCALE				AS NOTED		
		CONSULTANT PROJECT TEAM	APPROVED							CONTRACT NO.	DT DWG No.	DRAWING No.		REVISION		
© COPYRIGHT QUEENSLAND GOVERNMENT - QUEENSLAND TRANSPORT 2007										REV 1	02.05.07				PI-7.1	
										STATUS	DATE	DETAILS	CHECKED	APPROVED	JOB NO.	ISSUE REV 1
										UNLESS OTHERWISE			DIM SHALL BE IN MILLIMETRES			
										CONTRACTOR SHALL CONFIRM ALL DIMENSIONS AND DETAILS PRIOR TO CONSTRUCTION						

Unless otherwise noted all dimensions in drawings are in millimetres. Use figured dimensions in preference to scaling. Contractor to confirm all dimensions and details on site prior to manufacture.

**Attention**  
Due to this reproduction process the colours in this image are not exact representations of the final product.

**GENERAL CONSTRUCTION NOTES**  
1. Drawings show design intent. Any changes to specification which affects design intent must be approved by TransLink.

2. All structural members, fixings and/or footings to be confirmed by sign maker's engineer.

**Construction Details**  
1. Internal frame constructed from 4mm thick aluminium plate with 50 x 50 x 3 aluminium angle returns. Fit nutserts to take M8 fixings.

2. Fabricated sign panel from 4.5mm clear polycarbonate.

3. 20 x 20 x 3mm SHS aluminium bracing welded to internal frame.

4. Fabricated 3mm thick G450 Z350 steel fixing bracket behind logo. Cut to size to suit profile.

5. Grommet to suit outdoor application.

6. 4 off M8 S.S. 316 counter sunk bolt fixing to internal sign frame to secure polycarbonate sign face.

7. Clear polycarbonate gusset block.

8. Cable access hole to suit grommet.

10. 6500K daylight fluoros mounted to bracing with Terry clips.

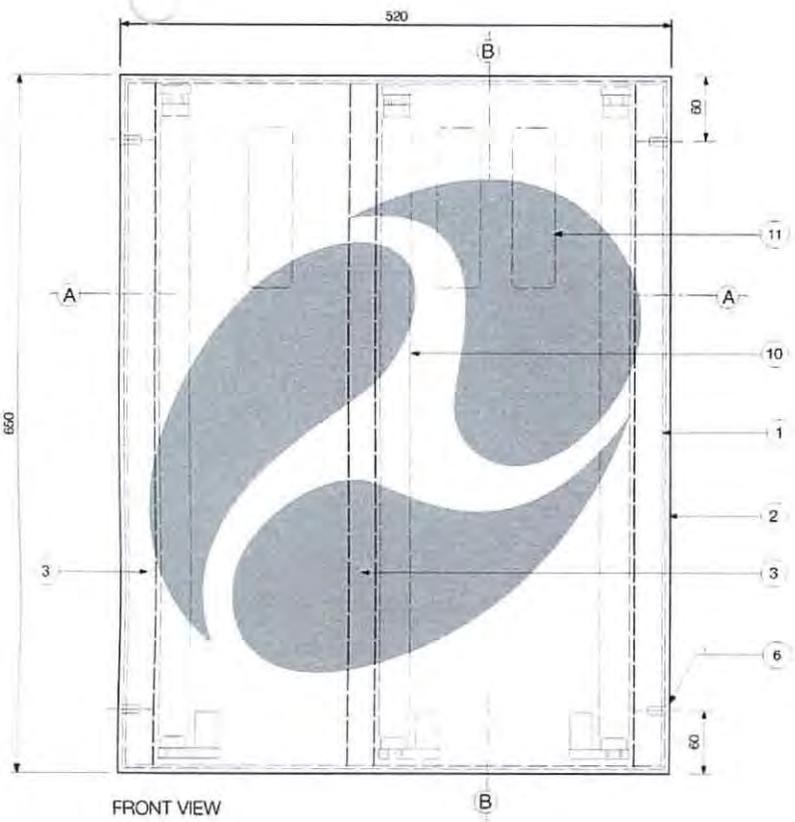
11. Ballast mounted to internal frame.

12. Conduit.

13. Station structure.

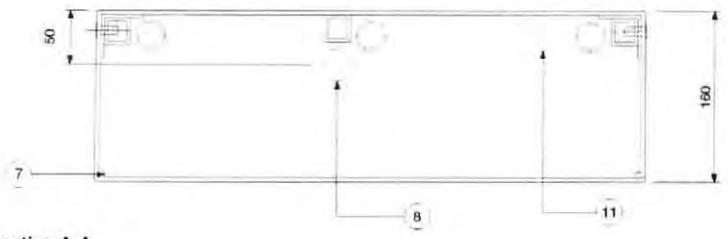
14. M10 SS socket head button screw and lock nut fixing sign to existing roof structure.

Also refer  
Performance Specification - Attachment Drawing

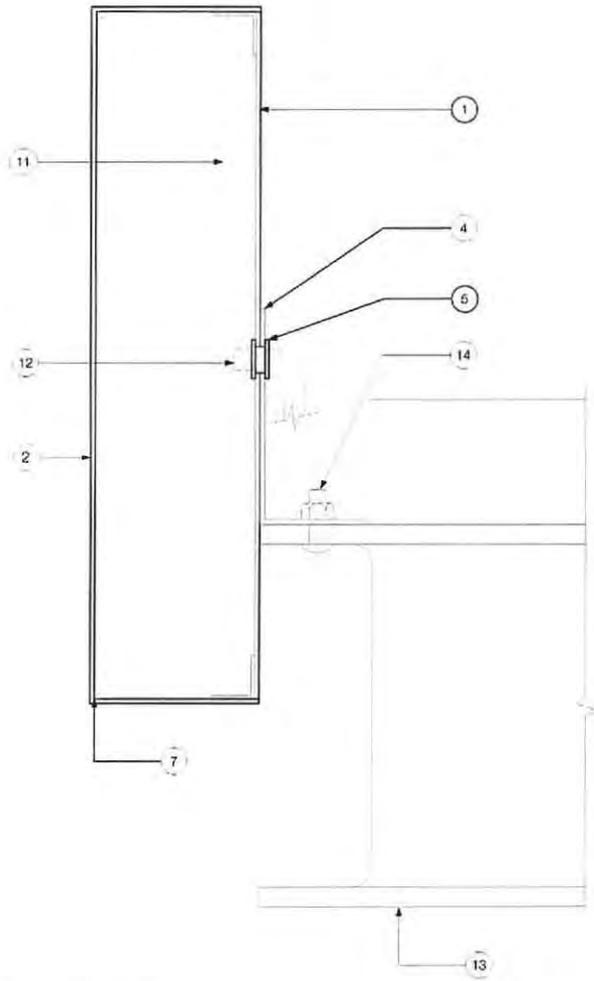


FRONT VIEW

Typical Elevation  
Scale 1:5



Section A-A  
Scale 1:5



Typical Section B-B  
Scale 1:5

GENERIC STANDARDS FOR TRANSLINK BUSWAY STATIONS 2007 – SIGNAGE AND GRAPHIC DESIGN



TRANSLINK BUSWAY STATION ARCHITECT	QT ARCHITECTURE	DRAWN	CHECKED	ORIGINAL SIGNED BY: TRANSLINK BUSWAY STATION ARCHITECT
DATE: .../.../2007	APPROVED			

PROJECT TITLE	PI-7 BADGE SIGN
TITLE	

SCALE	AS NOTED
CONTRACT NO.	QT 010/06
DRAWING NO.	PI-7.2
REVISION	
REV 1	02 05 07
SILE	DATE
STATUS	DATE
JOB NO.	ISSUE
REV 1	

**ANNEXURE 1 – PART 1 – ATTACHMENT 7D**  
**BUSWAY STATIONS – GENERIC DESIGN AND DETAILS DOCUMENTATION**

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Note: Refer Drawing A-0000 Rev 01 for full listing of Attachment 7D drawings





Queensland  
Government

Queensland Transport



**TRANSLink**

# GENERIC DESIGN AND DETAILS DOCUMENTATION

TENDER ISSUE  
2 MAY 2007



### Architectural

Drp. no.	Rev.	Drawing Title	Drp. no.	Rev.	Drawing Title
- A0000	1	Drawing List & Legend			
- A1005	1	TYPE 1 C2 PLATFORM LEVEL PLAN	- A4401	1	PLATFORM STRUCTURE SINGLE CANTILEVER- PLATFORM LEVEL, ROOF LEVEL PLANS
- A1006	1	TYPE 1 C2 PEDESTRIAN BRIDGE LEVEL PLAN	- A4402	1	PLATFORM STRUCTURE SINGLE CANTILEVER- REFLECTED CEILING PLAN
- A1011	1	TYPE 2 E2 PLATFORM LEVEL PLAN	- A4403	1	PLATFORM STRUCTURE SINGLE CANTILEVER- ELEVATION, SECTIONS
- A1012	1	TYPE 2 E2 PODIUM LEVEL PLAN	- A4404	1	PLATFORM STRUCTURE TYPICAL DETAILS
			- A4410	1	PLATFORM STRUCTURE DUAL CANTILEVER PLANS
			- A4411	1	PLATFORM STRUCTURE DUAL CANTILEVER- REFLECTED CEILING PLAN
			- A4412	1	PLATFORM STRUCTURE DUAL CANTILEVER- ELEVATIONS, SECTIONS
- A3010	1	TYPE 1 C2 ELEVATIONS	- A4413	1	PLATFORM STRUCTURE DUAL CANTILEVER ELEVATIONS SECTION
- A3025	1	TYPE 2 E2 ELEVATIONS	- A4420	1	PLATFORM STRUCTURE SHADE CANOPY PLAN
			- A4421	1	PLATFORM STRUCTURE SHADE CANOPY ELEVATION SECTIONS
- A4101	1	ARRIVAL STRUCTURE - FLOOR, ROOF & REF. CEILING PLANS	- A5401	1	EMERGENCY CALL POINT DETAILS
- A4102	1	ARRIVAL STRUCTURE - SECTIONS & DETAILS	- A5402	1	PLATFORM SUNSCREEN LOUVRES ELEVATION, DETAILS
- A4103	1	ARRIVAL STRUCTURE - LIFT CORE PLANS ELEVATIONS DETAILS	- A5403	1	PLATFORM CANTILEVER FURNITURE SECTION, DETAILS
- A4110	1	TYPE 2 E2 ARRIVAL STRUCTURE PLAN PLATFORM LEVEL	- A5404	1	HANDRAIL DETAILS
- A4111	1	TYPE 2 E2 ARRIVAL STRUCTURE PLAN PODIUM LEVEL	- A5405	1	BALUSTRADE TYPES SETOUT, DETAILS
- A4112	1	TYPE 2 E2 ARRIVAL STRUCTURE REFLECTED CEILING PLAN	- A5406	1	MEDIAN BARRIER DETAILS
- A4113	1	TYPE 2 E2 ARRIVAL STRUCTURE ROOF PLAN	- A5420	1	BICYCLE STORE STRUCTURE - PLAN, ELEVATIONS, SECTION & DETAILS
- A4114	1	TYPE 2 E2 ARRIVAL STRUCTURE SECTION & DETAILS	- A5421	1	BICYCLE STORE STRUCTURE - ROOF PLAN, RCP, DETAILS
- A4301	1	PEDESTRIAN BRIDGE PLANS	- A5430	1	COMBINED BICYCLE STORE/ SERVICES STRUCTURE - PLAN, ELEVATIONS, SECTION & DETAILS
- A4302	1	PEDESTRIAN BRIDGE ELEVATIONS, SECTIONS	- A5431	1	COMBINED BICYCLE STORE/ SERVICES STRUCTURE - ROOF PLAN, RCP, DETAILS
- A4303	1	PEDESTRIAN BRIDGE DETAILS 1			
- A4304	1	PEDESTRIAN BRIDGE DETAILS 2			

### LEGEND

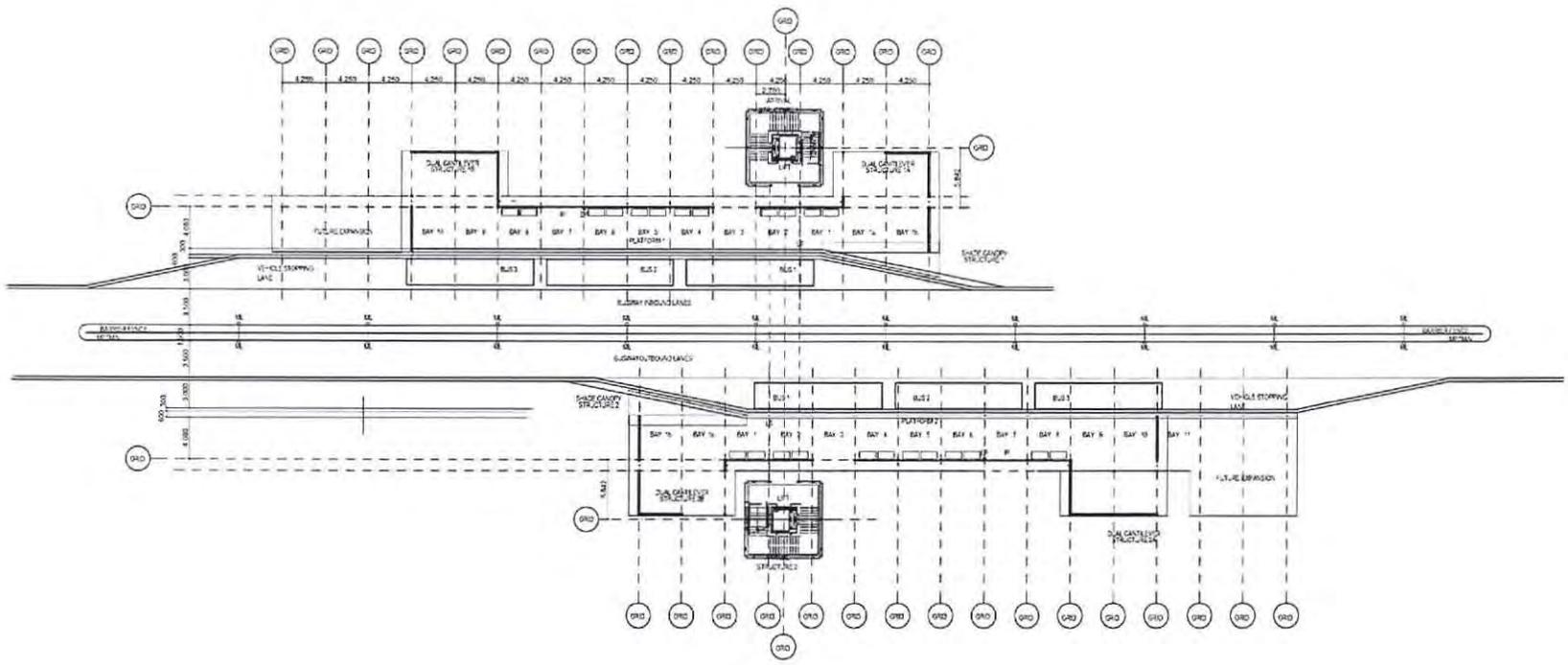
BC	—	BARGE CAPPING
BG	—	BOX GUTTER
BGL	—	BOX GUTTER LINING
BGS	—	BOX GUTTER SUPPORT
BR	—	BRACING
BS	—	BUSWAY STORAGE
CS	—	CEILING BATTEN
CF	—	CHAIN WIRE FENCE
CHS	—	CIRCULAR HOLLOW SECTION
DEG	—	DEGREE
DF	—	DRAINING FOUNTAIN
DA	—	DIAMETER
DM	—	STEEL DECKING
DL	—	DOWNLIGHT
DP	—	STAINLESS STEEL DOWNPIPE
EA	—	EQUAL ANGLE
EL	—	EMERGENCY LIGHT
EP	—	EMERGENCY CALL POINT
FB	—	FASCIA BEAM
FC	—	FIBRE CONCRETE
FGV	—	HOT DIPPED GALVANIZED
GR	—	GLAZED BALUSTRADE
GO	—	GUTTER OUTLET
GP	—	GLAZED PANEL
HR	—	HAND RAIL
IF	—	ILLUMINATED INFORMATION PANEL
IP	—	IGNITION PLATE
LR	—	LEADING RAIL
LS	—	LEAD STOP
ML	—	MEDIAN LIGHTING
MS	—	METAL SCREEN
NO	—	NUMBER QUANTITY
OF	—	OVERFLOW
PCF	—	PARALLEL FLANGE CHANNEL
PL	—	PLATE STEEL
RB	—	ROOF BEAM
RH	—	RAINWATER HEAD
RF	—	ROOF PURLIN
RS	—	ROOF SHEETING
SCS	—	SECURITY CAMERA AND SPEAKER
S	—	SOFFIT LINING
SP	—	SPRINKLER
SS	—	STAINLESS STEEL PANEL
ST	—	STAR STRAINER
SS	—	STAINLESS STEEL
SLS	—	SLIDING LOUVRES
ST	—	STRANCH
TSS	—	TACTILE GROUND SURFACE INDICATORS
TPP	—	TRYPIC
UA	—	UNUSUAL ANGLE
UB	—	UNIVERSAL BEAM
UC	—	UNIVERSAL COLUMN
VM	—	VERTICAL MACHINE
GR	—	GRID REFERENCE
EL	—	EMERGENCY LIGHTING
PA	—	PUBLIC ADDRESS SPEAKER
CS	—	SECURITY CAMERA
BT-01	—	DENSITIES BALUSTRADE TYPE REFER TO DRG. No. A-000 FOR DETAILS
BT-02	—	
BT-03	—	

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PERFORMANCE SPECIFICATION - ATTACHMENT DRAWINGS

TRANSLink		Queensland Government		TRANSLINK BUSWAY STATION ARCHITECTURE		GENERIC STANDARDS FOR TRANSLINK BUSWAY STATIONS 2007 - ARCHITECTURE AND DESIGN	
ORIGINAL DESIGNED BY	DATE	ORIGINAL DESIGNED BY	DATE	PROJECT TITLE	MANAGER	DRAWING LIST & LEGEND	SCALE
APPROVED	DATE	APPROVED	DATE	STATUS	DATE	STATUS	DATE
© COPYRIGHT QUEENSLAND GOVERNMENT - QUEENSLAND TRANSPORT 2007				NO SHALL BE IN VALUED			



PLATFORM LEVEL PLAN

GENERIC STANDARDS FOR TRANSLINK BUSWAY STATIONS 2007 - ARCHITECTURE AND DESIGN



TRANSLINK BUSWAY STATION ARCHITECT  
 ORIGINAL DESIGNED BY  
 DATE / 2007

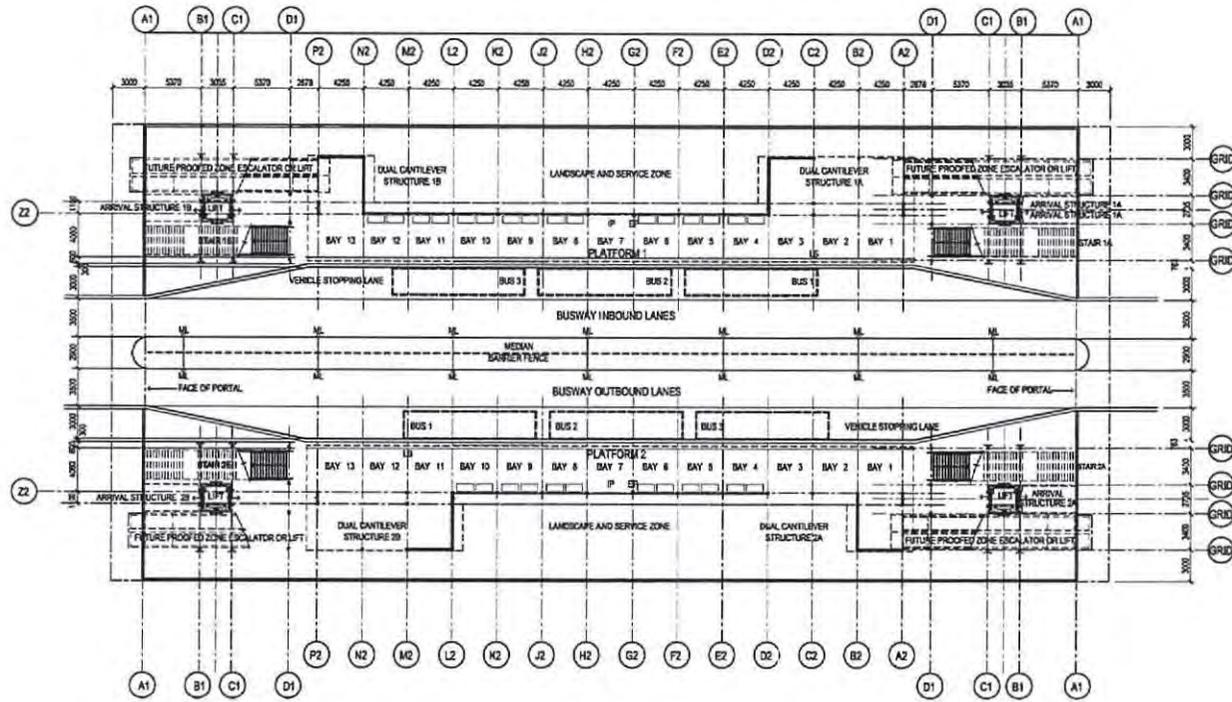
TRANSLINK BUSWAY STATION ARCHITECT G T I ARCHITECTURE  
 CONSULTANT PROJECT TEAM

PROJECT TITLE  
 MANAGER  
 ORIGINAL DESIGNED BY  
 DATE / 2007

TYPE 1-C2 PLATFORM  
 STAGGERED PLATFORMS  
 PLATFORM LEVEL PLAN

SCALE		1:250@A1, 1:500@A3	
CONTRACT NO		GT EN7066	
DRAWING NO	A1005	REVISION	1
STATUS	3446	ISSUE	1





GENERIC STANDARDS FOR TRANSLINK BUSWAY STATIONS 2007 - ARCHITECTURE AND DESIGN



TRANSLINK BUSWAY STATION ARCHITECT  
 ORIGINAL SIGNED BY  
 DATE: .../.../2007

TRANSLINK BUSWAY STATION ARCHITECT: dT1 ARCHITECTURE

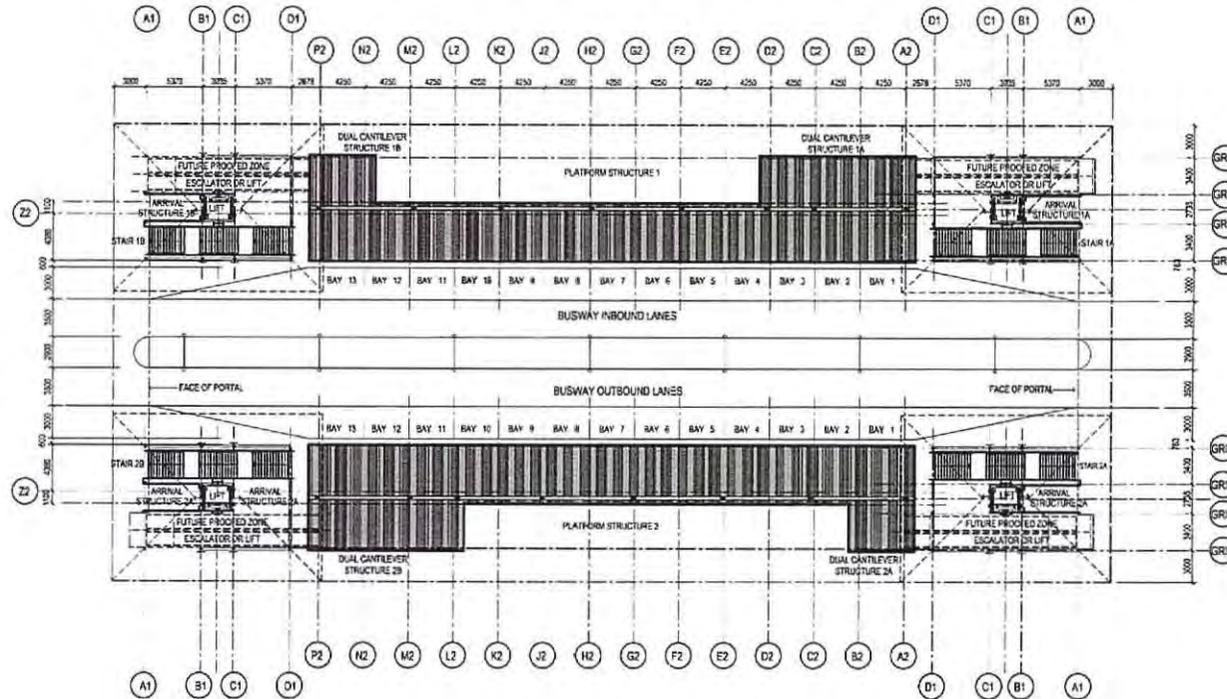
PROJECT FILE

APPROVED

MANAGER  
 ORIGINAL SIGNED BY  
 DATE: .../.../2007

TITLE  
 TYPE 2- E2 PLATFORM  
 LINEAR STAIRS AND LIFTS  
 PLATFORM LEVEL PLAN

SCALE 1:250 @ A1, 1:500 @ A3	
CONTRACT NO. 07 DWG No.	
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GENERIC STANDARDS FOR TRANSLINK BUSWAY STATIONS 2007 - ARCHITECTURE AND DESIGN

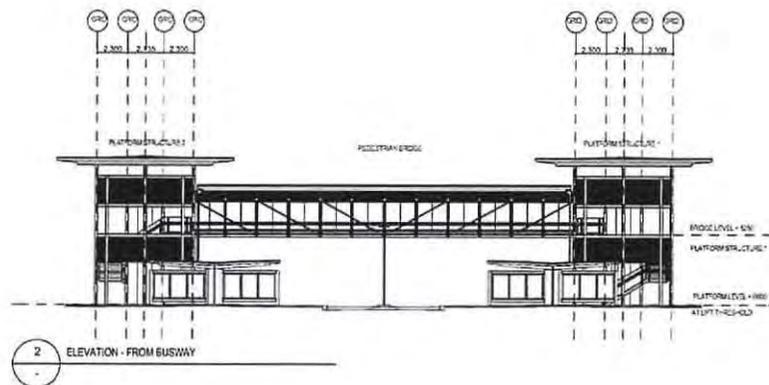
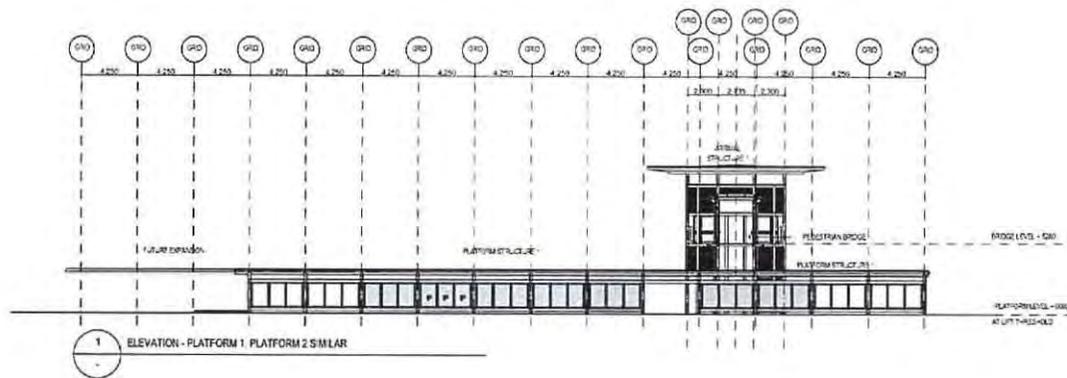


TRANSLINK BUSWAY STATION ARCHITECT  
 ORIGINAL SIGNED BY  
 DATE: ... 2007

MANAGER  
 ORIGINAL SIGNED BY  
 DATE: ... 2007

TYPE 2- E2 PLATFORM  
 LINEAR STAIRS AND LIFTS  
 PODIUM LEVEL PLAN

PROJECT FILE				SCALE 1:250 @ A1, 1:500 @ A3	
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DRAWING NO.				REVISION	
A-1012				1	
1	02/05/2007	TENDER ISSUE			
FILE	DATE	ISSUE	CHECKED	BY	DATE
UNLESS OTHERWISE SPECIFIED				ALL DIMENSIONS IN MILLIMETRES	



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 DATE: 14/08/07

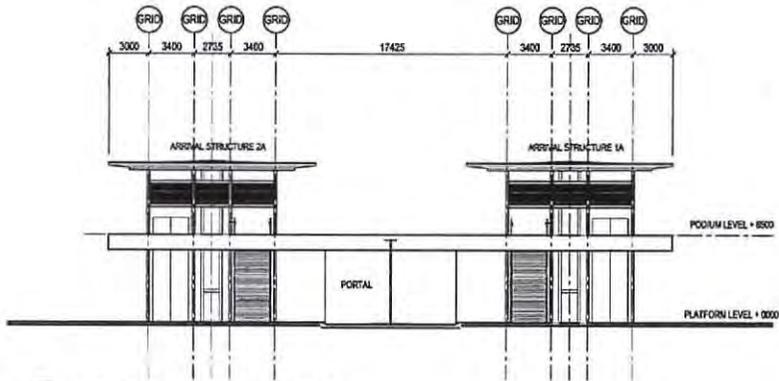
TRANSLINK BUSWAY STATION ARCHITECT: GTI ARCHITECTURE  
 CONSULTANT PROJECT TEAM

GENERIC STANDARDS FOR TRANSLINK BUSWAY STATIONS 2007 - ARCHITECTURE AND DESIGN

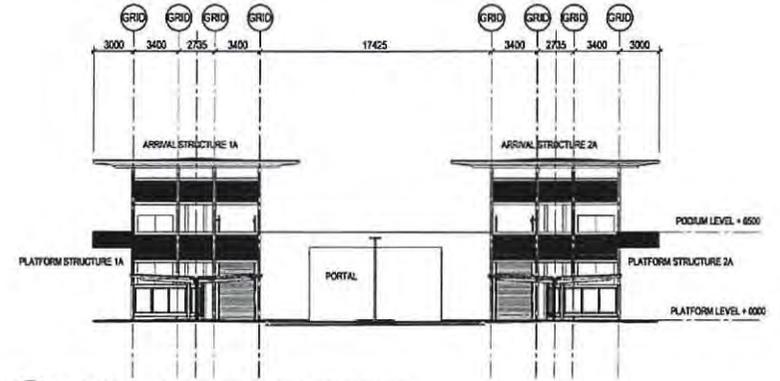
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 MANAGER  
 ORIGINAL SHEET NO.  
 DATE: 14/08/07

TYPE 1-C2 PLATFORM STAGGERED PLATFORM ELEVATIONS

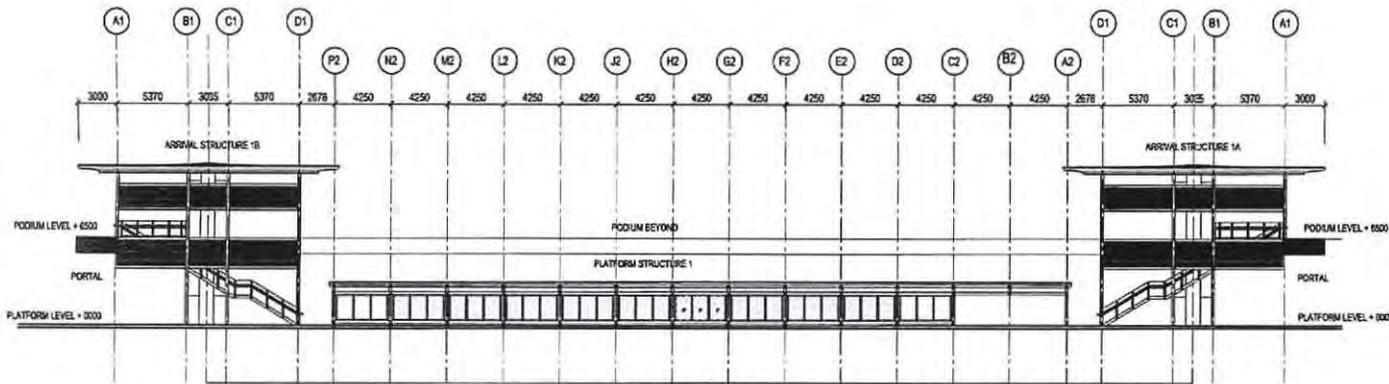
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CONTRACT NO.	GT 2007-01
DRAWING NO.	A-3010
REVISION	1
STATUS	3446
JOB NO.	3446
REV. NO.	1



2 ELEVATION - ARRIVAL STRUCTURES



3 ELEVATION - SECTION PLATFORM STRUCTURES



1 ELEVATION - PLATFORM 1, PLATFORM 2 SIMILAR

GENERIC STANDARDS FOR TRANSLINK BUSWAY STATIONS 2007 - ARCHITECTURE AND DESIGN



TRANSLINK BUSWAY STATION ARCHITECT  
 ORIGINAL SIGNED BY  
 DATE: .../.../2007

CONSULTANT PROJECT TEAM

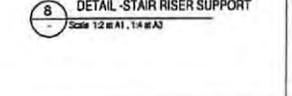
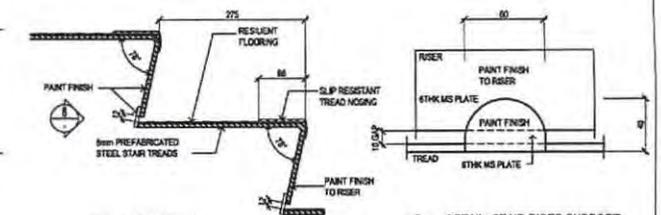
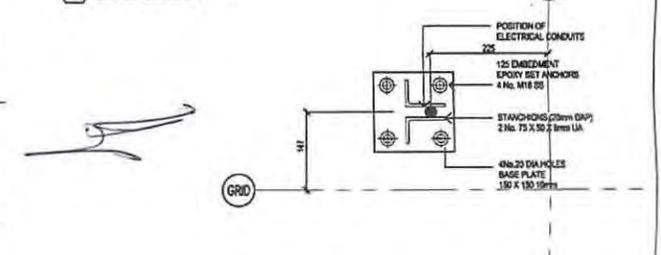
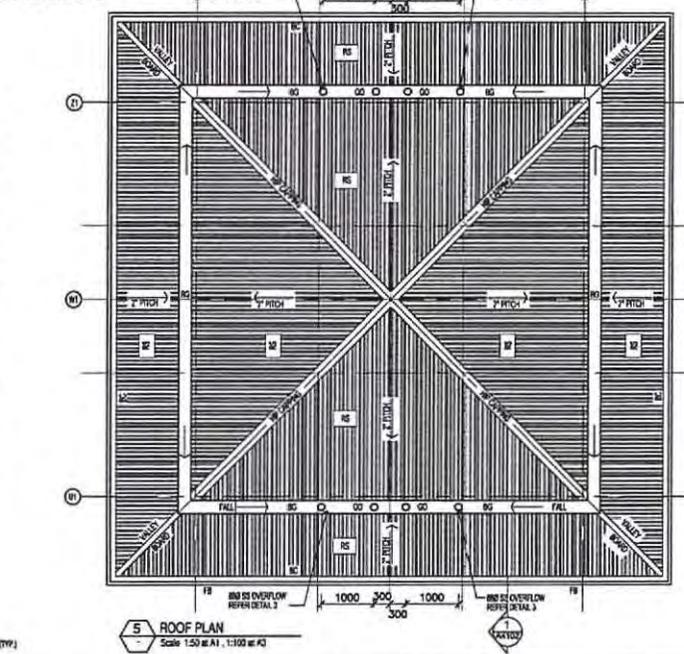
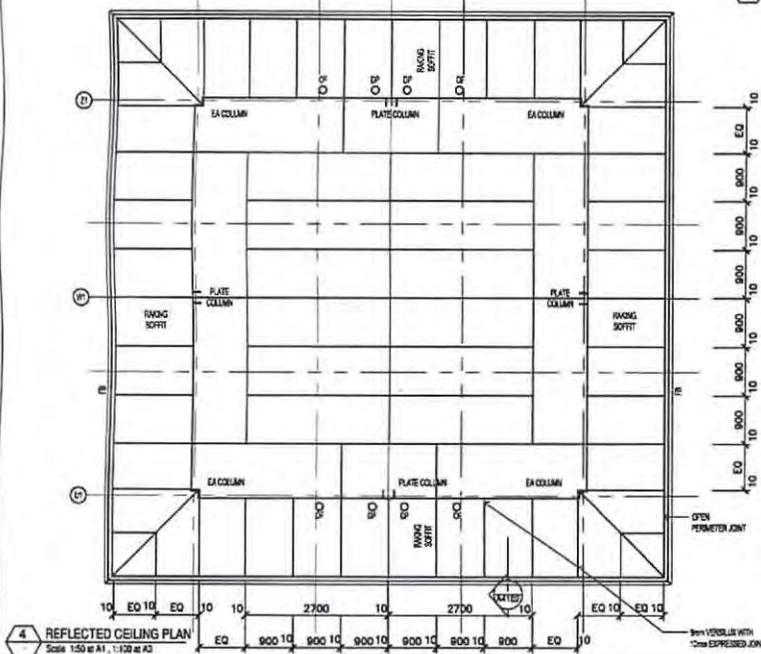
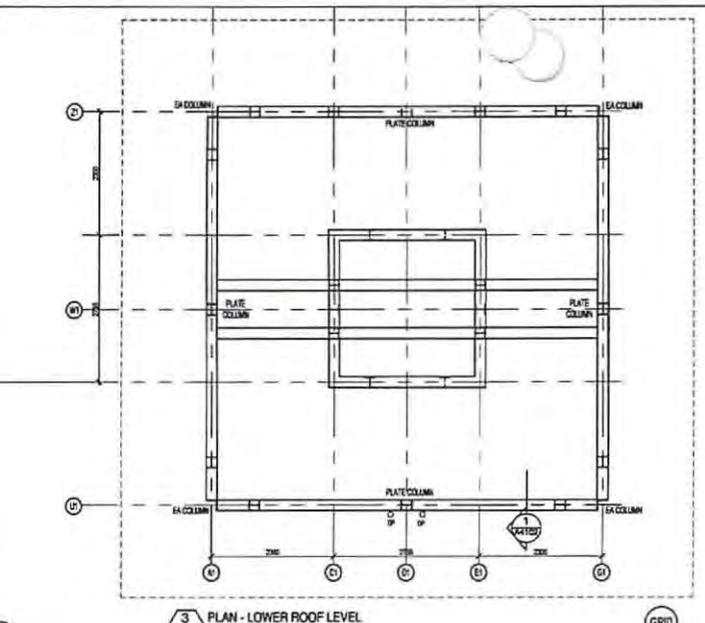
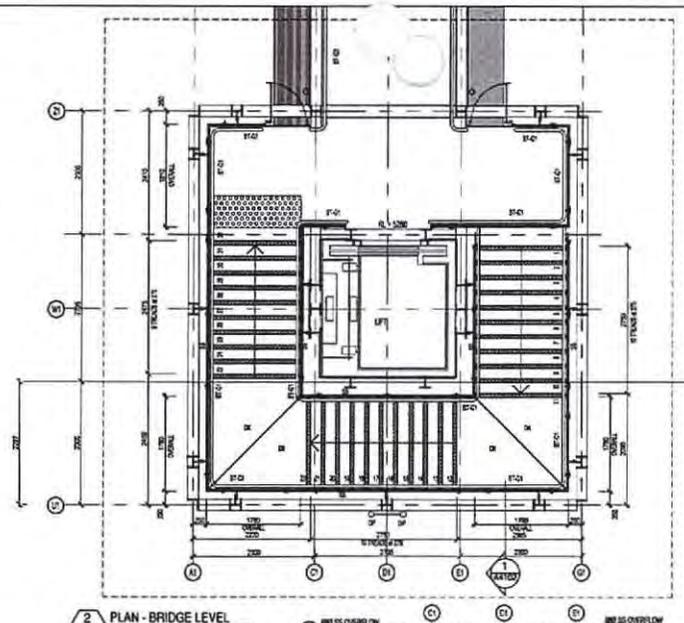
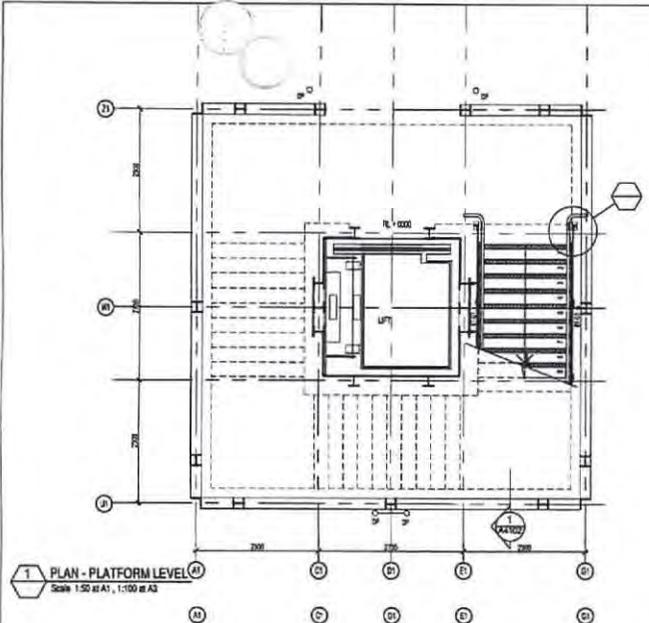
PROJECT TITLE  
 MANAGER  
 ORIGINAL SIGNED BY  
 DATE: .../.../2007

APPROVED

TYPE 2- E2 PLATFORM  
 LINEAR STAIRS AND LIFTS  
 ELEVATIONS

TITLE

SCALE 1:200 @ A1, 1:400 @ A3			
CONTRACT NO. 01/090/06			
DRAWING NO. A-3025		REVISION 1	
1	02.05.2007	TENDER ISSUE	
ISSUE	DATE	DETAILS	CHANGED TO
STATUS		UNLESS OTHERWISE SPECIFIED	



GENERIC STANDARDS FOR TRANSLink BUSWAY STATIONS 2007 - ARCHITECTURE AND DESIGN



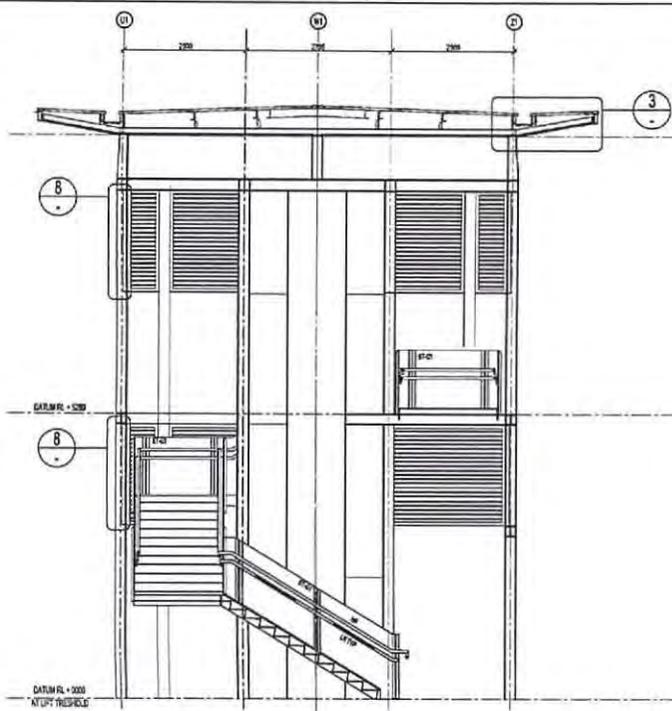
TRANSLink BUSWAY STATION ARCHITECT  
 ORIGINAL SIGNED BY  
 DATE: 11/11/2007

TRANSLink BUSWAY STATION ARCHITECT GT | ARCHITECTURE  
 CONSULTANT PROJECT TEAM  
 APPROVED

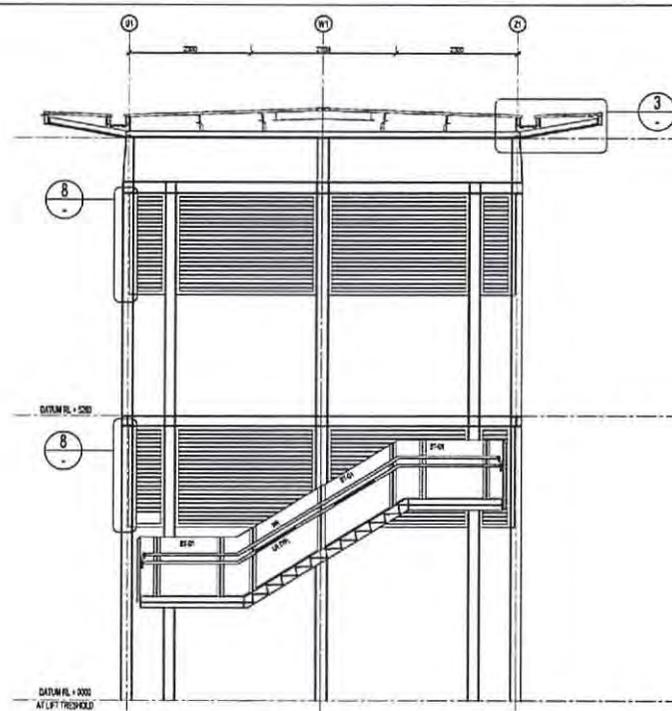
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 MANAGER  
 ORIGINAL SIGNED BY  
 DATE: 11/11/2007

ARRIVAL STRUCTURE  
 FLOOR, ROOF & REF. CEIL. PLANS  
 TITLE

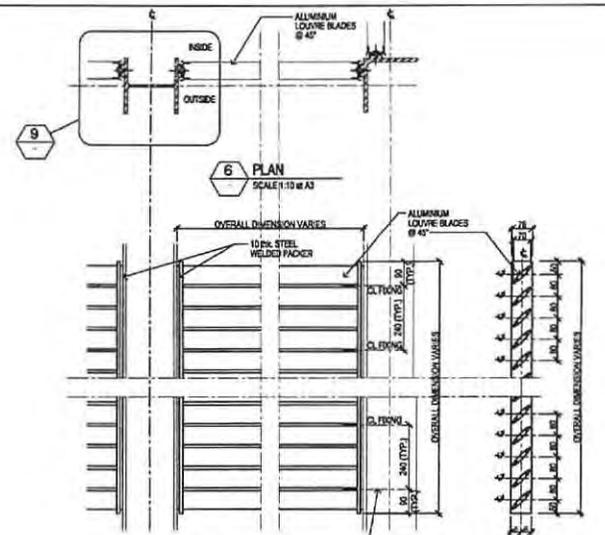
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CONTRACT NO.		GT DWG NO.	
DRAWING NO.	A-4101	REVISION	1
DATE	12/12/2007	STATUS	ISSUE
DESIGNER	TINERESIE	CHECKED	APPROVED
JOB NO.		UNLESS OTHERWISE NOTED ALL DIMENSIONS SHALL BE IN MILLIMETRES	



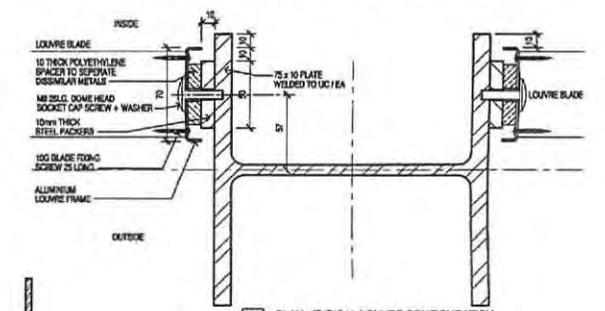
**1 SECTION**  
4101 1:50 @ A1, 1:100 @ A3



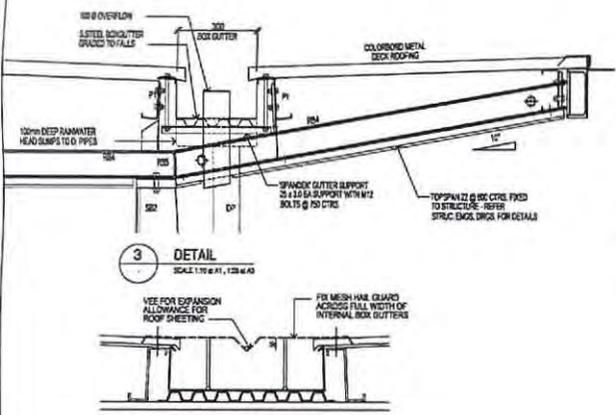
**2 SECTION**  
4101 1:50 @ A1, 1:100 @ A3



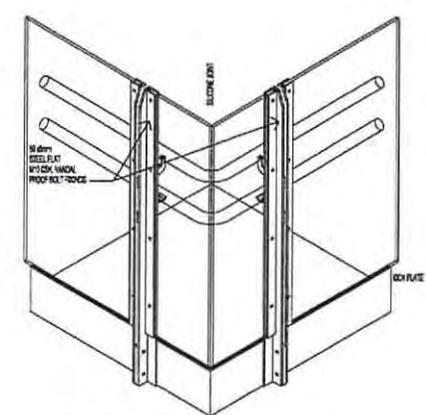
**6 PLAN** SCALE 1:10 @ A3  
**7 ELEVATION** SCALE 1:10 @ A3  
**8 SECTION** SCALE 1:10 @ A3  
**TYPICAL ARRIVAL STRUCTURE LOUVRE DETAILS**



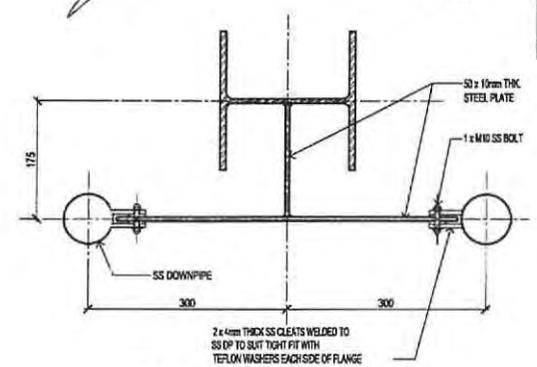
**9 PLAN - TYPICAL LOUVRE CONFIGURATION**  
SCALE 1:2 @ A1, 1:4 @ A3



**3 DETAIL**  
SCALE 1:10 @ A1, 1:20 @ A3



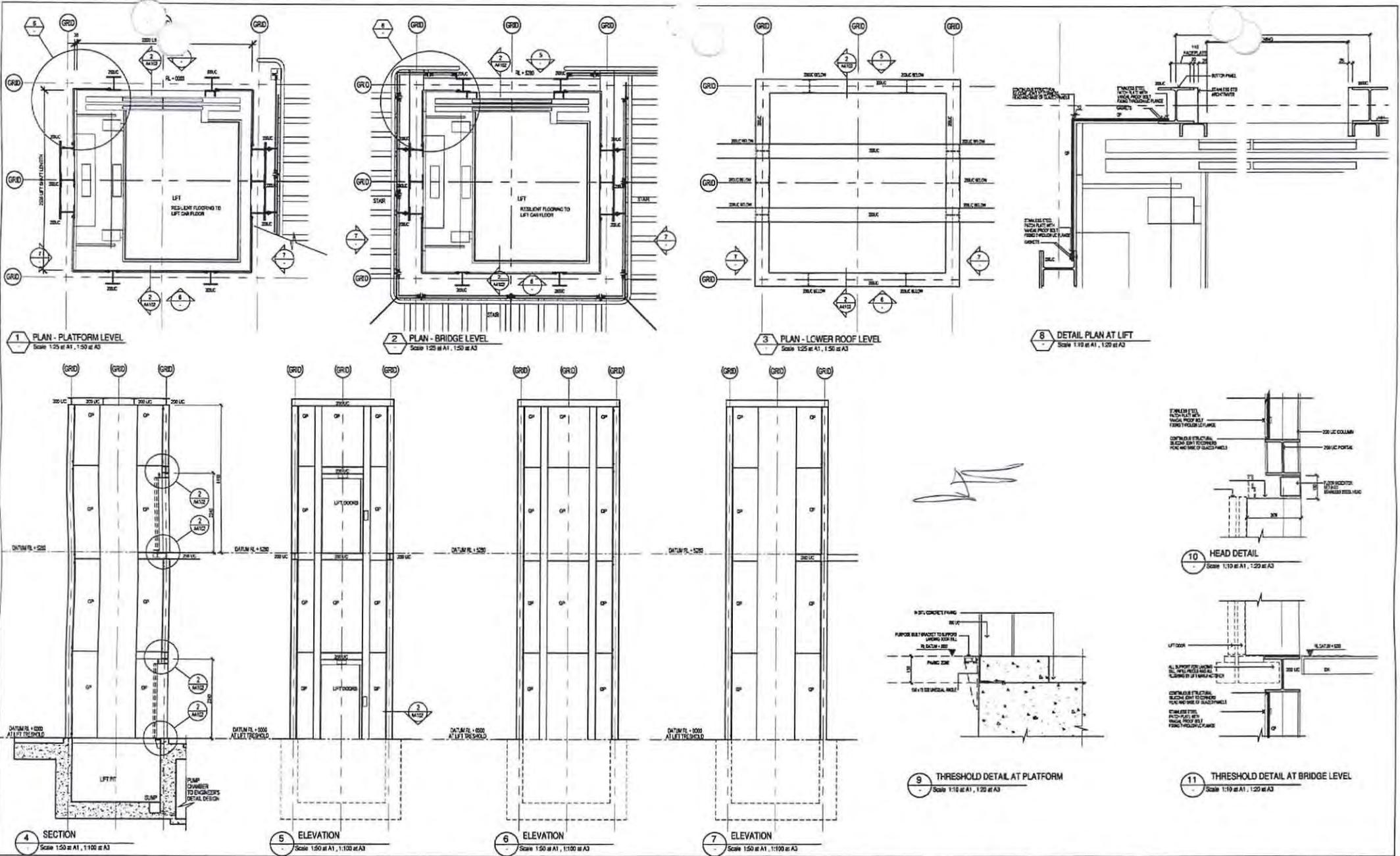
**TYPICAL BALUSTRADE CORNER DETAIL**



**5 PLAN - DOWNPIPE SUPPORT CLEATS**  
SCALE 1:2 @ A1, 1:4 @ A3

**GENERIC STANDARDS FOR TRANSLINK BUSWAY STATIONS 2007 - ARCHITECTURE AND DESIGN**

		TRANSLINK BUSWAY STATION ARCHITECT	TRANSLINK BUSWAY STATION ARCHITECT	GT   ARCHITECTURE	PROJECT TITLE	MANAGER	SCALE	AS SHOWN	
		ORIGINAL SIGNED BY				ORIGINAL SIGNED BY	ARRIVAL STRUCTURE SECTIONS & DETAILS	CONTRACT NO.	DT DWG NO.
LOGO		DATE: .../.../2007	CONSULTANT PROJECT TEAM		APPROVED	DATE: .../.../2007	TENDER DATE	REVISION	1
							STATUS	ISSUE	1



GENERIC STANDARDS FOR TRANSLINK BUSWAY STATIONS 2007 - ARCHITECTURE AND DESIGN



TRANSLINK BUSWAY STATION ARCHITECT  
 ORIGINAL SIGNED BY  
 DATE: 2007

TRANSLINK BUSWAY STATION ARCHITECT ST1 ARCHITECTURE  
 CONSULTANT PROJECT TEAM  
 APPROVED

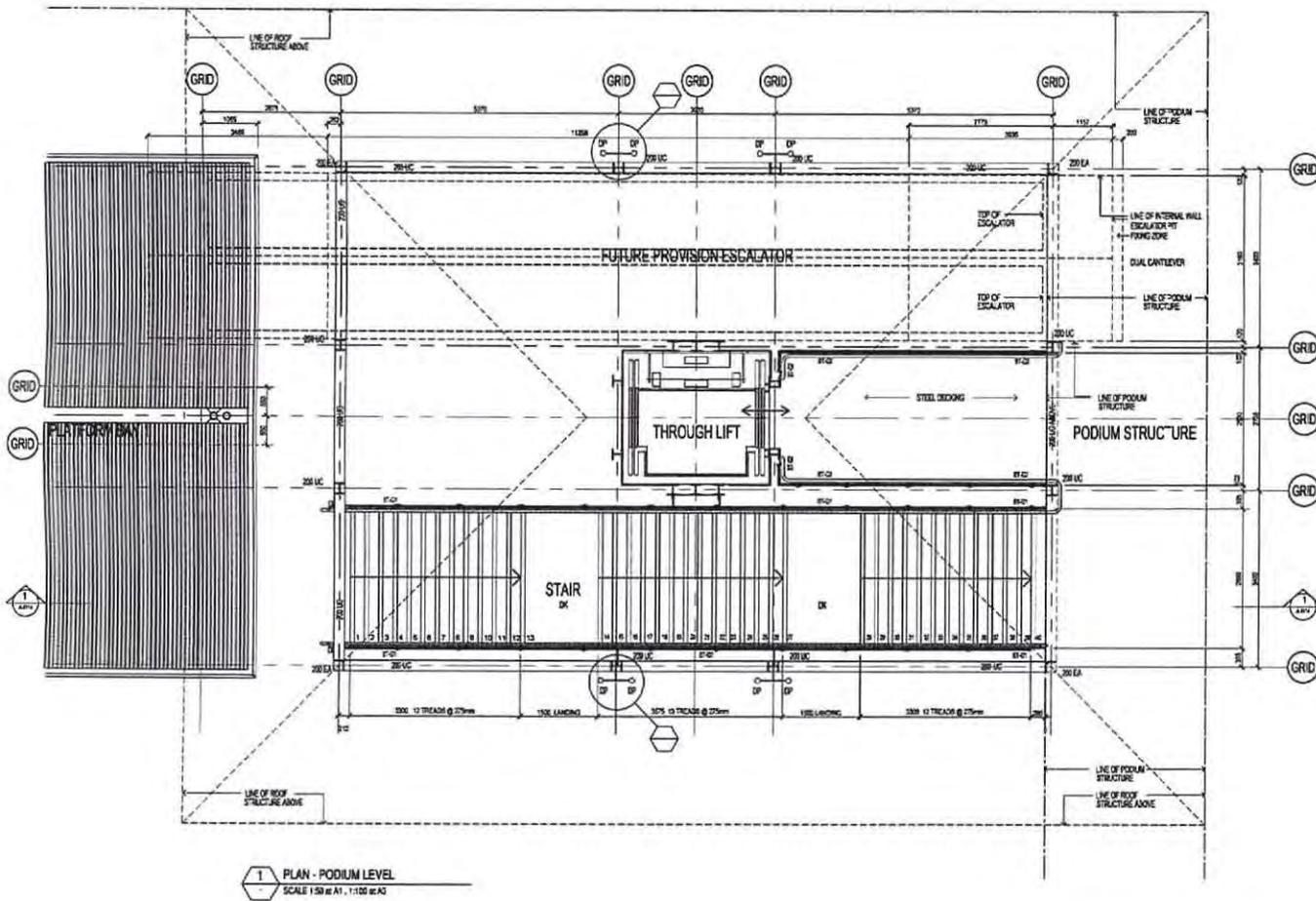
PROJECT TITLE  
 ARRIVAL STRUCTURE  
 LIFT CORE - PLANS, ELEVATIONS, DETAILS

NUMBER  
 ORIGINAL SIGNED BY  
 DATE: 2007

TITLE

SCALE		AS SHOWN	
CONTRACT NO.		GT 0700/06	
DRAWING NO.		A-4103	
REVISION		1	
1	ISSUED FOR TENDER	ISSUED FOR TENDER	ISSUED FOR TENDER
DATE	DATE	DATE	DATE
STATUS	DATE	STATUS	DATE





GENERIC STANDARDS FOR TRANSLINK BUSWAY STATIONS 2007 - ARCHITECTURE AND DESIGN



TRANSLINK BUSWAY STATION ARCHITECT  
 ORIGINAL SIGNED BY  
 DATE: .../.../2007

TRANSLINK BUSWAY STATION ARCHITECT GT1 ARCHITECTURE  
 MANAGER  
 ORIGINAL SIGNED BY  
 DATE: .../.../2007

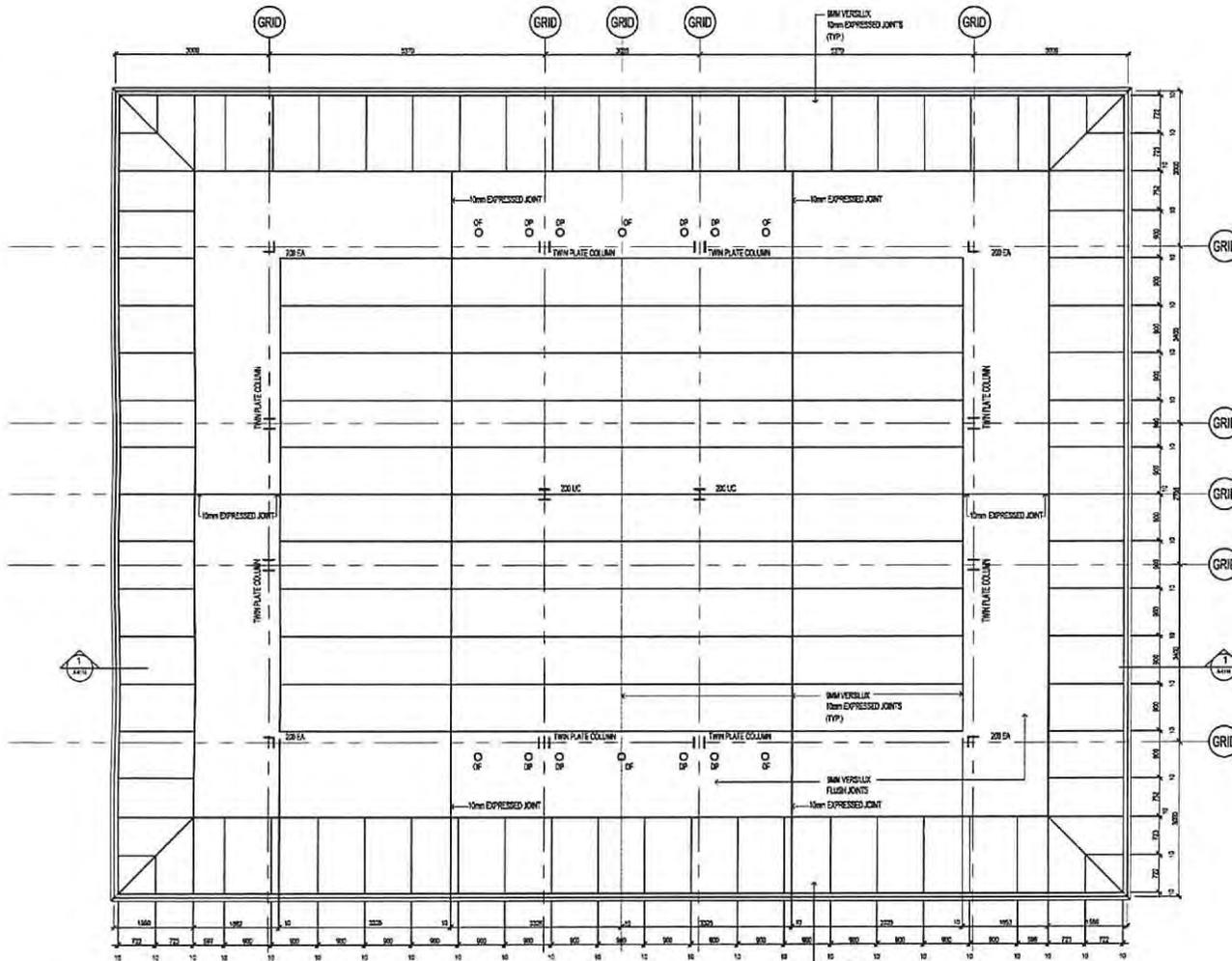
TYPE 2-E2  
 ARRIVAL STRUCTURE PLAN  
 PODIUM LEVEL

SCALE				1:50 @ A1, 1:25 @ A3	
CONTRACT NO.				GT DWS No.	
DRAWING NO.				A-4111	
1	02.02.07	TICKER ISLE		CHECKED	APPROVED
ISSUE	DATE	DETAILS	CHECKED	APPROVED	REVISION
STATUS				JOB NO.	
				ISSUE	

10009  
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UNLESS OTHERWISE NOTED ALL DIMENSIONS SHALL BE IN MILLIMETRES  
 USE FIGURED DIMENSIONS IN PREFERENCE TO SCALING  
 CONTRACTOR SHALL CONFIRM ALL DIMENSIONS AND DETAILS PRIOR TO CONSTRUCTION



1 REFLECTED CEILING PLAN  
SCALE 1:50 @ A1, 1:100 @ A3

GENERIC STANDARDS FOR TRANSLink BUSWAY STATIONS 2007 - ARCHITECTURE AND DESIGN



TRANSLink BUSWAY STATION ARCHITECT  
 ORIGINAL SIGNED BY  
 DATE: .../.../2007

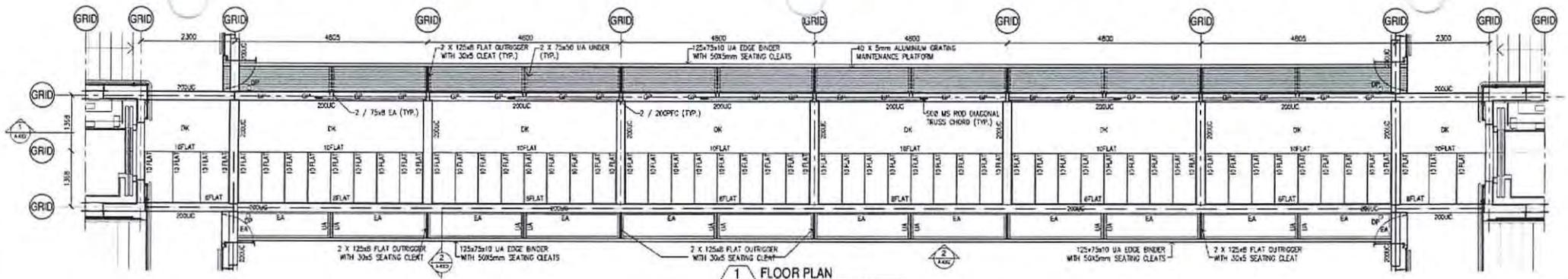
TRANSLink BUSWAY STATION ARCHITECT DT1 ARCHITECTURE  
 CONSULTANT PROJECT TEAM  
 APPROVED

MANAGER  
 ORIGINAL SIGNED BY  
 DATE: .../.../2007  
 TYPE 2- E2 ARRIVAL STRUCTURE  
 REFLECTED CEILING PLAN

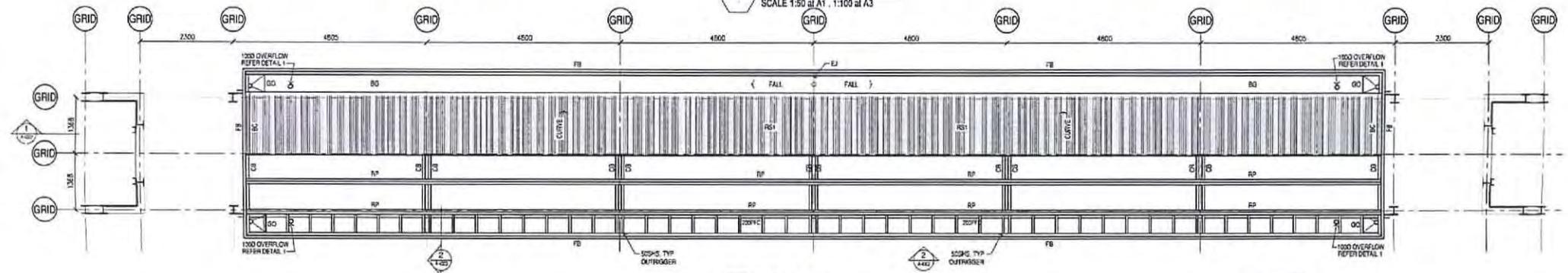
SCALE 1:50 @ A1, 1:25 @ A3			
CONTRACT NO.		DT DWG No.	
DRAWING NO. A-1112		REVISION 1	
1	22/02/07	TODOR GOLE	01/00/07
STATUS	DATE	DESIGN	CHECKED
UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS SHALL BE IN MILLIMETRES			



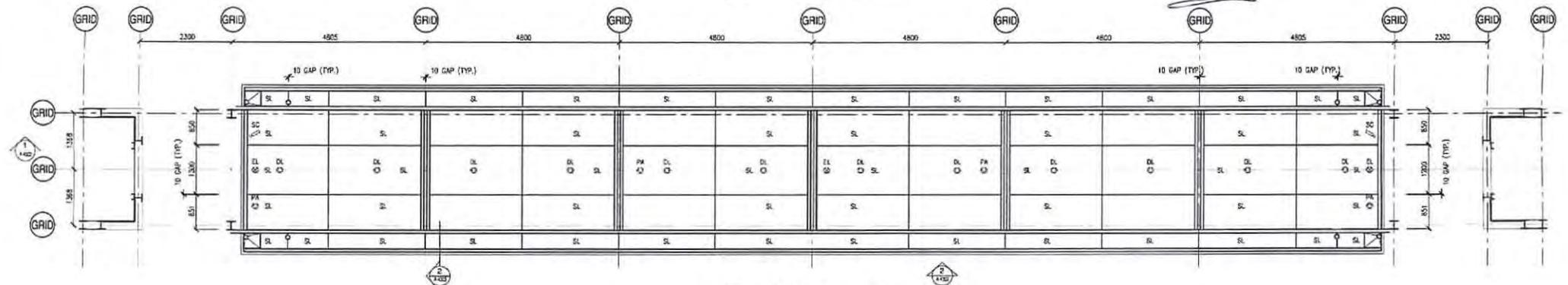




1 FLOOR PLAN  
SCALE 1:50 at A1, 1:100 at A3



2 ROOF PLAN  
SCALE 1:50 at A1, 1:100 at A3



3 REFLECTED CEILING PLAN  
SCALE 1:50 at A1, 1:100 at A3

GENERIC STANDARDS FOR TRANSLink BUSWAY STATIONS 2007 - ARCHITECTURE AND DESIGN

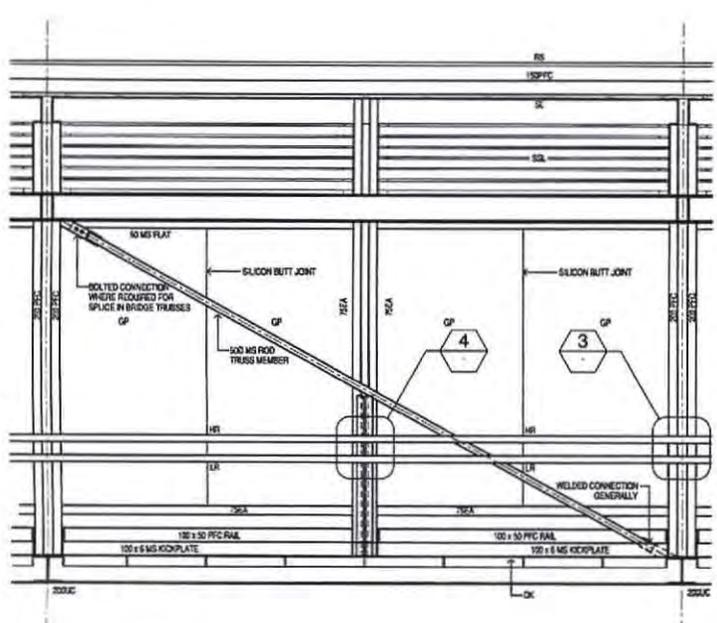


PROJECT TITLE: TRANSLink BUSWAY STATION ARCHITECTURE  
 ORIGINAL DESIGNED BY: TRANSLink BUSWAY STATION ARCHITECTURE  
 DATE: 11/01/2007

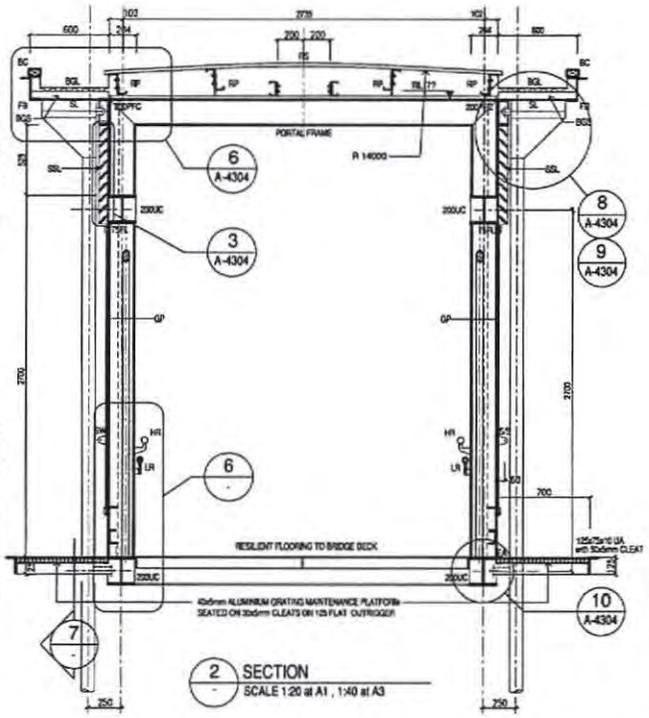
MANAGER: PEDESTRIAN BRIDGE  
 ORG. RAL. DESIGNED BY: PEDESTRIAN BRIDGE  
 DATE: 11/01/2007

SCALE: 1:50 @ A1, 1:100 @ A3	
CONTRACT NO.	OF ENG. NO.
DRAWING NO. A-4301	REVISION 1
DATE: 07/05/2007	TENDER NO.:
DATE: 07/05/2007	DATE: 07/05/2007
STATUS:	APPROVED:

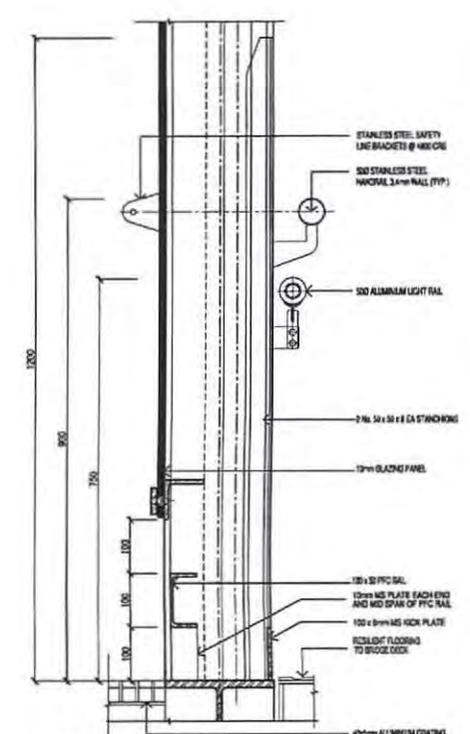




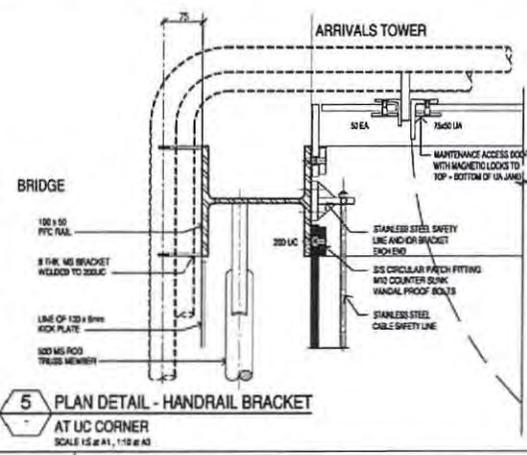
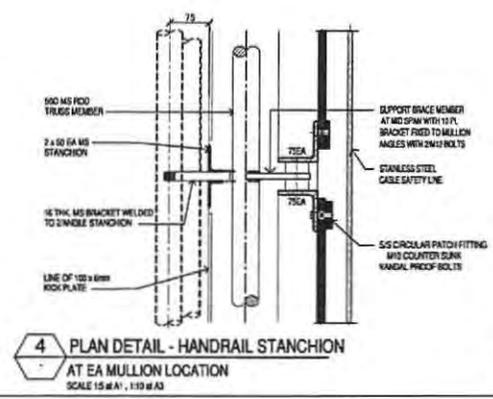
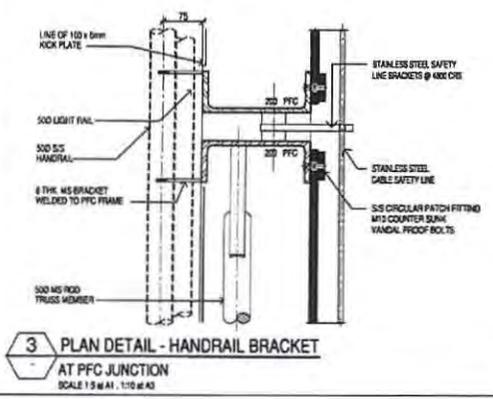
1 SECTION  
SCALE 1:20 at A1, 1:40 at A3



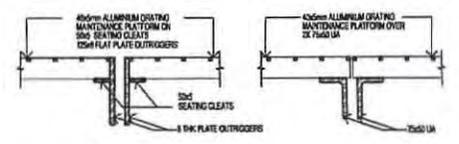
2 SECTION  
SCALE 1:20 at A1, 1:40 at A3



6 SECTIONAL DETAIL  
SCALE 1:5 at A1, 1:10 at A3



5 PLAN DETAIL - HANDRAIL BRACKET  
AT UC CORNER  
SCALE 1:5 at A1, 1:10 at A3



7 SECTIONAL DETAIL - MAINTENANCE PLATFORM  
SCALE 1:5 at A1, 1:10 at A3

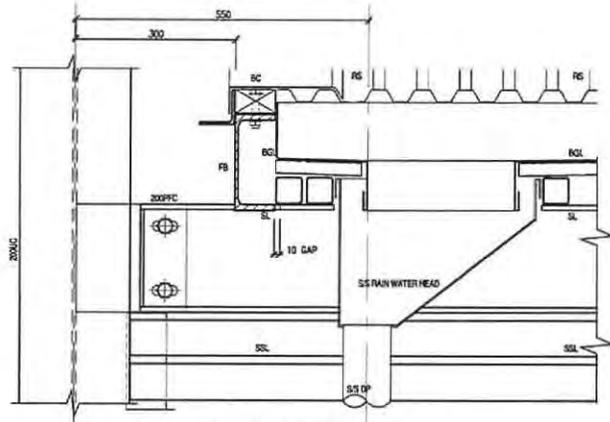
GENERIC STANDARDS FOR TRANSLINK BUSWAY STATIONS 2007 - ARCHITECTURE AND DESIGN



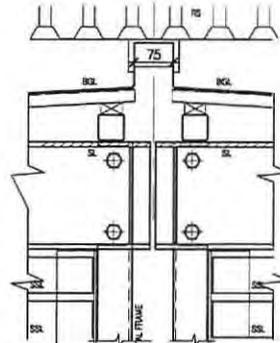
TRANSLINK BUSWAY STATION ARCHITECT	TRANSLINK BUSWAY STATION ARCHITECT	DT I ARCHITECTURE
ORIGINAL DESIGNED BY		
DATE: 11/11/2007		
CONSULTANT PROJECT TEAM		

MANAGER	
ORIGINAL DESIGNED BY	PEDESTRIAN BRIDGE SECTIONS & DETAILS 1
DATE: 11/11/2007	
APPROVED	
TITLE	

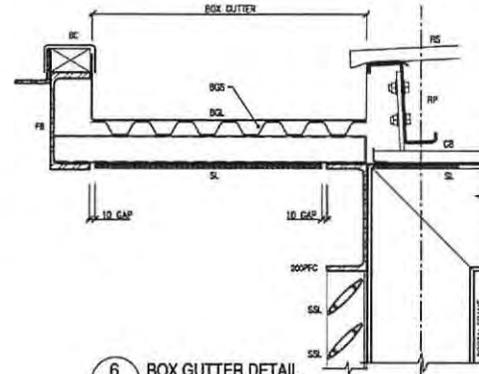
SCALE				AS SHOWN	
CONTRACT NO.				DT 0100 No.	
DRAWING NO.				A-4303	
REVISION				1	
ISSUE	DATE	DETAILS	CHECKED	APPROVED	JOB NO.
1	20/06/2007	TENDER ISSUE			
STATUS					



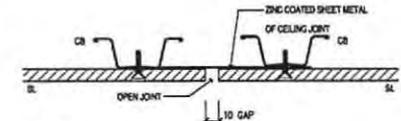
4 LONGITUDINAL SECTION  
A-4302 SCALE 1:5 at A1, 1:10 at A3



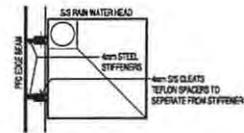
5 BOX GUTTER EXPANSION JOINT DETAIL  
A-4302 SCALE 1:5 at A1, 1:10 at A3



6 BOX GUTTER DETAIL  
A-4303 SCALE 1:5 at A1, 1:10 at A3



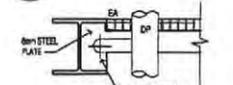
7 SOFFIT LINING JOINT DETAIL  
SCALE 1:2 at A1, 1:4 at A3



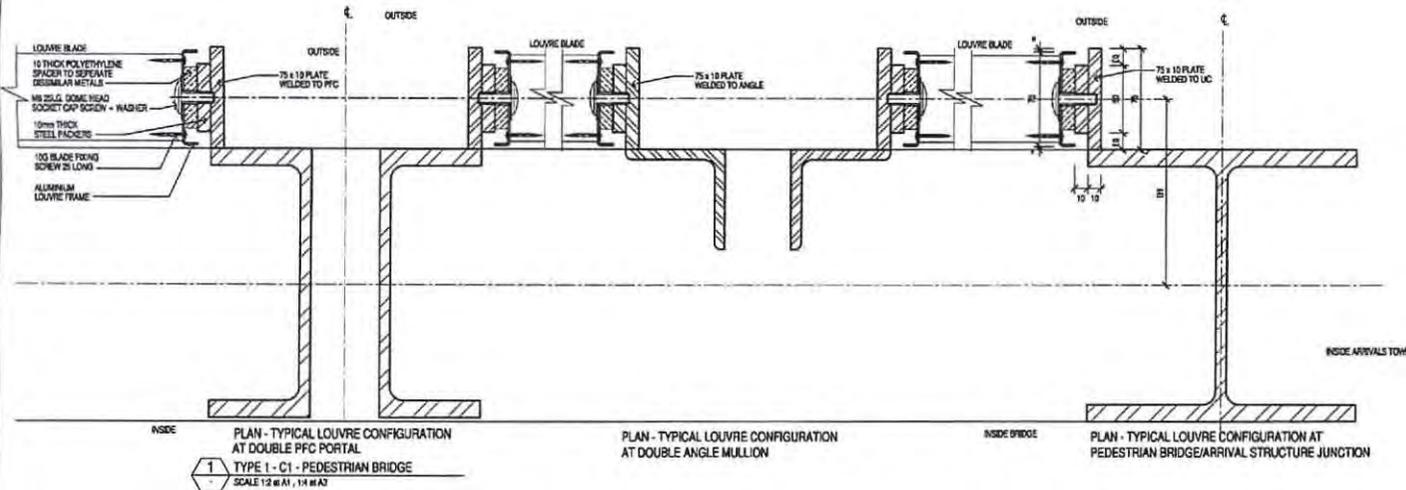
8 DETAIL  
A-4303 SCALE 1:10 at A1, 1:20 at A3



9 DETAIL  
A-4303 SCALE 1:10 at A1, 1:20 at A3



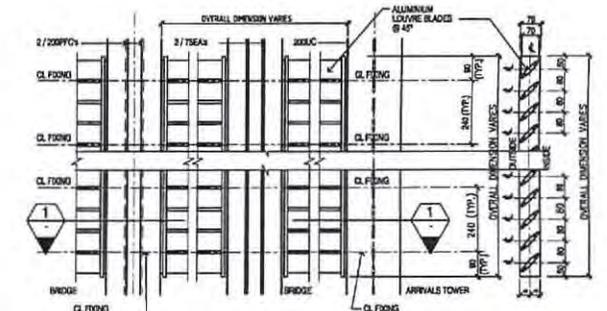
10 DETAIL  
A-4303 SCALE 1:10 at A1, 1:20 at A3



1 PLAN - TYPICAL LOUVRE CONFIGURATION AT DOUBLE PFC PORTAL  
SCALE 1:2 at A1, 1:4 at A3

PLAN - TYPICAL LOUVRE CONFIGURATION AT DOUBLE ANGLE MULLION

PLAN - TYPICAL LOUVRE CONFIGURATION AT PEDESTRIAN BRIDGE/ARRIVAL STRUCTURE JUNCTION



2 ELEVATION  
SCALE 1:10 at A1, 1:20 at A3

3 SECTION  
SCALE 1:10 at A1, 1:20 at A3

TYPICAL BRIDGE LOUVRE DETAILS

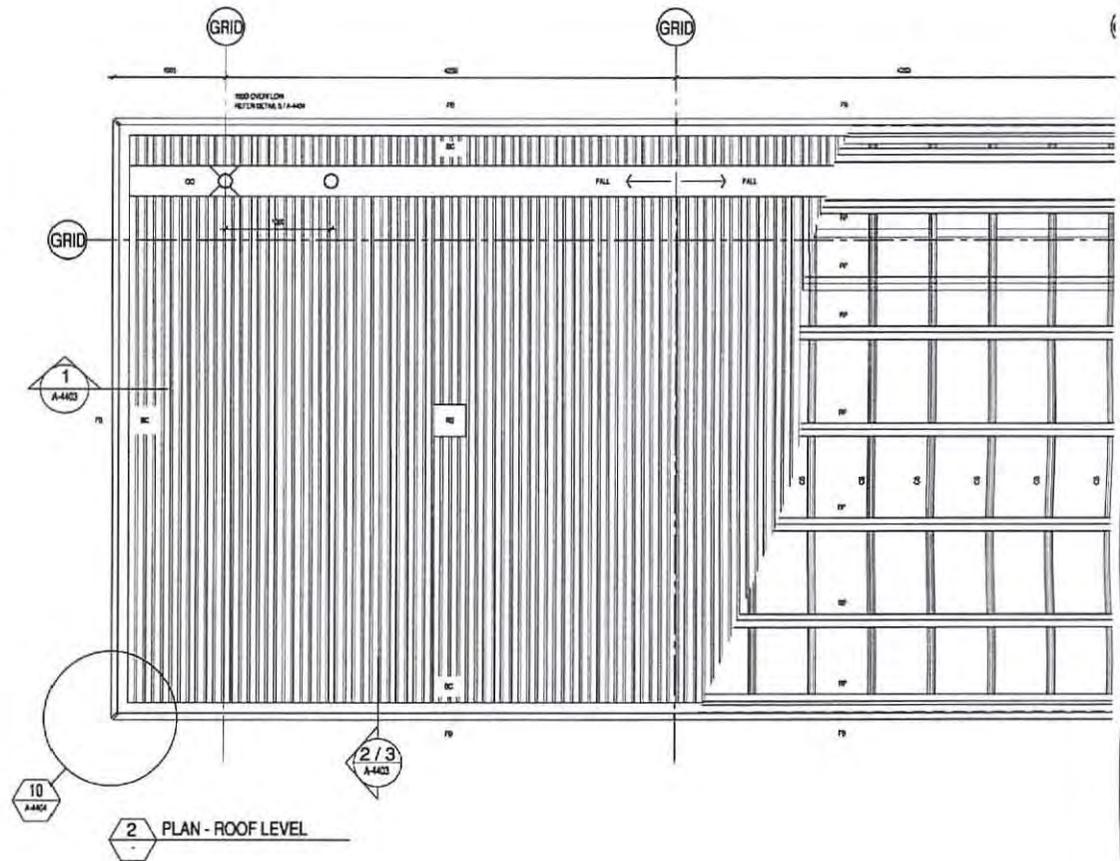
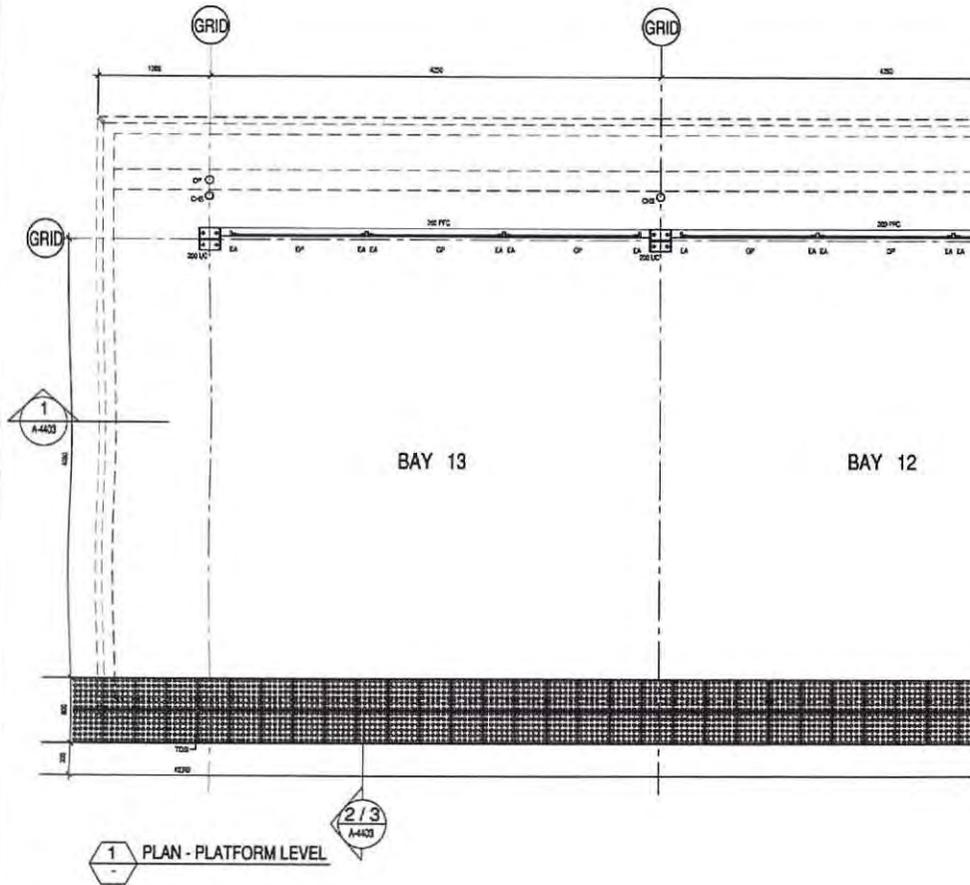
GENERIC STANDARDS FOR TRANSLINK BUSWAY STATIONS 2007 - ARCHITECTURE AND DESIGN



TRANSLINK BUSWAY STATION ARCHITECT  
ORIGINAL SIGNED BY  
DATE: .../.../2007

MANAGER  
ORIGINAL SIGNED BY  
DATE: .../.../2007  
PEDESTRIAN BRIDGE SECTIONS & DETAILS 2

SCALE AS SHOWN			
CONTRACT NO.		DT DWG NO.	
DRAWING NO. A-4304		REVISION 1	
STATUS		JOB NO.	
ISSUE		ISSUE	



GENERIC STANDARDS FOR TRANSLINK BUSWAY STATIONS 2007 - ARCHITECTURE AND DESIGN



TRANSLINK BUSWAY STATION ARCHITECT  
 ORIGINAL SIGNED BY  
 DATE: .../.../2007

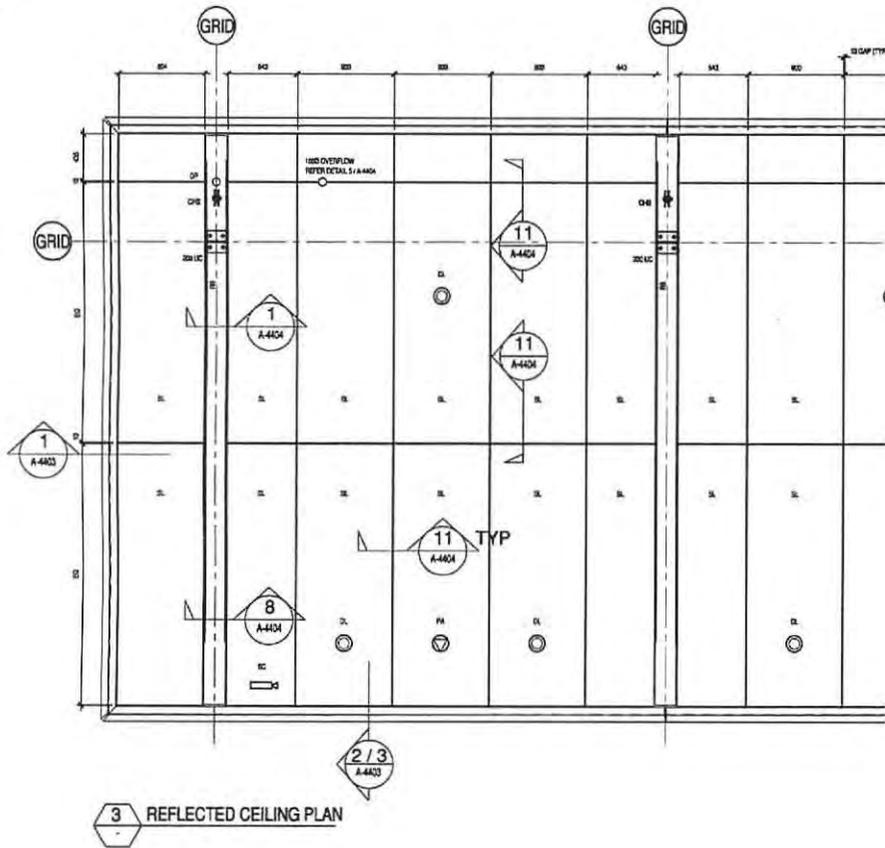
TRANSLINK BUSWAY STATION ARCHITECT QT \ ARCHITECTURE  
 CONSULTANT PROJECT TEAM

PROJECT TITLE  
 APPROVED

MANAGER  
 ORIGINAL SIGNED BY  
 DATE: .../.../2007

TITLE

SCALE 1:25 @ A1, 1:50 @ A3		CONTRACT NO. QT DWG NO.	
DRAWING NO. A-4401		REVISION 1	
1	02.08.2007	TENDER ISSUE	
DATE	STATUS	CHECKED	APPROVED
STATUS	JOB NO.	ISSUE	



GENERIC STANDARDS FOR TRANSLINK BUSWAY STATIONS 2007 - ARCHITECTURE AND DESIGN



TRANSLINK BUSWAY  
STATION ARCHITECT

TRANSLINK BUSWAY STATION ARCHITECT ST1 ARCHITECTURE

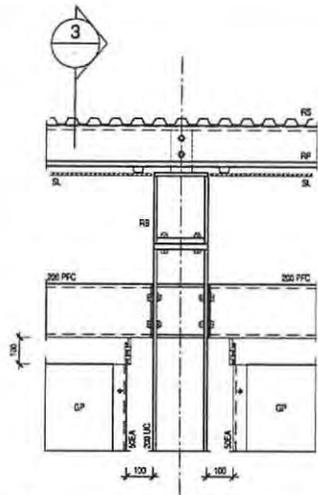
PROJECT TITLE

MANAGER  
ORIGINAL SIGNED BY  
DATE: .../.../2007

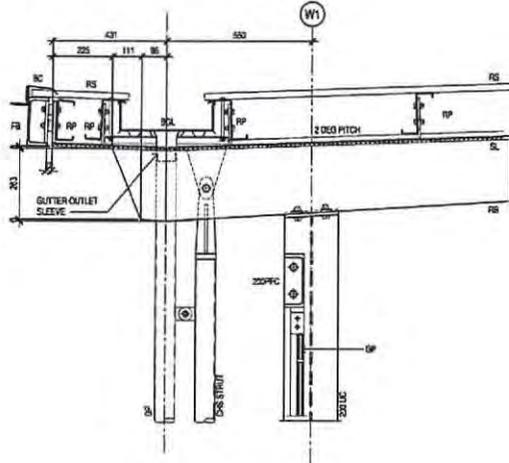
PLATFORM  
SINGLE CANTILEVER STRUCTURE  
REFLECTED CEILING PLAN

SCALE		1:25 @ A1, 1:50 @ A3	
CONTRACT NO.		01 DWG No.	
DRAWING NO.		A-4402	
REVISION		1	
1	02.05.2007	TENDER ISSUE	
ISSUE	DATE	DETAILS	
STATUS		JOB NO.	
UNLESS OTHERWISE		JWS SHALL BE IN MILLIMETRES	

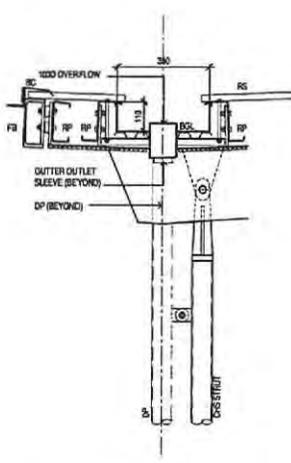




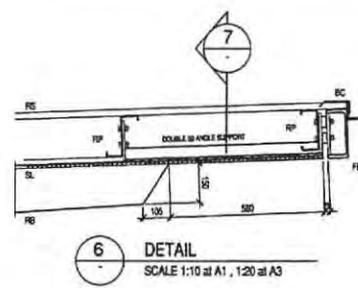
1 DETAIL  
SCALE 1:10 at A1, 1:20 at A3



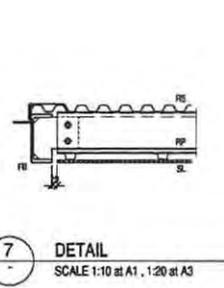
3 SECTION  
SCALE 1:10 at A1, 1:20 at A3



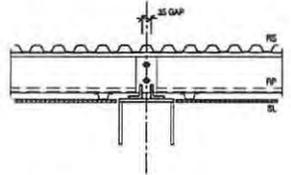
5 DETAIL- GUTTER OVERFLOW  
SCALE 1:10 at A1, 1:20 at A3



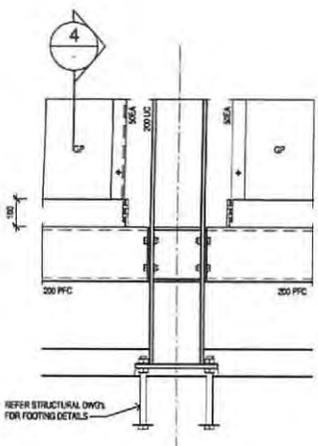
6 DETAIL  
SCALE 1:10 at A1, 1:20 at A3



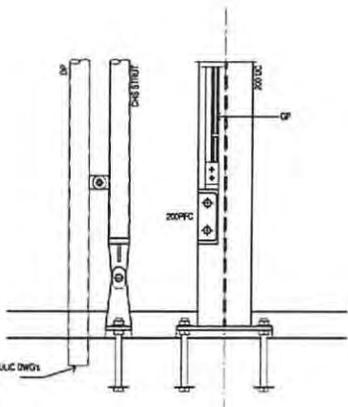
7 DETAIL  
SCALE 1:10 at A1, 1:20 at A3



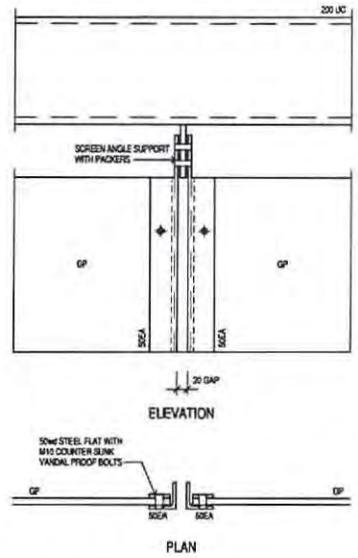
8 SECTION  
SCALE 1:10 at A1, 1:20 at A3



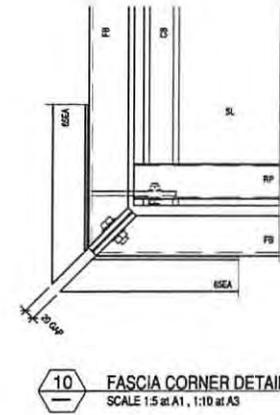
2 DETAIL  
SCALE 1:10 at A1, 1:20 at A3



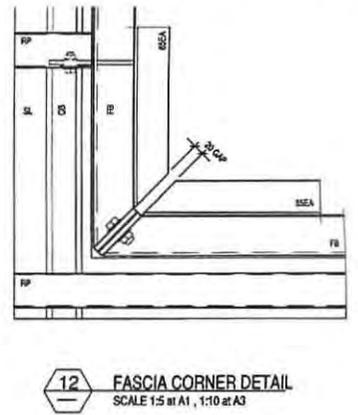
4 SECTION  
SCALE 1:10 at A1, 1:20 at A3



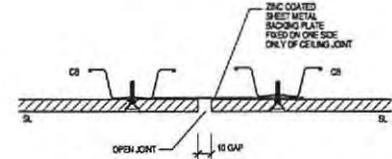
9 DETAIL - SCREEN FIXINGS  
SCALE 1:5 at A1, 1:10 at A3



10 FASCIA CORNER DETAIL  
SCALE 1:5 at A1, 1:10 at A3



12 FASCIA CORNER DETAIL  
SCALE 1:5 at A1, 1:10 at A3



11 TYPICAL SOFFIT LINING - JOINT DETAIL  
SCALE 1:2 at A1, 1:4 at A3

GENERIC STANDARDS FOR TRANSLINK BUSWAY STATIONS 2007 - ARCHITECTURE AND DESIGN



TRANSLINK BUSWAY STATION ARCHITECT  
ORIGINAL SIGNED BY  
DATE: 2007

TRANSLINK BUSWAY STATION ARCHITECT  
GT I ARCHITECTURE  
CONSULTANT PROJECT TEAM

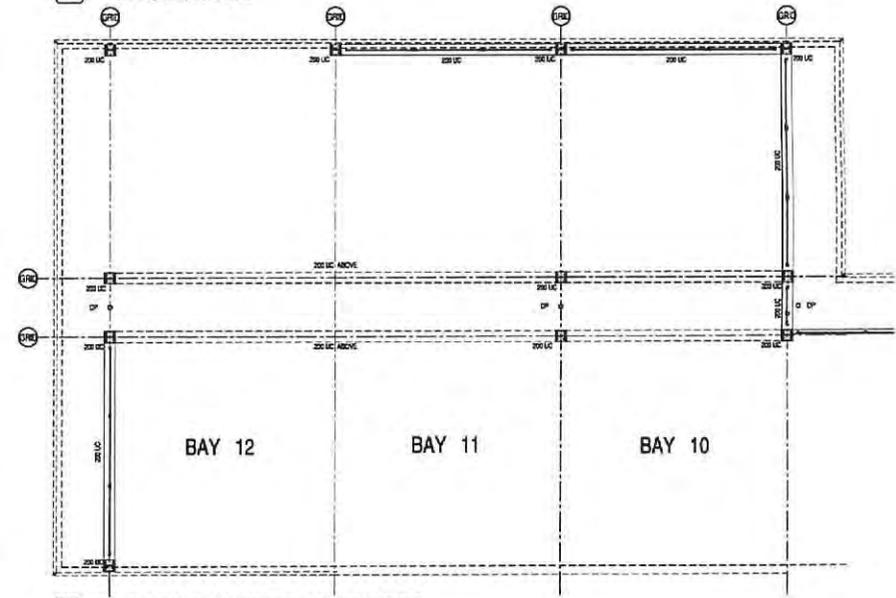
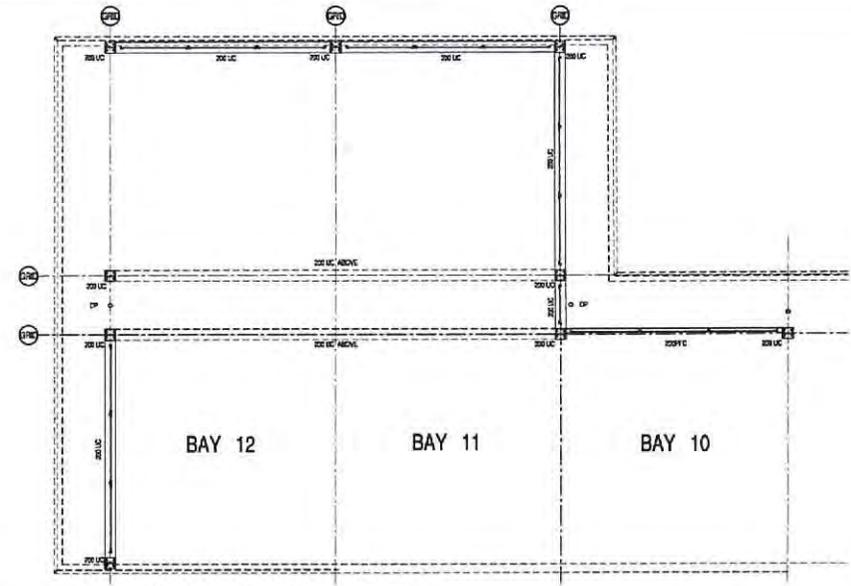
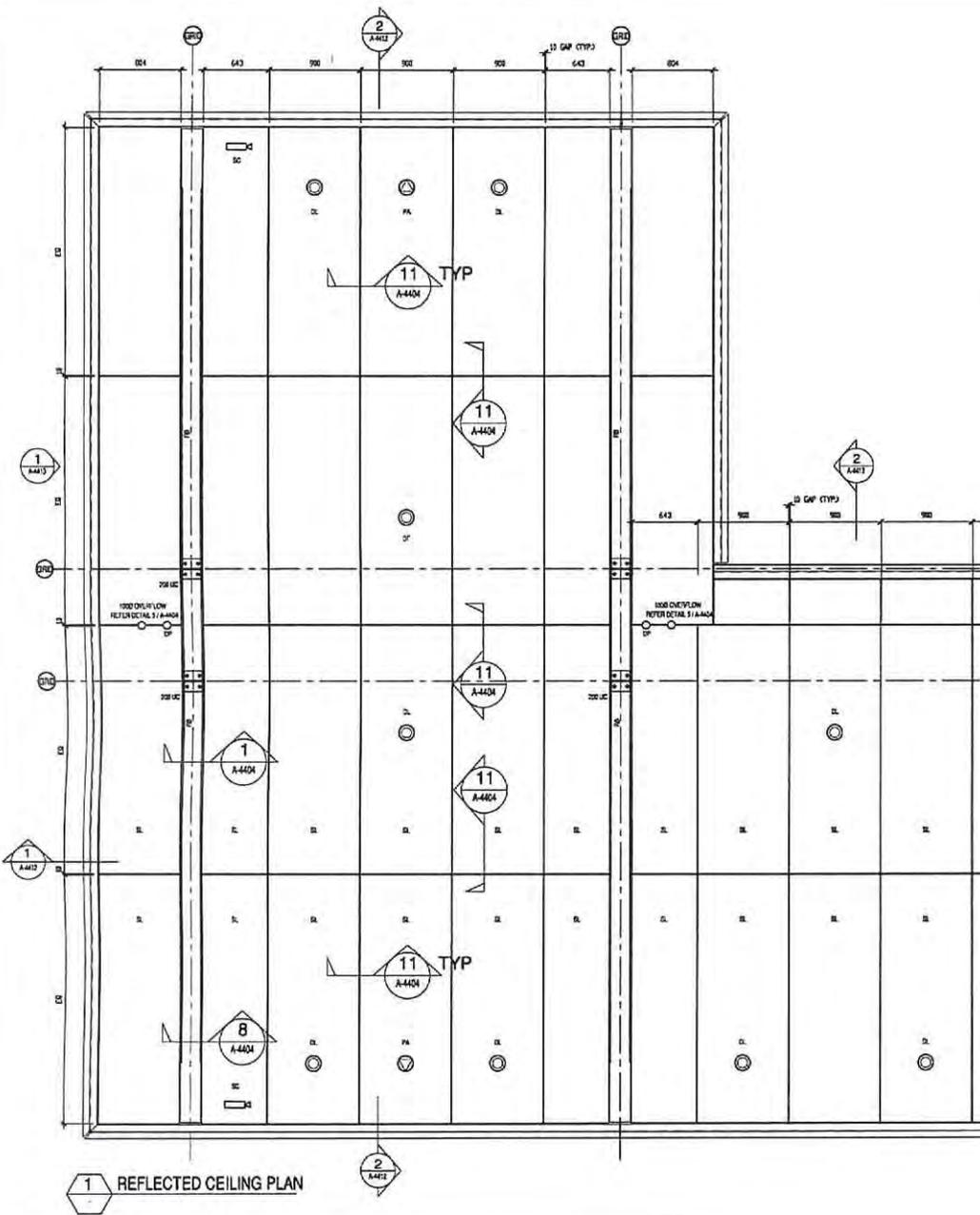
PROJECT TITLE  
APPROVED

UNRWA  
ORIGINAL SIGNED BY  
DATE: 2007  
TITLE

PLATFORM CANTILEVER STRUCTURES  
TYPICAL DETAILS

SCALE		AS NOTED	
CONTRACT NO.		GT DWG No.	
DRAWING NO.		A-4404	
REVISION		1	
ISSUE	DATE	TENDER ISSUE	DETAIL
1	22/08/2007		
STATUS		JOB NO.	
UNLESS OTHERWISE NOTED		DIMENSIONS SHALL BE IN MILLIMETRES	





GENERIC STANDARDS FOR TRANSLINK BUSWAY STATIONS 2007 - ARCHITECTURE AND DESIGN

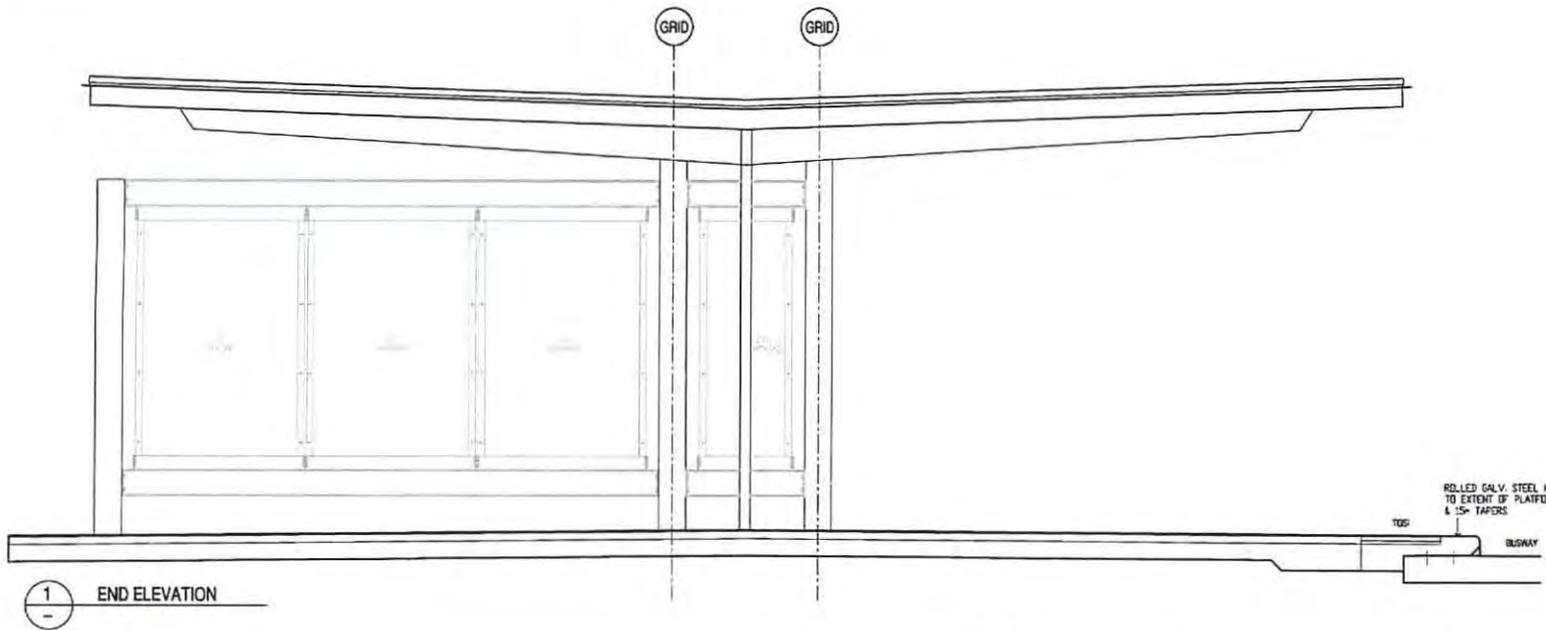
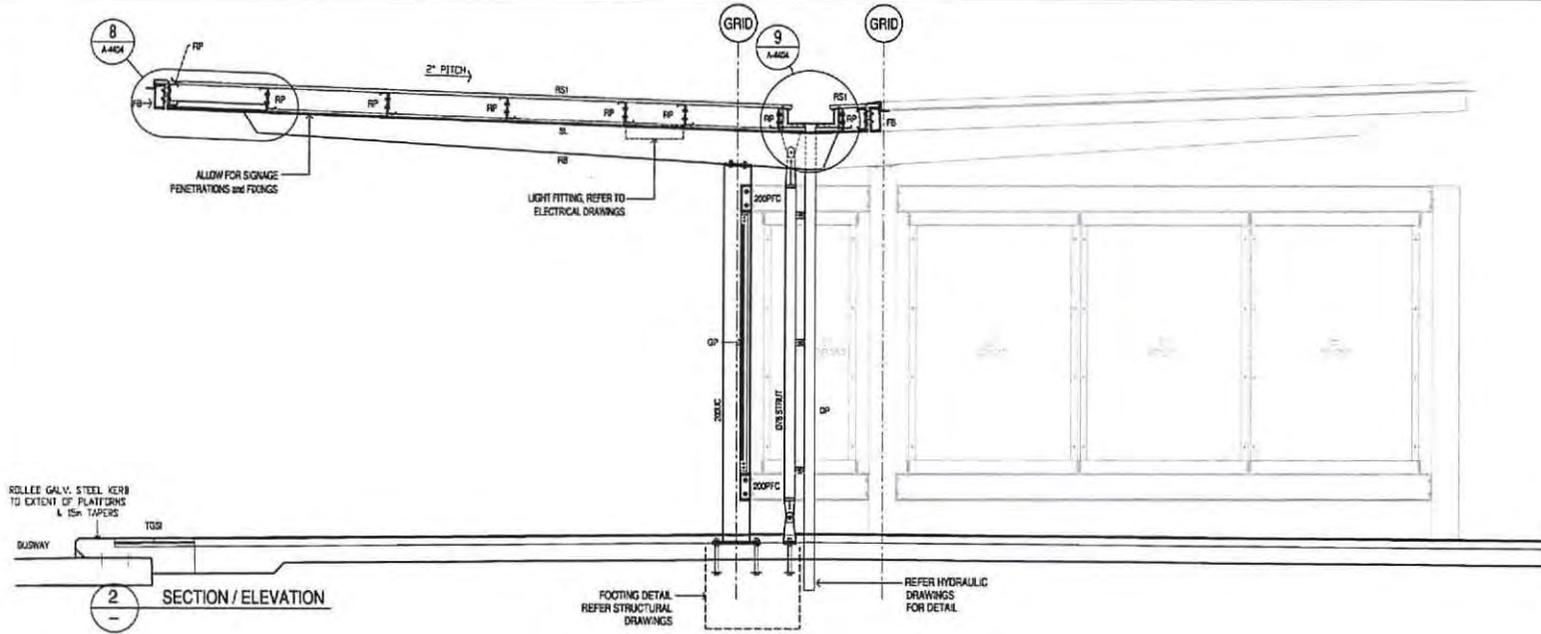


TRANSLINK BUSWAY STATION ARCHITECT  
 TRANSLINK BUSWAY STATION ARCHITECT DT | ARCHITECTURE  
 ORIGINAL SIGNED BY  
 DATE: .../.../2007

PROJECT TITLE  
 MANAGER  
 ORIGINAL SIGNED BY  
 DATE: .../.../2007  
 PLATFORM STRUCTURE  
 DUAL CANTILEVER  
 REFLECTED CEILING PLAN

SCALE 1:25 @ A1, 1:50 @ A3			
CONTRACT NO.		DT DWG No.	
DRAWING NO. A-4411		REVISION 1	
ISSUE	DATE	STATUS	ISSUE





GENERIC STANDARDS FOR TRANSLINK BUSWAY STATIONS 2007 - ARCHITECTURE AND DESIGN



TRANSLINK BUSWAY  
 PLATFORM ARCHITECT  
 ORIGINAL SIGNED BY  
 DATE: / / 2007

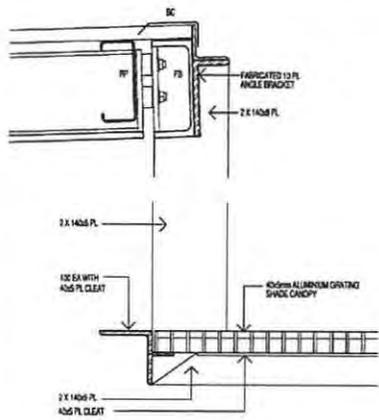
TRANSLINK BUSWAY STATION ARCHITECT QT\1 ARCHITECTURE  
 ORIGINAL SIGNED BY  
 DATE: / / 2007

PROJECT TITLE  
 PLATFORM STRUCTURE  
 DUAL CANTILEVER  
 ELEVATION / SECTIONS

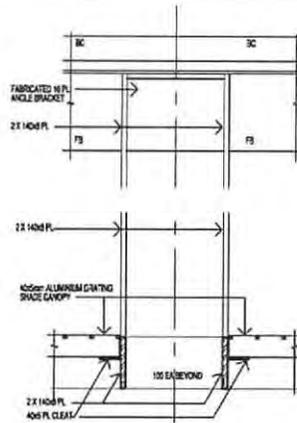
MANAGER  
 ORIGINAL SIGNED BY  
 DATE: / / 2007

SCALE 1:25 @ A1, 1:50 @ A3	
CONTRACT NO. QT DWS 16	
ISSUE	DATE
1	08.08.2007
TENDER ISSUE	DETAILS
STATUS	UNLESS OTHER
DRAWING NO. A-4413	REVISION 1
JOB NO.	ISSUE

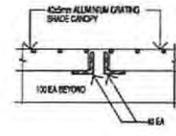




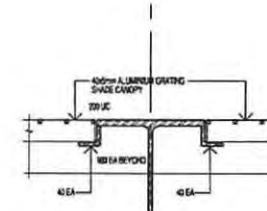
3 SECTIONAL DETAIL  
SCALE 1:5 at A1, 1:10 at A3



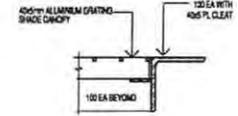
4 SECTIONAL DETAIL  
SCALE 1:5 at A1, 1:10 at A3



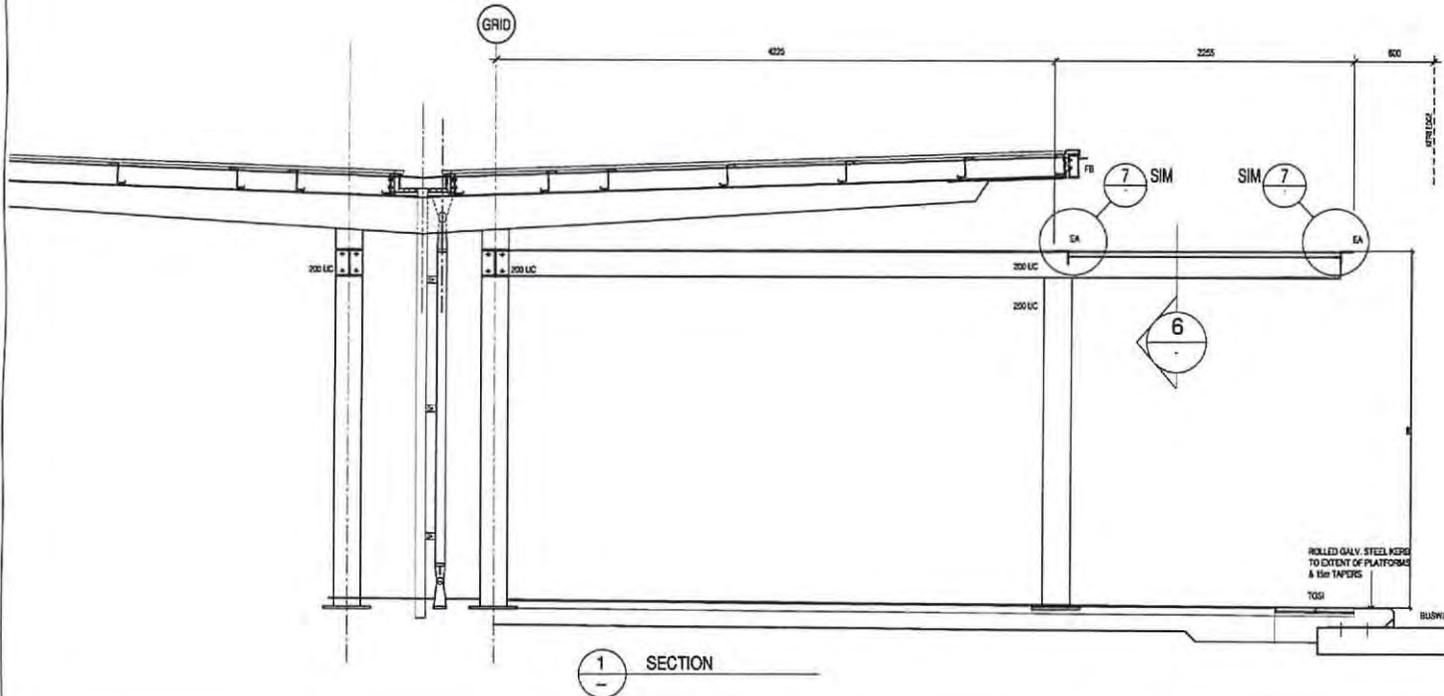
5 SECTIONAL DETAIL  
SCALE 1:5 at A1, 1:10 at A3



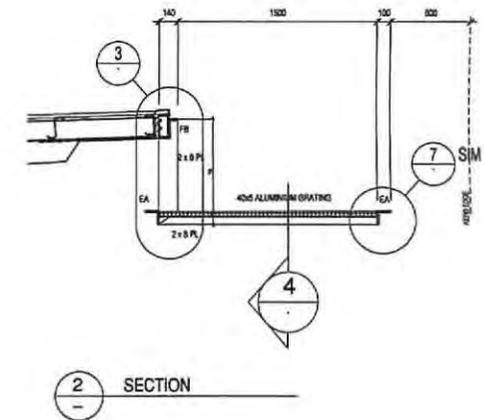
6 SECTIONAL DETAIL  
SCALE 1:5 at A1, 1:10 at A3



7 SECTIONAL DETAIL  
SCALE 1:5 at A1, 1:10 at A3



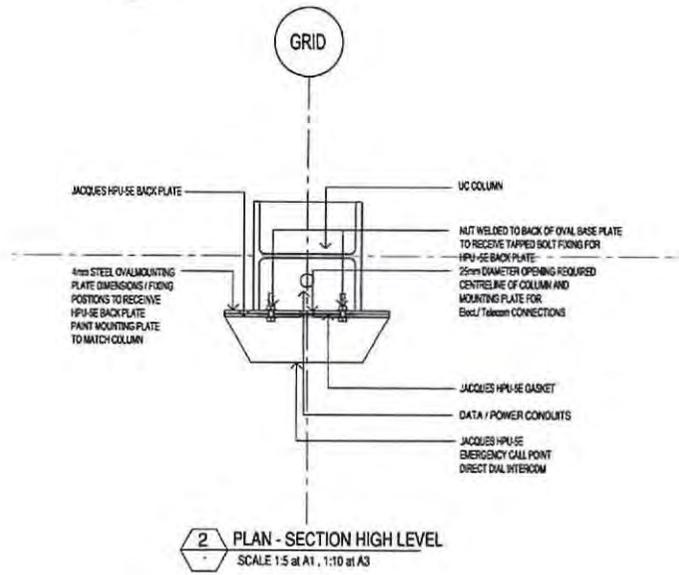
1 SECTION



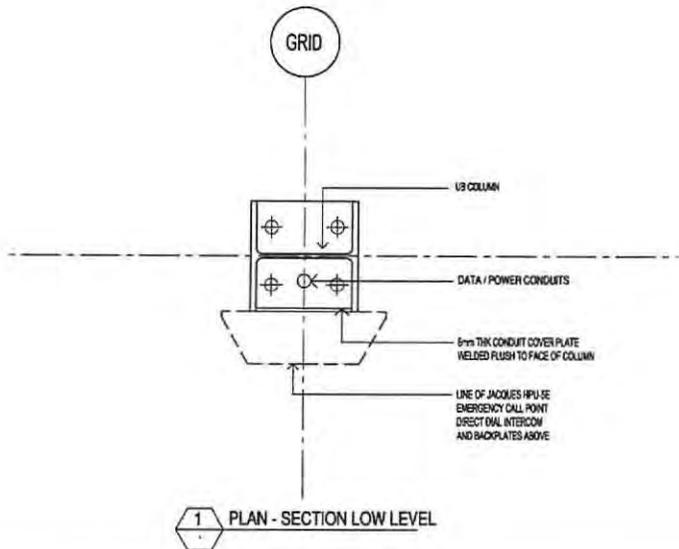
2 SECTION

GENERIC STANDARDS FOR TRANSLINK BUSWAY STATIONS 2007 - ARCHITECTURE AND DESIGN

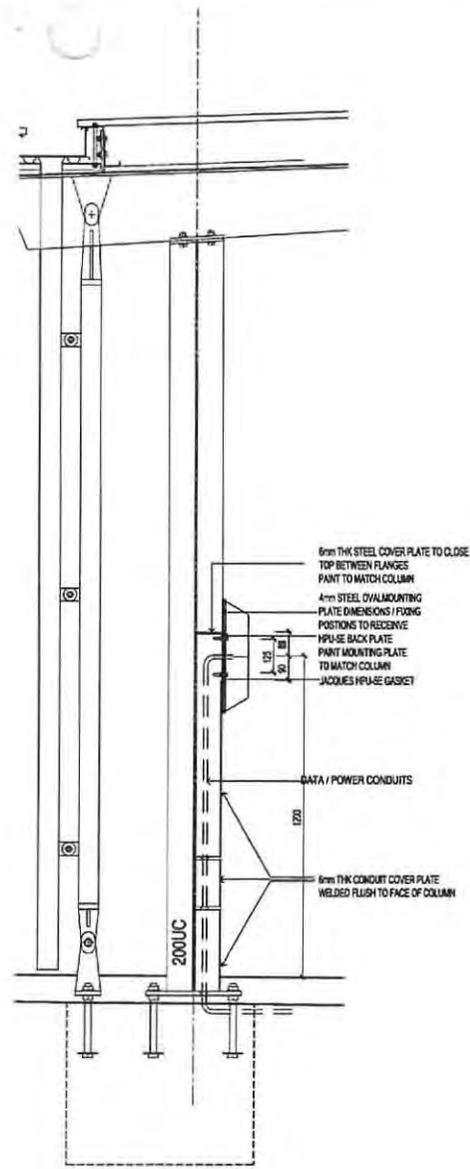
		TRANSLINK BUSWAY STATION ARCHITECT	TRANSLINK BUSWAY STATION ARCHITECT	GT1 ARCHITECTURE	MANAGER	TRANSLINK BUSWAY STATION SHADE CANOPY SECTIONS, DETAILS	SCALE 1:20 @ A1, 1:40 @ A3 AS SHOWN CONTRACT NO.      DT DWG No. DRAWING NO. A-4421      REVISION 1 ISSUE DATE      TENDER ISSUE      DETAILS      CHECKED      DATED STATUS      UNLESS OTHERWISE NOTED      UNDO SHALL BE IN MILLIMETRES USE REQUIRED DIMENSIONS IN PREFERENCE TO SCALING CONTRACTOR SHALL CONFIRM ALL DIMENSIONS AND DETAILS PRIOR TO CONSTRUCTION
		ORIGINAL SIGNED BY	DATE: .../.../2007	CONSULTANT PROJECT TEAM	APPROVED		
© COPYRIGHT QUEENSLAND GOVERNMENT - QUEENSLAND TRANSPORT 2007 ALL RIGHTS RESERVED. NO PART OF THIS DOCUMENT MAY BE REPRODUCED, STORED IN ANY RETRIEVAL SYSTEM OR TRANSMITTED IN ANY FORM OR BY ANY MEANS, ELECTRONIC, MECHANICAL, PHOTOCOPIING, RECORDING OR OTHERWISE WITHOUT PRIOR WRITTEN PERMISSION OF QUEENSLAND TRANSPORT							



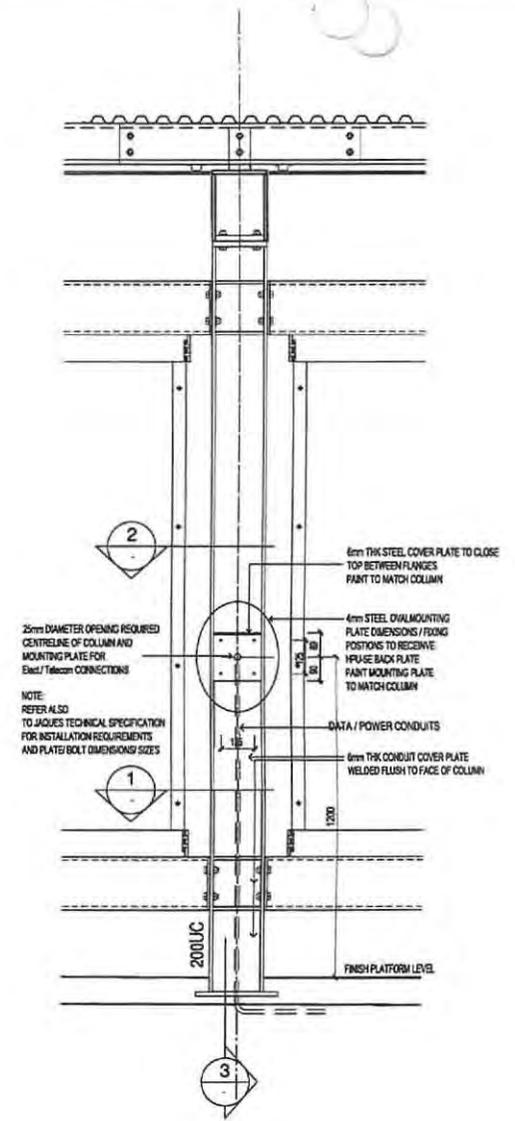
2 PLAN - SECTION HIGH LEVEL  
SCALE 1:5 at A1, 1:10 at A3



1 PLAN - SECTION LOW LEVEL



3 SECTION  
SCALE 1:10 at A1, 1:20 at A3



4 ELEVATION  
SCALE 1:10 at A1, 1:20 at A3

GENERIC STANDARDS FOR TRANSLINK BUSWAY STATIONS 2007 - ARCHITECTURE AND DESIGN

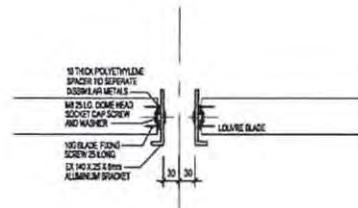


TRANSLINK BUSWAY STATION ARCHITECT  
ORIGINAL DRAWN BY  
DATE: .../.../2007

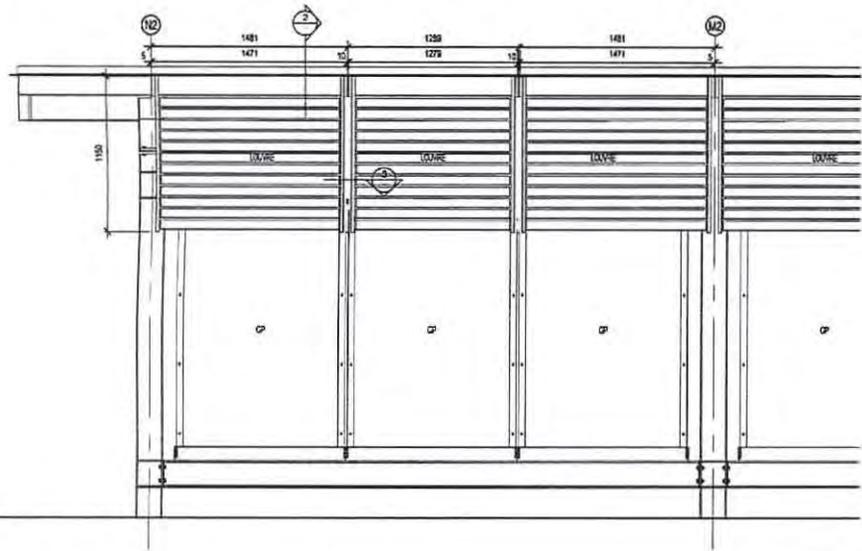
GT1 ARCHITECTURE  
MANAGER  
ORIGINAL SCALED BY  
DATE: .../.../2007

PLATFORM EMERGENCY CALL POINT DETAILS

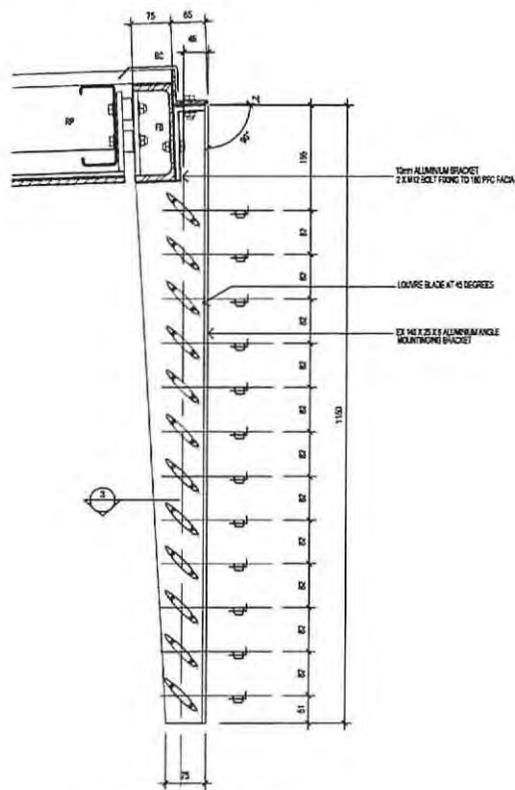
SCALE AS NOTED				
CONTRACT NO. 07 DWG NO.				
DRAWING NO. A-5401				
REVISION 1				
1	02.05.2007	TENDER ISSUE	CF/AM	CF/FOOD APPROVED
STATUS				



3 SECTION THROUGH LOUVRE BRACKET  
Scale 1:5 @ A1, 1:10 @ A3



1 ELEVATION OF LOUVRE PANELS  
1:20 @ A1, 1:40 @ A3



2 SECTION THROUGH LOUVRES  
1:5 @ A1, 1:10 @ A3

GENERIC STANDARDS FOR TRANSLINK BUSWAY STATIONS 2007 - ARCHITECTURE AND DESIGN

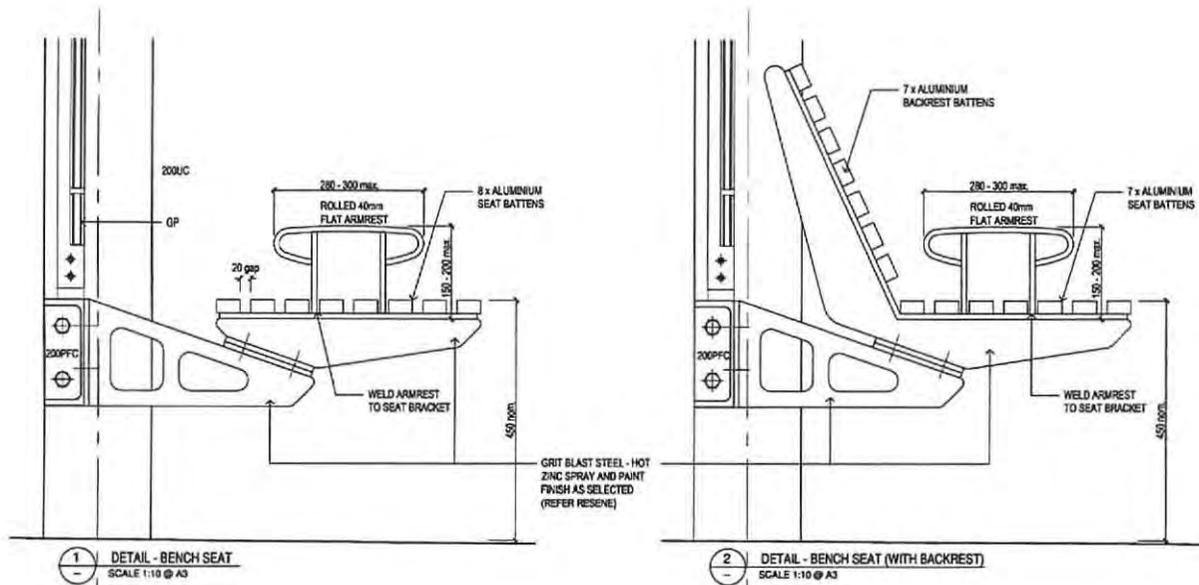


TRANSLINK BUSWAY STATION ARCHITECT  
ORIGINAL SIGNED BY  
DATE: .../.../2007

TRANSLINK BUSWAY STATION ARCHITECT AT \ ARCHITECTURE  
APPROVED

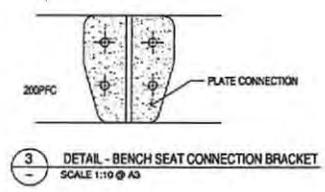
MANAGER  
ORIGINAL SIGNED BY  
DATE: .../.../2007  
PLATFORM SUNSCREEN LOUVRES  
ELEVATION, DETAILS

SCALE				AS NOTED	
CONTRACT NO.				GT 0403/04	
DRAWING NO.				A5402	
REVISION				1	
1	05/05/2007	TRACKER	000	000	000
ISSUE	DATE	TRACKER	DETAILS	CHECKED	BY
JOB NO.					



1 - DETAIL - BENCH SEAT  
SCALE 1:10 @ A3

2 - DETAIL - BENCH SEAT (WITH BACKREST)  
SCALE 1:10 @ A3



3 - DETAIL - BENCH SEAT CONNECTION BRACKET  
SCALE 1:10 @ A3

GENERIC STANDARDS FOR TRANSLINK BUSWAY STATIONS 2007 - ARCHITECTURE AND DESIGN



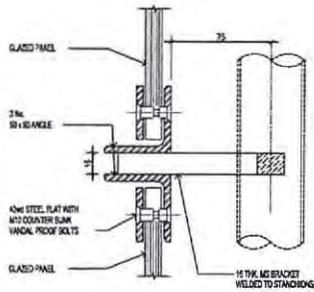
TRANSLINK BUSWAY STATION ARCHITECT  
ORIGINAL SIGNED BY  
DATE: .../.../2007

TRANSLINK BUSWAY STATION ARCHITECT: GT1 ARCHITECTURE  
CONSULTANT PROJECT TEAM

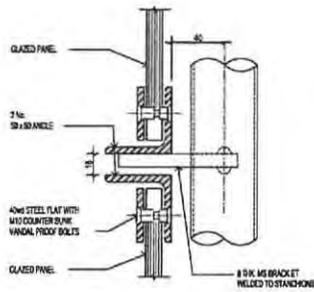
PROJECT TITLE  
MANAGER  
ORIGINAL SIGNED BY  
DATE: .../.../2007

PLATFORM CANTILEVER FURNITURE  
SECTION, DETAILS

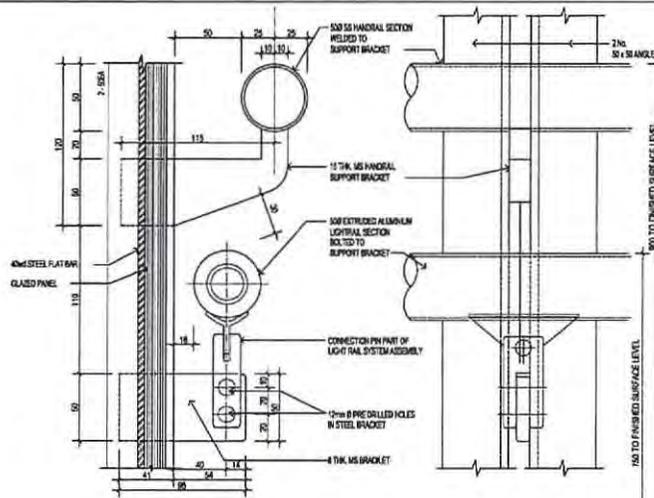
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CONTRACT NO.				DT DWG No.	
DRAWING NO.		A-5403		REVISION	
1		1			
ISSUE	DATE	TENDER ISSUE	DETAILS	CHECKED	APPROVED
STATUS					
JOB NO.				JOB NO.	



1 PLAN DETAIL - HANDRAIL BRACKET  
SCALE 1:2 @ A1, 1:4 @ A3

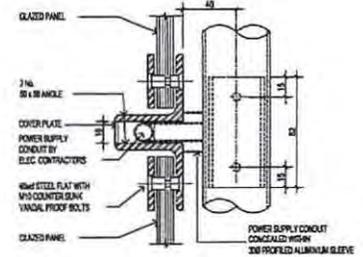


2 PLAN DETAIL - LIGHTRAIL BRACKET  
SCALE 1:2 @ A1, 1:4 @ A3

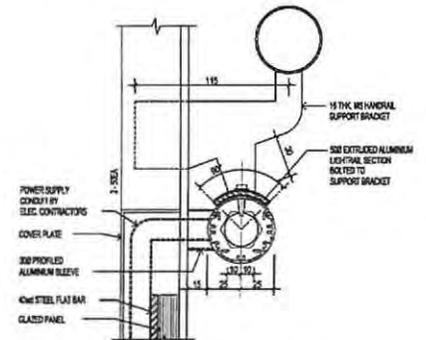


3 SECTION - HANDRAIL BRACKET  
SCALE 1:2 @ A1, 1:4 @ A3

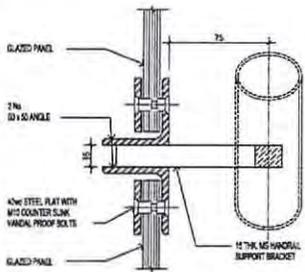
4 ELEVATION - HANDRAIL BRACKET  
SCALE 1:2 @ A1, 1:4 @ A3



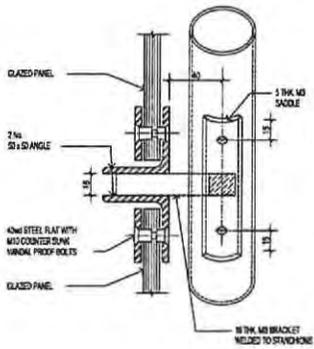
9 PLAN DETAIL - LIGHTRAIL BRACKET  
AT POWER SUPPLY ENTRY POINT  
SCALE 1:2 @ A1, 1:4 @ A3



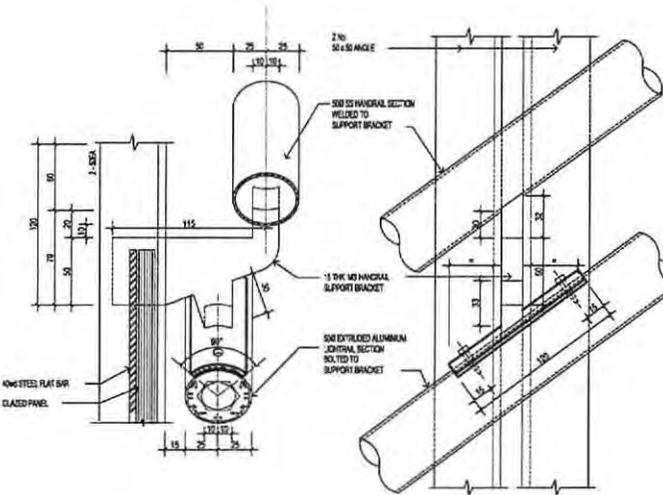
10 SECTION - LIGHTRAIL BRACKET  
AT POWER SUPPLY ENTRY POINT  
SCALE 1:2 @ A1, 1:4 @ A3



5 PLAN DETAIL - HANDRAIL BRACKET  
SCALE 1:2 @ A1, 1:4 @ A3

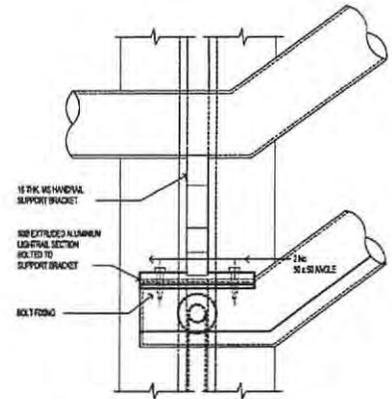


6 PLAN DETAIL - LIGHTRAIL BRACKET  
SCALE 1:2 @ A1, 1:4 @ A3



7 SECTION - HANDRAIL BRACKET  
SCALE 1:2 @ A1, 1:4 @ A3

8 ELEVATION - HANDRAIL BRACKET  
SCALE 1:2 @ A1, 1:4 @ A3



11 ELEVATION - LIGHTRAIL BRACKET  
AT POWER SUPPLY ENTRY POINT  
SCALE 1:2 @ A1, 1:4 @ A3

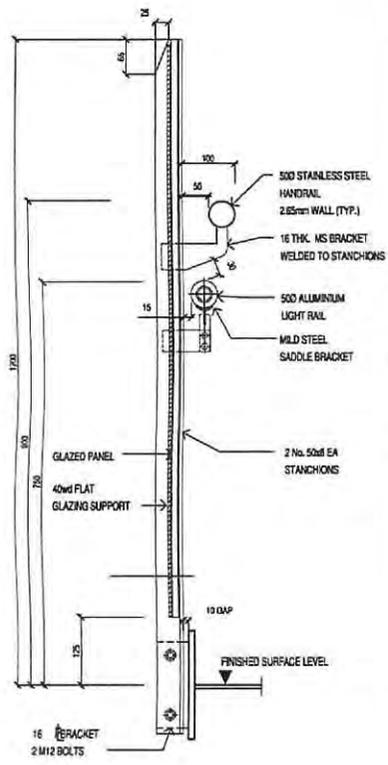
GENERIC STANDARDS FOR TRANSLINK BUSWAY STATIONS 2007 - ARCHITECTURE AND DESIGN



TRANSLINK BUSWAY STATION ARCHITECT  
ORIGINAL DRAWING BY  
DATE: .../.../2007  
TRANSLINK BUSWAY STATION ARCHITECT GT | ARCHITECTURE  
CONSULTANT PROJECT TEAM

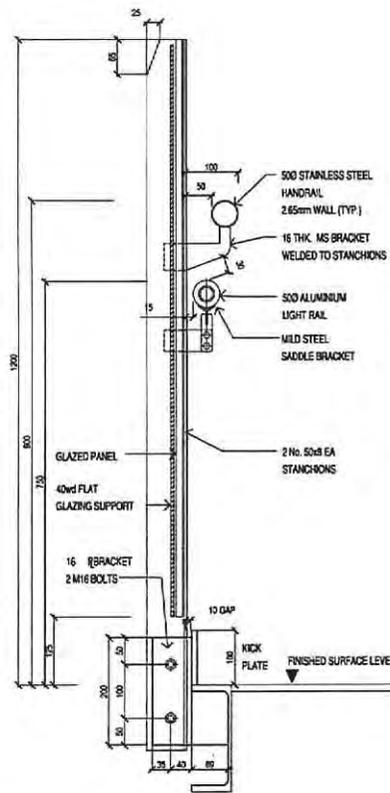
PROJECT TITLE  
MANAGER  
ORIGINAL DRAWN BY  
DATE: .../.../2007  
HANDRAIL DETAILS  
APPROVED  
TITLE

SCALE	1:2 @ A1, 1:4 @ A3
CONTRACT NO.	GT 07/01 No.
DRAWING NO.	A-5404
REVISION	1
JOB NO.	
ISSUE	



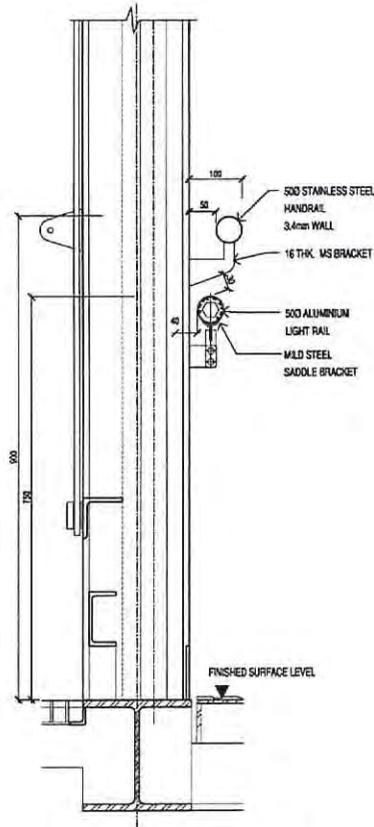
1 BALUSTRADE TYPE BT-G1  
SCALE 1:5 at A1, 1:10 at A3

TYPICAL LOCATION:  
ARRIVAL STRUCTURES  
REFER DETAIL PLANS  
FOR STANCHION SETOUT



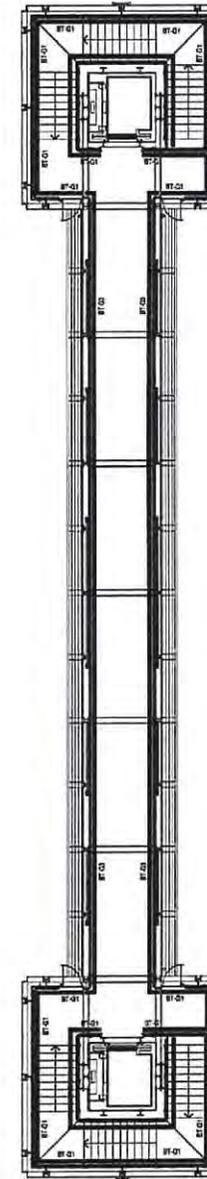
2 BALUSTRADE TYPE BT-G2  
SCALE 1:5 at A1, 1:10 at A3

TYPICAL LOCATION:  
ARRIVAL STRUCTURE TYPE 2 D1  
DECK AT PLATFORM LEVEL LIFT  
REFER DETAIL PLANS  
FOR STANCHION SETOUT



3 BALUSTRADE TYPE BT-G3  
SCALE 1:5 at A1, 1:10 at A3

TYPICAL LOCATION:  
PEDESTRIAN BRIDGE  
REFER DETAIL PLANS  
3 / A-400, 4 / A-403 AND 5 / A-405  
FOR HANDRAIL BRACKET AT PFC JUNCTION,  
HANDRAIL STANCHION AT EA MULLION  
AND HANDRAIL BRACKET AT 200 UC



1 BALUSTRADE TYPE PLAN  
BRIDGE LEVEL

GENERIC STANDARDS FOR TRANSLINK BUSWAY STATIONS 2007 - ARCHITECTURE AND DESIGN

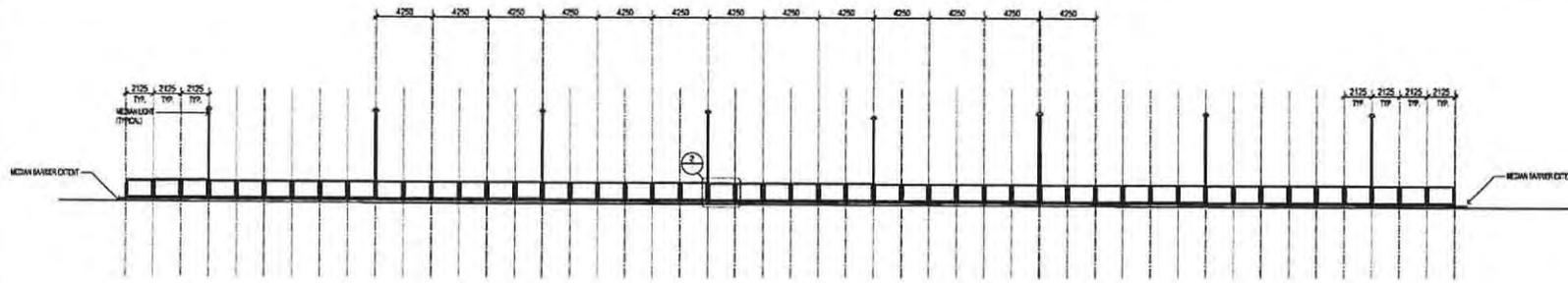


TRANSLINK BUSWAY STATION ARCHITECT  
ORIGINAL SIGNED BY  
DATE 11/03/07

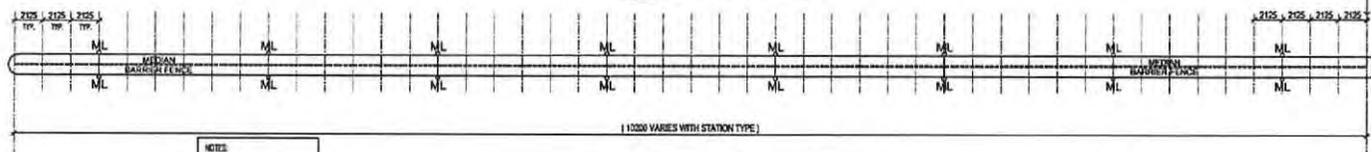
MANAGER  
ORIGINAL SIGNED BY  
DATE 11/03/07

BALUSTRADE TYPES  
SETOUT, DETAILS

SCALE					AS SHOWN	
CONTRACT NO.					DT DRG No.	
DRAWING NO.					A-5405	
REVISION					1	
JOB NO.					ISSUE	



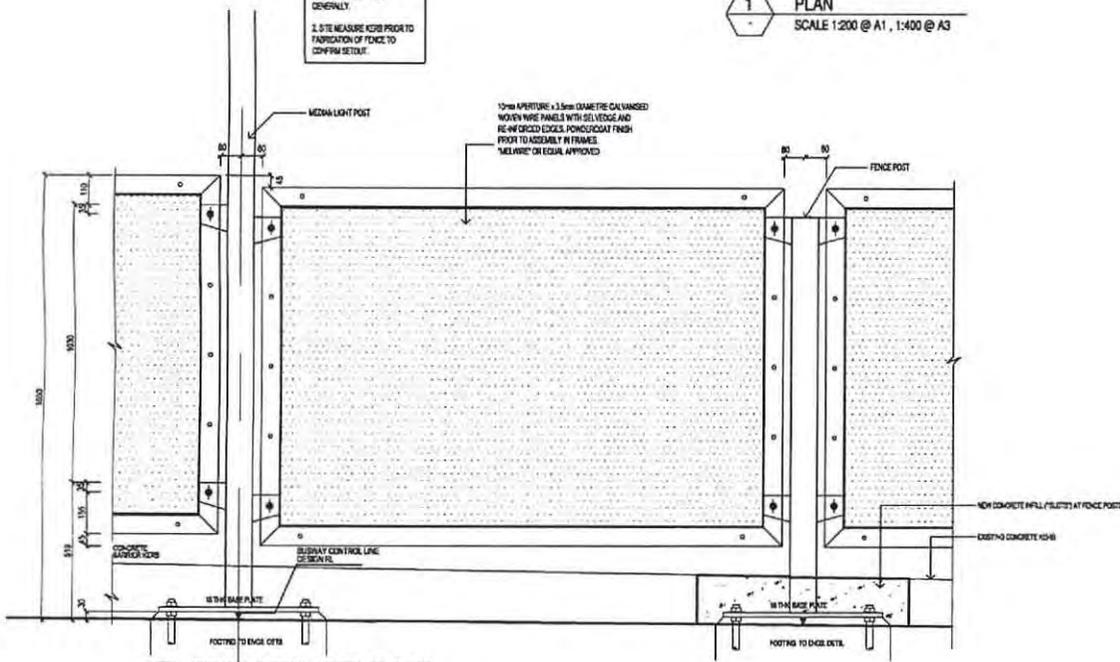
1 ELEVATION AT MEDIAN BARRIER  
SCALE 1:200 @ A1, 1:400 @ A3



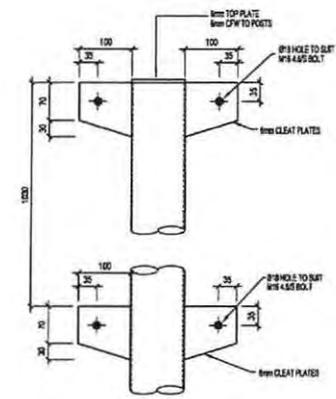
1 PLAN  
SCALE 1:200 @ A1, 1:400 @ A3

NOTES:  
1. POWDERCOAT FINISH GENERALLY.  
2. SITE MEASURE KEYS PRIOR TO FABRICATION OF FENCE TO CONFIRM SETOUT.

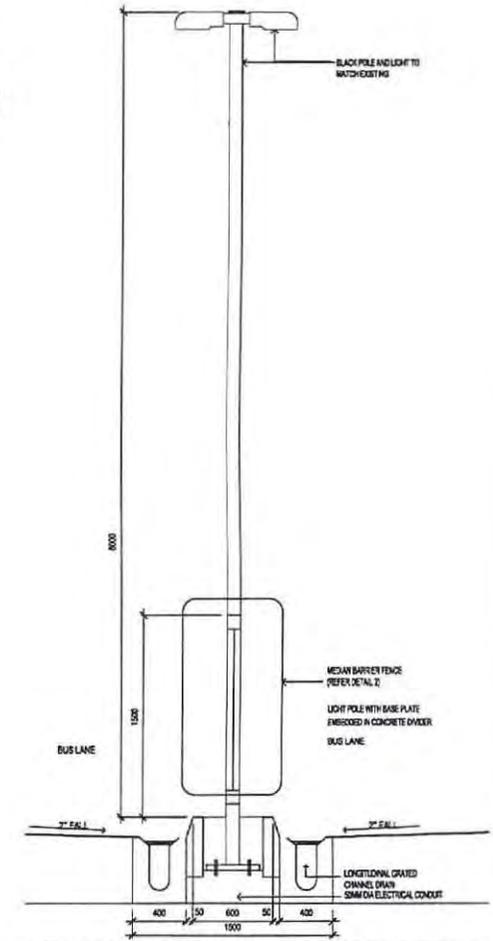
FENCE POST LOCATIONS INDICATED WITH DOT-DASH GRID LINES (TYPICAL)



2 TYPICAL DETAIL AT FENCE POST  
Scale 1:10 @ A1; 1:20 @ A3



3 FENCE POST SCREEN CLEAT DETAIL  
Scale 1:5 @ A1, 1/10 @ A3



4 TYPICAL CROSSSECTION @ BUSWAY CENTRE MEDIAN  
Scale 1:10 @ A1; 1:20 @ A3

GENERIC STANDARDS FOR TRANSLINK BUSWAY STATIONS 2007 - ARCHITECTURE AND DESIGN

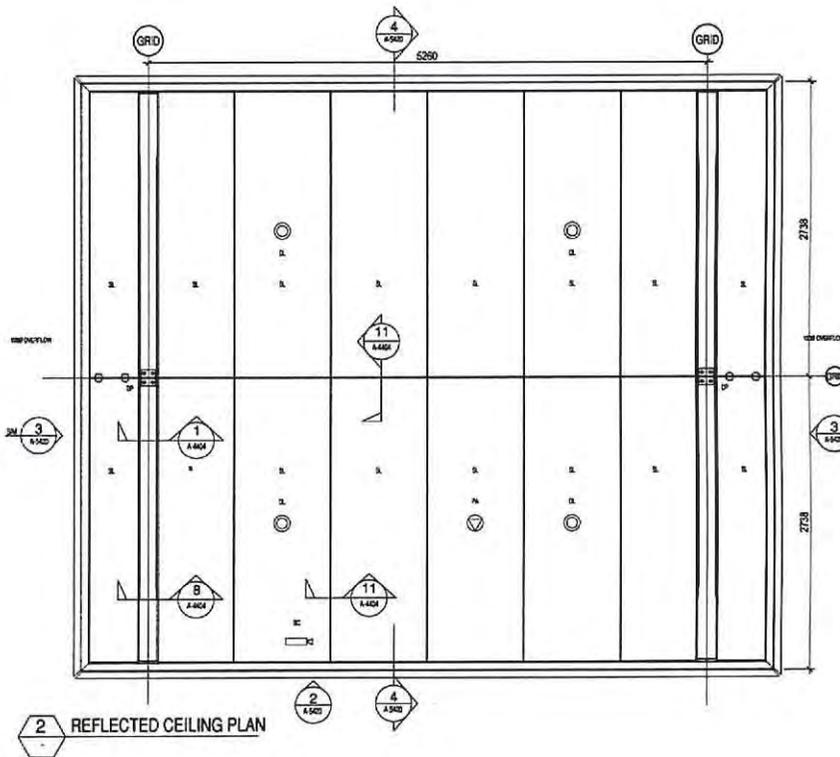
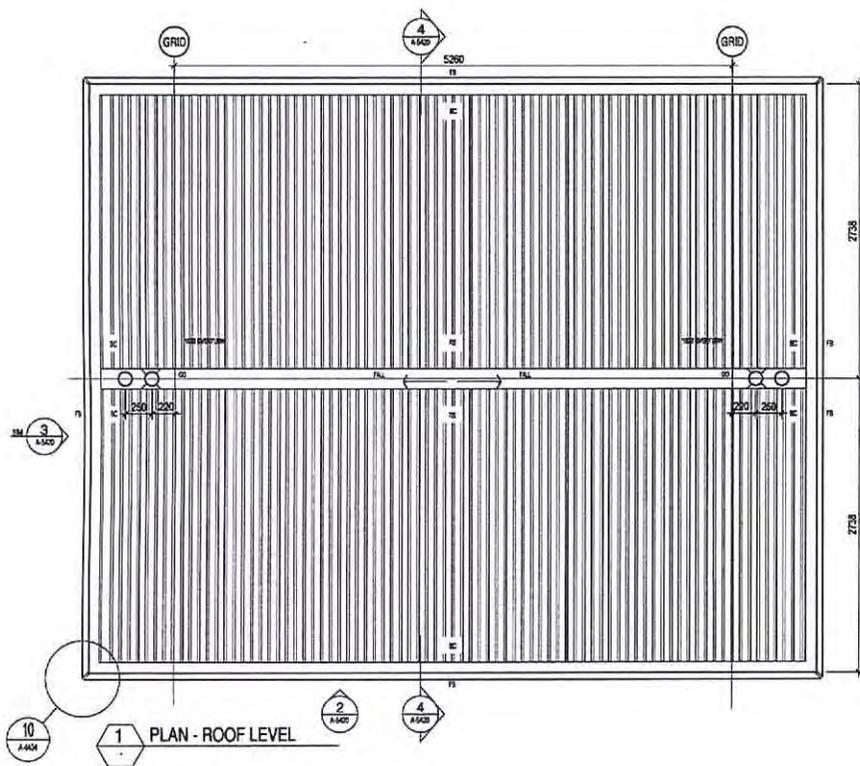


TRANSLINK BUSWAY STATION ARCHITECT  
ORIGINAL SIGNED BY [Signature]  
DATE: 11/05/2007  
TRANSLINK BUSWAY STATION ARCHITECT DT ARCHITECTURE  
CONSULTANT PROJECT TEAM

MANAGER  
ORIGINAL SIGNED BY [Signature]  
DATE: 11/05/2007  
MEDIAN BARRIER DETAILS

SCALE AS NOTED			
CONTRACT NO. QT 090161			
DRAWING NO. A-5406			
REVISION 1			
1	01/05/2007	TENDER BIBLE	
ISSUE	DATE	DETAILS	CHECKED
STATUS			
UNLESS OTHERWISE STATED, ALL DIMENSIONS SHALL BE IN MILLIMETRES			





GENERIC STANDARDS FOR TRANSLINK BUSWAY STATIONS 2007 - ARCHITECTURE AND DESIGN



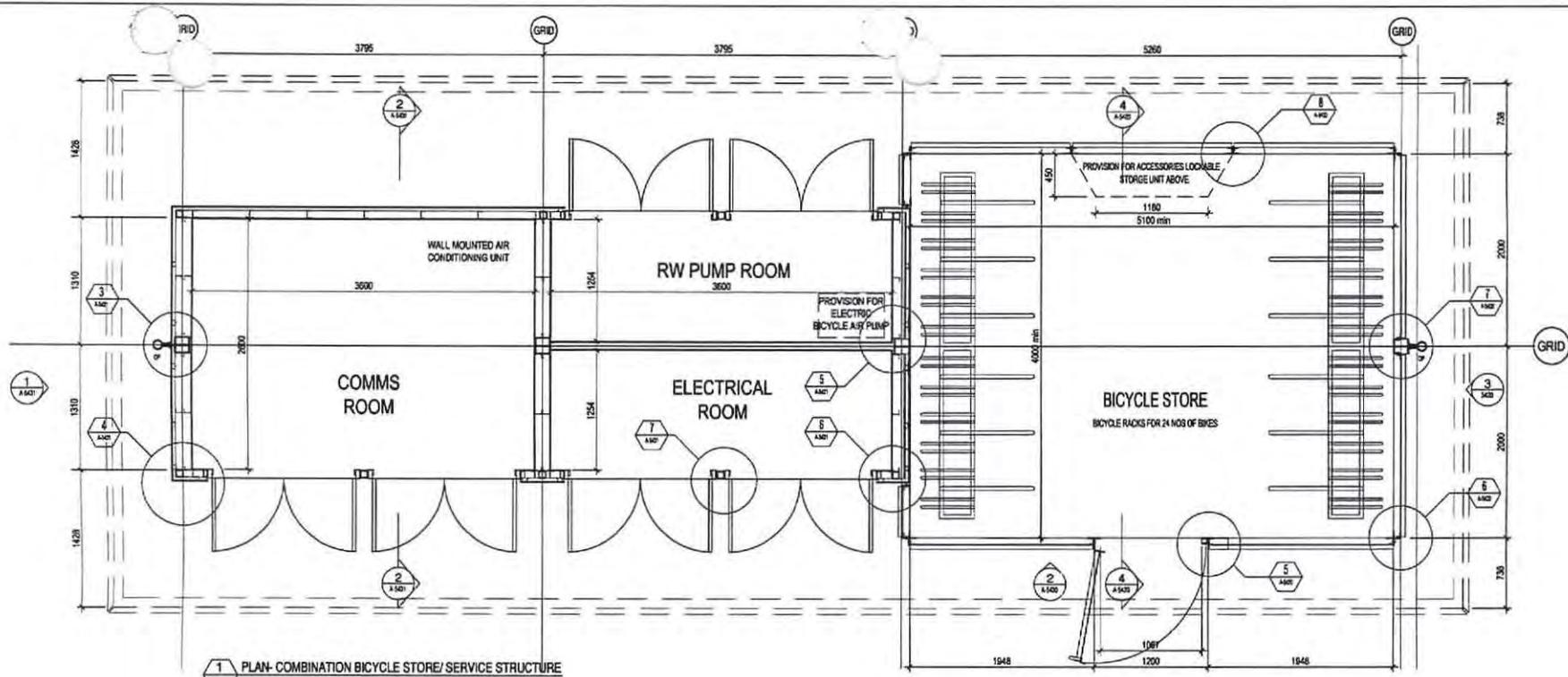
TRANSLINK BUSWAY STATION ARCHITECT  
 ORIGINAL SIGNED BY  
 DATE: .../.../2007

TRANSLINK BUSWAY STATION ARCHITECT DT1 ARCHITECTURE  
 CONSULTANT PROJECT TEAM

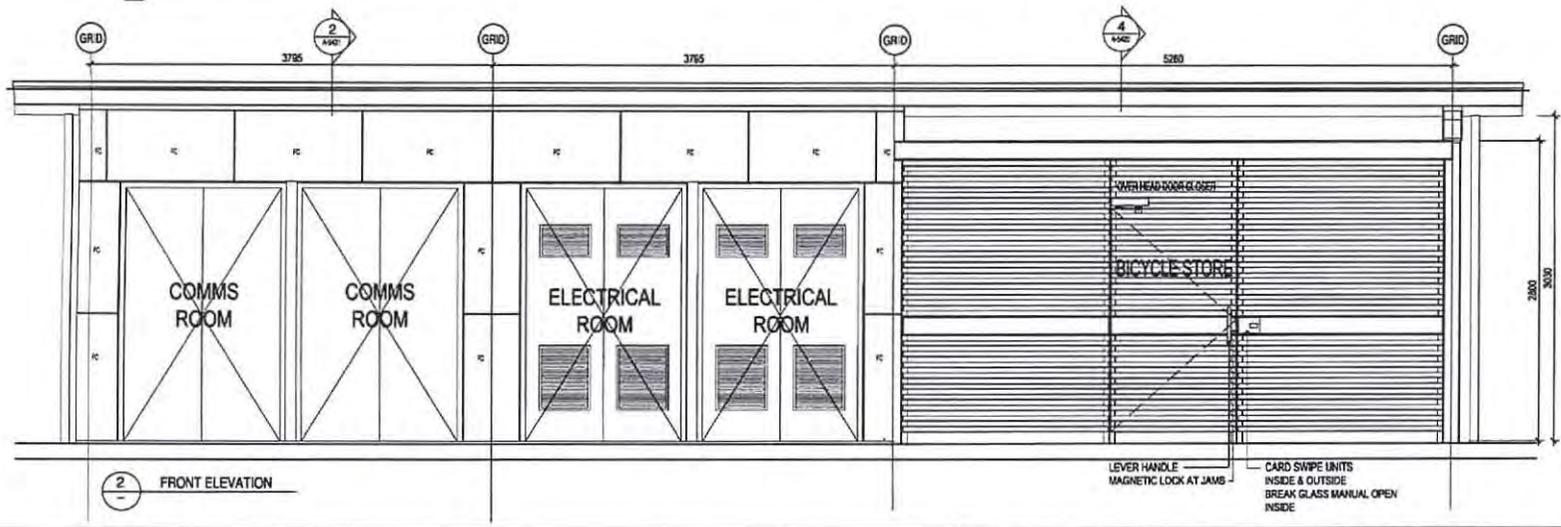
PROJECT TITLE  
 MANAGER  
 ORIGINAL SIGNED BY  
 DATE: .../.../2007

BICYCLE STORAGE STRUCTURE  
 ROOF PLAN, REFLECTED CEILING PLAN

SCALE: 1:25 @ A1, 1:50 @ A3				
CONTRACT NO. QT DWG No.				
DRAWING No. A-5421		REVISION 1		
JOB NO. ISSUE				
1	2007	TENDER ISSUE		
2		DETAILS	DESIGNED	APPROVED
STATUS				



1 PLAN- COMBINATION BICYCLE STORE/ SERVICE STRUCTURE



2 FRONT ELEVATION

GENERIC STANDARDS FOR TRANSLINK BUSWAY STATIONS 2007 - ARCHITECTURE AND DESIGN

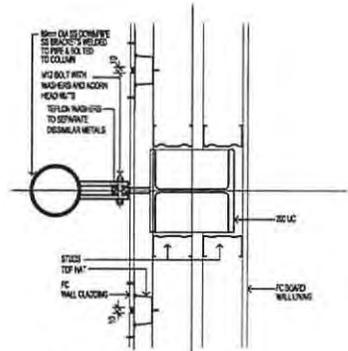
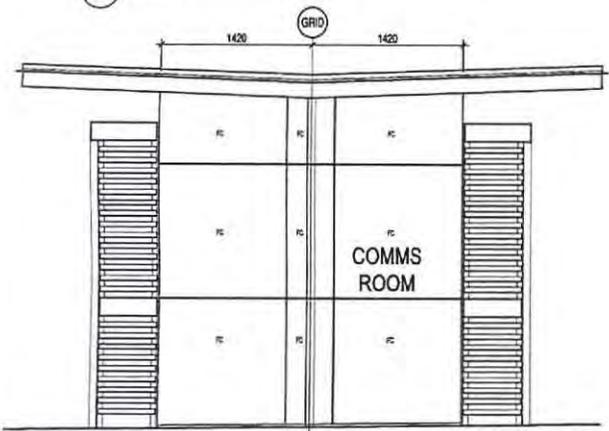
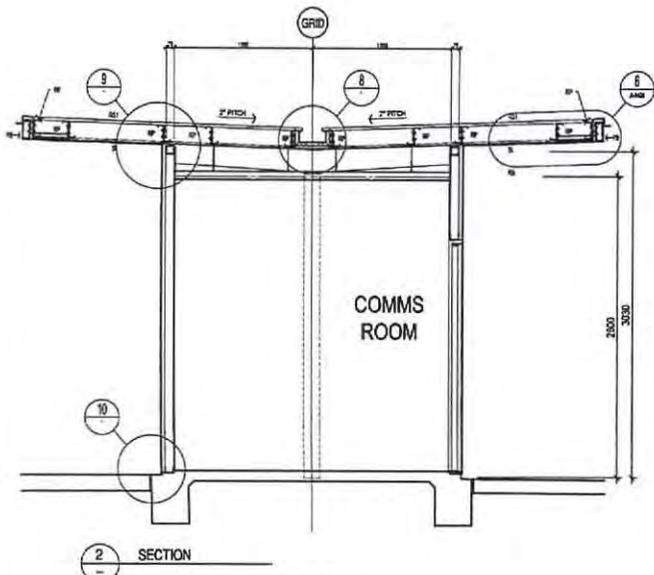


TRANSLINK BUSWAY STATION ARCHITECT  
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 DATE: .../.../2007

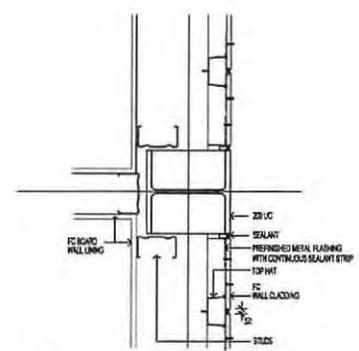
MINOR  
 ORIGINAL SIGNED BY  
 DATE: .../.../2007

COMBINATION BICYCLE STORE  
 SERVICES STRUCTURE  
 PLAN, ELEVATION

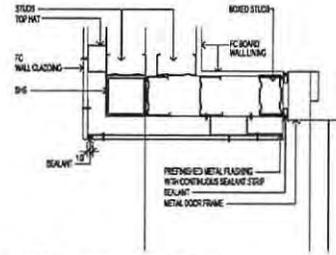
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DRAWING BY: A-5430				REVISION: 1	
JOB NO.				DATE	
1	DATE	TENDER ISSUE	DETAILS	CHECKED	APPROVED
STATUS				JOB NO.	



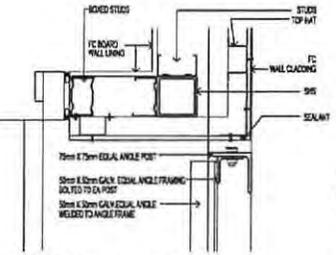
3 DETAIL AT UC POST  
SCALE 1:5 at A1, 1:10 at A3



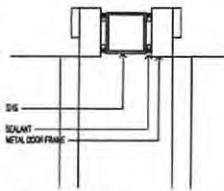
5 DETAIL AT UC POST  
SCALE 1:5 at A1, 1:10 at A3



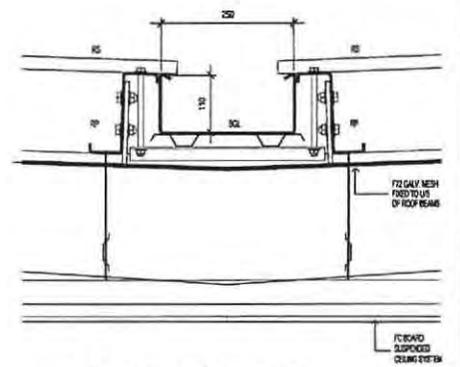
4 DETAIL AT SHS POST  
SCALE 1:5 at A1, 1:10 at A3



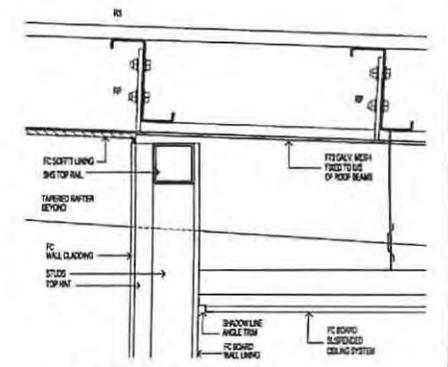
6 DETAIL AT SHS POST  
SCALE 1:5 at A1, 1:10 at A3



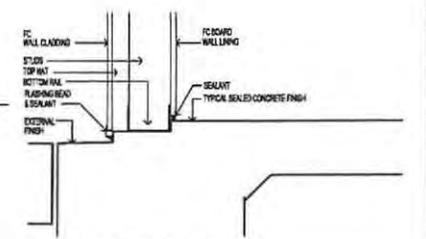
7 DETAIL AT SHS POST  
SCALE 1:5 at A1, 1:10 at A3



8 DETAIL AT BOX GUTTER  
SCALE 1:5 at A1, 1:10 at A3



9 DETAIL AT SOFFIT  
SCALE 1:5 at A1, 1:10 at A3



10 DETAIL AT WALL BASE  
SCALE 1:5 at A1, 1:10 at A3

GENERIC STANDARDS FOR TRANSLINK BUSWAY STATIONS 2007 - ARCHITECTURE AND DESIGN

		TRANSLINK BUSWAY STATION ARCHITECT	TRANSLINK BUSWAY STATION ARCHITECT	GT   ARCHITECTURE	MANAGER	COMBINATION BICYCLE STORE SERVICES STRUCTURE ELEVATION, SECTION, DETAILS	SCALE 1:25 @ A1, 1:50 @ A3	
		ORIGINAL ISSUED BY			ORIGINAL ISSUED BY			CONTRACT NO.
LOGOS	© COPYRIGHT QUEENSLAND GOVERNMENT - QUEENSLAND TRANSPORT 2007	DATE: .../.../2007	CONSULTANT PROJECT TEAM	APPROVED	DATE: .../.../2007	TITLE	DRAWING NO.	
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UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS AND DETAILS SHALL BE IN MILLIMETERS.							USE FIGURED DIMENSIONS IN PREFERENCE TO SCALING. DIMENSIONS SHALL CONFIRM ALL DIMENSIONS AND DETAILS PRIOR TO CONSTRUCTION.	

**ANNEXURE 1 – PART 1 – ATTACHMENT 8  
LIGHT RAIL DRAWINGS**

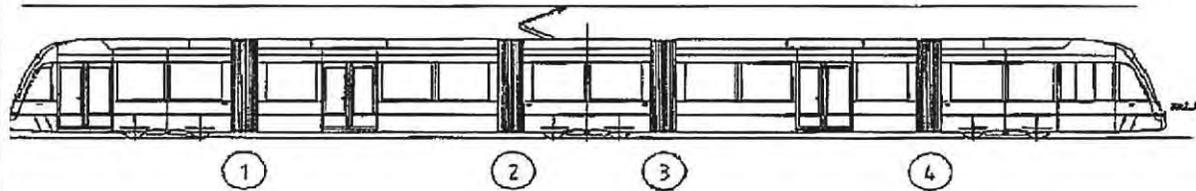
Reference	Title
ANX1-8-001 Rev 01	Co-location Diagram
ANX1-8-002A Rev 01	LRT Vehicle Characteristics, Sheet 1 of 3
ANX1-8-002B Rev 01	LRT Vehicle Characteristics, Sheet 2 of 3
ANX1-8-002C Rev 01	LRT Vehicle Characteristics, Sheet 3 of 3
ANX1-8-003 Rev 01	Minimum Track Alignment Requirements at Stations
ANX1-8-004 Rev 01	Light Rail Vehicle Swept Paths
ANX1-8-005 Rev 01	Concept Design Typical Section for Busway and LRT Co-location - Sheet 1 of 2
ANX1-8-006 Rev 01	Concept Design Typical Section for Busway and LRT Co-location - Sheet 2 of 2
ANX1-8-007 Rev 01	Typical Track Slab Overlay Concept
ANX1-8-008 Rev 01	Stray Current Collection System
ANX1-8-009 Rev 01	Lateral Joint Detail – Stray Current Provision
ANX1-8-010 Rev 01	Typical Floating Trackslab Lateral Joint Detail
ANX1-8-011 Rev 01	Pit and Conduit Details





### Vehicle Characteristics

Articulation details including degrees of freedom at each joint and constraints/performance of the joint (eg angle of rotation limits)



#### Tram Type A

#### Tram Type B

The in-service rotations will be less than the limits to provide safety margins. All rotations are damped by friction and/or hydraulic damping

Point	Horizontal Rotation	Twist	Vertical Rotation	Point	Horizontal Rotation	Twist	Vertical Rotation
1	± 18°	-	± 3°	1	± 22°	-	-
2	± 18°	± 2.2°	± 3°	2	± 22°	-	-
3	± 18°	No fixed limit but stabilised by hydraulic damping	± 3°	3	± 22°	-	-
4	± 18°	-	± 3°	4	± 22°	-	-
A & E = 6200mm				A & E = 6200mm			
B & D = 6640mm				B & D = 5900mm			
F, G, H, I = 700mm				F, G, H, I = 600mm			

**PRELIMINARY**  
NOT FOR CONSTRUCTION

01	03.07	CNI PERFORMANCE SPECIFICATION ATTACHMENT DRAWING
Rev.	Date	Revision Details



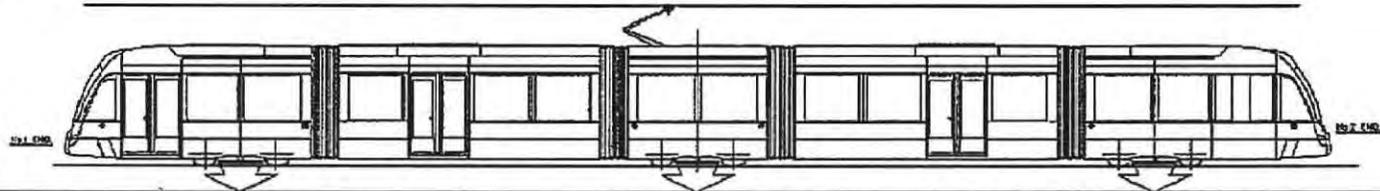
LRT VEHICLE CHARACTERISTICS  
SHEET 2 OF 3

Project No. 25175	
Scale NTS	Sheet Size A1
Sketch No.	Rev.
ANX1-8-002B 01	

04-11-2019 10:32:12 AM C:\Users\james.miller\OneDrive\Documents\25175\04-11-2019 10:32:12 AM C:\Users\james.miller\OneDrive\Documents\25175\04-11-2019 10:32:12 AM

**Vehicle Characteristics**

Distribution of the mass of the vehicle (including passengers)



<b>WEIGHT ON BOGIE 1 (CRUSH LOAD)</b> (TARE WEIGHT = 12300 Kgs) + PASSENGERS = 17300 Kgs	<b>WEIGHT ON BOGIE 2 (CRUSH LOAD)</b> (TARE WEIGHT = 12300 Kgs) + PASSENGERS = 22200 Kgs	<b>WEIGHT ON BOGIE 3 (CRUSH LOAD)</b> (TARE WEIGHT = 12300 Kgs) + PASSENGERS = 17300 Kgs
--	--	--

Structural Load capacity and general structural arrangement of the vehicle relating to both frontal and acute angle impacts.

Tram Type A			Tram Type B		
<u>Bogie 1</u>	<u>Bogie 2</u>	<u>Bogie 3</u>	<u>Bogie 1</u>	<u>Bogie 2</u>	<u>Bogie 3</u>
Crush Load = 17300kg	Crush Load = 22200kg	Crush Load = 17300kg	Crush Load = 15575kg	Crush Load = 17850kg	Crush Load = 15575kg
The car shell is designed and tested for a 200kN end load with onset of yielding at a load of 10% above this. It is estimated that this end load is equivalent to a 6kph collision between an empty vehicle and a stationary object. The energy absorbing draft gear behind the bumper will absorb energy to this point. After which the bumper assembly itself will deform.			The vehicle is designed to withstand a 50 tonne frontal compression crash test. Easily replaceable energy absorbing elements are integrated into the vehicle nose cones. These are capable of resiliently absorbing energy created by a 6kph impact without any deformation to the body structure/panels.		

**PRELIMINARY**  
NOT FOR CONSTRUCTION

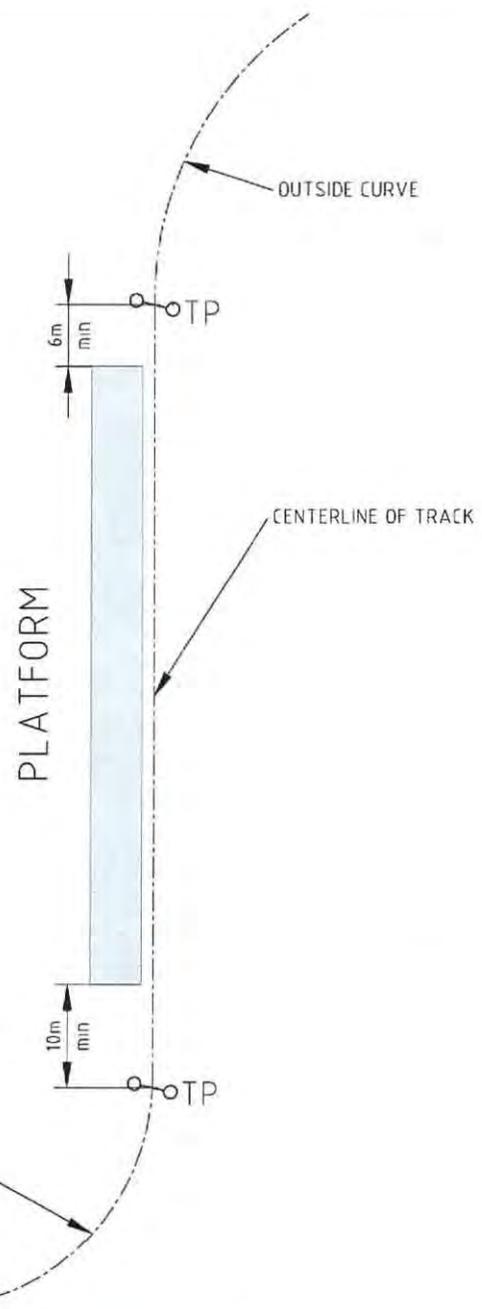
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Rev	Date	Revision Details



LRT VEHICLE CHARACTERISTICS  
SHEET 3 OF 3

Project No.	25175
Scale	NTS
Sheet Size	A1
Sketch No.	Rev.
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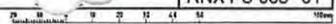
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MINIMUM TRACK ALIGNMENT  
REQUIREMENTS AT STATIONS

Project No. 25175	
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Sketch No.	Rev.
ANX1-8-003 01	



ESTIMATED DEVELOPED  
KINEMATIC ENVELOPE FOR  
OUTSIDE OF CURVES  
(SWEEP PATH)

ESTIMATED LIGHT RAIL  
VEHICLES KINEMATIC  
ENVELOPE

END THROW DIAGRAM

END MODULE OF  
LIGHT RAIL VEHICLE

CENTRE MODULE OF  
LIGHT RAIL VEHICLE

ESTIMATED DEVELOPED  
KINEMATIC ENVELOPE FOR  
INSIDE OF CURVES  
(SWEEP PATH)

ESTIMATED LIGHT RAIL  
VEHICLES KINEMATIC  
ENVELOPE

CENTRE THROW DIAGRAM

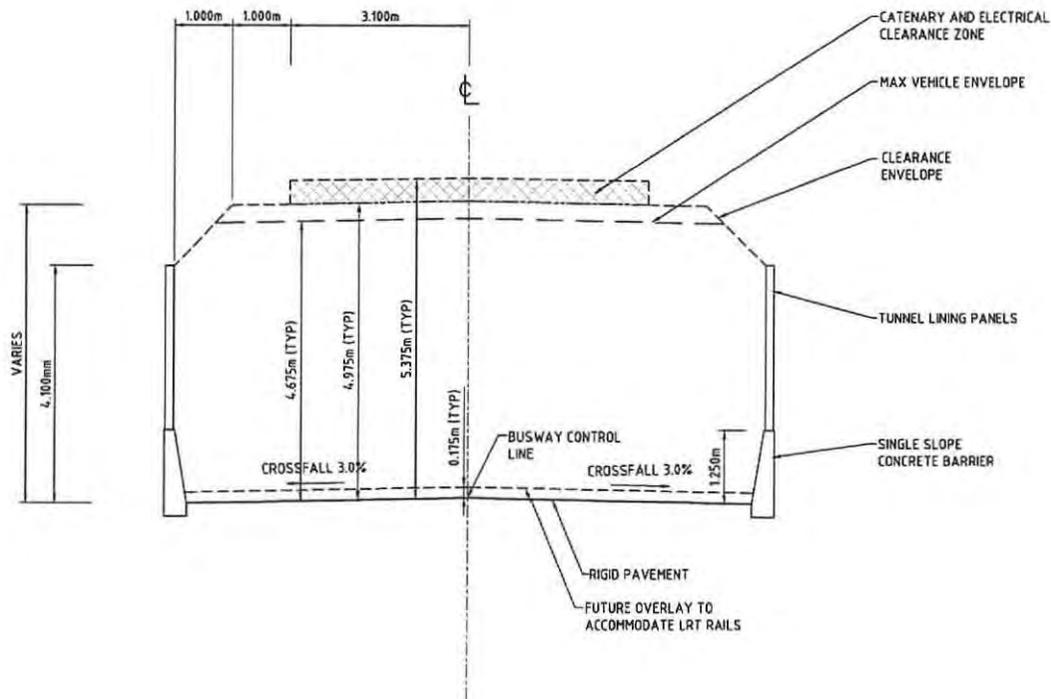
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Rev	Date	Revision Details



LIGHT RAIL VEHICLE  
SWEEP PATHS

**PRELIMINARY**  
NOT FOR CONSTRUCTION

Project No.	25175
State	NTS
Sheet Size	A1
Sketch No.	ANX1-8-004
Rev	01



NORTHERN BUSWAY  
TYPICAL TWO LANE TUNNEL ENVELOPE

PRELIMINARY  
NOT FOR CONSTRUCTION

Rev	Date	Revision Details
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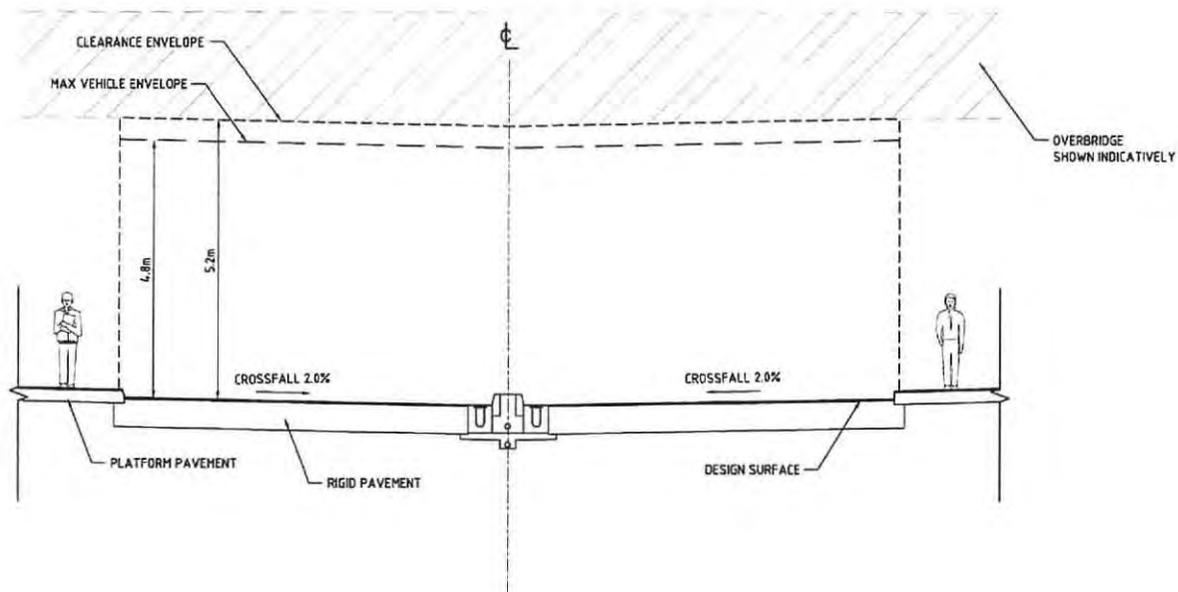
SKM Connell Wagner  
JOINT VENTURE

Queensland  
Government

airportlink  
Northern Busway  
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CONCEPT DESIGN  
TYPICAL SECTION FOR BUSWAY  
AND LRT CO-LOCATION  
SHEET 1 OF 2

Project No.	25175
Scale	NTS
Sheet Size	A1
Sketch No.	Rev.
ANX1-8-005	01



NORTHERN BUSWAY  
TYPICAL ENVELOPE AT BUSWAY  
STATION OVERBRIDGE

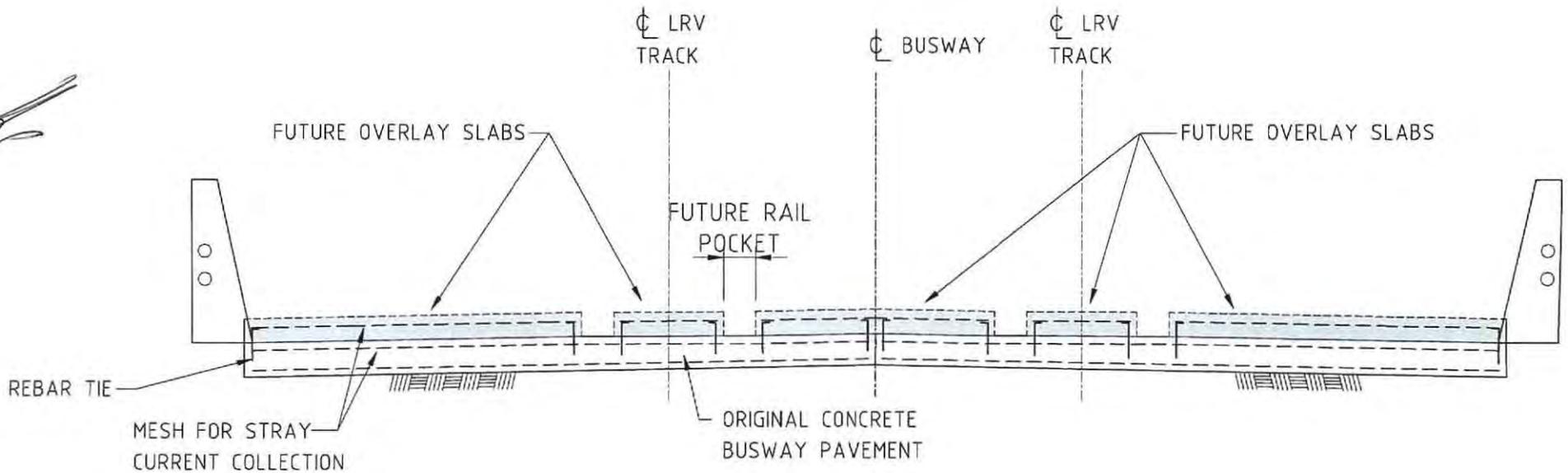
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Rev.	Date	Revision Details



CONCEPT DESIGN  
TYPICAL SECTION FOR BUSWAY  
AND LRT CO-LOCATION  
SHEET 2 OF 2

Project No.		25175	
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Sketch No.		Rev.	01
ANX1-8-006		01	



**NOTE:**

1. SLOTS FORMED BY PLACING OVERLAY SLAB IN FUTURE.
2. OVERLAY SLABS TO BE 220mm THICK MINIMUM.
3. INDICATIVE SKETCH ONLY.

**OVERLAY OPTION**  
NOT TO SCALE

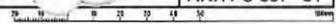
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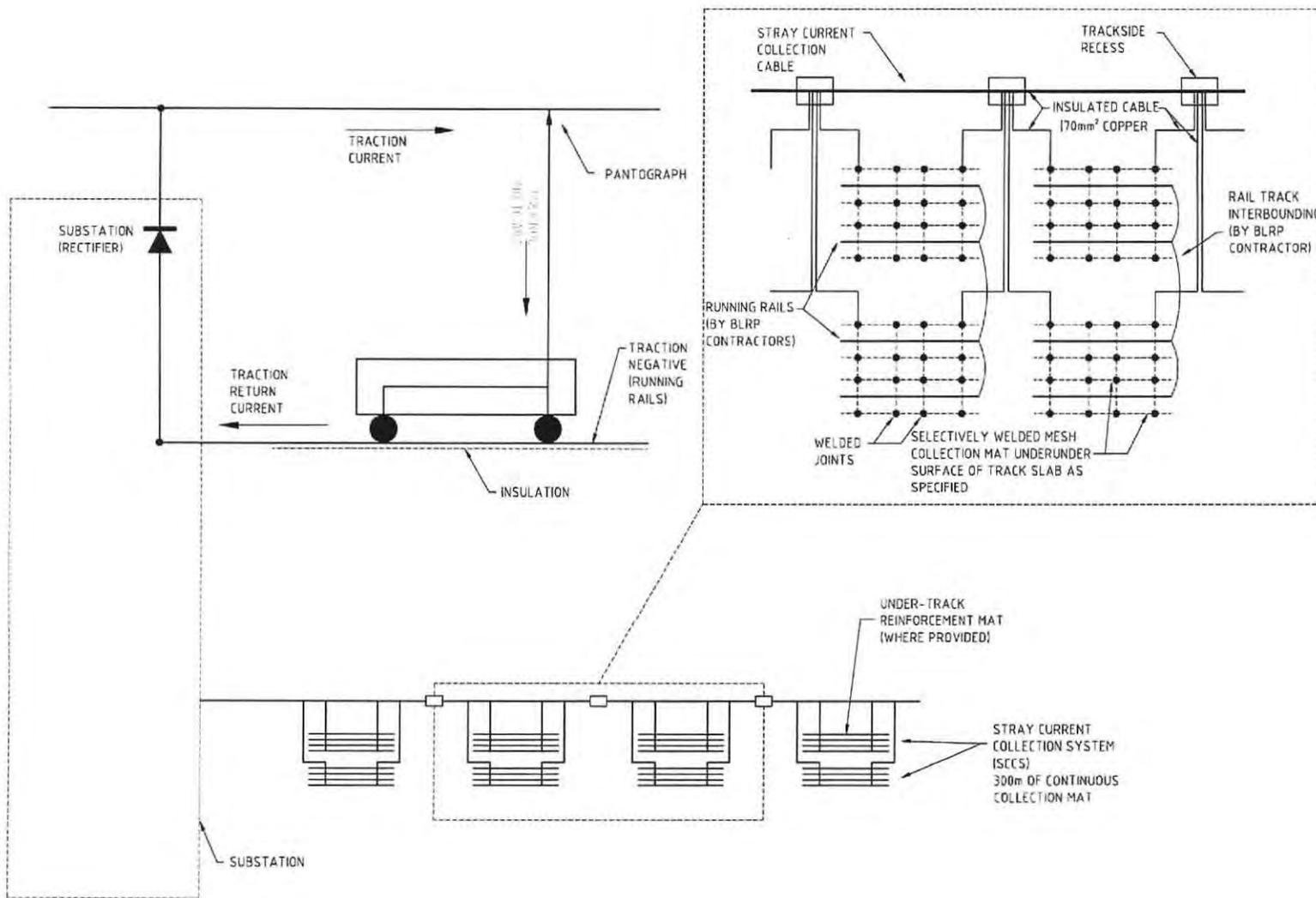


TYPICAL TRACK SLAB  
OVERLAY CONCEPT

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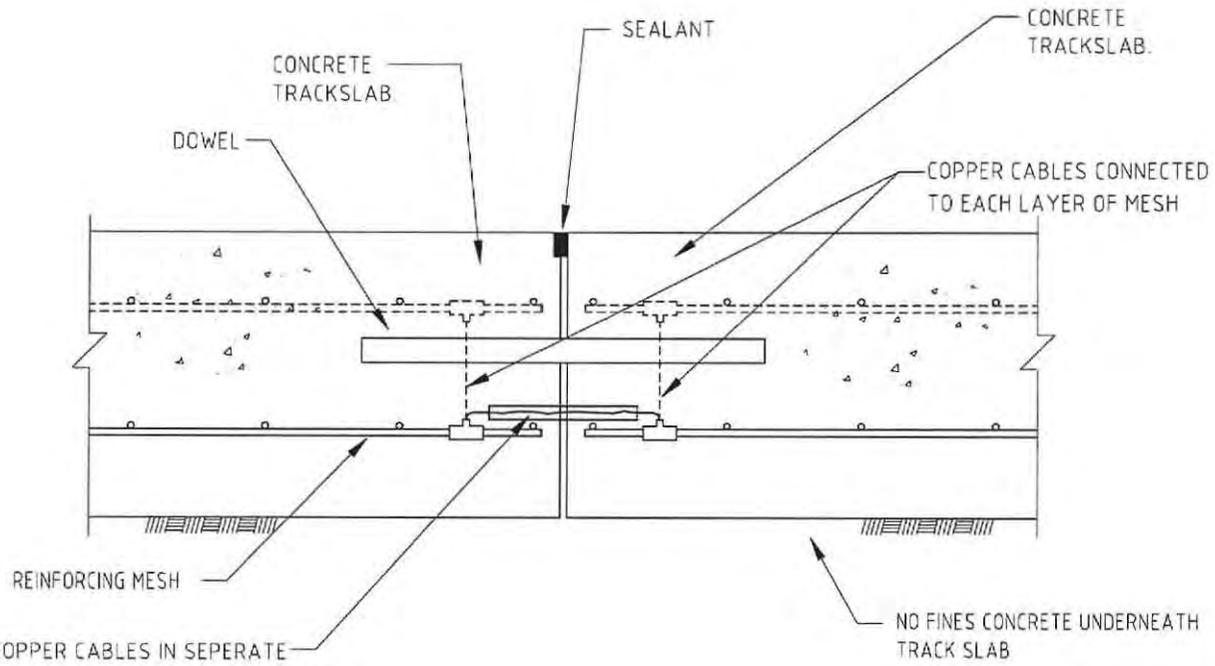
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STRAY CURRENT  
COLLECTION SYSTEM

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Sketch No.		Rev	
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70mm<sup>2</sup> COPPER CABLES IN SEPERATE PVC CONDUITS WITH 'CADWELD' CABLE TO REBAR CONNECTIONS 2 CABLE CONNECTIONS TO BE PROVIDED FOR EACH TRACK (4 TOTAL) PER LAYER OF MESH SPACE EVENLY

**LATERAL JOINT DETAIL**  
**DOWELED JOINT**  
 NOT TO SCALE

**NOTE:**  
 COPPER CABLE TO BE BRADED COPPER INSULATED.

**PRELIMINARY**  
 NOT FOR CONSTRUCTION

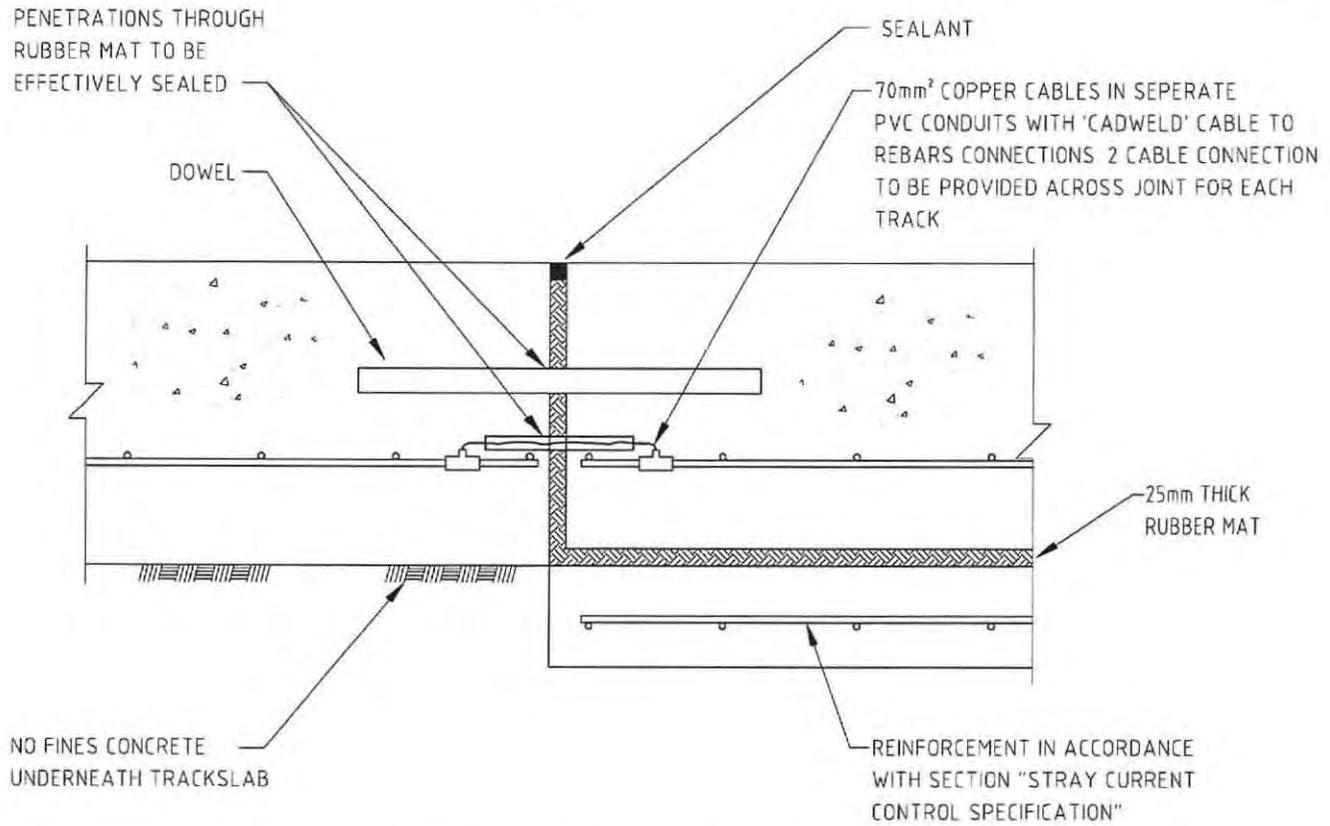
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LATERAL JOINT DETAIL  
 - STRAY CURRENT PROVISION

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Rev 01	

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**TYPICAL FLOATING TRACKSLAB  
STOP END JOINT DETAIL**  
NOT TO SCALE

**NOTE:**  
CONDUIT PASSING THROUGH RUBBER MAT AT END OF FLOATING TRACKSLAB  
TO BE SMOOTH FLEXIBLE CONDUIT AND EFFECTIVELY SEALED AT RUBBER  
MAT/CONDUIT INTERFACE

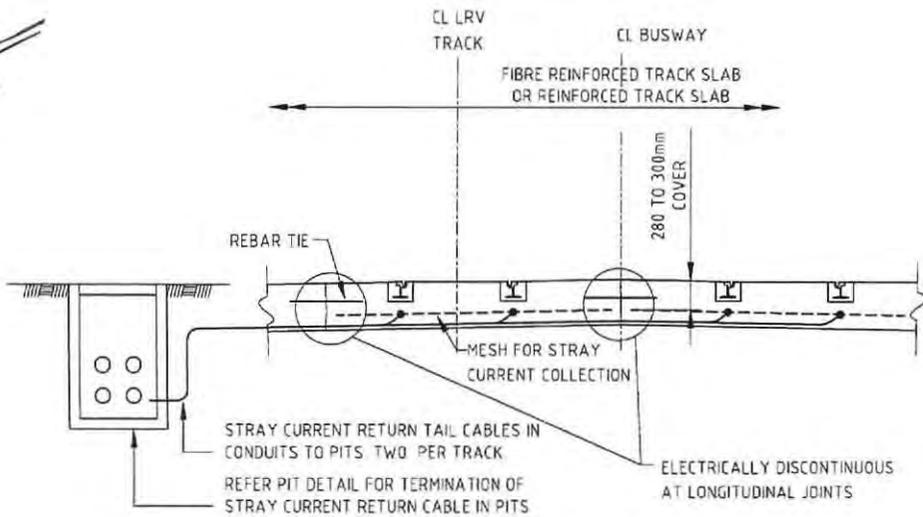
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TYPICAL FLOATING TRACKSLAB  
LATERAL JOINT DETAIL

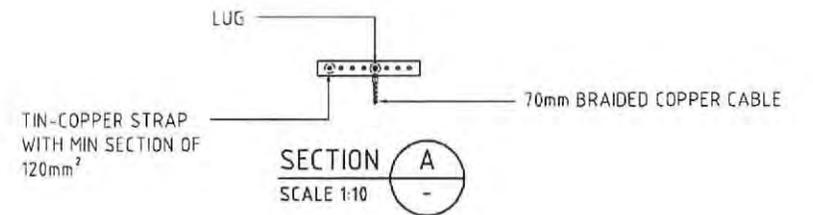
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Sketch No.	Rev.
ANX1-8-010 01	



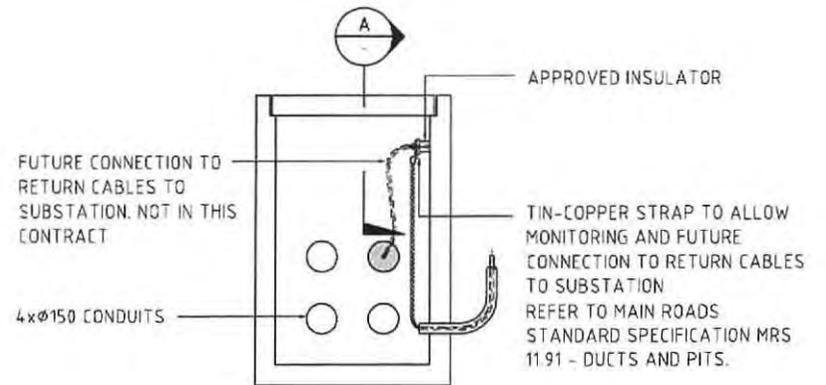
**INDICATIVE TRACK SLAB SECTION AND  
ADJACENT ROADSIDE TRACTION POWER PIT**  
NOT TO SCALE

**NOTE:**

1. STRAY CURRENT COLLECTION MESH INCLUDES ALL REINFORCING STEEL WITHIN THE SLAB DIRECTLY SUPPORTING THE RAILS. MINIMUM CROSS SECTIONAL AREA OF LONGITUDINAL REINFORCING STEEL TO BE 1800mm<sup>2</sup> WITHIN THE SLAB FOR EACH TRACK.
2. STRAY CURRENT RETURN CABLE TO BE 70mm<sup>2</sup> BRAIDED COPPER CABLE OR EQUIVALENT
3. STRAY CURRENT RETURN CABLES TO BE PROVIDED TO PITS AT EACH END OF ELECTRICALLY CONTINUOUS COLLECTION MESH
4. ELECTRICALLY CONTINUOUS COLLECTION MESH TO BE NO GREATER THAN 300m IN LENGTH (ie PITS AT 300m MAXIMUM SPACINGS)
5. RETURN CABLES BETWEEN PITS NOT IN THIS CONTRACT. TO BE SUPPLIED BY LIGHT RAIL CONTRACTOR



**SECTION A**  
SCALE 1:10



**PIT DETAIL**  
NOT TO SCALE

**PRELIMINARY**  
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**PIT AND CONDUIT  
DETAILS**

Project No 25175	
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## ANNEXURE 2 – PART 1 CONSTRUCTION REQUIREMENTS

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## 1 GENERAL

### 1.1 PURPOSE

This Annexure describes the minimum construction requirements which must be met by PPP Co in the construction of the Project Works.

### 1.2 WORK METHODS

- (a) The work methods to be used by PPP Co must result in the use and application of materials and workmanship which, as a minimum, comply with QDMR publications, TransLink publications or Council publications as appropriate, current Australian Standards, and relevant Technical Documents.
- (b) The methods of excavation, working at heights, protection from falling objects and other construction activities must conform to the requirements of the Department of Employment and Industrial Relations (including Workplace Health and Safety Queensland) and/or the Department of Natural Resources and Water, as appropriate.
- (c) PPP Co must ensure that all excavations are maintained in a stable condition and are secured against public and any unauthorised access at all times.

### 1.3 SAFETY

- (a) PPP Co must develop prior to commencement of the D&C Activities a Health and Safety Management Plan as described in Annexure 13 Part 1 (Safety Management Requirements) to govern all aspects of safety requirements throughout the performance of the Project Activities. Without limiting the requirements of the State Project Documents, PPP Co must continuously review, update and improve wherever possible the content and structure of the Health and Safety Management Plan.
- (b) At the commencement of the D&C Activities and prior to occupying the Licensed Construction Area, PPP Co must carry out safety risk assessments in respect of the Project Activities to identify, describe, and where possible quantify, all foreseeable risks. The assessment must take into account the rate at which hazardous situations might develop. From such analyses, PPP Co must develop appropriate procedures and contingency plans which are capable of securing the safety of workers, the public, the Project Works and adjacent property, and which can be implemented within the time necessary to prevent hazardous situations from occurring or worsening.

### 1.4 EFFECTS OF D&C ACTIVITIES

- (a) PPP Co must ensure that the performance of the D&C Activities has no adverse impact on the performance or condition of any future developments which have been approved by Council (at the date of the relevant D&C Activities), or existing buildings, structures, infrastructure, Public Utility Plant (PUP) or other property. The D&C Activities must also conform to the requirements of the Environmental Documents and the Environmental Management Plans.

- (b) PPP Co must ensure that all existing pedestrian and cycle facilities including Shared Use Paths are maintained or alternative connections provided, during the period in which such facilities are impacted by the D&C Activities. Alternative connections must be approved by the appropriate Authority (State or Council) or BAC as applicable before commencement of construction of the relevant section of the Project Works, and be of at least a standard, width, walking/riding surface, user safety, and convenience equivalent to the existing connection at all times during the performance of the D&C Activities.
- (c) PPP Co must display at each Construction Work Site measurement indicators of safety performance, community and environmental issues.

### 1.5 WORKING HOURS

The D&C Activities must be carried out within working hours in accordance with the Environmental Documents and the Environmental Management Plans.

### 1.6 EVENTS OF A PUBLIC INTEREST

Where events of a public interest are expected to generate additional vehicle or pedestrian traffic in any areas directly or indirectly affected by the Project Works, PPP Co must cooperate with BAC, QDMR, Council, TransLink, QPS and other Authorities to facilitate traffic and pedestrian flows.

### 1.7 ROAD CONDITIONS

PPP Co must ensure that any road, footpath or cycleway which is open to the public is sealed at all times and kept free of mud, dirt, deleterious material and debris arising from the Project Activities.

### 1.8 ROAD SAFETY AUDITS

PPP Co must procure independent road safety audits in accordance with section 5.11 of Annexure 1 Part 1 (Design Requirements).

### 1.9 EXISTING QDMR ROAD INFRASTRUCTURE AND FURNITURE

Any QDMR infrastructure that is removed for the Project Works which is not required for reuse as part of the Project Works, including road furniture that is in a serviceable condition, will remain the property of QDMR where so directed by QDMR and is to be delivered at PPP Co's expense to the QDMR depot at Deagon. PPP Co must contact QDMR to ascertain whether the QDMR infrastructure may be delivered to the QDMR depot at Deagon or disposed of. PPP Co must dispose of QDMR infrastructure not required by QDMR at PPP Co's expense.

### 1.10 EXISTING COUNCIL ROAD INFRASTRUCTURE AND FURNITURE

Any Council infrastructure that is removed for the Project Works which is not required for reuse as part of the Project Works, including road furniture that is in a serviceable condition, will remain the property of Council where so directed by Council and is to be delivered at PPP Co's expense to the Council depot at 7 Brockman St, Stafford. PPP Co must contact Council to ascertain whether the Council infrastructure may be delivered to the Council depot at 7 Brockman St, Stafford or disposed of. PPP Co must dispose of Council infrastructure not required by Council at PPP Co's expense.

### 1.11 EXISTING BAC ROAD INFRASTRUCTURE AND FURNITURE

Any BAC infrastructure that is removed for the Project Works which is not required for reuse as part of the Project Works, including road furniture that is in a serviceable condition, will remain the property of BAC where so directed by BAC and is to be delivered at PPP Co's expense to a location as required by BAC. PPP Co must contact BAC to ascertain whether the BAC infrastructure may be delivered to BAC or disposed of. PPP Co must dispose of BAC infrastructure not required by BAC at PPP Co's expense.

### 1.12 CONSTRUCTION VEHICLE LOADS

#### 1.12.1 Haulage of Plant and Materials

PPP Co must ensure that vehicles involved in any D&C Activities carrying plant and material over QDMR controlled roads, Council controlled roads and BAC controlled roads must comply with the vehicle weight limit requirements set out by the *Transport Infrastructure Act 1994*, and with any other vehicle weight limit requirements imposed by Authorities on whose roads such vehicles operate.

#### 1.12.2 Vehicles with Excess Axle Loads within the Construction Site

- (a) PPP Co will be permitted to operate vehicles with axle loads in excess of the limits prescribed by the *Transport Infrastructure Act 1994* within the Licensed Construction Area subject to the following conditions:
  - (i) the operation of vehicles with above legal axle loads must be limited to vehicles that remain within the Licensed Construction Area; and
  - (ii) the vehicles must not travel along or across any existing pavement or over any structure unless the pavement or structure has been designed to carry the vehicle or has been otherwise protected from damage by PPP Co.
- (b) Vehicles with excess axle loads with the exception of purpose designed compaction equipment, must not be operated on any partially or fully completed pavement work.

### 1.13 SPOIL PLACEMENT

Spoil handling and placement must be carried out by PPP Co in accordance with the Environmental Documents and the Environmental Management Plans.

### 1.14 USE OF EXPLOSIVES

#### 1.14.1 General

- (a) For the purposes of this section 1.14, "the Act" shall be the *Explosives Act 1999* (Qld).
- (b) PPP Co must give occupants of nearby premises, any Authorities and affected PUP owners and Emergency Service agencies reasonable notice (being not less than 28 days prior to the beginning of blasting in any discrete blasting area and not less than 14 days prior to any subsequent blasting in that area) of intended blasting and the anticipated impacts on the nearby premises and PUP as appropriate.

#### 1.14.2 Compliance with Laws and Standards

- (a) When using and handling explosives PPP Co must comply with the provisions of:
- (i) the Act and subordinate legislation;
  - (ii) the Environmental Documents and the Environmental Management Plans;
  - (iii) the relevant Local Government By-Laws ("the By-Laws");
  - (iv) the current Standards Australia explosives standards, with the exception that parallel, parallel-series and series-parallel electric circuits shall not be used;
  - (v) the QDMR Standard Specification MRS11.55 Use of Explosives in Roadworks; and
  - (vi) the National Association of Australian State Road Authorities' (now AUSTROADS) publication Explosives in Roadworks – Users' Guide (for guidance when developing explosive work procedures and processes).
- (b) If there is any conflict in the requirements of the above documents, then, to the extent of the conflict, the requirements will be interpreted in order of precedence as listed in paragraph (a).

#### 1.14.3 Compliance with the requirements of Authorities and Environmental Documents

- (a) PPP Co must satisfy the requirements of the State, Council, Environmental Protection Agency, PUP owners, QPS, Emergency Service agencies, other relevant Authorities, the Environmental Documents and the Environmental Management Plans in relation to the following matters:
- (i) permit requirements;
  - (ii) permitted hours of blasting;
  - (iii) Peak Particle Velocity (PPV) limits;
  - (iv) prohibited methods of blasting;
  - (v) the type and maximum amount of explosive per blast;
  - (vi) supervision requirements;
  - (vii) flyrock control;
  - (viii) traffic control; and
  - (ix) safety requirements.

#### 1.14.4 Times for Blasting

PPP Co must not, without approval from the State, carry out any blasting before 7.30 a.m. or after 5.00 p.m. Monday to Friday, or at any time on Saturdays, Sundays or public holidays. This restriction applies irrespective of any extensions to the above times and days permitted by the By-Laws.

#### 1.14.5 Safety Precautions

Without limiting, and in addition to, PPP Co's obligations under the State Project Documents relating to safety:

- (a) PPP Co must take all precautions necessary to prevent injury to persons and/or damage to property occurring as a result of the use of explosives; and
- (b) If blasting is undertaken, explosives must be transported to the Construction Site with appropriate security on an as required basis. Excess explosives must not be stored on the Licensed Construction Area.

#### 1.14.6 Personnel

PPP Co must, at all times during blasting operations, employ on the blasting site the necessary personnel required by MRS11.55 Use of Explosives in Roadworks.

#### 1.15 HOLD POINTS AND WITNESS POINTS

In constructing the Project Works, PPP Co must observe all required hold points under the State Project Documents and provide notice to the Independent Verifier and the State for witness points in accordance with Annexure 10 Part 1 (Quality Management).

#### 1.16 PROGRESS REPORTS ON THE D&C ACTIVITIES

PPP Co must submit to the State and the Independent Verifier progress reports on D&C Activities in accordance with Annexure 9 Part 1 Attachment 2 (Documentation Schedule).

#### 1.17 CONDITIONS PRECEDENT

Attachment 1 to this Annexure 2 Part 1, provides details of various conditions precedent to the achievement of nominated milestones forming part of the D&C Activities.

## 2 TUNNELS AND UNDERGROUND STRUCTURES

### 2.1 SELECTION OF TUNNELLING METHODS

- (a) The selection of the tunnelling methods to be employed must be based, inter alia, upon consideration of the ground conditions (including groundwater), the dimensions of the tunnel, and the stability of the face opening during excavation and prior to placement of any support. Tunnelling methods must be selected so that all necessary regard is given to avoiding hazards and combating at source foreseeable risks to those carrying out the work and others who may be affected.
- (b) Tunnelling machines must include:
- (i) the ability to drill probe holes ahead of the face of the tunnel drive in order to determine the likely nature and water-bearing characteristics of the materials ahead of the excavation. Operations in the tunnel drive must be suspended or modified as may be necessary to permit the drilling of the probe holes; and
  - (ii) methane and hydrocarbon alert systems must be provided on tunnelling machines at all headings.
- (c) Tunnel Boring Machines (TBMs) must include:
- (i) as a minimum, a replacement main bearing must be made available by PPP Co and must be stored at the manufacturer's facilities so as to be available for immediate machining and transport to the Construction Site; and
  - (ii) if a refurbished TBM is used, the main bearing of the TBM must be replaced by a new unit supplied by the original manufacturer prior to delivery of the TBM to the Construction Site.
- (d) Explosives and blasting must include:
- (i) unless otherwise reviewed without objection by the Independent Verifier, that the finished excavation profile for underground works using explosives must be formed by using perimeter-blasting techniques.

### 2.2 GEOTECHNICAL INVESTIGATION

Geological mapping of all exposed rock faces must be undertaken by a qualified and experienced geologist prior to any application of shotcrete or concrete support. Where support is constructed such that the ground conditions are not exposed (e.g. TBM installing segments), PPP Co must record the ground conditions inferred from probe holes, machine head torque, spoil cuttings etc. PPP Co must compile all mapping records and inferred ground conditions into separate reports for the AL Works and NB Works respectively, which must be submitted to the State in accordance with section 7.1.

### 2.3 TUNNEL EXCAVATION AND SUPPORT

- (a) Excavation and installation of ground support must be carried out with such care and strict precautions necessary so as to ensure that ground movement or subsidence and damage to adjacent property is minimised, and to ensure that the excavated surfaces exposed are stable and that overbreak is minimised. All excavated surfaces must be regularly examined and loose material removed or

otherwise made safe. The excavations must be promptly and safely supported at all times.

- (b) Excavation and installation of ground support must utilise machines and methods of working such that no personnel are required to be beneath unsupported ground.
- (c) Mapping of all installed support, including all rockbolts, steel sets, forward reinforcement and shotcrete thicknesses, must be undertaken by an experienced surveyor or tunnel engineer. PPP Co must compile all mapping records into separate reports for the AL Works and NB Works respectively, which must be submitted to the State in accordance with section 7.1.
- (d) Where precast concrete segments are used, PPP Co must ensure that manufacture of the precast concrete linings by the D&C Contractor is carried out within a suitable facility for the production of high quality precast concrete units. PPP Co must ensure that the segment manufacturer is ISO 9001 certified. The control of production procedures must be undertaken by experienced specialist personnel familiar with the manufacture of high strength, durable, dimensionally accurate precast concrete elements.

#### 2.4 WATERPROOFING OF TUNNEL STRUCTURES

For sections of tunnels constructed by driven tunnel techniques that incorporate a permanent cast in situ concrete lining or similar, PPP Co must provide a supervisor experienced in the installation of waterproof membranes in driven tunnels. The supervisor must be appropriately trained and experienced in the installation of waterproof membranes of similar scope and method.

#### 2.5 INFRASTRUCTURE PROTECTION

- (a) PPP Co must carry out the Project Activities to prevent damage to and safeguard the overlying and adjacent infrastructure against ground movement and vibration. Ground movements include the effects of excavation and groundwater drawdown induced subsidence and other activities.
- (b) Prior to commencing any construction work within the Construction Site, condition surveys must be undertaken in accordance with Annexure 7 Part 1 (Investigations, Surveys and Condition Monitoring Requirements).
- (c) During construction, monitoring must be undertaken in accordance with Annexure 7 Part 1 (Investigations, Surveys and Condition Monitoring Requirements) to provide data to verify the underground design based on the actual ground material behaviour. In addition, the monitoring results must provide all necessary information to confirm the integrity of existing infrastructure and that the installed support measures are sufficient to fulfil the criteria in section 5.1(a) of Annexure 7 Part 1 (Investigations, Surveys and Condition Monitoring Requirements). Monitoring schemes should be based on thorough hazard analyses of all possible impacts.

### 3 CONSTRUCTION SITES

#### 3.1 GENERAL

The State has procured, or will procure, a number of sites for use as Construction Work Sites (CWS) (which form part of the Construction Site) as described in the Site Access Schedule.

#### 3.2 TEMPORARY SITE FACILITIES

- (a) Site sheds must be supplied and maintained in sound condition. Site sheds must be established at locations and positions that minimise the impact on adjoining properties and the public. All facilities utilised for the purpose of performance of the Project Activities must be sited, constructed, secured and maintained to meet the requirements of the State and relevant Authorities.
- (b) For the duration of the D&C Activities, PPP Co must provide for the State's sole use a new 6m x 3m site office, with two car parking spaces, adjacent to each of the Windsor CWS and Kedron Central CWS. The site offices must each be fitted with:
- (i) reverse cycle air conditioning;
  - (ii) three computers with internet and network access;
  - (iii) adequate lighting;
  - (iv) deadlocking on all doors;
  - (v) insect screens and vermin proofing;
  - (vi) electrical power, including 4 double power points;
  - (vii) water supply and sink;
  - (viii) three digital telephone lines, two digital telephones and one digital facsimile machine;
  - (ix) three desks and three chairs;
  - (x) An A0 size drawing table;
  - (xi) 3-drawer lockable filing cabinet;
  - (xii) 4 full size lockers; and
  - (xiii) three sets of keys for all locksets.
- (c) Ablutions and meal amenities must be available in the immediate vicinity of the site offices for use by the State's or other Authorities' personnel. PPP Co must clean the site offices at least once a week and must provide the power, water and telephone and communication services to the site offices, free of charge to the State.
- (d) PPP Co must provide adequate and suitable accommodation for the Independent Verifier during performance of the Independent Verifier's functions.

### 3.3 SITE REINSTATEMENT

- (a) PPP Co must reinstate to its original condition, the Construction Site, together with any other land accessed for the purposes of carrying out any part of the Project Works, progressively as each part of the Project Works is completed.
- (b) All Temporary Areas and other land occupied or used by PPP Co for the purpose of the D&C Activities, including storage and site facilities, must be reinstated to a condition at least equivalent to that existing prior to the occupation or use.

### 3.4 SECURITY DURING CONSTRUCTION

- (a) During construction, PPP Co must secure the Construction Site by providing screening to ensure public safety and prevent road user distraction and unlawful access.
- (b) Fencing and screening must be made from as-new materials and must be maintained in a neat and tidy condition and be sympathetic with the surroundings.

### 3.5 DEMOLITION

Where permanent demolition of infrastructure is required, PPP Co must:

- (a) provide a levelled site free of depressions and undulations;
- (b) disconnect all PUP at the property boundaries in accordance with the requirements of the relevant PUP owners;
- (c) cap all conduits and pipes at the disconnection points to prevent ingress of surface runoff and groundwater;
- (d) remove all structures, facilities and debris above ground level;
- (e) remove all ground slabs, foundations, strip footings, pile caps, tanks and other structure below ground level excluding piles below pile cap level;
- (f) remove all demolished materials and debris from Project Areas; and
- (g) backfill all excavations with fill free of deleterious materials and compact to a density consistent with the surrounding ground.

## 4 TRAFFIC MANAGEMENT DURING CONSTRUCTION

### 4.1 GENERAL

- (a) As part of the Traffic Management Plans required under the State Project Documents, PPP Co must prepare Construction Traffic Management Plans (CTMPs) for the management of the construction of the Project Works that have an impact on the community and users of Affected Roads including footpaths, bikeways, Shared Use Paths and other transport infrastructure. Management of the impact in the CTMP must address, without limitation, the following matters:
- (i) traffic impact of construction sequencing ;
  - (ii) truck movements associated with delivery and haulage operations;
  - (iii) site access and parking for personnel and construction traffic;
  - (iv) public transport operations;
  - (v) pedestrian and cyclist movements;
  - (vi) QPS and Emergency Services agencies operations;
  - (vii) BAC, QDMR, Council, Queensland Transport (QT) and QR network operations;
  - (viii) local businesses including any potential business interruptions
  - (ix) access for local businesses and property owners;
  - (x) forecasting and monitoring of impacts;
  - (xi) Incident management procedures; and
  - (xii) consultation and communication of impacts.
- (b) PPP Co must nominate a management site representative (Traffic Representative) who has authority and responsibility for issues relating to traffic management including liaison with BAC, Council, QDMR, TransLink, QR, Brisbane Metropolitan Transport Management Centre (BMTMC), QPS and other stakeholders (as applicable) throughout the performance of the D&C Activities. This role must be filled on a full time basis with 24 hour availability and must not be delegated to another party. The Traffic Representative must have appropriate experience in traffic engineering, management and operations, including operational knowledge and understanding of traffic signal systems.
- (c) Vehicles involved in the Project Activities must only enter, operate within or exit from a traffic flow in a manner which does not endanger or restrict other road users and under suitably designed and appropriate traffic control measures.

### 4.2 COMPLIANCE WITH TRAFFIC INSTRUCTIONS

- (a) PPP Co must comply with any traffic direction or instruction given by BAC, QDMR, Council, TransLink, QR or QPS in respect to any traffic proposal that affects traffic for the relevant section of the Project Works.
- (b) QDMR, Council, QR or QPS may, at any time, instruct PPP Co to re-open any traffic lane, shoulder or rail track to traffic without delay, whether or not that lane,

shoulder or rail track was closed by prior agreement. PPP Co must immediately comply with such instructions.

#### 4.3 TRAFFIC MANAGEMENT CONSTRUCTION LIAISON GROUP

- (a) PPP Co must form and chair a Traffic Management Construction Liaison Group (TMCLG) prior to carrying out any part of the D&C Activities that may impact upon the community and users of roads, footpaths, bikeways, Shared Use Paths or other transport infrastructure.
- (b) The TMCLG must comprise representatives from the BMTMC, QDMR and Council and other groups nominated by QDMR or Council. The TMCLG is to be a forum for the exchange of information and the discussion of issues associated with CTMPs and traffic impacts. The TMCLG is not responsible for approving CTMPs or Construction Traffic Control Plans (CTCPs).
- (c) The TMCLG will have no legal responsibilities and will itself not have any power to require any of the parties or their Associates to act or refrain from acting in any way, and PPP Co's responsibility for traffic management will not be limited or affected by the existence of, or determinations or decisions of, the TMCLG.
- (d) The TMCLG must meet at least once every two weeks from its inception until the Date of Tollroad Completion, or such lesser frequency as may be agreed by QDMR and Council.
- (e) PPP Co must ensure that PPP Co's Traffic Representative responsible for traffic management attends each meeting of the TMCLG.
- (f) PPP Co must provide the TMCLG with:
  - (i) details as to timing of implementation of CTMPs;
  - (ii) a schedule of CTMPs submitted and those proposed to be submitted within the next two months; and
  - (iii) all relevant reports as requested by the TMCLG.

#### 4.4 CONSTRUCTION TRAFFIC MANAGEMENT PLANS (CTMP)

- (a) PPP Co in preparing CTMPs must examine existing conditions, network and traffic operations and road use to enable evaluation of impacts, forecasting of impacts, and compliance with any traffic restrictions. A separate CTMP must be prepared for each work area, and haulage operation for an agreed period of construction through the process described in section 4.6.
- (b) CTMPs must identify the full construction sequencing and duration required to complete each work area. A construction sequence will represent any change in path allocated for the movement of traffic, including pedestrians, through the work area.
- (c) In preparing CTMPs PPP Co must analyse and include details of:
  - (i) road user safety;
  - (ii) existing and forecast variations in traffic flow, including additional traffic generated by construction activities and haulage operations;

- (iii) minimum traffic requirements in accordance with section 4.9;
  - (iv) network and road capacity and performance;
  - (v) operating conditions including speed environment, speed limits and levels of service;
  - (vi) maintenance of relevant environmental conditions;
  - (vii) access arrangements for residents, local businesses and their customers and other organisations;
  - (viii) influence of external events and the operations of others on road capacity;
  - (ix) potential traffic diversion to other local roads and its effect on the affected road network;
  - (x) impact on road structures;
  - (xi) Incident and crash contingency plans;
  - (xii) timing including periods of reduced traffic lanes; and
  - (xiii) Community and Consultation Plan requirements for public notification including provision of road or rail user information.
- (d) PPP Co must monitor the effectiveness of the CTMP in respect of traffic impacts and report regularly to the TMCLG (refer section 4.3(d)). Monitoring must include actual measures of traffic flow and a review of road user behaviour. Where required by the Council or QDMR, PPP Co must provide CCTV coverage of Affected Roads capable of monitoring remote from the CCTV location, and installed prior to undertaking the relevant construction works. PPP Co must ensure the CCTV data is supplied to the BMTMC for broader road network management.
- (e) Where outcomes differ from forecast and when requested by the TMCLG, PPP Co shall amend operations in consultation with relevant Authorities.

#### 4.5 CONSTRUCTION TRAFFIC CONTROL PLANS (CTCP)

- (a) PPP Co must prepare Construction Traffic Control Plans (CTCP) for each construction sequence (refer section 4.4(b)) identified in CTMPs or major change in site traffic provision.
- (b) Each CTCP must include details in respect of:
- (i) lane or road closure;
  - (ii) timing of any such closure;
  - (iii) all traffic control devices;
  - (iv) traffic signal modifications, phasing and operation;
  - (v) traffic barrier types, locations, details, extents and terminal treatments;
  - (vi) vertical and horizontal geometry of Affected Roads, pathways and the like;
  - (vii) drainage provisions, including aquaplaning prevention measures and pavement drainage;

- (viii) pedestrian and cyclist provisions;
  - (ix) public transport provisions;
  - (x) parking provisions;
  - (xi) Construction Site egress;
  - (xii) access provisions for businesses and their customers;
  - (xiii) PUP access;
  - (xiv) lighting provisions, including temporary lighting;
  - (xv) worker and road user safety provisions; and
  - (xvi) independent road safety audit (refer section 1.8)
- (c) CTCPs must include detailed drawings identifying the nature and location of all temporary measures contemplated including linemarking, delineation, lighting, drainage, traffic barriers and signs.

#### 4.6 APPROVAL OF CONSTRUCTION TRAFFIC MANAGEMENT PLANS

- (a) Each CTMP must be distributed and agreed in accordance with the process as follows:
- (i) PPP Co must provide a CTMP to QDMR, Council, TransLink and QR as appropriate;
  - (ii) recipients of the CTMP must be allowed 20 Business Days to provide comments to PPP Co;
  - (iii) where the CTMP is not agreed and on receipt of comments from QDMR, Council, TransLink or QR, PPP Co must address the issues raised, amend and resubmit a CTMP for agreement with QDMR, Council, TransLink or QR, as appropriate, which must include:
    - A any adjustments required to meet the requirements of QDMR, Council, TransLink or QR, as appropriate; and
    - B written agreement of PPP Co's independent road safety auditor and PPP Co's Traffic Representative to the measures proposed.
- (b) Within 10 Business Days of receipt of a resubmitted CTMP which satisfies section 4.6(a)(iii), QDMR, Council, TransLink or QR as appropriate will:
- (i) notify PPP Co of its agreement to the CTMP; or
  - (ii) provide PPP Co with reasons why QDMR, Council, TransLink or QR does not agree with the CTMP, in which case PPP Co must update and resubmit a CTMP addressing the matters raised by QDMR, Council, TransLink or QR.
- (c) Where the resubmitted CTMP is not agreed, the process in sections 4.6(a)(iii) and 4.6(b) shall be reapplied until the CTMP is agreed.
- (d) The parts of the Project Works included in a CTMP must not proceed:
- (i) until the CTMP which complies with the requirements of the State Project Documents has been agreed in accordance with the process in 4.6(a) above;

- (ii) to the extent the Project Works are BAC EWAG Works, PPP Co has provided evidence to the State and the Independent Verifier that BAC is satisfied with the provisions of the CTMP; and
  - (iii) the CTMP has been provided to the State and the Independent Verifier.
- (e) CTCPs (refer section 4.7) will be considered not agreed until agreement of the relevant CTMP.

#### 4.7 APPROVAL OF CONSTRUCTION TRAFFIC CONTROL PLANS

- (a) Each CTCP must be distributed and agreed in accordance with the following process:
- (i) PPP Co must provide a CTCP and any applicable road Authority application forms to QDMR, Council, TransLink or QR where transport operations are to be impacted in any way by the performance of the D&C Activities;
  - (ii) recipients of the CTCP must be allowed 10 Business Days to provide approval or comments to PPP Co;
  - (iii) where the CTCP is not agreed by and on receipt of comments from QDMR, Council, TransLink or QR, PPP Co must amend and resubmit a CTCP for agreement with QDMR, Council, TransLink or QR, as appropriate, which must include:
    - A any adjustments required to meet the requirements of QDMR, Council, TransLink, QR, or other transport operators, as appropriate; and
    - B written agreement of PPP Co's independent road safety auditor (refer section 1.8) and PPP Co's Traffic Representative to the measures proposed.
- (b) Within 10 Business Days of receipt of a resubmitted CTCP which satisfies section 4.7(a)(iii), QDMR, Council, TransLink or QR as appropriate will:
- (i) notify on its agreement to the CTMP; or
  - (ii) provide PPP Co with reasons why QDMR, Council or TransLink does not agree with the CTCP, in which case PPP Co must update and resubmit a CTCP addressing the matters raised by QDMR, Council, TransLink or QR.
- (c) Where the resubmitted CTCP is not agreed, the process in sections 4.7(a)(iii) and 4.7(b) shall be reapplied until the CTCP is agreed.
- (d) Where applicable PPP Co must submit the agreed CTCP to QPS for any necessary permits.
- (e) The parts of the Project Works included in a CTCP must not be undertaken by PPP Co until:
- (i) the CTCP which complies with the requirements of the State Project Documents has been agreed in accordance with the process in 4.7(a) above;
  - (ii) to the extent the Project Works are BAC EWAG Works, PPP Co has provided evidence to the State and the Independent Verifier that BAC is satisfied with the provisions of the CTCP; and
  - (iii) the CTCP has been provided to the State and the Independent Verifier.

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- (f) Advertising of the proposed works included in a CTCP must not proceed until the CTCP has been agreed by BAC, QDMR, Council, TransLink or QR as appropriate.
- (g) The parts of the Project Works included in a CTCP must not be undertaken by PPP Co until all public notification requirements as specified in section 4.12 are satisfied and a period of not less than 5 Business Days has passed.
- (h) PPP Co must:
  - (i) undertake a post implementation independent road safety audit (AUSTRoads - Stage 4) of that part of the Project Works during the first 24 hours after the initial implementation of the CTMP, unless otherwise agreed by BAC, QDMR and Council as appropriate;
  - (ii) within 48 hours of the initial implementation of the CTMP, submit, unless otherwise agreed by BAC, QDMR and Council, a written report to BAC, QDMR and Council as appropriate including the results of the post implementation road safety audit and describing the actions taken in response to identified corrective actions. A copy of the report must be provided to the State and the Independent Verifier;
  - (iii) rectify all other deficiencies identified in the post implementation road safety audit within 48 hours; and
  - (iv) maintain the relevant parts of the Project Works executed in accordance with the CTCP.

#### 4.8 HAUL ROUTES AND OPERATIONS

- (a) PPP Co must prepare a CTMP for each separate major haulage operation. In addition to typical CTMP requirements (refer section 4.4), PPP Co must evaluate alternative haulage routes available and submit with each relevant CTMP, reasons for the chosen route.
- (b) Where haulage operations require specific traffic control provisions a CTCP will need to be submitted and agreed in accordance with section 4.7 prior to the commencement of haulage operations.
- (c) On provision of an agreed CTMP, PPP Co must provide prior advice to directly impacted stakeholders and undertake community advertising as required by section 4.12 prior to the commencement of haulage operations.

#### 4.9 MINIMUM TRAFFIC REQUIREMENTS

- (a) The minimum traffic requirements for Affected Roads are to be analysed and submitted with each CTMP. Subject to sections 4.9(b) to 4.9(g) below, the CTMP shall provide traffic capacity equivalent to the traffic capacity of the existing Affected Road network, delivering equivalent levels of service, safety and delays. Where a CTCP proposes a temporary reduction in road capacity, the capacity provided must be sufficient to maintain level of service C and 85% demand / capacity ratio (AUSTRoads) for all the elements of the Affected Road network at all times during the reduction in road capacity.
- (b) Prior to the opening of the North South Bypass Tunnel (NSBT), PPP Co must at all times ensure that there is a direct traffic connection between:

- (i) eastbound Inner City Bypass (ICB) and northbound Lutwyche Road; and
  - (ii) northbound and southbound Lutwyche Road, to westbound Inner City Bypass (ICB);
- (c) At Peak Traffic Times in the period after the opening of NSBT to traffic and prior to opening Airport Link to traffic, including the period of opening the permanent connections between Airport Link and NSBT, PPP Co must ensure that the connections between Lutwyche Road and NSBT are not less than:
- (i) for the southbound Lutwyche Road to southbound NSBT connection, 2 continuous dedicated lanes from Lutwyche Rd to NSBT including at the Lutwyche Rd approach to the southbound Lutwyche Rd to southbound NSBT connection, two left turn lanes with a minimum 150m length and two through southbound lanes on Lutwyche Rd to the City;
  - (ii) for northbound Lutwyche Road to southbound NSBT, 2 right turn lanes or a minimum 1 lane grade separated connection over Lutwyche Road with a minimum 100m stand-up length at the intersection with the southbound Lutwyche Road to southbound NSBT connection;
  - (iii) for northbound NSBT to southbound Lutwyche Road / Bowen Bridge Road 1 turn lane; and
  - (iv) for northbound NSBT to northbound Lutwyche Road 2 lanes.
- For the purpose of this section (c), Peak Traffic Times are 5:30am to 10:00am and 2:00pm to 7:00pm Monday to Friday and 7:30am to 10:00am and 2:00pm to 7:00pm Saturday.
- (d) Notwithstanding the requirements of section (c) above, PPP Co must at all times during the period specified in section (c) above, ensure that there is a direct traffic connection between:
- (i) eastbound Inner City Bypass (ICB) and northbound Lutwyche Road;
  - (ii) eastbound ICB and southbound NSBT;
  - (iii) southbound Lutwyche Road to westbound ICB;
  - (iv) northbound and southbound Lutwyche Road to southbound NSBT;
  - (v) northbound NSBT to eastbound / westbound ICB; and
  - (vi) northbound NSBT and northbound and southbound Lutwyche Road / Bowen Bridge Road.
- (e) The design speed of any Temporary Works associated with the connections identified in sections 4.9(b) to 4.9(d) above must be no less than those of the existing road to which the Temporary Works are connected or replace.
- (f) For the purpose of this section 4.9, "all times" means continuously 24 hours per day for each calendar day of the year, except for such times as have otherwise been approved by the relevant Authorities for the D&C Activities.
- (g) PPP Co must comply with the minimum requirements of sections 4.9(b) to 4.9(f), regardless of any other factors that may indicate lesser requirements including:
- (i) future traffic modelling;
  - (ii) grade separated free flowing arrangements; and

- (iii) differing traffic lane configurations around Construction Sites.

#### 4.10 TRAFFIC CONTROLLERS

PPP Co must ensure that all persons required to perform the duties of a traffic controller undertake the relevant training and are examined and certified under Queensland Transport's *Traffic Controller Accreditation Scheme* as competent to perform their respective traffic controller duties.

#### 4.11 PROPERTY ACCESS

- (a) PPP Co must carry out the Accommodation Works and do all things necessary to satisfy the reasonable requirements of individual owners, occupiers of and visitors to properties, businesses and community facilities affected by the D&C Activities in respect of timing, duration and the carrying out of the relevant D&C Activities.
- (b) Any reduction to the level of access to residential properties or other properties (other than commercial properties) must be limited to the minimum duration necessary to carry out the relevant D&C Activities.
- (c) No reduction to the level of access, (vehicular or pedestrian) to any commercial property during its relevant trading hours is permitted without the written agreement of the owner and occupier.
- (d) If performance of any part of the D&C Activities will, or is likely to, modify the amenity of, access to and egress from, or the functionality of, any property, PPP Co must give not less than 15 Business Days notice to the owner and the occupier (with a copy to the State), which must:
  - (i) request access for the purpose of carrying out Accommodation Works;
  - (ii) include a full description of the relevant Accommodation Works to be carried out (including the intended date for commencement of the Accommodation Works);
  - (iii) describe the impact such activities will have on the property including access to the property; and
  - (iv) include PPP Co's 24-hour contact phone numbers through which the owner or occupier of the property may register complaints or obtain further information regarding the carrying out of the activities or the effect of the activities on or near the property.
- (e) Within 7 days of completion of any activity requiring temporary access measures, PPP Co must ensure that:
  - (i) permanent access for the owner and/or occupier is restored; and
  - (ii) following restoration of permanent access, any temporary access measures implemented by PPP Co are removed.

#### 4.12 PUBLIC NOTIFICATION

Without limiting the requirements of Annexure 6 Part 1 (Community and Consultation Requirements):

- (a) during construction, adequate information must be advertised publicly by PPP Co to keep the travelling public and community, including businesses, informed of changes to traffic movement and of any possible disruptions, as agreed with BAC, Council, QDMR, TransLink or QR as appropriate;
- (b) the form of notification and advertising will depend on the nature of and the impact on and the stakeholders involved. All forms of notification and advertising will require pre-approval by the State and relevant Authorities, unless determined otherwise by the TMCLG;
- (c) notification may involve various formats including direct contact, radio, displays, local signs, published notices, websites and advertising;
- (d) PPP Co must ensure adequate lead times are provided for all notices to ensure impacted stakeholders have adequate advice to mitigate impacts; and
- (e) a weekly traffic report must be provided to BAC, Council, QDMR, TransLink and QDMR as appropriate, and a copy provided to the State and the Independent Verifier, detailing:
  - (i) network traffic performance;
  - (ii) traffic incidents as a result of any D&C activities;
  - (iii) public complaints due to D&C activities impacting on traffic and pedestrian pathways and bikeways;
  - (iv) all current D&C Activities affecting traffic and pedestrian pathways and bikeways; and
  - (v) D&C Activities proposed within the following 3 weeks.

#### 4.13 TRAFFIC INCIDENTS DURING CONSTRUCTION

- (a) In the event of a traffic incident within or adjacent to the Licensed Construction Areas, PPP Co must record relevant details of the traffic incident, supported by photographs of the traffic incident site including the details, location and condition of all safety and traffic control devices as soon as possible after the traffic incident. PPP Co must:
  - (i) advise BAC, QDMR, Council, TransLink and / or QPS as appropriate, of the traffic incident immediately; and
  - (ii) provide a report with this information to BAC, QDMR, Council and TransLink as appropriate, with a copy to the State and the Independent Verifier, within two (2) Business Days of the traffic incident.
- (b) PPP Co must appropriately manage all traffic incidents within the Licensed Construction Areas.
- (c) PPP Co must modify its procedures as appropriate to minimise recurrence of traffic incidents.

## 5 MAINTENANCE DURING CONSTRUCTION

- (a) The Construction Site and all other areas affected by the Project Activities must be maintained in a clean and tidy manner throughout the performance of the D&C Activities. The extended storage of rubbish or loose items on the Construction Site is not permitted.
- (b) PPP Co must ensure that all infrastructure, facilities and amenities in the areas being maintained during construction are maintained in accordance with this section 5 and otherwise are at all times fit for purpose, clean and tidy.
- (c) PPP Co must maintain the Licensed Construction Areas in a safe and tidy condition. PPP Co must inspect, maintain and repair each discrete part of the Affected Roads and existing assets located within the Licensed Construction Areas to the maintenance standards as required by BAC, Council, TransLink, QR and QDMR as appropriate, from the commencement of the construction activities in respect of the discrete part of the Affected Roads and existing assets, until the handover of that discrete part of the Affected Roads and existing assets to the relevant Facility Owner.
- (d) PPP Co must conduct and record safety inspections on Affected Roads at least once per week.
- (e) The routine maintenance requirements to existing facilities during construction include, but are not limited to:
  - (i) pavements;
  - (ii) drainage systems;
  - (iii) signage, line marking and traffic barriers;
  - (iv) road furniture;
  - (v) delineation;
  - (vi) landscaping and vegetation including grass cutting;
  - (vii) litter collection;
  - (viii) graffiti removal;
  - (ix) surface drainage and waterways;
  - (x) culverts and pipe drains;
  - (xi) structures;
  - (xii) ITS and communication systems;
  - (xiii) embankments and cuttings;
  - (xiv) traffic signals;
  - (xv) road lighting;
  - (xvi) response to traffic incidents and crashes; and
  - (xvii) miscellaneous repairs.

## 6 TESTING AND COMMISSIONING

### 6.1 GENERAL

- (a) Testing and commissioning of the Tollroad is a condition precedent to the achievement of Tollroad Completion.
- (b) Testing and commissioning of the Tolling System is a condition precedent to the achievement of Tolling System Completion.
- (c) Subject to 6.1(d) and 6.1(e) below, testing and commissioning of the Busway and Busway Stations suitable for TransLink's operations is a condition precedent to the achievement of NB Practical Completion.
- (d) Satisfactory completion of such testing and commissioning of the Busway ITS systems necessary to allow and enable Translink to undertake driver training in the Busway in a safe, secure, effective and efficient manner is a condition precedent to NB Practical Completion, excluding connections to the Busway Operations Centre unless required for safety reasons.
- (e) Testing and commissioning of the Northern Busway (Windsor to Kedron) ITS systems in accordance with section 6.2.2, not otherwise required in accordance with 6.1(d) above, is a condition precedent to the achievement of NB Final Completion.
- (f) Testing and commissioning of EWAG is a condition precedent to the achievement of EWAG Practical Completion.
- (g) Testing and commissioning of all components, subsystems and systems must be undertaken in a planned, methodical and timely manner to confirm and demonstrate compliance with performance requirements and to validate PPP Co's design.
- (h) Testing and commissioning tasks must include, but are not limited to:
  - (i) preparation of separate Completion, Commissioning and Handover Management Plans for the AL Works, the NB Works and the EWAG Works respectively, which includes comprehensive commissioning and acceptance plans and the Systems Integration Testing Plans as described in section 6.3 below;
  - (ii) preparation of ITS Commissioning Procedures in accordance with section 6.2.1 and compliance with PPP Co's obligations in accordance with the agreed procedures;
  - (iii) preparation of comprehensive inspection and test plans;
  - (iv) submission of type testing certificates for electrical components, switchboards, luminaires, motors, fire rated equipment such as dampers, and similar;
  - (v) factory acceptance tests for all major items of equipment such as ventilation fans, jet fans, deluge pumps and similar;
  - (vi) factory based, desktop testing of controls and communication systems including software algorithms and performance simulation, systems integration and human-machine interfaces;



- (vii) setting to work and pre-commissioning of plant;
  - (viii) calibration testing;
  - (ix) adjustment and regulation of components and plant;
  - (x) subsystem and system testing;
  - (xi) systems integration testing; and
  - (xii) a program of site acceptance tests witnessed by relevant stakeholders in accordance with section 6.1(i) to 6.1(n).
- (i) As a minimum, site acceptance tests as described in section 6.1(j) to 6.1(n) below, must include the simulation of:
- (i) all operational modes expected during normal and emergency conditions demonstrating that system performance and systems integration requirements have been met;
  - (ii) partial and total power failure demonstrating that reliability and system capacity (UPS) requirements have been met; and
  - (iii) plant failure demonstrating that redundancy requirements have been met.
- (j) A series of emergency smoke management site acceptance tests (hot smoke tests) must be carried out which must include:
- (i) a minimum of two (2) tests in at least three (3) different locations in each of the Busway tunnels and the Tollroad tunnels (a total of at least twelve (12) separate tests); one test involving the simultaneous generation of 1.5MW of heat and 5.0MW of smoke, and a second test involving the simultaneous generation of 2.5MW of heat and smoke;
  - (ii) testing of longitudinal smoke management with extraction and counter flow in the Tollroad tunnels;
  - (iii) testing of longitudinal smoke management without extraction in the vicinity of a portal in the Tollroad tunnels;
  - (iv) testing of smoke management in the Busway tunnels remote from, and adjacent to, Busway Stations at exit portals and other locations with unique operational requirements;
  - (v) testing the effect of deluge operation and a range of longitudinal air velocities in the Tollroad tunnels;
  - (vi) selection of test locations on the basis of simulating the most onerous conditions with at least one at a point where the downhill gradient is greatest; and
  - (vii) digital video recording of smoke tests which must be included with the Testing and Commissioning Report described in section (p).
- (k) Normal ventilation site acceptance tests in the Tollroad tunnels and Busway tunnels must include adjustment of sensor signals to simulate various traffic conditions.
- (l) Deluge site acceptance tests must include operation under design conditions at a range of hydraulically onerous locations. Testing must include the use of suitable collection pans located throughout the operational zones to confirm the density of discharge.

- (m) Tunnel lighting site acceptance tests must include the measurement of portal, transitional and tunnel illumination levels.
- (n) Tolling System site acceptance tests must include a minimum of 1000 vehicles passing through each tolling point to establish and demonstrate compliance with the requirements of section 17 of Annexure 1 Part 1 (Design Requirements).
- (o) PPP Co must prepare, facilitate and implement with the BMTMC and relevant Authorities a joint physical Tollroad safety drill performed in-field. PPP Co must provide a debrief on the outcomes to the personnel of those Authorities involved in the safety drill.
- (p) All testing and commissioning results must be recorded and assembled into separate comprehensive Testing and Commissioning Reports for the AL Works, the NB Works and the EWAG Works respectively, and must be presented in a manner that allows a direct comparison between specified requirements and performance as measured.
- (q) As well as a record of the results observed and measured, the Testing and Commissioning Reports for the AL Works, the NB Works and the EWAG Works must each, as a minimum, include a commentary on the process adopted for testing and commissioning, individual reports on the commissioning of each system and a report on systems integration.

## 6.2 NB WORKS

### 6.2.1 ITS Commissioning Procedure

- (a)
  - (i) PPP Co must prepare and document proposed ITS Commissioning Procedures which must be submitted to the State and the Independent Verifier for approval in accordance with this section 6.2.1(a) at the same time as the relevant Stage 2 Design Documentation is submitted in accordance with clause 13.2(c) of the Project Deed. Within 20 business days of receipt of the proposed ITS Commissioning Procedures each of the State and the Independent Verifier will notify PPP Co whether it approves or does not approve the relevant procedures set out in the proposed ITS Commissioning Procedures described in (ii) below. Where the State or Independent Verifier does not approve the proposed ITS Commissioning Procedures, PPP Co must amend and resubmit proposed ITS Commissioning Procedures for the approval of the State and/or the Independent Verifier (as applicable). This section 6.2.1(a) will continue to apply until the relevant procedures in the ITS Commissioning Procedures have been approved by each of the State and the Independent Verifier. PPP Co must not commence any testing or commissioning activities in relation to the ITS until the ITS Commissioning Procedures have been approved in accordance with this section 6.2.1.
  - (ii) The State's approval of the proposed ITS Commissioning Procedures submitted by PPP Co relates only to those procedures relevant to external connections to the Busway Operations Centre, any other activities or services proposed to be provided by the State or any procedures relating to the assistance to be provided by PPP Co to the State during the testing and commissioning process. The Independent Verifier's approval is required for

all other testing and commissioning procedures relating to the ITS not required to be approved by the State.

- (iii) No review of, comment on or approval of the ITS Commissioning Procedures (or any part thereof) by the State in accordance with this section 6.2.1(a) or any other act or omission of the State in relation to the ITS Commissioning Procedures will relieve PPP Co from its liabilities or responsibilities whether under the State Project Documents or otherwise according to Law or prejudice the State's rights against PPP Co whether under the State Project Documents or otherwise according to Law.
- (b) The ITS Commissioning Procedures submitted for approval must as a minimum:
- (i) be consistent with the outline ITS Commissioning Procedures identified in Annexure 2 Part 2;
  - (ii) include proposed methods, outcomes and timeframes for testing, commissioning and handover of the ITS to the State;
  - (iii) identify the proposed methods, outcomes and timeframes for testing, commissioning and handover of the ITS to the State for any sections of the Busway proposed to be handed back to the State prior to NB Practical Completion (eg. the Federation Street Connection);
  - (iv) clearly identify proposed testing and commissioning of the Busway ITS systems necessary to allow and enable TransLink to undertake driver training in the Busway in a safe, secure, effective and efficient manner, which must include as a minimum, commissioning and testing of lighting, Busway traffic signals, ventilation and fire and life safety systems of the Busway, but which exclude connections to the Busway Operations Centre unless required for safety reasons;
  - (v) include activities or services proposed to be provided by the State to enable those methods, outcomes, timeframes and activities referred to in (ii) to (iv) above to be successfully implemented and integrated with the Busway Operations Centre.

#### 6.2.2 ITS Testing and Commissioning

Following installation of the ITS on the Busway in accordance with the State Project Documents (including section 18 of Annexure 1 Part 1 (Design Requirements)), PPP Co must:

- (a) undertake its own on-site testing and commissioning of all as-built ITS systems in accordance with its obligations in the approved ITS Commissioning Procedures referred to in section 6.2.1, except connections to external systems described in (b) below, to ensure the ITS systems are functioning and ready for testing and commissioning of external connections to be carried out by the State in accordance with (b) below;
- (b) assist the State (in the manner and to the extent required by the State) with testing and commissioning of connections of the ITS systems to TransLink's system host servers and the Busway Operations Centre, as set out in the approved ITS Commissioning Procedures; and
- (c) include records in respect of the matters in paragraphs (a) to (b) above within the Testing and Commissioning Report for the NB Works (refer 6.1(p) above).

## 6.3 SYSTEMS INTEGRATION

### 6.3.1 Project Plan Relating to Systems Integration Testing

As sub-plans to the Completion, Commissioning and Handover Management Plans, PPP Co must prepare separate Systems Integration Testing Plans for the AL Works and the NB Works respectively, to be used for the complete and comprehensive testing of all the critical interfaces between the PMCS, TMCS, ITS, communications systems and other facilities for which integration is required.

### 6.3.2 Systems Integration Preliminary Testing

- (a) PPP Co must establish separate Systems Integration Preliminary Test Facilities for the Tollroad and the Busway respectively, in a dedicated building. Within this facility there must be installed:
- (i) representative computer servers and operator workstations for each major system;
  - (ii) peripheral equipment for each sub-system so that at least one example of each critical data exchange interface is represented; and
  - (iii) communications system elements as far as is practicable.
- (b) At least three months prior to the commencement of commissioning for each of the Tollroad and the Busway, PPP Co must undertake suitable and comprehensive preliminary systems integration testing of the Tollroad and the Busway respectively to prove the validity of each critical interface including fallback planning to allow the work to continue while integration issues that may cause delays are addressed.
- (c) The testing for both the Tollroad and the Busway must demonstrate the required functionality including but not limited to:
- (i) correctness and completeness of data integration;
  - (ii) timeliness of data presented to operators and users;
  - (iii) the adequacy (by extension) of systems to cope with the full data volumes to be expected from design traffic conditions; and
  - (iv) the consistent and suitable presentation of data on Human Machine Interfaces (HMIs).

### 6.3.3 Ongoing Activity

The Systems Integration Preliminary Test Facilities shall be maintained in a functional state during final tunnel commissioning to provide:

- (a) a reference facility where problems with final Project commissioning and similar issues can be diagnosed without interference to tunnel site activity; and
- (b) a facility for operator and maintenance staff training.

## 6.4 TRANSITION CONSTRUCTION – OPERATION

- (a) PPP Co must satisfy the requirements of section 1.3 of Annexure 4 Part 1 (Operations & Maintenance Requirements) as a condition precedent to the achievement of Tollroad Completion.

- (b) As a sub-plan to the Completion, Commissioning and Handover Management Plan for the NB Works, PPP Co must develop a NB Works Training Management Plan, and provide training to TransLink staff. As a minimum, the NB Works Training Management Plan must include training for all necessary Busway and Busway Station infrastructure including but not limited to:
- (i) ITS;
  - (ii) mechanical and electrical systems;
  - (iii) fire and life safety systems;
  - (iv) lifts;
  - (v) maintenance requirements; and
  - (vi) traffic control systems and Incident management systems.

## 7 AS-BUILT INFORMATION

### 7.1 AS-BUILT RECORDS

- (a) As a condition precedent to the achievement of Close-Out, two sets of as-built records / documents and data must be provided to the State for the AL Works.
- (b) As a condition precedent to the achievement of NB Practical Completion, two sets of as-built records / documents and data must be provided to the State for the NB Works.
- (c) As a condition precedent to the achievement of EWAG Practical Completion, two sets of as-built records / documents and data must be provided to the State for the EWAG Works.
- (d) The as-built records must be current, comprehensive and logically presented and must comply with section 3 of the Documentation Schedule.
- (e) As a minimum, the as-built records must include the following:
  - (i) PPP Co's design including specifications and details of software simulations;
  - (ii) records of any stakeholder agreements reached in developing PPP Co's design;
  - (iii) final Equitable Access Design Requirements Statement (refer section 3.7 Annexure 1 Part 1 (Design Requirements));
  - (iv) final Fire Safety Engineering Brief and associated modelling and reports on the outcome of this work (refer section 3.5.2 of Annexure 1 Part 1 (Design Requirements));
  - (v) final Fire Resistance and Fire Rating Assessment Report (refer section 7.5.1 of Annexure 1 Part 1 (Design Requirements));
  - (vi) final Egress Design Report (refer section 7.6 of Annexure 1 Part 1 (Design Requirements));
  - (vii) all certification required by the Certification Schedule;
  - (viii) completed inspection and test plans;
  - (ix) Testing and Commissioning Reports (refer section 6.1(p));
  - (x) as-built drawings of the Project Works (refer section 7.2) including schematics and equipment schedules;
  - (xi) operating and maintenance manuals for all systems;
  - (xii) an updated Site Access Schedule based on the as-built drawings referred to in paragraph (x) above defining maintenance boundaries and responsibilities;
  - (xiii) cable schedules;
  - (xiv) facility management database;
  - (xv) design documents, reports and all three dimensional models in Autocad, latest release, \*.dwg format and 12D\*.project format as appropriate, including the provisions for future infrastructure design (including the

- Northern Busway and the Future EWAG Traffic Connections) required by section 3.8 of Annexure 1 Part 1 (Design Requirements); and
- (xvi) training plans and training records.
- (f) The documentation in respect of the Busway ITS that is required for NB Practical Completion must also include the following in accordance with section 18 of Annexure 1 Part 1 (Design Requirements):
- (i) ITS installer contact list (2 hard copies and 1 electronic copy in \*.PDF format on disk(s));
  - (ii) ITS commissioning and acceptance test sheets (1 springback bound hard copy and 1 electronic copy in \*.PDF format on disk(s));
  - (iii) ITS equipment warranties and workshop manuals (1 springback bound hard copy and 1 electronic copy in \*.PDF format on disk(s));
  - (iv) as-built ITS drawings (3 hard copies and 2 electronic copies in AutoCAD and \*.PDF format on disk(s));
  - (v) ITS mainline optic fibre patch panel and krone block jumper record books;
  - (vi) ITS PLC manual updates (1 springback bound hard copy and 1 electronic copy in \*.PDF format on disk(s) per ITS PLC);
  - (vii) facilities management system SCADA operator & maintenance manual updates (1 springback bound hard copy and 1 electronic copy in \*.PDF format on disk(s)); and
  - (viii) tunnel PLC manual updates (1 springback bound hard copy and 1 electronic copy in \*.PDF format on disk(s)) per tunnel PLC).
- (g) Unless otherwise specified above, two sets of the as-built records must be provided in hard copy and electronic format for each of the AL Works, the NB Works and the EWAG Works respectively.

## 7.2 AS-BUILT DRAWINGS FORMAT

- (a) PPP Co must submit as-built drawings, models and other data presented as separate sets of documents for the AL Works, the NB Works and the EWAG Works respectively, to the State within 1 month of review by the Independent Verifier in accordance with Section 3 of the Documentation Schedule, in the following format:
- (i) 2 copies of A1 size in colour, where appropriate, certified by PPP Co and verified by the Independent Verifier and marked "as-built" required for micro-filming and record purposes;
  - (ii) 4 copies of A3 size in colour, where appropriate, certified by PPP Co and verified by the Independent Verifier and marked "as-built";
  - (iii) 1 electronic copy in Autocad, latest release, \*.dwg format with support files with layer descriptions in ASCII format on disk/s;
  - (iv) 1 electronic copy in Adobe latest release \*.pdf format on disk/s; and
  - (v) 1 electronic copy in the latest version of 12D \*.project format including all as-built survey files, design input files and support files with model descriptions in ASCII format, including as-built information on disk/s.

- (b) All as-built drawings and linstyles must comply with the requirements of QDMR "Drafting and Design Presentation Standards" manual.
- (c) All as-built drawings for bridges must be prepared in accordance with the QDMR Bridge Drafting Manual.
- (d) The Northern Busway (Windsor to Kedron) ITS as-built drawings must incorporate all drawing amendments effective as at the date of completion of acceptance testing and systems commissioning to the BMTMC in accordance with section 18.5 of Annexure 1 Part 1 (Design Requirements).



## ANNEXURE 2 – PART 1 – ATTACHMENT 1 CONDITIONS PRECEDENT

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## 1 HANDOVER OF RETURNED WORKS

Without limiting clause 14.5 of the Project Deed, PPP Co must prior to the handover of each Returned Facility:

- (a) in respect of pavements:
  - (i) engage an independent testing authority to undertake a comprehensive survey of the pavement and wearing surface for both new and restored pavement to confirm compliance with the requirements of Annexure 1 Part 1 (Design Requirements) and Annexure 11 Part 1 (Environmental Management Requirements). The survey must include but is not limited to:
    - A road roughness counts;
    - B skid resistance;
    - C texture;
    - D pavement deflection;
    - E pavement curvature;
    - F noise levels of completed pavements; and
  - (ii) submit a conformance report including the survey and analysis to the State and the Independent Verifier.
- (b) in respect of M&E, ITS and traffic management facilities:

submit a compliance report to the State and the Independent Verifier to demonstrate all equipment, systems and facilities are functioning in accordance with the requirements of Annexure 1 Part 1 (Design Requirements).
- (c) submit as-built drawings, models and other data in the following format:
  - (i) 2 copies of A3 size in colour, where appropriate, certified by PPP Co and verified by the Independent Verifier and marked "as-built";
  - (ii) 1 electronic copy in Autocad latest release \*.dwg format with support files with layer descriptions in ASCII format on disk/s;
  - (iii) 1 electronic copy in Adobe latest release \*.pdf format on disk/s; and
  - (iv) 1 electronic copy in the latest version of 12D \*.project format including all as-built survey files, design input files and support files with model descriptions in ASCII format, including as-built information on disk/s.

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## 2 TOLLROAD COMPLETION

Without limiting the requirements of the State Project Documents necessary for the achievement of Tollroad Completion, the following conditions noted in Table 1 below are required to be satisfied as a condition precedent to the achievement of Tollroad Completion:

**Table 1 Conditions Precedent to the achievement of Tollroad Completion**

Section No.	Condition Precedent
Section 3.5.2(i)(iv) Annexure 1 Part 1 Design Requirements	Certification by the Qualified Fire Engineer (QFE) that the design of the fire and life safety elements in Annexure 1 section 3.5.2(g) complies with and is consistent with the FEB and all engineering reports.
Section 3.5.2(i)(v) Annexure 1 Part 1 Design Requirements	Certification by the QFE that all as-built Project Works, testing and commissioning plans, testing and commissioning, and operations and maintenance plans comply with and are consistent with the FEB and all fire engineering reports.
Section 3.7(b) Annexure 1 Part 1 Design Requirements	Provision of certification by PPP Co's equitable access consultant that the as-built AL Works satisfy the requirements of the Equitable Access Design Requirements Statement.
Section 6.1(a) Annexure 2 Part 1 Construction Requirements	Satisfactory testing and commissioning of all components, subsystems and systems of the Tollroad, except the Tolling System.
Section 1.3 Annexure 4 Part 1 AL Operations and Maintenance Requirements	Completion of Fitness to Operate Drills to the approval of relevant Authorities including, but not limited to, Emergency Services, QPS, Council, QDMR and QT.  Demonstration that it has agreed with the D&C Contractor for the delivery and management of the works permits and the D&C Contractor(s) works which may be necessary during the O&M Phase to finish, correct or warrant construction works.
Section 2.2 (c) Annexure 9 Part 1, Attachment 2 Documentation Schedule	Submission of an addendum to the durability assessment report.
Section 4.1(c) Annexure 9 Part 1, Attachment 2 Documentation Schedule	Submission of the final AL O&M Manuals.

### 3 TOLLING SYSTEM COMPLETION

Without limiting the requirements of the State Project Documents necessary for the achievement of Tolling System Completion, the following conditions noted in Table 2 below are required to be satisfied as a condition precedent to the achievement of Tolling System Completion:

Table 2 Conditions Precedent to the achievement of Tolling System Completion

Section No.	Condition Precedent
Section 6.1(b) Annexure 2 Part 1 Construction Requirements	Satisfactory testing and commissioning of the Tolling System.

## 4 NB PRACTICAL COMPLETION

Without limiting the requirements of the State Project Documents necessary for the achievement of NB Practical Completion, the following conditions noted in Table 3 below are required to be satisfied as a condition precedent to the achievement of NB Practical Completion:

**Table 3 Conditions Precedent to the achievement of NB Practical Completion**

Section No.	Condition Precedent
Section 3.5.2(i)(iv) Annexure 1 Part 1 Design Requirements	Certification by the Qualified Fire Engineer (QFE) that the design of the fire and life safety elements in Annexure 1 section 3.5.2(g) complies with and is consistent with the FEB and all engineering reports.
Section 3.5.2(i)(v) Annexure 1 Part 1 Design Requirements	Certification by the QFE that all as-built Project Works, testing and commissioning plans, testing and commissioning, and operations and maintenance plans comply with and are consistent with the FEB and all fire engineering reports.
Section 3.7(c) Annexure 1 Part 1 Design Requirements	Provision of certification by PPP Co's equitable access consultant that the as-built NB Works satisfy the requirements of the Equitable Access Design Requirements Statement.
Section 9.15(b) Annexure 1 Part 1 Design Requirements	Provision of a certificate of compliance for each completed Busway Station certified by an independent building surveyor with accreditation with the Building Services Authority, which states that the Busway Station has been designed and constructed in full compliance with the Building Code of Australia.
Section 6.1(c) Annexure 2 Part 1 Construction Requirements	Satisfactory testing and commissioning of the Northern Busway (Windsor to Kedron) suitable for TransLink's operations, noting the requirements of section 6.1(d) of Annexure 2 Part 1 (Construction Requirements) described below, but excluding the requirements of section 6.1(e) of Annexure 2 Part 1 (Construction Requirements).
Section 6.1(d) Annexure 2 Part 1 Construction Requirements	Satisfactory completion of such testing and commissioning of the Northern Busway (Windsor to Kedron) ITS systems as is necessary to allow and enable TransLink to undertake driver training in a safe, secure, effective and efficient manner, and must include as a minimum, testing and commissioning of lighting, Busway traffic signals, ventilation and fire and life safety systems, but exclude connections to the Busway Operations Centre unless required for safety reasons.
Section 7.1(b) Annexure 2 Part 1 Construction Requirements and Section 3(e) Annexure 9 Part 1 Attachment 2 Documentation Schedule	Provision of as-built records for the NB Works.
Section 2.2 (d) Annexure 9 Part 1, Attachment 2 Documentation Schedule	Submission of an addendum to the durability assessment report.
Section 4.2.5 (c)	Submission of the final NB O&M Manuals.

Section No.	Condition Precedent
Annexure 9 Part 1, Attachment 2 Documentation Schedule	

## 5 EWAG PRACTICAL COMPLETION

Without limiting the requirements of the State Project Documents necessary for the achievement of EWAG Practical Completion, the following conditions noted in Table 4 below are required to be satisfied as a condition precedent to the achievement of EWAG Practical Completion:

**Table 4 Conditions Precedent to the achievement of EWAG Practical Completion**

Section No.	Condition Precedent
Section 6.1(f) Annexure 2 Part 1 Construction Requirements	Satisfactory testing and commissioning of EWAG is a condition precedent to the achievement of EWAG Practical Completion.
Section 7.1(c) Annexure 2 Part 1 Construction Requirements and Section 3(f) Annexure 9 Part 1 Attachment 2 Documentation Schedule	Provision of as-built records for the EWAG Works.
Section 2.2 (e) Annexure 9 Part 1, Attachment 2 Documentation Schedule	Submission of an addendum to the durability assessment report.
Section 4.3.5 (c) Annexure 9 Part 1, Attachment 2 Documentation Schedule	Submission of the final EWAG O&M Manuals.

## 6 CLOSE-OUT

Without limiting the requirements of the State Project Documents necessary for the achievement of Close-Out, the following conditions noted in Table 5 below are required to be satisfied as a condition precedent to the achievement of Close-Out:

Table 5 Conditions Precedent to the achievement of Close-Out

Section No.	Condition Precedent
Section 7.1 (a) Annexure 2 Part 1 Construction Requirements and Section 3(d) Annexure 9 Part 1 Attachment 2 Documentation Schedule	Provision of as-built records for the AL Works.

## 7 NB FINAL COMPLETION

Without limiting the requirements of the State Project Documents necessary for the achievement of NB Final Completion, the following conditions noted in Table 6 below are required to be satisfied as a condition precedent to the achievement of NB Final Completion:

Table 6 Conditions Precedent to the achievement of NB Final Completion

Section No.	Condition Precedent
Section 6.1(e) Annexure 2 Part 1 Construction Requirements	Testing and commissioning of the Northern Busway (Windsor to Kedron) ITS systems in accordance with section 6.2.2 of Annexure 2 Part 1 (Construction Requirements), not otherwise required in accordance with section 6.1(d) of Annexure 2 Part 1 (Construction Requirements).

## ANNEXURE 3 – PART 1 AL CUSTOMER SERVICE REQUIREMENTS

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## 1 GENERAL

### 1.1 PURPOSE

This Annexure describes the minimum standard of Customer Services which must be met by PPP Co in the performance of the O&M Activities.

### 1.2 CUSTOMER SERVICE REQUIREMENTS

PPP Co must achieve the following customer service performance measures within each calendar month and report on its performance against each measure during the O&M Phase in accordance with the Documentation Schedule:

	Performance Measure	Benchmark
1)	Customer calls answered within 20 seconds.	90%
2)	Customer accounts with financial institutions are credited or debited with the correct amounts	99.999%
3)	Complaint resolution: Customers to be contacted by the customer service staff within 2 Business Days of a Customer complaint being notified by a Customer	90%
4)	Accounts are not overcharged	100%
5)	Correct toll or fee is assigned to correct account of complying vehicles	99.9%
6)	Applications for Tollroad accounts correctly responded to within 5 days of receipt by mail	99%
7)	Availability and accuracy of information provided in : <ul style="list-style-type: none"><li>• Operator website</li><li>• Operator 1800 number (or similar)</li></ul>	90%

**ANNEXURE 4 – PART 1**  
**AL OPERATIONS AND MAINTENANCE REQUIREMENTS**

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## 1 GENERAL

### 1.1 PURPOSE

- (a) This Annexure describes the minimum operations and maintenance requirements which must be met by PPP Co in relation to the O&M Activities.
- (b) Unless the context otherwise requires, all maintenance requirements for the Tollroad, (including the Asset Management System, Code of Maintenance Standards, condition monitoring of Assets and contents of and compliance with the O&M Manuals) set out in this Annexure 4 and otherwise set out in the Performance Specification, apply equally to the Tollroad and the Maintained Non-Tollroad Works and PPP Co must meet all such requirements in maintaining the Tollroad and the Maintained Non-Tollroad Works.

### 1.2 TOLLROAD OPERATION AND MAINTENANCE

PPP Co must:

- (a) maintain safe and efficient traffic speeds on the Tollroad and manage the effects of the surrounding Brisbane road network on the Tollroad as required in Annexure 12 Part 1 (AL Traffic Management and Road Network Interfacing Requirements During the O&M Phase);
- (b) develop and implement an Incident Response Management Plan as required by section 3 of this Annexure and Annexure 12 Part 1 (AL Traffic Management and Road Network Interfacing Requirements During the O&M Phase);
- (c) liaise with QDMR and Council to coordinate the Tollroad operation with the operation of the Brisbane road network, in accordance with Annexure 12 Part 1 (AL Traffic Management and Road Network Interfacing Requirements During the O&M Phase);
- (d) ensure the O&M Activities are fully compatible with the infrastructure, systems, plans, protocols and standards of QDMR and Council; and
- (e) maintain, repair, upgrade, replace and rehabilitate Assets required to perform the O&M Activities.

### 1.3 TRANSITION CONSTRUCTION-OPERATION

- (a) As a condition precedent to achieving Tollroad Completion, PPP Co must:
  - (i) plan and manage resources including organisation ramping up in such a way to ensure a seamless and continuous transition of the facilities and systems from the AL D&C Activities to the O&M Activities. The transition period includes the planned testing and commissioning process ahead of the Fitness to Operate Drills as detailed under paragraph (b) below;
  - (ii) at least 6 months prior to the planned commencement of the testing and commissioning process, provide to the State details of the process regarding:
    - A training and planning, including an operative simulation facility;
    - B development, finalisation and provision of O&M Manuals;
    - C evidence that the training, simulation facility (refer section 6.2.2 of Annexure 2 Part 1 (Construction Requirements) and O&M Manuals

will provide the targeted levels of O&M staff competencies prior to entering into the Fitness to Operate Drills, and

- D the provision of ongoing training requirements;
  - (iii) complete Fitness to Operate Drills to the approval of relevant Authorities including, but not limited to, Emergency Services agencies, Queensland Police Service (QPS), Council, QDMR and QT; and
  - (iv) demonstrate it has agreed with the D&C Contractor in respect of the delivery and management of the D&C Activities which may be necessary during the O&M Phase to finish, correct or warrant construction works or otherwise carry out such D&C Activities. This agreement must be fully compatible with the Project Plans and be included in the Fitness to Operate Drills.
- (b) Fitness to Operate Drills include, but are not limited to, desktop and field simulation testing of the Incident Response Management Plan, traffic management plans and traffic control plans to ensure all physical resources function seamlessly and correctly, and PPP Co, Council, QDMR, QT and all relevant Authorities involved in implementing the plans are fully aware and able to prove their capability of fulfilling designated roles, tasks and responsibilities as defined in the documented procedures of each plan. PPP Co must provide copies of the Fitness to Operate Drills documentation to the Independent Verifier, Council, QDMR, QT, QPS and all relevant Authorities.

#### 1.4 OTHER ROAD PROJECTS & TRAFFIC OPERATIONAL CHANGES

In the event that other road projects or traffic operational changes impact or may impact on the Tollroad, PPP Co must as a minimum and without limiting clause 10 of the Project Deed or any specific requirement of the Performance Specification, update its Project Plans and associated O&M Manuals as appropriate, at least three (3) months prior to the other road projects or traffic operational changes becoming operational.

## 2 TOLLROAD OPERATION

### 2.1 TOLLROAD CONTROL CENTRE

- (a) PPP Co must provide a Tollroad Control Centre (TCC).
- (b) The TCC must be designed, constructed, fitted out and operated by PPP Co for the purposes of:
  - (i) monitoring and controlling all systems associated with tunnel safety, traffic management, tolling, ventilation, power, lighting and other systems required for the safe and efficient operation of the Tollroad;
  - (ii) initiating and managing Incident and emergency responses;
  - (iii) providing and managing maintenance facilities, equipment and appropriate support services;
  - (iv) providing offices and amenities for personnel required for O&M Activities; and
  - (v) providing temporary workspace and amenities for at least 4 personnel for use by Council, QDMR, Emergency Services agencies and QPS personnel as required.
- (c) The TCC must provide high capacity high speed interactive communication systems with the Brisbane Metropolitan Transport Management Centre (BMTMC) to ensure appropriate Brisbane metropolitan road network traffic management in accordance with the requirements of this Annexure and Annexure 12 Part 1 (AL Traffic Management and Road Network Interfacing Requirements During the O&M Phase).
- (d) The TCC must also provide dedicated communications systems with, and facilities for, Emergency Services agencies and QPS as required by Emergency Services agencies and QPS respectively.
- (e) Specifically, the TCC must include, without limitation, the following:
  - (i) a Tunnel Control Room (TCR) (refer section 2.2) where trained operators monitor tunnel safety and Tollroad traffic using CCTV and other monitoring equipment and control traffic as required using various systems including electronic signage, remote controlled devices, public address and radio rebroadcast systems. The TCR operators must manage the dispatch of breakdown vehicles to remove vehicles that have stopped on the Tollroad. PPP Co must also provide interlinking and liaison systems compatible with QDMR, QT and Council systems at the BMTMC;
  - (ii) facilities to monitor Tollroad plant and equipment to ensure that the Tollroad continues to operate reliably and safely as required under all traffic and emergency conditions, including scheduling and management of maintenance and repairs;
  - (iii) special Incident response facilities available to Emergency Services agencies and QPS; and
  - (iv) workplace facilities for support, maintenance and management staff of PPP Co.
- (f) The TCC must also incorporate:
  - (i) traffic monitoring and control;



- (ii) plant monitoring and control;
- (iii) Tolling System management;
- (iv) associated information technology systems and facilities;
- (v) amenities;
- (vi) workshops and garages;
- (vii) dedicated Incident management room near the TCR, also used for visiting guests; and
- (viii) parking and marshalling areas for staff, maintenance, Emergency Services agencies and QPS vehicles.

## 2.2 TUNNEL CONTROL ROOM

PPP Co must, as part of its obligations in respect of the TCR:

- (a) resource the TCR 24 hours a day, 7 days a week with a minimum of two TCR operators being on duty at any time;
- (b) monitor and control at all times the safe operation of the Tollroad;
- (c) monitor and control traffic on the Tollroad, in accordance with Annexure 12 Part 1 (AL Traffic Management and Road Network Interfacing Requirements During the O&M Phase);
- (d) provide traffic monitoring and information data in accordance with Annexure 12 Part 1 (AL Traffic Management and Road Network Interfacing Requirements During the O&M Phase);
- (e) provide "real time" interface, and liaise and cooperate with:
  - (i) QDMR and Council;
  - (ii) Emergency Services agencies;
  - (iii) QPS; and
  - (iv) other relevant Authorities in respect of Brisbane's road network;
- (f) ensure all its plans, systems and procedures remain fully compatible with the plans, systems, procedures and standards used by QDMR and Council;
- (g) communicate effectively with motorists on the Tollroad;
- (h) in collaboration with Council, QDMR, QPS and QT, liaise with the local community and promote driver education on tunnel road safety (including preventative safe driving and emergency responses); and
- (i) collect data, conduct Incident debriefs and compile reports on the operation of the Tollroad, including all responses to Incidents.

## 2.3 TOLLROAD SAFETY

PPP Co must:

- (a) ensure that passage through the Tollroad is safe:
  - (i) at all times for all road users and PPP Co staff and/or representatives operating within the Tollroad; and
  - (ii) under all conditions, including periods of slow moving or stationary traffic;

- (b) close any potentially unsafe vehicular tunnel if the requirements of section 2.3(a) above cannot be achieved;
- (c) detect and verify any Incident, or anticipate any planned event, which may impact on the Tollroad motorists safety or Tollroad throughput;
- (d) respond to any Incident or planned event while activating and implementing the Incident Response Management Plan or Maintenance Operation Traffic Management Plan and associated Traffic Control Plans (refer to Annexure 12 (AL Traffic Management and Road Network Interfacing Requirements During the O&M Phase), in collaboration with Emergency Services agencies, QPS, Council, QDMR and the relevant Authorities as required;
- (e) liaise, interface and support Emergency Services agencies, QPS and other relevant Authorities, in accordance with the Incident Response Management Plan or Maintenance Operation Traffic Management Plan and associated Traffic Control Plans (refer to Annexure 12 (AL Traffic Management and Road Network Interfacing Requirements During the O&M Phase);
- (f) provide a light vehicle breakdown and towing service, including facilities for the breakdown service crew, to a safe place 24 hours a day, at no cost to motorists, and make provision to process efficiently any Incident involving heavy vehicles; and
- (g) provide QDMR and Council with relevant information for media relations and communication to the public. PPP Co must not issue any information on traffic and Incident response operations directly to the media.

## 2.4 SECURITY

PPP Co must:

- (a) provide security to prevent unlawful and unauthorised access onto and along the Tollroad; and
- (b) cooperate with the QPS, Emergency Services agencies and other relevant Authorities in the event of any security threat (including any bomb alert or act of terrorism) in accordance with Annexure 14 Part 1 (Critical Infrastructure Protection Requirements).

## 2.5 CONTINUOUS IMPROVEMENT

PPP Co must:

- (a) promptly review any reported or observed problems with the operating systems of the Tollroad and implement appropriate corrective actions in accordance with the O&M Manuals;
- (b) benchmark regularly its tunnel operation standards with similar urban road tunnels in Australia and other countries, and propose and implement improvements to the O&M Activities; and
- (c) maintain compatibility with QDMR, QT and Council systems and interfaces at the BMTMC.

### 3 INCIDENT RESPONSE MANAGEMENT PLAN

#### 3.1 INCIDENT RESPONSE

PPP Co must develop, implement and regularly update the Incident Response Management Plan which, as a minimum:

- (a) meets the requirements of Annexure 12 Part 1 (AL Traffic Management and Road Network Interfacing Requirements During the O&M Phase);
- (b) references a Comprehensive Tunnel Danger Study (CTDS) – which is a study based on recognised risk identification and management procedures that examines all outcomes for tunnel users and personnel to be prepared by PPP Co;
- (c) identifies the Incident responses that it can manage and deliver with its own resources and procedures, without jeopardizing the safety of motorists and PPP Co staff;
- (d) details procedures for the escalation of Incident response management to Emergency Services agencies, QPS and other relevant Authorities, according to:
  - (i) the type of Incident;
  - (ii) the scale of the Incident; or
  - (iii) any other safety criteria;
- (e) assists and supports the QPS, Emergency Services agencies and other relevant Authorities; and
- (f) is compatible with and complements the relevant plans and procedures of QDMR, Council, Emergency Services agencies and QPS as updated by the relevant Authorities from time to time.

#### 3.2 RESOURCES

PPP Co must:

- (a) provide adequate resources to manage, in an effective and efficient manner, all actions arising for any Incident response to ensure that:
  - (i) the response time at the TCR between an event occurrence and the activation of the appropriate response does not exceed 2 minutes; and
  - (ii) where it is most appropriate for the field response to be undertaken by PPP Co, the response time between the activation of the appropriate response and the attendance of the appropriate response team at the Incident site must not exceed:
    - A 6 minutes in case of a tunnel fire (including a suspected fire risk);
    - B 10 minutes when requested by QDMR and Council or as nominated in the Incident Response Management Plan; or
    - C 20 minutes for other events; and
  - (iii) where it is most appropriate for the field response to be undertaken by a third party, including Emergency Services agencies, the response time is minimised and the responding third party is provided all necessary advice and assistance; and

- (b) provide emergency vehicles specifically equipped for tunnels and properly trained emergency teams capable of:
- (i) controlling a fire, except where the fire is of a size and nature which has been agreed with QFRS as one where the most appropriate response is by Emergency Services agencies;
  - (ii) assisting and supporting motorists in evacuating the tunnels when appropriate;
  - (iii) assisting and supporting Emergency Services agencies, QPS and other relevant Authorities in implementing their actions at the Incident site, notably in signalling and managing the traffic flowing adjacent to the Incident site whenever possible;
  - (iv) towing away a breakdown, abandoned or disabled vehicle as soon as possible, compatible with the relevant Authority's determination as to Incident management;
  - (v) assisting motorists in cases of an immobilised vehicle;
  - (vi) restoring any damaged or unsafe Assets to a safe condition;
  - (vii) restoring the traffic lane(s) to standard operating conditions as soon as conditions permit; and
  - (viii) monitoring and reporting of the status of the Incident and adjacent traffic conditions.

### 3.3 DATA AND COMMUNICATION MANAGEMENT

PPP Co must:

- (a) operate the Tollroad's integrated system of operational management and control (as defined in section 19 of Annexure 1 Part 1 (Design Requirements)) as provided at the TCR, to collect and store data and report (refer section 1.2 of the Documentation Schedule) on Incident response, providing response times, details and analysis of any Incident; and
- (b) establish and maintain at all times all necessary communication links and data flows between:
  - (i) the TCR and BMTMC; and
  - (ii) Emergency Services agencies personnel in command of the Incident response and other relevant Authorities.

### 3.4 RESTORATION OF DAMAGE

PPP Co must:

- (a) provide resources to undertake a swift, safe and effective restoration of damage arising from an Incident and/or from the activation of the Incident Response Management Plan; and
- (b) recover operation of the Tollroad and restore, with the appropriate phasing, to standard operating conditions as soon as it is safe to provide it to motorists.

### 3.5 CONTINUOUS IMPROVEMENT

PPP Co must:

- (a) conduct debriefs internally and with other relevant Authorities to analyse the effectiveness of the implementation of the Incident Response Management Plan, and, if necessary, propose and undertake immediately upon approval from QDMR, Council and relevant Authorities, modification of approved plans, systems, and manuals as deemed appropriate;
- (b) prepare, facilitate and implement with the BMTMC and relevant Authorities drills to test and improve the Incident Response Management Plan including:
  - (i) a joint Tollroad safety drill, at no greater than 6 month intervals, performed either on a desk-top and/or in-field with at least 1 in 4 drills requiring Tollroad closure to general public prior to conducting a physical drill; and
  - (ii) an annual joint Tollroad safety drill that is performed under live traffic conditions, and
- (c) ensure that personnel of those Authorities involved in the emergency exercises described in section 3.5(b) above are debriefed on the analysis of the outcomes of the exercises.

## 4 TOLLROAD MAINTENANCE

### 4.1 GENERAL

PPP Co must:

- (a) clean, maintain, repair, replace, rehabilitate, upgrade and refurbish the Tollroad and other assets within the Licensed Maintenance Area to ensure the Tollroad is safe for motorists and PPP Co staff and/or representatives;
- (b) develop a Code of Maintenance Standards (refer section 6 of this Annexure) consistent with applicable design assumptions including durability requirements, manufacturers' advice and as-built documentation including the details as described in section 6; and
- (c) update the initial Forecast Maintenance Program set out in Part 2 of this Annexure as required by clause 19.8 of the Project Deed.

### 4.2 ROUTINE MAINTENANCE

PPP Co must:

- (a) develop and implement a planned routine maintenance schedule that details a systematic approach to performing the routine cleaning and preventative maintenance works, inspections and monitoring that comply with the Code of Maintenance Standards; and
- (b) undertake safely routine maintenance in accordance with, and at a frequency in accordance with:
  - (i) a planned routine maintenance schedule;
  - (ii) the Maintenance Operation Traffic Management Plan and associated Traffic Control Plans (refer to Annexure 12 (AL Traffic Management and Road Network Interfacing Requirements During the O&M Phase);
  - (iii) the Health and Safety Management Plan in accordance with the requirements of Annexure 13 Part 1 (Safety Management); and
  - (iv) the O&M Manuals.

### 4.3 REPAIRS AND NON-ROUTINE MAINTENANCE

PPP Co must:

- (a) develop and implement an Asset repairs performance specification to ensure the durability of the Asset Element is maintained and required Residual Design Life of the Asset Element is achieved;
- (b) schedule and undertake the repairs and unplanned intervention in accordance with the Asset repairs performance specification; and
- (c) without limiting the routine maintenance requirements of section 4.2 above, develop and comply with the Maintenance Operation Traffic Management Plan and associated Traffic Control Plans (refer to Annexure 12 AL Traffic Management and Road Network Interfacing Requirements During the O&M Phase) and Health and Safety Management Plan for urgent repairs.

#### 4.4 MAJOR TOLLROAD WORKS

PPP Co must:

- (a) develop a replacement, rehabilitation and refurbishing major works program that details PPP Co's systematic approach to replace, rehabilitate, and refurbish the Tollroad; and
- (b) undertake safely the major Tollroad works in accordance with, and at a frequency in accordance with:
  - (i) the major Tollroad works schedule;
  - (ii) the Maintenance Operation Traffic Management Plan and associated Traffic Control Plans (refer to Annexure 12 (AL Traffic Management and Road Network Interfacing Requirements During the O&M Phase));
  - (iii) the Health and Safety Management Plan in accordance with the requirements of Annexure 13 Part 1 (Safety Management); and
  - (iv) the O&M Manuals.

#### 4.5 MAINTENANCE DATA MANAGEMENT

PPP Co must:

- (a) maintain detailed records of all works undertaken in the Assets Management System (refer section 5 of this Annexure);
- (b) maintain detailed records of O&M Activities undertaken and of the replaced, rehabilitated or refurbished or modified Assets in the Assets Management System and update the Project Plans and O&M Manuals accordingly; and
- (c) maintain an up to date inventory and stock of spare parts to meet the requirements of the Code of Maintenance Standards.

#### 4.6 ROAD SAFETY AUDITS

- (a) PPP Co must ensure that road safety audits are conducted on the Tollroad by an independent qualified road safety auditor;
  - (i) at two year intervals throughout the O&M Phase;
  - (ii) as a result of Incidents; and
  - (iii) as required for traffic management during the O&M Activities.
- (b) PPP Co must implement any corrective actions identified in the road safety audit.
- (c) Copies of all road safety audit reports and corrective action plans must be promptly provided to the State and the Independent Verifier.

## 5 ASSET MANAGEMENT SYSTEM

### 5.1 GENERAL

- (a) PPP Co must develop, maintain and update an Asset Management System to a standard which satisfies all planning, monitoring, control and reporting requirements of the State Project Documents ("Asset Management System").
- (b) The Asset Management System must be in a form acceptable to the State, and must be available for interrogation by the State. PPP Co must provide online, and real time, access for the State to any computerised database management system forming part of the Asset Management System.
- (c) The Asset Management System must:
  - (i) maintain a record of the current, historical and projected future condition of each Asset within the Leased Area and the Licensed Maintenance Area ("Asset Inventory") including detailed records of the repair or replacement of Asset Elements to assist in establishing the Residual Design Life of the Asset Elements. The Asset Inventory must be organised according to the relevant Asset's criticality with regards to the following criteria listed in order of precedence:
    - A safety;
    - B traffic capacity; and
    - C other criteria;
  - (ii) maintain a record of the nature, maintenance activity, extent, estimated and actual work quantity, location, response time as per the Code of Maintenance Standards (refer section 6 of this Annexure 4), actual response time and type of all works performed by, or programmed to be performed by, PPP Co;
  - (iii) include a method of reporting to the State on the performance of any Asset by analysis of the specific condition and defect information recorded for individual Asset Elements; and
  - (iv) provide for the development and maintenance of pavement performance models for monitoring the performance of the pavements throughout the O&M Phase. Each pavement performance model must provide for the expected growth in the volume of car traffic and of commercial vehicles.

### 5.2 ASSET INVENTORY

- (a) The Asset Inventory must list all Assets to be maintained under the State Project Documents.
- (b) The Asset Inventory must be structured in layers comprising Asset Elements, Asset Types, Asset Items and where appropriate, Asset Sub Items.

### 5.3 INSPECTION

The Asset Management System must document the regular inspection of the Asset Items and Asset Sub Items and document any failure to meet the Code of Maintenance Standards and must initiate an appropriate maintenance response. The relevant failure and nature and timing of the necessary response must be defined in the Code of Maintenance Standards for each Asset Element.

#### 5.4 CONDITION

Within the Asset Management System, PPP Co must record the condition of Assets as required in accordance with the condition inspection and performance standards procedures included in the most recent revision of the Code of Maintenance Standards.

#### 5.5 LOCATION REFERENCING

The location referencing system used in the Asset Inventory must be based on a linear system covering the Licensed Maintenance Area. The system must segment the Asset Element into homogeneous sections no longer than 120m. Assets such as software, communications or those within the TCR may be separately referenced.

#### 5.6 TIME SERIES OF DATA

PPP Co must ensure that the Asset Management System maintains a current accurate historical record of all of required data and information and that the data and information is available to the State on request. Each data item must be referenced with the date of the record as appropriate to the type of data.

#### 5.7 AS-BUILT LIST OF ASSETS

- (a) PPP Co must compile the initial list of Assets from the as-built documentation and provide that list for the State's comment.
- (b) The list of Assets must include all Assets and associated construction phase non-conformances in the Leased Area, the Licensed Maintenance Area and the Returned Works.
- (c) The Asset information for the Assets that are Returned Works must be in the format required by the relevant Facility Owner (as applicable).

#### 5.8 DATA INTEGRITY

PPP Co must ensure that the Asset Management System maintains accurate and complete data for all records by conducting six monthly data validation and integrity tests. Such tests include, but are not limited to, checking the accuracy of the data entered and the completeness of the data.



## 6 CODE OF MAINTENANCE STANDARDS

### 6.1 GENERAL

PPP Co must develop and employ intervention and maintenance standards that ensure that all of the requirements of the State Project Documents are met at all times during the performance of the O&M Activities. PPP Co must document its intervention and maintenance standards in the Code of Maintenance Standards as set out in this section 6.

### 6.2 CONTENTS OF THE CODE OF MAINTENANCE STANDARDS

The Code of Maintenance Standards must include the information in Table 1 below:

Table 1 Code of Maintenance Standards

Information	Description
Reference No.	A unique code reference number.
Asset Element	The Asset Element to which the standard applies.
Primary Outcome	The outcome to which the Asset Element makes its primary contribution.
Maintenance Rationale	The purpose for the maintenance of the Asset Element and its criticality to the safe and smooth operation of the Tollroad.
Defects	A listing of the principal defects likely to occur and the associated risk of their occurrence and the appropriate remedial action.
Performance Standards	The performance standards to be provided by the Asset Element, and by Asset Items and Asset Sub Items within that Asset Element, at various specified times up to the end of the Concession Period.
Inspection Procedure	A reference to the procedures used to inspect the condition of the Asset Element and monitor the durability performance.
Intervention Standard	The intervention level and response time for maintenance work on the Asset Element. This should consider the criticality of the Asset Element.
Inspection Plan	The frequency of inspection of the Asset Element. The plan must cover both regular inspections and less frequent but more comprehensive inspections and tests. This should consider the criticality of the Asset Element.
Maintenance Activity	A listing of the principal maintenance activities and relevant unit of measurement for that activity.

### 6.3 REVIEW OF CODE OF MAINTENANCE STANDARDS

- (a) The Code of Maintenance Standards must be regularly reviewed during the O&M Phase and updated to ensure that historical performance records reflect continued certainty that the latest inspection plans, performance standards and intervention standards will enable PPP Co to comply with its obligations under the State Project Documents.
- (b) Reviews of the Code of Maintenance Standards must be undertaken as part of each periodic review of the Quality Management Plan. As a minimum, formal reviews of all Code of Maintenance Standards must be undertaken at the first

anniversary of Tollroad Completion and then at two yearly intervals during the O&M Phase.

- (c) Reviews of the Code of Maintenance Standards must consider the criticality of each Asset Element to the safety and operations of the Tollroad.
- (d) Any modifications to the Code of Maintenance Standards must first be submitted to the State for comment.

## 7 CONDITION MONITORING OF ASSETS

### 7.1 GENERAL

PPP Co must incorporate condition indicators of Asset Items and Asset Sub Items into the Code of Maintenance Standards to allow objective determination of the condition and likely remaining Design Life of each Asset Element and to identify the time at which refurbishment or replacement of the Asset Element should be undertaken.

### 7.2 CONDITION RECORDS

- (a) The condition indicators must be recorded in the time series of data required to be maintained in accordance with section 5.6 of this Annexure.
- (b) This data record must be used in conjunction with the Code of Maintenance Standards to determine the extent to which the Tollroad and Maintained Non-Tollroad Works meet the standards required by the State Project Documents at the expiry of the Concession Period.



## 8 CONTENTS OF THE O&M MANUALS

As a minimum, the O&M Manuals must include:

(a) Tollroad Description and Records

A description of the physical elements of the AL Works, the plant and equipment, and the operational and security systems including a comprehensive set of all as-built records, design and as-tested performance data, as required in section 7 of Annexure 2 Part 1 (Construction Requirements).

(b) Asset Management System

The Asset Management System requirements of section 5 of this Annexure and;

- (i) the maintenance workflow processes;
- (ii) location and storage of data such as but not limited to condition, pavement performance indicators, as-built surveys, and mechanical and electrical readings;
- (iii) mandatory data fields in system;
- (iv) overview of integration and capture of external electronic documents; and
- (v) verification and validation reports of O&M Activities.

(c) Code of Maintenance Standards

The Code of Maintenance Standards including the requirements of section 6 of this Annexure.

(d) Condition Monitoring of Assets

The condition monitoring of Assets including the requirements of section 7 of this Annexure.

(e) Operation and Maintenance Organisation

A description of the operation and maintenance organisation, including:

- (i) the number, type, qualifications, experience and skills of personnel;
- (ii) vehicles, plant and equipment to be used in the various operations;
- (iii) subcontract arrangements (if any), and each of the sub-contractor's roles and responsibilities;
- (iv) the location(s) of the operation and maintenance organisation(s) and resources;
- (v) role and responsibilities of personnel;
- (vi) contact details; and
- (vii) training requirements.

(f) Performance Standards

The performance standards which include

- (i) reference documentation including:
  - A the Comprehensive Tunnel Danger Study;
  - B the hazards and risks mitigation strategies,
- (ii) performance standards including:

- A pavement performance including but not limited to roughness, skid resistance, cracking, rutting, texture and deflection targets;
- B response time targets for Incident management;
- C maintenance targets for timeliness of defect rectification and inspections, quality of the maintenance works and inspections, and road user impacts due to maintenance;
- D equipment availability targets;
- E water and air quality targets and limits;
- F tunnel air opacity targets and limits;
- G noise level targets and limits;
- H air flow velocity targets and limits;
- I normal operating condition levels (including lighting levels, air quality standards, signage etc);
- J unsafe operating condition levels or O&M Activities which may result in closure of part or all of the Tollroad;
- K system capacities, including safety limits and protection levels for systems and components;
- L Design Life and durability strategies; and
- M load limits and ratings.

(g) Operating Procedures

Operating procedures including the following:

- (i) operating procedures, protocols and Project Plans to ensure the satisfactory, safe and secure operation of the Tollroad, including, but not limited to, the following:
  - A the requirements of Annexure 12 Part 1 (AL Traffic Management and Road Network Interfacing Requirements During the O&M Phase);
  - B QPS and Emergency Services agencies communication protocols;
  - C operating details for all systems and equipment;
  - D environmental monitoring;
  - E Critical Infrastructure Protection Management Plans;
  - F Health and Safety Management Plan; and
  - G relevant traffic management plans;
- (ii) Incident management procedures for all types of Incidents including vehicle stopping on the Tollroad, vehicle breakdowns, errant vehicle use of the Tollroad, plant failures, electrical supply failure, traffic crashes, fires, hazardous spills, use of the tunnels by over height and prohibited vehicles, vehicles out of fuel, illegal use of the Tollroad including tunnels by pedestrians, damage to the tunnel or any part of the tunnel, injury to persons and other reports received. Incident management procedures must be contained in the Incident Response Management Plan; and
- (iii) the nominated safe location to which break down vehicles can be towed and safely stored.

- (h) Permanent Plant and Equipment Inventory  
A permanent plant and equipment inventory which details all plant and equipment together with associated data, including handbooks and spare parts lists for items of plant and equipment. The plant and equipment inventory must include the Asset Elements of the Asset Management System to be established in accordance with section 5 of this Annexure.
- (i) Forecast Maintenance Program  
The program should include all works during the O&M Phase. The replacement, rehabilitation and refurbishment program must include estimated quantities to achieve the Residual Design Life at the end of the O&M Phase.
- (j) Quality Assurance during O&M Activities.  
The requirements of Annexure 10 Part 1 (Quality Management) and the Quality Management Plan covering the O&M Phase.
- (k) Environmental Management during O&M Activities  
The requirements of Annexure 11 (Environmental Management) and the Environmental Management Plans covering the O&M Phase.
- (l) Special Purpose Manuals  
Special purpose manuals, for use by the State, QDMR, QPS, Emergency Services agencies, which contain a brief description of all systems and equipment with illustrations, diagrams, and sketches, particularly in relation to Incident operating procedures and must be incorporated into the Incident Response Management Plan.
- (m) Durability and Residual Design Life  
The O&M Manuals must address the ongoing durability of the Tollroad and compliance under the State Project Documents relating to Design Life and Handover and any construction non-conformance impacting on Asset performance and / or durability.
- (n) Knowledge Management and Continuous Improvement  
Knowledge management and continuous improvement including:
- (i) O&M Manuals continuous improvement procedure;
  - (ii) event analysis and Incident debrief procedures;
  - (iii) program for Tollroad safety drills; and
  - (iv) any agreement reached with the relevant Authorities and/or Emergency Services and QPS.
- (o) Tollroad Safety Records  
Tollroad safety records including
- (i) a Tollroad safety records system that has a clearly identified subset, selected as appropriate, to describe and enhance PPP Co's priority focus on tunnel safety and to monitor its ongoing commitment to its delivery; and
  - (ii) road safety audits documentation.

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## 9 HANDOVER CONDITIONS

Without limiting any of its other requirements under the State Project Documents, at the end of the Concession Period, PPP Co must ensure that in respect of the Tollroad and Maintained Non-Tollroad Works:

- (a) the Residual Design Life of Assets is at least equal to the required Residual Design Life described in section 3.3.3 of Annexure 1 Part 1 (Design Requirements);
- (b) the O&M Manuals are current and up to date and include all records; and
- (c) the Tollroad and Maintained Non-Tollroad Works are in accordance with the Code of Maintenance Standards.

## ANNEXURE 5 – PART 1 PUBLIC UTILITY PLANT REQUIREMENTS

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## 1 GENERAL

### 1.1 PURPOSE

This Annexure describes the minimum requirements which must be met by PPP Co in respect of Public Utility Plant (PUP) in the performance of the Project Activities.

### 1.2 GENERAL

- (a) PPP Co:
- (i) is required to establish the location of all PUP which may be affected by the Project Activities; and
  - (ii) is solely responsible for ensuring that there is no damage, or other adverse change or impacts, to the PUP, except where agreed to by the relevant PUP owner and the PUP operator, as a result of carrying out the Project Activities.
- (b) PPP Co must assess risks and protection necessary for all PUP.
- (c) PPP Co shall be responsible for liaising with PUP owners and determining the scope of work required for PUP relocations, adjustments, protection or support. PPP Co will make all necessary arrangements to locate the position of existing PUP so that they are known when the scope of relocation, adjustment, protection or support work is formulated. PPP Co must produce a PUP Relocation Plan showing the full extent of existing PUP and the proposed PUP Works. The PUP Relocation Plan must be approved by the PUP owner in writing prior to any PUP relocation work occurring.
- (d) Relocation of PUP within QDMR road reserves must not be undertaken without the written agreement of QDMR.
- (e) Relocation of PUP within BAC Land must not be undertaken without the written agreement of BAC.
- (f) Without limiting clause 9.2 of the Project Deed, PPP Co will be responsible for coordinating the PUP relocation work required in order to carry out the Project Activities. The costs of relocating such PUP are to be borne by PPP Co. Relocation work will include PUP mains within the road reserve as well as PUP services to adjoining properties.



## 2 DESIGN

- (a) As part of the design requirements of the D&C Activities, PPP Co must identify and confirm the location of all existing PUP affected or likely to be affected by the Project Works, Project Activities, or the proposed construction, operations or maintenance methods.
- (b) PPP Co must accommodate in its design the provision of ducting or conduits for future PUP as required by any PUP owners, BAC, Council or the State.
- (c) PPP Co must liaise with PUP owners regarding:
  - (i) the relocation of existing PUP affected or likely to be affected by the Project Works, Project Activities, or the proposed construction, operations or maintenance methods;
  - (ii) the methodology of relocating, adjustment, protection or support of any affected PUP such that the impact on that PUP is minimised;
  - (iii) the existence of PUP that will be, or have the potential to be, impacted by the D&C Activities, and which will be required to be protected and/or relocated to ensure that no impact to that PUP occurs during the D&C Activities or, to the extent relevant, during the O&M Activities; and
  - (iv) any proposed upgrades of PUP within or adjacent to the Construction Site or the Maintenance Site (as relevant) for which the Design Documentation should make allowance by the provision of space ducting or conduits.
- (d) PPP Co must ensure that all existing PUP is accurately represented in the Design Documentation, and, where applicable, the required relocation is identified together with any specific site requirements.
- (e) PPP Co must ensure that it identifies and addresses the impact of the D&C Activities on the existing traffic signals or existing traffic control communication cabling as part of the proposed method for managing traffic during construction.

### 3 CONSTRUCTION AND OPERATIONS AND MAINTENANCE

In undertaking the Project Activities, PPP Co is responsible for:

- (a) negotiating with the PUP owners;
- (b) providing protection systems for PUP which are affected by the Project Activities but which are not relocated;
- (c) programming the construction of the Project Works and the carrying out of the O&M Activities to suit the relocation of the PUP, the provision of protection systems for PUP (where relevant) and the installation of ducting or conduits for future PUP;
- (d) paying for all PUP owners' charges and administration costs for PUP Works, including the provision of ducting or conduits for future PUP; and
- (e) making due allowance in the D&C Program for the interaction with the PUP owners and operators, where relevant.

#### 4 DISRUPTION TO PUBLIC

- (a) PPP Co must ensure that disruption in disconnecting and reconnecting PUP to individual landowners and/or occupiers is kept to a minimum. PPP Co must consult with all affected landowners and/or occupiers to arrange a mutually acceptable time for any works that may potentially cause disruption at least five (5) Business Days before the commencement of the works in connection with the anticipated disruption.
- (b) PPP Co must identify and consult with any land owner and/or occupier with special requirements regarding the continuity of supply of any PUP and must take all measures necessary to satisfy such requirements.



## ANNEXURE 6 – PART 1 COMMUNITY AND CONSULTATION REQUIREMENTS

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# 1 INTRODUCTION

## 1.1 PURPOSE

This Annexure describes the minimum requirements PPP Co must meet with regard to communications, community relations and consultation management during the performance of the Project Activities.

## 1.2 GENERAL

- (a) The State requires a Project that promotes the goals of the *South East Queensland Regional Plan 2005-2026* (SEQRP), and provides community benefits, reduces adverse impacts on community life and contributes to a well-planned and well-designed urban environment.
- (b) The State is committed to maintaining a high quality of life for residents during the performance of the Project Activities and believes the community is entitled to expect that construction and operation of the Project Works will be well managed to reduce (and where possible avoid) disruption to businesses, community facilities and residents, and that the Projects will support general participation in community life.
- (c) The State and Council delivered a structured communication and consultation program during the EIS investigations for the AL Project.
- (d) The State, through TransLink, delivered a structured communication and consultation program during the CDIMP investigations for the Northern Busway.
- (e) The main aims of the previous community, communication and consultation activities were to:
  - (i) raise awareness of the Projects and their need for the Projects;
  - (ii) inform the broader community of specific details of the Projects;
  - (iii) engage with, and seek input from stakeholders on the corridor identification, project design, EIS and CDIMP; and
  - (iv) provide community feedback to the State's project team during the corridor identification and development of the EIS and CDIMP.
- (f) PPP Co must build upon the State's previous work with the community during the earlier phases of the Projects, and undertake broad communications across the City and provide more targeted communications with interested stakeholders, including residents, businesses and community organisations within the Projects corridor.
- (g) The State will implement marketing and communication activities for the Projects separately to PPP Co, including conducting media briefings and distributing media releases about the Projects on a regular basis during the D&C Phase.

## 2 PPP CO OBLIGATIONS

- (a) Subject to clause 40 of the Project Deed, PPP Co will be responsible for managing community issues, communication and consultation specifically related to the design, construction, maintenance and operation of the AL Works, the design and construction of the NB Works, and the design and construction of the EWAG Works.
- (b) PPP Co must:
- (i) appoint a suitably qualified and experienced full-time Communications Manager and ensure the Communications Manager has all the necessary support to adequately deal with stakeholder issues;
  - (ii) appoint a suitably qualified and experienced full-time Community Relations Manager and ensure the Community Relations Manager has all the necessary support to adequately deal with stakeholder and community issues during construction;
  - (iii) develop and implement:
    - A an overall Marketing and Communication Management Plan (MCMP) in accordance with Section 3(b) of this Annexure;
    - B a Community and Consultation Management Plan (CCMP) for the D&C Phase in accordance with Section 3(c) of this Annexure; and
    - C an Operation and Maintenance Communication Management Plan (OMCMP), at least 12 months before the commencement of the O&M Phase;
  - (iv) set up procedures to ensure that significant issues are reported to the State as soon as possible;
  - (v) seek and obtain the State's approval for all communication materials relating to the Projects prepared for public distribution, procedures for handling media enquiries, procedures for handling community complaints and enquiries, and protocols for working with the State. Communication materials relating to the Projects prepared for public distribution include but are not limited to public construction notifications, Project newsletters, website text, Project fact sheets and other education materials, public display material, advertising material, media releases and announcements and Project signage. PPP Co must provide draft materials to the State and allow sufficient time for the State's approval processes (up to five Business Days);
  - (vi) manage the CCMP to ensure it delivers extensive and ongoing communication with those immediately affected by the construction process, including local stakeholders, and the broader community including motorists, cyclists, pedestrians, public transport users and visitors to Brisbane;
  - (vii) implement an interactive consultation program to ensure that the relevant views of directly impacted stakeholders, local residents, and local communities are considered during all phases of the Projects, including detailed design, construction, and operations and maintenance of the Projects;
  - (viii) keep Brisbane residents and visitors well informed of the Projects' progress and any possible disruption caused by construction or other activities;

- (ix) prepare for the State a weekly 'Issues and Activity Report' containing details of all community liaison, communication, marketing and consultation activities, community enquiries, response times to calls, complaints, issues arising from stakeholder meetings and any other potential issues, and corrective actions taken to close out or manage issues;
- (x) provide the State with a monthly detailed rolling program providing a three-month outlook of the proposed construction activities, including details of any road or lane closures, changes to public transport services and other impacts of the proposed construction activities. This program must also outline PPP Co's proposed communication strategies, target audiences and timing of communication activities;
- (xi) provide the State with a monthly report detailing a three-month outlook of proposed community liaison, marketing and communication activities, including target audiences, timing, and possible media opportunities; and
- (xii) undertake the communication tasks detailed in this Annexure, section 4.12 of Annexure 2 (Construction Requirements), and all other actions required to advance the requirements of the MCMP, CCMP and OMCMP.

### 3 COMMUNICATION AND CONSULTATION MANAGEMENT PLANS

- (a) The MCMP, CCMP and OMCMP must detail how PPP Co will approach its long-term involvement and interaction with relevant Authorities, key stakeholders, PUP owners and PUP operators, community neighbours located close to the Project Activities (including residents, property owners, businesses and community facilities) and the broader community. PPP Co must review and annually update the MCMP, CCMP and OMCMP and prepare a report to the State detailing its recommendations for improvements in community liaison, consultation and communication activities for the next period, for the State to consider.
- (b) The MCMP must, at a minimum, outline the strategies to manage the community liaison, marketing and communication activities of PPP Co for the life of the Projects. The MCMP must:
- (i) detail how PPP Co will comply with the requirements of the State Project Documents in relation to community liaison, marketing and communication activities;
  - (ii) detail the communication team organisation including:
    - A nominated personnel;
    - B lines of responsibility and management; and
    - C interfaces with the Project organisational structure
  - (iii) identify all relevant stakeholders, including shareholders, investors, government agencies, potential users and the community;
  - (iv) outline procedures and strategies to:
    - A build effective relationships with key stakeholders
    - B provide timely and regular updates and information to key stakeholders;
    - C manage communications during crises and Incidents;
    - D manage internal communications;
    - E complement and support the State's broader marketing and communications strategy and activities; and
    - F monitor, evaluate and report on the MCMP.
- (c) The CCMP must, at a minimum, outline the community liaison, communication and consultation strategies for the D&C Phase of the Projects. The CCMP must detail:
- (i) how PPP Co will comply with the requirements of the State Project Documents in relation to communication and consultation activities during the D&C Phase;
  - (ii) communication and consultation team organisation including:
    - A nominated personnel;
    - B lines of responsibility and management; and
    - C interfaces with the Projects organisational structure;

- (iii) procedures and strategies to:
- A build effective relationships with the key stakeholders, including local communities proximate to the PPP Co D&C Activities and the Tollroad, Busway and EWAG alignments;
  - B seek to avoid and minimise inconvenience and disruption to the community during construction;
  - C provide timely and regular advice to the community about construction activities, and impacts (eg site establishment, traffic and transport, construction hours, service relocations, noise, etc);
  - D promote the Projects to the broader community, including key milestones and general progress of the Projects;
  - E consult relevant Authorities, directly affected stakeholders, and local communities, including residents, property owners, businesses and community facilities, during the D&C Phase, to identify relevant impacts and mitigation measures for design and construction;
  - F manage the efficient and fast handling of community enquiries, complaints and/or issues. PPP Co must provide its initial response to community enquiries, complaints and/or issues within 24 hours;
  - G manage communications during crises and Incidents;
  - H manage internal communications, including training for employees on managing and responding to community enquiries;
  - I complement and support the State's broader communications strategy and activities; and
  - J monitor and report on the CCMP.
- (d) The OMCMP must outline the community liaison and communication strategies for the O&M Phase. The OMCMP must be delivered at least 12 months prior to the O&M Phase and must detail:
- (i) how PPP Co will comply with the requirements of the State Project Documents;
  - (ii) community liaison and communication team organisation including:
    - A nominated personnel;
    - B lines of responsibility and management; and
    - C interfaces with the Project organisational structure;
  - (iii) procedures and strategies to:
    - A provide timely and regular advice to the community and key stakeholders about O&M Activities;
    - B manage the efficient and fast handling of community enquiries and/or complaints;
    - C complement and support the State's broader communications strategy and activities;

- D manage communications during crises and incidents;
- E manage internal communications; and
- F monitor and report on the OMCMP.



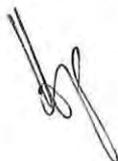
#### 4 REQUIRED COMMUNITY LIAISON AND COMMUNICATION TASKS

PPP Co must, as a minimum:

- (a) in relation to media and advertising:
- (i) seek State approval to issue any media releases or company statement or conduct media briefings;
  - (ii) refer all media enquiries to the State, who will consult with PPP Co and then determine whether the enquiry should be managed by the State or PPP Co. PPP Co must not communicate with any media or respond to any media enquiries except as approved by the State;
  - (iii) provided PPP Co has received the required approval referred to in paragraph (ii) above, nominate suitable spokespeople to speak on behalf of PPP Co in response to enquiries about the Projects; and
  - (iv) establish and maintain protocols to ensure that non-approved Project personnel do not speak directly to the media;
- (b) in relation to stakeholder management and engagement:
- (i) identify the stakeholders and compile and maintain a comprehensive stakeholder database (to be made available to the State as required);
  - (ii) establish and maintain regular contact with directly affected stakeholders, local residents and local communities throughout the D&C Phase;
  - (iii) ensure stakeholders, local residents and local communities who may be affected by the Projects are fully aware of all forthcoming construction activities, which may in any way impact or disrupt their normal activities;
  - (iv) particularly consider the needs of sensitive receptors including hospitals, education facilities, community centres, churches, child care centres, aged care facilities, cultural facilities and health providers;
  - (v) work with relevant Authorities (including, without limitation, TransLink, Brisbane Water, Emergency Services agencies and Queensland Rail) and BAC as applicable to provide adequate notice of forthcoming construction activities, which may in any way impact or disrupt the relevant Authorities' or BAC's regular activities;
  - (vi) provide a weekly update to Education Queensland and to affected schools of progress and anticipated forward work for activities within the vicinity of Kedron State High School, Windsor State School, Wooloowin State School, Stafford State School and Aviation High;
  - (vii) establish community consultative committees that represent a broad cross section of the community within the Project Areas. Meetings must be organised, facilitated and hosted by PPP Co which will pay all costs associated with establishing and operating the community consultative committees. Minutes of each meeting must be recorded and distributed to the State and committee members; and
  - (viii) work closely with community members located close to the Project Activities, including local residents, businesses and community facilities, to identify the construction impacts and identify strategies to manage or avoid these impacts;

- (c) in relation to community relations:
- (i) establish appropriate State-approved procedures for the handling of construction-related enquiries and complaints, keep records of complaints and their resolution, and make the complaints register available to the State as required; and
  - (ii) provide, maintain and staff a freecall 1800 community enquiry telephone service, seven days per week, 24 hours per day;
- (d) in relation to community information
- (i) keep the general community adequately informed of Project matters, including key milestones, design changes, changed traffic conditions and general progress of the Projects;
  - (ii) place regular State-approved 'Project Updates' and 'Construction Notifications' in the Courier-Mail and local Quest newspapers to keep the community well informed about the Projects' progress and to provide timely advice about possible upcoming construction-related impacts (including, without limitation changed traffic arrangements and potentially noisy works etc); and
  - (iii) provide, install and maintain high-quality, visible Project information signs at locations agreed with the State during construction indicating the name of the Projects, name of companies involved in the delivery of the Projects, Project boundaries, jobs indicator and the relevant persons the community may contact should they want to make an enquiry or complaint in relation to any aspect of the Projects;
- (e) in relation to public relations and marketing
- (i) proactively identify and implement a range of communication opportunities designed to maintain a positive image for the Projects, including well-planned community events;
  - (ii) organise and attend weekly Project communications team meetings with the State, where communication issues and community relations activities will be discussed;
  - (iii) design and maintain a website for the Projects;
  - (iv) establish a dedicated email address for community feedback / enquiries on the Projects;
  - (v) work cooperatively with the State to produce (at PPP Co's expense) quality, graphically designed, visual public display material. This will include professional photographs of the progress during construction taken at agreed appropriate intervals. State-approved display material may be used by both the State and PPP Co;
  - (vi) work cooperatively with the State to facilitate site tours, where such tours are mutually agreed, which must be safe, and promote the Projects and the Project objectives; and
  - (vii) provide, maintain and staff a Projects visitor education centre, open to the public and school groups at appropriate times during the day;
- (f) in relation to management, reporting and review

- (i) produce for the State an annual communication report for the Projects critically evaluating the success of the MCMP and the CCMP for the previous year and making recommendations for improvements to consultation and communication activities for the next period; and
- (ii) produce a communication report on the Projects for the State prior to the commencement of the O&M Phase that provides recommendations for ongoing communications during the O&M Phase. PPP Co must comply with the requirements set out in the communication report for the O&M Phase which must be approved by the State.



## ANNEXURE 7 – PART 1 INVESTIGATIONS, SURVEY AND CONDITION MONITORING REQUIREMENTS

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## 1 INTRODUCTION

### 1.1 PURPOSE

This Annexure describes the minimum investigation, survey and condition monitoring requirements which must be met by PPP Co in the performance of the Project Activities.

### 1.2 GENERAL

- (a) Without limiting clause 8 of the Project Deed, PPP Co must undertake all site investigations, property and land surveys and ground and infrastructure condition surveys, and monitoring required for the performance of the Project Activities.
- (b) PPP Co must promptly provide the State and the Independent Verifier with two hard copies, and one electronic copy in \*.PDF format, of all site investigation reports, property and land surveys and ground and infrastructure condition surveys, and monitoring results, including progressive copies of such documents, as each is developed.

## 2 SITE INVESTIGATION

- (a) Geotechnical site investigation work must be undertaken in accordance with AS1726 "Geotechnical Site Investigations". PPP Co must maintain records of all tests, site investigation and geotechnical reports (including position and elevation surveys).
- (b) The geotechnical site investigation, in conjunction with the design process, must identify all ground conditions and infrastructure conditions (including the condition of roads, railways, PUP, bridges and buildings) which may be affected by the performance of the Project Activities.
- (c) Where ground conditions or infrastructure are expected to be affected by the Project Activities, PPP Co must diligently monitor the actual effects in accordance with section 5.



### 3 CONDITION SURVEYS

- (a) In addition to inspections and surveys required by the Environmental Documents, the Environmental Management Plans and Annexure 15 Part 1 (QR Requirements), and prior to commencing any activity which could adversely affect existing ground conditions or infrastructure (including roads, railways, PUP and buildings), PPP Co must undertake ground and infrastructure condition surveys (including dilapidation surveys) to establish the condition of all existing infrastructure which could be affected by the Project Activities.
- (b) Condition surveys must be conducted with the agreement of the property owner and any occupier and must provide a detailed record (including dated photographs) of the pre-construction conditions of the ground and infrastructure which may be affected. The State, the Independent Verifier and the owner and/or occupier must be issued with a hard copy and an electronic copy in \*.PDF format of the survey report prior to PPP Co commencing the relevant activity.
- (c) The condition surveys must be carried out by independent and appropriately qualified assessors.



#### 4 SURVEY REQUIREMENTS

- (a) PPP Co's attention is directed to the possible existence of established survey marks within or in the vicinity of the Construction Site. PPP Co must establish and verify survey control for the Project Activities.
- (b) PPP Co must avoid any disturbance to existing survey marks. In the event that existing survey marks are disturbed or adversely affected by the Project Activities, PPP Co must re-establish the survey marks.
- (c) All survey levels must refer to Australian Height Datum (AHD). All survey information must be prepared and recorded to the Brisbane City Survey Grid 2002 (BCSG02).
- (d) PPP Co must make available to the State and any relevant Authorities the coordinates and level values (BCSG02) of established survey marks and allow access to the marks.
- (e) Field survey data and final design strings must be supplied to the State in 12D \*.project format. Any design data revisions are to be supplied to the State to enable the State's models to be updated.
- (f) In addition to the requirements set out in section 7 of Annexure 2 Part 1 (Construction Requirements), PPP Co must undertake a consolidated as-built survey of the Project Works which details the actual location of the AL Works, the NB Works and the EWAG Works and show the Tollroad is wholly located within the Tollroad Area, the Busway is wholly located within the Busway Area, and EWAG is wholly located within the BAC Leased Area.
- (g) PPP Co must ensure that qualified surveyors, who are eligible for membership of the Institution of Surveyors, Australia, or the Institution of Engineering and Mining Surveyors, Australia, take responsibility for all surveying control for the Project Works.

## 5 INFRASTRUCTURE PROTECTION

### 5.1 EFFECTS OF THE PROJECT ACTIVITIES

- (a) PPP Co must ensure that the Project Activities do not have any effects that are not Acceptable Effects (as defined in paragraph (c) below) on the existing ground conditions or on any infrastructure (including roads, railways, PUP, bridges, buildings or other property) including any impact on the:
- (i) amenity;
  - (ii) aesthetics;
  - (iii) durability;
  - (iv) function;
  - (v) user benefits;
  - (vi) safety during construction and operation; or
  - (vii) environmental performance;
- of that infrastructure. Such impacts may be due to, but not limited to, settlements, noise, vibrations, air quality and groundwater drawdown.
- (b) PPP Co must undertake a detailed and rigorous engineering analysis to predict the effects (the 'Predicted Effects') of the Project Activities on existing ground conditions and infrastructure (including roads, railways, PUP, bridges and buildings). The Predicted Effects must include the limits of accuracy of the prediction and the expected statistical spread of measured results. Condition surveys of all infrastructure that is predicted to be affected must be undertaken in accordance with section 2.5 of Annexure 2 Part 1 (Construction Requirements).
- (c) PPP Co must agree with the infrastructure owner and document in writing, the extent to which the Project Activities may adversely affect the existing ground conditions and infrastructure (consistent with satisfying the requirements of paragraph (a) above) (the 'Acceptable Effects'), before any work which may affect that infrastructure commences. Except in relation to BAC EWAG Works, if the infrastructure owner and PPP Co cannot agree, then the extent to which the Project Activities may affect the existing ground conditions and infrastructure will be determined by the Independent Verifier and as such will be the relevant Acceptable Effects. A copy of each agreement or determination must be provided to the State.
- (d) Throughout the performance of the Project Activities, PPP Co must monitor the actual effects of the Project Activities and compare the actual effects to both the Predicted Effects and the Acceptable Effects.
- (e) PPP Co must define appropriate trigger levels, which must be set at a level such that the PPP Co will be alerted prior to the potential exceedence of the Predicted Effects and the Acceptable Effects.
- (f) In the event that the actual effects of the Project Activities exceed the trigger levels, PPP Co must review and, if necessary, re-evaluate the Predicted Effects and make any necessary adjustments to the manner in which the Project Activities are undertaken to ensure that the Acceptable Effects are not exceeded and to ensure compliance with paragraph (a) above.
- (g) As part of the O&M Activities, PPP Co must monitor the actual effects of the Project Activities until it demonstrates whether, and to what extent, the actual

effects have fully materialised and that PPP Co has complied with paragraph (a) above.

- (h) PPP Co must repair and reinstate infrastructure damage caused by the Project Activities at the earliest opportunity so that PPP Co satisfies the requirements in paragraph (a) above in respect of each item of infrastructure. This requirement applies whether or not the actual effects of the Project Activities are more or less than the Predicted Effects or the Acceptable Effects.
- (i) PPP Co must promptly and progressively provide the State and the Independent Verifier with:
  - (i) accurate analysis, including any revisions, of Acceptable Effects, Predicted Effects and trigger levels of the Project Activities; and
  - (ii) detailed results of monitoring the actual effects of the Project Activities, in a form which is directly comparable to the Acceptable Effects, Predicted Effects and trigger levels.

## 5.2 MONITORING STRATEGY

- (a) In support of the requirements of section 2.5 of Annexure 2 Part 1 (Construction Requirements) and prior to commencing any part of the construction activities, PPP Co must implement a monitoring strategy. The monitoring strategy must include any monitoring requirements identified in the Environmental Documents, the Environmental Management Plans and any requirements of relevant Authorities, including those identified in Annexure 15 Part 1 (QR Requirements).
- (b) As part of the monitoring strategy, PPP Co must:
  - (i) determine the devices for and the locations of monitoring stations and devices necessary to comply with paragraph (a) above and section 2.5 of Annexure 2 Part 1 (Construction Requirements);
  - (ii) make arrangements with owners and any occupier (as required) to install and access monitoring stations and devices;
  - (iii) install and secure the monitoring stations and devices referred to in paragraph (i) above; and
  - (iv) as part of the monitoring strategy, at the locations that may be affected by the Project Activities, PPP Co must:
    - A. establish the baseline conditions of the ground and/or infrastructure; and
    - B. establish provisions to measure in-situ stress, strain, deformation and vibrations.

## ANNEXURE 8 – PART 1 D&C PROGRAM REQUIREMENTS

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## 1 INTRODUCTION

### 1.1 PURPOSE

This Annexure describes the minimum programming requirements which must be met by PPP Co in respect of the D&C Activities.

### 1.2 GENERAL

PPP Co must prepare, implement, maintain and update the D&C Program in accordance with this Annexure and the State Project Documents.

## 2 PPP CO'S UPDATED D&C PROGRAM

- (a) Within 20 Business Days from the date of Financial Close, PPP Co must prepare and submit to the State an updated D&C Program.
- (b) PPP Co's updated D&C Program must be consistent with the form provided in Part 2 of this Annexure 8 and the requirements in section 3 of this Annexure.



### 3 CRITICAL PATH NETWORK D&C PROGRAM

- (a) The D&C Program must be a resourced critical path network program for the D&C Activities and must be prepared and updated on a computerised project management system approved by the State. PPP Co's software must be capable of exporting data in an electronic format which can be readily loaded onto the State's project management software, Primavera (P3e).
- (b) Without limitation, the D&C Program must:
- (i) include all significant key dates, including but not limited to completion dates and dates by which PPP Co expects the State and/or Council to supply information or materials;
  - (ii) include all dates and periods required for Approvals and make due allowance for obtaining such Approvals from Authorities or BAC as applicable;
  - (iii) include an appropriate number of activities to cover both design and construction activities which are required to achieve completion of the D&C Activities;
  - (iv) nominate the total float for each activity;
  - (v) include all external constraints;
  - (vi) identify each design package for which Design Documentation is required;
  - (vii) set out the sequence in which, and the times by which, the Design Documentation is to be completed and given to the State and the Independent Verifier;
  - (viii) make due allowance for the Design Documentation to be submitted to the State and the Independent Verifier within the time:
    - A required by, and at a rate consistent with, the maintenance of progress of the AL D&C Activities so as to achieve Tollroad Completion by the Date for Tollroad Completion;
    - B required by, and at a rate consistent with, the maintenance of progress of the Northern Busway (Windsor to Kedron) D&C Activities so as to achieve NB Practical Completion by the Date for NB Practical Completion;
    - C required by, and at a rate consistent with, the maintenance of progress of the EWAG D&C Activities so as to achieve EWAG Practical Completion by the Date for EWAG Practical Completion; and
    - D which will enable the State and the Independent Verifier to perform their obligations in respect of the Design Documentation in accordance with the Documentation Schedule, and for any amendment and resubmission of the Design Documentation by PPP Co.
  - (ix) make due allowance for PPP Co to give monthly reports to TransLink, QDMR and Council (as appropriate), the State and the Independent Verifier setting out details of PPP Co's progress in developing the design (including Design Documentation) of the Project Works;



- (x) identify each package of work and the sequences of working intended by PPP Co for each activity in relation to each package of work including activity dependencies, earliest and latest start and finish dates for each activity in each package of work, total and free floats and delivery dates for long lead items of goods, plant and equipment;
- (xi) identify the dates or periods for, the nature of input from, or the review or comment required by, but not limited to, TransLink, QDMR, QR, Council, the State and the Independent Verifier;
- (xii) show a relevant milestone date for each construction milestone;
- (xiii) include as separate activities works associated with the NB Works;
- (xiv) include as separate activities works associated with AL Works;
- (xv) include as separate activities works associated with the North-South Bypass Tunnel;
- (xvi) show each major track possession of QR tracks;
- (xvii) show site access requirements which are consistent with the Site Access Schedule;
- (xviii) show critical paths for the AL Works, the NB Works and the EWAG Works for each construction milestone to be achieved by the relevant milestone date, set out to a time scale of calendar months;
- (xix) show any dependencies between the AL Works, the NB Works and/or the EWAG Works;
- (xx) allow for the preparation of all Traffic Management Plans and the submission for review and approval of those Traffic Management Plans;
- (xxi) identify the proposed commissioning tests for the Project Works and a program for the timing of those commissioning tests;
- (xxii) identify the dates for completion and handover to the relevant Facility Owners for the Returned Works;
- (xxiii) identify any item of plant, equipment or material with a significant lead time;
- (xxiv) identify any other matters which may have a bearing on the time required to complete the D&C Activities in accordance with the State Project Documents (including the construction milestones and all applicable relevant milestone dates);
- (xxv) identify the award of any material contract, subcontract or other agreement which is significant to the performance of the D&C Activities;
- (xxvi) identify the procurement, installation and the roll-out of products for the Tolling System, Customer Services and all other significant procurements;
- (xxvii) include such other information as the State and/or the Independent Verifier may reasonably require;
- (xxviii) include projected progress of the D&C Activities capable of being presented graphically;
- (xxix) include the estimated value of work for each of the AL Works, the NB Works and the EWAG Works programmed in each month to the Date of

Tollroad Completion, the Date of NB Practical Completion and the Date of EWAG Practical Completion respectively;

- (xxx) include PPP Co's bona fide planned work activities and sequences for achieving Tollroad Completion by the Date for Tollroad Completion;
  - (xxxii) include PPP Co's bona fide planned work activities and sequences for achieving NB Practical Completion by the Date for Tollroad Completion; and
  - (xxxiii) include PPP Co's bona fide planned work activities and sequences for achieving EWAG Practical Completion by the Date for EWAG Practical Completion.
- (c) include as separate activities works associated with EWAG Works
- (c) The D&C Program must be capable of being provided as three separate D&C Programs for the AL Works, the NB Works and the EWAG Works respectively.



#### 4 FURTHER UPDATES OF THE D&C PROGRAM

- (a) PPP Co must prepare and submit to the State
- (i) an updated D&C Program for the Project Works every month until the Date of Tolling System Completion; and
  - (ii) updated separate D&C Programs for the AL Works and NB Works respectively until the Date of NB Practical Completion, and an updated separate D&C Program for the EWAG Works until the Date of EWAG Practical Completion. Each updated D&C Program must take the form of a critical path network and must incorporate the requirements of section 3 of this Annexure. The updated D&C Programs must be provided to the State and Independent Verifier with its progress reports in accordance with the Documentation Schedule.
- (b) Each updated D&C Program must also show the detailed as-built progress of the D&C Activities carried out to a date not earlier than 7 days prior to the date of submission of the updated D&C Program together with details of the planned future work to the Date of Tolling System Completion.
- (c) If the actual progress of the D&C Activities is delayed from that shown in a D&C Program, PPP Co must set out in the next updated D&C Program the delay to the progress of the Project Works and what steps PPP Co proposes in order to achieve
- (i) Tollroad Completion by the Date for Tollroad Completion;
  - (ii) Tolling System Completion by the Date for Tolling System Completion;
  - (iii) NB Practical Completion by at least 2 months prior to Tollroad Completion;
  - (iv) Final Completion by the Date for Final Completion;
  - (v) EWAG Practical Completion by the Date for EWAG Practical Completion; and
  - (vi) EWAG Final Completion by the Date for EWAG Final Completion.
- (d) In addition to its obligations under clause 8.4(a) of the NB Works Deed PPP Co must notify the State of any change to the expected period of time between NB Practical Completion and Tollroad Completion.
- (e) PPP Co must notify the State of any changes to the D&C Program as it relates to the Federation Street Connection.
- (f) PPP Co must notify the State of any changes to the D&C Program as it relates to EWAG.
- (g) To the extent that actual progress of Project Activities differs from the D&C Program, PPP Co must immediately advise State and the Independent Verifier of the effects (if any) on the timing of information or activities required of the State or the Independent Verifier.

## 5 REVIEW OF PPP CO'S D&C PROGRAM

At each meeting of the Senior Project Group, the updated D&C Program and progress report that have been prepared in accordance with the Documentation Schedule must be reviewed.



## 6 D&C PROGRAM CONSTRAINTS

- (a) In the preparation of each update of the D&C Program, PPP Co must make due allowance for, without limitation, the impacts of the following activities on the performance of the D&C Activities (including those D&C Activities to be carried out by subcontractors):
- (i) RNA special events;
  - (ii) Council special events;
  - (iii) Riverfestival;
  - (iv) QR track possession requirements as described in Annexure 15 Part 1 (Queensland Rail Requirements); and
  - (v) lane restriction requirements for Affected Roads by the relevant road Authority or BAC.

## ANNEXURE 9 – PART 1 CONTRACT ADMINISTRATION REQUIREMENTS

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# 1 INTRODUCTION

## 1.1 PURPOSE

This Annexure describes the minimum contract administration requirements which must be met by PPP Co in the performance of the Project Activities and the minimum requirements which must be met by PPP Co in respect of PPP Co's organisation during the performance of the Project Activities.

## 1.2 STATE / PPP Co COMMUNICATIONS

- (a) PPP Co must comply with any protocols for communication between the State and PPP Co required by the State from time to time.
- (b) Without limiting clause 6.1 of the Project Deed, in respect of any communication or other interaction by PPP Co with the State where the State is acting in its capacity as an Authority, PPP Co may request the State (in its capacity as a party to the Project Deed) to facilitate liaison with the relevant officers of the State, in which case the State (in its capacity as a party to the Project Deed) must use reasonable endeavours to identify the relevant State officers and establish a meeting between those officers and PPP Co.

## 2 PPP CO ORGANISATION

### 2.1 KEY PERSONNEL

- (a) Those persons referred to in Part 2 of this Annexure 9 shall be PPP Co's key personnel for the Project Works.
- (b) Any vacancy of key personnel must be promptly filled by PPP Co with a person approved by the State who shall possess at least equal experience, qualifications and ability as the person replaced.



### 3 PROJECT PLANS

#### 3.1 GENERAL

- (a) PPP Co must develop, review, maintain and update Project Plans which document the management systems, procedures and plans required to carry out the Project Activities and ensure that the Project Works are delivered in accordance with the requirements of the Project Deed.
- (b) As a minimum, the Project Plans must together address the following matters:
- (i) project management;
  - (ii) industrial relations;
  - (iii) construction management;
  - (iv) quality management;
  - (v) risk management;
  - (vi) environmental management;
  - (vii) safety and health management;
  - (viii) local industry participation;
  - (ix) project training;
  - (x) design management;
  - (xi) fire and life safety design;
  - (xii) whole of life issues;
  - (xiii) construction management;
  - (xiv) construction traffic management;
  - (xv) completion, commissioning and handover including systems integration;
  - (xvi) customer service;
  - (xvii) communications and consultation management;
  - (xviii) operations and maintenance;
  - (xix) Incident response;
  - (xx) systems integration;
  - (xxi) operations traffic management
  - (xxii) Tolling business; and
  - (xxiii) critical infrastructure protection.
- (c) The Project Plans documents must:
- (i) comply with the requirements of the State Project Documents including the requirements of Part 1 and Attachment 1 to this Annexure 9;
  - (ii) document the relationship and interconnections between the various Project Plans; and
  - (iii) without limiting (i) and (ii) above, be of a standard and quality consistent with good industry practice.

### 3.2 UPDATING OF PROJECT PLANS

Without limiting clause 10.4 of the Project Deed, PPP Co must update the Project Plans and include improvements arising from reviews and audits of the performance outcomes of the Project Plans and from the State and the Independent Verifier comments.

### 3.3 COMPLIANCE WITH PROJECT PLANS

- (a) PPP Co acknowledges that in addition to the purposes described in clause 10.1 of the Project Deed the purpose of the Project Plans and any Initial Project Plans includes recording (to the extent that they are set out in those Project Plans or Initial Project Plans) liabilities, obligations or responsibilities assumed and risks accepted or retained by PPP Co in respect of the subject matter of the Project Plans or Initial Project Plans.
- (b) The Project Plans, (including any Initial Project Plans), or any reference to the Project Plans (including any Initial Project Plans), and anything done under or in connection with those plans (including meetings or discussions held) are not to be construed in any way:
- (i) to impose a risk, liability, obligation or responsibility on the State or its Associates or on the Independent Verifier which has not been expressly accepted, retained or undertaken under the State Project Documents, or as an aid to interpretation of such risks, liabilities, obligations or responsibilities;
  - (ii) to limit or reduce any liabilities, obligations or responsibilities undertaken, or risks accepted or retained by PPP Co or its Associates under the State Project Documents, or as an aid to interpretation of such risks, liabilities, obligations, responsibilities to the extent that to do so would limit or reduce those liabilities, obligations, responsibilities or risks or alter them to the detriment of the State;
  - (iii) to confer rights or remedies on PPP Co or its Associates which are inconsistent with the provisions of the State Project Documents;
  - (iv) as demonstrating compliance, or (in respect of any Initial Project Plans) the matters required to be included in the Project Plans to ensure compliance, by PPP Co or its Associates with the State Project Documents;
  - (v) as accepted or approved by the State for any purpose or as limiting the State's rights to require PPP Co to include or not to include certain matters in the Project Plans;
  - (vi) to otherwise limit, vary, alter or affect the rights of the State under the State Project Documents; and
  - (vii) to otherwise limit, vary, alter or affect any provision of the State Project Documents (including, for the avoidance of doubt, the Performance Specification).
- (c) The inclusion in any Project Plans, or any Initial Project Plans, of any express or implied delegation of risks, liabilities, obligations or responsibilities by PPP Co to any Associate (including by reference to obligations to be performed under or in connection with documents other than the Project Deed) does not constitute approval of such delegation by the State or in any way limit or derogate from the scope of PPP Co's obligations under the State Project Documents, and references to risks, liabilities, obligations or responsibilities assumed or accepted or acknowledgements given by any Associate of PPP Co (whether under the

Project Deed or otherwise) will be construed as assumed or accepted or given  
(as applicable) by PPP Co under the State Project Documents.



## ANNEXURE 9 – PART 1 – ATTACHMENT 1 PROJECT PLANS REQUIREMENTS

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## 1 PROJECT PLAN REQUIREMENTS

The minimum Project Plan requirements are detailed in this Attachment 1 of Annexure 9 (Project Plan Requirements).

### 1.1 PROJECT TRAINING MANAGEMENT PLAN

- (a) The Project Training Management Plan must comply with:
- (i) the State's *State Government Building and Construction Contracts – Structured Training Policy* (10% Training Policy);
  - (ii) any enterprise or other industrial agreement applicable to the Project;
  - (iii) the Health and Safety Management Plan;
  - (iv) the Quality Management Plan; and
  - (v) PPP Co's obligations with respect to the Environment including statutory obligations.
- (b) The Project Training Management Plan must demonstrate how PPP Co will:
- (i) meet requirements for civil construction projects as described in the 10% Training Policy;
  - (ii) meet statutory obligations including in respect of workplace health and safety training;
  - (iii) provide induction on workplace health and safety for all employees and persons engaged on the construction aspects of the D&C Activities and the O&M Activities which meets the applicable Law;
  - (iv) provide induction on environmental systems and requirements (including compliance with the Environmental Documents, the Environmental Management Plans and the cultural heritage management requirements) for all personnel engaged in the construction aspects of the D&C Activities and the O&M Activities;
  - (v) provide a structured training program to address the requirements of the State Project Documents, including environmental and Project specific requirements;
  - (vi) establish a dedicated training facility on the Construction Site; and
  - (vii) maintain on site and up to date copy of the Project Training Management Plan.
- (c) The key elements of the Project Training Management Plan must include:
- (i) description and details of the Project workforce;
  - (ii) identification of the training needs of all personnel engaged for the construction aspects of the D&C Activities and the O&M Activities;
  - (iii) identification of potential skill shortages and how they might be addressed;
  - (iv) a skill formation plan detailing training priorities for the construction aspects of the D&C Activities and the O&M Activities;
  - (v) an indication of how structured training outcomes are/will be achieved;
  - (vi) targets for addressing training needs; and



- (vii) priorities for training.
- (d) The Project Training Management Plan must be submitted within 40 Business Days of the date of Financial Close.
- (e) PPP Co must not commence any work upon the Licensed Construction Area until the expiry of 15 Business Days after the Project Training Management Plan which complies with the requirements of the State Project Documents has been submitted to the State and the Independent Verifier in accordance with clause 10 of the Project Deed.

## 1.2 LOCAL INDUSTRY PARTICIPATION MANAGEMENT PLAN

- (a) The Local Industry Participation Management Plan must comply with the State's relevant Local Industry Participation Policy (refer *Local Industry Policy: A Fair go for Local Industry 2001 - Industry Supplies Office*). PPP Co must ensure that its agents, consultants and others acting on its behalf adhere to those policies.
- (b) The Local Industry Participation Management Plan must be submitted within 40 Business Days of the date of Financial Close.
- (c) PPP Co must not commence any work upon the Licensed Construction Area until the expiry of 15 Business Days after the Local Industry Participation Management Plan which complies with the requirements of the State Project Documents has been submitted to the State and the Independent Verifier in accordance with the State Project Documents.

## 1.3 PROJECT MANAGEMENT PLAN

- (a) The Project Management Plan must detail:
  - (i) how PPP Co will ensure delivery of the Project Works and the carrying out of the Project Activities in accordance with the State Project Documents;
  - (ii) the organisational structure of its management team including:
    - A nominated management, supervisory and key personnel; and
    - B lines of communication between design, construction and operation and maintenance phases;
  - (iii) the updating and management of the D&C Program;
  - (iv) resource management through the D&C Phase and, where applicable, O&M Phase;
  - (v) risk management processes;
  - (vi) project reporting procedures;
  - (vii) document and data management;
  - (viii) industrial relations strategy and management;
  - (ix) schedule of required Approvals and process for obtaining Approvals;
  - (x) community engagement strategy;
  - (xi) interfaces between and with other Project Plans.
- (b) The Project Management Plan must be submitted within 20 Business Days of the date of Financial Close.

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- (c) PPP Co must not commence any work upon the Licensed Construction Area until the expiry of 15 Business Days after the Project Management Plan which complies with the requirements of the State Project Documents has been submitted to the State and the Independent Verifier in accordance with clause 10 of the Project Deed.

#### 1.4 DESIGN MANAGEMENT PLAN

- (a) The Design Management Plan must detail:
- (i) how PPP Co will comply with the requirements of the State Project Documents relating to design;
  - (ii) design team organisational structure including:
    - A nominated personnel;
    - B lines of responsibility and management; and
    - C interfaces with project organisational structure;
  - (iii) design management processes including integration of relevant design disciplines and supplier designs into each area or element of work;
  - (iv) design management processes for interaction with the Independent Verifier, Proof Engineer & Construction Verifier and the State;
  - (v) a schedule of the design packages and the timing of packages of Design Documentation to be provided, and how the individual design packages will be integrated to ensure integrated design will occur;
  - (vi) design verification and certification process for each design package and how integrated verification and certification will occur;
  - (vii) process for integration of all design elements and design packages, including Temporary Works;
  - (viii) strategy and processes for consideration of relevant stakeholder inputs including the State, Council, BAC, QR, TransLink, QDMR, QT, the D&C Contractor and the O&M Contractor, (including ensuring relevant input from the D&C Contractor to ensure that constructability issues are minimised);
  - (ix) design optimisation and value engineering process having regard to innovation and whole of life cost;
  - (x) schedule of required design Approvals and process for obtaining design Approvals;
  - (xi) procedure and process for design development presentations including timing, level of documentation to be presented, method and feedback procedure;
  - (xii) process for incorporating 'Safety in Design' principles within the design;
  - (xiii) process of design risk management and mitigation;
  - (xiv) procedure and process for the management of requests for information, Modifications (including those proposed or instructed by the State and those proposed by PPP Co) and updating of Design Documentation;
  - (xv) procedure and process for the management of design review comments from the Independent Verifier, the State and the Proof Engineer &

Construction Verifier and how these are incorporated into the design, how they are to be managed, and how they are to be recorded;

- (xvi) procedure and process for the verification and certification process of the Independent Verifier and Proof Engineer & Construction Verifier;
  - (xvii) design standards to be adopted for each design package including the standards to be adopted for the Tollroad, Busway, EWAG, PUP Works, Affected Road Works, Accommodation Works and Temporary Works; and
  - (xviii) interfaces with other Project Plans.
- (b) The Design Management Plan which complies with the requirements of the State Project Documents must be submitted within 20 Business Days of the date of Financial Close.
- (c) PPP Co must not commence any work upon the Licensed Construction Area until the expiry of 15 Business Days after the Design Management Plan which complies with the requirements of the State Project Documents has been submitted to the State and the Independent Verifier in accordance with clause 10 of the Project Deed.

#### 1.5 NB WHOLE OF LIFE PLAN

- (a) The NB Whole of Life Plan must detail how PPP Co:
- (i) will ensure that the NB Works are designed and constructed so as to comply with the WOL Objectives;
  - (ii) will identify and balance the following factors:
    - A the design and construction costs and the operation and maintenance costs of the NB Works;
    - B the useful life of the NB Works and each Asset Element of the NB Works;
    - C the reliability and availability for use of the NB Works throughout their useful life; and
    - D the operability and maintainability for use of the NB Works throughout their useful life;
  - (iii) will review and report to the State and the Independent Verifier the progress of the design and construction of the NB Works against the NB Whole of Life Plan and the WOL Objectives; and
  - (iv) will identify, consult with and recommend to the State proposals for ensuring that the designs, materials and methods of construction for the NB Works will achieve the WOL Objectives.
- (b) The NB Whole of Life Plan must address all major elements of the Busway and key components (eg: bearings etc) of the elements, including but not limited to:
- (i) structures, bridges, tunnels, retaining walls, embankments;
  - (ii) pavements, including wearing courses and sub-soil drainage systems;
  - (iii) noise attenuation devices;
  - (iv) road furniture;

- (v) signs, sign supports and linemarking;
- (vi) drainage systems, including water quality improvement devices;
- (vii) mechanical and electrical systems, including tunnel and building control systems, lighting systems, electrical supply systems and all fixtures and fittings for all items;
- (viii) fire and life safety features and devices;
- (ix) ITS systems;
- (x) Busway Station facilities including:
  - A paving surfaces;
  - B landscaping;
  - C glazing systems
  - D lifts and escalator provisions;
  - E mechanical, electrical and hydraulic systems;
  - F landscaping and irrigation systems;
  - G urban design elements; and
  - H balustrades, handrails, fences and the like;

- (c) The NB Whole of Life Plan must be updated and submitted within 40 Business Days of the date of Financial Close.
- (d) PPP Co must not commence any work upon the Licensed Construction Area until the expiry of 15 Business Days after the NB Whole of Life Plan which complies with the requirements of the State Project Documents has been submitted to the State and the Independent Verifier in accordance with clause 10 of the Project Deed.

#### 1.6 FIRE AND LIFE SAFETY DESIGN PLANS

- (a) A separate AL Works Fire and Life Safety Design Plan and a separate NB Works Fire and Life Safety Plan must be provided for the AL Works and the NB Works respectively. The Fire and Life Safety Design Plans must be updated and submitted in accordance with section 3.5 of Annexure 1 (Design Requirements).
- (b) PPP Co must not prepare the FEB and fire engineering reports until the expiry of 15 Business Days after the updated AL Works Fire and Life Safety Design Plan and NB Works Fire and Life Safety Plan which complies with the requirements of the State Project Documents have been submitted to the State, the Independent Verifier, the relevant stakeholders and Authorities as per section 3.5 of Annexure 1 (Design Requirements).

#### 1.7 SYSTEM INTEGRATION PLANS

- (a) A separate AL Works Systems Integration Plan and a separate NB Works Systems Integration Plan must be provided for the AL Works and the NB Works respectively. The Systems Integration Plans must be submitted in accordance with the requirements of section 19 of Annexure 1 (Design Requirements).

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- (b) PPP Co must not commence any work in respect of a component of the Tollroad or the Busway until the relevant Systems Integration Plan which complies with the requirements of the State Project Documents has been submitted to the State and the Independent Verifier.
- (c) PPP Co must not commence any work in respect of a component of the Tollroad or the Busway until the expiry of 15 Business Days after the relevant Systems Integration Plan which complies with the requirements of the State Project Documents has been submitted to the State and the Independent Verifier in accordance with clause 10 of the Project Deed.

### 1.8 CONSTRUCTION MANAGEMENT PLAN

- (a) The Construction Management Plan must detail:
  - (i) how PPP Co will comply with the requirements of the State Project Documents relating to construction;
  - (ii) construction team organisation including:
    - A nominated personnel;
    - B lines of responsibility and management; and
    - C interfaces with project organisational structure;
  - (iii) method of construction of each package of construction, including manpower and resources to be utilised and programme of works;
  - (iv) how outcomes of the Safety in Design processes identified in the Design Management Plan are to be incorporated into the construction activities to ensure these outcomes are achieved;
  - (v) construction documentation applicable to each construction package;
  - (vi) construction program development, monitoring, review and management (including by way of amendment of the relevant parts of the D&C Program);
  - (vii) schedule of required construction Approvals and process for obtaining construction Approvals;
  - (viii) procurement and contract management strategy;
  - (ix) process of construction risk management and mitigation;
  - (x) management and liaison with stakeholders, including the State, during the D&C phase;
  - (xi) design review management to ensure constructability issues are minimised;
  - (xii) traffic management during the works;
  - (xiii) community engagement during the works and responses to community concerns during construction;
  - (xiv) access to the Construction Site for plant and for persons;
  - (xv) management of safety and Incidents, including reporting procedures of Incidents;
  - (xvi) development and management of work method statements;

- (xvii) environmental management processes and responses to environmental Incidents;
  - (xviii) security of the Project Works and the Construction Site;
  - (xix) development and storage of as-built information including drawings, data, manuals, Asset management data and other such information;
  - (xx) management of spoil placement; and
  - (xxi) interfaces with other Project Plans.
- (b) The Construction Management Plan must be submitted within 20 Business Days of the date of Financial Close.
- (c) PPP Co must not commence any work upon the Licensed Construction Area until the expiry of 15 Business Days after the Construction Management Plan which complies with the requirements of the State Project Documents has been submitted to the State and the Independent Verifier in accordance with clause 10 of the Project Deed.

#### 1.9 QUALITY MANAGEMENT PLAN

- (a) The Quality Management Plan must be prepared and submitted in accordance with Annexure 10 Part 1 (Quality Management Requirements).
- (b) The Quality Management Plan must be submitted within 20 Business Days of the date of Financial Close.
- (c) PPP Co must not commence any work upon the Licensed Construction Area until the expiry of 15 Business Days after the Quality Management Plan which complies with the requirements of the State Project Documents has been submitted to the State and the Independent Verifier in accordance with clause 10 of the Project Deed.

#### 1.10 HEALTH AND SAFETY MANAGEMENT PLAN

- (a) The Health and Safety Management Plan must be prepared and submitted in accordance with Annexure 13 Part 1 (Safety Management Requirements).
- (b) Within 20 Business Days from the date of Financial Close, PPP Co must prepare and submit to the State and the Independent Verifier its Health and Safety Management Plan (including the construction workplace sub-plan and the safety in design sub-plan).
- (c) PPP Co must not commence any work upon the Construction Site or the Maintenance Site until the expiry of 15 Business Days after the Health and Safety Management Plan which complies with the requirements of the State Project Documents has been submitted to the State and the Independent Verifier in accordance with clause 10 of the Project Deed.

#### 1.11 CRITICAL INFRASTRUCTURE PROTECTION MANAGEMENT PLANS

- (a) A separate AL Works Critical Infrastructure Protection Management Plan, a separate NB Works Critical Infrastructure Protection Management Plan and a separate EWAG Works Critical Infrastructure Management Plan must be provided for the AL Works, the NB Works and the EWAG Works respectively. The Critical Infrastructure Protection Management Plans must be submitted in accordance with Annexure 14 (Critical Infrastructure Protection Requirements).

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- (b) As sub-plans to the Critical Infrastructure Protection Management Plans PPP Co must prepare Disaster Recovery Plans in accordance with Annexure 14 (Critical Infrastructure Protection Requirements).
- (c) PPP Co must not commence any work in respect of a component of the Tollroad, the Busway or EWAG until the expiry of 15 Business Days after the relevant Critical Infrastructure Protection Management Plan which complies with the requirements of the State Project Documents has been submitted to the State and the Independent Verifier in accordance with clause 10 of the Project Deed.

#### 1.12 ENVIRONMENTAL MANAGEMENT PLANS

- (a) Without limiting clause 10 to the Project Deed, the Environmental Management Plans must be prepared and submitted in accordance with Annexure 11 Part 1 (Environmental Management Requirements).
- (b) PPP Co must update and provide the State and the Independent Verifier with the AL Project and NB Project Design and Construction Environmental Management Plan for the AL Project and the NB Project D & C Activities (AL and NB D&C EMP) within 20 Business Days from the date of Financial Close.
- (c) PPP Co must provide the State and the Independent Verifier with the EWAG Project Design and Construction Environmental Management Plan for the EWAG D&C Activities (EWAG D&C EMP) which complies with the requirements of the State Project Documents and attaches evidence that BAC is satisfied the EWAG D&C EMP is in accordance with BAC's requirements within 40 Business Days of the last date of receipt by PPP Co of the Key BAC EWAG Approvals and the Key State EWAG Approval.
- (d) PPP Co must provide the State and the Independent Verifier with separate operation and maintenance Environmental Management Plans for the AL Works and the NB Works. The AL Works Environmental Management Plan (AL O&M EMP) must be provided to the State and the Independent Verifier within 20 Business Days prior to the anticipated Date of Tollroad Completion for the Tollroad and the NB Works Environmental Plan (NB O&M EMP) must be provided to the State and the Independent Verifier within 20 Business Days prior to the anticipated Date of NB Practical Completion for the Busway.
- (e) PPP Co must not commence any work upon the Licensed Construction Area for the AL Project and NB Project until the expiry of 15 Business Days after the updated AL and NB D&C EMP which complies with the requirements of the State Project Documents has been submitted to the State and the Independent Verifier in accordance with the State Project Documents.
- (f) PPP Co must not commence any work upon the Licensed Construction Area for the EWAG Project until the expiry of 15 Business Days after the EWAG D&C EMP which complies with the requirements of the State Project Documents has been submitted to the State and the Independent Verifier in accordance with the State Project Documents.

#### 1.13 COMMUNICATIONS AND CONSULTATION PLANS

##### 1.13.1 Marketing and Communications Management Plan

- (a) Without limiting clause 10 of the Project Deed, the Marketing and Communications Management Plan (MCMP) must be prepared and submitted in accordance with Annexure 6 (Communication and Consultation Requirements).

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- (b) Without limiting clause 10 of the Project Deed, PPP Co must update the MCMP.
- (c) The MCMP must be updated and submitted within 20 Business Days from the date of Financial Close.
- (d) PPP Co must not commence any work upon the Construction Site until the expiry of 15 Business Days after an updated MCMP which complies with the requirements of the State Project Documents has been submitted to the State and the Independent Verifier.

#### 1.13.2 Community and Consultation Management Plan

- (a) Without limiting clause 10 of the Project Deed, the Community and Consultation Management Plan (CCMP) must be prepared and submitted in accordance with Annexure 6 (Communication and Consultation Requirements).
- (b) Without limiting clause 10 of the Project Deed, PPP Co must update the CCMP.
- (c) The CCMP must be updated and submitted within 20 Business Days from the date of Financial Close.
- (d) PPP Co must not commence any work upon the Construction Site until the expiry of 15 Business Days after an updated CCMP which complies with the requirements of the State Project Documents has been submitted to the State and the Independent Verifier.

#### 1.13.3 AL Works O&M Communication Management Plan

- (a) Without limiting clause 10 of the Project Deed, the AL Works O&M Communication Management Plan (OMCMP) for the O&M Activities must be prepared and submitted in accordance with Annexure 6 (Communication and Consultation Requirements).
- (b) The OMCMP which complies with the requirements of the State Project Documents must be submitted at least 12 months prior to the anticipated commencement of the O&M Phase.

### 1.14 TRAFFIC MANAGEMENT PLANS

The Construction Traffic Management Plans (CTMPs) and Construction Traffic Control Plans (CTCPs) must be prepared and submitted in accordance with Annexure 2 Part 1 (Construction Requirements). The Standard Operation Traffic Management Plan, Maintenance Operation Traffic Management Plan, Traffic Control Management Plan and Incident Response Management Plan must be prepared and submitted in accordance with Annexure 12 Part 1 (AL Traffic Management and Road Network Interfacing Requirements During the O&M Phase).

### 1.15 COMPLETION, COMMISSIONING AND HANDOVER PLANS

- (a) A separate AL Works Completion, Commissioning and Handover Management Plan, a separate NB Works Completion, Commissioning and Handover Management Plan and a separate EWAG Works Completion, Commissioning and Handover management Plan must be provided for the AL Works, the NB Works and the EWAG Works respectively. The Completion, Commissioning and Handover Management Plans must detail:
  - (i) completion and testing management team including:
    - A nominated key personnel; and

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- B roles and responsibilities;
- (ii) processes, procedures and strategies to ensure that Tollroad Completion and Close-Out are achieved for the Tollroad, and NB Practical Completion and NB Final Completion are achieved for the Busway, and EWAG Practical Completion and EWAG Final Completion are achieved for EWAG;
  - (iii) commissioning and testing program;
  - (iv) the requirements in section 6 of Annexure 2 (Construction Requirements) including the Systems Integration Testing Plans that are sub plans to the Completion, Commissioning and Handover management Plans;
  - (v) commissioning tests and testing processes and procedures including manufacturers requirements and performance levels and criteria that must be satisfied;
  - (vi) handover processes and procedures for the NB Works to the State;
  - (vii) handover processes and procedures for the EWAG Works to the State;
  - (viii) as a sub-plan to the NB Works Completion, Commissioning and Handover Management Plan, an NB Works Training Management Plan as required by section 6.4 of Annexure 2 Part 1 (Construction Requirements);
  - (ix) handover processes and procedures for any Returned Works to the relevant Facility Owner;
  - (x) handover of as-built documentation and data, documentation and models documenting the design provisions for future infrastructure, O&M requirements and other documentation for the AL Works, the NB Works and the EWAG Works;
  - (xi) a schedule of approvals and acceptances required by BAC, Council, QDMR, PUP owners, Emergency Services agencies, QPS and other relevant Authorities;
  - (xii) relevant workplace, health and safety issues; and
  - (xiii) traffic management issues.
- (b) Documentation relating to the commissioning must identify the processes and management systems that PPP Co intends to apply to ensure the functionality of the Tolling System is in accordance with the requirements of the State Project Documents.
- (c) The commissioning, testing and handover program must make due allowance for the progressive provision of evidence to the Independent Verifier confirming compliance with the State Project Documents.
- (d) The AL Works Completion, Commissioning and Handover Management Plan which complies with the requirements of the State Project Documents must be submitted to the Independent Verifier and the State by the earliest of:
- (i) three months prior to the anticipated handover of any AL Returned Works;
  - (ii) 12 months prior to the anticipated Date of Tollroad Completion for the Tollroad.

- (e) The NB Works Completion, Commissioning and Handover Management Plan which complies with the requirements of the State Project Documents must be submitted to the Independent Verifier and the State by the earliest of:
  - (i) three months prior to the anticipated handover of any NB Returned Works;
  - (ii) 12 months prior to the anticipated Date of NB Practical Completion for the Busway.
- (f) The EWAG Works Completion, Commissioning and Handover Management Plan which complies with the requirements of the State Project Documents must be submitted to the Independent Verifier and the State by the earliest of:
  - (i) three months prior to the anticipated handover of any EWAG Returned Works;
  - (ii) 12 months prior to the anticipated Date of EWAG Practical Completion for EWAG.

#### 1.16 INCIDENT RESPONSE MANAGEMENT PLAN

The Incident Response Management Plan which complies with the requirements of the State Project Documents must be prepared and submitted in accordance with Annexure 4 Part 1 (AL Operations and Maintenance Requirements) and Annexure 12 Part 1 (AL Traffic Management and Road Network Interfacing Requirements During the O&M Phase).

#### 1.17 BUSWAY INCIDENT MANAGEMENT PLAN

The Busway Incident Management Plan which complies with the requirements of the State Project Documents must be prepared and submitted in accordance with section 4.2.3(d) of the Documentation Schedule.

#### 1.18 AL WORKS CUSTOMER SERVICE MANAGEMENT PLAN

- (a) The AL Works Customer Service Management Plan must detail:
  - (i) customer service management structure including:
    - A customer service management team; and
    - B roles and responsibilities;
  - (ii) processes and procedures for the identification, management, review and monitoring of customer service management, feedback and performance;
  - (iii) processes and procedures for management of customers from different ethnic and linguistic backgrounds;
  - (iv) customer service performance measures and benchmarks set out in Annexure 3 Part 1 (AL Customer Service Requirements);
  - (v) procedures to be adopted in respect of customer liaison, engagement and complaints handling;
  - (vi) program of review, reassessment and continuous improvement;
  - (vii) details of customer service reporting to be prepared; and
  - (viii) interfaces with other Project Plans.

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- (b) The AL Works Customer Service Management Plan which complies with the requirements of the State Project Documents must be submitted at least 12 months prior to the anticipated Date of Tollroad Completion.

#### 1.19 TOLLING BUSINESS MANAGEMENT PLAN

- (a) The Tolling Business Management Plan must:

- (i) detail the proposed contracting strategy for the Tolling System and related services, including:
- A the activities intended to be undertaken by PPP Co directly and through its proposed Tollroad Service Provider; and
  - B an overview of each supplier proposed to be involved in the provision of Tolling System and related services;
- (ii) provide details of the proposed Tolling System to demonstrate compliance with section 17 of Annexure 1 Part 1 (Design Requirements) and details of proposed Customer Services to demonstrate compliance with Annexure 3 Part 1 (AL Customer Service Requirements), including:
- A details of the proposed roadside and back-office systems including system and subsystem component software and hardware and communication links;
  - B the locations of all Tolling facilities;
  - C details of all Tolling products offered, including all toll levels;
  - D details of User Charges and Administration Fees and the basis on which these charges and fees were determined;
  - E a summary of the key Tolling business principles and proposed method of operation;
  - F details of Tollroad opening incentives
  - G details of the level of Customer Services provided;
  - H mechanisms for monitoring performance and managing Customer Services;
  - I proposed processes to achieve the Tolling Customer Service benchmarks;
  - J plans for continuous improvement during the Concession Period; and
  - K distribution channels;
- (iii) detail the proposed processes for plans for satisfying the requirements for interoperability including:
- A details of all interoperability arrangements, such as roaming agreements with home and foreign toll road service providers;
  - B PPP Co's proposed processes for exchanging data with foreign toll road service providers;
  - C PPP Co's proposed approach to developing Interoperability Agreements with other tollroad operators; and
  - D PPP Co's proposed processes for maintaining privacy obligations.

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- (b) The Tolling Business Management Plan must be updated and submitted within 40 Business Days of the date of Financial Close.
- (c) PPP Co must not commence any work in relation to the Tolling System including in relation to the procurement of the Tolling System until the expiry of 15 Business Days after the Tolling Business Management Plan which complies with the requirements of the State Project Documents has been submitted to the State and the Independent Verifier in accordance with clause 10 of the Project Deed.

## ANNEXURE 9 – PART 1 – ATTACHMENT 2 DOCUMENTATION SCHEDULE

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## 1 REPORTS

### 1.1 PROGRESS REPORTS ON THE D&C ACTIVITIES

(a) From the date of Financial Close to the Date of Tolling System Completion, PPP Co must provide:

- (i) monthly progress reports for the AL Works;
- (ii) monthly progress reports for the NB Works;
- (iii) a monthly executive summary report of the Project Works; and
- (iv) the monthly updated D&C Program;

to the State (six hard copies of each report and one electronic copy in \*.PDF format) and the Independent Verifier (one hard copy of each report and one electronic copy in \*.PDF format), by the fifth Business Day of each month and in the format required by the State.

(b) Without limiting the requirements of section 1.1(a) above, from the date of Financial Close to the Date of EWAG Practical Completion, PPP Co must provide monthly progress reports for the EWAG Works to the State (six hard copies of each report and one electronic copy in \*.PDF format) and the Independent Verifier (one hard copy of each report and one electronic copy in \*.PDF format), by the fifth Business Day of each month and in the format required by the State.

(c) The reports required in sections 1.1(a) and 1.1(b) above must contain or set out as a minimum:

- (i) the updated D&C Program;
- (ii) the actual progress made by PPP Co in the previous month in respect of the Project Works generally and each of the AL Works, NB Works and EWAG Works compared to the projected progress under the D&C Program for the previous month and the progress required in order to achieve Tollroad Completion by the Date for Tollroad Completion, NB Practical Completion by the Date for NB Practical Completion and EWAG Practical Completion by the Date for EWAG Practical Completion respectively;
- (iii) the course of action that PPP Co proposes to undertake in response to any significant delays that have occurred to the Project Activities during the previous month to ensure that the Project Activities will thereafter be carried out in accordance with the D&C Program and the terms of the State Project Documents so that Tollroad Completion is achieved by the Date for Tollroad Completion, NB Practical Completion is achieved by the Date for NB Practical Completion, and EWAG Practical Completion is achieved by the Date for EWAG Practical Completion;
- (iv) any act, matter or thing which has or is likely to have significant effect on:
  - A the progress of the Project Activities; or
  - B the interface of the Project Works with any other works or development being carried out or proposed to be carried out within or near the Construction Site;

together with detailed particulars on how PPP Co is dealing with any such issue;

- (v) status of NB Works payments made and payment claims yet to be paid and comparison with forecast cash flow and reason / intent for any significant departure, together with an updated forecast of payments for the next six months;
- (vi) status of EWAG Works payments made and payment claims yet to be paid and comparison with forecast cash flow and reason / intent for any significant departure, together with an updated forecast of payments for the next six months;
- (vii) a copy of the updated index of quality records, including all significant non-conformances identified under the Quality Management Plan together with the dispositions, authorisations and corrective actions undertaken and the updated register of survey marks;
- (viii) a copy of each certificate issued by the Quality Manager for the purposes of clause 7.1(c) of the Project Deed and each certificate issued by the Independent Verifier;
- (ix) a report on the status of all Project Plans, copies of any modifications made to any Project Plan and a report on any non-conformances identified and actions taken to address such non-conformances under any Project Plan;
- (x) all reports required under any of the Project Plans in accordance with the State Project Documents, including the Quality Management Plan and the results of any audits carried out under the Quality Management Plan and corrective actions proposed;
- (xi) a report on PPP Co's performance against the requirements of the Environmental Management Plan as described in Annexure 11, including monitoring and testing outcomes, air and water discharge quality, community issues and the status of compliance with the Environmental Documents and the Environmental Management Plans;
- (xii) a report on PPP Co's performance against the requirements of the Construction Traffic Management Plans as described in Annexure 2, including reporting on incidents, crashes or safety related matters;
- (xiii) a summary of community complaints and issues arising from the D&C Activities as described in Annexure 6 of the Performance Specification;
- (xiv) reports on any adverse or unexpected results from PPP Co's condition monitoring in accordance with Annexure 7 of the Performance Specification;
- (xv) copies of any independent road safety audits, safety and security audits and CPTED audits, and PPP Co's considerations and responses to the recommendations of the audits, in accordance with Annexure 1 and Annexure 2 of the Performance Specification;
- (xvi) a schedule of all design packages for which Design Documentation is required, including the following:
  - A the status of the design packages submitted in accordance with section 2;
  - B a daily programme for the next 4 weeks showing which design packages will be submitted in accordance with section 2;
  - C a three month look ahead programme showing which design packages will be submitted in accordance with section 2;

- (xvii) a summary of all meetings with and reports and submissions provided to Authorities or BAC as applicable;
- (xviii) a summary of any traffic crashes recorded at or near the Construction Site, in accordance with the Health and Safety Management Plan;
- (xix) photographic records (hardcopy and softcopy), using date marked photography, showing construction progress during the period;
- (xx) digital video records of construction progress for the period (nominal duration of 15 minutes) for each of the AL Works, the NB Works and the EWAG Works; and
- (xxi) such other information as the State may from time to time request.

## 1.2 AL WORKS – REPORTS ON THE O&M ACTIVITIES

- (a) With respect to the AL Works, every three months commencing from the date on which the Tollroad is opened to traffic in accordance with clause 19.2 of the Project Deed to the expiry of the Concession Period, PPP Co must provide a report to the State (six hard copies and one electronic copy in \*.PDF format) and the Independent Verifier (one hard copy and one electronic copy in \*.PDF format) in the format required by the State, containing or setting, as a minimum:
  - (i) updates of the O&M Manuals;
  - (ii) the progress of each element of the O&M Activities, including rectification works completed to date, O&M Activities identified and scheduled for rectification, and O&M Activities identified and not completed within the Code of Maintenance Standards response time;
  - (iii) a report on traffic volumes by sections and vehicle types, traffic management and safety issues, together with a summary of all traffic crashes that have occurred on the Tollroad;
  - (iv) a summary of any Incidents that have occurred and subsequent actions taken by the PPP Co;
  - (v) a copy of the updated index of quality records including all significant non-conformances identified under the Quality Management Plan, together with the dispositions, authorisations and corrective actions undertaken;
  - (vi) a copy of each certificate issued by the Quality Manager for the purposes of clause 7.1(c) of the Project Deed and by the Independent Verifier;
  - (vii) details of any modifications made to the O&M Manuals and a report on any non-conformances identified under the O&M Manuals;
  - (viii) all reports required under the O&M Manuals in accordance with the State Project Documents, including the results of any audits carried out under the O&M Manuals;
  - (ix) a report on PPP Co's performance against the requirements of the Environmental Management Plan referred to in Annexure 11, including monitoring and testing outcomes, air and water discharge quality, community issues and the status of compliance with the Environmental Documents and the Environmental Management Plans;
  - (x) a summary of community complaints and issues arising from the O&M Activities as described in Annexure 6 of the Performance Specification.

- (xi) a report on the rate of groundwater seepage in accordance with the requirements of section 7.4 of Annexure 1 Part 1 (Design Requirements);
- (xii) a report on the result of the infrastructure monitoring undertaken in accordance with the monitoring strategy developed under Annexure 7 Part 1 (Investigation, Survey and Condition Monitoring Requirements);
- (xiii) copies of any independent road safety audits and PPP Co's considerations and responses to the recommendations of the audits, in accordance with section 4.6 of Annexure 4 of the Performance Specification;
- (xiv) a report on performance against the customer service performance measures, non-conformances and recommendations for continuous improvement;
- (xv) current and planned resource and staffing levels;
- (xvi) a summary of all meetings with and reports and submissions provided to Authorities;
- (xvii) any act, matter or thing which has or is likely to have a significant effect on the O&M Activities, together with detailed particulars of any party with whom PPP Co is dealing with in relation to any such issue;
- (xviii) any other matters pertaining to PPP Co's performance of the O&M Activities under the Project Deed; and
- (xix) such other information as the State may from time to time request.

### 1.3 NB WORKS – REPORTS ON THE DEFECTS LIABILITY PERIOD

- (a) With respect to the NB Works, every three months from the Date of Final Completion to the expiry of the NB Defects Liability Period, PPP Co must provide a report to the State (six hard copies and one electronic copy in \*.PDF format) and the Independent Verifier (one hard copy and one electronic copy in \*.PDF format) in the format required by the State, containing or setting out:
  - (i) Defects identified and scheduled for rectification, and Defects identified and not yet scheduled for rectification;
  - (ii) Defect identification processes and procedures;
  - (iii) reasons for the Defect occurring;
  - (iv) proposed schedule for rectification for outstanding Defects;
  - (v) progress for each Defect requiring rectification; and
  - (vi) such other information as the State may from time to time request.

### 1.4 EWAG WORKS – REPORTS ON THE EWAG DEFECTS LIABILITY PERIOD

- (a) With respect to the EWAG Works, every three months from the Date of EWAG Final Completion to the expiry of the EWAG Defects Liability Period, PPP Co must provide a report to the State (six hard copies and one electronic copy in \*.PDF format) and the Independent Verifier (one hard copy and one electronic copy in \*.PDF format) in the format required by the State, containing or setting out:
  - (i) Defects identified and scheduled for rectification, and Defects identified and not yet scheduled for rectification;
  - (ii) Defect identification processes and procedures;

- (iii) reasons for the Defect occurring;
- (iv) proposed schedule for rectification for outstanding Defects;
- (v) progress for each Defect requiring rectification; and
- (vi) such other information as the State may from time to time request.



## 2 DESIGN DOCUMENTATION

### 2.1 GENERAL

- (a) Without limiting clause 13.4 of the Project Deed, PPP Co must give the State and the Independent Verifier the opportunity to comment on and monitor the development of the design by PPP Co in accordance with this Attachment 2 of Annexure 9 Part 1 (Documentation Schedule).
- (b) Subject to section 2.1(o) below, PPP Co must submit to the State and the Independent Verifier Design Documentation, including all Design Documentation for Temporary Works, for each distinct design element of the Project Works, including the Temporary Works, at the following stages of design development:
- (i) Stage 1a: finalised concepts or design solutions for the relevant design element including an explanation of the reasons for the selection and design solutions;
  - (ii) Stage 1b (NB Works and EWAG Works only): advanced preliminary design solutions for the relevant design element; and
  - (iii) Stage 2: completed detailed Design Documentation, including typical features and proposed schedules of fixtures, samples and material finishes.
- (c) Design Documentation submitted shall include all drawings, design reports, specifications, completed annexures, supplementary specifications and any other relevant information required to assess the Project Works.
- (d) In respect of Stage 1a, the Design Documentation must be supported by separate reports for the AL Works, the NB Works and the EWAG Works from PPP Co which identifies the scope of work, performance and technical requirements, standards, possible options available, and planned outcomes for the design package. Relevant technical, environmental, material standards, durability and service / residual design life criteria for the design package must be identified in the design reports.

The report to be provided with Stage 1a Design Documentation must also include a description of the method of design, a description of the method and tools of analysis to be used in the design and justification thereof and the checking / verification procedure to be implemented for the design, including any computer design models utilised. The software to be used and the validation certificates of that software (if available) must also be provided. The report must address and identify, as a minimum:

- (i) the scope of the design work;
- (ii) any proposed differences from the Concept Design and the reasons for proposing the differences (noting that provision of this information does not limit PPP Co's obligations under clause 13.7 of the Project Deed);
- (iii) any options from the Concept Design and a recommendation on the preferred option;
- (iv) the durability requirements for all elements within the design package;
- (v) the performance and technical requirements required for the design element and those provided within the design;
- (vi) the design loadings, exposure conditions and particular design standards for the design;

- (vii) compliance with the performance criteria stipulated in this Performance Specification;
  - (viii) O&M requirements, maintenance minimisation provisions, waste minimisation provisions, environmental requirements, relevant Approvals required and any other requirements of this Performance Specification;
  - (ix) Safety in Design provisions and any other relevant safety risks;
  - (x) constructability procedures, including traffic management during construction, where appropriate;
  - (xi) elements of the NB Works that rely for their support and / or integrity on elements of the AL Works;
  - (xii) elements of the AL Works that rely for their support and / or integrity on elements of the NB Works;
  - (xiii) multi-disciplinary design interfaces that have been addressed in the design package;
  - (xiv) evidence of model verification;
  - (xv) an assessment of risk on the design and construction;
  - (xvi) clearly detailed and documented drawings, images, reports or schematics;
  - (xvii) to the extent that the Design Documentation relates to the BAC EWAG Works, evidence that BAC is satisfied that the Design Documentation is in accordance with BAC's requirements; and
  - (xviii) any other details, calculations, models, drawings, reports or other information as reasonably requested by the State and the Independent Verifier.
- (e) In respect of Stage 1b (NB Works and EWAG Works only), the Design Documentation must be supported by a report from PPP Co that includes an explanation of in addition to the information contained in the Stage 1a report, how the issues raised by the Independent Verifier, Proof Engineer & Construction Verifier, the State and any other reviewers in respect of the Stage 1a design have been addressed. Any changes from the Stage 1a design must be noted and explanation provided for changes made or options selected.

The Stage 1b design report will be a development of the content of the Stage 1a report and in addition must address and include, as a minimum:

- (i) identifies any changes from the previously submitted design stage and the reasons for the changes made;
- (ii) where any changes have been made, the report provides an update on any changes to durability, exposure conditions performance, design loading or standards applied to the element;
- (iii) all necessary specialist engineering reports including where appropriate geotechnical and geotechnical parameters derivation, groundwater, hydrology, flooding, noise and vibration, materials testing, traffic, settlement assessment, monitoring and infrastructure protection, which are required for use in the Stage 1b design;
- (iv) copies of the road safety audits, safety and security audits and Crime Prevention Through Environmental Design (CPTED) audits as required by section 5.11 of Annexure 1 Part 1 (Design Requirements);

- (v) draft technical specifications and/or schedules produced by PPP Co in addition to the Technical Documents and this Performance Specification required for the Project Works;
  - (vi) consideration and response to all previous review comments provided within the Stage 1a design stage which must be attached as an appendix;
  - (vii) suggested methods of construction and any construction stage assumptions, traffic management, unique design components or special material, operational or maintenance requirements;
  - (viii) to the extent that the Design Documentation relates to the BAC EWAG Works, evidence that BAC is satisfied that the Design Documentation is in accordance with BAC's requirements; and
  - (ix) any other details, calculations, models, drawings, reports or other information as reasonably requested by the State or the Independent Verifier.
- (f) In respect of Stage 2, the Design Documentation must be submitted together with a report from PPP Co that includes, in addition to the information contained in the Stage 1a report (for the AL Works) and Stage 1b report (for the NB Works and EWAG Works), how the issues raised by the Independent Verifier, Proof Engineer & Construction Verifier, the State and any other reviewers in the Stage 1a design and Stage 1b design for the NB Works and EWAG Works have been addressed. Any changes from the Stage 1a or Stage 1b design as applicable must be noted and explanation provided for changes made or options selected.

The Stage 2 design report must be a development of the content of the Stage 1a report for the AL Works or Stage 1b report for the NB Works and EWAG Works as appropriate, and in addition will address and include, as a minimum:

- (i) identification of any changes from the previously submitted design stage and the reasons for the changes made;
- (ii) where any changes have been made, the report is to provide an update on any changes to durability, exposure conditions, performance, design loading or standards applied to the element;
- (iii) complete detailed design drawings, specifications and schedules produced by PPP Co in addition to the Technical Documents and this Performance Specification required for the Project Works
- (iv) for road design, copies of the road safety audits required to be undertaken during the design of the Project Works in accordance with section 5.11 of Annexure 1 Part 1 (Design Requirements);
- (v) all necessary specialist engineering reports including where appropriate geotechnical and geotechnical parameters derivation, groundwater, hydrology, flooding, noise and vibration, materials testing, traffic, settlement assessment, monitoring and infrastructure protection, which are required for use in the Stage 2 design;
- (vi) consideration and response to all previous review comments provided within the previous design stages which must be attached as an appendix;
- (vii) suggested methods of construction and any construction staging assumptions, traffic management, unique design components or special material, operational or maintenance requirements;

- (viii) evidence of third party agreements / approvals where they are required for the design package including, but not limited to, in accordance with:
- A section 1.4.6 of Annexure 1 Part 1 (Design Requirements);
  - B section 3.5 of Annexure 1 Part 1 (Design Requirements);
  - C section 3.7 of Annexure 1 Part 1 (Design Requirements);
  - D section 3.8.2 of Annexure 1 Part 1 (Design Requirements);
  - E section 4.2.2 of Annexure 1 Part 1 (Design Requirements);
  - F section 4.3.1 of Annexure 1 Part 1 (Design Requirements);
  - G section 4.3.2 of Annexure 1 Part 1 (Design Requirements);
  - H section 5.3.4 of Annexure 1 Part 1 (Design Requirements);
  - I section 6.2 of Annexure 1 Part 1 (Design Requirements);
  - J section 6.7.5 of Annexure 1 Part 1 (Design Requirements);
  - K section 7.5 of Annexure 1 Part 1 (Design Requirements);
  - L section 7.6 of Annexure 1 Part 1 (Design Requirements);
  - M section 1.4 of Annexure 2 Part 1 (Construction Requirements);
  - N section 4 of Annexure 2 Part 1 (Construction Requirements);
  - O section 1.2 of Annexure 5 Part 1 (PUP Requirements);
  - P section 3 of Annexure 7 Part 1 (Investigations, Survey and Condition Monitoring Requirements);
  - Q section 5.1 of Annexure 7 Part 1 (Investigations, Survey and Condition Monitoring Requirements);
  - R Annexure 12 Part 1 (AL Traffic Management and Road Network Interfacing Requirements during the O&M Phase); and
  - S Annexure 15 Part 1 (QR Requirements).
- (ix) to the extent that the Design Documentation relates to the BAC EWAG Works, evidence that BAC is satisfied that the Design Documentation is in accordance with BAC's requirements;
- (x) for civil / structural design packages, evidence that the design has been coordinated with and will accommodate the ITS and M&E design requirements;
- (xi) evidence of internal verification and checking of the design and documentation;
- (xii) where relevant for the design package, evidence that the design has been coordinated with operations and maintenance requirements;
- (xiii) any other details, calculations, models, drawings, reports or other information as reasonably requested by the State or the Independent Verifier.
- (g) For the purposes of the preparation of Design Documentation, "design elements" means each discrete component or package of the Project Works including, but not limited to:
- (i) tunnels and underground structures;

- (ii) bridges and structures, including retaining structures;
- (iii) road geometric design;
- (iv) geotechnical investigation and design;
- (v) foundations, earthworks, embankments, subgrades and slopes;
- (vi) drainage and flood mitigation;
- (vii) material durability;
- (viii) PUP protection and relocations;
- (ix) urban design and landscape design;
- (x) architecture;
- (xi) buildings;
- (xii) building services;
- (xiii) pavements and surfacing;
- (xiv) signing and pavement marking;
- (xv) furniture and roadside furniture;
- (xvi) traffic barriers;
- (xvii) noise, vibration and subsidence mitigation;
- (xviii) traffic signals;
- (xix) traffic management system requirements;
- (xx) Tollroad Control Centre;
- (xxi) emergency median crossings ;
- (xxii) shared use paths and footpaths;
- (xxiii) interface with M & E systems;
- (xxiv) electrical design;
- (xxv) lighting design;
- (xxvi) tunnel ventilation;
- (xxvii) fire and life safety design;
- (xxviii) management, control and monitoring infrastructure and systems;
- (xxix) tolling system;
- (xxx) ITS and communication systems;
- (xxxi) other services and facilities within tunnels;
- (xxxii) environmental works design;
- (xxxiii) Bus Stops;
- (xxxiv) Busway Stations;
- (xxxv) DDA compliance, security and CPTED design
- (xxxvi) traffic management;
- (xxxvii) road user safety;

- (xxxviii) all other elements of the Project Works, including Temporary Works, carried out by PPP Co.
- (h) Design Documentation must be submitted in accordance with the requirements of Annexure 1 Part 1 (Design Requirements) including (without limitation):
- (i) in respect of operations management and system integration;
  - (ii) in respect of the electronic Tolling System; and
  - (iii) in respect of the development of information and communications technology systems.
- (i) The certification and verification of the Stage 2 Design Documentation required by clauses 13.2(d) and 13.3(d) of the Project Deed and such certifications must be shown on the Stage 2 Design Documentation in the form set out in the Certification Schedule.
- (j) PPP Co must:
- (i) submit to the State and the Independent Verifier three sets of all Design Documentation required to be submitted in accordance with the State Project Documents, in hardcopy format, and one electronic copy in Adobe latest release \*.pdf format, including all Design Documentation for Temporary Works. The sets of Stage 2 Design Documentation must be certified in accordance with clauses 13.2(d) of the Project Deed and section 2(i) above;
  - (ii) allow fifteen Business Days from the date the Stage 2 Design Documentation sets are submitted to the State for the State (if it so desires) to consult with PPP Co and make comments to PPP Co and the Independent Verifier on that Design Documentation;
  - (iii) subject to section 2.1(k) below, allow twenty Business Days from the date the Stage 2 Design Documentation sets are submitted to the Independent Verifier for the Independent Verifier to verify the Design Documentation in accordance with clauses 6.7(b) and 13.3(d) of the Project Deed;
  - (iv) not use that Design Documentation for construction purposes until the Independent Verifier has verified and provided certification to the State that the Design Documentation is in accordance with clauses 6.7(b) and 13.3(d) of the Project Deed; and
  - (v) not amend any AFC Design Documentation except in accordance with the State Project Documents.
- (k) The Independent Verifier must within the twenty Business Days referred to in section 2.1(j)(iii) above either verify the Stage 2 Design Documentation as required by clauses 6.7(b) and 13.3(d) of the Project Deed or give reasons why the Design Documentation:
- (i) is not appropriate for construction purposes; or
  - (ii) does not comply with the Project Deed.
- (l) If the Independent Verifier verifies the Stage 2 Design Documentation as required by clauses 6.7(b) and 13.3(d) of the Project Deed, it must:
- (i) issue a certificate using the form set out in the Certification Schedule; and
  - (ii) address any comments made by the State under section 2(j)(ii) above in the verification.

- (m) If any Stage 2 Design Documentation is not verified by the Independent Verifier under section 2.1(k) above, PPP Co must promptly amend the Design Documentation and:
- (i) re-certify it in accordance with clause 13.2(d) of the Project Deed; and
  - (ii) re-submit it to the State and the Independent Verifier and after this, the process in section 2.1(j) above will be reapplied to the amended Stage 2 Design Documentation.
- (n) Without limiting clause 13.4 of the Project Deed, in considering any Design Documentation submitted under this section 2, the State is entitled to consult with and take into account any views and requirements of any relevant Authority.
- (o) Further to section 2.1(b) above and subject to the State's and the Independent Verifier's prior written approval, PPP Co is not required to submit the Stage 1a and Stage 1b Design Documentation for the following design elements:
- (i) early works necessary to expedite the commencement of the D&C Activities; and
  - (ii) Temporary Works excluding the following:
    - A driven tunnel temporary support; and
    - B Temporary Works which may have a safety or functionality impact on the public.

## 2.2 DURABILITY ASSESSMENT REPORTS

- (a) PPP Co must satisfy the durability requirements which are specified in Annexure 1 Part 1 (Design Requirements) of the Performance Specification.
- (b) Upon completion of the Design Documentation in respect of each Asset Element, PPP Co must submit to the State and the Independent Verifier in accordance with the process set out in sections 2.1(j) - 2.1(n), separate durability assessment reports for the AL Works, the NB Works and the EWAG Works respectively, which include:
- (i) appraisal of the exposure conditions to be encountered for the relevant Asset Element, correlation with expected exposure conditions including severity of the soil and groundwater conditions, environment within the roadway tunnel, and the structural elements and fittings/fixtures located therein. Reference must be provided to available soil and groundwater test results which shall be included as a report appendix;
  - (ii) description of the expected and assumed degradation and corrosion processes associated with the environments to be encountered by the relevant Asset Element;
  - (iii) description of the proposed durability measures and performance criteria of the relevant Asset Element; and
  - (iv) proposed inspection and maintenance requirements including actions and planned schedules.
  - (v) details of any design work undertaken by or on behalf of PPP Co in respect of the durability of the Asset Element;
  - (vi) consideration and response to all previous review comments provided on the durability assessment reports which must be attached as an appendix
  - (vii) copies of all certificates issued in respect of the Asset Element;

- (viii) the critical durability issues with respect to construction and maintenance of the Asset Element;
  - (ix) a schedule of inspection/monitoring and maintenance requirements in the construction and operation of the Asset Element to achieve the durability requirements;
  - (x) the relationship between Design Life, significance of failure, whole of life-costs, inspection schedules, maintenance strategies, actions and schedules of the Asset Element; and
  - (xi) such other information as the State may from time to time request.
- (c) As a condition precedent to Tollroad Completion, PPP Co must submit to the State and the Independent Verifier an addendum to the durability assessment report for the AL Works referred to in section 2.2(b) above which provides details of:
- (i) all non-conformances and the potential impact of such non-conformances on the durability and performance of the Asset Element;
  - (ii) the recommendations made and rectification work undertaken by PPP Co; and
  - (iii) any updates on the conclusions and recommendations made by PPP Co.
- (d) As a condition precedent to NB Practical Completion, PPP Co must submit to the State and the Independent Verifier an addendum to the durability assessment report for the NB Works referred to in section 2.2(b) above which provides details of:
- (i) all non-conformances and the potential impact of such non-conformances on the durability and performance of the Asset Element;
  - (ii) the recommendations made and rectification work undertaken by PPP Co; and
  - (iii) any updates on the conclusions and recommendations made by PPP Co.
- (e) As a condition precedent to EWAG Practical Completion, PPP Co must submit to the State and the Independent Verifier an addendum to the durability assessment report for the EWAG Works referred to in section 2.2(b) above which provides details of:
- (i) all non-conformances and the potential impact of such non-conformances on the durability and performance of the Asset Element;
  - (ii) the recommendations made and rectification work undertaken by PPP Co; and
  - (iii) any updates on the conclusions and recommendations made by PPP Co.
- (f) PPP Co must incorporate the outcomes of the durability assessment reports referred to in section 2.2(b) above in the O&M Manuals (refer section 4), which outcomes must include:
- (i) the type and frequency of inspection/monitoring for critical and non-critical Asset Elements;
  - (ii) guidance on interpretation of inspection/monitoring data;
  - (iii) actions to be taken arising from the review of the inspection/monitoring data;
  - (iv) impacts on the schedules of maintenance;
  - (v) the system of recording and reporting inspection/monitoring and maintenance records; and

- (vi) a process for achieving restoration of durability performance where durability is compromised.

### 2.3 PRESENTATION REQUIREMENTS OF DESIGN DOCUMENTATION

Without limiting the requirements of this Attachment 2 of Annexure 9 Part 1 (Documentation Schedule), the Design Documentation must be presented to the following requirements:

- (a) drawings must be clear and legible when produced at or reduced to A3 size format and must include colour where appropriate to enhance readability and understanding;
- (b) drawings must be provided in the following format and maximum scales:
  - (i) general arrangement - alignments: 1:500 scale at A1 size
  - (ii) general arrangements - structures: 1:250 scale at A1 size
  - (iii) intersection plans: 1:250 at A1 size
  - (iv) typical cross sections: 1:100 at A1 size
  - (v) annotated cross sections at 20m intervals: 1:100 at A1 size
  - (vi) long sections: 1:1000 horizontal/ 1:100 vertical at A1 size; and
- (c) drawings must be provided in A3 size in colour where appropriate.

### 3 AS-BUILT DOCUMENTATION

- (a) PPP Co must provide the Independent Verifier and the State with separate sets of as-built drawings, models, manuals, schematics and other such data/information for each of the AL Works, the NB Works and the EWAG Works (refer section 7 of Annexure 2 Part 1 (Construction Requirements)).
- (b) As-built drawings, in the same format, standard and style as the design drawings, must be prepared (including attaching such information as required by section 3(i)) and submitted to the Independent Verifier progressively as construction work is completed and in any event within one month of completion of the work covered by the drawings. The Independent Verifier must review as-built drawings submitted by PPP Co within 20 Business Days of receipt and, if appropriate, verify that the as-built drawings comply with the requirements of the State Project Documents.
- (c) Each as-built drawing must be identified as such and certified by PPP Co as an accurate representation of the constructed work.
- (d) As a condition precedent to the achievement of Close-Out for the AL Works, in respect of the AL Works all certified as-built drawings must be:
  - (i) submitted to the Independent Verifier and attach such information as required under section 3(i); and
  - (ii) verified by the Independent Verifier as complying with the requirements of the State Project Documents.
- (e) As a condition precedent to the achievement of NB Practical Completion for the NB Works, in respect of the NB Works all certified as-built drawings must be:
  - (i) submitted to the Independent Verifier and attach such information as required by section 3(i); and
  - (ii) verified by the Independent Verifier as complying with the requirements of the State Project Documents.
- (f) As a condition precedent to the achievement of EWAG Practical Completion for the EWAG Works, in respect of the EWAG Works all certified as-built drawings must be:
  - (i) submitted to the Independent Verifier and attach such information as required by section 3(i); and
  - (ii) verified by the Independent Verifier as complying with the requirements of the State Project Documents.
- (g) PPP Co must survey and record the final as-built horizontal and vertical geometry and features of the various permanent components of the Project Works, including all facilities, PUP and Affected Roads. The location must be described by coordinate and reduced level or chainage, offset and reduced level as appropriate.
- (h) The frequency of determining the location of various components of the Project Works must be such that all vertical and horizontal alignments, intersections and changes of gradient are adequately recorded. All horizontal and vertical curves must be defined using a minimum of three points and a radius.
- (i) The following information must be submitted concurrently with the as-built drawings submitted to the Independent Verifier under section 3(b) for the AL Works, the NB Works and the EWAG Works respectively:
  - (i) certification from a registered surveyor that the relevant components of the AL Works, the NB Works and the EWAG Works are located as shown in the as-built drawings;

- (ii) a schedule of as-built changes from the AFC Design Documentation originally verified by the Independent Verifier and issued for construction, together with a brief description of each change;
- (iii) a list of non-conformance reports pertaining to the work shown in the drawings;
- (iv) a list of the relevant shop drawings, as-built drawings / models / information / documentation, and any other drawings / documentation associated with the Project Works;
- (v) equitable access certification in accordance with section 3.7 of Annexure 1 Part 1 (Design Requirements);
- (vi) fire and life safety design certification in accordance with section 3.5.1(c) of Annexure 1 Part 1 (Design Requirements)
- (vii) FEB and fire engineering report certification in accordance with section 3.5.2(i) of Annexure 1 Part 1 (Design Requirements);
- (viii) fire resistance and fire rating certification in accordance with section 7.5.1(ii) and (iii) of Annexure 1 Part 1 (Design Requirements);
- (ix) BCA compliance certification in accordance with 7.6(d) of Annexure 1 Part 1 (Design Requirements); and
- (x) Building approval and BCA compliance certification in accordance with 9.15 of Annexure 1 Part 1 (Design Requirements).

## 4 O&M MANUALS

### 4.1 AL WORKS

- (a) PPP Co must submit to the State and the Independent Verifier an initial draft of the O&M Manuals which is not intended to differ in substance from the final draft but for minor details:
- (i) no less than 175 Business Days prior to the Date for Tollroad Completion; or
  - (ii) if the State reasonably anticipates that Tollroad Completion will be prior to the Date for Tollroad Completion, no less than 175 Business Days prior to the State's reasonably anticipated Date of Tollroad Completion, provided that the State gives PPP Co at least 25 Business Days notice of the required date for submission of the O&M Manuals.
- (b) PPP Co must submit to the State and the Independent Verifier a final draft of the O&M Manuals:
- (i) no less than 60 Business Days prior to the Date for Tollroad Completion; or
  - (ii) if the State reasonably anticipates that Tollroad Completion will be prior to the Date for Tollroad Completion, no less than 60 Business Days prior to the State's reasonably anticipated Date of Tollroad Completion.
- (c) PPP Co must submit to the State and the Independent Verifier the final O&M Manuals:
- (i) no less than twenty Business Days prior to the Date of Tollroad Completion; or
  - (ii) if the State reasonably anticipates that Tollroad Completion will be prior to the Date for Tollroad Completion, no less than twenty Business Days prior to the State's reasonably anticipated Date of Tollroad Completion.
- as a condition precedent to the achievement of Tollroad Completion.
- (d) Without limiting clause 19.5(e) of the Project Deed, the State may:
- (i) review the O&M Manuals or any draft of them submitted under section (a), (b) and (c) above; and
  - (ii) within fifteen Business Days of the submission, notify PPP Co that the O&M Manuals or the draft do not comply with the requirements of the State Project Documents.
- (e) PPP Co must promptly submit amended O&M Manuals or draft to the State and the Independent Verifier for review under this section 4.1.
- (f) PPP Co acknowledges and agrees that:
- (i) the O&M Manuals must provide a detailed description of how PPP Co intends to carry out its obligations under the State Project Documents during the Concession Period in accordance with the requirements of the State Project Documents; and
  - (ii) the O&M Manuals will require ongoing development, amendment and updating during the Concession Period to take into account:
    - A changes in Law;
    - B O&M Best Practices;

- C changes to the Environment or generally accepted environmental management practices, new risks to the Environment, any Pollution, Contamination or changes in Law;
  - D changes requested or required by the Environmental Protection Agency or any other Authority;
  - E international best practice and developing standards;
  - F changes to work practices affecting the industry generally;
  - G technological developments;
  - H repetitive non-conformances with the O&M Manuals;
  - I defects and inefficiencies in the operation and maintenance of the Tollroad; and
  - J any other events or circumstances which occur or come into existence and which have, or may have, any effect on the manner in which PPP Co carries out its obligations under the State Project Documents during the Concession Period.
- (g) PPP Co must continue to develop and promptly amend or update the O&M Manuals to take into account:
- (i) the circumstances and events referred to in section 4(f)(ii) above as those circumstances and events occur or come into existence; and
  - (ii) any breach or potential breach of the warranties referred to in clauses 19.5(b) of the Project Deed, and promptly submit the further developed, amended or updated O&M Manuals to the State and the Independent Verifier as they are further developed, amended or updated.
- (h) If the State believes that:
- (i) the O&M Manuals do not comply with the requirements of the State Project Documents; or
  - (ii) PPP Co has not further developed, updated or amended the O&M Manuals in accordance with the requirements of section 4(g) above,
- the State may, by written notice, direct PPP Co to further develop, update or amend the O&M Manuals specifying:
- (iii) the reasons why such development, updating or amending is required; and
  - (iv) the time within which such development, updating or amending must occur, and PPP Co must:
    - A further develop, update or amend the O&M Manuals as directed by the State; and
    - B submit the further developed, updated or amended O&M Manuals to the State and the Independent Verifier within the time specified under this paragraph (iv).

## 4.2 NB WORKS

### 4.2.1 General

- (a) PPP Co must furnish NB O&M Manuals that detail the operating and maintenance instructions, as-built documentation and test records for all the elements and

systems supplied and installed on the Busway, including Bus Stations and Bus Stops.

- (b) The NB O&M Manuals must give a clear, comprehensive description of all the equipment, components and sub-components installed on the Busway including the principles and methods of operation, test values on commissioning, number and source of required spare parts and maintenance procedures. Schematics, flow diagrams, line diagrams and any other illustrations to explain the installed equipment must accompany the system descriptions. Information, material and documentation provided in the NB O&M Manuals must not be manufacturer/supplier-supplied or generic information, but must be tailored or customised by PPP Co specifically for the equipment and systems installed in the Busway, including Bus Stations and Bus Stops.

#### 4.2.2 Structure of NB O&M Manuals

- (a) PPP Co must adopt a sequence, structure, layout and format of NB O&M Manuals that align with TransLink's current practice and as required in section 4.2.3 of this annexure.
- (b) 12 months prior to NB Practical Completion, PPP Co must obtain State's approval to the proposed sequence, structure, layout and format of the NB O&M Manuals.

#### 4.2.3 Contents of the NB O&M Manuals

As a minimum, the NB O&M Manuals must include:

- (a) Tunnel Description and Records

A description of the physical elements of the NB Works, the plant and equipment, and the operational and security systems including a comprehensive set of all as-built records, design and as-tested performance data, as required in section 7 of Annexure 2 Part 1 (Construction Requirements).

- (b) Code of Maintenance Standards

The Code of Maintenance Standards including the requirements of section 4.2.4.

- (c) Performance Standards

The performance standards which include:

- (i) reference documentation including the hazards and risks mitigation strategies,
- (ii) performance standards including:
- A pavement performance including but not limited to roughness, skid resistance, cracking, rutting, texture and deflection targets;
  - B response time targets for Incident management;
  - C maintenance targets for timeliness of defect rectification and inspections, quality of the maintenance works and inspections, and road user impacts due to maintenance;
  - D equipment availability targets;
  - E water and air quality targets and limits;
  - F tunnel air opacity targets and limits;
  - G noise level targets and limits;



- H air flow velocity targets and limits;
- I normal operating condition levels (including lighting levels, air quality standards, signage etc);
- J unsafe operating condition levels or maintenance activities which may result in closure of part or all of the Busway;
- K system capacities, including safety limits and protection levels for systems and components;
- L Design Life and durability strategies; and
- M load limits and ratings.

(d) Operating Procedures

Operating procedures including the following:

- (i) operating procedures, protocols and Project Plans to ensure the satisfactory, safe and secure operation of the Busway, including, but not limited to, the following:

- A public transport operations by TransLink;
- B QPS and Emergency Services agencies communication protocols;
- C operating details for all systems and equipment;
- D environmental monitoring;
- E relevant Critical Infrastructure Protection Management Plans;
- F Health and Safety Management Plan;
- G relevant Traffic Management Plans; and
- H Incident Management Plans / Procedures.

PPP Co must amend TransLink's existing "Busway Incident Management Plan" to provide for the Northern Busway, for all types of Incidents including but not limited to vehicles stopping on the Busway, vehicle breakdowns, errant vehicle use of the Busway, plant or equipment failures, electrical supply failure, traffic crashes, fires, hazardous spills, use of the tunnels by prohibited vehicles, vehicles out of fuel, illegal use of the Busway including tunnels by pedestrians, damage to the tunnel or any part of the tunnel, injury to persons and other reports received; and

- (ii) the nominated safe location to which break down vehicles can be towed and safely stored.

(e) Permanent Plant and Equipment Inventory

A permanent plant and equipment inventory which details all plant and equipment together with associated data, including handbooks and spare parts lists for items of plant and equipment.

(f) Environmental Management during O&M Activities

The requirements of Annexure 11 (Environmental Management) and the Environmental Management Plans covering the O&M Phase.

(g) Special Purpose Manuals



Special purpose manuals, for use by TransLink QDMR, QPS, Emergency Services agencies, which contain a brief description of all systems and equipment with illustrations, diagrams, and sketches, particularly in relation to Incident operating procedures.

(h) Durability

The NB O&M Manuals must address the ongoing durability of the NB Works to achieve the Design Life.

4.2.4 Code of Maintenance standards

(a) General

PPP Co must develop and employ intervention and maintenance standards that ensure that all of the requirements of the State Project Documents are met for the NB Works. PPP Co must document its intervention and maintenance standards in the Code of Maintenance Standards as set out in this section 4.2.4.

(b) Contents of the Code of Maintenance Standards

The Code of Maintenance Standards must include the information in the table below:

Information	Description
Reference No.	A unique code reference number.
Asset Element	The Asset Element to which the standard applies.
Primary Outcome	The outcome to which the Asset Element makes its primary contribution.
Maintenance Rationale	The purpose for the maintenance of the Asset Element and its criticality to the safe and smooth operation of the Busway.
Defects	A listing of the principal defects likely to occur and the associated risk of their occurrence and the appropriate remedial action.
Performance Standards	The performance standards to be provided by the Asset Element, and by Asset Items and Asset Sub Items within that Asset Element.
Inspection Procedure	A reference to the procedures used to inspect the condition of the Asset Element and monitor the durability performance.
Intervention Standard	The intervention level and response time for maintenance work on the Asset Element. This should consider the criticality of the Asset Element.
Inspection Plan	The frequency of inspection of the Asset Element. The plan must cover both regular inspections and less frequent but more comprehensive inspections and tests. This should consider the criticality of the Asset Element.
Maintenance Activity	A listing of the principal maintenance activities and relevant unit of measurement for that activity.

4.2.5 Submission Process

(a) PPP Co must submit to the State and the Independent Verifier an initial draft of the NB O&M Manuals which is not intended to differ in substance from the final draft but for minor details no less than 175 Business Days prior to the anticipated Date of NB Practical Completion.

- (b) PPP Co must submit to the State and the Independent Verifier a final draft of the NB O&M Manuals no less than 60 Business Days prior to the anticipated Date of NB Practical Completion.
- (c) PPP Co must submit to the State and the Independent Verifier the final NB O&M Manuals no less than twenty Business Days prior to the anticipated Date of NB Practical Completion as a condition precedent to the achievement of NB Practical Completion.
- (d) Without limiting clause 5(e) of the NB Works Deed, the State may:
  - (i) review the NB O&M Manuals or any draft of them submitted under section 4.2.5(a), 4.2.5(b) and 4.2.5(c) above; and
  - (ii) within fifteen Business Days of the submission, notify PPP Co that the NB O&M Manuals or the draft do not comply with the requirements of the State Project Documents.
- (e) PPP Co must promptly submit amended NB O&M Manuals or draft to the State and the Independent Verifier for review under this section 4.2.

#### 4.3 EWAG WORKS

##### 4.3.1 General

- (a) PPP Co must furnish EWAG O&M Manuals that detail the operating and maintenance instructions, as-built documentation and test records for all the elements and systems supplied and installed on EWAG.
- (b) The EWAG O&M Manuals must give a clear, comprehensive description of all the equipment, components and sub-components installed on EWAG including the principles and methods of operation, test values on commissioning, number and source of required spare parts and maintenance procedures. Schematics, flow diagrams, line diagrams and any other illustrations to explain the installed equipment must accompany the system descriptions. Information, material and documentation provided in the EWAG O&M Manuals must not be manufacturer/supplier-supplied or generic information, but must be tailored or customised by PPP Co specifically for the equipment and systems installed on EWAG.

##### 4.3.2 Structure of EWAG O&M Manuals

- (a) PPP Co must adopt a sequence, structure, layout and format of EWAG O&M Manuals as agreed with QDMR and as required in section 4.3.3 of this annexure.
- (b) 12 months prior to EWAG Practical Completion, PPP Co must obtain State's approval to the proposed sequence, structure, layout and format of the EWAG O&M Manuals.

##### 4.3.3 Contents of the EWAG O&M Manuals

As a minimum, the EWAG O&M Manuals must include:

- (a) Description and Records

A description of the physical elements of the EWAG Works, the plant and equipment, and the operational and security systems including a comprehensive set of all as-built records, design and as-tested performance data, as required in section 7 of Annexure 2 Part 1 (Construction Requirements).

- (b) Code of Maintenance Standards

The Code of Maintenance Standards including the requirements of section 4.3.4.

(c) Performance Standards

The performance standards which include:

- (i) reference documentation including the hazards and risks mitigation strategies,
- (ii) performance standards including:
  - A pavement performance including but not limited to roughness, skid resistance, cracking, rutting, texture and deflection targets;
  - B maintenance targets for timeliness of defect rectification and inspections, quality of the maintenance works and inspections, and road user impacts due to maintenance;
  - C equipment availability targets;
  - D water and air quality targets and limits;
  - E noise level targets and limits;
  - F normal operating condition levels (including lighting levels, air quality standards, signage etc);
  - G Design Life and durability strategies; and
  - H load limits and ratings.

(d) Operating Procedures

Operating procedures including the following:

- (i) operating procedures, protocols and Project Plans to ensure the satisfactory, safe and secure operation of EWAG, including, but not limited to, the following:
  - A public transport operations;
  - B QPS and Emergency Services agencies communication protocols;
  - C operating details for all systems and equipment;
  - D environmental monitoring;
  - E relevant Critical Infrastructure Protection Management Plans;
  - F Health and Safety Management Plan;
  - G relevant Traffic Management Plans; and
  - H Incident Management Plans / Procedures.

(e) Permanent Plant and Equipment Inventory

A permanent plant and equipment inventory which details all plant and equipment together with associated data, including handbooks and spare parts lists for items of plant and equipment.

(f) Durability

The EWAG O&M Manuals must address the ongoing durability of the EWAG Works to achieve the Design Life.

4.3.4 Code of Maintenance standards

(a) General

PPP Co must develop and employ intervention and maintenance standards that ensure that all of the requirements of the State Project Documents are met for the EWAG Works. PPP Co must document its intervention and maintenance standards in the Code of Maintenance Standards as set out in this section 4.3.4.

(b) Contents of the Code of Maintenance Standards

The Code of Maintenance Standards must include the information in the table below:

Information	Description
Reference No.	A unique code reference number.
Asset Element	The Asset Element to which the standard applies.
Primary Outcome	The outcome to which the Asset Element makes its primary contribution.
Maintenance Rationale	The purpose for the maintenance of the Asset Element and its criticality to the safe and smooth operation of the Busway.
Defects	A listing of the principal defects likely to occur and the associated risk of their occurrence and the appropriate remedial action.
Performance Standards	The performance standards to be provided by the Asset Element, and by Asset Items and Asset Sub Items within that Asset Element.
Inspection Procedure	A reference to the procedures used to inspect the condition of the Asset Element and monitor the durability performance.
Intervention Standard	The intervention level and response time for maintenance work on the Asset Element. This should consider the criticality of the Asset Element.
Inspection Plan	The frequency of inspection of the Asset Element. The plan must cover both regular inspections and less frequent but more comprehensive inspections and tests. This should consider the criticality of the Asset Element.
Maintenance Activity	A listing of the principal maintenance activities and relevant unit of measurement for that activity.

4.3.5 Submission Process

- (a) PPP Co must submit to the State and the Independent Verifier an initial draft of the EWAG O&M Manuals which is not intended to differ in substance from the final draft but for minor details no less than 175 Business Days prior to the anticipated Date of EWAG Practical Completion.
- (b) PPP Co must submit to the State and the Independent Verifier a final draft of the EWAG O&M Manuals no less than 60 Business Days prior to the anticipated Date of EWAG Practical Completion.
- (c) PPP Co must submit to the State and the Independent Verifier the final EWAG O&M Manuals no less than twenty Business Days prior to the anticipated Date of EWAG Practical Completion as a condition precedent to the achievement of EWAG Practical Completion.
- (d) Without limiting clause 10(e) of the EWAG Works Deed, the State may:
  - (i) review the EWAG O&M Manuals or any draft of them submitted under sections 4.3.5(a), 4.3.5(b) and 4.3.5(c) above; and

- (ii) within fifteen Business Days of the submission, notify PPP Co that the EWAG O&M Manuals or the draft do not comply with the requirements of the State Project Documents.
- (e) PPP Co must promptly submit amended EWAG O&M Manuals or draft to the State and the Independent Verifier for review under this section 4.3.



## 5 OTHER DOCUMENTATION REQUIREMENTS

- (a) PPP Co must provide all other documentation in accordance with the requirements of this Performance Specification, including:
- (i) copies of all site investigation reports, property and land surveys and property condition surveys, within one month of the report/surveys being completed;
  - (ii) settlement assessment, monitoring results and infrastructure impact reports; and
  - (iii) as-built documentation for all PUP relocations, within one month of completion of relocation work.



## ANNEXURE 10 – PART 1 QUALITY MANAGEMENT REQUIREMENTS

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# 1 INTRODUCTION

## 1.1 PURPOSE

This Annexure describes the minimum quality management requirements which must be met by PPP Co in the performance of the Project Activities.

## 1.2 GENERAL

- (a) PPP Co must throughout the performance of the Project Activities:
- (i) establish, implement and maintain a quality system which complies with the requirements of AS/NZS ISO Standards;
  - (ii) develop, implement, maintain and update a Quality Management Plan (including so as to comply with all requirements set out in section 2 of this Annexure 10 and clause 10 of the Project Deed);
  - (iii) comply with its quality system and its Quality Management Plan; and
  - (iv) ensure that the quality system records are readily made available to the Independent Verifier and the State.

## 1.3 HOLD POINTS AND WITNESS POINTS

- (a) Hold points must include, as a minimum, the hold points referred to in the QDMR Project Specific Technical Standards (PSTS) (as described in Attachment 1 to Exhibit A Performance Specification), which are to be observed in accordance with the Quality Management Plan.
- (b) PPP Co must notify the Independent Verifier and the State a minimum of one (1) Business Day before any witness point is to occur, except for witness points for procedures, method statements and any other witness points directed by the Independent Verifier throughout the performance of the Project Activities, of which five (5) Business Days' notice must be provided. PPP Co must attend the witness point and provide the Independent Verifier and the State with all documents, access and assistance necessary in respect of the witness point.

## 2 QUALITY MANAGEMENT PLAN REQUIREMENTS

PPP Co must develop, maintain and update the Quality Management Plan in accordance with the following requirements:

- (a) The Quality Management Plan must detail:
- (i) as a minimum, the requirements of QDMR specification PSTS50 "Specific Quality System Requirements";
  - (ii) how PPP Co will comply with the requirements of the State Project Documents relating to quality;
  - (iii) the quality management team organisation including:
    - A nominated personnel;
    - B authority of nominated personnel;
    - C roles and lines of responsibility and management; and
    - D interfaces with project organisational structure;
  - (iv) process of quality risk management and mitigation;
  - (v) the process of liaison and interface with the Independent Verifier and Proof Engineer & Construction Verifier;
  - (vi) how inspection, witnessing, monitoring and reporting will be undertaken;
  - (vii) the Designer's proposed methodology and scope for the review and witnessing of the carrying out of the construction of the Project Works and certifying that the construction of the Project Works is in accordance with the Design Documentation;
  - (viii) as sub-plans to the Quality Management Plan, Inspection and Test Plans (ITPs) for the Project Works including, but not limited to, the list of items in clause 9.2 of QDMR specification PSTS50 "Specific Quality System Requirements";
  - (ix) a schedule of hold points for each of the D&C Activities and the O&M Activities;
  - (x) the procedure for the release of hold points and a listing of the persons responsible for release of hold points;
  - (xi) the procedure for notifying the Independent Verifier and the State before any witness point is to occur;
  - (xii) procedures in respect of non-conformances, improvement opportunities and the taking of corrective action, including reporting procedures;
  - (xiii) auditing procedures for the Quality Management Plan; and
  - (xiv) interfaces with other Project Plans.

## ANNEXURE 11 – PART 1 ENVIRONMENTAL MANAGEMENT REQUIREMENTS

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## 1 INTRODUCTION

### 1.1 PURPOSE

- (a) This Annexure details the minimum requirements for environmental management in respect of the Projects.
- (b) PPP Co's environmental management requirements include:
  - (i) the development, implementation and maintenance of hazard identification and risk management procedures relating to the Environment including environmental emergency and Incident management procedures;
  - (ii) the development, implementation and maintenance of environmental site induction, training and awareness plans and procedures;
  - (iii) the development, implementation and maintenance of a Design and Construction Environmental Management Plan for the AL Project and NB Project D&C Activities (AL and NB D&C EMP) and a separate Design and Construction Environmental Management Plan for the EWAG Project D&C Activities (EWAG D&C EMP);
  - (iv) the development, implementation and maintenance of an AL Works Environmental Management Plan for the AL Works O&M Activities (AL O&M EMP); and
  - (v) the development of an NB Works Environmental Management Plan for the NB Works operation and maintenance activities (NB O&M EMP).

### 1.2 GENERAL REQUIREMENTS FOR ENVIRONMENTAL MANAGEMENT

PPP Co must:

- (a) implement and maintain throughout the D&C Phase and the O&M Phase a certified Environmental Management System (EMS) which is in accordance with AS/NZS ISO 14000 series;
- (b) provide a suitably qualified and experienced Environmental Manager throughout the D&C Phase for the AL Project, the NB Project and the EWAG Project and the O&M Phase for the AL Project, to be the point of liaison with the State, other relevant entities and the Independent Verifier on issues relating to the Environment and its management of the environmental effects in accordance with the Environmental Documents and the Environmental Management Plans; and
- (c) ensure the Environmental Manager holds current copies of the relevant legislation, guidelines, standards and Approvals on-site.

### 1.3 ENVIRONMENTAL EMERGENCY AND INCIDENT MANAGEMENT PROCEDURES

- (a) PPP Co must develop, implement and maintain hazard identification and risk management procedures relating to the Environment including Environmental Emergency and Incident Management Procedures;
- (b) The Environmental Emergency and Incident Management Procedures must detail:
  - (i) identification of risks for the construction and operation of the Project Works having regard to:
    - (A) in respect of construction – the potential risks associated with the Project Works including, among other things, inundation (including

flood inundation via the portals), tunnel collapse, fire and chemical hazard, traffic hazards associated with construction traffic, accessibility for Emergency Services agencies and QPS vehicles to the road network and the Construction Site, maintenance of essential urban services (including water, power, sewerage, drainage, telecommunications and gas), transport use and storage of dangerous goods in construction sites, and communications during Incidents; and

- (B) in respect of operation and maintenance – the potential risks associated with the Tollroad operation including, among other things, maintenance, inundation (including flood inundation via the portals), tunnel collapse, fire and chemical hazard, accessibility for Emergency Services agencies and QPS vehicles to the Tollroad and communications during Incidents;
  - (ii) risk management procedures, including a risk management plan in accordance with AS4360;
  - (iii) measures for avoidance, or minimisation and management of identified risks;
  - (iv) lines of responsibility and extent of jurisdiction for categories of Incidents;
  - (v) names of key project response personnel including their positions, responsibilities and contact details;
  - (vi) an integrated emergency response, communication arrangement and procedures between PPP Co and the State, Department of Emergency Services, Environmental Protection Agency, Emergency Services agencies (including Queensland Fire and Rescue Service and the Queensland Ambulance Service), Queensland Police, hospitals, the D&C Contractor, the O&M Contractor and traffic management Authorities; and
  - (vii) establishment and maintenance of an integrated environmental incident management group.
- (c) Separate Environmental Emergency and Incident Management procedures must be developed for the D&C Phase and the O&M Phase.

#### 1.4 INDUCTION AND TRAINING

- (a) PPP Co must develop specific environmental induction and training plans to ensure all personnel involved in the Projects receive the appropriate training related to the Environment.
- (b) PPP Co must ensure environmental induction, training and awareness is undertaken for all personnel involved in the Project Activities.
- (c) PPP Co must provide environmental training on an ongoing or periodic basis as required to all personnel involved in the Project Activities.
- (d) Environment training and awareness requirements must include:
  - (i) duties under the *Environmental Protection Act 1994* and other relevant Laws;
  - (ii) specific environmental and sustainability objectives and mitigation measures established in the D&C EMPs and the O&M EMPs;

- (iii) general responsibilities in relation to the design of the Projects;
  - (iv) responsibilities under the D&C EMPs and the O&M EMPs in relation to implementing mitigation measures, monitoring, reporting and implementing corrective actions;
  - (v) responsibilities in the event of an environmental Incident;
  - (vi) the consequences of not implementing mitigation measures or departure from specified operating conditions;
  - (vii) internal and external communication processes;
  - (viii) awareness of community and cultural sensitivities, perspectives and expectations; and
  - (ix) document control.
- (e) Records of training completed must be maintained in an environmental training register and include:
- (i) names of Project personnel
  - (ii) identification of training attended and accreditation where relevant;
  - (iii) date of attendance;
  - (iv) name of trainer; and
  - (v) name of organisation providing the training.



## 2 D&C EMP REQUIREMENTS

### 2.1 GENERAL

PPP Co must:

- (a) prepare an AL Project and an NB Project Design and Construction Environmental Management Plan for the AL Project and the NB Project D&C Activities (AL and NB D&C EMP), and a separate EWAG Project Environmental Management Plan for the EWAG Project D&C Activities (EWAG D&C EMP);
- (b) provide the Coordinator-General with the AL and NB D&C EMP at least 60 days prior to the commencement of any construction works for the AL Project and NB Project;
- (c) provide the chief executive, Department of Main Roads with the EWAG D&C EMP at least 60 days prior to the commencement of any construction works for the EWAG Project;
- (d) provide the Coordinator-General with the relevant and progressive updates of the AL and NB D&C EMP 30 days prior to the commencement of relevant stages of construction works;
- (e) provide the chief executive, Department of Main Roads with relevant and progressive updates of the EWAG D&C EMP 30 days prior to the commencement of relevant stages of construction works;
- (f) prepare the D&C EMPs in accordance with the Planning Approval, the NB Works Deed, the EWAG Works Deed, the Key State EWAG Approval and the Key BAC EWAG Approvals (as applicable) and this Annexure 11;
- (g) prepare the D&C EMPs to include measures necessary to avoid significant impact on matters of national environmental significance and impacts on the environment on Commonwealth land;
- (h) prepare the D&C EMPs to incorporate the recommendations contained in the Coordinator-General's Report, including:
  - (i) recommendation 3 seeking innovation in the mitigation of the risk of potential visual, noise, air quality and private property impacts of the Construction Work Site(s) at Kedron on the Kedron State High School and Wooloowin State School in a manner which complies with the safety, reasonable cost, traffic accessibility and flood impact objectives of the Project;
  - (ii) recommendation 4 seeking innovation in the mitigation the risk of potential visual and private property impacts of ventilation stations and outlets, in a manner which complies with the air quality, noise, safety, reasonable cost, traffic accessibility and flood impact objectives of the Project;
  - (iii) recommendation 5 regarding the cumulative impact of major transport projects in the inner northern suburbs of Brisbane and a coordinated approach to management and mitigation of cumulative impacts through such measures as the shared use of construction worksites in Bowen Hills, Windsor and Kedron, the management and monitoring of construction traffic during periods of peak traffic flows and car parking in surrounding localities, and the impacts of overlapping work programs in close proximity to sensitive receptors;



- (iv) recommendation 6 regarding urban regeneration opportunities generated by the Project in liaison with the Office of Urban Management and Council, including opportunities for integrated land use and transport; and
- (v) recommendation 7 regarding development of the project designs and construction methods to satisfy the design and construction criteria for connections with the local road network;
- (i) prepare and update the D&C EMPs as required including with the requirements of environmental and planning approvals required and obtained for the Projects;
- (j) develop the D&C EMPs and EMPs sub-plans, based on predictive studies, where relevant, which have regard to the scale, intensity, extent, location and duration of the design, and construction works; and
- (k) identify in the D&C EMPs properties which may be adversely affected.

**2.2 ENVIRONMENTAL OBJECTIVES AND PERFORMANCE CRITERIA**

- (a) The D&C EMPs must include measures to achieve the over-riding environmental objective, which is to ensure that Project Activities avoid significant impacts on matters of national environmental significance.
- (b) The D&C EMPs must also include measures to ensure that there are no significant impacts on the environment on Commonwealth land as a consequence of Project Activities.
- (c) The AL and NB D&C EMP, with regards to the NB Project, must adopt, but not be limited to, the environmental objectives and performance criteria as set out in Chapter 19 of the EIS, and must include the following environmental objectives and performance criteria from Chapter 24 of the CDIMP.

Environmental matter	Environmental objective	Performance criteria
Traffic and Transport	Ensure pedestrian and cycle accessibility is not diminished through the implementation of the Busway and enhance connectivity around Busway Stations	Pedestrian and cyclist facilities are to be maintained (or improved) as a result of the Busway, incorporating appropriate design standards for disability access
Geology and Soils	Avoid contaminating soil	No complaints relating to erosion, sedimentation, contamination and/or disturbance of ASS
	Aim to improve soil and geotechnical stability	No failure due to geotechnical instability of landforms exacerbated by the Projects
Flora and Fauna	Avoid disturbance to significant trees and vegetation, including those subject to VPOs	Disturbance to significant trees and vegetation protected under NALL, other than that identified in Chapter 19 of the EIS, Chapter 14 of the CDIMP and as permitted by relevant approvals, is avoided where reasonable and practicable
		Minimal root disturbance to Pop's Fig at Wallace Place

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Environmental matter	Environmental objective	Performance criteria
		Park, and fig trees fronting Officeworks and Windsor State School during construction
Social Environment	Enhance community liveability and local amenity through Busway Station design which is safe, accessible, reflective of local character and maximises pedestrian and cycle connectivity	Pedestrian walkways and bikeways disturbed by construction are re-routed and re-constructed to an equal or higher standard with adequate accessibility to and from Busway Stations
		Impacts near schools, parks and community facilities (including amenity, access, safety, traffic, air quality and noise) are adequately managed
Hazard and Risk	Maintain a safe and secure environment in busway station areas including Crime Prevention Through Environmental Design (CPTED) principles	Busway is designed to maintain a safe environment for workers, commuters and adjacent communities

- (d) In developing the concept design and construction methods for connections to the road network at the tunnel portals (Bowen Hills, Kedron/Lutwyche and Clayfield), the criteria set out in recommendation 7 of the Coordinator-General's Report must be satisfied for the Projects.

### 2.3 EMP SUB-PLANS

- (a) The D&C EMPs must incorporate EMP sub-plans as required by the Planning Approval to address in detail specific environmental impacts of the D&C Activities.
- (b) EMP sub-plans must include measures designed to achieve the environmental objectives and which comply with relevant industry standards, as a minimum requirement.

### 2.4 MITIGATION MEASURES

- (a) The D&C EMPs must establish through design, planning and management of the Project Activities, all such measures as are necessary to achieve the environmental objectives and performance criteria in relation to the predicted impacts, with detailed measures to address localised impacts where necessary.
- (b) The D&C mitigation measures may include a wide range of measures such as, but not limited to, flexibility and options in work procedures and practices, physical interventions to separate or buffer potentially affected places from predicted construction impacts or physical relocation of affected parties for agreed periods of time.
- (c) The D&C mitigation measures may include the mitigation measures contained in the draft outline EMP (construction) in Chapter 19 of the EIS, the impact management actions set out in the Management Overview Strategy in Chapter 24

of the CDIMP, or may include other measures, provided those other measures achieve the environmental objectives and performance criteria, and comply with all relevant Laws and the Planning Approval.

## 2.5 MONITORING

- (a) The D&C EMPs must identify on-going monitoring requirements to identify the effectiveness of the mitigation measures, having regard to the environmental objectives, performance criteria, mitigation measures and compliance with Approvals established in the D&C EMPs.
- (b) Monitoring must include a range of activities including but not limited to scientifically-conducted measurements of specified parameters, visual inspections, recordings of events, and communications with affected property owners and occupants.
- (c) In addition to the monitoring requirements of the Planning Approval, the D&C EMPs must:
  - (i) provide a description of monitoring methodology, frequency, location of monitoring points or criteria for location of monitoring points;
  - (ii) provide a program of monitoring to be undertaken as a regular scheduled activity at least as frequently as specified in the EIS and the Approvals, or as frequently as required to ensure the environmental objectives and performance criteria are achieved;
  - (iii) provide for a system of reporting of monitoring results that is relevant to understanding the effectiveness of the mitigation measures in achieving the environmental objectives and performance criteria; and
  - (iv) be in accordance with relevant standards and guidelines for environmental management identified in the EIS and Approvals. All analytical testing should use National Association of Testing Authorities (NATA) approved procedures where applicable.

## 2.6 CONSULTATION

- (a) The D&C EMPs must provide for the documentation of:
  - (i) the timing and provision of advice to stakeholders and the community;
  - (ii) the receipt of and response to complaints between PPP Co and the community;
  - (iii) consultation in relation to matters of national environmental significance, impacts on the environment on Commonwealth land, and critical premises (such as hospitals, nursing homes and schools) likely to be affected;
  - (iv) consultation with owners and occupants of premises adjacent to proposed works or proposed mitigation measures about construction issues during the D&C Phase; and
  - (v) consultation with stakeholders affected by the construction works.
- (b) The D&C EMP must establish and enable a formal process as identified in the Planning Approval for receiving and dealing quickly and effectively with complaints, and reporting on such processes.

## 2.7 REVIEW, REPORTING AND RESPONSIBILITIES

- (a) The D&C EMPs must document, and be subject to, regular review, including in respect of the management and mitigation measures and the consultation and complaints procedures established in the D&C EMPs.
- (b) The D&C EMPs must be capable of implementing and responding to Approval conditions, changing circumstances and Environmental management procedures in light of ongoing monitoring results, new management techniques, agency input, Environmental standards, complaints and reasonable community expectations.
- (c) The D&C EMPs must provide for further management and mitigation measures or review of management and mitigation measures to be implemented as soon as practical in response to monitoring results and the outcomes of community consultation, where environmental goals are exceeded.
- (d) The D&C EMPs must identify a process for dealing with circumstances where environmental goals are exceeded including mechanisms for consultation, mitigation, reporting, taking corrective action, and identifying responsibilities and timing for such actions.
- (e) The D&C EMPs must set out a reporting process to ensure the achievement of the environmental objectives and performance criteria and compliance with all relevant Approvals.
- (f) The D&C EMPs must establish responsibilities for environmental performance, monitoring, reporting and corrective actions for the Project Activities, consistent with the requirements of the Planning Approval.



### 3 AL WORKS O&M EMP REQUIREMENTS

- (a) PPP Co must prepare an AL Works Environmental Management Plan (AL O&M EMP) for the AL Project O&M Activities prior to Tollroad Completion.
- (b) The AL O&M EMP must be submitted as part of the O&M Manuals in accordance with Annexure 4 Part 1 (AL Operations and Maintenance Requirements).
- (c) The initial draft of the O&M Manuals submitted in accordance with the Documentation Schedule must contain the O&M EMP for the AL Project.
- (d) The AL O&M EMP must be provided to the Coordinator-General in accordance with the Planning Approval at least 90 days prior to the opening of the Tollroad to traffic.
- (e) The AL O&M EMP must be prepared, implemented and maintained in accordance with the Planning Approval and this Annexure 11.
- (f) The AL O&M EMP must implement and comply with all relevant Approvals.
- (g) In conditions 17 and 19(l),(m) and (n) of Schedule 3 of the Planning Approval the term "Proponent" is taken to mean PPP Co, such that PPP Co is responsible for satisfying the conditions in all their requirements.



## 4 NB WORKS O&M EMP REQUIREMENTS

### 4.1 GENERAL

- (a) PPP Co must prepare an NB Works Environmental Management Plan (NB O&M EMP) for the NB Project operations and maintenance activities prior to NB Practical Completion.
- (b) The NB O&M EMP must be submitted as part of the NB O&M Manuals in accordance with the Documentation Schedule.
- (c) The NB O&M EMP must be prepared in accordance with the requirements of the environmental management strategies for the operation and management of the Busway as set out in Chapter 24 of the CDIMP.
- (d) The NB O&M EMP must implement and comply with all relevant Approvals;

### 4.2 ENVIRONMENTAL OBJECTIVES AND PERFORMANCE CRITERIA

The NB O&M EMP must adopt, without limitation, the environmental objectives and performance criteria as set out in Chapter 24 of the CDIMP.

### 4.3 EMP SUB-PLANS

- (a) The NB O&M EMP must incorporate EMP sub-plans as required by the CDIMP to address in detail operational and maintenance issues specific to the environmental management of the NB Works. O&M sub-plans must include, but not be limited to:
  - (i) an operational tree management or vegetation protection EMP sub-plan(s) for the ongoing monitoring of the health of trees affected by the NB Project;
  - (ii) landscape maintenance and rehabilitation EMP sub-plan;
  - (iii) operation air quality EMP sub-plan;
  - (iv) operation stormwater drainage and water quality EMP sub-plan (including monitoring requirements and maintenance of water storage and quality improvement devices);
  - (v) local parking EMP sub-plan(s) as developed for the Busway Stations in consultation with Council;
  - (vi) Incident response EMP sub-plan(s);
  - (vii) waste management EMP sub-plan(s); and
  - (viii) other EMP sub-plan(s) as necessary to achieve the environmental objectives and performance criteria specific to the operation and maintenance of the Busway.
- (b) EMP sub-plans must include measures designed to comply with relevant industry standards in addition to the CDIMP requirements.

### 4.4 MITIGATION MEASURES

- (a) The NB O&M EMP must provide mitigation measures in respect of the predicted impacts of the Busway with detailed operation and maintenance measures to address any localised impacts.
- (b) The mitigation measures contained in the NB O&M EMP must be directed to achieving the environmental objectives and performance criteria relevant to

operation and maintenance of the Busway as set out in Chapter 24 of the CDIMP and all relevant Laws.

- (c) The mitigation measures contained in the NB O&M EMP must include the mitigation measures contained in Chapter 24 of the CDIMP, and may include other measures, provided those other measures achieve the environmental objectives and performance criteria.

#### 4.5 MONITORING

The NB O&M EMP must identify on-going monitoring requirements for operational impacts of those aspects of the NB Project identified in Chapter 24 of the CDIMP, including air quality (in-tunnel and ambient), noise, water quality, and such other aspects as necessary to assess performance having regard to the environmental objectives, performance criteria, mitigation measures and compliance with reasonable community expectations.

#### 4.6 COMPLAINTS

The NB O&M EMP must provide for the continuation of the formal process identified in the D&C EMP for receiving and dealing quickly and effectively with complaints.

#### 4.7 REVIEW, REPORTING AND RESPONSIBILITIES

- (a) The NB O&M EMP must provide for a process of regular review, including review of the mitigation measures outlined in the NB O&M EMP.
- (b) The NB O&M EMP must provide for further mitigation measures or review of mitigation measures to be implemented as soon as practical in response to monitoring results and reasonable complaints from community regarding the operation and maintenance of the Busway.
- (c) The NB O&M EMP must identify a process for dealing with circumstances where environmental goals are exceeded including mechanisms for reporting, taking corrective action, and identifying responsibilities and timing for such actions.
- (d) The NB O&M EMP must set out a reporting process on compliance with the EMP to ensure the achievement of the environmental objectives and performance criteria. Reporting requirements must be consistent with Chapter 24 of the CDIMP.



**ANNEXURE 12 – PART 1  
 AL TRAFFIC MANAGEMENT AND ROAD NETWORK INTERFACING  
 REQUIREMENTS DURING THE O&M PHASE**

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**ATTACHMENT 2    TRAFFIC INFORMATION REQUIREMENTS**

# 1 INTRODUCTION

## 1.1 PURPOSE

- (a) This Annexure describes the minimum requirements that must be met by PPP Co for traffic management throughout the O&M Phase in respect of the Tollroad and interfacing with the Brisbane metropolitan road network.
- (b) The minimum requirements that must be met by PPP Co for traffic management during construction of the Project Works are described in Annexure 2 Part 1 (Construction Requirements).
- (c) The minimum requirements that must be met by PPP Co in respect of design of traffic monitoring and control systems are described in Annexure 1 Part 1 (Design Requirements).
- (d) The minimum requirements that must be met by PPP Co in respect of operation and management of the Tollroad during the O&M Phase are described in Annexure 4 Part 1 (AL Operations and Maintenance Requirements).
- (e) For the purposes of this Annexure, "Incident" means Incidents caused by events occurring on the Tollroad and on the surrounding road network but excludes Incidents caused by PPP Co's maintenance activities (including routine maintenance, repairs and non-routine maintenance and major works) undertaken as part of the O&M Activities.
- (f) For the purposes of this Annexure, "BMTMC" means the Brisbane Metropolitan Transport Management Centre facility that is located at 266 George Street, Brisbane and the "BMTMC Service Provider" is the State's and Council's service provider responsible for operating the BMTMC
- (g) Communications in accordance with this Annexure must be in writing and addressed as follows (or as otherwise notified by that party to each party from time to time):

Council                    George Pund  
                                  Manager of Transport and Traffic Branch  
                                  City Policy and Strategy Division  
                                  Ph 3403 4815  
                                  Level 6, 266 George Street  
                                  GPO Box 1434  
                                  Brisbane Qld 4001

QDMR                     Steve Holzapfel  
                                  Traffic Management Systems  
                                  Ph 3292 6000  
                                  Floor 2, 266 George St  
                                  Brisbane Qld 4001



## 1.2 TRAFFIC MANAGEMENT OBJECTIVES

- (a) The traffic management objectives for the Tollroad during the O&M Phase are to:
- (i) maximise safety on the Tollroad and the surrounding road network;
  - (ii) maximise Tollroad and surrounding road network throughput and efficiency;
  - (iii) minimise time to clear Incidents;
  - (iv) minimise delay, disruption and variability of travel times for passenger, freight and commercial travel;
  - (v) keep relevant Authorities informed of all current operating conditions and provide motorists and road user information;
  - (vi) maximise compliance by Tollroad users with traffic laws; and
  - (vii) respond to surrounding road network requirements.

## 1.3 GENERAL REQUIREMENTS

- (a) Throughout the O&M Phase, PPP Co must implement, operate and maintain Tollroad infrastructure, systems, facilities, plans, services and resources that are required for the management of the Tollroad
- (b) Throughout the O&M Phase, PPP Co must
- (i) continuously communicate and liaise with QDMR and Council in relation to Tollroad operations;
  - (ii) implement, operate and maintain all Tollroad infrastructure, systems, facilities, plans, services and resources that are required for the management of the effects of the surrounding road network on the Tollroad; and
  - (iii) monitor and assess the impacts that the operation of the Tollroad has on the surrounding road network and communicate details of that monitoring and assessment to QDMR and Council.
- (c) The management of the road network within the Tollroad and the management of the impacts of the road networks surrounding the Tollroad must include as a minimum:
- (i) the provision and operation of a Tollroad Control Centre (TCC) and Tunnel Control Room (TCR) as detailed in Annexure 4 – Part 1 (AL Operations and Maintenance Requirements);
  - (ii) the provision, operation and maintenance of a Tollroad Traffic Monitoring and Control System (TTMCS) as detailed in Annexure 1 Part 1 (Engineering Design Requirements) and this Annexure including:
    - A Incident management system;
    - B traffic monitoring and information system;
    - C traffic signal interfaces;
    - D Variable Message Signs (VMS);
    - E Changeable Message Signs (CMS);

- F Lane Control Signs (LCS);
  - G Variable Speed Limit Signs (VSL);
  - H Vehicle Overheight Detection and Warning (VOW);
  - I dangerous goods vehicle detection;
  - J Automatic Incident Detection (AID);
  - K Closed Circuit Television Systems (CCTV);
  - L Supervisory Control and Data Acquisition (SCADA);
  - M ramp control signs system;
  - N travel time signs;
  - O Tollroad condition signs;
  - P radio rebroadcast communication system,
  - Q motorist help and emergency telephone system;
  - R public address systems;
  - S emergency closure system; and
  - T communications links and interfaces between the elements of the TTMCS and other systems.
- (iii) the development and implementation of an Incident Response Management Plan as detailed in Annexure 4 Part 1 (AL Operations and Maintenance Requirements) and this Annexure;
- (iv) interfacing with the BMTMC as detailed in Annexure 4 Part 1 (AL Operations and Maintenance Requirements) and this Annexure;
- (v) communication and interfacing with all relevant Authorities, the BMTMC Service Provider and tollroad lease holders including the lease holder and operator of the North South Bypass Tunnel;
- (vi) implementation of traffic management plans, traffic control plans and Incident responses.
- (d) In accordance with this Annexure, PPP Co must investigate, develop, document and implement Operational Plans including, as a minimum, a traffic management strategy, traffic management plans, traffic control plans and an Incident Response Management Plan.
- (e) The Operational Plans as described in paragraph (d) above must, as a minimum:
- (i) be finalised in accordance with this Annexure 12 Part 1 at least 2 months prior to the commencement of Tollroad Fitness to Operate Drills as detailed in Annexure 4 Part 1 (AL Operations and Maintenance Requirements);
  - (ii) address the safe, reliable and efficient management and operation of the road network within the Tollroad;
  - (iii) address and minimise the adverse impacts of the Tollroad on the surrounding road networks;
  - (iv) address the impacts of the surrounding road networks on the Tollroad;

- (v) address the State's and Council's requirement to provide a safe and efficient Brisbane metropolitan road network; and
  - (vi) liaise with QDMR and Council in relation to their respective needs and rights to access and control certain elements of PPP Co's TTMCS and infrastructure for the purposes of achieving the objective set out in paragraph (v) above.
- (f) For the avoidance of doubt, nothing in this Annexure 12 Part 1 in relation to the preparation, finalisation, updating or amendment (including consultation or communication with relevant Authorities) of any Operational Plans limits the obligations of PPP Co under the State Project Documents in relation to any Project Plans, including under clause 10 of the Project Deed. No comments on, consultation with, agreement to or acceptance by any relevant Authority in accordance with this Annexure 12 Part 1 will constitute approval of any such Operational Plan or any Project Plan by the State.
- (g) All relevant Authorities, the BMTMC Service Provider, tollroad leaseholders and operators, including the lease holder and operator of the North South Bypass Tunnel, must be consulted in the preparation of the Operational Plans and any specific or interface requirements identified are to be incorporated into the Traffic Management and Control Plans, Incident Response Management Plan and all relevant operational protocols, procedures, and communications.

## 2 TRAFFIC MANAGEMENT REQUIREMENTS DURING OPERATIONS AND MAINTENANCE

### 2.1 STANDARD OPERATION TRAFFIC MANAGEMENT

- (a) Traffic management requirements for the Tollroad during periods of standard operation, being those periods where there are no maintenance activities underway and no Incidents, include, but are not limited to, the following:
- (i) implementing the Standard Operation Traffic Management Plan and Traffic Control Management Plans prepared in accordance with section 5;
  - (ii) maximising Tollroad throughput without jeopardising safety;
  - (iii) maintaining safe and efficient traffic speeds through the vehicular tunnels; and
  - (iv) ensuring compliance with the environmental requirements of the State Project Documents, both inside and outside of the tunnels.

### 2.2 MAINTENANCE OPERATION TRAFFIC MANAGEMENT

- (a) Traffic management requirements for the Tollroad during maintenance activities including routine maintenance, repairs and non routine maintenance and major works include, but are not limited to, the following:
- (i) implementing the Maintenance Operation Traffic Management Plan and Traffic Control Management Plans prepared in accordance with section 5;
  - (ii) ensuring maintenance activities are only carried out at times that minimises traffic disruption;
  - (iii) advising QDMR and Council of the planned maintenance activities at least two business days in advance of commencement of the planned maintenance activities;
  - (iv) confirming with QDMR and Council that no mitigating circumstances exist within the surrounding road network that require PPP Co's proposed planned maintenance activities to be postponed (such as other temporary roads closures, events, emergencies in progress);
  - (v) ensuring traffic arrangements are appropriate for the specific maintenance activities planned (including the type of maintenance, the times of day proposed for the work and the location of the maintenance activities on the Tollroad);
  - (vi) ceasing maintenance activities if instructed by QDMR or Council due to adverse impacts on the operational performance of the surrounding road network;
  - (vii) providing clear and accurate information to the BMTMC Service Provider for the provision of information to motorists and road users both along the Tollroad and on approaches to the Tollroad
  - (viii) maintaining safe traffic speed through the vehicular tunnels during periods of partial closure at a safe traffic speed; and
  - (ix) ensuring compliance with the environmental requirements of the State Project Documents, both inside and outside of the tunnels.

- (b) PPP Co must carry out the routine maintenance, repairs and non routine maintenance and major works so that the total time for which the tunnels, ramps or lanes of the Tollroad are closed at a particular time does not exceed the periods set out in Table 1 below.
- (c) The maximum number of consecutive nights of closure of any part of the Tollroad to all traffic 'full closure', between 10 pm and 5 am, is five (5), subject to the requirement that PPP Co must not undertake full closure of the Tollroad at any time between 10 pm Friday and 5 am Saturday, and 10 pm Saturday and 5 am Sunday.
- (d) A minimum period of one calendar month applies from the end of any period of Tollroad closure at any time on consecutive days to the start of another period of Tollroad closure on consecutive days.
- (e) The requirements set out in paragraph (b) above do not apply to the extent that any repairs and non routine maintenance and major works is caused by the occurrence of an Incident that does not arise out of or in connection with a failure by PPP Co to comply with the requirements of the State Project Documents.

Table 1 Maximum Allowable Tollroad Closures

Period	Maximum allowable full closure, including ramps (hours/year)	Maximum allowable single lane closure, partial ramp or elevated structure closure (hours/year)
<b>North-east Connection at Clayfield to North-west Connection at Kedron</b>		
5 am to 10 am	0.2	0.4
10 am to 3 pm	2	4
3 pm to 8 pm	0.2	0.4
8 pm to 10 pm	1	2
10 pm to 5 am	84	42
<b>North-west Connection at Kedron to Southern Connection at Windsor</b>		
5 am to 10 am	0.2	0.4
10 am to 3 pm	2	4
3 pm to 8 pm	0.2	0.4
8 pm to 10 pm	1	2
10 pm to 5 am	84	42
<b>Southern Connection at Windsor to North-west Connection at Kedron</b>		
5 am to 10 am	0.2	0.4
10 am to 3 pm	2	4
3 pm to 8 pm	0.2	0.4
8 pm to 10 pm	1	2
10 pm to 5 am	84	42
<b>North-west Connection at Kedron to Southern Connection at Windsor</b>		
5 am to 10 am	0.2	0.4
10 am to 3 pm	2	4
3 pm to 8 pm	0.2	0.4
8 pm to 10 pm	1	2
10 pm to 5 am	84	42

## 2.3 INCIDENT TRAFFIC MANAGEMENT

- (a) PPP Co must coordinate its Tollroad Incident management operations and procedures with QDMR's and Council's incident management operations and procedures.
- (b) PPP Co must support QDMR and Council in the management of Incident responses to promote safety and efficiency in Incident management and road usage and to promote a sense of urgency in clearing Incidents.
- (c) Traffic management requirements for the Tollroad during Incidents, include but are not limited to, the following:
  - (i) implementing the Incident Response Management Plan and Traffic Control Management Plans detailed in this Annexure;
  - (ii) ensuring the safety of motorists and road users on the Tollroad;
  - (iii) ensuring the Incident Response Management Plan and Traffic Control Management Plans are appropriate for the specific event causing the Incident (including the type of event, the time of the event and the location of the event);
  - (iv) providing clear and accurate information to the BMTMC Service Provider for the provision of information by the BMTMC Service Provider to motorists and road users both along the Tollroad and on approaches to the Tollroad;
  - (v) minimising the time to fully reopen the Tollroad; and
  - (vi) integrating with the Critical Infrastructure Protection Plans detailed in Annexure 14 Part 1 (Critical Infrastructure Protection Requirements).
- (d) PPP Co's response time in respect of Incidents must, as a minimum, be in accordance with the requirements of Annexure 4 Part 1 (AL Operations and Maintenance Requirements). PPP Co's response must be in accordance with the relevant Incident Response Management Plan and Traffic Control Management Plans and must include notification to relevant Authorities for action and/or the despatching of PPP Co service crews.
- (e) PPP Co must restore the safe, continuous and efficient passage of vehicles on the Tollroad as soon as it is safe to do so, or in the event that a relevant Authority has closed the Tollroad in response to an Incident, when PPP Co has been directed to do so by the relevant Authority.

## 2.4 TRAFFIC MONITORING AND INFORMATION

- (a) PPP Co must provide current and relevant traffic data to support QDMR and Council's qualitative and quantitative analysis functions. As a minimum, traffic monitoring must include vehicle detection systems that produce accurate and reliable traffic data from the traffic monitoring sites in the Tollroad that record, forward and store traffic data for:
  - (i) Automatic Incident Detection (AID);
  - (ii) congestion detection; and
  - (iii) displaying information on the workstations at the Tollroad Control Centre.

- (b) Traffic information collection and the communication of traffic information must be in accordance with the following:
- (i) PPP Co must collect and record traffic volume, traffic speed and variability, lane occupancy and vehicle types information for the Tollroad in accordance with the traffic information requirements set out in Attachment 2. Data must be formatted to be fully compatible with relevant QDMR and Council systems and be delivered in real time to QDMR and Council; and
  - (ii) PPP Co must provide QDMR and Council with real time data and images of the traffic conditions of the Tollroad.
- (c) Information concerning an Incident must be provided by PPP Co to QDMR and Council in real time. Incident information must interface with and be fully compatible with the systems at the BMTMC. As a minimum, Incident information must include but not be limited to the following:
- (i) event type;
  - (ii) location;
  - (iii) specifics of the Incident Response Management Plan activated;
  - (iv) effect on the surrounding road network;
  - (v) estimated response and rectification time; and
  - (vi) other relevant information.



### 3 TRAFFIC MANAGEMENT RESPONSIBILITIES DURING OPERATIONS AND MAINTENANCE

#### 3.1 GENERAL

- (a) PPP Co must operate the Tollroad;
- (i) as part of the Brisbane metropolitan road network;
  - (ii) in accordance with and in support of the overall constraints, controls, traffic systems, requirements and responsibilities that QDMR and Council have for the operational management of the Brisbane metropolitan road network;
  - (iii) in accordance with QDMR's and Council's protocols and procedures for the management of the Brisbane metropolitan road network; and
  - (iv) in accordance with QDMR's and Council's requirements for communication of information relating to road network operations and traffic conditions.
- (b) PPP Co must not permit over height or dangerous goods vehicles to enter the Tollroad.
- (c) PPP Co must actively monitor all over height or dangerous goods vehicles detected passing the physical height limitation devices or the last diversion points and potentially entering the tunnel portals. PPP Co must record the vehicle particulars and immediately report these to QPS and Queensland Transport.
- (d) PPP Co must participate in de-briefs, following an Incident, with relevant Authorities including Council, QDMR, TransLink, Emergency Services agencies and the QPS, as required.

#### 3.2 COMPLIANCE WITH TRAFFIC INSTRUCTIONS

PPP Co must immediately comply with any traffic direction or instruction given by QDMR, Council, Emergency Services agencies and QPS that relate to the management of the road network within the Tollroad and the overall traffic management for the Brisbane metropolitan road network, including any instruction to close or reopen any traffic lane or shoulder to traffic.

#### 3.3 MAINTENANCE OPERATION TRAFFIC MANAGEMENT

PPP Co must implement maintenance operation traffic management and traffic control plans that comply with the requirements of relevant Authorities and this Annexure and are applicable to the nature of the maintenance activities, the time of day and to the location of the maintenance activities on the road network and also:

- (a) ensure that maintenance activities are carried out in accordance with the State Project Documents;
- (b) establish and maintain priority digital and voice communications channels between the Tollroad Control Centre and the BMTMC; and
- (c) inform QDMR and Council of Tollroad maintenance activities and continually coordinate with QDMR and Council for the duration of the maintenance activities

and any associated temporary traffic diversions required as a result of such maintenance activities.

### 3.4 INCIDENT TRAFFIC MANAGEMENT

PPP Co must implement the Incident Response Management Plan response that is applicable to the nature of the Incident, the times of day and to the Incident locations on the road network and also:

- (a) establish and maintain priority digital and voice communications channels between the Tunnel Control Centre and the BMTMC;
- (b) inform QDMR and Council of Incidents as a high priority and continually coordinate with QDMR and Council for the duration of the Incident; and
- (c) provide support to Emergency Services agencies and QPS, including traffic control in the vicinity of the Incident.

### 3.5 TRAFFIC MANAGEMENT OPERATIONS LIAISON GROUP

- (a) The Traffic Management Operations Liaison Group (TMOLG) will be a forum for the exchange of information and the discussion of issues associated with Tollroad traffic management, operational traffic interfaces, coordination of systems between the Tollroad and the surrounding road network, new traffic management developments and other relevant issues.
- (b) The BMTMC Centre Director will chair the TMOLG and will be responsible for the conduct, governance, nomination of members of the TMOLG and the timing of meetings.
- (c) PPP Co must participate in a TMOLG on a regular basis commencing at least 3 months prior to the Date of Tollroad Completion to the end of the Concession Period;
- (d) Subject to paragraph (b) above, PPP Co must ensure that PPP Co's Traffic Representative nominated under section 5.1 attends each meeting of the TMOLG.

### 3.6 TRAFFIC INFORMATION

- (a) Only the BMTMC Service Provider may issue real time provision of traffic information relating to the Brisbane metropolitan road network, including any planned Tollroad maintenance activities or Incidents. Real time traffic information relating to traffic operations on the Tollroad may only be issued by PPP Co in accordance with the Traffic Management and Control Plans.
- (b) The BMTMC Service Provider may comment on the traffic conditions of the Brisbane metropolitan road network, including the Tollroad, at any time, via a range of media including radio, web site and road network Variable Message Systems. The information reported may include, without limitation to the following:
  - (i) commentary on peak period congestion levels across the road network;
  - (ii) location and impact of any planned Tollroad maintenance activities or Incident;

- (iii) advice on diversion routes, either through or away from the Tollroad;
- (iv) maintenance activities or Incidents currently in progress; and
- (v) future works or planned events.



## 4 TOLLROAD TRAFFIC MANAGEMENT STRATEGY

### 4.1 GENERAL

- (a) PPP Co must operate the Tollroad so as to complement and integrate with QDMR's and Council's real time traffic management strategy. PPP Co must participate jointly with QDMR and Council in the planning and the operational management of the road network as it relates to the Tollroad.
- (b) PPP Co must manage the road network within the Tollroad in compliance with:
- (i) QDMR's and Council's overall planning and management hierarchy, protocols and processes for the Brisbane metropolitan road network.
  - (ii) all relevant Authorities' priorities, responsibilities and protocols for managing Incidents, based on, but not limited to:
    - A Incident locations
    - B Incident type;
    - C Incident duration;
    - D Incident severity including the extent of effects on the road network; and
    - E time of occurrence of Incident.
  - (iii) QDMR's and Council's overall traffic management strategy for the Brisbane metropolitan road networks, including:
    - A recognition of the complementary roles that QDMR and Council, relevant Authorities (including Emergency Services agencies) as well as tollroad lease holders and operators have in the management of traffic and the effects of maintenance activities and Incidents;
    - B liaison, cooperation and communication between QDMR and Council, relevant Authorities (including Emergency Services agencies) as well as tollroad lease holders and operators to manage traffic;
    - C the development of a team management approach between QDMR and Council, relevant Authorities as well as tollroad lease holders and operators to reduce the direct and indirect effects of maintenance activities and of Incidents;
    - D timely communication of information to QDMR and Council, relevant Authorities as well as tollroad lease holders and operators;
    - E integration of PPP Co's traffic management procedures with those of QDMR and Council, relevant Authorities as well as tollroad lease holders and operators;
    - F planning and implementation of real time decision making to manage traffic effectively;
    - G integration of public transport and pedestrians requirements into traffic management;
    - H timely and effective use of intelligent transport systems technology, including the TTMCS; and
    - I provision to QDMR and Council of access and control of relevant elements of the TTMCS as described in section 6, to assist in the

management of the effects of maintenance activities and Incidents on the Brisbane metropolitan road network.

#### 4.2 TOLLROAD TRAFFIC MANAGEMENT STRATEGY REQUIREMENTS

- (a) PPP Co must prepare, implement, operate and update a Tollroad Traffic Management Strategy (TTMS) for the Tollroad throughout the O&M Phase.
- (b) The TTMS must address as a minimum:
  - (i) the requirements detailed in this Annexure for the operation and management of the road networks during periods of Tollroad standard operation, Tollroad maintenance activities and Incidents;
  - (ii) the methodologies and specific measures that will be used to achieve the requirements detailed in this Annexure for the safe and efficient movement and management of all motorists and road users using the road networks; and
  - (iii) communication of information relating to road network operations and traffic conditions to stakeholders.

#### 4.3 TOLLROAD TRAFFIC MANAGEMENT STRATEGY DEVELOPMENT AND APPROVAL

- (a) The TTMS must be developed in consultation with relevant Authorities including Council, QDMR, TransLink, Emergency Services agencies and the QPS.
- (b) Relevant Authorities including Council, QDMR, TransLink, Emergency Services agencies and the QPS must be allowed a minimum of 20 Business Days to provide comments in relation to any TTMS (including any draft TTMS or revision or amended TTMS) provided by PPP Co.
- (c) PPP Co must specifically address any comments made by the relevant Authorities, including Council, QDMR, TransLink, Emergency Services agencies and the QPS, in relation to any TTMS issued for comment and make appropriate amendments to the TTMS prior to resubmission to relevant Authorities for further comment.
- (d) A final copy of the TTMS must be provided by PPP Co to each of the relevant Authorities requesting that the relevant Authority notify PPP Co if the TTMS provided does not comply with the relevant Authority's requirements within 20 Business Days of provision of the TTMS by PPP Co.
- (e) The TTMS, which complies with the requirements of this Annexure 12 and in relation to which no relevant Authority has given notice to PPP Co under section 4.3(d) above, must be completed and provided to the State, QDMR and Council at least 2 months prior to the commencement of Tollroad Fitness to Operate Drills as detailed in Annexure 4 Part 1 (AL Operations and Maintenance Requirements). PPP Co must further develop and update the TTMS throughout the O&M Phase to ensure that the requirements detailed in this Annexure 12 are met. The process set out in this section 4.3 must be complied with in relation to any further developed or updated TTMS. PPP Co must not implement any further developed or updated TTMS unless the following have been satisfied:
  - (i) the requirements of this section 4.3 have been satisfied in relation to the relevant further developed or updated TTMS;



- (ii) at least 20 Business Days has expired since the provision of the relevant further developed or updated TTMS to the relevant Authorities in accordance with section 4.3(d) above; and
- (iii) no notice has been given by any relevant Authority to PPP Co in accordance with section 4.3(d) above in relation to the relevant further developed or updated TTMS.



## 5 TRAFFIC MANAGEMENT AND CONTROL PLANS

### 5.1 GENERAL

- (a) PPP Co must prepare, implement, operate and update the following Traffic Management Plans (TMP's) for the Tollroad that are consistent with the TTMS throughout the O&M Phase:
- (i) Standard Operation Traffic Management Plan;
  - (ii) Maintenance Traffic Management Plan; and
  - (iii) Incident Response Management Plan.
- (b) PPP Co must prepare, implement, operate and update Traffic Control Management Plans (TCP's) for the Tollroad that are consistent with the TTMS and the TMP's throughout the O&M Phase.
- (c) The TMP's and TCP's must as a minimum:
- (i) address the requirements detailed in this Annexure for the operation and management of the road networks during periods of Tollroad standard operation, Tollroad maintenance activities and Incidents;
  - (ii) clearly describe the methodologies and specific measures to achieve the requirements detailed in this Annexure for the safe and efficient movement and management of all motorist and road users using the road networks;
  - (iii) include traffic data and simulation modelling analysis that demonstrate that traffic impacts during periods of Tollroad standard operation, Tollroad maintenance activities and Incidents on the surrounding road network are minimised; and
  - (iv) nominate PPP Co's Traffic Representative who has authority and responsibility for issues relating to Tollroad traffic management throughout the O&M Phase.
- (d) TMP's and TCP's must be developed in consultation with relevant Authorities including Council, QDMR, TransLink, Emergency Services agencies and the QPS. The Maintenance Operation Traffic Management Plan and associated Traffic Control Management Plans must also be audited by a QDMR accredited independent road safety auditor.
- (e) Relevant Authorities including Council, QDMR, TransLink, Emergency Service agencies and the QPS as well as relevant QDMR accredited independent road safety auditors must be allowed a minimum of 20 Business Days to provide comments in relation to any TMP or TCP.
- (f) PPP Co must specifically address any comments made by relevant Authorities and QDMR accredited road safety auditors in relation to any TMP or TCP issued for comment and make appropriate amendments to the TMP or TCP prior to resubmission to relevant Authorities and relevant QDMR accredited independent road safety auditors for further comment.

- (g) All TMP's and TCP's must be approved by all relevant Authorities in accordance with relevant statutory requirements.
- (h) PPP Co must further develop and update the TMP's and TCP's throughout the O&M Phase to ensure that the requirements detailed in this Annexure are met. The process set out in this section 5.1 must be complied with in relation to any further or updated TMP or TCP.

#### 5.2 STANDARD OPERATION TRAFFIC MANAGEMENT PLAN

- (a) The Standard Operation Traffic Management Plan must as a minimum address the following:
  - (i) the methodologies and specific measures that will be used to achieve the traffic management requirements of this Annexure during periods of standard operation;
  - (ii) traffic measures that are to be operated and maintained by PPP Co; and
  - (iii) traffic measures that are to be operated and maintained by QDMR and Council .

#### 5.3 MAINTENANCE OPERATION TRAFFIC MANAGEMENT PLAN

- (a) The Maintenance Operation Traffic Management Plan must as a minimum address the following:
  - (i) the methodologies and specific measures that will be used to achieve the traffic management requirements of this Annexure during periods of routine maintenance, repairs and non routine maintenance and major works;
  - (ii) the approval process for initiating, implementing and completing the requirements of the Maintenance Operation Traffic Management Plan;
  - (iii) traffic measures that are to be operated and maintained by PPP Co; and
  - (iv) traffic measures that are to be operated and maintained by QDMR and Council.

#### 5.4 INCIDENT RESPONSE MANAGEMENT PLAN

- (a) The Incident Response Management Plan must as a minimum address the requirements detailed in Annexure 4 Part 1 (AL Operations and Maintenance Requirements) and this Annexure.
- (b) The Incident Response Management Plan must comply with the requirements set out in Attachment 1 and address the following:
  - (i) the methodologies and specific measures that will be used to achieve the traffic management requirements of this Annexure during Incidents;
  - (ii) address the impacts of all anticipated Incidents, including those external to the Tollroad, that will affect the road networks within the Tollroad;

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- (iii) address and comply with all stakeholder priorities, responsibilities and protocols for managing Incidents and operational and communication protocols between stakeholders;
- (iv) the approval process for initiating, implementing and completing the requirements of the Incident Response Management Plan;
- (v) integration with the Critical Infrastructure Protection Plans detailed in Annexure 14 Part 1 (Critical Infrastructure Protection Requirements);
- (vi) traffic measures that are to be operated and maintained by PPP Co;
- (vii) traffic measures that are to be operated and maintained by QDMR and Council;
- (viii) diversion routes including the location of all remote control devices and signage, temporary signage and temporary traffic barriers and intersections requiring traffic control;
- (ix) any changes required to the existing road network design, traffic lane configuration, lane allocation and existing kerbside allocation to maximise capacity on the proposed diversion routes;
- (x) traffic signal operations including diversion phasing patterns;
- (xi) on site location of traffic control devices;
- (xii) on site location of Emergency Services agencies, QPS and PPP Co Incident management personnel;
- (xiii) wording required on variable message signs;
- (xiv) the display state of electronic traffic management devices, such as variable speed limits and lane control signs;
- (xv) any changes required to public transport services;
- (xvi) wording required in relation to the provision of traveller information through various mediums; and
- (xvii) operational conditions and traffic performance during the implementation of the Incident Response Management Plan.

## 5.5 TRAFFIC CONTROL MANAGEMENT PLANS

- (a) Traffic Control Management Plans must, as a minimum, be consistent with the TTMS and TMP's and be developed in accordance with the requirements of PSTS02 and AS 1742.3.

## 6 TOLLROAD TRAFFIC MONITORING AND CONTROL SYSTEM INTERFACING REQUIREMENTS

### 6.1 GENERAL

- (a) PPP Co must design, construct and operate a comprehensive Tollroad Traffic Monitoring and Control System (TTMCS) that, as a minimum, meets the requirements of Annexure 1 Part 1 (Design Requirements), Annexure 4 Part 1 (AL Operations and Maintenance Requirements) and this Annexure 12.
- (b) The TTMCS for the Tollroad must as a minimum:
  - (i) include system elements fully compatible with the traffic management and control systems used to operate the Brisbane metropolitan road network elements;
  - (ii) provide surveillance of all sections of the Tollroad including each ramp and at traffic light signals at intersections between the Tollroad and the surrounding road network;
  - (iii) include traffic monitoring and Incident management systems as well as incorporate a driver advisory system including variable message signs and regulatory signage including variable speed limit signs; and
  - (iv) be capable of redirecting traffic on the Tollroad and on approach roads as a consequence of traffic conditions on the Tollroad and the surrounding road network.
- (c) PPP Co will be responsible for any modifications or additional elements to the existing traffic management and control system used to operate the Brisbane metropolitan road network (including the systems at the BMTMC) required due to the addition of the Tollroad to the Brisbane metropolitan road network.
- (d) Without limiting the obligations of PPP Co under the State Project Documents (including clause 22 of the Project Deed), all modifications and additions to the traffic management and control systems used to operate the Brisbane metropolitan road network by PPP Co must have the prior consent of QDMR, Council and relevant Authorities.
- (e) Without limiting clause 12.4 of the Project Deed, installation and commissioning of modified or added elements to the traffic management and control system used to operate the Brisbane metropolitan road network must be undertaken by a subcontractor acceptable to both QDMR and Council.

### 6.2 SYSTEMS RELIABILITY, REDUNDANCY AND INTERFACING

- (a) The TTMCS must operate continuously and without interruption throughout the O&M Phase and as a minimum must also meet the system reliability requirements described in Annexure 1 Part 1 (Design Requirements).
- (b) The TTMCS must be designed to be capable of being operated at a location other than the Tollroad Control Centre (TCC) including in the event of a disaster impacting on the TCC.

- (c) The TTMCS must be designed to be capable of being fully and seamlessly integrated with the traffic management and control systems located at the BMTMC that are used to operate the Brisbane metropolitan road network.

### 6.3 INCIDENT MANAGEMENT SYSTEM

- (a) The Incident Management System required to be installed by PPP Co must be operated and maintained by PPP Co throughout the O&M Phase.
- (b) The Incident Management System must be designed and configured to provide an effective system to manage the effects of maintenance activities and Incidents. The Incident Management System must, as a minimum:
  - (i) detect the presence of an Incident on the Tollroad;
  - (ii) apply a recommended pre-planned Incident response to the detected Incident;
  - (iii) define the activities required to manage the effects of the Incident;
  - (iv) close the Incident response after the clearance of the Incident; and
  - (v) maintain event logs showing the progress in clearing the Incident
- (c) The Incident Management System must detect incidents both automatically and manually. Automatic sources for detection must include as a minimum:
  - (i) Automatic Incident Detection (AID) systems described in section 6.12;
  - (ii) traffic monitoring and information systems described in section 6.4;
  - (iii) Overheight Vehicle Detection and Warning (VOW) systems described in section 6.10;
  - (iv) dangerous goods vehicle detection systems described in section 6.11;
  - (v) emergency closure systems described in section 6.21;
  - (vi) fire detection inputs;
  - (vii) air quality exceedances; and
  - (viii) flood or water detection.
- (d) The Incident Management System must accommodate manual entry of Incident information. Manual sources of Incident information to be entered into the Incident Management System must include as a minimum:
  - (i) detection via the CCTV system described in section 6.13;
  - (ii) reports from QDMR or Council; and
  - (iii) reports from QPS.

### 6.4 TRAFFIC MONITORING AND INFORMATION SYSTEM

- (a) The traffic monitoring and information system required to be installed by PPP Co must be operated and maintained by PPP Co throughout the O&M Phase.
- (b) The traffic monitoring and information system must be based on in pavement vehicle loop detection techniques or an equivalent technology and the distances between the traffic monitoring sites must be configured into the TTMCS to enable

the accurate capture of traffic volume, traffic speed, lane occupancy and vehicle types.

#### 6.5 TRAFFIC SIGNALS

- (a) All permanent traffic light signals required to be installed at intersections by PPP Co will be operated and maintained by QDMR or Council, as appropriate.
- (b) Traffic light signals installed at intersections by PPP Co must be connected by PPP Co to the traffic management and control system used to operate the Brisbane metropolitan road network.

#### 6.6 VARIABLE MESSAGE SIGNS (VMS)

- (a) All permanent Variable Message Signs and associated systems required to be installed outside of the Tollroad by PPP Co will be operated and maintained by QDMR or Council, as appropriate.
- (b) All permanent Variable Message Signs and associated systems required to be installed within the Tollroad by PPP Co will be operated and maintained by PPP Co throughout the O&M Phase.
- (c) All Variable Message Signs installed by PPP Co must be connected to the traffic management and control system used to operate the Brisbane metropolitan road network including the systems at the BMTMC.
- (d) When Incidents occur along the Tollroad, the PPP Co control room operator responsible for the management of the Incident must contact QDMR or Council as appropriate, and request a pre-formatted message be displayed.
- (e) The wording of VMS messages must be developed and previously be agreed by PPP Co, QDMR and Council. Messages concerning the status or operation of the Tollroad or road network surrounding the Tollroad must only be displayed with prior agreement between PPP Co, QDMR and Council. Verbal communication may be used to implement the use of the VMS.

#### 6.7 CHANGEABLE MESSAGE SIGNS (CMS)

- (a) All CMS and the associated Changeable Message Signs System (CMSS) required to be installed by PPP Co must be operated and maintained by PPP Co throughout the O&M Phase.
- (b) Any CMS associated with movable medians used for lane configuration changes used to achieve full or partial tunnel closure must be interlocked electronically with the moveable median control systems to prevent any dangerous situations from occurring. The CMSS must include lamp failure detection and the raising of alerts for urgent repair maintenance requirements.
- (c) The status of the CMS must be clearly displayed in real time on a traffic operations display at the Tollroad Control Centre.

## 6.8 LANE CONTROL SIGNS (LCS)

- (a) All LCS and the associated Lane Control Sign System (LCSS) required to be installed by PPP Co must be operated and maintained by PPP Co throughout the O&M Phase.
- (b) PPP Co must provide LCS and a LCSS for tunnel lane management and closure that provides safe and efficient lane management and closure. The LCSS must allow motorists to choose the appropriate traffic lane when travelling along the Tollroad and when accessing the Tollroad from the surrounding road network.
- (c) The LCSS must incorporate as a minimum:
  - (i) centralised control of each LCS from the Tollroad Control Centre;
  - (ii) LCS lamp failure detection;
  - (iii) LCS lamp conflict control logic;
  - (iv) confirmation of the correct LCS aspect settings at all times to the Tollroad Control Centre; and
  - (v) "Failure to set as expected" alerts to the Tollroad Control Centre.
- (d) The status of the LCS must be clearly displayed in real time on a traffic operations display at the Tollroad Control Centre.

## 6.9 VARIABLE SPEED LIMIT SIGNS (VSL)

- (a) All VSL and the associated Variable Speed Limit System (VSLS) required to be installed by PPP Co must be operated and maintained by PPP Co throughout the O&M Phase.
- (b) The VSLS must as a minimum:
  - (i) comprise the VSL and a computer control system to control and monitor all VSL and log the status of VSL at any time;
  - (ii) be integrated with the LCS and LCSS;
  - (iii) be designed to allow for the future integration of a permanent speed camera installed by QPS, as approved for use in Queensland;
  - (iv) be capable of displaying speeds in 10 km/h increments from the permissible speed limit down to 40km/h;
  - (v) be in accordance with Queensland Transport and QDMR policy ; and
  - (vi) apply to all lanes open to traffic at any point.
- (c) The status of the VSL must be clearly displayed in real time on a traffic operations display at the Tollroad Control Centre.

## 6.10 OVERHEIGHT VEHICLE DETECTION AND WARNING (VOW)

- (a) All Overheight Vehicle Detection and Warning (VOW) system elements required to be installed by PPP Co must be operated and maintained by PPP Co throughout the O&M Phase.

- (b) Overheight vehicle detection must raise an alarm and alert at each operator workstation at the Tollroad Control Centre using the Incident Management System functionality. Incident responses to overheight vehicle detection must be generated within the Incident Management System and must be implemented in a timely manner to ensure that roadside devices are activated and produce effective advice to overheight vehicle drivers. All overheight vehicles that are detected must be logged in the Incident Management System event logging system.

#### 6.11 DANGEROUS GOODS VEHICLES DETECTION

- (a) All dangerous goods vehicle system elements required to be installed by PPP Co must be operated and maintained by PPP Co throughout the O&M Phase.
- (b) Dangerous goods vehicle detection must raise an alarm and alert at each operator workstation at the Tollroad Control Centre using the Incident Management System functionality. Incident responses to dangerous goods vehicle detection must be generated within the Incident Management System and must be implemented in a timely manner to ensure that roadside devices are activated and produce effective advice to dangerous goods vehicle drivers. All dangerous goods vehicles that are detected must be logged in the Incident Management System event logging system.

#### 6.12 AUTOMATIC INCIDENT DETECTION (AID)

- (a) All Automatic Incident Detection (AID) system elements required to be installed by PPP Co must be operated and maintained by PPP Co throughout the O&M Phase.
- (b) The AID system must be designed and configured to provide an effective system to detect Incidents. The AID system must reliably detect Incidents, minimise false alarms and declare Incident detections within two minutes of their occurrence.
- (c) The Incident detection algorithms' parameters and settings must be controlled centrally in the TTMCS and must be determined for each traffic-monitoring site.

#### 6.13 CLOSED CIRCUIT TELEVISION (CCTV) SYSTEM

- (a) The CCTV system required to be installed by PPP Co within the Tollroad must be operated and maintained by PPP Co throughout the O&M Phase.
- (b) The CCTV system must be capable of complete coverage of all points of the Tollroad under any conditions.
- (c) The CCTV system must allow any CCTV camera images to be displayed on any CCTV monitor installed at the Tollroad Control Centre. CCTV camera pan, tilt and zoom functions must be able to be controlled by control room operators at the Tollroad Control Centre.
- (d) The CCTV system must be capable of allowing PPP Co, QDMR and Council to provide each other with images selected from their respective CCTV systems. At all times the camera images from PPP Co, QDMR and Council controlled CCTV systems must be available for viewing at the choice of PPP Co, QDMR and

Council in accordance with QDMR and Council CCTV image sharing policies and protocols.

- (e) All equipment required to achieve operation and interoperability with the QDMR's and Council's CCTV systems, including equipment located at the BMTMC, must be supplied, installed and commissioned by PPP Co.
- (f) On request CCTV camera sites of another party may be remotely controlled and accessed by PPP Co or BMTMC control room operators respectively subject to agreement between PPP Co, QDMR and Council.
- (g) Any party when using the other parties CCTV system must adhere to the operating procedures relevant to that CCTV system.
- (h) There must be no unauthorised recording or distribution to others of CCTV images from the CCTV systems under any circumstances.

#### 6.14 SUPERVISORY CONTROL AND DATA ACQUISITION (SCADA)

All SCADA system elements required to be installed by PPP Co must be operated and maintained by PPP Co throughout the O&M Phase.

#### 6.15 RAMP CONTROL SIGNS SYSTEM

- (a) The ramp control signs systems required to be installed by PPP Co used to inform motorists on traffic conditions when accessing the Tollroad or when the approach roads have been reduced or closed must be operated and maintained by PPP Co throughout the O&M Phase.
- (b) The status of the ramp control signs systems must be clearly displayed in real time on a traffic operations display at the Tollroad Control Centre.

#### 6.16 TRAVEL TIME SIGNS

The travel time signs and associated system required to be installed by PPP Co must be operated and maintained by PPP Co throughout the O&M Phase.

#### 6.17 TOLLROAD CONDITION SIGNS

- (a) The Tollroad condition signs and associated system required to be installed by PPP Co must be operated and maintained by PPP Co throughout the O&M Phase.

#### 6.18 RADIO REBROADCAST COMMUNICATION SYSTEM

- (a) The radio rebroadcast communications system including a "break in" facility required to be installed by PPP Co must be operated and maintained by PPP Co throughout the O&M Phase.
- (b) Microphone and control panel equipment must be available at each operator workstations at the Tollroad Control Centre to allow easy and quick access to the "break in" facility. The "break in" facility system must include a provision that enables the control room operators to select and only "break in" to radio rebroadcasts in discrete sections of the tunnels.

- (c) The "break in" facility must automatically record and permanently store all voice instructions issued by the control room operators. The voice signal levels must be adjusted in the "break in" facility and tested to ensure that the control room operator's instructions are audible to drivers within vehicles.

#### 6.19 MOTORIST HELP AND EMERGENCY TELEPHONE SYSTEM

- (a) The motorist help telephones and associated systems required to be installed by PPP Co must be operated and maintained by PPP Co throughout the O&M Phase.
- (b) Motorist help telephone call details must be displayed at operator workstations at the Tollroad Control Centre and each control room operator must be able to independently and simultaneously answer calls from the motorist help telephones.
- (c) PPP Co control room operators must be able to call any motorist help telephone on the Tollroad from operator workstations at the Tollroad Control Centre.

#### 6.20 PUBLIC ADDRESS SYSTEM

The public address system required to be installed by PPP Co must be operated and maintained by PPP Co throughout the O&M Phase.

#### 6.21 EMERGENCY CLOSURE SYSTEM

- (a) The emergency closure system required to be installed by PPP Co must be operated and maintained by PPP Co throughout the O&M Phase.
- (b) Emergency close buttons must be provided on the operator workstations at the Tollroad Control Centre for each lane of all of the tunnels to initiate automatic closure of the tunnel lanes.

## ANNEXURE 12 – PART 1 – ATTACHMENT 1 CONTENTS OF THE INCIDENT RESPONSE MANAGEMENT PLAN

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# 1 CONTENTS OF THE INCIDENT RESPONSE MANAGEMENT PLAN

## 1.1 GENERAL

The Incident Response Management Plan must contain, as a minimum:

- (a) system specific inputs;
- (b) operational responses and instructions; and
- (c) Incident response maps.

## 1.2 SYSTEM SPECIFIC INPUTS

The system specific inputs identified in Table 1 below must be included as a minimum in the Incident Response Management Plan.

Table 1 System Specific Information Requirements

System Specific Inputs Requirement	Description of Requirements
Plan description	Concise description of plan.
Type	Reason for plan (e.g. accident, breakdown, general hazard).
Direction	Direction of travel of immediately impacted traffic flow.
Day	Day of week and time range.
Severity	Direction and number of lanes effected and the volume of traffic to be diverted (e.g. all directions, one direction, one lane, two lanes etc.)
Lane restrictions	Type of impact on traffic lane(s) (e.g. closure or restriction).
Procedures	A4 sheets with fully documented procedures for each plan, based upon comprehensive investigations for each plan as well as a digital copy in a format agreed with QDMR and Council.
Equipment identification	The unique identification of all devices to be used in the planned response.
Variable Message Sign (VMS) Frame 1	Road user advice (text) to be displayed on the VMS.
Variable Message Sign (VMS) Frame 2	Road user advice (text) to be displayed on the VMS.
Variable Speed Limit Sign (VSL)	Display requirements on the VSL.
Complex multi-agency responses (specifically Emergency Services agencies and QPS)	Documented procedures for the entire process, from detection through to notification, response and clearance.
Tollroad lease holders or operators responses	Documented procedures for Tollroad lease holders and operators where the plan requires a response from or affects other tollroad lease holders or operators.

### 1.3 OPERATIONAL RESPONSES AND INSTRUCTIONS

The operational responses and instructions identified in Table 2 below must be included as a minimum in the Incident Response Management Plan.

Table 2 Operational Response and Instruction Requirements

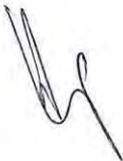
Operator Response/Instruction Requirements	Description of Requirements
Primary detour and affected secondary route description	Traffic guidance information, including details and a listing of all roads to be used to bypass the Incident location.  Traffic responses and instructions to address impacts on traffic routes (including public transport routes and tollroads) affected by the detour.
Heavy vehicle information	Additional traffic guidance information or instructions to be provided to address heavy vehicle requirements.
Road closure(s)	Road closure locations and any road closure sequencing information; and  Detour route guidance signage.
QPS resources	QPS resources required for special duties in response to the Incident, i.e. point duty at designated intersections.
Critical contacts	Priority contacts that are specific to the Incident and the plan.
Infrastructure changes	Alterations to physical infrastructure i.e. removal/implementation of tidal flow arrangements.
Traffic signals	Alterations in phasing at designated intersections to cater for detoured traffic.
VMS located external to the Tollroad	Display of supporting traffic advice on VMS located external to the Tollroad.
Strategic VMS information	An indicator to confirm that traffic advice has been strategically displayed as part of the plan.
Additional contacts	Other beneficial contacts, including other tollroad operators, bus operators and local schools.
Special traffic generators	Identification of special land uses affecting or affected by the Incident – major shopping centres, entertainment centres etc.
Long term signage (portable VMS)	Provisions for temporary VMS to supplement permanent VMS, including displayed messages.
Long term signage (static signs)	Provisions for manually erected static route guidance signage, including displayed message.

### 1.4 INCIDENT RESPONSE MAPS

The Incident response maps must be A3 in size, in a digital format agreed with QDMR and Council, and must show:

- (a) the relevant roadway system;
- (b) the associated Incident response identification reference;
- (c) the electronic traffic management devices and desired display state to manage the Incident;
- (d) other traffic management devices to be used to manage the Incident;

- (e) relevant landmarks (over/underpasses etc); and
- (f) the traffic detour routes.



## ANNEXURE 12 – PART 1 – ATTACHMENT 2 TRAFFIC INFORMATION REQUIREMENTS

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## 1 TRAFFIC INFORMATION REQUIREMENTS

### 1.1 TRAFFIC DATA

The traffic monitoring and information system, as a minimum, must supply the following traffic data and information from nominated traffic monitoring sites on the Tollroad, under all climatic, Environment and other conditions that will be encountered on the Tollroad, to the following levels of accuracy and reliability:

(a)	Traffic volume (number of vehicles in total):	Less than 2% error when measured over a fifteen minute traffic monitoring period.
(b)	Traffic speed:	Less than 2% error when vehicle speeds are aggregated over the traffic monitoring time interval.
(c)	Lane occupancy (expressed as a percentage):	Less than 2% error when aggregated over the traffic monitoring time interval.
(d)	Number of vehicles classified using AUSTROAD categories but modified as follows: (i) Short vehicles: less than 5.5 metres (ii) Medium vehicles: 5.5 metres to 11.5 metres (iii) Long vehicles: Longer than 11.5 metres	Less than 2% error when measured over a fifteen minute traffic monitoring period.

### 1.2 TRAFFIC MONITORING TIME INTERVAL

The traffic monitoring time interval must be 30 seconds.

**ANNEXURE 13 – PART 1  
SAFETY MANAGEMENT REQUIREMENTS**

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## 1 INTRODUCTION

### 1.1 PURPOSE

This Annexure describes the minimum safety requirements which must be met by PPP Co in the performance of the Project Activities.

### 1.2 GENERAL

For the purposes of this Annexure, "the Act" means the *Workplace Health and Safety Act 1995* (Qld).

## 2 WORKPLACE

Both the Construction Site and the Maintenance Site shall (during the D&C Phase and the O&M Phase respectively) be a workplace at which "construction work" (as defined in the Act) is carried out.



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### 3 WORKPLACE HEALTH AND SAFETY OFFICER

PPP Co must appoint (and if necessary employ) on both the Construction Site and the Maintenance Site (as relevant) a Workplace Health and Safety Officer, in accordance with the provisions of the Act, notwithstanding that there may be less than 30 employees on the Construction Site or the Maintenance Site respectively.



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#### 4 FIRST AID OFFICER

As a minimum, PPP Co must ensure that a First Aid Officer for each Construction Work Site, who holds qualifications in accordance with the *First Aid Code of Practice 2004* is located at each of the Construction Site and the Maintenance Site at any time when activities are being carried out. Each First Aid Officer must have a comprehensive first aid kit with all necessary equipment and supplies required for the number of staff on the Construction Site or Maintenance Site (as relevant) at any given time including but not limited to the required contents of a first aid kit set out at clause 2.1.1 of the *First Aid Code of Practice 2004*.



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## 5 REPORTING

Where PPP Co is required to produce any document, notice or report to Workplace Health and Safety Queensland under the Act or the *Workplace Health and Safety Regulation 1997* (Qld) ("the Regulation"), a copy of such document must be simultaneously forwarded to the State.

## 6 WORKPLACE HEALTH AND SAFETY PLAN

- (a) PPP Co must prepare, implement and maintain the Health and Safety Management Plan and if necessary work method statements for the Project Activities to fully integrate with PPP Co's quality management system.
- (b) The Health and Safety Management Plan must set out how PPP Co will comply with the requirements of the Act and the Regulation and must include, without limitation, the following components:
- (i) occupational health and safety policy;
  - (ii) organisation including:
    - A nominated personnel;
    - B roles and lines of responsibility and management; and
    - C interfaces with project organisational structure;
  - (iii) notifications and registrations;
  - (iv) process of safety risk management and mitigation;
  - (v) plant and equipment controls;
  - (vi) emergency planning;
  - (vii) consultative processes;
  - (viii) prescribed and restricted occupations;
  - (ix) hazardous substance management;
  - (x) hazard identification, evaluation and control;
  - (xi) training;
  - (xii) safe work method statements;
  - (xiii) subcontractor controls;
  - (xiv) accident reporting, recording, investigation and analysis;
  - (xv) safety audits; and
  - (xvi) the requirements of QDMRs' Manual of Uniform Traffic Control Devices (latest version) for working with traffic.
- (c) As a sub-plan to the Health and Safety Management Plan, PPP Co must also prepare, implement and maintain a construction workplace plan (as defined in the Regulation), which must comply with the requirements of the Act and the Regulation ("Construction Workplace Plan").
- (d) As a sub-plan to the Health and Safety Management Plan, PPP Co must also prepare, implement and maintain a 'safety in design' plan for the Project Activities covering the requirements of section 3.2 of Annexure 1 Part 1 (Design Requirements).

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## 7 SAFETY AUDITS

- (a) The State, its representative appointed under clause 6.4 of the Project Deed, or any other person nominated by the State or its appointed representative, may carry out audits on PPP Co's compliance with its Health and Safety Management Plan on the Construction Site and/or Maintenance Site at any time.
- (b) During an audit, PPP Co must provide the State's appointed representative, or other person nominated by the State or its appointed representative, with all documents, access and assistance necessary for carrying out the audit.
- (c) Auditing may comprise one or a combination of the following forms:
  - (i) a check on whether PPP Co is complying with the provisions of the Health and Safety Management Plan; or
  - (ii) a check on PPP Co's individual procedures and records.
- (d) If any non-conformity in PPP Co's Health and Safety Management Plan is detected, PPP Co must immediately rectify the non-conformance.

## 8 FEES

PPP Co shall be responsible for payment of any fees set out in the Act or the Regulation in connection with workplace health and safety.



## ANNEXURE 14 – PART 1 CRITICAL INFRASTRUCTURE PROTECTION REQUIREMENTS

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## 1 INTRODUCTION

### 1.1 PURPOSE

This Annexure describes the minimum critical infrastructure protection requirements which must be met by PPP Co in the performance of the Project Activities.

### 1.2 GENERAL

- (a) Without limiting the requirements of the State Project Documents, PPP Co must identify all infrastructure in connection with the Projects that constitutes critical infrastructure as defined in the National Counter-Terrorism Plan (NCTP) developed by the National Counter Terrorism Committee and must develop Critical Infrastructure Protection Management Plans in accordance with Section 3.
- (b) PPP Co must consider, and to the extent relevant, incorporate the FHWA Recommendations for Bridge and Tunnel Security report (September 2003) prepared by The Blue Ribbon Panel on Bridge and Tunnel Security, during its preparation of the Critical Infrastructure Protection Plans.

## 2 CRITICAL INFRASTRUCTURE PROTECTION MANAGEMENT PLANS

Critical Infrastructure Protection Management Plans must be prepared in relation to the following:

- (a) risk management plans and strategies to address counter-terrorism measures and provide adequate security for critical infrastructure forming part of the Projects;
- (b) business continuity arrangements;
- (c) emergency and Incident response, and disaster recovery, in respect of any impacts on critical infrastructure forming part of the Projects as a result of any act of terrorism; and
- (d) plan for communicating and coordinating with the State, relevant Authorities and relevant owners and operators of other critical infrastructure in connection with terrorism related matters.



### 3 REQUIREMENTS FOR CRITICAL INFRASTRUCTURE PROTECTION MANAGEMENT PLANS

#### 3.1 GENERAL

- (a) The Critical Infrastructure Protection Management Plans must:
- (i) be developed in accordance with the NCTP and any guidelines from the National Counter-Terrorism Committee and the requirements of relevant Authorities; and
  - (ii) address the various counter-terrorism alert levels.
- (b) The Critical Infrastructure Protection Management Plans must include risk assessments and identify systems and procedures to manage the risk to critical infrastructure
- (c) As sub-plans to the Critical Infrastructure Protection Management Plans PPP Co must prepare Disaster Recovery Plans developed in conjunction with Emergency Services agencies, QPS and other relevant Authorities. The Disaster Recovery Plans must also consider the recovery of systems and address the requirements of AS7799.
- (d) PPP Co must ensure that the Critical Infrastructure Protection Management Plans incorporate all measures necessary, in respect of the Project Activities, to meet the National Counter-Terrorism Committee's guidelines, requirements of Emergency Services agencies, QPS and all other requirements of Law and Authorities.

#### 3.2 AL WORKS

For the AL Works, PPP Co must continue to develop and maintain the Critical Infrastructure Protection Management Plans throughout the O&M Phase.

## ANNEXURE 15 – PART 1 QUEENSLAND RAIL REQUIREMENTS

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## 1 INTRODUCTION

### 1.1 PURPOSE

This Annexure describes the minimum requirements which must be met by PPP Co in the performance of the Project Activities to the extent that they relate to Queensland Rail (QR).

### 1.2 GENERAL

- (a) Without limiting the requirements of the State Project Documents and the Interface Agreement with QR, all Project Works and any of the Project Activities that:

- (i) impact on QR facilities or services;
- (ii) are constructed over or under QR facilities;
- (iii) are constructed on, over or under QR property; and
- (iv) border QR facilities;

must be in accordance with the latest QR requirements, including the QR Civil Engineering Technical Specifications and other QR technical and material specifications, and any other relevant requirements of QR. These documents are available directly from QR.

- (b) The QR Civil Engineering Technical Specifications include, but are not limited to, the following:

- (i) MCE-SR-001 Requirements for the Design of Road Overbridges
- (ii) MCE-SR-005 Requirements for the Design of Buildings over or near Railways
- (iii) MCE-SR-006 Requirements for the Design of Footbridges
- (iv) Standard Clearances for Proposed Structures.

- (c) Minimum vertical and horizontal clearances required for the Project Works and Temporary Works must be in accordance with QR drawing number 2461 'Standard clearances for proposed structures' and any specific requirements (including any future track alignments) relevant to that location as notified by QR.

### 1.3 PPP Co RESPONSIBILITIES

In undertaking the Project Activities, PPP Co shall be responsible for:

- (a) negotiating with QR;
- (b) obtaining approval from QR to undertake the Project Activities and to construct the Project Works on, over or under QR land;
- (c) programming the D&C Activities in accordance with QR requirements for track closures and isolations;
- (d) paying for all QR charges for, including (but not limited to), project administration, design development activities, construction coordination, investigations, track closures (and costs relating to track closures), isolations and delays to services and any other charges nominated by QR;

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- (e) making due allowance in the D&C Programme for the interaction with QR; and
- (f) ensuring project personnel working near rail infrastructure have been trained and certified according to QR requirements.



## 2 QR ACCESS REQUIREMENTS

### 2.1 GENERAL

Unless otherwise agreed with QR, the Project Activities must not at any time obstruct access to the following QR locations:

- (a) Mayne Rail Yard, Bowen Hills;
- (b) Toombul/Airtrain junction; and
- (c) Ferny Grove Line, Windsor.

### 2.2 MAYNE RAIL YARD

Where the Project Activities impact on the QR Mayne Rail Yard and QR access road, PPP Co must:

- (a) survey the existing roads, ICB and NSBT bridge structures and adjacent rail infrastructure prior to the commencement of the design activities for this area, and provide details of the survey to the State, QR and the Independent Verifier. The survey must specifically identify the existing horizontal and vertical clearances of the existing roads, ICB and NSBT bridge structures and adjacent rail infrastructure;
- (b) maintain horizontal and vertical clearances as agreed with QR within the Mayne Rail Yard, including those of the existing ICB and existing or proposed NSBT, during the Project Activities;
- (c) obtain written agreement from QR before construction activities commence for this area in accordance with the QR Access Protocol for Major Infrastructure Projects, (including submit section 255 applications under the Transport Infrastructure Act 1994 and obtain QR agreement for a licensed area);
- (d) not obstruct access to the Mayne Rail Yard via the QR access road at any time unless agreed otherwise with QR; and
- (e) at the completion of the D&C Activities, undertake a detailed survey of the QR access road, and any new and modified ICB, NSBT and Airport Link structures and provide the details of the survey to the State, QR and the Independent Verifier. The survey must allow for correlations and comparisons with pre-construction survey data.

### 3 SETTLEMENT AND MONITORING REQUIREMENTS

- (a) The requirements of this section 3 apply to the Project Activities undertaken in the vicinity of the following locations:
- (i) Mayne Rail yard;
  - (ii) Ferny Grove Rail line;
  - (iii) Main North Suburbs/Coast Rail line;
  - (iv) Toombul/Airtrain junction; and
  - (v) within 500m of any rail corridor for Project Activities which require blasting (refer section 3(b)(ii) below);
- (b) Without limiting the requirements of Annexure 7 Part 1 (Investigations, Survey and Condition Monitoring Requirements), PPP Co must:
- (i) provide a settlement monitoring procedure for review by QR prior to commencement of construction of any Project Works which may adversely affect QR infrastructure. The settlement monitoring procedure must include:
    - A at least eight (8) monitoring/survey points adjacent to, or under the rail corridor (four (4) on each side) of the Ferny Grove Line at its bridge crossing of Lutwyche Road. The number and location of the monitoring/survey points shall be nominated by QR;
    - B at least four (4) monitoring survey points adjacent to each of the outer tracks if an overpass is to be constructed where Campbell Street currently crosses the Exhibition Line;
    - C at least twenty-four (24) monitoring survey points adjacent to or under the rail corridor where the Main North Coast line at Toombul is intersected by Airport Link. The number and location of the monitoring/survey points shall be nominated by QR;
    - D nominated monitoring/survey points for any other QR infrastructure which may be affected by the Project Activities;
    - E identification by number and location of monitoring and survey points; and
    - F the format of the report required in paragraph (ii) below and reporting procedure, which is to be agreed with QR.
  - (ii) prior to any blasting within 500m of any rail corridor, provide mitigation proposals, arrange a vibration monitoring procedure and a reporting process acceptable to QR;
  - (iii) provide QR with a report that outlines the Predicted Effects, Acceptable Effects, and nominated trigger levels, of the Project Activities in accordance with section 5 of Annexure 7 Part 1 (Investigations, Survey and Condition Monitoring Requirements);
  - (iv) survey the monitoring points daily from the date of commencement of construction, or at a frequency as otherwise agreed with QR, until such time as QR has agreed that the actual effects have fully materialised. The monitoring points must then be surveyed at least every second day until the date that construction of the relevant works is completed. Survey of the monitoring points must then continue past this date every four (4) weeks, or

- a lesser period as may be required by QR, until the Date of Tollroad Completion;
- (v) monitor any other QR infrastructure which may be affected by the Project Activities at specific locations and at a frequency as agreed with, or otherwise advised by QR; and
  - (vi) forward monitoring and survey results to QR on each day surveys are undertaken.
- (c) If the settlement exceeds or, in QR's opinion, is likely to exceed the trigger levels, PPP Co must undertake additional monitoring, as required by QR, and undertake additional measures in accordance with section 5.1(f) of Annexure 7 Part 1 (Investigations, Survey and Condition Monitoring Requirements).



## 4 CONDITION OF RAIL INFRASTRUCTURE

### 4.1 DILAPIDATION SURVEY

- (a) Without limiting the requirements of section 3 of Annexure 7 Part 1 (Investigations, Survey and Condition Monitoring Requirements), PPP Co must, prior to commencement of construction of the relevant Project Works, obtain QR's prior approval of the scope of, undertake to the satisfaction of, and provide to QR, a comprehensive dilapidation investigation survey ('Pre-commencement Dilapidation Survey') and report in respect of the existing condition of QR infrastructure and any improvements on or in the vicinity of the Construction Site, including without limitation the 'Existing Improvements' defined in section 4.3 below.
- (b) PPP Co must:
- (i) in undertaking the D&C Activities take into account and comply with the recommendations arising from dilapidation investigations, surveys and reports referred to in section 4.1(a) above; and
  - (ii) whenever reasonably required by QR, undertake to the satisfaction of QR and provide to QR any further dilapidation investigation, survey and reports at PPP Co's own cost and expense for the purposes of monitoring the impact of the D&C Activities on the Construction Site, or any improvements on or in the vicinity of the Construction Site.
- (c) Prior to the Date for Tollroad Completion, PPP Co must:
- (i) undertake a further dilapidation investigation, survey and report in respect of QR infrastructure and any improvements on or in the vicinity of the Construction Site (including without limitation the Existing Improvements) to the scope of the Pre-commencement Dilapidation Survey; and
  - (ii) ensure that, to the extent required by QR, QR is present at all necessary inspections, tests or investigations and is provided with copies of all information collected or compiled in connection with any dilapidation investigation, survey or report.

### 4.2 CONDITION MONITORING

- (a) QR shall specify the Acceptable Effects, as defined in section 5.1(c) of Annexure 7 Part 1 (Investigations, Survey and Condition Monitoring), for specific items of its rail infrastructure prior to the Pre-commencement Dilapidation Survey. QR may choose to rectify any deviance of its specified rail infrastructure identified in the Pre-commencement Dilapidation Survey in excess of the Acceptable Effects, so that deviation is within QR's standards, prior to the commencement of the construction of the relevant Project Works.
- (b) Without limiting the requirements of section 5 of Annexure 7 Part 1 (Investigations, Survey and Condition Monitoring), PPP Co must undertake continuous monitoring, in the form and to the scope agreed by QR, of the specified rail infrastructure to compare the actual effects to both the Predicted Effects and the Acceptable Effects, and must report all measurements promptly to QR in the format agreed by QR.
- (c) Without limiting the requirements of section 5.1(f) of Annexure 7 Part 1 (Investigations, Survey and Condition Monitoring), PPP Co must not adjust the

manner in which the Project Activities are undertaken to ensure that the Acceptable Effects are not exceeded:

- (i) without QR agreement; or
  - (ii) subject to any other obligations or requirements of the State Project Documents.
- (d) Without limiting the requirements of section 5.1(h) of Annexure 7 Part 1 (Investigations, Survey and Condition Monitoring), where the Project Activities cause infrastructure damage, rectification shall be undertaken by QR at the time and in the manner of its own choosing at PPP Co's cost and expense.

#### 4.3 DEFINITION OF 'EXISTING IMPROVEMENTS'

'Existing Improvements' means the existing improvements situated on, about or in the vicinity of the Construction Site and includes any part of the Project Works including Returned Works (and for the avoidance of doubt includes all improvements situated on or about the whole of the Construction Site).

## 5 CAMPBELL STREET OVERBRIDGE REQUIREMENTS

### 5.1 CLEARANCE ENVELOPE

Notwithstanding the requirements of section 1.2(c), the minimum vertical clearance for an overbridge at Campbell Street above the maximum existing rail height must be 7.5m.

### 5.2 MODIFICATIONS TO OVERHEAD LINE EQUIPMENT

Due to a pre-existing level crossing at Campbell Street, overhead electrification equipment (OLE) in the vicinity (gantries, catenary, etc) is currently set at a height greater than that appropriate for conventional overpass clearances. If the Project Works will require QR to modify the OLE to accommodate any structures forming part of the Project Works over the railway lines at this location, and QR agrees to those modifications, PPP Co must:

- (a) provide QR a minimum 9 months notice of the date by which the relevant modifications by QR will be required to be completed; and
- (b) pay to QR all of QR's costs of the work which will be carried out by QR in carrying out and completing the relevant modifications.

### 5.3 BRIDGE SPANS

If the Project Works require an overbridge in this location, the overbridge must clear-span the entire width of QR property.



## 6 MAYNE RAIL YARD REQUIREMENTS

Where the Project Activities require the widening and/or any additional structure on the outside of the NSBT Lutwyche Rd to ICB connection ramp, and this widening extends into or over the QR Mayne Rail Yard, PPP Co must:

- (a) design and construct the widening in accordance with this Annexure 15;
- (b) maintain clearances to the existing tracks in accordance with QR's standard clearance requirements;
- (c) minimise encroachment into the QR Mayne Rail Yard during construction of any piers to minimise operational impacts on freight, passenger or stabling services;
- (d) minimise disruption to the QR access road and rail operations during construction; and
- (e) minimise the extent of any new sub-structure within the QR Mayne Rail Yard. Where new piers are proposed within the QR Mayne Rail Yard, these shall be located as agreed with QR.

## 7 TOOMBUL TUNNEL CROSSING REQUIREMENTS

### 7.1 GENERAL

- (a) Where the Project Activities impact on the QR rail corridor PPP Co must:
- (i) survey the existing rail infrastructure prior to commencement of the design activities for this area and provide details of the survey to the State, QR and the Independent Verifier. The survey must specifically identify the existing levels and clearances;
  - (ii) obtain written agreement from QR before construction activities commence for this area in accordance with the QR Access Protocol for Major Infrastructure Projects, (submit section 255 applications under the Transport Infrastructure Act 1994 and obtain QR agreement for a licensed area); and
  - (iii) at the completion of the D&C Activities undertake a detailed survey of the existing and any new or modified infrastructure and provide the details of the survey to QR and the Independent Verifier. The survey must allow for correlations and comparisons with pre-construction survey data.
- (b) PPP Co must make provision in the design and construction of the Project Works beneath the Toombul/Airtrain junction, for a future grade separation of the Airtrain tracks in a manner acceptable to QR.

### 7.2 TRACKSIDE SYSTEMS

- (a) If the Project requires modification by QR of the signalling, overhead wiring, communications cabling or other services to remove constraints within the existing infrastructure to enable freight, travel tilt trains and other special or out-of-gauge services to run on the suburban up and down lines, and QR agrees to those modifications, PPP Co must pay all costs of QR for those modifications.
- (b) PPP Co must provide QR a minimum 9 months notice of the date by which the relevant trackside system modification works are required to be completed by QR, such date being consistent with the agreed first date of isolation or closure.

### 7.3 TRACKWORK

Where the Project Activities require modification, removal or re-instatement of one or more tracks and ancillary equipment, PPP Co shall agree with QR the detailed works required and the party which shall carry out the works, at PPP Co's cost. These works shall include, but not be limited to:

- (a) removal the existing rail tracks, sleepers, ballast, overhead line equipment and other associated infrastructure to enable piling and / or other construction works to be undertaken;
- (b) reinstatement of the track to a condition acceptable to QR;
- (c) reinstatement of the overhead line equipment to a condition acceptable to QR;
- (d) reinstatement of table drains and side drainage along both sides of the tracks; and
- (e) reinstatement of signalling and other equipment to a condition acceptable to QR.

#### 7.4 MAIN CABLE ROUTES

Main cable routes exist on both the eastern and western side of the tracks in the vicinity of the Toombul/Airtrain junction. PPP Co must ensure all cables remain working and are protected and supported during any open excavation, piling or other construction works undertaken by PPP Co.

#### 7.5 DRAINAGE CULVERTS

Existing drainage culverts through the rail embankment will need to be demolished and reinstated/relocated during the construction works. PPP Co must provide provision for temporary and permanent drainage measures.



## ANNEXURE 16 – PART 1 BUSWAY CONDITION STANDARDS

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## 1 GENERAL

### 1.1 GENERAL

- (a) Without limiting the requirements of the State Project Documents (including clause 11 of the NB Works Deed), Busway Condition Standards are the standards and conditions of Assets (including Asset Items and Asset Sub Items) existing in respect of the Busway at NB Final Completion.
- (b) Busway Condition Standards must, as a minimum and in addition to PPP Co's other obligations under the State Project Documents (including the Performance Specification), be maintained by PPP Co throughout the NB Defects Liability Period. For the purposes of the NB Works Deed, failure to maintain or achieve a Busway Condition Standard during the NB Defects Liability Period shall be deemed to be a Defect.

### 1.2 MATTERS FOR BUSWAY INSPECTION REPORT AND BUSWAY ASSESSMENT REPORT

- (a) The State and/or the Independent Verifier may, in preparing a Busway Inspection Report or Busway Assessment Report, take into consideration, assess or review any one or more of the following:
  - (i) visible or other cracking in any structure;
  - (ii) visible or other defects of any surface, including painted surfaces, road markings and signage;
  - (iii) heat, vibration or distortion in bearings and bearing surfaces;
  - (iv) levels of illumination for all lighting;
  - (v) visible and measured deterioration of any asphaltic or concrete roadway wearing surface (including cracking, rutting, layer separation, skid resistance or abnormal abrasion);
  - (vi) accuracy of monitoring equipment;
  - (vii) the performance of control systems;
  - (viii) real time passenger information equipment and other ITS systems;
  - (ix) roadside furniture including road safety features such as fences and barriers;
  - (x) landscaping features, both hard and soft, including any loss of planting;
  - (xi) environmental impacts;
  - (xii) performance of waterproofing measures to structures (including tunnels) and buildings, including water ingress onto pavements, roof, wall or pavement structures;
  - (xiii) performance of all drainage systems including silt and interceptor traps and outfalls;
  - (xiv) performance of mechanical equipment (including ventilation fans, pumps, lifts and associated machinery) and electrical equipment (including transformers, switchboards, motors and motor control centres, cabling and lighting); and
  - (xv) performance of fire and life safety systems, including fire fighting equipment, telephones, signage, egress doors and escape passageways.

- (b) For the avoidance of doubt, the list of items described in section 1.2(a) above is not an exhaustive list of items. All parts of the Busway may be inspected and/or assessed to ensure compliance with the State Project Documents (including the Performance Specification).



## ANNEXURE 17 – PART 1 EWAG CONDITION STANDARDS

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## 1 GENERAL

### 1.1 GENERAL

- (a) Without limiting the requirements of the State Project Documents (including clause 16 of the EWAG Works Deed), EWAG Condition Standards are the standards and conditions of Assets (including Asset Items and Asset Sub Items) existing in respect of EWAG at EWAG Final Completion.
- (b) EWAG Condition Standards must, as a minimum and in addition to PPP Co's other obligations under the State Project Documents (including the Performance Specification), be maintained by PPP Co throughout the EWAG Defects Liability Period. For the purposes of the EWAG Works Deed, failure to maintain or achieve a EWAG Condition Standard during the EWAG Defects Liability Period shall be deemed to be a Defect.

### 1.2 MATTERS FOR EWAG INSPECTION REPORT AND EWAG ASSESSMENT REPORT

- (a) The State and/or the Independent Verifier may, in preparing an EWAG Inspection Report or EWAG Assessment Report, take into consideration, assess or review any one or more of the following:
  - (i) visible or other cracking in any structure;
  - (ii) visible or other defects of any surface, including painted surfaces, road markings and signage;
  - (iii) levels of illumination for all lighting;
  - (iv) visible and measured deterioration of any asphaltic or concrete roadway wearing surface (including cracking, rutting, layer separation, skid resistance or abnormal abrasion);
  - (v) the performance of control systems;
  - (vi) traffic management systems including CCTV and VMS;
  - (vii) roadside furniture including road safety features such as fences and barriers;
  - (viii) landscaping features, both hard and soft, including any loss of planting;
  - (ix) environmental impacts including significant impacts on matters of national environmental significance, and environmental impacts on Commonwealth land, including but not limited to soil erosion and sedimentation, water quality and vegetation loss or die-back;
  - (x) performance of waterproofing measures to structures;
  - (xi) performance of all drainage systems including silt and interceptor traps and outfalls; and
  - (xii) performance of electrical equipment (including transformers, switchboards, cabling and lighting).
- (b) For the avoidance of doubt, the list of items described in section 1.2(a) is not an exhaustive list of items. All parts of EWAG may be inspected and/or assessed to ensure compliance with the State Project Documents (including the Performance Specification).