

Annexure M

Amended and restated Exhibit K to the M2 Motorway Project Deed - Scope of Works and Technical Criteria

M2 Motorway

EXHIBITS TO PROJECT DEED

Exhibit K Scope of Works and Technical Criteria

This is Exhibit K to the M2 Motorway Project Deed between the Roads and Traffic Authority of New South Wales, The Honourable Bruce G Baird MP, Minister for Transport and Minister for Roads for and on behalf of Her Majesty Queen Elizabeth the Second in right of the State of New South Wales, The Hills Motorway Limited and Hills Motorway Management Limited as trustee of the Hills Motorway Trust.

23/10/2010

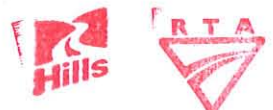


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SCOPE OF WORKS & TECHNICAL CRITERIA

1. SCOPE OF WORKS

1.1 General

1.1.1 Scope

The scope of works is to design, construct, operate and maintain:

(a) the North West Transport Link (the M2 Motorway):

- i. as described in paragraph 3.1 of Part 8 of the Environmental Impact Assessment Report In Relation To Proposal For A North West Transport Link dated 19 May 1993;
- ii. as identified as the preferred option in the North West Transport Links East Environmental Impact Statement dated April 1992 and the preferred option in the Environmental Impact Statement North West Transport Link Pennant Hills Road to Old Windsor Road dated 1992; and
- iii. subject to the modifications set out in paragraphs 4 to 17 of Part 8 of the Environmental Impact Assessment Reports In Relation to Proposal For A North West Transport Link dated 19 May 1993,

and otherwise in accordance with the determination dated 20 May 1993 by Bernard Fisk, Chief Executive, Roads and Traffic Authority of New South Wales under Part V, Environmental Planning and Assessment Act 1979 in relation to the proposal for a North West Transport Link and the confirmation of that determination by Maxwell William Moore-Wilton, Chief Executive, Roads and Traffic Authority of New South Wales dated 2 August 1994; and

(b) the additional elements designed and constructed as part of the M2 Upgrade Project in accordance with the agreement dated October 2010. (the M2 Upgrade)

The scope of the M2 Upgrade is:

- i. Eastbound Widening (Windsor Road to Lane Cove Road);
- ii. Westbound Widening (Lane Cove Road to Pennant Hills Road);
- iii. Windsor Road West Facing Ramps;
- iv. Christie Road/Herring Road East Facing Ramps; and
- v. Operations Management Control System (OMCS) : the upgraded M2 Motorway systems, including traffic management and control systems, plant management and control systems, motorway network communication systems and related infrastructure and devices..
- vi. Removal of Beecroft Road bus ramps

1.1.2 M2 Motorway

The M2 Motorway including the M2 Upgrade generally includes:

- (a) approximately 20km of expressway, comprising 2 carriageways each of 2 or 3 lanes from Epping Road, North Ryde to Old Windsor Road, West Baulkham Hills as detailed in the table below:

	Number of lanes
EASTBOUND	
Old Windsor Road (Ch 0) to Windsor Road east facing On Ramp (Ch 4350)	2
East facing On Ramp Windsor Road (Ch 4350) to west facing Off Ramp Pennant Hills Road (Ch 7800)	3
Pennant Hills Road Intersection (Ch 7800 to Ch 9600)	2
East facing On Ramp Pennant Hills Road (Ch 9600) to Lane Cove Road Off Ramp (Ch 17100)	3
Lane Cove Road Off Ramp (Ch 17100) to End of M2 (Ch 20240)	2
WESTBOUND	
Old Windsor Road (Ch 0) to Pennant Hills Road east facing Off Ramp (Ch 9600)	2
East facing Off Ramp Pennant Hills Road (Ch 9600) to Lane Cove Road Loop On Ramp (Ch 17600)	3
Lane Cove Road Loop On Ramp (Ch 17600) to End of M2 (Ch 20240)	2

- (b) a 2 way, 2 lane busway between Murray Farm Road bridge, Epping and Windsor Road, Baulkham Hills between the eastbound and westbound expressway carriageways and provision for future busway between Windsor Road, Baulkham Hills and Langdon Road, Winston Hills;
- (c) included in table in clause 1.1.2 (a) is an eastbound Transit Lane from east of Terrys Creek (Ch 14000) to Lane Cove Road Off Ramp (Ch 17100);
- (d) the first stage of a bus rail interchange at Epping including re-allocation of kerbside parking and an underpass for buses under the main Northern Railway Line as required by the Environmental Impact Determination (1993); and
- (e) interchanges and connections to arterial roads and crossings of the M2 Motorway for motorists and pedestrians.

The obligations which the RTA must perform in respect of the Environmental Impact Determination (1993) which are referred to in clauses 5.1(a) of the M2 Motorway Project Deed are set out in schedule 1 of the Scope of Works and Technical Criteria.

1.2 Principal items of the M2 Motorway

The principal items of permanent work covered by these criteria include the design and construction of the following:

(a) Bridgeworks

Bridgeworks which include all applicable fencing, lighting, drainage, noise barriers, retaining walls, pedestrian access, M2 Motorway bus stop access, fauna access, landscaping, restoration, structures, pavement, linemarking and all additional related work required for the operation of the M2 Motorway:

- (i) On the M2 Motorway, twin bridges over Toongabbie Creek.
- (ii) Over the M2 Motorway on Langdon Road. The scope of works extends to the limits required to join with Gibbon Road to the south

and with the existing road to the north. Pavement width to provide 2 x 4.5 m lanes.

- (iii) Over the M2 Motorway on Cropley Drive. The scope of works extends to the limits required to join with the existing road to the north and to join the Junction Road roundabout to the south. The design of Cropley Drive must cater for through vehicles to pass stationary vehicles at bus stops, the location of which is to be agreed with the relevant Authorities. Pavement width to provide 2 x 4.5 m lanes.
- (iv) Over the M2 Motorway on Watkins Road. The scope of works extends to the limits required to join with the existing road to the north and to join with Junction Road to the south. Pavement width to provide 2 x 4.5 m lanes.
- (v) Over the M2 Motorway on Windsor Road. The scope of works extends to the limits required to join with existing road.
- (vi) On the M2 Motorway, bridge over Darling Mills Creek
- (vii) Over the M2 Motorway on Barclay Road. The scope of works extends to the limits required to join with the existing roads. Pavement width to match existing pavement.
- (viii) On the M2 Motorway, bridge over Darling Mills Creek's tributary adjacent to Yale Close
- (ix) Over the M2 Motorway on Oakes Road. The scope of works extends to the limits required to join with the existing roads. Pavement width to match existing pavement.
- (x) Over the M2 Motorway on Pennant Hills Road. The scope of works for the Pennant Hills Road interchange must integrate with the current RTA upgrading design for Pennant Hills Road.
- (xi) On the M2 Motorway, bridge over Devlins Creek .
- (xii) On the M2 Motorway on Murray Farm Road. The scope of works extends to the limits required to join with the existing roads. Width to provide for single land each direction with curve widening as required.
- (xiii) Over the M2 Motorway on Beecroft Road. The scope of work extends to the limits required to join with the existing road to the north and to the south.
- (xiv) On Main Northern Railway Line over Bus Access Road. The scope of works is as required to construct the bus underpass as shown in drawing no. BR S017.
- (xv) On Main Northern Railway Line over the M2 Motorway.
- (xvi) On the M2 Motorway, bridge over Terry's Creek.
- (xvii) Over the M2 Motorway on Culloden Road. The scope of works extends to join with Busaco Road to the north west. Pavement width to provide 2 x 4.5 m lanes.

- (xviii) Over the M2 Motorway on Christie Road (formerly Balaclava Road). The scope of works extends as required to satisfy the detailed design of the interchange
- (xix) On the M2 Motorway over Khartoum Road.
- (xx) Over the M2 Motorway on Lane Cove Road. The scope of works extends as required to satisfy the detailed design of the interchange.
- (xxi) On the M2 Motorway, bridge over Wicks Road.
- (xxii) Over the M2 Motorway on Delhi Road. The scope of works extends as required to satisfy the detailed design of the junction.
- (xxiii) Over the M2 Motorway on Epping Road. The scope of works extends as required to satisfy the detailed design of the junction. The design must take into account the length of the structure and apply the necessary codes and standards to ensure safety of the public.

(b) Pedestrian access and emergency vehicle access

Additional access as required by the Environmental Impact Determination (1993) and as generally described below or as otherwise agreed with the relevant Authorities.

- (i) Pedestrian footway (grass) along east side of Old Windsor Road to the full extent of the works.
- (ii) Pedestrian access on both sides along Toongabbie Creek under bridge.
- (iii) Pedestrian footway on both sides of Langdon Road Bridge and approaches.
- (iv) Pedestrian overbridge and approaches between shopping centre and Gooden Drive at Winston Hills.
- (v) Pedestrian overbridge and approaches between Ixion Street and Leatherwood Circuit at Winston Hills.
- (vi) Pedestrian footway on each side of Cropley Road Bridge and approaches.
- (vii) Pedestrian footway on each side of Watkins Road Bridge and approaches.
- (viii) Pedestrian footway along each side of Windsor Road to the full extent of the works.
- (ix) Pedestrian footway between Linton Street and Canyon Road and Canyon Road and Windsor Road adjacent to the eastbound entry ramp from Windsor Road to the M2 Motorway.
- (x) Signalised pedestrian crossing of Windsor Road at the intersection of Oakland Avenue and Windsor Road.
- (xi) Bus turning facilities in the area east of Windsor Road affected by closures.

- (xii) Pedestrian access must be maintained throughout the Darling Mills State Forest to the existing standard.
- (xiii) Pedestrian footway on each side of Barclay Road Bridge and approaches.
- (xiv) Pedestrian access under the proposed bridge adjacent to Yale Close (to provide access between Yale Close and Westmore Drive) and under the arch east of Deaf and Blind School.
- (xv) Emergency service vehicle access to local bushland, in particular the Darling Mills Creek area.
- (xvi) Pedestrian footway on each side of Oakes Road Bridge and approaches to the limit of the works on the west side.
- (xvii) Pedestrian footway on the west side of Pennant Hills Road and partially on the eastern side, all within the limits of the works.
- (xviii) Pedestrian access under the twin bridges over Devlins Creek east of Orchard Road.
- (xix) Pedestrian and fauna access under Devlins Creek arch culvert west of Murray Farm Road.
- (xx) Pedestrian footway on each side of Murray Farm Road Bridge and approaches.
- (xxi) Pedestrian and fauna access under Devlins Creek culvert east of Murray Farm Road.
- (xxii) Pedestrian overbridge and approaches between Kent Street and Cheltenham Road.
- (xxiii) Pedestrian and fauna access under Devlins Creek arch culvert west of Beecroft Road.
- (xxiv) Pedestrian footways on each side of Beecroft Road overbridge
- (xxv) Emergency vehicle access and pedestrian access between Sutherland Road and Derby Street.
- (xxvi) Pedestrian footway from Somerset Street to Constance Place as part of the road construction.
- (xxvii) Pedestrian access under Terry's Creek Bridge.
- (xxviii) Pedestrian underpass and approaches at Busaco Road.
- (xxix) Pedestrian footway on one side of Culloden Road Bridge and its approaches.
- (xxx) Pedestrian footway on Christie Road (formerly Balaclava Road) Bridge and its approaches
- (xxxi) Maintain pedestrian footway on each side of Khartoum Road and its approaches.

- (xxxii) Pedestrian footway on each side of Lane Cove Road to the limits of the works.
- (xxxiii) Maintain pedestrian footway on each side of Wicks Road and its approaches.
- (xxxiv) Pedestrian footway on south side of Delhi Road to the limits of the works.
- (xxxv) Pedestrian footway on each side of Epping Road to the limits of the works.
- (xxxvi) Emergency vehicle access and turning facilities in accordance with the relevant Authorities' reasonable recommendations.

(c) Roadworks

The requirements generally set out below include all applicable fencing, noise barriers, drainage, subsoil drainage, erosion and sediment control, flood control, earthworks, retaining walls, pavement, landscaping, pavement marking and all additional related work required for the operation of the M2 Motorway. The roadworks must be designed and constructed to the reasonable requirements of the RTA and all relevant Authorities.

(i) Earthworks

Earthworks complete to allow for dual east and westbound carriageways each constructed for two or three lanes as detailed in clause 1.1.2 (a) and breakdown bicycle lane. Earthworks complete to allow for busway constructed in two way configuration between Murray Farm Road bridge, and Langdon Road, Winston Hills.

The requirements generally include all applicable temporary works, removal of vegetation, removal of topsoil, preparation and treatment of foundations, excavation of cuttings, haulage of material, construction of embankments, trimming, compaction, processing, removal and replacement of unsuitable materials, stockpiling, spoil, offsite disposal, borrow, import, reinstatement, stockpile treatments and any additional processing of selected materials.

(ii) Stormwater drainage pipework and culverts

Pipework and culverts must form part of a complete system for carrying water through and away from the M2 Motorway and where required, must incorporate fauna, pedestrian and emergency vehicle access.

The requirements generally include siting, excavation, installation, backfill, compaction, concrete, reinforcement, scour protection, silt protection and metalwork for drainage structures.

(iii) Old Windsor Road to Beecroft Road

East and westbound carriageways each constructed for two or three lanes as detailed in clause 1.1.2 (a) and breakdown bicycle lanes.

Busway constructed in two way, two lane configuration between Murray Farm Road bridge, Epping and Windsor Road, Baulkham Hills and provision for future busway between Windsor Road, Baulkham Hills and Langdon Road, Winston Hills.

As contemplated by clause 6.2 of the M2 Motorway Project Deed, which allows a change to the Scope of Works and Technical Criteria by written agreement, the busway may be converted to a light rail or other transport mode in accordance with the requirements of that clause.

(iv) Beecroft Road to Epping Road

East and westbound carriageways each constructed for two or three lanes as detailed in clause 1.1.2 (a) and breakdown bicycle lanes.

(v) At grade intersection with Old Windsor Road

The limits of works extend approximately 170 m north and 120 m south from the intersection and the line of the rear of the west kerb on Old Windsor Road. The roadworks include any adjustments required to local roads intersecting with Old Windsor Road as a consequence of the M2 Motorway within the limits of the works.

(vi) Grade separated interchange with Windsor Road

The roadworks extend to the limits required to safely join the existing roads north and south of the M2 Motorway. The roadworks include adjustments required to local roads intersecting with Windsor Road as a consequence of the M2 Motorway within the limits of the works.

The works include construction of traffic ramps facing east and west and dedicated busway ramps facing east and provision for dedicated busway ramps facing west.

(vii) Full grade separated interchange with Pennant Hills Road

The roadworks extend to the limits required to join with the new works to the north and south of the M2 Motorway as shown in drawing no. TA C006.

The work includes construction of dedicated busway ramps facing east and provision for dedicated busway ramps facing west.

Work on Pennant Hills Road beyond the limits shown in drawing no. TA C006 will be designed and constructed by the RTA.

Design of the M2 Motorway at the Pennant Hills Road interchange must be completed before the RTA can design and document the work it is required to do on Pennant Hills Road. Design and construction of this section of the M2 Motorway must be progressed to allow the RTA to integrate the design and construction work on Pennant Hills Road within the time limits associated with the various requirements of the Project.

All services adjustments and provisions for traffic required for the construction of the Pennant Hills Road interchange must be coordinated with the work by the RTA on Pennant Hills Road.

(viii) Partial grade separated interchange including east facing ramps with Beecroft Road

The roadworks extend to the limits required to join with the existing road to the north and to the south. The roadworks include any adjustments required to local roads intersecting with Beecroft Road within the limits of the works.

(ix) Interchange with Christie Road (formerly Balaclava Road) and Herring Road (west facing ramps only)

The roadworks include the reconstruction of Christie Road (formerly Balaclava Road) and Herring Road and adjustments required to Talavera Road at the intersections with the above roads

(x) Interchange with Christie Road (formerly Balaclava Road) and Herring Road (east facing ramps only)

The M2 Upgrade includes adjustments to Talavera Road and at the intersections of Talavera Road with Christie Road and Herring Road.

(xi) Partial grade separated interchange with Lane Cove Road (west facing ramps and loop ramp only)

The roadworks extend generally to Talavera Road to the south and Fontenoy Road to the north. The roadworks include adjustments required to local roads intersecting with Lane Cove Road within the limits of the works.

(xii) Partial grade separated interchange with Delhi Road (west facing ramps only)

The roadworks include the required adjustments to the intersection with Delhi Road within the limits of the works.

(xiii) Partial grade separated merge and interchange with Epping Road and Pittwater Road respectively

The roadworks include the required adjustments to the intersection with Epping Road and Pittwater Road.

(d) Tunnels

Design and construction of Norfolk Road twin tunnels, with associated shoulders suitable for use as cycleways, generally in accordance with the geometrical parameters as required by the Environmental Impact Determination (1993) and as shown in drawing no. TU C001 and modified as per drawing M2U-CS-002.

The tunnels must include ventilation, operational and emergency systems, automatic controls and monitoring, drainage systems, lighting, surveillance and communication systems, traffic control systems, fire detection and prevention systems (including fire sprinkler systems in accordance with the Fire Brigade's recommendations) and electrical systems including emergency power.

(e) Buildings

- (i) Administration control building, toll booths and maintenance depot including access, carparking, security, fencing, lighting and landscaping at Macquarie Park.
- (ii) Toll booths on the westbound onload ramp and eastbound off load ramp west of Pennant Hills Road intersection and associated facilities.
- (iii) Bus shelters at bus stops on the M2 Motorway.

- (iv) Technical shelters at toll points.

(f) Local roads

The requirements generally set out below include all applicable fencing, noise barriers, drainage, subsoil drainage, erosion and sediment control, flood control, earthworks, retaining walls, pavement, landscaping, pavement marking and all additional related work required for the operation of the M2 Motorway. Local bridges and local roads must be designed and constructed to the reasonable requirements of relevant Authorities.

The RTA is responsible for all work required in relation to approvals, design and construction of local roads and must bear the cost of that work.

(i) Leatherwood Court

Adjustments as required to maintain access.

(ii) Vincent Street

Road closure and cul-de-sac north of the M2 Motorway and reconstruction of Junction Road south of the M2 Motorway to delete intersection.

(iii) Horwood Avenue

Road closure and property access north of the M2 Motorway and reconstruction of Junction Road south of the M2 Motorway to delete intersection.

(iv) Junction Road

Road closure and cul-de-sac Junction Road west of Windsor Road and adjustments as required to maintain access from Watkins Road to the cul-de-sac.

(v) Canyon Road

Road closure and cul-de-sac north of the M2 Motorway.

(vi) Linton Street

Road closure and cul-de-sac north of the M2 Motorway.

(vii) Linton Street to Petrina Crescent and to Scout Hall

New access road from Linton Street to Petrina Crescent, adjustments to Petrina Crescent and access to Scout Hall north of the M2 Motorway.

(viii) Russell Street

Road closure and cul-de-sac south of the M2 Motorway.

(ix) Carlton Road

Road closure and cul-de-sac south of the M2 Motorway.

(x) Carmen Drive

Adjustments as required to Carmen Drive to maintain access to houses south of the M2 Motorway.

(xi) Kerribee Place

Close road north of Coral Tree Drive and reconstruct Coral Tree Drive to delete portion of intersection south of the M2 Motorway.

(xii) Glenwood Street

Road closure and reconstruct Lamorna Avenue to delete intersection south of the M2 Motorway.

(xiii) Orchard Road

Road closure and reconstruct Lamorna Avenue/Orchard Road intersection south of the M2 Motorway.

(xiv) Ferndale Road

Road closure and cul-de-sac south of the M2 Motorway.

(xv) Castle Howard Road

Adjustments as required north of the M2 Motorway.

(xvi) Kent Street

Adjustments of cul-de-sac as required south of the M2 Motorway.

(xvii) Barombah Road

Road closure east of Dunmore Road and Dunmore Road/Barombah Road intersection south of the M2 Motorway.

(xviii) Old Beecroft Road

Road closure and cul-de-sac north of the M2 Motorway and house access to houses previously accessed from Beecroft Road.

(xix) Sutherland Road

Road closure and cul-de-sac north of the M2 Motorway. Provide for pedestrian and emergency vehicle access.

(xx) Derby Street

Road closure north of Somerset Street. Reinstate connection of Derby Street and Somerset Street south of the M2 Motorway.

(xxi) Constance Close

Road closure north of Somerset Street and construction of new road over tunnel portal and connect to Constance Close. Adjust Somerset Street for closure of original Constance Close intersection south of the M2 Motorway. Adjust Constant Close to join new access north of the M2 Motorway.

(xxii) Somerset Street

Relocate and reconstruct Somerset Street as required near Gloucester Road.

(xxiii) Vimiera Road

Road closure and cul-de-sac south of the M2 Motorway.

(xxiv) Talavera Road west

Road closure and cul-de-sac of Talavera Road at Busaco Road junction south of the M2 Motorway.

(xxv) Busaco Road

Road closure of Busaco Road and new road connection from Culloden Road to Busaco Road north of the M2 Motorway.

(xxvi) Alma Road

Road closure and cul-de-sac south of the M2 Motorway or agreed alternative for property access.

(xxvii) Pittwater Road north of the M2 Motorway

Road closure and cul-de-sac north of the M2 Motorway.

(xxviii) Pittwater Road north of Wicks Road

Road closure, cul-de-sac and adjustments as required north of Wicks Road.

(xxix) Pittwater Road south of Wicks Road

Maintain road closure of Pittwater Road south of Wicks Road and adjustment south kerb Wicks Road south west of the M2 Motorway.

(g) Property Adjustments

Access to property must be maintained including:

- (i) adjustments required to property adjacent to existing roads and which are materially affected by the M2 Motorway; and
- (ii) adjustments required to property adjacent or in the vicinity of the works which are affected by the M2 Motorway.

(h) Emergency telephones

An emergency telephone system compatible with and of a standard equivalent to that on other RTA urban freeways must be provided at suitable locations along both sides of the M2 Motorway at approximate intervals of 1.0 km.

(i) Street and general lighting

Lighting must be provided at all on and off ramps; on the cross street overbridges and underpasses; at bus stops and at pedestrian underpasses, overbridges and footways; all to the reasonable requirements of the RTA.

Lighting at the toll plaza collection area must be provided. The approaches to the toll plaza must be illuminated to provide a light gradient for motorists. All lighting must be designed to ensure minimal disturbance to adjacent residential areas.

Throughout construction, lighting must be provided and maintained at all locations reasonably required for safe use by pedestrians and vehicles.

(j) Fire mains

If recommended by the Fire Brigade, fire hydrant risers must be provided on the M2 Motorway at the following locations:

- (i) Langdon Road;
- (ii) Cropley Road;
- (iii) Barclay Road; and
- (iv) Oakes Road.

The fire hydrant risers must be supplied and installed to the approval of the Fire Brigade. The location of each fire hydrant riser must be able to allow a fire appliance to safely park and load water.

If the fire hydrant risers are provided, it will be considered as a change to the Scope of Works and Technical Criteria as contemplated under clause 6.2 of the M2 Motorway Project Deed. The agreed cost of that change is four hundred thousand dollars (\$400,000).

Fire mains hydrant risers have been considered. NSWFB advised they were not required.

(k) Service adjustments

- (v) Liaise with all relevant Services authorities for the protection and relocation of any Services required as a result of the construction of the M2 Motorway and the M2 Upgrade
- (vi) Services affected by the construction of the M2 Motorway and the M2 Upgrade must be adjusted as required by the respective Services authorities.
- (vii) Services transmissions may not be located along the M2 Motorway without the written approval of the RTA.

(l) Traffic signals

Traffic signals must be provided at the intersection of the on and off ramps with:

- (i) Old Windsor Road;
- (ii) Windsor Road;
- (iii) Pennant Hills Road;
- (iv) Beecroft Road;
- (v) Lane Cove Road;
- (vi) Christie Road; and

- (vii) Delhi Road.

Traffic signals must be provided at Christie Road junction with Talavera Road.

(m) Traffic surveillance and communications system

A traffic surveillance and communications system must be provided to allow for monitoring of clearly defined critical sections of the M2 Motorway and all interchanges and tunnels during the Term to ensure the ability to comply with clause 5.4(d). Provisions must be made to relay video and other traffic monitoring information to the RTA Traffic Management Centre.

(n) Toll plazas

Toll plazas must have operational characteristics comparable with other toll plazas in Sydney and provide:

- (i) manual toll collection;
- (ii) automatic toll collection; and
- (iii) electronic toll collection;

unless the RTA otherwise approves and such approval not to be unreasonably withheld. The new toll plazas associated with the M2 Upgrade works, including the west facing Windsor Road ramps, Christie Road on ramp and Herring Road off ramp, must comply with (iii) only.

(o) Improvements to Epping bus rail interchange

Stage 1 improvements to the Epping Station area must be made and include:

- (i) set down for buses in Beecroft Road at the foot of the existing ramp to the station allowing buses to operate in a logical flow by setting down and then proceeding to pick-up zones in Langston Place;
- (ii) kerb space in Langston Place to provide pick-up zones for express buses and alternative site for taxis, either in Pembroke Street or Langston Place;
- (iii) ensuring that public and private buses are able to operate to the east as at present; and
- (iv) a connecting road system including the rail underpass from the interchange to the M2 Motorway, signalised intersections with Beecroft Road and adjustments to Beecroft Road and Epping Road.

(p) Bus stops and pedestrian access

Bus stops as shown on drawing no. BS C001, shelters and pedestrian access, including lighting, must be provided at the following locations:

- (i) pedestrian overpass near Gooden Reserve; and
- (ii) near Cropley Drive Overbridge.

Bus stops as shown on drawing nos. TA C004 and TA C005, shelters and pedestrian access, including lighting, must be provided:

- (i) near Barclay Road Overbridge; and
- (ii) near Oakes Road Overbridge.

Provision must be made for future central bus stops and future access to central bus stops near Gooden Reserve and near Cropley Drive.

(q) Access for pedestrian and vehicles

Adequate and safe access for vehicle and pedestrian traffic must be provided at all times during the construction and maintenance of the M2 Motorway and the M2 Upgrade unless agreed with the RTA.

Throughout construction of the M2 Motorway and the M2 Upgrade, pedestrian, emergency vehicle and vehicle access must be maintained at all locations where access is to be provided by the completed works. Access must be maintained for residents to properties and vehicle access can be only temporarily prevented after liaison with the resident and the provision of reasonable notice unless agreed with the RTA.

Provision must be made for traffic to continue to use Junction Road, Murray Farm Road and Sutherland Road during the construction of the M2 Motorway and the M2 Upgrade unless otherwise agreed with the relevant Authorities.

(r) Median barrier

Median barriers to limit the possibilities of head-on collisions must be provided for the full length of the M2 Motorway and approved by the RTA. Emergency vehicle cross-overs must be provided at no greater than 2 km intervals.

(s) Signposting

Signposting must be provided on the M2 Motorway and as required at and in the approaches to all interchanges including:

- (i) advance direction signs;
- (ii) direction signs;
- (iii) regulatory signs; and
- (iv) advisory signs.

Remotely-controlled variable message signposting must be provided to inform motorists of emergency situations, traffic conditions and other information.

(t) Noise mitigation structures

Noise mitigation structures must be provided in accordance with the Environmental Impact Determination (1993) to control noise from the M2 Motorway and the interchanges.

Where final design development leads to significant vertical or horizontal alignment changes, appropriate amendments must be made to details of noise

mitigation and related structures consistent with the objectives of the Environmental Impact Determination (1993).

(u) Not Used

(v) Traffic diversion and control

- (i) Arrangements must be made to modify traffic flow, and divert and control traffic during the construction of the M2 Motorway, including temporary traffic signals if required.
- (ii) Sufficient notice in writing of:
 - (A) details of any proposed arrangement; and
 - (B) any interference with traffic flow under those arrangements,
 must be given to the RTA for review and approval of those arrangements.
- (iii) The public must be given sufficient notice of those arrangements referred to in clauses 1.2(v) (i) and (ii).

(x) Open drains, channels, drainage basins and related watercourses

Open drains, channels, drainage basins and related watercourses constructed or altered as part of the Project or M2 Upgrade must in conjunction with pipework and culverts form a complete system for carrying water through and away from the M2 Motorway and must comply with the reasonable requirements of the Authorities. The drains, channels, drainage basins and related watercourses must be constructed to satisfy their design capacity at all times and must provide for the control of vegetation, the retention and removal of silt, erosion and scour protection and the retention of floodwater. Relevant provisions of the Clean Waters Act 1970 apply for all discharge.

(y) Security fencing

The M2 Motorway including the M2 Upgrade, Land, Licensed Areas and Ancillary Works must be secured as necessary by a fence or other means to ensure public safety and prevent access by trespassers to the satisfaction of the RTA.

(z) OMCS

Operation and Management Control Systems must be provided including upgraded M2 Motorway systems, including traffic management and control systems, plant management and control systems, motorway network communication systems and related infrastructure and devices.

2. TECHNICAL CRITERIA

2.1 Compliance

These technical criteria, where applicable, must be used in carrying out the design of the M2 Motorway. Technical criteria for the design of the M2 Upgrade works are

included in the M2 Upgrade Project Scope of Works and Technical Criteria dated October 2010 (the M2 Upgrade SWTC).

2.2 Classification

The M2 Motorway is classified as a freeway as defined in AS1348.1-1986.

2.3 The M2 Motorway's design parameters

(a) Vertical clearance

A minimum height clearance of 5.30 m must be provided for the full carriageway width for tunnels, under all bridges over the M2 Motorway and bridges which carry the M2 Motorway over local roads.

(b) Carriageway cross section

The cross section of the M2 Motorway must be generally as indicated below:

- (i) traffic lane widths of 3.5 m;
- (ii) bus lane widths of 3.5 m; and
- (iii) breakdown/bicycle lane widths of 2.5 m.

A minimum clearance of 500 mm is required between the edge of any traffic or bus lane and the face of a barrier kerb.

Typical cross sections are shown on drawing nos. SS C001 to SS C003 and M2U-CS-001 to M2U-CS-002 inclusive.

(c) Design speed

The minimum design speed is 100 km/hr.

(d) Vertical alignment

Maximum grade on tollroad of $\pm 6\%$.

Maximum grade of $\pm 8\%$ on the M2 Motorway ramps in accordance with Table 7.3.3 of Grade Separated Interchange Design Guide, NAASRA 1984 unless otherwise approved by the RTA.

Maximum grade of $\pm 3\%$ in the approach to the toll plazas.

Climbing lanes for trucks must be included where necessary to comply with the RTA Road Design Guide (August 1988).

Longitudinal sections as shown on drawing nos. LS C001 to LS C017 inclusive.

(e) Horizontal alignment

Horizontal radii must be 600 m minimum. This requirement must be met despite a lesser criterion required by the Environmental Impact Determination (1993).

Horizontal alignment as shown on drawing nos. TA C001 to TA C013 inclusive and drawing no. TA C003A.

(f) Noise mitigation structures

Noise mitigation structures must comply with the Environmental Impact Determination (1993).

Open grade asphaltic concrete must be laid on the pavement surface of the M2 Motorway and ramps unless the RTA otherwise approves.

(g) Design life

The minimum design life of the M2 Motorway must be:

- (i) for bridge and stormwater drainage structures, 100 years;
- (ii) for major mechanical and electrical items as per table below

Asset Element	Asset Type	Asset Sub-Item	Design Life (yrs)
M & E equipment (20 yrs)	In tunnel air monitoring instruments		12
	Ambient air monitoring equipment		12
	Axial fans	Bearings	4
		Vibration monitors	10
	Jet fan	Bearings	4
	Tunnel lighting	Fluoro tubes	0.9
		HPS lamps	3
	Exit / strobe signs	Lamps	4
	Illuminated exit signs	Batteries	7
	Directional exit signs	Batteries	7
	Directional exit signs	Lamps/Assembly	12
	UPS	Batteries	7
	Fire hose reels	Hoses	10
	Fire extinguishers		6
	Electric fire pumps		9
	Fire phones	PABX	12
	Fire doors	Paint finish	10
	HV & LV switchboards	Protection relays	10
	Motor control centres	Contactors, relays and indicator lamps	10
	Tunnel lighting controllers	Contactors, relays and photosensors	10
	Pumps	Motor	10
	Computerised Maintenance Management System	Update System (Transurban system)	12
Operations management and	Central computer systems	Hardware and operating system	7

Asset Element	Asset Type	Asset Sub-Item	Design Life (yrs)
control systems (OMCS) (10 yrs) and Electronic tolling systems			
		Application software	10
	Roadside computer systems	Industrial processor and peripherals	10
	VMS	Controller	10
	VMS	LED pixels	10
	CCTV	Cameras	10
	CCTV	Video recorders	6
	Control room	Video wall	10
	Control room	Monitors	6
	Over height detector (not required on this project)	Transceiver	10
	Portal barriers	Boom gates	10
	METS	PABX	10
	Incident response team communications	Portable radios	10
	Radio rebroadcast system	Active components such as transmitters, repeaters, etc	10
	UPS	Batteries	7

(iii) for pavements, a total of 45 years; and

(iv) for the road surface, 10 years.

(h) Compatibility with the existing road system

The following facilities must be designed to make the operation and maintenance of the M2 Motorway compatible with other motorways and freeways in the Sydney metropolitan area:

- (i) signposting;
- (ii) linemarking;
- (iii) traffic controls and lane signing;
- (iv) maintenance, sweeping and cleaning spillages;
- (v) breakdown services;
- (vi) emergency telephones;
- (vii) toll plazas and toll booths; and

- (viii) toll equipment and methods of toll collection.

2.4 Local road design parameters

(a) Vertical clearance

All roads must have minimum height clearances of 5.30 m.

(b) Vertical alignment

Maximum grade of 8% unless otherwise agreed in writing by the RTA.

(c) Design speed

- (i) A design speed of 80 km/hr must be adopted for:
- (A) Old Windsor Road;
 - (B) Pennant Hills Road;
 - (C) Beecroft Road;
 - (D) Lane Cove Road; and
 - (E) Epping Road.
- (ii) A design speed of 60 km/hr must be adopted for all other roads.

2.5 Standards

(a) General

Except as otherwise specified, the design construction, operation and maintenance of the M2 Motorway and the M2 Upgrade and the design and construction of all associated works must comply with the relevant Australian Standards.

All roadworks and structures design must conform to the relevant RTA publications (MR Form Series) and AUSTRROADS (and NAASRA Guides), as compiled in, and referred to in, Road Design Reference Documents (RTA 1989) for the initial construction of the M2 Motorway and the M2 Upgrade SWTC for the M2 Upgrade unless otherwise noted in these criteria.

The following additional requirements also apply:

- (i) tunnels must be designed in accordance with Permanent International Association of Road Congresses 1991 and meet all Authorities' requirements;
- (ii) construction must be in accordance with Hills Motorway Standard Specifications which must reflect the technical components of the RTA standard specifications. Where no Hills Motorway specification or RTA standard specification exists, then construction must be in accordance with accepted industry practice;
- (iii) design and construction must conform to quality assurance in accordance with AS2990-1987 or the AS3900 series;

- (iv) maintenance must be carried out in accordance with accepted RTA practice; and
- (v) RTA safety audit recommendations during the design, construction and operation phases must be adopted.

(b) Application of standards

- (i) Reference to standards or specifications, including RTA standards or specifications for the design and construction of:
 - A. the M2 Motorway, means the latest edition of those standards or specifications available in December 1993; and
 - B. The M2 Upgrade, means the standards and specifications set out in the M2 Upgrade SWTC
- (ii) The works contemplated by these criteria must be designed, constructed and maintained to be suitable for the purpose of which they are required. This involves, among other things, ensuring that the maintenance functions conform with the design and construction standards and specifications current at the time those functions are carried out. Nothing in this document in any way affects this general requirement.

(c) Standard units

Except as otherwise specified, SI units must be used.

(d) Survey

- (i) All necessary surveys for the design, construction, operation and maintenance of the M2 Motorway and the M2 Upgrade must be undertaken. All survey levels must refer to Australian Height Datum (AHD). All survey plan co-ordinates must refer to the Integrated Survey Grid for the M2 Motorway or Main Grid Australia for the M2 Upgrade works.
- (ii) The RTA must provide the boundary survey of the land for the M2 Motorway and the control survey.

(e) Requirements of other statutory authorities

The design, construction, operation and maintenance of the M2 Motorway must conform to the requirements of all relevant Authorities.

(f) Reference standards

Where no relevant Australian Standards or RTA publications exist, the relevant standards of the following organisations must be used:

- (i) AASHTO American Association of State Highway and Transportation Officials
- (ii) ACI American Concrete Institute
- (iii) ANSI American National Standards Institute

(iv)	API	American Petroleum Institute
(v)	ASA	American Standard Association
(vi)	ASTM	American Society of Testing Materials
(vii)	AWS	American Welding Society
(viii)	AWWA	American Water Works Association
(ix)	BSI	British Standards
(x)	CEP	European Concrete Committee
(xi)	CIE	International Commission on Lighting
(xii)	NACE	National Association of Corrosion Engineers (USA)
(xiii)	NEC	National Electrical Code (USA)
(xiv)	NEMA	National Electrical Manufacturers Association (USA)
(xv)	NESC	National Electrical Safety Code (USA)
(xvi)	NFPA	National Fire Protection Association (USA)
(xvii)	USAS	United States of America Standards
(xviii)	USBR	US Bureau of Reclamation
(xix)	USFS	United States Federal Specifications

(g) Order of precedence

The following order of precedence applies in the event of any inconsistency, ambiguity or discrepancy between any of these criteria and the various standards:

- (i) any specific provision in these criteria;
- (ii) RTA publications;
- (iii) NAASRA (currently AUSTROADS);
- (iv) Australian Standards; and
- (v) others.

(h) Engineering standards for roadworks

The following design elements must be in accordance with the relevant requirements stated below. Where the documents referred to have been revised, the latest revision applies.

(i) Road design

- (A) Guide to the Geometric Design of Rural Roads, AUSTROADS 1989;

- (B) Guide to Traffic Engineering Practice, Intersections at Grade, Part 5 NAASRA 1988;
- (C) Guide Policy for Geometric Design of Freeways and Expressways, NAASRA 1976;;
- (D) Grade Separated Interchanges (A Design Guide), NAASRA 1984;
- (E) Guide Policy for Geometric Design of major Urban Roads, NAASRA 1976;
- (F) Highway Capacity Manual (Special Report 209) Transportation Research Board, National Research Council, Washington DC 1985; and
- (G) Road Design Reference Documents, RTA 1989.

(ii) Stormwater drainage design

- (A) Drainage of Wide Flat pavements, NAASRA 1974;
- (B) Australian Rainfall and Runoff, Flood Analysis and Design, The Institution of Engineers Australia 1987;
- (C) Model Analysis to Determine Hydraulic Capacities of Kerb Inlets and Gully Pit Gratings, DMR NSW 1979;
- (D) AS 3725-1989 : Loads on Buried Concrete Pipes; and
- (E) applicable Australian Standards where other than concrete pipes and culverts are used.

The major stormwater drainage structures must be designed to accommodate, at a minimum, a 1 in 100 year flood or such greater reasonable requirement of any local council, the Upper Parramatta River Catchment Trust and the Lane Cove River Catchment Committee, the Water Board or any other relevant Authority at the time those structures are designed.

Detention basins must be provided to comply with the reasonable requirements of any relevant Authority and the Upper Parramatta Catchment Trust's reasonable requirements.

Stormwater drainage design as shown on drawing nos. SW C001 to SW C013 inclusive.

(iii) Sub-pavement drainage design

Design of sub-pavement drainage for Major Roadworks (Design Instruction) Road Design Engineer, May 1984.

(iv) Traffic signal design

Manual of Traffic Signal Practice, DMR NSW 1982 as amended to September 1989.

(v) Traffic sign design

Interim Guide to Signs and Markings, DMR NSW 1981 as amended to September 1989.

(vi) Pavement design

- (A) Pavement design of the M2 Motorway, Old Windsor Road, Windsor Road, Pennant Hills Road, Beecroft Road, Lane Cove Road and Epping Road must be in accordance with MR Form 76, Supplement to the NAASRA Guide to the Structural Design of Road Pavements and, as an additional and separate obligation, must comply with all other relevant requirements of these criteria.
- (B) Pavements (including ramp pavements) must be designed for a total of 45 year design life. Open grade wearing course will be required on the M2 Motorway unless otherwise agreed by the RTA.
- (C) Local roads must be designed in accordance with all relevant Authorities' reasonable requirements.

(vii) Guard fence

Section 6 of the RTA Road Design Guide, Safety Barriers for Roads and Bridges, October 1993.

(viii) Street lighting design

Must be in accordance with the relevant Authorities' reasonable requirements and relevant Australian Standards.

(ix) Landscaping design

Must be to the standard required by the Environmental Impact Determination (1993).

(x) Safety Audit

Safety audits must be in accordance with RTA's Road Safety Audits – Manual and Checklist, 1991.

(i) Bridgeworks

(i) Design

- (A) Bridges must be designed in accordance with AUSTRROADS 1992 Bridge Design Code. The minimum 28 day compressive strength of concrete in any bridge or part of a bridge must be 20 MPa and the minimum height of pedestrian barriers must be not less than 1100 mm.
- (B) Steel bridges must be designed in accordance with NAASRA 1976 code.

(ii) Reinforced concrete approach slabs

Concrete bridges must be provided with adequately designed and suitably proportioned approach slabs at each bridge abutment. One end must be supported by the bridge to prevent earth settlement next to the bridge.

(j) Composite steel girder and concrete deck bridges**(i) Provision of longitudinal reinforcement**

- (A) The NAASRA BDS 1976, section 7, clause 7.7.2.3, requires the longitudinal reinforcement in the deck to be sufficient to counteract the effects of temperature differential and concrete shrinkage. The effects of live load for both local (distribution reinforcement) and global effects also need to be considered, as does the effect of creep in relieving the shrinkage stresses.
- (B) Irrespective of the results of the above analysis, the following minimum area of reinforcement must be included when detailing the longitudinal reinforcement in the sagging moment regions:
- (I) simply supported spans: 1000 mm²/m in each face;
and
- (II) continuous spans: 1500 mm²/m in each face.
- (C) The above requirements are equivalent to size 16 bars at 200 mm centres and size 20 bars at 200 mm centres respectively, using structural grade deformed bars.
- (D) The minimum requirements do not apply to the hogging moment region of continuous spans, where the hogging moment resulting from live load will be significant but will vary depending on the span arrangement. Assuming the current practice of providing stud welded shear connectors in the hogging moment region, the reinforcement required will depend on the hogging live load moment developed as well as the effects of shrinkage and temperature. However, additional reinforcement will normally be required to that required for the sagging moment regions to meet requirements (in particular for crack widths) of the NAASRA BDS.

(ii) Splices

Welded splices must be used to connect main longitudinal steel members.

(iii) Erosion control

Erosion control measures must comply with Environmental Protection Authority's requirements, the Soil Conservation Service of NSW and Section 8 of RTA Road Design Guide, Erosion and Sedimentation, April 1989.

(k) Building structures

Building structures must be designed in accordance with the relevant SAA codes, the Building Code of Australia and good Australian engineering practice.

(l) Toll plazas

- (i) Toll plazas must be provided as required by the Environmental Impact Determination (1993).

- (ii) Design, construction and operation of toll plazas must be of a standard comparable with other toll plazas operative in the Sydney metropolitan region, particularly in relation to:
- (A) manual collection lanes at the Main Toll Plaza and Pennant Hills Road toll plazas;
 - (B) automatic collection lanes;
 - (C) electronic toll collection;
 - (D) collection of tolls;
 - (E) surveillance of traffic;
 - (F) traffic control;
 - (G) liaison with law enforcement authorities;
 - (H) liaison with the RTA;
 - (I) liaison with other Authorities;
 - (J) operation of equipment;
 - (K) safety;
 - (L) faults and corrective actions;
 - (M) security of cash handling;
 - (N) auditing and reporting;
 - (O) maintenance; and
 - (P) reliability.

2.6 Tunnels

(a) General design requirements

- (i) Approaches to and exits from each tunnel must be designed to provide flexibility for either carriageway to operate in a unidirectional mode or a two way mode during planned maintenance or emergency use only.
- (ii) Overheight vehicles or vehicles carrying hazardous goods must be excluded from the tunnels and suitable advance signs and opportunities for diversion must be provided. Overheight vehicles or vehicles carrying hazardous goods must be warned from entering the tunnels.
- (iii) The design of the support system for the tunnel openings must:
 - (A) for permanent conditions, meet the 100 year design life criterion for road structures generally; and
 - (B) for construction and for permanent conditions, be such as to ensure no differential or absolute settlement of the surface above of such magnitude as to results in any damage to adjacent buildings, structures or other property on the surface.

- (iv) Structural walls must be provided in the tunnels to supplement the rock pillar between tunnels at any point where the available width of rock pillar between any two tunnels is insufficient to support the overburden and to provide for the tunnel arch thrust.
- (v) The design of works must provide for any future building or structure known to be in the planning and design stage that will affect the tunnels.
- (vi) Any building structures, including ventilation towers, must be designed in accordance with the relevant SAA Codes, Building Code of Australia and good Australian engineering practice.
- (vii) Finishes must be non-flammable and non-toxic.
- (viii) Dense graded asphalt surfacing must be used within the tunnel.
- (ix) Suitable provision must be made to prevent sunlight from causing a safety hazard to westbound motorist in the tunnels

(b) Tunnel ventilation system design concepts

The ventilation system design must be in accordance with good international practice as typified by Permanent International Association of Road Congresses publications. The following matters must be addressed and included as appropriate in the ventilation system design:

- (i) the ventilation system capacity must be designed and arranged for economy of operation throughout the full range of tunnel traffic flow;
- (ii) the ventilation system must be designed to limit any longitudinal tunnel air velocity to 10 m/s under normal traffic conditions;
- (iii) the ventilation system design must permit rapid smoke removal under fire conditions;
- (iv) where fans are selected for operation in reverse flow mode for smoke removal, the fan design must ensure that maximum fan efficiency is achieved for the normal supply mode;
- (v) the mechanical ventilation system must be capable of continuous operation for at least two hours under fire mode; and
- (vi) when the mechanical ventilation system is operating at full load, the sound level at 1.5m above centre line of road level at any point must not exceed noise rating curve NR75.

(c) Ventilation requirements

- (i) Each tunnel must be designed for uni-directional traffic flow in three lanes.
- (ii) The air quality criteria for the tunnel ventilation design must be not less than the following:
 - (A) Carbon monoxide

Design condition	125 ppm maximum
Congested traffic condition	150 ppm maximum

(B) Particulates

Diesel smoke and particulates 1.5 mg/cu.m maximum

(C) Visibility

Design condition K Max = 0.005/m

Congested traffic condition K Max = 0.009/m

(iii) The ventilation design must be based on contaminant emission criteria of not less than the following:

(A) Carbon monoxide

Emissions of carbon monoxide generally must be modelled on Permanent International Association of Road Congresses' Data (Sydney, 1983) and the further contributions by Pischinger and Schweiger (BHRA, Lille, 1985) and Hyde (1985) – (refer DMR EIS, Eastern Distributor, Appendix 5, 1985).

As Australian Design Rules 37 for automobile design (Australian Transport Advisory Council, Motor Vehicle Emissions) is similar to USA Design Maximum Emission Rates of 1975/76, USA data derived at that date may be used but, in any event, emission rates not less than Permanent International Association of Road Congresses' Data (Sydney, 1983) must be used. The effect of gradient on carbon monoxide emission must be fully considered.

The carbon monoxide emission rate for an idling passenger car must be taken at 0.3 cu.m/hour.

(B) Particulates

Emissions of particulates from diesel powered vehicles must be computed on Permanent International Association of Road Congresses' Data (Sydney, 1983) with particular attention being given to ascending gradients.

(iv) The ventilation system must be operated to ensure that the design parameters of the contaminants are not exceeded.

(d) Environmental pollution at portals

In order to substantiate adequacy of pollution dispersion to the environment, appropriate modelling must be undertaken and designs refined accordingly.

This study must also be used to ensure that the designs minimise re-ingestion of pollutants into fresh air supplies of the tunnel ventilation systems themselves. The tunnel ventilation systems must be designed to ensure compliance with environmental noise criteria.

The above requirements do not apply under rapid smoke removal or testing of same.

(e) Operational and emergency systems

(i) Cross passages between any two tunnels must be provided for the entire length of the tunnels at a maximum interval of 120 m or such lesser

intervals as may be recommended by the Fire Brigade. Each of these passages must be equipped with fireproof "4 hour rating", air-tight steel doors. These doors must be designed to operate under all conditions of ventilation.

- (ii) All systems including fire, ventilation and drainage facilities must be fire isolated between tunnels.
- (iii) The spacing of emergency systems along each tunnel must be to the approval of the relevant Authorities.
- (iv) Fire safety and smoke control

The tunnel designs in conjunction with the mechanical ventilation systems must be designed to ensure safety under fire conditions, have smoke control provisions and must comply with any reasonable recommendations of the Fire Brigade.

(f) Automatic controls and monitoring

A tunnel management system must be provided at the control station to control and automatically monitor all tunnel functions. The system must be of current digital technology utilising solid state microprocessor based equipment with flexible software interface. All functions set out below must be capable of manual override and require operator interaction for response to abnormal conditions:

- (i) Carbon monoxide monitoring

Reliable automatic carbon monoxide monitoring devices must be provided at regular intervals for measuring tunnel carbon monoxide levels.

- (ii) Tunnel air velocity monitoring

Reliable tunnel air velocity measuring devices must be provided at regular intervals for monitoring tunnel air flows and volumes.

- (iii) Traffic control
- (iv) Fire detection equipment
- (v) Fault monitoring

All equipment and systems must be provided with fault monitoring.

(g) Tunnel drainage system

A complete system of drainage must be designed and installed to prevent the occurrence of flooding inside the tunnels by the ingress of water including stormwater, groundwater, cleaning water and fire fighting water. All water from the tunnels must be treated for oil separation and sedimentation. Relevant provisions of the Clean Waters Act 1970 apply for discharges.

(h) Lighting

- (i) Design requirements

Tunnel lighting design must comply with AS/NSZ 1158.5 "Lighting for roads and public spaces Part 5: Tunnels and Underpasses". The general principle for the lighting of road tunnels must be applied to avoid the

"Black Hole" effect on drivers entering the tunnel portals in daytime and to provide acceptable reduction ratios in luminance levels through the adaptation zones.

The following parameters must be determined for the basis of the tunnel lighting design:

- (A) tunnel cross sections;
 - (B) traffic lanes, number and width;
 - (C) traffic lane pavement finishes;
 - (D) tunnel wall finish;
 - (E) portal locations;
 - (F) portal openings;
 - (G) design traffic speed; and
 - (H) under all normal circumstances, both tunnels must be designed for uni-directional traffic flow.
- (ii) Tunnel central zone
- Average luminance values in the central zone must be not less than 10 cd/sq.m.
- (iii) Threshold and transition zones
- Adaptation lighting must be provided for the safety and visual comfort of drivers entering the tunnel portals.
- (iv) Lighting control
- Solid state photometer systems must be provided for the automatic control of the tunnel lighting installation by discreet step switching of the threshold and transition zone luminaires.
- Photometer systems must include dual channel switching units and cameras outside the portal entrances for measurement of access zone luminance values in response to changing ambient light conditions.
- (v) Tunnel luminaires
- Luminaires must be of a type specifically designed for use in roadway tunnels with corrosion resistant construction to comply with CIE Degree of Protection IP65 suitable for jetproof and dustproof operation.
- Control gear must prevent lamp pulsing.

Computer lighting calculations from the luminance suppliers must be provided to the RTA to demonstrate compliance with the tunnel lighting design.

(i) Traffic surveillance and communication system

A comprehensive tunnel surveillance system must be provided for traffic surveillance, security, communications and control of the tunnel electrical and mechanical plant.

The surveillance system must include:

- (i) traffic control system;
- (ii) closed circuit television system;
- (iii) traffic surveillance system;
- (iv) emergency telephone system;
- (v) radio rebroadcast system ; and
- (vi) central supervisory control system.

(j) Traffic control system

Traffic signs and signal lights must be provided in the tunnels for traffic control. All signage must be overhead. Signal lights inside the tunnels must be spaced at 300 m maximum intervals.

Green arrow must be displayed over each opened lane.

Red cross must be displayed over any fully closed lane.

Amber circle must be displayed when traffic may proceed with caution.

Lane control signals and other signs mounted on the tunnel ceiling must be as large as practicable

Tunnel Message Signs must be displayed over each carriageway within the tunnel.

In the event of failure of the ventilation system, traffic must be prevented from congesting in the tunnel by traffic control measures.

Electronic signs must be provided outside tunnel entrances to provide advice in the event of closure of any tunnels.

All traffic signs and control equipment must meet RTA requirements for traffic diversion and stopping in the event of closure of any tunnels.

All traffic signs and control equipment must meet RTA requirements and comply with the relevant Australian Standards.

(k) Fire prevention systems

The tunnel structures, systems and materials must be designed to reduce the risk of fires starting. In the event of a fire occurring, it must be contained and its intensity effectively reduced. A drainage system to collect vehicle spills inside the tunnel must be provided and must be fitted with flame traps.

Systems adopted must conform to good international practice and must be to the approval of the relevant Authorities. As a general guide, the following parameters are likely to be acceptable:

- (i) Fire detection

Within the tunnels, fire detection must be by means of heat detectors, close circuit television cameras, break-glass alarms, emergency

telephones and reed switches on the fire hydrant cabinet doors. All other sections must be provided with automatic detection. All alarms must provide input to the tunnel management systems to initiate fire mode operation.

(ii) Fire fighting

The tunnels must have a wet pipe hydrant system, break-glass alarms and dry chemical fire extinguishers located in cabinets with clear doors fitted with reed switches at up to 60 m intervals.

The tunnels must have a fire sprinkler system recommended by the Fire Brigade.

Major electrical plant areas must have detectors connected to an approved detection system.

All fire protection functions must be monitored and recorded at the control station and interfaced with the mechanical, electrical and traffic control systems.

(iii) Numbers of fire detection and fighting units

The spacing of units must generally be in accordance with the reasonable recommendations of the relevant Authorities.

(I) Electrical

- (i) Electrical supply must be from a ring feeder system with a minimum of two independent supplies which can individually meet capacity requirements.
- (ii) Electrical cables and supports within the tunnels must have a 2 hour fire rating and must be halogen free.
- (iii) Uninterruptible power supply systems must be provided to maintain essential lighting, traffic surveillance and communication equipment during power failures.
- (iv) An emergency generating system must be provided to maintain continuous operation of essential lighting, surveillance and communication equipment during power supply interruptions.
- (v) Codes

The design and installation of the fire systems must be in accordance with all relevant Authorities' requirements.

The following are specific codes which should be considered:

Specification 10 – (Fire Brigade)	Hydrants
Building Code of Australia	Construction
AS1221	Hose reels
AS1668	Mechanical

AS1670	Detectors
AS2118	Sprinklers
AS2444	Extinguishers
AS3000	Wiring rules

Standard of work

The design and construction of details, whether shown on drawings or not, must conform to the requirements of the applicable specifications and codes in these criteria, or, in the absence of an appropriate standard, with good engineering and construction practice.

3. SITE INVESTIGATIONS AND SURVEYS

All site investigations and surveys required for the planning, design, construction and operation of the M2 Motorway must be undertaken in accordance with AS1726 SAA Site Investigation Code.

The RTA must be given a detailed report of site investigations undertaken in accordance with this clause.

4. CONSTRUCTION

4.1 General Requirements

- (a) Construction methods, materials and workmanship must comply with the accepted standards specified by current Australian Standards and the RTA Technical Specifications available in December 1993 for the initial construction of the M2 Motorway and October 2010 for M2 Upgrade works.
- (b) Only materials of high quality, free from defects and imperfections, unused and of recent manufacture and workmanship of high quality, in accordance with current practice, must be used in the works for the M2 Motorway.
- (c) The M2 Upgrade may re-use materials from the M2 Motorway which must comply with the requirements of clause 4.1 (a).

4.2 Quality assurance

- (a) A quality assurance system for construction must be instituted in accordance with Category B, Australian Standard AS2990-1987 or the AS 3900 series Quality Systems for Engineering & Construction Projects. The M2 Upgrade works will be in accordance with ISO 9000.
- (b) During design and construction, the RTA must have full access to the quality assurance scheme.

4.3 Pavement

- (a) The pavement must be constructed to a NAASRA roughness at a rate of less than 50 counts per km over any 200 m continuous length.
- (a) The pavement surfaces:

- (i) must be constructed so that there is not a deviation greater than 5 mm from a 3 m straight edge, laid in any direction, at any stage;
- (ii) as an additional requirement, must not pond water; and
- (iii) must have a surface co-efficient of friction not less than those applicable from MR Circular No. 2, 1984.

4.4 Dilapidation survey

A dilapidation survey of:

- (a) any building within 50 m of the construction works; and
- (b) all buildings identified by the RTA which are subject to the RTA's Special Acquisition Policy,

must be undertaken prior to commencement of the original M2 Motorway construction.

4.5 Security during construction

The Land, Licensed Areas and Ancillary Works must be secured as necessary by a construction hoarding, fence or other means to ensure public safety and prevent access by trespassers.

5. OPERATION, MAINTENANCE AND REPAIR CRITERIA

5.1 General requirements

Road maintenance and operation of the M2 Motorway must be suitable for safe travel on a high speed, high standard urban freeway and in accordance with the Environmental Impact Determination (1993).

5.2 Roadway areas to be maintained

The M2 Motorway must be maintained in accordance with the maintenance manual or as otherwise as may be agreed with the RTA between 270 m west of Lane Cove River Bridge on Epping Road and the kerb line on the eastside of Old Windsor Road at West Baulkham Hills, including all work done as part of the construction and operation of the M2 Motorway and the M2 Upgrade except for the local roads and traffic signals.

Structures constructed as part of the works to carry local roads or pedestrians over the M2 Motorway must be maintained. The roadways over those structures will be maintained by others.

5.3 Drainage basins and related watercourses

Drainage basins and related watercourses constructed or altered as part of the Project and M2 Upgrade must be maintained to ensure that their design capacity is provided at all times. The maintenance includes the control of vegetation, the removal of silt, the repair of scour protection, the clearing of debris and the repair of erosion in accordance with the Environmental Management Plan. The maintenance also includes any modifications or improvements required to ensure that the basins and watercourses function properly.

5.4 Maintenance manual

Three months before the opening of the M2 Motorway, a maintenance manual must be submitted to the RTA for comment. The maintenance manual must detail to the satisfaction of the RTA the procedures that will ensure that the facilities will be maintained to a standard comparable with other metropolitan motorways, and that the criteria set out in clause 2.3(g) of this Scope of Works and Technical Criteria can be met.

The maintenance manual must cover among other matters:

(a) Organisation

- (i) The maintenance organisation (ie. number and type of personnel) to be established;
- (ii) the criteria for selection of the various members in the organisation;
- (iii) the vehicles and plant to be used in the various maintenance operations;
- (iv) the location and type of maintenance headquarters;
- (v) emergency call out arrangements; and
- (vi) attire of maintenance organisation personnel working on the M2 Motorway.

(b) Inspection, timing of maintenance work and repairs

- (i) The inspection and recording frequency of maintenance work to be done on the M2 Motorway;
- (ii) the timing of various routine and specific maintenance activities;
- (iii) guidelines on when maintenance work is to be done to:
 - (A) repair potholes, broken concrete pavement slabs, lifted asphaltic concrete surfacing;
 - (B) replace broken concrete pavement slabs;
 - (C) remove debris against cross motorway drainage structures and bridge scuppers;
 - (D) restore scours caused by water run off or discharge from culverts;
 - (E) stop undermining of lined catch drains;
 - (F) repair damaged boundary fencing and noise barriers; and
 - (G) repair cut and fill batter slips;
- (iv) frequency of grass cutting of roadside and median areas;
- (v) frequency of changing street lights; and
- (vi) frequency of line marking.

(c) Standard of maintenance work

- (i) The quality of materials to be used in carrying out maintenance on the M2 Motorway including bridges; and
- (ii) the standard of workmanship required from the maintenance organisation doing the various maintenance operations.

(d) Accidents

- (i) Arrangements must be detailed for:
 - (A) giving immediate notice to the RTA concerning accidents involving any or all of serious casualties, injuries and traffic delays after implementing any appropriate actions at the site of the accident including all relevant details as to apparent cause, extent of damage and expected hold up of traffic; and
 - (B) temporary safeguards to be provided for traffic following an accident together with a system for inspection and recording of road conditions and photographing of accident sites;
- (ii) the timing of repairs as a result of any accident causing damage to the road surface or road furnishings (including without limitation signs, lighting, guard fence, toll booths);
- (iii) arrangements to remove and clean up spilled toxic liquid products from the M2 Motorway;
- (iv) a continuous improvement program must be established with the aim of improving safety of the M2 Motorway; and
- (v) an annual accident summary report must be prepared and must include:
 - (A) accident rate summaries;
 - (B) analysis of accidents by type;
 - (C) proposals to reduce traffic hazards, for RTA review; and
 - (D) proposed program of hazard reduction works.

(e) Particular requirements

- (i) NAASRA roughness must be maintained at a rate below 80 counts per km over any 200 m continuous lane lengths.
- (ii) The pavement surfaces must be maintained so that there must not be a deviation greater than 20 mm from a 3 m straight edge, laid in any direction, at any stage. As an additional requirement, the surface must not pond water.
- (iii) The pavement surfaces must be maintained with surface co-efficient of friction not less than those applicable from MR Circular No. 2, 1984.
- (iv) A 24 hour, 7 day a week call out facility must be provided.
- (v) A minimum of one traffic lane must be maintained for each direction except for emergencies and any work carried out on the pavement must have traffic provisions to the standard of the RTA Specification for control

of Traffic Works on Roads (1989). The full pavement width must be available in clearway hours.

- (vi) The road reserve must be maintained in accordance with Authority's requirements as regards noxious weeds and must be kept clear of litter. Roadside verges must be kept clear of unnecessary hazards.
- (vii) Line marking, delineation, lighting and signposting must be maintained to provide good visibility under night time conditions at operating speeds.
- (viii) All improvements including without limitation toll plaza structures, bridges, drainage structures, guard fencing, signposting must be maintained in good repair from both a structural and visual aspect. Boundary fencing must be maintained in good condition. Maintenance must be directed towards maintaining a high level of visual acceptance of the M2 Motorway.
- (ix) Landscaping must be maintained in good order and dead plants replaced promptly.
- (x) The performance of the pavement in service must be monitored closely so that, when necessary, timely intervention will ensure effective and efficient pavement rehabilitation and management. Pavement repair and rehabilitation must be undertaken to maintain the pavements in good structural and visual condition.
- (xi) In addition, pavement instrumentation must be provided so that performance of the pavement can be accurately monitored and compared with design predictions. Routine monitoring must include measurement of surface characteristics using the Laser Road Surface Tester Vehicle (RST) and structural assessment using appropriate deflection measuring systems.
- (xii) Drainage basins must be maintained and or modified to provide the design water retention capacity. The overflow and drainage structures must be maintained in good structural condition and, together with basin landscaping, must be maintained in good visual condition.
- (xiii) Noise barriers must be maintained in good repair in both structural and visual aspects. Steel elements must be treated for and remain free from rust. All elements must be maintained in a clean and painted condition to provide a high level of visual acceptance.

(f) Operation Management Control System (OMCS) Requirements

- (i) The Maintenance Manual must be updated to include OMCS Works when completed.
- (ii) The maintenance requirements for the M2 OMCS Works are to be documented in Through-Life Support System Management Plan. This Plan must be developed and maintained in accordance with the Company's Systems Engineering Management Plan (SEMP). The OMCS O&M Manuals must be updated routinely in accordance with the SEMP.

As a minimum, the O&M Manuals must include:

- (A) General overview of the system
- (B) Detailed Description of the OMCS assets, including description of the physical elements of the plant and equipment, and the operational and security systems

- (C) Detailed operators and maintainers work instructions and procedures for the control, monitoring, service and maintenance of the system.
- (D) Schedule of OMCS & ITS Assets
- (E) Schedule of OMCS Spares & Maintenance
- (F) Configuration information
- (G) Maintenance
- (H) Maintenance overview
- (I) Maintenance activities
- (J) Asset management planning and
- (K) Procedures
- (L) Manufacturers manuals
- (M) Operation and Maintenance Organisations
Description of the operation and maintenance organisation, including:
 - i. skills of personnel;
 - ii. specialised tools and software versions required
 - iii. subcontract arrangements (if any), and the sub-contractor's authorities and responsibilities;
 - iv. the location(s) of the operation and maintenance organisation(s) and resources;
 - v. responsibilities of personnel;
 - vi. contact details; and
 - vii. training requirements.
- (N) Training
 - i. Training plan
 - ii. Operator course
 - iii. Maintenance course
- (O) Performance Standards
The performance standards must address the performance requirements of the Deed, including:
 - iv. response time targets for defect rectification or incident management;
 - v. equipment availability targets;
 - vi. unsafe operating conditions which must result in closure of a section or sections of the Motorway;
 - vii. design life and equipment life cycles including refurbishment requirements;
- (P) As Built Records

(g) OMCS and ITS Asset Management Systems

- (i) The OMCS and ITS asset management systems must, as a minimum:
 - (A) maintain a current record of the type, class, nature, location and composition of all OMCS and ICT systems assets within the Tollroad;
 - (B) maintain a record of the current, historical and projected future condition of each OMCS and ICT systems asset within the Tollroad, including the provision of detailed records of the repair or replacement of asset;
 - (C) maintain a record of the nature, extent, quantity, location, time and type of any maintenance works performed by, or programmed to be performed by, the Company under the Project Deed; and

- (D) include a method of reporting on the performance standards of any OMCS and ICT systems Asset by analysis of the specific condition and defect information recorded for individual assets.
 - (ii) The OMCS and ITS Asset Management Systems must be available for direct interrogation by the RTA for any information listed in clause 5.4 (g) (i).
- (h) Inspection**
- (i) RTA may by written notice annually seek access the Motorway to inspect and observe the operational performance, maintenance and repair of the OMCS and ICT systems assets in accordance with the Project Document.
 - (ii) The Company must make available to the RTA, its employees and agents access to the following systems in the Control Centre, for the purpose of Inspection,
 - (A) The OMCS event, alert and alarm logging and report system and including the fire protection system.
 - (B) The Motorway data network management system.
 - (C) The OMCS User Workstation to display current traffic system status displays.
- (i) Condition Indicators for Mechanical and Electrical Equipment**
- (iii) The Design Life of all mechanical and electrical equipment is expected to be twenty years except as specifically provided for particular Asset Items and Asset Sub-Items in the form of equipment data schedules in Appendix 29.
 - (iv) Equipment condition indicators must be capable of predicting probable failure and sufficient to ensure the Company's compliance with the requirements of the Deed.
 - (v) The method and frequency of testing of condition indicators and the minimum equipment performance at which intervention is required must be as nominated by the Operator taking into account the manufacturer's recommendations; and
 - (vi) in any event, be sufficient to ensure the Company's compliance with the requirements of the Deed.

5.5 Handover

At the end of the Term, the M2 Motorway must be in first class condition as described below:

(a) Structures

All structures including pavements must be in good structural and visual condition at handover. The pavement must be in a condition so that no immediate repair work is required and that no pavement rehabilitation is anticipated to be required for at least eight years.

Bridge structures, drainage structures and all other elements of the M2 Motorway must be in good order and repair and free from defects which reduce the design characteristics of the structures or which detract from the visual amenity of the structures.

(b) Equipment for structures

All equipment must be complete, in good working order and free from defects at handover.

All equipment must be in good structural condition and in good visual condition.

Equipment replaced during the Term must be replaced by equipment of an equivalent or better standard as that used generally throughout the Term. At handover, all equipment is to be of a like type to that provided for similar purpose.

(c) Equipment for toll plazas

All toll plaza equipment must be complete, in good working order and free from defects at handover.

All equipment must be in good visual condition. All equipment must be of a like type to that used for the same purpose throughout the works.

Equipment replaced during the Term must be replaced by equipment of an equivalent or better standard as that used generally throughout the Term. At handover, all equipment is to be of a like type to that provided for similar purpose.

(d) Other equipment

All other equipment must be in good working order and free from defects at handover.

All equipment must be in good structural and mechanical condition and must be in good visual condition.

Equipment replaced during the Term must be replaced by equipment of an equivalent or better standard as that used generally throughout the Term. At handover, all equipment is to be of a like type to that provided for similar purpose.

SCHEDULE 1**RTA's obligations in respect of the Environmental Impact Determination referred to in clause 5.1 (a) of the M2 Motorway Project Deed**

Part 8, Environmental Impact Assessment Report	RTA's Obligation
Clause 4.5	To investigate rezoning of areas not covered by Part V of EPA Act.
Clause 4.7	To investigate rezoning of those areas of existing road reservation areas which are not required for road purposes, and which lie to the north of the M2 Motorway and to the east of Alma Road and to the west of Lane Cove Road.
Clause 4.8	To investigate the possibility of rezoning of other areas of existing road reservation which are not required for road purposes, and take steps to implement such rezoning (where appropriate).
Clause 5.1 and Clause 11.1	To engage an independent professional to act as Community & Environment Liaison Officer having functions as set out.
Clause 6.1	To establish a task force to oversee the investigation and construction of Stage 2 upgrading to the Interchange at Epping Station.
Clause 7.1	To establish a Project Liaison Group comprising the Community & Environment Liaison Officer and one representative from each of: <ul style="list-style-type: none"> • the RTA; • the Company; • the Trust; • the EPA; • the NPWS; • the Forestry Commission; • the Water Board; • the Dept. Conservation & Land Management; • the Dept. of Water Resources; • the Hornsby Shire Council; • the Parramatta City Council; • the Ryde Municipal Council; and • the Baulkham Hills Shire Council.
Clause 7.4	To consider all comments and recommendations of the Project Liaison Group and may adopt any of those recommendations.
Clause 7.5	To require the Trust and the Company to comply with any recommendation from Project Liaison Group which the RTA adopts.
Clause 8.1	To establish for each part of the M2 Motorway Local

	<p>Liaison Groups comprising Community & Environment Liaison Officer and one representative from each of:</p> <ul style="list-style-type: none"> • the RTA; • the Company; • the Trust; and • the EPA, <p>and a representative of each of such of the following bodies as the RTA appoints:</p> <ul style="list-style-type: none"> • the NPWS; • the Forestry Commission; • the Water Board; • the Dept. of Conservation & Land Management; • the Dept. of Water Resources; • the Hornsby Shire Council; • the Parramatta City Council; • the Ryde Municipal Council; and • Baulkham Hills Shire Council; <p>And two representatives of the local communities appointed under clause 8.2.</p>
Clause 8.2	To call for written nominations from local communities, select in consultation with local councils and appoint two local community representatives to the Local Liaison Groups.
Clause 8.4	To consider all comments and recommendations of the Local Liaison Group and may adopt any of those recommendations.
Clause 9.1	<p>To form an Aboriginal Liaison Group for any particular part of the M2 Motorway in which aboriginal sites have been identified. The Aboriginal Liaison Group will comprise:</p> <ul style="list-style-type: none"> • the Community and Environment Liaison Officer, and a representative of each of the following bodies: • the RTA; • the Trust; • the Company; • the NPWS; • the Metropolitan Local Aboriginal Land Council; and • the Daruk Local Aboriginal Land Council.
Clause 9.3	To consider all comments and recommendations of the Aboriginal Liaison Group and may adopt any of those recommendations.
Clause 9.4	To require the Trust and the Company to comply with any recommendation from the Aboriginal Liaison Group which the RTA adopts.
Clause 10.1	To establish School Liaison Groups for each part of the M2 Motorway which in the RTA's view is likely to impact any schools. School Liaison Groups will

	<p>comprise of:</p> <ul style="list-style-type: none"> • the Community and Environment Liaison Officer, and a representative of each of the following bodies: • the RTA; • the Trust; • the Company; • the EPA; and • each of the schools which the RTA considers is likely to be impacted <p>and when appropriate a representative of each of the following bodies:</p> <ul style="list-style-type: none"> • the Dept. of Public Works; • the Dept. of School education; and • the Catholic Education Commission NSW.
Clause 10.3	To consider all comments and recommendations of the School Liaison Groups and may adopt any of those recommendations.
Clause 10.4	To require the Trust and the Company to comply with any recommendation from the School Liaison Groups which the RTA adopts.
Clause 11.2	To ensure that appropriate facilities are available to assist the Community and Environment Officer in carrying out that officer's functions.
Clause 11.3	To ensure that the Community and Environment Liaison Officer is available for consultation with local communities at all reasonable times and that the local communities are aware of such availability of access to that officer.
Clause 11.4	To ensure that the Community and Environment Liaison officer communicates regularly with all the Liaison Groups.
Clause 12.3	<p>To inform the Trust and the Company of the EPA's advice that pollution control licences or approvals issued in relation to the M2 Motorway may include requirements to:</p> <ul style="list-style-type: none"> • implement QA & QC principles in accordance with AS3900; and • prepare a detailed program to check environment impact assessment methods applied and effectiveness of environmental impact control measures.
Clause 12.5	<p>To inform the Trust and the Company of the EPA's advice that the premises on which the M2 Motorway is constructed will be scheduled premises under the Noise Control Act 1975 and are required to be licensed under that Act. Licence application or renewal to be accompanied by noise impact statement including:</p> <ul style="list-style-type: none"> • construction noise assessment; and

	<ul style="list-style-type: none"> proposals for noise mitigation during construction which will include combinations of noise mitigation measures designed after consideration of sound transmission loss performance within dominant traffic noise frequency range.
Clause 12.7	<p>To inform the Trust and the Company of the EPA's advice that a pollution control licence under the Clean Waters Act 1970 will be required before there is any discharge to water as a result of construction of the M2 Motorway. Application for, or renewal of licence to be accompanied by an environment management plan addressing:</p> <ol style="list-style-type: none"> control of pollution to water from: <ol style="list-style-type: none"> soil erosion; runoff from cleared areas, spoiled areas, construction areas; and stormwater runoff; dissipation of energy in runoff, and revegetation and drainage batters.
Clause 13.5	<p>To determine after reference to the Local Traffic Committee access points onto the site, and routes over local streets for construction vehicles. The aim will be to select access points and routes which minimise environmental and community disturbance and damage to local streets.</p>
Clause 13.21	<p>In conjunction with the EPA, to prepare, implement and review procedures to monitor emissions of CO, NOx, hydrocarbons, particulate matter, lead, sulphur compounds and benzene.</p>
Clause 13.26	<p>To appoint an archaeologist qualified in matters of aboriginal archaeology to produce a report to verify conclusions in the 1992 EIS and to produce in consultation with the NPWS, Metropolitan Local Aboriginal Land Council and Daruk Local Aboriginal land Council, a plan of management for identified significant aboriginal sites in 1992 EIS.</p>
Clause 14.1	<p>To ensure that acquisition of properties occurs in accordance with:</p> <ol style="list-style-type: none"> RTA's Land Acquisition Policy; and RTA's Special Acquisition Policy for the M2 Motorway.
Clause 15.1	<p>To signalise the junction of Oakland Avenue and Windsor Road.</p>
Clause 15.2	<p>To liaison with relevant local council or councils and investigate:</p> <ol style="list-style-type: none"> provision of bus turning facility within Linton Street/Canyon Road/Oakland Avenue/Forst Road precinct; provision of a new road linking Livingstone

	<p>Avenue with Windsor Road opposite Oakland Avenue at a signalised intersection;</p> <p>c. provision of a new road linking Woodlands Street with Windsor Road opposite Russell Street at a signalised intersection; and</p> <p>d. provision of pedestrian connections:</p> <ul style="list-style-type: none"> i. between Linton Street and Canyon Road adjacent eastbound on-load ramp; and ii. from Canyon Road to Windsor Road.
Clause 15.6	To consult with the Bicycle Institute of NSW during detailed design stage concerning in particular access for bicyclists.
	To provide a boundary survey of the land for the M2 Motorway.
	To provide the control survey for the M2 Motorway.

SCHEDULE 2

RTA's obligations in respect of the Scope of Works and Technical Criteria referred to in clause 2.17(a) of the M2 Motorway Project Deed

The RTA must design and construct the works described in clause 1.2(c)(i) (dealing with earthworks) and clause 1.2(c)(ii) (dealing with stormwater drainage pipework and culvert) of the Scope of works and Technical Criteria but excluding pavement and related drainage.

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External Reference Files	Lot No.	Approval
NEW	LAIE	AMENDMENT / REVISION DESCRIPTION

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SCALE: AS SHOWN
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DESIGNER: LEIGHTON
 AECOM

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TYPICAL CROSS SECTION

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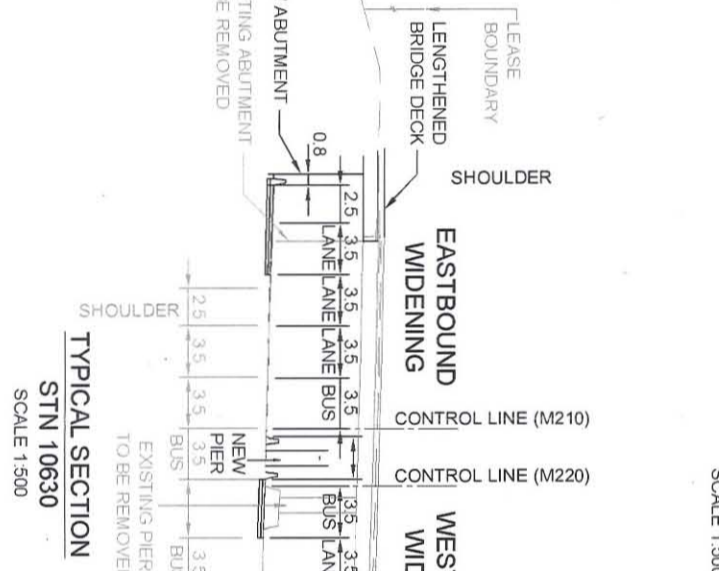
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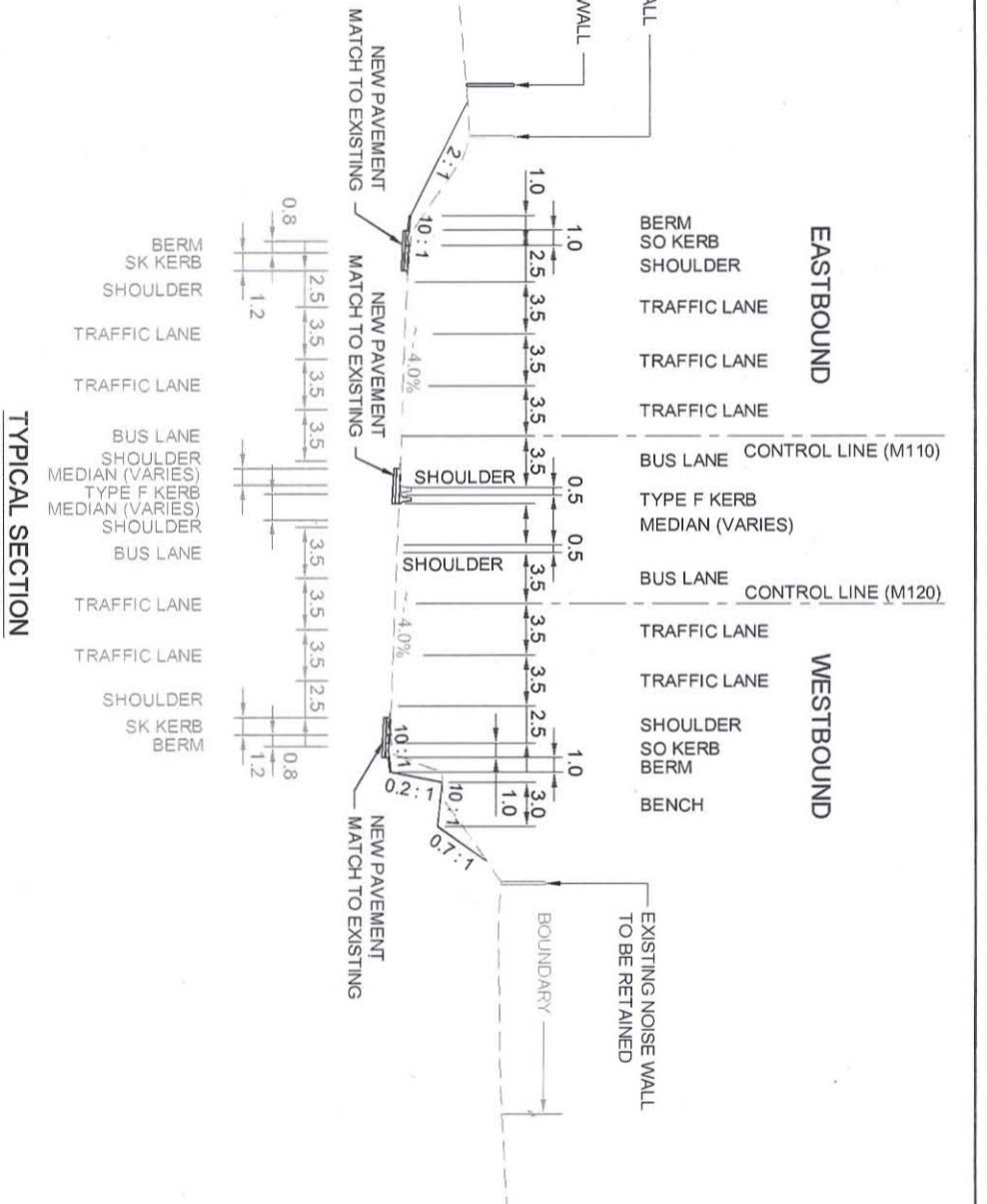
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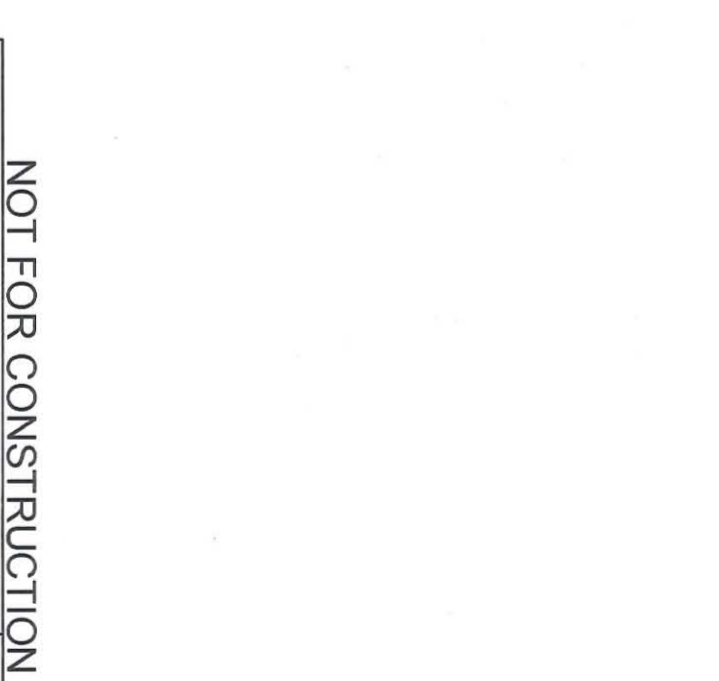
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