Transport Roads & Maritime Services

QA SPECIFICATION PS351

ROAD DESIGN

IC-QA-PS351

VERSION FOR: ***Macquarie Park Bus Priority and Capacity Improvement Project - Stage 2***
DATE: ***November 2018 (RFT Issue)***

CONTENTS

CLAUSE **PAGE**

FOREWORD

ROADS AND MARITIME SERVICES COPYRIGHT AND USE OF THIS DOCUMENT

When this document forms part of a contract

This document should be read with all the documents forming the Contract.

PROJECT SPECIFIC CHANGES

Any project specific changes have been indicated in the following manner:

(a) Text which is additional to the base document and which is included in the Specification is shown in bold italics e.g. ***Additional Text***.

(b) Text which has been deleted from the base document and which is not included in the Specification is shown struck out e.g. ~~Deleted Text~~.

RMS SPECIFICATION PS351

ROAD DESIGN

1 INTRODUCTION

1.1 PROFESSIONAL SERVICES SPECIFICATION

This specification is one of a set of Professional Services Specifications for detailed design. Refer to PS301 Professional Service Scope and Requirements.

1.2 SCOPE AND PROJECT DESCRIPTION

This Specification sets out the requirements for an aspect of detailed design. It requires C72 Panel Deed for Professional Services or equivalent Professional Services Conditions of Contract.

1.2.1 Project Specific Requirements

Refer to Annexure PS351/A for Project Specific Requirement for Road Design.

1.3 PROJECT INTRODUCTION

Refer to PS301 - Professional Service Scope and Requirements for Project Introduction details.

1.4 STRUCTURE OF THE SPECIFICATION

1.4.1 Schedules of HOLD POINTS, WITNESS POINTS, DELIVERABLES, MEETINGS AND WORKSHOPS.

The schedules in Annexure PS351/C list the **HOLD POINTS, WITNESS POINTS, DELIVERABLES, MEETINGS AND WORKSHOPS** that must be produced / observed. Refer to specification PS301 - Professional Service Scope and Requirements for definitions of **HOLD POINTS**.

1.4.2 Design Reference Documents and Support Information.

The schedules in Annexure PS351/M list the **DESIGN REFERENCE DOCUMENTS**, **REFERENCE DOCUMENTS** & **SUPPORTING INFORMTION** that apply to this Specification.

Unless otherwise specified the applicable issue of a referenced document, other than a RMS Specification, is the issue current at the date one week before the closing date for tenders, or where no issue is current at that date, the most recent issue.

2 ROAD DESIGN

2.1 GEOMETRIC DESIGN REQUIREMENTS

The geometric design must be fit for the intended purpose for which it is required by RMS as set out in this Specification and be developed in accordance with the design reference documents following the order of

precedence as specified in PS301 - Scope and Requirements and the additional design reference documents listed in Annexure PS351/M.

To ensure that the requirements of the approved concept design and the environmental assessments are met in the final detailed design.

The limits of work are to tie back into the existing road network are at appropriate locations to ensure road safety. Where there is combination of minimum or near minimum design standards the elements must be identified for review purposes.

All elements, including main carriageway, ramps and side roads, including bridge alignments, must be designed in accordance with the design reference documents and comply with the criteria and requirements in Annexure PS351/A.

Where the combination of superelevation transition and longitudinal grade results in areas of flat pavement, an out analysis must be carried out to determine that the resultant depth of water on the pavement does ***not*** result in aquaplaning occurring. Any proposed solutions must be determined in consultation with RMS Road Design Engineering.

As with other elements of design, the road alignment should provide for safe and continuous operation at a uniform travel speed. The provision of geometric consistency is a fundamental requirement in geometric road design.

The PSC warrants that the original fee and program contain sufficient allowances for the assumption by the PSC of the obligation to provide a compliant design. A compliant design must meet the minimum design standards; however, where compliance is achieved through a series of minimum design standards being met, RMS reserves the right to request the PSC to provide reasons as to why a better design outcome could not be achieved. The cost and time of all design iterations necessary to comply with the above request (if any) is deemed to be included in the PSC's original Fee and program.

2.2 HORIZONTAL ALIGNMENT

The horizontal alignment must be such that all roads, including elevated structures (bridges, viaducts, and sign gantries), footways, underpasses, batters, noise barriers, basins and other design elements are contained within the road corridor boundaries.

The Master Control (MC) strings are to be located as per Section 3.5 (Road Design) of RMS CADD Manual 2014.

Compound curves and broken back curves must be avoided. Where compound curves are unavoidable the design speed criteria, and not curve ration, must be satisfied.

The minimum length measured between tangent spiral points on adjacent reverse horizontal curves must be equal to or greater than the design speed expressed as metres.

2.3 VERTICAL ALIGNMENT

The vertical alignment must be included with the detailed design and is to be developed in accordance with the hierarchy of design reference documents specified within this design specification.

The limits of work are to tie back into the existing network at appropriate locations to ensure road safety.

Where the longitudinal gradient on a carriageway is less than 1% over a carriageway length of greater than 500 metres and the cross fall/superelevation is 3% consideration must be given to increasing the cross fall/superelevation to 4% to assist with surface drainage in soft soil areas.

All grades must result in having a difference between posted speed and truck operating speeds of no greater than 20%.

A risk analysis must be undertaken on the downhill grades on the main carriageways to assess and determine the need for:

(i) For escape ramps for heavy vehicles in the event of brake failures; and

(ii) For dedicated heavy vehicle stopping areas to allow for and enable cooling of brakes.

The PSC must provide any escape ramps and stopping areas for brake cooling as determined and required by the risk analysis.

2.4 TYPICAL CROSS SECTIONS

The elements of the typical cross section within the RMS road corridor must be:

(i) As per the requirements specified within this Specification.

(ii) As per the concept design (if available) unless otherwise specified in Annexure PS351/C.

(iii) As per the hierarchy of design reference documents specified within PS301 – Scope and Requirements and the additional design reference documents listed in Annexure PS351/M".

Local roads must be consistent with the existing typical cross section and in agreement with the relevant Local Government.

The elements of the typical cross section associated with property access must be in consultation with the land owner by an authorised RMS Representative.

The vertical clearances for pedestrian bridges over the main carriageways must be a minimum of 5.5m. All other vertical clearances across the main carriageway including ramps, shoulders and temporary works, must not be less than the existing minimum vertical clearances.

Refer to Annexure PS351/A Table PS351.A2 – Design requirements.

HOLD POINT	
Process held:	Detailed design cross-section
Submission details:	Embankment management strategy
Release of hold point	Typical Cross Section Drawings for the total width and length of the corridor. RMS's Representative will release the hold point following review of the Typical Cross Section Drawings the incorporation of RMS comments by the PSC.

The vertical clearances for pedestrian bridges over the main carriageways must be a minimum of 5.5m, all other vertical clearances across the main carriageway widths, including ramps, shoulders and temporary works, must be a minimum of 5.3m

2.5 MEDIAN TREATMENTS

Minor amendments to median treatments are to be as per the form and function of the existing. Significant amendments to median treatments are to be as per the requirements detailed in Annexure PS351/A Table PS351.A2 – Design requirements**.**

2.6 INTERSECTIONS

Intersection layouts are to be designed in accordance with the following:

(i) Current and projected future traffic volumes and characteristics.

(ii) Level of Service (if specified).

(iii) Provision of minimum approach sight distance on all legs of the intersection.

(iv) The hierarchy of design reference documents specified within this design specification. PS301 – Scope and Requirements and the additional design reference documents listed in Annexure PS351/M.

(v) The design vehicle specified in Annexure PS351/A.

(vi) The Design Speed.

(vii) Consider staggered pedestrian crossing areas across the main carriageway with minimum 3.6m median width in the ultimate configuration

2.7 LOCAL ROADS

Connections to the local road network are to reflect the Local Environmental Plan (LEP), the approved designs, the Environmental Documents, stakeholder requirements (e.g. short and long term needs of Local Government and are to be subject to RMS approval).

Local roads that are terminated as a consequence of these works must be provided with cul-de-sacs at the location of the closure or terminations. The cul-de-sacs must accommodate unless otherwise specified, as a minimum, the turning movements of a design single unit truck, as defined in AP– G34/06 - Austroads Design Vehicles and Turning Path Templates 2006.

Local roads must be consistent with the existing typical cross section and in agreement with the relevant Local Government.

2.8 BICYCLE AND PEDESTRIAN FACILITIES

The PSC must design the bicycle and pedestrian facilities must be fit for the intended purpose for which it is required by RMS as set out in Annexure PS351/A of this Specification and be developed in accordance with the design reference documents following the order of precedence as specified in PS301 - Scope and Requirements and the additional design reference documents listed in Annexure PS351/M.

Disable access requirements are to be considered. Special care is required in providing for pedestrians at crossings in regard to pavement grades, kerb facilities and road side furniture.

~~2.9 CROSS CARRIAGEWAY ACCESS~~

~~Cross carriageway access is to only be provided at intersections and must cater for the design vehicle and the checking vehicle.~~

2.10 DESIGN DRAWING AND MODEL REQUIREMENTS

Design drawing requirements and presentation are to be in accordance with RMS CADD manual unless otherwise specified.

Refer to Annexure PS351/A for detailed design drawing and model requirements for Road Design.
Refer to PS301 – Scope and Requirements for Detailed Design and Documentation Deliverables.

3 DELINEATION, SIGNPOSTING AND ROADSIDE FURNITURE

3.1 OBJECTIVES

(i) To design a delineation and signposting scheme that achieves the performance requirements listed in this Specification and appropriate design reference documentation.

(ii) Detail all work necessary to provide for the safe movement of traffic and the protection of persons and property through and/or around the project site.

(iii) To design the roadside furniture for the project to meet the performance and durability requirements of the project.

3.2 GENERAL

The PSC must develop a detailed signposting and delineation scheme, in consultation with RMS's Regional Road Safety and Traffic Manager and the Local Government. Meetings must be arranged and facilitated by the PSC to ensure that all requirements and practices are fully understood and implemented. At this stage sign sizes and letter heights will be determined, plus any other specific requirements such as overhead signs etc.

Consideration must be given to:

(i) Minimising the effects of unwanted headlight glare on both traffic and adjacent property.

(ii) The NSW road rules.

(iii) The needs of public transport. This may involve consultations with bus companies etc.

(iv) The needs of pedestrians and cyclists.

(v) Tourist routes etc.

HOLD POINT	
Process held:	Signposting and delineation detailed design
Submission details:	Concept signposting and delineation scheme
Release of hold point	RMS's representative will release the hold point following review of the PSC's concept signposting and delineation scheme and incorporation of RMS comments by the PSC

3.3 DELINEATION

Delineation must be designed using the appropriate design reference documents and the following guidelines:

(i) All delineation must be appropriate for the climatic conditions, lighting environment, design speed, urban design requirements and traffic conditions expected for the project.

(ii) The delineation is to convey a consistent message to the road user, particularly under adverse weather conditions.

(iii) The PSC must specify pavement marking materials of appropriate durability for the expected traffic volumes.

(iv) Delineation of bridges for river traffic to the relevant requirements of the respective waterway authorities.

(v) Clear visibility of merge and diverge treatments and intersection layouts that clearly identify to motorists the permitted manoeuvres.

(vi) Enhanced pavement markings as per the design reference documents.

(vii) No blacking out of markings will be permitted. Line marking removal must be carried out taking into account RMS environmental policies.

The PSC must use the approved concept signposting and delineation scheme (see hold point Clause 3.2) to design a delineation system for the project. Whilst the approved concept is used as the basis for commencing the design, the delineation scheme shall be upgraded to suit the approved final detailed design.

3.4 SIGNPOSTING

All signposting must be designed in accordance with the appropriate design reference documents and the following guidelines:

(i) The re-use and relocation of existing signposting is to be carefully considered and clearly identified.

(ii) All signposting is to be compatible with the delineation layout and must be appropriate for the climatic, lighting, design speed, urban design and traffic conditions expected for the project.

(iii) Provide motorists with progressive and consistent information to the road user and clearly indicate upcoming features (e.g. interchanges, roundabouts etc.) and reassurance about the route selected and trip distances involved.

(iv) Where the sign is free standing and situated within the clear zone, refer to the design reference documents for installation type and protection requirements.

(v) Provide vertical clearances beneath signs which are adequate for the environment in which the sign is placed and complying with the design reference documents.

(vi) Utilise standard signs for standard situations. Innovative measures should only be used where non-standard conditions exist and the standards do not provide an appropriate sign. Approval to use any non-standard sign must be sought from RMS.

(vii) The design of sign locations must ensure:

a. Clearance to overhead obstructions and utility services.

b. That the size of the sign is compatible with the available space in which it is to be erected.

c. That the sign itself does not restrict sight distance on bends, intersections, driveways, other traffic control devices (such as traffic control signal, stop signs etc.) or other road side furniture such as bus stops.

d. That the lateral and vertical positioning of the sign is appropriate with regard to the protection of the sign from impact/vandalism.

e. That the height, lateral position and direction of the sign are appropriate to the intended message.

f. That signs will not be obstructed by the urban design, street lighting/other street furniture, landscaping and the visual scheme or reflection from street lighting etc.

g. That signs do not obstruct or conflict with each other and are appropriately spaced to avoid overloading drivers with information.

(viii) Ensure the inclusion of appropriate driver safety signs (e.g. driver/reviver, rest area etc.), where appropriate.

(ix) Include appropriate signposting for pedestrians and cyclists and water traffic on bridges and incorporate signs associated with warnings, speed zones, place names, feature names and appropriate symbols.

(x) Appropriate signposting for tourist routes.

(xi) Consideration of future maintenance.

3.5 DIRECTIONAL SIGNPOSTING

Directional signposting must be provided in accordance with RMS Guide to Signposting and in consultation with RMS. The directional signposting must be consistent with the rest of the State Road network, including colour coordination and messages that are consistent with the road route.

The PSC must confirm all sign faces with RMS as part of the signposting design process, including the "New Road Name" and road number (s) on the signs. The road numbering must comply with the MAB route guidance system.

The PSC must determine the sign locations of all directional signposting.

3.6 GUIDE / REGULATORY / WARNING SIGNPOSTING

Guide, regulatory and warning signs must be provided and provide clear delineation of intersections, curves, manoeuvres and one way networks. Speed limit signs are to be provided in accordance with NSW Speed Zoning Guidelines and in consultation with RMS.

3.7 OVERBRIDGES / UNDERPASSES / CREEKS AND RIVERS

All overbridges and underpasses must have road name signs and be signposted in accordance with the directional signage scheme. All creeks and rivers must have the relevant name displayed and be signposted in accordance with the directional signage scheme.

3.8 TOURIST SIGNPOSTING

Where required and in consultation with RMS, Tourist signs must be provided in accordance with RMS Tourist Signposting Guidelines and must be approved by the Tourist Attraction Signposting Assessment Committee (TASAC) prior to installation.

3.9 NOT USED

3.10 CARRIAGEWAY TRANSITIONS SIGNPOSTING AND DELINEATION

Any temporary or staged crossovers must be signposted and delineated.

3.11 TEMPORARY SIGNPOSTING AND DELINEATION

Temporary delineation and signposting is to be designed to conform with RMS publication "Traffic Control at Worksites Manual version 4" edition and appropriate RMS QA specification parts.

3.12 REST AREA SIGNPOSTING

Signposting for rest areas must be provided in accordance with RMS TD2003/RS01 'Signposting of Rest Areas, Driver Reviver Sites and other Rest Stops'.

3.13 SHARD PATH SIGNPOSTING

Signposting of shared paths for cyclist and pedestrians must be provided in accordance with NSW Bicycle Guidelines.

3.14 DESIGN OF NON-STANDARD SIGN FACES AND SUPPORT STRUCTURES

All non-standard sign faces, for permanent and temporary signposting, are to be designed and presented as supplementary drawings. The design is to be fully dimensioned, and include all details relating to materials, patches, colours etc.

All non-standard sign support structures and foundations are to be designed and presented as supplementary drawings. Refer to PS361 for the design criteria.

Any non-standard sign posting, support or foundation is to be submitted to RMS for approval. The submission is to include all assumptions and calculations used for the structural elements.

The PSC must include in their tender submission price for the design of up to 5 different types of non-standard RMS sign post foundations, 5 different types of non-standard RMS traffic signal post/mast arm foundations designs and 5 different types of non-standard City of Ryde multi-function pole foundations. Examples of different types of non-standard foundations are:

- ***Single pile with cantilevered pile cap. Different pile size or length of cantilever is not considered a different foundation type***
- ***Two piles with pile cap. Different pile size or pile cap size is not considered a different foundation type***
- ***3 piles with pile cap. Different pile size or pile cap size is not considered a different foundation type***
- ***Piles with steel plate pile caps. Different pile size or steel plate pile cap size is not considered a different foundation type***

3.15 ROADSIDE FURNITURE

Roadside furniture must not be placed within the shoulder and when situated within the clear zone, refer to the design reference documents for protection requirements.

The design of road safety barriers must be designed as per the requirements of design reference documents. The selection of safety barrier system is to be assessed on the criteria of cost, safety, suitability to a particular situation, available deflection, staging, hazard, length, aesthetics, life cycle maintenance costs etc.

Special consideration is to be given to the location and continuity of road safety barriers at intersections/interchanges and the special geometry of interchanges. Further, the need to allow for pedestrian/cycle access, in conjunction with road safety barriers needs to be carefully assessed.

The PSC must consult with the relevant Local Government, any relevant bus company and RMS regarding necessary adjustments to bus routes on the service and local road network. This work is to include both construction and operation stages. The resultant requirements are to be designed and specified.

Batters of cuttings must be shaped and constructed to provide either a clear zone run-off area or features that emulate a rigid safety barrier.

Guide posts must be provided as per the requirements of RMS Delineation manual. The reflector pattern must be integrated so that there is consistent guidance provided through cuttings and across embankments, especially where safety barriers are erected and on bridges.

Other road furnishings to be considered in view of the above principles are:

(i) Landscaping, ***seating, bins, other City of Ryde Council required street furniture as detailed in the City of Ryde, Macquarie Park Corridor, Public Domain Technical Manual***

(ii) Street lighting. ***Refer to City of Ryde, Macquarie Park Corridor, Public Domain Technical Manual.***

3.18 DESIGN LIFE

Refer to PS301 for details regarding design life requirements.

3.19 DESIGN DRAWING AND MODEL REQUIREMENTS

Refer to Annexure PS351/A for detailed design drawing and model requirements for Delineation, Signposting and Roadside Furniture.

3.20 PERFORMANCE REQUIREMENTS

The design of delineation, signposting and roadside furniture must be appropriate for the climatic, lighting, travel speed (i.e. design speed), urban design and traffic conditions that can be reasonably be expected on the project.

3.20.1 Delineation

Delineation for the project must be designed to achieve the following:

(i) A high standard of definition of the through carriageways, particularly under adverse weather conditions.

(ii) Well marked intersections with layouts that clearly identify to motorists the manoeuvres required to load and unload from the through lanes.

(iii) Merge and diverge areas that are clearly visible.

(iv) Pavement wearing surfaces that combine with the delineation to give both audible and visual warnings that vehicles are moving out of a through lane.

3.20.2 Signing

Signing for the project must be designed to achieve the following:

(i) Be legible at the posted speed limits of the road taking into account the climatic conditions expected.

(ii) Colour and reflectivity that conforms to Australian Standards.

(iii) Provide a consistent message.

(iv) Incorporate signs associated with warnings, speed zones, place names, feature names and appropriate symbols.

(v) Provide motorists with progressive information (particularly where interchanges occur) and reassurance about the route selected and the trip distances involved.

(vi) Provide vertical clearances beneath signs which are adequate for the environment in which the sign is placed and complying with the Australian Standard.

(vii) Include foundations which are adequate for signs and their support structures (refer to PS361).

(viii) Include supporting structures that must collapse on impact where they are free standing and located within clear zones. Where the structures are not designed to collapse, protection is to be provided.

(ix) Sign support structures shall be designed in accordance with AS 1742.2 - Manual of uniform traffic control devices - Part 2: Traffic control devices for general use.

3.20.3 Roadside furniture

The design of roadside furniture must ensure the following:

(i) That the placement of road furniture in road verges is minimised.

(ii) Where non collapsible roadside furniture is located within the clear zone, it must be protected by a safety barrier.

4 TRAFFIC SIGNALS

4.1 OBJECTIVE

To ensure that the traffic signal system on the project safely and efficiently controls all traffic movements.

4.2 PURPOSE

To prepare a design of traffic signal layout that meets all project and RMS requirements.

4.3 DESIGN

The proposed layout for each TCS site is to be incorporated into the general plan layout.
The PSC must prepare detailed traffic signal drawings for each site, in accordance with this Specification and be developed in accordance with the design reference documents following the order of precedence as specified in PS301 - Scope and Requirements and the additional design reference documents listed in Annexure PS351/M and identify the following:

(i) Where pedestrian crossings are greater than 25m in length crossing and signal facilities need to satisfy the requirements of the Traffic Control Design manual for medians including minimum median widths.

(ii) Design vehicle turn paths.

(iii) Intersection operations, split approach or double diamond.

(iv) Traffic signal post type, location and appropriate offsets.

(v) Delineation requirements.

(vi) Median and corner island requirements

(vii) Turn bay storage requirements

(viii) Through movement and auxiliary (bus lane jump start etc.) requirements

In the case of reconstruction of existing traffic signals, RMS will provide the PSC with copies of the design drawings, cable installation drawings and cable connection chart for the existing installation

The traffic signal design must be co-ordinated with the road works detailed design to ensure that the details are consistent.

During the concept phase for the project, preliminary designs for the traffic signals in accordance with publication 08.092 Traffic Signal Design, Section 3-Design process, were prepared in order to assist in determining structure sizes and their locations and intersection layout. This information will be provided to the PSC.

HOLD POINT	
Process held:	Finalisation of traffic signal design and preparation of stage construction and proposed Duct/boring plans
Submission details:	Traffic control signal design drawings at 80% detailed. Hard copy drawings are to be accompanied by a CADD file compatible with Microstation V8i
Release of hold point	The RMS Representative will release the hold point following review of the traffic signal design drawings at 80% detailed stage and the incorporation of RMS comments by the PSC

Where the traffic signals are affected by the construction staging of road works, the PSC must prepare drawings showing the complete signal design for each stage of the road works construction.

The PSC must prepare, in accordance with 08.092 Traffic Signal Design, Section 4 proposed duct/boring plans showing the proposed position and size of all conduits and pits and the proposed position of signal posts, control equipment and electricity supply points. The positions must be dimensioned from property and kerb alignments or, preferably, a master alignment string from within the design model.

Note: This specification assumes that traffic signal Cable Installation plans and Cable Connection Charts required in 08.092 Traffic Signal Design will be prepared by the prequalified traffic signal construction contractor. Accordingly, preparation of Cable Installation plans and Cable Connection Charts is not included in the scope of the PSC work.

The PSC must confirm that the proposed traffic signal detailed design, including the structure foundation design and proposed Duct/boring plans, avoids any conflicts with existing or proposed utilities, drainage, awnings, trees and roadside furniture.

4.4 DETAILED DESIGN DRAWING AND MODEL REQUIREMENTS

Refer to Annexure PS351/A for the drawing and model requirements for Traffic Signals.

4.5 DESIGN LIFE

Refer to PS301 – Professional Service Scope and Requirements.

4.6 DESIGN DRAWING AND MODEL REQUIREMENTS

Refer to Annexure PS351/A for design drawing and model requirements for Traffic Signals.

5 STREET LIGHTING

5.1 OBJECTIVES

(i) To design a street lighting scheme in accordance with this Specification and be developed in accordance with the design reference documents following the order of precedence as specified in PS301 - Scope and Requirements and the additional design reference documents listed in Annexure PS351/M.

(ii) To provide a value for money lighting treatment based on road safety risk assessment.

(iii) To provide a cost effective and sustainable energy efficient lighting scheme.

5.2 GENERAL

The main carriageways of the project along with pedestrian paths and crossings require street lighting. Lighting also must be provided at intersections and as required for local roads and roundabouts.

All lighting must be designed in accordance with AS/NZS 1158 Lighting for Roads and Public Spaces.

The lighting subcategories for the project must be as specified in Annexure PS351/A.

Low loss control gear must be used.

The design of lighting must ensure that light spillage into residential properties and other sensitive areas is minimised.

5.3 LOCAL ROADS

Lighting of local roads at interchanges must be designed to be compatible with existing lighting systems.

Where the existing street lighting is modified, the final lighting scheme must not result in a standard of lighting less than that existing prior to the modifications.

Refer to City of Ryde, Macquarie Park Corridor, Public Domain Technical Manual for street lighting requirements and the installation of multi-function poles.

5.4 LIGHTING ON BRIDGES

Lighting on bridges must be located on the side of the deck with poles aligned behind the bridge rail.

Lighting may be required on the underside of bridges and underpasses. Lighting for bridges and underpasses must comply with AS1158. Light fittings susceptible to vandalism should be vandal proof.

Maritime navigation lighting may be required to be fixed to bridges. The PSC must determine the navigation light requirements (if any).

Aesthetic lighting of bridges may be required depending on the urban design requirements.

5.5 DESIGN REQUIREMENTS

Option 1 – Limited Access Freeways, RMS owns the asset

The street lighting design must be undertaken by a suitably qualified designer.

All lighting must be designed in accordance with AS/NZS 1158 and RMS QA specification R151-Street Lighting, RMS specification QA3851-Steel Tapered Lighting Columns and RMS Road Design Guide.

Option 2 - Non Limited Access Roads, Council owns the asset

All lighting must be designed in accordance with AS/NZS 1158 and the requirements of the energy authority and the local council. The PSC is to manage the design which is to be prepared by either the energy authority or a suitably qualified service provider. Where a suitably qualified service provider prepares the design, the PSC is to arrange third party (independent) verification of the street lighting design and to obtain written approval to the lighting design from the energy authority.

The design of the street lighting will be undertaken by the energy authority nominated in Annexure PS351.A6. During development of the detailed design the PSC must liaise with the nominated energy authority. The PSC must provide an electronic copy of the detailed design, in an acceptable format, to the nominated energy authority. The PSC must review and co-ordinate the design prepared by the nominated energy authority to ensure compliance with the project objectives and to ensure compatibility with the PSC's detailed design. The PSC must obtain approved design drawings from the nominated energy authority.

HOLD POINT	
Process held:	80% Detailed Lighting design
Submission details:	20% complete detailed lighting design
Release of hold point	The RMS Representative will release the hold point following review of the 20% complete lighting detailed design and incorporation of RMS comments by the PSC

HOLD POINT	
Process held:	100% Detailed Lighting design
Submission details:	80% complete detailed lighting design
Release of hold point	The RMS Representative will release the hold point following review of the 80% complete lighting detailed design and incorporation of RMS comments by the PSC

5.6 DESIGN LIFE

Refer to PS301 – Professional Service Scope and Requirements for details regarding design life requirements.

5.7 DETAILED DESIGN DRAWING AND MODEL REQUIREMENTS

Refer to Annexure PS351/C for the detailed designs drawing and model requirements for Street Lighting.

6 Traffic and transportation

6.1 OBJECTIVE

Assess the traffic and transportation patterns for the preferred route and interchange/intersection options and assess in detail the potential impacts of the project during construction and operation and produce a traffic and transportation assessment report.

6.2 DESIGN

(i) Carry out a detailed traffic/transportation study, including:

a. Review of existing traffic data and traffic models, if available

b. Review of historic traffic growth

c. Analyse the future traffic growth predicted to occur based on current and future land use

d. Analyse origin and destination survey data to ascertain predicted traffic volumes

e. Development of a detailed traffic model.

(ii) Analyse and optimise the traffic performance of the design including:

a. Level of service requirements.

b. Interchange/intersection requirements in both the short and long term.

c. Interchange/intersection options, both location and form including staged development.

d. Impact on accident rate and identified accident types in the study area.

e. Provision for public transport.

f. Provision for emergency vehicles.

g. Provision for cyclists/pedestrians.

h. Provision for other road users such as equestrians.

i. Heavy vehicles including B-doubles and truck stop facilities.

j. Local traffic.

k. Rest areas/service centres.

l. Construction staging.

m. Ancillary sites.

(iii) Analyse the impacts of the detailed design on traffic/transportation patterns including the impacts on the adjacent road network for all categories of road users and activities that interact with the project.

(iv) Analyse traffic impacts during construction.

(v) Produce a traffic and transportation assessment report. The report will need to be suitable for public display and for use as a working paper to the environmental assessment (EIS/REF), or alternatively form the basis of a separate report. For EIS projects, the report will be required to address the traffic and transport SEARs.

7 ROAD USER DELAY MANAGEMENT

7.1 DEFINITION

Within the context of "road user delay management" the definition of delay is:

"The difference between a driver's travel time through a section of road under normal conditions, and the travel time experienced when road works are in progress."

7.2 OBJECTIVES

(i) To ensure that road user delays are minimised during construction and operation of the project by ensuring throughout the detailed design process due consideration is given to minimising road user delays during construction and operation.

(ii) To ensure that this Specification and the appropriate design reference documents are used during the detailed design process to ensure design standards are maintained.

7.3 GENERAL

The PSC must design the works in such a way as to minimise the impacts on travel, by:

(i) Minimise speed limit reductions through the works in all hours and particularly when works are not occurring.

(ii) Minimising the likely road user delays during construction and future maintenance activities.

(iii) Maximising the performance of the route during the works construction period.

(iv) Maintaining access for the community.

(v) Including the requirement to minimise road user delays in the design.

(vi) Where possible, reverting the road to existing conditions during peak periods.

7.3.1 Pavement considerations

When pavement design parameters are being established, the likely delay costs during future routine maintenance activities must be identified and estimated. These costs must then be compared with the associated marginal pavement costs involved, such as the provision of concrete pavement throughout.

7.3.2 Design considerations

The PSC must ensure that:

(i) Any construction staging plans that are developed ensure the capacity of the roadway is maximised, and that existing capacity is not diminished, where possible.

(ii) Traffic control devices and roadside furniture are designed to ensure that future maintenance activities minimise potential road occupancy and road user delays.

7.3.3 ~~Bridge Considerations~~

~~The PSC must ensure that all bridge cost estimates include consideration of maintenance and operation. The capital costs associated with the provision of adequate dimensions on all bridge structures to provide sufficient clearance for vehicular use during maintenance activities must be assessed in comparison with the estimated road user delay costs involved.~~

7.3.4 Temporary alternative routes

A major determinant of road user delay is the availability of temporary alternative routes and/or side-tracks during construction and maintenance activities.

The PSC must identify and assess all reasonable temporary alternative routes to carry traffic around or through the work site. To ensure these routes are suitable, the assessment must consider the following factors, including, but not limited to:

(i) Alignment, grading and width.

(ii) Delineation and signposting requirements.

(iii) Pavement strength and condition (including an estimate of restoration costs).

(iv) Any restrictions on vehicle dimensions and weights.

(v) Any likely environmental impacts.

(vi) Timing and likely duration of operation.

(vii) The views of the Local Government.

(viii) Maintenance requirements.

The PSC must ensure that the design of the location of side-tracks on the project construction site must permit traffic to pass through or around the worksite without excessive delay. The potential for establishing side-tracks at individual work sites will depend primarily on the availability of clear space. This matter must be addressed in the development of the construction staging drawings.

Where upgrades of existing road infrastructure are required for temporary alternate routes and are located outside the extent or works, details of the upgrade requirements are to be included in the design report.

7.3.5 Haulage of road building materials

Major projects are likely to involve significant haulage of road and bridge building materials associated with the construction. The PSC must identify all potential haulage routes and their intersections with the main alignment/s and other access roads.

The PSC must consider all such likely routes, particularly where these routes intersect with or utilise the main alignment/s or other public roads to minimise road user impacts. Resultant likely haulage duration and possible road user delays must be estimated.

Where upgrades of existing road infrastructure are required for haulage and are located outside the extent or works, details the upgrade requirements are to be included in the design report.

7.4 ROAD USER DELAY MANAGEMENT REPORT

The Road User Delay Management Report must show that the road user delay strategies listed above have been fully considered and adequate attention has been given to minimising road user delay. This is to be a component of the detailed design report

8 CONSTRUCTION STAGING AND TRAFFIC MANAGEMENT

8.1 OBJECTIVES

(i) To develop a strategy and prepare drawings for construction staging and traffic management of the project construction. The drawings are to be limited to an area of work for a period of time, rather than a specific day to day operation of the site.

(ii) To define construction staging arrangements aimed at controlling the work and which seek to ensure the most efficient possible construction whilst minimising overall impacts on adjacent residents, businesses and road users.

8.2 DESIGN CONSIDERATIONS

The management of construction traffic on local roads will be an issue of concern for the Local Government and local residents. This requires the following issues to be considered:

(i) The development of measures to minimise and/or restrict the use of local roads by heavy vehicles involved in the project construction.

(ii) Designated vehicle access points from local roads to the site and heavy vehicle routes on local roads.

(iii) Maintaining local and residential access as much as practicably possible.

(iv) Design requirements are to be in accordance with the Traffic Control at Worksites – Version 4

8.3 CONSTRUCTION STAGING STRATEGY REPORT

The construction staging strategy report will include the preparation of construction staging and traffic management drawings for review by Roads and Maritime to confirm staging feasibility and practicality of construction. The report must include, but not be limited to:

(i) Impacts on traffic (including pedestrians, vehicles, public transport, pedal cyclists and disabled persons) including the staging of construction works to minimise lane closures during peak periods and delay to traffic.

(ii) Access to construction sites.

(iii) Heavy vehicle ingress and egress routes, entry and exit locations and the nature of loads.

(iv) Use of local roads by construction vehicles.

(v) Temporary traffic arrangements including intersections and property access.

(vi) Periods of operation and any necessary mitigating measures (if any), to compensate for the increased levels of noise, air pollution etc.

(vii) The provision of traffic barriers between working and trafficked areas, in order to meet WorkCover and WHS requirements, and installed to Roads and Maritime requirements.

(viii) A response plan which sets out the proposed response to any traffic, construction or other incident.

(ix) earthworks mass haul diagrams to illustrate the feasibility of the staging proposal.

(x) Appropriate review and amendment mechanisms.

(xi) A detailed level construction program reflecting the delivery strategy for the total construction and detailed construction arrangements for each delivery package.

HOLD POINT	
Process held:	Construction staging and traffic management planning
Submission details:	Construction staging strategy report
Release of hold point	The RMS Representative will release the hold point following review and consideration of the construction staging strategy report and the incorporation of RMS comments

Following the release of the hold point, the PSC must prepare construction staging / traffic management detailed drawings. The detailed drawings must show work areas and trafficked areas with traffic lane configuration, line marking, special signposting, and temporary connections to adjoining pavements and property.

The PSC must prepare cross sections drawings, with dimensions, at all critical locations allowing adequate offsets from barriers and take into consideration level differences between existing and finish surface levels including suitable temporary batter slopes nominated on the cross-section drawings. Cross section drawings must be prepared for each construction stage

The PSC must make use of earthworks mass haul diagrams to illustrate the feasibility of the staging proposal. The mass haul diagrams must take account of the information from the geotechnical investigations (quality of materials etc. refer PS331) and will be used in the preparation of quantities and estimates.

The PSC must plan construction staging to avoid delays that will inconvenience motorists or interfere with traffic during periods of heavy traffic flows. The PSC must comply with the Roads and Maritime's policy that stipulates that traffic capacity is not to be reduced during peak periods, and delays should be minimal out of peak periods. Refer also to Section 7 - Road User Delay Management for the requirements relating to road user delay management.

The construction staging / traffic management must take account of the potential impacts on adjacent property, including access to public roads and properties.

Temporary infrastructure requirements must be fully explored including batching plant sites, materials storage areas, temporary stockpile areas and areas for the disposal of unsuitable, acid sulphate and contaminated materials.

A construction program must be developed that reflects the delivery strategy for the total construction and detailed construction arrangements for each delivery package if applicable.

The construction staging report is to be a component of the detailed design report.

8.4 TRAFFIC MANAGEMENT PLANS

The PSC must consider the following, when developing staging and traffic management plans:

(i) Any previous constructability assessment review reports and issue register.

(ii) The use of appropriate turning path templates at intersections.

(iii) Temporary access to properties.

(iv) Temporary pavements to connect various stages.

(v) Temporary provision for pedestrians and cyclists.

(vi) Temporary provision for buses (i.e. bus stops etc.).

(vii) Clearance between work sites and traffic, provision of temporary traffic barriers as required.

(viii) The interaction of construction traffic with normal road traffic including heavy vehicle access points from local roads to the site and heavy vehicle routes on local roads.

(ix) The impact of construction activities that will be in progress and the construction methods.

(x) The locations of sources of construction materials.

(xi) Include viable alternatives that a construction contractor may consider, where they exist.

(xii) Indicative construction time schedule.

(xiii) Restrictions to work hours including hours allowed for blasting etc.

(xiv) Road occupancy licensing requirements.

(xv) Drainage – all areas under traffic to be effectively drained at all times.

(xvi) Temporary alternative routes (refer to section 7 - Road User Delay Management).

(xvii) Haulage of construction materials (refer to section 7 - Road User Delay Management).

(xviii) Provision of temporary signage, pavement markings and other forms of delineation.

8.6 DESIGN DRAWING AND MODEL REQUIREMENTS

Refer to Annexure PS351/C for the design drawing and model requirements for Construction Staging and Traffic Management.

9 PROPERTY WORKS

9.1 OBJECTIVES

(i) To ensure that the extent of the approved concept design and ultimately the detailed design footprint remains within the property boundaries.

(ii) To ensure that the adjacent land use, planning and zoning is compatible with the proposed design.

(iii) To advise RMS of any changes that may impact on, or be impacted by the design.

9.2 PROPERTY ADJUSTMENTS

There are 2 types of property adjustment:

(i) Property adjustments requiring property acquisition.

(ii) Property adjustments that only impact levels on the property boundary and don't require acquisition.

Prior to commencing property adjustment drawings, a detailed survey must be undertaken for each property to accurately locate all existing features in the affected area.

The PSC must, in consultation with RMS, prepare property adjustment drawings for use by RMS in negotiations with property owners. Separate drawings must be prepared for each property requiring adjustment.

The PSC must submit draft property adjustment drawings to suit RMS's timing for negotiations with property owners. It is essential that these drawings are prepared and discussed with owners early in the acquisition process to ensure that RMS has entry to the land when required.

The property adjustment drawings must show as a minimum:

(i) The address of the property, property description (lot/DP) and owner's name. (Note: the address of the property owner must also be included if the property occupant is not the owner).

(ii) A plan of the property showing all existing features in the affected area and the proposed work with set-out details.

(iii) A photo record of existing features.

(iv) Details of proposed work such as paths, driveways, fences, gates, retaining walls, drainage ~~and~~ landscaping, ***lighting,*** etc.

(v) Ensure that front boundary fences are fully contained within the owner's property, not on the road reserve.

(vi) Construction notes, listing the scope of work to be undertaken.

(vii) Box for property owner's acceptance of the proposed work.

(viii) car parking adjustments and their associated design as required

(ix) utility adjustments required

The design of the proposed work must comply with the Local Councils standards.

The PSC must monitor the impact of the detailed design on the adjacent land boundaries and immediately advise RMS of any change that will be required to the property adjustment drawings.

All adjustments agreed between RMS and property owners must be designed and incorporated into the property adjustment drawings and the construction contract tender documentation by the PSC.

9.2 PROPERTY ACQUISITION

Property boundaries have been established to provide sufficient land area to accommodate the land requirements of the design. The PSC must ensure that the physical extent of the design can be accommodated within these boundaries including items such as maintenance access, inspections, easement etc.

The PSC must advise RMS immediately if there is an unavoidable need to go outside of these boundaries for any reason. Where the footprint extends outside the existing boundaries, the PSC is to inform RMS of the following;

(i) The extent encroachment outside the road boundary.

(ii) Reason for the encroachment.

(iii) Alternative solutions and their impacts.

Where an adjustment is required to the existing or approved boundary, the PSC is to indicate on the drawings in metres the area of acquisition and corded dimensions.

The PSC must prepare sketches showing the proposed acquisition with survey co-ordinates, if amendments to the location of the boundaries are required. RMS will develop the boundary plans for approval and gazettal.

9.4 LAND USE PLANNING AND ZONING

A concept design may have been developed based on the land use and zoning that existed at the time. The PSC must confirm the status of the adjacent land use, and zoning, and then monitor any changes that may impact on, or will be impacted by the detailed design.

The PSC must advise RMS immediately of details and a recommended solution, and if necessary make changes to the detailed design.

9.5 FIXING OR VARY LEVELS

The PSC must discuss with the RMS Representative the procedure for fixing or varying of levels where level changes may interfere with frontages and entrances to private property or drainage conditions (especially flooding) under the provisions of the Roads Act 1993.

9.7 DETAILED DESIGN DRAWING AND MODEL REQUIREMENTS

Refer to Annexure PS351/A for the detailed design drawing and model requirements for Property Works.

10 INDEPENDENT VERIFICATION

Refer to PS301 for details regarding independent verification.

ANNEXURE PS351/A – PROJECT SPECIFIC REQUIREMENTS

A1 PROJECT DETAILS

Table PS351.A1 – Project Details

Project Name	***Macquarie Park Bus Priority and Capacity Improvement Project - Stage 2***
Project Number	***P.0023019***
Location	***Epping Road, Herring Road, Waterloo Road and Lane Cove Road, Macquarie Park***
Local Council	***Ryde Council***
Length (size) of the project	***MR 373 Epping Road to MR 162 Lane Cove Road via Herring Road (7486) and Waterloo Road at Macquarie Park and MR 162 Lane Cove Road from Waterloo Road to Epping Road.*** ***Project length approximately 2.8km.***
Project features	• ***Upgrade of the state and local road network in the Macquarie Park precinct to improve travel times and reliability for buses and for other road users*** • ***3 new signalised intersections and upgrades to the existing signalised intersections*** • ***Installation of bus lanes and road widening with improved pedestrian and cyclist crossing facilities at signalised intersections*** • ***Partial (strip) property acquisitions along Herring Rd, Waterloo Road, Byfield St, Khartoum Rd and Lane Cove Rd to enable the road widening and intersection upgrade works*** • ***Service relocations to allow kerb relocation and lane widening***

Refer PS301: Professional Services for Detailed Design Scope and Requirements, Annexure PS301/A for project details, background and project specific requirements.

A2 DETAILED DESIGN DRAWING AND MODEL REQUIREMENTS

Table PS351.A2 – Design Requirements

Element (D=Drawing) (M=Digital Model)	Drawing Stage 20% (D/M)	Drawing Stage 80% (D/M)	Drawing Stage 100% (D/M)	Comments
Road Feature - Existing				
Edge of Carriageway including medians / islands kerb profile (lip line)	DM	DM	DM	As per Survey
Edge of Carriageway including medians	DM	DM	DM	

Element (D=Drawing) (M=Digital Model)	Drawing Stage 20% (D/M)	Drawing Stage 80% (D/M)	Drawing Stage 100% (D/M)	Comments
/ islands kerb profile (Gutter line)				
Edge of Carriageway including medians / islands full kerb profile	DM	DM	DM	
Shoulder	DM	DM	DM	
On Road cycleway	DM	DM	DM	
Kerb ramps	DM	DM	DM	
Existing drainage pits	DM	DM	DM	
Drainage pipe network	DM	DM	DM	
Culverts	DM	DM	DM	
Headwalls	DM	DM	DM	
Pavement types (concrete/flexible)	DM	DM	DM	
Safety Barriers	DM	DM	DM	
Above ground utility information	DM	DM	DM	
Underground utility information	DM	DM	DM	Information to be obtained by Dial Before You Dig drawings. Utility information is to be included on the drawing such a utility type and size.
Lane lines	DM	DM	DM	As per Survey
Pavement arrows	DM	DM	DM	
Other pavement markings (bike lanes etc.)	DM	DM	DM	
Direction al Signposting	DM	DM	DM	
Guide / Regulatory / Warning signposting	DM	DM	DM	
Shared path signposting	DM	DM	DM	
Other signposting (rest area, tourist etc.)	DM	DM	DM	
footpath	DM	DM	DM	
Shared path	DM	DM	DM	
Off road cycleway	DM	DM	DM	
Existing road boundary	DM	DM	DM	
Fencing (pedestrian, safety etc.)	DM	DM	DM	

Element (D=Drawing) (M=Digital Model)	Drawing Stage 20% (D/M)	Drawing Stage 80% (D/M)	Drawing Stage 100% (D/M)	Comments
Fencing other (e.g. fauna, etc.)	DM	DM	DM	
Retaining wall location	DM	DM	DM	
Landscaping areas	DM	DM	DM	
Road side furniture	DM	DM	DM	
Road Feature Proposed				
Control String	DM	DM	DM	The control string is to be relative to the proposed design feature e.g. if a right turn is proposed the control sting is to be the adjoining through lane
Edge of Carriageway including medians / islands kerb profile (lip line)	D	DM	DM	
Edge of Carriageway including medians / islands kerb profile (Gutter line)	D	DM	DM	
Edge of Carriageway including medians / islands full kerb profile	D	DM	DM	
Shoulder	D	DM	DM	
On Road cycleway	D	DM	DM	
Kerb ramps	D	DM	DM	
New / amended drainage pits	No	DM	DM	
New amended drainage pipe network	No	DM	DM	
New / amended culverts	No	DM	DM	
New / Amended Headwalls	No	DM	DM	
Subsurface drainage	No	DM	DM	***RMS requirements to apply to the Ryde Council owned roads***
Pavement– full depth	No	DM	DM	
Pavement – mill / resheet	No	DM	DM	
Above ground	D	D	D	However, the likely impacts on the

Element (D=Drawing) (M=Digital Model)	Drawing Stage 20% (D/M)	Drawing Stage 80% (D/M)	Drawing Stage 100% (D/M)	Comments
utility information				existing utilities are to be included on the drawings e.g. relocate power pole indicating type of voltage or description where possible.
Underground utility information	D	DM	DM	However, the likely impacts on the existing utilities are to be included on the drawings e.g. relocate gas main
TCS requirements	D	DM	DM	See Section 4 of this specification for TCS drawings requirements (TCS Hardware only e.g. signal posts)
Delineation - Proposed				
Lane lines	D	DM	DM	As a CAD element
Pavement arrows	D	D	D	As a CAD element
Stop lines, pedestrian crossings	D	DM	DM	As a CAD element
Other pavement markings (bike lanes etc.)	D	DM	DM	As a CAD element
Directional Signposting	D	D	D	As a CAD element
Guide / Regulatory / Warning signposting	D	D	D	As a CAD element
Shared path signposting	D	D	D	As a CAD element
Non-standard sign faces	D	D	D	As a CAD element
Other signposting (rest area, tourist etc.)	D	D	D	As a CAD element
Safety Barriers	D	DM	DM	
Footway feature - Proposed				
Footpath	D	DM	DM	
Shared path	D	DM	DM	
Footway	D	DM	DM	
Off road cycleway	D	DM	DM	
Verge / rounding	D	DM	DM	
Design interface	D	DM	DM	
Proposed road boundary	D	DM	DM	
Fencing (pedestrian, safety etc.)	D	DM	DM	
Fencing other (e.g. fauna, etc.)	D	DM	DM	
Retaining wall	D	DM	DM	

Element (D=Drawing) (M=Digital Model)	Drawing Stage 20% (D/M)	Drawing Stage 80% (D/M)	Drawing Stage 100% (D/M)	Comments
location				
Landscaping areas	D	DM	DM	
Road side furniture	D	DM	DM	
Other				
Street Lighting layout	No	D	D	
Turn paths and turn path combinations	D	D	D	As a separate drawing for each intersection layout.
Typical cross section	D	D	D	As a CAD element. The typical cross section is to be submitted for concurrence prior to commencement of the 20% design stage. As per section 2.4 – Typical Cross Sections
Long section of main control strings for all main roads and side streets affect by the proposal.	DM	DM	DM	Where MX modelling data such as survey, contour, etc. is provided.
Other long sections (Retaining walls, etc.)	No	DM	DM	Where MX modelling data such as survey, contour, etc. is provided.
Drainage long sections	No	DM	DM	Long sections to be provided along all drainage lines
Cross sections of main control strings for all main roads and side streets.	No	DM	DM	Cross sections at ~~40m~~ ***20m intervals along straight sections and 10m intervals around curves, between tangent points at intersections*** and other critical points
Other cross sections	No	DM	DM	
Contours	No	DM	DM	Contours to be provided on regular intervals such as 0.1m. Flow arrow is also to be provided.
Construction staging – note 50% commencement submission point				
Temporary signposting Guide / Regulatory / Warning	D	D	D	As a CAD element
Temporary pavement markings.	D	DM	DM	As a CAD element
Side track Control lines (including longsection)	DM	DM	DM	
Edge of Side tracks	D	DM	D	Logos/ symbols to be provided as a CAD element
Pedestrian facilities	D	DM	D	Logos/ symbols to be provided as a

Element (D=Drawing) (M=Digital Model)	Drawing Stage 20% (D/M)	Drawing Stage 80% (D/M)	Drawing Stage 100% (D/M)	Comments
				CAD element
Bicycle facilities	D	DM	D	Logos/ symbols to be provided as a CAD element
Turn paths and turn path combinations	D	D	D	As a separate drawing for each intersection layout.
Typical cross section	D	D	D	As a CAD element

A3 ROAD DESIGN CRITERIA

The main carriageways, ramps and side roads, including ***footways and share paths*** ~~bridges,~~ must be designed to comply with the ~~following~~ design criteria and requirements ***in the Macquarie Park Bus Priority and Capacity Improvement Stage 1 - AFC Detail Design Report***.

In particular Sections:

- ***3.3 Design Guidelines***
- ***3.5 Design Speed***
- ***3.6 Geometric Design Criteria***
- ***3.7 Design Vehicle and Turning Paths***
- ***3.8 Lane Widths***
- ***3.9 Median Type***
- ***3.10 Road Cross-fall – note comment on cross-falls being addressed in this Stage 2 design work***

In addition, the following additional design standards have been agreed in the Stage 1 design and must be included in the Stage 2 design:

- ***At intersections, all pram ramps in accordance with RMS standards***
- ***Subsurface drainage to the City of Ryde Council owned roads must be in accordance with PS241.2.2.11***

All existing footways along City of Ryde Council owned roads, affected by the work (including grass verges), must be design with full footway width granite paving or concrete, like material finish for like material finish.

~~Table PS351.A3 Road Design Criteria~~

~~Main Carriageway~~			
~~Design Element~~	**~~Minimum Design Criteria~~**	**~~Design Element~~**	**~~Minimum Design Criteria~~**
~~Posted Speed~~	~~Inset number km/h~~	**~~Design Speed~~**	~~Inset number km/h~~
~~Lane Widths~~	~~Inset number m~~	**~~Median Width~~** ~~(A)~~	~~Inset number m~~
~~Left Turn Auxiliary Lane Widths~~	~~Inset number m~~	**~~Right Turn Auxiliary Lane Widths~~**	~~Inset number m~~
~~Nearside (Outside) Shoulder Width~~	~~Inset number m~~	**~~Offside (Median) Shoulder Width~~**	~~Inset number m~~
~~Ramps~~			

Lane Widths	Inset number m	**Auxiliary Lane Widths**	Inset number m
Nearside (Outside) Shoulder Width	Inset number m	**Offside (Median) Shoulder Width**	Inset number m
Side Road 1			
Design Element	**Minimum Design Criteria**	**Design Element**	**Minimum Design Criteria**
Posted Speed	Inset number km/h	**Design Speed**	Inset number km/h
Lane Widths	Inset number m	**Median Width**	Inset number m
Left Turn Auxiliary Lane Widths	Inset number m	**Right Turn Auxiliary Lane Widths**	Inset number m
Nearside (Outside) Shoulder Width	Inset number m	**Offside (Median) Shoulder Width**	Inset number m

(a) Minimum median width refers to the minimum effective median width at the typical section of the road and does not take into account treatments for auxiliary lane.

Side Road 2			
Design Element	**Minimum Design Criteria**	**Design Element**	**Minimum Design Criteria**
Posted Speed	Inset number km/h	**Design Speed**	Inset number km/h
Lane Widths	Inset number m	**Median Width**	Inset number m
Left Turn Auxiliary Lane Widths	Inset number m	**Right Turn Auxiliary Lane Widths**	Inset number m
Nearside (Outside) Shoulder Width	Inset number m	**Offside (Median) Shoulder Width**	Inset number m
Minimum Pedestrian Crossing length	In accordance with the TCS Design Manual Section 11	**Minimum median widths for staged pedestrian crossings.**	In accordance with the TCS Design Manual Section 11

A4 DESIGN VEHICLE AT INTERSECTIONS

The main carriageways, ramps and side roads, including ***footways and share paths*** bridges, must be designed to comply with the following design criteria and requirements ***in the Macquarie Park Bus Priority and Capacity Improvement Stage 1 - AFC Detail Design Report***.

In particular Sections:

- ***3.3 Design Guidelines***
- ***3.5 Design Speed***
- ***3.6 Geometric Design Criteria***
- ***3.7 Design Vehicle and Turning Paths***
- ***3.8 Lane Widths***
- ***3.9 Median Type***
- ***3.10 Road Cross-fall – note comment on cross-falls being addressed in this Stage 2 design work***

- ***Section 5.7 Street Lighting***

In addition, the following additional design standards have been agreed in the Stage 1 design and must be included in the Stage 2 design:

- ***At intersections, all pram ramps in accordance with RMS standards***
- ***Subsurface drainage to the City of Ryde Council owned roads must be in accordance with PS241.2.2.11***

~~Table PS351.A4 Design Vehicle~~

~~Location (add road names)~~	~~Design Vehicle~~	~~Checking Vehicle~~
~~Main Road to Main Road~~	~~Insert Vehicle~~	~~Insert Vehicle~~
~~Main Road to Secondary Road~~	~~Insert Vehicle~~	~~Insert Vehicle~~
~~Main Road to Local Road or Local Road to Main Road~~	~~Insert Vehicle~~	~~Insert Vehicle~~

A5 BICYCLE AND PEDESTRIAN FACILITIES

The PSC must design the following Bicycle and pedestrian facilities:

All existing share path and pedestrian facilities, affected by the design must be upgraded, in consultation with City of Ryde Council, in accordance with the City of Ryde Council Standard Drawings and Specification and/or RMS specifications.

~~Table PS351.A5 Bicycle and Pedestrian Facilities~~

~~Road Name~~	~~Type~~	~~Location~~	~~Side of Road~~	~~On/Off Road~~	~~Width~~
~~Insert Road Name~~	~~Insert Type~~	~~Insert Chainage~~	~~Insert Nearside / offside~~	~~Insert On/Off~~	~~Insert Width m~~

A6 LIGHTING SUBCATEGORIES

The lighting levels must be designed to comply with the ~~following~~ design criteria and requirements ***in Section 5.7 Street Lighting of the Macquarie Park Bus Priority and Capacity Improvement Stage 1 - AFC Detail Design Report. In particular:***

- ***Main arterial and distributor roads designed to subcategory V3.***
- ***Local and collector roads and pedestrian areas and share paths designed to subcategory P2.***
- ***Where the relocation of Street Lighting poles is required in the vicinity of Sydney Metro Transport Interchanges category P1 is adopted for pedestrian walkways.***

Refer to the City of Ryde, Macquarie Park Corridor, Public Domain Technical Manual and the City of Ryde Standard Drawings and Specifications for street lighting requirements for the installation of multi-function poles. New street lights must be City of Ryde multi-function poles. Existing Energy Authority street lights requiring relocation must be replaced with City of Ryde multi-function poles.

~~**Table PS351.A6 Lighting Subcategories**~~

~~**Location**~~	~~**AS/NZS 1158 Lighting Subcategory**~~
~~**Energy Authority**~~	
~~**Mainline Carriageways**~~	
~~**Intersections**~~	
~~**Side Road 1**~~	
~~**Side Road 2**~~	
~~**Cycle Paths**~~	

A7 PROPERTY WORKS

Partial (strip) property acquisitions are required to allow for the construction of the works. Refer to the Property Acquisition Schedule for details of the number of properties requiring acquisition, meetings required and property adjustment categories.

The PSC will be required to:

- ***Attend on-site meetings with RMS and the property owner or agent.***
- ***Develop property adjustment designs, drawings and documentation to enable the property adjustments to be constructed.***
- ***Co-ordinate the property adjustment design with the overall project design as required, in particular at the property boundary interfaces, to ensure a seamless transition between the footpaths/road reserves and the adjacent properties.***

ANNEXURE PS351/B – PAYMENT

Payment will be made for all costs associated with completing the work detailed in this Specification in accordance with the Pay Item(s) in **PS301**.

Where no specific pay items are provided for a particular item of work, the costs associated with that item of work are deemed to be included in the rates and prices generally for the works.

ANNEXURE PS351/C – SCHEDULES OF HOLD POINTS, WITNESS POINTS, DELIVERABLES, MEETINGS AND WORKSHOPS

C1 SCHEDULE OF HOLD POINTS AND WITNESS POINTS

The PSC must give the RMS Representative at least five working days written notice prior to reaching any hold point for which a release by the RMS Representative is required. Only items with a **Y** are required for this project.

Table PS351.C1 – Hold Point Requirements

Clause	Type	Description	Required
2.4	Hold	Detailed Design Typical Cross-Sections	Y
3.2	Hold	Signposting and Delineation Detailed Design	Y
4.3	Hold	Finalisation of traffic signal design and preparation of stage construction and proposed duct/boring plans	Y
5.5	Hold	80% Detailed Lighting Design	Y
5.5	Hold	100% Detailed Lighting Design	Y
8.3	Hold	Construction staging and traffic management plans	Y

C2 SCHEDULE OF DELIVERABLES AND SUBMISSION DETAILS

The PSC must give the RMS Representative at least ten working days to review all deliverables identified in the table below. Only items with an ☑ are required for this project.

Table PS351.C2 – Deliverables and Submission Details

Section	Description of Deliverable	Delivery timeframe	Required Y/N
3	Detailed signposting and delineation scheme	To be included in the Road Furniture drawings in the 80% submission.	***Y***
3	Detailed Signposting and Delineation report	To be included in the 80% Design Report onwards.	***Y***
4	Detailed Traffic Signal Layout	To be included in the Road Furniture drawings in the 80% submission	***Y***
5	Detailed Street Lighting Layout	To be included in the Road Furniture drawings in the 80% submission.	***Y***
~~6~~	~~Traffic and Transport Assessment Report~~	~~To be included in the 20% submission.~~	***N***
~~6~~	~~Microsimulation model / Detailed traffic model~~	~~To be included in the 80% submission.~~	***N***
7	Road User Delay Management	To be included in the 80% Design	***Y***

Section	Description of Deliverable	Delivery timeframe	Required Y/N
	Report.	Report onwards.	
8	Construction Staging and Strategy Report	To be included in the 80% Design Report onwards.	***Y***
8	Construction Staging Traffic Management Plans	To be included in the 80% submission onwards.	***Y***
8	Construction staging and traffic management independent verification requirements.	To be included in the 80% Design Report onwards.	***Y***
9	Marked up property plans for amendments to the detailed design	If required to be included in the ~~20~~ ***50%*** and 80% submissions.	***Y***
9	Property Acquisition Sketches	If required, to be included in the 20% and 80% submissions.	***Y***
9	Documentation of changes to boundaries, property adjustments, land use / zoning.	If required, to be included in the 80% submission.	***Y***

C3 SCHEDULE OF MEETINGS REQUIRED

Refer to PS301/A and PS301/C for meeting and workshop requirements and details.

Table PS351.C4 – Meeting Requirements

Clause	Description of Meeting	Required	Location	Expected Duration
	Refer PS301/A and PS301/C			

C4 SCHEDULE OF WORKSHOPS REQUIRED

Refer to PS301/A and PS301/C for meeting and workshop requirements and details.

Table PS351.C4 – Workshop Requirements

Clause	Description of Workshops	Required	Location	Expected Duration
	Refer PS301/A and PS301/C			

ANNEXURE PS351/M – REFERENCE DOCUMENTS & SUPPORTING INFORMATION

M1 DESIGN REFERENCE DOCUMENTS

Refer to clause 1.4.2

Roads and Maritime Technical Directions and Quality Alerts

TD2003/RS01 Signposting of Rest Areas, Driver Reviver Sites and other Rest Stops

Roads and Maritime Design Guides

03.286 NSW Bicycle Guidelines

Delineation Manual

Traffic Control at Worksites Manual Version 4

Guide to Signposting

NSW Speed Zoning

Tourist Signposting Guidelines

Traffic Signal Design manual

NSW Transport Management centre – Road Occupancy Manual

Pacific Highway Road User Delay Management Guidelines

Roads and Maritime Standard Drawings

Standard Drawings

Roads and Maritime Specifications

R151 Street Lighting

QA3851 Steel Tapered Lighting Columns

Austroads Guides

AP-G34/06 Austroads Design Vehicles & Turning Path Templates 2006

Australian Standards

All City of Ryde Specifications and Standards including:

- ***City of Ryde Stormwater and Floodplain Management, City of Ryde***
- ***Council Stormwater and Floodplain Management Technical Manual***

- ***City of Ryde Standard drawings and specifications***
- ***City of Ryde, Macquarie Park Corridor, Public Domain Technical Manual***
- ***City of Ryde Development Control Plan 2014 Part 8.3 Driveways***
- ***City of Ryde Development Control Plan 2014 Part 8.5 Civil Works***

M2 REFERENCE DOCUMENTS

Refer to clause 1.4.2

Property Acquisition Schedule

M3 SUPPORTING INFORMATION

Refer to clause 1.4.2