

PART D20
DESIGN ROADWORKS

CONTENTS

1. GENERAL
2. ROAD GEOMETRY
3. STORMWATER
4. EARTHWORKS
5. ROAD PAVEMENT
6. ROAD SIGNS AND PAVEMENT MARKING
7. BARRIERS
8. ROAD LIGHTING
9. CONDUIT SYSTEMS
10. INTELLIGENT TRAFFIC SYSTEM COMMUNICATIONS NETWORK
11. TRAFFIC SIGNALS
12. HOLD POINTS
13. RECORDS

1. GENERAL

- .1 This Part specifies the requirements for the design of roadworks and associated infrastructure, including facilities for pedestrians and cyclists.

2. ROAD GEOMETRY**References**

- .1 Unless specified otherwise, all design must be undertaken in accordance with the following:
 - (a) DPTI: Road Design Standards and Guidelines.
 - (b) DPTI: Pavement Marking Manual (Refer <http://www.dpti.sa.gov.au/documents/tass>).
 - (c) Austroads: Guide to Traffic Management.
 - (d) Austroads: Guide to Road Design.
 - (e) AS 1428 "Design for Access and Mobility".
 - (f) DPTI Guidelines for Disability Access in the Pedestrian Environment (Refer: <http://www.dpti.sa.gov.au/documents/tass>).
 - (g) Austroads: Design Vehicles and Turning Path Templates.
- .2 DPTI Design Standards / Guidelines are available from: <http://www.dpti.sa.gov.au/standards/roads-all>. The contractor shall be responsible for all elements of the geometric design of the roads as outlined by the Principal.

Records

- .3 The following records must be provided to the Principal:

Certificates

- (a) DPTI Design Certificate (Level 1) – submitted with the final drawings
- (b) Design to Survey Compliance Checklist – submitted with the final drawings
- (c) Presentation Review Checklist – submitted with the genio file of the design model
- (d) **Drawings** The drawings described in the DPTI: Road Design Standards and Guidelines.
- (e) As constructed drawings.

Reports

Surveys or reports which address:

- (f) road capacity analysis;
- (g) Level of Service (LOS);
- (h) traffic control and signal analysis;

- (i) intersection performance;
- (j) traffic barriers;
- (k) incident and emergency management and integration with emergency services; and
- (l) traffic weaving analysis.

3. **STORMWATER**

References

- .1 Unless specified otherwise, the design of stormwater infrastructure must be undertaken in accordance with the following:
 - (a) DPTI Design Standard: Stormwater Design DD3100.
- .2 Where the work under the Contract includes the alteration to natural watercourses and / or the design and hydraulic modelling of any modifications to any of the existing constructed stormwater network which is the responsibility of a Drainage Authority (including any constructed basins /wetlands), the Contractor must:
 - (a) undertake the design in consultation with all relevant Drainage Authorities;
 - (b) obtain written approval of any alterations to the council stormwater system and any natural watercourses from all relevant Drainage Authorities; and
 - (c) provide copies of all approvals to the Principal (who will forward these to the DPTI Stormwater Group).

Records

- .3 The following records must be provided to the Principal:
 - Drawings**
 - The drawings described in the DPTI: Road Design Standards and Guidelines (in particular all requirements listed in DD 300 "Stormwater Design").
 - As constructed drawings.
 - Drawing of any temporary drainage and/or sedimentation control devices required to comply with the SEDMP.

Reports

Drainage calculations in relation to drainage system capacity.

Design reports describing:

- the management of the roadway drainage;
- any water sensitive urban design elements and water quality analysis; and
- assessment of hydraulic grade lines, design flood events, stream velocities and scour protection.

Copies of all electronic input and output files applicable to the final design.

Stormwater Treatment Infrastructure (STI)

The contractor must submit information, in the form of proformas, which record physical details and maintenance requirements for any stormwater treatment devices that are associated with the works.

The Contractor must update the Stormwater Treatment Infrastructure (STI) manual by completing a "New Stormwater Treatment Infrastructure Location – Part A3 – Template" and a "New Stormwater Treatment Infrastructure Type – Part 4A – Template" if not already included in the manual (Refer: http://www.dpti.sa.gov.au/standards/environment?result_40034_result_page=2).

Implementation Records

Approvals from the Drainage Authorities (to be submitted prior to the conclusion of the relevant design stage).

4. **EARTHWORKS**

References

- .1 Unless specified otherwise, the design of earthworks for roads must be undertaken in accordance with the following:
 - (a) DPTI Design Standard: Earthworks for Roads EW100.

Records

- .2 The following records must be provided to the Principal:

Drawings

- Drawings specified in EW100.
- Drawings of any temporary earthworks, including settlement limiting or accelerating methods or dewatering temporary works.
- As constructed drawings.

Reports

- Design Report (refer EW100).

Implementation Records

- Settlement records (where specified).

5. ROAD PAVEMENT**References**

- .1 All pavements must be designated on Pavement Treatment drawings in accordance with DPTI Road Design Standards and Guidelines and on Pavement Schedules, as required by Part R20 Roadworks. Examples of these Schedules are included in the DPTI Supplement to the Austroads Guide to Pavement Technology Part 2: Pavement Structural Design, Tables 11.1 & 11.2
- .2 Unless specified otherwise, all design must be undertaken in accordance with the following:
- (a) DPTI - Pavement Design: "Supplement to the Austroads Guide to Pavement Technology Part 2: Pavement Structural Design" ("DPTI Design Supplement").
 - (b) DPTI - Pavement Rehabilitation: "Supplement to the Austroads Guide to Pavement Technology Part 5: Pavement Evaluation and Treatment Design" ("DPTI Rehabilitation Supplement").
 - (c) DPTI – Guide to Bikeway design, Construction and Maintenance for South Australia.
 - (d) CIRCLY Version 5 or later.
 - (e) Austroads: Guide to Pavement Technology Part 2: Pavement Structural Design, ("Austroads Design Guide").
 - (f) Austroads: Guide to Pavement Technology Part 5: Pavement Evaluation and Treatment Design, ("Austroads Rehabilitation Guide").
- .3 The following applies to concrete pavements only
- (a) RMS: Concrete Pavement Jointing and Structural Layout – Standard Details:
 - (i) Volume 1 – Continuously Reinforced Concrete Pavements (Drawings MD.R84.CC.A); and
 - (ii) Volume 2 – Plain Concrete Pavements (Drawings MD.R83.CP.A).
 - (b) RMS: Interim Guide to the Maintenance of Concrete Pavements.
 - (c) RMS: Guide to the Design & Construction of Concrete Roundabout Pavements.
 - (d) RMS: Concrete Pavement Manual - Design and Construction, Edition 2.
 - (e) Chapter 9 - RMS "Supplement to AUSTROADS Guide to Structural Design of Road Pavements".

Design Requirements

- .4 The pavement design must give consideration to:
- (a) geotechnical conditions;
 - (b) pavement drainage requirements;
 - (c) pavement construction tolerances;
 - (d) pavement construction staging requirements;
 - (e) detailing to minimise future pavement maintenance activities; and
 - (f) environmental requirements, including noise.
- .5 Pavements must extend under all painted and raised medians where the medians are less than 2 m in width.

Materials**Granular Materials**

- .6 Granular Materials must comply with Part R15 Supply and Delivery of Pavement Materials.

Cement Treated Materials

- .7 Cement Treated Materials must comply with R15 Supply and Delivery of Pavement Materials.
- .8 Cement treated virgin quarry materials must be PM1/20 or PM2/20 treated with not less than 4% blended cement (GB) binder. Cement treated recycled materials must be PM1/20 treated with not less than 4.5% blended cement (GB) binder.

Asphalt

- .9 Asphalt must comply with Part R27 Supply of Asphalt.
- .10 An asphalt wearing course must include an appropriate Polymer Modified Binder (PMB) in accordance with DPTI - Pavement Design Supplement.
- .11 Asphalt mixes with RAP incorporation must have the same modulus and fatigue constant values as the equivalent mix with virgin materials.
- .12 Pavements consisting of asphalt over cement treated subbase layers a minimum of 3 layers of asphalt must be provided.
- .13 Individual layer thickness must be rounded up or down to the nearest 5 mm. The total asphalt thickness must be rounded up to the nearest 5 mm.
- .14 Asphalt wearing course of new pavements and overlays must be Medium Duty and Light Duty of High Modulus Asphalt using PMB A5E for 50 m approaching signalised intersections.
- .15 A sprayed seal or SAMI (as appropriate) must be provided as a waterproofing layer below a Stone Mastic Asphalt or Open Graded Asphalt wearing course.

Spray Seals

- .16 Spray seals must comply with Part R26 Application of Sprayed Bituminous Surfacing. Spray seals must be designed in accordance with Part R33 Design of Spray Seals.

Fill Material Properties

- .17 The maximum allowable design modulus for fill materials is 100 MPa.
- .18 The design CBR of any particular fill material must not be greater than two thirds of the Characteristic Strength. The Characteristic Strength of a fill material is defined as the tenth percentile value (i.e. mean – 1.3 x standard deviation) of the laboratory 4-day soaked CBR results from at least 6 samples. The samples must be taken in accordance with Test Procedure TP226 with at least one sample from each of 6 Lots.
- .19 For recycled fill materials (i.e. those comprising demolition concrete, brick, asphalt, and reprocessed industrial by-products) the conditions for use and the design CBR value must be subject to prior approval.

Concrete

- .20 Any concrete pavement must comply with:
- (a) Lean mix concrete sub base – RMS Specification R82
 - (b) Jointed concrete base – RMS Specification R83
 - (c) Continuously reinforced concrete base – RMS Specification R83

Pavement Design Adjustment

- .21 The minimum calculated design thickness must be increased by 10 mm, which must be added to the pavement layer that governs the overall allowable loading (Critical Pavement Layer).

Pavement Construction Tolerances

- .22 Construction tolerances must be specified such that:
- (a) the allowable constructed thickness of individual pavement layers cannot result in the pavement life being less than the design life specified in the Project Design Brief; and

- (b) the thickness of the Critical Pavement Layer cannot be less than that determined and adjusted by 10 mm in accordance with Clause 7 "Pavement Design Adjustment".

Utilisation of Existing Pavement

- .23 Rehabilitation treatments and analysis of existing pavements must be designed using deflection testing at appropriate load levels and test intervals, and using mechanistic models where applicable.

Hold Points

- .24 The following is a summary of Hold Points referenced in this clause:

CLAUSE REF.	HOLD POINT	RESPONSE TIME
4.8	Provision of the insitu subgrade strength	10 Working Days

Records

- .25 The following records must be provided to the Principal:

Drawings

Pavement Treatment drawings, which at a minimum include:

- (a) diagrammatic representation of each pavement type with full layer description (including inter layer treatment);
- (b) details of treatment at interfaces between different pavements and with existing pavements;
- (c) pavement layout plans;
- (d) as constructed drawings; and
- (e) where concrete pavement is used, concrete pavement jointing plans, including concrete type, joint type, joint tie-bar spacings, concrete pavement construction notes, joint set-out details, location of traffic lanes in relation to joints, typical details at concrete anchors and edges of slabs, sawcut widths/depths/sealants for joints, slab reinforcement, details for odd-shaped slabs.

Reports

Pavement designs must be supported by a comprehensive Pavement Design Report including:

- (f) clear and concise design methodology and assumptions made for each pavement type, design calculations, geotechnical input, material values adopted, sources of data, reference documents etc.;
- (g) allowable traffic loadings for each pavement type;
- (h) verification details;
- (i) the components detailed in the DPTI - Pavement Design Supplement, Sections 8.6 or 9.8 for flexible or rigid pavements respectively;
- (j) details of pavement interface treatments between different pavement types;
- (k) discussion of any geotechnical issues which may affect pavement performance, including subgrade support, any foundation treatments, any specific requirements for fill material, site investigation and testing program to verify that actual subgrade conditions are consistent with design assumptions etc.;
- (l) assessment of the impact of likely residual and differential settlement of any supporting foundation which may affect pavement performance;
- (m) discussion of any pavement drainage issues which may affect pavement performance;
- (n) discussion of any anchorage requirements and edge effects for concrete pavements;
- (o) discussion of any jointing issues which may affect concrete pavement performance;
- (p) discussion of effect of construction tolerances on pavement performance;
- (q) fully detailed Pavement Work Schedules (refer Clause 11.1.1 of the DPTI - Pavement Design Supplement) for each pavement type;
- (r) details of any construction staging requirements; and
- (s) details of any special construction techniques or processes.

6. ROAD SIGNS AND PAVEMENT MARKING

General

.1 This clause specifies the requirements for the design of the pavement marking of roadworks and permanent Road Signs.

.2 The following definitions apply:

"**Road Sign**" includes route numbering, road naming, destinations, direction, regulatory and warning signing, hazard markers and sight boards, guideposts and kilometre posts and other devices for the purpose of regulating, warning, and guiding traffic.

"**V/CMS**" means a Variable Message Sign and / or Changeable Message Sign.

References

.3 Unless specified otherwise, all design must be undertaken in accordance with the following:

- (a) DPTI: "The Legal and Technical Responsibilities for Traffic Control Devices"
- (b) AS 1428 "Design for Access and Mobility"
- (c) DPTI Road Sign Guidelines (Guide to Visitor and Services Road Signs in SA)
- (d) DPTI: "Pavement Marking Manual"
- (e) DPTI: "Traffic Management Operational Instructions"
- (f) AS 1742.1 to 15: "Manual of Uniform Traffic Control Devices"
- (g) AS 1743: "Road Signs – Specifications"
- (h) **DPTI: Specific Road Signs Specifications (TES drawings)**
- (i) DPTI: "Signs Index Database"
- (j) Austroads: "Guide to Traffic Engineering Practice Parts 1- 15"
- (k) DPTI Drawing TES 12186 "Positioning and Attachment of Stiffener Rails", available from: <http://www.dpti.sa.gov.au/standards/tass>.

Design Requirements

.4 The Contractor must design assets for the following minimum design life:

ELEMENT	DESIGN LIFE (YEARS)
Major sign structures, including cantilever signs, gantries and supports for V/CMS	100
Other sign support structures and other roadside furniture	40
Sign faces	10

- .5 Signs and any other Road Furniture must not be placed within the Shoulder. Road Verges must be kept as free of furniture as practicable.
- .6 The proposal to place any Road Furniture within the Verge or the design clear zone shall constitute a **HOLD POINT**. Any non-frangible Road Furniture which has been approved to be placed within the design clear zone must be protected using a safety barrier.
- .7 The location of the Direction Signs must comply with the AS1742 Part 15 "Direction signs, information signs and route numbering". The Contractor is responsible for determining the type and location of all signs. Drawings must clearly show dimensions necessary to locate the signs and the type of supports to be used.
- .8 The Principal will provide authorised signface drawings (Specific Road Sign Specifications for South Australia) to the Contractor regarding route numbering, road names, destinations, and Tourist and Service signs.
- .9 The Contractor must design and provide drawings (Specific Road Sign Specifications for South Australia) detailing route numbering, road names, destinations, and Tourist and Service signs. Provision of these drawings shall constitute a **HOLD POINT**.

Major Sign Structures

- .10 Major sign structures, including cantilever signs, gantries and supports for V/CMS, must comply with the requirements of Part D35 Design – Structural and Part S30 Fabrication and Erection of Structural Steelwork. The protective treatment must comply with Part S35 Protective Treatment of Structural Steelwork.
- .11 The design must comply with the following:
 - (a) fabrication of sign fasteners must be in accordance with DPTI Drawing No. TES 12186;
 - (b) fixings of signs to gantry structure must be the same in principle as shown on DPTI Drawing No. 1-2894, sheet 87;
 - (c) unless specified otherwise, the geometric shape and appearance of gantries (portal and cantilever types) must match gantries on the adjacent road network;
 - (d) the final coating colour of all exposed steel surfaces and the back of the sign plate must be G61 to AS 2700 "Colour Standards for General Purpose";
 - (e) gantries must be rigid type; and
 - (f) gantries must be protected from traffic impact.
- .12 The gantry structures located within clearzone must be protected with a traffic barrier system complying with Clause 4 "Design Requirements - Barriers".
- .13 The minimum nearside and offside distance to the edge of the lane and the barrier must comply with AS 3845 and Austroads IR-97/05. The barrier must have sufficient clearance to the gantry to allow for barrier deflection and provide access for maintenance. Refer to Part R61 Installation of ITS Equipment, Clause 6 "Site Maintenance Access" for further access requirements for structures supporting Equipment for Intelligent Transport Systems (ITS).

Hold Points

- .14 The following is a summary of Hold Points referenced in this clause:

CLAUSE REF.	HOLD POINT	RESPONSE TIME
3.2	Proposal to place Roadside Furniture within the verge of Design Clear Zone.	5 Working Days
3.2	Provision of drawings.	10 Working Days

7. BARRIERS**General**

- .1 This clause specifies the requirements for the design of traffic barrier systems (if any).
- .2 All traffic barrier systems, including barrier terminals, must comply with AS 3845 and the following (as appropriate):
 - (a) Part R42 Supply and Installation of Steel Beam Road Safety Barrier Systems;
 - (b) Part R43 Supply and Installation of Wire Rope Road Safety Barrier Systems; and
 - (c) Part R44 Construction of Concrete Safety Barrier Systems.

References

- .3 Unless specified otherwise, all design must be undertaken in accordance with the following:
 - (a) DPTI: Road Design Standards and Guidelines.
 - (b) AS3845 "Road Safety Barriers Systems".
 - (c) Austroads: "Guide to Road Design Part 6: Roadside Design, Safety and Barriers".
 - (d) Manufacturer's Instructions.
- .4 DPTI publications / database for signs and pavement marking are available from: <http://www.dpti.sa.gov.au/standards/tass>.

Barrier Types

- .5 The type of barrier(s) and associated energy absorbing system(s) must be a product approved by the Principal. For a list of approved products, refer to GD 300 "Accepted Safety Barrier Products" available from: http://www.dpti.sa.gov.au/standards/road_design_standards_and_guidelines. The Contractor may apply for approval of a barrier not included in GD 300. Any request for approval of a barrier must include all necessary supporting information and shall constitute a **HOLD POINT**.
- .6 The Contractor acknowledges that for efficiency of maintenance, the Principal requires that the number of types of barriers and energy absorbing systems on the road network is kept to a minimum. The Principal reserves the right to withhold approval of any barrier type at its absolute and unfettered discretion.

Steel Beam Guard Fence

- .7 Steel beam guard fence, including the end terminals and the steel beam guard fence transition at connections to rigid barriers, must be provided in accordance with the relevant DPTI Standard Drawings.

Wire Rope Safety Barriers

- .8 Wire rope safety barrier systems must be 4 rope systems, designed in accordance with the manufacturer's requirements and must comply with the requirements of the DPTI Road Design Standards and Guidelines.
- .9 The drawings must clearly show the allowable deflection and the relevant test level condition (TL 3 or TL 4).

Terminals for Rigid Barriers

- .10 Crashworthy end treatments must be provided on both the approach and departure ends of barriers that terminate within the clear zone. Energy absorbing systems must comply with Austroads: "Roadside Safety Guide".

Traffic Barriers Foundations

- .11 The drawings must clearly show any non-standard traffic barriers foundations.

Hold Points

- .12 The following is a summary of Hold Points referenced in this clause:

CLAUSE REF.	HOLD POINT	RESPONSE TIME
3.2	Request for approval of barrier.	20 Working Days

Records

- .13 The following records must be provided to the Principal:

Drawings

- The drawings described in the DPTI: Road Design Standards and Guidelines
- As constructed drawings
- Details and Maintenance Manuals of any Energy Absorbing System.

8. ROAD LIGHTING**General**

- .1 This Clause specifies the requirements for the design of the lighting of roads and associated infrastructure (if any).
- .2 This Clause does not cover the design of the lighting of public transport interchanges, railway stations and railway infrastructure. (refer to http://www.dpti.sa.gov.au/contractor_documents/public_transport_technical_standards).
- .3 Design of the conduit system must be in accordance with Clause 9 "Conduit Systems".

References

- .4 Unless specified otherwise, the design of road lighting must be undertaken in accordance with the following:
- DPTI: Road Design Standards and Guidelines, including:

- 1) LD 001: The Design of Road Lighting
- 2) Standard lighting drawings.

Lighting Components

- .5 Road lighting poles, bases, luminaires, conduits, pits and associated components must comply with:
 - (a) Part R50 Supply of Lighting Components;
 - (b) Part R51 Supply of Luminaires;
 - (c) Part R52 Installation of Lighting;
 - (d) Part R53 Installation of Conduits and Pits.
- .6 If the Contractor propose to use products not covered in the above specifications (e.g. Heritage Style Poles, Pedestrian Lights, alternative luminaires or lamps), the Contractor must obtain the prior approval of the Principal. The proposal must include full details of maintenance requirements, whole of life costs and design / replacement life.
- .7 In addition to the above, any proposal to use unapproved luminaires and lamps must also include details of:
 - (a) compliance to relevant Australian Standards;
 - (b) NATA approved photometric files (i.e. *.IES or *.CIE files);
 - (c) design life;
 - (d) colour rendition;
 - (e) colour temperature (CCT);
 - (f) energy use;
 - (g) dimming capability;
 - (h) whole of life cost;
 - (i) lifespan / mortality data; and
 - (j) maintenance requirement.
- .8 Provision of details of proposed light poles shall constitute a **HOLD POINT**. The Principal is under no obligation to accept unapproved products and will take into account the benefits of having standardised lighting infrastructure on the road network.

Approvals

- .9 The Contractor is responsible for:
 - (a) liaising SA Power Networks and the Office of the Technical Regulator (OTR);
 - (b) determine the power supply points and reticulation in conjunction with SA Power Network; and
 - (c) obtaining all necessary approvals, including any required in relation to clearance from power cables.

Hold Points

- .10 The following is a summary of Hold Points referenced in this clause:

CLAUSE REF.	HOLD POINT	RESPONSE TIME
3.2	Proposal to use an alternative product	10 Working Days

Records

- .11 The following records must be provided to the Principal:

Drawings

- The design drawings produced in accordance with DPTI Design Presentation Standards, in particular “DP001 – General requirements” and “DP013 Lighting”.
- Updates to all existing lighting and conduit drawings where required.

- If feature lighting is part of the lighting system, the drawings must include details of lighting types and mountings.
- As Constructed Drawings.

Reports

A report detailing:

- compliance with AS1158, including:
- all calculations and details of the program used to prepare the calculations;
- the Maintenance Factor used in the design;
- power system, volt drop and fault loop impedance calculations;
- pole spacing calculations for straight road sections; and
- Isolux contour drawing or straight road spacing calculations with the relevant illuminance level shown.
- DPTI Lighting & Signals Presentation & Technical check list.

Implementation Records

- Copy of any OTR clearance approval;
- SA Power Networks “Bracket Check”;
- SA Power Networks of supply point availability;
- DPTI Lighting & Signals Presentation & Technical Check List.

9. CONDUIT SYSTEMS

General

- .1 This Clause specifies the requirements only for the design of conduit systems (if any) for communications and electrical systems associated with road transport infrastructure, such as traffic signals, Intelligent Transport Systems (ITS), communications and lighting.
- .2 For the design of conduit systems associated with railway support signalling and communications, refer to PTS-MS-10-SG-STD-00000094, available from:
http://www.dpti.sa.gov.au/contractor_documents/public_transport_technical_information.

References

- .3 The design of conduit systems must be undertaken in accordance with the following:
 - DPTI: Road Design Standards and Guidelines, including:
 - (a) LD 002: “A Guide to Conduit Design for Road Lighting”; and
 - (b) TS/ITS 002: “A Guide to Conduit Design for Traffic Signals & ITS”.

Records

- .4 The following records must be provided to the Principal:

Drawings

- Design drawings produced in accordance with DPTI Design Presentation Standards, in particular “DP001 – General requirements” and “DP013 Lighting”.
- Updates to all existing infrastructure drawings where required.
- “As Constructed” drawings showing actual locations of pits and conduits.

10. INTELLIGENT TRAFFIC SYSTEM COMMUNICATIONS NETWORK

General

- .1 This Clause specifies the requirements for the design of Intelligent Traffic System (ITS) Communications Network and associated Equipment (if any).

- .2 Unless specified otherwise, the design of ITS must be undertaken in accordance with the following:
 - (a) DPTI Design Standard: TS100 “Intelligent Traffic System Design;
- .3 The Contractor’s design must ensure that the Equipment complies with:
 - (a) Part R53 Conduits and Pits;
 - (b) Part R62 Mains Power for Traffic Management Equipment;
 - (c) Part R65 ITS Enclosures; and
 - (d) Part R70 Telecommunications Cabling.

Design Development

- .4 In addition to any other requirement in the Contractor’s Design Program, the Contractor must:
 - (a) provide a copy of the ITS network design to the Principal when the design is notionally 30% complete and allow 10 working days for the provision of comments; and
 - (b) provide a copy of the ITS network design (including calculations) to the Principal when the design is notionally 70% complete and allow 10 working days for the provision of comments.
- .5 Provision of the notionally 70% complete Preliminary Design shall constitute a **HOLD POINT**.

Hold Points

- .6 The following is a summary of Hold Points referenced in this clause:

CLAUSE REF.	HOLD POINT	RESPONSE TIME
10.2	Provision of notional 70% complete design	10 Working Days

Records

- .1 The following records must be provided to the Principal:

Drawings

- Construction drawings showing Equipment location details
- Network layout drawings
- As constructed drawings

Reports

- Design Report, which includes a comprehensive detailed description of the network and all associated design calculations.

11. TRAFFIC SIGNALS

General

- .1 This Clause specifies the requirements for the design of traffic signals (if any).
- .2 Unless specified otherwise, the design of traffic signals must be undertaken in accordance with the following:
 - (a) DPTI Design Standard: TS100 “Traffic Signal Design;
 - (b) DPTI AIMSUN Model Development Manual
 - (c) DPTI TRANSYT 15 modelling guidelines
 - (d) DPTI Modelling Guidelines – SIDRA 7
- .3 The Contractor must undertake Traffic Modelling of intersections and road networks in accordance with TS100 to demonstrate the design meets the design and operational performance criteria.
- .4 The Contractor acknowledges that the DPTI Traffic Operations Section, Norwood Office is responsible for providing the Principal’s approvals required under this clause.

Traffic Signal Components

- .5 The traffic signals and associated infrastructure must comply with:
 - (a) Part R55 Installation of Traffic Signals.

- .6 Traffic signal controllers, traffic signal lanterns and linking control modules must be DPTI Approved Products (refer http://www.dpti.sa.gov.au/contractor_documents/specifications).

Traffic Volumes and Design Vehicles

- .7 Unless specified otherwise by the Principal, the Contractor is responsible for the provision of traffic volumes, traffic flow characteristics, e.g. saturation flows, and traffic control data e.g. signal phasing and timing which is used to determine the traffic signals design.
- .8 If the Principal supplies current traffic volumes and / or projected traffic design volumes, these must be used in the models prepared by the Contractor.
- .9 The Contractor must design the traffic signals to accommodate the Projected Traffic Design Volumes.
- .10 The road geometry at the traffic signal controlled intersections will be designed to accommodate the phasing requirement outlined in TS100. The "design" vehicle is as specified by the Principal.

Traffic Modelling Requirements

- .11 The Contractor is responsible for transport or traffic models developed for the purpose of assessing the traffic signals design including any systems or road geometry considerations.
- .12 To ensure that the modelling is fit for purpose the contractor must submit a "model scoping proposal" for approval before commencing modelling. The provision of the model scoping document shall be a **HOLD POINT**.
- .13 The model scoping proposal document must outline the modelling applications proposed to be used and their intended purpose in determining the optimal design of the traffic signals (e.g. use of TRANSYT to provide signal offsets.)
- .14 Where DPTI has developed a model which may assist the contractor in developing a model or models, it will be provided to the Contractor as part of the Reference Design. The Contractor is responsible for updating, augmenting, calibration and validation of these models. The base case models must reflect current circumstances and the modelling assessment must take account of committed changes to the road network in the immediate vicinity of the project.
- .15 Any specific software applications are required to be used will be specified by the Principal.
- .16 Where specific intersections are required to be included in the scope of the models these will be listed by the Principal. Some of these intersections may be included as they are part of SCATS signal groups. The Contractor is responsible for identifying new intersections to be included in the models.

Hardware Considerations

- .17 The Contractor must provide Uninterrupted Power Supplies (UPS) and CCTV at any locations specified by the Principal. In addition, the Contractor must identify other traffic signal locations that will require UPS and CCTV in the Design. The requirement for the installation of UPS will be based upon the strategic location and linking with adjacent sites.
- .18 CCTV will be required in the signal controller at Level crossings, and may be considered at other traffic signal sites which will be identified in the design report in addition to any identified by the Principal.

12. HOLD POINTS

- .2 The following is a summary of Hold Points referenced in this clause:

CLAUSE REF.	HOLD POINT	RESPONSE TIME
10.4	Traffic Model Scoping Proposal	10 working days
TS 100	Network Performance Analysis	10 working days
TS 100	Construction Stage Model	10 working days
TS 100	Approval of Traffic Control Devices	15 working days
Part R55	Switching on new traffic signals, or changing the personality(s) in existing traffic signals	8 weeks

CLAUSE REF.	HOLD POINT	RESPONSE TIME
Part R55	Cable Connection Chart	15 working days

13. RECORDS

.2 The following records must be provided to the Principal:

Drawings

- Design drawings produced in accordance with TS 100 “Traffic Signal Design Standard”.

Reports

- Traffic model scoping proposal documents.
- The reports described in TS 100 “Traffic Signal Design Standard”, which includes the TSOPR and the Traffic Signals Design Report.
- The completed transport / traffic models form part of the design report and the model data files must be provided to the Principal in native file format.
- A report outlining the geometry of the road as designed and all of its elements demonstrating sufficient capacity to service the design traffic loading.
