

Road Design

CAD Manual

February 2025



Government of South Australia
Department for Infrastructure
and Transport

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Document Information

Document Information

KNet Number:	18857397
Document Revision	B
Document Date:	February 2025

Document Amendment Record

Rev	Change Description	Date
A	Revised	September 2022
B	Official Amendments and PDF Files sections have been updated	February 2025

Document Management

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Road Design CAD Manual

1 Introduction

- 1.1 This Part specifies the requirements for the Design of Road Infrastructure.
- 1.2 This document along with other Road Design Standards and Guidelines are accessible from <https://www.dit.sa.gov.au/standards>.
- 1.3 CAD support files are available to assist in the preparation of the Drawings and is available from - Technical Standards and Guidelines (Road & Marine) and accessible from: <https://dptapps.com.au/filesare/>.

Purpose and Scope

- 1.4 In South Australia, the Department for Infrastructure and Transport (DIT) is responsible for the construction, management and maintenance of the State's major road, light rail, and heavy rail infrastructure.
- 1.5 This document describes standards and procedures and guidance on the production of consistent, high-quality drawings that facilitate construction and can be easily stored and accessed in accordance with Departmental requirements.
- 1.6 The provisions of this document apply to DIT staff and all external organisations when producing Rail or Road Design Construction Drawings for DIT.

Definitions

- 1.7 The following definitions will be used in this Part:

Term	Definition
Plan Custodian	The Plan Custodian, Corporate Records Unit, is responsible for the storage, control & distribution of DIT Drawings, and for ensuring compliance with Government records management legislation
DIT Design Manager	The Person within DIT nominated to manage the design process.
Project Sponsor	An Executive or Senior Manager accountable for infrastructure project outcomes, who uses their authority to provide leadership and direction to the project and to ensure adequate project controls are in place.
IFC	Issued For Construction
IFC Construction Drawings	Formally accepted DIT drawings, created for the purpose of constructing all aspects of road and rail infrastructure.
Issued for Acceptance Form	The DIT Form (Roads) to record the design information, design certificates, endorsements, and acceptance of the design. The completed IFA Form is stored in KNET.
Acceptance	Acceptance by the nominated Engineering Authority that the level of technical endorsement is appropriate and the drawing(s) can be used for their intended purpose.
As Built Drawings	Formally accepted DIT drawings, created as a record of all aspects of the as-constructed infrastructure for the purpose of maintaining road and rail infrastructure.
KNET Number	The unique identifier assigned to a document in the DIT Records KNet (Knowledge Network) Management System
PATCHS Number	The 8 digit number assigned to a job in the Project Activity Tracking and Charging System (PATCHS).
Project Survey Data Set	The engineering survey data provided for a given project. Once created this data establishes the coordinate system that is to be used for that project
Local Grid	The horizontal and vertical coordinates established by the Project Survey Data Set.
MGA Planar	A Local Grid where the coordinates closely match MGA coordinates
Global Coordinate System:	Location data for the project referenced to the Geocentric Datum of Australia (GDA). GDA is part of a global coordinate reference frame and is directly compatible with the Global Positioning System (GPS).

2 Construction Drawing Types

2.1 The standard types of Construction Drawings are as detailed in Table 1.

Table 1 Drawing Type Presentation Standard

Drawing Type	Design Presentation Standard
Title and Index	RD2 Presentation Guidelines
Overview Plan	RD2 Presentation Guidelines
Typical Cross Section	RD2 Presentation Guidelines
Vegetation and Demolition	RD2 Presentation Guidelines
Geometric Setout	RD2 Presentation Guidelines
General Construction	RD2 Presentation Guidelines
Stormwater and Contours	RD2 Presentation Guidelines
Drainage Schedules	RD2 Presentation Guidelines
Pavement Treatment	RD2 Presentation Guidelines
Pavement Schedules	RD2 Presentation Guidelines
Traffic Control	RD2 Presentation Guidelines
Traffic Signals	RD2 Presentation Guidelines
Traffic Signal Conduit	RD2 Presentation Guidelines
Lighting	RD2 Presentation Guidelines
Longitudinal Sections	RD2 Presentation Guidelines
Cross Sections	RD2 Presentation Guidelines
Drainage Longitudinal Section	RD2 Presentation Guidelines
Landscape Design	RD2 Presentation Guidelines
Intelligent Transport Systems	RD2 Presentation Guidelines
Rail Infrastructure	SAPTA requirements

- 2.2 Which drawing types are to be used on each project is to be decided by agreement with the DIT Design Manager.
- 2.3 For more detail about what information should be shown on each drawing type and how it should be drawn, refer to the relevant design presentation standard for that drawing type.
- 2.4 Where practical sheet numbers should be allocated so that the sequence of drawings in the suite is the same as the list below.

3 Project Coordinate System

- 3.1 It is critical that all survey and design work for a given project is carried out according to the same coordinate system. All drawings created as part of the project shall also use this same coordinate system.
- 3.2 Prior to a Project Survey Data Set being issued, modelling work may be performed using the Global Coordinate System, however once a Project Survey Data Set has been issued, all design work shall be undertaken in accordance with the Local Grid established by that Project Survey Data Set.
- 3.3 One of the following notes shall be included on the relevant geometric drawing to indicate which coordinate system being used:
- Coordinate base is Local
 - Coordinate base is MGA Planar
 - Coordinate base is GDA 2020 MGA Zone 52
 - Coordinate base is GDA 2020 MGA Zone 53
 - Coordinate base is GDA 2020 MGA Zone 54

f) Coordinate base is GDA 2020 South Australia Lambert

4 Drawing Set Up

AutoCAD Template File

- 4.1 All drawings should be created using the standard template file DPTI-RD.DWT.
- 4.2 This file contains standard layers, text styles, dimension styles etc.

Drawing Size

- 4.3 All Drawings shall be A1 size.

Title Block

- 4.4 The title block “DPTI-RD-A1TitleBlock.dwg” shall be used for all construction drawings.
- 4.5 This title block shall be inserted in Paper Space at a scale factor of 1 and shall not be modified, for example attributes tags shall not be altered.

Figure 1 - DPTI Title Block

PROJECT NO. 14669		FILE NO. 18/02233		ROAD NO. 7200 STURT HIGHWAY	
DESIGNER: B. SMITH (MUNICIPALITY) M. Eng (Civil & Transport) DATE: 20/03/2019		SURVEY NO. 201900200		SEPELTSFIELD ROAD - GRENOCK ROAD	
REVIEWER: C. SMITH (MUNICIPALITY) CP Eng. NPER(Civil) DATE: 21/03/2019		PROJECT START ROAD FINISH DISTANCE: MCA1; CH 000 = 54.89km		MCA1; CH 50 - CH 864	
INTERIM DESIGN (BY TIER 1 IF FEASIBLE): D. SMITH (MUNICIPALITY) CP Eng. NPER(Civil) DATE: 22/03/2019		PROJECT END ROAD FINISH DISTANCE: MCA1; CH 4560 = 59.46km		FINAL SURFACE CONTOURS	
SCALE: HORIZONTAL: 1:1000 VERTICAL: 1:200		DATE: 30/03/2019		SHEET NO. 5933	
DRAWN BY: A. SMITH		CHECKED BY: A. SMITH		SHEET NO. 700	
PROJECT NO. 14669		FILE NO. 18/02233		SHEET NO. A	

Figure 2 - DPTI Title Signature Block

DESIGNER: B. SMITH (MUNICIPALITY) M. Eng (Civil & Transport) DATE: 20/03/2019		PROJECT NO. 14669		FILE NO. 18/02233		ROAD NO. 7200 STURT HIGHWAY	
REVIEWER: C. SMITH (MUNICIPALITY) CP Eng. NPER(Civil) DATE: 21/03/2019		SURVEY NO. 201900200		PROJECT START ROAD FINISH DISTANCE: MCA1; CH 000 = 54.89km		SEPELTSFIELD ROAD - GRENOCK ROAD	
INTERIM DESIGN (BY TIER 1 IF FEASIBLE): D. SMITH (MUNICIPALITY) CP Eng. NPER(Civil) DATE: 22/03/2019		PROJECT END ROAD FINISH DISTANCE: MCA1; CH 4560 = 59.46km		MCA1; CH 50 - CH 864		FINAL SURFACE CONTOURS	
SCALE: HORIZONTAL: 1:1000 VERTICAL: 1:200		DATE: 30/03/2019		SHEET NO. 5933		SHEET NO. 700	
DRAWN BY: A. SMITH		CHECKED BY: A. SMITH		SHEET NO. A		SHEET NO. A	
PROJECT NO. 14669		FILE NO. 18/02233		SHEET NO. 5933		SHEET NO. 700	

- 4.6 Information to be provided on the title block is detailed in Table 2 - Title Block information.

Table 2 - Title Block information

Information	Description
Road No(s).	As per Common Road Reference System (CRRS), list major road(s) first (may vary between sheets in suite). - item not used for rail projects
Road Name / Rail Line Name	Major road name, as per CRRS for road projects or rail line name for rail projects (may vary between sheets in suite)
Project Location Description	Briefly describe project location by section, intersection/junction, or other major feature (common to all sheets in suite)
Sheet Location Description	Briefly describe section of project shown on individual sheet e.g., CH. 0.000 – CH. 350.000 (varies between sheets in suite)
Drawing Type	Type of Drawing - see Section 1 (varies between sheets in suite)
Designed /Checked	Primary person responsible for the design elements and Primary person responsible for checking the design elements
Independent Design Certifier	Primary person responsible for certifying design elements and Primary person responsible for checking the drafting elements
Accepted For Use	The name and title of the accepting officer and the date of acceptance as per Part D of the Drawing Acceptance Form.
Acceptance Form No.	KNet identification number of the completed Drawing Acceptance Form as supplied by the Plan Custodian
Drawing No.	Number assigned to the drawing suite by the Plan Custodian (common to all sheets in suite)
Sheet No.	Number assigned to the individual sheet by the Plan Custodian (should not include leading zeros)
Amend No.	Amendment Number corresponding with the most recent modification made to the sheet (may vary between sheets in suite)
CAD File Name	AutoCAD file name, self populates upon saving (varies between sheets in suite)
Signal No.	Traffic Signals and Traffic Signals Conduit drawings are to have the relevant TS or PC asset number shown in this box. The box is displayed by turning on layer D-ENHA-SigBox
Project No.	Project Number as supplied by the DIT Design Manager (common to all sheets in suite)
File No.	Hardcopy file number as registered with DIT Corporate Records Unit. For most drawings this should be the Road Design File Number, but for existing Traffic Signal or Pedestrian Crossing Drawings it should be the Metropolitan Region file number
Design No.	Design Job number as registered in PATCHS (common to all sheets in suite)
Survey No.	Survey Job Number as registered in PATCHS (common to all sheets in suite)
Project Start RRD	Road running distance at the start of the project (common to all sheets in suite). This must be an actual Road Running Distance and not a Maintenance Marker reference (see Clause 4 for more details)
Project End RRD	Road running distance at the end of the project (common to all sheets in suite)
Scales	Scale bars relative to the scale at which the drawing is produced (varies between sheets in suite)

Drawing and Sheet Number

- 4.7 Drawing and sheet Numbers are to be numerical to ensure the drawing can be entered into the KNet drawing plan room. Alphanumeric identifiers shall not be used.
- 4.8 A 'Request for Drawing / Sheet Registration Numbers' form needs to be lodged with the Plan Custodian by a DIT staff member to obtain Drawing number and Sheet number for inclusion on the title block.

Consultant Logos and Approvals

- 4.9 Where projects are being designed and/or drafted by private sector consultancies, the open area to the right of the amendment box may be used to show the company's branding and quality management requirements such as documentation numbers, approving initials etc.
- 4.10 All logos shall use standard dwg vector entities and shall not include any raster objects.

Amendment Box

Figure 3 - Amendment Box

					INDEX SHEET REFERENCE: 5432 SHEET 27	
No.	AMENDMENT DESCRIPTION	BY	CHECK	ACCEPTANCE	DATE	UNCONTROLLED COPY WHEN PRINTED

100 MILLIMETER

4.11 The amendment box shall include the following details:

- Amendment number or letter (see Section 11)
- Brief description
- Initials of person amending the drawing
- Initials of person checking the amendment
- The name of the Accepting Officer as per Part D of the Acceptance Form
- The date of Acceptance as per Part D of the Drawing Acceptance Form

4.12 For further information about amendments (see Section 11)

Index Sheet Reference

4.13 On projects that include a Title and Index Sheet, every sheet in the suite shall contain the drawing number and sheet number of that index sheet. This shall be located to the right of the amendment box as indicated above.

Project Document Reference

Figure 4 - Project Document Reference

PROJECT DOCUMENT REFERENCE ????-DPTI-DRG-XXXXX-XXXXXX
--

4.14 This box may be used to record a project specific document reference identifier (for example a Teambinder or Aconnex number), SheetSynch and the CAD Matrix will turn it off by default, but it may be turned on if required.

4.15 Where used this reference must only be used in addition to the standard DIT drawing references, not in place of them.

Sheet Latitude, Sheet Longitude

4.16 This latitude and longitude of the design as shown on the drawing is to be identified in a box is located at the bottom right of the title block.

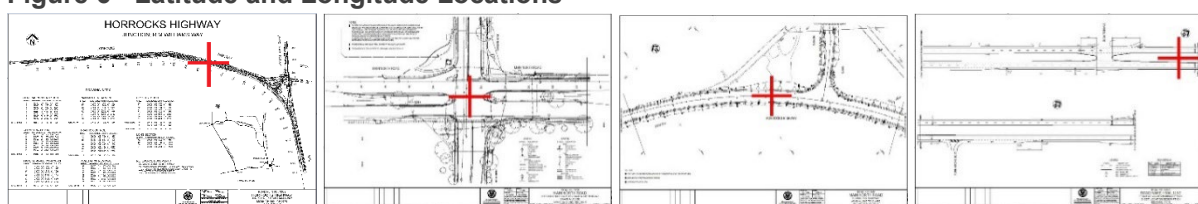
Figure 5 - Latitude and Longitude Title Block Information

SHEET LATITUDE -XX.XXXXX	SHEET LONGITUDE XXX.XXXXX
--------------------------	---------------------------

4.17 For all plan sheets (including the Title and Index sheet) it shall contain the latitude and longitude of a point at the nominal centre of the sheet detail as indicated by the examples below.

4.18 For all other sheet types (e.g., cross sections, longitudinal sections, and detail sheets) the box shall contain the same latitude and longitude values as the Title and Index Sheet.

Figure 6 - Latitude and Longitude Locations



- 4.19 If the contents of a sheet do not relate to any geographic location (e.g., a standard drawing) then the latitude and longitude fields shall be left blank.
- 4.20 When existing drawings that do not contain latitude and longitude information are amended, the latitude and longitude should be added to them.
- 4.21 If the existing title block does not include a space for latitude and longitude, there is a block provided in the standard block library. This block should be located directly under the bottom right of the existing title block. In general, inserting the standard block at 0,0 should accomplish this.
- 4.22 In all cases the latitude and longitude values shall be shown in decimal degree format as indicated above and shall not include a degree symbol.

Drawing Orientation

- 4.23 Drawings shall be oriented so that the north point faces one of the following general directions (in order of preference):
- Towards the top of the drawing sheet.
 - Towards the left-hand side of the drawing sheet.
 - Towards the right-hand side of the drawing sheet.
 - Only in exceptional circumstances shall the direction of north be below the horizontal.
- 4.24 Generally, all annotation shall be oriented such that it can be read either from the bottom or the right-hand side of the drawing sheet. Chainages and point numbers shall be aligned perpendicular to the relevant string and preferably on the right-hand side of it. They shall be read in the same direction as the string.
- 4.25 Under no circumstances shall the model be rotated or moved from its original survey coordinates.

Drawing Scales

- 4.26 The most appropriate scale must be used to allow the details to be clearly shown.
- 4.27 It is preferred practice to show Longitudinal Sections at the same horizontal scale as the project's plan scale with a 10 times vertical exaggeration.
- 4.28 Typical Cross Sections and Landscape Cross Sections may be drawn at any suitable scale or 'not to scale' if necessary for clarity.
- 4.29 Below are the preferred scales for Construction Drawings. Other scales require authorisation in writing by the DIT Design Manager.

Table 3 - DIT Drawing Scales

Drawing	Horizontal Scale	Vertical Scale
Plan Drawings		
Generally,	1:300, 1:500	Same as Horizontal
Intersections	1:200, 1:300	Same as Horizontal
Longitudinal Sections (Road or Drainage)		
All	1:300, 1:500, 1:1000	1:30, 1:50, 1:100
Cross Sections		
Generally	1:200	1:50
Typical Cross Sections	1:50, 1:100, 1:200	Same as Horizontal
Details		
Generally	1:20, 1:25, 1:40, 1:50	Same as Horizontal
Locality Details	Any suitable scale or 'not to scale'	Same as Horizontal

Aerial Images

- 4.30 Where the drawings include an Aerial image in the background of a drawing, the image shall be attached to a .DWG file.
- 4.31 The filename (excluding extension) of that image file shall be identical to the DWG file it is attached to in line with Clause 13.
- 4.32 The image size to be < 1MB to allow quick opening of created PDF.
- 4.33 The image shall be saved as a TIFF file for transmittal.

5 Standard Information on Drawings

- 5.1 All drawings shall have sufficient detail to explain clearly and adequately what is required to those responsible for the construction.
- 5.2 This is likely to include numerous small notes with leader lines to clarify specific details however care must also be taken not to clutter the drawing with unnecessary detail or obscure important information.
- 5.3 Where there is doubt about whether a particular item should be included or whether the level of detail is sufficient, clarification should be sought from the DIT Design Manager.
- 5.4 The following specific information shall be shown where relevant.

Scale Bars

- 5.5 Scale Bars shall be drawn in Paper Space on AutoCAD layer D-ENHA–Title Block.

North Point

- 5.6 North Points shall be shown on every plan drawing and shall be drawn in Model Space on AutoCAD layer D-ENHA–North Point.

Match lines “For Continuation” and “Extent of Works”

- 5.7 All drawings shall include match lines to indicate the point at which the detail from another drawing sheet takes over.
- 5.8 These match lines shall include the words “FOR CONTINUATION SEE DRG XXXX SHEET XXXX” (where “xxxx” is the appropriate drawing and sheet number) or the words “EXTENT OF WORKS” where the current project does not extend onto an adjoining sheet.
- 5.9 Match lines shall be green, in Model Space on layer D-ENHA-Matchline
- 5.10 Match line text shall be green, 3.5mm high in Paper Space on layer D-ENHA-Matchline
- 5.11 Landscape drawings may include a boundary line denoting the extent of the landscaping works. These extent of works boundaries and the associated text shall be in Model Space on layer D-LSCP-Extent of Works.

Direction Arrows

- 5.12 Direction arrows shall be placed at the ends of each sheet to help show the project’s location. They should indicate the name of the next town on rural projects or the next major road or suburb on urban projects and be positioned on the left-hand side of the road way in the direction of travel.
- 5.13 Direction arrows shall be drawn in Model Space, on layer D-ENHA-Direction Arrows. The arrows and text shall be drawn in green, and the text shall have a Paper Space height of 3.5mm.

Road Names

- 5.14 Road names are divided into two categories ‘Major’ and ‘Minor’ and are displayed above or on the left-hand side of the road way.
- 5.15 Road names shall be drawn in Model Space on layer D-ENHA–Road Names.
- 5.16 Major road names shall be drawn in blue with a Paper Space text height of 7.0mm.
- 5.17 Minor road names shall be drawn in red with a Paper Space text height of 5.0mm.

General Notes

- 5.18 Standard sets of notes have been supplied by DIT as AutoCAD blocks appropriate to the drawing type on which they are to appear.
- 5.19 The appropriate notes are to be selected and modified to suit the project, notes that are not relevant to that project should not appear, however where a note is required on one sheet it shall appear on all sheets of that type.
- 5.20 This means for example that the notes on all the General Construction drawings on a given project should be identical and preferably in the same location on each sheet.
- 5.21 Any additional General Notes that are not part of the standard notes in the DIT block library shall be approved by the DIT Design Manager before being included on the drawing.

- 5.22 At times it may be necessary to show multiple sets of General Notes (e.g., a General Construction drawing may require both Geometric and Drainage notes). In these situations, the notes shall be combined, duplications removed, and the notes renumbered accordingly.
- 5.23 Where there is insufficient room on a given sheet for the necessary notes, reference may be made to another sheet containing these notes. This may be either another sheet of that type in the suite which has the relevant notes on it, or it may be a dedicated 'Notes sheet'.
- 5.24 General Notes shall be drawn in Paper Space, on layer D-ENHA-General Notes.

Vehicle Turning Paths

- 5.25 Where the road geometry on a particular sheet has been designed to cater for a particular vehicle or vehicles, then the relevant Traffic Control sheets shall include a note to indicate this.
- 5.26 This note shall be the last note in the block and shall be separated from the other notes to draw attention to the fact that this particular note is sheet specific (refer to Traffic control Example Drawing).

Legends

- 5.27 Standard legends have been supplied by DIT as AutoCAD blocks appropriate to the drawing type on which they are to appear.
- 5.28 The appropriate legend is to be selected and modified to suit the project.
- 5.29 Items that are not relevant to that project should not appear on the legend, however where an item is required in the legend on one sheet it shall appear in the legend on all sheets of that type.
- 5.30 This means for example that the legend on all the General Construction drawings on a given project should be identical and preferably in the same location on each sheet.
- 5.31 Any additional legend symbols or definitions that are not part of the standard legends in the DIT block library shall be approved by the DIT Design Manager before being included on the drawing.
- 5.32 At times it may be necessary to show legends of multiple types (e.g., a General Construction drawing may require both Lighting and Services legends). In these situations, the legend items shall be combined, and duplications removed.
- 5.33 Where there is insufficient room on a given sheet for the necessary legend, reference may be made to another sheet containing the relevant items. This may be either another sheet of that type in the suite which has the relevant items on it, or it may be a dedicated 'Legend sheet'.
- 5.34 Legends shall be drawn in Paper Space, on layer D-ENHA-Legends.

Road Running Distance / Maintenance Markers

- 5.35 It should be noted that the term "Road Running Distance" is not interchangeable with the term "Maintenance Marker".

Road Running Distance (RRD)

- 5.36 Road Running Distance relates to the cumulative distance along a carriageway from the start of the road, it has significant implications for departmental databases and is strictly defined and controlled.
- 5.37 RRD numbers must be allocated by the Transport Information Management Section of DIT.
- 5.38 When personnel from an external organisation need to know a RRD (for example to complete the Titleblock) they should contact the DIT Design Manager.
- 5.39 Where a Road Running Distance is shown it should be in the format RRD18.23.

Maintenance Marker (MM)

- 5.40 A Maintenance Marker is a physical marker post located along the side of the road. Maintenance Marker numbers may or may not coincide with Road Running Distance numbers.
- 5.41 Where Maintenance Markers are shown on a drawing, they should be annotated with the marker number e.g., "Maintenance Marker 16".
- 5.42 Where a location is to be recorded in relation to a maintenance marker it should be shown as a distance in metres before or after that marker, for example "MM16+230m" or "MM23-15m".

6 Model Space / Paper Space

- 6.1 Generally, all entities in 'the model', and any other entities that need to be positioned with respect to the model should exist in Model Space.
- 6.2 Those that need to be located in relation to the sheet of paper should exist in Paper Space.
- 6.3 The drawing below indicates the type of features that should be located in Model Space (blue) and Paper Space (red).

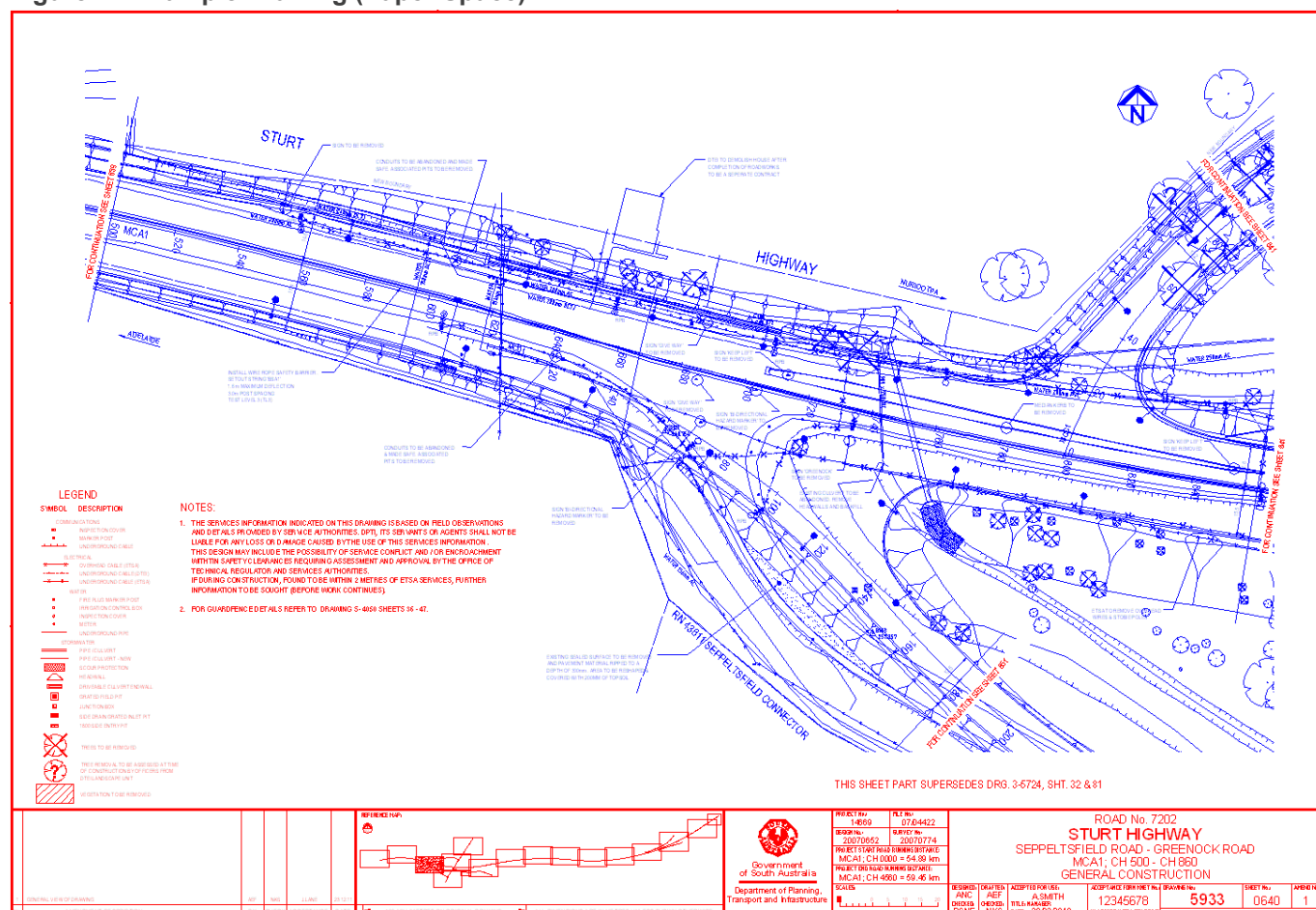
Model Space Scale

- 6.4 Entities in Model Space shall be drawn to the same size that they will exist in the real world.
- 6.5 For example, a 63.4m long median should scale off as 63.4m in Model Space.

Paper Space Scale

- 6.6 Entities in Paper Space shall be drawn to the same size that they are to exist on paper when plotted at 1:1
- 6.7 For example, the distance from the left crop mark to the right crop mark on an A1 sheet should scale off as 841mm in Paper Space.

Figure 7 - Example Drawing (Paper Space)



7 Lines and Text

- 7.1 Only standard AutoCAD linetypes and shape files or those supplied by DIT shall be used unless expressly authorised in writing by the DIT Design Manager.

Line Colour and Line weight

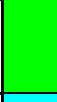
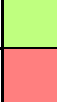
- 7.2 The following table shows those colours that have a specific purpose within DIT road design construction drawings.

- 7.3 In general, all new design features shall be drawn in either red, green, cyan, blue, or black with the specific colour used for each specific drawing element to be as indicated by the relevant Presentation Standard.
- 7.4 The plotted colour and lineweight of these elements are determined by the plot style used. There are three plot styles supplied by DIT which may be used depending on what style of output is required.
- 7.5 When a drawing is to be plotted at a reduced scale the lineweights shall be scaled down accordingly (e.g., by selecting the 'Scale Lineweights' option from the AutoCAD plot dialog).

Table 4 – Line Colour and Line Weight

Colours			Plot Styles					
AutoCAD Colour	Colour name (RGB values)	Usage Examples	DPTI-RD Colour		DPTI-RD Black		DPTI-RD Design Black	
			mm	Colour	mm	Colour	mm	Colour

Design features

1		Red (255,0,0)	Specific design features (footpaths, lighting conduits etc.)	0.50	Object Colour	0.50	Black	0.50	Black
3		Green (0,255,0)	Specific design features (earthworks, linemarking etc.)	0.35	Object Colour	0.35	Black	0.35	Black
4		Cyan (0,255,255)	Specific design features (stormwater drains, fences etc.)	0.50	Object Colour	0.50	Black	0.50	Black
5		Blue (0,0,255)	Specific design features (bitumen edges etc.)	0.70	Object Colour	0.70	Black	0.70	Black
7		White / black (255,255,255)	Specific design features (gutter inverts, text in legends etc.)	0.25	Object Colour	0.25	Black	0.25	Black
71		(191,255,127)	Coloured Pavement (Bicycle)	Object Weight	Object Colour	Object Weight	Black	Object Weight	Object Colour
11		(255,127,27)	Coloured Pavement (Bus)	Object Weight	Object Colour	Object Weight	Black	Object Weight	Object Colour

Survey features

8		(128,128,128)	General Survey features	0.30	Object Colour	0.25	Black	0.30	Object Colour
12		(204,0,0)	Existing Services (Electrical)	0.30	Object Colour	0.25	Black	0.30	Object Colour
30		(255,127,0)	Existing Services (Telecommunications)	0.30	Object Colour	0.25	Black	0.30	Object Colour
54		(153,153,0)	Existing Services (Gas)	0.30	Object Colour	0.25	Black	0.30	Object Colour
94		(0,153,0)	Existing Services (Sewer)	0.30	Object Colour	0.25	Black	0.30	Object Colour
160		(0,63,255)	Existing Services (Water)	0.30	Object Colour	0.25	Black	0.30	Object Colour
214		(153,0,153)	Existing Services (Stormwater)	0.30	Object Colour	0.25	Black	0.30	Object Colour
221		(255,127,223)	Existing Services (Reclaimed Water)	0.30	Object Colour	0.25	Black	0.30	Object Colour
21		(255,159,127)	Existing Services (Other)	0.30	Object Colour	0.25	Black	0.30	Object Colour

Geometric Setout drawing

10		(255,0,0)	Those design features that are shown in Red (i.e., AutoCAD colour 1) on other drawing types	0.30	Object Colour	0.25	Black	0.30	Object Colour
90		(0,255,0)	Those design features that are shown in Green (i.e., AutoCAD colour 3) on other drawing types	0.30	Object Colour	0.25	Black	0.30	Object Colour
130		(0,255,255)	Those design features that are shown in Cyan (i.e., AutoCAD colour 4) on other drawing types	0.30	Object Colour	0.25	Black	0.30	Object Colour
170		(0,0,255)	Those design features that are shown in Blue (i.e., AutoCAD colour 5) on other drawing types	0.30	Object Colour	0.25	Black	0.30	Object Colour
212		(204,0,204)	Dedicated construction setout strings (PLIG, PRAM, PPIT etc.)	0.30	Object Colour	0.25	Black	0.30	Object Colour

Proposed Services

16		(127,0,0)	Proposed Electrical	Object Weight	Object Colour	Object Weight	Black	Object Weight	Object Colour
32		(204,102,0)	Proposed Telecommunications	0.30	Object Colour	0.25	Black	0.30	Object Colour
56		(127,127,0)	Proposed Gas	0.30	Object Colour	0.25	Black	0.30	Object Colour
94		(0,153,0)	Proposed sewer	0.35	Object Colour	0.35	Black	0.35	Object Colour

Other

252		(132,132,132)	Existing Contours	Object Weight	Object Colour	Object Weight	Black	Object Weight	Object Colour
21		(255,159,127)	Design contours (minor interval)	0.30	Object Colour	0.25	Black	0.30	Object Colour
140		(0,191,255)	Design contours (major interval) Existing Boundaries	0.30	Object Colour	0.25	Black	0.30	Object Colour
2		Yellow) (255,255,0)	Temporary drawing elements	0.35	Object Colour	0.35	Black	0.35	Object Colour
144		(0,114,153)	Text linked to external sources	Object Weight	Object Colour	Object Weight	Black	Object Weight	Black
145		(63,111,127)	Design extent of works	Object Weight	Object Colour	Object Weight	Black	Object Weight	Object Colour
All other colours			Approval required (except for Pavement treatment fills)	Object Weight	Object Colour	Object Weight	Black	Object Weight	Object Colour

Text Colour and Size

- 7.6 The finished Paper Space text height for all text shall be either 2.5mm, 3.5mm, 5mm or 7mm, except for the title and subtitle on a Title and Index drawing which shall be 20mm and 10mm high, respectively.
- 7.7 For SHX fonts, text colour shall be dependent upon the text height as indicated in the table below.
- 7.8 Text that is linked to external sources in some way (e.g., via attributes) shall be AutoCAD colour 144. String labels and point numbers on Geometric Setout drawings shall be the same colour as the string they relate to.
- 7.9 Other text may either be black or follow the convention in the table below:

Table 5 - Text Colour and Height

Text Height	Colour
2.5mm	Black
3.5mm	Green
5mm	Red
7mm	Blue
10mm	Blue
20mm	Blue

Text Case

- 7.10 All text shall be in upper case except for where a recognised convention dictates otherwise.
- 7.11 This includes SI units (e.g., mm, kg, kPa) Plant species names (e.g., Eucalyptus leucoxylon) and Trade names (e.g., TriAx)

Fonts

- 7.12 All text shall use one of the following fonts:
- ARIAL NARROW - Design features
 - ISOCP - Survey features
 - ARIAL - Title/Subtitle (Title & Index Drawing) + certain title block text

Width Factor / Angle

- 7.13 All text shall be vertical and have a width factor of 1.

Elevation

7.14 All text shall have an elevation (Z level) of 0.

Paper Space / Model Space Text Heights

Table 6 - Paper Space / Model Space Text Heights

Finished Paper Space Text Height Required (mm)	Viewport Scale								
	1:20	1:25	1:40	1:50	1:100	1:200	1:300	1:500	1:1000
	Text height to use in Model Space (m)								
2.5	0.05	0.0625	0.1	0.125	0.25	0.5	0.75	1.25	2.5
3.5	0.07	0.0875	0.14	0.175	0.35	0.7	1.05	1.75	3.5
5.0	0.1	0.125	0.2	0.25	0.5	1.0	1.5	2.5	5.0
7.0	0.14	0.175	0.28	0.35	0.7	1.4	2.1	3.5	7.0

8 CAD Layers

8.1 The format for all layer names shall be: **P-TTTT-LLLL-DESCRIPTION** where:

- a) P = Phase (D for Design features, S for Surveyed features) - 1 character
- b) TTTT = Feature Type code (relevant code from the list below) – up to 4 characters
- c) LLLL = String Label (only necessary if layer contains MX or 12D strings) - up to 4 characters
- d) DESCRIPTION = Concise description (e.g., Bitumen edge, Gutter Invert, Top of kerb etc).

Feature Type codes

Table 7 - Feature Type Codes

Code	Description
Ground Surface Features	
CWAY	Surface features within the carriageway (between backs of kerbs or edges of shoulder)
VERG	Design Surface features in the verge between the carriageway and the earthworks
EWKS	Design Earthworks features
TOPO	Existing Topographical features (footpaths, banks, waterways etc. outside carriageway)
Structures	
BDGE	Bridge features
BUIL	Building features
Services	
COMM	Communications conduits & pits
ELEC	Underground & overhead power, signal & lighting conduit & pits
GAS	Gas pipes, pits etc.
WATR	Water pipes, pits etc.
SEWR	Sewer pipes, pits etc.
DRAI	Stormwater drainage features
Rail	
RAIL	Features specifically related to light rail or heavy rail track works
RAEL	Design features specifically related to rail electrification
RAST	Design features specifically related to structures for rail (bridges, safety screens etc.)
RASA	Design features specifically related to rail station works (platforms, shelters etc.)
Sections	
XSEC	Cross Section drawing elements
LSEC	Longitudinal Section drawing elements
Other	
MAST	All 6D Master alignment strings
SETO	Construction setout strings PLIG, PRAM, PPIT etc.
FURN	Street furniture & other man made objects (fences, signs, posts, bins etc.)
PAVT	Pavement design features (subgrade strings, sawcut strings etc.)
LNMK	Linemarking (includes chevrons, arrows etc.)
LSCP	All Landscape features (trees & other vegetation, water features etc.)
BDYS	Cadastral boundaries
MARK	Survey marks
ENHA	Drawing enhancements (notes, legends, text & leaders, north points etc.)
CONT	Contour lines
MISC	Only for those items that do not fit into one of the other type codes
ITS	Intelligent Transport Systems

Standard Layers

8.2 The standard DIT Layers are listed in CAD Layer Matrix.

Subdividing Layers

8.3 Standard DIT Layers may be 'subdivided' by adding a further description to the right-hand end of the layer name, for example "D-WATR-Irrigation Pipe" may be subdivided into "D-WATR-Irrigation Pipe-50mm" and "D-WATR-Irrigation Pipe-25mm".

Creating New Layers

8.4 Where it is not practical to use either a Standard DIT Layer or a subdivided Standard DIT Layer it is permissible to create a new layer with approval from the DIT Design Manager. In this case:

- The name must follow the format outlined above
- The feature type code must be one of those listed above
- The principle of subdividing must be followed

8.5 Examples:

- a) D-RAIL-Station Buildings
- b) D-RAIL-Station Buildings-Shelter Roof
- c) D-RAIL-Station Buildings-Shelter Walls

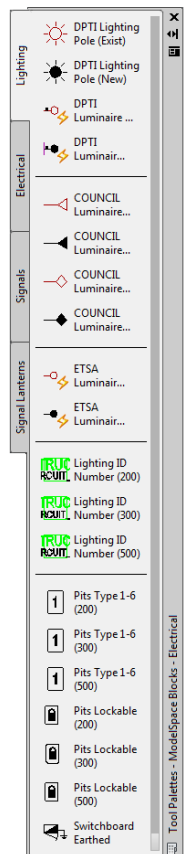
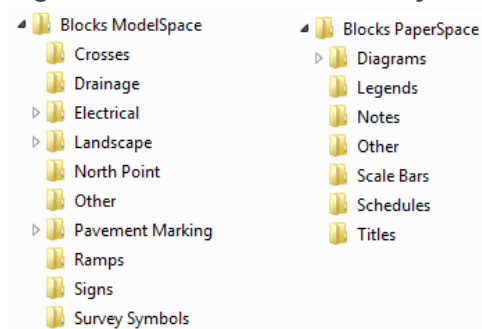
CAD Layering Matrix

- 8.6 The CAD Layer Matrix is now accessed from the DIT CAD Support Files FTP site located at <https://dptiapps.com.au/filesare/>.
- 8.7 The file is located in the top level of the CAD Support Files folder and the filename is "CAD Matrix.xls".
- 8.8 The matrix is updated on a regular basis. There is an "Issue Date" on Page 1 to help differentiate between versions and at every update the changes are highlighted.

9 Standard Block Library

- 9.1 A library of standard AutoCAD blocks can be accessed from <ftp.transportsa.com.au>
- 9.2 This block library has been organised based on the drawing space in which the blocks are to be used and the type of content. AutoCAD Tool palettes are also provided to allow easy access to the blocks and to help ensure the correct layers are used.

Figure 8 - Standard Block Library Image



- 9.3 Where there is a need to use a particular symbol or detail on a drawing and an appropriate block exists in the Standard Block Library then that block shall be used.
- 9.4 These blocks have generally been created with their entities drawn on layer 0 however where a block is expected to be exploded, the elements within that block have been created on the appropriate AutoCAD layer.
- 9.5 Paper Space blocks have been created at the correct size for an A1 drawing and Model Space blocks either at 1:1 or at different sizes for different scales.
- 9.6 In all cases blocks shall be inserted in the appropriate 'space', on the appropriate layer with a scale factor of 1.

10 Removing Existing Drawing Components

- 10.1 Drawings are commonly created using data from another source as a base (for example a road designer will create their drawings using data from survey as a base and a landscape designer will create their drawings using the road design drawing as a base).
- 10.2 Where it is necessary to edit this source data, a copy should be made, and the changes made to this copy rather than the original.
- 10.3 For example, it may be necessary to edit a survey XRef to remove the detail within the extents of the design. In this case a copy of the XRef should be made and the detail removed from this copy. This could be achieved within the design package used to produce the XRef, or manually within a drafting package.
- 10.4 In this way the original data remains intact and can be reloaded at any stage to check there are no discrepancies between the copies.

11 Drawing Amendments

- 11.1 Amendments record the changes made to a drawing throughout its life.

- 11.2 The details of each amendment shall be recorded in the amendment area at the bottom left side of the title block and the current amendment number shall be recorded in the box on the bottom right side of the title block.
- 11.3 The changes made shall be highlighted with the use of a triangle containing the amendment number or letter. 'Clouding' may also be used in combination with the amendment triangle to further highlight the changes at the drafter's discretion.
- 11.4 At the time that a new amendment is made all triangles and clouds highlighting the previous amendment shall be removed from the drawing.

Official Amendments

- 11.5 Issued For Construction (IFC) drawings formal amendment 0 shall be recorded in the box on the bottom right side of the title block and the amendment area at the bottom left side of the title block will be blank. Amendment triangles and clouds highlighting the previous amendment shall be removed from the drawing.
- 11.6 Formal amendments to a drawing (i.e., ones that are to be 'accepted' in accordance with the definitions from Clause 1.7) shall be identified with a number (1,2,3 etc).
- 11.7 Any revision triangles or clouding on the drawing shall highlight the changes between the current official amendment and the previous official amendment.

Unofficial Amendments

- 11.8 Whilst a drawing is being worked on, informal amendments may be recorded on the drawing at the drafter's discretion. These unofficial amendments shall be identified by appending a letter to the next official amendment number.
- 11.9 For example, amendments made prior to a drawing being accepted for the first time will be 0A, 0B, 0C etc. Once that drawing has been accepted all references to these unofficial amendments will be removed and the drawing will become amendment 0. Similarly, any informal amendments following this will 1A, 1B etc, which will become amendment 1 when the amended drawing is accepted.

Superseded Drawings

- 11.10 A new drawing may 'supersede' or 'partly supersede' an older drawing.
- 11.11 When this occurs both the new and old drawings must have one of the following cross reference notes added.
- 11.12 On the SUPERSEDED drawing:
 - a) THIS SHEET IS SUPERSEDED BY DRG ???? SHT ???? , or
 - b) THIS SHEET IS PART SUPERSEDED BY DRG ???? SHT ????
- 11.13 On the SUPERSEDING drawing:
 - a) THIS SHEET SUPERSEDES DRG ???? SHT ???? , or
 - b) THIS SHEET PART SUPERSEDES DRG ???? SHT ????
- 11.14 Note: The cross reference note may list multiple drawing and sheet numbers if required.
- 11.15 These cross reference notes represent an amendment to the drawing, as such the relevant processes for amending drawings as detailed in Section 11 shall apply.
- 11.16 When only part of a drawing is superseded, it shall be made clear on the drawing which area/detail is no longer current.
- 11.17 Cross reference notes shall be drawn in Paper Space and located in the lower right corner of the drawing above the title area. They shall be on layer D-ENHA-General Notes. Text shall be Red, 5mm high.

12 Modifying Scanned Drawings

- 12.1 In general, all drawings should be created using standard vector entities, however some older Departmental drawings only exist as a scanned image.
- 12.2 Where it is necessary to amend one of these drawings, the image shall first be attached to a .DWG file.

- a) The filename (excluding extension) of that image file shall be identical to the DWG file it is attached to in line with Clause 14.
- b) The image shall be inserted into Model Space at 0,0 and scaled to full size (ie a 6.5m wide road should scale as 6.5m in Model Space).
- c) Any new work shall be created using CAD entities.
- d) Any detail that needs to be removed from the image shall be removed from the image file itself (using Raster Design for example) rather than being 'covered up' by CAD entities (e.g., wipeouts).

13 Filenames

13.1 Drawing filenames shall consist of the drawing number and sheet number.

13.2 Individual PDF files shall also include the amendment letter / number.

13.3 The format shall be as follows:

- a) DWG Files - **1234 Sheet 0005.dwg** where:
 - i) 1234 is the drawing number
 - ii) 0005 is the sheet number
- b) Individual PDF Files - **1234 Sheet 0005-AMD 6.pdf** where:
 - i) 1234 is the drawing number
 - ii) 0005 is the sheet number
 - iii) 6 is the amendment number

14 Drawings Transmittal requirements

- 14.1 All drawings shall be submitted to DIT in both DWG and PDF format and shall be named in accordance with Section 13. Where the drawings are being sent by email the maximum size of any single email must not exceed 10MB.
- 14.2 Paper copies may also be requested, in this case it shall be the original prints that are supplied rather than photocopies or scans of these prints.
- 14.3 Prior to submission these files should be checked to ensure that they conform to the requirements of this document including the following.

DWG Files

- 14.4 DWG Files:
 - a) Shall be in AutoCAD format
 - b) Shall only contain one drawing sheet (multiple drawings on separate layout tabs will not be accepted)
 - c) Shall not contain any custom objects or proxy graphics
 - d) Shall be purged to remove unused content
 - e) Shall have the current layer set to '0'
 - f) Shall have 'Base' set to 0,0,0
 - g) Shall not contain any Paper Space objects outside the area of the Titleblock.
 - h) Shall be saved with the drawing being zoomed to extents in Paper Space.
- 14.5 During the course of the project, drawings and XRefs shall be supplied unbound, whereas at project completion all XRefs shall be bound to the host drawing.
- 14.6 Where a drawing includes a scanned image in accordance with Clause 12, the image file must accompany the main DWG file.
- 14.7 No other files should be transmitted unless their use has been expressly authorised in writing by the DIT Design Manager. This includes such things as plot style tables, font files, line style files and shape files.

PDF Files

- 14.8 All PDF files issued for approved formal amendments (i.e. 0, 1, 2, 3 etc.) shall be created at full size using the plot style "DPTI-RD-DesignBlack".
- 14.9 PDF files issued during the course of the project for review shall be created at full size using the plot style "DPTI-RD-Colour".
- 14.10 During the course of the project, upon request these shall be combined into a single multipage PDF file, whereas at project completion they must be provided as individual files (one PDF file for each drawing sheet).
- 14.11 PDF files shall include layer information but not be restricted or password protected in any way.

Digital Engineering Model

- 14.12 The Contractor shall provide a digital engineering model as specified in the DIT "Asset Information Requirements (Road Projects)" and DIT Digital Engineering Guidelines (Road Projects).