

Drafting and Design Presentation Standards Manual (DDPSM)

Volume 3: Structural Drafting Standards
Chapter 1 – Introduction

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1 General

This volume provides the drafting and design presentation standards to produce all structural drawings delivered as outputs of the planning and/or design activity of infrastructure projects performed for the Department of Transport and Main Roads.

This volume is Volume 3 of *Drafting Design and Presentation Standards Manual* (DDPSM).

The other volumes in DDPSM are as follows:

- Volume 1: *Drafting Design and Presentation Standards* provides general guidance for presentation. It also specifies departmental requirements for civil design drawings, and
- Volume 2: *Road Design Development Presentation* details expectations for specific road planning and design drawings.

The purpose of this volume is to standardise the presentation of structural engineering drawings for departmental projects. There is an expectation by Transport and Main Roads as the asset owner of uniformity in appearance and detailing on the drawings across all projects with structural details.

The emphasis is on presentation standards and explanation of bridge geometry.

2 References

Reference	Title
DDPSM Volume 1	<i>Drafting Design and Presentation Standards Manual</i>
DCBoS	<i>Design Criteria for Bridges and Other Structures</i>
AS 1100 Set	<i>Technical Drawing</i>
-	<i>Austrroads Guide to Bridge Technology – Part 5: Structural Drafting</i>

This volume shall be read in conjunction with DDPSM Volume 1, and the department's *Design Criteria for Bridges and Other Structures* (DCBoS).

As stated in DCBoS, all structural engineering drawings shall be completed to the standards of detailing, accuracy and completeness set out in this volume.

The presentation of all the content on the drawings shall be consistent across the set without change.

Refer to DDPSM Volume 1 for the following topics:

- computer software for road design and presentation
- requirements for tendering and construction

- preserving the design intent during construction
- departmental requirements
- management of project drawings
- drawing documentation, and
- engineering certification and safety in design.

3 Format of this volume

This volume is designed to be read in conjunction with DCBoS and DDPSM Volume 1.

Drawings and figures supplied in this volume are provided as examples only, and designers are expected to use them as a guide to inform project-specific detailed design outcomes tailored to the design of the particular project.

This volume is set out in 5 chapters, as shown in the following table.

Table 3 – Content structure of this volume

Chapter	Chapter title in this volume
1	Introduction
2	Standard of presentation for structural engineering drafting
3	Bridge geometry
4	Bridge drawings
5	Other structures drawings
6	Supplementary Information

4 Glossary of terms

Words and terms that have specific meaning in structural engineering drawings are generally to be adopted from Australian Standard AS 1348.1. Where conflict arises between departmental terminology and the Australian Standard, the departmental standard, as described in DDPSM Volume 1, Chapter 2, or in this volume, shall prevail.

Refer to Table 2.3.3.8(a) in DDPSM Volume 1, Chapter 2 for approved shortened forms, and Table 2.3.3.8(b) for approved units of measurement.

The following table shows the meaning of specific words, phrases and abbreviations, as they appear in this volume and on departmental structural drawings. These are in addition to those listed in DDPSM Volume 1, Chapter 2.

Table 4 - Glossary of terms

Term	Definition
alignment	The geometric form of the centreline (or other reference line) of a carriageway in both the horizontal and vertical directions.
ACRS	Australian Certification Authority for Reinforcing and Structural Steels.
AEP	Annual Exceedance Probability, expressed as % probability for design rainfall or flood event, including and less frequent than those with a 10% AEP, for example, a design rainfall described as having a 1% AEP.
AHD	Australian Height Datum.
ARI	Average Recurrence Interval describes how rare an event is, by comparing how often, on average, the event has occurred in the past.
avg	Average.
BH	Borehole is a narrow cylindrical hole made in the ground for extracting soil samples as part of a geological investigation of the work site.
BIS	Bridge Inventory System.
BF	Bottom face, usually for reinforcement callup.
BM	Benchmark, a surveyor's mark affixed to a permanent surface and used as a reference point in measuring heights.
bridge control	The line of reference used throughout bridge drawings; it may be the same line as the road control.
CC	Circle to circle or curve to curve, being the point on the alignment at where one curve meets another curve.
CHS	Circular Hollow Section.
CJ	Construction joint.
CL	Centreline.
continuous deck	Where a concrete bridge deck continues over a pier without an expansion or fixed joint.
crest curve	A convex vertical curve in the longitudinal profile of a road.
Crs	Centres, call up of a repeating constant spacing measured centre to centre.
crossfall	The slope of the running surface, measured at right angles to the alignment.
crown	The highest point on the cross-section of a carriageway with 2-way crossfall.
CSK	Countersink.

Term	Definition
CT	Circle to tangent or curve to tangent, being the point on the alignment at where a curve meets a tangent, with increasing chainage.
CTRL	Control Line, line of reference.
Dia	Diameter.
D/S	Downstream.
DWS	Deck Wearing Surface.
expansion joint EJ	Where the superstructure of a bridge is attached to a headstock with a joint that is designed to slide longitudinally as the bridge expands and contracts.
EMP	Environmental Management Plan.
FF	Far face, usually for reinforcement callup.
fixed joint FJ	Where the superstructure of a bridge is attached to a headstock with a connection that is not designed to move, i.e. it is fixed.
Galv	Hot dip galvanised.
GDA	Geocentric Datum of Australia.
HAT	Highest astronomical tide is the highest level that can be expected to occur under average meteorological and astronomical conditions.
HC	A horizontal curve in the plan or horizontal alignment of a carriageway.
HD	Holding down, usually describing a bolted connection.
Height Ht	This term is in place of Reduced Level (RL), Vertical or Z value of any point.
HLP	Heavy Load Platform.
hog	Magnitude of upward deflection in prestressed deck units and girders due to the action of prestressing forces.
ID	Inside diameter.
IFC	Issued for Construction.
IP	Intersection point, being the point on the alignment where 2 tangents intersect.
kerb	Raised near-vertical face at edge of road or median of sufficient height to prevent or deflect vehicles from moving off the carriageway.
may	Conditional, or optional, where no specific requirement for design or application is intended.
Max	Maximum.
MHW	Mean High Water.

Term	Definition
MHWS	Mean High Water Springs.
MLW	Mean Low Water.
MLWS	Mean Low Water Springs.
Min	Minimum.
MGA	Map Grid of Australia, a rectangular co-ordinate system using a Universal Transverse Mercator projection with zones 6 degrees wide and based on the Geocentric Datum of Australia.
ND	Nominal diameter.
NF	Near face, usually for reinforcement callup.
No Off	This term is for the quantity of items to be fabricated / cast / manufactured.
Nom	Nominal.
OD	Outside diameter.
Opp	Opposite.
pavement	That portion of a road designed for the support of, and to form the running surface for, vehicular traffic.
PCD	Pitch circle diameter.
%	Percentage.
PFC	Parallel Flange Channel.
PSC	Prestressed Concrete.
PTFE	Polytetrafluoroethylene.
PVC	Polyvinylchloride.
QR	Queensland Rail.
R	Radius.
RC	Reinforced Concrete.
RHS	Rectangular Hollow Section.
Rev	Revision.
RP	Reference Point.
RPEQ	Registered Professional Engineer of Queensland.
road control	The line of reference used throughout road drawings.
sag curve	A concave vertical curve in the longitudinal profile of a road.
shall	Mandatory requirement.

Term	Definition
should	Recommended but not mandatory.
SHS	Square Hollow Section.
SID	Structure identification number.
SM1600	Combination of S1600, stationary traffic load, and M1600, moving traffic load, as per AS 5100.2 <i>Bridge Design</i> .
SOP	Set Out Point.
sps	Spaces, call up of a repeating constant spacing.
superelevation	The slope of the running surface, measured at right angles to the alignment, usually on a horizontally curved pavement.
TC	Tangent to circle or tangent or curve, being the point on the alignment at where a tangent meets a curve, with increasing chainage.
TFB	Taper Flange Beam.
TFC	Taper Flange Channel.
TF	Top face, usually for reinforcement callup.
TMR	Department of Transport and Main Roads.
UB	Universal Beam.
UBP	Universal Bearing Pile.
UC	Universal Column.
UPVC	Unplasticised Polyvinylchloride.
U/S	Upstream.
VC	A vertical curve (generally parabolic) in the longitudinal profile of a carriageway to provide for a change of grade.
vertical alignment	The longitudinal profile along the centreline of a road.
WH&S	Workplace Health and Safety.

5 Structural engineering drawings

Structural engineering drawings for departmental projects traditionally follow these phases:

- Concept
- Preliminary
- Detailed design
- Issue For Construction (IFC), and
- As Constructed.

The level of detail provided at each phase increases as the project progresses. The following is a guide to the amount of drafting detail required at each stage.

Concept drawings typically show:

- draft general arrangement drawings including a superstructure section view
- articulation (location of expansion joints)
- service requirements
- barrier requirements
- lighting requirements
- drainage requirements
- vertical clearances to road and rail traffic, and
- draft abutment and pier drawings including preliminary founding heights.

The drawings need not show reinforcement at this stage.

Preliminary drawings typically are complete set of draft drawings with the foundation types confirmed but do not need to show reinforcement.

Detailed design drawings typically are complete set of drawings showing reinforcement and have been drafting checked.

Departmental requirements for IFC and As Constructed drawing are discussed in DDPSM Volume 1.

5.1 Drawing order

Austrroads Guide to Bridge Technology, Part 5: Structural Drafting lists the logical order of typical drawings for a simple bridge. The drawing order for large or complex bridges, and other structures, can be expanded on, or varied, from this generic list.

Tables containing typical drawing sets are included in the following chapters for bridge drawings and for other structures.

Example drawings that demonstrate best practice have been included where possible from recent projects, and several older example drawings from the previous version of the volume are retained for this reason.

5.2 Drawings submission for Structures directorate review

The DCBoS explains what the department requires to be submitted during each design report phase, including design drawings. The submitted drawings should clearly demonstrate and articulate the design intent for that stage of the project.

