

**Drafting and Design Presentation Standards  
Volume 3: Structural Drafting Standards**

**Chapter 20: Electronic Project Model (EPM)**

**December 2020**

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**Chapter 20 Amendments****Revision register**

<b>Issue/Rev No.</b>	<b>Reference Section</b>	<b>Description of Revision</b>	<b>Authorised by</b>	<b>Date</b>
1	–	First Issue.	Manager (Structural Drafting)	April 2011
2	–	Document name change.	Manager (Structural Drafting)	Nov 2011
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## **20 Electronic Project Model (EPM)**

### ***20.1 Glossary of terms***

For a complete glossary of terms refer Chapter 1 – *Introduction*.

### ***20.2 Figures and examples shown in this volume***

The figures and examples shown in this volume are for presentation purposes only, and may contain some details that are now superseded. These details have been included for ease of reference, to illustrate typical solutions, and to show the required standard of drafting presentation. The details are not to be used without an engineering check and certification by a Structural RPEQ to confirm that the details are appropriate for the specific project.

### ***20.3 Introduction***

This procedure outlines the method to produce 3D Electronic Project Models (EPMs) which are used by surveyors to set out bridges during construction. An EPM is an electronic drawing showing reference points on the bridge from where construction shall be set out.

Whilst this chapter describes outcomes based on the use of Autocad software it is recognised that projects developed using alternative software will also be used.

### ***20.4 File Format***

The file is to be supplied in AutoCAD format. This file can be imported into any civil / survey software package that the end user may have, for example, 12D, Terramodel and so on.

### ***20.5 Coordinates and Drawing Units***

All points shall be given an X, Y and Z coordinate value. All points are to be drawn in project coordinates (Real World Coordinates as termed in AutoCAD).

Drawing units for the EPM are to be in metres.

### ***20.6 File Name***

The file name of the EPM shall be *EXAMPLE\_EPM\_A.dwg* where *EXAMPLE* is the name of the bridge and *A* is the revision letter.

### ***20.7 Title Block and Revision Details***

The Project Name, Job No, Region and date of original issue (Revision A) are to be completed in the title block. The title block shall be drawn in 'paper space' in AutoCAD.

Each time a revision is made to the bridge design that affects the EPM, a new revision of the EPM is created and thus details of the revision need to be recorded.

Refer Figure 20.7-1 Title Block.

**Figure 20.7-1 Title Block**

Project Name: EXAMPLE CREEK BRIDGE  
Job No: 123/456/789  
District: NORTHERN  
Datum: GDA94

\*\*\*\*\*  
IMPORTANT NOTE : PLEASE READ

The data contained in this EPM (electronic project model) is to be read in conjunction with the information supplied on the drawings

\*\*\*\*\*

ELECTRONIC REVISION BLOCK FOR THE EPM

* REVISION *	DATE	* DESCRIPTION / REASON FOR REVISION *
* A	* 1 APRIL 2007	* ORIGINAL ISSUE
* B	*	*

\*\*\*\*\*

\*\*\*\*\*  
\*\*\*\*\* Dept of Transport & Main Roads – Bridge Design \*\*\*\*\*  
\*\*\*\*\* All queries about EPM files are to be directed to \*\*\*\*\*  
\*\*\*\*\* Manager (Structural Drafting) – Bridge Design \*\*\*\*\*  
\*\*\*\*\*

**20.8 Content of EPM**

The bridge components shall be drawn in ‘model space’ in the EPM, and shall show enough detail to allow piles to be set out, and for the concrete works to be formed.

When an EPM is transferred into the surveyor’s software, layers created in AutoCAD transfer across into the software with the same layer name as in AutoCAD. Therefore, parts of the bridge shall be differentiated by appropriate layer naming, allowing the end user to easily identify components. Layer naming shall be limited to a maximum of 24 characters and the naming convention is shown in Figure 20.8-1 *Naming Convention*.

**Figure 20.8-1 Naming Convention**



The following components are to be included in a 3D EPM in real world coordinates.

**Bridge Control**

Show all points on the Bridge Control at every abutment and pier at the top of road Height. On bridges that are level or on a constant grade, draw a straight AutoCAD line between each point. On bridges with a vertical curve, a ‘string’ shall be imported into the EPM from 12D. The ‘string’ shall have points at 1 m centres along the bridge control, plus points at the abutments and pier centrelines.

Item	AutoCAD Layer Name
Bridge Control	MRB_Bridge_Control

**Top of Road Surface at Kerbs**

The road surface is not usually part of the EPM unless specifically requested by the client.

If required, draw a ‘string’ on both sides of the bridge where the top of the DWS intersects with the kerb/parapet. The ‘string’ shall have points at 1 m centres along the bridge control.

Item	AutoCAD Layer Name
Top of road surface at each kerb	MRB_DWS

**Piles**

Assuming that the piles at a particular pier or abutment are equally spaced, the only points that shall be shown are the two outer piles. The coordinate given shall be at the centre-bottom of the pile. It does not matter what type of pile used (octagonal PSC piles, CIP piles, steel piles and so on). When showing a row of piles under a pier or abutment that are equally spaced, a single AutoCAD line shall be drawn between the two outer piles. The Surveyor can divide this line equally to calculate the coordinates of the intermediate piles.

If the piles are not equally spaced, a point for every pile shall be shown.

Item	AutoCAD Layer Name
Centre of piles	MRB_Pile_Bottom

**Abutments and Piers**

The following items shall be drawn where applicable:

- Soffit of headstocks and wingwalls
- Top of headstock bearing shelves

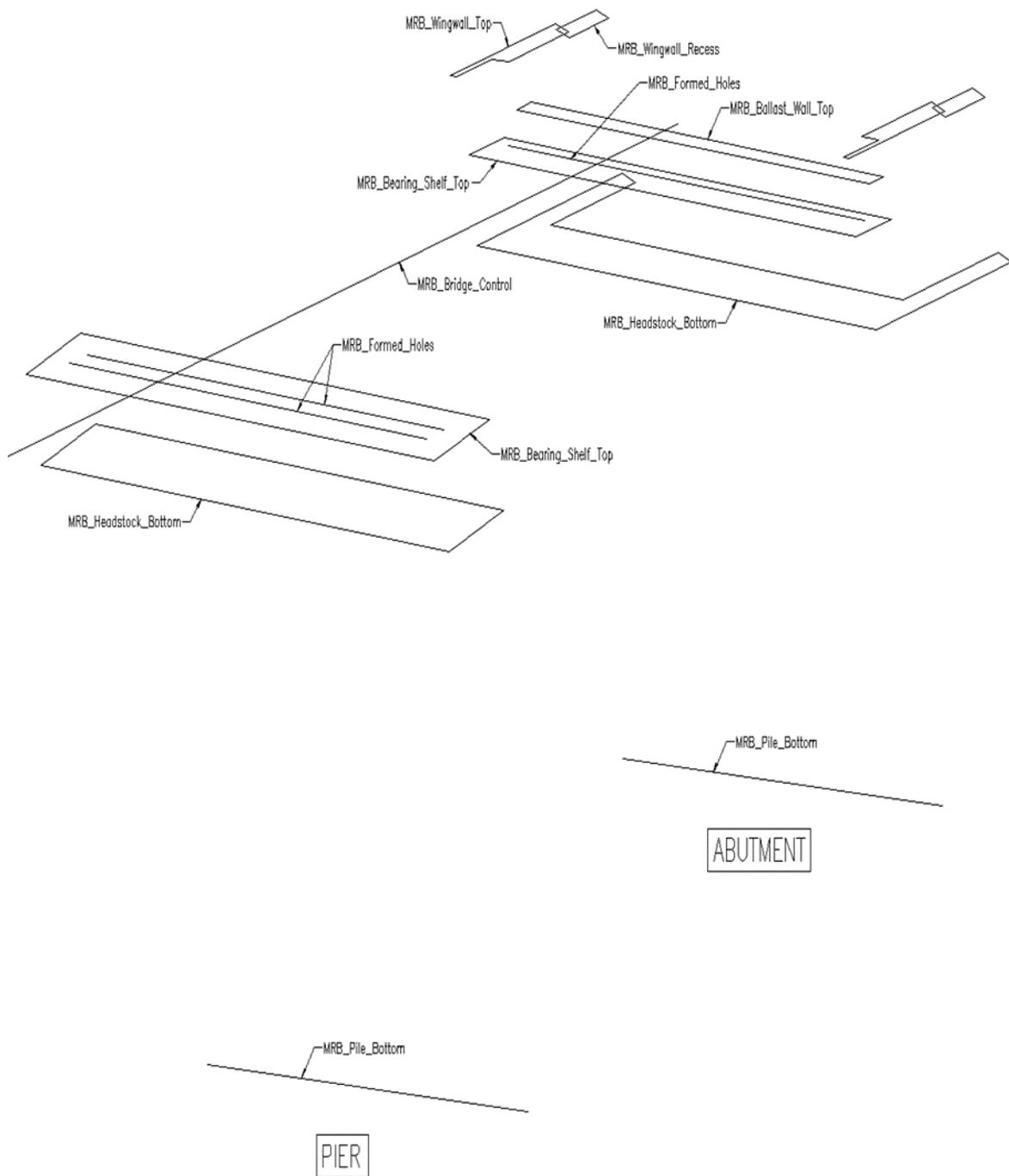
- Top of ballast walls
- Top of wingwalls
- Bridge traffic barrier recesses in wingwalls
- Bottom and top of columns
- Bottom and top of stems
- Soffit and top of pilecaps
- Other features when required
- Formed holes. Assuming that the formed holes are equally spaced, the only points that shall be shown are the two outer holes. The coordinate given shall be at the centre of the hole at bearing shelf height. An AutoCAD line shall be drawn between the two outer holes. The Surveyor can divide this line equally to calculate the coordinates of the intermediate holes. If the holes are not equally spaced, a point for every formed hole shall be shown.
- Bearings. The coordinate given shall be at the centre of the bearing. If the bearing is located in a recess, the Height given shall be at the bottom of the recess. If the bearing is located on pedestals, the Height given shall be at the top of the pedestal. Assuming that the bearings are equally spaced and the height difference between them is constant, the only points that shall be shown are the two outer bearings. If the bearings are not equally spaced, or the Height difference between them is not constant, then every bearing shall be shown.

Item	AutoCAD Layer Name
Headstock soffit outline	MRB_Headstock_Bottom
Top of bearing shelf outline	MRB_Bearing_Shelf_Top
Top of ballast wall outline	MRB_Ballast_Wall_Top
Top of wingwall outline	MRB_Wingwall_Top
Bridge traffic rail recess	MRB_Wingwall_Recess
Bottom of column outline	MRB_Column_Bottom
Bottom of stem outline	MRB_Stem_Bottom
Pilecap soffit outline	MRB_Pilecap_Bottom
Top of pilecap outline	MRB_Pilecap_Top
Centre of formed holes	MRB_Formed_Holes
Centre of bearings	MRB_Bearings

### 3D EPM Example

Figure 20.8-2 *Example 3D EPM* shows the details required on an EPM. The text shown is for illustration purposes only and shall not be included in the drawing.

**Figure 20.8-2 Example 3D EPM**



### 20.9 Checking EPMs

Checking the EPM will mean checking the electronic model created in AutoCAD. Items to be checked may include:

- EPM units are in metres
- AutoCAD UCS is set to 'world'
- Ensure all items displayed in the EPM are on appropriate layers
- Bridge Control coordinates, location and span lengths

- Skew of abutment and pier centrelines
- Pile locations and dimensions
- Pilecap, column locations and dimensions
- Headstock and wingwall locations and dimensions
- Formed holes and bearing recesses locations and dimensions
- Heights match those on the drawings
- Distance between formed holes on adjacent headstocks match the deck unit length (allowing for grade / VC adjustment)

