ENGINEERING DRAFTING GUIDELINES FOR HIGHWAY AND BRIDGE PROJECTS

VERSION 2.1

Alberta Transportation

June, 2016

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PREFACE

The Alberta Transportation Engineering Drafting Guidelines for Highway and Bridge Projects are intended to establish uniform standards and procedures to use when preparing drawings for Alberta Transportation projects.

The sharing and proper use of these drafting guidelines is a vital part of ensuring consistency and quality of projects. The department becomes the owner of the CADD work submitted by the Consultant and must be able to file and easily work with this information for the immediate project or for future projects.

The standardization of CADD details allows the department personnel to easily use CADD details supplied by a Consultant, as several different Consultants may be retained at any given time. In addition, contractors and suppliers also become equally familiar with consistent detailing practice. This consistency provides a more efficient and economical workflow.

It is important to note that any one project does not end when the CADD details are submitted by a Consultant for construction, as the project will in all likelihood need to be worked on in the future. Therefore, standardization of CADD detailing format would allow different Consultants or the department staff to work with the files on future assignments.

These drafting guidelines refer to various department documents, which can be found on the department’s website (www.transportation.alberta.ca). The latest version of these documents shall be used.

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1. GENERAL

1.1 INTRODUCTION

This manual is intended to establish uniform standards and procedures to use when preparing various drawings for Alberta Transportation Roads, Bridges, Airports, Planning Study and Aggregate Projects. The contents of the various drawings are described and, in most cases, illustrated by examples and provide guidance on detailing.

Drawings prepared for Roads, Bridges, Airports and Planning Study projects shall utilize similar drafting standards, which are described in Section 2.

Drawings prepared for Aggregate projects utilize a different set of standards, which are described in Section 3.

This document does not apply to Water projects.

Alberta Transportation shall be referred to as the department throughout this document.

The engineering entity preparing and taking engineering responsibility for the drawings shall be referred to as the Consultant throughout this document. Consultants shall familiarize themselves with these guidelines prior to completing any drafting.

1.2 SOFTWARE

It is the department’s policy to accept CADD files in MicroStation (DGN) format only.

All CADD files submitted shall be fully compatible with the MicroStation current version used by the department.

1.3 DISCLAIMERS AND LIMITATIONS OF LIABILITIES

The department does not warrant or certify the information to be free from errors or discrepancies of any kind. The use of any information in this manual does not relieve the Consultant from any obligations assumed by the contract or from complete and proper fulfillment of the terms of the contract, nor does it entitle the Consultant to compensation from the damages or loss which could be attributed to such use. The information is subject to change and anyone relying on this information should satisfy themselves as to the most current version.

The department does not assume any legal liability or responsibility for the accuracy, completeness, or usefulness of the maps, drawings, data, or information incidental thereto. The department recommends that users exercise their own skill and care with respect to their use or seek professional advice.

Under no circumstances will the department be liable to any person or business entity for any direct, indirect, special, incidental, consequential, or other damages as a result of any use of the maps, drawings, data, or any information incidental thereto, including, without limitation, any lost profits or business interruption.
2. HIGHWAYS AND BRIDGES

Section 2 applies to Highways, Bridges, Airports and Planning Study projects.

2.1 TECHNICAL DRAWING RESOURCES

2.1.1 MicroStation Workspace

The department has developed a MicroStation workspace which is to be used when working with any electronic CADD files. This workspace is available for all Consultants to use so that all electronic CADD files received from the Consultants can be used by the department.

The department MicroStation workspace is located on the FTP site, which can be accessed as follows:

- ftp://www.tu.gov.ab.ca/
  - User Name: tsbftp
  - Password: Srg4Tfh
- Click on Shared/
- Click on AT_CADD_INROADS_STANDARDS
- Download the data in a compressed ZIP file by clicking on AT_CADD_2016_06.zip
- This ZIP file will be occasionally updated and the current date will be included in the file name. Consultants shall ensure they are using the most current version.

The FTP site can also be accessed as follows: go to www.transportation.alberta.ca; click on link for Technical Resources; click on link for FTP Shared Data; click on link for Access to site.

This ZIP file includes cell libraries that contain the following:

- Sheet surround
- Highway signs etc
- Colour tables
- Master level library
- Font resource file AT font 99
- Printer and plotter files
- Custom line styles and pavement markings

The content of this ZIP file will evolve to reflect changes as required.
2.1.2 **MicroStation Master Level Library**

The department has developed a master level library, which is available in the file “AT_CADD__2016-06.zip”, located on the FTP site (described in Section 2.1.1) under the name “AT_master_library.dgnlib”. This master level library shall be used. However, this master level library may not cover all possibilities and Consultants may expand upon the master level library using the level naming format described below.

The level name format consists of four fields separated by hyphens. The following is an example of a Level Naming Convention:

Example:

```
C-BR-ABT-DET  (Civil – Bridge – Abutment – Details)
```

Discipline

Group

Descriptor 1

Descriptor 2

For more detailed level descriptions, see Appendix A.

2.1.3 **Standard Drawings**

The department standard drawings shall be used by the Consultants or Contractors engaged by the department to design or to construct a specific project.

The department assumes no liability or responsibility where these standard drawings are used by a Consultant or Contractor on behalf of a third party (“Third Party Projects”).

2.1.4 **Bridge and Structures**

The following additional CADD related resources for Bridges and Structures are available through the department’s website:

- Standard and Typical Detail Drawings ([www.transportation.alberta.ca/4738.htm](http://www.transportation.alberta.ca/4738.htm))

2.1.5 **Highway Design and Construction**

The following additional CADD related resources for Highway Design and Construction are available through the department’s website:

- Roadside Design Guide ([www.transportation.alberta.ca/3451.htm](http://www.transportation.alberta.ca/3451.htm))
- Highway Standard Plates CB-6 Standards ([www.transportation.alberta.ca/655.htm](http://www.transportation.alberta.ca/655.htm))
- Traffic Control Standards ([www.transportation.alberta.ca/1840.htm](http://www.transportation.alberta.ca/1840.htm))
- Highway Geometric Design Guide ([www.transportation.alberta.ca/951.htm](http://www.transportation.alberta.ca/951.htm))
2.1.6 **Other Resources**

Highway geomatics CADD data resources are available on the FTP site (as described in Section 2.1.1) under the *Shared/Roadway_Geometrics* folder. This data is extracted from GPS and Lidar and is provided in CSV file format. The data is updated after each construction cycle. The following data is available:

- GPS Combined
- Cross Slope
- Horizontal Curve Information
- Vertical Curve Information
- Sideslope/backslope/ditch depth (if available)

The following highway geomatics data is provided (if available) upon request from Alberta Transportation’s Highway Geomatics Section (some of this data is only available if contracted with Alberta Transportation):

- From the Survey/Imagery Coordinator:
  - Cadastral Mapping *
  - Satellite Imagery
  - Air Photo Imagery
  - Ortho Imagery
  - DEM/contour data
  - Airborne DEM (LiDAR derived)
  - Mobile LiDAR (collection of raw LiDAR for Hwy corridor)
  - Pipeline data

* Cadastral mapping is produced by a third party therefore the levels and fonts used are not Transportation’s standards. The consultant does not have to convert these files to Transportation’s standards.
2.2 GENERAL DRAWING REQUIREMENTS

2.2.1 Sheet Surrounds

2.2.1.1 Standard Sheet Surround for Road, Airport and Bridge Projects

The following 22” X 34” standard sheet surround shall be used for all roads and bridges projects, unless noted otherwise.

This sheet surround is in the file “AT_CADD_2016-06.zip”, located on the FTP site (described in Section 2.1.1) under the cell name “AT_22x34”.

The title block shall not be altered with exception of the revision block, which may be modified by removing a horizontal line to accommodate the revision text.

If required, the title block may be extended across the sheet to accommodate a key plan.
2.2.1.2 Standard Sheet Surrounds for Planning Study Projects

Planning Study standard sheet surrounds are in the file “AT_CADD__2016-06.zip” (on the FTP site described in Section 2.1.1) with the cell names in accordance with the following table.

<table>
<thead>
<tr>
<th>Cell Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PL_8.5x11</td>
<td>Plan/Location 8.5x11</td>
</tr>
<tr>
<td>PL_22x34</td>
<td>Planning Study 22x34</td>
</tr>
<tr>
<td>PL_34x22</td>
<td>Planning Study 34x22</td>
</tr>
<tr>
<td>PL_1000</td>
<td>Plan/Profile 1:1000</td>
</tr>
<tr>
<td>PL_2000</td>
<td>Plan/Profile 1:2000</td>
</tr>
<tr>
<td>PL_5000</td>
<td>Plan/Profile 1:5000</td>
</tr>
</tbody>
</table>

PL_22x34 Planning Study Sheet Surround
Planning Studies

Title blocks for Planning Study projects shall be completed as shown below.

2.2.2 Title Block Guide

Title blocks shall be completed as shown below. Additional information for completing title blocks is available in the “Roadway Drawing Sets” and “Bridge Drawing Sets” sections.

For Tender Drawings:

All text in the title block shall be AT Font 99 TX=3, WT=2 (not including headings and stamps). Unless noted otherwise below.

1) Consultant’s Logo
2) Revision block date YYYY-MM-DD: centered vertically and horizontally.
3) Comments
   a) The revision box is used to track design changes.
   b) The revision box is not to be used for tracking a drawing status. “Issued For Review” or “Issued For Tender” are not revisions.
   c) Text is left justified.
   d) If required, multiple lines of text is allowed.
4) Initials of design engineer.
5) Alberta Transportation logo. For municipal projects, remove “Alberta Transportation” and replace with municipality name.
6) See detailed title block format in the Highway and Bridge sections of this document.
   a) Use TX=5, WT=4. The width of the text may vary depending on text requirements. Text to be centered vertically and horizontally.
7) Department issued numbers for Bridges, Highways and Airports. Use TX=5, WT=4.
8) Sheet number and total number of sheets in the set, including any standard drawings.
9) Highway number and control section.
10) Department contract number.
11) Bridge site number, road intersection number or airport number.
12) Legal land description. This information is required for bridges, intersections, interchanges, airports and utilities.
13) Date drawing set completed (format: YYYY-MM-DD)
14) Engineering stamps shall be signed on the Mylars.
15) CAD files submitted to the department must be stamped with one of the following identification option:

![Designer Stamp](image1)

![Checker Stamp](image2)

16) Require a valid Permit to Practice Stamp and Number. Signature is optional. Either of the following alternate Permit to Practice stamps may be used at the Consultant’s discretion.

![Permit to Practice Stamp](image3)

17) Consultant’s job/plan number
For Record Drawings:

Title blocks for Record Drawings shall be modified as shown below.

1) Add the following note to all record drawings:

   THIS RECORD DRAWING INDICATES THAT THE CONSTRUCTED
   PROJECT SUBSTANTIALLY COMPLIES WITH THE DESIGN DRAWINGS
   AND ALL APPROPRIATE CONTRACT PLANS AND SPECIFICATIONS.

2) Update all drawing numbers, changing the “P” to a “C” to indicate it is a record drawing.

3) Make all record changes to the drawings and flag with revision symbol.

2.2.3 Typical Drafting Practices

2.2.3.1 Miscellaneous

- Layout of drawings should be balanced and legible.
- Dates shall be expressed numerically in order of year, month and day e.g. YYYY-MM-DD.
- Notes shall appear as close as practical to the referred figures. In no case shall lettering obscure any part of the drawing detail.
- Grid to ground survey note see bulletin 34.
- River and stream names should follow the shape of the feature.
- Bench marks locations to use station, offset and coordinates.
- Cross sections shall be shown looking in the direction of increasing chainage.

2.2.3.2 North Arrow

Drawings should generally be arranged so that North is orientated towards the top of the drawing. When it is not possible to orientate North towards the top, the drawing should be orientated in an easterly direction.

The north arrow symbol must be located on all land related plans/details and placed on the top left corner of the plan/detail.
The department approved north arrow shall be used and is included in the cell name “NARROW” in the file “AT_CADD_2016_06.zip” (on the FTP site described in Section 2.1.1).

2.2.3.3 Department Control Sections and Kilometre Post

Each highway in the province is divided into control section segments. Control sections increase from south to north and west to east. For example, the first control section on Highway 2 is 2:02 which originates at the Montana/Alberta border. Hwy 2:02 has a beginning chainage of 0+000.00 and kilometre post 0.000 km. This first control section ends at kilometre post 24.828 km at the intersection of Highway 5. The next Highway 2 control section is 2:04, beginning at the intersection of Highways 2 and 5; it begins with a kilometre post of 0.000 km and ends at 31.09 km south of Belly River Bridge. Generally control sections increase incrementally by a value of 2, i.e. 2:02, 2:04, 2:06, etc., until the final control section is reached.

The appropriate control section shall be on all plans. Kilometre posts must be on all Highway Drawings and these can be requested from the CADD Support Technologist in the Highway Geomatics Section.

2.2.3.4 Line Weights

The use of line weights contributes to the readability and understanding of the drawings. There should be a clear distinction between object lines, dimensions, and notes. Consultants shall use the department’s supplied level library.

The following table illustrates the department’s preferred use of line weights and consultants shall use the line weights and thickness for the elements listed. Consultants may use additional line weights if required to further enhance the readability and understanding of the drawings.

<table>
<thead>
<tr>
<th>THICKNESS (mm)</th>
<th>GRAPHIC WEIGHT</th>
<th>SUGGESTED USE FOR LINE WORK</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.18</td>
<td>0</td>
<td>Cross Section Symbols, Shading, Cross Hatching</td>
</tr>
<tr>
<td>0.30</td>
<td>1</td>
<td>Dimension Lines and Leaders</td>
</tr>
<tr>
<td>0.35</td>
<td>2</td>
<td>3 mm Text</td>
</tr>
<tr>
<td>0.50</td>
<td>3</td>
<td>Object Lines and Reinforcing</td>
</tr>
<tr>
<td>0.60</td>
<td>4</td>
<td>Secondary Titles</td>
</tr>
<tr>
<td>0.80</td>
<td>5</td>
<td>Main Titles</td>
</tr>
<tr>
<td>1.20</td>
<td>6</td>
<td>Sheet Surround</td>
</tr>
</tbody>
</table>
### 2.2.3.5 Lettering and SI Units

All lettering is to be done in capitals except metric SI unit symbols (e.g., mm, m, km, kN, kPa, ha).

A space is used between numbers and SI units (e.g. 25 km, 100 mm, 25 kg, 22 m³).

Unit symbols (e.g. m, kg, etc.) represent the unit. They are not abbreviations.

Minimum text height to be used is 3 mm, with the exception of soil logs, where a minimum of 2 mm can be used.

When a decimal fraction is used, a “0” shall always be placed before the decimal marker (e.g. 0.232 m).

A space is always required for a four digit or higher whole number, (e.g. 5 634 or 20 000)

The use of punctuation symbols, other than periods or commas, shall not be used.

**Example:** CLASS 1 FINISH, NOT “CLASS “1” FINISH

Periods shall not be used at the end of a note, unless they are used to separate two sentences within the same note.

*AT Font 99* shall be used for all text. This font resource file is in the file “AT_CADD_2016_06.zip” (on the FTP site described in Section 2.1.1).

The following short cut keys can be used with *AT Font 99*:

<table>
<thead>
<tr>
<th>Key</th>
<th>Symbol</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>$^1$</td>
</tr>
<tr>
<td>2</td>
<td>$^2$</td>
</tr>
<tr>
<td>3</td>
<td>$^3$</td>
</tr>
<tr>
<td>4</td>
<td>$^4$</td>
</tr>
<tr>
<td>5</td>
<td>$^5$</td>
</tr>
</tbody>
</table>

Bridge Projects to use these symbols.

### 2.2.3.6 Abbreviations

Abbreviations may be used where space is limited. Do not use abbreviations in notes. See example below. Only abbreviations on the department’s list of standard CADD abbreviations shall be used (see Appendix B).

**Example:**

The concrete strength to be 25 MPa, NOT “The conc strength to be 25 MPa.”

The use of periods with abbreviations is not allowed.

**Example:** CSA not C.S.A.
2.2.3.7 Drawing Component Titles

2.2.3.7.1 Main Titles

Main titles are used to describe most views (plans, elevations), sections, or details. Formatting of main titles shall be as shown below.

\[
\text{ELEVATION} \quad \frac{TX=6.0}{WT=5 (0.80 \text{ mm})} \\
\frac{WT=4 (0.60 \text{ mm})}{\text{(LOOKING NORTH) 1:50 DO NOT USE THE WORD SCALE}} \\
\frac{TX=3.0}{WT=2 (0.35)}
\]

2.2.3.7.2 Secondary Titles

Secondary titles are used when multiple views of the same object are shown side-by-side. Formatting of secondary titles shall be as shown below.

\[
\begin{align*}
\text{SECONDARY TITLES} & \quad \frac{TX=5.0}{WT=4} \\
\text{PLAN} & \quad \text{FRONT VIEW} \quad \text{SIDE VIEW} \\
\text{ANCHOR BRACKET DETAILS} & \quad \text{MAIN TITLE} \\
& \quad (35 \text{ REQUIRED}) 1:15
\end{align*}
\]

2.2.3.7.3 Cross-Reference Titles

Cross-reference titles are used for section titles and detail titles. Formatting of cross-reference titles shall be as shown below.

\[
\begin{align*}
\text{BRIDGE PLAQUE} & \quad \frac{TX=5}{WT=3 (0.50 \text{ mm})} \quad \frac{TX=6.0}{WT=5 (0.80 \text{ mm})} \\
& \quad \text{(2 REQUIRED) 1:5} \\
& \quad 15 \text{ mm } \phi \quad \text{WT=4 (0.60 mm)} \\
& \quad \text{WT=4 (0.60 mm)}
\end{align*}
\]
2.2.3.7.4 Culvert Titles

Formatting of culvert titles shall be as shown below.

### PLAN

<table>
<thead>
<tr>
<th>SCALE</th>
<th>1:500</th>
<th>TX = 6.0</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>WT = 5 (0.80 mm)</td>
<td></td>
</tr>
</tbody>
</table>

### LONGITUDINAL SECTION

<table>
<thead>
<tr>
<th>SCALE</th>
<th>1:100</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>TX = 3.0</td>
</tr>
<tr>
<td></td>
<td>WT = 2 (0.35 mm)</td>
</tr>
</tbody>
</table>

### STREAMBED PROFILE

<table>
<thead>
<tr>
<th>SCALE</th>
<th>H:1:100</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>V:1:100</td>
</tr>
</tbody>
</table>

### ROAD PROFILE

<table>
<thead>
<tr>
<th>SCALE</th>
<th>H:1:500</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>V:1:100</td>
</tr>
</tbody>
</table>

2.2.3.8 Cross Referencing

For roads and bridges projects, the following formatting shall be used to reference drawings, sections and details (this does not apply to typical roadway cross-sections).

2.2.3.8.1 Drawing References

When referencing department standard drawings, the approach shown in the following examples shall be used. For standard drawings, the revision date at the end of the drawing number shall be omitted so that the current drawing is always referenced. In the bridge drawing index, the year is to be included in the drawing number.

Example: S-1712-07

Examples:

CONSTRUCT TYPE IVb INTERSECTION AS PER CB6-2.3C32B

or

BRIDGE BARRIER AS PER S-1712

When referencing other drawings, the department issued drawing number shall be referenced. However, the “P” shall be omitted at the end of the referenced drawing number, thereby eliminating the need to edit this at the record drawing stage.
2.2.3.8.2 \hspace{1em} \textbf{Detail and Section References}

When calling up sections, use reference letters “A” TO “N” and avoid using letters “I”, “O” and “Q”. Formatting of section references shall be as shown below.

When calling up details, use reference letters “P” TO “Z”. Formatting of detail references shall be as shown below.

A circle may be used to define area of detail.
WILL A CIRCLE IS NOT FEASIBLE USE A LARGER ARROW

Reference letters shall be chosen consecutively on the sheets on which the sections or details are drawn. Do not use the same reference letter more than once on the same sheet.

The lower number refers to the sheet number on which the item is detailed. This may be the same sheet, in which case the number may be omitted and replaced with a dash.

When sections and details that appear on other drawings are referenced in a note, the actual department issued drawing number shall be referenced. However, the “P” shall be omitted at the end of the referenced drawing number, thereby eliminating the need to edit this at the record drawing stage.

2.2.3.8.3 Example 1

The following example is provided to demonstrate how to cross-reference details and sections. In this example, the “P” drawing number and the associated sheet number are provided for three drawings. Various details are then cross referenced between these three drawings to demonstrate the correct approach.

Drawing Number 40500-P (Sheet 3)

Drawing number 40500-P is Sheet 3 in this example drawing set. On this Sheet 3, a detail shows the bridge plaque and the expansion assembly. More information for the bridge plaque is provided in Detail-R on Drawing Number 40501-P (Sheet 4) and more information for the expansion assembly is provided in Detail-S on Drawing Number 40506-P (Sheet 9). Additionally, the bridge plaque location is referenced in a note to Drawing Number 40538-P.
EXAMPLE
A DETAIL ON SHEET 3 SHOWS
THE BRIDGE PLAQUE WHICH WILL
BE DETAILED ON SHEET 4 AND
THE EXPANSION ASSEMBLY WHICH
WILL BE DETAILED ON SHEET 9

NOTE:
FOR BRIDGE PLAQUE
LOCATION SEE
DRAWING 40538

Drawing Number 40501-P (Sheet 4)

Drawing number 40501-P is Sheet 4 in this example drawing set. On this Sheet 4, the bridge plaque is detailed
and the title references the detail from Drawing Number 40500-P (Sheet 3).
Drawing Number 40506-P (Sheet 9)

Drawing number 40506-P is Sheet 9 in this example drawing set. On this Sheet 9, the expansion assembly is detailed and the title references the detail from Drawing Number 40500-P (Sheet 3). Additionally, an A-section is cut through the expansion assembly. Since the A-section is detailed on the same sheet, the sheet number is omitted and replaced with a dash.

![Expansion Assembly Diagram]

2.2.3.8.4 Example 2

The following example is provided to demonstrate how to cross-reference sections on a typical roadway drawing. The ditch inlet structure plan is shown in Detail T. The A-Section is cut and shown on the same drawing.

![Ditch Inlet Structure Diagram]
2.2.3.9  **Linework**

To simplify the use of line work, the department utilizes line weights and styles as supplied by MicroStation.

The department has supplied additional custom line styles that are available (on the FTP site described in Section 2.1.1).

2.2.3.10  **Symbols**

Standard department symbols shall be used. For the full list of standard department symbols, refer to Appendix C. Cell libraries containing some of these symbols are available (on the FTP site described in Section 2.1.1).

If a nonstandard symbol is used, a legend is required.

2.2.3.11  **Annotation**

Place annotation as close as possible to the relevant item.

Annotation shall be placed to avoid leaders crossing through other text.
### 2.2.3.12 Slopes and Batters

Slopes and batters shall be in accordance with the formatting requirements shown in the following table.

<table>
<thead>
<tr>
<th>CATEGORY</th>
<th>APPLICATION</th>
<th>SAMPLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>SHALLOW SLOPES</td>
<td>ROADWAY CROWN, ABUTMENT &amp; PIER SEATS, TOP OF CURBS, AND GRADE LINES</td>
<td>1.00 0.02 1.00 0.05 +1.0% -2.5%</td>
</tr>
<tr>
<td>BATTERS</td>
<td>PILES</td>
<td>0.2 0.15 1.0 1.00</td>
</tr>
<tr>
<td>EARTHWORK</td>
<td>FILL, HEAD, SLOPES, SIDE SLOPES</td>
<td>3 1 3:1 2.5 1 2.5:1 2 1 2:1</td>
</tr>
</tbody>
</table>

**SLOPE INDICATOR**

- TOP OF SLOPE
- BOTTOM OF SLOPE
2.2.3.13 **Testholes**

Consultants shall use the Unified Soil Classification System (modified by the PFRA) when preparing testhole logs. The soil patterns used to represent testholes shall be in accordance with the formatting requirements shown in the following table.

<table>
<thead>
<tr>
<th>Coarse Grained Soils</th>
<th>Typical Names</th>
<th>Fine Grained Soils</th>
<th>Typical Names</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>GROUP SYM.</strong></td>
<td><strong>LOG SYM.</strong></td>
<td><strong>TYPICAL NAMES</strong></td>
<td><strong>GROUP SYM.</strong></td>
</tr>
<tr>
<td>GW</td>
<td>WELL GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES</td>
<td>CL</td>
<td>FINE GRADES OF LOW PLASTICITY, ORGANIC CLAYS, SANDY CLAYS, MUD CLAYS, LEAN CLAYS</td>
</tr>
<tr>
<td>GP</td>
<td>POORLY GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES</td>
<td>CI</td>
<td>FINE GRADES OF MEDIUM PLASTICITY, ORGANIC CLAYS, SANDY CLAYS, SILT CLAYS</td>
</tr>
<tr>
<td>GM</td>
<td>SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES</td>
<td>CH</td>
<td>FINE GRADES OF HIGH PLASTICITY, FATTY CLAYS</td>
</tr>
<tr>
<td>GC</td>
<td>CLAYY GRAVELS, GRAVEL-SAND CLAY MIXTURES</td>
<td>ML</td>
<td>FINE GRADES OF CLAY CLAYS, FINE SANDS, Silt, or Clays in sands or clays with slight plasticity</td>
</tr>
<tr>
<td>SW</td>
<td>WELL GRADED SANDS, ORGANICALLY SIZED, LITTLE OR NO FINES</td>
<td>MH</td>
<td>FINE GRADES OF SILETIC, ORGANIC Silty clays or ORGANIC SILT CLAY CLAYS</td>
</tr>
<tr>
<td>SP</td>
<td>POORLY GRADED SANDS, ORGANICALLY SIZED, LITTLE OR NO FINES</td>
<td>OL</td>
<td>FINE GRADES OF ORGANIC SILT CLAYS OR ORGANIC Silt</td>
</tr>
<tr>
<td>SM</td>
<td>SILTY SANDS, SAND-SILT MIXTURES</td>
<td>OH</td>
<td>FINE GRADES OF MEDIUM TO MEDIUM PLASTICITY, ORGANIC SILT</td>
</tr>
<tr>
<td>SC</td>
<td>CLAYY SANDS, SAND-CLAY MIXTURES</td>
<td>PI</td>
<td>FINE GRADES OF MEDIUM TO MEDIUM PLASTICITY, ORGANIC SOILS</td>
</tr>
</tbody>
</table>

**OTHER SYMBOLS**

<table>
<thead>
<tr>
<th>SYMBOL</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>BEDROCK UNCLASSIFIED</td>
<td>CONGLOMERATE</td>
</tr>
<tr>
<td>SANDSTONE</td>
<td>SAND</td>
</tr>
<tr>
<td>Silt</td>
<td>OVERBURDEN</td>
</tr>
<tr>
<td>LIMESTONE</td>
<td>TOPSOIL</td>
</tr>
</tbody>
</table>
Roadway Testhole Logs

Testhole logs for roadway projects shall be as shown and described below:

- The testhole number shall be included;
- The station and offset shall be included;
- The month and year that the geotechnical investigation was done is to be inserted on the title sheet under the Testhole Legend.
- A standard numerical order is used to record the testhole results as follows:
  1. Plasticity Index
  2. Soils classification
  3. Field moisture content
  4. Estimated optimum moisture content
  5. Estimated maximum dry density

Below are a couple examples of testholes for a roadway project.

<table>
<thead>
<tr>
<th>BH-06</th>
<th>BH-09</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>S1</td>
<td>S1</td>
</tr>
<tr>
<td>S2</td>
<td>S2</td>
</tr>
<tr>
<td>S3</td>
<td>S3</td>
</tr>
<tr>
<td>S4</td>
<td>S4</td>
</tr>
<tr>
<td>S5</td>
<td>S5</td>
</tr>
<tr>
<td>S6</td>
<td>S6</td>
</tr>
<tr>
<td>S7</td>
<td>S7</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>1. 32</td>
<td>1. 24.8</td>
</tr>
<tr>
<td>2. CI-SP</td>
<td>CI</td>
</tr>
<tr>
<td>3. 19.9</td>
<td>24.2</td>
</tr>
<tr>
<td>4. 15</td>
<td>4.24</td>
</tr>
<tr>
<td>5. 1850</td>
<td>5.1540</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>TOPSOIL</td>
<td>17.3</td>
</tr>
<tr>
<td>SAND AND CLAY</td>
<td>12.6</td>
</tr>
<tr>
<td>CLAY</td>
<td>20.4</td>
</tr>
<tr>
<td></td>
<td>26</td>
</tr>
<tr>
<td></td>
<td>1600</td>
</tr>
<tr>
<td>TOPSOIL</td>
<td>1500</td>
</tr>
<tr>
<td>FINE SANDY</td>
<td></td>
</tr>
<tr>
<td>CLAY</td>
<td></td>
</tr>
</tbody>
</table>
Bridge Testhole Logs

Testhole logs for bridge projects shall be as shown and described below:

- Provide elevation grid on left hand side of testholes;
- Testholes shall be drawn at correct elevations;
- The bottom of testhole elevations shall be noted;
- Major changes in the soil strata shall be noted on the right hand side of the testhole log with the depth and the major strata type noted (descriptions optional);
- The blow count (N-value) shall be noted on the left hand side. These shall be provided at each significant change in blow count value with the corresponding testhole depth;
- A testhole summary shall be provided below each testhole and shall include:
  - Testhole number;
  - Station and offset;
  - Top of testhole elevation;
  - Northing and Easting (optional);
  - Final depth of testhole;
  - Date testhole was drilled.

Below is an example of testholes for a bridge project.
2.2.4 **Drawing Numbers**

All drawings submitted to the department are required to have a department issued drawing number. Drawings prepared meeting any of the following criteria must use department issued drawing numbers:

- Any project located within the provincial highway right-of-way;
- Any project that is partially or fully funded by the department;
- Any project that will eventually become part of the department’s inventory.

Projects on local roads in county’s and rural municipalities and within urban centers that connect to the provincial road network must be given a provincial bridge site number and provincial drawing numbers. Copies of the mylar drawings and CAD files are to be sent to the department. As roadway and bridge jurisdictions change over time this is vital to keep track of infrastructure going forward.

Drawings submitted for tender and construction shall have a “-P” suffix (ie. Drawing 40157-P) these are referred to as “P” drawings. Once the as-constructed information has been added to the drawings they are referred to as “C” drawings (or Record drawings) and the “-P” suffix is changed to a “-C” suffix (ie. Drawing 40157-C). The drawing number remains the same.

If between tender and record drawings, some drawings have been removed, numbers shall remain the same at the record stage. Drawings that were removed will be noted in the index as “not constructed”.

2.2.4.1 **Roads Drawing Numbers**

For Roads projects, the following apply:

**Road Design**

For road designs, including geohazard sites and slide repairs, the drawing number format shall be as follows:

RD-12345-P

The “RD” stands for Road Design. The five digit number is a sequential number which will be provided by the department. The Consultant shall request these after the department has completed its 95% design review and the total number of drawings to be included in the tender is known. Under no circumstances shall the Consultant assign any additional sequential drawing numbers without submitting a request to the department.

**Intersection / Interchange / VIS / MIS / SRA Design**

For intersections, interchanges, vehicle inspection stations, mobile inspection stations, and safety rest areas, the drawing number format shall be as follows:

IN-12345-01-P

The "IN" stands for intersection but should also be used for the other drawing types listed above. The five digit number is a site number, which is unique to a given site. Each site shall be treated as a stand-alone drawing package and shall not be combined with other sites within the project. Therefore, sheet numbers shall refer to the number of drawings produced only for one site and shall not include sheets prepared for other sites within the project. When a site has geometric improvements, the site number remains the same but the new plan numbers will have a letter added (i.e. IN-12345A-01-P).
The use of letters denotes improvements to the intersection since the original design. The two digit number is used for individual sheet numbering. These drawing numbers will be provided by the department and may be requested by the Consultant at any point during the design phase.

VIS, MIS & SRA’s are also assigned an RSF (roadside facility) number, this will be assigned by the department at the same time plan numbers are issued.

**Airport Design**

For airport designs, the drawing number format shall be as follows:

```
AP-100-01-P
```

The “AP” stands for airport. The three digit number is the airport site number, which is unique for each airport. The two digit number is used for individual sheet numbering. These drawing numbers will be provided by the department and may be requested by the Consultant at any point during the design phase.

**Utilities Design**

For utility design drawings, the drawing number format shall be as follows:

```
33:06-01-P
```

The “33:06” stands for the highway number and the control section number. The two digit number is used for individual sheet numbering. These drawing numbers will be provided by the department and may be requested by the Consultant at any point during the design phase.

### 2.2.4.2 Bridge and Bridge Size Culverts Drawing Numbers

For bridge/bridge size culverts design drawings, the drawing number format shall be as follows:

```
40157-P
```

The five digit number is a sequential number which will be provided by the department. The Consultant shall request these after the department has completed its 95% drawing review and the total number of drawings to be included in the tender is known. Under no circumstances shall the Consultant assign any additional sequential drawing numbers without submitting a request to the department.

Overhead sign structures and retaining walls are considered to be bridge drawings and require bridge drawing numbers.

All requests for drawing numbers shall be sent by email accompanied with a PDF of the drawing containing the drawing index and the project description.
2.2.4.3 Planning Drawing Numbers

Drawing numbers will be issued by the project manager at the beginning of a project.

The project number will be visible on all the associated documents, reports and drawings.

For Planning Studies a Report number will be assigned.

R-0000

For Planning Study drawings the drawing number format shall be as follows (NOTE: the drawing number will be the same as the report number with the addition of the PL-001 Sheet number)

R-0000-PL-001

The three digit suffix number is used for individual sheet numbering and may be assigned as required.

2.2.5 Drawing Submission Requirements

2.2.5.1 Drawing Revisions

Drawings are considered “Preliminary” until they are officially signed and dated. Any changes that are made after signing are considered to be revisions and must be noted as such on the drawings. A small triangle with the revision number shall be placed by the item(s) that were revised, and the appropriate note, date and engineer’s initials shall be placed in the revision box.

All revisions, even minor ones, must be made on the MicroStation CADD file.

The revision box is not to be used for tracking a drawing status. “Issued For Review” or “Issued For Tender” are not revisions.

A revision triangle is to be placed on the left side of the detail title and another beside the item revised. The revision triangle is 1.25 times the triangle in the revision box.

2.2.5.2 Roads and Bridges Drawing Submissions

Drawing packages submitted for Roads and Bridges projects shall meet the requirements presented in this section.

Tender Stage

“Issued for Tender” drawings shall be submitted to the department as hard drawings and electronic files.

Both the Designer (design engineer) and Checker (independent check engineer) shall authenticate these drawings by stamping and signing each drawing. In addition, the Consultant shall authenticate the drawings by affixing the firm’s permit to practice stamp or permit number. Electronic stamps and seals are allowed but electronic signatures are not allowed.
Hard drawings shall satisfy the following requirements:

- One set of hard drawings shall be provided to the department.
- All hard drawings must be plotted on polyester film. This film must have a minimum thickness of 3 mil and a medium tooth matte finish. All polyester film drawings will be trimmed to 22” x 34”. Electrostatic plots are not acceptable.
- All polyester film drawings will be signed using a black permanent fine tipped marker. Smudged signatures and professional seals will not be accepted.

Electronic drawings shall satisfy the following requirements:

- Digital storage device shall be supplied to the department for each individual project, containing all of the electronic files for the project.
- Electronic drawings shall be supplied as 22” x 34” PDF files and as MicroStation DGN files.
- Each drawing shall be included as an individual electronic file and shall be named using the appropriate department issued drawing number. The following are examples:
  - Bridge Number: 12345-P
  - Roadway Number: RD-12345-P, IN-12345-01-P, 33:06-10-P
- Individual drawings shall be submitted in MicroStation DGN in “flat” format files.
- The working model file shall be submitted.
- Any mapping products photos/LiDAR derived DEM and orthophotography, not supplied by Transportation must be submitted.
- Bridge Model files shall be named: Bridge File Number-Contract Number-Model-DGN.
- Highway Model files shall be named: Highway Number-Control Section-Contract Number-Model-DGN.
- Planning Model files shall be named: Plan Number-Model-DGN.
- All electronic drawing files shall be unsecured and unlocked.

**Record Drawings Stage**

“Record” drawings shall be submitted to the department as hard drawings and electronic files.

The “Record” drawings shall provide an accurate representation of the completed construction project and shall be authenticated by the field review engineer indicating that the construction substantially complies with the design drawings and all appropriate contract plans and specifications. Electronic stamps and seals are allowed but electronic signatures are not allowed. Refer to the departments “Engineering Consultant Guidelines for Highway, Bridge and Water Projects, Volume 1 – Design and Tender” for further information regarding “Record” drawings.

Hard drawings shall satisfy the following requirements:

- One set of hard drawings shall be provided to the department.
- All hard drawings must be plotted on polyester film using a waterproof ink. This film must have a minimum thickness of 3 mil and a medium tooth matte finish. All polyester film drawings will be trimmed to 22” x 34”.
- All polyester film drawings will be signed using a black permanent fine tipped marker.
Electronic drawings shall satisfy the following requirements:

- Digital storage device shall be supplied to the department for each individual project containing all of the electronic files for the project.
- Electronic drawings shall be supplied as 22” x 34” PDF files and as MicroStation DGN files.
- Each drawing shall be included as an individual electronic file and shall be named using the appropriate department issued drawing number. The following are examples:
  - Bridge Number: 12345-C
  - Roadway Number: RD-12345-C, IN-12345-01-C, 33:06-10-C
  - MicroStation DGN files shall be provided using “flat” format files with no external reference files and should be clipped and merged into master drawing file.
  - In addition, the master model files and survey data in 3TM NAD83 format XML files (asci file) shall be included on the compact disc with the electronic drawing submission.
  - Any mapping products photos/LiDAR derived DEM and orthophotography, not supplied by Transportation must be submitted.
- All electronic drawing files shall be unsecured and unlocked.

2.2.5.3 Planning Study Submissions

Submissions to the department for Planning Study projects shall meet the following requirements:

- The department requires a minimum of two hard copies of the completed report, the number of additional hard copies of the report will be determined by the Project manager.

All hard copies shall clearly show the department issued report number on the cover and when feasible on the spine.

- Electronic files required by the department must be provided on a digital storage device and contain:
  - A PDF file of the complete report;
  - All MicroStation files including reference files, raster files and contour mapping files;
- Each MicroStation drawing shall be included as an individual file and shall be named using the appropriate department issued drawing numbers.

2.3 ROADWAY DRAWING SETS

2.3.1 Highway Drawing Layouts

The preferred design drawing order for Highway projects is as follows:

It is understood that at the tender date, utility and railway crossing agreements and plans may not be completed.

- Title Sheet
- Index Sheet (if required)
- Legend (if required)
- Plan-Profiles
- Cross Sections
- Drainage (if separate drawing required)
• Culvert Removal Tables
• Culvert Installation Tables
• Miscellaneous Details
• Mass Haul Diagrams
• Intersection layout
• Signing
• Pavement Markings
• Lighting
• Traffic Signals
• Utility Crossings
• Railway Crossings
• Standard Drawings

The preferred design drawing order for Interchange projects is as follows:

• Title Sheet
• Index Sheet (if required)
• Legend (if required)
• Interchange Layout
• Geometric Layout
• Plan –Profiles
• Cross Sections
• Drainage (if separate drawing required)
• Culvert Removal Tables
• Culvert Installation Tables
• Miscellaneous Details
• Mass Haul Diagrams
• Signing
• Pavement Markings
• Traffic Signals
• Lighting
• Overall Utilities (if required)
• Utility Crossings
• Railway Crossings
2.3.2 **Title Block**

The title block is not to be modified by the Consultant. Due to the various types of drawings that may be required for a highway project, below are some samples of titles.

<table>
<thead>
<tr>
<th>Roadways</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Alberta Transportation</strong></td>
</tr>
<tr>
<td><strong>HWY 216:04 (AHD)</strong></td>
</tr>
<tr>
<td>S OF WHITEMUD DRIVE - HWY 2:32</td>
</tr>
<tr>
<td>PLAN AND PROFILES</td>
</tr>
<tr>
<td>STA 49+800 TO STA 51+200 (NBL)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Interchanges</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Alberta Transportation</strong></td>
</tr>
<tr>
<td><strong>HWY 216:06 (AHD)</strong> AND CALLINGWOOD AVE INTERCHANGE</td>
</tr>
<tr>
<td>GEOMETRIC LAYOUT - SHEET 1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Intersections</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Alberta Transportation</strong></td>
</tr>
<tr>
<td><strong>HWY 11A:02</strong></td>
</tr>
<tr>
<td>HWY 11A:02 AND 48 STREET (IN ROCKY MOUNTAIN HOUSE)</td>
</tr>
<tr>
<td>TRAFFIC SIGNALS</td>
</tr>
<tr>
<td>ABOVE GROUND INSTALLATIONS</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Vehicle Inspection Station</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Alberta Transportation</strong></td>
</tr>
<tr>
<td><strong>HWY 43:14</strong></td>
</tr>
<tr>
<td>VEHICLE INSPECTION STATION - RSF 557</td>
</tr>
<tr>
<td>(WEST OF WHITECOURT)</td>
</tr>
<tr>
<td>SIGNING AND PAVEMENT MARKINGS</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Utilities</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Alberta Transportation</strong></td>
</tr>
<tr>
<td><strong>HWY 16:08</strong></td>
</tr>
<tr>
<td>762.00 mm NATURAL GAS PIPELINE</td>
</tr>
<tr>
<td>ABC CORPORATION OF ALBERTA</td>
</tr>
<tr>
<td>PLAN AND PROFILES</td>
</tr>
</tbody>
</table>

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2.3.3 **Title Sheet**

The following title sheet surround shall be used for all roads projects.

This title sheet surround is in the file “AT_CADD_2016-06.zip”, located on the FTP site (described in Section 2.1.1) under the cell name “AT_TITLE”.

Title sheets are to be prepared for all projects that have more than two plan-profile sheets, multiple intersections and/or interchanges. See Appendix D for a Title Sheet Check List.

The following information shall be included in the title:

- Project No. - Highway and control section
- Geographic Location - E OF JCT HWY 32 – E OF NITON JCT
- Description of work - Grading, Subgrade and Paving
- Contract No. – issued by Professional Services
- Define the extents of the project by specifying the “km to km” and the “station to station”
The site map shall show the project limits, km posts and highway numbers. It shall also include sections, townships, ranges, and topographical features. The coverage should be such that the project location is easily identified. On the site map, identify the limits of permanent construction by using GRADING LIMIT. When "Grading Limit" is used to define the limits of any highway, the station and km information shall be included. When "Grading Limit" is used to define limits on local roadways, only the station information needs to be attached.

The drawing index list shall be on the title sheet unless the list exceeds the allowed space, at which point a separate index sheet shall be produced.

The testhole legend and the borrow note are standard. These are included in the title sheet surround and should not be modified.

2.3.4 **Drawing List and Legend Sheet**

Where the drawing list does not fit on the title sheet, a separate sheet may be produced. If space permits, a legend (if required) may also be included on this sheet.
2.3.5 **Plan-Profile**

Several standard plan-profile sheets are available and shall be used for all roads projects.

These standard plan-profile sheets are available in the file “AT_CADD_2016-06.zip”, located on the FTP site (described in Section 2.1.1) under the cell names “RD_5000 (1:5000 scale)”, “RD_2000 (1:2000)” and “RD_1000 (1:1000)”. 
See Appendix D for a Plan-profile Check List.

Plan-profiles are to be prepared by utilizing the top half of the sheet for the plan view while the bottom half is used with a grid for all profile details. It should be noted that the grid sheet used for 1:5000 scale profiles is not suitable for 1:2000 or 1:1000 scale profiles, the appropriate grid shall be used. Mylars must have all the horizontal and vertical grid lines plotted. The horizontal scale for the profile and the plan view should be the same. Each sheet should have a 150 m data overlap. Stationing on the horizontal alignment should be perpendicular to the highway, however if space is constrained, stationing may be placed along the highway centreline.

Testholes must be plotted on the appropriate plan-profile sheets and plotted to the same vertical scale as the profile, 1:100 or 1:200 and plotted at the correct elevation. The location (station and offset) must be shown for each testhole. If testholes overlap on the drawings (e.g., same station – different offset) the testhole logs may be placed as close to the station as possible. On projects where there are a large number of testholes, a separate “Testhole Information Sheet” is to be utilized.

2.3.6 Cross-Sections/Mass Haul/Drainage/Landscaping/Miscellaneous Details/Stripping & Clearing

As many typical (or specific) cross sections should be drafted as necessary for a given project. If only one or two cross sections are required, they can be placed in a blank area on a plan-profile sheet; if more are required a separate sheet should be used to show all cross sections. Cross sections should be representative of the project and take into consideration such things as the existing road, special ditches, etc. All cross sections should show cut and fill details. If cross sections are not drafted to scale (1:200 horizontal, 1:100 vertical), they should at least be proportional. The “PROFILE GRADE” point is to be shown and labeled. Plan-profiles deal mainly with subgrade construction, therefore details of surfacing can be kept to a minimum. (Surfacing details are shown on small plans that accompany the contract map in the tender document). Ultimate stage cross sections shall be shown, dash lines may be used. If not in contract indicate cross section is provided for information only.

Mass haul diagrams shall be prepared when required, showing free haul (300 m), dead haul information and km posts. Since the length of projects and the material quantities vary, there are no set horizontal and vertical scales, however scales should be utilized and noted.

Miscellaneous detail drawings may be required on some projects. This sheet can be utilized to show any number of items that cannot be placed on the plan-profile sheets. Examples are unique borrow pit areas, modified drainage structures, geotechnical sites, landscaping details, clearing and timber salvage areas, stream diversions, drainage ditches, etc. The title should include the type of work or detail, i.e. Landscaping.

Stripping and clearing plans will be produced on a full size sheet with the top and bottom of the sheet divided into half. Therefore 1:5000 scales have a total of 7 km on one sheet.
2.3.7 Culvert Tables and Storm Sewer Tables

Drawings containing tables shall be used on all projects over five kilometres in length. The plan view on the plan-profile sheet should only show the appropriate symbol and station. The balance of the information, including any remarks necessary to clarify details, should be shown in the tables. If room is available existing culvert tables and Installation tables may be placed on the same sheet, otherwise they should be on separate sheets. On projects that are less than five kilometres in length, all notes referring to culverts shall be put directly on the plan view of the plan-profile sheet.

2.3.8 Interchange and Intersection Treatments

Interchanges can be quite complex, therefore the first drawing “Interchange Layout” shall show the complete interchange at a scale of 1:2000 or 1:1000. The Geometric Layouts will show portions of the interchange with an overlap, the appropriate curve data and tables shall be included on these drawings. In the case of a revision to an existing interchange the new drawing shall show the entire interchange with references to new construction. The consultant should request a copy of the existing digital CADD file to use as a base to facilitate showing the entire interchange. See Appendix D for Interchange Check List.

The grade separation necessitates the inclusion of profiles for the ramps. Plan-profiles for interchange ramps are to be shown on plan-profile sheets and included in the drawing set with IN- numbering. Cross-section and other drawings pertaining to the interchange shall also be included in the drawing set.

Interchange drawings used for base and paving or paving will have construction limits defined by using "SURFACING LIMIT" as required.

Intersection treatment drawings are required on the majority of highway projects. Drawings are generally drafted to a scale of 1:1000; however, drawings of 1:500 and 1:2000 are not uncommon. Only one intersectional treatment per sheet is permitted. In the case of an Intersectional treatment upgrade, the entire intersection must be included in the new drawing with all geometry information shown. The consultant should request a copy of the existing digital CADD file to use as a base to facilitate showing the entire intersection. Finished pavement and shoulder widths shall be shown.

Signing drawings and pavement marking drawings are required for interchanges and intersections. If signing and pavement markings are legible they may be combined on the same drawing. The graphics for overhead sign structures must be shown along with the bridge site number and bridge drawing number, however, the design of the structure itself is handled by Bridge Engineering.

Signalization drawings are required for all locations where signals are to be placed. This includes, but is not limited to, traffic signals at intersections/interchanges, pedestrian crosswalk signals, and advance warning signals at railway crossings. Plans or sketches may also be required for showing locations of flashing amber lights on median ends, flashing red lights at intersections, etc.
2.3.9 **Safety Rest Areas, Vehicle Inspection Stations and Mobile Inspection Stations**

Safety Rest Areas (SRA), Vehicle Inspection Stations (VIS) and Mobile Inspection Stations (MIS) are site specific and therefore have a unique identifier, referred to as a site number; drawing numbers begin with the prefix IN-. Also, they have a Roadside Facility number (RSF) which is to be added to the main text in the title block. When drawing numbers are issued by Transportation, RSF numbers will be issued as well. Requirements for signing, pavement markings and lighting plans shall be similar to interchanges and intersection plans.

2.3.10 **Railway and Utility Drawings**

Railway crossing drawings are required wherever roadwork is to be done at an existing or new crossing. The format for the plans and the information required is set out by the National Transport Agency. For further requirements see Engineering Consultants Guidelines for Highways, Bridges and Water projects, volume 1- Design & Tender.
Utility crossing drawings are to be prepared for each utility that crosses a highway within a project. Drawings are necessary for utility relocation or adjustment and to form agreements with utility companies to perform such work. The drawing is to be prepared showing the horizontal and vertical locations by chainage and elevations respectively. A copy of the plan is to be submitted to Technical Services Branch.

Overall utility drawings, plan view only, may be required when projects fall within urban areas such as towns and villages. These drawings provide an overview of all utilities in the vicinity and make contractors aware of their approximate locations.

Temporary transition drawings are required only if a nonstandard transition is to be utilized.

Temporary detour plans are required on highway projects where traffic is to be disrupted for a period of time. Detour plans do not have to be submitted at the record stage, unless the detour is still in place.
2.3.11 **Standard Drawings**

Standard drawings to be used in conjunction with the department’s written specifications are in the CB6 Standards Manual. Types of drawings included are:

- Intersection Treatments
- Standard Cross Sections
- Manholes, Inlets and Catch Basins
- Fencing
- Livestock Guards
- Metal Bin Retaining Wall
- Ditch Barrier
- Storm Sewer Installation
- Plastic Culvert Liner Installation
- Base Course, Pavement and Seal Coat Asphalt and Concrete Curbs, Medians, Islands
- Corrugated Steel and Concrete Pipe
- Crack Routing and Sealing

Complete CB6 Standards Manuals may be downloaded in PDF format from the department website.

Standard drawings may be printed and used in tender packages thereby eliminating the need to re-draft items.

2.3.12 **Roadway Record Drawings**

Record drawings are produced using the tender or issued for construction set of drawings as a base and any changes made at the construction stage should be noted and flagged with a revision triangle, “clouds” are not permitted.

All drawings produced at the tender stage should be reproduced at the record stage and submitted, regardless whether there were any revisions. The only drawings not required at the record stage are the Mass Haul Diagrams and Temporary Detours. However, if the temporary detours are still in place at the time of the record submission, then they should be submitted.

If after the tender set submission some drawings are not used (construction limits changed), drawing numbers shall remain the same and a note on the index beside the drawings should be placed stating “Not Constructed”.
2.4 BRIDGE DRAWING SETS

2.4.1 General Bridge information

The following CADD standards are unique to Bridges projects.

2.4.1.1 Title Sheet

In general, title sheets are not used for bridge projects and the drawing index is placed on the “General Layout” sheet. However, if there is insufficient space for the drawing index on the “General Layout” sheet, a “Bridge Title” sheet can be used. The following “Drawing Title” sheet shall be used and is available in the file “AT_CADD_2016-06.zip”, located on the FTP site (described in Section 2.1.1) under the cell name “BR_TITL_SHT”.

![Bridge Drawing Set Diagram]
2.4.1.2 Drawing Index

The drawing index shall be placed on the general layout bottom right hand corner 10 mm from border lines.

2.4.1.3 Title Block Format and Content

Title blocks shall be completed as described and shown below.

- Title blocks may have three or four lines for drawing description.
- Qualify the road name with a directional specification (EBL), (WBL), (NBL), or (SBL) when necessary.
- Qualify the railway name with SPUR or MAINLINE when required.
- Reference town name, to a name that appears on the current Alberta roadmap. Avoid use of redundant words such as CITY OF, TOWN OF, etc.
- Where a bridge goes over a road and railway, refer to both the road and railway.
- For towns and villages distances will be calculated from the centre.
- For cities distances will be calculated to nearest city boundary.
- All distances shall be rounded to nearest kilometre.
- In some circumstances a distance calculation may be referenced to a junction of two roadways. This shall only be done in very remote locations when there is no nearby locality clearly identified on the Alberta Road Map.
STREAM CROSSING

- WABASH CREEK BRIDGE
  ON HWY 597, 5 km W OF WESTLOCK
  GENERAL LAYOUT

- WATERCOURSE CULVERT
  ON LOCAL ROAD, 15 km NW OF VULCAN
  INFORMATION SHEET

- BOW RIVER BRIDGE
  ON STONEY TRAIL (WBL) IN CALGARY
  DECK - SHEET 1

- BEATON CREEK CULVERT
  ON HWY 689, NEAR DIXONVILLE
  GENERAL LAYOUT

- WABASH CREEK BRIDGE
  ON HWY 567, AT WESTLOCK
  INFORMATION SHEET

GRADE SEPARATIONS AND FLYOVERS

- HWY 41 OVER HWY 16
  GRADE SEPARATION AT VERMILION
  GENERAL LAYOUT

- CARDIFF ROAD OVER HWY 2
  FLYOVER 3 km SW OF MORINVILLE
  PEIR - SHEET 2

RAILWAY OVERPASSES AND UNDERPASSES

- CNR OVERPASS
  ON HWY 47, 10 km SW OF EDSON
  GENERAL LAYOUT

- CNR & HWY 37 UNDERPASS
  ON HWY 37, 5 km W OF NAMAO
  GENERAL LAYOUT
SIGN STRUCTURES LAYOUTS

- PRIME ROAD NAME
- HWY NUMBER
- LOCAL ROAD

- OVER

- LESSER ROAD NAME
- HWY NUMBER
- LOCAL ROAD

&

- LESSER ROAD NAME
- HWY NUMBER
- LOCAL ROAD

GRADE SEPARATION

- DISTANCE
- DIRECTION
- AT OF IN

- TOWN NAME
- CITY NAME

- SHEET TITLE

- SIGN STRUCTURE
- IDENTIFIER
- (STRUCTURE NUMBER)

PEDESTRIAN STRUCTURES

- ROAD NAME
- RAILWAY NAME
- STREAM NAME

- PEDESTRIAN

- OVER PASS
- SUBWAY
- BRIDGE

- DISTANCE
- DIRECTION
- AT OF IN

- TOWN NAME
- CITY NAME

- SHEET TITLE

- LITTLE ELBOW RIVER

- PEDESTRIAN BRIDGE

5 km W OF HIGH RIVER

GENERAL LAYOUT

MULTIPLE STRUCTURE INTERCHANGES

- ROAD NAME
- HWY NUMBER
- LOCAL ROAD
- RAMP

OVER

- ROAD NAME
- HWY NUMBER
- LOCAL ROAD

- DISTANCE
- DIRECTION
- AT OF IN

- TOWN NAME
- CITY NAME

- STRUCTURE NUMBER
- SHEET TITLE

- MANNING DRIVE (HWY 15) SOUTH-EAST RAMP 1
  OVER ANTHONY HENDAY DR (HWY 216)/EBL & WBL IN EDMONTON

- STRUCTURE 3

GENERAL LAYOUT
2.4.1.4 Dimensions and Scales

All dimensions shown on General Layout, Information and Soils Information Sheets are given in metres. All other drawings are dimensioned in millimetres except for stations and elevations which are expressed in metres.

Scales to be used for Bridge plans are as follows. If the drawing becomes over crowded at the preferred scale, use additional sheets as required.

The use of NTS (not to scale) is not recommended.

<table>
<thead>
<tr>
<th>APPLICATION</th>
<th>METRIC SCALES</th>
</tr>
</thead>
<tbody>
<tr>
<td>For General Layouts and Information Sheets</td>
<td>1: 500 1: 400 1: 300 1: 250 1: 200 1: 150 1: 100</td>
</tr>
<tr>
<td>For Detail Drawings</td>
<td>1: 100 1: 75 1: 50 1: 25 1: 20 1: 15 1: 10 1: 05 1: 02 1: 01</td>
</tr>
</tbody>
</table>
2.4.1.6 Site Map

Site maps shall meet the following requirements:

- Use the provincial roadway base map;
- For rural locations, the scale shall be 1:250,000;
- For urban locations scale may vary;
- The size of the Site Map should be 4 Ranges by 4 Townships (150 mm X 150 mm) and is located in the top right hand corner of the General Layout sheet for culvert drawings, and on the Information sheet for bridge drawings;
- The bridge site should be located approximately in the centre of the site map;
- Use standard abbreviations and symbols for township, range, roads, etc;
- The Town, Village, City, etc. used to reference structure should be shown on the map in bold letters (e.g. "STURGEON RIVER BRIDGE ON HWY 44, 5 km N OF VILLENEUVE") the town of "VILLENEUVE" should appear on the map. In the case where this is not possible, place an arrow in the direction of the location using a main highway or road saying "TO (location name)";
- The boundaries of cities, reservations, etc., must be clearly shown and hatched at 45 degrees;
- The location of the bridge shall be circled and noted as SITE with the bridge site number; in a rectangular box;
- Place the north arrow at the top left hand corner of the site map;
- The index for the road symbols should be placed below the site map as shown on the sample below:
2.4.1.7 Urban Bridge Projects

The preferred design drawing order for bridge type structures is as follows:

- General Layout
- Information Sheet(s)
- Piling and Foundation(s)
- Abutment(s)
- Retaining Wall(s)
- Pier(s)
- Bearing(s)
- Girders
- Deck
- Deck Joints
- Other (such as Street Lighting, Under-bridge Lighting, RWIS/FAST System, etc.)
- Bar List(s)
- Standard Drawings
Other types of structures (culverts, etc.) should follow the same basic order with drawings added and/or deleted as necessary. Bridge Engineering Section drawing numbers are to be used in all cases. Numbers will be established when exact number of design drawings in set is known.

A drawing index, listing all drawings included in the drawing set, is to be shown on the first sheet of the set. The index is normally orientated from the bottom up (i.e. sheet 1 shown at the bottom and successive sheets listed upward from there).

The following sections provide a general description of the layout for typical major bridge drawings. Consultants who are not familiar with AT bridge design drawings are encouraged to obtain recently completed design drawing sets for their guidance. Detailed drafting checklists are included in Appendix E for reference.

2.4.2.1 **General Layout Sheet**

The general layout sheet typically includes overall plan, elevation and section, and drawing index.

Bench mark tablet is to be placed on the plan view on Northwest corner of Bridge. The bench mark number is to be requested from the department’s survey imagery coordinator. Upon project completion, the final elevation is to be updated on the record drawing and provided to the survey/image coordinator.

2.4.2.2 **Information Sheets**

The information sheets typically consist of one or two drawings showing the relevant site information, roadway geometric information and stream geometric information (if required) and one drawing showing the relevant geotechnical information. Additional information sheets can be added if required to show additional information.
Information - Sheet 1

- Typically includes overall plan of site without bridge structure showing extents of fills and location of geotechnical test holes, locations with station and offset and coordinates. Overpassing roadway profile, underpassing roadway or stream profile, site map, site survey information notes, general notes and summary quantity estimate table.
- The general notes included here apply to the entire bridge drawing set.

Information - Sheet 2

- Typically includes an elevation showing the geotechnical test hole logs.
2.4.2.3  Abutment Sheets

The main focus of the abutment sheets is to provide the overall geometry and reinforcing details of the earth retaining and superstructure supporting elements of the abutment, along with any paving lip details required to facilitate installation of any expansion joints provided at the bridge ends.

For bridges with simple geometry, short lengths, narrow widths, and little to no skew, there is usually enough similarity between the two abutments that only one needs to be drawn. Double dimensioning may be used to provide the information for both abutments. Further, geometry and reinforcing requirements may be combined for these types of structures. For these situations, three sheets are generally sufficiently to detail the abutment.

For bridges with more complex geometries, long spans, wide decks, and/or large skew values, additional sheets are often required to sufficiently detail the abutment. In these situations, the geometry and reinforcing details shall be separated to avoid clutter and potential confusion. Additional abutment sheets may be added if required.

The majority of the abutment types used in Department projects can be categorized as either integral (full or semi) or conventional. Irrespective of the abutment type, the layout of the abutment sheets (from a drafting layout perspective) is more or less consistent.

Where street-lighting, under-bridge lighting, or RWIS/FAST systems are used on a project, the conduit sizes and locations, and the locations of junction boxes and light fixtures specific to these systems, shall be shown on the abutment drawings and shall refer to the applicable street-lighting drawings, under-bridge lighting drawings, or RWIS/FAST drawings.

Abutments – Sheet 1

- Typically consists of an abutment plan complete with approach/roof slab(s) and front elevation providing abutment dimensions and abutment piling layout, a quantity estimate table for both abutments, and any notes specific to abutments. A table providing the elevation to the top of grout pad (conventional and semi integral abutments) or top of concrete plinth (full integral abutments) shall also be provided;
- Reinforcing and geometry can be combined on projects with simpler geometry. In this case, reinforcing for the approach/roof slabs can be provided in the abutment plan. Reinforcing of the abutment seat can be provided on the front elevation;
- Projects with a more complex piling scheme that cannot be appropriately represented on the abutment sheet can incorporate a separate Pile Layout Plan located ahead of the abutment drawings;
Typically consists of an abutment section including roof/approach slab(s) and associated details, wingwall elevation, and various details and sections which are usually but do not necessarily have to be related to the wingwall;
Abutments – Sheet 3

- Typically includes the bridge plaque detail and all remaining abutment details and sections as required such as conduit and junction box details, schematic drain trough inlets, and access opening details as required;

2.4.2.4 Retaining Wall Sheets

Additional retaining wall sheets may be added if required for larger or more complex retaining walls.

Retaining Wall – Sheet 1

- Typically includes all the retaining wall dimensions; with a retaining wall plan, elevation and section, the retaining wall notes, and a quantity table for the retaining wall. Also clearly shows the surface and subsurface drainage for the retaining wall and how the drainage ties in with the overall site drainage plan.
- Abutment components and any other structures shall be shown correctly on the retaining wall drawings to ensure it is clear how the abutments and retaining walls interact and to ensure that conflicts do not exist.
- Utilities and drainage components shall be shown correctly on the retaining wall drawings to ensure that conflicts do not exist.
Retaining Wall – Sheet 2

- Typically intended to show elevation views of the walls. A view of each wall shall be shown.
Retaining Wall – Sheet 3

- Typically includes relevant sections and retaining wall details.

2.4.2.5 Pier Sheets

For simple piers, generally those without a pile cap where the piles extend to the underside of the pier cap, only a single sheet is required. More complex piers generally require two sheets: one dealing primarily with geometry and a second dealing primarily with reinforcing. Additional pier sheets can be added if required for larger or more complex piers, or for multi-span bridges with significant differences in the details from one pier to the next.

Pier(s) (if only one sheet required)

- Typically includes all the pier dimensions, pier reinforcing details, and pier piling information; with a pier plan, front elevation, pier section, details, pier notes, and a quantity table for the pier(s).
Pier(s) – Sheet 1 (if two or more sheets required)

- Typically includes all the pier dimensions, pier reinforcing details, and pier piling information; with a pier plan, front elevation, pier section, details, pier notes, and a quantity table for the pier(s).
Pier(s)-Sheet 2

- Typically includes most of the pier reinforcing; with pile cap plan and sections, a pier elevation and sections, a pier cap plan and sections.
2.4.2.6 **Bearing Sheets**

Additional bearings sheets may be added if required.

**Bearings – Sheet 1 (or just “Bearings” if only one drawing is required)**

- Typically includes an overall bearing layout showing which types of bearings are used where; bearing notes; bearing schedule showing design loads, movements, rotations and assumed dimensions; bearing setting table; and detailed bearing plans and sections to show the bearing design information. For elastomeric bearings and pot bearings, the elements between the sole plate and the base plate are to be designed by the contractor and need only to be shown conceptually on the drawings.
2.4.2.7 Steel Girder Sheets

Girder Identification

As shown in the figures below, spans, abutments and piers are numbered in the direction of increasing chainage, if known, or from “west to east” or from “south to north”. Girders and stringers are numbered “west to east” or “south to north”.

![Girder Identification Diagram]
Additional girder detail sheets can be added if required for larger or more complex projects.

**Girder Layout Sheet**

- Typically includes an overall plan showing the girder and diaphragm layout; top flange plan, web elevation, and bottom flange plan; and girder notes.

**Girder Details – Sheet 1**

- Typically includes sections showing the abutment, pier, and intermediate diaphragms; diaphragm connection details; stiffener details; and shear stud details.
Girder Details – Sheet 2

- Typically includes top flange, web and bottom flange splice details; flange width transition detail; typical flange weld detail; rubber drip strip details; and clearance sign bracket details.

Girder Camber Diagram

- Typically includes chart and table showing the camber information at 10th or 20th points along the span; and the camber notes.
2.4.2.8 Precast NU Girder Sheets

There are many different ways to construct an NU Girder bridge, depending on many factors such as the type of abutment; if the pier is integral with the superstructure; if the girders will be post-tensioned; the construction sequence; etcetera. As a result, many different details may be required. The following sheet layout will not cover all of these situations and some common sense can be used to ensure that sufficient information is provided. However, the general organization of the sheets should be maintained.

Girder Layout Sheet

- Typically includes an overall plan showing the girder and diaphragm layout; a section showing girder finishes; and girder notes.
- If required, this sheet typically includes the construction sequence for erecting the NU girders and making them continuous.
“Girder Descriptor” – Sheet 1

- An example of the name for this type of drawing would be 57 m NU2400 Girder – Sheet 1
- Several of these sheets may be required for different girder lengths.
- Typically includes a girder elevation showing the girder length; diaphragm locations; draped prestress strand deflection point locations; debonded prestress strand information; and general post-tensioning duct information.
- Typically includes a girder elevation showing the web and flange reinforcing information; and projected reinforcing information (projecting out the ends of the girders as well as the top of the girders).
- Where appropriate, the two girder elevations described above may be combined as long as the information can be presented clearly.
- Typically includes a note regarding the expected shortening in length of the girder due to prestress, post-tensioning, creep, shrinkage and relaxation.
- Typically includes a table showing the “Theoretical Net Girder Camber and Calculated Haunch at Mid-Span”.

![Girder Elevation Diagram]

GIRDER ELEVATION - PRESTRESSING

GIRDER ELEVATION - REINFORCEMENT

CAMBER TABLE
“Girder Descriptor” – Sheet 2

- Typically includes typical girder sections at the girder ends (abutment and pier if different) and at the girder mid-span. These sections will include typical girder shape geometry; prestress strand information; debonded prestress strand information; post-tensioning duct information; web and flange reinforcing information; and projected reinforcing information.
- Typically includes a girder end elevation showing geometric details of the girder ends. Two of these elevations may be required if the girder ends are different at each end.
- Typically includes a barlist for the entire girder reinforcing details.
- Typically includes the shoe plate details.
- Additional girder descriptor sheets may be used where appropriate.
Girder Post-tensioning

- Typically includes a post-tensioning duct profile elevation showing detailed information about the girder post-tensioning.
- Typically includes a post-tensioning stress diagram showing the variation of post-tensioning stress along the length of the strands at the various stages (transfer and final).
- Typically includes a post-tensioning stress table which provides specific post-tensioning stresses at various points shown on the post-tensioning stress diagram.
- Typically includes post-tensioning notes.
- Typically includes girder end elevation showing specific details about the post-tensioning anchorage.
- If more than one post-tensioning sheet is required, the naming convention shall be *Girder Post-tensioning – Sheet 1*, etcetera.
Girder Diaphragms – Sheet 1

- This sheet typically shows the steel cross-bracing information for the abutment and intermediate diaphragms. For bridges with conventional abutments, steel cross-bracing diaphragms are typically used at the abutments. For semi-integral and fully-integral abutments, the concrete abutment diaphragm is typically shown with the abutment sheets.
- Typically includes sections at the abutment and intermediate diaphragms to provide the cross-bracing sizes; as well as a few details showing the connection and anchorage information.
- Typically includes girder diaphragm notes.

Girder Diaphragms – Sheet 2

- This sheet is typically used to show concrete pier diaphragms for multi-span bridges.
- Typically includes an elevation, a plan and a number of sections to provide the diaphragm geometry and reinforcing.
2.4.2.9 Deck Sheets

Where street-lighting, under-bridge lighting, or RWIS/FAST systems are used on a project, the conduit sizes and locations, and the locations of junction boxes and light fixtures shall be shown on the deck sheets and shall refer to the applicable street-lighting sheets, under-bridge lighting sheets, or RWIS/FAST sheets.

Deck – Sheet 1

- Typically includes an overall deck layout plan showing the deck dimensions and reinforcing; a deck section showing deck and curb/barrier dimensions and reinforcing; deck notes; and a quantity table for the deck and curb/barrier.

Deck – Sheet 2

- Typically includes an overall elevation showing bridgerail post spacing and curb control joint layout; deck and haunch details; curb/barrier details; curb control joint details; and a deck placing schedule.
2.4.2.10 Deck Joint Sheets

The Department currently has three standard deck joint types for use in new construction. These are the Type 1 Strip Seal Deck Joint, the Cover Plated V-Seal Deck Joint, and the Standard Finger Plate Deck Joint Assembly. Each of these standard deck joint types is summarized in a set of standard drawings that provide standard details and notes. The intent of the site specific deck joint sheet(s) is to provide site specific information to supplement the details and notes found on the standard drawings. Further, the standard drawings define a multitude of variable dimensions by way of lettered designation that need to be clearly identified with the appropriate values on the site specific deck joint drawing(s).

For bridges incorporating one deck joint, simpler geometries, narrower widths, little to no skew, and no sidewalks or median a single sheet is typically sufficient to provide the necessary joint detail. If two deck joints of the same type are employed and there is sufficient similarity between them, only one need be drawn. Double dimensioning can be used to indicate the various dimensions specific to each deck joint. In cases with more than one deck joint type, larger skew, wider decks, or bridges incorporating sidewalks and separation barriers or medians, an additional sheet will likely be required in order to rectify space limitations and demand for additional detail.

Deck Joint - Sheet 1

- Typically includes a plan, a section through the joint at roadway, a section through the joint at the barrier, a section along the joint through the barrier, a gap setting table, and deck joint related notes.
2.4.2.11 Miscellaneous Sheets

Sheets with the titles “Miscellaneous – Sheet 1”, “Miscellaneous – Sheet 2”, etc. may be sparingly used. Typically, these sheets would be used for detailing items such as the drain troughs, deck drains, headslopes, and abutment/pier logos.

2.4.2.12 Other Component Sheets

Occasionally, certain components of an external system will extend onto the bridge structure. This might include street-lighting, under-bridge lighting, or RWIS/FAST systems. For such systems, the components of the systems that are to be incorporated into the bridge structure shall be shown on the actual bridge component sheets (i.e. street lighting utility ducts shall be shown in the barriers on the deck and abutment sheets). It may also be convenient to have additional sheets to show more specific information about these systems. These sheets shall be referred to with the titles such as “Street-lighting – Sheet 1”.

2.4.2.13 Bar List Sheets

Bar List – Sheet 1 (or just “Bar List” if only one sheet is required)

- Complete rebar details are to be shown on the ‘Bar List’ drawing.
- Bar marks should not be duplicated on a project unless the bars are identical.
- Incremented bars should each have their own bar mark, but not individual line items in the bar list. i.e. C1001 to C1015 in 100 mm increments.
- Mass for individual bar types is to be calculated and shown to the nearest kilogram.
- On the bar list drawing, separate mass totals for each different bar type, as well as a combined total, are to be given for each list for each bridge component, i.e. abutments, piers, deck, etc.
- On the Information Sheet drawing, separate totals for bar mass for substructure and superstructure, are to be shown in the Quantity Summary, but not in the quantity estimate tables for the individual bridge components.
- Rebar fabrication is generally done from the details shown on the ‘Bar List’ drawing. Therefore it is extremely important that the bar list details be correct.
- Bar mark suffixes on bar lists for bars other than conventional black reinforcement:

<table>
<thead>
<tr>
<th>Bar Mark</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>Epoxy coated bars</td>
</tr>
<tr>
<td>SS</td>
<td>Solid stainless steel bars (UNS S31653, S31603, S31803, S30400)</td>
</tr>
<tr>
<td>DS</td>
<td>Solid stainless steel bars (UNS S32304 or S24100)</td>
</tr>
<tr>
<td>MF</td>
<td>ASTM 1035</td>
</tr>
<tr>
<td>CR</td>
<td>Generic bar mark for alternative corrosion resistant rebar types</td>
</tr>
</tbody>
</table>

- When preparing the Record Drawings (C-drawings), all Type CR bars shall be updated to reflect the actual bar type used for construction.

- Bar mark prefixes shall be as follows.

<table>
<thead>
<tr>
<th>Component</th>
<th>Prefix Letter</th>
<th>Element</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABUTMENT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>General</td>
<td>Seat and Gradebeam</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Backwall</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Diaphragm</td>
</tr>
<tr>
<td>G</td>
<td>Approach Slab</td>
<td>Roof Slab</td>
</tr>
<tr>
<td>K</td>
<td>Curb</td>
<td>Barrier</td>
</tr>
<tr>
<td>W</td>
<td>Wing Wall</td>
<td>Curtain Wall</td>
</tr>
<tr>
<td></td>
<td></td>
<td>End Post</td>
</tr>
<tr>
<td>E</td>
<td>Drain Trough</td>
<td></td>
</tr>
<tr>
<td>Z</td>
<td>Dowels</td>
<td></td>
</tr>
<tr>
<td>J</td>
<td>Spare</td>
<td></td>
</tr>
<tr>
<td>DECK</td>
<td></td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>General</td>
<td>Deck Slab</td>
</tr>
<tr>
<td>C</td>
<td>Curb</td>
<td>Barrier</td>
</tr>
<tr>
<td></td>
<td>L, M and N</td>
<td>Spare</td>
</tr>
<tr>
<td>PIER</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>Diaphragm</td>
<td>Cap</td>
</tr>
<tr>
<td>P</td>
<td></td>
<td></td>
</tr>
<tr>
<td>H</td>
<td>Shafts</td>
<td></td>
</tr>
<tr>
<td>F</td>
<td>Footings</td>
<td></td>
</tr>
<tr>
<td>V</td>
<td>Columns</td>
<td></td>
</tr>
<tr>
<td>S</td>
<td>Stirrups in Cap</td>
<td>Stirrups in Footing</td>
</tr>
<tr>
<td>T</td>
<td>Ties</td>
<td></td>
</tr>
<tr>
<td>Z</td>
<td>Dowels</td>
<td></td>
</tr>
<tr>
<td>R, S and U</td>
<td></td>
<td>Spare</td>
</tr>
<tr>
<td>MISCELLANEOUS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>X and Y</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DO NOT USE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I, O and Q</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
2.4.3 **Standard Bridge Drawing Layout**

The Department’s standard box-shaped precast concrete girders are the SL, SLW, and SLC girders (reference Standard Drawings S-1723 to S-1749, S-1816 to S-1837, and S-1771 to S-1792 respectively). These are typically used when girder spans are less than 20 m and overall bridge lengths are less than 60 m. No other box-shaped precast concrete girder shape shall be used unless agreed upon in writing by the Bridge Engineering Section.

The following section provides a general description of the drawing layout for Department standard bridge drawings. Consultants who are not familiar with AT bridge design drawings are encouraged to visit the Department’s Bridges and Structures website where a detailed discussion regarding standard bridge requirements and design is outlined. Consultants are also encouraged to obtain recently completed design drawing sets for their guidance. Detailed drafting checklists are also included in Appendix E for reference.
2.4.3.1 General Layout Sheet

The intent of the general layout sheet is to provide a visual presentation of the bridge structure after completion. To facilitate this presentation a bridge plan, elevation, and a section shall be provided. A sheet index for the project shall also be presented listing all site specific and standard drawings referenced for the project. The plan and elevation are to be centered vertically with respect to each other and shall be presented in the same scale as shown in the following figure:

Refer to Appendix E for a comprehensive checklist regarding standard bridge drafting requirements for the general layout drawing.

2.4.3.2 Information Sheets

The information sheet is used to capture the background data used in the development of the final structure. Information shall include site plan, overpassing roadway profile, underpassing roadway/watercourse profile, quantity estimate table, site map, survey information, right of way, utilities, existing structure location and information (as applicable), geotechnical information, and general notes. Usually one or two information sheets will suffice for standard bridge projects however; additional sheets may be added on a site specific need.

The data shown on the site information sheets for standard bridges is similar to that for major bridges.

Information - Sheet 1
Incorporates a site plan (without the bridge structure), overpassing roadway profile and underpassing roadway/watercourse profile, a quantity estimate table for the entire structure, a site map, and general notes applicable to the entire drawing set.

Information - Sheet 2
Incorporates an elevation of the fills/cuts but does not show the bridge structure. Test hole log data relative to estimated pile tip elevation is to be provided.
The following figures reflect the information sheet layout for a typical standard bridge project incorporating two site information sheets:

Information Sheet 1

Information Sheet 2

Refer to Appendix E for a comprehensive checklist regarding standard bridge drafting requirements for the site information drawing(s).
2.4.3.3 **Abutment Drawing**

Standard bridge projects shall include an abutment drawing in the drawing set unless the region instructs otherwise. The abutment drawing shall consist of an abutment plan and elevation aligned and drawn to the same scale. The abutment sheet layout shall be consistent with that shown on the applicable standard drawing for the standard bridge design being utilized. All lettered dimensions listed on the standard drawing shall be replaced with the appropriate numerical values based on the site specific information along with the skew value. For SL Bridges refer to S-1755, S-1762, S-1765, and S-1794. For SLW Bridges refer to S-1755. For SLC Bridges refer to S-1779 and S-1790.

Refer to Appendix E for a comprehensive checklist regarding standard bridge drafting requirements for the abutment drawing.

2.4.3.4 **Pier Drawing**

Standard bridge projects shall include a pier drawing in the drawing set unless the region instructs otherwise. The pier drawing shall consist of a plan and elevation aligned and drawn to the same scale. The intent is to reflect the pier geometry being utilized on the project. The pier drawing layout shall be consistent with that shown on the applicable standard drawing for the standard bridge design being utilized. All lettered dimensions listed on the standard drawing shall be replaced with the appropriate numerical values based on the site specific information along with the skew value. For SL Bridges refer to S-1754, S-1762, and S-1765. For SLW Bridges refer to S-1754. For SLC Bridges refer to S-1780, and S-1791.

Refer to Appendix E for a comprehensive checklist regarding standard bridge drafting requirements for the pier drawing.

2.4.3.5 **Deck Drawing**

Standard bridges incorporating a cast in place concrete deck (SLC Bridges) shall have a deck reinforcing plan. The plan shall incorporate the bar size and spacing information provided on the standard drawings but shall supplement this information with deck bar marks specific to the project based on the skew, bridge length, and bridge width being used. The deck reinforcing information should be shown in a similar fashion as on the standard drawings S-1772 and S-1783.

Refer to Appendix E for a comprehensive checklist regarding standard bridge drafting requirements for the deck drawing.

2.4.3.6 **Bar List Drawing**

Standard bridges with certain field cast concrete components (deck, diaphragm, and curb ends) require the preparation of a site specific bar list to reflect bridge width, skew, and length. The bar list shall be subdivided by bridge component e.g. Abutment, Pier, Deck etc. The bar marks listed on the standard drawings that require site specific detailing shall be incorporated into the site specific bar list with the appropriate geometric variables identified. Mass for individual bar types is to be calculated and shown to the nearest kilogram with subtotals shown for each structure component by reinforcement type: Plain, CRR, and SS.

Refer to Appendix E for a comprehensive checklist regarding standard bridge drafting requirements for the bar list drawing.
2.4.4 **Sign Structure Drawings**

Sign Structures are delivered by way of a design build process and therefore the drawing demands from the department’s Consultant are relatively limited. The department has developed a standard drawing depicting a typical sample general layout that provides guidance and drawing requirements. Refer to S-1721. The Consultant is required to develop a general layout for each individual sign structure within the site plan of the given interchange. Each general layout sheet should provide a site plan with roadway information and sign structure locations, a sign structure elevation, site map, and sign structure general notes.

2.4.5 **Bridge Rehabilitation Drawings**

The number of drawing sheets required for rehabilitation projects will vary based on the scope of the project. As a minimum, all rehabilitation projects shall include a “Rehabilitation Layout” sheet. If additional sheets are required, “Rehabilitation - Sheet(s)” should be included in the drawing set.

**Rehabilitation Layout Sheet**

The “Rehabilitation Layout” sheet is similar to the general layout sheet used in new major bridge projects. It should include a plan, elevation, bridge section, general notes, and drawing index related to the current rehabilitation work. This index shall include all department assigned and applicable standard sheet numbers. In addition, a supplemental drawing index shall be included to document all reference drawings of the existing structure that are relevant to the scope of the rehabilitation.

The plan and elevation should be drawn to the same scale and aligned horizontally on the page with the plan located above the elevation. The bridge section should be located in the top right corner of the sheet and as a minimum, include the bridge superstructure. Main rehabilitation components, included as bid items in the unit price schedule of the specifications, should be labeled on the plan, elevation and section where appropriate.
Rehabilitation - Sheet 1

“Rehabilitation - Sheet 1” includes details, sections, or layouts of the rehabilitation. Typical examples of items contained on “Rehabilitation – Sheet #” are deck joint sections, lateral drain layouts, substructure sections, strengthening details or any site specific details requiring modification to standard drawings. Where applicable, rehabilitation sheets should be developed in accordance with guidelines contained within this document. Drawings notes included on the rehabilitation sheets shall be relevant to the information included on the specific sheets.

![Diagram of Rehabilitation Sheet Layout]

- Rehabilitation Details
- Sections
- Rehabilitation Component Notes
- Layouts
- Sections

(PREFERRED LOCATION IS TOP RIGHT CORNER)
2.4.6  **Bridge Culvert Drawings**

2.4.6.1  **General Layout Sheet**

The general layout sheet typically includes overall site plan, longitudinal cross section, road profile, stream profile, backfill details, site map, general notes (containing but not limited to survey information, bench marks, hydrotechnical summary, new structure information), drawing index (index shall include all department assigned and applicable standard sheet numbers) and quantity estimate table.
2.4.6.2 Information Sheets

Information sheets may be required depending on the specific complexity of the site and additional details that are required. Typical details shown may include but not be limited to, complex backfill details, guardrail details, plate assembly details, bridge plaque, temporary shoring, reinforcing details and borehole information.
### Bridge Quantities

Bridge Contracts are tendered on a unit price basis for most bid items. The following items, with their indicated units, are among the most commonly used:

<table>
<thead>
<tr>
<th>Name</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Piling (Type and size) – supply</td>
<td>- m</td>
</tr>
<tr>
<td>Piling (Type and size) – drive</td>
<td>- m</td>
</tr>
<tr>
<td>Piling (Type and size) – set up</td>
<td>- pile</td>
</tr>
<tr>
<td>Concrete – Type</td>
<td>- m³</td>
</tr>
<tr>
<td>Reinforcing steel - plain</td>
<td>- kg</td>
</tr>
<tr>
<td>Reinforcing steel – corrosion resistant</td>
<td>- kg</td>
</tr>
<tr>
<td>Reinforcing steel – stainless steel</td>
<td>- kg</td>
</tr>
<tr>
<td>Concrete Slope Protection</td>
<td>- m²</td>
</tr>
<tr>
<td>Rock Rip-Rap – Class</td>
<td>- m³</td>
</tr>
<tr>
<td>Bridgerail</td>
<td>- m</td>
</tr>
<tr>
<td>Handrail</td>
<td>- m</td>
</tr>
<tr>
<td>Bridge Deck Waterproofing</td>
<td>- m²</td>
</tr>
<tr>
<td>Wearing Surface – Two course hot-mix ACP (Type)</td>
<td>lump sum or tonne</td>
</tr>
<tr>
<td>Wearing Surface – Hot-mix ACP</td>
<td>lump sum or tonne</td>
</tr>
</tbody>
</table>

Piling, concrete, and rip-rap require a separate quantity for each size or type used.

Quantities, with the exception of slope protection and rip-rap, are to be calculated and shown to the nearest whole unit. Slope protection and rip-rap quantities are to be calculated and shown to the nearest 10 units.

Individual quantity estimate tables are to be shown on the applicable design sheets for the abutments, piers, and deck and are to be summarized on the quantity estimate table shown on Information – Sheet 1.

Quantities done by other than the site contractor are to be so identified on the quantity estimate tables.

Structural steel mass for steel girder superstructures shall be calculated and the mass, in tonnes, shall be shown in the ‘Girder Notes’ on the ‘Girder’ design drawings. The mass shall include girders, diaphragms, stiffeners, and splice plates but does not normally include deck joints, bearings, and bolts.

For quantity estimate tables, use only those items required for each project, but follow the order and wording as shown below. Items not shown shall be inserted into the estimate table in the order in which they are used in the construction of the bridge.
The following table shows the format for the overall bridge quantity estimate table to be included on Information - Sheet 1.

<table>
<thead>
<tr>
<th>ITEM</th>
<th>UNIT</th>
<th>SUBSTR</th>
<th>SUPERSTR</th>
<th>ESTIMATE</th>
<th>AS CONST</th>
</tr>
</thead>
<tbody>
<tr>
<td>GUARDRAIL - DEEP BEAM (APPROACHES)</td>
<td>m</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TRUSS RAIL - TUBE TYPE</td>
<td>m</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HANDRAIL - CHAIN LINK</td>
<td>m</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HANDRAIL - 1150 mm STAGGERED VERTICAL BAR</td>
<td>m</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BRIDGERAIL - DEEP BEAM, THIEBEAM</td>
<td>m</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BRIDGERAIL - PL1, PL2</td>
<td>m</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WEARING SURFACE - HOT - MIX ACP</td>
<td>m²</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WEARING SURFACE - TWO COURSE HOT-MIX ACP</td>
<td>m³</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WEARING SURFACE - SILICA FUME</td>
<td>m²</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BRIDGE DECK WATERPROOFING</td>
<td>m²</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RIP-RAP - CLASS 1, 1M, 2, 3, HEAVY ROCK</td>
<td>m³</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CONCRETE SLOPE PROTECTION</td>
<td>m³</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GEOTEXTILE FILTER FABRIC</td>
<td>m³</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BEDDING GRAVEL OR PIT-RUN GRAVEL</td>
<td>m³</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>POLYETHYLENE SHEETING (6 mil)</td>
<td>m³</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TREATED TIMBER</td>
<td>FBM</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PLANKING - TREATED TIMBER (76 x 305)</td>
<td>m</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CONCRETE - 30 MPa</td>
<td>m³</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CONCRETE - CLASS B, C, D, S, SF</td>
<td>m³</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CONCRETE - FILE</td>
<td>m³</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>REINFORCING STEEL</td>
<td></td>
<td>EPOXY</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>BLACK</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PILING - TREATED TIMBER</td>
<td></td>
<td>DRIVE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>SPLICE</td>
<td>SPLICE</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>SET-UP</td>
<td>PILE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PILING - PIPE</td>
<td></td>
<td>(760º x 10)</td>
<td>DRIVE</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(610º x 10)</td>
<td>SPLICE</td>
<td>SPLICE</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(406º x 7)</td>
<td>SET-UP</td>
<td>PILE</td>
<td></td>
</tr>
<tr>
<td>PILING - H PILE</td>
<td></td>
<td>(HP 360 x 132)</td>
<td>DRIVE</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(HP 310 x 94)</td>
<td>SPLICE</td>
<td>SPLICE</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(HP 250 x 62)</td>
<td>SET-UP</td>
<td>PILE</td>
<td></td>
</tr>
</tbody>
</table>

**QUANTITY ESTIMATE**
The following table shows the format for the individual bridge component quantity estimate table to be included on the component sheets.

<table>
<thead>
<tr>
<th>CONCRETE - CLASS B</th>
<th>m³</th>
</tr>
</thead>
<tbody>
<tr>
<td>CONCRETE - PILE</td>
<td>m³</td>
</tr>
</tbody>
</table>

### PILING - PIPE (356 x 7)

<table>
<thead>
<tr>
<th>ITEM</th>
<th>UNIT</th>
<th>TOTAL EST</th>
<th>AS COST</th>
</tr>
</thead>
<tbody>
<tr>
<td>GALV</td>
<td>m</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LG</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PLAIN LENGTH</td>
<td>m</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DRIVE</td>
<td>m</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SPlice</td>
<td>SPlice</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SET-UP</td>
<td>PILE</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**WHEN DRIVING GALVANIZED PILES**

**OR**

### PILING - PIPE (356 x 7)

<table>
<thead>
<tr>
<th>ITEM</th>
<th>UNIT</th>
<th>TOTAL EST</th>
<th>AS COST</th>
</tr>
</thead>
<tbody>
<tr>
<td>PARTIAL GALV</td>
<td>m</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PILE LENGTH</td>
<td>m</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SPlice</td>
<td>SPlice</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PLACE</td>
<td>PILE</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**WHEN PLACING GALVANIZED PILES**

**OTHER EXAMPLES OF PILING QUANTITIES WHICH WOULD REPLACE THAT SHOWN ON SHEET 1 SHOW THE EXTENT TO WHICH THE QUANTITY ESTIMATE APPLIES**

**NOTES:**

- **SHEET 1 SHOWS THE QUANTITY ESTIMATE FORMAT FOR THE INFORMATION SHEET. THE EXAMPLE SHOWN ABOVE SHOWS A FORMAT FOR A QUANTITY ESTIMATE FOR EACH BRIDGE COMPONENT.**

#### 2.4.8 Bridge Shop Drawings

The consultant shall submit a complete set of final shop drawings without comments to the department for all fabricated elements of any standalone bridge structure. This includes sign structures, bridge size culverts and retaining walls. Shop drawings are to be submitted in electronic image format and where applicable accompanying CAD files.

If a shop drawing is common to more than one structure at a bridge site, it must be copied and included in each separate set of shop drawings per structure. It will receive a unique bridge site, steel or concrete identifier.

Electronic shop drawings shall be submitted on either 11” x 17” or 22” x 34” image size depending on the complexity of the element being shown. The quality of shop drawings are to be sufficient so that all details are clearly legible in the submitted format size. If scanning is required is to be done in black and white scanning at 300 dpi. The minimum text height shall be 2.5 mm.

Shop drawings files are to be in unlocked format.

A consultant review stamp shall be on the front of each shop drawing; the stamp shall be legible, signed, dated and be positioned so as not to obscure any drawing information.
All shop drawings shall have a date noted on them in the title block, format being YYYY-MM-DD.

Any revised shop drawings are to be resubmitted to the department showing what was revised and have a revision date noted.

The department Shop Drawing Identification Block shall be included on all shop drawings and shall be completed as shown on the table below. The Block shall be placed near the bottom right of each shop drawing and be positioned so as not to obscure any drawing information. The size of the Block can be adjusted by the fabricator ensuring all information is represented and is legible and then that size is to remain constant for all shop drawings for that project. If the shop drawings are prepared for either a steel or concrete element, the fabricator will place a “N/A” in the other field.

<table>
<thead>
<tr>
<th>Hwy 2 Bridge over Red Deer River</th>
<th>XYZ Consultant</th>
<th>Project Identifier must go on all shop drawings.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Design Drawing Cross Reference:</td>
<td>45150-P</td>
<td>Determined by the Fabricator - this is the department design drawing number(s) that the shop drawing relates to.</td>
</tr>
<tr>
<td>Shop Drawing Number:</td>
<td>SP13-001</td>
<td>Determined by the Fabricator- is an internal numbering system, and contain revision numbers where applicable.</td>
</tr>
<tr>
<td>AT Bridge Site Number:</td>
<td>75335S</td>
<td>Supplied by the Consultant</td>
</tr>
<tr>
<td>AT Structure Number:</td>
<td>Structure 2</td>
<td>Supplied by the Consultant</td>
</tr>
<tr>
<td>Steel Identification Number:</td>
<td>A-1859 or N/A</td>
<td>Supplied by the Consultant (where applicable)</td>
</tr>
<tr>
<td>Concrete Identification Number:</td>
<td>C-1012 or N/A</td>
<td>Supplied by the Consultant Department (where applicable)</td>
</tr>
<tr>
<td>Sheet Number:</td>
<td>A-1859-001 or C-1012-001</td>
<td>Determined by the consultant. Last three digits are sequential to the number of drawings produced. Each drawing has its own unique number. The shop drawings set to be sorted and supplied by each major bridge component in the order construction.</td>
</tr>
</tbody>
</table>

For girder shop drawing submissions, the following additional requirements shall be met:

A plan view of the entire bridge shall be shown at a sufficient scale to legibly show and annotate all girder lines and diaphragms for both steel and concrete structures. The full length of the bridge shall be shown even if the bridge is symmetrical including centerlines of abutments and piers.
2.4.9 Bridge Record Drawings

Record drawings are produced using the tender or issued for construction set of drawings as a base and any changes made at the construction stage should be noted and flagged with a revision triangle, “clouds” are not permitted.

Further requirements for preparing Bridge Record Drawings are provided in the Record Drawing checklist in Appendix E.
3. AGGREGATE DRAWINGS

3.1 INTRODUCTION

Section 3 applies to Aggregate projects.

In this section, “Plan” refers to Testing, Operating, Crown Reservation, Pre-Development and Reclamation Plans, and Pre-Development and Reclamation Cross-Sections as they relate to aggregate pits, stockpile sites and haul roads.

3.1.1 MicroStation Workspace

The department has developed a MicroStation V8i workspace which is to be used when working with any electronic CADD files. This workspace is available for all consultants to use so that all electronic CADD files received from the consultants can be easily used by the department personnel.

The required Font Library, Cell Library, Color Tables and Seed file are located on the department FTP site.

The FTP site can also be accessed as follows: go to www.transportation.alberta.ca; click on link for Technical Resources; click on link for FTP Shared Data; click on link for Access to site.

- User Name: tsbftp
- Password: Srg4Tfh

Click on Shared/
Click on AT_CAD_INROADS_STANDARDS
Download 2015 aggregates_seed_cell_font_color.zip

All department plans are maintained as MicroStation files. Pit files, satellite imagery, Parcel Maps and AltaLIS mapping are available from the Regional Aggregate Co-ordinators and the Aggregate Administrator. On completion of a drafting project the digital file shall be forwarded to the appropriate Regional Office for review.

Procedures for updating the Aggregate Testing and Pit Plan following completion of a construction project are outlined in Section 3.17.

3.2 CHANGES TO GUIDELINES

The 2014 guidelines reflect changes since the last guidelines were published in 2010:

- The Cell library includes new templates and the department logo has been updated on all forms in the cell library.
- The seed file level descriptions have been updated.
- The level symbology colors have minor changes,
- The font resource file and color table remains unchanged.
MicroStation is encouraging the use of TrueType fonts, thus the font installer application has been removed from MicroStation V8i. This may make installing the ZATUFONT.rsc file difficult. Please review the full explanation from the Bentley:

If AT Font 5 cannot be installed, AT Font 99 may be used. AT Font 99 letters are slightly wider than AT Font 5.

3.3 SEED FILE

Obtain and store the “hesseed2d2015mask.dgn” as the default seed file in the appropriate directory. All new plans shall be based on this file. This file establishes the level symbology, dimensions, azimuth, and other features required for all plans.

3.4 MICROSTATION SETUP

Before starting drafting projects, the following steps must be completed to ensure all settings will be correct each time a new file is created from the seed file.

- Save the ‘zatufont.rsc’ font library into the appropriate directory
- Save the cell file ‘hes2015.cel’ to the appropriate directory
- Open the seed file
- Attach the cell library
- Save setting and close seed file
- Open Micro station and select the File New dialog. Then set the default seed file to hesseed2d2015mask.dgn

Thereafter, all new files will be created through the File New dialog box. The seed file should never need to be opened again.

3.5 FILE NAMING CONVENTION

The file name shall consist of the legal land description (zero filled) followed by the date drafted or updated. Letters shall be in lowercase. Spaces and commas shall not be used. The location should start with the land parcel representing the largest portion of the deposit.

Example of Plan File Name:

Project location: Northeast quarter of Section 18, Township 056, Range 23, West of the fourth meridian

Date drafted or updated: dec2014

File name format: QuarterSectionTownshipRangeMeridianDate.dgn

File name: ne1805623w4dec2014.dgn

Note; to preserve an original DGN file, the file must be renamed prior to any changes being made. Files shall be renamed by using the “File” “Save As” function from the menu.
3.6 WORKING UNITS

Standard Working Units for all plans have been established as part of the seed file. Should you accidently corrupt or change the seed file, the setting can be reset as shown below:

Figure 1 - Dimension Styles Settings (TEXT- font type, font size, line spacing)
Figure 2 - Dimension Styles Settings (Units- accuracy, angle format, angle display and angle accuracy, metric format)
Figure 3 - Design File Settings (angle readout format, accuracy, Direction Mode and Base)
3.7 PLAN TYPE AND LEVEL USAGE

The noted plans are composed of data that is stored on different levels as displayed below. The same levels must be turned on when plotting a plan. Though not covered here, use of a Pen Table will enhance color printing. Through the level display dialog box you can select a filter for each plan to display the associated levels only.

<table>
<thead>
<tr>
<th>Plan</th>
<th>Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aggregate Testing</td>
<td>1, 2, 3, 4, 5</td>
</tr>
<tr>
<td>Pit</td>
<td>4, 6, 5</td>
</tr>
<tr>
<td>Pit (with Operating Conditions)</td>
<td>4, 6, 7, 5</td>
</tr>
<tr>
<td>Development</td>
<td>14, 15, 5</td>
</tr>
<tr>
<td>Reclamation</td>
<td>11, 13, 5</td>
</tr>
<tr>
<td>Development X-Sec.</td>
<td>20, 22, 24, 5</td>
</tr>
<tr>
<td>Reclamation X-Sec.</td>
<td>21, 22, 25, 5</td>
</tr>
<tr>
<td>Reservation Boundary</td>
<td>9, 10, 17, 28, 35, 40, (33)</td>
</tr>
<tr>
<td>Soils Report (optional)</td>
<td>16</td>
</tr>
</tbody>
</table>

3.8 LEVEL COMPOSITION

The following describes the information required on each level when producing, updating or editing a plan:

<table>
<thead>
<tr>
<th>LEVEL</th>
<th>DESCRIPTION</th>
</tr>
</thead>
</table>
| 1     | • Aggregates Testing Form from Cell Library (Active Cell (AC)= AGG)  
      | • Title Block Info (Pit Name, Land Location, Date tested or updated) |
| 2     | • Test hole data using log cells from the Cell library (AC=LOGXX).  
      | • Hole number & log descriptions  
      | • Aggregate deposit boundary (dashed line)  
      | • Area calculation identifiers; A, B, C, D etc. |
| 3     | All line work, which includes:  
      | • Quarter Section boundaries copied from level 62 LSD lines  
      | • AT Boundary (Reservation/Ownership/Agreement)  
      | • Open Pit Boundary, Surface Contours and Features  
      | • Buildings and Improvements  
      | • Water Bodies, Streams and Rivers  
      | • Fence Lines (linear pattern =FENCE)  
      | • Utility Right of Ways (surface and underground)  
      | • Highway and Local Road Right of Ways  
      | • Tree Lines, Cut Lines and Trails  
      | • Symbols as required from Cell Library e.g. 2x2’s, muskeg, pins etc. |
| 4     | • All Text, Lines and Arrows to describe pit features  
      | • Legal sub-division (LSD) numbers from the Cell library  
<pre><code>  | • Stockpile Legend from the Cell Library (AC=STOCKP) and information. |
</code></pre>
<table>
<thead>
<tr>
<th></th>
<th>Pit name and Legal land description from Cell Library (AC=NAME)</th>
</tr>
</thead>
</table>
| 6 | Pit Plan Form from Cell Library. Boundary of tested aggregate traced from Level 2 and edit as required.  
All features. Copy from Level 3 and edit as required. |
| 7 | Project specific details (areas to be cleared, stripped, mined, reclaimed; stockpile and plant sites) |
| 8 | Volume of topsoil, subsoil, overburden and gravel (by area) mandatory |
| 9 | RESV plan: Property, r/w, and adjacent dispositions, ATS line work for unaffected ¼ sections |
|10 | RESV plan: Text for activity names, leaders and arrows |
|11 | Reclamation Plan Form from Cell Library (AC=REC);  
Text for title block  
¼ Sec. Lines from level 62 |
|12 | CRBP back up information for commonly asked questions (optional)  
Total current vegetation measurement and shape of area (bush line style, wt=0)  
Total disturbed area measurement of A1 after depletion including open pit (linestyle=0 wt=4)  
Maximum disturbed area of the pit at any one time(linestyle=2, wt=2)  
Others as required |
|13 | Reclamation Plan features; reclaimed pit boundary, water bodies, tree lines, Cross-Sections Indicators, Text, pre-Dec 78’ disturbance. |
|14 | Development Plan Form from Cell Library (AC=DEV)  
Text for title block  
¼ Sec. Lines from level 62 |
|15 | Development plan features; Cross-section indicators, Mining sequence, proposed stockpile locations, text Copy from level 3,4,6 and edit as required |
|16 | Soils logs/report |
|17 | RESV plan: ATS unbroken lines for affected ¼ sections |
|20 | Reclamation Cross-section Form from Cell Library (AC=RECX).  
Elevations, scale etc. |
|21 | Development Cross-section Form from Cell Library (AC=DEVX).  
Elevations, scale etc. |
|22 | Elevation and Scale for x-sections |
|24 | Reclamation cross-section features, lines, text, etc. |
|25 | Pre-development cross-section features, lines, stockpiles, and text. |
|28 | RESV plan: Disposition Boundary shape only |
### 3.9 TEST LOG

Gravel Test Hole Numbers and Logs are placed on level 2 using the ‘log cell’ from the Cell Library. Choose the log cell that has the required number of lines and spaces for the data to be entered.

This data is crucial to the accuracy of the Plan. Care shall be taken when placing or editing the field or existing information.

The Log cell can also be placed (relative) on level 16 and used for additional soils log information that can form part of the Conservation Reclamation Business Plan Submission (CRBP).

---

<table>
<thead>
<tr>
<th>Level</th>
<th>Description</th>
</tr>
</thead>
</table>
| 33    | - Reservation form from Cell library (AC=RES, RES1, RES2 or PNTLARGE).  
- Dimensions of boundary; Single entry data fields on form; AC=PNT NOTES  
- Most data previously on level 33 has been moved to meet ESRD document entitled “Content Requirements for Disposition Application Plans” Refer to levels 9,10,17,28,35,40. |
| 34    | - Haul Road reservation plan (if separate from pit boundary)  
- Reservation form from Cell library (AC=RES, RES1, RES2 or PNTLARGE) (place relative).  
- Dimensions of boundary; Single entry data fields on form; AC=PNT NOTES (Place Relative) |
| 35    | - RESV plan: Place cell AC=RP at a surveyed or theoretical pin location. |
| 40    | - RESV plan: Surface activity text label (PNT, DRS) place inside each boundary |
| 60    | - Other base mapping (1=20000 TELUS base) 10 m contour map |
| 61    | - Other base mapping (1=250,000)(LIDAR 1 m contour map) |
| 62    | - Current Cadastral Mapping (Parcel/township Map). |
| 63    | - Current GPS / Survey data. |
3.10 LINE WORK (TYPES AND WEIGHT)

To simplify the use of line work, the department utilizes, as much as possible, the line weights and styles (codes) as they appear in MicroStation software. The line code type - dash, dot, solid, etc., and weight shall correspond to the following:

**AGGREGATE TESTING PLAN AND PIT PLAN**

<table>
<thead>
<tr>
<th>Feature</th>
<th>Level</th>
<th>Line Style</th>
<th>Line Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>¼ Section Lines</td>
<td>3</td>
<td>———— 0</td>
<td>0</td>
</tr>
<tr>
<td>LSD Lines</td>
<td>3</td>
<td>———— 3</td>
<td>0</td>
</tr>
<tr>
<td>Creek, Stream, Pond</td>
<td>3</td>
<td>———— 0</td>
<td>0</td>
</tr>
<tr>
<td>River, Lake</td>
<td>3</td>
<td>———— 0</td>
<td>2</td>
</tr>
<tr>
<td>Trails/Cutlines</td>
<td>3</td>
<td>———— 5</td>
<td>0</td>
</tr>
<tr>
<td>Aggregate Deposit Boundary</td>
<td>2</td>
<td>———— 3</td>
<td>2</td>
</tr>
<tr>
<td>Aggregate Deposit Boundary</td>
<td>6</td>
<td>———— 0</td>
<td>3</td>
</tr>
<tr>
<td>AT Res. or Ownership Boundary</td>
<td>3</td>
<td>———— 0</td>
<td>4</td>
</tr>
<tr>
<td>Buffer Zone</td>
<td>3</td>
<td>———— 0</td>
<td>2</td>
</tr>
<tr>
<td>Bush/Tree Line ( )</td>
<td>3</td>
<td>{ Tree Line }</td>
<td>0</td>
</tr>
<tr>
<td>Fence lines (from cell library)</td>
<td>3</td>
<td>———— 0</td>
<td>1</td>
</tr>
<tr>
<td>HAUL ROAD Parallel lines (10 m wide)</td>
<td>3</td>
<td>———— 0</td>
<td>0</td>
</tr>
<tr>
<td>Roadways, Utilities, R.O.W.</td>
<td>3</td>
<td>———— 0</td>
<td>2</td>
</tr>
<tr>
<td>Open Pit Boundary (top of slope)</td>
<td>3</td>
<td>———— 0</td>
<td>4</td>
</tr>
<tr>
<td>Open Pit Boundary (toe of slope)</td>
<td>3</td>
<td>———— 0</td>
<td>1</td>
</tr>
<tr>
<td>Other Dispositions (no common boundary)</td>
<td>3</td>
<td>———— 0</td>
<td>0</td>
</tr>
<tr>
<td>Stockpile (base)</td>
<td>3</td>
<td>———— 0</td>
<td>2</td>
</tr>
</tbody>
</table>

**CROSS SECTION LINE WORK:**

<table>
<thead>
<tr>
<th>Line Style</th>
<th>Level</th>
<th>Line Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>———— 0</td>
<td>24,25</td>
<td>4</td>
</tr>
<tr>
<td>———— 3</td>
<td>24,25</td>
<td>2</td>
</tr>
<tr>
<td>———— 0</td>
<td>24,25</td>
<td>2</td>
</tr>
<tr>
<td>———— 0</td>
<td>24,25</td>
<td>0</td>
</tr>
<tr>
<td>———— 7</td>
<td>24,25</td>
<td>0</td>
</tr>
</tbody>
</table>
3.11 TEXT

All title block entries are Single-Entry Data Fields, which presets the size, weight and font type. To view the data fields turn on the Data Field from the View Attributes dialog box. Select the field for entry.

The font type used for all other text descriptions and normally stored as Font 5 from the ‘zatufont.rsc’ is specific to aggregate plan drafting and must be obtained from the department and added to the font library.

The line spacing may vary from 3.8 to 1.0, depending on the space available.

With the exception of the Level 33 DRS Plan, the 8.0 text size shall be used. The text size shall only be changed to avoid overlap or to increase clarity of a plan.

On level 33 text sizes shall conform to the following:

<table>
<thead>
<tr>
<th>Size of activity</th>
<th>Template from Cell library</th>
<th>Text Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>For reservation within a ¼ section</td>
<td>AC=res</td>
<td>8.0</td>
</tr>
<tr>
<td>For reservation within one section</td>
<td>AC=res1</td>
<td>15.00</td>
</tr>
<tr>
<td>For reservation &gt; 1 section, and up to 2.5 sections wide and 4 sections long</td>
<td>AC=res2</td>
<td>30.00</td>
</tr>
<tr>
<td>For reservation &gt;1 township</td>
<td>AC=pntlarge</td>
<td>Depends on plot scale (50-100) (1-20 000 scale recommended)</td>
</tr>
</tbody>
</table>

Using the larger text will ensure it is legible when printed on a paper size of 11”x17”.

3.11.1 Lettering and SI Units

All lettering is to be done in capitals except metric SI unit symbols (e.g., mm, m, km, kN, kPa)

A space is used between numbers and SI units (e.g. 25 km, 100 mm, 25 kg, 22 m$^3$).

Unit symbols (e.g. m, kg, etc.) represent the unit. They are not abbreviations.

Minimum text height to be used is 3 mm.

River and stream names should follow the shape of the feature.

When a decimal fraction is used, a “0” shall always be placed before the decimal marker (e.g. 0.232 m).

A space is always required for a four digit or higher whole number, (e.g. 5 634 or 20 000)

*AT Font 99* shall be used for all text. This font resource file can be found in the file “*AT_CADD_2016_06.zip*” (found on the FTP site described in Section 3.1.1).
The following short cut keys can be used with AT Font 99:

3.11.2 **Abbreviations**

The general use of abbreviations is discouraged.

Abbreviations may be used where they save space and where the meaning is very clear. The end user of the information must always be taken into consideration. New abbreviations must be added to the legend.

3.12 **LINEWORK**

To simplify the use of line work, the department utilizes, as much as possible, the line weights and styles (codes) as they appear in MicroStation software.

3.13 **COLOR TABLES**

All colors required for viewing drafting of Plans are contained in the “HEScolor.tbl” Color Table. No other color table shall be used. Ensure the approved color table is attached.

Plans shall be drawn in black (253), not in white. To select or change the background color double click on the square marked capital “B”

3.14 **CELLS**

All standard plans and features for drafting of plans are available from the “HES2015.cel” Cell Library. No other cell library(s) shall be used. To ensure the cells are placed on the proper level, refer to the cell’s description or Section 3.8 **Level Composition** for details.
The approved “HES2015.cel” Cell library contains several new cells. The previous cell library called HES2010.cel, should be deleted. The changes are noted in the chart below:

<table>
<thead>
<tr>
<th>KEY-IN(AC=)</th>
<th>DESCRIPTION</th>
<th>CHANGES</th>
</tr>
</thead>
<tbody>
<tr>
<td>2X2</td>
<td>2 BY 2 SURVEY STAKE or TREE TAG SHOWING TESTHOLE NUMBER</td>
<td></td>
</tr>
<tr>
<td>ABLOGO2014</td>
<td>Alberta transportation logo</td>
<td>New for 2014</td>
</tr>
<tr>
<td>AGG</td>
<td>Aggregate Testing Plan lv1</td>
<td>Updated logo 2014</td>
</tr>
<tr>
<td>ARR</td>
<td>Arrowhead terminator</td>
<td></td>
</tr>
<tr>
<td>ARRS</td>
<td>Small arrowhead terminator</td>
<td></td>
</tr>
<tr>
<td>DEV</td>
<td>Development plan form lv14</td>
<td>Updated logo 2014</td>
</tr>
<tr>
<td>DEVX</td>
<td>Development cross section form lv21</td>
<td>Updated logo 2014</td>
</tr>
<tr>
<td>FENCE</td>
<td>Fence line</td>
<td></td>
</tr>
<tr>
<td>IP</td>
<td>Iron pin or point</td>
<td></td>
</tr>
<tr>
<td>LOG00</td>
<td>Testhole log number only</td>
<td></td>
</tr>
<tr>
<td>LOG03</td>
<td>3 lines</td>
<td></td>
</tr>
<tr>
<td>LOG05</td>
<td>5 lines</td>
<td></td>
</tr>
<tr>
<td>LOG08</td>
<td>8 lines</td>
<td></td>
</tr>
<tr>
<td>LOG10</td>
<td>10 lines</td>
<td></td>
</tr>
<tr>
<td>LOG12</td>
<td>12 lines</td>
<td></td>
</tr>
<tr>
<td>LOG14</td>
<td>14 lines</td>
<td></td>
</tr>
<tr>
<td>LOG3S</td>
<td>3 lines smaller text</td>
<td></td>
</tr>
<tr>
<td>LOG5S</td>
<td>5 lines, smaller text</td>
<td></td>
</tr>
<tr>
<td>LSDNE</td>
<td>Lsd’s in ne ¼</td>
<td></td>
</tr>
<tr>
<td>LSDNW</td>
<td>Lsd’s in nw ¼</td>
<td></td>
</tr>
<tr>
<td>LSDSE</td>
<td>Lsd’s in se ¼</td>
<td></td>
</tr>
<tr>
<td>LSDSEC</td>
<td>Lsd’s in section</td>
<td></td>
</tr>
<tr>
<td>LSDSW</td>
<td>Lsd’s in sw ¼</td>
<td></td>
</tr>
<tr>
<td>MUSKEG</td>
<td>Muskeg symbol</td>
<td></td>
</tr>
<tr>
<td>NE</td>
<td>North east corner indicator for new plan creation</td>
<td></td>
</tr>
<tr>
<td>NORTH</td>
<td>North arrow for new plan creation</td>
<td></td>
</tr>
<tr>
<td>PIT</td>
<td>Pit Plan Form Lv6</td>
<td></td>
</tr>
<tr>
<td>PNT LARGE</td>
<td>Pnt template for plan area of a township lv33</td>
<td>Updated logo 2014</td>
</tr>
<tr>
<td>REC</td>
<td>Reclamation plan form lv11</td>
<td></td>
</tr>
<tr>
<td>RECX</td>
<td>Reclamation cross section form lv20</td>
<td>Updated logo 2014</td>
</tr>
<tr>
<td>RES</td>
<td>Reservation boundary form for a ¼ section lv33</td>
<td>Updated format and logo2014</td>
</tr>
<tr>
<td>RES1</td>
<td>Reservation Boundary Form For Plans Less Than 1 Section In Size Lv33</td>
<td>Updated format and logo 2014</td>
</tr>
<tr>
<td>RES2</td>
<td>Reservation boundary form for plans more than 1 section in size lv33</td>
<td>Updated format and logo 2014</td>
</tr>
<tr>
<td>RP RIGHT</td>
<td>Reference point right justified lv35</td>
<td></td>
</tr>
<tr>
<td>RP LEFT</td>
<td>Reference point left justified lv35</td>
<td></td>
</tr>
<tr>
<td>STOCKP</td>
<td>Stockpile legend lv4</td>
<td></td>
</tr>
</tbody>
</table>
3.14.1 **Symbols**

Standard symbols should be used. If a nonstandard symbol is required and used, it must be clearly noted and explained. The Cell library contains some of these symbols.

3.15 **REVISIONS**

All revisions must be made on the MicroStation CADD file. The amendment box in the title sheet shall be updated after each amendment or project. Prior to submission of any drafting project, the Delete Duplicate file utility shall be run to clean up the file. All dimension and notes shall be set to use filled arrowheads.

3.15.1 **AutoCAD**

Plans updated or created in AutoCAD and then exported to MicroStation often results in additional levels being created for individual elements, loss of line weight, line style and layer names. All elements must be converted to the appropriate levels, weight and style. All non-standard levels shall be deleted.

3.16 **IMPORTING OF GPS, SURVEY DATA AND MAPS**

All new plans must be developed by first importing the most current satellite imagery followed by the cadastral (parcel map) and AltaLIS base map provided by the department to ensure that the coordinate system is set to Nad83, 10tm projection. Legal subdivision (LSD) lines, if necessary, shall be placed in accordance with the Surveys Act. LSD lines are not required for the reservation plans in unsurveyed territory.

All old plans were drafted at co-ordinate 0,0. When updating an existing plan, the data shall be geo-referenced to the most current parcel mapping. The View may be rotated to facilitate drafting and text placement. The elements from maps and survey data shall not be rotated, as this will change their coordinates and labeling of bearing of lines.

The most recent GPS or Survey data line work shall be placed on level 63.

3.17 **PROCEDURE FOR EDITING THE AGGREGATE TESTING PLAN & PIT PLAN FOLLOWING CONTRACT COMPLETION**

The general steps to complete a plan update are as follows:

- Export GPS data to NAD83 10tm projection
- Ensure file is properly geo-referenced
- Use “Save As” from the File menu to rename the file prior to editing.
- Attach Reference the GPS line file
- Activate level 63. Delete original GPS or Survey data and import new data.
- Display levels 1-4; activate level 3.
- Trace the new GPS/Survey lines to level 3.
  - Curved lines should be traced with the Place Point or Stream tool
- Use partial delete line to edit lines and features as required. Update the stockpile legend if necessary. Copy edited level 3 to level 6; activate level 6 and edit as required.
- Activate level 2. Delete test logs obliterated by mining. Place new testhole logs using the 'log cell'.
- Activate level 4. Place text to describe new or edited features and all new stockpiles. Ensure text does not overlap lines on levels 1, 2 & 3.
- Activate level 1. Update Title Block amendment field (date, purpose, and name of consultant).
- On completion of the update, the digital file shall be forwarded to the appropriate Regional Aggregate Co-ordinators.
4. LIST OF ACRONYMS

The following acronyms apply to the Engineering Drafting Guidelines for Highway and Bridge Projects document:

ACP: Asphalt Concrete Pavement
AT: Alberta Transportation
CADD: Computer Aided Design & Drafting
CRR: Corrosion Resistant Reinforcing
DGN: MicroStation Drawing Format
FTP: File Transfer Protocol (this is the protocol used to share files through the Internet)
HPC: High Performance Concrete
MSE: Mechanically Stabilized Earth
PVC: Polyvinyl Chloride
RWIS: Road Weather Information System
SBC: Alberta Transportation Specifications for Bridge Construction
SSPC: Society for Protective Coating Standards
5. REFERENCES

Alberta Transportation Engineering Drafting Guidelines for Highway and Bridge Projects

Appendix A

MASTER LEVEL LIBRARY

Date Published: June, 2016
# Table of Contents

A.1  MASTER LEVEL LIBRARY .................................................................................................................................................. 1
### A.1 MASTER LEVEL LIBRARY

Below is a sample of the level structures:

<table>
<thead>
<tr>
<th>Name</th>
<th>Discipline Field</th>
<th>Descriptor 1</th>
<th>Descriptor 2</th>
<th>Descriptor 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>C-BR-ABT-DET</td>
<td>C-(Civil)</td>
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B.1 STANDARD CADD ABBREVIATIONS......................................................... 1
### B.1 STANDARD CADD ABBREVIATIONS

Abbreviations may be used where space is limited. Only abbreviations on the following list shall be used.

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C.1 STANDARD CADD SYMBOLS

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| CABLE OVERHEAD    | ![Pattern](image) | FIBRE OPTIC BURIED| --- FOB PROPOSED
| WATERMAIN         | ![Pattern](image) | WATERMAIN         | --- WM EXISTING |

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Appendix D – Roadway Drawing Checklists
D.1 TITLE SHEET CHECK LIST

- Hwy No and Control section i.e. Hwy 16:08
- Geographic Location i.e. E OF JCT HWY 32 – E OF NITON JCT
- Description of work i.e. Grading Only
- Contract No. (issued by Professional Services)
- km to km (request from Geomatics Section)
- Station to Station
- Site Map, (showing limits of work, township and ranges, km posts, Hwy numbers and site numbers of intersections/interchanges, if they are part of the project.
- North Arrow
- Bar Scale
- Drawing list
- Testholes legend and soil survey taken date
- Notes regarding proposed borrow pits, disclaimer and grading limits
- Consultant’s logo, bottom right hand corner
- ISSUED FOR TENDER, ISSUED FOR CONSTRUCTION or RECORD DRAWING noted
D.2 PLAN-PROFILE CHECK LIST

Plan Portion:

☐ Legal Land Descriptions
☐ North Arrow
☐ Land Owners Names (if available)
☐ Aerial photograph number and date flown
☐ Date of survey and by whom
☐ No overlapping text/no linework through text
☐ Location of Testholes
☐ Existing and proposed R/W boundaries with dimensions
☐ Radius, Delta, LS, TST, A-value, Superelevation and design speed on curves
☐ Alignment Information (CT, TC, chainages to section lines, R/A’s, intersection/interchange equations, drainage equations, etc.)
☐ Existing and Proposed Entrances
☐ Road closures/obliterations
☐ Existing and Proposed Culverts (utilize culvert tables as required)
☐ FIP’s (with stations and distance from centreline)
☐ Stations every 500 metres
☐ Bridge Information (site number, drawing number.)
☐ km Posts with Stations
☐ Project Beginning and End km, Stations
☐ Chainage equations
☐ References to Intersection Plan Numbers (e.g.: for details see IN-295-01-P)
☐ Reference to CB6 standard plans
☐ Label Important Intersection Roadways by Highway Number or Name
☐ Town Boundaries, Indian Reserves, River and Creek names, major/minor drainage courses
☐ Title Block with Sheet No., Hwy. Sect. No., & Project Description
☐ Pipeline and Utility Easements (power lines, buried cable and pedestals, etc.)
☐ Borrow Pit Locations
☐ Bar Scale
☐ Utility Plan Number, Pipe Size and Station
Profile Portion:

☐ No overlapping text/no linework through text
☐ Proposed gradeline labelled “Finished Pavement” or “Subgrade”
☐ Elevations every 20 metres on Vertical Curve only (show Sta. if not on even 20 m interval)
☐ Stations for Horizontal Control every 500 metres
☐ Existing Centreline, Left and Right Sod Lines, offset must be noted
☐ Proposed Ditches, Left and Right
☐ km Posts with Stations, Beginning and End km, Stations, Grading Limits/Paving Limits
☐ Bridge outline
☐ Chainage equations
☐ Testholes to Scale, Label with Station and Offset
☐ Direction for R/A’s (i.e., North South)
☐ Grade Percentages
☐ PI stations and elevations
☐ Chainage Ties for Road Allowance Intersections
☐ “K” Values and length of curve for Vertical Curves
☐ Bar Scale (Horiz. and Vert.)
D.3  INTERCHANGES / INTERSECTIONS CHECK LIST

Interchanges/Intersections geometry:

- No overlapping text/no linework through text
- Legal Land Descriptions
- North Arrow
- Bar Scale
- Label Roadways by Highway number or name
- Land Owners Names (if available)
- Existing and proposed R/W boundaries with dimensions
- Chainage equation at intersection of roadways
- Radius, Delta, LS, TST, A-value, Superelevation and Design speed on horizontal curves
- Three and two centre curve data
- Alignment Information (CT, TC, chainages to section lines, R/A’s, drainage equations, etc.)
- Taper length and ratio
- Travel lane and shoulder widths
- Existing and Proposed Entrances
- Existing and Proposed Culverts (utilize culvert tables as required)
- FIP’s (with stations and distance from centreline)
- 500 metre Markers
- Bridge Information (site number, drawing number.)
- km Posts with Stations, Beginning and End km, Stations, Grading Limits
- Matchlines with plan numbers
For profiles see profile checklist in section D.2

Pavement Markings and Signings:
☐ No overlapping text/no linework through text
☐ Legal Land Descriptions
☐ North Arrow
☐ Label Roadways by Highway number or name
☐ Land Owners Names (if available)
☐ Existing and proposed R/W boundaries
☐ Bar Scale
☐ Taper length and ratio
☐ Travel lane and shoulder widths
☐ Directional arrows
☐ Type and length of guardrail, end treatment
☐ Island details
☐ Gore details
☐ Bridge Information (site number, drawing number)
☐ km Posts with Stations, Beginning and End km, Stations, Grading Limits
☐ All signs shown including overhead signs
☐ Overhead sign structures include, site number and drawing number
☐ Matchlines with plan numbers

Lighting
☐ No overlapping text/no linework through text
☐ Legal Land Descriptions
☐ North Arrow
☐ Label Roadways by Highway number or name
☐ Existing and proposed R/W boundaries
☐ Legend (if required)
☐ Survey location of poles and pole numbers
☐ Pole elevations and details
☐ Circuit labels
☐ Conflicting utilities
☐ Utility crossing details
☐ Underground/overhead lines
Signals

- No overlapping text/no linework through text
- Legal Land Descriptions
- North Arrow
- Label Roadways by Highway number or name
- Existing and proposed R/W boundaries
- Legend (if required)
- Survey location of poles, pole labels
- Pole elevations
- Above ground details
- Below ground details
- Directional arrows and signage (above ground)
- Camera labelling, Display or Pushbutton labelling
- Timing/Phasing, detector setup
- PD and TC Cabinets (above and below ground)
D.4 RAILWAY AND UTILITY PLAN CHECK LIST

Railway:
- No overlapping text/no linework through text
- Legal Land Descriptions
- North Arrow
- Bar Scales
- Label Roadways by Highway number or name
- Land Owners Names (if available)
- Existing and proposed R/W boundaries with dimensions
- Chainage equation at intersection of roadway and railway
- Roadway cross section
- Key map
- Railway profile
- Roadway profile
- Sightline distance tables
- Proposed signing (road and railway)

Utilities:
- Location plan
- Detail of crossing (if required)
- No overlapping text/no linework through text
- Legal Land Descriptions
- North Arrow
- Bar Scales
- Label Roadways by Highway number or name
- Existing and proposed R/W boundaries
- Station of pipeline crossing
- Profile along pipeline
- Dimension minimum depth of pipeline below road ditch
- Elevation of pipeline below ditch
- Pipeline warning signs, vents and valves
- Clearance of overhead line
- Pipeline diameter
- Pipeline wall thickness
Roadway Drawing Checklist

- Pipeline specifications
- License maximum allowable pressure
- ERA license number
- License to carry
- Date issued
- Pipeline Company name
- Construction note
Alberta Transportation Engineering Drafting Guidelines for Highway and Bridge Projects

Appendix E

BRIDGE DRAWING CHECKLISTS

Date Published: June, 2016
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E.1 GENERAL

This appendix provides checklists for use when preparing drawings for Alberta Transportation projects. Specifically, these checklists address preparation of major bridge drawings, sign structure drawings, standard bridge drawings, bridge rehabilitation drawings and record drawings. They are not considered stand-alone documents and are intended to be used in conjunction with remainder of the “Engineering Drafting Guidelines for Highway and Bridge Projects” document.

These checklists are provided for guidance purposes. Consistency of drawing layout and content is very important and therefore, these checklists should be followed wherever possible. The language used in this document purposely includes a mixture of “definitive statements” (e.g. shall be) and “preferred statements” (e.g. should be). It is acknowledged that site specific concerns might require some modification to the “preferred statements”. However, deviation from the “preferred statements” shall only be done for specific and defendable reasons and not simply because a Consultant prefers to do it differently.

These checklists reflect the typical information required to appropriately convey design and construction information to the Contractor. These checklists should not be considered complete. Consultants shall use their own engineering judgment and discretion to ensure that sufficient information, beyond what is required by these checklists, is included on the drawings. At the time of publishing, these checklists are consistent with the design and construction requirements presented in the “Bridge Structures Design Criteria” and the “Standard Specifications for Bridge Construction”. However, the “Bridge Structures Design Criteria” and the “Standard Specifications for Bridge Construction” will be updated on a regular basis and the changes may not be reflected in these checklists. It is the Consultant’s responsibility to ensure that the information appearing on the detailed design drawings are modified to be consistent with the latest version of the “Bridge Structures Design Criteria” and the “Standard Specifications for Bridge Construction”.

E.2 MAJOR BRIDGE DRAWING CHECKLIST

E.2.1 General

The term “Major Bridge” includes any large bridge structure, including large or complex culvert, which requires site-specific drawings to define the structure. Typically major bridges are river crossings, highway interchanges or railway crossings.

The following checklist items shall apply to all major bridge drawings:

- The information contained in the Title Block shall be as per AT requirements;
- There shall not be any overlapping text;
- No periods shall be used at the ends of standard abbreviations;
- Labeling for roadway centrelines, abutment and pier bearing centerlines, control lines and etc., shall be consistent throughout the entire drawing set.

E.2.2 General Layout Sheet

The intent of the “General Layout” sheet is to provide an accurate representation of the bridge structure after construction. It typically includes an overall plan, an elevation of the bridge, a section of the bridge, and a drawing index. The plan and elevation are to be centred vertically with respect to each other and shall be in the same scale. If there is not sufficient room for all of these components on the sheet, the bridge section may be moved to “Information - Sheet 1” sheet.

The main components of the “General Layout” sheet are as follows:

General Comments:

- Make sure the Plan view and Elevation view are aligned vertically on the drawing. The elevation shall be a projection taken along the control line;
- The superstructure span lengths and the corrected girder lengths shall be dimensioned and noted as per the “Bridge Structures Design Criteria”.
- For the “General Layout” sheet and the “Information Sheets”, all dimensions shall be provided in metres and unless noted otherwise in these checklists shall be shown accurate to the third decimal point.

Plan:

- The Plan orientation shall be such that the North arrow is orientated towards the top or to the right of the sheet;
- Include roadway information for all roadways in the vicinity of the bridge, including ramps;
- For over-passing roadway:
  - Show and label initial stage roadway information including the centreline roadway control line (often the centreline roadway), centreline roadway lanes and roadway station markers (typically at 20 m spacing);
Major Bridge Drawing Checklist

- Show and label roadway lanes and provide directional arrows;
- Show and label bridge barrier;
- Label the clear roadway width, lane widths, shoulder widths and barrier/median/sidewalk widths.

☐ For under-passing roadway(s):
  - Show and label initial stage roadway information including the centreline roadway control line (often the centreline roadway or centreline of median), centreline roadway lanes and roadway station markers (typically at 20 m spacing);
  - Show and label roadway lanes and provide directional arrows;
  - Show initial stage roadway shoulders and swale;
  - If applicable, show and label critical horizontal clear zone dimensions;
  - If applicable, show dimension from median control line to centreline travel lanes;

☐ For interchanges, ensure that the Intersection Equation is completed and noted on the plan;

☐ Show and label work points (eg. WP1, WP2, etc.);

☐ At ends of the bridge, show the dimension(s) from the over-passing roadway control line to the top of the sideslopes. The top-of-fill width is the outside of bridge structure to outside of bridge structure width plus at least 2.0 m (1.0 m on each side). This same fill width shall be maintained away from the bridge ends until it can be transitioned to the width required for the approach roadway. This transition may not occur within the limits shown on the bridge plans (due to space constraints) and shall then be coordinated with the roadway plans;

☐ The width of the fill required at the end of the wingwall shall be continued down the slope, alongside and parallel to the bridge wingwalls and abutment seats, and shall tie in with the headslope protection;

☐ Show the appropriate headslope and sideslope configuration, as per the site specific Design Data Information. Unless geotechnical considerations dictate otherwise, the standard headslope is 2:1 and the standard sideslope is 3:1. Corner transitions between the bridge headslopes and the sideslopes shall use an elliptical curve at the elevation of the toe of the headslope;

☐ Label centreline abutment bearing abutment and centreline pier(s). Abutment and pier numbering increases in the direction of increasing chainage;

☐ Show drain troughs and trough terminals; refer to sheet with specific drain trough information; and indicate estimated length of each drain trough;

☐ Indicate location of the bridge plaque(s) and refer to sheet with specific bridge plaque information. Bridge plaques are to be placed on the right hand side of the first abutment encountered in direction of travel. Bridges carrying one way traffic require only one bridge plaque;

☐ Show and label the Bench Mark Tablet. All major bridges require the installation of a benchmark tablet. Each tablet is assigned a unique reference number obtained from the Department’s Survey/Imagery coordinator. The location of the tablet shall typically be in accordance with S-1478. The unique reference number should be included on the Tender Drawings and the as constructed elevation shall be provided when preparing the Record Drawings;

☐ Show and label the type of bridge barrier and approach rail transition complete with reference to the appropriate standard drawings; refer to the appropriate roadway drawings for the approach rail tie-ins;

☐ Show and label approximate location of the toe of slopes;

☐ Show and label the approximate locations of any existing or future utilities or culverts located near the bridge structure;
Major Bridge Drawing Checklist

☐ Rip rap (water crossings) shall be shown in accordance with the standard details found in the “Bridge Conceptual Design Guidelines”;

☐ Show and label the Clearance Sign(s) and refer to sheet with specific clearance sign information;

☐ The bridge skew angle shall be shown at the abutments and at the piers;

☐ Include the “A-Section” mark symbol for the bridge section (this should be facing up chainage);

☐ Show and label the edge of slope protection at each abutment and provide dimensions;

☐ Roadway layout stations shall be shown accurate to the nearest 10 metre. This does not include reference to roadway stations for specific bridge components, which shall be shown accurate to the third decimal point.

☐ Lane widths shall be shown accurate to the first decimal point.

Elevation:

☐ Show elevation marker lines along each side and roadway/streambed station marker lines along the bottom;

☐ Show and label the appropriate headslope configuration, as per the design data.
  ○ Standard department hatching shall be used to denote cut and fill;
  ○ For river bridges, show and label rip rap as required, in accordance with the standard details found in the “Bridge Conceptual Design Guidelines”;
  ○ For grade separation bridges, show and label the concrete headslope protection, in accordance with standard drawing S-1409. Elevation and station of toe of slope at centreline control line shall be labeled.

☐ Show and label the existing SOD lines, typically provided along the centerline of the overpassing roadway control line, 20 m right of the overpassing road control line and 20 m left of the overpassing road control line;

☐ For under-passing roadway:
  ○ Label the centreline median control line and centreline travel lanes for the underpassing roadway;
  ○ Show and label the initial stage roadway geometry including lanes, shoulders, gores, ramps and swale;
  ○ Label roadway lanes, shoulders, gores, ramps and swale for all future stages;
  ○ If applicable, show and label critical horizontal clear zone dimensions;
  ○ If applicable, show dimension from median control line to centreline travel lanes;

☐ Label centreline abutment bearing abutment and centreline pier(s);

☐ Label the bridge span lengths. Include the Department standard note explaining the difference between span length dimensions and stations. See “Bridge Structures Design Criteria” for further information on this.

☐ Label the abutment and pier stationing and elevation data, measured at the centreline control line and to the top of finished roadway surface. Text for this information shall be orientated vertically;

☐ Label the over-passing roadway gradeline slope. If the gradeline is variable, provide the gradeline information at each abutment. This shall be expressed as a percentage;
At both ends of the bridge, show and label the top of fill line where the theoretical headslope intersects the top of centerline finished roadway. This shall be labeled with "Top of CL Finished Rdwy" and shall include the associated station and elevation of this point;

Label bearing fixity at each abutment and pier (ie. FXD or EXP);

Show piles and label pile types, sizes and approximate pile tip elevations to the nearest half metre;

If applicable, show and label any barriers required on the underpassing roadway;

Show and label the approximate locations of any existing or future utilities or culverts located near the bridge structure;

Show the bridge rail and approach rail transition;

Show the vertical clearance sign at the actual locations where the vertical clearances govern and refer to sheet with specific clearance sign information. Only one vertical clearance sign shall be shown for each direction of travel. Theoretical clearances shall be shown for the initial stage and all future stages as necessary;

Show configuration of MSE walls (if applicable);

Show arrow and label the direction of overpassing roadway (typically show east / west or north / south);

Show and label any drain trough that would be visible in this view;

Lane widths shall be shown to the first decimal point.

Elevations for specific bridge components shall be shown to the third decimal point. With the exception of approximate pile tip elevations which shall be shown to the first decimal point.

**Bridge Section:**

The bridge section should be cut towards the middle of the bridge length. Where the bridge includes a pier, the pier should be shown. For single span bridges, show abutment;

The bridge section orientation shall match the direction of the section mark on the plan;

Label the centreline roadway control line;

Label the out-to-out bridge deck width;

Label the clear roadway widths (dimension from control line to face of barriers or curbs), and where applicable the median and the sidewalk widths;

Label the barrier widths;

Label the deck crossfall slope(s);

Show and label the deck waterproofing system type and thickness;

Show and label the deck type and thickness;

Show and label the barrier type(s);

Show and label the number, type and depth of girder (show the bearings and the girder bracing system, but no need to label);

Show and label the type of pier cap or abutment seat;

Show and label the type of pier shaft/column (as required);

Show and label the type of pier pile cap (as required);
Major Bridge Drawing Checklist

- Show and label the approximate ground line or streambed;
- Show and label the type and size of pier piles;

Drawing Index:

- Use standard drawing index table format;
- Locate drawing index in bottom right-hand corner of the drawing;
- If there is insufficient room on the General Layout, a Title Sheet may be used. See section 2.4.1.1;
- List all drawings included in the drawing set;
- Organize from the bottom up (i.e. sheet 1 is shown at the bottom and successive sheets listed upward);
- Include all standard drawings which are referenced in the drawing set. Standard drawings shall be included at the end of the drawing package, so should appear at the top of the drawing list.

E.2.3 Information Sheets

The “Information” sheets typically include the detailed roadway and stream information, site location information, site survey information notes, general notes and geotechnical information.

Typically, the site, roadway, and stream information is shown on “Information - Sheet 1” and the geotechnical information is shown on “Information - Sheet 2”. Occasionally, additional “Information” sheets may be required to present all of the site, roadway, and stream information. In this situation, the “Site Plan”, “Site Map”, “Survey Information”, “General Notes” and “Quantity Table” shall always be shown on the “Information - Sheet 1” and the roadway/stream profiles may be shown on subsequent “Information” sheets.

The geotechnical information shall always be shown on the last “Information” sheet in the set. The key geotechnical design parameters used in foundation design shall also be shown on this information sheet to.

Information - Sheet 1

Site Plan:

- Show the overall plan of the bridge site, without the bridge structure.
- The Plan orientation shall be such that the North arrow is orientated towards the top or to the right of the sheet; Show the North arrow;
- Include roadway information for all roadways in the vicinity of the bridge, including ramps;
- For over-passing roadway:
  - Show the initial stage approach roadway;
  - Show and label the roadway curve & spiral information (if applicable);
  - Show the headslopes and sideslopes. Label the fill toes lines as “Edge of Fill”;
  - Show and label the roadway control line (often the centreline roadway) and the roadway station markers (typically at 20 m spacing);
  - Show and label the top of fill width;
For under-passing roadway(s):
  o  Show and label initial stage roadway information including the centreline roadway control line (often the centreline roadway or centreline of median), centreline roadway lanes and roadway station markers (typically at 20 m spacing);
  o  Show and label the roadway curve & spiral information (if applicable);
  o  Show the roadway sideslopes;
  o  Show and label roadway lanes and provide directional arrows;
  o  Show initial stage roadway shoulders and swale;

For stream:
  o  Show the stream bank topographical information (contours);
  o  Show and label “Top of Bank”, “Bottom of Bank” and “Approx. Edge of Water (with month and year measured)”;
  o  Show and label stream name and show an arrow indicating direction of stream flow;
  o  Show and label the skew of stream flow to the centreline of the overpassing roadway control line;

Show and label the approximate locations of any existing or future utilities or culverts located near the bridge structure;

Show and label geotechnical test hole locations;

Provide the Intersection Equation to coordinate the overpassing roadway chainage with the underpassing roadway chainage;

Show and label site drainage using arrows to provide general impression of how drainage around bridge is dealt with;

Show and label legal land locations in the vicinity of the bridge;

Show and label existing right of way;

Show and label utilities, drainage culverts, fences, existing structures, and etc.;

Show and label existing bridge structure and roadway using light line weight;

If retaining walls are being used to shorten the headslopes or sideslopes, show the footprint of the retaining wall.

Quantity Estimate Table:

This table is essentially a summary of all of the quantity tables included in the drawing set;

Use standard quantity estimate table format;

The table shall include columns for substructure quantities, superstructure quantities, total estimated quantities and as constructed quantities. The “Estimate” quantities shall be completed for the Tender Drawings. These should match exactly the quantities provided in the tender bid items. The “As constructed” quantities are left empty until preparation of the Record Drawings;

Locate table in the bottom left-hand corner of the drawing.
Site Map:

- Provide a site map showing the Bridge File and the location of the bridge structure;
- Locate site map in the top right-hand corner of the drawing.

Survey Information:

- Provide site survey information notes as per the standard bridge notes and modify as required;
- Locate site survey information notes directly below the site map.

General Notes:

- Provide general notes as per the standard bridge notes and modify as required;
- The general notes apply to the entire bridge drawing set;
- Locate general notes directly below the site survey information notes.

Overpassing Roadway Profile:

- Provide a grid with 1 m intervals for the vertical gridlines representing elevation (label every 5 or 10 m) and with 100 m (typical) intervals for the horizontal gridlines representing roadway stations (label every 500 m);
- Show and label the existing SOD lines, typically provided along the centerline of the overpassing road control line, 20 m right of the overpassing road control line and 20 m left of the overpassing road control line;
- Show the bridge headslope lines and label the stations and elevations where the headslopes intersect the gradeline (top of fill). Text for this information shall be orientated vertically;
- Show and label the overpassing roadway profile, measured at the centreline control line and to the top of finished pavement (typically labeled “CL Finished Pavement”);
- Show and label all roadway profile information including gradeline slopes; and curve data such as the stations and elevations for the beginning and end of vertical curve (BVC and EVC), length of curve (L), rate of curvature (K) and point of intersection (PI). Text for this information shall be orientated vertically;
- Show and label centreline control line of the underpassing roadway (where applicable).

Underpassing Roadway:

- Provide a grid with 1 m intervals for the vertical gridlines representing elevation (label every 5 or 10 m) and with 500 m (typical) intervals for the horizontal gridlines representing roadway stations (label every 500 m);
- Show and label the existing SOD lines, typically provided along the centerline of the underpassing road control line, 20 m right of the underpassing road control line and 20 m left of the underpassing road control line;
- Show and label the underpassing roadway profile(s), measured at the centreline control line and to the top of finished pavement. If the underpassing roadway network includes multiple independent roads (i.e.,
for divided highways or ramp lanes), show and label roadway profiles for each independent road. This may require an additional separate profile view for the independent roads;

- Show and label all roadway profile information including gradeline slopes; and curve data such as the stations and elevations for the beginning and end of vertical curve (BVC and EVC), length of curve (L), rate of curvature (K) and point of intersection (PI). Text for this information shall be orientated vertically;

- If the underpassing roadway(s) is existing, it is recommended to provide the underpassing roadway elevation at each edge of the bridge and an average slope for the roadway. This information facilitates vertical clearance checking;

- Show and label centreline control line of the overpassing roadway and the centreline of any other nearby overpassing roadways (existing or new).

**Streambed Profile:**

- Provide a grid with 1 m intervals for the vertical gridlines representing elevation (label every 5 or 10 m) and with 50 m (typical) intervals for the horizontal gridlines representing roadway stations (label every 50 m);

- Show and label the existing SOD lines, typically provided along the streambed thalweg, 20 m right of the underpassing road control line and 20 m left of the underpassing road control line;

- Show with an arrow and label the average streambed slope;

- Show and label the water elevation as measured on the date of the stream survey. Include the date of the survey;

- Show and label centreline control line of the overpassing roadway and the centreline of any other nearby overpassing roadways (existing or new).

**Information - Sheet 2**

**Test Holes:**

This is typically shown as an elevation view of the bridge with test hole information shown.

- Show elevation marker lines along each side and roadway/streambed station marker lines along the bottom;

- Show and label the overpassing roadway profile, measured at the centreline control line and to the top of finished pavement (typically labeled “CL Finished Roadway”);

- Show arrow and label the direction of traffic on the overpassing roadway (typically show east / west or north / south);

- Show the bridge headslope lines and label slope. Show and label the top-of-fill locations where the headslopes intersect the gradeline. Label as “Top of CL Finished Rdwy” and include stations and elevations for top-of-fill locations;

- Label the out-to-out dimension of the bridge opening. This is defined as the length from top-of-fill to top-of-fill;
For a river crossing:
  o Show and label the existing SOD lines, typically provided along the streambed thalweg, 20 m right of the underpassing road control line and 20 m left of the underpassing road control line;

For an under-passing roadway:
  o Show the initial stage roadway geometry including lanes, shoulders, gores, ramps and swale;
  o Label the centreline median control line and centreline travel lanes for the underpassing roadway;

Show piles (spreadfooting) and approximate pile tip (spreadfooting bottom) elevations to the nearest half metre;

Show and label any geotechnical modifications to the headslope (ie. gravel toe, soil reinforcing, and etc.);

Show an outline of geotechnical test hole at the correct station and elevation. Label with test hole number and include station, offset distance from centerline, coordinates if known, overpassing roadway control line, elevation to top of test hole, and date of test hole data collection;

Show detailed geotechnical test hole information (ie. blow counts, detailed description of soil, etc.). Often, there is not sufficient room to provide all of the detailed test hole information on the bridge elevation. If this is the case, the detailed test hole information should be shown below the actual test hole location. Geotechnical test hole logs shall be presented as per the Department's customized test hole database template which is available upon request.

Provide standard geotechnical notes as per the standard bridge notes and modify as required;

Show and label headslope riprap as applicable for rivers.

Soil Parameters

Show all the key geotechnical parameters that the bridge foundation design is based on.

E.2.4 Abutment Sheets

The “Abutment” sheets typically include all of the abutment information including abutment piles, seats, backwalls/diaphragms (for full and semi integral abutments), wingwalls, gradebeams, roofslabs, approach slabs, barriers, drain trough inlets, abutment notes, and abutment quantity table. Typically, approach rail transitions, drain troughs, and deck joints will be shown schematically on the abutment sheets but will be detailed on other drawings.

For simpler bridges, the abutment information can usually be presented on three sheets and the geometry and reinforcing steel details can be combined. More abutment sheets may be added as required for more complex abutments (different abutment heights, wide abutments, high skews, curved, with sidewalks etc.). However, the same general layout principles shall be maintained except that geometry and reinforcing steel requirements should be separated to avoid clutter and confusion.

If both abutments are the same or similar only one of the abutments needs to be drawn and double dimensioning can be used to differentiate any differences in geometry. In this case a note should be provided in
the detail title indicating which abutment is shown and that the other abutment is opposite/similar. If both abutments are significantly different both abutments should be detailed separately.

**Abutments - Sheet 1**

Typically consists of an abutment plan complete with approach/roof slab(s) and front elevation providing abutment dimensions and abutment piling layout, a quantity estimate table for both abutments, and any notes specific to abutments. A table providing the elevation to the top of grout pad (conventional and semi integral abutments) or top of concrete plinth (full integral abutments) shall also be provided.

**General:**

- The abutment plan view and abutment elevation view are to be aligned vertically on the sheet and drawn to the same scale;
- Notes are to be located in the top right corner of the sheet with the quantity estimate table and the elevation top of grout pad/plinth table below.

**Abutment Plan:**

- The abutment plan shall be oriented such that the wingwalls are aligned vertically on the page. In the case of flared bridge ends the one wingwall that is not flaring should be aligned vertically;
- In cases where only one abutment needs to be drawn it should be the one located in the direction of increasing chainage. In most cases this will be abutment 2;
- Show North arrow

- For conventional abutments:
  - Show and label abutment with girders and deck removed for clarity;
  - Show and label grout pads, anchor rod cans and pile layout. If pile layout is complex, consider showing the pile layout separately;
  - Grout pad designation to match girder line numbers. Follow BIM numbering convention (Girder numbering increases to north or east);
  - Label curtain wall length(s) and thickness;
  - Show and label shear block;

- For fully or semi integral abutments:
  - Show and label abutment with diaphragm, girders and deck;
  - Show and label grout pads/plinths;
  - Label girder line numbers. Follow BIM girder numbering convention (Girder numbering increases to north or east);
  - Show and label shear block (as applicable);

- Show and label the abutment bearing centreline and the roadway control line. Also show and label the centreline abutment if different than the roadway control line;
- Show and label work points (eg. WP1, WP2, etc.);
- Label the clear roadway width, inside face of barrier to control line on each side of control line, and outside face of barrier to outside face of barrier;
Major Bridge Drawing Checklist

- Label abutment seat dimensions;
- Label wingwall wall length(s) and thickness;
- Label fillets between wingwalls and abutment/gradebeam. Fillets to extend to the underside of roof slabs but short of the underside of approach slabs;
- Label barrier widths;
- Label approach slab lengths. For jobs with simpler geometry provide reinforcing steel for slab in combination with dimensions;
- Label roof slab and gradebeam dimensions (as applicable). For jobs with simpler geometry provide reinforcing for roof slab in combination with dimensions;
- Show and label perforated drain pipe(s) behind abutment seat, grade beam (as applicable), and at sleeper slab (as applicable);
- Show and label utility duct routing through wingwall to duct termination points;
- Show and label the bridge barrier anchorage post assemblies and the approach transition barrier posts. Show dimensions for locating the bridge barrier anchorage post assemblies and reference applicable standard drawing for anchorage detail;
- Schematically show and label the location of all drain trough inlets (where applicable). Specific details are to be located on a separate referenced sheet (typically the “Miscellaneous” sheet);
- Label the joint types for the approach slab and roof slabs. (See drawings S-1411 and S-1443);
- Show and label locations of wick drain tubes as applicable;
- Show and label MSE wall in front of abutment seat (as applicable).

**Abutment Elevation:**

- For conventional abutments, show front elevation of abutment seat, piles, grout pads, anchor rod cans, shear blocks, backwall, curtain walls, wing walls, and barriers on wingwalls. Leave the girders and deck off for clarity;
- For fully and semi integral abutments, show front elevation of abutment seat, piles, casing (as applicable), diaphragm with girders, anchor rod cans (as applicable), shear block (as applicable), wingwalls, deck and barriers on deck;
- For projects with simpler geometry provide reinforcing for abutment seat and around piles;
- Label the elevation of the underside of abutment seat;
- Label height of abutment seat at exterior face and at control line;
- Label height of backwall (conventional abutment)/diaphragm (integral abutments);
- Label concrete curb/barrier height on fascia side and overall height of abutment from underside of seat to top of concrete curb/barrier as measured at centerline of abutment. Include note indicating that these dimensions may vary due to variations in girder camber;
- Show and label pile layout information;
- Show and label pile projection into abutment seat;
- Label deck cross fall/superelevation (integral bridges);
Show and label the control line;
Show grout pad/plinth locations;
Show and label shear block (as applicable);
Show and label the clear roadway width, inside face of barrier to control line on each side of control line, and outside face of barrier to outside face of barrier;
Show and label location of access hatch as applicable;
Specify thickness of curtain walls as applicable.

Abutment Notes:

Abutment notes shall be on the top right hand side of the sheet and shall include all standard abutment notes as shown in Appendix F. Notes provided here shall be specific to the abutment only.

Quantity Estimate Table:

Use standard quantity estimate table format;
Quantities listed in the table shall represent both abutments. The quantity calculations for the abutment should be coordinated carefully with the deck quantities, particularly for integral bridges;
The following quantities may be included:
  - Wearing surface – Two Course Hot Mix Asphalactic Concrete Pavement, measured in tonnes;
  - Waterproofing Membrane, measured in square meters;
  - Each concrete class used (Class C, Class Pile, Class HPC, etc.) and be measured in cubic metres.
  - Steel Piling: Each type of pile and pile size shall be listed separately (either H-piles or pipe piles). A quantity shall be provided for “Supply and Drive” and measured metres. Another quantity shall be provided for “Set-up” and measured in number of piles.
The “Estimate” quantities shall be completed for the Tender Drawings. These should match exactly the quantities provided in the tender bid items. The “As constructed” quantities are left empty until preparation of the Record Drawings.

Elevation Top of Grout Pad/Plinth Table:

Table shall provide the top of grout pad or plinth for each girder location for each abutment to the nearest 3rd decimal place (i.e. to the mm);
Any assumptions that were made during the design in calculating of the top of grout pad elevations should be clearly stated (eg. bearing thickness, girder haunch height, etc.).

Abutments - Sheet 2

The “Abutments - Sheet 2” drawing typically contains a section of the abutment and an elevation of the wingwall. For projects where wingwall geometries are similar at both abutments, a single wingwall can be drawn with double dimensions to capture the geometries of both walls and the geometry and reinforcing requirements can be combined on the same elevation. In cases where the wingwalls are sufficiently different such that they cannot
be appropriately represented with a single elevation, an additional elevation shall be provided. This sheet also typically includes various sections and details related to the wingwalls.

**Abutment Section:**

- **For conventional abutment bridges:**
  - Show and label abutment seat. Provide all reinforcing details including reinforcing around embedded steel piles and dowels from concrete piles;
  - Show and label grout pad and anchor rod cans;
  - Show and label backwall, roof slab (as applicable), approach slab, and grade beam and associated piling (as applicable). Provide reinforcing details for all slabs including dowels between slabs and backwall/gradbeam;
  - Locate cold joint between roof/approach slab and deck joint blockout beyond paving lip;
  - Do not show girders and deck;

- **For fully and semi integral abutment bridges:**
  - Show and label girder, deck, and cast in place concrete diaphragm and provide all reinforcing details;
  - Show and label construction joint between the deck pour and the diaphragm pour;
  - Show and label temporary girder support (plinth) and provide reinforcing details (fully integral abutments);
  - Show and label bearings and anchor rod cans (as applicable) (semi integral abutments);
  - Show and label abutment seat, approach slab, and sleeper slab (as applicable). Provide all reinforcing details;
  - Show and label casing (as applicable), and casing cap (as applicable);
  - Label fillet size between deck and cast in place diaphragm and provide reinforcing details;

- When providing reinforcing details for integral abutments, multiple sections showing details at and between piles and girders may be required to provide sufficient detail and clarity;

- Label centerline of bearing with a line extending beyond the upper and lower extents of the abutment;

- Label abutment seat and diaphragm/backwall height as measured along centerline of the abutment;

- Label abutment seat width on each side of the centerline of bearing;

- Label approach slab support corbel dimensions;

- Show and label the headslope fill line and backfill under slabs and behind abutment;

- Show and label concrete slope protection c/w bench;

- Show and label depth of embedment for abutment seat below finished grade;

- Show and label extent of sheet drain located on back of diaphragm/backwall;

- Show and label perforated drain pipe behind abutment seat and show daylighting detail through headslope. Drain pipe to have galvanized screen cover at intersection of headslope;

- Show and label abutment seat piles and provide dimensions to centerline of pile row(s). Dimension(s) to be referenced from centerline bearing;

- Label typical concrete joint types. Refer to S-1411 and S-1443;
Show and label rock riprap or concrete slope protection as applicable. See S-1409 for standard slope protection details;

Show deck waterproofing system:
  - For conventional abutments show deck waterproofing system continuous from start of roof slab (as applicable) to end of approach slab;
  - For integral abutments deck waterproofing is continuous from deck to end of approach slab;

Label and dimension perforated drain and granular drainage trench under sleeper slab (as applicable);

Label and show construction joint between abutment seat and backwall. Preference is for 150 above top of seat;

Show and label deck joint block out overhang distance beyond backwall and associated thickness;

Show and label reinforcing for backwall. Reinforcing around backwall access hatch to be provided on a separate detail;

Show and label dowels at diaphragm to deck interface (integral abutment) and approach slab support corbel. Dowel between approach slab and corbel should be placed at the centre of approach slab bearing to reduce stresses in the bar due to approach slab movement;

Show and label MSE wall and safety rail schematically as applicable. Show and label walkway width, rail height, and clear height from underside of girder to top of walkway. Use the MSE wall drawings to provide the remaining detailed information for the retaining wall and other associated components.

Wingwall Elevation:

- Show wingwall dimensions and location of utility duct and junction box(s);
- Show and label the headslope fill line;
- Show and label the amount of wingwall embedment below and beyond finished grade;
- Show and label all reinforcing steel located within the wing walls;
- Show and label bridgerrail post anchorage locations and indicate additional reinforcing requirements at these locations;
- Show and label bridge plaque on appropriate wingwall;
- Show and label any formed aesthetic treatments (eg. logos, patterns, etc.).

Sections and Details:

- Show and label anchor rod and anchor rod cans details (as applicable);
- Show and label wingwall section including transition between barrier and wingwall widths. Provide reinforcing detail between wingwall and barrier and additional reinforcing requirements at bridgerrail posts;
- Show and label any geometry changes in the bridge barrier at the end of the wingwall. For example concrete curbs used with the double tube bridgerrail have a chamfered end to alleviate wheel snag;
- Show and label details between roof (as applicable)/approach slab and wingwall including all reinforcing steel. Approach slabs are not to be attached to the wingwall;
Show and label cleat reinforcing requirements between wingwall and abutment and wingwall and gradebeam (as applicable);

**Abutments - Sheet 3**

“Abutments - Sheet 3” is typically reserved for any remaining abutment details not covered or that would not fit on the previous two sheets;

**Bridge Plaque:**

- Show and label bridge plaque details. Refer to standard drawings S-1477;
- Provide construction completion date, roadway or stream name, bridge file number, and structure number. The construction date on the Tender Drawings shall be shown as “20XX” and shall be updated to the actual date of construction completion when preparing the Record Drawings.

**Miscellaneous Sections and Details:**

- Provide backwall reinforcing details around access opening (as applicable) along with access hatch details;
- Provide details of approach slab geometry around the end of the wingwall including location of the adjacent approach rail transition posts and any drainage curbs at drain trough inlets (as applicable). Do not detail drain troughs on this sheet;
- Provide any utility duct junction box details including dimensions, hardware for connecting the utility duct, cover plate, and material requirements;
- Provide any remaining abutment related details and sections;

**E.2.5 Retaining Wall Sheets**

Typically earth retaining walls are built as MSE walls or cast-in-place concrete walls supported on pile foundation/footing. The “Retaining Wall” sheets include all the information about plan location, elevations, and change in wall height, foundation details, drainage details, wall facing panels, ground preparation requirements, backfill and soil reinforcement details and geotechnical requirements. For most large walls, the overall plan of the wall is shown on sheet 1 and the elevation is shown on sheet 2. For smaller walls, the plan and elevations may be combined.

**Retaining Walls – Sheet 1**

The “Retaining Walls - Sheet 1” is intended to show the location and extent of retaining walls with respect to roadway and bridge.

**Plan:**

- The Plan orientation shall be such that the North arrow is orientated towards the top or to the right of the sheet;
Show and label existing bridge structure and roadway using light line weight;
Include roadway information for all roadways in the vicinity of the retaining walls, including ramps;
Show and label the roadway centreline(s) and/or control lines;
Show fill slopes and transitions;
Show extent of geotechnical ground improvements (if required). For example, preloading, excavation, wick-drain installation, etc.;
Show and label geotechnical test hole locations;
Show and label site drainage using arrows to provide general impression of how drainage around the retaining wall is dealt with and how the drainage is tied into the overall site drainage;
Show and label the approximate locations of any existing or future utilities or culverts located near the retaining wall;
Show the retaining walls, including coping/swale and wall foundation (ie. footing for MSE walls and pile caps and piles for cast-in-place concrete walls);
Provide dimensions (stations, offsets or work points) at all locations as required to define the plan extents of the retaining walls and associated foundations. If the wall is sufficiently complex, a table may be required to define work point northings, eastings and elevations;
If it is expected that there might be load transfer to the retaining walls (ie. from bridge structure or from barrier slab) show a schematic diagram with loads and how they will be transferred to the retaining wall.

Retaining Wall Notes:

Retaining all notes shall be on the right hand side of the sheet and shall be specific to the retaining wall and associated foundation. Notes provided here shall include applicable design, material and construction requirements.

Quantity Estimate Table:

Use standard quantity estimate table format;
Quantities listed in the table shall represent all retaining wall and associated foundations;
The following quantities may be included:
  o Each concrete class used (Class C, Class Pile, Class HPC, etc.) and be measured in cubic metres.
  o Barrier safety rail, measured in metres;
  o Steel Piling: Each type of pile and pile size shall be listed separately (either H-piles or pipe piles). A quantity shall be provided for “Supply and Drive” and measured metres. Another quantity shall be provided for “Set-up” and measured in number of piles.

The “Estimate” quantities shall be completed for the Tender Drawings. These should match exactly the quantities provided in the tender bid items. The “As constructed” quantities are left empty until preparation of the Record Drawings.
Retaining Walls – Sheet 2

The “Retaining Walls – Sheet 2” is intended to show the elevation view of the walls. An elevation shall be shown for each separate retaining wall. If the walls are sufficiently large or complex an additional sheet may be required.

Elevation:

- Show bridge cross-section with the wall elevation;
- Provide dimensions (stations, elevations, work points, etc.) at all locations as required to define the elevation of the retaining walls and the associated foundations. Ensure the work point designations are consistent with what is shown on the retaining wall plan.
- Show foundation information, including dimensions and elevations;
- Show drainage details;
- Show elevation and information regarding any geotechnical ground improvements;
- For CIP walls mark location of construction joint if required along the length of the wall.
- For MSE walls, show precast facing panels and the coping;
- Show any aesthetic finishes on the wall faces;
- Show barrier safety rail (if required);
- Show location of MSE wall inspection wires (if required).

Retaining Walls - Sheet 3

The “Retaining Wall – Sheet 3” is intended to include relevant sections and details of the retaining walls, backfill and reinforcement, drainage, foundations, swale, coping, barrier safety rail, slope protection, etc.

Sections and Details

- Provide an overall section through the retaining wall. If the retaining wall is in close proximity to the abutment seat, show the section with the abutment seat and piles. If the overall wall section varies significantly along the length (eg. a different barrier system, different backfill requirements, different drainage requirements, etc.) provide additional overall sections as required to sufficiently convey the information.
  - Show wall geometry;
  - Show the extents of the bridge abutment and piles behind the MSE wall;
  - Show all drainage details (swales, pipe locations, geomembranes, etc.);
  - Where applicable, show barrier safety rail;
  - Show fill lines (above and below the retaining wall);
  - Show concrete slope protection as required (above and below the retaining wall);
  - Show backfill requirements;
  - Where applicable, show the geotechnical ground improvement information;
For MSE walls, show wall coping, precast concrete panels, levelling pad, reinforced earth strips. Clearly specify which components of the retaining wall are to be designed and detailed by the MSE wall supplier.

For cast-in-place concrete walls, show reinforcement details of the wall and foundation (footing, piles, etc.). Label all concrete dimensions, reinforcing bars, provide lap dimensions and required length of dowels projecting above the footing/pile caps to the wall stem.

- Provide a detail showing the top of the wall. This detail should show specific design information for the top of wall (coping) reinforcing, drainage (swale), backfill, and the barrier safety rail. If the retaining wall is in close proximity to the abutment seat, show the detail at the abutment. If the top of wall detail varies significantly along the length (eg. a different barrier system, different backfill requirements, different drainage requirements, etc.) provide additional details as required to sufficiently convey the information.

- Provide details for the barrier safety rail, including post spacing requirements, location and spacing requirements of rail expansion. Provide anchorage detail between base of rail post and the coping. If this information can be adequately described on the wall elevations, sections and details, then no additional details are required.

- Provide a detail at the base of the retaining wall showing foundation information, leveling pads, and drainage details.

- Provide details showing the concrete slope protection (above and/or below the retaining wall).

- Show other miscellaneous details as required for a given bridge. These might include department standard details (crack control joint detail for the coping, construction joint detail for cast-in-place walls, chamfer detail, etc.).

## E.2.6 Pier Sheets

The “Pier” sheets typically include all information required to construct the piers and pier foundations. For simple piers, generally those without a pile cap where the columns/piles extend to the underside of the pier cap, only a single sheet is required. More complex piers generally require two sheets: the first dealing primarily with geometry and the second dealing primarily with reinforcing. Checklists are provided for both cases.

### Piers (when only one drawing is required):

#### Pier Plan:

The pier plan shall be an accurate representation of the geometry of the pier cap and columns/piles. The following information shall be included:

- The pier plan shall be oriented such that the pier cap is horizontal on the page;
- Show North arrow;
- Show and label the pier centreline and the roadway control line;
- Show and label the skew angle of pier with respect to the control line;
- Show and label work points (eg. WP1, WP2, etc.);
Major Bridge Drawing Checklist

☐ For conventional pier:
  - Show and label pier with girders and deck removed for clarity;
  - Show and label grout pads and anchor rod cans;
  - Grout pad designation to match girder line numbers. Follow BIM numbering convention (Girder numbering increases to north or east);
  - Show and label shear block;

☐ For fully integral piers (where pier cap is cast integral with girder diaphragm):
  - Show and label pier with diaphragm, girders and deck;
  - Show and label grout pads/plinths;
  - Label girder line numbers. Follow BIM girder numbering convention (Girder numbering increases to north or east);

☐ Label pier dimensions relative to the control lines;
☐ Show and label piles, spacing and dimensions relative to the control lines;
☐ Show and label pier cap drip sheets;
☐ Show and label utility duct routing through columns or pier cap, if applicable;
☐ The scale of the plan drawing shall be the same as the scale of the pier elevation.

Pier Elevation:

The pier elevation shall be an accurate representation of the geometry of the pier cap and columns/piles and shall show the general layout of the reinforcing in the pier cap and columns/piles. The following information shall be included:

☐ Show and label the control line;
☐ Show and label the pier centreline and the roadway control line;
☐ For conventional pier:
  - Show front elevation of pier cap and columns/piles;
  - Show grout pads and anchor rod cans;
  - Show shear blocks;
  - Leave the girders and deck off for clarity.
☐ For fully integral piers (where pier cap is cast integral with girder diaphragm):
  - Show front elevation of pier cap and columns/piles;
  - Show temporary girder bearings and plinths;
  - Show diaphragm with girders and deck.
☐ Show and label pier cap and column/pile geometry and reinforcing;
☐ Show and label the elevation of critical points on the top of the pier shall be shown (may reference to a table directly below the pier elevation);
☐ Label the elevation of the underside of pier cap;
☐ Show and label column/pile projection into pier cap;
☐ Show and label approximate pile tip elevations;
Major Bridge Drawing Checklist

☐ Show and label approximate streambed elevation and direction of stream flow (for river bridges);
☐ Show final grading of the fill over the pile cap and label fill cover requirements (for overpasses);
☐ Show and label pile bracing;
☐ Indicate in which direction the elevation view is looking, which pier is shown, and that other piers are similar;
☐ The scale shall be the same as the scale of the pier plan;
☐ Show and label any formed aesthetic treatments (eg. logos, patterns, etc.).

Sections:

Typically, a pier cap section and a column/pile section are provided. Sections of other elements may be shown as required. The following information shall be included:

☐ Show and label configuration and spacing of longitudinal and transverse reinforcing;
☐ Show and label projection length of column/pile and reinforcing into the pier cap;
☐ Show and label the wash slope of the top of the pier cap;
☐ For conventional piers:
  o Show and label grout pads and anchor rod cans;
  o Show shear blocks (if applicable);
  o Leave the girders and deck off for clarity.
☐ For fully integral piers (where pier cap is cast integral with girder diaphragm):
  o Show temporary girder bearings and plinths;
  o Show diaphragm with girders and deck.

Details:

☐ Details showing the geometry and welding requirements for the pile bracing are typically shown
☐ Other possible details include: anchor rod details, pier cap end details, reinforcing details, etc.

Pier Notes and Pier Pile Notes:

☐ Provide Pier Notes and Pier Pile Notes as per the standard bridge notes and modify as required;
☐ Locate notes at the top right hand corner of the sheet

Quantity Estimate Table:

☐ Use standard quantity estimate table format;
☐ Quantities listed in the table shall represent the quantities for all piers;
☐ The following quantities may be included:
  o Each concrete class used (Class C, Class Pile, etc.) and be measured in cubic metres.
Steel Piling: Each type of pile and pile size shall be listed separately (either H-piles or pipe piles). A quantity shall be provided for “Supply and Drive” and measured metres. Another quantity shall be provided for “Set-up” and measured in number of piles.

The “Estimate” quantities shall be completed for the Tender Drawings. These should match exactly the quantities provided in the tender bid items. The “As constructed” quantities are left empty until preparation of the Record Drawings.

Pier(s) – Sheet 1 (if two or more sheets required)

The first sheet is used to primarily convey geometric information of the pier and foundation.

Pile Cap Plan

The pile cap plan shall be an accurate representation of the final geometry of the pile cap. The following information shall be included:

- The pile cap plan shall be oriented such that the pile cap is horizontal on the page;
- Show North arrow;
- Show and label the pier centreline and the roadway control line;
- Show and label the skew angle of pier with respect to the control line;
- Show and label work points (eg. WP1, WP2, etc.);
- Label pier cap dimensions relative to the control lines;
- Show and label piles, spacing and dimensions relative to the control lines;
- Show and label the magnitude and direction of pile batter;
- The scale of the plan drawing shall be the same as the scale of the pier cap and elevation.

Pier Cap Plan

The pier plan shall be an accurate representation of the geometry of the pier cap and columns/shaft. The following information shall be included:

- The pier plan shall be oriented such that the pier cap is horizontal on the page;
- Show North arrow;
- Show and label the pier centreline and the roadway control line;
- Show and label the skew angle of pier with respect to the control line;
- Show and label work points (eg. WP1, WP2, etc.);
- For conventional pier:
  - Show and label pier with girders and deck removed for clarity;
  - Show and label grout pads and anchor rod cans;
  - Grout pad designation to match girder line numbers. Follow BIM numbering convention (Girder numbering increases to north or east);
  - Show and label shear block;
For fully integral piers (where pier cap is cast integral with girder diaphragm):
  o Show and label pier with diaphragm, girders and deck;
  o Show and label grout pads/plinths;
  o Label girder line numbers. Follow BIM girder numbering convention (Girder numbering increases to north or east);

Label pier dimensions relative to the control lines;
Show and label column/shaft, spacing and dimensions relative to the control lines;
Show and label pier cap drip sheets;
Show and label utility duct routing through column/shaft or pier cap, if applicable;
The scale of the plan drawing shall be the same as the scale of the pier elevation.

Pier Elevation

The pier elevation shall be an accurate representation of the geometry of the pier cap, columns/shaft, pile cap and piles. The following information shall be included:

Show and label the pier centreline and the roadway control line;
Show front elevation of pier cap, columns/shaft, pier cap and piles;
For conventional pier:
  o Show grout pads and anchor rod cans;
  o Show shear blocks;
  o Leave the girders and deck off for clarity.
For fully integral piers (where pier cap is cast integral with girder diaphragm):
  o Show temporary girder bearings and plinths;
  o Show diaphragm with girders and deck.
Show and label the elevation of critical points on the top of the pier shall be shown (may reference to a table directly below the pier elevation);
Label the elevation of the underside of pier cap;
Show and label column/shaft projection into pier cap;
Label the elevation of the underside of pier pile cap;
Show and label pile types and size;
Show and label approximate pile tip elevations;
Show and label a minimum 100 mm thick mud slab below the pier pile cap;
Show and label the pile embedment depth into the pile cap;
Show and label approximate streambed elevation and direction of stream flow (for river bridges);
Show final grading of the fill over the pile cap and label fill cover requirements (for overpasses);
Indicate in which direction the elevation view is looking, which pier is shown, and that other piers are similar;
The scale shall be the same as the scale of the pier plan;
Show and label any formed aesthetic treatments (e.g. logos, patterns, etc.).

**Side View**

The pier side view shall be an accurate representation of the geometry of the pier cap, columns/shaft, pile cap and piles. The following information shall be included:

- Show and label the pier centreline;
- Show side view of pier cap columns/shaft, pier cap and piles;
- For conventional pier:
  - Show grout pads and anchor rod cans;
  - Show shear blocks;
  - Leave the girders and deck off for clarity.
- For fully integral piers (where pier cap is cast integral with girder diaphragm):
  - Show temporary girder bearings and plinths;
  - Show diaphragm with girders and deck.
- Show and label the wash slope of the top of the pier cap;
- Label the elevation of the underside of pier cap;
- Show and label column/shaft projection into pier cap;
- Label the elevation of the underside of pier pile cap;
- Show and label pile types and size;
- Show and label the magnitude and direction of pile batter;
- Show and label a minimum 100 mm thick mud slab below the pier pile cap;
- Show and label the pile embedment depth into the pile cap;
- Show and label approximate streambed elevation and direction of stream flow (for river bridges);
- Show final grading of the fill over the pile cap and label fill cover requirements (for overpasses);
- The scale shall be the same as the scale of the pier elevation;
- Show and label any formed aesthetic treatments (e.g. logos, patterns, etc.).

**Sections**

- A section of the pier column/shaft is typically provided along with details describing the geometry of formed aesthetic treatments (e.g. logos, patterns, etc.).

**Pier Notes**

- Provide Pier and Pier Pile notes as per the standard bridge notes and modify as required;
- Locate notes at the top right hand corner of the sheet.
Quantity Estimate Table:

- Use standard quantity estimate table format;
- Quantities listed in the table shall represent the quantities for all piers;
- The following quantities may be included:
  - Each concrete class used (Class C, Class Pile, etc.) and be measured in cubic metres.
  - Steel Piling: Each type of pile and pile size shall be listed separately (either H-piles or pipe piles). A quantity shall be provided for “Supply and Drive” and measured metres. Another quantity shall be provided for “Set-up” and measured in number of piles.
- The “Estimate” quantities shall be completed for the Tender Drawings. These should match exactly the quantities provided in the tender bid items. The “As constructed” quantities are left empty until preparation of the Record Drawings.

Pier(s) – Sheet 2

The second sheet is used to primarily convey reinforcing information of the pier and foundation.

Pile Cap Reinforcing – Plan

The pile cap reinforcing plan shall be an accurate representation of the reinforcing in the pile cap. The following information shall be included:

- Show and label the longitudinal reinforcing, stirrups and end bars;
- Show the location of the piles and columns/shafts and how reinforcing must be placed to accommodate these.

Pier Cap Reinforcing – Plan

The pier cap reinforcing plan shall be an accurate representation of the reinforcing in the pile cap. The following information shall be included:

- Show and label the longitudinal reinforcing, stirrups and end bars;
- Show the location of grout pads and grout cans as hidden lines;
- Show the locations of columns/shafts below the pier cap.

Pile Reinforcing – Elevation

The pier reinforcing elevation shall be an accurate representation of the reinforcing in the pier. The following information shall be included:

- Show and label all of the reinforcing in the pier cap, columns/shafts and pile cap;
- Show the location of the piles, with reinforcing layers shown in the proper location relative to the pile embedment depth
Show the projection lengths for bars extending from the pile cap into the pier shaft and from the pier column/shaft into the pier cap;

Show the location of grout pads and grout cans as hidden lines and how reinforcing must be placed to accommodate these.

Sections

One or more sections are generally provided to clarify reinforcing layout and details. This might include a section of the entire pier height (from pile cap to pier cap), or just various sections of the pier cap, the pier columns/shaft and the pile cap. The following information shall be included with each section:

- Show detailed and accurately drawn reinforcing information, with proper bar dimensions, concrete covers, bars bend, bar hooks, etc.;
- Show and label concrete covers

**E.2.7 Bearing Sheets**

The “Bearings” sheets typically include all information required to design, fabricate, and install the bridge bearings. Information typically contained on these sheets includes a bearing layout diagram, a bearing schedule, bearing notes, a bearing setting table, and detailed plans and sections of the bearing elements. For the simplest of structures, all information can be included on one sheet but typically two or more sheets are required. The first sheet should include the bearing layout, bearing notes, the bearing schedule and the bearing setting table. Detailed plans and sections can be included on the first sheet if space allows, with additional details being placed on the second sheets as required. Details shall include all applicable details shown on drawing S-1761.

**Bearings – Sheet 1 (or just “Bearings” if only one drawing is required):**

**Bearing Layout:**

The bearing layout shall be a line diagram showing a plan view of the centrelines of the girders, and the centrelines of bearing at each support, and shall clearly show the type and location of all bearings and lateral supports on the bridge. The following information shall also be included:

- North arrow to be provided at the top left hand corner of the sheet. The bearing layout orientation shall be such that the North arrow is orientated towards the top or right of the sheet and should be consistent with the orientation of the plan shown on the General Layout sheet;
- Show and label the roadway centreline and/or control line, along with a dimension to the nearest girder line at each support;
- Label the bearing spacing at each support;
- Label the skew angle of each support with respect to the control line;
- Show and label the distance between centreline of the supports along the control line;
- For more complex geometry, consider including the azimuth angle for each bearing;
Include a legend that clearly describes the type of bearing and lateral restraint as shown on the bearing layout.

**Bearing Notes:**

Bearing Notes shall be on the right hand side of the sheet and shall include all standard bearing notes shown in Appendix F.

**Bearing Schedule:**

The bearing schedule is a tabular summary of all the design reactions, movements and rotations that the bearings must be able to accommodate. The following information shall be included for each unique bearing type:

- Bearing Location
- Bearing type
- Quantity
- Bearing Height
- Design Bearing Reactions at ULS, SLS, and FLS including:
  - Vertical reaction for permanent load, maximum total load, and minimum total load
  - Longitudinal reaction
  - Transverse reaction
- Design Bearing Movements at SLS including:
  - Maximum longitudinal movements
  - Maximum transverse movements
- Design Bearing Rotations at SLS including:
  - Longitudinal rotation required to design tapered bearing plates
  - Maximum longitudinal rotation
  - Maximum transverse rotation

**Temperature Setting Table/Chart:**

A temperature setting table or chart shall be provided for positioning expansion bearing components according to girder temperature. Provide a longitudinal section of the girder/bearing which clearly shows which direction the bearing shall be moved for any given temperature.

**Detailed Plans and Sections:**

Plans and sections detailing the design requirements for all consultant-designed elements shall be provided. Details typically provided include:

- Plan and elevation view of bearing, including dimensions of sole/base plates, grout pad and anchor rod details;
Dimensions for tapered sole/base plates and radius of curvature for rocker plates;
- Pintle details;
- Connection details showing how the sole plate is attached to the girder;
- For elastomeric bearings, show a conceptual sketch of the bearing pad similar to the Neoprene Pad Detail shown on drawing S-1761;
- For elastomeric bearings, keeper bar details similar to those shown on drawing S-1761;
- For pot bearings, show a conceptual sketch with appropriate height and width dimensions.

E.2.8 Steel Girder Sheets

The “Steel Girder” sheets typically include complete design information required to fabricate steel girders. Typically all the plate sizes including web, flanges, stiffeners, diaphragms, etc. shall be shown. Details provided on drawings S-1759 and S-1760 shall be utilized where applicable.

Girder Layout Sheet:

The “Girder Layout” sheet shall be used to pictorially summarize girder information including the girder and diaphragm layout, girder plan and elevation, and girder notes. Where possible, the layout, plans, and elevation shall be vertically aligned and to the same horizontal scale. The main components of the “Girder Layout” sheet are as follows:

Girder and Diaphragm Layout:

The layout shall be a line diagram showing a plan view of the centrelines of the girders, diaphragms, and stiffeners, and shall be generally in accordance with the sample layout shown on typical drawing S-1759. The following information shall also be included:

- North arrow to be provided at the top left hand corner of the sheet. Layout orientation shall be such that the North arrow is orientated towards the top or right of the sheet;
- Centreline roadway and/or control line shall be shown along with its location relative to the nearest girder line;
- Girder spacing and overall out-to-out girder width shall be provided. Where girder lines are straight, but not parallel, show the girder spacing at each abutment. Where girders are kinked, show the girder spacing at each support and at all kink points;
- Diaphragm and intermediate stiffener spacing shall be provided;
- Centreline bearings for all abutments and/or piers shall be shown; or centreline abutment/pier for integral supports;
- The location of clearance sign brackets with reference to the sign bracket detail;
- Where more than one intermediate diaphragm type is used, indicate on the layout which diaphragm type is used where;
- The location of all girder kink points shall be provided.
Girder Plan and Elevations:

The flange plans and girder elevation shall be an accurate representation of the final geometry of all elements of the steel girder. The following information shall be included:

- An elevation view of the steel girder shall be provided, along with plan views of the top flange above and the bottom flange below. The plan and elevation views shall be drawn to the same horizontal and vertical scales;
- The plan views shall show:
  - the sizes and thickness of the flange plates;
  - the location of all shop and field splices;
  - the centreline of all supports.
- The elevation view shall show:
  - the height and thickness of the web;
  - the location and type of all stiffeners;
  - the shear stud spacing;
  - the location of all shop and field splices;
  - the location of any drip strips;
  - the weld specification for the flange to web welds (8mm fillet welds are typically used);
  - the location of all tension flange butt welds;
- Any sections shown on the detail sheets shall be clearly marked and referenced as appropriate on the elevation.

Girder Notes:

Girder notes shall be on the right hand side of the sheet and shall include all standard girder notes shown in Appendix F. Any notes that cannot be fit on the Girder Layout sheet shall be placed in the top right corner of the first Girder Details sheet.

Girder Details Sheet(s):

The “Girder Details” sheets provide all additional details required to complete the fabrication of the girders. A minimum of two “Girder Details” sheets are typically required, however small bridges with very few splice and diaphragm details may be able to get away with one details sheet. Any girder notes that could not be fit on the “Girder Layout” sheet shall be included in the top right corner of the first “Girder Details” sheet. Where applicable, the details shown should be in accordance with the typical details shown on S-1759 and S-1760. The main components of the “Girder Details” sheet are as follows:

Diaphragm Elevations:

A separate elevation drawing of each type of diaphragm shall be shown. Each elevation shall include the following information:
- Girder spacing and relative location of the girders with respect to the centreline or control line;
The size and layout of all diaphragm members. Typically, diaphragms are composed of angle sections arranged in a cross-brace or a k-brace configuration. Girders with a depth of 1200mm or shallower may use a single channel or W-shape section diaphragm;

The minimum clearance requirements between the top and bottom horizontal members and the top and bottom flanges as shown on drawing S-1759 shall be met;

The location of the work points on the girder webs shall be shown;

The size of the stiffener plates shall be noted;

Any connection details shown elsewhere on the Girder Details sheet(s) shall be clearly marked and referenced.

Lateral Bracing Plan:

A plan view of the lateral bracing system shall be shown and shall include the following information:

The size and layout of all bracing members;

The location of the work points on the girder flanges shall be shown;

The size of the gusset plates shall be noted;

Any connection details shown elsewhere on the Girder Details sheet(s) shall be clearly marked and referenced.

Connection Details:

Connection details for all diaphragm and lateral bracing members shall be provided and shall include the following information:

The size of all members framing in to the connection;

The size of any gusset plates in the connection;

The size and location of all bolts in the connection;

The location of member centroids;

The location of work points and the amount of any eccentricity in the connection.

Stiffener Details:

Stiffeners details shall be consistent with the details shown on drawing S-1760. Girder sections showing all stiffener types shall be shown and shall include the following information:

Weld specifications for all welds. Weld sizes shall be determined by the Consultant. However, in the past, 8mm fillet welds have been typically used between the stiffener and the girder webs and flanges;

Corner cope angle for stiffener plates that extend beyond the flange tips. The typical corner cope angle is 1:1;

Indicate whether stiffeners connected to the top and/or bottom flanges are ‘fit only’ or ‘fit to bear’;

Indicate the plate size of the stiffener.
Shear Stud Layout:

Girder sections showing all configurations of shear stud rows shall be provided and shall include the following information:

- Stud diameter and length;
- Stud spacing for the row;
- Width of flange;
- Edge distances.

Girder Splice Details:

A detail of each different girder splice type shall be provided. The detail shall show plan views of the top and bottom flange splice shown above and below an elevation view of the girder at the splice location. The details shall include the following information:

- Top and bottom flange splice plans shall show:
  - The plan dimensions of the splice plates (top plate for top flange, bottom plate for bottom flange);
  - The flange width;
  - Bolt hole locations and spacing;
  - Bolt edge distances;
  - Total number and type of bolts;
  - The gap distance between the ends of the girder sections.

- Girder web splice elevation view shall show:
  - The location and plan dimensions of the web splice plate;
  - The web height;
  - Bolt hole locations and spacing;
  - Bolt edge distances;
  - Total number and type of bolts;
  - Number and size of all splice plates (flange and web);
  - Accommodation of shear studs at splice location;
  - The gap distance between the ends of the girder sections.

Clearance Sign Details:

This detail shall include a plan and elevation view showing how the STD W-26 Clearance Sign is to be attached to the girder web shall be provided.
Other Details:

Where applicable, other details shown on typical drawing S-1760 shall be included. The details shall be modified to suit project specific requirements. These details shall include:

- Detail showing typical junction between welded vertical stiffener and longitudinal stiffener;
- Detail showing the welded ends of vertical stiffeners;
- Detail showing flange width transition;
- Detail showing full penetration flange weld;
- Detail showing drip strips at abutments and piers.

Camber Diagram Sheet:

The “Camber Diagram” sheet provides both a graphical (camber diagram) and tabulated (camber table) summary of camber requirements for the steel girders. Camber data shall be provided at 10th span points, centreline of supports, and centreline of field splices, along with net camber values for individual girder segments between splices. For spans longer than 50 m, data shall be presented at 20th span points. If all girders are the same, then only one camber diagram/table needs to be provided. However, for bridges where the girder lengths vary, a camber diagram/table shall be provided for each different girder. The main components of the “Camber Diagram” sheet are as follows:

Camber Diagram:

The camber diagram is a graphical representation of the data presented in the camber table and shall include the following details:

- 10th points (or 20th points) shall be labeled along the bottom horizontal axis;
- The vertical grade scale shall be labelled along the left side vertical axis;
- The deflection scale shall be labelled on the right side vertical axis;
- Span lengths and location of supports and field splices shall be labelled at the top of the diagram;
- Lines representing the deflection due to the dead load girder (A), the dead load deck (B), and SIDL – Barrier and Wearing Surface (C); along with lines representing the vertical grade (D) and chord (E) shall be shown;
- Values A through E above shall be dimensioned on the diagram along with the net camber (F).
Camber Table:

The camber table provides tabulated numerical camber data as shown below.

<table>
<thead>
<tr>
<th>LOCATION (10th PT SPAN)</th>
<th>0</th>
<th>1</th>
<th>...</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>D.L. Girder</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>D.L. Deck</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>SIDL (Barrier and Wearing Surface)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>Vertical Grade</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E</td>
<td>Chord</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F</td>
<td>Net Camber</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>G</td>
<td>As Constr Elev (m)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Camber data shall also be provided at all girder splice locations. Since splices often fall in between 10th points, it is typical to show the splice camber data below the camber table, but in line with the splice location.
- The camber data shall be provided in millimeters except the “As Constructed Elevations” which shall be provided in metres. The “As Constructed Elevations” shall represent the actual erected girder elevations before any additional dead load (deck formwork, etc.) is applied to the girder.

Camber Notes:

The standard camber diagram notes contained in Appendix F shall be included in the lower left hand corner of the sheet.

E.2.9 Precast NU Girder Sheets

The “NU Girder” sheets typically include complete design information required to fabricate NU girders. The standard NU girder section shall be shown with reinforcing, prestressing, post-tensioning, intermediate diaphragms, etc. Details provided on drawings S-1757 and S-1758 shall be utilized where applicable.

Girder Layout Sheet:

The “Girder Layout” sheet shall be used to summarize girder information including the girder and diaphragm layout, and girder notes. The main components of the “Girder Layout” sheet are as follows:

Girder and Diaphragm Layout:

The layout shall be a line diagram showing a plan view of the girders and diaphragms, and shall be generally in accordance with the sample layout shown on typical detail drawing S-1757. The following information shall also be included:
Major Bridge Drawing Checklist

- North arrow to be provided at the top left hand corner of the sheet. Layout orientation shall be such that the North arrow is orientated towards the top or right of the sheet.

- Centreline roadway and/or control line shall be shown along with its location relative to the nearest girder line.

- Centreline bearings for all abutments and/or piers shall be shown; or centreline abutment/pier for integral supports.

- Girderlines shall be numbered. This numbering shall be consistent with the girderline numbering shown on the abutment, pier and bearing sheets.

- Girder spacing and overall out-to-out girder width shall be provided. Where girder lines are straight, but not parallel, show the girder spacing at each abutment.

- Girder lengths from centerline bearing to centerline bearing shall be provided.

- Diaphragm spacing shall be provided.

- The location of clearance sign brackets with reference to the sign bracket detail;

- Length of girder beyond the centerline bearing shall be provided.

**Typical Girder Section:**

- Show the typical NU girder section, showing all relevant girder dimensions.

**Girder Finishes:**

- Show a cross-section of the NU girder and specify the relevant concrete girder finishes for the various girder surfaces, in accordance with the Standard Specifications for Bridge Construction. This often includes a note as follows:

  "TOP SURFACE OF GIRDER TO BE CLEAN AND FREE OF LAITANCE AND ROUGHENED TO 5 mm (MIN) FULL AMPLITUDE AND SPACING NOT GREATER THAN 15 mm, EXCEPT FOR 200 mm EDGE STRIPS THAT SHALL BE STEEL FLOATED TO A SMOOTH FINISH (TYP)"

- Include a note describing the Identification of Units in accordance with the Standard Specifications for Bridge Construction.

**Girder Notes:**

Girder notes shall be on the right hand side of the sheet and shall include all standard girder notes shown in Appendix F. Any notes that cannot be fit on the Girder Layout sheet shall be placed in the top right corner of the following “Girder Descriptor” sheet.

**Construction Sequence:**

NU girder bridges often require some notes describing the construction sequence. Where possible, these notes should be included on the General Layout sheet.
“Girder Descriptor” – Sheet 1:

An example of the naming convention for this sheet would be 57m NU2400 Girder – Sheet 1. Several of these sheets may be required if different girder lengths exist on a bridge.

The “Girder Descriptor” sheets provide prestressing and reinforcing information for the specific girders. Typically, two “Girder Descriptor” sheets are required for each girder type. Whenever possible, the details shown should be in accordance with the typical detail drawings S-1757 and S-1758. The main components of the “Girder Descriptor – Sheet 1” are as follows:

Girder Elevation – Prestressing:

- Include a girder elevation showing:
  - the total girder length; the relative positions of the girder ends measured to the centreline bearings; and the diaphragm locations;
  - the prestressing information including: the straight prestress strands (in the top flange and bottom flange); the draped prestress strands; the deflection point locations; the debonded prestress strand information; the strand projection information; and the general post-tensioning duct information.

- Include a note regarding the expected shortening in length of the girder due to prestress, post-tensioning, creep, shrinkage and relaxation. This note should clearly specify how much shortening is expected just after construction is complete and at the longterm condition.

Girder Elevation – Reinforcing:

- Include a girder elevation showing:
  - the web and flange reinforcing information; the projecting stirrup reinforcing information; and any supplemental reinforcing required in the girders;
  - information regarding the location of inserts or holes in the girder web required for clearance sign brackets and diaphragms. Additional detail for these can be provided on the diaphragm sheets;
  - information regarding the girder ends, such as the shape of the girder ends and holes through the girders to facilitate concrete diaphragm reinforcing. Show and refer to the shoe plate at each end of the girder;

- Where appropriate, the Girder Elevation – Reinforcing can be combined with the Girder Elevation – Prestressing as long as the information can be presented clearly.

Theoretical Girder Camber Table:

- This table presents the theoretical girder camber information. As a minimum, this table shall include information at the mid-span of the girder as shown on typical detail drawing S-1757. Consideration should be given to providing this information at tenth points along the length of the girder as this can be useful information during construction.
“Girder Descriptor” – Sheet 2:

Whenever possible, the details shown should be in accordance with drawings S-1757 and S-1758. The main components of the “Girder Descriptor – Sheet 2” are as follows:

**Typ Reinforcing Section:**
- Include a cross section of the NU girder showing all of the conventional reinforcing information such as: the top flange reinforcing and cover measured from top of top flange; web stirrup reinforcing, cover and the projection of stirrups above the top flange; bottom flange reinforcing cover measured to the top, side and bottom of the bottom flange.

**Mid-Span Section:**
- Include a cross section of the NU girder showing prestressing and post-tensioning at mid-span.
- Show height of draped strands and post-tensioning ducts at mid-span.
- Show typical girder reinforcement shall be included to demonstrate that conflicts do not exist.

**Abutment End Section:**
- Include a cross section of the NU girder showing prestressing and post-tensioning at the abutment end.
- Show height of draped strands and post-tensioning ducts at abutment end.
- Identify which strands are debonded.
- Include abutment end girder reinforcement to demonstrate that conflicts do not exist.
- Include abutment end shoe plate and studs to demonstrate that conflicts do not exist.
- If the abutment end includes an end block, include post-tensioning anchorage hardware and dimensions of the end thickening.

**Pier End Section:**
- Include a cross section of the NU girder showing prestressing and post-tensioning at the pier end. If this section and the abutment end section are the same, these can be combined.
- Show height of draped strands and post-tensioning ducts at pier end.
- Identify which strands are debonded.
- Include pier end girder reinforcement to demonstrate that conflicts do not exist.
- Include pier end shoe plate and studs to demonstrate that conflicts do not exist.

**Girder Bar Types:**
- Standard NU girder reinforcing shapes shall be shown. Welded wire fabric is typically utilized for bottom flange, web and top flange reinforcing. Regular reinforcing is often also utilized, particularly for stirrup projections and reinforcing at girder ends.
**Major Bridge Drawing Checklist**

**Shoe Plate Details:**

- Shoe plates are typically provided at both ends of the girders. Elevation and sections of the shoe plates shall be provided. A plan of the shoe plate can also be useful when the bridge has a skew.
- Whenever possible, the details shown should be in accordance with the drawing S-1761.
- Show the show plate dimensions.
- Include girder end reinforcement and prestressing to demonstrate that conflicts do not exist with the shoe plate and the studs.
- Include any details showing how the shoe plates interact with the bearings.

**Clearance Sign Details:**

A plan and elevation view showing how the STD W-26 Clearance Sign is to be attached to the girder web shall be provided.

**Girder Post-tensioning:**

If more than one post-tensioning sheet is required, the naming convention shall be *Girder Post-tensioning - Sheet 1*. The main components of the "Girder Post-tensioning" sheet are as follows:

**Post-tensioning Duct Profile:**

- Include an elevation showing the post-tensioning duct information. This elevation should ideally show the entire bridge length, although it may be split up if the bridge is long.
- Include centreline of all of the post-tensioning ducts.
- Below the elevation view, a table shall be included to provide all of the post-tensioning duct profile information. This table shall include the height of each duct, measured from the bottom of the girder to the centreline of each duct and the location of each point as measured horizontally along the girder length. This information shall be provided at the very least at tenth points along each span, but shall also be provided at the following points:
  - At abutment ends. If a cast-in-place diaphragm is included at the abutment, include the duct height at the outside face of the diaphragm as well as at the girder end;
  - At pier girder ends;
  - At duct low points; and
  - At duct high points.

**Post-tensioning Force Diagram:**

- This chart shows the variation of post-tensioning tendon force along the length of the bridge.
- Include post-tensioning force at transfer and at final stage.

**End Anchorage Detail:**

- Include the post-tensioning anchorage details.
Include dimensions for the post-tensioning blockout.

Post-Tensioning Notes:

Girder post-tensioning notes shall be on the right hand side of the sheet and shall include all the standard post-tensioning notes shown in Appendix F.

Girder Diaphragms – Sheet 1:

In accordance with the typical detail drawings S-1761, steel bracing is typically used for intermediate diaphragms and for abutment diaphragms for bridges with conventional abutments. This Girder Diaphragms – Sheet 1 shall be used to show the steel bracing information for abutment and intermediate diaphragms.

Abutment / Intermediate Diaphragm:

- Include a section through the superstructure showing the abutment and another section showing the intermediate diaphragm.
- Where applicable, the details shown should be in accordance with drawing S-1761.
- Include the size and layout of all diaphragm members. Typically, diaphragms are composed of angle sections arranged in an X-brace or a K-brace configuration.
- Include relevant dimensional information as required to determine the diaphragm member lengths. The minimum clearance requirements between the top and bottom horizontal members and the top and bottom flanges as shown on drawing S-1757 shall be met.
- Include details on the diaphragm connections, including the thickness of the gusset plates; number and size of bolts connecting the angles to the gussets; and any plates, inserts or bolts connecting the gusset plates to the girders.

Girder Diaphragm Notes:

- Girder diaphragm notes shall be on the right hand side of the sheet and shall include all the standard post-tensioning notes shown in Appendix F. These notes shall apply to steel cross-bracing diaphragms as well as the concrete diaphragm(s) that will be shown on subsequent girder diaphragm sheets.

Girder Diaphragms – Sheet 2:

In accordance with the drawing S-1761, full width concrete diaphragms are typically used for pier diaphragms. Where required, Girder Diaphragms – Sheet 2 shall be used to show full width concrete diaphragms at the piers.

Diaphragm Plan:

The diaphragm plan shall be an accurate representation of the final geometry and reinforcing for the diaphragm. The following information shall be included:

- Provide all plan dimensions of the diaphragm;
- Centreline of roadway and/or control line;
Major Bridge Drawing Checklist

- Centreline bearing;
- Skew angle with respect to the control line;
- Show girders framing into the diaphragm;
- Show and label diaphragm reinforcing;
- The scale of the plan drawing shall be shown and shall be the same as the scale of the diaphragm elevation.

**Diaphragm Elevation:**

The diaphragm elevation shall be an accurate representation of the final geometry and reinforcing for the diaphragm. The following information shall be included:

- Centreline of roadway and/or control line;
- Show girders and deck;
- Show and label diaphragm reinforcing;
- The scale shall be shown and shall be the same as the scale of the pier plan.

**Diaphragm Sections:**

Sufficient diaphragm sections shall be shown to adequately portray the necessary information. This often includes a section at the girder centreline as well as a section between girders.

The following information shall be included:

- Centreline bearing;
- Show girders and deck, clearly identifying the construction joint between the deck and the diaphragm;
- Dimensions of diaphragm;
- Dimension of girder embedded into diaphragm;
- Show general bearing configuration;
- Show and label any details connecting the girders to the diaphragm, such as reinforcement; prestress strands; post-tensioning; shoe plates; connector plates; or dowels;
- Show and label diaphragm reinforcing. Show deck reinforcing to demonstrate how diaphragm reinforcing and deck reinforcing interact;
- Each section shall be clearly referenced back to the diaphragm plan or elevation;
- A scale shall be provided for each section.

**Details:**

- Include any other details as required.
- Each detail shall be clearly referenced back to the diaphragm plan, elevation or sections.
Quantity Estimate Table:

- Use standard quantity estimate table format;
- Quantities listed in the table shall represent the quantities for all pier diaphragms;
- The following quantities may be included:
  - Each concrete class used (Class C, Class Pile, etc.) and be measured in cubic metres.
- The “Estimate” quantities shall be completed for the Tender Drawings. These should match exactly the quantities provided in the tender bid items. The “As constructed” quantities are left empty until preparation of the Record Drawings.

E.2.10 Deck Sheets

The Deck Sheets include all of the reinforcing and geometric information required to construct the deck. Usually two sheets are adequate to provide sufficient detail for this purpose. However, additional sheets may be used for large or complex bridges.

Deck – Sheet 1

This sheet includes an overall deck layout plan, a deck section taken at an exterior and interior girder, the deck notes, and a quantity estimate table.

Deck Layout:

- Provide the following geometric and dimensional information of the deck as a minimum:
  - Label centerline roadway/control line, centerline bearing at each abutment, and centerline of pier(s);
  - Overall out to out deck width;
  - Overall deck length;
  - Deck width on either side of centerline roadway/control line;
  - Clear roadway width on either side of centerline roadway/control line;
  - Barrier width as measured at top of wearing surface;
  - Show any median, sidewalk or light pole pedestal geometry (as applicable);
  - Distances from centerline bearing abutment to centreline pier(s) for all spans. Include dimension for deck joint blockouts (conventional abutment bridges) and any diaphragms (integral abutment bridges).

- Provide deck reinforcing details including:
  - Top and bottom matt reinforcing for the longitudinal and transverse directions;
  - Additional reinforcement requirements in the deck cantilever and at bridge barriers;
  - Additional deck reinforcing requirements over the pier(s). Bar cutoff locations (on both sides of pier) with respect to centerline of pier shall be provided;
  - Reinforcing steel lap lengths and locations as applicable;
  - Reinforcing details of any median, sidewalk or light pole pedestals.
Show and label electrical ground connections for CSE deck testing. The first electrical ground connection and associated hardware shall be located on the soffit of the deck overhang at one corner of the bridge and the second electrical ground connection shall be located at the opposite end and opposite soffit of the bridge.

**Typical Deck Section:**

The deck section shall be full width of deck and include wearing surface designation, dimensions and reinforcing information.

Provide the following information/dimensions as a minimum:

- Identify centerline roadway/control line and centerline of girders;
- Label girder spacing and dimensions to first adjacent girder off each side of centerline roadway/control line;
- Label deck cantilever dimension from centerline exterior girder to deck fascia;
- Schematically show deck haunch geometry at girders;
- Overall out-to-out deck width;
- Clear roadway width on either side of centerline roadway/control line;
- Bridge barrier width as measured at top of wearing surface;
- Provide dimensional and reinforcing information of any medians, sidewalks or light pole pedestals (as applicable);
- Overall height of deck from deck soffit to top of concrete barrier/curb;
- Label bridge barrier type and reference appropriate standard drawing;
- Label deck cross fall/super elevation. Soffit of deck typically follows this cross fall/super elevation except at the overhang where the soffit is level;
- Label deck waterproofing system and refer to standard drawing S-1443;
- Identify concrete deck thickness;
- Label typical top and bottom mat reinforcing steel;
- Label concrete cover to top and to bottom mat reinforcing steel;
- Provide additional reinforcing steel details applicable to the location at which the deck section is taken;
- Schematically show construction joint at deck/barrier interface including pour strip. Top of pour strip to be aligned with construction joint;
- Schematically show utility duct(s) in barrier.

**Deck Notes:**

Deck notes shall be on the right hand side of the sheet and shall include all standard deck notes as shown in Appendix F. Notes provided here shall be specific to the deck only.

**Quantity Estimate Table:**

- Use standard quantity estimate table format;
- Quantities listed in the table shall represent the quantities for the entire superstructure, including the deck, curb/barrier, median and sidewalk. It should not include cast-in-place concrete diaphragms if this
quantity is included on other sheets. The quantity calculations for the deck should be coordinated carefully with the abutment quantities, particularly for integral bridges;

- The following quantities may be included:
  - Wearing surface – Two Course Hot Mix Asphaltic Concrete Pavement, measured in tonnes;
  - Waterproofing Membrane, measured in square meters;
  - Bridgerail, measured in meters;
  - Each concrete class used (Class HPC, etc.) and be measured in cubic metres.

- The “Estimate” quantities shall be completed for the Tender Drawings. These should match exactly the quantities provided in the tender bid items. The “As constructed” quantities are left empty until preparation of the Record Drawings.

**Deck – Sheet 2**

**Bridgerail and Barrier/Curb/Median/Sidewalk Elevation**

The requirements for bridgerail post spacing and concrete crack control joint spacing are provided on the standard AT bridge barrier drawings. However, the spacings at the ends of the bridge need to be determined on a site specific basis. The title of this elevation should be simplified if the bridge does not have all of these components (eg. Bridgerail and Curb Elevation).

- Provide an elevation of the bridge structure and label centreline bearing and centerline pier(s). Schematically show the wingwalls, bridge barrier, and approach rail transition (enough to show the terminal connection to the bridge barrier);
- Show and label bridgerail post spacing by locating post centerline locations along the full length of bridge. Do not exceed the maximum spacing requirements as provided on the standard drawings. Note that post spacing is not the same for all AT standard bridgerails and the Consultant shall ensure they are using the appropriate standard spacing for the bridgerail on their project. Provide reference to the applicable standard bridgerail and approach rail transition drawings;
- Show and label concrete control joint locations in the barrier/curb/median/sidewalk. Control joints shall be centered between posts for barriers with bridgerail;
- A note shall be provided on the elevation indicating the reference temperature at which the dimensions are correct (typically at +15 ° C).

**Details**

The detail requirements for the bridge deck will vary depending on the project. For example, bridges with deck joints, medians, and sidewalks will require additional details in order to provide sufficient information pertaining to these features. As a minimum, all bridge projects shall include the following details:

- Deck overhang including bridge barrier and exterior girder:
  - Provide utility duct size and location in the bridge barrier;
  - Provide clear cover for reinforcing steel;
**Major Bridge Drawing Checklist**

- Provide deck overhang dimensions and reinforcing. Some dimensions such as the overall depth of concrete curb and deck (measured at the fascia) can vary due to girder camber. A note shall be provided to identify this condition;
- For post and rail bridge barriers the detail shall be taken at the post location. Provide curb to deck anchorage reinforcing and concrete curb reinforcing details. Indicate any additional reinforcing requirements at post locations. Post anchorage assemblies shall be shown to ensure there are no conflicts with reinforcing steel. Locate centre of post and anchorage assembly from front face of curb at top of wearing surface. Provide dimensioning information so that the post anchor rod lengths can be determined. Reference the appropriate standard drawing(s) for the remainder of the post anchorage details;
- For concrete bridge barriers provide the barrier/deck anchorage details and barrier reinforcing;
- Show the deck soffit drip groove. Provide an additional detail to provide the detailed dimensions;
- Show and label the temporary pour strip and formwork anchorage device on the barrier fascia. See standard drawing S-1680 or S-1650. The top of pour strip shall be located at the construction joint between the deck and barrier;
- Show and label barrier/curb geometry. Ensure it conforms to the standard curb/barrier values including vertical height as measured from top of finished wearing surface;
- Indicate wearing surface thickness, type, and cross fall/super elevation;

- **Deck detail at interior girder:**
  - Label centerline of girder;
  - Provide dimensions of girder haunch;
  - Provide clear cover to reinforcing steel;
  - Show deck reinforcing steel;
  - Show wearing surface;

- **Deck End Beam Detail(s) (as applicable):**
  - Provide dimensional and reinforcing information at and between girders;
  - Locate construction joint outside of paving lip;
  - Schematically show deck joint and reference standard deck joint drawings;
  - Show drip groove and wearing surface;

- **Curb/Barrier Control Joint Detail:**

- **Deck Drain Detail(s) (as applicable):**
  - Provide wearing surface swale detail adjacent to drain;
  - Provide deck drain geometry and dimensional information;
  - Provide wick drain detail at deck drain;
  - Provide deck waterproofing details around drain assembly;
  - Provide additional deck reinforcing requirements for drain installation;
  - Provide connection detail between deck drain pipe and girder

- **Deck Placing Schedule:**
  - Indicate deck pour sequencing including time and concrete strength requirements between pours. For longer bridges, deck placing sequence may affect camber calculations and therefore a note should be included cross-referencing to the girder camber drawings.
E.2.11 Deck Joint Sheets

The Department currently has three standard deck joint types for use in new construction. These are the Type 1 Strip Seal Deck Joint, the Cover Plated V-Seal Deck Joint, and the Standard Finger Plate Deck Joint Assembly. Each of these deck joint types is summarized in a set of standard drawings that provide details and notes. The intent of the site specific drawing is to provide site specific supplementary information to the details and notes found on the standard drawings. Further, the standard drawings define a multitude of variable dimensions by way of lettered designation that need to be clearly identified with the appropriate values on the site specific drawings.

For bridges incorporating one deck joint, simpler geometries, narrower widths, little to no skew, and no sidewalks or median, a single sheet is typically sufficient to provide the necessary joint detail. If two deck joints of the same type are employed and there is sufficient similarity between them, only one need be drawn. Double dimensioning can be used to indicate the various dimensions specific to each deck joint. In cases with more than one deck joint type, larger skew, wider decks, or bridges incorporating sidewalks/separation barriers/medians, an additional sheet will likely be required.

Deck Joint (label as Sheet 1 if more than one sheet is required)

Deck Joint Plan:

- Show and label clear roadway width on either side of crown. For cover plated deck joint also show the number and length of the cover plates on each side of crown;
- Show and label overall clear roadway width;
- Show and label site specific bridge barrier type including barrier width and cover plate extent;
- Show and label amount of recess between vertical faces of concrete barrier and barrier cover plate;
- Show and label the skew angle;
- Show and label snow plow guard plates for Type 1 strip seal deck joints installed on bridges with skew values between 20 and 45 degrees inclusive. See details on standard drawing S-1811. The distance from end of slow plow guard plate and edge of blockout concrete is to be identified based on site specific geometry;
- Show and label deck joint extrusion extension beyond traffic face of barrier (type 1 strip seal and cover plated v-seal deck joints only);
- Show and label erection angle including required length (type 1 strip seal and cover plated v-seal deck joints only);
- Show and label roadway cover plate length, number of deck cover plate bolt spaces and associated bolt spacing (cover plated v-seal deck joint only);
- Show and label locations for deck joint washout plugs (cover plated v-seal deck joint only);
- Show locations of deck joint end drains (cover plated v-seal deck joint only);
- Show and label the dimension between the deck cover plate and bridge barrier concrete (cover plated v-seal deck joint only);
Major Bridge Drawing Checklist

☐ Show and label shipping angle including required length (cover plated v-seal and finger plate deck joints only);

**Section Through Joint at Roadway:**

☐ Show deck joint assembly anchorage requirements;
☐ Show and label deck joint assembly bolting requirements (cover plated v-seal deck joint only);
☐ Show location of construction joint for blockout. Locate beyond paving lip;
☐ Show and label amount of deck joint recess below top of adjacent concrete;
☐ Show blockout reinforcing and coordinate with deck joint anchorage details;
☐ Provide size requirement of steel and wood support blocks located under adjustment bolt/rod. Refer to S-1639, S-1800, and S-1811;
☐ Show and indicate the site specific deck joint size selected from the standard drawings and label plate lengths accordingly (cover plated v-seal and finger plate deck joints only);

**Section Through Joint At Barrier:**

☐ Show and label shipping and erection angle including required length for barrier cover plates;
☐ Show and label blockout width (type 1 strip seal and cover plated v-seal deck joints only);
☐ Show and label amount of barrier cover plate recess below top of barrier concrete;
☐ Show and label bolting, anchorage, and dimensional requirements for barrier cover plate assembly;

**Section Along Joint Through Barrier:**

☐ Show and label barrier width;
☐ Show and label bolting, anchorage, and dimensional requirements for barrier cover plate assembly;
☐ Show and label blockout length (type 1 strip seal and cover plated v-seal deck joint only);
☐ Show and label recess between traffic face of barrier and barrier cover plate;
☐ Show and label recess between top of barrier and top of barrier cover plate;
☐ Show and label dimension between face of concrete barrier and edge of deck cover plate (cover plated v-seal deck joint only);
☐ Show and label length of neoprene drip boot and pvc drain pipe at ends of cover plated v-seal deck joint (as applicable);
☐ Show and label extent of deck joint projection beyond barrier (type 1 strip seal deck joint and cover plated v-seal deck joint only);
☐ Show and label extrusion turn up dimensions (type 1 strip seal deck joint only);
☐ Show and label utility duct passing through deck joint blockout;
Gap Setting Table:

- Provide a table with a temperature scale between the upper and lower design temperatures in 5 degree increments. Indicate the joint gap value “X” at each temperature increment. The table shall cover all the deck joints on a structure;

Deck Joint Notes:

Deck joint notes shall be on the right hand side of the sheet and shall include all standard deck joint notes as shown in Appendix F. Include any site specific installation procedures not covered by the standard drawing. Notes provided here shall be specific to the deck joint only.
E.3 SIGN STRUCTURE DRAWING CHECKLIST

Sign Structures are delivered by way of a design build process and therefore the drawing demands from the Department’s Consultant are relatively limited. However, the Consultant is required to develop a general layout for each sign structure for a project. The Department has developed a sample drawing showing what is typically required (refer to S-1721). An individual “Sign Structure” sheet shall be completed for each sign structure within the project. Each “Sign Structure” sheet should provide a site plan, a sign structure elevation, site map, and sign structure notes.

The following checklist items shall apply to all sign structure drawings:

☐ The information contained in the Title Block shall be as per AT requirements;
☐ There shall not be any overlapping text;
☐ No periods shall be used at the ends of standard abbreviations;
☐ Labeling for roadway centrelines, abutment and pier bearing centerlines, control lines and etc., shall be consistent throughout the entire drawing set.
☐ The record drawing is to be updated to reflect what specific sign structure was installed and not showing the generic type from the tender set.

**Sign Structure (label as Sheet 1 if more than one sheet is required)**

**Site Plan:**

☐ Provide a site plan of the interchange showing applicable roadway and bridge structures with North arrow oriented upwards or to the right;
☐ Locate all the sign structures assigned to a specific bridge file/intersection. Each sign structure is to be shown on the site plan accompanied by an enlarged detail of all the sign panels supported by the structure. The sign panels should be real representation of the number of panels supported, the conveyed messages etc.;
☐ Each sign structure location shall be identified by a station number based on roadway chainage and the Department assigned bridge file, A-Ident, and Structure numbers;
☐ Highlight the individual sign structure that is to be shown in the elevation portion of the drawing with a dashed rectangle.

**Sign Structure Elevation:**

☐ Provide an elevation of the sign structure highlighted in the site plan. The elevation should be located under the site plan;
☐ Provide roadway cross section including lane locations, widths, and crossfalls;
☐ Label side slope grade adjacent to sign structure;
☐ Indicate clearzone value between outside of travel lane to sign structure concrete foundation. Indicate and detail any barrier treatment if minimum clearzone value, as established from the AT Roadside design guide, is not met;
Sign Structure Drawing Checklist

- If barrier system is being used to shield the sign structure indicate the setback provided between barrier traffic face and edge of sign structure/foundation;
- Label projection of concrete foundation above adjacent grade on traffic side(s). Projection shall be 0.70 to 0.85m;
- Provide elevation of top of concrete foundation to the nearest millimeter;
- Provided height and length geometry of the frame being detailed. Column height to be labeled from top of concrete foundation to centerline arm. Length of arm to be labeled from centerline column to end of arm/centerline of opposite column for cantilever and sign bridge structures respectively;
- Show location of A-Ident tag on column and provide Department issued number. See S-1682;
- Show location and provide dimensions to and of all sign panels to be supported on the sign structure including initial, interim, and final stages (as applicable). Also show minimum design panel area as defined in Section 24 of the Standard Specifications for Bridge Construction and identify critical location;
- Label and locate critical vertical clearance between sign structure/sign panels and roadway below. 6.0m is the minimum requirement;
- Under the title of the elevation provide the Bridge File, A-Ident, and Structure numbers as well as the Station number relating the location of the sign structure to the roadway chainage.

Site Map:

- Provide a site map in the upper right corner of the drawing;
- Site map shall be in accordance with standard drafting guidelines for site maps summarized under the General Requirements of the Engineering Drafting Guidelines for Highway and Bridge Projects.

Sign Structure Notes:

Sign Structure notes shall be on the right hand side of the sheet and shall include all standard notes as shown in Appendix F.

- The General Notes found on the sample drawing S-1721 shall be supplemented as required;
- The Design information table shall be completely filled in by the consultant and the design fabricator.
E.4 STANDARD BRIDGE DRAWING CHECKLIST

E.4.1 General

The term “Standard Bridge” includes any bridge structure where the structure can be defined primarily through the use of standard bridge drawings (available from AT). Typically, standard bridges use standard precast girders and standard substructure elements. Minimal drawing preparation is required for standard bridges and is only required to reflect site specific information.

The following checklist items shall apply to all site specific drawings for standard bridges:

- The information contained in the Title Block shall be as per AT requirements;
- There shall not be any overlapping text;
- No periods shall be used at the ends of standard abbreviations;
- Labeling for roadway centrelines, abutment and pier bearing centerlines, control lines and etc., shall be consistent throughout the entire drawing set.

E.4.2 General Layout Sheet

The intent of the General Layout sheet is to provide a visual presentation of the bridge structure after completion. To facilitate this presentation a plan, elevation and a section shall be provided. The plan and elevation are to be centred vertically with respect to each other and shall be presented in the same scale. A sheet index for the project shall also be presented.

The main components of the General Layout sheet are as follows:

Plan:

The plan shall be an accurate representation of what the bridge structure will look like after construction and should not be cluttered with other information such as old bridge structures, utilities, and right of way boundaries. The plan should incorporate the following information:

- The Plan orientation shall be such that the North arrow is orientated towards the top or to the right of the sheet;
- Overpassing roadway information shall be provided. This includes labelling of the centreline of roadway using standard naming convention, stationing, and clear roadway width;
- Provide watercourse information and bank location. Direction of water flow shall be provided;
- If there is an underpassing roadway, label centreline, indicate direction of travel an locate critical vertical clearance and clearance signs;
- Label all information represented by letters in the standard drawing based on the site specific geometry (ie. bridge span(s), bridge width, span lengths, overall bridge length, skew, etc.).
Show the appropriate headslope and sideslope configuration. Unless geotechnical considerations dictate otherwise, the standard headslope is 2:1 and the standard sideslope is 3:1. Corner transitions between the bridge headslopes and the sideslopes shall use an elliptical curve at the elevation of the toe of the headslope;

Identify centreline bearing of abutment and pier(s). Abutment and pier numbering increases in the direction of increased chainage;

Indicate location of the bridge plaque(s) and refer to sheet with specific bridge plaque information. Bridge plaques are to be placed on the right hand side of the first abutment encountered in direction of travel. Bridges carrying one way traffic require only one bridge plaque;

All bridges with cast in place concrete or precast concrete substructures shall incorporate a cast in benchmark tablet. Each tablet is assigned a unique reference number secured from the Survey/Imagery coordinator from Technical Standards Branch. The tablet shall generally be located in the northwest corner of the bridge. Refer to S-1478. The unique reference number shall be provided on the Tender Drawings and the as constructed elevation shall be filled in on the Record Drawing;

Indicate the type of bridge rail and approach rail transition to be used and reference the appropriate standard drawing;

Ensure all roadway drainage considerations and barriers are coordinated between approach roadway and bridge. This is especially critical in urban to semi urban environments that employ curb and gutter drainage systems on the approach roadway;

Show approximate location of the toe of slope. If the fills do not fit do not scale the plan down. Use the information sheet to indicate the fill geometry with a smaller scale;

Rip rap shall be shown in accordance with the standard details found in the “Bridge Conceptual Design Guidelines”. Rock class to be specified;

Do not taper fills back to match roadway width until such time that the taper does not encroach on the 600 mm of fill width required behind transition and guardrail posts;

Provide deck reinforcing details including:
  - Longitudinal and transverse reinforcing;
  - Additional reinforcement requirements at bridge ends;
  - Additional longitudinal reinforcing requirements over the pier(s). Bar cutoff locations (on both sides of pier) with respect to centerline of pier shall be provided;
  - Reinforcing steel lap lengths and locations as applicable.

Elevation:

The elevation shall incorporate the following information:

- Elevation and station marker lines. Elevation markers to be placed each side of elevation view and station markers on bottom of elevation;
- All span lengths (nearest metre) as measured at 20 degrees Celsius. Include the Department standard note explaining the difference between span dimensions being correct at 20 degrees Celsius while stationing information is based on bearings being centred at -5 degrees Celsius;
- Provide abutment and pier stationing and elevation data based on top of finished roadway along roadway control line to the nearest millimetre. Text for this information shall be vertically orientated;
Standard Bridge Drawing Checklist

- Out to out bridge opening shall be labelled with “Top of Centreline Finished Rdwy” with the associated station and Elevation (top of finished roadway) based on the roadway control line;
- Provide grade line slope at Centreline Roadway (or control line) at each support location expressed as a percent;
- Indication of slope protection either concrete (grade separation) or rip rap (watercourse). Rip rap shall be shown in accordance with the standard details found in the “Bridge Conceptual Design Guidelines” while slope protection shall be in accordance with S-1409;
- Indication of fill or cut requirements at headslopes using standard hatching;
- Bridge plague location;
- Bearing fixity at each abutment and pier shall be provided (ie. FXD or EXP);
- Standard headslope is 2:1 (unless geotechnical considerations dictate otherwise). Standard department hatching shall be used to denote cut and fill;
- Standard sideslope shall be 3:1
- Proper representation of the bridgerail and approach rail transition. Bridgerail post spacing/location shall be provided so the fabricator can locate the anchorage assemblies appropriately during girder fabrication;
- Locate clearance sign(s) at locations of governing vertical clearances. Theoretical clearances shall be shown for the initial stage and all future stages as necessary;
- Pile sizes complete with approximate pile tip elevation to the nearest metre;
- Method of conveying ditch drainage thru bridge headslope for grade separations;
- Provide SOD lines for 20m Right, 20m Left, and at Centreline overpassing road alignment;
- Show barriers for pier protection if required (standard piers are not designed for impact force from vehicle collision);
- Under passing roadway layout including lane widths, shoulders, swales, gores, and ramps for current and future stages;
- Location of utility duct beyond end of bridge.

Bridge Section:

A typical section thru the bridge deck shall be taken at the pier for multi-span bridges and near the abutment for single span bridges. The section should show the following:

- Out to out deck width;
- Barrier width and clear roadway each side of centreline roadway (or control line);
- Wearing surface used (standard is two course hot mix ACP wearing surface and waterproofing membrane);
- Cross fall (standard designs assume symmetrical 2% cross fall about centreline roadway. Non-symmetrical cross fall or superelevation is a non-standard design);
- Bridgerail type;
- Type, number of, and depth of girders used;
Standard Bridge Drawing Checklist

- Pier cap or abutment seat description (steel, cast in place concrete, precast concrete, backwall type);
- Pier (or abutment in case of single span bridge) piles and bracing (as required);
- Approximate location of existing ground/streambed.

Drawing Index:

- Use standard drawing index table format;
- Locate drawing index in bottom right-hand corner of the drawing;
- List all drawings included in the drawing set;
- Organize from the bottom up (i.e. sheet 1 is shown at the bottom and successive sheets listed upward);
- Include all standard drawings which are referenced in the drawing set. Standard drawings shall be included at the end of the drawing package, so should appear at the top of the drawing list.

E.4.3 Information Sheets

The information sheet is used to provide information pertaining to design criteria, survey information, project location, head slope fills, geotechnical information, utilities, and roadway data. The intent is to summarize this information here to avoid clutter on the general layout drawing. Information required:

Information - Sheet 1

Site Plan:

- Show the overall plan of the bridge site, without the bridge structure.
- Plan orientation shall be such that the North arrow is orientated towards the top or to the right of the sheet; Show the North arrow;
- Include roadway information for all roadways in the vicinity of the bridge, including ramps;
- For over-passing roadway:
  - Show the initial stage approach roadway;
  - Show and label the roadway curve & spiral information (if applicable);
  - Show the headslopes and sideslopes. Label the fill toes lines as "Edge of Fill";
  - Show and label the roadway control line (often the centreline roadway) and the roadway station markers (typically at 20 m spacing);
  - Show and label the top of fill width;
- For stream:
  - Show the stream bank topographical information (contours);
  - Show and label "Top of Bank", "Bottom of Bank" and "Approx. Edge of Water (with month and year measured)";
  - Show and label stream name and show an arrow indicating direction of stream flow;
  - Show and label the skew of stream flow to the centreline of the overpassing roadway control line;
Show and label the approximate locations of any existing or future utilities or culverts located near the bridge structure;

Show and label geotechnical test hole locations;

Provide the Intersection Equation to coordinate the overpassing roadway chainage with the underpassing roadway chainage;

Show and label site drainage using arrows to provide general impression of how drainage around bridge is dealt with;

Show and label legal land locations in the vicinity of the bridge;

Show and label existing right of way;

Show and label utilities, drainage culverts, fences, existing structures, and etc.;

Show and label existing bridge structure and roadway using light line weight;

If retaining walls are being used to shorten the headslopes or sideslopes, show the footprint of the retaining wall.

Quantity Estimate Table:

This table is essentially a summary of all of the quantity tables included in the drawing set;

Use standard quantity estimate table format;

The table shall include columns for substructure quantities, superstructure quantities, total estimated quantities and as constructed quantities. The “Estimate” quantities shall be completed for the Tender Drawings. These should match exactly the quantities provided in the tender bid items. The “As constructed” quantities are left empty until preparation of the Record Drawings;

Locate table in the bottom left-hand corner of the drawing.

Site Map:

Provide a site map showing the Bridge File and the location of the bridge structure;

Locate site map in the top right-hand corner of the drawing.

Survey Information:

Provide site survey information notes as per the standard bridge notes and modify as required;

Locate site survey information notes directly below the site map.

General Notes:

Provide general notes as per the standard bridge notes and modify as required;

The general notes apply to the entire bridge drawing set;

Locate general notes directly below the site survey information notes.
Overpassing Roadway Profile:

- Provide a grid with 1 m intervals for the vertical gridlines representing elevation (label every 5 or 10 m) and with 100 m (typical) intervals for the horizontal gridlines representing roadway stations (label every 500 m);
- Show and label the existing SOD lines, typically provided along the centerline of the overpassing road control line, 20 m right of the overpassing road control line and 20 m left of the overpassing road control line;
- Show the bridge headslope lines and label the stations and elevations where the headslopes intersect the gradeline (top of fill). Text for this information shall be orientated vertically;
- Show and label the overpassing roadway profile, measured at the centreline control line and to the top of finished pavement (typically labeled “CL Finished Pavement”);
- Show and label all roadway profile information including gradeline slopes; and curve data such as the stations and elevations for the beginning and end of vertical curve (BVC and EVC), length of curve (L), rate of curvature (K) and point of intersection (PI). Text for this information shall be orientated vertically;
- Show and label centreline control line of the underpassing roadway (where applicable).

Streambed Profile:

- Provide a grid with 1 m intervals for the vertical gridlines representing elevation (label every 5 or 10 m) and with 50 m (typical) intervals for the horizontal gridlines representing roadway stations (label every 50 m);
- Show and label the existing SOD lines, typically provided along the streambed thalweg, 20 m right of the underpassing road control line and 20 m left of the underpassing road control line;
- Show with an arrow and label the average streambed slope;
- Show and label the water elevation as measured on the date of the stream survey. Include the date of the survey;
- Show and label centreline control line of the overpassing roadway and the centreline of any other nearby overpassing roadways (existing or new).

Bridge Plaque Detail:

- Show bridge plaque and include structure number, location, and construction completion date. The construction date on the Tender Drawings shall be shown as “20XX” and shall be updated to the actual date of construction completion when preparing the Record Drawings.

Information - Sheet 2

Test Holes:

- Show elevation marker lines along each side and roadway/streambed station marker lines along the bottom;
- Show and label the existing SOD lines, typically provided along the streambed thalweg, 20 m right of the underpassing road control line and 20 m left of the underpassing road control line;
For under-passing roadway:

- Show the initial stage roadway geometry including lanes, shoulders, gores, ramps and swale;
- Label the centreline median control line and centreline travel lanes for the underpassing roadway;

Show and label the overpassing roadway profile, measured at the centreline control line and to the top of finished pavement (typically labeled “CL Finished Roadway”);

Show the bridge headslope lines and label slope. Show and label the top-of-fill locations where the headslopes intersect the gradeline. Label as “Top of Centreline Finished Rdwy” and include stations and elevations for top-of-fill locations;

Label the out-to-out dimension of the bridge opening. This is defined as the length from top-of-fill to top-of-fill;

Show arrow and label the direction of overpassing roadway (typically show east / west or north / south);

Show piles (spreadfooting) and approximate pile tip (spreadfooting bottom) elevations to the nearest half metre;

Show and label any geotechnical modifications to the headslope (ie. gravel toe, soil reinforcing, and etc.);

Show outline of geotechnical test hole at correct station and elevation. Label with test hole number and include station, offset distance from centreline overpassing roadway control line, elevation to top of test hole, and date of test hole data collection;

Show detailed geotechnical test hole information (ie. test hole logs and etc.). The detailed information should be shown at an increased scale and can be shown offset and below the actual test hole location. Geotechnical test hole logs should be presented as per the Department’s customized test hole database template which is available upon request.

Provide standard geotechnical notes as per the standard bridge notes and modify as required;

Show and label headslope riprap as applicable for streams.

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**E.4.4 Abutment Sheets**

The abutment sheet (if required by the Region) shall be used to pictorially reflect the abutment information summarized in tables on the standard drawings. An abutment plan and elevation will be required to facilitate this process. The purpose for providing this additional detail is to simplify the information transfer in the tender documents by presenting information in a visual format instead of a tabular format (standard drawing table). This also provides a way for the department to facilitate recording as constructed information.

**Abutment Plan:**

A plan similar to that shown on the standard bridge drawings shall be provided in the P drawing set. All the lettered dimensions shown on the standard drawing abutment plan shall be replaced with the appropriate numerical values as secured from the summary tables found on the standard drawings and from site specific information and shall summarized on the P drawing plan. Refer to Standard Drawings S-1755, S-1762, S-1765, and S-1794 for SL girders, and S-1779 and S-1790 for SLC girder bridges for abutment plan reference. Reference back to standard details should be made to limit drafting effort.
Standard Bridge Drawing Checklist

- Show plan of abutment seat, backwall, and wingwall;
- Show abutment skew value;
- Provide dowel locations;
- Provide overall width dimension of the abutment;
- Provide clear roadway width;
- Provide locations and orientation of bearing, wingwall, and anchor piles (if required);
- Proper dowel location based on abutment and girder type;

**Abutment Elevation:**

An elevation shall accompany the abutment plan to provide additional clarification to the site specific bridge abutment. The elevation shall be centred vertically under the plan and drawn to the same scale.

- Provide overall bridge superstructure width;
- Provide Wingwall height and lengths;
- Provide approximate pile tip elevation;
- Provide clear roadway;

**E.4.5 Pier Sheet**

The pier sheet (if required by the Region) shall be used to pictorially reflect the pier information summarized in tables on the standard drawings. A pier plan and elevation will be required to facilitate this process. The purpose for providing this additional detail is to simplify the information transfer in the tender documents by presenting information in a visual format instead of a tabular format (standard drawing table). This also provides a way for the department to facilitate recording as constructed information.

**Pier Plan:**

A plan similar to that shown on the standard bridge drawings shall be provided in the P drawing set. All the lettered dimensions shown on the standard drawing pier plan shall be replaced with the appropriate numbered values as secured from the summary tables and site specific information and presented on the P drawing plan. Refer to Standard Drawings S-1754, S-1762, and S-1765 for abutment plan reference. Reference back to standard details should be made to limit drafting effort.

- Show plan of pier cap including overall width;
- Show pier skew value;
- Provide locations and orientation of bearing piles;
Pier Elevation:

An elevation shall accompany the pier plan to provide additional clarification to the site specific bridge pier. The elevation shall be centred vertically under the plan and drawn to the same scale.

- Provide pier height above stream bed;
- Indicate elevation of pier pile bracing;
- Provide approximate pile tip elevation;

E.4.6 Details Sheet

A details sheet may be provided to include the deck bar list, bridgerail elevation and any other site specific details that may be required. Alternatively, the deck bar list, bridgerail elevation and any other site specific details may be incorporated into the abutment, pier or information sheets.

Deck Bar List

A deck bar list is required for all SLC girder standard bridges. The bars are to be detailed to reflect the bridge width, length, and skew values selected for the site. Bars that require detailing include:

- Cast in place concrete deck reinforcing including abutment and pier diaphragms (SLC bridges).

Bridgerail Elevation

A bridgerail post anchor bolt elevation similar to that shown on S-1775 shall be included in the site specific drawings providing the proper post spacing within the limits of those set out in the standard bridgerail standard drawings. Refer to S-1642 or 1648 (for SLC bridges) or S-1652 or S-1653 (SL bridges) and S-1797 for SLW girder bridges.
E.5 BRIDGE REHABILITATION DRAWING CHECKLIST

The following checklist items shall apply to all bridge rehabilitation drawings:

- The information contained in the Title Block shall be as per AT requirements;
- There shall not be any overlapping text;
- No periods shall be used at the ends of standard abbreviations;
- Labeling for roadway centrelines, abutment and pier bearing centerlines, control lines and etc., shall be consistent throughout the entire drawing set.

E.5.1 Rehabilitation Layout Sheet

General:

The intent of the “Rehabilitation Layout” sheet is to provide an accurate representation of the completed bridge structure. It should include an overall plan, elevation, bridge section, drawing index, reference drawing list, and general notes. The plan and elevation should be centred vertically with respect to each other and of the same scale.

- The Plan and Elevation views should be aligned vertically on the drawing and of the same scale;
- The superstructure span lengths and the corrected girder lengths should be dimensioned in accordance with as constructed reference drawings or the “Bridge Structures Design Criteria” as applicable;
- All dimensions shown on the Rehabilitation Layout sheet are to be given in metres to three decimal places. All other sheets shall be dimensioned in millimetres except for stations, control points, coordinates and elevations which shall be expressed in metres;
- The notes on the drawing identifying the rehabilitation work items shall have a rectangle placed around them. Work items should be consistent with bid item descriptions where appropriate and only shown once on plan, elevation or bridge section;
- When load rating has been completed in conjunction with the scope of rehabilitation work a “Bridge Load Rating” table shall be included on the rehabilitation layout. The load rating table shall indicate the flexural and shear capacities for the various required rating vehicles. All load rating information presented shall be consistent with Department published manuals.

Plan:

- Plan orientation shall be such that the North arrow is orientated towards the top or to the right of the sheet;
- Include sufficient roadway information to facilitate scope of the rehabilitation work;
- Label the clear roadway width;
- Label the centreline roadway control line (often the centreline roadway or centreline of median)
Label centreline abutment bearing abutment and centreline pier(s). Abutment and pier numbering should be consistent with reference drawings. Typically numbering will increase in the direction of increasing chainage;

Include the “A-Section” mark symbol for the bridge section (direction of increasing chainage);

Show existing benchmark tablets or new tablets where new curbs are being constructed. New tablets are assigned a unique reference number secured from the Department. The location of the tablet shall typically be in accordance with S-1478. The unique reference number and as constructed elevation shall be indicated on the plan;

Show deck, curbs/barriers/medians, bridge rail and approach rail transitions;

Show substructure elements;

Show and label head slopes;

Show watercourse, name of watercourse and direction of flow;

Show and label rip rap;

The bridge skew angle shall be shown at the abutments and also at the piers if different;

Show extents of approach transition paving with 30 degree right hand forward tie-in to existing pavement structure;

Show approach and roof slab joint extents;

Show drain troughs and terminals.

The following typical rehabilitation text boxes should be included on the Plan, but is not limited to:

- Full and partial depth concrete repairs to the bridge deck;
- Full and partial depth concrete repairs to the bridge curbs/barriers/medians;
- Approach transition/approach slab/roof slab work;
- Deck drain work;
- Drain trough and terminal work. Label estimated length of each drain trough;

Where work items are required at multiple locations the rehabilitation text box should utilize “typical” references as appropriate. For example: “PARTIAL DEPTH REPAIR OF CURBS. TYPICAL BOTH SIDES OF BRIDGE.” or “INSTALL DRAIN TROUGH. TYPICAL AT ALL FOUR CORNERS. ESTIMATED LENGTH = 10,000 m EACH” or “REMOVE AND REPLACE APPROACH SLAB. TYPICAL AT BOTH ABUTMENTS”.

Multiple or double arrowheads should not be used to show work items occurring at multiple locations.

**Elevation:**

- Show deck, curbs/barriers/medians, sidewalks, bridge rail and approach rail transitions;
- Show substructure components (including foundations), and label the centreline abutment bearing and centreline pier(s);
- Label bearing fixity at each abutment and pier (ie. FXD or EXP);
- Show and label roadway directional arrows (typically show east/west or north/south and to the nearest population area (i.e. “WEST TO SPRUCE GROVE” in one direction and “EAST TO EDMONTON” in the
other direction). Where no population area exists only include the direction label (i.e. “NORTH” and “SOUTH TO EMPRESS”;

☐ Show streambed and headslope profiles;
  o For river bridges, show and label rip rap as required;
  o For grade separation bridges, show and label the concrete slope protection;

☐ Show and label the centreline of travel lanes/railway for the underpassing roadway/railway;
  o Show shoulders, gores, ramps and swale as required;
  o Show and label underpassing roadway barriers;
  o Show railway clearance boxes;
  o Show and label the clearance sign(s);

☐ Show and label the bridge span lengths;

☐ Show and numerically label location of deck joint replacements; and

☐ Show retaining or MSE walls;

☐ Show and label drain troughs;

The following typical rehabilitation text boxes should be included on the Elevation, but is not limited to:

☐ Girder strengthening or repair work;

☐ Substructure work;
  o Full and partial depth concrete repairs;
  o Concrete finishing and sealing;
  o Bearing work;

☐ Headslope, concrete slope protection, or channel work;

☐ Retaining/MSE wall work;

☐ Painting work;

**Bridge Section:**

☐ The bridge section should be taken towards the middle of the bridge length;

☐ The bridge section orientation shall match the direction of the section mark on the plan;

☐ Show deck, curbs/barriers/medians, sidewalks, and bridgerail;

☐ Show girders, bracing system, and bearings;

☐ Where the bridge includes a pier, the pier should be shown. For single span bridges, an abutment should be shown;

☐ Label the centreline roadway control line;

☐ Label the clear roadway width (dimension from control line to face of curbs/barriers);

☐ Label curb/barriers widths, and where applicable median and sidewalk widths;

☐ Label the deck crossfall slope(s);
The following typical rehabilitation text boxes should be included on the bridge section, but is not limited to:

- Surface removal depth including existing materials to be removed and new deck protection system (i.e. `REMOVE 65 mm (NOM) OF EXISTING CHIP SEAL COAT AND DECK CONCRETE. REPLACE WITH CLASS HPC CONCRETE WITH STEEL FIBRES`)
- Bridgerail work;
- Curb/barrier/median work.

**Drawing Index:**

- Use standard drawing index table format;
- Locate drawing index in bottom right-hand corner of the drawing;
- List all drawings included in the drawing set;
- Organize from the bottom up (i.e. sheet 1 is shown at the bottom and successive sheets listed upward);
- Include all standard drawings which are referenced in the drawing set. Standard drawings shall be included at the end of the drawing package, so should appear at the top of the drawing list.

**Reference Drawing Index:**

- Use modified drawing index table format, there is no sheet number column required;
- Locate reference drawing index above drawing index or to the left if required;
- List all reference drawings applicable to the scope of the rehabilitation work;
- Organize in chronological order bottom up (i.e. earliest produced drawings shown at the bottom and successive sheets listed upward);
E.6 Culvert Drawing Checklist

E.6.1 General Layout Sheet

The intent of the “General Layout” sheet is to provide an accurate representation of the culvert structure after construction. It typically includes overall site plan, longitudinal cross section, road profile, stream profile, backfill details, site map, general notes, drawing index and quantity estimate table.

If there is not sufficient room for all of these components on the General Layout sheet, some details may be moved to an Information Sheet(s)

Site Plan:

- The Site Plan orientation shall be such that the North arrow is orientated towards the top or to the right of the sheet;
- Show and label legal land locations in the vicinity of the culvert including land ownership
- Show and label stream name and show an arrow indicating direction of stream flow;
- Show and label “Top of Bank” and “Bottom of Bank” ;
- Show and label stream stations
- Show culvert at skew to roadway and label with new culvert note: culvert diameter, shape, length, skew angle, roadway crossing station
- Show and label the extent of rip rap and type of rock used
- Show and label exiting roadway centreline, shoulder and toe of slope and show slope indicators
- Show and label roadway stations
- Show and label existing right of way;
- Show any additional right of way required, show stations and dimensions
- Show and label any existing or future utilities, fences, existing infrastructure near the new culvert.
- Show and label existing culvert structure using light dashed lines
- Label new culvert, number of culverts, diameter, invert length, skew to roadway and station
- Show and label geotechnical bore hole locations;
- Show and label all survey monuments
- Show and label existing or new guardrail
- Show and label any erosion measures
- Show and dimension existing roadway and clear roadway
- Show any berms with sideslopes, dimension width’s and elevations
- Show transition to streambed channel
Culvert Drawing Checklist

Longitudinal Section

- Show horizontal gridlines representing elevation (label every 5 m)
- Show and label centreline roadway with elevation
- Show and dimension finished shoulder line with elevation
- Show and dimension between new guardrail if required
- Show and label direction of inlet and outlet (typically east/west or north/south)
- Show stream flow arrow
- Show and label streambed profile
- Show and label streambed elevation at inlet and outlet rip rap and centreline roadway
- Show and label upstream, centreline and downstream invert elevations
- Show and label top of rip rap and berm/bank elevations
- Show and dimension length of inlet and outlet rip rap aprons
- Show and dimension length of inlet and outlet clay seals
- Show and dimension length of culvert from roadway centreline
- Show and label all Geotextile material
- Show and label head water and tail water
- Show and label all granular and clay material using standard department symbology
- Dimension granular material below culvert
- Show and label sideslope to road
- Show and label concrete end treatment if required and identify either inlet or both inlet and outlet to receive the treatment. Call up the Department Standard drawing number to be used.
- Under the section title add note to indicate the skew angle to roadway, station and scale

Backfill Details

- Show and label finished gradeline
- Show and label existing gradeline if applicable
- Show and label excavation limits
- Show and label clay seal limits
- Show and dimension culvert
- Show and label geotextile material
- Show and label granular material
- Show and label stream bed elevation inside culvert
- Show and label all granular and clay material using standard department symbology
- Show and dimension bottom of excavation and haunches
Culvert Drawing Checklist

- Show and dimension top of excavation and side slope cut angle (1 to 1 typ)
- Show and dimension depth of excavation, depth of granular material below and above culvert
- Show and dimension height of granular envelope
- Show and dimension sideslope berms if required
- Call up the class of granular backfill material for gravel and crushed aggregate

Roadway Profile:
- Show horizontal gridlines representing vertical elevation intervals of 1 m (label every 5 m) and vertical gridlines representing roadway stations intervals of 20 m (label every 100 m)
- Show and label the existing SOD lines right and left;
- Show and label existing grade
- Show BVC and EVC with stations and elevation if there is a gradeline change
- Show and indicate direction arrows
- Show and label centreline of the overpassing roadway with station
- Show and label centreline invert elevation
- Show culvert shape

Streambed Profile:
- Show horizontal gridlines representing vertical elevation intervals of 1 m (label every 5 m) and vertical gridlines representing roadway stations intervals of 20 m (label every 100 m)
- Show with a flow arrow
- Show and indicate direction arrows
- Show and label streambed profile
- Show and label the water elevation as measured on the date of the stream survey. Include the date of the survey;
- Show and label centreline of the overpassing roadway with station
- Show and label design tailwater and design headwater elevations
- Show and label upstream, centreline and downstream invert elevations

Site Map:
- Provide a site map showing the Bridge Site Number and the location of the bridge structure, the structure is to be centered in the map;
- The municipality that the culvert is referenced from is to be shown on map in bold letters
Culvert Drawing Checklist

- Locate site map in the top right-hand corner of the drawing. Map to be 4 ranges by 4 townships and labeled with ranges on bottom and townships on left side of map, include legend for road types

**Survey Information:**

- Provide site survey information notes as per the standard drawing notes for bridge projects and modify as required;
- Include grid to ground scale factor
- Locate site survey information notes directly below the site map;

**Bench Marks:**

- Identify all found survey monuments and any new ones placed to undertake the survey of the site;
- Should include station, roadway offset, elevations and northing and easting;

**Hydrotechnical Summary:**

- Notes to include, total drainage area, design discharge, mean outlet velocity and average surveyed slope of streambed

**Structure:**

- Identify culvert diameter, length, and skew and highway station;
- Identify plate thickness, coating and corrugation profile;

**General Notes:**

- Provide general notes as per the standard culvert notes and modify as required;
- The general notes apply to the entire culvert drawing set;
- Locate general notes directly below the structure information

**Drawing Index:**

- Use standard drawing index table format;
- Locate drawing index in bottom right-hand corner of the drawing; leave 10 mm space all around to the sheet surround;
- List all drawings included in the drawing set;
- Organize from the bottom up (i.e. sheet 1 is shown at the bottom and successive sheets listed upward);
- Include all standard drawings which are referenced in the drawing set. Standard drawings shall be included at the end of the drawing package, so should appear at the top of the drawing list. Standard drawings are included in the number of sheets in the set of drawings
Quantity Estimate Table:

- Use standard quantity estimate table format;
- Table reads from bottom to top;
- Locate table such that there is a minimum 10 mm space to any sheet surround linework.
E.7 BRIDGE RECORD DRAWING CHECKLIST

The purpose of the Record Drawings is to accurately represent what was constructed in the field based on the Tender Drawings provided.

Record drawings shall satisfy the following:

- All Record Drawings are to be authenticated by the Engineer of Record;
- The name of the design engineer and the date of signing for the original Tender Drawings shall appear on all Record Drawings;
- The design Consultant’s Permit to Practice stamp shall appear on all Record Drawings;
- The date in the title block shall remain the same as that shown on the Tender Drawings;
- All changes between the Tender Drawings and the Record Drawings shall be flagged with a revision triangle, including all changes to dimensions, notes, elevations, stations, rebar spacing, etc.;
- All reference to the Record Drawing numbers shall be change from a “-P” suffix to a “-C” suffix. A single revision triangle shall be placed beside the drawing index title to indicate the change of drawing status;
- The average pile tip elevation shall be shown to the nearest centimetre and redrawn to the new elevation on all applicable drawings;
- Update the Bench Mark Tablet information on the General Layout Sheet with the as constructed elevation and submit elevation to the department’s survey image coordinator;
- Update all Quantity Tables with the as constructed quantity information;
- Check the cross referencing of the sheet numbers on Details and Sections throughout the drawing set, in particular if drawings have been added or subtracted during the construction phase and the Record Drawing Index does not match the Tender Drawing Index;
- Check the Record Drawing Index to verify the total number of drawing sheets, drawing names and drawing numbering.
Alberta Transportation
Engineering Drafting Guidelines for Highway
and Bridge Projects

Appendix F

STANDARD DRAWING NOTES FOR BRIDGE
PROJECTS

Date Published: June, 2016
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F.1 GENERAL

This appendix provides standard drawings notes for use on Alberta Transportation projects. These notes are provided for guidance purposes. Consistency of drawing notes is very important and therefore, these notes should be used wherever possible. However, these notes may be modified or added to as required for site specific concerns.

These standard notes reflect the typical information required to appropriately convey design and construction information to the Contractor. At the time of publishing, these standard notes are consistent with the design and construction requirements presented in the “Bridge Structures Design Criteria” and the “Standard Specifications for Bridge Construction”. However, the “Bridge Structures Design Criteria” and the “Standard Specifications for Bridge Construction” will be updated on a regular basis and the changes may not be reflected in these standard notes. It is the Consultant’s responsibility to ensure that the notes appearing on the detailed design drawings are modified to be consistent with the latest version of the “Bridge Structures Design Criteria” and the “Standard Specifications for Bridge Construction”.

Text in blue shall be modified for project specific information. Text in red italics are comments for consideration and should not be included with the notes.
**F.2 STANDARD DRAWING NOTES FOR NEW BRIDGES**

The following standard notes are provided for use on detailed design drawings for new bridges.

**F.2.1 General Layout Notes**

The following Standard Notes shall be included on the “General Layout” sheet.

For bridges with steel girder superstructures:

<table>
<thead>
<tr>
<th>NOTE:</th>
</tr>
</thead>
<tbody>
<tr>
<td>* GIRDER LENGTHS SHOWN ARE MEASURED ALONG BOTTOM FLANGE AND ARE CORRECT AT +20° C. ABUTMENT AND PIER STATIONINGS ARE LOCATED SUCH THAT BEARINGS ARE CENTRED AT -5° C</td>
</tr>
</tbody>
</table>

Comment: This note is provided to coordinate the girder fabrication, girder erection and bearing positioning. For most steel girder bridges it is most accurate to measure the girder length along the bottom flange as this translates directly into the dimensions provided on the drawings for bearing positioning. However, in certain situations (e.g. for haunched girders) it may not appropriate to measure along the bottom flange. In these situations, it may make more sense to measure along the top flange, but the Consultant will need to incorporate girder end geometry into the girder length calculations.

DIMENSIONS ARE SHOWN TO GROUND. STATIONS AND CONTROL POINTS ARE SHOWN TO 3TM GRID COORDINATE VALUES.

For bridges with precast concrete girder superstructures:

<table>
<thead>
<tr>
<th>NOTE:</th>
</tr>
</thead>
<tbody>
<tr>
<td>* GIRDER LENGTHS SHOWN ARE MEASURED ALONG BOTTOM FLANGE AND ARE CORRECT AT +20° C. ABUTMENT AND PIER STATIONINGS ARE LOCATED SUCH THAT BEARINGS ARE CENTRED AT -5° C. PRECAST SUPPLIERS SHALL MAKE APPROPRIATE ALLOWANCE FOR PRESTRESS SHORTENING, SHRINKAGE &amp; CREEP UP TO THE TIME OF GIRDER ERECTION</td>
</tr>
</tbody>
</table>

DIMENSIONS ARE SHOWN TO GROUND. STATIONS AND CONTROL POINTS ARE SHOWN TO 3TM GRID COORDINATE VALUES.
### F.2.2 Information Sheet Notes

The following Standard Notes shall be included on "Information – Sheet 1".

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#### SITE MAP

---

#### SURVEY INFORMATION

- SURVEY INFORMATION PROVIDED BY ABC Ltd., COMPLETED SEPTEMBER 2009 UNDER THE DIRECTION OF T. S. GEISEL

- CONTROL POINT
  - CP 205  N 5720943.420  E -1836.231  EL 1005.361
  - ASCM 94946  N 5720499.173  E -140.734  EL 1001.638

- THE COORDINATES AND STATIONING ARE BASED ON NAD’83 DATUM USING THE 3TM GRID PROJECTION, CENTRAL MERIDIAN 114. A COMBINED SCALE FACTOR (CSF) OF 0.999743 HAS BEEN ADOPTED FOR THIS PROJECT.

- ALL DIMENSIONS INDICATED ON THESE DRAWINGS ARE GROUND DISTANCES.
  - GRID DIMENSION = GROUND DIMENSION x CSF
  - GROUND DIMENSION = GRID DIMENSION / CSF

---

#### GENERAL NOTES

- ALL DIMENSIONS SHOWN ON THE GENERAL LAYOUT AND INFORMATION SHEETS ARE GIVEN IN METRES. ALL OTHER DRAWINGS ARE DIMENSIONED IN MILLIMETRES EXCEPT FOR STATIONS, CONTROL POINT COORDINATES AND ELEVATIONS WHICH ARE EXPRESSED IN METRES.

- ROADWAY DESIGN STANDARD:
  - TWP RD 310  RUL-209-110
  - HWY 2  RFD-412.4-130 (EXISTING)
  - HWY 2  RFD-616.6-130 (6-LANE)
  - HWY 2  RFD-820.8-130 (8-LANE ULTIMATE)

- ROADWAY ELEVATIONS ARE GIVEN TO TOP OF FINISHED CL ROADWAY

---

#### DESIGN

- CAN / CSA-S6-14
- LIVE LOAD:  CL800

#### ABUTMENT PILE LOADS

- SLS PERMANENT LOADS ONLY = 500 kN
- SLS EXTREME LOADS (COMBINATION #1) = 750 kN
- ULS PERMANENT LOADS ONLY = 1000 kN
- ULS EXTREME LOADS (COMBINATION #4) = 1250 kN

#### PIER PILE LOADS

- SLS PERMANENT LOADS ONLY = 500 kN
- SLS EXTREME LOADS (COMBINATION #1) = 750 kN
- ULS PERMANENT LOADS ONLY = 1000 kN
- ULS EXTREME LOADS (COMBINATION #4) = 1250 kN
The following Standard Geotechnical Notes shall be included on the Information Sheet showing the geotechnical test hole logs (typically “Information – Sheet 2”). These notes typically appear at the bottom left-hand corner of the sheet.

**GEOTECHNICAL NOTES**

- ALL GEOTECHNICAL INFORMATION PROVIDED FOR THIS PROJECT HAS BEEN COMPILED FOR ALBERTA TRANSPORTATION FOR DESIGN PURPOSES ONLY. INFORMATION WAS COMPILED FROM ABC Ltd. REPORT, “GEOTECHNICAL INVESTIGATION - MONSTER CREEK BRIDGE. ALBERTA” SEPTEMBER 2009. ADDITIONAL INFORMATION IS AVAILABLE IN THE REPORT AND SHOULD BE EXAMINED AND SUPPLEMENTED AS REQUIRED. ALL DISCLAIMERS IN THIS REPORT ARE APPLICABLE AND IN CASE OF DISCREPANCY, THE GEOTECHNICAL REPORT GOVERNS.

- GEOTECHNICAL LIMITATION: WHILE THE GEOTECHNICAL INFORMATION PROVIDED FOR THIS PROJECT IS BELIEVED TO CORRECTLY REPRODUCE OR SUMMARIZE OBSERVATIONS MADE DURING TESTING, IT IS VALID ONLY FOR THE PRECISE LOCATION(S) SHOWN, AND IT IS NOT TO BE CONSTRUED AS GUARANTEEING THE ACTUAL MATERIALS AND CONDITIONS EXISTING THROUGHOUT THE SITE. THE TESTING METHODS USED MAY NOT HAVE DETERMINED THE PRESENCE, ABSENCE OR EXTENT OF BOULDERS, HARD OR SOFT FORMATIONS, WATER TABLES, ARTESIAN CONDITIONS AND OTHER VARIABLES. IT IS THE RESPONSIBILITY OF OTHERS USING THIS INFORMATION TO ENSURE THAT IT IS ADEQUATE FOR THEIR PURPOSES, OR TO SUPPLEMENT IT WITH ADDITIONAL INFORMATION.

*Comment: Geotechnical design criteria shall be included on this sheet for future reference. This information shall be included as per the following pages.*
### Geotechnical Design Criteria:

**For Pile Foundation:**

<table>
<thead>
<tr>
<th>Foundation Type</th>
<th>Foundation Design Parameters</th>
<th>Settlement Considerations</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ELEV</td>
<td></td>
</tr>
<tr>
<td>Driven H-Pile</td>
<td>GEOTECH ULTIMATE SKIN FRIC.</td>
<td></td>
</tr>
<tr>
<td>Or Driven Pipe</td>
<td>GEOTECH ULTIMATE END BEARING</td>
<td></td>
</tr>
<tr>
<td>Or Drilled CIP</td>
<td>Soil Resistance Factors</td>
<td></td>
</tr>
<tr>
<td>Pile</td>
<td>Modulus of Subgrade Reaction (K)</td>
<td>Downdrag Effects</td>
</tr>
<tr>
<td></td>
<td>Group Effects</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Short Term</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Long Term</td>
<td></td>
</tr>
</tbody>
</table>

For Skin Friction, \( F = X \)

For End Bearing, \( F = X \)

**For Spread Footing Foundation:**

<table>
<thead>
<tr>
<th>Foundation Type</th>
<th>Foundation Design Parameters</th>
<th>Settlement Considerations</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ELEV</td>
<td></td>
</tr>
<tr>
<td>Spread Footing</td>
<td>GEOTECH ULTIMATE BEARING PRESSURE</td>
<td>Sliding Resistance</td>
</tr>
<tr>
<td></td>
<td>Soil Resistance Factors</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Modulus of Subgrade Reaction (K)</td>
<td>Short Term</td>
</tr>
<tr>
<td></td>
<td>Long Term</td>
<td></td>
</tr>
</tbody>
</table>

For Sliding, \( F = X \)

<table>
<thead>
<tr>
<th>Soil Parameters from Lateral Analysis</th>
<th>Earth Pressure (EP) Parameters</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELEV</td>
<td></td>
</tr>
<tr>
<td>Driven H-Pile Or Driven Pipe Or Drilled CIP Pile</td>
<td>Depth Below Finish Grade</td>
</tr>
<tr>
<td>(m)</td>
<td>(m)</td>
</tr>
</tbody>
</table>

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Appendix F – Bridge Standard Drawing Notes
<table>
<thead>
<tr>
<th>FOUNDATION TYPE</th>
<th>SOIL FRICTION ANGLE</th>
<th>EARTH PRESSURE (EP) PARAMETERS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Degrees</td>
<td>$K_0$</td>
</tr>
</tbody>
</table>
F.2.3 Abutment Sheet Notes

The ABUTMENT NOTES and ABUTMENT PILE NOTES are typically located on “Abutments – Sheet 1”. Where integral abutments are used, additional notes for INTEGRAL ABUTMENT CONSTRUCTION SEQUENCE may be provided to supplement the abutment and abutment pile notes.

<table>
<thead>
<tr>
<th>ABUTMENT NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>• CONCRETE SHALL BE CLASS C (f’c = 35 MPa), EXCEPT CURBS ON WINGWALLS, CAST IN PLACE CONCRETE DIAPHRAGMS, TOP 300 mm OF ABUTMENT BACKWALL, ROOF SLABS, APPROACH SLABS, AND SLEEPER SLABS WHICH SHALL BE CLASS HPC (f’c = 45 MPa)</td>
</tr>
<tr>
<td>• ALL REINFORCING STEEL SHALL HAVE 50 mm CLEAR COVER UNLESS NOTED OTHERWISE</td>
</tr>
<tr>
<td>• ALL EXPOSED CORNERS SHALL HAVE 20 mm CHAMFER OR FILLET UNLESS NOTED OTHERWISE</td>
</tr>
<tr>
<td>• CONCRETE FINISHES SHALL BE AS SPECIFIED IN THE STANDARD SPECIFICATIONS FOR BRIDGE CONSTRUCTION</td>
</tr>
<tr>
<td>• ALL REINFORCING STEEL LAP SPLICES SHALL BE FULL TENSION CLASS B UNLESS NOTED OTHERWISE</td>
</tr>
<tr>
<td>• SOLID STAINLESS STEEL REINFORCING BARS SHALL CONFORM TO ASTM A276 AND A955/955M (INCLUDING ANNEX 1.2 OR 1.3) AND ONE OF THE FOLLOWING UNS GRADES: S30400, S31603, S31653, S31803, OR S32304 AND A MINIMUM YIELD STRENGTH OF 420 MPA AND / OR</td>
</tr>
<tr>
<td>• CRR REINFORCING BARS SHALL BE EITHER:</td>
</tr>
<tr>
<td>o LOW CARBON/CHROMIUM STEEL CONFORMING TO ASTM A1035 ALLOY TYPE CS; OR</td>
</tr>
<tr>
<td>o SOLID STAINLESS STEEL CONFORMING TO ASTM A276 AND A955/955M (INCLUDING ANNEX 1.2 OR 1.3) AND ONE OF THE FOLLOWING UNS GRADES: S30400, S31603, S31653, S31803, OR S32304 WITH A MINIMUM YIELD STRENGTH OF 420 MPA</td>
</tr>
</tbody>
</table>

Comment: The Bridge Structures Design Criteria identifies areas where Corrosion Resistant Reinforcing (CRR) is to be used for durability. For certain components of the bridge, stainless steel reinforcing bars shall always be specified. These typically include deck joint blockouts, corbels and reinforcing bars connecting approach slabs to corbels. For other components of the bridge (barriers, decks, approach slabs and roof slabs), the type of reinforcing depends on the exposure classification for a specific bridge. Consultants shall refer to the Bridge Structures Design Criteria in order to determine which exposure class the specific bridge falls into.

Bridges with exposure class 1 shall be detailed using stainless steel with all bar marks using the “SS” suffix
Bridges with exposure class 2 shall be detailed with CRR which can be either stainless steel or low carbon/chromium (ASTM A1035 Alloy Type CS), depending on what the contractor decides to bid. For exposure class 2, the Consultant will not know which type of reinforcing will be provided by the Contractor. For these bridges, both of the above notes are required, since some of the reinforcing must be stainless steel (eg. in corbels) while the remaining steel might not end up being stainless steel. While preparing the Tender drawings, the CRR reinforcing steel shall be called up using the “CR” suffix on the bar mark. While preparing the Record drawings, the Consultant shall identify which reinforcing type was actually used by the Contractor and the bar marks shall be updated with the “SS” suffix if stainless steel reinforcing is used and “MX” if low carbon/chromium reinforcing is used.

Consultants should be aware the low carbon/chromium reinforcing bars are currently only available in imperial sizes.

- **PLAIN STEEL REINFORCING BARS SHALL CONFORM TO CSA G30.18 GRADE 400**

**ABUTMENT PILE NOTES**

- **ALL REQUIREMENTS OF THE STANDARD SPECIFICATIONS FOR BRIDGE CONSTRUCTION SECTION 3 SHALL BE MET**

- **PILE CONCRETE SHALL BE CLASS PILE WITH SULFATE RESISTANT (TYPE HS) PORTLAND CEMENT**

- **H-PILES SHALL BE HP 310x174. PILE SPLICES SHALL BE IN ACCORDANCE WITH STANDARD DRAWING S-1415. H-PILING SHALL CONFORM TO CSA G40.21 350W AND / OR**

- **PIPE PILES SHALL BE 273 O.D. X 7.8 WALL THICKNESS. PILE SPLICES SHALL BE IN ACCORDANCE WITH STANDARD DRAWING S-1414. PIPE PILING SHALL CONFORM TO ASTM A252 GRADE 2**

- **PILES SHALL BE DRIVEN TO THE ELEVATIONS SHOWN ON THE GENERAL LAYOUT DRAWING. DYNAMIC MONITORING OF THE PILE DRIVING SHALL BE USED ON THE FIRST FOUR PILES AT EACH ABUTMENT TO ACCURATELY DETERMINE PILE CAPACITY. BASED ON THE RESULTS THE REMAINING PILE LENGTHS MAY BE SHORTENED OR LENGTHENED AS DIRECTED BY THE GEOTECHNICAL CONSULTANT**

  *Comment: The second and third sentences of this note refer to dynamic testing of piles to determine capacity when the dynamic resistance factor in the CSA bridge code is used. In cases where the dynamic testing is not required, the last two sentences can be deleted.*

- **PILES SHALL NOT BE OUT OF THE POSITION SHOWN ON THE DRAWINGS BY MORE THAN 50 mm**

  *Comment: Provide an out of position tolerance here only if it is different than the standard value provided in the Standard Specifications for Bridge Construction Section 3*

- **ALL OF THE PILE SPLICE WELDS THAT ARE REQUIRED WITHIN THE TOP “X” m OF THE PILE**
ARE TENSION SPLICE WELDS

Comment: All welded pile splices whose tensile or flexural capacity is critical to the structural integrity of the bridge (for example with integral bridges), shall be identified as tension splice welds on the Detailed Design drawings. These welds will require testing using non-destructive testing techniques.

- MINIMUM REQUIRED PILE GEOTECHNICAL COMPRESSION CAPACITIES OF ABUTMENT PILES SLS EXTREME LOADS (COMBINATION #1) = 600 kN

Comment: All different abutment pile locations shall be listed here. For example, if wingwall or gradebeam piles have different design loads, they should be listed here as well.

- ALL WELDING SHALL BE IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS FOR BRIDGE CONSTRUCTION SECTION 13 AND THE CURRENT AWS SPECIFICATIONS D1.5

Comment: This note is for driven piles only.

- CSP SLEEVES SHALL MEET THE REQUIREMENTS OF CSA STANDARD G401

Comment: Smooth wall pipe may be substituted for the CSP (poor soil conditions, construction staging or large movements of the piles inside the sleeves). The smooth wall pipe shall meet the requirements of ASTM A252 Grade 2 or better.

INTEGRAL ABUTMENT CONSTRUCTION SEQUENCE

- INSTALL STEEL PIPE/CSP SLEEVES CENTRED ON PILE LOCATIONS. EXCAVATE INSIDE SLEEVES PRIOR TO DRIVING H-PILES

- DRIVE H-PILES INSIDE PIPE SLEEVES. USE OF A DRIVING FRAME IS REQUIRED TO ENSURE H-PILES REMAIN CENTRED IN PIPE SLEEVES

- TRIM H-PILES AND SLEEVES TO SUIT DESIGN ELEVATIONS

- FILL SLEEVES WITH POLYSTYRENE PELLETS AND PLACE CAP OVER THE SLEEVE TO PREVENT INFILTRATION OF CONCRETE. PELLETS SHALL BE “STOROPACK VIRGIN POLYSTYRENE 14.4 kg/m3 FILLER BEAD NOMINAL DIAMETER OF 5 mm” OR APPROVED EQUIVALENT

- PLACE ABUTMENT SEAT CONCRETE FOR THE FULL WIDTH OF THE ABUTMENT SEAT

- PLACE CONCRETE PLINTHS AND PLAIN UNREINFORCED ELASTOMERIC BEARING PADS

Comment: This note is to be modified to match the site specific temporary girder support being used

- ERECT GIRDERS ONTO PLAIN UNREINFORCED ELASTOMERIC BEARING PADS ENSURING THE SLOTTED HOLES IN THE GIRDER BOTTOM FLANGE ALIGN WITH THE ANCHOR ROD GROUT CANS. PLACE AND GROUT ANCHOR RODS. PLACE WASHERS AND NUTS ON
**ANCHOR RODS AND FINGER TIGHTEN**

*Comment: This note is to be modified to match the site specific temporary girder support being used.*

- PLACE DECK CONCRETE IN THE SEQUENCE SHOWN ON THE DECK DRAWINGS EXCLUDING THE DECK SECTIONS ADJACENT TO THE ABUTMENT DIAPHRAGM

- SNUG TIGHTEN THE NUTS ON THE ANCHOR RODS. CAST REMAINING PORTION OF DECK AND ABUTMENT DIAPHRAGM

*Comment: This note is applicable to projects utilizing anchor rods for temporary support at girder lines and may be modified to suit site specific requirements.*

- CAST WINGWALL CONCRETE

- BACKFILL BEHIND ABUTMENTS ONCE CONCRETE HAS ACHIEVED 75% OF THE 28 DAY STRENGTH. ENSURE THAT THE DIFFERENCE IN FILL HEIGHT BETWEEN THE TWO ABUTMENTS DOES NOT EXCEED 500 mm AT ANY TIME

*Comment: The construction sequence provided here is for full integral abutments and is provided for guidance. The construction sequence can be modified in order to meet special and/or site specific requirements.*
## Appendix F – Bridge Standard Drawing Notes

### F.2.4 Pier Sheet Notes

The PIER NOTES and PIER PILE NOTES are typically located on “Pier(s) – Sheet 1”.

<table>
<thead>
<tr>
<th><strong>PIER NOTES</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>• CONCRETE SHALL BE CLASS C (f’c = 35 MPa)</td>
</tr>
<tr>
<td>• STEEL REINFORCING BARS SHALL CONFORM TO CSA G30.18 GRADE 400</td>
</tr>
<tr>
<td>• STAINLESS STEEL DRIP SHEET SHALL CONFORM TO AISI TYPE 304</td>
</tr>
<tr>
<td>• ALL REINFORCING STEEL SHALL HAVE 50 mm CLEAR COVER UNLESS NOTED OTHERWISE</td>
</tr>
<tr>
<td>• ALL REINFORCING STEEL LAP SPLICES SHALL BE FULL TENSION CLASS B UNLESS NOTED OTHERWISE</td>
</tr>
<tr>
<td>• ALL EXPOSED CORNERS SHALL HAVE 20 mm CHAMFER OR FILLET UNLESS NOTED OTHERWISE</td>
</tr>
<tr>
<td>• CONCRETE FINISHES AND SEALERS SHALL BE AS SPECIFIED IN THE STANDARD SPECIFICATIONS FOR BRIDGE CONSTRUCTION</td>
</tr>
<tr>
<td>• ELECTRONIC FILE OF LOGO TO BE SUPPLIED BY CONSULTANT WHICH WILL INCLUDE DIMENSIONS AND CASTING DETAILS</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>PIER PILE NOTES</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>• ALL REQUIREMENTS OF THE STANDARD SPECIFICATIONS FOR BRIDGE CONSTRUCTION SECTION 3 SHALL BE MET</td>
</tr>
<tr>
<td>• PILE CONCRETE SHALL BE CLASS PILE (f’c=30 MPa) WITH SULFATE RESISTANT (TYPE HS) PORTLAND CEMENT</td>
</tr>
<tr>
<td>• H-PILES SHALL BE HP 310x174. PILE SPLICES SHALL BE IN ACCORDANCE WITH STANDARD DRAWING S-1415. H-PILING SHALL CONFORM TO CSA G40.21 350W AND / OR</td>
</tr>
<tr>
<td>• PIPE PILES SHALL BE 273 O.D. X 7.8 WALL THICKNESS. PILE SPLICES SHALL BE IN ACCORDANCE WITH STANDARD DRAWING S-1414. PIPE PILING SHALL CONFORM TO ASTM A252 GRADE 2</td>
</tr>
<tr>
<td>• PILES SHALL BE DRIVEN TO THE ELEVATIONS SHOWN ON THE GENERAL LAYOUT DRAWING. DYNAMIC MONITORING OF THE PILE DRIVING WILL BE USED ON THE FIRST FOUR PILES AT THE PIER TO ACCURATELY DETERMINE PILE CAPACITY. BASED ON THE RESULTS THE REMAINING PILE LENGTHS MAY BE SHORTENED OR LENGTHENED AS DIRECTED BY THE GEOTECHNICAL CONSULTANT</td>
</tr>
<tr>
<td>• PILES SHALL NOT BE OUT OF THE POSITION SHOWN ON THE DRAWINGS BY MORE THAN 50 mm</td>
</tr>
</tbody>
</table>

Comment: Include note only if the tolerance required for design purposes is different than the standard value provided in the Standard Specifications for Bridge Construction Section 3
• **MINIMUM REQUIRED PILE GEOTECHNICAL COMPRESSION CAPACITIES OF PIER PILES**  
  SLS EXTREME LOADS (COMBINATION #1) = 500 kN

• **ALL WELDING SHALL BE IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS FOR BRIDGE CONSTRUCTION SECTION 13 AND THE CURRENT AWS SPECIFICATIONS D1.5**

• **THE PILE DRIVING EQUIPMENT SHALL BE APPROPRIATE TO THE DRIVING CONDITIONS AND CAPABLE OF DELIVERING A MINIMUM SPECIFIED ENERGY OF 70 kJ**

  *Comment: This note is for driven piles only.*

### F.2.5 Bearing Sheet Notes

The BEARING NOTES are typically located on “Bearing – Sheet 1”.

#### BEARING NOTES

• **ALL BEARING FABRICATION AND INSTALLATION SHALL BE IN ACCORDANCE WITH SECTION 8 OF THE STANDARD SPECIFICATIONS FOR BRIDGE CONSTRUCTION.**

• **ALL ABUTMENT BEARINGS SHALL BE SLIDING STEEL REINFORCED ELASTOMERIC PADS**  
  OR

• **ALL ABUTMENT BEARINGS SHALL BE POT BEARINGS**  
  OR

• **ALL ABUTMENT BEARINGS SHALL BE PLAIN UNREINFORCED ELASTOMERIC PADS**

  *Comment: Bearing types shall be selected as described in the Bridge Structures Design Criteria.*

• **ALL PIER BEARINGS SHALL BE STEEL ROCKER BEARINGS**  
  OR

• **ALL PIER BEARINGS SHALL BE POT BEARINGS**  
  OR

• **ALL PIER BEARINGS SHALL BE SLIDING STEEL REINFORCED ELASTOMERIC PADS**  
  OR

• **ALL PIER BEARINGS SHALL BE PLAIN UNREINFORCED ELASTOMERIC PADS**  
  OR

  *Comment: Bearing types shall be selected as described in the Bridge Structures Design Criteria.*

• **BEARINGS SHALL BE DESIGNED AND DETAILED TO BE EASILY REPLACEABLE**

• **ALL BEARINGS SHALL BE SUPPLIED COMPLETE WITH ROCKER/SOLE PLATES, BASE PLATES, ANCHOR ROD ASSEMBLIES AND SHIM STACKS TO MATCH THE LOADS, MOVEMENT ALLOWANCES AND DIMENSIONS SHOWN ON THE DRAWINGS**

• **THE CONTRACTOR SHALL ESTABLISH THE BEARING SEAT ELEVATIONS BY DEDUCTING THE ACTUAL BEARING THICKNESS FROM THE TOP OF BEARING ELEVATIONS. IF THE ACTUAL BEARING THICKNESSES ARE DIFFERENT FROM THOSE SHOWN ON THE**
### Drawings

The contractor shall adjust the reinforcing steel and dimensions of the substructure to suit.

#### Materials

- Rocker/sole plates shall be ungalvanized and conform to CSA G40.21 grade 350AT CAT 3
  
  OR

- Rocker/sole plates shall conform to CSA G40.21 grade 300W and shall be galvanized after fabrication in accordance with ASTM A123/A123M

- Base plates shall conform to CSA G40.21 grade 300W and shall be galvanized after fabrication in accordance with ASTM A123/A123M

- Anchor rod assembly (rods, couplers, nuts and washers) shall conform to stainless steel AISI standard type 316
  
  OR

- Anchor rod assembly (rods, couplers, nuts and washers) shall conform to CSA G40.21 grade 300W and shall be galvanized after fabrication in accordance with ASTM F2329

- For pot bearings, the pot and piston plates, except for surfaces in contact with elastomer, shall be metallized in accordance with ASTM A780, Method 3

- Shim plates used for shim stacks shall be CSA G40.21 grade 300W steel and shall be galvanized in accordance with ASTM A123/A123M

- Galvanized top surface of base plates shall be isolated from black rocker plate by painting with two coats of epoxy mastic paint

- Underside of galvanized base plates in contact with concrete or grout shall have the contact surfaces protected by a barrier coating in accordance with Section 12 of the Standard Specifications for Bridge Construction

#### Fabrication

- Fabrication of bearings shall not commence until shop drawings have been submitted and approved.

- All welding shall be in accordance with the standard specifications for bridge construction and the current AWS specifications D1.5

- The curved surface of the rocker plate and the top central 250 mm width of the base plate shall be machined to a surface finish of 6.4 μm and a flatness tolerance of 0.001 x length of contact

#### Installation

- Installation of bridge bearings shall be in accordance with Section 8 of the
STANDARD SPECIFICATIONS FOR BRIDGE CONSTRUCTION

- **GROUT PAD AND ANCHOR ROD VOIDS SHALL BE GROUTED WITH SIKA 212 FLOWABLE GROUT OR APPROVED EQUIVALENT PRIOR TO CONCRETE DECK POUR**

- **BASE PLATES SHALL BE INSTALLED LEVEL ON GALVANIZED STEEL SHIM STACKS**
  - **TAPERED BASE PLATES SHALL BE INSTALLED ON GALVANIZED STEEL SHIM STACKS**
  - SO THAT THE TOP OF THE BASE PLATE IS PARALLEL WITH THE UNDERSIDE OF THE SOLE PLATE

  *Comment: In general, bearings should be installed with the top of the base plate level and the first note above can be used. However, in some situations there might be a need to install the base plate so that the top of the base plate is parallel with the underside of the sole plate. For example, on a longer bridge with significant longitudinal slope, if finger plate or cover plated deck joints are used, the longitudinal girder expansion must follow the longitudinal grade of the bridge. Therefore, depending on the bearing design, this might require the base plate to be tapered so that the top of the base plate is parallel to the underside of the sole plate. In this case, the second note should be used rather than the first note.*

- **ATTACHMENT OF ROCKER PLATE OR SOLE PLATE TO SHOE PLATE BY WELDING SHALL BE IN THE LONGITUDINAL DIRECTION OF THE GIRDER ONLY. TRANSVERSE ENDS SHALL BE SEALED WITH SIKAFLEX 1a OR APPROVED EQUIVALENT CAULKING MATERIAL**

  *Comment: This note shall only be included where the sole plate is going to be welded to the shoe plate of a precast girder.*

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**F.2.6 Steel Girder Sheet Notes**

The GIRDER NOTES are typically located on the “Girder Layout” sheet, but may be continued on the following sheet if space is limited.

**GIRDER NOTES**

- **DESIGN STANDARD CAN/CSA-S6-14**

- **LIVE LOAD : CL800 LOADING**
  - **GIRDER DISTRIBUTION FACTOR**
  - **POSITIVE MOMENT** ULS = 0.615  FLS = 0.503
  - **NEGATIVE MOMENT** ULS = 0.638  FLS = 0.511
  - **SHEAR** ULS = 0.738

- **FATIGUE : CLAUSE 10.17 FOR HIGHWAY CLASS A WITH C_L = 1.0**

- **DEAD LOAD: STEEL GIRDER** - 3.27 TO 5.31 kN/m
  - **CONCRETE DECK** - 13.22 kN/m
  - **CONCRETE CURB & RAILING** - 5.04 kN/m
  - **ACP** - 4.70 kN/m
- THE GIRDER CAPACITY HAS BEEN EVALUATED FOR THE FOLLOWING UNFACTORED CONSTRUCTION LOADS IN ADDITION TO THE DEAD LOADS OF THE STEEL GIRDER:
  - LIVE LOAD ON WALKWAY: $W_1 = 2.4$ kPa
  - FORMWORK DEAD LOAD: $W_2 = 1.0$ kPa
  - WIND LOADS: $W_3$ and $W_4 = 70$ km/h MAXIMUM WIND SPEED CORRESPONDING TO 1:10 YEAR RETURN PERIOD WITH $q = 0.35$ kPa
  - CONCRETE DECK DEAD LOAD: $W_5 = 5.4$ kPa
  - SCREED MACHINE LOAD ON ONE SCREED RAIL: $P = 40$ kN

Comment: The above sketch shall be modified by the consultant for the specific bridge geometry and loading.

- IF THE CONTRACTOR PROPOSES TO USE ANY CONSTRUCTION LOADS OR PROCEDURES THAT DEVIATE FROM THOSE SHOWN ON THE DRAWINGS, THE CONTRACTOR SHALL SUBMIT FOR REVIEW TO THE CONSULTANT, NEW PLANS, SIGNED AND SEALED BY A PROFESSIONAL ENGINEER REGISTERED IN THE PROVINCE OF ALBERTA, INDICATING ALL LOADS, PROPOSED METHODS AND SEQUENCES OR CONSTRUCTION, AND ANY TEMPORARY SUPPORT SYSTEMS REQUIRED. THE SUBMISSION SHALL VERIFY THAT THE GIRDERS ARE CAPABLE OF RESISTING THE ACTUAL LOADS SAFELY AND WITHOUT DAMAGE

**MATERIALS**

- ALL STEEL FOR GIRDER FLANGES, WEB, STIFFENERS, SPLICE PLATES AND ANY DETAIL MATERIAL WELDED TO THE GIRDERS SHALL CONFORM TO CSA G40.21 GRADE 350AT CATEGORY 3
- SOLE PLATES BOLTED TO BOTTOM FLANGE SHALL CONFORM TO CSA G40.21 GRADE 300W AND SHALL BE GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH ASTM
**A123/A123M**

*Comment: Sole plates for steel girders shall be bolted to the bottom flange rather than welded.*

- ALL SHEAR STUDS SHALL CONFORM TO THE CHEMICAL REQUIREMENTS OF ASTM A108, GRADES 1015, 1018, OR 1020. IN ADDITION THEY SHALL MEET THE MECHANICAL PROPERTIES SPECIFIED IN AWS D1.5 TABLE 7.1 FOR TYPE B STUDS

- ALL OTHER STEEL NOT INCLUDED ABOVE SHALL CONFORM TO CSA G40.21 GRADE 350A

- ALL BOLTED CONNECTIONS SHALL BE MADE WITH 22 mm DIAMETER HIGH STRENGTH BOLTS CONFORMING TO ASTM A325M - TYPE 3. WEATHERING PROPERTIES AND COLOUR OF BOLTS SHALL MATCH THE JOINED STEEL. APPROVAL OF BOLTS TO BE USED SHALL BE OBTAINED FROM THE CONSULTANT BEFORE ANY BOLTS ARE PLACED

- THE ESTIMATED MASS OF SUPERSTRUCTURE STEEL IN (GIRDERS, DIAPHRAGM, AND SPLICES, BUT NOT DECK JOINT ASSEMBLIES OR BEARINGS, STUDS, BOLTS ETC) IS 170 TONNES. THIS ESTIMATE IS FOR DEPARTMENT USE ONLY AND THE DEPARTMENT ASSUMES NO RESPONSIBILITY FOR ITS ACCURACY OR USE BY OTHERS

### FABRICATION

- FABRICATION SHALL BE IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS FOR BRIDGE CONSTRUCTION SECTION 6

  *Comment: This note is provided to coordinate the girder fabrication, girder erection and bearing positioning. For most steel girder bridges it is most accurate to measure the girder length along the bottom flange as this translates directly into the dimensions provided on the drawings for bearing positioning. However, in certain situations (eg. for haunched girders) it may not appropriate to measure along the bottom flange. In these situations, it may make more sense to measure along the top flange, but the Consultant will need to incorporate girder end geometry into the girder length calculations.*

- GIRDERS SHALL MEET THE CAMBER REQUIREMENTS AS SHOWN ON GIRDER CAMBER DIAGRAM

- ALL WELDING SHALL BE IN ACCORDANCE WITH AWS SPECIFICATION D1.5

- ALL FLANGE AND WEB BUTT SPLICES AND ALL STIFFENER TO WEB FILLET WELDS SHALL BE MADE BY AN APPROVED SEMI OR FULLY AUTOMATIC SUBMERGED ARC PROCESS

- ALL WELD METAL DEPOSITS SHALL HAVE A CHARPY V NOTCH IMPACT STRENGTH OF AT LEAST 27 JOULES AT -30°C. ALL WELD METAL DEPOSITS SHALL BE SUBJECT TO THE APPROVAL OF THE CONSULTANT AND SHALL PRODUCE BOTH THE CORROSION RESISTANCE AND THE COLOUR PROPERTIES OF THE BASE METAL

- ALL BOLT HOLES SHALL BE DRILLED 2 mm LARGER THAN THE SPECIFIED BOLT DIAMETER UNLESS NOTED OTHERWISE
- ALL STEEL SHALL BE BLAST CLEANED IN ACCORDANCE WITH SSPC-SP6 AFTER FABRICATION

NON DESTRUCTIVE TESTING

- WELD INSPECTION WILL BE CARRIED OUT IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS FOR BRIDGE CONSTRUCTION

ERECITION

- GIRDER WILL BE ADEQUATELY SUPPORTED BY TEMPORARY BRACES TO ENSURE THAT NO DAMAGE IS CAUSED BY HANDLING AT ANY TIME

- CONTRACTOR IS RESPONSIBLE FOR THE MEANS OF MAINTAINING GIRDER IN CORRECT ALIGNMENT UNTIL THE DECK HAS BEEN CAST AND REACHED SPECIFIED STRENGTH

JACKING

- THE BRIDGE SHALL REMAIN IN SERVICE DURING JACKING FOR BEARING REPLACEMENT

- AT THE ABUTMENTS, JACKS SHALL BE CENTRED UNDER THE JACKING STIFFENER. MAXIMUM FACTORED JACKING LOAD IS 1000 kN PER GIRDER.

- AT THE PIERS, JACKS SHALL BE CENTRED UNDER THE JACKING STIFFENERS ON BOTH SIDES OF THE BEARING. MAXIMUM FACTORED JACKING LOAD IS 1800 kN PER GIRDER.

GIRDER CAMBER NOTES

- NET CAMBER = A + B + C + D – E

- "NET CAMBER" FIGURES ARE FOR GIRDER SECTIONS IN ZERO LOAD CONDITIONS

- FABRICATOR IS RESPONSIBLE FOR MAKING ALLOWANCES SUCH THAT CAMBER ON COMPLETED GIRDER SECTIONS WILL BE WITHIN ALLOWABLE TOLERANCES. ALL PROCEDURES FOR CAMBER ADJUSTMENT MUST BE APPROVED BY THE DEPARTMENT PRIOR TO USE.

- LONGITUDINAL GIRDER DIMENSIONS (SHOWN HORIZONTALLY) ARE MEASURED ALONG THE BOTTOM FLANGE AND ARE CORRECT AT +20˚C

- CAMBER DIAGRAM IS BASED ON THE DECK BEING PLACED AS SHOWN ON THE DECK PLACING SCHEDULE. THE CONTRACTOR SHALL BE RESPONSIBLE TO MODIFY THE GIRDER CAMBERS IF THE DECK PLACING SCHEDULE IS MODIFIED. MODIFICATIONS TO THE GIRDER CAMBERS MUST BE APPROVED BY THE DEPARTMENT PRIOR TO WORK.
F.2.7  Precast NU Girder Sheet Notes

The GIRDER NOTES are typically located on the “Girder Layout” sheet, but may be continued on the following sheet if space is limited. If POST-TENSIONING NOTES are required, they may be located on the girder post-tensioning sheet.

### GIRDER NOTES

- **DESIGN STANDARD CAN/CSA-S6-14**

- **LIVE LOAD: CL800 LOADING**
  - GIRDER DISTRIBUTION FACTOR
    - POSITIVE MOMENT: ULS = 0.615  FLS = 0.503
    - NEGATIVE MOMENT: ULS = 0.638  FLS = 0.511
    - SHEAR: ULS = 0.738

- **DEAD LOAD:**
  - NU GIRDER: 18.27 kN/m
  - CONCRETE DECK: 13.22 kN/m
  - CONCRETE CURB & RAILING: 5.04 kN/m
  - ACP: 4.70 kN/m

- **THE GIRDER CAPACITY HAS BEEN EVALUATED FOR THE FOLLOWING UNFACTORED CONSTRUCTION LOADS IN ADDITION TO THE DEAD LOADS OF THE NU GIRDERS:**
  - LIVE LOAD ON WALKWAY: W₁ = 2.4 kPa
  - FORMWORK DEAD LOAD: W₂ = 1.0 kPa
  - WIND LOADS: W₃ and W₄ = 70 km/h MAXIMUM WIND SPEED CORRESPONDING TO 1:10 YEAR RETURN PERIOD WITH q = 0.35 kPa
  - CONCRETE DECK DEAD LOAD: W₅ = 5.4 kPa
  - SCREED MACHINE LOAD ON ONE SCREED RAIL: P = 40 kN

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Alberta Transportation Engineering Drafting Guidelines for Highway and Bridge Projects v. 2.1
Appendix F – Bridge Standard Drawing Notes
IF KNEE BRACE STRUT DOES NOT EXTEND TO THE BOTTOM FLANGE, CONTRACTOR TO DETERMINE WHETHER TEMPORARY STRUTS TO INTERIOR GIRDERS ARE REQUIRED TO DISTRIBUTE LOAD.

Comment: The above sketch shall be modified by the consultant for the specific bridge geometry and loading.

- IF THE CONTRACTOR PROPOSES TO USE ANY CONSTRUCTION LOADS OR PROCEDURES THAT DEVIATE FROM THOSE SHOWN ON THE DRAWINGS, THE CONTRACTOR SHALL SUBMIT FOR REVIEW TO THE CONSULTANT, NEW PLANS, SIGNED AND SEALED BY A PROFESSIONAL ENGINEER REGISTERED IN THE PROVINCE OF ALBERTA, INDICATING ALL LOADS, PROPOSED METHODS AND SEQUENCES OR CONSTRUCTION, AND ANY TEMPORARY SUPPORT SYSTEMS REQUIRED. THE SUBMISSION SHALL VERIFY THAT THE GIRDERS ARE CAPABLE OF RESISTING THE ACTUAL LOADS SAFELY AND WITHOUT DAMAGE.

### MATERIALS

- CONCRETE FOR GIRDERS SHALL BE STANDARD WEIGHT AND CONTAIN SILICA FUME
- CONCRETE FOR GIRDERS SHALL HAVE A 28 DAY STRENGTH OF 70 MPa AND A RELEASE STRENGTH OF 45 MPa
- PRESTRESSING STRAND SHALL CONFORM TO ASTM A416/A416M GRADE 1860 AND SHALL BE 15.2 mm DIA, 7-WIRE LOW RELAXATION STRAND (\(f_{pu} = 1860\) MPa)
- WELDED WIRE REINFORCEMENT SHALL CONFORM TO ASTM A1064/A1064M GRADE 70 (\(f_y = 485\) MPa). MINIMUM ELONGATION AT ULTIMATE STRENGTH SHALL BE 4% AS MEASURED OVER A MINIMUM GAGE LENGTH OF 100 mm THAT INCLUDES AT LEAST ONE CROSS WIRE.
  
  AND / OR

- PLAIN STEEL REINFORCING BARS SHALL CONFORM TO CSA G30.18 GRADE 400
- GIRDER STIRRUP PROJECTIONS INTO DECK SHALL BE LOW CARBON/CHROMIUM STEEL CONFORMING TO ASTM A1035 ALLOY TYPE CS

### FABRICATION

- FABRICATION SHALL BE IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS FOR BRIDGE CONSTRUCTION SECTION 7
- FORCE IN PRESTRESSING STEEL:
  
  \[
  \begin{align*}
  \text{INITIAL:} & \quad 195 \text{ kN/STRAND} \quad (0.75 \text{ } f_{pu}) \\
  \text{TRANSFER:} & \quad 182 \text{ kN/STRAND} \quad (0.70 \text{ } f_{pu}) \\
  \text{AFTER ALL LOSSES:} & \quad 135 \text{ kN/STRAND} \quad (0.52 \text{ } f_{pu})
  \end{align*}
  \]
- ALL EXPOSED CONCRETE CORNERS TO HAVE 20 mm CHAMFER OR FILLET UNLESS NOTED OTHERWISE
- GIRDER TO BE SUPPORTED 1000 mm FROM EITHER END IN STORAGE BUT CAN BE
### SUPPORTED AT CENTRELINE OF LIFTING POINTS DURING TRANSPORTATION

- Ensure embedded items have proper clearance and do not interfere with post-tensioning ducts

- Sandblast roughening is required on all girder ends, field cast diaphragm areas and post-tensioning anchor pockets

- Unless noted otherwise, clear cover shall be:
  - Reinforcing steel: 30 mm
  - Prestressing strand and PT ducts: 45 mm

### ERECTION

- Lifting force at each hook must be more than 60 degrees from horizontal at all times. Hooks shall not be located any further than 1000 mm from the girder ends.

- Girder must be level at all times.

- Ensure that the girders are given adequate lateral support during all aspects of girder handling, girder and bracing installation and bridge construction.

- Estimated mass of a 57 m girder = 115 tonnes

### JACKING

- The bridge shall remain in service during jacking for bearing replacement.

- At the abutments, jacks shall be centred under the girder webs, approximately 600 mm from the centreline bearing. Maximum factored jacking load is 1000 kN per girder.

- At the piers, jacks shall be centred under the girder webs, on both sides of the bearing, located approximately 600 mm from the centreline bearing. Maximum factored jacking load is 1800 kN per girder.

### POST-TENSIONING NOTES

- The contractor shall verify all post-tensioning details and inform the consultant of all discrepancies which may arise for any given post-tensioning system.

- Prestressing strand for post-tensioning shall conform to ASTM A416/A416M grade 1860 and shall be 15.2 mm dia, 7-wire low relaxation strand (fpu = 1860 MPa)
  - Provide four tendons each with 12 strands

- Post-tensioning forces are based on the following design criteria:
**INITIAL JACKING FORCE** = 2440 kN PER TENDON (0.78 fpu)

**WOBBLE COEFFICIENT** $K = 0.003 / m$

**CURVATURE FRICTION COEFFICIENT** $\mu = 0.2 /$ RADIAN

**ANCHOR SET** = 10 mm

**MODULUS OF ELASTICITY** $E = 195$ GPA

- **ALL DUCTS SHALL BE GALVANIZED, CORRUGATED, SEMI-RIGID DUCTS. VENTS SHALL BE PROVIDED AT ALL HIGH POINTS OF DUCTS.**

- **ALL ANCHORS SHALL BE ABLE TO DEVELOP 95% OF THE ULTIMATE TENSILE CAPACITY OF THE TENDONS**

- **POST-TENSIONING SHALL BE IN TWO STAGES:**
  - STAGE 1 – BEFORE CASTING THE DECK (TENDONS 1 AND 2)
  - STAGE 2 – AFTER STAGE 2 DECK HAS ATTAINED SPECIFIED 28 DAY STRENGTH (TENDONS 3 AND 4)

- **TENDONS SHALL BE STRESSED FROM ONE END ONLY, BUT SHALL BE STRESSED FROM ALTERNATE ENDS FOR EACH STAGE SUCH THAT TENDON 1 AND TENDON 2 ARE STRESSED FROM ALTERNATE ENDS AND TENDON 3 AND TENDON 4 ARE STRESSED FROM ALTERNATE ENDS.**

*Comment: Stressing each tendon from both ends of the girder is only usually required for longer bridges. For average length single span or two span bridges, stressing the tendons from alternating ends is usually sufficient. When stressing is required from both ends, this is usually accomplished by stressing from one end and then doing a “dead-end lift-off” from the other end until the stresses are symmetric. The problem with this approach is that for shorter bridges, the “dead-end lift-off” involves very small strand displacement at the dead-end, which could result in a situation where you would have to double-grip the strand end. Double gripping the strand is not allowed.*

- **ENDS OF GIRDER TO BE SUPPORTED ON TEMPORARY SUPPORTS DURING POST-TENSIONING. TEMPORARY SUPPORTS SHALL ALLOW FREE LONGITUDINAL MOVEMENT OF GIRDER DURING POST-TENSIONING.**

- **PIER DIAPHRAGM SHALL HAVE A MINIMUM COMpressive STRENGTH OF 35 MPa BEFORE STAGE 1 POST-TENSIONING**

- **AFTER STRESSING RECORDS HAVE BEEN REVIEWED AND APPROVED BY THE CONSULTANT, DUCTS SHALL BE FILLED WITH AN APPROVED GROUT (MINIMUM 35 MPa STRENGTH AT 28 DAYS)**

- **ANCHOR POCKETS TO BE CONCRETED AFTER POST-TENSIONING BUT PRIOR TO GROUTING OF THE DUCTS. ANCHORS AND ANCHOR POCKETS SHALL BE CLEANED AND DEGREASED AND RECEIVE AN APPROVED EPOXY AGENT PRIOR TO PLACING THE CONCRETE.**
GIRDER DIAPHRAGM NOTES

- CONCRETE SHALL BE CLASS HPC ($f'_c = 45$ MPa)
- STEEL REINFORCING BARS SHALL CONFORM TO THE REQUIREMENTS OF CSA G30.18
- ALL REINFORCING STEEL SHALL HAVE 50 mm CLEAR COVER UNLESS NOTED OTHERWISE
- ALL EXPOSED CORNERS SHALL HAVE 20 mm CHAMFER OR FILLET UNLESS NOTED OTHERWISE
- CONCRETE FINISHES AND SEALERS SHALL BE AS SPECIFIED IN THE STANDARD SPECIFICATIONS FOR BRIDGE CONSTRUCTION
- ALL BOLTED CONNECTIONS SHALL BE MADE WITH 22 mm DIAMETER HIGH STRENGTH BOLTS CONFORMING TO ASTM A325M - TYPE 1
- DIAPHRAGM CROSS-BRACING STEEL INCLUDING ANGLES AND GUSSET PLATES SHALL CONFORM TO CSA G40.21 GRADE 300W
- ALL DIAPHRAGM STEEL INCLUDING BOLTS, NUTS, WASHERS, ANGLES AND PLATES SHALL BE GALVANIZED IN ACCORDANCE WITH ASTM A123/A123M AND ASTM F2329
- DIAPHRAGM GUSSET PLATE ASSEMBLIES SHALL BE INSTALLED AT THE PLANT BY PRECAST SUPPLIER

F.2.8 DECK SHEET NOTES

The DECK NOTES are typically located on “Deck – Sheet 1”.

DECK NOTES

- ALL CONCRETE SHALL BE CLASS HPC ($f'_c = 45$ MPa), INCLUDING DECK, CURBS AND ABUTMENT DIAPHRAGM
- ALL REINFORCING STEEL SHALL HAVE 50 mm CLEAR COVER UNLESS NOTED OTHERWISE
- ALL EXPOSED CORNERS SHALL HAVE 20 mm CHAMFER OR FILLET UNLESS NOTED OTHERWISE
- CONCRETE FINISHES AND SEALERS SHALL BE AS SPECIFIED IN THE STANDARD SPECIFICATIONS FOR BRIDGE CONSTRUCTION
- ELEVATIONS FOR BRIDGERAIL SHALL BE SET BY INSTRUMENT AFTER DECK IS CAST
- SOLID STAINLESS STEEL REINFORCING BARS SHALL CONFORM TO ASTM A276 AND A955/955M (INCLUDING ANNEX 1.2 OR 1.3) AND ONE OF THE FOLLOWING UNS GRADES: S30400, S31603, S31653, S31803, OR S32304 AND A MINIMUM YIELD STRENGTH OF 420 MPA AND / OR
CRR REINFORCING BARS SHALL BE EITHER:

- LOW CARBON/CHROMIUM STEEL CONFORMING TO ASTM A1035 ALLOY TYPE CS;
  OR
- SOLID STAINLESS STEEL CONFORMING TO ASTM A276 AND A955/955M (INCLUDING ANNEX 1.2 OR 1.3) AND ONE OF THE FOLLOWING UNS GRADES: S30400, S31603, S31653, S31803, OR S32304 WITH A MINIMUM YIELD STRENGTH OF 420 MPa

Comment: The Bridge Structures Design Criteria identifies areas where Corrosion Resistant Reinforcing (CRR) is to be used for durability. For certain components of the bridge, stainless steel reinforcing bars shall always be specified. These typically include deck joint blockouts, corbels and reinforcing bars connecting approach slabs to corbels. For other components of the bridge (barriers, decks, approach slabs and roof slabs), the type of reinforcing depends on the exposure classification for a specific bridge. Consultants shall refer to the Bridge Structures Design Criteria in order to determine which exposure class the specific bridge falls into.

Bridges with exposure class 1 shall be detailed using stainless steel with all bar marks using the “SS” suffix on the bar mark. For these bridges only the first note above is required.

Bridges with exposure class 2 shall be detailed with CRR which can be either stainless steel or low carbon/chromium (ASTM A1035 Alloy Type CS), depending on what the contractor decides to bid. For exposure class 2, the Consultant will not know which type of reinforcing will be provided by the Contractor. For these bridges, both of the above notes are required, since some of the reinforcing must be stainless steel (e.g. in corbels) while the remaining steel might not end up being stainless steel. While preparing the Tender drawings, the CRR reinforcing steel shall be called up using the “CR” suffix on the bar mark. While preparing the Record drawings, the Consultant shall identify which reinforcing type was actually used by the Contractor and the bar marks shall be updated with the “SS” suffix if stainless steel reinforcing is used and “MX” if low carbon/chromium reinforcing is used.

Consultants should be aware the low carbon/chromium reinforcing bars are currently only available in imperial sizes.

LAP SPLICES SHALL BE STAGGERED UNLESS NOTED OTHERWISE

Note: * DIMENSIONS MAY VARY DUE TO VARIATIONS IN GIRDER CAMBER. CONTRACTOR SHALL SURVEY GIRDER TOP ELEVATIONS AFTER ERECTION TO DETERMINE THE ADJUSTMENTS REQUIRED, AND SUBMIT THEM TO THE CONSULTANT FOR APPROVAL PRIOR TO PLACEMENT OF DECK FORMWORK

Comment: The above note is typically located close to the deck section details. The asterix “*” should be referenced to any dimensions that may vary due to girder camber including the nominal deck haunch thickness and the outside of curb/fascia dimensions.
F.2.9 DECK JOINT NOTES

The DECK JOINT NOTES are typically located on “Deck Joint – Sheet 1”.

DECK JOINT NOTES

- ALL REQUIREMENTS OF THE CURRENT VERSION OF THE STANDARD SPECIFICATIONS FOR BRIDGE CONSTRUCTION SECTION 6 SHALL BE MET

Comment: Provide only site specific deck joint requirements here in cases where the notes on the standard deck joint drawings need to be revised or supplemented for site specific reasons.

INSTALLATION PROCEDURE

Comment: Provide only site specific joint installation requirements here in cases where the installation procedure notes on the standard deck joint drawings need to be revised or supplemented for site specific reasons. Discuss any proposed revisions-supplements to the joint installation notes found on the standard deck joint drawings with the Bridge Engineering Section before proceeding.

F.2.10 SIGN STRUCTURE NOTES

The SIGN STRUCTURE NOTES are typically located on “Sign Structure – Sheet 1”.

SIGN STRUCTURE NOTES

DESIGN

- OVERHEAD SIGN STRUCTURES SHALL BE DESIGNED IN ACCORDANCE WITH THE REQUIREMENTS OF AASHTO “STANDARD SPECIFICATIONS FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINAIRES AND TRAFFIC SIGNALS” (THE “AASHTO STANDARD SPECS”), LATEST EDITION PLUS INTERIMS AND ALBERTA TRANSPORTATION STANDARD SPECIFICATIONS FOR BRIDGE CONSTRUCTION SECTION 24

- THE FATIGUE IMPORTANCE FACTORS IN TABLE 11-1 OF THE AASHTO STANDARD SPECS SHALL BE BASED ON FATIGUE CATEGORY I

- THE FOLLOWING DESIGN CRITERIA SHALL BE USED:

  1. FATIGUE DESIGN

<table>
<thead>
<tr>
<th></th>
<th>IMPORTANCE FACTOR $I_F$</th>
<th>PRESSURE $P$ (Pa)</th>
</tr>
</thead>
<tbody>
<tr>
<td>GALLOPING</td>
<td></td>
<td></td>
</tr>
<tr>
<td>VORTEX SHEDDING</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
2. WIND LOADING

REFERENCE WIND PRESSURE \( q(50) \) (Pa)

EXPOSURE FACTOR \( K_z \)

DRAG COEFFICIENT \( C_d \)

DESIGN PANEL AREA \( (m^2) \)

DESIGN WIND PRESSURE (Pa)

3. ICE ACCRETION

DESIGN ICE ACCRETION THICKNESS (mm)

4. CRITICAL ANCHOR ROD FORCES

CRITICAL ANCHOR ROD FORCES (identify load type) (kN)

Comment: The design information in the above tables is to be filled out by the Consultant with the anchor rod forces being provided by the sign structure designer/fabricator. This design information shall be completed and provided for each sign structure.

MATERIALS

- STRUCTURAL PLATE SHALL CONFORM TO CSA G40.21 GRADE 300W. HSS MEMBERS SHALL CONFORM TO CSA G40.21 GRADE 350W AND CSA G40.20 CLASS H. ALL OTHER STRUCTURAL SHAPES SHALL CONFORM TO CSA G40.21 GRADE 300W.

- ALL STRUCTURAL STEEL SHALL BE GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH ASTM A123/A123M

- ANCHOR ROD ASSEMBLY SHALL CONFORM TO ASTM F1554 GRADE 55 (\( F_y = 380 \) MPa) AND SHALL BE GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH ASTM F2329. ANCHOR ROD ASSEMBLIES SHALL CONSIST OF ANCHOR ROD, TOP NUTS, PLATE WASHERS, BOTTOM ANCHOR PLATES, BOTTOM ANCHOR NUTS, AND THIN CLAMPING NUTS.

- ALL BOLTED CONNECTIONS SHALL BE MADE WITH ASTM A325 - TYPE 1 BOLTS GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH ASTM F2329

- ALL REINFORCING STEEL SHALL CONFORM TO CSA G30.18 GRADE 400

- ALL CONCRETE SHALL BE CLASS C WITH TYPE HS OR HSb SULPHATE RESISTANT CEMENT

- BASE PLATES SHALL BE GROUTED WITH SIKA 212 FLOWABLE GROUT OR APPROVED
### EQUIVALENT

#### FOUNDATION CONSTRUCTION

- **COMPETENCY OF FOUNDATION MATERIAL SHALL BE CONFIRMED ON SITE PRIOR TO POURING FOUNDATION CONCRETE**
- **ALL REINFORCING STEEL SHALL HAVE 75 mm CLEAR COVER UNLESS NOTED OTHERWISE**

#### FABRICATION

- **ALL WELDING SHALL BE IN ACCORDANCE WITH AWS SPECIFICATIONS D1.5 AND D1.1**
- **FABRICATION OF BEARINGS SHALL NOT COMMENCE UNTIL SHOP DRAWINGS HAVE BEEN SUBMITTED AND APPROVED**

#### INSTALLATION

- **FIELD WELDING OR MODIFICATION TO ANY PORTION OF THE SIGN STRUCTURE IS NOT PERMITTED**
- **ALL STRUCTURAL BOLTS SHALL BE TIGHTENED BY THE TURN-OF-NUT METHOD**
- **ANCHOR ROD ASSEMBLIES SHALL BE SUPPLIED AND INSTALLED IN ONE COMPLETE ASSEMBLY AND CONSIST OF, BUT NOT LIMITED TO: ANCHOR RODS COMPLETE WITH TOP NUTS, PLATE WASHERS, TOP TEMPORARY TEMPLATES, BOTTOM ANCHOR PLATES, BOTTOM ANCHOR NUTS, AND THIN CLAMPING NUTS. NO WELDING OF ANY COMPONENT IS ALLOWED. ANCHOR RODS SHALL BE INSTALLED TRUE AND PLUMB. ANCHOR RODS SHALL BE PRE-TENSIONED USING A SINGLE TOP NUT BY THE TURN-OF-THE-NUT METHOD FROM A SNUG TIGHT CONDITION AFTER THE GROUT PADS HAVE ATTAINED DESIGN STRENGTH. ALL VOIDS INCLUDING SLOTS AND THE ANNULAR SPACE AROUND ANCHOR RODS IN THE BASE PLATE SHALL BE FILLED WITH CORROSION INHIBITING PASTE**

### F.2.11 CULVERT GENERAL LAYOUT NOTES

#### SURVEY INFORMATION

- **SURVEY INFORMATION PROVIDED BY ABC Ltd., COMPLETED SEPTEMBER 2009 UNDER THE DIRECTION OF T. S. GEISEL**
- **THE COORDINATES AND STATIONING ARE BASED ON NAD’83 DATUM USING THE 3TM GRID PROJECTION, CENTRAL MERIDIAN 114. A COMBINED SCALE FACTOR (CSF) OF 0.999743 HAS BEEN ADOPTED FOR THIS PROJECT.**
- **ALL DIMENSIONS INDICATED ON THESE DRAWINGS ARE GROUND DISTANCES.**
  - GRID DIMENSION = GROUND DIMENSION x CSF
  - GROUND DIMENSION = GRID DIMENSION / CSF
### BENCH MARKS
- CP 560, IRON BAR, 7.743 m RT OF CENTRELINE ROAD AT STA 26+335.709 EL 1701.658 - N 5638984.771, E 148508.7184
- ASCM 45609, N 5467936.504, E 7030.956, EL 1346.856

### HYDROTECHNICAL SUMMARY
- TOTAL DRAINAGE AREA = 43 k2
- DESIGN DISCHARGE = 12 m3/s
- MEAN OUTLET VELOCITY AT NEW CULVERT FOR DESIGN DISCHARGE = 1.6 m/s
- AVERAGE SURVEYED SLOPE OF STREAMBED IS 0.016 m/m

### STRUCTURE
- 1 - 2.500 DIA CSP CULVERT BY 42 m INVERT LENGTH ON 24^ LHF SKEW TO CL LOCAL ROAD LOCATED AT STATION 26+325.400
- WALL THICKNESS IS 2.8 mm, 610 g/m2 ZINC GALVANIZED COATING, CORRUGATION PROFILE OF 125 mm x 25 mm

### GENERAL NOTES
- ALL DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE
- DESIGN SPECIFICATION CAN/CSA - S6 – 06
- ROADWAY DESIGN STANDARD RUL – 209 – 110
- ROADWAY ELEVATIONS ARE GIVEN TO TOP OF FINISHED CENTRELINE ROADWAY
- CULVERT INSTALLATION TO BE IN ACCORDANCE WITH DRAWING S-1418-03
### F.3 STANDARD DRAWING NOTES FOR BRIDGE REHABILITATIONS

The following standard notes are provided for use on detailed design drawings for bridges rehabilitations.

<table>
<thead>
<tr>
<th>GENERAL NOTES</th>
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</thead>
<tbody>
<tr>
<td>• ALL DIMENSIONS SHOWN ON THE REHABILITATION LAYOUT SHEET ARE GIVEN IN METRES. ALL OTHER DRAWINGS ARE DIMENSIONED IN MILLIMETRES EXCEPT FOR STATIONS, CONTROL POINT COORDINATES AND ELEVATIONS WHICH ARE EXPRESSED IN METRES.</td>
</tr>
<tr>
<td>• ALL DIMENSIONS ARE NOMINAL BASED ON REFERENCE DRAWINGS AND SHALL BE FIELD CONFIRMED BY THE CONTRACTOR PRIOR TO FABRICATION OF ANY COMPONENTS</td>
</tr>
<tr>
<td>• ALL REINFORCING STEEL SHALL HAVE 50 mm CLEAR COVER UNLESS NOTED OTHERWISE</td>
</tr>
<tr>
<td>• CONCRETE SURFACE FINISHES AND SEALER APPLICATION SHALL MEET THE REQUIREMENTS OF THE STANDARD SPECIFICATIONS FOR BRIDGE CONSTRUCTION UNLESS NOTED OTHERWISE</td>
</tr>
<tr>
<td>• ALL EXPOSED CONCRETE EDGES SHALL BE CHAMFERED OR FILLETED 20 mm UNLESS NOTED OTHERWISE</td>
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</tbody>
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