

3.9 Appendices

3.9.1 Drawing & Map Legends

As a general rule, primarily in the interest of time and money, pencil fair drawings are an acceptable presentation. However, there may occasions where inked final drawings are required. For that purpose, it will be noted that "template" information is shown.

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Symbols and markers

- [Drawing and map legends \(PDF\)](#)

North arrow symbol

Compass readings will be accepted in areas where legal boundaries are not or cannot be defined. The drawings prepared in such areas will show the North arrow as well as the declination arrow, amount of declination, and the year.

In all other areas where a firm tie has been made to a legal boundary, the commencement bearing is the boundary bearing, and only the true North arrow need be shown on the related drawings.

3.9.2 Basic Drainage Site Report Requirements

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Stream crossing data collection

Carry out the following:

1. Take at least two cross-sections to measure flow. Divide the width of the stream into four equal parts. Measure the flow velocity at each of the four sections.
2. In planning the layout of the structure:
 - Choose an appropriate location, along a stream reach with uniform or uniformly varying flow close to the proposed crossing, to measure a cross-section. Sketch the cross-section of the stream gully, showing evidence of the high-water level, present water level, and depth of the stream across the bottom. Extend the cross-section back from the stream an appropriate distance to show the terrain that affects the proposed crossing and road alignment.

- Note any visual evidence of high water.
 - Measure and record the average gradient of the stream at the crossing and at the cross-section if the two are taken at different locations.
 - Record the soil type, soil profile, parent material, and substrate material at the crossing and describe the stream bottom.
 - Describe the stream channel (debris loading, bank stability, crossing location on a fan, bedload problem, etc.).
 - If the site is a fish stream, consult the [Fish-Stream Crossing Guidebook \(PDF, 4.2MB\)](#) for site and design requirements.
1. For the flow measurement cross-sections, sketch a graph of surface velocity across the channel and estimate average surface velocity (V_s) from the graph. Compute cross-sectional area (A), wetted perimeter (WP), and hydraulic radius (R) for each section. Average these values for two sections and use the slope of the reach between them to obtain discharge (Q) at present water level (PWL) and estimated high water level (HWL).

Centreline profiles

- Take a centreline profile showing streambed, PWL , HWL (if possible), and top of bank (if well-defined), extending 50-100 m on each side of centreline.
- Tie in all cross-sections and profiles to a traverse.

Photographs

Take stereo pairs of photos looking upstream and downstream, with the centreline in the foreground. Note the sizes of any other culverts on the same stream or its tributaries, and record their past performances, if known.

Benchmarks and references

Establish a minimum of one benchmark and two reference points.

Additional information

- Note the size, amount, and description of debris, and photograph debris accumulation.
- Make soil tests - at least one at the culvert site and one downstream where scour is expected. Drive a bar into the bottom of each hole and note its behaviour.
- Note all topographic control features that may affect culvert design.
- Note possible sources of compaction-zone backfill, riprap, and road fill.

Plan Details

At a scale of 1:200, with 0.5 m contours, show the following:

- present waterline (give date) and estimated high waterline;
- boundaries and descriptions of rock, soil, and vegetation types;
- large boulders, beaver dams, or debris accumulations (describe);
- any use of private property that might be affected, with status and right-of-way lines (if known);
- flow pattern, by arrows with appropriate length and direction;
- soil test holes and their logs;
- stream cross-section locations or their direction and distance if they are off the plan;
- control traverse;
- declination;
- topography points;
- reference points and benchmark, including elevation datum; and
- the key map.

3.9.3 Sample Survey & Design Contract

The following "sample" Survey & Design Contract are included in this appendix to illustrate the general content of such a contract.

- [Sample Survey & Design Contract - title page and table of contents \(PDF\)](#)
- [Sample Survey & Design Contract - entire document \(DOC\)](#)

The sample is for illustrative purposes only. Download the correct and current contract form(s) from the forms index as required.

3.9.4 Project Tracking Checklist

Use this checklist to prepare a paper trail of key outputs prepared by consultants and sign-offs by the ministry.

- [Project Tracking Checklist \(PDF\)](#)