

BC Ministry of Forests
Bridge Site Plan Standards

Nov. 3, 2022

Site plans shall conform to the following requirements, and shall be prepared by capable survey crew working under the technical direction of a forest professional or an engineering professional who is a member in good standing of the Association of BC Forest Professionals (ABCFP) or Engineers and Geoscientists BC (EGBC).

1. Site Conditions

Site conditions should be such that the ground surfaces and any existing structures within the limits of survey are clearly visible (i.e., snow free).

2. Survey Accuracy

The site survey(s) will be conducted with a theodolite/transit or total station with a relative precision not less than 1:1000 horizontally and 1:300 vertically.

Field referencing and bench marks will be established with a relative precision not less than 1:1000 horizontally and 1:300 vertically.

3. Limits of Survey

Extend the site plan in the following directions:

- 3.1 Upstream to show any bend which may influence the current pattern at the site, either at normal stage or in flood (generally, assume a distance up to seven (7) stream widths or to the second bend, minimum of 20 m);
- 3.2 Downstream three (3) stream widths, or to the limit of possible location changes; or to show all creek cross-sections, minimum 20 m;
- 3.3 Back from each bank to cover potential overflow channels, or to well above the high water mark; and
- 3.4 Along the existing or proposed road location a minimum of 50 m back from each existing or proposed abutment, or far enough to show approach problems. The surveyed area shall be large enough to cover possible bridge and road location changes.

Establish a control traverse to gather site information and tie to the road P-line.

4. Field Referencing

4.1 Reference Points

Establish two reference points at each site to allow for relocation and control surveys. The references will consist of a ground hub and a reference back-site in a tree or a reference ground hub back-site, on tangent with a transit hub, on each side of the stream crossing. Both reference hub and back-site will be placed out of the right-of-way to avoid disturbance.

4.2 Benchmarks

Benchmarks are elevational reference points. Establish at least two benchmarks, away from any potential disturbance, to be placed on firm fixed objects which will not be disturbed, one on each streambank. Preferably place the benchmarks where they will be visible from both proposed bridge abutments and within 1500 mm above high water level. Where elevations have not been established, use reference elevation datum of 100.000 m and note as "assumed datum of 100 m." Generally install 200 mm spikes in the side of a blazed, live tree (greater than 50 mm diameter), using the head as a bench mark.

4.3 Construction Reference Stakes

Establish a minimum of two pairs of offset construction reference stakes to the existing centreline or P-line at each site; to allow for establishment of the location of the proposed bridge centreline with horizontal measurement. Establish one pair on each side of the crossing, right and left of the centreline, away from potential disturbance and preferably outside the right-of-way. Where possible, stakes should be placed at approximately the same elevation as the road surface to allow for level, tape measurement.

5. Data Collection

- 5.1 Present Water Level (PWL): Collect spot elevations every 10 m along both sides of the stream to an accuracy sufficient to determine stream surface slopes.
- 5.2 High Water Level (HWL): Collect spot elevations where evidence is clear; note evidence.
- 5.3 Stream flow pattern: Use floats dropped at several points across the stream to collect relative flow velocities. Note measured velocities; and signs of bank erosion (overhanging trees and roots, vertical banks, areas where present channel differs from previous channels, etc.).
- 5.4 Site features: Note sloughs, abandoned channels, overflow channels, sand or gravel bars, bedrock, boulder areas, log jams, debris accumulations, fords, vegetation boundaries, trails, ice-jam areas or other significant features.
- 5.5 Note descriptions and boundaries of soil and rock types as seen on the surface, including streambed substrate, particularly where exposed rock may affect bridge structure or abutment location. Note any test-hole locations and their logs.

- 5.6 For existing bridge structures within the limits of survey obtain:
- a) Spot elevations for each corner of the existing deck and/or edges of the existing travelled road surface;
 - b) Spot elevations for the upper corners of the existing abutments;
 - c) Spot elevations showing the perimeter of the abutments where they contact the ground surface and the outline of the edges of the existing bridge; and
 - d) The outline of the outside perimeter of the existing structure.
- 5.7 Provide descriptions and locations for other existing items:
- a) Structures such as: buildings, fences, roads, driveways and gates;
 - b) Utilities such as: power poles with numbers, height, and direction of wires; gas lines with any surface markings and structures; and
 - c) Right-of-way markings such as: Forest Service Road, pipe line, gas line, easement, railway and power line R/W pins.
- 5.8 Descriptive photographs (including descriptive captions) shall be taken to show the bridge crossing site and surrounding area. At minimum, take photographs of:
- a) The proposed and existing bridge sites from upstream and downstream;
 - b) The existing and proposed bridge sites from a reasonable distance up-chain and down-chain on the road approaches;
 - c) Each streambank from the opposite streambank, in sufficient numbers to show existing and proposed abutment locations, and the full extent of the surveyed streambanks with captions noting signs of bank erosion (see 5.3 above);
 - d) Along the road centreline away from the bridge, in each direction, from the existing and proposed bridges;
 - e) Upstream and downstream from the proposed and existing bridge sites;
 - f) HWL evidence (see 5.2 above);
 - g) Site features (see 5.4 above);
 - h) Difficult or convoluted ground conditions, and bedrock outcrops; and
 - i) Other existing items (see 5.7 above).

- 5.9 In addition to other data points required, collect sufficient data points for production of the following profiles and cross-sections:
- a) For proposed crossings, take a road centreline profile, including soundings where appropriate, of the expected crossing line to include: approach alignment (a minimum of 50 m each side or adequate distance to resolve any approach or alignment problems), high water line, present water line, wetted perimeter, top of banks and other topographic features;
 - b) If the reach is uniform, take one other section about three to five stream widths (minimum 15 m) downstream from centreline and upstream from centreline. If the reach is non-uniform, take two or more sections below centreline at points of change, and do the same upstream; and
 - c) Where a bridge structure exists, cross-sections shall be taken, parallel to the road centreline, along the upstream and downstream edge of the bridge to show stream bed and ground lines adjacent to the abutments.

6. **Plan Details**

Using a preferred scale of 1:200, plot the following information on the plan drawing:

- 6.1 The designation, location, and description of reference points and benchmarks, including elevation and datum;
- 6.2 Contours, as follows:
 - a) The contour interval shall be 0.5 m; this may need to change on rock cliffs;
 - b) Make a conspicuous warning note if different intervals are used on the same plan;
 - c) Show all cross-sections and points read;
 - d) Extend contours across the streambed where possible particularly at the proposed crossing location and at possible sites for a work bridge or ford; and
 - e) Accuracy should permit interpolation to a 0.3 m error on rock, around existing bridge structure components and along the stream banks;
- 6.3 PWL and date of data collection; show spot elevations every 10 m along both sides of stream to an accuracy sufficient to determine stream surface slopes;
- 6.4 HWL; show spot elevations where evidence is clear and if possible join with a dashed line; describe evidence;
- 6.5 Stream flow patterns (details as per 5.3 above);

- 6.6 For existing bridge structures show:
- a) Spot elevations for each corner of the existing deck (indicate "deck");
 - b) Spot elevations for the upper corners of the existing abutments (indicate as "top abut" or "top crib");
 - c) Spot elevations showing the perimeter of the abutments where they contact the ground surface; and
 - d) Outline of the perimeter of the existing structure;
- 6.7 Show and label significant features from data collection such as sloughs, abandoned channels, overflow channels, sand or gravel bars, boulder areas, log jams, debris accumulations, fords, vegetation boundaries, cabins, trails, ice-jam areas or other significant features. Provide descriptive notes to describe such features;
- 6.8 Show and describe boundaries of soil and rock types as seen on the surface, including the streambed, particularly where exposed rock may affect bridge structure or abutment location. Show test-hole locations and their logs;
- 6.9 Other existing structures, utilities and rights-of way;
- 6.10 Vegetation boundaries and types;
- 6.11 Location of stream cross-sections taken;
- 6.12 Land status and right-of-way boundaries, where known;
- 6.13 Control traverse;
- 6.14 North arrow and magnetic declination;
- 6.15 Key map showing location of bridge site, direction and distance to town;
- 6.16 Legend of symbols and lines;
- 6.17 Scales; and
- 6.18 Title Block, showing: bridge structure number, FSR or forest road name, km location, stream name, who completed the survey, who completed the drawing, date of survey, and drawing number.

7. **Profile/Cross Section Drawings**

7.1 **Summary of Requirements**

Drawing	Scales
Creek Cross Sections	1:200 Horizontal and Vertical
Road Centreline Profiles (on existing/proposed bridge centrelines)	1:200 Horizontal and Vertical
Detailed Bridge Centreline Profiles (for existing and proposed bridges- extends 10 m from each bridge end)	1:100 Horizontal and Vertical
Creek Centreline Profile	1:200 Horizontal and Vertical

7.2 Details for Road and Bridge Centreline Profiles

Requirements include, but are not limited to:

- a) Use a stationing of 0+000 at the beginning of the town side;
- b) For a detailed bridge centreline profile of an existing bridge: on the same drawing, using distinct line types, show the streambed and banks along the upstream and downstream edge of the bridge (where possible), and show ground lines adjacent to the abutments;
- c) Show the present water level and right bank/left bank; and
- d) Show high water level.

7.2 Details for Creek Centreline Profile

Show the profile of the stream bed and water surface for the length of the site plan including stream bed gradient.

7.3 Title Blocks

Show the bridge structure number, FSR or forest road name, km location, stream name, who completed the survey, who completed the drawing, date of survey, and drawing number.