2.4 Field Reconnaissance

The process of field reconnaissance has three primary objectives:

1. investigate potential route corridors considering all of the elements, including reviews of optional locations and the constraints of the harvesting system that would contribute to the final location of the road;
2. gather information for subsequent use by the road survey and design contractor, and to access the need for any additional information or assessments; and
3. flag the reconnaissance line of the preferred road location using field traverse Survey Level 1 standards as required. See Survey Level 1 for field traverse.

2.4.1 Field Reconnaissance Procedures & Records

Ensure that the person conducting field reconnaissance has established skill sets. Refer to Engineering Equipment and Services (EES) Directory.

Carry out the following reconnaissance steps:

1. Walk the proposed routes.
2. Mark the centreline (P-line or L-line) of all proposed routes with intervisible flagging tape, using hand instruments for direction and grade control. Maintain horizontal control with a hand-held compass and a hip chain; and maintain vertical control with clinometer readings. Handheld GPS units may be used to establish the centreline (P-line or L-line) where road grades are not an issue and the operator ensures that sufficient satellite coverage is available. Measure side slopes with a clinometer, and record average readings for consistent topographic sections.
3. Note the grades between control points. Keep road gradients within specifications.
4. Mark cumulative chainages and TP numbers on the flagging tape with felt pen. Mark curves with flagging by approximating the best alignment.
5. Mark control points used as photo ties on the ribbon line, noting the air photo tie number and the air photo numbers.
6. Where a location survey is not required for the project because of the easy terrain, reference all control points and flag the right-of-way boundaries.
7. Record side slopes between control points.
8. Provide detailed notes on soils and topographic features, including:
    - stream crossings where channel and bank disturbances can be prevented or

mitigated, locations that require site plans, and data required for minor stream crossings;

- forest cover (species composition, timber quality, and volume per hectare);
- recommended slash and debris disposal methods and additional clearing widths required for the slash and debris disposal;
- soil types based on visual observations of exposed cuts, shallow hand-dug test holes and probing, and the location of these soils on maps or aerial photos;
- maximum road grades and minimum curve radii;
- location and extent of bedrock, if rippable, and the potential as ballast;
- location and extent of gravel sources and the potential for use as subgrade and surfacing materials;
- endhaul sections and potential waste areas;
- recommended construction methods and potentially appropriate alternatives; and
- recommended survey level or levels appropriate for the terrain. See Survey Levels.

9. Note harvest opportunities and access requirements. As part of any field reconnaissance, confirm or evaluate the need for any additional information or assessments, including:
    - terrain stability field assessments for roads;

      A terrain stability assessment **must** be conducted by a qualified professional to determine whether measures are required to reduce the likelihood of a landslide occurring, or to reduce the likelihood of a landslide affecting forest resources, in the following situations:

      a. terrain stability mapping indicates that the road is located on terrain that is unstable or potentially unstable;
      b. the mapping referred to in paragraph (a) has not been done, and the road is located on terrain with slopes greater than 60%; or
      c. the road is located on terrain where there are indicators of slope instability.

      Ensure that the professional carries out the assessment in accordance with the EGBC Guidelines for Terrain Stability Assessments in the Forest Sector (PDF, 1.9MB).

    - riparian classification of streams, wetlands, and lakes;
    - identification of fish streams;
    - visual impact assessments;
    - applications of general wildlife measures, and protection of resource features and wildlife habitat features;
    - fan destabilization and a gully process (for coastal BC) (see fans and gully);
    - archaeological impact assessments; and

- soil erosion field assessments.

2.4.2 Specific Concerns

Consider the following items during reconnaissance:

1. **Vertical alignment:** The grades that result in the best combination of haul and construction costs should be selected. See Table 3-2: Summary of alignment controls for forest roads (PDF).
2. **Horizontal alignment:** The speed limits for various degrees of curvature are given in Table 3-3: Curve Widenings.
3. **Junctions:** A high level of safety must be maintained in selecting a site for a junction. The following factors should be incorporated as much as possible:
    - adequate sight distance in both directions in accordance with the normal travel speed (up to 65km/h, 100m; and 65–80km/h, 150m);
    - near-level ground conditions (2% plus or minus);
    - right angle T-junctions rather than Y-junctions; and
    - only gradual change in horizontal or vertical alignment.
4. **Soils:** For locating roads, landforms can be excellent guides to desirable areas or to areas to avoid. Alluvial terrains, lacustrine deposits, water melt channels, colluvial deposits, alluvial fans eskers, and kames are strong indicators of the types of soils to be found below the surface. Easily accessible gravels, found in alluvial fans or kames, are an economical source of surfacing material. Glacial moraines, which contain relatively unsorted material, are a good source of subgrade material. Other glacial deposits that can provide subgrade or surfacing materials are basal tills and drumlins.
5. **Riparian Management Areas:** Ensure that riparian classifications are identified for streams near the road location, and that the road layout places the road beyond the riparian management area for each stream, except as provided in section 50 (1) of FPPR.

    Plan on obtaining any large fragmented rock required for road ballast or rip rap from rock outcrops (quarries) or talus slopes. Avoid very fine-grained soils of lacustrine origin, particularly for sidehill construction.

    Illustrations of the landforms mentioned here are found in Terrain Classification System for British Columbia (PDF, 8.21 MB).

2.4.3 Drainage Structures

Some of the most important control points reviewed during a field investigation are those used to locate bridges and culverts.

Bridge Location

Locate a bridge site to provide an acceptable horizontal and vertical alignment for the road, considering:

- stream width;
- upstream and downstream watercourse alignment;
- streambank stability;
- whether streambanks are fairly even in height on both sides;
- availability of local materials for construction;
- access to both sides of watercourse during construction phase;
- potential for ice and debris buildup; and
- potential for streambank erosion.

Ideally, locate the crossing of a waterway at right angles to the centreline (P-line or L-line) of the waterway and include approach tangents of a minimum 15m in length. Limit the maximum grade on a bridge deck to 4%, but preferably less.

Major Culvert Location

In planning for major culverts, use much of the same location criteria as used for bridges. Refer to the Fish-Stream Crossing Guidebook (PDF, 4.2MB).

2.4.4 Harvesting Requirements

As the field investigation proceeds, consider the harvesting systems that will affect on block roads.. For detailed information on total chance plans and mainline roads, see FPInnovations (FERIC) Handbooks No. 4: Timber Development Planning for the British Columbia Interior: The Total Chance Concept (PDF, 4.19 MB), and No 9: Forest Harvesting and Renewal Planning for the British Columbia Interior: An Extension of the Total Chance Concept, which cover planning considerations and logging methods for various types of terrain.

2.4.5 Use of Appropriate Professionals

To adequately manage and conserve forest resources, ensure that qualified professional specialists are consulted where appropriate. Site-specific conditions will dictate what the critical impacts and risks will be, but in general specialists might include those in the fields of terrain stability, stream morphology, structural engineering, aquatic and marine habitat, archeology, wildlife, botany, visual impacts, and forestry. Ensure that the professional specialists who have been retained to do the work are in fact qualified to do this work. See Engineering Equipment and Services (EES) Directory for those categories related to road engineering, and for these particular categories, consult with the ministry engineering professionals and have them:

- assess a consultant's qualifications prior to retaining the consultant under a service

contract; and

- assist with service contract language.