

## Chapter 3: Road Survey & Design

Route reconnaissance is usually the first on the ground location work used to define the general position of a road. Based on the reconnaissance and reconnaissance summary, further investigations and surveys may be required, including field traverses and surveys to an established standard or Survey Level. The level is determined primarily by the complexity of the terrain and end results required. Once the survey has been completed, the road design can be carried out.

Road design varies in complexity and can be as simple as providing basic road dimensions and grades required to a more detailed design to establish excavation and fill volumes, grades and alignments. In most cases, road design is usually an office process utilizing computers and road design software. Again, depending on the complexity and end results required, further road survey work may be required to establish the road location.

This chapter presents the ministry's standards related to road location survey and road design practices, and to the associated output. It is intended to provide the reader with enough detail to be able to understand the mandatory procedures, as well as carrying out appropriate best practices to address the applicable regulatory requirements.

### 3.0.1 Policy

For any FSR, the road will be:

- Surveyed with appropriate detail and accuracy for the terrain and complexity of the layout; and
- Designed in a manner that:
  - Is commensurate with the level of survey and expected use, cost and potential impacts on other resources by the road construction; and
  - Incorporates the results of any required assessments.

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#### 3.1 Mandatory Procedures & Best Practices

#### 3.2 Road Survey & Design Professional Responsibilities & Considerations

#### 3.3 Road Location Survey

- 3.3.1 Types of Survey
- 3.3.2 Survey Levels

#### 3.4 Survey Procedures

- 3.4.1 Survey Level 1

- 3.4.2 Survey Level 2 & 3
- 3.4.3 Survey Level 4 (For High-Order Survey Requirements)

### 3.5 Geometric Road Design

- 3.5.1 Design Planning Considerations
- 3.5.2 Road Design Criteria
- 3.5.3 Swell & Shrinkage of Materials
- 3.5.4 Example Correction Factors

### 3.6 Culvert Design

- 3.6.1 Log Culvert Design
- 3.6.2 Ford Design & Construction on Non-Fish Streams
- 3.6.3 Design Considerations
- 3.6.4 Cross Drain Culverts
- 3.6.5 Culverts on Non-Fish-Bearing Streams
- 3.6.6 Factors Affecting Runoff
- 3.6.7 High Water Estimation Method for Stream Culverts
- 3.6.8 Road Junctions
- 3.6.9 Other Structures

### 3.7 Geometric Road Design Requirements

### 3.8 Survey & Design Outputs - Road Plans

### 3.9 Appendices

- 3.9.1 Drawing & Map Legends
- 3.9.2 Basic Drainage Site Report Requirements
- 3.9.3 Sample Survey & Design Contract
- 3.9.4 Project Tracking Checklist