Alberta

Freedom To Create. Spirit To Achieve.

Smoky River at Grande Cache BF76474

Alberta Transportation

April 2012

Government of Alberta

Background

- Original structure built in 1967

- Looking Upstream

- Looking South

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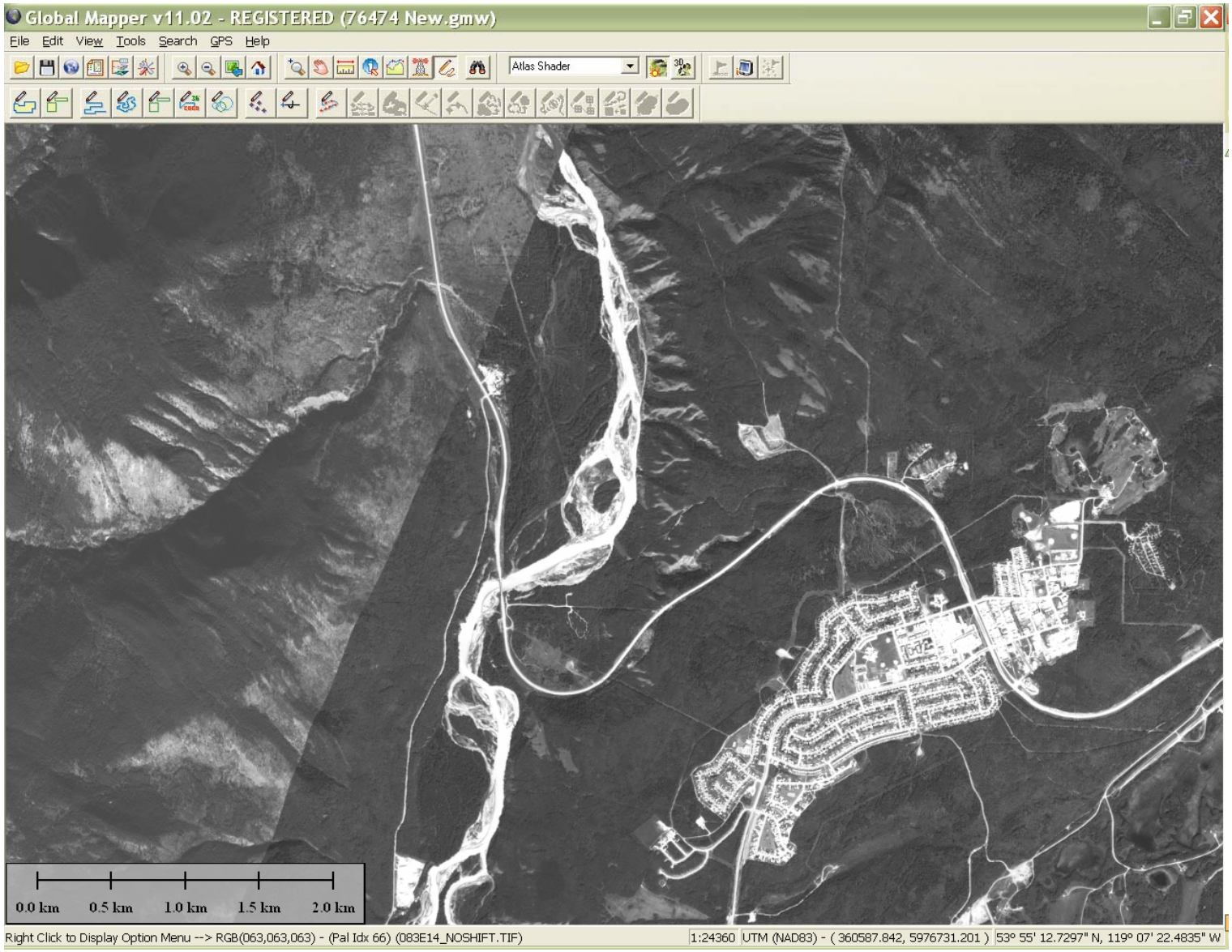
Satellite Photo



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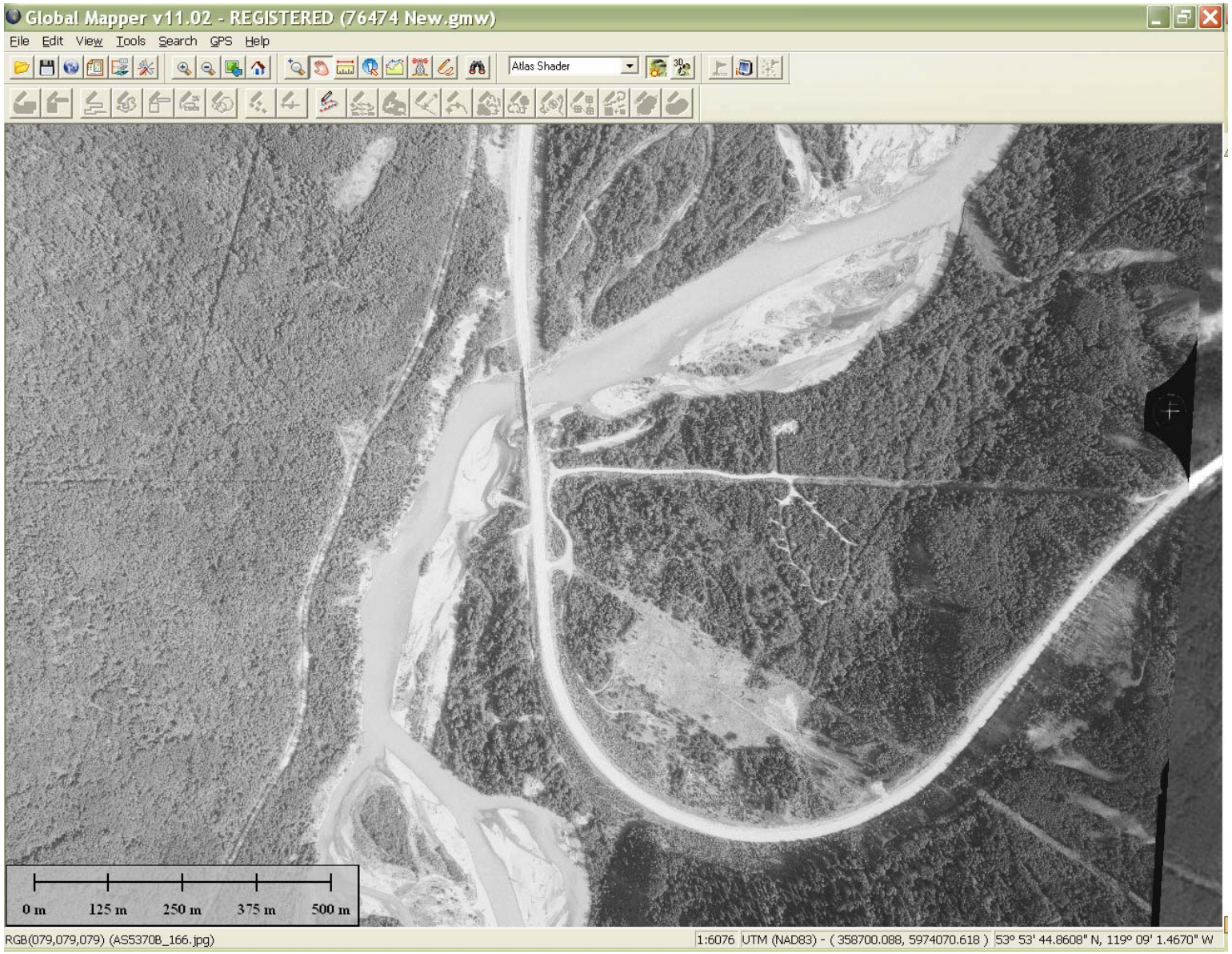
Airphoto (2006)



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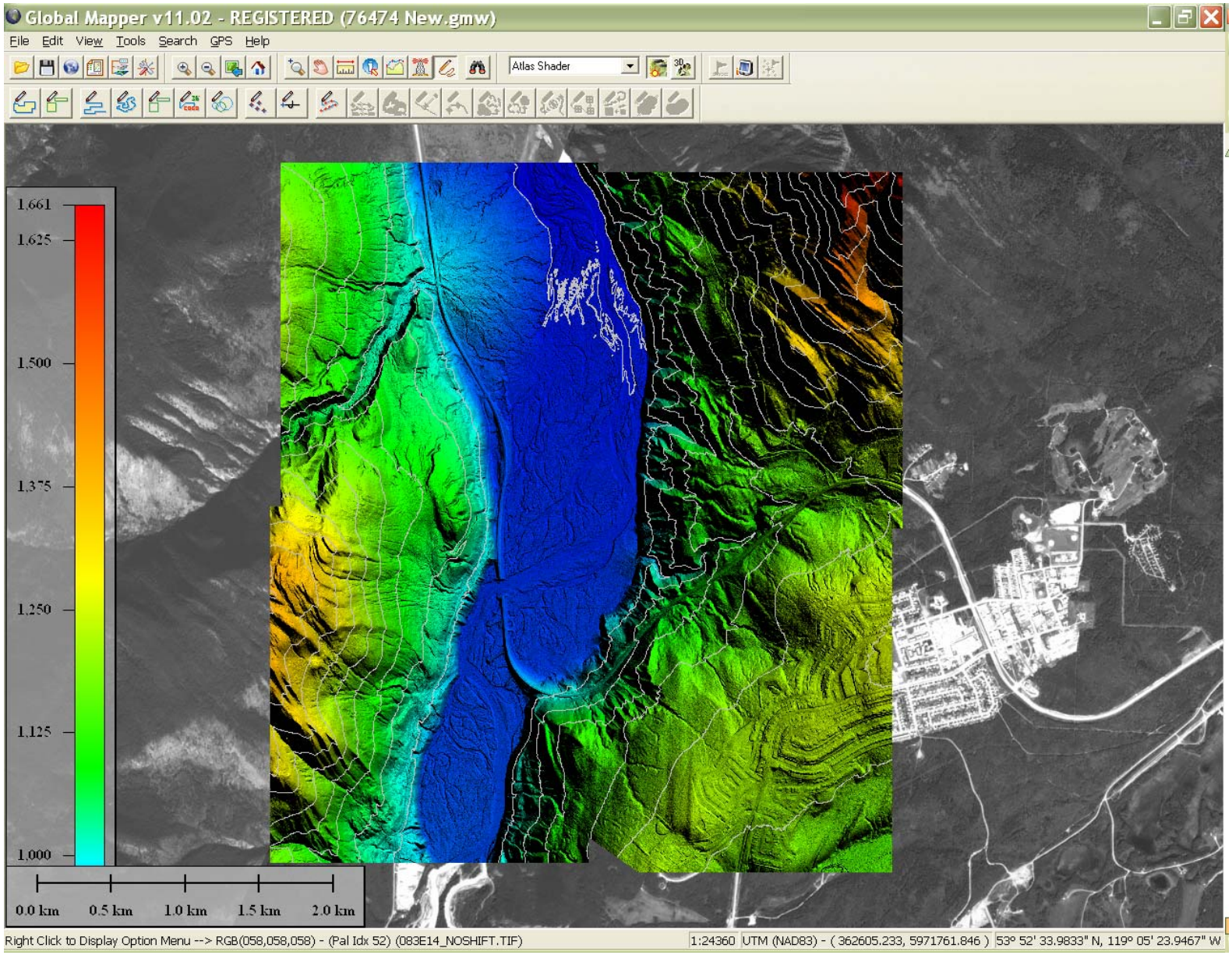
LiDAR w/ 50m Contours



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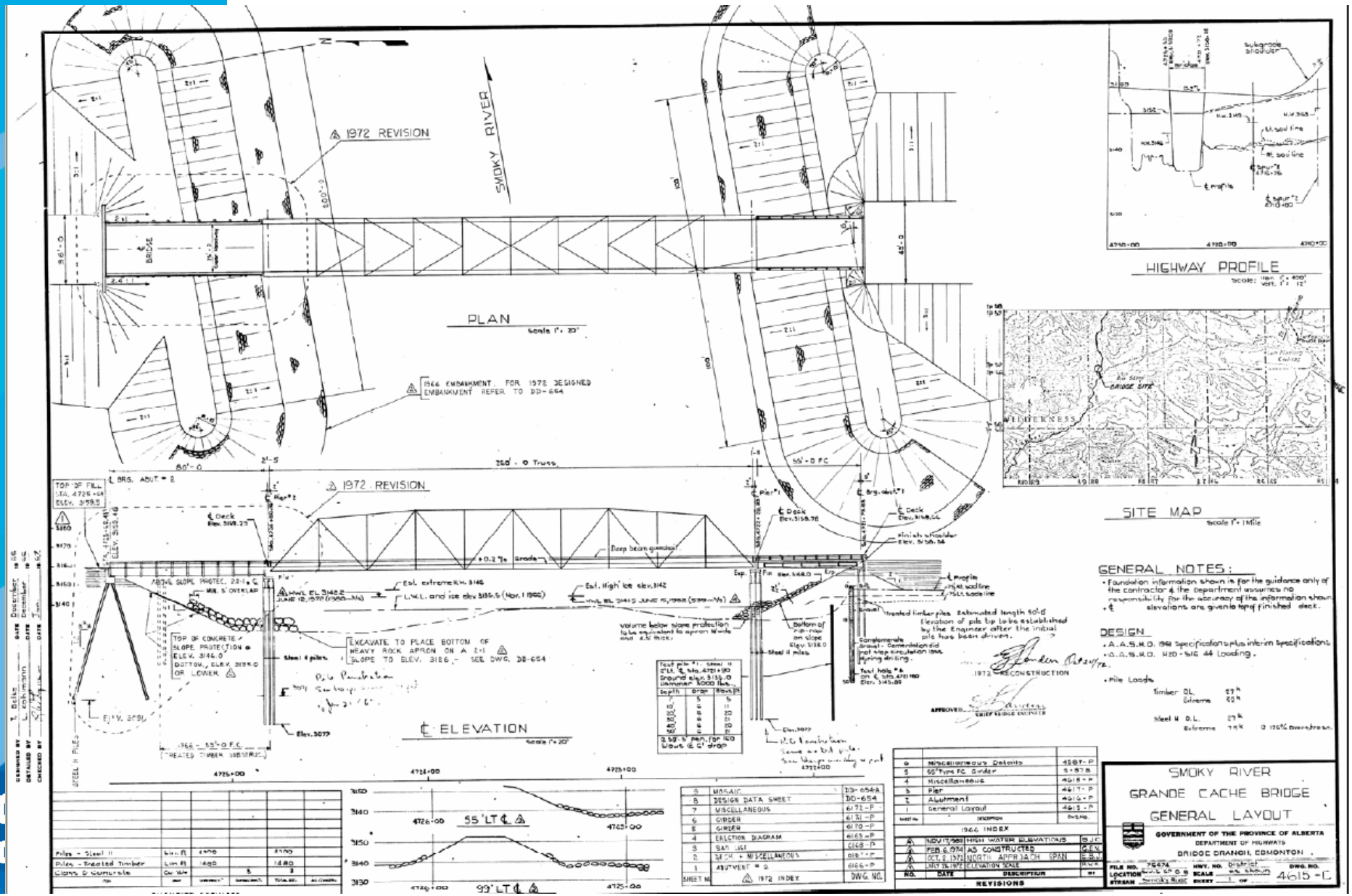
Old General Layout



Information Collection Phase

- Scenario: You are asked to participate in a FPS as a bridge planner with the freedom to develop a new roadway corridor and/or bridge crossing

  - what background information would you need?

  - what are some of the site constraints?

  - what are some of the design considerations?

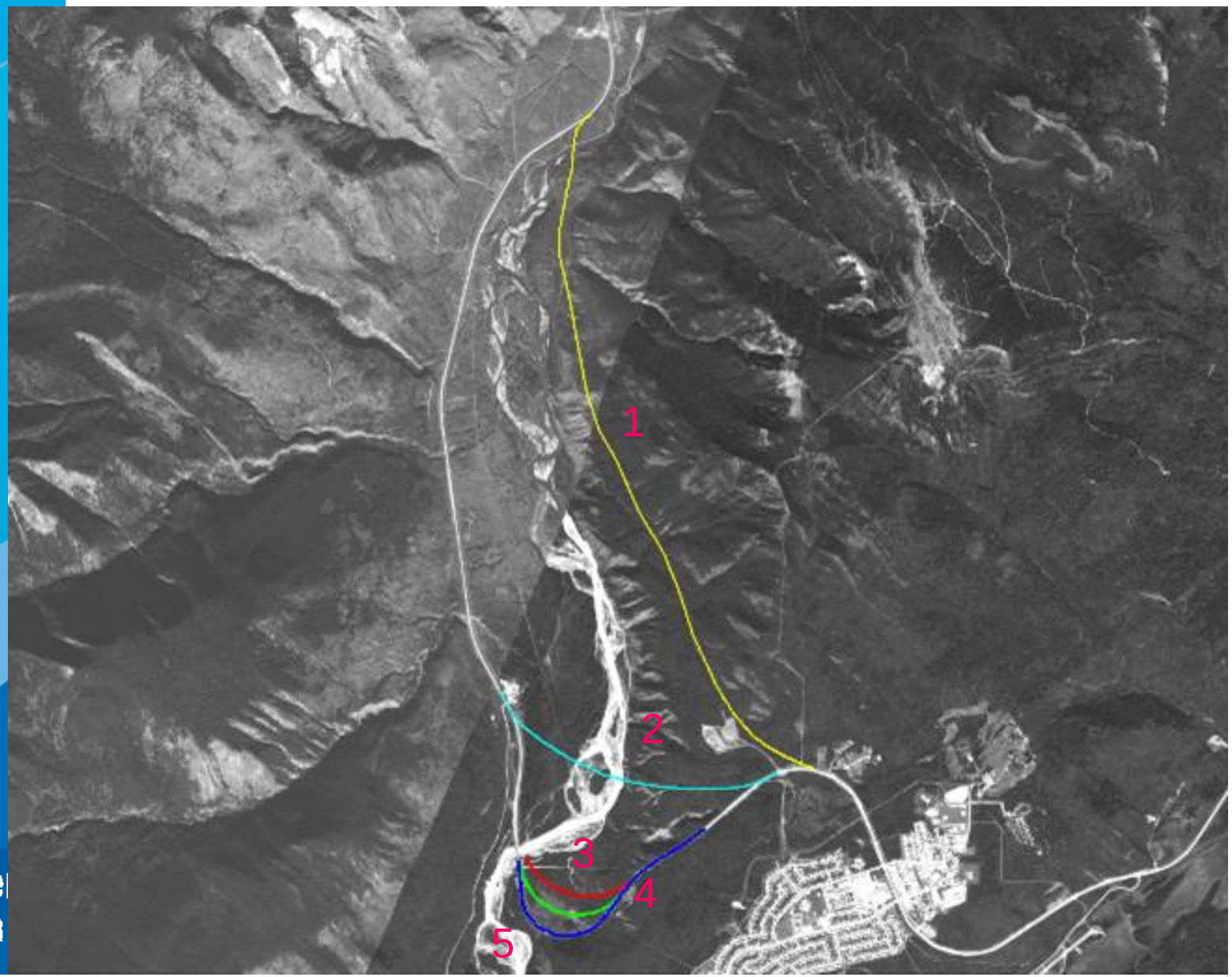
Information Collection Phase

- Site history
  - File review, BIMs, highwater events, WSC Gauges, maintenance, rehabs, collisions, drift, ice, geotechnical, RPWs, banktracking, pier scour
- Roadway Geometrics
  - Horizontal, vertical, xsection, existing designation, AADT, pavement, urban vs rural
- Land Use
  - Landowners, industry (well sites, logging), utilities, existing RoW, historical resources, railways, access management
- Environmental
  - wildlife, vegetation, fish, watercourse classification (RAP), AEW, SRD, well sites, contamination
- GIS Data
  - Maps, airphotos, LiDAR, RoW
- Other….

New Design Considerations

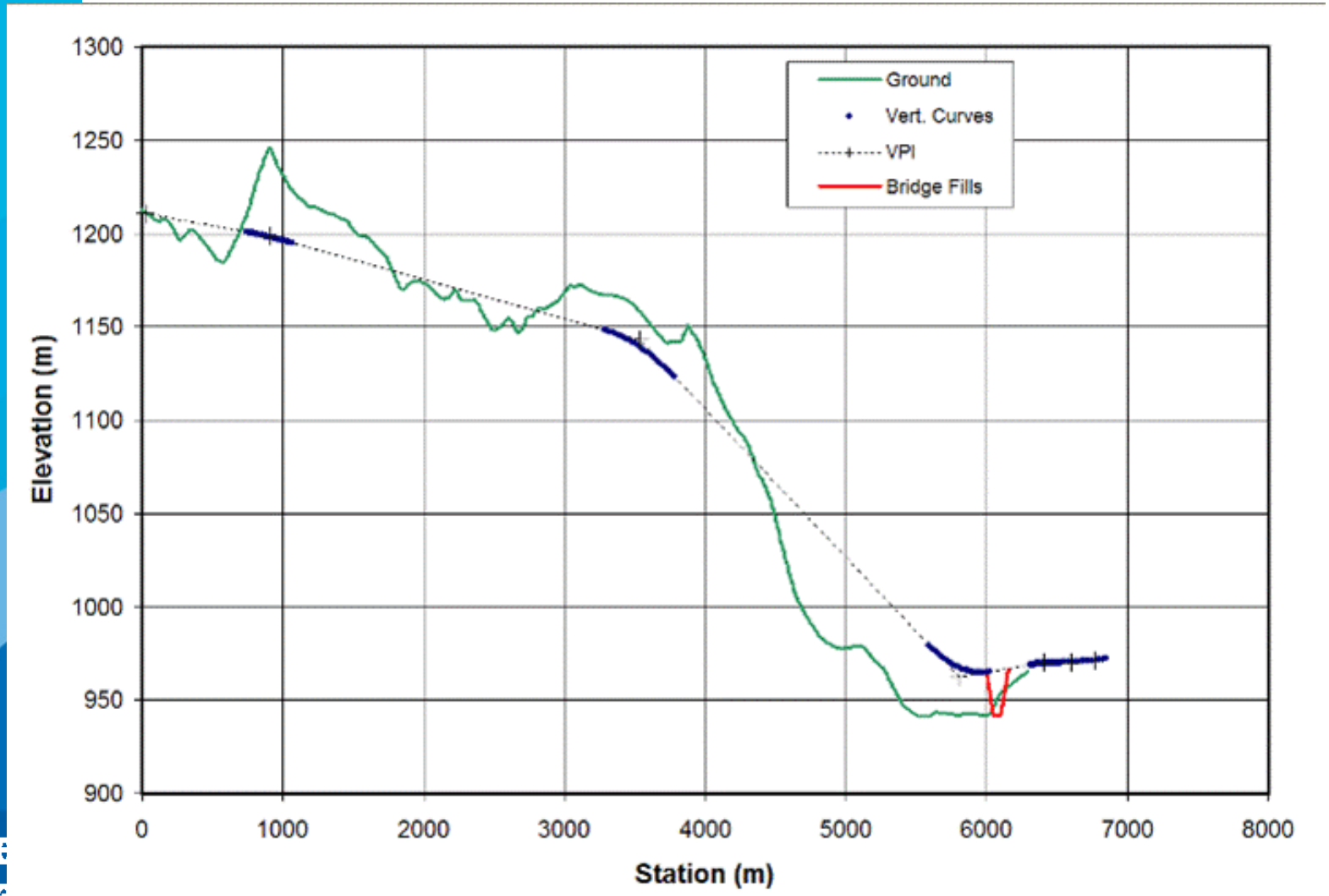
- Roadway Geometrics
  - Proposed highway designations (traffic growth rate)
  - Vertical/horizontal standards (k, G, R)
  - XSection (lane widths, shoulders, clearzones, future overlays)
  - Site distances (intersection, bridge rail)
  - Access management
- Bridge Considerations
  - shy distances, desirable 1% gradient, max. resultant of 4%, deck drainage, skew, freeboard, no spirals/curves on bridges, structural (girders, piers, abutments, deck)
- Hydrotechnical
  - Design highwater, velocity, constriction, freeboard, drift, ice, headslopes, protection works, good crossing locations (stability, width)
- Constructability
  - Grading (cut/fill balance, high cuts/fills), geotechnical, piers, RAP, fish
- Stakeholder impacts
  - aboriginals, landowners, industry, municipalities, political
- Cost (initial and lifecycle)

FPS Alignments Considered

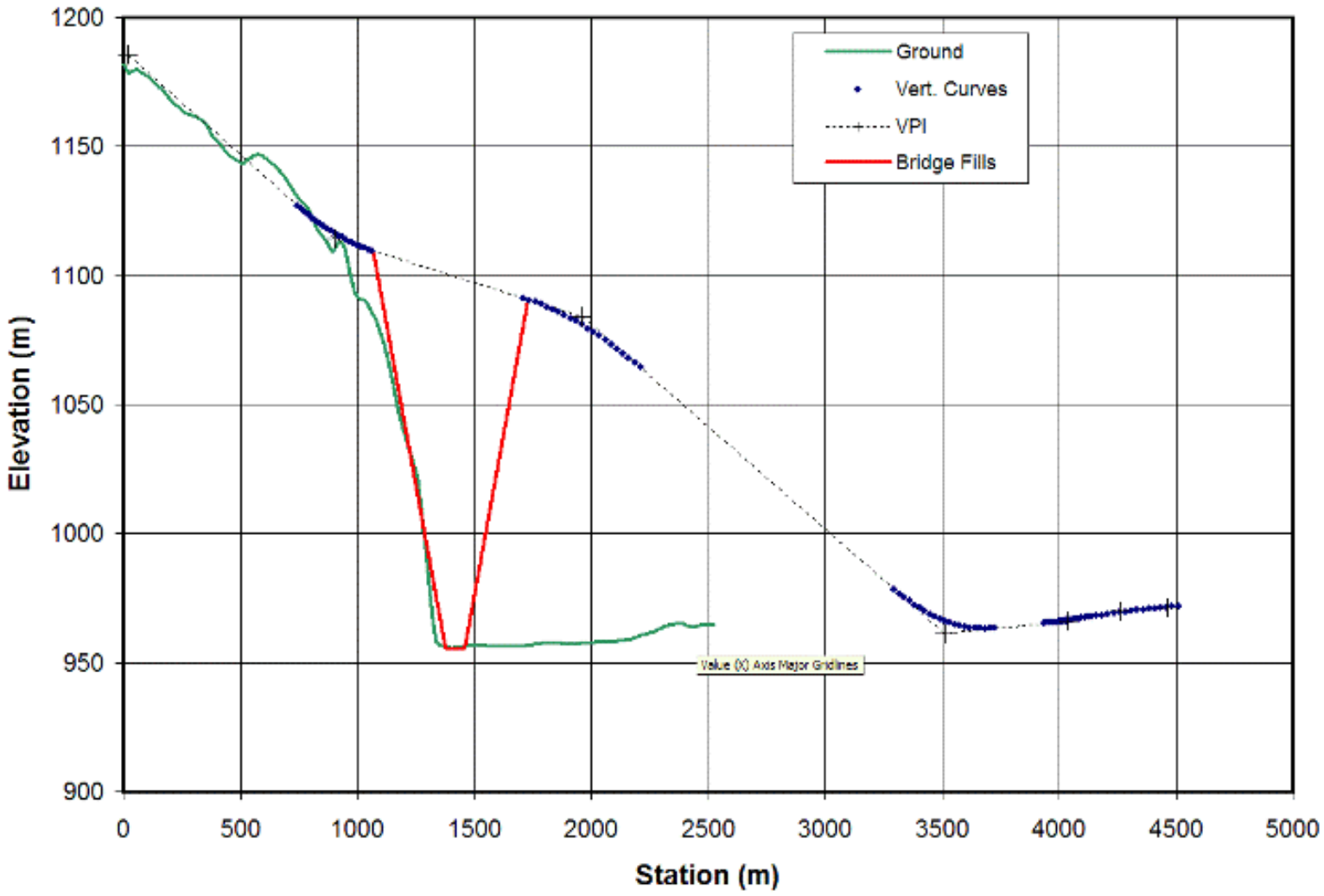


Alternative 1

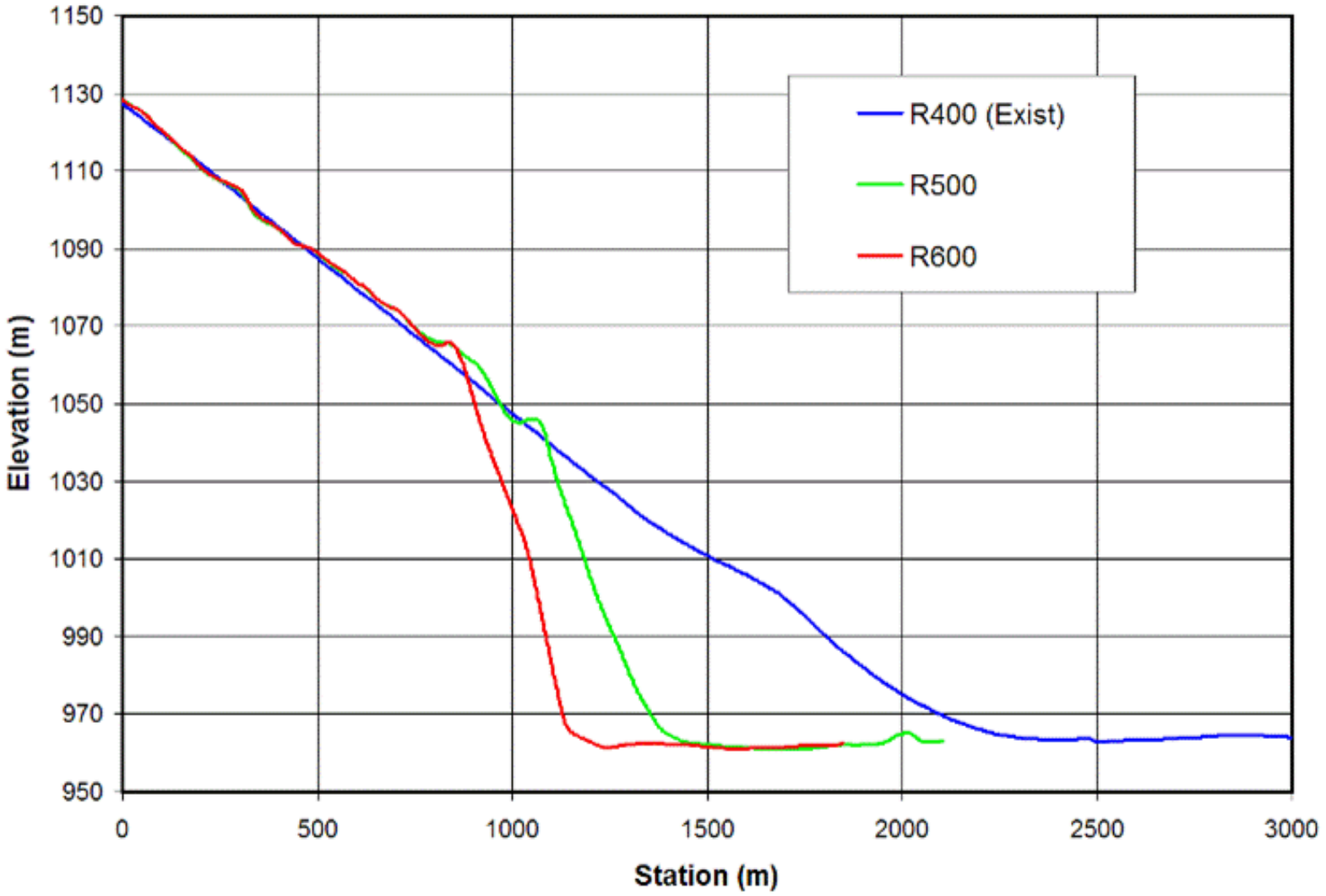
- Multiple profiles developed for each alignment



Alternative 2



Alignments 3 (R600),4 (R500),5(R400)



FPS Alignments Considered

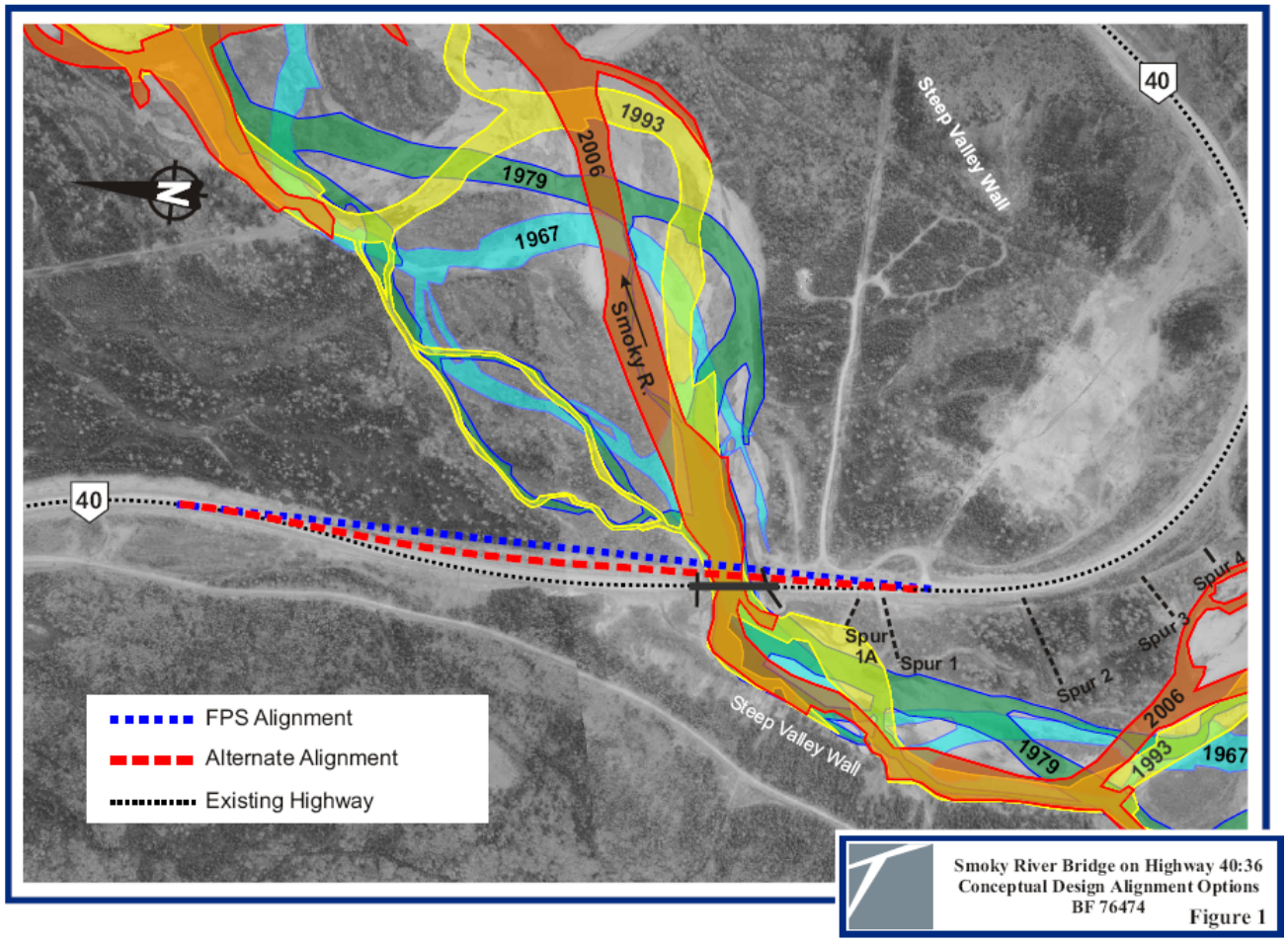
- What are some of the pros/cons for each alignment?
- Other alignments that look feasible?

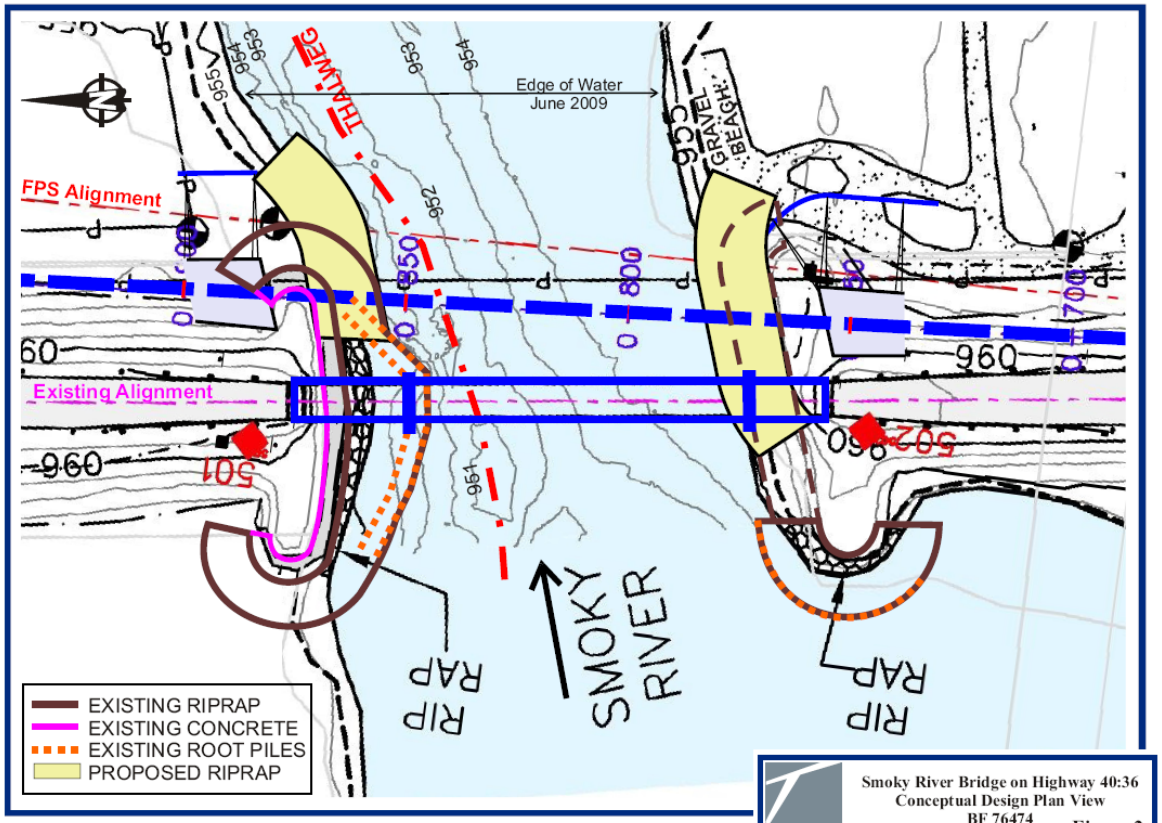
FPS Alignments Considered

- Grading volumes, balance of cut/fill (borrow/waste)
- Geotechnical (depth of cut/fills, instabilities)
- Bridge height, length, skew
- River crossing location (width, stability)
- Road network in the area (potential for upgrading)
- Costs

Conceptual Bridge Planning

- Refinement of FPS
- Examination of site constraints in detail
- Optimization

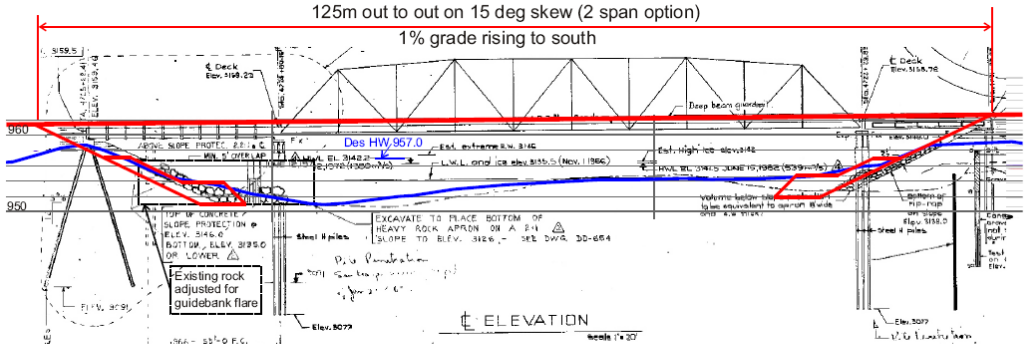




Smoky River Bridge on Highway 40:36
Conceptual Design Plan View
BF 76474
Figure 2

-Level of Detail for Conceptual Plan

-Prior to formal DDs



Proposed Waterway Opening superimposed on Dwg 4615-P

Smoky River Bridge on Highway 40:36
Conceptual Design Elevation View
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Figure 3

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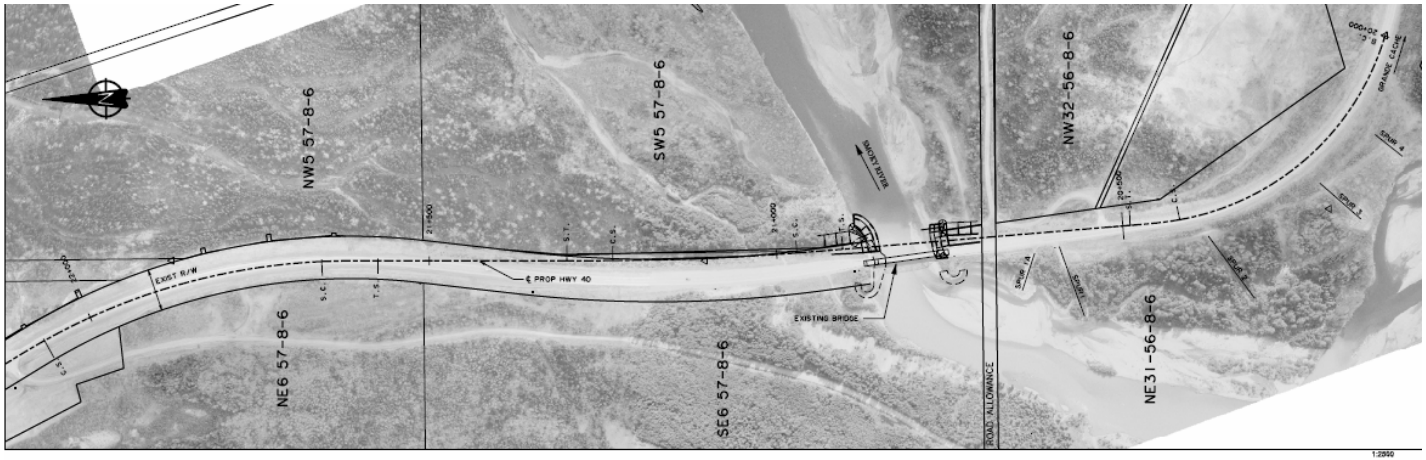
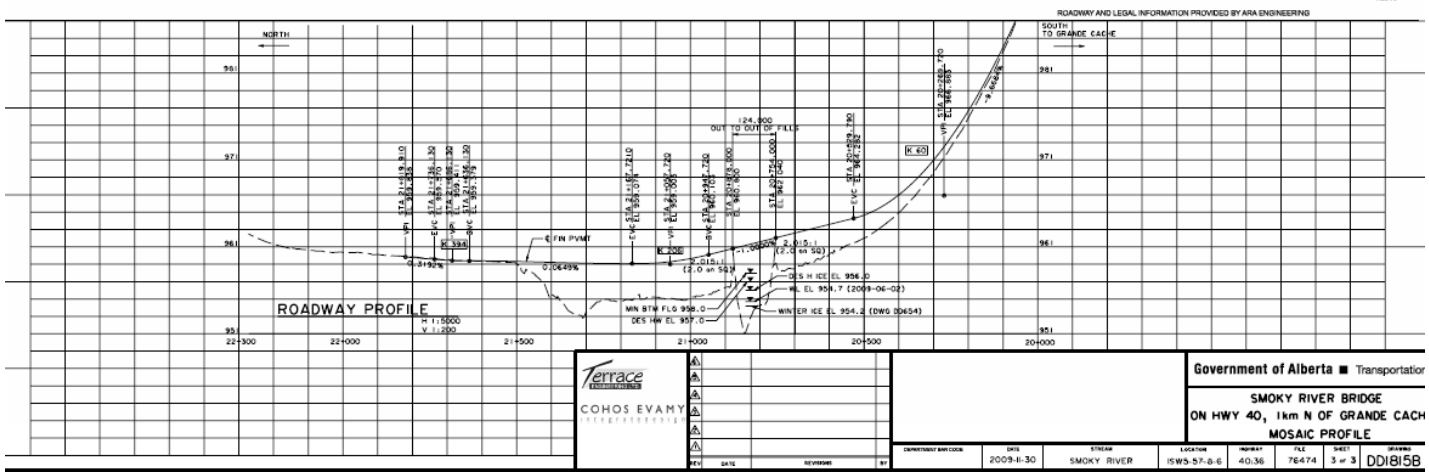
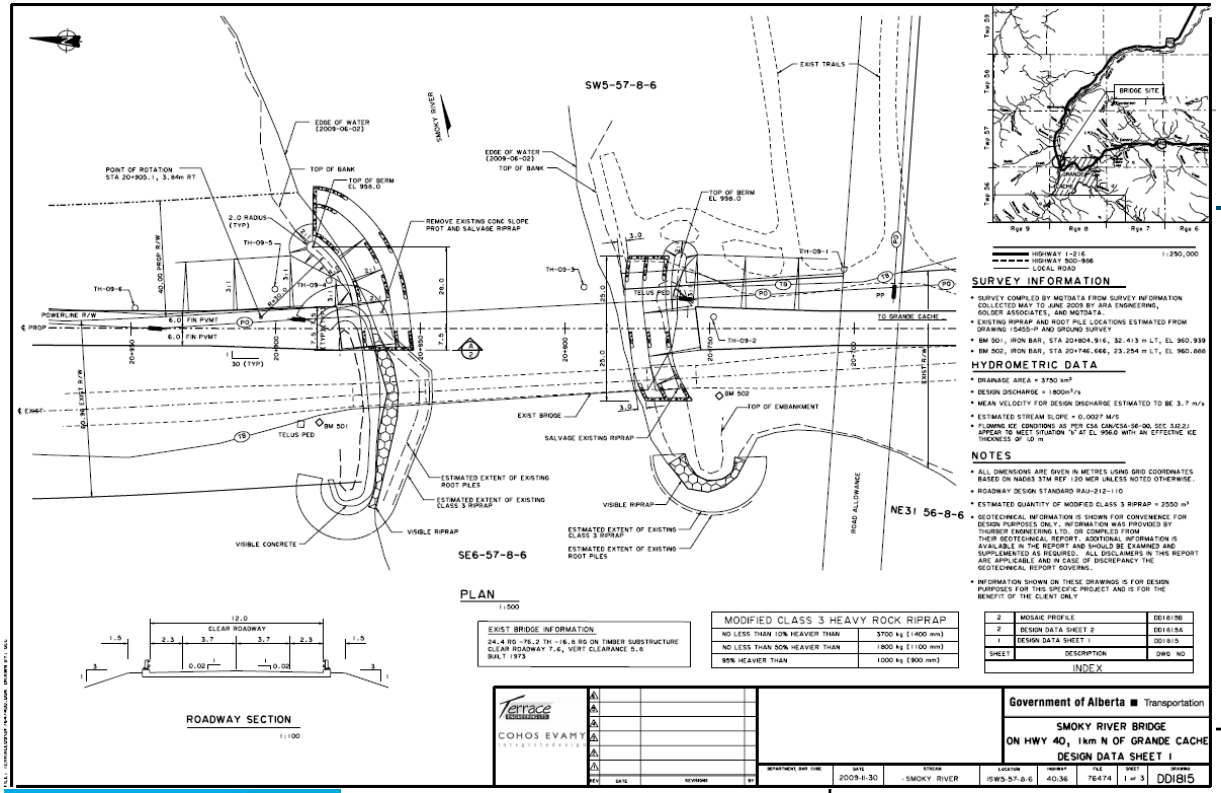
DD Development

- Confirmation of Plan with Site Conditions
  - Site visit, survey data

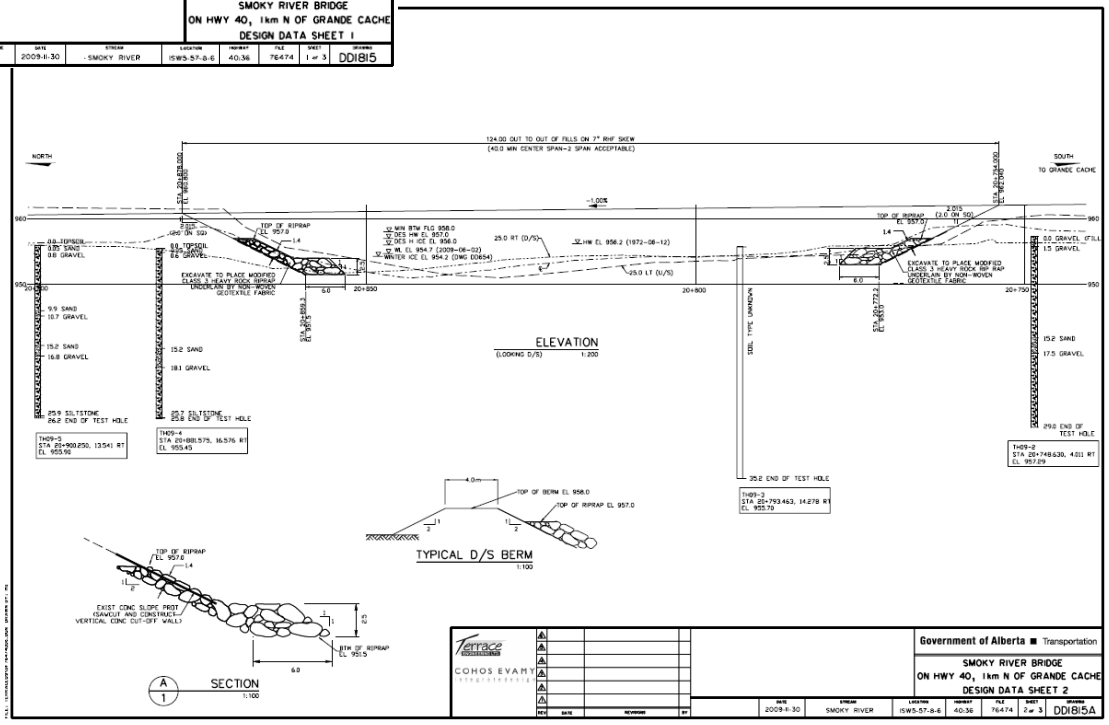






- Number of sheets may vary, depending on site/complexity

- Structure/pier details typically not shown



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Summary

- Difference in scale/level of detail/effort of work from FPS to Concept to DDs
- Optimization
- Most value in planning phase
- Finalize before structural design (rework – time/$)
- Collaboration with others (structural, roadway, geotechnical, environment)
- Applicable to grade separations/interchanges (with further considerations)