



Fig 1: Satellite Photo



Fig 2: 1:50 000 Airphoto (2006)

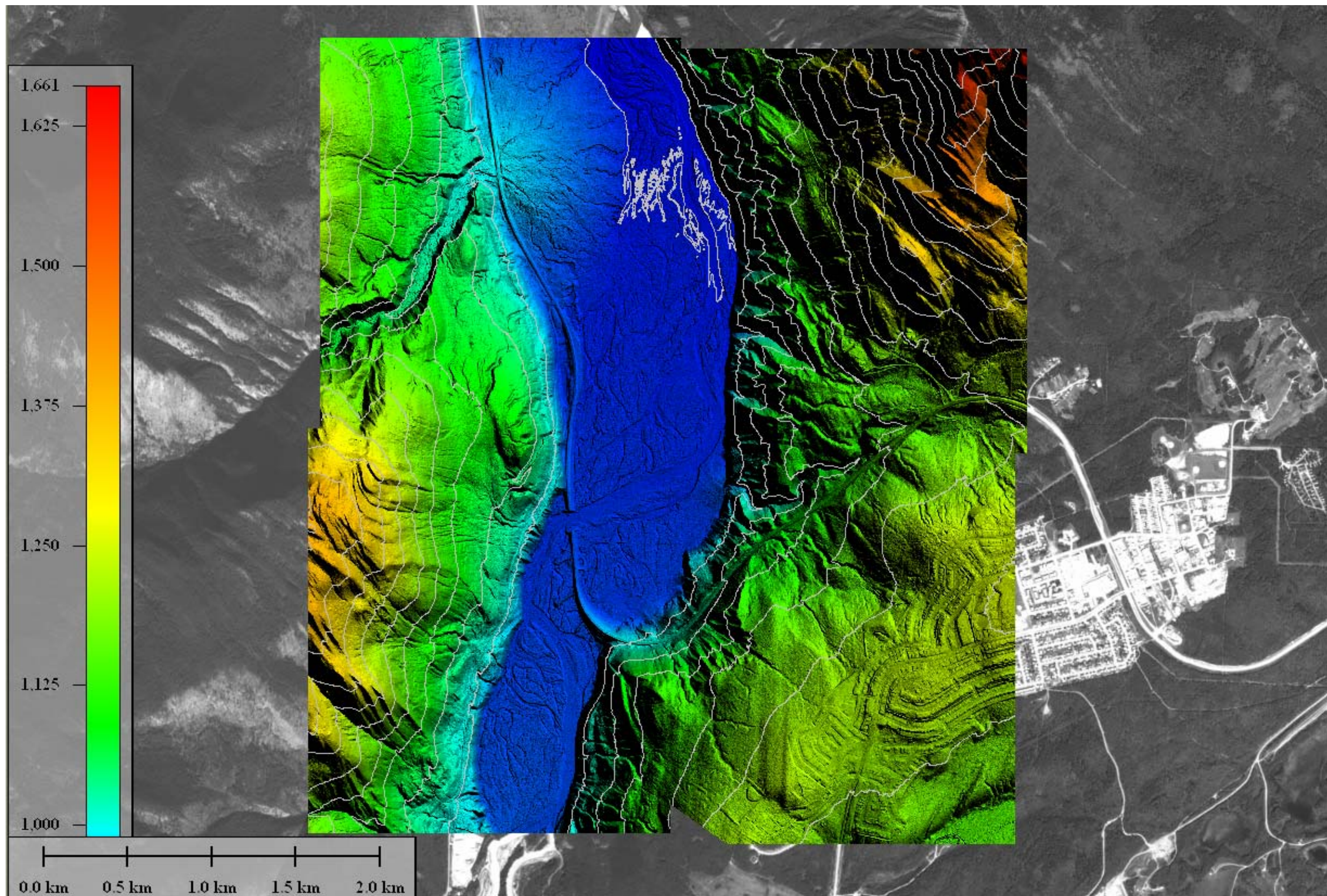


Fig 3: LiDAR DEM (50m Contours)

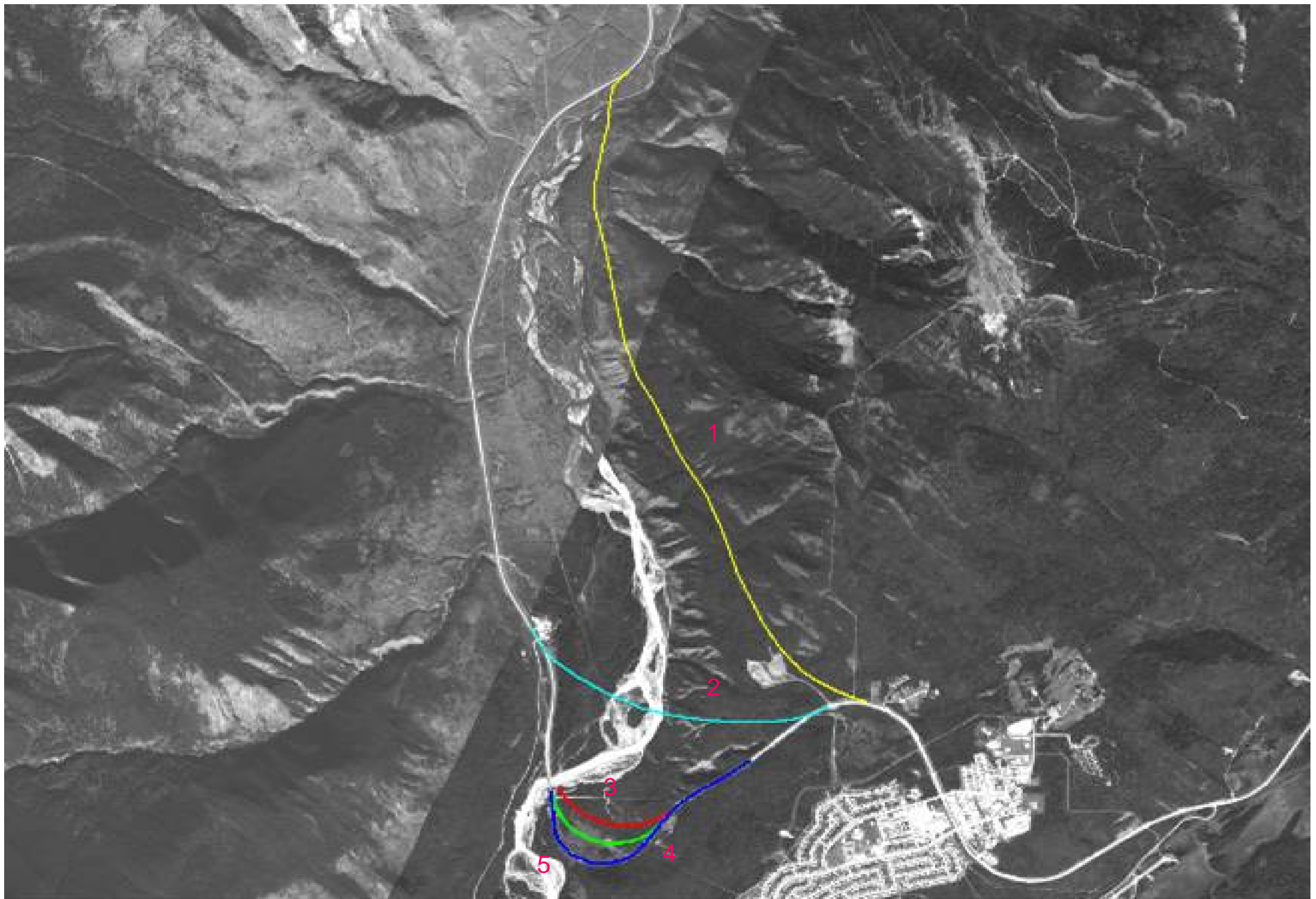


Fig 4: FPS Alignments

File 76474 - Smoky River near Grande Cache

Hydrotechnical File History

- 1966 New bridge proposed to service mine on north side of river, located approx 6 km upstream of existing foot bridge and ferry. Class 2 rock placed to protect two guidebanks and three spurs located on the right bank upstream. Ice jam in December caused by CNR road bridge located near old foot bridge. Ice ~1.5m > LWL.
- 1967 Bridge built. Highwater inspection. Spurs and guidebanks have settled and additional rock is required.
- 1969 Class 3 rock placed at left guidebank and at spur # 3. Highwater inspection in July. Film made of model tests performed by U of A.
- 1971 Highwater in June. Rock deteriorating at spur # 3. Rock rearranged at left guidebank. 4th spur considered for right bank upstream.
- 1972 Major flood, estimated to be greater than 1:100 year flood. Left approach span washed out due to abutment scour and temporary bailey span erected. Local velocities estimated to be approx. 20' /s (6 m/s) which exceeds specs for available riprap classes. An 80' steel span was added to replace the washed out 55' concrete girder span. Spur #1 and the left guidebank were rebuilt, and protected with concrete and class 3 rock with holder piles. Spur #1 was rebuilt slightly shorter.
- 1976 Handrail profile surveyed.
- 1979 Highway 40 about 6 km north of the bridge being attacked by the river. A temporary rock spur is constructed to save the highway.
- 1981 The temporary rock spur is starting to erode.
- 1982 Highwater with 3 peaks through the summer.
- 1983 2 permanent spurs built, with one being protected by Class 3 rock.
- 1987 Holder piles at bridge noted to be projecting into the flow, and are cut-off.
- 1990 Highwater inspection - noted that upstream end of the right guidebank is under attack. Some erosion has occurred between spur #1 and the right guidebank, but bank is well vegetated.
- 1993 Additional erosion is noted between the spur #1 and the right guidebank. Short spur may be required in future.
- 1994 U/S end of right guidebank and the nose of spur #1 are reinforced

01/17/11

BF 76474 Hwy 40 Over Smoky River Hydrotechnical Summary

Channel Capacity :

S = 0.0025
B = 75 m, h = 3 m, T = 100 m
Use AT equation

At Bank Height : Y = 3.0 m, V = 2.4 m/s, Q = 650 cms
At Channel Capacity : Y = 4.0 m, V = 3.0 m/s, Q = 1100 cms

Historical Highwater Data :

HW was noted in June 1967 (Y ~ 3m), June 1968 (Y ~ 2.5m), June 1971 (Y ~ 3.5m), June 1972 (Y ~ 4m, span washed out), June 1982 (Y ~ 3.5m), July 1997 (Y ~ 2.5m), and July 2001 (u/s spur damaged).

Gauge 07GA001 (DA = 3840 km², 1968 – Now) reports Q = 1380cms (stage rise ~ 4.8m) in June 1972 (gauged at Q = 670cms, stage rise = 3.5m), Q = 1010cms in July 1997, and Q = 810cms in July 2001.

Basin Runoff Potential :

Gross DA = 3730 km² (exceeds range of application of runoff depth method).

Conclusion :

Historical observations govern. Recommended parameters :

Y = 4.0 m, V = 3.0 m/s, Q = 1100 cms
EL 958.0 m (4615-P)



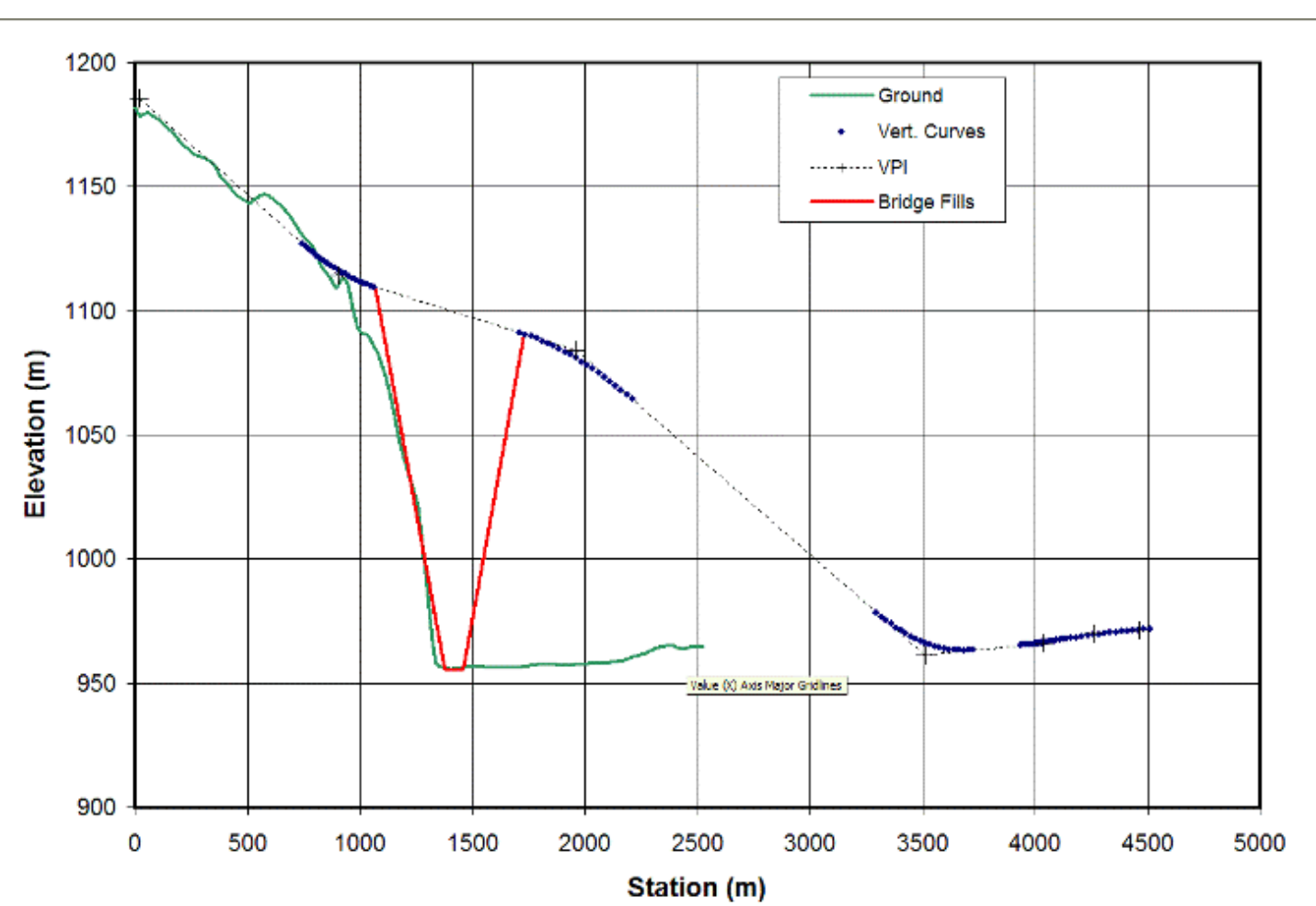
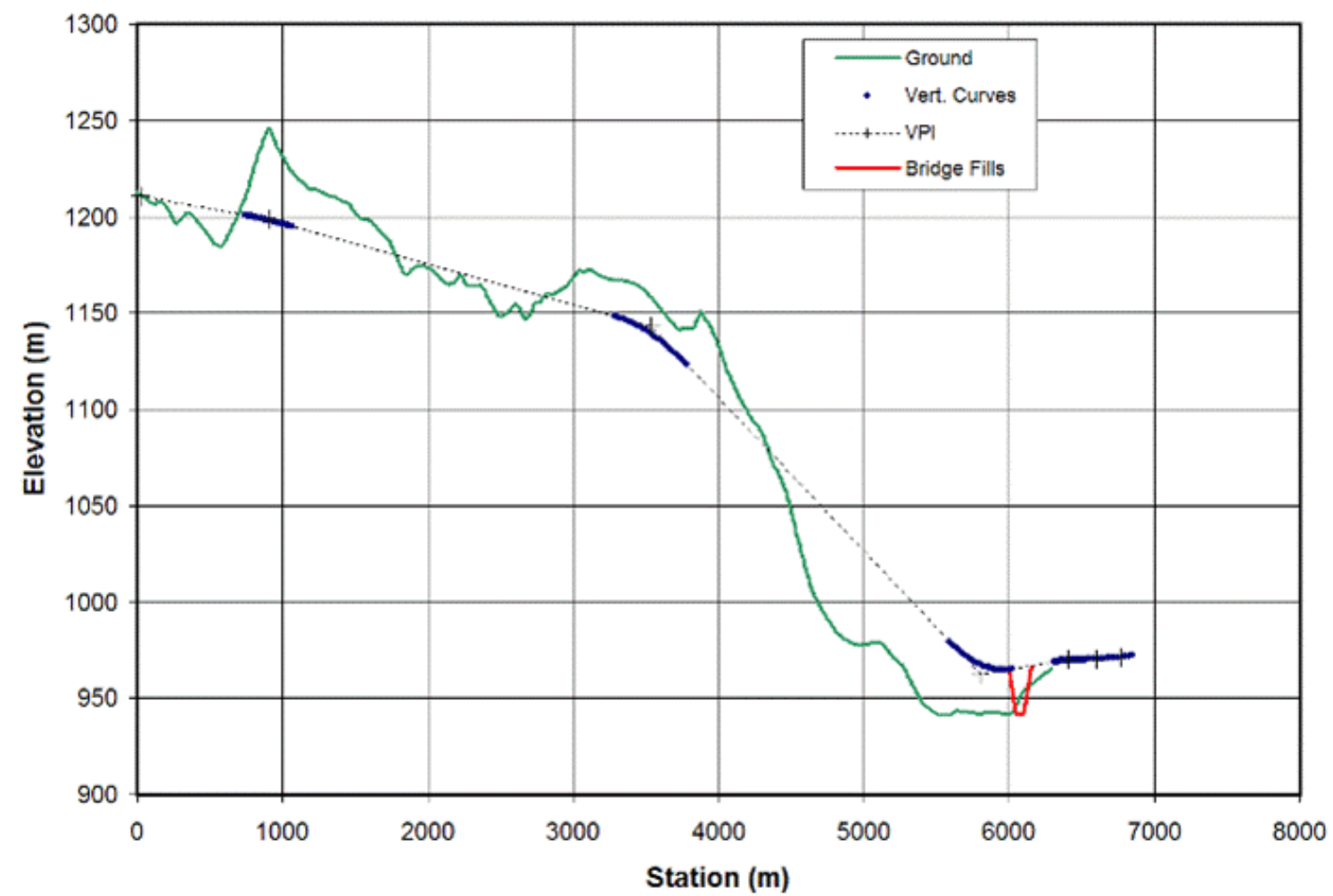
Looking South; flow right to left



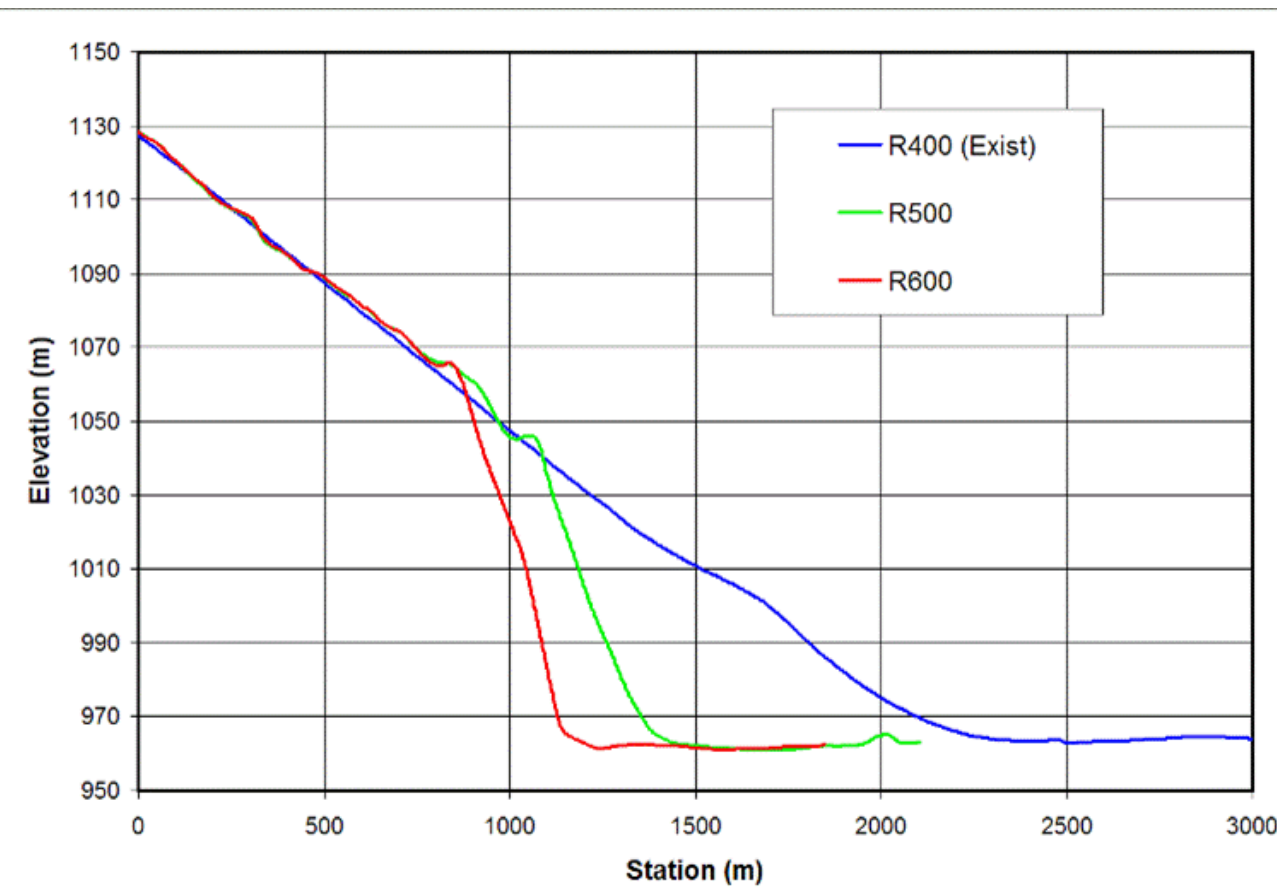
Looking North; flow left to right



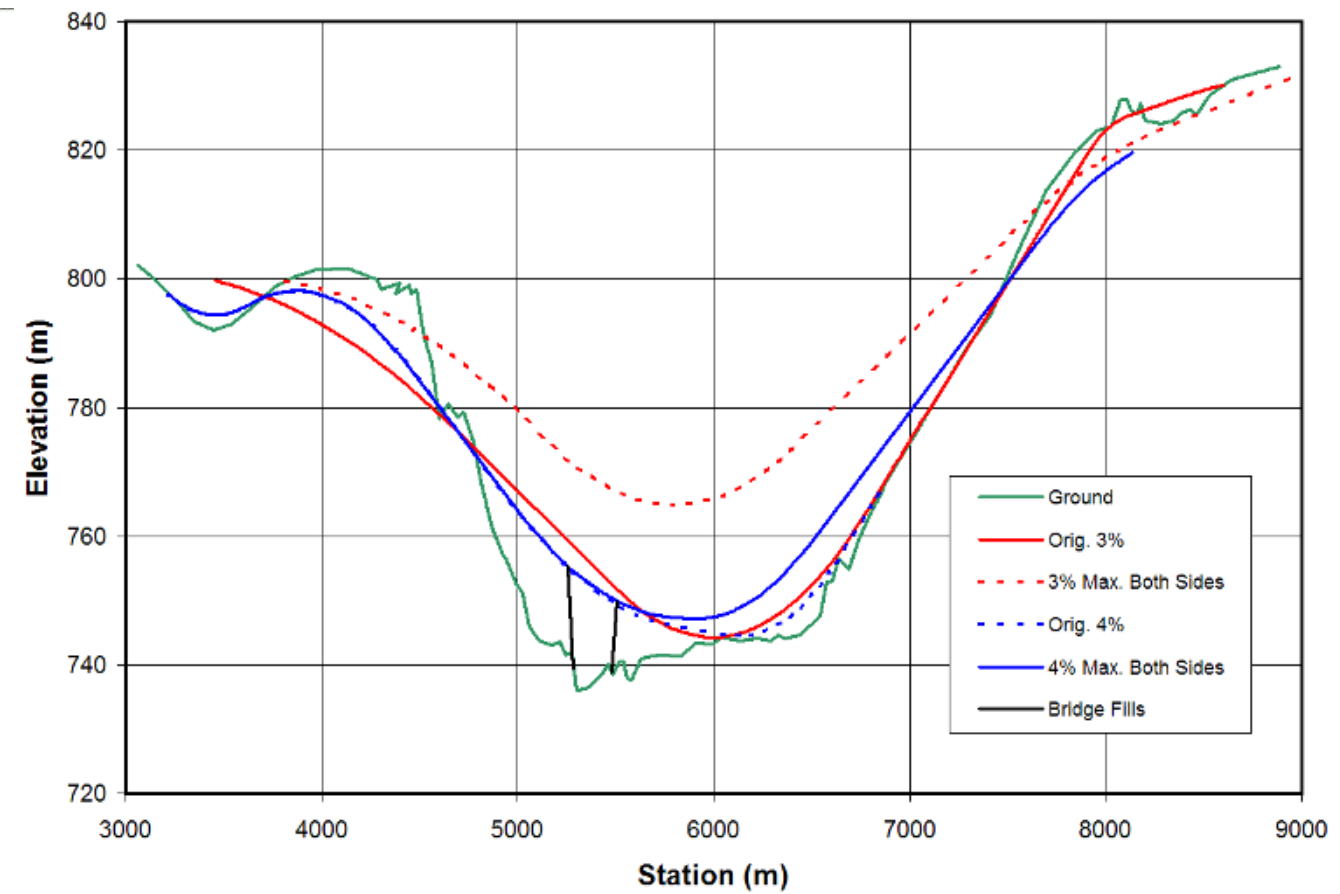
Day After High Water.
Level Had Dropped
4 to 5 Feet When These
Photos Where Taken.



Alternative 1:



Alternative 2:



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

Alternative 3: Multiple Vertical Profiles