

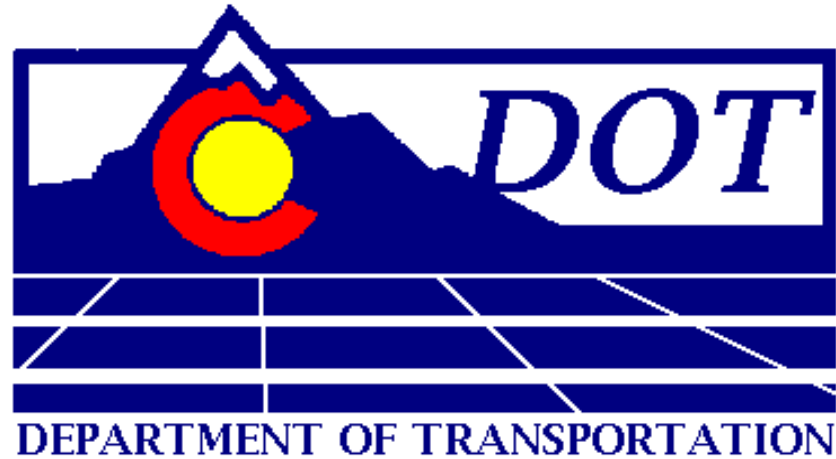
Consultants Profiler Experience by Gary Higgins



Earth Engineering Consultants, Inc.

4396 Greenfield Drive

Windsor, Colorado 80550

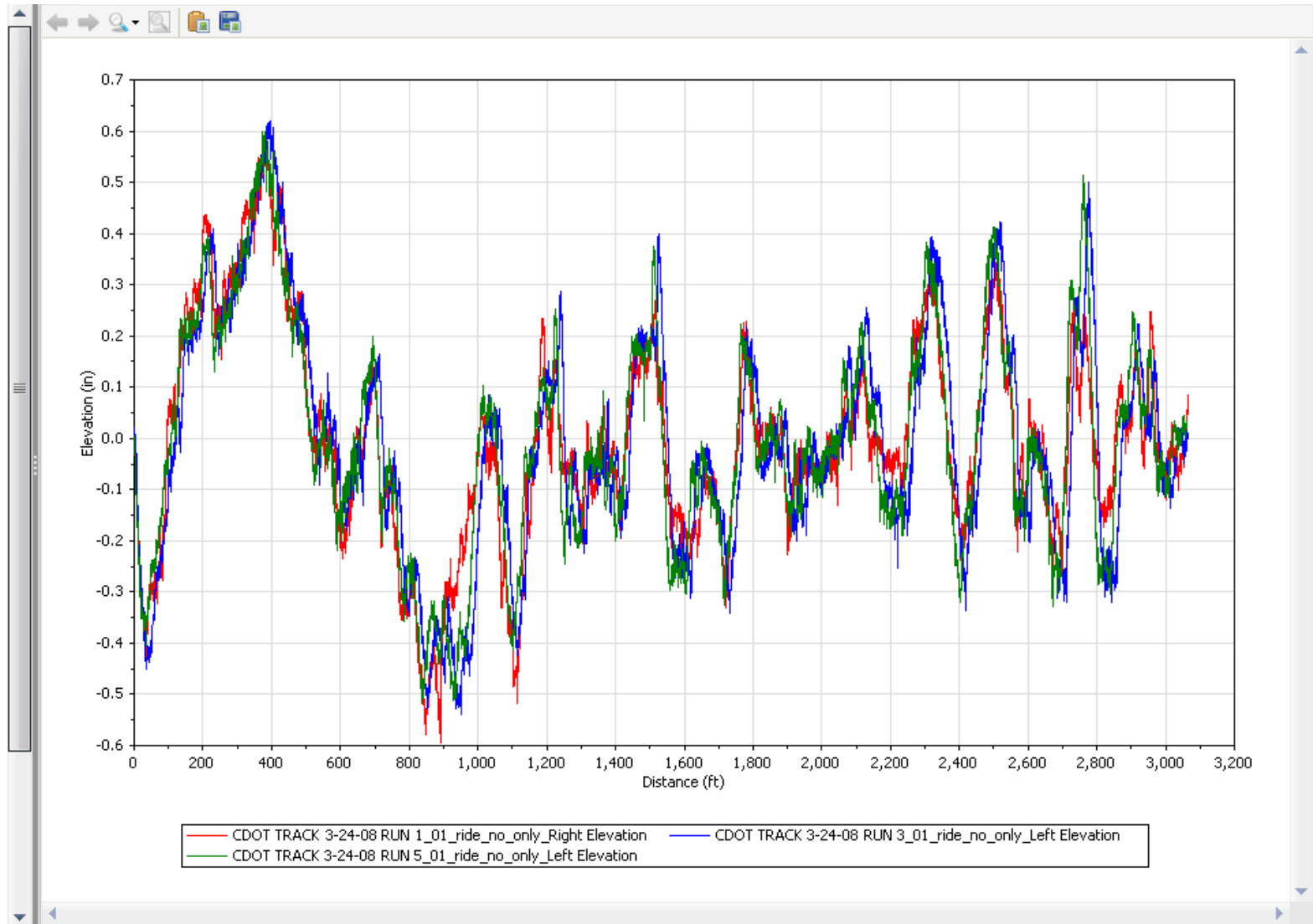


- Test track is ½ mile long
- Profilers required to make 10 runs
- Produce IRI report in 0.10 mile segments
- Required to be within 6.0 in/mi IRI for each 0.10 mile segment
- Distance accurate to 0.20% total length
- Bias is to SurPRO 2000

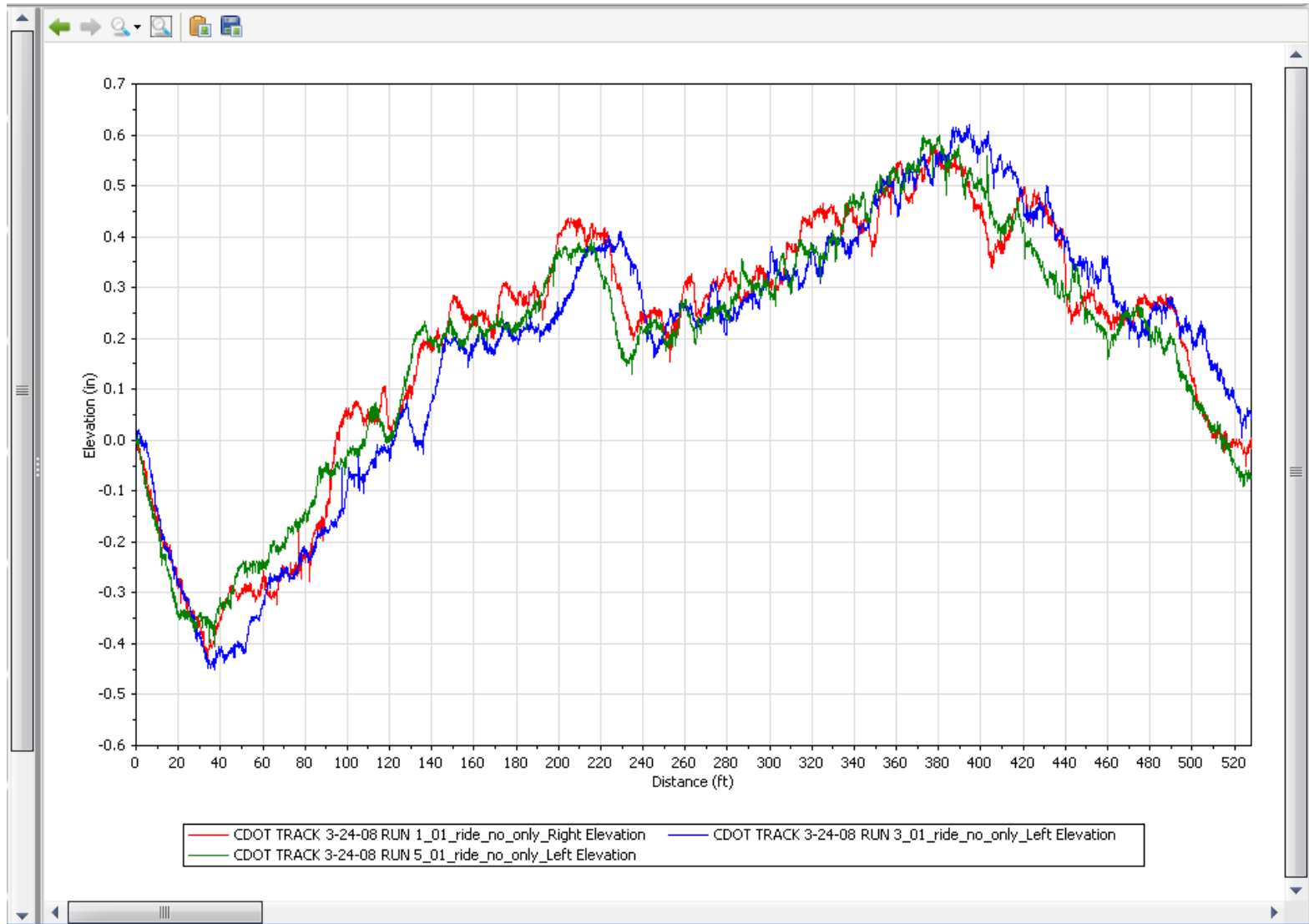


- LABCAT Level S Certification
- Renew every 3 years
- Demonstrate basic understanding of State regulations
- Demonstrate basic HSP operation
- Demonstrate ability to produce Interval Reports

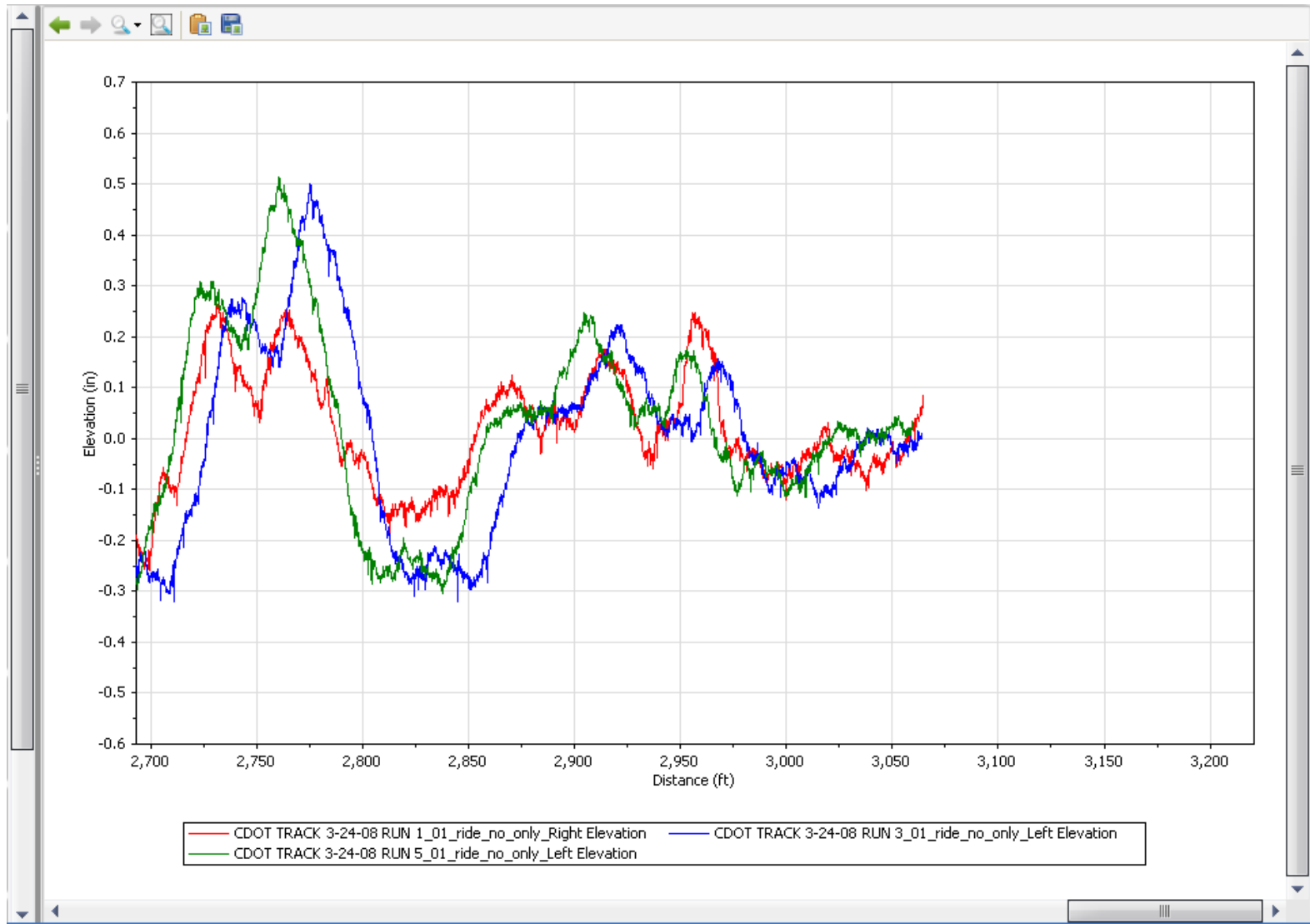
2008 Certification



2008 Certification



2008 Certification



CDOT Verification Testing

16522			HRI Category I									HRI Difference
NH 0341-073			Eastbound Driving Lane									
Region 4												
			CDOT (8-13-2009)				Contractor (8-13-2009)					
							Earth Engineering					
Start	Stop	Distance	Run 1	Run 2	Run 3	Average	Run 1	Run 2	Run 3	Average		
Mile	Mile	Mile	HRI	HRI	HRI	HRI	HRI	HRI	HRI	HRI		
0.0000	0.1000	0.1000	63.1	62.9	63.0	63.0	61.0	62.8	62.4	62.1	0.9	
0.1000	0.2000	0.1000	64.8	65.5	65.5	65.3	63.3	65.8	66.0	65.0	0.2	
0.2000	0.3000	0.1000	51.0	51.1	51.0	51.0	51.8	51.2	51.6	51.5	0.5	
0.3000	0.4000	0.1000	70.3	70.7	71.0	70.7	69.5	70.3	69.2	69.7	1.0	
0.4000	0.4090	0.0090	124.8	126.1	125.5	125.5	125.0	124.1	124.1	124.4	1.1	

CDOT Localized Roughness Report

ProVAL Report - 2.73.0026

Untitled

Analysis - Ride Statistics Continuous

Input	Value	Unit
Apply 250mm Filter	Yes	
Use Point Reset	No	
Sliding Base Length	25	ft
HRI Threshold	135	in/mi

EB OS RUN 3 HW34_01

Profile 1: Left Elevation

Profile 2: Right Elevation

Location (miles)	Max HRI (in/mi)
0.1563 to 0.1568	137.78
0.2334 to 0.2342	141.52
0.3455 to 0.3558	214.18
0.4107 to 0.4204	280.33
0.4209 to 0.4209	135.04
0.4212 to 0.4215	137.27
0.4321 to 0.4328	138.81
0.4377 to 0.4583	388.04
0.4680 to 0.4690	152.79
0.4696 to 0.4700	136.96
0.4717 to 0.4730	163.12
0.4733 to 0.4769	158.52
0.4772 to 0.4879	353.84
0.5252 to 0.5309	218.36
0.8116 to 0.8118	135.85
0.8118 to 0.8138	148.15
1.5757 to 1.5792	171.25

Contractor requests our HSP locate, mark areas of roughness identified by the State for grinding.

PROBLEMS

- How much grinding to remove roughness?
- Which run shows accurate roughness location?
- How to find the roughness?
- What will roughness look like when found?

What do I have control over and is it influencing my results?

Accurate equipment

- Passed Certification
- No control over calculations
- Perform Manufacturer tests/calibrations
- Run Certification track weekly

Repeatability

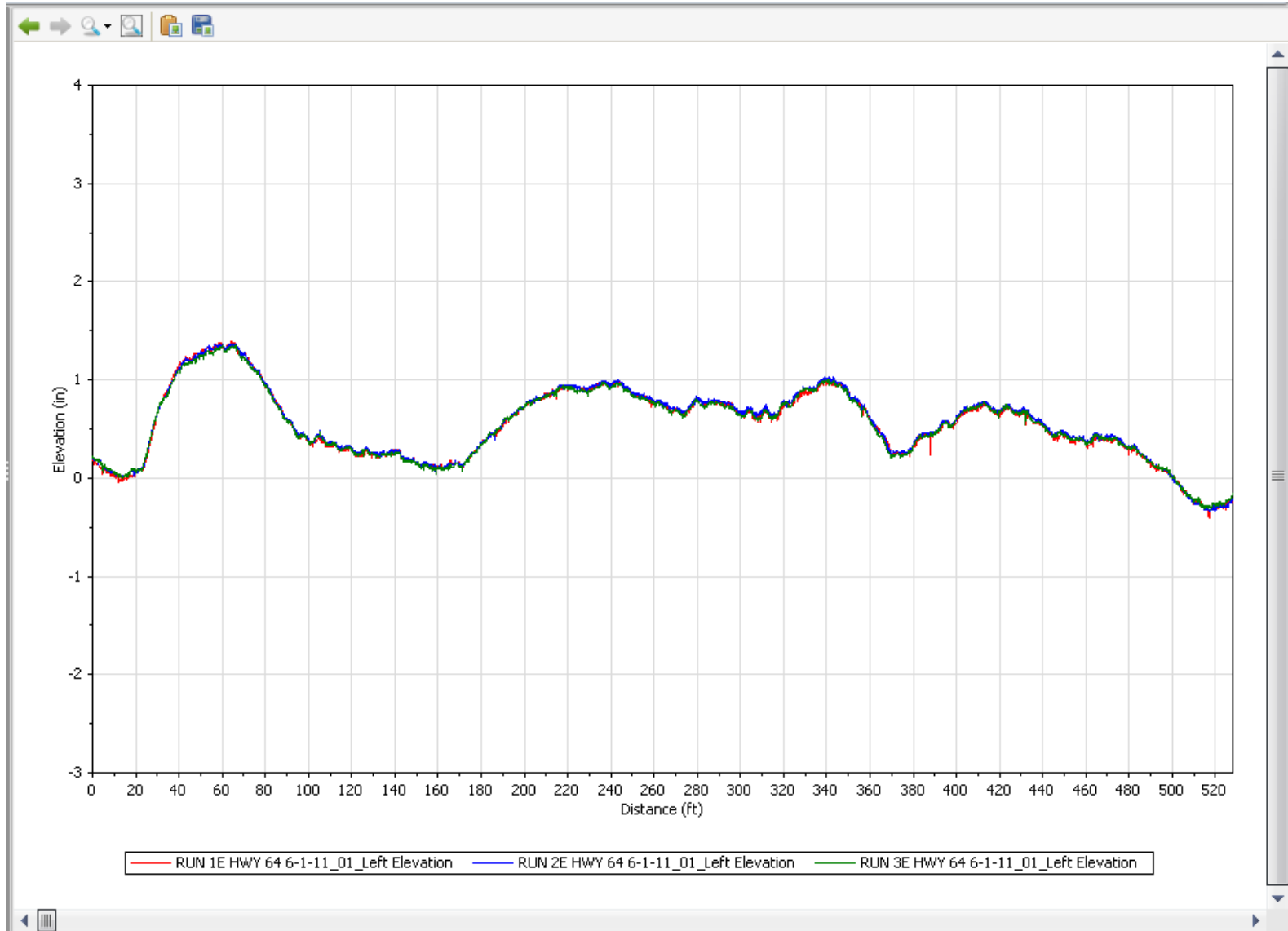
- Vehicle condition
- Operator
- Day or Night
- Climate



ICC UNIT MOUNTED ON NEW VAN



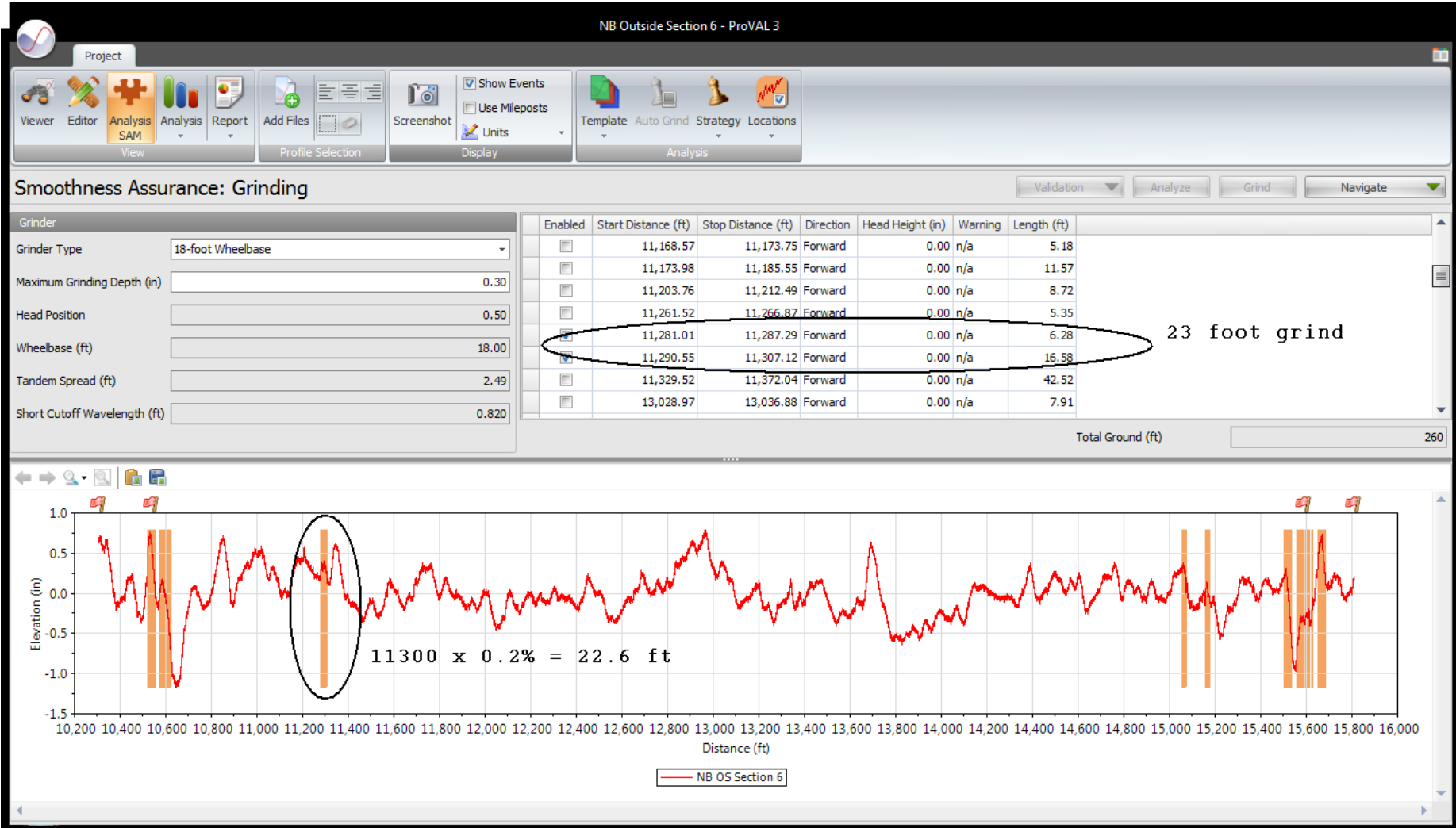
Recent Data - Repeatable



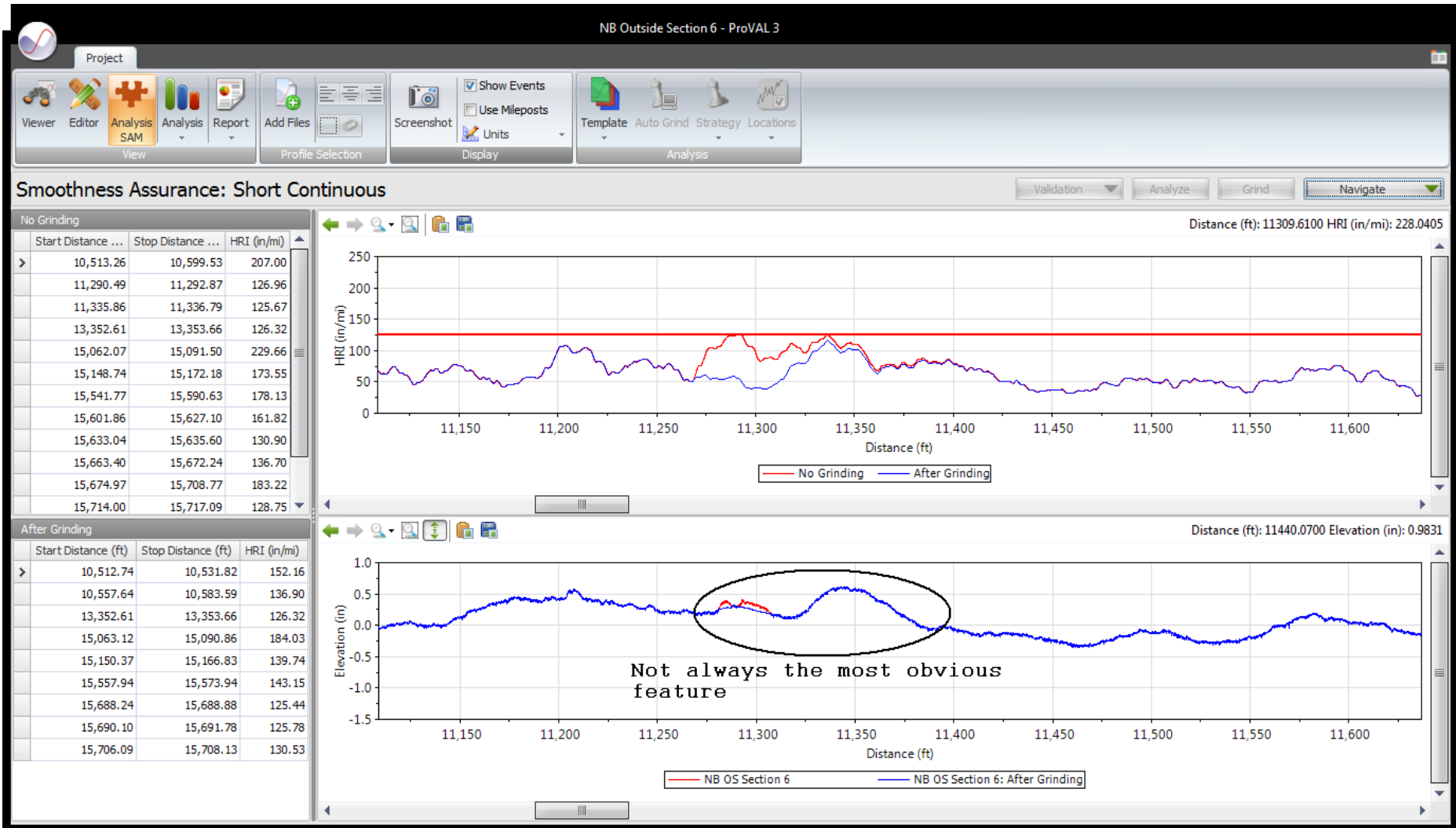
GRINDING

- State identifies areas of Localized Roughness
- Contractor requests consultant HSP to locate
- Create grind strategy in ProVAL – Smoothness
Assurance using State defined thresholds
- Locate roughness and mark for grinder

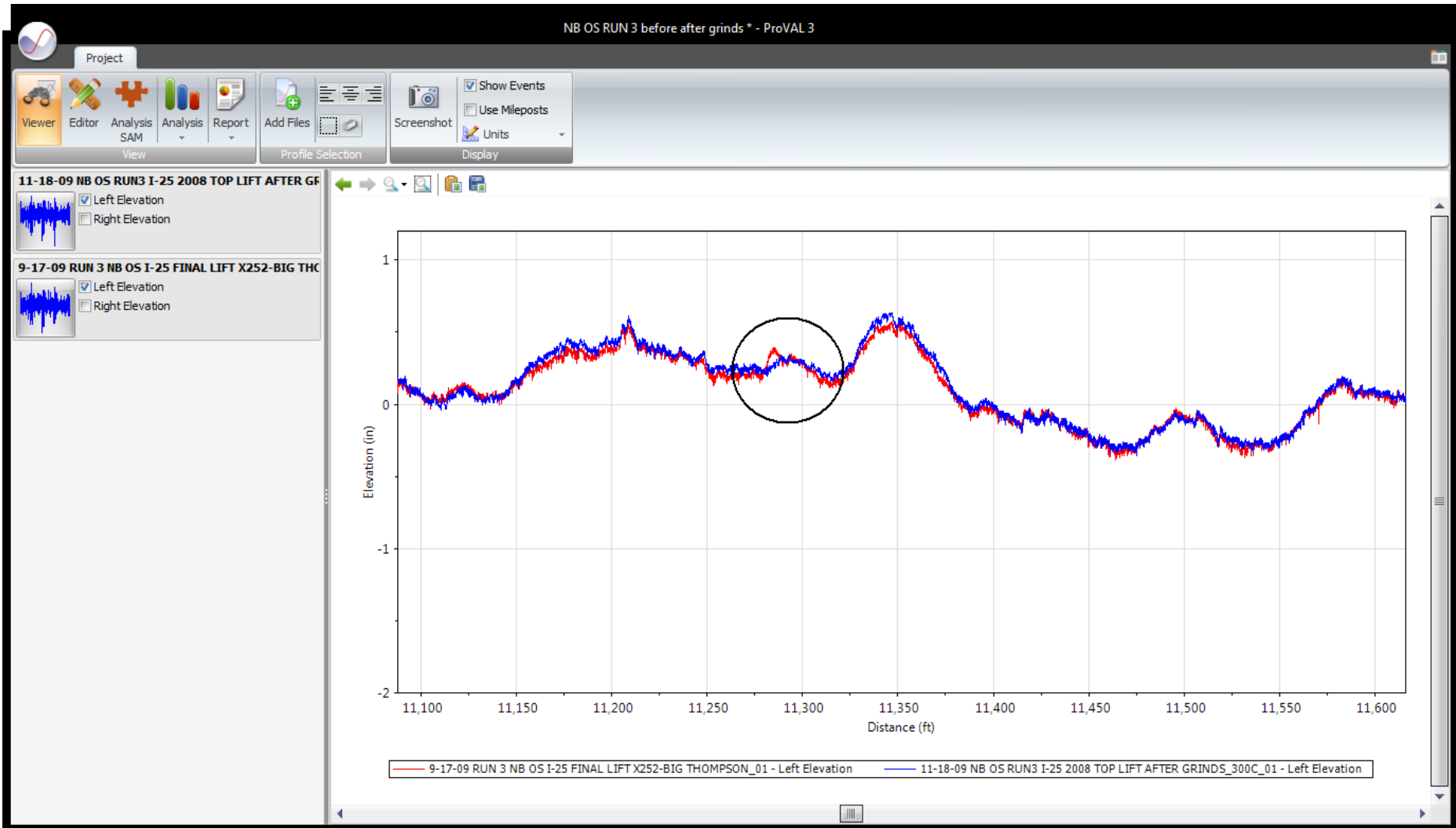
Locating Roughness - Example



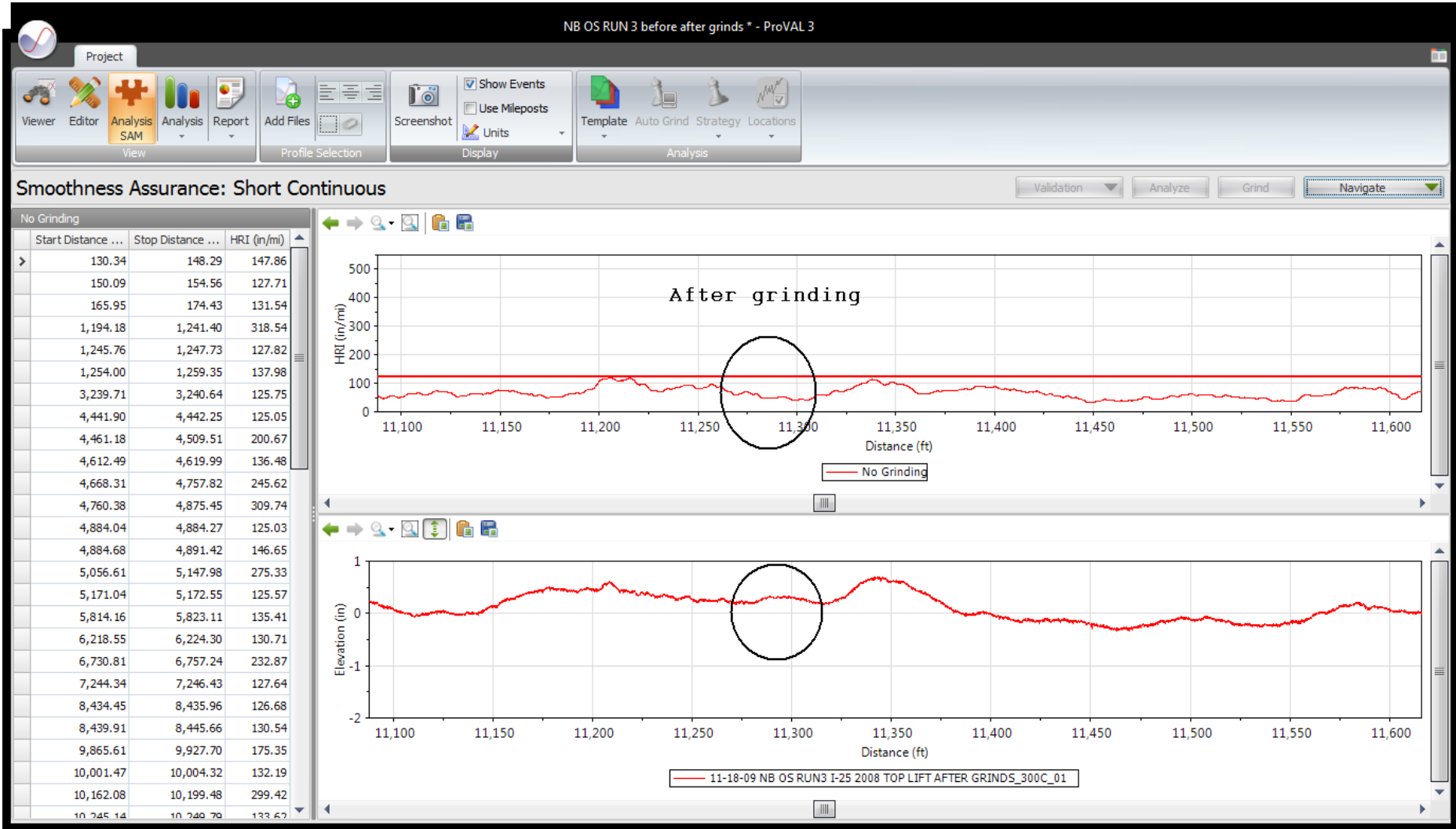
Locating Roughness – ProVAL SAM



Locating Roughness – After Grind



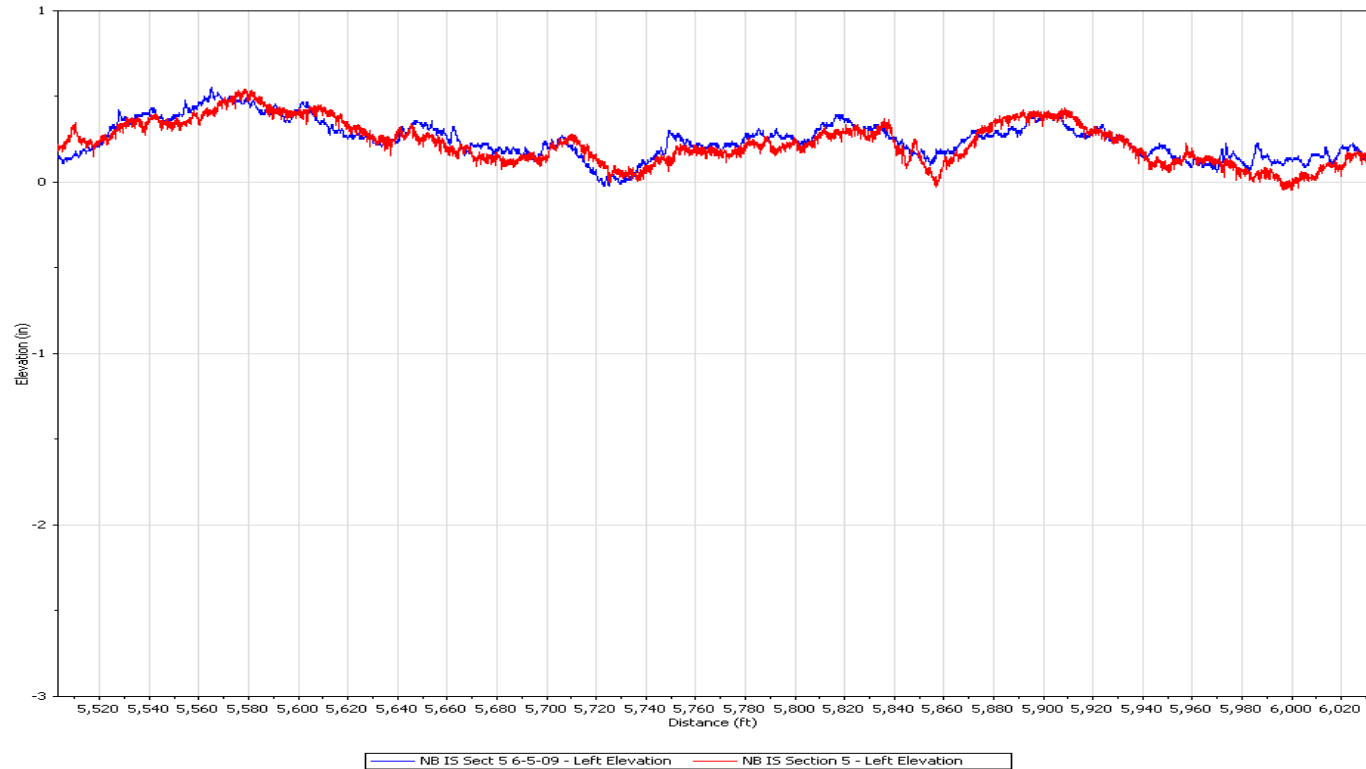
Locating Roughness - Results



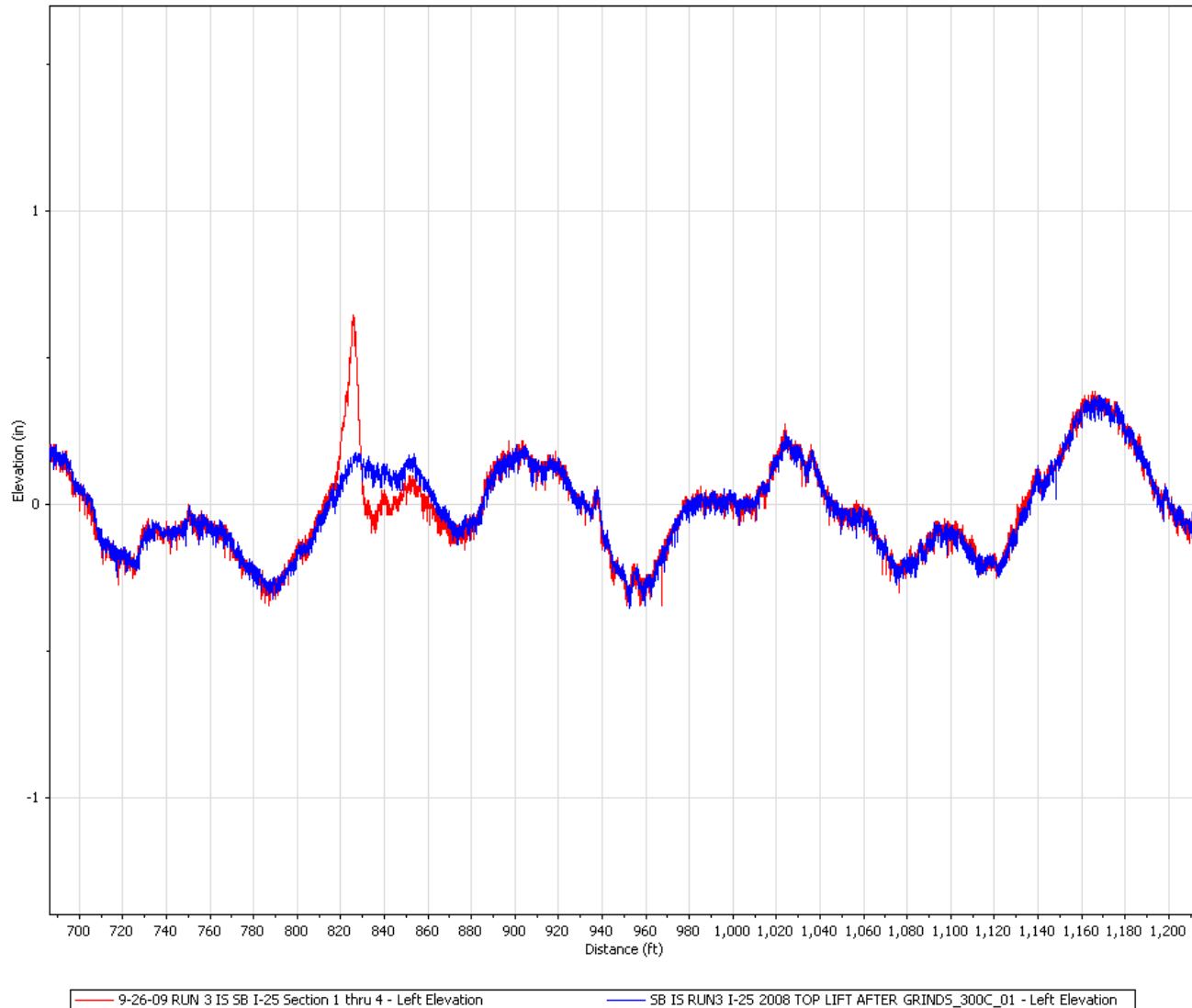
Intermediate Lift / Top Lift

Intermediate Lift (Blue) = 68.22 in/mi HRI

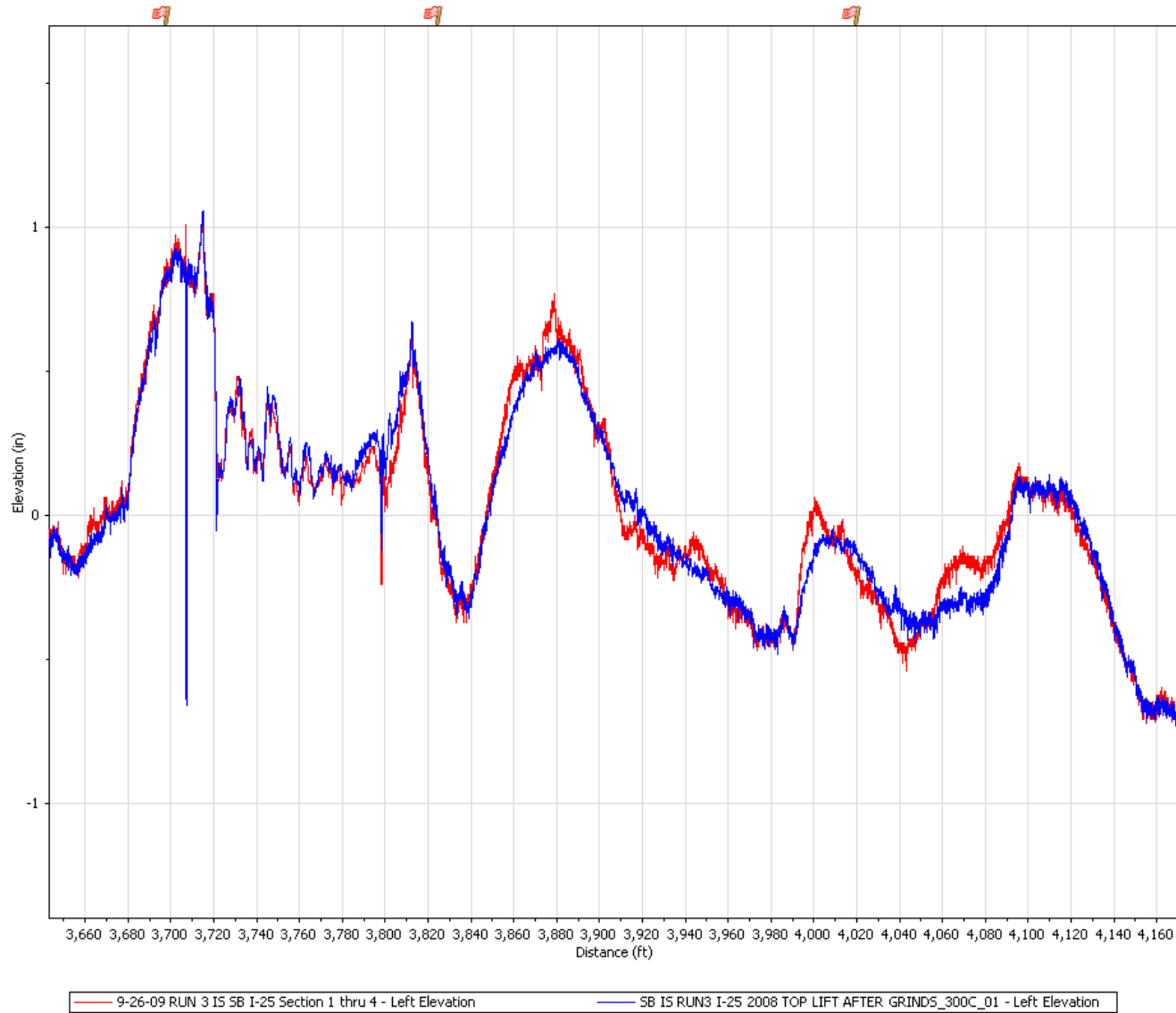
Top Lift (Red) = 66.22 in/mi HRI



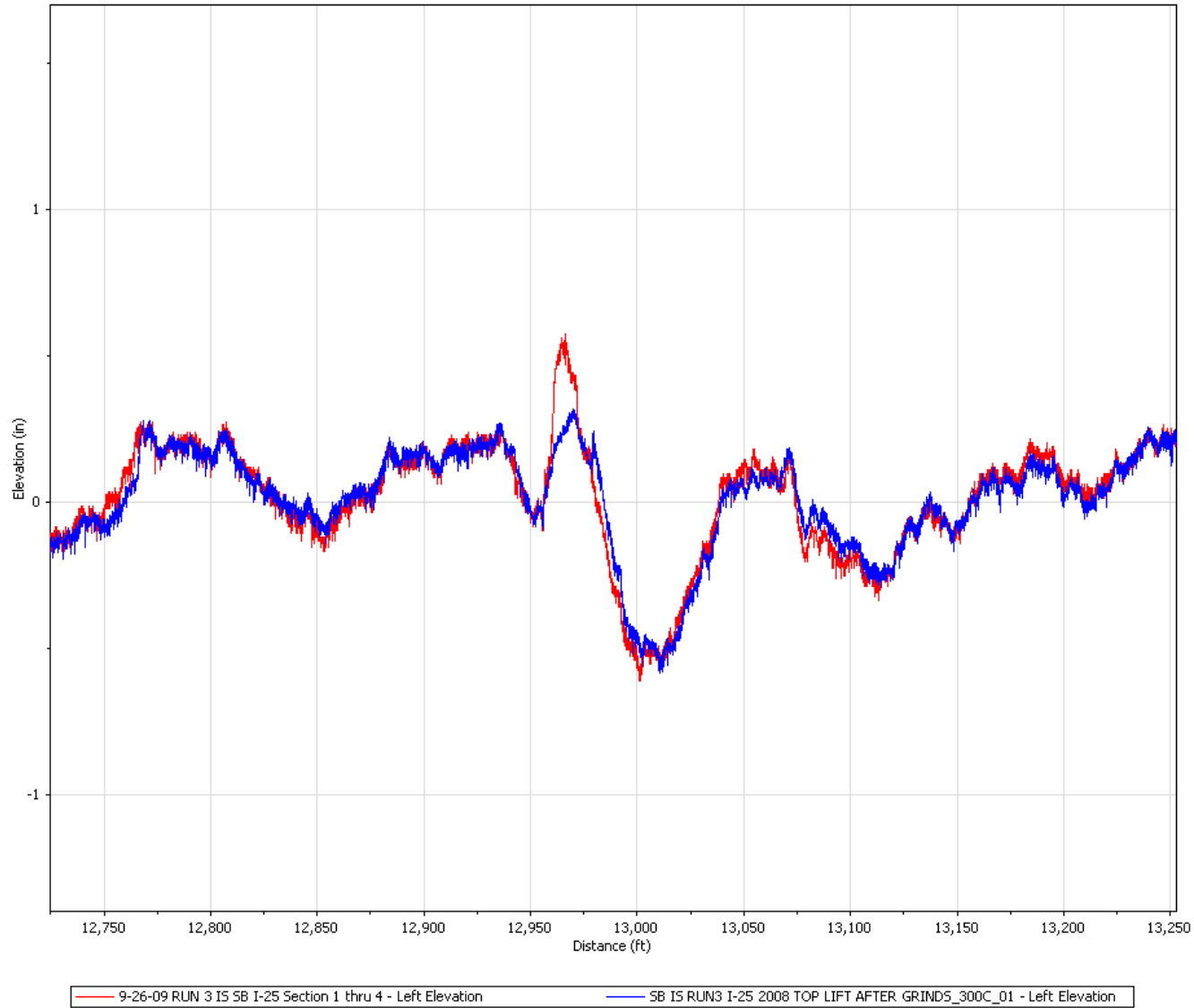
Before and After Grinding



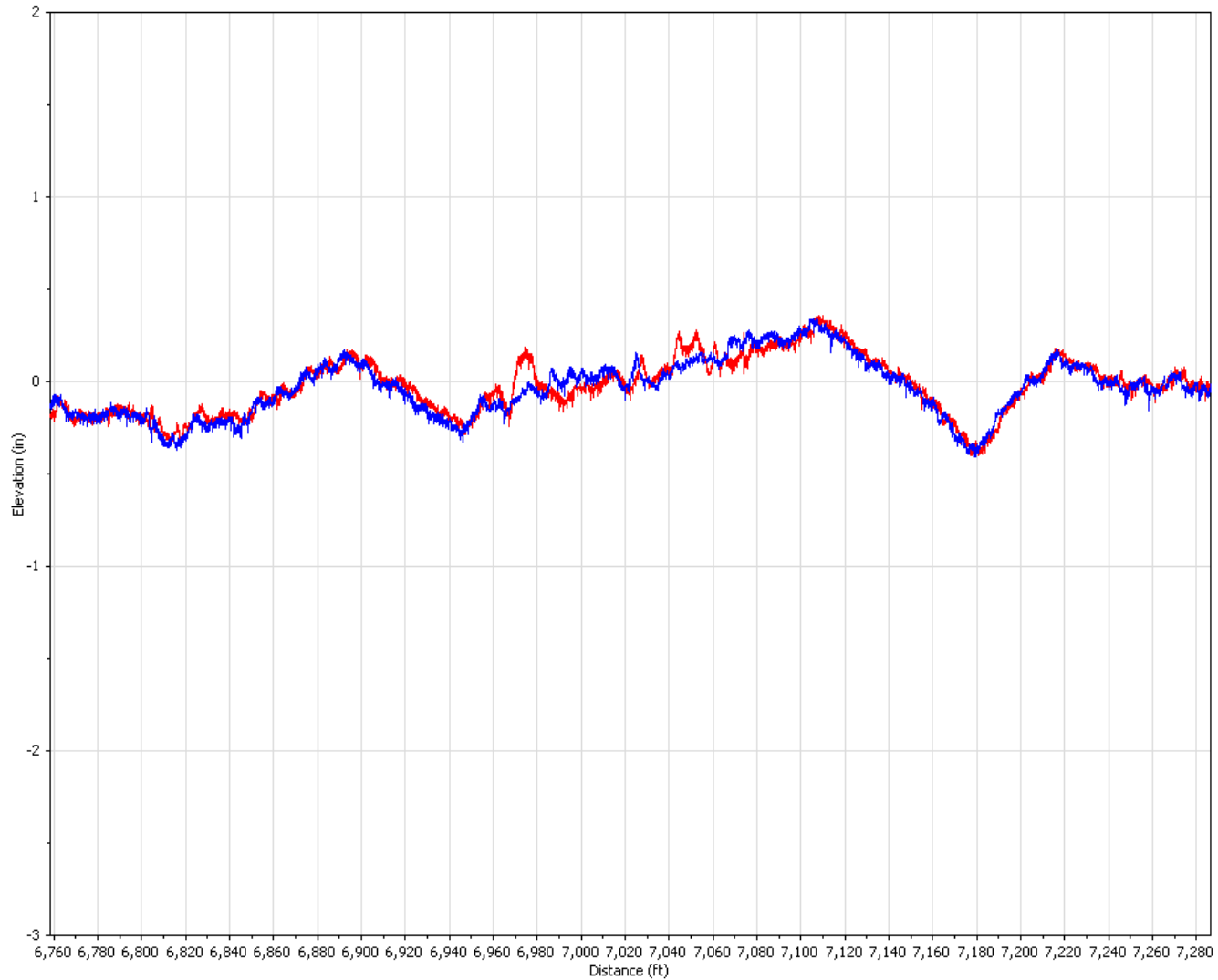
Before and After Grinding



Before and After Grinding

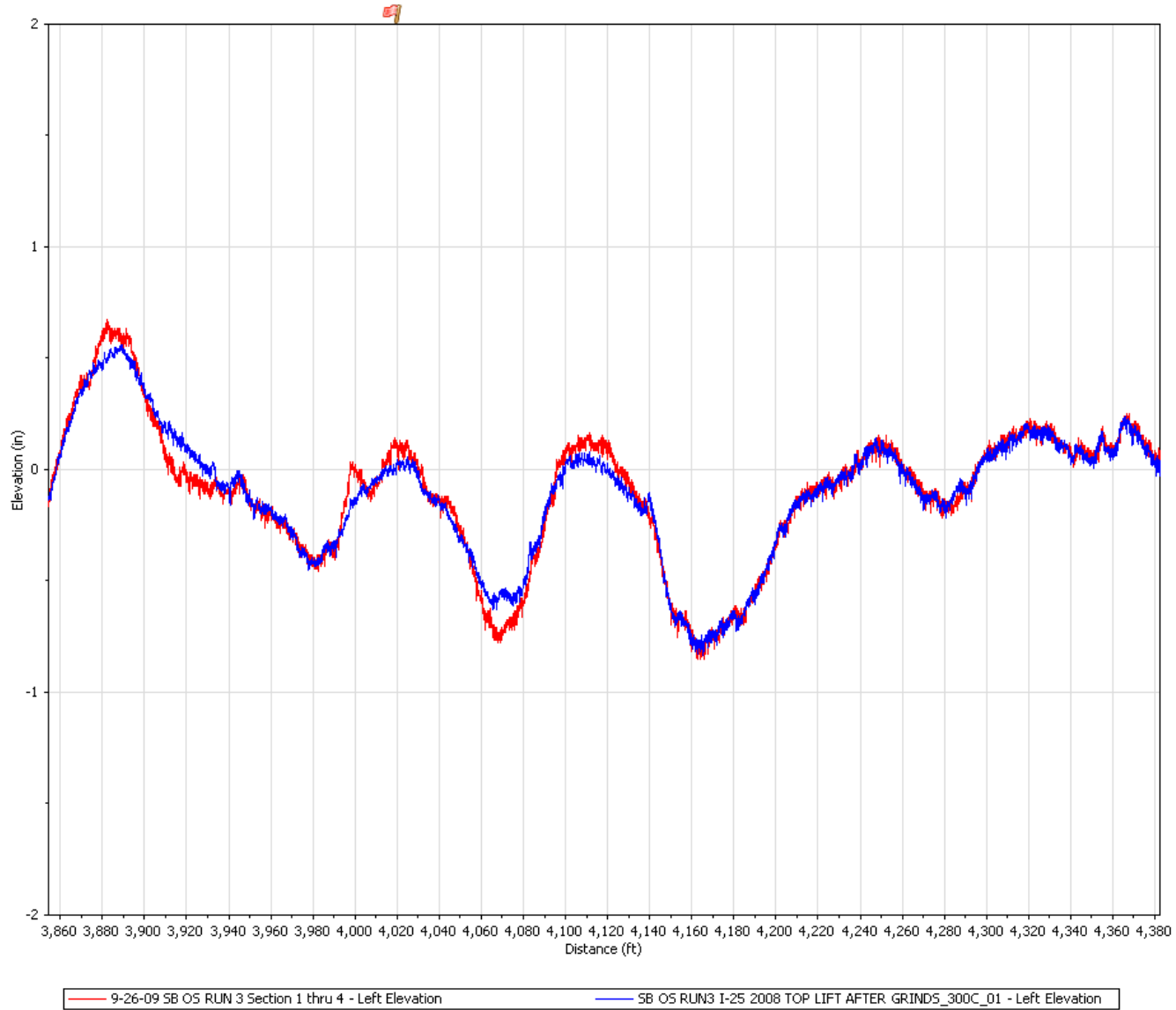


Before and After Grinding



9-16-09 RUN 3 NB IS I-25 FINAL LIFT X252-BIG THOMPSON_01 - Left Elevation 11-18-09 NB IS RUN3 I-25 2008 TOP LIFT AFTER GRINDS_300C_01 - Left Elevation

Before and After Grinding



With this level of repeatability, I can:

- Accurately locate roughness, reducing costs by eliminating unnecessary grinding
- Produce ProVAL graphs for contractor, demonstrating that grinding was effective
- Evaluate operator performance
- Return to project at a later date and collect data which lines up with previous data