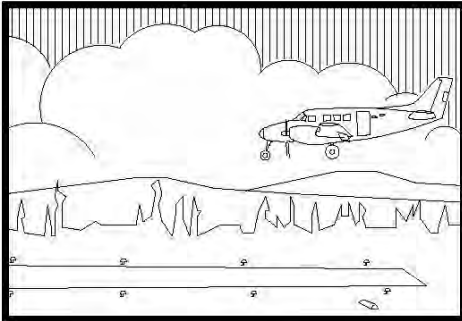


DESIGN STUDY REPORT

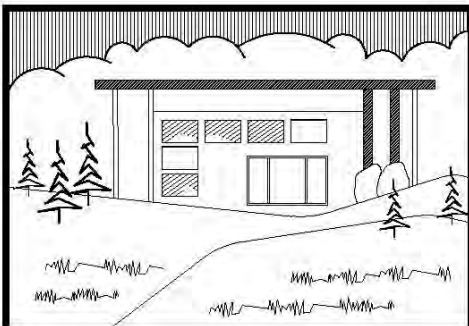
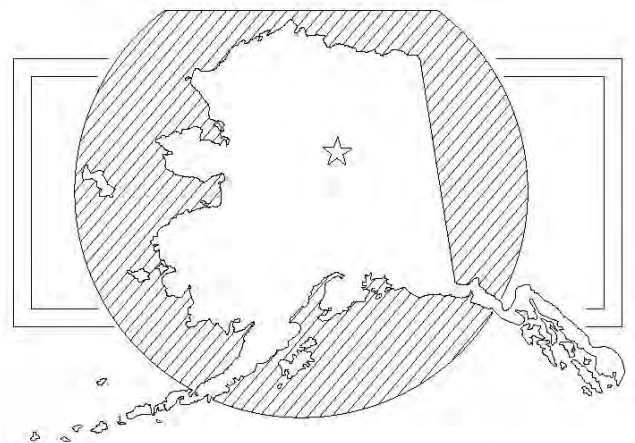
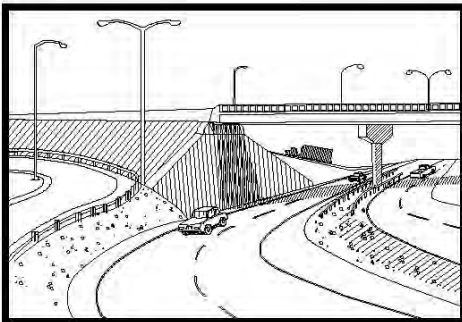
MCGRATH ROAD UPGRADE

Z628380000/0002300



STATE OF ALASKA

Department of Transportation
and Public Facilities

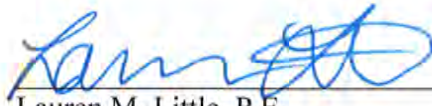


NORTHERN REGION

March 2017

DESIGN APPROVAL
MCGRATH ROAD UPGRADE
PROJECT NO. Z62838000/0002300

Requested by:

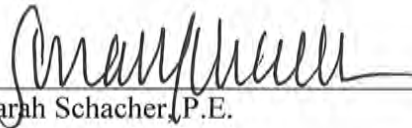


Lauren M. Little, P.E.
Engineering Manager
Northern Region

3/7/2017

Date

Design Approval
Granted:



Sarah Schacher, P.E.
Preconstruction Engineer
Northern Region

3/8/2017

Date

Distribution: NR Design Directive 16-02 Distribution

DESIGN STUDY REPORT
FOR

MCGRATH ROAD

PROJECT NO. Z628380000/0002300

PREPARED BY: Erik Brunner

UNDER THE SUPERVISION OF: Lauren M. Little, P.E.



ALASKA DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES
NORTHERN REGION DESIGN AND ENGINEERING SERVICES
FEBRUARY, 2017

MCGRATH ROAD UPGRADE
PROJECT NO, Z628380000/0002300

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INTRODUCTION/HISTORY

The Alaska Department of Transportation and Public Facilities (DOT&PF), in cooperation with the Federal Highway Administration is proposing the McGrath Road Upgrades project.

McGrath Road services an area of subdivisions and trailer courts and connects the Old Steese Highway and Farmers Loop Road. McGrath Road was surfaced in 1968 and in 1980 saw a minor realignment and resurfacing project. In 2000 a detached bicycle/pedestrian facility was constructed from Farmers Loop Road to Willow Grouse road on the west side of the road.

Historically the two lane roadway has exhibited moderate to severe structural issues. These problems result in continual efforts from the Maintenance and Operations Section (M&O) to maintain the facility. Inconsistent to non-existent shoulders provide little refuge area for drivers to use in an emergency.

The project vicinity is shown in Figure 1.

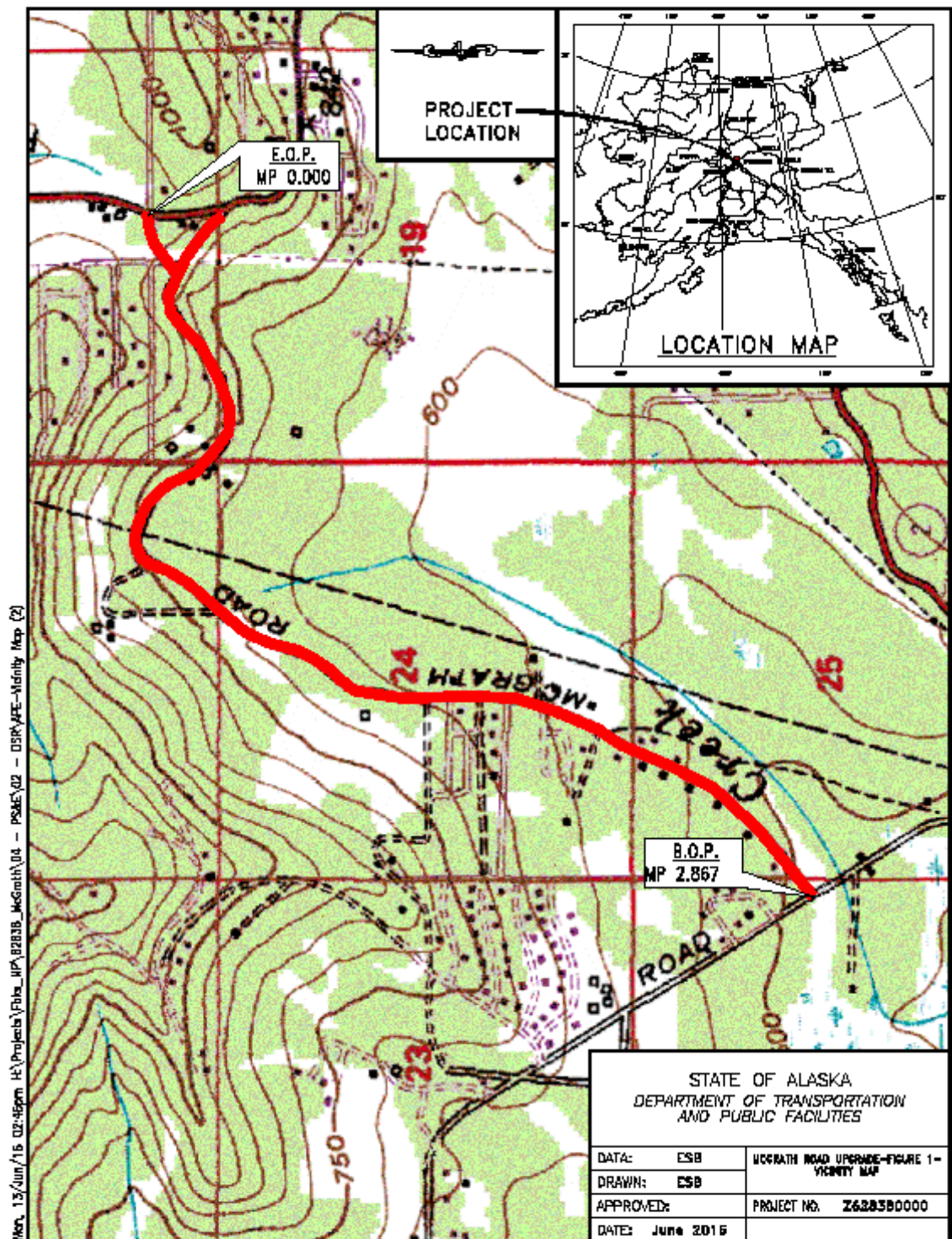


Figure 1. Project Location and Vicinity Map

PROJECT DESCRIPTION

McGrath Road is situated within the Fairbanks North Star Borough north of Fairbanks, Alaska. The Beginning of Project (BOP) is at Coordinated Data System mile point (CDS MP) 2.8796 at Farmers Loop Road. The End of Project (EOP) is at CDS MP 0 at the Old Steese Highway. Mile points run opposite of as-built stationing.

The primary goals are to enhance the structural integrity of the highway, enhance safety and extend useful service life. The existing facility has nominal 11 foot or less lanes and little to no shoulders from BOP to EOP. There is a mostly detached pedestrian facility from the BOP to Willow Grouse Road. Culverts, driveways, and clusters of mailboxes are present throughout the corridor. Sideslopes vary throughout the project depending primarily on embankment height.

The project will add 3 foot shoulders from Farmer's Loop Road to Willow Grouse Road and widen the road from Willow Grouse Road to EOP to provide a consistent 24 foot paved total top width to enhance safety.

Proposed improvements include:

- Reconstruct existing pedestrian path, including realignment as needed
- Establish 3 foot shoulder for lower portion of corridor (Farmer's Loop to Willow Grouse Road).
- Replace, repair or clean existing culverts.
- Install new culverts.
- Construct mailbox turnouts where feasible.
- Reduce the number and severity of compound curves in the alignment.
- Rebuild and pave driveways and approaches.
- Clear embankment foreslopes and backslopes.
- Establish 24 foot paved total top width with a 1 foot shouldering detail for upper portion of corridor (Willow Grouse Road to EOP).

DESIGN STANDARDS

The design of this project is based on:

- ☐ State of Alaska, DOT&PF's *Highway Preconstruction Manual* (PCM)
- ☐ State of Alaska, DOT&PF's *Alaska Flexible Pavement Design Manual*, 2004 (AFPD)
- ☐ State of Alaska, DOT&PF's *Alaska Traffic Manual*, 2016 (ATM)
- ☐ AASHTO's *A Policy on Geometric Design of Highways and Streets*, 2011 (Green Book)
- ☐ AASHTO's *Guide for the Development of Bicycle Facilities*, 2012 (Bike Book)
- ☐ AASHTO's *Roadside Design Guide*, 2011 (RDG)

DESIGN EXCEPTIONS AND DESIGN WAIVERS

A radius of curvature design exception will be prepared for the upper portion.

DESIGN ALTERNATIVES

Three initial design alternatives for the lower section of the road were brought forward.

These alternatives were constructing a 24 foot top and maintaining the existing detached path, constructing a 40 foot top and removing existing detached path and constructing a 30 foot top and maintaining the existing path.

Input from the materials sections after completion of investigative drilling resulted in an alternative typical section for the lower section of the project which widened the roadway about its existing centerline, realigned the existing pedestrian facility and filled/removed the existing ditch between the roadway and path.

A grade raise was suggested but slope flattening will be used to push water further from the structural section of the road.

Moving the path closer to the road will also increase the opportunity for effective water management between the path and right-of-way.

Currently McGrath Road continues on a steep and curved alignment to the Old Steese Highway, and another connection to the Old Steese Highway, along McGrath Road Wye exists. During the safety analysis for this project, it was proposed that McGrath Road terminate at McGrath Road Wye, and McGrath Road Wye would be the only connection to the Old Steese Highway. The roadway geometrics for McGrath Road Wye are less steep, and improved intersection sight distance can be provided by utilizing this route. The property adjacent to this section of roadway is undeveloped, as is the portion of McGrath Road that will be terminated. No property will be cut off from access to McGrath Road with this alternative.

PREFERRED DESIGN ALTERNATIVE

The preferred alternative for the lower section of the project is a 28 foot total top width consisting of two 11 foot lanes with 3 foot shoulders for the lower portion and construction of a separated pedestrian facility to replace the existing detached path. This widens the road symmetrically about the existing centerline for the majority of the project in as suggested in the projects geotechnical report. The upper portion of the project will be brought to a consistent 24 foot paved total top width consisting of two 11 foot lanes with one foot paved shoulders.

McGrath Road will be terminated at McGrath Road Wye, and McGrath Road Wye will be improved to have consistent top width matching the upper portion of McGrath Road and the intersection with the Old Steese Highway will be realigned slightly to improve sight distance.

3R ANALYSIS

Not applicable. This is a reconstruction project.

TRAFFIC ANALYSIS

A traffic analysis was not performed. Shoulders were added to both protect the travelled way pavement edge from raveling and to provide a space for cyclists choosing to use the roadway. The functional classification for McGrath Road is urban major collector, and traffic is anticipated to increase at a rate of 1.25% per year. Traffic values are:

McGrath Road	Base 2012	Predicted 2025	Predicted 2045
ADT (2Way)	2150	2530	3240
DHV (11.4%)	245	290	370

HORIZONTAL/VERTICAL ALIGNMENT

The horizontal alignment between Farmers Loop Road and Willow Grouse will be shifted to the east where necessary to create clearance from the separated pedestrian path and existing compound curves will be removed. From Willow Grouse to the intersection with the Old Steese the alignment will be straightened to the extent practical and compound curves removed while remaining within the existing ROW.

McGrath Road currently intersects the Old Steese at two points. The existing primary access point will be closed and the portion of the road known as the “Wye” will become the only access point for the roadway. Minor horizontal realignment within the existing right of way will be necessary at McGrath Road’s intersection with the Old Steese to create a skew angle closer to 90 degrees at the intersection formerly known as the “Wye” with McGrath Road.

The vertical alignment throughout the project will primarily remain as existing with only minor grade adjustments anticipated. Abandoning McGrath Road from the McGrath Road Wye intersection east will remove an 11% grade leading into a substandard radius curve from the project.

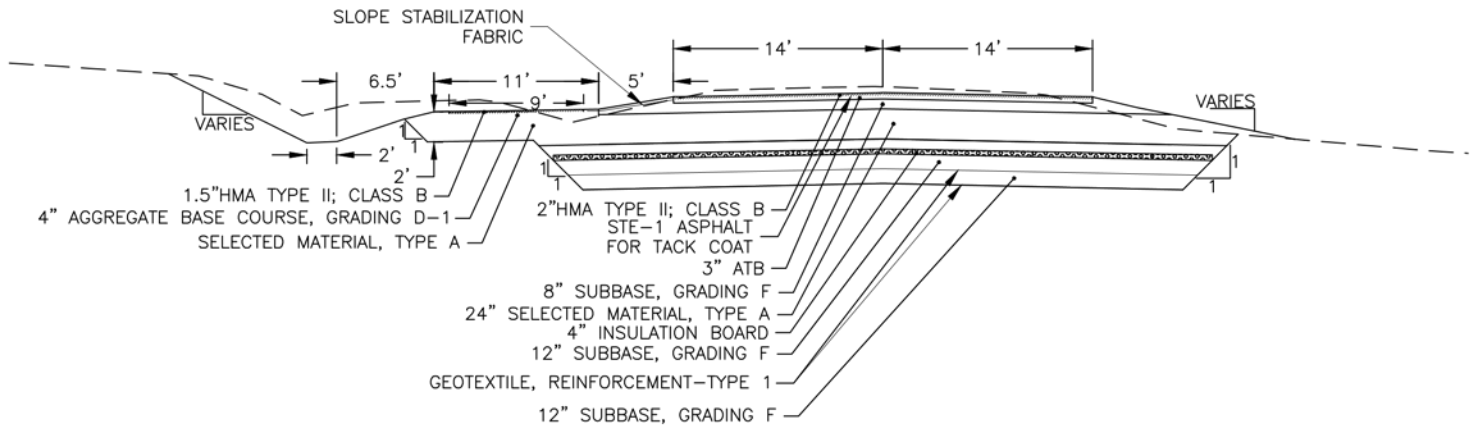
TYPICAL SECTION(S)

The proposed typical section is a paved two-lane two-way roadway:

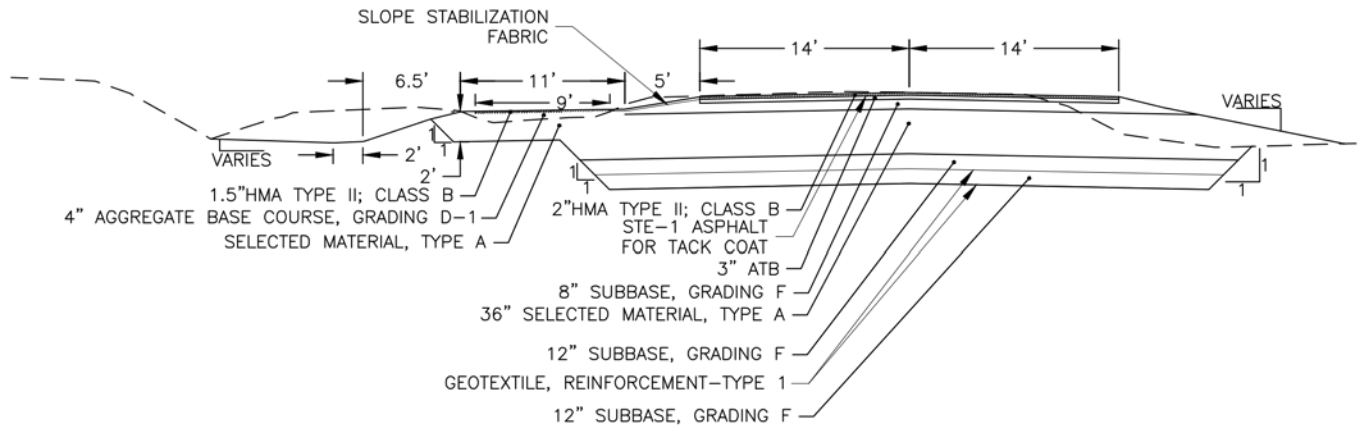
- 11 foot driving lanes
- 3 foot shoulders from BOP to Willow Grouse Road
- 1 foot shoulder from Willow Grouse Road to EOP and McGrath Wye
- 2% crowned cross slope
- Separated 11 foot pedestrian facility project left from BOP to Willow Grouse Road
- Variable foreslopes throughout project.

The proposed typical sections are shown in Figure 2.

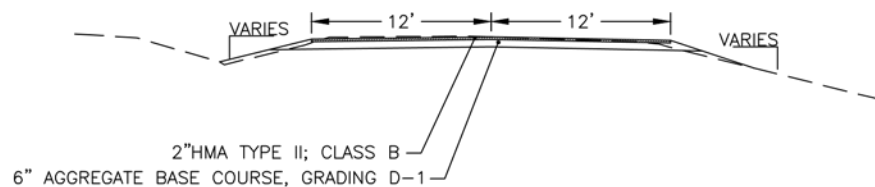
STATE	PROJECT DESIGNATION	YEAR	FIGURE NO.	TOTAL FIGURES
ALASKA	Z628380000	2016	3	3



INSULATED SEGMENT TYPICAL SECTION



NON-INSULATED SEGMENT TYPICAL SECTION



UPPER SEGMENT TYPICAL SECTION

PAVEMENT DESIGN

Pavement design calculations for a 15-year design life were performed using the AFPD program and manual. Heavy vehicles consisted of 4.5% of total traffic volume with equivalent single-axle loads of 206,132. The pavement structure for the upper segment satisfies the requirements of the mechanistic design method and DOT&PF's stabilized base policy.

The two proposed lower section pavement structures will consist of an insulated section and an un-insulated section dependent on subsurface conditions.

The insulated section will consist of:

- 2 inches of asphalt concrete
- 3 inches of Asphalt Treated Base (ATB)
- 8 inches of Subbase, Grading "F"
- 24 inches of Selected Material, Type "A"
- 8 inches of Subbase, Grading "F"
- 4 inches of insulation board
- Two 12 inch layers of Subbase Type "F" separated by Type 1 geotextile reinforcement fabric with Type 1 fabric placed at the excavation bottom

The un-insulated section will consist of:

- 2 inches of asphalt concrete
- 3 inches of ATB
- 8 inches of Subbase, Grading "F"
- 36 inches of Selected Material, Type "A"
- Two 12 inch layers of Subbase, Grading "F" separated by Type 1 geotextile reinforcement fabric with Type 1 fabric placed at the excavation bottom

Contingent of the granting of a stabilized base policy waiver, the upper segment section will consist of:

- 2 inches of asphalt concrete
- 6 inches of aggregate base course, grading D-1

PRELIMINARY BRIDGE LAYOUT

Not applicable. There are no bridges within the project limits.

RIGHT-OF-WAY REQUIREMENTS

The acquisition of minor additional right of way will be required from FNSB parcels TL-1322, TL-2429, TL-2412, TL-2410 and TL-2525.

Temporary Construction Permits will be obtained for driveway reconstruction as needed.

MAINTENANCE CONSIDERATIONS

McGrath Road is currently maintained by DOT&PF. Overall this project is anticipated to reduce maintenance costs. Maintenance will be affected by the following:

- Road reconstruction will reduce the patching/leveling efforts required to keep the surface drivable.
- Drainage improvement and slope flattening will help protect the embankment from water damage reducing maintenance effort.
- Construction of shoulders will reduce pavement spalling in the driving lanes reducing maintenance effort.
- Increased width will result in increased lane miles for snow plowing, however this added cost is anticipated to be balanced out by the improvements to the structural section and drainage, resulting in a net decrease in maintenance costs.
- Moving the primary entrance and removing the duplicate access point will result in fewer lane miles needing maintenance.

MATERIAL SOURCES

Material sources for this project will be contractor furnished; sufficient material in quantity and quality are available from private sources in the area.

UTILITY RELOCATION & COORDINATION

Multiple utilities cross and run longitudinally along much of the project. Utility conflicts requiring relocation or adjustment include:

- Relocation of multiple utility poles.
- Relocation of buried communication cable and relocation or adjustment of telephone pedestals.

New locations and elevations of utilities will be coordinated with the proposed roadway improvements. Utility relocations may require the creation of a public utility easement and temporary constructions easements.

No betterment of utilities is anticipated.

ACCESS CONTROL FEATURES

McGrath Road is not a controlled access facility. Common access is controlled by the driveway permit process.

PEDESTRIAN/BICYCLE (ADA) PROVISIONS

A separated pedestrian/bicycle facility is present from McGrath Road's intersection with Farmers Loop Road to the intersection of Willow Grouse Road. The existing pedestrian facility

is being reconfigured to provide a consistent offset to improve maintainability and provide a more consistent user experience.

The shoulders of McGrath Road are being widened to varying degrees throughout the complete corridor.

In accordance with the Public Rights-of-Way Accessibility Guidelines (as directed by Section 5.1.1 of the Bike Book) the grade of the separated multi-use path will not exceed the general grade of the adjacent McGrath Road. The path is contained within the highway right-of-way.

SAFETY IMPROVEMENTS

Safety improvements include:

- Rehabilitation of the road will remove heave and frost damage which will improve the driving surface.
- A continuous wider shoulder will provide more area for pedestrians and bicyclists to safely utilize the road.
- Guardrail will be replaced with compliant barrier and end terminals.
- Removal of existing compound curves.
- Creating a consistent 5 foot separation between the path and roadway.
- Road foreslopes will be reconstructed removing several areas of significant over-steepening caused by ATV's driving in the ditch between the roadway and multi-use path.
- Removal of the duplicate access point will remove a section of 11% grade leading into a substandard radius curve.

INTELLIGENT TRANSPORTATION SYSTEM FEATURES

Not applicable. There are no intelligent transportation system features within the project limits and none will be constructed.

DRAINAGE

The primary drainage pattern is southeast flowing off the hillside to the flats at its base and Isabella Creek which passes through Farmers Loop Road in culverts. Mean annual precipitation is 10.53 inches. The crowned roadway and separated multi-use path will shed water to both sides of the road and path, into ditches designed to convey the water down gradient through cross culverts and approach culverts. Poor functioning drainage in combination with foundation movement from geological and thermal processes has resulted in water being trapped in places on the ditch on the north side of the path embankment resulting in pooling. Drainage improvements include:

- Cleaning existing culverts
- Ditch reconditioning
- Culvert replacement
- Additional culvert installation

Post construction of drainage improvements, “Best Management Practices” (BMPs) will be implemented to reduce the potential for erosion of soil and other contaminants from storm water from entering waters of the United States. BMP’s will consist of:

- Permanent seeding

SOIL CONDITIONS

McGrath Road is located in the Yukon-Tanana Upland physiographic section of Alaska. The terrain consists of low mountains, plateaus and highland with summits from 1,000 to 5,000 feet above sea level.

McGrath Road generally consists of 0.1 to 1.0-feet of asphalt concrete over 3 feet of rounded alluvial fill mixed with sand and silt underlain by wind-blown loess with moisture content between 22 and 42%. Frozen soils were intercepted in several test holes.

McGrath Road multi-use path generally consists of 0.1 to 0.3- feet of asphalt concrete over 2 to 5 feet of well graded alluvial gravel with sand underlain by very loose loess. Groundwater was intercepted perched on seasonal frost and beneath the seasonal frost layers.

McGrath Road is located in the Continental Climatic Zone of Alaska. The climate is characterized by large daily and annual temperature variation, in addition to low precipitation, cloudiness and humidity.

The project area experiences an average of 13917 heating degree days and 58 cooling degree days for a 65 degree base temperature.

EROSION AND SEDIMENT CONTROL

The project will include an Erosion and Sediment Control Plan (ESCP). This plan will describe BMPs that may be used during construction and serve as a guide for SWPPP development.

The primary potential for erosion occurs where shoulders are widened, mailbox turnouts are constructed and new culverts installed. Embankment slopes will not be constructed steeper than 2:1. Slopes will be seeded to provide temporary and permanent erosion protection.

Perimeter control, inlet/outlet control at culverts, soil stabilization, construction scheduling and other measures as described in the ESCP will be used as appropriate to prevent or retain storm water runoff.

ENVIRONMENTAL COMMITMENTS

PERMITS- The following permits will be required:

- United States Army Corps of Engineers, section 404

WETLANDS- Mitigation for temporary and permanent impacts will be accomplished by in lieu fee payments.

There are no additional environmental commitments beyond compliance with permits and the contract for this project.

WORK ZONE TRAFFIC CONTROL

This project is not considered significant for traffic control per DOT&PF's Policy and Procedure 05.05.015. Single lane through traffic will be maintained through the work zone, practical alternate routes will be maintained. Complete road closures are not anticipated.

VALUE ENGINEERING

This federally funded project does not meet the criteria for a Value Engineering (VE) analysis; McGrath Road is not a National Highway System route nor does the total cost exceed \$50M.

COST ESTIMATE

The estimated costs for this project are as follows:

Design	\$709,541.00
Utilities	\$250,000.00
Right of Way	\$500,000.00
Construction (Includes 15% Engineering)	\$5,600,000.00
	<hr/>
Total Cost of Project	\$7,059,541.00

APPENDIX A

DESIGN CRITERIA AND DESIGN DESIGNATION

ALASKA DOT&PF PRECONSTRUCTION MANUAL
Chapter 11 - Design
PROJECT DESIGN CRITERIA

Project Name: McGrath Road Upgrade (Milepoint 0 to 1.073)	
<input checked="" type="checkbox"/> New Construction/Reconstruction <input type="checkbox"/> 3R <input type="checkbox"/> PM <input type="checkbox"/> Other:	
Project Number:	Z628380000/002300 <input type="checkbox"/> NHS <input checked="" type="checkbox"/> Non NHS
Functional Classification:	Urban Major Collector
Design Year:	2040
Design Year ADT:	811
DHV:	11.40%
Percent Trucks:	4.00%
Pavement Design Year:	2040
Terrain:	Mountainous
Design Speed:	35 mph
Width of Traveled Way:	22-ft
Width of Shoulders:	Outside: 1-ft Inside: 0-ft
Cross Slope:	2%
Superelevation Rate:	6% MAX
Minimum Radius of Curvature:	80-ft #
Min. K-Value for Vert. Curves:	Sag: 49 Crest: 29
Maximum Allowable Grade:	10%
Minimum Allowable Grade:	0.3%
Stopping Sight Distance:	250-ft
Lateral Offset to Obstruction:	1.5-ft
Vertical Clearance:	18.35-ft existing minimum
Bridge Width:	N/A
Bridge Structural Capacity:	N/A
Passing Sight Distance:	550-ft
Surface Treatment:	T/W: Asphalt Shoulders: Asphalt
Side Slope Ratios:	Foreslopes: vary (2:1-6:1) Backslopes: Vary (.25:1-10:1)
Degree of Access Control:	Driveway /Entrance regulations
Median Treatment:	N/A
Illumination:	None
Curb Usage and Type:	None
Bicycle Provisions:	Lane/ Shoulder
Pedestrian Provisions:	Lane/ Shoulder
Misc. Criteria:	None

Proposed - Designer/Consultant:

Endorsed - Engineering Manager:

Approved - Preconstruction Engineer:

Date:

Date:

Date:

Shaded criteria are commonly referred to as the *FWHA 13 controlling criteria*. For NHS routes only, these criteria must meet the minimums established in the Green Book (*AASHTO A Policy on Geometric Design of Highways and Streets*). For all other routes, these criteria must meet the minimums established in the *Alaska Highway Preconstruction Manual*. Otherwise a Design Exception must be approved.

Design Criteria marked with a " # " do not meet minimums and must have a Design Exception(s) and/or Design Waiver(s) approved. See the Design Study Report for Design Exception/Design Waiver approval(s) and approved design criteria values.

ALASKA DOT&PF PRECONSTRUCTION MANUAL
Chapter 11 - Design
PROJECT DESIGN CRITERIA

Project Name: McGrath Road Upgrade (Milepoint 1.073 to 2.867)	
<input checked="" type="checkbox"/> New Construction/Reconstruction <input type="checkbox"/> 3R <input type="checkbox"/> PM <input type="checkbox"/> Other:	
Project Number:	Z628380000/002300 <input type="checkbox"/> NHS <input checked="" type="checkbox"/> Non NHS
Functional Classification:	Urban Major Collector
Design Year:	2040 Present ADT: 2150
Design Year ADT:	3045 Mid Design Period ADT: 2560
DHV:	11.40% Directional Split: 60-40
Percent Trucks:	4.00% Equivalent Axle Loading: 206,000
Pavement Design Year:	2040 Design Vehicle: WB-40
Terrain:	Level Number of Roadways: 1
Design Speed:	35 mph
Width of Traveled Way:	22-ft
Width of Shoulders:	Outside: 3-ft Inside: 0-ft
Cross Slope:	2%
Superelevation Rate:	6% MAX
Minimum Radius of Curvature:	340-ft
Min. K-Value for Vert. Curves:	Sag: 49 Crest: 30.85
Maximum Allowable Grade:	10%
Minimum Allowable Grade:	0.3%
Stopping Sight Distance:	250-ft
Lateral Offset to Obstruction:	1.5-ft
Vertical Clearance:	20' 6" (utilities)
Bridge Width:	N/A
Bridge Structural Capacity:	N/A
Passing Sight Distance:	550-ft
Surface Treatment:	T/W: Asphalt Shoulders: Asphalt
Side Slope Ratios:	Foreslopes: vary (2:1-6:1) Backslopes: Vary (2:1-10:1)
Degree of Access Control:	Driveway /Entrance regulations
Median Treatment:	N/A
Illumination:	None
Curb Usage and Type:	None
Bicycle Provisions:	Separated path/ Shoulder
Pedestrian Provisions:	Separated path/ Shoulder
Misc. Criteria:	None

Proposed - Designer/Consultant:

Endorsed - Engineering Manager:

Approved - Preconstruction Engineer:

Date: 3-7-17

Date: 3/7/2017

Date: 3/8/2017

Shaded criteria are commonly referred to as the *FWHA 13 controlling criteria*. For NHS routes only, these criteria must meet the minimums established in the Green Book (*AASHTO A Policy on Geometric Design of Highways and Streets*). For all other routes, these criteria must meet the minimums established in the *Alaska Highway Preconstruction Manual*. Otherwise a Design Exception must be approved.

Design Criteria marked with a " # " do not meet minimums and must have a Design Exception(s) and/or Design Waiver(s) approved. See the Design Study Report for Design Exception/Design Waiver approval(s) and approved design criteria values.

Station Name:McGrath Rd Noth of Frog Pond
Combined Data

	0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00	Total	
Fri 23	10	3	5	1	1	6	21	35	19	26	17	18	27	22	29	49	42	84	54	37	35	30	30	22	623	
Sat 24	16	14	6	8	2	0	13	8	19	27	24	28	46	38	40	50	42	44	38	38	29	32	23	22	607	
Sun 25	8	7	7	1	5	7	9	11	21	39	34	38	50	58	35	42	48	62	47	42	33	30	17	7	658	
Mon 26	4	3	2	0	3	10	20	37	24	17	23	19	36	24	25	34	38	51	49	40	53	28	17	3	560	
Tue 27	3	2	6	1	9	9	18	31	20	30	33	22	29	24	23	29	40	53	53	43	40	26	9	6	559	
Wed 28	9	5	4	0	4	10	22	27	26	23	20	33	25	22	18	30	43	76	52	48	41	17	17	8	580	
Thu 29	6	1	3	3	3	7	16	34	22	29	22	28	24	26	37	46	46	67	34	41	36	20	18	8	577	
Percentage	1.34%	0.84%	0.79%	0.34%	0.65%	1.18%	2.86%	4.39%	3.63%	4.59%	4.15%	4.47%	5.69%	5.14%	4.97%	6.72%	7.18%	10.49%	7.85%	6.94%	6.41%	4.39%	3.15%	1.83%	100.00%	
Hour Total:	56	35	33	14	27	49	119	183	151	191	173	186	237	214	207	280	299	437	327	289	267	183	131	76	4164	

MEMORANDUM

State of Alaska


Department of Transportation & Public Facilities

TO: Ryan F. Anderson, P.E.,
Preconstruction Engineer
Northern Region

DATE: December 16, 2013

FILE NO: I:\Traffic Data\DESIGN\2013\McGrath_62838.doc

TELEPHONE NO: 451-5150

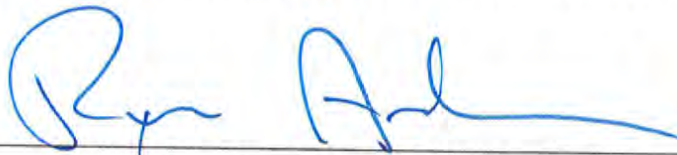
FROM: 
Judy Chapman
Planning Chief
Northern Region

SUBJECT: McGrath Rd Upgrade
62838/0002300
Design Designation

Please approve the attached updated design designation by signing the endorsement below which enables your staff to proceed.

Included in this package is raw volume data obtained from a special data request during the 2013 field season along McGrath Rd.

Any questions should be directed to Jennifer Anderson at 451-2257.



Ryan F. Anderson, P.E., Preconstruction Engineer

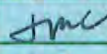


12/17/2013

Date

JCA/sgv

cc: Sarah Schacher, P.E., Engineering Manager, Northern Region
Jennifer Anderson, Traffic Data Manager, Northern Region

Attachment

Please circulate and return to Traffic Data & Forecasting Manager	
Planning Manager (outside FNSB)	
Planning Chief	
Fairbanks Area Planner (FNSB)	
Traffic & Safety	
Any changes, additions, or questions, Please write on this sheet	

DESIGN DESIGNATION
Northern Region Planning
 Traffic Data & Forecasting

ROUTE NAME: McGrath Rd
 STATE ROUTE NO: 151400
 CDS MILEAGE: 0.000-2.867
 FUNCTIONAL CLASS: Major Collector

	YEAR	ADT	%
ADT	2012	2150	
	2025	2530	
	2045	3240	
DHV	2025	290	11.4
	2045	370	
D			40-60
T			4.00 %
			3.50
			0.50
ESAL'S (Design Lane)	To Be Provided by Design		
			Total Class 5 Class 6


MEMORANDUM

State of Alaska
Department of Transportation & Public Facilities
Northern Region Design and Engineering Services

TO: Judy Chapman
Planning Chief
Northern Region


DATE: November 20, 2013

FILE NO: V:\Hwy\62838\04PS&E\02DSR\Design\DesignationMemo 11 20 13

THRU: Ryan F. Anderson, P.E. 
Preconstruction Engineer
Northern Region

PHONE NO: 907-451-5129

FAX NO: 907-451-5126

FROM: Sarah Schacher, P.E. 
Engineering Manager
Northern Region

SUBJECT: McGrath Road Upgrade
62838/0002300
Design Designation Request

Please provide a Design Designation for the subject project.

- ☒ Present AADT
- ☒ Design Year AADT (2045)
- ☒ Mid-Design Period AADT (2025)
- ☒ Design Hourly Volume
- ☒ Directional Split
- ☒ Percent Trucks
- ☒ Design Functional Classification
- ☐ Intersection Turning Movement Counts at:
- ☐ Other (*Specify*)

The project is scheduled for construction in 2018.

Please complete the attached Traffic Data Request Form.

Attachment: as stated

eb/vzb 

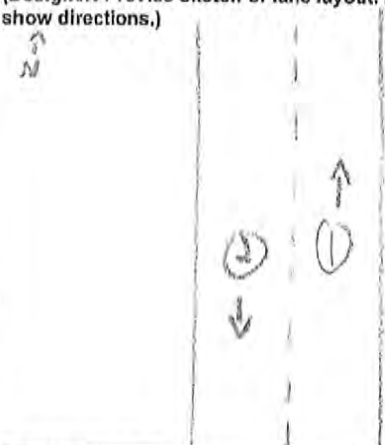
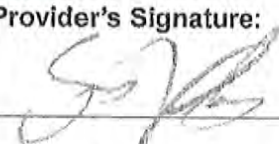

Traffic Data Request Form				TDR Form-1-10/20/03																		
Alaska Department of Transportation & Public Facilities																						
Requested By: <i>Sarah Schacher</i>		Design Project Number: <i>62838</i>		Date Requested: <i>11/10/13</i>																		
Base Year: <i>2012</i> Base Year Total AADT: <i>2150</i> AADT Growth Rate Forward (%/yr): <i>1</i> End Year: <i>2045</i> Back Cast (%/yr): Begin Year:		Common Route Name: Functional Class: <i>Major Collector</i> (Urban/Rural) Historic M.P. Interval: <i>0 - 2.867</i>		CDS Route Name: <i>McGreath Rd</i> CDS M.P. Interval: <i>Same</i>																		
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 20%;">Truck Category</th> <th style="width: 20%;">Load Factor (ESALs per Truck)</th> <th style="width: 20%;">% of Total AADT in Truck Category</th> </tr> </thead> <tbody> <tr><td>2-axle</td><td></td><td></td></tr> <tr><td>3-axle</td><td><i>See</i></td><td></td></tr> <tr><td>4-axle</td><td><i>attached</i></td><td></td></tr> <tr><td>5-axle</td><td></td><td></td></tr> <tr><td>≥ 6-axle</td><td></td><td></td></tr> </tbody> </table>		Truck Category	Load Factor (ESALs per Truck)	% of Total AADT in Truck Category	2-axle			3-axle	<i>See</i>		4-axle	<i>attached</i>		5-axle			≥ 6-axle			Lane Configuration Sketch: (Designer: Provide sketch of lane layout. Number each lane and show directions.) 		
Truck Category	Load Factor (ESALs per Truck)	% of Total AADT in Truck Category																				
2-axle																						
3-axle	<i>See</i>																					
4-axle	<i>attached</i>																					
5-axle																						
≥ 6-axle																						
Percent of Base Year Total AADT for Each Numbered Lane in Configuration Sketch: <table border="1" style="width: 100%; border-collapse: collapse;"> <tbody> <tr><td>Lane # <i>1</i></td><td>% <i>50</i></td></tr> <tr><td>Lane # <i>2</i></td><td>% <i>50</i></td></tr> <tr><td>Lane #</td><td>%</td></tr> <tr><td>Lane #</td><td>%</td></tr> <tr><td>Lane #</td><td>%</td></tr> <tr><td>Lane #</td><td>%</td></tr> </tbody> </table>		Lane # <i>1</i>	% <i>50</i>	Lane # <i>2</i>	% <i>50</i>	Lane #	%	Lane #	%	Lane #	%	Lane #	%	Comments:								
Lane # <i>1</i>	% <i>50</i>																					
Lane # <i>2</i>	% <i>50</i>																					
Lane #	%																					
Lane #	%																					
Lane #	%																					
Lane #	%																					
Data Provided By: <i>Scott Yankers</i>		Provider's Signature: 		Date Provided: <i>12/19/13</i>																		

Figure 6-1. Traffic Data Request (TDR) Form






















Highway Log Report

CDS Route: 151400 Mcgrath Road * Fbks NSB (Internal Dup # 0)
 Milepoint: 0.000 to 2.867
 General Direction: Southwest

Features Selected:

 Cross Streets
  Mileposts
  Bridges/Culverts
  Railroad Crossings
  Buildings/Landmarks

Attributes Selected

Milepoint	Side	Feature CDS	Feature
0.000	Left	150105	 Old Steese @ Fox
0.000	Right	150105	 Old Steese @ Fox
0.145	Left	151450	 Mcgrath Road Wye
0.145	Right	-	 Broadview Drive
0.326	Right	-	 Sunrise Drive
0.643	Left	-	 Kristin Drive
1.073	Left	-	 Frog Pond Circle
1.073	Right	-	 Willow Grouse Road
1.233	Left	-	 Mcgrath Rd Baptist Church
1.343	Left	-	 Marten Drive
1.588	Right	-	 Crystal Road
1.762	Left	-	 Teresa Turn Around
1.762	Right	-	 Rambling Road
1.822	Right	-	 Wildwood Mhp Ent
1.887	Right	-	 Howland Road
1.937	Right	-	 Town & Country Mhp Ent
2.028	Right	-	 Village Mhp Ent
2.756	-	-	Road Continues
2.756	Left	-	 Flapjack Road
2.792	Right	-	 Lowell Road
2.841	Right	-	 Mcgrath Rd-Farmers Lp Wye
2.867	Left	150200	 Farmers Loop
2.867	-	150200	Farmers Loop

December 09, 2013

ALASKA DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES
 11/27/13 SUMMARY DATA - ADT

TWVRM13
 16:25:15.4

STATION ID 30521000 NORTH-SOUTH ROUTE 151400 MILEPOINT 2.763
 MCGRATH ROAD NORTH OF FARMERS LOOP ROAD

* * * UNVERIFIED DATA * * *

YEAR	AADT	PERCENT OF ANNUAL AVERAGE DAILY TRAFFIC						
		MON	TUE	WED	THR	FRI	SAT	SUN
2001	2146	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2003	2445	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2004	2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2005	1947	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2006	2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2007	2407	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2008	2266	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2009	2330	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2010	2379	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2011	2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2012	2135	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00

PF1 - INQUIRY
 PF5 - SELECTION

PF2 - HELP
 PF10-NEXT STATION

PF3 - QUIT

PF4 - TDS MENU

ALASKA DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES
11/27/13 SUMMARY DATA - ADT

TWVRM13
16:25:03.5

STATION ID 30520000 EAST-WEST ROUTE 151400 MILEPOINT 0.250
MCGRATH ROAD WEST OF MCGRATH ROAD WYE

* * * UNVERIFIED DATA * * *

YEAR	AADT	PERCENT OF ANNUAL AVERAGE DAILY TRAFFIC						
		MON	TUE	WED	THR	FRI	SAT	SUN
2001	399	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2003	341	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2004	410	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2005	336	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2006	389	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2007	483	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2008	484	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00

PF1 - INQUIRY
PF5 - SELECTION

PF2 - HELP
PF10-NEXT STATION

PF3 - QUIT

PF4 - TDS MENU

Station Name:McGrath @ Howland Rd Southbound

Site ID:300002005100

Start Date/Time:08-01-2013 00:00

End Date/Time:09-05-2013 23:59

	0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00	Total
Fri 30	11	8	3	4	2	21	59	100	98	47	37	54	46	52	51	48	50	68	53	52	45	26	18	12	965
Sat 31	10	7	4	4	9	3	13	22	36	55	48	59	44	60	43	67	45	38	55	34	29	36	20	25	766
Sun 1	13	10	5	8	5	8	9	15	26	51	59	56	53	35	50	50	47	50	38	46	34	24	19	6	717
Mon 2	13	7	7	3	6	6	14	25	22	30	47	40	47	40	53	42	35	54	39	23	36	26	19	15	649
Tue 3	11	4	5	1	8	22	56	116	70	52	38	38	41	38	47	45	51	53	64	36	39	22	8	13	878
Wed 4	8	2	4	5	6	20	57	123	80	49	46	38	41	51	55	59	59	56	55	38	41	18	13	7	931
Thu 5	8	3	4	6	3	19	58	128	78	49	38	52	45	51	47	54	51	52	44	41	28	26	10	13	908

Percentage 1.27% 0.71% 0.55% 0.53% 0.67% 1.70% 4.58% 9.10% 7.05% 5.73% 5.38% 5.80% 5.45% 5.62% 5.95% 6.28% 5.81% 6.38% 5.99% 4.64% 4.33% 3.06% 1.84% 1.57% 100.00%

Hour Total 74 41 32 31 39 99 266 529 410 333 313 337 317 327 346 365 338 371 348 270 252 178 107 91 5814

Station Name:McGrath @ Howland Rd Northbound

Site ID:300002001100

Start Date/Time:08-01-2013 00:00

End Date/Time:09-05-2013 23:59

	0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00	Total
Fri 30	17	6	3	4	1	4	22	27	35	16	32	32	49	54	53	75	72	99	94	62	45	45	30	20	897
Sat 31	12	14	5	2	6	0	5	8	14	25	39	36	48	55	54	64	57	68	54	56	44	42	35	25	768
Sun 1	13	11	3	7	3	4	3	5	13	37	30	33	50	44	47	51	48	68	51	41	45	30	30	13	680
Mon 2	8	8	8	3	4	3	9	13	13	10	27	33	34	48	62	50	48	64	59	31	49	27	25	21	657
Tue 3	13	5	3	2	0	4	11	21	28	21	30	39	49	37	57	65	82	122	99	54	45	45	17	11	860
Wed 4	11	5	6	5	3	5	7	21	34	29	25	28	35	42	50	70	91	139	103	58	60	41	30	14	912
Thu 5	11	8	9	1	4	3	8	17	28	19	30	51	37	39	43	69	90	108	88	64	48	60	22	15	872

Percentage 1.51% 1.01% 0.66% 0.43% 0.37% 0.41% 1.15% 1.98% 2.92% 2.78% 3.77% 4.46% 5.35% 5.65% 6.48% 7.86% 8.64% 11.83% 9.71% 6.48% 5.95% 5.14% 3.35% 2.11% 100.00%

Hour Total 85 57 37 24 21 23 65 112 165 157 213 252 302 319 366 444 488 668 548 366 336 290 189 119 5646

Station Name: McGrath Rd Noth of Frog Pong

Site ID: 300001009200

Start Date/Time: 08-01-2013 00:00

End Date/Time: 08-31-2013 23:59

	0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00	Total
Fri 23 All Lanes	10	3	5	1	1	6	21	35	19	26	17	18	27	22	29	49	42	84	54	37	35	30	30	22	623
Sat 24 All Lanes	16	14	6	8	2	0	13	8	19	27	24	28	46	38	40	50	42	44	38	38	29	32	23	22	607
Sun 25 All Lanes	8	7	7	1	5	7	9	11	21	39	34	38	50	58	35	42	48	62	47	42	33	30	17	7	658
Mon 26 All Lanes	4	3	2	0	3	10	20	37	24	17	23	19	36	24	25	34	38	51	49	40	53	28	17	3	560
Tue 27 All Lanes	3	2	6	1	9	9	18	31	20	30	33	22	29	24	23	29	40	53	53	43	40	26	9	6	559
Wed 28 All Lanes	9	5	4	0	4	10	22	27	26	23	20	33	25	22	18	30	43	76	52	48	41	17	17	8	580
Thu 29 All Lanes	6	1	3	3	3	7	16	34	22	29	22	28	24	26	37	46	46	67	34	41	36	20	18	8	577
Percentages	1.34%	0.84%	0.79%	0.34%	0.65%	1.18%	2.86%	4.39%	3.63%	4.59%	4.15%	4.47%	5.69%	5.14%	4.97%	6.72%	7.18%	10.49%	7.85%	6.94%	6.41%	4.39%	3.15%	1.83%	100.00%
Hour Totals	56	35	33	14	27	49	119	183	151	191	173	186	237	214	207	280	299	437	327	289	267	183	131	76	4164

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION
AND
PUBLIC FACILITIES

Item No. _____

DATE 11/29/13

Project No. 62838

Project Name McGrath Upgrade

Calc. by Scot V

Checked by _____

Computations

For McGrath Rd. Design Designation

Year	ADT
2012	2150
2025	2530
2045	3240

ADT from short term count on McGrath N of
Farness Loop Rd.

1.25 % growth rate used

13 yr factor 1.17
33 yr factor 1.51

DIV: 1.4 %
2025: 240
2045: 370

Directional Split: 60-40

% Trucks 4 % Class count from Skyline Rd used as base

Class	# Axes	%	Load Factor
5	2	3.5	0.50
6	3	0.5	0.85
7	4	✓	✓
8	4	✓	1.20
9	5	✓	1.55
10	6	✓	2.24
11	6	✓	✓
12	6	✓	✓
13	7+	✓	2.24

APPENDIX B

ENVIRONMENTAL DOCUMENT
(only include the signature page of the FONSI or ROD)

VII. Environmental Documentation Approval

N/A YES NO

3. **For 6004 projects:** The project meets the criteria of the [DOT&PF Programmatic Approval 2](#) authorized in the November 6, 2012 "[CE Directive – Delegation of Approval Authority for Certain CEs under 6004 MOU](#)". If yes, the CE may be approved by the Regional Environmental. If no, the CE may be approved by a Statewide NEPA Manager.
4. **For non-assigned projects:** The project meets the criteria of the April 13, 2012 "Programmatic Categorical Exclusion for Use on Federal-Aid Highway Projects in Alaska" between FHWA and DOT&PF. If yes, the CE may be approved by the Regional Environmental Manager. If no, the CE may be approved by FHWA Area Engineer.

☐ ☒ ☐

☒ ☐ ☐

VIII. Environmental Documentation Approval Signatures

Prepared by: 
[Sign] Environmental Impact Analyst

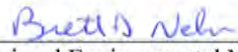
Date: 5/20/15

Robert A. Effinger
[Print Name] Environmental Impact Analyst

Reviewed by: 
[Sign] Engineering Manager

Date: 5/20/2015

Sarah Schuchner
[Print Name] Engineering Manager

Approved by: 
[Sign] Regional Environmental Manager

Date: 5-20-15

Brett Nelson
[Print Name] Regional Environmental Manager

Assigned CE

Approved by: _____
[Sign] DOT&PF Statewide NEPA Manager

Date: _____

[Print Name] DOT&PF Statewide NEPA Manager

Non-Assigned CE

Approved by: _____
[Sign] FHWA Area Engineer

Date: _____

[Print Name] FHWA Area Engineer

APPENDIX C

PAVEMENT DESIGN

Project: McGrath Road Proj No.: 62,838		New Construction by Erik Brunner 6/9/2016 2:55:02 PM									
AADT = 2,150	Past Loadings	Future Loadings	Season	Modulus (ksi)	Poisson's Ratio	Tensile Critical Micro Strain	Critical Compressive Stress (psi)	Million Cycles to Failure	XY Load Locations (in): Load = 4500 (lbs) Tire Pressure = 110 (psi)	Future Damage %	Total Damage %
25% Spring 25% Summer 25% Fall 25% Winter ----- Total:		51,500 51,500 51,500 51,500 ----- 206,000							XY Evaluation Points (in):	6.75 0 0	0 0
Layer	Critical Z Coordinate	Asphalt Properties									
2(in) Asphalt_Concrete	1.99	4% Air 5.5% Asph 148 pcf	Spring Summer Fall Winter	755 510 510 1,500	0.3 0.3 0.3 0.3	86.7 41.4 28.7 38.2		40.26 641.05 2,140.68 332.47 Total Damage:		0.13 0.01 0.00 0.02 0.15	0.13% 0.01% 0.00% 0.02% 0.15
3(in) 4-5% Asph_Treated_Base	4.99	6% Air 4.5% Asph 145 pcf	Spring Summer Fall Winter	250 300 350 500	0.35 0.35 0.35 0.4	293 242 226 108		0.44 0.71 0.78 6.49 Total Damage:		11.71% 7.29 6.64 0.79 26.45	11.71% 7.29% 6.64% 0.79% 26.45
8(in) Select_A_P200<6%	5.01		Spring Summer Fall Winter	25 35 35 90	0.4 0.4 0.4 0.4		19.40 23.10 22.20 25.10 Total Damage:	0.90 1.53 1.74 25.36 Total Damage:		5.71 3.37 2.96 0.20 12.24	5.71% 3.37% 2.96% 0.20% 12.24
36(in) Select_A_P200<6%	13.01		Spring Summer Fall Winter	25 35 35 90	0.4 0.4 0.4 0.4		9.14 9.86 9.71 10.00 Total Damage:	10.49 24.54 25.79 509.34 Total Damage:		0.49 0.21 0.20 0.01 0.91	0.49% 0.21% 0.20% 0.01% 0.91
S-Infinite Subgrade_P200<30%	49.01		Spring Summer Fall Winter	50 10 10 10	0.45 0.45 0.45 0.45		1.77 0.91 0.90 0.54 Total Damage:	21,204.24 638.70 645.64 3,492.89 Total Damage:		0.00 0.01 0.01 0.00 0.02	0.00% 0.01% 0.01% 0.00% 0.02

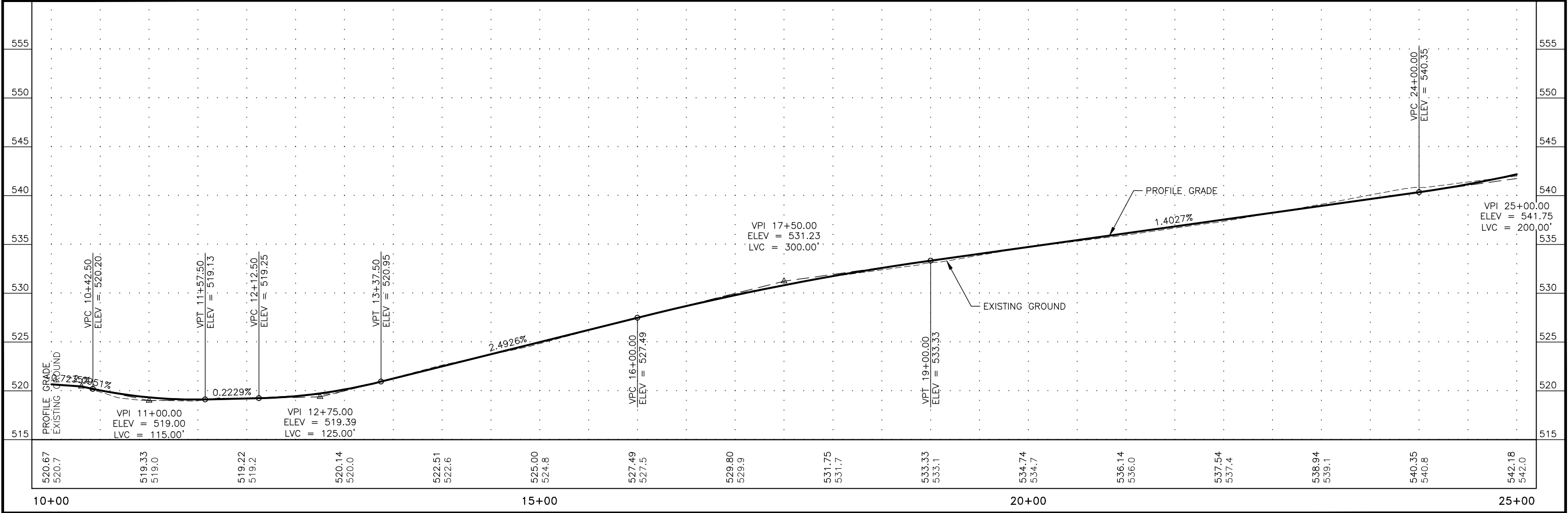
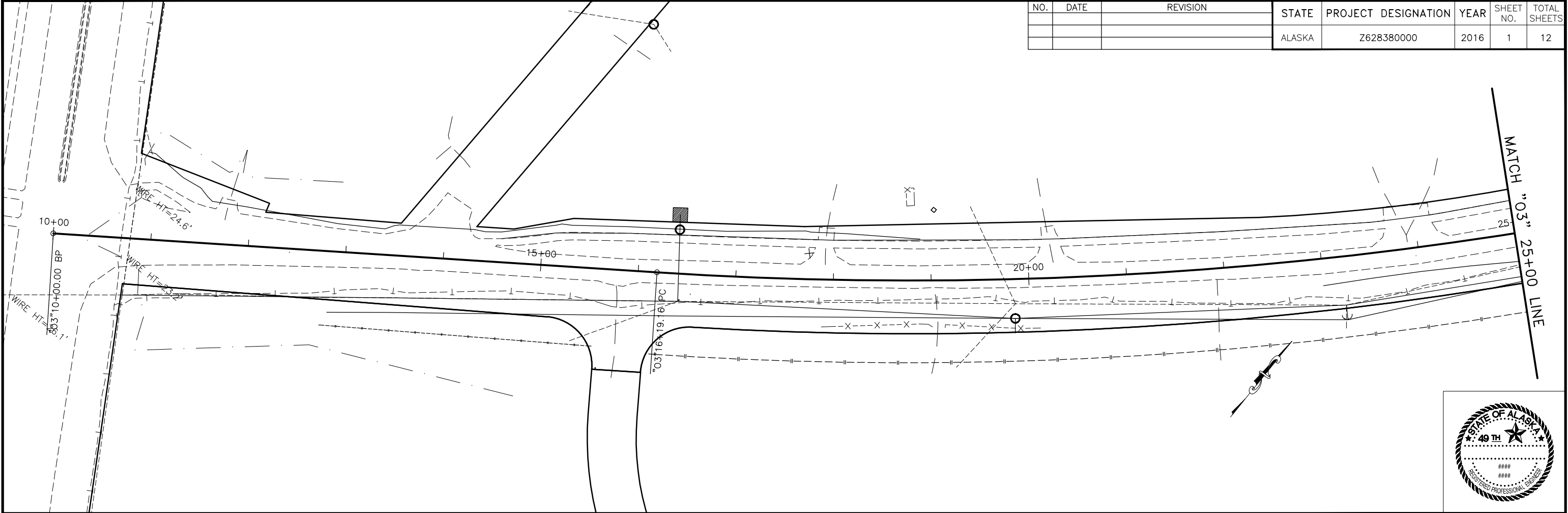
OK - J. McGarry,
Soil Curvey, P.E. 10-24-16
NR Mathis Eng'g

APPENDIX D

PRELIMINARY PLAN AND PROFILE SHEETS

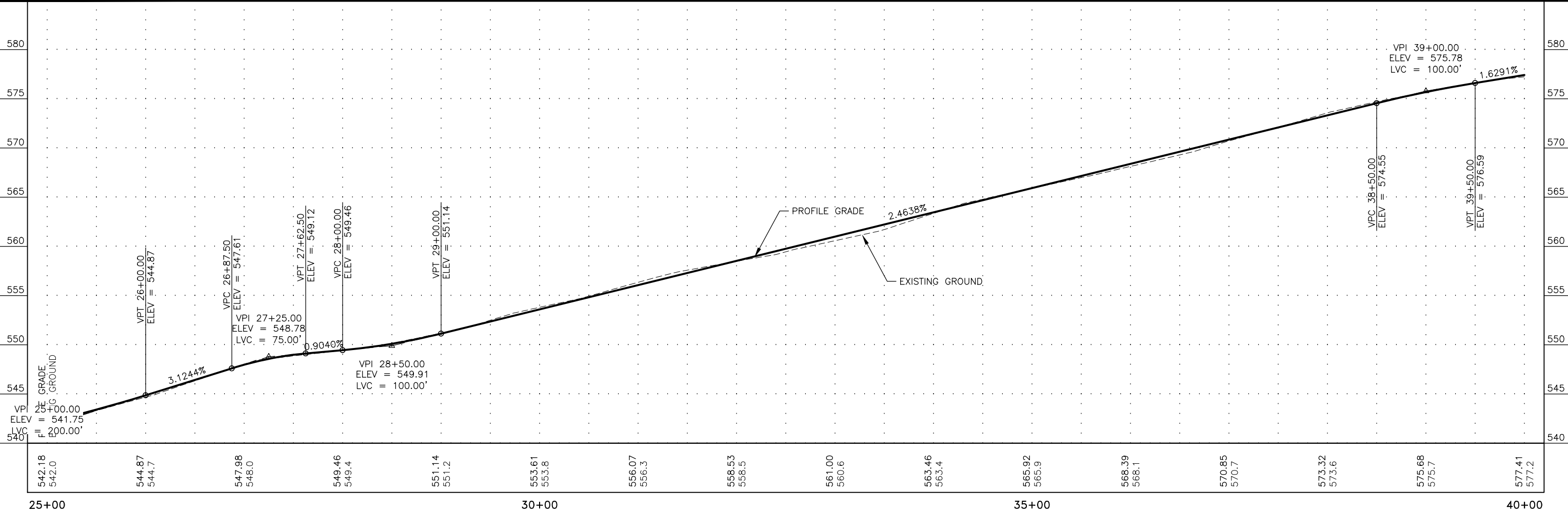
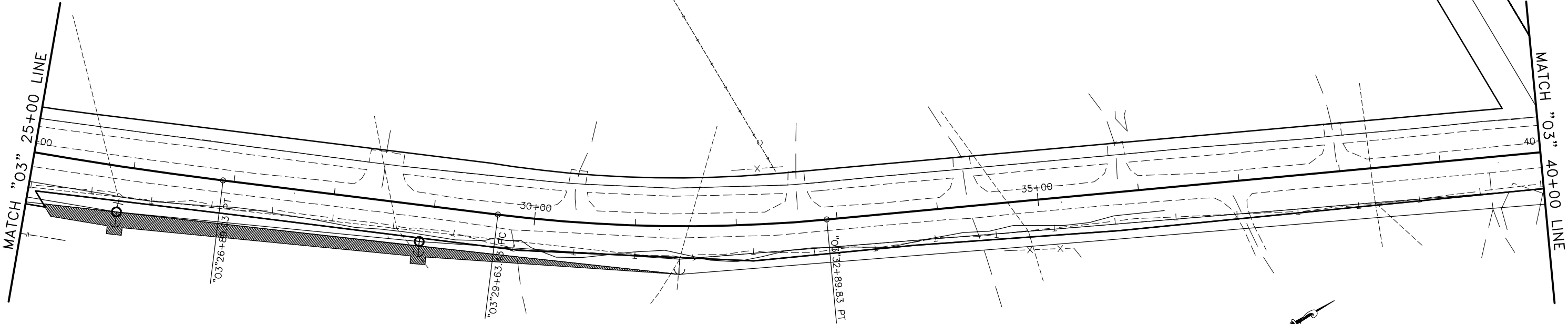
PLANS DEVELOPED BY: STATE OF ALASKA DEPARTMENT OF TRANSPORTATION & PUBLIC FACILITIES, NORTHERN REGION, 2301 PEGER ROAD, FAIRBANKS, AK 99709 (907)451-2200
H:\Projects\Fbks\NP\62838_McGrath\09 - CSD\Plans\62838_DSR_P&P-10+00.00-25+00.00 Thu, Oct/27/16 03:46pm

NO.	DATE	REVISION	STATE	PROJECT DESIGNATION	YEAR	SHEET NO.	TOTAL SHEETS
			ALASKA	Z628380000	2016	1	12



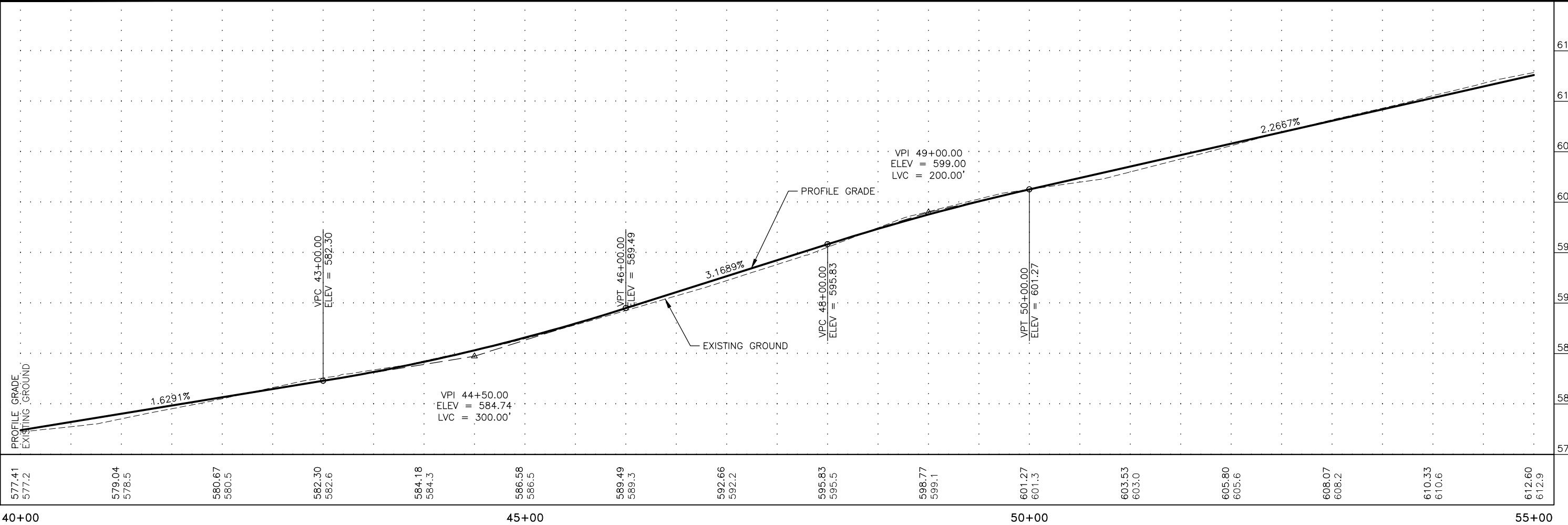
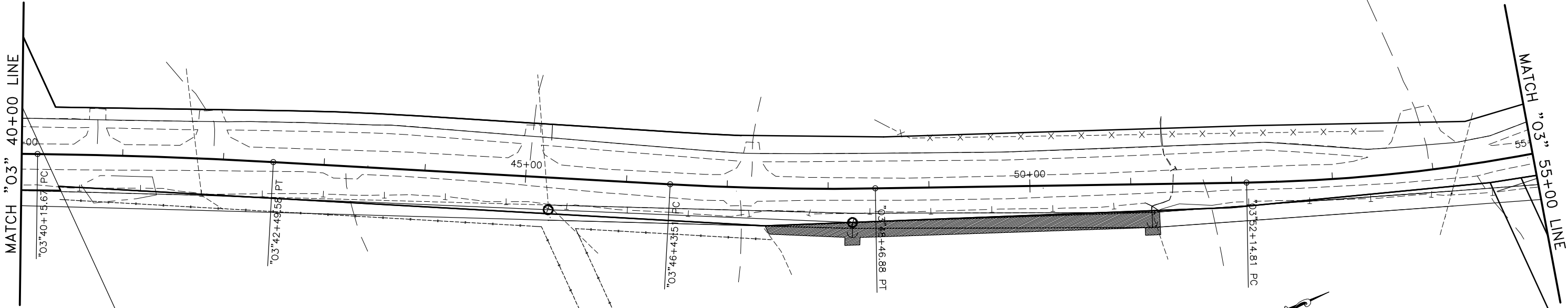
PLANS DEVELOPED BY: STATE OF ALASKA DEPARTMENT OF TRANSPORTATION & PUBLIC FACILITIES, NORTHERN REGION, 2301 PEGER ROAD, FAIRBANKS, AK 99709 (907)451-2200
H:\Projects\Fbks\NP\62838_McGrath\09 - CSD\Plots\62838_DSR_P&P-25+00.00-40+00.00 Thu, Oct/27/16 03:49pm

NO.	DATE	REVISION	STATE	PROJECT DESIGNATION	YEAR	SHEET NO.	TOTAL SHEETS
			ALASKA	Z628380000	2016	2	12



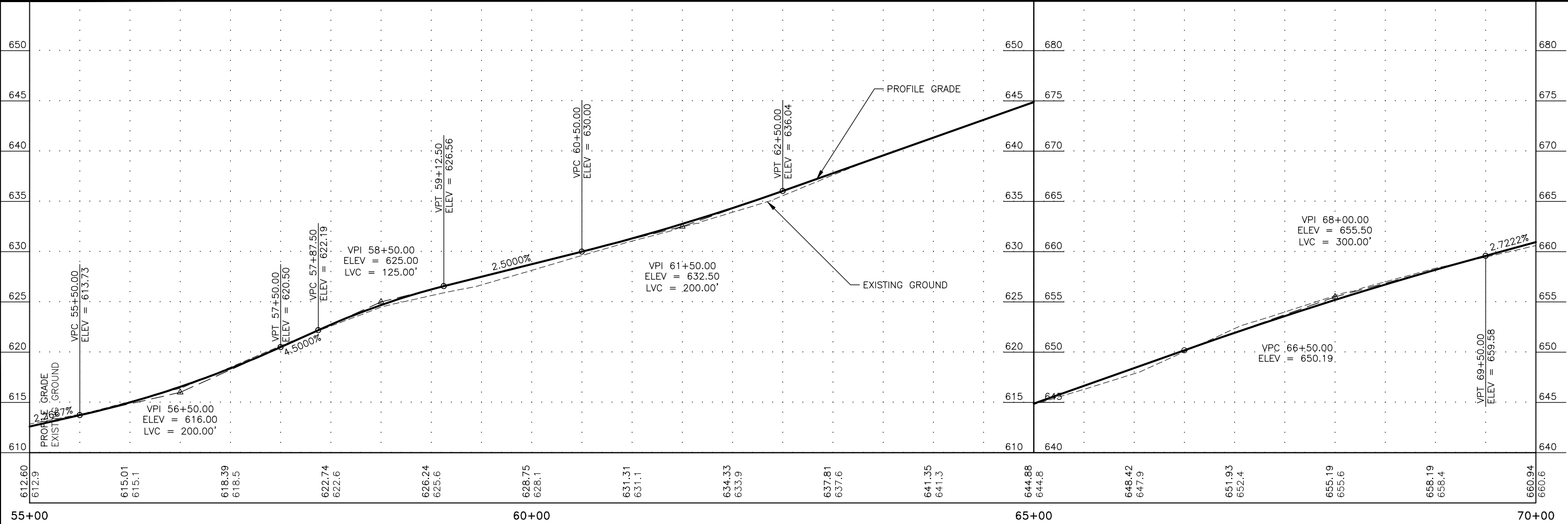
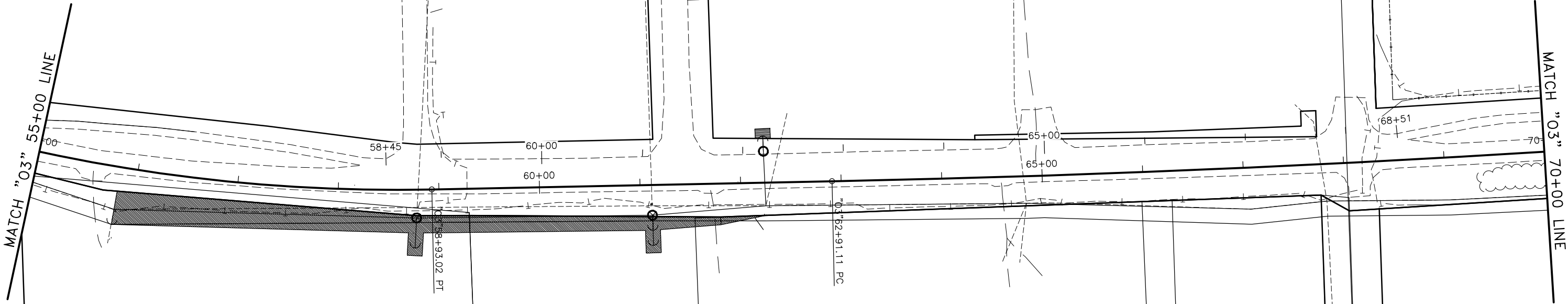
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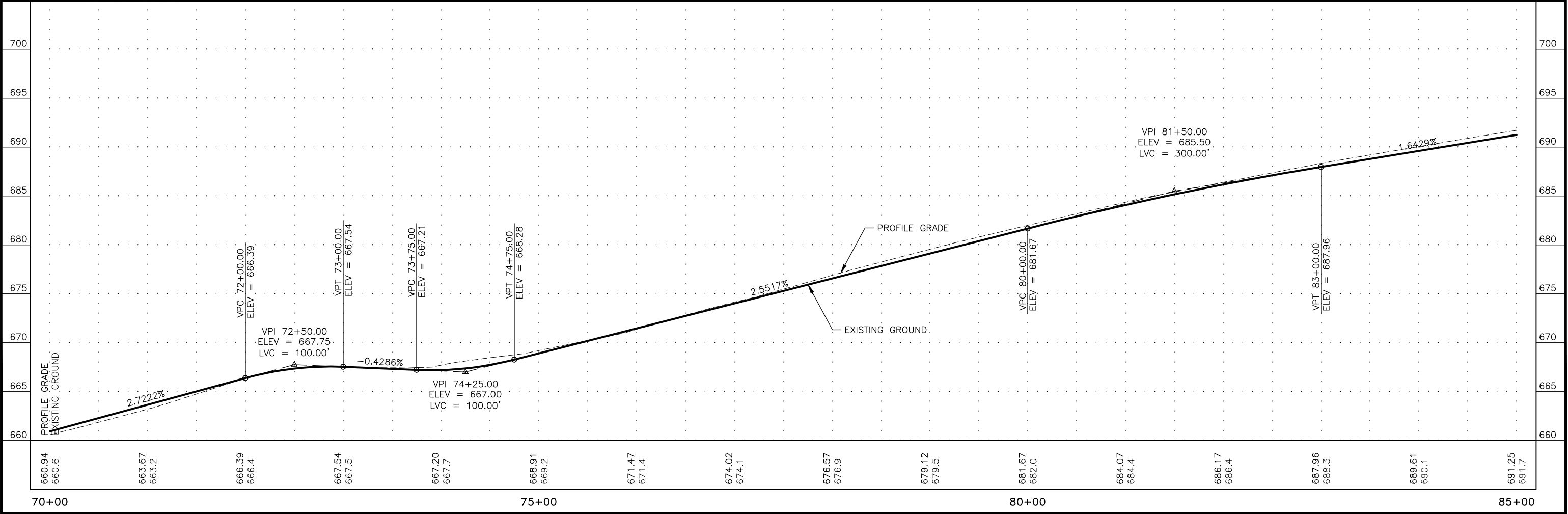
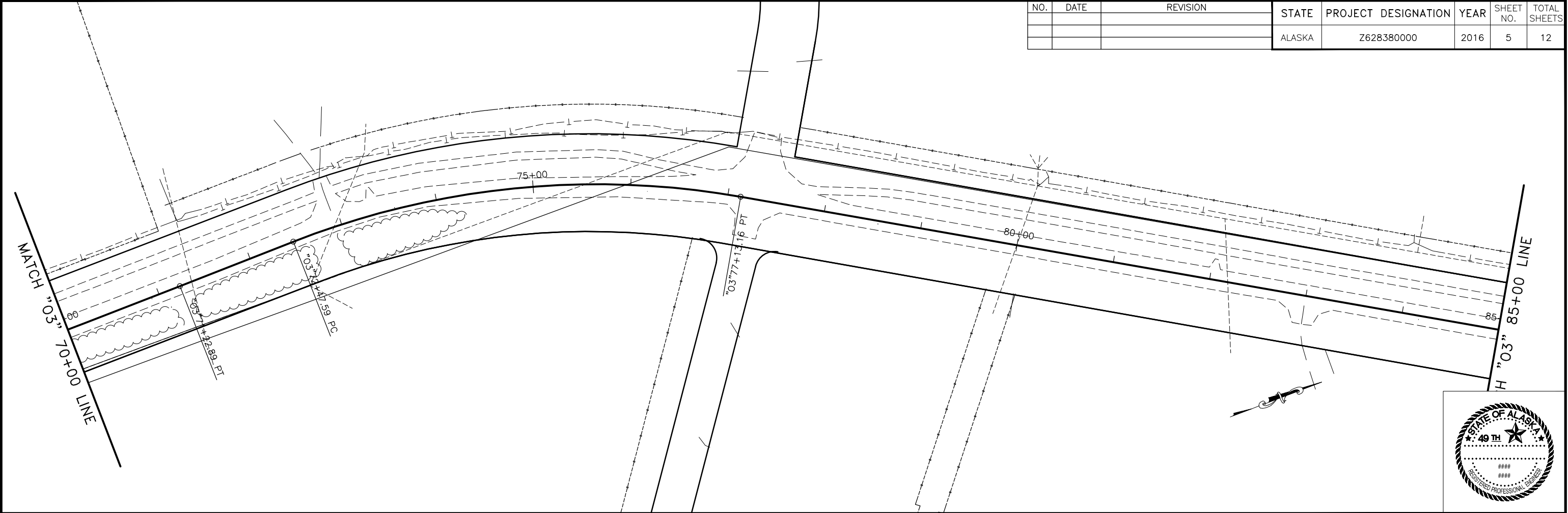
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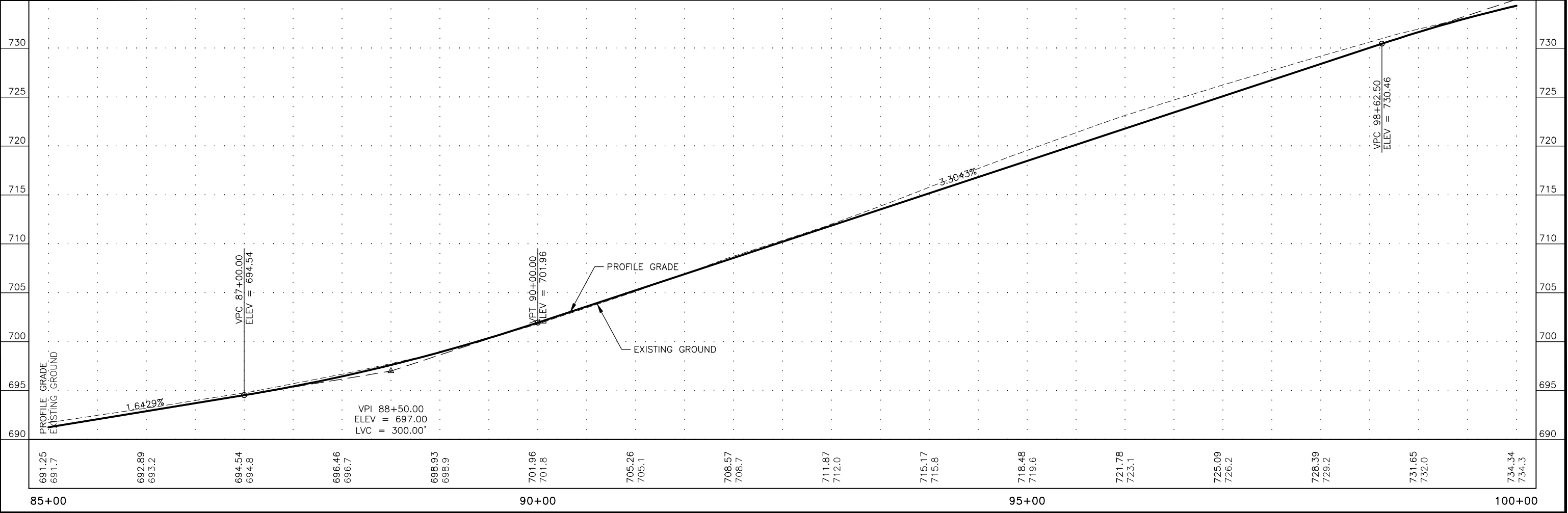
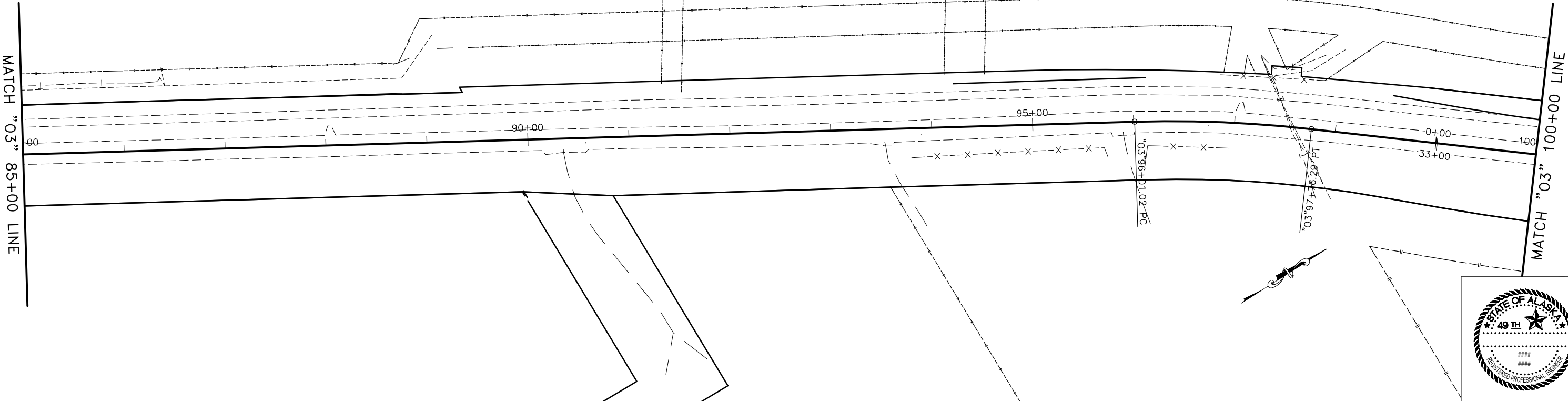
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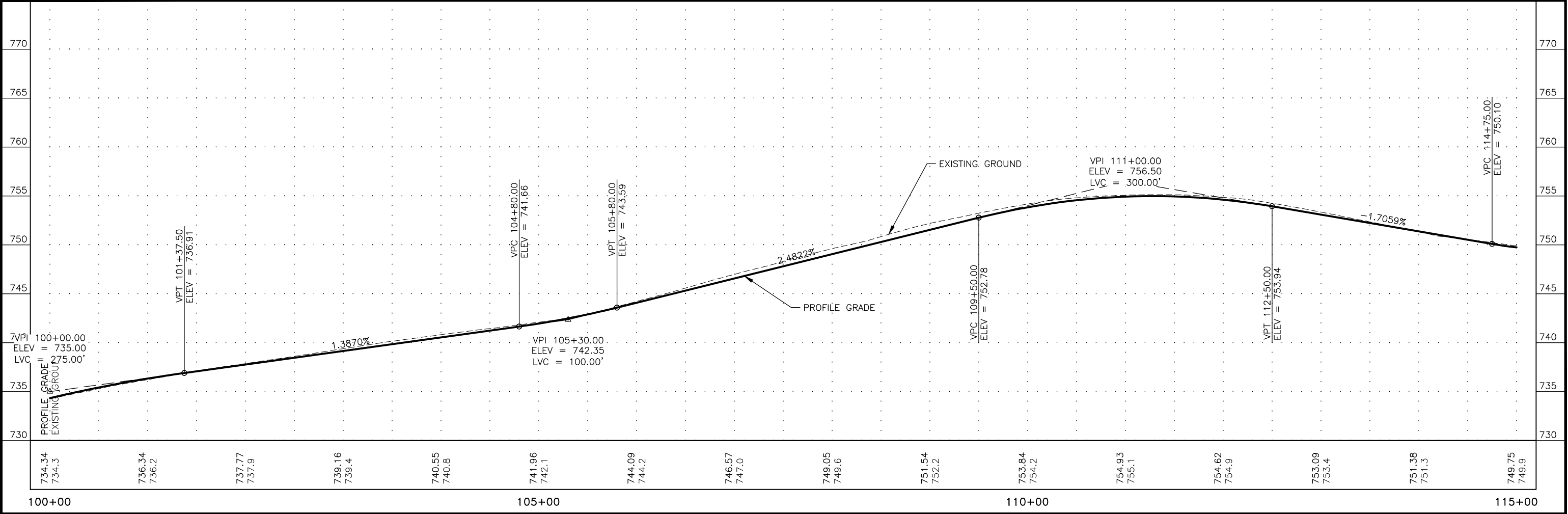
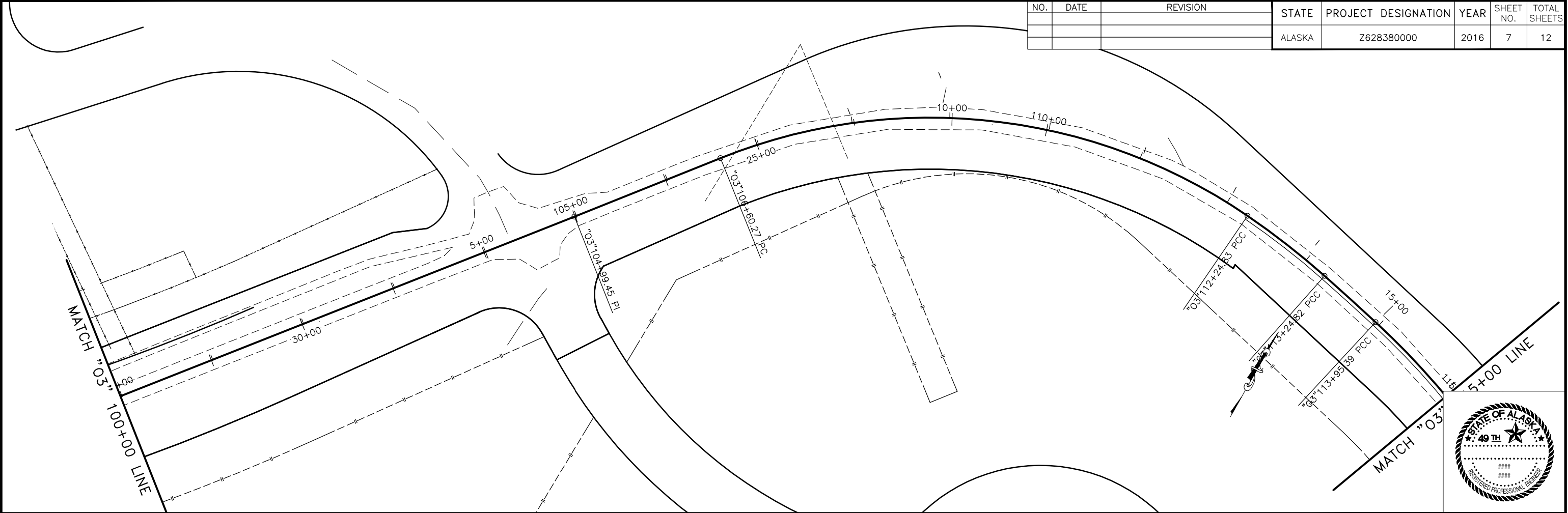
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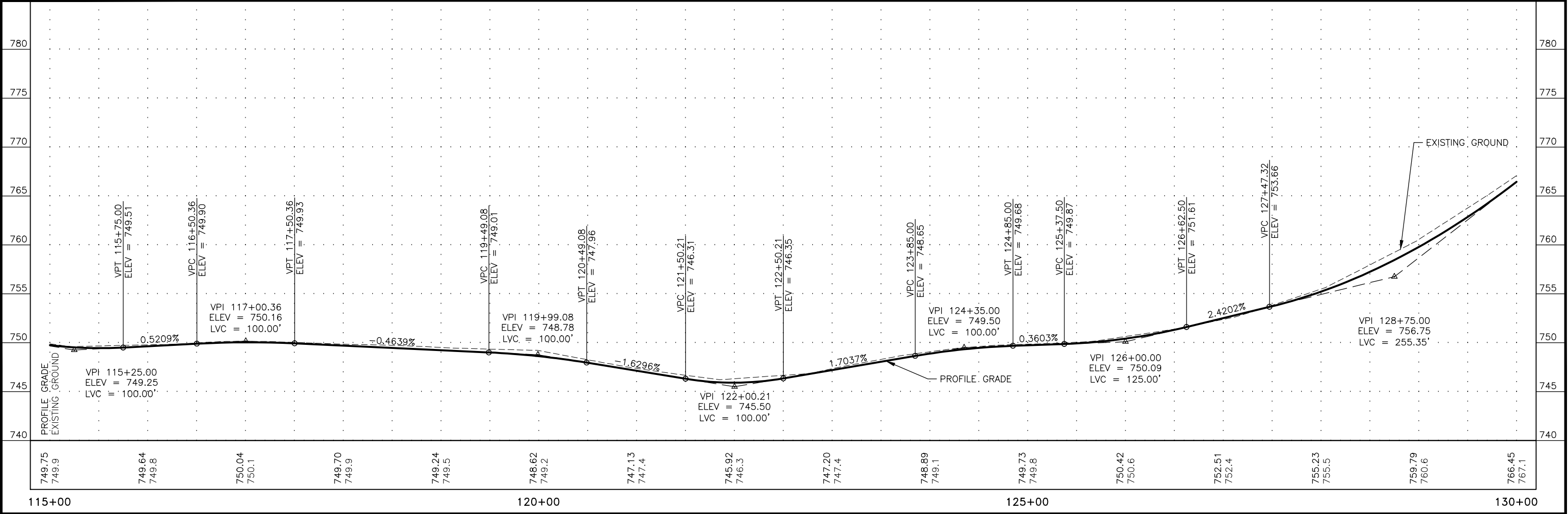
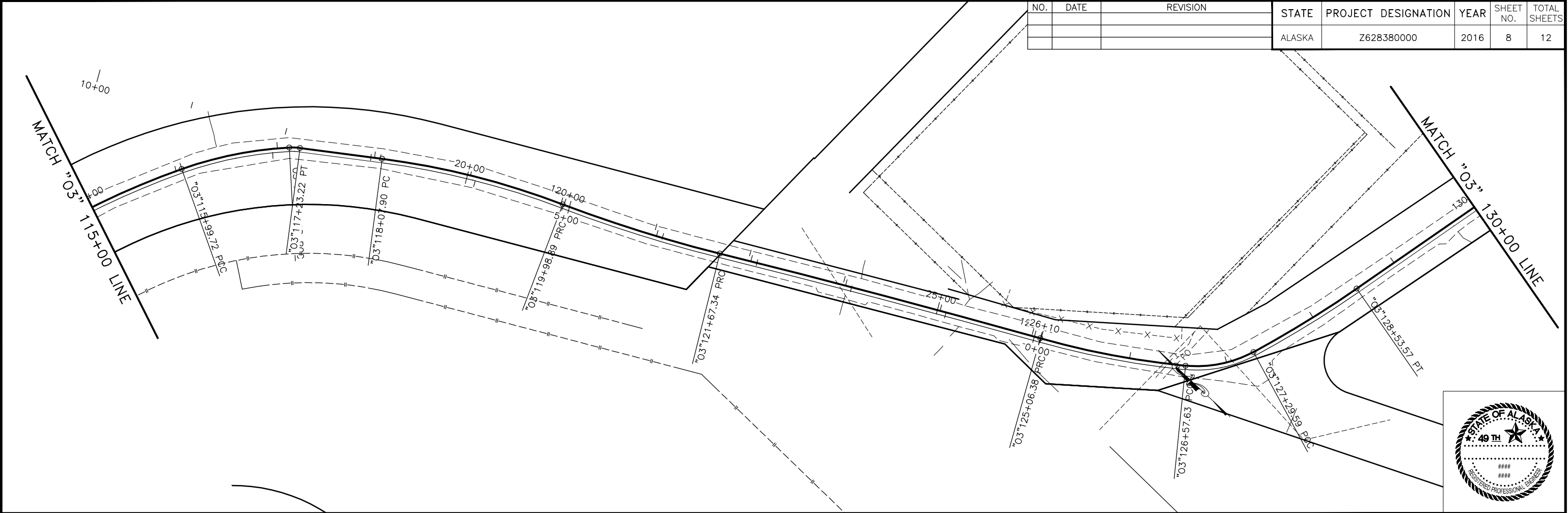
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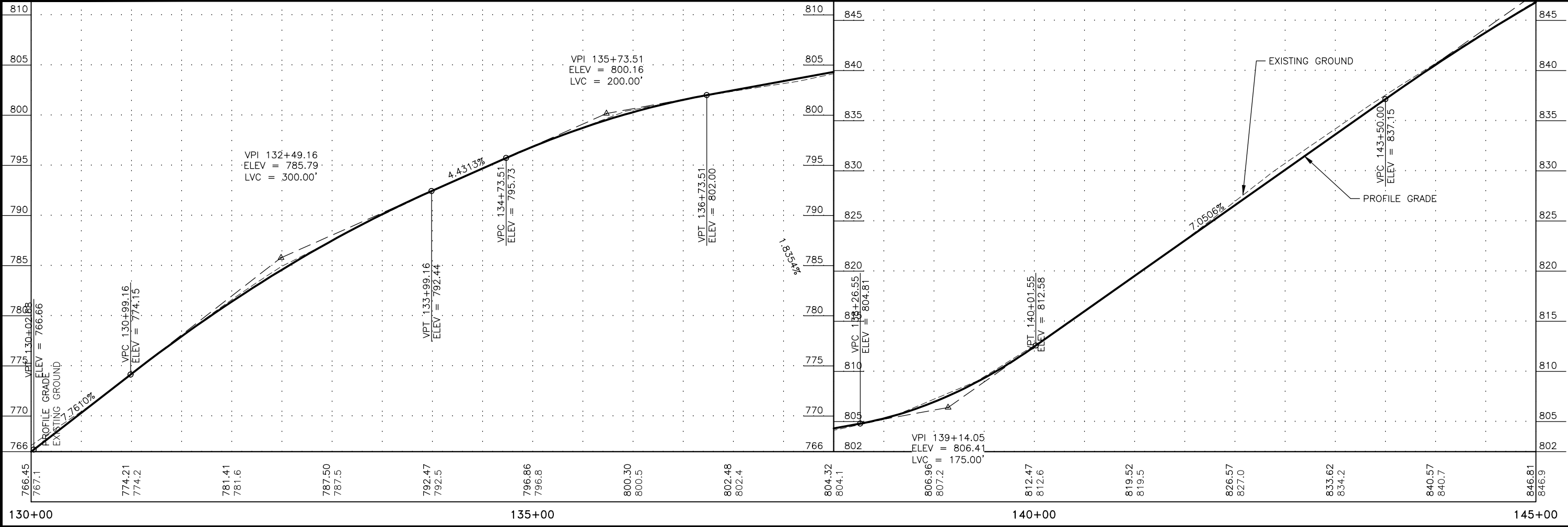
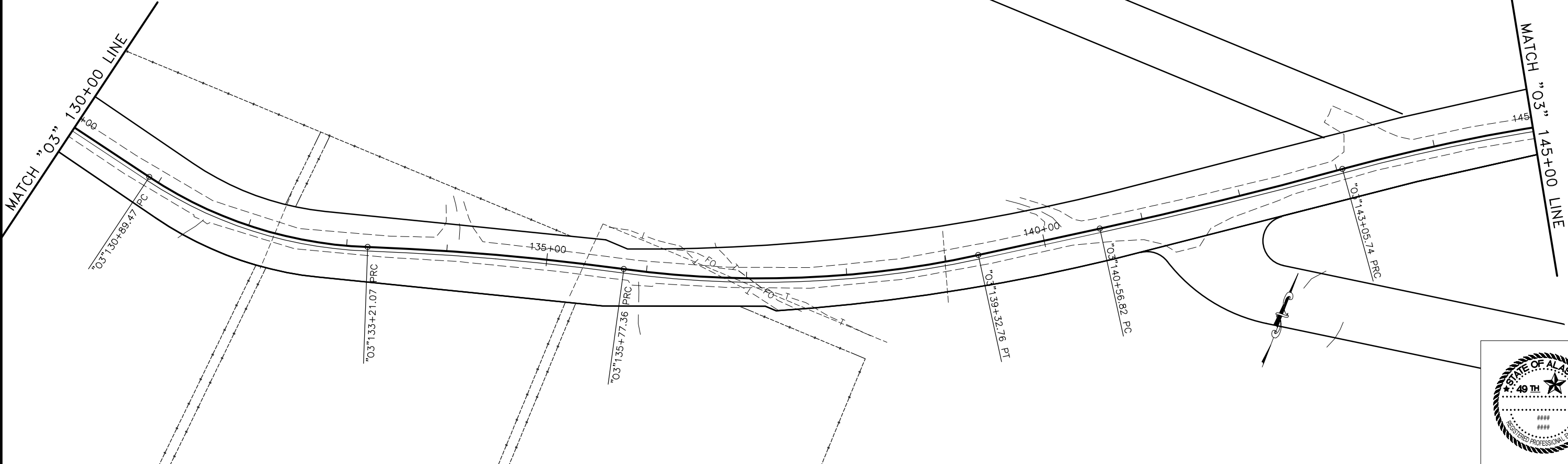
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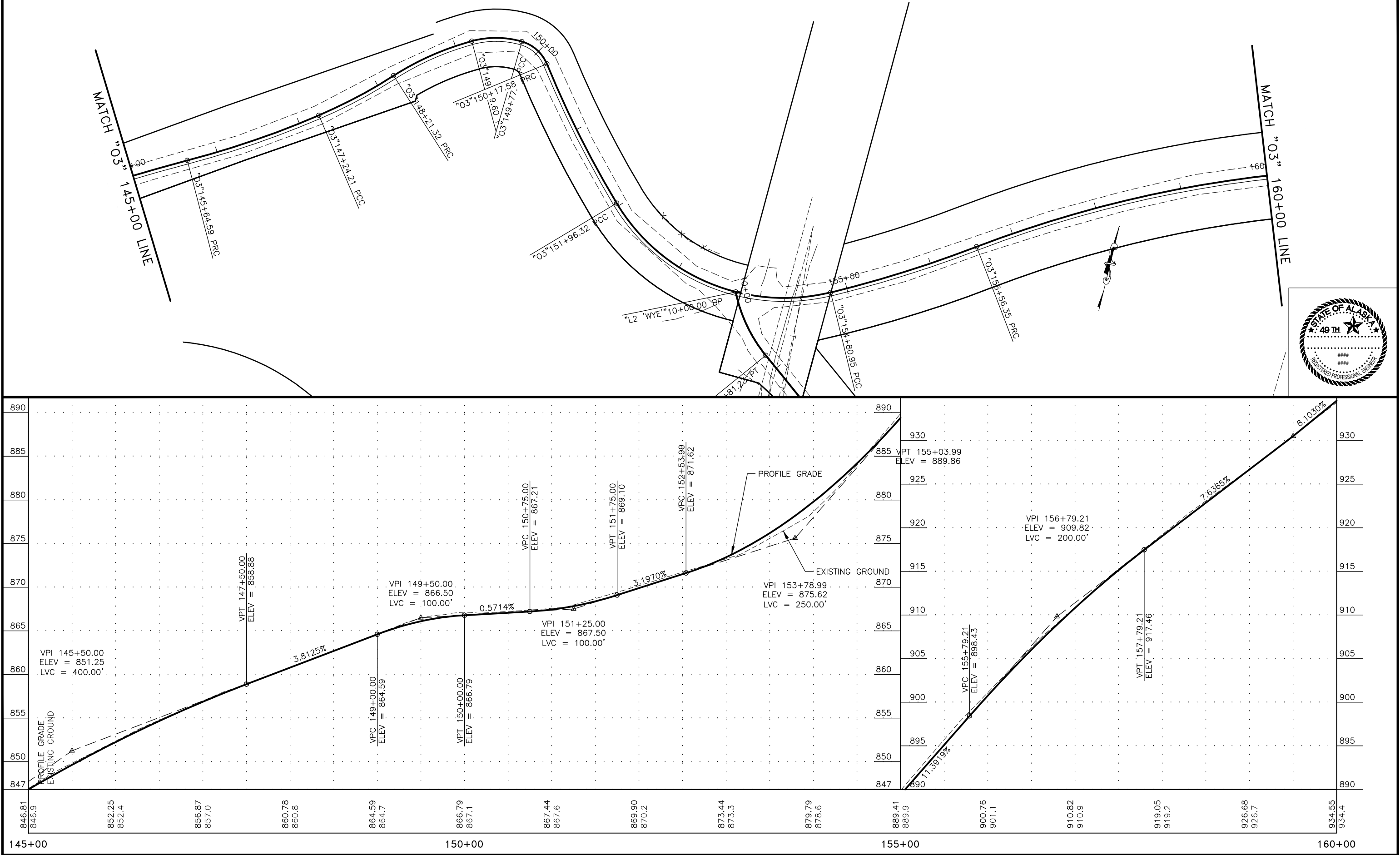
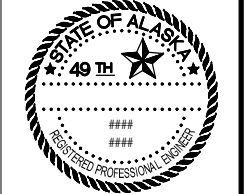
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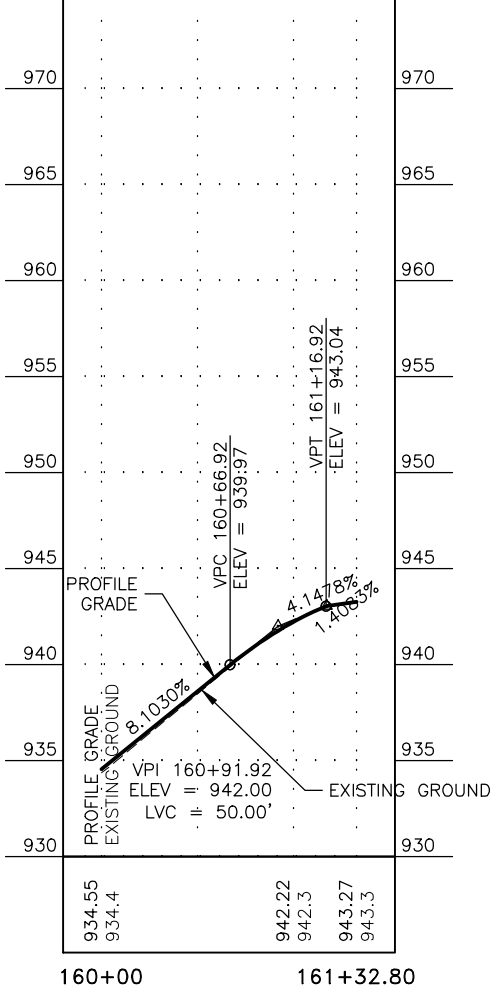
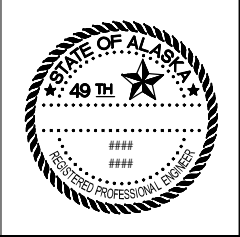
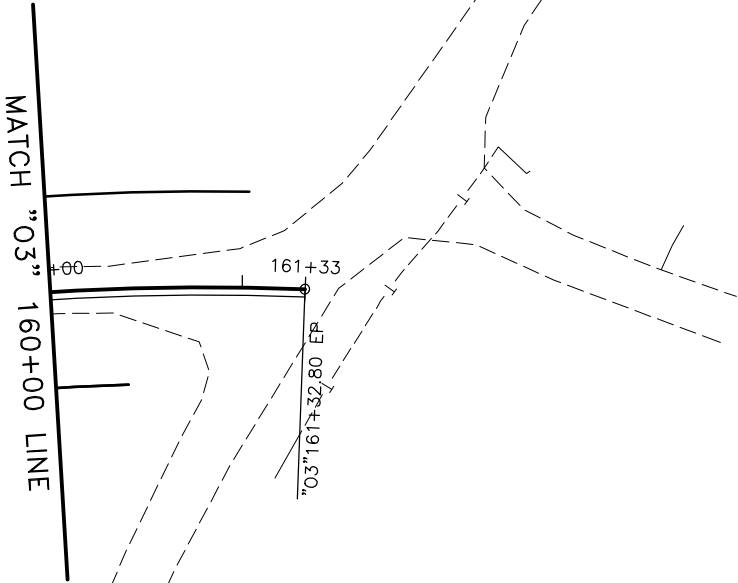
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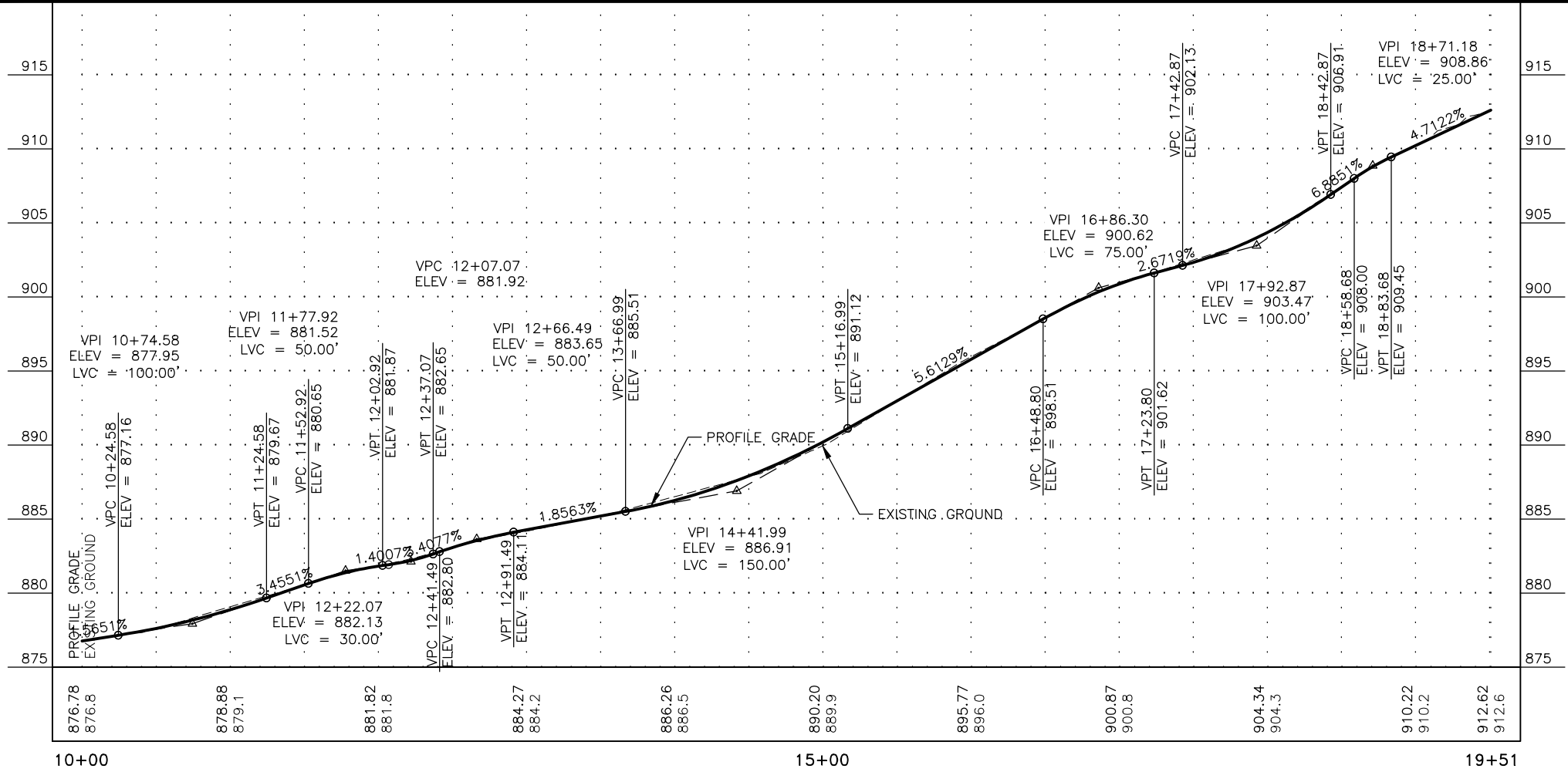
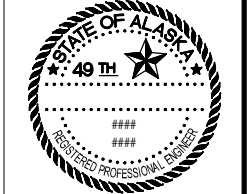
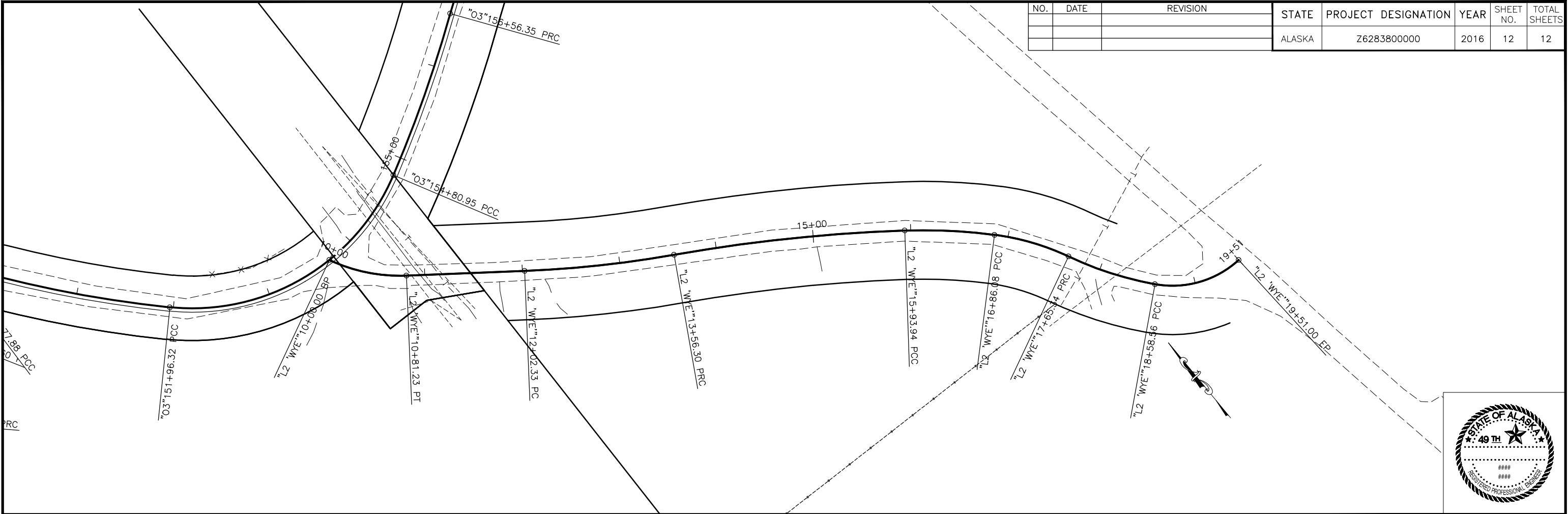


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APPENDIX E

DESIGN EXCEPTIONS AND DESIGN WAIVERS

ALASKA DOT&PF PRECONSTRUCTION DESIGN EXCEPTION/DESIGN WAIVER FORM

Type of Request: (select one or both)

- ☒ Design Exception (FHWA controlling design criteria only)
- ☐ Design Waiver (all other design criteria)

PROJECT INFORMATION:

Project Name: McGrath Road Upgrade

Project Number: Z628380000/002300

☐ NHS ☒ Non NHS

Functional Classification: Urban Major Collector

Design Year: 2040

Present ADT: 595 vpd

Design Year ADT: 811 vpd

Mid Design Period ADT: 717 vpd

DHV: 11.4%

Directional Split: 60-40

Percent Trucks: 4

Equivalent Axle Loading: 74,850

Pavement Design Year: 2033

Design Vehicle: WB-40

Terrain: Mountainous

Number of Roadways: 1

*Design Speed: 35

Posted Speed: 35

Operational Speed: 35

** If requesting a design exception for design speed, use the recommended not reduced design speed here. Further, any design which uses a design speed below the posted or regulatory speed limit should not be approved (Source: FHWA Supplement, Section 8.,b. Application of Design Standards, Uniform Federal Accessibility Standards, and Bridges located here: <http://www.fhwa.dot.gov/design/0625sup.cfm>). FHWA also recommends evaluating specific geometric element(s) and treating those as design exceptions instead of design speed.*

PROJECT INFORMATION:

It is required that a location map, as a minimum, be provided with your package. It is highly recommended that other exhibits be provided to support your request. Exhibits may include typical sections, geometric details, correspondence from other sections, agency correspondence, etc.

1. *Design Exception requested for the following design criteria. Mark the criteria to be discussed:*

- ☐ Design Speed
- ☐ Lane Width
- ☐ Shoulder Width
- ☐ Cross Slope
- ☐ Superelevation Rate
- ☒ Horizontal Alignment (minimum radius of curvature)
- ☐ Vertical Alignment (minimum sag and/or crest K values)
- ☐ Grade (minimum and/or maximum allowable grades)
- ☐ Stopping Sight Distance
- ☐ Lateral Offset to Obstruction
- ☐ Vertical Clearance
- ☐ Bridge Width
- ☐ Bridge Structural Capacity

These 13 design criteria are commonly referred to as the *FHWA 13 controlling criteria*. For NHS routes only, these criteria must meet the minimums established in the Green Book (*AASHTO A Policy on Geometric Design of Highways and Streets*). For all other routes, these criteria must meet the minimums established in the *Alaska Highway Preconstruction Manual*. Otherwise a Design Exception must be approved.

Design Waiver requested for the following design criteria.

- ☐ Other

Explain:

Design Waivers are required for any design criteria, other than the *FHWA 13 controlling criteria*, which do not meet the minimums established in the *Alaska Highway Preconstruction Manual*.

2. *Provide a synopsis of the project scope (including purpose and need), the situation you are encountering, and the problem you are attempting to mitigate.*

This project will upgrade McGrath Road between Farmers Loop Road and the Old Steese Highway. Improvements for this portion of the project will include a consistent roadway and shoulder width and removal or minimization of compound curve severity where feasible. The project was initiated to reduce maintenance costs through improved pavement structure and improve safety where possible for bicycles and pedestrians. The existing road is narrow with no shoulder. There is an existing separated bicycle/pedestrian path along the southern portion of the corridor. The northern section has substantially less traffic volume due to decreased residential development. The pavement is worn and past its useful service life.

The northern portion of McGrath Road has sub-standard vertical and horizontal curves currently. Upgrading these deficiencies to new construction standards would result in significant impacts including probable relocation of property owners adjacent to the road.

3. Provide a concise written description of the proposed Design Exception(s)/Design Waiver(s). It is required to be specific in stating which design standard(s) is being requested to be excepted or waived and the location (either the entire project length or a station range). State the standard and proposed values of the design criteria exception/waiver citing AASHTO, Department, or other standards. Include the date of the design standard references cited. Whenever possible, reference AASHTO guidelines to support your design decisions.

A horizontal alignment design exception is proposed between station 105+00 and the EOP at the intersection with the Old Steese Highway. The AASHTO curve minimum radius for 6% superelevation rate is 340 feet. A design exception for a minimum radius of 80 feet is requested. The existing as-built best fit alignment contains a double compound curve with a 44 foot radius, this curve will be redesigned from a double compound curve to a curve with a minimum radius of 80 feet. There are three horizontal curves within the station range that have less than design minimum radius curves. These curves are located around Sta. 126+50, 150+00, 162+50. The current design proposes to generally maintain the existing alignment for this portion of the project.

Proposed Design Exceptions/Design Waivers Summary			
Criteria	Standard ¹	Proposed	Location (entire project or station range)
Horizontal Alignment	Curve min radius 340-ft	Curve min radius 280-ft	PI Sta. 126+50
Horizontal Alignment	Curve min radius 340-ft	Curve min radius 80-ft	PI Sta. 150+00
Horizontal Alignment	Curve min radius 340-ft	Curve min radius 80-ft	PI Sta. 162+50

¹AASHTO, 2011 A Policy on Geometric Design of Highways and Streets

4. Discuss the terrain in the area of the project and the proposed Design Exception(s)/Design Waiver(s).

The terrain in the project area varies from rolling to mountainous. The terrain in the area of the proposed design exceptions is mountainous. These design exceptions are dependent on terrain as the roadway in this section is primarily a hillside cut with very limited existing right of way. See attached typical section for a graphic representation of these conditions.

5. Discuss the traffic characteristics in the area of the project and the proposed Design Exception(s)/Design Waiver(s).

Traffic in the area is a mix of commercial and local commuters. Design features for this project are based on a 35 mph design speed.

6. Discuss the crash history of the project and the proposed Design Exception(s)/Design Waiver(s). State if any anomalies are present within the project limits.

From 2006 to 2010 a total of 2 crashes occurred within the area of the proposed design exceptions. These crashes consisted of one ditch and one run off the road. The crashes consisted of one property damage only and one minor injury. Unsafe speed is listed as a factor in both crashes and it does not appear that roadway geometry contributed. The crash rate is 1.73 crashes per million vehicle miles traveled. By comparison, the crash rate for the southern portion of McGrath Road, where alignment geometry meets new construction standards, is 2.16 crashes per million vehicle miles traveled. There do not appear to be any anomalies present within the project limits.

7. Discuss the degree to which a standard is being reduced, whether the exception/waiver will affect other standards, and are there any additional features being introduced, e.g., signing or delineation that would mitigate the deviation and the proposed Design Exception(s)/Design Waiver(s). Also, discuss if multiple Design Exceptions/Waivers are being requested in the same segment and if they will influence each other.

The standard minimum radius for 6% superelevation with a 35 mph design speed is 340 feet. The northern portion of McGrath Road currently is substandard for horizontal alignment, and the proposed project will be an improvement over the existing geometry even with the proposed design exceptions. The design exceptions proposed are to best match the existing geometry where constrained by right-of-way and will not result in an inconsistent driving experience for this local collector.

The curve at PI Sta. 126+50 will be constructed with a radius of 280 feet which will allow roadway geometry improvement over the existing reverse curve into a 3 radius compound curve containing a 120 foot minimum radius while still remaining within the existing right of way.

The proposed minimum radius for PI Sta. 150+00 is 80 feet as part of an existing compound curve. The existing curve is a 3 radius compound curve with a minimum radius of 44-ft. The curve will be simplified to a curve with a minimum radius of 85-ft.

The current intersection of the Old Steese and McGrath Road has a 52 degree approach angle. In accordance with AASHTO intersection design guidance construction of an 80 foot radius curve (PI Sta. 162+50) will allow realignment of the approach to an 87 degree approach angle with no right-of-way impacts. This curve is in an approach to a stop condition. A stop ahead sign in addition to curve warning signs will be evaluated for warrants during detailed design.

Curve warning signs will be installed throughout the project to warn drivers of the reduced standards and bring the road corridor into compliance with current MUTCD signing standards.

8. Explain why the proposed Design Exception(s)/Design Waiver(s) is needed. (Provide supporting information as to why the minimum design criteria cannot be met. Substantiate reasons with facts, historical data, cost estimates, etc.)

The proposed design exceptions are needed to prevent the project excavation limits from extending beyond the existing right-of-way and onto approximately 22 private landowners. Right-of-way impacts associated with a major realignment necessary to meet new construction standards range from minor strip acquisitions to probable complete relocation of adjacent landowners. See the attached documents for a “test” realignment that features 340 foot minimum radius curves and the resultant catch lines and a spreadsheet itemizing additional project costs associated with construction of an alignment with no design exceptions.

9. Discuss the cost of the project and the proposed Design Exception(s)/Design Waiver(s). Provide information that reflects the cost with and without the Design Exception(s)/Design Waiver(s). Attach detailed cost estimates.

Meeting minimum design criteria would increase project costs by approximately \$940,000 not including the cost of property necessary for the new right-of-way. These additional project costs also do not account for any costs associated with project delays caused by the need for significant additional right-of-way and property boundary survey necessitated by roadway realignment.

Project Cost Summary	
To Standards	With approved Design Exceptions/ Design Waivers
\$8,536,137.00	\$5,600,000.00

Proposed Designer/Consultant:



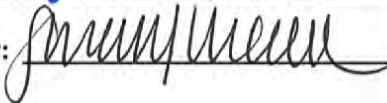
Date: 3-7-2017

Endorsed Engineering Manager:



Date: 3/7/2017

Approved Preconstruction Engineer:



Date: 3/8/2017

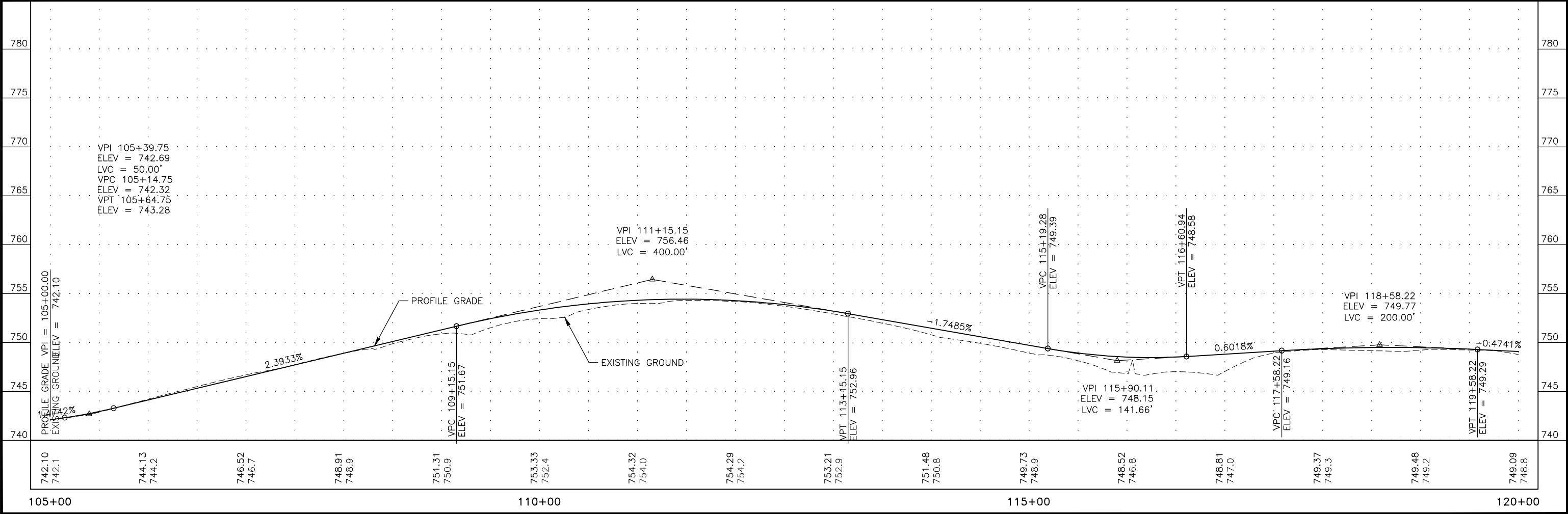
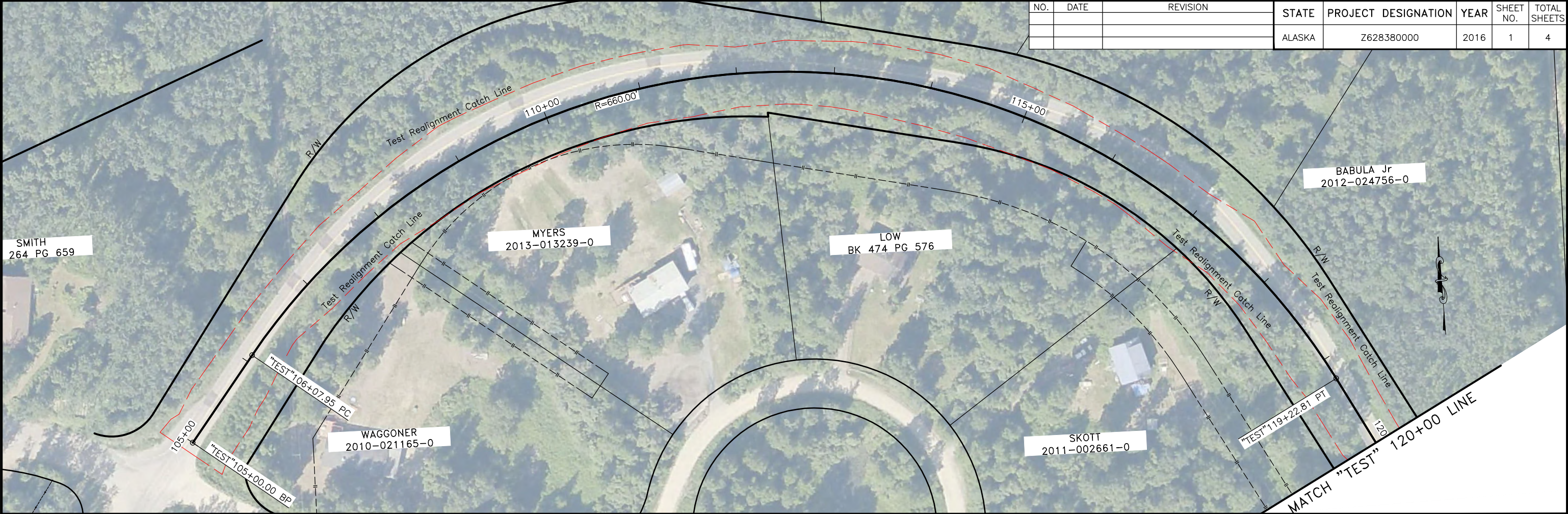
Concur – FHWA: _____

Date: _____

FHWA concurrence required for high profile projects only.

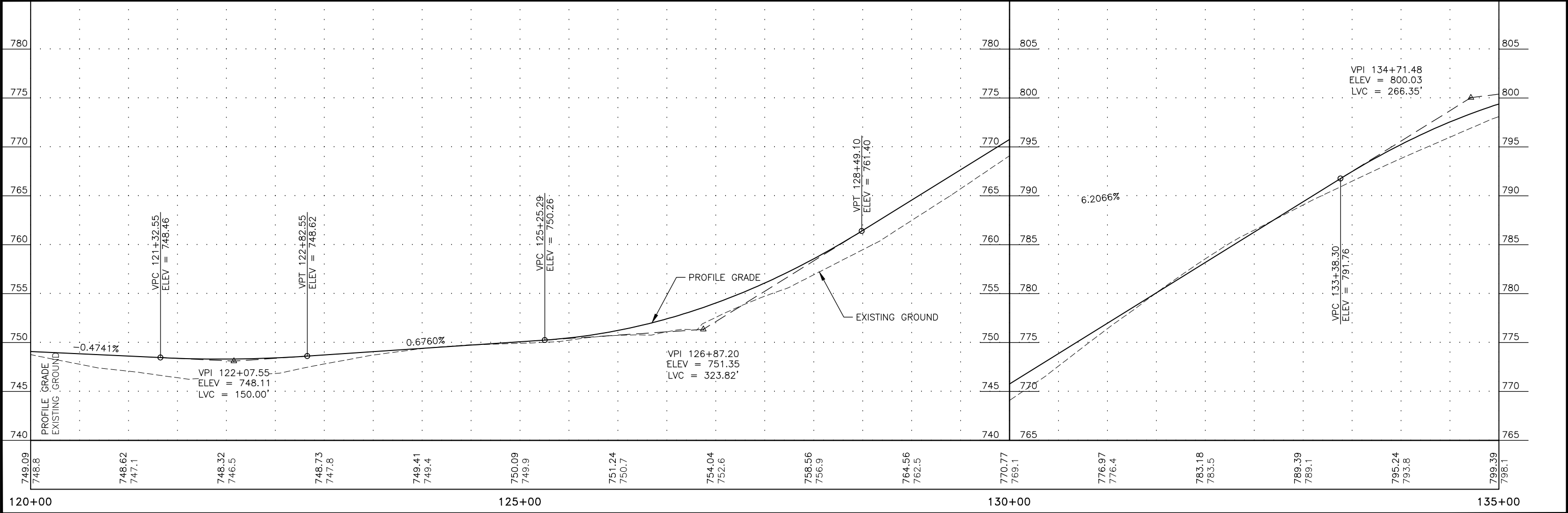
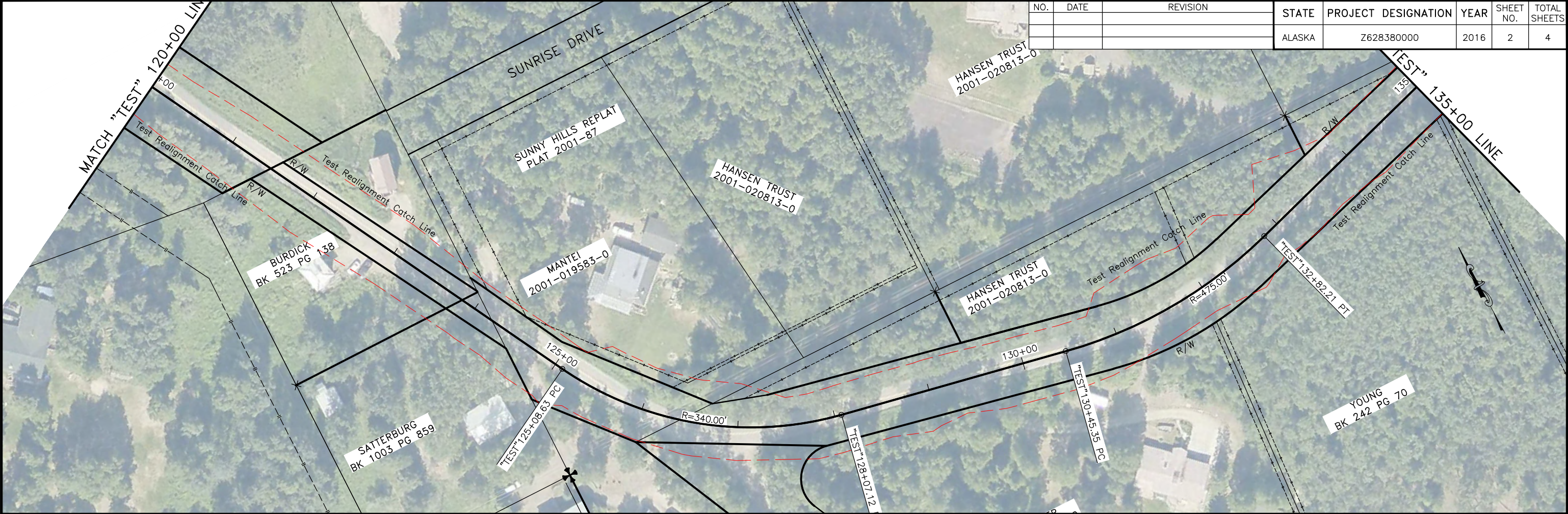
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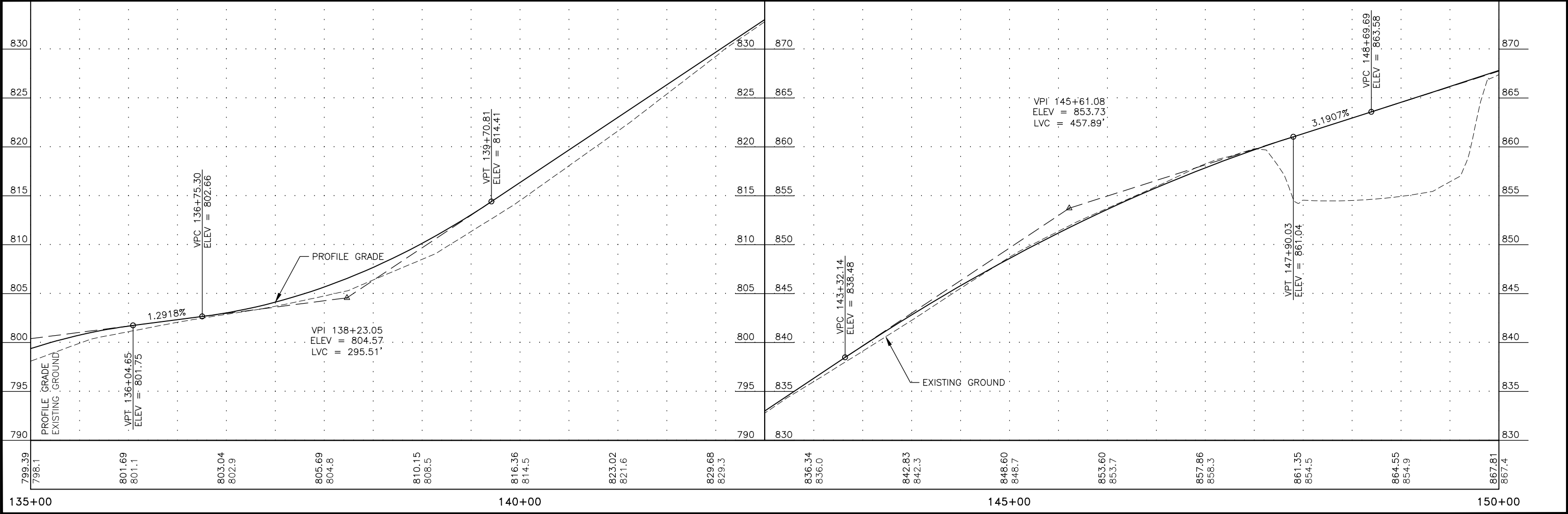
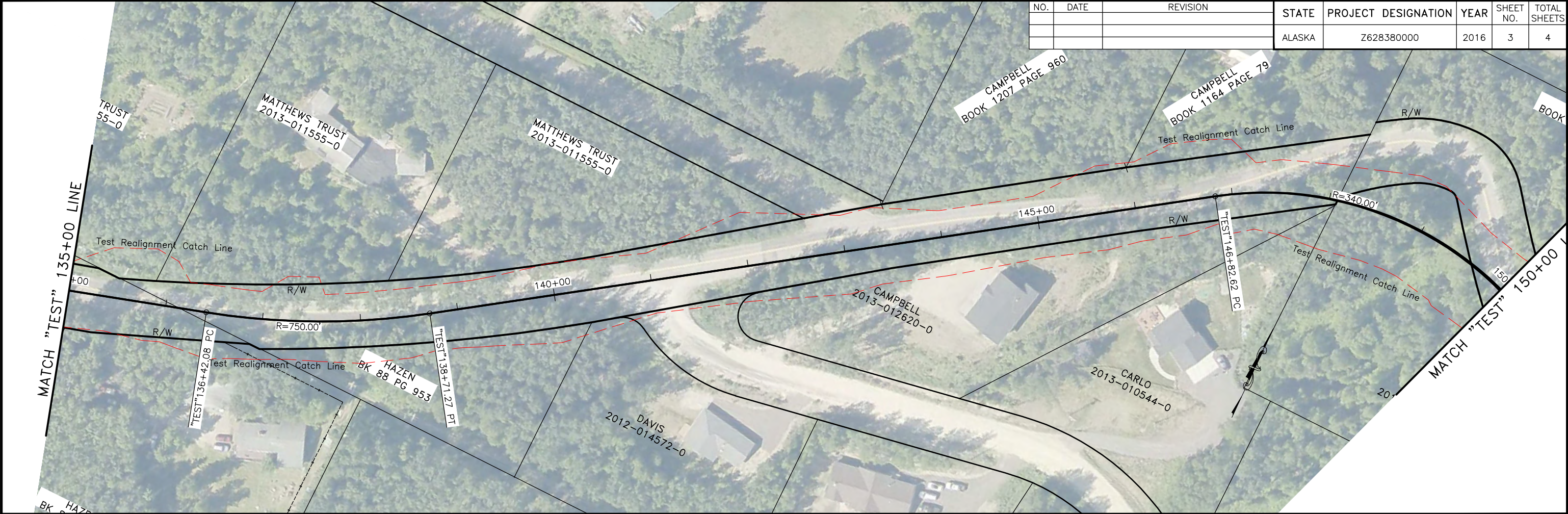
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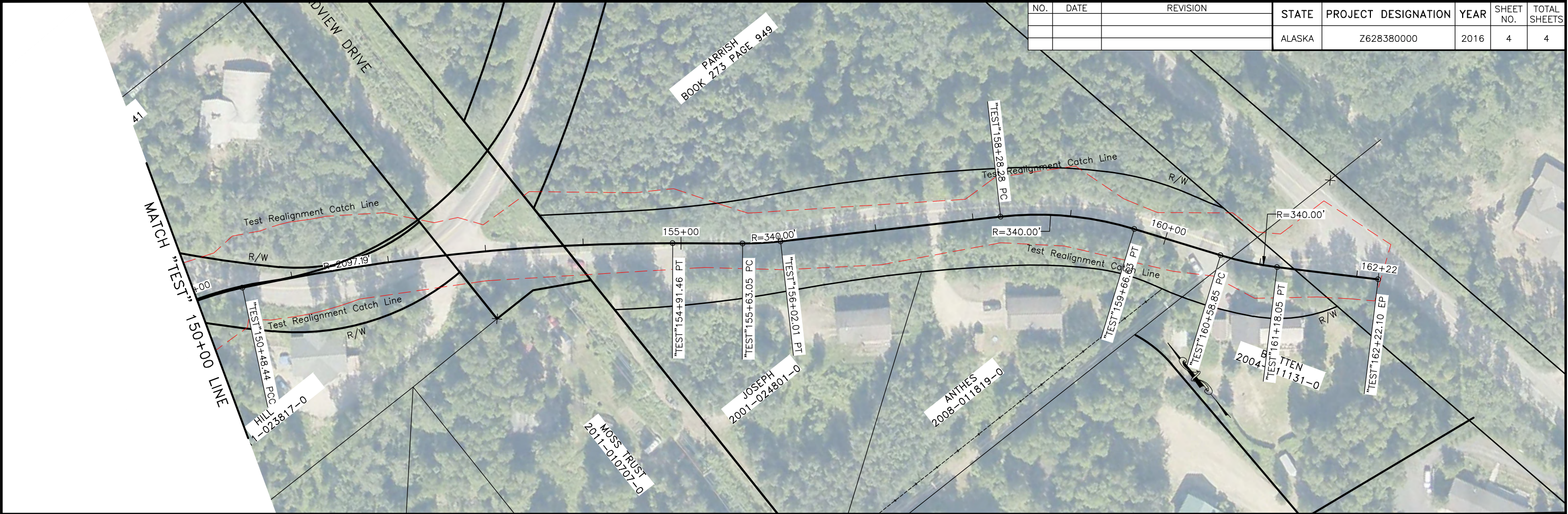


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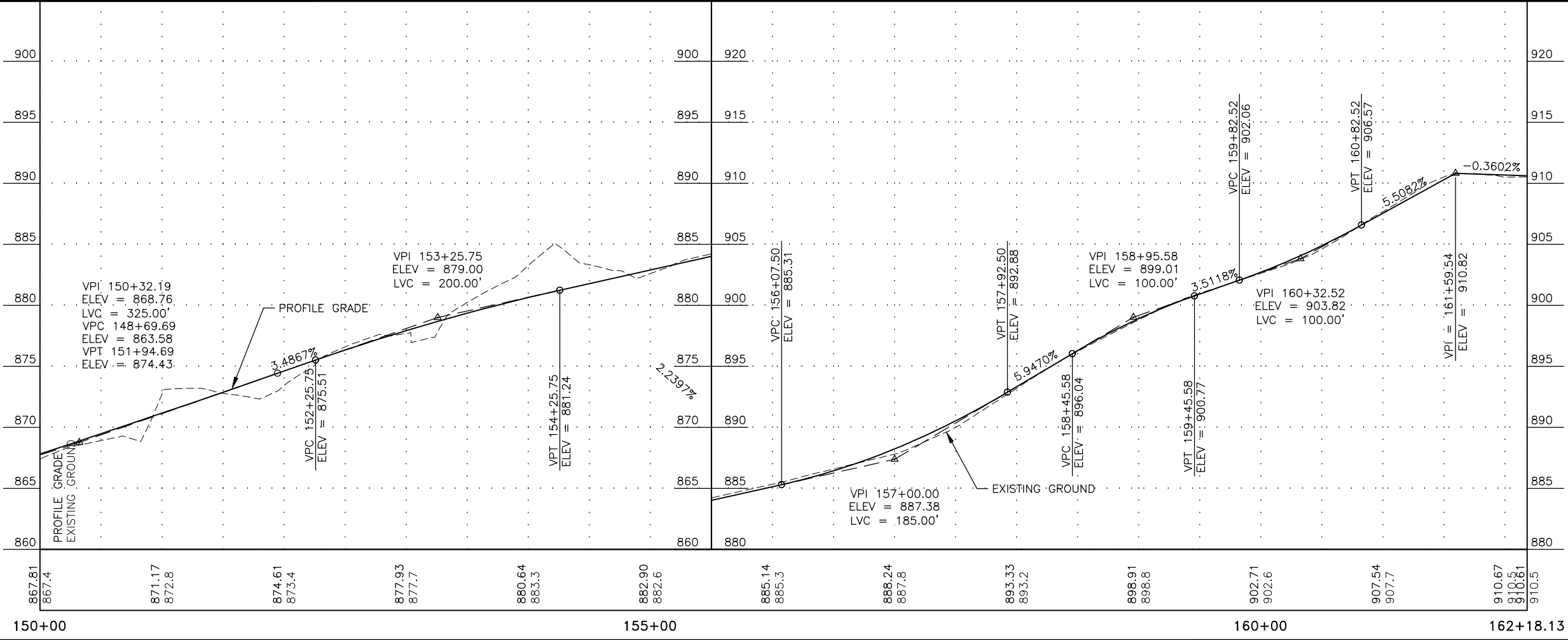
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NO.	DATE	REVISION	STATE	PROJECT DESIGNATION	YEAR	SHEET NO.	TOTAL SHEETS
			ALASKA	Z628380000	2016	4	4



Project Cost With Design Exception					
ITEM	DESCRIPTION	UNIT	QUANTITY	PRICE	TOTAL
203(3)	Unclassified Excavation	C.Y.	4,275	\$6.50	\$27,787.50
203(5)	Borrow	TON	600	\$10.00	\$6,000.00
301(1)	Aggregate Base Course	TON	4,890	\$26.00	\$127,140.00
401(1)	HMA	TON	1,628	\$70.00	\$113,960.00
401(4)	Asphalt Binder	TON	82	\$750.00	\$61,125.00
Total Project Cost W/ Contingency, CE, and ICAP:					\$5,600,000.00
Project Cost Without Design Exception					
ITEM	DESCRIPTION	UNIT	QUANTITY	PRICE	TOTAL
203(3)	Unclassified Excavation	C.Y.	7,400	\$6.50	\$48,100.00
203(5)	Borrow	TON	33,450	\$10.00	\$334,500.00
301(1)	Aggregate Base Course	TON	6,300	\$26.00	\$163,800.00
401(1)	HMA	TON	2,100	\$70.00	\$147,000.00
401(4)	Asphalt Binder	TON	105	\$750.00	\$78,750.00
	Additional Survey Costs	L.S.	1	\$220,000.00	\$220,000.00
	Additional ROW Costs	L.S.	1	\$280,000.00	\$280,000.00
Total Project Cost W/ Contingency, CE, and ICAP:					\$6,536,137.50