

DESIGN APPROVAL

WHITESHED ROAD AND PEDESTRIAN IMPROVEMENTS

PROJECT NO. NFHWY00129 / 0837004

Requested by:

Russell Johnson, P.E. Engineering Manager Northern Region 5/16/2022

Date

Design Approval Granted:

Carrah Chall

Sarah E. Schacher, P.E. Preconstruction Engineer Northern Region 5/16/2022

Date

Distribution: NR Design Directive 20-01 Distribution

DESIGN STUDY REPORT FOR

WHITSHED ROAD AND PEDESTRIAN IMPROVEMENTS

PROJECT NO. NFHWY00129 / 0837004

PREPARED BY: Russell Johnson, P.E.



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

WHITSHED ROAD AND PEDESTRIAN IMPROVEMENTS PROJECT NO, NFHWY00129 / 0837004

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INTRODUCTION/HISTORY

The Alaska Department of Transportation & Public Facilities (Department) in cooperation with the Alaska Division of the Federal Highway Administration (FHWA) is reconstructing Point Whitshed Road to add pedestrian accommodations from the intersection with the Copper River Highway to the intersection with Orca Inlet Drive (approximately 0.8 miles). See the following Figure 3 for project location.

Point Whitshed Road is a curvy, narrow, paved, two-lane, two-way, undivided, rural major collector. The road generally leads southwest away from the Copper River Highway along the south side of Orca Inlet and ends at Hartney Bay (approximately 6.8 miles in length). It passes through mountainous terrain as it winds along the coast. Several driveways along the project corridor consist of steep uphill and downhill grades. Numerous residential and commercial properties rely on Point Whitshed Road as their only route to the City of Cordova. No alternate routes exist.

The paved top width on Point Whitshed Road within the project limits is 22-feet which allows for two 11-foot vehicular travel lanes with no shoulders between existing steep topographic features on both sides of the roadway.



Figure 1: Example mountainous road pavement width with steep topographic features on both sides of the roadway. (source: DOT&PF file photo, Point Whitshed Road MP ~0.4, 2019)



Figure 2: Miniature rock slide (right) as an example of ditch infill. (source: DOT&PF file photo, Point Whitshed Road MP ~0.6, 2019)

Point Whitshed Road was last resurfaced over its full length in 2004-2005. In 2015 the road was resurfaced between the Copper River Highway and Milepost 3. Neither of those projects addressed existing drainage deficiencies such as failing or undersized culverts.

Longitudinal roadside drainage facilities, where present, consist of minimal depth vee-ditches on the uphill (mountain) side of the road. Ditch depth is limited in some places due to shallow bedrock. In some areas ditches accumulate loose, sloughing soil and aggregate detritus from adjacent backslopes, requiring them to be cleaned/excavated a few times a year to re-establish drainage. See Figure 2.

Failing and undersized drainage culverts and infilled ditches causes surface water to sheet flow across the roadway surface in some areas, creating potential vehicular hydroplaning and roadway sheet icing hazards.

The narrow road Right-of-Way combined with the exceptionally steep rock topography beyond the paved road surface limits the physical room to fit new pedestrian accommodations and accommodate construction activities. Construction expertise is needed to develop constructible design. The Department has chosen to utilize the Construction Manager General Contractor (CMGC) project delivery method. The CMGC will assist the Department with identifying impact areas, estimating preliminary costs, provide constructability consultation, construction phasing and traffic control in support the development of the project's environmental document and final design.

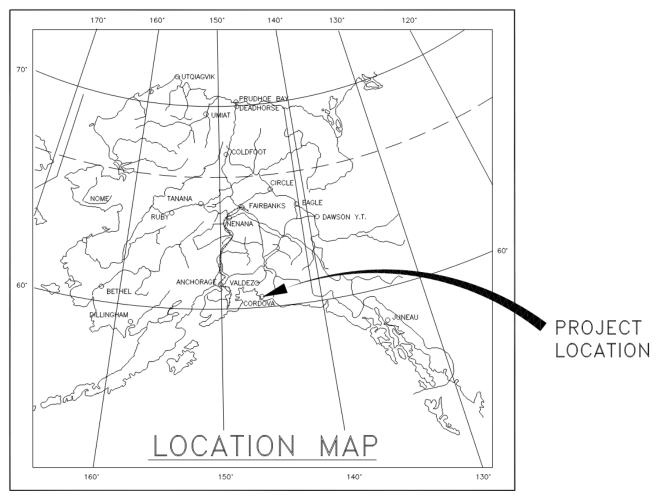


Figure 3: Project location map

PROJECT DESCRIPTION

The purpose of the project is to improve safety by providing accommodations for non-motorized traffic along the corridor. The project is needed because Point Whitshed Road is narrow with no dedicated shoulders. The lack of shoulders combined with the steep topography causes non-motorized users to share the existing 11-ft vehicle lanes or forces them to trek off the paved roadway.

Project work includes the following items:

- Acquiring right-of-way and resolving existing encroachments in the right-of-way
- Adjusting the road's horizontal and vertical alignments to minimize impacts to surrounding properties
- Re-grading and paving the roadway
- Relocating and/or re-grading driveways and paving approaches
- Relocating utilities
- Replacing AVC sensors
- Improving drainage
- Constructing a shared use path for non-motorized traffic
- Updating signage and applying painted traffic markings

DESIGN STANDARDS

The project will be designed according to the following standards:

- State of Alaska, DOT&PF Highway Preconstruction Manual (HPCM)
- State of Alaska, DOT&PF *Highway Drainage Manual*, 2006
- State of Alaska, DOT&PF Alaska Traffic Manual, with latest Interim Revisions
- State of Alaska, DOT&PF Alaska Flexible Pavement Design Manual, 2020
- State of Alaska, DOT&PF Alaska Bridges and Structures Manual, 2017
- AASHTO Guide for the Development of Bicycle Facilities, 2012
- AASHTO A Policy on Geometric Design of Highways and Streets, 2011
- AASHTO Roadside Design Guide, 2011

The proposed project design speed is 30 MPH for the first 700 lineal feet (to station 8+00), and then 40 mph thereafter. Terrain within the project limits is generally mountainous even though the beginning and end of the project contain locally rolling terrain.

See Appendix A for design criteria and design designation.

DESIGN EXCEPTIONS AND DESIGN WAIVERS

There are no design exceptions or design waivers.

DESIGN ALTERNATIVES

To reduce project construction costs, the following design elements have been dismissed:

- 1. <u>Separated Path</u>. Constructing a 4-foot wide concrete valley gutter between the road shoulder and shared use path has been eliminated. This reduces the roadway width, which reduces concrete and embankment fill volumes.
- 2. <u>Soldier Pile and MSE retaining walls</u>. Instead of using Soldier Pile and MSE retaining walls, the project proposes to construct steepened (1.5H:1V) "shot rock" embankment fill slopes.
- 3. <u>Continuous Illumination</u>. Constructing continuous street illumination along the project corridor is not required and has been eliminated. The project will retain the existing Copper River Highway and Orca Inlet Road intersection lighting.

PREFERRED DESIGN ALTERNATIVE

Refer to Typical Section for the preferred design alternative.

3R ANALYSIS

This section is not applicable; this is not a 3R project requiring 3R analysis.

TRAFFIC ANALYSIS

The project design designation found in Appendix A indicates the average annual daily traffic (AADT) in 2015 was 1260 vehicles per day, and the projected traffic count for 2045 is estimated to be 1700 vehicles per day. Analysis of crash data shows no apparent accident clusters or crash patterns.

HORIZONTAL/VERTICAL ALIGNMENT

The existing horizontal road alignment is curvy and the existing vertical alignment is relatively flat. The project will generally follow the existing vertical alignment. To minimize impacts to adjacent properties, the project will make adjustments to the horizontal alignment while generally following the existing vertical alignment.

Road centerline grades and horizontal and vertical curves will meet current design standards for a 30 MPH design speed the first 700 lineal feet of the project, and 40 MPH thereafter.

TYPICAL SECTION(S)

The Whitshed Road typical section is a 2 lane paved roadway having 11-foot wide vehicle lanes with 1-foot shoulders. The right (ocean) side of the road will have a 6' to 8' wide pedestrian/bicycle shared use path separated from the road shoulder by concrete curb & gutter. The path width will be 6-feet wide in areas where handrails are required for safety.

Embankment fore-slopes and ditch back-slopes:

- a. Project left (mountain side) fore-slopes will nominally be 4H:1V and tie into a 4-foot wide flat bottom ditch. Ditch back-slopes will vary between 0.75H:1V and 3H:1V. Besides the ditch providing drainage, it's also designed to catch rock-falls to minimize the risk of rocks from encroaching into vehicle travel lanes. Where warranted, wire rope netting will be placed on steep ditch back-slopes to mitigate rock-fall risks/hazards.
- b. Project right (ocean side) fore-slopes will vary between 1.5H:1V to 4H:1V. In areas constrained by steep topography and/or Right-of-Way limits, the project will construct steepened 1.5H:1V embankment fill slopes using "shot rock" material.

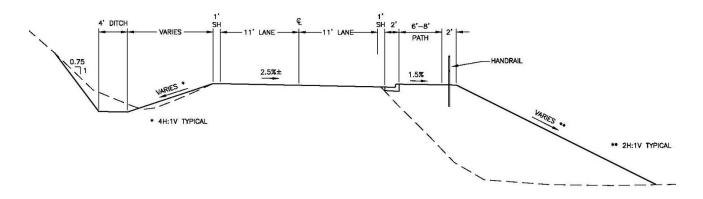


Figure 4: Typical Section

PAVEMENT DESIGN

The pavement design is presented in Appendix C. Two pavement structures for the road and shared use path have been developed and approved by the Regional Materials Engineer:

- 1. Pulverizing the existing asphalt pavement to create a Crushed Asphalt Base Course in areas where the proposed horizontal and vertical road alignment generally matches existing
- 2. Using Aggregate Base Course where the road alignment and proposed separated shared use path are outside the existing paved roadway limits

The most cost effective pavement structure will be determined and chosen by the CMGC team.

PRELIMINARY BRIDGE LAYOUT

There are no bridges within the proposed project limits.

RIGHT-OF-WAY REQUIREMENTS

During 1935, the Federal Agency, US Bureau of Public Roads received the original Whitshed Road Right-of-Way (ROW) interest from the Copper River & Northwestern Railway Company. In 1959, the ROW was conveyed to the Department through the 1959 Alaska Omnibus Act. Over time since its original construction, the Whitshed Road alignment has moved and is not centered or contained entirely inside the existing road ROW limits. In a few areas, portions of the road extends outside the ROW limits.

Recent survey and property title research has revealed mistakes have been made in the past. These mistakes have created situations where existing subdivision lots overlap the Whitshed Road ROW, creating ROW encroachments. All ROW encroachments within the project limits will be resolved and/or permitted prior to construction.

ROW acquisition will be required and is anticipated to be a mix of fee simple and easement interest depending on underlying land status. Strip acquisitions are the primary acquisition type, no full acquisitions are anticipated. Temporary Construction Easements and Permits will be acquired, as necessary, to provide room for construction activities and to transition existing driveways to match/tie into Whitshed Road. See Appendix E for the Preliminary Right-of-Way Map.

MAINTENANCE CONSIDERATIONS

The City of Cordova and Department have entered into an approved maintenance agreement for the project. In summary:

- 1. The Department owns and will continue to maintain Point Whitshed Road
- 2. The City of Cordova will have maintenance responsibilities for the new pedestrian accommodation. This includes maintaining the:
 - a. Path and its surface, including snow removal
 - b. Path's concrete curbs and pedestrian handrails

Department maintenance requirements will decrease due to widening and deepening ditches along with replacing failing and undersized culverts to provide more drainage capacity and storage of sediment. In addition the proposed rock-fall mitigation will reduce/eliminate the need to periodically remove rocks and derbies off the driving surface. There is an increase in maintenance requirements related to adding drainage catch basins and manholes. There is also a slight increase in lane-miles maintenance responsibility. The Department currently maintains 1.38 lane-miles inside the project corridor. The project will add 1-foot shoulders to each side of Point Whitshed Road which equals and adds 0.13 lane miles of maintenance responsibility to the Department for a total of 1.51 lane-miles.

Constructing the new path will add 0.50 lane-miles of maintenance responsibility to the City of Cordova.

MATERIAL SOURCES

A substantial volume of excavated material is anticipated to be generated from new cut slopes during roadway realignment near the end of the project. This material will be incorporated as fill for constructing and widening the roadway.

All other material sources will be contractor furnished. Commercial and/or private material sources are available in the project vicinity.

UTILITY RELOCATION & COORDINATION

Underground utilities are present in the project area:

- City of Cordova (CCC); water and sewer
- Cordova Electric Cooperative (CEC); electric
- Cordova Telephone Cooperative (CTC); communications
- GCI Communication Corporation (GCI); cable

Extensive underground electric, communication and cable TV conflicts are expected along the project corridor due to proposed drainage ditch widening and grading. A new duct bank will be constructed under the new shared use path for relocated electric, communication, and cable television utilities. The duct bank will be constructed while existing utilities remain in service to avoid the need for temporary utilities during construction. It also minimizes outage disruptions by limiting the time required to cut over new utilities to existing services.

The intent of the current design is to avoid major water and sewer line conflicts and limit them to minor water line valve box and sewer manhole lid elevation adjustments.

ACCESS CONTROL FEATURES

The Copper River Highway and Point Whitshed Road are not access controlled facilities. No changes to access control are proposed with this project.

Common access to adjacent property along the Copper River Highway and Point Whitshed Road is controlled by the driveway permit process.

PEDESTRIAN/BICYCLE (ADA) PROVISIONS

Existing pedestrian facilities on Point Whitshed Road in the project area consist of a 4-foot wide sidewalk with curb & gutter located on the north corner of the Copper River Highway/Whitshed Road intersection. The sidewalk terminates within the intersection's radius return and the existing curb and gutter terminate 16 feet further along/down Whitshed Road. No ADA curb ramps exist at this intersection.

The project proposes to construct a 6' to 8' wide ADA compliant paved shared use path along the right (ocean) side of Whitshed Road within the project corridor. The path will be adjacent to Whitshed Road, separated by a 1-foot wide paved shoulder and a 2-foot wide concrete curb and gutter. The curb and gutter will provide visual delineation and tactile separation between the roadway and path in addition to accommodating surface drainage. Safety railing will be constructed along the outer edge of the path in areas where embankment steepness and heights warrant its use. The path width will be reduced to 6-feet where there is safety railing. See Typical Section Figure 4.

SAFETY IMPROVEMENTS

Safety improvements include the following:

- Addition of an 8-ft wide, shared use path to accommodate non-motorized users so they no longer have to share vehicle travel lanes with vehicles
- Minor horizontal road centerline realignment near end of project to provide better sight stopping distance
- Rock-fall ditch and netting on project left to mitigate rocks falling onto the road
- Providing clear zones and constructing traversable and/or recoverable embankment slopes
- Removing existing irregularly-spaced roadway illumination along the project corridor eliminates the visual hazard of mixing light and dark areas along the road corridor

INTELLIGENT TRANSPORTATION SYSTEM FEATURES

The project will replace sensors in the roadway for the traffic count and classification system that currently exists near the Meals Water Treatment Plant on the south side of the roadway at approximate MP 0.31. By definition in the HPCM, this is a non-significant ITS project and a Systems Engineering Analysis (SEA) is not required.

DRAINAGE

Cordova is within a maritime climate with moderate temperatures and abundant precipitation. The average annual temperature is 42.5°F with an annual low of 37.5°F and annual high of 47.6°F. The average annual precipitation is 148.4 inches. Groundwater is relatively shallow recorded between 4.5 and 12 feet below the ground surface that flows generally through fractured rock.

Significant runoff occurs during heavy rains from the higher elevation rock slopes on the north (mountain) side of the road. Numerous steep outfall channels, discharge large flows and sediment that occasionally overwhelm existing ditch and culvert capacities. The amount of

sediment accumulated in ditches necessitates M&O to excavate 'Bell Holes' or sumps to capture the sediment and facilitate ditch drainage through cross culverts. The project will increase ditch and culvert capacities along with stabilizing rock faces to reduce the amount of loose debris (sediment) transported towards culvert inlets.

Numerous existing culverts are failing and/or undersized. The culverts are primarily made of galvanized steel and none of them are identified as fish passage. All culverts will be removed and replaced. Their locations and sizes will be designed to accommodate changes in roadway geometry and driveway approaches. New catch basins and concrete curb & gutter will be designed and constructed mitigate excess volumes of storm water runoff and to delineate the new pedestrian walkway.

The City of Cordova participates in the National Flood Insurance Program (NFIP) and the project lies within a regulated floodplain in Zone X, Area of Minimal Flood Hazards. The project is anticipated to not involve significant encroachments and should not support incompatible floodplain development.

SOIL CONDITIONS

A foundation geology investigation was performed in November of 2020 by the Alaska DOT&PF Northern Region Materials Section. The investigation included test holes drilled at existing embankment and potential retaining wall locations, rockfall analysis and outcrop mapping, and a capacitively-couple resistivity (CCR) survey. General surface conditions in the embankment fill section of Whitshed Road at the project location were characterized as fills between 1 to 5 foot thickness consisting of gravel with silt, sand, cobbles and boulders. General subsurface conditions were characterized as unfrozen glacial till: cobbles and boulders with a dense matrix of gravel, sand, and silt. Groundwater was encountered between 4.5 and 12 feet below the ground surface in all test holes. Permafrost and seasonally frozen ground was not observed in any test holes, but seasonal frost may be expected during winter months. 4 separate typical soil profiles were generated from the test hole data and can be found in the draft foundation geology report.

EROSION AND SEDIMENT CONTROL

The proposed project will include an Erosion and Sediment Control Plan (ESCP). This plan will describe Best Management Practices (BMPs) that may be used during construction and serve as a guide for Storm Water Pollution Prevention Plan (SWPPP) development.

The primary potential for erosion will occur in excavated areas where vegetation cover is disrupted due to construction of roadway embankments and ditches. Slopes will be seeded, covered with durable matting or rolled erosion control product (RECP), or covered with rock blankets 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 control storm water discharge.

ENVIRONMENTAL COMMITMENTS

For this proposed project, only one environmental commitment has been made:

• Mechanized vegetation clearing will be avoided during the recommended migratory bird nesting window for the project area (May 1 – July 15) unless a mitigative BMP is submitted by the contractor and approved by DOT&PF.

No specific mitigation measures have been committed to. A copy of the environmental document signature approval page may be found in Appendix B.

WORK ZONE TRAFFIC CONTROL

During construction and before disrupting traffic, the construction contractor will be required to develop an approved temporary traffic control plan for each work zone. The plan(s) will be developed to provide safety for motorists, bicyclists, pedestrians, workers, and emergency vehicles as they pass through the work zone. Each plan will identify and provide adequate warning, delineation, and channelization to assist in guiding road users through the work zone.

This project is not considered significant for traffic control in accordance with HPCM Section 1400.2.

VALUE ENGINEERING

Value engineering was considered but will not be conducted for this project. Collaboration with the CMGC contractor will obtain all desired outcomes from the Value Engineering (VE) process. In accordance with DOT&PF Policy and Procedure 05.01.030, this project does not meet requirement criteria for a VE analysis.

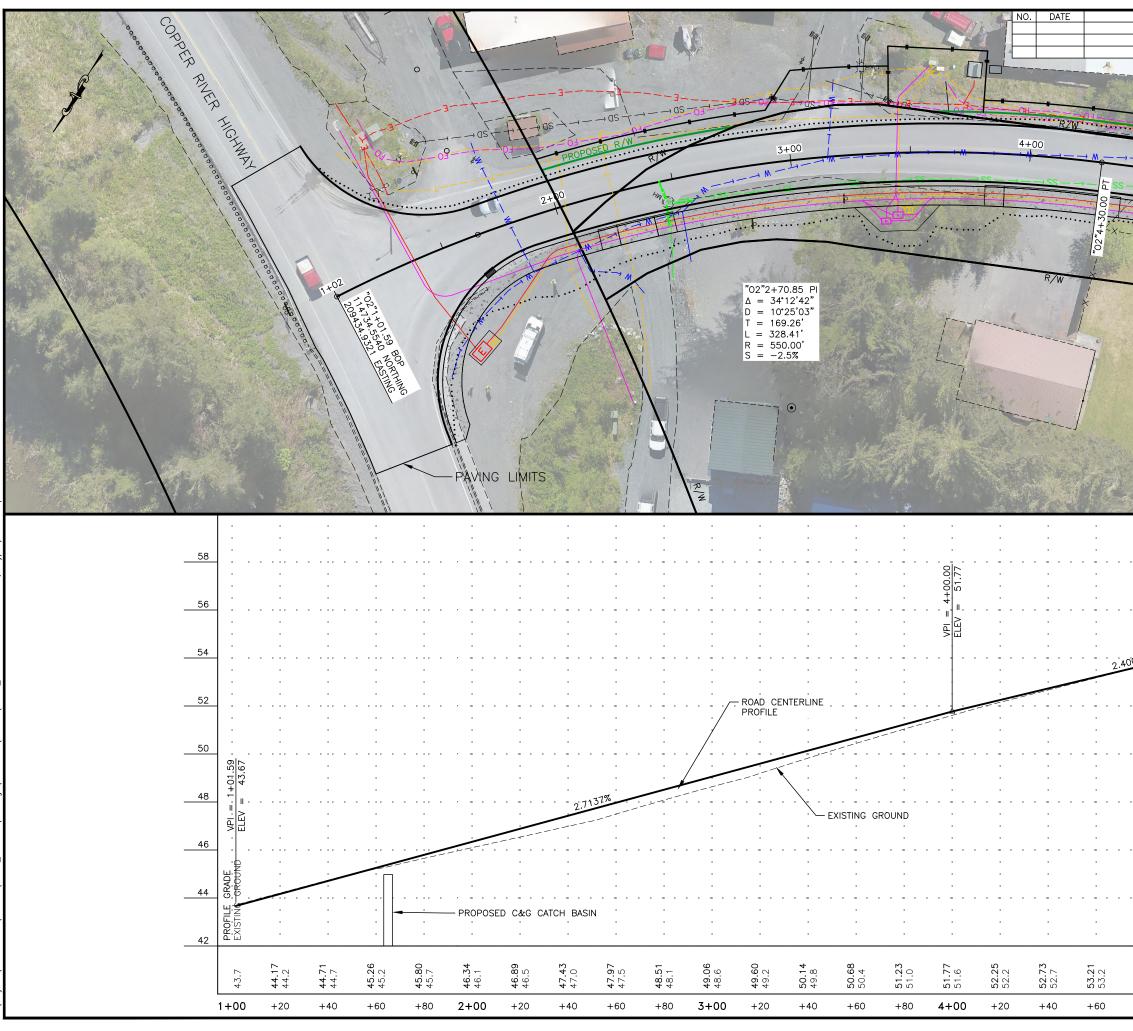
COST ESTIMATE

The estimated costs for this project are as follows:

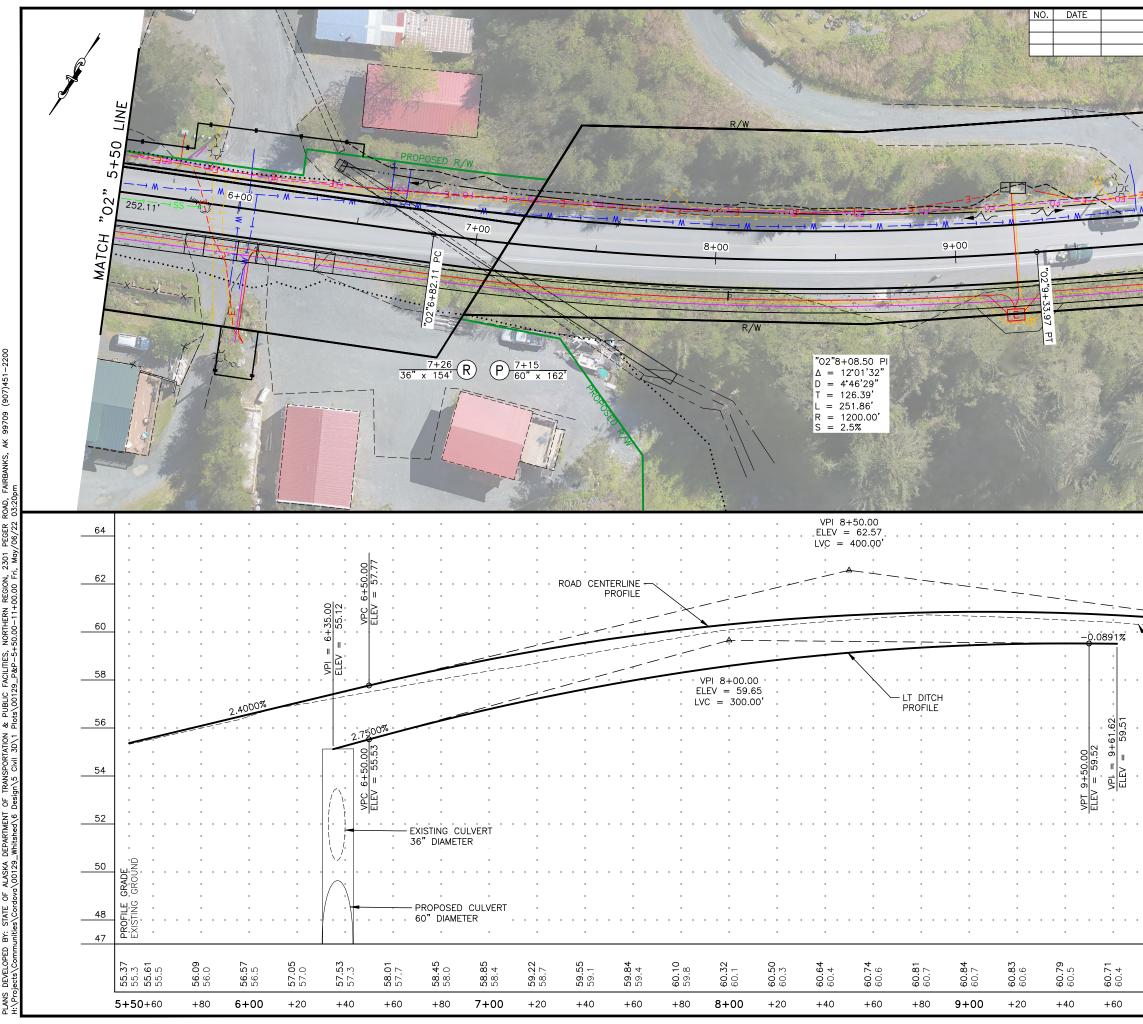
Design	\$2,225,740.00
Utilities	\$1,500,000.00
Right of Way	\$1,000,000.00
Construction	\$9,000,000.00
Total Cost of Project	\$13,725,740.00

APPENDIX D

PRELIMINARY PLAN AND PROFILE SHEETS

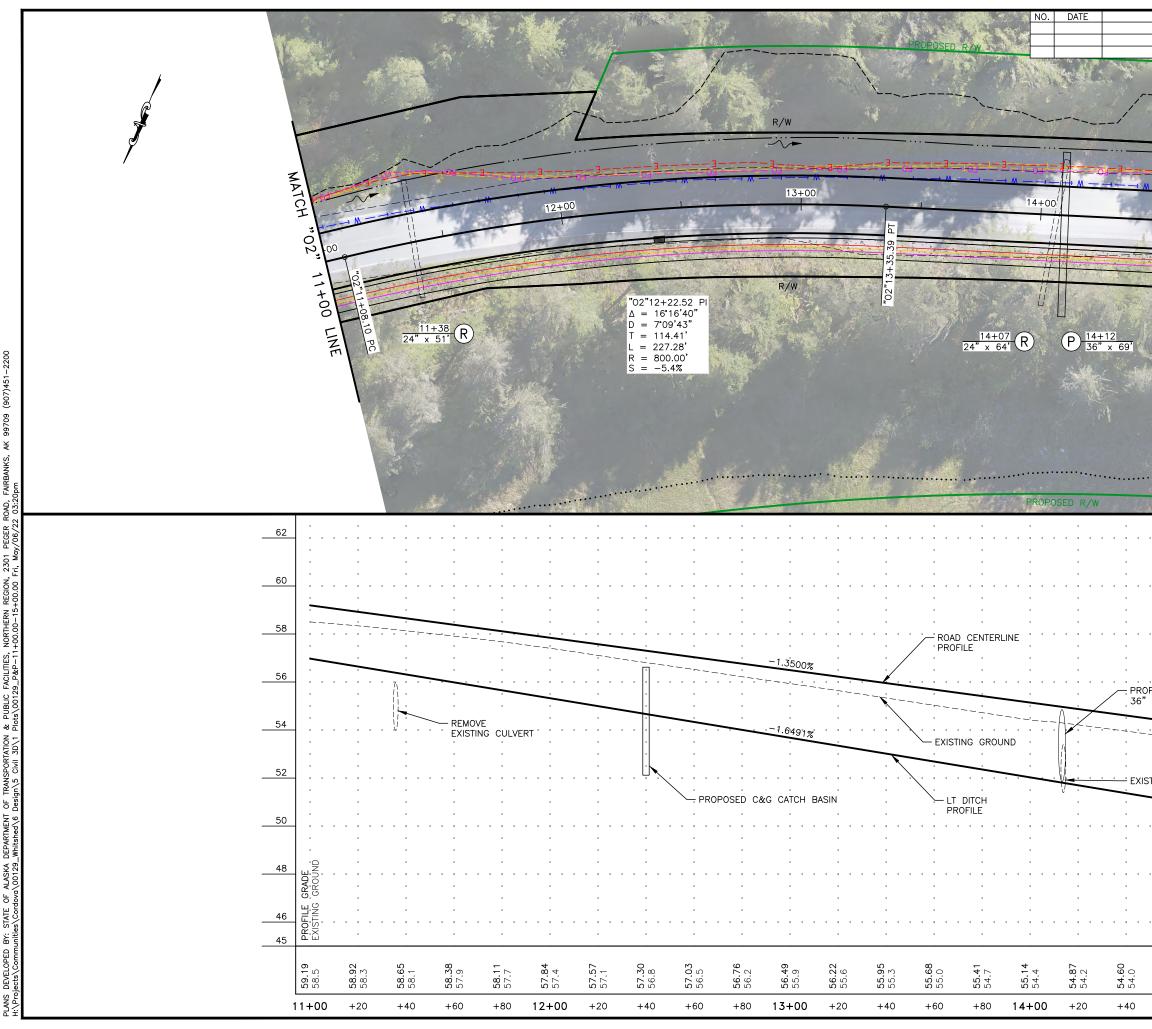


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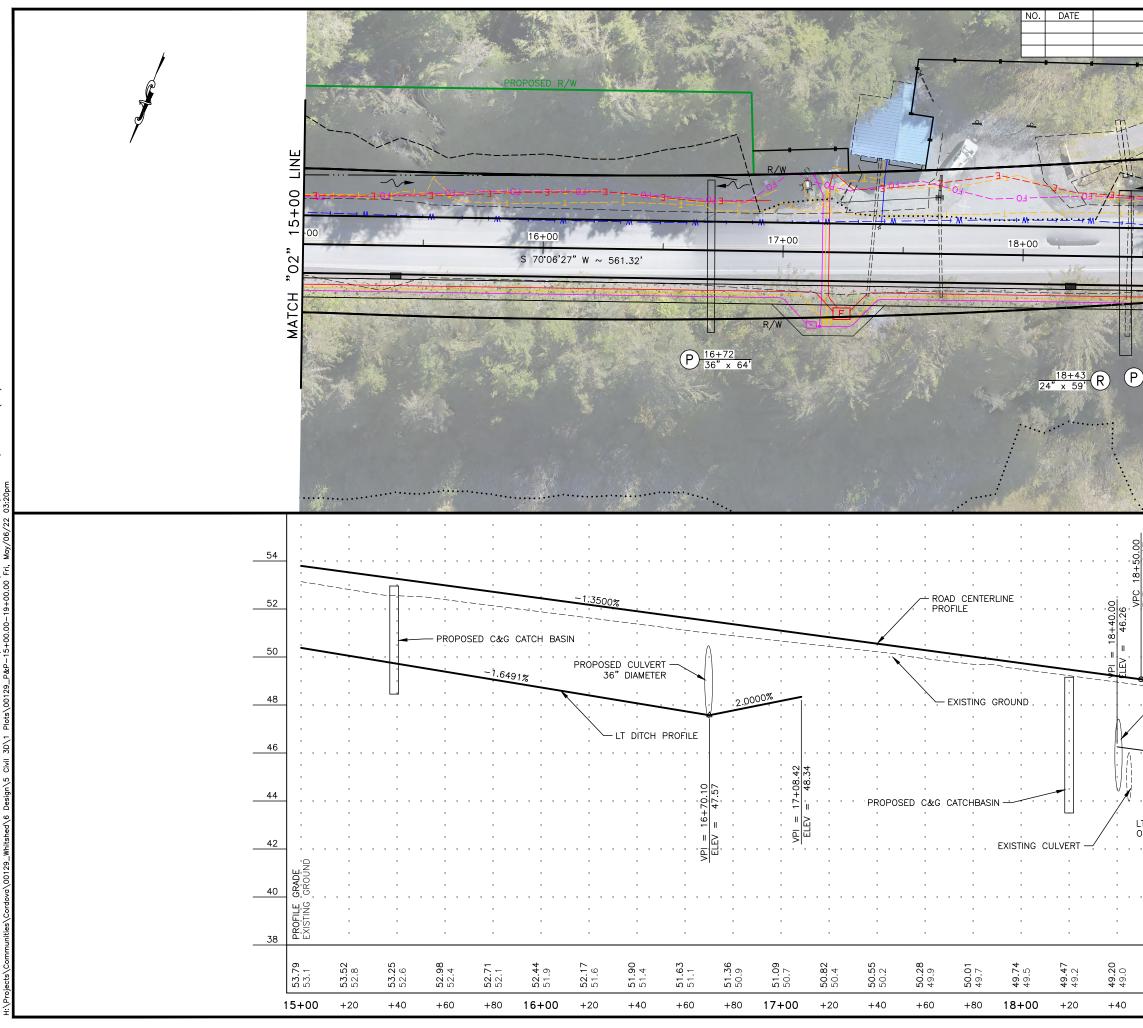


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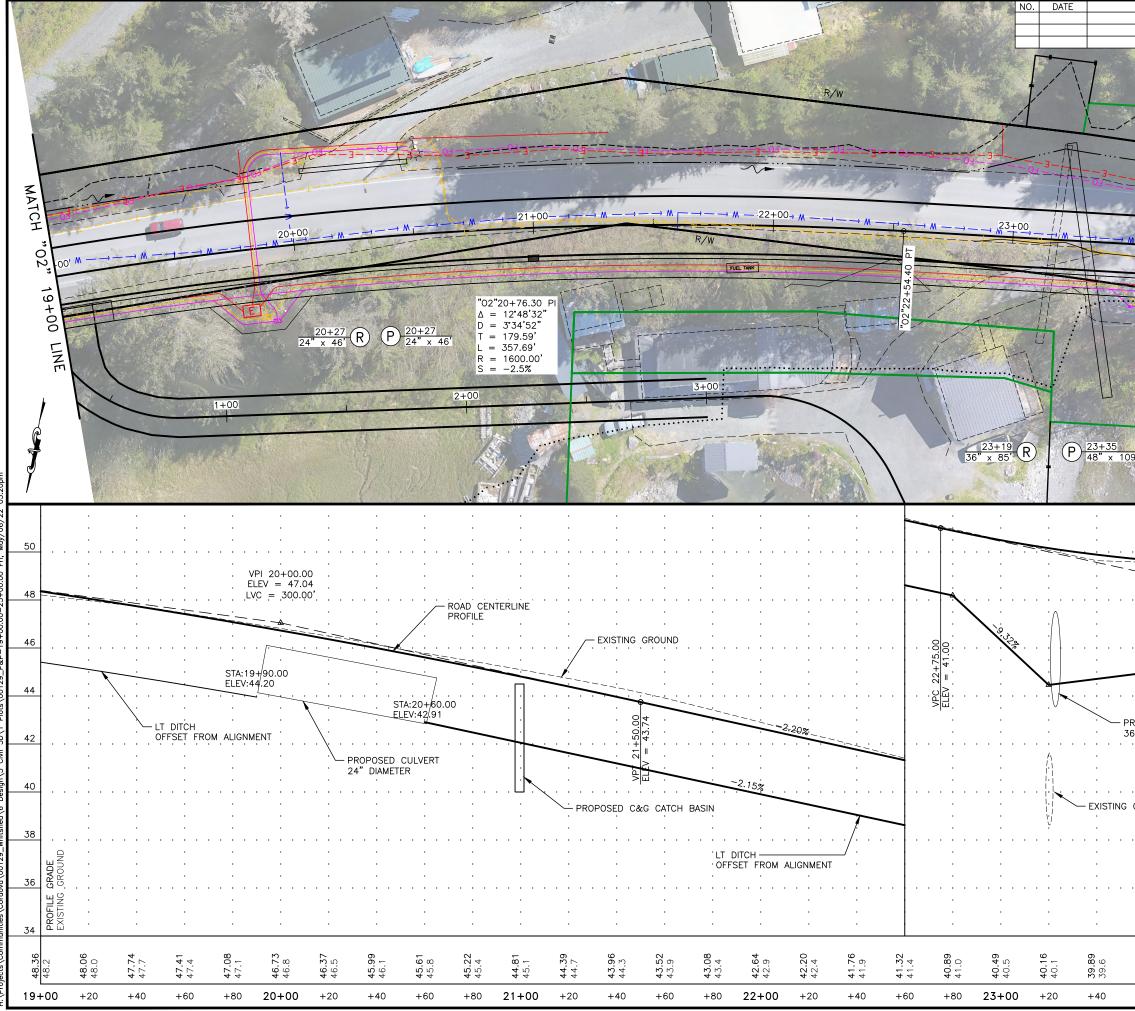


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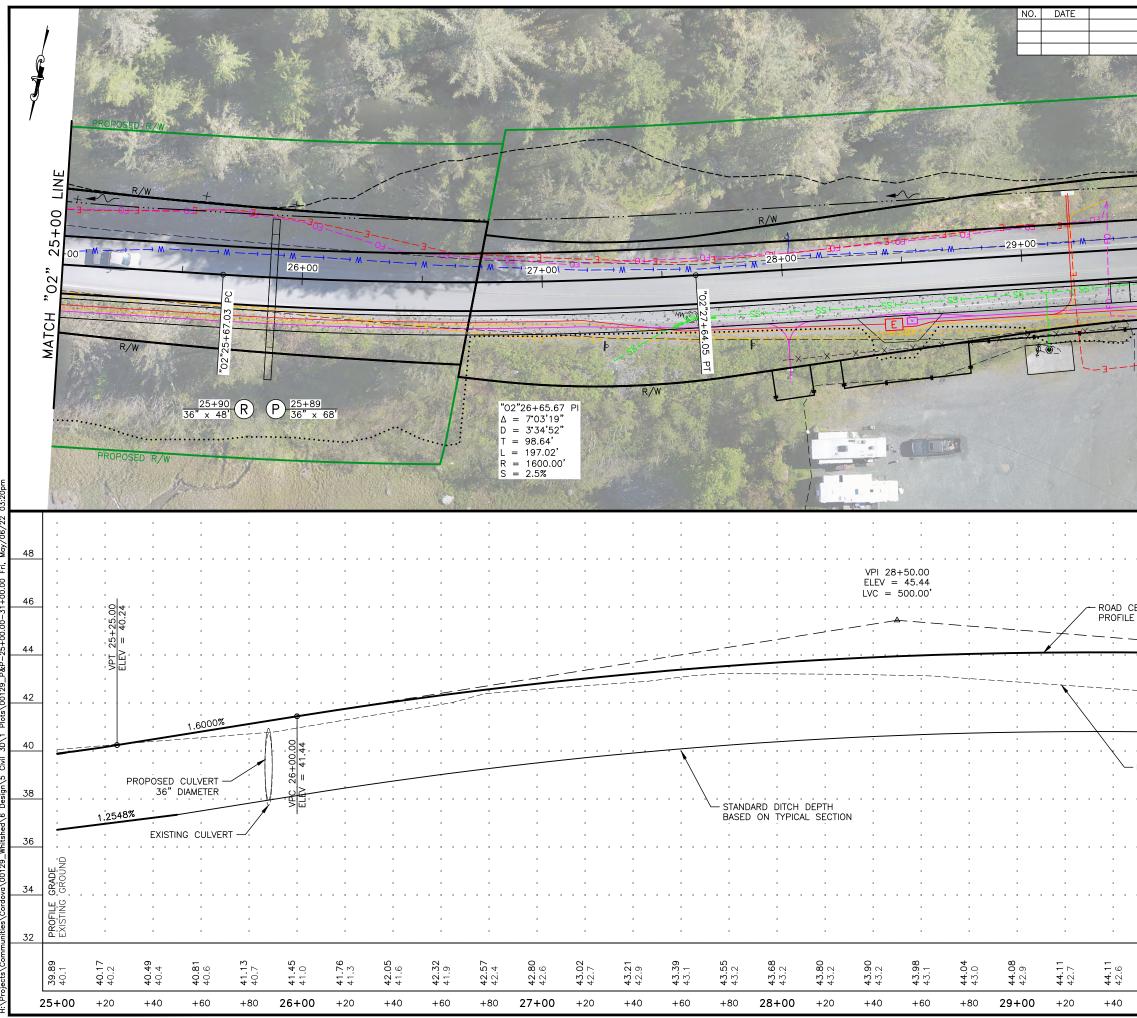
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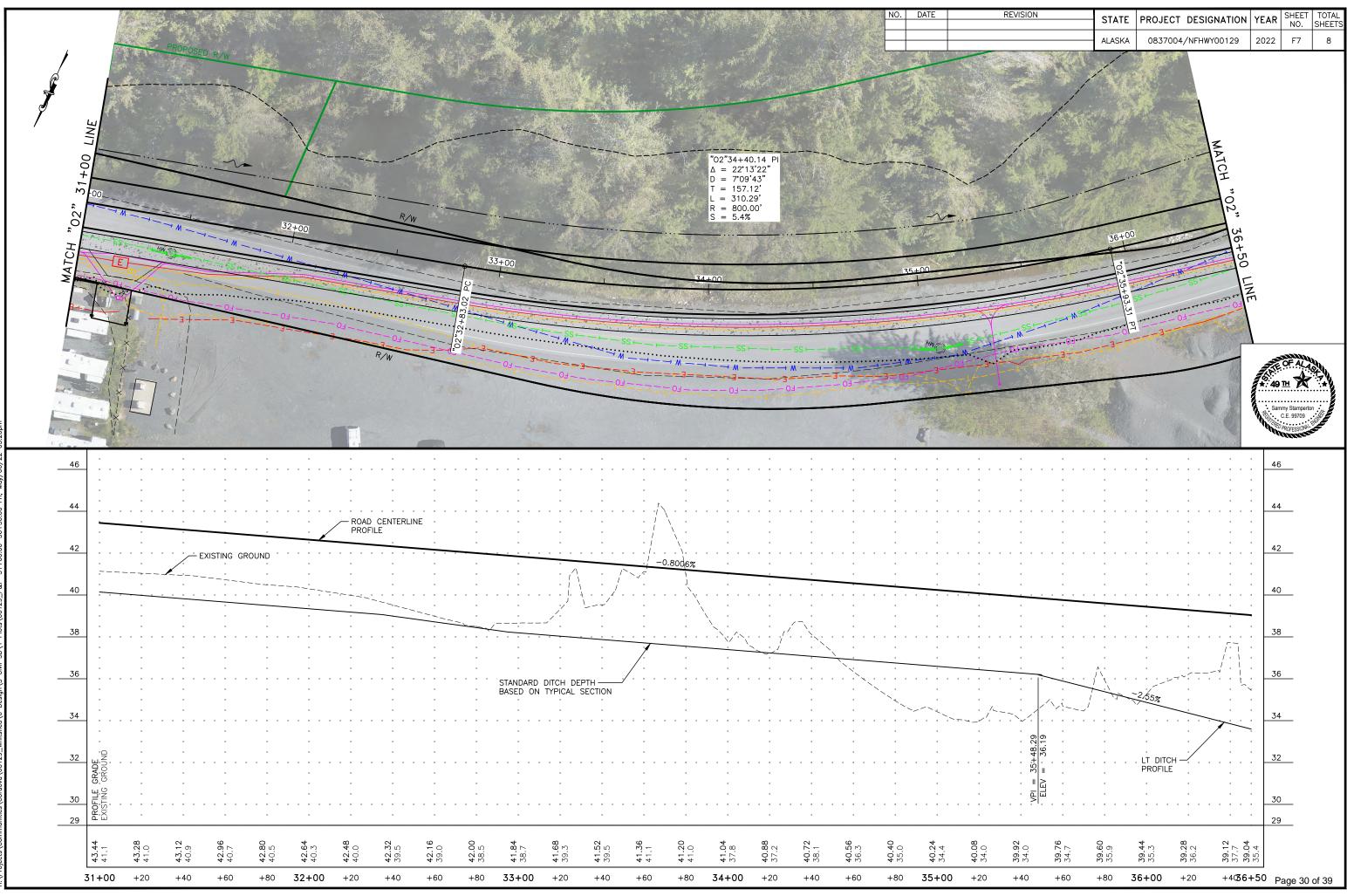
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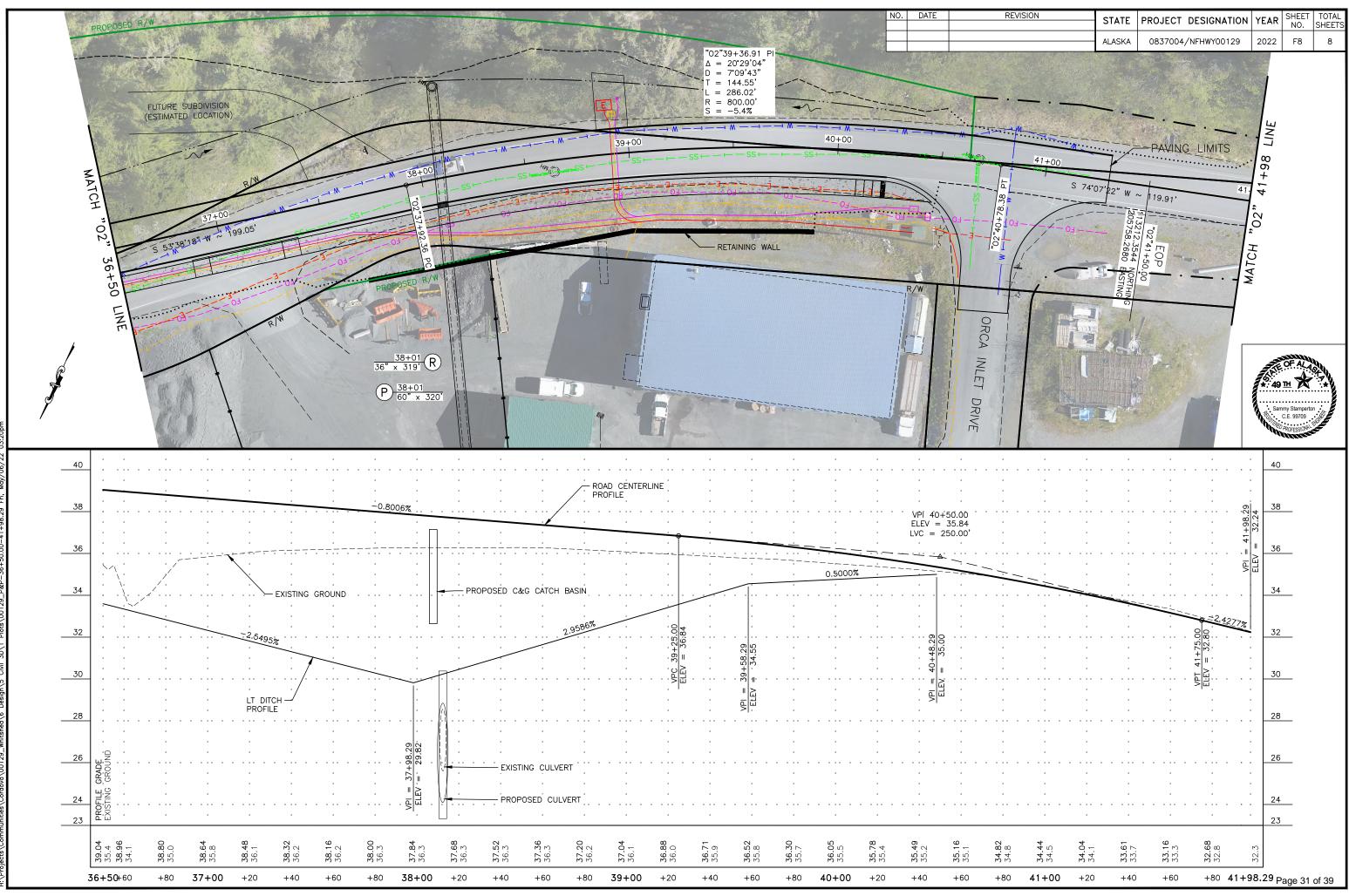


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