Narrative and Technical Information in Support of a FEMA Letter of Map Revision (LOMR) Request for Cottonwood Creek at Weeping Birch Street

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Prepared for:

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Attachment 6: Annotated FIRM

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Digital Attachment 1: HEC-HMS Model Files (HMS_CottonwoodCrkatWeepingBirch.zip)

Digital Attachment 2: Pre-Project and Post-Project SMS Model Files (SMS_CottonwoodCrkatWeepingBirch.sms.zip)

Digital Attachment 3: Post-Project 1% AEP Flood Extent GIS Files (Post-Project_1pctAEP_Flood_Extent.zip)

Digital Attachment 4: Revised Cross Section GIS Files (RevisedCrossSections.zip)

List of Acronyms and Abbreviations

2D – Two-Dimensional
AEP – Annual Exceedance Probability
CAD – Computer-Aided Design (design/drafting software)
CFS – Cubic feet per second
DEM – Digital Elevation Model
DOT&PF – Alaska Department of Transportation and Public Facilities
FEMA – Federal Emergency Management Agency
FHWA – Federal Highway Administration
FIS – Flood Insurance Study
FT – Feet
GIS – Geographic Information System (mapping software)
HEC-HMS – Hydraulic Engineering Center-Hydrologic Modeling System (modeling software)
HR – Hour
IN – Inches
KGB – Knik-Goose Bay
LOMR – Letter of Map Revision
MSB – Matanuska-Susitna Borough
N/A – Not Applicable
NAD83 – North American Datum of 1983
NAVD88 – North American Vertical Datum of 1988
NGVD29 – National Geodetic Vertical Datum of 1929
NLCD – National Land Cover Database
NOAA – National Oceanic and Atmospheric Administration
NRCS – National Resource Conservation Service (formerly known as the Soil Conservation Service)
SFHA – Special Flood Hazard Area
SMS – Aquaveo Surface Modeling System
SPAK4 – State Plane Alaska Zone 4 Projection
SRH-2D – Sedimentation and River Hydraulics – Two-Dimension (modeling software)
SV1 –Local Projection
USGS – United States Geologic Survey
WSE – Water Surface Elevation

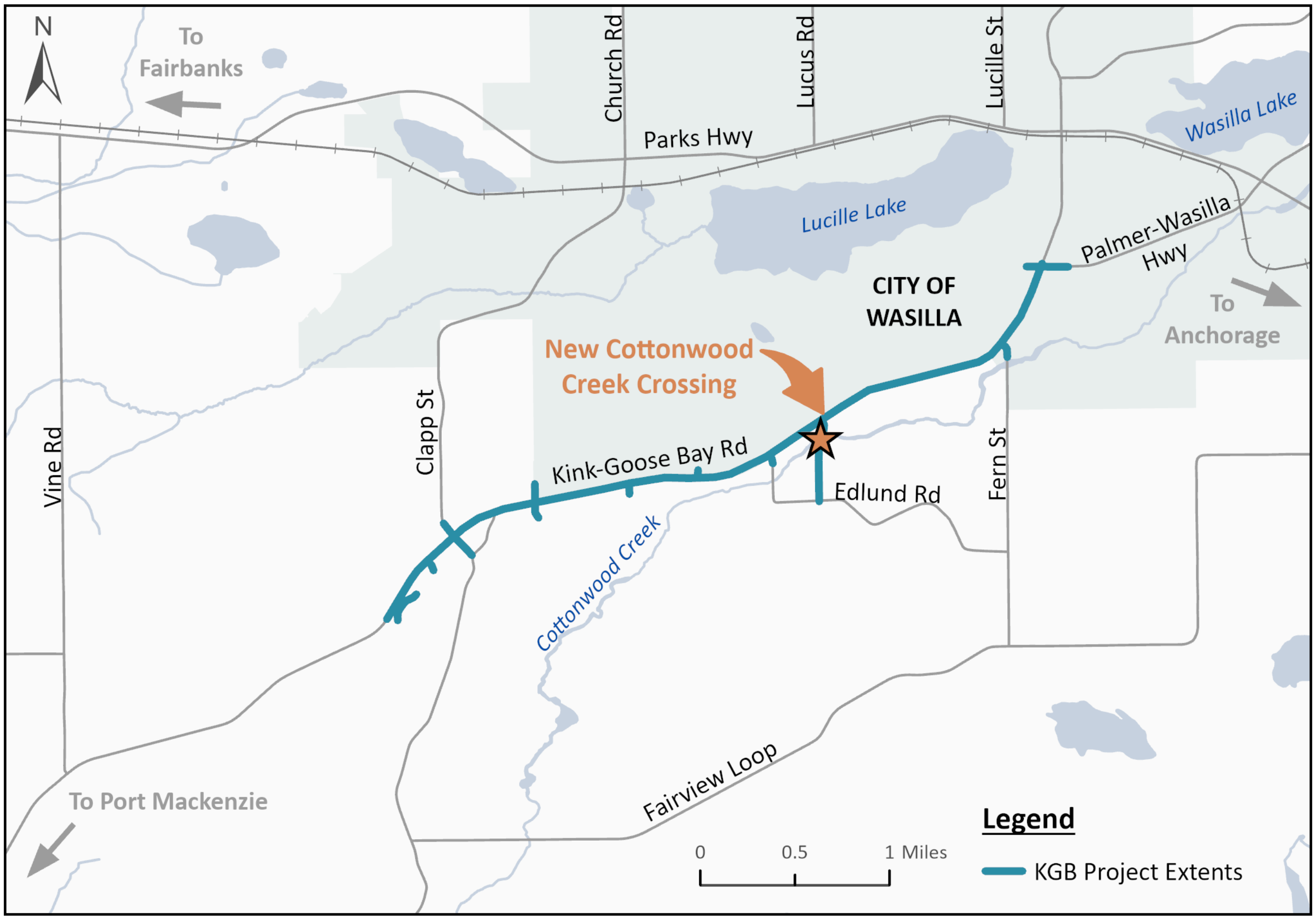
1. Narrative

The Alaska Department of Transportation and Public Facilities (DOT&PF), in partnership with the Federal Highway Administration (FHWA), recently reconstructed Knik-Goose Bay (KGB) Road between Palmer-Wasilla Highway and Fairview Loop. The project is located near the City of Wasilla in the Matanuska-Susitna Borough (MSB) in Alaska.

The project extended Weeping Birch Street to the north to intersect KGB Road. This required a new road crossing over Cottonwood Creek.

Figure 1 shows the KGB project extents and the new crossing location.

Figure 1: Project Location



1.1. Description of Existing FEMA Products

The new creek crossing is in an area mapped by Federal Emergency Management Agency (FEMA) as a Zone A Special Flood Hazard Area (SFHA). The effective mapping in the vicinity of the new crossing is shown on Flood Insurance Rate Map Number 02170C8090F and analysis details are provided in the MSB’s 2019 Flood Insurance Study (FIS).

Zone A areas are defined by FEMA as “areas of the 100-year flood; base flood elevations and flood hazard factors not determined.” As such, Zone A areas do not typically include published flood elevations. However, this Zone A is considered a “modeled-back” A Zone, and flood elevations are included on the FIRM. Flood profiles are not provided.

The hydraulic analysis completed for the FIS used HEC-RAS Version 4.1 software. This model performs steady state, one-dimensional calculations and was created to identify flood risks at a large, reach-wide scale. Flood elevations at creek cross sections are based on a simplified hydraulic evaluation of the creek. This hydraulic evaluation does not include existing roadway embankments, culverts, or bridges.

1.2. Project-Specific Analyses

Detailed, project-specific hydrologic and hydraulic analyses of Cottonwood Creek were completed in support of the roadway project, and the studies show that the new road will cause a rise in the upstream water surface elevation (WSE). A MSB flood hazard permit was obtained for this project. Upon completion of the project, the local MSB Flood Hazard Administrator requested a LOMR be submitted to FEMA to incorporate the project-specific studies and update the mapping to reflect the resulting change in flood elevations.

1.3. Document Purpose and Organization

This document presents the analyses and evaluations completed to support an MT-2 submittal to FEMA for a LOMR. The document is structured to outline and address each of the requirements of the MT-2 FEMA submittal. Each of the required MT-2 submittal elements is either contained in this document or attached to it. Submittal items that are not applicable (N/A) are also addressed.

2. Data Used

The various data used to support these analyses and evaluations are discussed in Attachment 1.

3. MT-2 Application Forms

The following forms are required by FEMA for this LOMR request and are included in Attachment 2:

- FEMA Form 1: Overview and Concurrence Form. *Please note this form requires signature by the MSB prior to submittal to FEMA.*
- FMEA Form 2: Riverine Hydrology & Hydraulics Form

FEMA Form 2 downloaded from FEMA’s website on 11/05/2025 appears to have two errors in Section D on page 3. These are discussed below.

Question 3 does not have check boxes to provide a response to the question. This request is not a CLOMR, so, the response to this question is N/A.

Question 4 appears to have repeated question 3. Based on review of prior versions of the form, question 4 was assumed to read “For LOMR requests, is the regulatory floodway being revised?” and was answered accordingly.

4. Hydrologic Analysis

The sections below summarize the hydrologic analysis completed for the new crossing.

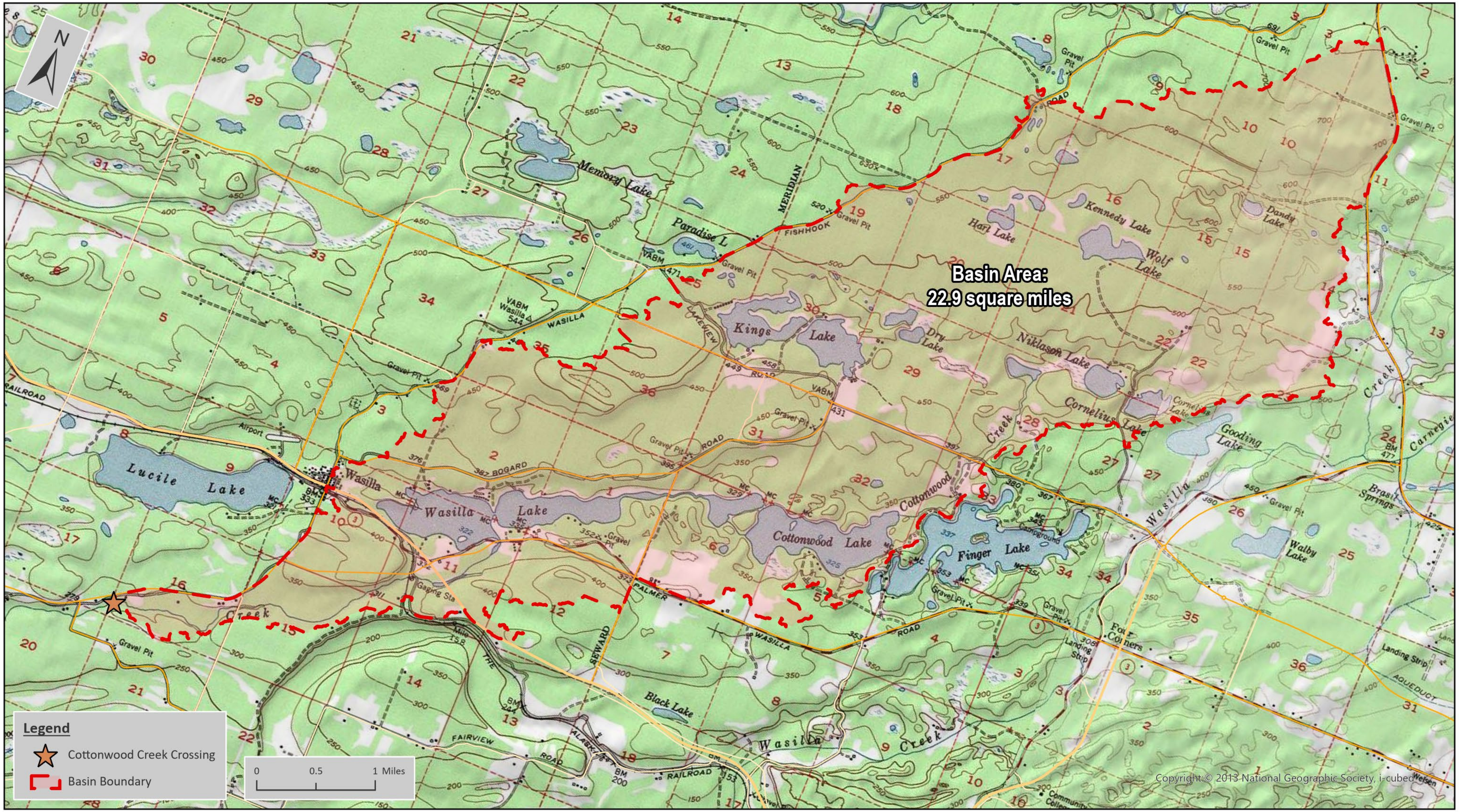
4.1. Explanation and Need for New Hydrology

The hydrology for the effective mapping is documented in the FIS and is based on regression equations. The equations used have been superseded and are no longer recommended for use by USGS. Additionally, the regression equation approach does not account for upstream lake attenuation or non-stationarity. As a result of these limitations, project-specific hydrology was developed for the new crossing. A comparison between the project-specific flows and the FIS flows is provided in Section 4.5.

4.2. Drainage Basin Delineation and Description

The drainage basin area for the new crossing is approximately 22.9 square miles and extends from the foot of Hatcher Pass through the City of Wasilla to the proposed crossing location, as shown in Figure 2. The drainage basin was delineated using GIS processing tools and available topographic data. The basin varies from highly developed commercial land in the City of Wasilla to low-density, rural residential development and undeveloped land in surrounding areas. The terrain is generally mildly sloped. Basin elevations range from 750 feet near Hatcher Pass to 260 feet near the proposed crossing. The basin contains numerous lakes and streams which play a significant role in controlling the quantity of flow that reaches the new crossing location. Sediment transport is not expected to impact this system’s hydrology.

Figure 2. Drainage Basin



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4.3. Overall Methodology

Peak flows for the new crossing were estimated using a rainfall-runoff model approach. This approach simulates a basin's response to a specified rain event and allows lake attenuation impacts and non-stationarity considerations to be integrated into the analysis. For flood mapping and permitting purposes, the 1% Annual Exceedance Probability (AEP) event was evaluated. For reference purposes, the peak flows associated with 1% AEP upper and lower 90% confidence interval rainfall depths were also evaluated.

There is an inactive United States Geological Survey (USGS) gage (Number 15286000) located on Cottonwood Creek 2.8 miles upstream of the new crossing. This gage does not have a sufficient record of annual peak flow data to perform a Flood Frequency Analysis, but it does have continuous flow records that were used to calibrate the rainfall-runoff model.

Details regarding the rainfall-runoff model approach are discussed below.

4.4. Rainfall-Runoff Models

For this project, three rainfall-runoff models were created using the Hydraulic Engineering Center-Hydrologic Modeling System (HEC-HMS) Version 4.5. These models include a calibration model, an existing conditions model, and a full-build conditions model.

Calibrating a rainfall-runoff model helps ensure that the hydrologic model parameters and transformation processes are accurately reflecting the basin's response to rainfall. This was particularly important for the Cottonwood Creek drainage basin due to the attenuation effect of the many lakes and ponds in the basin. Model calibration requires both stream flow data and basin rainfall data that are collected during the same period. The only stream flow data available for Cottonwood Creek is from the years 2000 and 2001. While this data is fairly old, the only significant change in the basin since this time was landcover, due to notable basin development in the last 20 years. The calibration model was created to mimic landcover conditions in 2000/2001 and establish key calibration parameters for the basin.

Once the calibration model was completed, existing-conditions and full-build conditions models were created using the calibrated basin parameters. Each model is discussed in detail below and details are provided in Attachment 3.

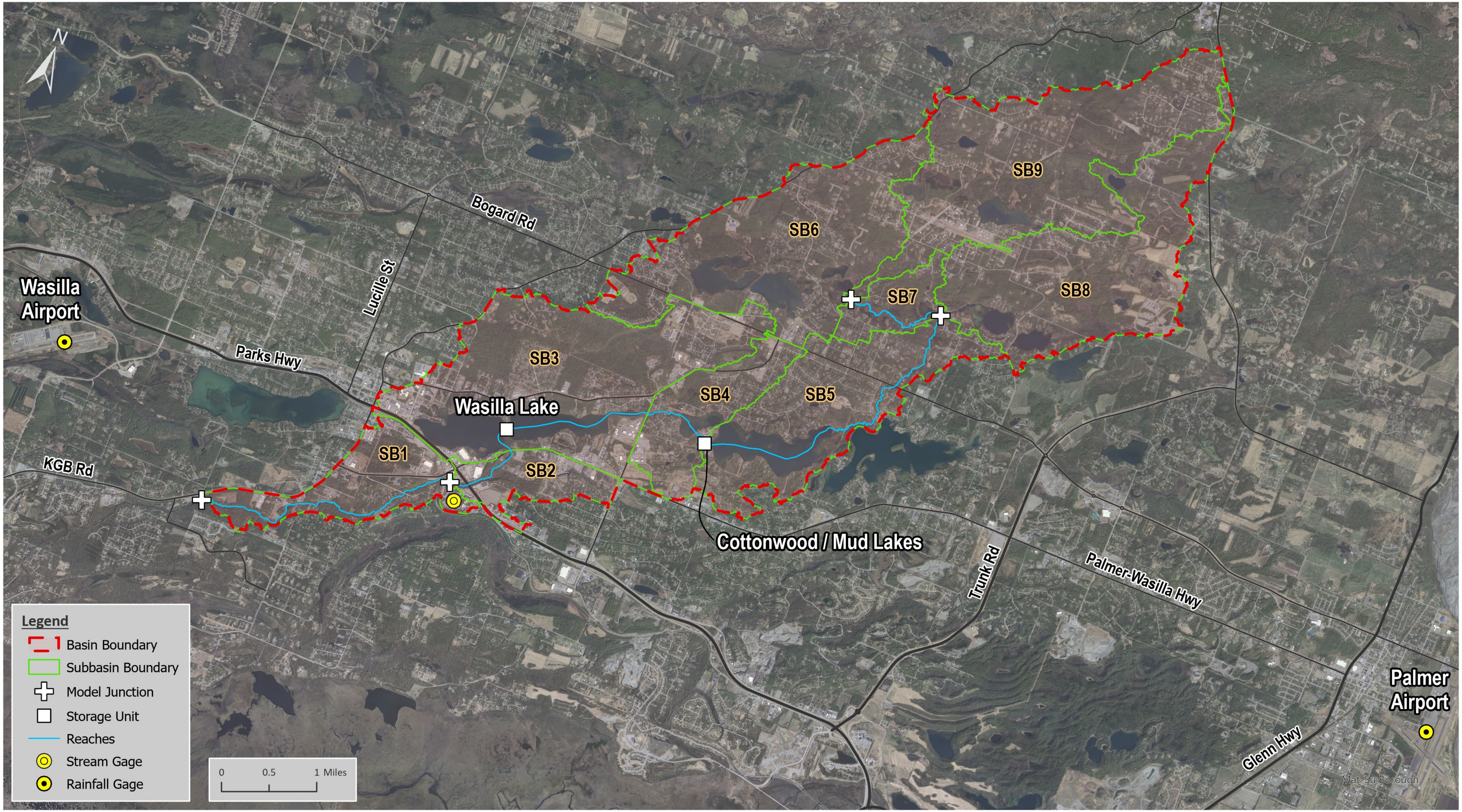
4.4.1. Calibration Model

The paragraphs below present the methodologies selected for this calibration analysis and how the inputs were developed.

Subbasin and Routing Network Delineation. The overall basin was subdivided based on drainage patterns so that hydrologic routing through the upstream lakes could be simulated. Subbasin outlet locations were established at the outlets of major lakes or where major streams converge. An additional subbasin outlet was set at the USGS gage to allow for model calibration. Model reaches representing the connectivity between the lakes and streams were then established by connecting the outlet points using the available topographic data.

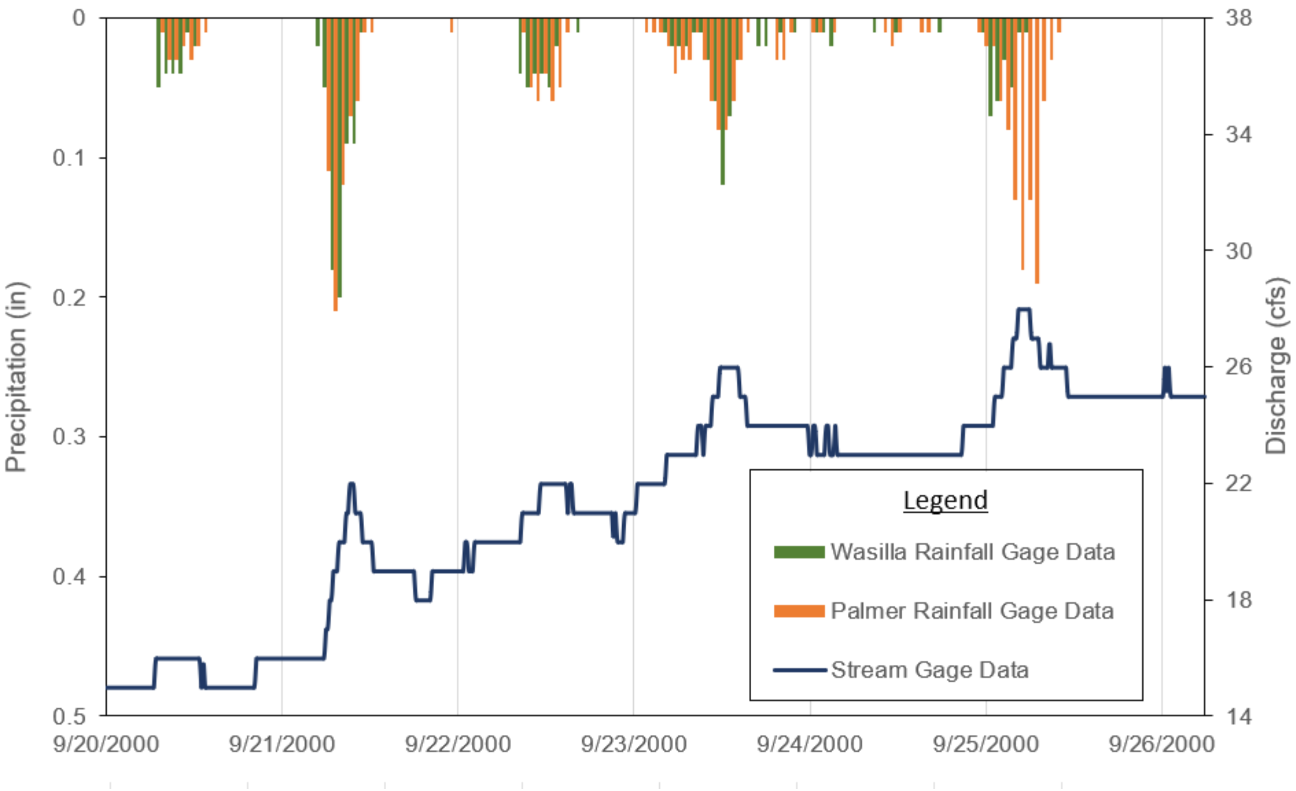
A model schematic that includes the subbasin and routing network delineation is shown in Figure 3.

Figure 3. Hydrologic Model Schematic



Rainfall. The Wasilla Airport and Palmer Airport weather stations (shown in 4) are nearby and both have historic rainfall records. As previously stated, continuous flow records for the USGS gage are only available for two years (2000 and 2001). Few single-peak events were recorded due to the short period of record and the long winters this area experiences. These single-peak events were generally small and in many cases had minimal impact on the gage flows. Because this model is being developed for the 1% AEP event, these smaller rain events were considered not appropriate for calibration. Based on an extensive review of the available historic gage data, a multi-peak high flow event from 2000 was chosen for model calibration. The 2000 event occurred September 20th through the 26th, and gage data from this event are shown in Figure 4.

Figure 4. Historic Gage Data for 2000 Calibration Event



The rainfall input hyetograph for each subbasin varied based on the subbasin's proximity to the two weather stations. If the subbasin was much closer to either weather station, only that station's records were used. If the subbasin was in between the two weather stations, a weighted average of the records was used. In this case, this approach was considered appropriate because rainfall amounts are expected to increase moving from west to east across the basin toward the mountains due to an orographic effect. GIS processing was used to establish weights for each subbasin and are included in Attachment 3.

Soils and Infiltration. Soil properties were obtained from the Alaska Gridded Soil Survey Database and from published reference values, and were spatially assigned to the subbasins using GIS processing tools. The basin predominantly contains National Resource Conservation Service (NRCS) Group B soils which indicates a moderately low runoff potential.

Infiltration loss was simulated using the Green-Ampt method within HEC-HMS. This method computes the change in infiltration rate during an event by approximating the soil wetting front. The selected values for the calibration model represent a dry soil condition because the historic gage data generally shows a dry period prior to the start of the selected event.

The range of average soil and infiltration properties used in this model are provided in Table 1. Values for each subbasin are included in Attachment 3.

Table 1. Soil Properties

Parameter	Range of Average Values
Initial Content (fraction)	0.290 to 0.304
Saturated Content (fraction)	0.496 to 0.499
Suction (in)	16.67 to 18.46
Conductivity (in/hr)	0.18 to 0.21

Land Cover. Land cover across the basin was obtained from the 2001 National Land Cover Database (NLCD) and from published reference values, and was spatially assigned to the subbasins using GIS processing tools. The basin includes a mix of land cover ranging from highly developed areas to full forested areas. Average percent impervious values ranged from 10 to 30 percent. Values for each subbasin are included in Attachment 3.

Channel Routing. Channel routing simulates flow through the previously established network of streams. This process was represented in the model using the Muskingum-Cunge method, which is a variation of the kinematic wave model. This method uses hydraulic computations based on channel slope and cross-sectional shape characteristics. Stream geometry was approximated based on available topographic data and aerial imagery. Detailed channel geometry was not critical, as this information was only used to approximate hydrograph routing and timing. It was not used to estimate flow depths or extents. A detailed summary of channel routing inputs is included in Attachment 3.

Lake Routing and Geometry. Cottonwood, Mud, and Wasilla lakes were represented in the model as storage units. HEC-HMS routes runoff through storage units using the level pool routing method, which correlates a reservoir’s inflow, storage, outflow, and WSE. This method assumes the surface of the reservoir stays level, which is generally expected to be the case for these lakes.

Lake bathymetry data were obtained from Alaska Department of Fish and Game fishing maps. These maps were georeferenced into GIS, and the lake depth contours were traced and converted to elevation contours. The elevation contours were then merged with the MSB 2011 DEM, and the merged terrain was used to represent the storage capability of each lake.

The geometry and properties of each lake outfall were estimated using data from georeferenced Alaska Department of Fish and Game culvert data. Using the georeferenced data as input, rating curves relating lake outflow and lake WSE were developed using FHWA HY-8 software.

The lake storage and outfall rating curves are included in Attachment 3

Baseflow and Starting Lake WSEs. Available historic stream gage data shows that baseflow in Cottonwood Creek ranges from 10 to 14 cfs depending on the season and/or presence of extended wet/dry periods. Based on this, a constant baseflow value of 14 cfs was assumed. Other baseflow modeling approaches were considered, but not utilized due to challenges associated with estimating input parameters as well as added calibration complexity.

The starting lake WSEs were set assuming a baseflow condition (lake inflow equals lake outflow) because the records generally show a dry period prior to the start of the selected event.

Transformation and Calibration. Excess rainfall was transformed into a runoff hydrograph using the Clark Unit Hydrograph approach within HEC-HMS. The two primary user inputs to the Clark unit hydrograph are the time of concentration and a basin storage coefficient. These inputs were computed for each subbasin.

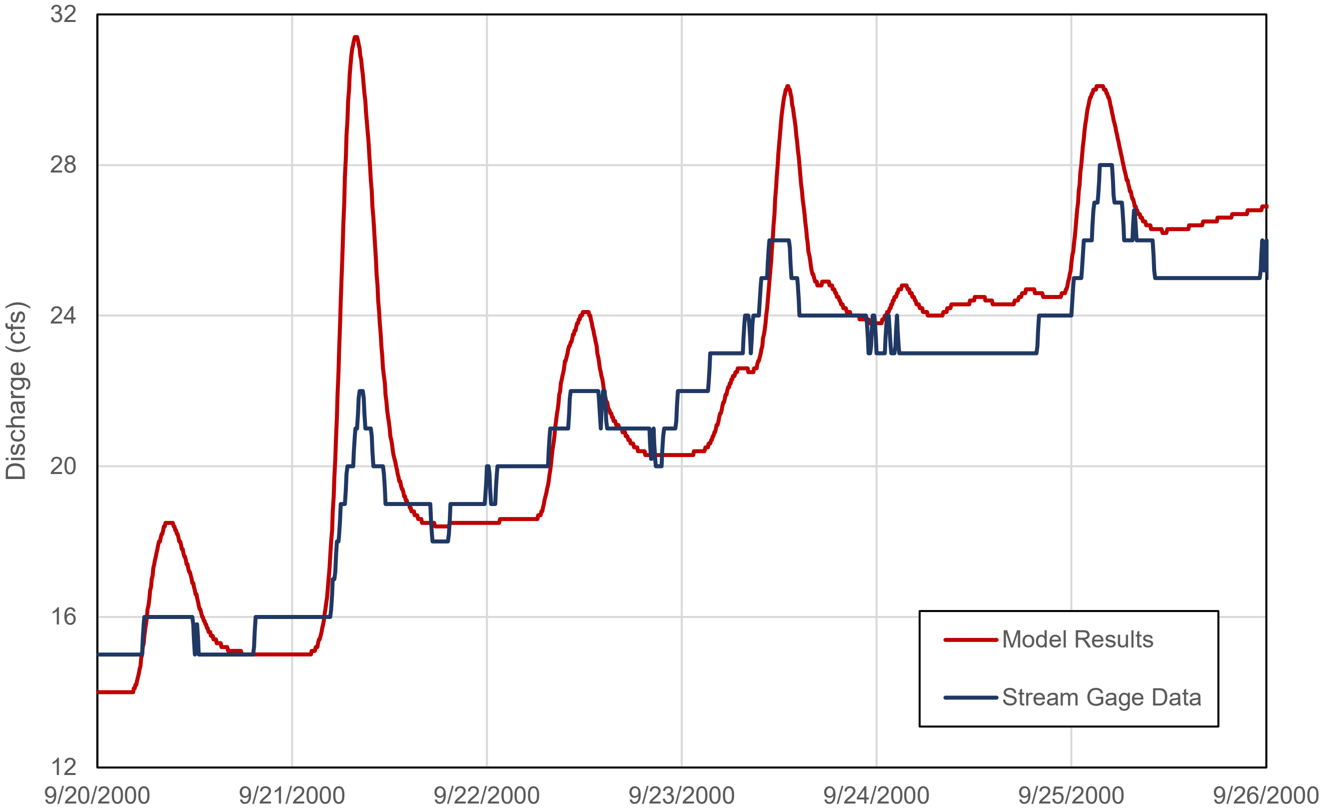
The subbasin times of concentration were computed using standard procedures from the NRCS publication, *Technical Release 55 Urban Hydrology for Small Watersheds.* The procedure estimates travel times for sheet flow, overland flow, and channelized flow and sums them to obtain the time of concentration. Values for each subbasin ranged from 2.0 to 7.3 hours.

The subbasin storage coefficients were used to calibrate the model results to match the historic stream gage data. The calibration focused on minimizing the percent error in the peak flow and total runoff volume (represented by the area under the hydrograph). Through a trial-and-error calibration process, the storage coefficient was set to 60% of the time of concentration for each subbasin.

Storage coefficient and times of concentration values for each subbasin are included in Attachment 3.

Figure 5 shows a comparison of the historic stream gage data and the resulting calibrated model flows. As shown, the calibrated model flows are slightly larger than the historic stream gage data, but the timing was similar. The elevated peak flow results were considered acceptable because the runoff volume was generally well represented. Reduction of the storage coefficients to help better match the observed peak flows was considered, but this is expected to result in reduced 1% AEP peak flows. In this case, peak flow overestimation was considered reasonable given that the intended use of the model was for providing peak flows to support flood mapping based on steady flow hydraulic modeling.

Figure 5. Calibrated Flow vs. Historic Stream Gage Data



4.4.2. Existing Conditions Model

A second HEC-HMS model was created to represent the existing conditions at the time of the original project-specific analysis (2018), prior to construction of the new road and creek crossing. This model was created by modifying the calibration model to replace the historic rainfall gage data with a design storm event and by updating the land cover properties, soil properties, and starting lake WSEs as discussed below.

Rainfall. Design rainfall hyetographs were created by distributing National Oceanic and Atmospheric Administration (NOAA) rainfall depths for events of interest over a 24-hour period using a local rainfall distribution. This design event represents a theoretical range of design rainfall events up to a 24-hour duration, including shorter, more intense events. This 24-hour design event is applicable to a wide range of basins, provided basin time of concentration does not exceed 24 hours which is the case for this basin. A longer duration storm was considered to better represent the multi-event pattern observed in the area, but was not selected because DOT&PF design criteria requires use of the 24-hour event. Instead, at the beginning of the simulation, the soil infiltration values were set to reflect saturated conditions, and the upstream lakes were set to an elevated level. Soil properties used and starting lake WSEs are discussed in more detail below.

The 1% AEP 24-hour rainfall depth was obtained from NOAA in raster format. Because the rainfall depth varied across the basin, GIS processing tools were used to compute the average rainfall depths for each subbasin. The 24-hour rainfall depths for each subbasin are shown in Table 2. The ranges shown in parentheses are the upper and lower 90% confidence interval rainfall depths.

Table 2. 1% AEP Rainfall Depths

Subbasin	Value (in)
SB1	2.94 (2.36 - 3.71)
SB2	2.97 (2.38 - 3.74)
SB3	3.02 (2.43 - 3.79)
SB4	3.04 (2.45 - 3.82)
SB5	3.13 (2.50 - 3.95)
SB6	3.20 (2.58 - 4.02)
SB7	3.39 (2.73 - 4.27)
SB8	4.03 (3.26 - 5.05)
SB9	3.87 (3.12 - 4.85)

A project specific local rainfall distribution was developed using NOAA rainfall depths and the NRCS WinTR-20 software. The hydrology chapters of the NRCS National Engineering Handbook describe the specific procedures used by the software. A project specific local rainfall distribution was chosen over the Alaska Highway Drainage Manual recommended NRCS Type 1 distribution because it can be tailored to this site based on rainfall patterns in this area and can utilize more current rainfall data. The local rainfall distribution is included in Attachment 3.

<u>Soils</u>. The soil properties were updated to reflect saturated conditions at the start of the design event because multi-day rain events regularly occur in this area, and because this represents a conservative approach. This was achieved by adjusting the initial soil water content to equal the saturated water content. As stated in Section 4.4.1, the calibration model represents a dry soil condition because the area experienced dry weather leading up to the calibration event, but based on historic flooding in this region, dry conditions are not always expected leading up to the 1% AEP event. All other soil properties remained unchanged from the calibration model.

<u>Land Cover</u>. Basin land cover for the existing conditions model was obtained using the 2011 NLCD, the 2018 MSB imagery, and published reference values. Land cover types were spatially assigned to the subbasins using GIS processing tools. Under existing conditions, the basin includes a mix of land cover ranging from highly developed areas to full forested areas, but with more developed land than the 2000/2001 conditions reflected in the calibration model. Average existing conditions percent impervious values ranged from 13 to 34 percent. Values for each subbasin are included in Attachment 3.

<u>Baseflow and Starting Lake WSEs</u>. The starting lake WSEs were increased from the baseflow condition (lake inflow equals lake outflow) represented in the calibration model because multi-day rain events regularly occur in this area

and because this represents a conservative approach. To establish reasonable starting lake WSEs at the start of the design event, the existing conditions model was first run with the starting lake WSEs set at the baseflow condition. The results of this test run showed that for the 1% AEP, the water depth in Wasilla Lake and Mud/Cottonwood Lake increased by 1.4 feet and 2.1 feet, respectively. To reflect the potential for a higher starting WSE in the lake before the 1% AEP occurs, the depth increases from the test run were multiped by 0.25 and added to the starting lake WSEs. These elevated WSEs were used as starting lake WSEs at the start of the 1% AEP simulation.

4.4.3. Full-Build Conditions Model

A third HEC-HMS model was created to represent a future full-build condition. This model was created by updating the existing conditions model to reflect expected future land cover as discussed below.

Land Cover. The existing conditions land cover was updated to represent full-build conditions using estimates of future development in the basin provided by MSB Capital Projects group. Similar to existing conditions, the full-build conditions basin includes a mix of land cover ranging from highly developed areas to full forested areas, but with substantially more developed land. Average full-build conditions percent impervious values ranged from 31 to 44 percent. Values for each subbasin are included in Attachment 3.

4.5. Peak Flow Comparison

The existing and full build conditions 1% AEP model results were compared to the flows from the FIS as well as a recent nearby DOT&PF project also on Cottonwood Creek. This comparison is shown in Table 3. The ranges shown in parentheses are simulated peak flows based on the upper and lower 90% confidence interval rainfall data.

Table 3. Peak Flow Comparison

Source	Location	Hydrologic Method	1% AEP Peak Flow	Notes
Project-Specific Analysis (Existing Conditions)	-	Rainfall-Runoff Model	294.3 (225.1 - 393.6)	- Does not account for non-stationarity
Project-Specific Analysis (Full Build Conditions)	-	Rainfall-Runoff Model	361.4 (281.5 - 472.5)	- Selected for use
Edlund Road Project (recent nearby project)	2,000 feet downstream of new crossing	Weighted 2016 Regression Equation-Flood Frequency Analysis	327	- Does not account for non-stationarity or lake attenuation - Based on less than the recommended 10 years of data
FIS	Reach extends from the Parks Highway to the Inlet	2003 Regression Equations	463.3	- Does not account for non-stationarity or lake attenuation - 2003 Regression Equations have been superseded

When considering the methodology and location, this comparison shows the full-build conditions rainfall-runoff model results are reasonable. The rainfall-runoff model is expected to provide more appropriate peak flow estimates, as it was developed specifically for this site, it accounts for lake attenuation, and it accounts for basin non-stationarity.

The digital HEC-HMS model for the selected flow of 361.4 cfs is provided as Digital Attachment 1.

5. Hydraulic Analysis

Project specific hydraulic considerations and analysis for the new crossing are presented below.

5.1. Crossing Description

Prior to this project, no existing infrastructure was present in the area. The average bankfull width of Cottonwood Creek in the new crossing vicinity is approximately 30 feet. The average channel slope in this reach is approximately 0.3%. The floodplain is heavily vegetated with birch and spruce trees.

The new crossing meets DOT&PF design criteria and consists of a single-span, prestressed box beam bridge with vertical soldier pile wall abutments and a 37-foot hydraulic opening. A 36-inch plastic overflow culvert is also located approximately 500 feet southwest of the bridge.

Pre-project and post-project site photos are provided in Figures 6 and 7, respectively. Pre-project and post-project aerial imagery of the crossing is provided in Figure 8.

Figure 6. Pre-Project Photo

Looking Upstream Towards Future New Crossing

Figure 7. Post-Project Photo

Looking Upstream at New Crossing

Figure 8. Pre-Project and Post-Project Aerial Imagery

Pre-Project

Post-Project

The Cottonwood Creek crossing has three key features that must be considered for accurate hydraulic analysis. First, the existing floodplain is fairly flat with an average width of approximately 425 feet. Approximately 400 feet upstream of the new road crossing, the floodplain splits, creating a shallow side channel. The side channel is heavily vegetated and expected to only flow during large flood events. The wide floodplain and the presence of the side channel result in multi-directional flow during large discharges. Second, the Edlund Road crossing is located approximately 2,000 feet downstream of the recently constructed Weeping Birch crossing. The Edlund Road embankment and crossing culvert create a backwater during high flows which has the potential to impact the hydraulics at Weeping Birch Street. Third, due to traffic and roadway design considerations, the new road crosses Cottonwood Creek at a skew. This further contributes to the multi-directional flow pattern during large discharges.

5.2. Hydraulic Model/Method Used

Site-specific hydraulics were evaluated using the Sediment and River Hydraulic Two-Dimensional (SRH-2D) model accessed via the Aquaveo Surface Modeling System (SMS) software, Version 13.3. This software was selected for the project because it can handle the key features discussed in Section 5.1 and it has several features that streamline the design and scour analysis process.

5.3. Project Specific Hydraulic Models

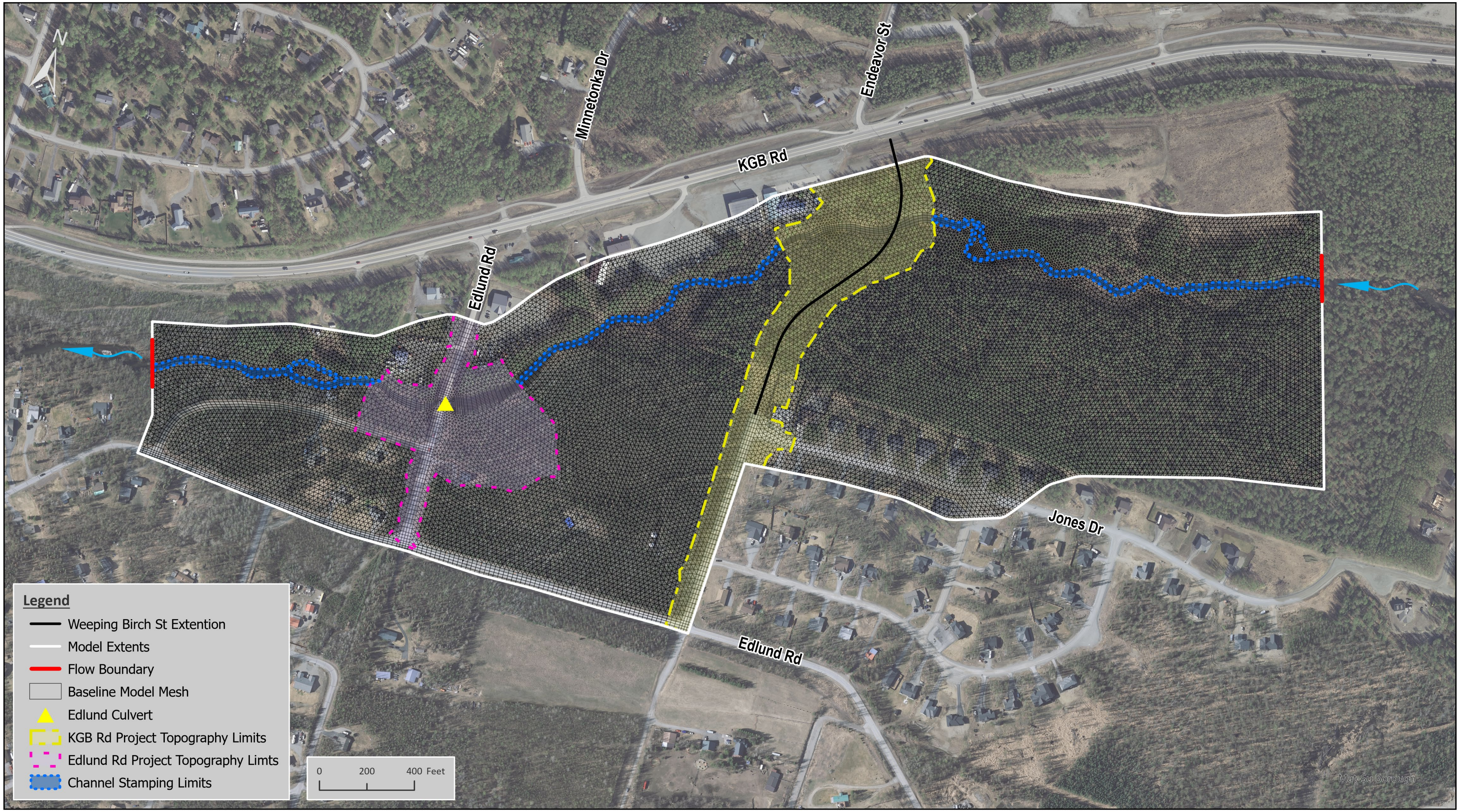
To support the LOMR request, two hydraulic scenarios were modeled for this project. One represents pre-project conditions, and the second represents the post-project conditions. Each model is discussed in detail below and details are provided in Attachment 3.

The digital pre-project and post-project SMS files are attached to this report as Digital Attachment 2. This project file name is *CottonwoodCreekatWeepingBirch.sms* and the Pre-Project and Post-Project simulation names are *Pre-Project* and *Post-Project*, respectively. These models have a vertical datum of NGVD29. Results discussed in this report are converted to NAVD88 for comparison with the elevations on the FEMA flood maps.

5.3.1. Pre-Project Model

The first SRH-2D model was created to simulate the pre-project hydraulics in the vicinity of the new crossing. This model provides a baseline for evaluating the project impacts. Figure 9 provides a model schematic, and key features of the hydraulic modeling are discussed below.

Figure 9. Hydraulic Model Schematic



Topography and Hydraulic Structures. The model topography was based on KGB project survey data, Edlund Road project topography, and a MSB LiDAR DEM. Channel elevations from the DEM generally represent the water surface and not the channel bottom. To accommodate that limitation, a trapezoidal channel shape was approximated based on available survey data, and the channel was incorporated into the terrain using a stamping procedure. This was only completed in areas outside of the survey limits.

The culvert at Edlund Road was included in the hydraulic model. Culvert information including location, length, size, and material was obtained from information provided by DOT&PF. The FHWA HY-8 software was used within SRH-2D to compute culvert hydraulics.

Details regarding channel stamping and the geometry of this culvert are included in Attachment 4.

Model Extents and Boundary Conditions. The model extends approximately 1,900 feet upstream and 3,200 feet downstream of the new crossing. The downstream boundary is located 1,000 feet beyond the Edlund Road crossing to include potential hydraulic impacts of that crossing. No additional nearby downstream hydraulic controls were identified.

The upstream boundary condition was defined as a constant inflow to simulate steady flow conditions. The downstream boundary condition was defined as constant tailwater elevation assuming normal depth assigned using Manning's equation.

Mesh. SRH-2D uses a computational grid, called a mesh, to represent the underlying terrain and develop the geometric and hydraulic properties that support the two-dimensional (2D) flow computations. The existing topography was used to establish the mesh for the baseline conditions hydraulic model. Mesh breaklines and refinement areas were used to ensure that key features such as channel banks, road embankments, ditches, and side channels were captured in the mesh and would be incorporated into the 2D flow computations. In critical areas, the mesh spacing was reduced to a minimum of approximately four feet. A sensitivity analysis was performed to help establish the mesh size and to identify areas in need of mesh refinement. Mesh details are included in Attachment 4.

Manning's n Assignment. For the main channel and overbanks of Cottonwood Creek, a base Manning's n value was established using pebble count data (obtained during a site visit) and the Limerinos equation. The base value was then modified to account for channel slope, vegetation, uniformity, sinuosity, etc. using the Cowen Method.

Aerial imagery correlated to standard published values were used for developed areas such as paved roads and gravel roads.

Values used are shown in Table 4. Additional Manning's n details are included in Attachment 4.

Table 4. Baseline Manning's n Values

Land Cover	Value
Main Channel	0.044
Overbank	0.08
Open Overbank	0.055
Pavement	0.016
Gravel	0.02
Grass	0.03
Buildings	0.2

Model Control. A range of time steps were considered, and a time step of 5 seconds was selected. This timestep best minimizes the model process time and convergence error while maintaining continuity and consistent results.

A model simulation time of 12 hours was selected based on a trial-and-error process. The model run time was set long enough to allow the model to reach a stable, steady-state condition.

5.3.2. Post-Project Conditions

A second SRH-2D model was created to simulate the post-project hydraulics. This model was created by updating the pre-project model to include the new crossing. Key model updates as discussed below.

Topography and Hydraulic Structures. An as-built survey of the new Weeping Birch embankment, bridge, and overflow culvert was used to reflect this project's construction. The model topography was updated accordingly.

Pressure flow through the new bridge does not occur during the 1% AEP. For this reason, a pressure zone simulating the bridge deck was not incorporated into the model.

The new overflow culvert was also included in the updated hydraulic model using the same approach as the described for the Edlund Road culvert. Details regarding the geometry of this culvert are included in Attachment 4.

Mesh. The pre-project mesh was updated to reflect the post-project topography. Additional mesh breaklines and refinement areas were used to ensure that key features such as the new road, ditches, and bridge opening were captured in the mesh. In critical areas, the mesh spacing was further reduced to a minimum of approximately two feet. Details of the proposed mesh are included in Attachment 4.

Manning's n Assignment. Standard published values were used to assign manning's n values for areas with roughness changes compared to the baseline conditions hydraulic model. Values used are shown in Table 5. Additional Manning's n details are provided in Attachment 4.

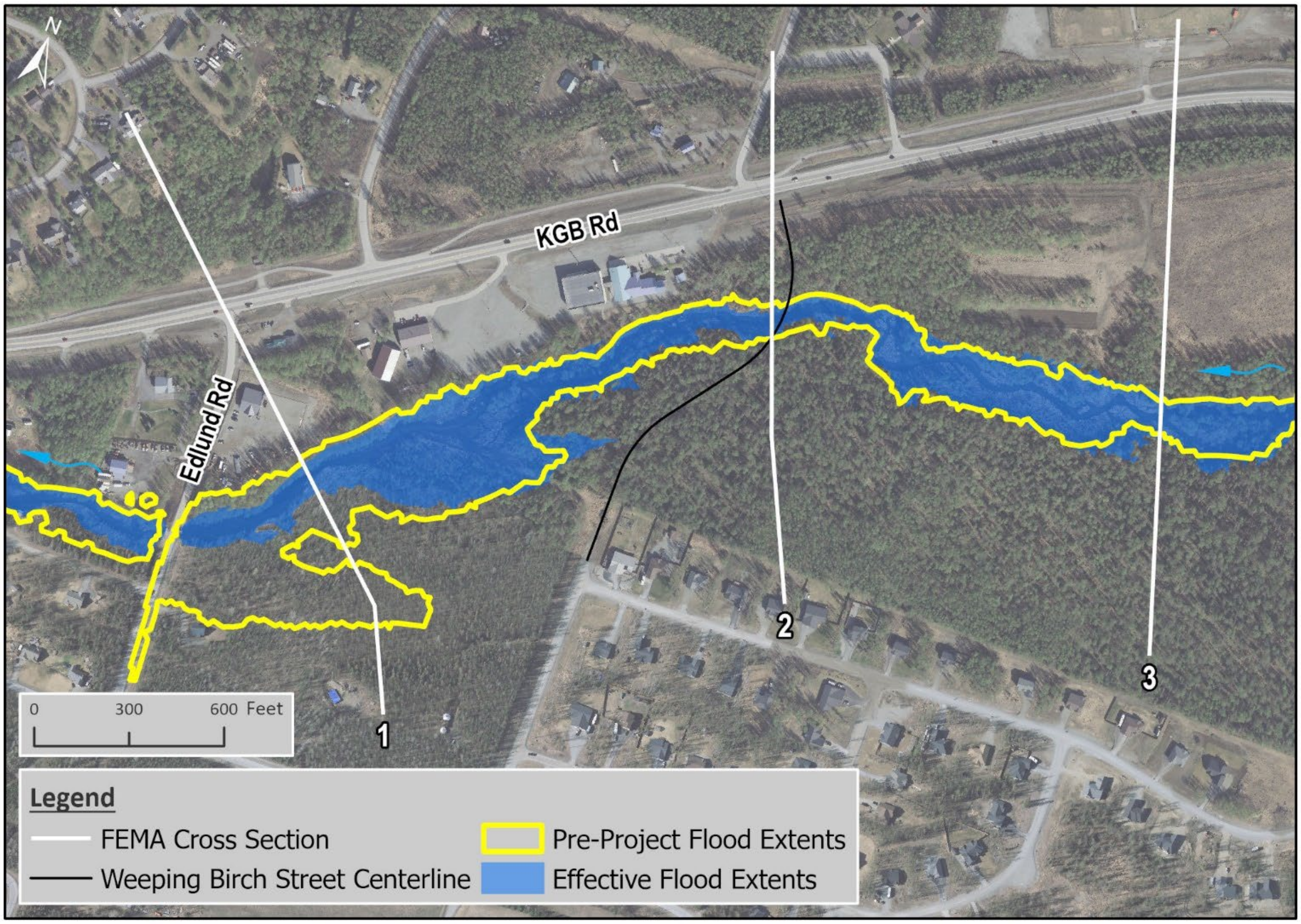
Table 5. Additional Manning's n Values

Land Cover	Value
Wingwalls	0.04
Reconstructed Bank	0.05
Riprap with Vegetative Mat	0.046
Riprap	0.06

5.4. Results

The hydraulic model results and comparison to effective FEMA mapping are discussed below and shown graphically in Figures 10, 11, and 12. WSE comparisons are provided in Table 6.

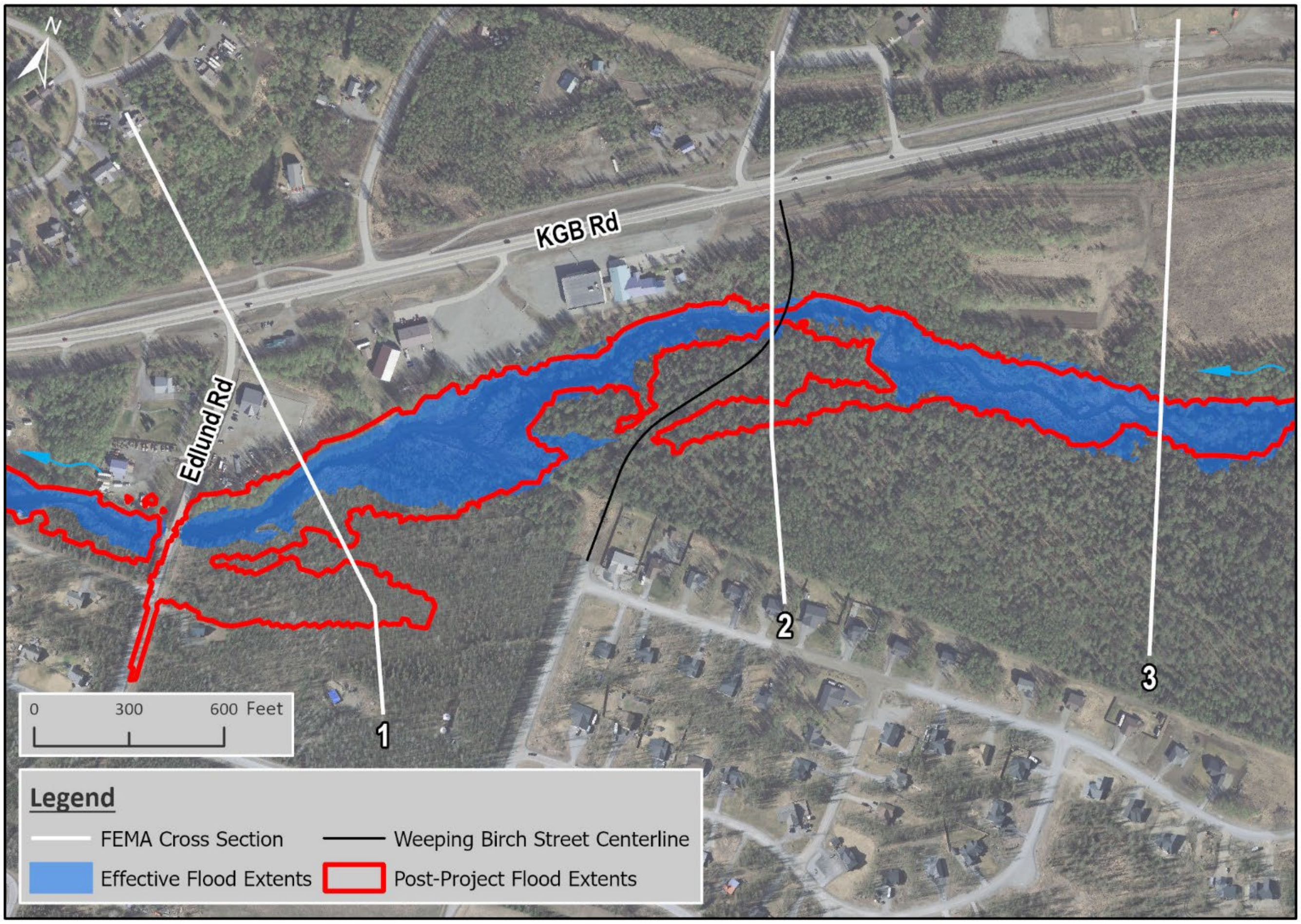
Figure 10. Pre-Project vs Effective 1% AEP Flood Extents



As shown in Figure 10, the pre-project flood mapping is similar to the effective flood mapping at cross sections 2 and 3. As shown in Table 6, the effective WSE at cross section 3 is 0.9 feet higher than the pre-project WSE, but this is expected because project specific hydrology is being used. A major difference in plan view extents at this location is not expected because the floodplain is more confined in this area.

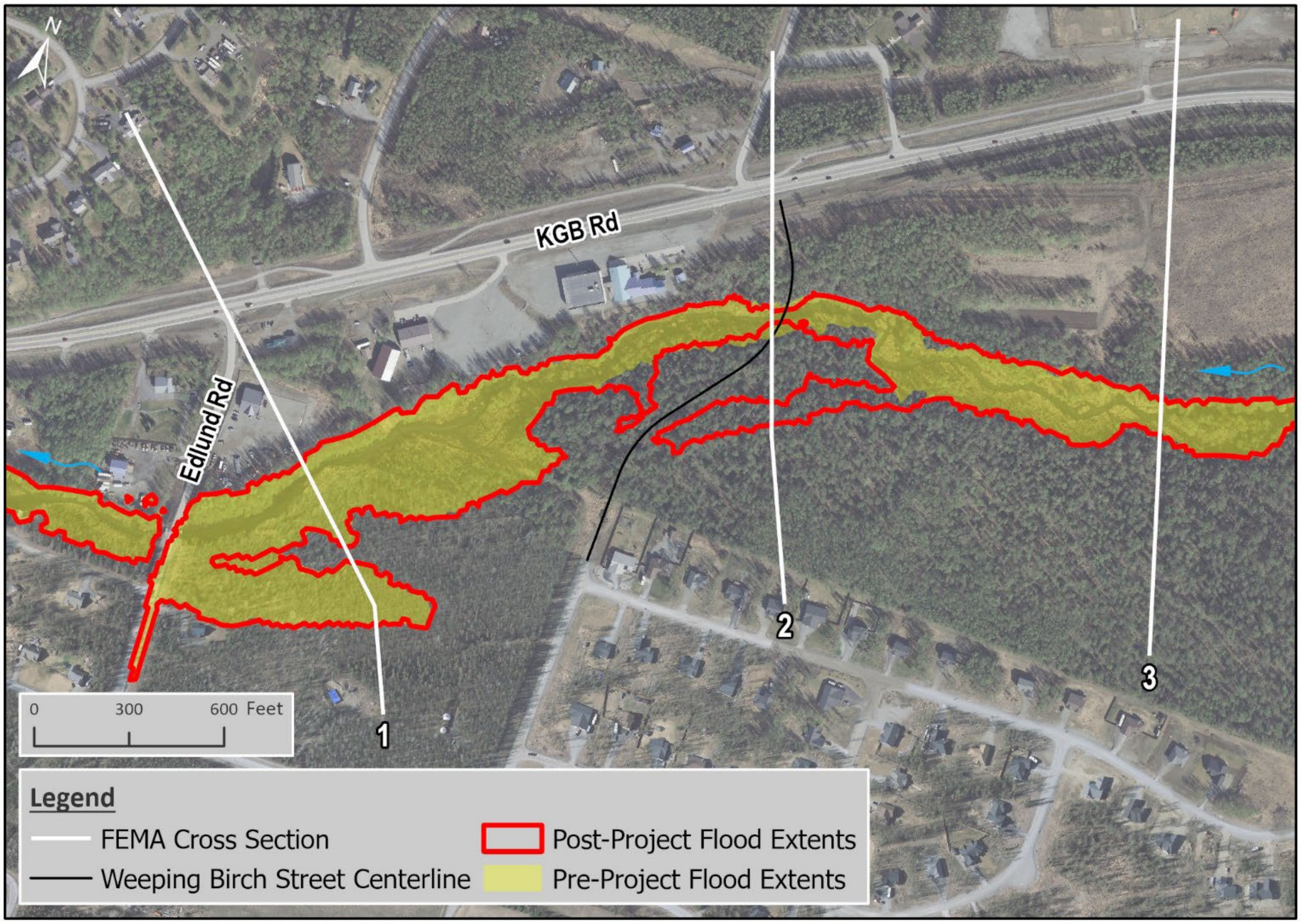
At cross section 1, the pre-project flood mapping shows a larger flooded area than the effective mapping. This is due to the backwater effect of the Edlund Road crossing, which is not accounted for in the FEMA analysis.

Figure 11. Post-Project vs Effective 1% AEP Flood Extents



Similar to the pre-project flood mapping and as Shown in Figure 11, the post-project flood mapping is comparable to the effective flood mapping at cross section 3, and it results in a larger flooded area than the effective mapping at cross section 1. Cross section 2 overlaps with the new Weeping Birch Street roadway centerline, and the resulting post-project WSE is slightly higher than the effective WSE. The floodplain in this location is wide and flat, and the small increase in WSE causes floodwaters to be directed to the small side channel located south of the main channel near cross section 2.

Figure 12. Pre-Project vs Post-Project 1% AEP Flood Extents



As shown in Figure 12 and Table 6 below, the post-project WSE is unchanged from pre-project conditions at cross sections 1 and 3. The post-project conditions results in a 0.2-foot rise from existing conditions at cross section 2. As previously discussed, the floodplain in this location is wide and flat, and the small increase in WSE causes floodwaters to be directed to the small side channel located south of the main channel near cross section 2.

WSE values for all comparison cases are provided in Table 6, below.

Table 6. 1% AEP WSE Comparison

Cross Section (See Figure)	WSE (ft)			WSE Rise (ft)	
	Effective (463.4cfs)	Pre-Project (361.4cfs)	Post-Project (361.4cfs)	FEMA to Post-Project	Pre-Project to Post-Project
1	262.4	264.0	264.0	1.6	0.0
2	267.9	267.9	268.1	0.2	0.2
3	272.4	271.5	271.5	-0.9	0.0

Notes: Elevations are in NAVD88 vertical datum. WSEs given are for main channel.

5.5. Reach to be Revised

The requested reach to be revised extends from Edlund Road upstream to cross section 3.

Downstream Tie-In. Edlund Road was selected as the downstream tie-in for the following reasons:

- The effective, pre-project, and post-project mapping all show no Edlund Road overtopping. This provides a break in the mapping, making it an ideal tie-in location because no transition is required between the effective and revised extents.
- The pre-project and post-project WSEs at Cross Section 1 match.

Upstream Tie-In. Cross section 3 was selected as the upstream tie-in location because the floodplain is more confined in this area. The effective and revised flood extents are generally similar despite the 0.9-foot WSE difference. This is outside FEMA's required difference of 0.5 feet for tie-in locations. Because project specific hydrology is being used, a tie-in location with a WSE difference of less the 0.5 feet is not expected at any nearby cross section. The next upstream break in the effective mapping is at Fern Street which is well outside the current study extents. Similar to Edlund Road, the backwater from the Fern Street crossing is not accounted in the FEMA analysis. Compared to the Edlund Road crossing, the Fern Steet culvert crossing is older and has a smaller hydraulic opening. So, if the Post-Project model were extended to Fern Steet, it is possible the Post-Project extents would show Fern Steet overtopping, making it a poor tie-in location. Cross section 3 was considered a reasonable tie-in location because the confinement noted above results in a relatively smooth transition.

The post-project 1% AEP flood extent GIS files for the revision area are provided as Digital Attachment 3.

6. Certified Topographic Work Map

A certified map meeting the requirements outlined in MT-2 Form 2 is provided as Attachment 5.

7. Annotated FIRM

An annotated FIRM for this LOMR request is provided as Attachment 6. The FEMA cross section locations have been modified to represent post-project conditions.

The revised cross section GIS files are provided as Digital Attachment 4.

8. Review Fee Payment

Based on FEMA's online fee schedule, this request is expected to be considered a "LOMR based on bridge, culvert, channel, hydrology, or combination thereof". If submitted online, the fee for this type of request is $8,000. The *FEMA Payment Information Form* is provided as Attachment 7. Please note this form requires payment method information to be added prior to submittal to FEMA.

9. Proposed/As-built Plans

The relevant sheets from this project's design plans are provided as Attachment 8.

10. Property Owner Notification

This LOMR request requires either public notification of the revision or induvial legal notices to affected property owners. Notification documentation is required to be submitted with the LOMR request. See the FEMA MT-2 Form Instructions for sample notification templates. Property notification will be coordinated by either the DOT&PF or the MSB.

11. Other MT-2 Submittal Requirements that at N/A

- Meet 65.10 Requirement: This is N/A. This project does not include a berm/levee/floodwall to reduce the flood hazard.
- Operation and Maintenance Plan: This is N/A. The project does not include a berm, levee, floodwall, dam, or detention basin to reduce the flood hazard.
- Floodway Notice: This is N/A. The floodway is not mapped for this area.
- Endangered Species Act: This is N/A. The project is already constructed.
- Regulatory Requirements of 44 CFR 65.12. This is N/A. The floodway is not mapped for this area.

Attachment 1: Data Used

Data Summary

- *Topography*
  - Project Survey. Detailed topographic information for Cottonwood Creek was obtained from the KGB project topographic survey completed by DOT&PF in the fall of 2018 and winter of 2019. The survey extends approximately 200 feet upstream and 375 feet downstream of the new crossing. The cross-section spacing varies from approximately 10 feet in the immediate vicinity of the new crossing up to approximately 40 feet near the survey limits. This information was used to characterize channel elevation, shape, slopes, and bankfull width. These data have a vertical datum of NGVD29 and a horizontal datum of NAD83 SV1.
  - Edlund Road Project Survey and Design. The Edlund Road project topographic survey was completed by DOT&PF in 2015 and 2016. The Edlund Road survey extends approximately 325 feet upstream and downstream of Edlund Road with a cross section spacing of approximately 40 feet. This survey was used to supplement the KGB project survey. The Edlund Road Project design was completed by Kinney Engineering, LLC and was provided by DOT&PF. The design information was used to determine the size and characteristics of the Edlund Road crossing. These data have a vertical datum of NGVD29 and a horizontal datum of NAD83 SV1.
  - 2011 LiDAR DEM. A 1-meter (3.28-foot) resolution DEM from the MSB 2011 LIDAR dataset was used to delineate the drainage basin and to supplement the KGB project survey. Prior to using the DEM, a vertical translation of -6.07 feet was applied to convert the elevations from NAVD88 to NGVD29. This translation was approximated by computing the average difference between the DEM and eight survey shots along the centerline of KGB road near the new crossing and was confirmed by DOT&PF Survey. The data was also horizontally translated from NAD83 SPAK4 to NAD83 SV1 using transformation parameters provided by DOT&PF Survey. The accuracy is as follows: 95% CI FVA = 7.2in and 95% CI CVA = 13.8in.
  - Project Design. The road design was completed by DOT&PF and was provided in CAD format. This information was used to characterize the new road embankment outside the floodplain.
  - As-built Information. An as-built survey of the new road within the floodplain, bridge, and overflow culvert was provided by DOT&PF. This survey was completed in November of 2024. This information was used to characterize the new road embankment within the floodplain, bridge deck location, and bridge abutment locations.
- *Aerial Imagery*. Historical MSB aerial imagery was obtained from the MSB online GIS server. This imagery was used for developing model inputs and supporting graphics.
- *Lake Bathymetry*. Lake bathymetry for Cottonwood, Mud, and Wasilla lakes was obtained from maps presented in the Alaska Department of Fish and Game Regional Information

Report Number 2A00-23 dated May 2000. Lake bathymetry was used to support hydrologic routing upstream of the new crossing.

- *Culvert Information.* Culvert data for various culverts on Cottonwood Creek were obtained from the Alaska Department of Fish and Game Fish Resource Monitor application. This included size, shape, length, relative elevation, and end treatment. The culvert data was primarily used to support hydrologic routing upstream of the new crossing.
- *Land Cover Information*
    - <u>Historic</u>. Historic land cover for the area was obtained from the Multi-Resolution Land Characteristics Consortium 2001 NLCD. The database provides land cover geographic data in raster form with areas delineated into 16 different land use or land cover categories. This information was used for input into the hydrologic calibration model.
    - <u>Existing</u>. Existing land cover for the area was obtained from the Multi-Resolution Land Characteristics Consortium 2011 NLCD and from 2018 MSB aerial imagery. These data were the most current available at the start of this study. This information was used for input into the hydrologic existing conditions model.
    - <u>Full-Build</u>. General estimates regarding types and locations of future development within the drainage basin was based on information from the MSB Capital Projects group (contacted in July of 2018). This information was used for input into the hydrologic full-build conditions model.
- *Soils Information.* Soil data were obtained from the NRCS 2017 Alaska Gridded Soil Survey Database. These soil data were used to define the soil characteristics throughout the drainage basin.
- *Rainfall Data*
    - <u>Historic</u>. Historic rainfall gage data were obtained from the National Centers for Environmental Information (formerly the National Climatic Data Center) Climate Data Online application. These data were used for hydrologic model calibration.
    - <u>Design Event Depths</u>. Design rain event depths were obtained from the NOAA Atlas 14, Volume 7 publication dated 2012. The NOAA Precipitation Frequency Data Server was used to obtain this publication's data in raster form for specific rain events. The publication also contains a historical precipitation trend analysis that was used for the climate non-stationarity analysis.
- *Historic Stream Data.* Historic stream gage data were obtained from the USGS National Water Information System Web Interface. These data were used for hydrologic model calibration.
- *Parcel and Right-of-Way Mapping.* Parcel and right-of-way mapping was provided by DOT&PF This information was supplemented with data obtained from the MSB online GIS server.

Data Summary

- *Previous Flood Studies and Mapping*
  - Flood Insurance Study. The 2019 MSB FEMA Flood Insurance Study was obtained from FEMA's Map Service Center. The Cottonwood Creek FEMA model file was provided by MSB Floodplain Administrator.
  - Edlund Project Hydrologic and Hydraulic (H&H) Report. Kinney Engineering, LLC provided the H&H report dated 8-9-16 for the Edlund Road project. The hydrologic information from this report was compared to the hydrology developed for this project.

Attachment 2: FEMA MT-2 Forms

(Attached as separate files within this document)

Attachment 3: Hydrologic Modeling Details

Hydrologic Modeling Details

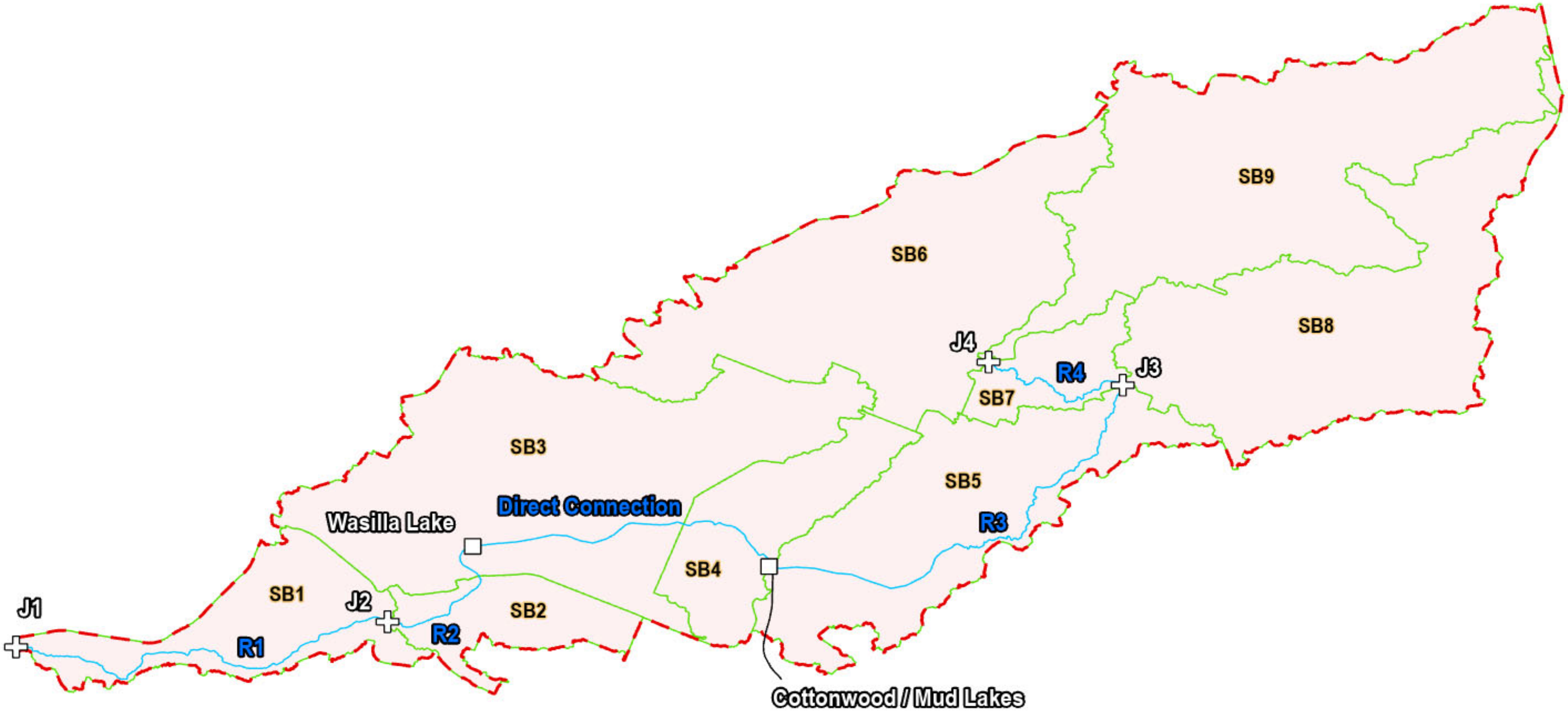
Subbasin Summary

Subbasin	Area (square miles)	Gage Weights		Soils				Land Cover	Transformation		Routing
		Palmer	Wasilla	Initial Content (fraction)	Saturated Content (fraction)	Suction (in)	Conductivity (in/hr)	Impervious (%)	Time of Concentration (hr)	Storage Coefficient	Downstream Connection
1	1.41	0.0	1.0	0.499	0.499	16.67	0.21	51	4.36	2.62	J1
2	0.79	0.0	1.0	0.499	0.499	17.08	0.21	54	2.66	1.60	J2 (USGS Gage)
3	4.48	0.0	1.0	0.497	0.497	17.56	0.20	47	2.01	1.21	Wasilla Lake
4	1.25	1.0	0.0	0.497	0.497	17.78	0.19	41	2.10	1.26	Cottonwood / Mud Lakes
5	2.68	0.7	0.3	0.496	0.496	18.46	0.18	43	2.29	1.38	Cottonwood / Mud Lakes
6	3.79	0.3	0.7	0.497	0.497	17.73	0.20	34	4.78	2.87	J4
7	0.61	1.0	0.0	0.497	0.497	17.71	0.20	31	4.86	2.91	J3
8	3.59	1.0	0.0	0.499	0.499	17.02	0.21	31	6.13	3.68	J3
9	4.33	1.0	0.0	0.499	0.499	17.06	0.21	34	7.34	4.40	J4

Hydrologic Modeling Details

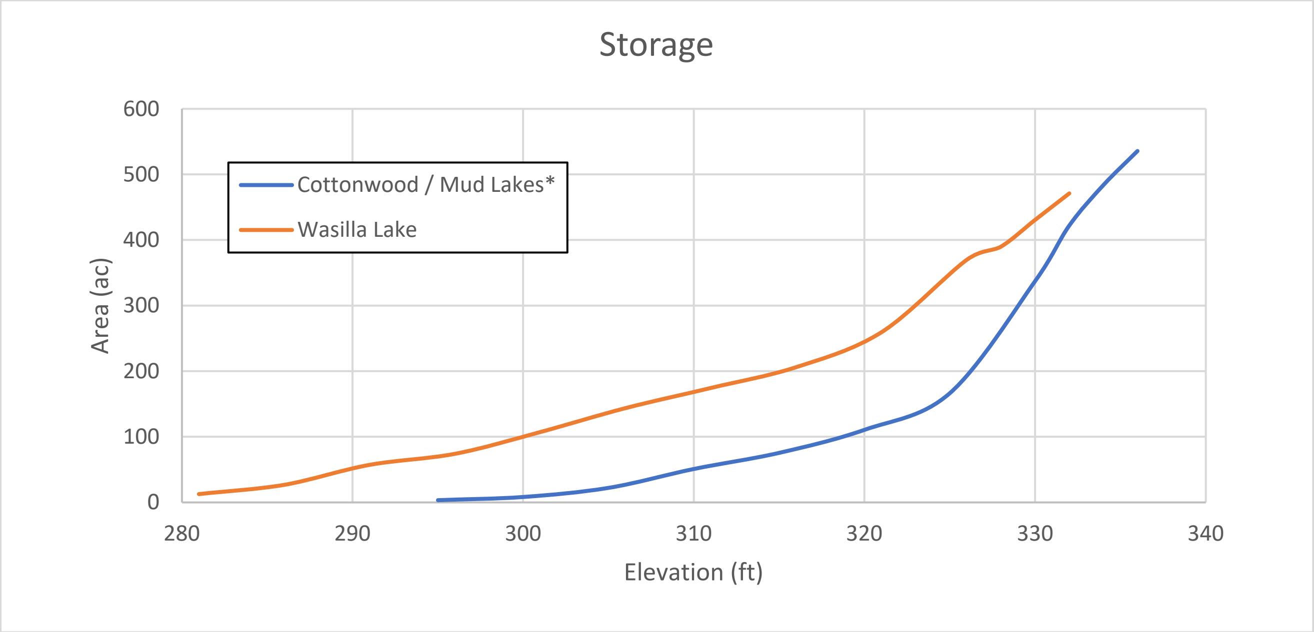
Reach Summary with Schematic

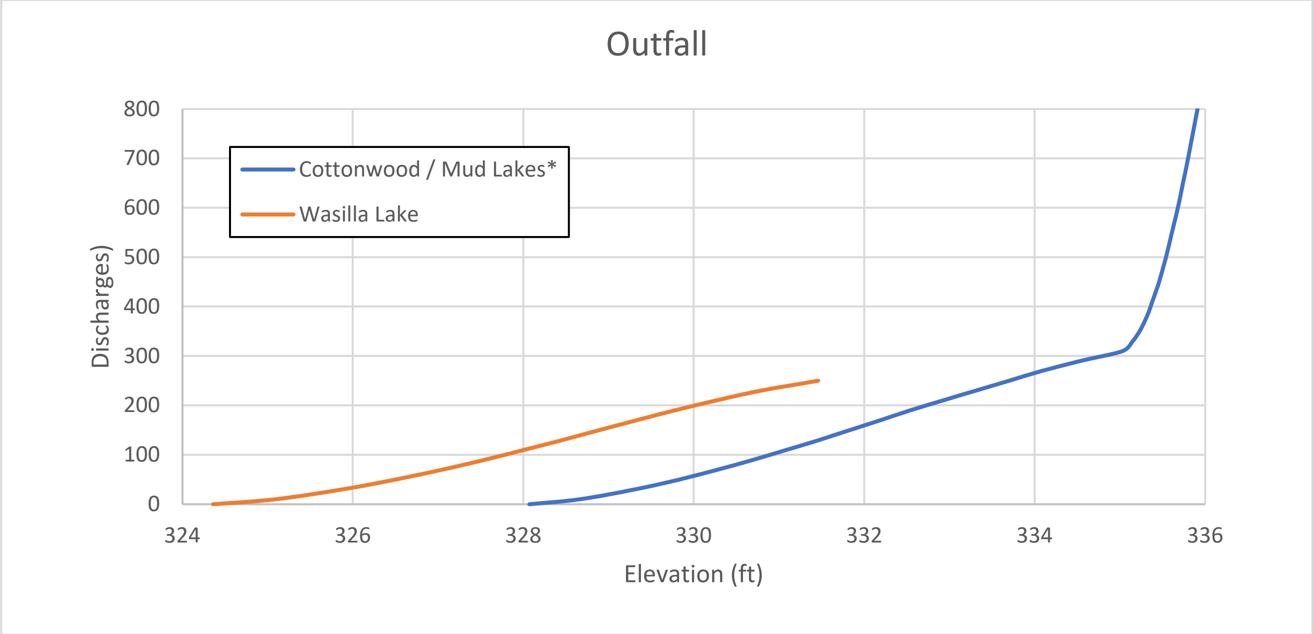
Reach	Main Channel			Floodplain			Routing	
	Side Slopes (_H:1V)	Depth (ft)	Bottom Width (ft)	Side Slopes (_H:1V)	Depth (ft)	Bench Width (ft)	Downstream Connection	Upstream Connection
R1	3	1	19.5	3	4	3	J1 (Project Site)	J2
R2	3	1	30	6	4	3	J2 (USGS Gage)	Wasilla Lake
R3	3	0.75	7.5	2.5	4	3	Cottonwood / Mud Lakes	J3
R4	4	1.5	2	3	1.5	119.25	J3	J4



Hydrologic Modeling Details

Rating Curves

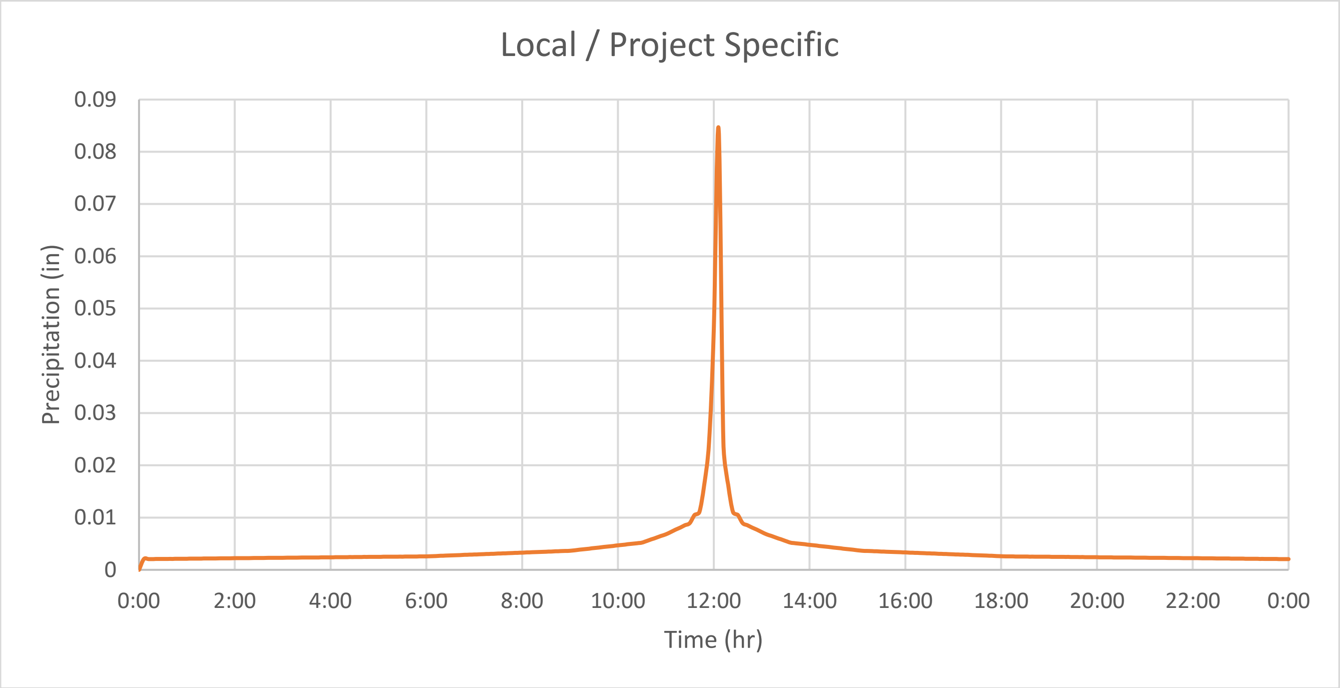




*Cottonwood and Mud lakes act as one storage unit under flood condtions.

Hydrologic Modeling Details

Rainfall Distribution



Hydrologic Modeling Details

Soil Property Lookup Table

Texture Class	**NRCS Soil Group**[1]	**Saturated Content - Porosity**[2] **(fraction)**	**Conductivity**[2] **(in/hr)**	**Suction**[2] **(in)**	**Intitial Content - Field Capacity**[3] **(fraction)**
Loamy Sand	A	0.437	2.406	5.59	0.105
Silt Loam	B	0.501	0.268	15.91	0.284
Clay Loam	C	0.464	0.091	17.56	0.31
Clay	D	0.475	0.024	28.11	0.378

Notes:

1 - SWMM User Manual, 2010, Page 161

2 - HEC-HMS Technical Reference Manual, 2000, Page 43

3 - SWMM User Manual, 2010, Page 160

Hydrologic Modeling Details

Percent Impervious Lookup Table

NLCD Classification	**NLCD ID**	**Impervious[1] (%)**
Open Water	11	100
Perennial Ice/Snow	12	100
Developed, Open Space	21	15
Developed, Low Intensity	22	40
Developed, Medium Intensity	23	70
Developed, High Intensity	24	95
Barren Land	31	2
Deciduous Forest	41	2
Evergreen Forest	42	2
Mixed Forest	43	2
Dwarf Shrub	51	2
Shrub/Scrub	52	2
Pasture/Hay	81	2
Cultivated Crops	82	2
Woody Wetlands	90	100
Emergent Herbaceous Wetlands	95	100

Notes:

1 - Assigned based on aerial imagery, NLCD classification descriptions, and SWMM Hydrology Reference Manual Page 66 (2016)

Attachment 4: Hydraulic Modeling Details

Hydraulic Modeling Details

Terrain Stamping

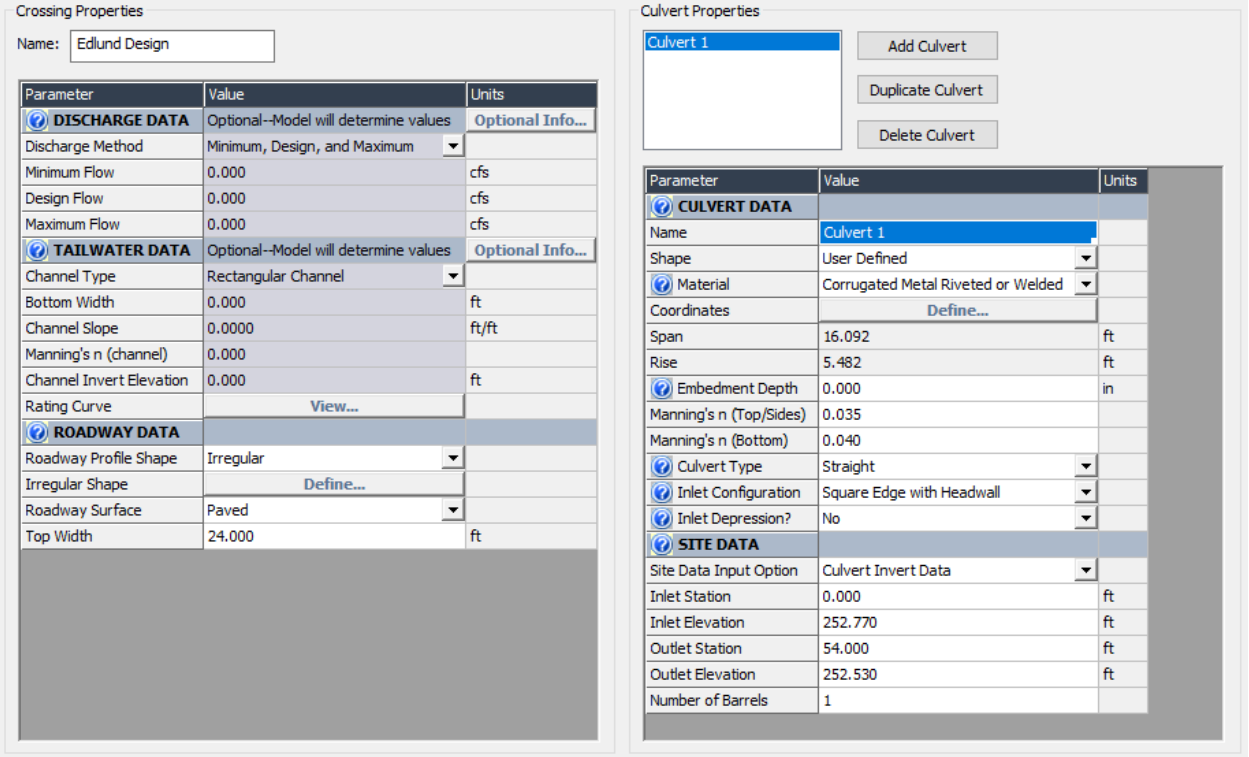
Main Channel

Parameter	Value	Notes
Channel Width (ft)	5 to 20	Assigned based on LIDAR data and image
Channel Depth (ft)	0.75	Assigned based on comparing survey and LIDAR data
Side Slope (_H:1V)	3	Assigned based on survey data

Hydraulic Modeling Details

Culvert Data

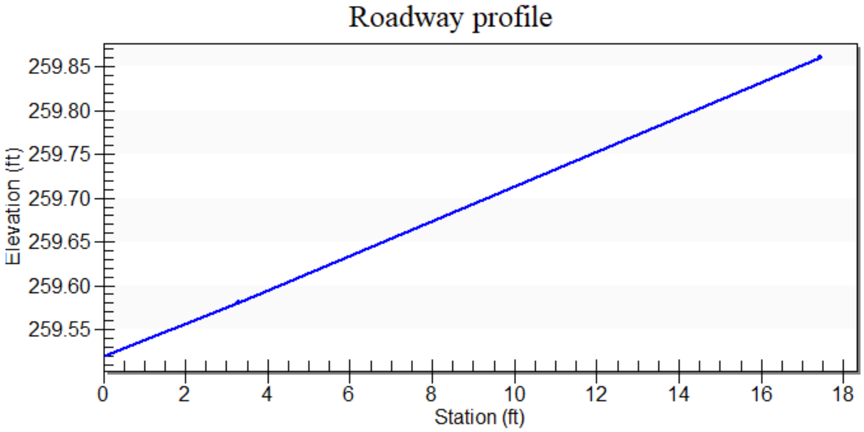
Edlund Culvert

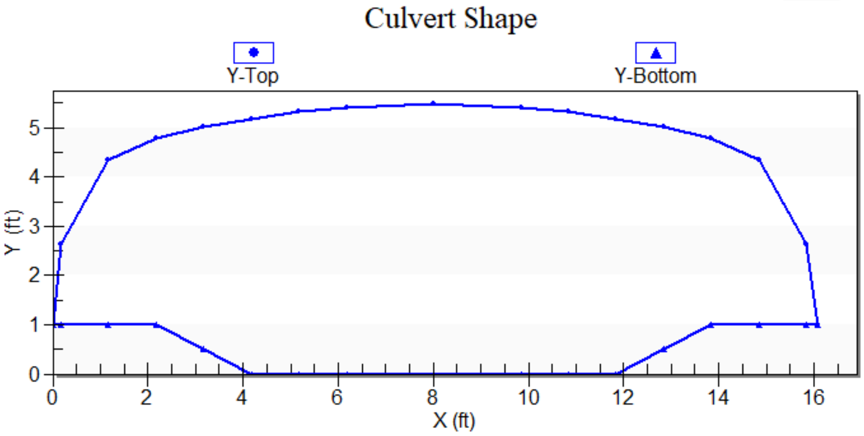


Name: Edlund Design

Parameter	Value	Units
DISCHARGE DATA	Optional--Model will determine values	Optional Info...
Discharge Method	Minimum, Design, and Maximum	
Minimum Flow	0.000	cfs
Design Flow	0.000	cfs
Maximum Flow	0.000	cfs
TAILWATER DATA	Optional--Model will determine values	Optional Info...
Channel Type	Rectangular Channel	
Bottom Width	0.000	ft
Channel Slope	0.0000	ft/ft
Manning's n (channel)	0.000	
Channel Invert Elevation	0.000	ft
Rating Curve	View...	
ROADWAY DATA		
Roadway Profile Shape	Irregular	
Irregular Shape	Define...	
Roadway Surface	Paved	
Top Width	24.000	ft

Parameter	Value	Units
CULVERT DATA		
Name	Culvert 1	
Shape	User Defined	
Material	Corrugated Metal Riveted or Welded	
Coordinates	Define...	
Span	16.092	ft
Rise	5.482	ft
Embedment Depth	0.000	in
Manning's n (Top/Sides)	0.035	
Manning's n (Bottom)	0.040	
Culvert Type	Straight	
Inlet Configuration	Square Edge with Headwall	
Inlet Depression?	No	
SITE DATA		
Site Data Input Option	Culvert Invert Data	
Inlet Station	0.000	ft
Inlet Elevation	252.770	ft
Outlet Station	54.000	ft
Outlet Elevation	252.530	ft
Number of Barrels	1	

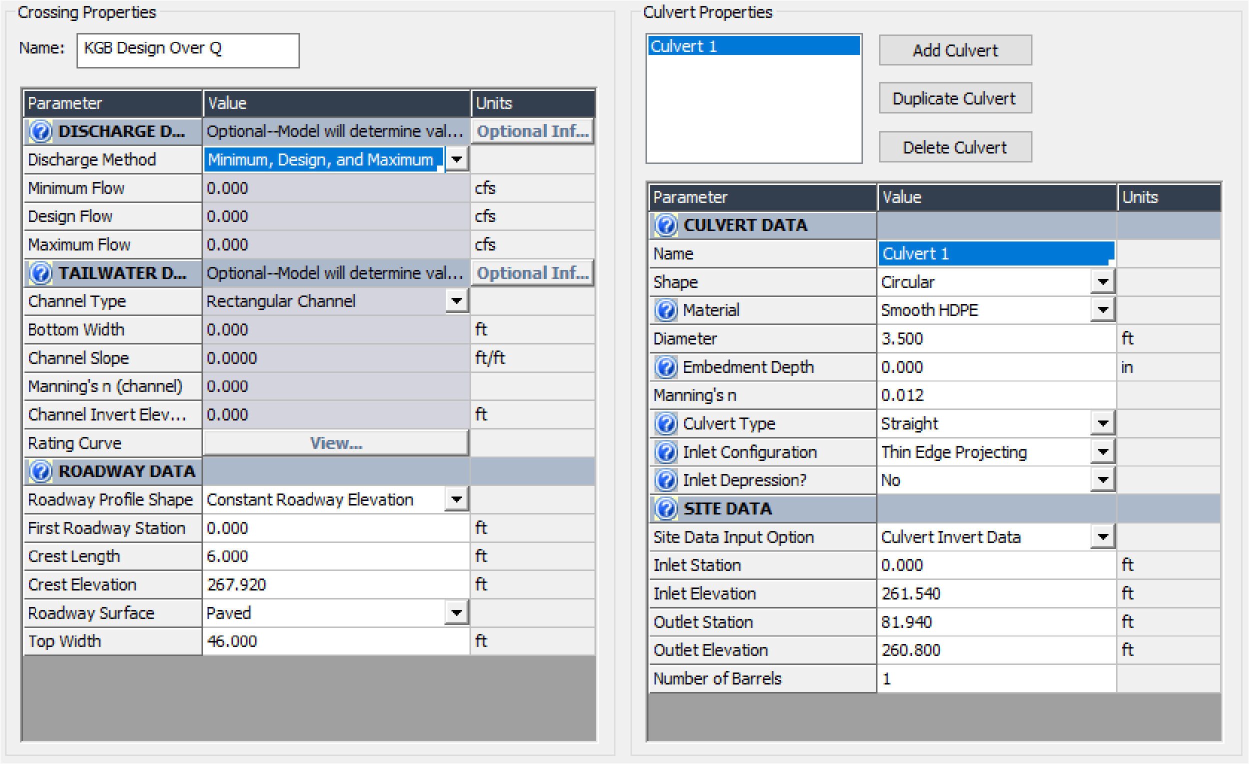

Roadway profile


Culvert Shape

Hydraulic Modeling Details

Culvert Data

Post-Project Weeping Birch Overflow Culvert



Crossing Properties

Name: KGB Design Over Q

Parameter	Value	Units
DISCHARGE D...	Optional--Model will determine val...	Optional Inf...
Discharge Method	Minimum, Design, and Maximum	
Minimum Flow	0.000	cfs
Design Flow	0.000	cfs
Maximum Flow	0.000	cfs
TAILWATER D...	Optional--Model will determine val...	Optional Inf...
Channel Type	Rectangular Channel	
Bottom Width	0.000	ft
Channel Slope	0.0000	ft/ft
Manning's n (channel)	0.000	
Channel Invert Elev...	0.000	ft
Rating Curve	View...	
ROADWAY DATA		
Roadway Profile Shape	Constant Roadway Elevation	
First Roadway Station	0.000	ft
Crest Length	6.000	ft
Crest Elevation	267.920	ft
Roadway Surface	Paved	
Top Width	46.000	ft

Culvert Properties

Culvert 1

Parameter	Value	Units
CULVERT DATA		
Name	Culvert 1	
Shape	Circular	
Material	Smooth HDPE	
Diameter	3.500	ft
Embedment Depth	0.000	in
Manning's n	0.012	
Culvert Type	Straight	
Inlet Configuration	Thin Edge Projecting	
Inlet Depression?	No	
SITE DATA		
Site Data Input Option	Culvert Invert Data	
Inlet Station	0.000	ft
Inlet Elevation	261.540	ft
Outlet Station	81.940	ft
Outlet Elevation	260.800	ft
Number of Barrels	1	

Hydraulic Modeling Details

Boundary Condition Data

Downstream Normal Depth Assumptions

Parameter	Value	Notes
Composite Manning's n	0.055	Approximate weighted average of main channel and overbank values
Slope (ft/ft)	0.0056	Assigned based on LIDAR data

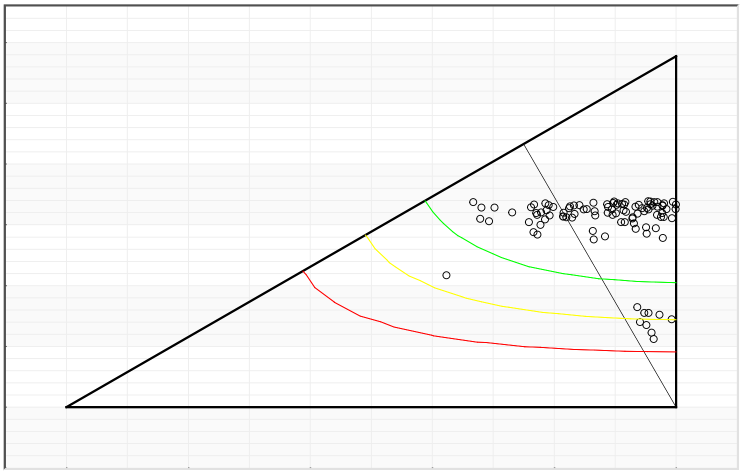
Hydraulic Modeling Details

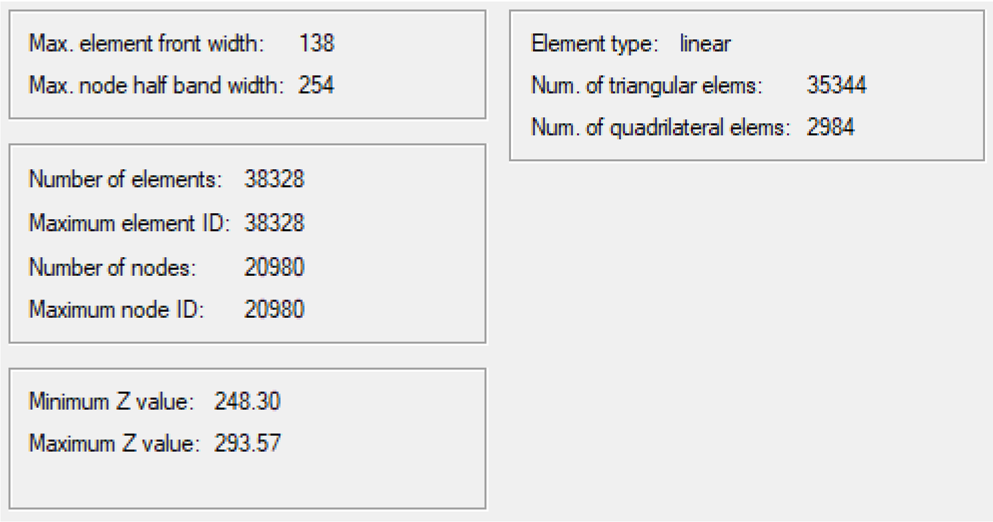
Mesh Data

Pre-Project Mesh Summary

Angle Representation Region

Q(Rr)





Max. element front width: 138

Max. node half band width: 254

Number of elements: 38328

Maximum element ID: 38328

Number of nodes: 20980

Maximum node ID: 20980

Minimum Z value: 248.30

Maximum Z value: 293.57

Element type: linear

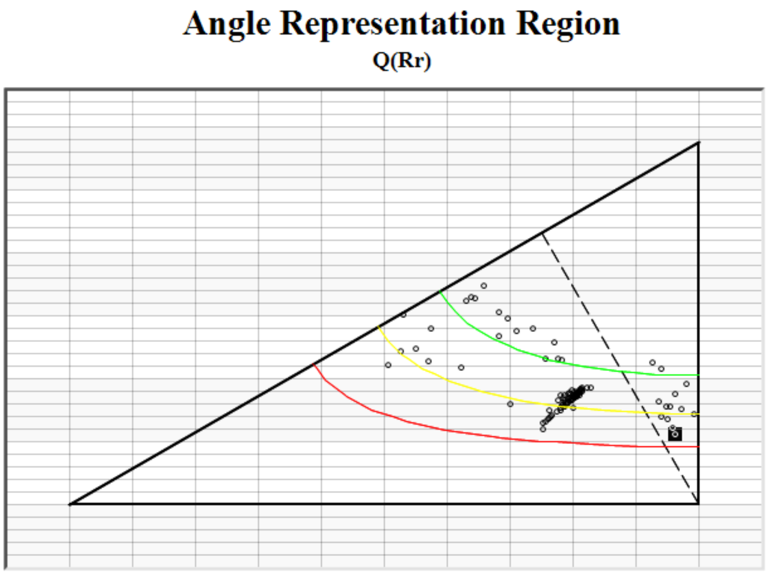
Num. of triangular elems: 35344

Num. of quadrilateral elems: 2984

Hydraulic Modeling Details

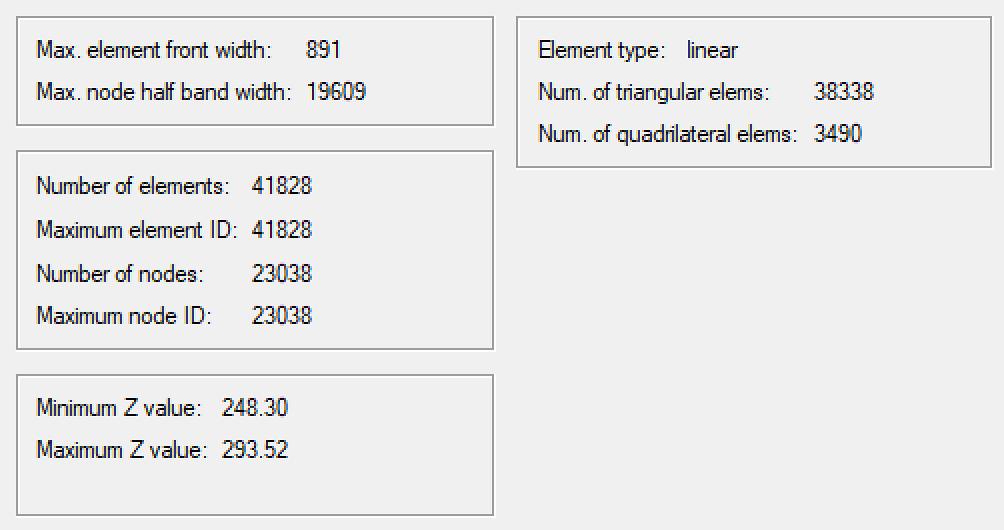
Mesh Data

Post-Project Mesh Summary



Angle Representation Region

Q(Rr)



Max. element front width: 891

Max. node half band width: 19609

Number of elements: 41828

Maximum element ID: 41828

Number of nodes: 23038

Maximum node ID: 23038

Minimum Z value: 248.30

Maximum Z value: 293.52

Element type: linear

Num. of triangular elems: 38338

Num. of quadrilateral elems: 3490

Hydraulic Modeling Details

Manning's n Assignment

Cowan Method Summary

Factor	Main Channel		Overbank		Open Overbank		Refrence[1]
	Value	**Channel Conditions**	**Value**	**Channel Conditions**	**Value**	**Channel Conditions**	
Base Value (n_b)	0.04	-	0.04	-	0.04	-	Equation 5[2]
Degree of Irregularity (n_1)	0	None	0	None	0	None	Table 2
Variation in Channel Cross Section (n_2)	0	None	0	None	0	None	Table 2
Effect of Obstruction (n_3)	0.002	Negligible - Mid	0.005	Minor - Low	0.005	Minor - Low	Table 2
Amount of vegetation (n_4)	0.002	Small - Low	0.035	Large - Mid	0.01	Medium - Low	Table 2
Degree of meandering (m)	1	Minor	1	Minor	1	Minor	Table 2
Channel Value (n)	0.044		0.08		0.055		Equation 3

Notes:

1 - Guide for Selecting Manning's Roughness Coefficients for Natural Channels and Flood Plains, USGS, 1989

2 - Inputs from field measurements

Hydraulic Modeling Details

Manning's n Assignment

Standard Published Values

Surface	Value	Reference / Notes
Pavement	0.016	Table 5.1.1[1]
Gravel	0.02	Table 5.1.1[1]
Grass	0.03	Table 5.1.1[1]
Building/Connex	0.2	Selected and tested with sensitivity analysis
Riprap	0.06	Table 2.2[2] - Assume 3.3' flow depth and Class I / Value rounded

Notes:

1 - Water Resources Engineering, Mays, 2011

2 - HEC-15 Design of Roadside Channels with Flexible Linings, FHWA, 2005

Hydraulic Modeling Details

Manning's n Assignment

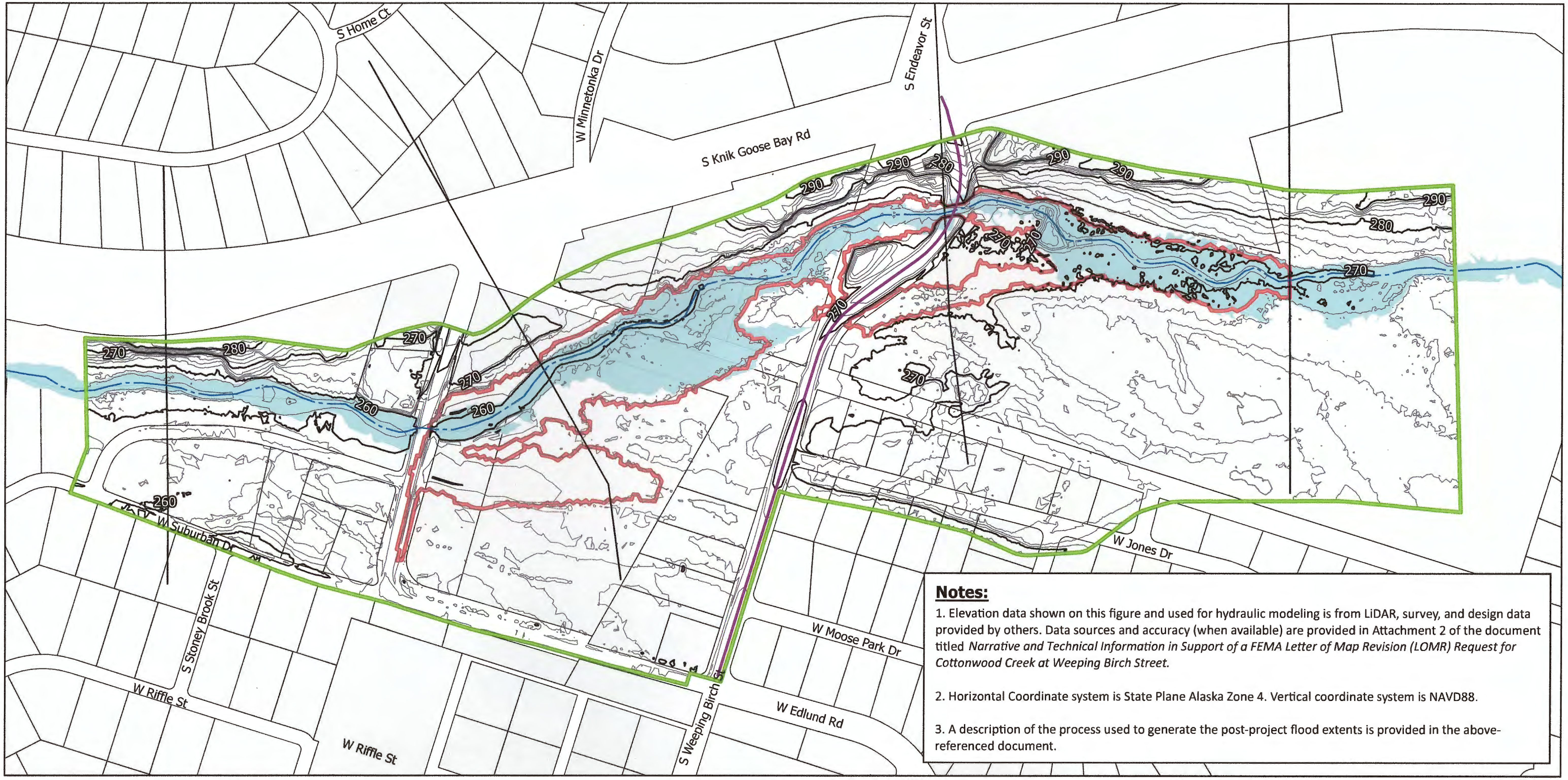
Pre-Project Manning's Schematic

Hydraulic Modeling Details

Manning’s n Assignment

Post-Project Manning’s Schematic

Attachment 5: Certified Topographic Work Map



Notes:

1. Elevation data shown on this figure and used for hydraulic modeling is from LiDAR, survey, and design data provided by others. Data sources and accuracy (when available) are provided in Attachment 2 of the document titled *Narrative and Technical Information in Support of a FEMA Letter of Map Revision (LOMR) Request for Cottonwood Creek at Weeping Birch Street.*

2. Horizontal Coordinate system is State Plane Alaska Zone 4. Vertical coordinate system is NAVD88.

3. A description of the process used to generate the post-project flood extents is provided in the above-referenced document.

Topographic Work Map

FEMA LOMR Request for Cottonwood Creek at Weeping Birch Street

Legend

- 🟩 Study Limits
- — New Weeping Birch Street Centerline
- -·- Cottonwood Creek
- — Effective FEMA Cross Section
- 🟥 Post-Project 1% AEP Flood Extents (proposed revision area only)
- 🟦 Effective 1% AEP Flood Extents
- ☐ Parcels
- ☐ Right-of-Way or Section Line Easement

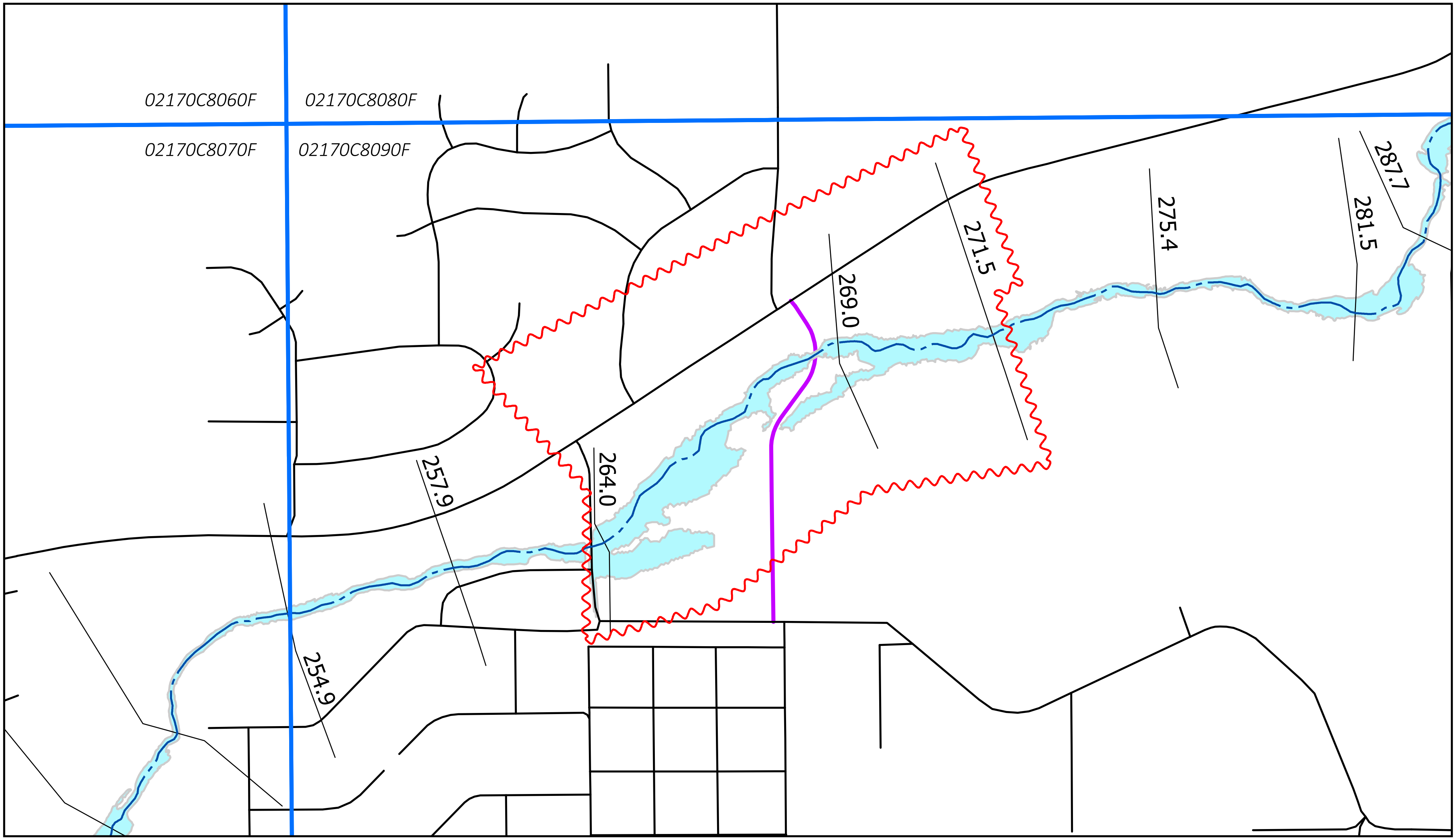
STATE OF ALASKA 49TH
Aaron Havel
12/8/25
CE No. 107250
REGISTERED PROFESSIONAL ENGINEER

0 175 350 700 Feet
1 inch = 350 feet 1:4,200

AWR Engineering, LLC
2702 Gambell Street, Suite 104
Anchorage, Alaska 99503
COA: AECL 1470

N

Attachment 6: Annotated FIRM



Annotated FIRM - Map Number 02170C8090F

FEMA LOMR Request for Cottonwood Creek at Weeping Birch Street

Legend

- New Weeping Birch Street Centerline
- Revision Area
- FIRM Panel Limit
- Cross Section with 1% Annual Chance Water Surface Elevation
- Special Flood Hazard Areas - Zone A

N

0 500 1,000 2,000 Feet

1 inch = 1,000 feet 1:12,000

Vertical Datum: NAVD88

AWR Engineering, LLC 11-07-25

Attachment 7: FEMA Payment Information Form

(Attached as separate files within this document)

Attachment 8: Relevant Design Plans

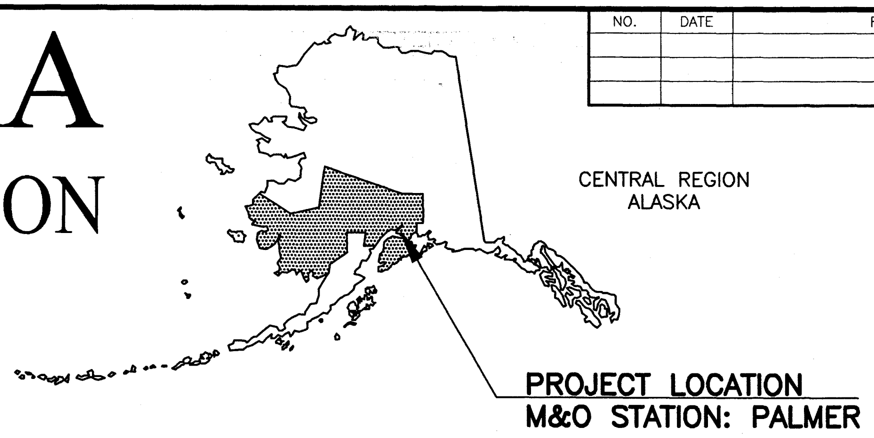
DESIGNED BY DKM, KEP
CHECKED BY ---
DRAFTED BY KEP
SCALE N/A
DATE 4/25/2022 TIME 9:48 AM
DRAWING LOCATION
W:\PROJECTS\KGB ROAD RECON CENTAUR TO VINE - 52464\CIV3D19_PHASE_I\PLANSET\52464_A1-A2_PH1-TTL.DWG

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION
AND PUBLIC FACILITIES

NO.	DATE	REVISION

STATE	PROJECT DESIGNATION	YEAR	SHEET NO.	TOTAL SHEETS
ALASKA	0525019/CFHWY00599	2022	A1	A10

ROUTE ID	2381037X000	MILEPOINT	0.360 - 4.148
LATITUDE	61.555065°	LONGITUDE	-149.493582°



PROPOSED HIGHWAY PROJECT
KNIK-GOOSE BAY ROAD RECONSTRUCTION
PHASE 1 - FAIRVIEW LOOP TO CENTAUR AVENUE
PROJECT NO. 0525019/CFHWY00599
GRADING, DRAINAGE, PAVING, PATHWAYS, ILLUMINATION, SIGNALIZATION, SIGNING, AND STRIPING

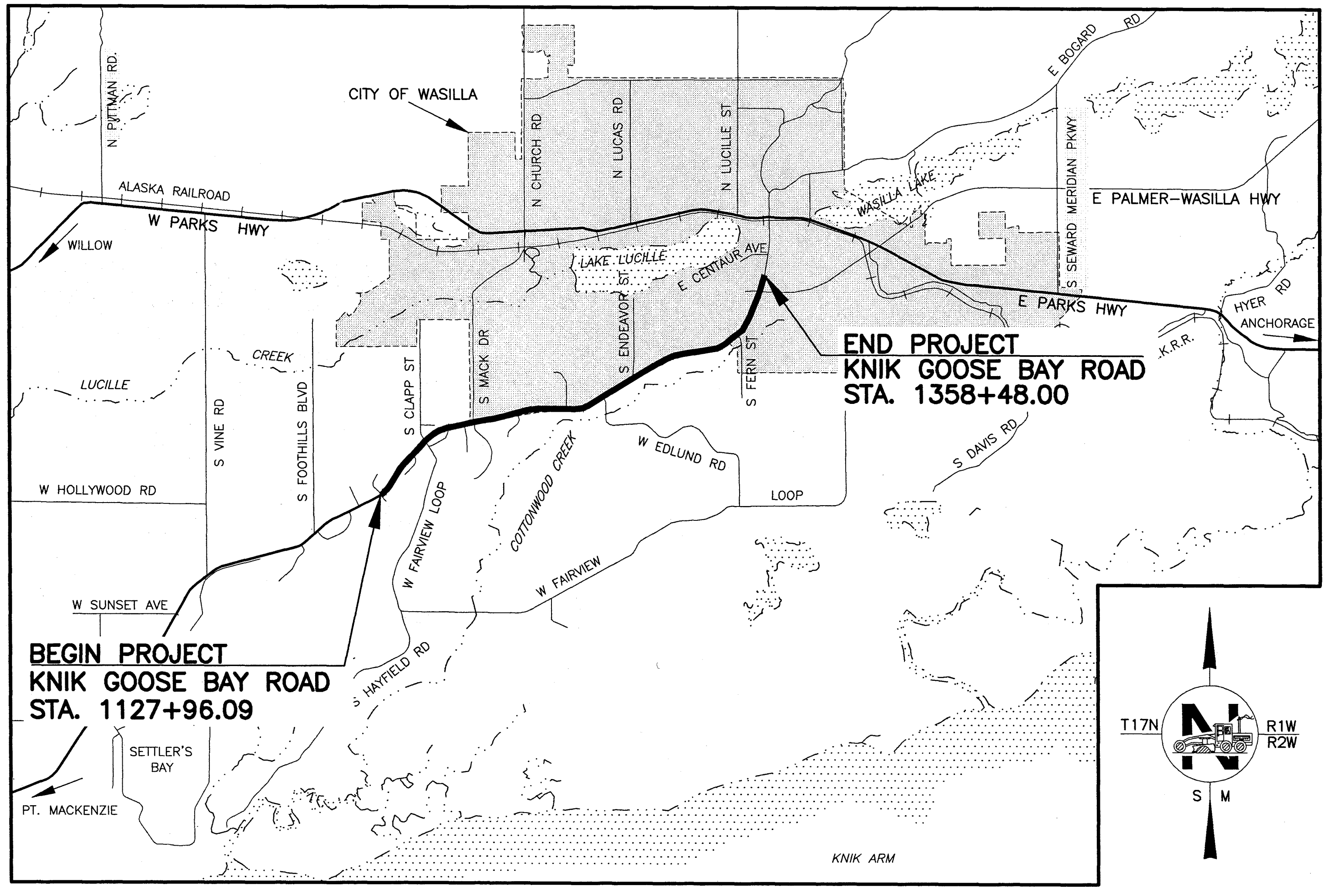
PROJECT SUMMARY

ROADWAY	WIDTH	LENGTH
S KNIK-GOOSE BAY ROAD	40 - 114 FT	4.4 MILES
COTTONWOOD CREEK BRIDGE NO. 2364	48 FT	50 FT 6 ½ IN

DESIGN DESIGNATIONS

S KNIK-GOOSE BAY RD:
W FAIRVIEW LOOP - E CENTAUR AVE

FUNCTIONAL CLASS	URBAN ARTERIAL
AADT (2018)	18,124 - 20,729
AADT (2040)	28,795 - 31,718
DESIGN SPEED (V) (MPH)	60 MPH
DHV (2018)	11.0
DHV (2040)	11.0
T-PERCENT COMMERCIAL TRUCKS (%)	4.85%
D-DIRECTIONAL DISTRIBUTION (%)	50 / 50



END PROJECT
KNIK GOOSE BAY ROAD
STA. 1358+48.00

BEGIN PROJECT
KNIK GOOSE BAY ROAD
STA. 1127+96.09

CENTRAL REGION
AS-ADVERTISED
MAY 2022

Volume 1 of 4

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION & PUBLIC FACILITIES
4111 AVIATION AVENUE, ANCHORAGE, AK 99502
(907)269-0590

APPROVED: Jenelle Brinkman 4/27/2022
For!
REGIONAL PRECONSTRUCTION ENGINEER DATE

CONCUR: 4/27/2022
REGIONAL CONSTRUCTION ENGINEER DATE

DRAWING LOCATION	DATE	TIME	SCALE	DESIGNED BY	DKM, KEP
W:\PROJECTS\KGB ROAD RECON CENTAUR TO VINE - 52464\CIV3D19_PHASE_I\PLANSET\52464_A1-A2_PH1-TTL.DWG	4/25/2022	9:48 AM	N/A	CHECKED BY	---
				DRAFTED BY	KEP

NO.	DATE	REVISION

STATE	PROJECT DESIGNATION	YEAR	SHEET NO.	TOTAL SHEETS
ALASKA	0525019/CFHWY00599	2022	A2	A10

GENERAL NOTES:

1. ALL CONSTRUCTION SHALL BE CONTAINED WITHIN THE RIGHT-OF-WAY, TEMPORARY CONSTRUCTION EASEMENTS, AND TEMPORARY CONSTRUCTION PERMITS. NO EXCESS MATERIAL SHALL BE DISPOSED OF WITHIN THE RIGHT-OF-WAY, UNLESS SPECIFICALLY CALLED FOR IN THE PLANS OR DIRECTED BY THE ENGINEER.
2. ALL PAVEMENT CUTS SHALL BE MADE WITH A SAW OR ALTERNATE METHOD APPROVED BY THE ENGINEER.
3. CLEARING LIMITS ALONG KGB SHALL BE FROM RIGHT-OF-WAY LINE TO RIGHT-OF-WAY LINE. CLEARING LIMITS ALONG ALL OTHER ROADWAYS SHALL BE 10 FEET BEYOND SLOPE CATCH POINTS OR 5 FEET INSIDE THE RIGHT-OF-WAY LINE, WHICHEVER IS LESS. IN WETLAND AREAS, CLEARING LIMITS SHALL BE 10 FEET BEYOND SLOPE CATCH POINTS.
4. PLACE 4" TOPSOIL AND SEED ON ANY AREAS DISTURBED BY CONSTRUCTION AND AS DIRECTED BY THE ENGINEER.
5. THE EXISTING INFORMATION SHOWN IN THE PLANS IS FROM AS-BUILTS AND HAS BEEN PARTIALLY FIELD VERIFIED. FIELD CONDITIONS MAY NOT BE ACCURATELY REPRESENTED AND/OR MAY HAVE CHANGED. ADJUST INSTALLATIONS AS DIRECTED BY THE ENGINEER.
6. ADJUST ALL PAVEMENT PENETRATIONS TO FINAL GRADE PRIOR TO TOP LIFT OF PAVING.

   IF ANY PAVEMENT PENETRATION REQUIRES GRADE ADJUSTMENT AFTER FINAL LIFT PAVING, AS DETERMINED BY THE ENGINEER, SAW CUT A NEAT LINE ALONG THE PAVEMENT TO BE REMOVED. USE AN INFRARED HEATER TO HEAT THE EXISTING PAVEMENT; EQUIPMENT AND MAXIMUM TEMPERATURE SHALL BE APPROVED BY THE ENGINEER. REPLACE THE REMOVED ASPHALT WITH NEW HOT MIX ASPHALT AND THOROUGHLY COMPACT. SEAL JOINTS, AT LEAST 12 INCHES WIDE CENTERED ON JOINT, USING ASPHALT SYSTEMS GSB-88, OR APPROVED EQUAL, WHILE THE HOT MIX ASPHALT IS CLEAN, FREE OF MOISTURE AND PRIOR TO STRIPING.

   THERE SHALL BE NO PAYMENT FOR ADDITIONAL WORK CAUSED BY FAILURE TO ADJUST PAVEMENT PENETRATIONS TO FINAL GRADE.
7. CONSTRUCT CURB RAMPS TO AVOID IMPACTING SIGNAL POLE FOUNDATIONS. DO NOT COVER SIGNAL POLE FOUNDATION BOLTS AND BASE PLATES WITH TOPSOIL.
8. FOR PARALLEL GUARDRAIL TERMINALS, USE AN END OFFSET OF 2 FEET UNLESS DIRECTED BY THE ENGINEER.
9. MAINTAIN FOUR FEET OF COVER OVER THE 20 INCH GAS TRANSMISSION LINE, REDUCE DITCH DEPTH WHEN NECESSARY.
10. A 12 INCH MINIMUM SEPARATION FROM OTHER UNDERGROUND STRUCTURES AND FACILITIES SHALL BE MAINTAINED AROUND THE 20 INCH GAS TRANSMISSION LINE. COORDINATE WITH THE ENGINEER TO RESOLVE ANY CONFLICTS.
11. ALL TYPE "A" INLET BOXES SHALL HAVE MINIMUM 18" SUMPS.
12. WHEN INSTALLING SHORT RADIUS GUARDRAIL PER ALASKA STANDARD PLAN G-26.00, MATCH PAVEMENT AND GUARDRAIL RADII SUCH THAT PAVEMENT EXTENDS TO FACE OF GUARDRAIL. WHEN NECESSARY, TAPER PAVEMENT AT A RATE OF 10:1.

ALIGNMENT ABBREVIATIONS:

CARY	S CARYSHEA ST
CLAP	S CLAPP ST
DRIV	DRIVEWAY
EAGL	S EAGLE EYE CIR
EDLN	W EDLUND RD
ENDV	S ENDEAVOR ST
FAIR	W FAIRVIEW LOOP
FERN	S FERN ST
FRNK	E FRANK SMITH WAY
HARM	E HARMONIOUS DR
HERI	S HERITAGE FARM RD
HDRK	HARDROCK CIRCLE
KGB	S KNIK-GOOSE BAY RD
LAKE	S LAKEWOOD DR
MACK	S MACK DR
MNTK	W MINNETONKA DR
MINI	S MINNIE WAY
MOOS	W MOOSE PARK DR
OLKC	S OLD KNIK CIR
OLDK	S OLD KNIK RD
PHI	PHASE I TAPER
PIPE	W PIPESTONE DR
PWHY	E PALMER-WASILLA HWY
RILY	E RILEY AVE
ROGR	E ROGERS CIR
SAKA	S SAKAI ST
STON	W STONEBLUFF DR
VOLT	S VOLT PL
WEEP	S WEEPING BIRCH ST

SPECIFICATION:

CONSTRUCT THE IMPROVEMENTS COVERED BY THESE PLANS IN ACCORDANCE WITH THE ALASKA DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES 2020 STANDARD SPECIFICATIONS FOR HIGHWAY CONSTRUCTION AND THE PROJECT SPECIAL PROVISIONS.

INDEX

	SHEET NO.	DESCRIPTION
Volume 1	A1	TITLE SHEET
	A2	INDEX, ABBREVIATIONS, AND GENERAL NOTES
	A3	LEGEND
	A4	PROJECT LAYOUT
	A5-A10	SURVEY CONTROL SHEETS
	B1-B8	TYPICAL SECTIONS
	C1-C3	ESTIMATE OF QUANTITIES
	D1-D22	SUMMARY TABLES
	E1-E13	DETAIL SHEETS
	F1-F59	PLAN AND PROFILE SHEETS
Volume 2	G1-G11	GRADING PLANS
	H1-H21	TRAFFIC DETAILS
	HA1-HA6	SIGNAL SYSTEM SHEETS
	HB1	SIGNAL SYSTEM SHEET
	HC1	SIGNAL SYSTEM SHEET
	HD1-HD6	SIGNAL SYSTEM SHEETS
	HE1	SIGNAL SYSTEM SHEET
	HF1-HF6	SIGNAL SYSTEM SHEETS
	HG1-HG6	SIGNAL SYSTEM SHEETS
	HH1-HH28	ILLUMINATION, INTERCONNECT, SIGNALIZATION, SIGNING, AND STRIPING
	HI1-HI23	SIGN SUMMARY
Volume 3	J1-J3	TRAFFIC CONTROL PLANS
	K1-K15	AUTOMATED TRAFFIC RECORDER PLANS
	N1-N24	BRIDGE SHEETS
	R1-R39	RIGHT-OF-WAY MAPS
	U1-U11	UTILITY SHEETS

Volume 4

THE FOLLOWING ALASKA STANDARD PLANS APPLY TO THIS PROJECT:

C-04.12, C-05.20,
D-01.02, D-06.10, D-20.05, D-22.01, D-23.01, D-24.00, D-26.04,
F-01.04, F-03.02,
G-00.05, G-05.11S, G-05.11W, G-09.05S,
G-10.20, G-11.01, G-14.01, G-16.00, G-20.12, G-26.00, G-32.02,
G-47.00,
I-22.11,
L-25.01, L-30.11,
M-13.01, M-16.01, M-20.15, M-23.13,
S-00.12, S-05.02, S-23.00, S-30.05, S-31.02, S-32.02,
T-05.10, T-20.04, T-21.04, T-22.04, T-23.01, T-25.10, T-30.12,
T-52.22, T-53.01, T-55.11, T-56.11, T-57.11
U-03.01

THE FOLLOWING CENTRAL REGION STANDARD DETAILS APPLY TO THIS PROJECT:

CR-T-01.20, CR-T-04.10

IN THE EVENT OF CONFLICT, CENTRAL REGION STANDARD DETAILS SUPERSEDE ALASKA STANDARD PLANS, STANDARD MODIFICATIONS, AND STANDARD SPECIFICATIONS. PLANS AND SPECIAL PROVISIONS SUPERSEDE CENTRAL REGION STANDARD DETAILS.

AlexRead
ALEXANDER L. READ
CE 14657
4/26/2022

STATE OF ALASKA DOT&PF
4111 AVIATION AVENUE
ANCHORAGE, AK 99502
(907) 269-0590

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION
AND PUBLIC FACILITIES

KNIK-GOOSE BAY ROAD
RECONSTRUCTION
PHASE 1 - FAIRVIEW LOOP TO
CENTAUR AVENUE

INDEX, ABBREVIATIONS, AND
GENERAL NOTES

DESIGNED BY	DKM, KEP
CHECKED BY	---
DRAFTED BY	KEP

SCALE
1" =1'

DATE	TIME
4/22/2022	1:03 PM

DRAWING LOCATION
W:\PROJECTS\KGB ROAD RECON CENTAUR TO VINE - 52464\CIV3D19_PHASE_1\PLANSET\52464_A3_LGND.DWG

NO.	DATE	REVISION

STATE	PROJECT DESIGNATION	YEAR	SHEET NO.	TOTAL SHEETS
ALASKA	0525019/CFHWY00599	2022	A3	A10

ROADWAY

	EXISTING	PROPOSED
EDGE OF PAVEMENT	- - - - -	———
LIMIT OF CUT SLOPE & FILL SLOPE		CUT— — — FILL···········
GRAVEL EDGE	— · —	— · —
SIDEWALK AND PATH/TRAIL		
CONCRETE CURB & GUTTER		
CONCRETE CURB CUT		
PARALLEL CURB RAMP PERPENDICULAR CURB RAMP		
DETECTABLE WARNING TILE		
BRIDGE		
GUARDRAIL	○ ○ ○ ○ ○ ○	● ● ● ● ● ●
END & PARALLEL END SECTIONS		
ROADWAY OBLITERATION		▨
FENCE	— — x — — x —	— — x — — x —
NOISE BARRIER	====X====X	====X====X
RETAINING WALL		
BOTTOM OF DITCH		
SPECIAL DITCH	—>—>—>—	—>—>—>—
FLAT BOTTOM DITCH		
BERM		
RIPRAP		
BOULDER OR BOULDERS		
PRIVATE SIGN, MAILBOX	MB	MB
POST, BOLLARD	□ ○	■ ●
INFILTRATION/DETENTION BASIN		
CHECK DAM		
GEOTEXTILE		— · —
DITCH LINING		▨
POROUS BACKFILL		▨
FILTER BLANKET		▨
PATTERNED CONCRETE		▨
ASPHALT		▨

UTILITIES

	EXISTING	PROPOSED
STORM DRAIN	— SD —	
STORM DRAIN MANHOLE, CLEANOUT	◎SD ○CO	◎SD ○CO
CURB INLET CATCH BASIN FIELD INLET CATCH BASIN	FI	FI
PIPE CULVERT WITH END SECTION		
SANITARY SEWER	— SS —	— SS —
SANITARY SEWER MANHOLE, CLEANOUT	○SS ○CO	○SS ○CO
SEPTIC VENT, SEWER SERVICE CONNECTION	S ▽	▼
WATER	— W —	— W —
FIRE HYDRANT, VALVE OR RISER		⋈
WELL, WATER SERVICE CONNECTION	Ⓦ	
NATURAL GAS	— G — — G —	
TRANSMISSION GAS LINE	—TG— —TG—	
OIL OR GASOLINE PIPELINE	— O — O —	
TANKS (ABOVE GROUND, UNDERGROUND)	U	
ELECTRIC	— OE — (OVERHEAD) — UE — (UNDERGROUND) — OE&OT — (OVERHEAD)	
UTILITY POLE, POLE WITH LUMINAIRE		
GUY POLE, GUY WIRE ANCHOR	GP	
TRANSMISSION TOWER (WOOD, STEEL)		
ELECTRIC PEDESTAL, TRANSFORMER	E E	
ELECTRIC MANHOLE, METER	E	
ELECTRIC OUTLET, LANDSCAPE LIGHT		
TELEPHONE	— OT — (OVERHEAD) — UT — (UNDERGROUND) — UT&TV — (UNDERGROUND)	
TELEPHONE MANHOLE, PEDESTAL	T T	
FIBER OPTIC	— FO —	
FIBER OPTIC MANHOLE	FO	
CABLE TV	— OTV — (OVERHEAD) — UTV — (UNDERGROUND)	
CABLE TV PEDESTAL, SATELLITE DISH	V	
UNDERGROUND DUCT, UTILIDOR (ELECTRIC, TELEPHONE, FIBER OPTIC)	==========	
VENT	⊙	

TOPOGRAPHY

	EXISTING
LAKE OR POND, WETLANDS	LAKE/POND
TREE (CONIFER/DECIDUOUS) TREELINE (EDGE OF VEGETATION)	
PLANTER	
BUILDING OR FOUNDATION	

	EXISTING	PROPOSED
CONTOUR, MAJOR OR MINOR	520	520
DRAINAGE FLOW	←	←
CREEK (CENTERLINE)		
RIVER (EDGE OF WATER)		

TRAFFIC

	EXISTING	PROPOSED
LOAD CENTER		☒
STATE TRAFFIC, MOA TRAFFIC, & BEACON CONTROLLER ARROW INDICATES DOOR LOCATION		☒
TYPE 1A, II, III, IV JUNCTION BOX		## ## ## ##
FIBER OPTIC VAULT	F/O	F/O ##
ELECTROLIER		##
HIGHTOWER		HT#
SIGNAL POLE WITH MASTARM		14
PEDESTRIAN PUSH BUTTON & SIGNAL		## ##
VEHICULAR SIGNAL		##
VEHICULAR SIGNAL LEFT & RIGHT		## ##
OPTICAL, CAMERA, RADAR, AND GPS DETECTOR		A CAM # RAD # GPS C
LOOP DETECTOR		###
COMMUNICATION ANTENNA		
RURAL & SCHOOL ZONE BEACON		## ##
LOOP DETECTOR CONDUIT	- - - - -	— — — — —
SIGNAL CONDUIT	— TR —	— - - - — TR —
LIGHTING CONDUIT	— LTG —	— - - - — LTG —
SIGNAL & LIGHTING CONDUIT	— T/L —	— - - - — T/L —
CONDUIT BORING		
CONDUIT SIZE IN INCHES	2"-3C4	2" 1-3C4 CKT BA12 CKT BA13 ▶
INTERCONNECT	— I/C —	— I/C —
SIGN POST		##
RIGID DELINEATOR		W
FLEXIBLE DELINEATOR		●

PAVEMENT MARKINGS

	PROPOSED
TRAFFIC PROJECT CENTERLINE	——— — ——— — ———
8" & 4" WHITE SOLID STRIPE	8"W 4"W
4" WHITE SKIP STRIPE 10' STRIPES AND 30' SPACES	4"W SKIP
8" WHITE LANE GUIDE SKIP LANE CONTINUATION OR TURN SKIP 1' STRIPES AND 3' SPACES	8"W GUIDE SKIP
8" & 4" YELLOW SOLID STRIPE	8"Y 4"Y
4" YELLOW SKIP STRIPE 10' STRIPES AND 30' SPACES	4"Y SKIP
STRIPING CHANGE STATION INTERVAL	+20
2' CROSSWALK OR STOPBAR	24"W (TYP)
LADDER CROSSWALK LAYOUT 2' WIDE RUNGS WITH 2' SPACES ALIGNED TO AVOID TIRE PATHS	10'
TYPICAL PAINTED MEDIAN	12' (2)-4"Y 3" APART VARIES 18"Y @ 45°

RIGHT-OF-WAY

	RECOVERED	SET THIS PROJECT
FEDERAL GOV'T SURVEY MONUMENT		
GOV'T CONTROL STATION		
PRIMARY MONUMENT (BRASS/AL CAP)	⊕	
MISC SECONDARY CORNER	○	●
PRIMARY CENTERLINE MONUMENT		
SECONDARY CENTERLINE MONUMENT	◑	◑
RANDOM CONTROL MONUMENT	RCM	
PRIMARY GPS CONTROL POINT	GPS	
HORIZONTAL CONTROL POINT	CP	
SECONDARY CONTROL POINT	SCP	
VERTICAL BENCHMARK	BM	
TEMPORARY BENCHMARK	TBM	
TOWNSHIP AND RANGE LINES	T13N T12N R3W R2W	
SECTION LINE	———	
1/4 SECTION LINE	——— ———	
1/16 SECTION LINE	——— ——— ———	
CORPORATE or CITY LIMITS	━━ ━ ━	
EXISTING RIGHT-OF-WAY	▨	
RIGHT-OF-WAY OR EASEMENT REQUIRED	▨	
PROJECT RIGHT-OF-WAY LINE	———	
EXISTING RIGHT-OF-WAY EASEMENT	- - - - - -	
EXISTING PROPERTY LINE	———	
CONTROLLED ACCESS LINE	——— ··· ———	
EXISTING UTILITY EASEMENT	- - - - - -	
PROPOSED UTILITY EASEMENT	———	
EXISTING CENTERLINE	——— — ———	
RAILROAD CENTERLINE	—+—+—+—	
TEMPORARY CONSTRUCTION EASEMENT	—‖—‖—‖—‖—	
TEMPORARY CONSTRUCTION PERMIT	—//—//—//—//—	

PROJECT SPECIFIC

20" TRANSMISSION GAS LINE	—TG— —TG— —TG—

Alex Read
ALEXANDER L. READ
CE 14657
4/26/2022

STATE OF ALASKA DOT&PF
4111 AVIATION AVENUE
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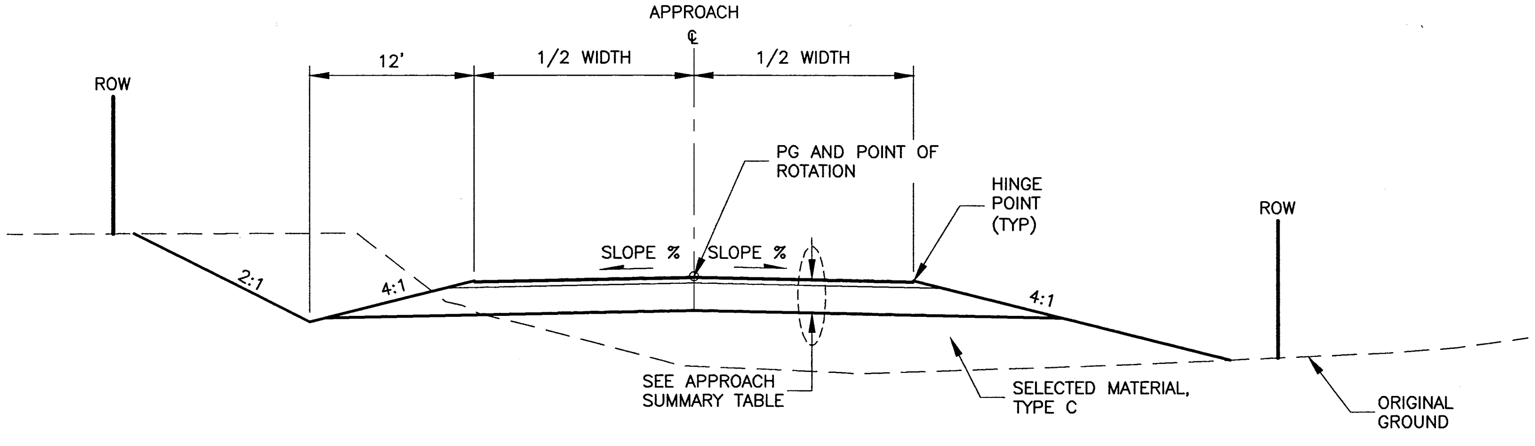
STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION
AND PUBLIC FACILITIES

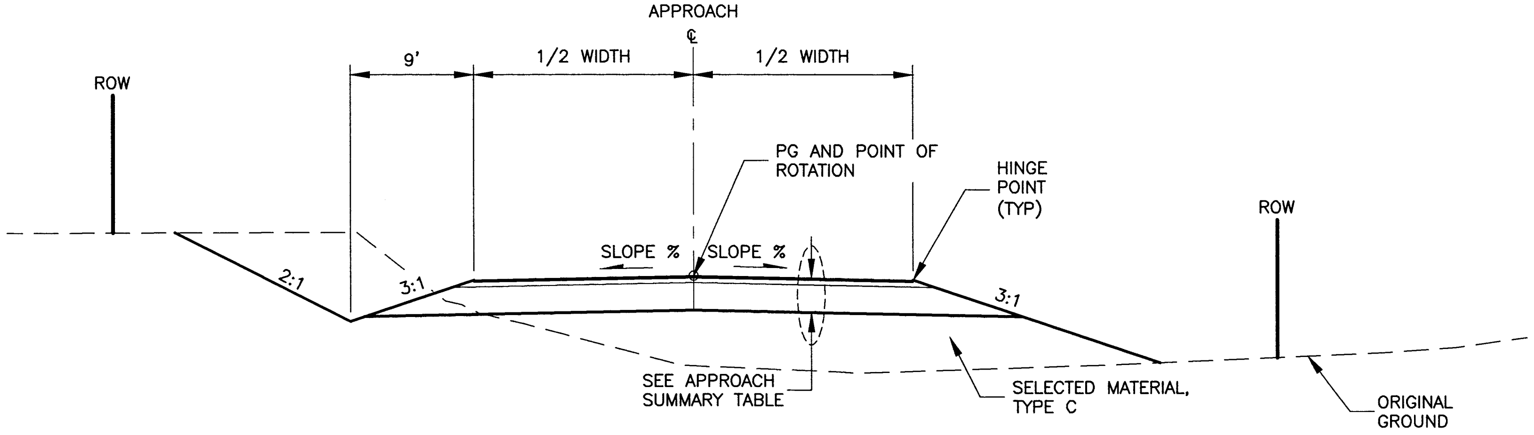
KNIK-GOOSE BAY ROAD RECONSTRUCTION
PHASE 1 - FAIRVIEW LOOP TO CENTAUR AVENUE

LEGEND

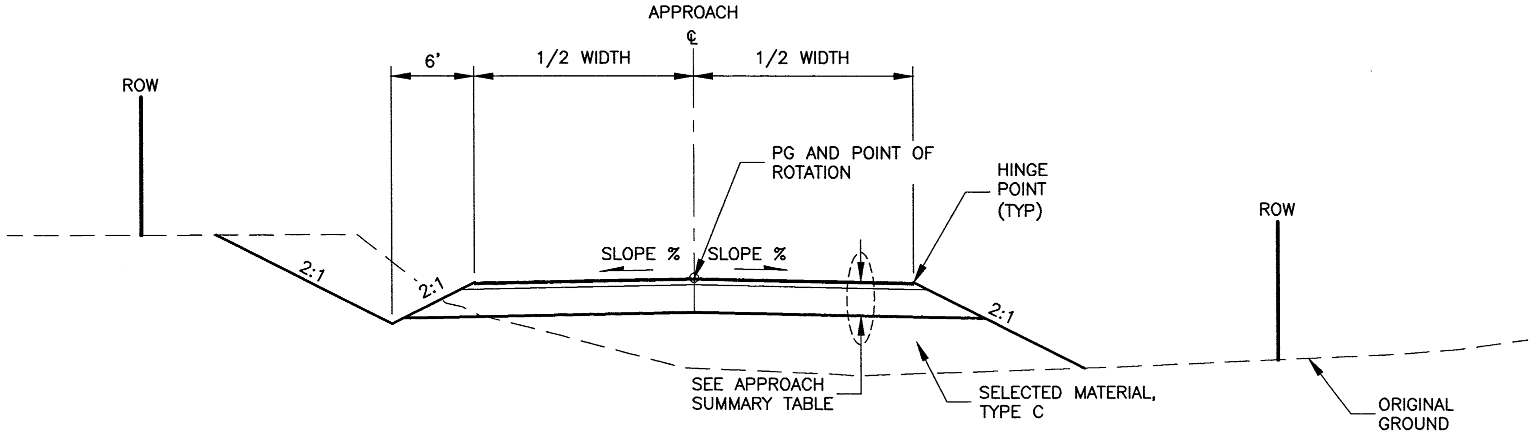
NO.	DATE	REVISION	STATE	PROJECT DESIGNATION	YEAR	SHEET NO.	TOTAL SHEETS
			ALASKA	0525019/CFHWY00599	2022	B6	B8



APPROACH TYPE A



APPROACH TYPE B



APPROACH TYPE C

NOTES:

1. SEE APPROACH SUMMARY ON D20-D22 SHEETS FOR APPROACH WIDTHS, STRUCTURAL SECTIONS, AND SLOPE %.

ALEXANDER L. READ
CE 14657
Alex Read
4/26/2022

STATE OF ALASKA DOT&PF
4111 AVIATION AVENUE
ANCHORAGE, AK 99502
(907) 269-0590

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION
AND PUBLIC FACILITIES

KNIK-GOOSE BAY ROAD
RECONSTRUCTION
PHASE 1 – FAIRVIEW LOOP TO
CENTAUR AVENUE

TYPICAL SECTIONS

DRAWING LOCATION
W:\PROJECTS\KGB ROAD RECON CENTAUR TO VINE – 52464\CIV3D19_PHASE_I\PLANSET\52464_B1-B8_TYP.DWG

DATE	TIME	SCALE		
4/25/2022	11:24 AM	N/A	DESIGNED BY	DKM, KEP
			CHECKED BY	---
			DRAFTED BY	KEP, BMS

NO.	DATE	REVISION	STATE	PROJECT DESIGNATION	YEAR	SHEET NO.	TOTAL SHEETS
			ALASKA	0525019/CFHWY00599	2022	D10	D22

603.2032.0018, 603.2032.0024, 603.2032.0036, 603.2032.0042, 603.2033.0018, 603.2033.0024, 605.2008.0006
PIPE SUMMARY

SHEET	PIPE NO.	SIZE (IN)	LENGTH (LF)	INLET		OUTLET		SLOPE %	END SECTIONS	REMARKS
				LOCATION	INVERT	LOCATION	INVERT			
F21		24	45.0	"CARY" 1500+73.00, 22.50 RT	323.31	"CARY" 1500+73.00, 22.50 LT	322.79	1.16%	2	
F22		18	37.2	"CARY" 1511+67.19, 18.38 LT	320.57	"CARY" 1511+61.74, 18.38 RT	320.36	0.55%	2	
F23		18	47.8	"DRIV" 300+17.61, 21.68 LT	337.62	"DRIV" 300+16.94, 26.11 RT	336.40	2.55%	2	
F23		24	43.7	"OLKC" 2050+80.99, 21.66 RT	315.98	"OLKC" 2050+81.01, 22.03 LT	315.52	1.05%	2	
F25		24	98.0	"FAIR" 2080+90.83, 50.95 RT	313.23	"FAIR" 2080+91.84, 47.00 LT	312.37	0.88%	2	
F25		24	42.2	"OLDK" 2090+58.99, 21.15 LT	306.26	"OLDK" 2090+58.86, 21.02 RT	304.16	4.98%	1	
F26		24	65.9	"DONO" 30+91.07, 25.12 RT	291.45	"DONO" 30+74.80, 39.47 LT	288.84	3.96%	1	
F26		24	53.4	"DRIV" 0+73.94, 24.28 RT	302.91	"DRIV" 0+77.22, 29.01 LT	301.33	2.96%	1	
F29		24	59.1	"MACK" 3086+07.95, 30.82 LT	311.80	"MACK" 3086+18.70, 27.30 RT	310.90	1.52%	2	
F30		24	59.9	"MINN" 10+50.77, 23.63 LT	267.48	"MINN" 10+48.77, 36.19 RT	263.40	6.82%	1	
F30		24	77.4	"HERI" 3120+67.93, 39.38 LT	312.44	"HERI" 3120+80.30, 37.06 RT	309.95	3.16%	2	
F30		24	53.3	"STON" 3140+55.50, 19.97 LT	307.60	"STON" 3140+39.16, 30.78 RT	307.20	0.75%	2	
F32		24	92.6	"VOLT" 3270+86.06, 49.01 RT	323.00	"VOLT" 3270+68.77, 41.95 LT	322.60	0.43%	2	
F32		24	48.0	"VOLT" 3272+19.87, 20.31 LT	322.17	"VOLT" 3272+40.68, 23.00 RT	321.98	0.40%	1	
F33		24	53.4	"STON" 3281+68.08, 29.04 LT	321.50	"STON" 3281+58.09, 23.38 RT	321.30	0.37%	1	
F34		24	37.8	"DRIV" 3290+73.06, 18.74 RT	319.50	"DRIV" 3290+73.02, 19.10 LT	319.34	0.42%	2	
F34		24	73.0	"DRIV" 3300+62.69, 36.44 RT	316.50	"DRIV" 3300+63.37, 36.54 LT	316.22	0.38%	2	
F36		24	44.05	"LAKE" 3312+22.51, 24.02 LT	319.43	"LAKE" 3312+22.49, 23.08 RT	319.18	0.57%	2	
F36		24	14.9	"LAKE" 3311+90.43, 21.02 RT	319.45	"LAKE" 3312+05.28, 22.08 RT	319.29	1.07%	2	
F36		24	15.0	"LAKE" 3311+90.80, 20.55 LT	319.60	"LAKE" 3312+05.81, 21.36 LT	319.53	0.47%	2	
F37		24	46.3	"PIPE" 3350+84.94, 21.11 RT	297.90	"PIPE" 3350+61.30, 18.73 LT	297.08	1.77%	2	
F38		18	38.3	"DRIV" 16+23.58, 19.13 RT	328.81	"DRIV" 16+23.63, 19.15 LT	324.97	10.01%	1	
F39		24	51.6	"DRIV" 900+87.47, 25.54 RT	277.10	"DRIV" 900+87.47, 26.07 LT	276.94	0.31%	2	
F39		24	69.9	"EDLN" 3410+60.56, 34.32 LT	277.50	"EDLN" 3410+64.90, 35.42 RT	277.21	0.42%	2	
F39		18	47.5	"DRIV" 3421+43.96, 25.71 LT	263.05	"DRIV" 3421+59.68, 19.12 RT	262.77	0.59%	2	
F40		24	80.9	"DRIV" 0+73.32, 43.39 LT	273.73	"DRIV" 0+70.51, 37.45 RT	273.39	0.42%	2	
F40		24	43.3	"MNTK" 3453+66.35, 22.08 LT	278.00	"MNTK" 3453+66.17, 21.19 RT	277.70	0.70%		
F41		24	65.1	"DRIV" 0+80.86, 22.60 LT	279.44	"DRIV" 0+71.07, 41.62 RT	275.83	5.56%	2	
F42		24	49.6	"DRIV" 3480+74.29, 26.66 RT	275.40	"DRIV" 3480+75.40, 22.91 LT	274.98	0.85%		
F43		24	100.7	"WEEP" 3540+73.10, 44.56 LT	284.00	"WEEP" 3540+72.98, 56.11 RT	283.51	0.49%	2	
F43		42	81.9	"WEEP" 3549+15.46, 37.27 LT	261.54	"WEEP" 3549+23.75, 44.25 RT	260.80	0.90%		

NOTES:

1. MINIMUM COVER SHALL BE ONE FOOT FOR CULVERTS WITH 18–42 INCH DIAMETERS, UNLESS APPROVED BY THE ENGINEER.

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4/26/2022

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STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION
AND PUBLIC FACILITIES

KNIK–GOOSE BAY ROAD
RECONSTRUCTION
PHASE 1 – FAIRVIEW LOOP TO
CENTAUR AVENUE
SUMMARY TABLES

DRAWING LOCATION
W:\PROJECTS\KGB ROAD RECON CENTAUR TO VINE – 52464\CIV3D19_PHASE_I\PLANSET\52464_D1–D22_SUM.DWG

DATE	TIME
4/22/2022	12:36 PM

SCALE
N/A

DESIGNED BY DKM, KEP, BMS
CHECKED BY ---
DRAFTED BY KEP, BMS

NO.	DATE	REVISION

STATE	PROJECT DESIGNATION	YEAR	SHEET NO.	TOTAL SHEETS
ALASKA	0525019/CFHWY00599	2022	D16	D22

609.0002.0001 - CURB AND GUTTER, TYPE 1

SHEET	FROM		TO		LENGTH (LF)	REMARKS
	STATION	OFFSET	STATION	OFFSET		
F04	1159+60.32	53.00 LT	1160+30.02	101.00 LT	105.34	
F04	1160+90.02	99.00 LT	1161+62.31	61.16 LT	95.55	
F04	1159+94.02	61.00 RT	1160+42.02	109.00 RT	83.63	
F04	1161+06.02	122.70 RT	1161+54.01	53.02 RT	105.33	
F13	1270+06.75	53.00 LT	1270+76.44	101.07 LT	105.41	
F13	1271+24.42	108.93 LT	1271+94.14	61.00 LT	105.27	
F13	1270+28.77	53.00 RT	1270+76.79	100.93 RT	83.56	
F13	1271+24.79	101.07 RT	1271+72.77	53.00 RT	83.70	
F17	1324+86.98	52.97 LT	1325+59.56	103.78 LT	109.30	
F17	1326+06.54	100.07 LT	1326+79.88	53.00 LT	105.37	
F17	1325+25.29	53.03 RT	1325+71.60	98.46 RT	80.56	
F17	1326+13.40	101.83 RT	1326+58.90	53.03 RT	84.10	
F19	1345+39.81	3.85 LT	1349+73.55	6.00 LT	885.52	KGB MEDIAN
F19	1349+07.09	46.00 LT	1349+71.28	106.11 LT	118.95	
F19	1349+37.49	39.25 RT	1350+12.52	49.66 RT	172.36	PEDESTRIAN REFUGE
F19	1350+22.81	56.78 RT	1350+44.47	84.19 RT	85.75	PEDESTRIAN REFUGE
F19-F20	1350+42.25	91.81 LT	1351+35.38	46.00 LT	116.64	
F20	1351+28.14	90.76 RT	1351+68.95	29.17 RT	98.05	
F24	"CLAP" 2067+60.00	15.50 LT	"CLAP" 2068+95.06	14.00 LT	135.14	
F57	"RILY" 3757+90.96	14.75 LT	"RILY" 3759+22.77	14.75 LT	271.62	MEDIAN
F57-F58	"PWHY" 3761+33.25	5.00 RT	"PWHY" 3767+56.73	1.00 LT	1,266.21	MEDIAN
				TOTAL:	4,297.36	
				PAY ITEM QUANTITY:	4,300	

610.0002.0000 - DITCH LINING

SHEET	BEGIN STATION	END STATION	OFFSET	LENGTH (LF)	WIDTH (FT)	DEPTH (FT)	VOLUME (CF)	WEIGHT (TON)	REMARKS
F05	1175+00.00	1176+16.50	RT	116.50	16.7	1	1,945.55	107.0	VERTICAL OFFSET = 2.5'
F05	1176+61.94	1176+62.98	RT	37.80	18.0	1	680.40	37.4	BASIN-1 OUTFALL
F09	1226+94.39	1226+95.28	RT	27.83	20.0	1	556.60	30.6	BASIN-2 OUTFALL
F11	1253+57.76	1254+32.31	RT	74.55	10.0	1	745.50	41.0	VERTICAL OFFSET = 1.0'
F12	1255+22.37	1255+22.00	RT	41.36	17.0	1	703.12	38.7	BASIN-3 OUTFALL
F15	1294+03.83	1294+29.72	RT	28.22	17.0	1	479.74	26.4	BASIN-5 OUTFALL
F18	1336+89.29	1338+76.20	RT	190.81	17.0	1	3,243.77	178.4	FLAT BOTTOM DITCH
F19	1339+26.61	1344+26.31	RT	504.86	17.0	1	8,582.62	472.0	FLAT BOTTOM DITCH
F22	"CARY" 1511+29.37	"CARY" 1514+00.00	RT	270.63	10.8	1	2,922.80	160.8	
F24	"CLAP" 2061+82.71	"CLAP" 2064+30.22	RT	247.51	12.7	1	3,143.38	172.9	
F24	"CLAP" 2064+97.67	"CLAP" 2066+35.92	RT	138.25	12.7	1	1,755.78	96.6	
F24	"CLAP" 2066+97.14	"CLAP" 2068+77.36	RT	180.22	12.7	1	2,288.79	125.9	
F25	"FAIR" 2080+79.76	"FAIR" 2082+76.93	LT	197.17	12.7	1	2,504.06	137.7	
F25	"FAIR" 2083+27.11	"FAIR" 2085+63.26	LT	236.15	12.7	1	2,999.11	165.0	
F29	"MACK" 3084+80.00	"MACK" 3086+07.95	LT	127.95	12.7	1	1,624.97	89.4	
F29	"MACK" 3084+80.00	"MACK" 3086+18.70	RT	138.70	12.7	1	1,761.49	96.9	
F30	"HERI" 3121+71.63	"HERI" 3124+04.83	LT	233.20	10.8	1	2,518.56	138.5	
F30	"HERI" 3122+82.51	"HERI" 3123+31.11	RT	48.60	10.8	1	524.88	28.9	
F30	"MINI" 10+50.77	"MINI" 14+48.80	LT	392.49	9.0	1	3,532.41	194.3	
F37	"PIPE" 3350+12.00	"PIPE" 3357+23.00	LT	711.00	10.8	1	7,678.80	422.3	
F37	"PIPE" 3350+84.94	"PIPE" 3352+75.83	RT	190.89	10.8	1	2,061.61	113.4	
F37	"PIPE" 3354+29.11	"PIPE" 3357+23.00	RT	293.89	10.8	1	3,174.01	174.6	
F43	"WEEP" 3549+09.82	"WEEP" 3549+21.38	LT	5.00	10.5	0.67	133.00	7.3	CULVERT APRON
F43	"WEEP" 3549+18.99	"WEEP" 3549+28.35	RT	14.00	10.5	0.67	196.00	10.8	CULVERT APRON
F53	"FERN" 3690+84.69	"FERN" 3692+20.45	LT	135.76	12.7	1	1,724.15	94.8	
F53	"FERN" 3692+39.72	"FERN" 3693+08.19	RT	68.47	12.7	1	869.57	47.8	
F53	"FERN" 3693+79.07	"FERN" 3694+50.00	RT	70.93	12.7	1	900.81	49.5	
							TOTAL:	3,258.8	
							PAY ITEM QUANTITY:	3,300	

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4/26/2022

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STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION
AND PUBLIC FACILITIES

KNIK-GOOSE BAY ROAD
RECONSTRUCTION
PHASE 1 – FAIRVIEW LOOP TO
CENTAUR AVENUE
SUMMARY TABLES

DRAWING LOCATION	DATE TIME	SCALE	DESIGNED BY	DKM, KEP, BMS
W:\PROJECTS\KGB ROAD RECON CENTAUR TO VINE - 52464\CIV3D19_PHASE_I\PLANSET\52464_D1-D22_SUM.DWG	4/22/2022 12:36 PM	N/A	CHECKED BY	---
			DRAFTED BY	KEP, BMS

DESIGNED BY DKM, KEP, BMS
CHECKED BY --
DRAFTED BY KEP, BMS
SCALE N/A
DATE 4/22/2022 TIME 12:36 PM
DRAWING LOCATION W:\PROJECTS\KGB ROAD RECON CENTAUR TO VINE - 52464\CIV3D19_PHASE_I\PLANSET\52464_D1-D22_SUM.DWG

639.2000.0000 - APPROACH SUMMARY (CONTINUED)

SHEET	INTERSECTION STATION	OFFSET	WIDTH (FT)	APPROACH TYPE	STRUCTURAL SECTION	RADIUS (FT)	LANDING LENGTH (FT)	SKEW ANGLE (DEG)	LENGTH (FT)	SLOPE % (LT/RT)	SEE NOTE 1	ALIGNMENT/ROADWAY NAMES	REMARKS
F34	"KGB" 1217+96.34	RT	24	F	3	36/40	30	89.92	118.50	2/2		A-KGB-121796-RT	
F34	"KGB" 1225+38.10	RT	24	E	5	36/40	30	90.00	195.00	3/3		A-KGB-122538-RT	
F34	"KGB" 1228+09.83	RT	12	F	6	20/20	10	90.00	170.00	3/3		A-KGB-122810-RT-MAINTENANCE	BASIN-2 ACCESS
F35	N/A		16	UTILITY	-	-	10	90.00	999.97	/3		A-KGB-122736-UTILITY	UTILITY ACCESS TRAIL
F36	"KGB" 1231+66.31	LT	24	D	2	40/40	30	88.60	241.00	2/2	X	A-KGB-123166-LT-LAKEWOOD	S LAKEWOOD DR
F36	"KGB" 1248+22.49	RT	20	F	5	16/20	10	89.77	211.80	3/3		A-KGB-124822-RT	
F37	N/A		24	B	2	40/40	30	90.00	831.20	2/2		A-PIPESTONE	W PIPESTONE DR
F38	"PIPE" 3350+36.52	RT	14	F	5	20/20	10	90.00	52.85	3/3		A-PIPE-335037-RT	
F38	"PIPE" 3354+10.00	RT	14	D	6	20/20	10	90.00	135.87	3/3		A-PIPE-335410-RT	
F39	"KGB" 1253+88.32	LT	20	E	3	40/40	30	90.00	106.87	2/2		A-KGB-125388-LT	
F39	"DRIV" 900+61.00	LT	12	F	5	-/20	10	90.00	52.00	3/3		A-DRIV-90061-LT-UTILITY	
F39	"KGB" 1253+25.66	RT	20	A	3	36/40	30	88.00	134.29	2/2		A-KGB-125326-RT-EDLUND	W EDLUND RD
F39	"EDLN" 3410+75.00	RT	16	UTILITY	-	-	10	-	50.20	/3		A-EDLN-341075-RT	UTILITY ACCESS TRAIL
F39	"EDLN" 3414+60.93	RT	24	E	4	40/34	30	75.98	150.25	2/2		A-EDLN-341461-RT	
F40	"DRIV" 1+03.63	RT	12	F	6	20/20	10	90.00	83.99	3/3		A-DRIV-104-RT-MAINTENANCE	BASIN-3 ACCESS
F40	"KGB" 1256+33.85	RT	24	F	3	24/40	30	90.00	308.54	2/2		A-KGB-125634-RT	
F40	"KGB" 1257+99.40	LT	26	B	3	40/40	30	90.00	141.98	2/2	X	A-KGB-125799-LT-MINNETONKA	W MINNETONKA DR
F41	"KGB" 1262+58.05	RT	24	F	3	40/40	30	90.00	187.44	2/2		A-KGB-126258-RT	
F41	"DRIV" 1+15.00	LT	24	F	5	20/20	20	90.00	27.10	3/3		A-DRIV-115-LT	ACCESS OFF CHURCH DRIVEWAY
F42	"WEEP" 3542+29.95	RT	24	B	6	36/40	30	90.00	357.74	3/3		A-WEEP-354230-RT	CHURCH AND BASIN-4 ACCESS
F42	"WEEP" 3542+29.95	LT	24	F	6	40/40	30	90.00	53.54	3/3		A-WEEP-354230-LT	KNIKATNU ACCESS
F43-F44	"KGB" 1271+06.61	RT	32	A	2	40/40	30	89.90	2,372.97	2/2		A-KGB-127107-RT-WEEPING	S WEEPING BIRCH ST
F45	"WEEP" 3555+08.69	LT	24	B	5	40/40	30	87.69	58.15	3/3		A-WEEP-355509-LT-JONES	W JONES DR
F45	"WEEP" 3560+76.05	LT	24	B	5	40/40	30	89.85	56.00	3/3		A-WEEP-356076-LT-MOOSE	W MOOSE PARK DR
F45	"WEEP" 3561+64.39	RT	16	C	5	20/20	10	85.85	36.00	3/3		A-WEEP-356164-RT	
F46	"KGB" 1270+94.61	LT	32	A	2	40/40	30	89.90	534.00	2/2	X	A-KGB-127095-LT-ENDEAVOR	S ENDEAVOR ST
F46	"ENDV" 3510+54.07	RT	24	E	5	40/40	30	98.25	64.14	3/3		A-ENDV-351054-RT	

NOTE:

1. APPLY TRAFFIC DETAIL CR-T-01.20 UNSIGNALIZED INTERSECTION STOP AND CROSSING

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4/26/2022

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STATE OF ALASKA
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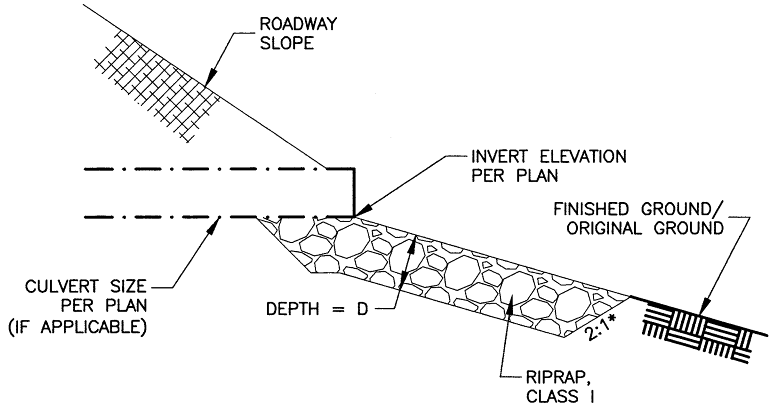
KNIK-GOOSE BAY ROAD
RECONSTRUCTION
PHASE 1 – FAIRVIEW LOOP TO
CENTAUR AVENUE
SUMMARY TABLES

NO.	DATE	REVISION	STATE	PROJECT DESIGNATION	YEAR	SHEET NO.	TOTAL SHEETS
			ALASKA	0525019/CFHWY00599	2022	E11	E13



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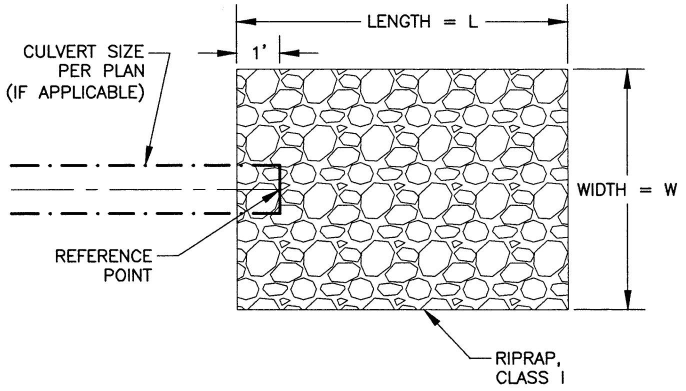


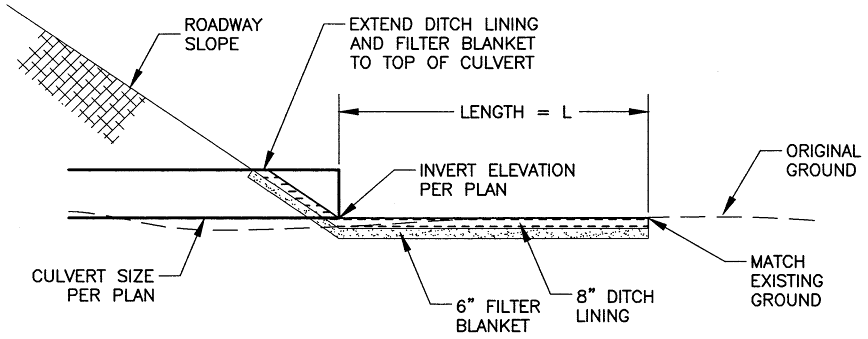
PLAN

ENERGY DISSIPATER

NTS

SEE SUMMARY TABLE FOR MORE INFORMATION

SEE PIPE SUMMARY TABLE FOR CULVERT DETAILS



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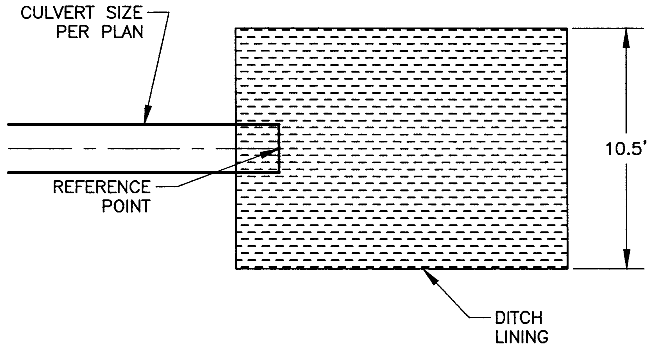


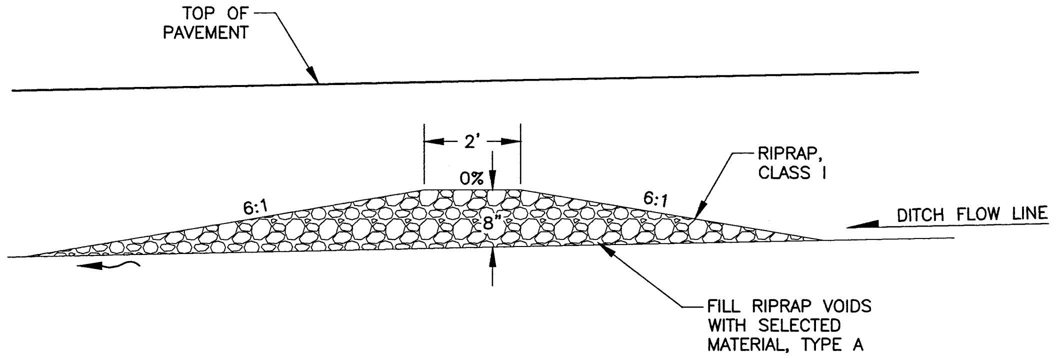
PLAN

CULVERT APRON

NTS

SEE SUMMARY TABLES FOR FOR INFORMATION

SEE PIPE SUMMARY TABLE FOR CULVERT DETAILS



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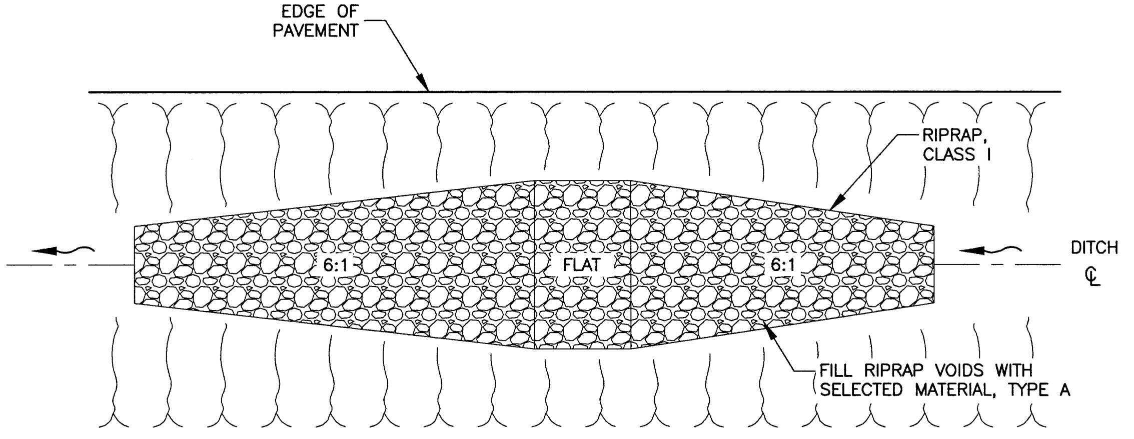

PLAN

CHECK DAM

NTS

SEE SUMMARY TABLE FOR MORE INFORMATION

ALEXANDER L. READ
CE 14657
4/22/2022

STATE OF ALASKA DOT&PF
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STATE OF ALASKA
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KNIK–GOOSE BAY ROAD
RECONSTRUCTION
PHASE 1 – FAIRVIEW LOOP TO
CENTAUR AVENUE
ENERGY DISSIPATERS, CULVERT
APRONS, AND CHECK DAMS

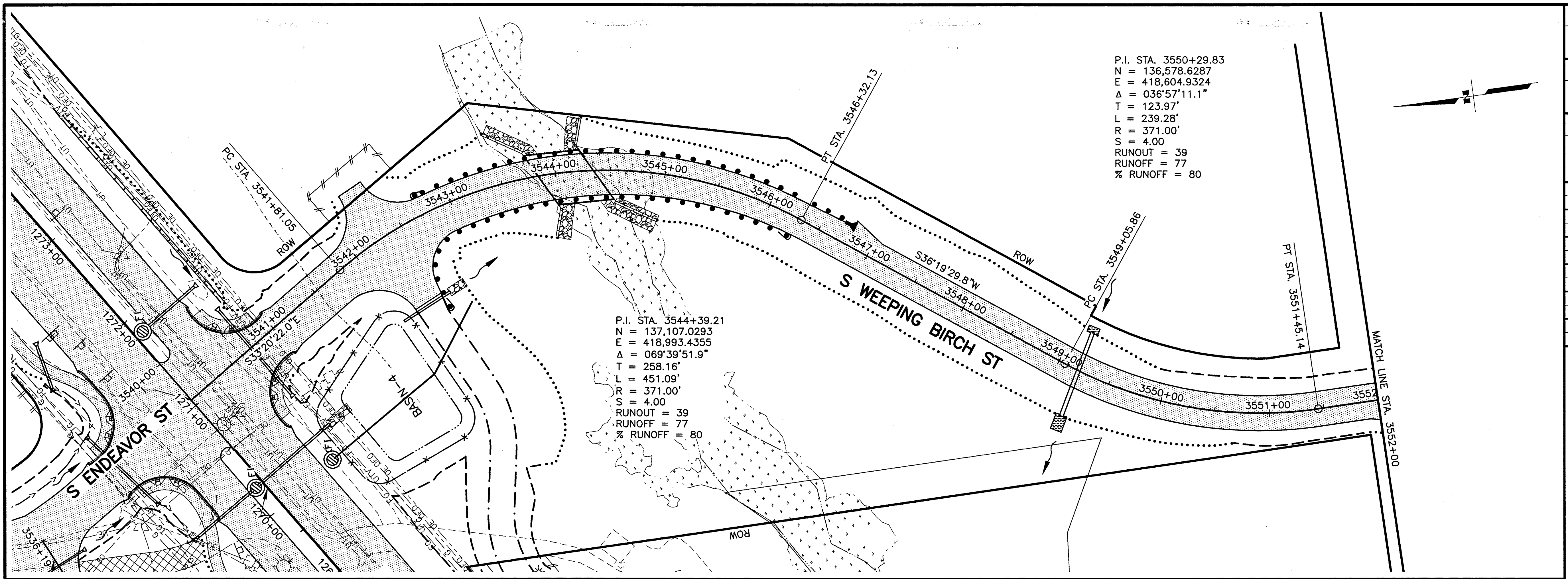
DRAWING LOCATION
W:\PROJECTS\KGB ROAD RECON CENTAUR TO VINE – 52464\CIV3D19_PHASE_1\PLANSET\52464_E10-E11_CULVERT_DITCH_SPECIALS.DWG

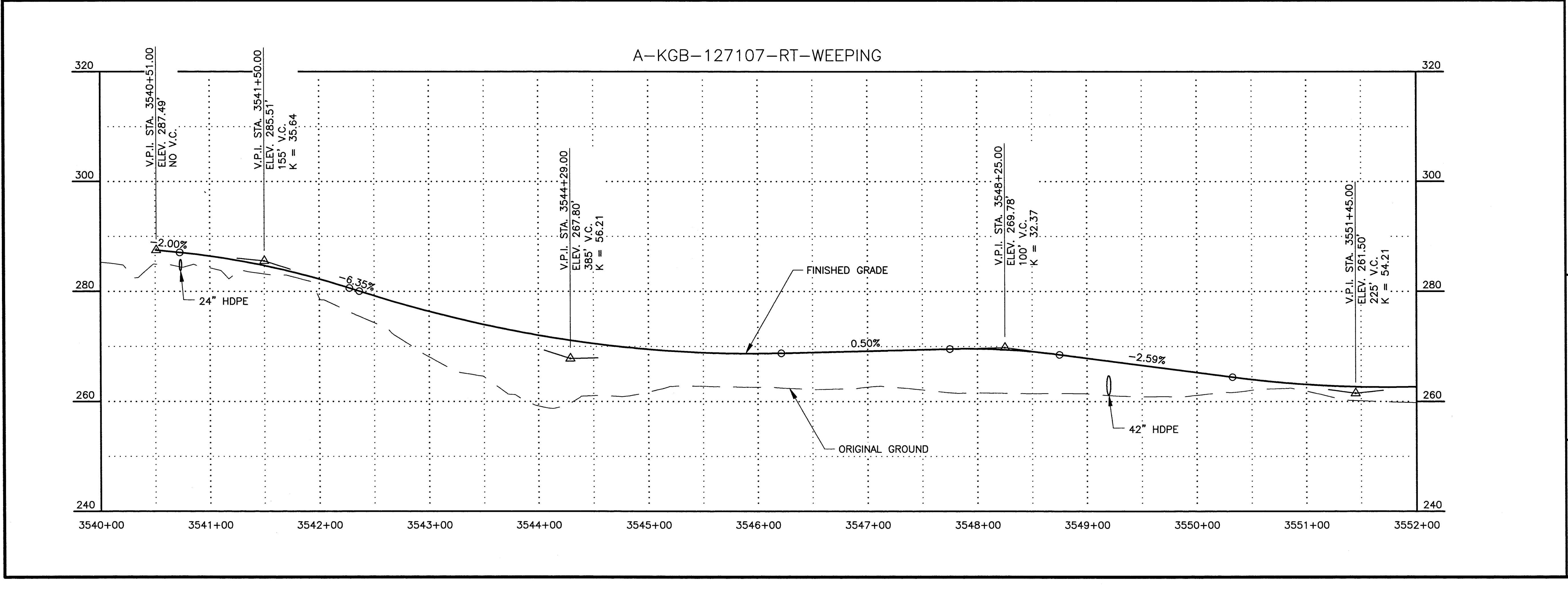
DATE	TIME	SCALE		
4/22/2022	12:28 PM	N/A	DESIGNED BY	DKM, KEP
			CHECKED BY	---
			DRAFTED BY	KEP

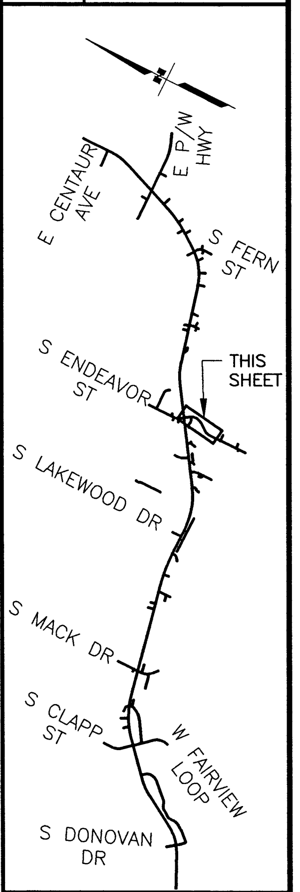
SHEET NO.	TOTAL SHEETS
F43	F59
STATE	YEAR
ALASKA	2022

PROJECT DESIGNATION
0525019/
CFHWY00599

NO.	REVISION
DATE	
NO.	REVISION
DATE	
NO.	REVISION
DATE	







Alex Read
ALEXANDER L READ
CE 14657
4/26/2022

STATE OF ALASKA DOT&PF
4111 AVIATION AVENUE
ANCHORAGE, AK 99502
(907) 269-0590

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION
AND PUBLIC FACILITIES
KNIK-GOOSE BAY ROAD
RECONSTRUCTION
PHASE 1-FAIRVIEW LOOP TO
CENTAUR AVENUE

DRIVEWAYS AND APPROACHES

DATE	TIME	SCALE		
4/26/2022	2:29 PM	1" = 50'	DESIGNED BY	DKM, KEP
			CHECKED BY	---
			DRAFTED BY	KEP

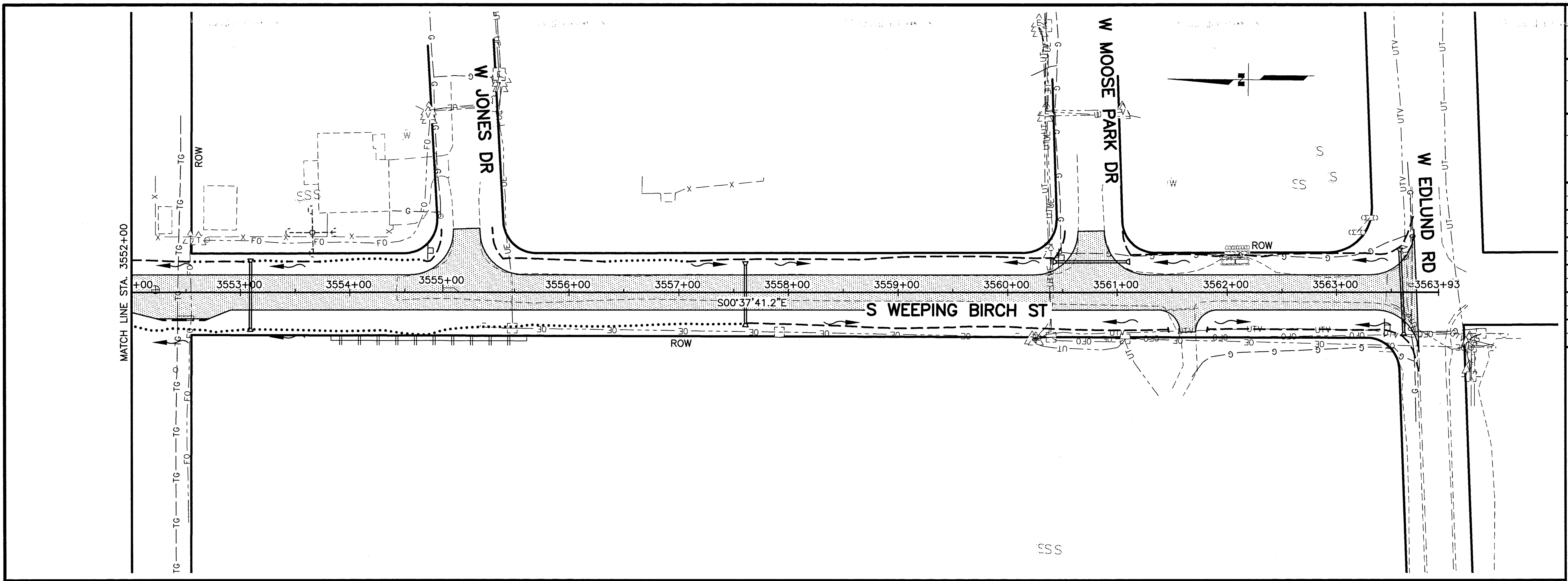
DRAWING LOCATION
W:\PROJECTS\KGB ROAD RECON CENTAUR TO VINE - 52464\CIV3D19_PHASE_I\PLANSET\52464_F21-F58_PH1_APPROACHES P&P.DWG

SHEET NO.	TOTAL SHEETS
F44	F59
STATE	YEAR
ALASKA	2022

PROJECT DESIGNATION

0525019/
CFHWY00599

NO.	REVISION
DATE	
NO.	REVISION
DATE	
NO.	REVISION
DATE	



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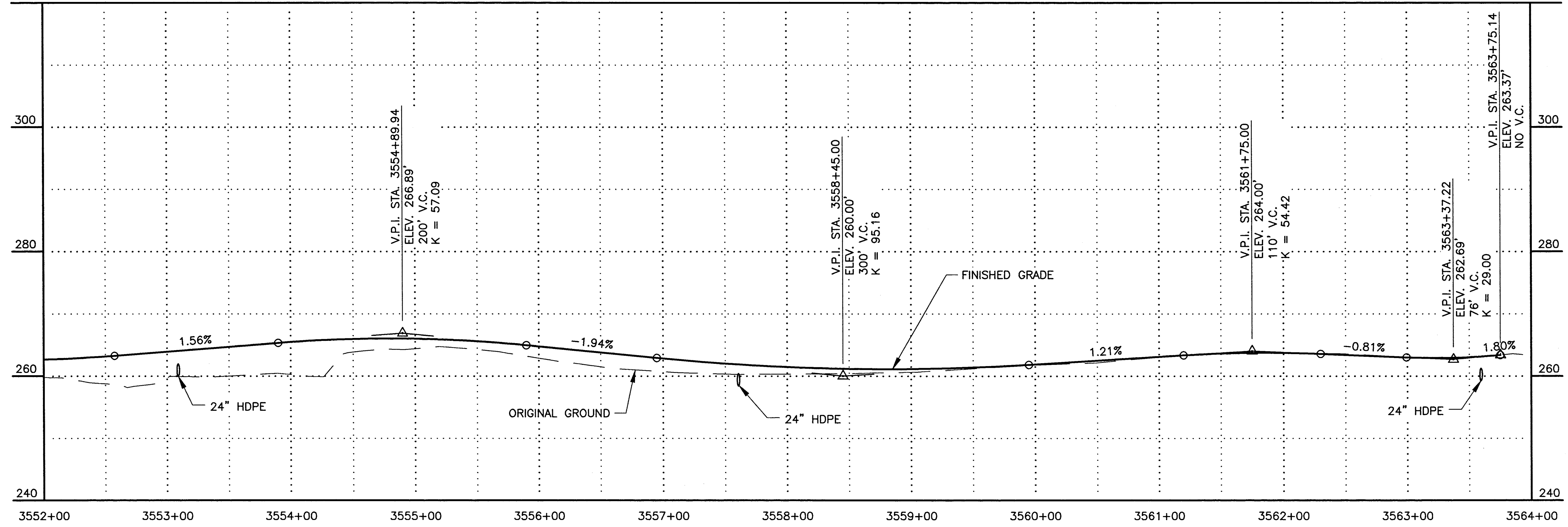

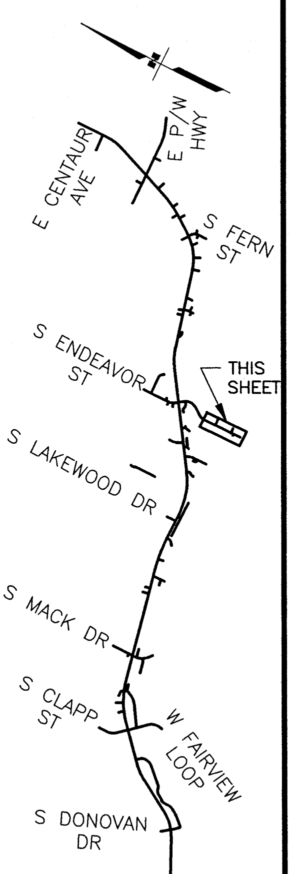

ALEXANDER L READ
CE 14657
4/26/2022

STATE OF ALASKA DOT&PF
4111 AVIATION AVENUE
ANCHORAGE, AK 99502
(907) 269-0590

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION
AND PUBLIC FACILITIES
KNIK-GOOSE BAY ROAD
RECONSTRUCTION
PHASE 1-FAIRVIEW LOOP TO
CENTAUR AVENUE

DRIVEWAYS AND APPROACHES

DATE	TIME
4/26/2022	2:30 PM

SCALE	
1" = 50'	

DESIGNED BY	DKM-KEP
CHECKED BY	--
DRAFTED BY	KEP

DRAWING LOCATION
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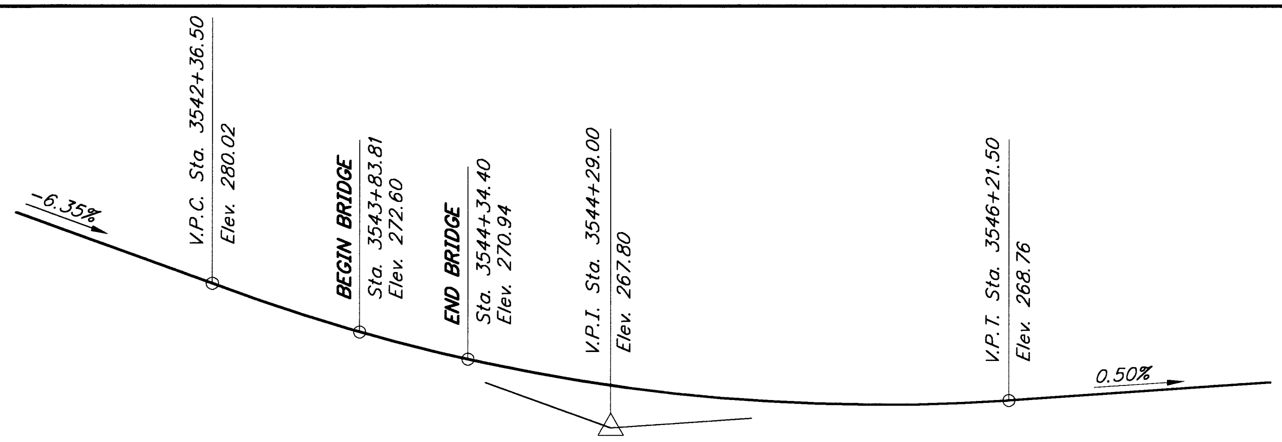
STATE	PROJECT DESIGNATION	YEAR	SHEET NO.	TOTAL SHEETS
ALASKA	0525016/CFHWY00599	2022	N1	N24



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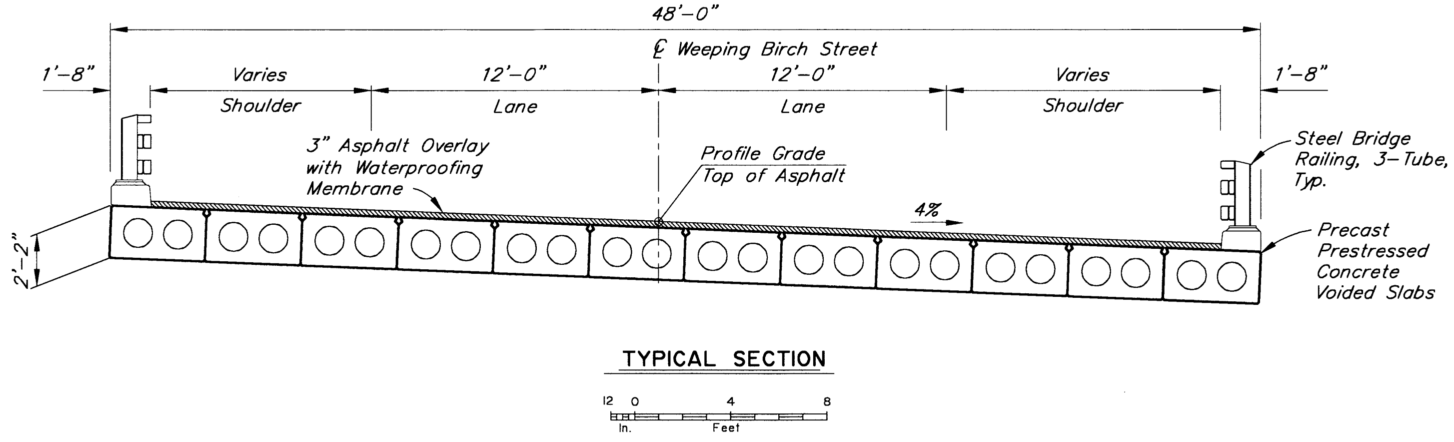
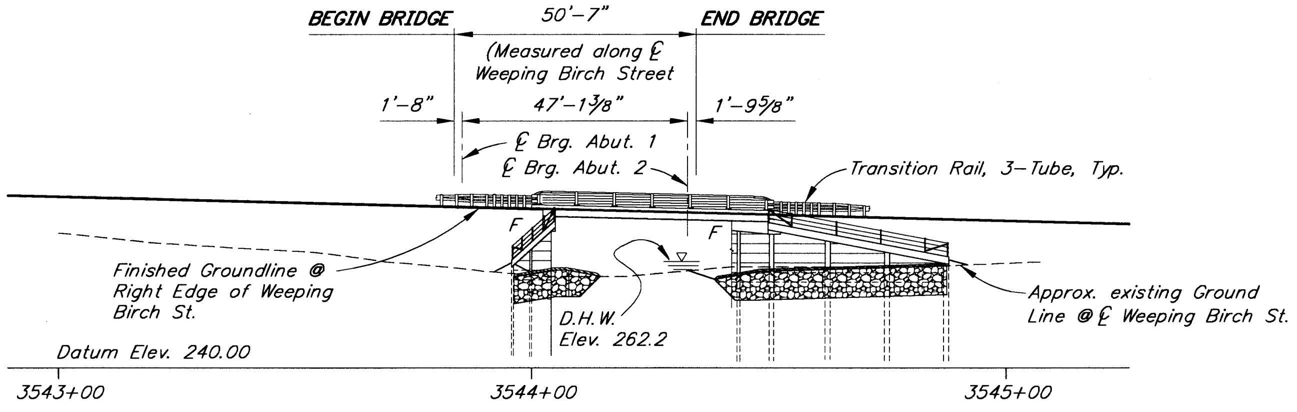
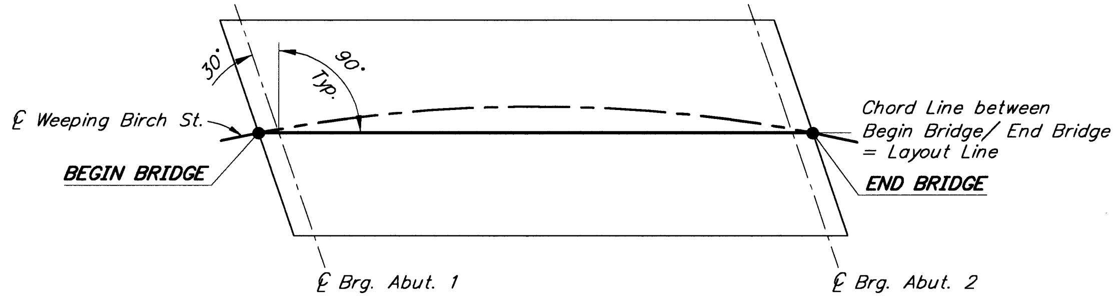


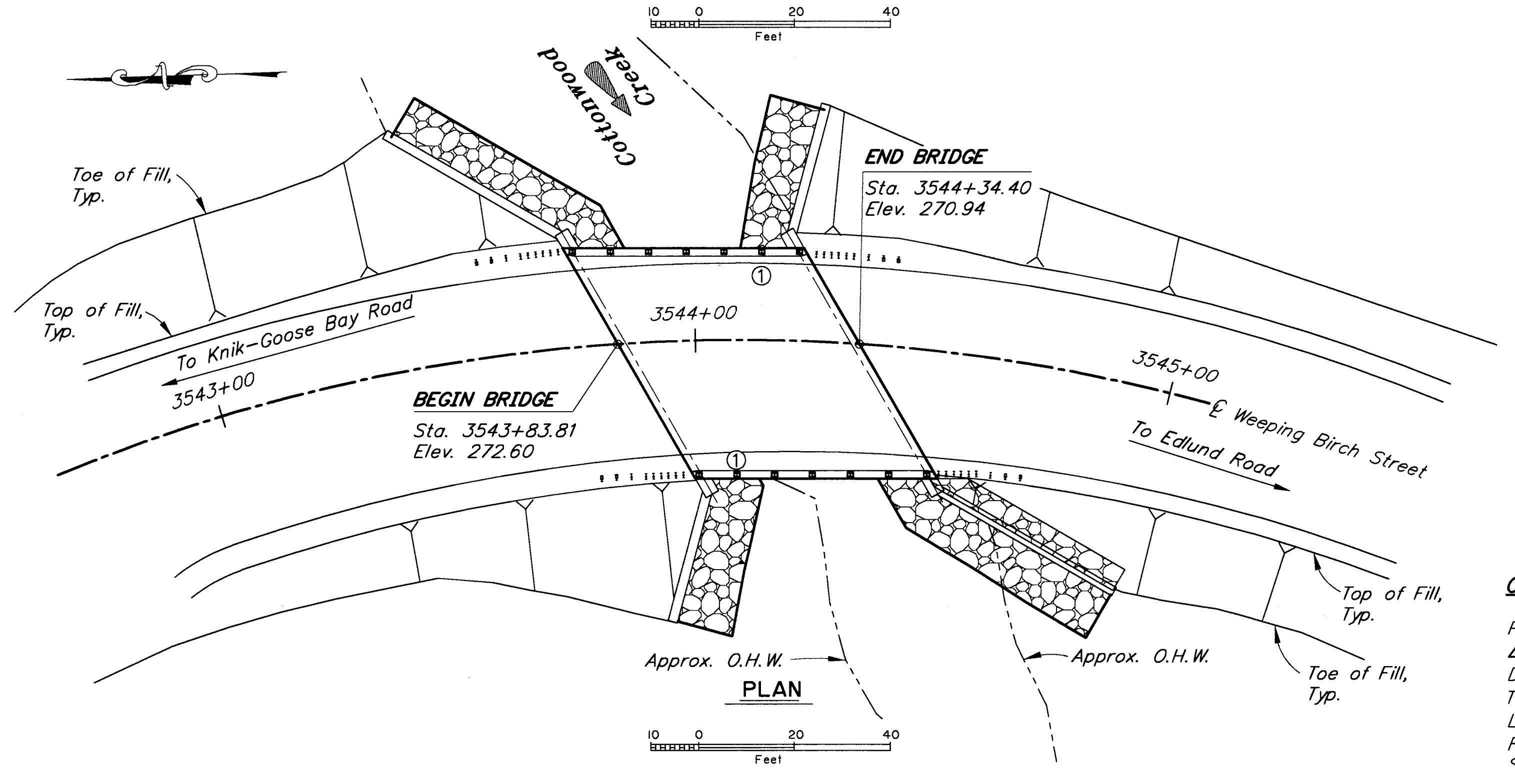
TYPICAL SECTION



ELEVATION



LAYOUT LINE
No Scale



PLAN

BRIDGE DRAWING INDEX

TITLE	DWG. NO.
GENERAL LAYOUT	1
SITE PLAN	2
ABUTMENT 1 RETAINING WALL	3
ABUTMENT 2 RETAINING WALL	4
RETAINING WALL DETAILS	5
SAFETY RAILING DETAILS	6
RIPRAP LAYOUT AND DETAILS	7
ABUTMENT 1	8
ABUTMENT 2	9
ABUTMENT DETAILS	10
FRAMING PLAN AND TYPICAL SECTION	11
VOIDED SLABS	12
VOIDED SLAB DETAILS	13
STEEL BRIDGE RAILING, 3-TUBE	14
TRANSITION RAIL, 3-TUBE	15
TEST HOLE LOGS AND LOCATIONS	16-24

CURVE DATA:

PI = 3544+39.21
Δ = 69°39'51.9"
D = 15°26'36.98"
T = 258.16'
L = 451.09'
R = 371.00'
S = 4.00%

NOTES:

① Approximate location of Bridge Number Plate.

DESIGNED BY: Andrew Wells	CHECKED: Jared Jones Jarod T. Jones	LAYOUT BY: Andrew Wells	CHECKED BY: Jared Jones Jarod T. Jones
DRAWN BY: Sam Sollie Sam Sollie	CHECKED: Andrew Wells	SPECIFICATIONS BY: Andrew Wells	P S & E COMPARED: Jared Jones Jarod T. Jones
QUANTITIES BY: Andrew Wells	CHECKED: Jared Jones Jarod T. Jones	APPROVAL RECOMMENDED BY:	Rich Pratt

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES
BRIDGE SECTION
3132 Channel Drive
Juneau, Alaska 99801
907-465-2975

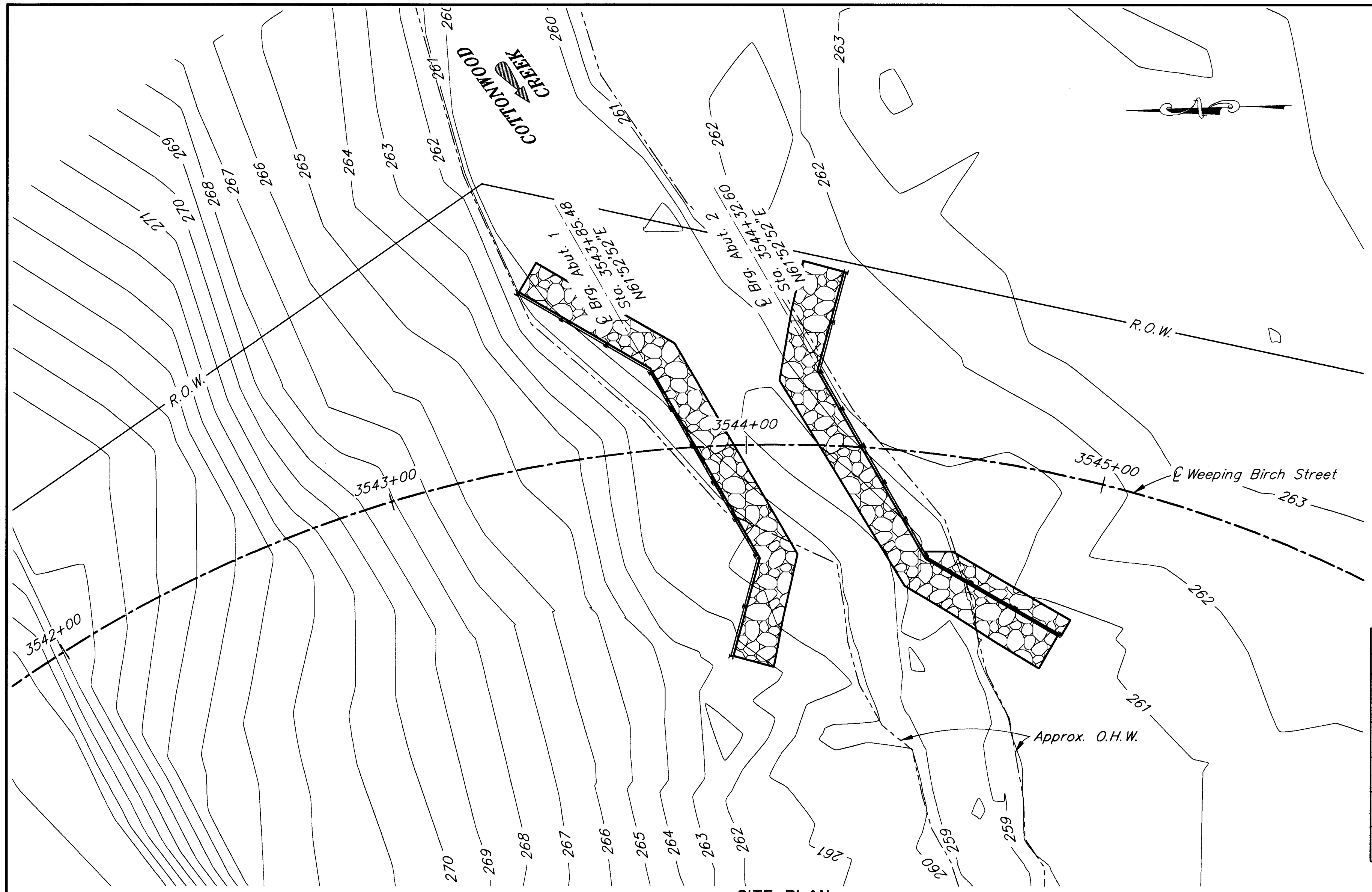
Andrew C. Wells
04-13-2022
No. CE-156778

COTTONWOOD CREEK BRIDGE
WEEPING BIRCH STREET
GENERAL LAYOUT

BRIDGE NO. 2364
DWG. NO. 1

C:\Users\shsollie\AppData\Local\Temp\AcPublish_126376\2364-1 Wed, Apr/13/22 07:03am

STATE	PROJECT DESIGNATION	YEAR	SHEET NO.	TOTAL SHEETS
ALASKA	0525016/CFHWY00599	2022	N2	N24



SITE PLAN

10 0 20 40
Feet

GENERAL NOTES

DESIGN:...................................... AASHTO LRFD Bridge Design Specifications, 2020 Edition, with latest interim specifications.

Seismic design per AASHTO Guide Specifications for LRFD Seismic Bridge Design, 2011 with latest interim revisions.

LIVE LOAD:................................ HL-93

DEAD LOAD:............................... Includes 50 psf for all wearing surfaces.

SEISMIC PARAMETERS:.............. PGA = 0.58
Ss = 1.32
S1 = 0.51
Site Class = C
Liquefaction Potential = Low
AASHTO 7% probability of exceedance in 75 years.

REINFORCEMENT:........................ ASTM A706, Grade 60, Fy = 60,000 psi
ASTM A970 Headed bars, Class HA.
Space reinforcement evenly unless otherwise noted.

PRESTRESSED CONCRETE:.......... See "VOIDED SLABS" Dwg.

CONCRETE:.................................Class A Concrete unless otherwise noted, f'c = 4,000 psi

STRUCTURAL STEEL:...................ASTM A709, Grade 50T3, Fy = 50,000 psi
Galvanize structural steel in accordance with AASHTO M111 unless shown otherwise.

STRUCTURAL STEEL PILING:...... ASTM A709, GR50T3, Fy = 50,000 psi.
Galvanize structural steel piles in accordance with AASHTO M111
Pile Tip reinforcing is required.

PILE DATA TABLE

LOCATION	PILE TYPE	DRIVING CRITERIA			DESIGN DATA		
		MINIMUM PENETRATION (ft)	ESTIMATED PILE TIP ELEVATION (ft)	DRIVING RESISTANCE (K)	STRENGTH I FACTORED LOAD (K)	NOMINAL RESISTANCE (K)	RESISTANCE FACTOR, φ
Soldier Pile Wall 1 (Piles A,B,C,J,K)	HP14x117	28	231	*45	*30	*45	N/A
Abutment 1 (Piles D,E,F,G,H,I)	HP14x117	28	210	405	265	405	0.65
Abutment 2 (Piles N,O,P,Q,R,S)	HP14x117	28	210	405	265	405	0.65
Soldier Pile Wall 2 (Piles L,M,T,U,V)	HP14x117	28	231	*45	*30	*45	N/A

Difficult driving conditions are expected. Pilot bore hole required for each pile.
* For constructibility only. Not intended for acceptance.

ESTIMATE OF QUANTITIES

ITEM NO.	ITEM	PAY UNIT	ESTIMATING UNIT	SUBST.	SUPERST.	TOTAL QUANTITY
205.0006.0000	Structural Fill	CY	CY	2,410	---	2,410
501.0001.0000	Class A Concrete	LS	CY	95.3	---	95.3
501.0007.0000	Precast Concrete Member, 50'-6½" Voided Slab	EA	EA	---	12	12
501.0007.0000	Precast Concrete Member, 11'-3" Lagging	EA	EA	65	---	65
501.0007.0000	Precast Concrete Member, 13'-10" Lagging	EA	EA	57	---	57
503.0001.0000	Reinforcing Steel	LS	LBS	9,570	---	9,570
503.0002.0000	Epoxy-Coated Reinforcing Steel	LS	LBS	---	220	220
505.0005.0001	Furnish Structural Steel H-Piles, HP14x117	LF	LF	997	---	997
505.0006.0001	Drive Structural Steel H-Piles, HP14x117	EA	EA	22	---	22
507.0001.0003	Steel Bridge Railing, 3-Tube	LF	LF	---	101	101
507.0006.0000	Cable Safety Railing	LF	LF	143	---	143
508.0001.0000	Waterproofing Membrane, Spray-Applied	LS	SF	---	2,258	2,258
606.0016.0000	Transition Rail	EA	EA	---	4	4
611.0001.0001	Riprap, Class I	CY	CY	380	---	380
631.0002.0001	Geotextile, Erosion Control, Class 1	SY	SY	270	---	270

Item numbers are for reference only. Quantities shown are not necessarily the pay quantities nor the total quantity of the particular item.

ABBREVIATIONS:

℄ = centerline
℘ = plate
& = and
@ = at
ø = diameter
± = approximate
Abut. = abutment
Approx. = approximate
b.f. = back/dirt face
B.F.M. = bonded fiber matrix
bot. = bottom
Br. = bridge
btwn. = between
Brg. = bearings
C.G. = center of gravity
C.I.P. = cast in place
CJP = complete joint penetration
Clr. = clear, clearance
CMP = corrugated metal pipe
CY = cubic yard
D.H.W. = design high water
Dia. = diameter
Dwg. = drawing
E = expansion
(E) = existing
EA = each
Elev. = elevation
e.f. = each face
e.w. = each way
Ext. = exterior
F = fixed
f.f. = front/air face
f'c = specified concrete compressive strength
f'ci = specified concrete compressive strength at release
Ft. = feet
Fy = yield stress
Galv. = galvanize
H.S. = high strength
Hwy. = highway
ID = internal diameter
Int. = interior
Jt. = joint
K = kips
ksf = 1000 pounds per square foot
ksi = 1000 pounds per square inch
LBS or lb = pounds
LF = linear foot
LS = lump sum
LT. = left
max. = maximum
min. = minimum
MSE = mechanically stabilized earth
N/A = not applicable
n.f. = near face
No. = number
o.c. = on center
O.H.W. = ordinary high water
pcf = pounds per cubic foot
psf = pounds per square foot
psi = pounds per square inch
R = radius
R.O.W. = right of way
RT. = right
Rd. = road
spcs. = space, spaces
Sta. = station
SF = square feet
SY = square yard
St. = street
Std. = standard
Symm. = symmetric
Typ. = typical
UT = ultrasonic testing
V.P.C. = point of vertical curve
V.P.I. = point of vertical intersection
V.P.T. = point of vertical tangent
w/ = with

DESIGNED BY: Andrew Wells	CHECKED: Jared Jones Jared T. Jones	FOUNDATIONS REVIEWED BY: Dave Hemstreet
DRAWN BY: Sam Sollie Sam Sollie Jr	CHECKED: Andrew Wells	
QUANTITIES BY: Andrew Wells	CHECKED: Jared Jones Jared T. Jones	

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION
AND PUBLIC FACILITIES
BRIDGE SECTION
3132 Channel Drive
Juneau, Alaska 99801
907-465-2975

Andrew C.Wells
04-13-2022
No. CE-156778

COTTONWOOD CREEK BRIDGE

WEEPING BIRCH STREET

SITE PLAN

BRIDGE NO. 2364
DWG. NO. 2

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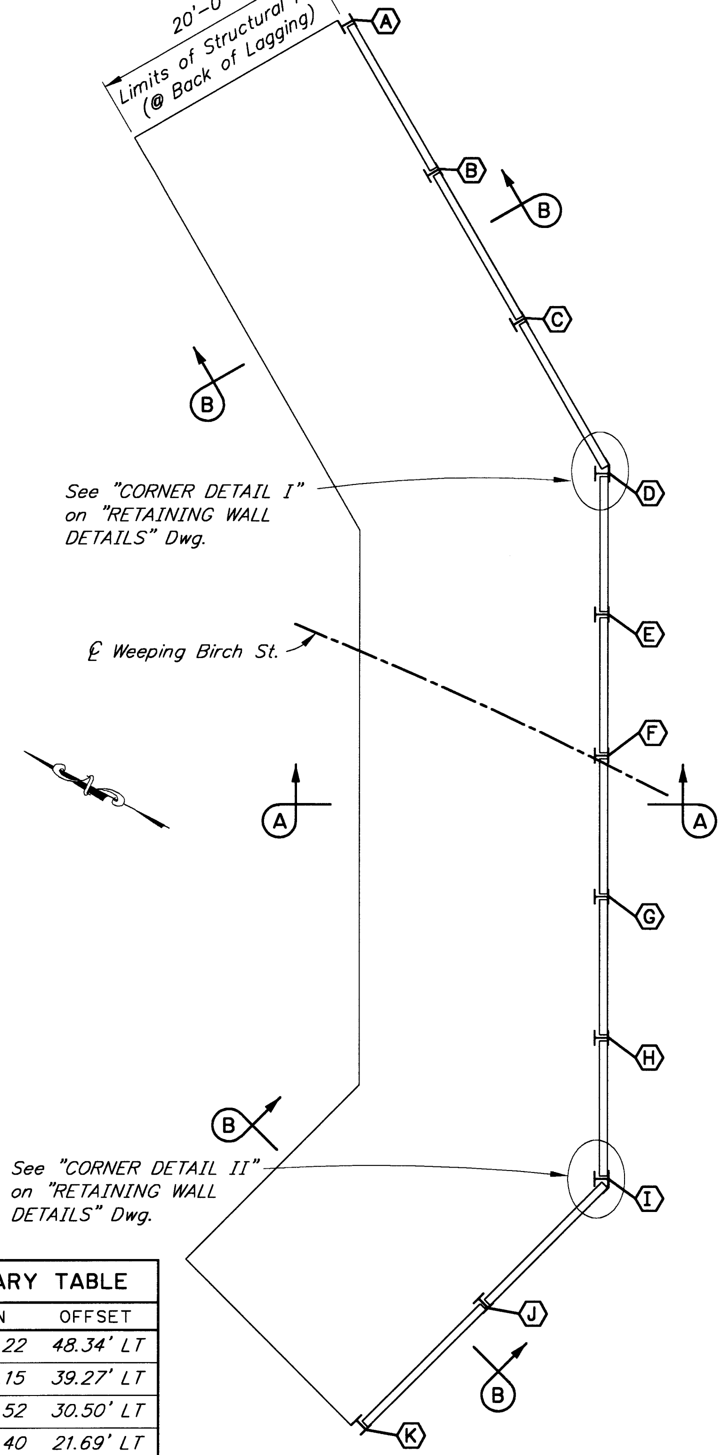
STATE	PROJECT DESIGNATION	YEAR	SHEET NO.	TOTAL SHEETS
ALASKA	0525016/CFHWY00599	2022	N3	N24

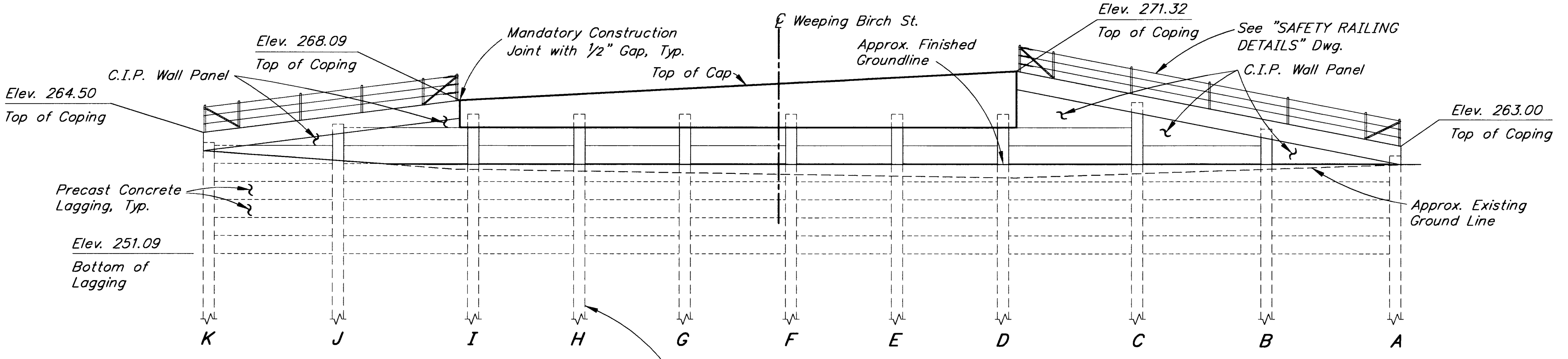


POINT	STATION	OFFSET
A	3543+44.22	48.34' LT
B	3543+54.15	39.27' LT
C	3543+64.52	30.50' LT
D	3543+75.40	21.69' LT
E	3543+80.19	11.05' LT
F	3543+85.25	0.49' LT
G	3543+90.60	10.01' RT
H	3543+96.27	20.42' RT
I	3544+02.29	30.75' RT
J	3543+98.07	44.65' RT
K	3543+93.19	58.35' RT

PILE SUMMARY TABLE

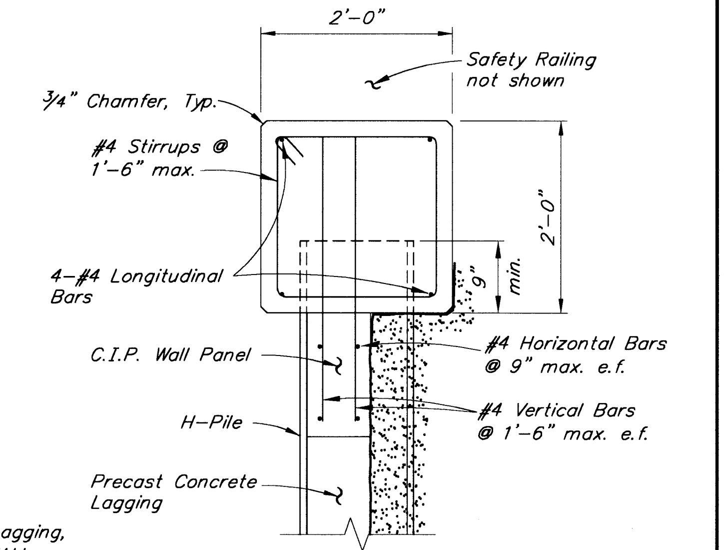
Orient piles as shown. Station and offset to center of piles.

PLAN



DEVELOPED ELEVATION

(Looking back on Station)



C.I.P. COPING DETAIL

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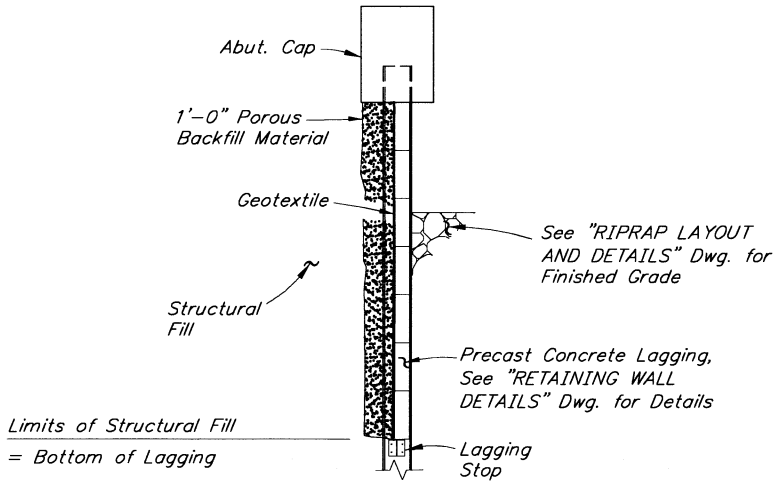
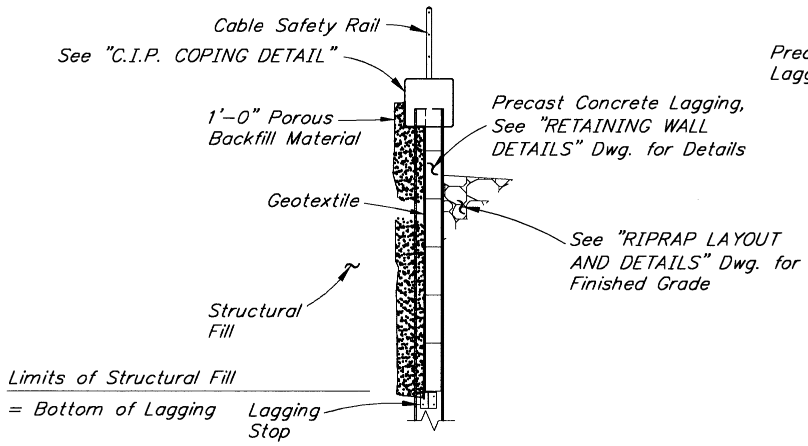


SECTION A-A

12 0 4 8
In. Feet



SECTION B-B

12 0 4 8
In. Feet

NOTES:

1. Use epoxy–coated rebar in coping and C.I.P. wall panels.
2. Complete backfilling and riprap placement in front of wall prior to backfilling above original grade behind wall.

DESIGNED BY: Andrew Wells	CHECKED: Jared Jones Jarod T. Jones
DRAWN BY: Sam Sollie Sam Sollie	CHECKED: Andrew Wells
QUANTITIES BY: Andrew Wells	CHECKED: Jared Jones Jarod T. Jones

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES
BRIDGE SECTION
3132 Channel Drive
Juneau, Alaska 99801
907–465–2975

Andrew C. Wells
04-13-2022
No. CE-156778

COTTONWOOD CREEK BRIDGE

WEEPING BIRCH STREET

ABUTMENT 1 RETAINING WALL

BRIDGE NO. 2364

DWG. NO. 3

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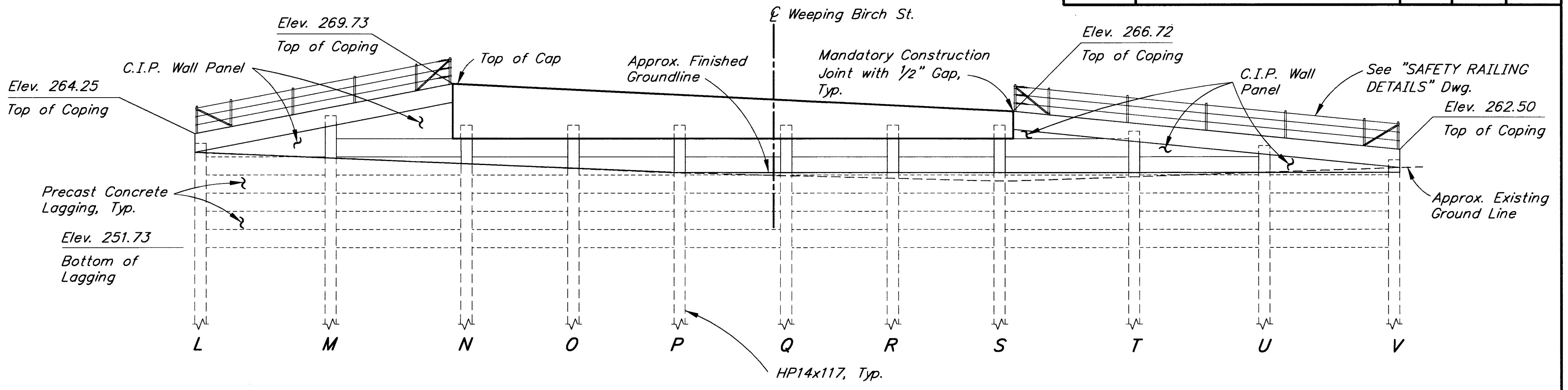
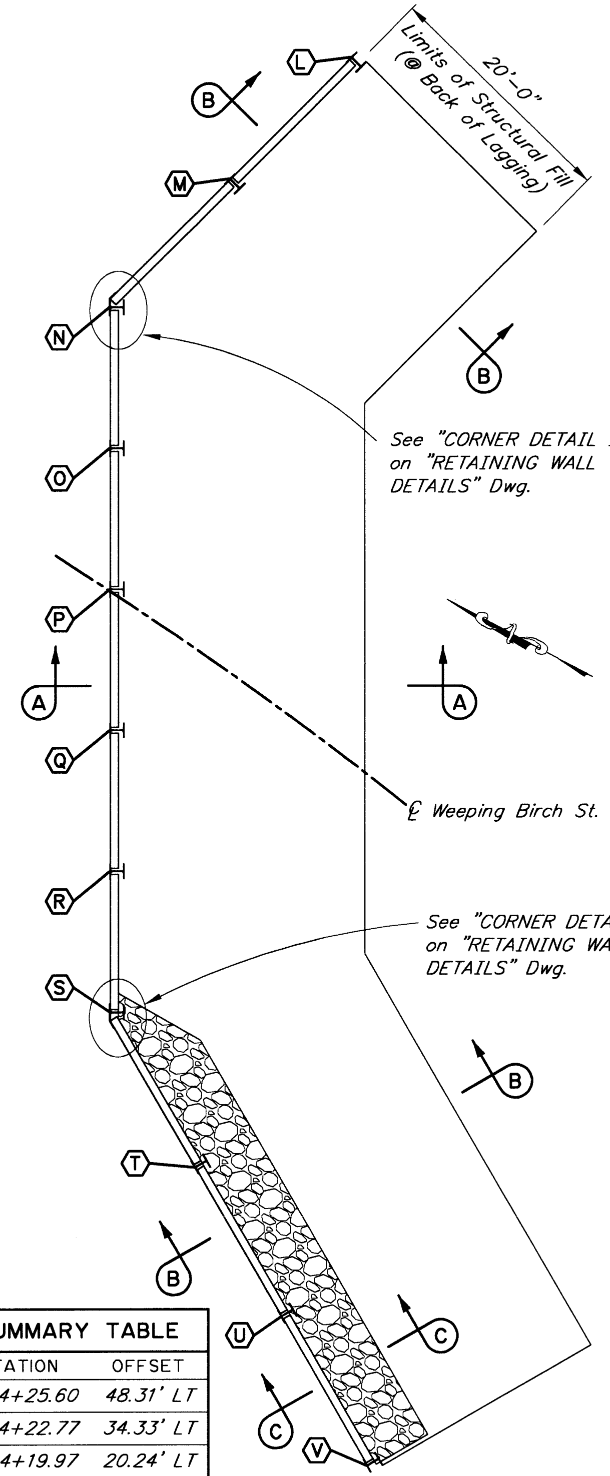
STATE	PROJECT DESIGNATION	YEAR	SHEET NO.	TOTAL SHEETS
ALASKA	0525016/CFHWY00599	2022	N4	N24



DEVELOPED ELEVATION

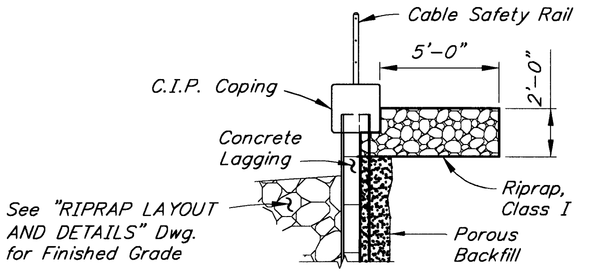


PLAN

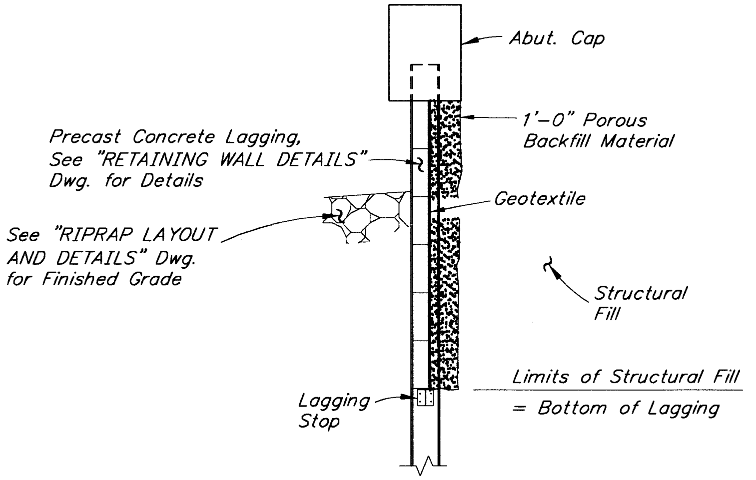
PILE SUMMARY TABLE

POINT	STATION	OFFSET
L	3544+25.60	48.31' LT
M	3544+22.77	34.33' LT
N	3544+19.97	20.24' LT
O	3544+25.97	10.29' LT
P	3544+32.30	0.45' LT
Q	3544+38.96	9.28' RT
R	3544+46.00	18.89' RT
S	3544+53.42	28.36' RT
T	3544+68.09	33.99' RT
U	3544+83.05	38.83' RT
V	3544+98.43	43.12' RT

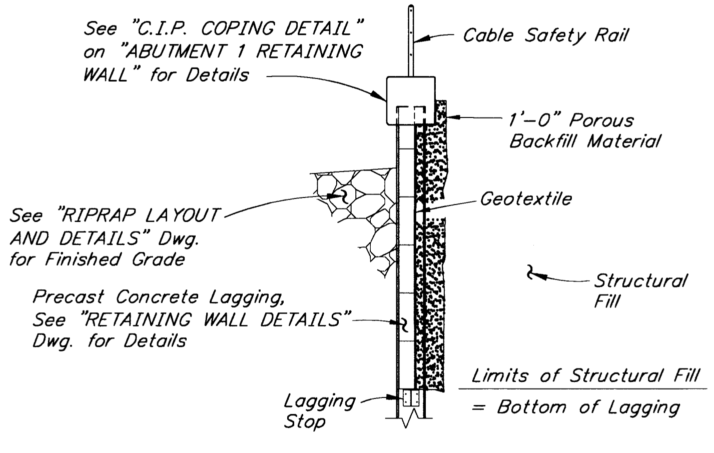
Orient piles as shown. Station and offset to center of piles.



SECTION C-C



SECTION A-A



SECTION B-B

NOTES:

1. Use epoxy-coated rebar in coping and C.I.P. wall panels.
2. Complete backfilling and riprap placement in front of wall prior to backfilling above original grade behind wall.

DESIGNED BY: Andrew Wells	CHECKED: Jared Jones Jared T. Jones
DRAWN BY: Sam Sollie Sam Sollie	CHECKED: Andrew Wells
QUANTITIES BY: Andrew Wells	CHECKED: Jared Jones Jared T. Jones

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES
BRIDGE SECTION
3132 Channel Drive
Juneau, Alaska 99801
907-465-2975

Andrew C.Wells
04-13-2022
No. CE-156778

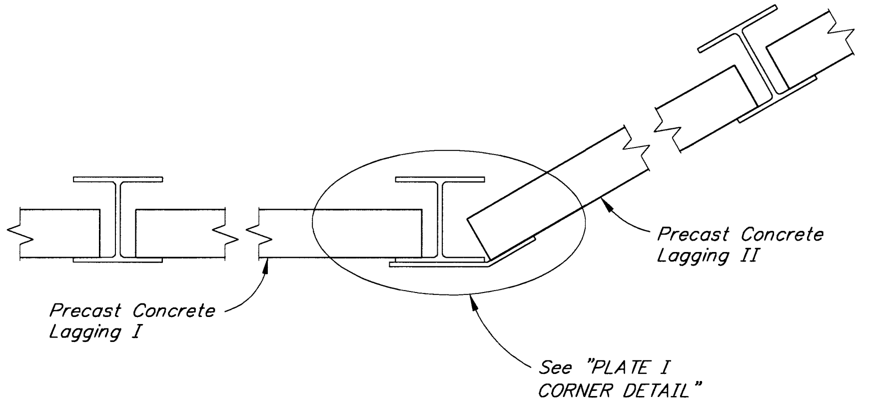
COTTONWOOD CREEK BRIDGE

WEEPING BIRCH STREET

ABUTMENT 2 RETAINING WALL

BRIDGE NO. 2364
DWG. NO. 4

STATE	PROJECT DESIGNATION	YEAR	SHEET NO.	TOTAL SHEETS
ALASKA	0525016/CFHWY00599	2022	N5	N24



CORNER DETAIL I

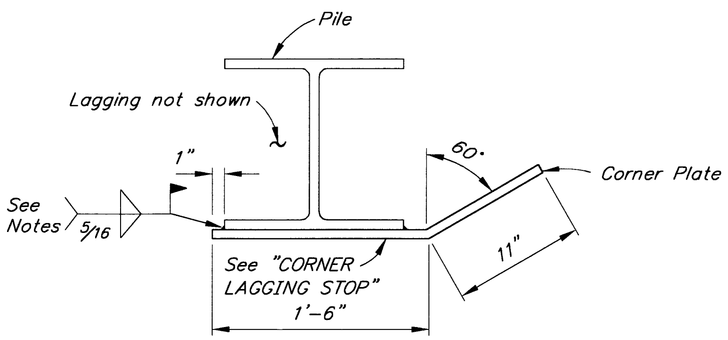


PLATE I CORNER DETAIL

No Scale

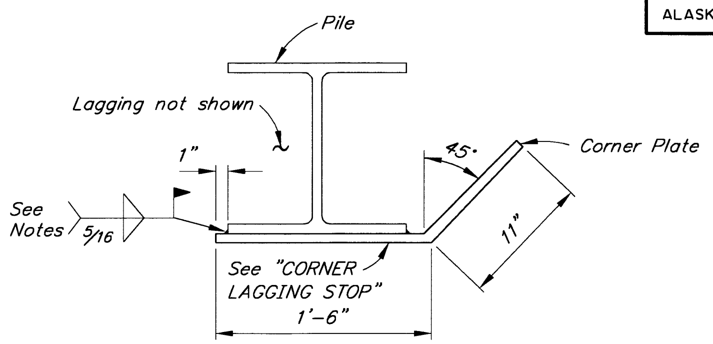


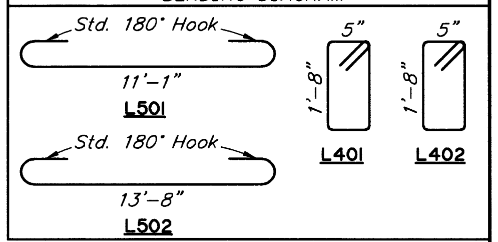
PLATE II CORNER DETAIL

No Scale

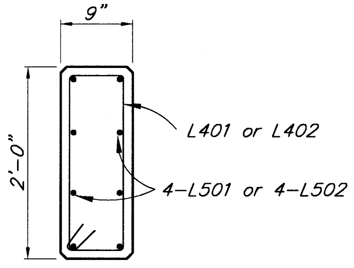
REINFORCING STEEL - ONE PANEL

MARK	NOTE	SIZE	NO.	LENGTH	TYPE
L401	E	4	17	4'-11"	STIRRUP
L402	E	4	21	4'-11"	STIRRUP
L501	E	5	8	12'-3"	BENT
L502	E	5	8	14'-10"	BENT

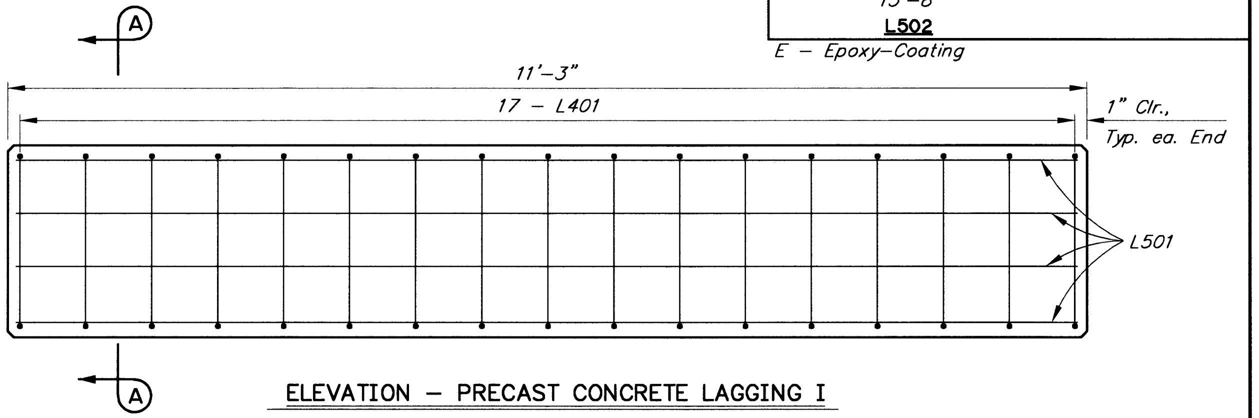
BENDING DIAGRAM



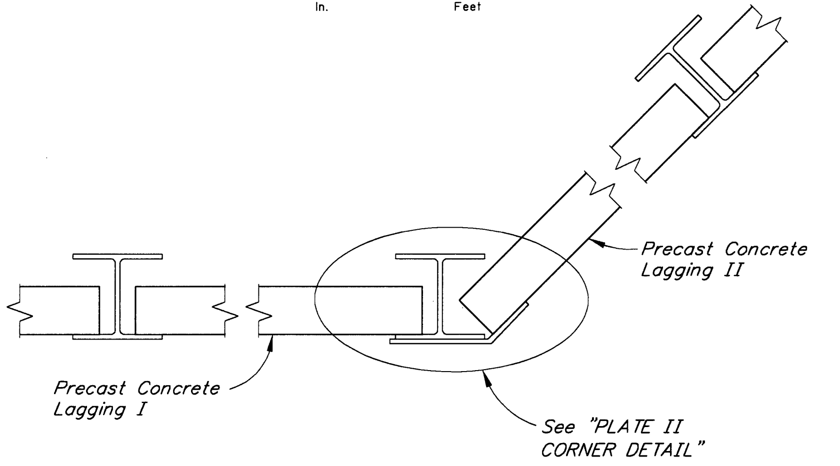
E – Epoxy–Coating



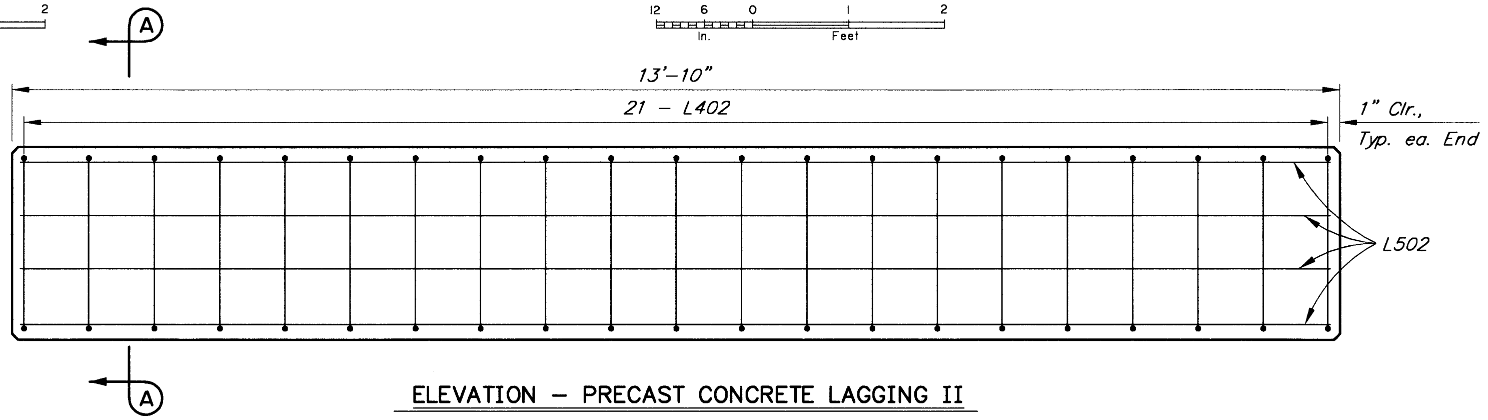
SECTION A–A



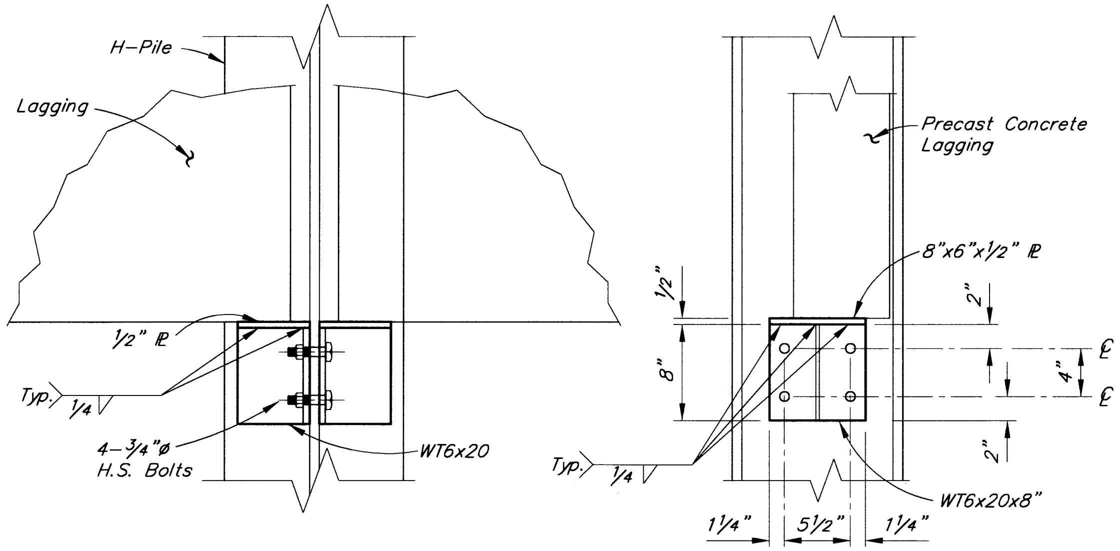
ELEVATION – PRECAST CONCRETE LAGGING I



CORNER DETAIL II



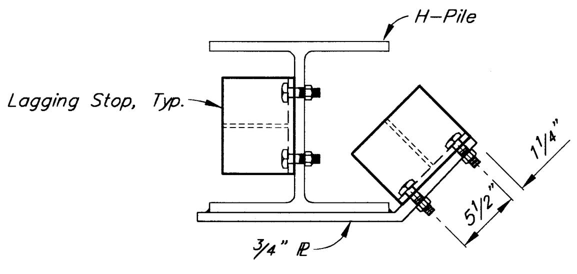
ELEVATION – PRECAST CONCRETE LAGGING II



SECTION

LAGGING STOP DETAILS

ELEVATION



CORNER LAGGING STOP

No Scale

NOTE:

1. Corner plate to extend from top of lagging elevation to 1'–0" below top of lagging stop.
2. Remove galvanizing from edges prior to field welding.
3. Galvanize field welds and repair damaged galvanizing on piles and plates after field welding.

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DESIGNED BY: Andrew Wells	CHECKED: Jared Jones Jared T. Jones
DRAWN BY: Sam Sollie	CHECKED: Andrew Wells
QUANTITIES BY: Andrew Wells	CHECKED: Jared Jones Jared T. Jones

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES
BRIDGE SECTION
3132 Channel Drive
Juneau, Alaska 99801
907-465-2975

Andrew C. Wells
04-13-2022
No. CE-156778

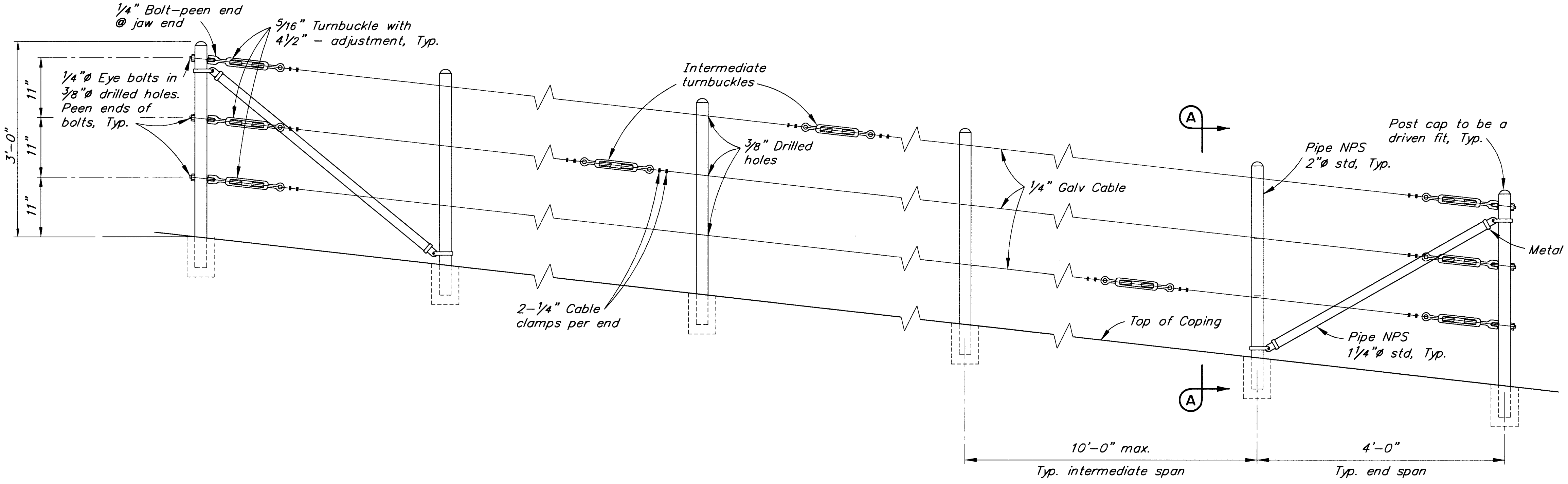
COTTONWOOD CREEK BRIDGE

WEEPING BIRCH STREET

RETAINING WALL DETAILS

BRIDGE NO. 2364
DWG. NO. 5

STATE	PROJECT DESIGNATION	YEAR	SHEET NO.	TOTAL SHEETS
ALASKA	0525016/CFHWY00599	2022	N6	N24

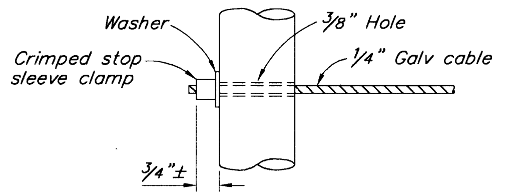


ELEVATION

No Scale

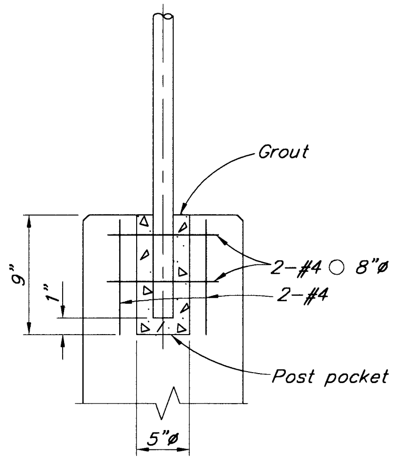
NOTES:

1. Place intermediate turnbuckles in adjacent spans.
2. Do not splice cable between intermediate turnbuckles and end posts.
3. Galvanize all posts, cable and hardware.
4. Install posts plumb. Alignment of holes may vary to conform to slope of coping.
5. Verify all controlling dimensions in the field before ordering or fabricating any material.
6. Brace posts with diagonal braces at each end, each change in direction, and each change in slope.
7. Center post pockets in top of coping.
8. Provide thimbles at all cable loops.
9. Use epoxy–coated reinforcing steel in coping.



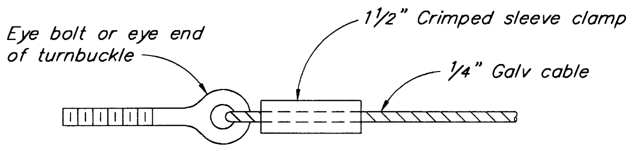
ALTERNATIVE DEAD END ANCHORAGE

No Scale



POST POCKET

No Scale



ALTERNATIVE CABLE CONNECTION

No Scale

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DRAWN BY: Sam Sollie Sam Sollie Jr	CHECKED: Andrew Wells
QUANTITIES BY: Andrew Wells	CHECKED: Jared Jones Jared T. Jones

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION
AND PUBLIC FACILITIES
BRIDGE SECTION
3132 Channel Drive
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Andrew C. Wells
04-13-2022
No. CE-156778

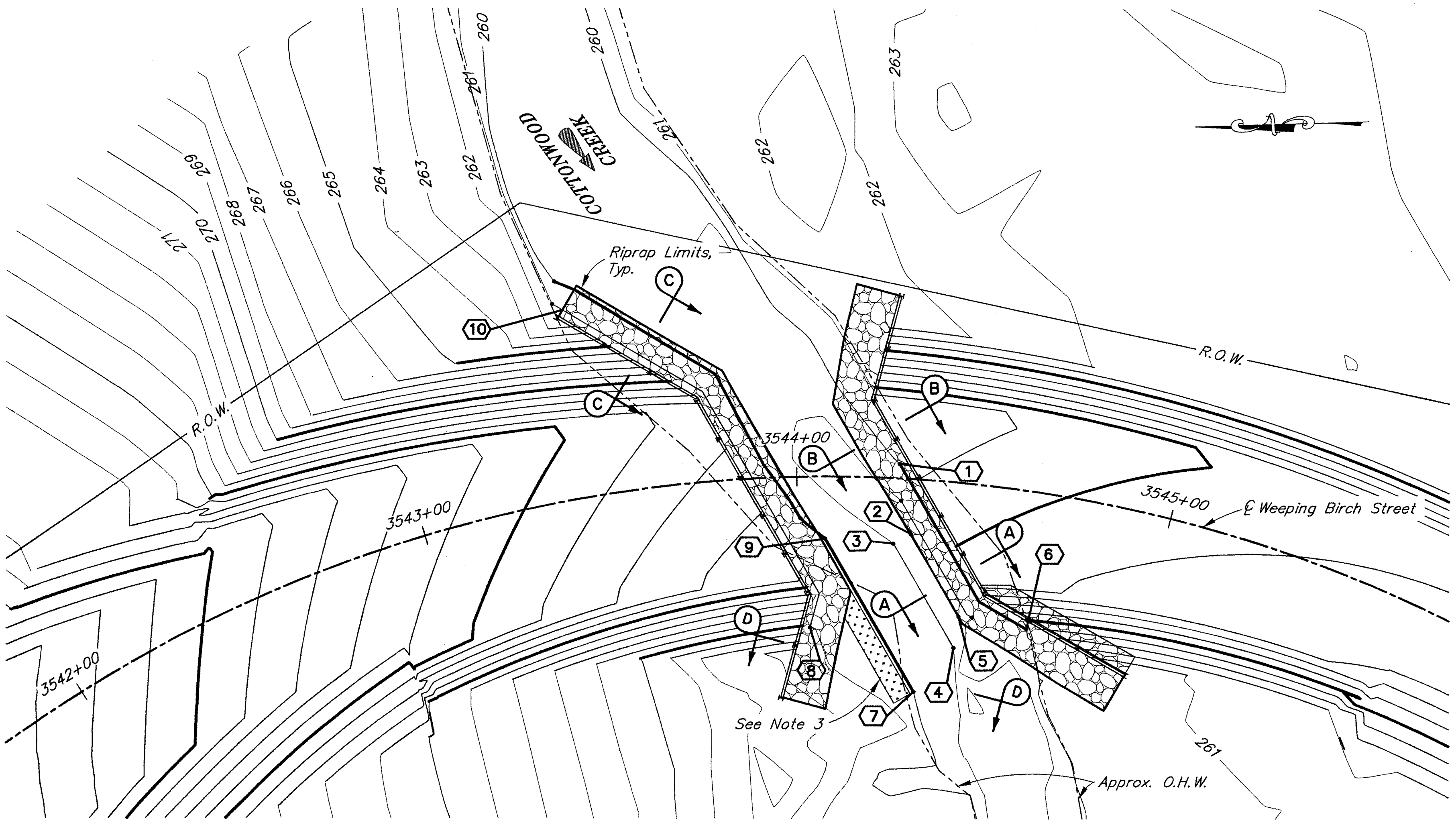
COTTONWOOD CREEK BRIDGE

WEEPING BIRCH STREET

SAFETY RAILING DETAILS

BRIDGE NO. 2364
DWG. NO. 6

STATE	PROJECT DESIGNATION	YEAR	SHEET NO.	TOTAL SHEETS
ALASKA	0525016/CFHWY00599	2022	N7	N24



RIPRAP LAYOUT

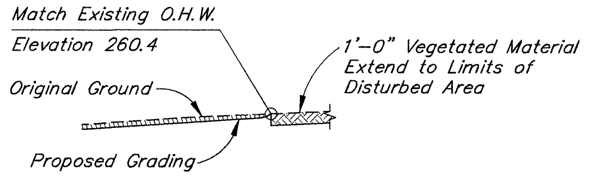
RIPRAP LAYOUT, GRADING, AND CHANNEL ALIGNMENT TABLE			
POINT	STATION	OFFSET	ELEVATION
1	3544+27.1	3.8' Left	260.0'
2	3544+31.2	14.8' Right	258.8'
3	3544+26.5	17.4' Right	259.0'
4	3544+49.6	43.9' Right	259.0'
5	3544+46.6	35.5' Right	258.5'
6	3544+66.9	36.4' Right	260.0'
7	3544+35.0	56.3' Right	260.0'
8	3544+2.8	40.0' Right	261.0'
9	3544+7.5	16.6' Right	260.0'
10	3543+45.6	50.0' Left	261.0'

HYDRAULIC & HYDROLOGIC SUMMARY

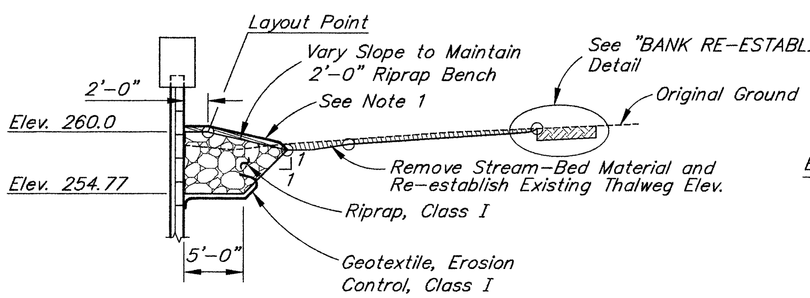
Flood Frequency (Yr.)	50	100	500
Exceedance Probability (%)	2	1	0.2
Discharge (cfs)	☒	361.4	484.9
Water Surface Elevation (ft)	☒	262.2	262.5
Anticipated Add'l Backwater (ft)	☒	0.1	0.1
Contraction Scour (ft)	☒	1.4	1.9
Abutment Scour (ft)	☒	N.C.	N.C.
Long–Term Degradation (ft)	3		

Drainage Area for this crossing:..... 22.9 square miles

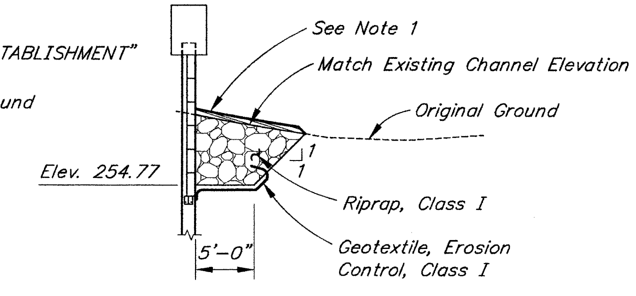
Hydraulic Capacity:......................... Roughly 390 C.F.S.



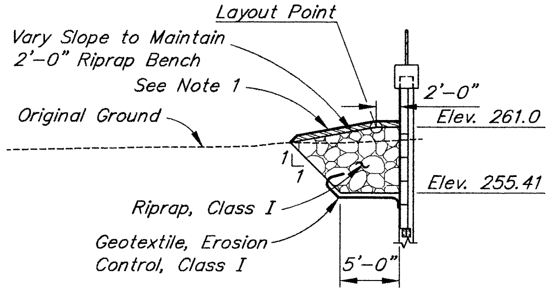
BANK RE-ESTABLISHMENT



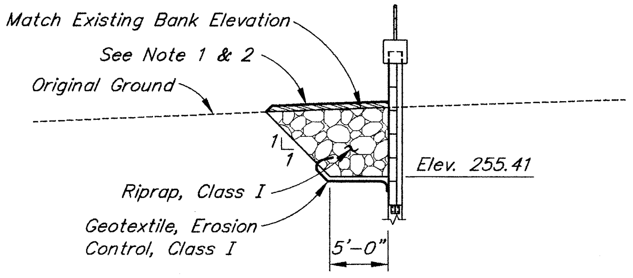
SECTION A-A



SECTION B-B



SECTION C-C



SECTION D-D

RIPRAP NOTES:

1. *Details show a 6" fill depth of salvaged streambed material over the top of riprap, but should be interpreted as the filling of interstitial voids. Final fill depths and acceptance of any boulder "protrusions" through the salvaged streambed fill layer are at the discretion of the Engineer.*
2. *Apply seed and B.F.M on backfilled riprap above O.H.W.*
3. *Salvage and protect native vegetative mat for placement over disturbed area along bank (See Bank Re-Establishment Detail)*

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DESIGNED BY: Aaron Havel	CHECKED:
DRAWN BY: Sam Sollie	CHECKED: Aaron Havel
QUANTITIES BY: Andrew Wells	CHECKED:

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES
BRIDGE SECTION
3132 Channel Drive
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Aaron J Havel
No. CE 107250
4/14/22

COTTONWOOD CREEK BRIDGE
WEEPING BIRCH STREET
RIPRAP LAYOUT AND DETAILS

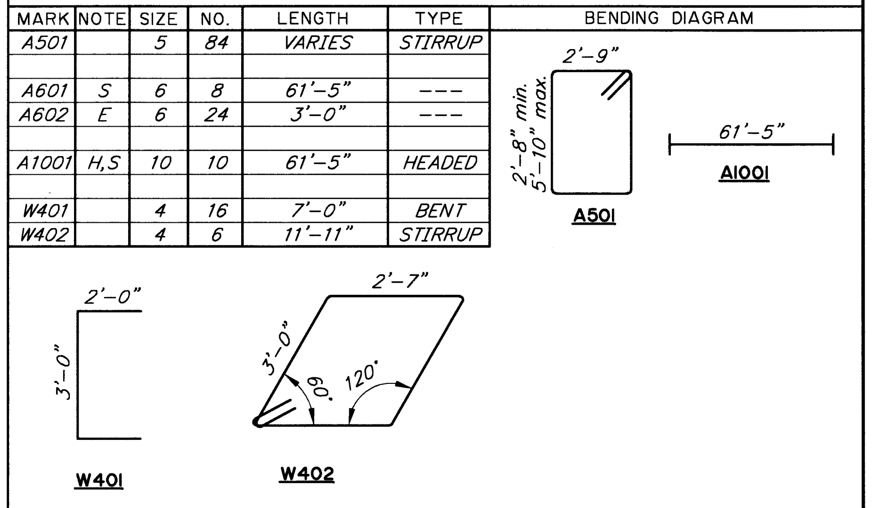
BRIDGE NO. 2364
DWG. NO. 7

STATE	PROJECT DESIGNATION	YEAR	SHEET NO.	TOTAL SHEETS
ALASKA	0525016/CFHWY00599	2022	N8	N24

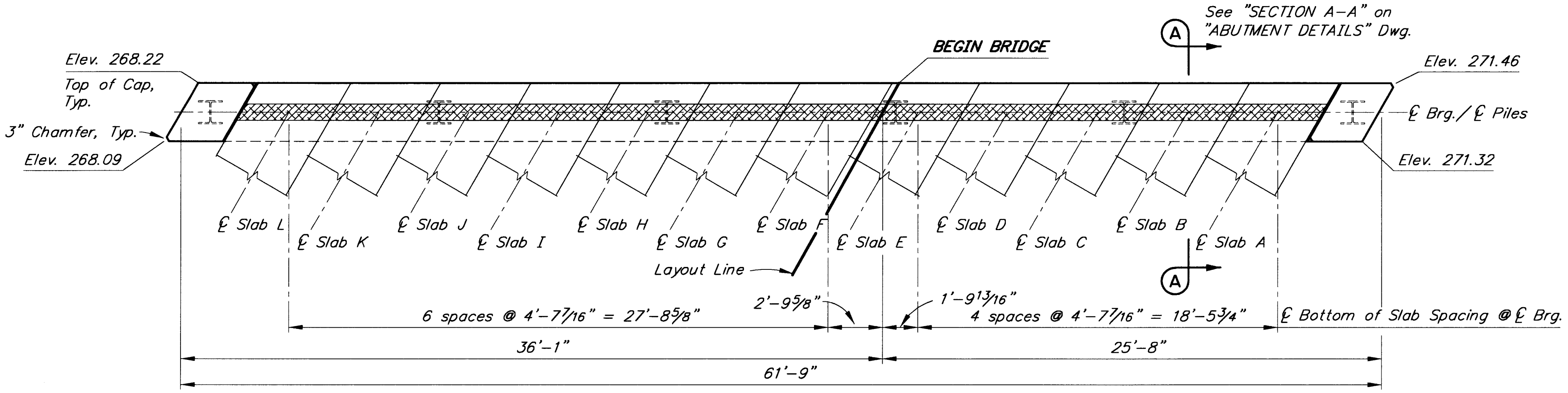
REINFORCING STEEL - ABUTMENT I

MARK	NOTE	SIZE	NO.	LENGTH	TYPE
A501		5	84	VARIES	STIRRUP
A601	S	6	8	61'-5"	---
A602	E	6	24	3'-0"	---
A1001	H,S	10	10	61'-5"	HEADED
W401		4	16	7'-0"	BENT
W402		4	6	11'-11"	STIRRUP

BENDING DIAGRAM

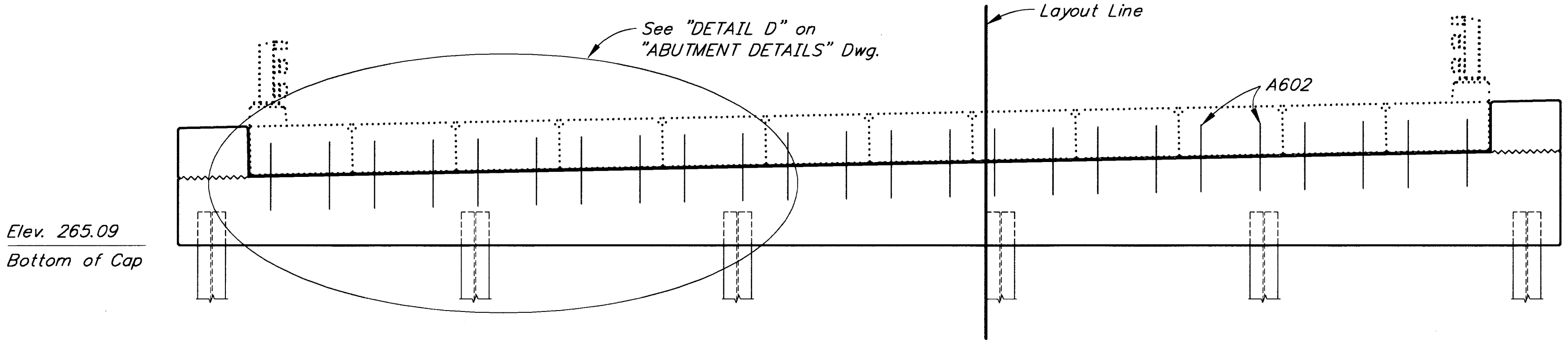


E – Epoxy-Coated
H – Headed reinforcing steel
S – Length does not include splices



PLAN

12 0 4 8
In. Feet



ELEVATION

(Looking back on station)

12 0 4 8
In. Feet

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DESIGNED BY: Andrew Wells	CHECKED: Jared Jones Jared T. Jones
DRAWN BY: Sam Sollie Sam Sollie Jr.	CHECKED: Andrew Wells
QUANTITIES BY: Andrew Wells	CHECKED: Jared Jones Jared T. Jones

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907-465-2975

Andrew C.Wells
04-13-2022
No. CE-156778

COTTONWOOD CREEK BRIDGE

WEEPING BIRCH STREET

ABUTMENT 1

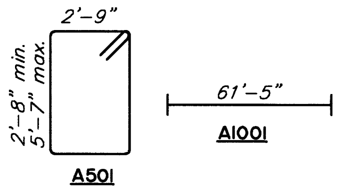
BRIDGE NO. 2364
DWG. NO. 8

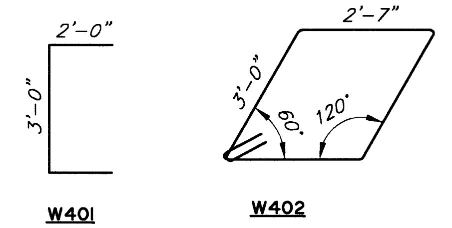
STATE	PROJECT DESIGNATION	YEAR	SHEET NO.	TOTAL SHEETS
ALASKA	0525016/CFHWY00599	2022	N9	N24

REINFORCING STEEL - ABUTMENT 2

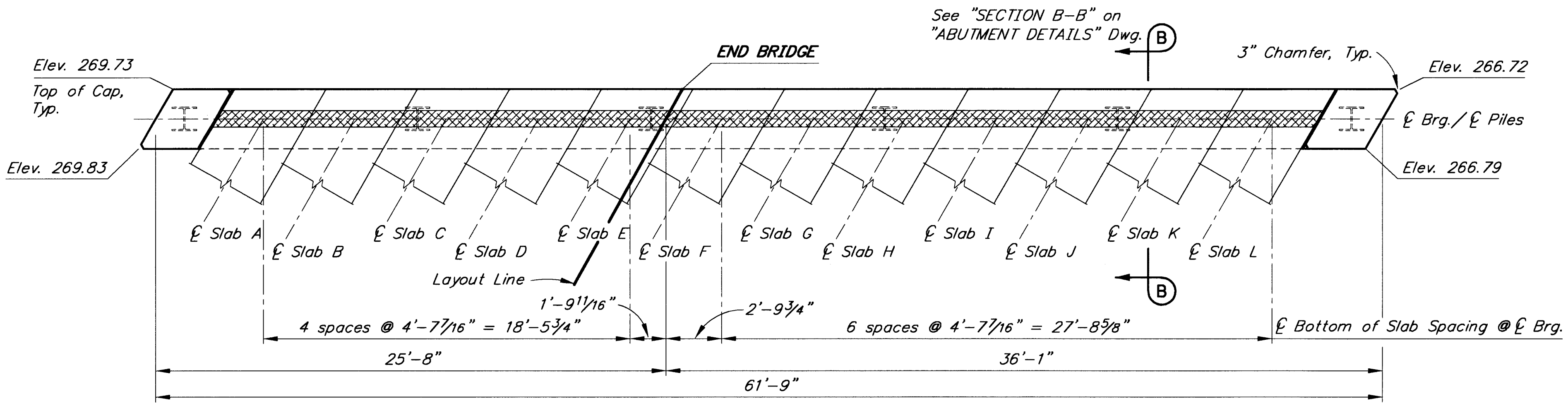
MARK	NOTE	SIZE	NO.	LENGTH	TYPE
A501		5	84	VARIES	STIRRUP
A601	S	6	8	61'-5"	---
A602	E	6	24	3'-0"	---
A1001	H,S	10	10	61'-5"	HEADED
W401		4	16	7'-0"	BENT
W402		4	6	11'-11"	STIRRUP

BENDING DIAGRAM



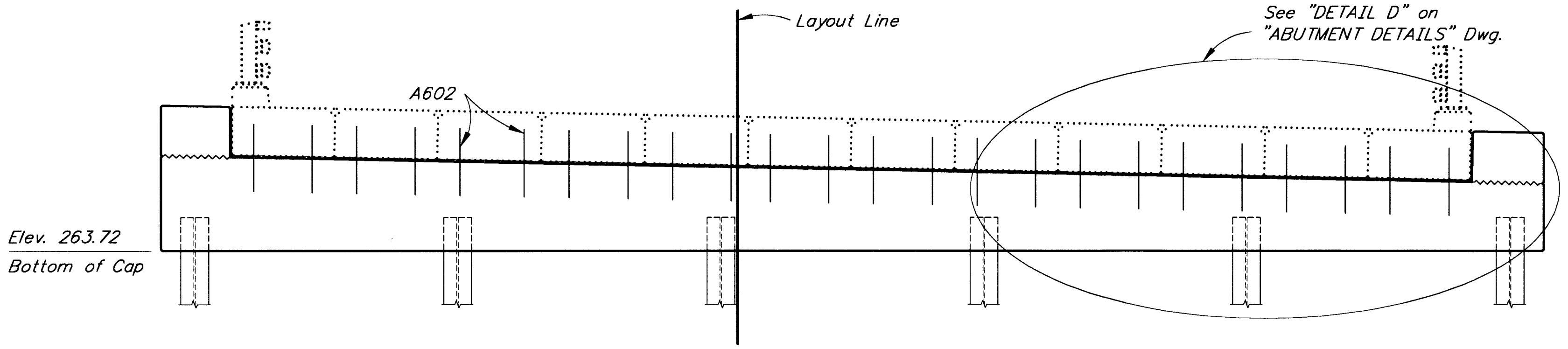


E - Epoxy-Coated
H - Headed reinforcing steel
S - Length does not include splices



PLAN

12 0 4 8
In. Feet



ELEVATION

12 0 4 8
In. Feet

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DESIGNED BY: Andrew Wells	CHECKED: Jared Jones Jared T. Jones
DRAWN BY: Sam Sollie	CHECKED: Andrew Wells
QUANTITIES BY: Andrew Wells	CHECKED: Jared Jones Jared T. Jones

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION
AND PUBLIC FACILITIES
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3132 Channel Drive
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Andrew C.Wells
04-13-2022
No. CE-156778

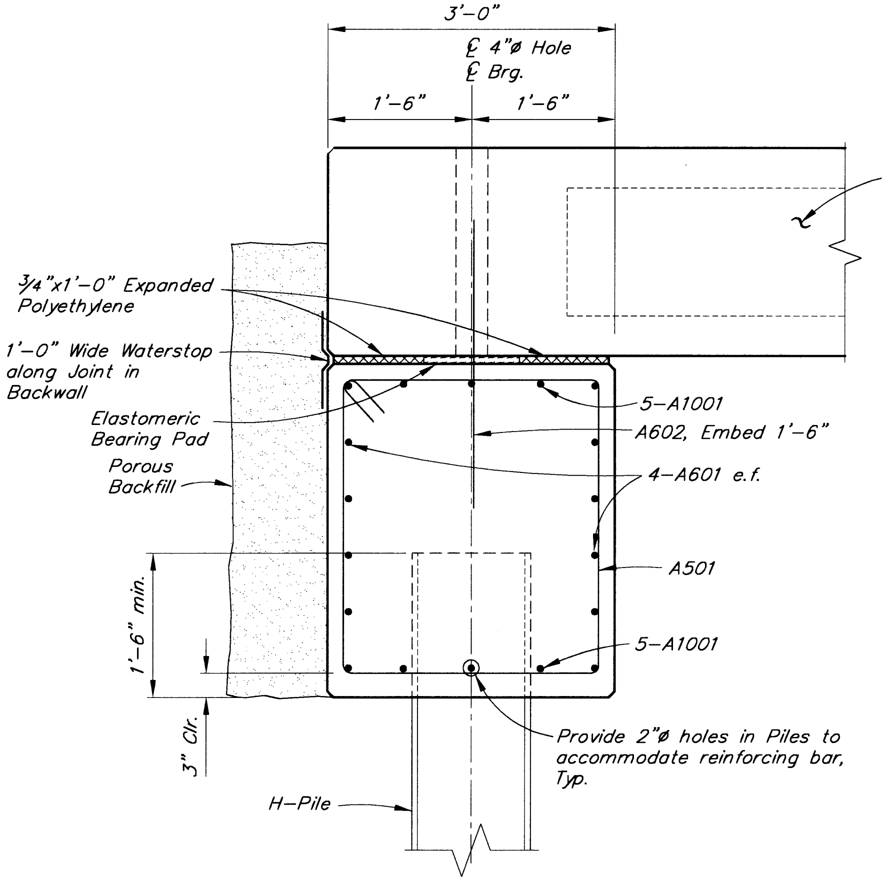
COTTONWOOD CREEK BRIDGE

WEEPING BIRCH STREET

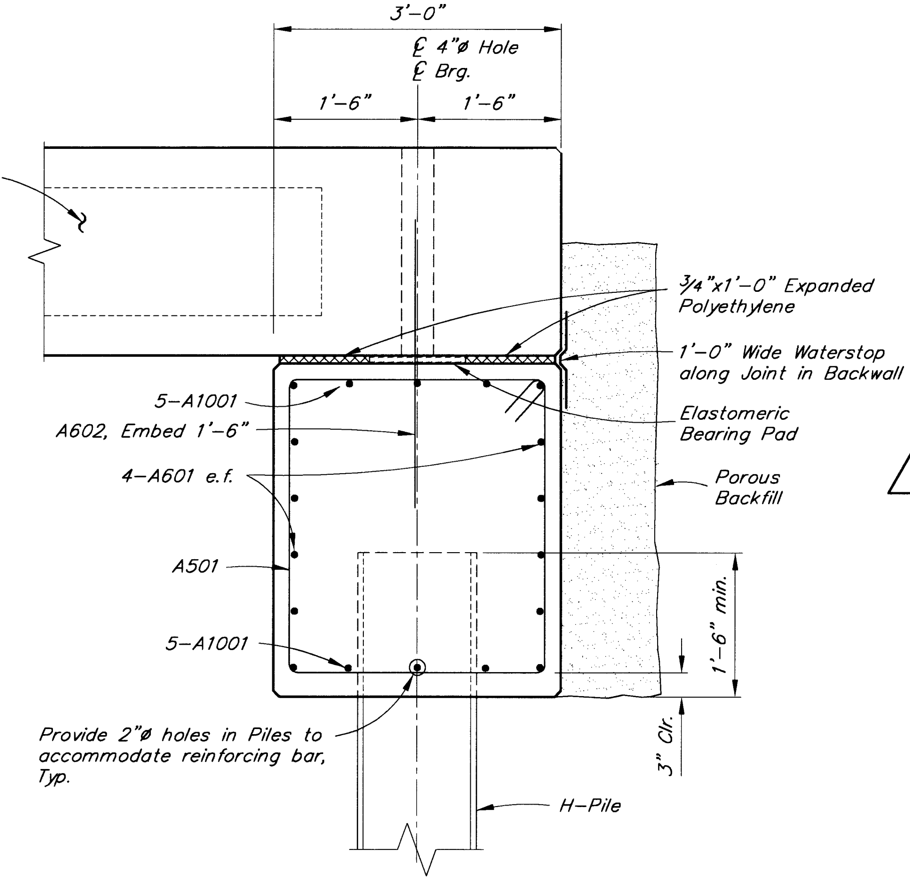
ABUTMENT 2

BRIDGE NO. 2364
DWG. NO. 9

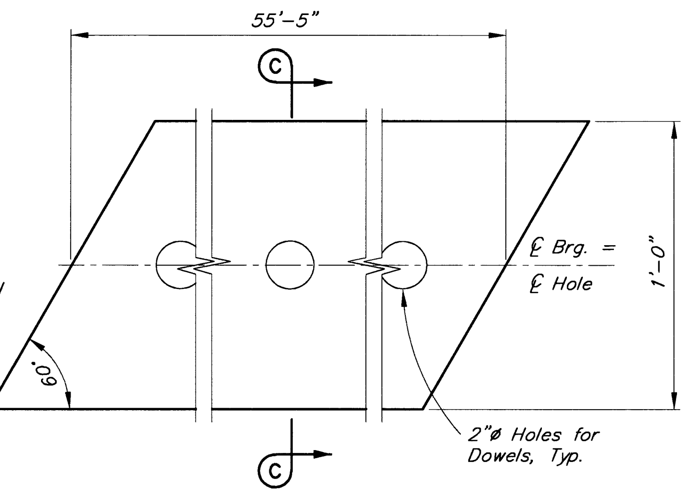
STATE	PROJECT DESIGNATION	YEAR	SHEET NO.	TOTAL SHEETS
ALASKA	0525016/CFHWY00599	2022	N10	N24



SECTION A-A

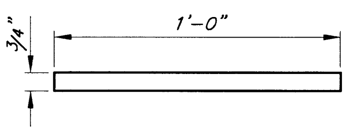


SECTION B-B

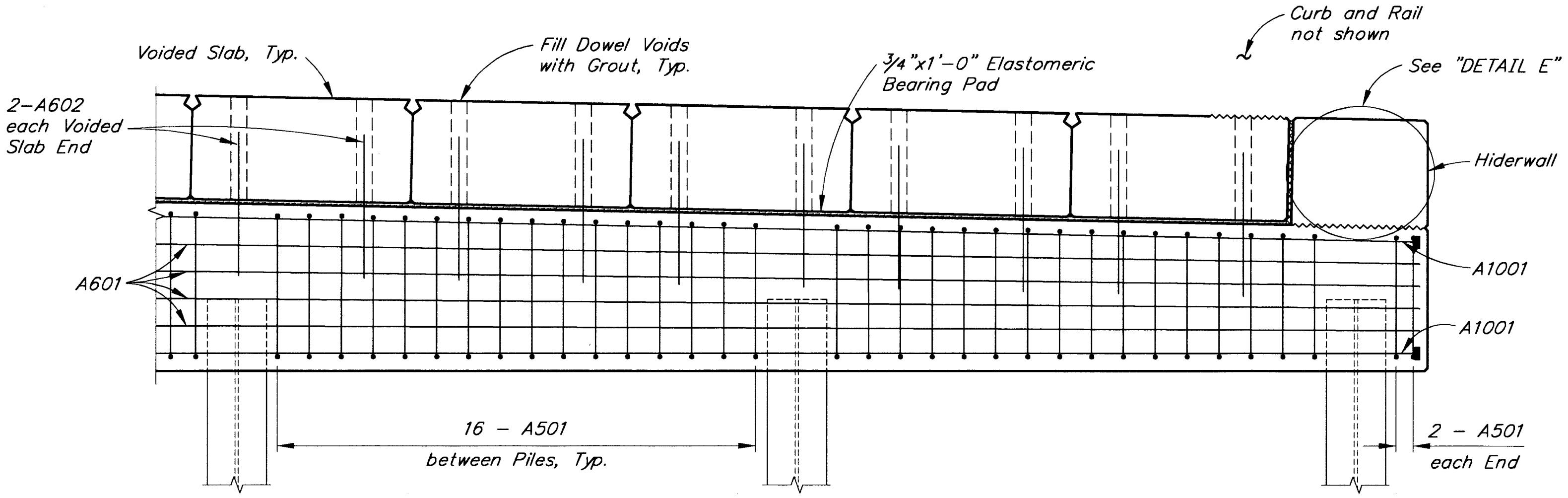


ELASTOMERIC BEARING PAD

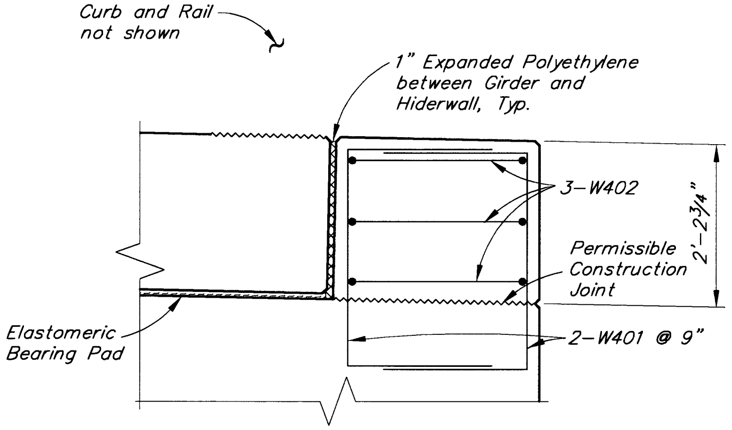
Grade 5
Dead Load = 30 k / Girder End
Live Load = 49 k / Girder End
Shear Modulus = 115 psi



SECTION C-C



DETAIL D



DETAIL E

DESIGNED BY: Andrew Wells Andrew Wells	CHECKED: Jared Jones Jarad T. Jones
DRAWN BY: Sam Sollie Sam Sollie Jr.	CHECKED: Andrew Wells Andrew Wells
QUANTITIES BY: Andrew Wells Andrew Wells	CHECKED: Jared Jones Jarad T. Jones

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES
BRIDGE SECTION
3132 Channel Drive
Juneau, Alaska 99801
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49TH
Andrew C.Wells
04-13-2022
No. CE-156778

COTTONWOOD CREEK BRIDGE

WEEPING BIRCH STREET

ABUTMENT DETAILS

BRIDGE NO. 2364
DWG. NO. 10

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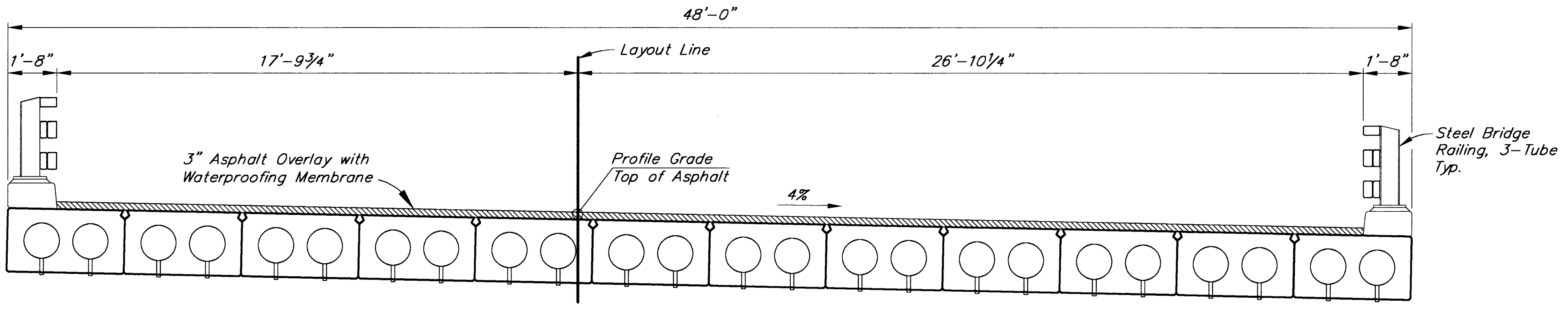
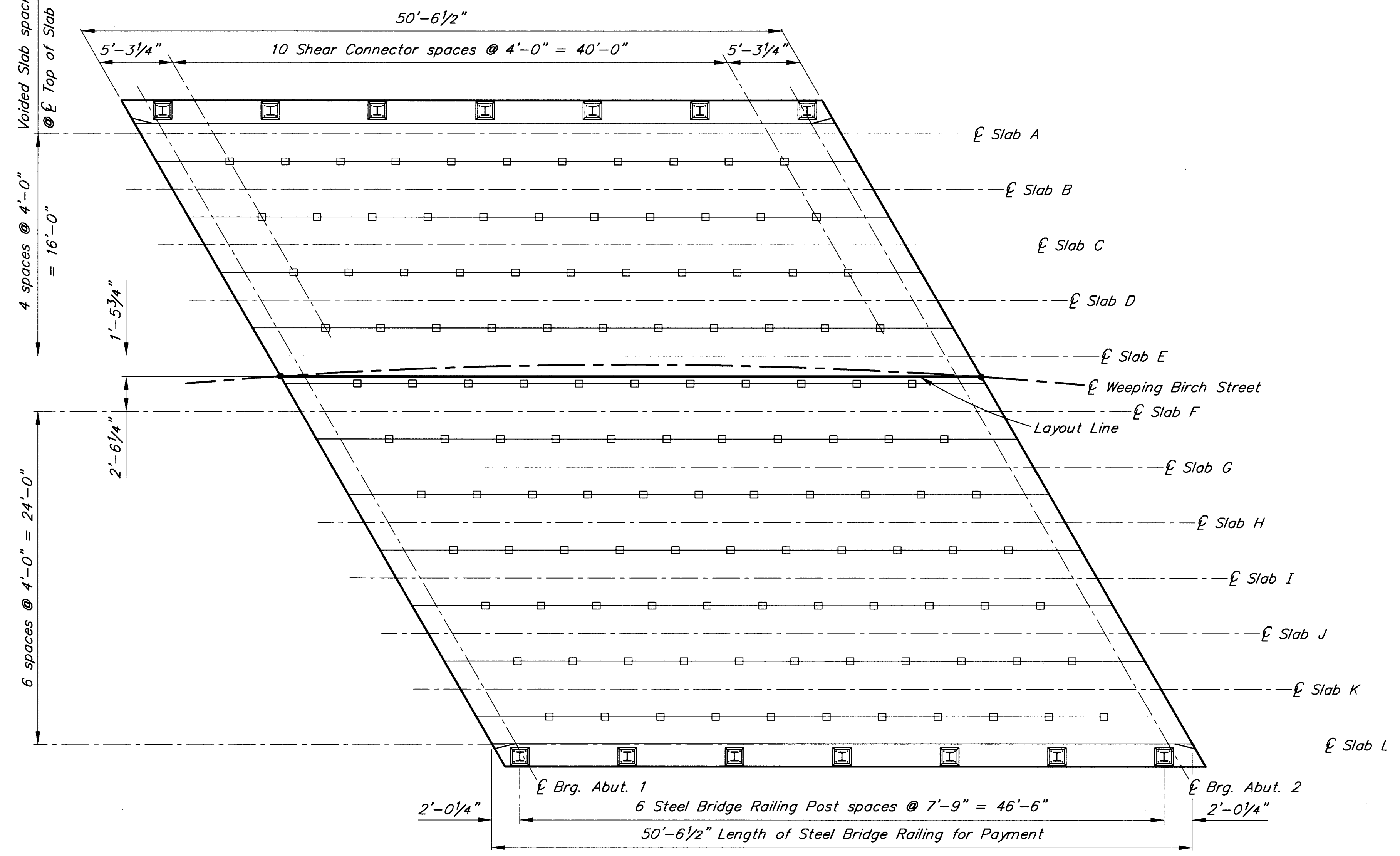
STATE	PROJECT DESIGNATION	YEAR	SHEET NO.	TOTAL SHEETS
ALASKA	0525016/CFHWY00599	2022	N11	N24



TYPICAL SECTION



FRAMING PLAN

DESIGNED BY: Andrew Wells	CHECKED: Jared Jones Jared T. Jones
DRAWN BY: Sam Sollie	CHECKED: Andrew Wells
QUANTITIES BY: Andrew Wells	CHECKED: Jared Jones Jared T. Jones

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES
BRIDGE SECTION
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Andrew C. Wells
04-13-2022
No. CE-156778

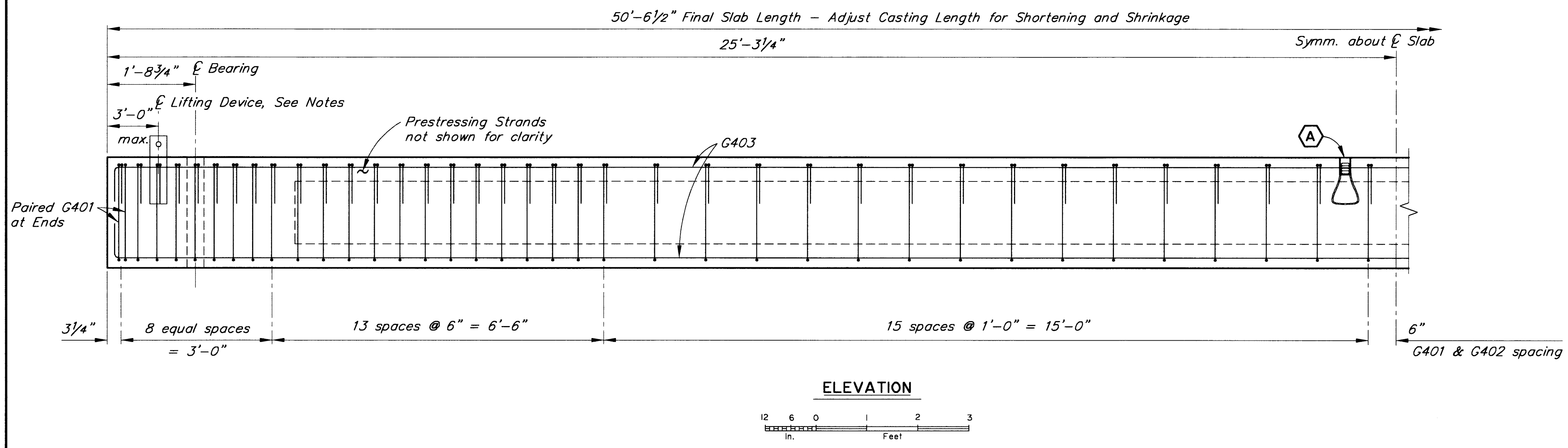
COTTONWOOD CREEK BRIDGE

WEEPING BIRCH STREET

FRAMING PLAN AND TYPICAL SECTION

BRIDGE NO. 2364
DWG. NO. 11

STATE	PROJECT DESIGNATION	YEAR	SHEET NO.	TOTAL SHEETS
ALASKA	0525016/CFHWY00599	2022	N12	N24

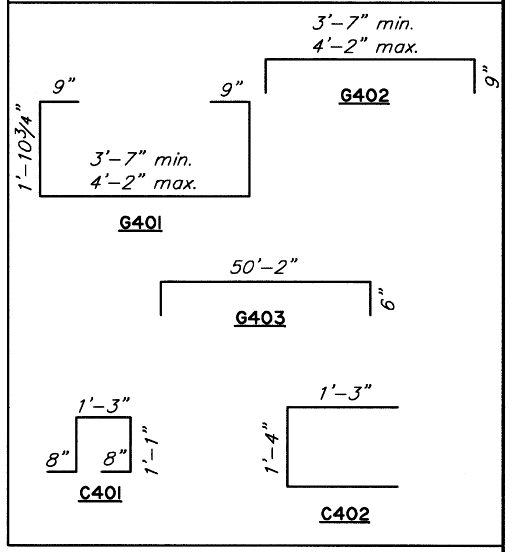


ELEVATION

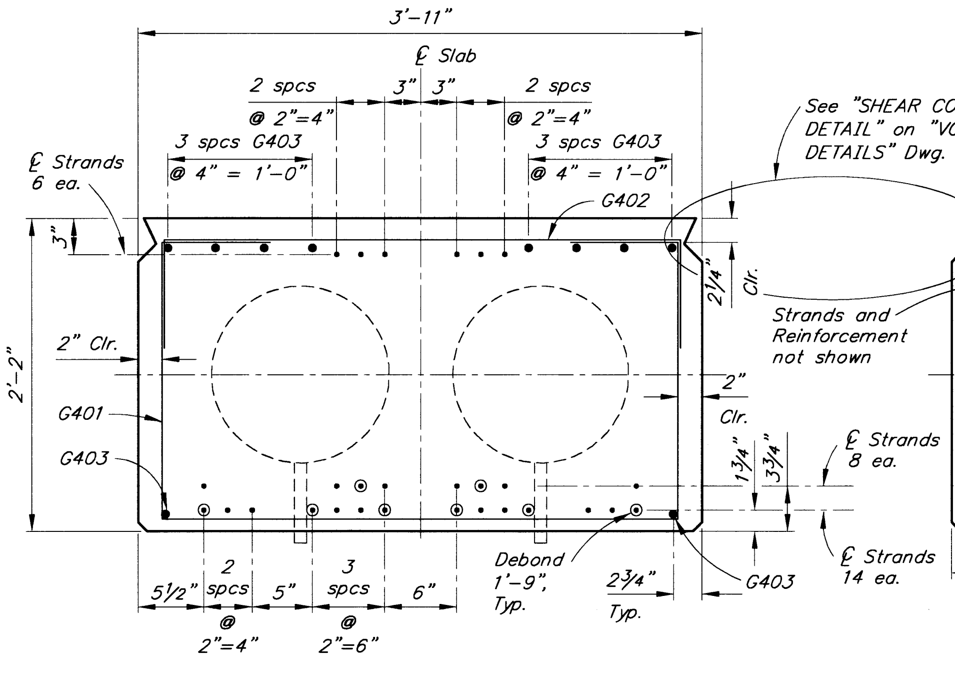
REINFORCING STEEL SCHEDULE - ONE VOIDED SLAB

MARK	NOTE	SIZE	NO.	LENGTH	TYPE
G401	E	4	76	VARIES	BENT
G402	E	4	74	VARIES	BENT
G403	E	4	10	51'-2"	BENT
C401	E,X	4	40	4'-9"	BENT
C402	E,X	4	14	3'-10"	BENT
C403	E,S,X	4	3	50'-2"	---

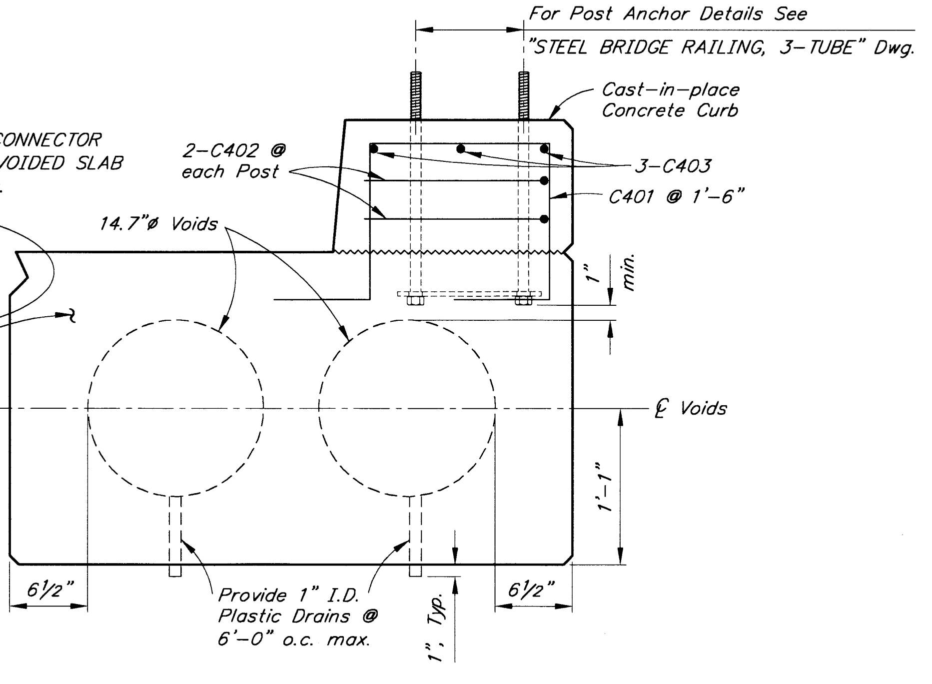
BENDING DIAGRAM



E – Epoxy-Coated reinforcing steel
S – Length does not include splices. Minimum lap splice length for splices shall be: 2'-0" for #4 bars, 2'-6" for #5 bars.
X – Exterior girders only



INTERIOR SLAB
TYPICAL SECTION



EXTERIOR SLAB
TYPICAL SECTION

VOIDED SLAB NOTES:

Use Class P concrete with the following strengths:
at Stress Transfer.....f'ci = 7,000 psi
at 28 Days.................f'c = 8,000 psi

Use ½"ø low relaxation prestressing strands with an ultimate tensile strength of 270 ksi and a cross sectional area of 0.153 in².

Steel stresses: Pretensioning – Jacking Stress 189 ksi
After initial losses 183 ksi
After all losses 154 ksi

One inch clear cover on reinforcing steel unless noted otherwise.

See "FRAMING PLAN AND TYPICAL SECTION" Dwg. for Shear Connector spacing.

Galvanize all structural steel embedded in slabs except for shear connectors.

Ⓐ 1"X1'-0" Coil Anchor Insert for vertical adjustment of girders. Recess 2".

Omit Shear Key and Shear Key Connector in the exterior face of exterior slabs.

Submit lifting device for approval.

Burn strands flush and epoxy with material meeting AASHTO M235, Type IV, Grade 1.

Finish top flange with light broom finish. Roughen surface under curb.

DESIGNED BY: Andrew Wells Andrew Wells	CHECKED: Jared Jones Jared T Jones
DRAWN BY: Sam Sollie Sam Sollie Jr	CHECKED: Andrew Wells Andrew Wells
QUANTITIES BY: Andrew Wells Andrew Wells	CHECKED: Jared Jones Jared T. Jones

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES
BRIDGE SECTION
3132 Channel Drive
Juneau, Alaska 99801
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Andrew C. Wells
04-13-2022
No. CE-156778

COTTONWOOD CREEK BRIDGE
WEEPING BIRCH STREET
VOIDED SLABS

BRIDGE NO. 2364
DWG. NO. 12

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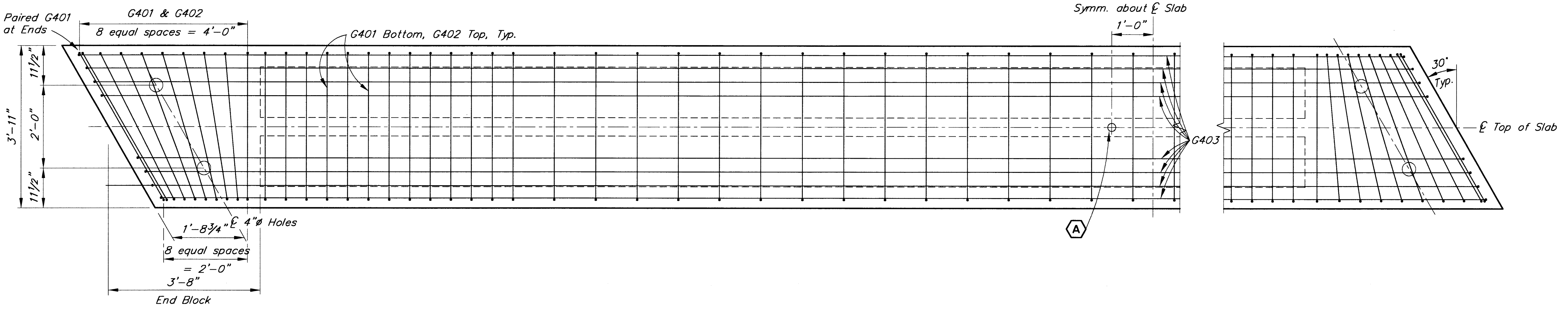
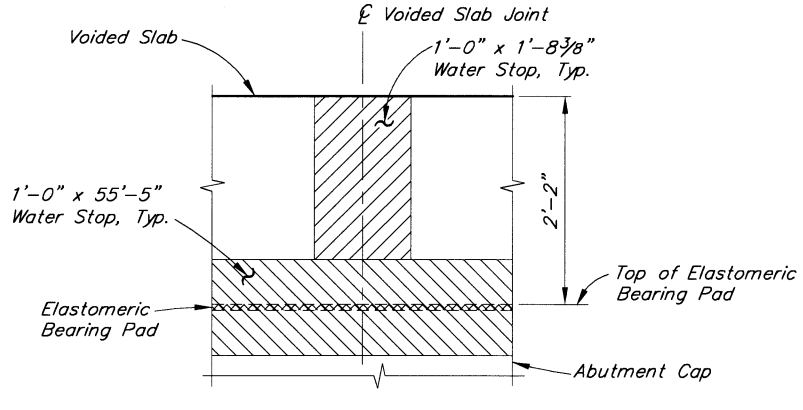
STATE	PROJECT DESIGNATION	YEAR	SHEET NO.	TOTAL SHEETS
ALASKA	0525016/CFHWY00599	2022	N13	N24



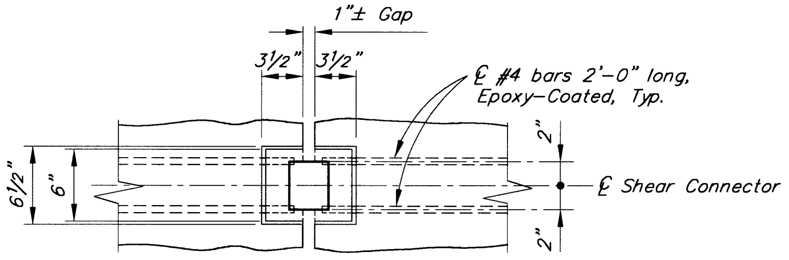
PLAN

12 6 0 1 2 3
In. Feet



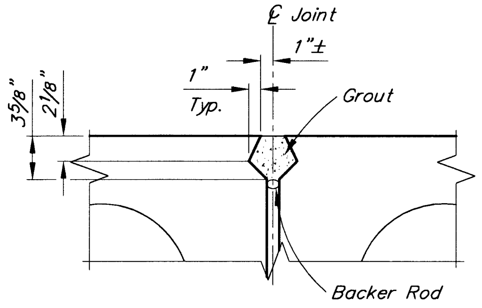
WATER STOP DETAIL
END ELEVATION

12 6 0 1 2
In. Feet



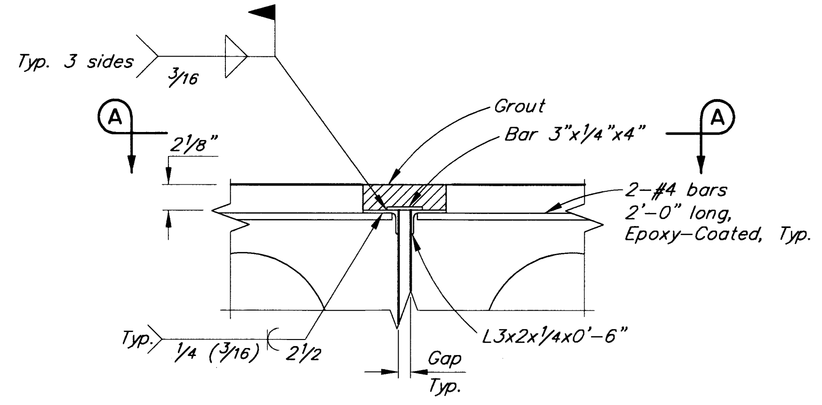
VIEW A-A

12 6 0 1
In. Feet



SHEAR KEY DETAIL

12 6 0 1
In. Feet



SHEAR CONNECTOR DETAIL

12 6 0 1
In. Feet

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DESIGNED BY: Andrew Wells Andrew Wells	CHECKED: Jared Jones Jared T. Jones
DRAWN BY: Sam Sollie Sam Sollie Jr	CHECKED: Andrew Wells Andrew Wells
QUANTITIES BY: Andrew Wells Andrew Wells	CHECKED: Jared Jones Jared T. Jones

STATE OF ALASKA
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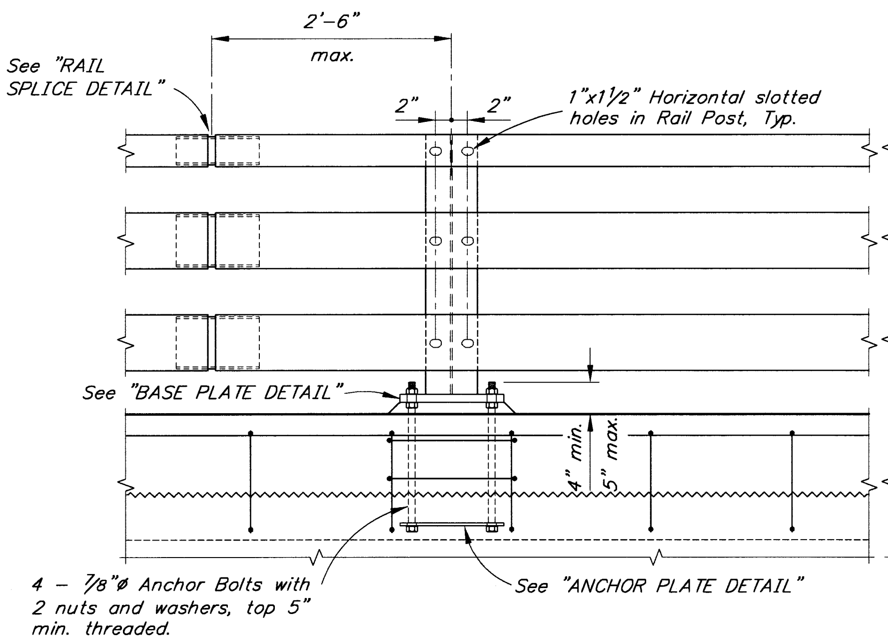
Juneau, Alaska 99801
907-465-2975

Andrew C.Wells
04-13-2022
No. CE-156778

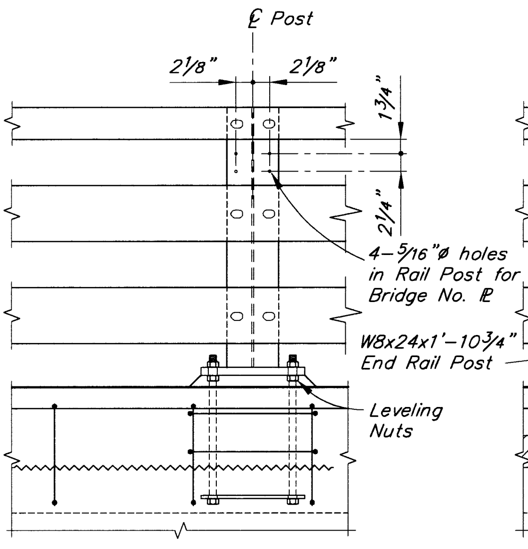
COTTONWOOD CREEK BRIDGE
WEEPING BIRCH STREET
VOIDED SLAB DETAILS

BRIDGE NO. 2364
DWG. NO. 13

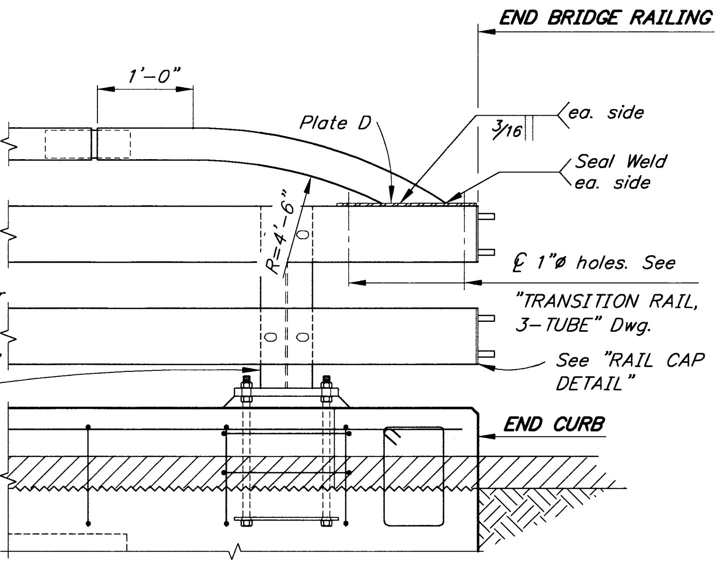
STATE	PROJECT DESIGNATION	YEAR	SHEET NO.	TOTAL SHEETS
ALASKA	0525016/CFHWY00599	2022	N14	N24



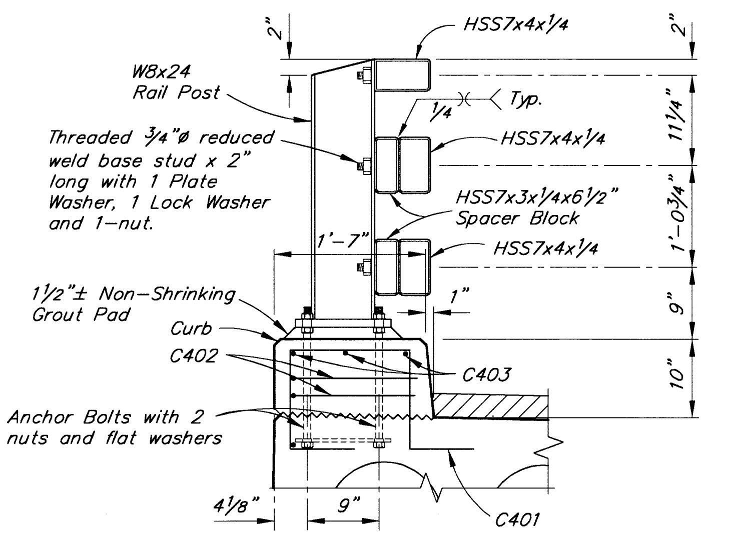
EXPANSION JOINT



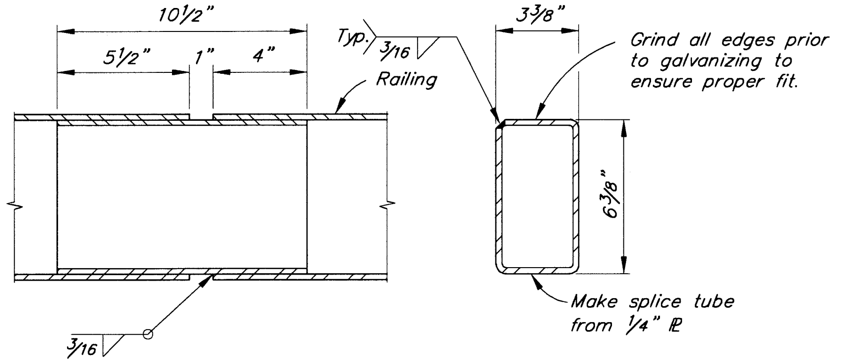
TYPICAL POST ELEVATION



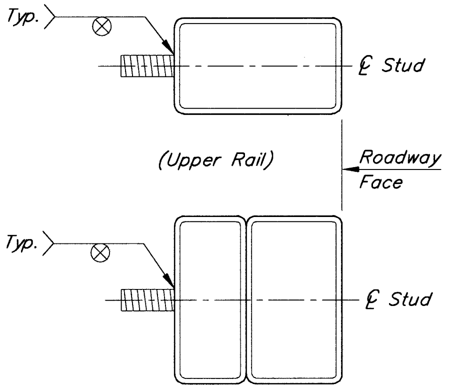
END POST - ELEVATION



TYPICAL SECTION



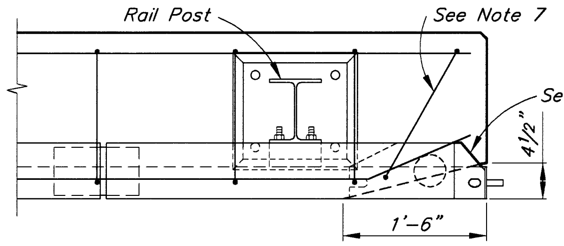
RAIL SPLICE DETAIL



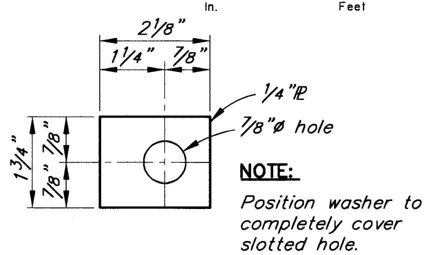
RAILING STUD DETAIL

(Lower and Middle Rail)

No Scale



PLAN

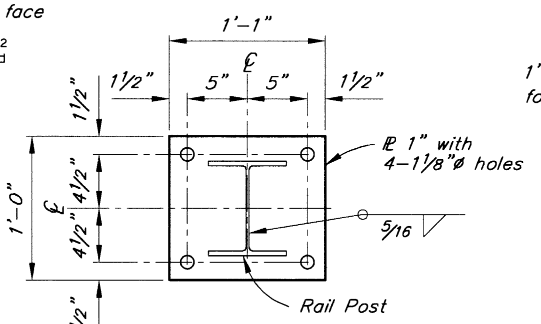


NOTE:

Position washer to completely cover slotted hole.

PLATE WASHER

No Scale



BASE PLATE DETAIL

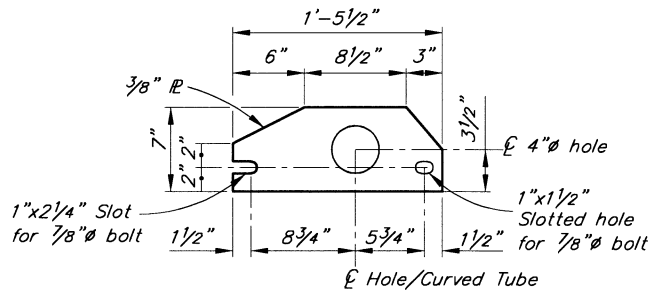
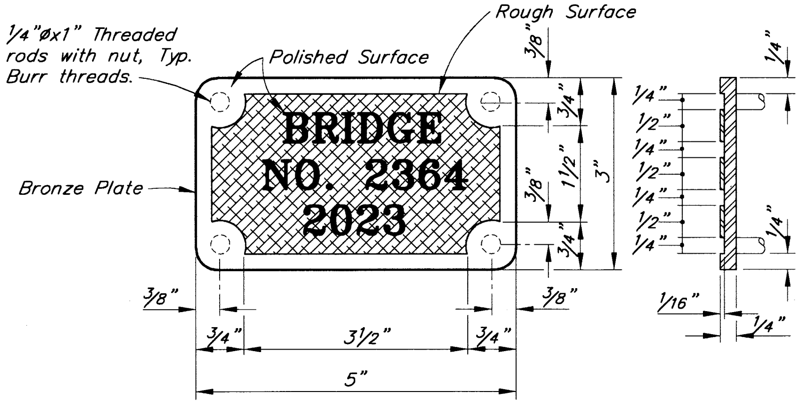
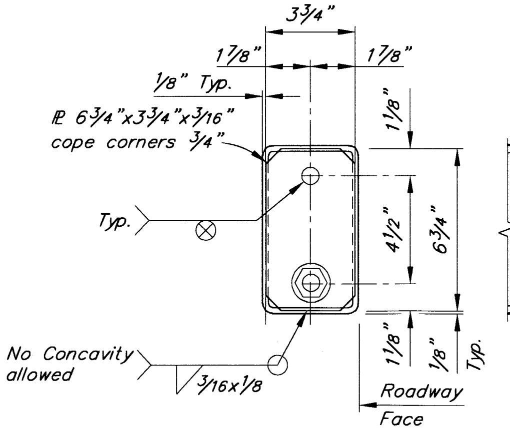


PLATE D

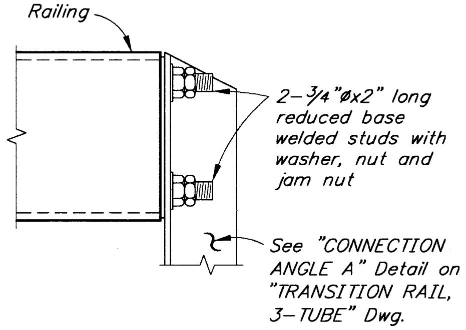


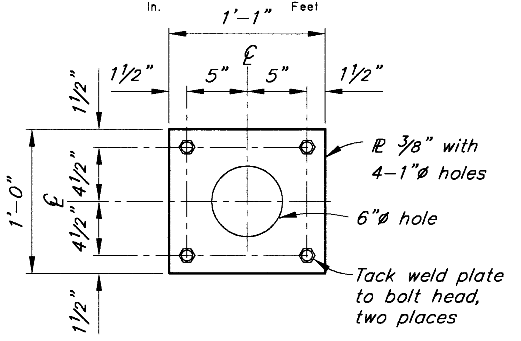
BRONZE BRIDGE NO. PLATE

No Scale



RAIL CAP DETAIL





ANCHOR PLATE DETAIL

NOTES:

1. Locate bridge number plates on right hand side of approaching traffic near each end as shown on "GENERAL LAYOUT" Dwg. (2 total).
2. Furnish bridge number plates. Use "Century" type style lettering. Use studs and nuts that conform to UNS C65100 or C65500. Braze ¼"ø threaded rod to back of plate with nut – 4 required. Use tamper proof nuts.
3. Provide railing expansion joints at 50'-0" maximum intervals. Railing shall be continuous over 2 posts minimum. Railing expansion joints are required in rail panels that span bridge expansion joints.
4. Install grout in a single placement.
5. See "FRAMING PLAN AND TYPICAL SECTION" Dwg. for rail post spacing.
6. Install bridge rail posts plumb.
7. Adjust reinforcing to accommodate curb taper.

C:\Users\shsollie\AppData\Local\Temp\AcPublish_126376\2364-1-14 Wed, Apr/13/22 07:02am

DESIGNED BY: Andrew Wells Andrew Wells	CHECKED: Jared Jones Jared T. Jones
DRAWN BY: Sam Sollie Sam Sollie	CHECKED: Andrew Wells Andrew Wells
QUANTITIES BY: Andrew Wells Andrew Wells	CHECKED: Jared Jones Jared T. Jones

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION
AND PUBLIC FACILITIES
BRIDGE SECTION
3132 Channel Drive
Juneau, Alaska 99801
907-465-2975

Andrew C. Wells
04-13-2022
No. CE-156778

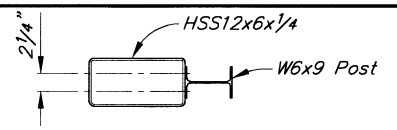
COTTONWOOD CREEK BRIDGE

WEEPING BIRCH STREET

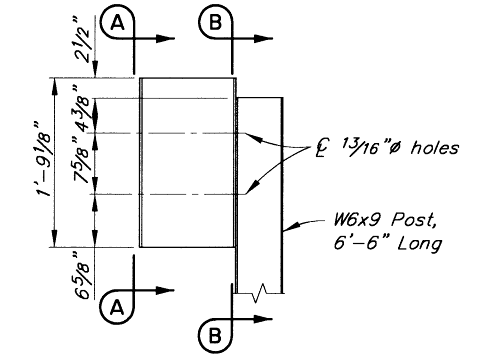
STEEL BRIDGE RAILING, 3-TUBE

BRIDGE NO. 2364
DWG. NO. 14

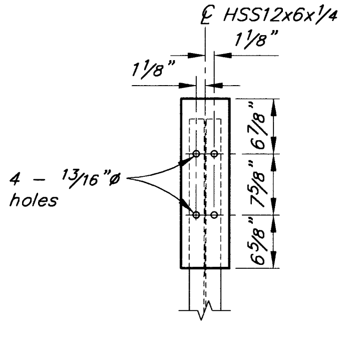
STATE	PROJECT DESIGNATION	YEAR	SHEET NO.	TOTAL SHEETS
ALASKA	0525016/CFHWY00599	2022	N15	N24



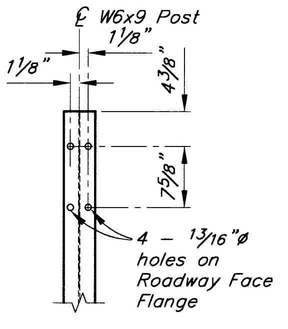
TOP VIEW



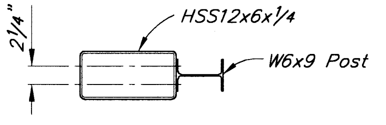
THRIE BEAM STEEL BLOCKOUT - LONG



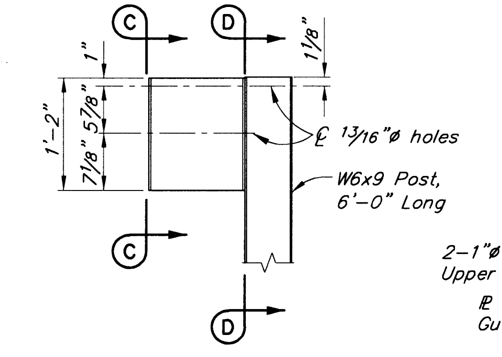
VIEW A-A



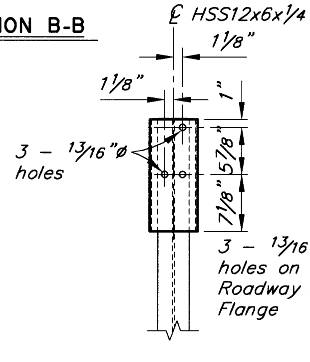
SECTION B-B



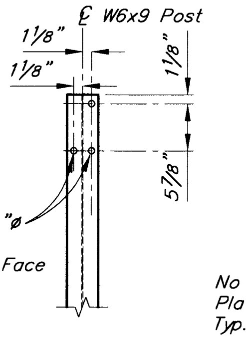
TOP VIEW



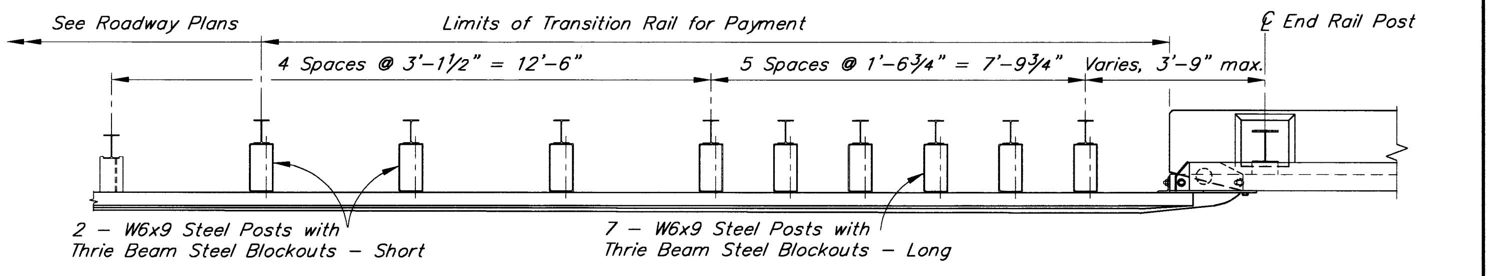
THRIE BEAM STEEL BLOCKOUT - SHORT



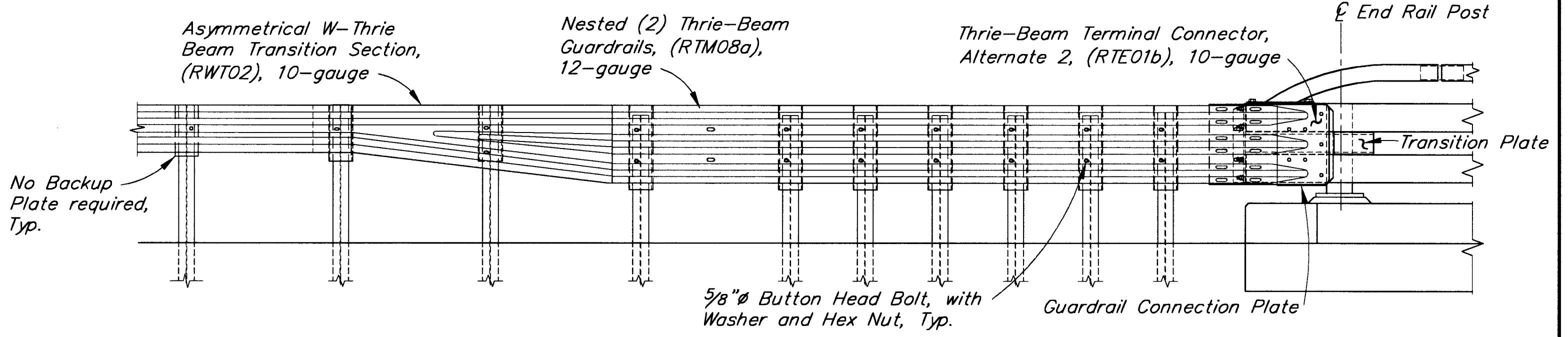
VIEW C-C



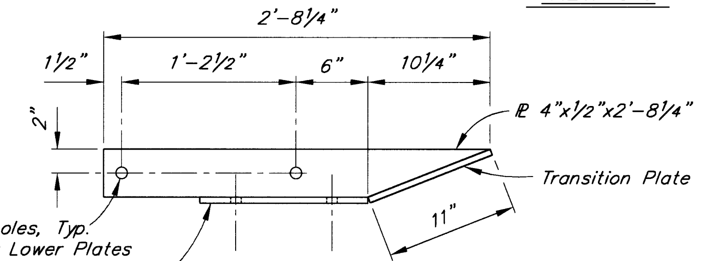
SECTION D-D



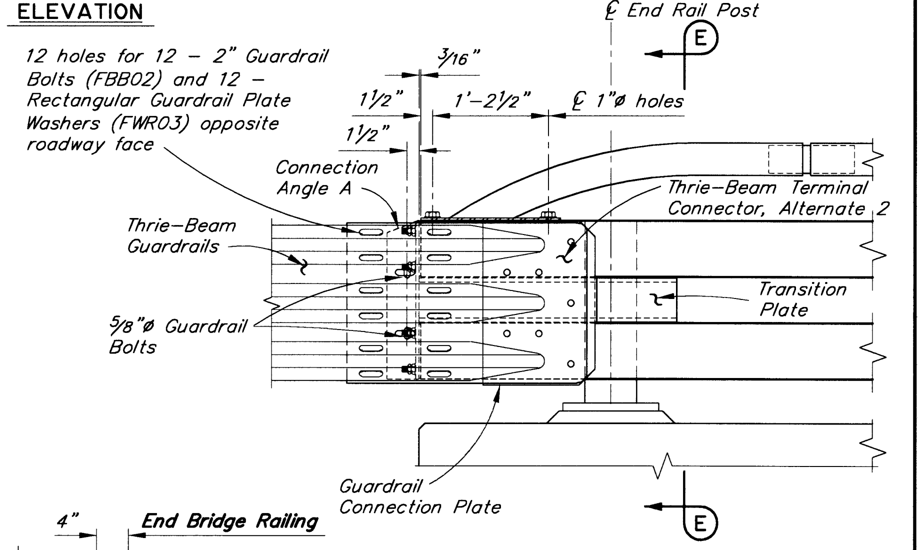
PLAN



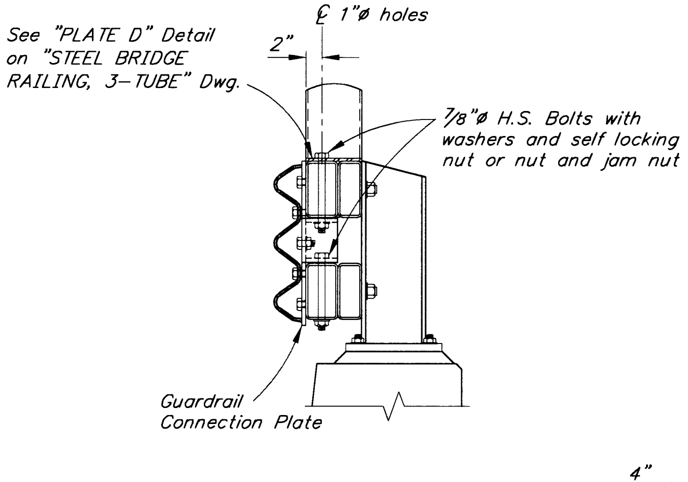
ELEVATION



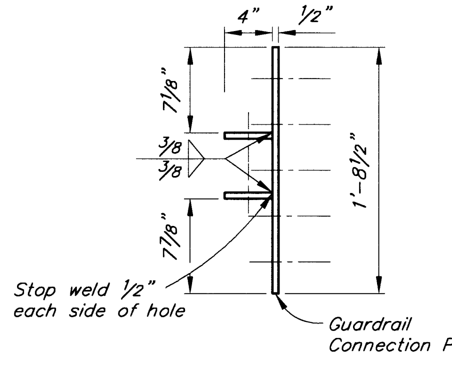
TOP VIEW



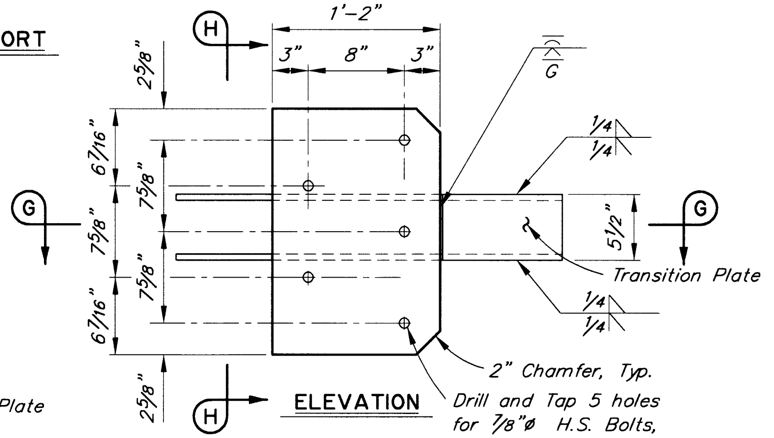
TRANSITION CONNECTION - ELEVATION



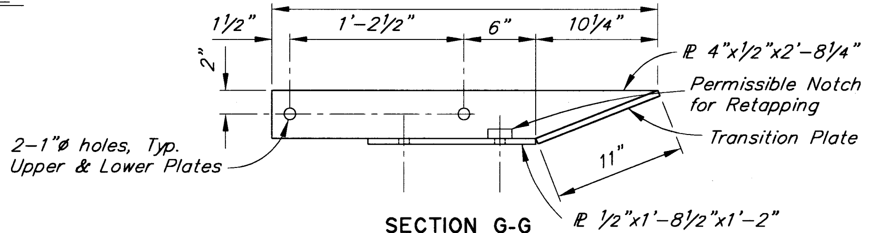
SECTION E-E



SECTION H-H

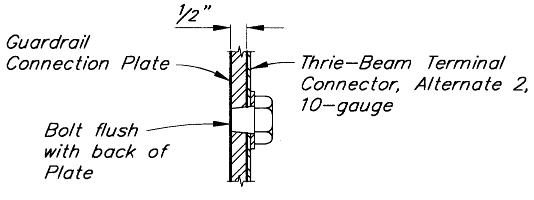


ELEVATION

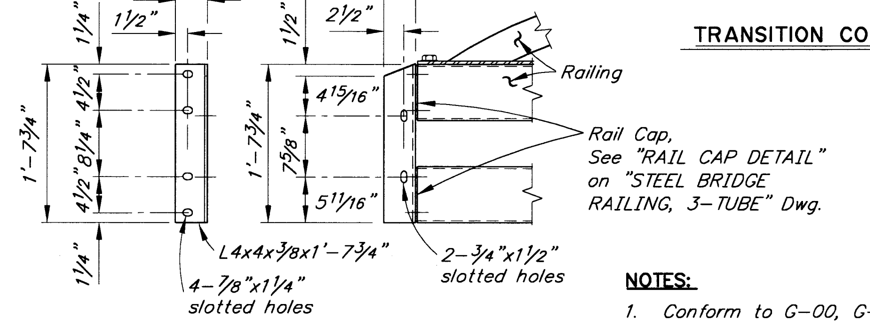


SECTION G-G

GUARDRAIL CONNECTION PLATE DETAILS



DETAIL F



END VIEW

ELEVATION

CONNECTION ANGLE A

NOTES:

1. Conform to G–00, G–05 and G–10 of the Standard Plans for all Thrie Beam Transition details not shown.
2. Thrie Beam Transition part numbers are listed in parentheses () and referenced in the "Task Force 13 Guide to Standardize Roadside Hardware."

No Scale

C:\Users\shsollie\AppData\Local\Temp\AcPublish_126376\2364-1-15 Wed, Apr/13/22 07:02am

DESIGNED BY: Andrew Wells
Andrew Wells

CHECKED: Jared Jones
Jared T. Jones

DRAWN BY: Sam Sollie
Sam Sollie

CHECKED: Andrew Wells
Andrew Wells

QUANTITIES BY: Andrew Wells
Andrew Wells

CHECKED: Jared Jones
Jared T. Jones

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION
AND PUBLIC FACILITIES
BRIDGE SECTION
3132 Channel Drive
Juneau, Alaska 99801
907–465–2975

Andrew C. Wells
04-13-2022
No. CE-156778

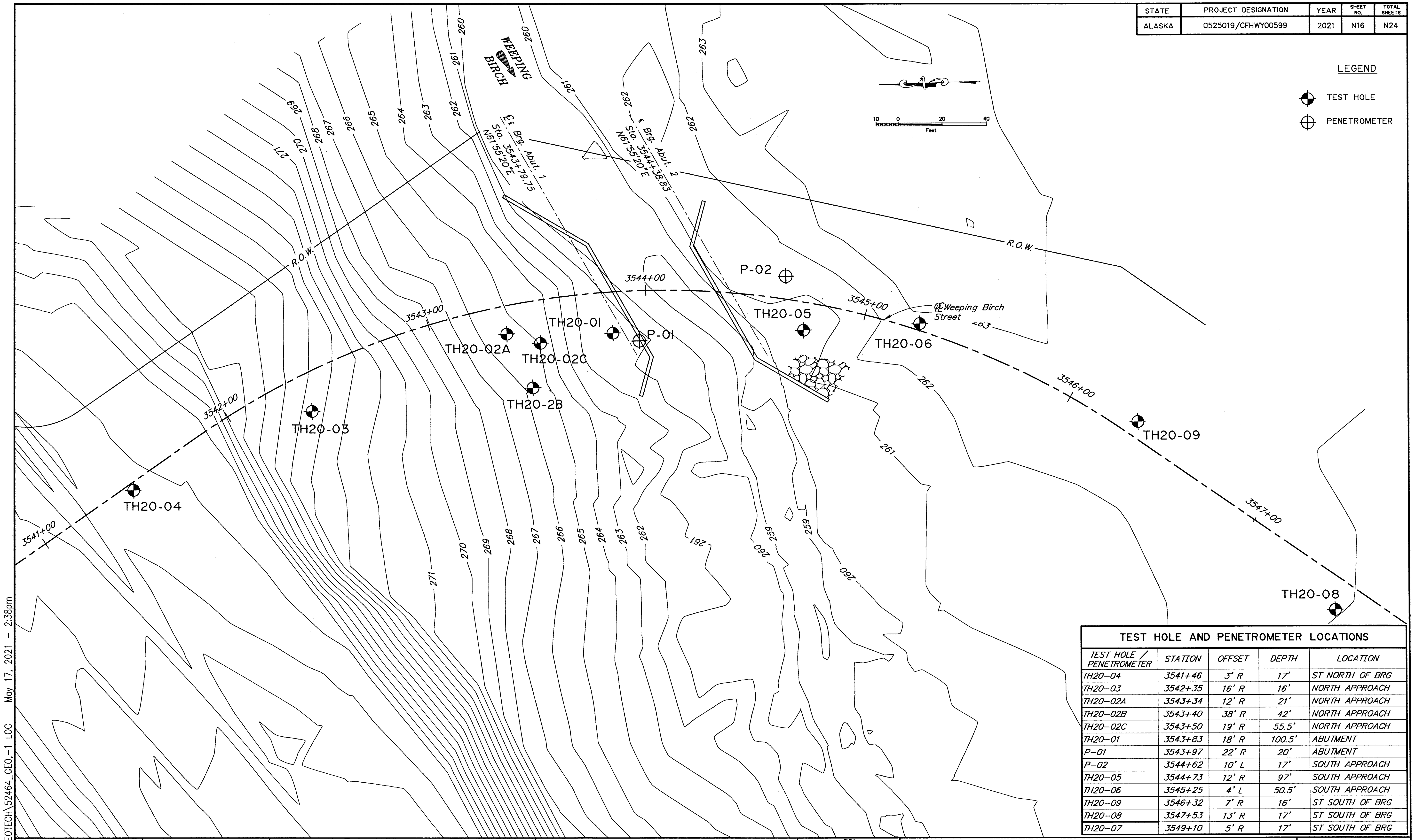
COTTONWOOD CREEK BRIDGE
WEEPING BIRCH STREET
TRANSITION RAIL, 3–TUBE

BRIDGE NO. 2364
DWG. NO. 15

STATE	PROJECT DESIGNATION	YEAR	SHEET NO.	TOTAL SHEETS
ALASKA	0525019/CFHWY00599	2021	N16	N24

LEGEND

- ⊕ TEST HOLE
- ⊕ PENETROMETER



TEST HOLE AND PENETROMETER LOCATIONS

TEST HOLE / PENETROMETER	STATION	OFFSET	DEPTH	LOCATION
TH20-04	3541+46	3' R	17'	ST NORTH OF BRG
TH20-03	3542+35	16' R	16'	NORTH APPROACH
TH20-02A	3543+34	12' R	21'	NORTH APPROACH
TH20-02B	3543+40	38' R	42'	NORTH APPROACH
TH20-02C	3543+50	19' R	55.5'	NORTH APPROACH
TH20-01	3543+83	18' R	100.5'	ABUTMENT
P-01	3543+97	22' R	20'	ABUTMENT
P-02	3544+62	10' L	17'	SOUTH APPROACH
TH20-05	3544+73	12' R	97'	SOUTH APPROACH
TH20-06	3545+25	4' L	50.5'	SOUTH APPROACH
TH20-09	3546+32	7' R	16'	ST SOUTH OF BRG
TH20-08	3547+53	13' R	17'	ST SOUTH OF BRG
TH20-07	3549+10	5' R	17'	ST SOUTH OF BRG

R:\cad\2364\DWG\GEOTECH\52464_GEO_1 LOC May 17, 2021 - 2:38pm

DESIGNED BY:	D. Hemstreet	CHECKED:	Engineer
DRAWN BY:	R. Angell	CHECKED:	J. Nicolazzo
QUANTITIES BY:	Engineer	CHECKED:	Engineer

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES
STATEWIDE MATERIALS

David A. Hemstreet
No. CE 9800
5/17/21

COTTONWOOD CREEK BRIDGE

WEEPING BIRCH STREET

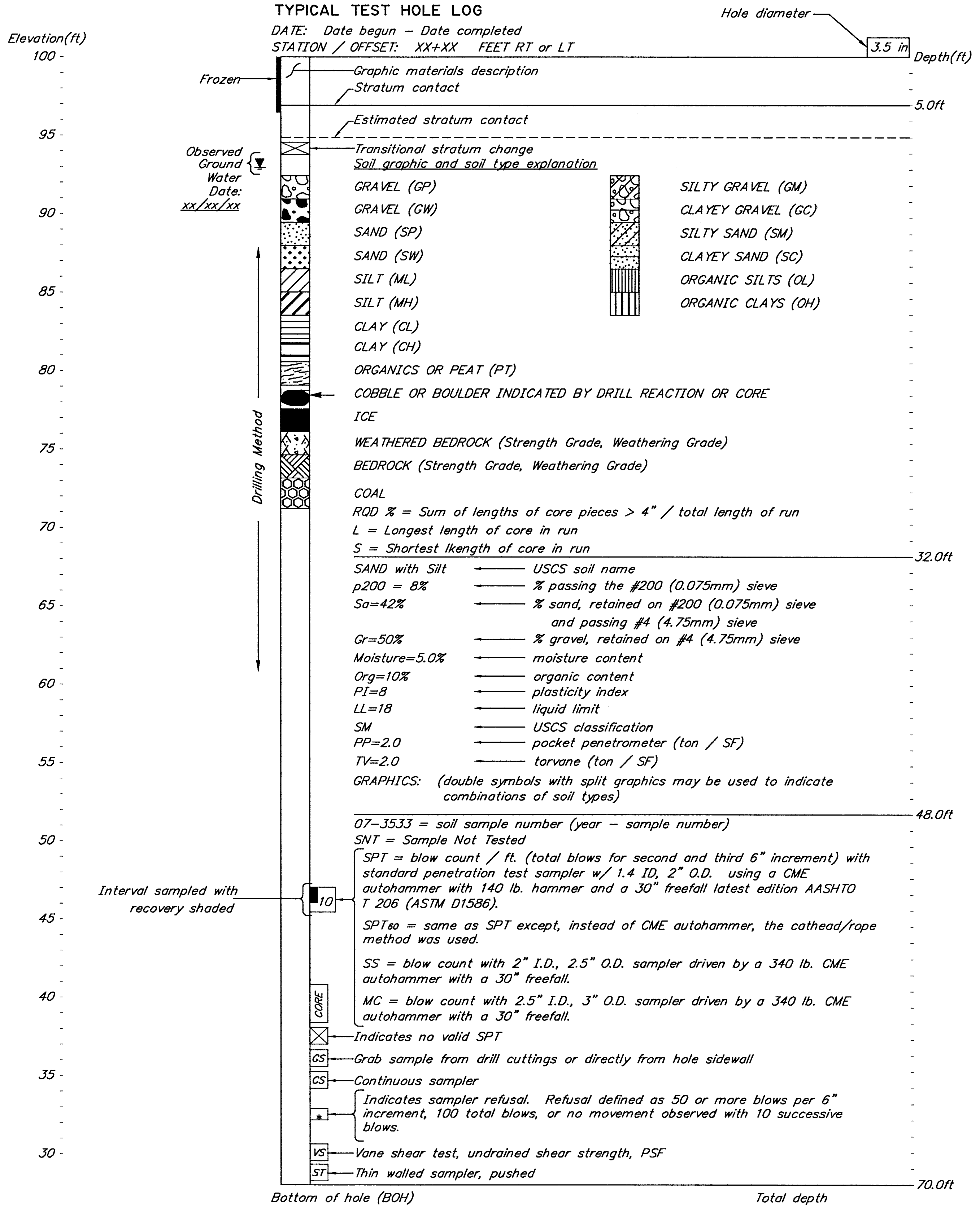
TEST HOLE & PENETROMETER LOCATION

BRIDGE NO. 2364
DWG. NO. 16

STATE	PROJECT DESIGNATION	YEAR	SHEET NO.	TOTAL SHEETS
ALASKA	0525019/CFHWY00599	2021	N17	N24

TYPICAL TEST HOLE LOG

DATE: Date begun – Date completed
STATION / OFFSET: XX+XX FEET RT or LT



Graphic materials description
Stratum contact
Estimated stratum contact
Transitional stratum change

Soil graphic and soil type explanation

GRAVEL (GP)	SILTY GRAVEL (GM)
GRAVEL (GW)	CLAYEY GRAVEL (GC)
SAND (SP)	SILTY SAND (SM)
SAND (SW)	CLAYEY SAND (SC)
SILT (ML)	ORGANIC SILTS (OL)
SILT (MH)	ORGANIC CLAYS (OH)
CLAY (CL)	
CLAY (CH)	
ORGANICS OR PEAT (PT)	
COBBLE OR BOULDER INDICATED BY DRILL REACTION OR CORE	
ICE	
WEATHERED BEDROCK (Strength Grade, Weathering Grade)	
BEDROCK (Strength Grade, Weathering Grade)	
COAL	

RQD % = Sum of lengths of core pieces > 4" / total length of run
L = Longest length of core in run
S = Shortest lkength of core in run

SAND with Silt	USCS soil name
p200 = 8%	% passing the #200 (0.075mm) sieve
Sa=42%	% sand, retained on #200 (0.075mm) sieve and passing #4 (4.75mm) sieve
Gr=50%	% gravel, retained on #4 (4.75mm) sieve
Moisture=5.0%	moisture content
Org=10%	organic content
PI=8	plasticity index
LL=18	liquid limit
SM	USCS classification
PP=2.0	pocket penetrometer (ton / SF)
TV=2.0	torvane (ton / SF)

GRAPHICS: (double symbols with split graphics may be used to indicate combinations of soil types)

07–3533 = soil sample number (year – sample number)
SNT = Sample Not Tested

SPT = blow count / ft. (total blows for second and third 6" increment) with standard penetration test sampler w/ 1.4 ID, 2" O.D. using a CME autohammer with 140 lb. hammer and a 30" freefall latest edition AASHTO T 206 (ASTM D1586).

SPT_{60} = same as SPT except, instead of CME autohammer, the cathead/rope method was used.

SS = blow count with 2" I.D., 2.5" O.D. sampler driven by a 340 lb. CME autohammer with a 30" freefall.

MC = blow count with 2.5" I.D., 3" O.D. sampler driven by a 340 lb. CME autohammer with a 30" freefall.

Indicates no valid SPT
Grab sample from drill cuttings or directly from hole sidewall
Continuous sampler

Indicates sampler refusal. Refusal defined as 50 or more blows per 6" increment, 100 total blows, or no movement observed with 10 successive blows.

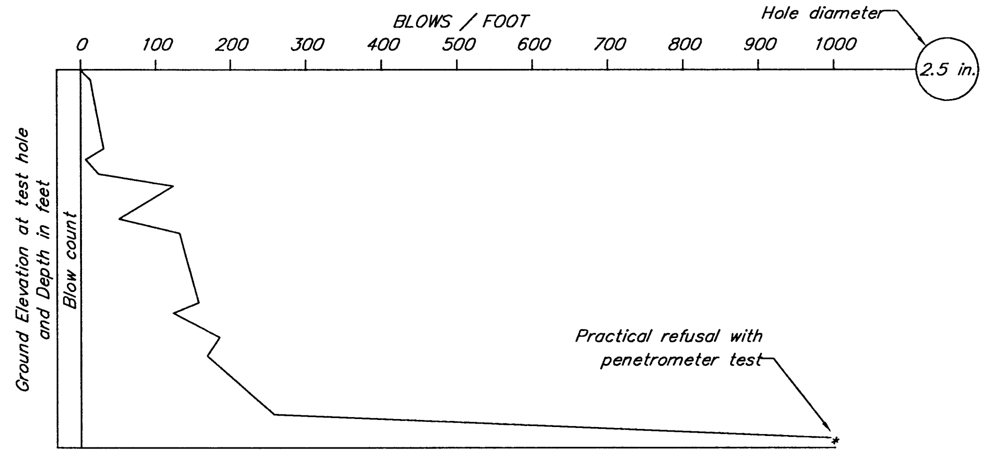
Vane shear test, undrained shear strength, PSF
Thin walled sampler, pushed

NOTES:

1) The test hole logs depicted graphically in these drawings are distillations of the original field logs, based on post–field investigation review and analysis. These drafted logs include changes made to field descriptions based upon laboratory test data, review and analysis. Detailed field observations of rock and soil sampled during the drilling program are not reproduced in the drafted logs.
2) Description of soils follows Alaska Geotechnical Procedures manual. Classification of soils follows Unified Soil Classification System (ASTM D2487).
3) The test hole logs from these sheets are an integral part of the Foundation Geology Report. See Construction Contract Bid Documents – invitation to bid/notice to bidders. Important information about the test hole logs and the foundation investigation is contained in the report. The test hole logs are not severable from and cannot be completely and correctly interpreted without reference to the Foundation Geology Report.

TYPICAL PENETROMETER TEST LOG

DATE: Date begun – Date completed
STATION / OFFSET: XX+XX / RT or LT (feet)



Bottom of hole (BOH)

NOTES:
Penetrometer W/2.5" O.D., with a CME AUTOMATIC Hammer using a 340 lb. weight and a 30" freefall

DESIGNED BY: D. Hemstreet	CHECKED: Engineer	
DRAWN BY: R. Angell	CHECKED: J. Nicolazzo	
QUANTITIES BY: Engineer	CHECKED: Engineer	

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES
STATEWIDE MATERIALS

David A. Hemstreet
No. CE 9800
5/17/21

COTTONWOOD CREEK BRIDGE
WEEPING BIRCH STREET
TEST HOLE & PENETROMETER LEGEND

BRIDGE NO. 2364
DWG. NO. 17

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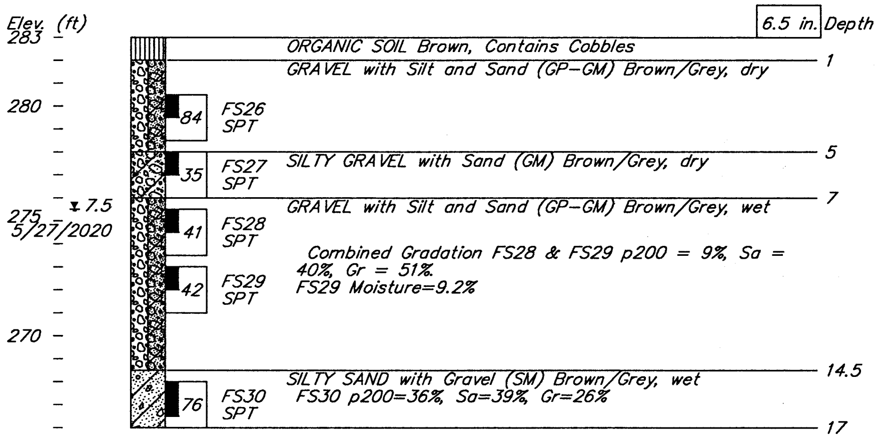
STATE	PROJECT DESIGNATION	YEAR	SHEET NO.	TOTAL SHEETS
ALASKA	0525019/CFHWY00599	2021	N18	N24

TH20-04

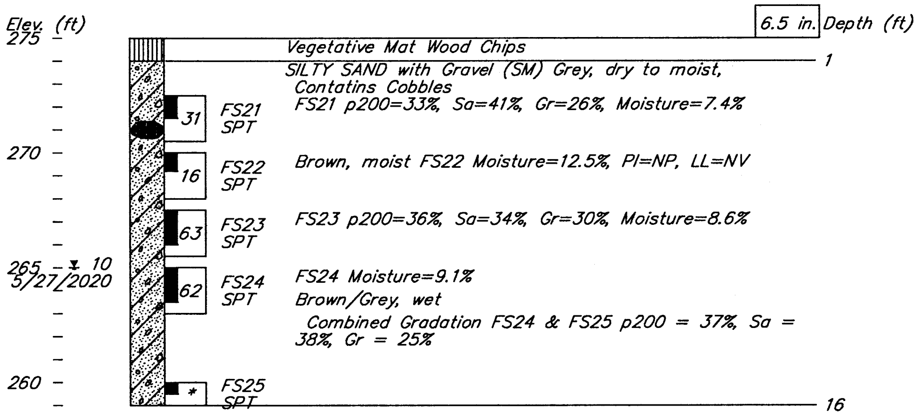
Date: 5/27/20 – 5/27/20
Station: 3541+46 Offset: 3' R



BOH: 17 ft.
Hammer: CME Auto Hammer 140 lb hammer
Equipment: CME 850
Drilling Method: Hollow–Stem Auger
Geologist: M. Byrd
Field Crew: Denali Drilling
Latitude: 61.55873 Longitude: –149.47958

TH20-03

Date: 5/27/20 – 5/27/20
Station: 3542+35 Offset: 16' R



BOH: 16 ft.
Hammer: CME Auto Hammer 140 lb hammer
Equipment: CME 850
Drilling Method: Hollow–Stem Auger
Geologist: M. Byrd
Field Crew: Denali Drilling
Latitude: 61.5585 Longitude: –149.47939

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DESIGNED BY:	D. Hemstreet	CHECKED:	Engineer
DRAWN BY:	R. Angell	CHECKED:	J. Nicolazzo
QUANTITIES BY:	Engineer	CHECKED:	Engineer

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES
STATEWIDE MATERIALS

David A. Hemstreet
No. CE 9800
5/17/21

COTTONWOOD CREEK BRIDGE

WEEPING BIRCH STREET

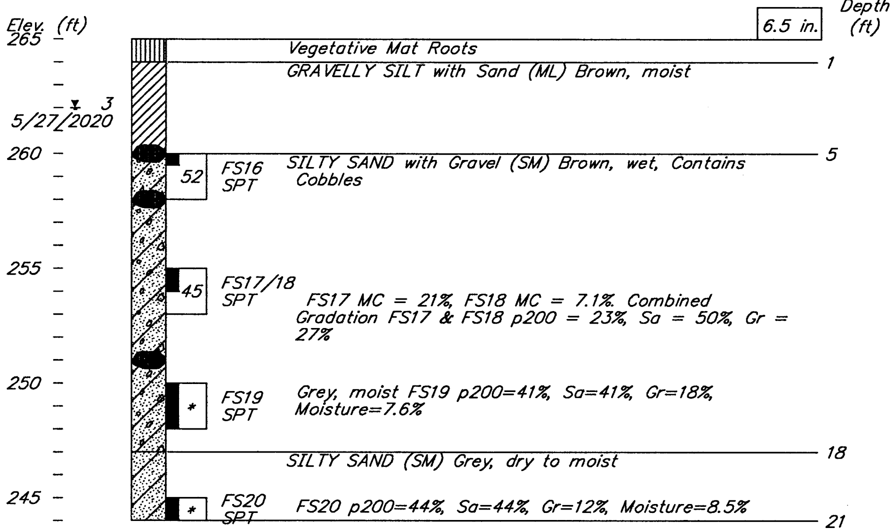
TEST HOLE & PENETROMETER LOGS

BRIDGE NO. 2364
DWG. NO. 18

STATE	PROJECT DESIGNATION	YEAR	SHEET NO.	TOTAL SHEETS
ALASKA	0525019/CFHWY00599	2021	N19	N24

TH20-02 A

Date: 5/27/20 – 5/27/20
Station: 3543+34 Offset: 12' R



Vegetative Mat Roots

GRAVELLY SILT with Sand (ML) Brown, moist

SILTY SAND with Gravel (SM) Brown, wet, Contains Cobbles

FS17 MC = 21%, FS18 MC = 7.1%. Combined Gradation FS17 & FS18 p200 = 23%, Sa = 50%, Gr = 27%

Grey, moist FS19 p200=41%, Sa=41%, Gr=18%, Moisture=7.6%

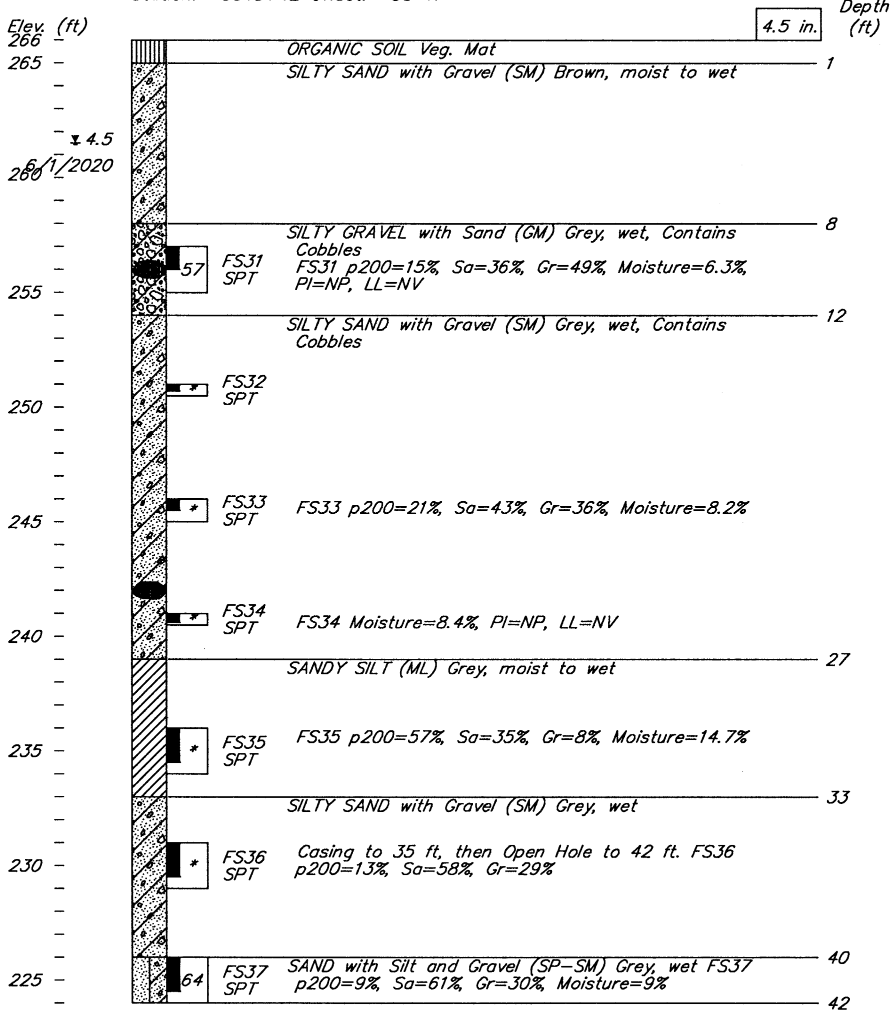
SILTY SAND (SM) Grey, dry to moist

FS20 p200=44%, Sa=44%, Gr=12%, Moisture=8.5%

BOH: 21 ft.
Notes: TH20–02 A
Hit Refusal with HSA&SPT at 21', move uphill 5' and try again (7.5' refusal on cobble/boulder), move uphill 3' and try again (10' refusal on cobble/boulder). Moved to TH20–02 B location to try again.
Hammer: CME Auto Hammer 140 lb hammer
Equipment: CME 850
Drilling Method: Hollow–Stem Auger
Geologist: M. Byrd
Field Crew: Denali Drilling
Latitude: 61.55826 Longitude: –149.47921

TH20-02 B

Date: 5/27/20 – 6/2/20
Station: 3543+42 Offset: 38' R



ORGANIC SOIL Veg. Mat

SILTY SAND with Gravel (SM) Brown, moist to wet

SILTY GRAVEL with Sand (GM) Grey, wet, Contains Cobbles
FS31 p200=15%, Sa=36%, Gr=49%, Moisture=6.3%, PI=NP, LL=NV

SILTY SAND with Gravel (SM) Grey, wet, Contains Cobbles

FS33 p200=21%, Sa=43%, Gr=36%, Moisture=8.2%

FS34 Moisture=8.4%, PI=NP, LL=NV

SANDY SILT (ML) Grey, moist to wet

FS35 p200=57%, Sa=35%, Gr=8%, Moisture=14.7%

SILTY SAND with Gravel (SM) Grey, wet

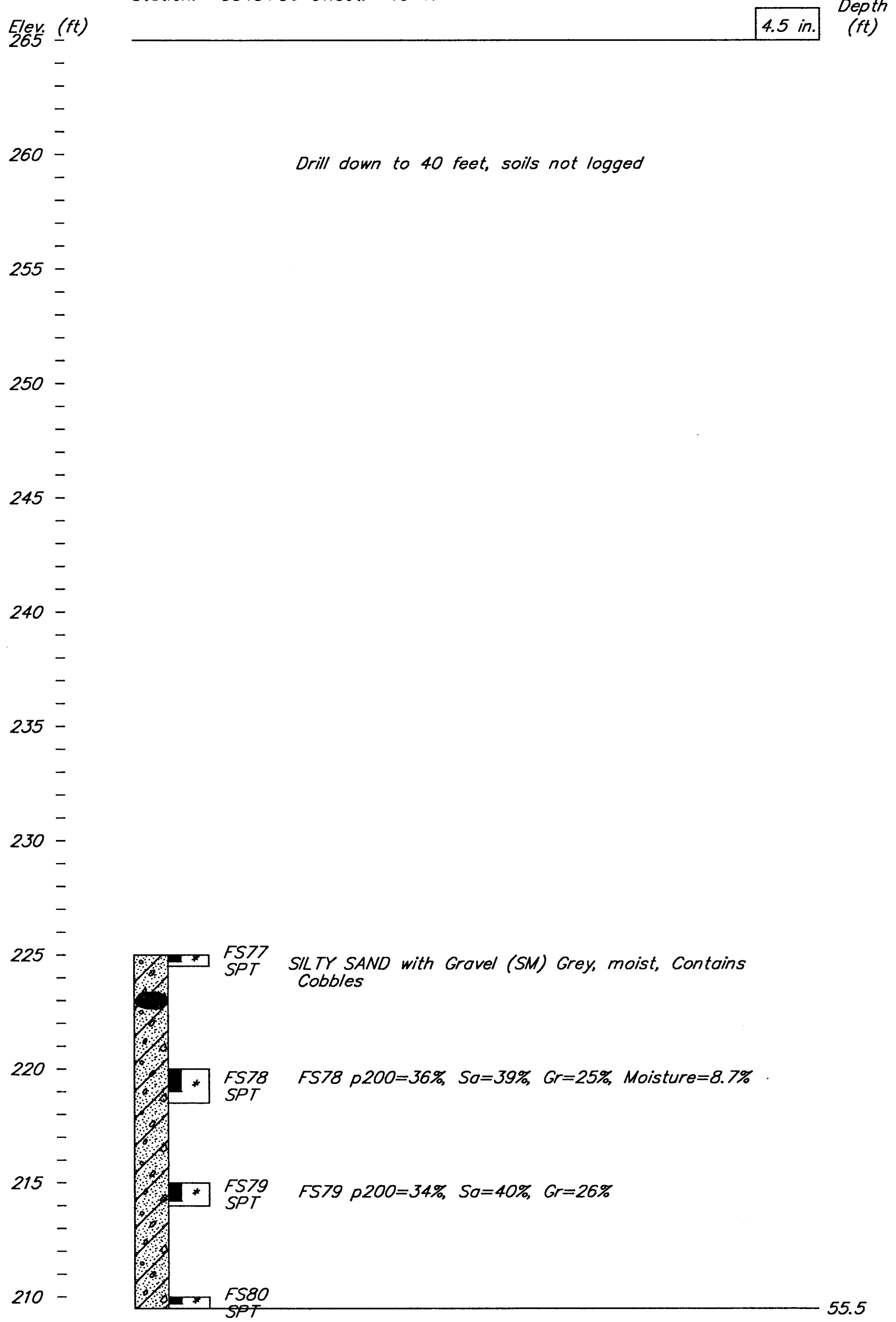
Casing to 35 ft, then Open Hole to 42 ft. FS36 p200=13%, Sa=58%, Gr=29%

SAND with Silt and Gravel (SP–SM) Grey, wet FS37 p200=9%, Sa=61%, Gr=30%, Moisture=9%

BOH: 42 ft.
Notes: TH20–02 B (See notes on TH20–02 A)
Try 1: Hit Refusal at 8' on cobble/boulder
Try 2: Hit Refusal at 10' on cobble/boulder
Move to 4" Casing & Rotary Wash
Test hole was pre–drilled before casing was pounded in using the 340lb hammer.
Hammer: CME Auto Hammer both 140 and 340 lb hammer
Equipment: CME 850
Drilling Method: HSA/Rotary Wash & Casing
Geologist: M. Byrd
Field Crew: Denali Drilling
Latitude: 61.55823 Longitude: –149.47935

TH20-02 C

Date: 6/17/20 – 6/18/20
Station: 3543+50 Offset: 19' R



Drill down to 40 feet, soils not logged

SILTY SAND with Gravel (SM) Grey, moist, Contains Cobbles

FS78 p200=36%, Sa=39%, Gr=25%, Moisture=8.7%

FS79 p200=34%, Sa=40%, Gr=26%

BOH: 55.5 ft.
Notes: TH20–02 C
Started Logging Test Hole at 40'.
Btw 15'–20' Silty Zone.
Hard Drilling on cobble @ 35'

Drive 4" Casing to 35' – Open Hole from 35 ft to 55.5 ft.
Hammer: CME Auto Hammer 140 lb hammer
Equipment: CME 850
Drilling Method: Rotery Wash & Casing
Geologist: M. Byrd
Field Crew: Denali Drilling
Latitude: 61.55821 Longitude: –149.47924

R:\cad\2364\DWG\GEOTECH\52464_GEO_3 TH20–2ABC May 17, 2021 – 2:38pm

DESIGNED BY:	D. Hemstreet	CHECKED:	Engineer
DRAWN BY:	R. Angell	CHECKED:	J. Nicolazzo
QUANTITIES BY:	Engineer	CHECKED:	Engineer

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES
STATEWIDE MATERIALS

David A. Hemstreet
No. CE 9800
5/17/21

COTTONWOOD CREEK BRIDGE

WEEPING BIRCH STREET

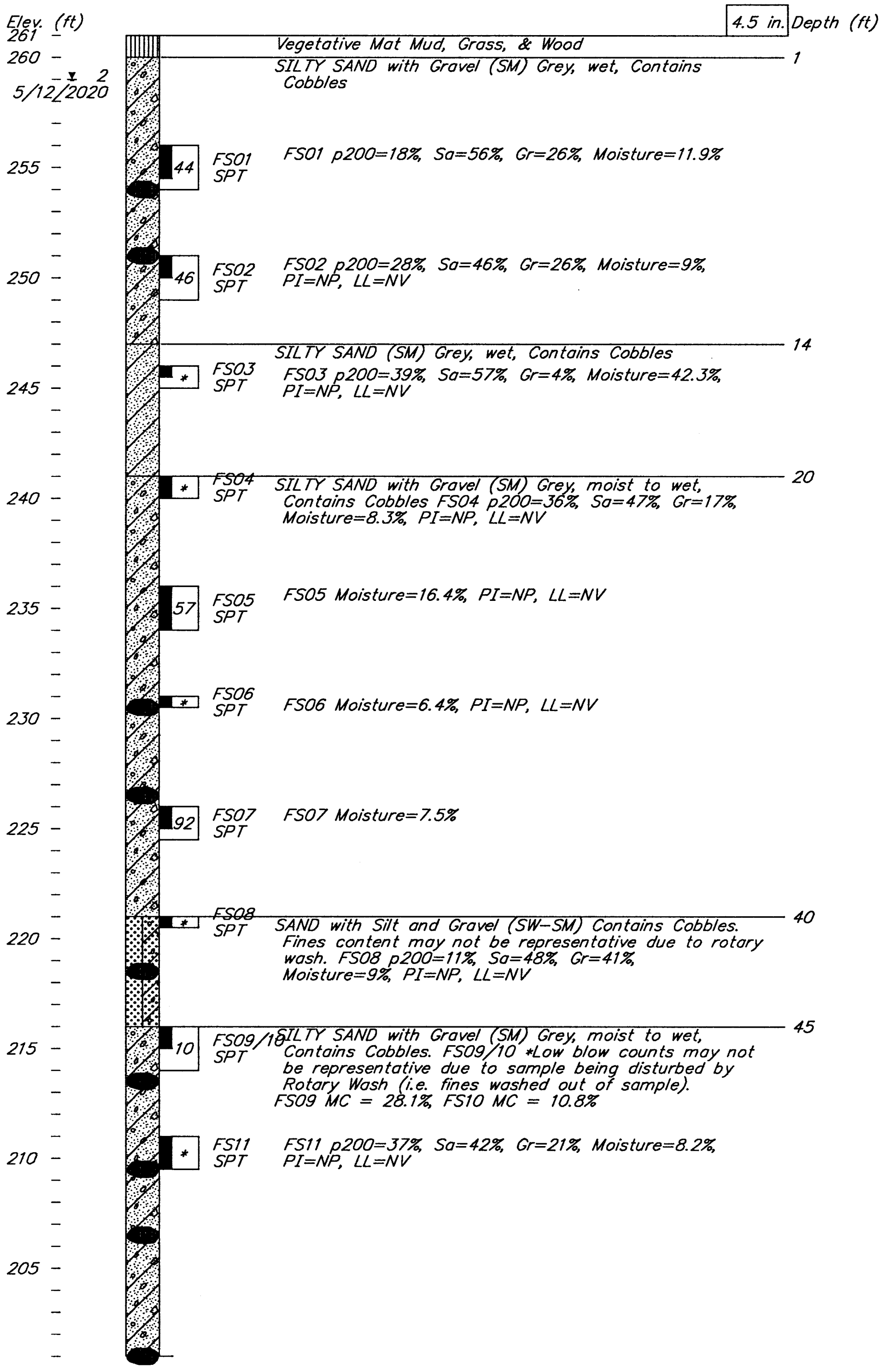
TEST HOLE & PENETROMETER LOGS

BRIDGE NO. 2364
DWG. NO. 19

STATE	PROJECT DESIGNATION	YEAR	SHEET NO.	TOTAL SHEETS
ALASKA	0525019/CFHWY00599	2021	N20	N24

TH20-01

Date: 5/12/20 – 5/20/20
Station: 3543+83 Offset: 18' R



Vegetative Mat Mud, Grass, & Wood

SILTY SAND with Gravel (SM) Grey, wet, Contains Cobbles

FS01 p200=18%, Sa=56%, Gr=26%, Moisture=11.9%

FS02 p200=28%, Sa=46%, Gr=26%, Moisture=9%, PI=NP, LL=NV

SILTY SAND (SM) Grey, wet, Contains Cobbles

FS03 p200=39%, Sa=57%, Gr=4%, Moisture=42.3%, PI=NP, LL=NV

SILTY SAND with Gravel (SM) Grey, moist to wet, Contains Cobbles FS04 p200=36%, Sa=47%, Gr=17%, Moisture=8.3%, PI=NP, LL=NV

FS05 Moisture=16.4%, PI=NP, LL=NV

FS06 Moisture=6.4%, PI=NP, LL=NV

FS07 Moisture=7.5%

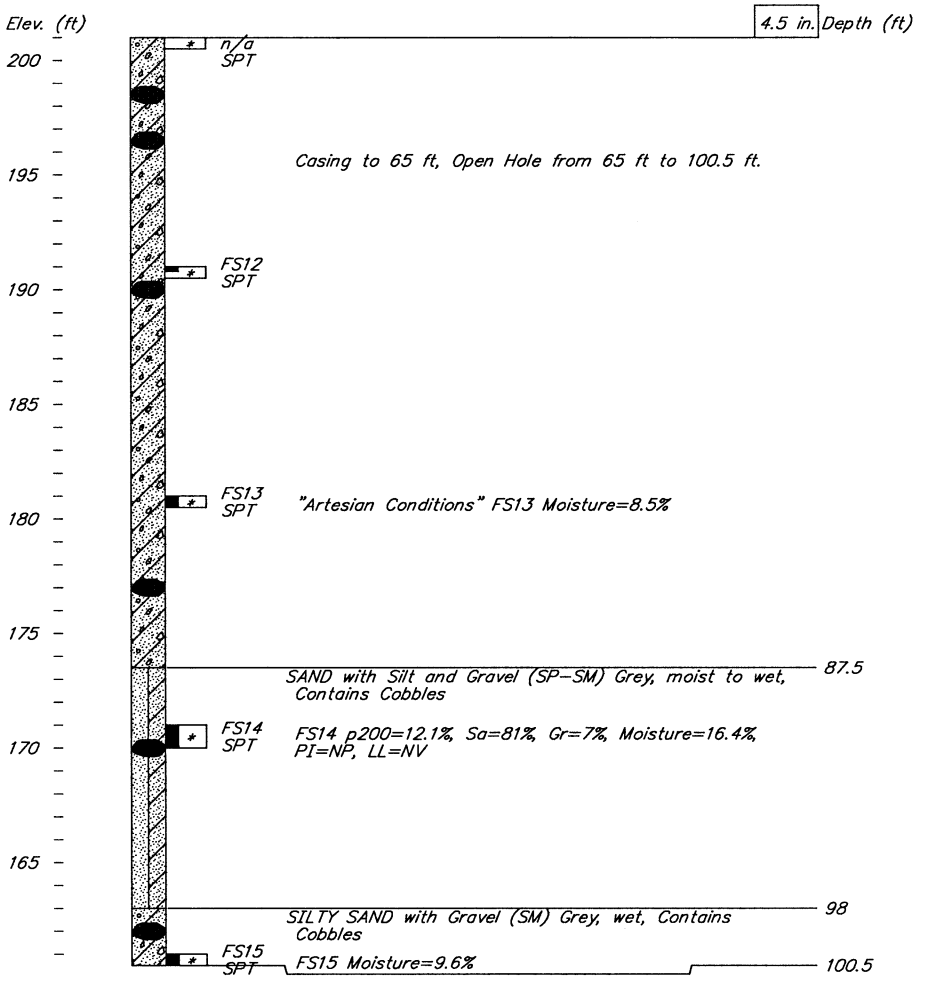
SAND with Silt and Gravel (SW–SM) Contains Cobbles. Fines content may not be representative due to rotary wash. FS08 p200=11%, Sa=48%, Gr=41%, Moisture=9%, PI=NP, LL=NV

*SILTY SAND with Gravel (SM) Grey, moist to wet, Contains Cobbles. FS09/10 *Low blow counts may not be representative due to sample being disturbed by Rotary Wash (i.e. fines washed out of sample). FS09 MC = 28.1%, FS10 MC = 10.8%*

FS11 p200=37%, Sa=42%, Gr=21%, Moisture=8.2%, PI=NP, LL=NV

TH20-01 (cont.)

Date: 5/12/20 – 5/20/20
Station: 3543+83 Offset: 18' R



Casing to 65 ft, Open Hole from 65 ft to 100.5 ft.

"Artesian Conditions" FS13 Moisture=8.5%

SAND with Silt and Gravel (SP–SM) Grey, moist to wet, Contains Cobbles

FS14 p200=12.1%, Sa=81%, Gr=7%, Moisture=16.4%, PI=NP, LL=NV

SILTY SAND with Gravel (SM) Grey, wet, Contains Cobbles

FS15 Moisture=9.6%

BOH: 100.5 ft.
Notes: Drilled to 20' using HSA then switched to 4" Casing & Rotary Wash. Test hole was pre–drilled before casing was pounded in using the 340lb hammer.
Hammer: CME Auto Hammer both 140 and 340 lb hammer
Equipment: CME 850
Drilling Method: HSA/Rotary Wash & Casing
Geologist: M. Byrd
Field Crew: Denali Drilling
Latitude: 61.55813 Longitude: –149.47922

DESIGNED BY:	*D. Hemstreet*	**CHECKED:**	*Engineer*
DRAWN BY:	*R. Angell*	**CHECKED:**	*J. Nicolazzo*
QUANTITIES BY:	*Engineer*	**CHECKED:**	*Engineer*

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES
STATEWIDE MATERIALS

David A. Hemstreet
No. CE 9800
5/17/21

COTTONWOOD CREEK BRIDGE

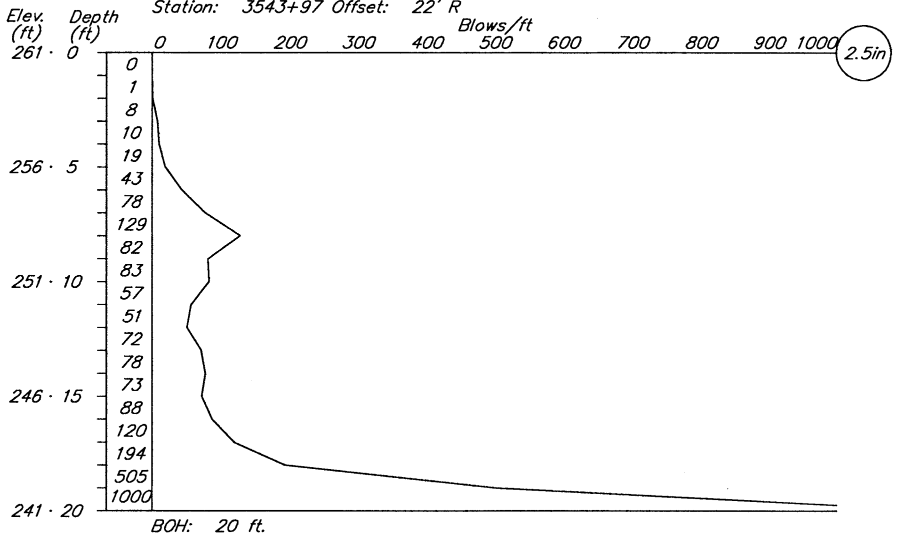
WEEPING BIRCH STRRE

TEST HOLE & PENETROMETER LOGS

BRIDGE NO. 2364
DWG. NO. 20

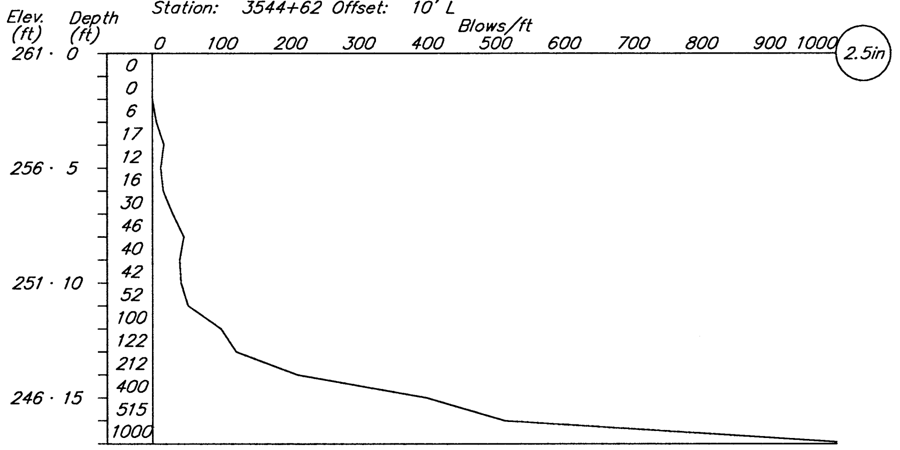
STATE	PROJECT DESIGNATION	YEAR	SHEET NO.	TOTAL SHEETS
ALASKA	0525019/CFHWY00599	2021	N21	N24

P-01
Date: 5/11/20 – 5/11/20
Station: 3543+97 Offset: 22' R



BOH: 20 ft.
Notes: Initial Pull: 1200 psi
Refusal at 19' 9"
Hammer: CME Auto Hammer 340 lb hammer
Equipment: CME 850
Drilling Method: Penetrometer
Geologist: M. Byrd
Field Crew: Denali Drilling
Latitude: 61.55809 Longitude: –149.47924

P-02
Date: 6/4/20 – 6/4/20
Station: 3544+62 Offset: 10' L



BOH: 17 ft.
Notes: Inital Pull: 1500 psi
Refusal at 16' 11"
Hammer: CME Auto Hammer 340 lb hammer
Equipment: CME 850
Drilling Method: Penetrometer
Geologist: M. Byrd
Field Crew: Denali Drilling
Latitude: 61.55791 Longitude: –149.47909

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DESIGNED BY:	D. Hemstreet	CHECKED:	Engineer
DRAWN BY:	R. Angell	CHECKED:	J. Nicolazzo
QUANTITIES BY:	Engineer	CHECKED:	Engineer

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES
STATEWIDE MATERIALS

David A. Hemstreet
No. CE 9800
5/17/21

COTTONWOOD CREEK BRIDGE

WEEPIING BIRCH STREET

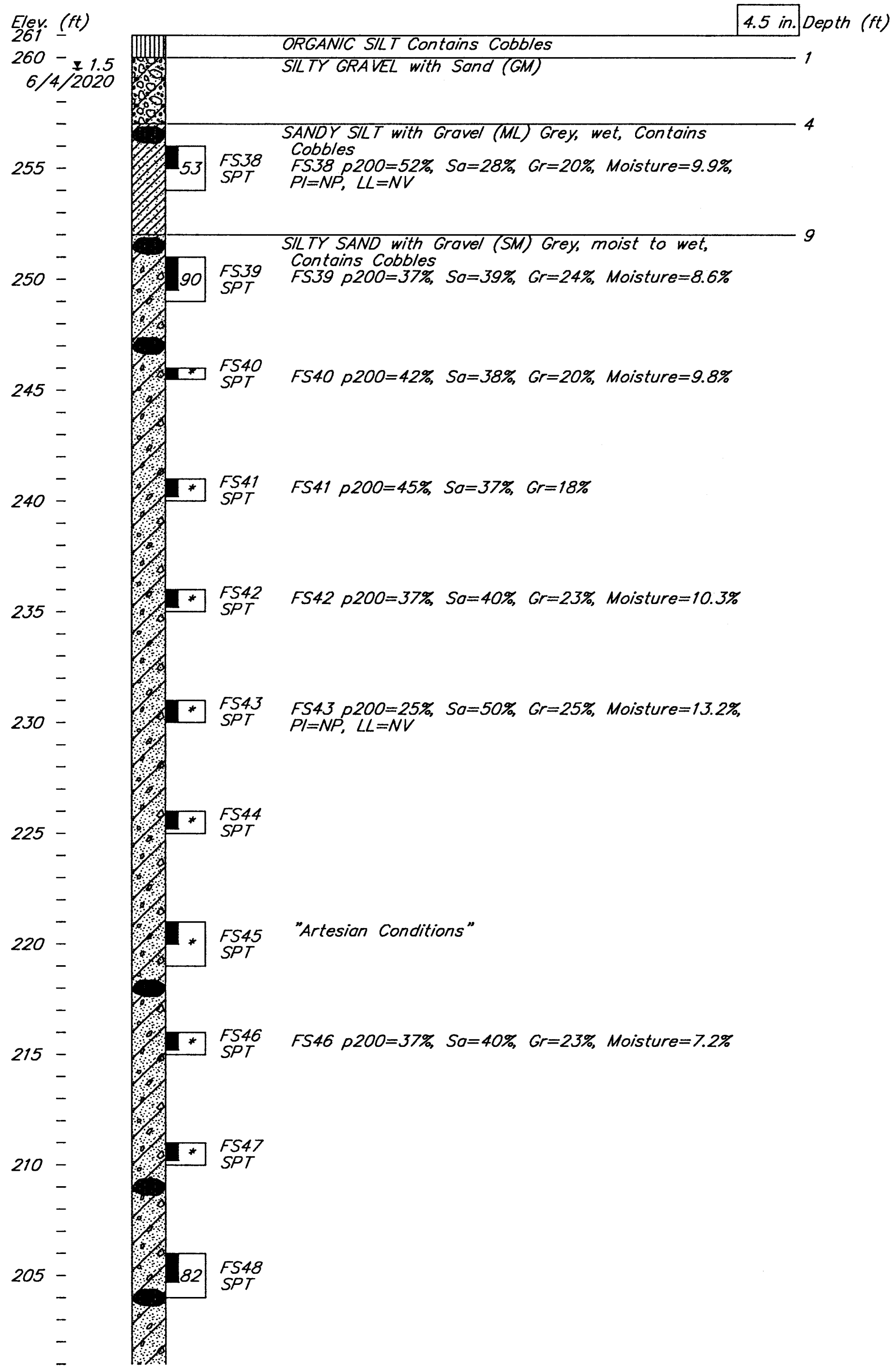
TEST HOLE & PENETROMETER LOGS

BRIDGE NO. 2364
DWG. NO. 21

STATE	PROJECT DESIGNATION	YEAR	SHEET NO.	TOTAL SHEETS
ALASKA	0525019/CFHWY00599	2021	N22	N24

TH20-05

Date: 6/4/20 – 6/10/20
Station: 3544+73 Offset: 12' R



ORGANIC SILT Contains Cobbles

SILTY GRAVEL with Sand (GM)

SANDY SILT with Gravel (ML) Grey, wet, Contains Cobbles
FS38 p200=52%, Sa=28%, Gr=20%, Moisture=9.9%, PI=NP, LL=NV

SILTY SAND with Gravel (SM) Grey, moist to wet, Contains Cobbles
FS39 p200=37%, Sa=39%, Gr=24%, Moisture=8.6%

FS40 p200=42%, Sa=38%, Gr=20%, Moisture=9.8%

FS41 p200=45%, Sa=37%, Gr=18%

FS42 p200=37%, Sa=40%, Gr=23%, Moisture=10.3%

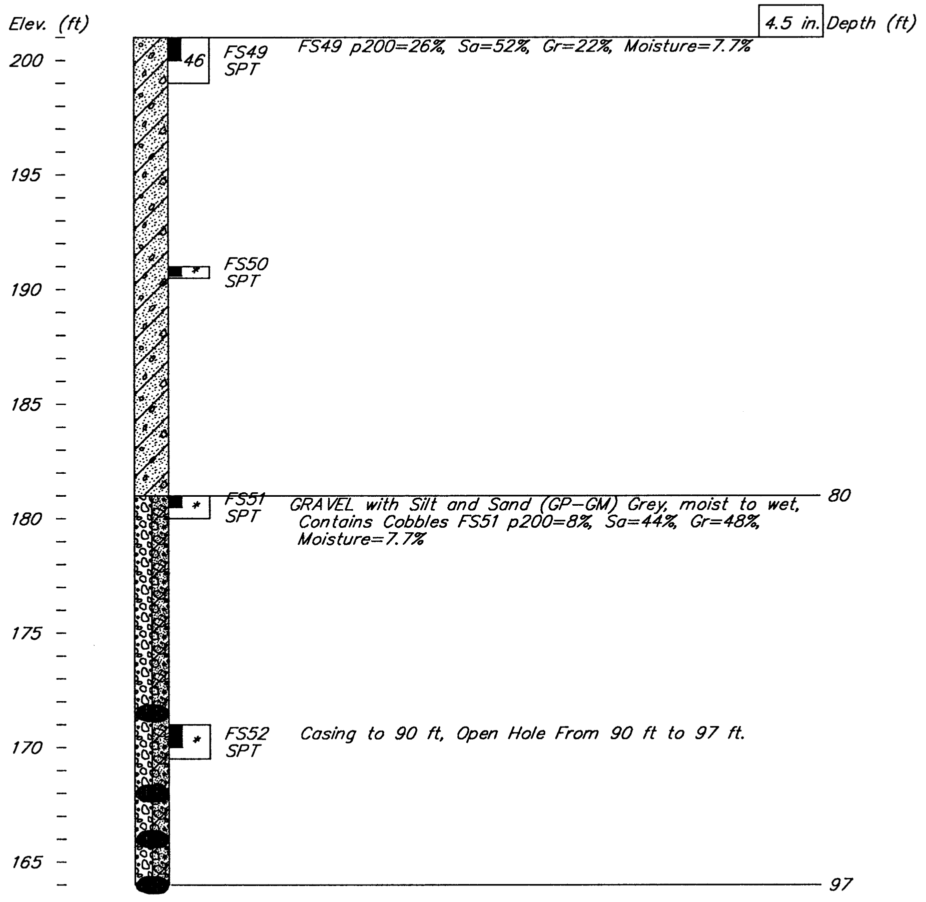
FS43 p200=25%, Sa=50%, Gr=25%, Moisture=13.2%, PI=NP, LL=NV

"Artesian Conditions"

FS46 p200=37%, Sa=40%, Gr=23%, Moisture=7.2%

TH20-05 (cont.)

Date: 6/4/20 – 6/10/20
Station: 3544+73 Offset: 12' R



FS49 p200=26%, Sa=52%, Gr=22%, Moisture=7.7%

GRAVEL with Silt and Sand (GP–GM) Grey, moist to wet, Contains Cobbles FS51 p200=8%, Sa=44%, Gr=48%, Moisture=7.7%

Casing to 90 ft, Open Hole From 90 ft to 97 ft.

BOH: 97 ft.
Notes: Hit Refusal at 97' on Cobble/Boulder, grinding on rock 20+ min and not advancing. Black chips and bubbles coming out. Test hole was pre–drilled before 4" casing was pounded in using the 340lb hammer.
Hammer: CME Auto Hammer both 140 and 340 lb hammer
Equipment: CME 850
Drilling Method: Rotary Wash & Casing
Geologist: M. Byrd
Field Crew: Denali Drilling
Latitude: 61.55789 Longitude: –149.47923

R:\cad\2364\DWG\GEOTECH\52464_GEO,-6 TH20-05   May 17, 2021 - 2:38pm

DESIGNED BY:	D. Hemstreet	CHECKED:	Engineer
DRAWN BY:	R. Angell	CHECKED:	J. Nicolazzo
QUANTITIES BY:	Engineer	CHECKED:	Engineer

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES
STATEWIDE MATERIALS

David A. Hemstreet
No. CE 9800
5/17/21

COTTONWOOD CREEK BRIDGE

WEEPING BIRCH STREET

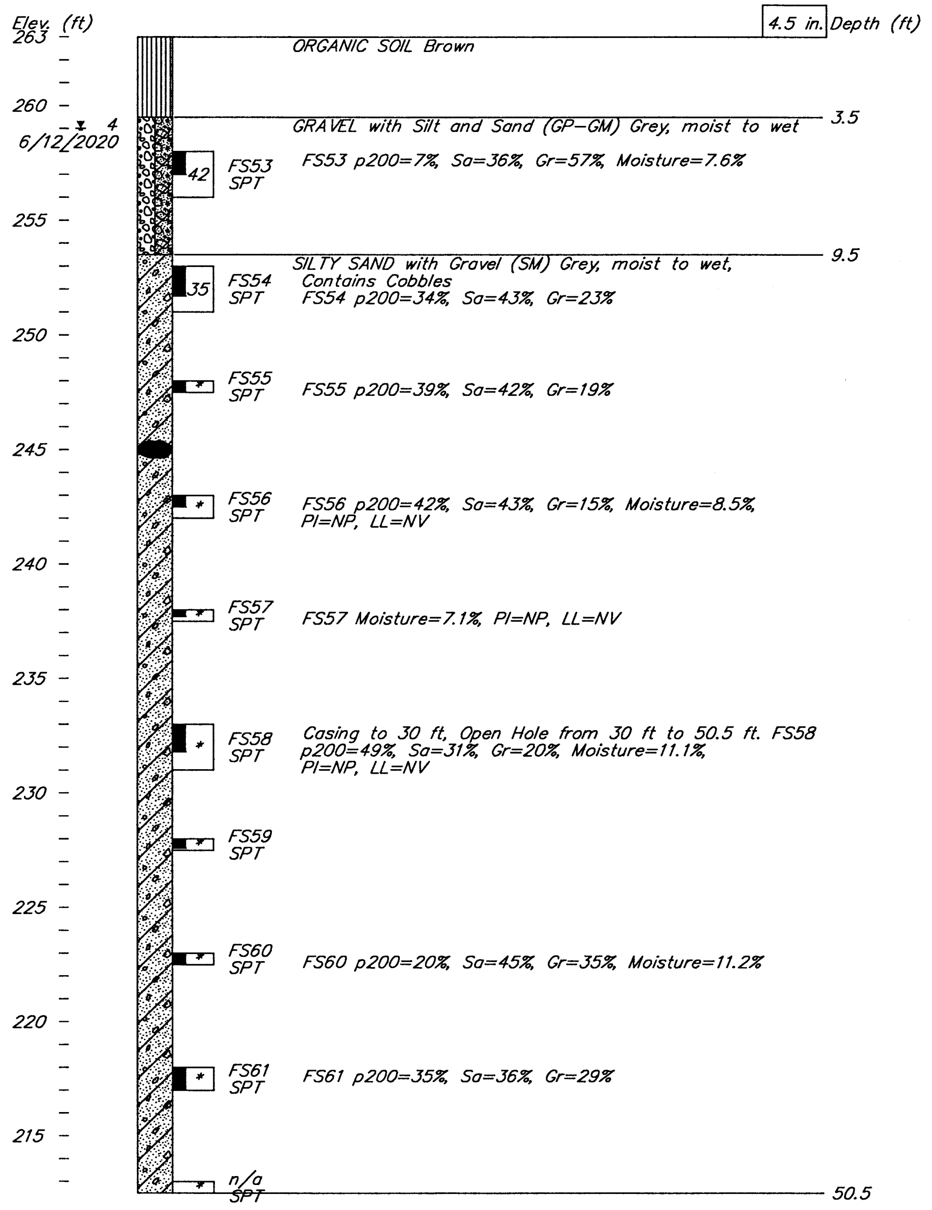
TEST HOLE & PENETROMETER LOGS

BRIDGE NO. 2364
DWG. NO. 22

STATE	PROJECT DESIGNATION	YEAR	SHEET NO.	TOTAL SHEETS
ALASKA	0525019/CFHWY00599	2021	N23	N24

TH20-06

Date: 6/11/20 – 6/12/20
Station: 3545+25 Offset: 4' L



ORGANIC SOIL Brown

GRAVEL with Silt and Sand (GP–GM) Grey, moist to wet

FS53 p200=7%, Sa=36%, Gr=57%, Moisture=7.6%

SILTY SAND with Gravel (SM) Grey, moist to wet, Contains Cobbles

FS54 p200=34%, Sa=43%, Gr=23%

FS55 p200=39%, Sa=42%, Gr=19%

FS56 p200=42%, Sa=43%, Gr=15%, Moisture=8.5%, PI=NP, LL=NV

FS57 Moisture=7.1%, PI=NP, LL=NV

Casing to 30 ft, Open Hole from 30 ft to 50.5 ft. FS58 p200=49%, Sa=31%, Gr=20%, Moisture=11.1%, PI=NP, LL=NV

FS60 p200=20%, Sa=45%, Gr=35%, Moisture=11.2%

FS61 p200=35%, Sa=36%, Gr=29%

BOH: 50.5 ft.
Notes: Test hole was pre–drilled before 4" casing was pounded in using the 340lb hammer.
Hammer: CME Auto Hammer both 140 and 340 lb hammer
Equipment: CME 850
Drilling Method: Rotary Wash & Casing
Geologist: M. Byrd
Field Crew: Denali Drilling
Latitude: 61.55774 Longitude: –149.47923

DESIGNED BY:	D. Hemstreet	CHECKED:	Engineer
DRAWN BY:	R. Angell	CHECKED:	J. Nicolazzo
QUANTITIES BY:	Engineer	CHECKED:	Engineer

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES
STATEWIDE MATERIALS

David A. Hemstreet
No. CE 9800
5/17/21

COTTONWOOD CREEK BRIDGE

WEEPING BIRCH STREET

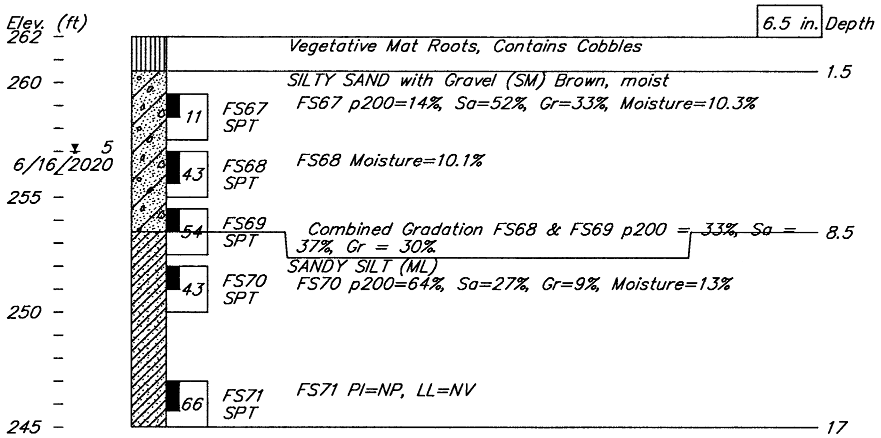
TEST HOLE & PENETROMETER LOGS

BRIDGE NO. 2364
DWG. NO. 23

R:\cad\2364\DWG\GEOTECH\52464_GEO_7 TH20-06   May 17, 2021 – 2:39pm

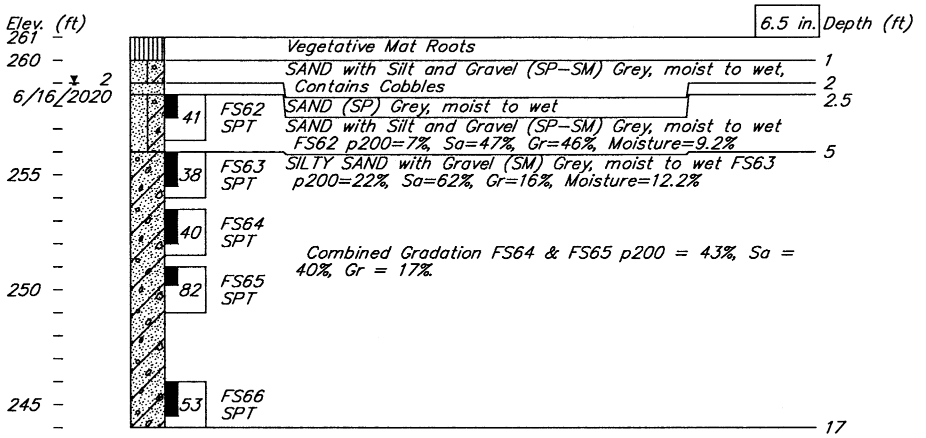
STATE	PROJECT DESIGNATION	YEAR	SHEET NO.	TOTAL SHEETS
ALASKA	0525019/CFHWY00599	2021	N24	N24

TH20-08
Date: 6/16/20 – 6/16/20
Station: 3547+53 Offset: 13' R



BOH: 17 ft.
Hammer: CME Auto Hammer 140 lb hammer
Equipment: CME 850
Drilling Method: Hollow–Stem Auger
Geologist: M. Byrd
Field Crew: Denali Drilling
Latitude: 61.55725 Longitude: –149.48001

TH20-07
Date: 6/16/20 – 6/16/20
Station: 3549+10 Offset: 5' R



BOH: 17 ft.
Hammer: CME Auto Hammer 140 lb hammer
Equipment: CME 850
Drilling Method: Hollow–Stem Auger
Geologist: M. Byrd
Field Crew: Denali Drilling
Latitude: 61.55689 Longitude: –149.48051

R:\cad\2364\DWG\GEOTECH\52464_GEO,-TH20-08&07 May 17, 2021 – 2:39pm

DESIGNED BY:	D. Hemstreet	**CHECKED:**	Engineer
DRAWN BY:	R. Angell	**CHECKED:**	J. Nicolazzo
QUANTITIES BY:	Engineer	**CHECKED:**	Engineer

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES
STATEWIDE MATERIALS

David A. Hemstreet
No. CE 9800
5/17/21

COTTONWOOD CREEK BRIDGE
WEEPING BRICH STREET
TEST HOLE & PENETROMETER LOGS

BRIDGE NO. 2364
DWG. NO. 24