COOPER LANDING BYPASS INTERCHANGE TO EXISTING STERLING HIGHWAY

Project No.: CED 2020.01

DESIGN STUDY REPORT

ALASKA
DEPARTMENT OF TRANSPORTATION
AND PUBLIC FACILITIES

PREPARED BY: SDE Engineers
2900 Spirit Way
Anchorage, AK 99508

January 2019

Revised May 2019

ALASKA
DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES
DESIGN AND ENGINEERING SERVICES – CENTRAL REGION

DESIGN STUDY REPORT

For

Cooper Landing Bypass Interchange to Existing Sterling Highway

Project No.: CED 2020.01

Written by: SDE Engineers

Prepared by:

_____

SDE Engineers Date
2900 Spirit Way
Anchorage, AK 99508
907-151-0000

Concur by:

_____

James E. Amundsen, P.E. Date
Highway Design Group Chief

Approved:

_____

John R. Linnell, P.E. Date
Preconstruction Engineer

NOTICE TO USERS

This report reflects the thinking and design decisions at the time of publication. Changes frequently occur during the evolution of the design process, so persons who may rely on information contained in this document should check with the Alaska Department of Transportation and Public Facilities for the most current design. Contact the Student Project Manager, Aldrey Antonio, at 907-151-0000 for this information.

PLANNING CONSISTENCY

This document has been prepared by the Alaska Department of Transportation and Public Facilities according to currently acceptable design standards and Federal regulations, and with the input offered by the local government and public. The department's Planning Section has reviewed and approved this report as being consistent with present community planning.

CERTIFICATION

The Alaska Department of Transportation and Public Facilities hereby certify that this document was prepared in accordance with Section 520.4.1 of the current edition of the department's Highway Preconstruction Manual and CFR Title 23, Highway Section 771.111(h).

The department has considered the project's social and economic effects upon the community, its impacts on the environment and its consistency with planning goals and objectives as approved by the local community. All records are on file with Central Region - Design and Engineering Services Division, Highway Design Section, 4111 Aviation Avenue, Anchorage, AK 99502.

John R. Linnell, P.E.	Date	Todd Vanhove	Date
Preconstruction Engineer Chief		Chief, Planning	

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF ACRONYMS

AADT	Annual Average Daily Traffic
AASHTO	American Association of State Highway and Transportation Officials
ADF&G	Alaska Department of Fish and Game
AHDM	Alaska Highway Drainage Manual
ANSI	American National Standards Institute
APDES	Alaska Pollutant Discharge Elimination System
ARRC	Alaska Railroad Corporation
ATM	Alaska Traffic Manual
ATMS	Alaska Traffic Manual Supplement
BMP	Best Management Practice
CFR	Code of Federal Regulations
CGP	Alaska Construction General Permit
CIRI	Cook Inlet Region, Inc.
CLBIESH	Cooper Landing Bypass Interchange to Existing Sterling Highway
CNF	Chugach National Forest
DEC	Alaska Department of Environmental Conservation
DOT	U.S. Department of Transportation
DOT&PF	Alaska Department of Transportation and Public Facilities
DOJ	U.S. Department of Justice
ESCP	Erosion and Sediment Control Plan
EPA	Environmental Protection Agency
FHWA	Federal Highway Administration
HPCM	Alaska Highway Preconstruction Manual
HMCP	Hazardous Material Control Plan
HSIP	Highway Safety Improvement Program
IES	Illuminating Engineering Society
KNWR	Kenai National Wildlife Refuge
KPB	Kenai Peninsula Borough
LOS	Level of Service
MADT	Monthly Average Daily Traffic
MOA	Municipality of Anchorage
MP	Milepost
MPH	Miles per Hour
MS4	Municipal Separate Storm Sewer Systems
MSB	Matanuska-Susitna Borough
MUTCD	Manual on Uniform Traffic Control Devices
NB	Northbound
NPDES	National Pollutant Discharge Elimination System

PGDHS	A Policy on Geometric Design of Highways and Streets
PIP	Public Information Plan
PROWAG	Proposed Accessibility Standards for Pedestrian Facilities in the Public Right-of-Way
RDG	Roadside Design Guide
ROW	Right-of-Way
SWMM	Storm Water Management Model
SWPPP	Storm Water Pollution Prevention Plan
SB	Southbound
TMP	Traffic Management Plan
TOP	Transportation Operations Plan
TRB	Transportation Research Board
USGS	United States Geological Survey

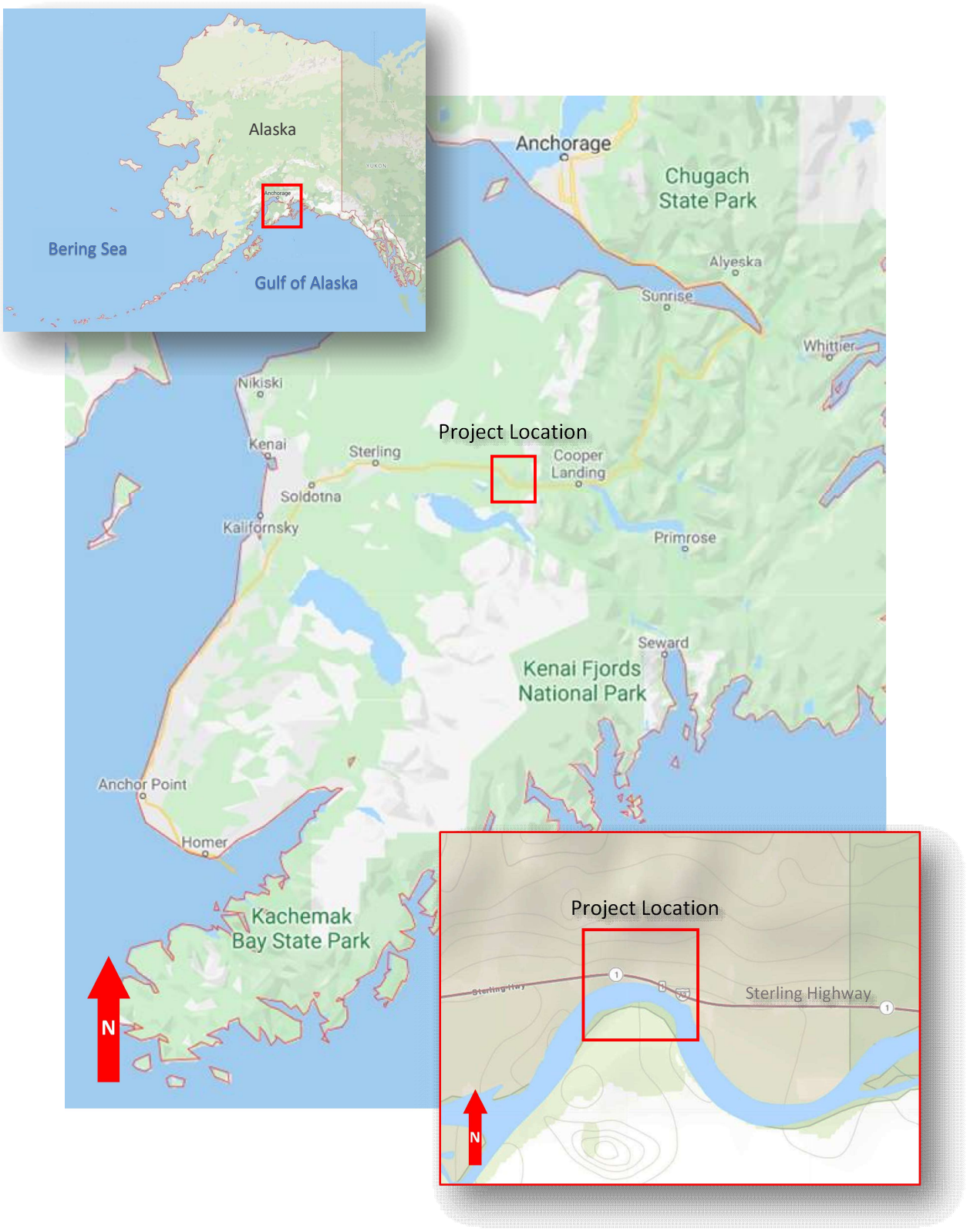


Figure 1: Location and Vicinity Map

1.0 PROJECT DESCRIPTION

1.1 Project Location and Description

The Alaska Department of Transportation & Public Facilities (DOT&PF) in partnership with the Federal Highway Administration (FHWA) proposes for highway redesign and improvement between MP 45-60 of the Sterling Highway in the Kenai Peninsula. Part of this project is the re-route of the highway north of the community of Cooper Landing. This new alignment will need to be reconnected to the existing highway at both the east and west ends.

The proposed project is to evaluate an interchange design that will connect the existing Sterling Highway and the preferred Juneau Creek Alternative's west end. The project is located west of the community of Cooper Landing, Alaska and immediately north of the Kenai River approximately between MP 56–58. The interchange will provide free flowing conditions for the traveling public on the Juneau Creek alignment. It will also adhere to the constraints of the Environmental Impact Statement (EIS).

1.2 Existing Facilities and Land Use

The Sterling Highway was originally built in the 1950s as a gravel road that connected the Kenai Peninsula to Anchorage and the rest of the Alaska highways. This area has seen an increase in traffic, especially during the summer season, from tourists and locals alike as a popular location for fishing, camping, hiking, and other recreational activities. Currently, the Sterling Highway is the only existing transportation facility in the area, and retains its original design of having narrow lanes, no shoulders, and sharp curves.

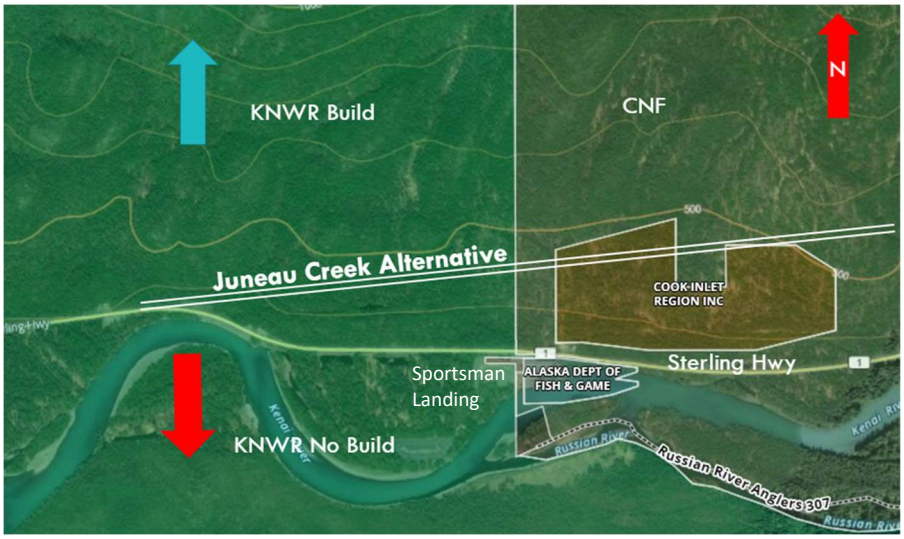


Figure 2. Land Ownership Map

The location of the project is surrounded by federally owned and managed forest and wildlife namely the Chugach National Forest (CNF) which is east of MP 55 and the Kenai National Wildlife Refuge (KNWR) which is west of MP 55. There are also undeveloped and developed public and privately owned parcels of land near the highway that are owned by the State of Alaska, the Kenai Peninsula Borough (KPB), and by CIRI, a regional Alaska Native Corporation. There are also historically significant archeological sites near the highway during the Gold Rush Era of Alaska as well as culturally significant sites that are considered important to the Kenaitze Indian Tribe. There is also a parcel of

land south of the existing highway owned by the Alaska Department of Fish and Game (ADF&G) which is known as Sportsman's Access. This is a four-acre site that was created to provide overflow parking for tourists and anglers wishing to use the Russian River Ferry. Sportsman's also has a boat launch that is used by all boats in this portion of the river.

1.3 Purpose and Need

The purpose of this project is to supplement the three interconnected goals (meet current design standards, improve highway safety, and reduce congestion) of the Sterling Highway MP 45–60 project by tying the existing highway to the proposed bypass highway.

These are the additional needs and consideration for the project:

- Give traffic priority to motorists on the Juneau Creek Alternative,
- Reduce pollution/spills in the Kenai River,
- An interchange design that has less environmental impacts,
- and meet current design standards for an interchange.

2.0 DESIGN STANDARDS AND GUIDELINES

Design standards and guidelines that apply to the CLBIESH project are contained in the following publications:

- A Policy on Geometric Design of Highways and Streets (PGDHS), 6th Edition, AASHTO, 2011.
- Roadside Design Guide (RDG), 4th Edition, AASHTO, 2011.
- Alaska Highway Preconstruction Manual (HPCM), DOT&PF, 2005 as amended.
- Alaska Highway Drainage Manual (AHDM), DOT&PF, 2006.
- The Alaska Traffic Manual (ATM), consisting of the Manual on Uniform Traffic Control Devices (MUTCD), 2009 as amended, U.S. DOT, FHWA) and the Alaska Traffic Manual Supplement (ATMS), DOT&PF, 2016.
- ADA Standards for Transportation Facilities, DOT, 2006. X
- ADA Standards for Accessible Design, DOJ, 2010. X
- Guide for the Development of Bicycle Facilities, 4th Edition, AASHTO, 2012.
- Recommended Practice for Roadway Lighting (RP-8-14), ANSI / IES, 2014.
- Highway Capacity Manual (HCM), 5th Edition, TRB, 2010.
- Alaska Bridges and Structures Manual, DOT&PF, 2017.

Appendix A contains the project Design Criteria and Design Designation.

3.0 DISCUSSION OF ALTERNATIVES

A total of three interchange alternatives were analyze based on the level of service (LOS), such as speed, traffic, and delay; safety; environmental impact, water run off consideration and requirements based on the EIS statement; and constructability, such as traffic maintenance during construction, mobility, materials

and its construction feasibility. The first alternative is the No-Build option in which a standard T-intersection will be built; the second alternative is the Trumpet Interchange; and the third alternative is the Y Interchange.

3.1 First Alternative

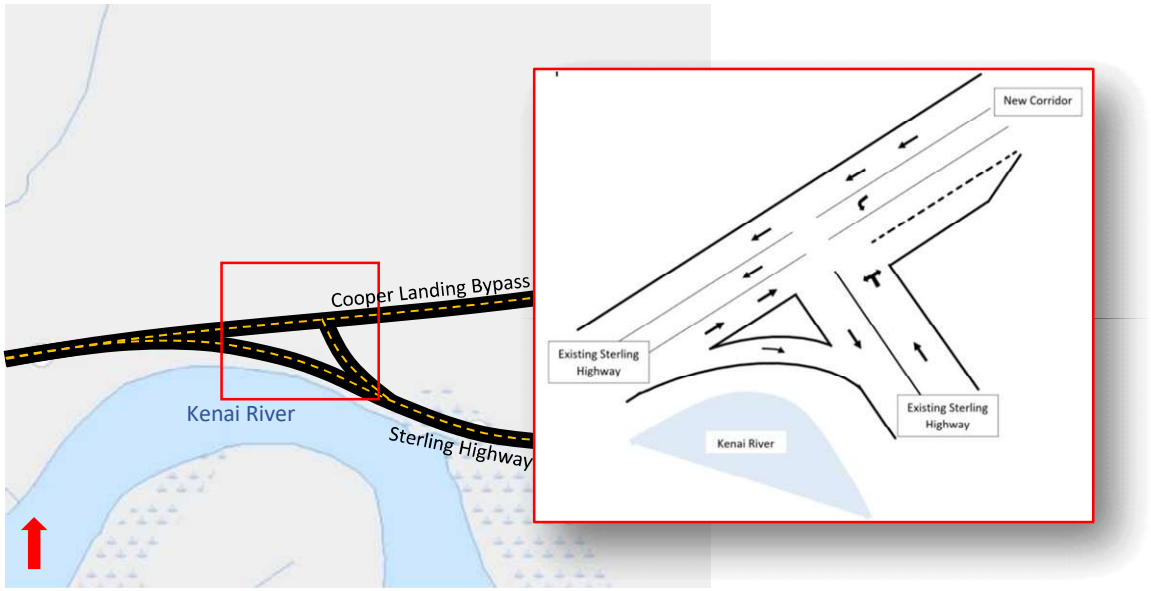


Figure 3. No Build Intersection Concept

The first alternative is the No-Build option. Under this alternative, the connection will be built as a standard T-intersection tying together the existing Sterling Highway and proposed Cooper Landing. This design consists of four turning lanes. These turning lanes and movements will create points of conflict as they pass through main alignment and stop control would be used. To increase safety measures further the intersection would feature an additional lane in the SB direction to allow motorist merging onto the main alignment an acceleration lane. Due to this design being an intersection it did not meet the project scope and is therefore the no build alternative. However, the T intersection is overall the cheap, simple and low impact.

3.2 Second Alternative

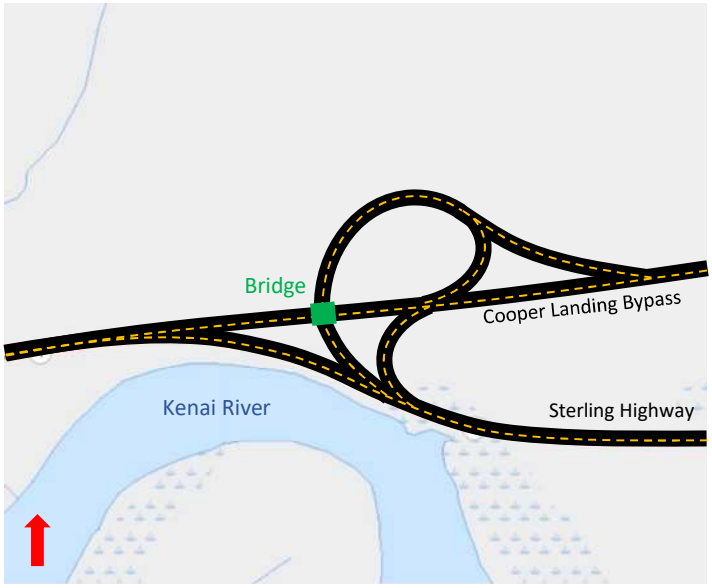


Figure 4. Trumpet Interchange Concept

The second alternative is the Trumpet Interchange. This design consists of a bridge that connects to one looping on and off ramps and two on and offside ramps to the main highway. It separates the traffic between the existing Sterling Highway and the proposed Cooper Landing Bypass. Through movement of vehicles will be unimpeded. Signalization is not needed, however, safety concerns at the merging sections and the radial turn will need to be address by introducing acceleration and deceleration lanes to control vehicle speed as they enter and exit to the main highway. The Trumpet design is a common interchange for ending and merging highways. It allows for a smaller impact and footprint by utilizing similar geometry on the north side of the main alignments.

3.3 Third Alternative

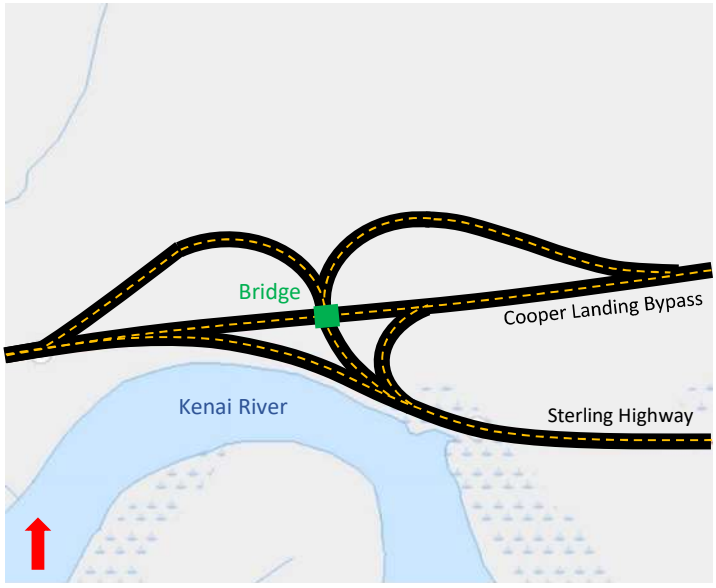


Figure 5. Y Interchange Concept

The third alternative is the Y Interchange. This design consists of two on and two offside ramps, one of each is connected to a bridge, to the main highway. Like the second alternative, it also separates the traffic between the existing Sterling Highway and the proposed Cooper Landing Bypass causing through movement to be unimpeded. However, signalization is needed at the intersection of the entrance and exit lane to the main highway due to their intersection on the north side. Acceleration and deceleration lanes will also be added to control vehicle speed as they merged/exit to the main highway.

4.0 PREFERRED ALTERNATIVE

Figure 6. Alternative Comparison Summary

Even though the first alternative is very easy to construct and has the least environmental impact, it is not recommended because it does not address the requirement of giving top priority to through movements coming from the proposed Cooper Landing Bypass. The Trumpet Interchange and the Y Interchange both accommodates priority to through movement and the traffic demands of the highway as well as continuing to provide a better LOS than the current existing conditions of the highway.

Although very similar in design and needs, the preferred alternative is the second alternative, the Trumpet Interchange. It has the lesser environmental impact and is also cheaper, easier and less time consuming to construct than the third alternative due to having one less ramp. It also does not need signalization which in maintenance's point of view will be fairly inexpensive to maintain.

The basic cost estimation for the alternatives can be referred in Table below. It is important to note that the intersection for alternative one is not included as it is an intersection and exponentially low cost to that of the interchanges. Additionally, Y are typically relatively low on cost however the Y interchange has similar cost to the Trumpet interchange due to the Y requiring a longer bridge and signalization.

Table 4.1 Preliminary Cost Estimation

Interchange Type	Cost
Y	Moderate
Trumpet	Moderate-High

Source: Kentucky DOT

5.0 TYPICAL SECTIONS

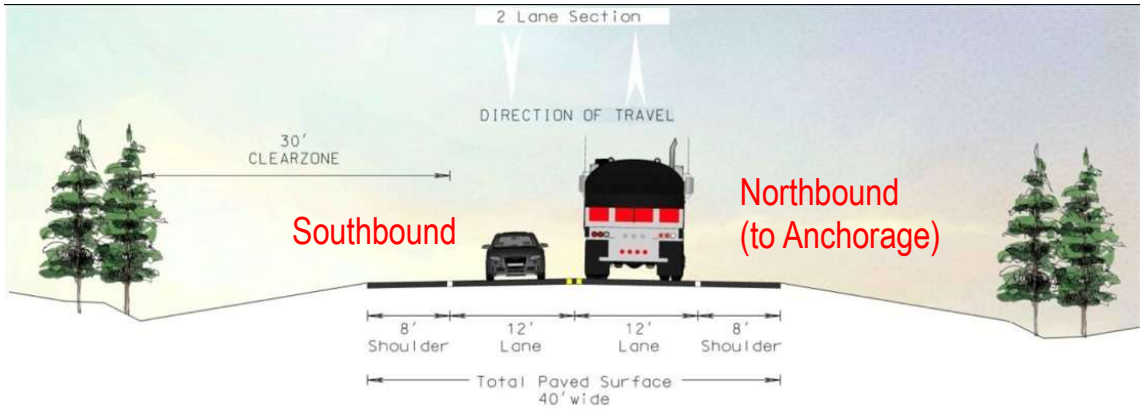


Figure 7. Typical Sections Existing Sterling Highway

Typical Sections for the existing Sterling Highway are shown in Figure 6. There is currently one 12' lane North bound and one 12' lane South Bound. Shoulder widths are 8' a piece both North and South bound. There is a 30' clear zone on each side of the highway extending from the edge of the 12' lane. The total width of the paved surface will be 40'.

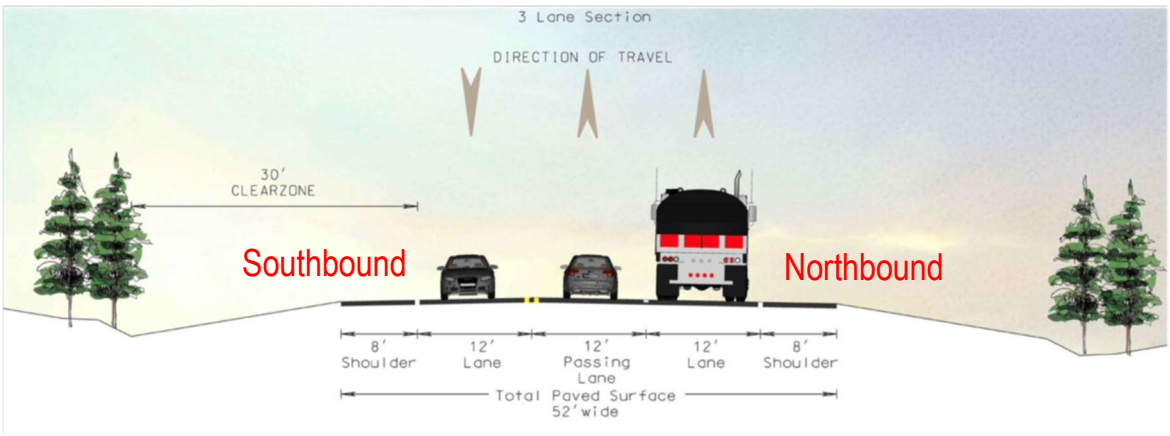


Figure 8. Typical Sections Juneau Creek Alternative

Typical Sections for the proposed Juneau Creek Alternative will consist of two 12' lanes heading North bound and one 12' lane heading South bound. There will be 8' shoulders and a 30' clear zone on each side of the highway. The total width of the paved surface will be 40'.

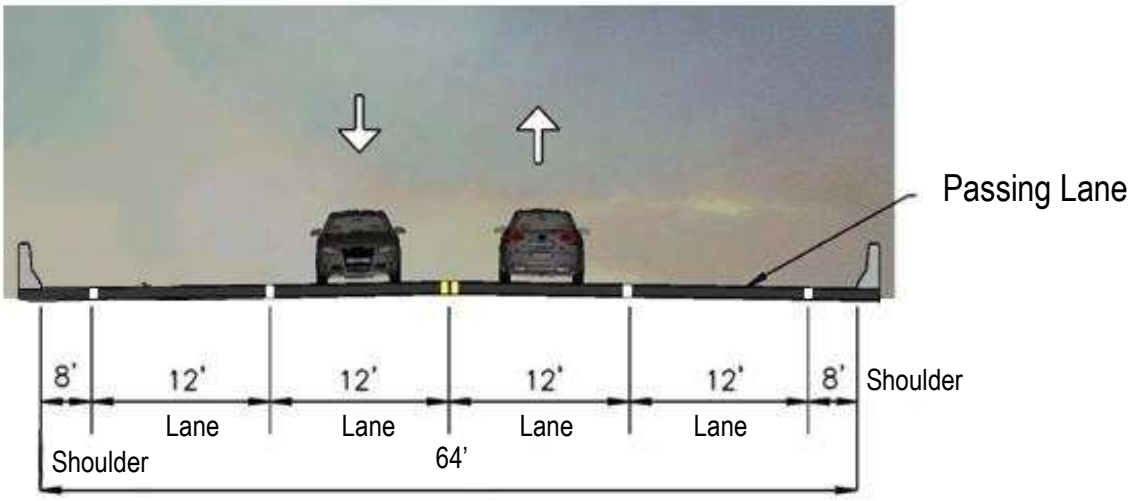


Figure 9. Typical Sections Existing Sterling Highway

Typical Sections for the overpass Deck Bulb Tee Bridge will consist of four 12' lanes with 8' shoulders heading South, and North bound. There will also be 1'-6" wall barrier on each side of the bridge. The overall lane width of the bridge will be 64'.

The typical sections created in CAD are provided in Appendix B.

6.0 HORIZONTAL AND VERTICAL ALIGNMENT

6.1 Horizontal Alignment

The proposed interchange design will consist of two alignments. The existing Sterling Highway and the main proposed Sterling Highway. The existing Sterling Highway alignment will serve as the approaches to and from the main alignment. The approaches on the north side of the interchange will flow underneath the 64' wide overpass connecting the existing alignment to the main alignment. Since the proposed Sterling highway alignment will merge into the existing Sterling Highway shortly below the interchange location the existing connection between the two alignments will be used to maintain traffic during construction. After construction the existing Sterling Highway in this section will be converted into a 12' lane as the northbound off ramp in the interchange.

6.1.1 Entrance Ramps

The entrance ramps were aligned to minimize the impact to the surrounding area. This emphasized lower design speeds and longer acceleration lanes on the main alignment.

6.1.2 Entrance Ramp Radii

When determining the entrance ramp radii several factors were considered. Each individual curve radii were determined by considering the design speed of the proposed and the existing Sterling Highway and the acceleration length requirements. Table 1 below shows the minimum radii and the design speed that was utilized to design the entrance ramps horizontal curvature. The curve

radii for all of the design speeds used were determined using a super elevation maximum rate of 6 percent.

V_{design} (mph)	Radius (feet)	Source (Page)
30	231	AASHTO (3-55)
40	485	AASHTO (3-55)
50	833	AASHTO (3-55)
60	1130	AASHTO (3-55)

Table 6.1: Minimum Ramp Horizontal Curves on Ramps

6.1.3 Exit Ramps

To minimize the impact to the surrounding area the exit ramps utilized a taper type design and similar geometry to the entrance ramps. The design also utilized the existing Sterling Highway alignment for the northbound off ramp to additionally minimize impact and cost.

6.1.4 Exit Ramp Radii

The exit ramp curve radii were determined taking the following considerations: ROW, deceleration lane distances and lane tapering. Minimum radii for the design speeds are presented in Table 1, above.

6.2 Vertical Alignment

The existing terrain in the project area is rolling to mountainous. The vertical clearance for the proposed bridge is 18 feet, 6 inche**s.**

The vertical grades for the four ramps were determined using the design criteria and the project goals to avoid ROW impacts and minimize footprint size. Table 2 below shows the vertical alignment elements for the interchange ramps.

Alignment	Proposed Maximum Slope	Vertical Clearance
NB OFF	6%	
NB ON	6%	
SB ON	6%	18.5’
SB OFF	6%	18.5’

Table 6.2: Maximum Slope and Clearance

6.2.1 Superelevation Rate

The maximum superelevation rate of 6% will be used for this interchange. Superelevation rates were determine based on the horizontal radii and design speeds through the entrance and exit ramps.

7.0 EROSION AND SEDIMENT CONTROL

The proximity of the project corridor to the Kenai River requires an ESCP. This plan will establish the importance of sediment control for this location during construction and how to do so. The contractor will be required to create a SWPPP in compliance with the EPA regulations. All disturbances will be fixed by various stabilization techniques when the work has been completed in that area. Stabilization techniques will be recorded in the SWPPP under BMP's. The contractor will not be able to close out the project until all soil has been permanently stabilized.

8.0 DRAINAGE

In compliance with the DOT&PF Highway Preconstruction Manual Section 1120.5, provisional culvert sizes were chosen to carry the 50-year flood (Q50) flow across the roadway for drainages with delineated drainage basins. Conveyances with an equal diameter of more than 48 inches were also measured for flood conveyance Q100. Land studies of the streams were not conducted at the crossing sites, so channel details such as width, depth, slope, and substratum are not available.

Streams and wetlands are located within the project corridor and must be considered in the design. With the addition of the new Interchange the project area will see a great increase in surface runoff. The surface runoff will be a sheet flow down the grade and into the surrounding embankments. Most of this water will infiltrate the highly porous soil in the area. Mitigation techniques such as culverts, ditches, and settling ponds will be used.

9.0 SOIL CONDITIONS

On the 31st of January 2020 a Geotechnical Report was created by R&M Consultants Inc for phase 1A of the Sterling Highway MP45-60 Project. Phase 1A data will be utilized due to being in between our project location but will provide an accurate representation of the geotechnical data within our project at MP56-58.

The Geotechnical information was collected for both surface and subsurface conditions in portion 1A. The project area was determined to contain alluvial fan, floodplain, landslide, and glacial deposits consisting of boulders, cobbles, gravel, sand, silt, clay, and sedimentary rocks. Bedrock depth varied from thin soil layers to thick soil layers from alluvial fan deposits. The project location is also on the subduction of the Pacific plate under the North American plate and is in a very-high seismic activity area. Groundwater was found by test bore holes from 7.5 ft to 24.0 ft that change seasonally.

10.0 ENVIRONMENTAL COMMITMENTS AND CONSIDERATIONS

This technical report offers an evaluation of the Kenai Peninsula's essential fish habitat (EFH) that may be affected by the 45–60 Sterling Highway Milepost (MP) project. The project area hosts several popular fishing, camping, and hiking recreation sites. Furthermore, the areas around the highway provide habitat for various species of wildlife including moose, bald eagle, Dall sheep, and brown bear. Water bodies of the project region sustain a world-class fishery for five species of salmon, rainbow trout and Dolly Varden. The Kenai Dam, Kenai River, Bean Creek, Juneau Creek, Cooper Creek, Russian River, and Fuller Creek are major water bodies within the project area. For those species managed under a Federal Fishery

Management Plan (FMP), in compliance with the Magnuson Stevens Fishery and Conservation and Management Act (MSFCMA), all of these water bodies are considered to be EFH, because they have been determined to be waters appropriate for fish spawning, reproduction, feeding or maturity development. On behalf of the United States, AKDOT&PF and the Federal Highway Administration, has decided that in this project area it may inflict temporary and permanent adverse effects on EFH resources.

11.0 BRIDGES

The bridge selected for the preferred interchange is the Decked Bulb Tee Girder Bridge. It is chosen due to its excellent adaptability to the constraints in Alaska. It is also the most common type of bridge structure that AKDOT&PF have employed to recent bridge projects for all spans between 50' to 145' on state highway systems. The advantages of this structure are that the cost is low to moderate for construction as well as maintenance, it is also fast to construct on-site. Careful handling of the precast structure must be considered during the transportation and erection.

The Deck Bulb Tee structure is estimated between $250-350/SF based on the table 8-1 of the Alaska Bridge and Structure Manual. The bridge has a length of 100' which covers the width of the southbound on/off ramp and it has an overall lane width of 64'. The cost of the interchange bridge is estimated between $1,600,000 and $2,240,000.

Specification of the bridge structure will be overseen by the AKDOT&PF Bridge Team. Design is subject to change and improvement.

12.0 COST ESTIMATE

Design Engineering	$2,200,000
Right of Way	$400,000
Construction	$7,400,000
Total	$10,000,000

APPENDIX A - Approved Design Criteria and Design Designation

PROJECT DESIGN CRITERIA

Project Name: Cooper Landing Bypass Interchange to Existing Interchange

State Project No.: CED 2020.01 Federal Project No.: n/a

Functional Classification: Rural Principle Arterial Terrain: Choose an item. Rolling

Segment: New Sterling Highway

Present ADT (2,915): 2012 Design ADT (3,969): 2043

DHV (%): 23.3 Trucks (%): 16.43 (2009 Directional Split (%/%): 49.8% NB 50.2 SB

Pavement Design Year: 2042 Pavement Design ESAL: 3,390,592

Design Turning Vehicle: WB-67

Project Type: Interchange Design NHS: ☒ Non-NHS: ☐

FHWA 10 CONTROLLING DESIGN CRITERIA		SOURCE	STANDARD	AS PROPOSED	EXCEPTION[1]
Design Speed[1]		Existing And FHWA	60 mph	60 mph	Choose an item.
Lane Width	Travel	FWHA	12 ft	12 ft	Choose an item.
	Auxiliary	FWHA	12 ft	12 ft	Choose an item.
Shoulder Width	Outside	FWHA	8 ft	8 ft	Choose an item.
	Inside	FWHA	8 ft	8 ft	Choose an item.
	Auxiliary	FWHA	12 ft	12 ft	Choose an item.
Horizontal Curve Radius, min		PDGHS (2-55)	1333 ft	1333 ft	Choose an item.
Superelevation Rate, e, max		HPCM (1160-22_	6 %	6 %	Choose an item.
Stopping Sight Distance (SDD), min		FWHA (3-4)	515 ft	515 ft	Choose an item.
Grade	Min.[2]		%	.16 %	Choose an item.
	Max.		%	6 %	Choose an item.
Cross Slope		PDGHS (10-93)	2 %	2 %	Choose an item.
Vertical Clearance, Bridge Structure Overhead			18.5 ft	18.5 ft	Choose an item.
Design Loading Structural Capacity[1]			H5-25	HS-25	Choose an item.

[1] On low speed roadways (<50 mph) on the NHS, only Design Speed and Design Loading Structural Capacity require a Design Exception; all other criteria require a Design Waiver. For projects off the NHS, all criteria require a Design Waiver.

[2] Minimum grade is not one of the FHWA 10 Controlling Design Criteria and will require a Design Waiver for any variance.

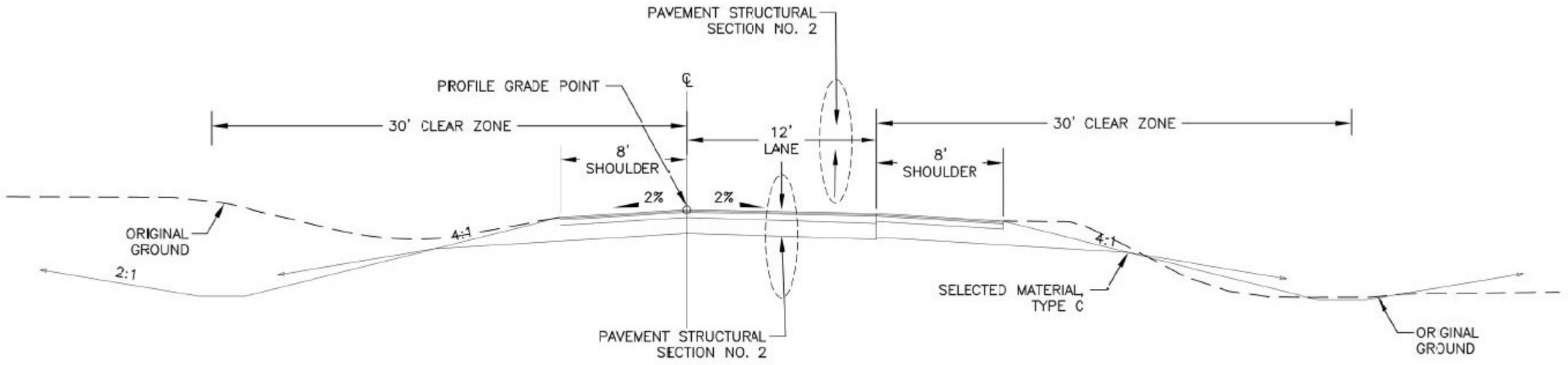
OTHER DESIGN CRITERIA		SOURCE	STANDARD	AS DESIGNED	WAIVER
Superelevation Transition, Δ			6 %	6 %	Choose an item.
Bridge Clear-Roadway Width			64 ft	64 ft	Choose an item.
Vertical Curvature (min)	K (crest)	PDGHS	357	357	Choose an item.
	K (sag)	PDGHS	135	135	Choose an item.
Lateral Offset to Obstruction		HPCM (1130-6)	30 ft	30 ft	Choose an item.
Surfacing Material		Existing	Paved	Paved	Choose an item.
Clear Zone	Slope (fill)	HPCM (1130-6)	4:1	4:1	Choose an item.
	Width (fill)		30 ft	30 ft	Choose an item.
	Slope (cut)		4:1	4:1	Choose an item.
	Width (cut)		30 ft	30 ft	Choose an item.
Bicycle Lane Width			n/a ft	n/a ft	Choose an item.
Sidewalk/Pathway Width			n/a ft	n/a ft	Choose an item.
Intersection Sight Distance*, Choose an item.	Left Turn (GB Case B1)		n/a ft	n/a ft	Choose an item.
	Right Turn (GB Case B2)		n/a ft	n/a ft	Choose an item.
	Crossing (GB Case B3)		n/a ft	n/a ft	Choose an item.
Passing Sight Distance			n/a ft	n/a ft	Choose an item.
Degree of Access Control			n/a		Choose an item.
Median	Treatment		n/a		Choose an item.
	Width		n/a ft	n/a ft	Choose an item.
Illumination			n/a		Choose an item.
Curb Type			n/a		Choose an item.

Notes:

Proposed by: _____ Date: _____
Designer (Consultant or Staff)

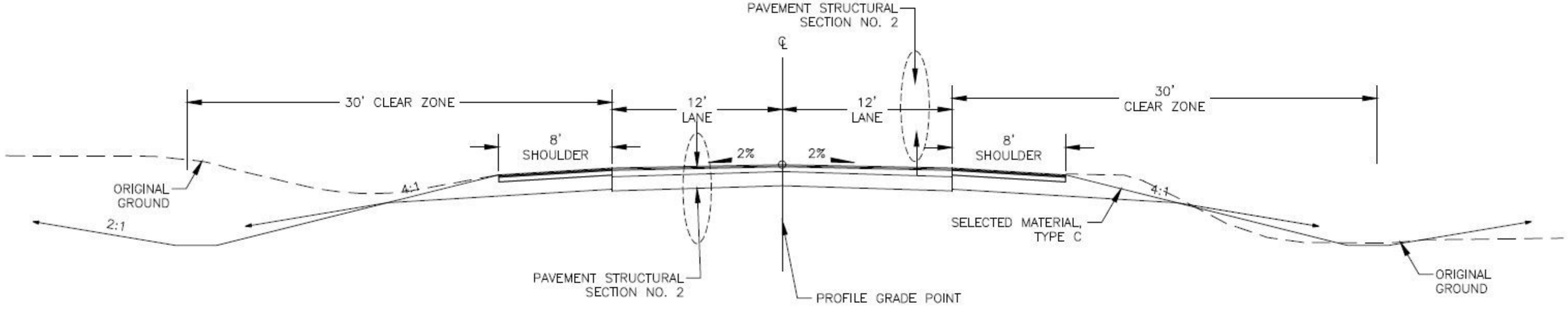
Recommended by: _____ Date: _____
Engineering Manager

Accepted by: _____ Date: _____
Regional Preconstruction Engineer



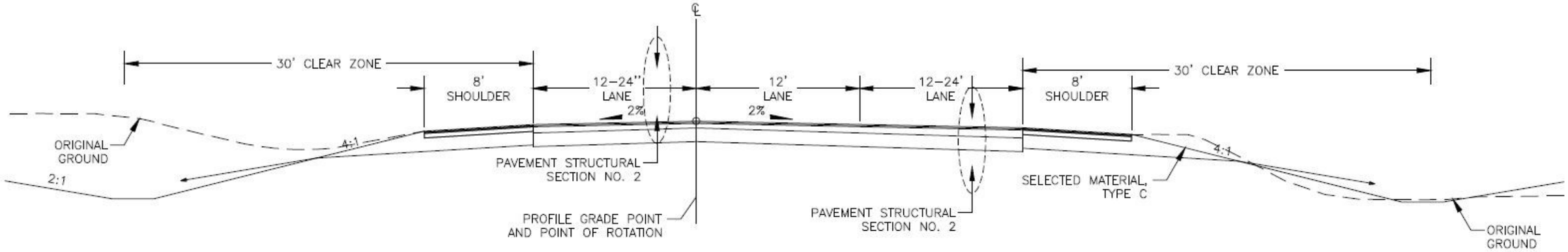
SOUTH BOUND OFF/ON RAMP

STA. −2+94 TO STA. 12+50
STA. 00+00 TO 7+60



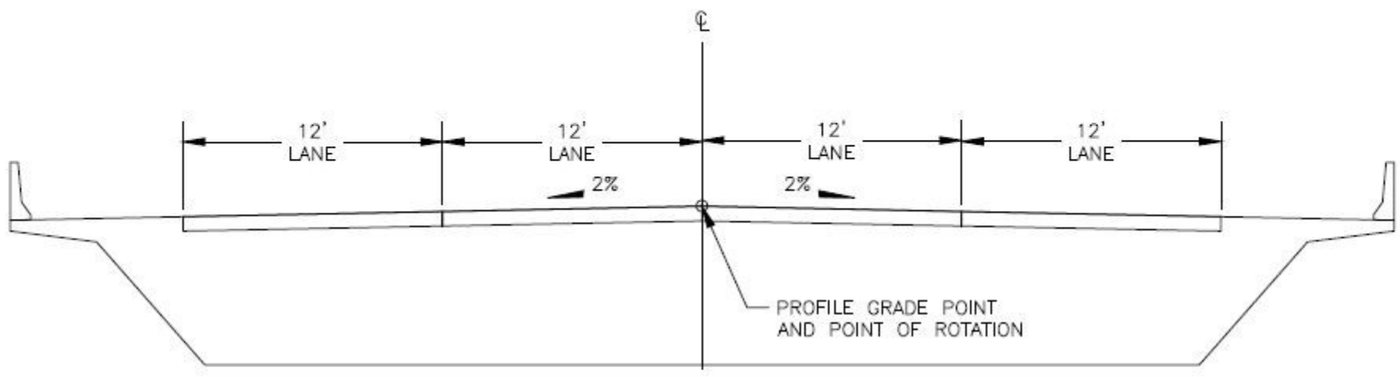
SOUTH BOUND ON RAMP

STA. 12+50 TO STA. 30+00



PROPOSED STERLING HIGHWAY

STA. 1394+50.94 TO STA. 1431+00



PROPOSED STERLING HIGHWAY BRIDGE

STA. 1408+25.56 TO STA. 1409+24.89

APPENDIX D – Geotechnical Report

Geotechnical report from the 2020 Preliminary Geotechnical Report prepared by R&M Consultants, Inc. was used.

APPENDIX E – Traffic Analysis

Traffic data from the 2014 Traffic Study Update prepared by HDR Alaska, Inc. and Lounsbury & Associates, Inc. was used. A copy of this document can be found at the Sterling Highway MP 45-60 project website.

APPENDIX F – Environmental Documents

A copy of the Sterling Highway Milepost 45-60 Environmental Impact Statement (EIS) can be found at the AKDOT&PF Central Region Office and at the Sterling Highway MP 45-60 website.

APPENDIX G – Design Memo

MEMORANDUM

State of Alaska

Department of Transportation & Public Facilities
Statewide Design & Engineering Services Division / Bride Section

TO: Chris Post, P.E.
AKDOT&PF

DATE: April 19, 2020

BRIDGE NO: 2020.01

TELEPHONE NO: 907-269-0585

FROM: Mark Credito
Senior Student, UAA

CONTACT: Aldrey Antonio
907-151-0151
avantonio@alaska.edu

RE: Sterling Highway Interchange

SUBJECT: Bridge Selection and Estimates

In response to the Sterling Highway Interchange project, a bridge structure is selected for the preferred Trumpet Interchange.

The "Decked Bulb Tee" design has been proposed and will be used in this project. The "Alaska Bridge Instruction Manual" stresses that this specific design is very adaptable and is the preferred design by the DOT. The Preliminary General Layout drawings as well as other specifications will be handled by AKDOT&PF Bridge Design team. The preliminary costs were estimated. It is to be noted that we have limited foundation and hydraulic information for this location.

The Instruction Manual also provides a list of advantages and disadvantage for the Decked Bulb Tee bridge. One of the advantages is that the need for a cast-in-place is eliminated. It is also relatively low cost in terms of both construction and maintenance. Lastly, it has a fast-on-site construction. On the other hand, the disadvantages include its limited ability to adapt to complex geometries. It has limited span lengths and almost all the components are heavier than most making it a little bit more challenging to transport.

Decked Bulb Tee:
Estimated cost per square foot: $250-350/SF
(based on Table 8-1 of the Alaska Bridges and Structures Manual)
Estimated cost: $1,600,000 – $2,240,000
Total bridge length: 100'
Roadway width: 64'

At this time, no significant design changes were made after the approval of this document. The final as-built plans for this project will be available in Central Files within the Highway Design Section (4111 Aviation Avenue, Anchorage, AK 99502)