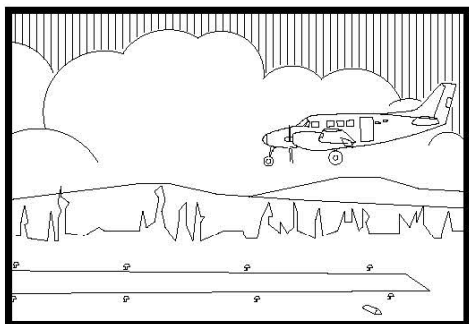


# DESIGN STUDY REPORT

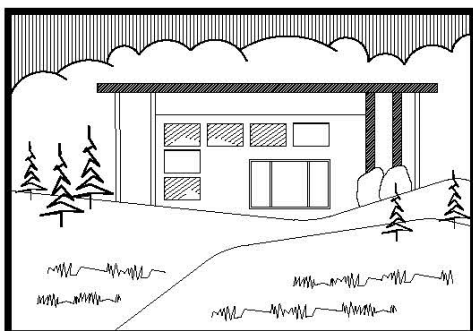
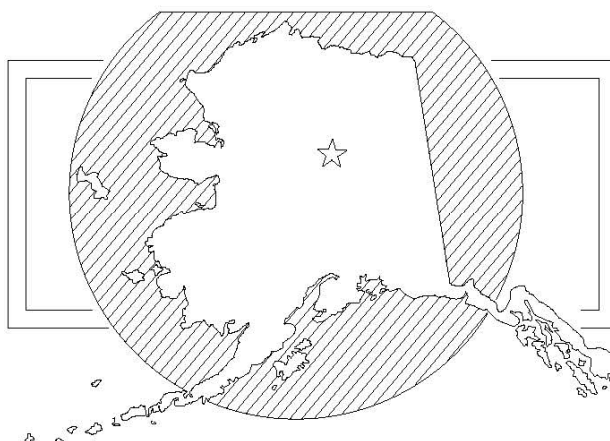
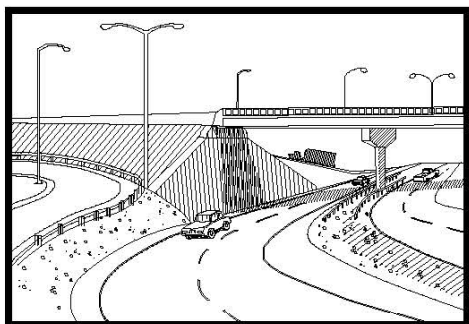
## Cordova Second Street Reconstruction

NFWY00595 / 0002493



# STATE OF ALASKA

Department of Transportation  
and Public Facilities



*NORTHERN REGION*

*November 2024*

DESIGN APPROVAL

CORDOVA SECOND STREET RECONSTRUCTION

PROJECT NO. NFHWY00595 / 0002493

Requested by:

**Russell Johnson**  
Location: AK DOT&PF  
Contact Info: russell.johnson@alaska.gov  
Date: 2024.11.20 07:07:31-09'00'

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Russell Johnson, P.E.  
Engineering Manager  
Northern Region

Date

Design Approval  
Granted:

**AI Beck**  
DocuSigned by:  
69CC515A62D5404...

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Albert Beck, P.E.  
Acting Preconstruction Engineer  
Northern Region

11/20/2024

Date

Distribution: NR Design Directive 20-01 Distribution

DESIGN STUDY REPORT  
FOR

CORDOVA SECOND STREET RECONSTRUCTION

PROJECT NO. NFHWY00595 / 0002493

PREPARED BY: Brandon Irvine, P.E.

UNDER THE SUPERVISION OF: Russell Johnson, P.E.



ALASKA DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES  
NORTHERN REGION DESIGN, ENGINEERING, & CONSTRUCTION  
SEPTEMBER 2024

CORDOVA SECOND STREET RECONSTRUCTION  
PROJECT NO. NFHWY00595 / 0002493  
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## **INTRODUCTION**

The State of Alaska Department of Transportation and Public Facilities (DOT&PF) in coordination with the City of Cordova and the Alaska Division Office of the Federal Highway Administration (FHWA) is proposing a project to reconstruct Second Street from the Copper River Highway to West Davis Avenue in Cordova Alaska. The City of Cordova created this project by nominating and submitting a project application for Community Transportation Program (CPT) funding. See Figure 1 for the project limits.

Second Street is located on a hillside with moderate to steep longitudinal grades. Areas with steep grades, combined with an aged storm drain system, contribute to isolated areas of poor drainage. The paved road surface is deteriorating and needs to be replaced. Several of the intersections along 2<sup>nd</sup> Street have limited sight distance. This creates safety concerns for both pedestrians and vehicles. In addition, a majority of the project corridor does not have sidewalks and there are gaps where sections do not have sidewalks. In addition, many existing curb ramps do not meet current ADA standards.

## **PROJECT DESCRIPTION**

Second Street extends from the intersection with the Copper River Highway on the South end to the intersection with West Davis Avenue on the North end. The project length is approximately 0.36 miles.

The purpose of this project is to improve safety by upgrading existing and adding new pedestrian facilities to meet current Americans Disabilities Act (ADA) standards and to repave the street. The project is needed because existing pedestrian facilities are incomplete, not ADA compliant, and the existing roadway pavement is deteriorated and beyond its economic lifespan.

Inside the project corridor, the project will repave the road, construct a new storm-drain system and sidewalks along both sides of the roadway. Existing on-street parking will be retained to the maximum extent feasible. New roadway and pedestrian signage and lighting will also be constructed.



Figure 1: Project Location & Limits

## DESIGN STANDARDS

- Americans with Disabilities (ADA) Standards for Transportation Facilities, United States Department of Transportation, 2006.
- Americans with Disabilities Act (ADA) Standards for Accessible Design, United States Department of Justice, September 15, 2010.
- A Policy on Geometric Design of Highways and Streets (PGDHS or “Green Book”), American Association of State Highway and Transportation Officials (AASHTO), 2018.
- Alaska Flexible Pavement Design Manual (PDM), DOT&PF, 2004.
- Alaska Highway Drainage Manual (AHDM), DOT&PF, 2006.
- Alaska Highway Preconstruction Manual (HPCM), DOT&PF, 2023.
- Alaska Traffic Manual (ATM), consisting of the Manual on Uniform Traffic Control Devices (MUTCD), U.S. Department of Transportation, Federal Highway Administration (FHWA), 2009 as amended, and the Alaska Traffic Manual Supplement, State of Alaska, DOT&PF, 2016.
- Alaska Utilities Manual, DOT&PF, 2014
- IES Recommended Practice for Roadway Lighting (RP-8-14), Illuminating Engineering Society (IES), 2014.
- Roadside Design Guide, 4th Edition, AASHTO, 2011.

## DESIGN EXCEPTIONS AND DESIGN WAIVERS

Due to the naturally hilly and, in some areas, steep topography within the project area, it's expected that maximum allowable ADA compliant grades will be exceeded on some curb ramps, crosswalks, and parking areas. A future addendum (Appendix D) to this DSR identifying non-compliant locations will be issued after the detailed vertical design has been completed.

## DESIGN ALTERNATIVES

The project's horizontal layout and typical sections were developed and approved in coordination with the City of Cordova. Multiple roadway typical sections and parking layout alternatives were developed with the main goal of maximizing the amount of on-street parking while also providing continuous sidewalks on both sides of Second Street.

## **PREFERRED DESIGN ALTERNATIVE**

The preferred typical section(s) contain the following elements:

1. Two 11-foot travel lanes, one Northbound and one Southbound.
2. 1-foot shoulders will be constructed and striped where practicable.
3. Sidewalks on both sides of Second Street:
  - a. 6-foot-wide minimum sidewalk width.
  - b. 10-foot-wide sidewalks will be constructed in front of the Mt. Eccles Elementary School
  - c. 8-foot-wide sidewalks will be constructed in some areas where there is room inside the existing ROW limits.
4. Curb “bulb-outs” (extensions) will be utilized at some intersections to reduce pedestrian crossing widths and improve vehicle sight distances.
5. Orientation of on-street parking will vary and consist of parallel, perpendicular and 45-degree angle parking.

## **3R ANALYSIS**

Not applicable. This is a reconstruction project.

## **TRAFFIC ANALYSIS**

Second Street is classified as a Major Collector between the Copper River Highway to Lake Avenue and as a Minor Collector between Lake Avenue to West Davis Avenue. The current (2020) ADT is 1,600 vehicles per day but is projected to increase to 2,150 vehicles per day by 2050.

A traffic analysis/traffic study is not warranted and will not be completed due to the low speed (20 mph design speed) and low AADT along the project corridor.

## **HORIZONTAL/VERTICAL ALIGNMENT**

The proposed horizontal alignment generally follows the existing alignment with some exceptions. Minor horizontal centerline shifts have been made in some areas to provide new or widen existing on-street parking. This includes some centerline alignment shifts across intersections.

The vertical alignment generally follows existing with some intentional modifications made to ensure positive drainage and provide vertical tie-ins at driveways and adjacent properties. The existing vertical centerline profile has grades ranging from 0% to as much as 13-14% with the average being 8-10%. The road grade generally slopes uphill from the South end (BOP) at the



Copper River Highway intersection having the lowest elevation and the North end (EOP) at the West Davis Avenue intersection having the highest elevation.

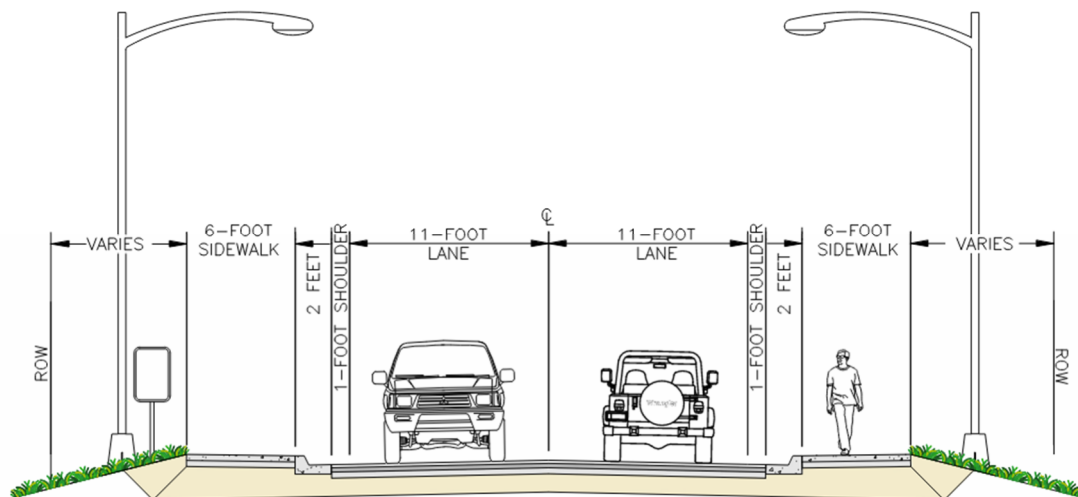
## TYPICAL SECTION(S)

Second Street is a low-speed (20 mph design speed) urban street and will be re-paved with hot mix asphalt. A roadway crown or full width cross-slope of 1.5%-3.0% will be used to prevent water ponding and provide lateral drainage along the corridor. See Figure 2.

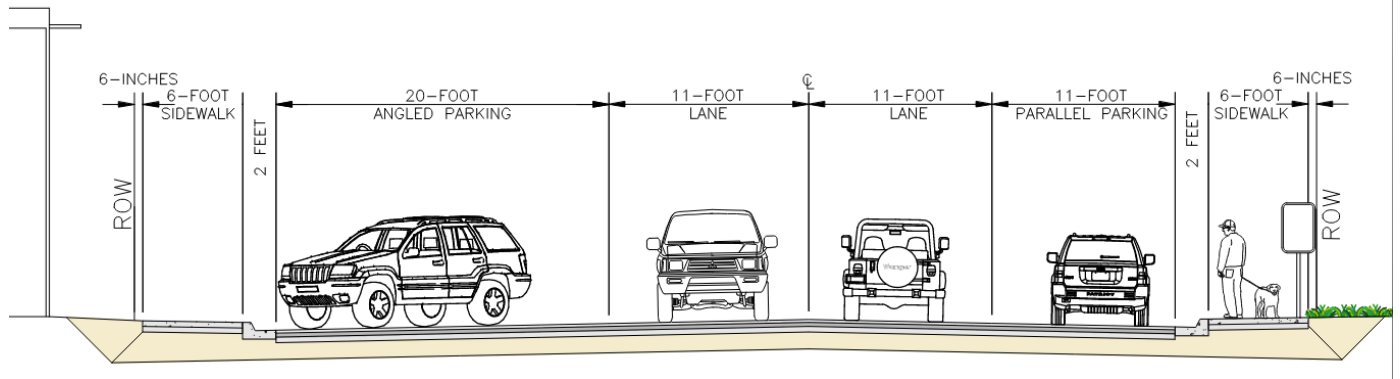
The typical section consists of two 11-foot lanes (one northbound and one southbound) with 1-foot shoulders on each side of the road in some areas where ROW limits allow. Standard 2-foot wide curb & gutter will be constructed in front of all sidewalks. The majority of the new sidewalks will be 6 feet wide while some areas will have 8-10 feet wide sidewalks where ROW limits allow.

On-street parking and widths vary block by block along the project corridor. Below are typical section figures for each of the 5 blocks that make up the project corridor.

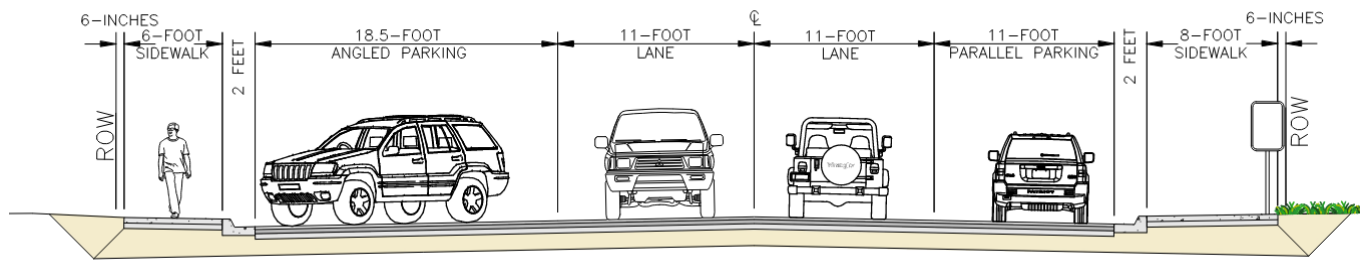
**Figure 2: Typical Sections**



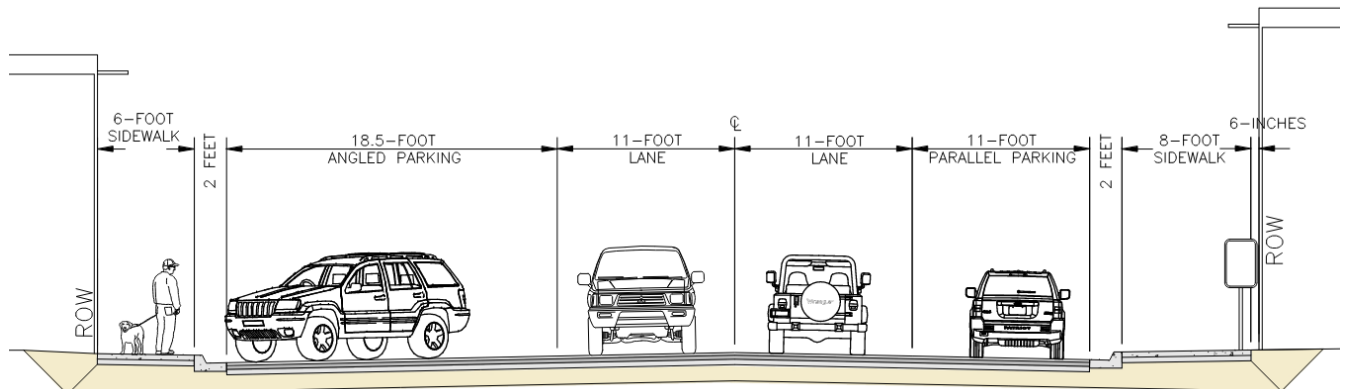
Block 1: Copper River Hwy to Lake Ave.



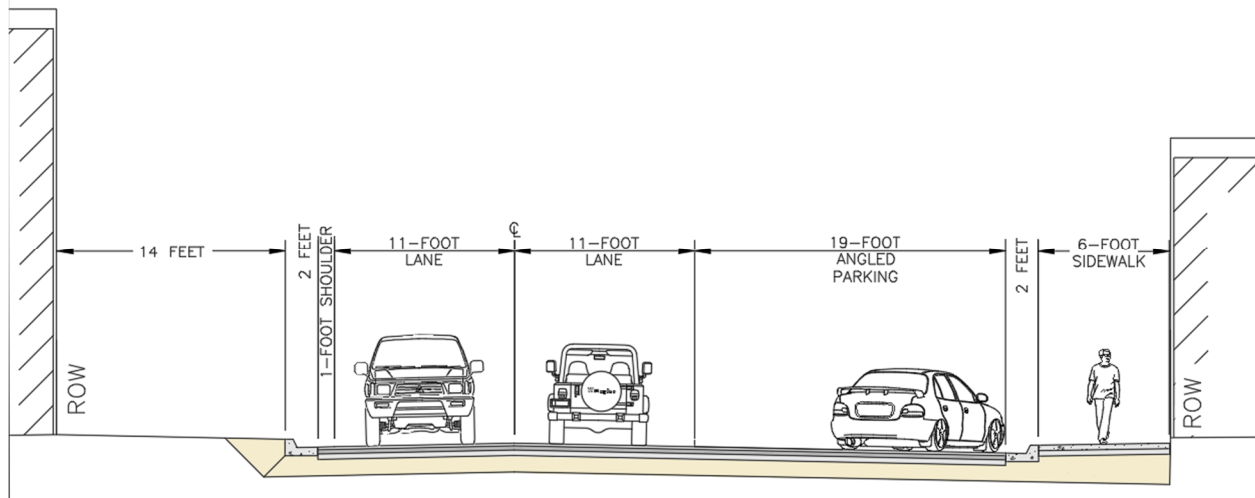
Block 2: Lake Ave. to Adams Ave.



Block 3: Adams Ave. to Browning Ave.



Block 4: Browning Ave. to Council Ave.



Block 5: Council Ave. to W. Davis Ave.

## PAVEMENT DESIGN

As-built drawings indicate that the existing pavement is 1.5" thick with 4.5" to 6" of base course. The proposed pavement design for Second Street is based primarily on future predicted traffic loading as well as this as-built information.

The proposed pavement design has been developed in coordination with and approved by the Northern Region Materials Engineer and consists of the following:

- Two (2) inches of hot mix asphalt (HMA); over
- Three (3) inches of D-1 Base Course material

Sidewalks will be 6" thick concrete underlain with a 6" minimum thick layer of D-1 Base Course material.

## PRELIMINARY BRIDGE LAYOUT

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

## RIGHT-OF-WAY REQUIREMENTS

One partial Right-of-Way (ROW) acquisition is needed at the southeast corner of the 2<sup>nd</sup> Street/Davis Avenue intersection. This acquisition provides room to construct new sidewalk and for anticipated future extension of the sidewalk east along Davis Avenue. The ROW acquisition is currently owned by the City of Cordova.

Temporary Construction Permits (TCPs) will be needed to reconstruct driveways and Temporary Construction Easements (TCEs) will be needed in other areas:

1. To transition/blend grades behind sidewalks.
2. To tie into the surrounding topography.
3. For utility relocation work.
4. Construct storm drain service lines.

There are currently 8 separate ROW encroachments identified on this project that need to be resolved. These range in width from 1 foot to 10 feet and in length from 8 feet to 162 feet. Most encroachments are 6-8" building fronts or sidewalks constructed within the ROW.

Encroachments are typically resolved by removing the encroachment or by the property owner obtaining an encroachment permit.

A section of sidewalk inside the project corridor, located south of and adjacent to the Prince William Motel will be excluded from the project. In this area, a portion of a building (Nichols' Back Door Company) extends under the existing sidewalk and into the ROW. An existing recorded easement grants rights for the building to be there. This easement conflicts with Federal-Aid project requirements Title 23 CFR 1.23(b), which states that all real property within the road right-of-way shall be devoted exclusively to public highway purposes. This CFR prohibits DOT&PF from certifying the project's ROW because a private party (the building's owners) have a valid non-highway purpose right for their building to be located inside the ROW. Therefore, this section of sidewalk will be excluded from the project area and no project work will be performed within its boundary.

## **MAINTENANCE CONSIDERATIONS**

The City of Cordova owns Second Street and is responsible for maintaining the roadway. Maintenance requirements include snow removal, pavement management, street lighting maintenance, and street sweeping. The city is also responsible for cleaning and maintaining the Storm Drain system.

The project is expected to increase some maintenance efforts along Second Street due to the addition of new sidewalk and curb/gutter along the project corridor. It is anticipated that the additional hardscaping will increase the effort required for snow removal and sweeping/cleaning the street and sidewalks. However, rebuilding the pavement structure will decrease required pavement patching and pothole repairs.

The reconstructed roadway is anticipated to result in the following changes to maintenance responsibilities:

1. Roadway: The existing number of lane miles for the project area is 0.71 and will increase after the project is constructed due to the addition of new on-street parking, requiring additional snow removal and street sweeping.
2. Sidewalks: The City currently maintains 1,900 linear feet of sidewalk and curb/gutter, together, ranging in width from 5 feet to 9 feet. The project will add approximately 1,650

feet of 6-foot wide sidewalk, 450 feet of 8-foot wide sidewalk, and 110 feet of 10-foot sidewalk.

3. Storm Drain: The project will add additional storm drain catch basins and storm drain piping. This additional infrastructure will require regular maintenance and cleaning; however the additional storm drainage infrastructure will result in fewer roadway maintenance issues caused by poor drainage.
4. Street Lighting: The number of streetlights along Second Street will increase in order to provide new continuous lighting along the project corridor. The City owns the street lights, pays for the illumination power, and Cordova Electric maintains them. There will be an increased number of total streetlights, however they will be energy efficient LED fixtures with a long lifespan, resulting in a lower overall life cycle cost compared to traditional high pressure sodium light fixtures.

## **MATERIAL SOURCES**

All materials will be Contractor-furnished. Material sources with appropriate quality and quantity are available from private and/or commercial sources in Cordova.

## **UTILITY RELOCATION & COORDINATION**

Numerous existing utilities run parallel to and/or cross the Second Street corridor. These utilities include:

- City of Cordova, wastewater, storm drain, and water utilities
- Cordova Telephone Company (CTC), telephone communications
- Cordova Electric Cooperative (CEC), electric power
- General Communications Inc. (GCI), fiber optic and cable telecommunications

The existing utility information is based on as-builts, utility system maps, field-surveyed locates, and information provided by utility companies. During construction activities, it's not uncommon, and is somewhat expected, to discover additional unknown existing utilities located within the project area. This will likely be the case on this project.

Due to widening the roadway, extensive underground electric, communication and cable TV conflicts are expected and are being identified as the design progresses. It is expected that constructing a new underground utility duct bank that consolidates all utilities to one primary corridor will be the most cost-effective solution to resolving numerous utility conflicts and making the utility whole after the project is constructed. The duct bank would be constructed while existing utilities remain in service to avoid the need for temporary utilities during construction. It also minimizes outage disruptions by limiting the time required to cut over new utilities to existing services.

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

## **ACCESS CONTROL FEATURES**

Currently there are eight stop-controlled intersections along Second Street that control access onto the corridor:

1. Copper River Highway
2. Railroad Way
3. Lake Ave.
4. Adams Ave.
5. Federal Ave.
6. Browning Ave.
7. Council Ave.
8. W. Davis Ave.

There are 14 existing driveways along the Second Street corridor.

## **PEDESTRIAN/BICYCLE (ADA) PROVISIONS**

The project will improve pedestrian facilities by providing continuous sidewalks on both sides of Second Street. The majority of these sidewalks will be 6 feet wide while some will be 8-10 feet wide. ADA compliant curb ramps will be installed at all four quadrants of each intersection and where return radii are used for driveways. Curb ramps will also be installed at driveway curb cuts.

Bicyclists are permitted to use the vehicle travel lanes. For much of the project length the on-street parking located next to the vehicle lanes is wider than required and can help increase the comfort of cyclists sharing those vehicle lanes.

Second Street is in an area with a naturally occurring steep topography where full ADA compliance will not be feasible/practicable. The longitudinal grade of the roadway can be as steep as 14% which exceeds the 5% maximum route running slope required by the ADA. Cross slopes, especially at cross walks, will likely exceed the 2% ADA maximum in some locations. The number of non-compliant ADA features constructed as part of this project will be identified in the future as the detailed horizontal and vertical design(s) are developed. Then an amendment to this DSR will be developed/issued to document non-compliant ADA features in Appendix D.

## **SAFETY IMPROVEMENTS**

Safety will be improved by the construction of continuous sidewalks on both sides of Second Street which eliminates the need for pedestrians to walk in vehicle travel lanes. The project will also construct sidewalk “bulb-outs” at intersections which reduce pedestrian crossing distances at intersections and provide a protected refuge for pedestrians to stand and wait before crossing the street.

The new sidewalks, curb and gutter, and parking striping will also provide visual cues to more clearly define designated on-street parking locations which will improve pedestrian safety and limit vehicle/pedestrian interaction.

In a few areas, safety will also be improved by constructing angled parking versus the existing perpendicular parking. Angled parking helps to mitigate the need for vehicles to encroach into the oncoming traffic lane when backing out of a parking spot. The parking between Adams Ave. and Browning Ave. will remain perpendicular per City of Cordova's request. In some areas existing informal perpendicular parking will be replaced with parallel parking adjacent to the curb/gutter and sidewalk. This allows pedestrians to travel on sidewalks where the curb & gutter provides a physical barrier/separation from vehicles that are in the process of parking.

Adjusting vertical elevations of the roadway combined with the improved storm drain system will help prevent storm water from accumulating in the roadway and bypassing through intersections. This improves safety by encouraging drivers to stay in their travel lanes and not to avoid large areas of standing/ponding water or ice. It also encourages drivers to park in designated areas located outside the travel lanes rather than park close to or within adjacent travel lanes to avoid standing water or ice.

A hollow gap under the existing sidewalk in front of the Prince William Motel will be filled in with a low strength concrete sand slurry. The hollow gap is created from an existing sub-surface retaining wall located a few feet in front of the Prince William Motel's basement wall. Filling in this gap will strengthen the subsurface materials and limit any future movement of the new sidewalk above.

## **INTELLIGENT TRANSPORTATION SYSTEM FEATURES**

Not applicable. There are no intelligent transportation system features within the project limits.

## **DRAINAGE**

The existing natural topography around the project corridor is generally sloped downhill in a southwesterly direction:

- A. Drainage along Second Street flows from North to South with the W. Davis intersection being the high point and the Copper River Highway intersection being the low point.
- B. Drainage from eastern (uphill) side streets flows towards Second Street and is a significant contributor to the total water collected along the project corridor.
- C. There is also a significant amount of surface water runoff/drainage collected along Davis Avenue that flows west to the 2<sup>nd</sup> Street intersection then flows south along 2<sup>nd</sup> Street towards Council Avenue.

Drainage is collected in an existing storm drain system along the length of Second Street which eventually flows west towards the harbor via underground trunklines under side streets.

1. There is an existing trunkline flowing from east to west located in the center of Council Avenue. A continuously flowing stream enters the trunkline above (east) 2<sup>nd</sup> Street

project corridor and it is the collection point for all Second Street drainage between Browning Avenue and West Davis Avenue.

2. There is another east-west flowing trunkline under Adams Ave. that collects drainage from Browning Ave. to Adams Ave.
3. South of Adams Ave. most of the drainage makes its way South to field inlets and culverts along the Copper River highway that eventually flows east into Odiak Slough.

The project will replace the entire storm drainage system along Second Street. Storm drain inlets and lateral pipes will be located as needed to facilitate proper storm water catchment. Additional catch basin inlets and lateral pipes will be added to the system to improve drainage. New trunkline(s) will be placed along Second Street that tie into existing trunklines.

A section of the existing Council Avenue east-west flowing trunkline inside the 2<sup>nd</sup> Street project corridor limits will be replaced and upsized. This is in preparation for future expansion and upgrades to the City's existing storm drain system outside of the project limits. Two new storm drain manholes located on the east and west sides of the Council Avenue/2<sup>nd</sup> Street intersection will be constructed as they tie into the existing trunkline.

The project corridor is "peppered" with private roof drains and basement sump pumps that currently drain into the City of Cordova's sewer system, which must be treated before it's released. To reduce the volume (and cost) of treating sewer wastewater, the city of Cordova requests this project facilitate rectifying this practice. In response, the new storm drainage system will construct capped storm drain stub-outs running from the new 2<sup>nd</sup> Street trunkline out to the edge of the road ROW. The City of Cordova will work with private owners to have them modify their roof drains and/or sump pumps to drain into a new privately owned and constructed storm drain service lines that tie into the storm drain stub-outs.

## **SOIL CONDITIONS**

A ground penetrating radar survey was conducted in June 2020 by NRMS to determine approximate existing fill thicknesses and depth to bedrock. Geotechnical borings were not performed due to the fear of striking the large number of underground utilities scattered along the project corridor.

Below is a summary of the ground penetrating radar findings:

1. West Davis Ave. to Council Ave.
  - a. Fill thickness generally less than 2 feet with some thicker sections near West Davis and Council Aves.
  - b. Depth to bedrock is between 3 and 7 feet.
2. Council Ave. to Browning Ave.
  - a. Fill thickness generally less than 2 feet.
  - b. Depth to bedrock is between 3 and 7 feet with isolated areas over 7 feet deep.
3. Browning Ave. to Adams Ave.
  - a. Fill thickness generally between 2 and 4 feet.
  - b. Depth to bedrock is between 5 and 7 feet.



4. Adams Ave. to Copper River Highway
  - a. Fill thickness generally between 2 and 4 feet thick
  - b. Depth to bedrock is between 3 and 7 feet thick.

## **EROSION AND SEDIMENT CONTROL**

The construction Contractor will prepare a Storm Water Pollution Prevention Plan (SWPPP) that conforms to the Alaska Construction General Permit (ACGP), DOT&PF's Best Management Practices (BMPs) for erosion and sediment control, and project specifications. The Contractor will submit the SWPPP to DOT&PF for approval and keep the approved SWPPP on-site at all times during construction. All construction activity will be conducted in accordance with the SWPPP, and the SWPPP will be updated throughout construction as different areas of the project are disturbed.

The area of ground disturbance for the Second Street reconstruction project is approximately 2.5 acres, not including material sites or staging areas. The project corridor is located in an urban area, with ground cover being predominately concrete or asphalt pavement and very little previously undisturbed ground.

Temporary erosion control measures may include, but are not limited to:

1. Preservation of existing vegetation
2. Erosion control mats
3. Velocity control BMPs, including silt fence or fiber rolls
4. Watering and/or chemical stabilization for dust control
5. Perimeter controls
6. Good housekeeping practices

Sediment filtration BMPs will be installed and maintained at all existing and new inlet structures. Ground disturbance will be minimized as much as reasonably possible throughout the project to prevent excessive erosion and dust. All disturbed ground will be reseeded or receive other surface treatment for permanent stabilization at the conclusion of construction activity. The site will be monitored at the frequency indicated in the ACGP until final stabilization has been achieved.

## **ENVIRONMENTAL COMMITMENTS**

For this project one environmental commitment has been made:

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

## **WORK ZONE TRAFFIC CONTROL**

The project is expected to take one summer season to construct. Pedestrian, bicycle, and motorized access to all residents and businesses along the project corridor will be provided and maintained at all times during construction.

This project is not located on a State Highway and is not significant. There will be temporary traffic detours and alterations to intersection traffic patterns during construction. The construction Contractor will be responsible for developing the phasing and sequencing of construction activities to minimize impacts to the traveling public.

## **VALUE ENGINEERING**

A value engineering study is not required since the total project cost will not exceed \$40 million. A study has been considered but will not be performed for this project.

## **COST ESTIMATE**

The current estimated costs for this project are as follows:

Design	\$2,305,000
Utilities	\$800,000
Right of Way	\$325,000
Construction	<u>\$10,000,000</u>
Total Cost of Project	\$13,430,000

# **APPENDIX A**

## **DESIGN CRITERIA & DESIGN DESIGNATION**

## PROJECT DESIGN CRITERIA

<b>Project Name: Cordova Second Street Reconstruction</b>				
<input checked="" type="checkbox"/> New Construction/Reconstruction		<input type="checkbox"/> 3R	<input type="checkbox"/> PM	<input type="checkbox"/> Other:
<b>Project Number:</b>	NFHWY00595 / 0002493		<input type="checkbox"/> NHS	<input checked="" type="checkbox"/> Non NHS
<b>Functional Classification:</b>	MP 0.0-0.0675 Major Collector; MP 0.0675-0.359 Minor Collector			
<b>Design Year:</b>	2050	<b>Present ADT:</b>	1600 (2020)	
<b>Design Year ADT:</b>	2150 (2050)	<b>Mid Design Period ADT:</b>	1950 (2040)	
<b>DHV:</b>	285 (2050)	<b>Directional Split:</b>	45% NB; 55% SB	
<b>Percent Trucks:</b>	8%	<b>Equivalent Axle Loading:</b>		
<b>Pavement Design Year:</b>	2050	<b>Design Vehicle:</b>	S-BUS-40	
<b>Terrain:</b>	Rolling (AASHTO GB 3-121)	<b>Number of Roadways:</b>	One, 2-Way Undivided Road	
<b>Design Speed:</b>	20 MPH			
<b>Lane Width:</b>	11 ft (HPCM 1130.1.3; AASHTO GB 6.3.2.1)			
<b>Shoulder Width:</b>	<b>Outside:</b>	1 ft	<b>Inside:</b>	none
<b>Cross Slope:</b>	2%			
<b>Superelevation:</b>	N/A			
<b>Min. Radius of Horizontal Curvature:</b>	115 ft (HPCM Fig. 1120-1)			
<b>Maximum Allowable Grade:</b>	10% (HPCM Fig. 1120-1) (12% AASHTO GB Table 6-7)			
<b>Stopping Sight Distance:</b>	126 ft (AASHTO GB Table 3-2; Average 2nd St. Grade = 8-10%)			
<b>Vertical Clearance:</b>	20.5' Overhead Utilities (HPCM Table 1130-1)			
<b>Design Loading Structural Capacity:</b>	N/A			
<b>Bridge Width:</b>	N/A			
<b>Min. Allowable Grade:</b>	0.3%; 0.5% is preferred (AASHTO GB 6-12)			
<b>Min. K-Value for Vert. Curves:</b>	<b>Sag:</b>	17 (AASHTO GB Table 6-3)	<b>Crest:</b>	7 (AASHTO GB Table 6-3)
<b>Passing Sight Distance:</b>	N/A (no passing)			
<b>Surface Treatment:</b>	<b>T/W:</b>	HMA	<b>Shoulders:</b>	HMA
<b>Side Slope Ratios:</b>	<b>Foreslopes:</b>	Varies (4:1 max)	<b>Backslopes:</b>	Varies (4:1 max)
<b>Degree of Access Control:</b>	Stop controlled intersections; permitted driveways			
<b>Median Treatment:</b>	N/A			
<b>Illumination:</b>	Continuous			
<b>Lateral Offset to Obstruction:</b>	1.5' behind face of curb, 3' at intersections (AASHTO GB 6.3.4)			
<b>Curb Usage and Type:</b>	Standard Curb & Gutter			
<b>Bicycle Provisions:</b>	Shared Lanes			
<b>Pedestrian Provisions:</b>	6'-10' wide sidewalks			
<b>Misc. Criteria:</b>				

Date: 9/20/2024

Shaded criteria are commonly referred to as *FHWA controlling criteria for NHS high-speed roadways (design speed  $\geq$  to 50 mph)*. For NHS low-speed roadways (design speed  $<$  50 mph), the only two *FHWA controlling criteria* which apply are design speed and design loading structural capacity. For NHS routes only, controlling criteria must meet the minimums established in the Green Book, unless a design exception is approved. For all other routes, all criteria must meet the minimums established in the Alaska Highway Preconstruction Manual, unless a Design Waiver is approved.

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

## **APPENDIX C**

### **PAVEMENT DESIGN**

Project Name: Cordova Second Street Reconstruction				Project Number: NFHWY00595				Analysis Date: 6/5/2023				Project Status	
Design Type: New Design				Designer: Brandon Irvine				Unit: US Customary				All layer damages less than 100%.	
Project Location: CORDOVA M K SMITH AP				Tire Load (lbs) 4500	Load Description: ESAL								
Design AADT: 1,600			Design Loadings	Tire Press. (psi) 110	Load Loc (in) X: Y:	0 0	13.5 0						
Spring%: 33			77,188		Eval Loc (in) X: Y:	0 0	6.75 0						
Summer%: 33			77,188										
Fall%: 17			39,764										
Winter%: 17			39,764										
Total%: 100			233,904										
Layer		Critical Z Coordinate (in)	Asphalt Properties	Season	Modulus (Ksi)	Poisson's Ratio	Tensile Micro Strain	Compressive Stress (psi)	Million Cycles to Failure	Past Damage (%)	Future Damage (%)	Total Damage (%)	
Thickness (in): 3		2.99	Air%: 5	Spring	350	0.30	372		0.40		19.36	19.36	
Name: sphalt Concrete (Unmodified Asph			Asphalt%: 5.5	Summer	300	0.30	334		0.65		11.85	11.85	
Use TAl: Yes			Density (pcf) 148	Fall	300	0.30	334		0.65		6.10	6.10	
				Winter	1200	0.30	148		2.87		1.39	1.39	
									Total Damage:		38.70	38.70	
Thickness (in): 6		3.01	Air%:	Spring	40	0.35		42.4	0.33		23.70	23.70	
Name: Aggregate Base P200<6%			Asphalt%:	Summer	50	0.35		48.7	0.43		17.96	17.96	
Use TAl:			Density:	Fall	50	0.35		48.7	0.43		9.25	9.25	
				Winter	100	0.35		35.0	12.07		0.33	0.33	
									Total Damage:		51.24	51.24	
Thickness (in): 0		9.01	Air%:	Spring	10	0.45		10.6	0.21		36.75	36.75	
Name: Subgrade P200<30%			Asphalt%:	Summer	10	0.45		10.3	0.23		33.81	33.81	
Use TAl:			Density:	Fall	10	0.45		10.3	0.23		17.42	17.42	
				Winter	10	0.45		6.5	1.02		3.89	3.89	
									Total Damage:		91.87	91.87	
Thickness (in):			Air%:	Spring									
Name:			Asphalt%:	Summer									
Use TAl:			Density:	Fall									
				Winter									
									Total Damage:				
Thickness (in):				Spring									
Name:				Summer									
				Fall									
				Winter									
									Total Damage:				
H:\Projects\Communities\Cordova\00595 Cordova 2nd Street\6 Design\3 Pavement Design\Cordova Second Street Reconstruction.xml													

## **APPENDIX D**

### **NON-COMPLIANT ADA FEATURES**

**TO BE ADDED AT A LATER DATE**