TECHNICAL MEMORANDUM

System Performance Criteria

TO:	Kelly Summers, P.E., Project Manager – Department of Transportation and Public Facilities (DOT&PF)
FROM:	Renee Whitesell, PTP, Project Manager - DOWL
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PROJECT:	Parks Highway Alternative Corridor Planning and Environmental Linkages (PEL) Study Project Numbers: Federal-0A41039/004210000 State-CFHWY00421/0A41039

1.0 Introduction

This memorandum proposes performance targets for an alternative transportation corridor to the Parks Highway through Wasilla, with a focus on safety, mobility, and pavement condition. The analysis of system performance consists of the following steps:

- Review performance criteria set forth in applicable transportation plans
- Engage relevant stakeholders and incorporate input
- Evaluate existing performance on the Parks Highway through Wasilla (focus on the area between the Hyer Road interchange to the east, and West Hawk Lane to the west)
- Propose appropriate performance targets for an alternative corridor to the Parks Highway

2.0 Transportation Codes and Plans Performance Criteria

Performance criteria specified in transportation codes and plans were reviewed and summarized.

2.1 Transportation Codes Performance Criteria

Performance criteria in transportation codes were reviewed in Title 23 Code of Federal Regulations (CFR) Parts 490, 515, and 625.

2.1.1 23 CFR 490

The Code of Federal Regulations in 23 CFR 490 "National Performance Management Measures"[1] states requirements for performance management for safety, pavement condition, bridge condition, travel time reliability, freight movement, congestion, and air quality. It requires state departments of transportation to set performance targets for all the previously stated categories (in Alaska this is part of the State of Alaska Department of Transportation and Public Facilities' Long-Range Transportation

[1] *Code of Federal Regulations Title 23 Part 490 – National Performance Management Measures.* United States National Archives and Records Administration. Accessed 2022. https://www.ecfr.gov/current/title-23/chapter-I/subchapter-E/part-490

Plan (LRTP)), with various requirements for the time horizon, reporting, assessment, and target adjustment.

23 CFR 490 states safety performance measures shall include the number and rate of fatalities, number and rate of serious injuries, and the number of non-motorized fatalities and serious injuries (combined) but does not set specify quantitative targets for each. It states performance measures for pavement condition are to include percentage of pavements in good condition and poor condition, which is a factor of the International Roughness Index (IRI), cracking, and rutting. The maximum acceptable percentage of lane-miles of the Interstate System in poor condition in Alaska is 10 percent (five percent in other states).

The two measures used to assess travel time reliability are the percentage of person-miles traveled (PMT) that are reliable on the Interstate and percentage of PMT that are reliable on the non-Interstate National Highway System. PMT is a measure of mobility that combines both the number and length of trips and is intended to account for all transportation modes. PMT tends to be higher for travelers who live in suburban locations owing to most of these trips being performed by driving, however.[2] The Alaska LRTP does not set a performance target for this metric, but states "DOT&PF to coordinate with MPOs; the measure is applicable to the Interstate system and non-Interstate NHS."

2.1.2 23 CFR 515

23 CFR 515 "Asset Management Plans"[3] establishes processes state departments of transportation must use for developing asset management plans, establishes minimum requirements of asset management plans, and describes penalties for not meeting the minimum requirements.

In compliance with CFR 515, the DOT&PF developed the Transportation Asset Management Plan[4], which sets forth a plan to manage National Highway System roads in good condition according to performance target and control for risk in a financially responsible manner. The infrastructure targets set in the plan are:

- Poor Pavement Condition on the Interstate: 10 percent
- Good Pavement Condition on the Interstate: 20 percent
- Poor Pavement Condition on the non-Interstate National Highway System: 15 percent
- Good Pavement Condition on the non-Interstate National Highway System: 15 percent

2.1.3 23 CFR 625

The Code of Federal Regulations in 23 CFR 625[5] sets forth a policy for the design of routes on the National Highway System (NHS), which includes the Eisenhower Interstate System. An alternative corridor would be designed in accordance with CFR 625 as it likely will replace the Parks Highway's

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[2] *https://www.fhwa.dot.gov/policy/otps/nextgen_stats/chap5.cfm*

[3] *Code of Federal Regulations Title 23 Part 515 – Asset Management Plans.* United States National Archives and Records Administration. Accessed 2022. https://www.ecfr.gov/current/title-23/chapter-I/subchapter-F/part-515

[4] *Transportation Asset Management Plan.* Alaska Department of Transportation and Public Facilities. 2019. https://dot.alaska.gov/stwddes/asset_mgmt/assets/tamp.pdf

[5] *Code of Federal Regulations Title 23 Part 625 – Design Standards for Highways.* United States National Archives and Records Administration. Accessed 2022. https://www.ecfr.gov/current/title-23/chapter-I/subchapter-G/part-625

current designation on the Eisenhower system. CFR 625 states plans and specifications for NHS projects shall "adequately serve the existing and future planned traffic of the highway in a manner that is conducive to safety, durability, and economy of maintenance." It continues that "An important goal of the FHWA is to provide the highest practical and feasible level of safety for people and property associated with the nation's highway transportation systems and to reduce highway hazards and the resulting number and severity of accidents on all the nation's highways." Minimum design criteria are determined by the American Association of State Highway and Transportation Officials (AASHTO)'s A Policy on Geometric Design of Highways and Streets, A Policy on Design Standards, and LRFD Bridge Design Specifications. The Alaska Highway Preconstruction Manual (HPM)[6] also provides guidance for the design of highway projects in Alaska. The HPM specifies criteria for highway capacity, highway design, and non-motorized transportation design.

2.2 Transportation Plans Performance Criteria

System performance criteria were reviewed in the following transportation plans:

- Let's Keep Moving 2036: Alaska Statewide Long-Range Transportation Plan[7]
- Matanuska-Susitna Borough Long Range Transportation Plan[8]
- Alaska Strategic Highway Safety Plan 2018-2022[9]
- Alaska Highway Safety Plan – Federal Fiscal Year 2021[10]

Other area plans were also considered for locational context but are not discussed further in this memorandum as they do not include transportation system performance criteria.

Let's Keep Moving 2036 (adopted December 2016) is Alaska's Statewide Long-Range Transportation Plan (LRTP). It addresses multimodal transportation, including highway, aviation, transit, rail, marine, and non-motorized facilities. The LRTP notes it will provide the basis for establishing performance measures/metrics and associated targets that comply with federal law. The Fixing America's Surface Transportation (FAST) Act focused the federal-aid program on seven national goal areas, which include safety, infrastructure condition, congestion reduction, system reliability, freight movement, and economic vitality. The first policy goal identified is to "develop new capacity and connections that cost-effectively address transportation system performance." With this goal, the first action identified is to "focus state surface transportation finance responsibilities on the Interstate, Non-Interstate National Highway System, Alaska Highway System, and other high-functional class routes." Performance measures and corresponding state targets are shown in Appendix A Table A-1.

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[6] *Alaska Highway Preconstruction Manual.* Alaska Department of Transportation and Public Facilities.

[7] *Let's Keep Moving 2036: Policy Plan.* Alaska Department of Transportation and Public Facilities. December 2016. https://dot.alaska.gov/stwdplng/areaplans/lrtpp2016/docs/LRTPpolicyplan_finalsigned_12-16.pdf

[8] *Matanuska-Susitna Borough Long Range Transportation Plan.* Matanuska-Susitna Borough. December 2017. https://matsugov.us/plans/lrtp

[9] *Alaska Strategic Highway Safety Plan 2018-2022.* Alaska Department of Transportation and Public Facilities. Accessed 2022. https://dot.alaska.gov/stwdplng/shsp/assets/AKDOT_SHSP_2018_2022.pdf

[10] *Alaska Highway Safety Plan - Federal Fiscal Year 2021.* Alaska Department of Transportation and Public Facilities. 2020. https://www.nhtsa.gov/sites/nhtsa.gov/files/documents/ak_fy21_hsp.pdf

In the previous statewide LRTP, Let's Get Moving 2030[11], the first strategic goal identified was "complete the modernization of the National Highway System to current standards to address safety and connectivity". Specifically, the goal states to "address demand-driven urban capacity on the most congested highways in Alaska" and later states the most critical of these projects include "construction of a new through-route south of Wasilla parallel to the Parks Highway to provide sufficient capacity in the corridor."

The **Matanuska-Susitna Borough (MSB) LRTP 2035** (adopted December 2017) assesses growth in the MSB over 20 years and identifies the key elements of the borough's future transportation system that will be needed to serve its growing communities. It takes a performance-based planning approach to improve transportation decision-making and help make the best use of scarce financial resources. The LRTP references the same national goals as are identified in the statewide LRTP and outlines how these national planning goals are addressed by the MSB LRTP. The LRTP articulates seven goals to reflect what the community wants their future transportation system to look like, which include transportation choices, improving connectivity, safety, and mobility, and supporting economic vitality. Conceptual performance measures to meet these goals are shown in Appendix A Table A-2.

The **Alaska Strategic Highway Safety Plan (SHSP) 2018-2022** is a statewide, comprehensive safety plan that provides a coordinated framework for reducing fatalities and serious injuries on all public roads. The plan identifies priority emphasis areas, selects critical factors related to crashes and potential solutions, and establishes performance goals for reducing fatalities and serious injuries in 2022 to 67 and 33, respectively. The plan focuses on lane departure, intersection-related, and animal-vehicle crashes, while emphasizing bicyclist, pedestrian, and motorcyclist road users. Safety performance is monitored to determine where Alaska is making progress and where there is a need for more effort. The DOT&PF Central Region Traffic and Safety Engineer has stated the new SHSP goal for non-motorized fatalities and serious injuries is less than 15 percent of all fatalities and serious injuries.

The **Alaska Highway Safety Plan (HSP)** is developed annually by the Alaska Highway Safety Office (AHSO) to provide a framework for creating a safer, more efficient transportation system. The HSP includes clearly articulated goals and objectives that link to performance measures and targets established through data analysis and stakeholder input. The program areas, related core performance measures, and how each will be measured are shown in Appendix A Table A-3.

The City of Wasilla Comprehensive Plan[12] guides decision-making of elected officials for transportation, land use, capital improvements, and economic development in Wasilla. The desired future conditions for transportation include "a functional network of State and regional roads are funded and constructed including a Parks Highway bypass. This allows the existing Parks Highway to be re-scaled to fit community needs." Actions in the plan related to an alternative corridor include "coordinate with federal, state, and Borough government agencies to support and fund local and regional transportation needs, such as regional corridors, Parks Highway alternatives, and better street connectivity in and out of the City."

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[11] *Let's Get Moving 2030 – Alaska's Statewide Long-Range Transportation Policy Plan.* Alaska Department of Transportation and Public Facilities. 2008. https://dot.alaska.gov/stwdplng/areaplans/2030/assets/SWLRTPPfinal022908.pdf

[12] *City of Wasilla Comprehensive Plan.* City of Wasilla Alaska. 2011. https://www.matsugov.us/docs/general/14622/2011-citycompplan.pdf

3.0 Stakeholder Engagement and Input

A stakeholder workshop was held on March 4, 2022 to solicit feedback on preliminary findings for the system performance analysis (refer to meeting notes in Appendix C). The workshop included attendees from the Mat-Su Borough, the City of Wasilla, and DOT&PF. The agenda included a project and task overview, a presentation of system performance analyses to date, and a general discussion at the end of each performance topic presentation (i.e., safety, mobility, and pavement condition). Feedback from the stakeholders has been integrated throughout this memorandum.

4.0 Performance on the Parks Highway

The following describes how the Parks Highway currently performs in terms of safety, mobility, and pavement condition. The analysis focuses on performance for 2017 to 2019, the most recent three-year period before the onset of the COVID-19 pandemic, though other years are included in some analyses to show longer-term trends.

4.1 Safety

From 2013 to 2019, a total of 13 people were killed and 63 were seriously injured on the Parks Highway.[13] Fatalities varied from zero to four per year, while serious injuries were constant, except for 2015, where serious injuries were 57 percent higher than the seven-year average. No clear yearly trends were seen in the fatality or serious injury rates per vehicle miles traveled (VMT), with a seven-year fatality rate of 1.56 per 100 million VMT and a serious injury rate of 7.55 per 100 million VMT.

Locations of fatal and serious injury crashes from 2017 to 2019 are shown in Figure 1. In the most recently available three years (2017 to 2019), the following statistics were observed:

- Number of fatalities: 6
- Number of serious injuries: 24
- Rate of fatalities (per 100 million VMT): 1.67
- Rate of serious injuries (per 100 million VMT): 6.68
- Number of non-motorized fatalities and serious injuries: 1

Two-thirds of the fatalities and serious injuries were intersection-related. In addition, fatality and serious injury rates by segment corresponded with the percentage of crashes that were intersection-related (Table 1). Pittman Road to Hawk Lane had the highest rate and the highest intersection-related crash percentage, while Hyer Road to Broadview Avenue had the lowest rate and the lowest intersection-related crash percentage.

The 2013-2016 fatality and serious injury rate on Clapp Street to Pittman Road was 20 percent higher than in 2017-2019, potentially due to the reduction in head-on crashes following conversion to a divided highway. While seven fatalities and serious injuries occurred involving head-on collisions from 2013 to 2016, none occurred from 2017 to 2019 on this segment. Before converting the Hyer Road to Broadview Avenue segment to a divided freeway, the fatality and serious injury rate was 23.78 per 100 million VMT, similar to the rate on the Pittman Road to Hawk Lane segment. This demonstrates

[13] *Email Correspondence with Alaska Department of Transportation and Public Facilities staff.* October 11, 2021.

that while dividing a highway can improve safety, converting to a controlled-access divided facility may cause even higher improvements to safety.

Table 1. Crash Rates and Intersection-Related Crash Percentages by Segment, 2017-2019

Segment	Fatality and Serious Injury Rate (per 100 million VMT)	Intersection-Related Crash Percentage
Hyer Road to Broadview Avenue	0.00	0%
Broadview to Clapp Street	7.73	67%
Clapp Street to Pittman Road	5.67	50%
Pittman Road to Hawk Lane	22.63	75%

Figure 1. Fatal and Serious Injury Crashes, 2017 to 2019

4.2 Mobility

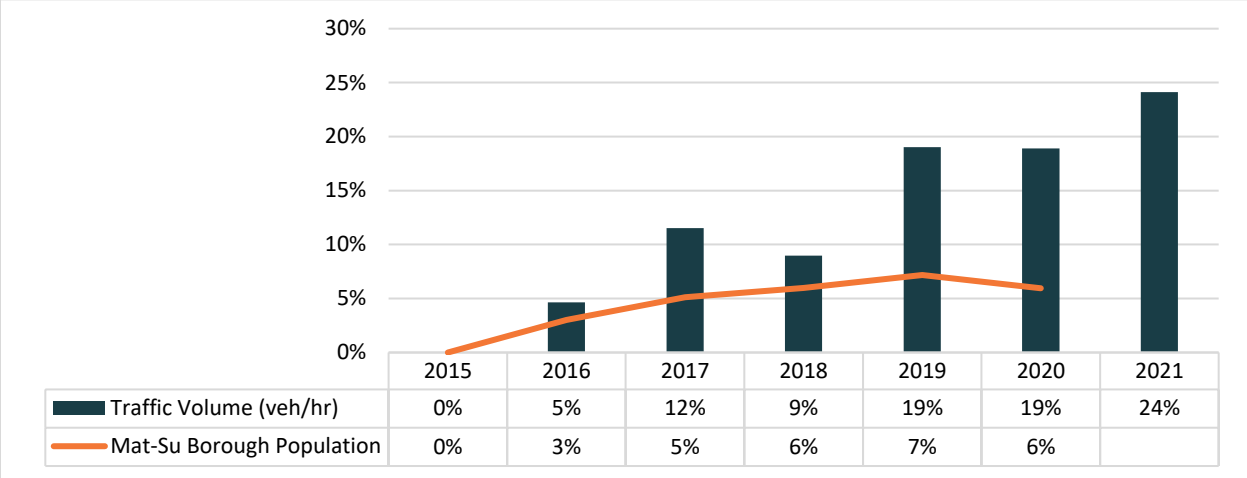
The mobility analysis evaluates trends in peak hour volume, vehicle speeds, and delay, as well as travel time reliability. Mobility captures how much extra time is lost due to congestion during daily commuting, how efficiently goods can be delivered to their destinations, and how much travel times vary from day to day during peak periods. Mobility has significant impacts on individuals' quality of life, freight movement logistics and resources, and retail sales for local businesses.

Volumes, Speed, and Delay

Traffic volumes have been growing significantly on the Parks Highway since 2015. At the Parks Highway and Church Rd intersection, the average weekday hourly traffic volume (vehicles/hour) from 3:00-6:00 PM (i.e., PM peak period) in May through June increased by 24 percent (Figure 2).[14] Traffic

[14] *Alaska Traffic Data.* Alaska Department of Transportation and Public Facilities. Accessed 2021. https://alaskatrafficdata.drakewell.com/publicmultinodemap.asp

volume growth exceeded the population growth for Mat-Su Borough in the same years, which averaged between one and two percent non-compounding growth per year.[15]



	2015	2016	2017	2018	2019	2020	2021
Traffic Volume (veh/hr)	0%	5%	12%	9%	19%	19%	24%
Mat-Su Borough Population	0%	3%	5%	6%	7%	6%	

Figure 2. Change in PM Peak Period Average Hourly Traffic Volume, Parks Highway at Church Road, and Mat-Su Borough Population by Year

Speed performance was analyzed using "big data" for trips on the Parks Highway between Seward Meridian Highway and Lucille Street. This entire segment has a posted speed limit of 45 mph. Data were obtained from a traffic data vendor that collects vehicle location data from in-vehicle global positioning system (GPS) navigation and location-based mobile phone applications on a three-to-five second interval (see "Parks Highway Alternative Corridor PEL Study Origin-Destination Study Report" for more details).

Figure 3 shows May 2021 vehicle speeds (left axis) and traffic volumes (right axis) by the hour of the day, for weekdays only. The data demonstrate an inverse relationship, where speeds significantly decrease as traffic volumes grow from 7:00 AM to 7:00 PM. Average speeds drop from 41 mph in the off-peak period (7:00 PM to 7:00 AM) to 31 mph in the PM peak period (3:00 to 6:00 PM). The percentage of speeds below 35 mph is 60 percent in the PM peak, compared to 33 percent in the off-peak. This peak period speed reduction causes a delay of four minutes for each trip in this segment, or a total of 12,200 vehicle-hours of delay in May 2021 alone. By dropping below a 40 mile per hour average speed, this segment operates at level-of-service (LOS) F for two-lane highways per the Highway Capacity Manual.[16]

In addition to volumes on the Parks Highway, high volumes on intersecting roadways, such as the Palmer-Wasilla Highway and Knik-Goose Bay Road, also contribute to low average speeds and long vehicle queues at intersections. From 2017 to 2019, average PM peak period volumes were 1,300

[15] *Annual Estimates of the Resident Population: April 1, 2010 to July 1, 2019.* United States Census Bureau. Accessed 2021. API URL: https://api.census.gov/data/2019/pep/population

2020 Decennial Census. United States Census Bureau. Accessed 2021. API URL: https://api.census.gov/data/2020/dec/pl

[16] *Highway Capacity Manual 6th Edition: A Guide for Multimodal Mobility Analysis.* Exhibit 15-3. Transportation Research Board of the National Academies. 2016. https://www.nap.edu/catalog/24798/highway-capacity-manual-6th-edition-a-guide-for-multimodal-mobility

vehicles per hour on Palmer-Wasilla Highway at Trunk Road and 1,400 vehicles per hour on Knik-Goose Bay Road at Clapp Street. With these significant cross-flows, signal retiming alone is unlikely to significantly improve operations.

While adding more lanes on the Parks Highway would likely result in less congestion and increase PM peak period average speeds, the proximity of the railroad, Lake Lucille, Wasilla Lake, and many businesses to the road alignment must be considered, as well as the cost of purchasing significant right-of-way. In addition, impacts on other considerations such as non-motorized travel and local businesses must be assessed.

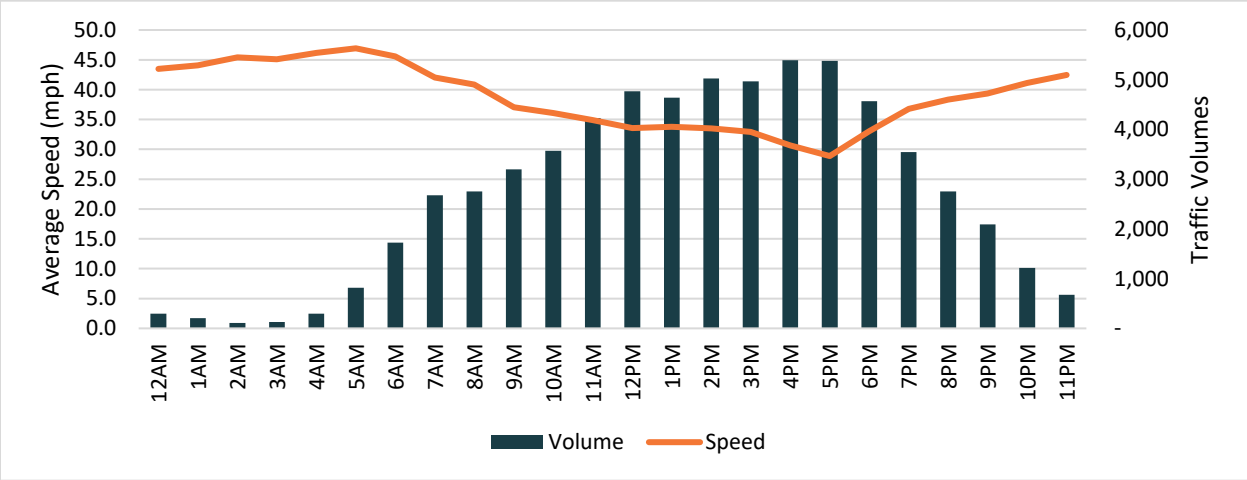


Figure 3. Average Speed and Traffic Volumes, Seward Meridian Highway and Lucille Street, May 2021

Travel Time Reliability

Travel time reliability refers to the day-to-day variability in travel times along a road segment within a given time period, rather than the absolute travel times. A road may have a low average travel time in the PM peak period across an entire year, but also many days and times with extremely long PM peak period travel times. Travel time reliability represents how much additional time drivers need to allocate to be confident they will arrive at destinations on time during peak period travel.

Travel time reliability is measured by the "Level of Travel Time Reliability" (LOTTR).[17] It is calculated by comparing long travel times to average travel times during the AM peak, midday peak, PM peak, and weekend time periods. If the LOTTR is less than 1.5 for all four periods, the segment is categorized as reliable. Commercial truck travel time reliability is measured according to the Truck Travel Time Reliability (TTTR) index.[18] There is currently no established threshold value for the TTTR in which to categorize a segment as "reliable." For both measures, lower indices represent higher reliability.

[17] LOTTR is calculated by dividing the 80th percentile travel time (i.e., the travel time that is higher than 80 percent of all travel times) by the 50th percentile travel time.

[18] TTTR is calculated by dividing the 95th percentile truck travel time by the 50th percentile truck travel time, for the same time periods as the LOTTR with an additional weekday overnight category.

The LOTTR and TTTR weighted by PMT (occupancy per vehicle equal to 1.7) from 2017 to 2019 for the Parks Highway are 1.25 and 2.22, respectively.[19] The percentage of PMT that are considered reliable was 90 percent. LOTTR by segment is shown in Figure 4.

Some residents have noted that freight drivers have been seen taking other routes besides the Parks Highway during peak periods to avoid congestion. Many of these routes are not designed for freight vehicles and increase the distance traveled during the trip compared to using the Parks Highway.

Figure 4. Travel Time Reliability by Segment, 2019

4.3 Pavement Condition

Per 23 Code of Federal Regulations (CFR) 490.313, pavement condition is evaluated using three variables including the international roughness index (IRI), rutting, and cracking. IRI is a measure of the comfort level experienced by the traveling public based on the pavement surface condition. Rutting is a measure of the longitudinal surface depressions in the pavement measured in inches. Cracking is defined as a separation or break in the continuous surface of the pavement section. 23 CFR 490.313 defines the thresholds for pavement conditions considered poor, fair, and good. From 2017 to 2019, 34 percent of the Parks Highway was in good condition, while two percent was considered poor.

The Parks Highway pavement condition may deteriorate faster than other National Highway System routes due to high intersection density and the frequent hard braking and acceleration events required when traffic signal phases change from green to red. In addition, idling at red lights increases the overall time freight trucks spend on the road thus increasing the load per trip on the pavement.

5.0 Non-motorized and Transit Travel Performance

An alternative corridor that is controlled access would not accommodate non-motorized facilities due to adjacent high vehicular speeds, unless the facilities were part of a frontage road system or a parallel separated pathway. However, changes in traffic volumes and average speeds on the Parks Highway resulting from traffic shifting to an alternative corridor may impact non-motorized travel and change the primary function of the Parks Highway, which may impact its desired design elements.

[19] *Data obtained via email correspondence with Alaska Department of Transportation and Public Facilities Staff.* November 12, 2021.

The City of Wasilla Comprehensive Plan transportation actions include "seek alternatives to expanding and widening the Parks Highway through Downtown to alleviate current and future traffic." It states desired future transportation conditions include "downtown has become pedestrian friendly."

The Wasilla Main Street Rehabilitation Project[20] currently being designed by DOT&PF will convert Main Street and Yenlo Street to a one-way couplet and improve pedestrian and bicyclist facilities, on-street parking, and landscaping enhancements. The Alaska Railroad Corporation (ARRC) is also working with the Mat-Su Borough to construct a transportation hub on the existing Parks Highway west of the Palmer-Wasilla Highway.[21] As part of the Wasilla Main Street Rehabilitation Project, ARRC is relocating their railroad stop from Knik-Goose Bay Road to the new transportation hub's location. The transportation hub is planned for sufficient parking spaces and connections to rail, bus, and shuttle amenities.

For transit travel, the performance targets identified would also apply to transit vehicles, including fatality and serious injury rate, average peak period speed, travel time reliability, and pavement condition. While there were no transit vehicle fatalities and serious injuries from 2017 to 2019, a lower crash rate facility decreases the likelihood of one occurring in the future. Transit routes run during peak period travel times, and, as such, higher average peak speeds and improved travel time reliability improve transit operations and transit user experience. Pavement condition impacts the year-to-year wear and tear on transit vehicles.

6.0 Performance Targets on Alternative Parks Highway Corridor

This section synthesizes findings from the transportation policy and plan review, analysis of the Parks Highway performance, and analysis of performance on comparison controlled-access facilities. It also provides context into national and statewide performance. With this synthesis, performance targets on an alternative corridor to the Parks Highway are proposed.

6.1 Controlled Access Facilities for Comparison

For comparison purposes, performance was analyzed on three controlled access facilities in Alaska with similar traffic volumes and levels of surrounding development to the Parks Highway (referred to as "comparison controlled access facilities" throughout). The three facilities are shown in Table 2 along with the facility length, length-weighted annual average daily traffic (AADT), and the range of AADT.

Table 2. Controlled Access Facilities for Comparison

Segment	Limits	Facility Length (mi)	Length-weighted 2019 AADT (vpd)	Range of AADT (vpd)
Glenn Highway (Eagle River)	Birchwood interchange (MP 20) to the Old Glenn	8.8	34,900	33,400 – 37,500

[20] *Wasilla Main Street Rehabilitation Project.* Alaska Department of Transportation and Public Facilities. Accessed 2022. http://wasillamainstreetproject.com/

[21] *Expanded Rail Opportunities.* Alaska Railroad Corporation. 2020. https://www.alaskarailroad.com/sites/default/files/Communications/2020_Expanded_Rail_PaxService_Opportunities.pdf

Segment	Limits	Facility Length (mi)	Length-weighted 2019 AADT (vpd)	Range of AADT (vpd)
	Highway interchange (MP 30)			
New Seward Highway (Anchorage)	Rabbit Creek Road exit (MP 118) to the Dimond Boulevard interchange (MP 122)	4.1	30,500	15,800 – 37,800
Minnesota Dr (Anchorage)	Old Seward Highway intersection (at O'Malley Road) to the Raspberry Road interchange	3.8	29,800	23,900 – 37,200

6.2 Safety

National and Alaska statewide statistics show controlled access freeways have lower fatality rates per vehicle miles traveled (VMT) compared to principal arterial facilities.[22] From 2017 to 2019, nationwide interstate fatality rates were 65 percent lower than principal arterial fatality rates, while in Alaska the comparison controlled access facilities had a 40 percent lower fatality rate than statewide principal arterials. The combined fatal and serious injury rate on the Parks Highway was two times the rate on the comparison controlled access facilities. Interstate and comparison controlled access facility rates include fatalities on ramps and at ramp terminal intersections.

Serious injury rates are not available by facility type nationally or statewide. However, nationally derived models in the Highway Safety Manual (HSM),[23] for a freeway segment with base crash modification factor conditions (e.g., 12-foot lanes, 10-foot outside shoulders, etc.), show that serious injury crashes are 2.5 times more frequent than fatal injury crashes.

Given the national and statewide lower crash rates associated with interstates and the lower fatal and serious injury rates shown on the comparison controlled access facilities, the performance target is recommended to be significantly lower than the existing fatal and serious injury rates on the Parks Highway (Table 3). The average rate on the comparison controlled access facilities is below the Parks Highway rate and below the upper threshold target in the Alaska LRTP. As such, a fatality rate of 1.00 per 100 million VMT is the safety performance target for an alternative corridor. As serious injury crash rates are 2.5 times higher than fatal crash rates in the HSM, the performance target for the serious injury rate is 2.50 per 100 million VMT.

This fatality safety performance target is below the statewide fatality rate of 1.30 fatalities per 100 million VMT in 2021 and the same as the national target of less than 1.00 fatalities per 100 million VMT set by the Federal Highway Administration. The safety performance on an alternative corridor should be less than the statewide average, because statewide and nationally controlled-access facilities are shown to be among the lowest fatality rate facility types.

[22] *FARS2019NationalCSV.zip.* National Highway Traffic Safety Administration. Accessed 2022. https://www.nhtsa.gov/file-downloads?p=nhtsa/downloads/FARS/2019/National/

[23] *Highway Safety Manual – 1st Edition.* American Association of State Highway Transportation Officials. 2010.

As the proposed alternative corridor will be controlled access, non-motorized users will likely be excluded from using it. However, crashes could occur at ramp termini intersections connecting to an alternative corridor, or at other locations where pedestrians could interact with the roadway (i.e., overpasses or underpasses). The 2017-2019 data show no non-motorized fatalities occurred at any ramp termini across the entire state. As such, the performance target for non-motorized fatalities and serious injuries is zero, including at the alternative corridor segments, ramps, and ramp termini intersections. This is well below the Alaska LRTP goal of fewer than 55 non-motorized fatalities and serious injuries (combined) statewide per year.

Table 3. Performance Targets for Alternative Corridor, Safety

Source	Fatality Rate (per 100 million VMT)	Serious Injury Rate (per 100 million VMT)	Non-motorized Fatalities and Serious Injuries (Combined)
Parks Highway	1.67	6.68	1
Comparison Controlled Access Facilities (Glenn Highway, Seward Highway, and Minnesota Drive)	1.03	2.93	1
National (interstates)	0.55	Not available	1,726
Alaska LRTP Goal	Less than 1.50	Less than 7.50	Less than 55 (statewide)
Performance Targets	**Less than 1.00**	**Less than 2.50**	**0**

5.3 Mobility

Mobility performance targets include average speed and travel time reliability.

Average Speed

Average speeds tend to be higher on freeways than on arterials due to higher design speeds, accommodated by wider lanes and shoulders, roadside design features, larger curve radii, and uninterrupted flow due to access control and lack of controlled stop conditions (signals or stop signs). Average speeds were predicted on an alternative Parks Highway corridor using Highway Capacity Manual[24] (HCM) methodologies for freeway operations. Assuming a speed limit of 65 mph, two lanes in each direction, 0.5 ramps per mile (one direction), and the same demand volumes as on the Parks Highway at Church Road in 2021, the HCM predicts an average speed of 61.6 mph on weekdays from 3-6 PM for May through June. The Highway Capacity Software report is shown in Appendix B.

The HCM predicted speed is approximately equal to the average PM peak speed on the comparison facility Minnesota Drive, though lower than speeds on the Glenn Highway and Seward Highway. To maintain an acceptable LOS of C or better, a peak period minimum of 50 miles per hour average speed must be maintained. In addition, the average daily freight vehicle speed in the 14 largest

[24] *Highway Capacity Manual 6th Edition: A Guide for Multimodal Mobility Analysis.* Transportation Research Board of the National Academies. https://www.nap.edu/catalog/24798/highway-capacity-manual-6th-edition-a-guide-for-multimodal-mobility

metropolitan areas was 55 miles per hour in 2019[25], which experience significantly higher congestion levels. As such, the performance target for PM peak period average speed is recommended to be 50.0 miles per hour, on an alternative corridor.

Travel Time Reliability

The Bureau of Transportation Statistics publishes data on travel time indices (i.e., free-flow travel times divided by peak period travel times) for the 100 largest cities in the US.[26] National data are not available for LOTTR or TTTR, though the Travel Time Index (TTI) is a similar measure. The TTI from 2017 to 2019 for Anchorage was 1.19, while the small city (fewer than 500,000 people) average was 1.14.

The LOTTR and TTTR on the Parks Highway were 14 percent and 80 percent higher, respectively, than the comparison controlled access facilities. While the comparison controlled access facility LOTTR and TTTR were both lower than the statewide average, this is to be expected, as many state routes are not controlled access facilities. The average LOTTR and TTTR of the comparison controlled access facilities is a reasonable target. A LOTTR of 1.10 and a TTTR of 1.30 are recommended for performance targets for an alternative corridor.

From 2017-2019, the average percent of PMT that were reliable on the Parks Highway was 90 percent, which was about the same for the statewide average. On all three comparison controlled access facilities, 100 percent of the PMT were reliable for each year. As such, the target percent of PMT that are reliable is 100 percent.

Performance Targets

Mobility performance targets and the synthesis of relevant data are shown in Table 4.

Table 4. Performance Targets for Alternative Corridor, Mobility

Source	Average PM Peak Period Speed (mph)	LOTTR Index	TTTR Index	Percent of PMT that are Reliable
Parks Highway	38.5	1.25	2.34	90%
Comparison Controlled Access Facilities (Glenn Highway, Seward Highway, and Minnesota Drive)	65.1	1.10	1.30	100%
National (HCS)	61.6	Not available	Not available	Not available
Alaska Statewide on State Routes (i.e., “AK-XX” roads)	Not available	1.23	1.82	91%
Alaska LRTP Goal	Not applicable	To be determined	To be determined	To be determined

[25] *Freight Transportation System Condition & Performance.* Bureau of Transportation Statistics. Accessed 2022. https://data.bts.gov/stories/s/Freight-Transportation-System-Condition-Performanc/vvk5-xjjp

[26] *Travel Time Index.* Bureau of Transportation Statistics. Accessed 2022. https://www.bts.gov/content/travel-time-index

Source	Average PM Peak Period Speed (mph)	LOTTR Index	TTTR Index	Percent of PMT that are Reliable
Performance Targets	**Greater than 50.0**	**Less than 1.10**	**Less than 1.30**	100%

5.4 Pavement Condition

A synthesis of the analysis of pavement condition performance is shown in Table 5, including national and Alaska statewide pavement condition statistics. The Parks Highway has a higher percentage of pavement in good condition than the comparison controlled access facilities but a similar percentage of pavement in poor condition. National data on pavement condition was only available for IRI, without considering cracking and rutting. The pavement condition performance targets for an alternative corridor are less than 10 percent of the corridor in poor condition, consistent with the LRTP goal, and more than 20 percent in good condition, consistent with the Alaska Transportation Asset Management Plan.

Table 5. Performance Targets for Alternative Corridor, Pavement Condition

Source	Pavement in Good Condition	Pavement in Poor Condition
Parks Highway	34%	2%
Comparison Controlled Access Facilities (Glenn Highway, Seward Highway, and Minnesota Drive)	26%	3%
National[27] (based on IRI only)	61%	10%
Alaska Statewide	Not available	Not available
Alaska LRTP Goal	Not available	Less than 10%
Performance Targets	**Greater than 20%**	**Less than 10%**

7.0 Summary and Next Steps

The System Performance Criteria memorandum recommends performance targets for safety, mobility, and pavement condition on an alternative Parks Highway corridor. The study consists of a review of performance goals in applicable transportation plans, stakeholder engagement involving a stakeholder workshop, analyses of performance on the Parks Highway, performance on comparison controlled-access facilities, and statewide and national performance metrics. The key findings of the analyses are shown in Figure 5. Table 6 shows the performance targets for an alternative corridor.

The findings of this analysis will be integrated into the Purpose and Need development and will support the development of alternative corridor screening and evaluation criteria.

[27] *National Highway System Pavement Condition. Bureau of Transportation Statistics. Accessed 2022. https://www.bts.gov/archive/publications/pocket_guide_to_transportation/2017/1_Infrastructure/table1_5_text*

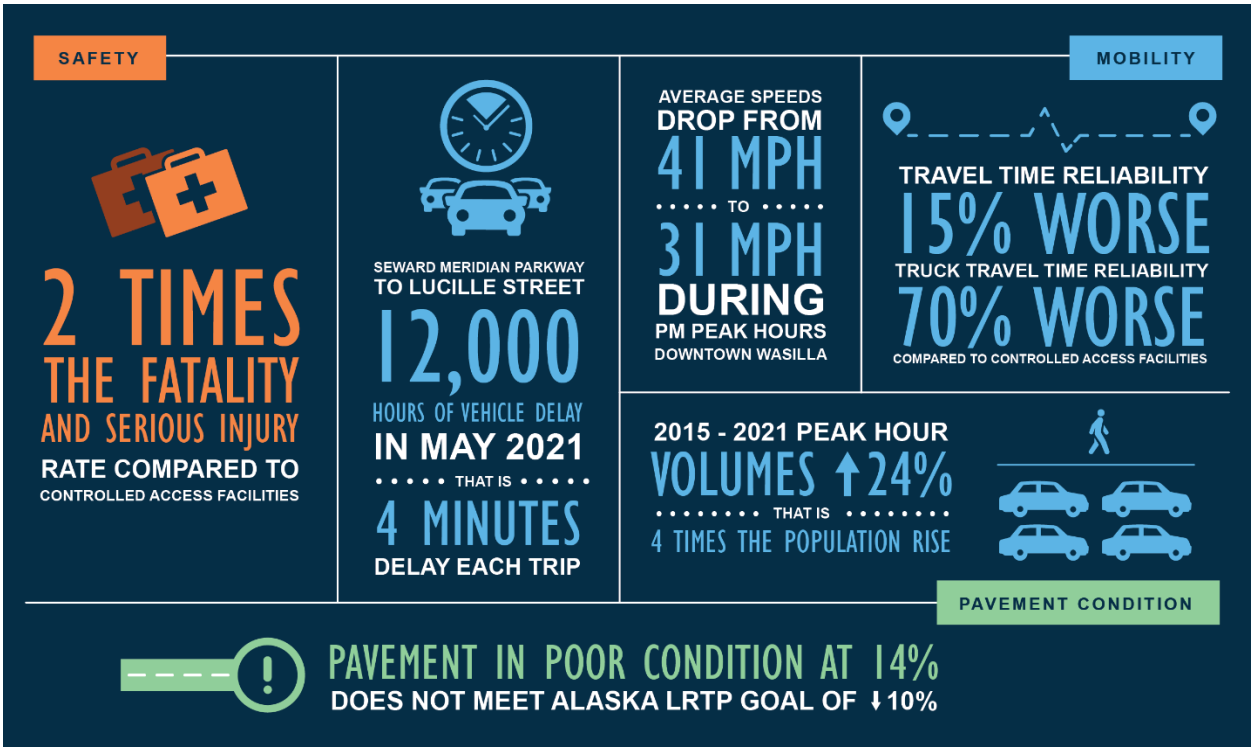


Figure 5. Key Performance Analysis Findings

Table 6. Performance Targets for Alternative Corridor

Performance Metric	Performance Target
Safety	
Rate of fatalities (per 100 million VMT)	Less than 1.00
Rate of serious injuries (per 100 million VMT)	Less than 2.50
Number of nonmotorized fatalities and serious injuries	0
Mobility	
Average PM peak period speed (mph)	Greater than 50.0
Level of travel time reliability index (LOTTR)	Less than 1.10
Truck travel time reliability index (TTTR)	Less than 1.30
Percent of person-miles traveled that are reliable	100%
Pavement Condition	
Pavement in good condition	Greater than 20%
Pavement in poor condition	Less than 10%

Appendix A

Table A-1. Alaska Statewide LRTP Performance Criteria

Map-21 National Goal Area and Metric	LRTP Policy Area	Metric Detail	Performance Target[28]
Safety: Number of fatalities	System Management and Operations; Safety and Security	**Number of fatalities.** Five-year rolling average of the total number of fatalities on all public roads in a calendar year.	Less than 75 annually
Safety: Fatality rate		**Fatality rate.** Five-year rolling average of the number of fatalities per 100 million (above) VMT for a calendar year.	1.5 per 100 million vehicle miles traveled
Safety: Number of serious injuries		**Number of serious injuries**. Five-year rolling average of number of serious injuries on all public roads in a calendar year.	Less than 375 annually
Safety: Rate of serious injuries		**Serious injury rate**. Five-year rolling average of number of serious injuries (above) per 100 million VMT for a calendar year.	7.5 per 100 million vehicle miles traveled
Safety: Non-motorized fatalities and serious injuries		**Number of non-motorized fatalities and serious injuries**. Five-year rolling average of the total number of fatalities and serious injuries among pedestrians and bicyclists in a calendar year.	Non-Motorized: 55 non-motorized fatalities and non-motorized serious injuries (combined) To be provided in updates to the SHSP, HSP, and HSIP.
Pavement Condition: Pavement condition on the National Highway System	System Preservation	**Non-interstate NHS pavement in good, fair, or poor condition**. Condition of pavement is determined to be a combination of IRI, cracking, and rutting.	Percentage of lane miles on non-interstate NHS in poor condition would not exceed 10% TBD in-state target setting to include percentage in good condition in addition to

[28] The LRTP states in Exhibit 10 that performance targets will change annually.

Map-21 National Goal Area and Metric	LRTP Policy Area	Metric Detail	Performance Target[28]
			percentage in poor condition.
Bridge Condition: Bridge conditions on NHS		**Percent of NHS bridges by deck area classified as good condition**. Condition is determined by a combination of IRI, cracking, and rutting.	% Good <40% good in 2016
		Percent of NHS bridges by deck area classified as poor condition. Condition is determined by a combination of the NBI rating for deck, superstructure, substructure, and culvert.	Less than 10% of all NHS bridges by deck area should be in poor condition. Less than 7% of all NHS bridges by deck area is structurally deficient; the 10-year average between 2005 and 2014 is 8.5%.
Congestion Reduction: Traffic congestion	New Facilities and Modernization; System Management and Operations	**Percentage of reliable person miles on interstate and non-interstate NHS.**	DOT&PF to coordinate with MPOs to set consistent methodology and determine targets
System Performance and Reliability: Performance of the NHS	New Facilities and Modernization; System Management and Operations	**Level of Travel Time Reliability (LOTTR).** Percent of the Interstate System and non-Interstate NHS providing for percentage of reliable person miles	DOT&PF to coordinate with MPOs. The measure is applicable to the interstate system and non-interstate NHS.
		Peak Hour Excessive Delay (PHED). Percent of the Interstate System and non-Interstate NHS where Peak Hour Travel Times meet expectations	From 2020 this measure will apply to urban centers with populations over 200,000.
Freight movement on the Interstate Highway: Planning Travel Time Index		**Truck Travel Time Reliability (TTTR)**. Percent of the Interstate	To be determined.
On-road vehicle emissions	Livability, Community, and the Environment	**Annual Tons of Emission Reductions by Project for each Applicable Criteria Pollutant and Precursor**. Daily kilograms of on-road, mobile source air	To be determined.

Map-21 National Goal Area and Metric	LRTP Policy Area	Metric Detail	Performance Target[28]
		pollutants (ozone, carbon monoxide, and particulate matter) reduced by the latest annual Congestion Mitigation and Air Quality Improvement Program projects over a 2-year and 4-year time frame (cumulative reductions).	

Table A-2. MSB LRTP Conceptual Performance Criteria

Goal	Conceptual Performance Measures
Goal 1: Improve transportation and land use connection	Number of mixed-use developments approved.
	Percentage of school children who ride buses
Goal 2: Provide transportation choices	Number of homes within 0.25-mile walking distance to regional attractors and generators
	Number of homes within 0.25 mile of transit corridor
	Designated park and ride capacity and use
	Number of transit boardings
Goal 3: Improve connectivity	Roadway connectivity score
	Sidewalk connectivity score
	Trail connectivity score
Goal 4: Improve mobility	Level of service on select roads
	Annual hours of delay
	Travel time on select roads
	Transit travel times on select routes
Goal 5: Make transportation safer	Number of fatalities
	Fatality rate
	Number of serious injury crashes
	Rate of serious injury crashes
	Accident rate
	Number of non-motorized fatalities and serious injuries
	Miles of roadway pavement in poor condition
	Number of deficient bridges

Goal	Conceptual Performance Measures
Goal 6: Support economic vitality	Freight volume on highways
	Number of at-grade rail crossings
	Total time for capital improvement project initiation to construction
	Direct/indirect dollars from aviation, freight, rail, port, etc.
Goal 7: Enhance environmental quality	Motor vehicle emissions (PM 2.5)
	Number of impeded fish passage culverts replaced
	Number of roadways within floodways and floodplains reduced
	Air quality attainment

Table A-3. Highway Safety Plan Core Performance Measures for FFY 2021

Program Area	NHTSA Measure	Core Performance Measures	Measured By
Overall AHSO Program Area Goals	C-1	Reduce fatalities	Number of traffic-related fatalities
	C-2	Reduce serious injuries	Number of traffic-related serious injuries
	C-3	Reduce fatality rate per 100 million Vehicle Miles Traveled (VMT)	Fatalities per 100 million VMT
Occupant Protection	C-4	Reduce unrestrained fatalities	Number of unrestrained fatalities
	B-1	Increase observed belt use	Observed belt use
Impaired Driving	C-5	Reduce fatalities at 0.08 Blood Alcohol Content (BAC) or above	Number of fatalities at 0.08 BAC or above
Speeding	C-6	Reduce speeding-related fatalities	Number of speeding-related fatalities
Motorcycle Safety	C-7	Reduce motorcyclist fatalities	Number of motorcyclist fatalities
	C-8	Reduce unhelmeted motorcyclist fatalities	Number of unhelmeted motorcyclist fatalities
Novice Drivers	C-9	Reduce drivers 20 or under involved in fatal crashes	Drivers 20 or under involved in fatal crashes
Pedestrian and Bicycle Safety	C-10	Reduce pedestrian fatalities	Number of pedestrian fatalities

Program Area	NHTSA Measure	Core Performance Measures	Measured By
	C-11	Reduce bicyclist fatalities	Number of bicyclist fatalities

Appendix B