

Interchange Access Justification Report

HSIP: Richardson Highway MP 351 Interchange Project

Project No. NFHWY00097/0A24034

Fairbanks North Star Borough, Alaska

Prepared For:
Alaska Department of Transportation
and Public Facilities
2301 Peger Road
Fairbanks, AK 99709

Prepared By:
Kittelson & Associates, Inc.
851 SW 6th Avenue, Suite 600
Portland, OR 97205
(503) 228-5230



Project Analyst: Bryan Graveline
Project Designer: Darren Hippenstiel, P.E.
Project Manager: Kelly Laustsen
Project Principal: Marc Butorac, P.T.O.E.

July 2018

STAKEHOLDER ACCEPTANCE

Interstate Access Change Request

HSIP: Richardson Highway MP 351 Interchange Project

This **Interstate Access Change Request**, prepared under my direct supervision, has been prepared in accordance with appropriate Federal Highway Administration and Alaska Department of Transportation and Public Facilities processes.

IACR Engineer of Record

By: Darren A. Hippenstiel

Associate Engineer Title

Date: June 29, 2018



DOT&PF Approval – Engineering Manager

By: [Signature]

Date: July 11, 2018

DOT&PF Concurrence – Preconstruction Engineer

By: [Signature]

Date: 7/13/2018, 2018

FHWA Approval – FHWA Northern Region Area Engineer

By: [Signature]

Date: 7-13-18, 2018

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SECTION 1 INTRODUCTION

INTRODUCTION

Highway 2 (Richardson Highway) runs east/west between Fairbanks and North Pole. It is a four-lane divided highway with a posted speed of 60 miles per hour and an Interstate functional classification. The three-leg intersection of Richardson Highway and Old Richardson Highway near milepost 351 is currently at grade with Old Richardson Highway stop-controlled. A map of the study area is shown in Figure 1 and existing lane configurations and traffic control devices at the study intersections are shown in Figure 2.

According to the Alaska Highway Safety Improvement Plan (HSIP), crash data at the Old Richardson Highway/Richardson Highway intersection includes 24 reported multi-vehicle crashes from 2008 to 2012, including 8 minor injury crashes and 1 fatal crash. Overall, the intersection has experienced a crash rate 2.5 times higher than the statewide average for similar intersections. Given the crash history experienced at this intersection, there is a need to modify/reconstruct the existing Old Richardson Highway/Richardson Highway access along with portions of the adjacent road network to provide safe and efficient access to and from Richardson Highway. Based on a detailed planning process, a partial or full interchange will be implemented at the location of the existing Old Richardson Highway/Richardson Highway intersection. In this context, a partially grade separated interchange refers to a grade-separated eastbound intersection and an at-grade westbound intersection.

INTERSTATE ACCESS CHANGE REQUEST REQUIREMENTS

To support the Old Richardson Highway/Richardson Highway modification/reconstruction process, this intersection has been included in the Alaska HSIP and this Interstate Access Change Request (IACR, also known as an Interchange Justification Report) has been prepared as required by the Federal Highway Administration (FHWA). The IACR documents the interchange planning process, development and evaluation of improvement alternatives, design of the preferred alternative, impacts to the Interstate system and local street network, and public involvement and coordination that supports and justifies the request for an access revision. As a component of the IACR process, a Methods and Assumptions document is required to record assumptions and criteria and support decisions used in the development of the IACR. The *HSIP: Richardson Highway MP 351 Interchange Project Methods and Assumptions Document* (provided in Appendix A) was approved in June 2017.

As documented in a memorandum from FHWA dated May 22, 2017, there is a new Policy on Access to the Interstate System (Reference 1). The new policy replaces the previous eight-point policy requirements that need to be addressed as part of an IACR with a two-point policy. The new policy is intended to "focus on the technical feasibility of any proposed change in access in support of FHWA's determination of safety, operational, and engineering acceptability" and eliminate duplication with other project reviews.

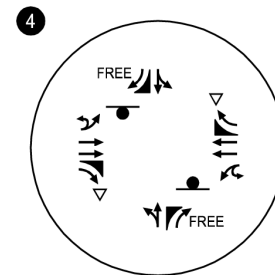
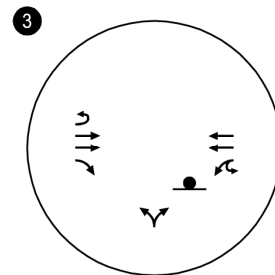
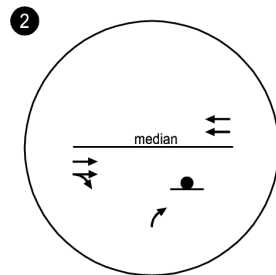
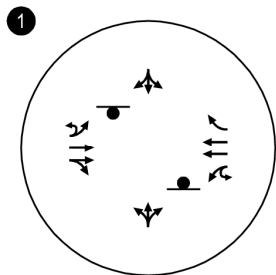





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- Study Intersections

Study Area
Fairbanks North Star Borough, Alaska

Figure
1



-  - STOP SIGN
-  - YIELD SIGN
-  - TRAFFIC SIGNAL

Existing Lane Configurations & Traffic Control Devices
Fairbanks North Star Borough, Alaska

Figure
2

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The two policy points include:

Policy Point 1 – Operational and Safety Analyses

- ▶ This policy point confirms that the proposed change in access does not have a significant adverse impact on the safety and operation of the Interstate facility at the study intersections and on the highway mainline.
- ▶ It will assess operations in the near and long-term considering the existing interchange design and preferred layout.
- ▶ It will include a conceptual plan of the type and location of proposed signage.
- ▶ All operational and safety analysis will be conducted per DOT&PF's standards and methodologies.

Policy Point 2 – Access and Connection

- ▶ The analysis will include documentation of how the interchange improvements meet or exceed DOT&PF's design standards. Any design deviations needed to support the preferred interchange design will be fully addressed in this section.
- ▶ In the event that a partially grade separated interchange is proposed, this policy point will describe whether future provision of a full interchange is precluded by the proposed design.

REPORT FORMAT

This report is organized into the following sections:

- ▶ **Existing and Future No-Build Conditions:** this section provides an overview of operations in the study area under existing conditions and in the future years 2020 and 2040 with the existing infrastructure. It also includes a review of the safety history at intersections within the study area and describes the existing corridor character.
- ▶ **Alternatives Analysis Summary:** this section describes the process used to identify and evaluate alternatives, leading to the preferred alternative described below.
- ▶ **Policy Point 1:** this section fulfills the requirements of an IACR related to Policy Point 1, Operational and Safety Analysis.
- ▶ **Policy Point 2:** this section fulfills the requirements of an IACR related to Policy Point 2, Access and Connection.
- ▶ **Findings:** this section provides a short summary of the IACR report.

PREFERRED ALTERNATIVE

Several conceptual alternatives were proposed to address the existing safety issue at the Old Richardson Highway/Richardson Highway intersection. Based on the supporting analysis

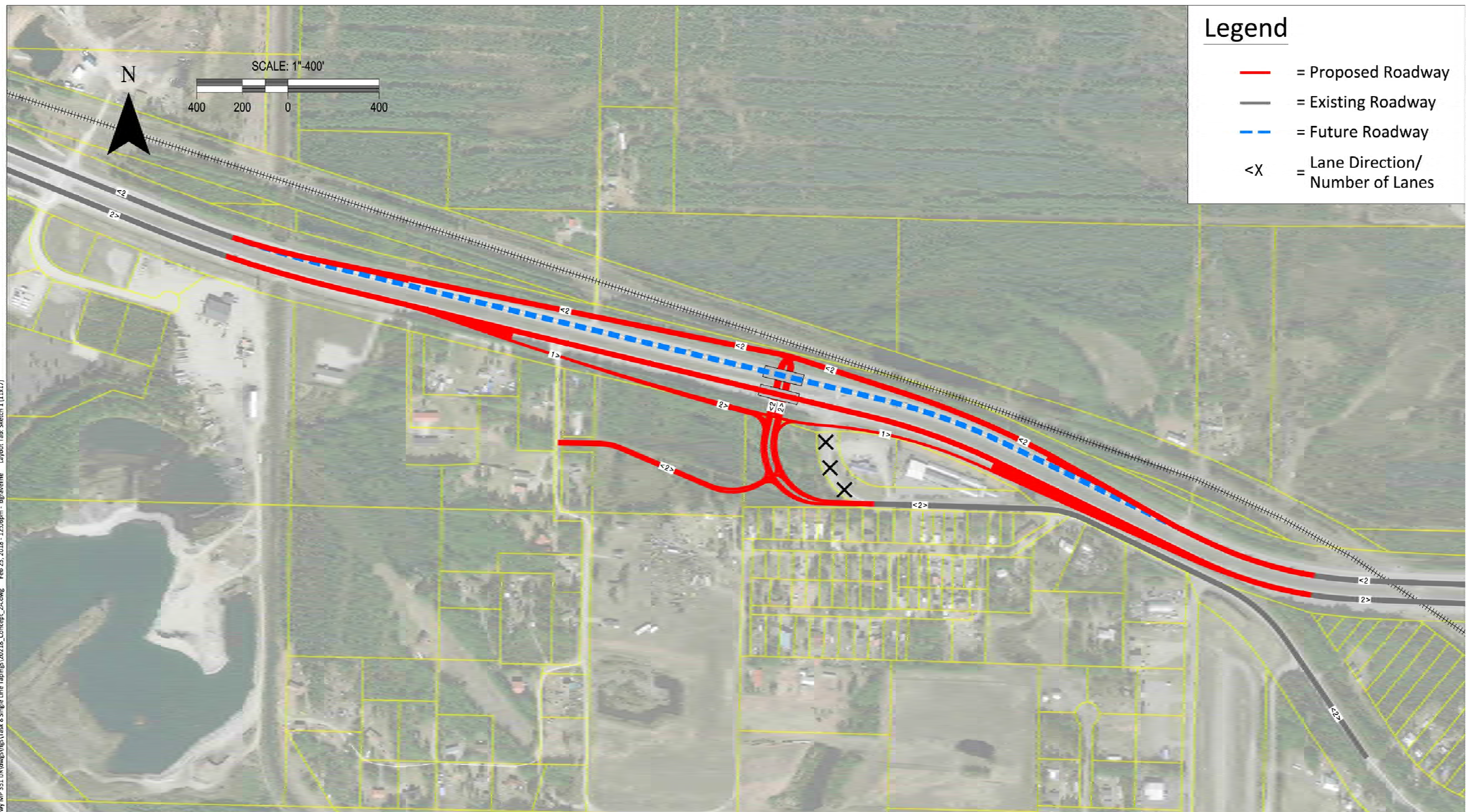
documents, public engagement activities, and the Value Analysis workshop conducted at DOT&PF Fairbanks offices from December 19th through 21st, 2017, Alternative 2A (shown in Figure 3) was recommended as the preferred alternative. The preferred alternative is a partially grade separated interchange at the location of the existing Old Richardson Highway/Richardson Highway intersection. The decision to construct a partially grade separated interchange is based on the available funding and the current and projected traffic and crash history.

The preferred alternative, as illustrated in Exhibit 1, elevates the eastbound mainline of Richardson Highway to eliminate its conflict with turning movements at Old Richardson Highway. The eastbound on- and off-ramps intersect Old Richardson Highway at a stop-controlled ramp terminal intersection. On the north side of the intersection, the westbound through movement along the mainline operates freely, while the northbound left-turn movement at the intersection is stop-controlled.

Exhibit 1. Alternative 2A Partially Grade Separated Interchange Option



View from the West



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Richardson Hwy MP 351 Interchange Project

Interchange at Old Richardson Highway/Richardson Highway (MP 351) Preferred Alternative Single Line Taping

Figure 3

In the future, a full interchange could be constructed if traffic volumes and future development warrant. The full interchange option, as illustrated in Exhibit 2, elevates both the eastbound and westbound mainlines of Richardson Highway. The eastbound and westbound on- and off-ramps would intersect Old Richardson Highway at stop-controlled ramp terminal intersections on the south and north sides of the interchange, respectively.

The lane configurations for both scenarios are illustrated in the "Operational Analysis" subsection. In both scenarios, the Keeney Road access to Richardson Highway would be closed to accommodate the eastbound off-ramp. Note that this conceptual design is subject to change based upon final information regarding the adjacent railroad right-of-way.

Exhibit 2. Alternative 2A Full Interchange Option



View from the West



SECTION 2

**EXISTING AND FUTURE NO
BUILD CONDITIONS**

EXISTING AND FUTURE NO BUILD CONDITIONS

As summarized below, the study area is currently experiencing and is expected to continue to experience unsatisfactory outcomes regarding operations, safety performance, and corridor character. Specifically, minor street left-turns at Richardson Highway experience long wait times and conditions are expected to degrade with traffic growth through year 2040. The Old Richardson Highway/Richardson Highway intersection currently has a crash rate 2.5 times that of comparable intersections. The Richardson Highway corridor features many at-grade intersections, which is inconsistent with the vision for a grade-separated corridor and current Interstate functional classification. This section provides an operational analysis, review of crash history, and discussion of corridor character based on existing and future no build conditions

EXISTING AND FUTURE NO BUILD CONDITIONS OPERATIONAL ANALYSIS

An operational analysis was conducted of the study intersections and Richardson Highway under existing conditions and future year 2020 and year 2040 conditions with the existing infrastructure. As demonstrated in the sections below, the northbound approaches at the two-way stop-controlled intersections of Old Richardson Highway/Richardson Highway and Peridot Street-Finell Drive/Richardson Highway operate with delays that do not meet standards during the weekday AM and/or PM peak hour under existing conditions. Delays increase in year 2020 and year 2040 with projected growth on Richardson Highway and the north/south study roadways. The Richardson Highway mainline operates at a LOS "B" or better currently and is expected to continue to operate at a LOS "B" or better under future conditions. Further details on the operational analysis are provided below.

PERFORMANCE STANDARDS AND METHODOLOGY

The preferred level-of-service (LOS) for intersections, the mainline, and merge/diverge locations is LOS "C" although LOS "D" may be acceptable. This standard originates from the Alaska Preconstruction Manual (Reference 2) which refers to the 2011 American Association of State Highway and Transportation Officials (AASHTO) publication *A Policy on Geometric Design of Highways and Streets* (Reference 3). This publication states that "conditions may make the use of level-of-service D appropriate for freeways and arterials; however, this level should be used sparingly, and at least level-of-service C should be sought."

The operational analyses were prepared following *Highway Capacity Manual 2000* (Reference 4) analysis procedures using Synchro 9 and Highway Capacity Software (HCS) 7 traffic analysis software. Results at the intersections of Old Richardson Highway/Richardson Highway and Peridot Street-Finell Drive/Richardson Highway are conservative and overstate delay at the intersections, as the existing acceleration lanes were not taken into account in the Synchro 9 models. Performance measures reported include LOS and volume-to-capacity ratio (v/c).

EXISTING CONDITIONS OPERATIONAL ANALYSIS

Operations were assessed for the study intersections and mainline segment of Richardson Highway under existing conditions. The intersections within the study area are stop-controlled for the minor north/south approaches. Vehicles traveling on the Richardson Highway through the two-way stop-controlled intersection are not controlled and, therefore, experience no delay to their movements. For this reason, the vehicular analysis procedure was developed to report the amount of delay for the critical movement, which is frequently a left-turn or through movement from the side street.

Intersection Operational Analysis

DOT&PF provided weekday AM and PM peak hour turning movement counts at each of the study intersections from July and September 2016 (see *Appendix B*). Per DOT&PF direction, no seasonal factors were applied to these counts and the counts were balanced between intersections. Operations of the study intersections under existing conditions were assessed using the previously described methodology and were compared to the DOT&PF operating standard. Figure 4 and Figure 5 provide a summary of the existing operations during the weekday AM and PM peak hour, respectively.

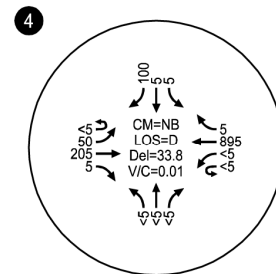
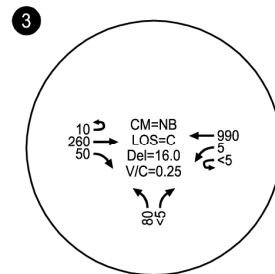
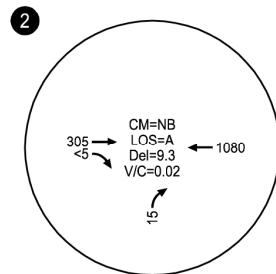
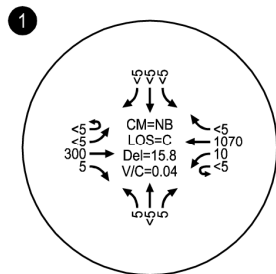
As shown in the figures, the critical movements at the intersections of Frontage Road/Richardson Highway and Keeney Road/Richardson Highway operate at LOS "C" or better during both the weekday AM and PM peak hour. The northbound approach at Old Richardson Highway/Richardson Highway operates at LOS "D" during the weekday PM peak hour with a v/c ratio of 0.34. The northbound approach at Peridot Street-Finell Drive/Richardson Highway operates at LOS "D" during the weekday AM peak hour with a v/c ratio of 0.01 and operates at LOS "F" during the weekday PM peak hour with a v/c ratio of 0.31. While these minor street approach through and left-turn movements operate at a delay in excess of the DOT&PF's LOS "C" standard, they are under capacity. The major street turning and through movements and the minor street right turns operate at LOS "B" or better. *Appendix C* includes the existing conditions intersection operations analysis worksheets.

Mainline Operational Analysis

Existing level-of-service was analyzed along the Richardson Highway mainline using Highway Capacity Software (HCS) 7 traffic analysis software. As shown in Table 1, the mainline operates at LOS B or better during existing conditions during the weekday AM and PM peak hours. The HCS analysis output sheets showing mainline operations are provided in *Appendix D*.

Table 1. Mainline Level-of-Service

Scenario	Eastbound		Westbound	
	Weekday AM Peak	Weekday PM Peak	Weekday AM Peak	Weekday PM Peak
Existing	A	A	B	A

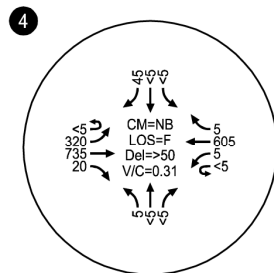
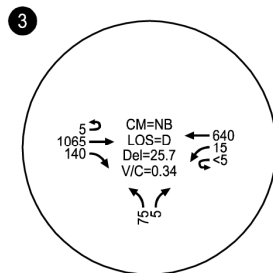
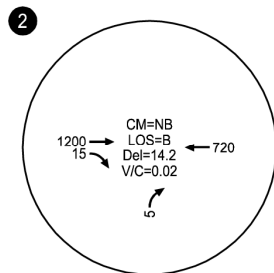
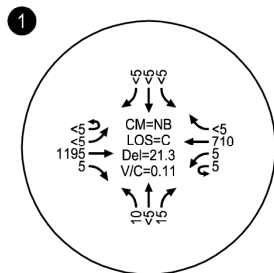


CM = CRITICAL MOVEMENT
 LOS = CRITICAL MOVEMENT LEVEL OF SERVICE
 Del = CRITICAL MOVEMENT CONTROL DELAY
 V/C = CRITICAL VOLUME-TO-CAPACITY RATIO

Existing Traffic Conditions
 Weekday AM Peak Hour
 Fairbanks North Star Borough, Alaska

Figure
 4

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 LOS = CRITICAL MOVEMENT LEVEL OF SERVICE
 Del = CRITICAL MOVEMENT CONTROL DELAY
 V/C = CRITICAL VOLUME-TO-CAPACITY RATIO

Existing Traffic Conditions
 Weekday PM Peak Hour
 Fairbanks North Star Borough, Alaska

Figure
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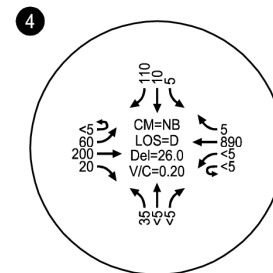
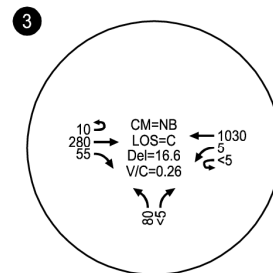
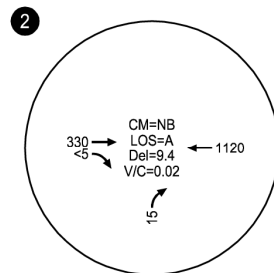
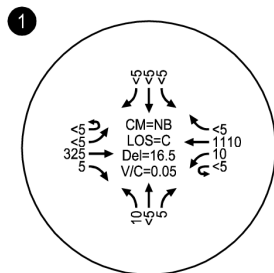
FUTURE NO BUILD OPERATIONAL ANALYSIS

As part of the operational analysis, volumes were projected for years 2020 and 2040 under a no build scenario, assuming the existing roadway infrastructure and intersection configurations. The Fairbanks Metropolitan Area Transportation System (FMATS) travel demand model includes link volumes for Richardson Highway, Old Richardson Highway, Peridot Street, and Finell Drive. The land use assumptions in the FMATS model project growth as high as 500% for some Transportation Analysis Zones along Richardson Highway in the study area due to the limited existing land use density. A map is provided in *Appendix E* illustrating the base and future land use assumptions within the study area.

Future intersection turning movement counts were generated using National Cooperative Highway Research Program (NCHRP) 765 (Reference 5), which provides a methodology for generating future intersection volumes with existing turning movement counts, base year model volumes, and future year model volumes. The future turning movement volumes reflect an annual growth rate of approximately one percent on Richardson Highway. The FMATS model does not include volumes for Frontage Road or Keeney Road. Therefore, future intersection counts were generated by assuming an annual growth rate of 2% on the Frontage Road and Keeney Road minor approaches and matching the volumes on the Richardson Highway mainline with the intersections to the east. Further details on the future volume development process, including future link volumes and growth within the study area, can be found in *Appendix F*.

Future No Build Intersection Operational Analysis

Figure 6 and Figure 7 provide a summary of study intersections operations under the year 2020 no build scenario during the weekday AM and PM peak hour, respectively. As shown in the figures, the critical movements at the intersection of Frontage Road/Richardson Highway and Keeney Road/Richardson Highway operate at LOS "C" or better during both the weekday AM and PM peak hour. The northbound approach at Old Richardson Highway/Richardson Highway operates at LOS "D" in the PM peak hour with a v/c ratio of 0.37. The northbound approach at Peridot Street-Finell Drive/Richardson Highway operates at LOS "D" during the weekday AM peak hour with a v/c ratio of 0.20 and operates at LOS "F" during the weekday PM peak hour with a v/c ratio exceeding 1.0.

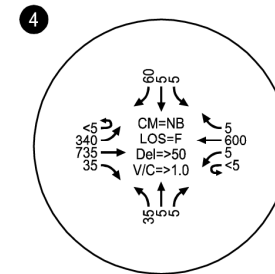
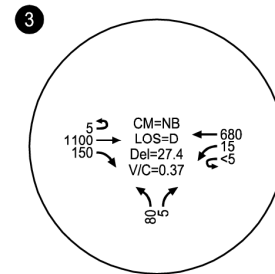
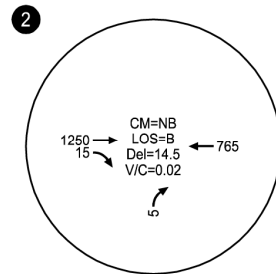
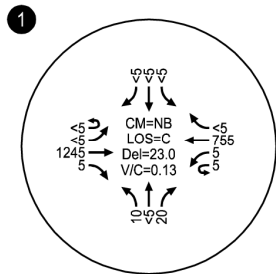


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 LOS = CRITICAL MOVEMENT LEVEL OF SERVICE
 Del = CRITICAL MOVEMENT CONTROL DELAY
 V/C = CRITICAL VOLUME-TO-CAPACITY RATIO

2020 No Build Traffic Conditions
 Weekday AM Peak Hour
 Fairbanks North Star Borough, Alaska

Figure
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 LOS = CRITICAL MOVEMENT LEVEL OF SERVICE
 Del = CRITICAL MOVEMENT CONTROL DELAY
 V/C = CRITICAL VOLUME-TO-CAPACITY RATIO

2020 No Build Traffic Conditions
 Weekday PM Peak Hour
 Fairbanks North Star Borough, Alaska

Figure
 7

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The major street turning and through movements operate at LOS "B" or better. *Appendix G* includes the year 2020 no build scenario intersection operations analysis worksheets.

Figure 8 and Figure 9 provide a summary of study intersections operations under the 2040 no build scenario during the weekday AM and PM peak hour, respectively. As shown in the figures, the intersection of Keeney Road/Richardson Highway operates at LOS "C" or better during both the weekday AM and PM peak hours. The northbound approach at Frontage Road/Richardson Highway operates at LOS "D" in the weekday PM peak hour with a v/c ratio of 0.25. The northbound approach at Old Richardson Highway/Richardson Highway operates at LOS "E" in the weekday PM peak hour with a v/c ratio of 0.53. The southbound approach of Peridot Street-Finell Drive/Richardson Highway operates at a LOS "D" in the weekday AM peak hour with a v/c ratio of 0.35 and at a LOS "F" in the weekday PM peak hour with a v/c ratio that exceeds 1.0. The northbound approach of Peridot Street-Finell Drive/Richardson Highway operates at LOS "F" in both the weekday AM and PM peak hour with a v/c ratio exceeding 1.0 in both scenarios.

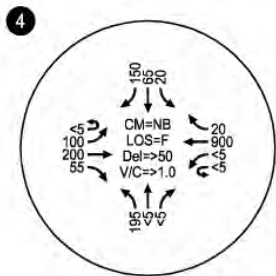
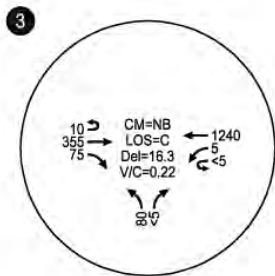
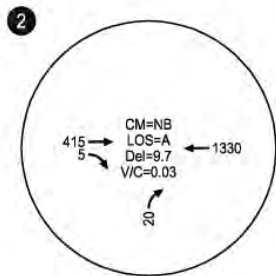
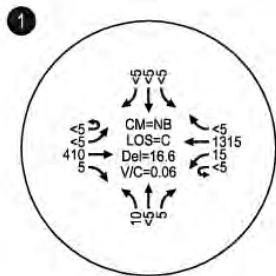
The major street turning and through movements operate at LOS "B" or better. *Appendix G* includes the 2040 no build scenario intersection operations analysis worksheets.

Future No Build Mainline Operations Analysis

Future 2020 and 2040 no build operations were analyzed along the Richardson Highway. As shown in Table 2, the mainline operates at LOS B or better during the weekday AM and PM peak hours. The HCS analysis output sheets showing mainline operations for the year 2020 and year 2040 no build scenarios are provided in *Appendix H*.

Table 2. Mainline Level-of-Service

Scenario	Eastbound		Westbound	
	Weekday AM Peak	Weekday PM Peak	Weekday AM Peak	Weekday PM Peak
Year 2020 No Build	A	A	B	A
Year 2040 No Build	A	B	B	A

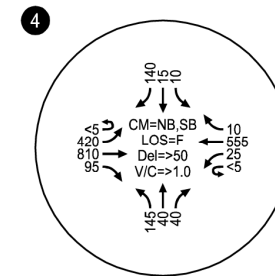
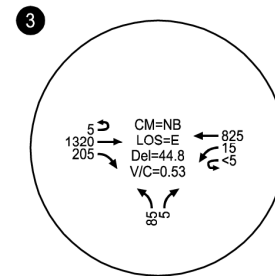
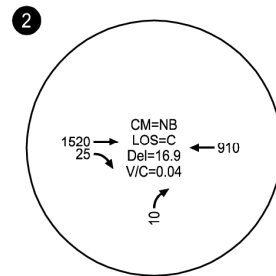
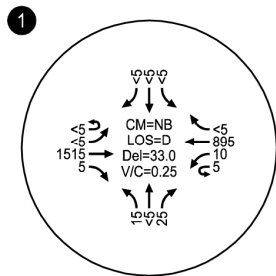


CM = CRITICAL MOVEMENT
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2040 No Build Traffic Conditions
 Weekday AM Peak Hour
 Fairbanks North Star Borough, Alaska

Figure 8

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CM = CRITICAL MOVEMENT
 LOS = CRITICAL MOVEMENT LEVEL OF SERVICE
 Del = CRITICAL MOVEMENT CONTROL DELAY
 V/C = CRITICAL VOLUME-TO-CAPACITY RATIO

2040 No Build Traffic Conditions
 Weekday PM Peak Hour
 Fairbanks North Star Borough, Alaska

Figure
 9

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EXISTING CONDITIONS SAFETY ANALYSIS

This section summarizes the existing crash history of the study corridor and gives an assessment of sight distance at the Old Richardson Highway/Richardson Highway intersection. As described below, 44 crashes occurred at the Old Richardson Highway/Richardson Highway intersection over the 5-year study period, including 14 injury crashes and one fatal crash.

EXISTING CRASH HISTORY

The crash histories at the study intersections were reviewed to identify potential safety issues. DOT&PF provided available crash records for the five-year period from January 1, 2010 through December 31, 2014. Table 3 summarizes the crash data. Appendix I includes the crash data sheets.

Table 3. Study Intersections Crash Summary (January 1, 2010 – December 31, 2014)

Intersection	Total Crashes	Crash Type					Crash Severity		
		Angle	Rear End	Side-swipe	Single Vehicle	Head On	PDO ¹	Injury	Fatal
Frontage Road/Richardson Highway	1	0	0	0	1	0	1	0	0
Keeney Road/Richardson Highway	1	0	1	0	0	0	1	0	0
Old Richardson Highway/Richardson Highway	44	16	9	5	12	2	29	14	1
Peridot Street-Finell Drive/Richardson Highway	9	2	2	1	4	0	9	0	0

¹PDO = Property Damage Only

The crash history for each intersection is described below.

Frontage Road/Richardson Highway and Keeney Road/Richardson Highway Crash Histories

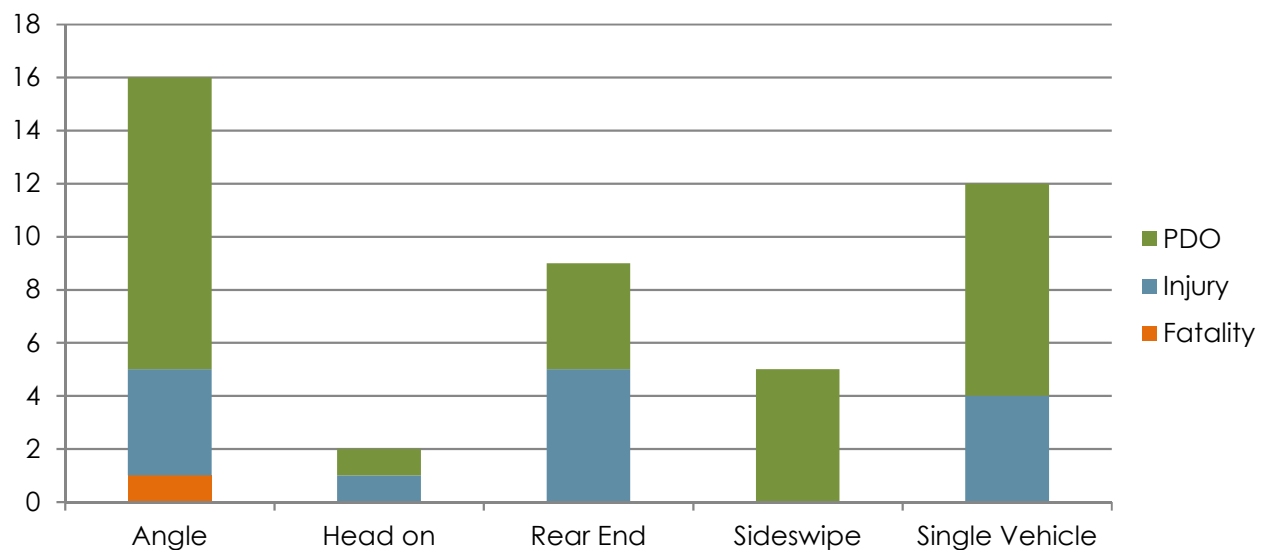
The two property damage only crashes that were reported in the vicinity of the Frontage Road/Richardson Highway and Keeney Road/Richardson Highway intersections were not intersection related, as determined by an analysis of available crash data.

Old Richardson Highway/Richardson Highway Crash History

A total of 44 crashes were reported in the vicinity of the Old Richardson Highway/Richardson Highway intersection. Of these 44 crashes, 30 crashes were intersection related. Five crashes occurred within a one-hour period in November 2010, with the later four crashes related at least in part to maneuvers made to avoid the first crash. Similarly, two crashes occurred within a two-hour period in January 2013, with the second related at least in part to the first. Figure 10 provides a crash diagram illustrating the approximate locations of the reported crashes, as well as crash type, severity, presence of snow/ice conditions, and night-time crashes. This data was reviewed to identify trends related to severity, crash type, weather, and lighting as further discussed below.

The most frequent crash types at the Old Richardson Highway/Richardson Highway intersection include angle crashes and single vehicle crashes. Of the 44 reported crashes, there were 14 injury crashes and one fatal crash. Exhibit 3 shows the crash severities by crash type.

Exhibit 3. Severity by Crash Type at Old Richardson Highway/Richardson Highway Intersection



As shown in Table 3 and Figure 10, six of the angle crashes involved a northbound left-turning vehicle and eastbound through vehicle. One of these crashes was a fatal crash and four involved injuries. Five of these crashes occurred in daylight conditions, and only one of these crashes occurred during snow/ice/sleet conditions. The twelve single vehicle crashes reported include fixed object crashes, run off the road crashes, and animal crashes. Based on the crash reports, four of the crashes at this intersection involved a heavy vehicle. These crashes included a rear end, sideswipe, and two angle crashes (one involving two eastbound vehicles and one involving an eastbound right-turning vehicle and northbound vehicle).

Most of the single vehicle crashes and many of the other types of crashes occurred during snow, ice, or sleet conditions. Of the 44 crashes at this intersection, 30 occurred during snow, ice, or sleet conditions. Exhibit 4 displays the crash types by roadway conditions. Twenty-five (25) of the 44 crashes occurred during the winter months between November and February.

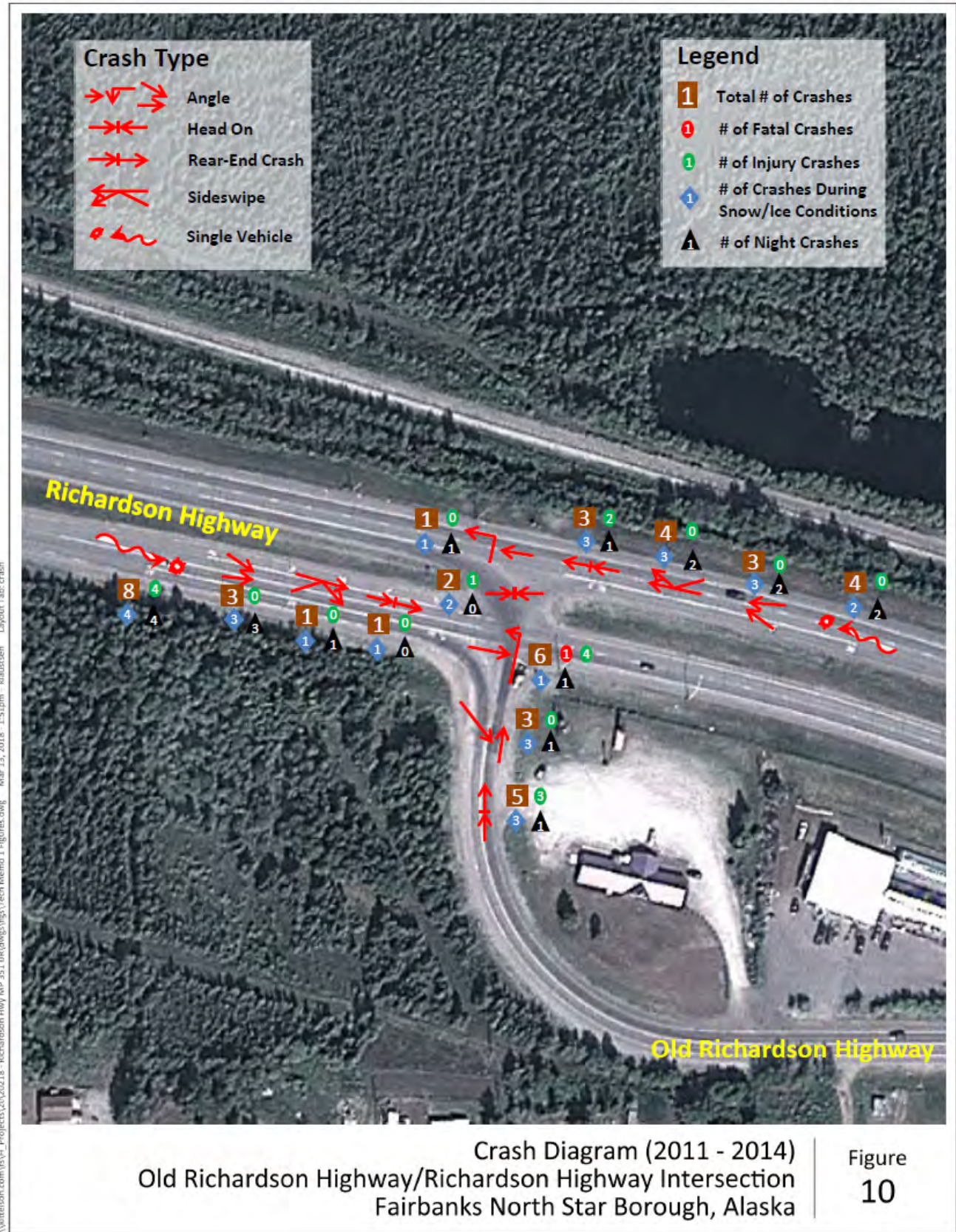
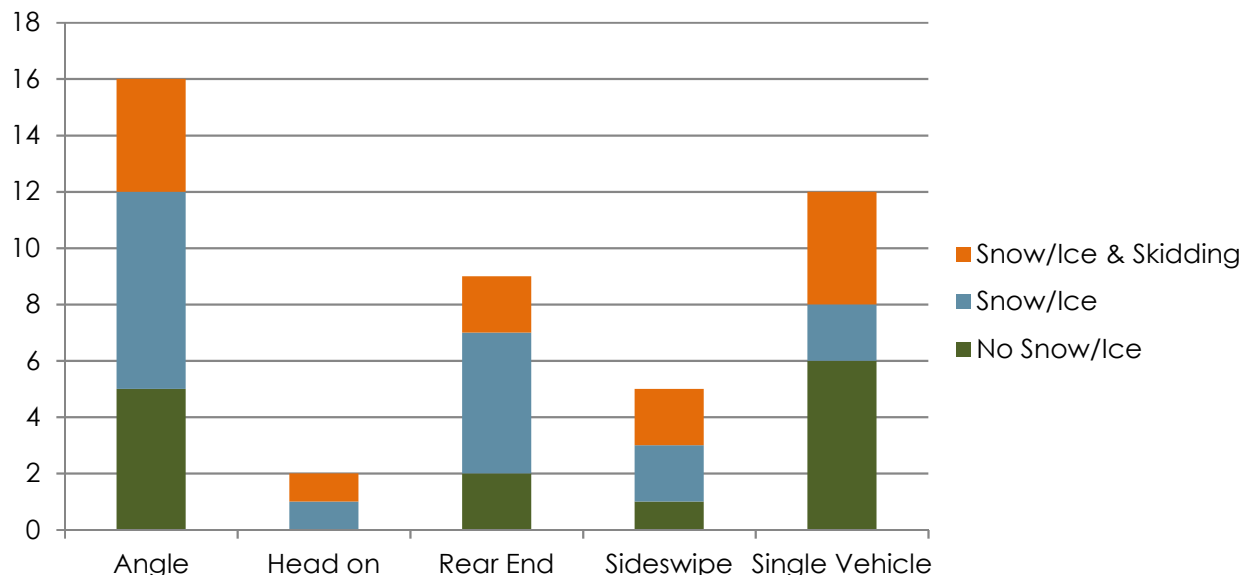
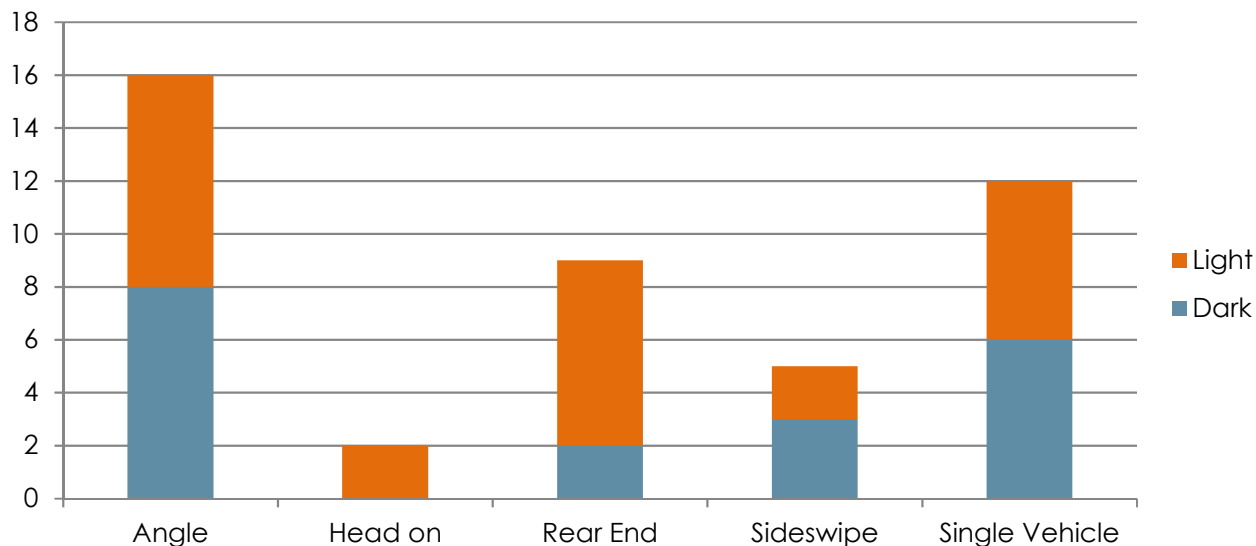


Exhibit 4. Crash Type by Roadway Conditions at Old Richardson Highway/Richardson Highway Intersection



The crash data was also reviewed for trends related to lighting. Exhibit 5 illustrates the crash type by lighting conditions. Nineteen (19) of the 44 crashes occurred in dark conditions. Street illumination is provided by two light poles each on the southeast and northwest sides of the intersection.

Exhibit 5. Lighting Conditions by Crash Type at Old Richardson Highway/Richardson Highway Intersection



Peridot Street-Finell Drive/Richardson Highway Crash History

Of the nine crashes that were reported in the vicinity of the Peridot Street-Finell Drive/Richardson Highway intersection between 2010 and 2014, two were intersection related. These two crashes both occurred when northbound vehicles on Finell Drive were crossing Richardson Highway to Peridot Street and were struck by westbound vehicles on Richardson Highway. The non-intersection

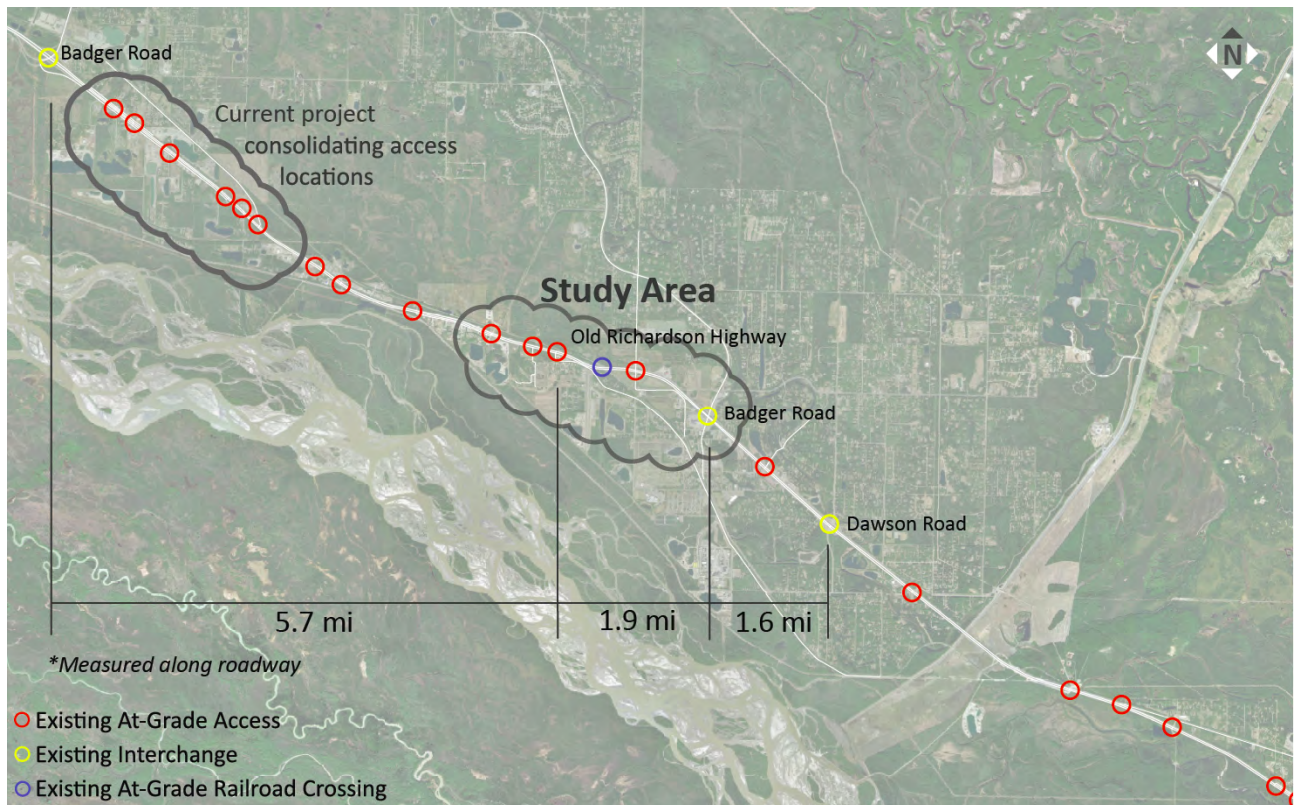
related crashes included four single vehicle crashes, two rear-end crashes, and one sideswipe crash. All nine of the reported crashes involved property damage only.

INTERSECTION SIGHT DISTANCE

Required intersection sight distance for a multilane divided highway intersection with a design speed of 70-mph (60-mph posted) and a median greater than 50 feet is 980 feet for passenger cars and 1,270 feet for single-unit trucks. Calculations for intersection sight distance were prepared per the 2011 AASHTO publication *A Policy on Geometric Design of Highways and Streets* (Reference 3). Observations at the project site for each of the study intersections found actual sight distance available in each case was greater than 1,270 feet. Additionally, acceleration and deceleration lanes are provided, allowing left turning vehicles to gain speed before merging into westbound through lanes.

EXISTING CORRIDOR CHARACTER

Exhibit 7 provides additional context for the project and study area by illustrating the existing at-grade intersections and interchanges locations along Richardson Highway. To improve operations and safety outcomes, the long-term vision for the Richardson Highway corridor calls for fully grade separated interchanges and access consolidation. The long-range policy to develop a freeway along Richardson Highway was established by resolution of the Fairbanks Metropolitan Area Transportation System (FMATS) Policy Committee in 1984 and evaluated in the 1988 *Ester to Eielson Freeway Reconnaissance* report (Reference 7). To achieve the long-term vision, the corridor should not have interchanges spaced closer than 1-mile within urban areas per the AASHTO guidelines in *A Policy on Geometric Design of Highways and Street* (Reference 3).

Exhibit 6. Corridor Context

As shown in Exhibit 7, there are currently many at-grade intersections along the Richardson Highway, including the Old Richardson Highway/Richardson Highway intersection. The long-term vision for the corridor calls for a closure of all at-grade intersections and for access to be replaced by interchanges spaced at least 1 mile apart along the corridor.



SECTION 3

ALTERNATIVES ANALYSIS

ALTERNATIVE ANALYSIS SUMMARY

As shown in the previous section, the study area is currently experiencing and is expected to continue to experience unsatisfactory outcomes regarding operations, safety performance, and corridor character. Through the IACR process, a variety of infrastructure improvements were developed and evaluated to achieve satisfactory outcomes in these areas.

This section provides an overview of the alternative development, analysis, and selection of the preferred alternative.

ALTERNATIVE DEVELOPMENT AND ANALYSIS

The key objective of the project is to address the existing crash history at the intersection of Old Richardson Highway/Richardson Highway. Other considerations that guided the alternatives development include:

- 1) Support the vision of Richardson Highway as an interstate facility with grade-separated interchanges,
- 2) Consider the potential to provide a full interchange in the study area in the future with access north and south of the highway, and
- 3) Consider future access and interchange spacing on Richardson Highway within the study area.

The project team worked with a Technical Advisory Committee (TAC) throughout the project to provide feedback. The project team initially developed five concepts for the study area. Next, a high-level screening and fatal flaw analysis was conducted with the project team and the remaining concepts were presented at TAC meeting #2 on August 31st, 2017. The TAC was asked to provide input on each concept and suggest whether it should move forward for further consideration. The concepts supported by the TAC members for further review were then presented to the public during an open house September 27th, 2017. Each of the concepts presented to the public were further reviewed and a more thorough evaluation was conducted based on the criteria selected by the TAC members and listed below. At the first TAC meeting on May 10th, 2017, the relative importance of each criterion was rated by all TAC members on a scale of 1 to 5, with 5 being the most important. The criteria were weighted according to the average importance assigned by the TAC members.

► **Safety (Average Rating: 4.9)**

The primary purpose of this project is to enhance safety performance at the intersection of Richardson Highway and Old Richardson Highway. The intersection has a crash rate 2.5 times higher than the statewide average for similar intersections, based on the HSIP application. Alternatives will be assessed based on the anticipated impact of the design based on the crash history.

▶ **Transportation Operations (4.6)**

The transportation operations criterion refers to the level of performance at the study intersections and along the corridor. Measures of effectiveness for this criterion include LOS and volume to capacity ratio. The interchange alternatives will accommodate current and anticipated future traffic volumes.

▶ **Accessibility and Connectivity (3.9)**

This criterion considers access spacing requirements, local roadway connectivity, access to currently developed properties, and future access for undeveloped properties in the vicinity.

▶ **Constructability (3.8)**

This criterion addresses the ability to construct the improvements in phases and local impacts during construction. It also considers the feasibility and anticipated construction timeline.

▶ **Maintenance (3.8)**

This evaluation addresses the operational and life cycle costs. Alternatives that require less effort and cost to maintain, as well as alternatives with longer anticipated lifetimes, will be given the highest ratings.

▶ **Land Use (3.4)**

Land use considers right-of-way impacts, consistency with adopted land use and economic development plans, impacts to utilities, and impacts to existing businesses/developments. Impacts to the railroad are included in this criterion.

▶ **Multimodal Accessibility (3.1)**

While the corridor currently has low pedestrian and bicycle usage, this criterion refers to the accessibility as well as the quality of facilities for pedestrians and bicyclists. It also includes any impacts to existing pedestrian or bicycle facilities of cross streets.

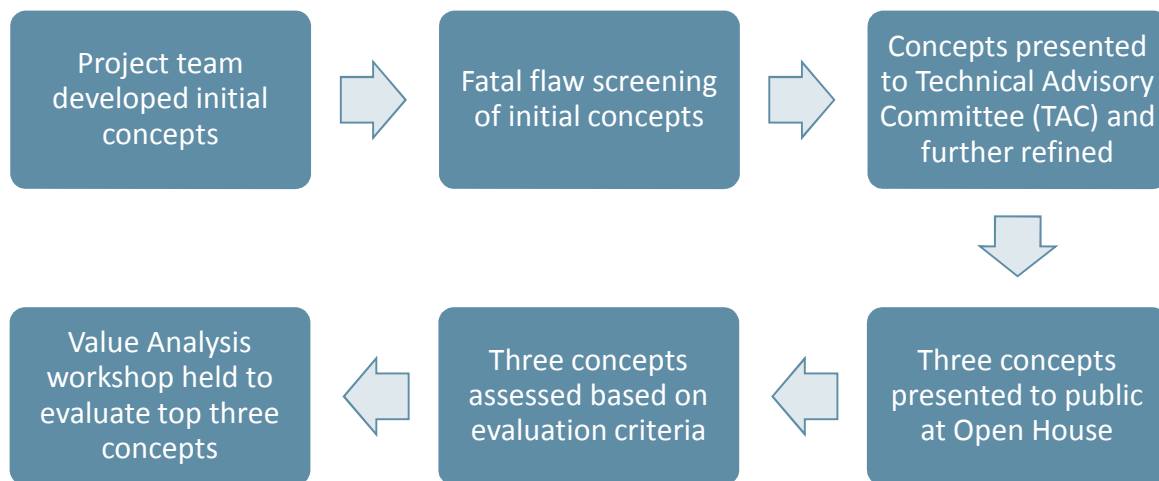
▶ **Environmental Impact (2.9)**

The environmental criterion refers to the impacts a given alternative will have on the local environment. Alternatives that have small environmental footprints will be given the highest ratings in this category.

▶ **Cost (2.4)**

This criterion reflects the expected relative cost between the alternatives. The applicability of funding sources will also be considered.

The evaluation process described above is summarized in Exhibit 8.

Exhibit 7. Alternative Development and Evaluation Process**FINAL CONCEPTS**

As shown in Exhibit 8, three concepts were identified by the TAC for further evaluation and presented to the public. These concepts are described below with figures representing each concept provided in *Appendix J*.

- ▶ **Alternative 1 – Median Closure at Old Richardson Highway/Richardson Highway Intersection:** The Old Richardson Highway/Richardson Highway intersection is restricted to right-in/right-out movements through a median closure. This concept is low cost and addresses the safety concern associated with northbound left-turn movements. It also does not preclude future infrastructure improvements. In the near-term, it causes out of direction travel and limits access for uses along Old Richardson Highway.
- ▶ **Alternative 2A – Interchange at Old Richardson Highway/Richardson Highway (MP 351) (HSIP Project Nomination):** The eastbound mainline of Richardson Highway is elevated to eliminate its conflict with Old Richardson Highway. An at grade intersection remains between the westbound mainline of Richardson Highway and Old Richardson Highway. A full interchange could be developed in the future if traffic volumes, development and crash history warrant, as shown in the figure with dashed lines. This concept would require right-of-way acquisition to complete a frontage road system. Additionally, the Keeney Road access to Richardson Highway would be closed to accommodate the eastbound off-ramp.
- ▶ **Alternative 2B – Interchange at Old Richardson Highway/Richardson Highway (MP 351) (Shifted Southwest):** As with Concept 2A, the eastbound mainline of Richardson Highway is elevated to eliminate its conflict with Old Richardson Highway while the westbound mainline remains at grade. The concept is shifted south to provide greater separation from the existing railroad. This concept would require right-of-way acquisition to the south of the existing Richardson Highway right-of-way, including the existing 12 Mile Road House

and Hawk's Greenhouse, as well as additional right-of-way to complete the frontage road system. Additionally, the Keeney Road access to Richardson Highway would be closed to accommodate the eastbound off-ramp.

- ▶ **Alternative 3A – Full Interchange at Frontage Road/Richardson Highway (MP 351.75) (Mainline Moves North):** A full interchange is implemented at the existing at grade intersection of Richardson Highway and Frontage Road. The Richardson Highway mainline is moved north and median width is decreased to keep all ramps within the existing available right-of-way. The existing Old Richardson Highway access to Richardson Highway is closed and a frontage road connection between Old Richardson Highway and the new interchange is created. The frontage road connection to the west may require right-of-way acquisition.
- ▶ **Alternative 3B – Full Interchange at Frontage Road/Richardson Highway (MP 351.75) (Frontage Moves South):** As with Concept 3B, a full interchange is implemented at the existing at grade intersection of Richardson Highway and Frontage Road. The interchange is shifted south to maintain the current alignment of Richardson Highway and create more space between the interchange and railroad. The frontage road connecting Old Richardson Highway and the new interchange is diverted south because of lack of right-of-way along the Richardson Highway mainline. The frontage road would require right-of-way acquisition.

The assessment of the remaining concepts with the evaluation criteria did not reveal a clear preferred option, with trade-offs recognized with each of the concepts. Table 4 illustrates the evaluation criteria assessment. Therefore, a three-day Value Analysis workshop was held to more thoroughly evaluate the options. *Technical Memorandum #2: Concept Development and Initial Evaluation* and *Technical Memorandum #2B: Alternative Operations, Staging, Right-of-Way Considerations and Cost Estimates* (included in Appendix J) provide additional details on the alternatives process.

Table 4. Evaluation Criteria Assessment

Concept	Primary Advantages	Primary Constraints	Safety	Transportation Operations	Accessibility and Connectivity	Constructability	Maintenance	Land Use	Multimodal Accessibility	Environmental Impacts	Cost	Weighted Total ¹
Concept 1 – Median Closure at Old Richardson Highway/ Richardson Highway Intersection	<ul style="list-style-type: none"> Immediately Implementable Low Cost No Right-of-Way Impacts 	<ul style="list-style-type: none"> Causes out-of-direction travel Restricts Access Does not move towards corridor goal of grade separation 	+1	-2	-2	+2	+2	0	0	+1	+2	+2.2
Concept 2A – Interchange at Old Richardson Highway/ Richardson Highway (HSIP Nomination)	<ul style="list-style-type: none"> Funding through HSIP process for partially grade separated interchange likely Addresses primary safety concern with northbound left-turn 	<ul style="list-style-type: none"> At grade intersection remains if full interchange is not pursued 	+1 (partial)/ +2 (full)	+1 (partial)/ +2 (full)	0	+1	0	0	0	0	+1 (partial)/ -1 (full)	+3.1 (partial)/ +4.1 (full)
Concept 2B – Interchange at Old Richardson Highway/ Richardson Highway (Shifted West)	<ul style="list-style-type: none"> Funding through HSIP process may be possible for partially grade separated interchange Grade separation addresses safety, operations, and corridor vision 	<ul style="list-style-type: none"> At grade intersection remains if full interchange is not pursued Right-of-way impacts 	+1 (partial)/ +2 (full)	+1 (partial)/ +2 (full)	+1	+1	-2	-2	0	0	+1 (partial)/ -1 (full)	+1.0 (partial)/ +2.0 (full)
Concept 3A – Full Interchange at Frontage Road/Richardson Highway (MP 351.75) (Mainline Moves North)	<ul style="list-style-type: none"> Creates more even spacing between existing and future planned interchanges Grade separation addresses safety, operations, and corridor vision 	<ul style="list-style-type: none"> Right-of-way impacts Alternative funding mechanisms necessary 	+2	+2	+2	-1	-1	-1	0	0	-1	+2.7
Concept 3B – Full Interchange at Frontage Road/Richardson Highway (MP 351.75) (Frontage Moves South)	<ul style="list-style-type: none"> Creates more even spacing between existing and future planned interchanges Grade separation addresses safety, operations, and corridor vision 	<ul style="list-style-type: none"> Right-of-way impacts Alternative funding mechanisms necessary 	+2	+2	+2	-2	-1	-1	0	0	-1	+1.9

¹ Weighted total calculated by multiplying category weights (as detailed above) by category scores. Scores divided by 5 (maximum score of category weights).

VALUE ANALYSIS WORKSHOP

A Value Analysis workshop was conducted at DOT&PF Fairbanks offices from December 19th through 21st, 2017. The intention of a Value Analysis is to assess value improvements based on an analysis of function and costs. It intends to simplify, clarify, and unify decision making. Key principles of Value Analysis decision making include:

- ▶ Decisions must be based on the **importance** of advantages
- ▶ Decisions must be anchored to the **relevant facts**
- ▶ A **disadvantage** of one alternative is an **advantage** of another

At this workshop, Alternative 2A was determined to be the most advantageous option and was recommended to be moved forward for further analysis. The preferred alternative calls for either a partial or full interchange to be implemented at the location of the existing Old Richardson Highway/Richardson Highway intersection.

The full report from the workshop is provided in *Appendix K*.



SECTION 4 POLICY POINT 1

POLICY POINT 1 – OPERATIONAL AND SAFETY ANALYSIS

Policy Point 1 confirms that the proposed change in access does not have a significant adverse impact on the operation and safety of the Interstate facility at the study intersections or mainline. It requires a near- and long-term study of both the existing conditions and the preferred alternative in accordance with DOT&PF's methodology. As shown in this section, the preferred alternative results in improved operations and safety both in the near- and long-term. A conceptual signage plan is also provided, as required by Policy Point 1.

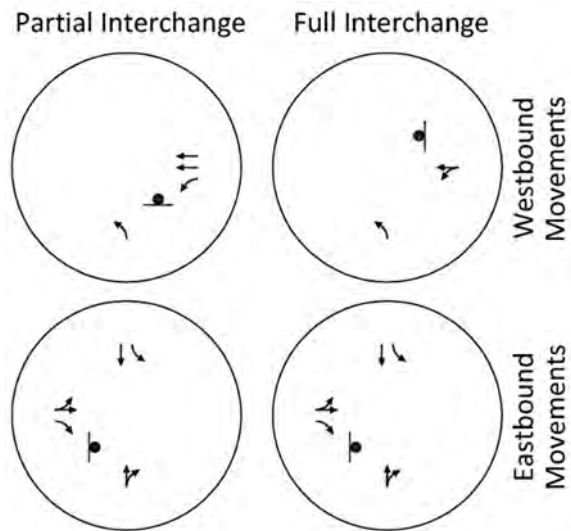
FUTURE BUILD CONDITIONS OPERATIONAL ANALYSIS

In the future, delay for the northbound approaches at Old Richardson Highway/Richardson Highway and at Peridot Street-Finell Drive/Richardson Highway is expected to increase, with delays in excess of DOT&PF standards. With implementation of a partial or full interchange at the Old Richardson Highway/Richardson Highway intersection, however, operations improve to provide a LOS "C" or better for all movements at the Old Richardson Highway/Richardson Highway intersection. Improvements at the Peridot Street-Finell Drive/Richardson Highway intersection will be considered separately from this project.

Operations were assessed at the study intersections and highway mainline for the preferred alternative under year 2020 and year 2040 conditions. Because the preferred alternative includes a partially grade separated interchange or full interchange, merge/diverge operations were also assessed.

FUTURE BUILD CONDITIONS INTERSECTION OPERATIONAL ANALYSIS

The intersections associated with the changes at Old Richardson Highway/Richardson Highway were analyzed to assess the impact of the preferred alternative. The assumed lane configurations are shown in Exhibit 8.

Exhibit 8. Preferred Alternative Lane Configurations at Old Richardson Highway/Richardson Highway

As seen in Exhibit 8, with the partially grade separated interchange scenario, the northbound left-turn onto Richardson Highway is stop-controlled and is required to merge with westbound traffic on the Richardson Highway mainline. Operations under both scenarios are shown in Table 5 and Table 6. Synchro output sheets showing year 2020 and 2040 build intersection operations are provided in *Appendix L*.

Table 5. Intersection Operations Analysis – Partially Grade Separated Interchange

Location	Scenario	Weekday AM Peak			Weekday PM Peak		
		Critical Movement	Delay (LOS)	v/c	Critical Movement	Delay (LOS)	v/c
Old Richardson Highway/ WB Richardson Highway	2020 Build	NBL	15.4 (C)	0.22	NBL	12.4 (B)	0.15
	2040 Build	NBL	18.0 (C)	0.26	NBL	13.6 (B)	0.19
Richardson Highway Eastbound Ramp Terminal	2020 Build	EBT/R	9.1 (A)	0.01	EBR	9.1 (A)	0.17
	2040 Build	EBT/R	9.2 (A)	0.01	EBR	9.4 (A)	0.24

Table 6. Intersection Operations Analysis – Full Interchange

Location	Scenario	Weekday AM Peak			Weekday PM Peak		
		Critical Movement	Delay (LOS)	v/c	Critical Movement	Delay (LOS)	v/c
Richardson Highway Westbound Ramp Terminal	2020 Build	WBL/T	10.0 (A)	0.01	WBL/T	9.9 (A)	0.02
	2040 Build	WBL/T	10.0 (A)	0.01	WBL/T	10.0 (A)	0.02
Richardson Highway Eastbound Ramp Terminal	2020 Build	EBL/T	9.1 (A)	0.01	EBR	9.1 (A)	0.17
	2040 Build	EBL/T	9.2 (A)	0.01	EBR	9.4 (A)	0.24

As shown in the tables, all intersections operate at LOS C or better during the weekday AM and PM peak hours under the 2020 and 2040 scenarios for both the partially grade separated interchange and full interchange options. Operations improve for northbound left-turning vehicles under the full interchange option as compared to the partially grade separated interchange option given the grade-separation with the Richardson Highway mainline.

FUTURE BUILD CONDITIONS MAINLINE OPERATIONAL ANALYSIS

Future build operations were analyzed along the Richardson Highway mainline. As shown in Table 7, the mainline¹ operates at LOS B or better during future 2020 and 2040 conditions during the weekday AM and PM peak hours. The HCS analysis output sheets showing mainline operations are provided in Appendix M.

¹ Operations are shown for volumes along the segment immediately west of the Old Richardson Highway/Richardson Highway intersection.

Table 7. Mainline Level-of-Service

Scenario	Eastbound		Westbound	
	Weekday AM Peak	Weekday PM Peak	Weekday AM Peak	Weekday PM Peak
Year 2020 Build	A	A	B	A
Year 2040 Build	A	B	B	A

FUTURE BUILD CONDITIONS MERGE/DIVERGE OPERATIONAL ANALYSIS

Interchange merge/diverge areas were also analyzed for the future build conditions. As set forth in the *Methods and Assumptions Memorandum*, the operational standard required is LOS C or better. Table 8 provides a summary of the merge/diverge operations.

Table 8. Merge/Diverge Operations at Old Richardson Highway/Richardson Highway

Merge/Diverge Location	Year 2020 Build		Year 2040 Build	
	Weekday AM Peak	Weekday PM Peak	Weekday AM Peak	Weekday PM Peak
EB On-Ramp (Merge)	A	B	A	B
EB Off-Ramp (Diverge)	A	B	A	B
WB On-Ramp (Merge) (Full Interchange Scenario Only)	B	A	B	A
WB Off-Ramp (Diverge) (Full Interchange Scenario Only)	B	A	B	A

As shown in Table 8, all merge/diverge locations at the Old Richardson Highway /Richardson Highway intersection/interchange are projected to operate acceptably. Note that the eastbound ramps analysis is applicable to both the partial and full interchange scenario, while the westbound ramps would only exist under a full interchange. The HCS analysis output sheets showing merge/diverge operations are provided in *Appendix N*.

FUTURE BUILD CONDITIONS SAFETY PERFORMANCE ASSESSMENT

A study of crash histories and the preferred alternative shows that the proposed change in access does not have a significant adverse impact on the safety of the Interstate facility. It concludes that implementing a partial or full interchange at the proposed location is expected to reduce the number of crashes at the Old Richardson Highway/Richardson Highway intersection and at other locations along the highway mainline.

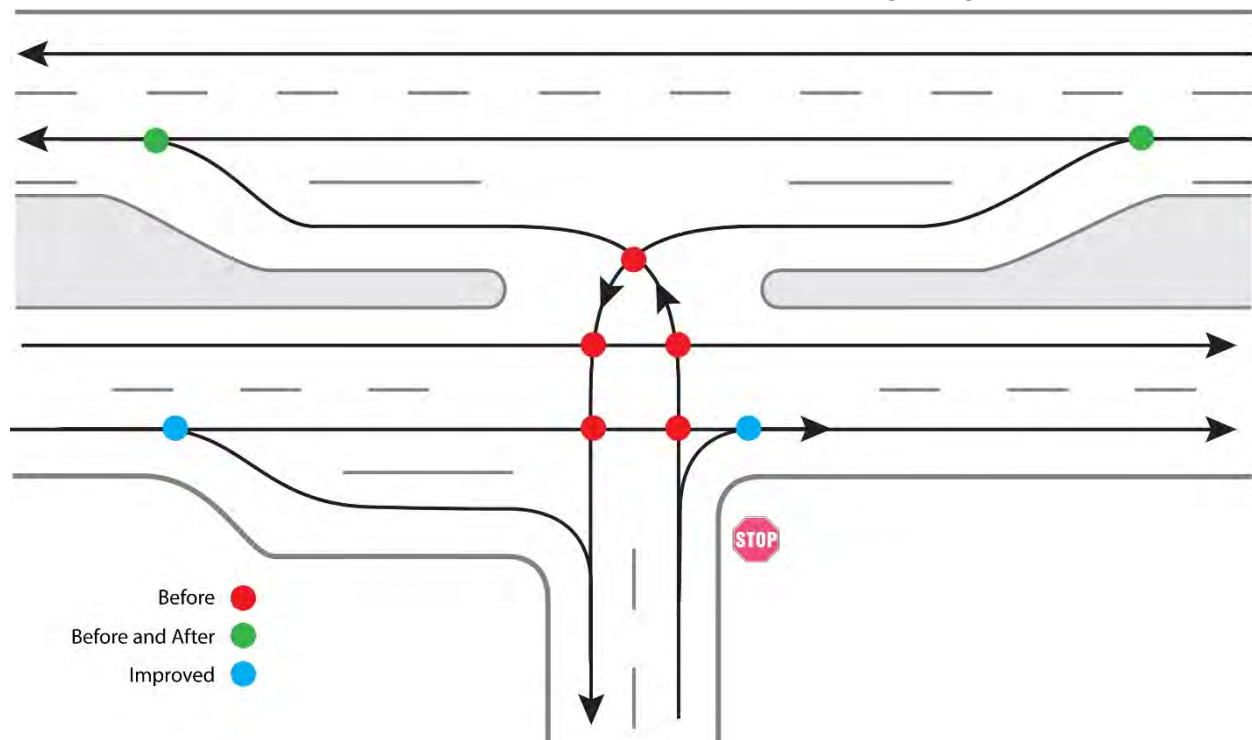
The *Highway Safety Manual* (Reference 6) cites studies showing that at-grade intersections that are converted to interchanges typically see a reduction in total crashes between 42% and 57%. Based

on this finding, converting the Old Richardson Highway/Richardson Highway from an at-grade intersection to an interchange should reduce the number of crashes at this intersection.

This is evident by not only the national research presented in the *Highway Safety Manual*, but by the fact that the preferred alternative will eliminate 5 high-speed conflict points, improve the right turn off the Richardson Highway by converting a deceleration lane to an off ramp, and improve the right turn onto Richardson Highway by converting an acceleration lane to an on ramp. These improvements reduce the speed differential between the movements. All eliminated and improved conflict points are shown in Exhibit 9. A reduction in high-speed conflict points is likely to lead to improved safety outcomes as the number of opportunities for high-speed collisions decreases. Of the 44 crashes occurring at this intersection from 2010 to 2014, 21 of them involved a conflict point that would be eliminated or improved with construction of the preferred alternative. In addition, 10 of the 15 severe (injury or fatality) crashes used for the project nomination are associated with the movements that would be eliminated or improved with the preferred alternative.

The full interchange alternative would eliminate all the existing high-speed conflict points at the intersection and likely further improve the overall intersection safety but is not warranted at this time based on existing development, traffic volumes, and crash history.

Exhibit 9. Before and After (with Partially Grade Separated Interchange) High-Speed Conflict Points



Additionally, this improvement will have effects on the safety outcomes of the entire corridor. An interchange at the Old Richardson Highway/Richardson Highway intersection will consolidate the Keeney Road/Richardson Highway intersection and will help make the future consolidations of the Frontage Road/Richardson Highway and Peridot Street-Finell Drive/Richardson Highway

intersections feasible. This will result in fewer at-grade intersections and conflict points on this high-speed corridor.

CONCEPTUAL SIGNAGE PLAN

Figure 11 and Figure 12 provide a conceptual plan of the type and location of the signs proposed for the partial and full interchange alternatives, respectively. *Appendix O* provides dimensions of the proposed signage.

Figure 11. Conceptual Signage Plan - Partially Grade Separated Interchange Option

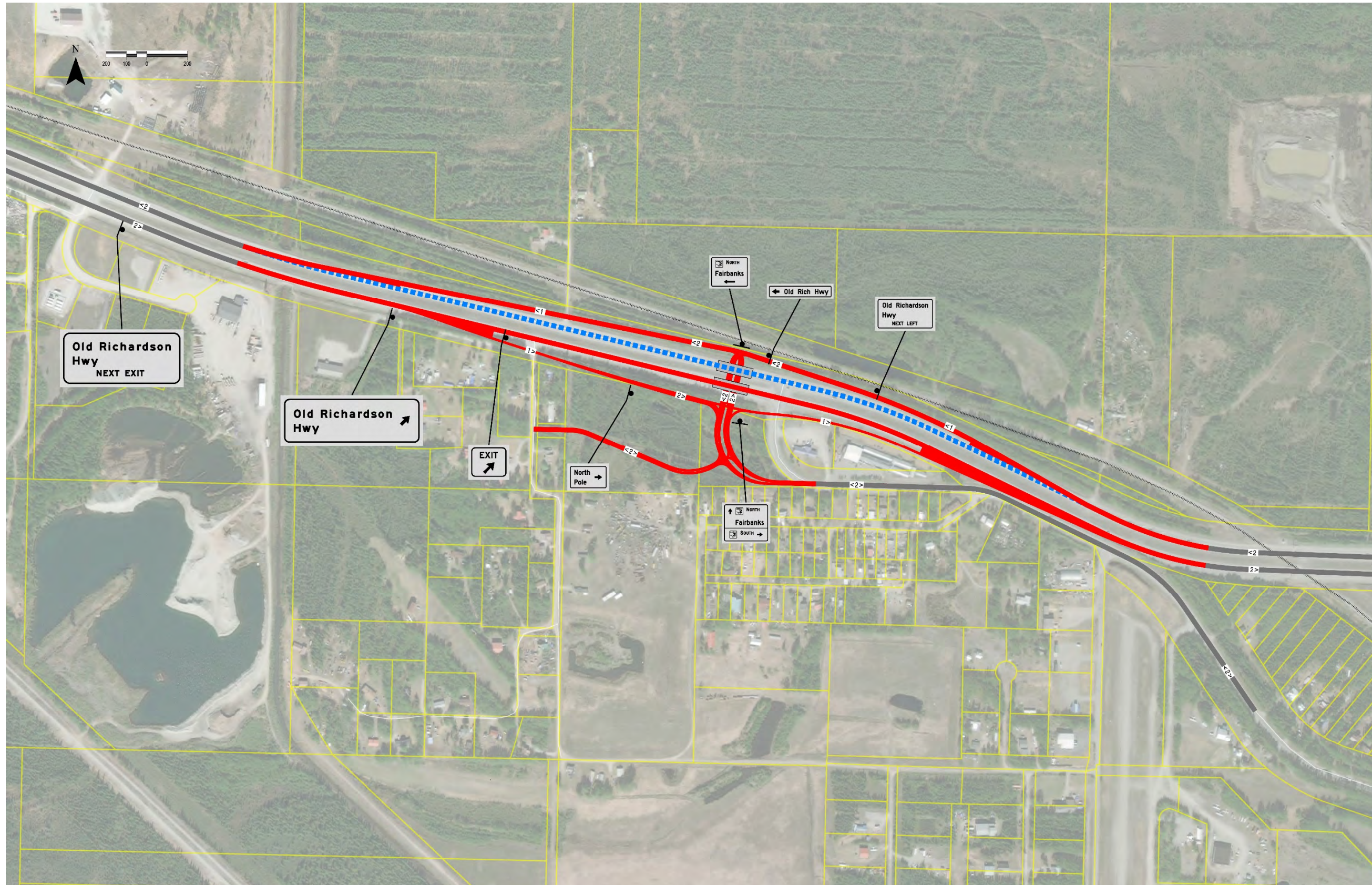
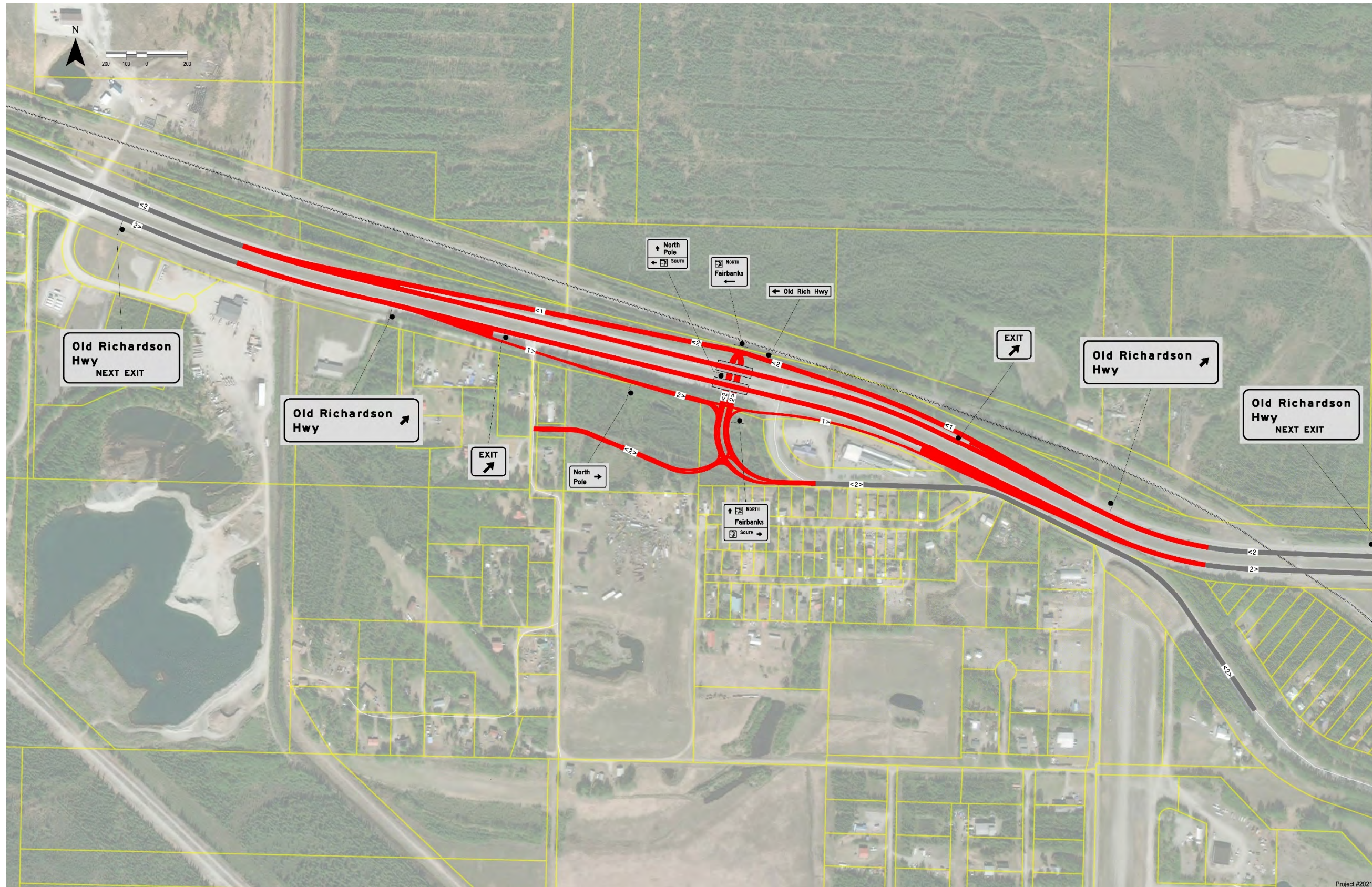


Figure 12. Conceptual Signage Plan – Full Interchange Option





SECTION 5 POLICY POINT 2

POLICY POINT 2 – ACCESS AND CONNECTION

Policy Point 2 addresses the design of the preferred alternative and any necessary design deviations. It also discusses the ability to implement a full interchange when a partially grade separated interchange is proposed. Table 9 shows that through preliminary design, the preferred alternative is anticipated to align with DOT&PF's long-range vision and policy for the Richardson Highway corridor and meet design standards. It also states that the proposed partially grade separated interchange does not preclude a future full interchange and that all movements served by the existing at-grade intersection are also served by the proposed partially grade separated interchange.

Table 9. Future Potential Access Consolidation Actions to Ensure Interchange Spacing Needs

Access Location	Spacing	Future Potential Access Consolidation Action
Frontage Road	0.68 miles to the west	The existing Frontage Road intersection has the potential to be consolidated in the future either through the extension of a frontage road to the new Old Richardson Highway interchange or via a new interchange to the west accessing the existing or expanded frontage road system.
Keeney Road	0.24 miles to the west	Keeney Road will be closed as part of the preferred alternative to accommodate the new eastbound off-ramp and reconnected via a frontage road extension from Old Richardson Highway.
Peridot Street-Finell Drive	0.83 miles to the east	The Peridot Street-Finell Drive intersection has the potential to be consolidated in the future by utilizing the existing roadway network connecting to the existing easterly Badger intersection or through future frontage road extensions to the new Old Richardson Highway interchange.

The preferred alternative aligns with the long-range vision and policy by eliminating an at-grade access (disconnecting Keeney Road from the Richardson Highway via a new frontage road) and implementing a grade-separated interchange at the Old Richardson Highway/Richardson Highway intersection. The location of the preferred alternative meets the interchange spacing standards for the Richardson Highway (>1 mile) and supports potential future consolidation of accesses (e.g., Frontage Road and Peridot Street-Finell Drive intersections) and development of a frontage road system, although those changes are not part of the IACR.

DESIGN AND IMPLEMENTATION STRATEGY

The preferred alternative design shown in Figure 3 adheres to 2011 AASHTO guidelines (Reference 3) and the 2013 Alaska DOT&PF design standards (Reference 4). Based on the conceptual design and a preliminary assessment, current design standards will be met or exceeded and the need for design exceptions is not anticipated. See *Appendix P* for the project design criteria used in the concept development.

Note that while the design calls for a partially grade separated interchange, a fully grade separated interchange is not precluded and could be implemented in the future if traffic volumes, development or crash experiences warrant. Further, the partially grade separated interchange serves all movements currently served by the at-grade intersection.

RIGHT-OF-WAY CONSIDERATIONS

As part of the conceptual design and costing estimating effort, potential impacts to property and additional right-of-way needs as well as potential construction easements were initially assessed. This section summarizes the potential number of partial and full right-of-way takes necessary to construct the preferred alternative. Table 10 provides a summary of the preliminary right-of-way needs, total square-footage, potential acquisition costs, and current unknowns. Specific parcel impacts are summarized in *Appendix Q*. Estimates of potential acquisition costs were developed in coordination with DOT&PF and are reflective of an average cost per parcel impacted for partial takes, and the total assessed property value as reported on the Fairbanks North Star Borough website for full takes. The cost per parcel impacted was provided based on recent project experience averages costs. **These right-of-way costs are preliminary and will be refined through more specific partial and full parcel acquisition data.**

Table 10. Preferred Alternative Right-of-Way Considerations

# of Impacted Properties		# of Relocations ²	Approximate ROW Needed (KSF)	Estimated ROW Cost	Unknowns
Partial ¹	Full				
4	2	0	231	\$210,000	Railroad Right-of-Way Alignment

¹May require full takes under certain conditions

²Assume relocation required for properties with buildings

PRELIMINARY COST ESTIMATES

Design criteria were identified based on DOT&PF standards supplemented with the AASHTO *A Policy on Geometric Design of Highways and Street* (Reference 3). The design criteria for the preferred alternative were populated in the standard DOT&PF Form and provided in *Appendix P*. The design criteria identified was the basis for developing the advanced preferred alternative concept. Through this preliminary analysis, the need for design exceptions is not anticipated. However, further refinement of this design and finalized parcel location data is necessary to state definitively whether design exceptions will be necessary.

Quantity take offs were performed for the preferred alternative. Estimated quantities are based on generalized assumptions of length, width and depth for roadway pavements, square footage of bridge constructed, length of barrier/guardrail, etc. Estimates focused on elements that are a high percentage of the construction project such as roadway, bridge, embankments, barrier/guardrail, etc.

Right-of-way impacts were estimated for the preferred alternative. It should be noted that square footage estimates of impact are at the conceptual level and based on aerial/GIS taxlot mapping and are not as accurate as if a survey had been completed. As such variations on the actual right-of-way impacts are anticipated. Table 11 below provides the estimated cost for the preferred alternative. In addition, Table 11 notes the proposed new lane miles with each alternative for use in assessing the additional maintenance effort associated with this alternative. Tables supporting the cost estimate development are provided in *Appendix R*.

Table 11. Preferred Alternative Preliminary Estimated Costs

Description	Cost Estimate	New Proposed Lane Miles (Frontage/Ramps)
Partially grade separated interchange at Old Rich/Rich Hwy (HSIP Nomination)	\$15,740,000	1.63

Given the location of the existing westerly (5.7 miles west of Old Richardson Highway) and easterly (1.9 miles east of Old Richardson Highway) Badger Road interchanges, the preferred alternative meets this spacing requirement and demonstrates the ability for other access points within a one-mile distance to be consolidated either as part of this project or future corridor improvements. Each access point within one mile and its related potential access consolidation action are identified in Table 9.



SECTION 6 FINDINGS

FINDINGS

This report documents the alternatives process and evaluation conducted to identify a preferred alternative at the Old Richardson Highway/Richardson Highway intersection. Through an iterative process involving a Technical Advisory Committee (TAC), public engagement, and Value Analysis workshop, a partially grade separated interchange at Old Richardson Highway was selected as the preferred alternative. This design eliminates at-grade northbound left-turning movements at the intersection, which are associated with the history of severe crashes at the intersection. The design will result in a positive impact on the safety and operation of the study intersections and Richardson Highway mainline.

Through this preliminary assessment, the need for design exceptions is not anticipated. Note that while the design calls for a partially grade separated interchange, a full interchange is not precluded.

The preferred alternative aligns with the long-range vision and policy by eliminating an at-grade access (disconnecting Keeney Road from the Richardson Highway via a new frontage road) and implementing a grade-separated interchange at the Old Richardson Highway/Richardson Highway intersection. The location of the preferred alternative meets the interchange spacing standards for the Richardson Highway (>1 mile) and supports potential future consolidation of accesses (e.g., Frontage Road and Peridot Street-Finell Drive intersections) and development of a frontage road system, although those changes are not part of the IACR or the proposed project.

As indicated in Table 12, the report addresses all required policy points.

Table 12. Policy Point Assessment

Policy Point	Requirement	Addressed?	Location
1	The proposed change in access does not have a significant adverse impact on the safety and operation of the Interstate facility at the study intersections and on the highway mainline.	✓	Pages 11-24, pages 34-38
1	Operations assessed in the near and long-term considering the existing interchange design and preferred layout.	✓	Pages 11-19, pages 34-37
1	Conceptual plan of the type and location of proposed signage.	✓	Pages 39-40
1	All operational and safety analysis conducted per DOT&PF's standards and methodologies.	✓	Page 10
2	Documentation of how the interchange improvements meet or exceed DOT&PF's design standards. Any design deviations needed to support the preferred interchange design fully addressed.	✓	Page 44
2	In the event that a partially grade separated interchange is proposed, description is provided as to whether future provision of a full interchange is precluded by the proposed design.	✓	Page 42



SECTION 7

REFERENCES

REFERENCES

1. Everett, Thomas D. and Hari Kalla. Memorandum: Action Changes to FHWA's Policy on Access to the Interstate System. May 22, 2017.
2. Alaska Department of Transportation and Public Facilities. *Alaska Highway Preconstruction Manual*. Effective November 15, 2013.
3. American Association of State Highway and Transportation Officials (AASHTO). *A Policy on Geometric Design of Highways and Streets, 6th Edition*. 2011.
4. Transportation Research Board. *2000 Highway Capacity Manual*. 2000.
5. NCHRP Report 765: Analytical Travel Forecasting Approaches for Project-Level Planning and Design. Transportation Research Board, 2014.
6. American Association of State Highway and Transportation Officials Highway Safety Manual. 2010.
7. State of Alaska Department of Transportation and Public Facilities. *Ester to Eielson Freeway Reconnaissance*. April 1988.