ENGSTROM ROAD TO TRUNK ROAD CORRIDOR
TRAFFIC ANALYSIS

DRAFT

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LIST OF ABBREVIATIONS

AADT ..... Average Annual Daily Traffic
AMATS ..... Anchorage Metropolitan Area Traffic Solutions
DOT&PF ..... Department of Transportation and Public Facilities
HDL ..... HDL Engineering Consultants, LLC
HSIP ..... Highway Safety Improvement Plan
LOS ..... Level of Service
LRTP ..... Long Range Transportation Plan
MSB ..... Matanuska-Susitna Borough
OSHP ..... Official Streets and Highways Plan
ROW ..... Right-of-Way
TAZ ..... Transportation Analysis Zones
TIP21 ..... Transportation Infrastructure Program (2021)

1.0 INTRODUCTION

The Matanuska-Susitna Borough (MSB) proposes construction of a new road connecting Engstrom Road and Trunk Road to provide an alternate travel route between these existing roadways. This development will improve connectivity and reduce congestion to meet the needs of current and future traffic volumes, which are constricted by the Fishhook and North Lakes areas' limited collector-level road network. Improvements may include right-of-way (ROW) acquisition, existing road upgrades and new road construction, intersection improvements, creek crossing(s), utility relocations, pedestrian facilities, drainage improvements, and signage and striping.

HDL Engineering Consultants, LLC (HDL) is under contract with MSB to complete a traffic analysis to determine future traffic conditions in the area for each selected connector route between Engstrom Road and Trunk Road.

2.0 PROJECT HISTORY AND BACKGROUND

2.1 Population Location

The project is located in Sections 22, 23, 26, and 27, Township 18 South, Range 1 East, of the Seward Meridian; Latitude 61°37'37.5", Longitude 149°14'15.1". The analysis area is generally bounded to the west by Engstrom Road, to the south by Bogard Road, to the east by Trunk Road and Palmer-Fishhook Road, and to the north by Tex-Al Road (Figure 1).

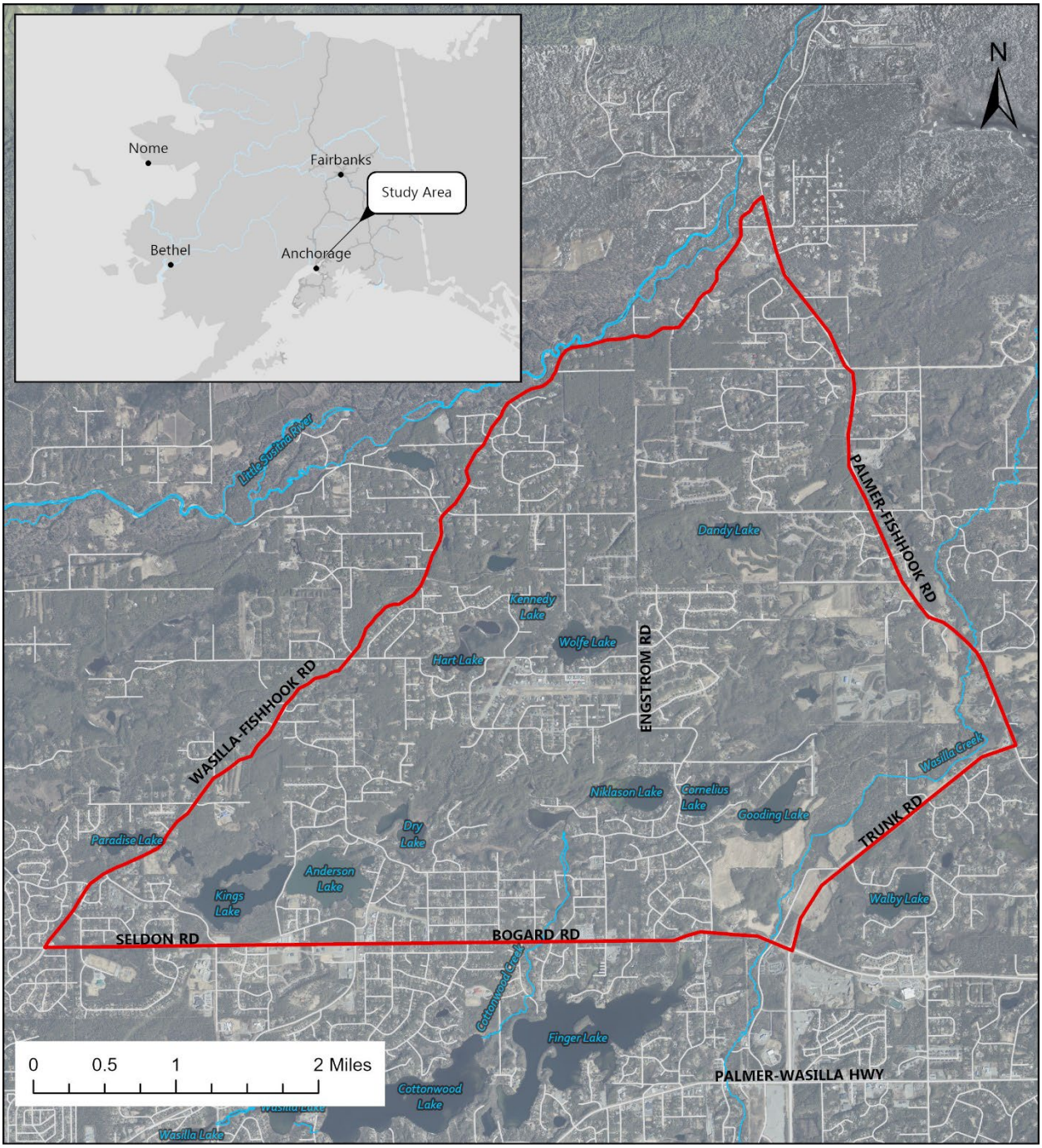

Figure 1: Project Area

2.2 Existing Facilities and Land Use

There is no current direct connection between Engstrom Road and Trunk Road. Traffic traveling to and from Trunk Road and Engstrom Road must use Bogard Road and enter using the only collector intersection serving the project area. This has resulted in a high concentration of traffic at the Engstrom Road and Bogard Road intersection, particularly left-turning traffic from Engstrom Road onto Bogard Road. The intersection has limited sight distance, which, coupled with high traffic volumes, has contributed to congestion and a crash rate higher than the statewide average for similar intersections.

Engstrom Road is classified by the MSB 2022 Official Streets and Highway Plan (OSHP) as a major collector. The paved surface is 24 feet wide and accommodates two-way traffic (one travel lane in each direction), and the existing speed limit is 35 mph. Trunk Road is classified by the MSB OSHP as a major arterial and consists of one 12-foot lane and an 8-foot shoulder in each direction, with a 12-foot separated pathway along the northwest side.

Adjacent land use largely consists of single-family and multi-family developments intermixed with some agricultural and industrial facilities. Additionally, large areas within the project area, including areas along the proposed connection routes, remain undeveloped.

2.3 Transportation Planning

Considerable steady population growth throughout the MSB has occurred over the last several decades, which has increased demand on the poorly connected network of local roads. The MSB's 2035 Long Range Transportation Plan (LRTP) specifically identified congestion issues along Engstrom Road, and a need to reduce congestion and provide an alternate access to Trunk Road or Palmer-Fishhook Road. The project has been developed in accordance with the 2035 LRTP and 2022 OSHP, and was approved by voters as part of the 2021 Transportation Infrastructure Program (TIP21).

3.0 PROJECT DEVELOPMENT

In 2022, the MSB solicited proposals to design a connector from Engstrom Road to Trunk Road that was generally in line with the existing North Old Homestead Road; this was referred to as the "Southern Route" alternative. Subsequently, HDL performed an evaluation for the MSB of an alternate route beginning approximately 1 mile to the north on Engstrom Road, referred to as the "Northern Route".

The Southern and Northern Routes were presented to the public in an open-house meeting on March 26th, 2025. Based on public input from the meeting, the MSB and HDL expanded the project to include evaluation of additional routes, designated as "Northern Routes 1 and 2" and the "Stone Creek to Aspen Ridge Route". The four routes were selected for further evaluation and traffic analysis based on criteria including minimum intersection spacing, MSB planned and future planned projects, and ongoing and future residential development (Figure 2).

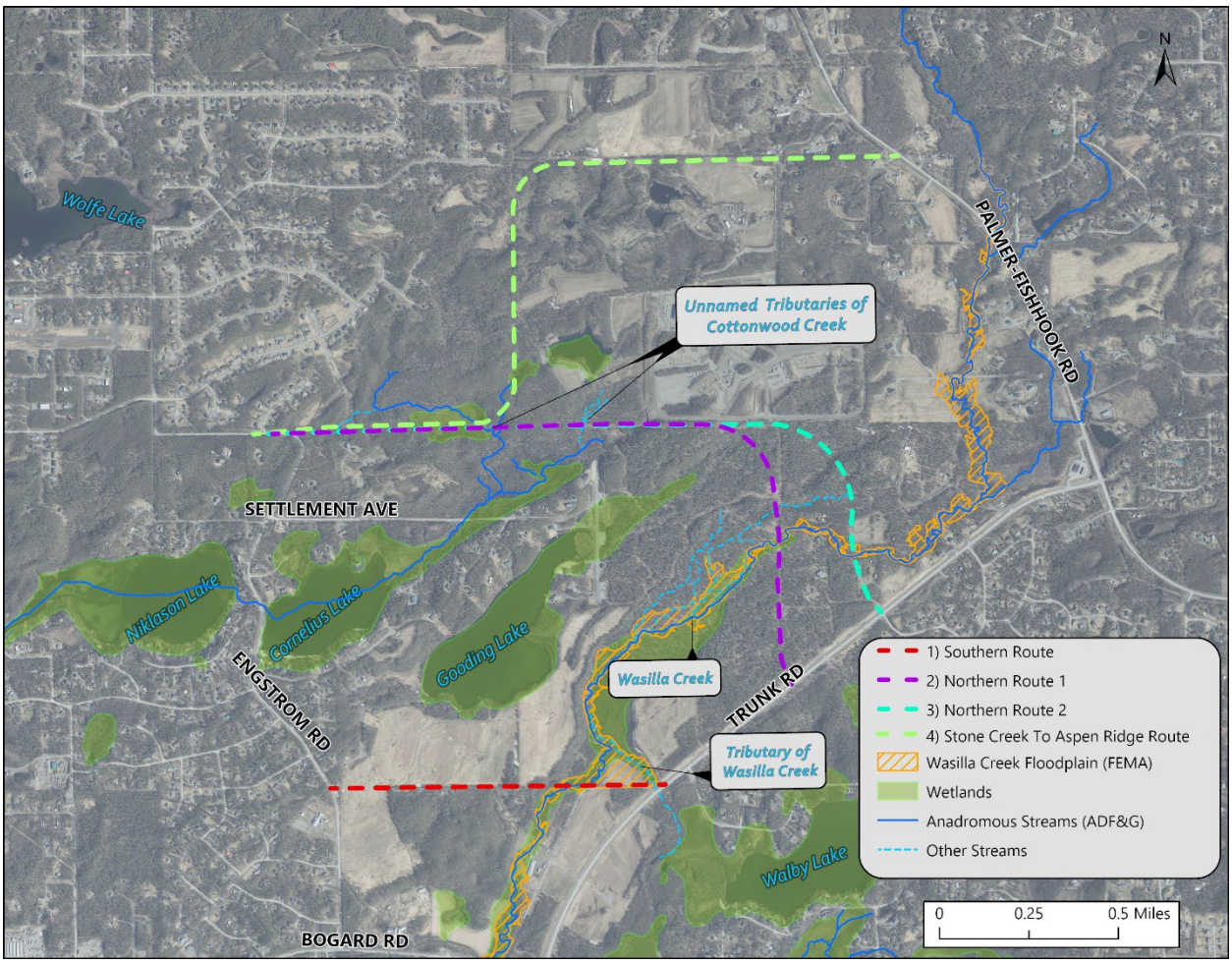

Figure 2: Selected Routes and Future Development

The selected routes are described in the sections below.

3.1 Southern Route

The proposed Southern Route begins approximately 0.4 miles north of the Bogard Road/Engstrom Road intersection and extends east, merging into North Old Homestead Road. This route was presented to voters as part of TIP21. The Southern Route is approximately 0.9 miles long and would require construction of a new approach/intersection with Engstrom Road and make use of the existing approach of North Old Homestead Road to Trunk Road. A new gravel extraction site has been permitted in this area, and gravel operations would likely make use of this route.

3.2 Northern Route 1

Northern Route 1 begins approximately 1.6 miles north of the Bogard Road/Engstrom Road intersection, extends east along the ¼ Section line of Section 22 to Section 23, then turns southeast and then south, where it connects to Trunk Road approximately 0.2 miles southwest of Heaton Road. The proposed corridor is approximately 1.9 miles long and would require a new intersection at both Engstrom Road and Trunk Road. The proposed intersection location with Trunk Road aligns with a proposed future collector road north of Walby Lake, as identified in the OSHP.

3.3 Northern Route 2

Northern Route 2 to Trunk Road follows the same alignment as the Northern Route 1, but continues approximately 800 feet further east before turning south to make use of the existing intersection of North Heaton Road with Trunk Road.

3.4 Stone Creek to Aspen Ridge Route

The Stone Creek to Aspen Ridge Route follows the same alignment eastward as the two Northern Routes for approximately 0.5 miles and then turns north towards Aspen Ridge Road. It then extends along Aspen Ridge Road eastward before intersecting with Palmer-Fishhook Road at Snicker Avenue.

4.0 DESIGN CRITERIA AND TYPICAL SECTION

A future potential connector roadway between Engstrom Road and Trunk Road is depicted in the MSB's LRTP as a major collector. The design speed and posted speed limit have yet to be determined. For the purpose of this analysis, 40 mph has been selected as the design speed.

The typical section for each proposed route consists of two 12-foot lanes, 6-foot shoulders, 10-foot wide 4H:1V foreslopes, and 3H:1V backslopes (Figure 3). Pedestrian facilities will be considered in accordance with the MSB's 2023 Bike and Pedestrian Plan and may include a 10-foot separated path.

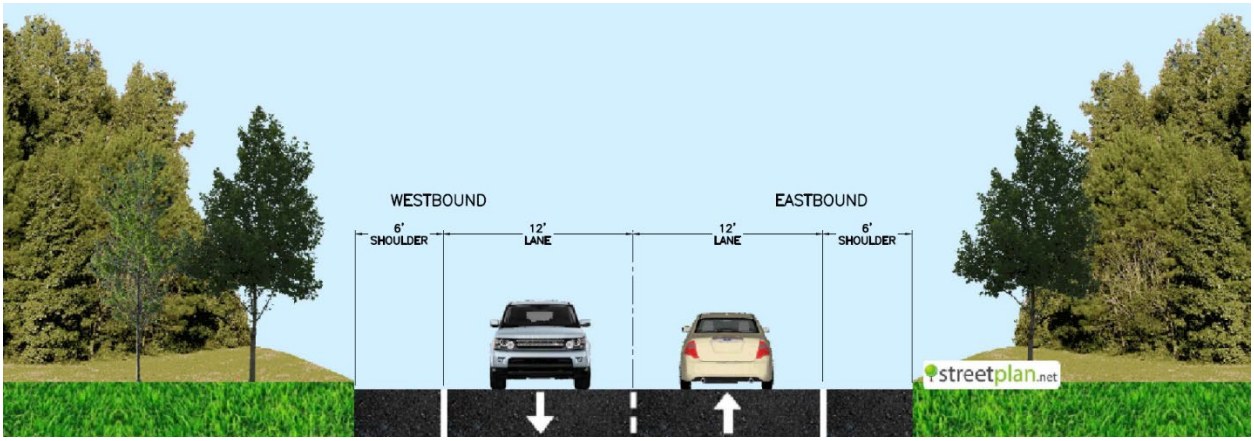

Figure 3: Major Collector Typical Section

Additional sections may be considered as the design progresses. These sections may include retaining walls, guardrail, slope variations, and shoulder width variations at applicable locations, such as creek crossings and areas requiring significant cut or fill.

5.0 CRASH HISTORY

Collision data for the project area was obtained from the MSB's online traffic data resource and is summarized in Table 1.

Table 1: Intersection Crash History (2018-2022)

LOCATION	SEVERITY					TOTAL CRASHES
	No Apparent Injury	Possible Injury	Suspected Minor Injury	Suspected Serious Injury	Fatal Injury	
Engstrom Rd/Bogard Rd/ Green Forest Dr Intersections	11	8	2	0	0	21
Trunk Rd/Bogard Rd Roundabout	40	5	2	0	0	47
Engstrom Rd (Bogard Rd to Aspen Ridge Rd)	13	4	1	1	0	19
Bogard Rd (Engstrom Rd to Trunk Rd)	10	2	2	0	1	15
Trunk Rd (Bogard Rd to Palmer-Fishhook Rd)	4	1	1	1	0	11

The majority of the collisions in the five-year study period occurred at the Trunk Road/Bogard Road roundabout, but did not result in serious injuries or fatalities. The number of crashes resulting in injury or possible injury was slightly higher for the Engstrom Road/Bogard Road/Green Forest Drive intersection than for surrounding roadways; the Department of Transportation and Public Facilities' (DOT&PF) Highway Safety Improvement Program (HSIP) roundabout project at this intersection is intended to address these crashes. One fatality occurred within the project area during the study period, on Bogard Road between Engstrom Road and Trunk Road.

6.0 EXISTING TRAFFIC CONDITIONS

Existing daily traffic counts and peak hour volumes were determined using volumes recorded by HDL in 2024, and data collected by DOT&PF traffic recorder sites within or adjacent to the project area.

6.1 2024 Traffic Counts

HDL performed a 24-hour traffic count within the project area on Thursday, October 3, 2024, using a MioVision Traffic Recorder camera. School was in session, and the roadways were clear of snow during this period. The counts were performed at the roundabout at the intersection of Trunk Road and Bogard Road. Existing traffic for other intersections within the project area was determined using data from the nearby DOT&PF traffic recorder sites.

6.2 Existing Traffic Volumes, Level of Services, and Delays

Engstrom Road serves as the primary access route for the existing subdivisions between Tex-Al Drive and Bogard Road. Existing traffic volumes often result in substantial queues and delay times at the Engstrom Road and Bogard Road intersection (Figure 4).

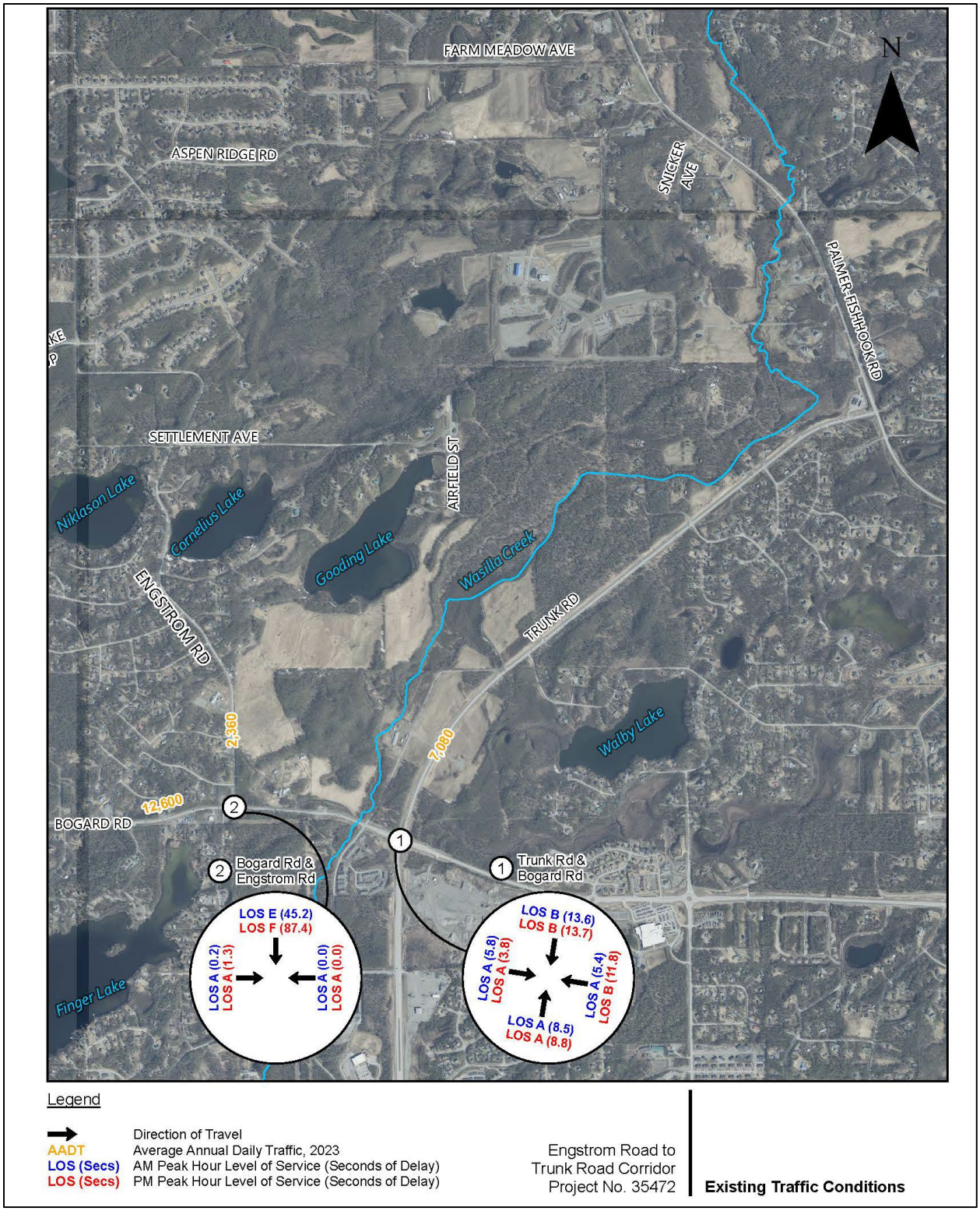

Figure 4: Existing Traffic Conditions

7.0 TRAFFIC FORECASTS

Future traffic conditions were forecasted for the Design Year (2050) based on outputs from the DOT&PF's Draft Intraregional Traffic Corridor Study Model. The model was originally produced for Anchorage Metropolitan Area Transportation Solutions (AMATS) in 2016 and was updated in 2019. The updates to the AMATS base model included current socioeconomic data and increased density of the transportation analysis zones (TAZ) and road network features within the MSB. More information is available in the *Draft Mat-Su Intra-Regional Corridor Study: Travel Demand Model 2019 Update Technical Memorandum* (Kinney Engineering, LLC, April 2022). The model assumes the future construction of other adjacent projects identified in the MSB's planning documents, including the Engstrom Road North Extension and the Tex-Al Drive Extension, as well as the DOT&PF's planned roundabout at the Engstrom Road and Bogard Road intersection.

Calculated growth rates for various roadway segments within the roadway corridor are presented in Table 2.

Table 2: Calculated Annual Growth Rates

LOCATION	ANNUAL GROWTH RATE
Bogard Road, Sebastion to Engstrom	2.26%
Bogard Road, Trunk to 49th State	2.78%
Trunk Road, Katherine to Bogard	1.86%
Trunk Road, Bogard to Palmer-Fishhook	0.97%
Engstrom, Bogard to Hart Lake	3.35%
Palmer-Fishhook, Alpine to Trunk	-0.09%
Palmer-Fishhook, Trunk to Farm Loop	1.12%

The future construction of the Engstrom Road, Bogard Road, and Green Forest Drive roundabout by the DOT&PF will significantly affect traffic delays in the project area. The future traffic conditions presented in this report address these anticipated changes.

7.1 Traffic Volume Forecasts

Traffic volumes were calculated for Engstrom Road, Bogard Road, and Trunk Road for the Design Year (2050) under the No Build condition (Figure 5). Levels of Service (LOS) and delay times were calculated for the Engstrom Road/Bogard Road and Bogard Road/Trunk Road intersections for the existing and future design years.

The alignment and intersection locations of each proposed route impact future traffic volumes, LOS, and delay times on the adjacent connecting roadways. To reflect this, for each of the proposed routes, Design Year (2050) volumes were forecasted for Engstrom Road, Bogard Road, and Trunk Road, in addition to the selected route. Design Year (2050) intersection LOS and delays were analyzed for the Engstrom Road/Bogard Road, Bogard Road/Trunk Road, and Trunk Road/Palmer-Fishhook Road intersections for each proposed route, in addition to the LOS and delays for the connecting intersections for each route. Stop-control was assumed for all future potential intersections.

Future traffic conditions for the No Build condition are presented in Figure 5; future conditions for the four proposed routes are presented in Figures 6, 7, 8, and 9. Intersection delay times and LOS are presented in Table 3.

Table 3: Intersection Level of Service and (Delay in Seconds)

INT.		2023 EXISTING (STOP CONTROLLED AT ENG/BOG)				2050 NO BUILD				2050 SOUTHERN ROUTE				2050 NORTHERN ROUTE 1				2050 NORTHERN ROUTE 2				2050 STONE CREEK TO ASPEN RIDGE ROUTE			
DIRECTION		EB	WB	NB	SB	EB	WB	NB	SB	EB	WB	NB	SB	EB	WB	NB	SB	EB	WB	NB	SB	EB	WB	NB	SB
ENGSTROM/ BOGARD ROUNDABOUT	AM	A (0.2)	A (0.0)	-	E (45.2)	F (299.9)	C (21.8)	C (23.5)	F (178.9)	F (253.1)	D (26.1)	C (21.6)	F (117.8)	F (258.7)	D (26.0)	C (21.8)	F (124.7)	F (258.7)	D (26.0	C (21.8)	F (124.7)	F (275.7)	D (25.8)	C (22.5)	F (146.7)
	PM	A (1.3)	A (0.0)	-	F (87.4)	F (115.2)	F (142.2)	C (18.4)	F (236.4)	F (91.0)	F (148.1)	C (17.1)	F (166.0)	F (93.8)	F (147.3)	C (17.3)	F (174.0)	F (93.8)	F (147.3)	C (17.3)	F (174.0)	F (102.3)	F (145.2)	C (17.7)	F (198.9)
TRUNK/ BOGARD ROUNDABOUT	AM	A (5.8)	A (5.4)	A (8.5)	B (13.6)	E (35.4)	A (7.3)	E (45.7)	F (230.8)	E (39.5)	A (7.3)	E (47.8)	F (257.2)	E (39.0)	A (7.3)	E (47.5)	F (254.2)	E (39.0)	A (7.3)	E (47.5)	F (254.2)	E (37.8)	A (7.3)	E (47.2)	F (245.0)
	PM	A (3.8)	B (11.8)	A (8.8)	B (13.7)	A (7.0)	F (56.5)	E (47.6)	F (217.6)	A (7.3)	F (55.3)	F (57.2)	F (219.5)	A (7.3)	F (55.0)	F (55.2)	F (220.4)	A (7.3)	F (55.0)	F (55.2)	F (220.4)	A (7.2)	F (56.0)	F (51.8)	F (220.0)
TRUNK/ PALMER FISHOOK	AM					B (10.4)	-	A (5.6)	A (0.0)	B (10.4)	-	A (5.6)	A (0.0)	B (10.4)	-	A (5.6)	A (0.0)	B (10.4)	-	A (5.6)	A (0.0)	B (11.0)		A (5.2)	A (0.0)
	PM					C (15.7)	-	A (3.0)	A (0.0)	C (15.7)	-	A (3.0)	A (0.0)	C (15.7)	-	A (3.0)	A (0.0)	C (15.7)	-	A (3.0)	A (0.0)	C (20.0)		A (2.6)	A (0.0)
ENGSTROM/ CONNECTOR	AM									-	A (9.3)	A (0.0)	A (1.1)	A (0.0)	A (1.4)	B (11.1)	-	A (0.0)	A (0)	B (8.8)	-	A (0.0)	A (1.5)	B (11.2)	-
	PM									-	B (11.9)	A (0.0)	A (1.2)	A (0.0)	A (1.6)	C (17.8)	-	A (0.0)	A (0)	B (8.9)	-	A (0.0)	A (1.4)	C (17.5)	-
TRUNK/ CONNECTOR	AM									D (25.2)	-	A (0.9)	A (0.0)	E (39.9)		A (1.1)	A (0.0)	F (55.1)	F (80.1)	A (1.0)	A (0.1)	A (9.1)		A (1.4)	A (0.0)
	PM									C (18.8)	-	A (0.7)	A (0.0)	E (38.5)		A (0.9)	A (0.0)	F (79.0)	F (151.5)	A (0.9)	A (0.4)	A (9.6)		A (1.3)	A (0.0)

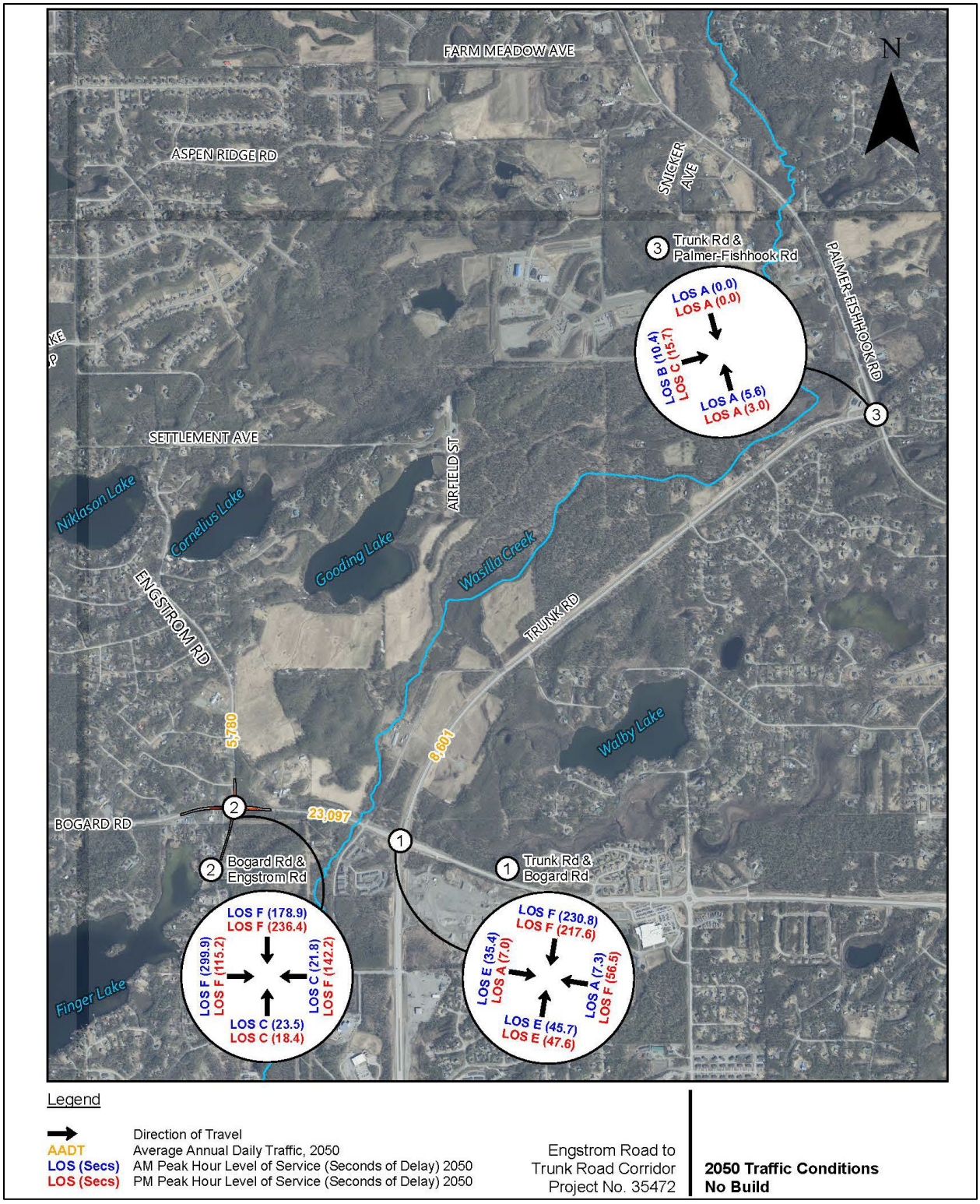

Figure 5: No Build 2050 Traffic Conditions

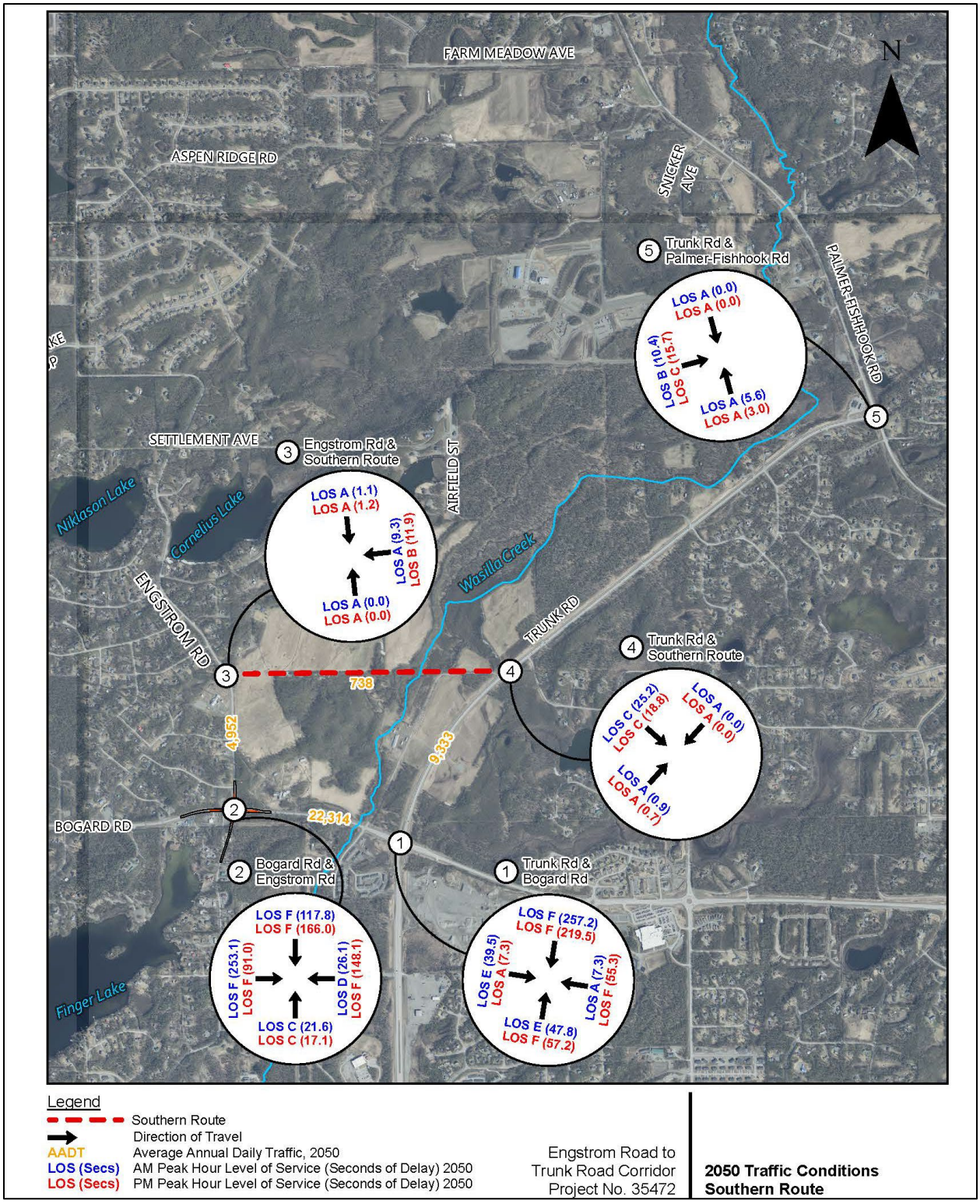

Figure 6: Southern Route 2050 Traffic Conditions

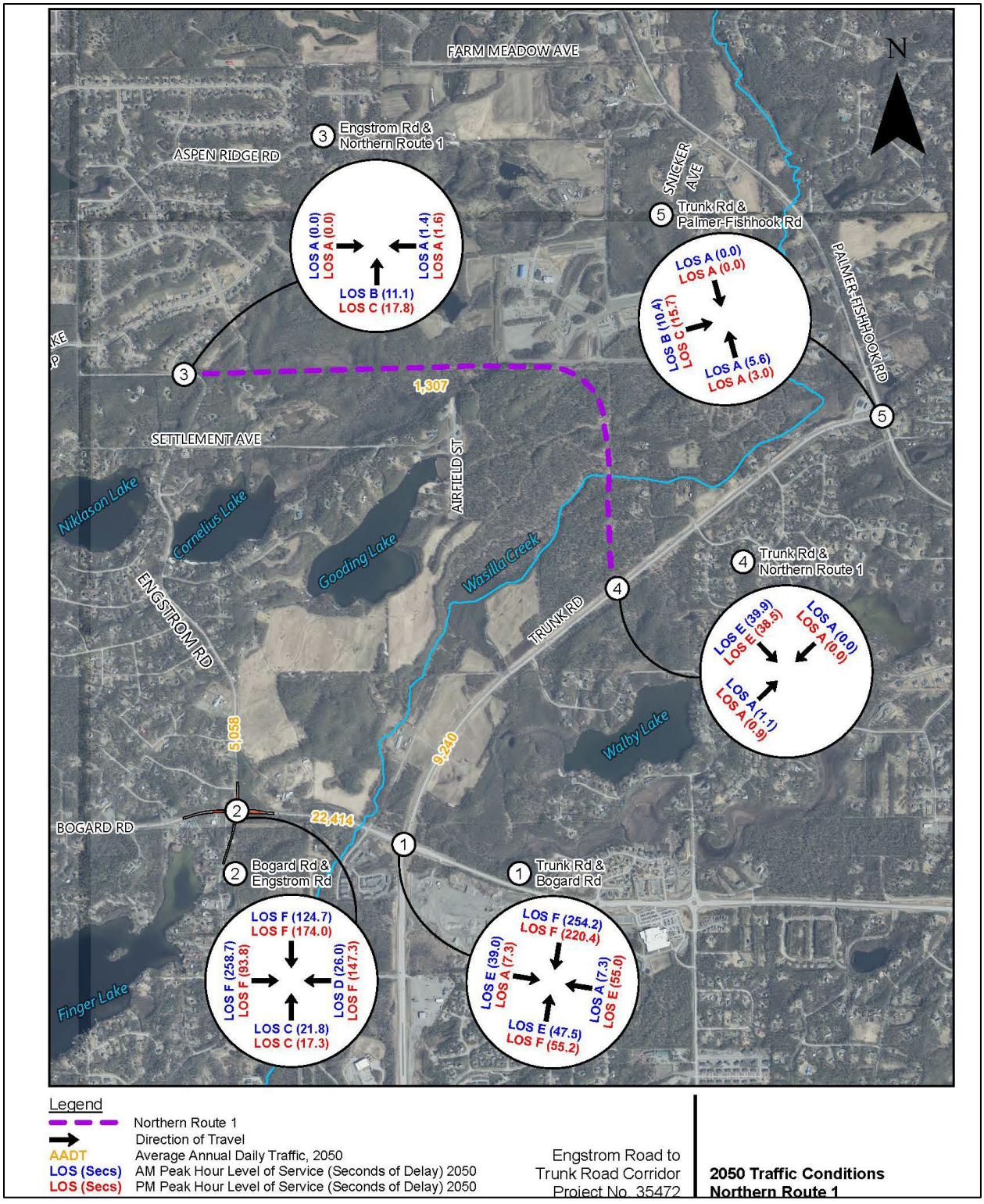

Figure 7: Northern Route 1 2050 Traffic Conditions

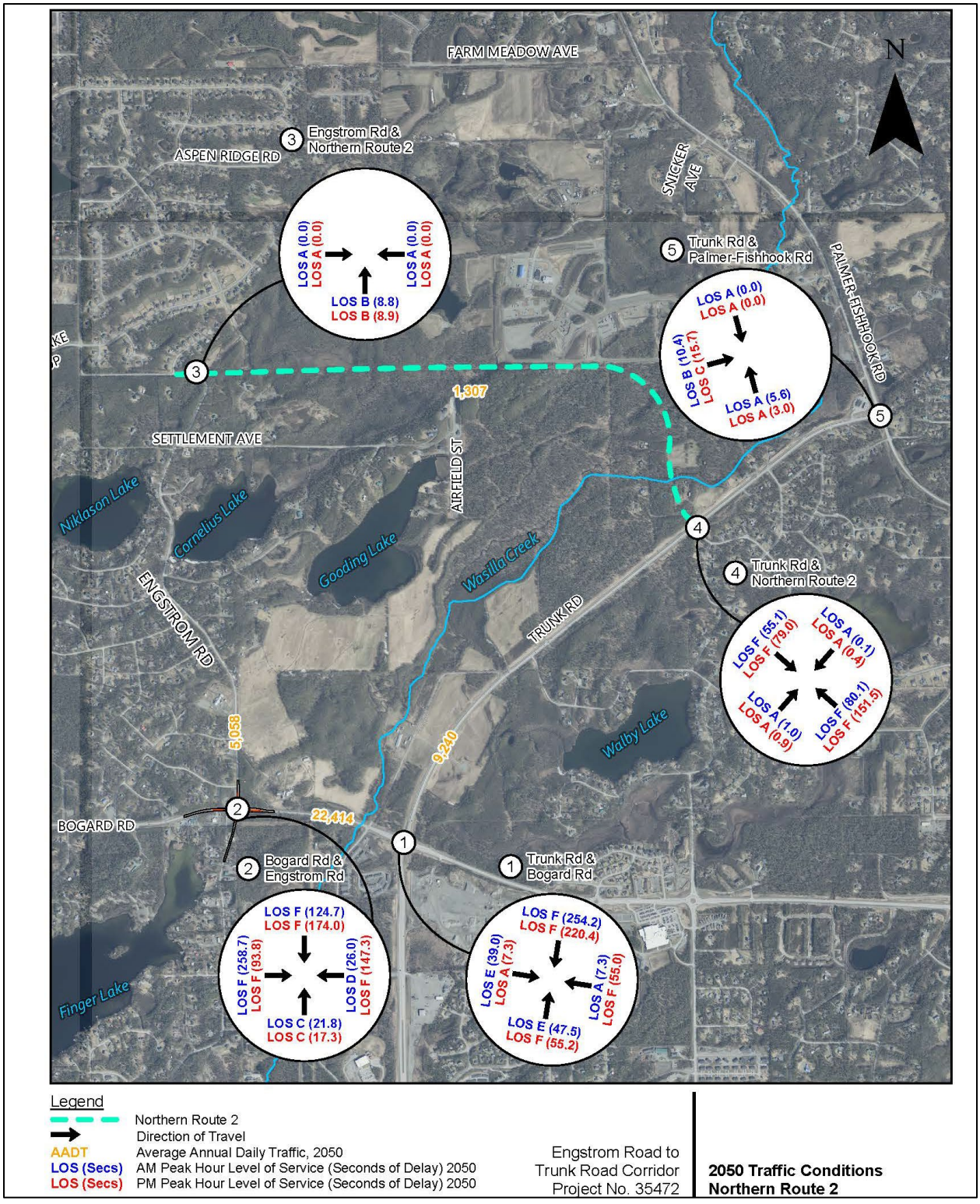

Figure 8: Northern Route 2 2050 Traffic Conditions

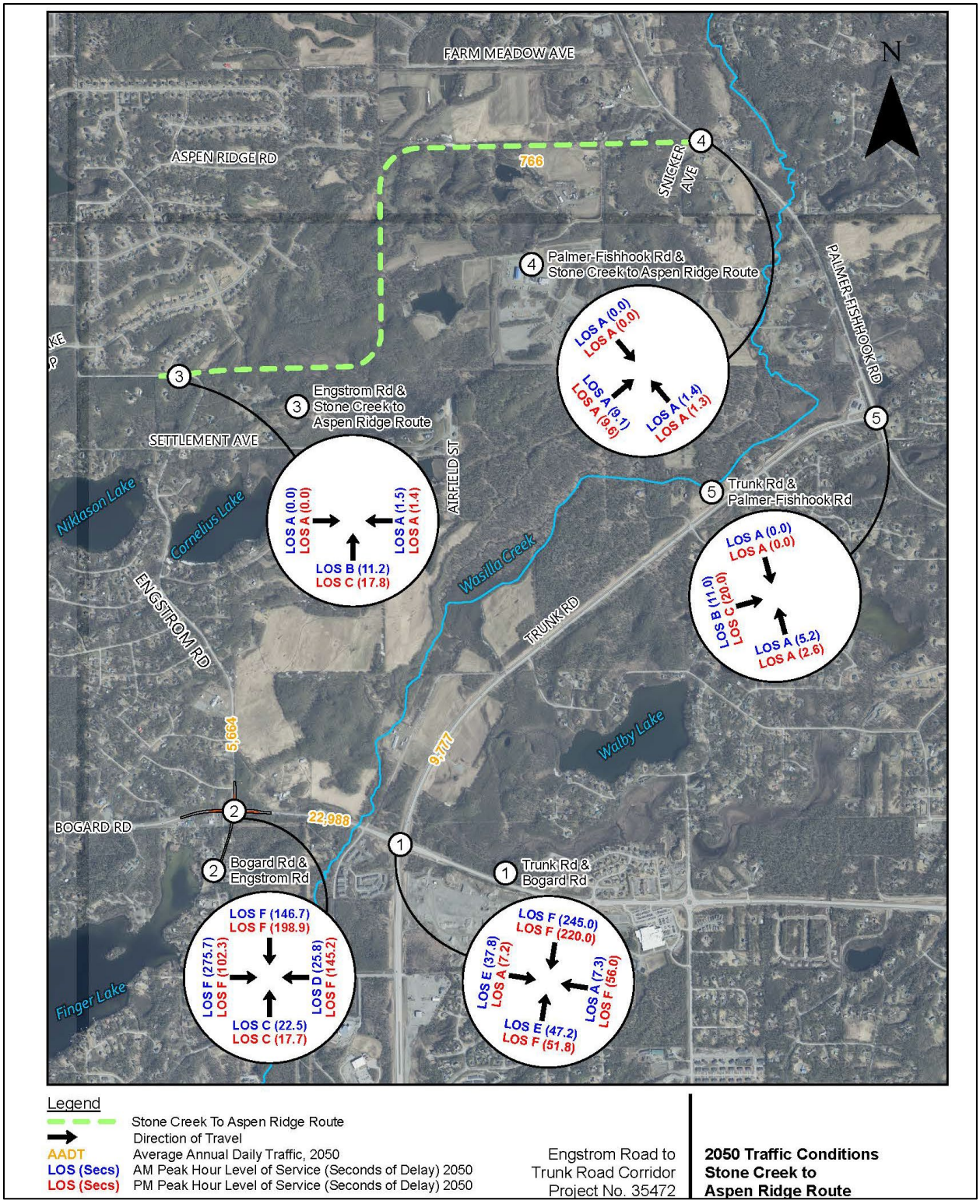

Figure 9: Stone Creek to Aspen Ridge Route 2050 Traffic Conditions

8.0 ANALYSIS RESULTS

Each of the four selected routes evaluated in this analysis will result in different future Design Year (2050) traffic conditions. The information presented in this report, in addition to other decision criteria, is intended to aid in the comparison and selection of a preferred alternative

8.1 Traffic Delay Comparison

Table 4 compares the overall intersection delay times for the four proposed routes at the future Engstrom Road/Bogard Road roundabout and the Trunk Road/Bogard Road roundabout against the No Build option for the Design Year (2050).

Each of the proposed routes will result in decreased delay times for vehicles queuing at the Engstrom Road/Bogard Road roundabout when compared to the No Build. Northern Routes 1 and 2 will improve total wait times by nearly twice as many seconds as the Stone Creek to Aspen Ridge Route, and the Southern Route provides the greatest reduction in traffic delay overall for this intersection.

Table 4: 2050 Critical Intersections - LOS (Delay in Seconds)

INT.		2050 NO BUILD				2050 SOUTHERN ROUTE				2050 NORTHERN ROUTE 1				2050 NORTHERN ROUTE 2				2050 STONE CREEK TO ASPEN RIDGE ROUTE			
		Entire Intersection				Entire Intersection				Entire Intersection				Entire Intersection				Entire Intersection			
DIRECTION/TIME		EB	WB	NB	SB	EB	WB	NB	SB	EB	WB	NB	SB	EB	WB	NB	SB	EB	WB	NB	SB
ENGSTROM/ BOGARD ROUNDABOUT	AM	F 174.3				F -27.7				F -24.3				F -24.3				F -13.8			
		F 299.9	C 21.8	C 23.5	F 178.9	F -46.8	D +4.3	C -1.9	F -61.1	F -41.2	D +4.2	C -1.7	F -54.2	F -41.2	D +4.2	C -1.7	F -54.2	F -24.2	D +4	C -1	F -32.2
	PM	F 139.1				F -13.9				F -12.4				F -12.4				F -7.6			
		F 115.2	F 142.2	C 18.4	F 236.4	F -24.2	F +5.9	C -1.3	F -70.4	F -21.4	F +5.1	C -1.1	F -62.4	F -21.4	F +5.1	C -1.1	F -62.4	F -12.9	F +3	C -0.7	F -37.5
TRUNK/ BOGARD ROUNDABOUT	AM	F (83.0)				F +12.6				F +11.0				F +11.0				F +6.7			
		E 35.4	A 7.3	E 45.7	F 230.8	E +4.1	A 0	E +2.1	F +26.4	E +3.6	A 0	E +1.8	F 23.4	E +3.6	A 0	E +1.8	F +23.4	E +2.4	A 0	E +1.5	F +14.2
	PM	F (68.4)				F +6.2				F +5.3				F +5.3				F +3.2			
		A 7.0	F 56.5	E 47.6	F 217.6	A +0.3	F -1.2	F +9.6	F +1.9	A +0.3	F -1.5	F +7.6	F +2.8	A +0.3	F -1.5	F +7.6	F +2.8	A +0.2	F -0.5	F +4.2	F -2.4

8.2 Traffic Volumes Comparison

As depicted in Figures 5 through 9, traffic volumes in the Design Year (2050) for each of the evaluated routes vary based on the location of the proposed intersections with Engstrom Road and either Palmer-Fishhook Road or Trunk Road. These volumes are compared against the volumes for the future No Build option in Table 5.

Table 5: 2050 Critical Roadway Segments: Forecasted Volumes Comparison (AADT)

ROADWAY SEGMENT	2050 NO BUILD	2050 SOUTHERN ROUTE	2050 NORTHERN ROUTE 1	2050 NORTHERN ROUTE 2	2050 STONE CREEK TO ASPEN RIDGE ROUTE
Engstrom Rd	5,780	4,952	5,058	5,058	5,664
Bogard Rd: Engstrom Rd to Trunk Rd	23,097	22,314	22,414	22,414	22,988
Trunk Rd: Bogard Rd to Palmer-Fishhook Rd	8,601	9,333	9,240	9,240	9,777
Proposed Connector Route	–	738	1,307	1,307	766

Traffic volumes on Trunk Road will increase in the design year under all conditions as nearby residential developments expand. All four of the proposed routes will additionally increase traffic volumes on Trunk Road by redirecting traffic from adjacent roadways. Traffic volumes on Engstrom Road and Bogard Road are most significantly decreased by the selection of the Southern Route. The Southern Route also has the lowest traffic volumes on the new connector itself; this is due to its proximity to Bogard Road. Traffic allocated to the new Southern Route is redirected almost exclusively from Engstrom Road and Bogard Road. A new connection in this location does not provide alternative travel routes for residents of the neighborhoods north of Cornelius and Niklason Lakes. Similarly, the Stone Creek to Aspen Ridge Route connects to Palmer-Fishhook Road at a location far enough north of the local neighborhoods to disincentivize most residents from selecting it as an alternative travel route.

Both the Northern Routes connect to Engstrom Road and Trunk Road at locations that make them viable alternative travel routes for a large portion of residents in the area, and therefore, their connector route volumes are the highest. While they do not pull as many vehicles directly from the adjacent Engstrom and Bogard roadways, they attract more vehicles from a broader area than either of the Southern or Stone Creek to Aspen Ridge Routes.

8.3 Intersection Queue Length Comparison

Intersection queue lengths at Engstrom Road and Bogard Road are a substantial source of traffic delays and contribute to driver frustration. Table 6 compares queue lengths generated by each proposed route at the future roundabout against the No Build option, for the Design Year (2050).

Table 6: 95th-Percentile Queue Lengths at Engstrom/Bogard Roundabout (Vehicles)

YEAR/ROUTE	AM PEAK				PM PEAK			
	EB	WB	NB	SB	EB	WB	NB	SB
2050 No Build	86	14	1	23	39	58	1	20
2050 Southern Route	78	16	1	16	34	58	1	15
2050 Northern Route 1	79	16	1	17	34	58	1	16
2050 Northern Route 2	79	16	1	17	34	58	1	16
2050 Stone Creek to Aspen Ridge Route	78	16	1	16	34	58	1	15

Each route reduces queue lengths for every leg of the future roundabout for both morning and evening peak traffic times, with the exception of the AM westbound leg, where each route will increase the queue length by two vehicles. While queue lengths are otherwise very similar across all four routes, the Southern Route and Stone Creek to Aspen Ridge Route reduce the southbound queue lengths by one additional vehicle for both AM and PM peak traffic hours.

9.0 SUMMARY

This analysis evaluates future traffic data (2050) for the four proposed connector routes between Engstrom Road and Trunk Road or Palmer-Fishhook Road and compares these routes against the future No Build option. For each proposed route option, the LOS and delay times at the future Engstrom Road/Bogard Road roundabout are considered in addition to forecasted traffic volumes on the connector route itself, and the potential reduction of traffic volumes on Engstrom Road provided by the selection of that route.

Using these criteria, each route is scored on a scale of 1-5, with one representing the most desirable results in a given category. Table 7 summarizes the scoring results for each proposed route.

Table 7: Scoring Results for Proposed Routes

ROUTE	LOS AND DELAY	ROUTE TRAFFIC VOLUMES	ENGSTROM TRAFFIC VOLUME REDUCTION
2050 No Build	5	N/A	5
Southern Route	1	4	1
Northern Route 1	2	1	2
Northern Route 2	2	1	2
Stone Creek to Aspen Ridge Route	4	3	4

Of the four build routes selected for traffic analysis in this report, Northern Routes 1 and 2 both receive the best ratings overall. These two routes are recommended for further evaluation in the Route Selection Report.

APPENDIX A

Synchro Inputs/Outputs

APPENDIX B

Traffic Model Volume Outputs Map