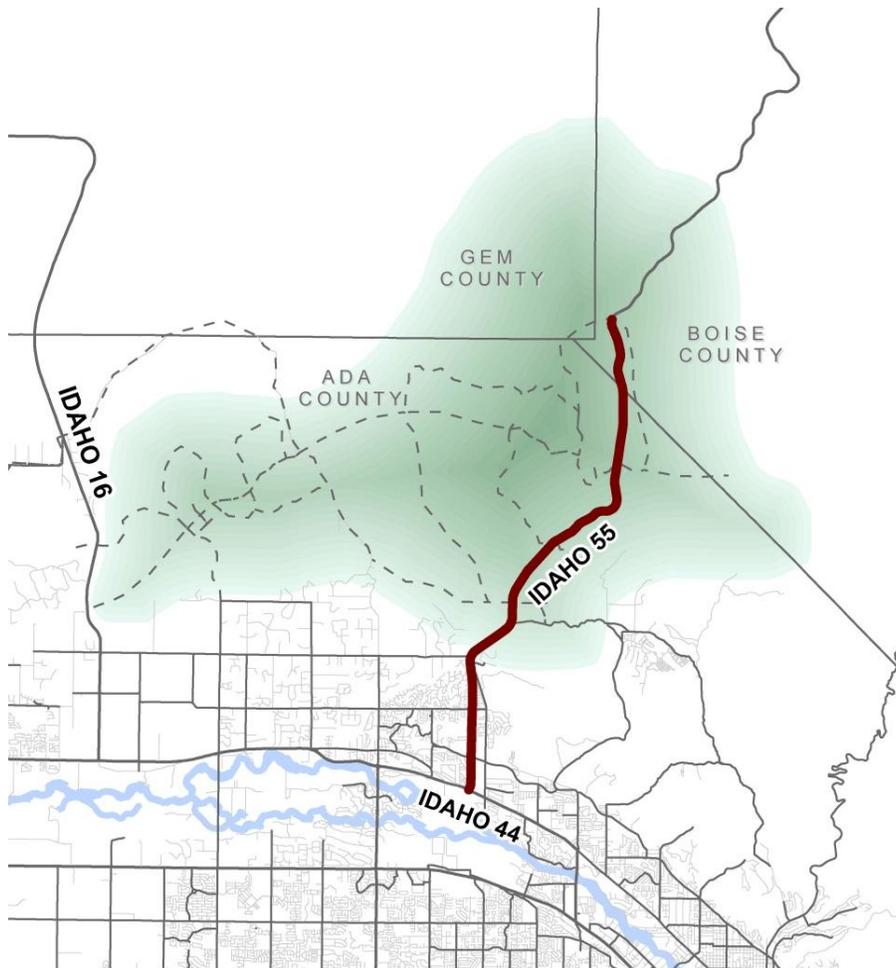


APPENDIX A: Northwest Foothills Traffic Impact Study Update

See attached appendix.

FINAL REPORT

NORTHWEST FOOTHILLS TRAFFIC IMPACT STUDY UPDATE PROJECT No. A010(546), KEY No. 10546



Prepared for:



Idaho Transportation
Department
District 3

Prepared by:



SIX MILE ENGINEERING, PA

December 27, 2013

CERTIFICATION

The analysis and data included in this document were prepared under the responsible charge of Leah G. Kelsey, P.E.



REPORT SUMMARY

Introduction

In 2010, the Idaho Transportation Department (ITD) retained Six Mile Engineering to evaluate the impacts on Idaho 55 from traffic generated by several proposed developments in the northwest foothills of Ada County. The Northwest Foothills Traffic Impact Study used the same demographics estimates, development horizon year (2030) and proposed internal street system in the northwest foothills of Ada County as two earlier studies:

- Northwest Foothills Development Joint Transportation Study (2007 and 2009) prepared for the Highway 55 Owners/Developers Association
- Northwest Foothills Transportation Study (2008) prepared for the Ada County Highway District (ACHD)

In 2013, ACHD updated the Northwest Foothills Transportation Study (NWFTS) to reflect the changes in the demographic forecasts and roadway system for the new planning horizon year, 2035, and to tie the plan to the 2035 Communities in Motion (CIM).

Following ACHD's update of the NWFTS, ITD retained Six Mile Engineering to update the 2010 Northwest Foothills Traffic Impact Study to:

- Estimate when the anticipated traffic demand from the proposed northwest foothills developments exceeds the capacity of the existing infrastructure on Idaho 55
- Identify and prioritize the roadway and intersection improvements needed on Idaho 55 by 2025 (interim planning year) and by 2035 (planning horizon year) to accommodate the anticipated traffic demand

Study Approach

The study approach consisted of conducting a high-level review of ACHD's year 2035 travel demand forecast model with demographics from the proposed foothills developments and future roadway network consistent with the 2035 CIM. Using planning-level capacity analysis and a detailed intersection traffic analysis, transportation improvements were identified on Idaho 55 that are needed to accommodate the base forecasted traffic and the additional forecasted traffic generated by the proposed foothills developments.

ITD established the following operational thresholds for the needed transportation improvements:

- Maximum level of service (LOS) D for conventional at-grade signalized intersections. Intersections that exceed LOS D require grade separation.
- Maximum planning-level LOS D for arterial roadway segments. Segments that exceed LOS D require additional travel lanes or conversion to expressways (uninterrupted flow with grade separated intersections)

Northwest Foothills Developments

The northwest foothills developments consist of several proposed large-scale mixed-use developments, known as planned communities, and several relatively small-scale mixed-use and residential-only developments. The proposed developments are located north of the City of Eagle in Ada, Boise and Gem Counties in the general area between Idaho 55 and Idaho 16. These state highways are critical corridors for access to and from the developments.

The analysis years for this study are:

- 2025 Interim Planning Year
- 2035 Planning Horizon Year (not total build-out)

The developments' proposed internal roadway network was identified by the two previous Northwest Foothills Transportation Studies conducted by ACHD. The ACHD studies identified the following three development approaches that intersect Idaho 55:

- Avimor Road North (future approach)
- Avimor Road South (existing approach)
- Brookside Lane (existing intersection, north of Dry Creek Road)

Study Area

The study area includes the following roadway limits and intersections on Idaho 55:

- Idaho 55 Roadway:
 - From the Idaho 44 junction to the study area limit located north of the Avimor Road North development approach
- Idaho 55 Intersections:
 - Idaho 55 and Avimor Road North (future)
 - Idaho 55 and Avimor Road South
 - Idaho 55 and Brookside Lane (north of Dry Creek Road)
 - Idaho 55 and Beacon Light Road
 - Idaho 55 and Floating Feather Road
 - Idaho 55 and Hill Road

ACHD's travel demand forecast model ends north of the Ada County line at the Avimor Road North intersection; therefore, this update does not include analysis for roadway segments north of Avimor Road North or the future Suncor Road intersection on Idaho 55.

Demographics for Traffic Forecast Models

The 2035 CIM demographics (long-range transportation plan projections) were used for the 2025 and 2035 base demographics and include approximately 6,000 households in the northwest foothills by 2035. As a comparison, the base demographics from our 2010 study had no additional households by the 2030 planning year. The 2040 CIM demographics were not used because they were not adopted by the time this study update was initiated.

Table A summarizes the approximate number of households that are projected in the northwest foothills for each analysis year for this study. The base demographics are the demographics projected in the 2035 CIM and the build demographics are the base demographics plus additional development in the Northwest Foothills.

Table A. Approximate households projected in the northwest foothills

Planning Year	CIM Demographics (Base)	Base plus Additional Development in the Northwest Foothills (Build)
2025 Interim Year	2,000	7,000
2035 Horizon Year	6,000	13,889

The total 2035 horizon year household and job demographics included in the NWFTS Update and this study are:

- Households = 13,889
- Jobs (non-school) = 4,579

ACHD’s NWFTS Update does not include interim year 2025 demographic projections. As a result, the interim demographics for this study were estimated by assuming that approximately 50 percent of the foothills developments’ demographics would be distributed at locations closest to Idaho 55 and Idaho 16 by year 2025.

Roadway Networks for Traffic Forecast Models

Two roadway networks were used in the traffic forecast models:

- **Funded Roadway Network:** The funded roadway network is consistent with the roadway network in the adopted 2035 CIM long-range transportation plan, which excludes unfunded transportation improvements on state routes. Although no unfunded state routes were included in the funded roadway network, unfunded local roadway improvements identified in ACHD’s 2012 Capital Improvements Plan (CIP) are included on two key local roadways in the study area vicinity.

The 2025 and 2035 funded roadway network (2035 CIM with 2012 CIP roadway network) includes the following lanes in the vicinity of the study area:

- 2025 and 2035 Forecasts:
 - Idaho 55:
 - 4 lanes from Idaho 44 to Beacon Light Road (existing)
 - 2 lanes from Beacon Light Road to study area limit (existing)
 - Idaho 44:
 - 4 lanes plus median from Linder Road to Eagle Road (December 2013 anticipated completion)
 - 4 lanes plus median from Eagle Road to Glenwood Street (existing)
 - Beacon Light Road:
 - 4 lanes plus median from Idaho 16 to Idaho 55 (unfunded, widened by 2035 in the 2012 CIP)
 - Hill Road:
 - 4 lanes plus median from Idaho 55 to Seaman’s Gulch Road (unfunded, widened by 2035 in the 2012 CIP)
 - State Street:
 - 6 lanes plus median from Glenwood Street to 36th Street (funded)
- **Needs Roadway Network:** The needs roadway network includes projects in the funded network (2035 CIM plus 2012 CIP roadway network) plus unfunded roadway improvements on state routes that are needed to accommodate the forecasted traffic from 2025 and 2035 adopted model (base) and northwest foothills demographics (build) as determined by a planning-level threshold analysis. The following lanes are included in the needs roadway network in the vicinity of the study area:
 - 2025 Forecasts:
 - Idaho 55:
 - 6 lanes from Idaho 44 to Beacon Light Road (unfunded)
 - 4 lanes from Beacon Light Road to Avimor Road South (unfunded)
 - 2 lanes from Avimor Road South to study area limits (existing)
 - Idaho 44:
 - 4 lanes plus median from Linder Road to State Street (December 2013 anticipated completion)
 - 4 lanes plus median from State Street to Glenwood Street (existing)
 - State Street:
 - 6 lanes plus median from Glenwood Street to 36th Street (funded)

- 2035 Forecasts:
 - Idaho 55:
 - 6 lanes from Idaho 44 to Beacon Light Road (unfunded)
 - 4 lanes from Beacon Light Road to study area limits (unfunded)
 - Idaho 44:
 - 4 lanes plus median from Linder Road to State Street (December 2013 anticipated completion)
 - 4 lanes plus median from State Street to Eagle Road (existing)
 - 6 lanes plus median from Eagle Road to Glenwood Street (unfunded)
 - Although Idaho 44 was not evaluated in detail for this study, widening on this segment is needed by 2035 and was assumed for the needs roadway network. Without widening on Idaho 44, the roadway is constrained and vehicles cannot access Idaho 55, resulting in unrealistic forecasts as described in the Forecasted Traffic Development section of this report.
 - State Street:
 - 6 lanes plus median from Glenwood Street to 36th Street (funded)

Needed Transportation Improvements

The following results were concluded from the intersection traffic analysis and the planning-level traffic threshold volumes. The 2025 and 2035 roadway segment and intersection improvements needed to accommodate base and build traffic are summarized in Table B. The traffic analysis results and needed transportation improvements are based on the developments' demographic projections and the funded roadway network identified at the time of this study. The results of this study are subject to change if the demographic projections change or if there are additional collector or arterial roadway improvements in the vicinity of the study area.

Table B. Idaho 55 needed transportation improvements

Idaho 55	Existing Lanes	2025		2035	
		Base Traffic Lanes	Build Traffic Lanes	Base Traffic Lanes	Build Traffic Lanes
Roadway Segment					
Study Area Limits to Avimor Road North	2	2	2	4	4
Avimor Road North to Avimor Road South	2	2	2	4	4
Avimor Road South to Brookside Lane	2	2	4	4	4
Brookside Lane to Beacon Light Road	2	2	4	4	4
Beacon Light Road to Floating Feather Road	4	4	6	6	6
Floating Feather Road to Hill Road	4	4	6	6	6
Hill Road to Idaho 44	4	4	6	6	6
Intersection					
Avimor Road North	n/a	n/a	G	n/a	G
Avimor Road South	SC	SC	G	SC	G
Brookside Lane	n/a	n/a	G	n/a	G
Beacon Light Road	SC	S	S	S	G
Floating Feather Road	S	S	S	S	G
Hill Road	S	S	O	G	O
Idaho 44	S	S	S	G	G

SC = Stop Controlled; S = Signalized; G = Grade Separated Interchange; O = Overpass

Transportation Improvements Needed by 2025

By 2025, the following improvements are needed on Idaho 55, as illustrated in Figure 17 on page 37.

- 2025 Base Traffic (with demographics for year 2025 from the 2035 CIM):
 - No additional travel lanes needed
 - No grade-separated intersections needed
 - Traffic signal likely warranted at the Beacon Light Road intersection
- 2025 Build Traffic (with demographics for year 2025 from the 2035 CIM plus an assumed 50 percent of the developments' horizon year demographics):
 - 6-lane arterial/expressway from Idaho 44 to Beacon Light Road
 - 4-lane expressway from Beacon Light Road to Avimor Road South
 - No additional travel lanes needed north of Avimor Road South

- Overpass at Hill Road and grade-separated interchanges at Brookside Lane, Avimor Road South and Avimor Road North

The majority of the transportation improvements needed on Idaho 55 to accommodate the anticipated horizon year (2035) traffic demand for the northwest foothills development are needed by 2025.

Transportation Improvements Needed by 2035

By 2035, the following improvements are needed on Idaho 55, as illustrated in Figure 18 on page 38.

- 2035 Base Traffic (with demographics for year 2035 from the 2035 CIM, which includes approximately 6,000 households in the northwest foothills):
 - 6-lane arterial/expressway from Idaho 44 to Beacon Light Road
 - 4-lane uninterrupted flow highway from Beacon Light Road to study area limit
 - Grade-separated intersections at Idaho 44 and Hill Road
- 2035 Build Traffic (with demographics for year 2035 from the 2035 CIM plus 100 percent of the developments' horizon year demographics):
 - 6-lane expressway from Idaho 44 to Brookside Lane
 - 4-lane expressway from Brookside Lane to study area limit
 - Overpass at Hill Road and grade-separated interchanges at the remaining six study area intersections on Idaho 55

Summary of Traffic Analysis Results

The following summarizes the results of the signalized intersection and planning-level traffic analysis.

- Idaho 55
 - 2025 Base Traffic
 - Approximately 10,500 to 19,000 additional vehicles per day travel on Idaho 55 compared to existing traffic.
 - No roadway widening is needed from Idaho 44 to Beacon Light Road, and no grade-separated intersections are needed on the corridor.
 - 2035 Base Traffic
 - Approximately 16,500 to 30,000 additional vehicles per day travel on Idaho 55 compared to existing traffic.
 - Idaho 55 requires widening to six lanes from Idaho 44 to Beacon Light Road with a grade-separated interchange at Idaho 44 and an overpass at Hill Road.
 - From Beacon Light Road to the study area limits, Idaho 55 requires widening to four lanes and should operate as an uninterrupted flow highway.

- 2025 Build Traffic
 - Approximately 23,000 to 35,000 additional vehicles per day travel on Idaho 55 compared to existing traffic.
 - Idaho 55 requires widening to six lanes from Idaho 44 to Beacon Light Road with an overpass at Hill Road.
 - Idaho 55 requires widening to four lanes from Beacon Light Road to Avimor Road South. From Avimor Road South north to the study area limits, Idaho 55 does not require widening.
 - At the development approaches at Brookside Lane, Avimor Road South and Avimor Road North, traffic volumes will increase and signalization will be needed; however, grade separated interchanges are required to maintain an expressway or uninterrupted flow highway.
- 2035 Build Traffic
 - Approximately 28,000 to 41,000 additional vehicles per day travel on Idaho 55 compared to existing traffic.
 - Idaho 55 requires widening to six lanes from Idaho 44 to Beacon Light Road and four lanes from Beacon Light Road to the study area limits and operate as an expressway with grade-separation at all seven study area intersections. Traffic from the proposed northwest foothills developments requires significant transportation improvements on Idaho 55 and – even with the additional unfunded improvements from the needs roadway network – the forecasted traffic on Idaho 55 exceeds the planning-level traffic threshold volumes by 185 percent between Beacon Light Road and Brookside Lane. As a result, the highway is constrained and the ability of vehicles to access the highway will be restricted.
- Idaho 44
 - An evaluation of Idaho 44 was not included in this study; however, with the forecasted base traffic conditions in 2035, Idaho 44 requires widening to six lanes from Glenwood Street to Eagle Road. In the vicinity of Idaho 55, Idaho 44 is overcapacity by 2035 with the funded roadway network and base traffic alone. No reserve roadway capacity exists with the existing 4 lanes plus median. When the roadway is widened to a six lanes, the base traffic uses most or all of the added capacity and little to no reserve capacity remains. Due to the lack of alternative east-west routes and lack of widening improvements on US 20/26 (which is also constrained by 2035), traffic is forced to use Idaho 44 although congestion exists. Because Idaho 44 is constrained, both the base traffic and the development traffic are not able to access Idaho 55. As a result, the impact of the development traffic becomes difficult to delineate from the base traffic without adding lanes.
 - To accommodate 2035 forecasted build traffic, Idaho 44 will require additional lanes beyond what is required for base traffic, but the number of lanes modeled on Idaho 44 was limited to six lanes for this study.

Priority of Transportation Improvements

Key transportation improvements were prioritized as either a first priority or second priority as illustrated in Figure 19 and Figure 20 on pages 43 and 44. Priority for each improvement was assigned by comparing the results of the arterial and intersection analysis and then ranking the improvements relative to each other. The prioritization process also considered where grade separation is needed for expressways and uninterrupted flow highways. In general, key transportation improvements are needed on Idaho 55 starting from the south and improving to the north.

Timing of Needed Improvements

It is unknown whether the actual rate of development in 2025 and 2035 will be equal to the projected demographics used in this study; therefore, the timing of improvements was not estimated in terms of a specific year. It was estimated in terms of the FDOT threshold volumes summarized in Table 4 on page 13. When the traffic on a roadway segment exceeds the LOS D threshold, the need for the roadway improvements is triggered. Because several study area roadway segments require expressways with grade separation at the major intersections, the thresholds for the intersection improvements at these locations are the same as the FDOT roadway thresholds. However, at intersection locations where grade separation is required to accommodate the intersection turning movement traffic, traffic thresholds for the timing were estimated as summarized in Table 16 on page 46.

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INTRODUCTION

In 2010, the Idaho Transportation Department (ITD) retained Six Mile Engineering to evaluate the impacts on Idaho 55 from traffic generated by several proposed developments in the northwest foothills of Ada County. The Northwest Foothills Traffic Impact Study used the same demographics estimates, development horizon year (2030) and proposed internal street system in the northwest foothills of Ada County as two earlier studies:

- Northwest Foothills Development Joint Transportation Study (2007 and 2009) prepared for the Highway 55 Owners/Developers Association
- Northwest Foothills Transportation Study (2008) prepared for the Ada County Highway District (ACHD)

In 2013, ACHD updated the Northwest Foothills Transportation Study (NWFTS) to reflect the changes in the demographic forecasts and roadway system for the new planning horizon year, 2035, and to tie the plan to the 2035 Communities in Motion (CIM) long-range transportation plan.

Following ACHD's update of the NWFTS, ITD retained Six Mile Engineering to update the 2010 Northwest Foothills Traffic Impact Study to:

- Estimate when the anticipated traffic demand from the proposed northwest foothills developments exceeds the capacity of the existing infrastructure on Idaho 55
- Identify and prioritize the roadway and intersection improvements needed on Idaho 55 by 2025 (interim planning year) and by 2035 (planning horizon year) to accommodate the anticipated traffic demand

Study Approach

Specific tasks to achieve the study purpose include:

- Reviewing the development horizon planning year (2035) travel demand forecast model used in the 2013 NWFTS Update conducted by ACHD.
- Identifying the funded and unfunded transportation projects that have potential impacts to the study area.
- Coordinating with ACHD to develop an interim planning year (2025) northwest foothills model.
- Developing forecasted traffic scenarios with varying funded and unfunded roadway improvements for the interim year (2025) and horizon year (2035).
- Identifying transportation improvements within the study area to accommodate the interim year (2025) and horizon year (2035) traffic volumes on Idaho 55.

- Estimating when existing facilities and identified improvements on Idaho 55 are expected to no longer accommodate traffic demand.
- Prioritizing the improvements needed on Idaho 55.

Study Limitations and Assumptions

The study effort was conducted with the following limitations and assumptions:

- Existing traffic counts were not collected and analyzed.
- The assumed horizon year of the northwest foothills developments is 2035, which is consistent with ACHD's 2013 NWFTS Update.
- The ACHD travel demand model was used to develop the traffic forecasts for analysis.
- The interim demographics for this study were estimated by assuming that approximately 50 percent of the foothills developments' demographics would be distributed at locations closest to Idaho 55 and Idaho 16 by 2025.
- The analysis period was limited to the PM peak hour.
- The future roadway network improvements on state routes outside of the study area were consistent with the 2035 CIM, which only include funded and partially funded roadway projects in the Treasure Valley.
- ITD established a maximum level of service (LOS) of D for conventional at-grade signalized intersections. When intersections reached LOS E, they were identified for grade separation (interchange or overpass as directed by ITD).
- ITD limited the maximum planning-level LOS to D for arterial roadways. When a roadway segment reached LOS E, additional lanes were added or uninterrupted flow (expressway) operations were recommended.
- ITD will limit their contribution to roadway widening on Idaho 55 to 6 lanes from Idaho 44 to Brookside Lane and 4 lanes from Brookside Lane to the study area limit.
- Construction cost estimates were not developed for the transportation improvements identified in this study.

STUDY AREA AND PROPOSED DEVELOPMENTS

Study Area Roadway and Intersections

Figure 1 on page 5 shows the study area roadways, county boundaries and surrounding city limits. The study area on Idaho 55 are from Idaho 44 to approximately 1.5 miles north of the Ada County line.

Figure 2 on page 6 shows the general area of the proposed developments and locations of the following seven study area intersections on Idaho 55:

- Avimor Road North (future intersection)
- Avimor Road South (existing intersection)
- Brookside Lane (existing intersection, north of Dry Creek Road)
- Beacon Light Road (existing intersection)
- Floating Feather Road (existing intersection)
- Hill Road (existing intersection)
- Idaho 44 (existing intersection)

The 2010 ITD study extended to the north boundary of the northwest foothills developments in Boise County; however, ACHD's travel demand forecast model ends north of the future Avimor Road North intersection. Therefore, this update does not include analysis for roadway segments north of Avimor Road North or the future Suncor Road intersection on Idaho 55.

Proposed Northwest Foothills Developments

The proposed northwest foothills developments are generally located north of the City of Eagle between Idaho 55 and Idaho 16. Figure 2 on page 6 illustrates the general locations of the developments in relation to the study area roadway and intersections.

For the 2010 ITD study, the northwest foothills developments consisted of ten named developments and several unnamed developments with a horizon year of 2030 which was assumed to be full build-out. Since the completion of the previous study, several planned developments in the northwest foothills have either reduced or canceled plans for development resulting in changes to the demographics and the build-out year.

Due to the large scale of the developments and the slowed rate of future development, an accurate build-out year is difficult to estimate. Realizing that construction of the developments may be delayed, a horizon year of 2035 was established for this study to be consistent with the horizon year analyzed in ACHD's 2013 NWFTS Update. The horizon year was used to determine the needed external roadway improvements at a point in the future before the developments are fully built-out. The updated total horizon year demographics for the northwest foothills developments used in the NWFTS Update and this study are:

- Households – 13,889
- Jobs – 4,579

The internal roadway network for the development was revised with the NWFTS Update and is shown in Figure 2 on page 6. Three access points to the developments on Idaho 55 are identified at Avimor Road North, Avimor Road South and Brookside Lane.

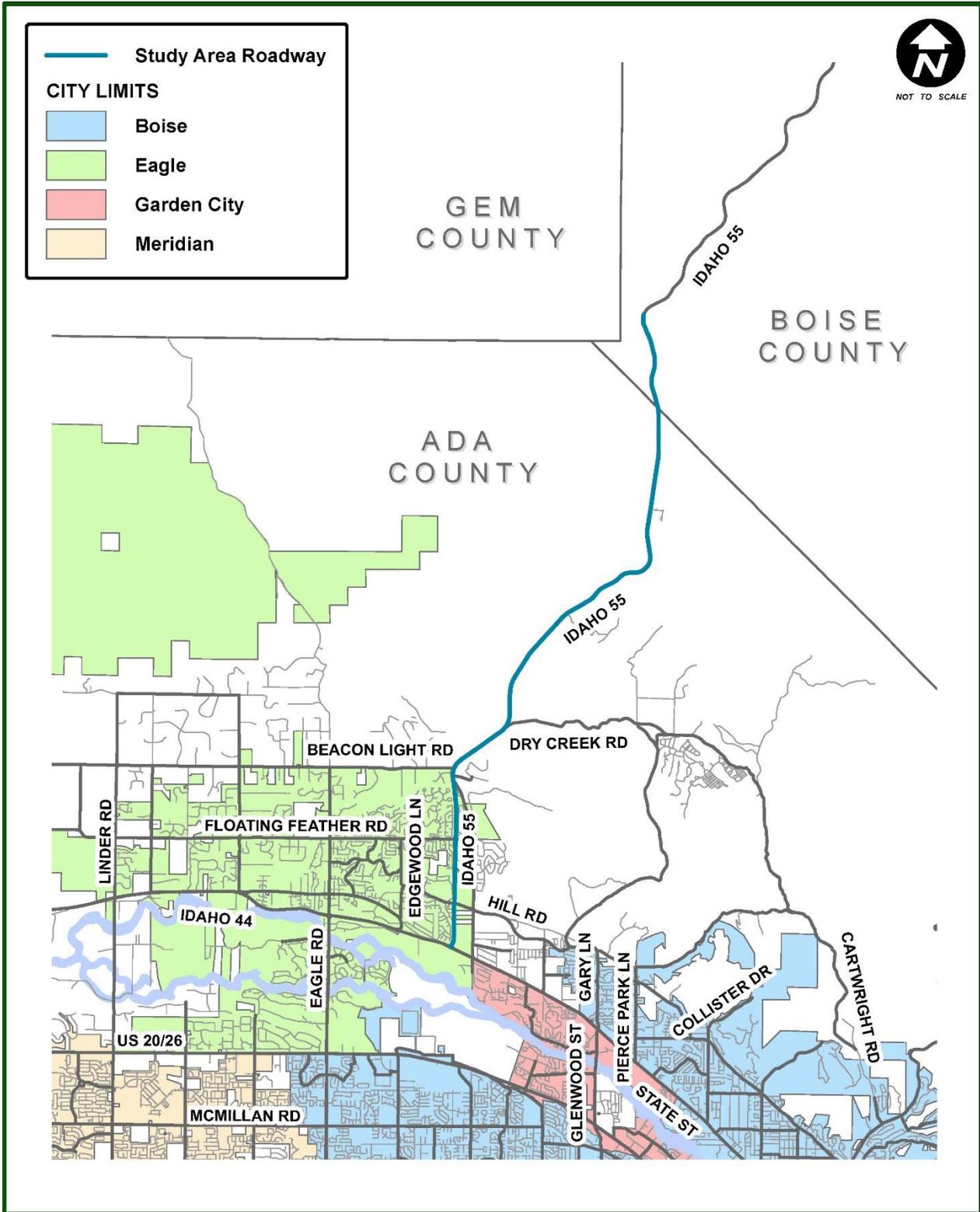


Figure 1. County and city limits

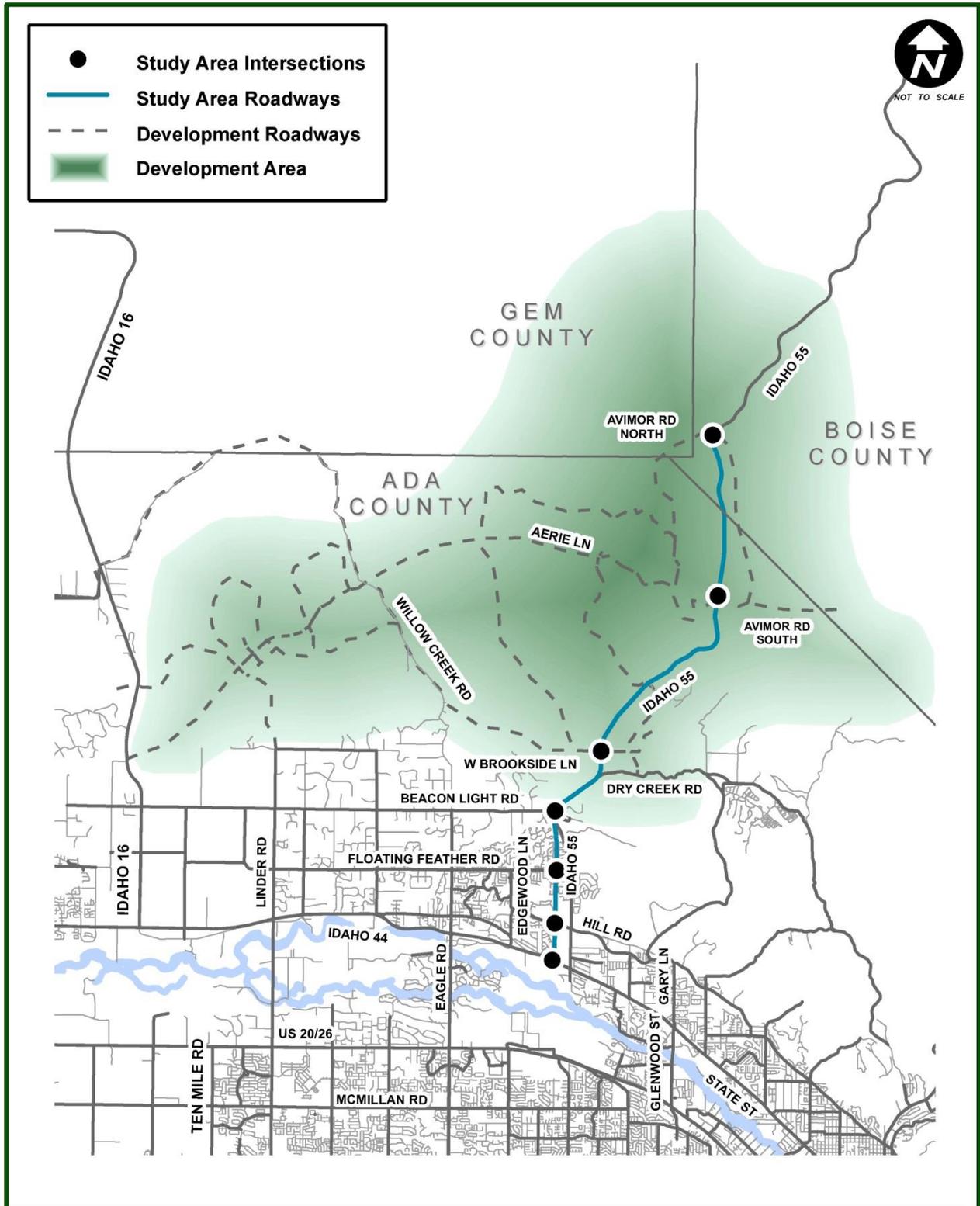


Figure 2. Development area and proposed development roadways

Study Area Roadway Network

Figure 3 on page 8 shows the functional classifications of the development's internal roadways and roadways in the vicinity of the study area. Functional classifications were compiled from the 2035 Functional Classification Map maintained by the Community Planning Association of Southwest Idaho (COMPASS).

Idaho 55 is a state highway that extends from Marsing to New Meadows. Within the study area, it is classified as a principal arterial and has a posted speed limit of 55 to 60 miles per hour. From Idaho 44 to Beacon Light Road it is a limited access facility with approximately one-mile access spacing and 2 lanes in each direction divided by a 4-foot to 14-foot wide painted median. North of Beacon Light Road it transitions to a 2 lane undivided highway with limited access approach locations at minor cross streets and existing homes. From the Shadow Valley canyon to the northern limits of the study area near the base of the Horseshoe Hill grade, the two-lane undivided highway has limited access approach locations, including the Avimor Road South approach.

Idaho 44 is a state highway that extends from I-84 near Caldwell to Glenwood Street in Boise. Within the study area it is classified as a principal arterial and has a posted speed limit of 55 miles per hour. From Eagle Road to Idaho 55 it is a limited access facility with approximately one-mile traffic signal spacing and with 2 lanes in each direction divided by a 4-foot to 14-foot wide painted median. From Idaho 55 to Glenwood Street it has 2 lanes in each direction divided by a 14-foot paved median/two-way left-turn lane. Access density is highest east of Idaho 55 with access permitted at intersections, businesses and homes.

Eagle Road and **Glenwood Street** are functionally classified as principal arterials to the south of Idaho 44 and minor arterials to the north of Idaho 44. To the south, they both have 2 lanes in each direction with a two-way left-turn lane. To the north they both have and one lane in each direction with a two-way left-turn lane. Eagle Road from Idaho 44 south to I-84 is a segment of Idaho 55, and Glenwood Street from State Street to Chinden Boulevard is a segment of Idaho 44.

Hill Road, Beacon Light Road and **Floating Feather Road** are minor arterials and/or collectors with two lanes in each direction. A design is currently ongoing to widen Hill Road to 3 lanes west of Idaho 55 and is assumed to be constructed before the interim year (2025). ACHD's 2012 Capital Improvement Plan (CIP) identifies widening improvements on Hill Road to 5 lanes east of Idaho 55 and widening improvements on Beacon Light Road to 5 lanes west of Idaho 55. These improvements are assumed to be constructed before the horizon year (2035).

Traffic signals are currently operating on Idaho 55 at Idaho 44, Hill Road and Floating Feather Road. Beacon Light Road is currently stop-controlled, but it is assumed that it will be signalized by the interim year (2025). Figure 4 on page 9 shows the existing average daily traffic (ADT) on Idaho 55 within the study area.

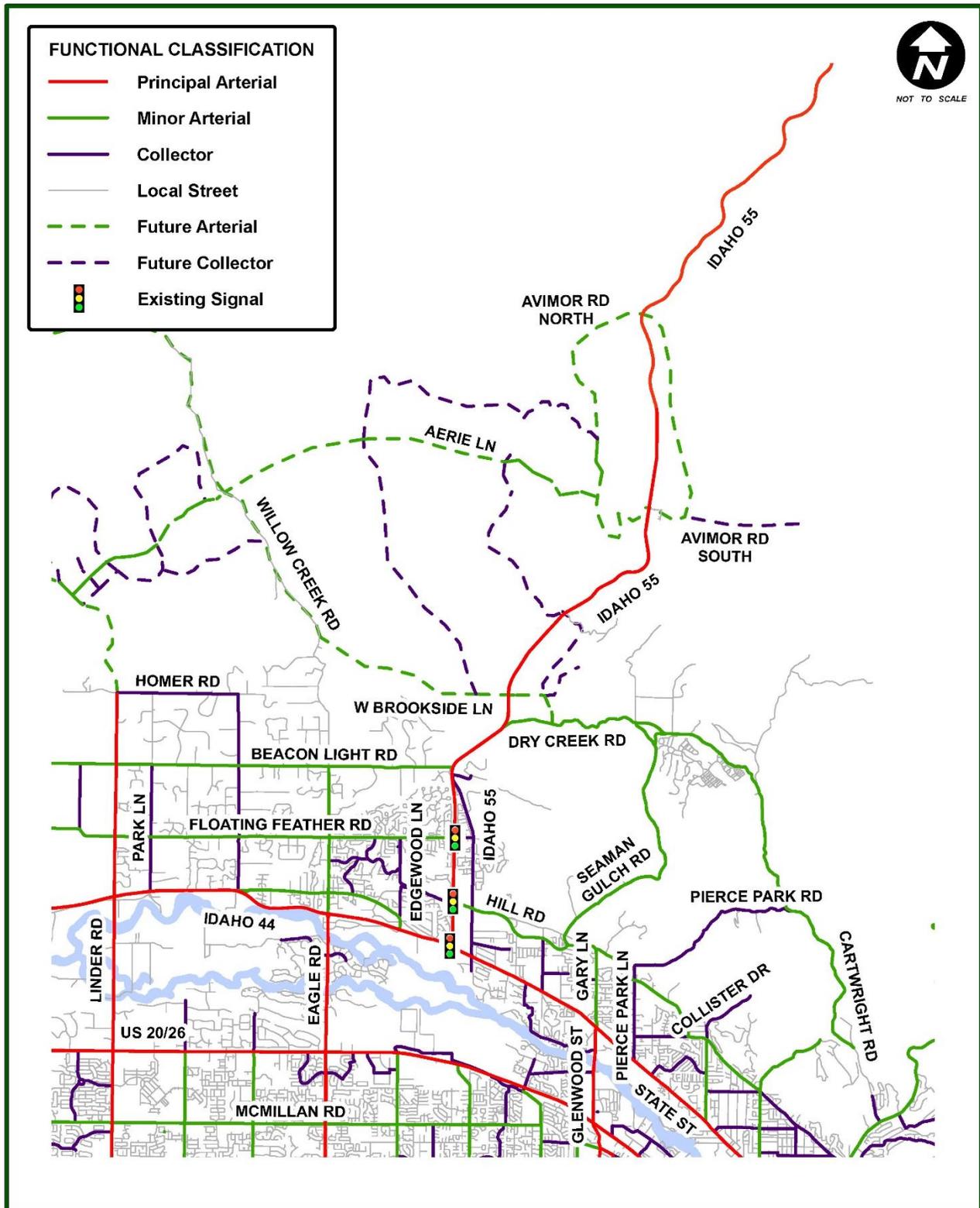


Figure 3. Functional classifications and existing signaled study area intersections

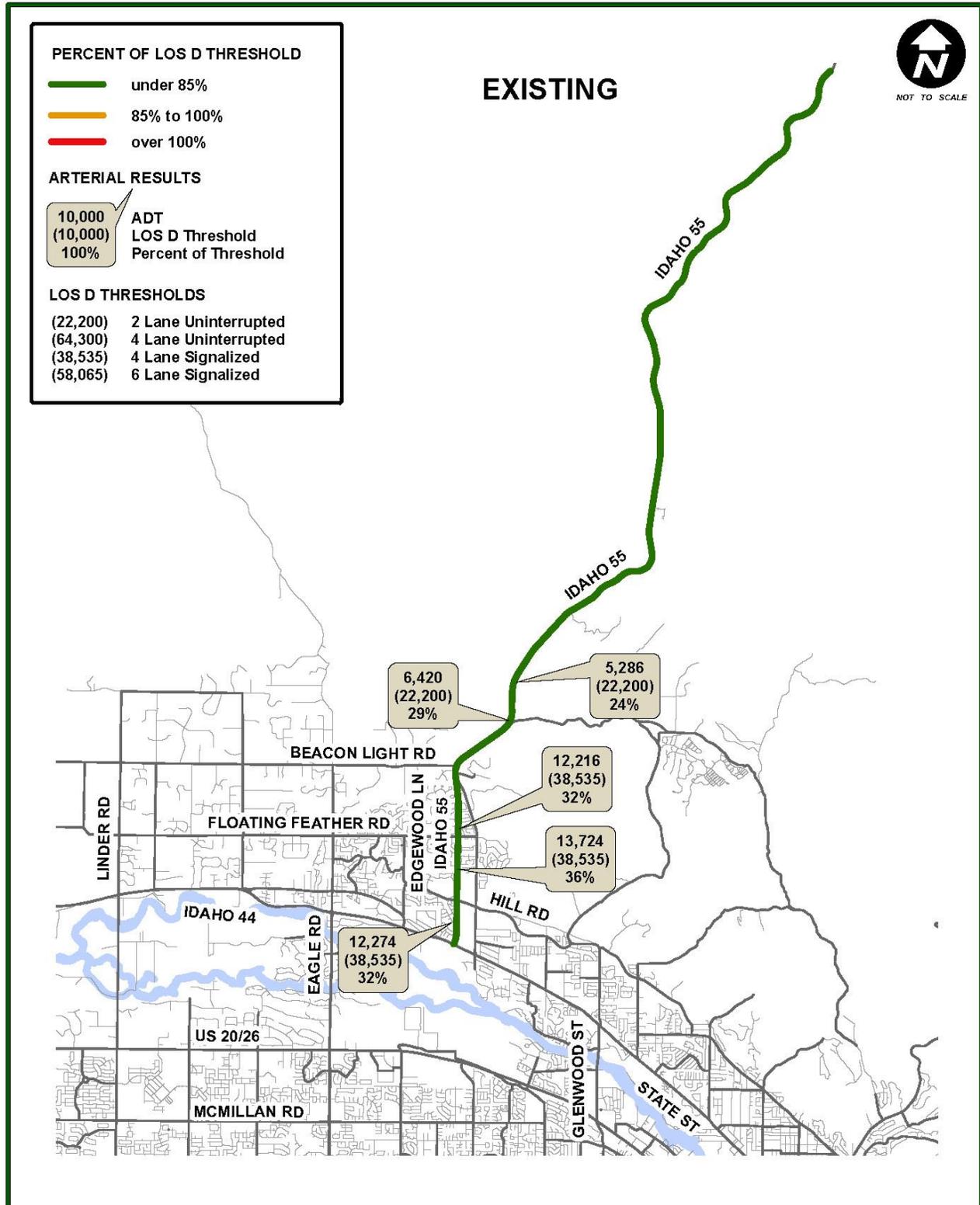


Figure 4. Existing ADT, arterial thresholds and percent of thresholds

Long-Range Transportation Plans

This future roadway network in the vicinity of this study area consider two key transportation plans – Communities in Motion (CIM) and ACHD’s Capital Improvement Plan (CIP). The approved long-range transportation plan during the analysis stages of the project was the 2035 CIM (the 2040 CIM update was in-progress). Many of the state and local roadway improvements identified during the CIM process are not included in the adopted 2035 CIM future roadway network due to lack of funding. ACHD’s 2012 CIP identifies two key local roadway improvements in the vicinity of the study roadway, which do not have funding at this time.

Table 1 summarizes the key funded, partially funded and unfunded improvements in the study area vicinity that are reflected in the 2035 CIM and 2012 CIP.

Table 1. Key funded, partially funded and unfunded roadway improvements in study area vicinity

Plan	Roadway	From	To	Improvement	Comment
2035 CIM	Funded				
	None	-	-	-	-
	Partially Funded				
	Idaho 44/State Street	Idaho 55	Downtown Boise (Multi-Modal Center)	6 Lanes plus median	Funded in part from Glenwood Street to 36 th Street
	Idaho 16	Ada/Gem County Line	I-84	4 Lanes	Funded in part from Idaho 44 to US 20/26
	Linder Road	Ustick Road	Beacon Light Road	4 Lanes plus median	Funded in part from Franklin Road to Chinden Boulevard
	Unfunded				
	Beacon Light Road	Idaho 16	Idaho 55	4 Lanes plus median	-
	Idaho 55	Beacon Light Road	Brookside Lane	4 Lanes	-
	Three Cities River Crossing	Idaho 44	US 20/26 (Chinden Boulevard)	4 Lane Bridge	-
US 20/26	I-84, Exit 29	Eagle Road	4 Lanes	-	
2012 CIP	Unfunded				
	Beacon Light Road	Idaho 16	Idaho 55	4 Lanes plus median	-
	Hill Road	Idaho 55	Seaman’s Gulch Road	4 Lanes plus median	-

NWFTS Update Model

The travel demand forecast models used in ACHD’s NWFTS Update were reviewed. The differences between the NWFTS Update model network and the approved base roadway network from the 2035 CIM network are shown in Table 2. The roadway improvements included in the NWFTS Update that are listed below are not funded improvements in the 2035 CIM.

Table 2. Travel demand model roadway network differences

Roadway	2035 CIM Approved Base Model Roadway Network	NWFTS Update Model Roadway Network
Idaho 55	•2 lanes north of Beacon Light Road to study area limits	•4 lanes north of Beacon Light Road to study area limits
Idaho 16	•2 lanes north of Idaho 44 •2 lanes south of US 20/26	•4 lanes north of Idaho 44 •4 lanes south of US 20/26
Black Cat Road	•3 lanes south of US 20/26	•5 lanes south of US 20/26

Upon further review of the NWFTS Update travel demand model, two key traffic analysis zones (TAZ) in the vicinity of Idaho 55 included errors. The TAZ adjacent to the east segment of Avimor Road North and the TAZ adjacent to the northernmost segment Idaho 55 were incorrectly connected to the roadway network, resulting in reduced travel demand on Avimor Road North and Idaho 55. Because of the inaccuracies in the roadway network and traffic analysis zones in the NWFTS Update models, new travel demand forecast models were developed for this study.

FORECASTED TRAFFIC

Traffic volumes from the ACHD regional travel demand forecast model were analyzed for this study. To determine the needed roadway improvements on Idaho 55, forecasted traffic from several different model scenarios were evaluated, and final model scenarios were carried forward for detailed traffic analysis. This section of the report discusses the model parameters (analysis years, demographics and roadway network) and the development of the final model scenarios.

Demographics

To determine the impacts to Idaho 55, the base (adopted regional travel demand model) and build (plus northwest foothills) demographics were evaluated for an interim year (2025) and the horizon year (2035). Table 3 summarizes the approximate number of households that are projected in the northwest foothills for each analysis year for this study.

Table 3. Approximate households projected in the northwest foothills

Planning Year	CIM Demographics (Base)	Base plus Additional Development in the Northwest Foothills (Build)
2025 Interim Year	2,000	7,000
2035 Horizon Year	6,000	13,889

Base

To remain consistent with ACHD’s NWFTS Update, the interim year (2025) and horizon year (2035) base demographics used for this study are from the 2035 CIM. The 2035 CIM update includes a growth control total that exceeds a population of 1 million and includes approximately 6,000 additional households in the northwest foothills area (located approximately between Beacon Light Road to north of the Ada County line and between Idaho 16 and Idaho 55). The 2030 CIM demographics used for the previous 2010 ITD study included relatively few households or jobs in northwest foothills area.

Build

The horizon year (2035) northwest foothills developments’ total demographics used for this study and ACHD’s NWFTS Update are:

- Households – 13,889
- Jobs (non-school) – 4,579

ACHD’s NWFTS Update does not include interim year 2025 demographic projections. As a result, the interim demographics for this study were estimated by assuming that approximately 50 percent of the foothills developments’ demographics would be distributed at locations closest to Idaho 55 and Idaho 16 by year 2025.

Planning-Level Thresholds

To estimate the number of lanes required to accommodate the future traffic on Idaho 55, the forecasted daily traffic volumes were compared to roadway planning thresholds from the *2010 Florida Department of Transportation (FDOT) Quality/Level of Service Handbook*. The FDOT thresholds are a result of analytical techniques from recent research in Florida. Currently, there are no local or nationally accepted threshold volumes; therefore, the FDOT threshold volumes were approved for use in this study. Note that the FDOT threshold capacity is not the actual capacity of roadway as determined by standard engineering practice. With standard engineering practice, the roadway threshold capacity on arterials, highways and expressways is determined by other quantitative methods outlined in the *2010 Highway Capacity Manual*.

Three roadway facility types defined by the *2010 Highway Capacity Manual* – freeway/expressway, uninterrupted flow highway, and state signalized arterial – are included in the *FDOT Handbook*. The roadway facility types are classified by their number of lanes, major intersection spacing, median types and access restrictions. The three roadway facility types used for this study are defined by FDOT as follows:

- Freeways/Expressways – multilane, divided roadways with at least two lanes for exclusive use of traffic in each direction and full control of ingress and egress (direct access limited to grade-separated intersections)
- Highways – generally uninterrupted flow roadways which may be further categorized as two-lane or multilane
- Class I State Arterials – non-rural signalized roadways that primarily serve through traffic with speed limits of at least 45 miles per hour and an average signal density of less than 2 signals per mile

For this study, ITD limited the maximum LOS threshold for roadways to LOS D. The LOS threshold volumes vary depending on the area type, roadway type, number of lanes, and other factors such as turn lanes and medians. Although some study area roadway segments are located in a transitional area between urban areas and rural areas, the areas surrounding these roadways are assumed to be more urbanized by 2025 and 2035; therefore, all threshold volumes used for this study are for urbanized areas. Table 4 summarizes the average daily volume LOS D thresholds for urbanized areas.

Table 4. FDOT LOS D ADT thresholds (urbanized areas)

Lanes	State Signalized Arterial	Uninterrupted Flow Highway	Freeway/ Expressway
2	17,325	22,200	n/a
4	38,535	64,300	73,600
6	58,065	96,400	110,300

The results of the planning-level capacity analysis are presented in the tables and figures in subsequent sections of the report. Roadway segments that exceed the thresholds are highlighted with red text in the tables. In the figures, the percent of the LOS D threshold results are presented graphically with different colors representing the following three ranges:

- Under 85 percent – Under capacity with a significant amount of reserve capacity
- 85 to 100 percent – Approaching maximum capacity
- Over 100 percent – Overcapacity with more average daily traffic volume than available capacity (potentially constrained roadway segment)

Note that the FDOT planning-level thresholds are not the maximum roadway capacities in the ACHD travel demand model. Roadway capacities are not defined in the ACHD model, instead vehicles attempt to minimize their travel time within the given roadway network, and therefore, the capacity of a roadway becomes a function of the number of lanes and speed limits.

Preliminary Modeling Results

A number of preliminary forecast model runs were generated to determine the roadway improvement scenarios that would yield useful and comparable results between the base traffic and northwest foothills developments traffic. The preliminary modeling was used to identify the constraints and limitations of the modeled roadway network. Planning-level capacity analysis results were used to compare model scenarios and determine the transportation impacts.

In general, the base and build demographics were applied to the following two roadway network scenarios for the preliminary modeling:

- **Funded Roadway Network** includes only the funded and partially funded projects identified in the 2035 CIM plus the unfunded roadway improvement projects on Beacon Light Road and Hill Road identified in the 2012 CIP.
- **Needs Roadway Network** includes the funded and partially funded projects in the 2035 CIM and the three unfunded projects in the 2012 CIP plus additional improvements on Idaho 55 and Idaho 44 that are not funded but are required to accommodate forecasted traffic. Unfunded improvements on other roadways are not included.

Funded Roadway Network

The funded roadway network is consistent with the roadway network in the adopted 2035 CIM, which does not include any unfunded transportation improvements in the Treasure Valley. The funded roadway network also includes unfunded roadway improvements on Beacon Light Road and Hill Road that are identified in the 2012 CIP.

Table 5 on page 15 shows the roadway lanes included in the funded roadway network scenarios.

Table 5. Funded roadway networks

Study Area Roadway	2025 Funded Network	2035 Funded Network
Idaho 55	<ul style="list-style-type: none"> •4 lanes from Idaho 44 to Beacon Light Road (existing) •2 lanes from Beacon Light Road to study area limits (existing) 	<ul style="list-style-type: none"> •4 lanes from Idaho 44 to Beacon Light Road (existing) •2 lanes from Beacon Light Road to study area limits (existing)
Other Roadways in Study Area Vicinity		
Beacon Light Road	<ul style="list-style-type: none"> •2 lanes from Idaho 16 to Idaho 55 (existing) 	<ul style="list-style-type: none"> •4 lanes plus median from Idaho 16 to Idaho 55
Hill Road	<ul style="list-style-type: none"> •3 lanes from Edgewood Lane to Idaho 55 •2 lanes from Idaho 55 to Seaman’s Gulch Road (existing) 	<ul style="list-style-type: none"> •3 lanes from Edgewood Lane to Idaho 55 •4 lanes plus median from Idaho 55 to Seaman’s Gulch Road
Idaho 44	<ul style="list-style-type: none"> •4 lanes plus median from Linder Road to State/Ballantyne Lane (December 2013 anticipated completion) •4 lanes plus median from State/Ballantyne Lane to Glenwood Street (existing) 	<ul style="list-style-type: none"> •4 lanes plus median from Linder Road to State/Ballantyne Lane (December 2013 anticipated completion) •4 lanes plus median from State/Ballantyne Lane to Glenwood Street (existing)
State Street	<ul style="list-style-type: none"> •6 lanes plus median from Glenwood Street to 36th Street 	<ul style="list-style-type: none"> •6 lanes plus median from Glenwood Street to 36th Street

The complete internal roadway network for the northwest foothills development was included with the funded roadway network when the interim year (2025) and the horizon year (2035) build demographics were added for modeling purposes. A detailed summary of the planning-level capacity analysis is included in the Appendix.

Needs Roadway Network

To determine the roadway improvements needed by the interim year (2025) and the horizon year (2035), additional lanes were added to the funded roadway network. The improvements added to Idaho 55 were constrained by the limits set by ITD. However, for the 2035 needs network, improvements on Idaho 44 were required in order to provide realistic forecasts and to adequately quantify the needed improvements on Idaho 55. To minimize the number of preliminary evaluations required to determine the 2035 needs roadway network, the roadway improvement combinations were reduced to the following two scenarios:

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- Scenario 1 – Unfunded improvements were added to only Idaho 55 within the study limits.
- Scenario 2 – The same improvements in Scenario 1 were added to Idaho 55 plus additional unfunded improvements were added to Idaho 44 within the study area vicinity.

Table 6 summarizes the roadway improvements included in the 2025 and 2035 needs roadway network scenarios.

Table 6. Needs roadway networks

Study Area Roadway	2025 Needs Roadway	2035 Needs Roadway Scenario 1	2035 Needs Roadway Scenario 2
Idaho 55	<ul style="list-style-type: none"> •6 lanes from Idaho 44 to Beacon Light Road •4 lanes from Beacon Light Road to Avimor Road South •2 lanes from Avimor Road South to study area limits (existing) 	<ul style="list-style-type: none"> •6 lanes from Idaho 44 to Beacon Light Road •4 lanes from Beacon Light Road to study area limits 	<ul style="list-style-type: none"> •6 lanes from Idaho 44 to Beacon Light Road •4 lanes from Beacon Light Road to study area limits
Other Roadways in Study Area Vicinity			
Idaho 44	•4 lanes plus median from Eagle Road to Glenwood Street (existing)	•4 lanes plus median from Eagle Road to Glenwood Street (existing)	•6 lanes from Eagle Road to Glenwood Street

The 2035 base and build demographics were added to the 2035 needs Scenario 1 and Scenario 2 roadway networks and the resulting forecasted daily traffic results were compared. Due to the large amount of data, a detailed summary of the planning-level capacity analysis is included in the Appendix. Table 7 and Table 8 on page 17 summarize the planning-level analysis for three key areas.

Table 7. Planning-level capacity results – base demographics with needs network scenarios

Roadway	Location	2035 Base Scenario 1				2035 Base Scenario 2			
		LOS D Threshold	Thresh- old Lanes ¹	ADT (vpd)	Percent of LOS D Threshold	LOS D Threshold	Thresh- old Lanes ¹	ADT (vpd)	Percent of LOS D Threshold
Idaho 55	Hill Road to Idaho 44	58,065	6	28,300	49%	58,065	6	39,800	69%
Hill Road	Edgewood Lane to Idaho 55	15,595	2	9,200	59%	15,595	2	7,000	45%
	Idaho 55 to Horseshoe Bend Road	34,685	4	37,200	107%	34,685	4	21,300	61%
Idaho 44	Edgewood Lane to Idaho 55	38,535	4	49,900	129%	58,065	6	62,300	107%
	Idaho 55 to Horseshoe Bend Road	38,535	4	54,200	141%	58,065	6	77,100	133%

¹Signalized Arterial Threshold

Table 8. Planning-level capacity results – build demographics with needs network scenarios

Roadway	Location	2035 Build Scenario 1				2035 Build Scenario 2			
		LOS D Threshold	Thresh- old Lanes ¹	ADT (vpd)	Percent of LOS D Threshold	LOS D Threshold	Thresh- old Lanes ¹	ADT (vpd)	Percent of LOS D Threshold
Idaho 55	Hill Road to Idaho 44	58,065	6	44,700	77%	58,065	6	53,600	92%
Hill Road	Edgewood Lane to Idaho 55	15,595	2	10,300	66%	15,595	2	8,400	54%
	Idaho 55 to Horseshoe Bend Road	34,685	4	37,900	109%	34,685	4	25,500	74%
Idaho 44	Edgewood Lane to Idaho 55	38,535	4	49,400	128%	58,065	6	66,800	115%
	Idaho 55 to Horseshoe Bend Road	38,535	4	58,600	152%	58,065	6	79,800	137%

¹Signalized Arterial Threshold

Scenario 2 – with 6 lanes on Idaho 44 – was selected as the preferred needs scenario based on the following results:

- With four lanes on Idaho 44, Idaho 44 in the vicinity of Idaho 55 is overcapacity with the 2035 base and build traffic and no reserve capacity exists. Idaho 44 is constrained and vehicles cannot access Idaho 55, resulting in unrealistic forecasts.
- With four lanes on Idaho 44, Idaho 44 is constrained and additional east-west traffic in the vicinity is using Hill Road. As a result, Hill Road east of Idaho 55 is overcapacity with the 2035 base and build traffic and has forecasted volumes comparable to volumes expected on major arterials.
- With six lanes on Idaho 44, Hill Road east of Idaho 55 is under capacity and the level of congestion on Idaho 44 is reduced. However, Idaho 44 remains overcapacity which indicates that at least six lanes are needed to accommodate future traffic.

Models Selected for Traffic Analysis

With the addition of the base demographics added to the needs roadway network, the following five demographic and roadway alternatives were selected for traffic analysis:

- 2025 Base Demographics plus Funded Roadway Network
- 2025 Build Demographics plus Needs Roadway Network
- 2035 Base Demographics plus Funded Roadway Network
- 2035 Base Demographics plus Needs Roadway Network
- 2035 Build Demographics plus Needs Roadway Network

One of the project objectives is to determine the transportation improvements that are needed with and without the addition of the northwest foothills developments' traffic. Typically this is achieved by comparing the base model results with the build model results (totaling four alternatives with 2025 and 2035 analysis years). However, the needs roadway networks for this study change between the base and build models, and as a result, it becomes difficult to compare the results because the roadway networks are not equivalent. In order to compare the forecast results and draw meaningful conclusions, a different approach to modeling base and build conditions was needed.

When a roadway is widened to add capacity, congestion on the roadway is decreased, and as a result traffic demand from parallel or nearby roadways may redistribute to the roadway to minimize their travel time. Also, if an overcapacity or constrained roadway is widened, there will likely be an increase in the base traffic demand because more vehicles can now access the roadway. If the roadway is constrained under base traffic conditions, the needed improvement is driven by base traffic in addition to development traffic. On the other hand, if a roadway is widened and the excess capacity is not used by base traffic, then the improvement is driven by development traffic only. Therefore, in order to help delineate between improvements which are driven by development traffic or base traffic, it is necessary to evaluate the base demographics with both the funded roadway network and the needs roadway network.

To determine the roadway improvements needed by the interim year (2025), additional lanes were added to the funded roadway network to meet the capacity needs of the build traffic. Idaho 55 was modeled with 4 lanes plus median from Idaho 44 to Avimor Road South. The build traffic forecasted volumes increased when additional lanes were added on Idaho 55, indicating that the roadway was constrained. The planning-level analysis for the build traffic on the needs roadway network is summarized in the Traffic Analysis section of the report on page 21.

Figure 5 on page 19 illustrates the existing and funded roadway networks on state routes. Figure 6 on page 20 illustrates the 2025 and 2035 needs roadway networks. The 2035 needs roadway network is also summarized in Table 6 on page 16.

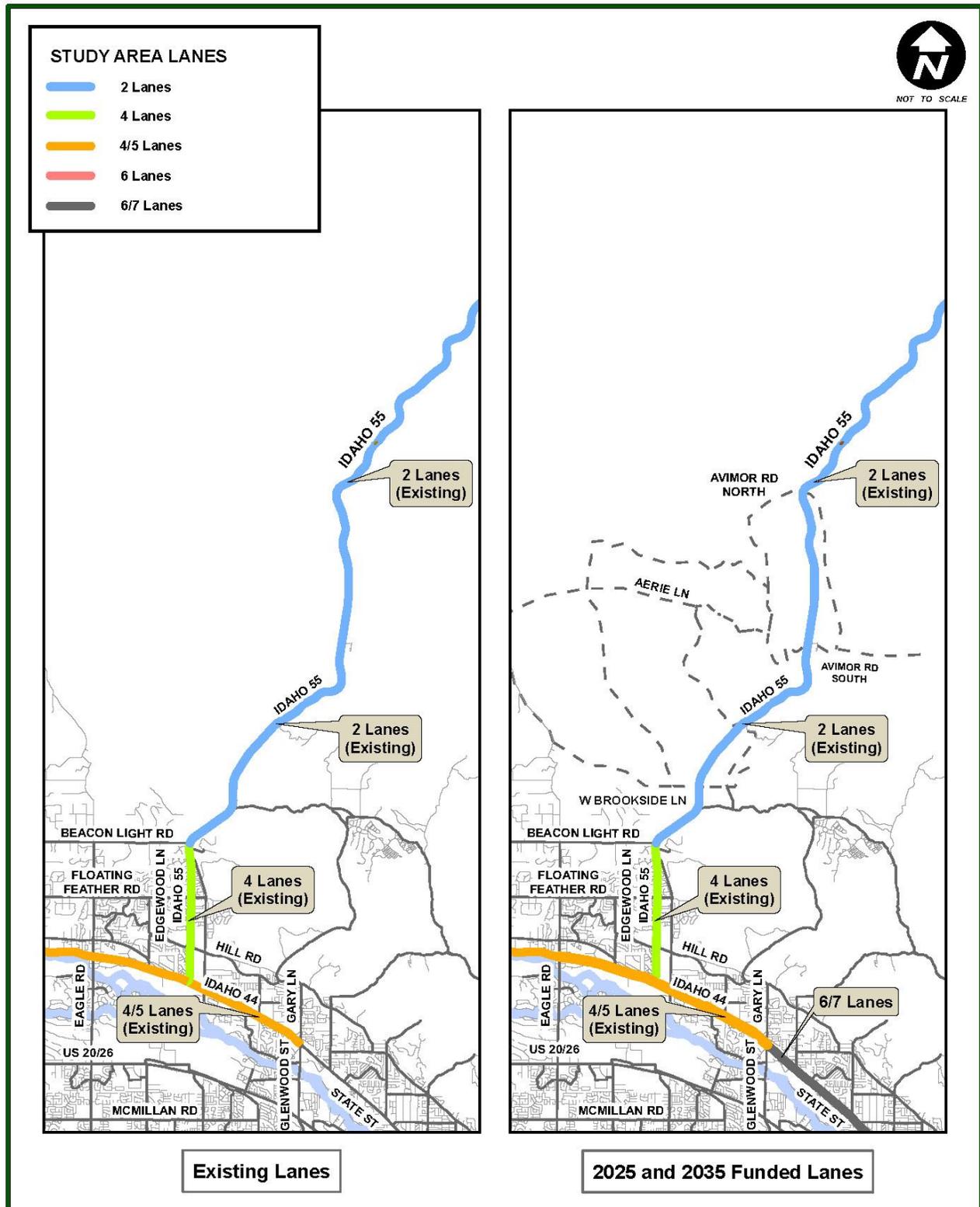


Figure 5. Existing, 2025 and 2035 funded roadway networks

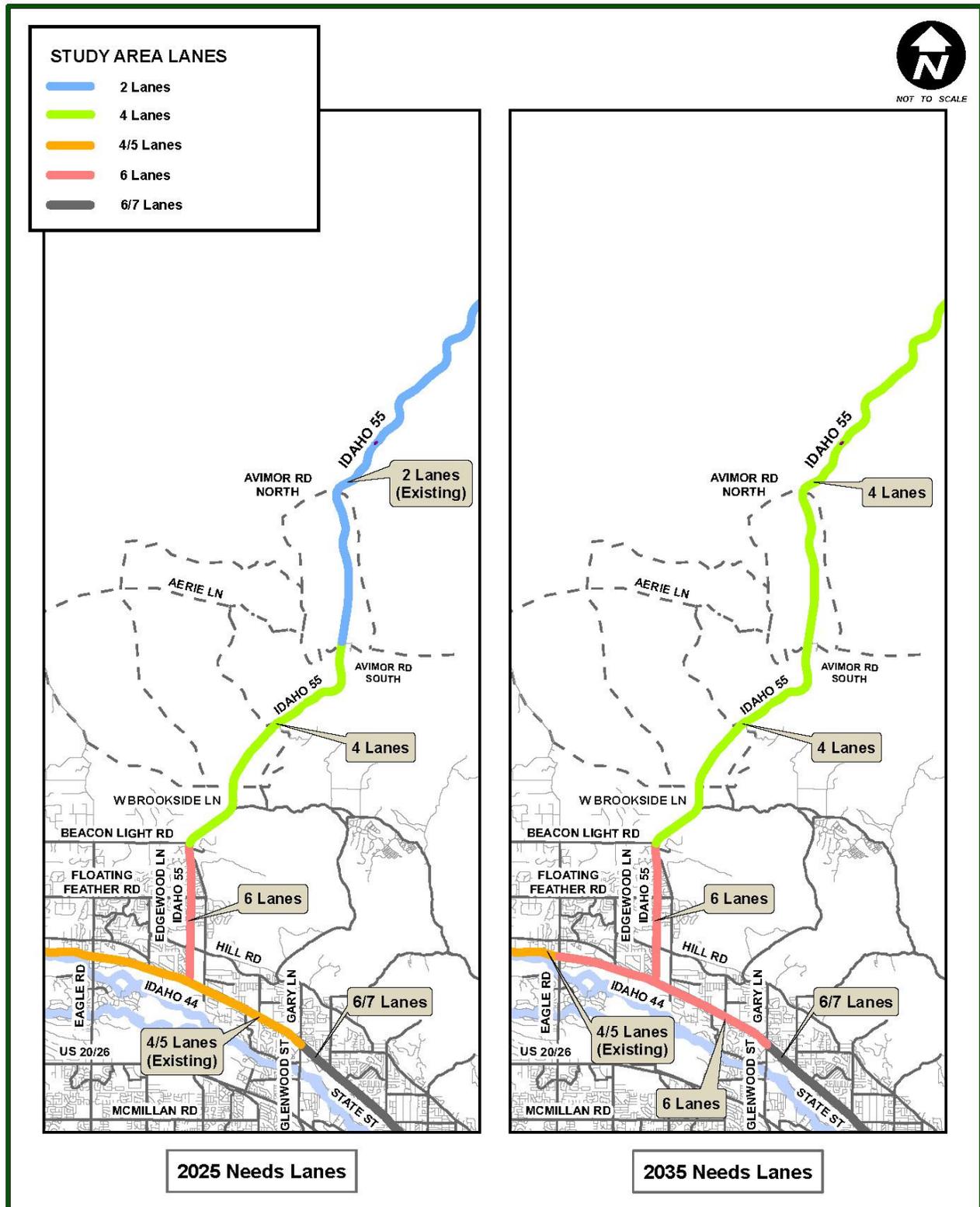


Figure 6. 2025 and 2035 needs roadway networks

TRAFFIC ANALYSIS

The traffic analysis consists of a detailed intersection turning movement analysis and planning-level capacity analysis for the 2025 and 2035 forecasts. Although the FDOT traffic thresholds used for the planning-level capacity analysis can indicate the number of lanes and type of facility that is needed, the capacity of urban roadways is controlled by the signalized intersection operations, requiring a detailed intersection analysis. From the intersection analysis, the required intersection lane configurations were determined, with limitations on the number of through lanes that are consistent with the funded and needs roadway networks.

Signalized Intersection Operations Analysis

Peak Hour Turning Movement Traffic

The forecasted PM peak hour intersection turning movement traffic was developed by balancing the forecasted peak hour approach volumes with the existing intersection turning movement percentages, where available, using the Furness Method. The Furness Method is a turning movement estimation technique presented in *NCHRP 255* that alternately balances the entering and departing traffic until the results converge, providing balanced forecasted turning movement traffic at the intersection. Peak hour approach volumes for the PM peak hour were taken from the peak hour travel demand models provided by ACHD.

Where existing turning movement percentages were not available, the forecasted traffic was distributed manually to balance the entering and departing traffic.

Signalized Intersection Analysis

The 2025 and 2035 forecasted PM peak hour intersection turning movement traffic was analyzed with Synchro 8 which is consistent with methodology in the *2010 Highway Capacity Manual*. The following analysis parameters were assumed for this study based on traffic trends in Ada County and the limitations established in the study scope:

- The number of through lanes on Idaho 55 is limited by the lanes identified for the funded and needs roadway networks. Only the minimum number of turn lanes needed for the intersection to achieve a LOS D were added.
- Dual left-turn lanes were not added to every approach with opposing dual left-turn lanes if the intersection was under capacity or the volume did not warrant a second left-turn lane. Dual left-turn lanes were only added where adequate receiving lanes were anticipated.
- Intersections were evaluated with fully-actuated uncoordinated signal control and assumed cycle lengths. Signal timing splits were optimized using Synchro 8.

Table 9 and Table 10 on page 22 summarize the interim year (2025) and the horizon year (2035) signalized intersection analysis results. The results that exceed a LOS D (over 55 seconds of control delay) or are overcapacity are highlighted with red text.

Table 9. 2025 signalized intersection results

Intersection	2025 Base Funded					2025 Build Needs				
	LOS	Control Delay (s)	Int. v/c Ratio	Max Lane Group v/c Ratio	Cycle Length (s)	LOS	Control Delay (s)	Int. v/c Ratio	Max Lane Group v/c Ratio	Cycle Length (s)
Avimor Road North	n/a					C	22	0.65	0.81 (EBR)	150
Avimor Road South	n/a					C	23	0.60	0.85 (NBL)	150
Brookside Lane	n/a					C	27	0.74	0.88 (NBL)	150
Beacon Light Road	C	22	0.65	0.87 (NBL)	150	B	19	0.72	0.90 (NBL)	150
Floating Feather Road	C	35	0.79	0.91 (NBL)	150	D	36	0.82	0.92 (NBL)	150
Hill Road	D	54	0.92	1.11 (WBR)	150	F	103	1.12	1.85 (WBR)	150
Idaho 44	C	24	0.79	0.87 (EBL)	150	C	29	0.86	0.91 (EBL)	150

Table 10. 2035 signalized intersection results

Intersection	2035 Base Funded					2035 Base Needs					2035 Build Needs				
	LOS	Control Delay (s)	Int. v/c Ratio	Max Lane Group v/c Ratio	Cycle Length (s)	LOS	Control Delay (s)	Int. v/c Ratio	Max Lane Group v/c Ratio	Cycle Length (s)	LOS	Control Delay (s)	Int. v/c Ratio	Max Lane Group v/c Ratio	Cycle Length (s)
Avimor Road North	n/a					n/a					C	34	0.74	0.91 (EBR)	200
Avimor Road South	n/a					n/a					F	87	1.01	1.40 (EBR)	200
Brookside Lane	n/a					n/a					F	89	1.10	1.87 (EBR)	200
Beacon Light Road	C	35	1.14	0.96 (SBR)	150	C	32	1.20	0.93 (SBR)	180	D	51	0.98	1.02 (NBL)	200
Floating Feather Road	E	58	1.05	1.00 (WBT)	150	C	35	0.84	0.93 (NBL)	180	E	63	1.03	1.48 (WBR)	200
Hill Road	F	93	1.26	1.53 (WBR)	150	F	96	1.09	1.83 (WBR)	180	F	90	1.32	1.61 (WBR)	200
Idaho 44	C	28	0.85	0.89 (EBL)	150	E	70	1.01	1.24 (EBL)	180	F	92	1.06	1.64 (EBL)	200

Planning-Level Capacity Analysis

The interim year (2025) and horizon year (2035) planning-level capacity analysis results for the five model scenarios are summarized in Table 11 and Table 12 on page 24.

Table 11. 2025 planning-level capacity results

Location	2025 Base Funded				2025 Build Needs			
	LOS D Threshold	Thresh- old Lanes	ADT (vpd)	Percent of LOS D Threshold	LOS D Threshold	Thresh- old Lanes	ADT (vpd)	Percent of LOS D Threshold
Study Area Limits to Avimor Road North	22,200	2 (H)	15,400	69%	22,200	2 (H)	15,400	69%
Avimor Road North to Avimor Road South	22,200	2 (H)	15,800	71%	22,200	2 (H)	18,300	82%
Avimor Road South to Brookside Lane	22,200	2 (H)	17,200	77%	64,300	4 (H)	28,400	44%
Brookside Lane to Beacon Light Road	22,200	2 (H)	20,600	93%	64,300	4 (H)	40,700	63%
Beacon Light Road to Floating Feather Road	38,535	4 (A)	22,700	59%	58,065	6 (A)	44,800	77%
Floating Feather Road to Hill Road	38,535	4 (A)	32,600	85%	58,065	6 (A)	47,800	82%
Hill Road to Idaho 44	38,535	4 (A)	23,900	62%	58,065	6 (A)	35,800	62%

A = Arterial; H = Highway

Table 12. 2035 planning-level capacity results

Location	2035 Base Funded				2035 Base Needs				2035 Build Needs			
	LOS D Threshold	Thresh-old Lanes	ADT (vpd)	Percent of LOS D Threshold	LOS D Threshold	Thresh-old Lanes	ADT (vpd)	Percent of LOS D Threshold	LOS D Threshold	Thresh-old Lanes	ADT (vpd)	Percent of LOS D Threshold
Study Area Limits to Avimor Road North	22,200	2 (H)	22,400	101%	22,200	2 (H)	22,400	101%	22,200	2 (H)	22,800	103%
Avimor Road North to Avimor Road South	22,200	2 (H)	23,200	105%	64,300	4 (H)	23,200	36%	64,300	4 (H)	27,400	43%
Avimor Road South to Brookside Lane	22,200	2 (H)	24,800	112%	64,300	4 (H)	24,800	39%	64,300	4 (H)	44,200	69%
Brookside Lane to Beacon Light Road	22,200	2 (H)	25,200	114%	64,300	4 (H)	30,600	48%	64,300	4 (H)	66,300	103%
Beacon Light Road to Floating Feather Road	38,535	4 (A)	37,300	97%	58,065	6 (A)	41,700	72%	58,065	6 (A)	65,400	113%
Floating Feather Road to Hill Road	38,535	4 (A)	44,400	115%	58,065	6 (A)	50,000	86%	58,065	6 (A)	66,300	114%
Hill Road to Idaho 44	38,535	4 (A)	28,800	75%	58,065	6 (A)	39,800	69%	58,065	6 (A)	53,600	92%

A = Arterial; H = Highway

Traffic Analysis Figures

Figure 7 through Figure 16 on pages 25 through 34 graphically illustrate the intersection analysis and planning-level capacity analysis results summarized in Table 9 through Table 12 on pages 22 through 24. The intersection analysis exhibits show the 2025 and 2035 peak hour forecasted turning movements, intersection LOS, required lane configurations with signalized intersection control at the study area intersections. The planning-level capacity analysis exhibits show the forecasted ADT volumes on the study area roadways, LOS D threshold volumes for arterials and the percentage of the ADT volume to the threshold.

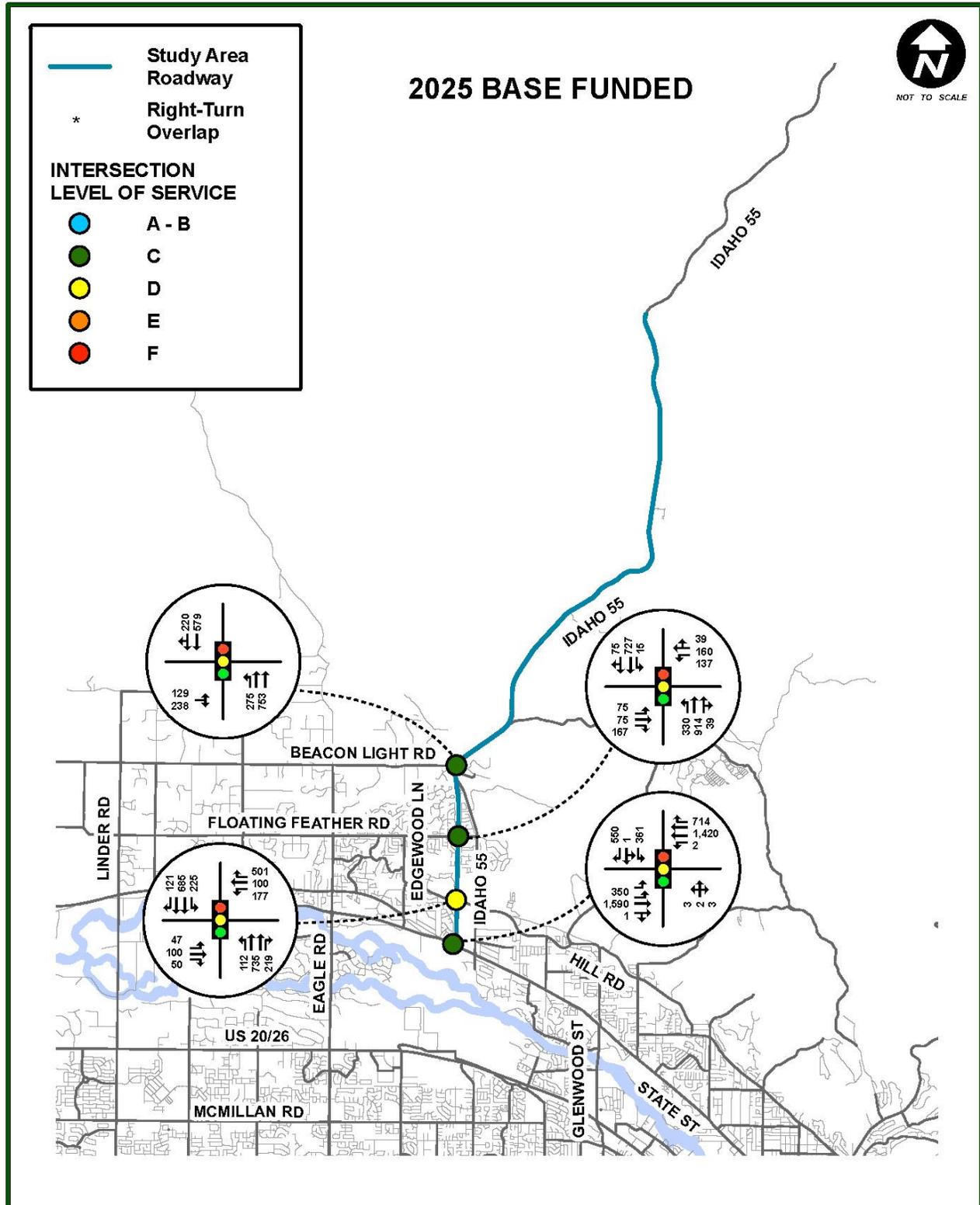
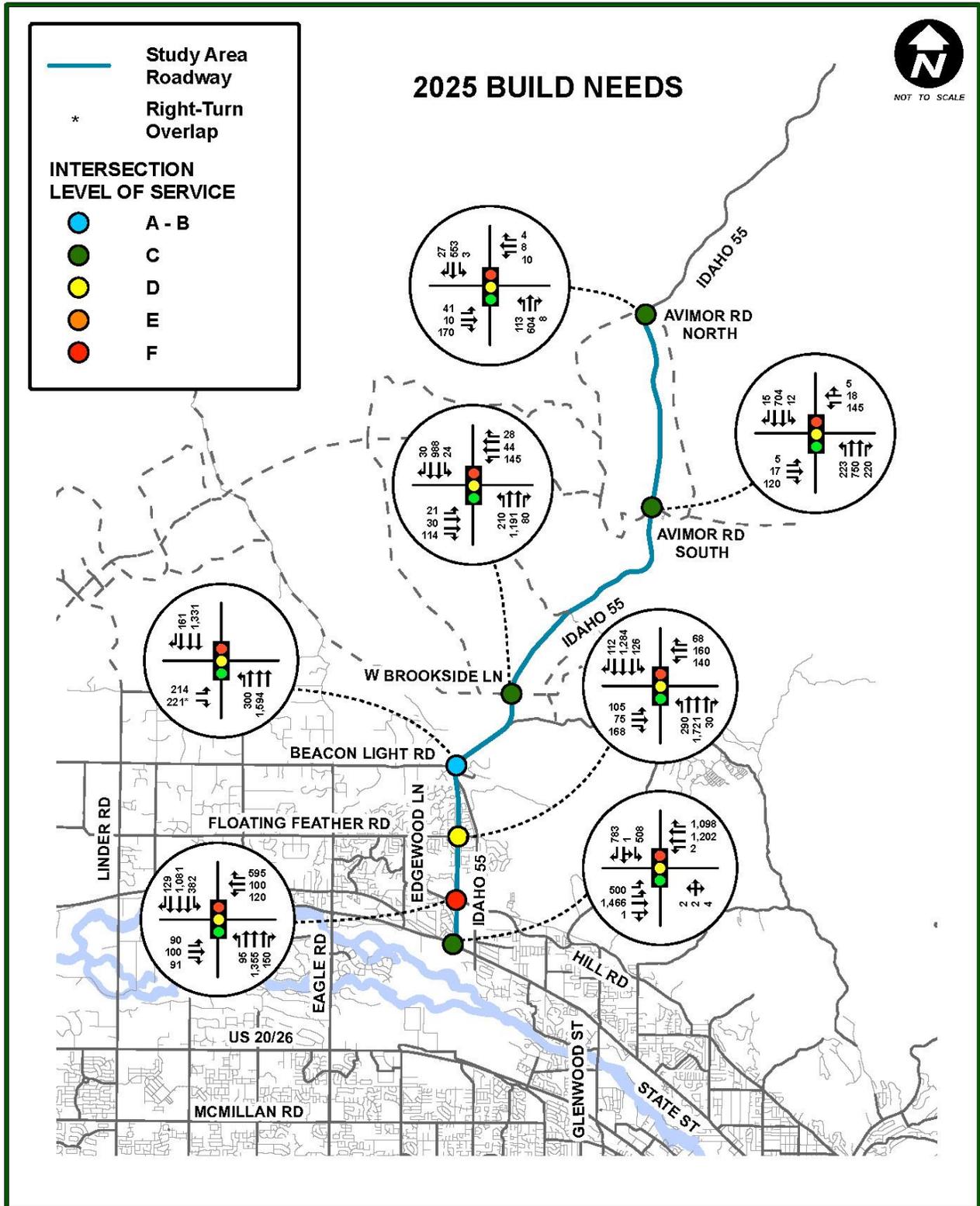


Figure 7. 2025 base funded intersection results



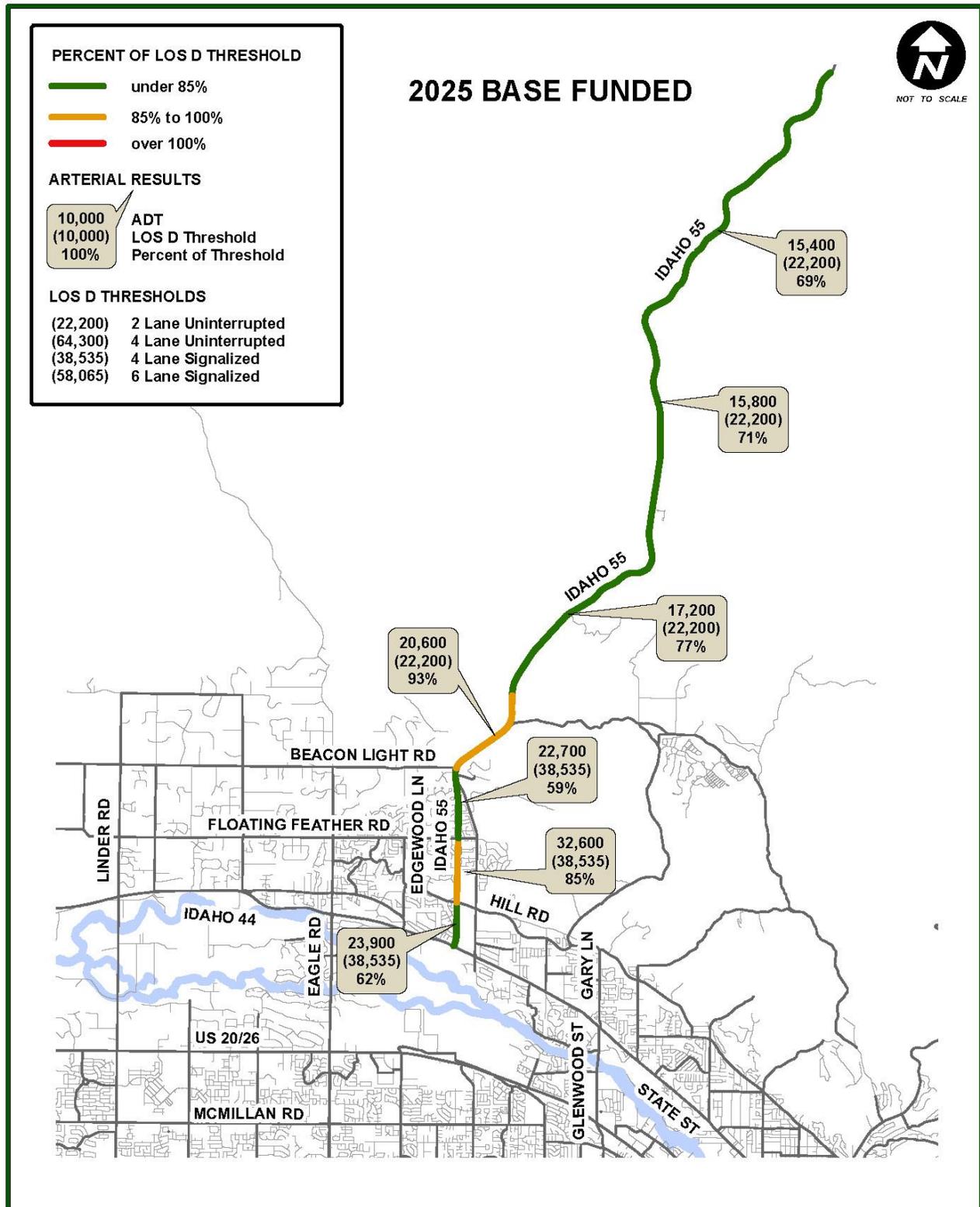


Figure 9. 2025 base funded planning-level capacity results

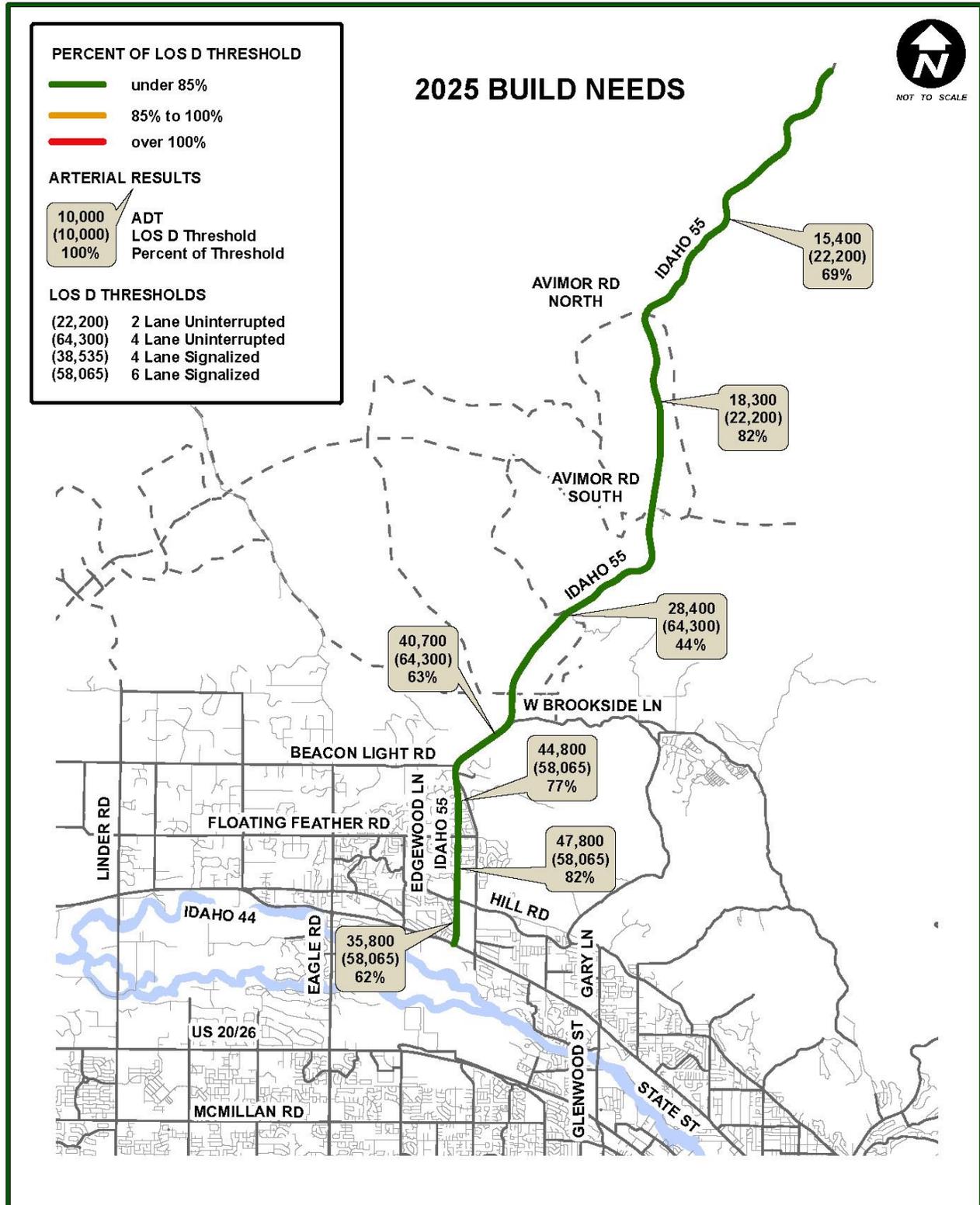


Figure 10. 2025 build needs planning-level capacity results

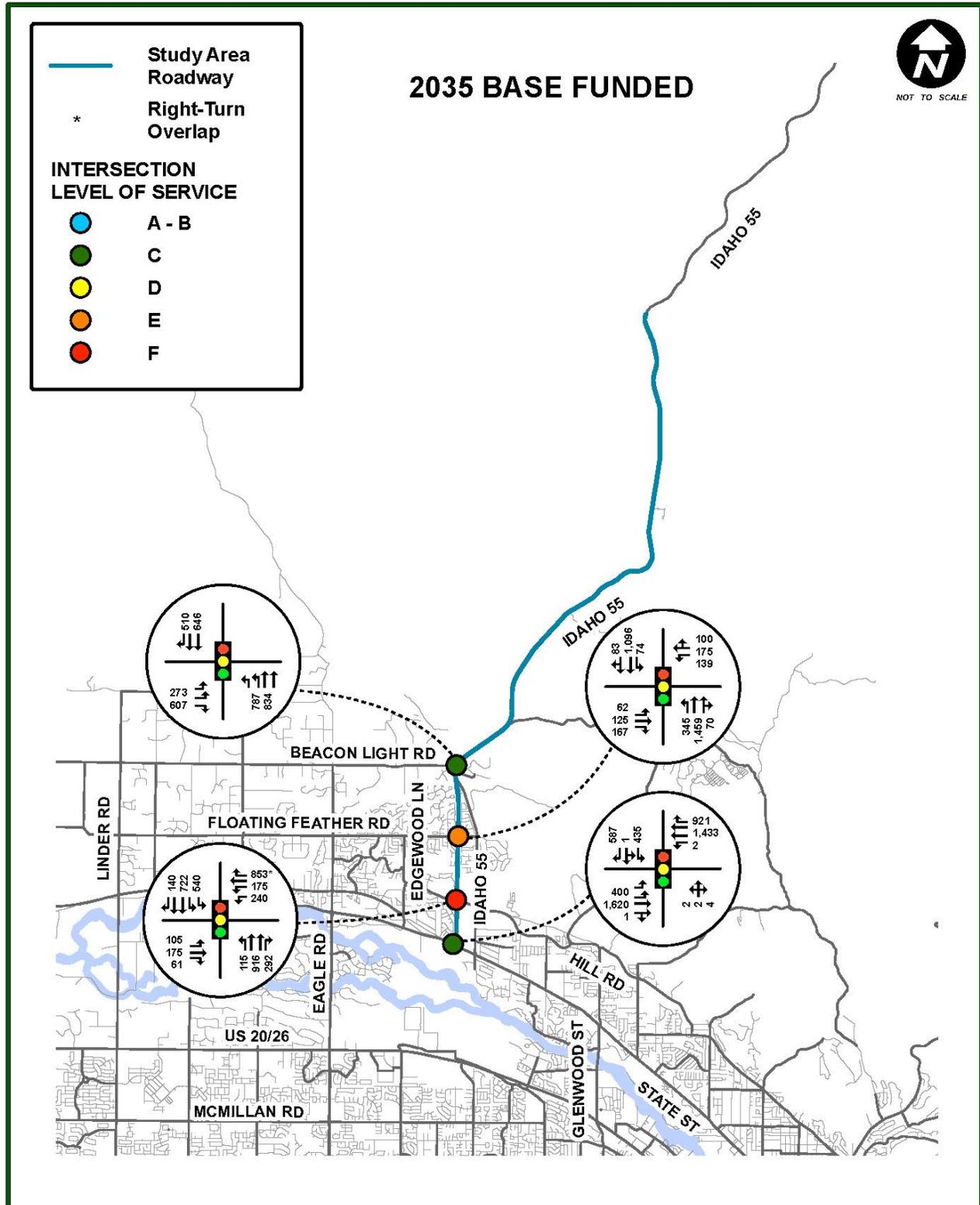


Figure 11. 2035 base funded intersection results

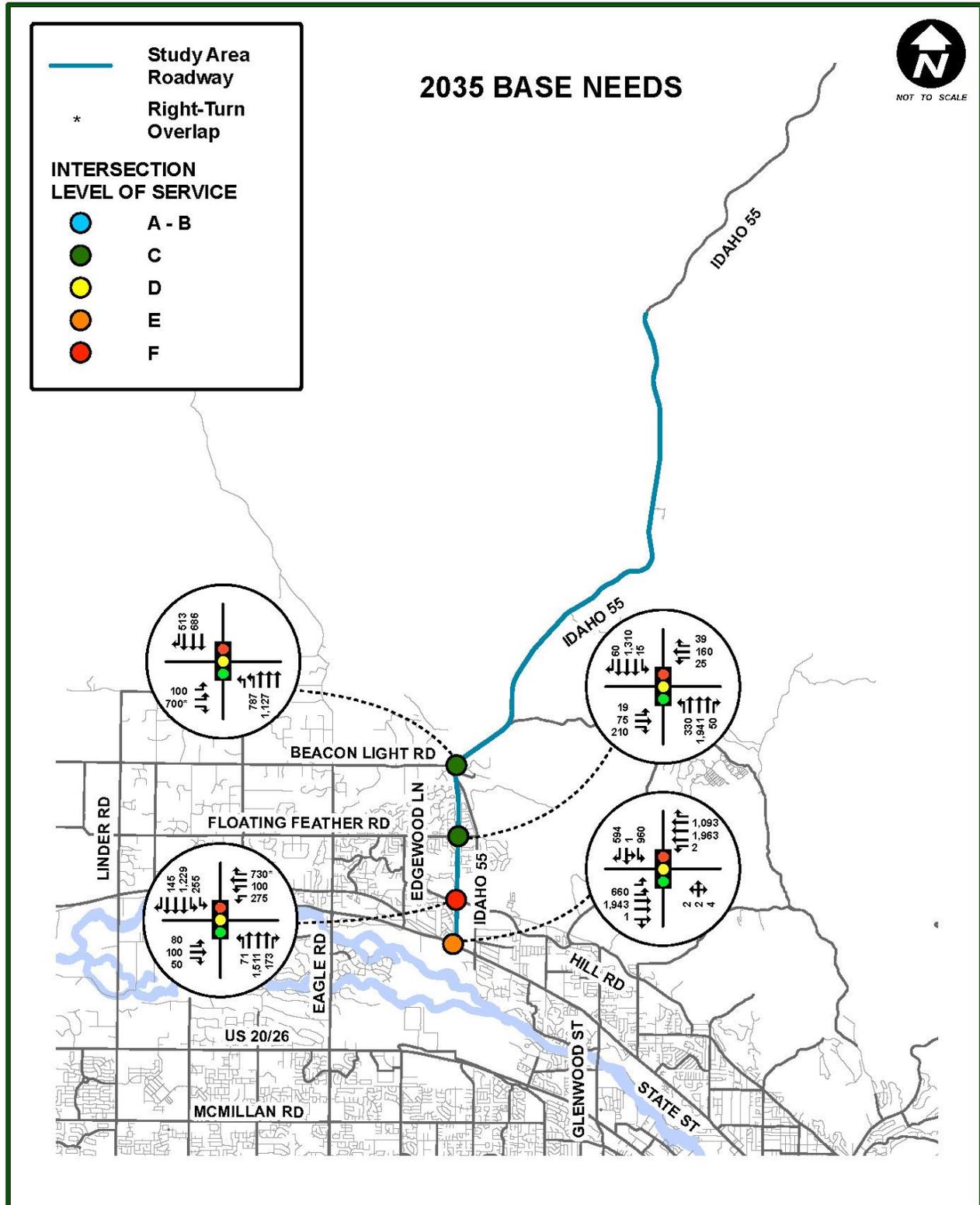


Figure 12. 2035 base needs intersection results

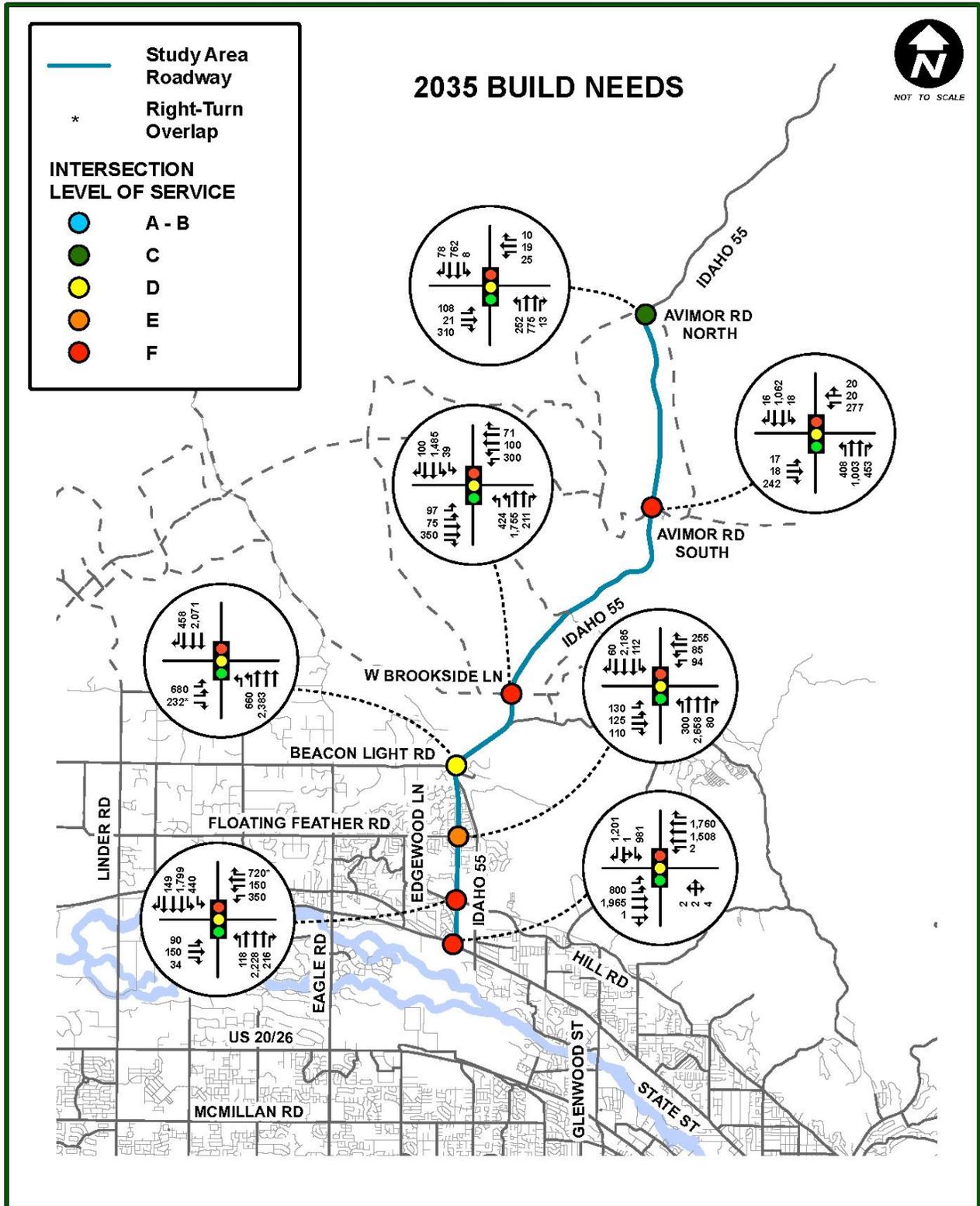


Figure 13. 2035 build needs intersection results

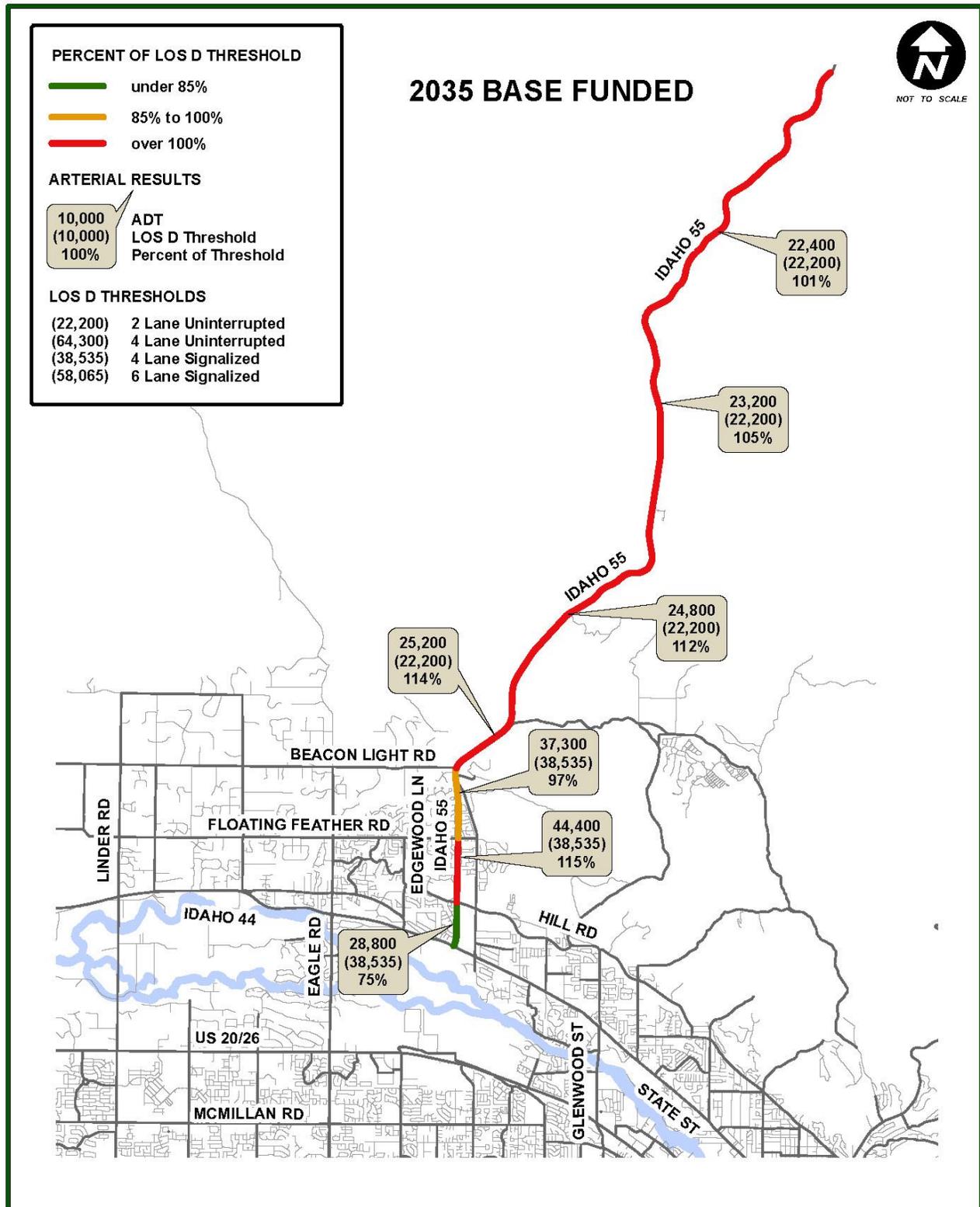


Figure 14. 2035 base funded planning-level capacity results

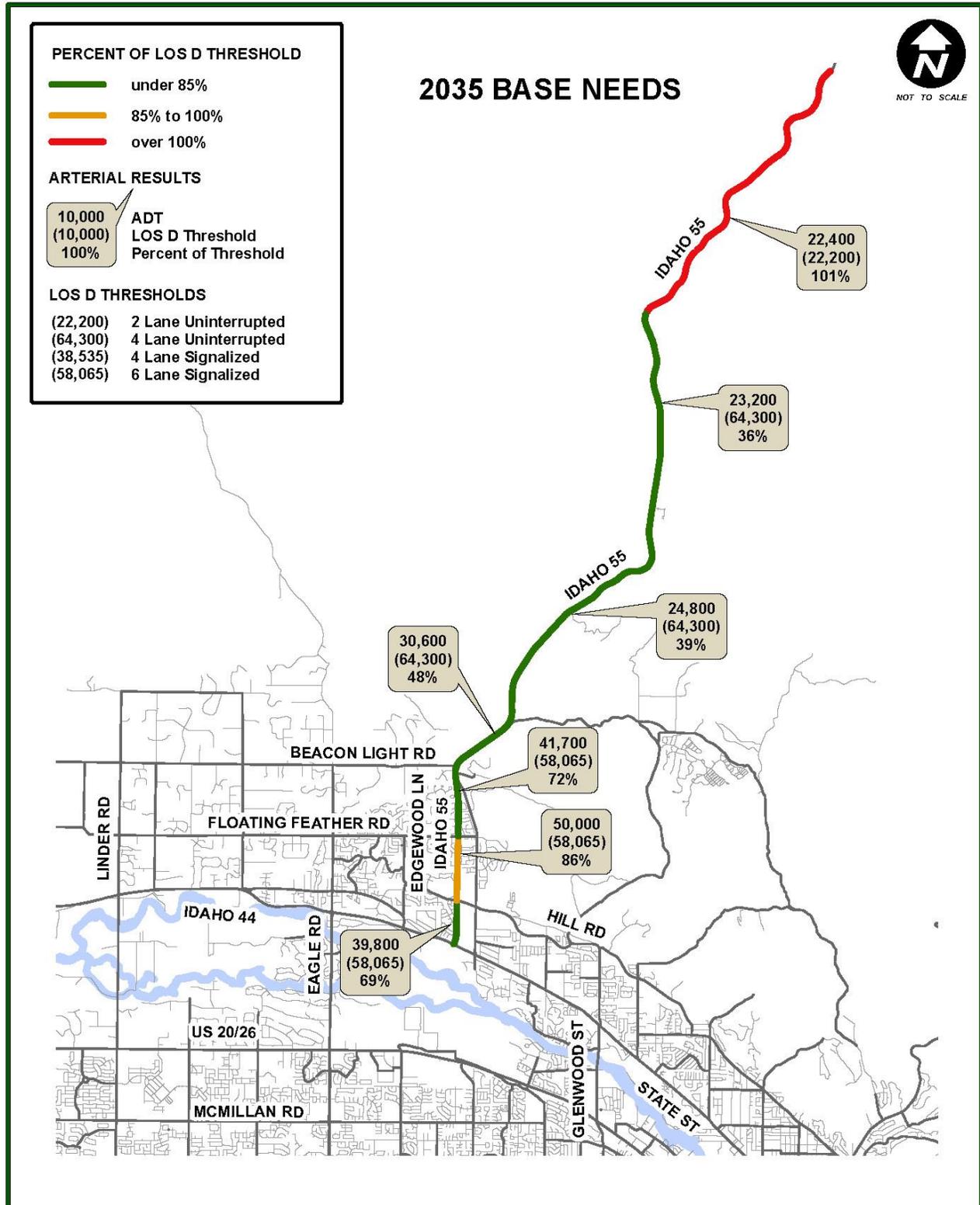


Figure 15. 2035 base needs planning-level capacity results

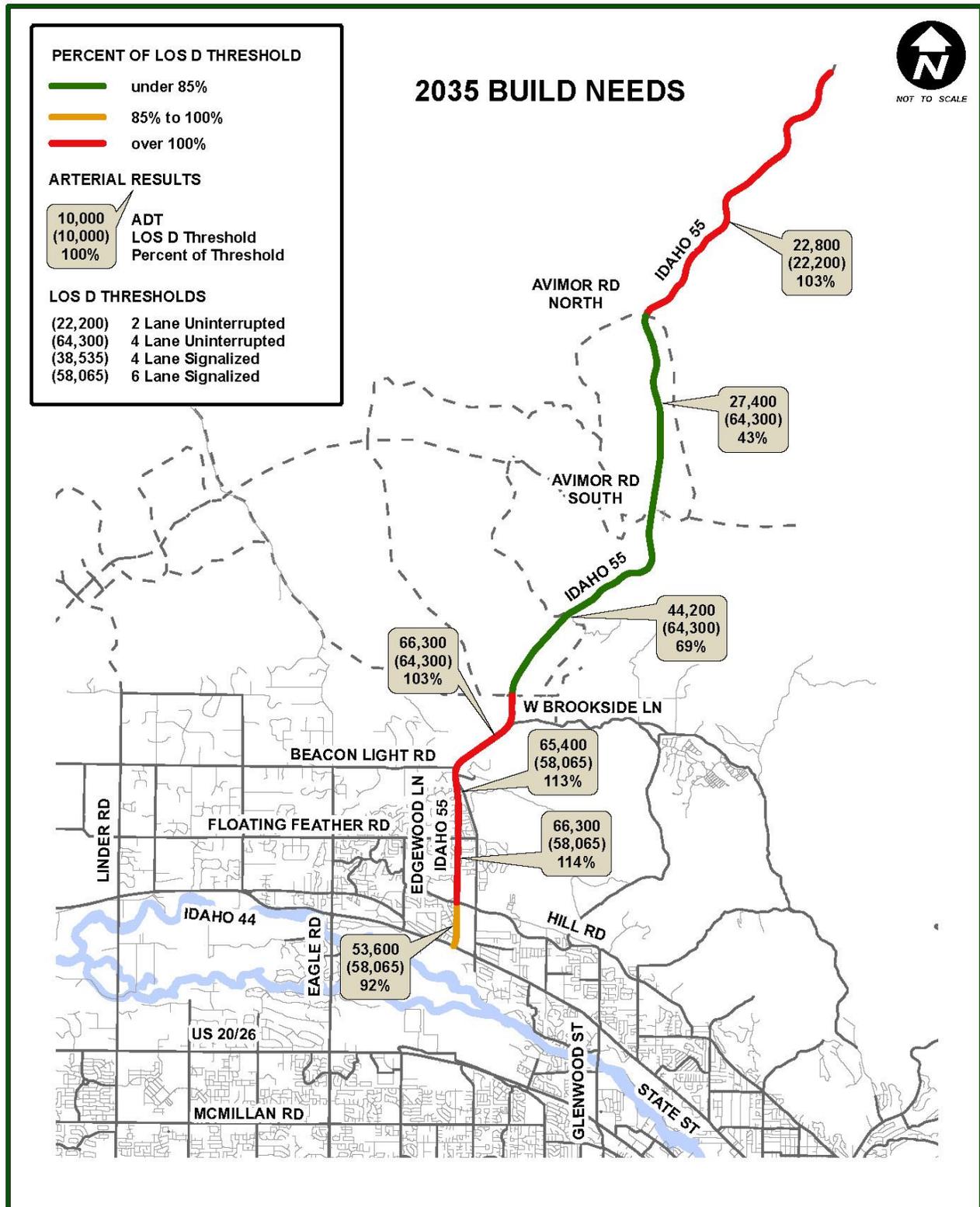


Figure 16. 2035 build needs planning-level capacity results

NEEDED TRANSPORTATION IMPROVEMENTS

The transportation improvements needed to accommodate the forecasted base and build traffic conditions were identified by evaluating intersection operations and traffic threshold volumes on roadway segments. The timing of the needed improvements is based on traffic threshold volumes rather than time because the build-out schedules of the proposed developments are unknown. The priority of needed improvements is based on quantitative analysis results that are qualitatively aggregated into logical priority groups that would maximize efficiency of the roadway network.

Determining Needed Improvements

Several intersections and roadway segments on Idaho 55 exceed the maximum LOS thresholds established for this study. When intersection operations exceed a LOS D, then grade separation is identified, and when forecasted traffic on a roadway segment exceeds the LOS D threshold, either the addition of through lanes or a change in the roadway facility type is identified. Because Idaho 55 is limited to six lanes from Idaho 44 to Brookside Lane and four lanes from Brookside Lane to the study area limits, the roadway facility type must change to accommodate forecasted traffic in some cases. The capacity of a roadway can be increased while maintaining the number of travel lanes by changing the facility type from a signalized arterial to an uninterrupted flow highway or expressway.

The following assumptions and methods were applied while determining the needed improvements:

- A six-lane expressway is identified in locations that require more than six arterial lanes. It is assumed that a four-lane arterial will first be widened to a six-lane arterial to increase capacity, and then eventually be converted to a six-lane expressway. A roadway will not transition from a six-lane arterial to a four-lane expressway (which has a higher capacity).
- From Brookside Lane to the north, Idaho 55 will transition from a 2-lane uninterrupted flow highway to either a 4-lane uninterrupted flow highway or expressway. Multi-lane arterials with signalized intersection control are not allowed on Idaho 55 from Brookside Lane to the north.
- Where the forecasted traffic requires an uninterrupted flow highway or expressway, the study area intersections within the roadway segment were identified as grade-separated, even though signalized operations are below the maximum threshold (LOS D) for an at-grade intersection.
- All northwest foothills development approaches on Idaho 55 have grade separation identified to maintain an uninterrupted flow highway or expressway once traffic signal control is required. Although not included as part of the study, future right-in only access will be implemented at the Dry Creek Road and Idaho 55 intersection once the Brookside Lane and Idaho 55 intersection is improved due to development (interim signal or grade-separated interchange).
- To maintain lane continuity, additional lanes were added to Idaho 55 roadway segments between intersections although the forecasted traffic requires fewer lanes.
- A future overpass intersection treatment is identified at the Hill Road and Idaho 55 intersection.

Idaho 55

With the 2025 base traffic, the existing lanes on Idaho 55 have reserve capacity on all roadway segments. In addition, all study area intersections on Idaho 55 operate acceptably (LOS D or better) with signalized control and have reserve capacity. With the 2035 base traffic (which includes approximately 6,000 household in the northwest foothills), Idaho 55 requires widening to six lanes from Idaho 44 to Beacon Light Road with an overpass at Hill Road. From Beacon Light Road north to the study area limits, Idaho 55 needs to be widened to four lanes and operate as an uninterrupted flow highway.

When traffic generated by the proposed developments is added to the study area, all reserve capacity for the roadway segments and intersections is used and major improvements are required on Idaho 55 by 2025. By 2035, additional improvements are required to accommodate the development traffic, although the majority of improvements on Idaho 55 are needed by 2025.

Idaho 44

In the vicinity of Idaho 55, Idaho 44 is overcapacity by 2035 with the funded roadway network and base traffic alone. No reserve roadway capacity exists on Idaho 44 with the existing 4 lanes plus median. When the roadway is widened to a six lanes, the base traffic uses most or all of the added capacity and little to no reserve capacity remains. Due to the lack of alternative east-west routes and lack of widening improvements on US 20/26 (which is also constrained by 2035), traffic is forced to use Idaho 44 although congestion exists. Because Idaho 44 is constrained, both the base traffic and the development traffic are not able to access Idaho 55. As a result, the impact of the development traffic becomes difficult to delineate from the base traffic without adding lanes.

Summary of Needed Improvements

Figure 17 and Figure 18 on pages 37 and 38 graphically illustrate the needed intersection and roadway improvements identified for the 2025 and 2035 base and build conditions.

The traffic analysis results and needed transportation improvements are based on the developments' demographic projections and the funded roadway network at the time of this study. The results of this study are subject to change if the demographic projections change or if any state or local roadway undergoes additional improvements in the vicinity of the study area.

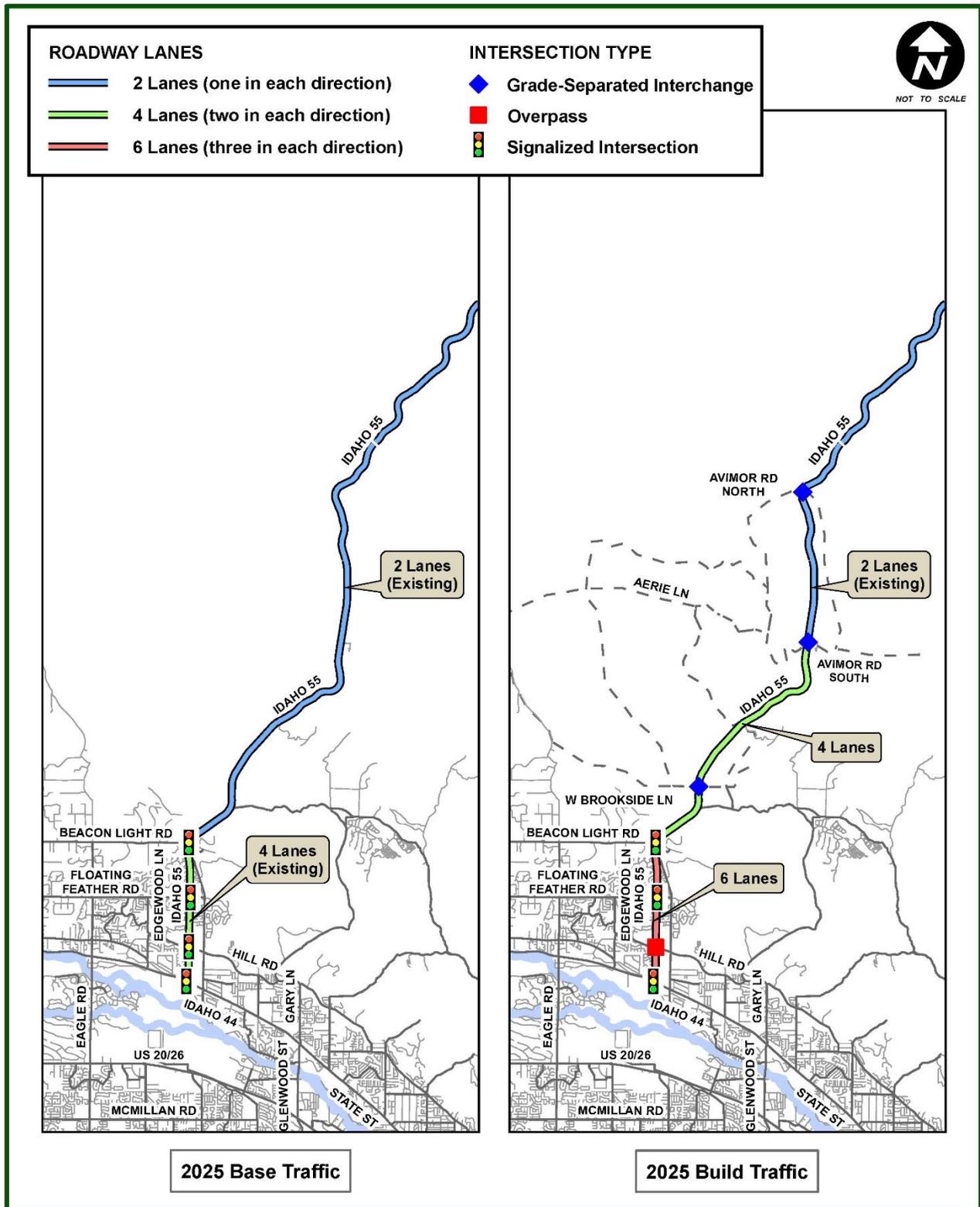


Figure 17. 2025 needed roadway improvements

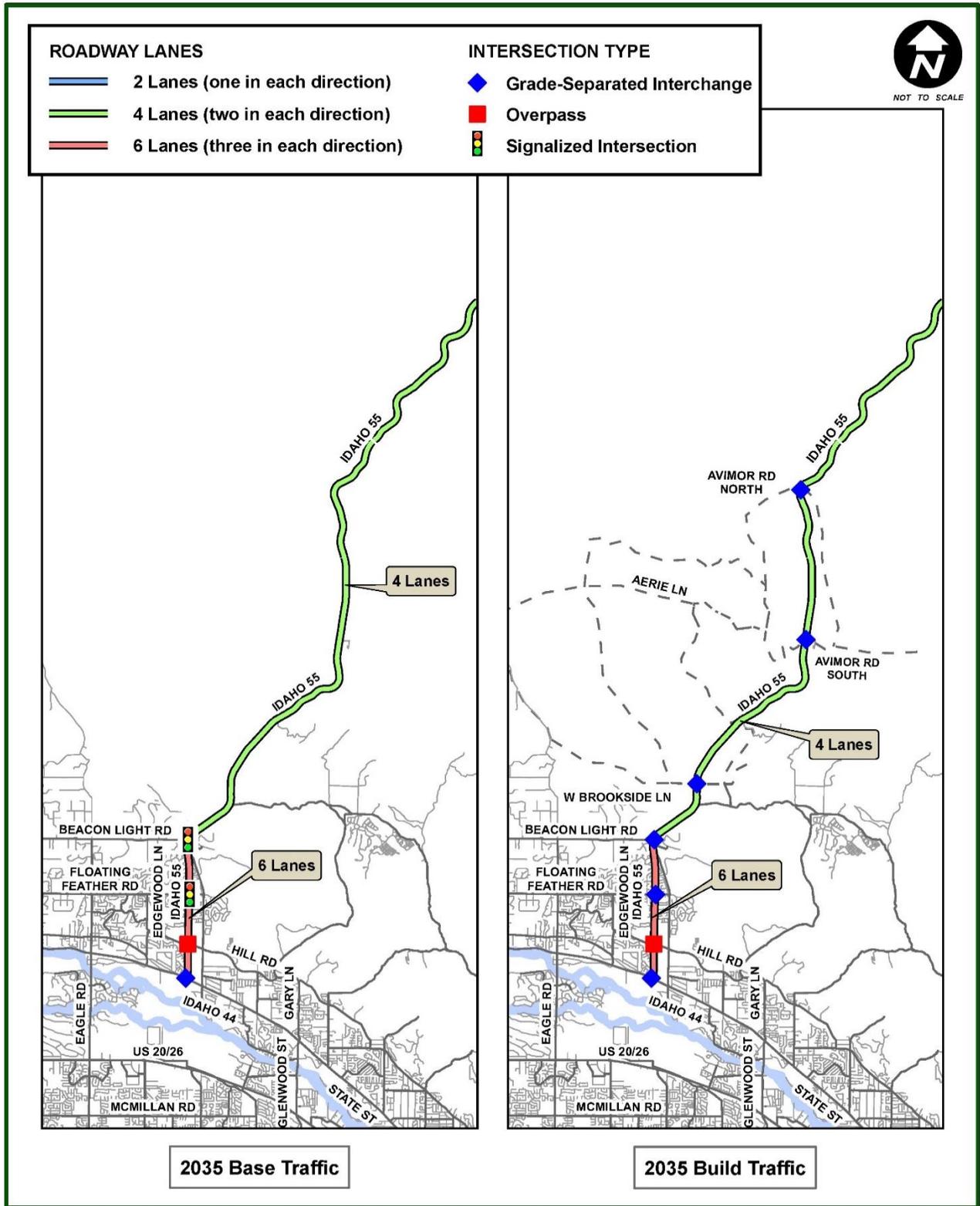


Figure 18. 2035 needed roadway improvements

Idaho 55 Needed Improvements

Transportation improvements needed on Idaho 55 to accommodate the base and build traffic consist of:

- Base Traffic
 - By 2025, a traffic signal is required at Beacon Light Road.
 - By 2025, no roadway improvements are required.
 - By 2035, a grade-separated interchange is required at Idaho 44 and an overpass is required at Hill Road.
 - By 2035, six lanes are required from Idaho 44 to Beacon Light Road, and four lanes are required from Beacon Light Road to the study area limits to accommodate the base traffic.
 - For the existing 2-lane highway segment north of Brookside Lane, the 2035 base traffic exceeds the capacity (22,200 vpd) by 200 to 2,600 vpd; therefore, a 4-lane highway is identified north of Brookside Lane to the study area limit to meet the LOS D threshold established for this study.
- Build Traffic
 - By 2025, a 6-lane arterial/expressway is required from Idaho 44 to Beacon Light Road, and a 4-lane expressway is required from Beacon Light Road to Avimor Road South to accommodate the build traffic. No roadway widening improvements are required on the existing 2-lane highway from Avimor Road South to the study area limit.
 - By 2025, Hill Road requires an overpass and Brookside Lane, Avimor Road South and Avimor Road North require grade separated interchanges. Brookside Lane, Avimor Road South and Avimor Road North all operate acceptably with traffic signal control; however, grade separation is required to maintain an expressway or uninterrupted flow highway.
 - By 2035, the same roadway improvements are needed on Idaho 55 that were required with 2025 traffic (a 6-lane expressway from Idaho 44 to Beacon Light Road and a 4-lane expressway from Beacon Light Road to Avimor Road South), except the 6-lane expressway should be extended north to Brookside Lane and the 4-lane expressway should be extended north to Avimor Road North. A 4-lane highway is required from Avimor Road North to the study area limit.
 - By 2035, Hill Road requires an overpass and the remaining six study area intersections on Idaho 55 require grade separated interchanges. Beacon Light Road and Avimor Road North operate acceptably with traffic signal control; however, grade separation is required to maintain an expressway or uninterrupted flow highway

Table 13 on page 40 summarizes the needed improvements on the Idaho 55 roadway segments and intersections for the 2025 and 2035 base and build traffic.

Table 13. Idaho 55 needed transportation improvements

Idaho 55	Existing Lanes	2025		2035	
		Base Traffic Lanes	Build Traffic Lanes	Base Traffic Lanes	Build Traffic Lanes
Roadway Segment					
Study Area Limits to Avimor Road North	2	2	2	4	4
Avimor Road North to Avimor Road South	2	2	2	4	4
Avimor Road South to Brookside Lane	2	2	4	4	4
Brookside Lane to Beacon Light Road	2	2	4	4	4
Beacon Light Road to Floating Feather Road	4	4	6	6	6
Floating Feather Road to Hill Road	4	4	6	6	6
Hill Road to Idaho 44	4	4	6	6	6
Intersection					
Avimor Road North	n/a	n/a	G	n/a	G
Avimor Road South	SC	SC	G	SC	G
Brookside Lane	n/a	n/a	G	n/a	G
Beacon Light Road	SC	S	S	S	G
Floating Feather Road	S	S	S	S	G
Hill Road	S	S	O	G	O
Idaho 44	S	S	S	G	G

SC = Stop Controlled; S = Signalized; G = Grade Separated Interchange; O = Overpass

Table 14 and Table 15 on page 41 summarize the forecasted daily traffic and the needed roadway improvements that are identified for the 2025 and 2035 base and build conditions with the planning-level analysis. The LOS D threshold volumes for the needed improvements are included to provide a planning-level estimate of the reserve capacity available if the improvement is implemented.

Table 14. 2025 planning-level capacity results – with needed improvements

Location	Existing Lanes	2025 Base Traffic				2025 Build Traffic			
		Needed Lanes	ADT (vpd)	LOS D Threshold	Percent of Threshold	Needed Lanes	ADT (vpd)	LOS D Threshold	Percent of Threshold
Study Area Limits to Avimor Road North	2 (H)	2 (H)	15,400	22,200	69%	2 (H)	15,400	22,200	69%
Avimor Road North to Avimor Road South	2 (H)	2 (H)	15,800	22,200	71%	2 (H)	18,300	22,200	82%
Avimor Road South to Brookside Lane	2 (H)	2 (H)	17,200	22,200	77%	4 (E)	28,400	73,600	39%
Brookside Lane to Beacon Light Road	2 (H)	2 (H)	20,600	22,200	93%	4 (E)	40,700	73,600	55%
Beacon Light Road to Floating Feather Road	4 (A)	4 (A)	22,700	38,535	59%	6 (A)	44,800	58,065	77%
Floating Feather Road to Hill Road	4 (A)	4 (A)	32,600	38,535	85%	6 (A)	47,800	58,065	82%
Hill Road to Idaho 44	4 (A)	4 (A)	23,900	38,535	62%	6 (E)	35,800	110,300	32%

A = Arterial; H = Highway; E = Expressway

Table 15. 2035 planning-level capacity results – with needed improvements

Location	Existing Lanes	2035 Base Traffic				2035 Build Traffic			
		Needed Lanes	ADT (vpd)	LOS D Threshold	Percent of Threshold	Needed Lanes	ADT (vpd)	LOS D Threshold	Percent of Threshold
Study Area Limits to Avimor Road North	2 (H)	4 (H)	22,400	64,300	35%	4 (H)	22,800	64,300	35%
Avimor Road North to Avimor Road South	2 (H)	4 (H)	23,200	64,300	36%	4 (E)	27,400	73,600	37%
Avimor Road South to Brookside Lane	2 (H)	4 (H)	24,800	64,300	39%	4 (E)	44,200	73,600	60%
Brookside Lane to Beacon Light Road	2 (H)	4 (H)	30,600	64,300	48%	4 (E)	66,300	73,600	90%
Beacon Light Road to Floating Feather Road	4 (A)	6 (A)	41,700	58,065	72%	6 (E)	65,400	110,300	59%
Floating Feather Road to Hill Road	4 (A)	6 (E)	50,000	110,300	45%	6 (E)	66,300	110,300	60%
Hill Road to Idaho 44	4 (A)	6 (E)	39,800	110,300	36%	6 (E)	53,600	110,300	49%

A = Arterial; H = Highway; E = Expressway

Priority of Needed Improvements

The needed improvements were prioritized as either a first priority improvement or second priority improvement. Priority was assigned using the relative percentages of arterial thresholds and relative intersection delays. The prioritization process also considered where grade separation is required for an expressway. In general, improvements are needed first from south to north.

The prioritization only considers the need for improvements at two points in time – 2025 and 2035 – and it does not evaluate the phasing of improvements in detail. For example, a several-mile-long segment of roadway may be widened to 6 lanes. The 6-lane roadway would then be transitioned to a 6-lane expressway where access would be eliminated and intersections would be grade separated. For all the roadway segments identified as expressways, an interim phasing option would be to widen the roadway to a signalized arterial and then transition to a restricted access expressway.

Note that the prioritization developed for this study identified first priorities at locations with higher overall traffic volumes. The rationale is to provide improvements to the facilities with the highest usage to maximize the benefits of the improvement and help reduce the congestion on adjacent facilities. However, the actual need for improvements and/or available funding in the future may not follow the sequence with the proposed prioritization.

Figure 19 and Figure 20 on pages 43 and 44 illustrate the estimated priority of the needed improvements.

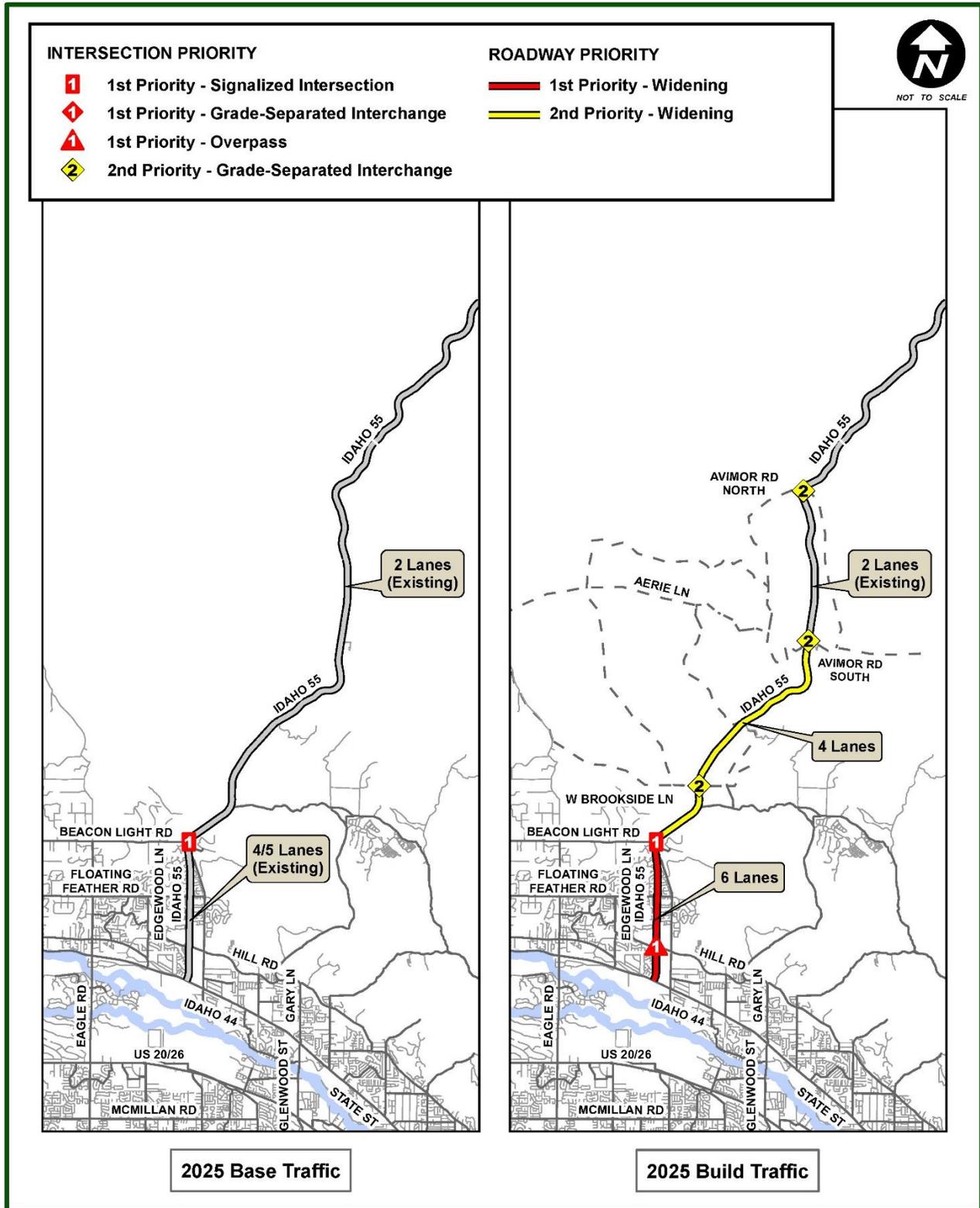


Figure 19. 2025 improvement priority

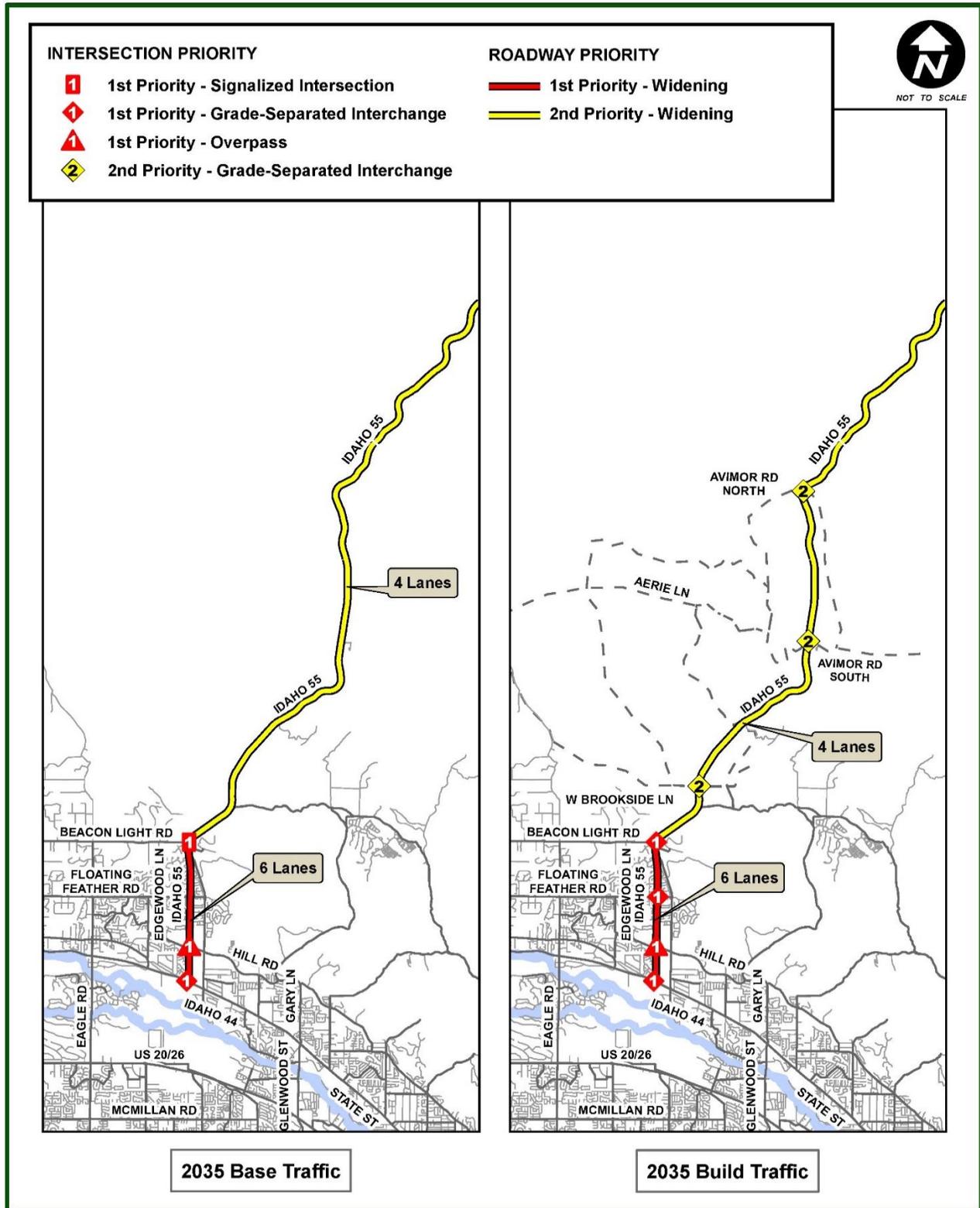


Figure 20. 2035 improvement priority

2025 Priority

The following summarizes the priority of the transportation improvements needed on Idaho 55 to accommodate the 2025 base and build traffic:

- With the 2025 base traffic, all needed improvements are a first priority.
- Traffic signal control at Beacon Light Road will likely be warranted in the relatively near future. Traffic signal installations are a relatively low cost improvement compared to the other improvements and would likely be constructed first.
- When 2025 build traffic is added to the base conditions, all roadway and intersection improvements from Idaho 44 to Beacon Light Road become a first priority in addition to those identified for the base traffic. Without these improvements, congestion will occur on this roadway segment which will prevent development traffic from accessing Idaho 55.
- With the 2025 build traffic, the roadway improvements north of Beacon Light Road are a second priority because, although they are needed, the improvements to the south on Idaho 55 are prioritized first to add needed capacity and unconstrain several overcapacity segments, thereby allowing development traffic to access Idaho 55.

2035 Priority

The following summarizes the priority of the transportation improvements needed on Idaho to accommodate the 2035 base and build traffic:

- All first priority improvements identified for 2025 remain a first priority for 2035.
- With the 2035 base traffic, all roadway and intersection improvements from Idaho 44 to Beacon Light Road become a first priority. Widening from Beacon Light Road to the study area limit is a second priority because the traffic volumes are relatively low and the roadway will not be extremely overcapacity.
- When 2035 build traffic is added to the base conditions, all roadway and intersection improvements from Idaho 44 to Brookside Lane become a first priority in addition to those identified for the base traffic. Without these improvements, congestion will occur on this roadway segment which will prevent development traffic from accessing Idaho 55.
- With the 2035 build traffic, the roadway improvements north of Brookside Lane are a second priority because, although they are needed, the improvements to the south on Idaho 55 are prioritized first to add needed capacity and unconstrain several overcapacity segments, thereby allowing development traffic to Idaho 55.

Timing of Needed Improvements

It is unknown whether the actual rate of development in 2025 and 2035 will be equal to the projected demographics used in this study; therefore, the timing of improvements was not estimated in terms of a specific year and was estimated in terms of the FDOT threshold volumes summarized in Table 4 on page 13. When the traffic on a roadway segment exceeds the LOS D threshold, this triggers the need for the roadway improvement. Because several study area roadway segments require expressways with grade

separation at the major intersections, the roadway segments dictate the improvements so the thresholds for the intersection improvements were assumed to be the same as the roadway thresholds. However, at intersection locations where grade separation is required to accommodate the intersection turning movement traffic, intersection traffic thresholds for the timing were estimated.

This study did not estimate thresholds to determine when traffic signal control is required. Traffic signal warrants are required to justify the need for a traffic signal. The warrants are typically based on 4-hour or 8-hour volumes – rather than delay – and the associated threshold volumes that require a traffic signal cannot be estimated. It is expected that a traffic signal will likely be required at Beacon Light Road by 2025.

All three of the development approaches on Idaho 55 require grade separation because the intersection volumes cannot be accommodated with two-way stop control and signalized control is not permitted along this section of Idaho 55. Grade-separated interchanges at these three locations are driven by the need for signalization and not the need for an expressway or uninterrupted highway; therefore, the grade separation threshold volumes at these locations cannot be estimated.

Traffic thresholds for grade separation are the traffic volumes on Idaho 55 that cause the signalized intersection LOS to exceed a LOS D. The peak hour intersection volumes were reduced by a percentage in Synchro 8 until the delay was below the LOS D threshold. The percentage reduction was applied to the forecasted volumes to estimate the grade-separation threshold volumes, shown in Table 16. Grade separation at the intersections listed in the table may be required before the threshold is met if the roadway segment requires an expressway or uninterrupted flow highway at a lower threshold volume. The grade-separated intersections not included in the table have thresholds driven by the adjacent roadway segment thresholds.

Table 16. Approximate ADT thresholds for grade separation

Scenario ¹	Intersection ²	Forecasted ADT on Idaho 55 (vpd)	Percent Traffic Reduction for LOS D	Approximate Grade-Separated Threshold ADT on Idaho 55 (vpd)
2025 Build	Hill Road	47,800	-24%	36,300
2035 Base or Build	Idaho 44	39,800	-7%	37,000
	Floating Feather Road	65,400	-8%	60,200

¹ all scenarios include are analyzed with forecasts from needs roadway network

² intersections not included in table require grade separation due to roadway type; therefore, threshold is FDOT threshold

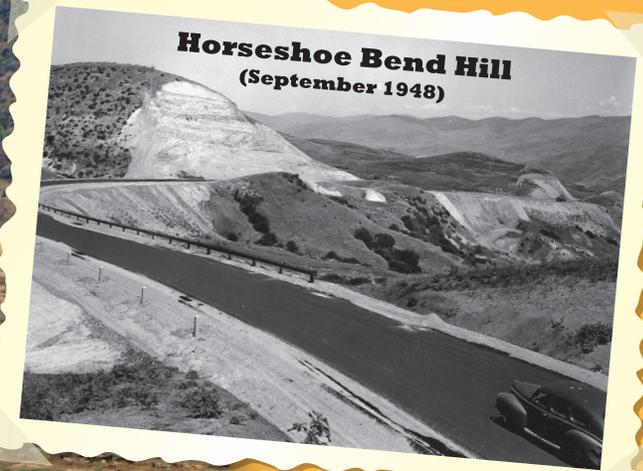
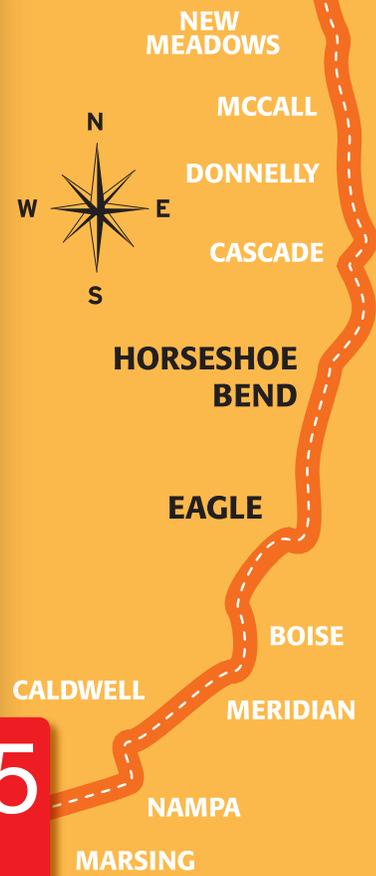
APPENDIX

APPENDIX B: Idaho 55 Central Corridor Environmental Scan

See attached appendix.

IDAHO 55 CENTRAL ENVIRONMENTAL SCAN

STATE STREET TO BANKS LOWMAN ROAD



FEBRUARY 2014
UPDATED: AUGUST 2015





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Executive Summary

This Environmental Scan accompanies the Corridor Plan (CP) for State Highway 55 (Idaho 55) in Ada and Boise Counties from the junction with State Highway 44 (State Street) to the junction with Banks Lowman Road. This covers 33.675 miles and passes through the cities of Eagle and Horseshoe Bend. As part of a required component of the CP, an environmental scan of the Idaho 55 Corridor has been completed to identify the existing environmental conditions, potential fatal flaws, and environmental permits that may be required during any future design and construction projects within the existing right-of-way. The CP is not linked to any projects in the current Idaho Transportation Investment Plan that would merit special attention.

The environmental scan included windshield surveys of the project corridor, as well as review of existing data sources from local, State, and Federal regulatory agencies. The lateral extent along the corridor included in the scan generally consisted of a 100 foot buffer from the highway centerline. The environmental scan included a review of the natural and built environment along the project corridor. It revealed the following information:

- Land cover was evaluated within the project corridor. Most of the natural environment remains as shrubland and evergreen forest while the remainder has been developed for either agriculture or human habitation.
- Twenty soil complexes were identified as being prime farmlands within or adjacent to the Idaho 55 project corridor.
- Ada County is considered an area of concern for particulate matter with a diameter of 2.5 micrometers or less (PM-2.5) (such as pollen and smoke) and ozone. Northern Ada County is also a federally designated and Department of Environmental Quality (DEQ) identified air quality maintenance area for carbon monoxide and PM-10.
- The majority of surface waters identified along Idaho 55 are natural drainages. The following named rivers and streams were identified along and/or crossing Idaho 55: Dry Creek, Spring Valley Creek, South Fork Willow Creek, Alkali Creek, Cottonwood Creek (1), Robbs Creek, Payette River, Porter Creek, Hill Creek, Cottonwood Creek (2), and Flemming Creek. In addition, numerous ephemeral drainages were also identified. Of these 11 drainages, the South Fork Willow Creek has been identified as being water quality impaired by the DEQ. In addition to the natural drainages, the following irrigation related drainages were identified along and/or crossing Idaho 55: Dry Creek Canal, Farmers Union Canal, Power Canal, and four unnamed ditches/laterals.
- The Payette River north of Beehive Bend boat access is a State Protected River
- Mapped floodplains were identified along the Boise River, Payette River, and Dry Creek.
- Sixty wetland communities were identified, mostly along natural drainages consisting of forested, scrub shrub and emergent wetlands.
- There are neither designated Sole Source Aquifers located within the project corridor nor any groundwater areas of concern.



- Nineteen hazardous materials sites were identified within or adjacent to the Idaho 55 project corridor. Four of the sites were identified as Leaking Underground Storage Tanks, all of which have been designated as “cleanup complete”.
- Seven species are listed on the U.S. Fish and Wildlife Service Threatened and Endangered species list for Ada and Boise Counties.
- Nine Idaho species of greatest conservation need with recorded occurrences within one mile of Idaho 55 were identified through the Idaho Fish and Wildlife Information Systems.
- Wildlife and fish resources documented during a windshield survey included: four riparian corridors, two locations of raptor nests, three locations of cliff swallow and possibly barn swallow nests, game crossing signage, areas of intact sagebrush/shrub steppe habitat along the Horseshoe Bend Hill segment of Idaho 55, and one location of a golden eagle nest.
- The corridor is adjacent to or bisects deer, elk and pronghorn winter ranges.
- No minority or low-income populations were identified.
- No cultural resource sites were listed on the National Register of Historic Places; however, fourteen potentially eligible historic resources were identified within or adjacent to the Idaho 55 project corridor.
- The project corridor lies within the Payette River Scenic Byway.
- Six potential Section 4(f) resources were identified, all of which are parks or recreation areas. Section 4(f) resources will be identified as potential until a Section 4(f) evaluation is completed.
- A search of Section 6(f) grants funded for Ada and Boise Counties did not identify projects funded through the Land and Water Conservation Fund program within the corridor.
- Land use within Eagle, Idaho includes a mix of commercial, residential, and multi-use zones. As the corridor moves from the City of Eagle into Ada County, land use is predominantly rural residential/rural preservation. Unincorporated Boise County is one Multiple Use Zone District. The City of Horseshoe Bend includes a mix of commercial, industrial, multi-use, public, and residential.
- Ten point noise transects were conducted along the corridor which recommended allowable setbacks by categories.
- One public aviation facility was identified within the corridor: Horseshoe Bend Heliport.

The environmental scan identified existing conditions of the corridor for each resource. This document is not to serve as the environmental document for any proposed future work; rather it should be used as a guide to identify potential resources of concern within the area. Project specific environmental review in accordance with the National Environmental Policy Act (NEPA) is needed, as well as resource specific agency approvals and permitting.



Introduction

The Idaho Transportation Department (ITD) is currently in the process of developing a Corridor Plan (CP) for State Highway 55 (Idaho 55) in Ada and Boise Counties from the junction with State Highway 44 (State Street) to the junction with Banks Lowman Road. This covers 33.675 miles and passes through the cities of Eagle and Horseshoe Bend. An Environmental Scan is a component of a CP and identifies existing environmental conditions, potential fatal flaws and environmental permits that may be required during any future design and construction projects within the existing right-of-way (R/W). The CP is not linked to any projects in the current Idaho Transportation Investment Plan that would merit special attention.

Project area

The Idaho 55 Central Corridor is located in Ada and Boise Counties in southwest Idaho (see **Appendix A, Figure 1-1, Page 32**). The project corridor is largely a two-lane rural highway, except for a three-lane segment on the south side of Horseshoe Bend Hill, and four-lane segments in the City of Eagle and on the north side of Horseshoe Bend Hill. The lateral extent of the study area is dictated by available parallel routes that would be used in the event Idaho 55 was closed. Much of the project corridor is defined by the topography of the Payette River Canyon so parallel routes do not exist. The alternate route, should Idaho 55 be closed is U.S. 95. The width of the Idaho 55 Central Corridor is ¼ mile from each side of the centerline.

Methodology and Data Sources

Windshield surveys of the project corridor were conducted from October through November of 2013. Preparation of this document consisted of a combination of field data collection, based on a windshield survey, as well as the review and incorporation of existing available data from local, State and Federal regulatory agencies. **Table 1** below provides resource specific methodology.

Table 1: Resource Methodology for the Idaho 55 Central Corridor Environmental Scan

RESOURCE	METHODOLOGY
Land Cover	The U.S. Department of Agriculture 2014 Cropland Data Layer was utilized with Geographic Information Systems (GIS) capabilities.
Soil Resources and Prime Farmlands	The Natural Resources Conservation Service (NRCS) website was reviewed to determine soil classifications within the project corridor.
Air Quality	ITD's Air Quality Policy was referenced.
Surface Waters	Windshield surveys were conducted to identify surface waters within the project corridor. Surface waters were mapped and water quality impaired waterbodies identified.
Floodplains	Online floodplain maps were obtained and reviewed.
Wetlands	U.S. Fish and Wildlife Service (USFWS) National Wetlands Inventory (NWI) maps were reviewed and field verified. Windshield surveys were conducted to identify additional potential wetlands. Approximate wetland areas were mapped. Dominate wetland



	vegetation was identified.
Groundwater	Sole Source Aquifers (SSA) and areas of groundwater contaminants were identified.
Hazardous Materials	Windshield survey of the project corridor was conducted to identify the potential for hazardous materials locations. Regulatory mapping programs were reviewed for properties adjacent to the project corridor. Sites listed were not researched further to determine reasoning for listing on regulatory databases.
Threatened and Endangered Species	USFWS county-wide threatened and endangered species lists were obtained and reviewed. General habitat description is included based on windshield survey.
Species of Greatest Conservation Need	Idaho Fish and Wildlife Information Systems (IFWIS) database was requested, obtained and reviewed for Idaho sensitive species within the vicinity of the project corridor.
Wildlife and Fish Resources	Potential impacts to non-listed or proposed species were identified during windshield survey.
Wildlife Linkage Zones	IDFG and ITD Fish and Wildlife Linkage Report GIS Layers prepared by Geodata Services, Inc. of Missoula, Montana.
Demographic Information	Readily available general census data was obtained for the project corridor.
Environmental Justice	Readily available general census data was obtained for the project corridor.
Cultural Resources	The National Register of Historic Places (NRHP) was reviewed. Windshield survey was conducted to screen for properties which appear to meet NRHP historic criteria. Properties visible from the existing roadway were included. No research was conducted at the Idaho State Historic Preservation Office (SHPO).
Visual Impacts	Windshield surveys were conducted to identify potential visual impacts.
Section 4(f) Resources	Parks and schools were identified by windshield survey. Zoning maps, aerial photography, topographic maps, and Bureau of Land Management (BLM) recreation data were reviewed.
Section 6(f) Resources	The State Land and Water Conservation Fund (LWCF) database was reviewed.
Land Use and Zoning	Electronically available land use and zoning was obtained.
Noise	A ten-point transect was modeled in the traffic noise model perpendicular to the existing roadway centerline. Sensitive noise receptors were not identified.
Federal Aviation Administration (FAA) Airspace Intrusion	The National Transportation Atlas Database was utilized with GIS capabilities to identify FAA facilities.



Physical Environment

The Physical Environment includes vegetation, soils, air quality, hydrology and hazardous materials.

Land Cover

Land cover is the vegetation on and structures over the bare ground. **Table 2** presents the land cover of the project area in 2014.

Table 2: Idaho 55 Central Corridor Land Cover in 2014

LAND COVER	ACRES	PERCENT OF CORRIDOR
Crops	213.7	2.0%
Fallow Cropland	4.7	0.0%
Pasture	4,042.7	37.4%
Developed	1,819.6	16.8%
Open Water	125.7	1.2%
Wetlands	13.1	0.1%
Barren	0.4	0.0%
Shrubland	3,739.6	34.6%
Forest	862.4	8.0%
TOTAL	10,821.9	100.00%

Most of the natural environment remains as shrubland and evergreen forest while the remainder has been developed for either agriculture or human habitation.

Soil Resources and Prime Farmlands

The Farmlands Protection Policy Act (FPPA) of 1981 intended to minimize the impact Federal programs have on the unnecessary and irreversible conversion of farmland to nonagricultural uses. It assures that to the extent possible federal programs are administered to be compatible with state, local units of government, and private programs and policies to protect farmland. For the purpose of FPPA, farmland includes prime farmland, unique farmland, and land of statewide or local importance. Farmland subject to FPPA requirements do not have to be currently used for cropland. These lands can be forest land, pastureland, cropland, or other land, but not water or urban and built-up land (developed areas).

Review of the Ada and Boise county soil surveys identified the following soil complexes as being prime farmlands along the project corridor:

- Purdam silt loam, 0 to 2 percent slopes
- Notus-LesBois complex, 0 to 1 percent slopes
- Flofeather sandy loam, 1 to 3 percent slopes
- Flofeather sandy loam, 3 to 8 percent slopes
- Goose Creek-Collister complex, 0 to 1 percent slopes
- Collister-Flofeather complex, 1 to 3 percent slopes



- Piercepark loam, 4 to 8 percent slopes
- Piercepark coarse sandy loam, 8 to 25 percent slopes
- Cashmere loamy sand, 8 to 25 percent slopes
- Pawtoot-Polecat complex, 3 to 12 percent slopes
- Cranegulch loam, 2 to 5 percent slopes
- Oxyaquic Xerofluvents-Cumulic Haploxerolls complex, nearly level
- Bissell loam, 2 to 4 percent slopes
- Bissell loam, 4 to 8 percent slopes
- Porter sandy loam, 1 to 4 percent slopes
- Boise coarse sandy loam, 3 to 8 percent slopes
- Flofeather-Shawmount complex, 1 to 3 percent slopes
- Jasseek loam, 1 to 3 percent slopes
- Jasseek loam, 3 to 8 percent slopes
- Adaboi silt loam, 1 to 4 percent slopes

Appendix A, Figures 2-1 and 2-2 (Pages 33-34) display the location of prime farmlands within and along the project corridor. It should be noted according to the FPPA requirements, areas within urban and built-up lands, such as the City of Eagle, and water are not subject to the FPPA requirements. In addition, certain project actions are subject to FPPA exemptions:

- Construction within existing right-of-way purchased before August 6, 1984.
- All resurfacing and normal road repairs.
- Right-of-way taken from existing residents and/or businesses.
- Borrow areas and disposal sites not arranged for under the direction of ITD.
- Land committed to water storage.

If the project is not deemed exempt, consultation with the NRCS should be conducted to evaluate the potential for prime farmland impacts.

Air Quality

The Idaho 55 Central Corridor lies within both Ada and Boise Counties. According to the Idaho Department of Environmental Quality (DEQ) website, Ada County is considered an area of concern for particulate matter with a diameter of 2.5 micrometers or less (PM-2.5) (such as pollen and smoke) and ozone. Northern Ada County is also a federally designated and IDEQ identified air quality maintenance area for carbon monoxide and PM-10. Boise County is in attainment with all National Ambient Air Quality Standards criteria pollutants established by the Clean Air Act (Idaho DEQ 2006). The ITD Air Screening Policy should be reviewed to determine whether a specific project may be screened out early in the development process or warrant a full air quality analysis.



Hydrology

Surface Waters

Topographic maps, aerial photographs, and DEQ stream layer geographic data were reviewed for the location of natural streams and rivers, as well as irrigation related canals, ditches and laterals along the project. These areas were then field verified during a windshield survey conducted in November 2013.

The majority of surface waters identified along Idaho 55 are natural drainages. The following named rivers and streams were identified along and/or crossing Idaho 55. Two of the natural drainages are referred to by the same name, Cottonwood Creek. In addition, numerous ephemeral drainages were also identified and are illustrated in **Appendix A, Figures 3-1 through 3-19 (Pages 35-53)**.

- Dry Creek
- Spring Valley Creek
- South Fork Willow Creek
- Alkali Creek
- Cottonwood Creek (1)
- Robbs Creek
- Payette River
- Porter Creek
- Hill Creek
- Cottonwood Creek (2)
- Flemming Creek

Of these 11 drainages, the South Fork Willow Creek has been identified as being water quality impaired by DEQ. The South Fork Willow Creek does not support its designated beneficial use for cold water aquatic life due to temperature pollutants.

In addition to the above natural drainages, the following irrigation related drainages were identified along and/or crossing Idaho 55: Dry Creek Canal, Farmers Union Canal, Power Canal, and four unnamed ditches/laterals.

Numerous surface waters have been identified in the project corridor; therefore, any future project that may impact these drainages would need to be coordinated with the U. S. Army Corps of Engineers and other agencies, as applicable, to determine hydrological connectivity to waters of the U.S. In addition, a joint application for impacts would be required and potential mitigation. The South Fork Willow Creek has been identified as water quality impaired by DEQ; therefore, as part of the joint application process, DEQ would review the permit to ensure the project does not cause exceedance of the total maximum daily load developed for the waterbody.

The Payette River north of Beehive Bend boat access (Milepost 71.5) is a State Protected River classified for Recreational use by the Idaho Water Resource Board. Construction of hydropower projects; construction or expansion of dams or impoundments; dredge or placer mining; or mineral or sand and gravel extraction within the stream bed are not allowed on this stream.

Floodplains

Federal Emergency Management Agency (FEMA) National Flood Hazard Layer geospatial data for Ada County (see **Appendix A, Figure 4-1, Page 54**) and FEMA floodplain maps for Boise County were reviewed for the project corridor. The FEMA floodplain maps for Boise County included the following floodplain panels from north to south: 16015C0125B, 16015C0250B, 16015C0237B, 16015C0239B, 16015C0377B, and 16015C0400B. The majority of the project corridor, aside from a small portion within



the Boise River floodplain at the southernmost boundary, Dry Creek, and the Payette River, is mapped as “Unshaded Zone X”. Unshaded Zone X is an area above the 0.2-percent-annual-chance-floodplain, and properties within this zone are considered to be at a low risk of flooding. A small portion of the project corridor lies within the Boise River floodplain at the southernmost boundary and is mapped as being within the 0.2-percent-annual-chance-floodplain putting it at moderate risk of flooding. Both the Payette River and Dry Creek are mapped on FEMA maps as “Zone A” which are areas of 1-percent-annual-chance flooding. Properties in Zone A are considered to be at high risk of flooding under the National Flood Insurance Program.

Because both Dry Creek and the Payette River have mapped floodplains associated, coordination with the local floodplain administrator would need to be completed during project development to ensure the project does not cause an increase in floodwaters. In addition, a floodplain development permit would be completed to document these findings.

Wetlands

USFWS NWI mapping data was reviewed for the project corridor. NWI maps revealed five wetland polygons identified within 100 feet of the Idaho 55 centerline. The wetland polygons identified included one riverine polygon (identified as the Payette River), two freshwater ponds (one identified as the Power Canal), and two freshwater emergent wetlands. All but two polygons were field verified as present during a windshield survey of the project corridor. The two freshwater emergent wetlands (one located approximately 250 feet north of the Idaho 44/Idaho 55 intersection on the west side and one located approximately 600 feet north of Hill Road on the east side) were field verified as absent during a windshield survey of the project corridor.

A windshield survey was conducted within the project corridor to identify potential wetland communities and dominant vegetation within those communities. A total of 60 potential wetland communities have been identified within the project corridor. Most of the potential wetlands identified are associated with natural drainages.

Three types of wetland communities were identified within the corridor and include emergent, scrub shrub, and forested wetlands. The emergent community consists predominantly of herb-like, non-woody plants and woody plants less than 3.2 feet tall. The emergent vegetation was generally represented by reed canary grass (*Phalaris arundinacea*), hardstem bulrush (*Schoenoplectus acutus*), sedges (*Carex spp.*), rushes (*Juncus spp.*), bulrush (*Scirpus spp.*), and cattail (*Typha latifolia*) species. The scrub shrub communities consist of woody plants greater than or equal to 3.2 feet tall but less than 3 inches in diameter at breast height. The scrub shrub vegetation in the project corridor was generally dominated by willows (*Salix spp.*), wood’s rose (*Rosa woodsii*), and salt cedar (*Tamarix spp.*). The forested community consists predominantly of trees with a stem greater than 5 inches in diameter and 20 feet or higher. This community is generally represented by such species as black cottonwood (*Populus trichocarpa*), narrowleaf willow (*Salix exigua*), Russian olive (*Elaeagnus angustifolia*), and black locust (*Robinia pseudoacacia*). **Appendix A, Figures 3-1 through 3-19 (Pages 35-53)** display the locations of the waters and wetlands identified and **Table 3** below lists the wetlands identified by type and the waters associated with the wetland community.



Table 3: Potential Wetlands Identified by Wetland Type

WETLAND TYPE	WATERS ASSOCIATED WITH	LOCATION BY FIGURE
Emergent	Unnamed Ditch	3-1 A
Emergent	Isolated	3-1 B
Emergent	Isolated	3-1 B
Emergent	Farmers Union Canal	3-1 C
Emergent	Isolated	3-2 A
Forested	Dry Creek	3-2 A
Forested, Scrub Shrub, Emergent	Spring Valley Creek	3-2 B and C 3-3 A, B and C 3-4 A, B and C 3-5 A and B
Emergent	Ephemeral Drainage	3-6 A
Scrub Shrub	South Fork Willow Creek	3-6 A
Forested, Scrub Shrub	Alkali Creek	3-6 B and C 3-7 B and C
Scrub Shrub	Ephemeral Drainage	3-6 B
Scrub Shrub	Ephemeral Drainage	3-6 B
Scrub Shrub	Ephemeral Drainage	3-6 B
Scrub Shrub	Ephemeral Drainage	3-7 A
Scrub Shrub	Ephemeral Drainage	3-7 A
Scrub Shrub	Isolated	3-7 A
Scrub Shrub	Ephemeral Drainage	3-7 B
Scrub Shrub	Ephemeral Drainage	3-7 C
Forested, Scrub Shrub	Cottonwood Creek (1)	3-8 A and B
Emergent	Isolated	3-8 C
Emergent	Isolated	3-8 C
Scrub Shrub	Isolated	3-9 A
Forested, Scrub Shrub	Robbs Creek	3-9 A
Forested, Scrub Shrub	Payette River	3-9 B 3-10 B and C 3-11 A, B and C 3-12 A, B and C 3-13 A, B and C 3-14 A, B and C 3-15 A, B and C 3-16 A



		3-17 C 3-18 A 3-19 B and C
Forested	Isolated	3-9 C
Emergent	Unnamed Ditch	3-9 C
WETLAND TYPE	WATERS ASSOCIATED WITH	LOCATION BY FIGURE
Scrub Shrub	Porter Creek	3-11 B
Scrub Shrub	Ephemeral Drainage	3-12 B
Scrub Shrub	Isolated	3-12 B
Emergent	Ephemeral Drainage	3-14 B and C
Scrub Shrub	Ephemeral Drainage	3-15 A
Scrub Shrub	Ephemeral Drainage	3-15 B
Scrub Shrub	Ephemeral Drainage	3-15 C
Scrub Shrub	Ephemeral Drainage	3-15 C
Scrub Shrub, Emergent	Cottonwood Creek (2)	3-15 C 3-16 A
Scrub Shrub	Ephemeral Drainage	3-16 B
Emergent	Isolated	3-16 C
Emergent	Isolated	3-17 A
Scrub Shrub	Ephemeral Drainage	3-17 A
Scrub Shrub	Ephemeral Drainage	3-17 B
Emergent	Isolated	3-17 B
Scrub Shrub	Ephemeral Drainage	3-17 B
Scrub Shrub	Flemming Creek	3-17 C
Emergent	Ephemeral Drainage	3-18 A
Emergent	Isolated	3-18 A
Scrub Shrub	Ephemeral Drainage	3-18 A
Scrub Shrub	Ephemeral Drainage	3-18 B
Scrub Shrub	Ephemeral Drainage	3-18 B
Scrub Shrub	Isolated	3-18 C
Scrub Shrub, Emergent	Ephemeral Drainage	3-18 C
Scrub Shrub	Ephemeral Drainage	3-18 C
Emergent	Isolated	3-18 C
Emergent	Isolated	3-18 C



Scrub Shrub	Ephemeral Drainage	3-19 A
Scrub Shrub	Ephemeral Drainage	3-19 A
Scrub Shrub	Ephemeral Drainage	3-19 B
Scrub Shrub	Ephemeral Drainage	3-19 B
Scrub Shrub	Ephemeral Drainage	3-19 B

Numerous wetland areas were identified within and adjacent to the project corridor; therefore, future projects need to conduct project specific wetland delineations, coordinate with the USACE, and, as applicable, permitting and mitigation.

Groundwater

Approximately nine billion gallons of groundwater are withdrawn everyday for various uses in Idaho. Groundwater provides 95 percent of the state’s drinking water; however, drinking water accounts for only 4 percent of total groundwater withdrawals each year. Agriculture uses approximately 60 percent of the total groundwater withdrawn.

An SSA is defined as an aquifer that supplies 50 percent of the drinking water for the area overlying the aquifer and no other source of water is available. There are no designated SSAs located within the project corridor.

Nitrate is one of the most widespread groundwater contaminants in Idaho. As part of DEQ’s goal of restoring degraded groundwater, DEQ has developed a list of degraded groundwater areas. This list focuses on nitrate and ranks the top 32 nitrate-degraded areas (referred to as “nitrate priority areas”) in the state based on the severity of the degradation. There are no nitrate-degraded areas located within the project corridor.

Hazardous Materials

Hazardous materials are defined as any material that poses harmful risks to human health and/or the environment. It includes any hazardous or toxic substance, waste, pollutant, or chemical regulated under the Clean Air Act, Clean Water Act, Toxic Substance Control Act, and/or the Resource Conservation and Recovery Act (RCRA). Hazardous material sites are tracked through the Idaho DEQ Waste Management and Remediation Program, as well as the Environmental Protection Agency’s Envirofacts Program.

Throughout the project corridor there are businesses/operations that raise the risk of encountering hazardous materials. Examples include residential underground storage tanks, gas stations, wrecking yards, dry cleaners, auto body shops and auto repair, guard railing, bridges, and dump sites. Leaking Underground Storage Tanks (LUSTs) and soil staining, lead and asbestos are the most typical concerns. See **Appendix A, Figures 5-1 and 5-2 (Pages 55-56)** for LUST site locations within the project corridor.

Even if R/W is not required, plumes of soil contamination can drift into/across ITD R/W. Projects that require excavation have a higher potential of encountering hazardous materials during construction. If parcels are identified with a potential for hazardous materials, assessments that determine the extent of



the contamination are required. Remediation is required when contamination level exceeds state or federal standards. **Table 4** lists Underground Storage Tanks (USTs) and LUSTs within the project corridor. There are 14 USTs of which five are still in use and four were LUSTs but all of those have been cleaned up.

Table 4: Idaho 55 Central Corridor UST and LUST Sites

FACILITY ID	FACILITY NAME	STATUS	LUST ID	LOCATION BY FIGURE	CLEANUP COMPLETION DATE
3-010864	St. Luke's R.M.C. (Eagle)	Open	--	5-1 A	n/a
3-010732	B&B Prop/Shadow Valley Golf Course	Open	1415	5-1 B	June 22, 2007
3-010743	Beacon Light Chevron	Open	--	5-1 B	n/a
3-010263	Dry Creek Corral	Closed	--	5-1 B	n/a
3-080014	Spring Valley Ranch	Closed	1419	5-1 C	October 3, 2007
3-080020	Ray's Corner Market	Open	--	5-2 A	n/a
3-080023	Chevron Station	Closed	--	5-2 A	n/a
3-080606	Boise Cascade Corp - HSB	Closed	--	5-2 A	n/a
3-080610	Valley View Chevron	Open	--	5-2 A	n/a
3-080006	Boise County Road Dist 3	Closed	--	5-2 B	n/a
3-080007	Idaho Transportation Dept	Closed	325	5-2 C	July 10, 1995
3-080011	Banks #1	Closed	1047	5-2 C	June 30, 1992
3-080016	Banks Station	Closed	--	5-2 C	n/a
3-080604	Banks	Closed	--	5-2 C	n/a

There are five sites in the highway corridor that are listed as hazardous waste generators under the RCRA. Those sites are listed in **Table 5**.

Table 5: Idaho 55 Central Corridor RCRA Sites

EPA FACILITY ID	FACILITY NAME	LOCATION ADDRESS	LOCATION CITY
110005791438	Kirk Huff Trucking	9797 Shields Avenue	Boise
110007263157	Idaho Forest Inc.	125 Mill Road	Horseshoe Bend
110014374505	Roundy's Pole Fence Co.	1871 McGrath Road	Eagle
110018905247	Home Depot 1809	2808 E State Street	Eagle
110044939813	Dentpro	1574 N Ellington Way	Eagle



Biological Resources

Biological Resources include federally listed threatened and endangered species, state sensitive species and wildlife and fish resources. Data presented on the occurrence or potential occurrence of federally listed species come from the USFWS. Data concerning state sensitive wildlife and plant species, and other wildlife and fish resources come from the IFWIS through the Idaho Fish and Game (IDFG). In addition to data provided by IFWIS, a windshield survey of the project area was conducted on November 7, 2013 by qualified biologists. However, no field investigations were made to determine the presence or absence of threatened, endangered, or sensitive species or their habitats in the project corridor.

The project corridor encompasses several habitat types including: commercial, suburban, agricultural, light forested, shrub steppe/grassland habitats, and riparian areas associated with the Payette River and its tributaries.

Threatened and Endangered Species

The USFWS list of endangered, threatened and candidate species under the Endangered Species Act (ESA) which occur in Ada and Boise Counties can be found in **Table 6**. No federally listed species were observed during the windshield survey.

Table 6: List of Endangered, Threatened, Proposed and Candidate Species for Ada and Boise Counties

SPECIES	SCIENTIFIC NAME	COUNTY LISTED	FEDERAL STATUS
Snake River Physa Snail	<i>Physa natricina</i>	Ada	Endangered
Greater Sage Grouse	<i>Centrocercus urophasianus</i>	Ada	Candidate
Bull Trout	<i>Salvelinus confluentus</i>	Ada, Boise	Threatened; Designated Critical Habitat in Boise County
Yellow-billed Cuckoo	<i>Coccyzus americanus</i>	Ada, Boise	Threatened
Slickspot Peppergrass	<i>Lepidium papilliferum</i>	Ada, Boise	Proposed Endangered
Gray Wolf	<i>Canis lupus</i>	Boise	Recovery
Whitebark Pine	<i>Pinus albicaulis</i>	Boise	Candidate

USFWS List Updated on June 22, 2015

Species of Greatest Conservation Need

The January 2015 extract of the IDFG IFWIS database was used to determine the occurrence of species of concern within one mile of the highway corridor (see **Table 7**). Ranks for each species are presented below, including IDFG, global, and the BLM rankings as applicable. Species with state and global rankings of S4G4 or S5G5 were eliminated. In addition to those species presented below, 190 species of migratory birds have been observed within the project area. No field investigations were made to determine the presence or absence of these species or suitable habitat.



Table 7: List of Species of Concern Known to Occur within One Mile of the Project Corridor

SPECIES	SCIENTIFIC NAME	IDFG RANK ¹	OTHER AGENCY OR GLOBAL RANK(S) ¹
Animal Species			
Columbia Pebblesnail	<i>Fluminicola fuscus</i>	SNR	G3
Common Gartersnake	<i>Thamnophis sirtalis</i>	S3	G5
Ring-necked Snake	<i>Diadophis punctatus</i>	S2	G5
Stonefly	<i>Utacapnia nedia</i>	S1	G3
Townsend's Pocket Gopher	<i>Thomomys townsendii</i>	S2	G4G5
Wolverine	<i>Gulo gulo</i>	S2	G4T4
Woodhouse's Toad	<i>Anaxyrus woodhousii</i>	S2	G5
Plant Species			
Aase's Onion	<i>Allium aaseae</i>	S3	G3, BLM Type 2
Wovenspore Lichen	<i>Texosprium sancti-jacobi</i>	S2	G2, BLM Type 2

Received from IDFG on August 10, 2015

¹ S: State Rank; G: Global Rank. S1: Critically imperiled; S2: Imperiled; S3: Vulnerable; SNR: Not yet assessed; BLM Type 2: Rangewide/Globally Imperiled.

Wildlife and Fish Resources

Wildlife and fish resources documented during the windshield survey conducted on November 7, 2013 included: a riparian corridor along Dry Creek (MP 48); raptor nests (likely used by red-tailed or Swainson’s hawks in 2013) located on the Shadow Valley Golf Course (MP 49); two raptor nests (likely used by red-tailed hawks, Swainson’s hawks, or great-horned owls in 2013) located in the riparian areas associated with Alkali Creek and the South Fork Willow Creek adjacent to the highway between MP 54.5 and 56.5; a riparian corridor which crosses Idaho 55 via a large concrete culvert under the highway at Cottonwood Creek (MP 62); cliff swallow and possibly barn swallow nests (5 to 10 nests documented) on the Payette River Bridge in Horseshoe Bend; potential cliff swallow and barn swallow nesting habitat on the bridge across the Payette River to Gardena, ID (MP 69.5); game crossing signage area along Idaho 55 from MP 76 to MP 77; and barn swallow and possibly cliff swallow nests (approximately 10-15 nests documented) on the Payette River bridge at the intersection of Idaho 55 and Banks Lowman Road. Areas of intact sagebrush/shrub steppe habitat are located adjacent to the highway, along the Horseshoe Bend Grade segment of Idaho 55.

In addition to the resources documented during the windshield survey, the wildlife data obtained from IFWIS contained the location of a golden eagle nest within one mile of the project area. The record is from a golden eagle nesting survey conducted in 2004. It is unclear whether the nesting territory has





been occupied since 2004; however, golden eagles are known to be highly site fidelic (use the same nesting territory year after year), and it is possible that the nesting territory may be occupied in the future. Golden eagles are not listed by the USFWS, or considered sensitive by the State of Idaho; however, they are protected under the Bald and Golden Eagle Protection Act of 1940 and the Migratory Bird Treaty Act.

Wildlife Linkage Zones

In November, 2007, ITD and IDFG produced a wildlife linkage report and an accompanying GIS database. The purpose of the assessment was to identify opportunities and needs for protecting or creating appropriate movement habitats for wildlife, identify linkage areas for wildlife, and address areas of interest along the highway segments related to wildlife habitat, development pressure and public safety. Most of Idaho 55 in the study corridor is adjacent to or bisects big game winter range as illustrated in Appendix A, Figure 6-1 (Page 57).

Human Environment

The human environment includes population, visual impacts, cultural/historic resources, land use/zoning, noise and airspace intrusion. Federally funded projects must comply with a number of laws and regulations that may be triggered by those components of the human environment.

Demographic Information

Population counts were taken from the 2010 U.S. Census and income estimates from the 2007-2011 American Community Survey 5-Year Estimate. Population counts are a direct count of the entire population while income estimates come from surveys of a portion of the population over a five-year period from 2007 to 2011. This data is displayed in Table 8.

Table 8: Idaho 55 Central Corridor Demographic Information

AREA	2010 POPULATION	ESTIMATED MEDIAN HOUSEHOLD INCOME 2011	ESTIMATED PERCENT POPULATION BELOW POVERTY LEVEL 2011	PERCENT MINORITY POPULATION 2010
State of Idaho	1,567,582	\$46,890	14.3%	10.9%
Ada County	392,365	\$55,304	11.2%	9.7%
Idaho 55 Central Corridor in Ada County	2,158	\$64,191 - \$94,494	3.8% - 13.2%	4.9%
City of Eagle	19,908	\$80,724	6.2%	5.6%
Boise County	7,028	\$47,128	17.3%	4.6%
Idaho 55 Central Corridor in Boise County	1,000	\$37,351 - \$39,901	16.6% - 21.8%	5.7%
City of Horseshoe Bend	707	\$40,000	22.2%	6.4%



“Estimated Median Household Income” and “Estimated Population below Poverty Level” data for both the Ada County and Boise County portions of the Idaho 55 Central Corridor represent areas that extend beyond the corridor boundary. Population data is available at the block level which is a smaller area than the block group level. Income estimates are not available at the block level but start at the block group level. **Appendix A, Figure 7-1 (Page 58)** illustrates the extent of block groups beyond the corridor boundary.

Environmental Justice

Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, signed by the President on February 11, 1994, directs Federal agencies to identify and address disproportionately high and adverse human health and environmental effects, including the interrelated and social and economic effects of their programs, policies and activities on minority and low-income populations in the United States. For transportations projects, this means no particular minority or low-income person may be disproportionately isolated, displaced, or otherwise subjected to adverse effects.

A windshield survey of the project did not reveal areas that may be of concern for minority or low-income populations. Additional census research of the project needs to be conducted to determine whether or not this may or may not be of concern for future projects.

Cultural Resources

Research was not conducted at the SHPO for this project; rather a review of the NRHP was examined. No sites have been identified within the project area as registered on the NRHP.

On October 16 and 17, 2013, a 33.675 mile windshield survey of Idaho 55 from the junction of SH 44 (State Street) in Eagle, Idaho to the junction of Banks Lowman Road in Boise County was conducted. A total of eleven potentially eligible historic resources were identified: six historic bridges, two historic sites, two historic waterways and one historic railroad (see **Appendix A, Figures 8-1 and 8-2, Pages 59-60**). All were identified as potentially eligible for the NRHP. **Table 9** represents all of the historic resources identified during the windshield survey.

Table 9: Potentially Historic Resources within the Project Corridor

TEMP. SITE NO.	NAME/TYPE OF SITE	NRHP ELIGIBILITY	PROXIMITY TO APE	FIGURE
Location #1	Farmers Union Canal - 1 st Order	Potentially Eligible	Crosses the project corridor	7-1 A
Location #2	“South End” Bridge over the Payette River in Horseshoe Bend, ID (southwest of Kit’s Riverside Restaurant)	Potentially Eligible	Within the project corridor	7-1 B
Location #3	The “Old Riverside Depot Inn” 105 Payette River Road Horseshoe Bend, ID	Potentially Eligible	Adjacent to the project corridor on the east side of Idaho 55	7-1 B



Location #4	Power Canal - 1 st Order	Potentially Eligible	Crosses the project corridor	7-1 C
Location #5	Oregon Short Line (now the Thunder Mountain Line) Rail Road Crossing	Potentially Eligible	Crosses the project corridor	7-1 C
Location #6	Placer Lodge No. 3 453 Hwy 55 Horseshoe Bend, ID	Potentially Eligible	Adjacent to the project corridor on the east side of Idaho 55	7-1 C
Location #7	Bridge crossing over the railroad north of Horseshoe Bend, ID	Potentially Eligible	Within the project corridor	7-2 A
Location #8	“North End” Bridge over the Payette River (just northwest of Location #7)	Potentially Eligible	Within the project corridor	7-2 A
Location #9	Metal, One-Lane Bridge crosses the Payette River at Brownlee Road near Gardena, ID	Potentially Eligible	Adjacent to the project corridor on the west side of Idaho 55	7-2 B
Location #10	Bridge crossing over the Payette River (southwest of Banks Lowman Road)	Potentially Eligible	Within the project corridor	7-2 C
Location #11	Bridge crossing over the Payette River northwest of Idaho 55 and Banks Lowman Road	Potentially Eligible	Adjacent to the project corridor on the west side of Idaho 55	7-2 C

An additional three potentially eligible historic resources outside the limits of the windshield survey but within the study corridor had been identified in 1989 by an Ada County Reconnaissance Survey. Collectively known as the Spring Valley Ranch Structures, these are the main ranch house, bunkhouse/cellar and barn. Their location is noted in the inset of **Appendix A, Figure 8-1**.

The fourteen resources identified were not formally recorded for NRHP eligibility and, therefore, those recommendations are only preliminary. If projects within the corridor proceed to a formal Section 106 evaluation, these eleven resources (along with all other historic properties within the project corridor) will be formally recorded and eligibility determinations will be made. At that time, any or all of the eleven sites may or may not be eligible for the NRHP. Additionally, other sites not identified within this windshield survey may in fact be determined eligible.

Prior to construction, it is recommended that all known historic sites within the project corridor be reassessed for NRHP eligibility.

Visual Impacts

Visual impacts refer to changes in the visual landscape such as putting a highway in a new location or putting up structures that impede aesthetically appealing vistas. The project corridor lies within the Payette River Scenic Byway. From the junction of Idaho 44 and Idaho 55 in the City of Eagle, this byway



heads north on Idaho 55 to Horseshoe Bend where it meets the Payette River. From there, it passes through the Boise and Payette National Forests and the popular resort towns of Cascade and McCall before reaching the northern end of the byway at New Meadows.

ITD does not anticipate projects resulting in visual impacts within the project corridor; however, the established Scenic Byways Advisory Committee will be consulted during the development of any future projects. If there is a potential for visual impacts, impacts to the existing visual element(s), the relationship of the impacts to potential viewers of and from the project, as well as measures to avoid, minimize, or reduce the adverse impacts should be identified.

Section 4(f) Resources

Section 4(f) of the Department of Transportation Act of 1966 applies to the use of land from publically owned parks, recreation sites, wildlife and waterfowl refuges, and public or private historic sites for Federal highway projects.

The city and county comprehensive plans, as well as park and recreation information, were reviewed to identify potential Section 4(f) resources. The NRHP was also reviewed to identify known listed historic sites. Section 4(f) resources will be identified as potential until a Section 4(f) evaluation is completed. In addition, a windshield survey of the project corridor was conducted. **Table 10** lists the potential Section 4(f) resources identified and the location along the project corridor (see **Appendix A, Figures 9-1 and 9-2, Pages 61-62**).

Table 10: Potential Section 4(f) Resources

TYPE	SITE	LOCATION BY FIGURE
Park	Horseshoe Bend High School	398 School Road, 8-1 A
Park	Horseshoe Bend City Park	112 Ada Street, 8-1 B
Recreation Area	BLM - Parnell Beach Recreation Site	8-1 C
Recreation Area	BLM - Beehive Bend Take-Out Recreation Site	8-2 A
Recreation Area	BLM - Chief Parrish Day Use Recreation Site	8-2 B
Recreation Area	BLM - Payette River: Confluence	8-2 C

Prior to approving the use of Section 4(f) resources, the Federal Highway Administration (FHWA) must determine that no prudent or feasible alternatives exist and that the project action minimizes harm to the resource.

Section 6(f) Resources

Passed by Congress in 1965, the Recreation Coordination and Development Act established the LWCF, a matching assistance program that provides grants, which pay half the acquisition and development costs of outdoor recreation sites and facilities. Section 6(f) of the Act prohibits the conversion of property acquired or developed with these grants to a non-recreational purpose without the approval of the U.S. Department of the Interior - National Park Service.





A search of grants funded for Ada and Boise Counties did not indicate projects funded through the LWCF program within the corridor.

Land Use and Zoning

Current zoning and future land use data was obtained from the following jurisdictions: the City of Eagle, Ada County, the City of Horseshoe Bend, and Boise County. The following is a description of the existing and future zoning and land use along Idaho 55 within each jurisdictional boundary.

City of Eagle

Existing land use along Idaho 55 within the City of Eagle includes a mix of commercial, residential, and multi-use. The commercial zone includes retail establishments, such as the Home Depot and Chevron Station located at the junction of Idaho 44 and Idaho 55. The residential zone includes single family residential - low density and medium density. According to the Eagle Comprehensive Plan, proposed future land use along this corridor will be predominately commercial with a business park on the east side transitioning into rural residential to the north.

Ada County

The majority of land along the project corridor within Ada County is used and zoned for rural residential and rural preservation purposes with the exception of the planned communities of Avimor and Dry Creek Ranch. No proposed change in zoning was identified.

City of Horseshoe Bend

Existing land use along Idaho 55 within the City of Horseshoe Bend includes a mix of commercial, industrial, multi-use, public, and residential. The commercial zone includes retail establishments, such as food markets, restaurants, office, medical and other professional businesses. The industrial zone includes establishments that manufacture, process, fabricate, and test goods and materials. The public zone includes, but is not limited to, school sites, bike paths, park sites, and public safety facilities such as police, fire, or emergency medical facilities. The residential zone includes single family residential low, medium and high densities. No proposed change in zoning was identified.

Boise County

The Boise County Zoning and Development Ordinance designates all lands located within the county as one Multiple Use Zone District. The purpose of one land use classification is to grant landowners maximum flexibility in using and developing their properties in a way that will protect, retain or enhance the natural beauty and open space characteristics of Boise County. All uses in the county have been classified as allowed, not-allowed, or conditional. No proposed change in zoning was identified.

Noise

The FHWA has identified the following sensitive receptors and established Noise Abatement Criteria (NAC) for several categories of land use activities (see **Table 11**). This table depicts different NAC standards for various land uses which must be met in the design year or mitigation may be necessary. In addition, ITD policy for a substantial increase in noise level is 15 decibels (dBA) or that which would be considered over twice as loud to the human ear. A Leq, A-weighted, one-hour, (Leqah) noise measurement is used as the basis to assess the impacts that a roadway has on the sensitive receptors that are located along the road.



The FHWA Absolute NAC and ITD Guidelines are defined by the predicted noise level approaching (1 dBA below the FHWA NAC) or exceeding the FHWA NAC. This noise level is a Leq of 57 dBA for Category A receptors, Leq of 67 dBA for Categories B and C receptors and a Leq of 72 dBA for Category E receptors. Category D receptors require an internal Leq of 52 dBA and Categories F and G have no criteria. ITD considers noise abatement when the FHWA Absolute NAC is approached within 1 dBA: 56 dBA for Category A, 66 dBA for Category B and C, 57 dBA for Category D and 71 dBA for Category E. Additionally, an increase of 15 dBA over existing is considered a substantial increase.

Table 11: FHWA Noise Abatement Criteria

ACTIVITY CATEGORY	Leq (dBA) FHWA	EVALUATION LOCATION	DESCRIPTION OF ACTIVITY CATEGORY
Category A	57	Exterior	Land on which serenity and quiet are of extraordinary significance and serve an important need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose
Category B	67	Exterior	Residential
Category C	67	Exterior	Active sport areas, amphitheatres, auditoriums, campgrounds, cemeteries, day care centers, hospitals, libraries, medical facilities, parks, picnic areas, places of worship, playgrounds, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, recreation areas, Section 4(f) sites, schools, television studios, trails, and trail crossings
Category D	52	Interior	Auditoriums, day care centers, hospitals, libraries, medical facilities, places of worship, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, schools, and television studios
Category E	72		Hotels, motels, offices, restaurants/bars, and other developed lands, properties or activities not included in A-D or F
Category F	--	--	Agriculture, airports, bus yards, emergency services, industrial, logging, maintenance facilities, manufacturing, mining, rail yards, retail facilities, shipyards, utilities (water resources, water treatment, electrical), and warehousing
Category G	--	--	Undeveloped lands that are not permitted
Substantial Increase	15		A substantial increase of 15 dBA over the existing noise levels

Source: 23 CFR 772 and ITD Noise Policy

Segment Analysis

The Idaho 55 corridor was divided into ten segments based on similar traffic volumes and speeds. Ten point transect analyses were conducted using the FHWA Traffic Noise Model (TNM) 2.5 software on these ten segments to predict what distance from centerline the FHWA NAC standards would be approached or exceeded. The ten segments are identified below:





- Segment 1: State Highway 44 to Hill Road, 55 mph.
- Segment 2: Hill Road to Floating Feather Road, 55 mph.
- Segment 3: Floating Feather Road to Beacon Light Road, 55 mph.
- Segment 4: Beacon Light Road to W Dry Creek Road, 55 mph.
- Segment 5: W Dry Creek Road to Old Horseshoe Bend Hill, 60 mph.
- Segment 6: Old Horseshoe Bend Hill to 3rd Street Circle, 45 mph.
- Segment 7: 3rd Street Circle to 1st Street, 35 mph.
- Segment 8: 1st Street to State Highway 52 (Horseshoe Bend), 35 mph.
- Segment 9: State Highway 52 to Porter Creek Road, 60 mph.
- Segment 10: Porter Creek Road to Garden Valley Road, 60 mph.

The results of the TNM transect analysis are depicted in **Table 12**.

Table 12: dBA Levels for Ten Point Transects in Each Segment along the Idaho 55 Corridor

DISTANCE FROM CENTERLINE (FT)	SEGMENT 1	SEGMENT 2	SEGMENT 3	SEGMENT 4	SEGMENT 5
50	73.9	74.0	72.4	71.6	71.8
75	70.2	70.1	68.5	67.8	68.0
100	67.6	67.4	65.9	65.1	65.3
125	65.8	65.4	63.9	63.1	63.3
150	64.3	63.8	62.3	61.5	61.8
200	62.0	61.3	59.8	59.0	59.3
250	60.2	59.4	57.9	57.1	57.4
300	58.7	57.8	56.3	55.5	55.8
400	56.3	55.3	53.9	53.1	53.3
800	49.9	49.0	47.5	46.7	46.7
DISTANCE FROM CENTERLINE (FT)	SEGMENT 6	SEGMENT 7	SEGMENT 8	SEGMENT 9	SEGMENT 10
50	68.0	65.6	65.8	72.3	72.5
75	64.3	62.1	62.3	68.5	68.6
100	61.9	59.8	60.0	65.9	66.0
125	60.1	58.1	58.3	64.0	64.1
150	58.6	56.8	57.0	62.4	62.5
200	56.4	54.7	54.9	60.0	60.1
250	54.7	53.1	53.3	58.1	58.2
300	53.2	51.8	52.0	56.6	56.6
400	51.0	49.7	49.9	54.1	54.2
800	45.0	44.1	44.3	47.5	47.6



Setback constraints according to the TNM transects analysis are discussed below. Category F and G receptors have no NAC; therefore, these receptors have no setback constraints.

Segment 1:

These results indicate a 400 foot setback would be appropriate for Category A, a 125 foot setback would be appropriate for categories B and C, and Category E is constrained by a 75 foot setback.

Segment 2:

These results indicate a 400 foot setback would be appropriate for Category A, a 125 foot setback would be appropriate for categories B and C, and Category E is constrained by a 75 foot setback.

Segment 3:

These results indicate a 300 foot setback would be appropriate for Category A, a 100 foot setback would be appropriate for categories B and C, and Category E is constrained by a 75 foot setback.

Segment 4:

These results indicate a 300 foot setback would be appropriate for Category A, a 100 foot setback would be appropriate for categories B and C, and Category E is constrained by a 50 foot setback.

Segment 5:

These results indicate a 300 foot setback would be appropriate for Category A, a 100 foot setback would be appropriate for categories B and C, and Category E is constrained by a 50 foot setback.

Segment 6:

These results indicate a 200 foot setback would be appropriate for Category A, a 75 foot setback would be appropriate for categories B and C, and Category E is constrained by a 50 foot setback.

Segment 7:

These results indicate a 150 foot setback would be appropriate for Category A, and a 50 foot setback would be appropriate for categories B, C and E.

Segment 8:

These results indicate a 150 foot setback would be appropriate for Category A, and a 50 foot setback would be appropriate for categories B, C and E.

Segment 9:

These results indicate a 300 foot setback would be appropriate for Category A, a 100 foot setback would be appropriate for categories B and C, and Category E is constrained by a 75 foot setback.

Segment 10:

These results indicate a 300 foot setback would be appropriate for Category A, a 100 foot setback would be appropriate for categories B and C, and Category E is constrained by a 75 foot setback.

FAA Airspace Intrusion

There is one public aviation facility within the project corridor: Horseshoe Bend Heliport. This is illustrated in **Appendix A, Figure 10-1 (Page 63)**.



Any proposed new construction or alteration of an existing facility that may impose an obstruction to present or future air navigation must be coordinated with the FAA and with the department's Division of Aeronautics (Aeronautics) to ensure that airway-highway clearances are adequate for the safe movement of air and highway traffic. Aeronautics requires notification of any structure that would be 150 feet above ground or water surface and the FAA requires notification of any structure 200 feet above ground or water surface.



Data Sources

IN ORDER OF APPEARANCE

Figure 1-1: Idaho Transportation Department. "ID55_Central_Highway". Queried from sdeProd.SDE.StateHighwayUpdateFile.
Corridor Boundary – Buffer from "ID55_Central_Highway", above.
http://www.idwr.idaho.gov/GeographicInfo/GISdata/gis_data.htm

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Figures 2-1 and 2-2: Ortho Imagery – United States Department of Agriculture. "Ada County 2011 National Ag. Imagery Program Mosaic". Served through <http://datagateway.nrcs.usda.gov> under name of "ortho_1-1_1n_s_id001_2011_1".
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Figures 3-1 through 3-19: Ortho Imagery – United States Department of Agriculture. "AdaCounty 2011 National Ag. Imagery Program Mosaic". Served through <http://datagateway.nrcs.usda.gov> under name of "ortho_1-1_1n_s_id001_2011_1".
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Bionomics Environmental, Inc. "Wetlands.shp".

Bionomics Environmental, Inc. "Wetlands_line.shp".

Figure 4-1:

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Corridor Boundary – Buffer from "ID55_Central_Highway", above.

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Federal Emergency Management Agency. National Flood Hazard Layer: "S_FLD_HAZ_AR". Publication Date: 20090116.

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Idaho Transportation Department. "ID55_Central_Highway". Queried from sdeProd.SDE.StateHighwayUpdateFile.

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- Figures 5-1 and 5-2: Ortho Imagery – United States Department of Agriculture. “Ada County 2011 National Ag. Imagery Program Mosaic”. Served through <http://datagateway.nrcs.usda.gov> under name of “ortho_1-1_1n_s_id001_2011_1”.
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- Idaho Transportation Department. “ID55_Central_Highway”. Queried from sdeProd.SDE.StateHighwayUpdateFile.
- Corridor Boundary – Buffer from “ID55_Central_Highway”, above.
- Idaho Transportation Department. “State Highway MilePost Signs”. Served through <http://cloud.insideidaho.org/arcgis/services> under name of “MilePostsSigns”.
- <http://www.deq.idaho.gov/waste/ustlust>
- <http://www.epa.gov/envirofw>
- Table 3: Idaho Transportation Department. “ID55_Central_Highway”. Queried from sdeProd.SDE.StateHighwayUpdateFile.
- Corridor Boundary – Buffer from “ID55_Central_Highway”, above.
- <http://www.deq.idaho.gov/waste/ustlust>
- Table 4: Idaho Transportation Department. “ID55_Central_Highway”. Queried from sdeProd.SDE.StateHighwayUpdateFile.
- Corridor Boundary – Buffer from “ID55_Central_Highway”, above.
- <http://www.epa.gov/envirofw>
- Table 5: <http://www.fws.gov/endangered/species/index.htm>
- Table 6: IFWIS Information Request
- Table 7: <http://factfinder2.census.gov>
- Idaho Transportation Department. “ID55_Central_Highway”. Queried from sdeProd.SDE.StateHighwayUpdateFile.
- Corridor Boundary – Buffer from “ID55_Central_Highway”, above.
- <http://www.census.gov/geo/maps-data/data/tiger-data.html>
- Figure 6-1: IDFG & ITD Fish and Wildlife Linkage Project GIS Layers
- Figure 7-1: <http://factfinder2.census.gov>
- Idaho Transportation Department. “ID55_Central_Highway”. Queried from sdeProd.SDE.StateHighwayUpdateFile.



Figures 8-1 and 8-2:

Corridor Boundary – Buffer from “ID55_Central_Highway”, above.

<http://www.census.gov/geo/maps-data/data/tiger-data.html>

Ortho Imagery – United States Department of Agriculture. “Ada County 2011 National Ag. Imagery Program Mosaic”. Served through

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under name of “ortho_1-1_1n_s_id001_2011_1”.

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Table 9:

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Idaho Department of Parks and Recreation. “Idaho Department of Parks and Recreation Sites”. Served through

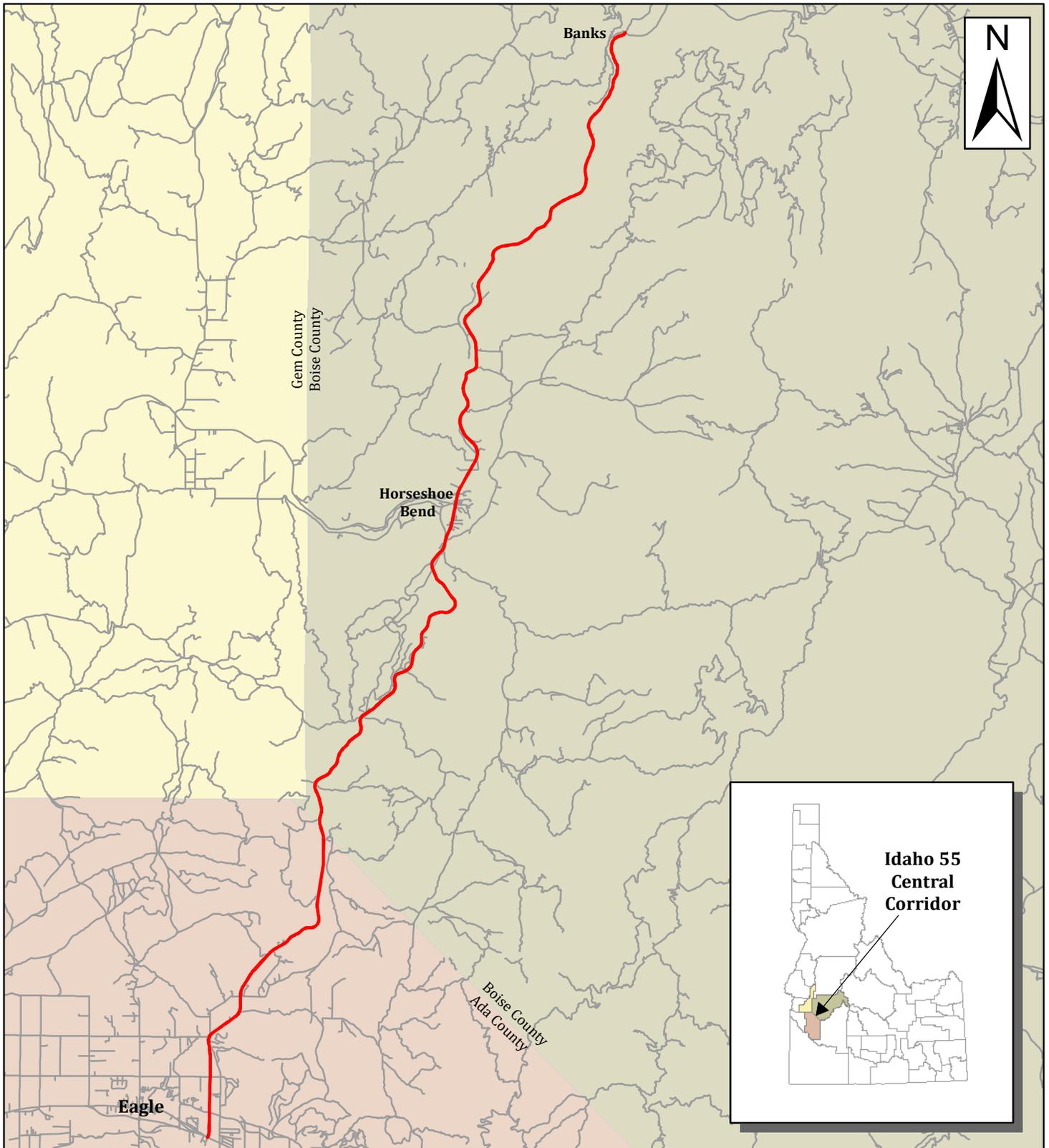
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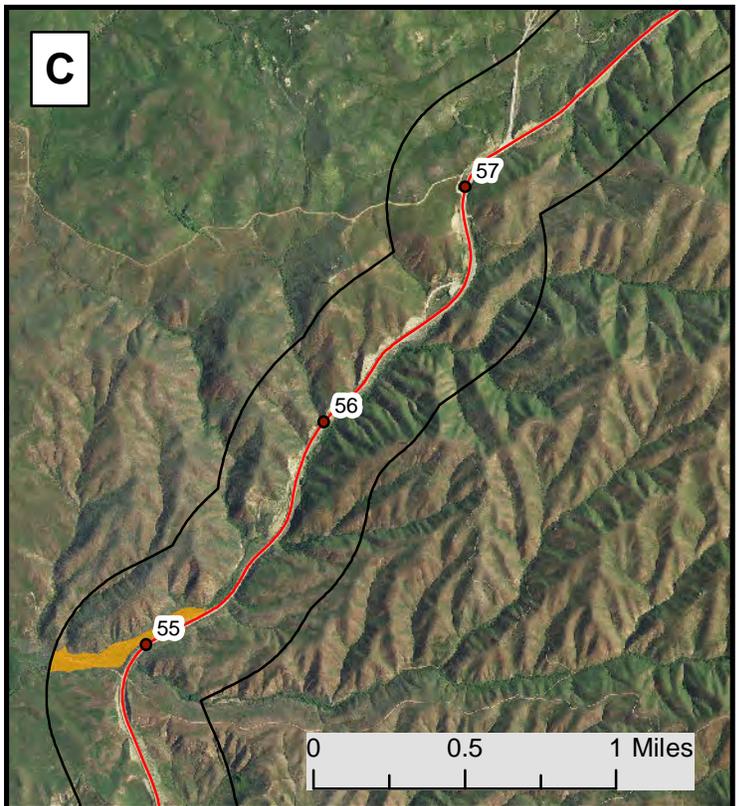
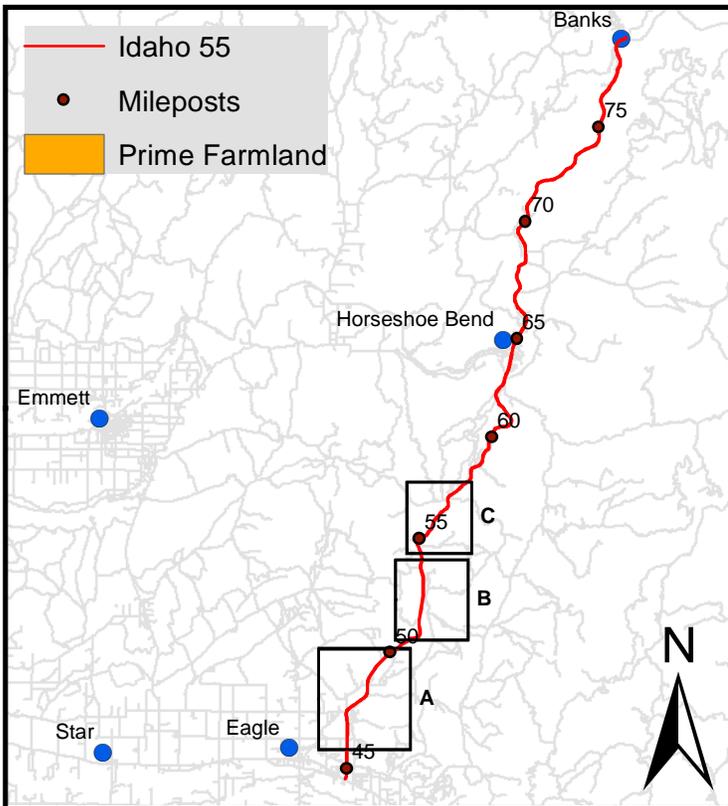
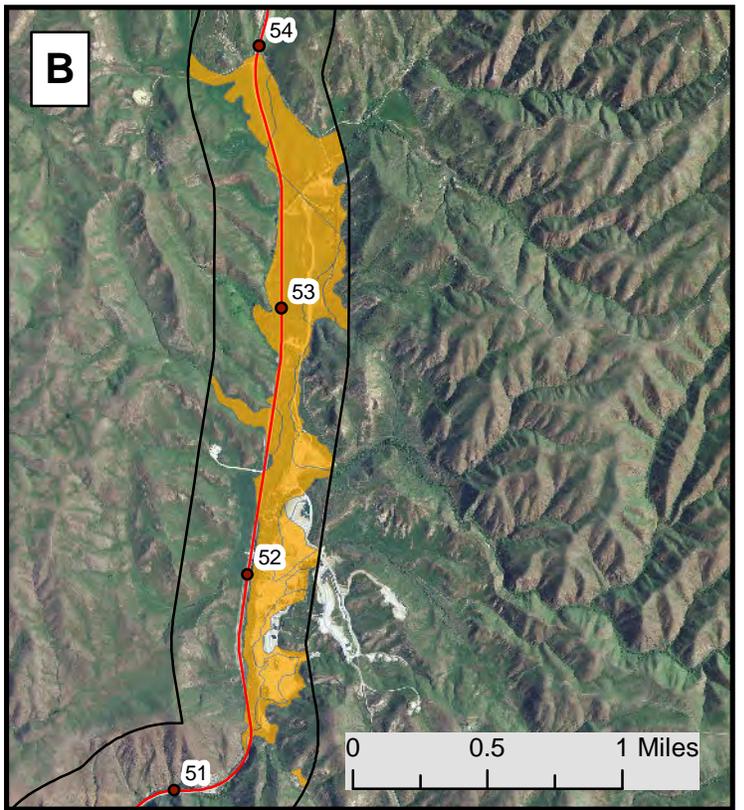
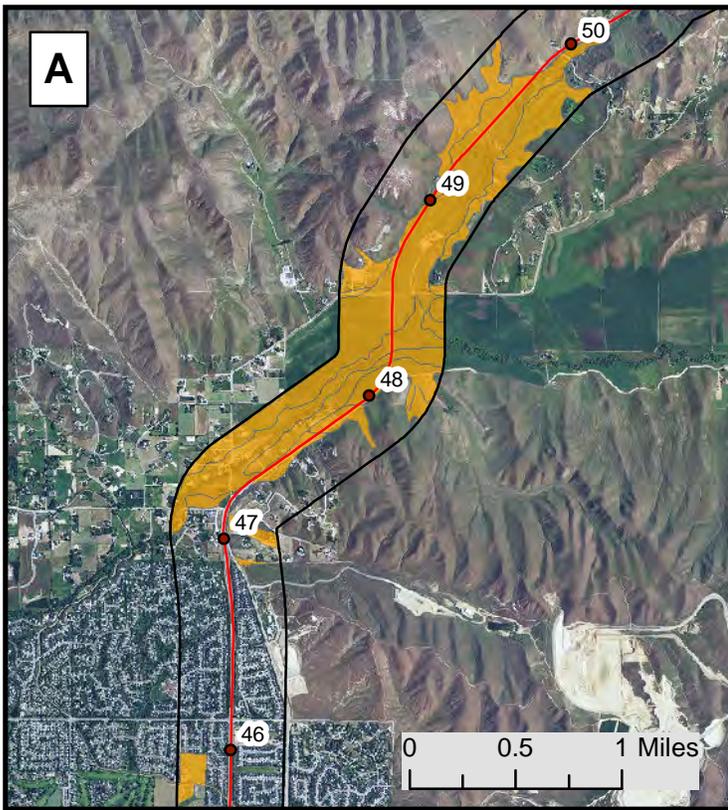


	<p>Bureau of Land Management. “Recreation Sites”. Served through http://cloud.insideidaho.org/arcgis/services under name of “REC_BLMRecreationSites_PUB_UNK_POINT”.</p>
Figures 9-1 and 9-2:	<p>Ortho Imagery – United States Department of Agriculture. “Boise County 2011 National Ag. Imagery Program Mosaic”. Served through http://datagateway.nrcs.usda.gov under name of “ortho_1-1_1n_s_id015_2011_1”.</p> <p>Idaho Transportation Department. “ID55_Central_Highway”. Queried from sdeProd.SDE.StateHighwayUpdateFile.</p> <p>Corridor Boundary – Buffer from “ID55_Central_Highway”, above.</p> <p>Idaho Transportation Department. “State Highway MilePost Signs”. Served through http://cloud.insideidaho.org/arcgis/services under name of “MilePostsSigns”.</p> <p>Idaho Department of Parks and Recreation. “Idaho Department of Parks and Recreation Sites”. Served through http://cloud.insideidaho.org/arcgis/services under name of “recSites_id_idpr”.</p> <p>Bureau of Land Management. “Recreation Sites”. Served through http://cloud.insideidaho.org/arcgis/services under name of “REC_BLMRecreationSites_PUB_UNK_POINT”.</p>
Table 10:	23 CFR 772 and ITD Noise Policy
Table 11:	FHWA Traffic Noise Model (TNM) 2.5 Software
Figure 10-1:	<p>Ortho Imagery – United States Department of Agriculture. “Boise County 2011 National Ag. Imagery Program Mosaic”. Served through http://datagateway.nrcs.usda.gov under name of “ortho_1-1_1n_s_id015_2011_1”.</p> <p>Idaho Transportation Department. “ID55_Central_Highway”. Queried from sdeProd.SDE.StateHighwayUpdateFile.</p> <p>Corridor Boundary – Buffer from “ID55_Central_Highway”, above.</p> <p>Airports – National Transportation Atlas Database (NTAD) 2013.</p>

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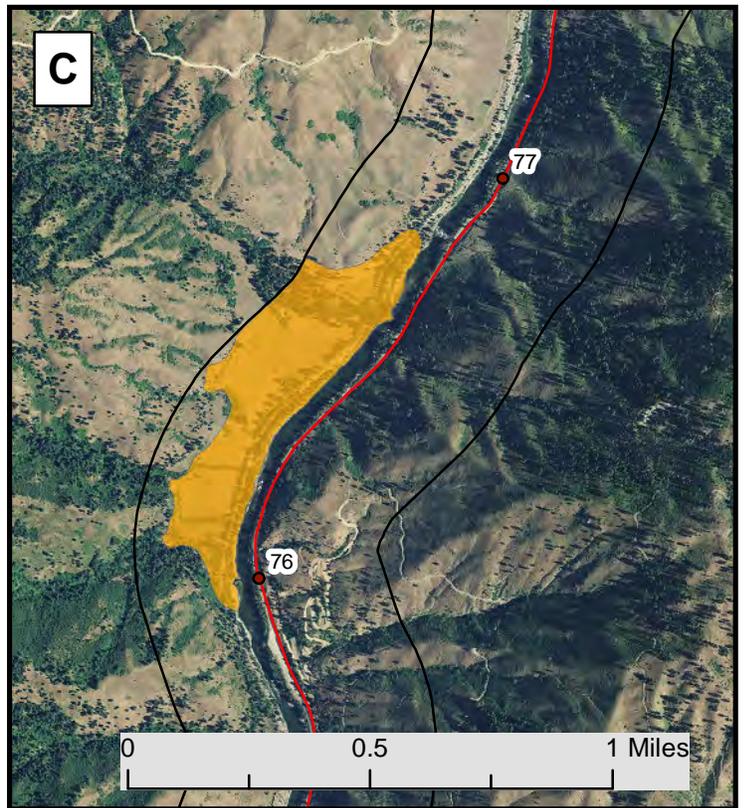
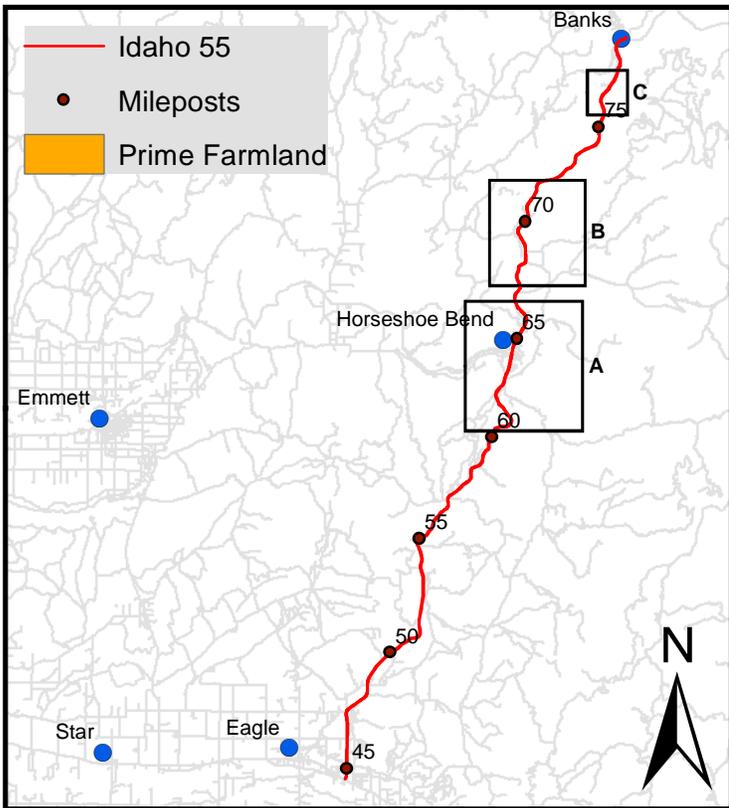
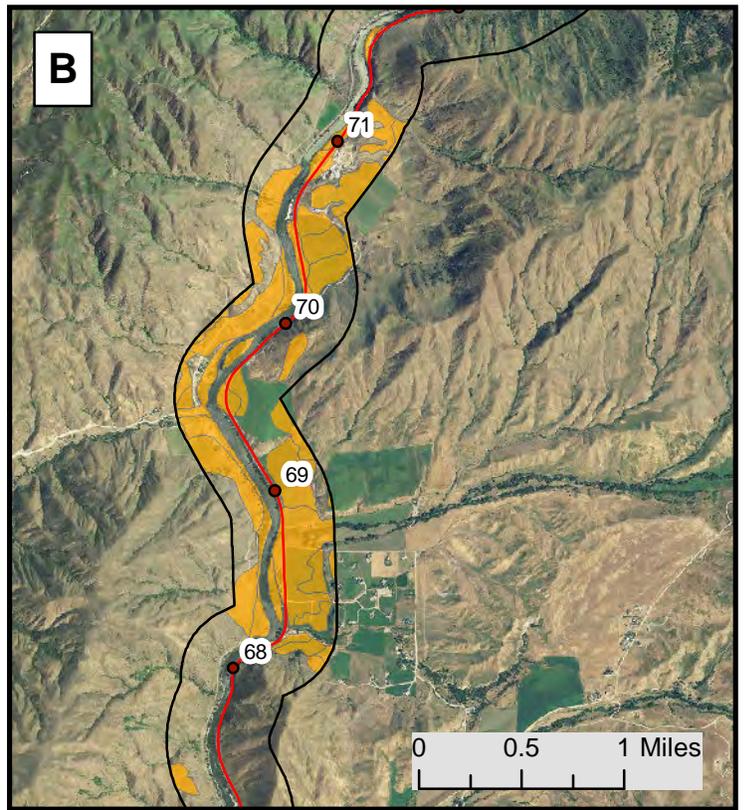
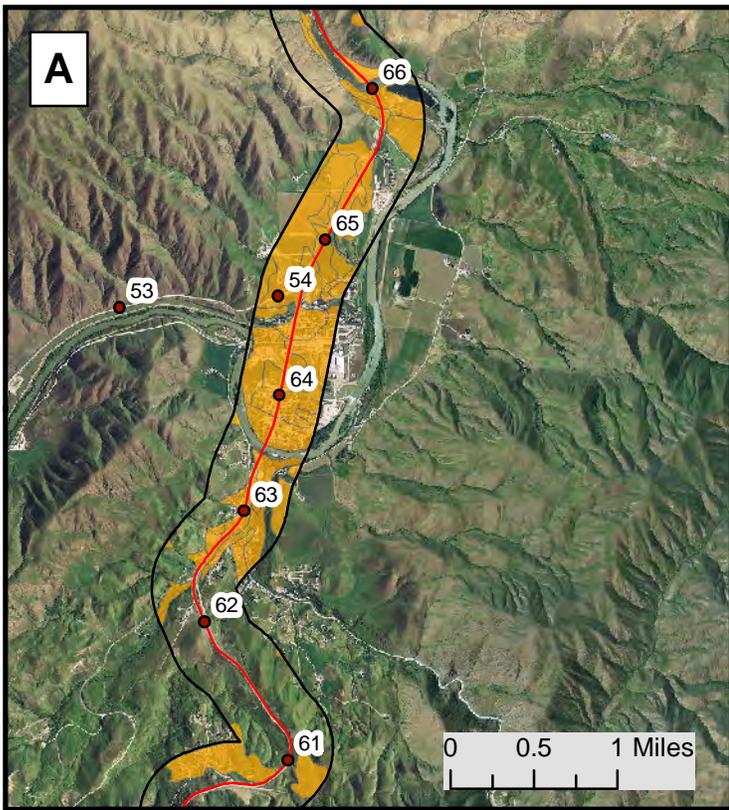


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	Date February 2014	Figure Title Vicinity Map for the Idaho 55 Central Corridor	Figure 1-1	

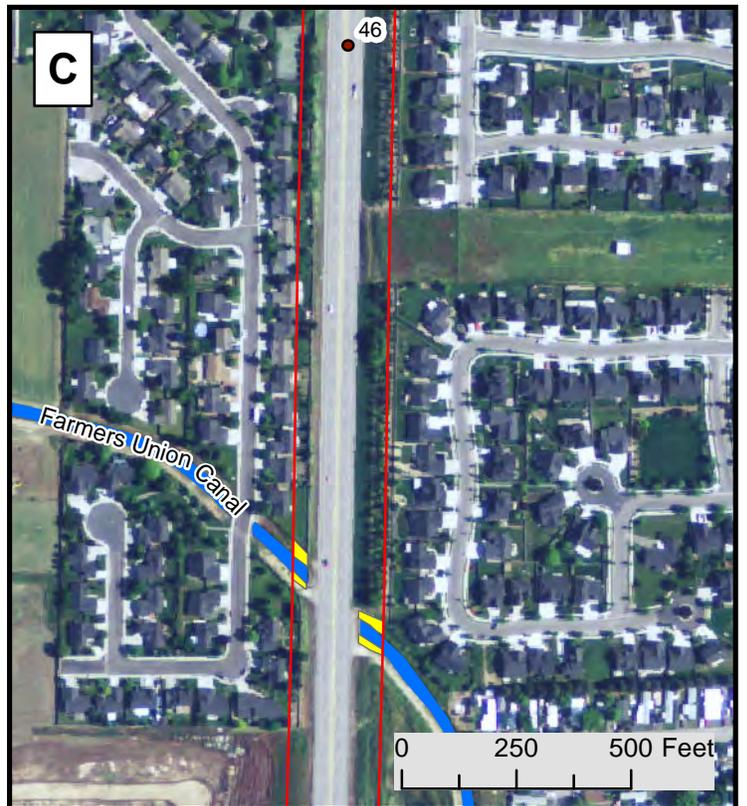
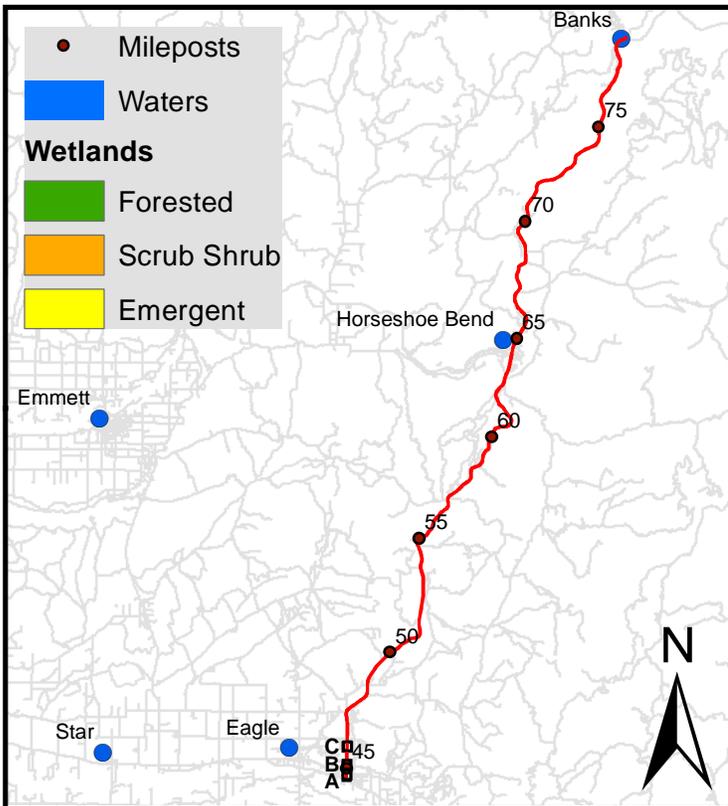
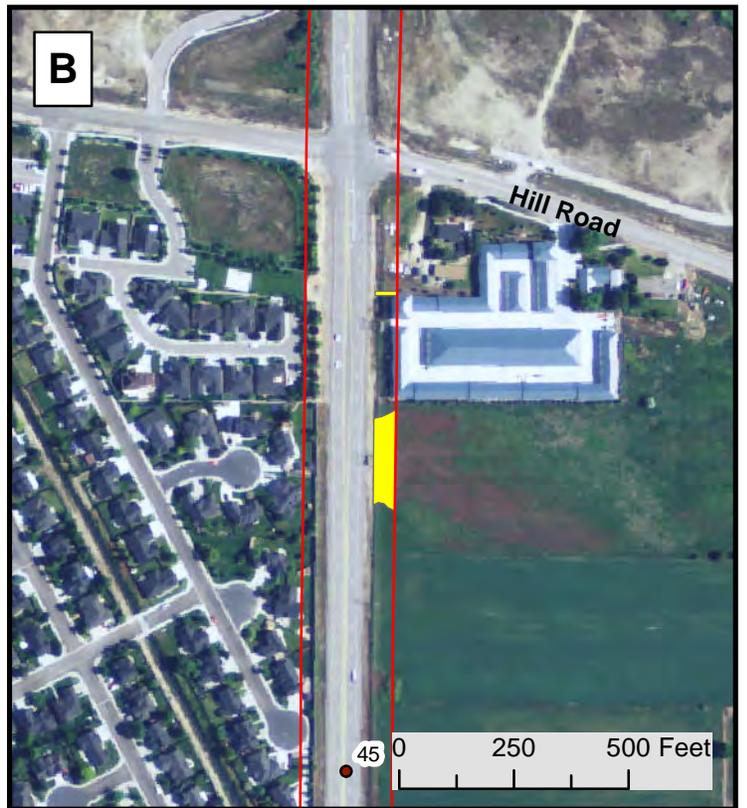
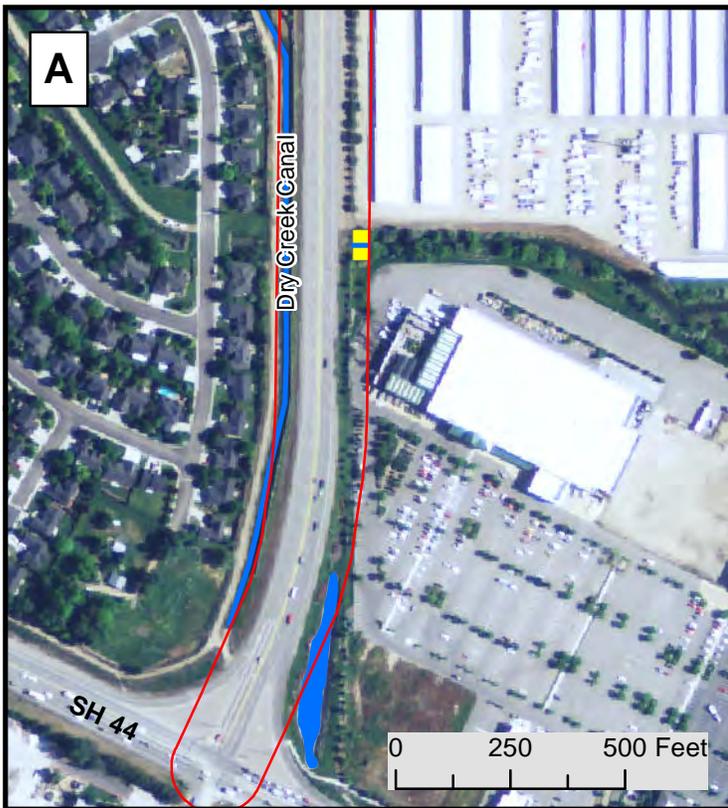


Project No. A009(967), Key No. 09967		
Date	Figure Title	Figure
February 2014	Prime Farmlands Identified in the Idaho 55 Central Corridor	2-1



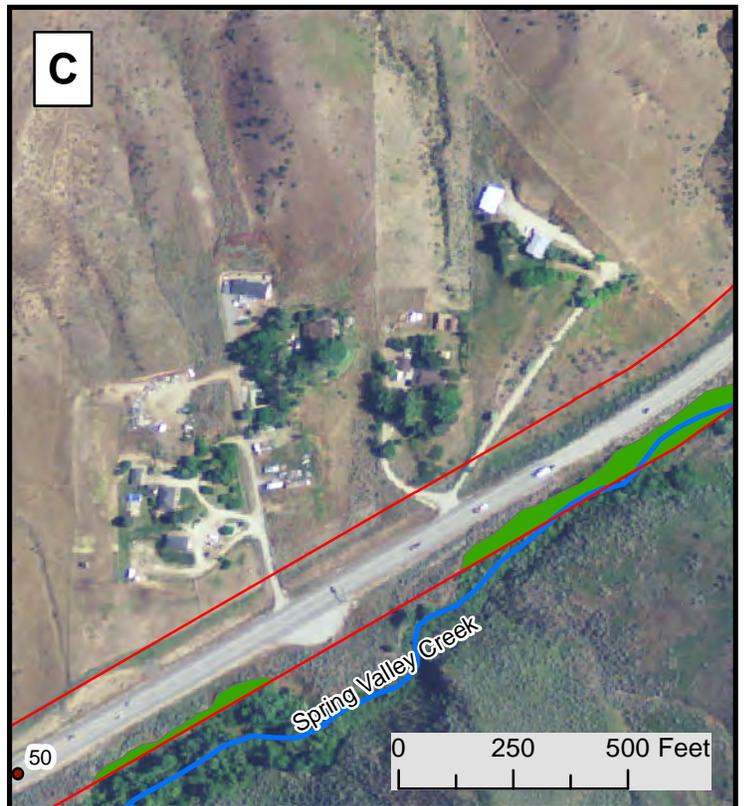
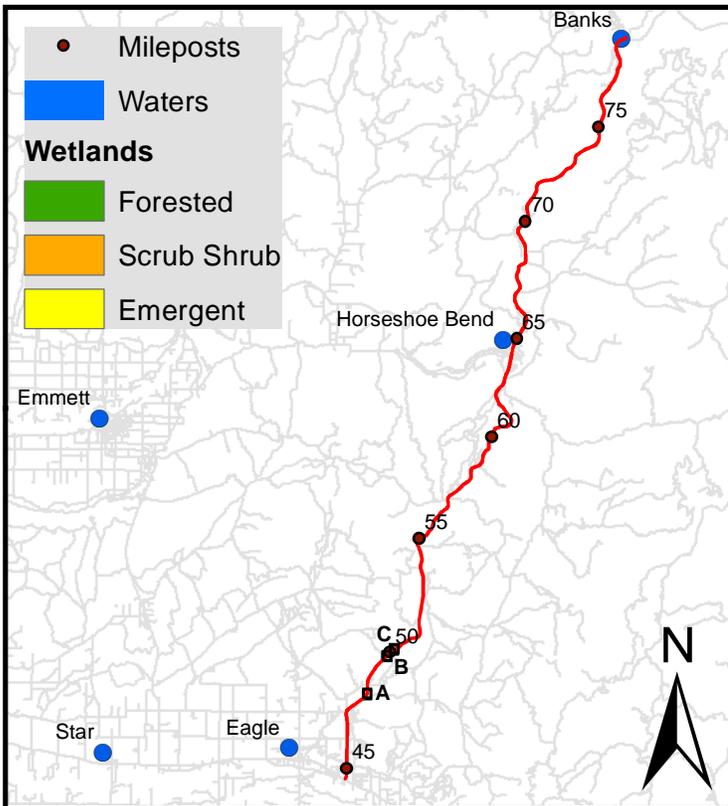
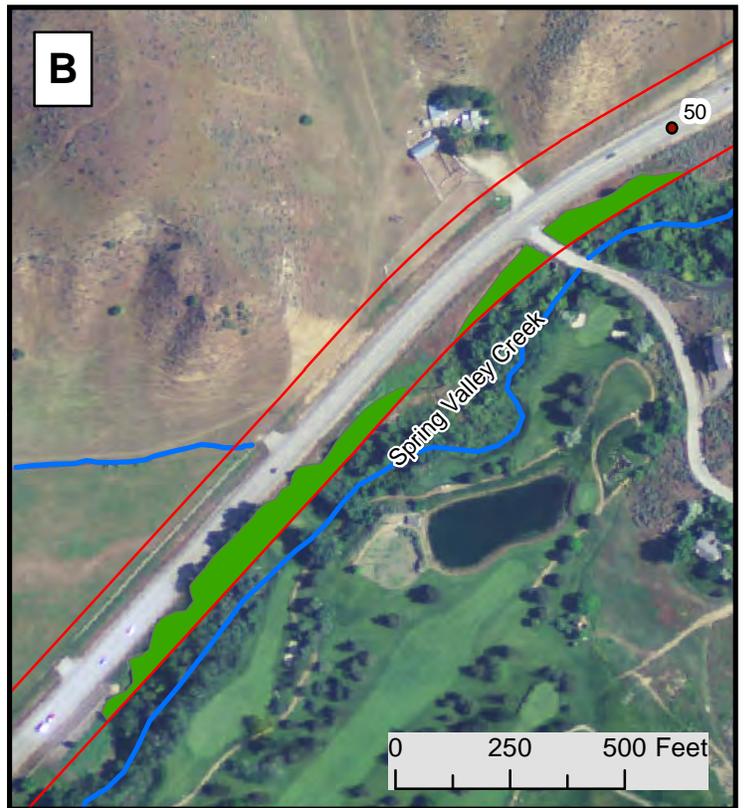
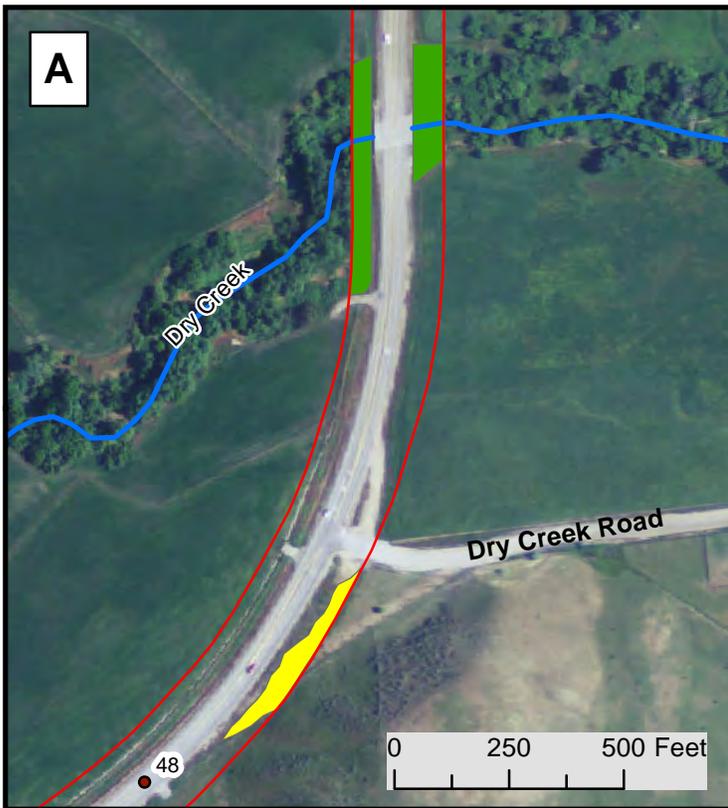


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	Date	Figure Title	Figure	
February 2014	Prime Farmlands Identified in the Idaho 55 Central Corridor	2-2		



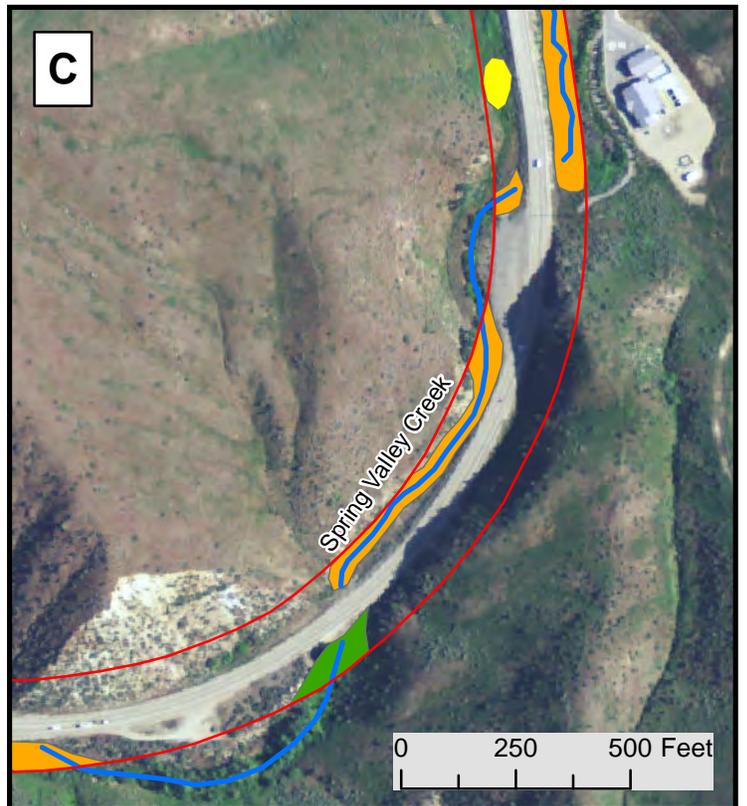
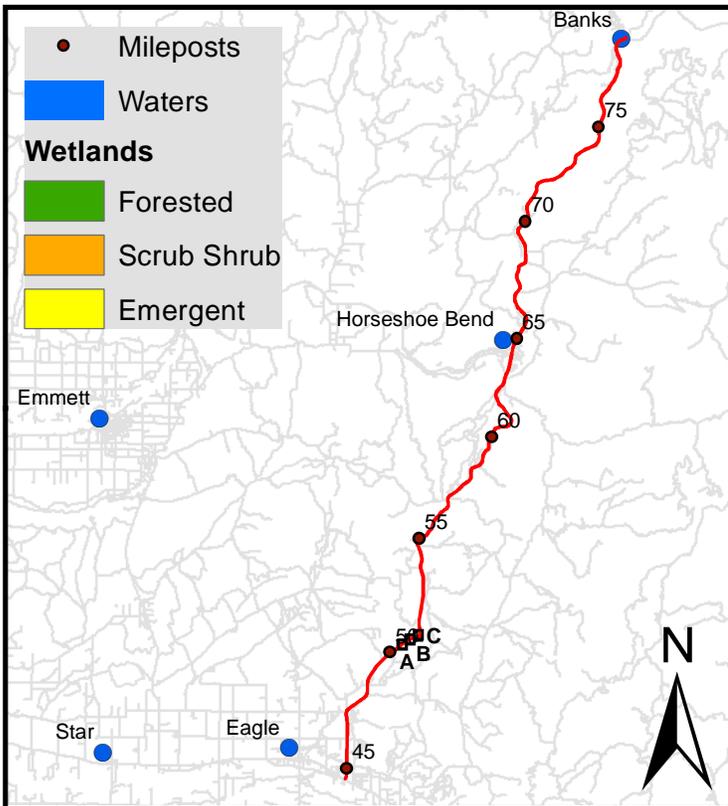
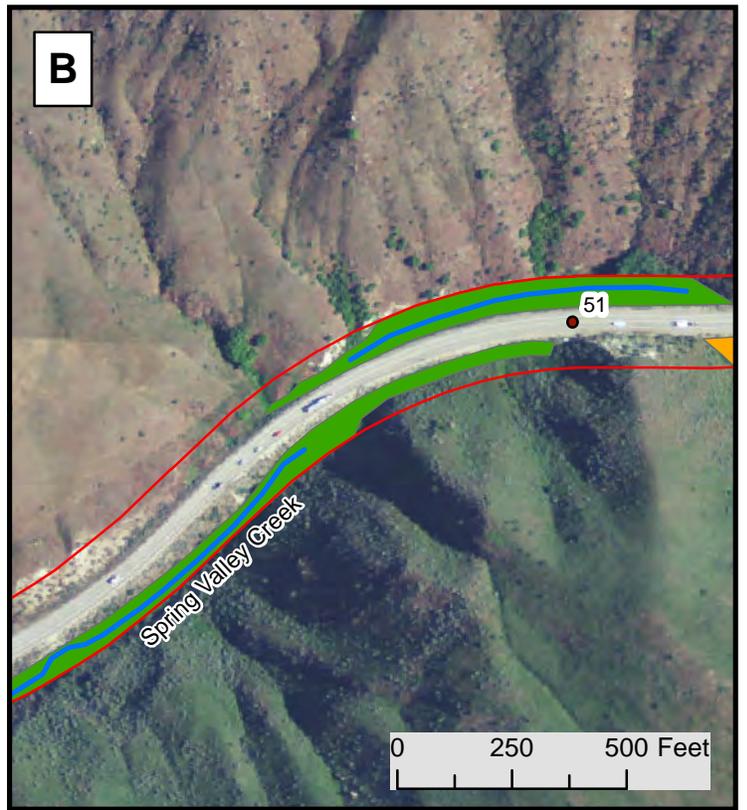
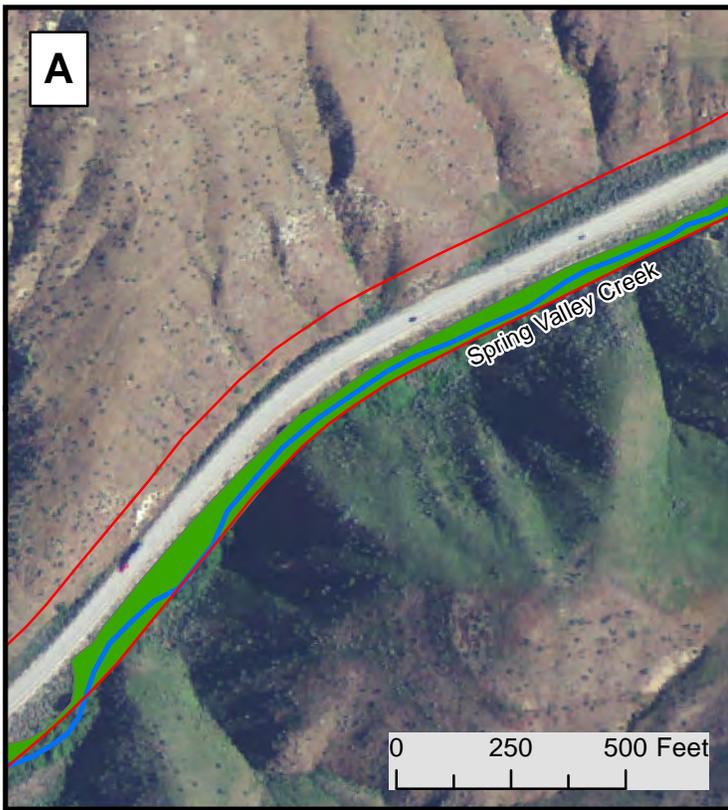
Project No. A009(967), Key No. 09967		
Date	Figure Title	Figure
February 2014	Potential Surface Waters and Wetlands Identified in the Idaho 55 Central Corridor	3-1





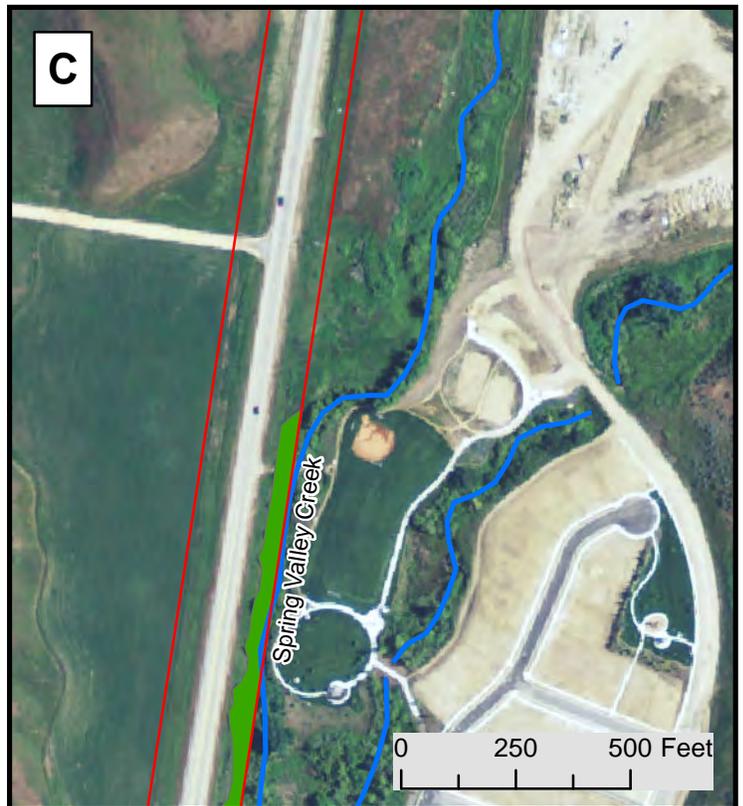
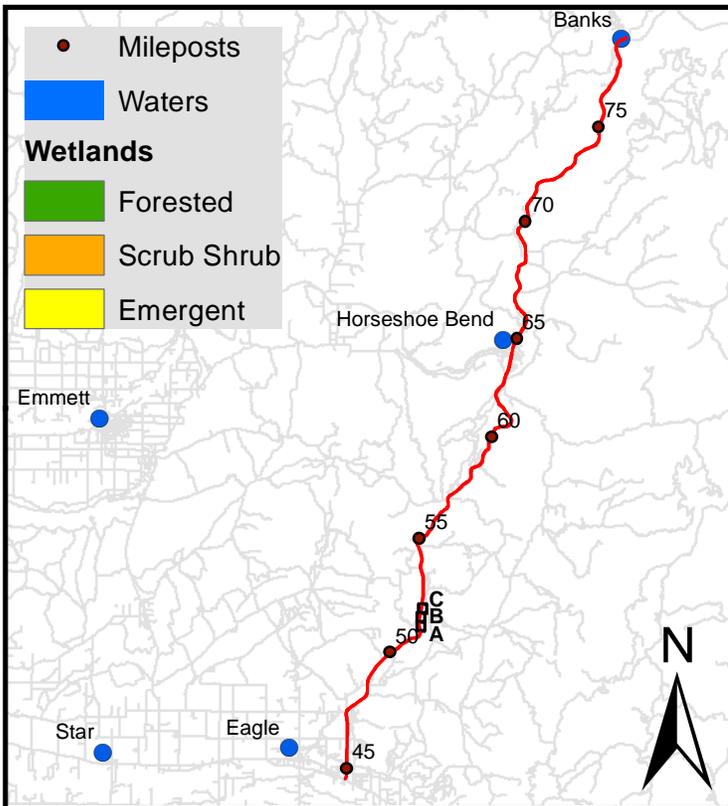
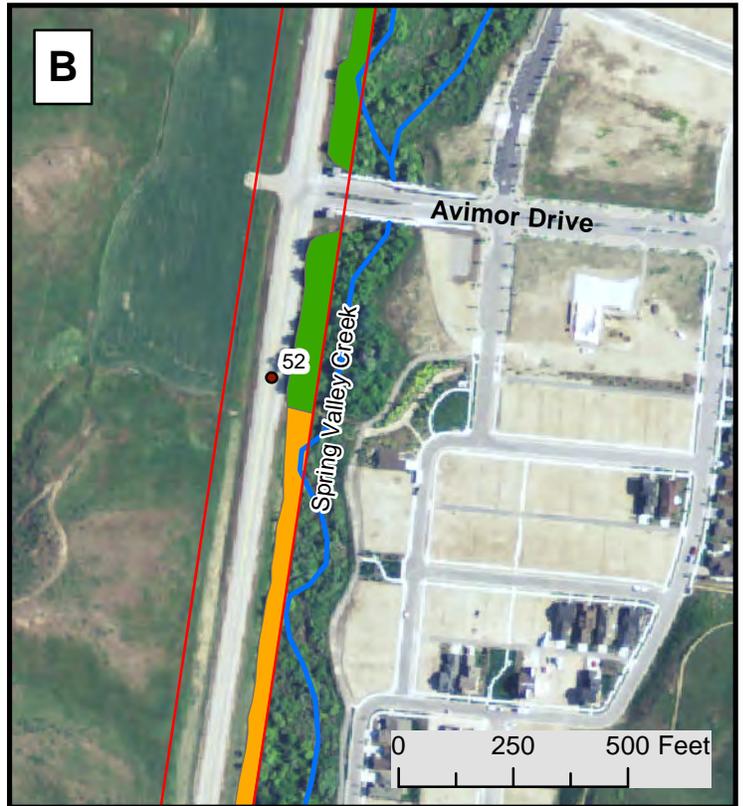
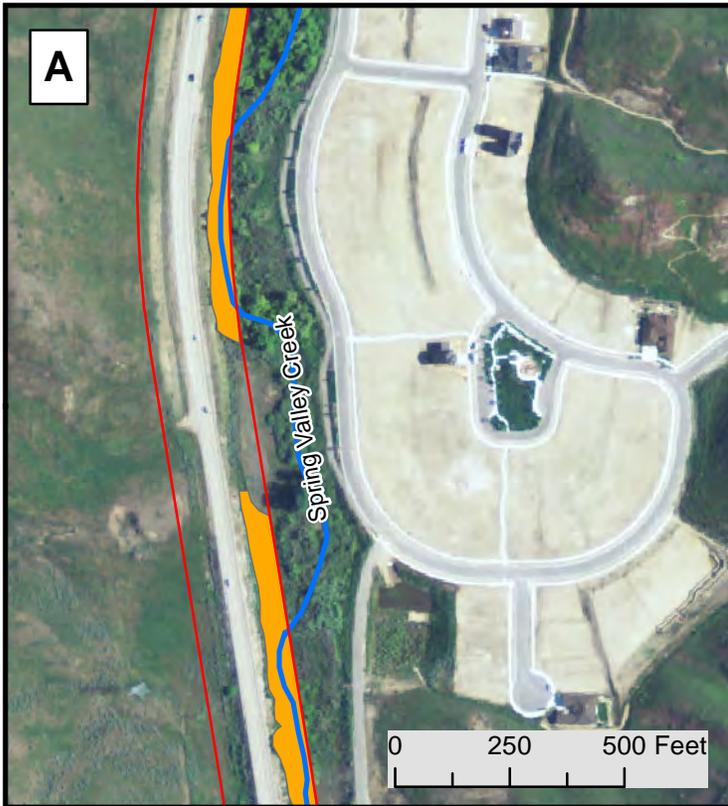
Project No. A009(967), Key No. 09967		
Date	Figure Title	Figure
February 2014	Potential Surface Waters and Wetlands Identified in the Idaho 55 Central Corridor	3-2



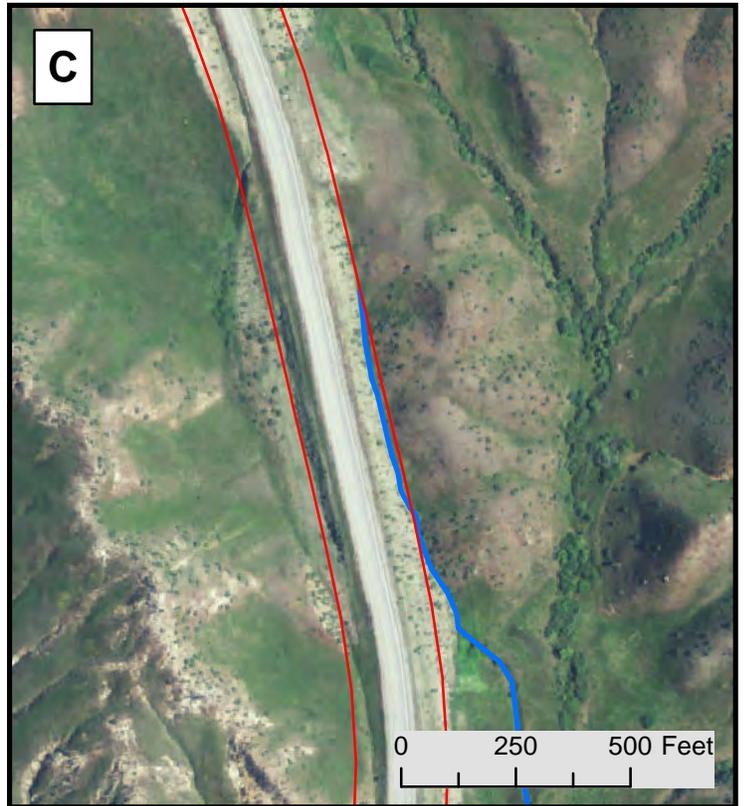
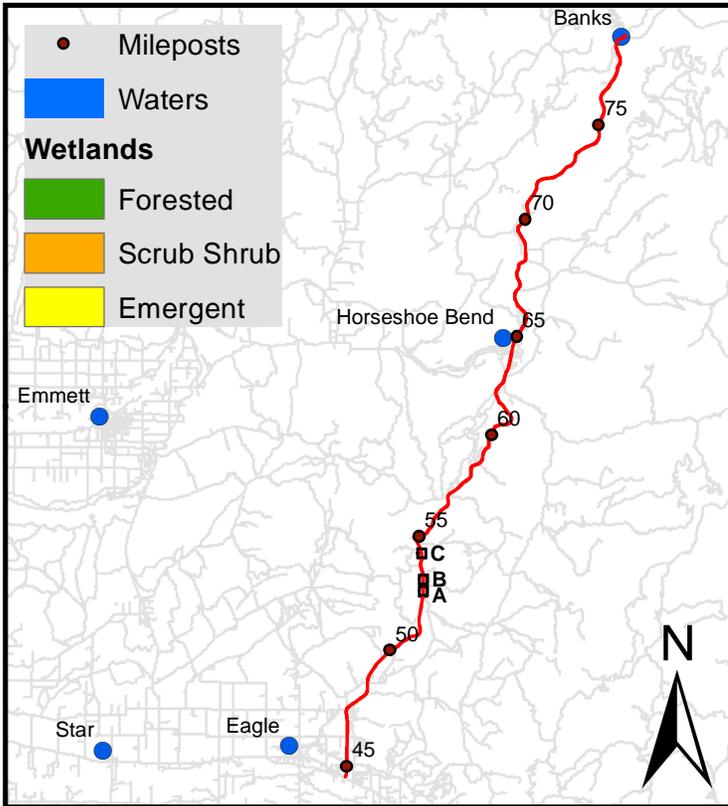
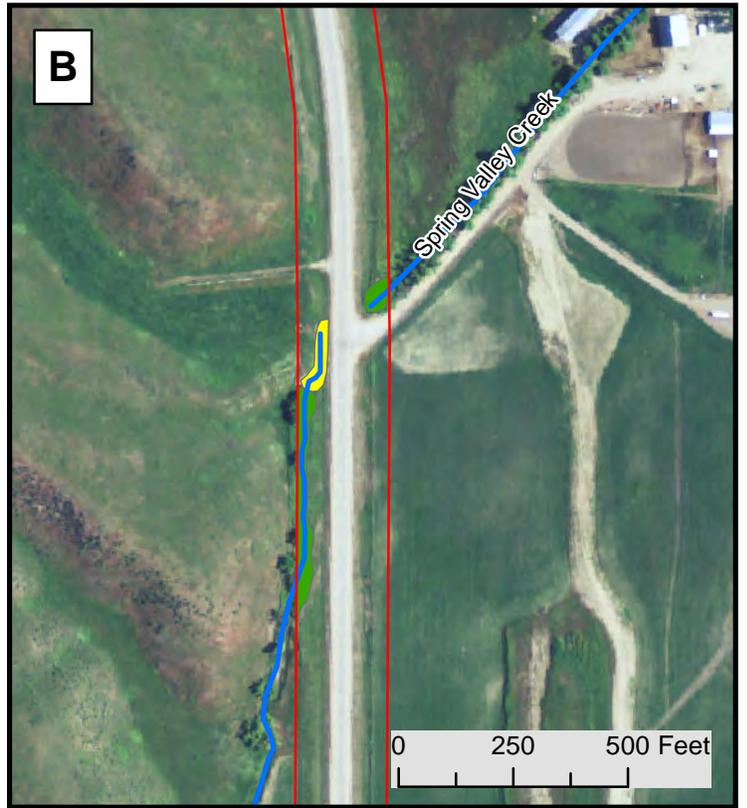


Project No. A009(967), Key No. 09967		
Date	Figure Title	Figure
February 2014	Potential Surface Waters and Wetlands Identified in the Idaho 55 Central Corridor	3-3



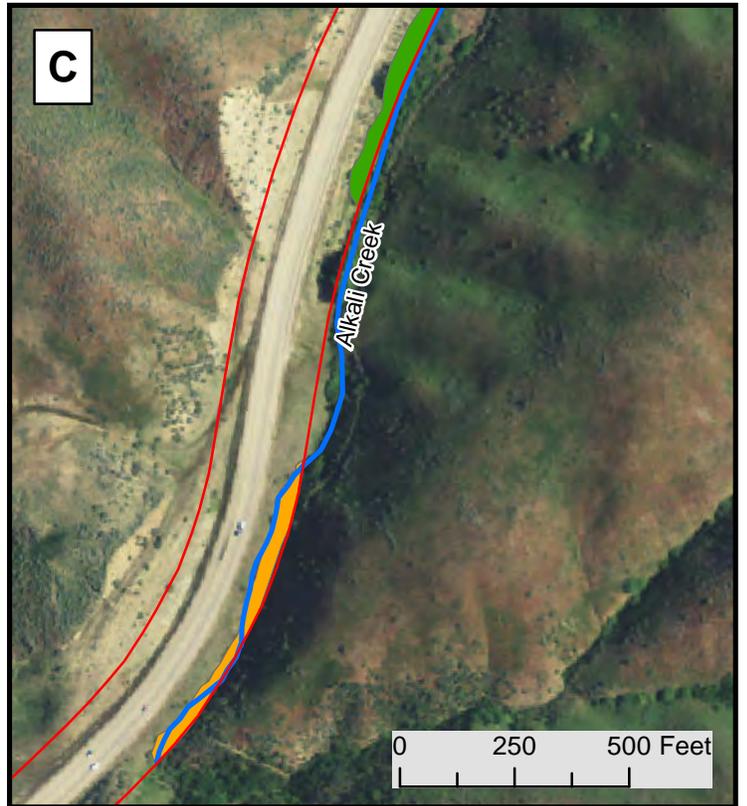
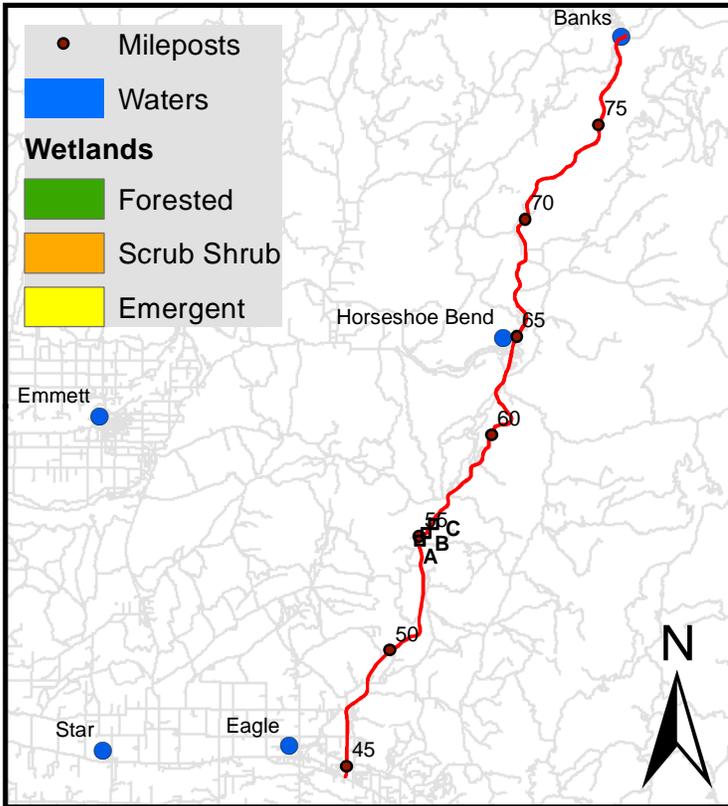
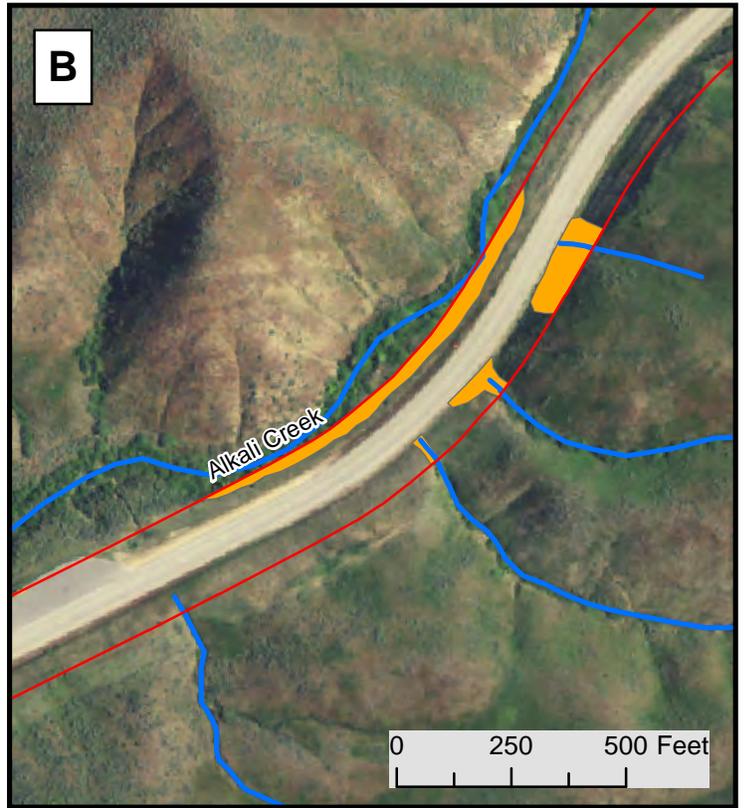
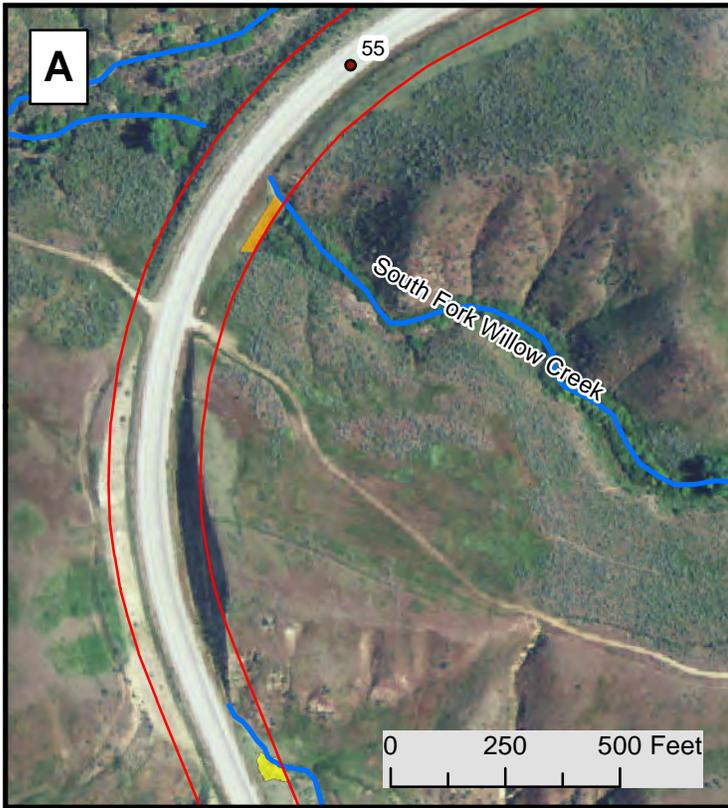


	Project No. A009(967), Key No. 09967			
	Date February 2014	Figure Title Potential Surface Waters and Wetlands Identified in the Idaho 55 Central Corridor	Figure 3-4	



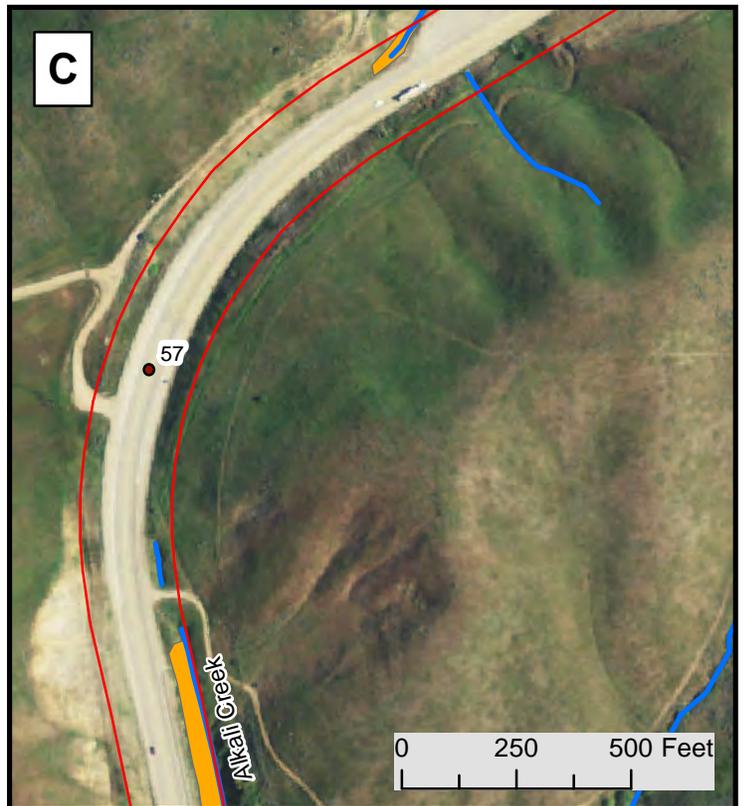
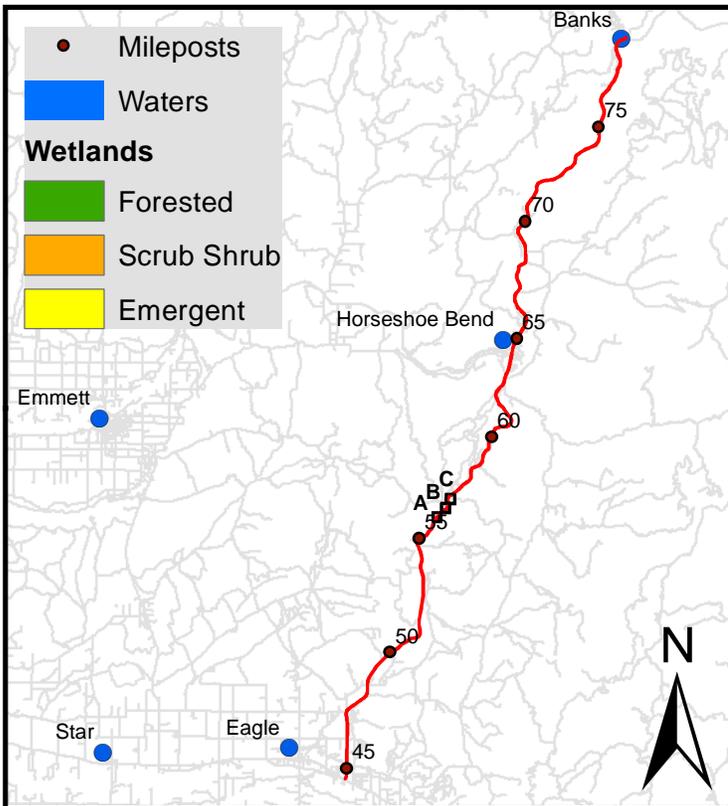
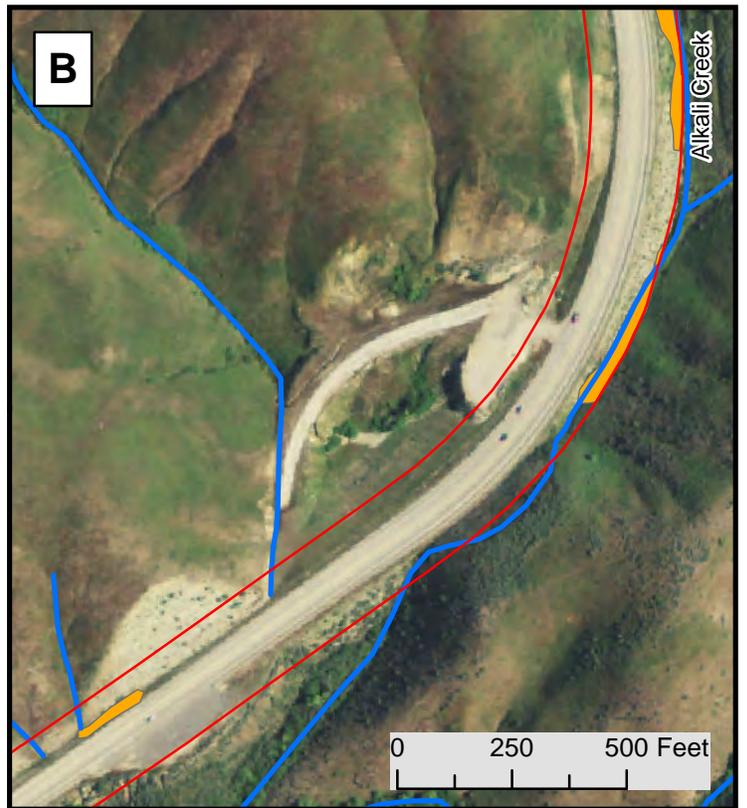
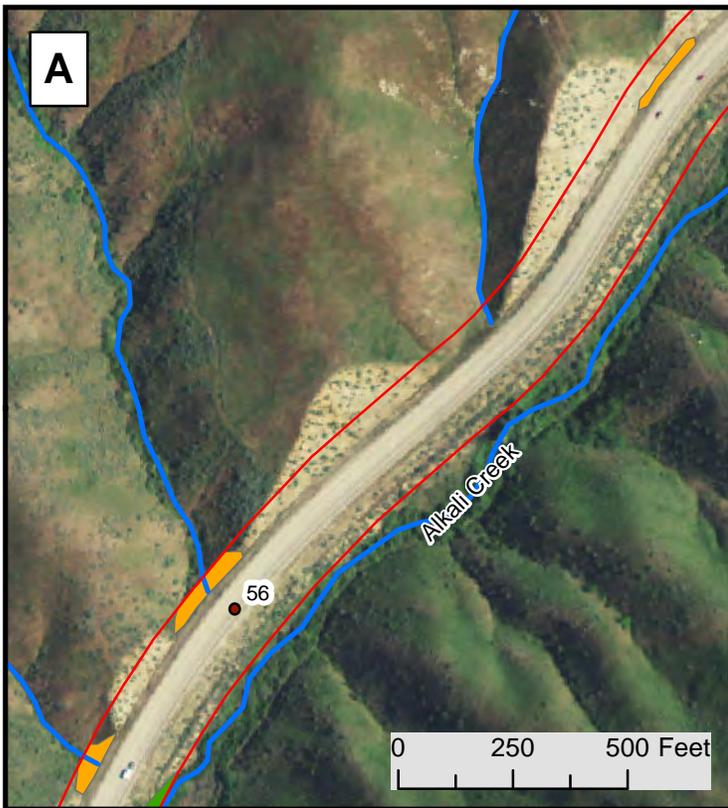
Project No. A009(967), Key No. 09967		
Date	Figure Title	Figure
February 2014	Potential Surface Waters and Wetlands Identified in the Idaho 55 Central Corridor	3-5





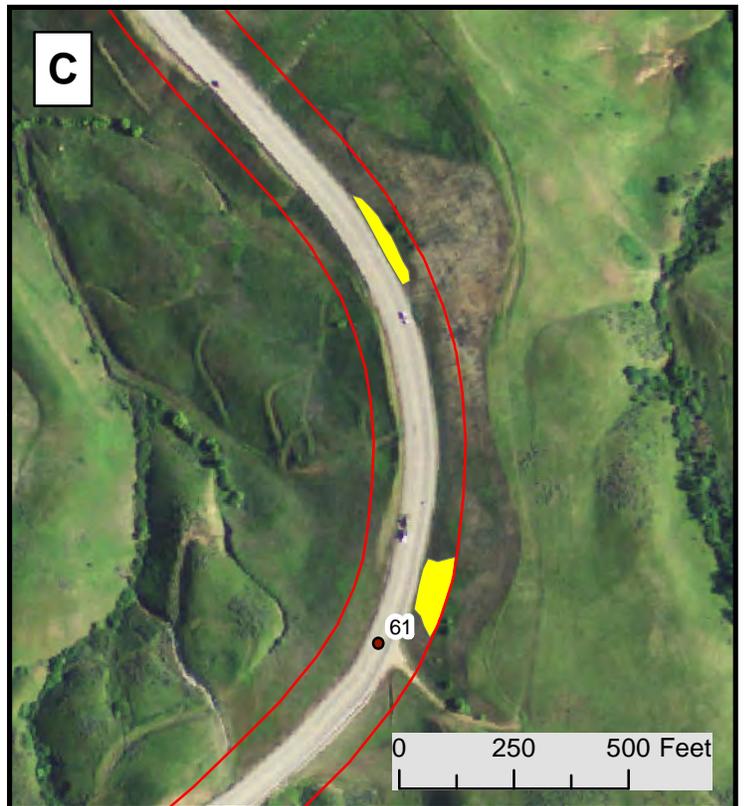
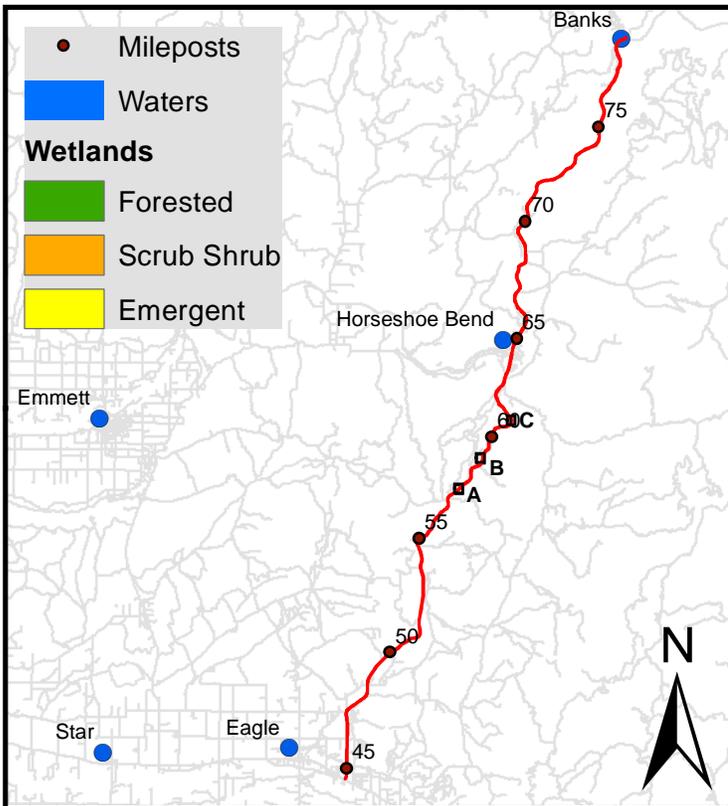
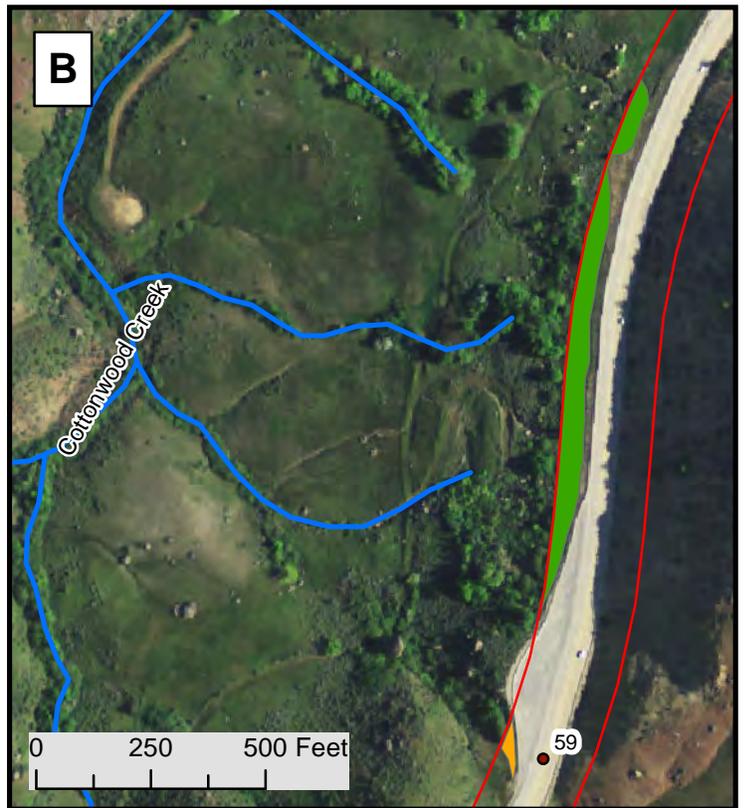
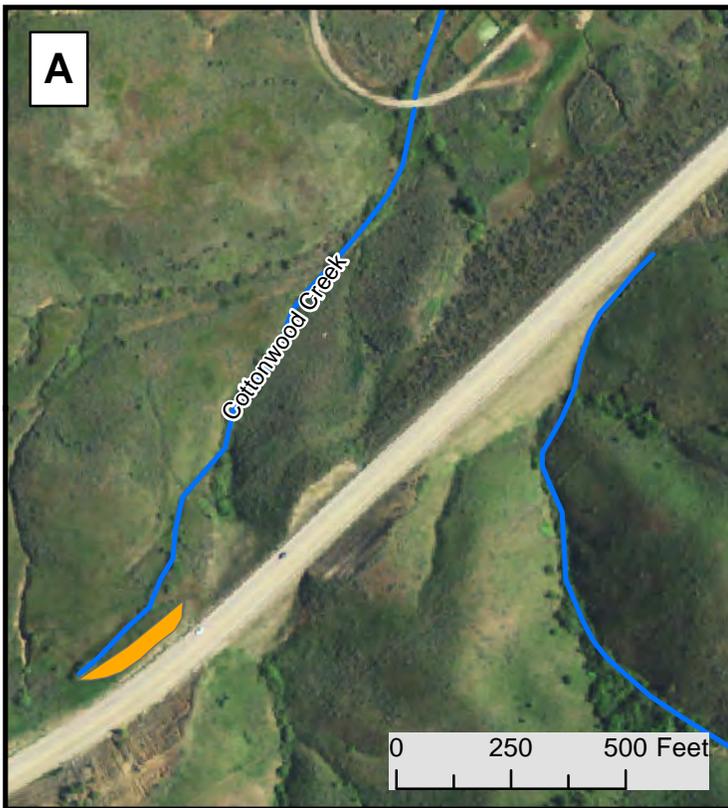
Project No. A009(967), Key No. 09967		
Date	Figure Title	Figure
February 2014	Potential Surface Waters and Wetlands Identified in the Idaho 55 Central Corridor	3-6





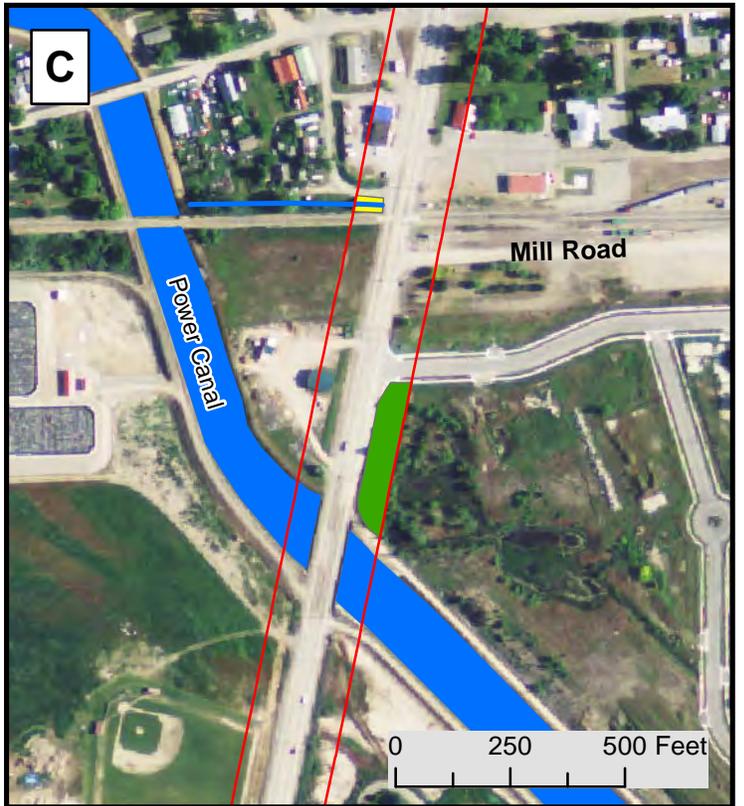
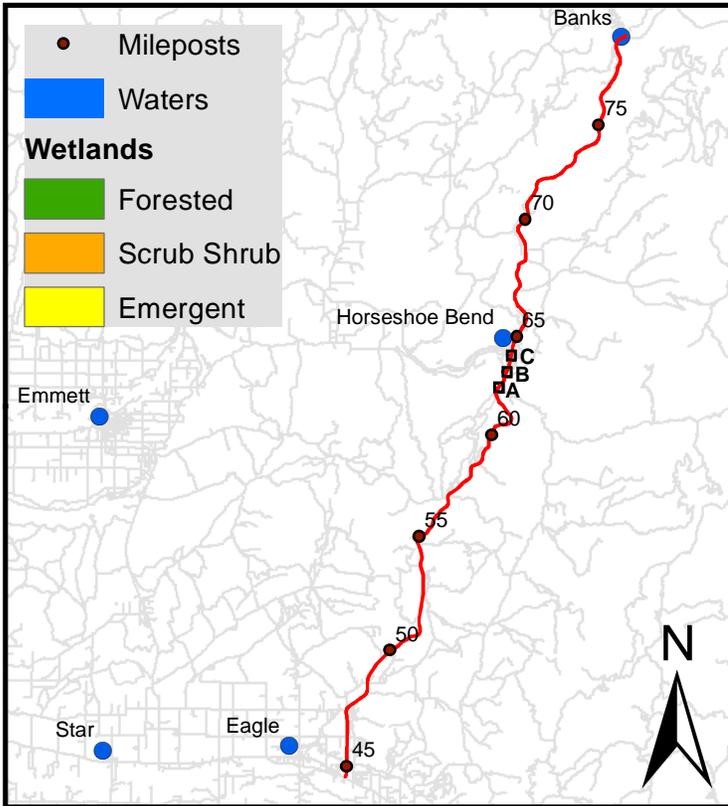
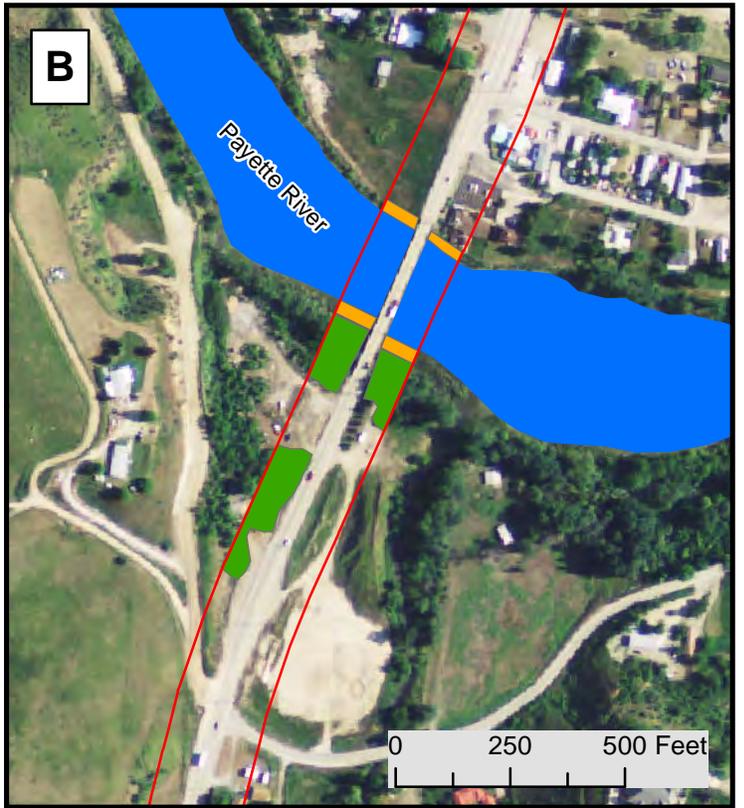
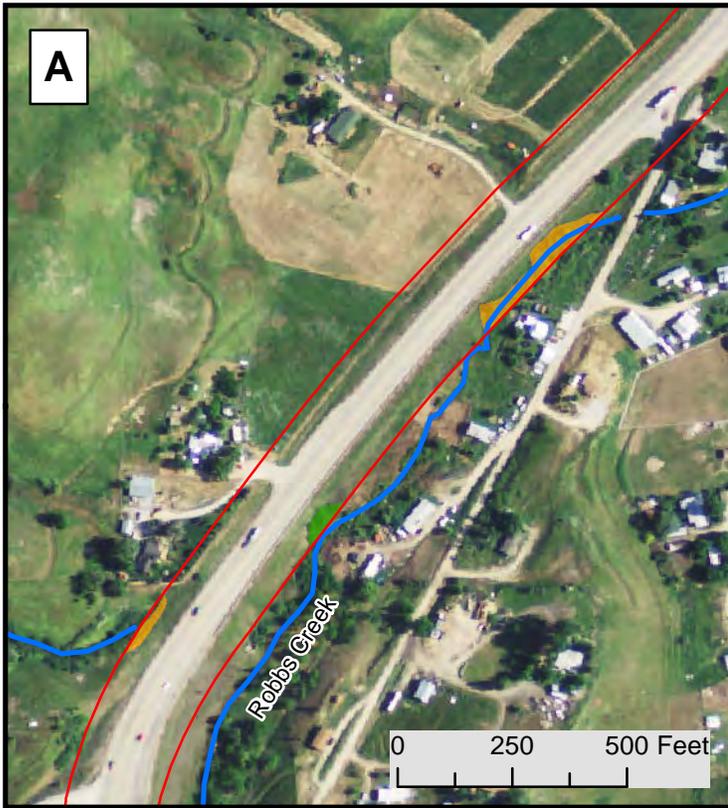
Project No. A009(967), Key No. 09967		
Date	Figure Title	Figure
February 2014	Potential Surface Waters and Wetlands Identified in the Idaho 55 Central Corridor	3-7





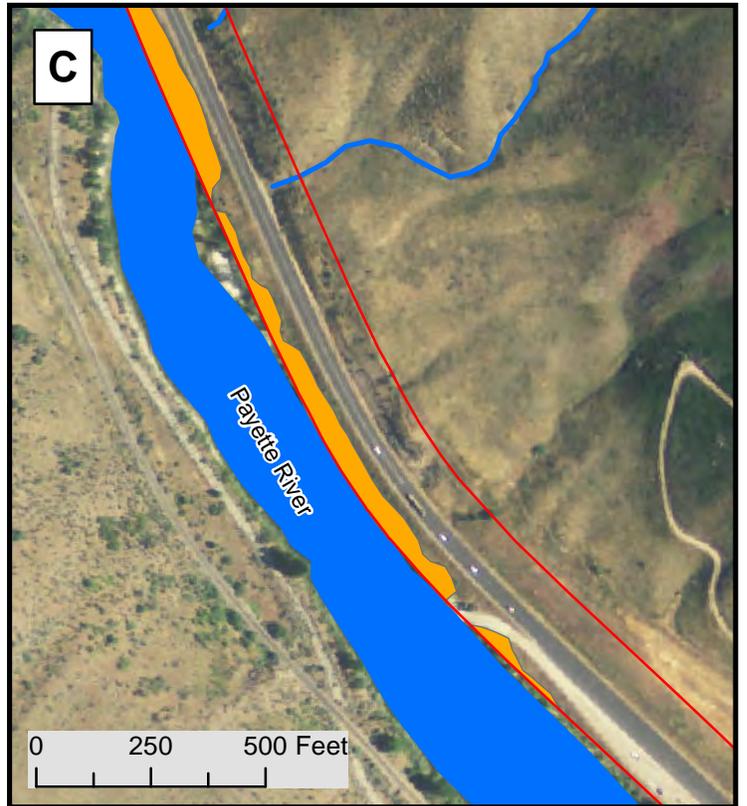
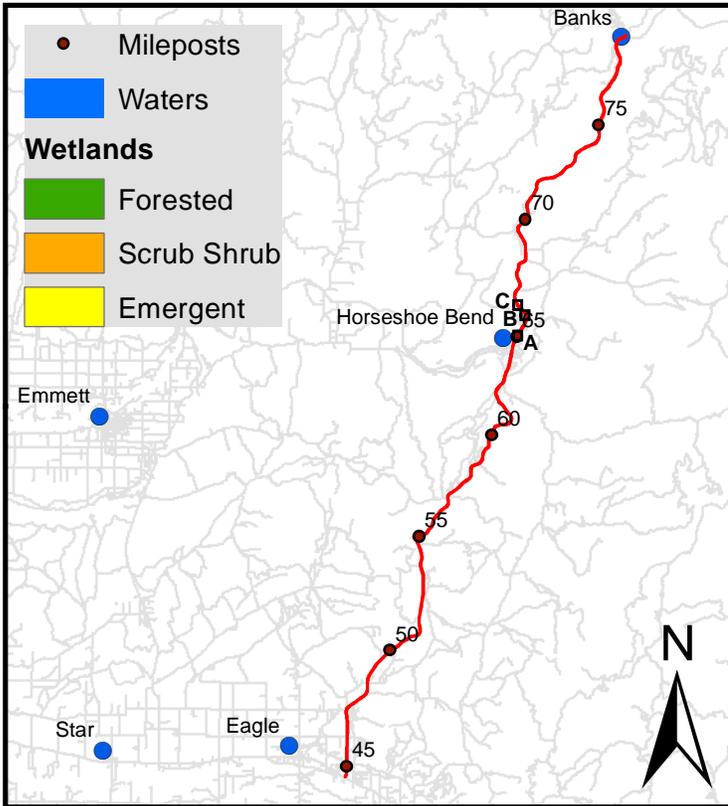
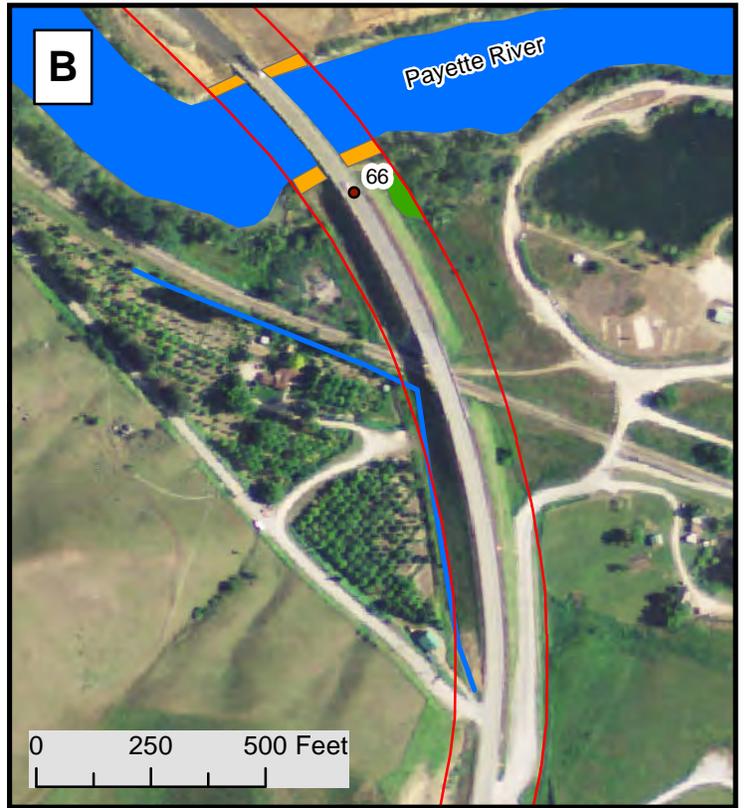
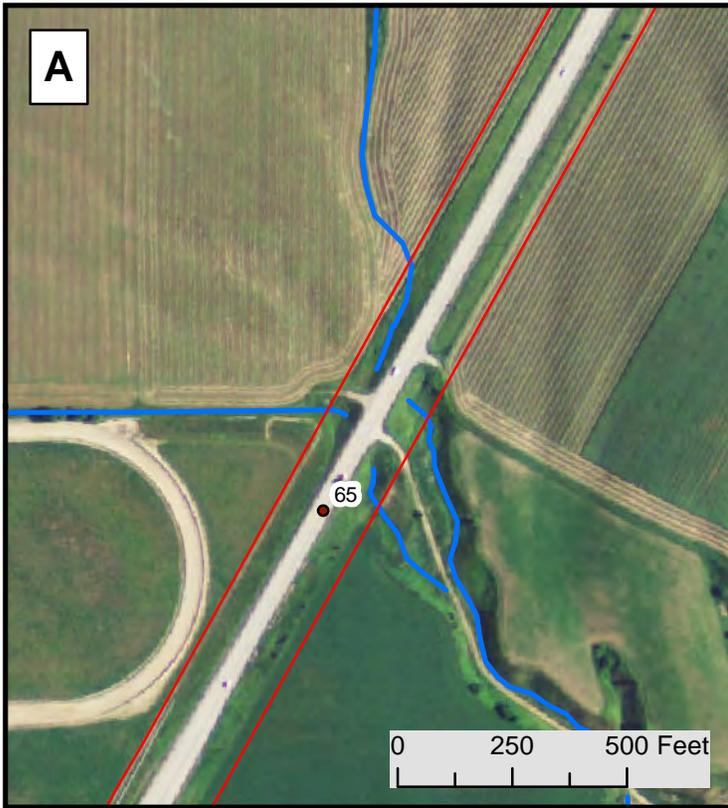
Project No. A009(967), Key No. 09967		
Date	Figure Title	Figure
February 2014	Potential Surface Waters and Wetlands Identified in the Idaho 55 Central Corridor	3-8



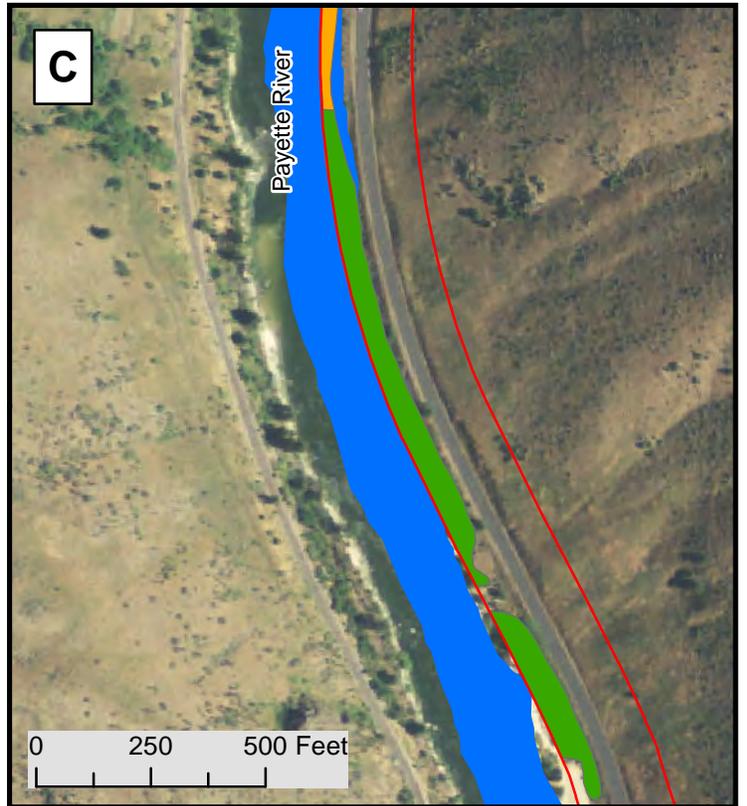
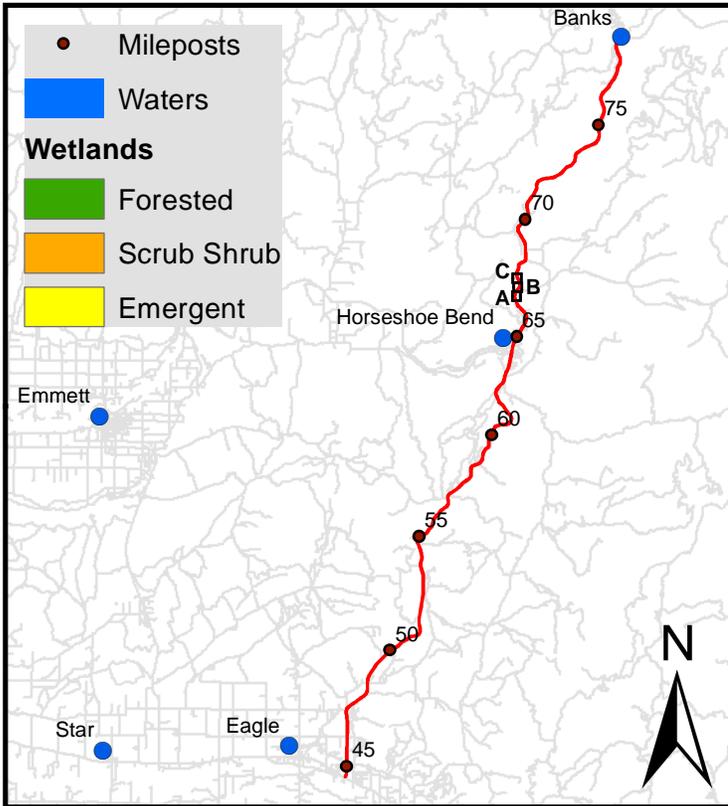
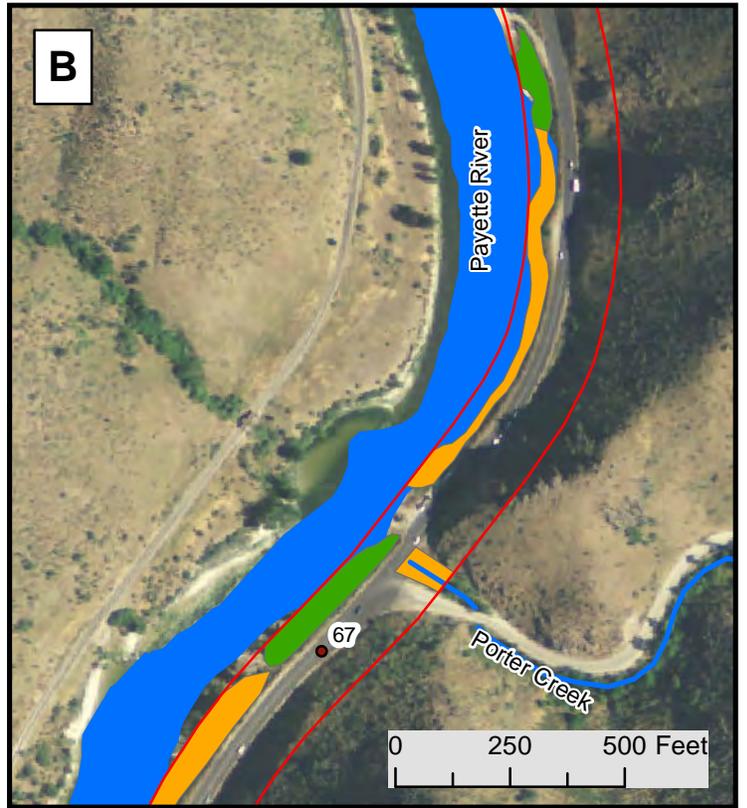
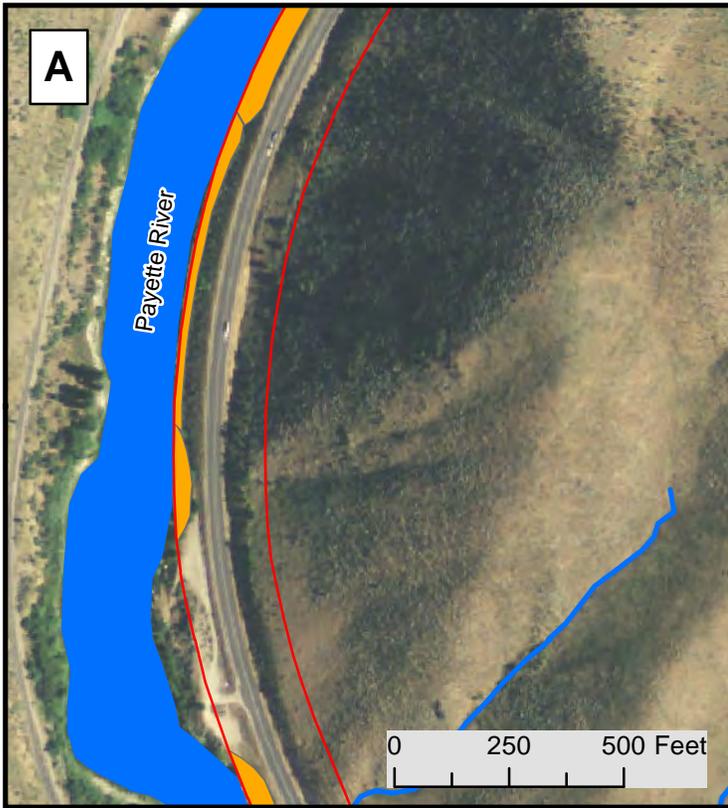


Project No. A009(967), Key No. 09967		
Date	Figure Title	Figure
February 2014	Potential Surface Waters and Wetlands Identified in the Idaho 55 Central Corridor	3-9

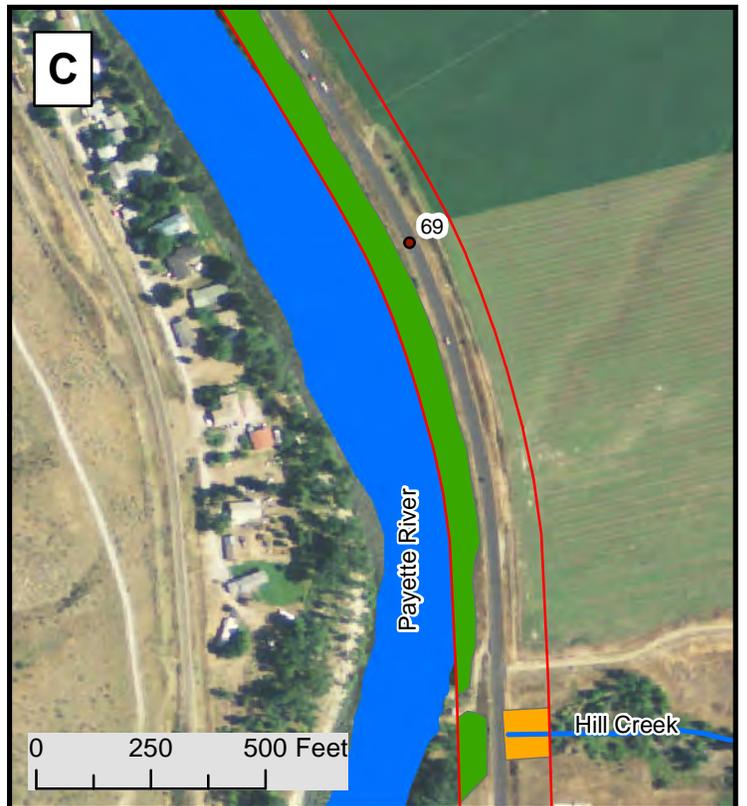
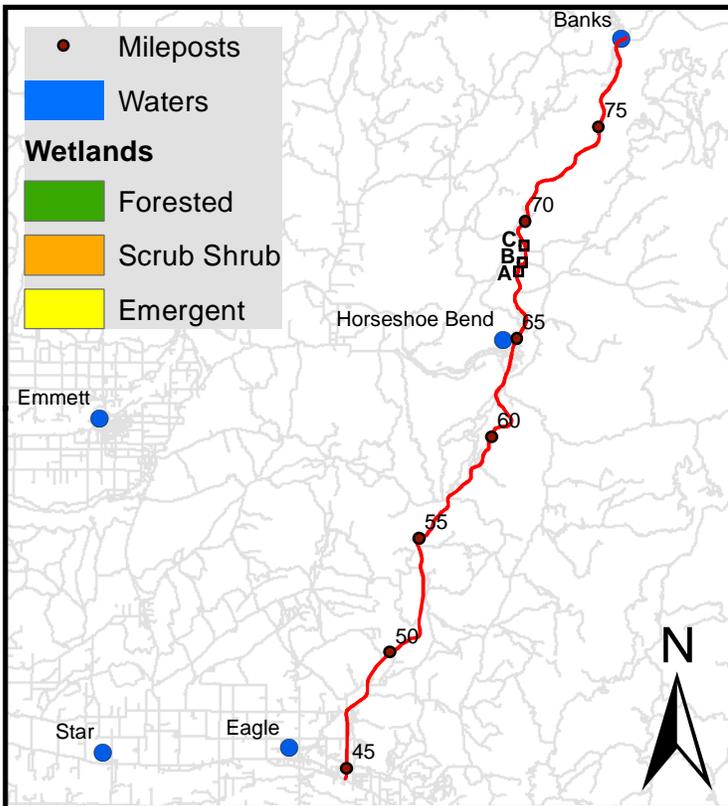
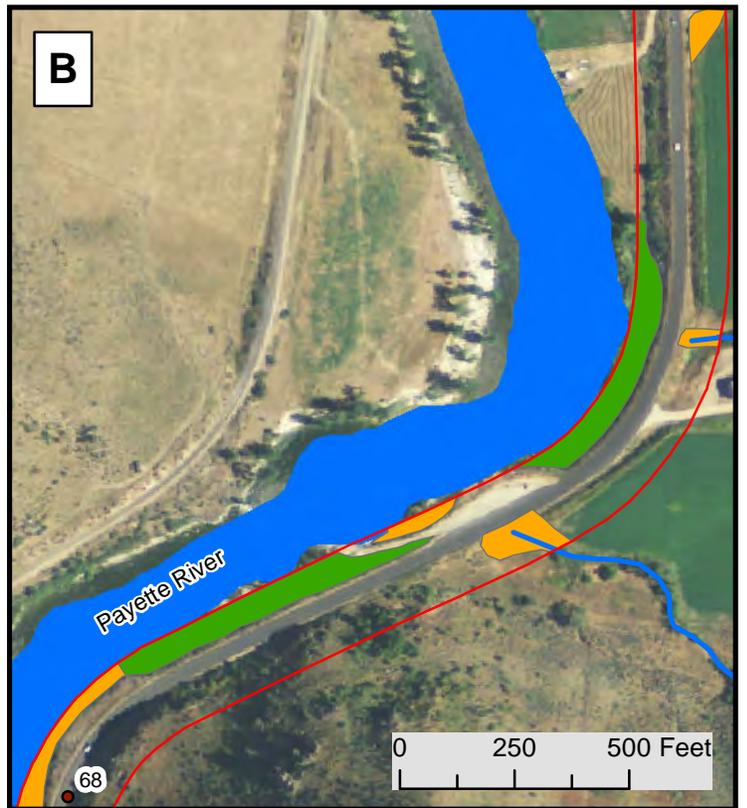
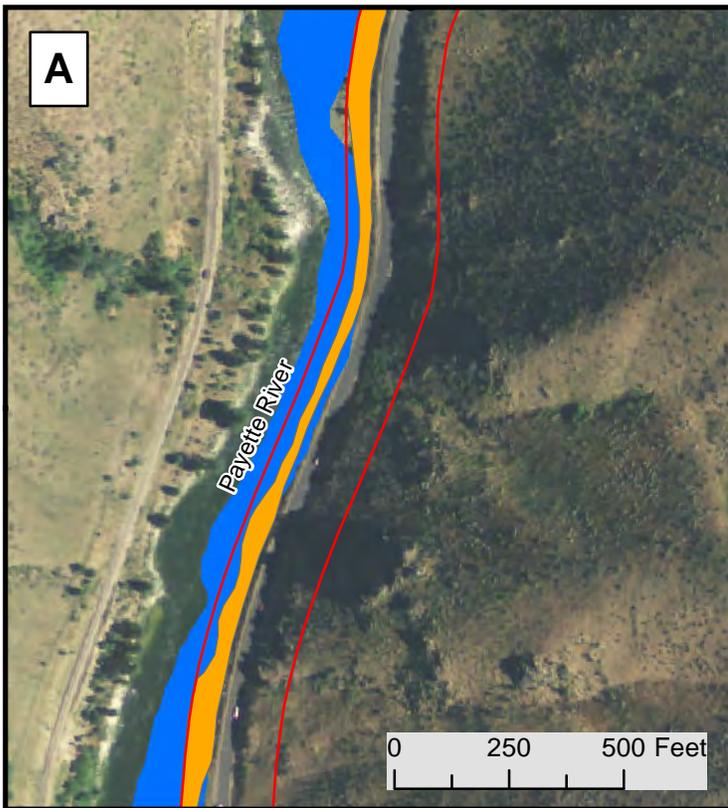




	Project No. A009(967), Key No. 09967			
	Date February 2014	Figure Title Potential Surface Waters and Wetlands Identified in the Idaho 55 Central Corridor	Figure 3-10	

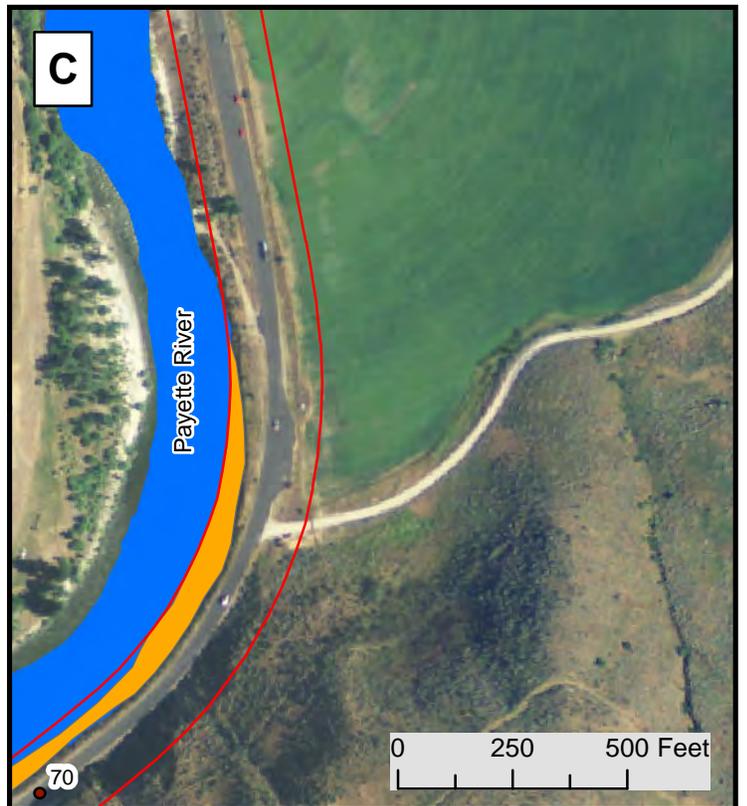
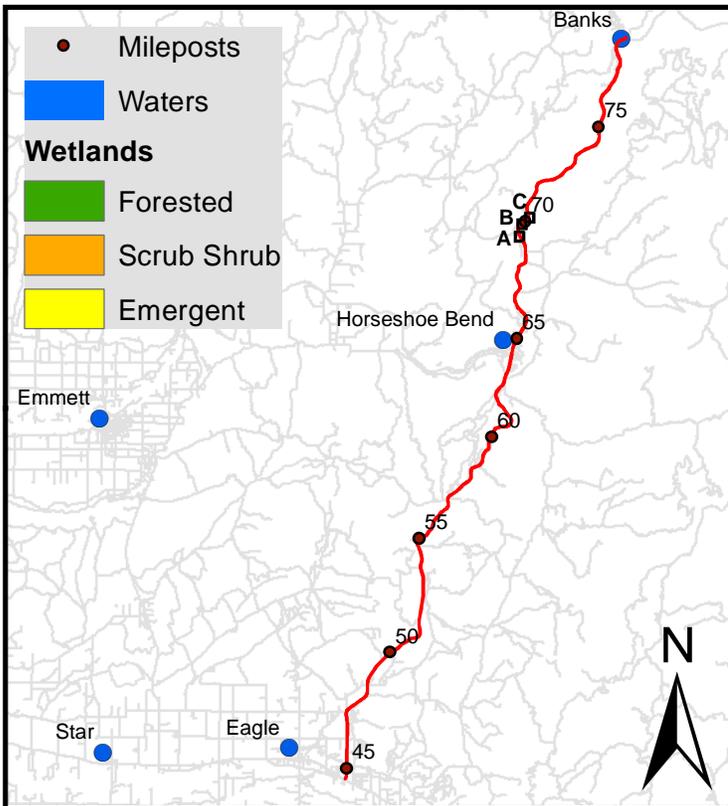
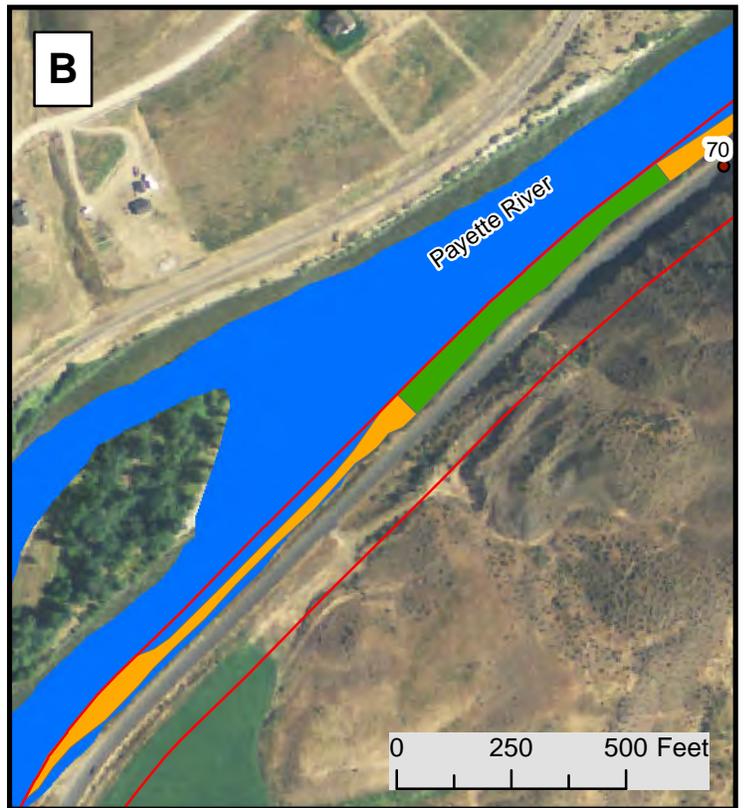
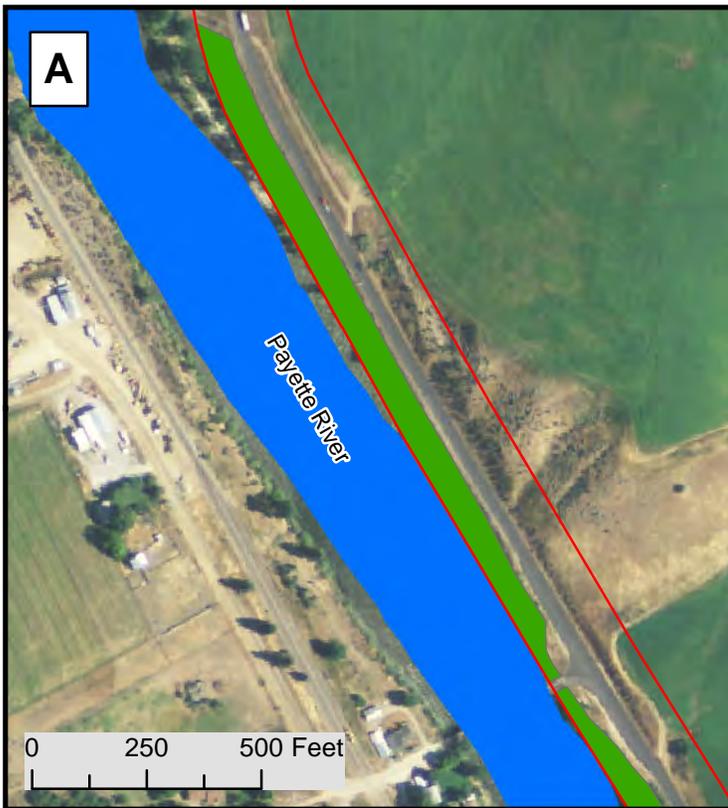


	Project No. A009(967), Key No. 09967			
	Date	Figure Title	Figure	
February 2014	Potential Surface Waters and Wetlands Identified in the Idaho 55 Central Corridor	3-11		



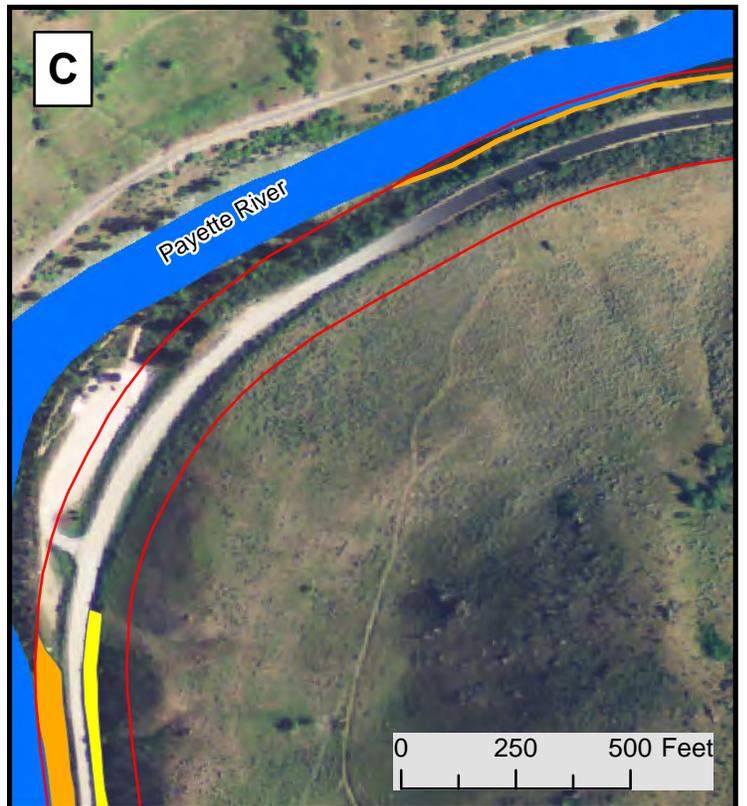
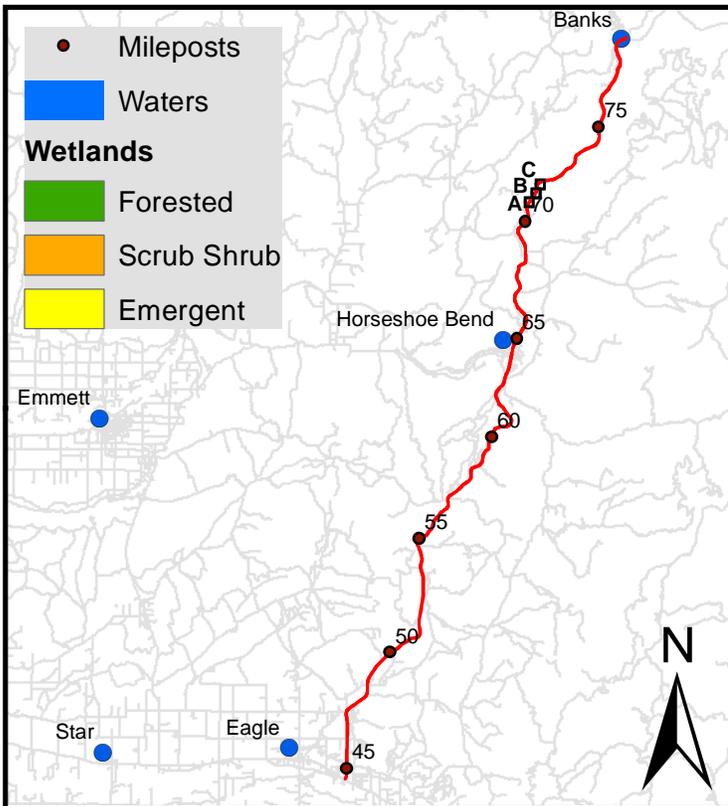
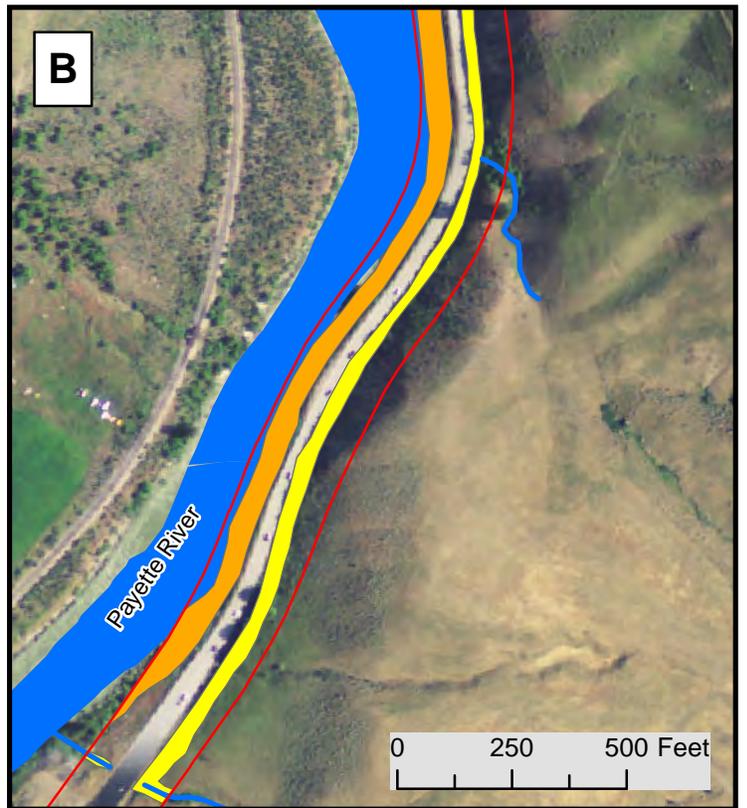
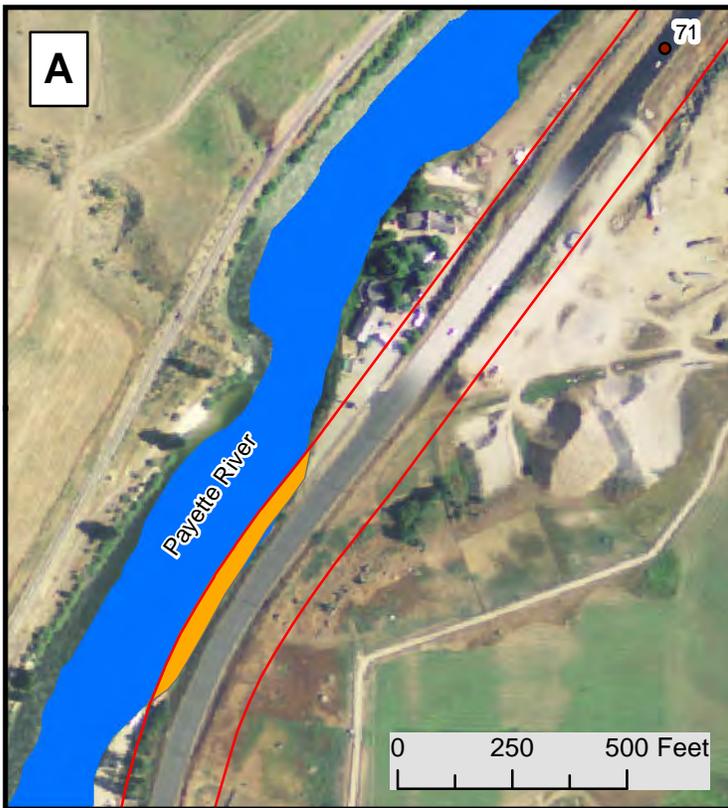
Project No. A009(967), Key No. 09967		
Date	Figure Title	Figure
February 2014	Potential Surface Waters and Wetlands Identified in the Idaho 55 Central Corridor	3-12





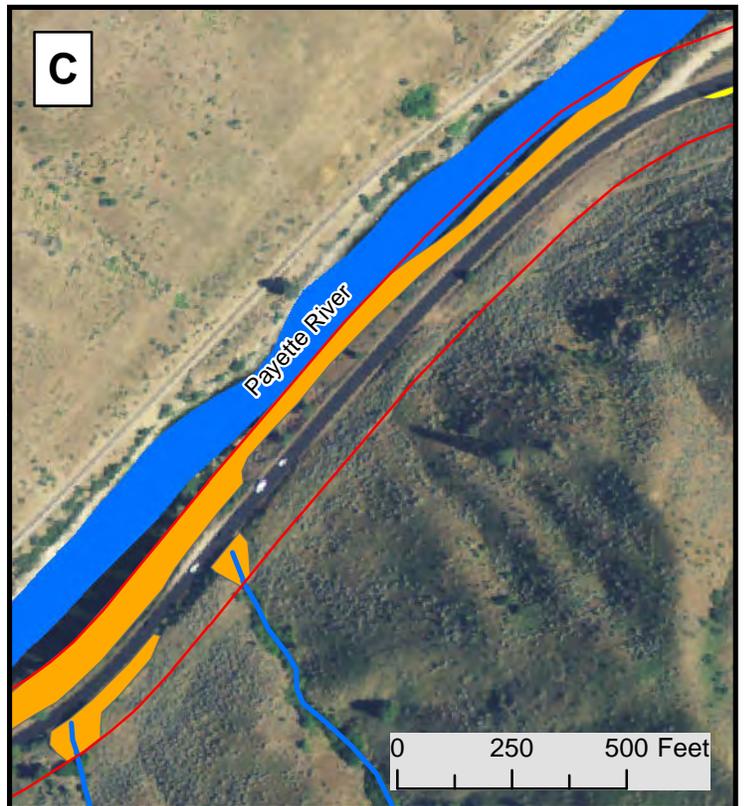
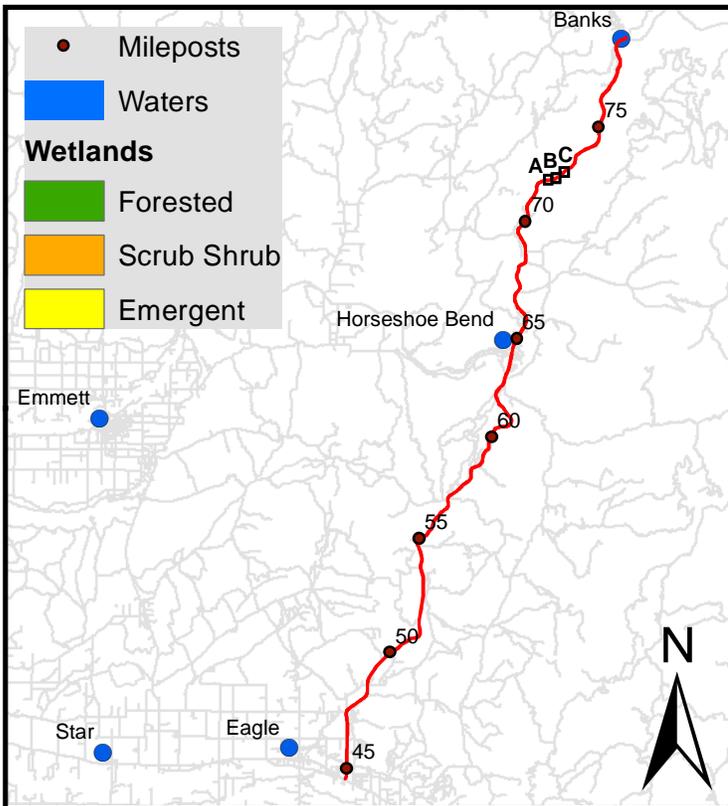
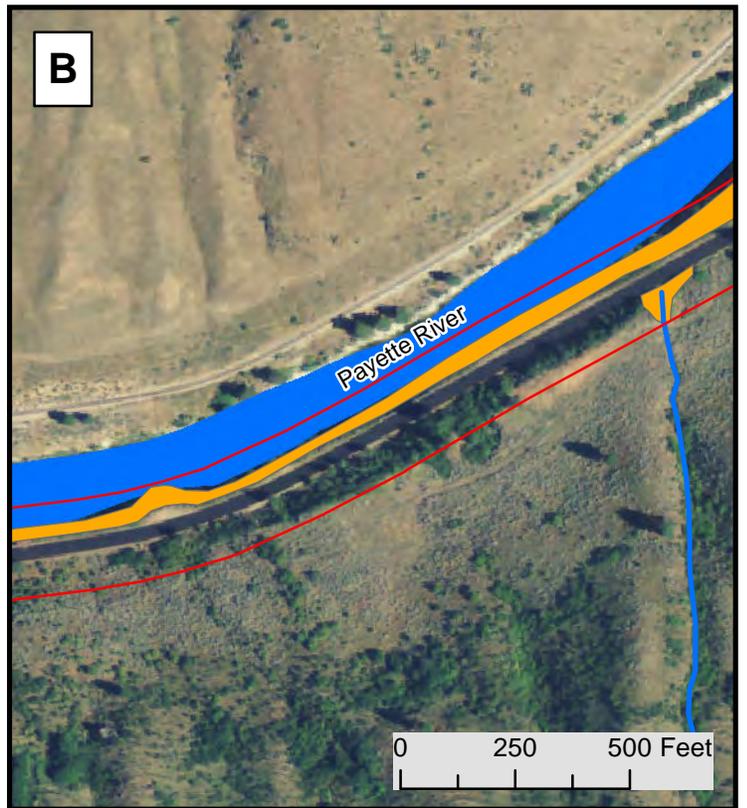
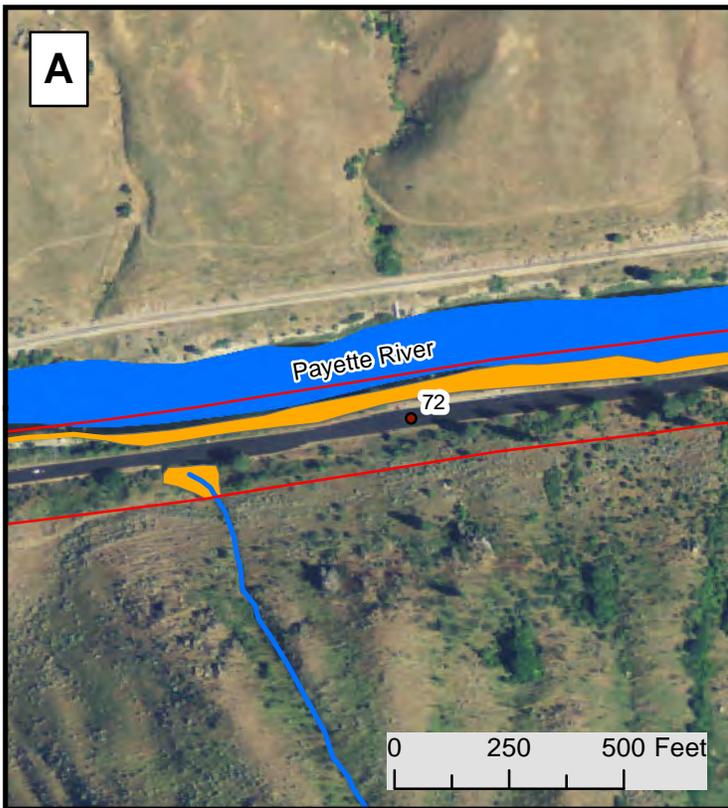
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Date	Figure Title	Figure
February 2014	Potential Surface Waters and Wetlands Identified in the Idaho 55 Central Corridor	3-13





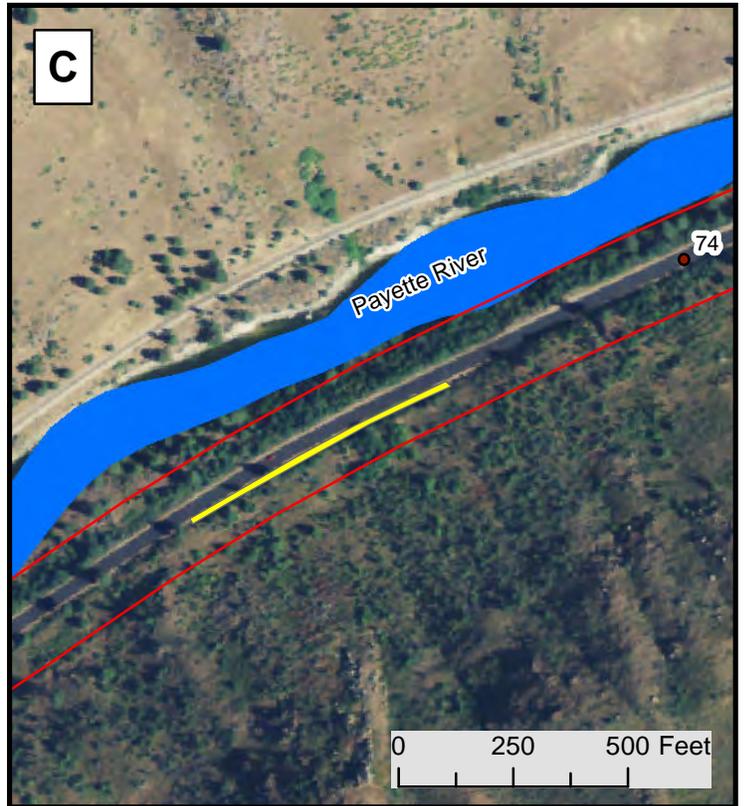
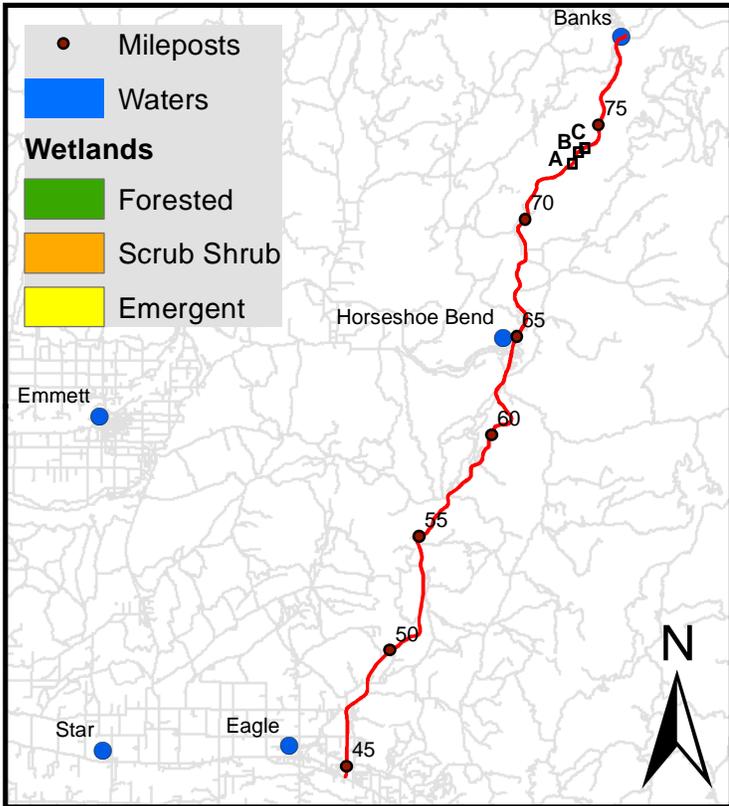
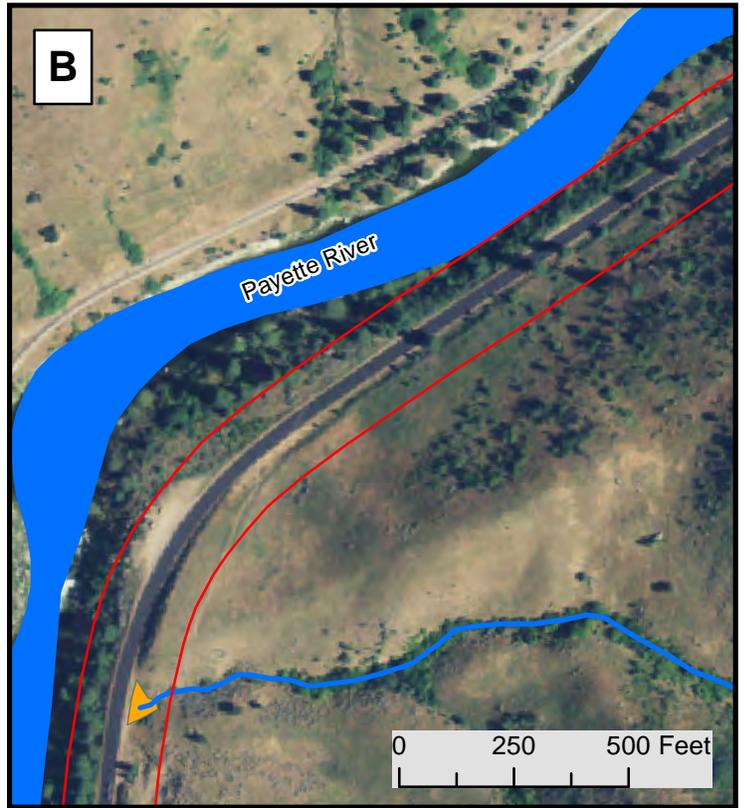
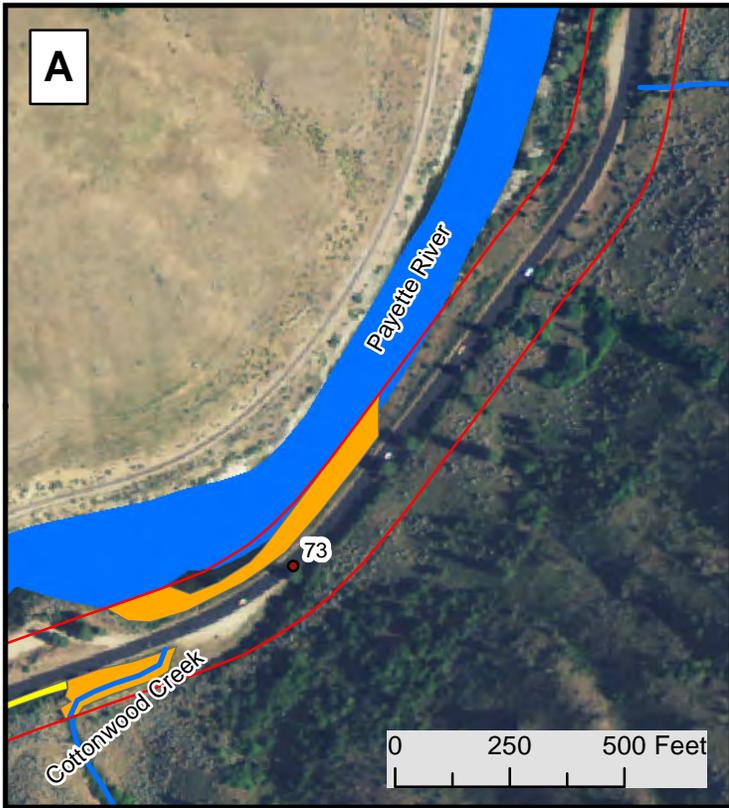
Project No. A009(967), Key No. 09967		
Date	Figure Title	Figure
February 2014	Potential Surface Waters and Wetlands Identified in the Idaho 55 Central Corridor	3-14





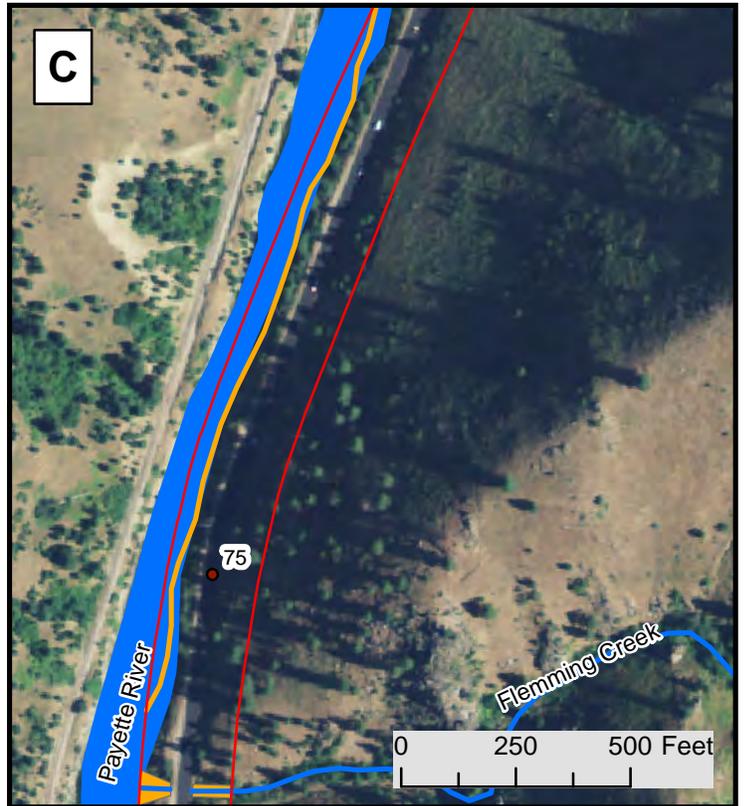
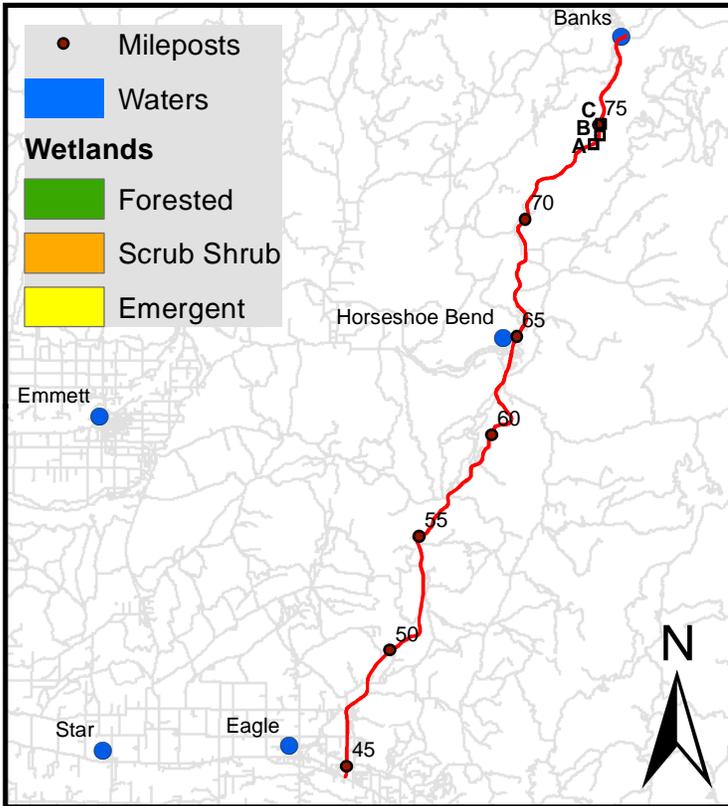
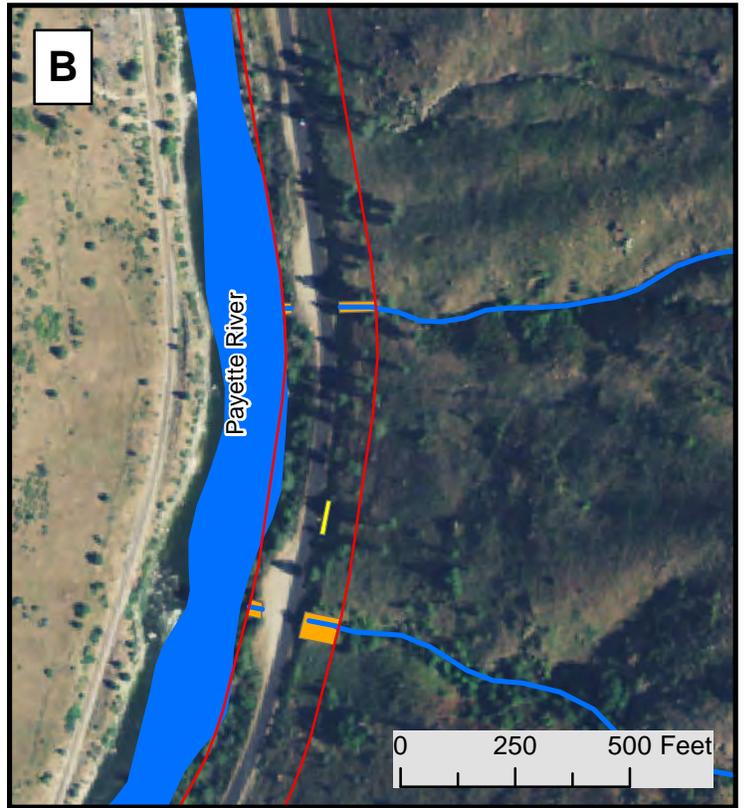
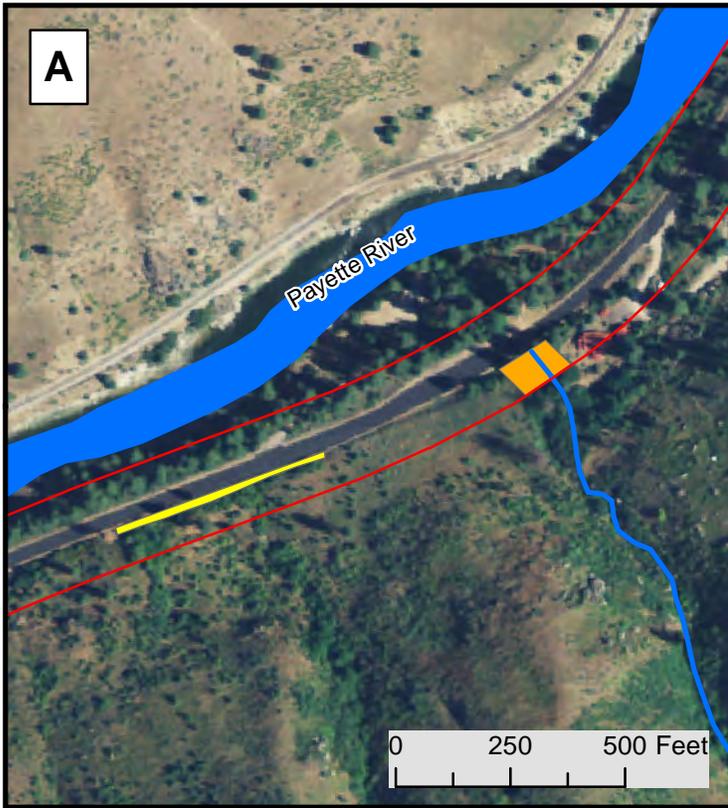
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Date	Figure Title	Figure
February 2014	Potential Surface Waters and Wetlands Identified in the Idaho 55 Central Corridor	3-15





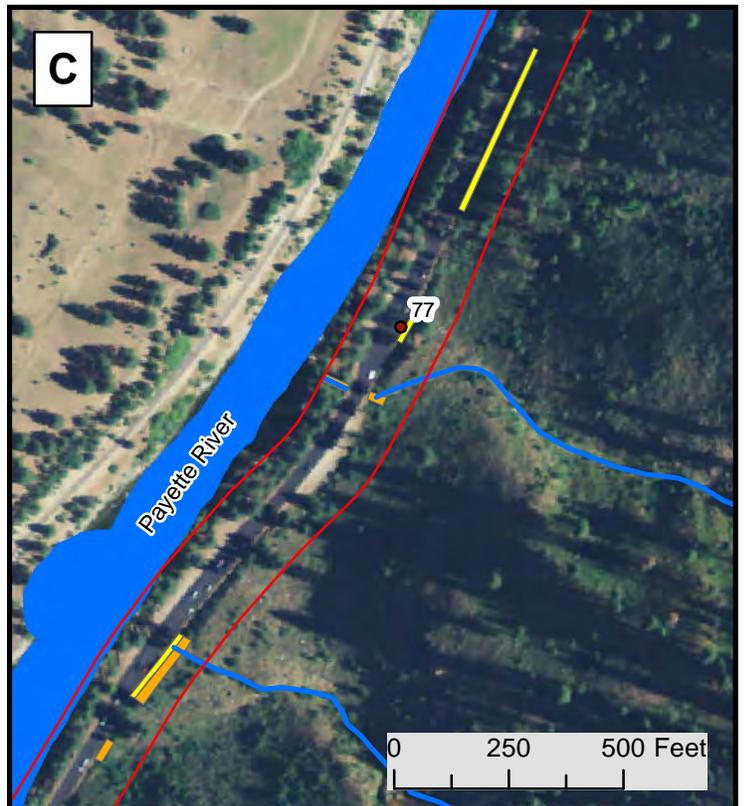
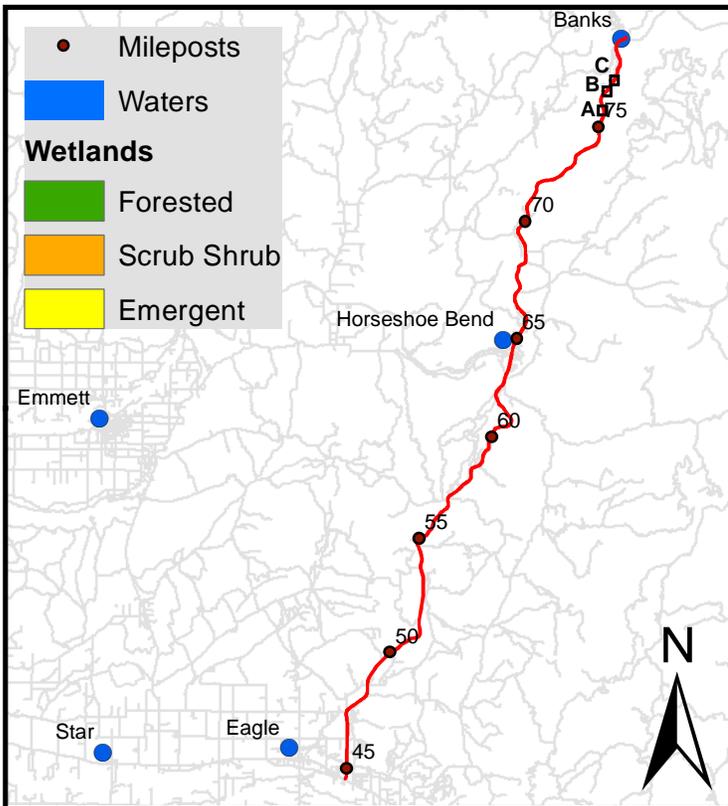
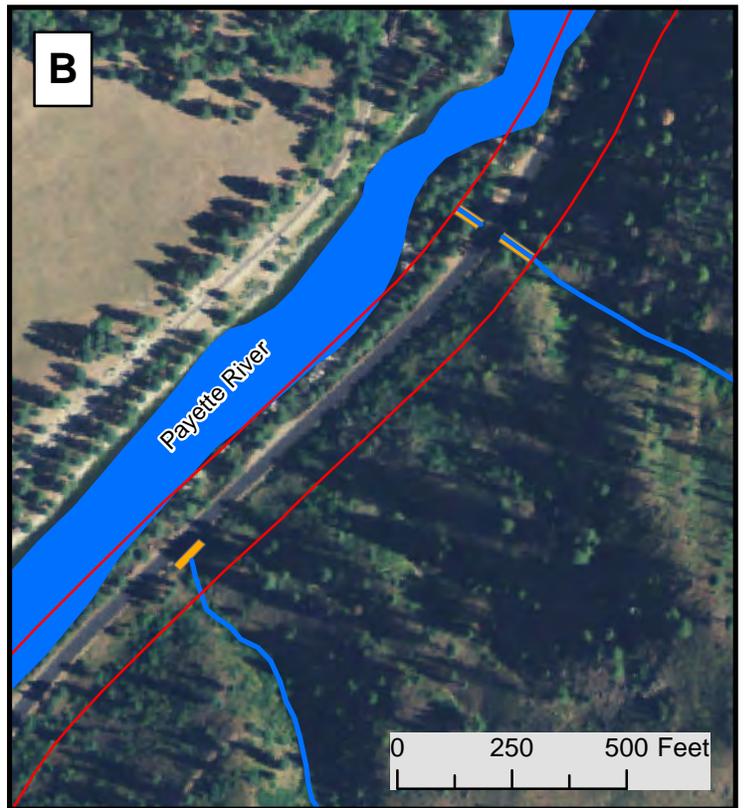
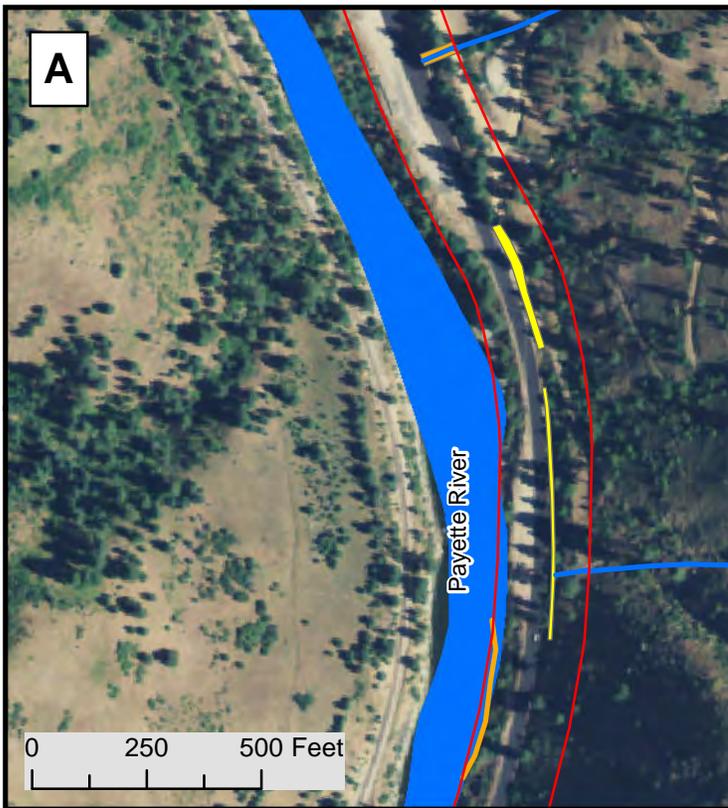
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Date	Figure Title	Figure
February 2014	Potential Surface Waters and Wetlands Identified in the Idaho 55 Central Corridor	3-16





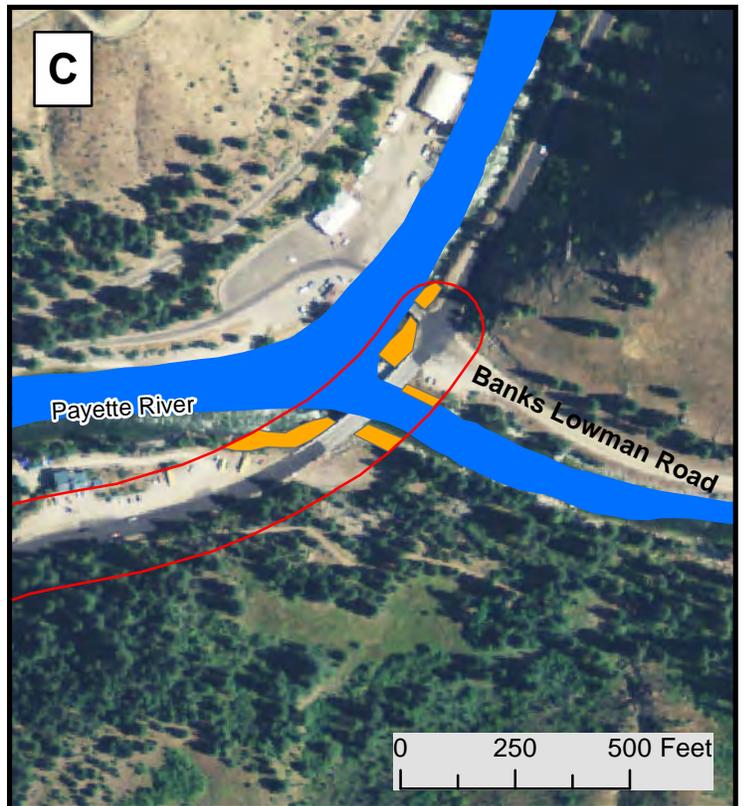
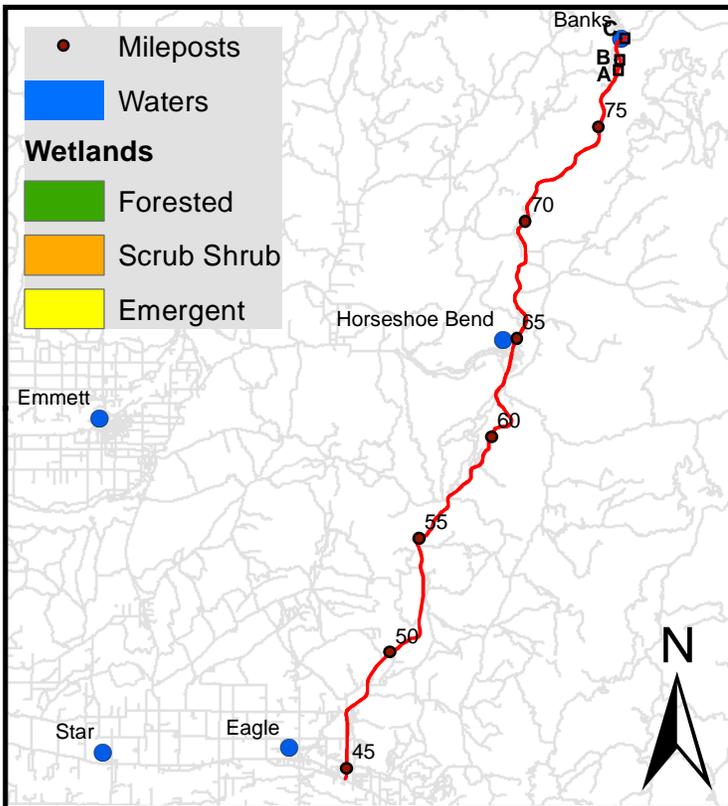
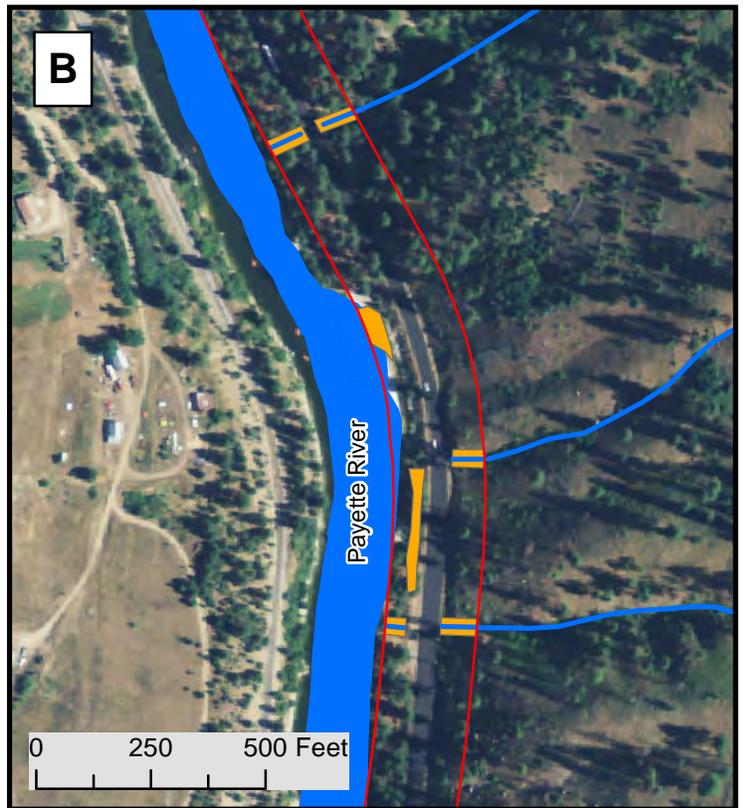
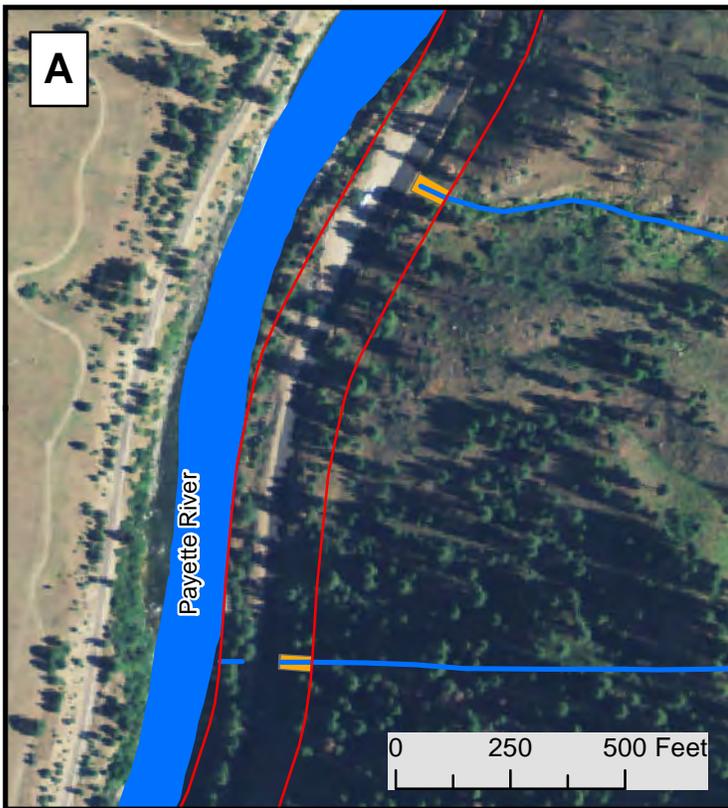
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Date	Figure Title	Figure
February 2014	Potential Surface Waters and Wetlands Identified in the Idaho 55 Central Corridor	3-17





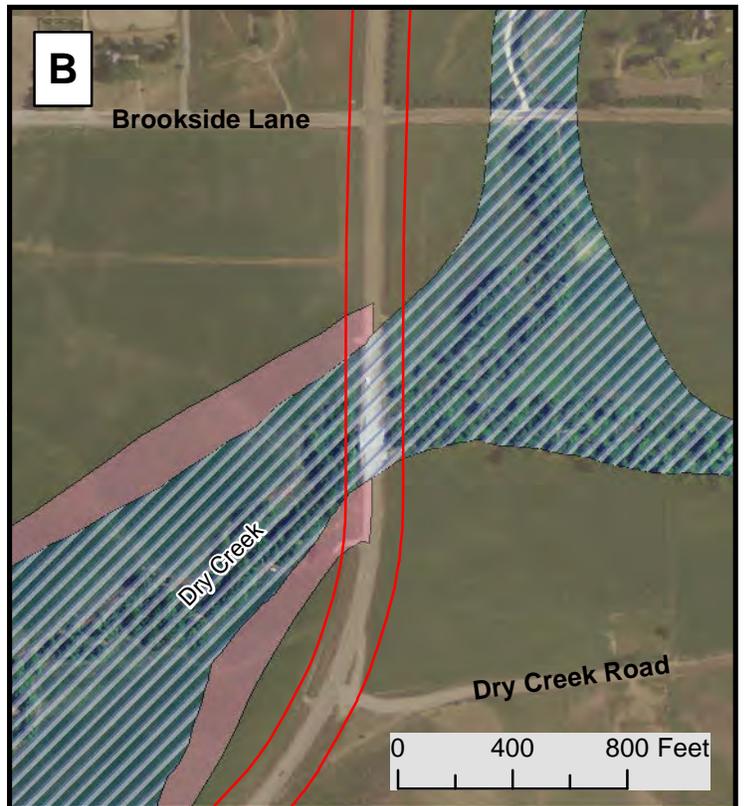
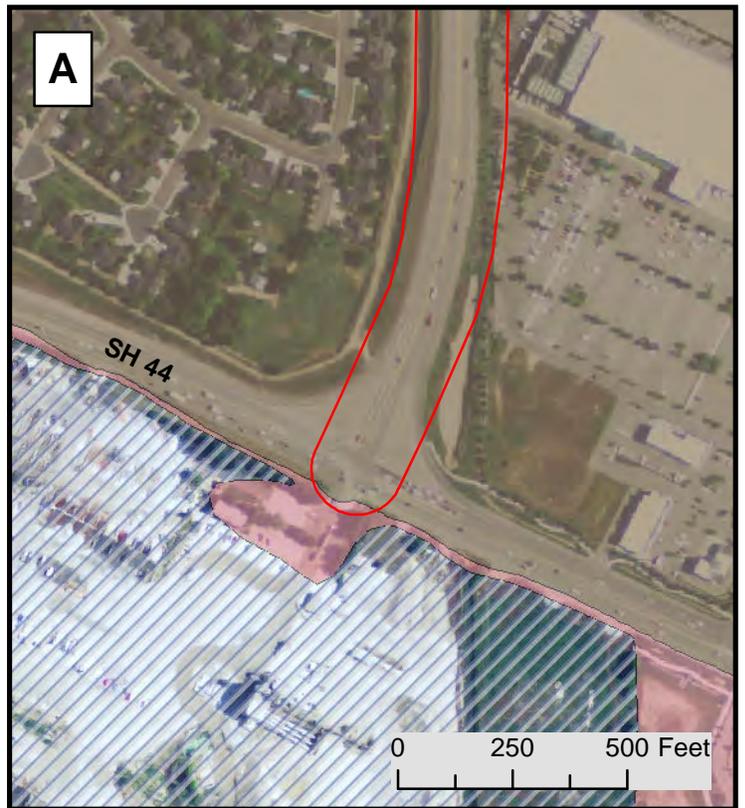
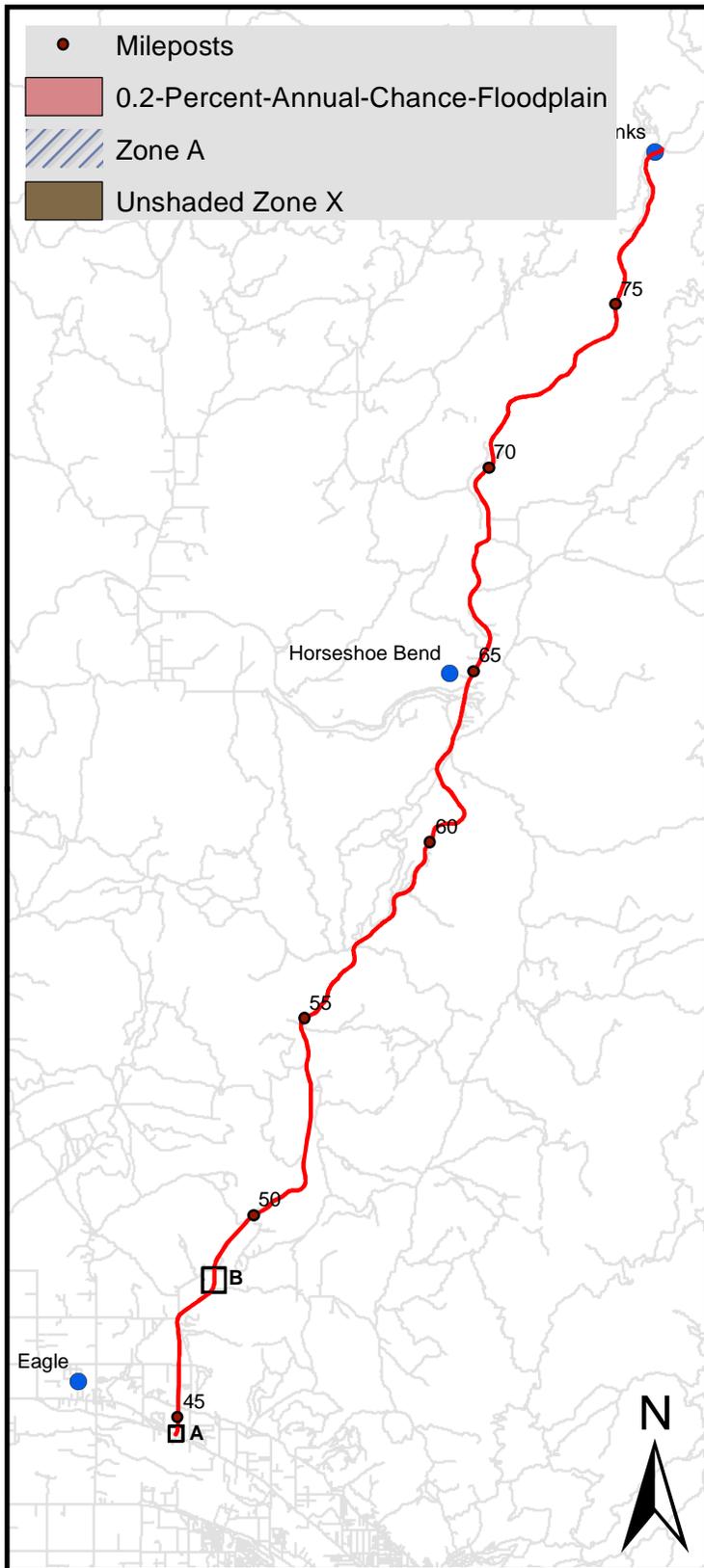
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Date	Figure Title	Figure
February 2014	Potential Surface Waters and Wetlands Identified in the Idaho 55 Central Corridor	3-18





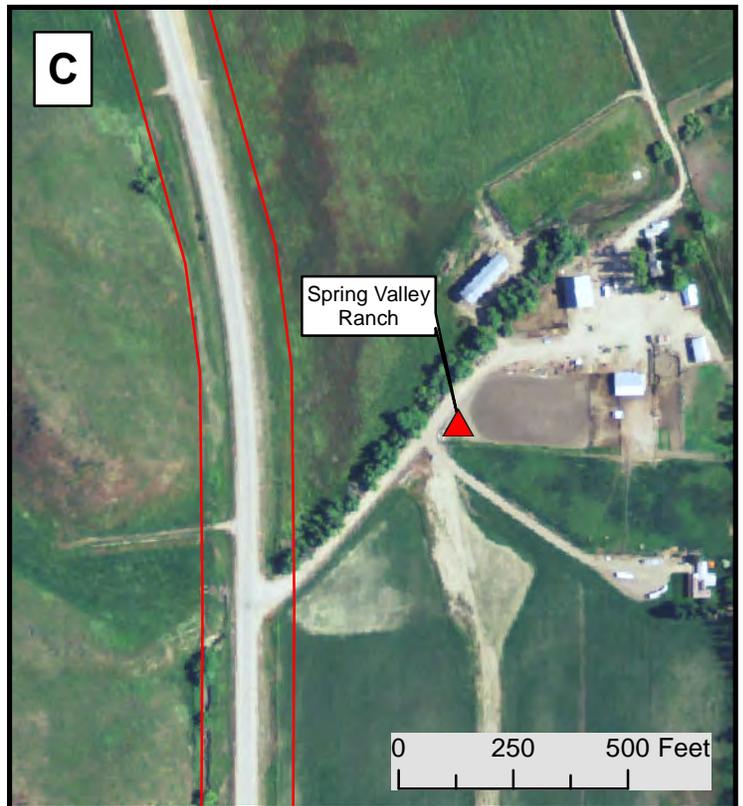
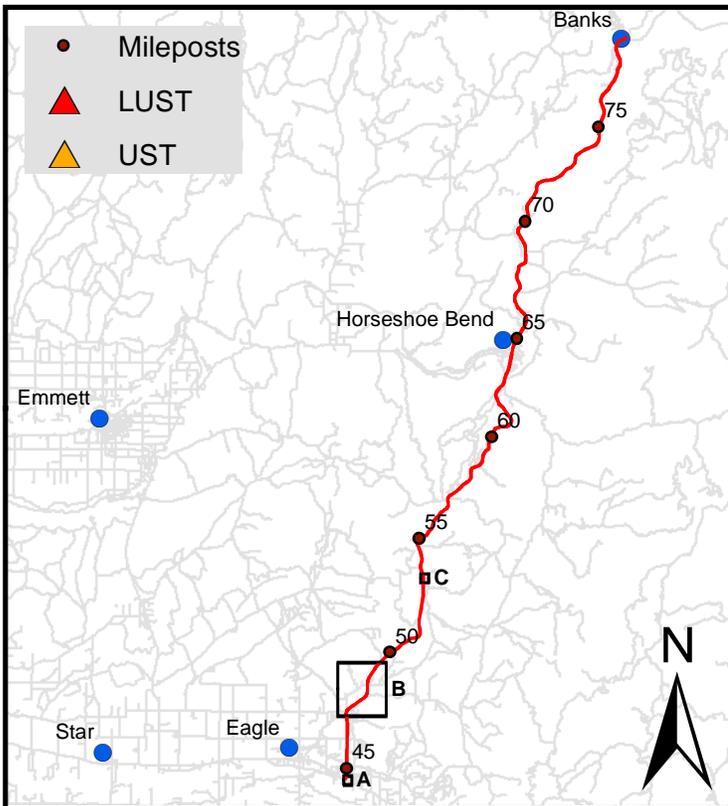
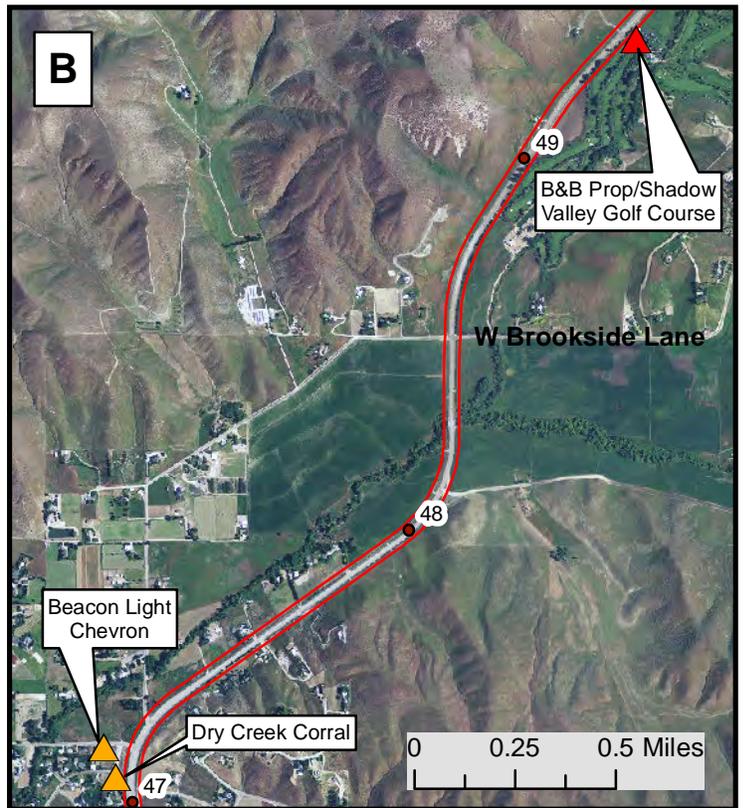
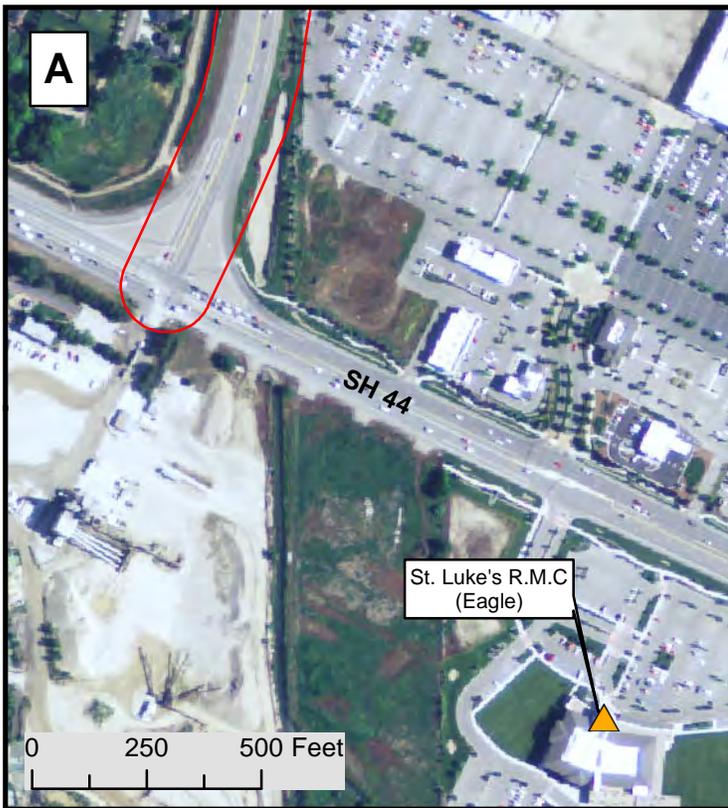
Project No. A009(967), Key No. 09967		
Date	Figure Title	Figure
February 2014	Potential Surface Waters and Wetlands Identified in the Idaho 55 Central Corridor	3-19





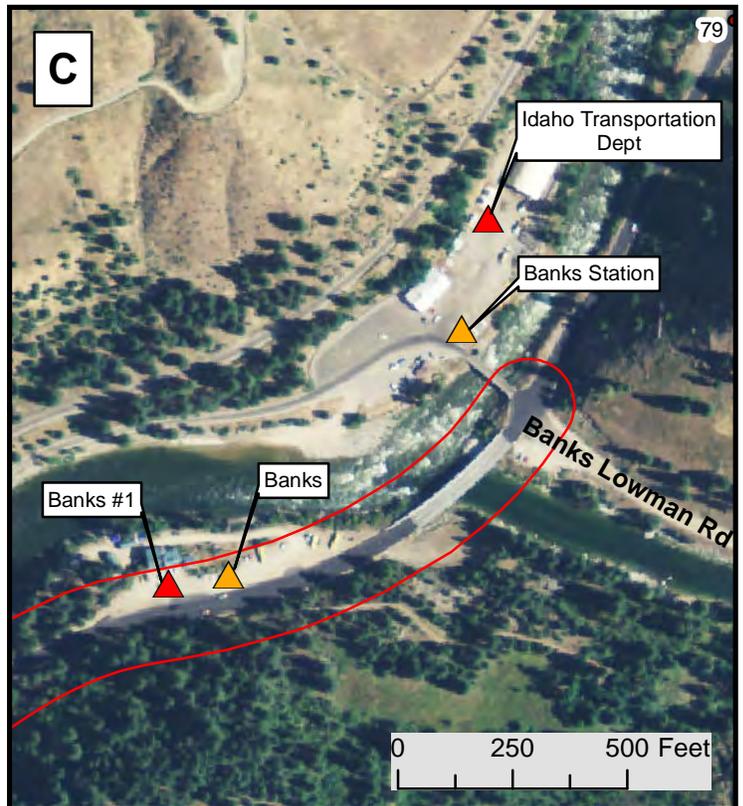
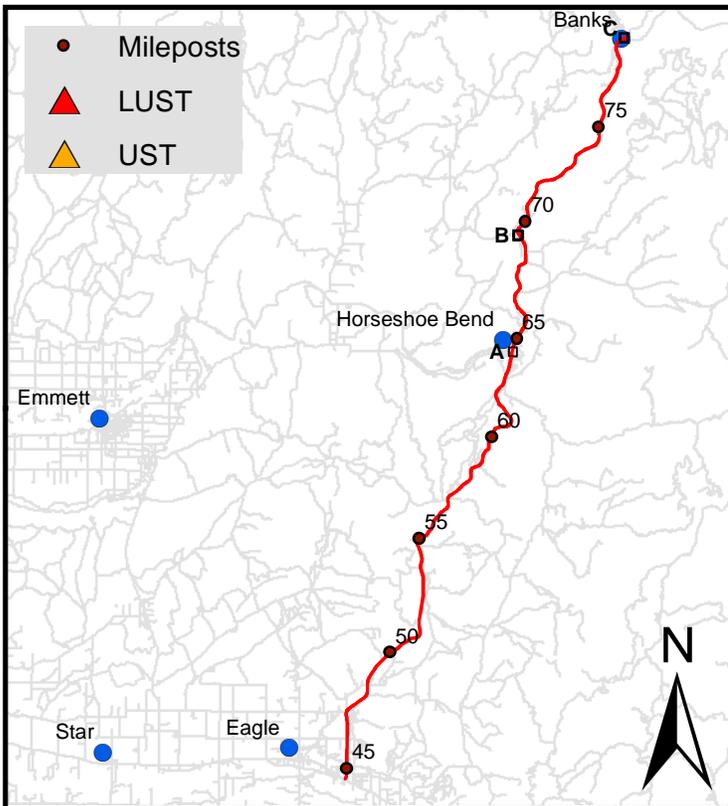
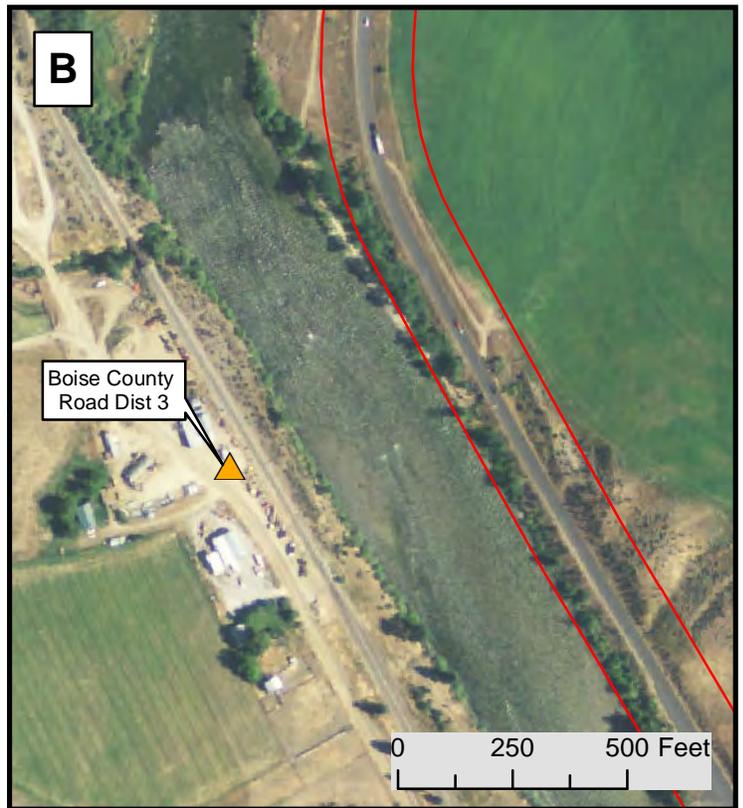
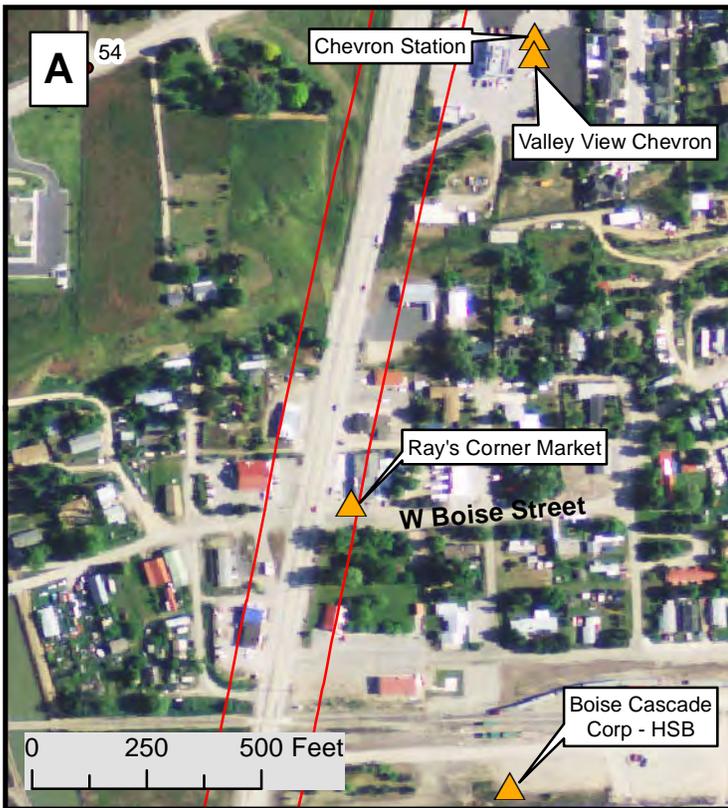
Project No. A009(967), Key No. 09967		
Date February 2014	Figure Title Floodplains Identified in the Idaho 55 Central Corridor	Figure 4-1





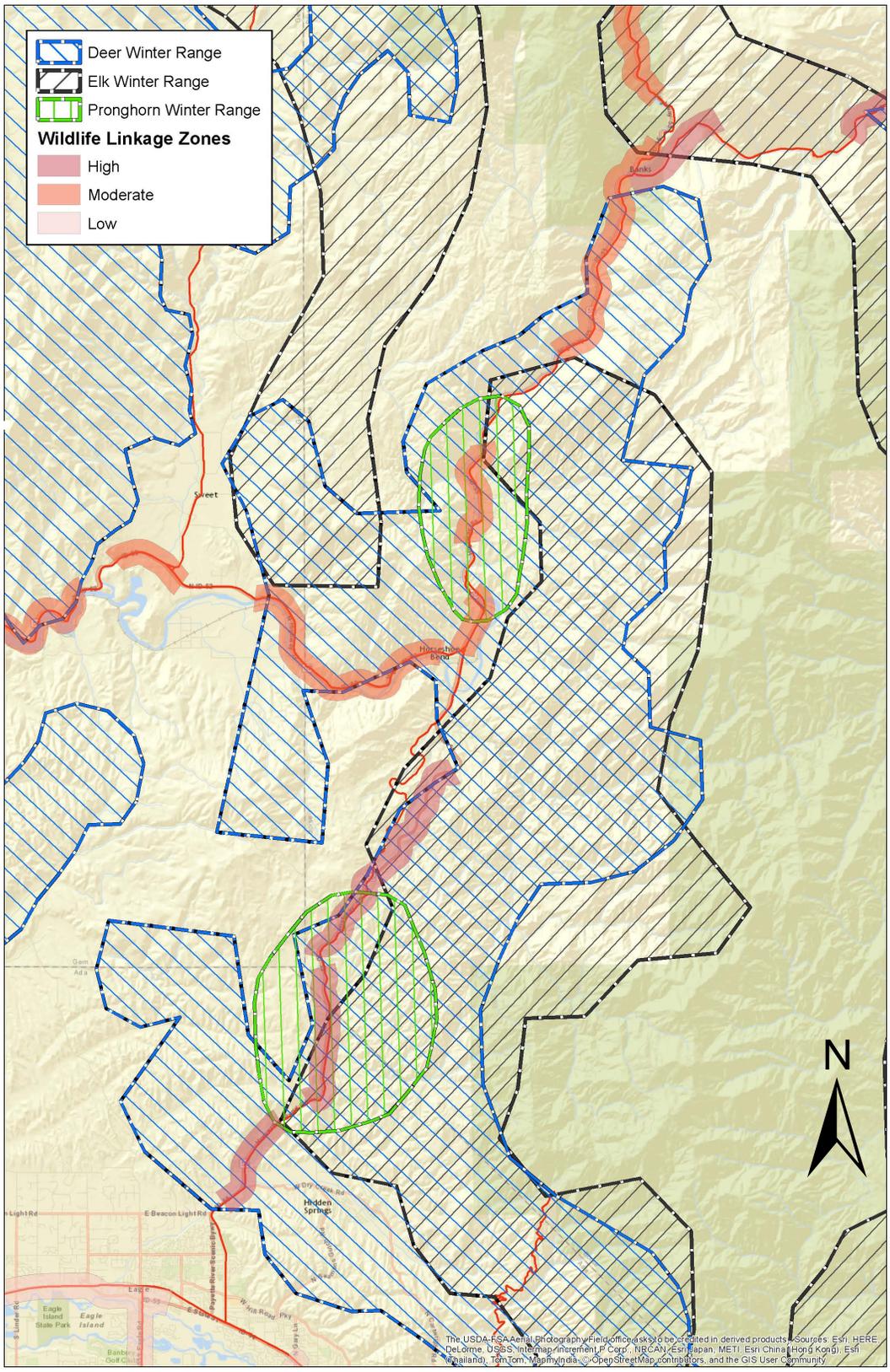
Project No. A009(967), Key No. 09967		
Date	Figure Title	Figure
February 2014	Hazardous Materials Sites Identified in the Idaho 55 Central Corridor	5-1





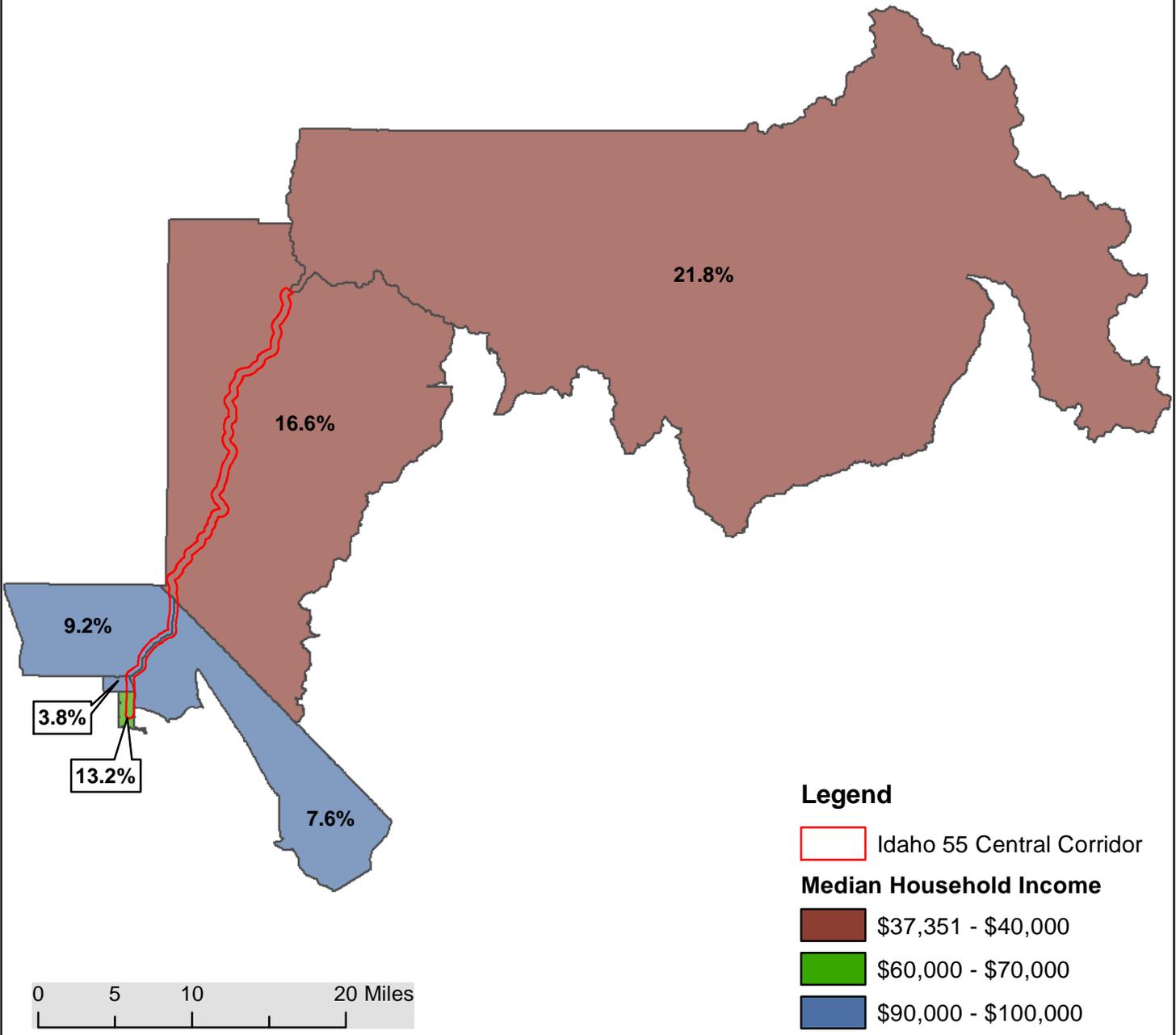
Project No. A009(967), Key No. 09967		
Date	Figure Title	Figure
February 2014	Hazardous Materials Sites Identified in the Idaho 55 Central Corridor	5-2





Project No. A009(967), Key No. 09967		
Date	Figure Title	Figure
August 2015	Wildlife Linkage Zones in the Idaho 55 Central Corridor	6-1





Legend

- Idaho 55 Central Corridor
- Median Household Income**
- \$37,351 - \$40,000
- \$60,000 - \$70,000
- \$90,000 - \$100,000



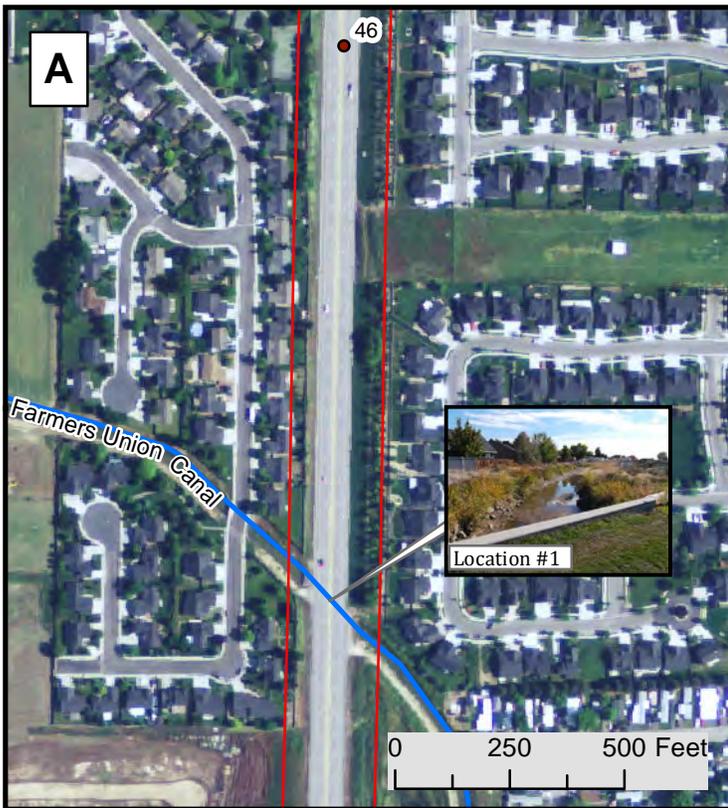
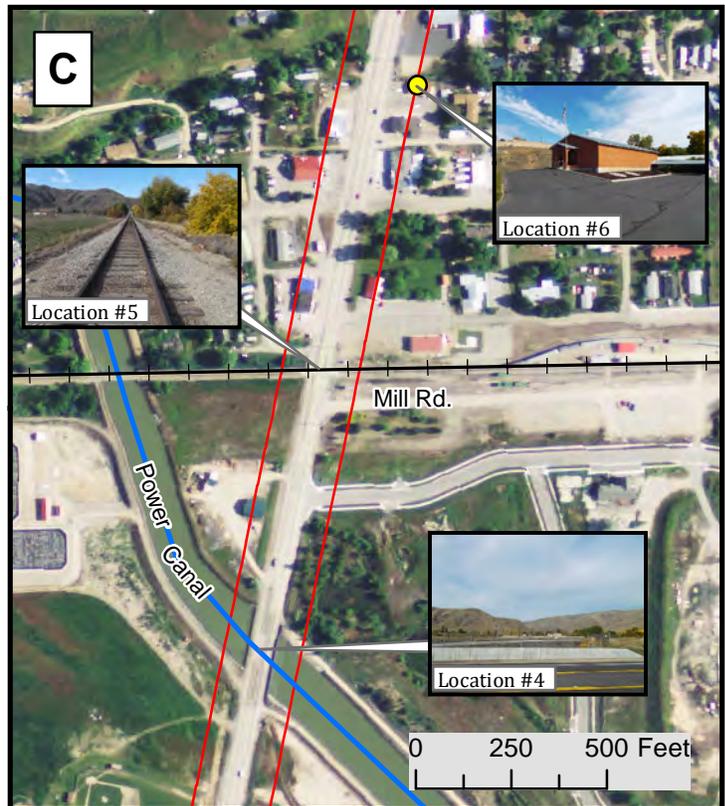
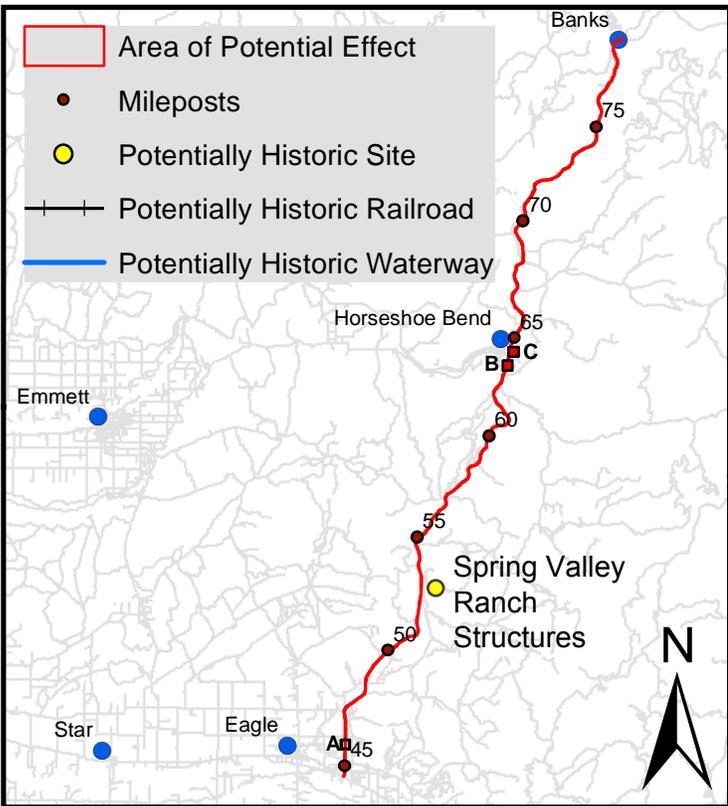
Project No. A009(967), Key No. 09967

Date
February 2014

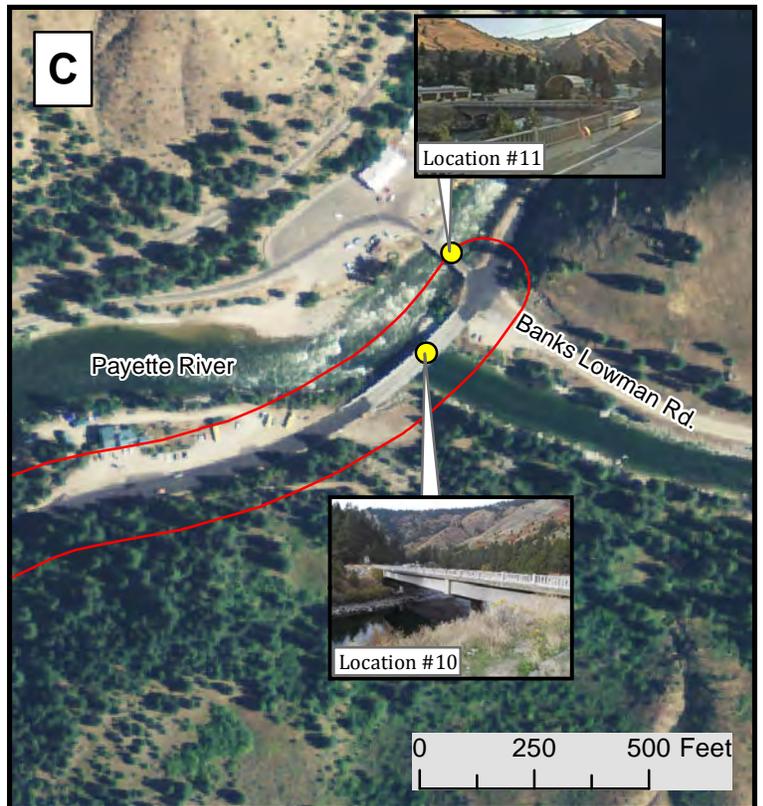
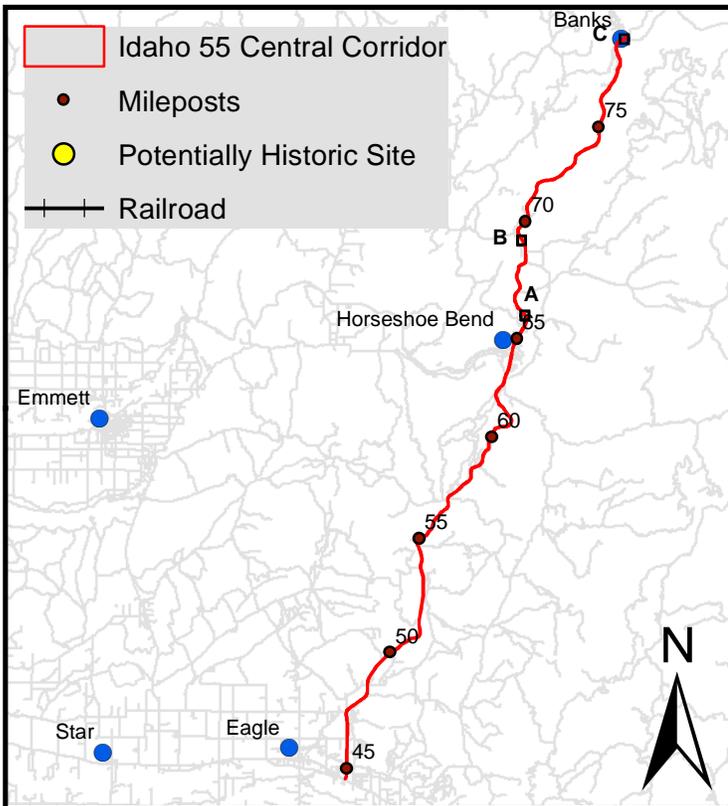
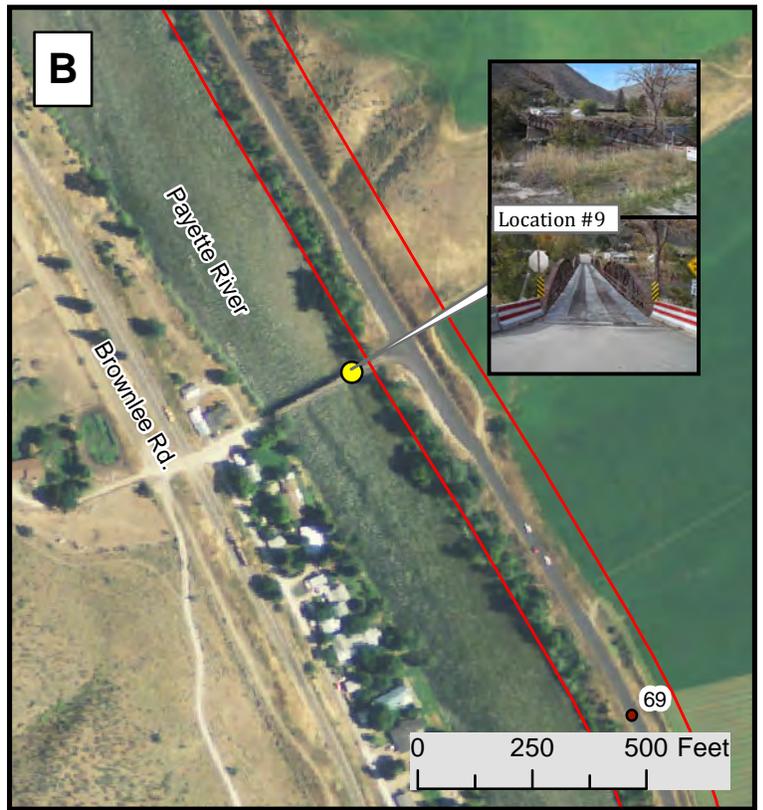
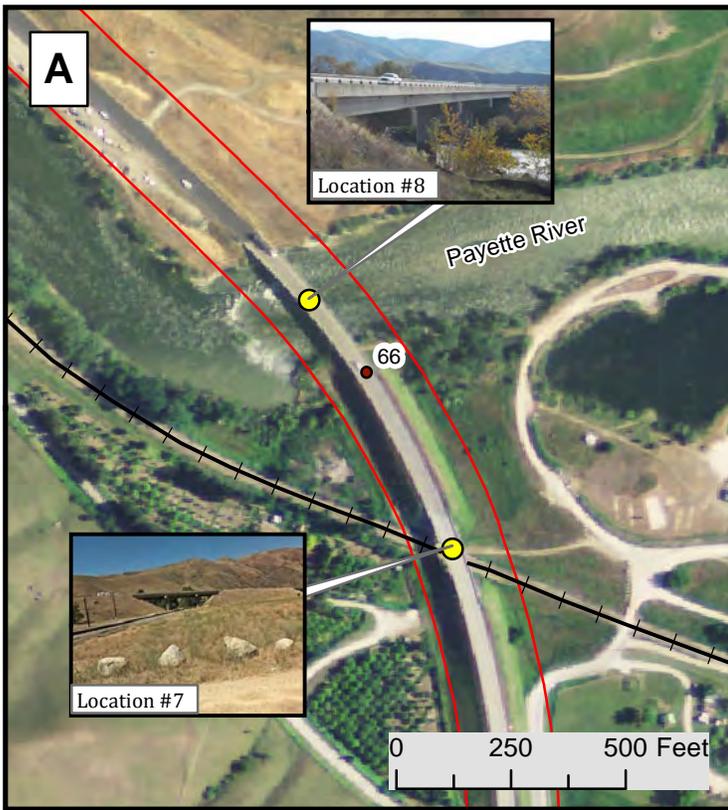
Figure Title
Median Household Income and Population Percentage below the Poverty Level by Census Block Group

Figure
7-1



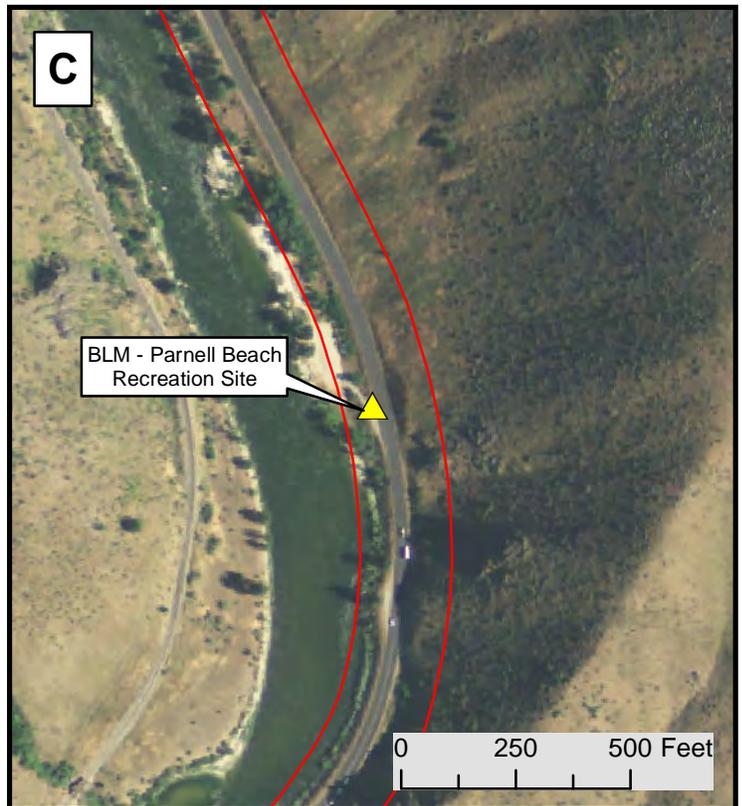
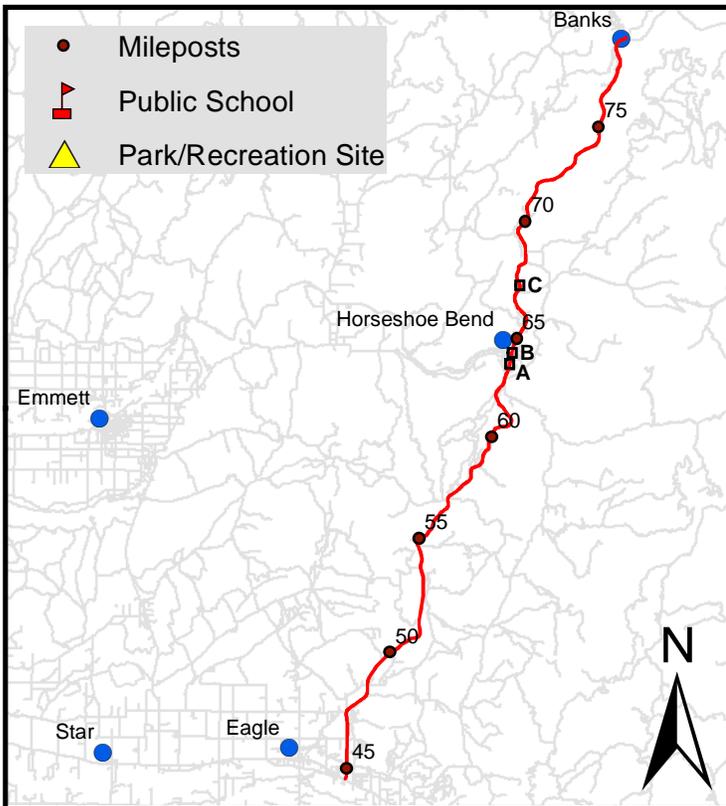
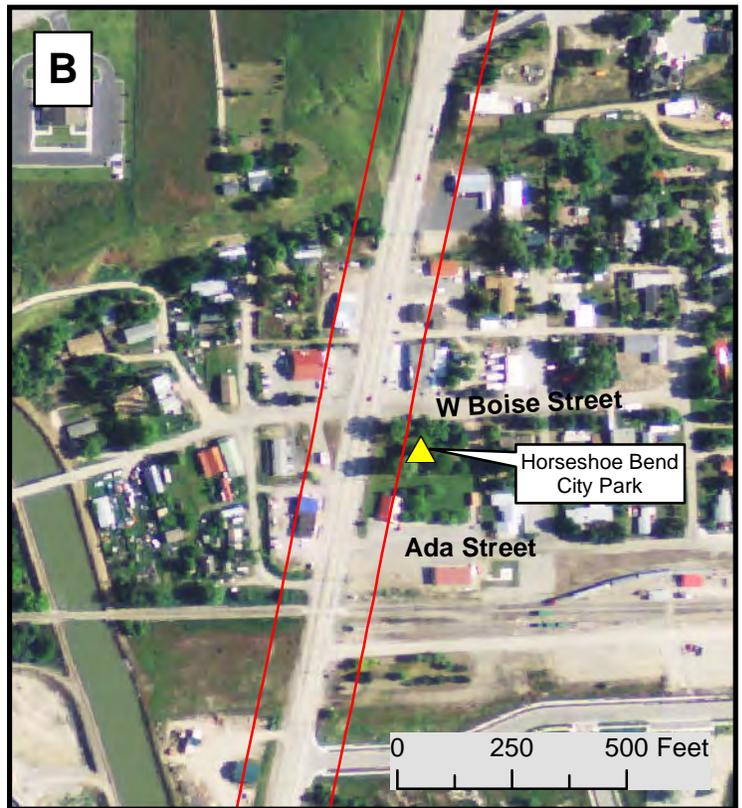
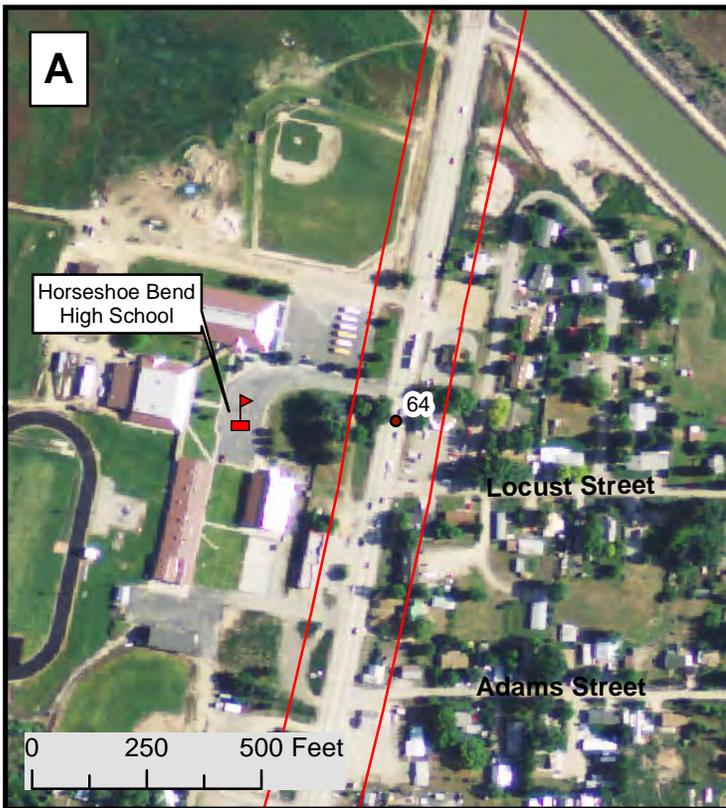



	Project No. A009(967), Key No. 09967			
	Date August 2015	Figure Title Potentially Historic Sites, Waterways, and Railroad Identified in the Idaho 55 Central Corridor	Figure 8-1	



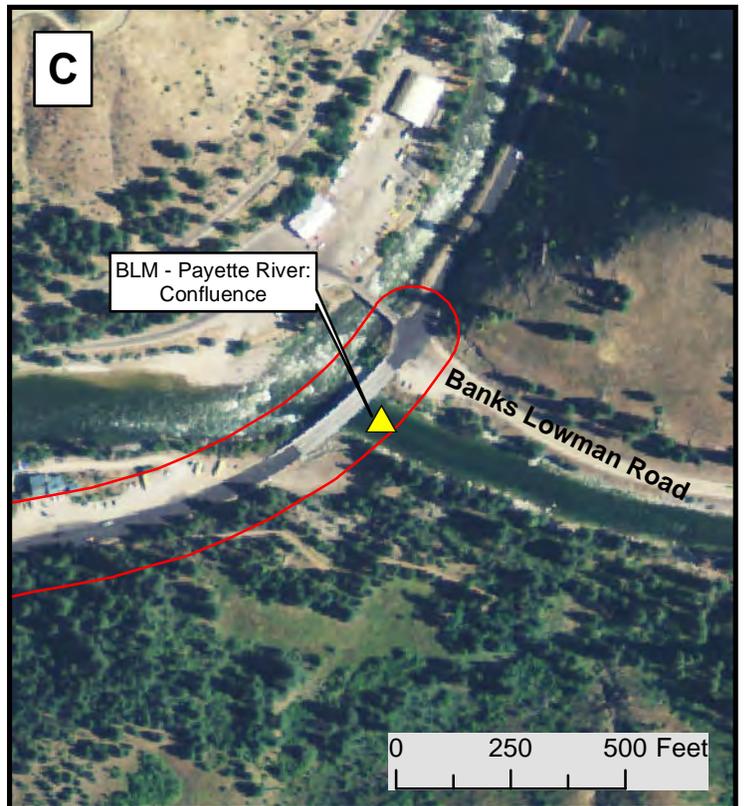
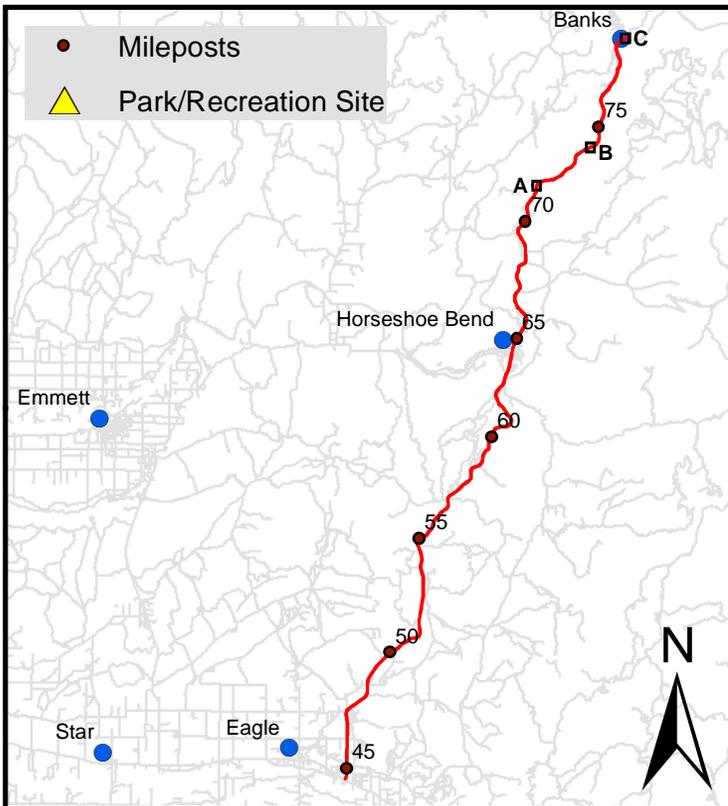
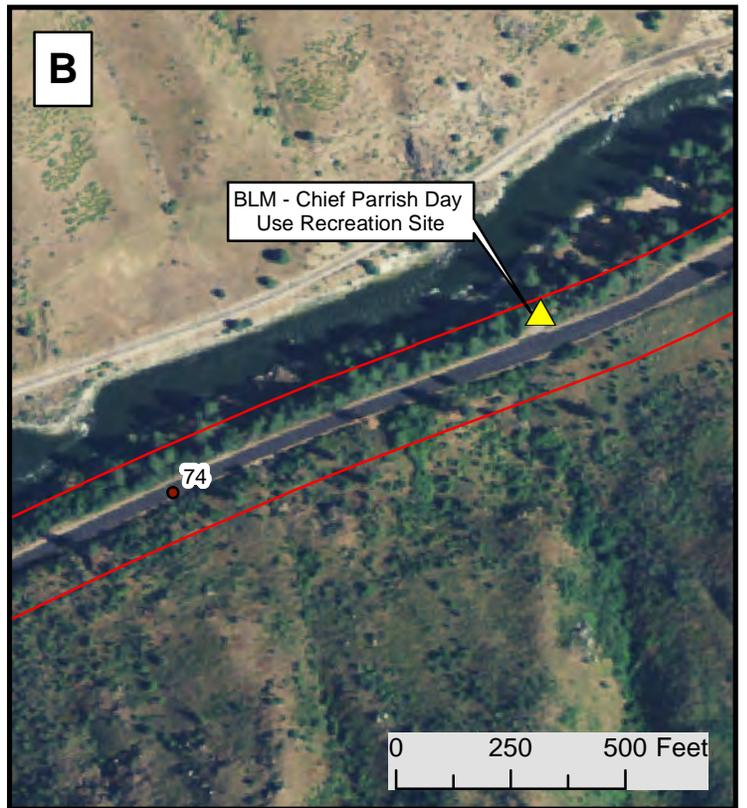
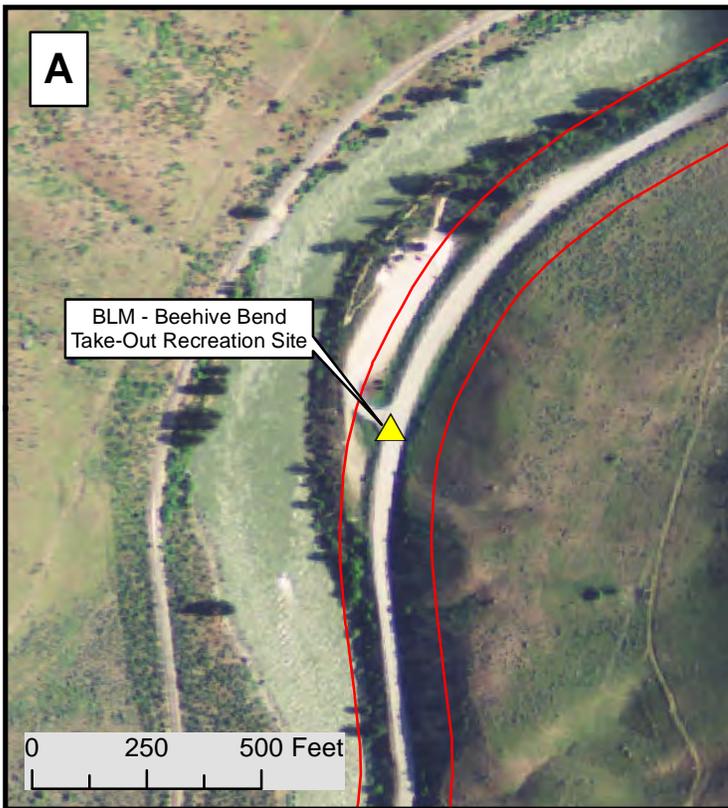
Project No. A009(967), Key No. 09967		
Date	Figure Title	Figure
February 2014	Potentially Historic Sites, Waterways, and Railroad Identified in the Idaho 55 Central Corridor	8-2





Project No. A009(967), Key No. 09967		
Date	Figure Title	Figure
February 2014	Potential Section 4(f) Resources Identified in the Idaho 55 Central Corridor	9-1



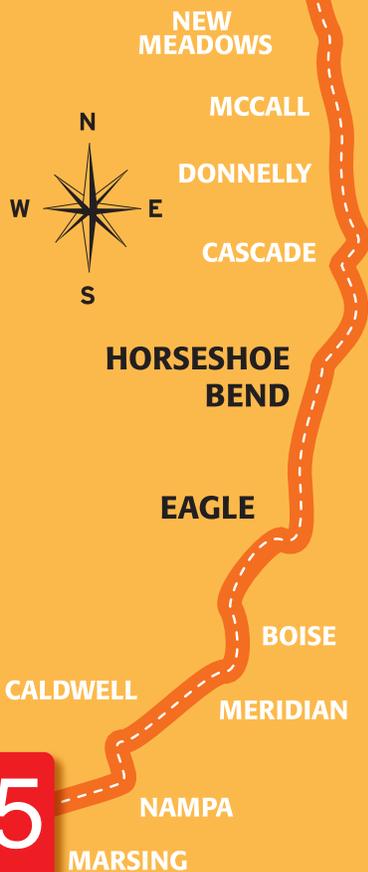


Project No. A009(967), Key No. 09967		
Date	Figure Title	Figure
February 2014	Potential Section 4(f) Resources Identified in the Idaho 55 Central Corridor	9-2



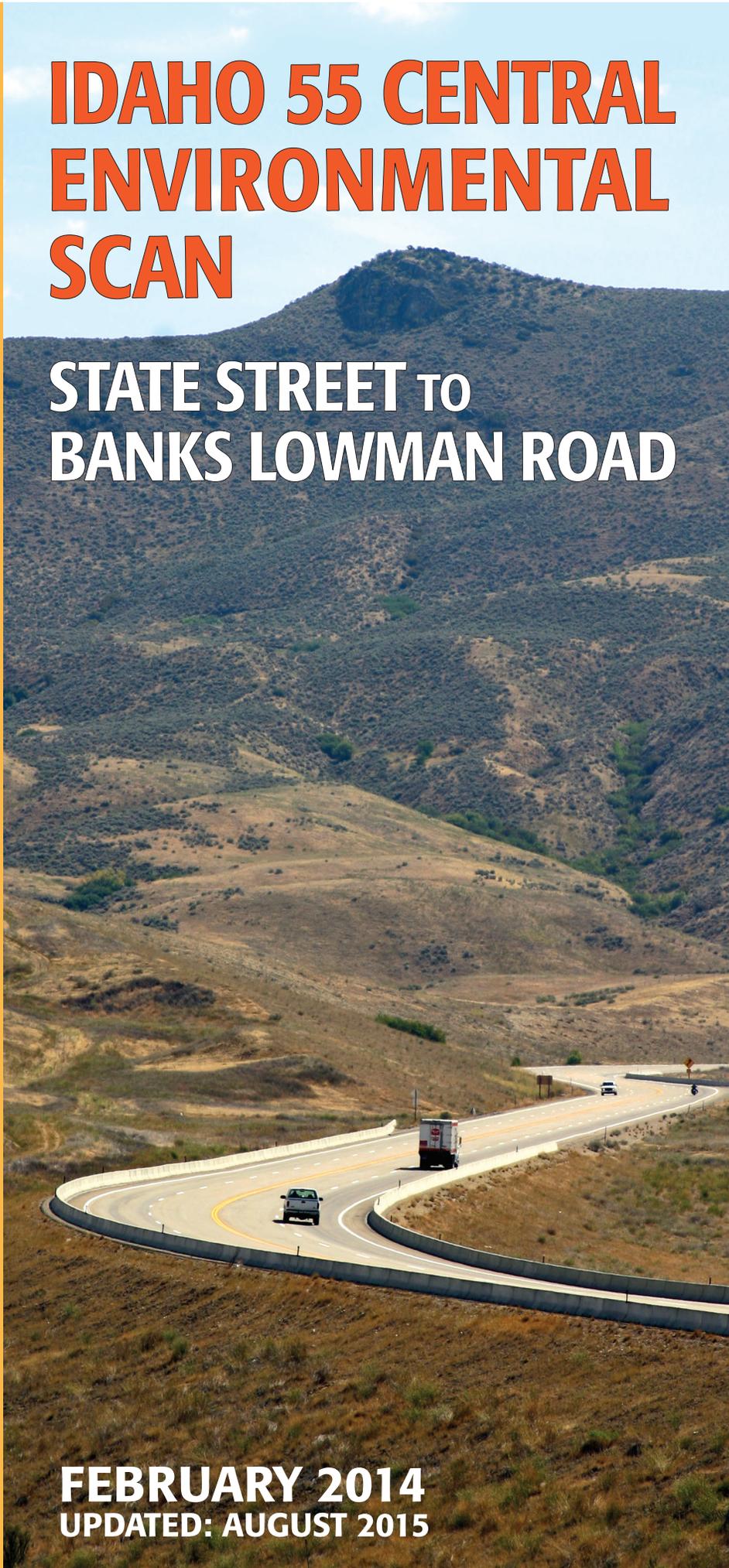


	Project No. A009(967), Key No. 09967			
	Date February 2014	Figure Title Aviation Facilities Identified in the Idaho 55 Central Corridor	Figure 10-1	



IDAHO 55 CENTRAL ENVIRONMENTAL SCAN

STATE STREET TO BANKS LOWMAN ROAD



For more information about the Idaho 55 Corridor Study, visit itd.idaho.gov and select *Projects, Southwest Idaho* and *Idaho 55 Corridor Study*, or contact:

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FEBRUARY 2014
UPDATED: AUGUST 2015

APPENDIX C: Idaho 55 Central Corridor Plan Public Involvement



SUMMARY
Boise County Workshops
Idaho 55 Corridor Study

Horseshoe Bend
Dec. 11, 2008



Idaho Transportation Department
Prepared by RBCI

Boise County Workshops Summary

The Idaho Transportation Department (ITD) hosted two public workshops in Boise County to gather input on the Idaho 55 Corridor Study. Both workshops were held at the Horseshoe Bend School on Dec. 11, 2008.

At a Glance

<i>Attendance</i>	42 people.
<i>Comments</i>	22 comments.
<i>Stakeholder letter</i>	Sent to 36 stakeholders county-wide.
<i>Postcard distribution</i>	Mailed to 2,122 people county-wide. 2,080 by mail carrier route 42 to project database
<i>Media release</i>	Sent to local media outlets on Dec. 5.
<i>Display ad</i>	Ran in Idaho World newspaper the week of Dec. 1.
<i>Web site</i>	Notice placed on Boise County and ITD Web sites.
<i>Sandwich boards</i>	Placed at several locations along the corridor.

Meeting materials and notification details are included in the *Idaho 55 Corridor Study Summary of Public Workshops binder*. The binder is on file at ITD District 3.

Boise County Summary of Comments

ITD asked the following questions at the Boise County workshops in Horseshoe Bend:

1. What highway improvements are needed on Idaho 55? Please be specific with improvements and locations.
2. What is the most important improvement needed?
3. What transportation improvements are needed to accommodate foothill developments adjacent to Idaho 55?
4. Other comments: Have we missed anything?

This summary represents the main themes and opinions expressed by the public. It is not intended to be statistically reliable or represent a popular vote. A verbatim transcription of comments is on file at ITD District 3.

At a Glance

Workshop participants identified the following overall needs and improvements. Specific locations are included in the detailed summary on the next page.

- Add turn lanes or passing lanes, especially at the Gardena Bridge.
- Address safety issues, primarily sight distance on curves.
- Pursue alternate route/bypass.
- Enforce speeds; speeds are not observed.

Regarding foothills developments adjacent to Idaho 55, workshop participants had the following overall comments:

- Developers should pay for improvements to Idaho 55.
- Improve and widen Idaho 55 from Avimor to Beacon Light.
- No traffic lights, especially at Avimor; put other projects first.
- Build overpasses, acceleration/deceleration lanes and other improvements around developments.

Summary of Comments: Horseshoe Bend

Twenty-two (22) people completed comment sheets at the Boise County workshops in Horseshoe Bend or returned comments by e-mail. The following summary represents often-repeated themes. Many people identified more than one suggestion or location in their comments. In these cases, all locations have been included in the summary.

1. Improvements

What highway improvements are needed on Idaho 55?

Twenty-one (21) people responded to this question. The following improvements were repeated most often. Locations are identified where applicable.

- **Add turn lanes or passing lanes.**

<i>Locations:</i> North of HSB: Gardena Bridge	(11)
North of HSB: General	(3)
North of HSB: Banks Lowman Road	(2)
North of HSB: Porter Creek Road	(2)
Horseshoe Bend: Cascade Raft	(3)
Horseshoe Bend: Weigh station	(2)
Horseshoe Bend: General	(2)
Horseshoe Bend: Coopers Bear Town	(2)
Horseshoe Bend: Mill Pond access	(1)
South of HSB: Horseshoe Vue Ranch	(2)
South of HSB: General	(1)
South of HSB: Golf course/Brookside	(1)

- **Address safety issues.**

<i>Locations:</i> Banks Lowman Road (sight distance)	(3)
Gardena Bridge (sight distance)	(2)
Hill Creek Road (sight distance; create no-passing zone)	(2)
Horseshoe Bend Bridge (replace, add sidewalks)	(3)
Porter Creek Road (sight distance)	(1)
Harris Creek Road (unsafe access)	(1)
General (shoulder widening)	(1)

- **Pursue alternate route/bypass.**

Horseshoe Bend (better way through town)	(2)
I-84 to McCall	(1)
Indian Valley bypass	(1)
West side of Horseshoe Bend – Idaho 52	(1)
Banks/Lowman Road area	(1)

Smiths Ferry to Round Valley (1)

▪ **Enforce speeds; speeds not observed.**

General (2)

Gardena Bridge (1)

Segment 6 of map – south of HSB (1)
(need transition from 60 to 35 mph)

2. Top priorities

What is the most important improvement needed?

Respondents did not consistently identify a single top priority. Many identified more than one top priority.

The following list was compiled from the 15 people who identified one top priority.

- Build turn lanes at Gardena Bridge. (5)
- Repair/widen bridge south of Horseshoe Bend. (2)
- Improve sight distance at curves (i.e., Gardena). (1)
- Need turn lanes at Horseshoe Vue Road and Porter Creek. (1)
- Need turn lanes at weigh station. (1)
- No-passing zone at Hill Creek Road. (1)
- Accommodate truck. (1)
- Require developers pay for improvements. (1)
- Need an alternate route from I-84 to McCall. (1)

Others identified multiple priorities. These are reflected in the answers to Question 1.

3. Foothill developments

What transportation improvements are needed to accommodate foothill developments adjacent to Idaho 55?

Thirteen (13) wrote responses in the space for Question 3. Many more people addressed foothills development in their answers to the other questions. The following summary includes all comments related to foothills developments.

- Developers should pay for improvements to Idaho 55. (7)
- Improve and widen Idaho 55 from Avimor to Beacon Light. (5)
- No traffic lights, especially at Avimor; put other projects first. (4)
- Add acceleration/deceleration lanes or on/off ramps at developments. (3)
- ITD should work with Boise County planning and zoning; county needs data from ITD to raise developer fees. (3)
- Too many subdivisions; minimize disruptions; don't put developer projects before local projects. (3)

- Build overpasses around developments. (2)
- Developers should build frontage roads; add new corridors. (2)
- Proposed Brookside Road grade separation is bad for wildlife. (1)

4. Other comments

Other comments: Have we missed anything?

- Add signage to indicate local traffic turns on/off roadway. (1)
- Truck traffic accommodations, education and enforcement; staff weight station full time. (1)
- Multiple lanes detract from scenic beauty of corridor. (1)
- No speed patrols on Wednesday. (1)
- No improvements needed. (1)
- Coordinate crash data with emergency service providers. (1)



SUMMARY

Ada County Open House

Idaho 55 Corridor Study
North of State Street to Banks Lowman Road

Shadow Valley Golf Course
15711 Horseshoe Bend Rd.
Boise, Idaho 83714
Dec. 17, 2013



Idaho Transportation Department
Prepared by RBCI

Ada County Workshop Summary

The Idaho Transportation Department (ITD) hosted a public open house in Boise, Idaho on December 17, 2013 to gather input on the Idaho 55 Corridor Study. The purpose of the open house was to give Ada County community members the opportunity to:

- Learn about the Idaho 55 Corridor Study.
- Identify transportation needs north of State Street to Banks Lowman Road.

At a Glance

<i>Attendance</i>	70 people
<i>Comments</i>	14 comment sheets returned 2 comments returned by email
<i>Stakeholder letter</i>	Sent to 47 stakeholders county-wide
<i>Postcard distribution</i>	Mailed to 11,452 people in December 2013 by mail carrier route
<i>Media release</i>	Sent to local media outlets prior to open house
<i>Display ad</i>	Ran in the December 2013 issue of The Independent News
<i>Website</i>	Notice placed on ITD's website

Meeting materials and notification details are included in the *Idaho 55 Corridor Study Summary of Public Workshops binder*. The binder is on file at ITD District 3.

Idaho 55 Corridor Study Ada County Open House | Summary of Comments

The Ada County public open house on December 17, 2013 was intended to gather input on the Idaho 55 Corridor Study. Seventy (70) people attended the open house and 16 people completed comment sheets or returned comments by mail/email. ITD asked participants to give input by answering the following questions:

5. What highway improvements are needed on Idaho 55?
6. What is the most important improvement needed?
7. Other comments (have we missed anything?).

This summary represents the main themes and opinions expressed by the public. It is not intended to be statistically reliable or represent a popular vote. A verbatim transcription of comments is on file at ITD District 3.

1. Improvements

What highway improvements are needed on Idaho 55?

Fourteen people responded to this question. The following improvements were repeated most often. Locations are identified where applicable.

- **Widen roadway, turning lanes and passing lanes**
Locations: Hwy 55 to Avimor
Hwy 16 to M3/Spring Valley
Smiths Ferry to Round Valley
Beacon Light Road to Avimor
Horseshoe Bend to Gardena
Near Brownlee Road (left-turn pocket and north/south approach)
Quarter mile on each side of milepost 48
Dry Creek Road onto Hwy 55
- **More slow traffic pull-outs and ingress/egress improvements**
Locations: Boise to Cascade
Recreation sites along the Payette River
- **Other improvements include:**
 - Rest area between Round Valley and Horseshoe Bend
 - Soundwall for safety and noise at Echo Creek subdivision
 - Replace railroad tracks from Round Valley to Horseshoe Bend with a one-way highway heading south and maintain current Hwy 55 as a one-way highway heading north.
 - Move the speed limit sign where it changes from 55 mph to 60 mph to a mile further north of the Avimor entrance.
 - Frontage roads will be required on both sides of SH-55 north of Beacon Light Road to provide access to existing homes, subdivisions and businesses.

2. Top priority

What is the most important improvement needed?

Nine people identified the following priorities as the most needed improvements.

- Long passing lanes near Banks (southbound and northbound)
- Wide pull-out lanes
- A four-lane city bypass at the town of Horseshoe Bend
- Widen lanes between Round Valley and Smiths Ferry
- Stop light at Banks to address congestion
- Left-turn lanes
- More signs for air brakes
- Gopher control
- Turning lane in middle of Hwy 55 for approximately ¼ mile on each side of milepost 48
- Rest area
- Funding
- Create a divided highway between Horseshoe Bend and Round Valley
- Eliminate passing lane at curve near milepost 69.5
- Type III access control

3. Other comments

Have we missed anything?

Responses to this question varied widely. Comments included:

- Repave south of Banks.
- Focus on improving Highway 55 as opposed to a new route from Emmett through Indian Valley.
- Super presentation and overview of information! We learned a lot!
- There is some indication of roads near Avimor on the display board that shows improvements for 2025. Have these roads been confirmed?
- Thank you for hosting this open house.
- The plan looks good except it's too bad there is not enough funding and resources to do these improvements sooner.
- There is a long delay in turning onto Hwy 55 during morning and evening work week traffic – this is caused by traffic coming down from Horseshoe Bend and coming up from Boise.
- Didn't see anything regarding wildlife corridors or safe crossings. For the safety of people and wildlife, there should be many of these.
- When SH-55 is widened to four lanes north of Beacon Light Road, Type III access control must be implemented in accordance with Admin Policy A-12-01.
- Please give due consideration to costs and timeframes associated with improvements to SH-55 from SH-44 to Avimor. Of specific concern are costs and timeframes associated with environmental clearances through the canyon north of milepost 50.

APPENDIX D: Idaho 55 Central Corridor Turn Lane Warrant Study

See attached appendix.

Idaho 55 Central Corridor Turn Lane Warrant Study

In the summer and fall of 2014, Idaho Transportation Department (ITD) District 3 staff counted vehicles passing through four intersections on Idaho 55 between State Street and Banks Lowman Road. The cross streets from south to north were: Summit Ridge Road, Horseshu Vue Road, Porter Creek Road and Brownlee Road. All four intersections are stop sign controlled for the local crossroad and the state highway is uncontrolled. The mile post location, 2014 Average Annual Daily Traffic (AADT) numbers, and Speed Limit on Idaho 55 for each intersection follow:

<u>Crossroad</u>	<u>Mile Post</u>	<u>2014 AADT</u>	<u>Idaho 55 Speed Limit</u>
Summit Ridge Road	57.179	100	60 mph
Horseshu Vue Road	60.581	no data	60 mph
Porter Creek Road	67.038	270	55 mph
Brownlee Road	69.172	410	55 mph

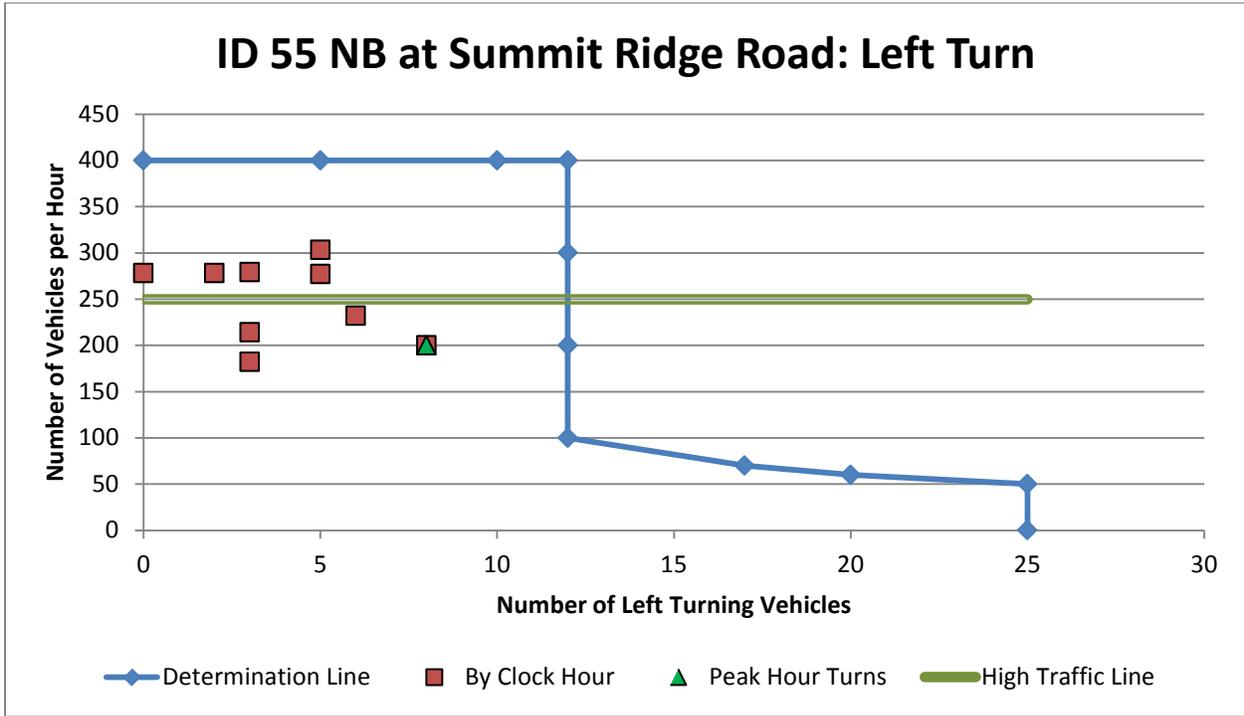
Idaho 55 has four lanes, two northbound and two southbound, at the intersections of Summit Ridge Road and Horseshu Vue Road. Idaho 55 has two lanes, one northbound and one southbound, at the intersections of Porter Creek Road and Brownlee Road. There is an existing right-turn deceleration lane on Idaho 55 northbound at Porter Creek Road. The existing paved shoulder on the west side of Idaho 55 functions as a right-turn deceleration lane for southbound traffic at Brownlee Road.

ITD Traffic Manual Section 451.00 was used to determine if turn bays were warranted at the four intersections studied. The criteria called for design hourly volume to be used. Instead, collected data was used instead of the design hourly volume because the design hourly volume is an estimate and the actual count data is a better representation. Also, Section 451.00 is intended to be used for turn lanes for new approaches; the intersections studied are existing approaches.

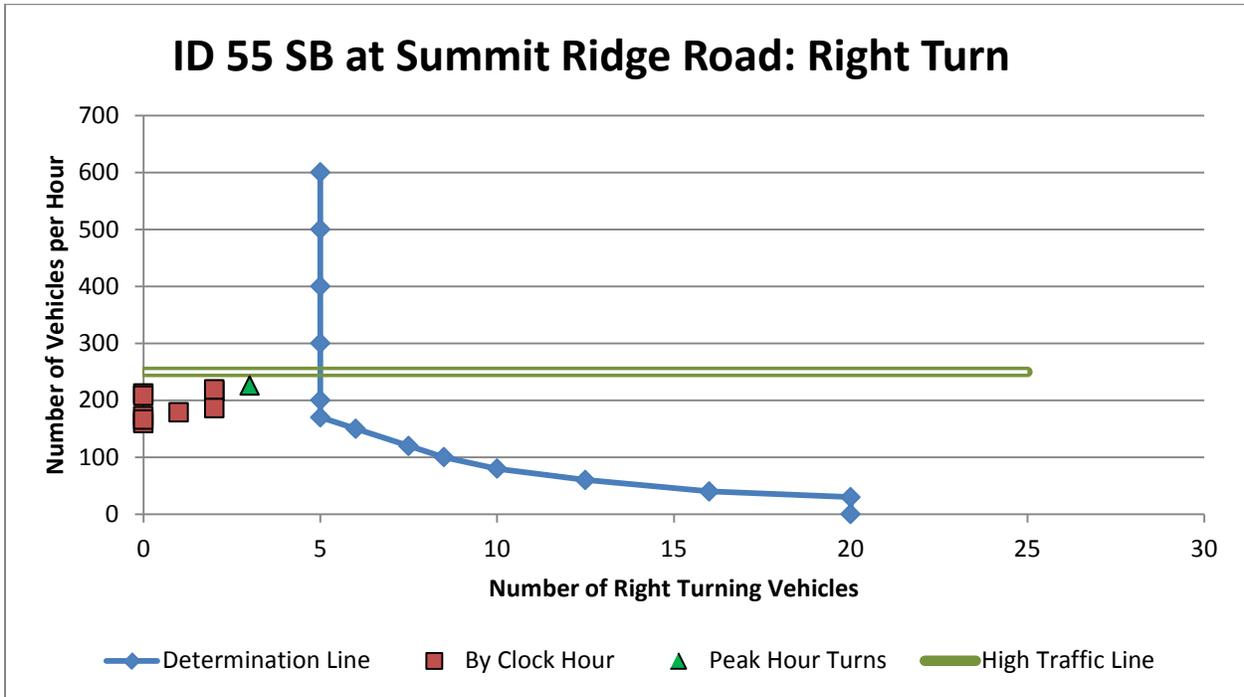
Two graphs were constructed for each intersection: one for each left turn and one for each right turn. In each graph, a line or point that crosses the determination line indicates that a turn lane is warranted. For multi-lane highway segments, only vehicles in the turn-lane are counted toward the “Number of Vehicles per Hour” on the Y-axis of the following graphs. For right turns, only vehicles in the same lane as the right turning vehicles are counted. For left turns, all on-coming traffic from the opposite direction is counted.

Nine (9) hours of data was collected at each intersection between 10:00 AM and 7:00 PM. Data was collected on two or three different days no less than 3 days but no more than 24 days apart.

Idaho 55 and Summit Ridge Road (3-leg T-intersection, no east leg):

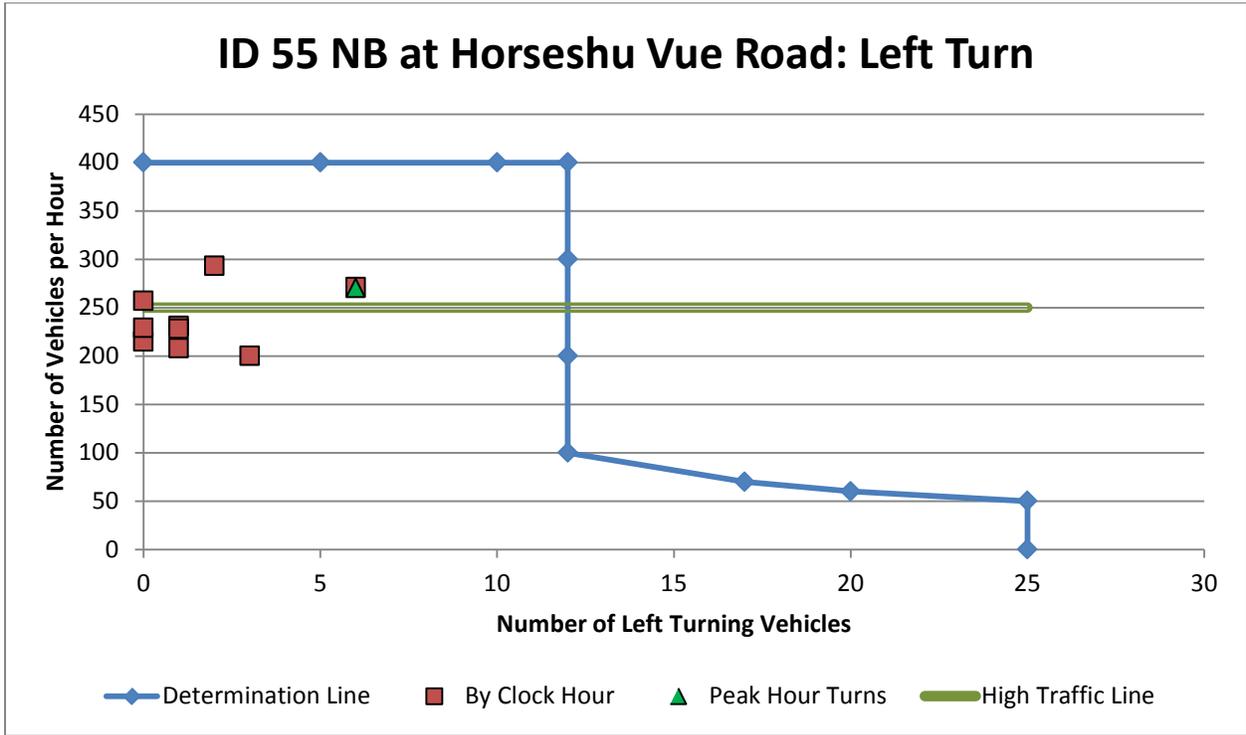


A left-turn bay is not warranted for the inside northbound travel lane.

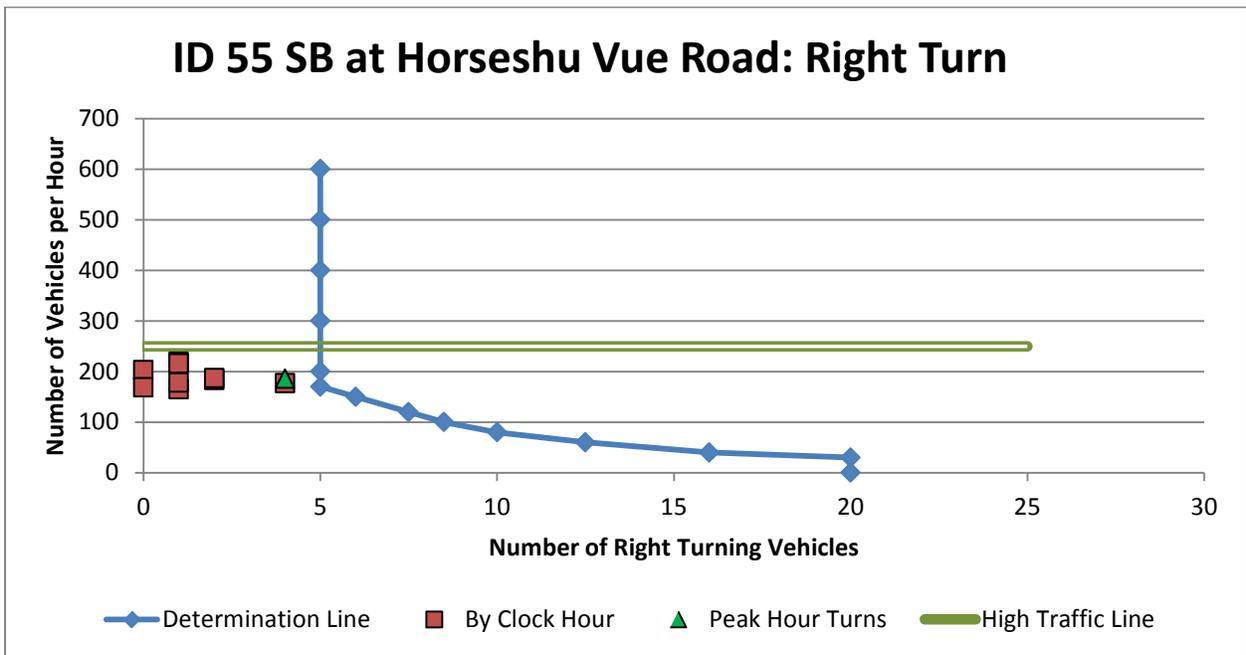


A right-turn bay is not warranted for the outside southbound travel lane.

Idaho 55 and Horseshu Vue Road (3-leg T-intersection, no east leg):

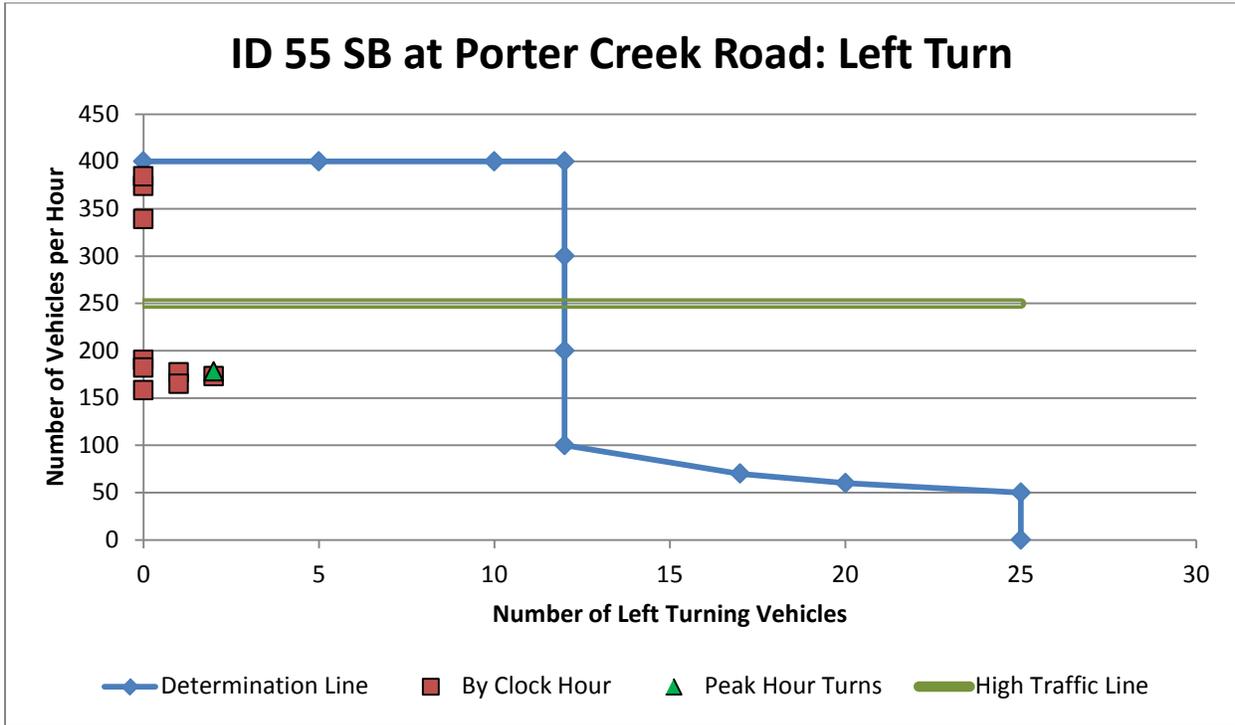


A left-turn bay is not warranted for the inside northbound travel lane.

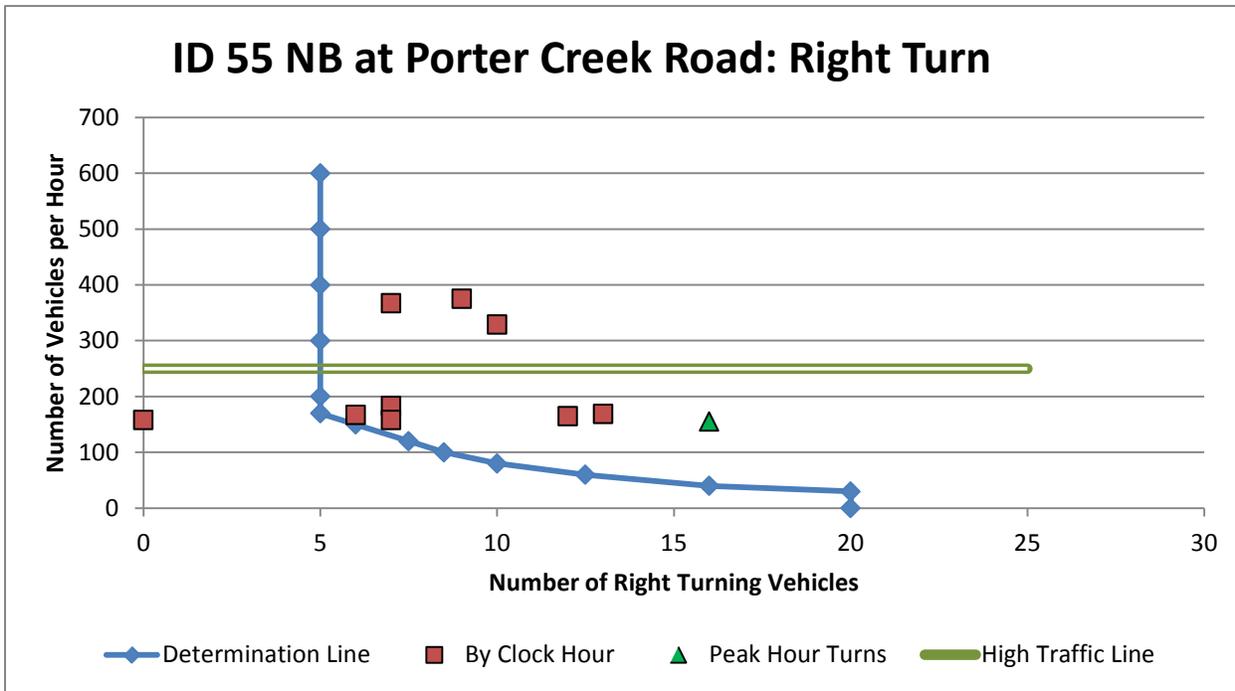


A right-turn bay is not warranted for the outside southbound travel lane.

Idaho 55 and Porter Creek Road (3-leg T-intersection, no west leg):

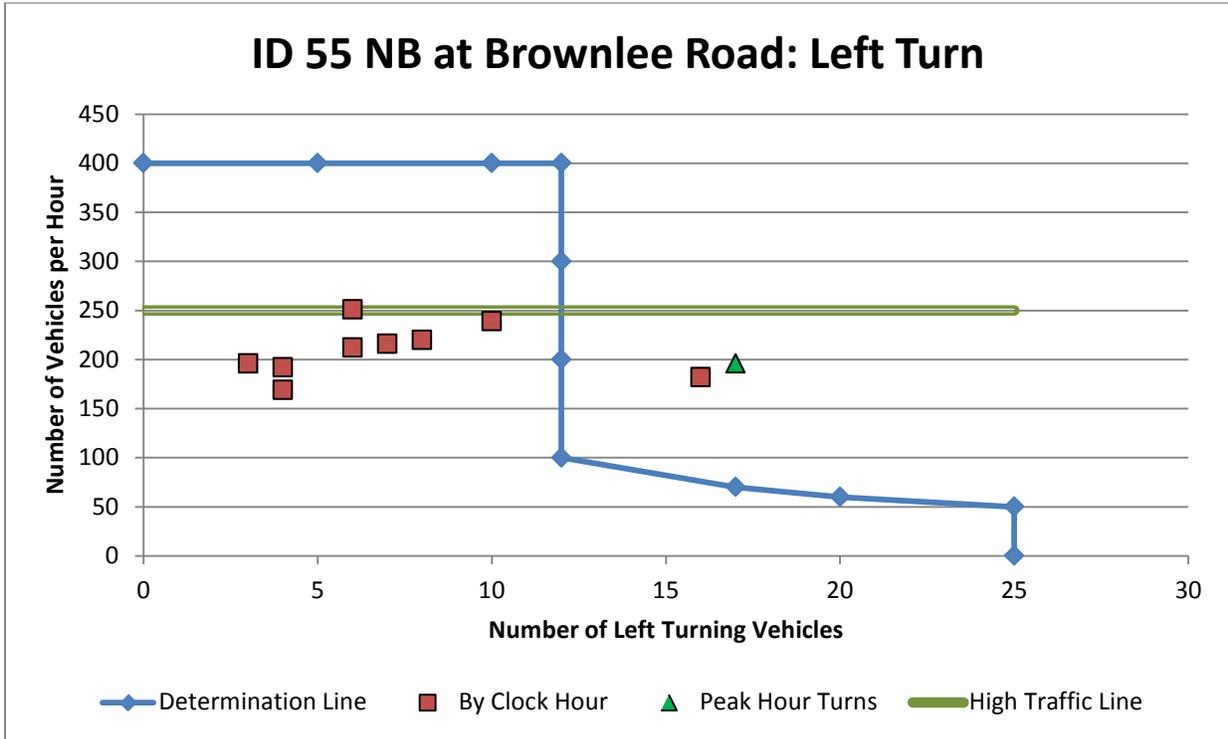


A left-turn bay is not warranted for southbound travel.

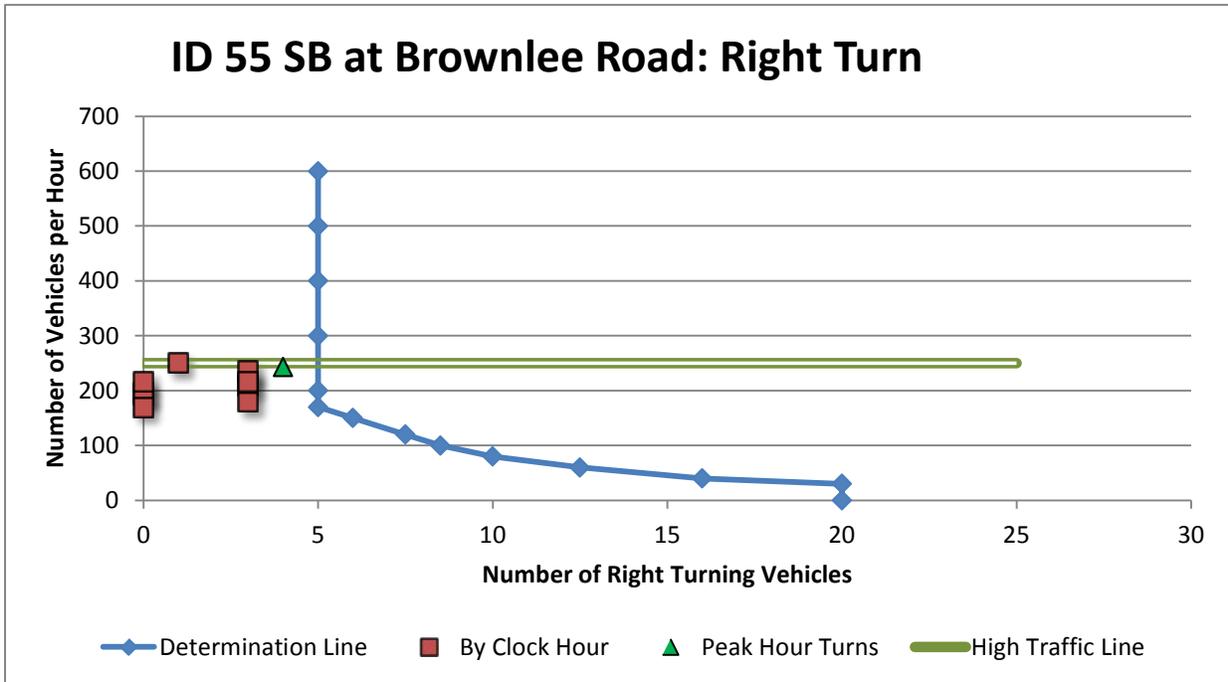


A right-turn bay is warranted for northbound travel. That right-turn bay already exists.

Idaho 55 and Brownlee Road (3-leg T-intersection, no east leg):



A left-turn lane is warranted for northbound travel.



A right-turn lane is not warranted for southbound travel. The paved shoulder functions as one.

APPENDIX E: ITD Research Paper 242

See attached appendix.



RP 242

Measures to Alleviate Congestion at Rural Intersections

*Case Study: Intersection of State Highway 55,
Banks-Lowman Road, and Banks-Grade Way*

By

Michael P. Dixon, Ahmed Abdel-Rahim,
Christopher J. Bacon, and Angel Gonzalez

Prepared for

Idaho Transportation Department
Research Program, Contracting Services
Division of Engineering Services

<http://itd.idaho.gov/highways/research/>

February 2015

RESEARCH REPORT

IDAHO TRANSPORTATION DEPARTMENT

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1. Report No. FHWA-ID-15-242	2. Government Accession No.	3. Recipient's Catalog No.	
4. Title and Subtitle Measures to Alleviate Congestion at Rural Intersections - Case Study: Intersection of State Highway 55, Banks-Lowman Road, and Banks-Grade Way		5. Report Date February 2015	
		6. Performing Organization Code	
7. Authors Ahmed Abdel-Rahim, Michael P. Dixon, Christopher J. Bacon, and Angel Gonzalez		8. Performing Organization Report No. NIATT-N14-12	
9. Performing Organization Name and Address National Institute for Advanced Transportation Technology (NIATT) University of Idaho 875 Perimeter Dr. MS 0901 Moscow, ID 83844-0901		10. Work Unit No. (TRAIS)	
		11. Contract or Grant No. RP 242	
12. Sponsoring Agency Name and Address Idaho Transportation Department Division of Engineering Services, Contracting Services, Research Program PO Box 7129 Boise, ID 83707-7129		13. Type of Report and Period Covered Final or Interim Report 01/06/2014 – 09/31/2014	
		14. Sponsoring Agency Code	
15. Supplementary Notes Project performed in cooperation with the Idaho Transportation Department and the Federal Highway Administration.			
16. Abstract Many rural highways experience a surge in traffic flow levels on certain "high-travel" days during national holidays. Due to the platooned nature of the high volume traffic on the main highway, vehicles on the minor approach attempting to turn to the major highway are subjected to excessive delays. Our research focuses on alternative intersection treatments to alleviate congestion at rural intersections during increased traffic volume on high-travel days. Specifically, the case study we investigated is the intersection of State Highway 55 (SH55), Banks-Lowman Road, and Banks-Grade Way. The high hourly traffic volume on SH55 during Memorial Day, Independence Day, and other summer weekends causes excessive delay for vehicles on the Banks-Lowman Road. Traffic flow trends for the intersection were obtained from data collected from several Automatic Traffic Recorders (ATR) continuously monitoring traffic near the intersection. In addition, field data was collected at the intersection during the 2014 Memorial Day and Independence Day weekends. The results of our study showed that signalization of the intersection along with some geometry alternation are the recommended treatments to alleviate the congestion and provide safe, efficient movement for both vehicular and pedestrian traffic at this intersection.			
17. Key Words Alleviate congestion, Banks-Lowman Road, State Highway 55, Signalized Intersection, Roundabout, Left-turn congestion		18. Distribution Statement Copies available online at http://itd.idaho.gov/highways/research/	
19. Security Classification (of this report) Unclassified	20. Security Classification (of this page) Unclassified	21. No. of Pages 44 pages (includes Appendices)	22. Price None

FHWA Form F 1700.7

METRIC (SI*) CONVERSION FACTORS

APPROXIMATE CONVERSIONS TO SI UNITS					APPROXIMATE CONVERSIONS FROM SI UNITS				
Symbol	When You Know	Multiply By	To Find	Symbol	Symbol	When You Know	Multiply By	To Find	Symbol
<u>LENGTH</u>					<u>LENGTH</u>				
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yd	yards	0.914	m	m	meters	1.09	Yards	yd	
mi	Miles (statute)	1.61	km	km	kilometers	0.621	Miles (statute)	mi	
<u>AREA</u>					<u>AREA</u>				
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yd ²	square yards	0.836	meters squared	m ²	km ²	kilometers squared	0.39	square miles	mi ²
mi ²	square miles	2.59	kilometers squared	km ²	ha	hectares (10,000 m ²)	2.471	Acres	ac
ac	acres	0.4046	hectares	ha					
<u>MASS (weight)</u>					<u>MASS (weight)</u>				
oz	Ounces (avdp)	28.35	grams	g	g	grams	0.0353	Ounces (avdp)	oz
lb	Pounds (avdp)	0.454	kilograms	kg	kg	kilograms	2.205	Pounds (avdp)	lb
T	Short tons (2000 lb)	0.907	megagrams	mg	mg	megagrams (1000 kg)	1.103	short tons	T
<u>VOLUME</u>					<u>VOLUME</u>				
fl oz	fluid ounces (US)	29.57	milliliters	mL	mL	milliliters	0.034	fluid ounces (US)	fl oz
gal	Gallons (liq)	3.785	liters	liters	liters	liters	0.264	Gallons (liq)	gal
ft ³	cubic feet	0.0283	meters cubed	m ³	m ³	meters cubed	35.315	cubic feet	ft ³
yd ³	cubic yards	0.765	meters cubed	m ³	m ³	meters cubed	1.308	cubic yards	yd ³
Note: Volumes greater than 1000 L shall be shown in m ³									
<u>TEMPERATURE (exact)</u>					<u>TEMPERATURE (exact)</u>				
°F	Fahrenheit temperature	5/9 (°F-32)	Celsius temperature	°C	°C	Celsius temperature	9/5 °C+32	Fahrenheit temperature	°F
<u>ILLUMINATION</u>					<u>ILLUMINATION</u>				
fc	Foot-candles	10.76	lux	lx	lx	Lux	0.0929	foot-candles	fc
fl	foot-lamberts	3.426	candela/m ²	cd/cm ²	lx	cd/cm ²	0.2919	foot-lamberts	fl
<u>FORCE and PRESSURE or STRESS</u>					<u>FORCE and PRESSURE or STRESS</u>				
lbf	pound-force	4.45	newtons	N	N	newtons	0.225	pound-force	lbf
psi	pound-force per square inch	6.89	kilopascals	kPa	kPa	kilopascals	0.145	pound-force per square inch	psi

Technical Advisory Committee

Each research project has an advisory committee appointed jointly by the ITD Research Manager and ITD Project Manager. The Technical Advisory Committee (TAC) is responsible for assisting the ITD Research Manager and Project Manager in the development of acceptable research problem statements, requests for proposals, review of research proposals, and oversight of the approved research project. ITD's Research Manager appreciates the dedication of the following TAC members in guiding this research study.

Project Manager – Kevin Sablan, Idaho Transportation Department

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Marc Danley - Idaho Transportation Department

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FHWA-Idaho Advisor - Lance Johnson

Acknowledgments

Special acknowledgement is given to Dr. Michael Dixon of the University of Idaho, the original investigator and lead researcher on this project, who passed away prior to the completion of this project.

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Executive Summary

Many rural highways experience a surge in traffic flow levels on “high-travel” days during national holidays. Due to the platooned nature of the high volume traffic on the main highway, vehicles on the minor approach attempting to turn to the major highway are subjected to excessive delays. Our research focuses on alternative intersection treatments to alleviate congestion at rural intersections caused by increased traffic volume during high-travel days. The case study we investigated is the intersection of State Highway 55 (SH55), Banks-Lowman Road, and Banks-Grade Way. SH55 is a main North-South road to recreation areas from Boise. The high hourly traffic volume on SH55 during Memorial Day, Independence Day, holiday weekends, and many other summer weekends combined with high traffic volumes on the Banks-Lowman Road, causes excessive delays for vehicles on the Banks-Lowman Road.

Traffic flow trends for the intersection were obtained from data collected from several of the Automatic Traffic Recorder (ATR) continuously monitoring traffic near the intersection. In addition, field data was collected at the intersection during the 2014 Memorial Day and Independence Day (July 4th) weekends. From a trend analysis, three main sources that contribute to the excessive delay were identified as follows:

- The platooned nature of the traffic in the main highway reduces the number of gaps that are large enough to allow vehicles waiting in the minor road to turn onto the main road.
- Possible queue spillback from Horseshoe Bend, ID to the intersection is being studied.
- Conflicts arising from the one-lane bridge on the west approach in the intersection which prevents more than one movement from using the bridge at a time.

The results of our study showed that signalization of the intersection along with some geometry alterations are the recommended treatment to alleviate the congestion and provide safe and efficient movement for both vehicular and pedestrian traffic. Specifically, we recommend the following:

- An advanced warning sign “BE PREPARED TO STOP WHEN FLASHING” with the associated yellow flashing beacon should be installed in advance of the intersection on SH-55 and on the Banks-Lowman Road. This will alert drivers about the possibility of stopping at a red light at the intersection.
- This traffic signal should operate primarily in flashing mode and be activated only when traffic conditions warrant it. Specifically, signal actuation would occur when the queue on Banks-Lowman Road exceeds a certain length, when the traffic volume on SH55 reaches a set limit, or when activated by a pedestrian.
- Widening the bridge over the South Fork Payette River on SH55 and adding a lane will not only allow for future long-term development but can also fix issues with the bridge that has been identified as “Structurally Deficient” in the [Idaho 55 Central Draft Corridor Plan](#).

- Widening the bridge over the North Fork Payette River is recommended to remove the conflict created by the one-lane bridge and to allow for future expansion to the west and to improve the safety of pedestrian movement on the bridge.
- A left-turn lane should be constructed on the Banks-Lowman Road. The added turn-lane will reduce delay time for vehicles turning right at the intersection.
- To eliminate the possibility of queue spill back from Horseshoe Bend, ITD should consider reviewing the 25 mph speed limit through Horseshoe Bend.
- To manage congestion at the intersection, ITD should continue to encourage drivers to avoid the intersection during the peak summer travel periods through public service messages in different media outlets.
- ITD should continue their flagging operations practice until intersection improvements can be made.

Chapter 1

Introduction

Many rural highways experience a surge in traffic flow levels on certain “high-travel” days during national holidays. Due to the platooned nature of the high volume traffic on the main highway, vehicles on the minor approach attempting to turn to the major highway are subjected to excessive delays. Our research focuses on alternative intersection treatments to alleviate congestion at rural Intersections due to increased traffic volume during high-travel days.

Banks-SH55 Intersection’s Problem

The case study investigated is the intersection of State Highway 55 (SH55), Banks-Lowman Road, and Banks-Grade Way (hereafter, the intersection will be referred to as the “Banks-SH55 Intersection”). The high hourly traffic volume on SH55 during Memorial Day, and Independence Day combined with high traffic volumes on Banks-Lowman Road, causes excessive delay for vehicles on Banks-Lowman Road. To quote an Idaho Transportation Department (ITD) Foreman on how the holiday traffic affected the Banks-SH55 Intersection:

“Congestion at [the Banks-SH55] Intersection on summer holiday weekends forced law enforcement officers to control the traffic at the intersection and neglect other duties. The traffic backs up on SH55, all the way from [Horseshoe Bend, ID]... [and the resultant] backed up, stop and go traffic on SH55 prevented traffic on the Banks-Lowman Road from entering SH55 completely. People could sit for hours on the B/L road without moving. Engines would overheat, people needed to use a bathroom, etc. Drivers would get desperate and try to force their way into SH55 traffic, resulting in accidents and calls to law enforcement. Law enforcement would respond and try to unsnarl the mess, getting stuck at the location for hours.”⁽¹⁾

“But if the weather is good and holiday traffic is heavy, the Intersection is just a bad place to be.”⁽¹⁾

Study Area Description

Located about 41 miles north of Boise as shown in Figure 1, the SH55 Intersection is a four-legged intersection with each leg oriented roughly in the cardinal directions.⁽²⁾ The north and south legs are SH55, while the east leg is the start of Banks-Lowman Road and the west leg is a one-lane bridge across the North Fork Payette River(NFPR) to provide access to Banks-Grade Way (Figure 2).



Figure 1. SH55 Reference Map

Classification and Conflict Management Method

According to Idaho's "Statewide Transportation Systems Plan Technical Report 5: Highway System Classification," the roads are classified as follows: ⁽³⁾

1. SH55: Principle Arterial - Other (rural)
2. Banks-Lowman Road: Minor Arterial (rural)
3. Banks-Grade Way: Minor Collector (rural)

For most of the year, conflict between the four legs is controlled by a two-way stop intersection (TWSC). Stop signs control the minor east/west approach roads but are uncontrolled on the principal arterial, SH55.

The eastbound traffic, Banks-Lowman Road, approaches at 50 miles-per-hour (mph) and the westbound traffic, Banks-Grade Way, approaches at 25 mph prior to having to stop while uncontrolled SH55 has a speed limit of 55 mph. As noted by the ITD foreman, however, the current control method is insufficient during summer travel peaks: "As a result of the situation, law enforcement requested that ITD manage the traffic... ITD usually puts out a media alert, asking drivers to avoid the intersection during the high congestion periods on these weekends and that has actually helped some. [Also,] message boards are put up well in advance of the flaggers..."⁽¹⁾

Geometric Description

The intersection is also nested in some very confining geographical boundaries (see Figure 2). Just southeast of the intersection, the NFPR and the South Fork Payette River (SFPR) join to create the Payette River. As a result, the Banks-Lowman Road is paralleled on the south side by the SFPR, limiting road expansion to the south. Similarly, the SH55's south leg of the T-intersection has to cross the SFPR. Expansion of the southern leg of the intersection would require replacement of the existing bridge, which would have a significant cost. As for the NFPR, it hinders any westward expansion of the SH55. Finally, a slope [slightly less than a 1.5:1 (Vertical: Horizontal)] borders the east edge of SH55 and the north edge of Banks-Lowman Road.

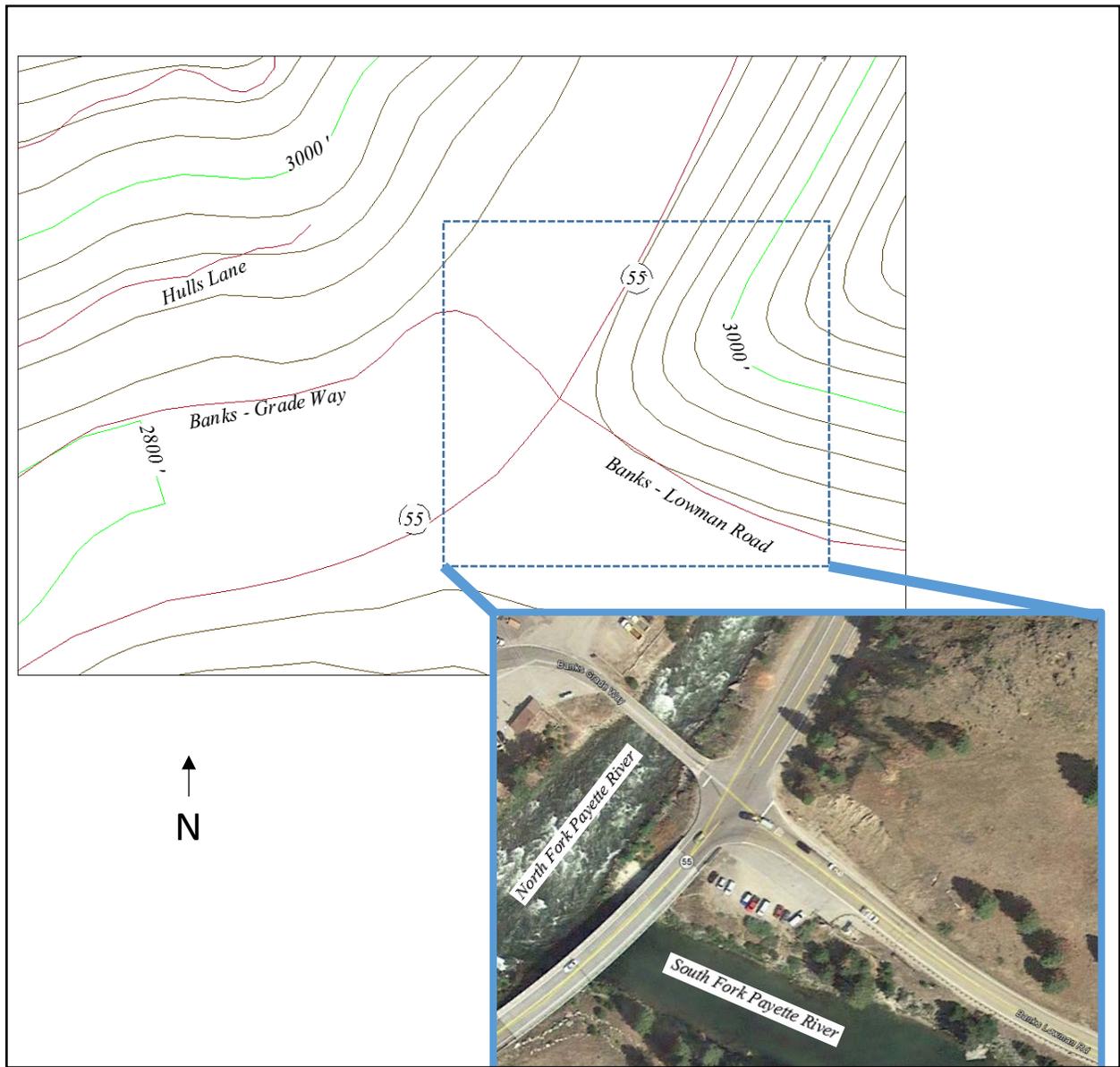


Figure 2. Simplistic Topography Map with 40 Foot Contour Intervals from the USGS Website⁽⁴⁾
Detail: Aerial Photo from Google Earth of the Banks-SH55 Intersection⁽²⁾

Chapter 2

Existing Traffic Conditions

Study Approach

Two types of data sources were used in this study:

- Previous years of counts from the Automatic Traffic Recorder (ATR) were provided by ITD.
- Field data collected specifically for this study.

Past ATR Count Data

Since late 2006, ITD has been reporting ATR data on 3 of the 4 legs in the Banks-SH55 Intersection. To facilitate that reporting, there is a permanent counter embedded in the north, south and east legs, and each counter is named and numbered as shown in Figure 3.



Figure 3. ATR Names and Numbers Used for ITD's Reporting

Data was collected from ITD's Average Daily Traffic (ADT) report for each ATR during the years of 2008 - 2013 to define what months were included in the Banks-SH55 Intersection's peak season, and then ITD ATR Monthly Hourly Traffic Volume reports for those peak months were analyzed for trends.⁽⁵⁾

Field Studies

Over the 2014 Memorial Day and Independence Day weekends, traffic movements and queue build-up were recorded with video surveillance cameras. Post-processing was used to report turning movements and volumes for all of the approaches as well as identify queue length on the Banks-Lowman Road.

Summary of Findings

Traffic Volume

The Seasonal Peak

Table 1 shows the monthly average ADT volumes reported by ITD for each ATR at the Banks-SH55 Intersection. For emphasis, the July values in red are the peak ADT volumes and the December or January values in blue are the lowest ADT values for each year. For each year, the mean of the peak and low traffic volumes was used to define when the peak season started and ended (See Figure 4).

Table 1. Average Over 2008 to 2013 of ADT Reported for ATR #182 – 184⁽⁵⁾

ATR Number/ ATR Name	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
182 / S. Banks	2,515	2,647	2,343	2,272	3,285	4,497	6,154	5,323	4,026	3,376	2,619	2,272
183 / E. Banks	981	1,046	1,099	1,349	1,849	2,428	3,086	2,720	2,096	1,721	1,350	1,043
184 / N. Banks	3,421	3,578	3,351	3,402	4,991	6,787	8,817	7,889	5,837	4,884	3,727	3,261

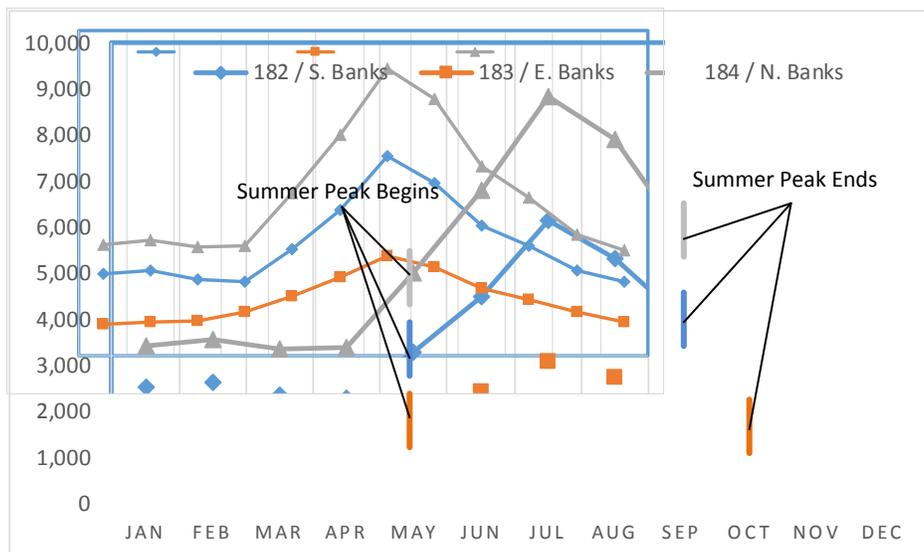


Figure 4. Graphical Representation of Table 1; Split by Peak and Off-Peak Periods

May was typically when the ADT rose above the mean value. Also, September was when the ADT typically dropped below the mean traffic volume. Therefore, the peak season was defined as the months of May through September, similar to the peak season defined in the *Idaho 55 Central Draft Corridor Plan*.⁽⁶⁾

Weekly Peaks within Each Season

As is shown in Figure 5, from the *Idaho 55 Central Draft Corridor Plan* which used data from ATR #184 (S. Banks), the average Sunday and Friday peaks are double the peaks of almost any other day of the week for SH55.⁽⁶⁾ Because of this increase, Friday and Sunday peaks were further analyzed in this plan as shown in Figure 6 and Figure 7. Figure 6 shows that the majority of the vehicles traveling Sunday on SH55 are southbound. Conversely, Figure 7 of the same plan indicates that about the same majority of vehicles are northbound on Fridays. Similar figures to those shown for ATR #184 are found in analyzing ATR #182 and #183 (noting of course that since ATR #183 measures east to west flow, Friday is predominately eastbound and Sunday is predominately westbound). Appendix A presents Friday and Sunday trend graphs for peak seasons 2011 – 2013.

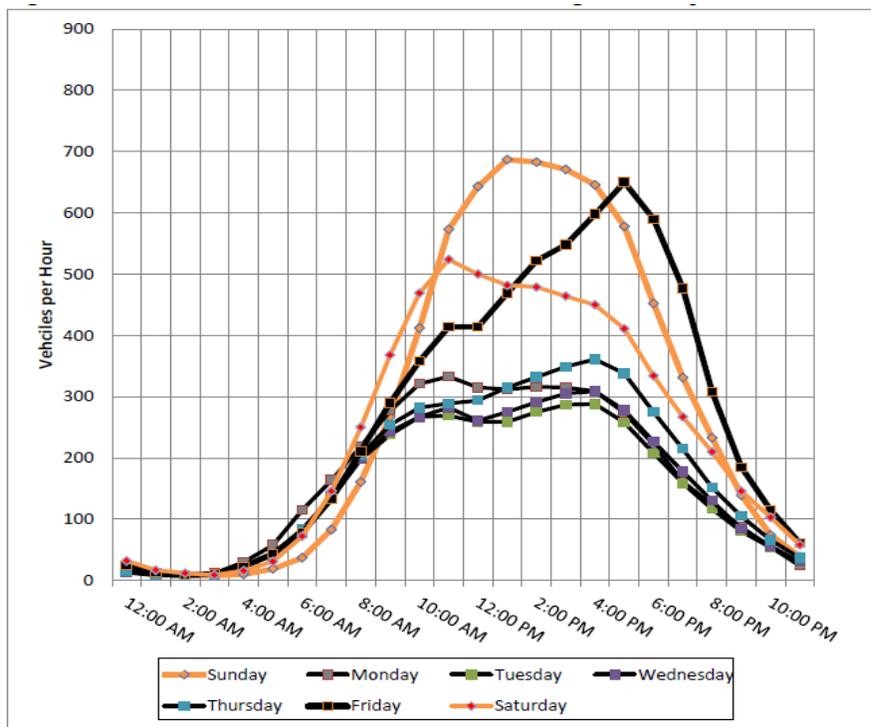


Figure 5. SH55 South of the Banks-Lowman Road Average Vehicles Per Hour for ATR #184⁽⁵⁾

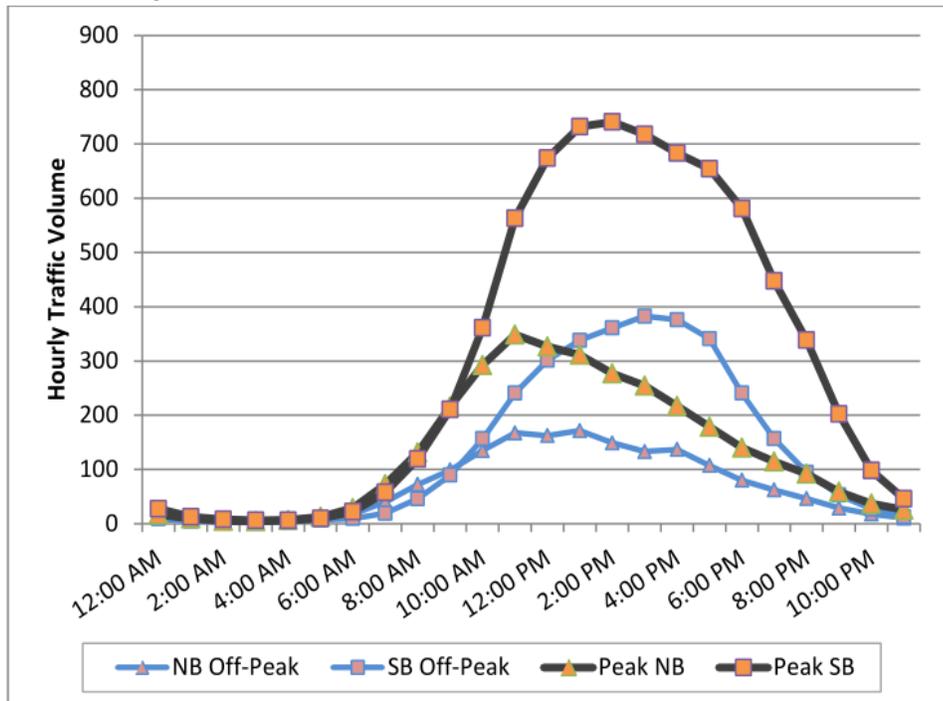


Figure 6. SH55 South of Banks-Lowman Road Average Sunday Traffic Volume by Direction by Hour⁽⁵⁾

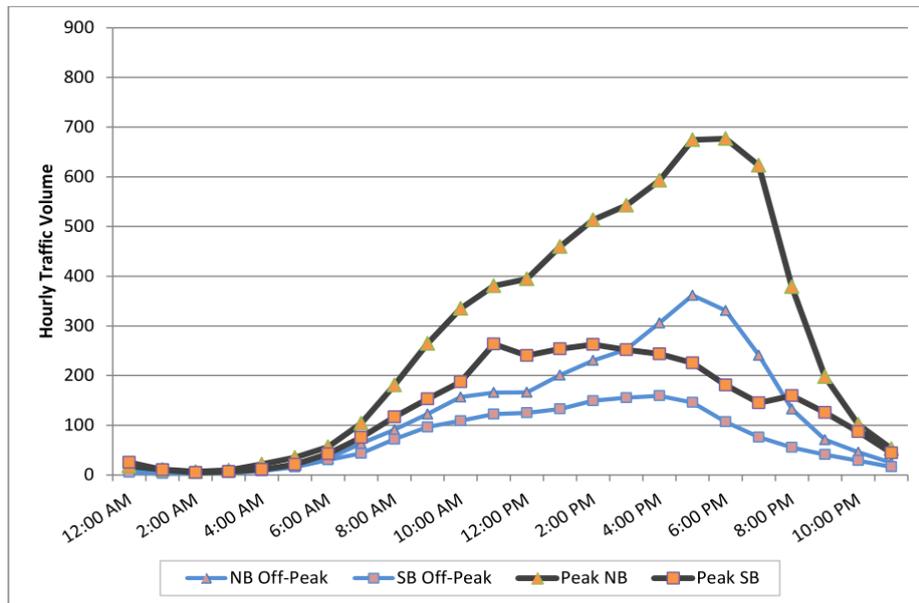


Figure 7. SH55 South of Banks-Lowman Road Average Friday Traffic Volume by Direction by Hour⁽⁵⁾

Although Sunday and Friday peaks are mentioned in the Corridor Plan, it is not the specific day of the week, but what it represents that is important.⁽⁶⁾ The typical American work week is Monday through Friday with the majority of workers having Saturday and Sunday off. Therefore, the trend for increased traffic volume occurs on Friday, the last night of the work week when a high peak in the northbound and

eastbound directions occurs. Similarly, on Sunday, the last day before work starts again, a high peak in the southbound and westbound directions occurs.

It logically follows that when holidays are on a Friday or Monday, the expected weekend peaks will not take place on Friday and Saturday. In the case of all Memorial Days and Labor Days, the last day before the work starts again is Monday and not Sunday so the southbound peak is shifted that week to Monday. As a result, our study focused on how holidays shift the expectations for when high peaks will occur during peak season.

Peak 15 Minute and Turning Movement Counts

Two field studies were performed during the 2014 peak season. The first study was conducted from May 23 to May 26, 2014 (Memorial Day Weekend) and the second took place over the Independence Day weekend (July 3 to July 6, 2014). From those studies, the northbound and southbound peak hours were identified and are listed in Table 2.

Table 2. Peak Hour Counts from Field Studies

Field Study Weekend	Primary Directions of Travel	Date of the Peak Hour	Peak Hour's Total Count for All Movements
Memorial Day Weekend 2014	Northbound	Friday, May 23 rd 5:15 - 6:15 PM	1,398 vehicles
	Southbound	Monday, May 26 th 11:45 - 12:45	1,367 vehicles
Independence Day Weekend 2014	Northbound	Thursday, July 3 rd 4:49 - 5:49 PM	1,303 vehicles
	Southbound	Sunday, July 6 th 4:19 - 5:19 PM	1,396 vehicles

The peak 15 minute volumes represent the most critical period for operations and were the focus of this study. Although the May 23rd's volume count is the highest, the slightly lower July 6th peak 15 minutes was used. Our study followed the protocols found in the *Highway Capacity Manual*, where every turning movement is placed in priority ranks with "left turn from minor road to major road" being the lowest priority.⁽⁷⁾ Furthermore, the minimum acceptable gap required in the lane crossed over during the left turn movement is smaller than that which is required in the lane the left turn movement ends.

For the Banks-SH55 Intersection, the two minor roads left turns are off of Banks-Grade Way and Banks-Lowman Road. Banks-Grade Way's traffic is insignificant compared to Banks-Lowman Road's traffic so emphasis is put on the Banks-Lowman Road's left turn movement. Since Banks-Lowman Road's left turns end in the southbound lane of SH55, the time when the traffic experiences the largest volumes of left turns from the Banks-Lowman Road and southbound SH55 through movements produces the greatest delay for the minor roads. Because May 23rd is predominately northbound but July 6th is mostly southbound, the July 6th data's peak 15 minute volumes were used and are shown below in Figure 8.

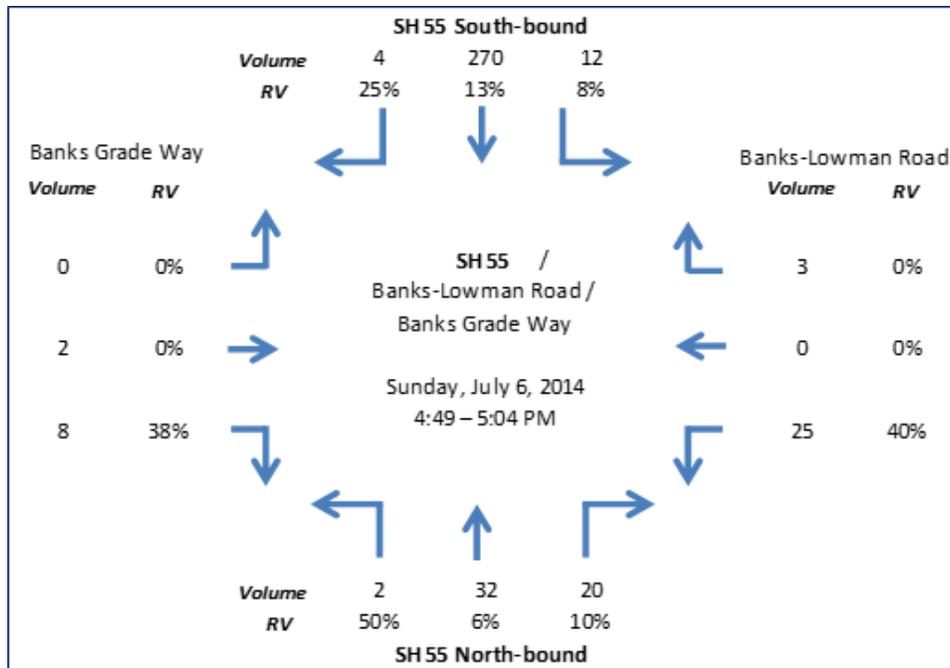


Figure 8. Independence Day Weekend’s Southbound Peak 15 Minutes

Level of Service

During the peak hour on July 6, 2014, flaggers controlled the Banks-SH55 Intersection. For this report, McTrans’ Highway Capacity Software was used to determine all of the levels of service (LOS) which meant adapting the “Streets” module in HCS 2010 to represent the flagging operation.⁽⁸⁾ To do that, timestamps on the recorded video were used to calculate the percent service time for SH55, Banks-Grade Way, and Banks-Lowman Road shown in Table 3.

Using those values and the peak 15 minute volumes from Figure 7, the LOS E was calculated (see Table 4) based on the Highway Capacity Manual’s classifications. LOS E corresponds to average delay per vehicle that ranges from 55 seconds to 80 seconds, indicating that the intersection is running at full capacity with long queues and delays.

Table 3. Breakdown of Cycle Length Inputs for Highway Capacity Manual 2010's Street Module

Approach	Percent of Time Given to the Approach by Flaggers	Seconds Allotted to Each Phase in HCS 2010 Street Module
SH55	68	82
Banks-Grade Way	9	11
Banks-Lowman Road	17	20
All-Red Time	6	7
Totals	100	120

**Table 4. Level of Service Report from Highway Capacity Manual
2010 Streets Module for Existing Flagging Operation**

Movement Group Results	EB			WB			NB			SB			
	L	T	R	L	T	R	L	T	R	L	T	R	
Approach Movement													
Assigned Movement	3	8	18	7	4	14	1	6	16	5	2	12	
Adjusted Flow Rate (v), veh/h		29			239			204			1045		
Adjusted Saturation Flow Rate (s), veh/h/ln		1374			1476			1590			1617		
Queue Service Time (g _s), s		2.6			14.9			0.0			43.6		
Cycle Queue Clearance Time (g _c), s		2.6			14.9			5.8			74.8		
Green Ratio (g/C)		0.03			0.12			0.66			0.66		
Capacity (c), veh/h		36			183			1077			1095		
Volume-to-Capacity Ratio (X)		0.821			1.307			0.190			0.954		
Available Capacity (c _a), veh/h		57			183			1077			1095		
Back of Queue (Q), veh/ln (95th percentile)		2.0			22.4			3.3			35.6		
Queue Storage Ratio (RQ) (95th percentile)		0.00			0.00			0.00			0.00		
Uniform Delay (d ₁), s/veh		58.2			52.6			8.0			19.6		
Incremental Delay (d ₂), s/veh		19.3			171.8			0.4			18.1		
Initial Queue Delay (d ₃), s/veh		0.0			0.0			0.0			0.0		
Control Delay (d), s/veh		77.5			224.3			8.4			37.8		
Level of Service (LOS)		E			F			A			D		
Approach Delay, s/veh / LOS	77.5	E		224.3	F		8.4	A		37.8	D		
Intersection Delay, s/veh / LOS		64.0						E					

In addition to computing the LOS for the existing flagging operation, the LOS for if the flagging operation didn't exist was also calculated using HCS 2010's TWSC module and shown in Table 5.

**Table 5. Level of Service Report from HCS 2010 TWSC Module
For the Existing Operations if No Flagging Were Performed**

Delay, Queue Length, and Level of Service									
Approach	Northbound	Southbound	Westbound			Eastbound			
Movement	1	4	7	8	9	10	11	12	
Lane Configuration	LTR	LTR		LTR			LTR		
v (veh/h)	8	48		112			40		
C (m) (veh/h)	488	1328		70			192		
v/c	0.02	0.04		1.60			0.21		
95% queue length	0.05	0.11		9.62			0.76		
Control Delay (s/veh)	12.5	7.8		426.5			28.6		
LOS	B	A		F			D		
Approach Delay (s/veh)	--	--		426.5			28.6		
Approach LOS	--	--		F			D		

Congestion from Horseshoe Bend to the Banks-SH55 Intersection

Method and Results

The "floating-car" method was used on July 6, 2014 (the peak day of the 2014 Peak Season if things followed previous year's trends) to track and evaluate the southbound traffic shockwave that some

assume originated and propagates northerly from the point where Horseshoe Bend speed limit dropped to 25 mph..⁽⁹⁾

Therefore, a manned-vehicle was positioned just upstream of Horseshoe Bend’s 35 MPH zone. The floating car reported the following observations:

- At the first monitoring location (see Figure 9) from about 9:30 AM Mountain Daylight Time until 4:45 PM and the traffic flow behavior was observed. When the shockwave’s congestion reached the monitoring location, the time was recorded on a data collection form (see Appendix B).
- At 4:45, the driver then drove north, observing traffic conditions along the way. Several times along the drive, the southbound traffic would alternate between pockets of stand-still traffic and free-flowing traffic, with the largest (and also the last) stand-still group extending from the “Before Cascade Raft” location to somewhere past the “Gravel Bank at Cottonwood Creek” Location.
- Stopping at the 9th designated location (Figure 9) to record how long it took to reach that point, the floating car then followed the congestion, recording the times the shockwave reached a location and then driving to the next designated location. However, by 5:30 PM, the shockwave stopped advancing after traveling over 10.5 miles.



Figure 9. Floating Car Method’s Designated Location Reference

Discussion

Although the shockwave standstill traffic did not reach the Banks-SH55 Intersection, the data from the floating car observations suggests that it can and supports some of the observations by the Banks-SH55 Intersection ITD foreman's as stated in the quote below:

"The traffic backs up on SH55, all the way from Horseshoe Bend, due to several factors. The Banks Café is quite busy and traffic entering and leaving their parking area slows SH55 traffic. Whitewater enthusiasts crossing the North Fork of the Payette River bridge in front of our maintenance shed contribute, as do vehicles entering and leaving the numerous turnouts along SH55 south of Banks, particularly the little beach area about a half mile south of the café. Traffic may or may not have a short run at near highway speeds between the rafting takeout at Beehive Bend and the backed up traffic from the 25 MPH speed limit and turning traffic congestion in Horseshoe Bend, but usually traffic is backed up for several miles north of town, if not all the way to Banks."⁽¹⁾

The ITD foreman assumed that it was through several factors including "vehicles entering and leaving the numerous turnouts along SH55 south of Banks, particularly the little beach area about a half mile south of the Banks Café." Applying this more generally, the data suggests that the main shockwave is primarily due to vehicles slowing down and bunching up. Since there is a reduction in the speed limit to 25 mph when entering Horseshoe Bend, that location is consistently forcing vehicles to slow down and this causes bunching. Combine that with the large platoons along SH55 the bunching-induced shockwave can propagate as long as the large platoons frequent enough. (See Figure 10) Since July 6, 2014 had lower volumes than usual for the end of Independence Day weekend (see Appendix C and Appendix D), it is assumed that the "pockets" of traffic near highway speeds seen by the floating car driver would disappear to match the ITD foreman's observations.

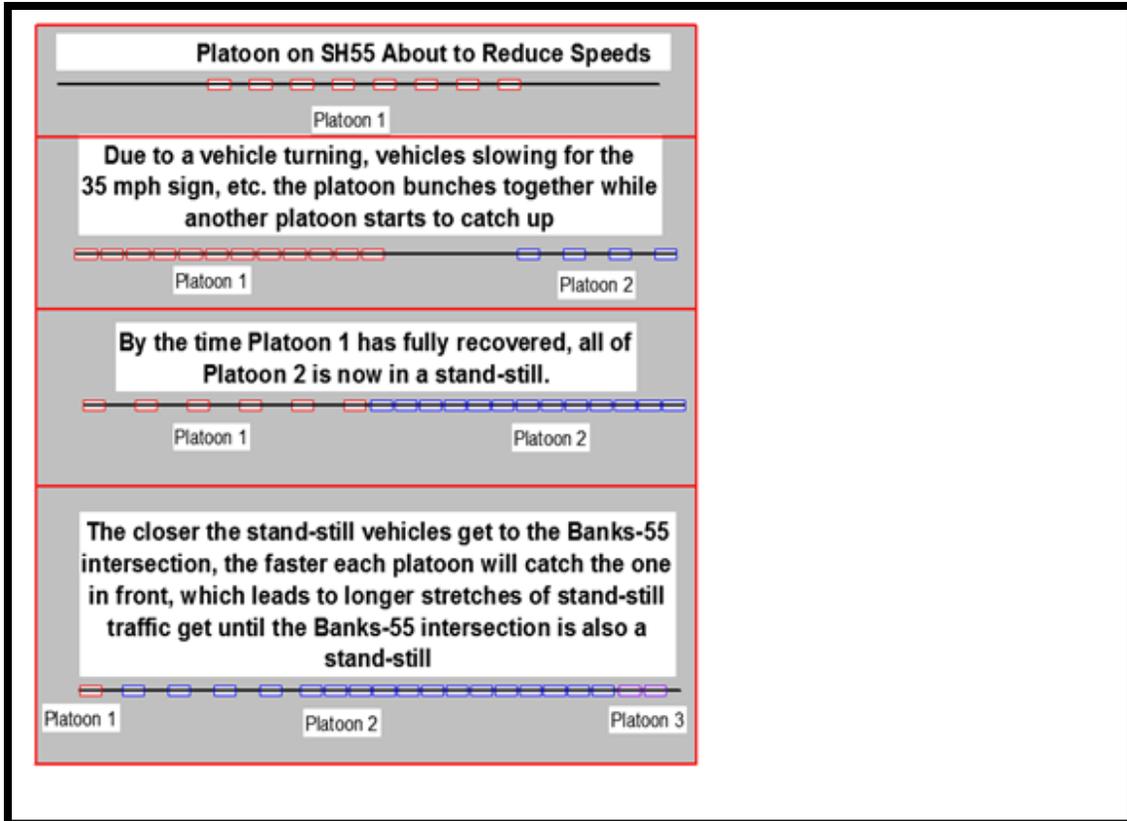


Figure 10. Graphical Representation of How a Shockwave Could Propagate the 15 Miles from Horseshoe Bend to the Banks-SH55 Intersection

Chapter 3

Conclusions and Recommendations

Three possible treatments are presented. With all of the proposed treatments, it is suggested that the expansion of the North Fork Payette River Bridge also be included. If done, it would remove the conflict on the existing one-lane bridge and would help mitigate future demands.

Signalize the Intersection and Add a Left Turn Pocket

Cost: \$250,000 - \$350,000

Pro: Signalized Intersections are one of the most well documented treatments available. So it makes sense to use this treatment to resolve traffic congestion. Since the timing of the signal forces the main line to stop at an optimized timing, there is a guaranteed time when a vehicle on Banks-Lowman Road will be served. Furthermore, the signal can be set to red and yellow flashing for most of the year (yellow serving SH55 and red for Banks-Lowman Road and Banks-Grade Way), but also have detectors on the approaches that will activate the actuated mode when the traffic volume reaches a set limit or the queue length in Banks-Lowman Road reaches a certain predefined limit. The signal can also be actuated through pedestrian push buttons. The LOS expected with after a traffic signal is installed is presented in Table 6. The conceptual intersection layout is presented in Figure 11.

Signal timings will also help pedestrians to cross SH55 safely by incorporating a pedestrian signal into the phase designs, and the transition time between phases can be decreased when compared to the existing flagging operation. Furthermore, as part of the signalization, the Banks-Grade Way bridge can be signalized so that when a pedestrian pushes a button to cross the bridge, signs turn on to prohibit turning into the bridge so as to protect the pedestrian without interfering with the signal timing. (i.e. The pedestrian pushing the button would act like a preempt signal from an on-coming train, similar to the system used in Folsom, California.)⁽¹⁰⁾

We recommend that a left turn pocket be added on the Banks-Lowman Road, so that the right turn and through movements can better perform their functions and reduce the queue length. Although right turns make up only 5 percent of the westbound vehicle movements, the lane can be achieved with relative low cost.

An advanced warning sign “BE PREPARED TO STOP WHEN FLASHING” with the associated yellow flashing beacon should be installed in advance of the intersection on SH-55 and on the Banks-Lowman Road. This will alert drivers about the possibility of stopping at red light at the intersection.

Con: Although angled crashes would decrease, the expected rear-end crashes would probably increase. Also, a formal signal warrant analysis is still needed, but that is not anticipated to be an issue.

Table 6. Level of Service Report for the Signalization Treatment

Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Assigned Movement	3	8	18	7	4	14	1	6	16	5	2	12
Adjusted Flow Rate (v), veh/h		29			239			204			1045	
Adjusted Saturation Flow Rate (s), veh/h/ln		1374			1476			1588			1617	
Queue Service Time (g_s), s		2.6			18.8			0.0			43.9	
Cycle Queue Clearance Time (g_c), s		2.6			18.8			5.8			75.0	
Green Ratio (g/C)		0.03			0.19			0.66			0.66	
Capacity (c), veh/h		36			283			1074			1093	
Volume-to-Capacity Ratio (X)		0.821			0.845			0.190			0.955	
Available Capacity (c_a), veh/h		366			443			1074			1093	
Back of Queue (Q), veh/ln (95th percentile)		1.9			11.3			3.3			35.9	
Queue Storage Ratio (RQ) (95th percentile)		0.00			0.00			0.00			0.00	
Uniform Delay (d_1), s/veh		58.2			46.8			8.1			19.8	
Incremental Delay (d_2), s/veh		15.5			5.0			0.4			18.4	
Initial Queue Delay (d_3), s/veh		0.0			0.0			0.0			0.0	
Control Delay (d), s/veh		73.7			51.8			8.4			38.2	
Level of Service (LOS)		E			D			A			D	
Approach Delay, s/veh / LOS	73.7		E	51.8		D	8.4		A	38.2		D
Intersection Delay, s/veh / LOS				37.0						D		

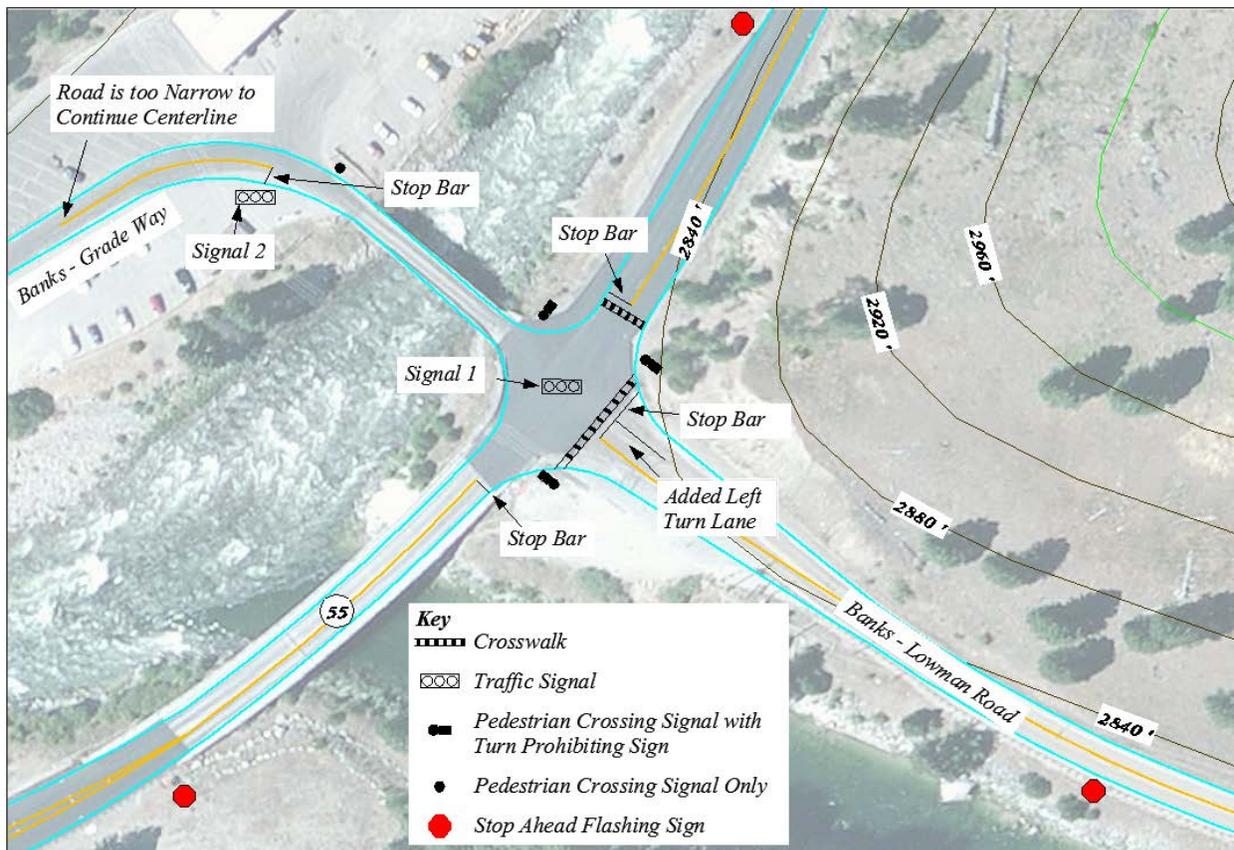


Figure 11. Conceptual Signalization Layout

Left-Turn Median Acceleration Lane

Pro: A Left-Turn Median Acceleration Lane (LTMAL) consists of a separate left turn lane on the mainline and an additional separate lane for left turns on to the mainline. Example of a left-turn median acceleration lane projected onto the Banks-SH55 intersection is presented in Figure 12. The LOS analysis for this treatment is presented in Table 7. Similar to a permitted left-turn through a median, westbound vehicles only interact with one direction at a time. The westbound-turning-southbound vehicle first crosses the northbound traffic into an added lane which allows the westbound-turning-southbound vehicle to sit protected in between the north and south bound traffic. Then, when there is a gap in the southbound traffic, the vehicle could enter the southbound lane.

Con: The greatest challenge to this treatment is that the bridge over SFPR is only a 220 feet south of the intersection. In order to avoid the cost of shifting the Banks-Lowman Road Intersection further north or widening the bridge, a truck and trailer must be able to drive across the northbound lane and get completely into the middle lane before they get too close to the bridge. That said, in the *Idaho 55 Central Draft Corridor Plan*, it identified the SFPR Bridge as being “Structurally Deficient.”⁽⁶⁾ Therefore, the cost to improve and widen the bridge may be connected to repairs to the bridge.

Table 7. Level of Service Report for the Left-Turn Median Acceleration Lane Treatment

Delay, Queue Length, and Level of Service								
Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LTR	LTR		LTR			LTR	
v (veh/h)	8	48		112			40	
C (m) (veh/h)	488	1328		120			192	
v/c	0.02	0.04		0.93			0.21	
95% queue length	0.05	0.11		6.00			0.76	
Control Delay (s/veh)	12.5	7.8		133.2			28.6	
LOS	B	A		F			D	
Approach Delay (s/veh)	--	--	133.2			28.6		
Approach LOS	--	--	F			D		

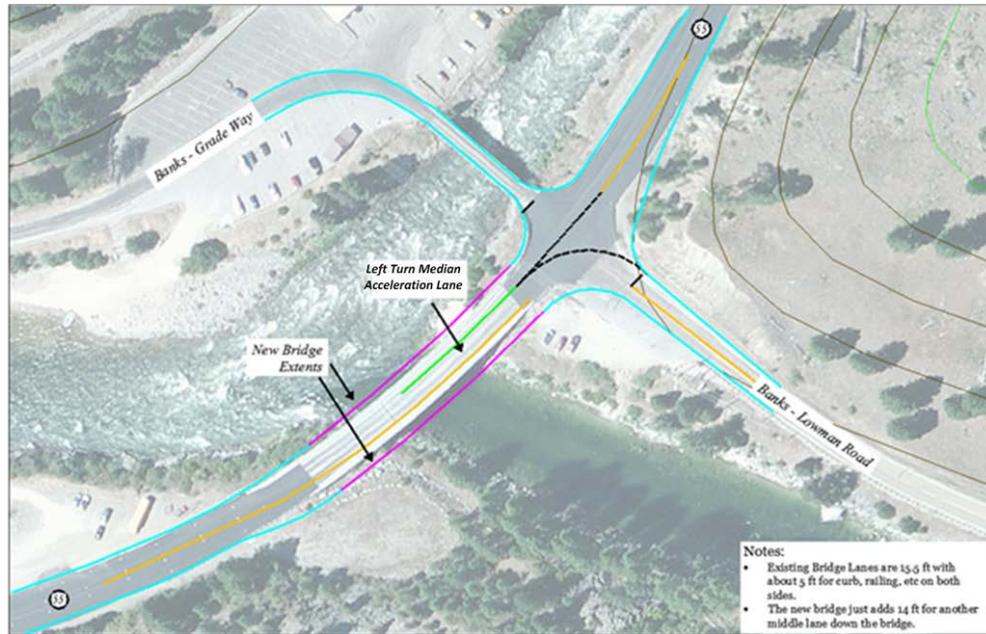


Figure 12. Example of a Left-Turn Median Acceleration Lane Projected Onto the Banks-SH55 Intersection

Roundabout

Pro: Since the Washington State Department of Transportation's roundabout on US Highway 2 (US2) and Rice Road has a similar approach speed, the applicability of that treatment is based on that case study. SH55's speed limit is 55 mph and US2's speed limit at the location is 50 mph, and their similarity suggests similar benefits such as relieved congestion, should be realized. However, the main difference between US2's implementation of the roundabout is that the goal wasn't to relieve congestion, but to reduce accidents. Congestion reduction was just an additional benefit for long-term planning, and the same could be realized at the Banks-SH55 Intersection. Using a roundabout, no approach would be subjected to more than a LOS C.⁽¹¹⁾ A preliminary design of a roundabout at the Banks-SH55 intersection is presented in Figure 13. The LOS analysis for the roundabout is presented in Table 8.

Con: Something to keep in mind when considering the roundabout is that the congestion on our case study road is limited to 3 months, but the effects from a roundabout would last year-round. To use the US2 example, where the speed limit shortly before and shortly after the roundabout is 50 mph, the major route is slowed to 40 mph prior to reaching the roundabout and then drivers are cautioned to slow to 20 mph while in the roundabout. That means that 8 to 9 months out of the year, drivers on SH55 would be unjustly forced to slow at the Banks-SH55 Intersection.

Furthermore, there would be an extensive costs associated with the roundabout option. As shown in Figure 13, not only would the bridge have to be remodeled, a significant amount of excavation would need to be done in order to accommodate the roundabout.

Table 8. Level of Service Report for the Roundabout Treatment

Delay and Level of Service												
	EB			WB			NB			SB		
	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		11.9			8.1			5.6		17.5	22.0	
Lane LOS		B			A			A		C	C	
Lane 95% Queue		0.3			1.3			0.8		5.2	7.0	
Approach Delay, s/veh	11.87			8.11			5.61			19.92		
Approach LOS, s/veh	B			A			A			C		
Intersection Delay, s/veh	15.98											
Intersection LOS	C											

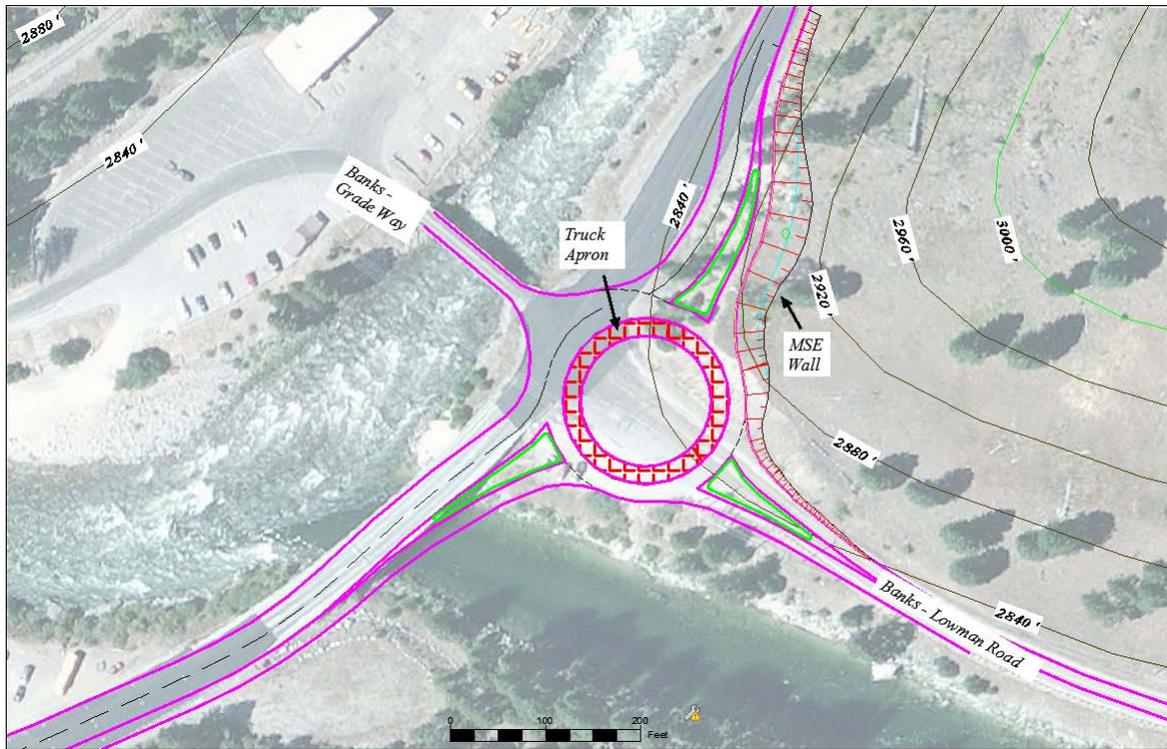


Figure 13. Preliminary Design of a Roundabout at the Banks-SH55 Intersection

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Accessed October 2014.

Appendix A

Friday and Sunday Trend Graphs For Peak Seasons 2011 – 2013

Friday Trends

Table 9. Key for Data in Figure 14, Figure 15, and Figure 16

Key for Friday Graphs						
Sunday #	2011		2012		2013	
	<i>Month</i>	<i>Day</i>	<i>Month</i>	<i>Day</i>	<i>Month</i>	<i>Day</i>
1	May	6	May	4	May	3
2	May	13	May	11	May	10
3	May	20	May	18	May	17
4	May	27	May	25	May	24
5	June	3	June	1	May	31
6	June	10	June	8	June	7
7	June	17	June	15	June	14
8	June	24	June	22	June	21
9	July	1	June	29	June	28
10	July	8	July	6	July	5
11	July	15	July	13	July	12
12	July	22	July	20	July	19
13	July	29	July	27	July	26
14	August	5	August	3	August	2
15	August	12	August	10	August	9
16	August	19	August	17	August	16
17	August	26	August	24	August	23
18	September	2	August	31	August	30
19	September	9	September	7	September	6
20	September	16	September	14	September	13
21	September	23	September	21	September	20
22	September	30	September	28	September	27

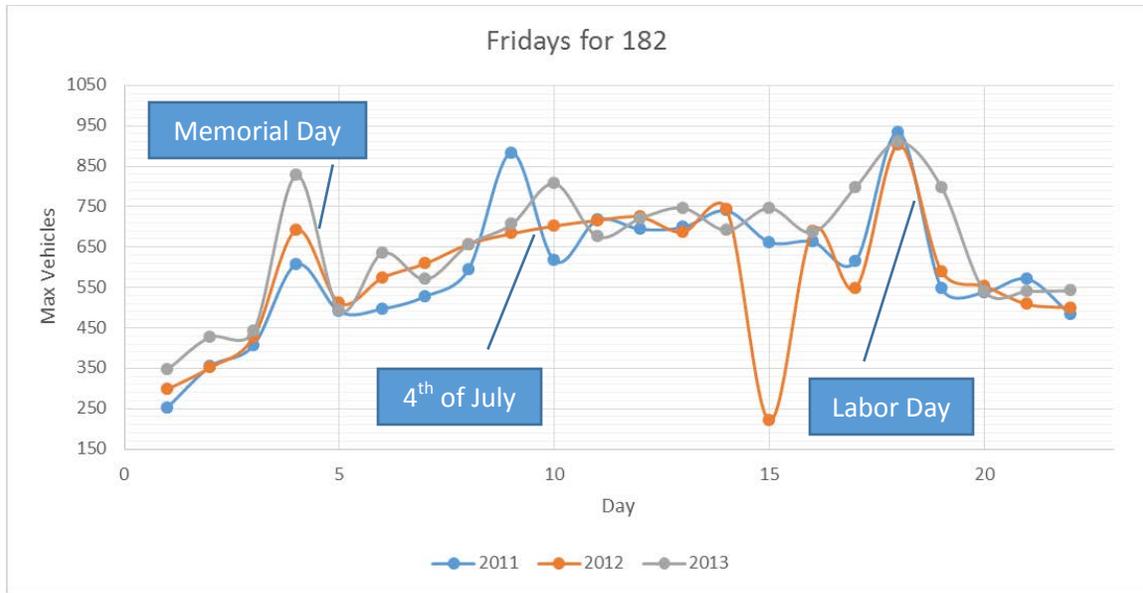


Figure 14. Fridays for ATR #182

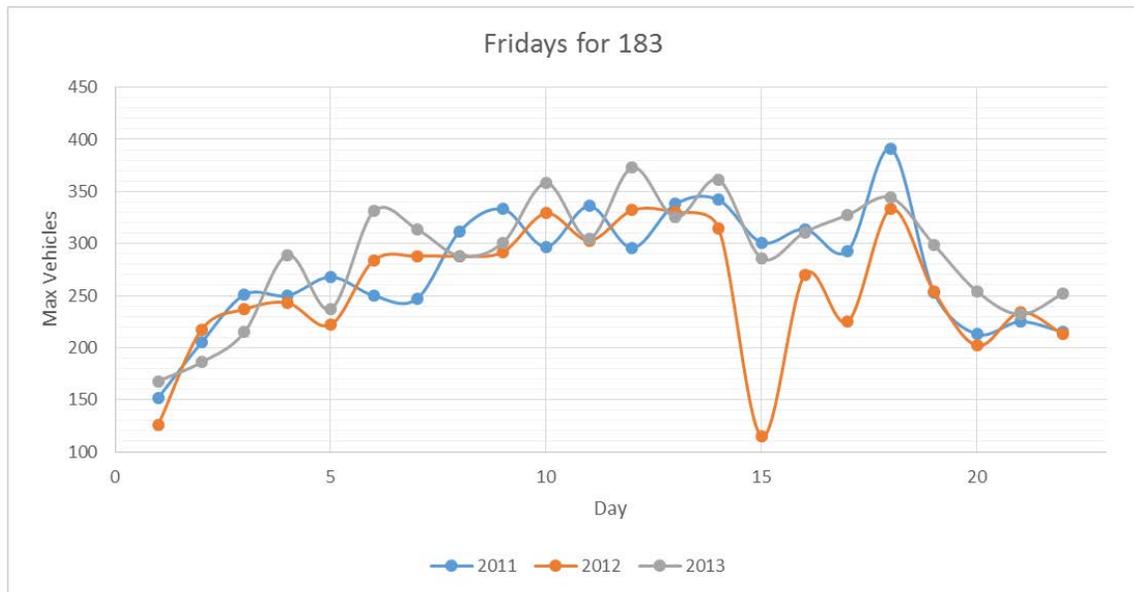


Figure 15. Fridays for ATR #183

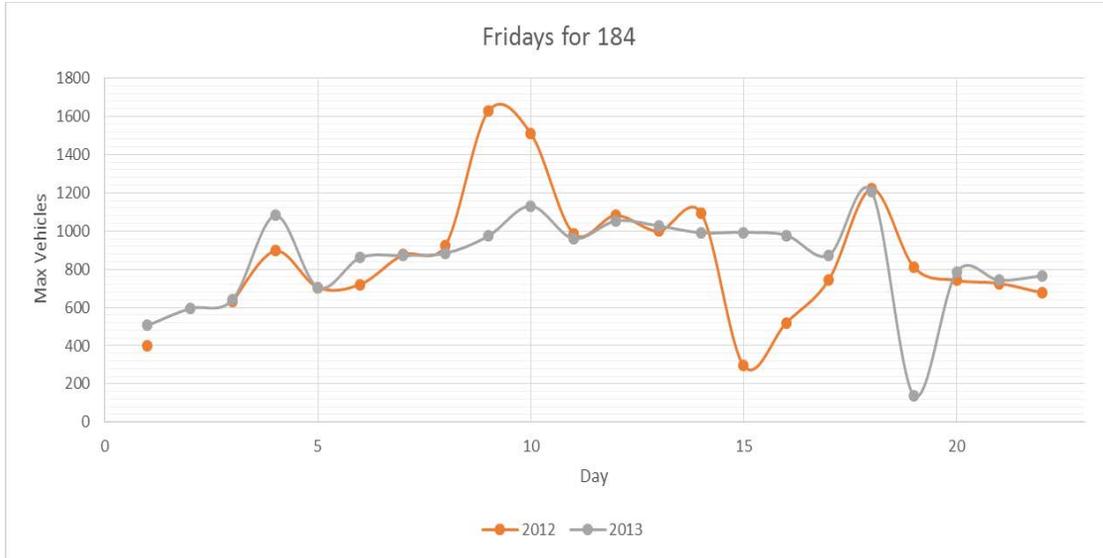


Figure 16. Fridays for ATR #184

Note: During the year 2011, ATR #184 was having problems accurately counting vehicles and was excluded from this chart (ITD assumes errors were due to construction in the area).

Sunday Trends

Table 10. Key for Data in Figure 17, Figure 18, and Figure 19

Key for Sunday Graphs						
Sunday #	2011		2012		2013	
	Month	Day	Month	Day	Month	Day
1	May	1	May	6	May	5
2	May	8	May	13	May	12
3	May	15	May	20	May	19
4	May	22	May	27	May	26
5	May	29	June	3	June	2
6	June	5	June	10	June	9
7	June	12	June	17	June	16
8	June	19	June	24	June	23
9	June	26	July	1	June	30
10	July	3	July	8	July	7
11	July	10	July	15	July	14
12	July	17	July	22	July	21
13	July	24	July	29	July	28
14	July	31	August	5	August	4
15	August	7	August	12	August	11
16	August	14	August	19	August	18
17	August	21	August	26	August	25
18	August	28	September	2	September	1
19	September	4	September	9	September	8
20	September	11	September	16	September	15
21	September	18	September	23	September	22
22	September	25	September	30	September	29

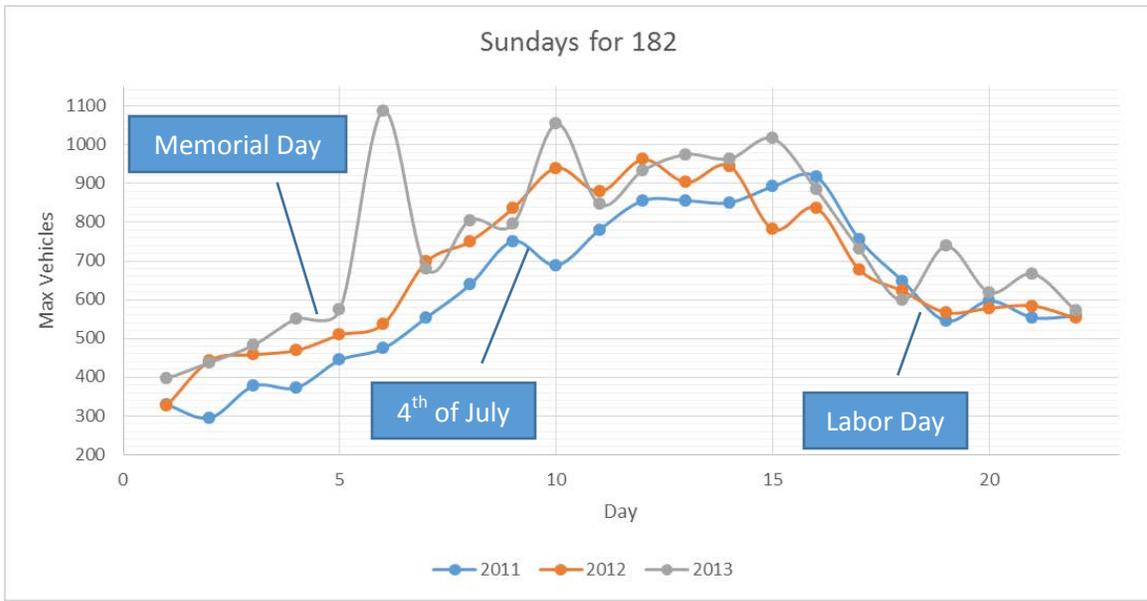


Figure 17. Sundays for ATR #182

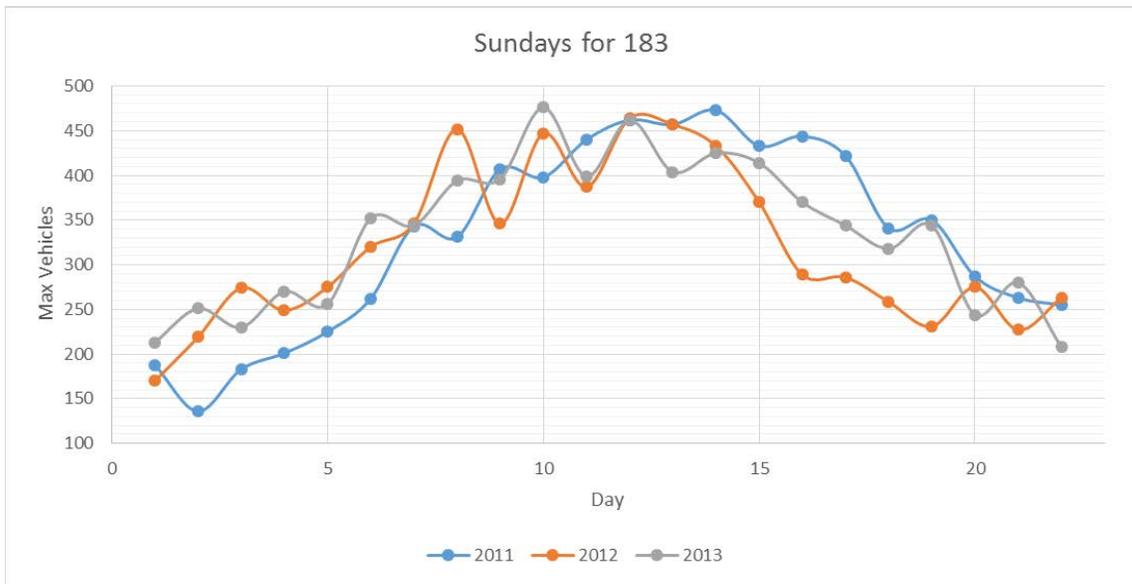


Figure 18. Sundays for ATR #183

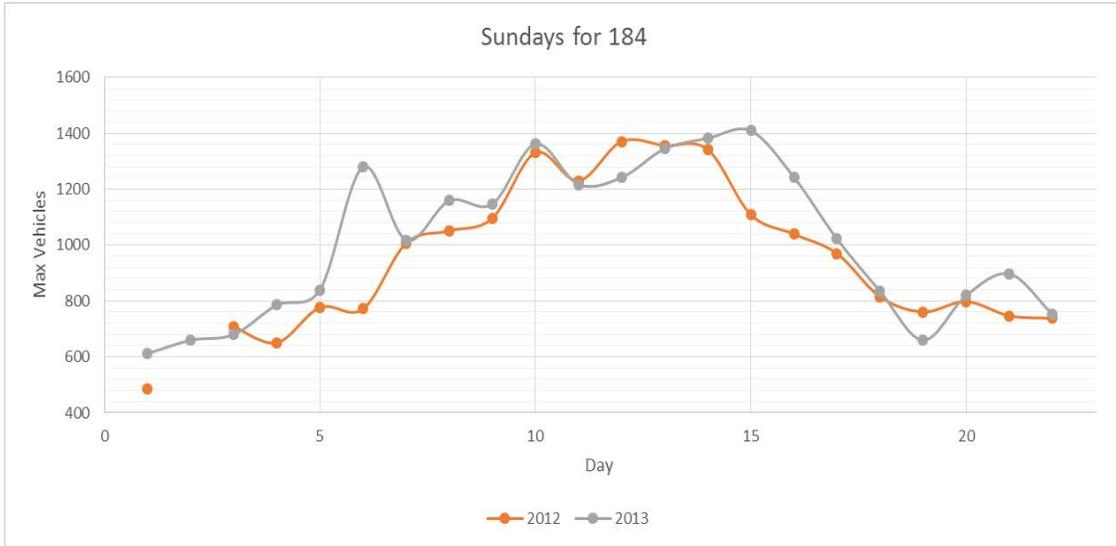


Figure 19. Sundays for ATR #184

Note: During the year 2011, ATR #184 was having problems accurately counting vehicles and was excluded from this chart (ITD assumes errors were due to construction in the area).

Appendix B

Mileage and Time Form for the Floating Car Method

Table 11. Blank Form

Floating Car Driver: _____ **Observation Date:** July 06, 2014 **Start Time:** _____

Stop #	Name/Description	Distance	Distance Traveled	Expected Travel Time		Time Traveled
				Time	Time Traveled	
0	35 mph sign	0	0.0	0	0	N/A
1	Rocky Road	0.8	0.8	1	1	
2	Near Bridge	0.4	1.2	1	2	
3	Porter Creek Road	0.9	2.1	1	3	
4	Hill Creek Road	1.2	3.3	2	5	
5	Before Cascade Raft	1.9	5.2	3	8	
6	After Cascade Raft	0.8	6.0	1	9	
7	After Beartown	0.9	6.9	2	11	
8	Gravel Bank at Cottonwood Creek	1.1	8.0	1	12	
9	Residential Pullout	1.2	9.2	1	13	
10	Off-Roadng Pullout	1.5	10.7	2	15	
11	shoulder Pullout	1.2	11.9	2	17	
12	Off-Roadng Pullout	1.1	13.0	1	18	
13	Banks	0.7	13.7	0.87	18.87	

*All distances are in units of miles and time is in units of minutes.

Table 12. Completed Form

Floating Car Driver: Christopher BaconObservation Date: July 06, 2014Start Time: 11 AM

Stop #	Name/Description	Distance	Distance Traveled	Expected Travel Time		Time Backup Reached Location
				Time	Time Traveled	
0	35 mph sign	0	0.0	0	0	Not Monitored
1	Rocky Road	0.8	0.8	1	1	14:30
2	Near Bridge	0.4	1.2	1	2	Arrived too Late
3	Porter Creek Road	0.9	2.1	1	3	Arrived too Late
4	Hill Creek Road	1.2	3.3	2	5	Arrived too Late
5	Before Cascade Raft	1.9	5.2	3	8	Arrived too Late
6	After Cascade Raft	0.8	6.0	1	9	Arrived too Late
7	After Beartown	0.9	6.9	2	11	Arrived too Late
8	Gravel Bank at Cottonwood Creek	1.1	8.0	1	12	Arrived too Late
9	Residential Pullout	1.2	9.2	1	13	17:07
10	Off-Roadng Pullout	1.5	10.7	2	15	17:21
11	shoulder Pullout	1.2	11.9	2	17	N/A
12	Off-Roadng Pullout	1.1	13.0	1	18	N/A
13	Banks	0.7	13.7	0.87	18.87	N/A

Note: All distances are in units of miles, Expected Travel Time is in units of minutes, and Time Backup Reached Location is in MDT.

Appendix C

15-Day Memorial Day Comparison: Field Values vs ATR Volumes

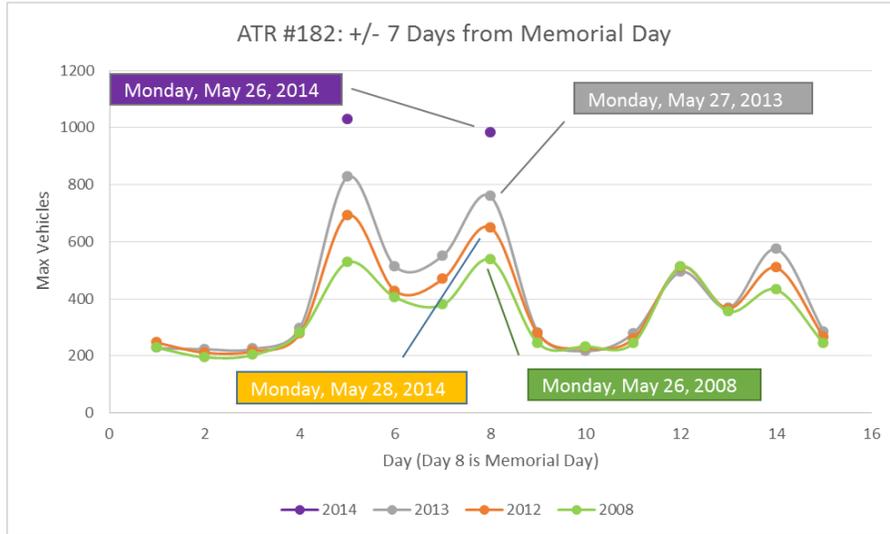


Figure 20. ATR #182's 15-Day Comparison with Field Test, Centered on Memorial Day

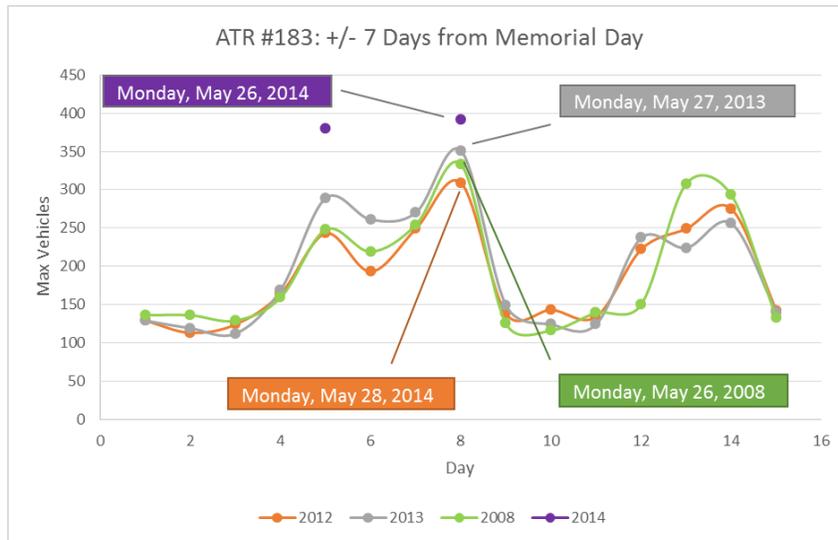


Figure 21. ATR #183's 15-Day Comparison with Field Test, Centered on Memorial Day

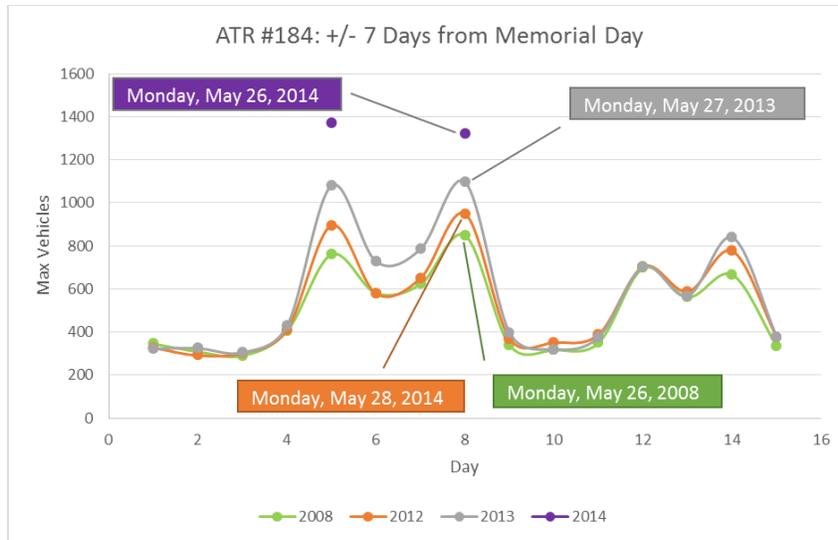


Figure 22. ATR #184's 15-Day Comparison with Field Test, Centered on Memorial Day

Appendix D 15-Day Independence Day Comparison: Field Values vs ATR Volumes

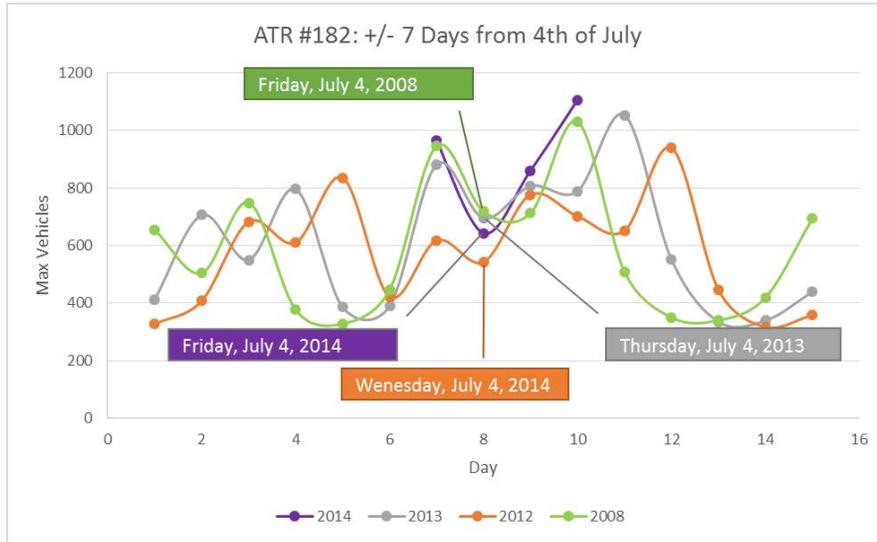


Figure 23. ATR #182's 15 Day Comparison with Field Test, Centered on Independence Day

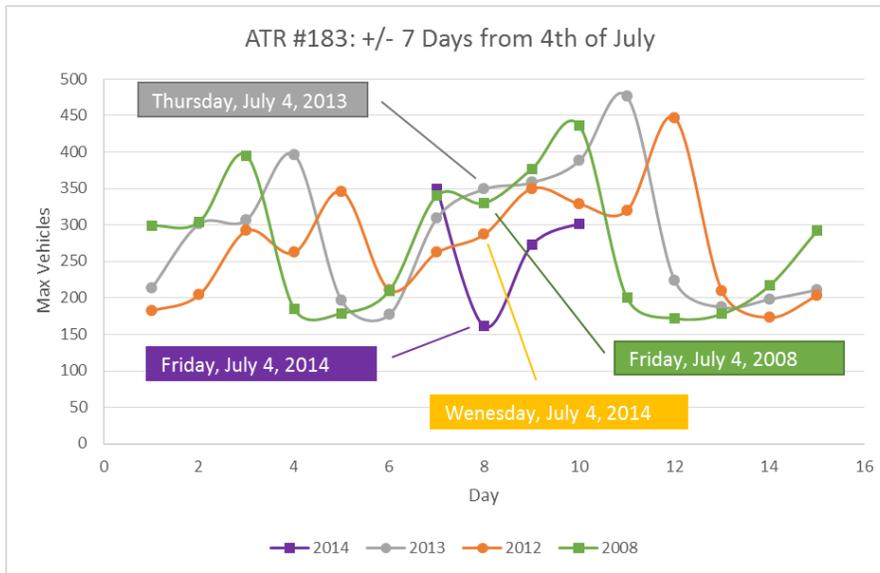


Figure 24. ATR #183's 15 Day Comparison with Field Test, Centered on Independence Day

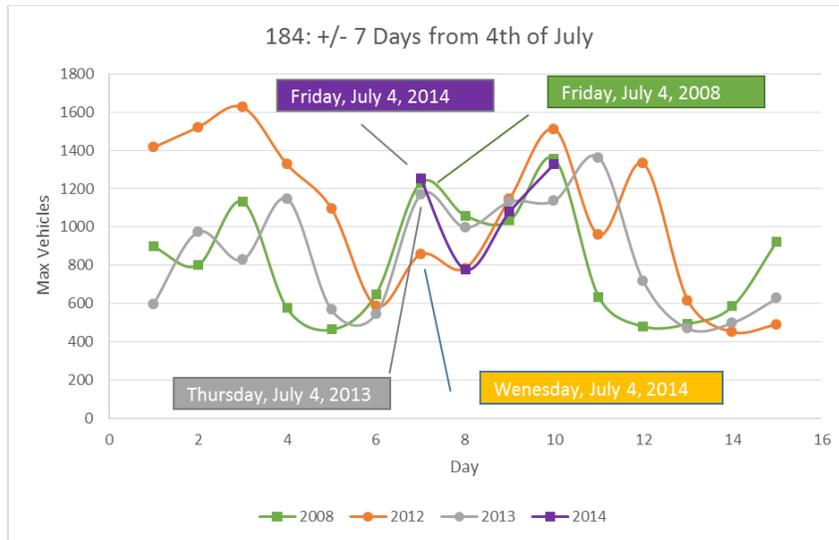


Figure 25. ATR #184's 15 Day Comparison with Field Test, Centered on Independence Day