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DAVID EVANS AND ASSOCIATES INC.

US-95 Transportation Access Plan
and Mobility Study

Kootenai MPO

Coeur d'Alene Chamber of Commerce

In Coordination With

Idaho Transportation Department
Lakes Highway District
City of Coeur d' Alene
City of Hayden
Coeur d' Alene Chamber of Commerce

January 30, 2009

Technical Memorandum

Prepared for

Kootenai Metropolitan Planning Organization

and partnering jurisdictions

For the

US-95 Access Study

January 30, 2008

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Table of Contents

Figures

TABLES

Executive Summary

In 2006, the Idaho Transportation Board (IT Board) considered closing the unsignalized median crossings along US-95 from Interstate 90 (I-90) through State Highway 53 (SH-53). Before taking action, the IT Board asked the Kootenai Metropolitan Planning Organization (KMPO) to evaluate the impacts of median closures and look for ways to improve mobility on US-95. The IT Board also asked that the evaluation take into consideration the diverse group of stakeholders with interests in the US-95 corridor.

The KMPO policy board took action on this request and formulated a plan to develop the US-95 Access Study. KMPO's vision was that the endeavor would take on a system approach recognizing that US-95 is not an island in its context. This vision necessitated the inclusion of off-system (not on the ITD transportation system) transportation infrastructure when considering the affects of median closures or other solutions arising from the study process. Furthermore, KMPO desired that all highway users be considered including both through travelers and local users. A Steering Committee comprised of multiple local jurisdictions and elected officials developed study goals that complimented the IT Board request for evaluating US-95 mobility as follows:

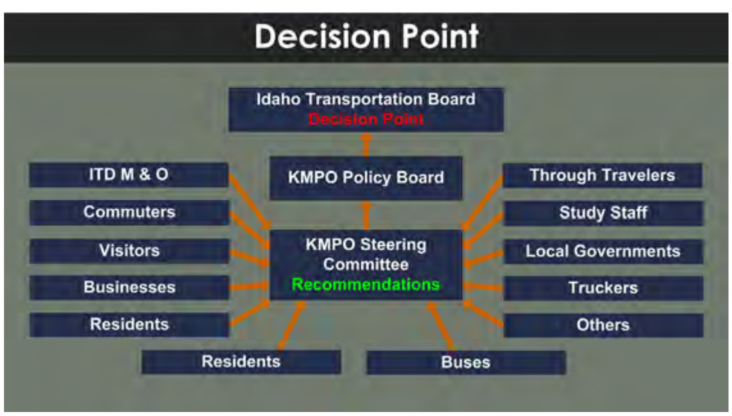
- Find practical, low cost ideas to improve US-95 operations
- Manage and balance safety and mobility on US-95 while providing essential community access to and from the highway

A partnership with the Coeur d'Alene Chamber of Commerce provided a significant opportunity for KMPO to engage the business community along the corridor with regard to perceived needs and evaluation of potential solutions. The Chamber provided guidance to KMPO and the consultant team in not only developing concepts but in the identification of key stakeholders as well.

A public outreach program was developed to engage business owners, residents and other key stakeholders during consideration of the multiple ideas that were derived as the Steering Committee proceeded with the planning process. Two public outreach meetings were held during the course of the study along with discussions with the Kootenai County Area Transportation Team (KCATT) and the KMPO Policy Board.

Ownership of Decisions

With the inclusion of such a diverse group of stakeholders and jurisdictional members, it becomes apparent that at some point, someone has to ultimately be responsible for making decisions regarding study recommendations. The graphic below illustrates the dynamic stakeholders interests involved with the study and identifies the IT Board as the ultimate *Decision Point*.



Final Improvement Strategy

In addition to answering the IT Board's question concerning median closure impacts, the evaluation process that the Steering Committee followed, based on traffic analysis, public input and steering committee involvement, identified 35 specific improvements totaling just over $6.7 million. The improvements ranged in cost from $10,000 to $518,000 as shown in the Implementation Plan (Table E-1). The final Improvement Strategy is shown in Figure E-1 (near the end of this Executive Summary).

Highlights of the overall effectiveness of the final Improvement strategy are as follows:

- Reduces total system delay
- Reduces total northbound US-95 delay
- Slightly increases total southbound US-95 delay
- Reduces unsignalized cross-street delay (by eliminating movements and rerouting traffic)
- Reduces signalized cross-street delay (in the more urban section of the corridor)
- Reduces intersection crossing points
- Slightly increases system VMT
- Provides great potential for efficient use of the corridor green-band
- Reduces northbound travel time by nearly one minute
- Slightly increases southbound travel time.

Implementation Plan

To assist each jurisdiction in implementing the Improvement Strategy for US-95, the improvements were grouped into two primary categories: *Mutually Exclusive* projects and *Project Groups*. Mutually exclusive projects are those that can be constructed at any time without significant adverse impacts to adjacent facilities (upstream or downstream) or the corridor as a whole. Project Groups are combinations of improvements that need to be constructed simultaneously to maintain acceptable traffic and access conditions. As shown in the Implementation Plan (see Table E-1 and Figure E-2), many of the mutually exclusive projects are included in project groups. These can be implemented as stand-alone projects but become required when other projects within the project group are constructed.

The Implementation Plan also includes an *AMS rating* based on an average of *access*, *mobility* and *safety* benefits. Some of the projects have more or less benefit to one or more of these ratings than others depending on the nature of the improvement. Although based on the analyses within this study, this rating is non-scientific.

Access

The access rating is related to community access to and from US-95. When this access is enhanced, in terms of access opportunities or reduction in wait time (to and/or from the highway), the access rating is high.

Mobility

The mobility rating is related to corridor traffic operations. A project specifically related to enhancement of US-95 corridor in terms of reduction of corridor travel time or reduction of driver delay was assigned a higher rating.

Safety

The safety rating is related to the overall reduction in potential vehicle crossing conflict points. Elimination of crossing conflicts (e.g. restriction of turning movements, installation of a signal to provide a protected turning phase) earns the project a higher rating.

Each rating is designated using a symbol as follows:

○ Minimal benefit for category
◉ Moderate benefit for category
● Significant benefit for category

In the *AMS Intensity* column, the symbol was given a color to assist in quickly identifying the most beneficial projects among the total group. Red was assigned to full circles (as the most significant benefit), blue was assigned to partially filled circles and green was assigned to open circles.

It should be noted that all of the projects work together to facilitate balanced optimization of all three rating categories. As explained in further detail within the analysis, the practical and relatively low cost projects included in the final Improvement Strategy work in unison to manage and balance safety and mobility on US-95 while providing essential community access to and from the highway.

Table E-1. Implementation Plan

IMPROVEMENT GROUPING		LOCATION	IMPROVEMENT DESCRIPTION	ESTIMATED SUB-PART COST	ESTIMATED TOTAL COST	ACCESS	MOBILITY	SAFETY	AMS Rating
ME	ME-0	US-95 at Cherry Lane	Install Turn Restrictions	$40,000	$40,000	○	◉	●	◉
	ME-1	US-95 at Haycraft	Install Turn Restrictions	$40,000	$40,000	○	◉	●	◉
	ME-2	US-95 at Wilbur	Install Turn Restrictions	$40,000	$40,000	○	◉	●	◉
	ME-3	US-95 at Aqua	Install Turn Restrictions	$40,000	$40,000	○	◉	●	◉
	ME-4	US-95 at Bentz	Restrict to Right-in/Right-out1[1]	$10,000	$10,000	○	◉	●	◉
	ME-5	US-95 at Boekel	Install Turn Restrictions	$40,000	$40,000	○	◉	●	◉
	ME-6	US-95 at Murphy	Restrict to Right-in/Right-out[1]	$10,000	$10,000	○	◉	●	◉
	ME-7	US-95 at Prairie	Add EB Right Turn Lane	$470,000	$708,000	●	◉	○	◉
	ME-8	US-95 at Prairie	Add WB Right Turn Lane	$238,000		●	◉	○	◉
	ME-9	US-95 at Neider	Add WB Right Turn Lane	$263,000	$263,000	●	◉	○	◉
	ME-10	US-95 at Dalton	Add WB Right Turn Lane	$100,000	$100,000	●	◉	○	◉
	ME-11	US-95 at Miles	Install Traffic Signal (Z-Structure)	$325,000	$815,000	●	◉	●	●
		US-95 at Miles	Add two lanes to EB approach for exclusive left and right turn lanes.	$225,000		●	◉	○	◉
		US-95 at Miles	Add two lanes to WB approach for exclusive left and right turn lanes.	$265,000		●	◉	○	◉
	ME-12	US-95 at Wyoming	Install Traffic Signal (Z-structure)	$325,000	$805,000	●	◉	●	●
		US-95 at Wyoming	Add two lanes to EB approach for exclusive left and right turn lanes.	$215,000		●	◉	○	◉
		US-95 at Wyoming	Add two lanes to WB approach for exclusive left and right turn lanes.	$265,000		●	◉	○	◉
	ME-13	US-95 at Prairie	Add 2nd SB Left Turn Lane	$55,000	$55,000	●	●	○	●
	ME-14	US-95 at Kathleen	Add 2nd SB Left Turn Lane	$55,000	$55,000	●	●	○	●

[1] From ITD US-95, Wyoming to Ohio Match preliminary project plans

IMPROVEMENT GROUPING		LOCATION	IMPROVEMENT DESCRIPTION	ESTIMATED SUB-PART COST	ESTIMATED TOTAL COST	ACCESS	MOBILITY	SAFETY	AMS Rating
	ME-15	US-95 at Honeysuckle	EB Right Turn Lane Addition Add 2nd NB Left Turn Lane	$500,000	$500,000	●	●	○	●
PG-1		US-95 at Orchard	Install Turn Restrictions	$40,000	$1,332,000	○	◉	●	◉
		US-95 at Dakota	Install Turn Restrictions	$40,000		○	◉	●	◉
		US-95 at Lacey	Install Turn Restrictions	$40,000		○	◉	●	◉
	ME-16	US-95 at Lancaster	Add EB Right Turn Lane Lengthen Existing Left Turn Lane	$185,000		●	◉	○	◉
		US-95 at Lancaster	Add WB Left Turn Lane Lengthen Existing Right Turn Lane	$185,000		●	◉	○	◉
		US-95 at Lancaster	Install Traffic Signal (Z-structure)	$325,000		●	◉	●	●
	ME-17	US-95 at Hayden	Add EB Right Turn Lane and 2nd Thru Lane.	$517,000		●	◉	○	◉
PG-2[2]		US-95 at Bosanko	Remove Existing Signal. Install Turn Restrictions. Connect Howard Road and extend Neider.	$100,000	$766,000	○	●	●	●
	ME-18	US-95 at Kathleen	Add WB Right Turn Lane	$283,000		●	◉	○	◉
	ME-19	US-95 at Kathleen	Add EB Right Turn Lane	$383,000		●	◉	○	◉
PG-3[3]		US-95 at Canfield	Remove Existing Signal. Install Turn Restrictions	$100,000	$1,115,000	○	●	●	●
		US-95 at Wilbur	Widen EB Approach to create left, thru & right turn lanes. Add signal. Extend Wilbur to Gov't Way and connect extended Wilbur south to Canfield.	$518,000		●	●	●	●
	ME-20	US-95 at Hanley	Convert Existing WB right turn to thru lane Widen for Relocated Right Turn Lane	$245,000		●	◉	○	◉
	ME-21	US-95 at Hanley	Add EB Right Turn Lane and 2nd Thru lane	$252,000		●	◉	○	◉
PG-4		Corridor	Signal Re-timing	$35,000	$35,000	○	●	○	○
				Total Improvements	$6,769,000				

ME: Mutually Exclusive, PG: Project Group
Note: Cost estimates include provisions for R/W acquisition, engineering and contingencies

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[2] Costs do not include connection of Howard Road from Bosanko to Neider or extension of Neider to Howard connection as shown on the Implementation Plan (Figure E-2).
[3] Costs do not include connection from US-95 to Government Way or the south link between the extended Wilbur to Canfield as shown on the Implementation Plan (Figure E-2).

Project Group Explanations

Project Group 1 (Lancaster / Hayden)

The final improvement strategy (see Figure E-1) identified infrastructure improvements at each of the intersections included in this project group. It is potentially feasible to install any one of the turn restrictions at Orchard, Dakota or Lacey by themselves (mutually exclusively) but it is more likely that these three intersections will have turn restrictions installed simultaneously; however, it is recommended that the signal warrants be evaluated at Miles and Wyoming prior to the restriction of turning movements at Dakota or Lacey. Furthermore, installation of these turn restrictions contributes to a significant re-routing of traffic to the Hayden and Lancaster intersections. This additional re-routed traffic will add a fair amount of delay for US-95 and cross-street traffic at Hayden and Lancaster. Therefore, the improvements shown at these two intersections need to be installed as a group upon implementation of the turn restrictions.

Project Group 2 (Bosanko)

Although two of the infrastructure improvements (right turn lanes on Kathleen) in this group can be installed as mutually exclusive, the third component of this group, removing the signal at Bosanko and adding turn restrictions, re-routes enough traffic to Kathleen that the mutually exclusive components become required components of the project group. A mutually exclusive connection of Howard Road from Bosanko to Neider will enhance connectivity and circulation between the signalized intersections at Neider and Kathleen.

Project Group 3 (Canfield)

The final improvement strategy identifies the removal of the Canfield signal and replacement with turn restrictions while installing a new signal at Wilbur. The signal installation at Wilbur and maintenance of community access requires that a new connection be made from US-95 to Government Way (as an extension of Wilbur). This connection is coupled with another access link from Wilbur south to Canfield (see Figure E-1). Upon making the signalization change at Canfield, a significant amount of traffic will be rerouted to the adjacent signalized intersection to the south (Hanley), requiring the mutually exclusive projects shown (at Hanley) to become required. Prior to the signal changes at Wilbur and Canfield, the Hanley improvements can be installed as mutually exclusive.

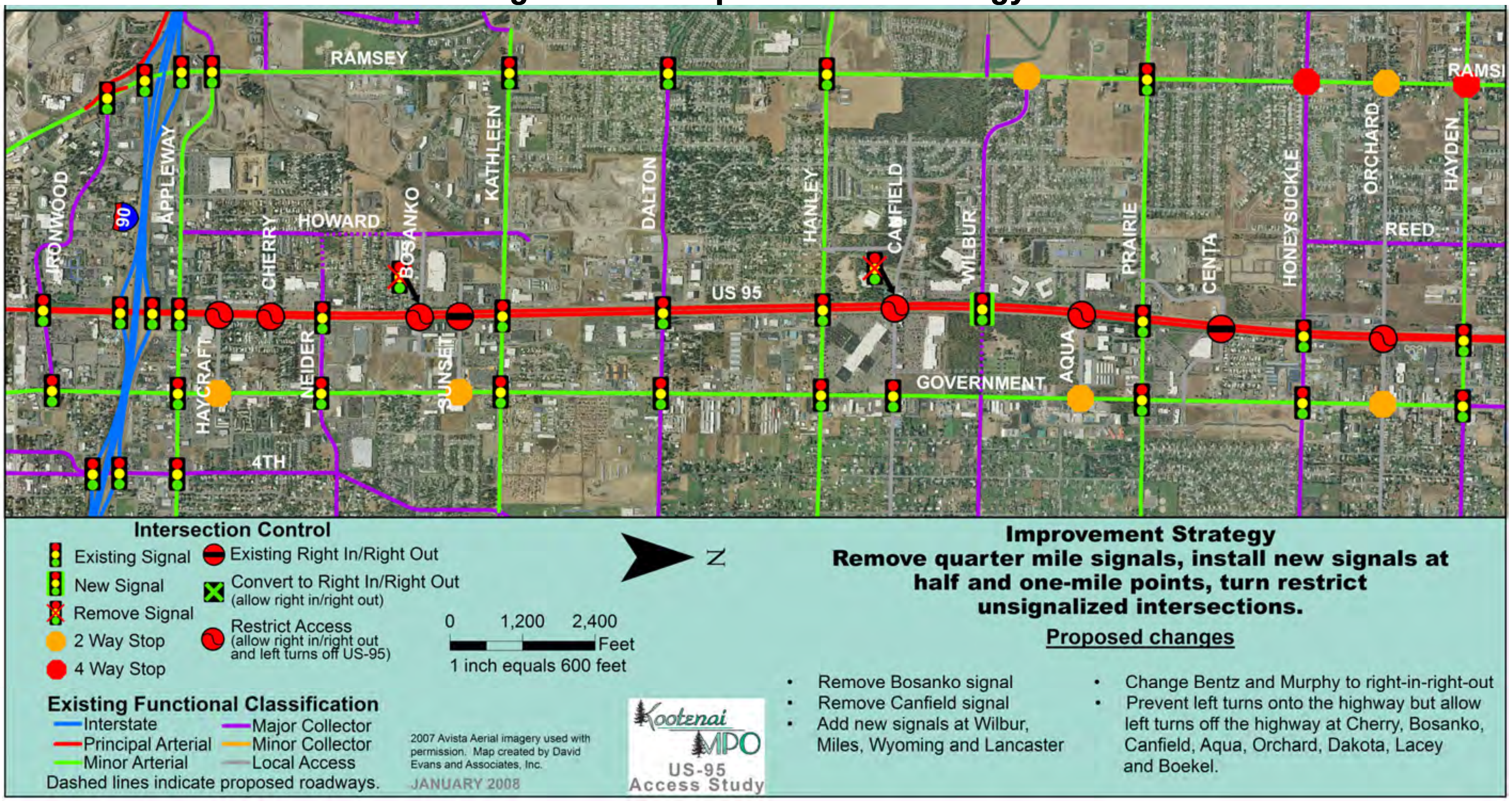
Project Group 4 (Signal Re-timing)

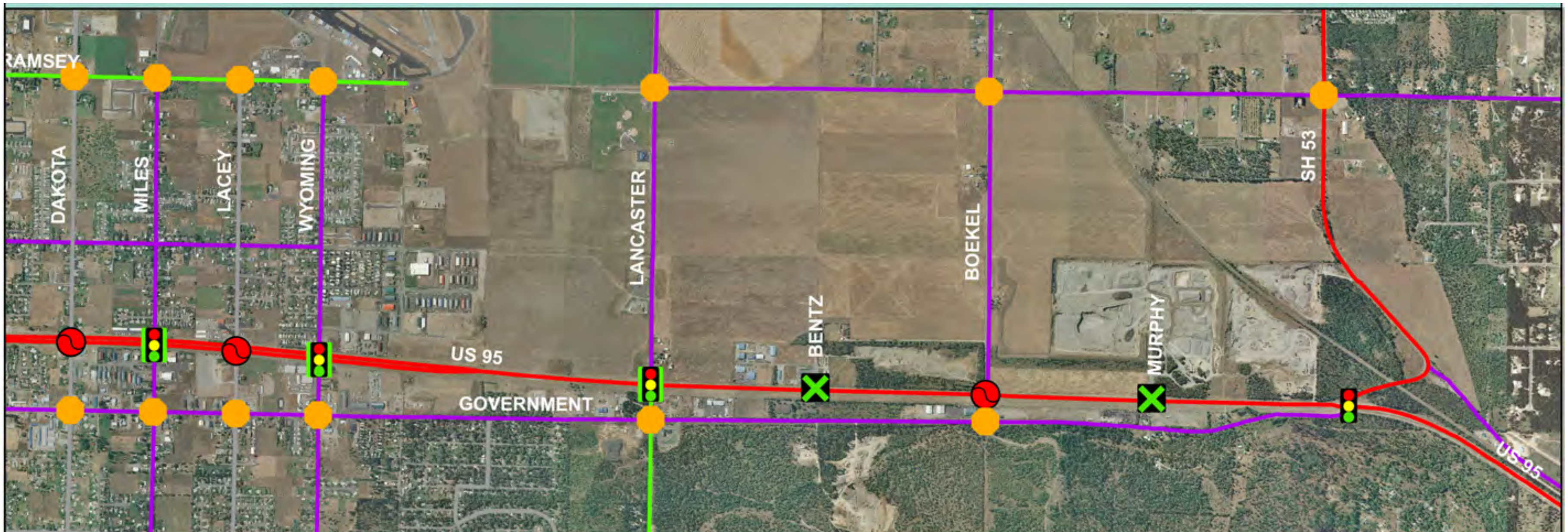
As improvements are installed, signal timing adjustments will become necessary to maintain optimum intersection and corridor mobility. Prior to the installation of the project groups, cycle times may require adjustment because of re-routed traffic. After the installation of the project groups, it is likely that the total coordinated signal timing will need adjusted to take advantage of the normalized signal spacing intervals. It is assumed that this group is ongoing but will be finalized upon installation of all improvements. It should be noted that ITD is investigating the implementation of an adaptive signal controller system along the corridor which will compliment the improvements identified through this analysis.

1.1 Project Funding

It is anticipated that funding the improvements identified through this effort will involve much ingenuity and close attention to strategic finance opportunities. An ongoing partnership among involved jurisdictions will ensure a coordinated approach to financing the improvements. Opportunities for developer associated funding will likely arise as time progresses, allowing for independent developer financing as well as public/private partnerships and/or mitigative requirements. In some cases, development proposals will need to include elements of project groups to assist with carrying out this plan. In other cases, the jurisdictions may pursue installation of a particular improvement independently.

Figure E-1. Improvement Strategy





Mitigated System Results

SAFETY

- Safety is improved at existing unsignalized intersections.
- Reduces intersection crossing points, thus reducing the number of potential acccident locations.
- Traffic wishing to turn left onto or travel across the highway is forced to signals. Additional traffic at the signals may increase the number of collisions there.
- New signals may reduce severity of collisions, but may increase the number of collisions.

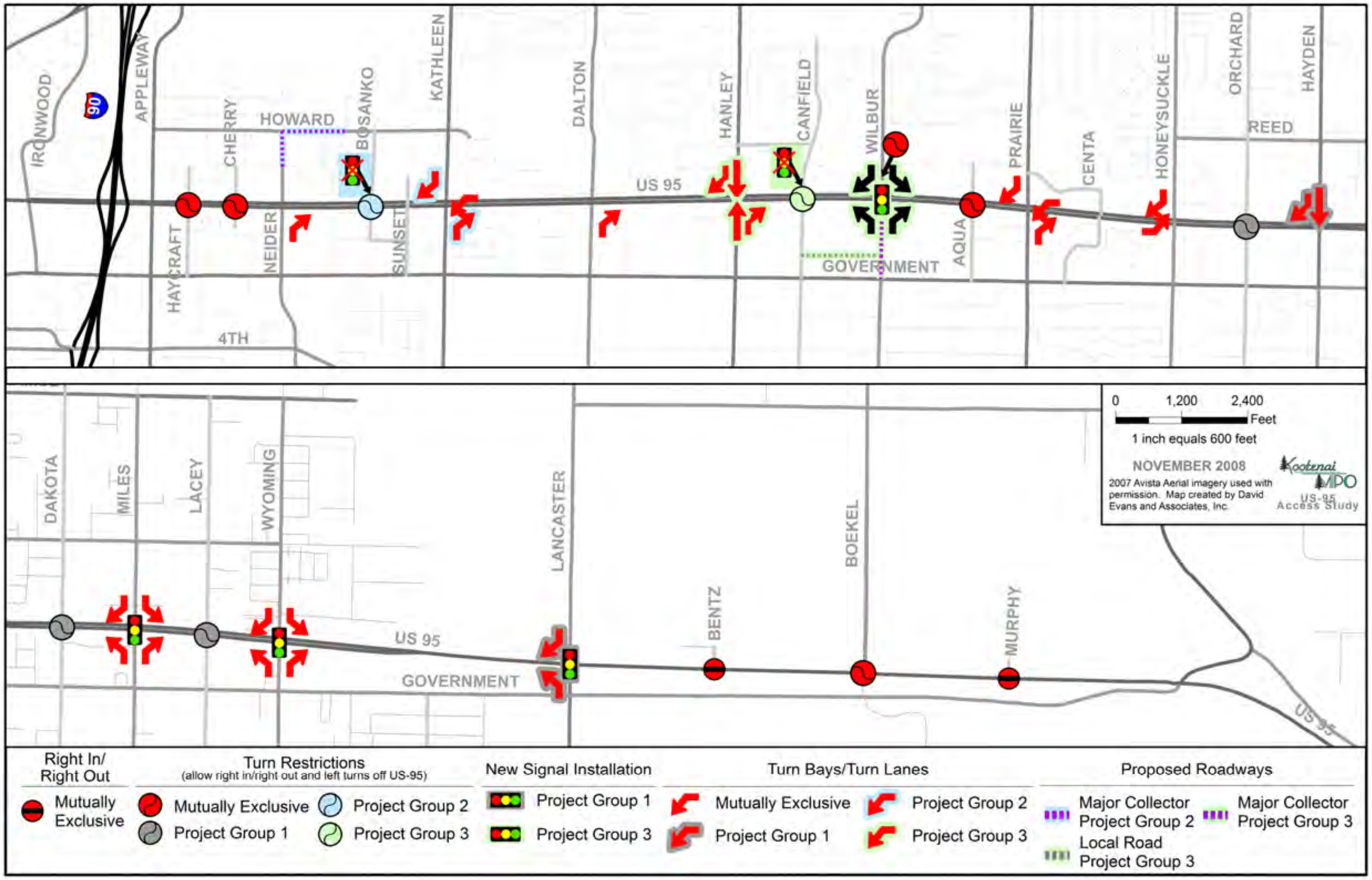
US95 MOBILITY

- Southbound US-95 travel time is increased slighty by 16.1 seconds.
- Northbound US-95 travel time is reduced by 48.5 seconds.
- Reduces total northbound US-95 delay.
- Slightly increases total southbound US-95 delay.

SYSTEMWIDE IMPACTS

- Total hours of driver delay for the entire study area is reduced.
- Unsignalized cross-street delay is reduced (by eliminating movements and rerouting traffic).
- Signalized cross-street delay in the urban section of the corridor is reduced.
- Better signal coordination is possible due to evenly spaced signals on half-mile and one-mile points.
- Total system-wide vehicle miles traveled (VMT) is slightly increased.

Figure E-2. Implementation Plan



1. Introduction

In 2006, Idaho Transportation Board (IT Board) considered closing the unsignalized median crossings along US-95 from Interstate 90 (I-90) through State Highway 53 (SH-53). Before taking action, the IT Board asked the Kootenai Metropolitan Planning Organization (KMPO) to evaluate the impacts of median closures and look for ways to improve mobility on US-95. The IT Board also asked that the evaluation take into consideration the diverse group of stakeholders with interests in the US-95 corridor.

The KMPO policy board took action on this request and formulated a plan to develop the US-95 Access Study. KMPO's vision was that the endeavor would take on a *system* approach recognizing that US-95 is not an island in its context. This vision necessitated the inclusion of *off-system* (not on the ITD transportation system) transportation infrastructure when considering the affects of median closures or other solutions arising from the study process. Furthermore, KMPO desired that all highway users be considered including both through travelers and local users.

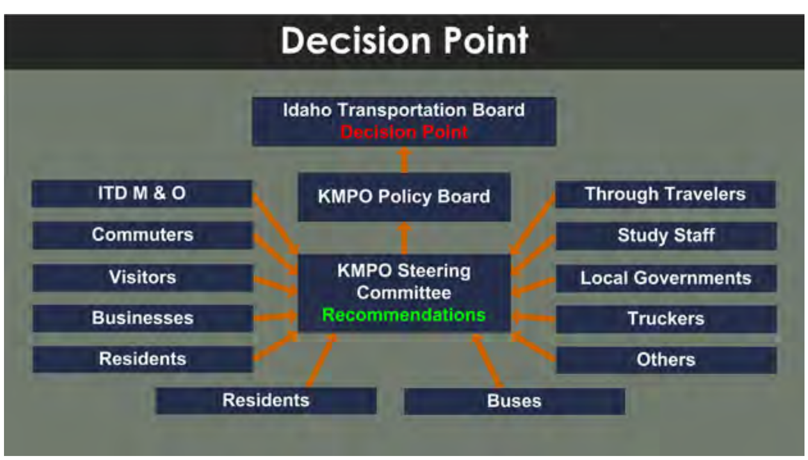
1.1 Steering Committee

Prior to the initiation of the US-95 Access Study, KMPO organized a project Steering Committee to carefully guide the planning process, evaluate findings and make recommendations from the study to the KMPO Policy Board and ultimately the IT Board. Summaries of the Steering Committee meetings are included in Appendix B. The Steering Committee identified included members from:

- Lakes Highway district
- City of Coeur d'Alene
- City of Hayden
- Idaho Transportation Department
- Coeur d'Alene Chamber of Commerce
- Idaho State Senate

1.2 Ownership of Decisions

With the inclusion of such a diverse group of stakeholders and jurisdictional members, it becomes apparent that at some point, someone has to ultimately be responsible for making decisions regarding study recommendations. The graphic below illustrates the dynamic stakeholders interests involved with the study and identifies the IT Board as the ultimate *Decision Point.*



1.3 Study Goals

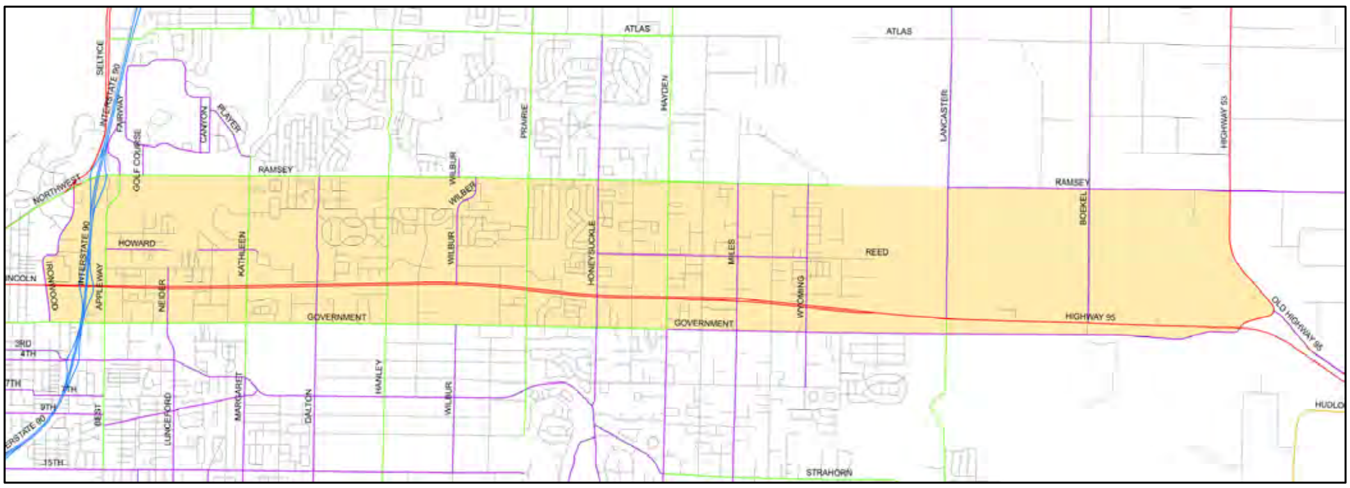
In addition to answering the IT Board's question concerning median closure impacts, the Steering Committee developed study goals that compliment the IT Board request for evaluating US-95 mobility as follows:

- Find practical, *low cost* ideas to improve US-95 operations
- Manage and balance *safety* and *mobility* on US-95 while providing essential community *access* to and from the highway

1.4 Study Area

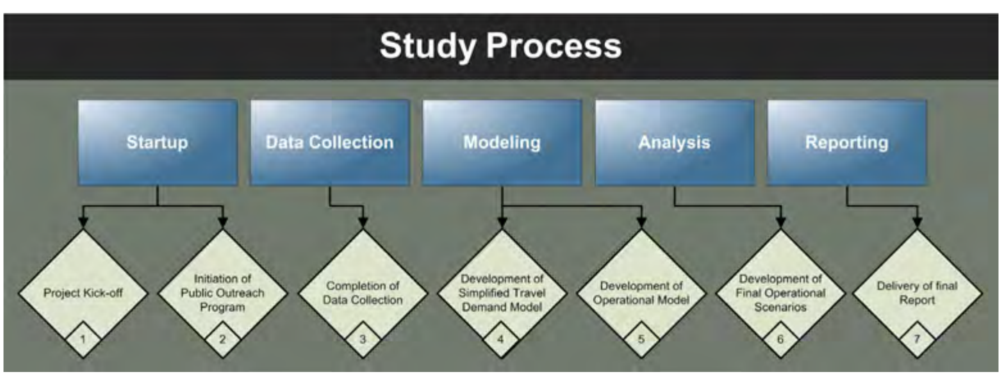
The area encompassing the US-95 Access Study includes the area between I-90 to the south, SH-53 to the north, Ramsey Road to the east, and Government Way to the west. The planning area is depicted below.

Figure 1-1. Planning Area



1.5 Study Process

The general strategy for approaching the US-95 Access Study was to identify practical, low cost solutions, develop evaluation measures to compare solution performance, invite public participation in the assessment of each potential solution, refine the solutions based on Steering Committee, stakeholder and general public input, then recommend a master strategy for US-95. The overall process is depicted in the following graphic:



In addition to their effect on the operations along US-95, proposed improvements to the highway were also evaluated for their impact on the local system. Such effects were identified during the project, but the scope of the project did not include identifying mitigation for the local system, focusing only on US-95 projects.

1.6 Public Outreach

The partnership with the Coeur d'Alene Chamber of Commerce provided a significant opportunity for KMPO to engage the business community along the corridor with regard to perceived needs and evaluation of potential solutions. The Chamber provided guidance to KMPO and the consultant team in not only developing concepts but in the identification of key stakeholders.

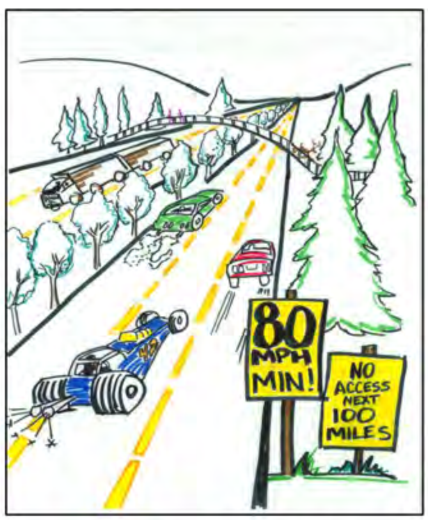
The public outreach program was designed to engage business owners, residents and other key stakeholders during consideration of the multiple ideas that were derived as the Steering Committee proceeded with the planning process. Two public outreach meetings were held during the course of the study along with discussions with the Kootenai County Area Transportation Team (KCATT) and the KMPO Policy Board.

1.7 Public Meetings

1.7.1 May 20, 2008 Public Outreach Meeting

On May 20, 2008 a public meeting was facilitated by KMPO, at the Silver Lake Motel in Coeur d'Alene, to allow for an open presentation and discussion of the solutions that had been developed to date. The solutions presented included multiple combinations of potential travel and access scenarios along the corridor. Although the solutions had not yet been analyzed from a technical engineering perspective, the public discussion focused on understanding the community's values with regard to the balance between or emphasis on *access*, *mobility*, and *safety*.

Access Emphasis



Mobility Emphasis

Safety Emphasis

Over 50 individuals attended this meeting, actively engaging in the discussion. During the meeting, attendees were encouraged to participate in the consideration of each combination of solutions both verbally and by recording their comments on note paper (see Appendix A – Public Outreach). The meeting was successful in both sharing the intentions of the study and establishing a vision of the community's desires regarding access along the US-95 corridor.

1.7.2 September 9, 2008 Public Outreach Meeting

On September 9, 2008 the second public meeting was facilitated, at the Centennial Distributing Company in Hayden, to allow participants to consider an expanded set of solutions (resulting from the first public meeting and ongoing Steering Committee involvement). The solutions were combinations of corridor improvements that were presented along with technical analysis results. The meeting also included a sit-down presentation at the top of each hour to explain what displays meant and the process for attendee participation. Over 60 people were in attendance during this meeting. Many comments were received (See Appendix A – Public Outreach) giving the Steering Committee valuable information for bringing the study to a successful close.

1.7.3 Media Interviews

As the study progressed multiple opportunities were presented allowing KMPO and consultant team staff to communicate project intentions and ongoing results of community input and technical analysis. These opportunities included both newspaper media as well as television interviews.

2. Data Collection

The evaluation of the performance of US-95 through Coeur d'Alene and Hayden was accomplished through the measurement of several parameters including traffic volumes, queue lengths, travel times, and other factors such as geometry, signal timing, and land use. The gathering of these data initiated the modeling process detailed in later chapters.

2.1 Turning Movements

The amount of traffic traversing an intersection approach or roadway segment is typically quantified by the number of vehicles per hour (vph) flowing through that facility. Turning movement counts for this study were collected in two phases. First, volumes at each of 38 primary intersections along the US-95 corridor were recorded. This phase of data collection included intersections along parallel routes as well as the highway, including Ramsey Road, Government Way, and 4th Street and the intersection of Prairie Avenue and Atlas Road (see Figure 2-1). As shown in the figure, there were several minor or lower volume intersections that were not counted in this effort. The volumes for most of these intersections were projected based on volumes from numerous previous efforts in the area. Traffic counts from a 2004 study of the corridor and the 2005 counts for the Hayden Transportation Plan were used to calculate growth rates in the area which were used to project volumes to 2008. As part of the modeling process, an additional 13 counts were performed at access points off of side streets, such as the intersection of Appleway Avenue and Fruitland Drive or the entrances to the Silver Valley Mall off of Canfield Avenue and Hanley Avenue. Finally, the turning movement volumes at intermediate intersections in the study area for which no counts were available were estimated by manually balancing the volumes between adjacent intersections or driveways.

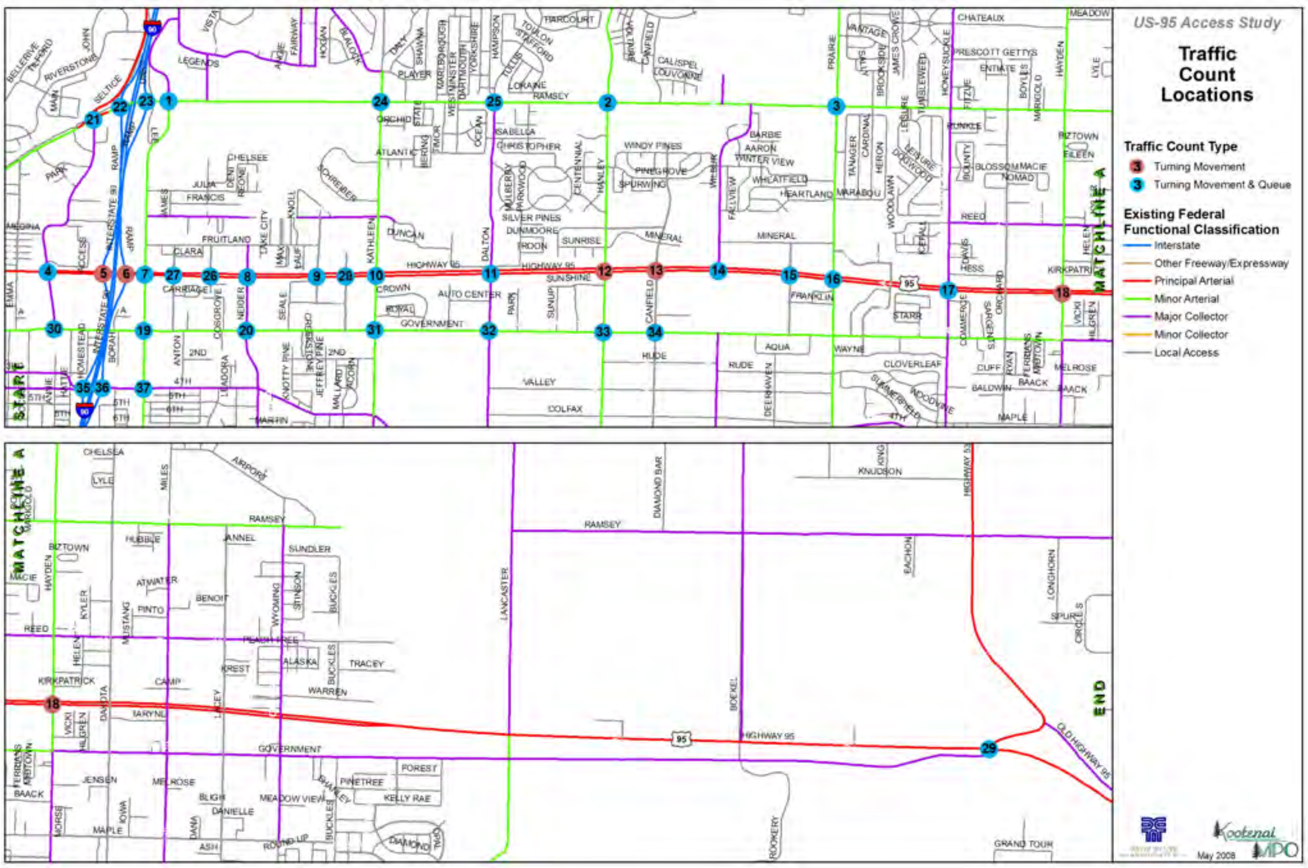
2.2 Existing Modeling Data

A pre-existing Synchro network was used as the platform for the operational analysis of the US-95 corridor. A model provided by the Idaho Transportation Department (ITD) containing the intersections along US-95 provided a starting point for building a model of the entire network, including the aforementioned parallel routes, external driveways, and interconnecting roads. The parameters of this model, including roadway and intersection geometry and signal timing and coordination, were field verified and checked against existing timing plans where applicable. The modeling process is described in further detail in Chapter 3.

2.3 Existing Traffic Characteristics

Additional attributes of the traffic operations along the US-95 corridor were monitored and recorded for creating and calibrating the operational model. The most visible measure of the performance of a signal is the queue length. The queue length is that which quantifies the length (in feet or number of vehicles) of the queue as vehicles arriving at a red signal indication begin stacking up. Queue counts were conducted at the intersections as shown in Figure 2-1. The saturation flow rate is a measure of how many vehicles could travel across a point, such as the approach of an intersection, during a given time period. Typically measured as vehicles per hour per lane (vphpl), the saturation flow is influenced by such factors as lane width, turning vehicles, and driver behavior as well as other factors. The default value typically employed by transportation professionals is 1,900, which is then adjusted based on the influencing factors. Field studies to determine the saturation flow rate along the corridor were conducted at six of the intersections along US-95. Finally, the travel time through a corridor is a widely accepted measure of its performance. The baseline travel time was determined by averaging several runs through the limits of the study area.

Figure 2-1. Traffic Count Locations



2.4 Roadway Geometry

In order to accurately represent the operations of the corridor, it was essential that the modeled geometry match the existing conditions. Once the layout of the Synchro operational model was completed based on aerial imagery, an extensive intersection-by-intersection review was conducted to ensure the modeled network mirrored the real-world network. This review included the number of through and turn lanes, the length of turn bays, and the approximate radius of curvature for turning vehicles. The result was a highly accurate representation of traffic conditions within the operational model.

3. Traffic Modeling

This evaluation of the US-95 was conducted through the use of two models. First, the roadway network was created in the Synchro operational software. Synchro is a network-based interactive software package for modeling, optimizing, managing, and simulating traffic systems. The output produced by Synchro simplifies the calculation of the levels of service at signalized and unsignalized intersections for multiple locations and different scenarios. Synchro also calculates signal timing plans (green times and cycle lengths), optimizes signal timing plans for isolated intersections and corridors, and determines 95th percentile queue lengths to assist in evaluating signalized intersections. The Synchro software also employs the 2000 Highway Capacity Manual analysis procedures to evaluate traffic operations at signalized and unsignalized intersections. Next, the roadway network was imported into VISUM, a comprehensive, flexible software system for transportation planning, travel demand modeling and network data management. VISUM is usually used to build a conventional four-step planning model for the study area. The VISUM software follows these steps to match existing conditions, predict build-out patterns, and/or project traffic movement onto some modified roadway network.

This transportation planning model is a representation of the area's transportation facilities and of the travelers using these facilities. The four steps traffic-forecasting model usually contains inventories of the existing roadway facilities and of all socioeconomic data such as single- and multi-family housing and retail- and non-retail employment in the area. These inventories and the parameters of travel behavior such as route choice, speed reduction, and priority at intersections result in traffic on the streets and intersections. The traditional four steps modeling procedure requires detailed land use information and a significant calibration effort. However, the existing travel pattern is needed to model to facilitate the alternative analyses. Therefore, an innovative method was used using VISUM to mimic study area traffic patterns, providing a base network for calibration and alternative analysis. The model calibration then consists of repetitive regression analysis in addition to minor adjustment of road network parameters such as speed and capacity until the modeled traffic volumes match the observed traffic counts, as discussed in Chapter 2.

3.1 Framework

The structure for each of the models was created in Synchro, including the roadway layout, intersection geometry, and signal timing. Once the geometrics were accurately input, the signal timing plans for signalized intersections were collected from the appropriate agencies. Traffic personnel from ITD, the City of Coeur d'Alene, and the City of Hayden provided timing plans in the form of signal controller output sheets, Synchro files, or through field visits to the signal. These timing plans were then implemented in the Synchro operational model. Additional traffic parameters including the peak hour factor (PHF), the percentage of heavy vehicles (%HV), and the saturation flow rate (s) as collected in the field were used in Synchro to further refine the simulation model to match existing conditions.

The peak hour factor and percentage of heavy vehicles were collected in coordination with each of the turning movement counts. The peak hour factor is based on the amount of traffic during the peak 15 minutes of the peak hour. As stated in Equation 1, this factor weights the turning movement volumes based on the amount of fluctuations in the 15 minutes increments of the peak hour. For example, if the peak hour flow were 400 vph, and the peak 15 minute flow were 100 vph, the peak hour factor would be 1.0. It is important to understand that the variance of traffic increases as the volume decreases. Therefore, lower traffic volumes create greater fluctutaions in 15 minute volume levels which tends to increase PHF. Considering this fact in addition to filed data, a PHF of 0.92 for the northbound and southbound through lanes on US-95, 0.85 for all other movements was used. Synchro uses the PHF to adjust the volume for peaks during the analysis timeframe. Also, Synchro uses the heavy vehicle percentage to convert the volume measure of vehicles per hour to *passenger* vehicles per hour.

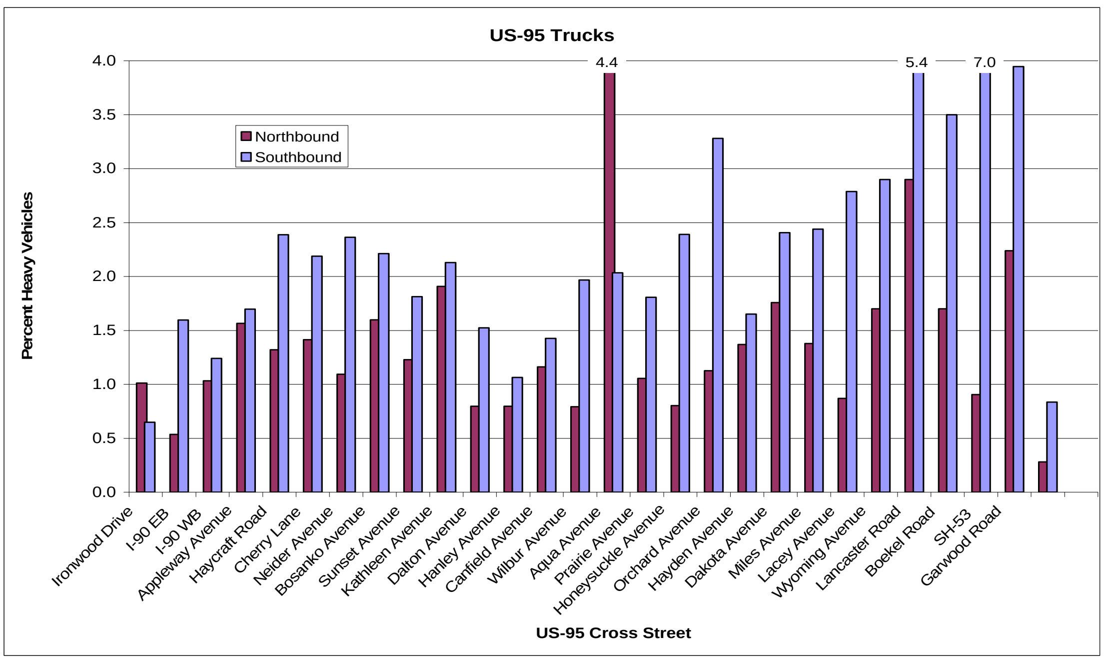
As shown in Figure 3-1, the heavy vehicle percentages on US-95 tended to increase to the north end of the corridor, particularly for the southbound lanes. As a result, a value of 3% was used for the southbound lanes north of Hayden Avenue. All other approaches were set to a standard 2% heavy vehicles. Saturation flow rate is the number of vehicles that can pass a given point on a highway in a given period of time. In other words, if an intersection's approach signal were to stay green for an entire hour and the flow of traffic through this intersection were as dense as physically possible, the saturation flow rate would be the amount of passenger car units that passed through this intersection during that hour. According the HCM (Highway Capacity Manual) the standard value of saturation flow rate is 1900v/h/l. The presences of heavy vehicles affect the saturation flow rate as well as intersection operation. The field counted saturation flow rate was clearly demonstrated a reduced saturation flow rate induced by heavy vehicles along US-95. Finally, the measured saturation flow rates were entered into the Synchro software and the simulation model was evaluated for calibration.

$$PHF = \frac{V}{4 * V_{m15}}$$

Equation 1 V = hourly volume, vehicles

V_{m15} = maximum 15 minute volume within the hour, vehicles

Figure 3-1. Heavy Vehicle Percentage



Once the network was accurately coded into the operational model, the turning movement counts, whether collected, projected, or balanced, were entered into the system for calibration and evaluation. The calibration of the model is consisted of a comparison between the observed results of the travel time and queue length analyses and the results achieved through the model are shown in the Table 3-1. By altering such parameters as the turning speed and lane utilization, the model was modified so that the travel times and queue lengths were comparable between the real-world and the model.

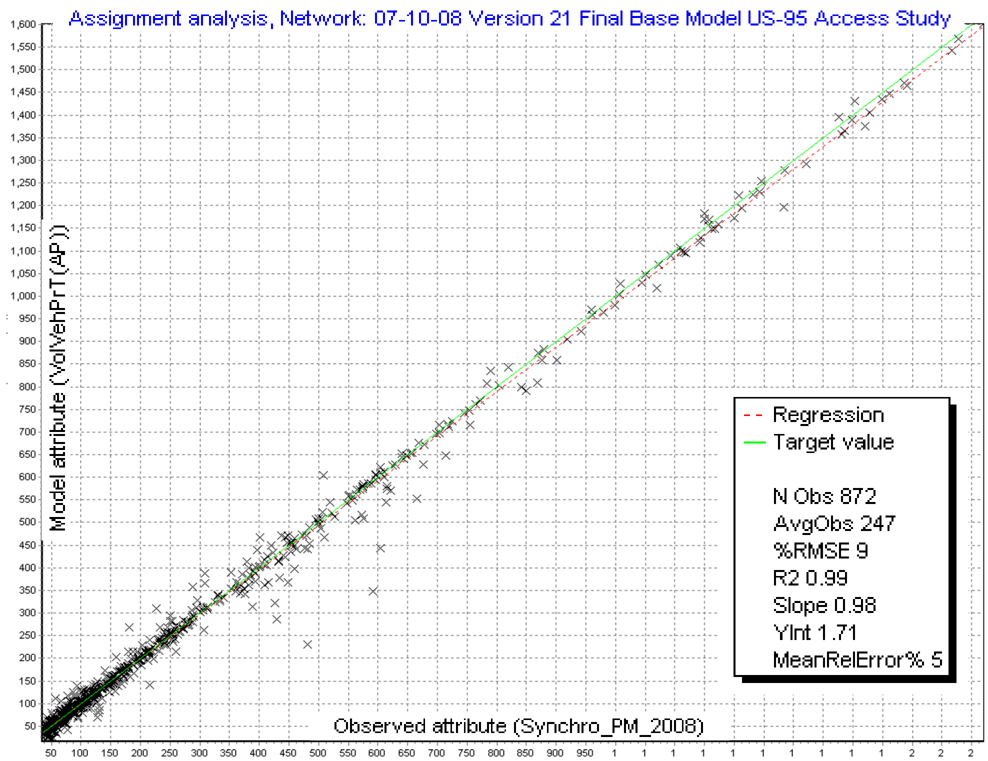
Table 3-1. Alternative Travel Times

		NB	SB	Time Savings (-)	
Measured Travel Time	Measured July 31, 2008	1069.0	990.5	NB	SB
		17:49.0	16:30.5	Model variance from measured times	
Existing	Baseline simulation model	1071.5	1025.9		
		17:51.5	17:05.9	2.5	35.4
Alternative 1	RIRO	1503.7	1026.8	432.2	0.9
		25:03.7	17:06.8		
Alternative 2	3/4 MVMT	1078.0	1008.8	6.5	-17.1
		17:58.0	16:48.8		
Alternative 3a	Signals at 1/2 mile, existing access	1138.8	1072.7	67.3	46.8
		18:58.8	17:52.7		
Alternative 3b	Signals at 1/2 mile, 3/4 MVMT	1104.6	1055.4	33.1	29.5
		18:24.6	17:35.4		
Alternative 4a	Wilbur signal, 3/4 MVMT, Bosanko RIRO	1069.4	1001.1	-2.1	-24.8
		17:49.4	16:41.1		
Alternative 4b	Wilbur signal, 3/4 MVMT, Canfield & Bosanko RIRO	1136.6	1007.7	65.1	-18.2
		18:56.6	16:47.7		
Alternative 5	Wilbur signal, 3/4 MVMT, incl. Canfield & Bosanko	1159.8	1058.3	88.3	32.4
		19:19.8	17:38.3		

3.2 Redistribution Modeling

Once the network was created in Synchro, the elements were exported for a transfer to a VISUM platform. This conversion, including the turning movement volumes, intersection geometry, and signal timing, was followed by the assignment of the Transportation Analysis Zones and their associated data; such as route access, and other information unique to the zone. Next, a baseline origin-destination (O-D) matrix was created between the TAZs using a T-Flow Fuzzy procedure that applied corrections to the matrix based on traffic counts. This resulted in a modified assignment trip table that produced assigned volumes on the road network closely matching traffic counts. This was an application of the traffic assignment model, run repetitively in a type of regression analysis to obtain a "perfect" O-D matrix for each and every traffic count that was supplied to the model. The quality of the results depends on the quality of the count volumes provided, and the totality of area-wide coverage. If there were large gaps in the count inventory, the T-Flow-Fuzzy method would have produced strange results. If the count inventory was accurate and provided uniform coverage, the method produces a remarkably accurate trip table. – but only for the base year of the counts. When this trip table was assigned to the road network, the resulting assigned volumes were nearly identical with counts. In lieu of the existence of actual counts, it was imperative that the best available estimated counts were developed where there were significant gaps in the count coverage in order to avoid false predictions at those locations, hence the volume balancing effort noted in Chapter 2. The result of this process is a model calibrated such that the modeled volumes closely match the observed values (see Figure 3-2). Once the calibration of the travel demand model was complete, the seven alternative scenarios were coded into the VISUM model and the assignment of vehicles to the network was completed. The volumes resulting from the assignment were then exported for use in corresponding versions of the operational model.

Figure 3-2. Existing (2008) Model Calibration



3.3 Operational Modeling

Following the demand forecasting of volumes throughout the corridor, a new operational model was created based on the original network that incorporated the proposed changes for each of seven scenarios that are described in more detail in the next chapter. These models, each calibrated based on the original model, were used to evaluate the intersections in the study area with such measures as delay and travel time. In addition, microscopic simulations of the corridor were created and observed to highlight any visual deficiencies in the performance of the system.

4. Current Transportation Conditions

4.1 Current Access and Traffic Conditions

The current access configuration for the existing US-95 corridor with the study area is depicted in Figures 4-1a and 4-1b. The intersections along the corridor range from right-in/right-out, to two-way stop controlled, to full signalized. With the exception of two intersections, signals are spaced fairly evenly occurring at approximately ½ mile intervals. Two off-standard signals (Bosanko Ave and Canfield Ave) occur at ¼ mile intervals.

The unsignalized intersections have historically presented both congestion and safety issues for ITD. Vehicle stalemates often occur as drivers enter the open area in the median to negotiate turns, in avoidance of oncoming traffic. This not only often causes the potential for crashes but often prevents cross street traffic from crossing and/or turning onto the highway.

Historically, generally high congestion levels and queue lengths along the corridor have necessitated ongoing refinement efforts to maximize through-mobility while maintaining acceptable community access. Cross street delays have also been high which in-turn exacerbates local system access issues while queues spill back across approaches.

Even in light of the aforementioned issues, the US-95 corridor, within the planning area, remains a shining example of access management. ITD has maintained that no private commercial/residential approaches or unevenly spaced intersections be allowed onto the corridor. This has maximized the longevity of the corridor with respect to traffic growth over time. The issues currently being addressed are becoming more vivid due to increasing traffic volumes and community development and access needs.

4.2 Measures of Effectiveness (MOE's)

During the course of the study, the Steering Committee identified ten points of consideration to evaluate potential solutions. The points of consideration included 4 major categories including:

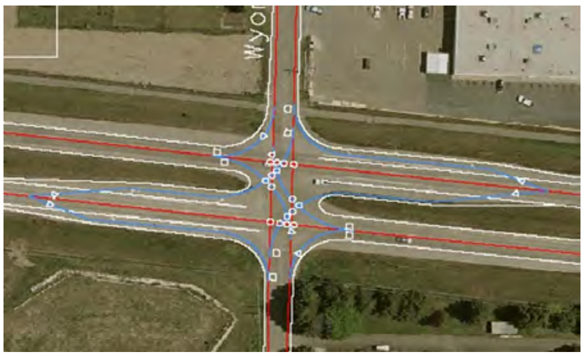
1. Driver Delay
2. Safety
3. Vehicle Miles Traveled
4. Corridor Mobility

To evaluate the effectiveness of solution concepts, each of the above points of consideration was assigned a technical measure or *measure of effectiveness* (MOE). As concepts were developed, these MOE's became the point of comparison, allowing all alternatives to be compared with the existing condition, giving the Steering Committee a technical basis for making recommendations. An aggregated table of MOE's for each of the potential solution combinations has been provided in Figure 5-23. The measures of effectiveness are described as follows:

1. *Total System Delay*. The total system delay is expressed in terms of the total intersection delay (in hours) of all vehicles, during the PM peak hour period, within the planning area.
   Existing condition: 3,049 hours
2. *Northbound US-95 Delay*. The northbound US-95 delay measures the delay experienced by all drivers along US-95 during the PM peak hour period.
   Existing condition: 134 hours
3. *Southbound US-95 Delay*. The southbound US-95 delay measures the delay (in hours) experienced by all drivers along US-95 during the PM peak hour period. Note that the southbound delay is generally lower than the northbound delay because during the evening commute, a majority of the traffic is headed in the northbound direction.
   Existing condition: 109 hours
4. *Cross Street Delay (I-90 to SH-53)*. The cross street delay is expressed as total hours of delay for vehicles approaching (from the east and west) all intersections along the US-95 study corridor.
   Existing condition: 2,996 hours
5. *Cross Street Delay Signalized (Ironwood Ave to Prairie Ave)*. This MOE expresses the total delay (in hours) at signalized intersections in the most urbanized (and traveled) segment of the US-95 study corridor.
   Existing condition: 193 hours
6. *Vehicular Crossing (conflict) Points (unsignalized intersections)*. To address a measure of safety benefit for each

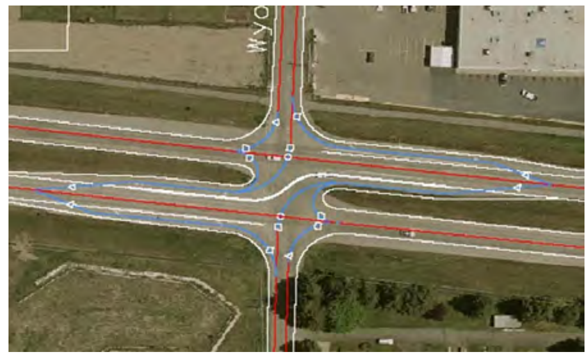
solution, this MOE expresses the total number of intersection crossing (e.g. "t-bone" conflicts as opposed to "sideswipe" encounters) points. Restriction or elimination of movements within an unsignalized intersection has a direct influence on this measure. The following graphic illustrates the reduction in conflict points resulting from the restriction of turning movements at an unsignalized intersection.
Existing condition: 162 crossing conflicts

Existing Unsignalized Intersection



Crossing Conflicts	16
Diverge Conflicts	8
Merge Conflicts	8
Total Conflicts	**32**

Turn Restricted Intersection



Crossing Conflicts	2
Diverge Conflicts	6
Merge Conflicts	8
Total Conflicts	**16**

7. *Total System Vehicle Miles Traveled (VMT).* This MOE quantifies the total planning area vehicle miles traveled during the PM peak hour. Solutions inducing the need for more circuitous travel routes to the same original destination would have a tendency to increase the VMT.
Existing condition: 57,536 miles

8. *Efficient Use of US-95 Green-Band.* This MOE recognizes opportunities for maximizing the likelihood for a vehicle to enter a *green-band* and stay within it for as long as possible. It is important to note that unevenly spaced intersections tend to lessen the efficiency of the green-band, degrading through mobility along the highway. Furthermore, unevenly spaced intersection tend to require longer signal cycle lengths which degrades side street mobility by increasing delay times (when vehicles are waiting for the US-95 green time to expire.
Existing condition: poor

9. *Northbound US-95 Travel Time.* The US-95 travel time is a very intuitive MOE that simply measures the time it takes (in minutes and seconds) to travel from one end of the corridor to another.
Existing condition: 17 minutes 51.5 seconds

10. *Southbound US-95 Travel Time.* See previous descriptions
Existing condition: 17 minutes 5.9 seconds

4.3 Capacity Analysis

A capacity analysis was performed along the existing corridor, evaluating the existing intersection (approach level) LOS and V/C for each roadway segment within the planning area. The analysis results are displayed graphically in Figure 4-2a and Figure 4-2b. In general, the results showed poor operational characteristics for vehicles approaching US-95. Additionally, the congestion along some segments of the US-95 corridor exhibited very high V/C ratios, especially where key destinations were in the vicinity or where lanes merged. Off-system capacity results were also reported for comparison of the local-system impact of solution concepts during the analysis.

Figure 4-1a. Existing Conditions

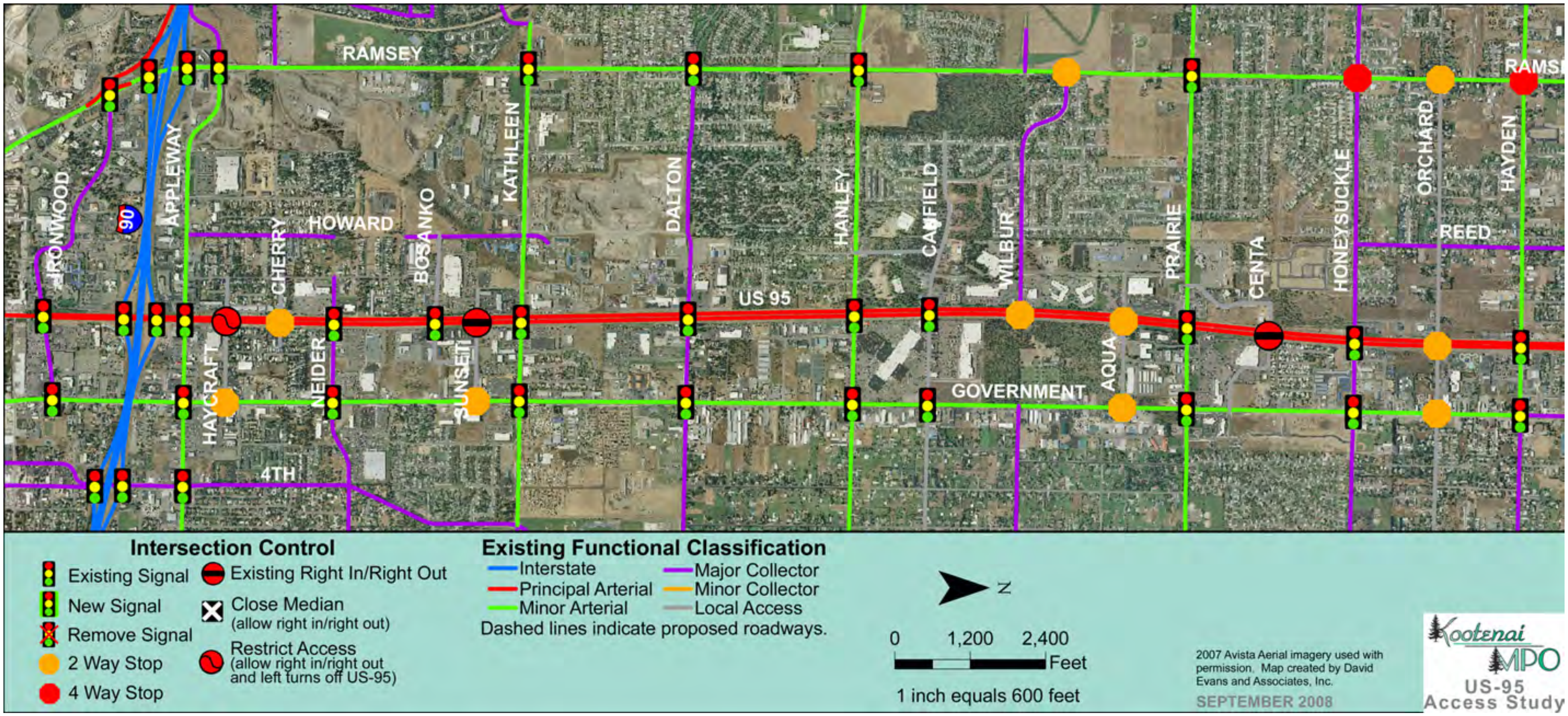


Figure 4-1b. Existing Conditions

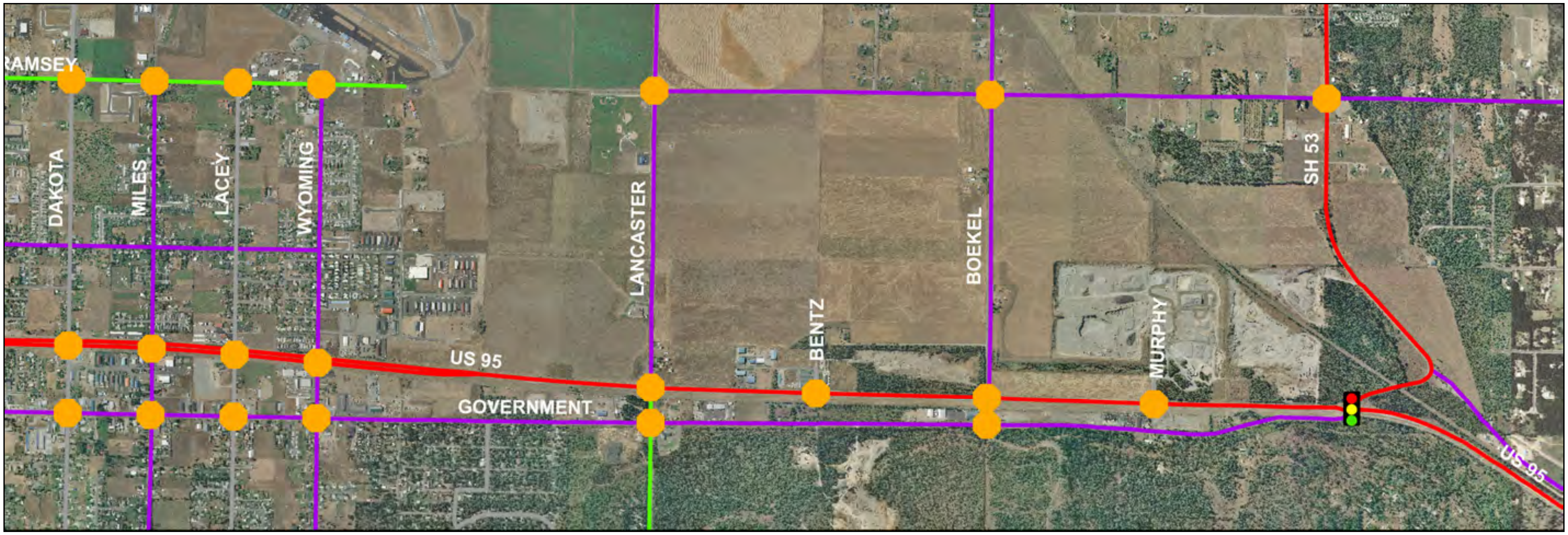


Figure 4-2a. Existing Volume to Capacity / Level of Service

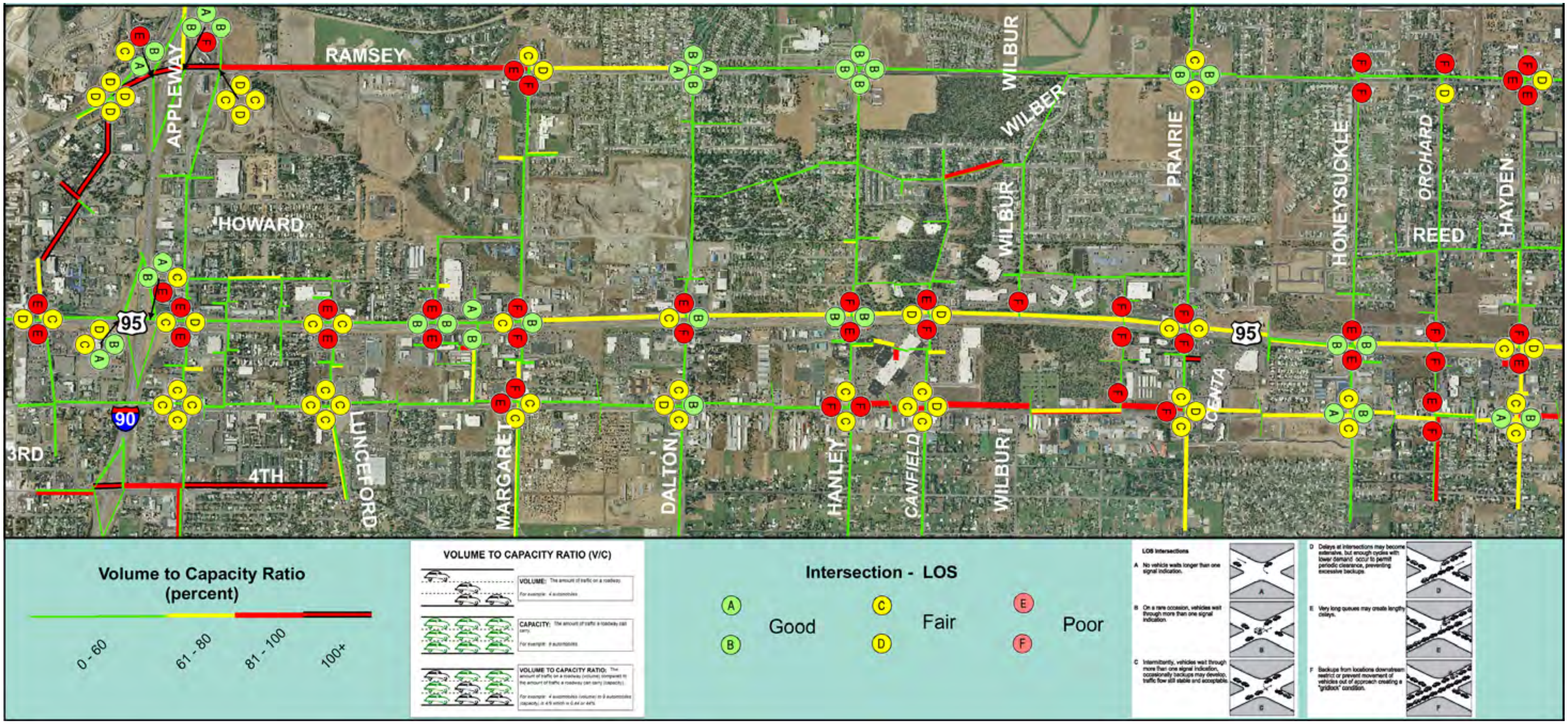
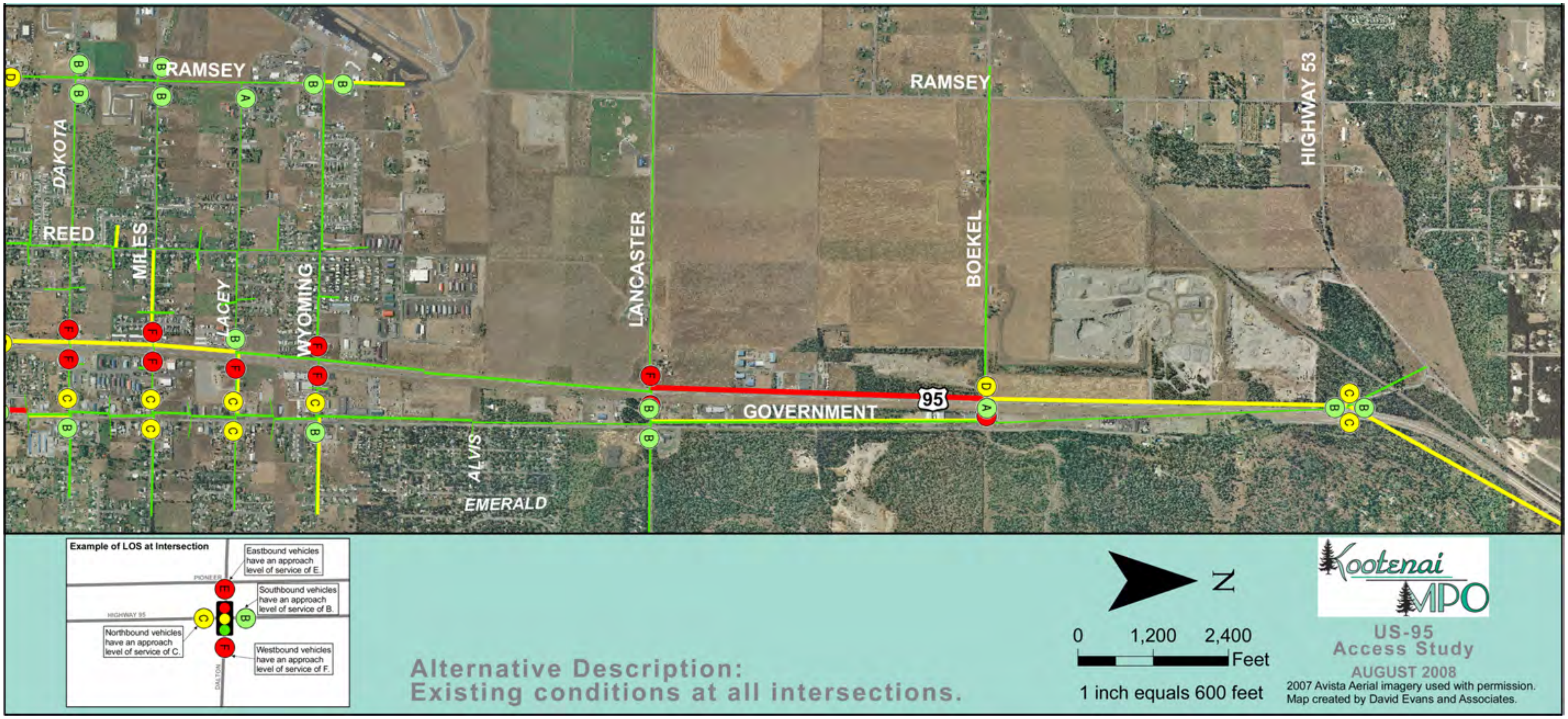


Figure 4-2b. Existing Volume to Capacity / Level of Service

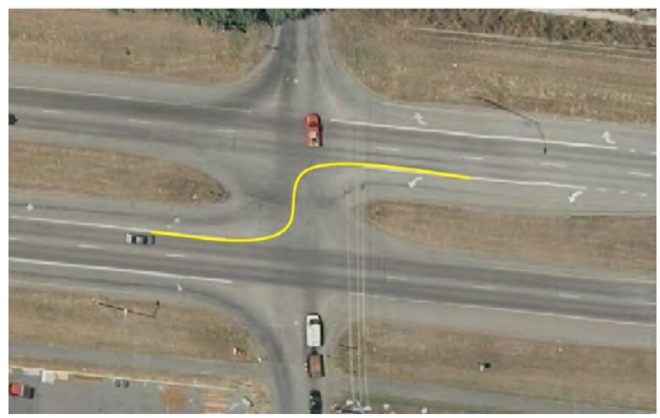


5. Alternatives Considered

The toolbox of low-cost improvements for use in enhancing the operations of US-95 include varying degrees of median treatments, turn restrictions, removed, relocated, or added signals, and additional short segments of connector streets. These improvement strategies were focused on intersection treatments, since intersections are where most of the delays and crashes occur. One of the most frequently proposed improvements to the US-95 corridor was the modification of median treatments at unsignalized intersections. With full turning access at an unsignalized intersection, there is the potential of 32 conflict points, or locations in which crossing vehicles could come into contact with each other. With the addition of turn restrictions eliminating the left turn movements or crossing movements from the side streets, the potential conflict points is cut in half to 16. Further restriction eliminating all movements except right-in-right-out turns to/from the side streets removed all crossing conflict points leaving only those introduced by right turning vehicles entering the highway (see Figure 5-1). Turn limitations or restrictions were a primary tool in the improvements for US-95.

Figure 5-1. Median Treatments

(a) Existing Sunset Ave Intersection



(b) Possible Turn Restriction Layout at Wyoming

The uniform spacing of signals along a corridor has a direct and distinct impact on the performance of any coordination system implemented. Currently, there are two signals-Bosanko and Canfield-that disrupt this spacing along the corridor, ultimately violating the Idaho code requiring a ½ mile spacing of signals. The bulk of the remaining improvements to the corridor revolve around the current location of signals, the potential removal or relocation of those signals, and the proposed addition of future signals to the north of the corridor.

5.1 Alternatives Analysis

Initially, there were four alternatives spanning from the elimination of left turns to the extension of a signalized corridor north to SH-53. As feedback was received, Alternatives 3 and 4 were split into "a"s and "b"s with slight modifications made to each. As a clearer image of the preferred future network became apparent, a seventh option-Alternative 5-was added as a montage of the previous six options. These alternatives are described in further detail throughout this Chapter. It should be noted that each of these alternatives includes the planned signal at Lancaster Road.

5.1.1 Alternative 1

The first alternative to the existing US-95 is to close the median openings at all unsignalized intersections. This alternative was specifically requested by the IT Board and included restricting access at the 12 unsignalized intersections between the Interstate and SH-53 (see Figure 5-2). Alternative 1 significantly improves the safety along the corridor by eliminating nearly all of the conflict points at the unsignalized intersections. However, modeling demonstrated that redirecting of all left turning traffic to signalized intersections would have a detrimental effect on the operations at those signals. Most notably are the effects on the intersection at Hayden Avenue. Currently, there are four unsignalized intersections with median access between Hayden and Lancaster. By forcing all of the left turning vehicles (predominantly northbound during the PM peak hour) to the nearest signalized intersection was shown on have catastrophic effects on the northbound left turning movement at Hayden, causing queuing that was simulated to reach beyond Honeysuckle. Although overall system delay was reduced by this alternative (due to the reduced delay of vehicles waiting to turn left from the crossing street), the complete breakdown at Hayden Avenue eliminated this option from further consideration. Capacity analysis results are depicted in Figure 5-9a and Figure 5-9b. Volume re-distributions are depicted in Figure 5-15a and Figure 5-16b.

5.1.2 Alternative 2

Whereas the first alternative eliminated cross street access at unsignalized intersections, this alternative proposed the installation of turn movement restrictions at the 12 unsignalized intersections, only eliminating the minor left turn movements(see Figure 5-3a and Figure 5-3b). The restricted access still allows for the left turns off of US-95 and right turns onto and off of the side streets (right-in-right-out). This alternative, while still improving the safety aspects like Alternative 1, does not have the adverse operational impacts of Alternative 1. Though left turning vehicles off of the side streets are re-routed to signals, this is a relatively small volume when compared to the left turning vehicles off of the Highway. The result, as summarized in Figure 5-23, is reduced overall delay and with comparable travel times through the corridor. Capacity analysis results are depicted in Figure 5-10a and Figure 5-10b. Volume re-distributions are depicted in Figure 5-17a and Figure 5-17b.

5.1.3 Alternatives 3a and 3b

The third round of alternatives involved the addition of new signals north of Hayden at 1 or ½ mile spacing, including new signals at Miles Avenue, Wyoming Avenue, Lancaster Avenue, and Boekel Avenue. Alternative 3a introduces these signals and Alternative 3b promotes turn restrictions at the remaining unsignalized intersections (see Figure 5-4a and Figure 5-4b an Figure 5-6a and Figure 5-6b). These options essentially push the current view of US-95 further north to the signal at SH-53, resulting in few improvements in the operations. Capacity analysis results are depicted in Figure 5-10a and Figure 5-10b. Volume re-distributions are depicted in Figure 5-18a and Figure 5-18b and Figure 5-19a and Figure 5-19b.

5.1.4 Alternatives 4a and 4b

The fourth round of alternatives improvements focused on the removal of signals from the ¼ mile spaced Bosanko and Canfield intersections, the addition of a ½ mile spaced intersection at Wilbur Avenue (north of Canfield), and varying degrees of turn restrictions at the unsignalized intersections. Alternative 4a calls for the implementation of a closed median at Bosanko and turn restrictions at the remaining unsignalized intersections (see Figure 5-6a and Figure 5-6b) whereas Alternative 4b closes the median at both Bosanko and Canfield. Additionally, Alternative 4b proposes a connection from Government Way to the new signal at Wilbur Avenue as well as a new connection between Wilbur and Canfield west of Government Way (see

Figure 5-7a and Figure 5-7b). Both alternatives reduced the total delay along the corridor by significantly reducing the cross street delay, although slightly increasing delay to the northbound and southbound US-95 traffic. Also, with the addition of turn restrictions, safety along the corridor is expected to increase. Further, Alternative 4a draws a substantial amount of traffic off of US-95 and onto Ramsey Road and Government Way. Capacity analysis results are depicted in Figure 5-13a and Figure 5-13b and Figure 5-14a and Figure 5-14b. Volume re-distributions are depicted in Figure 5-20a and Figure 5-20b and Figure 5-21a and Figure 5-21b.

5.1.5 Alternative 5

As shown in Figure 5-8a and Figure 5-8b, the final alternative compounds several of the previous alternatives by eliminating the ¼ mile signal at Bosanko, relocating the ¼ mile at Canfield Avenue to a ½ mile signal at Wilbur Avenue, adding signals north of Hayden Avenue at Miles Avenue, Wyoming Avenue, and Lancaster Avenue, and implementing turn restrictions at all unsignalized intersections. This alternative also limits Bentz Road and Murphy Road to right-in-right-out only between Boekel Road and SH-53, which was done to be consistent with ITD's design plans for the US-95 Wyoming to SH-53 project. Alternative 5 reduces the total delay along the corridor by decreasing the cross street delay, primarily at those intersections north of Prairie Avenue. Reduced delay coupled with increased safety and enhanced with the presence of planned signals to the north highlights this alternative for further consideration. Capacity analysis results are depicted in Figure 5-15a and Figure 5-15b. Volume re-distributions are depicted in Figure 5-22a and Figure 5-22b.

5.2 Favored Solutions

As a result of the technical analyses and the feedback from public meetings and the US-95 Steering Committee, there were two alternatives selected for further refinement, analysis, and recommendation. Through the course of several meetings, members of the Steering Committee evaluated the alternatives for their preferred measures of effectiveness, weighing safety, access, and mobility with each of the alternatives. Summaries of these meetings are included in Appendix B. Alternative 4a was selected as the first step in improving operations along US-95 with Alternative 5 being the next horizon. The next Chapter further details the refinements inflicted upon these alternatives and their projected improvements upon the system.

Figure 5-2a. Alternative 1 – Intersection Control

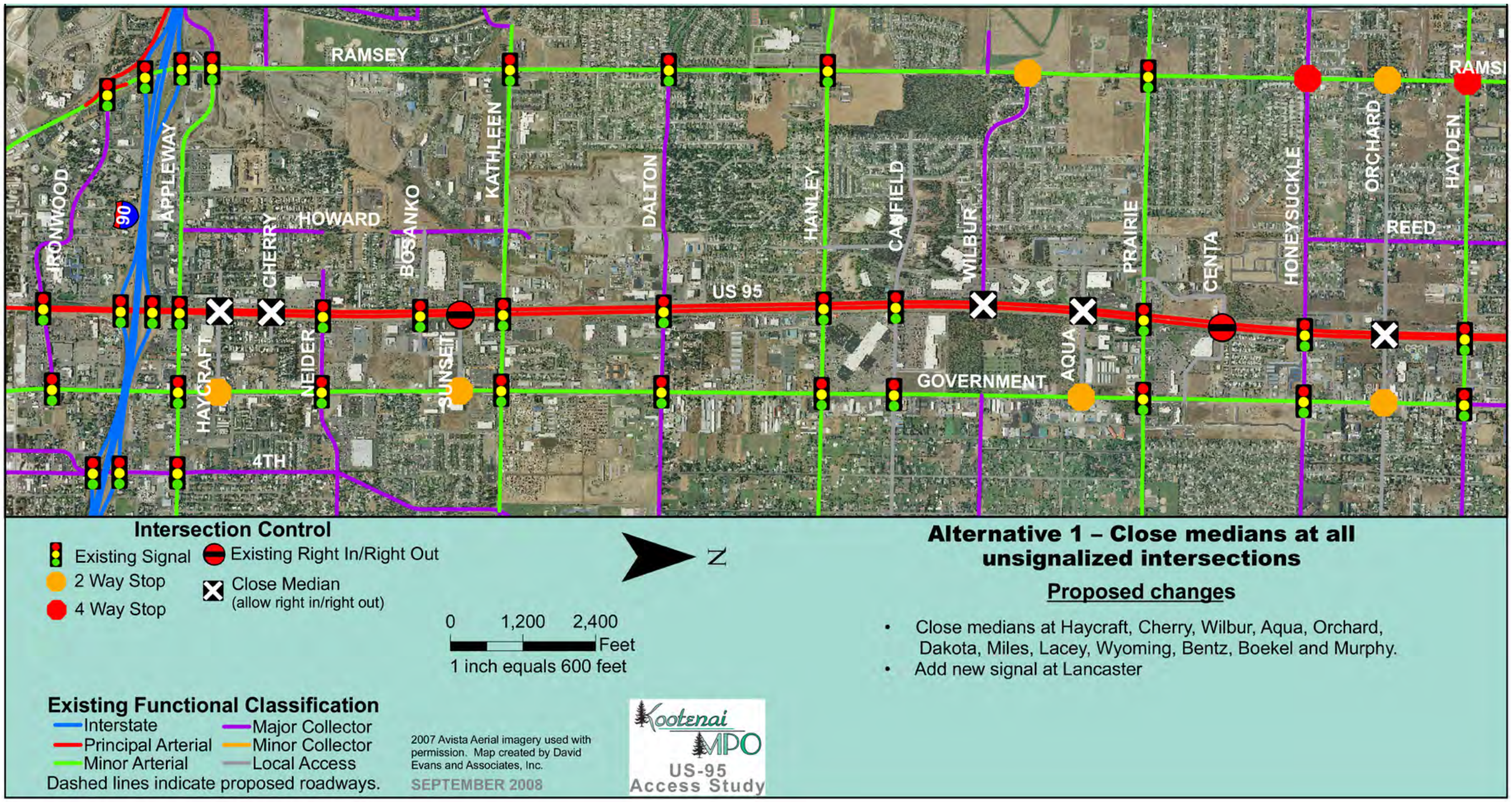
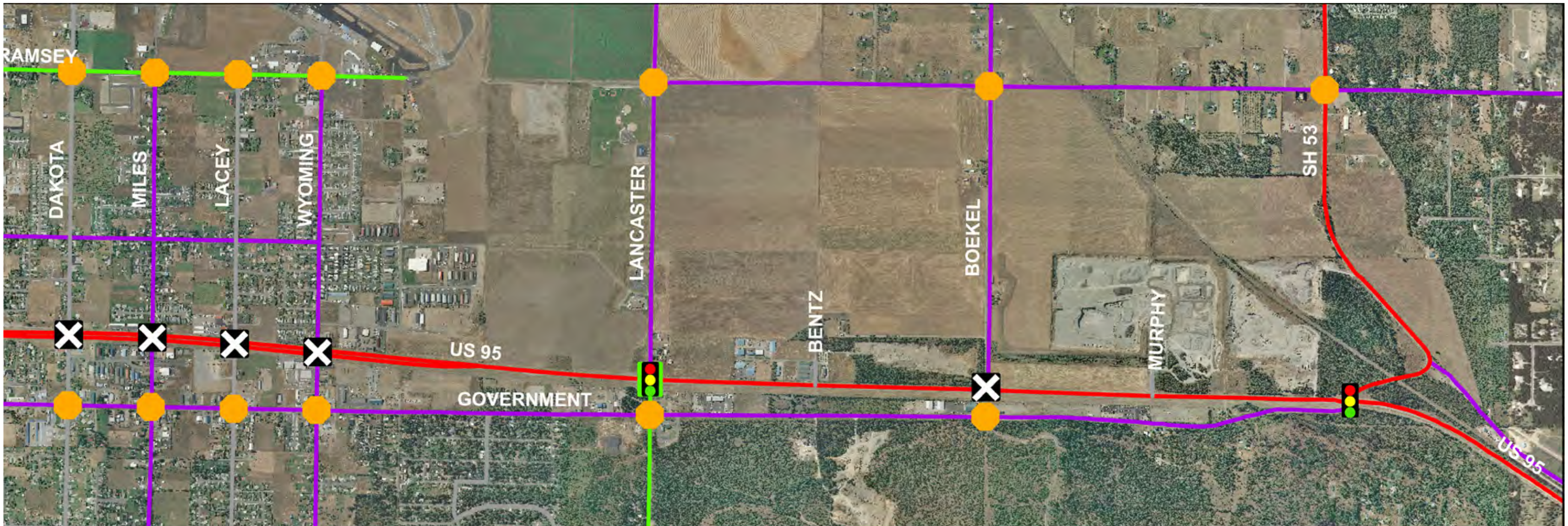


Figure 5-2b. Alternative 1 – Intersection Control



Key Technical Findings

SAFETY
- Safety is significantly improved at unsignalized intersections
- All left turning vehicles and all vehicles wishing to cross the highway are forced to signals. Higher traffic volumes at signals may increase the number of collisions there.

US95 MOBILITY
- Severe congestion occurs on US95 at the Hayden intersection.
- Long lines of left turning traffic backs up into the through lanes on US95 at Hayden, causing delays on US 95, and increasing US95 travel time by up to 8 minutes overall.
- Significant traffic volume reduction on US95 between Hayden and Lancaster (up to 300 vehicles per hour in each direction).

SYSTEMWIDE IMPACTS
- Total hours of driver delay for entire study area is reduced by about 50%
- Significant traffic volume increases on the local system, especially in the northern half of the study area:
  - Hayden Ave between US-95 and Reed sees a large increase in traffic
  - Reed from Hayden to Wyoming has a large traffic increase
  - Government Way through Hayden has a large traffic increase

Figure 5-3a. Alternative 2 – Intersection Control

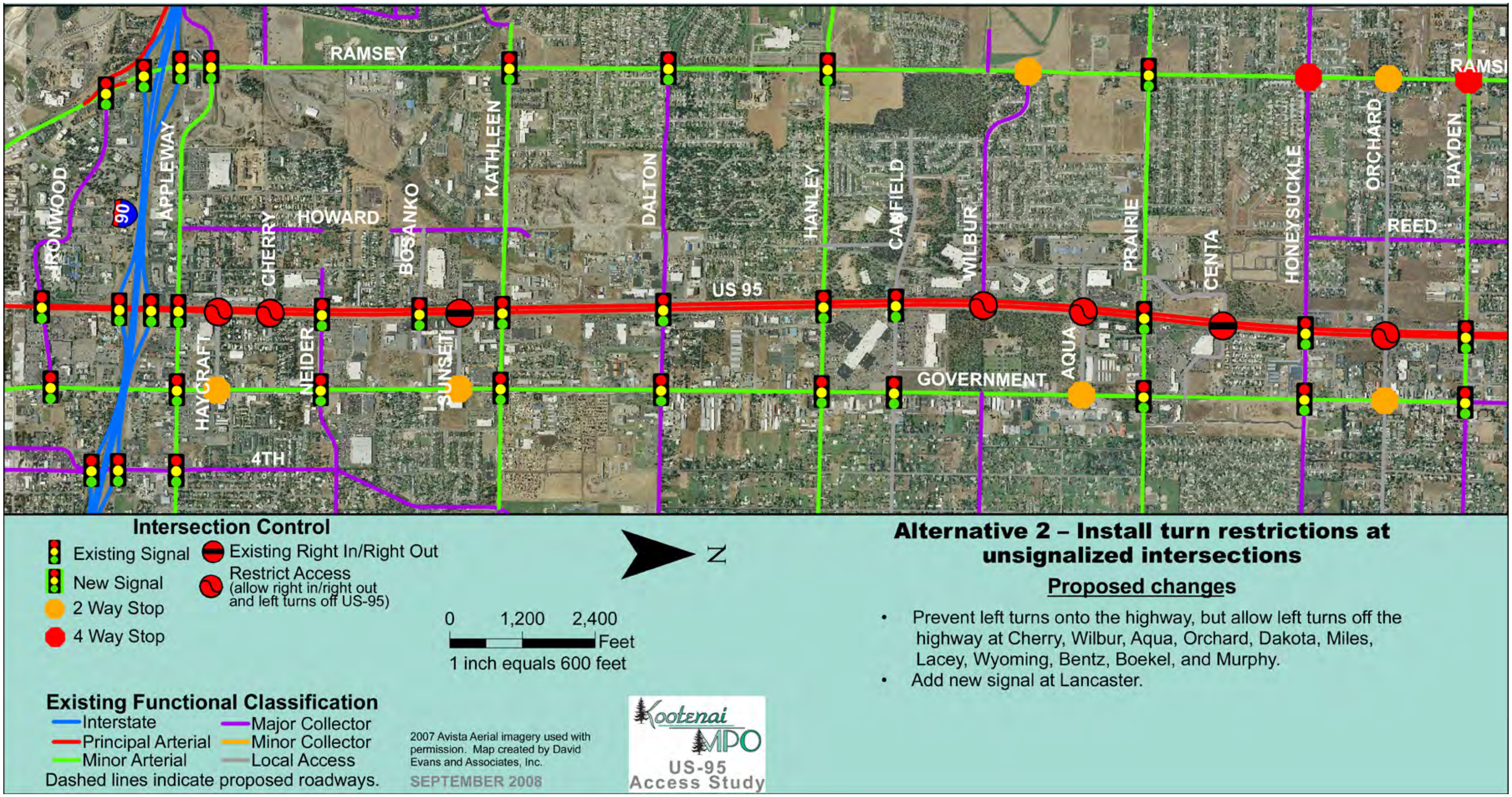
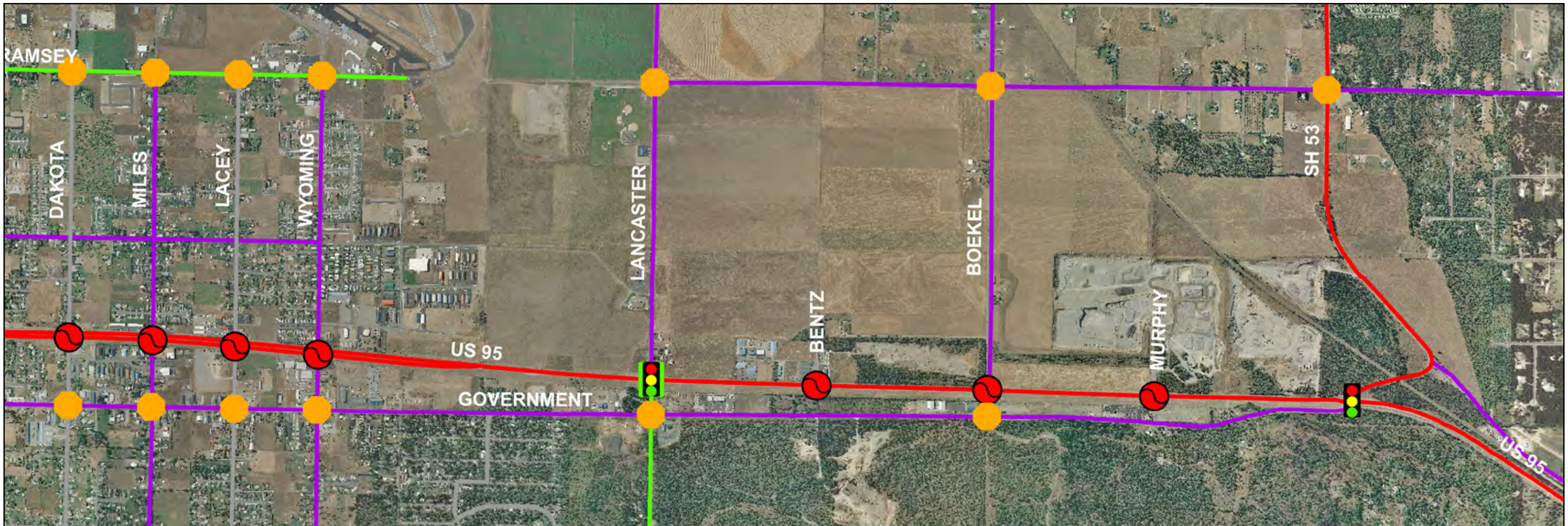


Figure 5-3b. Alternative 2 – Intersection Control



Key Technical Findings

SAFETY
- Safety is improved at unsignalized intersections.
- Traffic wishing to turn left onto or cross the highway is forced to signals. Additional traffic at the signals may increase the number of collisions there.

US95 MOBILITY
- No appreciable change to US95 travel time.
- Traffic volumes decrease significantly (by up to 300 vehicles per hour) on US95 between Hayden and Miles.

SYSTEMWIDE IMPACTS
- Total hours of driver delay for entire study area is reduced by about 50%
- Minor redistribution of traffic on the local system. Prairie, Hayden, Lacey, Wyoming and Government Way see moderate traffic increases (up to 200 vehicles per hour).

Figure 5-4a. Alternative 3a - Intersection Control

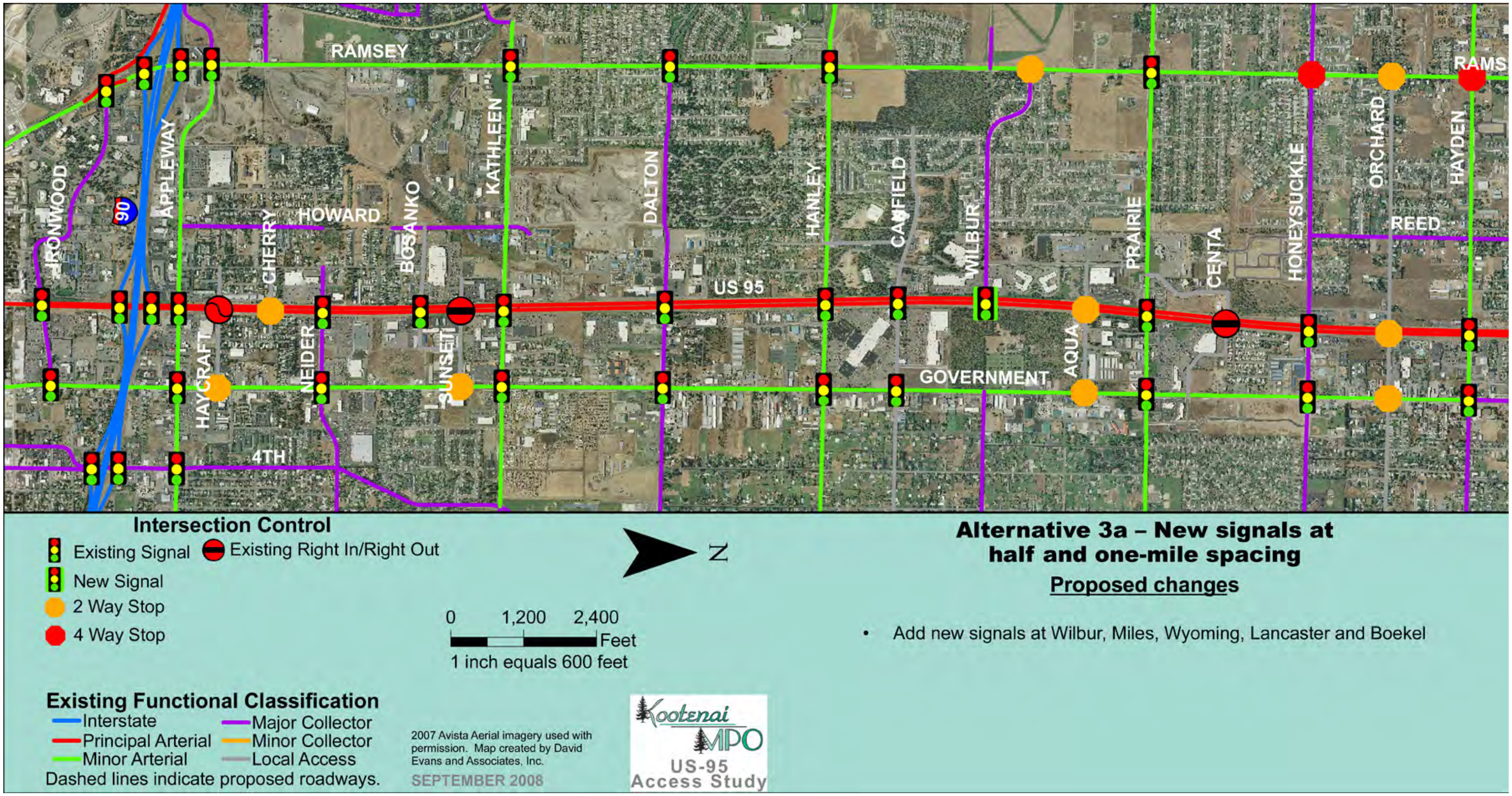
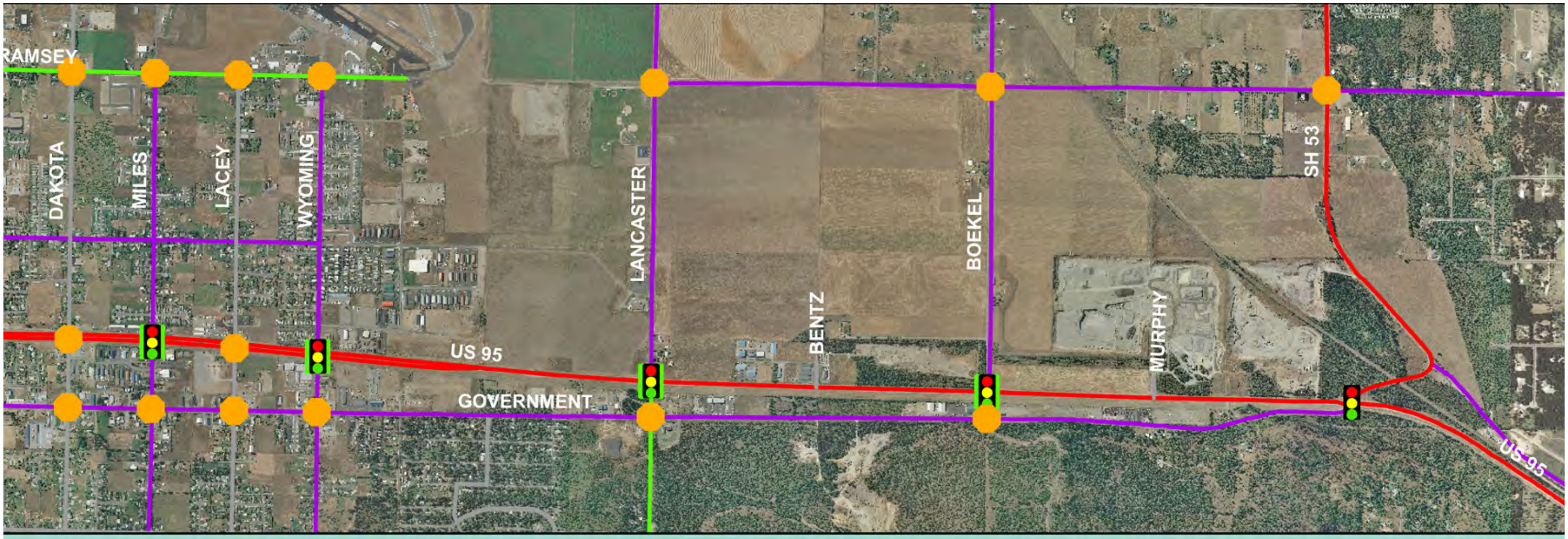


Figure 5-4b. Alternative 3a – Intersection Control



Key Technical Findings

SAFETY

- New signals may decrease the severity of collisions; however the total number of collisions may increase.

US95 MOBILITY

- Travel Time on US95 increases by up to 70 seconds.
- No appreciable traffic volume changes on US95.

SYSTEMWIDE IMPACTS

- Total hours of driver delay for the entire study area is reduced by about 23%.
- No appreciable change to travel patterns and volumes on local system.

Figure 5-5a. Alternative 3b – Intersection Control

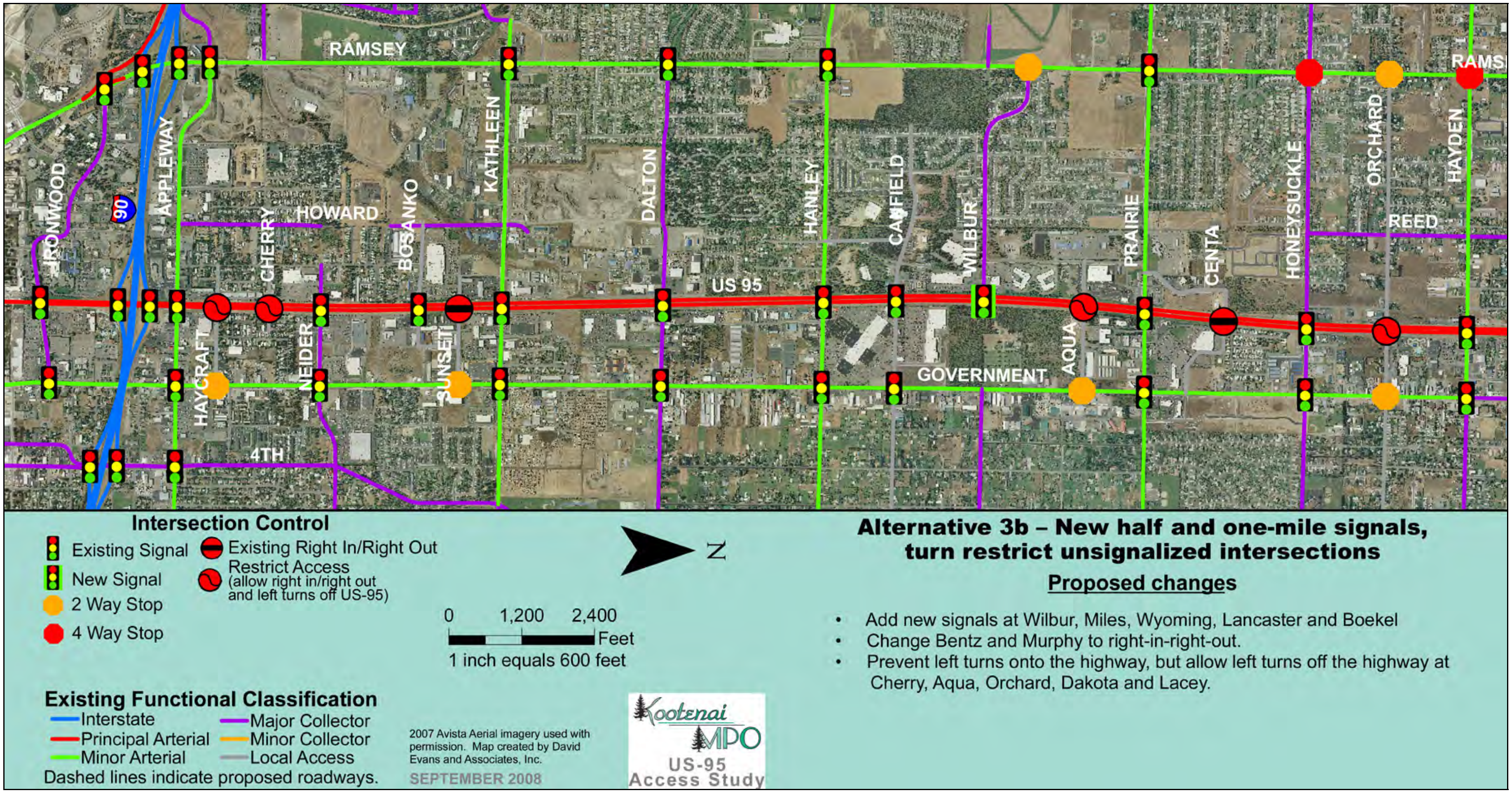
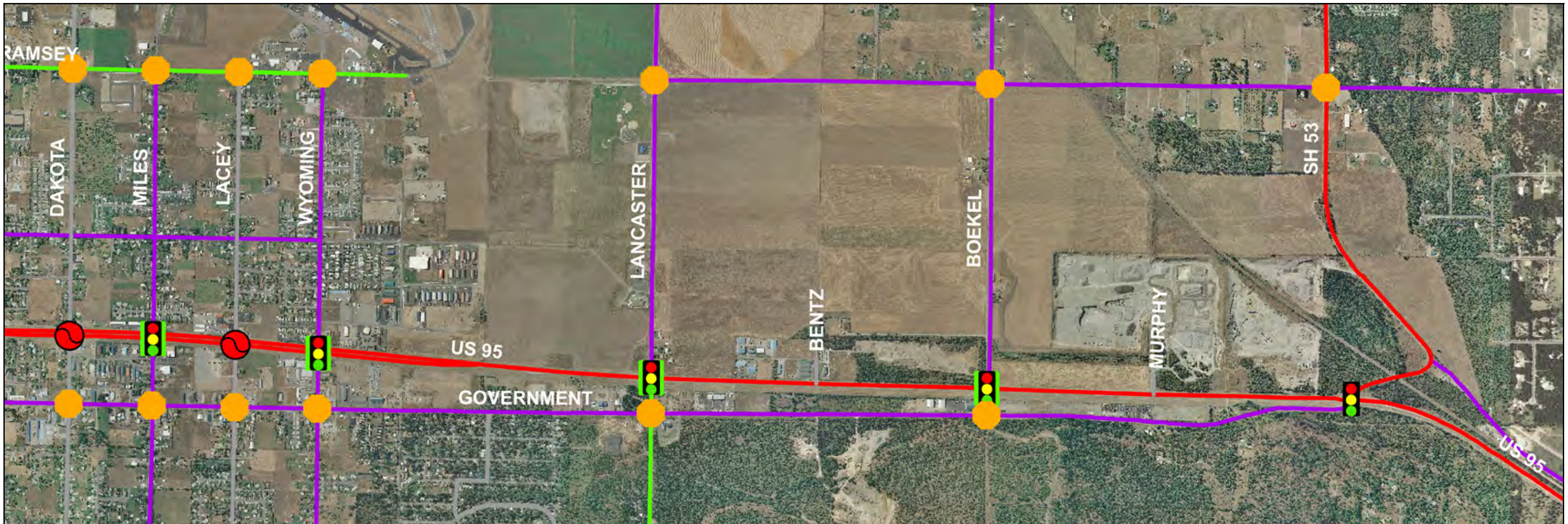


Figure 5-5b. Alternative 3b – Intersection Control



Key Technical Findings

SAFETY

- New signals may decrease the severity of collisions; however the total number of collisions may increase.
- Safety is improved at unsignalized intersections.
- Traffic wishing to turn onto or cross the highway is forced to signals. Additional traffic at signal locations may increase the number of collisions there.

US95 MOBILITY

- Travel time on US95 may increase by about 30 seconds.
- No appreciable change to overall traffic volumes on US95.

SYSTEMWIDE IMPACTS

- Total hours of driver delay for entire study area is reduced by about 50%.
- Minor travel pattern changes occur on local system, however no appreciable change to overall local system performance.

Figure 5-6a. Alternative 4a – Intersection Control

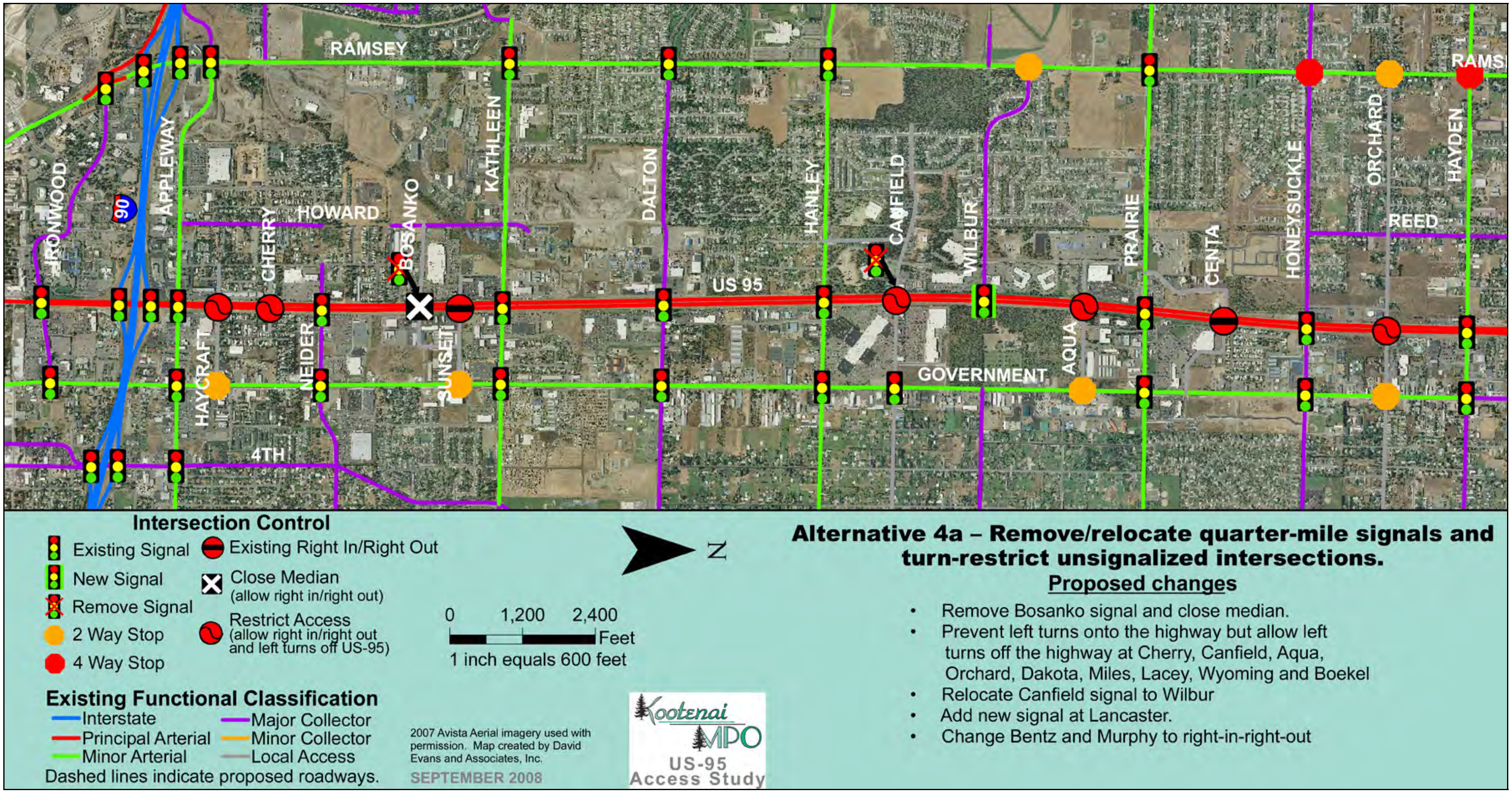
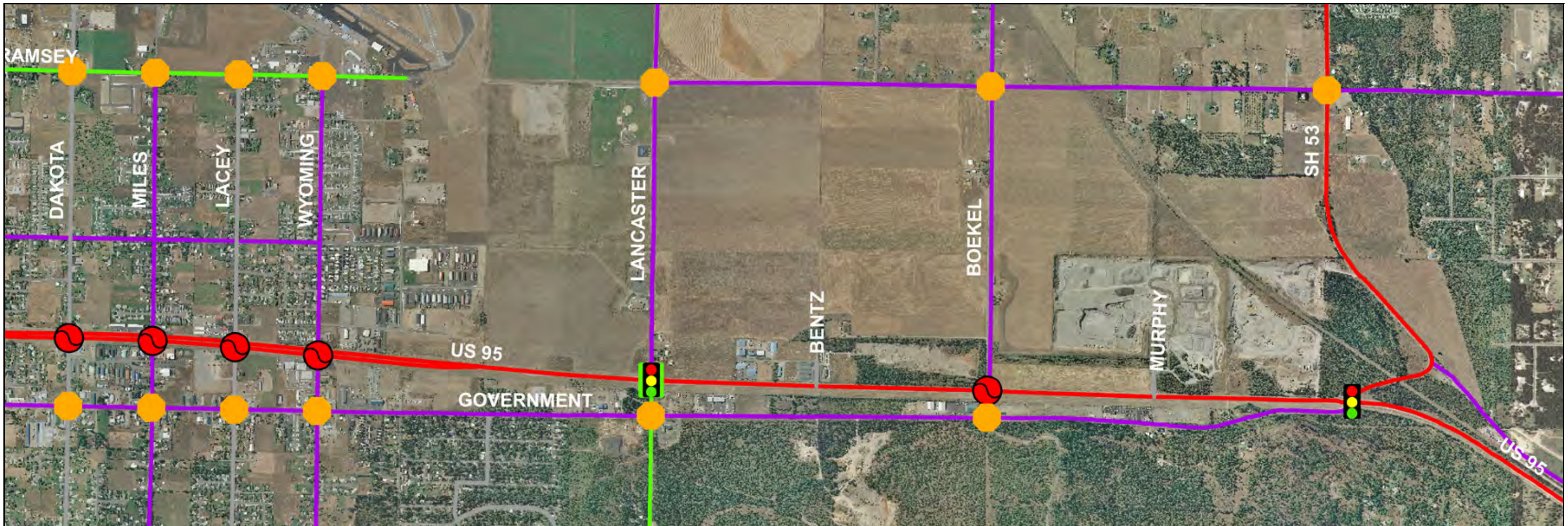


Figure 5-6b. Alternative 4a – Intersection Control



Key Technical Findings

SAFETY
- Safety is improved at existing unsignalized intersections.
- Traffic wishing to turn left onto or travel across the highway is forced to signals. Additional traffic at the signals may increase the number of collisions there.

US95 MOBILITY
- Slight decrease in US95 delay (about 4%)
- No appreciable change to US95 travel times.
- Traffic volumes decrease significantly (by up to 300 vehicles per hour) on US95 between Hayden and Miles.

SYSTEMWIDE IMPACTS
- Total hours of driver delay for entire study area is reduced by about 50%
- Minor redistribution of traffic on the local system. Prairie, Hayden, Lacey, Wyoming, and Ramsey see moderate traffic increases (up to 150 vehicles per hour).
- Large traffic increases (up to 250 vehicles per hour) on segments of Government Way.
- Better signal coordination is possible due to evenly spaced signals on half-mile and one-mile points. This may allow shorter signal cycle lengths, with more frequent green lights for cross streets.
- No appreciable change to delays at signalized intersections, however "experience" of drivers on some cross streets may improve with more frequent (but shorter) green light opportunities.

Figure 5-7a. Alternative 4b – Intersection Control

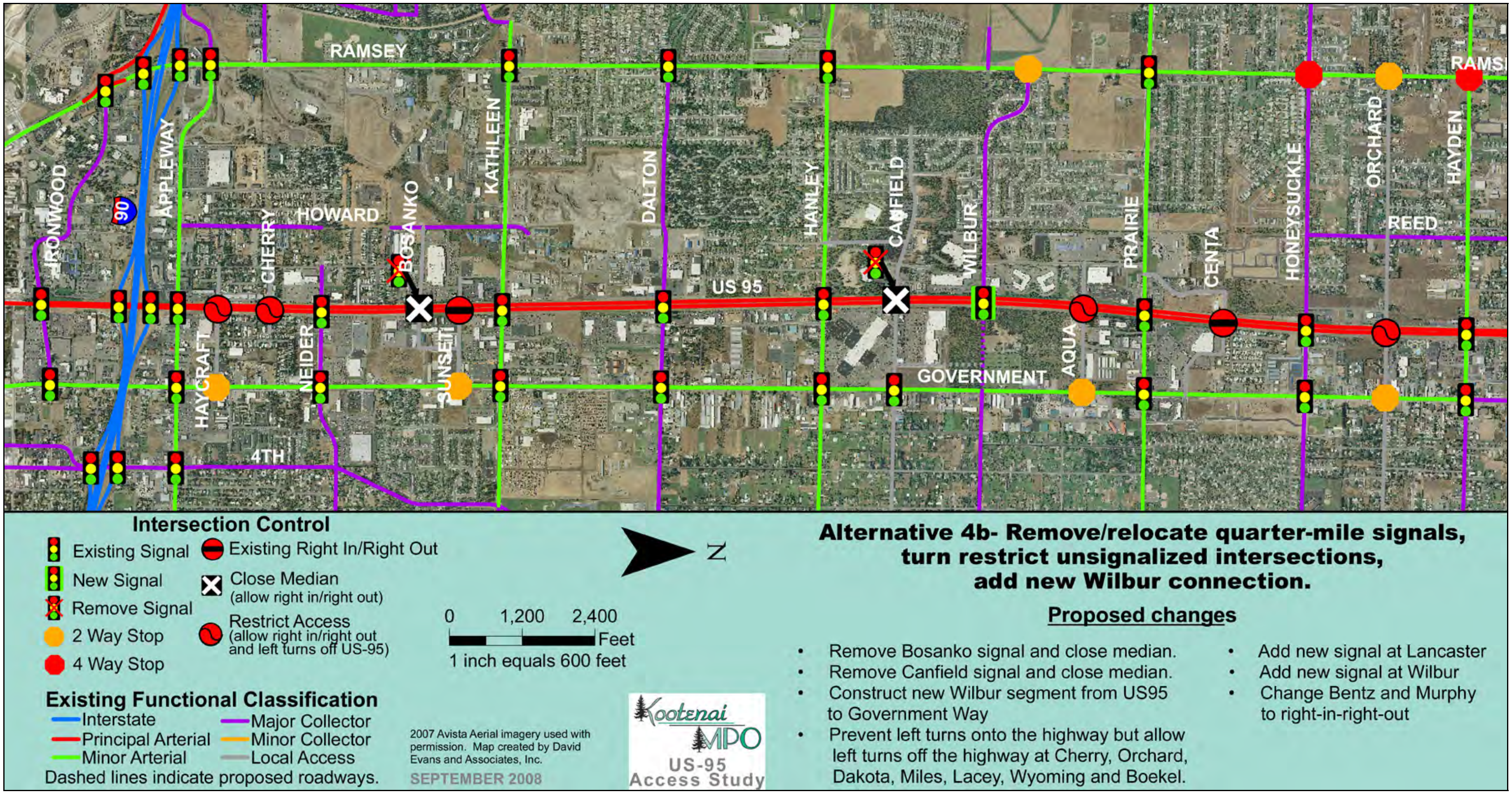
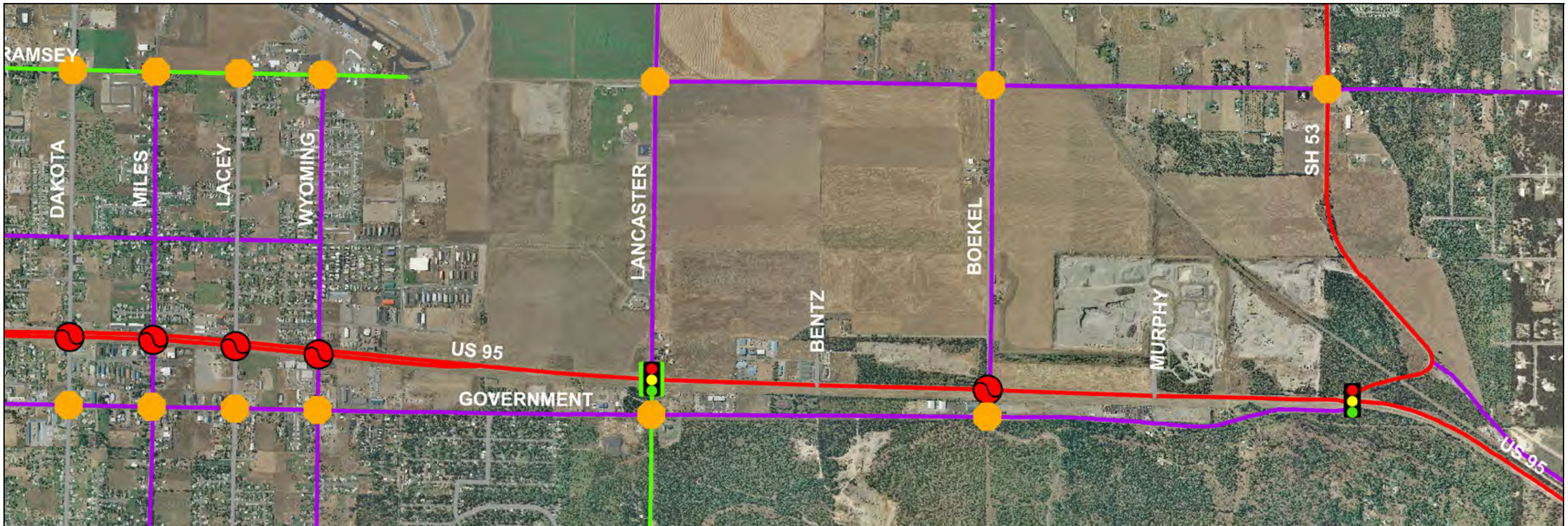


Figure 5-7b. Alternative 4b – Intersection Control



Key Technical Findings

SAFETY

- Safety is improved at existing unsignalized intersections.
- Traffic wishing to turn left onto or travel across the highway is forced to signals. Additional traffic at the signals may increase the number of collisions there.
- New signals may reduce severity of collisions, but may increase the number of collisions.

US95 MOBILITY

- Sight increase to US95 delay (about 8%)
- US95 travel time may increase by up to 65 seconds.

SYSTEMWIDE IMPACTS

- Total hours of driver delay for entire study area is reduced by about 50%
- Traffic volumes are redistributed on the local system. Kathleen, Hayden, Lacey, Wyoming and portions of Ramsey have traffic volume increases; Prairie, Honeysuckle, Orchard and Dakota have volume decreases.
- Better signal coordination is possible due to evenly spaced signals on half-mile and one-mile points. This could allow shorter signal cycle lengths, and more frequent green lights for cross streets.
- No appreciable change to total delays at signals, however "experience" of drivers on some cross streets may improve with more frequent (but shorter) green light opportunities.

Figure 5-8a. Alternative 5 – Intersection Control

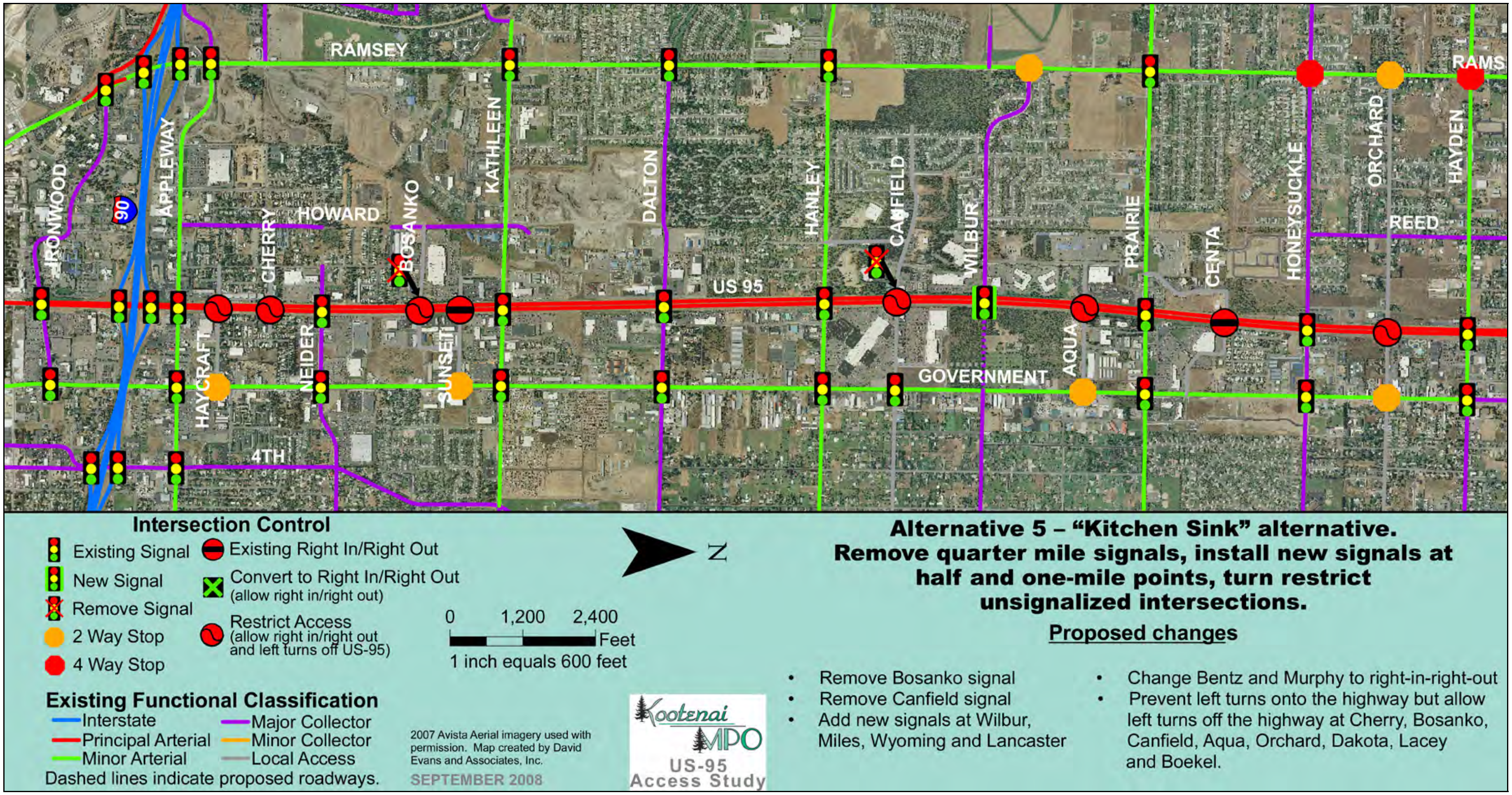
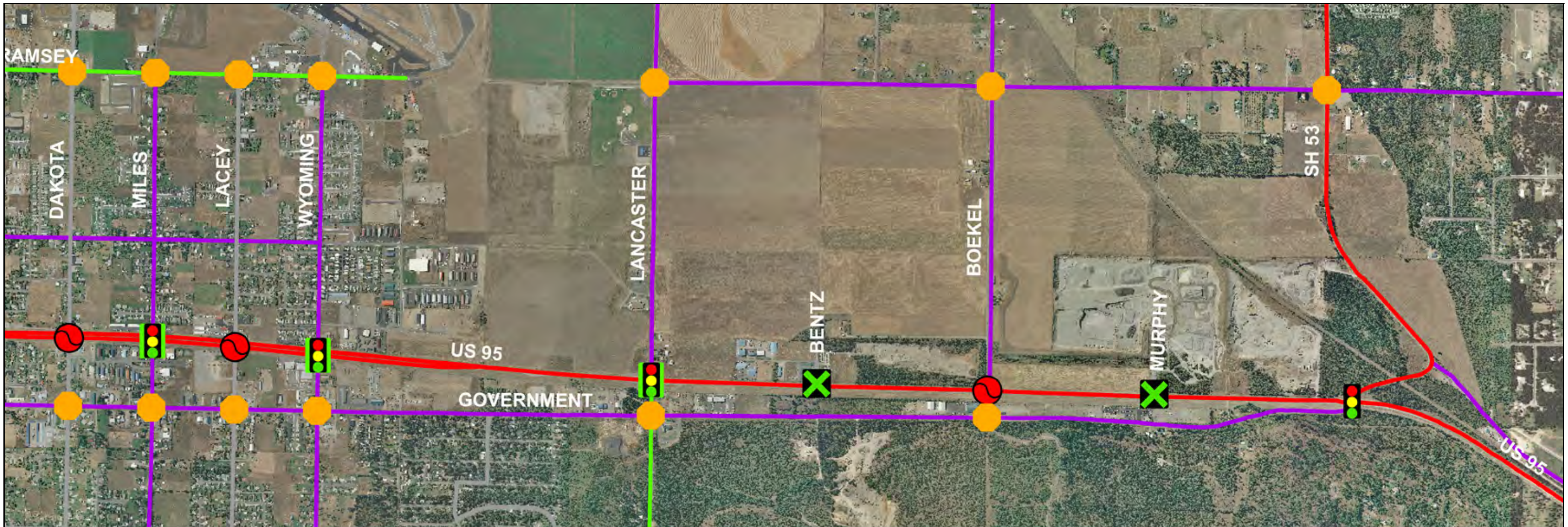


Figure 5-8b. Alternative 5 – Intersection Control



Key Technical Findings

SAFETY

- Safety is improved at existing unsignalized intersections.
- Traffic wishing to turn left onto or travel across the highway is forced to signals. Additional traffic at the signals may increase the number of collisions there.
- New signals may reduce severity of collisions, but may increase the number of collisions.

US95 MOBILITY

- Total delay on US95 increases slightly (up to 15%)
- US95 travel time increases by about 90 seconds

SYSTEMWIDE IMPACTS

- Total hours of driver delay for the entire study area is reduced by about 50%.
- Better signal coordination is possible due to evenly spaced signals on half-mile and one-mile points. This could allow shorter signal cycle lengths, and more frequent green lights for cross streets.
- No appreciable change to total delays at signals, however "experience" of drivers on some cross streets may improve with more frequent (but shorter) green light opportunities.

Figure 5-9a. Alternative 1 – Volume to Capacity Ratio

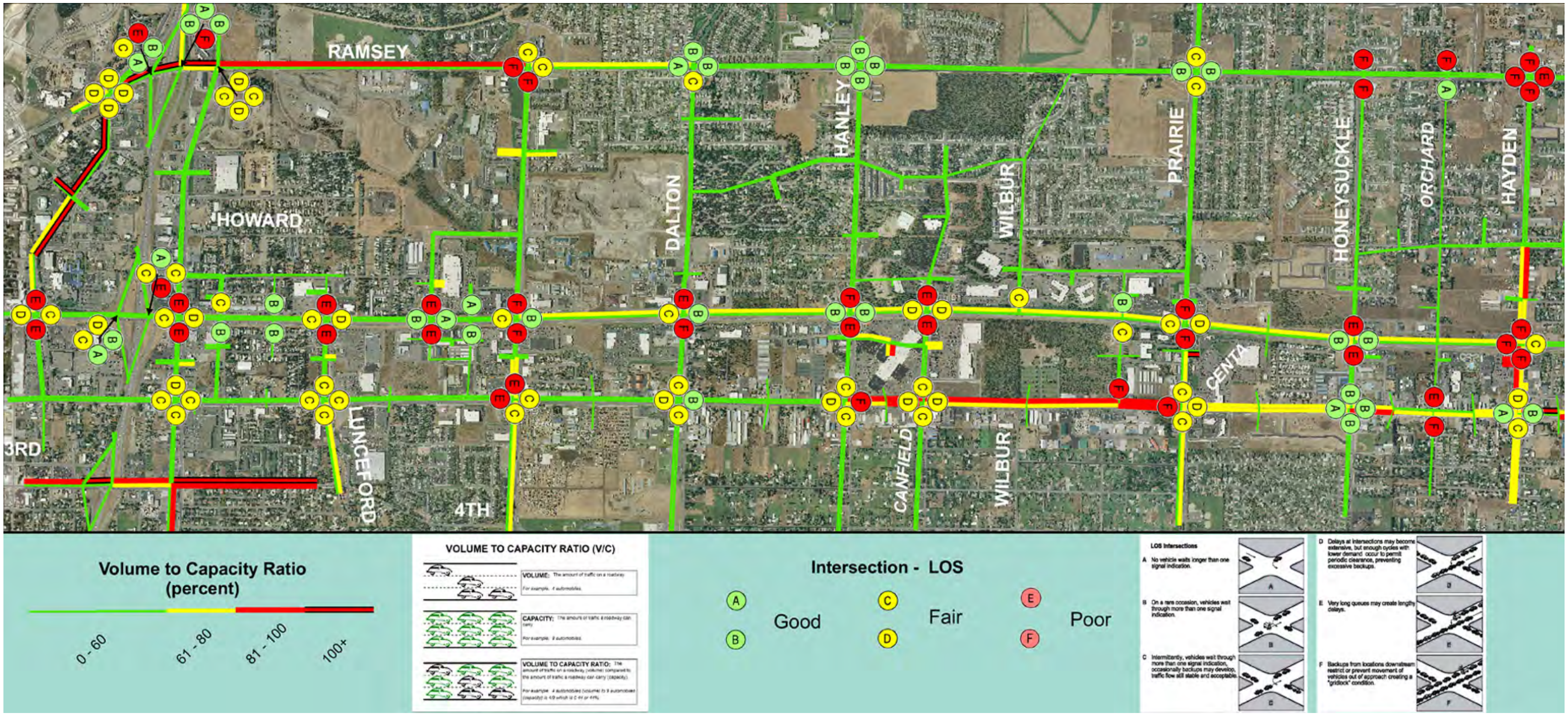


Figure 5-9b. Alternative 1 – Volume to Capacity Ratio

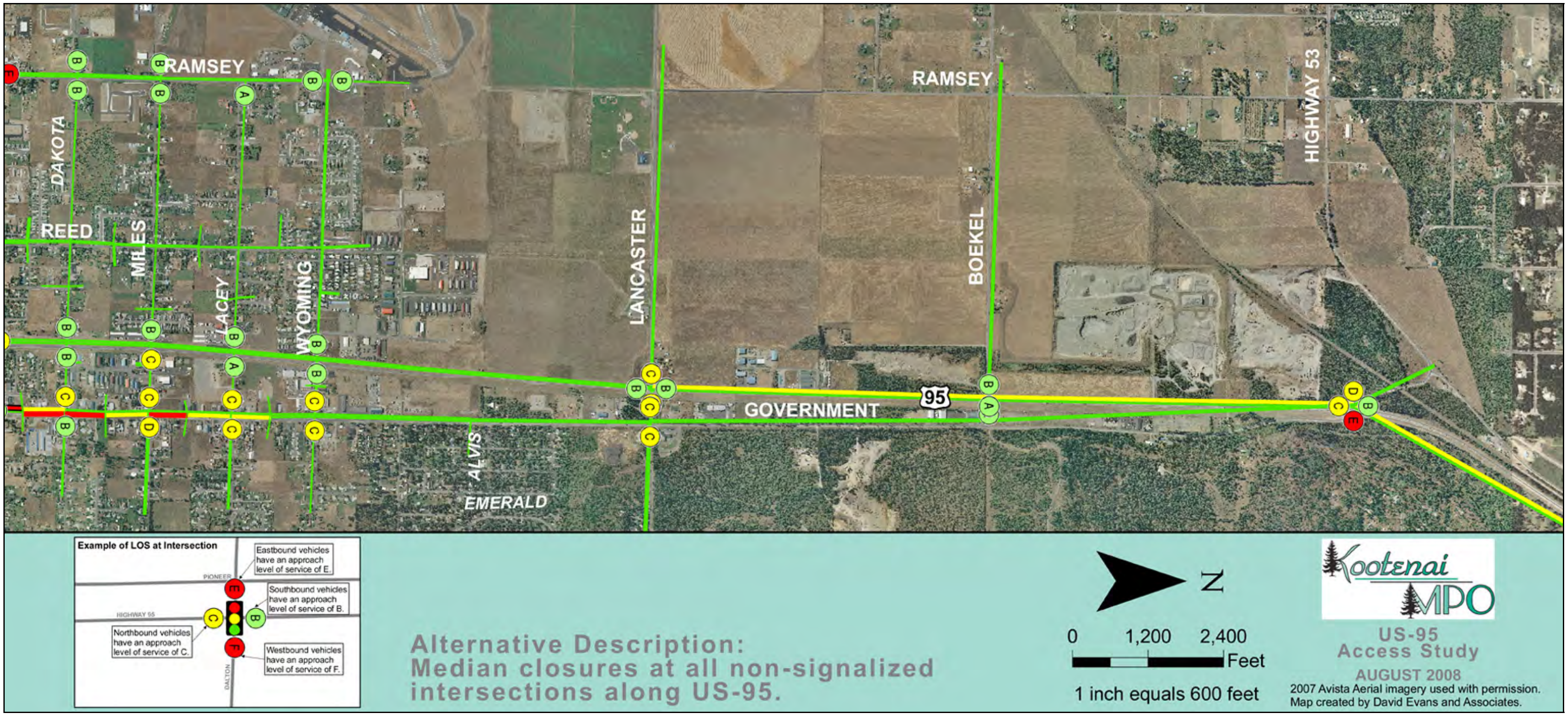


Figure 5-10a. Alternative 2 – Volume to Capacity Ratio

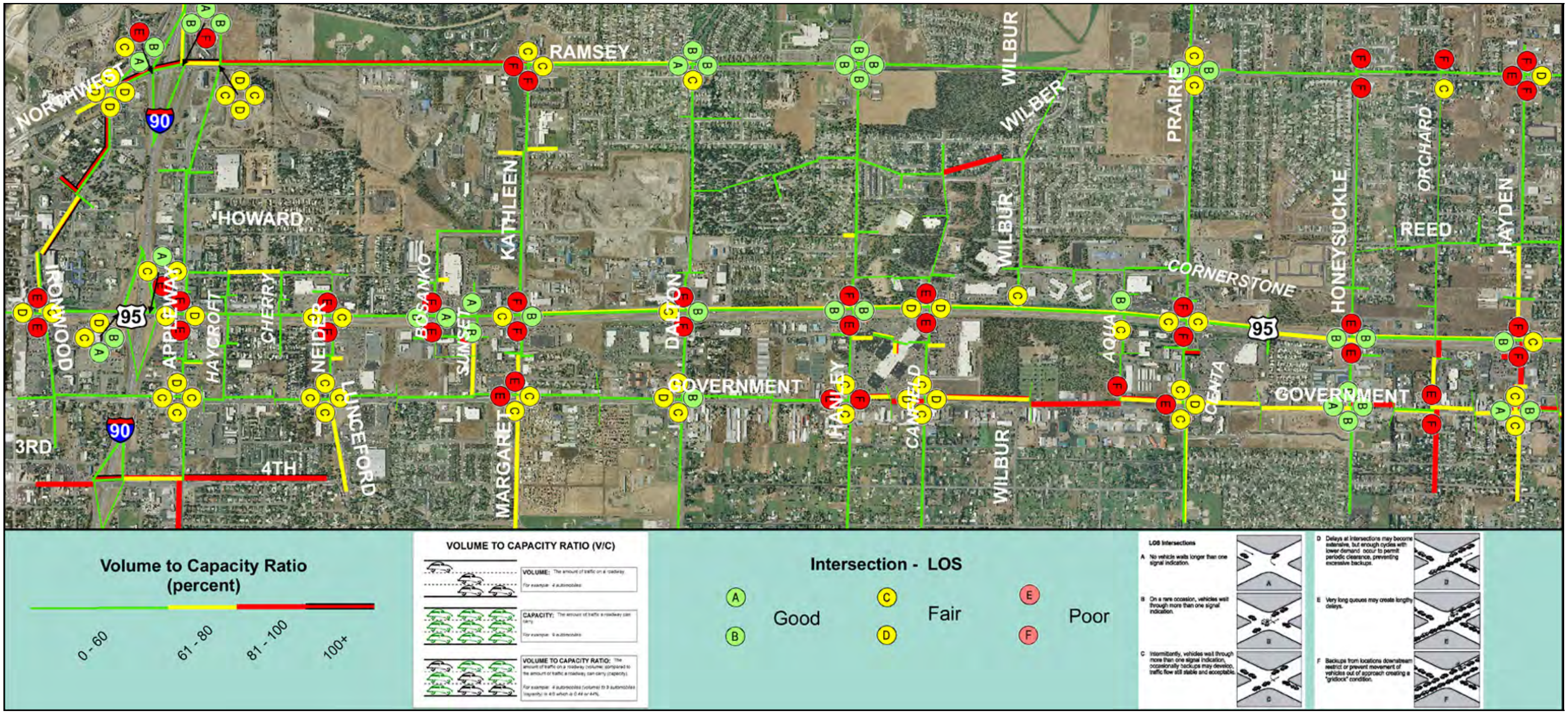


Figure 5-10b. Alternative 2 – Volume to Capacity Ratio

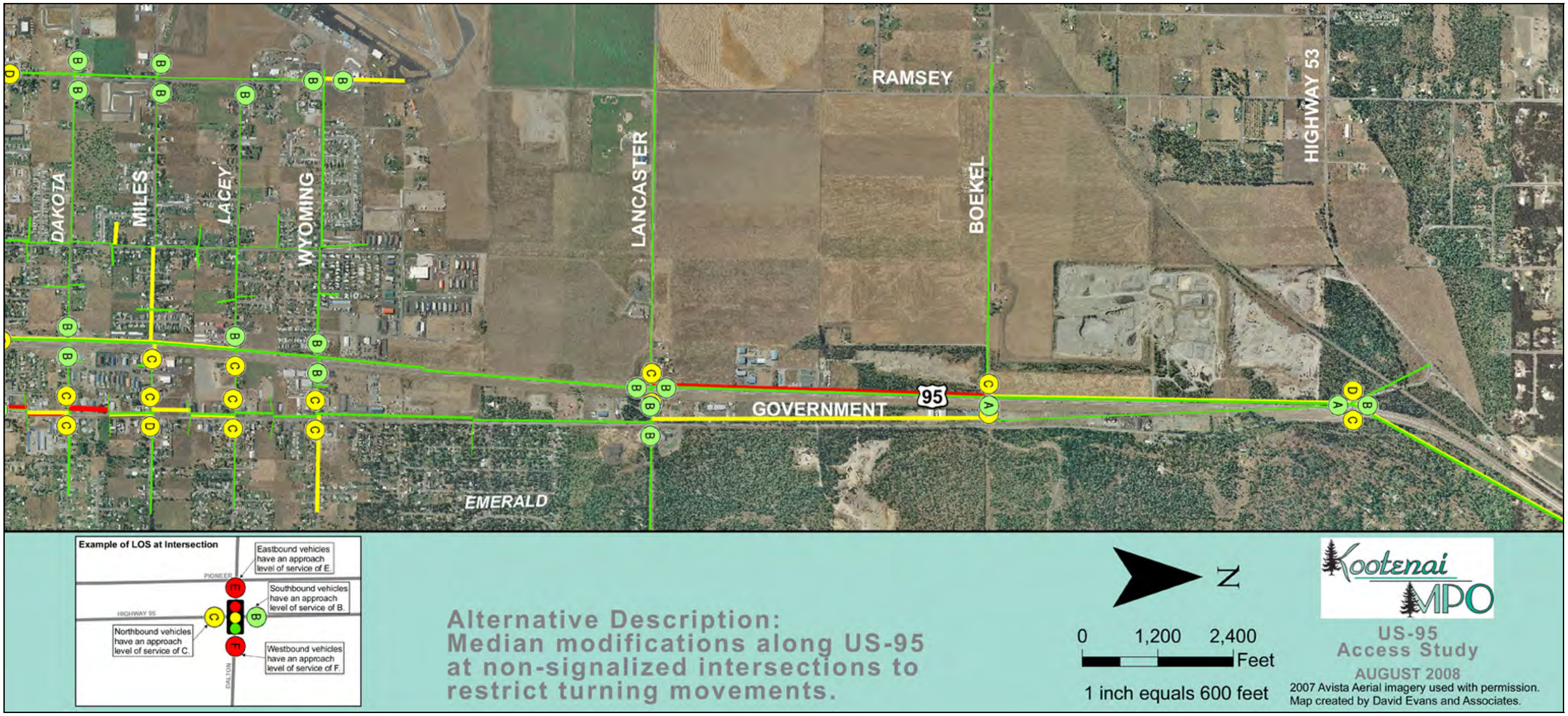


Figure 5-11a. Alternative 3a – Volume to Capacity Ratio

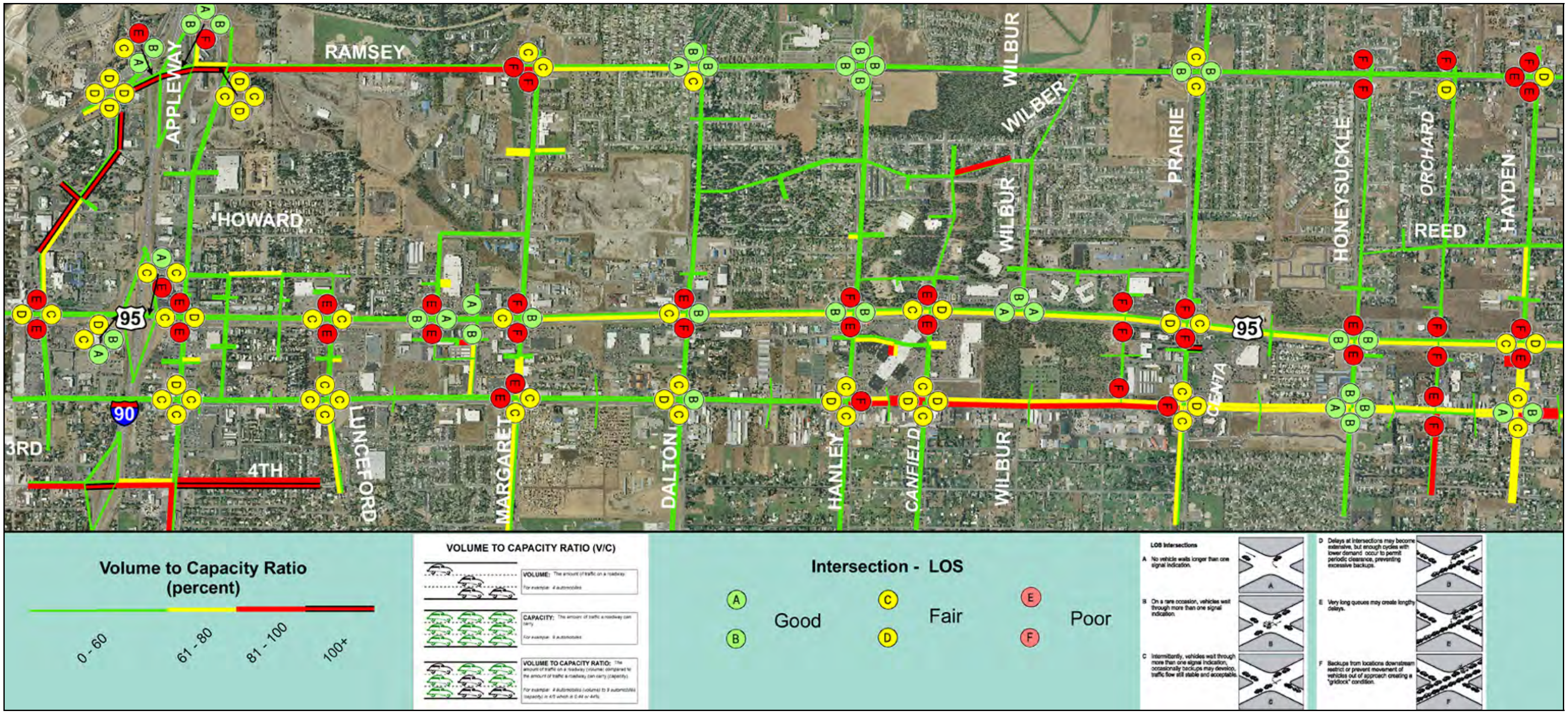


Figure 5-11b. Alternative 3a – Volume to Capacity Ratio

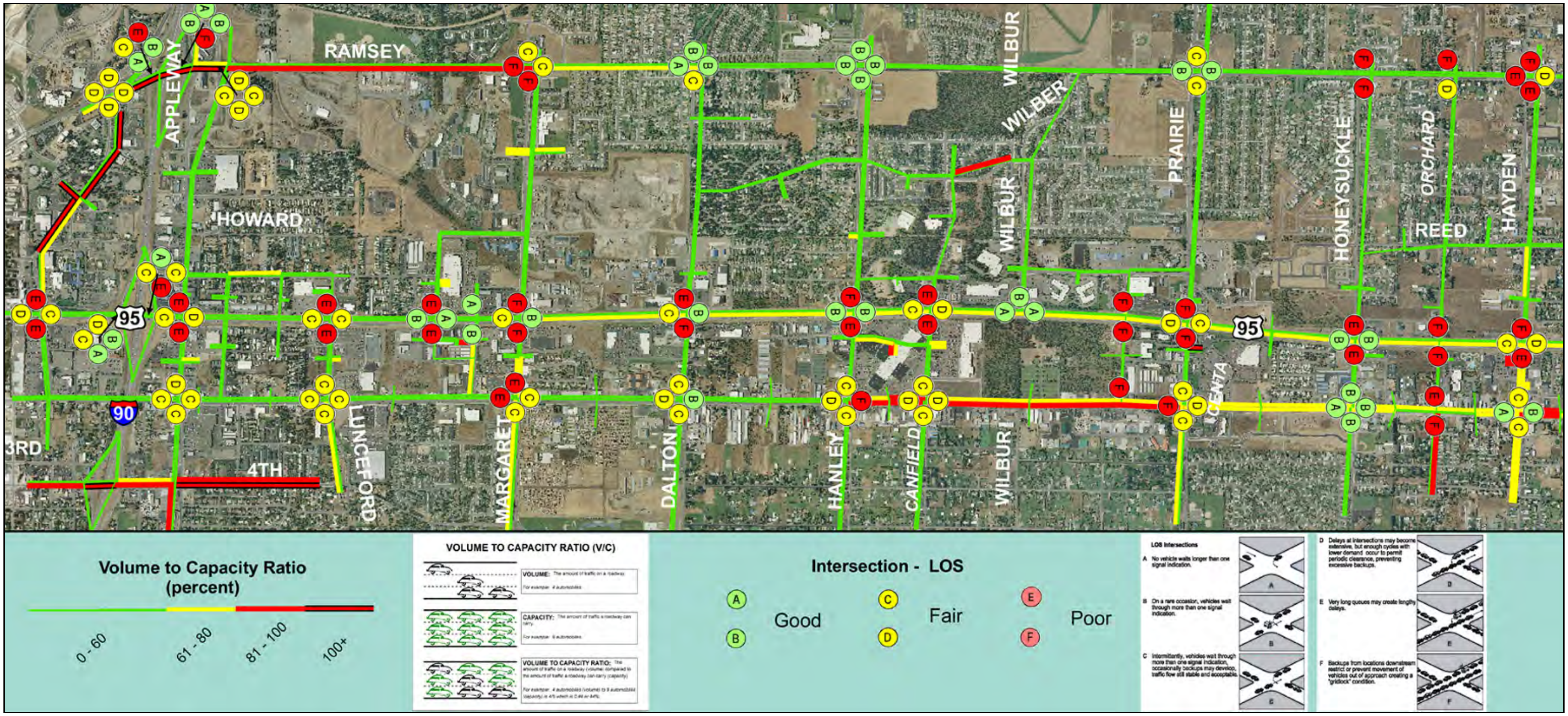


Figure 5-12a. Alternative 3b – Volume to Capacity Ratio

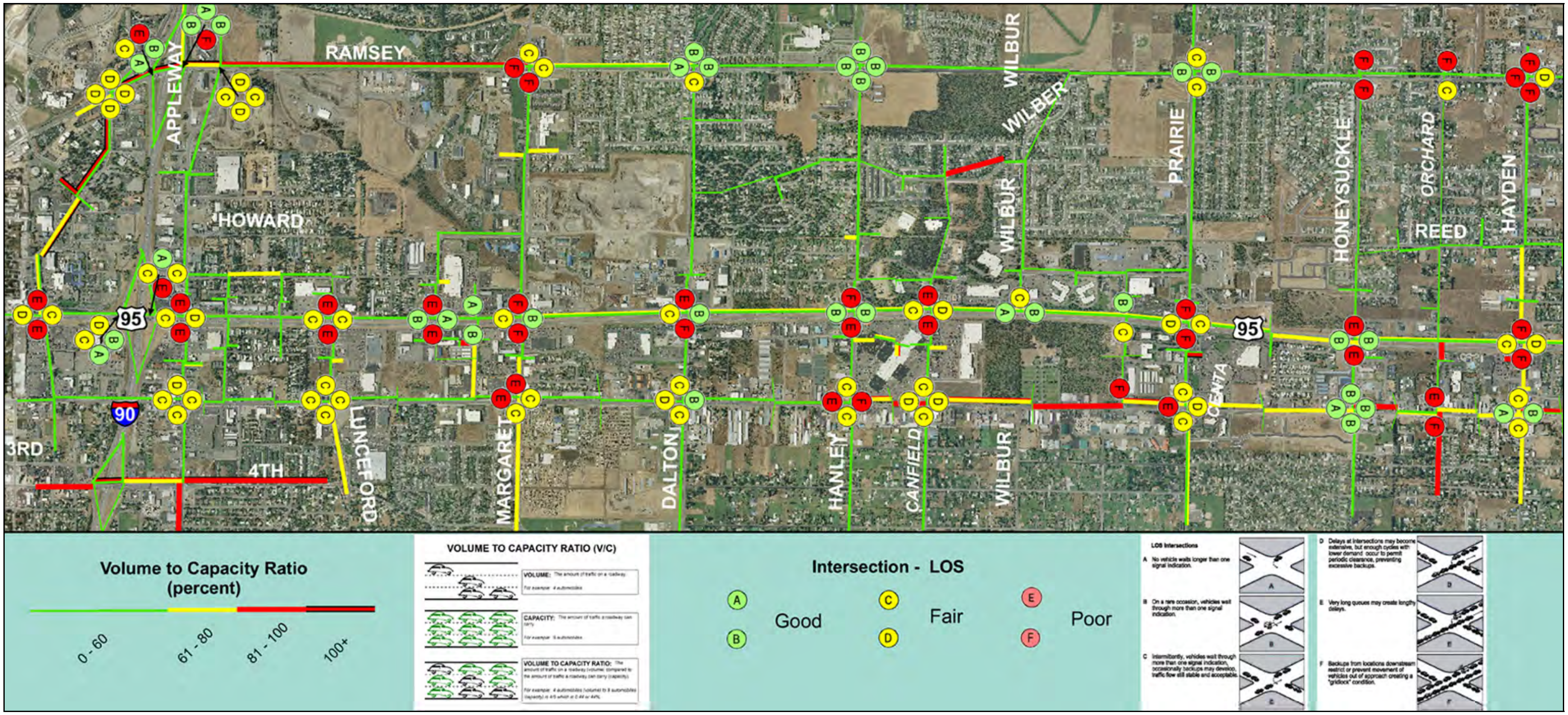


Figure 5-12b. Alternative 3b – Volume to Capacity Ratio

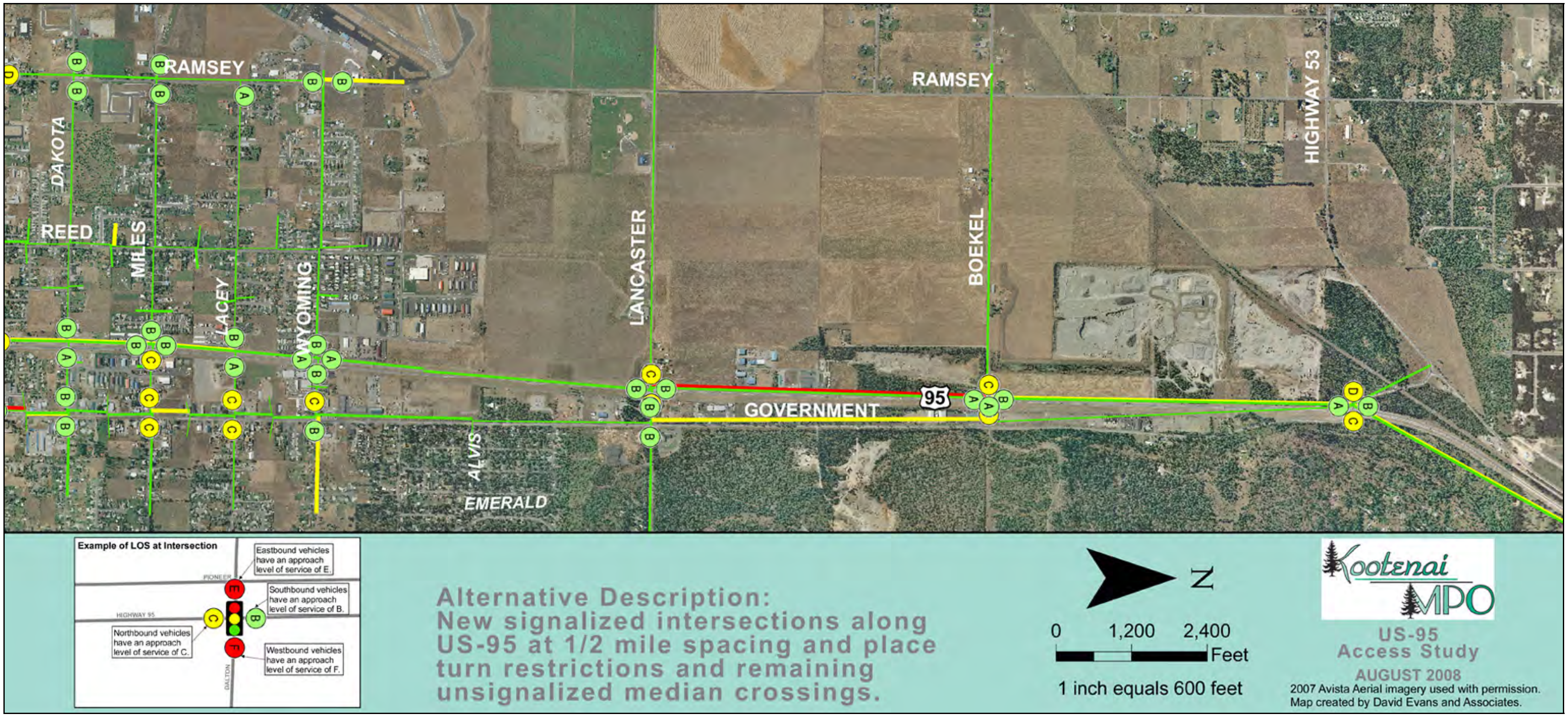


Figure 5-13a. Alternative 4a – Volume to Capacity Ratio

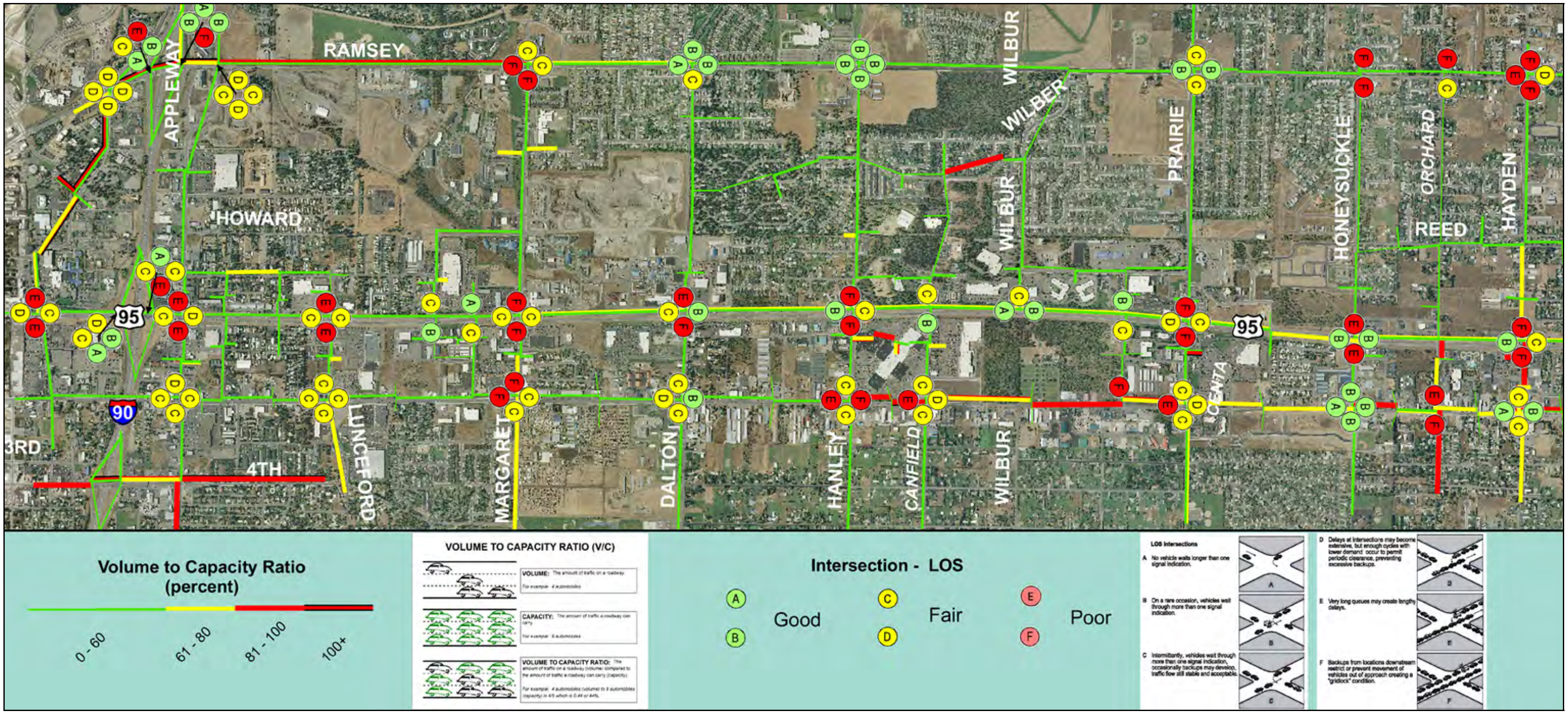


Figure 5-13b. Alternative 4a – Volume to Capacity Ratio

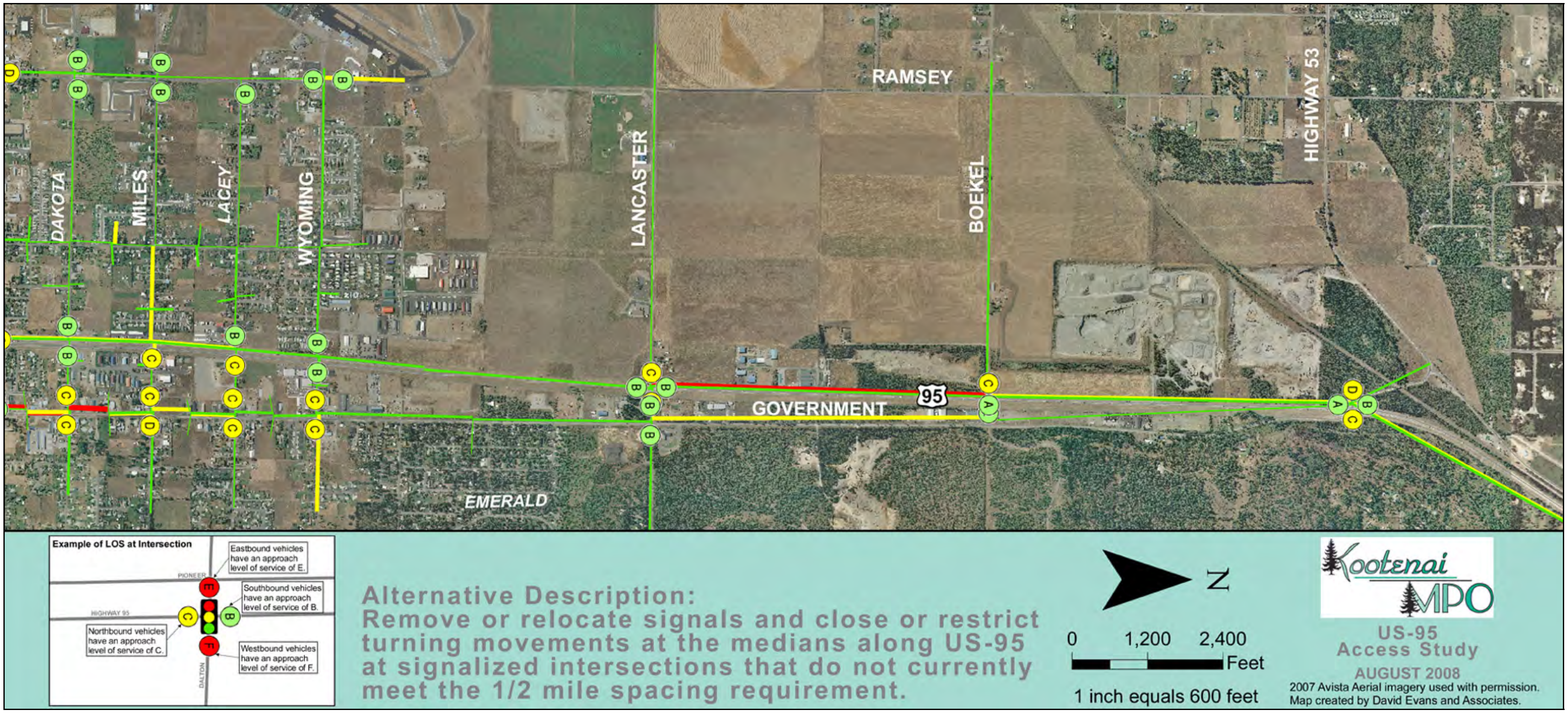


Figure 5-14a. Alternative 4b – Volume to Capacity Ratio

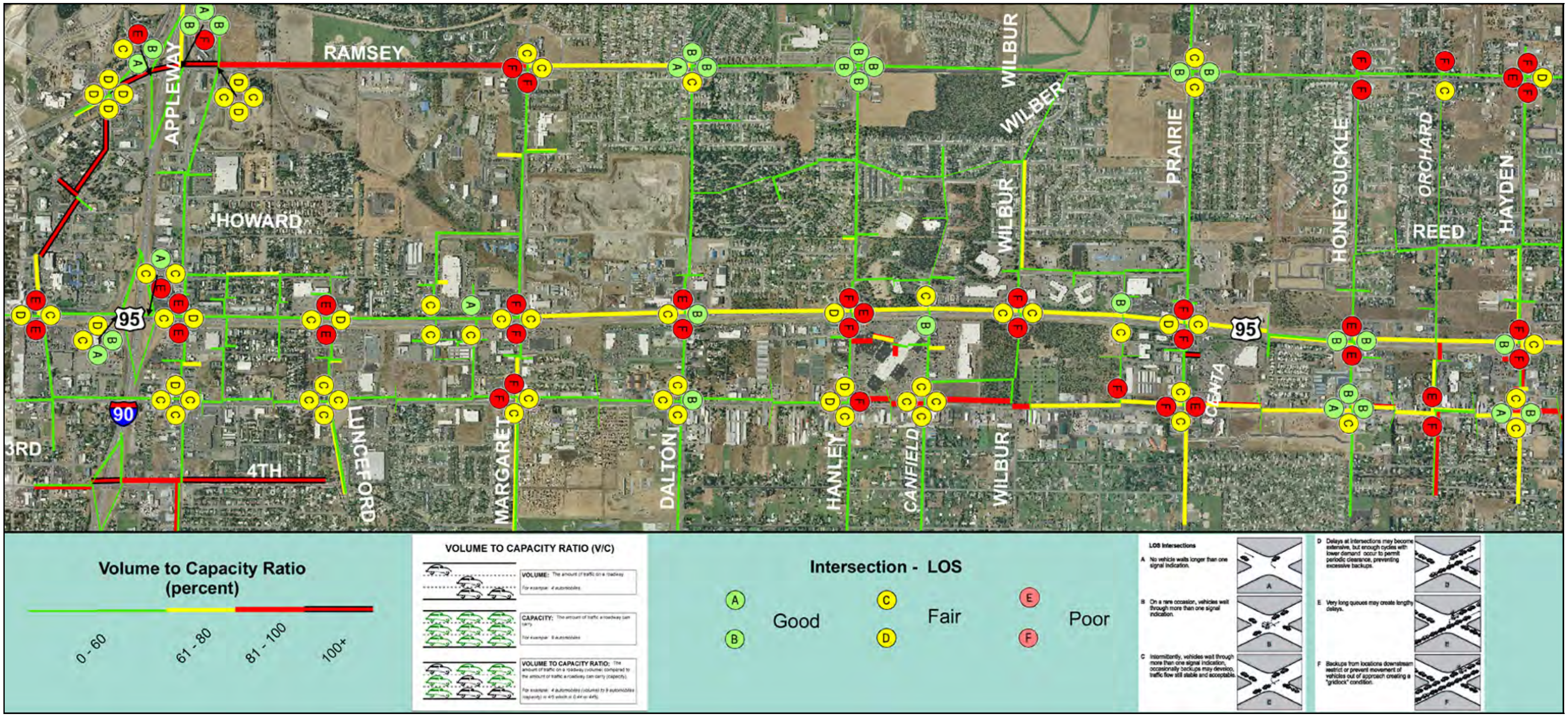


Figure 5-14b. Alternative 4b – Volume to Capacity Ratio

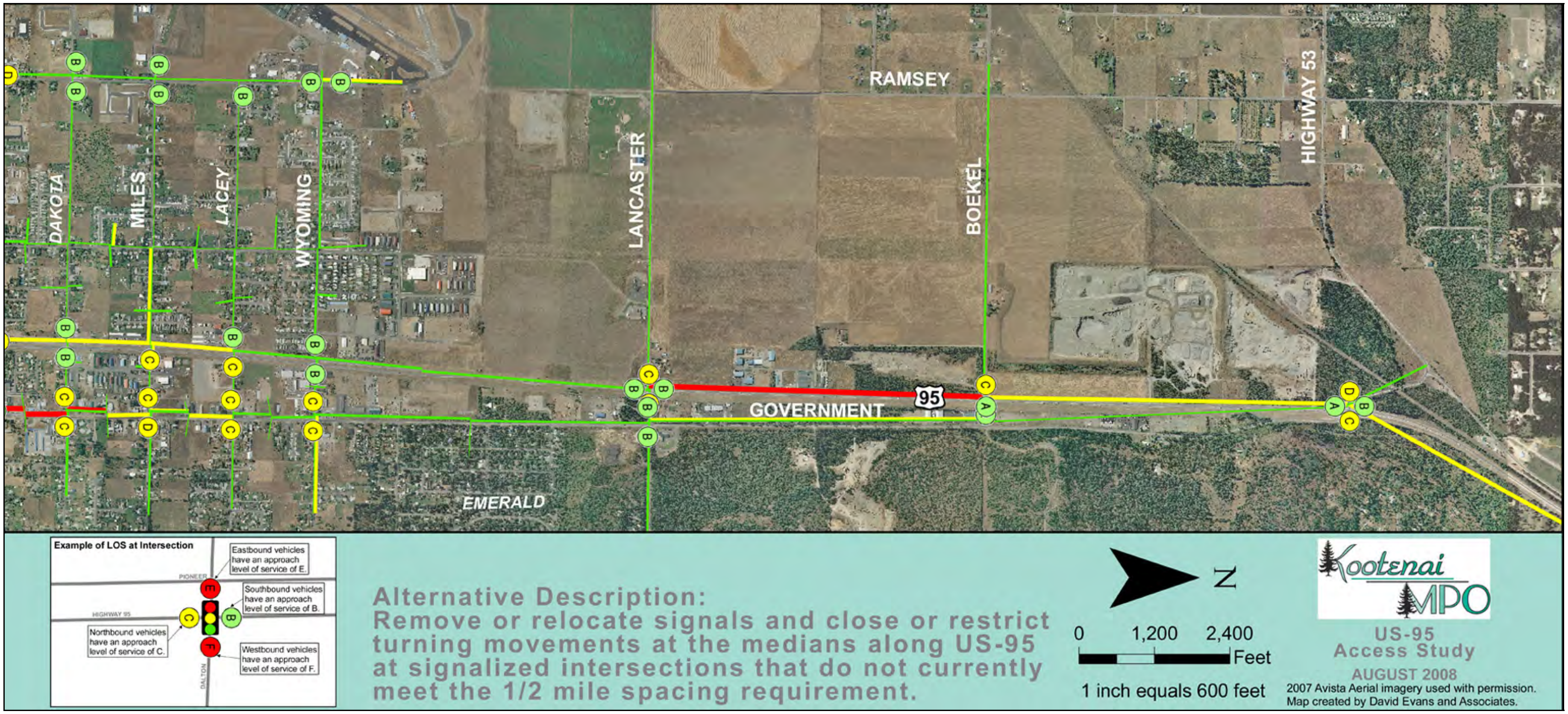


Figure 5-15a. Alternative 5 – Volume to Capacity Ratio

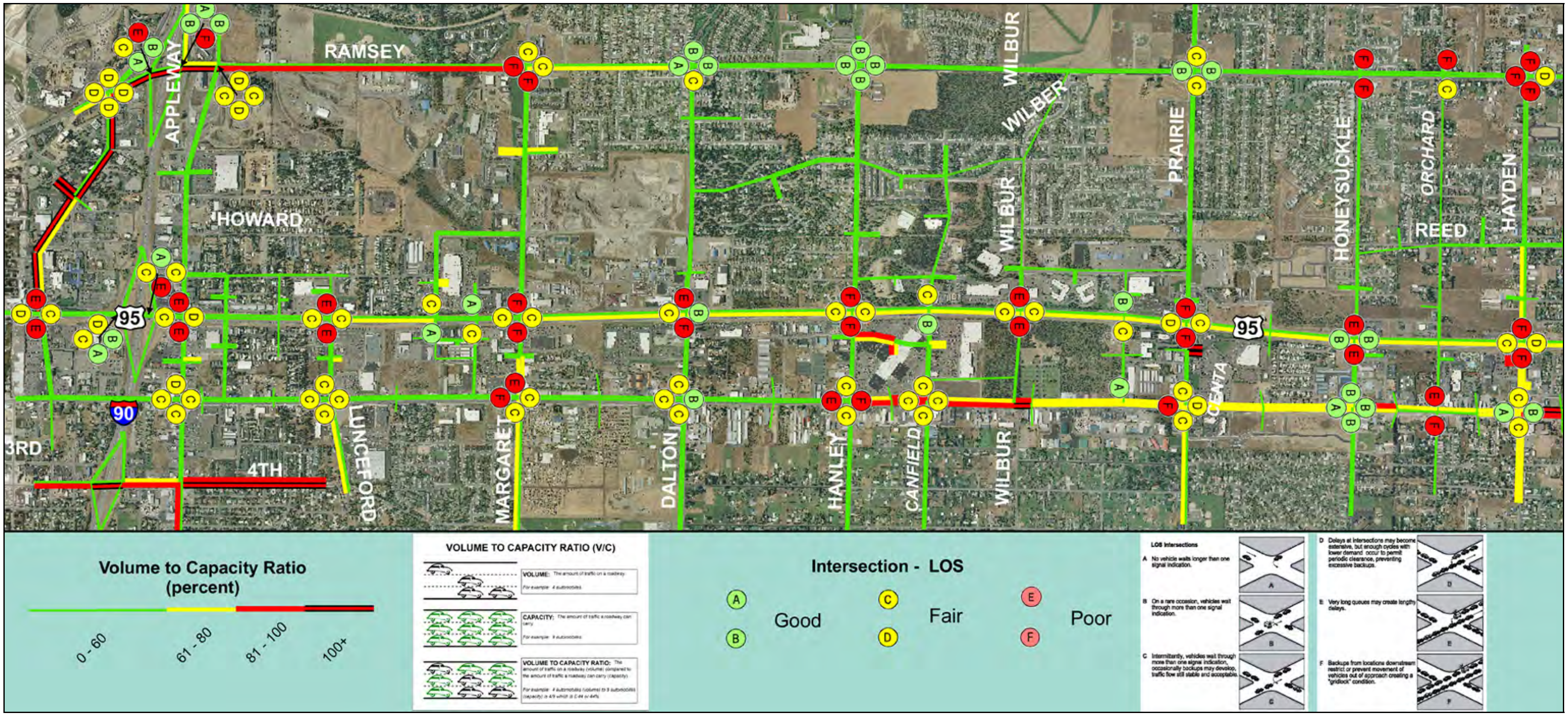


Figure 5-15b. Alternative 5 – Volume to Capacity Ratio

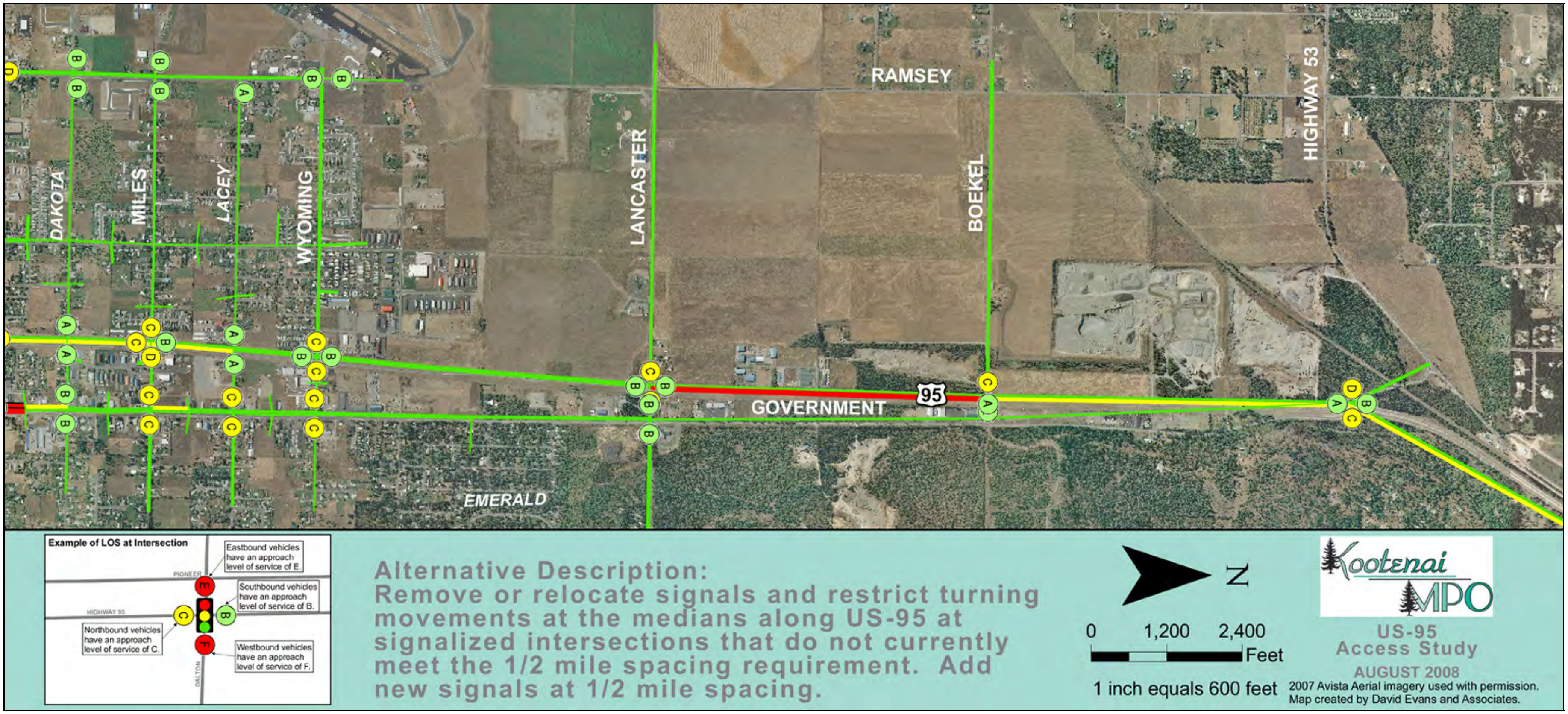


Figure 5-16a. Alternative 1 – Volume Control Changes

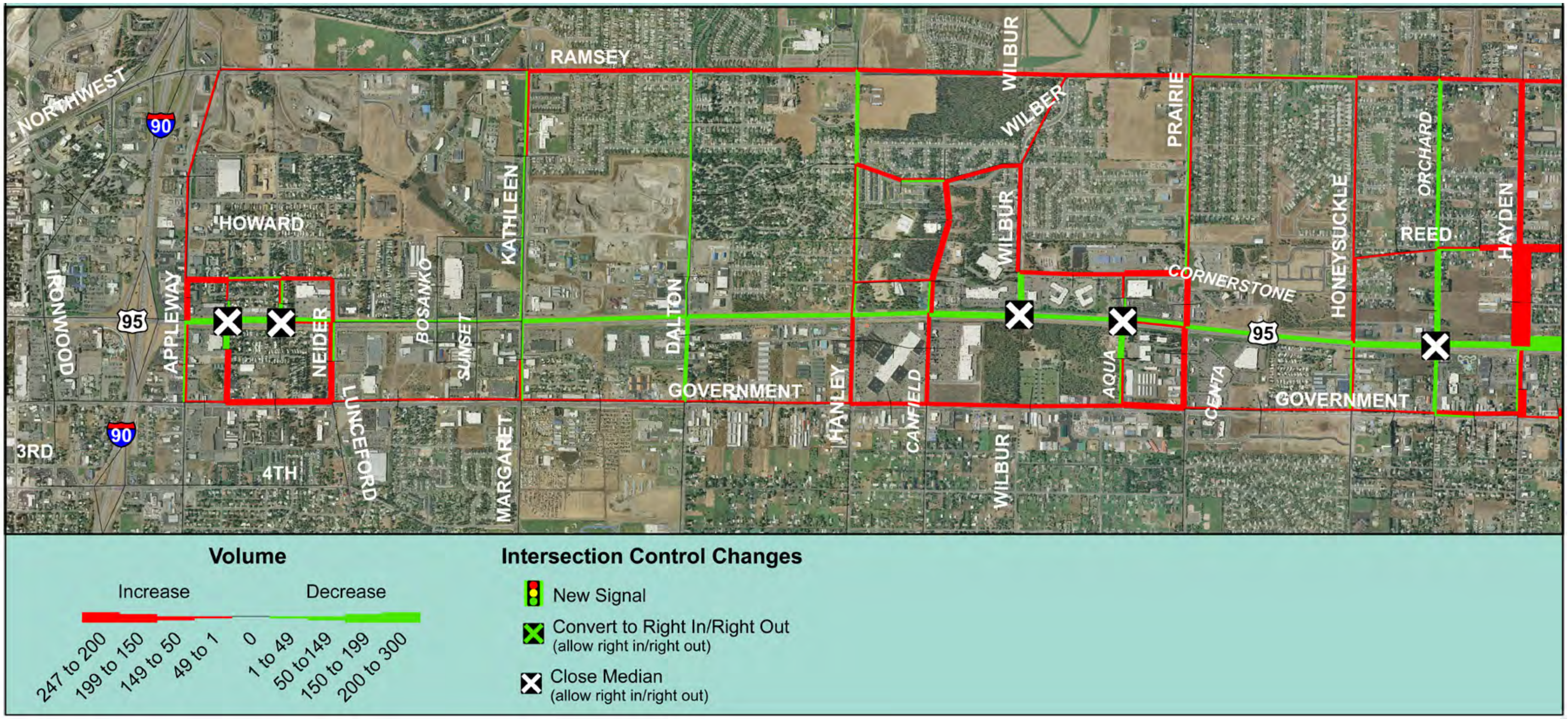
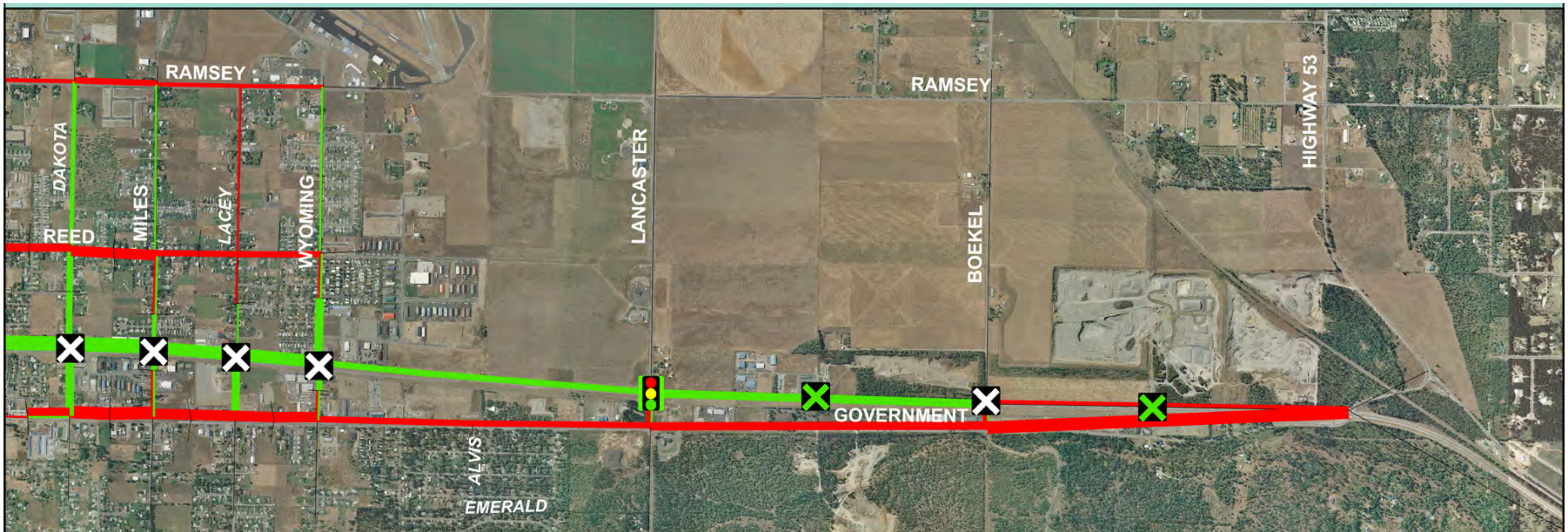


Figure 5-16b. Alternative 1 – Volume Control Changes



Alternative Description:
Median closures at all non-signalized intersections along US-95.

Figure 5-17a. Alternative 2 – Volume Control Changes

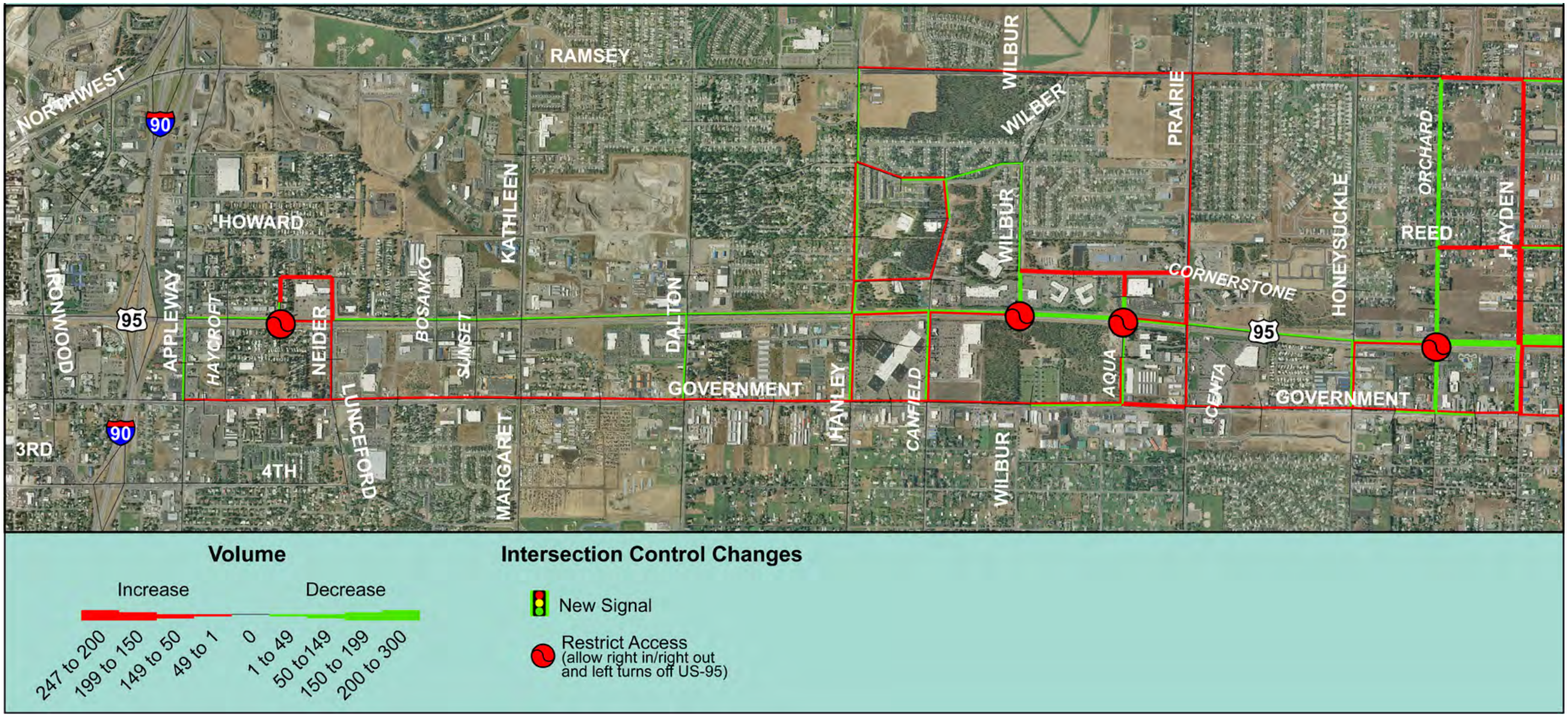


Figure 5-17b. Alternative 2 – Volume Control Changes

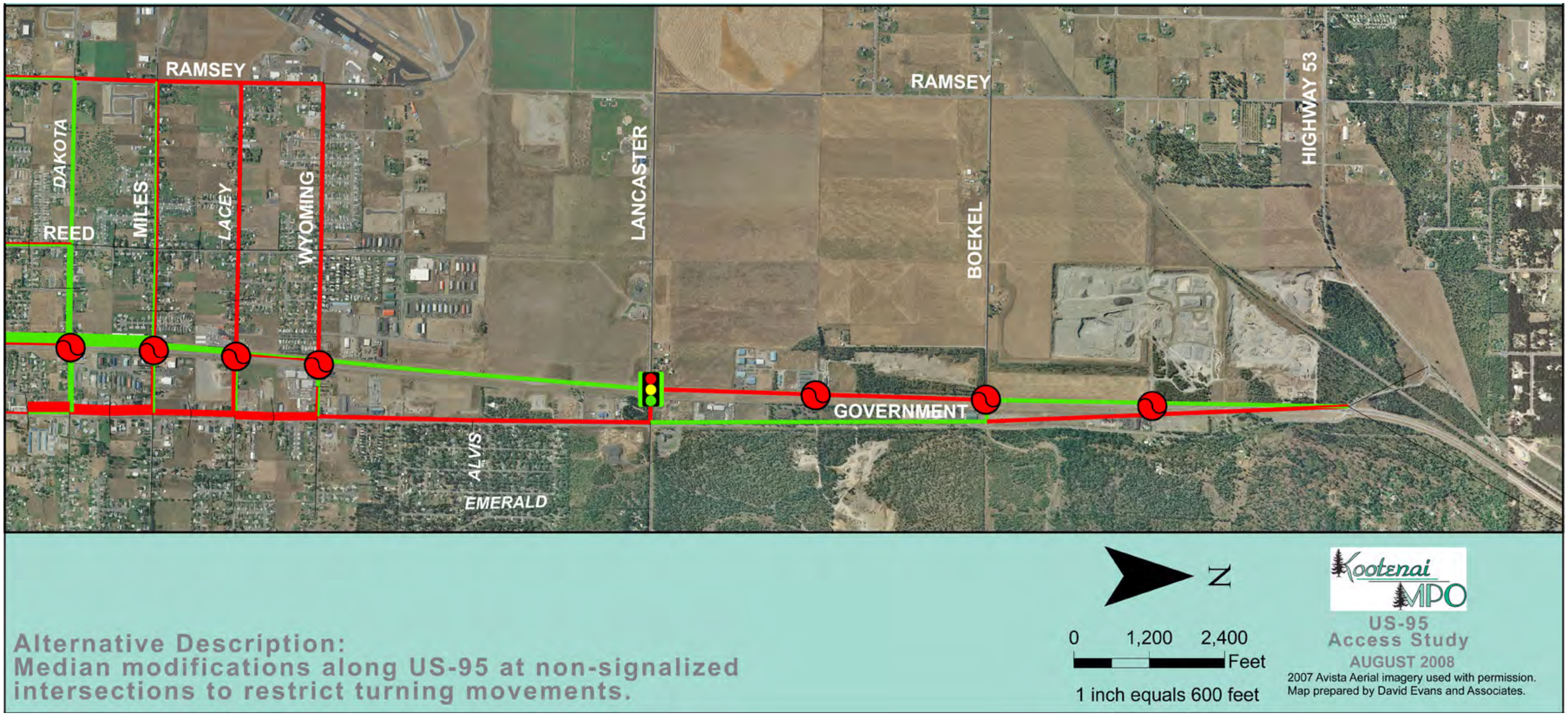


Figure 5-18a. Alternative 3a – Volume Control Changes

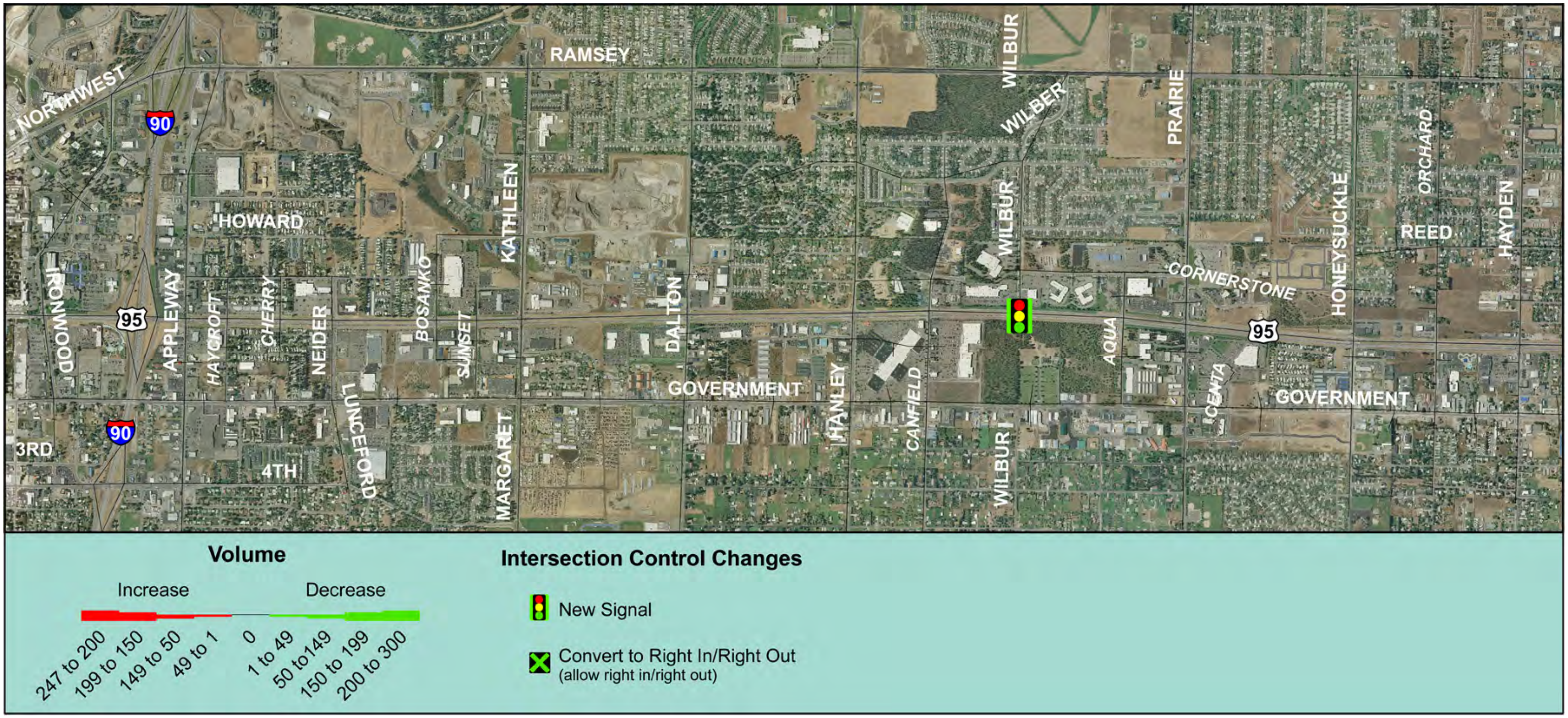


Figure 5-18b. Alternative 3a – Volume Control Changes

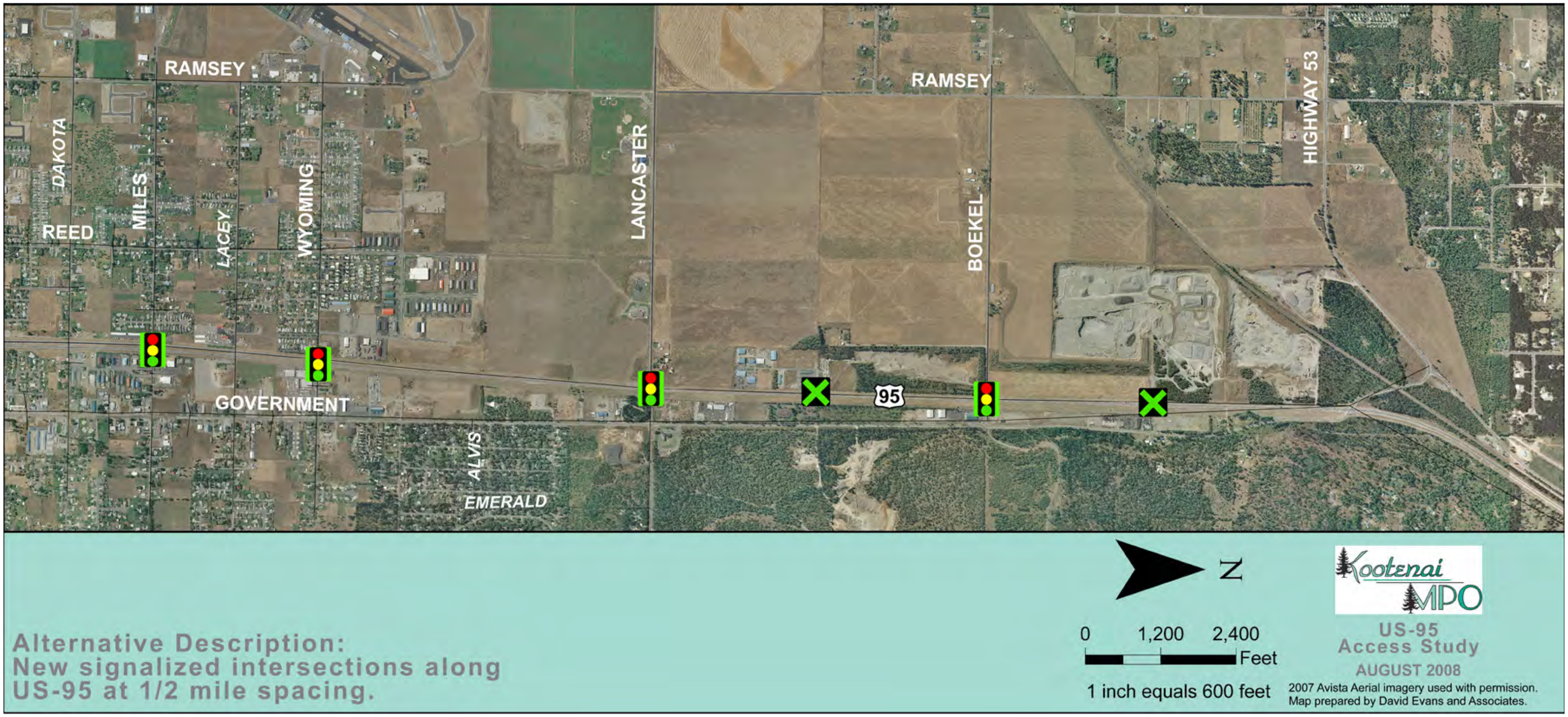


Figure 5-19a. Alternative 3b – Volume Control Changes

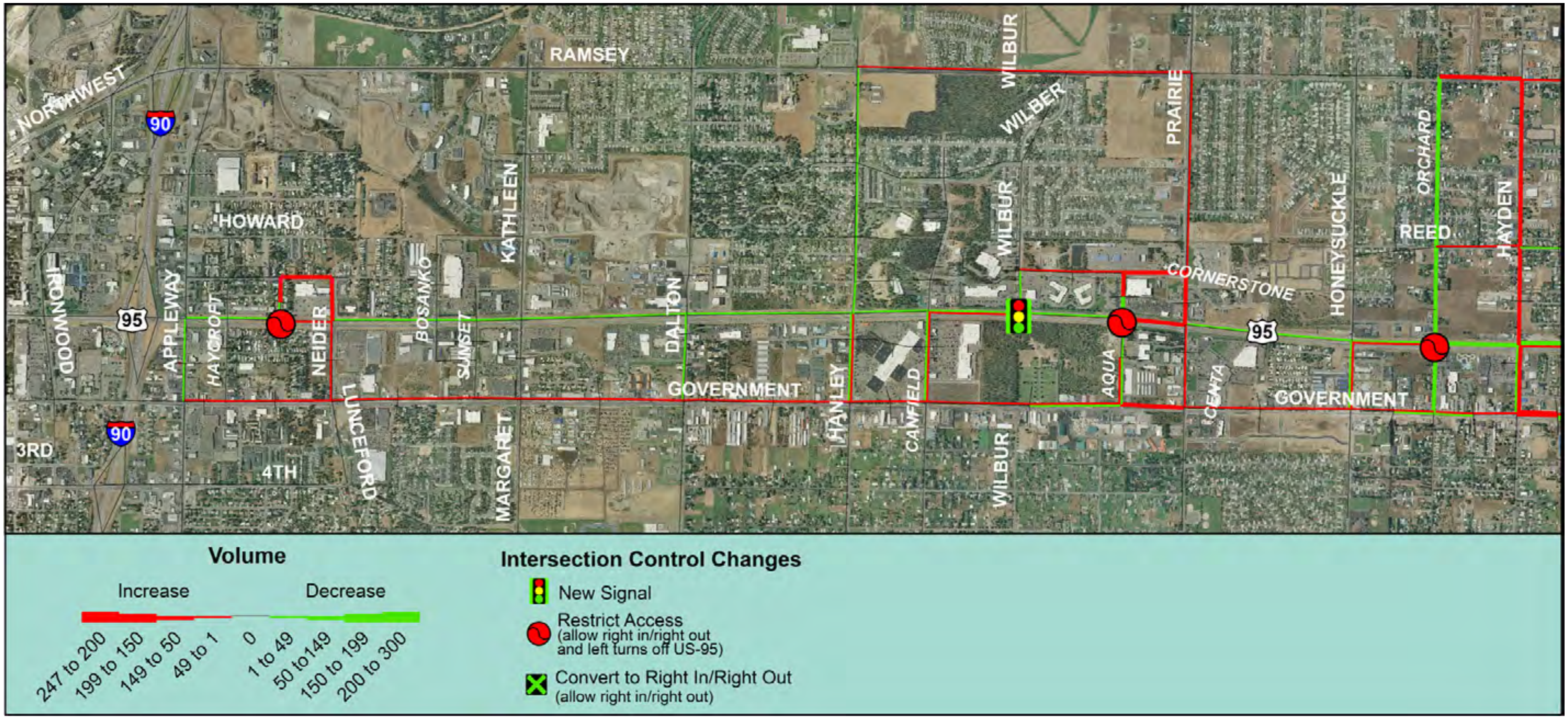
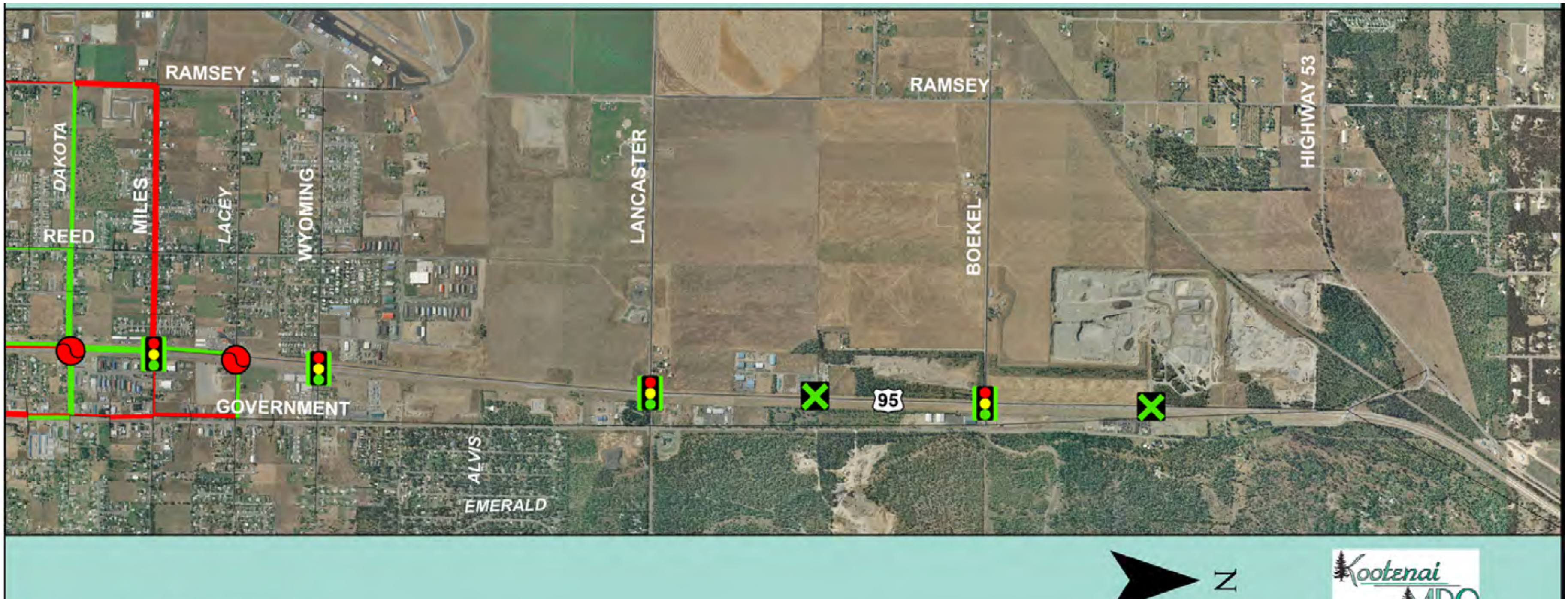


Figure 5-19b. Alternative 3b – Volume Control Changes



Alternative Description:
New signalized intersections along US-95 at 1/2 mile spacing and place turn restrictions at remaining unsignalized median crossings.

Figure 5-20a. Alternative 4a – Volume Control Changes

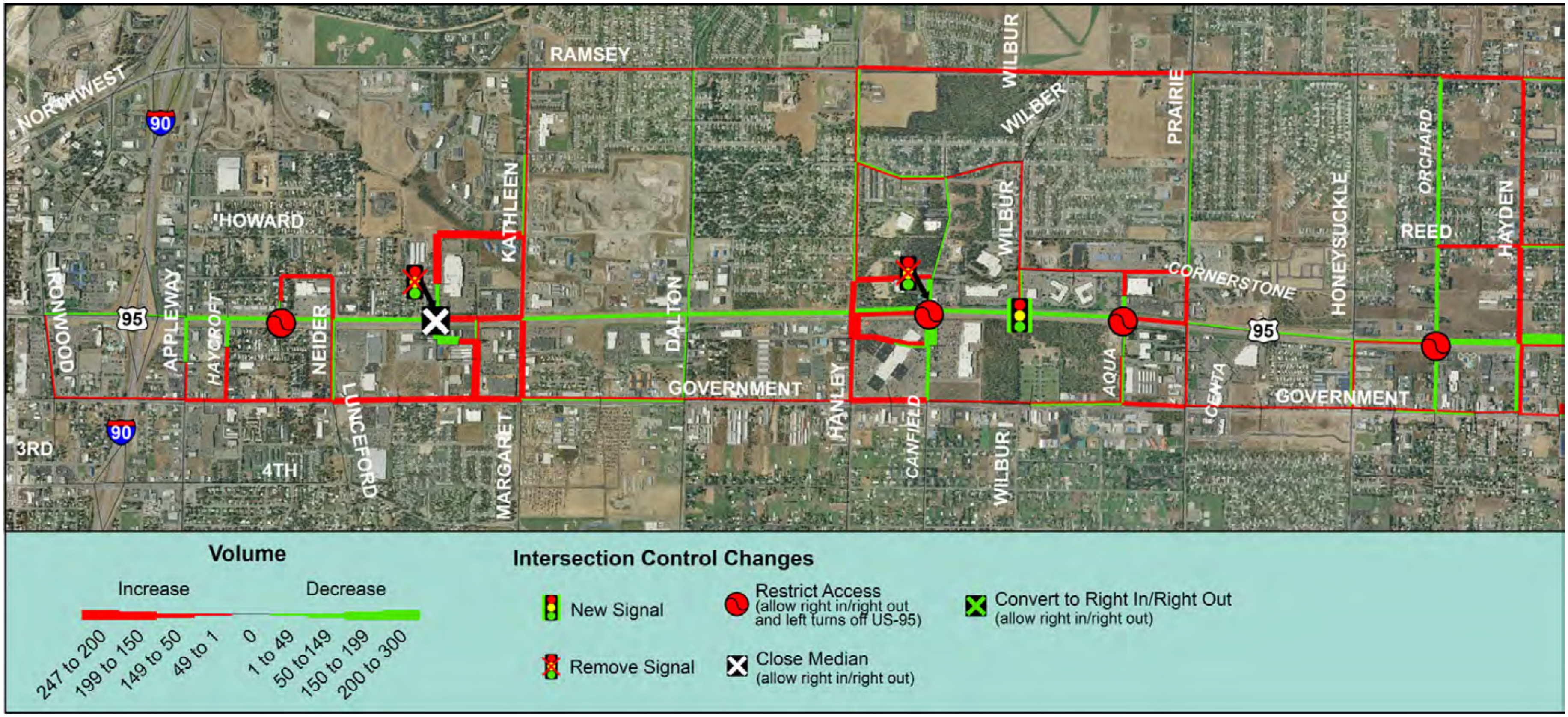


Figure 5-20b. Alternative 4a – Volume Control Changes

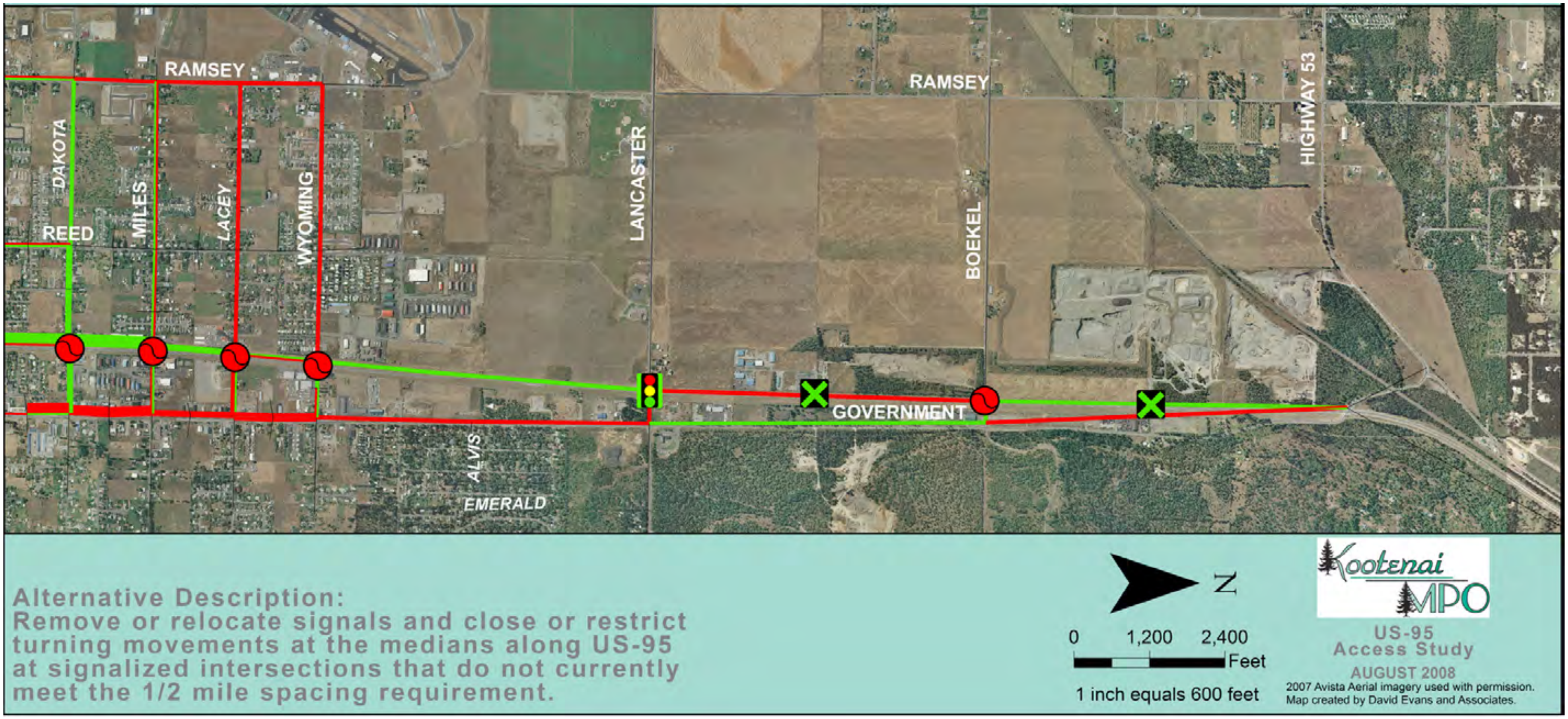


Figure 5-21a. Alternative 4b – Volume Control Changes

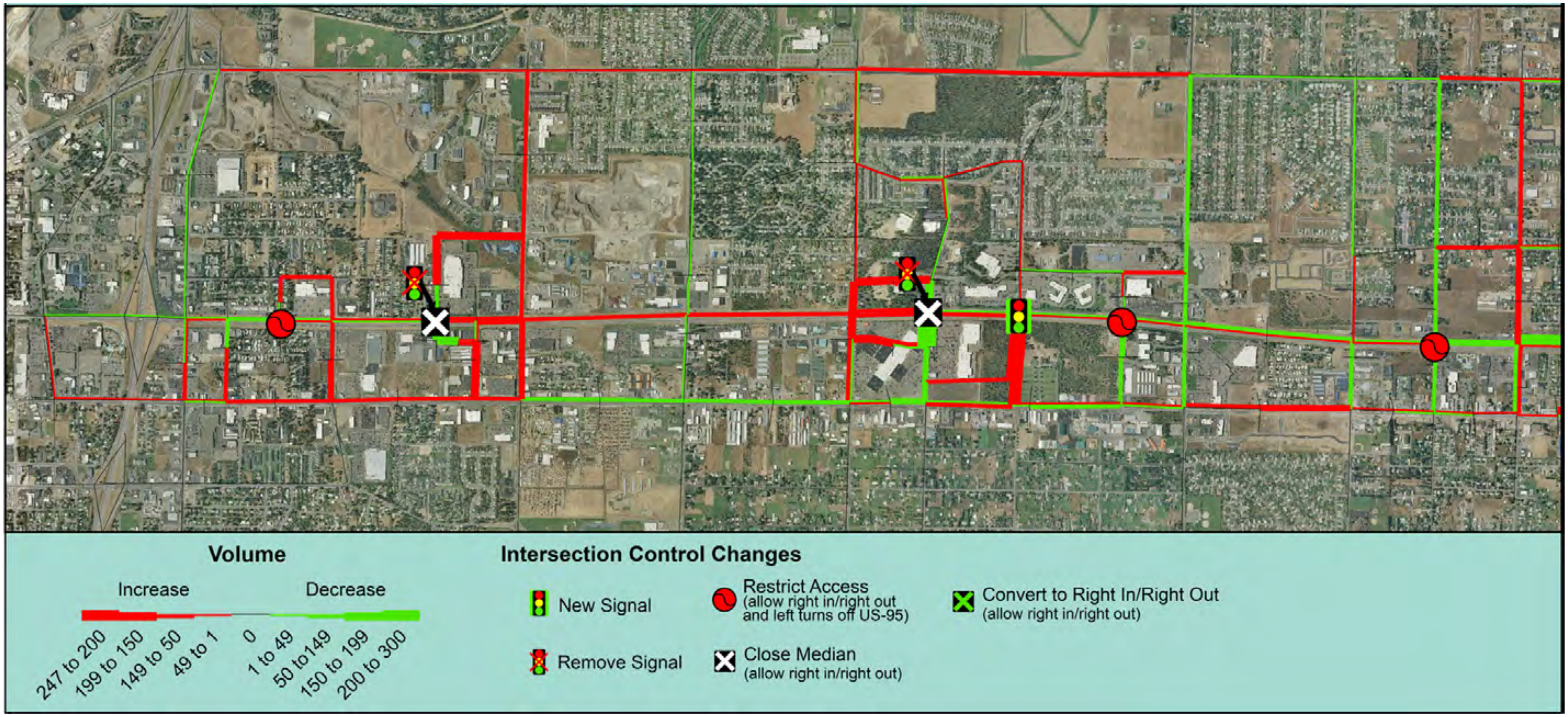


Figure 5-21b. Alternative 4b – Volume Control Changes

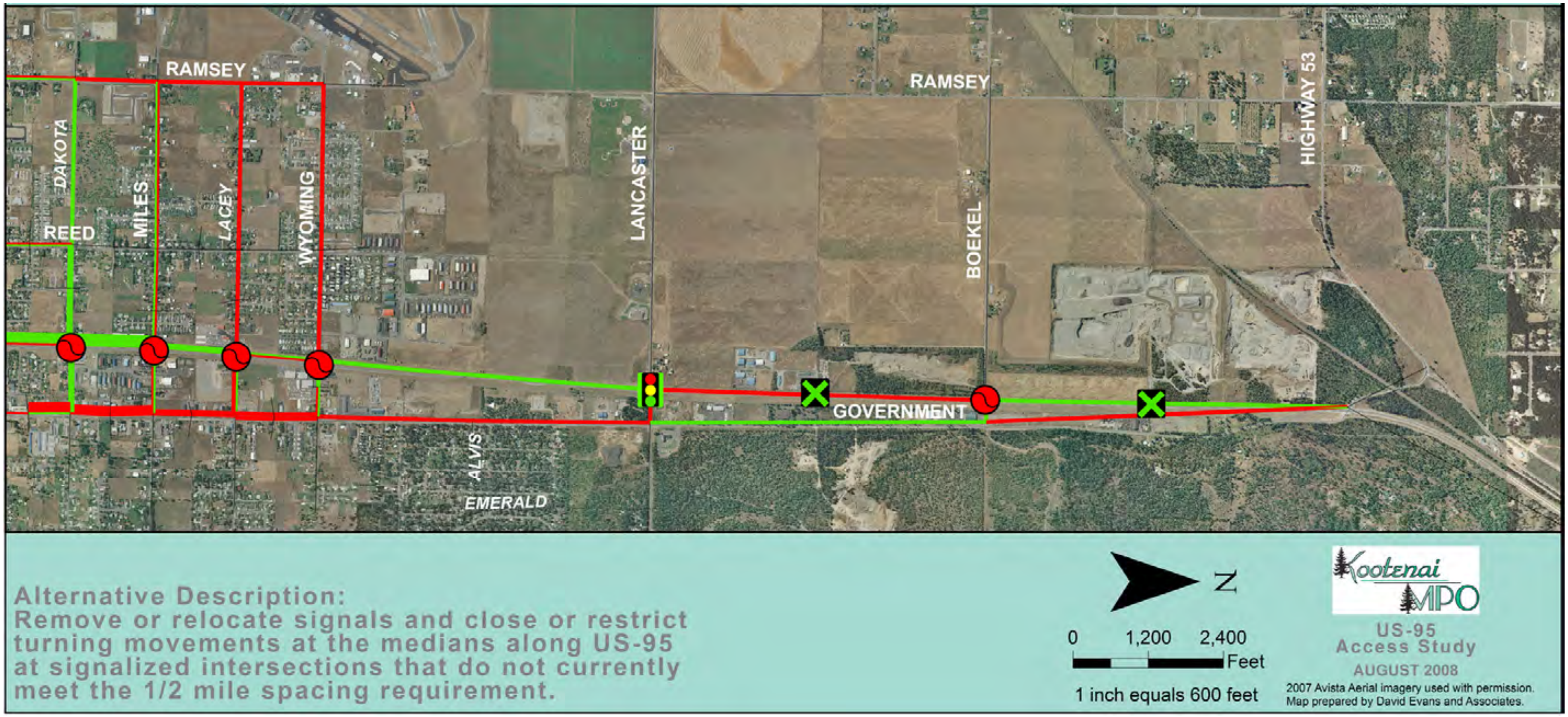


Figure 5-22a. Alternative 5 – Volume Control Changes

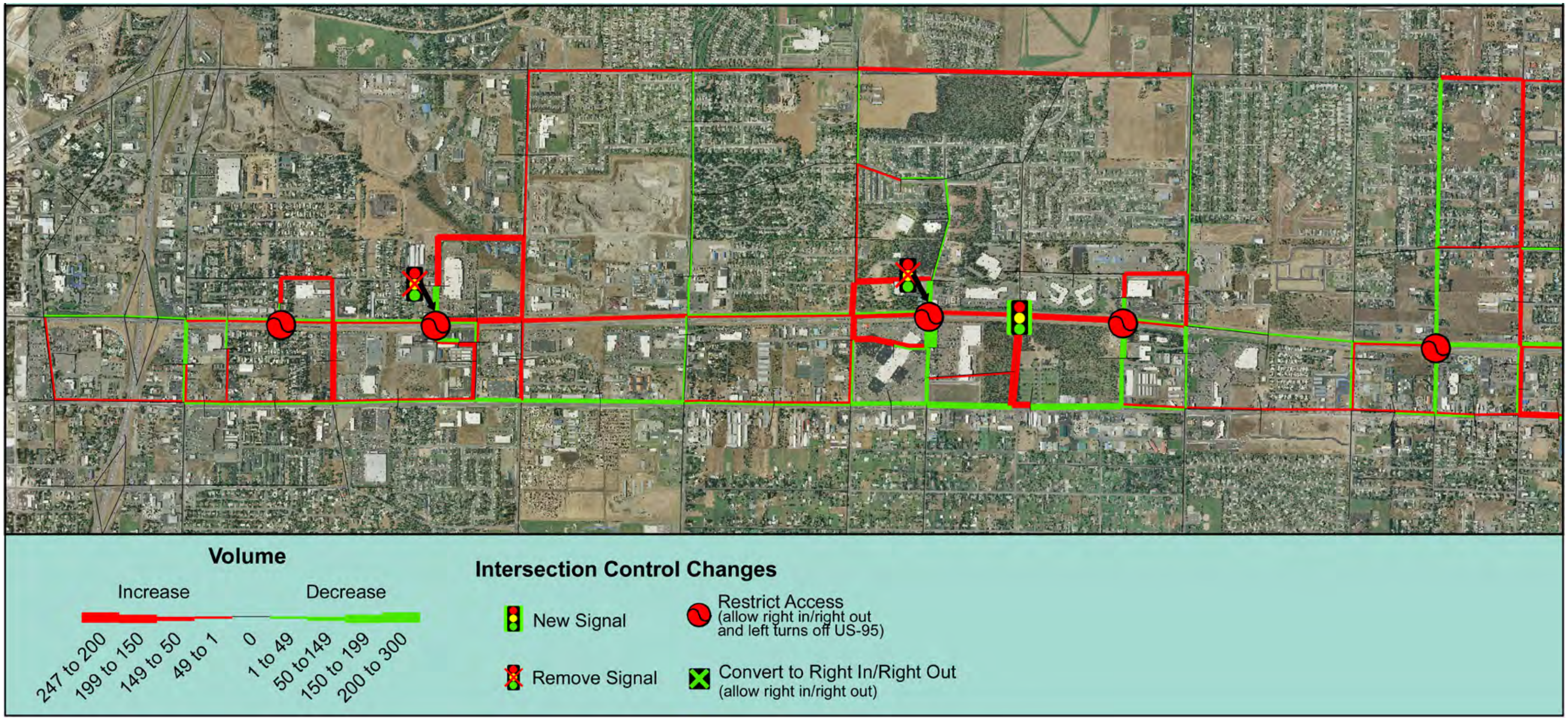


Figure 5-22b. Alternative 5 – Volume Control Changes

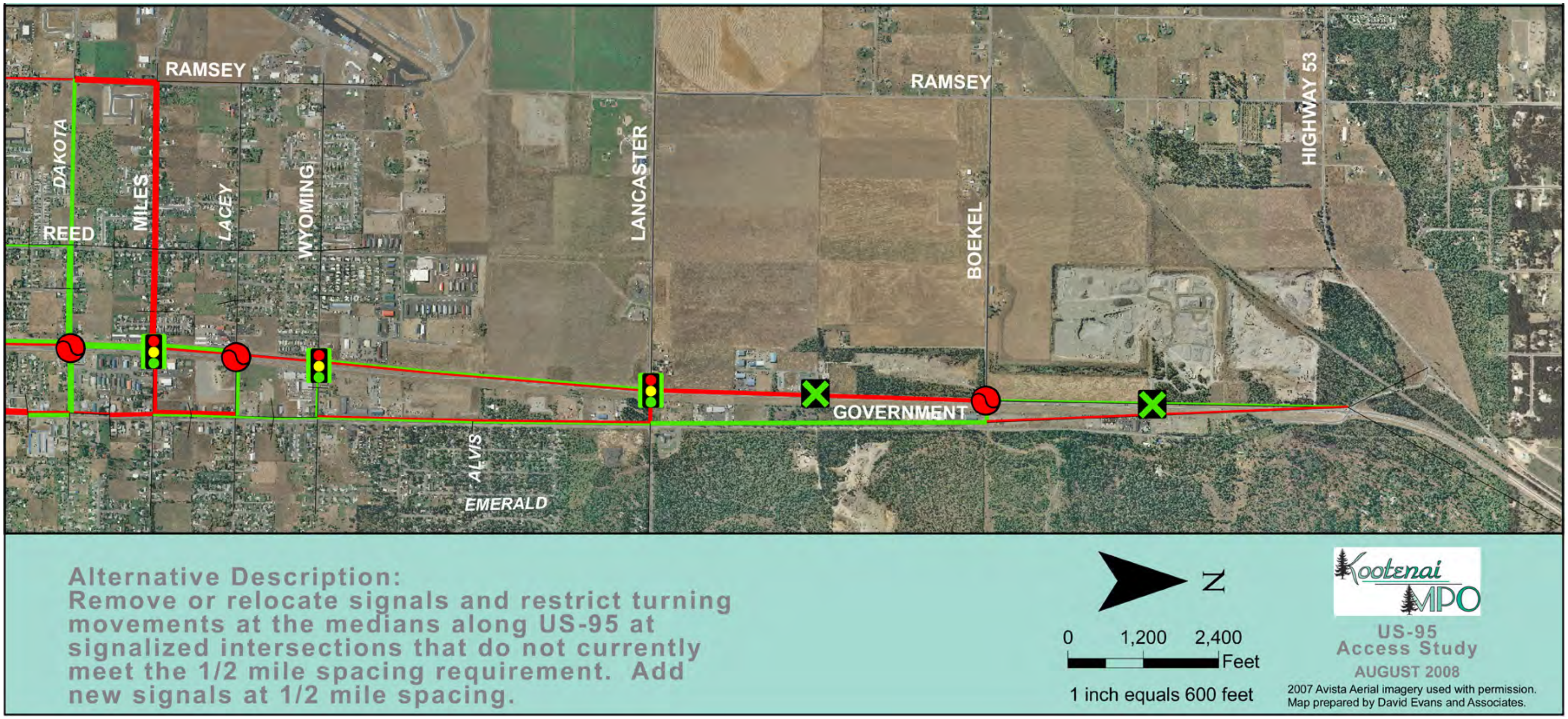


Figure 5-23. Measure of Effectiveness

US-95 Access Study

Kootenai MPO

Point of Consideration	Measure of Effectiveness	EXISTING	ALT-01	ALT-02	ALT-3A	ALT-3B	ALT-4A	ALT-4B	ALT-5	ALT-4A Mitigated	ALT-5 Mitigated
			Close medians at unsignalized intersections†	Restrict turning movements at unsignalized intersections‡	New signalized intersections at 1/2 mile spacing	New signalized intersections at 1/2 mile spacing and place turn restrictions‡ at unsignalized intersections	Relocate signals to 1/2 mile spacing south of Hayden and restrict turning movements‡ at unsignalized, close median† at Bosanko	Relocate signals to 1/2 mile spacing south of Hayden and restrict turning movements‡ at unsignalized, close medians† at Bosanko and Canfield	Relocate and place new signals only at 1/2 mile spacing and restrict turning movements‡ at unsignalized		
IMPACT ON STUDY AREA TRANSPORTATION SYSTEM	TOTAL DELAY (HOURS)	3049	1480	1557	2340	1403	1576	1599	1401	867	873
NORTH BOUND ON US-95	TOTAL DELAY (HOURS)	134	164	131	155	168	129	145	155	127	129
SOUTH BOUND ON US-95	TOTAL DELAY (HOURS)	109	115	104	120	118	94	109	112	110	111
TOTAL CROSS STREET DELAY AT ALL INTERSECTIONS FROM I-90 TO SH-53	TOTAL DELAY (HOURS)	2996	859	841	2150	825	606	599	577	478	480
CROSS STREET DELAY AT SIGNALIZED INTERSECTIONS FROM IRONWOOD TO PRAIRIE	TOTAL DELAY (HOURS)	193	191	191	184	188	193	187	184	137	137
SAFE ACCESS TO AND FROM US-95 AT UNSIGNALIZED INTERSECTIONS	CROSSING POINTS AT UNSIGNALIZED INTERSECTIONS	162	0	24	82	12	20	18	18	20	18
IMPACT ON SYSTEM WIDE TRAVEL (NOT INCLUDING US-95)	VEHICLE MILES TRAVELED (VMT)	57536	58278	57601	57536	57562	57796	57832	57704	57796	57709
EFFICIENT SIGNAL COORDINATION: US-95	EFFICIENT USE OF GREEN BAND		No Improvement	No Improvement	No Improvement	No Improvement	Possible Improvement	Possible Improvement	Possible Improvement	Improved	Improved
NORTHBOUND MOBILITY ON US-95	Travel Time (Min:Sec)	17:51.5	25:03.7	17:58.0	18:58.8	18:24.6	17:49.4	18:56.6	19:19.8	16:32.3	17:03.0
SOUTHBOUND MOBILITY ON US-95	Travel Time (Min:Sec)	17:05.9	17:06.8	16:48.8	17:52.7	17:35.4	16:41.1	16:47.7	17:38.3	16:55.0	17:22.0

*ALL RESULTS PRESENTED FOR PM PEAK HOUR **UNMITIGATED ALTERNATIVES

†MEDIAN CLOSURE = ALLOW RIGHT IN/RIGHT OUT ‡RESTRICT ACCESS = ALLOW RIGHT IN/RIGHT OUT AND LEFT TURNS OFF US-95

6. Mitigation Analysis

6.1.1 Refined Favored Solution

After selection of Alternative 5, the Steering Committee initially considered using Alternative 4A as a possible stepping stone to ultimately achieving the infrastructure improvements associated with Alternative 5. Although Alternative 4A was advanced as a second choice to Alt. 5, it does not have the Steering Committee's full endorsement. There are several aspects of Alt. 4A that were not recommended, such as preventing all cross traffic in Hayden. As a result, a decision was made to recommend against interim turn restrictions at Miles and Wyoming. The mitigation needs at each intersection that will either remain signalized will become signalized have been shown in the following intersection mitigation sheets (Figures 6-1 through 6-10):

6.2 Mitigated Measures of Effectiveness

As expected, the further refinement (through mitigation) of Alternative 5 improved its operational characteristics. A complete list of MOE's is included in the following list:

- Reduces total system delay
- Reduces total northbound US-95 delay
- Slightly increases total southbound US-95 delay
- Reduces unsignalized cross-street delay (by eliminating movements and rerouting traffic)
- Reduces signalized cross-street delay (in the more urban section of the corridor)
- Reduces intersection crossing points
- Slightly increases system VMT
- Provides great potential for efficient use of the corridor *green-band*
- Reduces northbound travel time by 48.5 seconds
- Slightly increases southbound travel time by 16.1 seconds.

The Steering Committee recognized the mitigation results of Alternative 5 as a success in that it not only provided for enhanced local *access* but it generally maintained *mobility* along the corridor and provided a positive *safety* benefit.

Figure 6-1. US-95 and Haycraft

US-95 and Haycraft

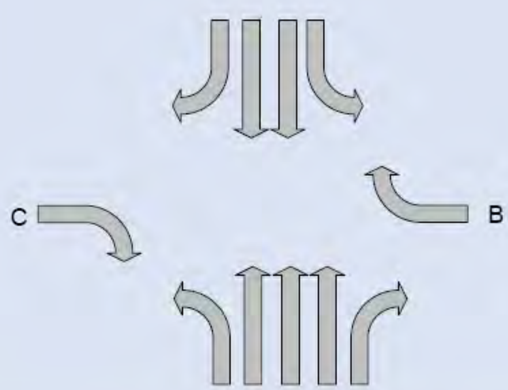
2008

Unsignalized Intersection with Turn Restrictions

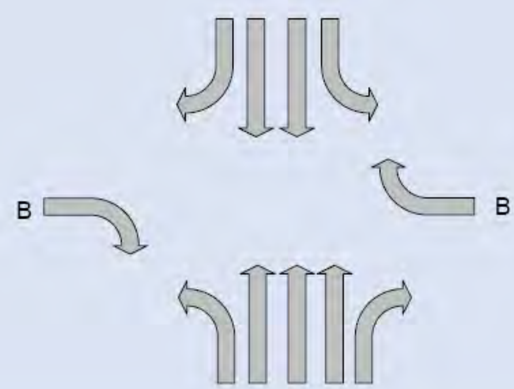
2008 MITIGATED

Unsignalized Intersection with Additional Turn Restrictions

EXISTING LANE CONFIGURATION AND LOS BY MOVEMENT



MITIGATED LANE CONFIGURATION AND LOS BY MOVEMENT



TOTAL INTERSECTION COST: $40,000

FEASIBILITY:

- Turn Restrictions: the addition of a curbed median indicating cross street movement restrictions is feasible. The intersection currently exists with turn restictions.

Figure 6-2. US-95 and Cherry

US-95 and Cherry

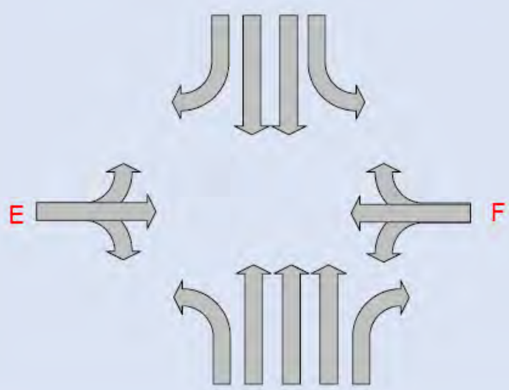
2008

Unsignalized Intersection

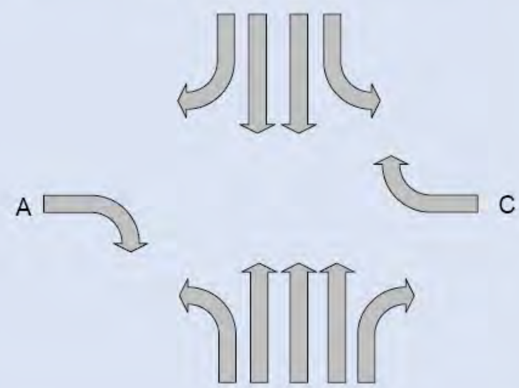
2008 MITIGATED

Unsignalized Intersection with Turn Restrictions

EXISTING LANE CONFIGURATION AND LOS BY MOVEMENT



MITIGATED LANE CONFIGURATION AND LOS BY MOVEMENT



TOTAL INTERSECTION COST: $40,000

FEASIBILITY:

- Turn Restrictions: the addition of signage, pavement markings, and a curbed median indicating cross street movement restrictions is feasible.

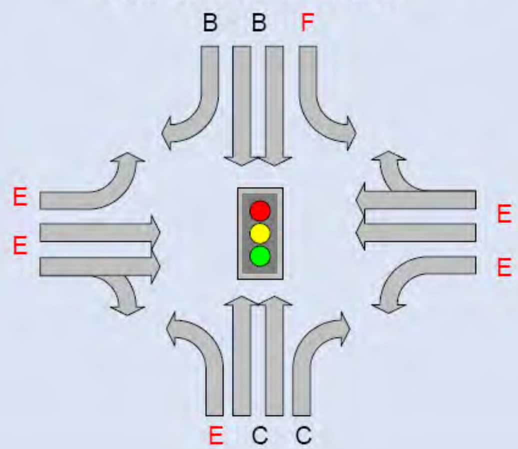
Figure 6-3. US-95 and Neider

US-95 and Neider Avenue

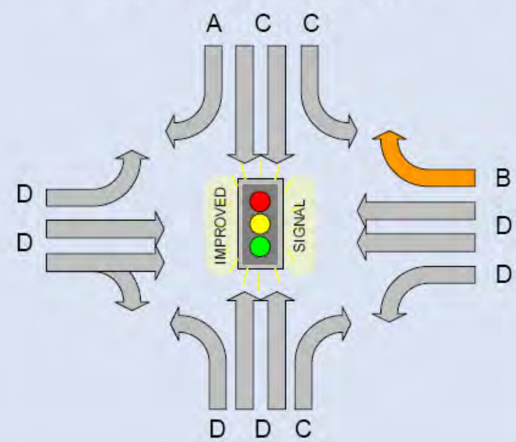
2008
LOS = D
V/C = 0.70
CYCLE LENGTH = 160 seconds

2008 MITIGATED
LOS = D
V/C = 0.72
CYCLE LENGTH = 120 seconds

EXISTING LANE CONFIGURATION AND LOS BY MOVEMENT



MITIGATED LANE CONFIGURATION AND LOS BY MOVEMENT



TOTAL INTERSECTION COST: $263,000

FEASIBILITY:

- Implementation of the widening to accommodate right turn lane is feasible.
- Right-of-way acquisition is required and some loss of parking will occur on the north side of Neider east of US-95.

Figure 6-4. US-95 and Bosanko

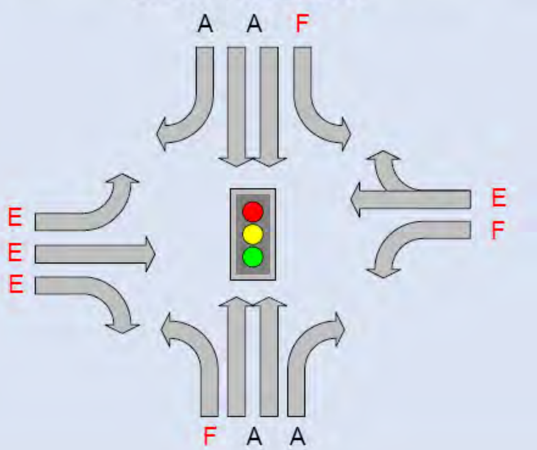
US-95 and Bosanko

2008
LOS = B
V/C = 0.54
CYCLE LENGTH = 160 seconds

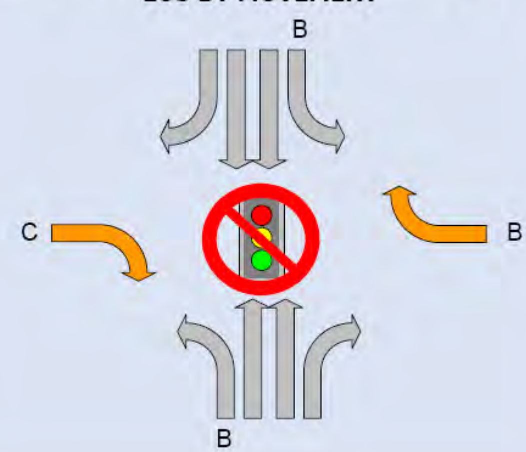
2008 MITIGATED

Unsignalized Intersection with Turn Restrictions

EXISTING LANE CONFIGURATION AND LOS BY MOVEMENT



MITIGATED LANE CONFIGURATION AND LOS BY MOVEMENT



TOTAL INTERSECTION COST: $100,000*

FEASIBILITY:
- Signal Removal: the removal of the existing signal is feasible, making equipment available for future installations.
- Turn Restrictions: the addition of signage, pavement markings, and delineation indicating cross street movement restrictions is feasible.

*These improvements assume a connection of Howard Road between Bosanko and Neider that is not included in the cost estimate.

Figure 6-5. US-95 and Sunset

US-95 and Sunset

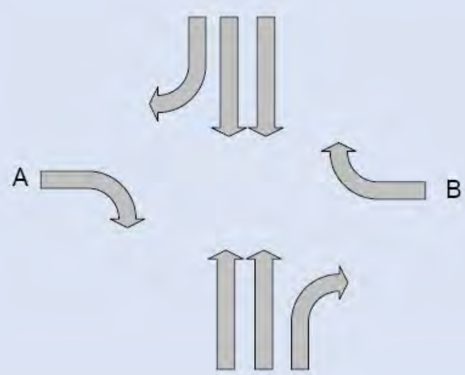
2008

Unsignalized Intersection

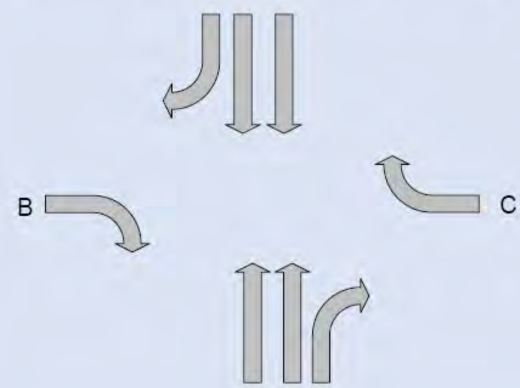
2008 MITIGATED

Unsignalized Intersection-No Change

EXISTING LANE CONFIGURATION AND LOS BY MOVEMENT



MITIGATED LANE CONFIGURATION AND LOS BY MOVEMENT



TOTAL INTERSECTION COST: $0

FEASIBILITY:

- No changes are proposed.

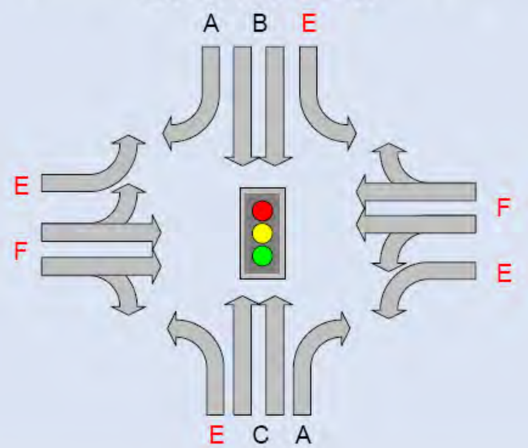
Figure 6-6. US-95 and Kathleen

US-95 and Kathleen

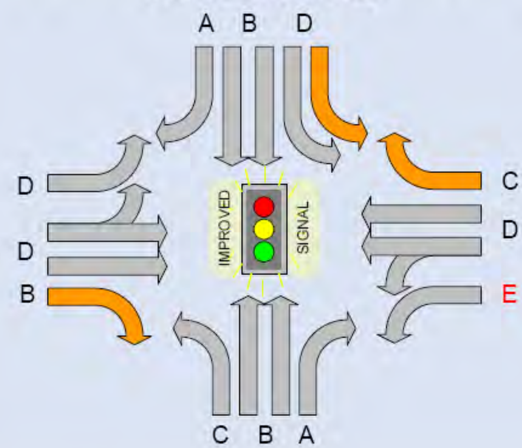
2008
LOS = C
V/C = 0.88
CYCLE LENGTH = 160 seconds

2008 MITIGATED
LOS = C
V/C = 0.80
CYCLE LENGTH = 120 seconds

EXISTING LANE CONFIGURATION AND LOS BY MOVEMENT



MITIGATED LANE CONFIGURATION AND LOS BY MOVEMENT



TOTAL INTERSECTION COST: $721,000

FEASIBILITY:

- Add WB Right Turn Lane: Roadway widening to accommodate right turn lane is feasible; however, right-of-way acquisition is required and there are site impacts on the Super 1 site including loss of parking.
- Add EB Right Turn Lane: Roadway widening to accommodate right turn lane is feasible, however, widening requires R/W acquisition, loss of on-site parking and possible relocation of large monument sign.
- Add 2nd EB Thru lane US-95 to Government Way: Improvement is feasible but has R/W impacts affecting four properties on the southerly side of Kathleen and potential loss of on-site parking on two sites.

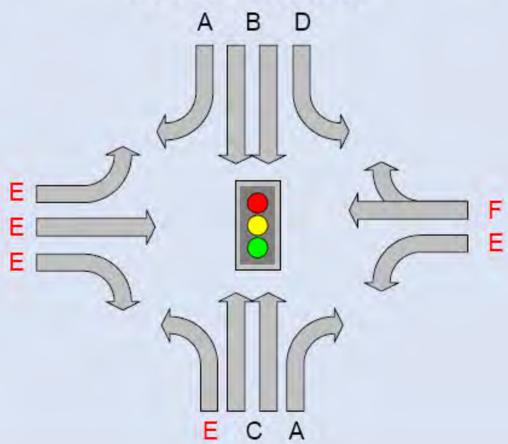
Figure 6-7. US-95 and Dalton

US-95 and Dalton

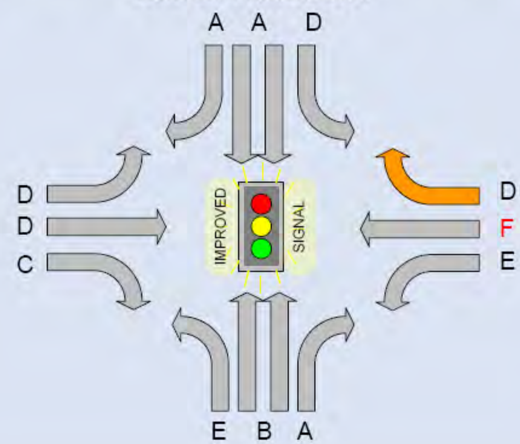
2008
LOS = C
V/C = 0.76
CYCLE LENGTH = 160 seconds

2008 MITIGATED
LOS = C
V/C = 0.74
CYCLE LENGTH = 120 seconds

EXISTING LANE CONFIGURATION AND LOS BY MOVEMENT



MITIGATED LANE CONFIGURATION AND LOS BY MOVEMENT



TOTAL INTERSECTION COST: $295,000

FEASIBILITY:
- Widening of the westbound approach for installation of a right turn lane is feasible.
- Right-of-way acquisition for two sites on the north side of Dalton is required and there are limited site impacts on the Dalton Professional Building site.

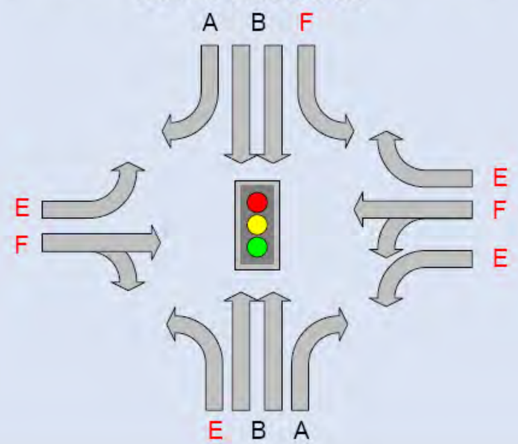
Figure 6-8. US-95 and Hanley

US-95 and Hanley

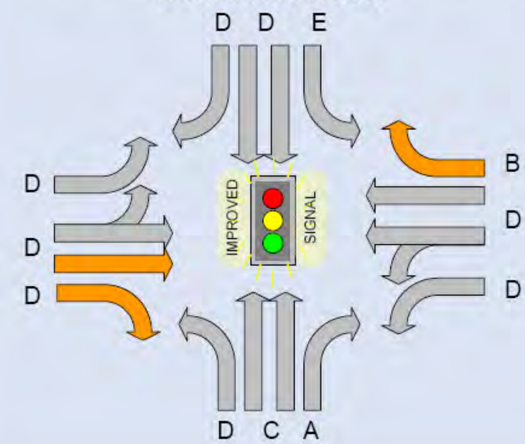
2008
LOS = C
V/C = 0.85
CYCLE LENGTH = 160 seconds

2008 MITIGATED
LOS = D
V/C = 0.80
CYCLE LENGTH = 120 seconds

EXISTING LANE CONFIGURATION AND LOS BY MOVEMENT



MITIGATED LANE CONFIGURATION AND LOS BY MOVEMENT



TOTAL INTERSECTION COST: $497,000

FEASIBILITY:

- WB Right Turn Lane: Widening for construction of the right turn lane is feasible. There are right-of-way impacts on the Pizza Hut and likely some loss of parking. If the length of right turn lane extends to the Skipper's site, there will be additional right-of-way and site impacts including potential loss of the Skipper's drive thru aisle.
- EB Additional Thru lane and Rt. Turn Lanes: The two-lane widening is feasible but there are right-of-way impacts and will require relocation of an overhead utility line.

Figure 6-9. US-95 and Canfield

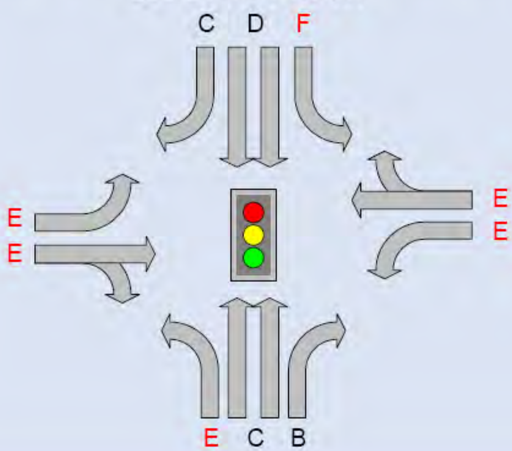
US-95 and Canfield

2008
LOS = D
V/C = 0.89
CYCLE LENGTH = 160 seconds

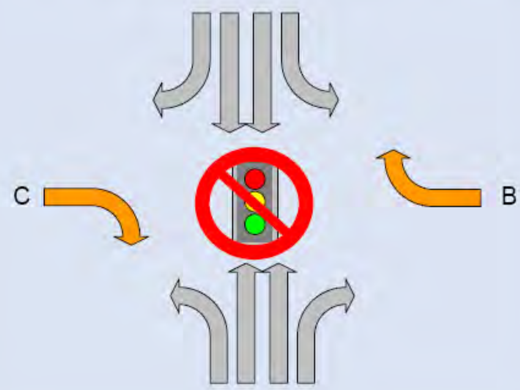
2008 MITIGATED

Unsignalized Intersection with Turn Restrictions

EXISTING LANE CONFIGURATION AND LOS BY MOVEMENT



MITIGATED LANE CONFIGURATION AND LOS BY MOVEMENT



TOTAL INTERSECTION COST: $100,000

FEASIBILITY:

- Signal Removal: the removal of the existing signal is feasible, making equipment available for future installations.
- Turn Restrictions: the addition of signage, pavement markings, and a curbed median indicating cross street movement restrictions is feasible.

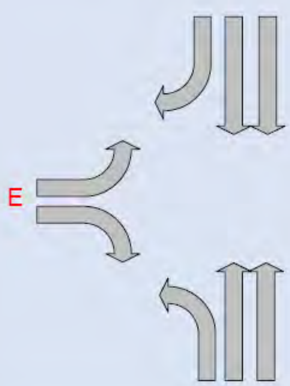
Figure 6-10. US-95 and Wilbur

US-95 and Wilbur

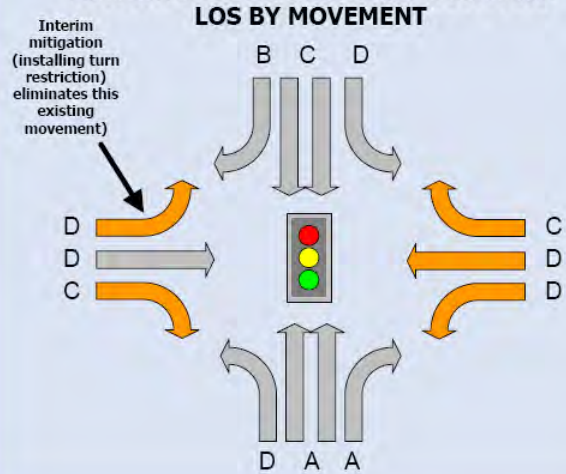
2008
Unsignalized Intersection

2008 MITIGATED
Interim: Add turn restriction
Opportunistic: Add Signal
LOS = B
V/C = 0.78
CYCLE LENGTH = 120 seconds

EXISTING LANE CONFIGURATION AND LOS BY MOVEMENT



MITIGATED LANE CONFIGURATION AND LOS BY MOVEMENT



TOTAL INTERSECTION COST: $518,000*

FEASIBILITY:

- The interim turn restriction is a mutually exclusive project that will eliminate unprotected EBL conflicts with NB & SB US-95 traffic and prevent gridlock in the median opening. Trips will be forced to re-route to adjacent signalized intersections.
- The signalized expansion of this intersection is part of a bracketed group with other improvements (see Improvements Map and Schedule).
- Widening will be needed for additional EB approach lanes: Improvement is feasible however there are right-of-way impacts on the Panda Express site and modification of the existing retaining wall may be required.

*These improvements assume a new local road connection to Government Way that is not included in the cost estimate.

Figure 6-11. US-95 and Aqua

US-95 and Aqua

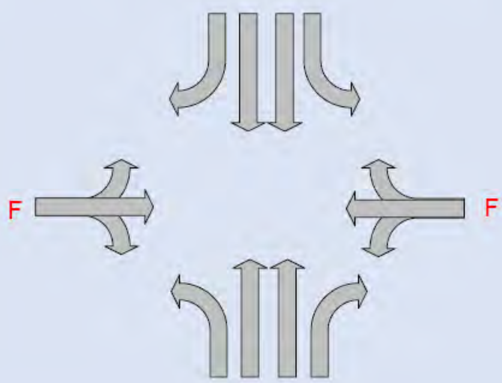
2008

Unsignalized Intersection

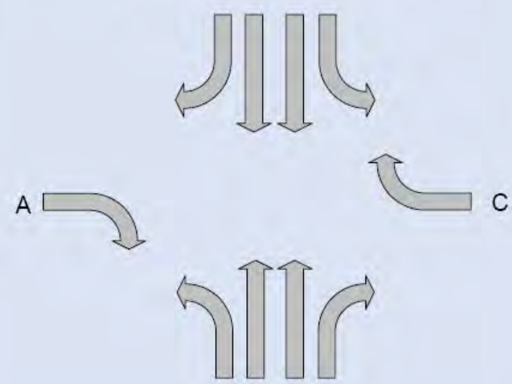
2008 MITIGATED

Unsignalized Intersection with Turn Restrictions

EXISTING LANE CONFIGURATION AND LOS BY MOVEMENT



MITIGATED LANE CONFIGURATION AND LOS BY MOVEMENT



TOTAL INTERSECTION COST: $40,000

FEASIBILITY:

- Turn Restrictions: the addition of signage, pavement markings, and a curbed median indicating cross street movement restrictions is feasible.

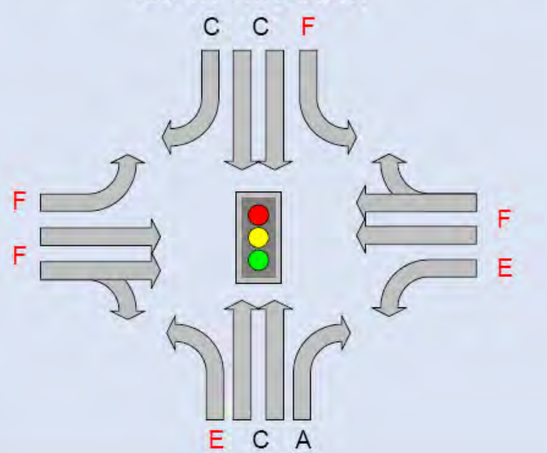
Figure 6-12. US-95 and Prairie

US-95 and Prairie

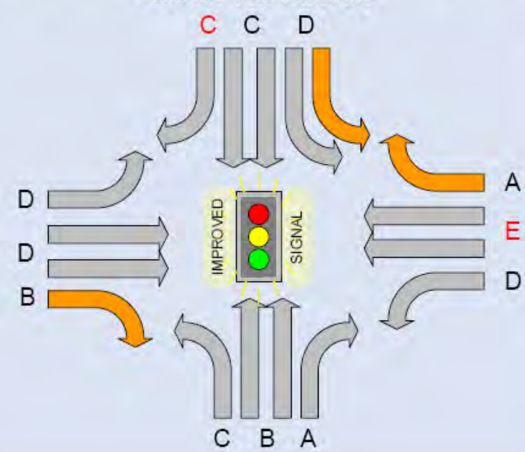
2008
LOS = E
V/C = 0.93
CYCLE LENGTH = 160 seconds

2008 MITIGATED
LOS = C
V/C = 0.89
CYCLE LENGTH = 120 seconds

EXISTING LANE CONFIGURATION AND LOS BY MOVEMENT



MITIGATED LANE CONFIGURATION AND LOS BY MOVEMENT



TOTAL INTERSECTION COST: $763,000

FEASIBILITY:

- WB Right Turn Lane: Implementation of the improvement is feasible but there are right-of-way impacts on the bank site and some modification of the existing site improvements and/or a retaining wall may be required.
- EB Right Turn Lane: Implementation of the improvement is feasible; however, there are potentially significant impacts to the Del Taco site including drive thru aisle. At a minimum, right-of-way acquisition, a retaining wall, utility relocations and site drainage modifications will be required to implement the improvement. Non-standard lane widths and/or more narrow sidewalk (5' instead of 8-10') may be required to implement the widening without impacting the Del Taco drive thru aisle.

Figure 6-13. US-95 and Centa

US-95 and Centa

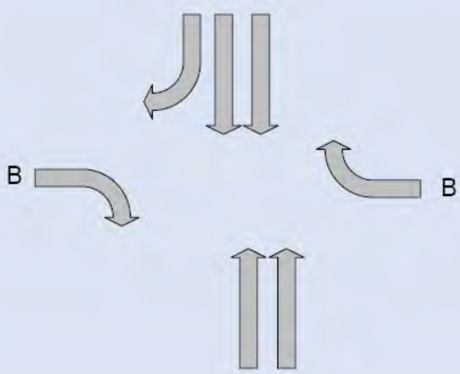
2008

Unsignalized Intersection

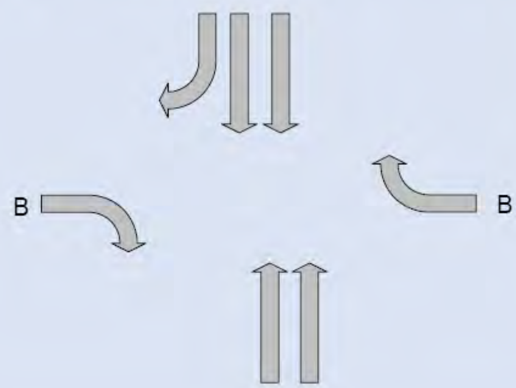
2008 MITIGATED

Unsignalized Intersection-No Change

EXISTING LANE CONFIGURATION AND LOS BY MOVEMENT



MITIGATED LANE CONFIGURATION AND LOS BY MOVEMENT



TOTAL INTERSECTION COST: $0

FEASIBILITY:

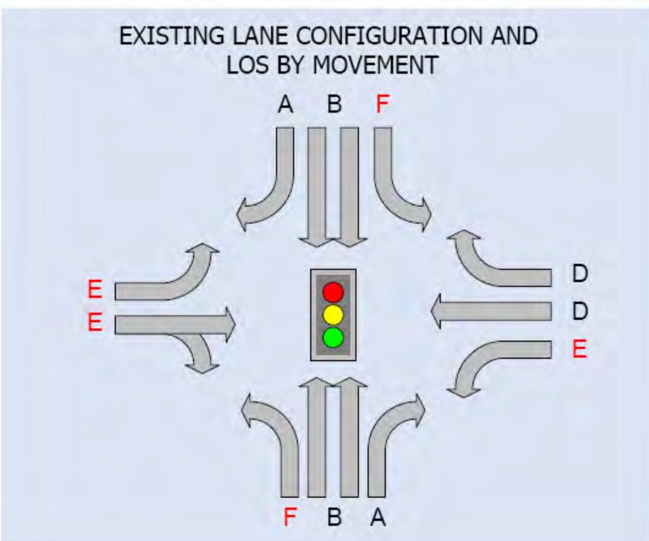
- No changes are proposed.

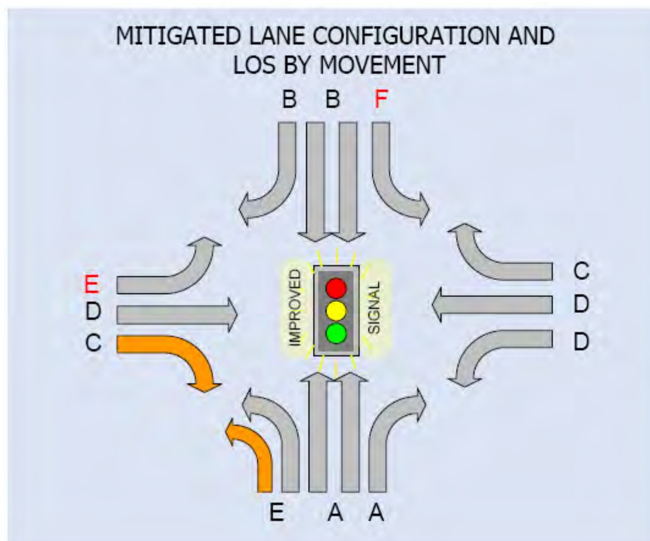
Figure 6-14. US-95 and Honeysuckle

US-95 and Honeysuckle

2008
LOS = C
V/C = 0.70
CYCLE LENGTH = 160 seconds

2008 MITIGATED
LOS = C
V/C = 0.69
CYCLE LENGTH = 120 seconds





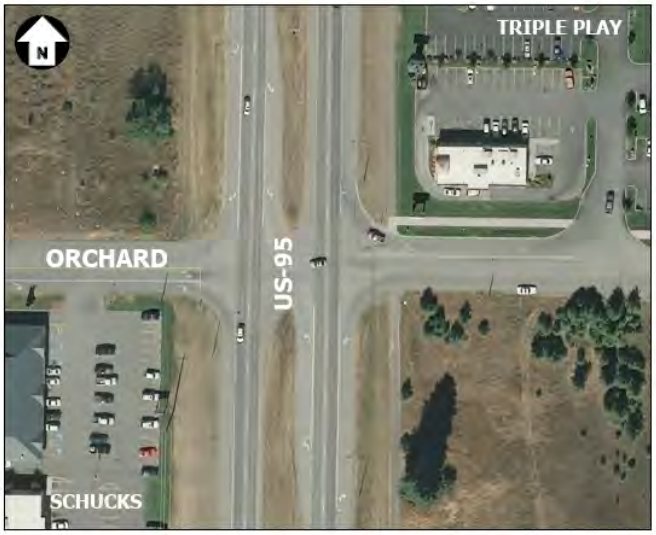
TOTAL INTERSECTION COST: $500,000

FEASIBILITY:

- The addition of an additional northbound left turn lane and an eastbound right turn lane are feasible as included in proposed development in the area.

Figure 6-15. US-95 and Orchard

US-95 and Orchard



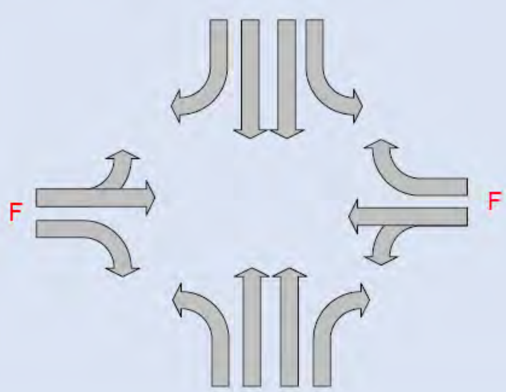
2008

Unsignalized Intersection

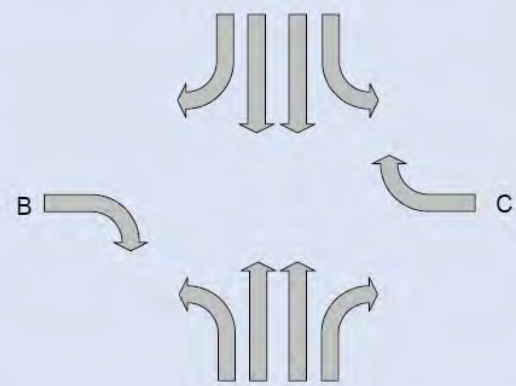
2008 MITIGATED

Unsignalized Intersection with Turn Restrictions

EXISTING LANE CONFIGURATION AND LOS BY MOVEMENT



MITIGATED LANE CONFIGURATION AND LOS BY MOVEMENT



TOTAL INTERSECTION COST: $40,000

FEASIBILITY:

- Turn Restrictions: the addition of signage, pavement markings, and a curbed median indicating cross street movement restrictions is feasible.

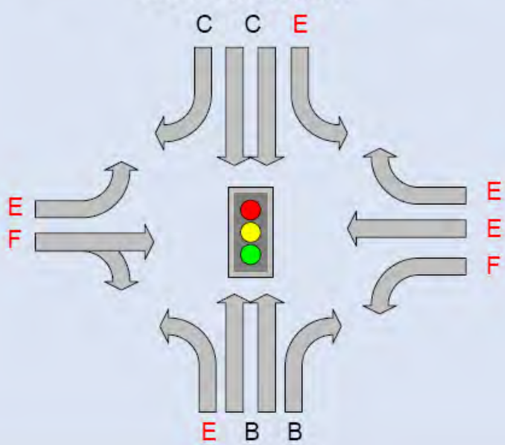
Figure 6-16. US-95 and Hayden

US-95 and Hayden Avenue

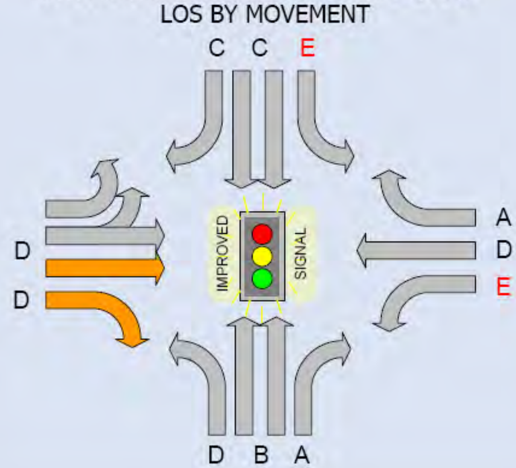
2008
LOS = D
V/C = 0.81
CYCLE LENGTH = 160 seconds

2008 MITIGATED
LOS = C
V/C = 0.75
CYCLE LENGTH = 120 seconds

EXISTING LANE CONFIGURATION AND LOS BY MOVEMENT



MITIGATED LANE CONFIGURATION AND LOS BY MOVEMENT



TOTAL INTERSECTION COST: $517,000

FEASIBILITY:

- Widening the EB approach for the addition of a second left turn lane and a dedicated right turn lane is feasible, but will create significant right-of-way and site impacts to the commercial site on the south side of Hayden Avenue.
- Site impacts include loss of parking and impacts to the existing business.

Figure 6-17. US-95 and Dakota

US-95 and Dakota

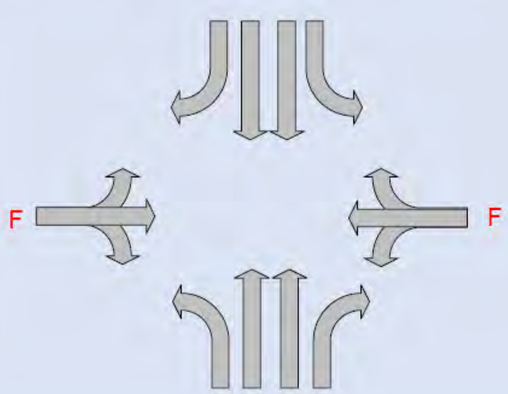
2008

Unsignalized Intersection

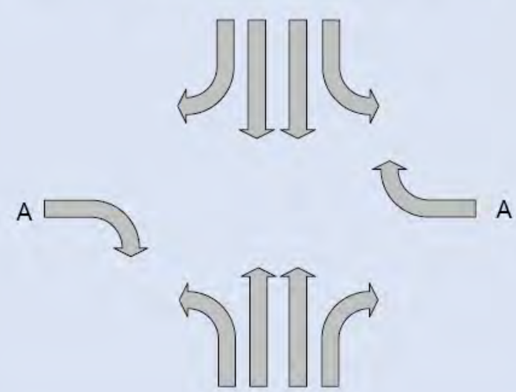
2008 MITIGATED

Unsignalized Intersection with Turn Restrictions

EXISTING LANE CONFIGURATION AND LOS BY MOVEMENT



MITIGATED LANE CONFIGURATION AND LOS BY MOVEMENT



TOTAL INTERSECTION COST: $40,000

FEASIBILITY:

- Turn Restrictions: the addition of signage, pavement markings, and a curbed median indicating cross street movement restrictions is feasible.

Figure 6-18. US-95 and Miles

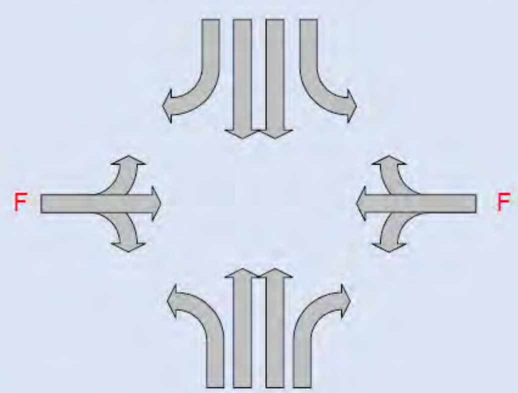
US-95 and Miles Avenue

2008

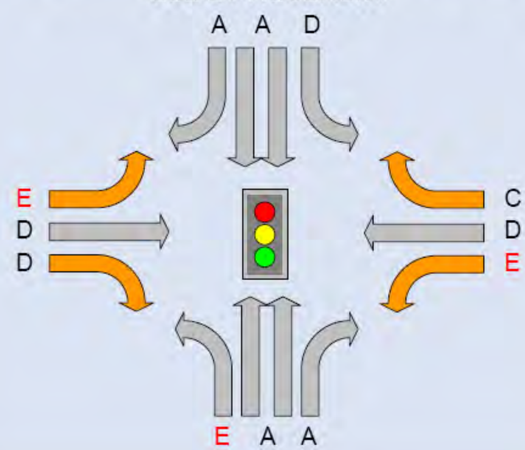
Unsignalized Intersection

2008 MITIGATED
LOS = B
V/C = 0.73
CYCLE LENGTH = 120 seconds

EXISTING LANE CONFIGURATION AND LOS BY MOVEMENT



MITIGATED LANE CONFIGURATION AND LOS BY MOVEMENT



TOTAL INTERSECTION COST: $815,000

FEASIBILITY:

- Addition of exclusive left and right turn lanes to both the EB and WB approaches is feasible however there are moderate right-of-way and site impacts on all four quadrants.
- Costs assume the EB approach lane additions are limited to approximately 150 LF to reduce the impacts to nearby residential properties that front Miles Avenue.

Figure 6-19. US-95 and Lacey

US-95 and Lacey

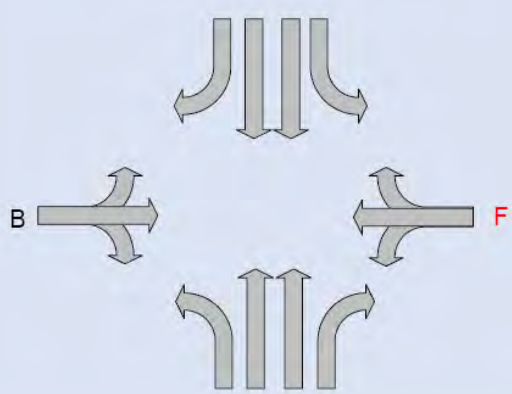
2008

Unsignalized Intersection

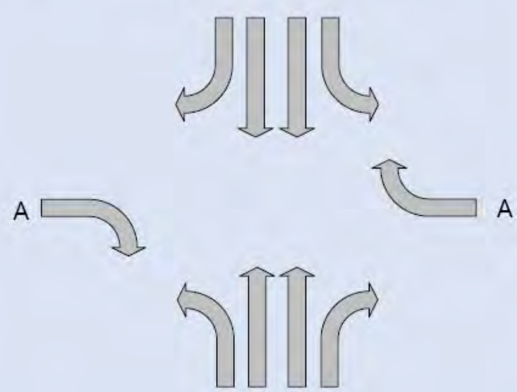
2008 MITIGATED

Unsignalized Intersection with Turn Restrictions

EXISTING LANE CONFIGURATION AND LOS BY MOVEMENT



MITIGATED LANE CONFIGURATION AND LOS BY MOVEMENT



TOTAL INTERSECTION COST: $40,000

FEASIBILITY:

- Turn Restrictions: the addition of signage, pavement markings, and a curbed median indicating cross street movement restrictions is feasible.

Figure 6-20. US-95 and Wyoming

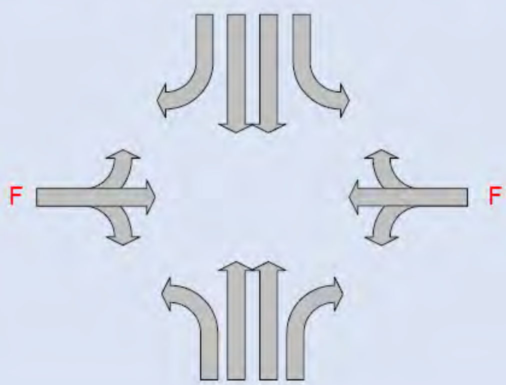
US-95 and Wyoming

2008

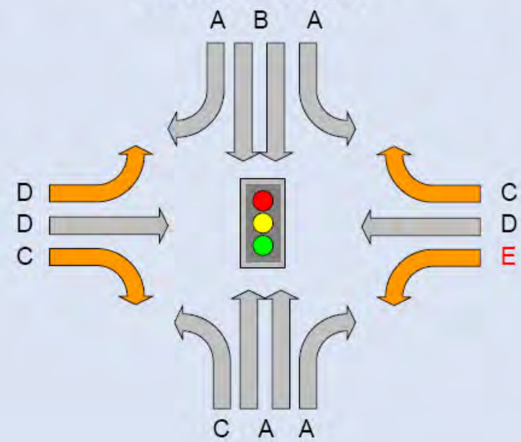
Unsignalized Intersection

2008 MITIGATED
LOS = C
V/C = 0.59
CYCLE LENGTH = 120 seconds

EXISTING LANE CONFIGURATION AND LOS BY MOVEMENT



MITIGATED LANE CONFIGURATION AND LOS BY MOVEMENT



TOTAL INTERSECTION COST: $805,000

FEASIBILITY:

- Roadway widening for the addition of exclusive left and right turn lanes to both the EB and WB approaches is feasible; however, there are moderate right-of-way and site impacts on all four quadrants.
- Geometric realignment of approaches could be considered to minimize site and right-of-way impacts.

Figure 6-21. US-95 and Lancaster

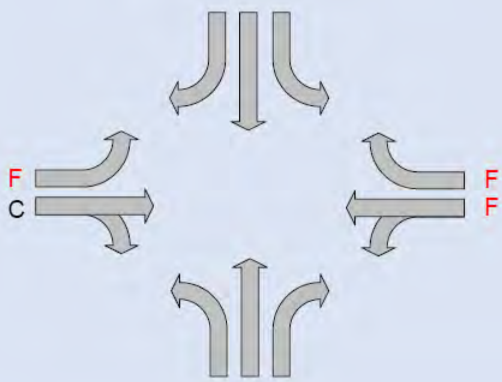
US-95 and Lancaster

2008

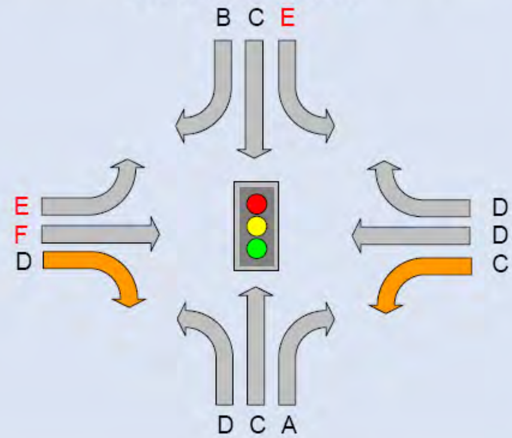
Unsignalized Intersection

2008 MITIGATED
LOS = C
V/C = 0.91
CYCLE LENGTH = 120 seconds

EXISTING LANE CONFIGURATION AND LOS BY MOVEMENT



MITIGATED LANE CONFIGURATION AND LOS BY MOVEMENT



TOTAL INTERSECTION COST: $695,000

FEASIBILITY:
- Widening of EB and WB approaches to install additional turn lanes is feasible with moderate right-of-way acquisition required.
- Adjacent site impacts are minimal.

Figure 6-22. US-95 and Boekel

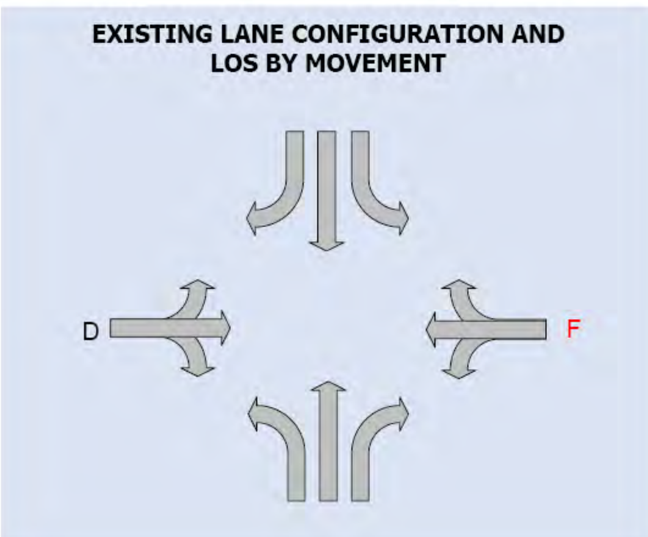
US-95 and Boekel

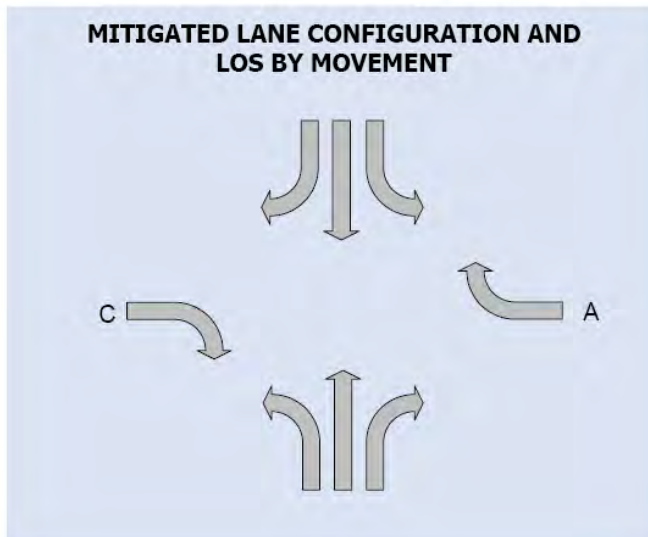
2008

Unsignalized Intersection

2008 MITIGATED

Unsignalized Intersection with Turn Restrictions





TOTAL INTERSECTION COST: $40,000

FEASIBILITY:

- Turn Restrictions: the addition of signage, pavement markings, and a curbed median indicating cross street movement restrictions is feasible.

7. Planning Level Costs and Prioritization

7.1 Implementation Plan

To assist each jurisdiction in implementing the Improvement Strategy for US-95, the improvements were grouped into two primary categories: *Mutually Exclusive* projects and *Project Groups*. Mutually exclusive projects are those that can be constructed at any time without significant adverse impacts to adjacent facilities (upstream or downstream) or the corridor as a whole. Project Groups are combinations of improvements that need to be constructed simultaneously to maintain acceptable traffic and access conditions. As shown in the Implementation Plan (see Table E-1 and Figure E-2), many of the mutually exclusive projects are included in project groups. These can be implemented as stand-alone projects but become required when other projects within the project group are constructed.

The Implementation Plan also includes an *AMS rating* based on an average of *access*, *mobility* and *safety* benefits. Some of the projects have more or less benefit to one or more of these ratings than others depending on the nature of the improvement. Although based on the analyses within this study, this rating is non-scientific.

Access

The access rating is related to community access to and from US-95. When this access is enhanced, in terms of access opportunities or reduction in wait time (to and/or from the highway), the access rating is high.

Mobility

The mobility rating is related to corridor traffic operations. A project specifically related to enhancement of US-95 corridor in terms of reduction of corridor travel time or reduction of driver delay was assigned a higher rating.

Safety

The safety rating is related to the overall reduction in potential vehicle crossing conflict points. Elimination of crossing conflicts (e.g. restriction of turning movements, installation of a signal to provide a protected turning phase) earns the project a higher rating.

Each rating is designated using a symbol as follows:

○ Minimal benefit for category
◉ Moderate benefit for category
● Significant benefit for category

In the *AMS Intensity* column, the symbol was given a color to assist in quickly identifying the most beneficial projects among the total group. Red was assigned to full circles (as the most significant benefit), blue was assigned to partially filled circles and green was assigned to open circles.

It should be noted that all of the projects work together to facilitate balanced optimization of all three rating categories. As explained in further detail within the analysis, the practical and relatively low cost projects included in the final Improvement Strategy work in unison to manage and balance safety and mobility on US-95 while providing essential community access to and from the highway.

Table 7-1. Implementation Plan

IMPROVEMENT GROUPING		LOCATION	IMPROVEMENT DESCRIPTION	ESTIMATED SUB-PART COST	ESTIMATED TOTAL COST	ACCESS	MOBILITY	SAFETY	AMS Rating
ME	ME-0	US-95 at Cherry Lane	Install Turn Restrictions	$40,000	$40,000	○	⊙	●	⊙
	ME-1	US-95 at Haycraft	Install Turn Restrictions	$40,000	$40,000	○	⊙	●	⊙
	ME-2	US-95 at Wilbur	Install Turn Restrictions	$40,000	$40,000	○	⊙	●	⊙
	ME-3	US-95 at Aqua	Install Turn Restrictions	$40,000	$40,000	○	⊙	●	⊙
	ME-4	US-95 at Bentz	Restrict to Right-in/Right-out1[4]	$10,000	$10,000	○	⊙	●	⊙
	ME-5	US-95 at Boekel	Install Turn Restrictions	$40,000	$40,000	○	⊙	●	⊙
	ME-6	US-95 at Murphy	Restrict to Right-in/Right-out[4]	$10,000	$10,000	○	⊙	●	⊙
	ME-7	US-95 at Prairie	Add EB Right Turn Lane	$470,000	$708,000	●	⊙	○	⊙
	ME-8	US-95 at Prairie	Add WB Right Turn Lane	$238,000		●	⊙	○	⊙
	ME-9	US-95 at Neider	Add WB Right Turn Lane	$263,000	$263,000	●	⊙	○	⊙
	ME-10	US-95 at Dalton	Add WB Right Turn Lane	$100,000	$100,000	●	⊙	○	⊙
	ME-11	US-95 at Miles	Install Traffic Signal (Z-Structure)	$325,000	$815,000	●	⊙	●	●
		US-95 at Miles	Add two lanes to EB approach for exclusive left and right turn lanes.	$225,000		●	⊙	○	⊙
		US-95 at Miles	Add two lanes to WB approach for exclusive left and right turn lanes.	$265,000		●	⊙	○	⊙
	ME-12	US-95 at Wyoming	Install Traffic Signal (Z-structure)	$325,000	$805,000	●	⊙	●	●
		US-95 at Wyoming	Add two lanes to EB approach for exclusive left and right turn lanes.	$215,000		●	⊙	○	⊙
		US-95 at Wyoming	Add two lanes to WB approach for exclusive left and right turn lanes.	$265,000		●	⊙	○	⊙
	ME-13	US-95 at Prairie	Add 2nd SB Left Turn Lane	$55,000	$55,000	●	●	○	●
	ME-14	US-95 at Kathleen	Add 2nd SB Left Turn Lane	$55,000	$55,000	●	●	○	●
	ME-15	US-95 at Honeysuckle	EB Right Turn Lane Addition Add 2nd NB Left Turn Lane	$500,000	$500,000	●	●	○	●
PG-1		US-95 at Orchard	Install Turn Restrictions	$40,000	$1,332,000	○	⊙	●	⊙
		US-95 at Dakota	Install Turn Restrictions	$40,000		○	⊙	●	⊙
		US-95 at Lacey	Install Turn Restrictions	$40,000		○	⊙	●	⊙
	ME-16	US-95 at Lancaster	Add EB Right Turn Lane Lengthen Existing Left Turn Lane	$185,000		●	⊙	○	⊙
		US-95 at Lancaster	Add WB Left Turn Lane Lengthen Existing Right Turn Lane	$185,000		●	⊙	○	⊙
		US-95 at Lancaster	Install Traffic Signal (Z-structure)	$325,000		●	⊙	●	●
	ME-17	US-95 at Hayden	Add EB Right Turn Lane and 2nd Thru Lane.	$517,000		●	⊙	○	⊙

[4] From ITD US-95, Wyoming to Ohio Match preliminary project plans

IMPROVEMENT GROUPING		LOCATION	IMPROVEMENT DESCRIPTION	ESTIMATED SUB-PART COST	ESTIMATED TOTAL COST	ACCESS	MOBILITY	SAFETY	AMS Rating
PG-2[5]		US-95 at Bosanko	Remove Existing Signal. Install Turn Restrictions. Connect Howard Road and extend Neider.	$100,000	$766,000	○	●	●	●
	ME-18	US-95 at Kathleen	Add WB Right Turn Lane	$283,000		●	◉	○	◉
	ME-19	US-95 at Kathleen	Add EB Right Turn Lane	$383,000		●	◉	○	◉
PG-3[6]		US-95 at Canfield	Remove Existing Signal. Install Turn Restrictions	$100,000	$1,115,000	○	●	●	●
		US-95 at Wilbur	Widen EB Approach to create left, thru & right turn lanes. Add signal. Extend Wilbur to Gov't Way and connect extended Wilbur south to Canfield.	$518,000		●	●	●	●
	ME-20	US-95 at Hanley	Convert Existing WB right turn to thru lane Widen for Relocated Right Turn Lane	$245,000		●	◉	○	◉
	ME-21	US-95 at Hanley	Add EB Right Turn Lane and 2nd Thru lane	$252,000		●	◉	○	◉
PG-4		Corridor	Signal Re-timing	$35,000	$35,000	○	●	○	○
				Total Improvements	$6,769,000				

ME: Mutually Exclusive, PG: Project Group
Note: Cost estimates include provisions for R/W acquisition, engineering and contingencies

[5] Costs do not include connection of Howard Road from Bosanko to Neider or extension of Neider to Howard connection as shown on the Implementation Plan (Figure 7-2).

[6] Costs do not include connection from US-95 to Government Way or the south link between the extended Wilbur to Canfield as shown on the Implementation Plan (Figure 7-2).

7.2 Off-system recommendations

During the planning and mitigation process, several *off-system* improvement needs were identified that will help facilitate the success of US-95 recommendations, minimize negative impacts to the local system, and in some cases improvement current local system operations. The improvements were not a pre-planned goals of the study but should be considered by each affected jurisdiction as transportation improvements are planned. The off-system improvements are depicted in Figure 7-3 through Figure 7-10.

Figure 7-1. Prioritization Map

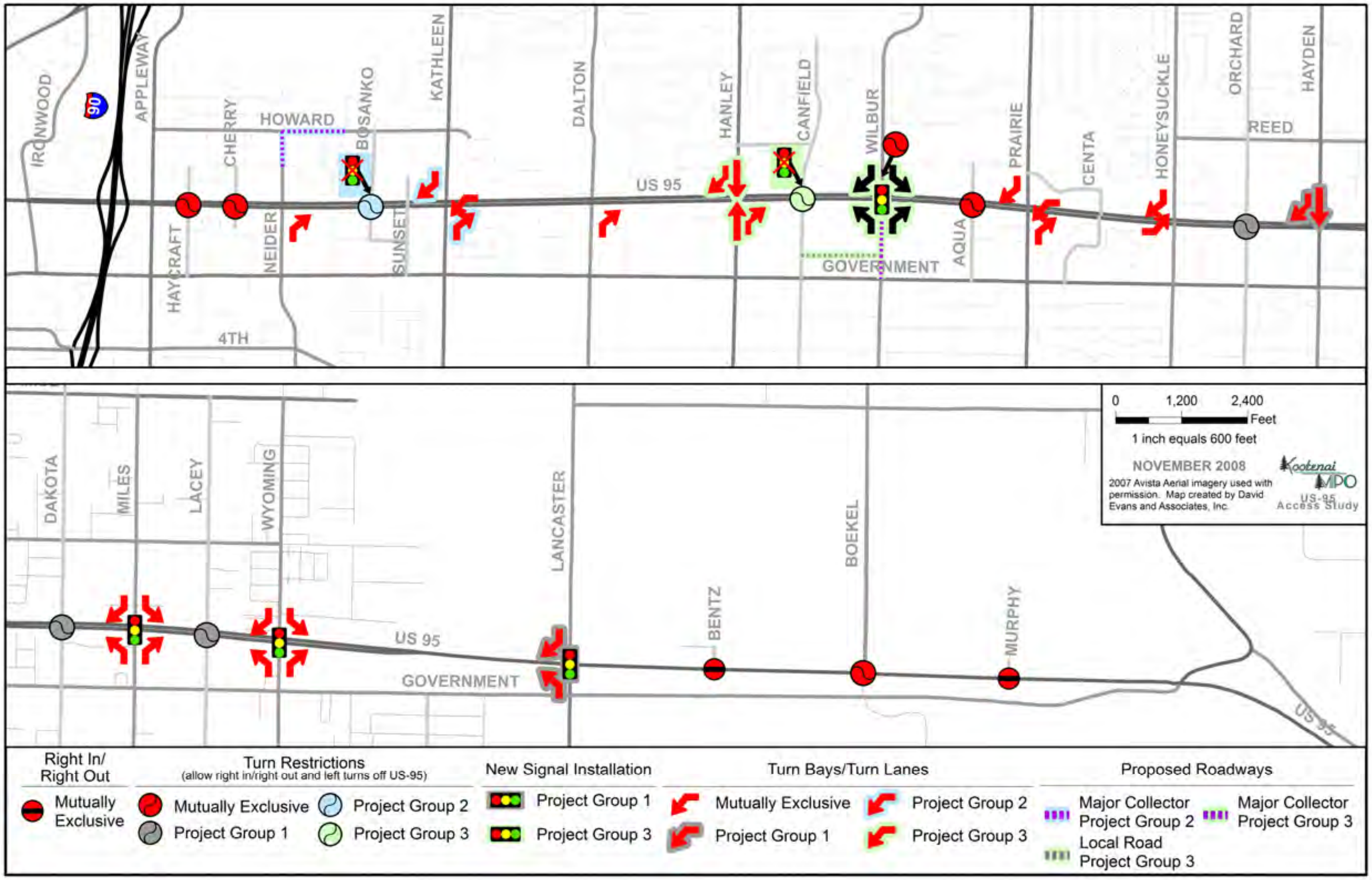


Figure 7-2. Recommended Corridor Concept

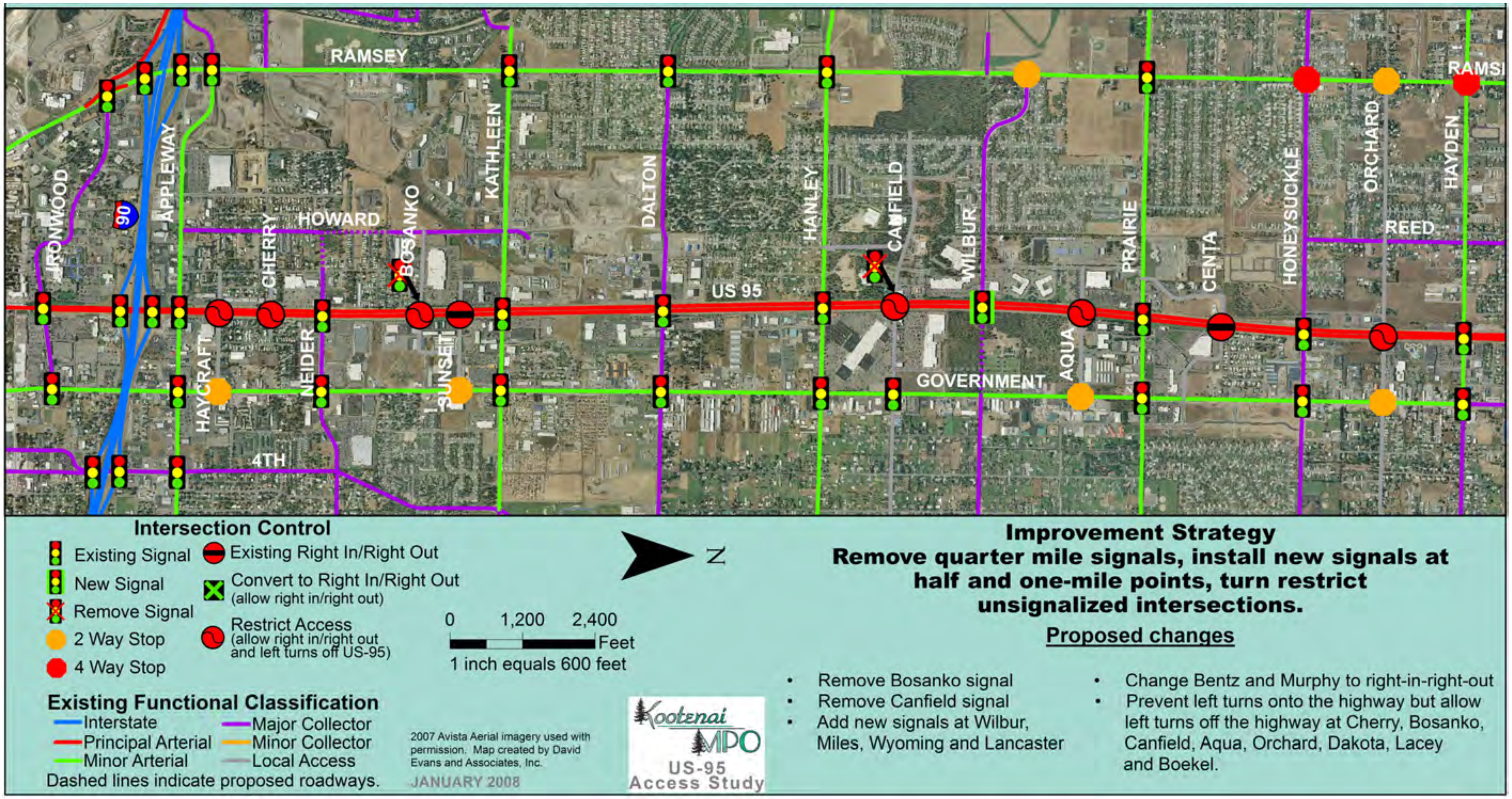
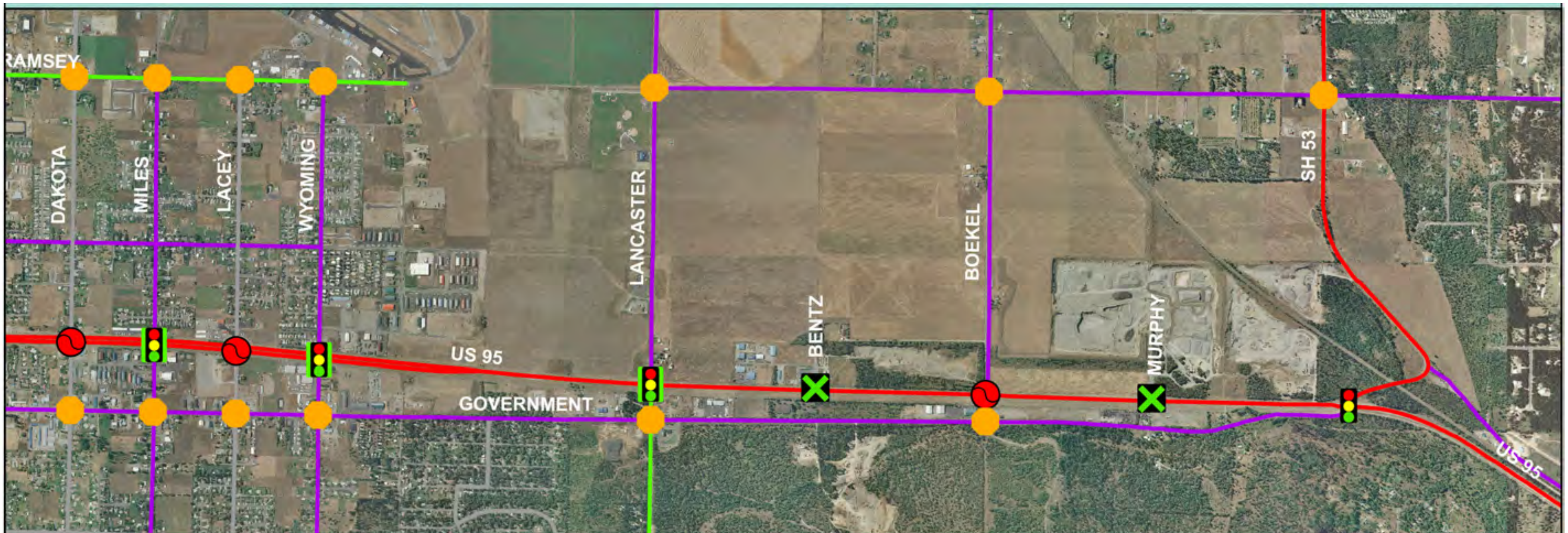


Figure 7-2. Recommended Corridor Concept, continued.



Mitigated System Results

SAFETY

- Safety is improved at existing unsignalized intersections.
- Reduces intersection crossing points, thus reducing the number of potential acccident locations.
- Traffic wishing to turn left onto or travel across the highway is forced to signals. Additional traffic at the signals may increase the number of collisions there.
- New signals may reduce severity of collisions, but may increase the number of collisions.

US95 MOBILITY

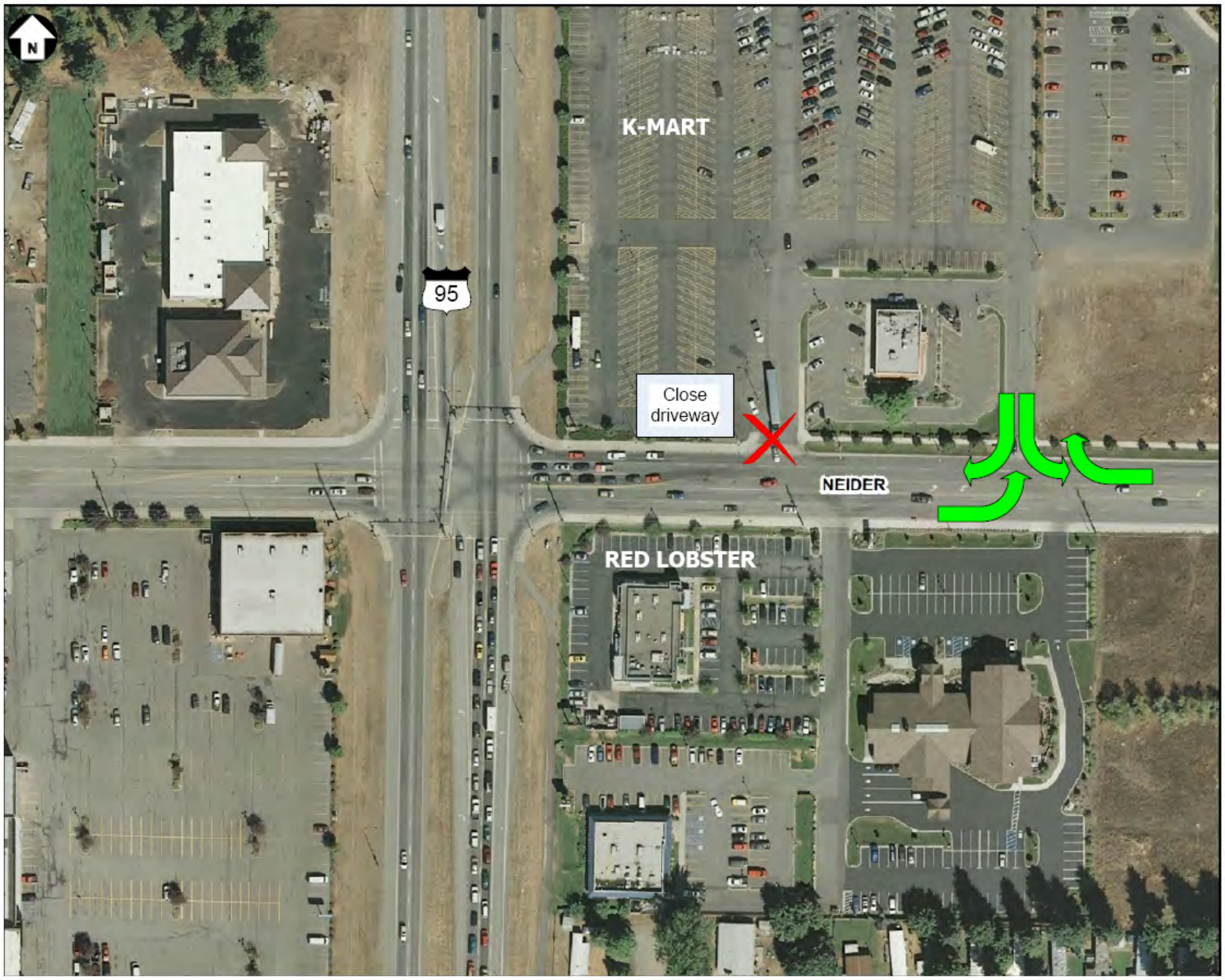
- Southbound US-95 travel time is increased slighty by 16.1 seconds.
- Northbound US-95 travel time is reduced by 48.5 seconds.
- Reduces total northbound US-95 delay.
- Slightly increases total southbound US-95 delay.

SYSTEMWIDE IMPACTS

- Total hours of driver delay for the entire study area is reduced.
- Unsignalized cross-street delay is reduced (by eliminating movements and rerouting traffic).
- Signalized cross-street delay in the urban section of the corridor is reduced.
- Better signal coordination is possible due to evenly spaced signals on half-mile and one-mile points.
- Total system-wide vehicle miles traveled (VMT) is slightly increased.

Figure 7-3. Off-System Improvements for US-95 and Neider

US-95 and Neider Avenue (Related Off-System Recommendations)



OFF SYSTEM IMPROVEMENT NOTES:

- The close proximity of this approach to the US-95 intersection degrades performance of both intersections.

Figure 7-4. Off-System Improvements for US-95 and Bosanko

US-95 and Bosanko (Off-System Recommendations)

OFF SYSTEM IMPROVEMENTS:

1. Connect Howard Road from south of Neider Avenue to Bosanko Avenue. A portion of this project will be completed as part of planned development.
2. Extend Neider Avenue west to the Howard Road connection.

Figure 7-5. Off-System Improvements for US-95 and Kathleen

US-95 and Kathleen (Off-System Recommendations)

OFF SYSTEM IMPROVEMENTS:

1. Relocate the Super One food main entrance to facilitate the movement of the right turn lane.
2. The one lane section on east Kathleen Avenue needs to be widened to a two lane section from the Super One food entrance to Government Way (or at least to Home Depot). Therefore, it will operate as effective receiving lanes for the two eastbound through lanes.
3. The possible connection between W Crown Ave and Auto Center Dr may help to distribute the traffic more evenly between Kathleen Ave and Dalton Avenue without requiring trips to congest the US-95 intersection at Kathleen Avenue.

Figure 7-6. Off-System Improvements for US-95 and Dalton

US-95 and Dalton (Off-System Recommendations)

OFF SYSTEM IMPROVEMENT NOTES:

- Close proximity of this driveway may hamper effective traffic operations.

Figure 7-7. Off-System Improvements for US-95 and Hanley

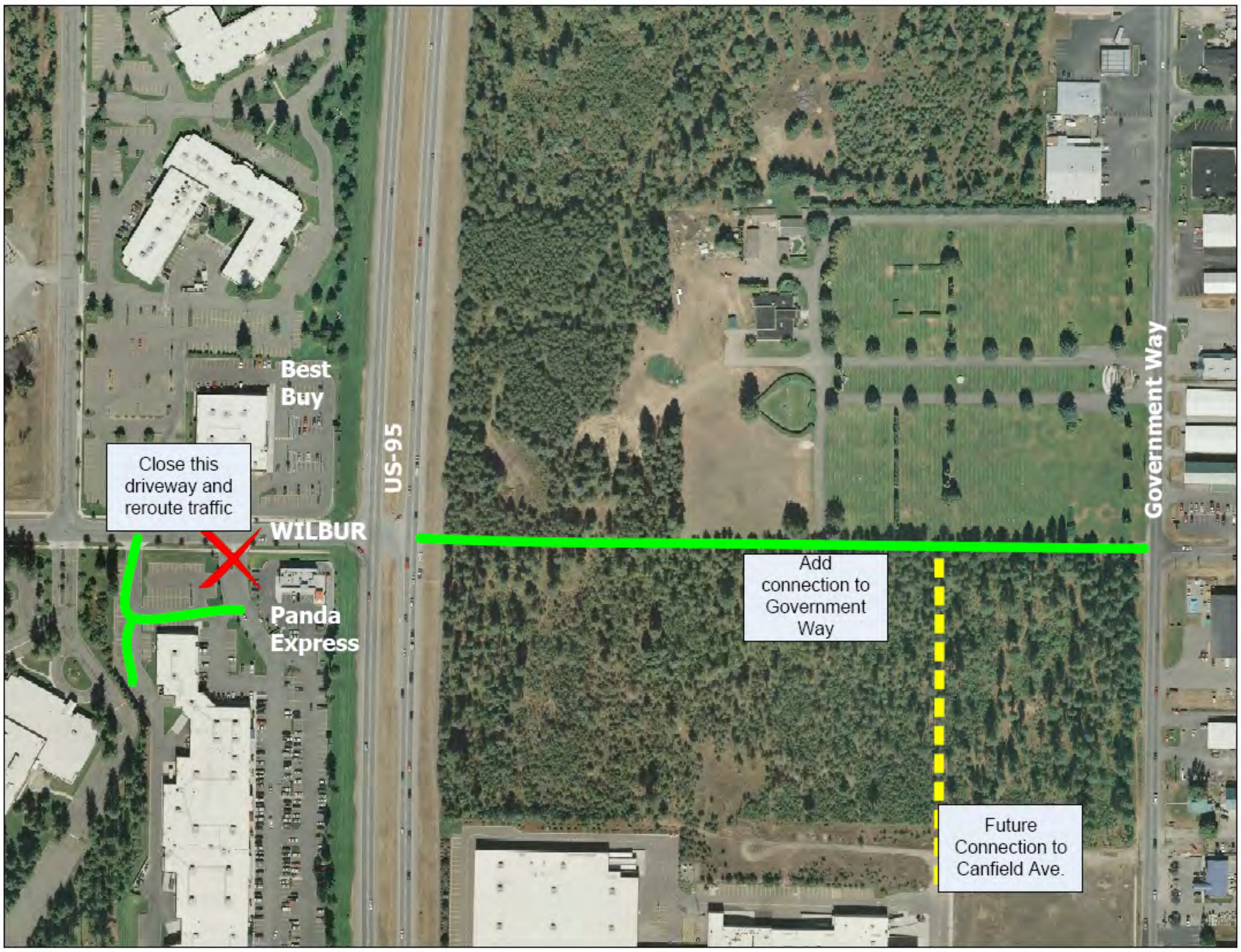
US-95 and Hanley (Off-System Recommendations)

OFF-SYSTEM IMPROVEMENTS:

- The close proximity of this approach to the US-95 intersection degrades performance of both intersections.

Figure 7-8. Off-System Improvements for US-95 and Wilbur

US-95 and Wilbur (Off-System Recommendations)

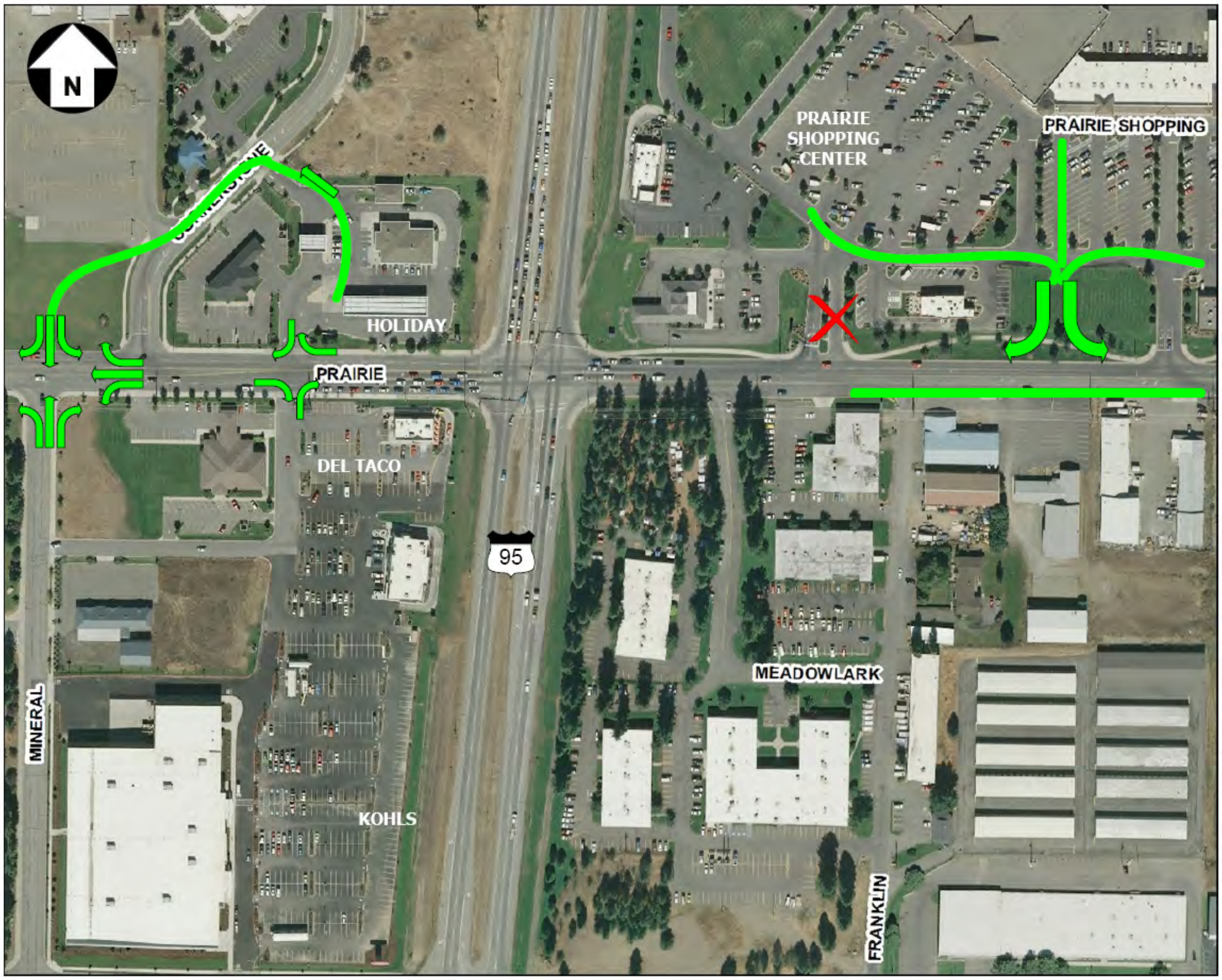


OFF SYSTEM IMPROVEMENTS:

- The close proximity of the parking lot approach to the US-95 intersection degrades performance of both intersections.
- Connection to Government Way provides another access to a signalized intersection.
- A future connection to Canfield Avenue will provide an alternate route for vehicles currently using the signal at Canfield.

Figure 7-9. Off-System Improvements for US-95 and Prairie

US-95 and Prairie (Off-System Recommendations)

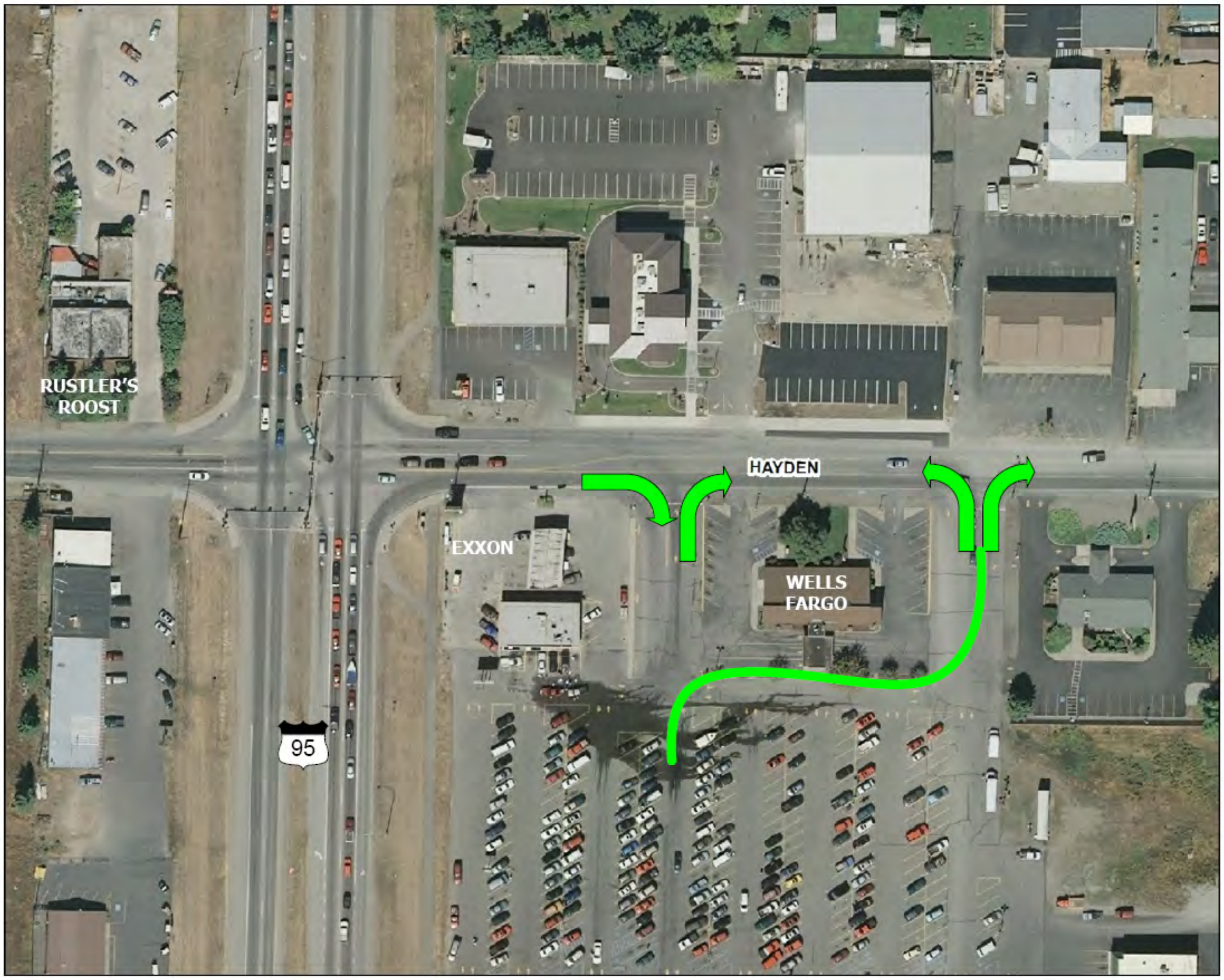


OFF-SYSTEM IMPROVEMENTS:

- Reconfiguration of accesses, as shown, will improve the operational characteristics of this segment of Prairie Avenue.

Figure 7-10. Off-System Improvements for US-95 and Hayden

US-95 and Hayden (Off-System Recommendations)



OFF-SYSTEM IMPROVEMENTS:

- Restricting the west-most intersection to right-in/right-out will improve access and operational conditions on Hayden Avenue and US-95 at the intersection.

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