3.0 FUTURE TRAFFIC CONDITIONS

This Part examines future traffic conditions in Whitefish and describes how the US 93 corridor may operate in the year 2030. Simulations and analyses based on the results of travel demand modeling for the year 2030 were used to identify future traffic conditions and potential operational concerns within the corridor. The travel demand model used for this Corridor Study was also used for the Whitefish Transportation Plan.

3.1 Travel Demand Forecasting in the Whitefish Area

The methods and process developed to predict growth in the Whitefish area to the year 2030 are described in detail in the Whitefish Transportation Plan and briefly summarized below. Through the use of population, employment and other socio-economic projections, the needs for the future transportation system along the US 93 corridor were defined. A model of the future (2030) street network in the Whitefish area was created to predict traffic demands based on the projected socio-economic information and changes to the transportation system likely to occur before the year 2030. The following section provides information about how the future year traffic model was created.

3.1.1 Future Street Network

For the purposes of the corridor study, the future street network in the Whitefish area was assumed to consist of the existing system plus committed projects expected to be in place by the year 2030. The Whitefish Transportation Plan refers to this future street network as the “E+C Network.” MDT’s Whitefish-West project is the only “committed” transportation improvement included on the E+C Network. The Whitefish-West project extends from Reference Post (RP) 127.8 (located on 2nd Street between Baker and Lupfer Avenues) to RP 133.0 west of Whitefish and is currently in the design phase. No local improvements to the transportation network were assumed to be in place by the year 2030.

The Whitefish Transportation Plan recommends numerous and extensive improvements to the local street network including new bridges and road connections in order to help meet the anticipated traffic demands for the year 2030. Some of these recommended projects are located on routes that fall under the MDT’s jurisdiction; however, most of the recommendations affect streets and roads that fall under the responsibility of either the City of Whitefish or Flathead County. There is no certainty MDT or these local governments can or will implement all of these projects over the planning horizon. For this reason, the E+C Network presents a very “conservative” representation of the future street system in Whitefish. Modeling the E+C Network provides analysts with an indication of what future operating conditions on the local road and street network may be like without expanding the capacity on US 93 or major system improvements.

3.1.2 Traffic Model Development

The year 2030 was selected as the planning horizon for the future year traffic model. The model takes into account socio-economic and growth projections for the community through the allocation of new housing units and employment through the year 2030 for the Whitefish area. These allocations were consistent with the assumptions about future growth and development included in the Whitefish City-County Growth Policy.

Land use and socio-economic characteristics in the greater Whitefish area influence the traffic patterns present in the community today. To build a model to represent this condition, the housing information was collected from the 2000 Census and updated to include housing to the year 2003, utilizing Department of Revenue data. The employment information was gathered from the Montana Department of Labor and Industry, second quarter of 2003 and was reviewed by local agency planners and MDT staff.

The roadway network/centerline information was provided by the Flathead County GIS office. This information was supplemented by input from staff from the City of Whitefish, Flathead County, and MDT. With this substantial local knowledge, the accuracy of the base model was increased.

The GIS files, population census information, and employment information are readily available and summaries of the housing and employment forecasts are presented in the Whitefish Transportation Plan. *TransCAD* software, which employs this information as input data, was used to create the traffic model. The *TransCAD* traffic model uses the input data to generate, distribute and assign traffic and project traffic volumes for the road network. These traffic volumes are then compared to actual ground counts and adjustments are made to ensure the accuracy of the model.

It should be noted that since traffic models are based on forecasted land uses and existing travel patterns, the resulting traffic volumes are not expected to be completely accurate but only to assist in the evaluation of projected future conditions.

To develop a transportation model, the modeling area must be established. The modeling area is, by necessity, much larger than the corridor study area. The study area for the Whitefish area traffic model is the same as the Whitefish Planning Jurisdiction Area considered in the City-County Growth Policy. Traffic generated from outlying communities or areas contributes to the traffic load within the Whitefish area, and is therefore important to accuracy of the model. Additionally, it is desirable to have a large model area for use in future projects.

The modeling area was subdivided by using census tracts and census blocks to help identify population and other socio-economic characteristics of the area. Census blocks are typically small in the downtown and existing neighborhood areas, and grow geographically larger in the less densely developed areas. The census blocks and census tracts were used to allocate the population and employment growth anticipated to occur between now and 2030.

3.1.3 Traffic Simulation and Analysis

Traffic simulation software is used to determine how a roadway, intersection, or network performs under designated conditions. *Synchro* plus *SimTraffic 6* (designed by Trafficware Ltd.) was used to simulate traffic behavior, optimize signal timings, and perform analysis throughout the specified network. For the purposes of the corridor study, the network consists of every intersection along Spokane Avenue between 13th Street and 2nd Street, every intersection along Baker Avenue between 13th Street and 2nd Street, and the intersection of Central Avenue and 2nd Street.

Synchro requires peak-hour turning movement volumes to be input at each intersection in the network. These turning movement volumes came from taking twelve percent (12%) of the modeled traffic volumes generated by the *TransCAD* traffic model. The geometry of the future network and of each intersection reflects the geometry in place today.

The signal timing for future conditions was determined by using the "optimize" function in *Synchro*. This feature allows *Synchro* to optimize cycle lengths, splits and offsets to determine the situation that performs at the best level for the entire network. Signal timing for existing conditions was based on current signal timing values obtained from MDT. Once the network is set up with the appropriate geometry, traffic volumes and signal timings, an analysis of the network and of each individual intersection can be done. The analysis process was also done via *Synchro*, which is capable of producing detailed reports for "Intersection Capacity Analysis" and "Measures of Effectiveness".

Information about vehicle delays and the projected future LOS for each intersection, as determined through the "Intersection Capacity Analysis", is presented later in this Part of the Corridor Study.

3.2 Projected Traffic Conditions (2030)

This section examines projected traffic conditions in the year 2030 on the E+C Network. The future traffic conditions for the Whitefish area were predicted through the use of the traffic model and analysis methods discussed earlier. These tools help to identify future problems on the road and street network and determine possible improvement options to help the network perform at a higher level.

3.2.1 Future Traffic Volumes and Capacity Considerations

Using the traffic model, it was possible to project traffic volumes (AADTs) on all major roads within the Whitefish study area. These roads were analyzed for the base year 2003 and for the future year 2030 to determine how volume changes expected to occur on the network by the year 2030 may affect traffic operations. The volumes generated by the model reflect the future year housing and employment projections.

The modeled traffic volumes on the US 93 corridor, Baker Avenue, and adjoining streets for the year 2030 can be found in **Figure 3-1**. Modeled volumes for the year 2003 were previously presented in **Figure 1-9**. Changes in modeled traffic volumes at selected locations for the years 2003 and 2030 are highlighted in **Table 3-1**.

The travel demand model projects substantial increases in traffic volumes throughout the study area by the year 2030. Model results show future traffic volumes at locations along Spokane Avenue ranging from 1.2 to 2.0 times higher than modeled volumes for 2003. Traffic volume increases along 2nd Street show future volumes that are 1.5 times higher than those for 2003. Likewise, modeling shows future traffic volumes along Baker Avenue could be about 1.3 to 1.5 times above modeled volumes for 2003. Consistent with the range of projected volume increases on Spokane Avenue in the vicinity of 13th Street, the model predicts increases in traffic volumes on 13th Street both east and west of Spokane by the year 2030.

The number of lanes and projected daily traffic volumes can be used to help predict future roadway capacity issues. As noted in **Part 1.0**, two-lane roadways can typically accommodate up to 12,000 vehicles per day. Since Spokane Avenue, 2nd Street, and Baker Avenue are two lane facilities, this standard was used as an indicator of future capacity concerns on these roadways. The model results for the year 2030 showed the following roadway sections within the corridor with modeled AADT volumes at or near 12,000 vehicles:

- Spokane Avenue (between 13th and 6th Streets);
- 2nd Street between Central and Baker Avenues;
- The north and south approaches at the intersection of 2nd Street and Baker Avenue; and
- Baker Avenue between the Whitefish River and 13th Street.

This suggests the current two-lane roadways may be at or exceeding their capacity by the year 2030 and indicates the need for design and/or operational changes to increase their capacity.

Segments within individual roadway corridors showing volume to capacity (v/c) ratios of 0.8 or higher are of concern because this limitation on road capacity leads to congestion. Ratios of 1.0 or more suggest the road is beyond its ability to accommodate traffic flows. As previously discussed in **Part 1.0**, most of Spokane Avenue between Riverside Avenue and 2nd Street currently has v/c ratios ranging from about 0.80 to more than 1.0. Similarly, portions of Baker Avenue north of 2nd Street and between 6th and 13th Streets have v/c ratios that suggest the roadway is currently approaching its capacity.

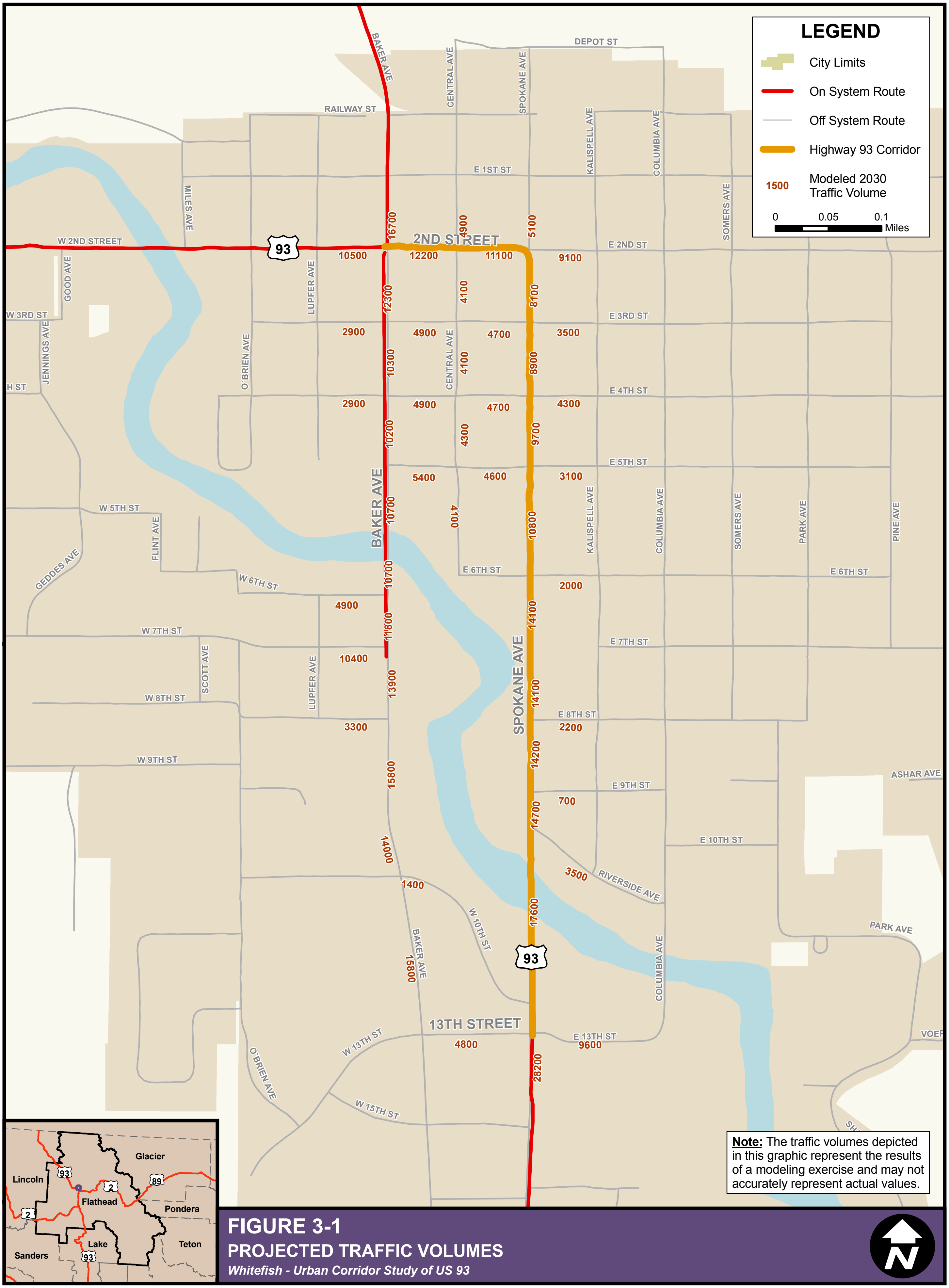

FIGURE 3-1
PROJECTED TRAFFIC VOLUMES
Whitefish - Urban Corridor Study of US 93

Since numerous roadway segments of US 93 and Baker Avenue already operate at or near their capacities, it is apparent that the ability of these roadways to accommodate traffic flows would continue to decrease as traffic volumes increase in the future.

Table 3-1: Current and Future Modeled Traffic Volumes on US 93 and Baker Avenue

Location	Current/Future Modeled Traffic Volumes	
	2003 Volume	2030 Volume
Spokane Avenue		
South of 13th Street	13700	28200
North of 13th Street	10900	17600
South of 6th Street	10400	14100
Between 6th and 5th Streets	8700	10800
Between 4th and 3rd Streets	7300	8900
South of 2nd Street	6400	8100
North of 2nd Street	3400	5100
2nd Street		
East of Spokane Ave	6200	9100
West of Spokane Ave	7600	11100
West of Central Ave	7900	12200
West of Baker Ave	9600	10500
Baker Avenue		
North of 2nd Street	12500	16700
South of 2nd Street	9100	12300
Between 5th Street and WF River	8000	10700
Between 7th and 8th Streets	10600	13900
North of 10th Street	10100	14000
Between 10th and 13th Streets	10400	15800
South of 13th Street	8500	12500
Central Avenue		
North of 2nd Street	2600	4900
South of 2nd Street	2100	4100
13th Street		
West of Spokane Ave	2100	4800
East of Spokane Ave	2000	9600

3.2.2 Future Level of Service at Corridor Intersections

As noted in **Part 1.0** of this study, urban road systems are controlled by the operation of their major intersections. Intersection failures reduce the number of vehicles that can be accommodated during peak travel hours at specific locations and lessen a roadway corridor's overall traffic volume capacity each day.

Each intersection along the US 93 corridor and along Baker Avenue between 2nd and 13th Streets was analyzed using the procedures outlined in the Transportation Research Board's Highway Capacity Manual – Special Report 209. The analyses were conducted using *Synchro* plus *SimTraffic 6* software and projected traffic data for corridor intersections generated by the traffic model.

The existing (2003) and future (2030) peak hour LOS for the signalized and unsignalized intersections along the US 93 corridor and on Baker Avenue are shown on **Figure 3-2**. The peak hour traffic volumes at each intersection were estimated from the results of traffic model for current and future conditions. Existing signal timings were used to analyze existing conditions. Optimal signal timing was applied to each signalized intersection in the future (2030) analysis to obtain the traffic conditions at that location.

Figure 3-2 shows that without improvements, the peak hour LOS at most signalized intersections on Spokane Avenue may progressively worsen as traffic volumes increase. By the year 2030, the signalized intersections at Spokane Avenue and 13th and at 2nd Street and Baker Avenue may operate at LOS E or F, respectively, during the peak hour.

By the year 2030, almost all unsignalized intersections along Spokane and Baker Avenues may operate at LOS E or F during the peak hour without improvements. The poor overall peak hour LOS rating reported for unsignalized intersections is the result of at least one of the movements at each intersection operating with significant delays and does not necessarily mean that the operation of the entire intersection is poor. The poor LOS ratings at unsignalized intersections in the corridor are due to the lengthy delays that side street traffic may experience while attempting to enter or cross traffic flows on Spokane or Baker Avenues and not the result of poor operations on these major roadways. Analyses suggest Spokane and Baker Avenues would likely operate at an acceptable LOS in the peak hour through the year 2030. This is consistent with a fundamental priority to facilitate traffic flows on the arterial corridor.

Please note the "improved" LOS at the intersection of Spokane Avenue and 9th Street by the year 2030 is a peculiarity of the travel demand model and likely the result of little or no turning movements being assigned to the existing side street approach. There is no reason to believe this side street approach would operate any differently than other nearby intersections during peak hour conditions.

Highway capacity analyses for the signalized intersections at Spokane Avenue and 2nd Street and at 2nd Street and Central Avenue predict little change in LOS ratings at these locations during peak hours in 2030. This may be due in part because the intersection analyses assumed optimized signal timing at these locations. The poor operation of the intersection at 2nd Street and Baker Avenue may also inhibit traffic flows on 2nd Street and indirectly benefit the LOS at the intersections of Central and Spokane Avenues.

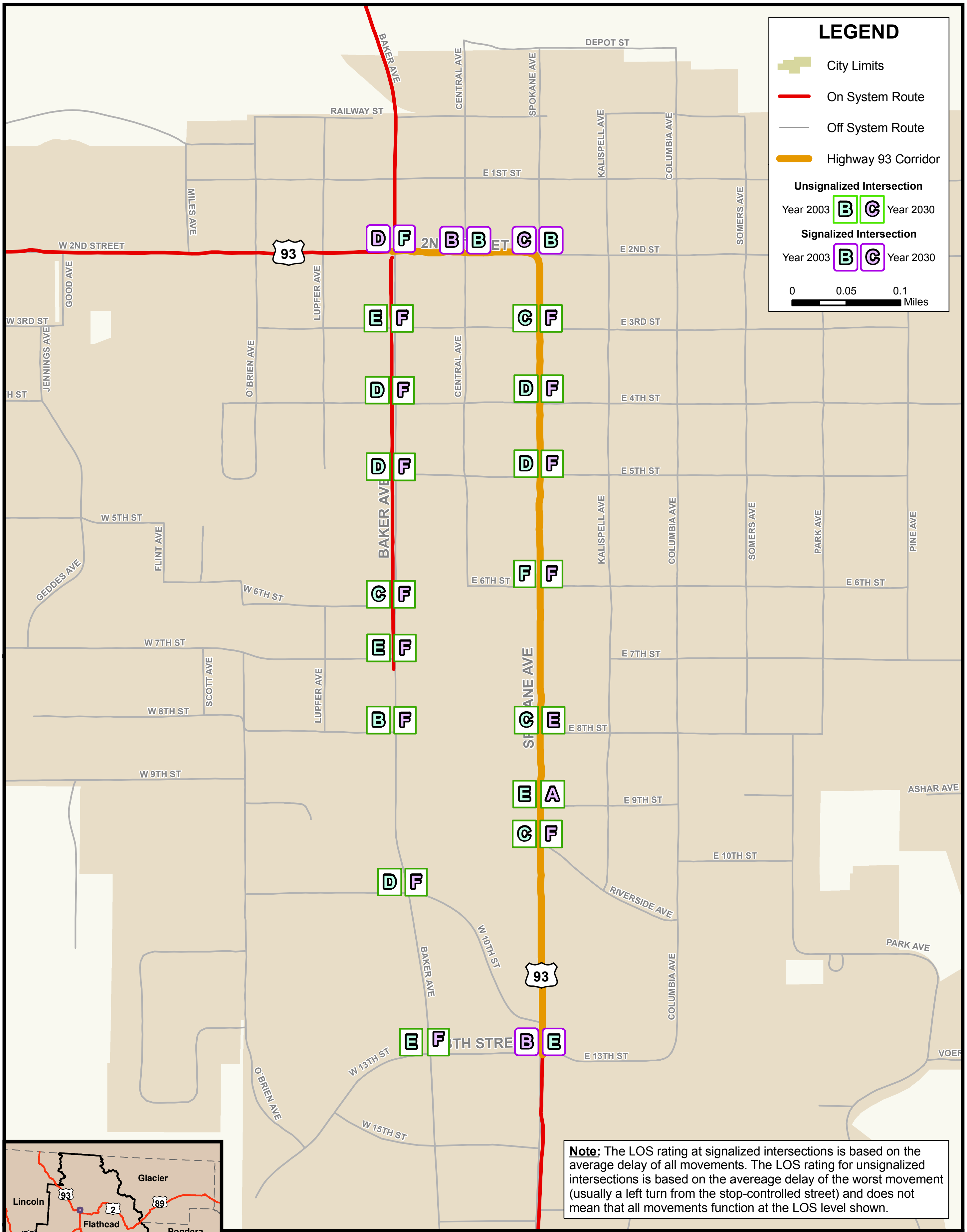

FIGURE 3-2

INTERSECTION LEVEL OF SERVICE

Whitefish - Urban Corridor Study of US 93

3.3 Anticipated Future Operational Deficiencies

This section identifies future operational deficiencies on the US 93 corridor. In general, increasing traffic volumes, inadequate intersection or road geometries, and poor traffic flows will contribute to deteriorating traffic operations within the corridor. Based on projected travel demands and the assumption no major improvements are implemented to address such demands, the most apparent future deficiencies corridor will be:

- Lengthy delays for side street traffic attempting to enter or cross Spokane and Baker Avenues;
- Deteriorating LOS at the signalized intersections of Spokane Avenue and 13th Street and 2nd Street and Baker Avenue; and
- The continued inability for the intersection of 2nd Street and Baker Avenue to adequately accommodate all turning movements by large trucks.

Failure resulting from inadequate roadway and intersection capacity may result in traffic congestion and poor network performance. Traffic volumes that exceed or approach capacity levels cause increased vehicle delays along the roadway and on side streets resulting in lower LOS ratings.