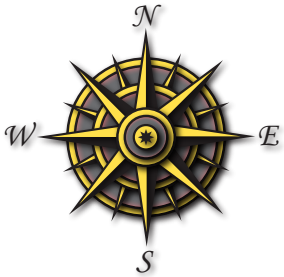
System Needs Assessment

As the Wasatch Front Region grows and development patterns emerge, the travel demand for all transportation modes will increase and the need to manage all elements of the transportation system will become much more pronounced. This Chapter describes the system-wide needs the WFRC has identified through public input, analysis of current and future travel patterns, and other means. Critical regional corridors are identified on page 54, General Needs Overview.

Chapter 3

Photo at Left: The *Wasatch Weave* interchange provides automobile access between Interstate 15, Highway 89 and the Legacy Parkway at Farmington. This complex interchange also accomodates freight train and *Front Runner* commuter rail corridors at the new Station Park transit-oriented development.



Needs Assessment

PUBLIC SCOPING OF NEEDS

The following is a summary of public involvement work and comments received during the scoping phase of the 2040 RTP. Open houses were held and other efforts made to determine the views of the general public concerning needed and desirable changes and enhancements to the Regional Transportation System. Those efforts included an update to the Regional Vision in partnership with the Mountainland Association of Governments (MAG) and Envision Utah which involved the general public as well as many representatives from local jurisdictions. In addition, presentations on transportation issues were made to numerous groups including members of the State Legislature, the Governor's Office, civic groups, chambers of commerce, service clubs, environmental justice and low income groups, groups focused on protecting the environment, and motor cargo organizations.

During the process of preparing the 2040 RTP, the Wasatch Front Regional Council participated in dozens of open houses sponsored by other transportation agencies in order to receive comments and recommendations. Thousands of copies of the September 2007 brochure outlining the 2030 RTP were distributed. Quarterly newsletters were also mailed, and annual presentations made on transportation needs were made to the respective county councils of government. Based on the above public involvement efforts, it became clear that the following transportation needs were perceived by members of the general public and representatives of the interested groups.

Weber County

- Increase transit service options (streetcar, local bus routes, connections to commuter rail, express bus)
- Improve and increase bicycle and pedestrian facilities and safety (pedestrian overpass
- Operational improvements on major arterials (signal timing, turn lanes)
- Support new and upgrades to facilities in growing areas of the county
- Preservation and Improve air quality
- Adjust development patterns to provide more housing near employment centers

Davis County

- Increase access to the freeway system
- Expand and improved east-west facilities and movement
- Provide more pedestrian and bicycle facilities (pedestrian bridges, like lanes, pathways)
- Improve transit service through Davis and to Salt Lake County
- Improve and increase the north-south facilities on west side of county

Salt Lake County

- Increase and improve freeway access
- Fund more pedestrian and bicycle facilities and safety improvements (sidewalks, paths-separate from roads, bike parking, bike lanes-separate from traffic)
- Improve and expand transit facilities (park and rides, TRAX stations, east-west routs, service throughout the valley)
- Increase north-south roadway capacity
- Increase east-west roadway capacity
- Air Quality improvements
- Innovative roadway improvements (reversible lanes, one-way streets, congestion mitigation strategies)

GENERAL NEEDS OVERVIEW

In order to assess transportation needs in the Wasatch Front Region, the WFRC established 14 subareas and identified issues and opportunities within each. These regional subareas are graphically depicted in Chapter 4, Map 4-5. In addition to compiling needs noted by the public, the WFRC researched various data sources. The types of issues and concerns identified in most of the subareas included: bottlenecks, underdeveloped transportation networks, sensitive lands, lack of adequate transit service, safety concerns, congestion, geometric deficiencies, and lack of sufficient freeway access. A complete listing of regional transportation and land use issues and opportunities identified can be found in Appendix F – Issues and Opportunities.

Major Travel Demand Corridors

In order to fully identify transportation system needs, future travel demand must be quantified. The regional travel demand model facilitates analyses to provide this

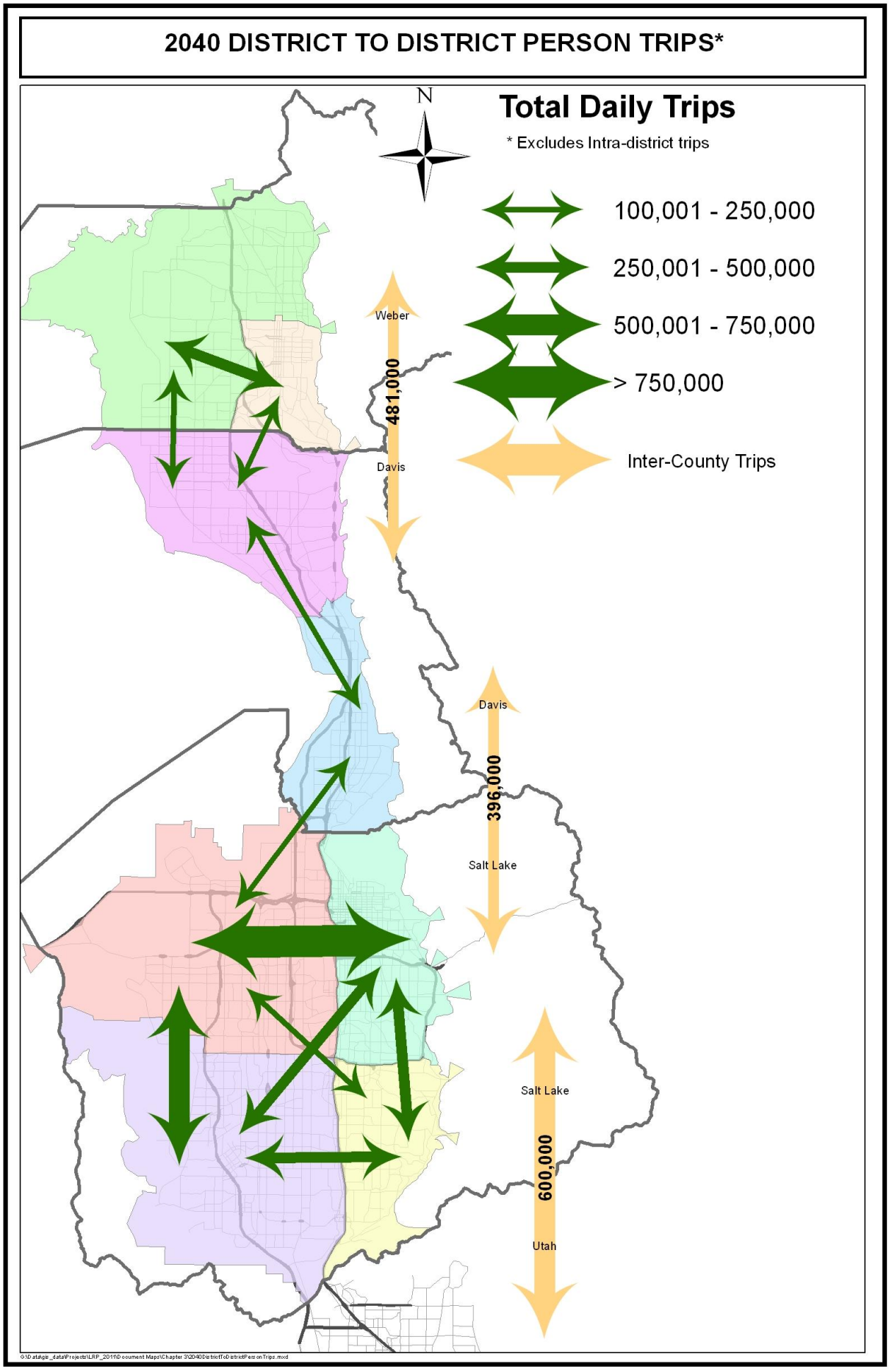


Fig. 3-1, 2040 TRAVEL DESIRES

information. A detailed documentation of this modeling process is provided in Appendix C – Transportation Modeling and Analysis Tools. The projected 2040 desire lines of travel are displayed in Figure 3-1, the width of the line indicating the magnitude of the travel flows. The largest intra-county 2040 travel flows are shown in addition to each of the north-south, urban inter-county flows. The magnitude of the inter-county travel flow arrows illustrates the interconnected economy of the Wasatch Front Region. Based upon regional travel demand illustrated in Figure 3-1, it appears that the primary travel flows, in order of magnitude, will be as follows.

- East / West flow between northwestern and northeastern Salt Lake County
- North / South flow across the Salt Lake / Utah County line
- North / South flow between southwestern and northwestern Salt Lake County
- North / South flow across the Davis / Weber County line
- East / West flow between southeastern and southwestern Salt Lake County
- North / South flow across the Salt Lake / Davis County line
- East / West flow between western and southeastern Weber County

Finding Future (2040) Deficiencies

An essential analytical step in the process of identifying needs is to calculate how the existing transportation system would perform in the horizon year, 2040. In other words, what will be the deficiencies of the existing transportation system? For the purposes of this analysis, the "existing" system is assumed to be the facilities currently in use as well as funded projects. The highway and transit projects included are those to be constructed by 2016 (funded projects).

The following Figures 3-2, 3-3, and 3-4 identify the deficiencies of the existing transportation system through the year 2040. In each county the future (2040) travel demand (red or green) is compared to the existing plus funded highway capacity (blue outline) across a set of screenlines. Where demand exceeds capacity the screenlines show up as red. As could be expected, the largest capacity deficiencies along the Wasatch Front will be primarily in the high growth areas where there is limited infrastructure, plus the heavily traveled I-15 corridor.

A review of these graphics indicated that the following six major corridors will experience the most serious mobility deficiencies.

- I-15 along the Wasatch Front in Weber, Davis and Salt Lake Counties
- East / West flow in the southwest quadrant of Salt Lake County (between 6200 South and 14600 South)
- East / West flow in the central west portion of Salt Lake County (between 3100 South and 6200 South)
- North / South flow in southern and western Salt Lake County
- North / South and East / West flow in northwestern Davis County
- East / West flow in western Weber County

Traffic Congestion

Often in high growth areas, new capacity (supply) seems to be prematurely congested by recurring commuter traffic and non recurring accidents and construction. In "supply" and "demand" terms, the travel "demand" is the number of vehicles (drivers) wanting to use the roads and the "supply" is the volume of vehicles that a road can carry in the peak period. The highway system provides exceptional mobility until it starts to break down because of daily congestion at choke points or irregular incidences such as crashes. Congestion then is compounded because as demand increases in the peak periods, supply declines when speeds are reduced.

When freeways reach capacity, they lose up to thirty percent of their ability to move traffic efficiently. For example, a 10-lane freeway can carry about 21,000 vehicles going at a speed of 60 miles per hour. When the situation degrades to an average speed around 20 mph, the 10-lane freeway can only carry about 15,000 vehicles. Transit, and carpooling, on the other hand can be expanded by adding passenger cars to peak hour trains without reducing the service speed. Regional transit is better suited to the peak hour travel demand and will best succeed where access, travel time, convenience, cost and comfort are attractive when compared with congested auto travel.

The auto / highway system will remain the dominant mode in the Region through 2040 but creative strategies are needed to avoid compounding highway congestion. At its most fundamental level, highway congestion results

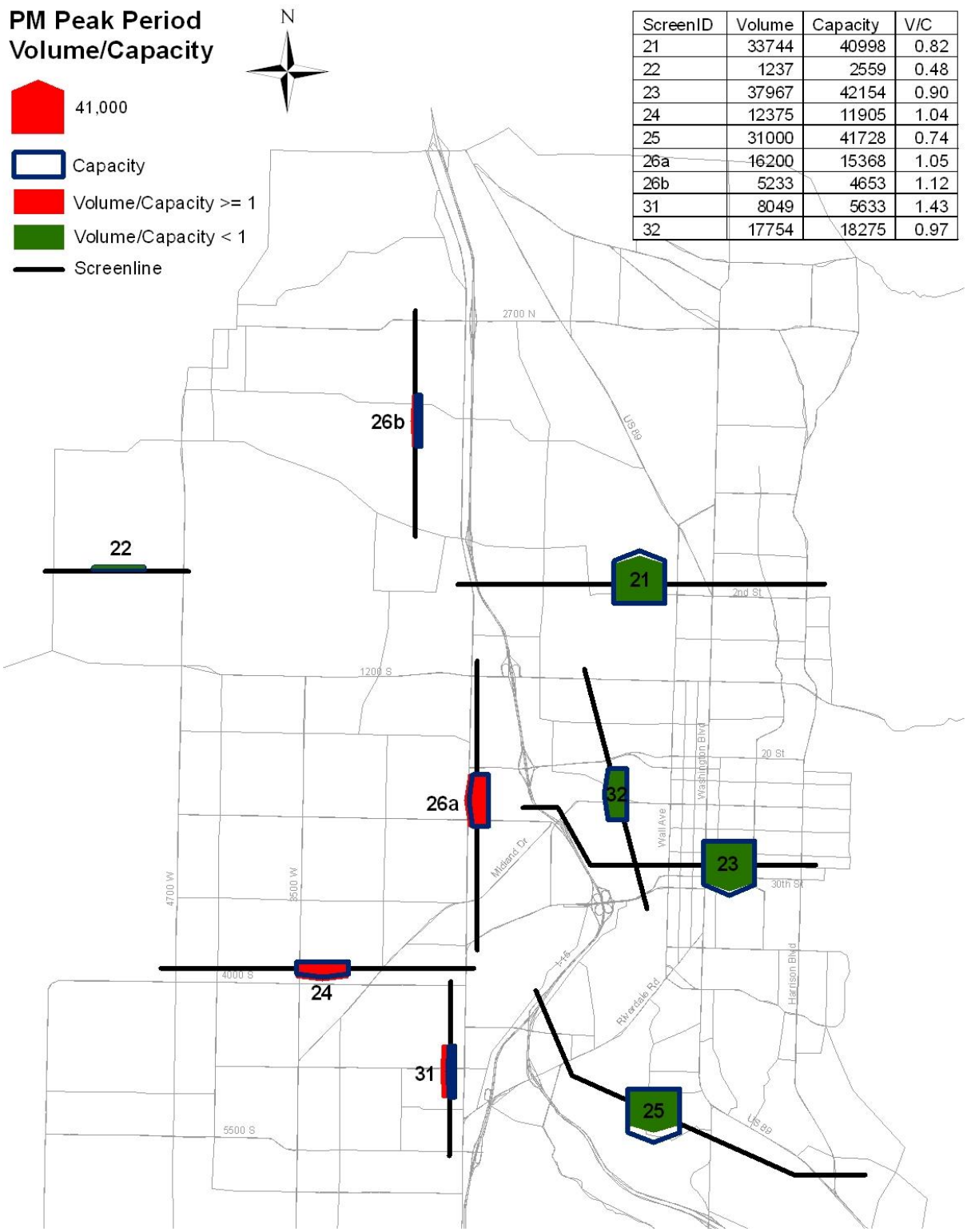
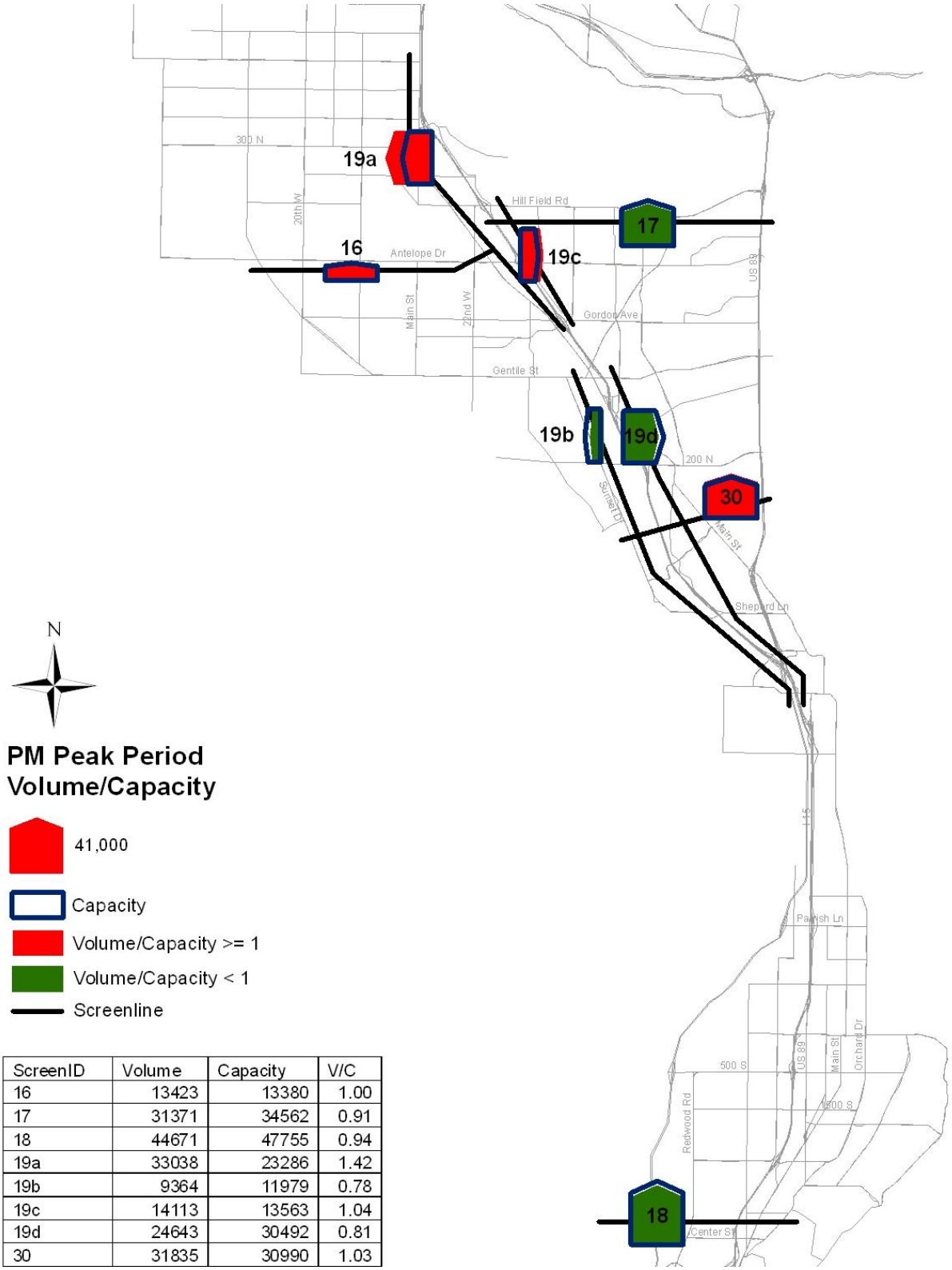
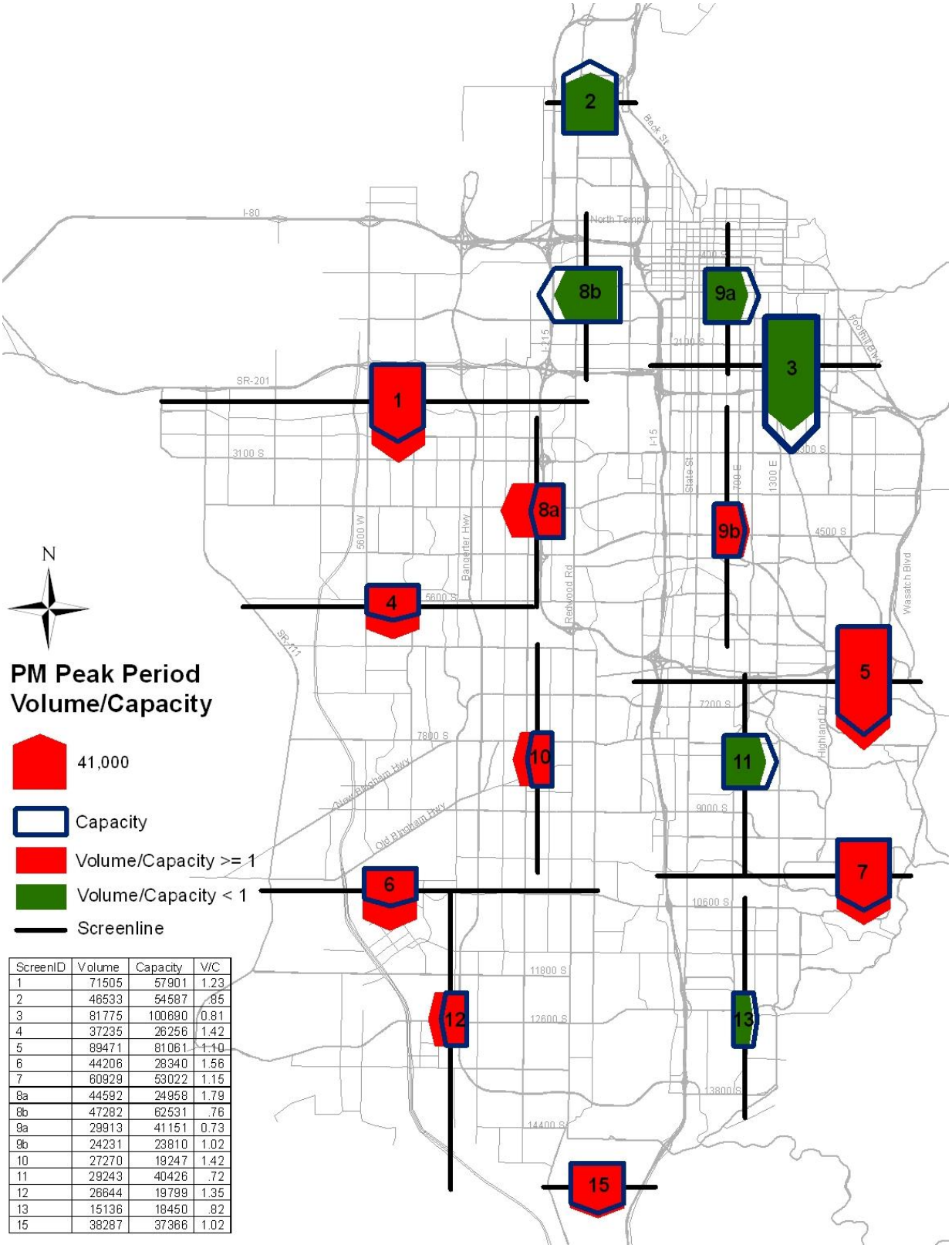


Fig. 3-2, WEBER COUNTY 2040 PM PEAK PERIOD VOLUME / 2016 CAPACITY

Fig. 3-3, DAVIS COUNTY 2040 PM PEAK PERIOD VOLUME / 2016 CAPACITY



ScreenID	Volume	Capacity	V/C
16	13423	13380	1.00
17	31371	34562	0.91
18	44671	47755	0.94
19a	33038	23286	1.42
19b	9364	11979	0.78
19c	14113	13563	1.04
19d	24643	30492	0.81
30	31835	30990	1.03



ScreenID	Volume	Capacity	V/C
1	71505	57901	1.23
2	46533	54587	.85
3	81775	100690	0.81
4	37235	26256	1.42
5	89471	81061	1.10
6	44206	28340	1.56
7	60929	53022	1.15
8a	44592	24958	1.79
8b	47282	62531	.76
9a	29913	41151	0.73
9b	24231	23810	1.02
10	27270	19247	1.42
11	29243	40426	.72
12	26644	19799	1.35
13	15136	18450	.82
15	38287	37366	1.02

Fig. 3-4, SALT LAKE COUNTY 2040 PM PEAK PERIOD VOLUME / 2016 CAPACITY

from the lack of mechanisms to efficiently manage use of highways. Therefore, this needs analysis will consider new policy choices and innovative solutions including congestion pricing measures and intelligent transportation systems (ITS) to manage the peak period demand (see system management review, page 68).

The Role of Regional Growth Principles

The growth principles adopted by the Regional Council, and described in more detail in the Wasatch Choices 2040 report, are important for protecting the quality of life in this Region, even with respect to relieving congestion. For example, when regional land use patterns foster closer proximity between housing and jobs, the origins of most work trips are less dispersed, trip lengths to work and shop are reduced, vehicle miles of travel decrease, and these all lead to less congestion and more opportunity for transit to offer a viable alternative.

The following sections in this chapter explore more specific needs in the greater Wasatch Front Region for highways, transit, and other modes of transportation. Managing the transportation system is also discussed further, including a review of safety and security conditions.

TABLE 3-1

Average Weekday Traffic Volume Guidelines

Number of Lanes Needed	Freeways (vehicles)	Arterials (vehicles)
4	<90,000	<20,000
6	90,000 - 140,000	20,000 - 40,000
8	>140,000	>60,000

HIGHWAY SYSTEM REVIEW

As part of the Congestion Management Process (CMP), the WFRC reviewed future congestion conditions and identified a number of locations where congestion mitigation is or will be needed. The CMP involves an evaluation of Transportation System Management (TSM) strategies, such as signal coordination, intersection widening, and access management. Transportation Demand Management (TDM) strategies, include ridesharing, high occupancy vehicle (HOV) lanes, and telecommuting, as potential solutions to regional congestion rather than increasing highway capacity. Corridors have been identified where TSM and TDM strategies can delay the need for new capacity (Refer to page 201 – Transportation System Improvements). Where these strategies cannot meet the travel demand, new capacity needs are noted. Whenever additional capacity is added, demand should be reduced, and the transportation system made as efficient as possible in order to maximize the effectiveness of the new capacity and minimize the need for future capital investments in highways.

For 2040 RTP development purposes, congestion is considered to occur when level of service (LOS) "E" conditions are reached. Traffic operating at LOS "E" is characterized by operations that are very unstable at significantly reduced speeds and when there are virtually no gaps in the traffic stream. Level of service is based on volume to capacity ratios (V/C) in the case of freeways, and operating speeds in the case of arterials. The WFRC continues to support the actual design of facilities to meet a LOS "D" in urban areas when reasonably possible. Traffic operating at LOS "D" is characterized by reduced speeds and restricted ability to maneuver within the traffic stream. Any incident disrupting the traffic flow at LOS "D" will immediately result in LOS "E" conditions or worse. This CMP evaluation has been applied to the final phase of the 2040 RTP. For a more complete discussion of level of service, see Sections 15-II and 23-II of the Highway Capacity Manual.

The process for identifying congestion needs for the 2040 RTP begins with a computer model of existing highway and transit facilities plus projects in the Transportation Improvement Program (TIP), which are committed to be built. This transportation network is then assigned 2040 traffic demand and the resulting travel model is identified as the "2040 No Build" scenario. The "2040 No Build" scenario is further modified with a series of TSM and TDM strategies and the resulting modeled transportation network is identified as the

"2040 CMP" (congestion management process) scenario. The specific TSM and TDM strategies applied in the 2040 CMP model are limited to signal coordination, access management, pedestrian and bicycle facilities, and a combined factor for flextime, telecommuting, and growth management.

The WFRC selected these specific strategies because reasonable quantitative assumptions can be made about the impact of these measures on speeds or capacity. The benefits of ITS, incident management and ramp metering are already included in model highway capacities. The mode choice algorithms in the model account for the trip reductions achieved by transit and rideshare. The Congestion Management Process (CMP) analysis for the 2040 RTP and the post-model adjustments used to measure the impacts of various TSM and TDM strategies are described in Appendix G – CMS Travel Model Analysis.

Once the TSM and TDM strategies are applied in the model, locations where LOS "E" conditions still remain in the PM peak period are evaluated. Average weekday traffic volumes for 2007 and 2040 are also considered. Table 3-1 identifies guidelines for Average Weekday Traffic (AWKDT) volumes, which also supplements the evaluation of LOS "E" conditions identified by the 2040 CMP model run. Since the travel model is regional in nature, individual facility volumes may reveal differences between modeled and observed base year volumes and these discrepancies should be considered when evaluating future traffic conditions. Historical growth rates can also provide reasonableness checks.

Congestion management strategies (TSM & TDM) were applied to all applicable facilities in the 2040 CMP model scenario. Even if additional capacity is warranted, TSM and TDM strategies still need to be incorporated with each new project in order to preserve the investment in this new capacity for as long as possible. The following paragraph summarizes the results of this CMP analysis. Several of the six corridors identified on page 56, have the most serious and readily recognizable mobility deficiencies.

CMP Identified Capacity Needs

An inspection of the "2040 CMP" scenario reveals a number of congestion problems. In southwest Weber and northwest Davis Counties, much of SR-108 is anticipated to operate at the LOS "E" level. East-west travel in this general area will also need congestion mitigation. Additional capacity will be required to alleviate congestion on I-15 in north Davis County. Congestion levels on I-15 and Bangerter Highway in Salt Lake County indicate a need for a freeway type facility in the Mountain View Corridor. Without new capacity, several east-west facilities in west Salt Lake Valley would operate at the LOS "E" level. A few congested locations east of I-15 will also require more lanes. Significant congestion levels are evident on a number of arterials scattered through the Region.

TRANSIT SYSTEM REVIEW

Transportation demand in the region has grown substantially in recent years and continues to grow at a pace exceeding expectations. In light of transit successes, it has become obvious that preservation and expansion of the transit system is essential to the Region's mobility and economy.

System Preservation

For all the focus in the Wasatch Front Region on new major transit investments, the vast majority of transit trips in the region currently takes place, and will continue to take place, on existing light-rail lines and local buses. Clearly preserving these existing services is essential to the success of transit in the region. Preservation for transit includes maintenance of capital facilities and continuation of existing transit operations.

Needs Assessment

The Utah Transit Authority, which provides public transit services in the region, is divided into five business units. These business units cover the following areas of responsibility: the Ogden - Layton Urbanized Area; the paratransit service in Salt Lake County; the bus service in Salt Lake and Tooele Counties; TRAX service in Salt Lake County; and Utah County bus service. Each of these business units and UTA's Strategic Planning Department were surveyed as to their preservation needs. The following paragraphs summarize their responses and select information from the most recent Transit Development Program.

Capital Facilities

UTA dedicates a significant proportion of its budget to the preservation of its rail lines, bus and rail vehicles, scattered passenger facilities, maintenance facilities and real properties. Most of the existing facilities are in need of expansion and some re-design / engineering to accommodate growth in the fleet, workforce, and activities. Some of these needs are described below.

- **Bus Maintenance Facility Improvements** - As the composition of the fleet continues to diversify, existing bus maintenance facilities will need to be modified or expanded.
- **Central Division Replacement** - As of September 2010, the UTA Central Bus maintenance facility is operating at 125 percent of its design capacity. UTA indicates that it needs to be replaced due to aging infrastructure and functional deficiencies.
- **Riverside Division Expansion** - The Riverside Division, home of UTA's Flextrans fleet, has an existing physical design capacity for 84 paratransit vehicles. The total active and expansion fleet operating from the facility is 110 vehicles. Therefore, additional storage canopies and an expanded maintenance facility are necessary in order to increase the effectiveness of the Flextrans vehicle fleet. The operations facility was designed and built to accommodate 70 operators; currently there are 135 operators working out of the Riverside Division.
- **New Division** - Due to the current and projected geographic distribution of bus service, it is recommended that the site for a new division be located in the southern part of the Salt Lake service area where bus service demand is projected to be greatest.
- **Bus Layover Facilities** - Having Tooele and Brigham City express trips originate in those cities in the AM and return there in the PM would save significant operational costs in each area. Adopting this schedule would likely necessitate capital investment for adequate infrastructure; either at a UTA acquired site, or at a joint use site such as a UDOT or school district facility. The operational savings would likely outweigh initial capital costs.

Preservation of Operations

All of UTA's bus service is impacted by highway congestion. In order to keep its current service schedule in the face of increasing vehicle delays, several improvements will need to be made to the highway system in order to preserve existing bus system operations. The techniques used for this preservation effort will likely require a combination of signal priority and queue jumper equipment and policies at select traffic signals. Table 3-2 lists existing candidates for preservation of operations improvements.

Capacity Issues

The recent success of transit in the Wasatch Front Region has begun to expose capacity issues in the UTA system. Capacity issues have been especially evident when fuel prices peak. A review of 2009 route characteristics revealed fourteen routes that may be candidates for capital improvements needed to enhance their operational characteristics. These routes have either a relatively high service frequency or high ridership. Unfortunately, they may also have either poor on-time performance, relatively slow speeds, and / or a high potential for standing loads.

Additionally, a survey of UTA business units reveals additional capacity needs on TRAX service, Tooele County service, service to the Cottonwood Canyons, and on Paratransit services. The current TRAX routes are the Sandy Line and the University Line. UTA indicates that full loads are common in peak periods on both lines. There is virtually no remaining capacity at most of the Sandy Line park and ride facilities. The opening of additional TRAX lines which operate on portions of the Sandy and University Lines has the potential to not only create more parking capacity on the individual lines but to

TABLE 3-2

Existing Candidates for Preservation of Operation Improvements

Route Number	Route Name	Issues and Opportunities
602	Ogden - Weber State University	High Ridership
603	Washington Boulevard	High Ridership
470	Ogden – Salt Lake Intercity	High Ridership, Low Reliability, Standing loads
2	"2 the U"	High Ridership, Standing Loads
200	State Street North	Highest Ridership, Standing Loads, Low Speed, Low Reliability
203	300 East	Low Reliability
205	500 East	Low Reliability
209	900 East	Low Reliability
217	Redwood North	High Ridership, Low Reliability
220	Highland Drive	Low Reliability
227	2700 West	Slow Speeds
232	3200 West	Low Reliability
240	4000 West / Dixie Valley	Slow Speeds, Low Reliability

create more demand on segments of the existing lines due to their increased frequency and broader coverage. Salt Lake to Tooele Valley transit service is provided by Routes 451, 453, and 454. Capacity shortfalls experienced on these routes are likely to increase as Tooele Valley continues its rapid growth. Furthermore, UTA indicates that the Region has a severe need for additional transit service in Big and Little Cottonwood Canyons.

UTA is finding it difficult to keep up with current paratransit demands. The impending 'graying' of the Regions' baby boomers will aggravate this situation. As part of its response, UTA is attempting to move more of its riders with disabilities from paratransit to regular service to reduce the per-trip cost. This will enable UTA to provide more total service to disabled riders. Wide, barrier-free sidewalks and loading surfaces are important to providing the mobility needed by for these patrons.

Market Expansions

Market expansions for transit can take many forms. There may be expansion into a new area or, more likely, adding a new type of service to an existing transit corridor. The three basic types of transit are inter-regional, regional, and community. The popularity of express bus and TRAX in the Region has demonstrated the large number of riders receptive to inter-regional (long) and regional (medium) distance transit services. The key to continued successful transit system expansion will be to identify the home-end and destination-end markets for concentrations of inter-regional, regional, or community trips occurring at the same time of day. The highest probability for concentrated travel patterns exists with work, college, and selected other trips, such as to sports arenas.

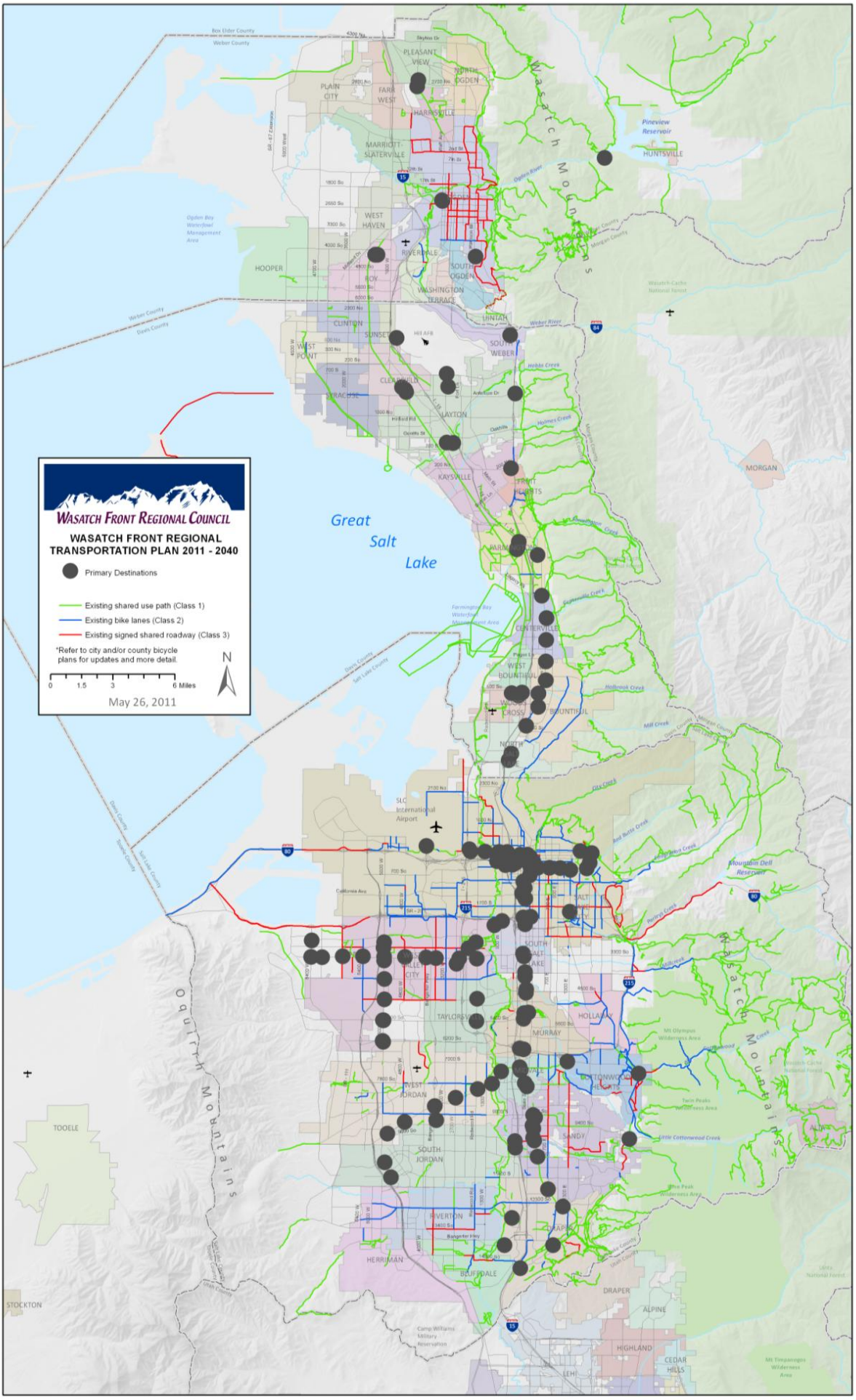
OTHER TRANSPORTATION MODE NEEDS

In addition to highways and transit, other modes are part of the Region's transportation system. These other modes serve important functions, such as bicycle and pedestrian paths that provide alternative transportation choices and opportunities conducive to healthy life styles. Reliable movement of goods is addressed in part by the highway system, but railroads also play a vital role. The needs of these other modes, including trucks, are discussed in this section.

Pedestrians / Bicycles

According to the 2000 Census, about 1.8 percent of the work trips in the Region were made by walking, while about

Map 3-1, 2011-2040 RTP EXISTING BICYCLE ROUTES AND DESTINATIONS



0.4 percent were made through the use of bicycles. While these percentages are small, it is important to provide the option of walking and biking, particularly for short trips. The demand for appropriate bicycle and pedestrian facilities has been growing. To address the needs of growing numbers of bicyclists and pedestrians, the WFRC recommends that state and local governments focus the addition of new land and pathways on east / west routes, providing access across I-15 and other major roadways, connections to transit stations, and the connectivity of existing routes. Municipal and county governments in Salt Lake, Davis, and Weber Counties through their respective trails and bicycle committees have reviewed and updated the existing bicycle routes shown in Map 3-1 in order to identify additional routes needed to bridge gaps between existing bicycle facilities. Locations of TRAX stations, FrontRunner stations, future transit stations, and major college or university campuses have been included so that routes needed to reach these destinations can be identified. Other significant areas of greater than average bicycle and pedestrian travel are secondary schools, the Salt Lake Central Business District, and the Ogden Central Business District. For a more comprehensive picture of school locations, see Map 8-1 on Page 240.

One of the primary considerations in planning for the needs of pedestrians and bicyclists must be safety. To be safe, pedestrians need adequate sidewalks and street crossing opportunities. For bicyclists, a system of separated bikeways and designated routes on safe streets that allow free movement throughout the Wasatch Front Region is needed. School children represent a special class of pedestrians and bicyclists who require unique facilities to ensure their safety. SAFETEA-LU requires that states set up a "Safe Routes to School" program. UDOT has implemented this program.

FREIGHT NEEDS

Each year over 180 billion tons of freight is shipped to and from Utah with an estimated value of nearly $100 billion. Trucks account for almost 70 percent of Utah's freight tonnage, with railroads hauling approximately 25 percent. These numbers do not reflect the considerable freight tonnage passing through Utah. In discussions with trucking associations and others in the freight industry, the following trucking and railroad related needs have been identified.

Trucking

- Interchange and intersection improvements at key locations near warehouses, oil refineries and other truck facilities to provide turning radii sufficient for trucks to move through unimpeded
- Turn lanes of adequate length and signal timing at intersections with high truck volume
- Road widening near the largest concentrations of industrial parks and warehouses
- Advance signal warning systems on high speed expressways
- Improved access to industrial parks and oil refineries, including staging / parking facilities and signalization

Railroads

- Improvements to allow trains to move through the urban area more rapidly and decrease their adverse impact on vehicular mobility and neighborhoods
- Railroad crossing improvements, including grade separations to increase safety

Intermodal Freight Connectivity

- Address inadequate highway capacity on SR-172 (5600 West) serving the Union Pacific intermodal facility located between SR-201 and I-80
- Improve highway access to all Salt Lake Area oil refineries and the Pioneer Pipeline terminal for both standard and longer combination (LCV) oil tank trucks
- Improve access off 900 West in South Salt Lake City to the Union Pacific automobile transload facility at Roper Yard

AIR TRANSPORTATION NEEDS

This section relates aviation and the eight public-use airports in the region to the multi-modal transportation system of the Wasatch Front Region. Airports are essential transportation facilities similar in character to the Interstate Highway System. Like the highway system, the system of airports in the Wasatch Front region facilitates the quick and efficient movement of people and goods.

Airports are a key catalyst of economic activity by facilitating rapid passenger travel between distant locations. In addition to passenger travel, the air transportation system

Needs Assessment

is used to move high value, time sensitive goods such as documents and technical equipment to remote locations. Airports also often play a key role in facilitating the transportation of passengers and equipment during emergency medical and natural disaster situations. Airports play a key role in the Utah economy and must continue to be developed and protected in order for the region to preserve its quality of life and achieve maximum economic potential. Airports must be improved to take advantage of new technology and new facilities in order to continue to serve the air transportation and economic needs of the region, while minimizing impacts to surrounding communities.

System Planning

The information presented in this section of the plan is intended to identify current and future aviation related trends and the impact of those trends could have on the region's airports. The information also functions to bring aviation planning into congruence with other long range planning efforts. Long range system-wide planning is crucial for metropolitan airports because rapid growth and demand for services can quickly outgrow capacity. System plans assure efficient use of scarce airport resources and optimize the use of public funds. They complement individual airport plans and ensure the needs of all airport and airspace users are considered. System planning links individual airport plans with the state and national airport plans and local surface transportation plans. System planning prevents the unnecessary duplication of facilities within the airport system by ensuring that airports with similar roles serve geographically distinct regions.

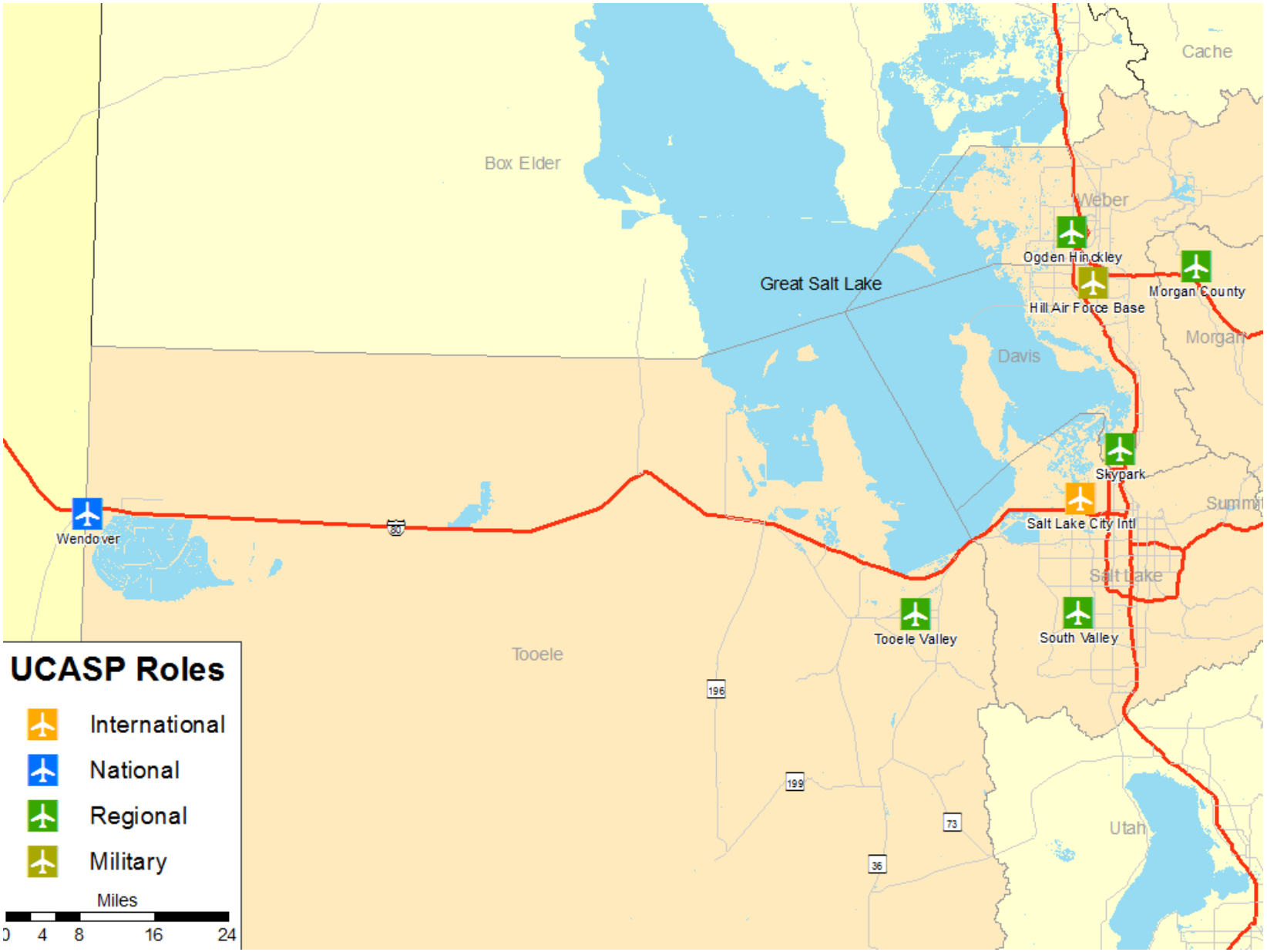
Previous System Planning Efforts

The Wasatch Front Regional Council prepared the 2003 Metropolitan Airports System Plan under the Federal Aviation Administration Planning Grant Program. The most recent update of the statewide system plan or UCASP (Utah Continuous Aviation System Plan) was completed in 2007.

In the UCASP, airport specific needs were assessed using a system of state-specific roles. Typically, state-specific roles are developed through consideration of many different factors including geography, demographic characteristics, economic development potential, and the demand for aviation services. A combination of these factors established what role each airport should play within the airport system, given existing and projected future demand for airport facilities. The roles established by the UCASP for the airports in the WFRC region are presented in the Map 3-2. For the purposes of this document, a new role (Military) has been added for Hill Air Force base.

Airspace, Air Traffic Control, and Flight Operations

Proper management of airspace in the region is critical to future growth and development of airports in the region. Since the Metropolitan Area is essentially surrounded by mountains, the available airspace for aircraft operations at the



Map 3-2, AIRPORT ROLES ESTABLISHED BY THE UTAH CONTINUOUS AVIATION SYSTEM PLAN

region's airports is limited. The Class B or controlled airspace associated with Salt Lake City International Airport covers a substantial portion of the region, limiting airspace available for uncontrolled Visual Flight Rules (VFR) flying conducted by most smaller general aviation (GA) aircraft.

The FAA is in the process of implementing a new air traffic control system known as 'Next-Gen'. NextGen is transforming air traffic control from a ground-based radar system to a GPS satellite-based system. This advancement is anticipated to provide significant safety, efficiency and environmental benefits to the nations aviation system. It is anticipated that NextGen technologies and procedures will increase capacity and safety and reduce fuel burn, carbon emissions and noise by providing more efficient air routes and procedures.

Locally, the FAA is currently in the process of redesigning the Salt Lake City Class B airspace structure. This process is primarily being untaken to fully contain and protect existing operations arriving and departing the SLCIA. The proposed changes will create additional uncontrolled airspace increase the amount of navigable airspace available for GA users operating at airports surrounding SLCIA, particularly the South Valley Regional and Bountiful Skypark airports. It is expected that these improvements will enhance safety and access to these airports while having little or no effect on other airports in the local area.

Aviation Activity Projections

In order for the system to be developed to meet future demand, projections of future activity are prepared. These projections are used to determine infrastructure needs and evaluate the ability of the airport system to accommodate the needs of the region. Demand at individual airports was analyzed based aircraft FAA operations and based aircraft data from 2009 and county population growth rate projections. National aviation forecasts are based on the FAA national forecasts and considered a 20-year horizon. National projections indicate aviation activity will continue to grow over the long term despite the current economic downturn. Even with the numerous challenges the airline industry has faced over the last 10 years the number of passenger traveling has increased over the long term. The FAA's 20-year forecast for Fiscal Years 2010-2030 predicts domestic passenger enplanements will increase by 0.5 percent in 2010 and then grow an average of 2.5 percent per year during the remaining forecast period. Total operations at airports are forecast to decrease 2.7 percent to 51.5 million in 2010, and then grow at an average annual rate of 1.5 percent reaching 69.6 million in 2030. At the nation's 35 busiest airports, operations are expected to increase 60 percent from 2010 to 2030. Locally, aviation activity within the region is expected to continue to grow more quickly than the nation as a whole. Projections of aviation activity at individual airports can be found in Appendix H – Aviation Activity By Individual Airport.

SYSTEM MANAGEMENT REIVEW

In order to maximize the life and effectiveness of transportation systems, careful management is required. Pavement management facilitates extend the life of roadways. System management preserves the capacity of roadways. Demand management improves the effectiveness of the transportation system by reducing the number of vehicle miles traveled (VMT). These three management strategies are discussed in this section.

Pavement Management

One of the Regional Growth Principles is to "provide public infrastructure that is efficient and adequately maintained." This principle is in line with UDOT's strategic goal to "take care of what we have." One of the best ways to accomplish these objectives is through pavement management. UDOT and most cities and counties in the Region employ these effective techniques to maintain their roadways.

Pavements represent the largest capital investment in any modern highway system. Maintaining and operating pavements on a large highway system typically involves complex decisions about how and when to resurface or apply other treatments to keep the highway performing and operating costs at a reasonable level. Traditional methods left these decisions up to a road supervisor who would select treatments based on extensive knowledge and experience. This practice is still widely used and works well in low traffic areas or where repair / restoration funds are relatively unlimited. However, in most cases, this is not the situation. Rarely are there enough funds to complete all required road repairs. Secondly, high traffic volumes severely restrict when roads can be closed for maintenance. Pavement management brings more science

into this process. A pavement management system consists of three major components as shown below.

- A procedure to regularly collect highway condition data
- A computer database to sort and store the collected data
- An analysis program to evaluate repair or preservation strategies and suggest cost effective projects to maintain optimal highway conditions

In most agencies, these components are combined with needs identified in the planning process and political considerations to develop annual highway repair / preservation programs.

System Management / Demand Management

Part of providing efficient public infrastructure is to ensure that unnecessary obstacles to mobility are identified and removed from the transportation system. The congruence between the Regional Growth Principles and UDOT's four strategic goals is again reflected, as the second goal is to "make the system work better." By providing effective transit service, the UTA works to achieve this goal. Local governments also give vital support to both System Management and Demand Management.

Transportation System Management (TSM) strategies include incident management, ramp metering, High Occupancy Vehicle / Toll (HOV / HOT) lanes, signal coordination, access management, and ITS, which overlap several of the previous strategies. Most of these strategies are currently applied to some degree but need to be expanded or enhanced to ensure better performance of the transportation system. Implementing such congestion mitigation measures helps preserve the original design capacity of the facility so that it can accomplish its intended purpose of moving a certain volume of traffic. For example, a highway lined with a high density of heavily used driveways will experience diminished capacity due to side friction, accidents, and reduced speeds. This may lead to an apparent need for additional capacity, when in reality, if access management was in place, the roadway would function as intended.

Transportation Demand Management (TDM) strategies include transit service in all its forms (bus, light rail, commuter rail, bus rapid transit (BRT 3), and Enhanced Bus (BRT 1)), ridesharing, flextime, telecommuting, pedestrian and bicycle accommodations, growth management, and congestion pricing. Most of these strategies are currently utilized in the existing transportation network. Enhanced implementation of these strategies is needed to provide a full range of options to the traveling public, as well as to decrease congestion levels on highways. The environmental, social, and financial consequences of only building and widening highways further point to the need to reduce the demand for single-occupant vehicle travel.

TSM and TDM strategies offer many benefits to the transportation system at a relatively low cost when compared to adding more travel lanes or other new facilities. The benefits to the transportation system from TSM and TDM include improved operating efficiency, preserving design capacity of existing facilities, increased safety, reduced energy consumption, and reduced emissions. These benefits stem from the improved operation of existing facilities when TSM strategies are implemented and from the reduction in vehicle trips as TDM strategies are applied.

Intelligent Transportation Systems

"Non-recurring" congestion, such as that caused by traffic accidents, highway construction, or weather conditions, has been estimated to account for around 50 percent of traffic congestion in the Region. Intelligent Transportation Systems (ITS) are a vital tool to manage the effects of non-recurring

congestion. One element of these systems includes dynamic message signs to alert motorists of incidents on the road ahead so that they can take an alternate route. Communications systems to speedily alert emergency management providers, traffic control centers, dispatch, incident management personnel, the media, and others about incidents are also part of ITS. Detectors and cameras further aid in verifying and managing these incidents. The ability to implement pre-packaged signal timing plans to respond to traffic changes from incidents is another aspect of ITS.

ITS can also be used to better manage recurring congestion, associated with weekday peak commuting times. This is accomplished through means such as signal timing plans on arterial streets and ramp metering to improve freeway traffic flow. Coordinating signals can reduce delays by 20 to 30 percent. Ramp metering also has significant effects in decreasing delay.

Another way in which ITS addresses both non-recurring and recurring highway congestion is by improving the efficiency and convenience of the transit system, thus increasing ridership and reducing single-occupant vehicle travel. Riders can be notified in "real-time" of bus and rail travel schedules and connecting transit service through electronic signs, the internet, phone systems, and other means. The transit fleet can be better managed in response to changing traffic conditions. Voice enunciators and smart card payment systems are also part of transit ITS.

If ITS applications are to be expanded in the Wasatch Front Region, more funding is needed. The majority of the existing system, known as CommuterLink, was funded as part of the major reconstruction of I-15 in Salt Lake County during the late 1990s. Original equipment is quickly becoming obsolete, reducing the potential effectiveness of the system. Consequently, a priority need for ITS is to update and maintain the existing systems already implemented in the Region. Without a continued effort to update signal timing plans and to keep equipment working, the ability to effectively move people on the transportation system by providing readily available information will suffer. A key component of these systems is the ability to disseminate both real-time and historical travel time information and other relevant highway and transit facts. The need to continue to improve and expand these capabilities will persist. As discussed above, there is a great need to reduce travel demand, and ITS improvements implemented in the transit system play an important role in meeting this need.

Congestion Pricing

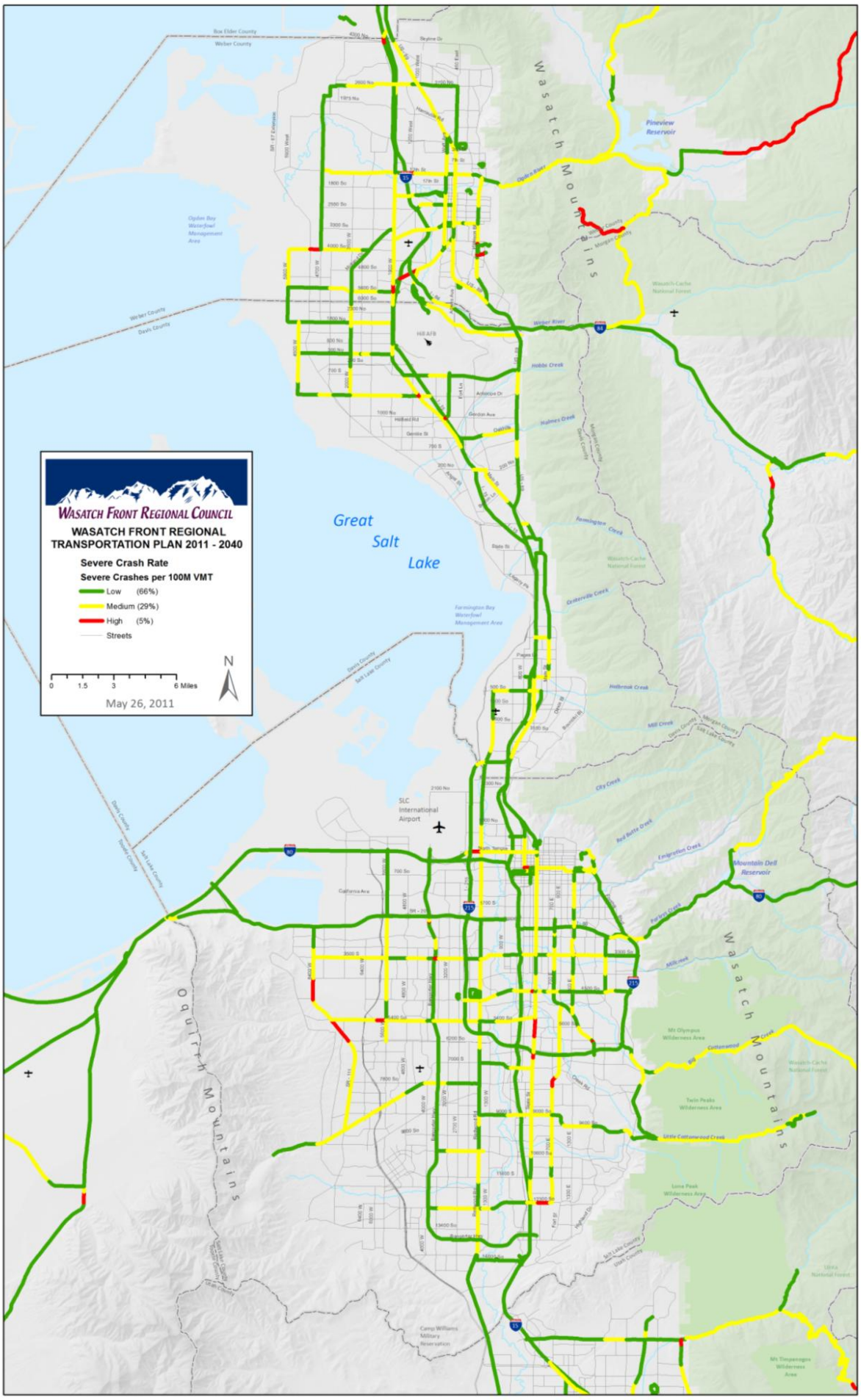
The largest traffic volumes are found on freeways. As discussed in the General Needs Review, page 54, the need to manage freeways is vital because their ability to move traffic is dramatically reduced as volumes approach capacity and speeds plummet. Congestion pricing on freeways prevents speeds from dropping by increasing the cost to the traveler to use the facility. If fully implemented, congestion pricing will increase the cost to use the facilities, based on congestion during peak periods. In order for businesses to prosper and the regional economy to be sustained, impediments to freeway travel must be minimized. Congestion pricing can be an effective tool for addressing this need. Other facilities or locations can also benefit from congestion pricing. For example, establishing fees for travel in central business districts has proven effective for managing traffic in some large cities.

SAFETY AND HOMELAND SECURITY NEEDS

Safety

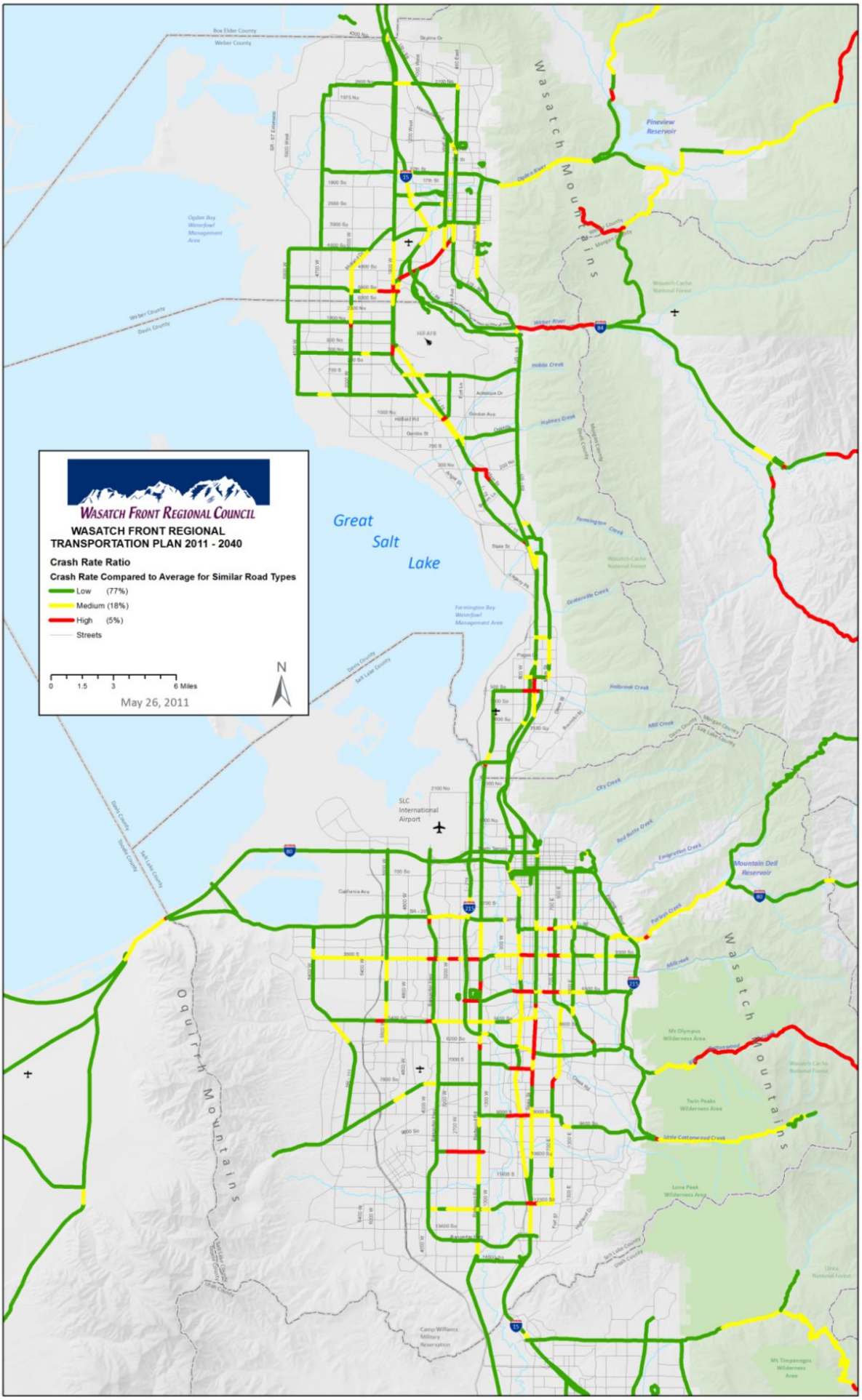
The WFRC is in the beginning stages of completing a 5-Year Regional Transportation Safety Plan. This plan is being coordinated with the Utah MPO Safety Initiative, UDOT, and the other MPO's in Utah. This initiative is a comprehensive program designed to improve safety integration and linkage to the UDOT's Strategic Highway Safety Plan (SHSP). The WFRC will continue work on the seventeen milestones developed to enhance the development of the regional safety plan. The Safety Index, and crash statistics discussed below will help identify areas of need, while the safety plan will help identify action steps, stakeholders, and performance measures and remediation measures for specific projects.

The Safety Index provides a starting point for identifying where safety improvements are needed. This index has been developed by UDOT to help identify locations where higher than normal severe crash rates and crash rate ratios exist throughout the state. Both rates use crash data from 2005 to 2007 reported for more than 2,200 individual segments along state-owned routes using the annual average daily traffic (AADT) segmentation.



Map 3-3, WASATCH FRONT URBAN AREA SAFETY INDEX SEVERE CRASH RATE

Map 3-4, WASATCH FRONT URBAN AREA SAFETY INDEX CRASH RATE RATIO



The severe crash rate covers a period of three years. The statewide severe crash rate is 12.48 per 100 million vehicle miles traveled (VMT). Map 3-3 shows all state-owned segments below the statewide value in green, any segment with a value over the statewide number in yellow, and the highest five percent of segments are displayed in red. The crash rate ratio is a comparison between historic crash rates and expected crash rates. The UDOT last published expected crash rate by type of area, functional class, and volume in 2005. The crash rate ratio is the actual crash rate divided by the expected crash rate. Map 3-4, shows all segments at or below the expected rate in green, any segment with an actual crash rate over the expected rate is displayed in yellow, and the highest five percent of state roads are shown in red.

The Utah Comprehensive Safety Plan identifies 17 crash type categories. Crash statistics were provided for the period 2006 - 2008 for "All Crashes" and "Serious Injury and Fatal Crashes." The data were provided for the WFRC area (Salt Lake, Tooele, Davis, Weber, and Morgan Counties) along with a Statewide total and an Urban Area total (Washington, Utah, Salt Lake, Davis, Weber, and Cache Counties). Crash type percentages are calculated comparing the number of crashes per type in the county to the county total. The top three categories of causes for All Crashes in Salt Lake, Davis, and Weber Counties were: Aggressive Driving / Speeding Crashes, Intersection Related Crashes, and crashes involving Younger Drivers (between 15 and 19 years old). The top three categories for Serious Injury and Fatal Crashes for Salt Lake and Davis Counties were Intersection Related Crashes, Aggressive Driving / Speeding Crashes, and Improper Use of Safety Equipment Crashes. The top three categories for Serious Injury and Fatal Crashes for Weber County were Intersection Related Crashes, Improper Use of Safety Equipment Crashes, and Roadway Departure Crashes. Appendix I – 3-Year Crash Statistics includes the complete table of 3-year Crash Statistics for all crashes and serious injury and fatal crashes.

Homeland Security

The Wasatch Front Region is often times referred to as the "cross roads of the west". Because the Rocky Mountains bisect the western portion of the United States (north-south), there are only five interstate facilities that allow east-west travel across that portion of the country. Of those facilities, I-80 is the most centrally located running through Salt Lake City and connecting New York - Chicago - Omaha - Salt Lake and San Francisco. Similarly, I-15 is one of only three north-south interstate facilities west of the Mississippi River, which extends to the northern and southern borders of the United States. Designated the Canadian - Mexican (CanaMex) transportation corridor, I-15's regional impacts along the Wasatch Front are ever increasing. Paralleling the Rocky Mountains it too passes through the Wasatch Front Region intersecting I-80 in the Salt Lake Valley.

The aviation and railroad systems experience a convergence equivalent to that of the interstate highways. The Trans-Continental Railroad continues to be the major east-west rail connection across the United States. Aviation, like rail, targets a specific transportation market and has considerable influence on the Inter-Mountain Region. The Salt Lake City International Airport is a major hub for Delta Airlines and cargo airlines. It serves a major portion of the Intermountain West as the next closest major commercial service airport is over 300 miles away.

In developing a regional transportation plan, the distinctive topography of the Region must be taken into account. I-15, I-80 and I-84 all enter and exit the Region through narrow corridors constrained by topography. On the northern end of the Region, the I-15 transportation corridor narrows to one mile. This condition also occurs in the city of Centerville, in Davis County, and at the southern border of Salt Lake County. All three of these constrained locations include I-15, railroad lines, a power corridor, frontage road and one or two parallel arterials. The east-west corridors are similarly constrained by high mountain passes and the Great Salt Lake. Weber Canyon is located in east Weber County. At 400 feet wide it is constrained by rock cliffs and the Weber River, and is the route of I-84 and a railroad corridor. To the east in Salt Lake County is Parley's Canyon, which is 200 feet wide in places, constrained by cliffs and is the route of I-80. To the west in Salt Lake County at Lake Point Junction the corridor is one-quarter mile wide and constrained by the Oquirrh Mountains and the Great Salt Lake. This includes I-80, a railroad corridor, a power corridor and a frontage road.

The distinctive regional topography constraining the transportation network has a conspicuous impact on the entire Wasatch Front Region in the form of natural hazards.

Needs Assessment

Potential hazards include earthquakes, landslides, wildfires, dam failures, flood and severe weather. With a prominent geological fault paralleling the foothills of the Wasatch Mountains throughout the Region and extending through the Great Salt Lake and into north-central Salt Lake County, the effects of an earthquake or other natural disasters on the transportation system must also be taken into consideration. The Wasatch Front Region's geologic faults and areas with high liquefaction potential are identified in Map 8-8 on Page 271.

The air corridors are also severely restricted as access to the Salt Lake International Airport is limited to north-south approaches. These approaches are further impacted by the confined air space bounded by mountains on the east and west. The restrictive natural topography or "pinch points" affecting surface transportation in all cardinal directions from Salt Lake City and the availability of limited air space are the basis of the need for more redundancy within the transportation system throughout the Region.

In considering the convergence of two interstate highways, the trans-continental railroad and an international airport along the Wasatch Front, it becomes very evident that the regional transportation facilities have national significance. This importance is further increased when consideration is given to the physical constraints of the topography and potential for natural disasters. These conditions quickly raise awareness and concerns about the potential impact disruptions in the Region's transportation systems could have not only on local and regional populations but the national transportation industry and security interests as well.

The national significance of this "cross roads of the west", coupled with the restrictive topography and demonstrated need for additional regional transportation facilities to serve increasing regional travel demands, bolsters the rationale for long range transportation planning, new capacity and improvement of current facilities, and elimination of choke points in transportation corridors. In order to effectively address regional security needs, a concerted effort must continue at all levels of government and industry within the metropolitan area to develop a consensus on what elements of security incident prevention and mitigation can and should be incorporated into the state and metropolitan area's transportation planning processes.

Regional security goals at the metropolitan planning level are based, in-part, on improved communication and coordination between the increasing number of agencies involved with security and emergency preparedness. As a component of the coordination effort, several plans should be considered for review and update. These plans include but are not limited to a Public Transit Emergency Management Operations and Recovery Plan; a Fuel Shortage Plan; and Emergency Operations Plans at local, regional and state levels. Conducting simulations and exercising these plans is needed to determine their operational benefits and shortfalls.

At the operational level, intelligent transportation systems (ITS) should be improved to facilitate the expansion and responsiveness of the UDOT Traffic Operation Center (TOC) and UTA Dispatch Operations. These major components would help to preserve the reliability, robustness, and resiliency of the transportation infrastructure system and to maintain essential services needed to preserve confidence in the transportation system in the event of a man caused or natural disaster.