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TransPlan50
Transportation Systems Performance Appendix A

Transportation Network Travel Demand

Appendix A

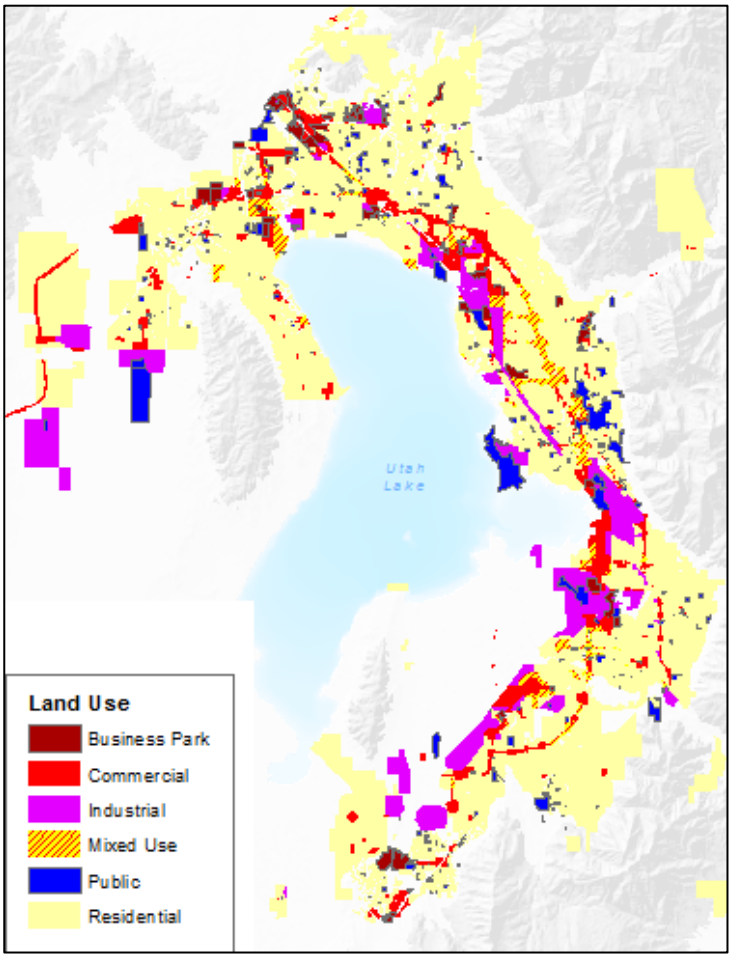
LANDUSE MODELING

The MPO model process is an integrated land-use, transportation, and air quality model co-developed with the Wasatch Front Regional Council designed to perform a wide range of analyses. The model includes several advanced features that place it on the cutting edge of improved modeling methods required to satisfy the requirements of the federal transportation bill (FAST Act, Fixing America's Surface Transportation Act) and the federal Clean Air Act. Several features recommended by the Travel Model Improvement Program of the US Department of Transportation, the Federal Highway Administration, the Federal Transit Administration and the Environmental Protection Agency are incorporated into the model.

The land use model identifies the future use of land and allocates a county total for housing and jobs forecast by the Kem C. Gardner Policy Institute (GPI) of the University of Utah. The location of those houses and jobs are based on accessibility, availability of land (through physical constraints and zoning), and the location and value of existing land use. This model uses both the municipal adopted land uses and the centers identified in Wasatch Choice for 2050 as land use indicators. Growth is assigned countywide using these adopted parameters. The goal of the model is to approximate actual real estate decisions. The land use model is referred to as the Real Estate Market Model (REMM).

GPI forecasts Utah County's total population to increase 114 percent, from 606,425 in 2017 (Census estimate) to 1,297,515 in 2050, or a 2.3 percent annual average rate of change. Total employment follows a little slower trend growing 102 percent, from 341,957 in 2017 to 689,992 in 2050, or a 2.2 percent annual average rate of change. The population growth in Utah County is forecast to be higher than all other Wasatch Front counties combined. When compared to the region's total population for Weber, Davis, Salt Lake, and Utah counties, Utah County's region-wide share increases from 27 percent in 2017 to 35 percent in 2050 and the regional percentage of total employment increases from 22 percent in 2017 to 27 percent in 2050.

A.1 | General Land Use Map



Municipalities and the county develop land use plans as a part of the general plan process. Many local land use plans have only ten-year horizons, leaving gaps between local plans and regional transportation planning. MPO staff work with the local jurisdictions to review their plans and to collect their most recent land use and general plan data, any emerging developments, and their transportation plans. This helps MPO staff gain additional insight into where future growth could occur. Meetings were held to discuss with local staff of the needs from TransPlan40 and give a preliminary look at the additional needs for the new plan for 2050. This is the first step in creating a future countywide development pattern to use in the traffic model. Major proposed developments are also included in the future countywide generalized land use plan. Goals of the Wasatch Choices 2050 plan are also incorporated into the land-use data. The finalized land use plan for the MPO is used to develop the socioeconomic dataset needed to run the travel model.

Once all the data was collected and compiled, MPO staff met with the jurisdictions of 3 different areas of the county (north, central, south) for the Transportation Summits. These meetings were to facilitate collaboration amongst the jurisdictions and adjoining cities to create a more localized vision for the sub-regions. It is a goal of the MPO to build a transportation system in line with the vision which, if necessary, may also include helping the municipalities to incorporate preferred land uses. Action plans must be created to ensure that those with the jurisdictional power make any

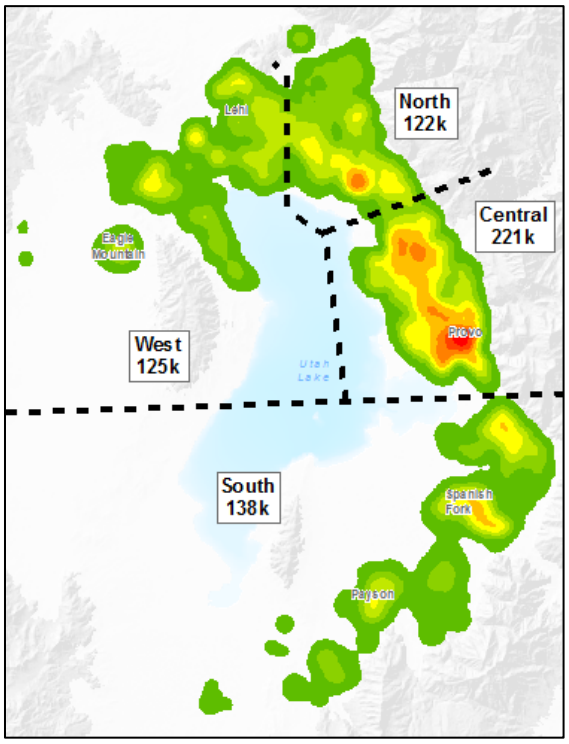
necessary updates in their local plans. The difficulty lies in educating them of the consequences of the different local land use and transportation decisions that don't line up with the sub-regional vision.

Employment is a difficult component of a socioeconomic forecast. Limited data sources and data error require extra effort to create a forecast. Once county employment control totals are produced by the state, REMM allocates the households and jobs within the county. First, a base year dataset is created with current household and job locations and totals. Census, building permits, and Utah County Assessor data determines where current residential units are. Employment data from the Department of Workforce Services (DWS) along with an inventory of non-residential buildings is used to locate current jobs.

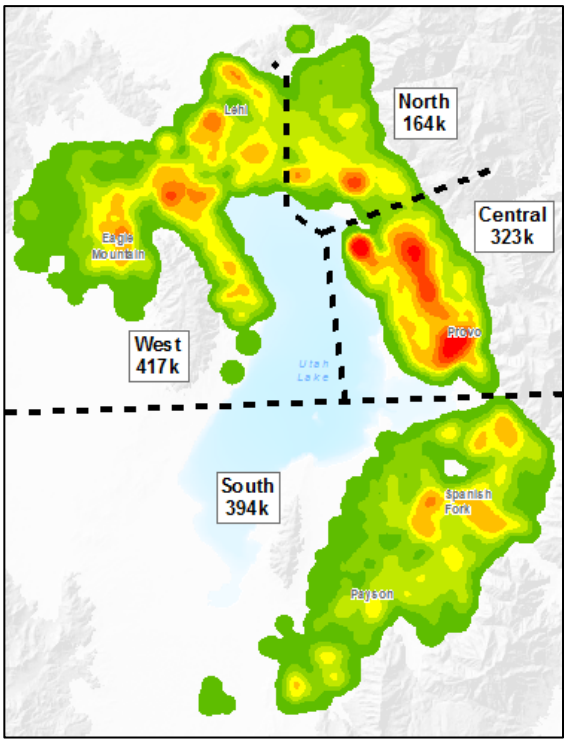
The base year dataset with the local and sub-regional trends give a base for REMM to produce a socioeconomic output for each year for the travel model including households, population, and jobs by industry classification. Once the model is estimated and calibrated to the base year, it can then forecast to the year 2050. Wasatch Choice high intensity land use centers increase the density allowed in certain areas that the cities may not currently plan for. This allows the cities that reach build out before 2050 to continue to grow and redevelop further. Once the model is run to the desired forecast year, the outputs are analyzed and reviewed to check for reasonableness.

One of the biggest socioeconomic factors that impact traffic is the balance of jobs and households in sub-regional area. Homes are trip generators, and jobs are typically the destination. The closer in proximity of those two reduce the travel distance of the trip and therefore reduce the number of vehicles on the roads at a given time. The southern end of Utah Valley and Cedar Valley both pose a problem when the residential growth is so large and highly out-paces the job growth. Utah County, in the 2050 forecast, has a job to household ratio of 1.4 which is lower than the rest of the Wasatch Front region at 1.65. These ratios suggest that some workers in Utah County must commute to jobs in Salt Lake County. Southern Utah Valley and Cedar Valley both will have a ratio of about 1.04requiring workers to commute to Salt Lake or into Provo/Orem.

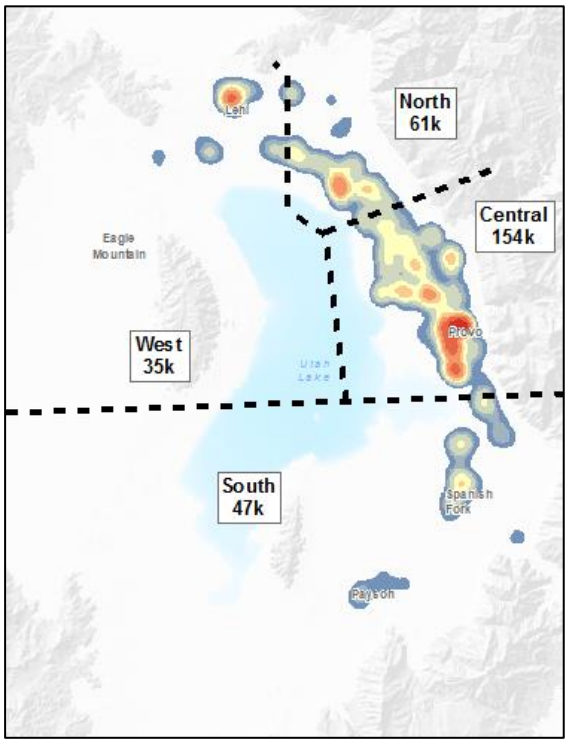
A.2 | 2017 Population Density Heat Map



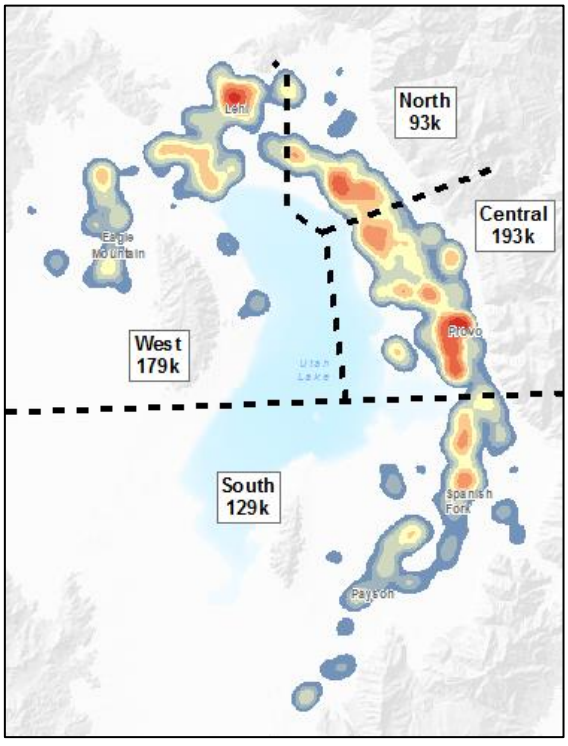
A.3 | 2050 Population Density Heat Map



A.4 | 2017 Job Density Heat Map



A.5 | 2050 Job Density Heat Map

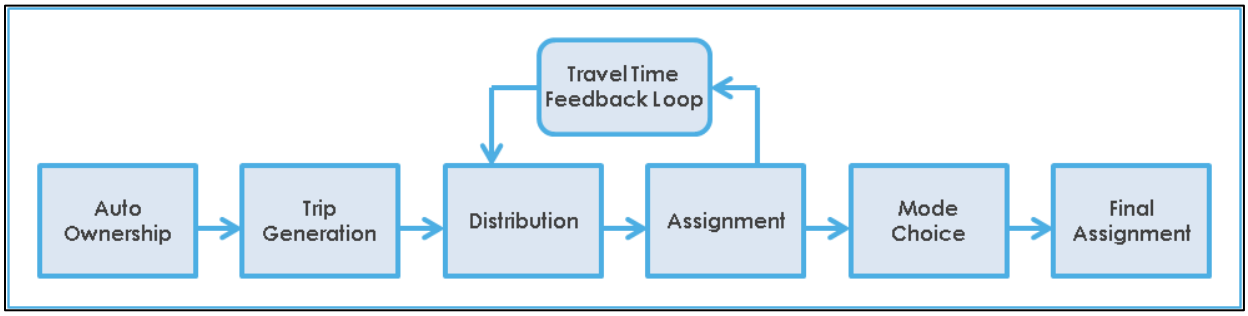


TRAVEL MODEL COMPONENTS

At the start of a full travel demand model run, the model estimates household auto-ownership levels, then trip generation rates for land-use data to calculate trip ends at the Transportation Analysis Zone (TAZ) level. These trip ends are paired into origins and destinations in the distribution model. In the mode-split model, a mode of travel is selected for each trip. Vehicle trips are assigned to the highway network in the assignment model.

The travel time feedback loop in the model is accomplished prior to mode choice by converting person trips to vehicle trips based on observed data.

A.6 | Modified 4-Step Travel Model Diagram



The model is comprised of several steps with each step programmed or scripted separately. These steps include, but are not limited to the following:

- Auto Ownership: Auto ownership is a function of the characteristics of a household and where it is located. Auto ownership and availability is a strong predictor of trip making and mode choice behavior.
- Trip Generation: calculates the number of person trips generated within each TAZ. The trip generation model parameters are developed from travel surveys collected in 1993 and 2001. The number of trips to and from a place is a function of the amount and types of land-use activity within the zone.
- Trip Distribution: pairs the origins and destinations for each zone for each of the trip purposes. Trip generation estimates the number of trips to and from each TAZ. Trip distribution completes the trip by describing which trip origins are linked with which trip destinations. The result of this is a person-trip matrix for each trip type. Trip distribution links trip-ends of the same type based

primarily on the spatial separation of different land uses and observed sensitivities to trip length. One output of trip distribution is the person-trip table for home to work that can be compared to the "Journey-to-Work" data provided by the Bureau of the Census.

- Vehicle Assignment: locates the "best" routes between each origin/destination pair and assigns vehicle trips to the highway network. Important outputs of this module include number of vehicles on each roadway segment by time period. Several other pieces of data can be extracted, including operating speeds, travel times, Vehicle Miles Traveled (VMT), Vehicle Hours Traveled (VHT), and Volume over Capacity (V/C) on roadway links. In addition, one can configure the vehicle assignment to save all the vehicle trips that use a single link in either direction (select link analysis) or all the vehicle trips that originate or are destined for a zone (select zone analysis).
- Travel Time Feedback: finds the best available travel path via each of the travel modes explicitly modeled. Several modes are explicitly modeled, including auto, transit modes (local bus, bus rapid transit, light rail, commuter rail), and non-motorized modes. Skims are reasonable approximations of the travel time and cost between all pairs of TAZs, and skims are described for each travel mode. The path-finding algorithms are calibrated based on observed travel paths and observed relationships between volumes and congested speeds.
- Mode Choice: calculates which mode each person trip is likely to take based on availability and mode-specific parameters (e.g. time, cost, transit frequency). Mode split provides a breakdown of person trips by mode, both for captive riders (people without automobiles) and for the total population. The mode split model is developed based on observed data on mode preferences and what those preferences imply about sensitivities to mode attributes.
- Final Assignment: uses the trip table from mode split and assigns the person trips using transit to the appropriate transit route. It also gives the final number of vehicles on each roadway segment by time period. This provides a means of viewing roadway volumes and transit ridership graphically and understanding the relative effectiveness of different segments of the road and transit networks.

- Model Output: is summarized automatically by the model, including regional statistics (e.g. VMT, VHT, transit shares and trip lengths), corridor and segment performance statistics (e.g. delay, volume, and ridership), district and county-level trip flow, MOVES emissions model inputs (EPA air quality model), and calibration statistics.

MODEL CALIBRATION

The model is calibrated to reasonably represent 2015 as the "base year" travel conditions and patterns, a process in which model output is validated against real-world data. Trip rates, transit ridership, and highway volumes are examples of types of model outputs that are validated. When the model results do not match the base-year values within an acceptable tolerance, parameters are adjusted until the model is acceptable. For future forecast years, the model output is checked to validate model results, allowing model sensitivities to be assessed. UDOT traffic count data is used to further calibrate individual corridors.

COMMUTER CHARACTERISTICS

Transportation problems occur as a result of high travel demands throughout the area. Most of the current job locations and most of the expected future employment growth happen in the Provo / Orem area and along the north county I-15 corridor.

Although it is expected that some future employment opportunities will be disbursed throughout the county, the Provo / Orem area will continue to be the hub of employment activity. The linear configuration of urban development parallel to the I-15 corridor place heavy demands on the freeway. Even with the recently expanded I-15 with additional lane capacity, by 2030 will congestion will be considerable.

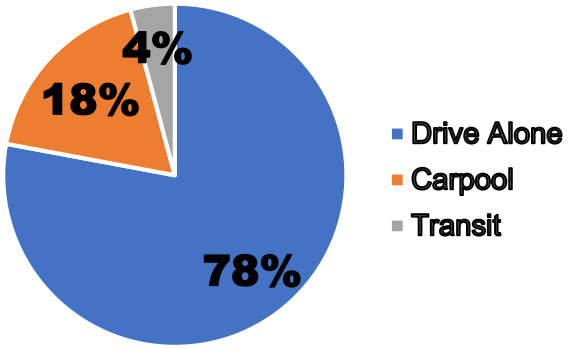
The number of workers commuting from Utah County to Salt Lake County has always been larger than the reverse commute. This trend is changing. In the Census 1990, 10.6 percent of all Utah County workers were employed outside of Utah County. According to Census 2000 that percentage raised to 14.6 percent and in 2010 raised to 17.4 percent. The number of work trips from Salt Lake County south to Utah County have increased by 36.1 percent since the 2000 Census, whereas work trips from Utah County going north to Salt Lake County grew by 59.8 percent.

Though increasing numbers of commuters are traveling south to Utah County, northbound trips still far outweigh them. In 2010, there were 40,000 one-way commuter trips at the Point of the Mountain each workday.

The majority of these inter-county commutes exceed 40 miles per trip. They contribute to a large portion of the region's annual vehicle travel, are costly to travelers and contribute to congestion and air quality issues. As the north end of Utah County and the south end of Salt Lake County continue to develop, these longer trips will slowly diminish. The highest demand on commuter facilities is for residents that live and work in Utah County.

Work Trips Mode Split: The 2013 Census American Community Survey data (5-year data) summarize the work trip mode split as listed on the table below. Work trips by automobile, by either drive alone or carpool, account for most of all work trips at 85.4 percent. Walking/biking is 5.8 percent due to the high amount of college students that attend the valley's two universities. The Wasatch Front travel model considers three different modes of travel for future years; Drive alone, Carpool, and Transit as shown on the Mode Split for 2050 chart below.

A.7 | Modeled Mode Split for 2050

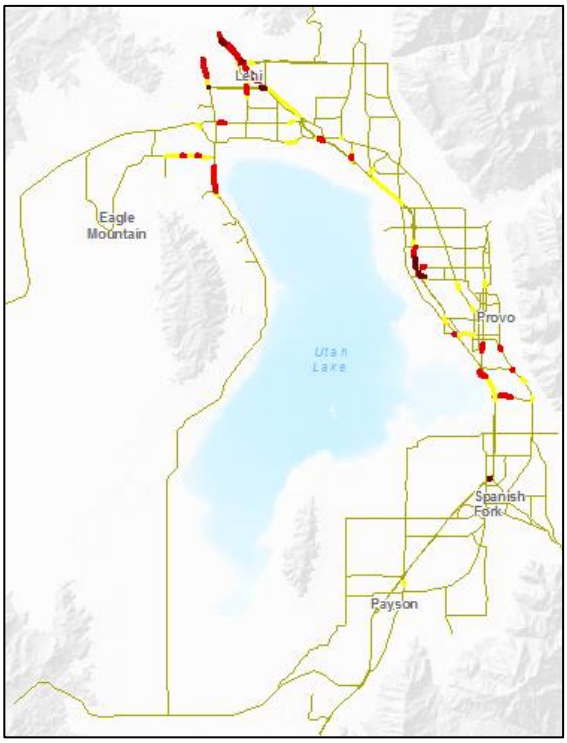


Level of Service (LOS): Over the years the Transportation Research Board of the National Academy of Science has devised a qualitative method of describing the ease, comfort, and convenience that a driver of a vehicle experiences along a street or highway. This method of description is called Level-of-Service (LOS). The LOS D is a goal for the transportation plan balancing convenience and cost. A Level-of-Service

D was adopted by elected officials as a policy for planning, which follows the UDOT Guidelines. The national standard is to plan for a LOS C.

Another indicator for improving the system is decreased travel times from key origins and destinations. Travel time was measured between Provo and Payson, Provo and Eagle Mountain, Lehi and Salt Lake City, and others. In a scenario with 2050 demographics and 2040 RTP projects, travel times from Provo to Eagle Mountain go from 39 minutes in 2015 to 1 hour 16 minutes. A trip from Provo to Payson increases from 18 minutes to 1 hour 1 minute, and a trip from Salt Lake City to Lehi would be 41 minutes versus 1 hour 4 minutes.

A.8 | 2015 Congestion Map

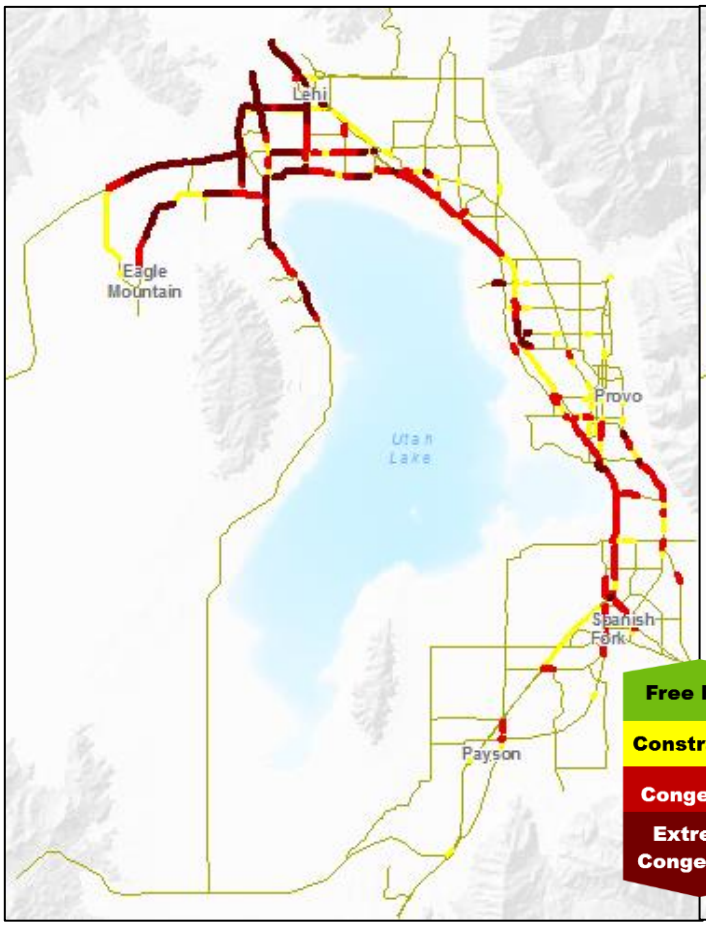


The current road and highway system are built from a history of multiple communities with their own network of local roads with a few connecting state-owned routes. Then I-15 was built as a main connection of these communities and others out of the region. I-15 remains the only freeway facility in the county. Built with the maximum number of general-purpose lanes from Orem northward, it is enough for today's traffic.

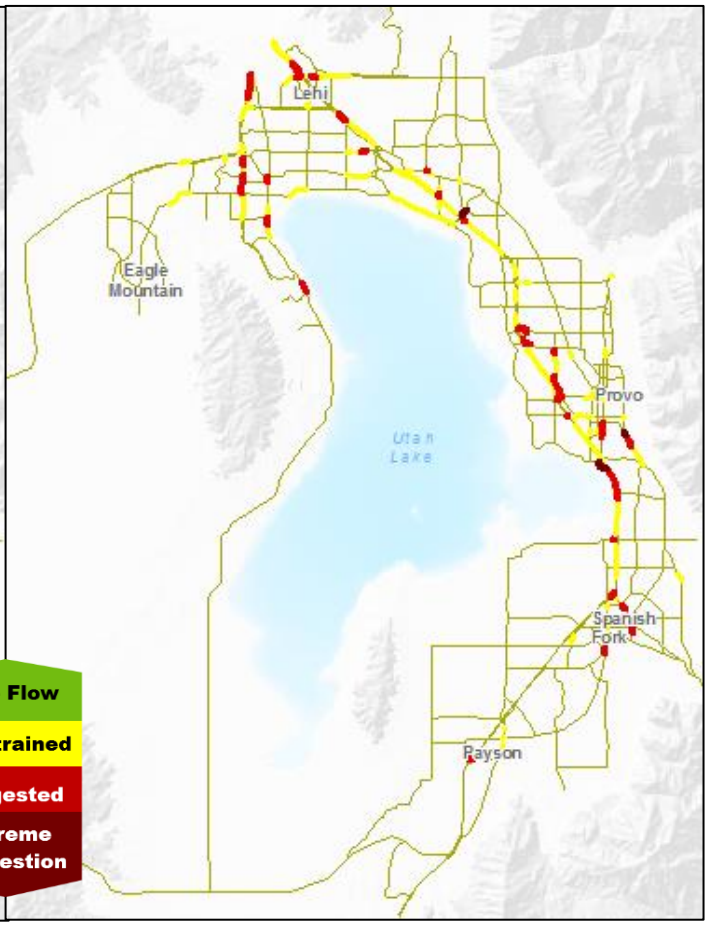
To identify needed highway projects for the plan, regional roads that are classified or proposed as minor or principal arterials, expressways, and freeways are analyzed. In developing these projects, three sources are reviewed. They include projects on the current transportation plan, city master transportation plans, and transportation studies. Projects from these sources are reviewed by MPO staff to create a draft highway network to be modeled. In running the model, the first 11-year phase of the plan, or Phase 1, is run using the socioeconomic data for 2030 (population, employment, households) compared with the Base Year model network plus currently funded Transportation Improvement Program (TIP) projects programmed

to 2022. This shows what traffic congestion will be in 2030 if no additional improvements are made to the highway network. It also allows staff to visualize where needed highway projects should be planned. Projects are proposed and the model is run again for Phase 1, with the new projects added to gauge network performance. Phase 2 and Phase 3 follows the same process in 10-year intervals.

A.9 | 2030 Congestion - No New Projects

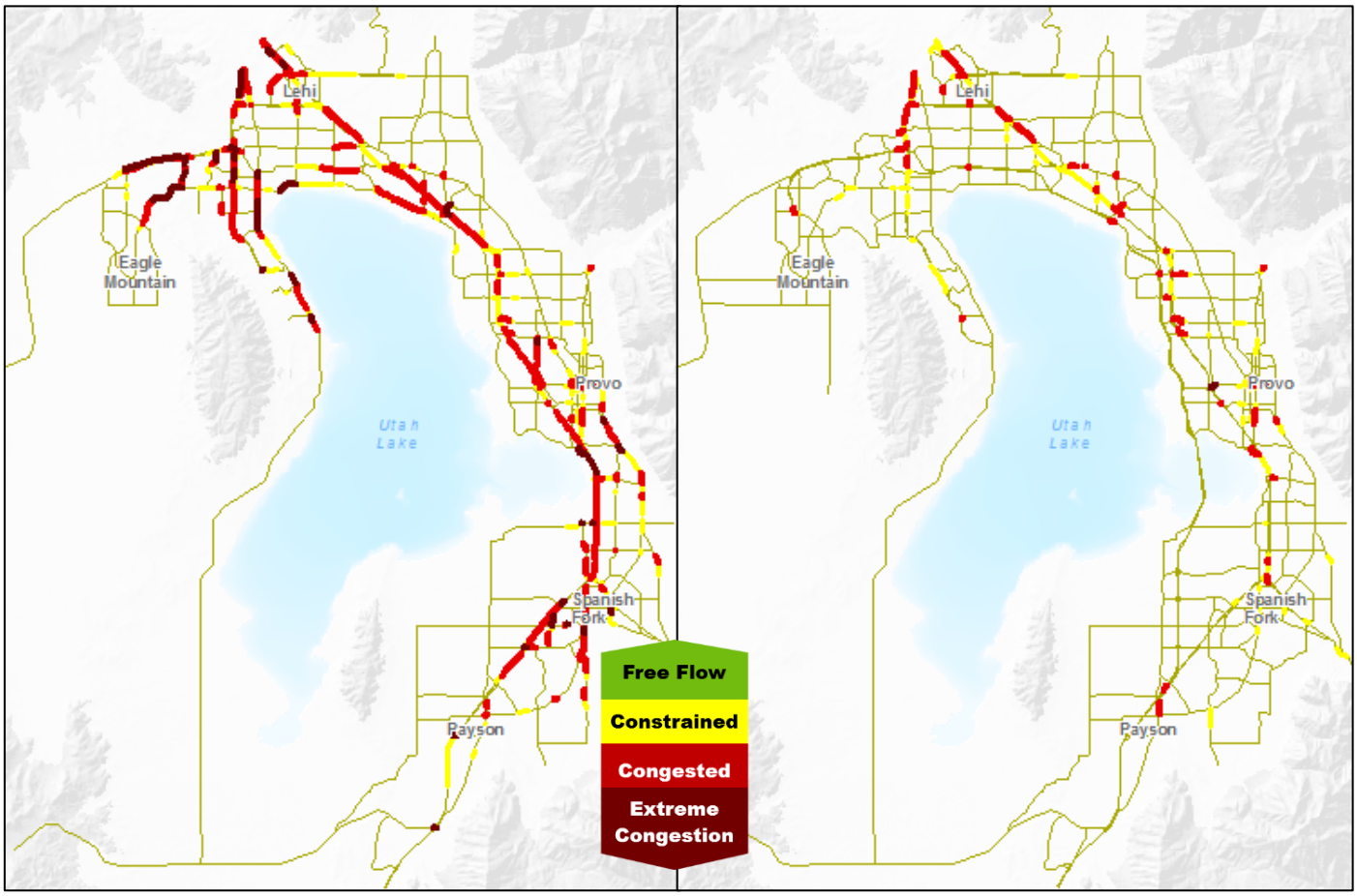


A.10 | 2030 Congestion with Projects



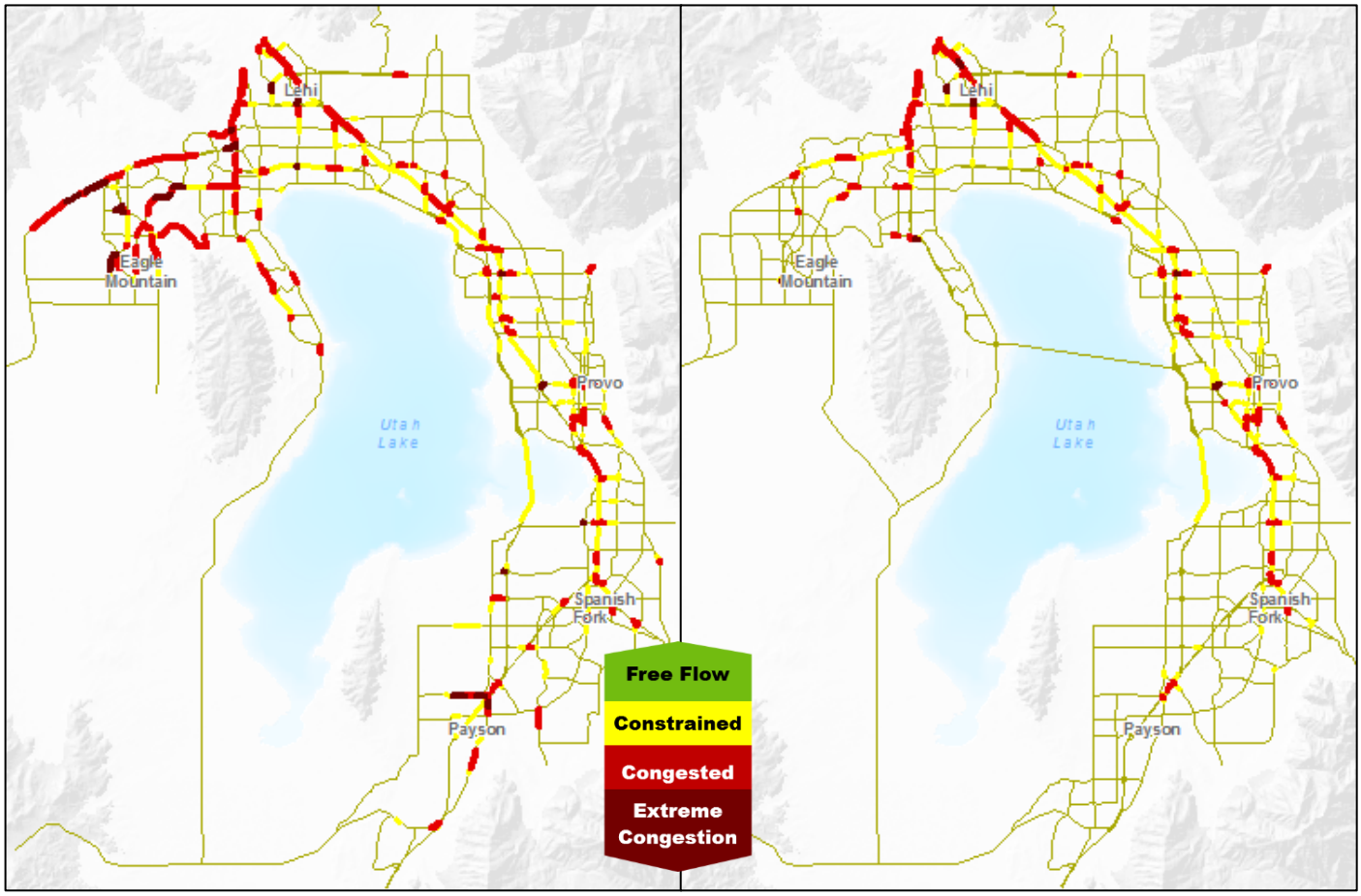
A.11 | 2040 Congestion - No New Projects

A.12 | 2040 Congestion with Projects



A.13 | 2050 Congestion - No New Projects

A.14 | 2050 Congestion with Projects



Once the three phases of the plan are modeled and a draft listing of projects is created, MPO staff review the data and projects with each municipality, the county, and the Utah Department of Transportation gaining input on needed changes. Numerous meetings were held to fine tune the project list. One major theme in update is the need for additional large highway facilities by 2040.

GRID NETWORK

In developing a plan for a balanced transportation system, attention was given first to creating an ideal grid network (IGN) for the whole of the county. A grid helps reduce the adverse effects of chokepoint, or bottleneck by distributing travel demand more widely. Most notable bottlenecks in Utah County are the Point of the Mountain, the Lindon area, and the Springville area. East/west travel through Lehi and the Cedar Pass area of Eagle Mountain also act as chokepoints. These areas are,

or will be, the most congested areas in the county. Traffic growth in these areas is quite high with the Point of the Mountain gaining the most trips from 224k trips per day today to 530k trips in 2050, more than doubling.

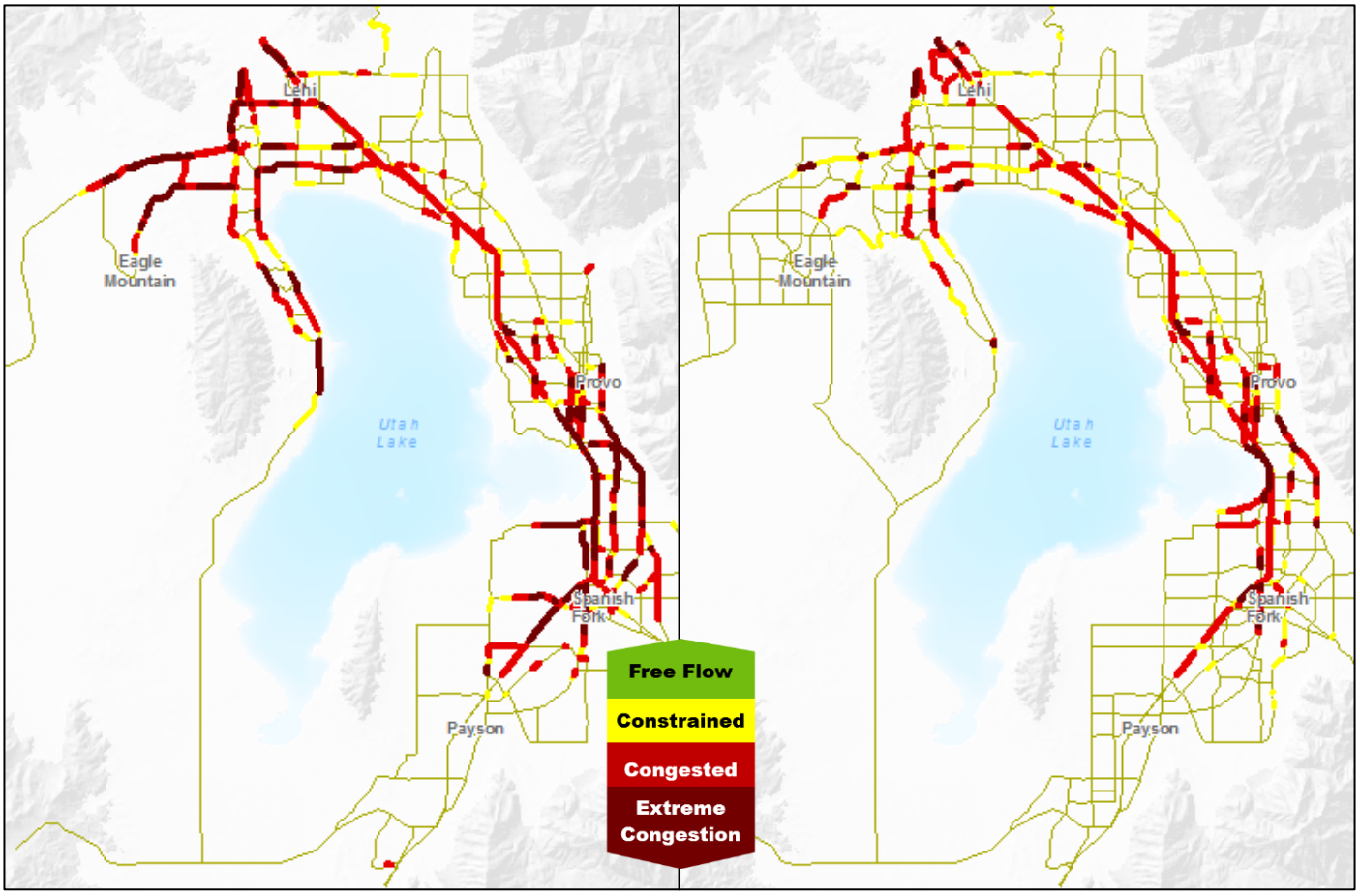
However, the Springville bottleneck also more than doubles from 144k trips today to 350k trips in 2050. An exercise was performed to look at real life opportunities for a grid network, utilizing new and existing road corridors and connecting existing corridors to each other to complete the grid regionally. In an ideal grid system minor arterial should be spaced every mile, and collectors spaced every half mile. TransPlan40 2040 projects were combined with the new 2050 socioeconomic forecast to see where the previous transportation plan showed deficiencies with another 10 years of growth. The county sum of vehicle delay hours showed 11 times delay compared to 2015. Salt Lake County today, for comparison, is 5 times the delay Utah County had in 2015. The Ideal Grid Network brought the 2050 hours of delay down from 11 times to 7 times more than today's delay.

Transit also benefits from having a grid network by allowing more direct paths both for accessing transit, the first and last mile, and the transit line itself.

Local bus routes, bus rapid transit lines, and light and commuter rail lines are integrated with the transportation system at intermodal hubs, mainly around rail stations. Park and ride facilities were designed to match the transit modes accessing them. Where transit and highway projects cross the county line, coordination is made with Wasatch Front Regional Council, ensuring they are consistent with other regional transportation needs.

A.15 | 2050 Congestion – 2040 Planned

A.16 | 2050 Congestion – 2040 Planned Projects with Arterial Grid Network



A Need for Larger Facilities: By 2050, even with the arterial grid network scenario, it becomes quite apparent that new arterial roads cannot be the only solution to our growth. The I-15 freeway at 12 lanes is heavily congested in the PM peak period and has reached its capacity. Many major arterials in the north county are experiencing high congestion levels. Two prominent bottleneck areas in the county, Lindon and Springville, cannot function without reliever corridors. An expansion of major highway facilities in the county is needed.

An exercise was done illustrating the current day major highway system in Salt Lake County and comparing it to the ITE Ideal Highway Spacing guidelines allowing decision makers to view current conditions in the neighboring Salt Lake Valley. The

conclusion was that other than the southwest area of Salt Lake County, the highway network was close to optional.

The same freeway grid was then overlaid in Utah County with the planned 2040 highway system (I-15 Freeway and Mountain View Freeway in Lehi as the only large facilities) showing the lack of geographic coverage of larger facilities. A simple analogy was then drawn - Utah County is projected at 1.3 million in population in 2050, higher than current-day Salt Lake County. The planned major highway facilities with this level of urbanization cannot handle the traffic. A grid system of major facilities is needed. Other metropolitan areas near 1 million today include Buffalo, NY, Richmond, VA, Raleigh, NC, and Oklahoma City, OK. Their major highway systems were also reviewed to further demonstrate the need to expand freeway and expressway facilities in the region.

With the need for expansion of major highway facilities demonstrated, MPO staff began to model various freeway scenarios to address two goals; congestion relief in the bottleneck areas of Lehi, Lindon, Cedar Pass, and Springville, and corridor preservation in the Cedar and Goshen Valleys and southern Utah Valley. West side corridors through Cedar Pass connecting the Mountain View Freeway in Saratoga Springs to Santaquin were first modeled. Then a bridge over Utah Lake to Saratoga Springs. Another bridge over the southern portion of Utah Lake to the Mosida area would help complete the grid in the south. North/South movement is more difficult to address due to heavy development and the options are limited. Multiple scenarios were tested. Widening I-15 with a frontage road system, a collector-distributor system, and a larger express lane system (basically a freeway within a freeway) have all been modeled. A parallel freeway to I-15 crossing Provo Bay from Payson through Lehi was modeled as well. All these corridors will require future studies to fine-tune and make realistic proposals.

Modeling a west side corridor through Cedar Pass, the Cedar Valley to Santaquin corridor alone did not address the goal of congestion relief in Lehi, Lindon, or Springville. MPO staff with the direction of the MPO Technical Advisory Committee next modeled additional freeway scenarios that would better create the grid

network. The continuation of the Mountain View Freeway south through Saratoga Springs and crossing Utah Lake to I-15 in Provo was modeled as well as a freeway from Payson to Provo as suggested in the Provo to Nebo Transportation Study, and a freeway from Provo to Lehi via Vineyard Connector and Pioneer Crossing. All these corridors would have major obstacles to work through from environmental issues to home and business impacts. The overall impact to the transportation network was quite noticeable with these corridors. Congestion relief in all the bottleneck areas is achieved with all the modeled freeways in the urban area carrying freeway levels of traffic by 2050.

A Utah Lake crossing bridge has been proposed by a private developer in the past. The proposal is to start near Pelican Point in Saratoga Springs and cross the lake meeting at Orem 800 North. The MPO modeled this proposal as well as a connection to Provo 2000 North (FWY to FWY interchange at I-15 with no eastbound connection into Provo/Orem). The Orem 800 North connection modeled 10,000 fewer trips per day than the Provo 2000 North connection. The reason for modeling an alternate location was due to concerns that connecting a major facility at Orem 800 North places more traffic in the highest traffic volume area in the county. Of course, with the environmental impacts that could occur to the wetlands and other historical elements surrounding the lake, any proposal would need further environmental study.

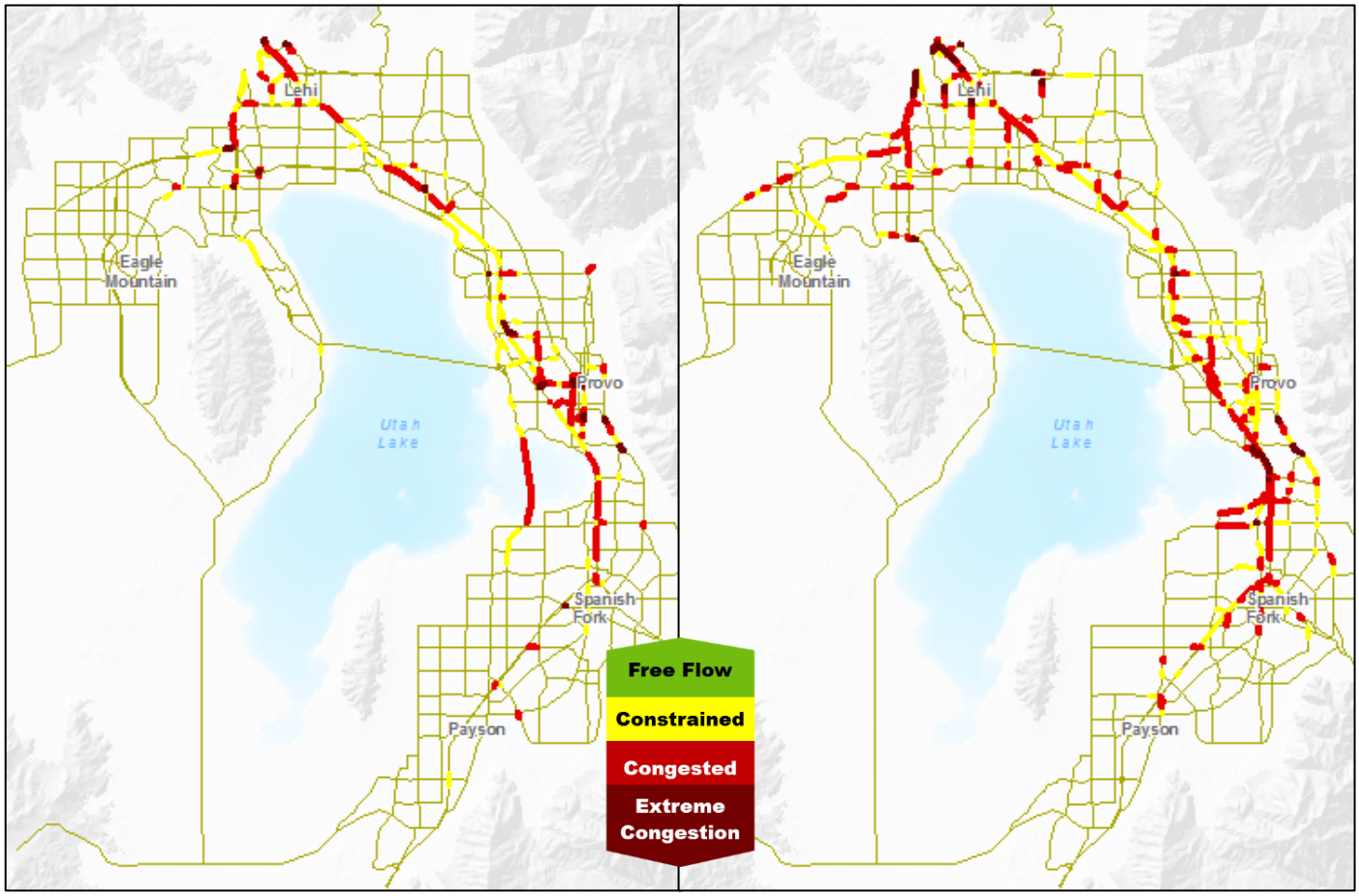
Shown below are LOS maps for the year 2050 for different scenarios modeled for the Transportation Summits. The first scenario is building only TIP projects and not building anything else through 2050. The second scenario is building the Ideal Grid Network

Of the many above corridors modeled, the greatest need is for a north/south project. To satisfy the needs of fiscal constraint, air quality conformity, and work done for future environmental studies, a combination of the north/south scenarios for I-15 is officially coded in the model. A parallel corridor is not coded in the model. The project representing this north/south corridor in this regional transportation plan is open to further study to produce the most appropriate alternative. Until such study happens, the fiscally constrained 2050 model network has coded:

- A frontage road system from Salt Lake County to Lehi 2100 North
- An additional general-purpose lane from Orem University Parkway to US-6 totaling 5 general purpose lanes and 1 express lane per direction
- A collector-distributor system from Lehi 2100 North to Spanish Fork Main Street
- An additional general-purpose lane from US-6 to Payson 800 S

A.17 | 2050 Congestion – Needs Based Preferred Scenario

A.18 | 2050 Congestion – Financially Constrained Plan



TRANSIT SYSTEM NETWORK TRANSPLAN50 PROJECT DEVELOPMENT

UTA operates 17 bus routes in the Utah County Area. The routes serve densely populated areas as well as rural, less dense area of the county and the bus frequency also ranges from every 6 minutes on the UVX line, 15 minutes on the 850 route that serves State Street, to the 805 in Eagle Mountain and Saratoga Springs and the 806 in Spanish Fork and Payson that are active only during morning and evening peak times. Most of the routes have a 30-minute frequency.

Most of the bus lines connect to the FrontRunner Commuter Rail line and the arrival times of the train are key to the functioning and timing of the rest of the system. The intent of the system is to create convenient transit connections that will facilitate easy transfers. Long distance commuter trips to Salt Lake County and Salt Lake City and places northward are made using the FrontRunner line.

The new UVX line operates between the two most southern FrontRunner stations that service the core of the county in the Provo and Orem area. UVX operates as a collector and a distributor of riders from FrontRunner. It connects to the most riders to the highest trip generators in the county, namely BYU, UVU, downtown Provo, University Mall, and Provo Town Centre Mall.

This fall a new concept of demand response is planned as an experimental service for the south end of Salt Lake County from Herriman to Draper. If this service is successful, a possible expansion of that service could serve Eagle Mountain and Saratoga Spring and then perhaps south county cities.

Transit capital projects are selected by assessing which areas or markets are viable and most productive for investments in transit coupled with an analysis of which transit technology is most appropriate in the environment that it is expected to perform. The measure of appropriateness is found in the study process and incorporates public input. Population and employment densities are the most important factors in determining transit need. Higher development densities concentrate more trips into a smaller area. A concentration of trips traveling to or from the same point makes transit operations viable. If in the study process it is

determined that adequate transit market potential exists in a certain area or corridor, then a matrix of transit options is explored. Those options, if regionally significant, are modeled using the regional travel demand model to predict its effectiveness.

Plans or selections are determined with the following goals:

- Ridership: Increase ridership at a rate greater than population growth.
- Quality: Provide transit service that is fast, frequent, and reliable by incorporating modern technologies, infrastructure improvements, and passenger amenities to enhance transit system operations and rider comfort.
- Productivity: Increase transit ridership per unit of service by evaluating and modifying service areas with greater potential and minimize service with lesser potential for ridership.
- Efficiency: Reduce the cost per passenger by maximizing ridership and minimizing operating costs.
- Access: Maximize access to the transit system according to the intensity of development through appropriate local, express, and regional services complemented by park and ride lots, transit centers, and intermodal facilities.

EXPANDING TRANSIT MARKET

Utah County population and employment, while concentrated in Orem and Provo is experiencing significant growth in the north part of the county. It is expected that as population and employment grow, more areas of the county will have densities to support internal, circulating transit routes. Potential increases in local transit could come in the form of new east/west routes that would connect to commuter rail and light rail stations and bus rapid transit alignments, tighter grid patterns with more frequency in Provo and Orem, additional north county routes, a more frequent south county route, more frequent service along State Street and on local circulating routes, and more frequent service on the Utah Valley/TRAX Express bus.

Expanded Bus Service: TransPlan50 assumes some significant increases in the level of bus service that would be provided through increased frequencies or headways on existing routes as well as creating new additional routes to serve growing areas. This will facilitate an increased number of transit trips and would help reduce vehicle

miles traveled and lower pollution emissions. As improved mode choices are developed it is hoped that many will choose to ride the bus to and from school and jobs, reducing congestion and air quality concerns. Additional park and ride facilities and FrontRunner and light rail stations along with the addition of carpool lanes on I-15 will have a significant impact on travel times and would make the service more appealing to new riders.

New planned bus network enhancements are being developed in partnership with UTA. The new network uses transit stations in various parts of the county with a bus network feeding each route from localized areas providing a faster more direct route to key destinations or transfer points. The bus system in conjunction with FrontRunner, UVX and eventually TRAX light rail will to move people quickly between each of the transit stations and destinations. The purpose of the improved network is to facilitate quicker movements from the south and north parts of the county and eliminate or reduce the long-distance routes that currently travel the length of the county.

Cedar Valley Core Bus Line: The Cedar Valley Core Bus Line is designed to provide efficient access from Eagle Mountain, Saratoga Springs and western Lehi residents to Commuter Rail. It would connect Eagle Mountain town center through Saratoga Springs and proceed along Pioneer Crossing to the FrontRunner station at American Fork.

State Street Bus Rapid Transit Line: The State Street Bus Rapid Transit Line uses the State Street corridor connecting the American Fork Commuter Rail Station to the UVX, proceeding along Provo 500 West ending at the Provo Intermodal Center again linking to Commuter Rail.

Redwood Core Route: The Redwood Core Route ties into work already being done to create a high frequency core route to serve the Redwood Road corridor. This route will be implemented in Salt Lake County in earlier years and as it progresses southward Saratoga Springs will be included.

Maple Core Bus Line: Central south county areas will connect to Provo via the Maple Core Bus Line. This line will create high frequency direct access between Spanish Fork and Provo also serving Springville.

Nebo Core Bus Line: The south county will be served by the Nebo Core Bus Line. The line would initiate either at the Provo Intermodal Center or the south end of the Provo-Orem BRT Line and connect south using the State Street corridor to run through Springville and Spanish Fork eventually connecting at the Spanish Fork proposed future FrontRunner station. This line after connecting at the future FrontRunner station in Spanish Fork it will traverse through Salem and into Payson ending at the future Payson FrontRunner Station. It will act as a collector and distributor for FrontRunner riders.

New FrontRunner Stations: In the very near future a FrontRunner train station needs to be built in Vineyard, and later in Springville, Spanish Fork, and Payson. The proposed plan also includes pedestrian enhancements through the adjoining neighborhoods, bicycle facilities, mixed land use, and transit-oriented development. It is anticipated that the locations will serve passengers on express buses to and from Salt Lake City, possibly connect to the new UVX line through Provo and Orem, and commuters riding the train to Salt Lake City and Ogden.

FrontRunner Commuter Rail Upgrades and Positive Train Control: FrontRunner has seen steady gains in ridership with an average weekday ridership of 21,800 in September 2018. To be more efficient with the operations of Commuter Rail UTA would like to add enhancements in the first phase of this plan. Trains operating during the peak morning and evening commutes frequently operate at or near capacity. FrontRunner service operates on a largely single-track system with double tracking in select locations. This limits the frequency of train service and forces the system to operate at lower than system optimum speeds. Reliability is also reduced when trains are delayed due to large passenger loads, equipment malfunctions or other incidents. The addition and modifications to FrontRunner's train control system in order to comply with federal Positive Train Control (PTC) requirements will create a further challenge maintaining reliability. Improvements to the FrontRunner system capacity, reliability and speeds could be made through additional double tracking,

adding additional passenger cars to the trains and, ultimately, electrifying the system. UTA commissioned a study that concluded in 2018 called the Future of FrontRunner Study. This study took a long term look at the FrontRunner service and recommended different enhancement or investment scenarios.
Currently the FrontRunner line is single tracked and this limits how many trains may operate on the line at any given time. UTA is proposing to add sidings in various locations along the line and looking for opportunities to add double tracking to allow for greater passing capacity and frequency. UTA would also like to add an efficient technology enhancement called positive train control to help them identify where the train is on the line at any given time.

During phase 1 of the plan, FrontRunner Commuter Rail would expand further south from the existing Provo Station to the southern part of Utah County likely ending in Payson. Stations would likely be added in Springville, Spanish Fork and Payson.

TRAX Light Rail: Residential and business growth in south Salt Lake County and the north part of Utah County is proposed to continue to merge together becoming one continuous urban area.

North Line Light Rail: Light rail in the north county would extend the current Blue Line that currently ends in Draper and continues it to American Fork. This line would greatly enhance countywide mobility and provide high speed transit between northern Utah and southern Salt Lake counties. Current funding would not allow this line to be constructed until after 2040. Demand modeling demonstrates that this service would be warranted by 2030. Funding beyond the 30-year tend assumptions within the plan would need to be proposed and secured to construct the line within the warranted timeframe.

Central Line Light Rail: A future extension of light rail could continue further south along the State Street corridor through Vineyard, converting the Utah Valley Express bus rapid transit into rail and ending in the south Provo area. It is proposed that demand for service would occur the second phase of the plan or before 2040. Current funding allocations push this outside the current 2050 plan horizon.

Additional funding resources would need to be secured to construct the line within TransPlan50.

South Line Light Rail: Light rail farther south between Provo and Spanish Fork is warranted in phase three. No funding is allocated within the plan. Future funding would need to be proposed and secured to construct the line within the third phase. A corridor alignment would also need to be studied and placed within the city and regional plans.

West Line Light Rail/BRT: Other potential extensions would go to Eagle Mountain and Saratoga Springs. Current land use densities within Lehi and a split travel shed of trips going north to Salt Lake County and south to Provo make this line not warranted before 2050.

Expanded Transit Maintenance Facility: The expansion in bus service and potential rail operation will require the addition of approximately 60-75 vehicles to the existing fleet and would also necessitate the expansion of the UTA maintenance facility on Geneva Road in Orem or the addition of a new facility in the south part of the county. The facility would need additional bus stalls for parking, more maintenance and fuel bays and more space in the building for operators and staff. UTA owns land at the existing Geneva Road location that is available to accommodate these additions.

Paratransit Service: Paratransit is a service offered to persons with disabilities in the Utah Valley area in order to be compliant with the Complementary Paratransit Service provision of the Americans with Disabilities Act (ADA). The service is provided by the United Way of Utah County through a contract relationship and under the direction of UTA who is primarily responsible for mobility compliance with the ADA for the Wasatch Front. Paratransit offers transportation to persons who are prevented from using the fixed UTA routes available to the general public. Persons who are mentally, physically, or temporarily disabled may be eligible for the service. Eligible riders may ride to and from any location if it is within one-quarter mile of a fixed route UTA bus route in the Utah Valley UTA service area. An application for determining who may be eligible can be obtained from the United Way Transportation Services of Utah County. Once a person has applied and been

approved to ride the Paratransit system, they can schedule trips by calling United Way or UTA Customer Service.

The future of paratransit service in Utah Valley involves changes to keep up with the increasing demand. The future Paratransit system will need to implement the following:

Replacement of older vehicles in the paratransit service fleet will help keep the system efficient. New engine technology and the implementation of advanced scheduling software should allow the service to remain in compliance with ADA needs and requirements while improving efficiencies. All UTA regular service buses are wheelchair lift equipped.

Scheduling will need to be upgraded with software solutions integrated with GPS technology will help keep up with future demand by improving operational efficiency. Currently, all schedules are done by hand and then entered into a computer. This is a time-consuming process and it doesn't generate efficient mapping for the driver. As demand for scheduling grows, this process will need to be changed. By purchasing computer-scheduling software with a real time, GPS location enabled, and GIS maps-based software, the efficiency could increase dramatically, and the process would be simplified.

Smaller, wheelchair-lift-equipped vans for paratransit service can be used for times when demand is low or on trips that are far away from the central service area. Smaller vans have a shorter life expectancy than larger vans, but lower cost should make the smaller vans more viable.

The MPO, in partnership with UTA and United Way, has initiated a new service in 2017 called Utah Valley Rides. Initially a volunteer-driven service with two vans that serves the Provo and Orem area with hopes of expansion as drivers, money, and vehicles become available. This system supports efforts to more fully coordinate the specialized transportation needs of seniors, disabled individuals, and eligible low-income populations. Further efforts include maintenance of a Coordinated Mobility

Plan as part of the Statewide Coordinated Plan prepared in partnership with UTA and other local partners to meet the requirements under SAFETEA-LU to access FTA Section 5310, JARC and New Freedom funds. Additionally, the MPO in partnership with UTA, will continue to competitively select projects, and facilitate the inclusion of those projects selected, for funding to be listed in the Transportation Improvement Plan and Statewide Transportation Improvement Plan.

A recent emphasis has been put on local areas to learn to coordinate the method in which they provide transportation to various individuals who need special assistance by Human Service Providers. Currently each of those providers have methods of transporting their clients as needed, however they are done without coordination and often are duplicative or inefficient. The Federal government has therefore put forth an initiative to try to coordinate and share services thereby hopefully decreasing the resources required to provide that service. UTA and MAG are working with state legislators to fund a one-call system where all the various providers can pool resources and all the respective clients can call into this one number and the most efficient ride could be selected by them and credits would be given to all participating agencies to ensure fairness in the distribution of costs and services.

Utah County has formed its own Regional Coordinating Council, progressing toward a goal of trying to integrate a coordinated approach to providing service. The goal is to create a partnership with providers to share services. This will eliminate duplication of services and create efficiencies that will enable more service to be provided.