

Executive Summary

Purpose

As the FrontLines 2015 program comes to closure with the opening of the Draper TRAX line extension, the Utah Transit Authority (UTA) Board has requested that a study be developed to identify the next round of capital and operating improvements.

The Network Study identifies the next group of capital and operating improvements that will need additional after completion of the FrontLines 2015 program. The Network Study builds on the work completed for the 2015 program, the Wasatch Front Regional Council (WFRC) and Mountainland Association of Governments (MAG) Regional Transportation Plans (RTPs), and the Wasatch Choice for 2040.

More specifically, the purpose of the study is to:

- Analyze “State of the System”
- Advance projects identified in Utah’s Unified Transportation Plan
- Compare and contrast potential networks and system coverage
- Inform sustainable land use and transportation decisions
- Implement the Wasatch Choice for 2040 vision

The Study identifies and defines the issues and opportunities found with the current transit system and serves as a catalyst for project development entering the environmental process and securing federal funding under an evolving MAP 21 environment.

Study Area

The study area for the Network Study includes Weber, Davis, Salt Lake, and Utah counties. See Figure ES-1.

Project Team

The project team was comprised of experts in transportation planning and engineering, transit operations, ridership forecasting, travel demand modeling, and land use and environmental planning from UTA, WFRC, MAG, and private consultants (Lochner, RSG, Nelson Nygaard, and Metro Analytics).

State of the Transit System

Since its inception in 1970, UTA has grown from a small service agency operating 90 buses to a multi-modal agency with a fleet of more than 600 buses, 200 rail vehicles, and one of the largest service areas in the country. UTA’s system now includes commuter rail (FrontRunner), light rail (TRAX), express bus service, local bus service, bus rapid transit (BRT) (35MAX), ski bus service, paratransit, vanpool, route deviation bus service (FLEX Route), and streetcars (in December 2013), as well as approximately 30 miles of non-motorized, multi-use trails.

System Highlights

UTA has progressively built a fixed-guideway transit network beginning with the opening of the first TRAX light rail line in 1999 and continuing to the imminent completion of the FrontLines 2015 program by December 2013 (Figure ES-2). Table 1 highlights key information regarding UTA's current system, and Table ES-2 shows infrastructure statistics before and after the 2015 program.

Table ES-1: UTA Highlights

Service Area	4,774 square miles 75 cities 6 counties
Fleet (as of 2011)	Over 600 buses Over 140 light rail TRAX vehicles Over 60 FrontRunner commuter rail vehicles
Annual Revenue Miles (2011)	34 million total: 16 million bus 6 million rail 4 million paratransit 8 million vanpool
Bus Stops	6,600
Joint Use Park-and-Ride Lots	128
Passenger Trips per Year (2011)	41 million
Employees	Over 2,000

Source: UTA Certified Audited Financial Report, 2012, Service Area is based on area of tax districts who provide funding to UTA.

Table ES-1: System Infrastructure Statistics

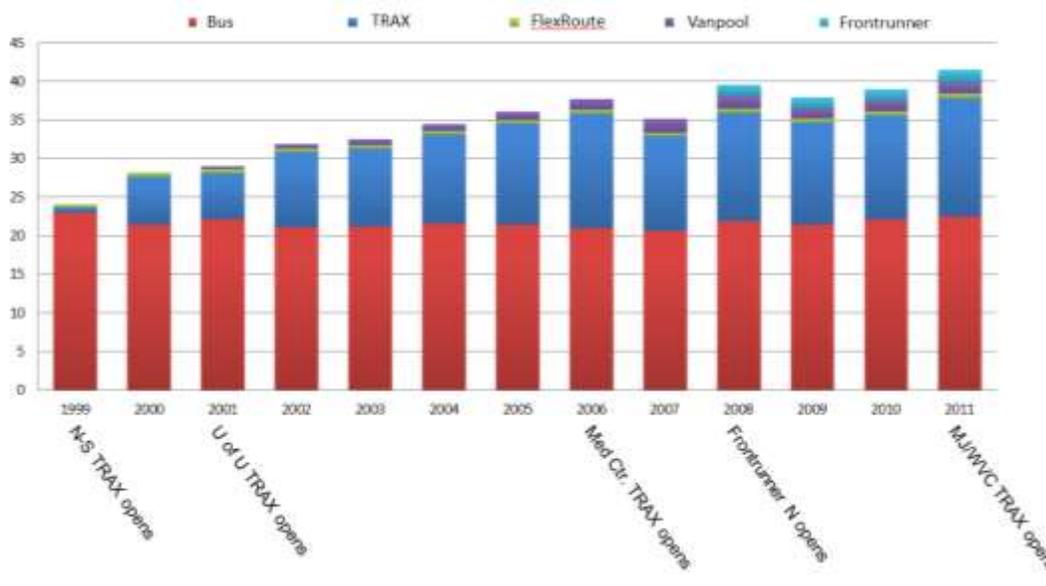
Mode	Post-FrontLines 2015 / Sugarhouse Streetcar
Light Rail	45 miles
Commuter Rail	88 miles
Stations	63
Park-and-Ride Stalls	16,341

Source: www.rideuta.com. Park-and-ride stalls are an estimate from the UTA Planning Department.

Ridership

UTA's investment in a fixed-guideway network has resulted in a steady increase in ridership, as shown in Figure ES-3. System ridership as of fall 2011 (when ridership data was collected) was 148,000 boardings on a typical weekday; ridership is expected to grow to almost 160,000 boardings per day after the FrontLines 2015 projects are complete.

Figure ES-3: UTA Ridership Trends by Mode (Annual Boardings in Millions)*



*Note: N-S TRAX is now Red Line and Blue Line; U of U TRAX is now Red Line; Medical Center is now Red Line; Mid-Jordan (MJ) is now Red Line; and West Valley (WVC) is now Green Line.

Source: UTA, 2012

Network Needs

After extensive efforts, the project team of experts identified key strategic needs to move forward into the next era of transit service along the Wasatch Front. These efforts included an assessment of the current transit network, analysis of more than 60 travel demand model runs, comparisons of key performance metrics to similar transit systems in the U.S., public involvement, and workshops with Metropolitan Planning Organization (MPO) planners and UTA capital, planning, and operations departments.

UTA's recent investments have built the backbone of a world-class, high-quality transit system. With the backbone of the system in place, the need now is to fill out the network, reinforce the backbone service, and provide better connections to the backbone.

Specifically, the network needs include the following, which are discussed in more detail below:

- **Expanded network of high-quality, high-frequency transit ("Bus Plus")**
- **Increased service frequency, including defined bus routes that are protected from service cuts ("Core Network")**
- **Fast, direct transit connections between FrontRunner and TRAX stations and employment centers**
- Improved reliability on key bus routes
- Increased frequency and decreased travel time on FrontRunner commuter rail
- Faster east-west travel times across downtown Salt Lake City
- Better active transportation accessibility to FrontRunner and TRAX stations
- Integrated land use and transit planning

Fill Out the High-Quality, High-Frequency Transit Network

The project team defined the high-quality, high-frequency transit network as having the following characteristics: substantial stations with amenities, pre-board ticketing for shorter dwell times, transit signal priority, and service frequencies of 15 minutes or better for non-commuter services.

The current high-quality, high-frequency network is shown on Figure ES-4. This network assumes and includes FrontRunner commuter rail and TRAX light rail—the “backbone” of the system—as well as MAX BRT service on 3500 South. MAX BRT service has, among other amenities, stations with pre-board ticketing and exclusive lanes for the bus in some areas. As shown on Figure ES-4, the majority of the population along the Wasatch Front is not within walking distance of high-quality, high-frequency transit service. Network coverage is needed, with a focus on connecting the key Wasatch Choice for 2040 nodes (i.e., Metro Centers and Urban Centers), as shown on Figure ES-4.

Service Frequency

More service frequency is needed for all modes, with an emphasis on attaining 15-minute service frequency where possible. A core network of frequent bus service that would not be subject to service cuts should be defined. This network would extend beyond the high-quality network.

Reinforce the Backbone of the Network

In addition to filling out the network, the current backbone rail network needs targeted improvements. More service frequency is needed, specifically for commuter rail and east-west TRAX connections across downtown Salt Lake City.

FrontRunner Commuter Rail Operations

Travel demand modeling showed that more frequent service and decreased travel time could result in almost a 70 percent increase in ridership on commuter rail. Increasing frequency may require capital improvements such as double-tracking.

Improve Transit Connections to FrontRunner Commuter Rail Stations

There is a clear need for high-quality transit connections between FrontRunner stations and key activity and employment centers, such as Adobe in Lehi, the proposed Falcon Hill development in Clearfield, Brigham Young University (BYU), and Weber State University.

Reduce Transit Travel Time across Downtown Salt Lake City

A substantial portion of all transit trips begin or end in downtown Salt Lake City and/or the University of Utah area—up to 70 percent in Salt Lake County, more than 50 percent in Davis County, almost 25 percent in Weber County, and almost 20 percent in Utah County (before FrontRunner South opened). Although getting to downtown Salt Lake City is fairly convenient on TRAX and FrontRunner, getting to destinations within downtown on transit is more challenging. Because the Salt Lake Intermodal Hub is not near key employment centers, a transfer is required for many work trips. East-west transit connections are needed between the Salt Lake Intermodal Hub and destinations in downtown Salt Lake City and the University of Utah area.

Direct Active Transportation Connections to FrontRunner and TRAX Stations

The Network Study identified a need to improve biking and walking connections to transit stations. In many cases, the pedestrian route to the station is circuitous and/or there is no clearly identified cycling route to the station. Further work to identify active transportation improvements is being completed in a separate study, “Utah Collaborative Active Transportation Study”.

Integrate Land Use and Transit Planning

Land use planning is an effective way to increase the attractiveness of a transit mode. The Network Study found that a compact land use scenario in accordance with the Wasatch Choice for 2040 plan could increase ridership by up to 40 percent more than a more sprawling land use scenario that is consistent with historic development patterns. The projects identified in the Network Study will help reinforce the Wasatch 2040 Land Use Plan. Further studies of impacts of transit on land use values have shown that land values increase by 10 to 205 percent.

Address Customer Desires

Extensive on-board and online surveys have been conducted over the past 30 years, providing an accurate representation of customer desires. These include:

- Reliability
- Frequent service
- Reasonable fares
- Longer service hours
- Transfers
- Real-time information
- Seat availability
- Simple routes
- Station/stop comfort
- Safety
- On-board amenities

Next Tier Projects to Address System Needs

In accordance with the purpose of the Network Study, the project team evaluated projects to advance from the RTPs, and also identified smaller, cost-effective investments of a size or nature that are not normally in the RTP (e.g., bus amenities, service frequency, and pedestrian improvements). The proposed Next Tier projects are shown on Figures ES-5 to ES-8 and summarized below.

Bus Plus Network

A network of high-quality, high-frequency bus service, termed “Bus Plus,” is proposed to fill out the regional transit network. Bus Plus service would include all of the amenities of BRT without the exclusive lanes (it is referred to as *Enhanced Bus* in the Unified Plan/RTP). The proposed Bus Plus network addresses key needs in that it:

- Expands the high-quality transit network
- Increases service frequency
- Decreases travel time across downtown Salt Lake City
- Improves reliability on key routes (transit signal priority, reduced stops, and pre-board ticketing improve reliability)

There is abundant research on the qualities and benefits of BRT, including the Transportation Research Board’s (TRB) Transit Cooperative Research Program (TCRP) Report 118: Bus Rapid Transit Practitioner’s Guide. The Bus Plus network would include some or all of the following amenities:

- 15-minute frequency or better, all day
- Stations with seating and shelters
- Real-time next bus information
- Route and schedule information at stations
- Coordinated schedule with TRAX
- Pre-board ticketing, tap-on/tap-off ticketing, or mobile ticketing
- Transit signal priority
- Stops at the far side of the intersection to improve travel times
- Limited stops (half-mile to 1-mile spacing) to improve travel times
- Branding

Core Bus Network

A core bus network signifies existing and continuing commitment to high levels of transit service is under development. Core routes achieve high productivity (riders per mile) by being useful to many people for many trip purposes, rather than specializing around a certain rider’s needs. The core bus network would extend beyond the Bus Plus network and would not necessarily include capital investments. UTA should work with municipalities to ensure that transit-supportive land uses are planned along the core bus network. Concurrently, because the core bus network constitutes a commitment to service, these corridors should retain high levels of service to be defined in UTA’s service standards. Core bus routes would not be subject to service cuts.

As described in UTA’s Core Network Memo (Nelson Nygaard, December 2012), a process was created to show how routes qualify to be in the core bus network. Criteria include transit-supportive land use/densities, high service frequency, and high ridership, among others.

FrontRunner Commuter Rail Circulators

Clean-fuel bus circulators are proposed to provide a fast, direct transit connection between FrontRunner stations and employment centers such as the Falcon Hill development in Clearfield. These circulators would address first-mile/last-mile accessibility to the regional transit network and would increase ridership on FrontRunner commuter rail with a relatively low capital investment.

Targeted Fixed-Guideway Projects with Integrated Land Use Planning

Targeted fixed-guideway projects are proposed where there is a local community desire and potential for ridership. These projects are targeted to fill out the high-quality, high-frequency transit network, connect Wasatch Choice for 2040 nodes, and provide connections between FrontRunner commuter rail stations and key activity centers. Fixed-guideway projects from the RTP include a light rail extension to Orem from Salt Lake County, improved transit service (mode is yet to be determined) to serve the Cottonwood Canyons, and streetcar and BRT connections to FrontRunner in Ogden, Salt Lake City, Taylorsville/Murray, Sandy, South Jordan, and Provo.

Land use and density are inextricably linked to the success of a transit project, and the implementation of the Wasatch Choice for 2040 land use and transportation vision hinges upon integrating the planning of land use and fixed-guideway projects. As part of the Network Study, the project team developed a checklist of planning activities for a community to complete when preparing for a transit project. It is proposed that UTA, WFRC, and MAG partner with local communities to use Wasatch Choice for 2040 and ET Plus tools to complete planning activities on the checklist.

Downtown Salt Lake City Projects

To decrease east-west travel times across downtown Salt Lake City, fixed-guideway and operational improvements are proposed, including a streetcar on 200 South (or a parallel road) and a direct TRAX connection between the Salt Lake Intermodal Hub and the University of Utah. Restoration of direct TRAX light rail service on existing rail infrastructure is also proposed.

FrontRunner Commuter Rail Improvements

FrontRunner operational enhancements to reduce travel time and increase service frequency are proposed. Improvements such as double-tracking in key areas, electrification, and skipping certain stops with the fewest boardings would reinforce the backbone of the transit network.

Active Transportation Improvements

Active transportation improvements are a low-cost way to increase ridership. Cycling access to the transit network could be improved through bike share programs, improved bicycle access on FrontRunner vehicles (e.g., more dedicated bike space on cars), and more direct access to transit stations. Infrastructure to improve pedestrian and cycling access within a half-mile of the more than 60 FrontRunner and TRAX stations would include direct sidewalk connections, multi-use trails, or cycling facilities that “punch through” barriers to stations. Travel demand modeling indicates that a program of improvements like these could increase system-wide ridership by 4,500 trips per day. The costs for the active transportation scenario assume installation of 27 bike share stations at key locations and capital improvements to increase pedestrian/cycling access at 63 FrontRunner and TRAX stations.

Approximately 60 percent of transit riders walk to access transit. Another 3 percent bike. Improved walking and biking access within close proximity of stations is an easy, cost-effective way to increase transit ridership.

Benefits of Next Tier Projects

High-Quality, High-Frequency Transit Network

The high-quality, high-frequency transit network would be improved with the Next Tier projects, as shown on Figure 8. The difference between the current network and the proposed network is striking. The current high-quality, high-frequency network is sparse, with most high-frequency service occurring close to downtown Salt Lake City; whereas, the proposed network includes high-quality, high-frequency service that spans a broader area of the Wasatch Front and is well connected to Wasatch Choice for 2040 nodes and other key activity centers.

Ridership

Table ES-4 shows the system-wide ridership benefits of the Next Tier projects.

Table ES-3: System-Level Ridership Comparison, 2020

Ridership Category	2020 "Do Nothing" Scenario	2020 Next Tier Projects Scenario	% Increase
Boardings per Day	194,000	272,000	40%
Boardings per Year	57 million	79 million	39%

Source: Network Study Travel Modeling Memo, RSG, January 2013

Travel Time

The project team analyzed transit travel times between select locations for the Build Scenario (including the Next Tier projects). Table ES-5 shows a comparison of these transit travel times assuming the RTP land use data set. The table shows that the recommended scenario provides substantial travel time benefits for select locations.

Table ES-4: Transit Travel Time Benefits of Next Tier Projects

From	To	Transit Travel Time (min.)		
		No-Build	Build Scenario	Difference
Falcon Hill	Downtown Ogden	60	46	-23%
International Center	Downtown SLC	50	34	-33%
Millcreek	Downtown SLC	45	40	-11%
Ft. Union	University of Utah	70	62	-11%
Pleasant Grove	Sandy City Hall	94	72	-24%
UVU	BYU	42	25	-39%

Source: Network Study Travel Modeling Memo, RSG, January 2013

Air Quality

Implementing the Next Tier projects would have significant impacts on air quality improvement. An estimated 1,370 tons of emissions would be reduced annually, as shown in Table ES-6.

Table ES-5: Air Quality Benefits of Next Tier Projects

Next Tier Projects Scenario	
Total 2020 Linked Trips	201,000
Persons per Car	1.1
Daily Vehicle Equivalent	228,409

Average Miles per Trip	7
Total Daily Miles Reduced by Transit	1,598,864
Total Annual Miles Reduced	470,065,909
Total Daily Emissions Reduced (tons)	4.65
Total Annual Emissions Reduced (tons)	1,370

Source: Recommended Practice for Quantifying Greenhouse Gas Emissions from Transit, APTA SUDS-CC-RP-001-09, August 2009

Job Creation

Job creation can be estimated using data obtained from the Executive Office of the President, Council of Economic Advisers (CEA). The CEA estimates that \$76,923 in government generated spending for transportation infrastructure projects results in one (1) job year. Using the CEA figure of \$76,923 in government spending per job-year and an indicated total program cost of ±\$4.8 billion for Utah Transit Authority's Next Tier program could result in an estimated total job creation (*direct, indirect and induced*) figure of **62,345** job-years for all of the capital investments and an additional **1,209** job-years annually for operations and maintenance of the Next Tier projects.

Livability

As demographics shift, Baby Boomers and Generation Y are driving demand for compact development. A 2012 study showed that 66 percent of those 65 or older intend to move into a smaller house and 50 percent of those aged 50 to 64 desire a smaller house. Transit Oriented development and more dense housing options are made possible by an expanding transit system.

The workforce-age population also benefits from increased transit service. The Next Tier projects aim to connect key job markets in Northern Utah County, Weber State University, Sandy and South Jordan, and Hill Air Force Base. More transit connections will allow more people to use the system

Proximity to Good Service

The Next Tier projects add 257 more miles of BRT service, 164 miles of Bus Plus service, and 34 more miles of LRT/streetcar. With this new service, there will be up to 726,000 more jobs within 1 mile of good service by 2040, a 52 percent increase and up to 1.8 million more people living within 1 mile of good service by 2040, an increase of 61 percent.

Transit Oriented Development

The Wasatch Choices 2040 identifies activity centers throughout the region where regional destinations have grown, where economic activity has clustered, or in strategic locations that are pointed in this direction. The Vision suggests that these centers should expand to provide ever-broadening choices for residents to live, work, shop and play; a mix of all of these activities is welcome. The Next Tier projects provide transit support to these centers and will help allow for development of TOD in these centers.

The benefits of TOD are wide-ranging, covering fiscal, social and environmental concerns. TOD can benefit individual communities and the region as a whole as more and more communities adopt TOD as a growth strategy. The benefits of TOD include:

- Improved quality of life for households from less time in traffic and more time with families;
- Reduced transportation spending and increased housing affordability for households;
- Efficient use of infrastructure due to greater development intensities, both in existing and new areas;
- Increased return for developers from less money and land spent on parking and roads;
- More cost-effective transit brought about by greater ridership potential near major transit lines;

- Variety and choice of housing types, retail destinations, office locations, and community lifestyle;
- Decreased auto dependence and greater mobility choice, especially for those who cannot drive or afford a car;
- Revitalization and redevelopment of underutilized and disinvested urban and suburban areas into vibrant communities;
- Creation and enhancement of communities with distinctive identity and sense of place;
- Enhanced public health and safety through more active and cared-for public spaces and walkable and bikeable neighborhoods;
- Improved air quality and reduced traffic congestion;
- A structure for new growth in compact patterns and in redevelopment areas, preserving valuable agricultural land and natural features;
- A catalyst for redevelopment of brownfields sites;
- Improved water quality through less impermeable surface runoff and potential open space preservation.

Costs

UTA's primary source of funding is the local option sales tax.

The anticipated costs of the Next Tier projects are \pm \$4.8 billion. The MPOs have projected the funding needing for transit through 2040. In order to meet the anticipated costs, the MPOs, in their Long Range Plans, have identified a financial plan that include a local option 1-cent sales tax dedicated to transit by 2040.

With the decrease in sales tax revenue due to the state of the economy and the bonding levels associated with the FrontLines 2015 program, UTA has limited financial ability to further invest in the Next Tier projects. The Utah Foundation published a report in February 2013 (Report Number 713: Fueling Our Future, 2013-2040: Policy Options to Address Utah's Future Transportation Needs) that outlined the following transit funding options:

- Sales tax increase of 0.25% (\$3.8 billion over the next 30 years)
- 1% increase in hotel taxes (\$139 million over the next 30 years)
- 1% increase in rental car tax (\$71 million over the next 30 years)
- Transit property tax of \$0.1 for counties in the UTA service area (\$5.8 billion over the next 30 years)

Next Steps

The Network Study provides many recommendations for the next capital and operating improvement project that UTA can implement. Many of the recommendations are being studied:

- Southwest Salt Lake County Transit Study
- Ogden Streetcar Transit Study
- Salt Lake Streetcar Alternatives Analysis
- Long Range Plan

These, and future projects will help meet the needs of the network, as identified in the Study. With the continued support of the Counties, Cities, and MPOs along the Wasatch Front, UTA will be able to advance these projects and meet the growing demands of the transit network.