WAV ON DEMAND PILOT
PROJECT ID: CEEN_2018CPST_015

by

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A Capstone Project 30% Completion Report

Submitted to

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Introduction

PROJECT TITLE: WAV ON DEMAND PILOT
PROJECT ID: CEEn_2018CPST_015
PROJECT SPONSOR: Utah Transit Authority
TEAM NAME: Enginuity

The BYU capstone team has assisted the UTA Innovative Mobility Solutions Office in providing an equal opportunities service known as Wheelchair Assessable Vehicle On-Demand Mobility Service. This document will describe in detail the background and project description, as contained in the request for proposal drafted by the BYU students. The results section includes the conclusions, processes, and assumption made by the students. They evaluated the pros and cons of the site selection, derived the cost analysis, estimated the total vehicle miles traveled, respectively. Following the results section, this document provides a project schedule, a lessons learned section and the conclusion. This document serves as the partial completion report for the CEEn 471A class and documents the work done by the BYU capstone team.

1- Background

To provide equal opportunity for all users in Salt Lake County, the UTA Innovative Mobility Solutions Office and Coordinated Mobility Department are exploring a public/private partnership which would pilot the introduction of wheel chair accessible vehicles (WAVs) into an on-demand ride-hailing network. Currently, there are no providers of on-demand WAVs in the UTA service area or on any TNC platform in the Greater Salt Lake Area.

The goal of this pilot is to test a new solution to paratransit mobility and to improve transit for disabled users. UTA aims to test the functionality of a WAV on-demand program, to understand the WAV ridership demand in Salt Lake County, to gain operational experience with an on-demand WAV service, and to accurately predict the costs associated with implementing this solution. If successful, the project team will work to identify future funding opportunities for expansion as part of future UTA innovative services.

2- Project Description

The WAV on-demand mobility pilot will run from March 1st to August 31st. UTA will provide four, non-branded 2017 Ford Transit vans with wheelchair lifts, where each vehicle seats six passengers. These vehicles will operate in conjunction with a carpool on-demand service to the entire public, prioritizing rides given to individuals needing wheelchair accessibility. The pilot will be limited to Salt Lake County (xxx sq. miles). The pilot is expected to operate 24-7, every day of the month. Hours of operation will be determined by drivers ~~hired~~ contracted by the TNC, and the vehicles will be leased from UTA at zero cost to the drivers. Drivers will be expected to meet the qualifications set by UTA and the TNC partner.

UTA Responsibilities

Vehicles

- UTA will provide the four, non-branded, 2017 Ford vans, which seats six passengers, and cover maintenance costs
- UTA will lease the vehicles at no cost to the TNC hired drivers

Drivers

- UTA will provide WAV drivers with proper training on vehicle operation, wheelchair lift operation, passenger securement, and all other applicable UTA training programs
- UTA will provide $100 fuel card to drivers, weekly

Marketing

- UTA will contribute to marketing efforts with the TNC partner

TNC Partner Responsibilities

Technology

- The application interface must include a WAV option
- Operation will be limited to the geofenced pilot zone (i.e. Salt Lake County)
- Priority must be given to WAV requests in the rider queue

Driver Management

- Drivers must be financially incentivized to maintain ideal hours of operation (four vehicles must be in operation during daytime hours)
- TNC partner is expected to maintain their standard responsibility for insurance, driver recruitment, driver training, and payment methods

Data and Measures of Effectiveness

UTA requests the following data and collaboration from the TNC partner to estimate operation costs more accurately and to more efficiently launch the service in September of 2019.

- Total number of WAV trip requests
- Wait time distribution of WAV users and their request location
- Total number of WAV trips provided, including their origins and destinations
- Total number of trips requested (per hour, per day, per month)
- Total number of trips provided (per hour, per day, per month)
- Total number of carpool trips with WAV rider and regular rider
- Origins and destinations of carpool trips with WAV users

With this data, UTA can better understand paratransit mobility within Salt Lake County including the WAV mobility demand, the proportion of paratransit riders, and a comparison to wheelchair ridership on public transit.

Marketing

- The TNC partner will be expected to contribute $20,000 to marketing efforts, in collaboration with marketing provided by UTA
- The TNC partner should explore "add code" promotions to focus the WAV user demand in more concentrated areas and to increase ridership

3- BYU Student Team Responsibilities (Until November 30th)

Site Selection – Identify the best locations for launching the pilot. Research key variables and available data, determine appropriate area size, and evaluate selection criteria.

Cost Analysis – Estimate the total monthly cost to run the pilot. Evaluate assumptions and determine a range of cost, and identify the most sensitive variables.

Vehicle Miles Traveled Estimate – Based on location data from buses that deploy the wheelchair ramp, estimate number of trips and total vehicle miles traveled (VMT) that can be assumed during the pilot. Clarify your assumptions.

Request for Proposal – Assist the UTA professionals in drafting a request for proposal. This document should explain clearly the background, project description, and partner responsibilities of the WAV project. This document will be used in the procurement process and in identifying a transportation network company (TNC) provider.

UTA On-Demand WAV Pilot Site Selection

Brigham Young University

The Brigham Young University (BYU) capstone team has identified six potential sites for UTA to test the on-demand wheelchair accessible vehicle (WAV) pilot. Of the six sites, **the BYU team recommends Site 2. South Salt Lake.** The most important factor in the pilot will be volume (i.e. number of pick-ups and drop-offs), and the main goals were to identify where the users are coming from and where they are going: trip productions and attractions. The data used in this analysis are displayed in Appendix A.

Using data from UTA Paratransit Services, the students selected the following six sites based on criteria that includes square mileage of the pilot area, number of addresses of eligible paratransit users, number of paratransit pick-ups/drop-offs (during the week of Sept. 17-21, 2018), and number of bus ramp activations within the month of August 2018 (see Table 1).

The team identified four static sites and two dynamic zones. Static sites are smaller and would assume that the four UTA WAVs are not connected and would not coordinate spacing. A dynamic zone covers a larger area and assumes the vehicles space themselves intelligently to cover more area and avoid "bunching".

A static site was selected based on the assumption that vehicles will not be connected (i.e. aware of spacing) and a smaller area will reduce user wait times.

- Site 1. Salt Lake City Downtown. 300 N to 900 S and 600 W to the U of U
- **Site 2. South Salt Lake. 1700 S to 4500 S and 300 W to 1300 E**
- Site 3. West Jordan. 6200 S to 9000 S and 4000 W to Redwood Rd.
- Site 4. Sandy. 8600 S to 10600 S and 500 W to Mt Jordan Rd.
- Dynamic Zone 1. Salt Lake City. 1700 N to I-80 and I-215 (north of I-80) to the U of U
- Dynamic Zone 2. Murray. I-80 to I-215 and I-15 to 1300 E

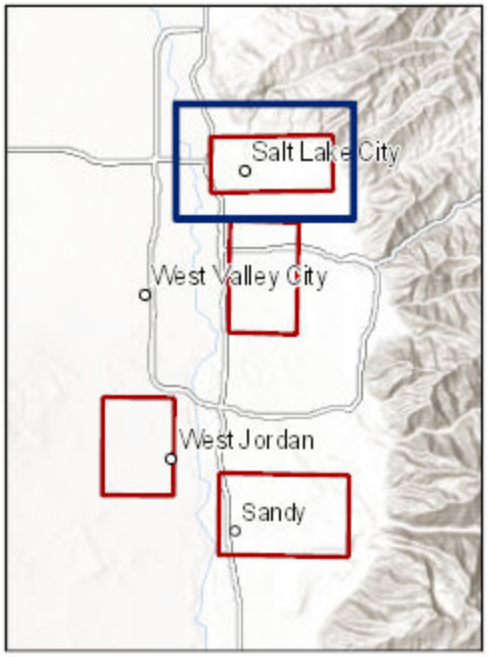
Table 1 Comparison of the Six Sites Based on Area, Travel Time, Number of Addresses, and Number of Pick-ups/Drop-offs

	Area (mi^2)	Travel Time (min)		Addresses	Pick-Ups	Bus Ramps
Static Sites		East-West	North-South			
SLC Downtown	9	30	18	178	94	3820
South Salt Lake	10.2	15	25	302	98	4883
West Jordan	9.5	15	15	267	74	450
Sandy	14.25	22	15	131	22	123
Dynamic Zones		East-West	North-South			
Salt Lake City	17	30	25	388	186	6669
Murray	16.25	25	25	338	79	4649

Site 1. Salt Lake City Downtown

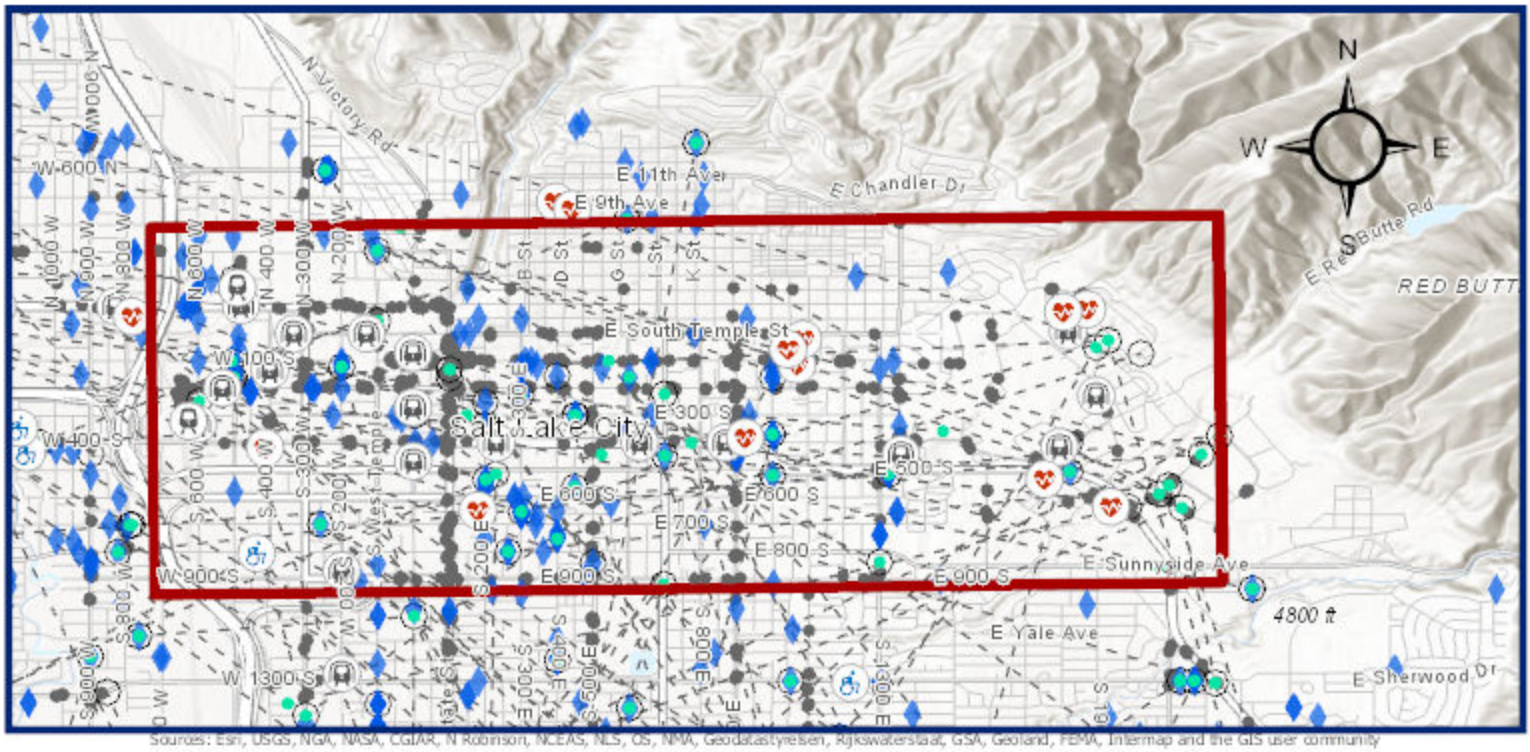
300 N to 900 S and 600 W to the U of U

- **Area:** 9 sq. miles
- **Eligible Paratransit Users:** 178 addresses
- **Paratransit Pick-Ups:** 94
- **Bus Ramp Activations:** 3820
- **Peak Hour Travel Time:** 30 min EW and 18 min NS



Pros: Dense wheelchair population and high usage, high variety of attractions.

Cons: Many trips enter/leave the area, high public transit accessibiltiy.



- Paratransit Drop-Offs
- Eligible Paratransit Users Address
- Paratransit Pick-Ups
- Paratransit Connections
- Bus Ramp Activations
- Day Programs
- Health Clinics
- LightRailStations_UTA
- Front Runner Stations
- Area

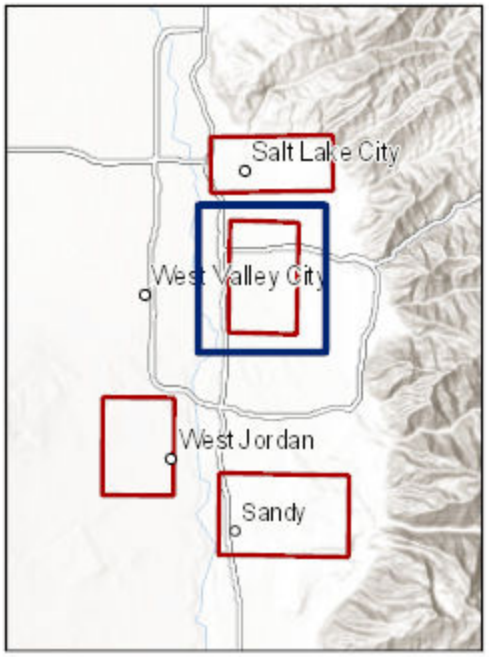
Site 2. South Salt Lake

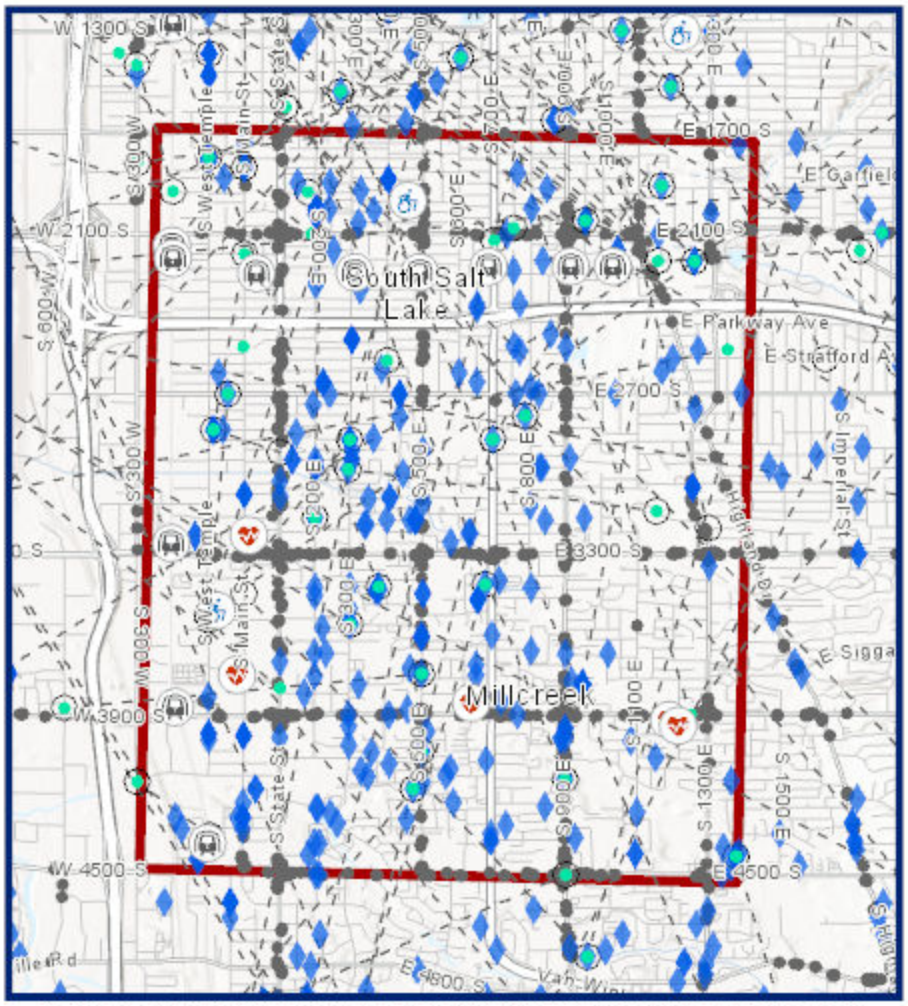
1700 S to 4500 S and 300 W to 1300 E

- **Area:** 10.2 sq. miles
- **Eligible Paratransit Users:** 302 addresses
- **Paratransit Pick-Ups:** 98
- **Bus Ramp Activations:** 4883
- **Peak Hour Travel Time:** 15 min EW and 25 min NS

Pros: Highest density of ramp activations and user addresses, public transit slightly less accessible.

Cons: Many trips enter/leave the area.





Sources: Esri, USGS, NGA, NASA, CGIAR, N Robinson, NCEAS, NLS, OS, NMA, Geodatastyrelsen, Rijkswaterstaat, GSA, Geoland, FEMA, Intermap and the GIS user community

- Paratransit Drop-Offs
- Eligible Paratransit Users Address
- Paratransit Pick-Ups
- Paratransit Connections
- Bus Ramp Activations
- Day Programs
- Health Clinics
- LightRailStations_UTA
- Front Runner Stations
- Area

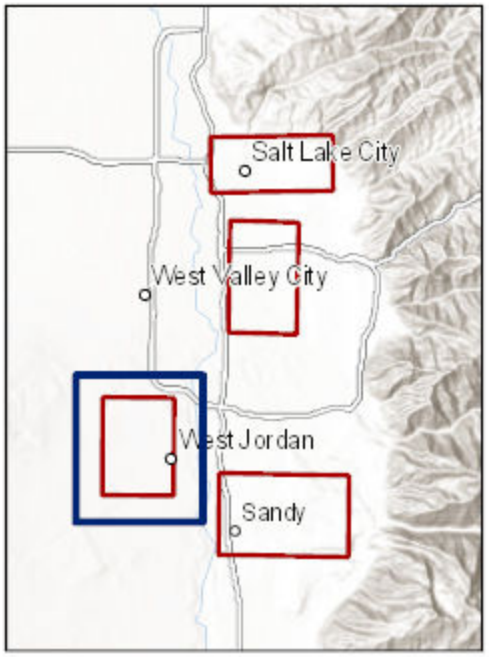
Site 3. West Jordan

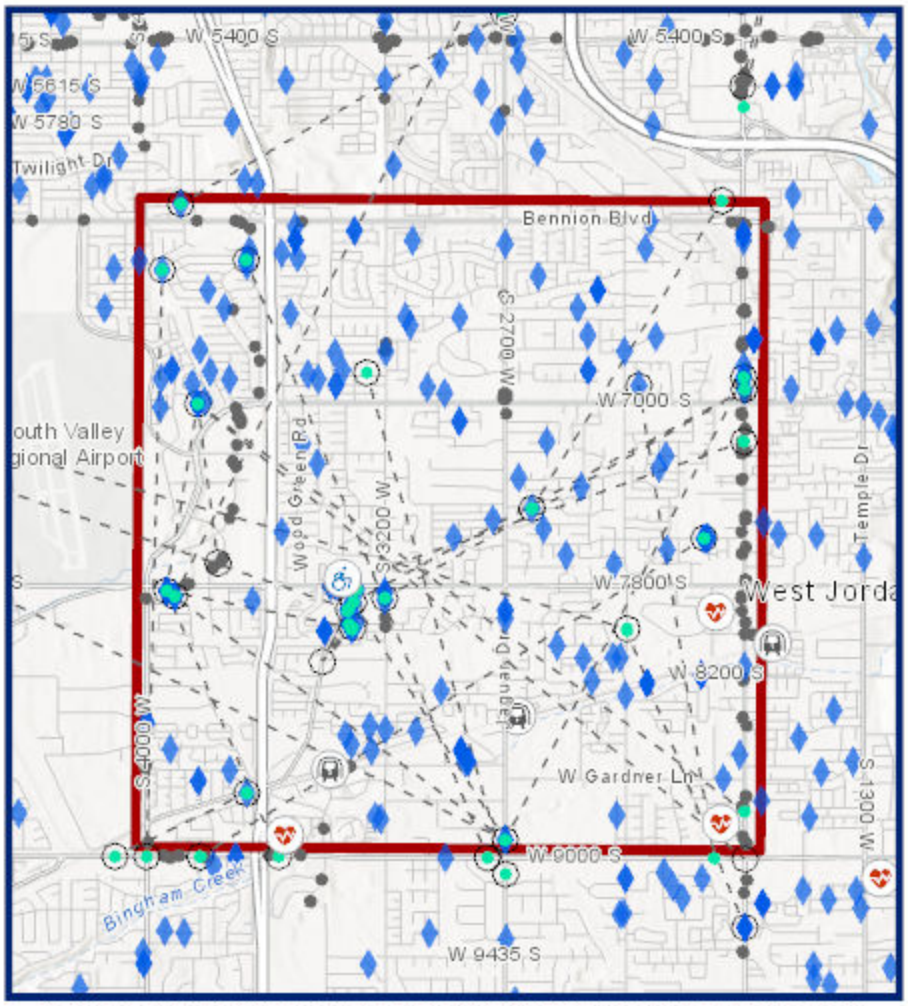
6200 S to 9000 S and 4000 W to Redwood Rd.

- **Area:** 9.5 sq. miles
- **Eligible Paratransit Users:** 267 addresses
- **Paratransit Pick-Ups:** 74
- **Bus Ramp Activations:** 450
- **Peak Hour Travel Time:** 15 min EW and 15 min NS

Pros: Most paratransit trips were contained within site, lower transit accessibility.

Cons: Lower paratransit demand.





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- Paratransit Drop-Offs
- Eligible Paratransit Users Address
- Paratransit Pick-Ups
- Paratransit Connections
- Bus Ramp Activations
- Day Programs
- Health Clinics
- LightRailStations_UTA
- Front Runner Stations
- Area

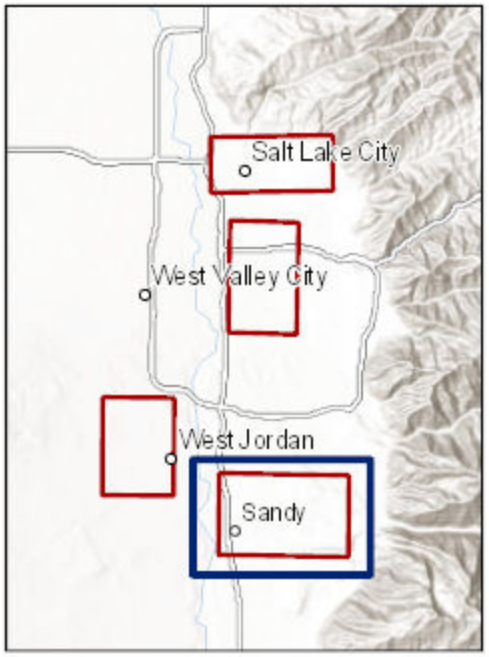
Site 4. Sandy

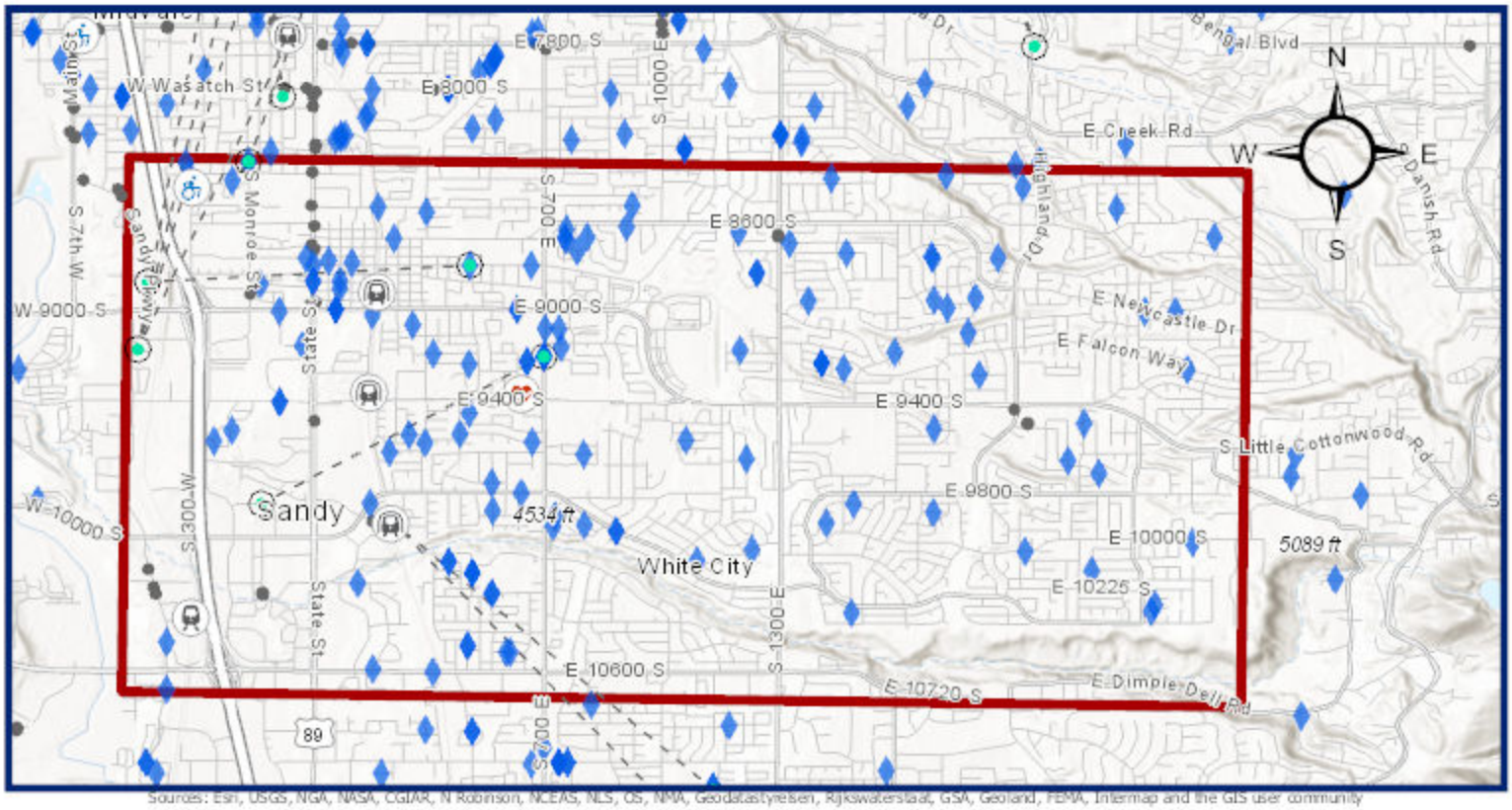
8600 S to 10600 S and 500 W to Mt. Jordan Rd.

- **Area:** 14.3 sq. miles
- **Eligible Paratransit Users:** 131 addresses
- **Paratransit Pick-Ups:** 22
- **Bus Ramp Activations:** 123
- **Peak Hour Travel Time:** 22 min EW and 15 min NS

Pros: Lowest area of transit accessibility.

Cons: Lowest paratransit demand, fewest addresses.





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- Paratransit Drop-Offs
- Eligible Paratransit Users Address
- Paratransit Pick-Ups
- Paratransit Connections
- Bus Ramp Activations
- Day Programs
- Health Clinics
- LightRailStations_UTA
- Front Runner Stations
- Area

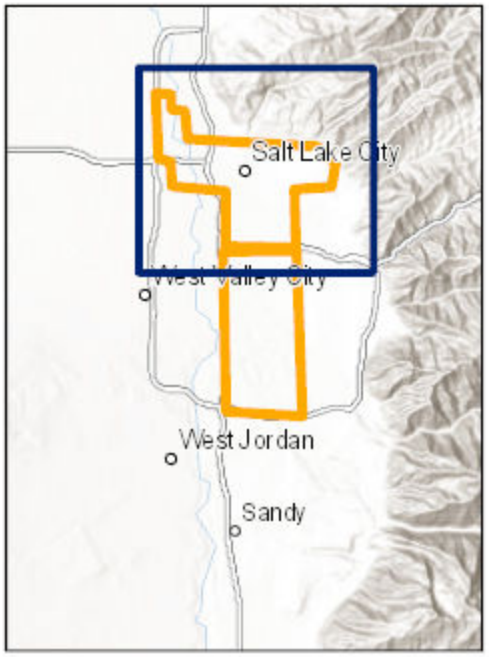
Dynamic Zone 1. Salt Lake City

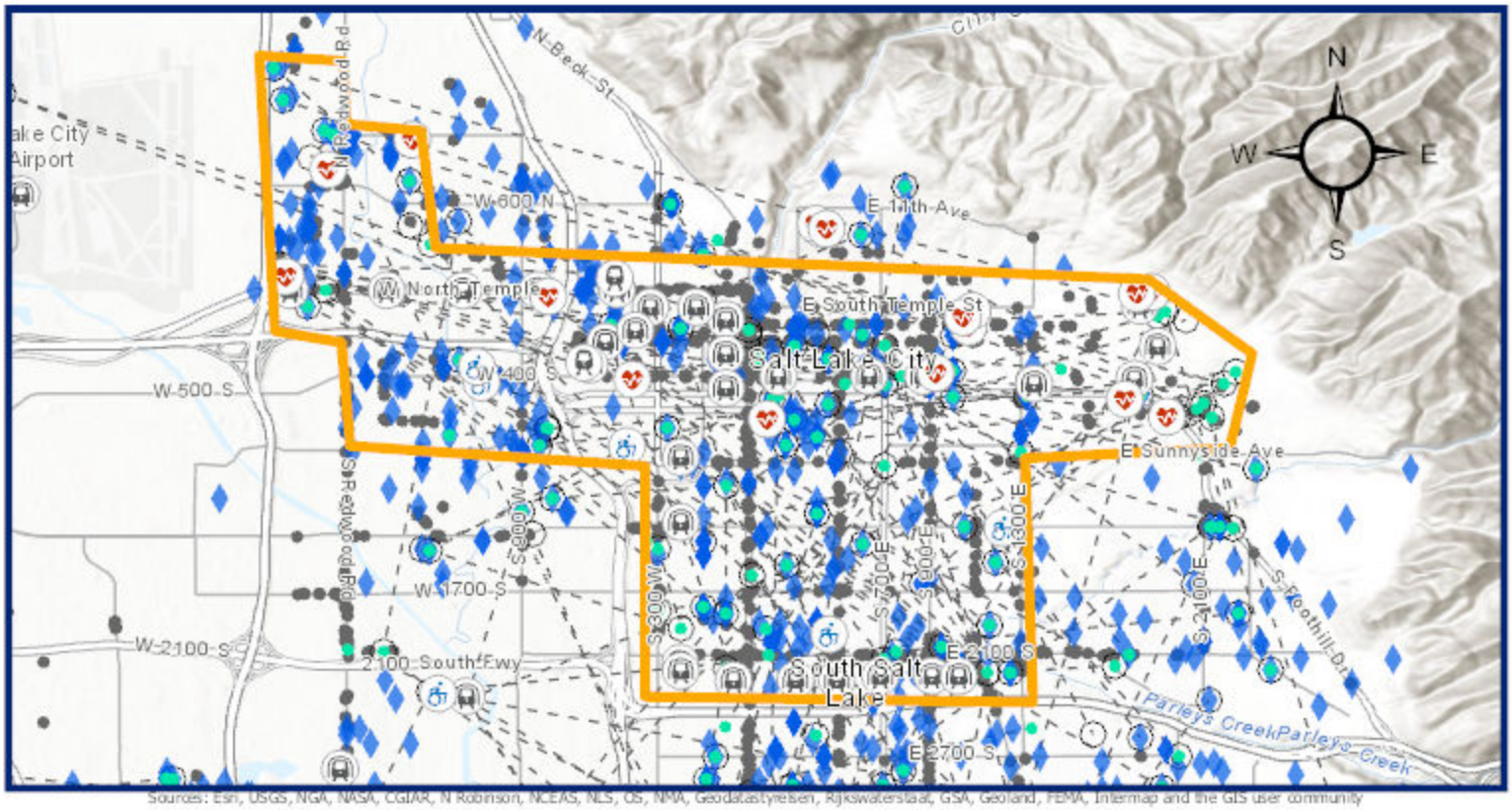
1700 N to I-80 and I-215 to the U of U

- **Area:** 17 sq. miles
- **Eligible Paratransit Users:** 388 addresses
- **Paratransit Pick-Ups:** 186
- **Bus Ramp Activations:** 6669
- **Peak Hour Travel Time:** 30 min EW and 25 min NS

Pros: Higher known demand, more intrazonal trips.

Cons: High transit accessibility, longer wait times.





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- Paratransit Drop-Offs
- Eligible Paratransit Users Address
- Paratransit Pick-Ups
- Paratransit Connections
- Bus Ramp Activations
- Day Programs
- Health Clinics
- LightRailStations_UTA
- Front Runner Stations
- Zone1

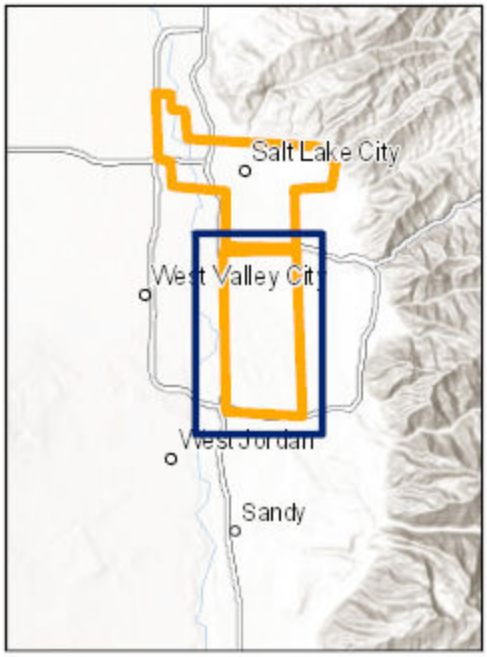
Dynamic Zone 2. Murray

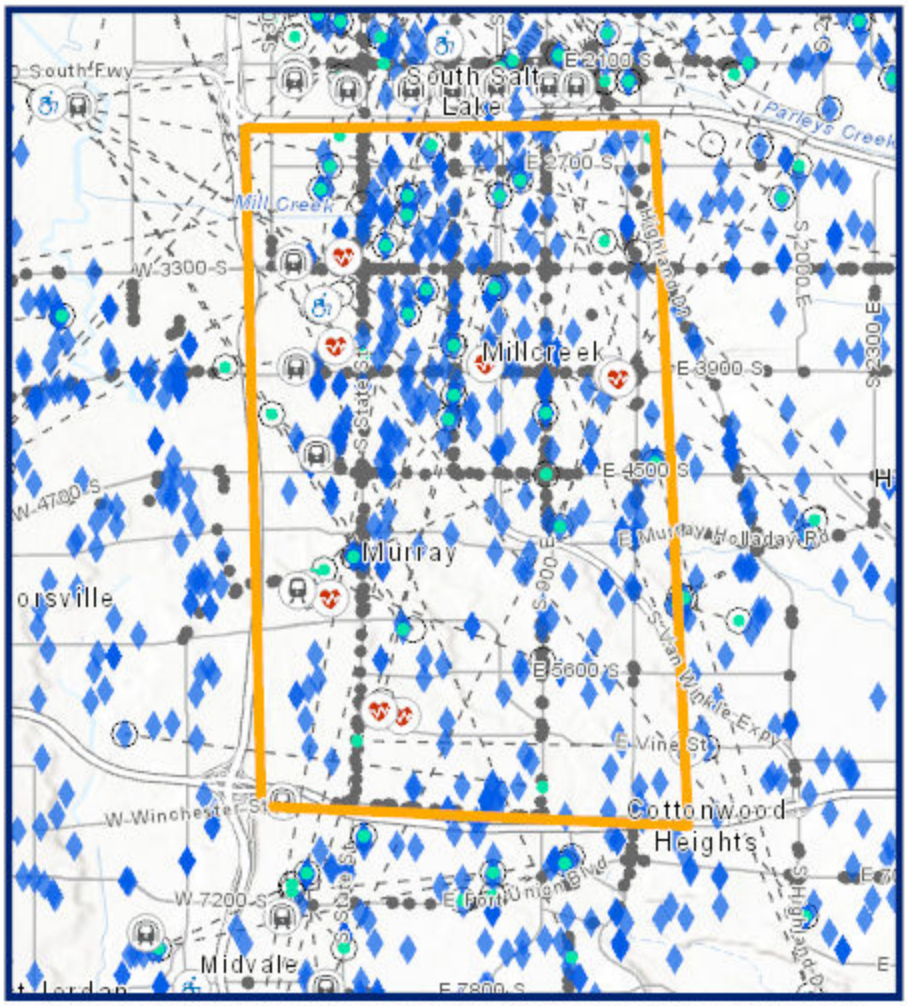
I-80 to I-215 and I-15 to 1300 E

- **Area:** 16.3 sq. miles
- **Eligible Paratransit Users:** 338 addresses
- **Paratransit Pick-Ups:** 79
- **Bus Ramp Activations:** 4649
- **Peak Hour Travel Time:** 25 min EW and 25 min NS

Pros: Higher known demand, more intrazonal trips, first/last mile alternative.

Cons: High transit accessibility, longer WAV wait times.





- Paratransit Drop-Offs
- Eligible Paratransit Users Address
- Paratransit Pick-Ups
- Paratransit Connections
- Bus Ramp Activations
- Day Programs
- Health Clinics
- LightRailStations_UTA
- Front Runner Stations
- Zone2

Appendix A

Data and Analysis

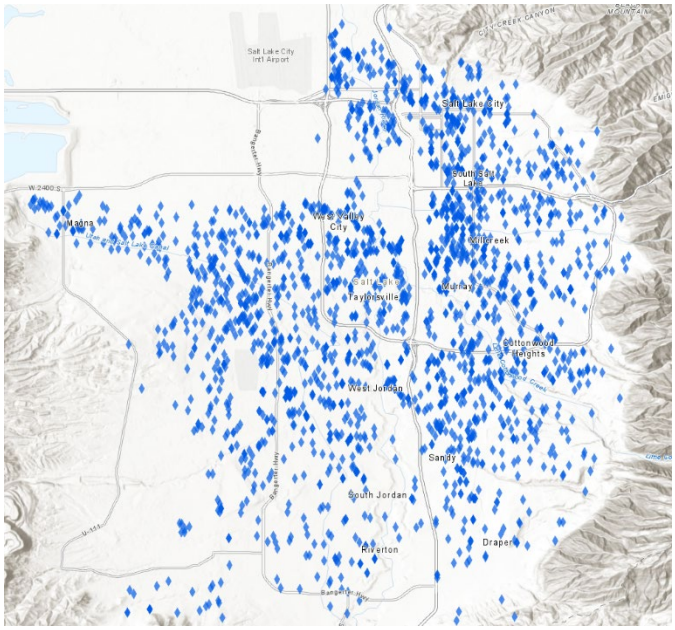


Figure 1 Addresses of qualified applicants for paratransit services (2,564 total). This data does not account for the unknown amount of wheelchair users that did not qualify for paratransit.

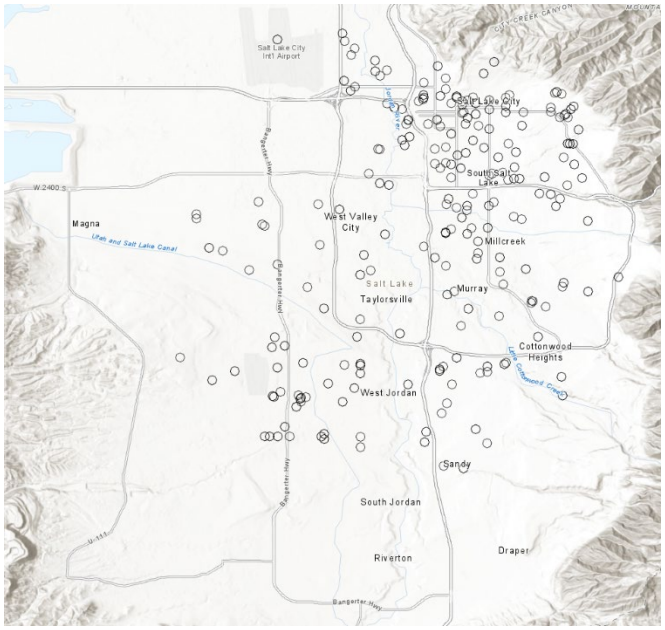


Figure 2 Locations of paratransit pick-ups from September 17-21, 2018 (554 total). Note that users must request a ride at least 24 hours in advance.

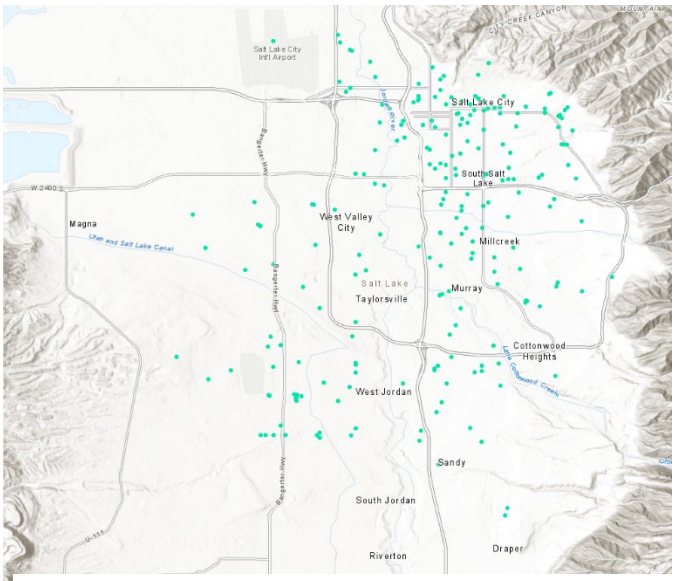


Figure 3 Locations of paratransit drop-offs ups from September 17-21, 2018 (554 total). Drop-offs occur within ¾ mile of route.

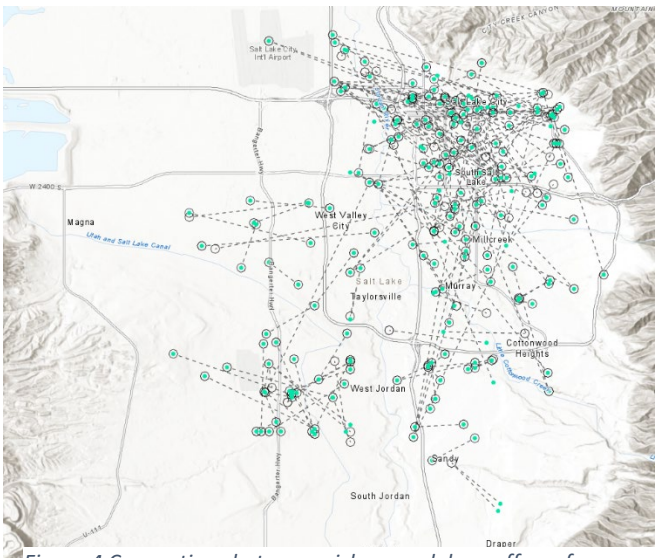


Figure 4 Connections between pick-up and drop-off ups from September 17-21, 2018. This data is highly correlated with routes that require more than one bus transfer.

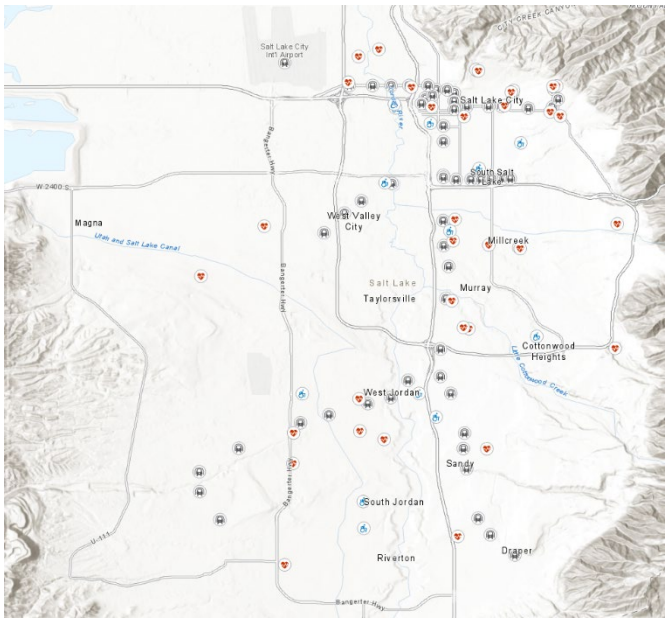


*Figure 5 Potential attractions including day programs (13), medical clinics (42), and commuter rail stations. **This data set does NOT include all day programs or medical clinics in the county. Other attractions discussed but not shown include grocery stores, shopping centers, restaurant, movie theaters, and other forms of entertainment.*

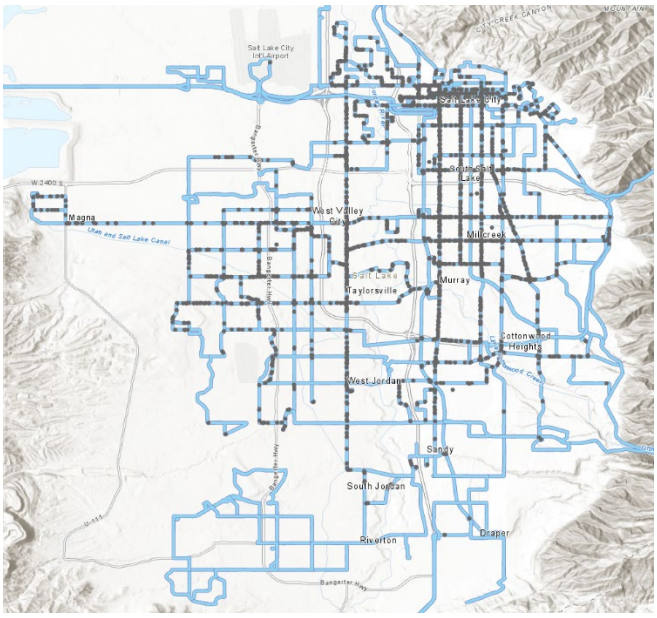


Figure 6 Bus routes and locations of ramp access activations from buses during the month of August 2018 (17,853 total). Note that every wheelchair user is to be properly strapped into the bus by the driver.

UTA On-Demand WAV Cost Analysis

Brigham Young University

The Brigham Young University (BYU) capstone team calculated the total monthly cost to operate four wheelchair accessible vehicles for 10 hours per day for 31 days to be between **$9,000 and $11,200**, as shown in Table 1. **This value assumes that cost of labor is $0/hour**. This assumption is sensitive to the variables held constant (i.e. insurance, depreciation, gas price and maintenance costs) and compares monthly cost based on vehicle miles traveled (VMT). This price can be reduced by changing number of hours and days of operation. Further cost comparisons are shown in Appendix B.

Table 1 Calculation of Monthly Cost Comparing VMT

Variable	Min Value	Max Value	
Number of Vans	4	4	
Wage (per driver per hour)	$ -	$ -	
Hours of Operation (per day)	10	10	
Days of Operation (per month)	31	31	
Insurance (per month)	$ 1,200.00	$ 1,200.00	
Maintenance (per mile)	$ 0.09	$ 0.09	
Vehicle Miles Traveled (VMT) (per van per day)	25	75	
MPG	15	15	
Gas Price	$ 3.50	$ 3.50	
Depreciation (per month)	$ 855.00	$ 855.00	
Cost of Operation	$ 2.97	$ 1.20	Per mile
	$ 296.99	$ 360.66	Per day
	$ 2,301.71	$ 2,795.13	Per week
	$ 9,206.83	$ 11,180.50	Per month
	$ 2,301.71	$ 2,795.13	Per van per month

The team used the following equation to estimate total monthly cost. From this equation the team calculated the derivative with respect to each variable to measure the sensitivity of each variable (see Appendix A and B).

$$Total\ Monthly\ Cost = \#vans * [\frac{fuel\ cost}{month} + \frac{insurance\ cost}{month} + \frac{maintenance\ cost}{month} + \frac{labor\ cost}{month} + \frac{depreciation\ cost}{month}]$$

The *BYU Cost Analysis Final* spreadsheet is a tool built to analyze monthly cost based on changes in assumptions of several variables. As multiple variables are uncertain, *BYU Cost Analysis Final* provides an adaptive solution to accurately estimate price as data becomes more available (i.e. variance in gas price, ridership demand, wage, and hours and days of operation).

The estimate used for vehicle miles traveled (VMT) was NOT calculated mathematically. A travel demand estimate is still to be done by the BYU student team; this will provide more accurate estimates of VMT. However, the above range is sufficiently broad to cover a minimum and maximum VMT.

Appendix A

Equations and Derivatives

Variables

$\#vans =$ number of wheelchair accessible vehicles in operation

$VMT =$ number of vehicle miles traveled per van per day

$\$gas =$ price of gas per gallon

$\#days =$ number of days of operation per month

$MPG =$ miles per gallon of wheelchair accessible vehicle

$\$insurance =$ fixed monthly cost of insurance per vehicle

$\$maintenance/_{mile} =$ fixed cost of maintenance per vehicle per mile

$wage =$ hourly wage paid to driver

$\#hours =$ number of hours of operation per day

$\$depreciation =$ fixed monthly cost of depreciation per vehicle

General Equations

$$Total\ Monthly\ Cost = \#vans * [\frac{fuel\ cost}{month} + \frac{insurance\ cost}{month} + \frac{maintenance\ cost}{month} + \frac{labor\ cost}{month} + \frac{depreciation\ cost}{month}]$$

$$\frac{fuel\ cost}{month} = \frac{VMT * \$gas * \#days}{MPG}$$

$$\frac{insurance\ cost}{month} = \frac{\$insurance}{month}$$

$$\frac{maintenance\ cost}{month} = \frac{\$maintenance/_{mile} * VMT * \#days}{month}$$

$$\frac{labor\ cost}{month} = \frac{wage * \#hours/_{day} * \#days}{month}$$

$$\frac{depreciation\ cost}{month} = \frac{\$depreciation}{month}$$

Final Equation

$$MC = \left[\frac{VMT * \$gas * \#days * \#vans}{MPG}\right] + (\ \$insuarance * \#vans\ ) + \left[\frac{\$maintenance}{mile} * VMT * \#days * \#vans\right] +$$

$$(\ wage * \#hours/_{day} * \#days * \#vans\ ) + (\ \$depreciation * \#vans\ )$$

Derivatives

$$\frac{\partial\, MC}{\partial\, \#vans} = \left[\frac{VMT * \$gas * \#days}{MPG}\right] + \$insurance + \left[\frac{\$maintenance}{mile} * VMT * \#days\right] + wage * {}^{\#hours}/_{day} * \#days + (\$depreciation)$$

$$\frac{\partial\, MC}{\partial\, wage} = \#hours * \#days * \#vans$$

$$\frac{\partial\, MC}{\partial\, \#hours} = wage * \#days * \#vans$$

$$\frac{\partial\, MC}{\partial\, \#days} = \left[\frac{VMT * \$gas * \#vans}{MPG}\right] + \left[\frac{\$maintenance}{mile} * VMT * \#vans\right] + wage * {}^{\#hours}/_{day} * \#vans$$

$$\frac{\partial\, MC}{\partial\, \$insurance} = \#vans$$

$$\frac{\partial\, MC}{\partial\, \$maintenance} = VMT * \#days * \#vans$$

$$\frac{\partial\, MC}{\partial\, \$depreciation} = \#vans$$

$$\frac{\partial\, MC}{\partial\, VMT} = \left[\frac{\#days * \$gas * \#vans}{MPG}\right] + \left[\frac{\$maintenance}{mile} * \#days * \#vans\right]$$

$$\frac{\partial\, MC}{\partial\, \$gas} = \left[\frac{\#days * VMT * \#vans}{MPG}\right]$$

$$\frac{\partial\, MC}{\partial\, MPG} = -\frac{VMT * \$gas * \#days * \#vans}{MPG^2}$$

Appendix B

Comparisons and Examples

Table 2 compares the change in cost based on VMT.

Table 2 Comparison of Monthly Cost Based on VMT

Variable	Min Value	Max Value	
Number of Vans	4	4	
Wage (per driver per hour)	$ -	$ -	
Hours of Operation (per day)	10	10	
Days of Operation (per month)	31	31	
Insurance (per month)	$ 1,200.00	$ 1,200.00	
Maintenance (per mile)	$ 0.09	$ 0.09	
Vehicle Miles Traveled (VMT) (per van per day)	25	75	
MPG	15	15	
Gas Price	$ 3.50	$ 3.50	
Depreciation (per month)	$ 855.00	$ 855.00	
Cost of Operation	$ 2.97	$ 1.20	Per mile
	$ 296.99	$ 360.66	Per day
	$ 2,301.71	$ 2,795.13	Per week
	$ 9,206.83	$ 11,180.50	Per month
	$ 2,301.71	$ 2,795.13	Per van per month

Table 3 compares change in cost based on wages, holding everything else constant (assumes $40/hour wage based on UTA standards given).

Table 3 Comparison of Monthly Cost Based on Wages

Variable	Min Value	Max Value	
Number of Vans	4	4	
Wage (per driver per hour)	$ -	$ 40.00	
Hours of Operation (per day)	10	10	
Days of Operation (per month)	31	31	
Insurance (per month)	$ 1,200.00	$ 1,200.00	
Maintenance (per mile)	$ 0.09	$ 0.09	
Vehicle Miles Traveled (VMT) (per van per day)	40	40	
MPG	15	15	
Gas Price	$ 3.50	$ 3.50	
Depreciation (per month)	$ 855.00	$ 855.00	
Cost of Operation	$ 1.98	$ 11.98	Per mile
	$ 316.09	$ 1,916.09	Per day
	$ 2,449.73	$ 14,849.73	Per week
	$ 9,798.93	$ 59,398.93	Per month
	$ 2,449.73	$ 14,849.73	Per van per month

Differently from Table 2 and Table 3, Table 4 reduces the daily and days hours of operations per month and compares change in cost based on number of vans.

Table 4 Comparison of Monthly Cost Based on Number of Vans with Reduced Hours and Days of Operation

Variable	Min Value	Max Value	
Number of Vans	2	4	
Wage (per driver per hour)	$ -	$ -	
Hours of Operation (per day)	5	5	
Days of Operation (per month)	20	20	
Insurance (per month)	$ 1,200.00	$ 1,200.00	
Maintenance (per mile)	$ 0.09	$ 0.09	
Vehicle Miles Traveled (VMT) (per van per day)	40	40	
MPG	15	15	
Gas Price	$ 3.50	$ 3.50	
Depreciation (per month)	$ 855.00	$ 855.00	
Cost of Operation	$ 2.89	$ 2.89	Per mile
	$ 230.97	$ 461.93	Per day
	$ 1,154.83	$ 2,309.67	Per week
	$ 4,619.33	$ 9,238.67	Per month
	$ 2,309.67	$ 2,309.67	Per van per month

Table 5 is the table of derivatives and shows the changes in monthly cost with respect to each variable. It calculates the slopes associated with the values from Table 4. The slope shows the amount of change in dollars per unit (i.e. maintenance slope represents the change in monthly cost increased for every dollar per mile increase, wage slope represents the change in monthly cost for every dollar per hour increase, and VMT slope represents change in monthly price for every additional mile traveled per van per day). The steeper the slope of the variable, the more influence it has on the final monthly cost.

Table 5 Calculated Values of Derivatives of Monthly Cost with Respect to Each Variable

Variable	Slope (dollar per change in variable unit)	
	Min	Max
Number of Vans	2309.67	2309.67
Maintenance	1600.00	3200.00
Hours of Operation	0.00	0.00
Wage (Driver Rate)	200.00	400.00
Days of Operation	25.47	50.93
Gas Price	106.67	213.33
VMT	12.73	25.47
Insurance	2.00	4.00
Depreciation	2.00	4.00
MPG (negative)	24.89	49.78

UTA On-Demand WAV Demand Prediction (VMT)

Brigham Young University

The Brigham Young University (BYU) capstone team estimated that the demand in vehicle miles traveled (VMT) should be at most **70 miles per day**, as shown in Table 1 (according to the specified assumptions). These results are based on the number of activations from bus ramps during the month of August and only include wheelchair users (not regular public using the service).

The team used the following equation and following assumptions to determine these results. Each variable in the equation has a high level of uncertainty.

$$VMT = (\#\ of\ trips) * (avg.trip\ distance) * (usage\ factor)$$

Table 1 Vehicle Miles Traveled in Each Site

Site	Bus Ramp Activations	# of Trips	Avg. Trip Distance (miles)	Usage Factor	VMT (per month)	VMT (per day)
SLC Downtown	3820	1910	2.06	0.2	785.01	26.17
South Salt Lake	4883	2442	2.56	0.2	1250.05	41.67
West Jordan	450	225	2.36	0.2	106.09	3.54
Sandy	123	62	2.73	0.2	33.58	1.12
Salt Lake City	6669	3335	3.14	0.2	2095.73	69.86
Murray	4649	2325	2.56	0.2	1190.14	39.67

Number of Trips

The total number of trips (in this analysis) is limited to wheelchair users that currently take the bus. We assume that the main population piloting the on-demand service will be those who currently use the bus system. According to the number of bus ramp activation provided by UTA, we assume that two activations equals one trip in each area.

Average Trip Distance

Average trip distance is an average of four arbitrary, conservative trip lengths selected in the site.

Usage Factor

Usage factor is the percentage of users that will use the on-demand service instead of public transit. This value varies from 6% to 20%. We assume that on-demand ridership in Salt Lake would be below average, and that paratransit demand would be even lower. But to show conservative results we used 20% (http://prospect.org/article/ridesharing-versus-public-transit).

VMT (per day)

The total vehicle miles traveled in one day is independent of number of vans. This is the total demand estimated per day.

Schedule

1. Service zone map & hours – Map and GPS coordinates for a geofenced service zone within Salt Lake County. Analyze data to estimate customer demand, determine optimal service zone, and days and hours of operation. Presented to Client: October 23, 2018 .

2. Cost estimate spreadsheet – These are the costs to UTA in order to run the pilot. Costs analyzed included, but were not limited to, vehicle maintenance, depreciation, fuel costs, and insurance. Costs were estimated as per vehicle per mile and total estimated cost per month. Presented to Client: November 19, 2018.

3. Service plan report and request for proposal – Report outlining how the pilot could launch, operate, and be measured. UTA plans to incorporate elements of the service plan report into the Partner procurement process. Propose a timeline to launch and prerequisites to launch. Recommend key performance metrics and how they could be tracked. Recommend optimal configuration for the vehicle's wheelchair area and passenger seats. Identify marketing and communication needs, strategies to meet those needs, planned stakeholder outreach, and estimated marketing budget. Describe potential risks and mitigation options. Describe driver training plan, vehicle maintenance plan and insurance needs. This information will then be incorporated into a Request for Proposal (RFP) that will be sent out to potential partners upon completion. The RFP will also define the responsibilities of UTA versus those of the partner, as well as the proposed manner in which UTA and the partner would work together during the pilot. First Draft Given to Client: December 7, 2018.

4. Service plan presentation – PowerPoint or other presentation format for UTA executives. Target date: November 30, 2018.

5. Cost audit spreadsheet – Measure and report on actual costs. Target date: May 1, 2019 or two months after pilot launch. If costs are higher than estimated, suggest cost reduction options.

6. Service audit report – Monitor and report on actual performance to key performance metrics. Target date: May 1, 2019 or two months after pilot launch. Where performance is lower than expected, suggest options to improve. Are there enough vehicles? Are these the right vehicles? Recommend continuous improvements based on lessons learned.

Lessons Learned

Everything went fairly smooth working through this project during the semester. As a team we were able to work together and hit goals and milestones set by our sponsor. One thing we could clearly see as being a struggle, was the simple fact that a lot of what we had to work off of was speculation. There were minimal avenues of concrete data for us to use with this project, and because of that, there was an overwhelming amount of data that was available to us to analyze. In the beginning, made the task seem extremely daunting and almost impossible as we continually found more variables in our situation with every new piece of data we looked at. An important lesson learned from this however, was how to analyze and decide what is most important for the overall project.

As a team we were able to look at a list of variables and determine which things we felt mattered most. Once a list of variables were determined we focused primarily on those items, and then left the rest alone. We knew that focusing on the important variables was the best that we could do, and that we would be able to continue analyzing and modifying our recommendations as we deemed necessary once the project actually got started.

Overall the main lesson learned so far is, when working on something brand new with large amounts of uncertainty, it is ok to not be 100% sure what the outcome will be. Also, there will have to be changes and adjustments made as the project moves along. Being flexible and not focused on everything going as planed is key in having success and maintaining a positive attitude.

Conclusions

The BYU capstone team assisted the UTA Innovative Mobility Solutions Office in building a partnership to provide an on-demand, wheelchair accessible vehicle service, in partnership with a transportation network company (i.e. Uber or Lyft). The students were responsible for site selection, cost analysis, vehicle miles traveled estimation, and a draft of the Request for Proposal. In their analysis, the students identified pros and cons to six major sites in the Salt Lake area, calculate the monthly cost to be between $9,000 and $11,200, and estimated the VMT to be at most 70 miles per day. These conclusions were based off of the assumptions stated in the report (i.e. variance in gas price, ridership demand, wage, and hours and days of operation) and off of the data provided by UTA.