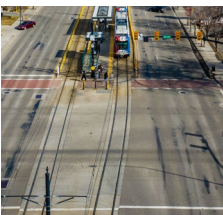
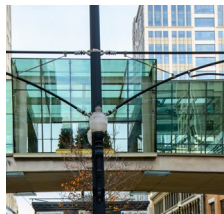
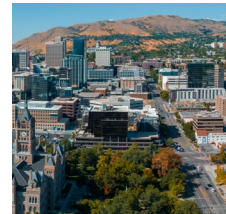
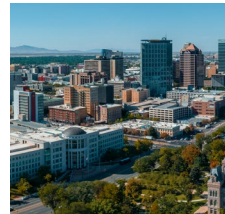
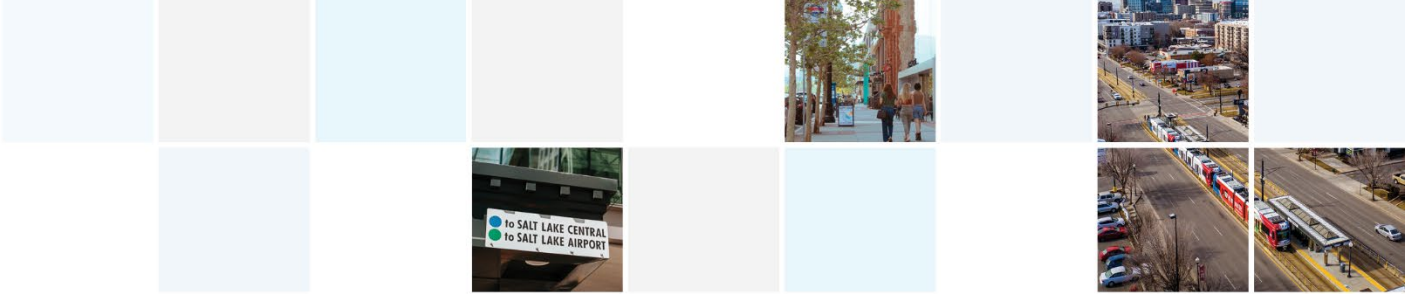




APPENDIX G: ALTERNATIVES EVALUATION REPORT





TechLink TRAX Study

Alternatives Evaluation Report

November 2024

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- Attachment G1: FTA STOPS Model Report
- Attachment G2: Rail Operations Simulations Findings Memorandum
- Attachment G3: Economic Opportunity Memorandum
- Attachment G4: Equity Analysis Memorandum
- Attachment G5: Opinion of Probable Cost Report



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List of Acronyms

CIG	Capital Investment Grant
FTA	Federal Transit Administration
HH	Households
LRT	Light Rail Transit
LRV	Light Rail Vehicle
MOW	Maintenance-of-Way
MPO	Metropolitan Planning Organization
NEPA	National Environmental Policy Act
O&M	Operations and Maintenance
RDA	Redevelopment Agency of Salt Lake City
SLC	Salt Lake City
ROW	Right-of-Way
STOPS	Simplified Trips-on-Project Software
UDOT	Utah Department of Transportation
UTA	Utah Transit Authority
WFRC	Wasatch Front Regional Council



1 Introduction

1.1 Overview

The Utah Transit Authority (UTA) in collaboration with Salt Lake City (SLC), the Redevelopment Agency of Salt Lake City (RDA), University of Utah, Wasatch Front Regional Council (WFRC), and Utah Department of Transportation (UDOT) has initiated the TechLink TRAX Study to analyze an additional light rail (TRAX) service between the Salt Lake City International Airport and the University of Utah, including potential new service into Research Park and the Granary District south of downtown Salt Lake City connecting into the Ballpark Station. The analysis will also include potential operational changes with the existing Blue and Green TRAX Lines termini.

1.1.1 Study Goals

The goals of the TechLink TRAX Study are to:

- Develop and evaluate transit improvements that provide connections between key areas of growth and development and support partner agencies to meet their transit, land use, and economic development goals.
- Recommend strategies that improve connections and capacity in response to future growth.
- Select a Locally Preferred Alternative that can seamlessly transition to a National Environmental Policy Act (NEPA) study.
- Provide a transparent and collaborative process between study partners and stakeholders.
- Thoughtfully incorporate equity and sustainability in the planning and public engagement process and develop recommendations that enhance transportation accessibility and equity.

1.2 Study Area

The TechLink study area extends from the Salt Lake City International Airport on the west side of Salt Lake City through the downtown area and east into the University of Utah (Figure 1). This study will focus on the implementation of additional light rail transit (LRT) services utilizing existing infrastructure, providing a more direct connection between these two destinations. The study will also evaluate new light rail infrastructure through a new rail extension south into the Granary District neighborhood and eventually connecting to the existing Ballpark TRAX Station as well as a new spur into Research Park.

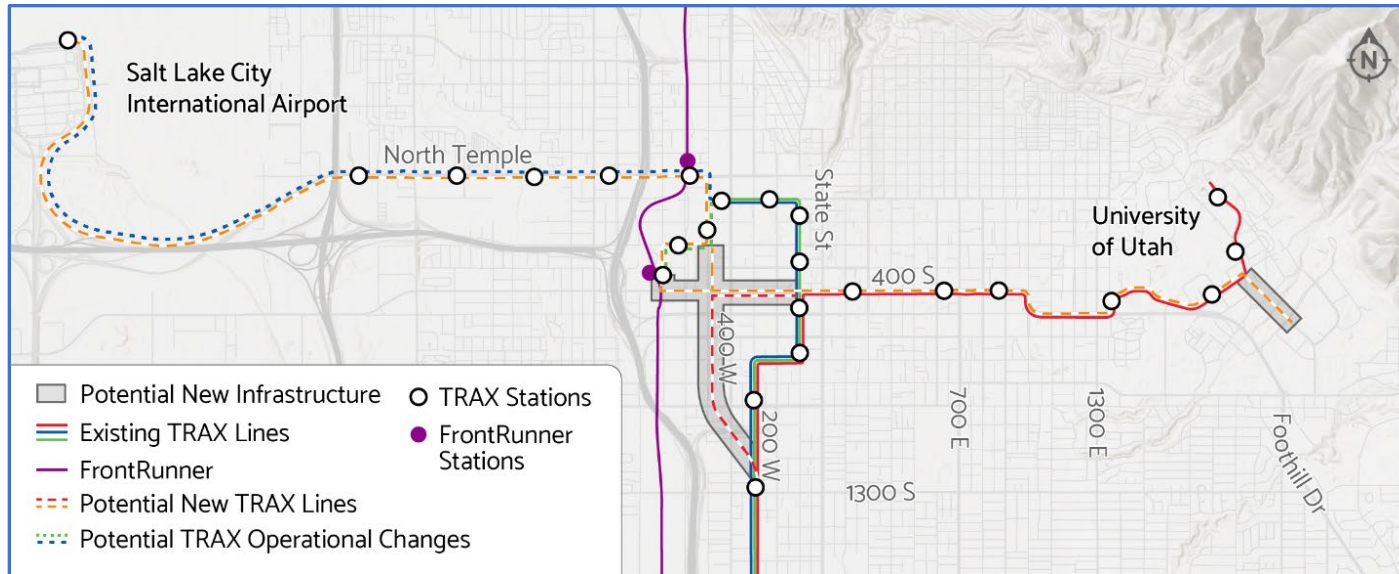


Figure 1. TechLink TRAX Study Area

1.3 Report Purpose

This report documents the findings from the alternatives evaluation process to guide the selection of the Locally Preferred Alternative. The purpose of the alternatives evaluation is to understand the tradeoffs between each alternative and how well each alternative meets the project's Purpose and Need.

This report describes:

- The evaluation process, alternatives considered, and criteria used (Section 2)
- Findings from the alternatives evaluation, including summary and detailed information (Section 3)
- The technical recommendation based on the alternatives evaluation (Section 4)



2 Evaluation Process and Criteria

2.1 Process

Due to the extensive work that was previously completed from the Salt Lake City Downtown Streetcar Alternatives Analysis (2014), Downtown Salt Lake City Rail Extension & Connections Feasibility Study (2021), Research Park Strategic Vision Plan (2021), and Future of Light Rail Strategic Plan (2023), a substantial amount of qualitative and quantitative information had previously been collected. This study builds on that previous work and therefore used a single-step process for the alternatives evaluation process. The purpose of the alternatives evaluation was to obtain more detailed and quantitative data to compare alternatives and ultimately inform a decision on the Locally Preferred Alternative.

2.2 Alternatives Considered

Four alternatives were evaluated during the alternatives screening process. Figure 2 through Figure 5 depict these alternatives and the key features of each.

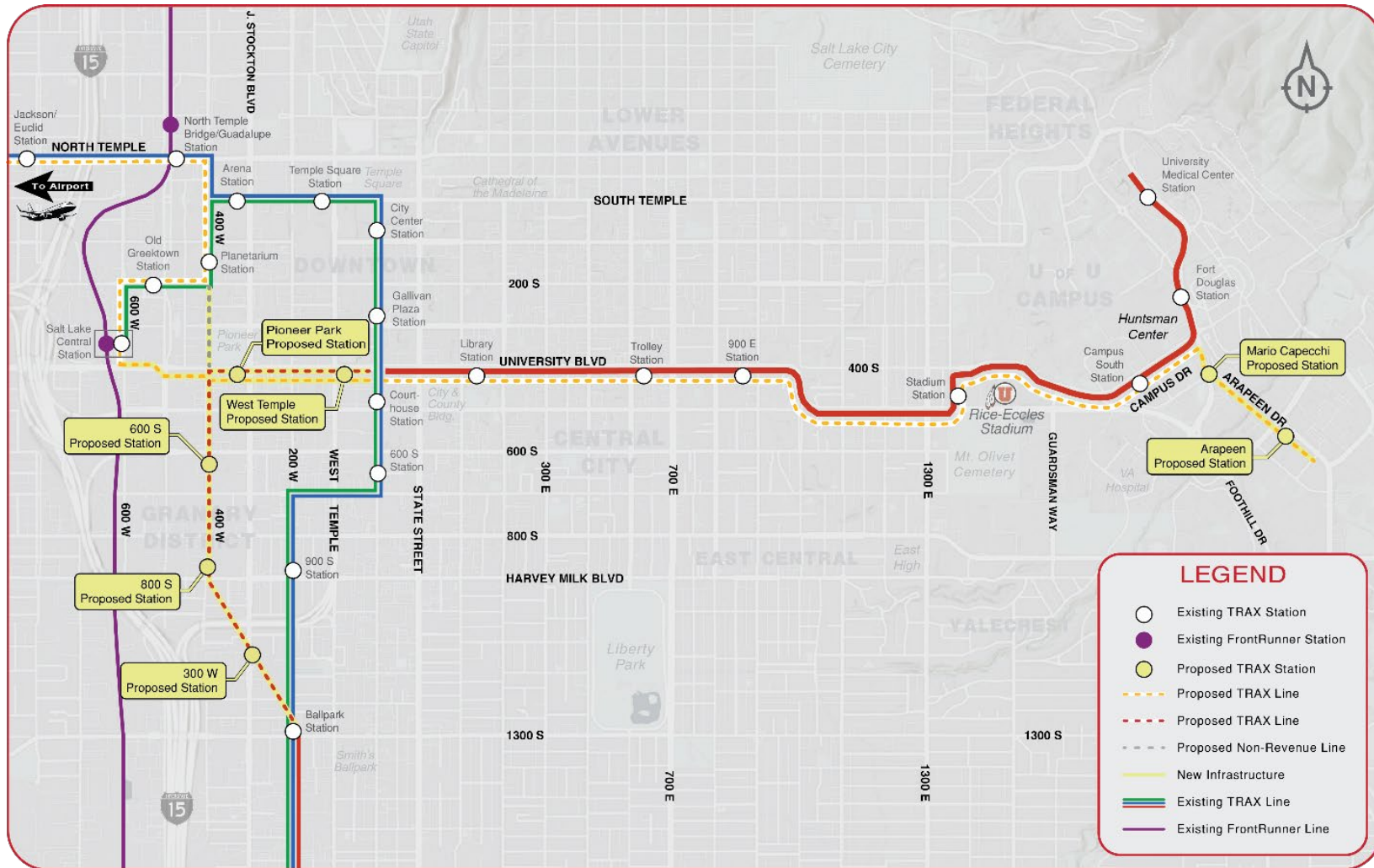


Figure 2. Alternative 1 - Future of Light Rail Baseline

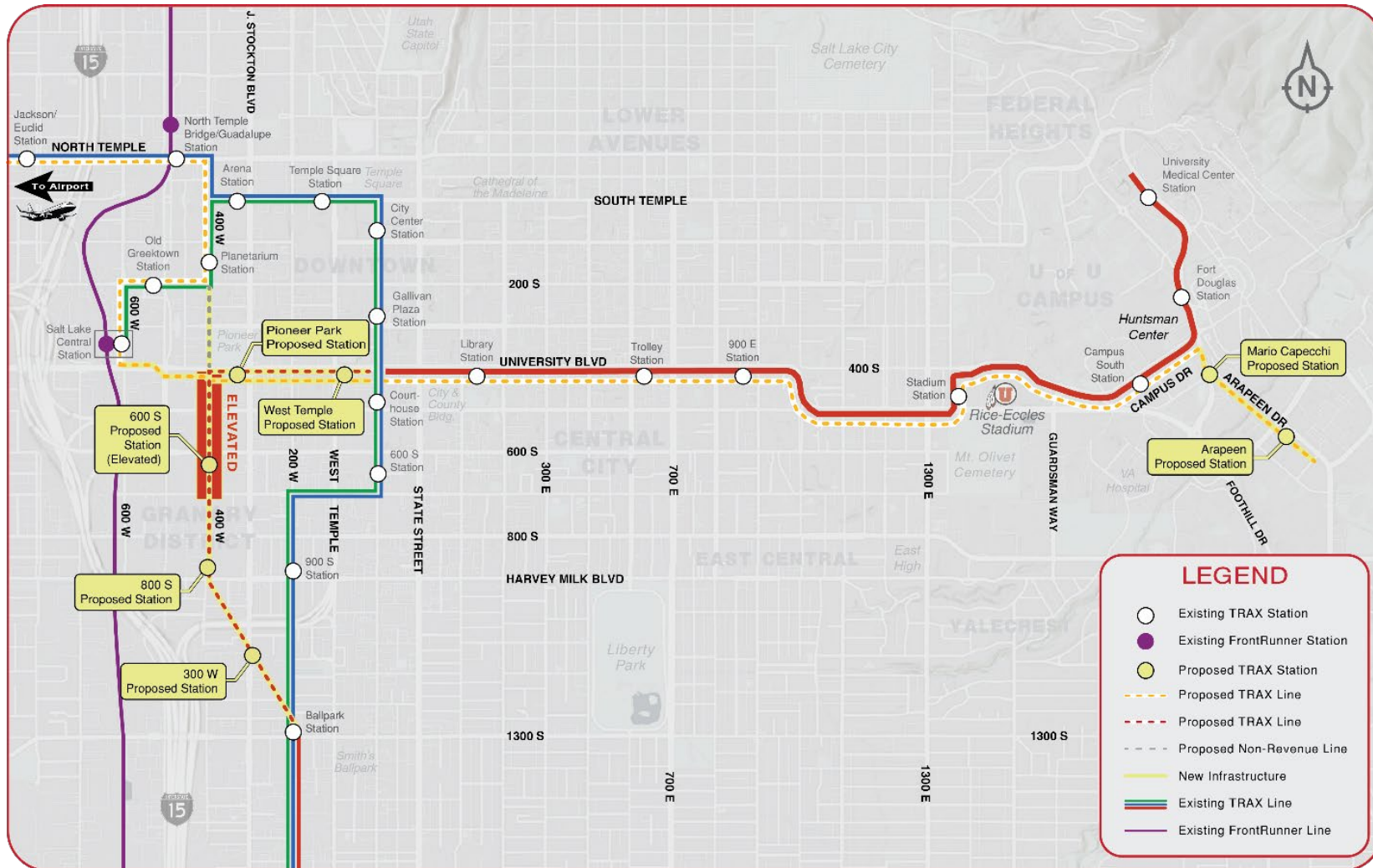


Figure 3. Alternative 2 - Elevated on 400 West

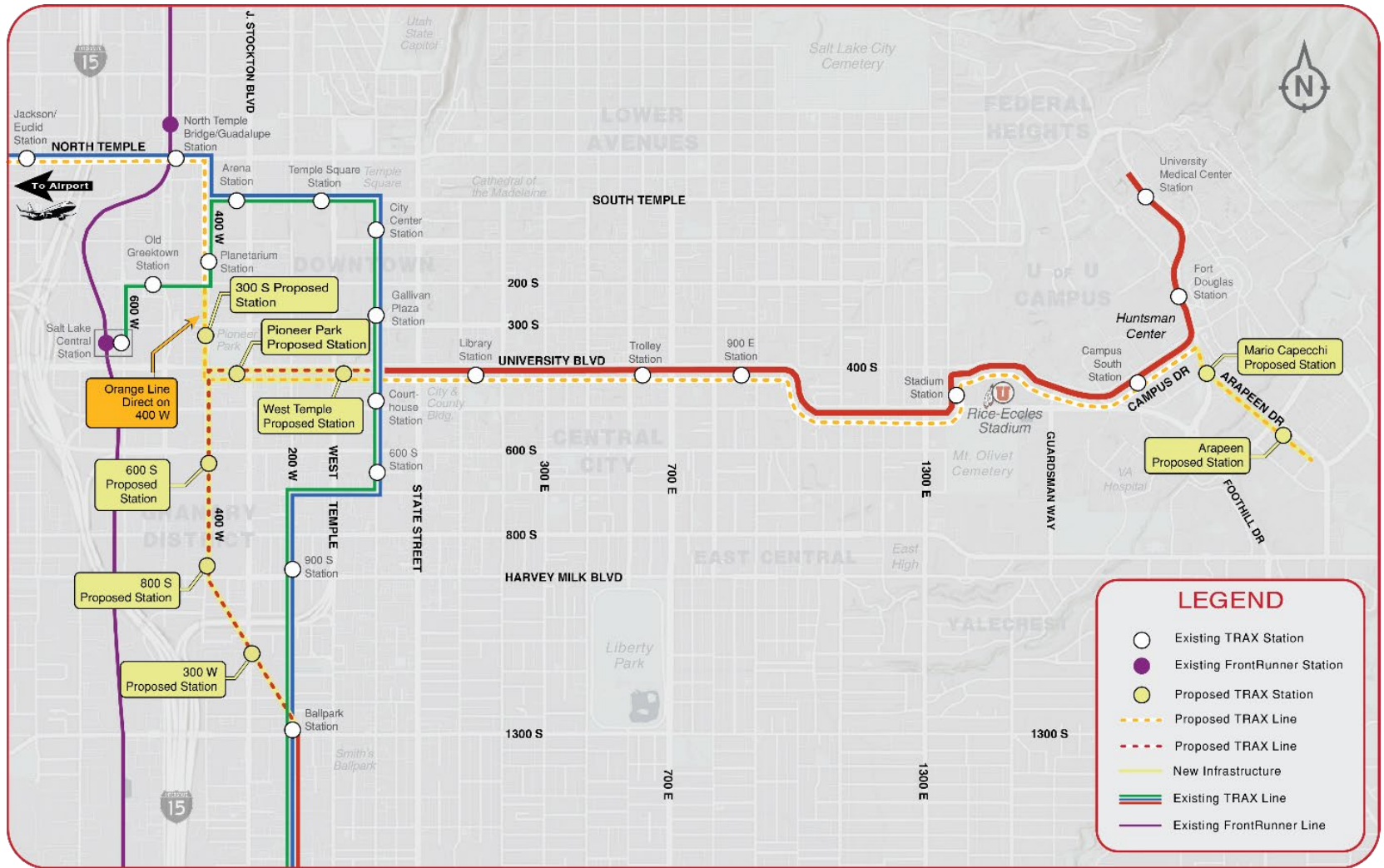


Figure 4. Alternative 3 - Direct on 400 West

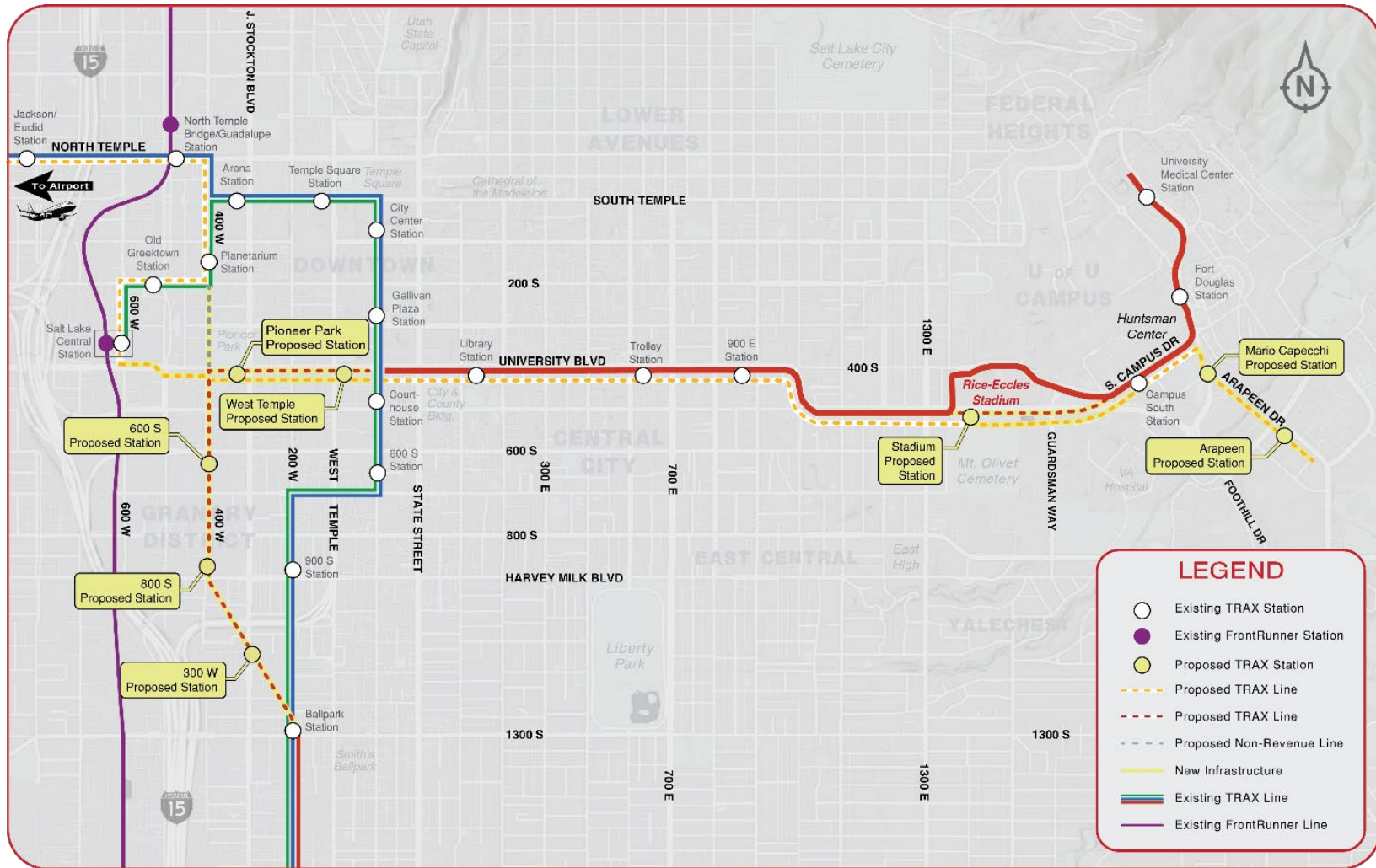


Figure 5. Alternative 4 – University of Utah Realignment



2.3 Evaluation Criteria

This process used evaluation criteria to measure how well an alternative met the project's Purpose and Need. Table 1 summarizes the criteria and data sources used in the evaluation process. Evaluation criteria were tied directly to the previously developed Purpose and Need for this study.

Table 1. Evaluation Criteria in Relation to Purpose and Need

Purpose/Need Elements	Proposed Criteria	Data Source
Support local and regional transportation growth in Salt Lake City	Ridership	Federal Transit Administration (FTA) Simplified Trips-on-Project Software (STOPS) model
Improve transit reliability and capacity	Transit travel times and transit reliability	TrainOps rail simulation model
Enhance mobility between existing and emerging centers	Economic development potential	Potential development and redevelopment indicators: <ul style="list-style-type: none"> • High-value commercial permits • Effective year built • Improvement value as a percentage of land value • Population and employment density (now/future) Qualitative understanding
Increase access to opportunity for disadvantaged populations	Access to opportunity	<ul style="list-style-type: none"> • EJ Screen (access for minority/low-income populations) • Employment projections
Provide sustainable transportation options	Potential for environmental impacts	Environmental resources analysis
	Capital and operations and maintenance (O&M) costs	<ul style="list-style-type: none"> • Capital cost assumptions based on updated concept design • Baseline O&M assumptions are from the Future of Light Rail Strategic Plan (2023)



3 Evaluation Results

This section describes the findings from the alternatives evaluation, including a high-level summary (Section 3.1) and supporting information for each criterion (Sections 3.2 through 3.8).

3.1 Summary

A high-level summary of the findings from the alternatives evaluation are shown in Figure 6. Due to the similarities between alternatives, many criteria performed similarly across all alternatives, including ridership, operational reliability, and access to opportunity. Notable differences between alternatives were found in transit travel times (primarily the Orange Line), economic development potential, Capital and O&M costs, and environmental impacts. The following sections describe the results in more detail for each evaluation criterion.









Proposed Criteria	Alternative 1 Future of Light Rail	Alternative 2 400 West Elevated	Alternative 3 Direct on 400 West	Alternative 4 U of U Realign
Weekday Ridership 	Similar	Similar	Similar	Similar
Transit Travel Times and Reliability 	<ul style="list-style-type: none"> Orange Line travel time: 4 minutes slower Similar for other lines 	<ul style="list-style-type: none"> Orange Line travel time: 4 minutes slower Similar for other lines 	<ul style="list-style-type: none"> Orange Line travel time: 4 minutes faster Similar for other lines 	<ul style="list-style-type: none"> Orange Line travel time: 4 minutes slower Similar for other lines
Economic Development Potential 	<ul style="list-style-type: none"> Directly serves <u>potential redevelopment</u> Close to existing development 	<ul style="list-style-type: none"> Directly serves <u>potential redevelopment</u> Close to existing development 	<ul style="list-style-type: none"> Directly serves <u>existing development</u> Close to potential redevelopment 	<ul style="list-style-type: none"> Directly serves <u>potential redevelopment</u> Close to existing development
Access to Opportunity 	Similar	Similar	Similar	Similar
Potential for Environmental Impacts 	Primarily right-of-way, cultural/historic, noise/vibration	Slight increase in visual impact along 400 West	Slightly reduced impacts along 400 South	Slightly increased impacts along 500 South
Capital and Annual O&M Costs 	Capital: \$460 M Annual O&M: +26%	Capital: \$510 M Annual O&M: +26%	Capital: \$400 M Annual O&M: +25%	Capital: \$570 M Annual O&M: +26%

Figure 6. Summary of Alternatives Evaluation¹

¹ Reduced travel time for Alternative 3 could potentially require one less train set to operate the TRAX system compared to the other alternatives, thereby reducing both capital and O&M costs. This potential operational change should be modeled and verified in discussions with UTA TRAX operations in future phases of work.



3.2 Ridership

Ridership was forecasted for the four alternatives using Federal Transit Authority's (FTA) Simplified Trips-on-Project Software (STOPS) model. STOPS is an FTA tool that allows transit agencies to evaluate ridership on a proposed system improvement with a reduced set of model inputs, mainly U.S. Census data, Metropolitan Planning Organization (MPO) demographic forecasts, and trip characteristics from an origin-destination survey. This simplified modeling framework is calibrated within the distinct regions of the United States to ensure model outputs are consistent with observed behavior in the modeled region. The STOPS model was selected as the forecasting tool for this study, as it is used for ridership as part of the FTA Capital Investment Grant (CIG) program.

Ridership Key Takeaway: All alternatives performed similarly, with a range in ridership (daily boardings at new stations) between 3,400-3,750 in 2023 and 5,400-5,700 in 2050.

The following inputs and assumptions were used for the STOPS modeling effort:

UTA STOPS Model (2023 Base):

- Existing transit network – Spring 2023 (11/27/2022 through 4/16/2024)
- Route and stop counts to average weekday – Spring 2023 (11/27/2022 through 4/16/2023)
- Population and employment forecasts – Provided by WFRC, up to date per mid-2023
- Automobile skims – From the latest WFRC model, up to date per mid-2023
- Underlying Origin-Destination Survey (2019) – Has not been updated, consistent with FTA standard
- Forecast years: 2023 and 2045

UTA STOPS Model (TechLink Specifics):

- No Build network – Spring 2023 UTA network
- Build network – New TRAX schedule for Red, Green, Blue, and new Orange Lines
- Cloning – Used in the Granary District to better represent trips in areas with a growing population
- STOPS “Trips on Project” (trips boarding, alighting, or passing through project stations)
 - Definition: All new stops (Granary and University of Utah stops)



The team modeled four potential alternatives of UTA’s TRAX light rail network that were developed as part of this study. The input schedules were developed by Hatch as a part of their rail simulation modeling done for the TechLink study (see Section 3.3). All four alternatives include the new Orange Line, the swapping of the Blue and Green Lines on the northern end of the system, and the proposed realignment of the TRAX Red Line from its current location alongside the Blue and Green Lines towards the west through the Granary District along 400 West.

Table 2 below provides a breakdown of projected ridership numbers for the alternatives for the year 2023. The key metric that will be used as part of the FTA CIG process is the “Weekday Linked Transit Trips on Project,” in bold in Table 2 below. Within the margin for error all alternatives perform similarly, ranging from approximately 3,500 to 3,800.

Table 2. 2023 FTA STOPS Modeling Results

2023 Results	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Weekday Linked Transit Trips (All Transit/All Car Households [HH])	74,924	74,906	75,007	74,889
Weekday Unlinked Transit Trips (All Transit/All Car HH)	103,519	103,460	103,571	103,371
Weekday Incremental Linked Transit Trips (All Transit/All Car HH) (vs. No Build)	778	760	861	743
Weekday Incremental Unlinked Transit Trips (All Transit/All Car HH) (vs. No Build)	951	892	1,003	803
Weekday Linked Transit Trips on Project (All Transit/All Car HH)	3,476	3,479	3,748	3,763*

**Alternative 4’s Weekday Linked Transit Trips on Project is inclusive of Stadium Station, which is not technically a new station and is therefore not perfectly comparable to Weekday Linked Transit Trips on Project for Alternatives 1-3. If Stadium Station were removed, ridership for Alternative 4 would be approximately 3,400.*

Table 3 below provides a breakdown of projected ridership numbers for the alternatives for the projected 2045 horizon year. Significant growth in ridership is expected with all alternatives. Similar to 2023, within the margin of error, all alternatives perform similarly, ranging from 5,500 to 5,700.



Table 3. 2045 FTA STOPS Modeling Results

2045 Results	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Weekday Linked Transit Trips (All Transit/All Car HH)	86,834	86,818	86,846	86,801
Weekday Unlinked Transit Trips (All Transit/All Car HH)	119,019	118,923	118,913	118,875
Weekday Incremental Linked Transit Trips (All Transit/All Car HH) (vs. No-Build)	936	920	948	903
Weekday Incremental Unlinked Transit Trips (All Transit/All Car HH) (vs. No-Build)	735	639	629	591
Weekday Linked Transit Trips on Project (All Transit/All Car HH)	5,480	5,462	5,722	5,697*

**Alternative 4's Weekday Linked Transit Trips on Project is inclusive of Stadium Station, which is not technically a new station and is therefore not perfectly comparable to Weekday Linked Transit Trips on Project for Alternatives 1-3. If Stadium Station were removed, ridership for Alternative 4 would be approximately 5,400.*

As this project advances, additional STOPS modeling optimization as well as refinements of socioeconomic data in the study area from the WFRC regional model could help increase potential forecasted results. For additional information regarding ridership, please refer to Attachment G1, FTA STOPS Model Report.



3.3 Transit Travel Times and Reliability

Transit travel times and reliability were measured using the Hatch Operations Planning & Simulation group’s TrainOps software. TrainOps is Hatch’s operations and electrical network simulation software for all types of rail systems. It supports a wide range of analyses, ranging from conceptual planning exercises to detailed engineering design work. The software models train performance, signaling systems, and traffic signal interactions to recreate the complex interactions experienced by train operators.

Assumptions for the TrainOps software were based on previously agreed-upon assumptions (including additional TRAX improvements outside of TechLink) from the Future of Light Rail Strategic Plan (2023). It was developed using UTA-provided track charts and signal control line drawings and includes:

- Civil speed restrictions
- Wayside signaling
- Existing intersection priorities/delay probabilities
- Station dwell time distributions by line, direction, and time of day

Transit Travel Times

A summary of average travel times for each TRAX line under all alternatives from the TrainOps model is shown in Table 4. Across all alternatives, end-to-end travel times were similar for the Blue Line, Red Line, and Green Line. The most notable difference is in Orange Line travel times, where Alternatives 1, 2, and 4 are fairly similar (ranging from 49.5 minutes to 50 minutes on the northbound trip) and Alternative 3 is significantly shorter at 45.5 minutes. This reduced travel time on the Orange Line is due to the shorter length of Alternative 3 and reduced number of 90-degree turns, which require slower travel speeds. Notably, this reduced travel time for Alternative 3 could potentially require one less train set to operate the TRAX system compared to the other alternatives. This potential operational change should be modeled and verified in discussions with UTA TRAX operations in future phases of work.

Transit Travel Times and Reliability Key Takeaways: For transit travel times, all alternatives performed similarly for Red Line travel times with an end-to-end trip of 64.5 - 65 minutes. The Orange Line travel time saw differences by alternative, with Alternatives 1, 2, and 4 taking a total trip time of 49.5 - 50 minutes and Alternative 3 about 4 to 4.5 minutes faster at 45.5 minutes. Transit reliability was also similar between all alternatives, with an estimated on-time percentage of 96-98%, which is an improvement over the current UTA TRAX system on-time percentage of 90%.



Table 4. Travel Times for each Alternative

TRAX Line	Terminals	Dir	Travel Times (h:mm:ss)				
			Scheduled ¹	Average Simulated Time ²			
				Alternative 1	Alternative 2	Alternative 3	Alternative 4
Blue Line	Draper Town Center	NB	1:02:00	1:05:51	1:06:17	1:06:25	1:05:51
	Airport	SB	1:03:00	1:06:07	1:06:05	1:05:53	1:06:08
Red Line ³	Daybreak Parkway	NB	1:03:00	1:03:00	1:05:04	1:05:35	1:04:52
	Medical Center	SB	1:01:00	1:01:00	1:03:30	1:04:25	1:03:05
Green Line	West Valley Central	NB	0:38:00	0:42:12	0:41:48	0:42:26	0:42:05
	Salt Lake Central	SB	0:38:00	0:40:44	0:40:46	0:41:26	0:40:54
Orange Line	Arapeen	NB	0:48:00/0:44:00	0:50:09	0:49:40	0:45:22	0:49:34
	Airport	SB	0:47:00/0:43:00	0:48:18	0:48:30	0:44:33	0:48:09

Notes:

¹ **Scheduled Time:** The time scheduled for a train between stations as it would appear in a public timetable. The times provided in the results are the schedule times between terminals.

² **Average Simulated Time:** The average time that a train in the simulation takes between stations. The simulated trains may be delayed due to traffic signal delays, longer dwell times, or interactions with other trains. The average simulated time may be compared against the scheduled time to determine how well the trains are meeting the schedule.

³ Current end-to-end travel times for the Red Line are scheduled at 61 minutes northbound and 60 minutes southbound. For the TechLink alternatives, the new scheduled times increase to 63 minutes northbound and 61 minutes southbound. Simulated trains average about 2 minutes behind this scheduled time at about 65 minutes northbound and 63 minutes southbound.



Transit Reliability

Transit reliability was measured as on-time performance also using the TrainOps model. UTA TRAX currently operates at a systemwide TRAX on-time percentage of approximately 90%. As shown in Table 5, all alternatives substantially improve (within the margin of error) the on-time performance of all TRAX lines and the system as a whole with an estimated 96-98% on-time percentage.

Table 5. On-Time Performance for each Alternative

Alternative#	TRAX Train Line				Combined Average
	Blue Line	Red Line	Green Line	Orange Line	
Alternative 1	97.7%	99.5%	93.8%	99.0%	97.8%
Alternative 2	97.0%	99.7%	95.4%	99.2%	98.0%
Alternative 3	94.8%	94.1%	94.7%	99.8%	95.5%
Alternative 4	97.2%	99.9%	93.7%	98.9%	97.8%

For additional information regarding transit travel times and reliability and supporting information on terminal turn times and fleet requirements, please refer to the Rail Operations Simulation Findings Memorandum (Attachment G2).



3.4 Economic Development Potential

An analysis was performed to identify the performance of each alternative as it relates to generating economic development opportunities. For the analysis, Alternatives 1, 2, and 4 were considered to perform similarly based on the almost identical alignments and station locations. Alternative 3 was the only alternative found to potentially show differences based on variations in alignment and station location characteristics. Therefore, the remaining discussion will focus on the differences between Alternative 1 (which also includes 2 and 4) and Alternative 3.

In summary, economic indicators analyzed generally favor all alternatives (Table 6); however, the opportunities for economic development themselves are different. Alternative 1 is farther from existing centers of population, employment, and recent development, but could serve more potential opportunities for redevelopment. Alternative 3, routing directly along the 400 West corridor to North Temple, has fewer opportunities for potential redevelopment directly adjacent, but is closer to in-demand development areas with higher densities of existing employment and population. For additional information regarding economic factors, please refer to the Economic Opportunity Memorandum (Attachment G3).

It is worth noting, however, that future funding opportunities through the FTA CIG program focus on existing programs and policies. Future planned developments are not the primary focus of project scoring for competitiveness. The commitment level associated with programs and policies, including dedicated funding and entitled developments, are important quantitative measures presented in the grants process. As stated in the FTA CIG Policy Guidance (January 2023), “qualitative examination of the existing local plans and policies to support economic development proximate to the project” is the basis of determining the economic development effects of a project. A focus has been observed over the last three years on transit dependent populations and affordable housing.

Economic Development Potential Key Takeaways: All alternatives will increase access to economic opportunity and support redevelopment potential. Alternatives 1, 2, and 4, routing through Salt Lake Central Station, are farther from existing centers of population, employment, and recent development, but could provide more additional opportunities for potential redevelopment as part of the envisioned Rio Grande District Vision & Implementation Plan and UTA’s potential redevelopment of Salt Lake Central Station. Alternative 3, routing directly along the 400 West corridor to North Temple, has fewer opportunities for potential redevelopment directly adjacent, but is closer to development areas with high densities of existing employment and population.



Table 6. Summary of Key Findings from Economic Factors Analyzed

Economic Factor Analyzed	Alternatives 1, 2, and 4	Alternative 3
Current Development Activity: High-Value Commercial Building Permits	Low concentration of high-value commercial building activity. Alternatives 1, 2, and 4 could potentially spur new investment in the future.	Shows substantial clustering of high-value permits indicating strong existing development activity. This alternative would provide direct access to existing high-investment areas.
Past Development Activity: Year Built	Mostly older buildings with some limited newer development. Indicates larger-scale opportunities for potential redevelopment in the future.	Large, newer buildings exist with some smaller and older buildings. Indicates existing demand now and a moderate opportunity for potential redevelopment in the future.
Population and Employment Density	Lower densities of <i>existing</i> residential and employment do not indicate a strong current demand for ridership today.	Higher densities of <i>existing</i> residential and employment provides an opportunity to increase access and ridership today.
Other Qualitative Information	Potential redevelopment is planned in this area through the proposed Rio Grande District (roughly between 400 West and 600 West and 200 South and 400 South) and at the Salt Lake Central Station. These opportunities would be served more <i>directly</i> via these alternatives.	Potential redevelopment is planned in this area through the proposed Rio Grande District (roughly between 400 West and 600 West and 200 South and 400 South) and at the Salt Lake Central Station. These opportunities would be served <i>indirectly</i> (up to ~0.25-mile walk) via Alternative 3.



3.5 Access to Opportunity

Providing equity through transit is a central component of the study to aid in fair and just access to transportation services and infrastructure for all individuals, regardless of their socioeconomic status or geographical location. Identification of demographic conditions surrounding environmental justice populations is generally focused on minority or low-income populations; however, a more comprehensive look at other socioeconomic indicators was conducted to better understand the needs and opportunities for diverse populations with varying transportation challenges.

The access to opportunities and jobs evaluation quantified the number of individuals currently within each specified disadvantaged category who would benefit from enhanced transit frequency and more direct access/connectivity via these alternatives. This was followed by an analysis of new populations that would benefit from the added sections and alignments for new infrastructure.

The analysis area was set as a buffer of 0.25 miles around each alternative, as this is considered an acceptable walking distance away from a fixed transit route. Since the 0.25-mile buffer for Alternatives 1, 2, and 3 are similar, these alternatives were evaluated together (Figure 7). Alternative 4 was analyzed separately, as the analysis buffer was slightly different due to the proposed realignment of the TRAX line from South Campus to 500 South near the University of Utah (Figure 8).

Access to Opportunity Key Takeaway: All alternatives perform similarly. By providing additional transit options in underserved areas, all alternatives improve access to minority and low-income populations by approximately 4% and increase access to employment opportunities by approximately 10%.

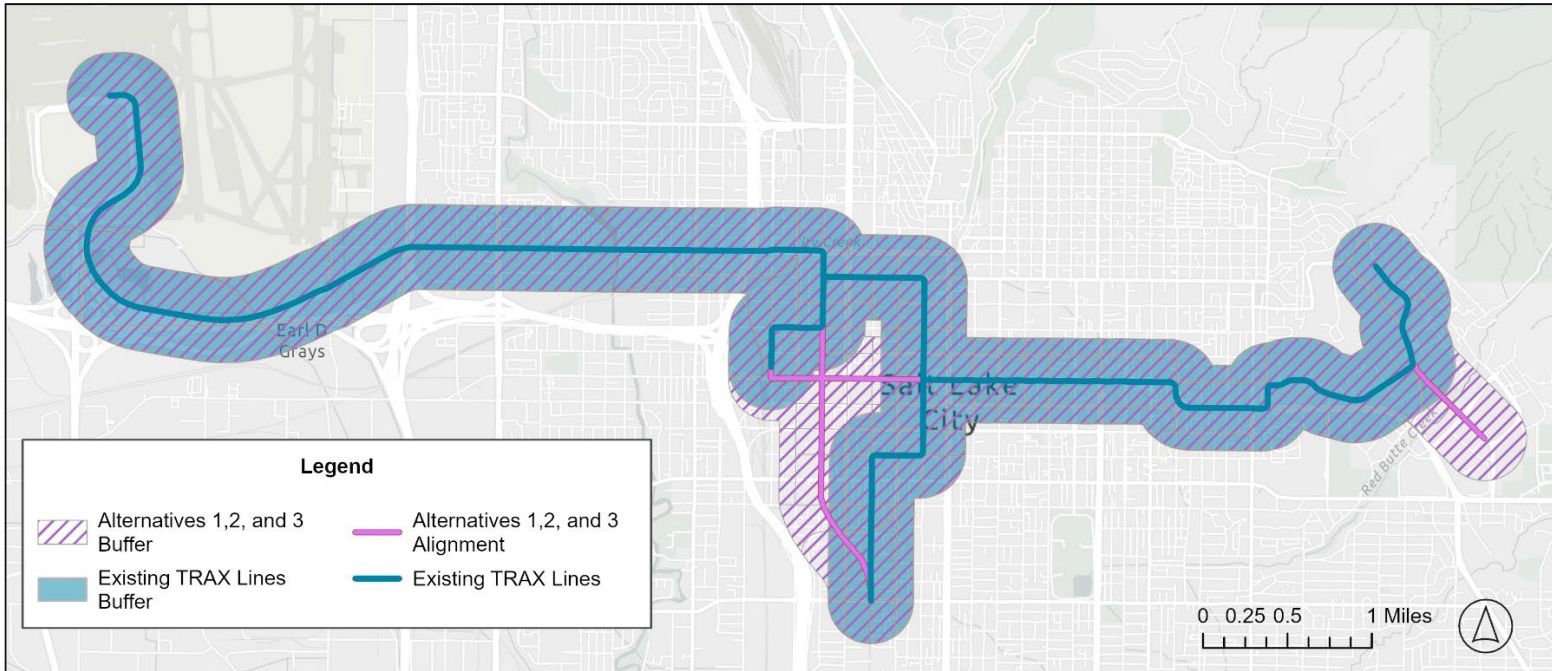


Figure 7. Alternatives 1, 2, and 3 Buffer and Existing TRAX Lines Buffer

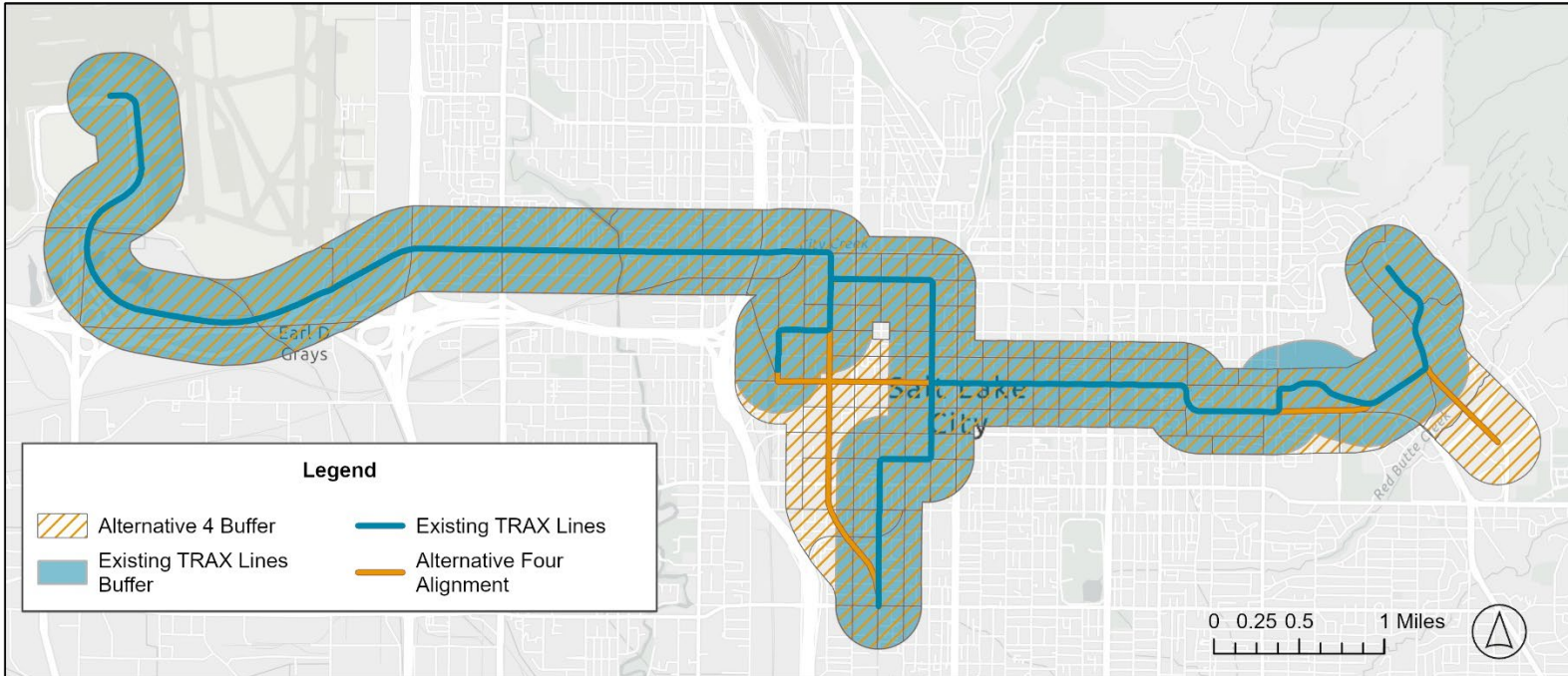


Figure 8. Alternative 4 Buffer and Existing TRAX Lines Buffer

The data in Table 7 indicate the disadvantaged populations and underserved households within the analysis buffer, and the percentages indicate the incremental improvements of the alternatives over the existing TRAX lines. For instance, Alternatives 1, 2, and 3 see an improvement in access for minority and low-income populations by approximately 4.5% compared to the existing TRAX lines, whereas the improvement in access for Alternative 4 is slightly lower at approximately 4%.

Regarding access to opportunities, analysis results show access to jobs will increase with all four alternatives. For the year 2023, the increase in access to jobs between the existing TRAX lines and Alternatives 1, 2, and 3 is 9.3%, increasing to 10.67% by the year 2050. Alternative 4 shows a slight decrease relative to the other alternatives, with an increase in access to jobs in 2023 at 7.4% and growing to 8.9% in 2050.



The analysis results show that, overall, all four alternatives improve access to transit for the socioeconomic indicators outlined in Table 7 below, with Alternatives 1, 2, and 3 having a greater positive impact compared to Alternative 4. Table 7 shows the equity analysis findings for the existing TRAX lines; Alternatives 1, 2, and 3; and Alternative 4.

It is important to note that the alternatives buffer intersects with the Granary District, which is a fast-growing area. While precise data on the exact number of jobs and population influx into this area is currently unavailable, it is anticipated to surpass the numbers presented in the table below. Consequently, this suggests that the incremental improvements offered by the alternatives compared to the existing TRAX lines, particularly for indicators such as access to jobs, may actually be greater than reflected in Table 7.

Although the incremental improvements across all socioeconomic indicators are less than 10%, it is important to note that the existing TRAX lines already provide substantial coverage for disadvantaged communities. Currently, 38% of the population that lives within a 0.25-mile buffer of the existing TRAX lines are minority populations.

Table 7. Equity Evaluation- Socioeconomic Indicators and Access to Opportunities

Socioeconomic Indications	Existing TRAX Lines 0.25-mile Buffer	Alternatives 1, 2, and 3 0.25-mile Buffer	Alternative 4 0.25-mile Buffer
Total Population	27,849	29,151	28,875
Minority Populations	10,470	10,937 (+4.5%)	10,879 (+3.9%)
Low-Income Populations	11,588	12,102 (+4.4%)	11,965 (+3.2%)
Limited English-Speaking Households	657	682 (+3.8%)	680 (+3.5%)
Population with Disability	3,668	3870 (+5.5%)	3852 (+5%)
Zero-Vehicle Households	2,555	2,705 (+5.9%)	2,694 (+5.4%)
Rent-Burden Housing Units	6,440	6,848 (+6.3%)	6,785 (+5.4%)
Access to Opportunities	Existing TRAX Lines 0.25-mile Buffer	Alternatives 1,2,3 0.25- mile Buffer	Alternative 4 0.25- mile Buffer
Access to Jobs 2023	143,380	156,750 (9.3%)	154,034 (7.4%)
Access to Jobs 2050	186,633	206,553 (10.67%)	203,304 (8.9%)



For additional information regarding equity, please refer to the Equity Analysis Memorandum (Attachment G4).

3.6 Potential for Environmental Impacts

Environmental resources were evaluated to determine existing resources present in the study area that may be affected by or are relevant to selecting and refining an alternative to advance as the Locally Preferred Alternative. There are some resources that most likely would not be impacted by the alternatives that were evaluated, and those include prime and unique farmland and Section 6(f) resources. The resources that are more likely to be impacted by the alternatives include the following: land use and zoning, right-of-way (ROW) acquisitions and relocations, environmental justice populations, economics, historic and archaeological resources, Section 4(f) resources, visual and aesthetic resources, noise and vibration, air quality, floodplains, traffic and transportation, wetlands and waters of the U.S., public services and utilities, soils and geology, threatened and endangered species, energy, and more.

The anticipated environmental impacts are similar for all alternatives with slight variations. The resources that show differences between alternatives are outlined in Table 8. For additional environmental information, please refer to the Environmental Resources Screening Report (Appendix F of the Final Report).

Table 8. Environmental Summary by Alternative

Environmental Resource	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Acquisitions and Relocations	<ul style="list-style-type: none"> • Potential ROW acquisition along 400 South, Ballpark spur line, and within Research Park • One potential building demolition on Ballpark spur line 			
			Fewer ROW Acquisitions (no ROW acquisition on 400 South west of 400 West)	Potential additional ROW acquisition south of Rice-Eccles Stadium along 500 South
Cultural, Historic, and Archaeological Resources	<ul style="list-style-type: none"> • Potential Adverse Effect to Pioneer Park (if mature trees are removed along the southern edge of the park; however, it is anticipated that this impact would be avoided in future phases of design), D&RGW Railroad, and Oregon Short Line Railroad • Potential No Adverse Effect to Salt Lake City Warehouse District, Exchange Place Historic District, buried trolley tracks, and Fort Douglas 			



Environmental Resource	Alternative 1	Alternative 2	Alternative 3	Alternative 4
			Fewer impacts to Salt Lake City Warehouse District (potential No Adverse Effect)	Potential No Adverse Effect to Mt. Olivet Cemetery
Noise and Vibration	<ul style="list-style-type: none"> Potential for increased vibration to one Category 1 receiver (Noorda Oral Health Sciences building), approximately 420 feet from the proposed alignment 			
	<ul style="list-style-type: none"> 69 potential noise impacts 26 potential vibration impacts 	<ul style="list-style-type: none"> 69 potential noise impacts 26 potential vibration impacts 	<ul style="list-style-type: none"> 67 potential noise impacts 24 potential vibration impacts 	<ul style="list-style-type: none"> 70 potential noise impacts 26 potential vibration impacts
Section 4(f) Resources	<ul style="list-style-type: none"> Potential greater than de minimis impact to Pioneer Park (if mature trees are removed along the southern edge of the park; however, it is anticipated that this impact would be avoided in future phases of design) Potential de minimis impact to Salt Lake City Warehouse District, Exchange Place Historic District, and Fort Douglas 			
			Fewer impacts to Salt Lake City Warehouse District (potential de minimis impact)	Potential de minimis impact on Mt. Olivet Cemetery
Visual and Aesthetic Resources	<ul style="list-style-type: none"> Minimal visual impacts to built environment, as there are currently existing light rail lines throughout the study area and the concepts would be largely constructed in urbanized, developed areas Higher potential for visual impacts to the natural environment at Red Butte Creek crossing 			



Environmental Resource	Alternative 1	Alternative 2	Alternative 3	Alternative 4
		Noticeable change in visual character as a result of the elevated line above 400 West		
Water Resources	<ul style="list-style-type: none"> Potential to impact Red Butte Creek and pump station west of Red Butte Creek 			
				Potential to impact wells, covered water storage reservoir, and Mt. Olivet Reservoir south of Rice Eccles Stadium along 500 South
Wetlands and Waters of the U.S.	<ul style="list-style-type: none"> Potential to impact Red Butte Creek 			
				Potential to impact Mt. Olivet Reservoir (likely not jurisdictional)



3.7 Capital Costs

An opinion of probable cost was performed for the four alternatives based on key factors, including route feasibility, environmental impact, traffic disruptions, construction costs, and operational efficiency. These Class 5 (reflecting 0-2% maturity of design) estimates aim to provide a comprehensive understanding of the financial implications and logistical considerations associated with each alternative. The estimated costs presented below include allocated contingencies but exclude escalation and unallocated contingencies. **Note that these costs are preliminary and were developed using high-level design concepts that were developed to define the scope of work (general alignment and station areas) for the purposes of alternatives evaluation. The concepts and associated costs will continue to be refined through project development and are not intended to be final determinations.**

Capital Costs Key Takeaway: The capital costs of each alternative range from the lowest cost Alternative 3 (\$400 M) to the highest cost Alternative 4 (\$570 M). Alternatives 1 and 2 fall within that range at an estimated \$460 M and \$510 M, respectively.

The expected estimated cost range for the four alternatives, based on the estimate classification and expected accuracy using a low of -25% and a high of +40%, are listed in Table 9.

Table 9. Capital Cost Estimates and Range

Alternative #	Expected Estimate Cost Range	Low Range (-25%)	Current Estimate	High Range (+40%)
Alternative 1	Baseline Concept – Future of Light Rail	\$350,000,000	\$460,000,000	\$650,000,000
Alternative 2	Elevated Red Line on 400 West	\$380,000,000	\$510,000,000	\$710,000,000
Alternative 3	Direct on 400 West	\$300,000,000	\$400,000,000	\$560,000,000
Alternative 4	University of Utah Stadium Realignment	\$430,000,000	\$570,000,000	\$800,000,000

As shown in Table 9, capital costs from the current estimate range from \$400 M (Alternative 3) to 570 M (Alternative 4), with Alternatives 1 and 2 falling within this range at \$460M and \$510M, respectively.

The basis of the estimates are conceptual alignments that outline the proposed paths of the rail and roadway impacts reflected in Google Earth KMZ files. Parametric quantities were developed from CAD files and pricing was supplemented by historical cost data from similar projects along with estimator judgment. Pricing reflects the early concept study definition and is heavily reliant on historical in-house data and estimator



judgment. The estimate was developed in 2024 U.S. dollars. Construction craft rates are based on local prevailing wages in Salt Lake City. Equipment and material prices reflect procurement and delivery costs for Salt Lake City at the time of the estimate.

Vehicle assumptions were based on findings and recommendations from the Future of Light Rail Strategic Plan (2023), which assumed an additional four vehicles. It is assumed that additional discussions and modeling regarding the appropriate number of vehicles to include for this cost estimate will continue to evolve as the project advances. It is also worth noting that the reduced travel time for Alternative 3 could potentially require one less train set to operate the TRAX system compared to the other alternatives, thereby reducing both capital and O&M costs. This potential operational change should be modeled and verified in discussions with UTA TRAX operations in future phases of work.

A full list of estimate assumptions and exclusions, summary reports for each alternative, and ROW estimates can be found in the Opinion of Probable Cost Report (Attachment G5).

3.8 Operations and Maintenance Costs

O&M costs of the various alternatives play a significant role in determining the feasibility of new and altered service patterns. O&M costs used for this study were based on the agreed-upon assumptions documented as part of the Future of Light Rail Strategic Plan (2023), Appendix C – Operations and Maintenance Cost Estimating Methodology.

O&M cost estimates were based on existing TRAX and streetcar service costs. Major cost drivers include operations labor costs (operators and supervisors), vehicle maintenance (electromechanics and service employees), and Maintenance-of-Way (MOW) including line and signal technicians and traction power costs. An amount of fringe is added to each labor cost to include employee benefits, training and development, and leave and extra board operators. Other costs and supplies are added to the operations costs, vehicle miles are added to the vehicle maintenance costs, and additional parts and maintenance are added to the MOW costs by project for an annual total cost estimate. These additional costs vary by project and take into consideration hours of service per day and trips per direction per day, which are then multiplied by the traction cost per mile in addition to the light rail vehicle (LRV) cost per mile.

O&M Costs Key Takeaway: The annual O&M costs for Alternatives 1, 2, and 4 are similar at an increase of approximately \$18M over the existing TRAX O&M. Alternative 3 has the lowest O&M cost at an increase of approximately \$17M over the existing TRAX O&M.

The hours of service per day and trips per direction per day is an estimate that can be calculated based on current service, using existing miles and schedule times, or a more sophisticated rail simulation model. The results of this service plan will include the total vehicle miles, operating



hours, and required LRVs to run the service. Traction power costs were developed based on the sum of each UTA substation's electricity cost and then divided by the annual LRV mileage.

Light Rail Business Unit overhead was also included with all costs not directly associated with delivering service, such as administration, security, marketing, engineering, capital development, planning, and finance.

Estimated annual O&M costs for the entire TRAX system are shown in Table 10. Alternative 3 has the lowest annual O&M cost of \$85.6M/year, and Alternatives 1, 2, and 4 are slightly higher at \$86.0-86.1M/year. These estimates represent an increase of 25-26% over the baseline costs to operate and maintain the TRAX system today.

Table 10. Annual O&M Cost Estimates

Alternative #	Expected O&M Costs	Total Annual O&M Cost	Percentage Increase over Baseline
Alternative 1	Baseline Concept – Future of Light Rail	\$86,130,000	26%
Alternative 2	Elevated Red Line on 400 West	\$86,120,000	26%
Alternative 3	Direct on 400 West	\$85,660,000	25%
Alternative 4	University of Utah Stadium Realignment	\$86,030,000	26%

The planning-level O&M cost estimates developed for the Future of Light Rail Strategic Plan (2023) using the methodology described above are conceptual in nature and are based on limited current data. These estimates are primarily for comparative purposes to determine the feasibility of the alternatives and establish long-range plan recommendations. As more detailed design and analysis occur during future phases of each project, the planning-level O&M cost estimates should be reviewed and refined.



4 Technical Recommendation

4.1 Alternatives Recommended for Elimination

Based on the alternatives evaluation findings presented in Section 3, it is proposed that both Alternatives 2 and 4 do not advance for further consideration.

4.1.1 Alternative 2

Alternative 2 performed similarly to other alternatives, with some operational efficiency benefits through grade separation of the Red Line over 500 and 600 South. However, analysis performed shows that the benefits from this grade separation would be minimal (minor overall end-to-end travel time savings and negligible changes in ridership) compared to the overall substantive added project cost. In addition, several project partners expressed concern over access to elevated stations, limitations related to street activation, and potential visual impacts. For these reasons, it was proposed that this alternative does not move forward into additional phases of work.

4.1.2 Alternative 4

Alternative 4 performed similarly to other alternatives and would also enhance campus permeability, which is a goal of the University of Utah. However, the substantive added cost and increase in potential impacts to resources along 500 South with limited benefits to TechLink goals do not make this a competitive alternative. For these reasons, it was proposed that this alternative does not move forward into additional phases of work. It is noted that project partners support additional study for the existing TRAX alignment along South Campus Drive to enhance campus permeability.

4.2 Additional Factors for Consideration – Alternatives 1 and 3

The remaining alternatives – Alternatives 1 and 3 – performed similarly and additional considerations were taken into account to provide additional information. These additional factors were access to transit connections and access to economic redevelopment opportunities.

4.2.1 Access to Transit Connections

The study team looked at existing transit connections in the study area and also consulted with UTA service planners (Figure 9). Key takeaways for how Alternatives 1 and 3 would provide connections to other transit service in the study area include:

- Both Alternatives 1 and 3 would provide similar direct access to local bus service, FrontRunner, and other TRAX lines; however, these connections may occur in different places.
- The differences between Alternatives 1 and 3 is where transfers would take place, not the overall availability or number of connections.
- Regardless of the alternative selected, the bus network would be optimized to serve the new TRAX stations.

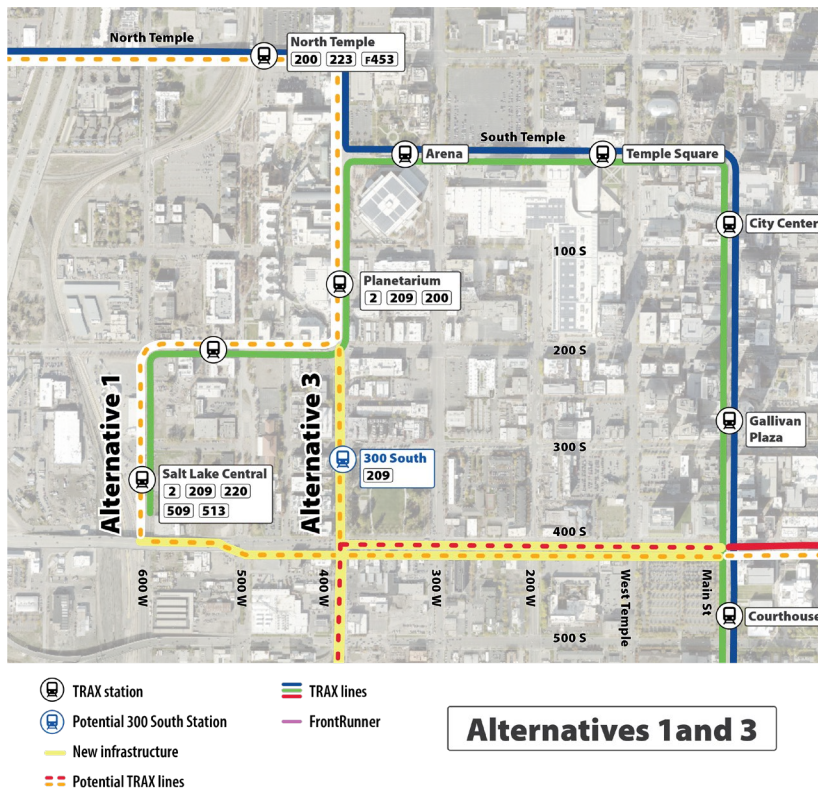


Figure 9. Alternatives 1 and 3 Transit Connections

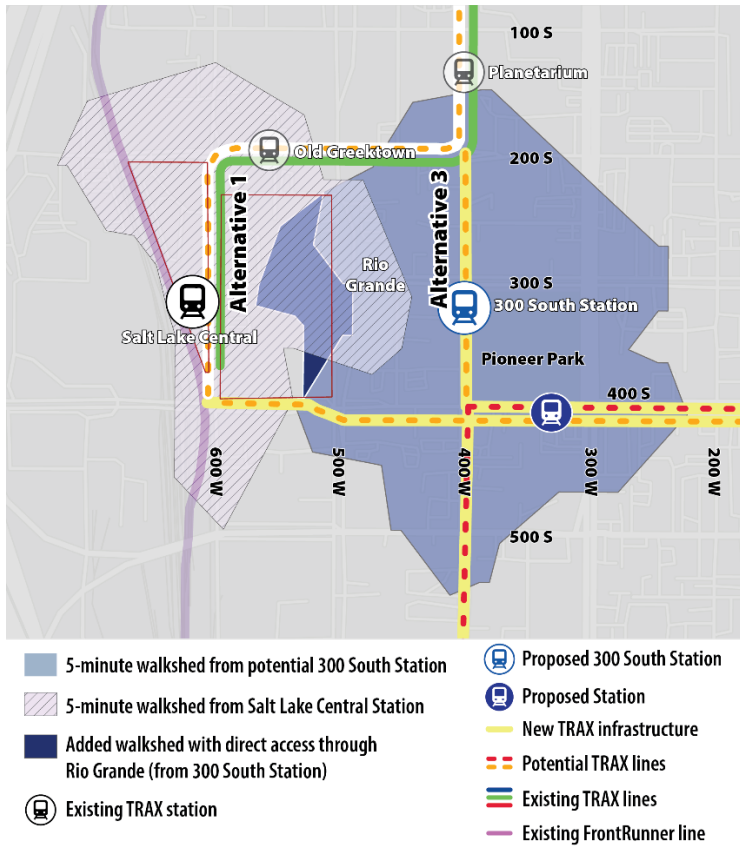


4.2.2 Walkshed Access to Economic Redevelopment Opportunities

The study team looked specifically at transit access to Alternative 1 and 3 from proposed economic redevelopment opportunities, specifically a 5-minute and 15-minute walkshed (Figure 10). The 5-minute walkshed also depicts the added walkshed if direct access through the Rio Grande Building is provided.

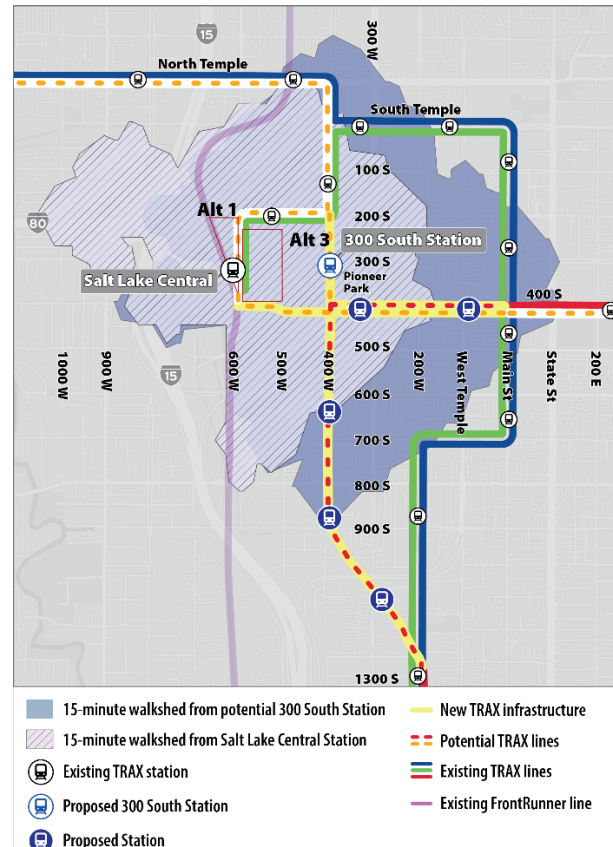
In Figure 10, the red-lined rectangle east of 600 West depicts the area that would potentially be redeveloped into the Rio Grande District, and the red-lined triangle west of 600 West is the proposed Salt Lake Central Station redevelopment. The proposed Rio Grande redevelopment would be served in close proximity to Alternative 1 (from the west) and Alternative 3 (from both the east and west) primarily within the 5-minute walkshed. It is worth noting that access would be enhanced with direct access through the Rio Grande Building. The proposed Salt Lake Central Station redevelopment would be most directly served by Alternative 1 and indirectly served by Alternative 3 where it is just beyond the 5-minute walkshed.

Key Takeaway: A notable key finding from this analysis is that enhanced access between 400 West and 600 West through the Rio Grande Building would be critical for providing access to both Alternatives 1 and 3.



5-minute Walkshed

Figure 10. Walkshed Access



15-minute Walkshed



4.3 Technical Recommendation

Based on the findings described above from the alternatives evaluation, the technical recommendation for the Locally Preferred Alternative is Alternative 3 (see Figure 4 in Section 2.2). Alternative 3:

- Is the lowest cost alternative for both capital costs and annual O&M costs
- Increases operational efficiency by offering higher transit reliability and a travel time on the Orange Line that is 4-5 minutes faster than the other alternatives
- Provides a slight reduction in ROW and environmental impacts (cultural resources and noise/vibration)
- Offers an enhanced customer experience/perception (per public comment)
- Provides similar projected ridership as other alternatives
- Directly serves key economic development opportunities along 400 South and the Granary District and proximal service (within 0.3 miles) to the Rio Grande District and Salt Lake Central Redevelopment



Attachment G1: FTA STOPS Model Report

Utah Transit Authority

**TECHLINK TRAX STUDY FTA
STOPS MODEL REPORT**

October 7, 2024





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1.0 PROJECT OVERVIEW

Utah Transit Authority (UTA) in partnership with the Redevelopment Agency of Salt Lake City (RDA), Salt Lake City (SLC), University of Utah, Wasatch Front Regional Council (WFRC), and the Utah Department of Transportation (UDOT) is conducting the TechLink TRAX Study to improve local and regional connectivity and reliability. UTA's TRAX light rail system presently serves Salt Lake County via its Blue, Green, and Red Lines. Major connections include the University of Utah campus, Salt Lake City International Airport, Downtown Salt Lake City, and various connections with the FrontRunner commuter rail system.

The TechLink TRAX Study involves exploring four potential realignments of the TRAX network, which all include the addition of a proposed Orange Line and the rerouting of the Red Line through the Granary District. TechLink also proposes switching the northern termini of the Blue Line and Green Line. The Granary District has evolved from an historically light industrial land use into a thriving artist-driven warehouse district with breweries, restaurants, new denser housing options, and other local business destinations. The boundaries of the Granary District are highlighted in the map shown in Figure 1.

FIGURE 1: MAP OF GRANARY DISTRICT

This report provides an overview of the implementation of a Federal Transit Administration (FTA) Simplified Trips-on-Project Software (STOPS) model for the UTA service region to forecast changes in future TRAX ridership across the four Build Alternatives. Evaluation of the four Build Alternatives was focused on connections in Salt Lake City, including links between the University of Utah, Salt Lake City International Airport, and new ridership produced within the Granary District. In addition to this overview, detailed draft findings are appended to this report.



2.0 MODEL DEVELOPMENT

STOPS is an FTA tool that allows transit agencies to evaluate ridership on a proposed system improvement with a reduced set of model inputs, mainly U.S. Census data, Metropolitan Planning Organization (MPO) demographic forecasts, and trip characteristics from an origin-destination survey. This simplified modeling framework is calibrated within the distinct regions of the United States to ensure model outputs are consistent with observed behavior in the modeled region.

The UTA STOPS implementation used for the TechLink TRAX Study is based on an existing, calibrated STOPS model that RSG has used elsewhere to forecast ridership on proposed UTA projects including FrontRunner Forward, FrontRunner South Valley Extension, and the UTA’s 10-Year Capital Plan. The TechLink implementation is calibrated to 2023 transit route and stop counts and uses the 2019 UTA systemwide Origin-Destination as the base trip table. This implementation uses STOPS’ Type 2 Special Markets mode to allow methods to better represent the future trip table in the Granary District.

2.1 STOPS INPUT DATA

The following section summarizes the various data input used in the TechLink STOPS modeling effort.

Route and Stop Counts

2023 route ridership data were used in the TechLink STOPS modeling effort. As shown in Table 1, compared to 2019, overall network ridership in 2023 declined to 67% of 2019 ridership. However, 2023 bus ridership is 82% of 2019 ridership. Observed ridership across FrontRunner, TRAX, and UVX in 2023 is 54-62% of 2019 ridership.

TABLE 1: NETWORK RIDERSHIP (2019 VS 2023)

Service	2019 Ridership	2023 Ridership	2023 Ridership as % of 2019
FrontRunner	20,351	11,945	59%
TRAX + S-Line	58,580	31,543	54%
UVX	11,977	7,457	62%
Continued Bus Routes	57,276	47,052	82%
Bus Routes specific to 2019 or 2023	9,386	7,951	85%
Total	157,570	105,948	67%

Origin-Destination Survey

The 2019 Origin-Destination Survey served as the basis for the STOPS imported trip table. These survey data are summarized to represent weighted zone-to-zone flows stratified by car ownership and trip purpose.

MPO Population and Employment

Updated MPO population and employment data for the TechLink STOPS implementation were received from WFRC in the fall of 2023. As shown in Table 2, between 2023 and 2045, population and employment across the entire MPO are expected to grow by 34% and 30%, respectively.¹

TABLE 2: MPO-LEVEL DEMOGRAPHIC CHANGE (2023 – 2045)

Demographic Change	2023	2045	Change	% Growth
Population	2,579,143	3,451,635	872,492	34%
Employment	1,854,347	2,406,164	551,817	30%

MPO Highway Skim File

RSG received updated highway skims from WFRC in the fall of 2023, which were used in the TechLink STOPS model. These skims are outputs from the WFRC model runs from that time for both current and future years.

Walk Shape File

When available, a walk link shapefile can be used in a STOPS model to better represent walking distances and times to and from transit stops. For the TechLink STOPS model, the RSG team used a walk links file provided by WFRC for the 2019 version of the STOPS model. The RSG team inspected the walk links shapefile in the Granary District to ensure potential project trips had appropriate walk network connections.

Census Data

The census data used in the TechLink STOPS model are the 2006-2010 American Community Survey (ACS) Census Transportation Planning Products (CTPP) data prepared by the FTA at the state level specifically for use in STOPS modeling.

¹ Note that as a result of the TechLink TRAX Study, project partners are interested in reviewing and potentially revising socioeconomic data in the WFRC model to more accurately reflect existing and planned future development. An effort to update is expected to occur as this project advances.

Existing Network

The existing network used in the TechLink STOPS model consists of UTA’s bus, TRAX, UVX, and FrontRunner General Transit Feed Specification (GTFS) file representing the December 2022 to April 2023 change period. This existing network does not include planned improvements to the network such as the FrontRunner South Valley Extension, FrontRunner 2X, Point of the Mountain Transit, or additional planned transit improvements in WFRC and MAG’s RTPs and UTA’s Long Range Transit Plan (LRTP).

2.2 STOPS PARAMETERS AND CALIBRATION

The UTA TechLink STOPS model was initially calibrated for the Point of the Mountain Bus Rapid Transit (BRT)/Light Rail Transit (LRT) forecasting done in 2022 (using 2019 stop and route counts). Calibration was then lightly updated when the model was adapted to use 2023 stop and route counts. Table 3 shows the STOPS calibration parameters used in the TechLink model.

TABLE 3: STOPS PARAMETERS

STOPS PARAMETER	SETTING
STOPS Mode	4 (Type 2 Special Market)
CTTP Calibration Approach	02 Prod and Attraction Dist.
Group Calibration Approach	12 - OD Matrix Adj. (Rte&Stop)
GTFS Connectors	04 Walk, PNR, and KNR
Transfer Penalty	1.0
PNR Penalty	0.0
Full Fixed Guideway Setting	1.0
Partial Fixed Guideway Setting	0.1
Ratio of Unlinked to Linked Transit Trips	Linked Trip Totals Provided
Walk Weight	1.0
KNR Transit	0.4
PNR Settings	v2.52 defaults except those listed below
PNR: Maximum Contribution of Circuitry	0.0
PNR: Maximum Contribution of Backtracking	0.75
Auto Time Adjustment Factor	1.0

Table 4 shows high-level calibration results, and Table 5 shows detailed calibration results with respect to trip purpose and access mode shares in the 2019 UTA Origin-Destination Survey.

TABLE 4: HIGH-LEVEL CALIBRATION MEASURES

CALIBRATION METRIC	TARGET	2023 EXISTING STOPS MODEL
Linked Trips	N/A	74,146
Unlinked Trips	105,948	102,568
Unlinked/Linked Ratio	1.32	1.38
Systemwide Adjustment Factor	N/A	.69

TABLE 5: DETAILED CALIBRATION RESULTS

CALIBRATION METRIC	2019 ORIGIN-DESTINATION SURVEY	2023 EXISTING STOPS MODEL
All Trips: Trip Purpose		
HBW%	42.6%	41.9%
HBO %	46.8%	47.1%
NHB %	10.6%	11%
All 0-Car Trips: Trip Purpose		
HBW%	36.3%	36.7%
HBO %	51.1%	51.0%
NHB %	12.6%	12.3%
All Trips: Access Mode		
Walk	82.3%	79.0%
KNR	6.8%	6.2%
PNR	10.8%	14.7%
Fixed Guideway Only: Access Mode		
Walk	72.0%	65.2%
KNR	10.1%	10.7%
PNR	17.9%	24.1%
Fixed Guideway + Bus: Access Mode		
Walk	82.8%	88.6%
KNR	6.5%	6.1%
PNR	10.7%	5.3%

2.3 FORECAST YEARS

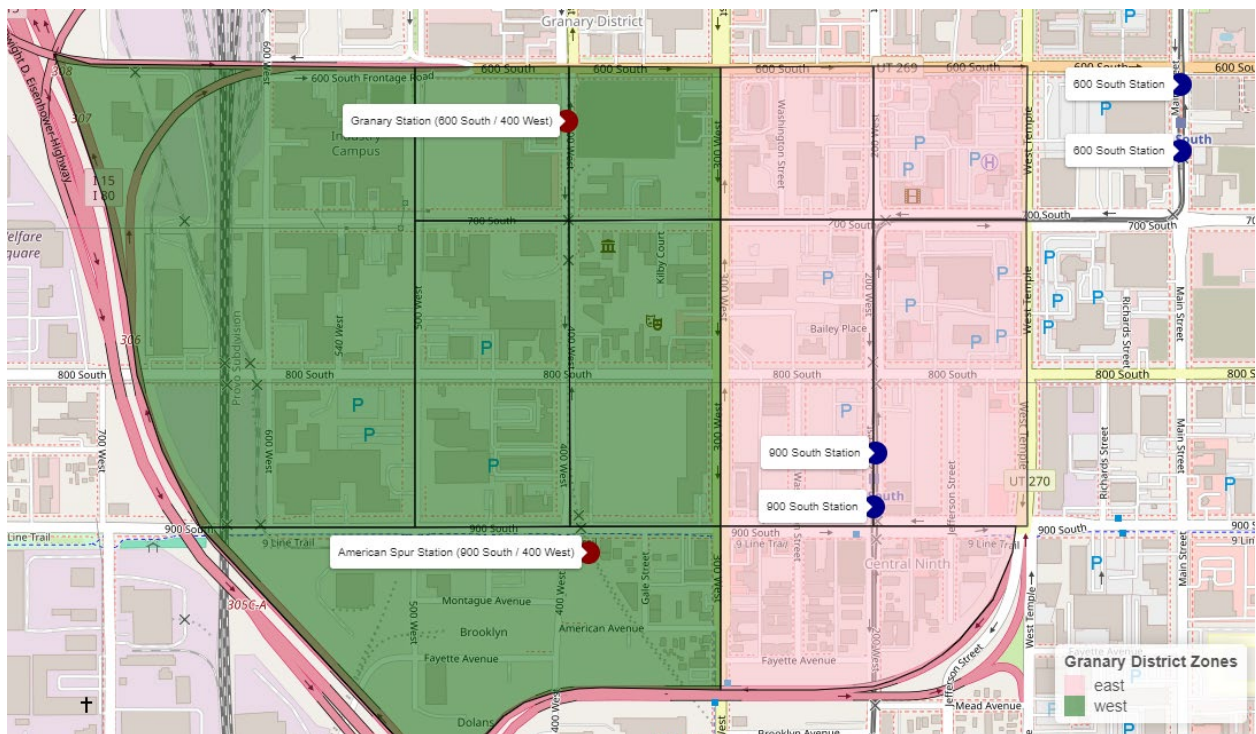
The base year for modeling is set to 2023, to be consistent with the existing transit counts and the transit network GTFS used in the model. The horizon year is set to 2045.

2.4 GRANARY AREA TRIP TABLE CLONING

Of particular interest in the TechLink STOPS model was the forecasted change in ridership in response to the expected shift in land use in the Granary District. STOPS forecasts ridership using present-day trip making characteristics alongside expected changes to population and employment. Without further specification, STOPS may not adequately represent future transit ridership and changes to trip characteristics that result from land use changes such as those expected in the Granary District.

Figure 2 illustrates the boundary of East Granary (red) and West Granary (green). Given the expected shift away from industrial land use in the West Granary, the RSG team determined it was necessary to represent a change in trip making behavior for trips generated in the West Granary. To accomplish this, RSG utilized the “cloning” functionality of STOPS, which allows the user to assert that the trip characteristics of a chosen area match the trip making characteristics of another.

FIGURE 2: EAST AND WEST GRANARY DEFINITION



In this case, cloning was used to impart the West Granary with the trip making characteristics of the presently more developed East Granary. The result of this is that as population grows in the West Granary, the trip profile will resemble the trip profile of the East Granary – an area which already includes TRAX access.

Table 6 and Table 7 show the forecasted population and employment changes in the East and West Granary.

TABLE 6: GRANARY DISTRICT POPULATION CHANGE & EXISTING MODEL TRIP PRODUCTIONS

GRANARY AREA	PRODUCTION				POPULATION		
	All	HBW	HBO	NHB	2023	2045	Change
East Side	789	425	353	11	1,537	3,965	158%
West Side	161	63	73	24	1,075	7,420	590%
Total	950	488	426	36	2,612	11,385	336%

TABLE 7: GRANARY DISTRICT EMPLOYMENT CHANGE & EXISTING MODEL TRIP ATTRACTIONS

GRANARY AREA	ATTRACTIONS				EMPLOYMENT		
	All	HBW	HBO	NHB	2023	2045	Change
East Side	122	80	15	27	3,334	3,036	-9%
West Side	169	50	43	75	3,776	2,113	-44%
Total	291	130	58	103	7,110	5,149	-28%

3.0 NO BUILD AND BUILD NETWORKS

This section details the No Build and Build GTFS networks that were used as inputs to the TechLink STOPS model implementation.

3.1 NO BUILD ALTERNATIVE

The modeled No Build Alternative in both the 2023 base year and the 2045 horizon year are identical to the existing scenario, using the UTA network from the December 2022 to April 2023 change period. Like the existing scenario, the No Build Alternative does not include any improvements to FrontRunner, TRAX, or the bus network.

3.2 BUILD ALTERNATIVES

The RSG team modeled four potential alternatives of UTA’s TRAX light rail network that were developed by the TechLink TRAX Study. The input schedules were developed by Hatch as a part of their rail simulation modeling done for the TechLink project. All four alternatives include adding the new Orange Line, swapping of the Blue and Green Lines on the northern end of the system, and implementing the proposed realignment of the TRAX Red Line from its current location alongside the Blue and Green Lines towards the west through the Granary District along 400 West. See Table 8 for a list of defining features for the Build Alternatives and Figure 3 through Figure 6 for further details.

TABLE 8: COMPARISON OF BUILD ALTERNATIVE FEATURES

MAJOR FEATURE	ALTERNATIVE 1	ALTERNATIVE 2	ALTERNATIVE 3	ALTERNATIVE 4
Addition of Orange Line	X	X	X	X
Realignment of Red Line through Granary District	X	X	X	X
Blue Line Replaces Green along Airport Arm	X	X	X	X
Orange Line Connection with Salt Lake Central Station	X	X		X
Elevated 600 South Red Line Station		X		
Stadium Station Realignment				X

FIGURE 3: BUILD ALTERNATIVE 1 – FUTURE OF LIGHT RAIL BASELINE (DOWNTOWN DETAIL)



FIGURE 4: BUILD ALTERNATIVE 2 – ELEVATED ON 400 WEST (DOWNTOWN DETAIL)

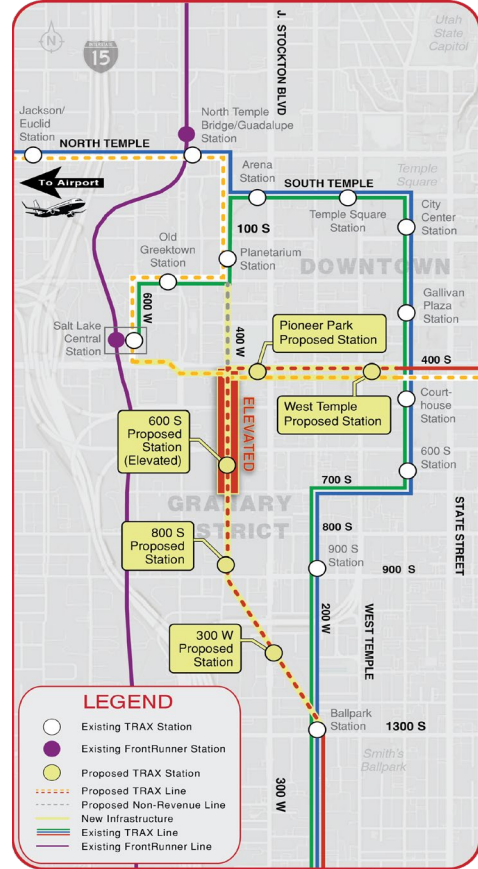


FIGURE 5 : BUILD ALTERNATIVE 3 – DIRECT ON 400 WEST (DOWNTOWN DETAIL)

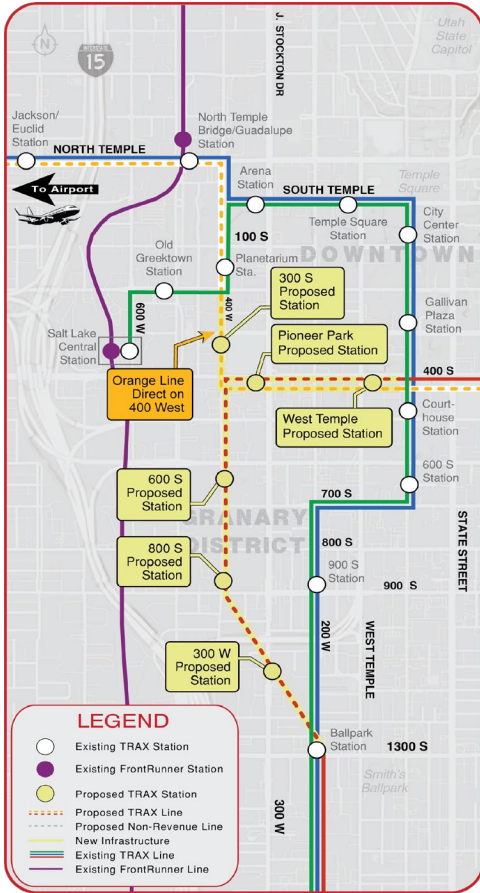
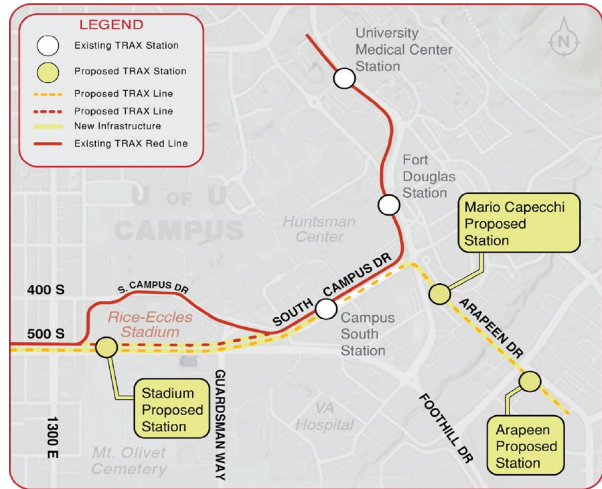


FIGURE 6: BUILD ALTERNATIVE 4 – UNIVERSITY OF UTAH REALIGNMENT (STADIUM DETAIL)



4.0 RIDERSHIP RESULTS

This section includes select results from the STOPS models for the 2023 current year and the 2045 horizon year. Table 9 and Table 10 outline high-level ridership in the 2023 base year and 2045 horizon year for all four Build Alternatives.

Across all four alternatives, linked trips on the project were relatively consistent between Build Alternatives. In the future year, linked trips on project ranged from 5,480 to 5,722. Linked incremental transit trips and new weekday transit trips that would not have been made in the No Build Alternative were also relatively unchanged from one Build Alternative to another. The modeled network improvements resulted in 903 to 948 average daily incremental transit trips in the 2045 horizon year.

The "trips on project" metric represents trips boarding, alighting, or passing through the proposed TechLink project stations. Note that trips on project in Build Alternative 4 includes a realigned Stadium Station while Build Alternatives 1-3 do not. Therefore, results are not perfectly comparable.

4.1 CURRENT YEAR RESULTS (Y2023)

Table 9 contains high-level base year results for each Build Alternative including linked trips, unlinked trips, and trips on project. As previously noted, the "trips on project" metric represents trips boarding, alighting, or passing through the proposed TechLink project stations.

TABLE 9: HIGH-LEVEL RESULTS (2023 BUILD)

2023 AVERAGE WEEKDAY RESULTS	ALTERNATIVE 1	ALTERNATIVE 2	ALTERNATIVE 3	ALTERNATIVE 4*
Linked Transit Trips	74,924	74,906	75,007	74,889
Unlinked Transit Trips	103,519	103,460	103,571	103,371
Incremental Transit Trips: Linked	778	760	861	743
Incremental Transit Trips: Unlinked	951	892	1003	803
Linked Trips on Project	3,476	3,476	3,748	3,763

*Alternative 4 Linked Trips on Project is inclusive of Stadium Station and is therefore not perfectly comparable to trips on project for Alternatives 1-3.

Table 10 presents 2023 route-level and total system boardings for each of the four Build Alternatives.

TABLE 10: HIGH-LEVEL ROUTE RESULTS (2023 BUILD)

ROUTE	EXISTING	NO BUILD	ALTERNATIVE 1	ALTERNATIVE 2	ALTERNATIVE 3	ALTERNATIVE 4
FrontRunner	11,698	11,698	11,846	11,698	12,006	11,847
TRAX Blue	10,623	10,623	12,906	13,019	12,350	12,934
TRAX Green	8,723	8,723	8,874	8,868	8,752	8,828
TRAX Red	11,063	11,063	4,553	4,544	4,559	4,553
TRAX Orange	0	0	5,152	5,023	6,045	5,055
S-Line	1,137	1,137	1,009	1,009	1,077	1,009
Bus	59,324	59,324	59,179	59,176	58,782	59,145
Total Boardings	102,568	102,568	103,519	103,337	103,571	103,371

Table 11 outlines 2023 TRAX station boardings with a focus on stations relevant to the four TechLink Build Alternatives (e.g., TechLink TRAX Study stations and existing stations parallel to new TechLink TRAX Study stations).

TABLE 11: TRAX STATION BOARDINGS: NEW STATIONS AND PARALLEL EXISTING STATIONS (2023 BUILD)

STATION	NEW STATION	EXISTING	NO-BUILD	ALTERNATIVE 1	ALTERNATIVE 2	ALTERNATIVE 3	ALTERNATIVE 4
300 West	Granary: New	0	0	390	389	277	350
300 South	Granary: New	0	0	0	0	205	0
600 South	Granary: New	0	0	78	0	56	78
600 South	Granary: New	0	0	0	76	0	0
800 South	Granary: New	0	0	107	107	137	107
Pioneer Park	Granary: New	0	0	557	558	589	550
West Temple	Granary: New	0	0	485	488	477	469
600 South Station	Granary: Parallel	699	699	331	331	310	331
900 South Station	Granary: Parallel	908	908	564	564	645	564
Ballpark Station	Granary: Parallel	1,344	1,344	1,354	1,354	1,316	1,354
Courthouse Station	Granary: Parallel	1,916	1,916	454	454	527	455
Arapeen Drive	University: New	0	0	237	237	237	236
Mario Capecchi	University: New	0	0	193	193	211	190
Stadium Station (Realignment)	University: New	0	0	0	0	0	187
Stadium Station	University: Parallel	144	144	241	241	226	0
Fort Douglas Station	University: Parallel	331	331	44	44	61	44
University Medical Center	University: Parallel	21	21	16	16	40	16
University South Campus Station	University: Parallel	2,266	2,266	2,452	2,452	2,542	2,423
Other	Other	22,922	22,922	24,266	24,236	24,080	24,376
Total		30,407	30,407	31,488	31,460	31,710	31,730

4.2 FUTURE YEAR RESULTS (Y2045)

Table 12 contains high-level future year results for each build scenario in the 2045 horizon year including linked trips, unlinked trips, and trips on project. As previously noted, the “trips on project” metric represents trips boarding, alighting, or passing through the proposed TechLink project stations.

TABLE 12: HIGH-LEVEL RESULTS (2045 BUILD)

2045 AVERAGE WEEKDAY RESULTS	ALTERNATIVE 1	ALTERNATIVE 2	ALTERNATIVE 3	ALTERNATIVE 4*
Linked Transit Trips	86,834	86,818	86,846	86,801
Unlinked Transit Trips	119,019	118,923	118,913	118,875
Incremental Transit Trips: Linked	936	920	948	903
Incremental Transit Trips: Unlinked	735	639	629	591
Linked Trips on Project	5,480	5,462	5,722	5,697

* Alternative 4 Trips on Project is inclusive of Stadium Station and is therefore not perfectly to trips on project for Alternatives 1-3.

Table 13 summarizes 2045 route-level and total system boardings for each of the four build alternatives.

TABLE 13: HIGH-LEVEL ROUTE RESULTS (2045 BUILD)

ROUTE	EXISTING	NO-BUILD	ALTERNATIVE 1	ALTERNATIVE 2	ALTERNATIVE 3	ALTERNATIVE 4
FrontRunner	11,698	15,283	15,113	15,090	15,219	15,115
TRAX Blue	10,623	13,044	15,471	15,640	15,046	15,500
TRAX Green	8,723	10,922	12,612	12,550	12,564	12,565
TRAX Red	11,063	15,766	5,780	5,760	5,962	5,780
TRAX Orange	0	0	7,222	7,065	7,687	7,127
S-Line	1,137	1,563	1,348	1,348	1,412	1,348
Bus	59,324	61,706	61,473	61,470	61,023	61,440
Total Boardings	102,568	118,284	119,019	118,923	118,913	118,875

Table 14 presents 2045 TRAX station boardings with a focus on stations relevant to the four TechLink build alternatives (e.g., TechLink TRAX Study stations and existing stations parallel to new TechLink TRAX Study stations).

TABLE 14: TRAX STATION BOARDINGS: NEW STATIONS AND PARALLEL EXISTING STATIONS (2045 BUILD)

STATION	NEW STATION	EXISTING	NO-BUILD	ALTERNATIVE 1	ALTERNATIVE 2	ALTERNATIVE 3	ALTERNATIVE 4
300 West	Granary: New	0	0	390	389	262	390
300 South	Granary: New	0	0	0	0	398	0
600 South	Granary: New	0	0	215	0	224	215
600 South	Granary: New	0	0	0	184	0	0
800 South	Granary: New	0	0	371	371	286	371
Pioneer Park	Granary: New	0	0	1,011	995	879	1,006
West Temple	Granary: New	0	0	691	692	690	673
600 South Station	Granary: Parallel	699	1,784	1,123	1,124	1,089	1,123
900 South Station	Granary: Parallel	908	1,513	749	751	895	748
Ballpark Station	Granary: Parallel	1,344	1,249	1,356	1,356	1,221	1,357
Courthouse Station	Granary: Parallel	1,916	2,266	577	576	599	577
Arapeen Drive	University: New	0	0	328	327	325	329
Mario Capecchi	University: New	0	0	298	298	221	296
Stadium Station (Realignment)	University: New	0	0	0	0	0	151
Stadium Station	University: Parallel	144	98	204	204	203	0
Fort Douglas Station	University: Parallel	331	417	51	51	51	51
University Medical Center	University: Parallel	21	13	11	11	26	11
University South Campus Station	University: Parallel	2,266	2,975	3,071	3,069	3,153	3,043
Other	Other	22,778	29,414	30,637	30,612	30,743	30,634
Total		30,407	39,729	41,083	41,010	41,265	40,975

Lastly, Table 15 summarizes horizon year incremental fixed-guideway trips by market.

TABLE 15: 2045 TRIPS BY MARKET (ALL FIXED GUIDEWAY)

MARKETS	EXISTING	NO-BUILD	INCREMENTAL (All-FG)			
			ALTERNATIVE 1	ALTERNATIVE 2	ALTERNATIVE 3	ALTERNATIVE 4
Trips Within Salt Lake County, No End in Downtown	7,952	9,418	545	539	320	529
Trips Between Downtown and University of Utah (TRAX Red/Orange)	4,453	5,796	830	828	837	821
Trips Between Downtown/University of Utah and Salt Lake County	12,249	15,586	234	231	297	147
Granary to Downtown/University of Utah	273	1,200	118	113	116	116
Granary to Other	222	1,028	72	81	78	72
Other Markets	17,559	20,190	11	1	105	12
Total	42,708	53,218	1,810	1,793	1,753	1,697

UTA Techlink STOPS Preliminary Results

DRAFT STOPS Model Results for
TechLink Alternatives 1-4



Last Updated: 9/13/2024

Aaron Lee, Bill Woodford, Ricky Zapata

STOPS

- STOPS is a travel model developed by the Federal Transit Administration (FTA) specifically to evaluate ridership and vehicle miles traveled (VMT) impacts of fixed guideway transit projects
 - Uses existing transit counts/flows, census data and GTFS Networks
 - Fixed Guideway Focus, but detailed system-wide representation
- Historically a high level of success in forecasting ridership for Fixed Guideway projects
 - Calibration against a range of rider-survey datasets
 - Validation against a wide range of projects/systems

UTA Stops Model (2023 Base)

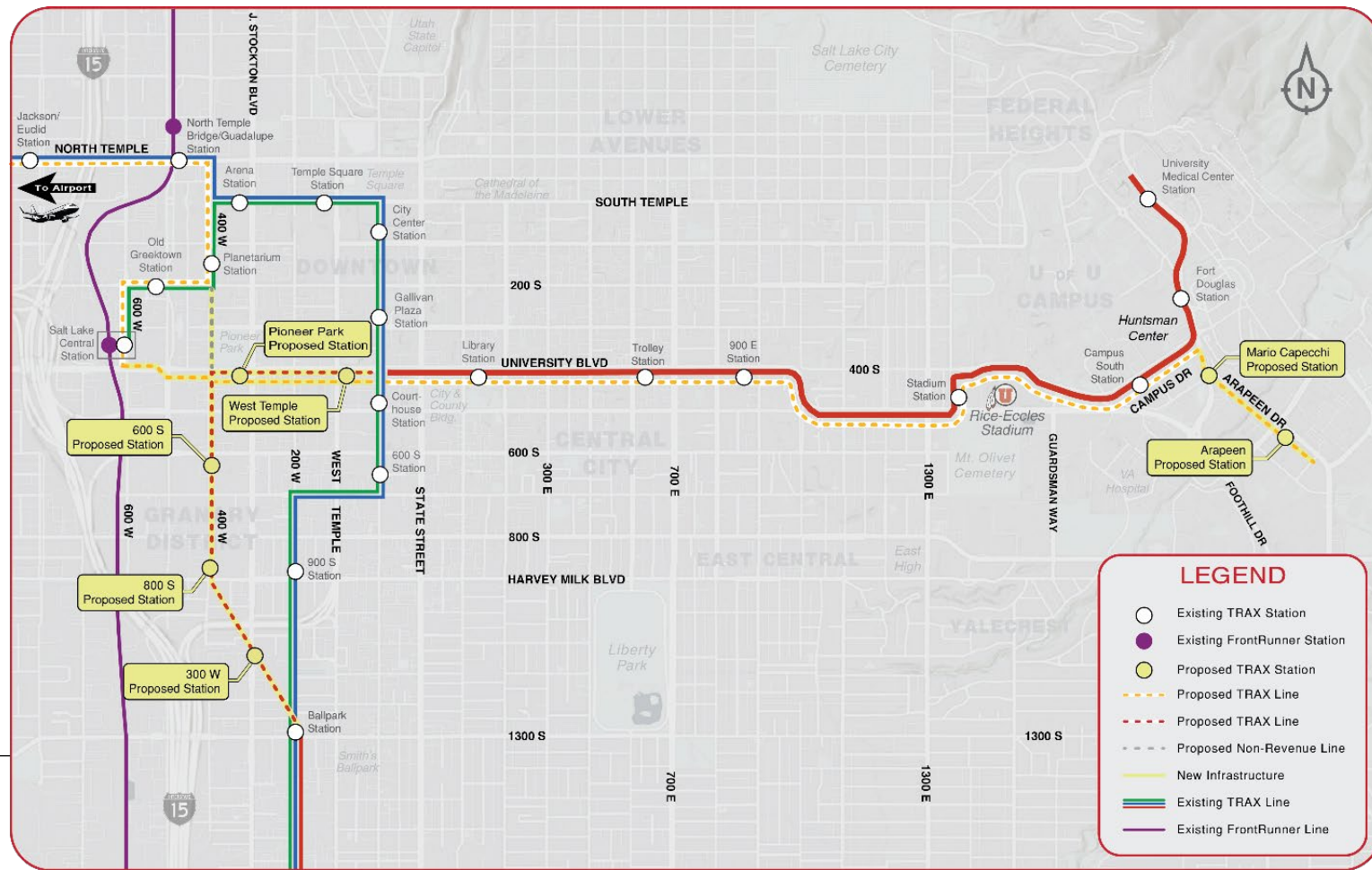
- Existing Transit Network Spring 2023 (11/27/22 through 4/16/2023)
- Route and Stop counts to average weekday Spring 2023 (11/27/22 through 4/16/2023)
- Population and Employment Forecasts (provided by WFRC – up to date per mid 2023)
- Automobile Skims (from latest WFRC model – up to date per mid 2023)
- Underlying OD Survey (2019) has not been updated - consistent with FTA standard
- Forecast years: 2023 and 2045

UTA Stops Model: Techlink Specifics

- No-Build Network - Spring 2023 UTA network
- Build Network - New TRAX Schedule for Red, Green Blue and new Orange Line
- Cloning - used in the Granary district to better represent trips in areas with growing population
- STOPS “Trips on Project” (trips boarding, alighting or passing through project stations)
 - Definition: All new stops (Granary Stops and University)

Build Network

- Build Network = New TRAX Schedule for Red, Green Blue and new Orange Line



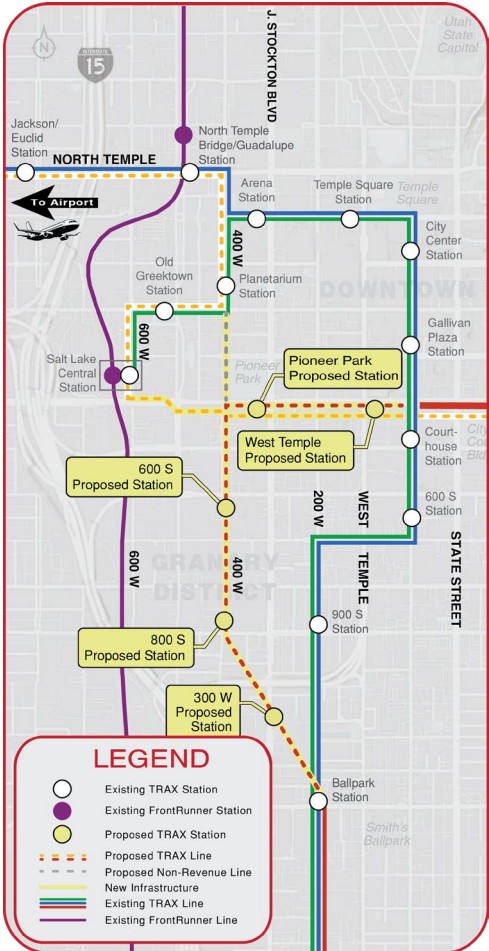
Station Group	Existing Boarding headway	Build Boarding Headway	Difference
Red/Orange to University	15	7.5	add orange
Blue/Red Trunk	7.5	7.5	
Blue/Red/Green Trunk	5	7.5	red through granary
Blue/Green Downtown (To Arena)	7.5	7.5	
Blue South End	15	15	
Red South End	15	15	
Green South End	15	15	
Blue (Green) to SLC	15	7.5	add orange
Green (Blue) to Airport	15	7.5	add orange
New Granary	NA	7.5/15	depending on station

Peak Headway	Existing	Build
Blue Line	15	15
Red Line	15	15
Green Line	15	15
Orange Line		15

Build Network

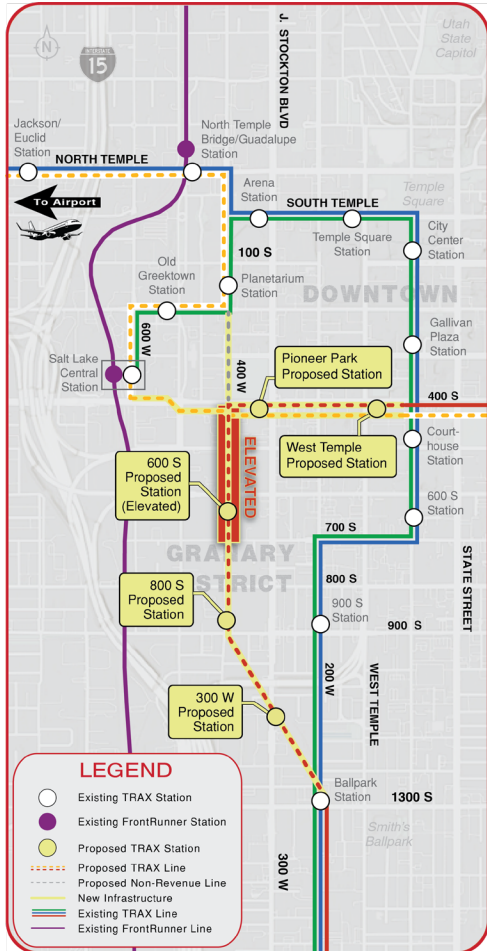
Alternative 1

- Orange Line to Salt Lake Central



Alternative 2

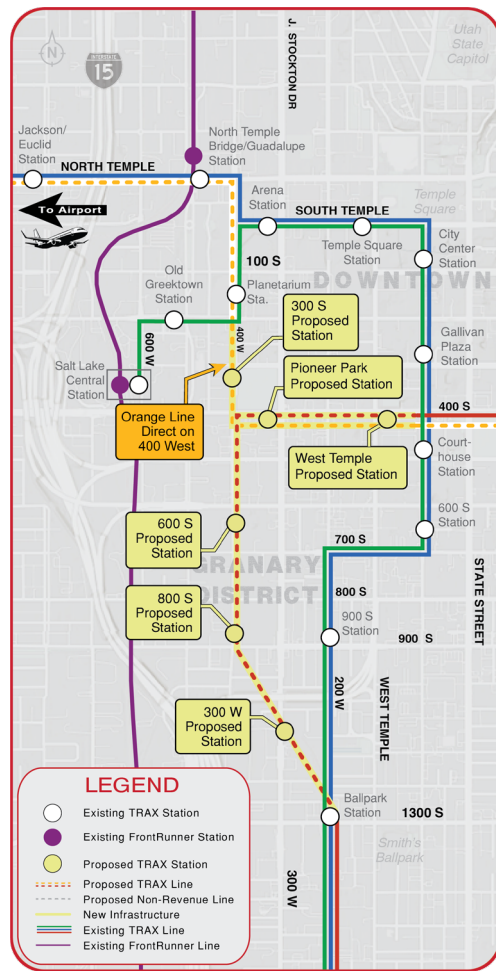
- Elevated station coded in STOPS as type 3 (one floor up)



Build Network

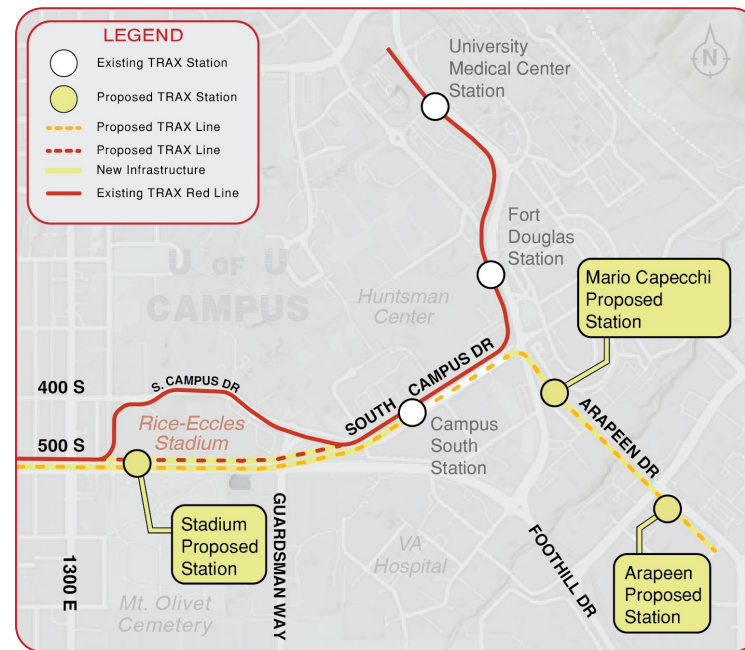
Alternative 3

- Orange Line direct on 400 West



Alternative 4

- Realignment of Red/Orange Line - Stadium Station



Results Summary

High Level Results for Techlink Alternatives
1-4



High Level Results

2023 Results	2023: Alternative 1	2023: Alternative 2	2023: Alternative 3	2023: Alternative 4
*** WEEKDAY LINKED TRANSIT TRIPS (All Transit/All car HH) ***	74,924	74,906	75,007	74,889
*** WEEKDAY UNLINKED TRANSIT TRIPS (All Transit/All car HH) ***	103,519	103,460	103,571	103,371
*** WEEKDAY INCREMENTAL LINKED TRANSIT TRIPS (All Transit/All car HH) (VS. NO-BUILD) ***	778	760	861	743
*** WEEKDAY INCREMENTAL UNLINKED TRANSIT TRIPS (All Transit/All car HH) (VS. NO-BUILD) ***	951	892	1,003	803
*** WEEKDAY LINKED TRANSIT TRIPS ON PROJECT (All Transit/All car HH)***	3,476	3,476	3,748	3,763

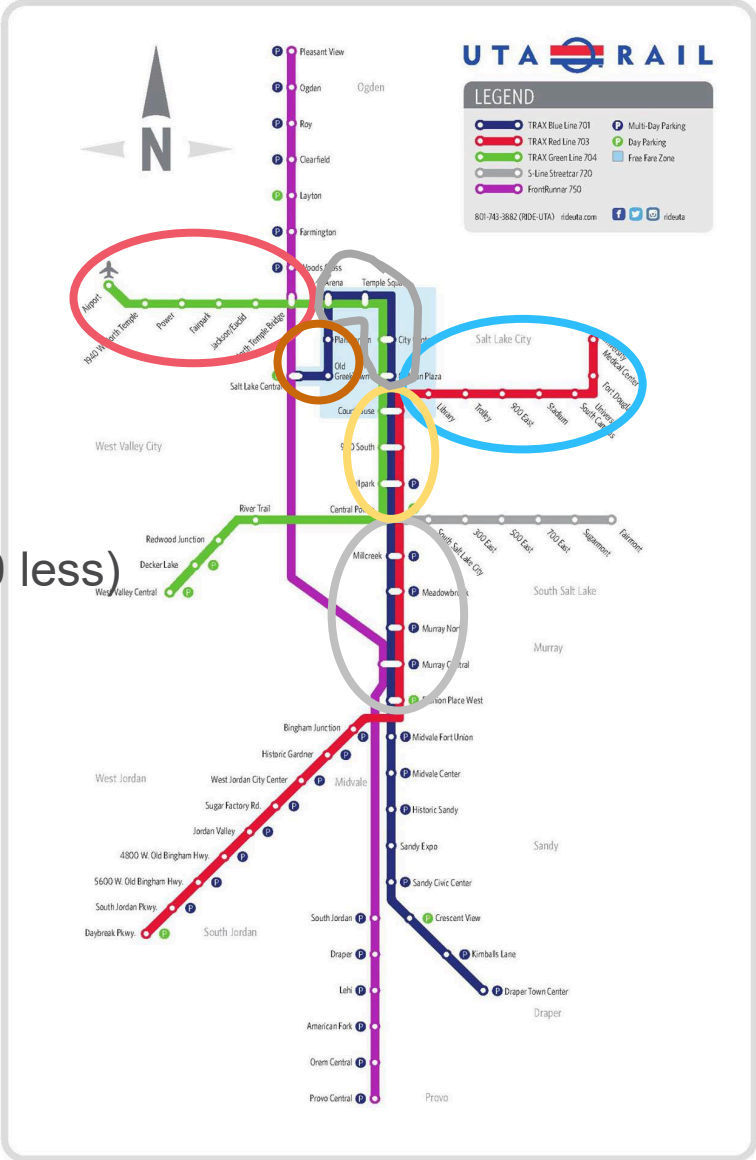
2045 Results	2045: Alternative 1	2045: Alternative 2	2045: Alternative 3	2045: Alternative 4
*** WEEKDAY LINKED TRANSIT TRIPS (All Transit/All car HH) ***	86,834	86,818	86,846	86,801
*** WEEKDAY UNLINKED TRANSIT TRIPS (All Transit/All car HH) ***	119,019	118,923	118,913	118,875
*** WEEKDAY INCREMENTAL LINKED TRANSIT TRIPS (All Transit/All car HH) (VS. NO-BUILD) ***	936	920	948	903
*** WEEKDAY INCREMENTAL UNLINKED TRANSIT TRIPS (All Transit/All car HH) (VS. NO-BUILD) ***	735	639	629	591
*** WEEKDAY LINKED TRANSIT TRIPS ON PROJECT (All Transit/All car HH)***	5,480	5,462	5,722	5,697

Station Level Results Summary

2045 Boardings

- Red/Orange Branch +20% boardings
- To Salt Lake Central +30% alternative 1, -30% alternative 3
- To Airport +8% alternative 1, +25% alternative 3
- Red/Orange/Green Trunk -44% boardings
 - New Granary Stops don't quite make up difference (250-350 less)

Station Group	Existing	Build 2045 No Build 2045	Build 2045 (Alternative 1)	Build 2045 (Alternative 2)	Build 2045 (Alternative 3)	Build 2045 (Alternative 4)
Red Orange to University	4,367	5,759	6,873	6,869	6,995	6,773
Blue Red Trunk	6,297	8,204	8,515	8,516	8,796	8,532
Courthouse/900 S/ Ballpark	4,867	6,812	3,805	3,807	3,804	3,805
New Granary	0	0	2,678	2,631	2,739	2,655
Blue Green Downtown (To Arena)	4,772	5,683	5,173	5,174	5,340	5,188
Blue South End	2,556	2,789	3,008	3,008	2,799	3,009
Red South End	1,947	3,286	3,158	3,158	3,273	3,159
Green South End	1,414	1,744	1,626	1,626	1,607	1,626
Blue (Green) to SLC	1,072	1,602	2,088	1,897	1,132	2,087
Green (Blue) to Airport	3,115	3,850	4,159	4,324	4,780	4,141



Linked Trips by Mode 2045

- Build Scenario has ~1,800 more total Fixed Guideway (TRAX, Frontrunner, UVX) Trips
- Half come from bus only trips, half are new

	Existing	No-Build 2045	Build Linked Trips				Incremental Linked Trips			
			Alternative 1 2045	Alternative 2 2045	Alternative 3 2045	Alternative 4 2045	Alternative 1 2045	Alternative 2 2045	Alternative 3 2045	Alternative 4 2045
FG Only Linked Trips	32,992	42,449	43,638	43,626	43,769	43,634	1,189	1,177	1,320	1,185
FG + Bus Linked Trips	9,738	10,801	11,418	11,412	11,244	11,313	617	611	443	512
Bus Only Linked Trips	31,416	32,648	31,778	31,780	31,833	31,833	-870	-868	-815	-815
<i>Total</i>	<i>74,146</i>	<i>85,898</i>	<i>86,834</i>	<i>86,818</i>	<i>86,846</i>	<i>86,801</i>	<i>936</i>	<i>920</i>	<i>948</i>	<i>903</i>

All Fixed Guideway: 2045 No-Build

No-Build

Trips within Salt Lake County, no end in Downtown/UofU

Frontrunner, UVX and Frontrunner/TRAX Transfers

Trips between Downtown/UofU and Salt Lake County

TL5v2 (2045): No-Build	South Utah	N of SLC	External	Hemm, Draper, Bluff	WJ, Sandy, CWH	W SLC	SE SLC	Downtown	UofU	Gran	Total
South Utah	7,816	141	0	355	249	512	223	2,293	769	2	12,360
N of SLC	283	1,297	0	135	53	562	211	1,640	207	11	4,399
External	308	190	0	12	80	48	115	284	39	0	1,076
Hemm, Draper, Bluff	316	92	0	13	474	210	610	1,586	1,081	9	4,391
WJ, Sandy, CWH	188	185	0	909	537	233	495	1,852	440	3	4,842
W SLC	135	212	0	349	341	937	686	2,274	306	15	5,255
SE SLC	303	306	0	757	850	570	1,447	3,071	856	24	8,184
Downtown	136	243	0	465	673	1,102	1,246	3,215	1,817	7	8,904
UofU	31	39	0	254	52	86	242	648	116	7	1,475
Gran	5	99	0	13	0	763	252	711	489	0	2,332
Total	9,521	2,804	0	3,262	3,309	5,023	5,527	17,574	6,120	78	53,218

Trips between Downtown and UofU (Trax Red/Orange)

Trips Starting or Ending in Granary District

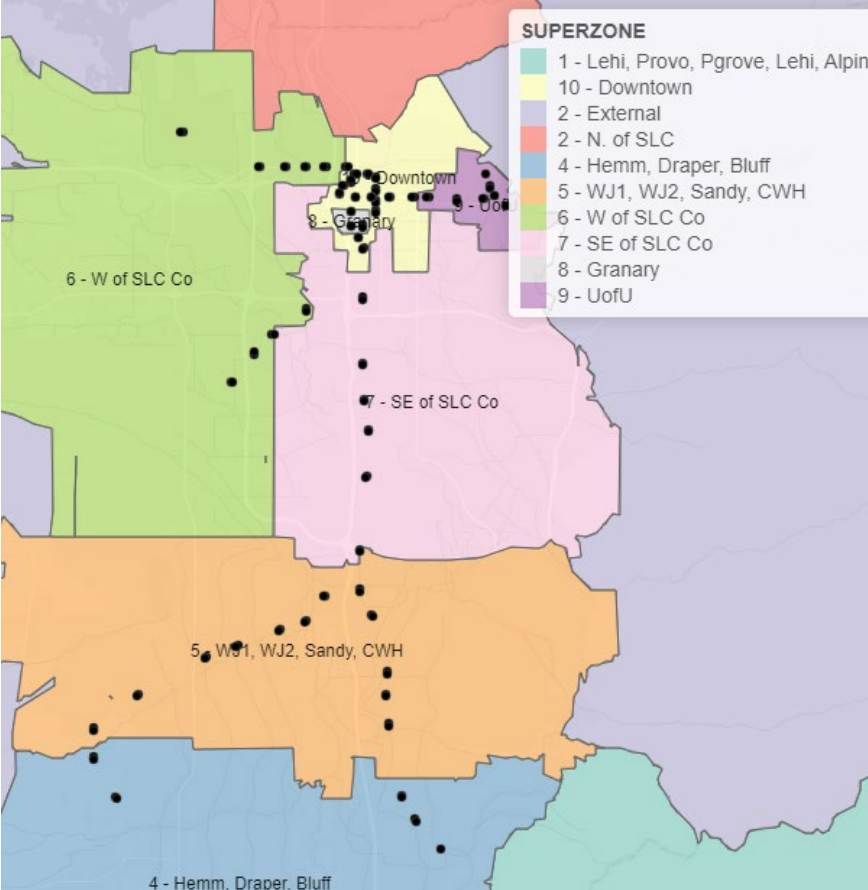
2045 Incremental Fixed Guideway Trips: Main Markets

Markets	Existing (All-FG)	No-Build 2045 (All-FG)	Alternative 1 Incremental (All-FG)	Alternative 2 Incremental (All-FG)	Alternative 3 Incremental (All-FG)	Alternative 4 Incremental (All-FG)
Trips within Salt Lake County, no end in Downtown	7,952	9,418	545	539	320	529
Trips between Downtown and UofU (Trax Red/Orange)	4,453	5,796	830	828	837	821
Trips between Downtown/UofU and Salt Lake County	12,249	15,586	234	231	297	147
Granary to Downtown / UofU	273	1,200	118	113	116	116
Granary to Other	222	1,028	72	81	78	72
Other Markets	17,559	20,190	11	1	105	12
Total	42,708	53,218	1,810	1,793	1,753	1,697

+20%

+40%

+32% / +90%





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2023 Results

2023 Results for Techlink Alternatives 1-4



2023 High Level Results

	2023: Alternative 1	2023: Alternative 2	2023: Alternative 3	2023: Alternative 4
*** WEEKDAY LINKED TRANSIT TRIPS (All Transit/All car HH) ***	74,924	74,906	75,007	74,889
*** WEEKDAY UNLINKED TRANSIT TRIPS (All Transit/All car HH) ***	103,519	103,460	103,571	103,371
*** WEEKDAY INCREMENTAL LINKED TRANSIT TRIPS (All Transit/All car HH) (VS. NO-BUILD) ***	778	760	861	743
*** WEEKDAY INCREMENTAL UNLINKED TRANSIT TRIPS (All Transit/All car HH) (VS. NO-BUILD) ***	951	892	1,003	803
*** WEEKDAY LINKED TRANSIT TRIPS ON PROJECT (All Transit/All car HH)***	3,476	3,476	3,748	3,763
*** WEEKDAY LINKED TRANSIT TRIPS ON PROJECT (All Transit/0-car HH)***	1,276	1,278	1,581	1,350
*** WEEKDAY LINKED TRANSIT TRIPS ON PROJECT (All Transit/1-2-car HH)***	2,200	2,198	2,167	2,413
Weighted trips on project	4,752	4,754	5,329	5,113
Incremental WEEKDAY AUTOMOBILE PMT	-11,023	-10,244	-16,712	-10,337
Incremental Weekday Auto VMT (PMT/1.1)	-10,021	-9,313	-15,193	-9,397

2023 Route Results

--Route Name	Existing	No-Build 2023	Build – No-		Build – No-		Build – No-		Build – No-	
			Build (Alternative 1)	Build (Alternative 1)	Build (Alternative 2)	Build (Alternative 2)	Build (Alternative 3)	Build (Alternative 3)	Build (Alternative 4)	Build (Alternative 4)
750-FRONTRUNNER	11,698	11,698	11,846	148	11,821	123	12,006	308	11,847	149
<i>Total Frontrunner</i>	<i>11,698</i>	<i>11,698</i>	<i>11,846</i>	<i>148</i>	<i>11,821</i>	<i>123</i>	<i>12,006</i>	<i>308</i>	<i>11,847</i>	<i>149</i>
701-BLUE LINE	10,623	10,623	12,906	2,283	13,019	2,396	12,350	1,727	12,934	2,311
704-GREEN LINE	8,723	8,723	8,874	151	8,868	145	8,752	29	8,828	105
703-RED LINE	11,063	11,063	4,553	-6,510	4,544	-6,519	4,559	-6,504	4,553	-6,510
720-S-LINE	1,137	1,137	1,009	-128	1,009	-128	1,077	-60	1,009	-128
705-ORANGE LINE	0	0	5,152	5,152	5,023	5,023	6,045	6,045	5,055	5,055
<i>Total Trax</i>	<i>31,546</i>	<i>31,546</i>	<i>32,494</i>	<i>948</i>	<i>32,463</i>	<i>917</i>	<i>32,783</i>	<i>1,237</i>	<i>32,379</i>	<i>833</i>
830X-- UVX	7,481	7,481	7,485	4	7,485	4	7,479	-2	7,485	4
<i>Total for UVX</i>	<i>7,481</i>	<i>7,481</i>	<i>7,485</i>	<i>4</i>	<i>7,485</i>	<i>4</i>	<i>7,479</i>	<i>-2</i>	<i>7,485</i>	<i>4</i>
<i>All Other Routes</i>	<i>51,843</i>	<i>51,843</i>	<i>51,694</i>	<i>-149</i>	<i>51,691</i>	<i>-152</i>	<i>51,303</i>	<i>-540</i>	<i>51,660</i>	<i>-183</i>
System Total Boardings	102,568	102,568	103,519	951	103,460	892	103,571	1,003	103,371	803

TRAX STOP Analysis

2023

Station	Existing	No-Build	TL5v2 (2023): Alternative 1	TL5v2 (2023): Alternative 2	TL5v2 (2023): Alternative 3	TL5v2 (2023): Alternative 4	
300 West (Proposed)		0	0	390	389	277	350
300 South (Proposed)		0	0	0	0	205	0
600 South (Proposed)		0	0	78	0	56	78
600 South (Proposed, Elevated)		0	0	0	76	0	0
800 South (Proposed)		0	0	107	107	137	107
Pioneer Park (Proposed)		0	0	557	558	589	550
West Temple (Proposed)		0	0	485	488	477	469
600 South Station		699	699	331	331	310	331
900 South Station		908	908	564	564	645	564
Ballpark Station		1,344	1,344	1,354	1,354	1,316	1,354
Courthouse Station		1,916	1,916	454	454	527	455
Arapeen (Proposed)		0	0	237	237	237	236
Mario Capecchi (Proposed)		0	0	193	193	211	190
Fort Douglas Station		331	331	44	44	61	44
Stadium Station		144	144	241	241	226	0
Stadium Station (Realignment)		0	0	0	0	0	187
University Medical Center		21	21	16	16	40	16
University South Campus Station		2,266	2,266	2,452	2,452	2,542	2,423
Other		22,922	22,922	24,266	24,236	24,080	24,376
Total		30,407	30,407	31,488	31,460	31,710	31,730

Station Group	Existing	No-Build Y2023	TL5v2 (2023): Alternative 1	TL5v2 (2023): Alternative 2	TL5v2 (2023): Alternative 3	TL5v2 (2023): Alternative 4	
New Granary		0	0	1,577	1,579	1,741	1,554
Granary Parellels		4,867	4,867	2,703	2,703	2,798	2,704
New University		0	0	430	430	448	613
University Parallels		2,618	2,618	2,512	2,512	2,643	2,483
All Other Stations		22,922	22,922	24,266	24,236	24,080	24,016
Total		30,407	30,407	31,488	31,460	31,710	31,370

2045 Results

2045 Results for Techlink Alternatives 1-4



2045 High Level Results

	2045: Alternative 1	2045: Alternative 2	2045: Alternative 3	2045: Alternative 4
*** WEEKDAY LINKED TRANSIT TRIPS (All Transit/All car HH) ***	86,834	86,818	86,846	86,801
*** WEEKDAY UNLINKED TRANSIT TRIPS (All Transit/All car HH) ***	119,019	118,923	118,913	118,875
*** WEEKDAY INCREMENTAL LINKED TRANSIT TRIPS (All Transit/All car HH) (VS. NO-BUILD) ***	936	920	948	903
*** WEEKDAY INCREMENTAL UNLINKED TRANSIT TRIPS (All Transit/All car HH) (VS. NO-BUILD) ***	735	639	629	591
*** WEEKDAY LINKED TRANSIT TRIPS ON PROJECT (All Transit/All car HH)***	5,480	5,462	5,722	5,697
*** WEEKDAY LINKED TRANSIT TRIPS ON PROJECT (All Transit/0-car HH)***	1,708	1,712	2,120	1,761
*** WEEKDAY LINKED TRANSIT TRIPS ON PROJECT (All Transit/1-2-car HH)***	3,772	3,750	3,602	3,936
Weighted trips on project	7,188	7,174	7,842	7,458
Incremental WEEKDAY AUTOMOBILE PMT	-8,070	-7,315	-12,483	-7,406
Incremental Weekday Auto VMT (PMT/1.1)	-7,336	-6,650	-11,348	-6,733

2045 Route Results

--Route Name	Existing	No-Build 2045	Build – No- Build		Build – No- Build		Build – No- Build		Build – No- Build	
			(Alternative 1)	(Alternative 1)	(Alternative 2)	(Alternative 2)	(Alternative 3)	(Alternative 3)	(Alternative 4)	(Alternative 4)
750-FRONTRUNNER	11,698	15,283	15,113	-170	15,090	-193	15,219	-64	15,115	-168
<i>Total Frontrunner</i>	<i>11,698</i>	<i>15,283</i>	<i>15,113</i>	<i>-170</i>	<i>15,090</i>	<i>-193</i>	<i>15,219</i>	<i>-64</i>	<i>15,115</i>	<i>-168</i>
701-BLUE LINE	10,623	13,044	15,471	2,427	15,640	2,596	15,046	2,002	15,500	2,456
704-GREEN LINE	8,723	10,922	12,612	1,690	12,550	1,628	12,564	1,642	12,565	1,643
703-RED LINE	11,063	15,766	5,780	-9,986	5,760	-10,006	5,962	-9,804	5,780	-9,986
720-S-LINE	1,137	1,563	1,348	-215	1,348	-215	1,412	-151	1,348	-215
705-ORANGE LINE	0	0	7,222	7,222	7,065	7,065	7,687	7,687	7,127	7,127
<i>Total Trax</i>	<i>31,546</i>	<i>41,295</i>	<i>42,433</i>	<i>1,138</i>	<i>42,363</i>	<i>1,068</i>	<i>42,671</i>	<i>1,376</i>	<i>42,320</i>	<i>1,025</i>
830X-- UVX	7,481	7,061	7,052	-9	7,052	-9	7,046	-15	7,052	-9
<i>Total for UVX</i>	<i>7,481</i>	<i>7,061</i>	<i>7,052</i>	<i>-9</i>	<i>7,052</i>	<i>-9</i>	<i>7,046</i>	<i>-15</i>	<i>7,052</i>	<i>-9</i>
<i>All Other Routes</i>	<i>51,843</i>	<i>54,645</i>	<i>54,421</i>	<i>-224</i>	<i>54,418</i>	<i>-227</i>	<i>53,977</i>	<i>-668</i>	<i>54,388</i>	<i>-257</i>
System Total Boardings	102,568	118,284	119,019	735	118,923	639	118,913	629	118,875	591

TRAX STOP Analysis

2045

Station	Existing	No-Build	TL5v2 (2045): Alternative 1	TL5v2 (2045): Alternative 2	TL5v2 (2045): Alternative 3	TL5v2 (2045): Alternative 4	
300 West (Proposed)		0	0	390	389	262	390
300 South (Proposed)		0	0	0	0	398	0
600 South (Proposed)		0	0	215	0	224	215
600 South (Proposed, Elevated)		0	0	0	184	0	0
800 South (Proposed)		0	0	371	371	286	371
Pioneer Park (Proposed)		0	0	1,011	995	879	1,006
West Temple (Proposed)		0	0	691	692	690	673
600 South Station		699	1,784	1,123	1,124	1,089	1,123
900 South Station		908	1,513	749	751	895	748
Ballpark Station		1,344	1,249	1,356	1,356	1,221	1,357
Courthouse Station		1,916	2,266	577	576	599	577
Arapeen (Proposed)		0	0	328	327	325	329
Mario Capecchi (Proposed)		0	0	298	298	221	296
Fort Douglas Station		331	417	51	51	51	51
Stadium Station		144	98	204	204	203	0
Stadium Station (Realignment)		0	0	0	0	0	151
University Medical Center		21	13	11	11	26	11
University South Campus Station		2,266	2,975	3,071	3,069	3,153	3,043
Other		22,778	29,414	30,637	30,612	30,743	30,634
Total		30,407	39,729	41,083	41,010	41,265	40,975

Station Group	Existing	No-Build Y2045	TL5v2 (2045): Alternative 1	TL5v2 (2045): Alternative 2	TL5v2 (2045): Alternative 3	TL5v2 (2045): Alternative 4	
New Granary		0	0	2,678	2,631	2,739	2,655
Granary Parellels		4,867	6,812	3,805	3,807	3,804	3,805
New University		0	0	626	625	546	776
University Parallels		2,762	3,503	3,337	3,335	3,433	3,105
All Other Stations		22,778	29,414	30,637	30,612	30,743	30,634
Total		30,407	39,729	41,083	41,010	41,265	40,975

All Fixed Guideway: 2045 Existing

Existing

TL5v2 (2045): Existing	South Utah	N of SLC	External	Hemm, Draper, Bluff	WJ, Sandy, CWH	W SLC	SE SLC	Downtown	UofU	Gran	Total
South Utah	7,571	139	0	213	220	387	199	1,728	249	1	10,707
N of SLC	297	1,057	0	65	65	517	221	1,234	325	19	3,800
External	243	32	0	9	35	33	58	163	27	0	600
Hemm, Draper, Bluff	328	78	0	7	321	151	463	1,213	659	11	3,231
WJ, Sandy, CWH	276	167	0	586	496	206	557	1,269	547	3	4,107
W SLC	153	219	0	207	317	869	773	1,793	424	31	4,786
SE SLC	303	274	0	436	744	537	1,282	2,433	754	29	6,792
Downtown	155	231	0	216	560	898	1,163	2,241	1,515	59	7,038
UofU	42	38	0	29	48	66	177	376	321	11	1,108
Gran	1	43	0	50	10	43	119	195	78	0	539
Total	9,369	2,278	0	1,818	2,816	3,707	5,012	12,645	4,899	164	42,708

All Fixed Guideway: 2045 No-Build

No-Build

TL5v2 (2045): No-Build	South Utah	N of SLC	External	Hemm, Draper, Bluff	WJ, Sandy, CWH	W SLC	SE SLC	Downtown	UofU	Gran	Total
South Utah	7,816	141	0	355	249	512	223	2,293	769	2	12,360
N of SLC	283	1,297	0	135	53	562	211	1,640	207	11	4,399
External	308	190	0	12	80	48	115	284	39	0	1,076
Hemm, Draper, Bluff	316	92	0	13	474	210	610	1,586	1,081	9	4,391
WJ, Sandy, CWH	188	185	0	909	537	233	495	1,852	440	3	4,842
W SLC	135	212	0	349	341	937	686	2,274	306	15	5,255
SE SLC	303	306	0	757	850	570	1,447	3,071	856	24	8,184
Downtown	136	243	0	465	673	1,102	1,246	3,215	1,817	7	8,904
UofU	31	39	0	254	52	86	242	648	116	7	1,475
Gran	5	99	0	13	0	763	252	711	489	0	2,332
Total	9,521	2,804	0	3,262	3,309	5,023	5,527	17,574	6,120	78	53,218

All Fixed Guideway: 2045 Build

Build (Alternative 1)

TL5v2 (2045): Build (Alternative 1)	South Utah	N of SLC	External	Hemm, Draper, Bluff	WJ, Sandy, CWH	W SLC	SE SLC	Downtown	UofU	Gran	Total
South Utah	7,816	143	0	292	250	562	222	2,232	686	2	12,205
N of SLC	283	1,297	0	129	55	571	223	1,749	208	10	4,525
External	308	190	0	12	83	50	110	278	46	0	1,077
Hemm, Draper, Bluff	314	90	0	14	501	230	644	1,594	971	8	4,366
WJ, Sandy, CWH	185	176	0	891	537	333	517	1,966	415	3	5,023
W SLC	142	224	0	357	396	919	788	2,347	416	14	5,603
SE SLC	319	334	0	800	876	596	1,560	3,028	884	28	8,425
Downtown	140	247	0	448	730	1,119	1,283	3,529	1,880	7	9,383
UofU	31	38	0	223	55	124	210	792	423	7	1,903
Gran	6	99	0	12	0	813	275	812	505	0	2,522
Total	9,544	2,838	0	3,178	3,483	5,317	5,832	18,327	6,434	79	55,032

All Fixed Guideway: 2045 Build

Build (Alternative 2)

TL5v2 (2045): Build (Alternative 3)	South Utah	N of SLC	External	Hemm, Draper, Bluff	WJ, Sandy, CWH	W SLC	SE SLC	Downtown	UofU	Gran	<i>Total</i>
South Utah	7,816	143	0	292	250	552	222	2,232	686	2	12,195
N of SLC	283	1,297	0	129	55	569	223	1,749	208	10	4,523
External	308	190	0	12	83	50	110	278	46	0	1,077
Hemm, Draper, Bluff	314	90	0	14	501	227	644	1,593	971	8	4,362
WJ, Sandy, CWH	185	176	0	891	537	331	517	1,965	415	3	5,020
W SLC	142	224	0	357	396	919	788	2,347	416	14	5,603
SE SLC	319	334	0	800	876	595	1,560	3,029	884	26	8,423
Downtown	140	247	0	448	729	1,119	1,282	3,531	1,880	6	9,382
UofU	31	38	0	223	55	124	210	791	423	7	1,902
Gran	6	99	0	12	0	823	274	812	502	0	2,528
Total	9,544	2,838	0	3,178	3,482	5,309	5,830	18,327	6,431	76	55,015

All Fixed Guideway: 2045 Build

Build (Alternative 3)

TL5v2 (2045): Build (Alternative 3)	South Utah	N of SLC	External	Hemm, Draper, Bluff	WJ, Sandy, CWH	W SLC	SE SLC	Downtown	UofU	Gran	<i>Total</i>
South Utah	7,816	142	0	299	238	548	225	2,366	692	2	12,328
N of SLC	283	1,297	0	132	47	597	212	1,635	295	11	4,509
External	308	190	0	12	74	47	112	266	51	0	1,060
Hemm, Draper, Bluff	319	88	0	13	484	228	625	1,591	943	8	4,299
WJ, Sandy, CWH	181	168	0	962	559	309	444	1,858	418	3	4,902
W SLC	139	220	0	380	398	927	747	2,356	422	15	5,604
SE SLC	315	346	0	799	846	529	1,491	3,247	897	35	8,505
Downtown	135	253	0	440	676	1,148	1,280	3,528	1,929	6	9,395
UofU	30	46	0	229	47	116	211	769	408	7	1,863
Gran	5	101	0	12	0	821	275	814	502	0	2,530
Total	9,531	2,851	0	3,278	3,369	5,270	5,622	18,430	6,557	87	54,995

All Fixed Guideway: 2045 Build

Build (Alternative 4)

TL5v2 (2045): Build (Alternative 3)	South Utah	N of SLC	External	Hemm, Draper, Bluff	WJ, Sandy, CWH	W SLC	SE SLC	Downtown	UofU	Gran	Total
South Utah	7,816	143	0	292	250	562	222	2,232	685	2	12,204
N of SLC	283	1,297	0	129	55	571	223	1,749	208	10	4,525
External	308	190	0	12	83	50	110	278	45	0	1,076
Hemm, Draper, Bluff	314	90	0	14	501	230	646	1,594	971	8	4,368
WJ, Sandy, CWH	185	176	0	892	537	333	517	1,966	411	3	5,020
W SLC	142	224	0	357	395	919	788	2,346	381	14	5,566
SE SLC	319	334	0	800	876	596	1,546	3,014	873	28	8,386
Downtown	140	247	0	448	728	1,119	1,277	3,529	1,876	7	9,371
UofU	31	38	0	223	55	113	209	791	421	7	1,888
Gran	6	99	0	12	0	813	275	812	505	0	2,522
Total	9,544	2,838	0	3,179	3,480	5,306	5,813	18,311	6,376	79	54,926

All Fixed Guideway: 2045 Incremental

Incremental (Alternative 1)

TL5v2 (2045): Incremental (Alternative 1)	South Utah	N of SLC	External	Hemm, Draper, Bluff	WJ, Sandy, CWH	W SLC	SE SLC	Downtown	UofU	Gran	Total
South Utah	0	0	0	-62	1	46	-1	-64	-83	0	-163
N of SLC	0	0	0	-7	0	5	10	106	0	0	114
External	0	0	0	0	3	0	-4	-7	7	0	-1
Hemm, Draper, Bluff	-1	-3	0	1	30	20	34	7	-109	-1	-22
WJ, Sandy, CWH	-4	-5	0	-17	1	101	23	114	-26	0	187
W SLC	4	13	0	8	59	-16	100	74	111	0	353
SE SLC	18	27	0	40	27	25	109	-42	29	5	238
Downtown	4	5	0	-17	58	17	38	315	64	0	484
UofU	-1	0	0	-32	4	38	-30	144	307	-1	429
Gran	1	0	0	-1	0	50	23	102	16	0	191
Total	21	37	0	-87	183	286	302	749	316	3	1,810

All Fixed Guideway: 2045 Incremental

Incremental (Alternative 2)

TL5v2 (2045): Incremental (Alternative 2)	South Utah	N of SLC	External	Hemm, Draper, Bluff	WJ, Sandy, CWH	W SLC	SE SLC	Downtown	UofU	Gran	<i>Total</i>
South Utah	0	0	0	-62	1	39	-1	-64	-83	0	-170
N of SLC	0	0	0	-7	0	4	10	106	0	0	113
External	0	0	0	0	3	0	-4	-7	7	0	-1
Hemm, Draper, Bluff	-1	-3	0	1	30	18	34	7	-109	-1	-24
WJ, Sandy, CWH	-4	-5	0	-17	1	98	23	112	-26	0	182
W SLC	4	13	0	8	59	-16	100	74	111	0	353
SE SLC	18	27	0	40	27	24	109	-42	29	3	235
Downtown	4	5	0	-17	57	18	37	316	63	0	483
UofU	-1	0	0	-32	4	38	-30	142	307	-1	427
Gran	1	0	0	-1	0	60	22	101	12	0	195
Total	21	37	0	-87	182	283	300	745	311	1	1,793

All Fixed Guideway: 2045 Incremental

Incremental (Alternative 3)

TL5v2 (2045): Incremental (Alternative 3)	South Utah	N of SLC	External	Hemm, Draper, Bluff	WJ, Sandy, CWH	W SLC	SE SLC	Downtown	UofU	Gran	Total
South Utah	0	0	0	-56	-12	36	2	67	-77	0	-40
N of SLC	-2	0	0	-3	-4	31	-2	-6	87	0	101
External	0	0	0	0	-6	-1	-3	-18	11	0	-17
Hemm, Draper, Bluff	2	-4	0	0	11	19	15	5	-137	0	-89
WJ, Sandy, CWH	-10	-14	0	54	19	79	-54	6	-24	0	56
W SLC	4	8	0	28	55	-10	60	82	117	0	344
SE SLC	13	35	0	39	-2	-40	47	178	40	10	320
Downtown	-1	12	0	-24	3	47	36	313	111	0	497
UofU	-2	7	0	-26	-4	29	-31	121	292	-1	385
Gran	0	2	0	-1	0	56	23	104	12	0	196
Total	4	46	0	11	60	246	93	852	432	9	1,753

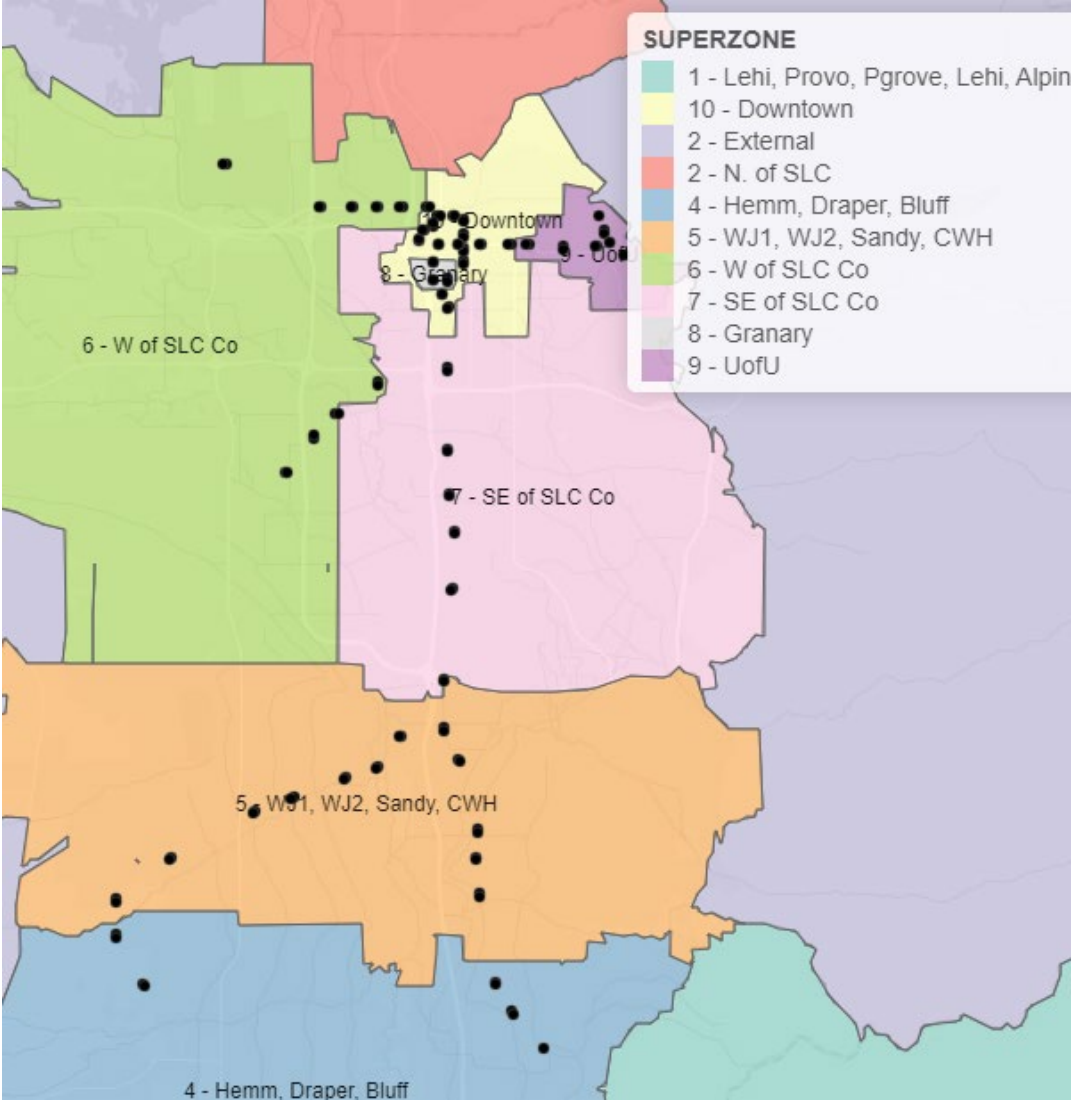
All Fixed Guideway: 2045 Incremental

Incremental (Alternative 4)

TL5v2 (2045): Incremental (Alternative 4)	South Utah	N of SLC	External	Hemm, Draper, Bluff	WJ, Sandy, CWH	W SLC	SE SLC	Downtown	UofU	Gran	<i>Total</i>
South Utah	0	0	0	-62	1	46	-1	-64	-83	0	-163
N of SLC	0	0	0	-7	0	5	10	106	0	0	114
External	0	0	0	0	3	0	-4	-7	7	0	-1
Hemm, Draper, Bluff	-1	-3	0	1	30	20	34	7	-109	-1	-22
WJ, Sandy, CWH	-4	-5	0	-17	1	101	23	114	-28	0	185
W SLC	4	13	0	8	58	-16	100	73	76	0	316
SE SLC	18	27	0	40	27	23	96	-57	18	5	197
Downtown	4	5	0	-17	55	17	32	315	59	0	470
UofU	-1	-1	0	-32	3	27	-32	142	305	-1	410
Gran	1	0	0	-1	0	50	23	102	16	0	191
Total	21	36	0	-87	178	273	281	731	261	3	1,697

2045 Incremental Fixed Guideway Trips: Main Markets

Markets	Existing (All-FG)	No-Build 2045 (All-FG)	Alternative 1 Incremental (All-FG)	Alternative 2 Incremental (All-FG)	Alternative 3 Incremental (All-FG)	Alternative 4 Incremental (All-FG)
Trips within Salt Lake County, no end in Downtown	7,952	9,418	545	539	320	529
Trips between Downtown and UofU (Trax Red/Orange)	4,453	5,796	830	828	837	821
Trips between Downtown/UofU and Salt Lake County	12,249	15,586	234	231	297	147
Granary to Downtown / UofU	273	1,200	118	113	116	116
Granary to Other	222	1,028	72	81	78	72
Other Markets	17,559	20,190	11	1	105	12
Total	42,708	53,218	1,810	1,793	1,753	1,697



All Transit: 2045 Incremental

Incremental (Alternative 1)

TL5v2_2045: Incremental (Alternative 1)	South Utah	N of SLC	External	Hemm, Draper, Bluff	WJ, Sandy, CWH	W SLC	SE SLC	Downtown	UofU	Gran	Total
South Utah	0	0	0	-62	1	47	-1	-64	-82	0	-161
N of SLC	0	0	0	-7	0	6	8	79	-4	0	82
External	0	0	0	0	3	1	-3	-8	6	0	-1
Hemm, Draper, Bluff	-1	-3	0	1	35	16	30	-5	-88	-1	-16
WJ, Sandy, CWH	-4	-5	0	-17	-4	60	18	87	-29	0	106
W SLC	4	1	0	8	36	-24	69	36	57	0	187
SE SLC	18	17	0	40	16	17	44	-28	-15	3	112
Downtown	4	4	0	-17	50	12	18	182	18	0	271
UofU	-1	0	0	-32	2	17	-23	84	154	0	201
Gran	1	0	0	-1	0	48	20	64	21	0	153
Total	21	14	0	-87	139	200	180	427	38	2	934

All Transit: 2045 Incremental

Incremental (Alternative 2)

TL5v2_2045: Incremental (Alternative 2)	South Utah	N of SLC	External	Hemm, Draper, Bluff	WJ, Sandy, CWH	W SLC	SE SLC	Downtown	UofU	Gran	Total
South Utah	0	0	0	-62	1	40	-1	-64	-82	0	-168
N of SLC	0	0	0	-7	0	6	8	79	-4	0	82
External	0	0	0	0	3	1	-3	-8	6	0	-1
Hemm, Draper, Bluff	-1	-3	0	1	35	15	30	-5	-88	-1	-17
WJ, Sandy, CWH	-4	-5	0	-17	-4	57	18	86	-29	0	102
W SLC	4	1	0	8	36	-24	69	36	57	0	187
SE SLC	18	17	0	40	16	16	44	-27	-15	2	111
Downtown	4	4	0	-17	50	12	17	182	18	0	270
UofU	-1	-1	0	-32	2	17	-23	81	154	0	197
Gran	1	0	0	-1	0	58	18	64	18	0	158
Total	21	13	0	-87	139	198	177	424	35	1	921

All Transit: 2045 Incremental

Incremental (Alternative 3)

TL5v2_2045: Incremental (Alternative 3)	South Utah	N of SLC	External	Hemm, Draper, Bluff	WJ, Sandy, CWH	W SLC	SE SLC	Downtown	UofU	Gran	Total
South Utah	0	0	0	-56	-12	37	2	67	-75	0	-37
N of SLC	-2	0	0	-3	-6	29	0	2	59	0	79
External	0	0	0	0	-5	-1	-2	-18	10	0	-16
Hemm, Draper, Bluff	2	-4	0	0	16	17	18	-6	-114	0	-71
WJ, Sandy, CWH	-10	-14	0	54	16	39	-29	9	-28	0	37
W SLC	4	-1	0	28	34	-20	43	49	73	0	210
SE SLC	13	23	0	39	3	-15	12	83	-4	5	159
Downtown	-1	8	0	-24	0	29	13	175	48	0	248
UofU	-2	6	0	-26	-4	19	-23	65	137	0	172
Gran	0	2	0	-1	0	55	20	68	17	0	161
Total	4	20	0	11	42	189	54	494	123	5	942

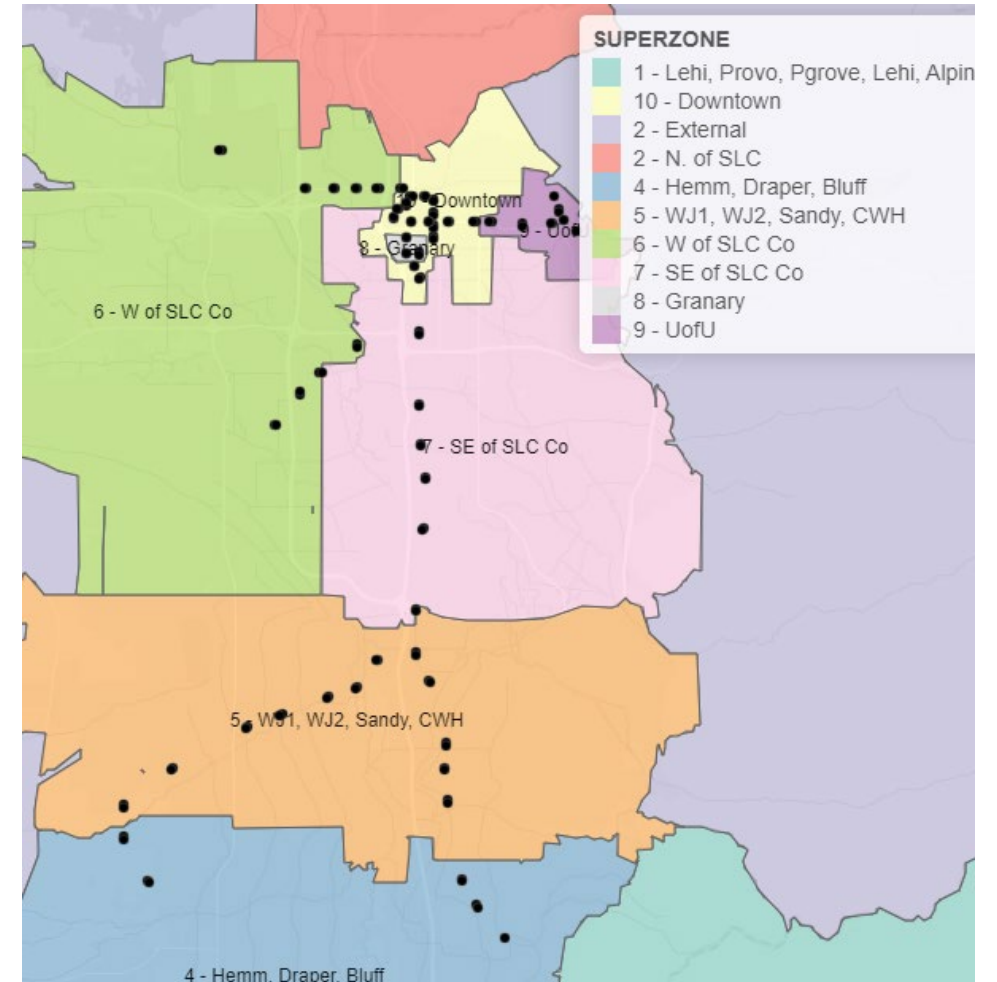
All Transit: 2045 Incremental

Incremental (Alternative 4)

TL5v2_2045: Incremental (Alternative 4)	South Utah	N of SLC	External	Hemm, Draper, Bluff	WJ, Sandy, CWH	W SLC	SE SLC	Downtown	UofU	Gran	Total
South Utah	0	0	0	-62	1	47	-1	-64	-82	0	-161
N of SLC	0	0	0	-7	0	6	8	79	-4	0	82
External	0	0	0	0	3	1	-3	-8	6	0	-1
Hemm, Draper, Bluff	-1	-3	0	1	35	16	31	-5	-88	-1	-15
WJ, Sandy, CWH	-4	-5	0	-17	-4	60	18	87	-29	0	106
W SLC	4	1	0	8	36	-24	69	36	50	0	180
SE SLC	18	17	0	40	16	17	41	-35	-20	3	97
Downtown	4	4	0	-17	48	12	17	182	16	0	266
UofU	-1	-1	0	-32	2	16	-23	83	153	0	197
Gran	1	0	0	-1	0	48	20	64	21	0	153
Total	21	13	0	-87	137	199	177	419	23	2	904

2045 Incremental All Transit Trips: Main Markets

Markets	Existing (All-FG)	No-Build 2045 (All-FG)	Alternative 1 Incremental (All Transit)	Alternative 2 Incremental (All Transit)	Alternative 3 Incremental (All Transit)	Alternative 4 Incremental (All Transit)
Trips within Salt Lake County, no end in Downtown	7,952	9,418	345	340	255	343
Trips between Downtown and UofU (Trax Red/Orange)	4,453	5,796	438	435	425	434
Trips between Downtown/UofU and Salt Lake County	12,249	15,586	42	41	46	19
Granary to Downtown / UofU	273	1,200	85	82	85	85
Granary to Other	222	1,028	67	75	74	67
Other Markets	17,559	20,190	-43	-52	57	-44
Total	42,708	53,218	934	921	942	904



Additional Analysis

Additional miscellaneous analysis



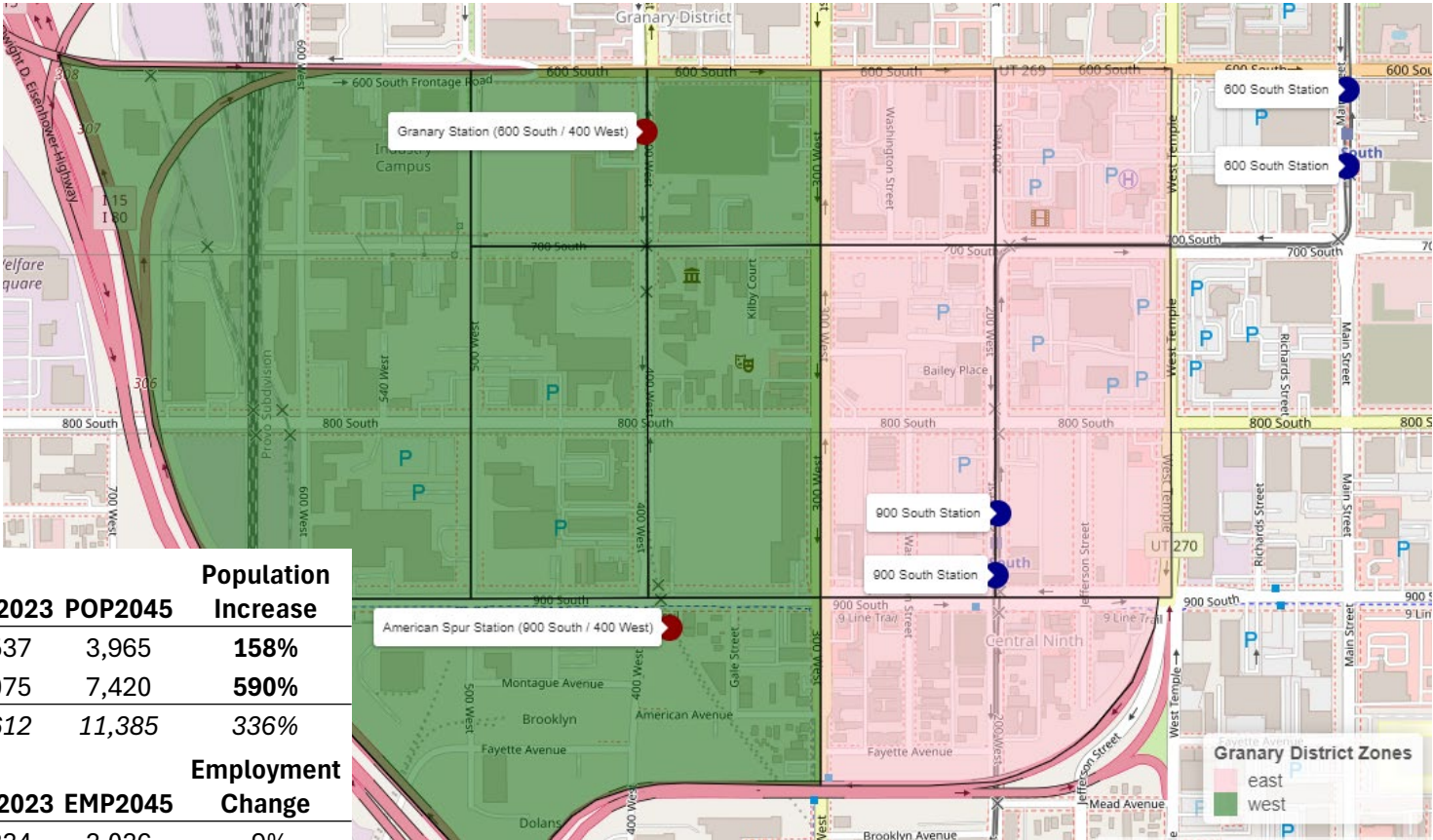
Base Ridership Data

- STOPS Calibrates an existing model run to closely match existing conditions:
- Flows – 2019 OD survey
- Counts - average weekday Spring 2023 (STOPS adjusts to Route and Stop level counts)

Service	2019 Ave Weekday	2023 Ave Weekday	As a percent of 2019
Frontrunner	20,351	11,945	59%
TRAX + S-Line	58,580	31,543	54%
UVX	11,977	7,457	62%
<i>Subtotal Fixed Guideway</i>	<i>90,908</i>	<i>50,945</i>	<i>56%</i>
<i>Subtotal Bus</i>	<i>66,662</i>	<i>55,003</i>	<i>83%</i>
Total	157,570	105,948	67%

Granary District Cloning

- Big population growth on West Side (600%)
- West side currently has relatively few Transit productions
- “Clone” existing east side transit trip patterns to the west side



Granary Area	Production:				POP2023	POP2045	Population Increase
	All	HBW	HBO	NHB			
East Side	789	425	353	11	1,537	3,965	158%
West Side	161	63	73	24	1,075	7,420	590%
Total	950	488	426	36	2,612	11,385	336%

Granary Area	Attractions:				EMP2023	EMP2045	Employment Change
	All	HBW	HBO	NHB			
East Side	122	80	15	27	3,334	3,036	-9%
West Side	169	50	43	75	3,776	2,113	-44%
Total	291	130	58	103	7,110	5,149	-28%

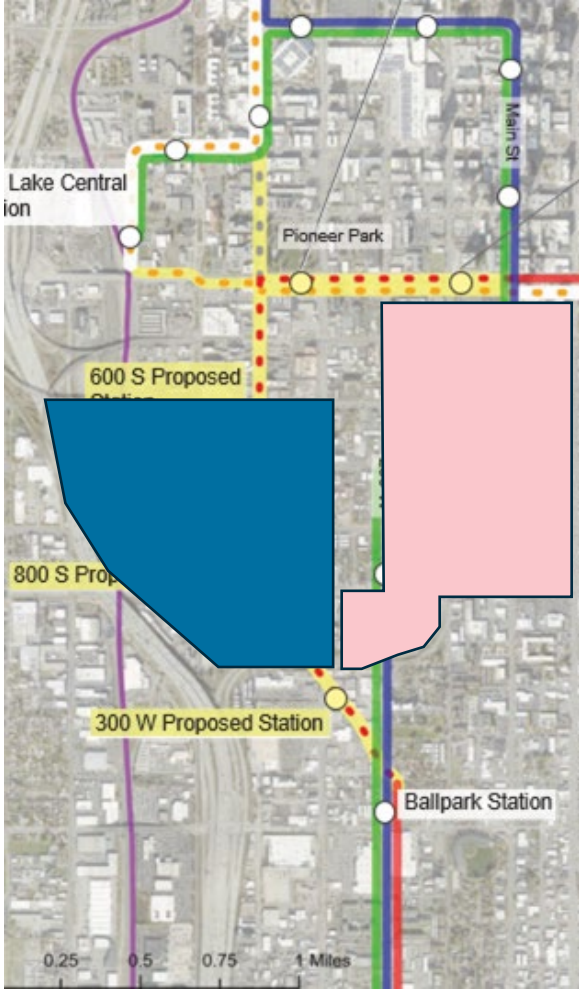
Effect of the Red Line Reroute

Population & Input Trip Productions

Area	Productions	POP2023	POP2045	Population Change	Population Change
West Granary	161	1,075	7,420	6,345	590%
Affected by Reroute	1,571	2,402	8,597	6,195	258%

Employment & Input Trip Attractions

Area	Attractions	EMP2023	EMP2045	Employment Change	Employment Change
West Granary	169	3,776	2,113	-1,663	-44%
Affected by Reroute	1,477	14,354	28,128	13,774	96%



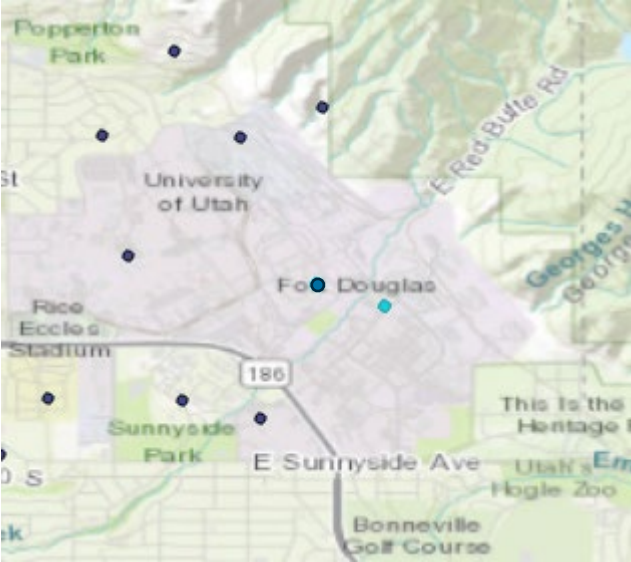
Expected Research Park Growth

Population & Input Trip Productions

Productions	POP2023	POP2045	Population Change	% Change
24	964	8,314	7,350	762%

Employment & Input Trip Attractions

Attractions	EMP2023	EMP2045	Employment Change	% Change
459	9,923	14,487	4,564	46%



Transfers

Notable Changes

- South Utah to UofU (Frontrunner to Trax)
 - Existing:
 - 4 Minute wait at Murray Central (Red)
 - Alternative 1:
 - 9 minute wait at SLC Central (Orange)
 - 11 minute wait at North Temple (Orange)
 - 0 minute wait at Murray Central (Red)
 - Alternative 3:
 - 3 minute wait at North Temple (Orange)
 - 0 minute wait at Murray Central (Red)

Orange-Red Combined Headways

Measured at Pioneer Park

Build Alternative 1	Wait 1	Wait 2
Towards Daybreak/Airport	4 Minutes	11 Minutes
Towards UofU	3 Minutes	12 Minutes

Build Alternative 3	Wait 1	Wait 2
Towards Daybreak/Airport	5 Minutes	10 Minutes
Towards UofU	8 Minutes	7 Minutes

Measured at Stadium Station

Build Alternative 1	Wait 1	Wait 2
Towards Daybreak/Airport	5 Minutes	10 Minutes
Towards UofU	4 Minutes	11 Minutes

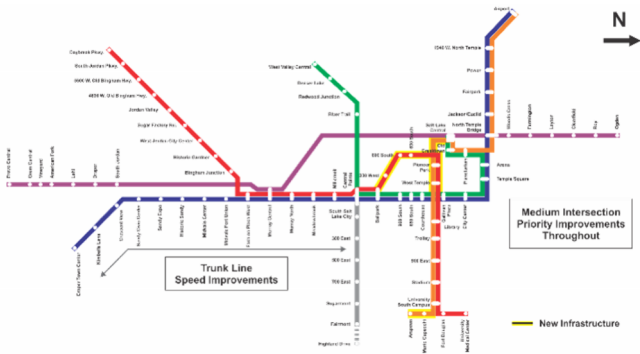
Build Alternative 3	Wait 1	Wait 2
Towards Daybreak/Airport	4 Minutes	11 Minutes
Towards UofU	6 Minutes	9 Minutes



Attachment G2: Rail Operations Simulation Findings Memorandum

HATCH LTK

TechLink TRAX Study Rail Operations Simulation Findings Memorandum



Prepared for:
Horrocks

by:
Hatch

Simulation

The TechLink TRAX study team completed detailed network simulations of each TechLink TRAX alternative to understand the operating performance, run time, and fleet requirement outcomes of the different route and alignment choices. These simulations used Hatch’s TrainOps® simulation software, which was previously applied to determine the performance of alternatives under the Utah Transit Authority (UTA) Future of Light Rail (FOLR) study (2023). TrainOps supports a wide range of analyses, ranging from conceptual planning exercises to detailed engineering design work. It expertly models train performance, signaling systems, and traffic signal interactions to recreate the complex interactions experienced by train operators (see Figure 1).

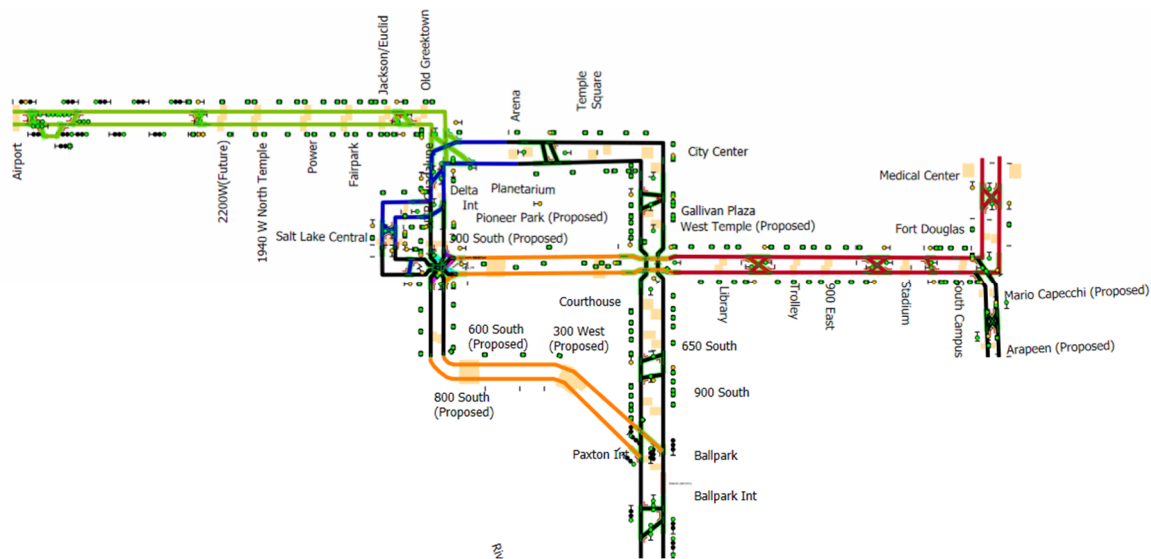


Figure 1. Example TechLink Corridor Simulation Network

Model Inputs

The simulated model was carefully calibrated during the FOLR Study, and these calibrations were carried forward to the TechLink TRAX Study. These included specific assumptions on the existing light rail fleet, existing wayside signaling, existing intersection priorities/delay priorities (Figure 2), modeled performance of the Siemens S70 vehicle, and station dwell times. These are detailed in the assumptions found in the FOLR Light Rail Strategic Plan (2023), Appendix B.

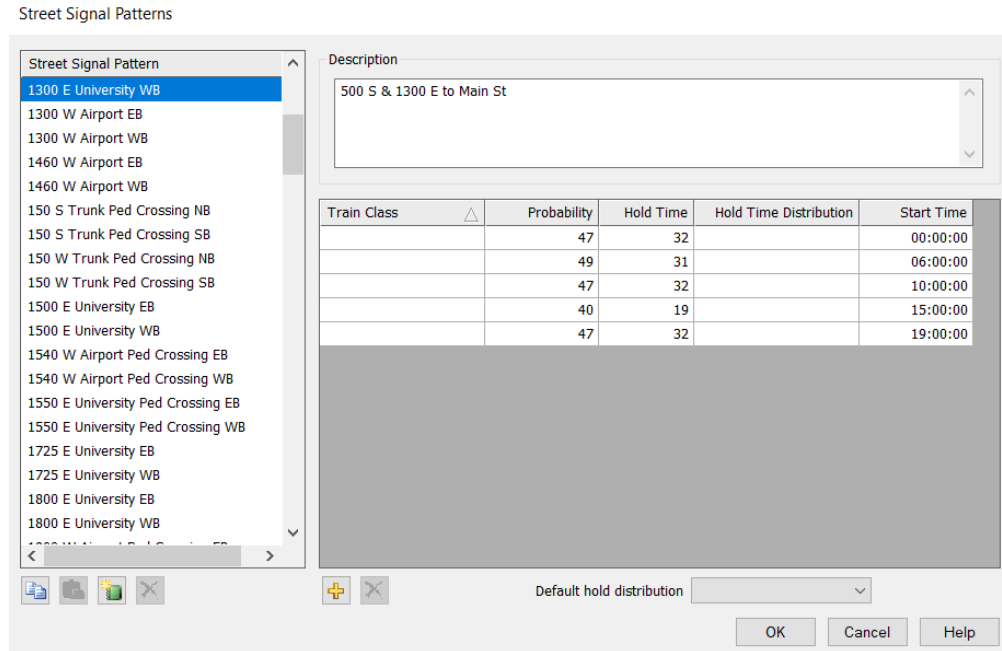


Figure 2. Intersection Delay Probability in TrainOps

All TechLink alternatives were modeled with other recommended projects from the FOLR Light Rail Strategic Plan (2023) including trunk line speed improvements, service reliability improvements (Central Pointe [Union] interlocking turnback and connecting track from west to south), 400 West (Pioneer Park Connector (as applicable to Alternatives 1, 2, and 4), TRAX Traction Power System Improvements, optimizations to fleet efficiencies, and medium intersection transit signal priority treatments. These proposed improvements are described throughout the FOLR Light Rail Strategic Plan (specifically see Chapters 2, 5, and 6).

New speed restrictions for the alternatives were updated from FOLR and were based on safe operating curve speeds provided by the design team for each section of track and other operating rule restrictions. Where TechLink TRAX stations are newly introduced, dwell times are based on the dwell distribution from stations with comparable ridership. New tracks modeled include the Ballpark Spur used by the Red Line; Research Park Terminal; and where required by the alternatives with the new alignments to Salt Lake Central (Alternative 1, Alternative 2, and Alternative 4), through 400 South (Alternative 3 – Direct on 400 West), and around the University of Utah Rice-Eccles Stadium (Alternative 4 – University of Utah Realignment).

Operating Plans

Conceptual Operating Plans were developed for each alternative to minimize delays between lines and to provide for even headways between lines on the trunk. As shown in the Alternative 1 schematic below in Figure 3, the proposed Orange Line interacts with the Blue, Green, and Red Lines along its alignment. The Red Line further interacts with both the Blue and the Green Lines. This creates an operational challenge, where even headways in one segment can lead to uneven headways on another. The Operating Plans were built to prioritize even headways on the longest shared segments of the network while maintaining reasonable and achievable train spacing elsewhere. All services operate with 15-minute headways.

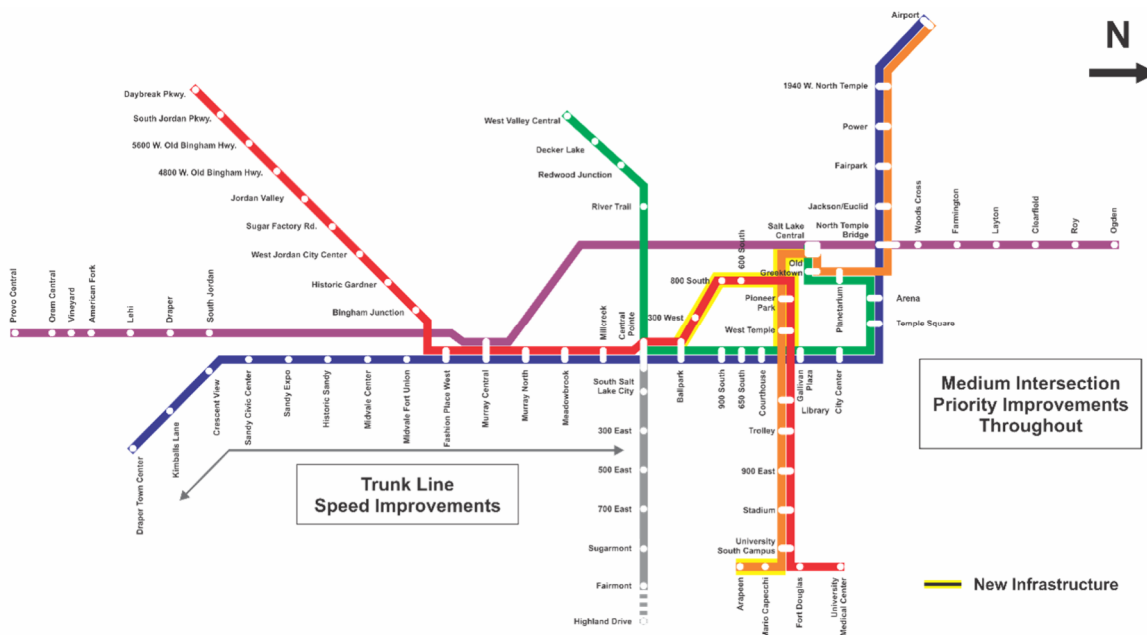


Figure 3. Alternative 1 Schematic

Operating Requirements

Table 1 provides the scheduled turn times used for each alternative. For the operations simulation, a minimum terminal turn time of 8 minutes was used, matching UTA operating practices for scheduling the TRAX System. The minimum terminal turn time is used to schedule the train turns at terminals. For a paired set of trips using the same train, the first trip must be scheduled to arrive at the terminal at least 8 minutes before the next trip’s departure. Where 9 minutes would be required on both ends, an additional train was introduced to provide comparable recovery time between alternatives. Were this recovery time not needed operationally; the number of train sets could potentially be reduced in Alternative 3. This potential reduction of train sets should be explored in future phases of work.

Table 1. Scheduled Turn Times by Line and Alternative

Line	Terminal	Scheduled Turn Time (mm:ss)			
		Alt. 1	Alt. 2	Alt. 3	Alt. 4
Blue	Draper Town Center	12:00	12:00	16:00	12:00
	Airport	13:00	13:00	09:00	13:00
Red	Daybreak Parkway	14:00	14:00	10:00	14:00
	Medical Center	12:00	12:00	16:00	12:00
Green	West Valley Central	22:00	22:00	09:00	22:00
	Salt Lake Central	08:00	08:00	20:00	08:00
Orange	Arapeen Drive	16:00	16:00	24:00*	16:00
	Airport	09:00	09:00	09:00	09:00

*Reduction to 9-minute scheduled turn possible, potentially eliminating one train from service

Table 2 shows the fleet requirements by alternative. These fleet requirements do not account for any spare margin or run-as-directed trains in service. All alternatives require 35 trains in operation. If a 20% spare margin is assumed, this would result in a total fleet requirement of 42 trains. For the purposes of simulation, 4-car trains were used for all TRAX services, as this provides the worst-case travel-times and creates a conservative operating assumption. (Longer trains generally have longer travel times due to the need to clear the length of the train through speed restrictions.) A vehicle-needs analysis in future phases of work should be completed to refine the car quantity needed for operation.

Table 2. Operating Fleet Requirements by Alternative

Line	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Red	10	10	10	10
Green	7	7	7	7
Blue	10	10	10	10
Orange	8	8	8*	8
Total	35	35	35	35

*Seven trains possible with 9-minute scheduled turn at Arapeen Drive

Results Summary

Average simulated end-to-end travel times are provided in Table 3. Of note, simulated travel times were used to help the TechLink TRAX study team estimate the ridership of each alternative. The change of elevating 600 South in Alternative 2 results in small travel time savings from eliminating traffic signal delays. When Alternative 1 is compared to Alternative 4, which takes an alternate route around the Rice-Eccles Stadium, the travel time differences are similarly minimal; a savings of 35 seconds is realized in the northbound

direction and 9 seconds in the southbound direction. The alternative with the largest difference in travel time is Alternative 3. Here, the out-of-direction travel to Salt Lake Central is eliminated, resulting in quicker travel time from Salt Lake City International Airport to the rest of the corridor.

Table 3. Travel Time Times vs Schedule by Line and Alternative

Line	Terminals	Dir	Travel Times (h:mm:ss)				
			Scheduled Time ¹	Average Simulated Time ²			
				Alt. 1	Alt. 2	Alt. 3	Alt. 4
Blue	Draper Town Center	NB	1:02:00	1:05:51	1:06:17	1:06:25	1:05:51
	Airport	SB	1:03:00	1:06:07	1:06:05	1:05:53	1:06:08
Red ³	Daybreak Parkway	NB	1:03:00	1:05:04	1:05:06	1:05:35	1:04:52
	Medical Center	SB	1:01:00	1:03:30	1:03:00	1:04:25	1:03:05
Green	West Valley Central	NB	0:38:00	0:42:12	0:41:48	0:42:15	0:42:05
	Salt Lake Central	SB	0:38:00	0:40:44	0:40:46	0:41:26	0:40:54
Orange	Arapeen Drive	NB	0:48:00/ 0:44:00	0:50:09	0:49:40	0:45:22	0:49:34
	Airport	SB	0:47:00/ 0:43:00	0:48:18	0:48:30	0:44:33	0:48:09

Notes:

¹ **Scheduled Time:** The time scheduled for a train between stations as it would appear in a public timetable. The times provided in the results are the schedule times between terminals.

² **Average Simulated Time:** The average time that a train in the simulation takes between stations. The simulated trains may be delayed due to traffic signal delays, longer dwell times or interactions with other trains. The average simulated time may be compared against the scheduled time to determine how well the trains are meeting the schedule.

³ Current end-to-end travel times for the Red Line are scheduled at 61 minutes northbound and 60 minutes southbound. For the TechLink alternatives, the new scheduled times increase to 63 minutes northbound and 61 minutes southbound. Simulated trains average about 2 minutes behind this scheduled time at about 65 minutes northbound and 63 minutes southbound.

As all alternatives share the same scheduled run times for the Blue, Red, and Green Lines, on-time performance (OTP) is easily compared. The performances of each TechLink simulation are comparable to those seen in the Light Rail Strategic Plan from the FOLR Study. As is standard in the TRAX system, trains are considered on time when departing from a station within 4:59 minutes of their scheduled departure. Of the three existing lines, the Red Line sees the highest average OTP across scenarios but suffers from interactions with the Orange Line under Alternative 3. The scheduled headways in this scenario are necessarily closer than in the other alternatives. The Red and Orange Lines both share tracks with the Blue Line, and due to the quicker run times in Alternative 3, the Orange and Red Lines are not able to easily slot into the same operating headway alongside the Blue Line.

The Orange Line performs the best in Alternative 3 (Figure 4) when compared to the other alternatives, with an OTP of 99.8%. This high OTP may be partially explained by the large recovery time available at Arapeen Drive, which is supported by a 24-minute scheduled turn.

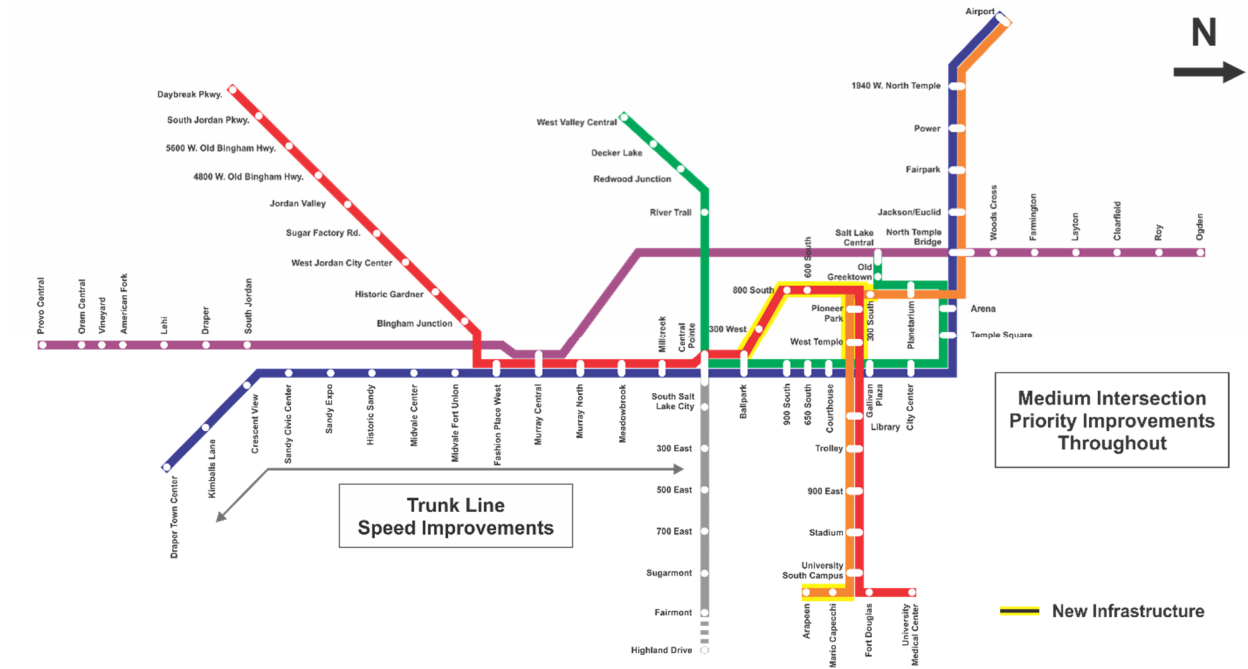


Figure 4. Alternative 3 Schematic

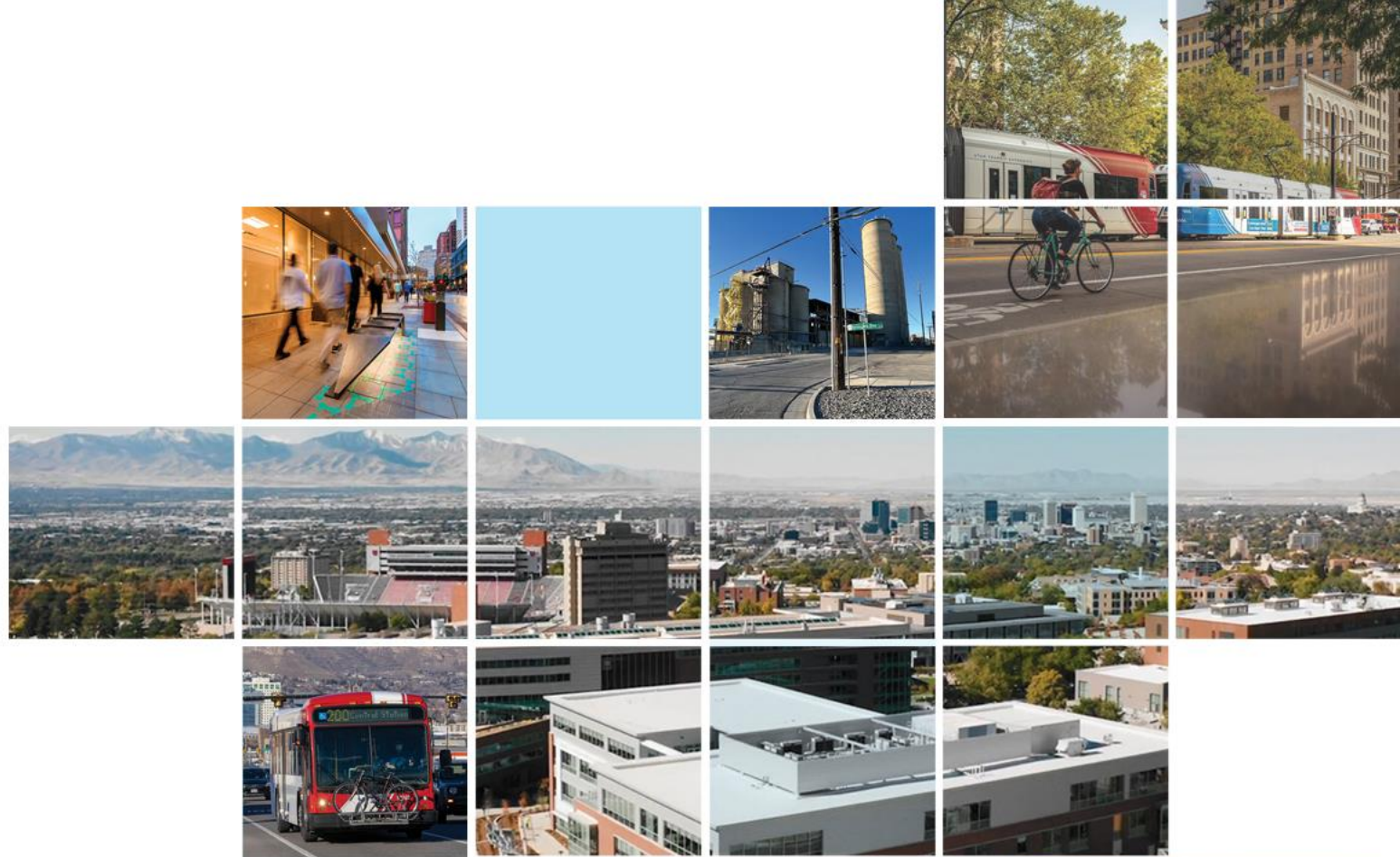
Note that while Alternative 1 includes the same operation as previously proposed in the FOLR Study, the level of design of the alignment has progressed, allowing for more accurate modeling of the Ballpark spur and the other components of the TechLink TRAX alternative. This has affected both the travel times and OTP for the alignment. As can be seen from the alternative results, OTP has improved for all four train lines as a result of these modifications (see Table 4).

Table 4. Comparative On-Time Performance (OTP) by Alternative

	TRAX Train Line				Combined Average
	Blue Line	Red Line	Green Line	Orange Line	
No Build	96.0%	89.1%	92.6%		92.5%
FOLR Light Rail Strategic Plan	95.0%	99.0%	93.5%	97.3%	96.4%
Alternative 1	97.7%	99.5%	93.8%	99.0%	97.8%
Alternative 2	97.0%	99.7%	95.4%	99.2%	98.0%
Alternative 3	94.8%	94.1%	94.7%	99.8%	95.5%
Alternative 4	97.2%	99.9%	93.7%	98.9%	97.8%

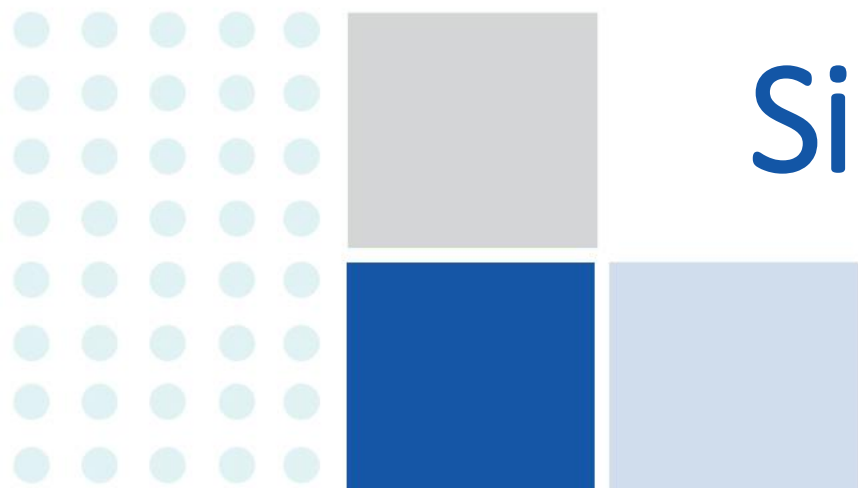
Conclusions

All alternatives feature similar operating performance. Of notable significant differences between alternatives, Alternative 3 has the fastest travel times on the Orange Line, resulting in a potential reduction in overall fleet requirement. The operating performance of Alternative 3 is, however, lower for the intersecting lines than in the other alternatives with an overall network OTP that is up to 2.5% lower than in Alternative 2. The simulation analysis has found each alternative to be feasible from an operating and performance standpoint and noted no large knock-on effects on the larger TRAX network due to the introduction of the TechLink TRAX project.



Simulation Results

December 20, 2024





Agenda

- Model Overview
- Alternatives Overview
 - Schematics (track infrastructure and routes)
- Review Preliminary Results for Alternatives 1-4
 - On-Time Performance
 - Terminal to Terminal Travel Times
 - Terminal Turn Times & Equipment Needs



TrainOps® Software Overview



- TrainOps software development is managed by the Hatch Operations Planning & Simulation Group,
- TrainOps® is Hatch's operations and electrical network simulation software for all types of rail systems.

It supports a wide range of analyses, ranging from conceptual planning exercises to detailed engineering design work. It expertly models train performance, signaling systems, and traffic signal interactions to recreate the complex interactions experienced by train operators.



TrainOps® Software Overview



- TrainOps algorithms based on inputs from Hatch Vehicle Electrical Engineering, Vehicle Mechanical Engineering, Rail Systems Engineering and Transportation Planning professionals,
- Development performed in-house with a team of full-time dedicated software developers, quality assurance specialists, documentation specialists and technical domain experts,
- TrainOps is continually updated and enhanced, with a 20+ year history of continuous improvement.



Model Development

- Based on the previous version used for the Future of Light Rail Study
- Developed using UTA-provided track charts and signal control line drawings and includes –
 - Civil Speed Restrictions
 - Wayside Signaling
 - Existing Intersection Priorities/Delay Probabilities
 - Station Dwell Time Distributions by Line, Direction and Time of Day
 - Vehicle Data Siemens S70



Example of TrainOps Traffic Light Simulation Intersection Stopping Probabilities and Hold Times

Street Signal Patterns

Street Signal Pattern

- 1300 E University WB
- 1300 W Airport EB
- 1300 W Airport WB
- 1460 W Airport EB
- 1460 W Airport WB
- 150 S Trunk Ped Crossing NB
- 150 S Trunk Ped Crossing SB
- 150 W Trunk Ped Crossing NB
- 150 W Trunk Ped Crossing SB
- 1500 E University EB
- 1500 E University WB
- 1540 W Airport Ped Crossing EB
- 1540 W Airport Ped Crossing WB
- 1550 E University Ped Crossing EB
- 1550 E University Ped Crossing WB
- 1725 E University EB
- 1725 E University WB
- 1800 E University EB
- 1800 E University WB
- 1800 W Airport Ped Crossing EB
- 1800 W Airport Ped Crossing WB

Description

500 S & 1300 E to Main St

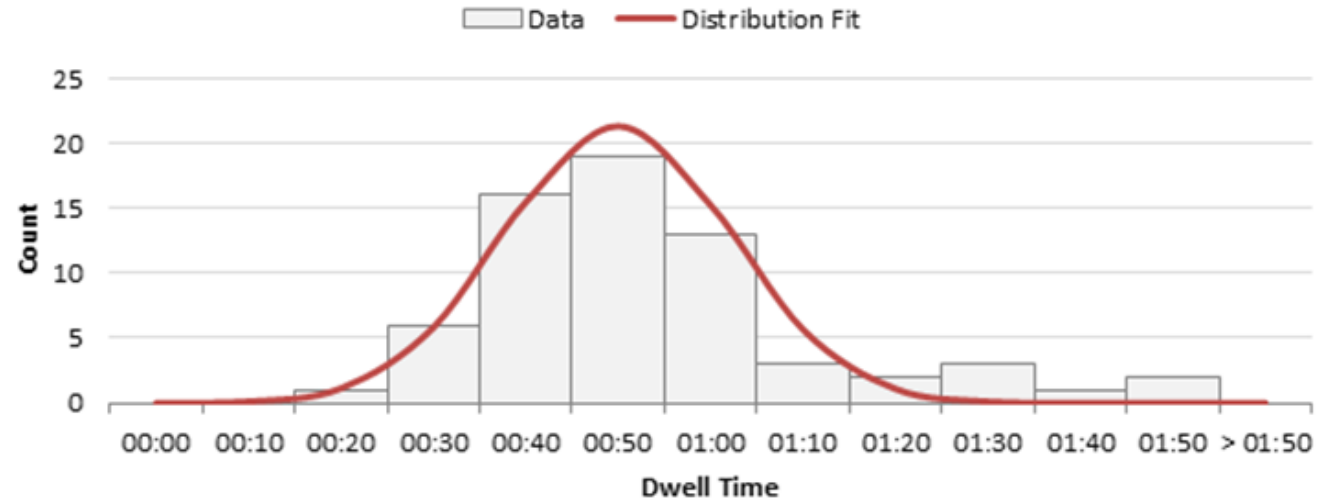
Train Class	Probability	Hold Time	Hold Time Distribution	Start Time
	47	32		00:00:00
	49	31		06:00:00
	47	32		10:00:00
	40	19		15:00:00
	47	32		19:00:00

Default hold distribution

OK Cancel Help



Example of Dwell Data for Normal Distribution (seconds)



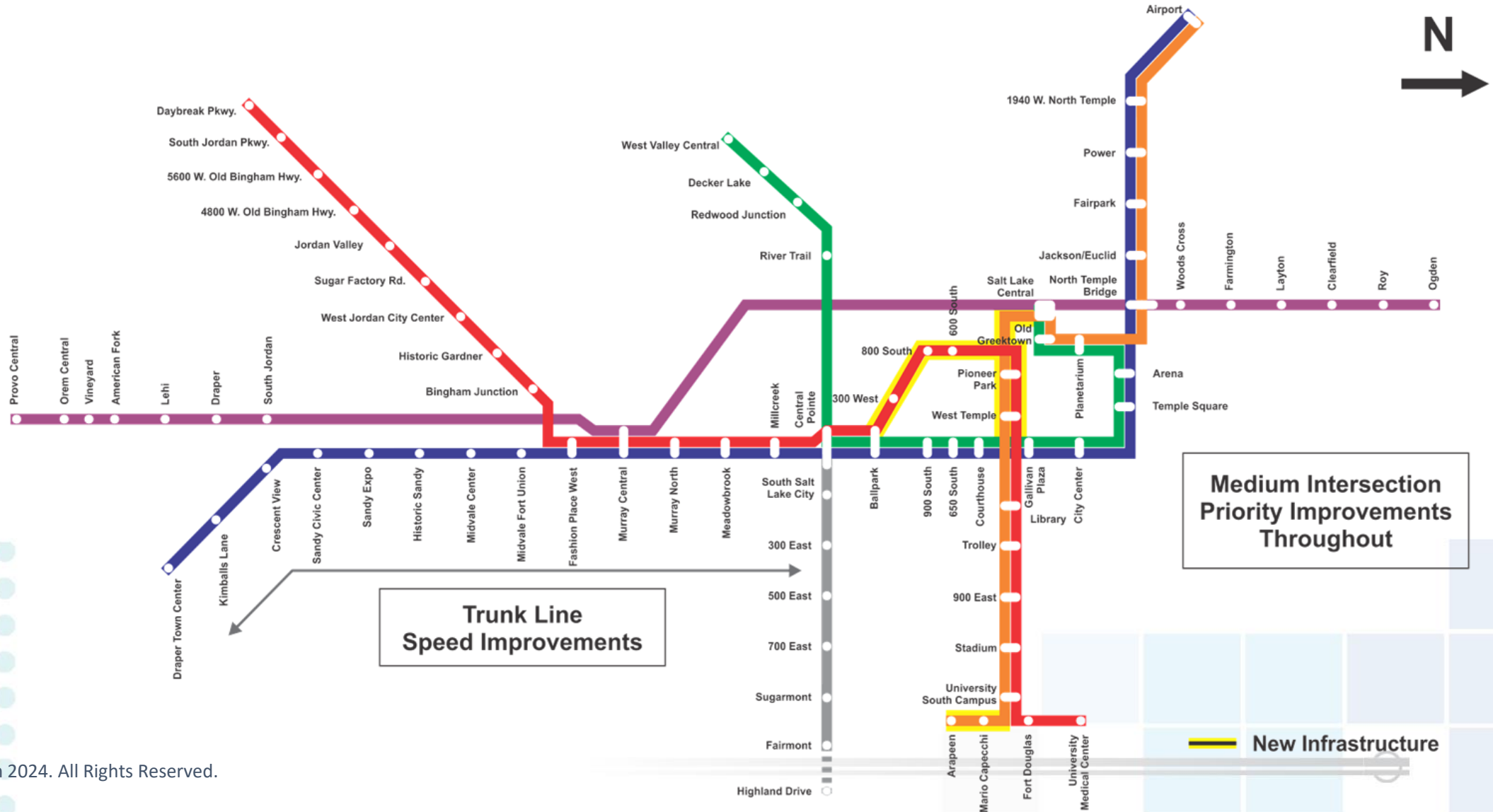
	Min	Max	Mean	Standard Deviation
G-1940 W North Temple-PM Peak-NB	18	76	39	25
G-1940 W North Temple-PM Peak-SB	19	63	35	21
G-1940 W North Temple-AM Peak-NB	18	57	32	18
G-1940 W North Temple-AM Peak-SB	19	63	34	22
G-1940 W North Temple-Off-Peak-NB	18	56	31	21
G-1940 W North Temple-Off-Peak-SB	17	56	30	20



Alternatives Overview

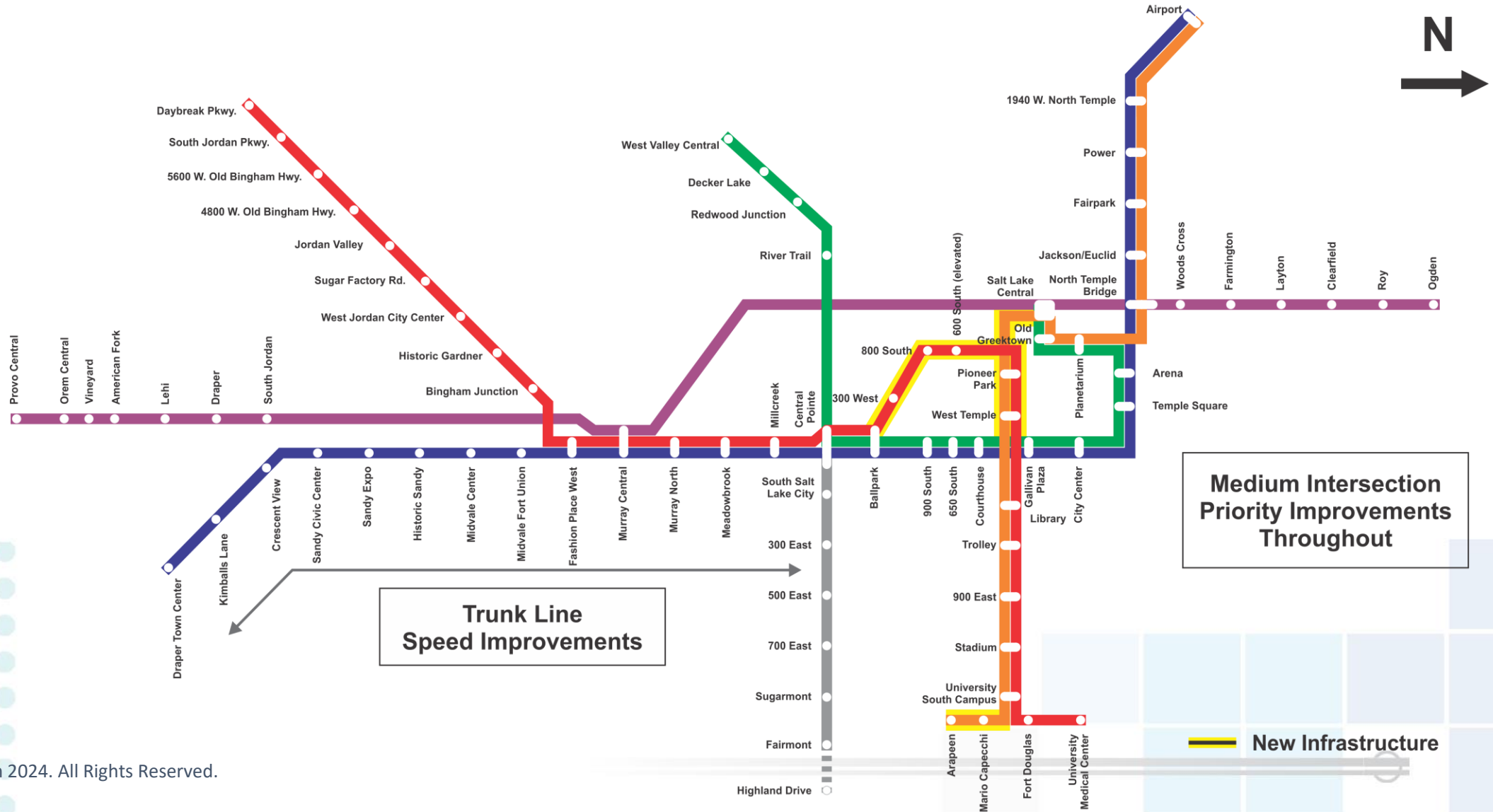


Schematic – Alternative 1



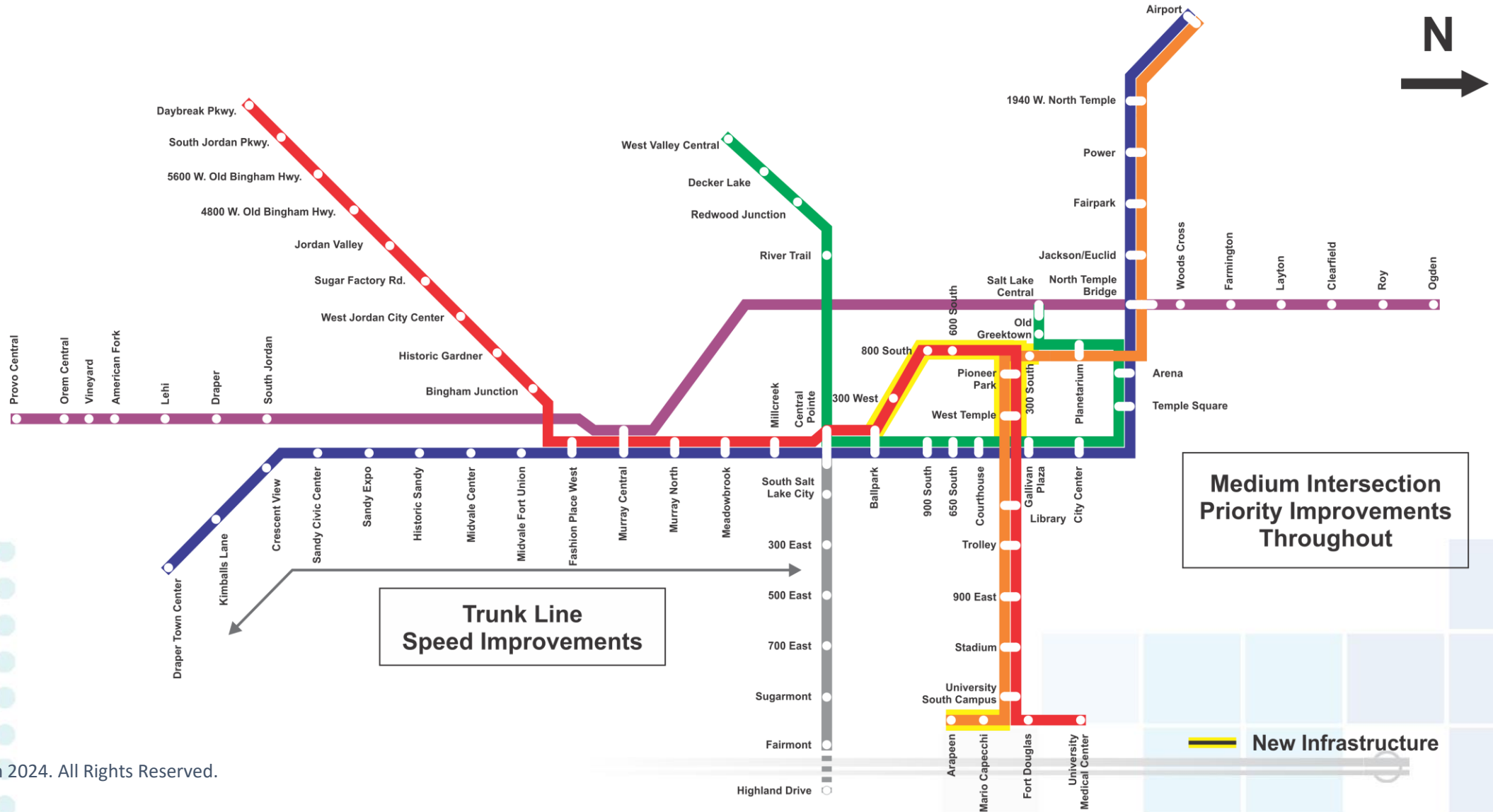


Schematic – Alternative 2



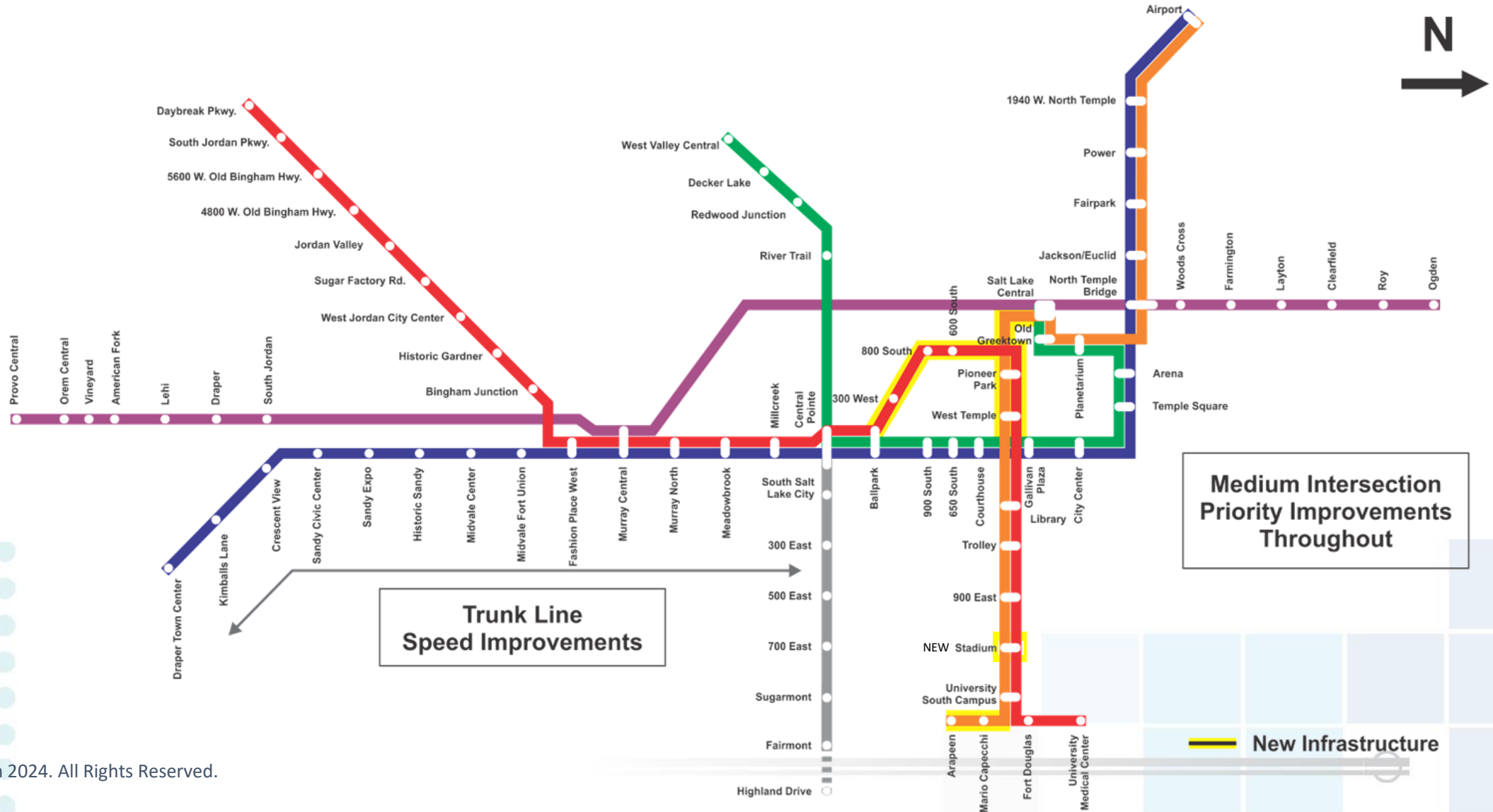


Schematic – Alternative 3



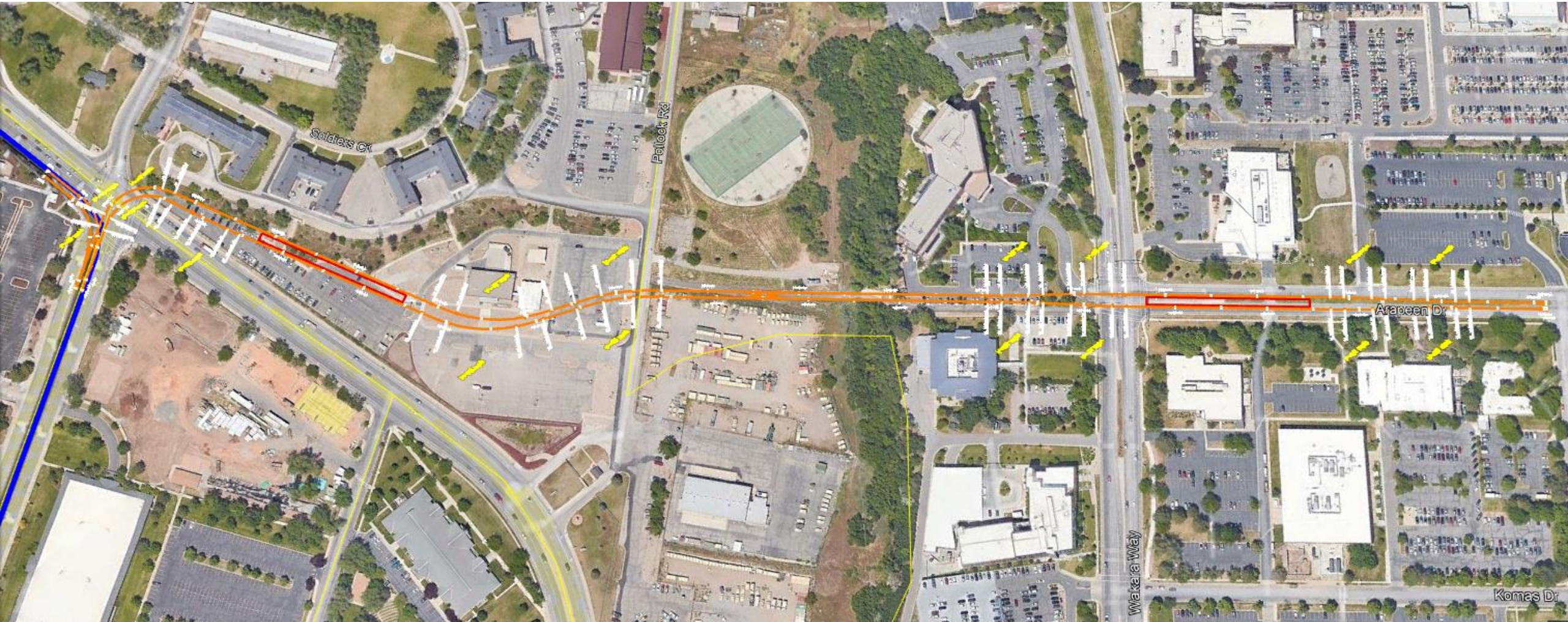


Schematic – Alternative 4





Additional Tracks - Orange Line Terminal (Research Park)



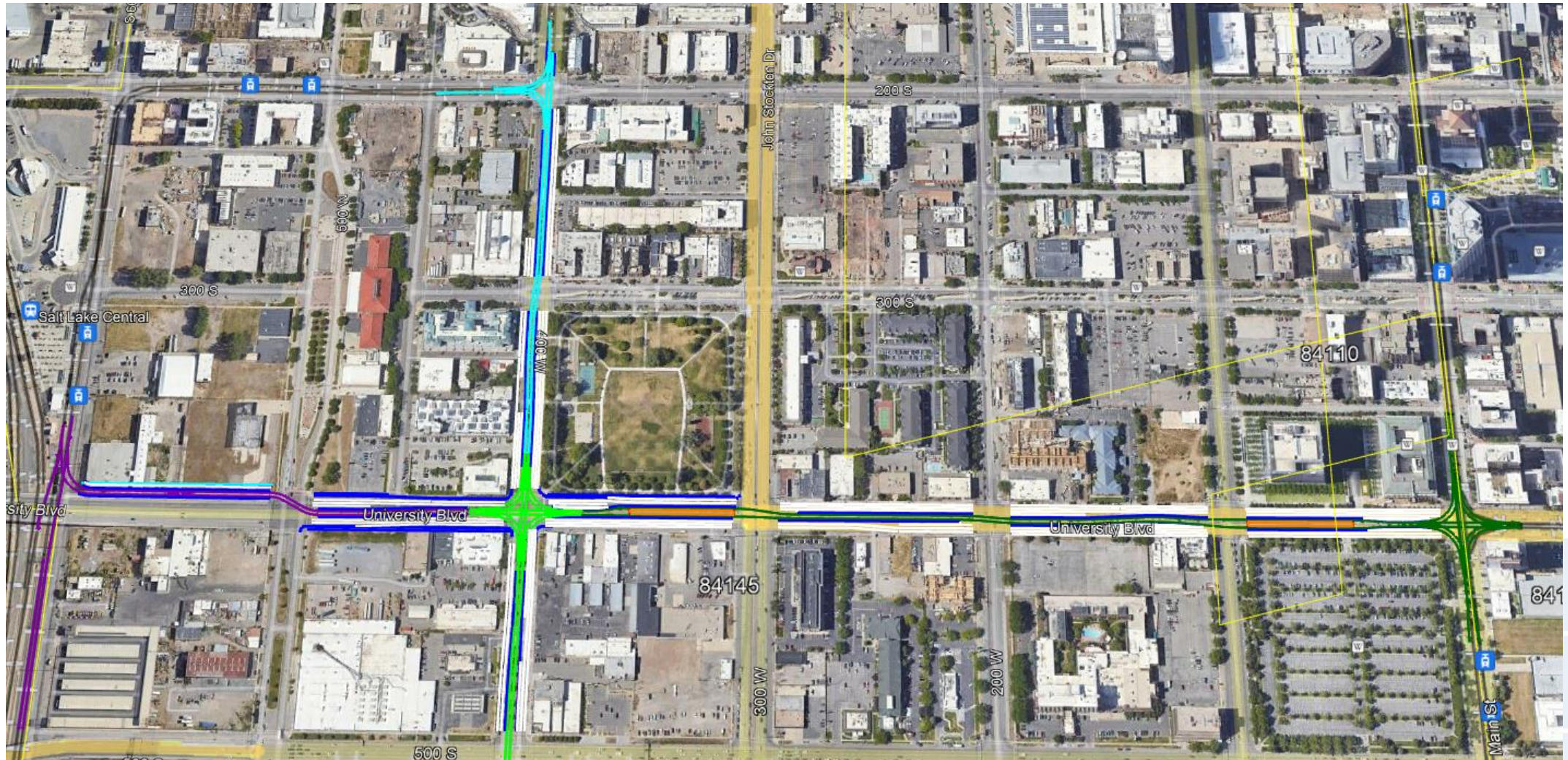


Additional Tracks – Ballpark Spur



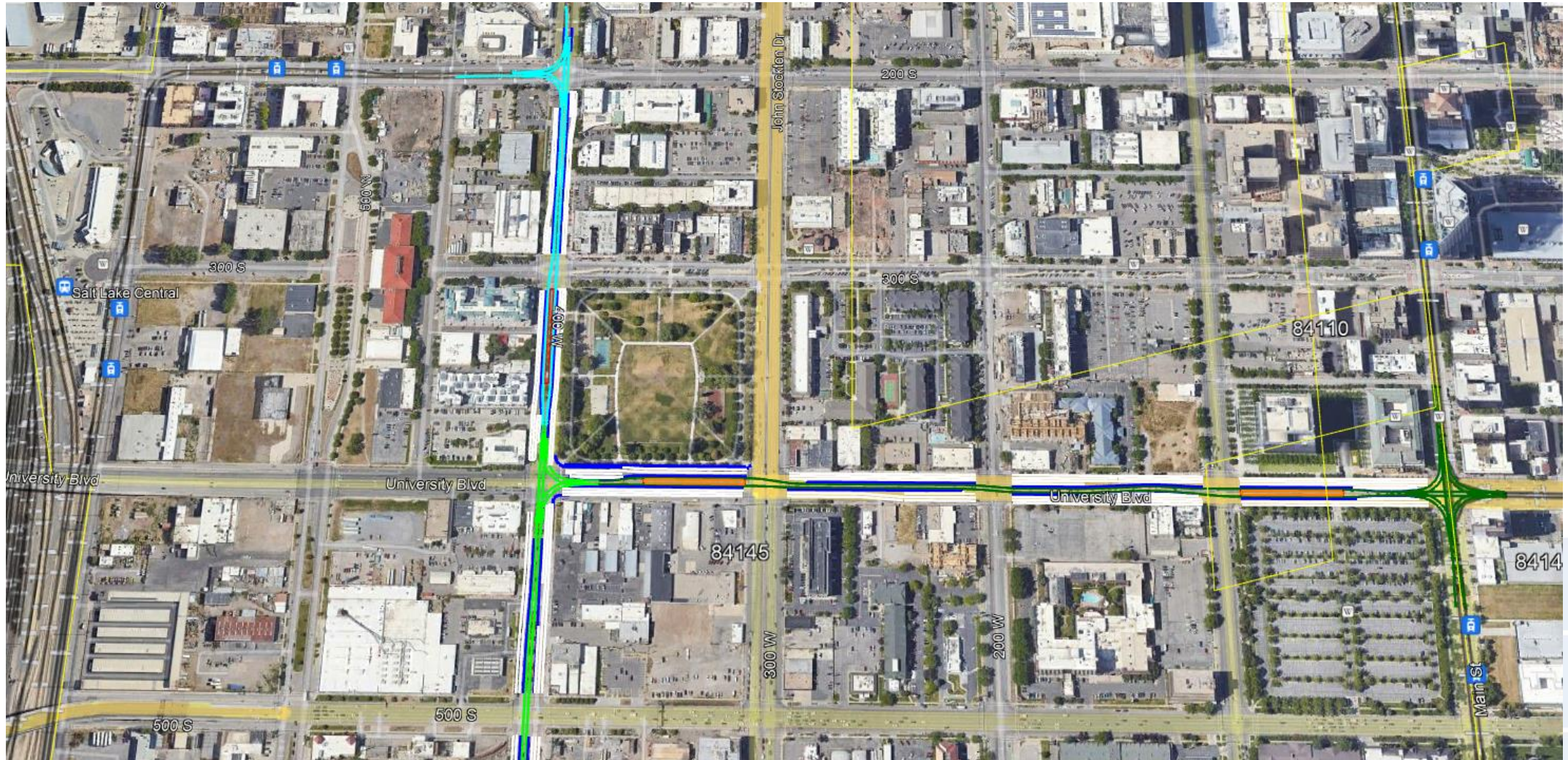


Additional Tracks – Alternative 1, 2 & 4



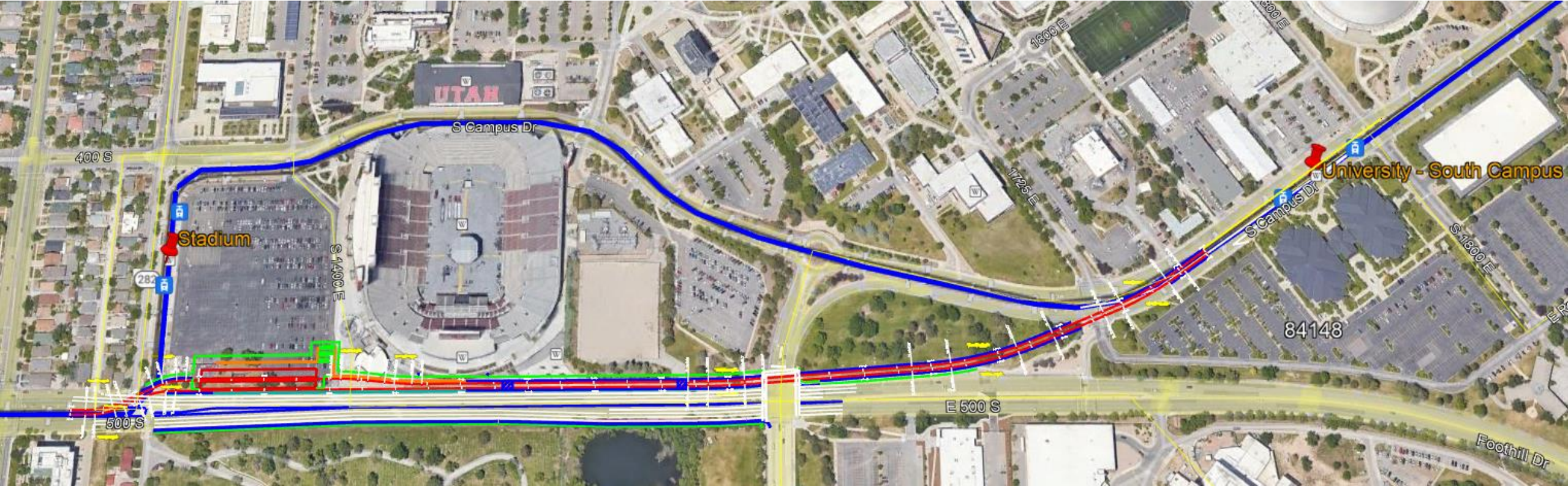


Additional Tracks – Alternative 3





Additional Tracks – Alternative 4 New Stadium Alignment





Summary Results



Summary - On-Time Performance

Future Baseline vs. TechLink Alternativeual Alternatives- On-Time Performance					
Combined Average	TRAX Train Line				Combined Average
	Blue Line	Red Line	Green Line	Orange Line	
Future Baseline	96.0%	89.1%	92.6%		92.5%
Light Rail Strategic Plan	95.0%	99.0%	93.5%	97.3%	96.4%
Alternative 1	97.7%	99.5%	93.8%	99.0%	97.8%
Alternative 2	97.0%	99.7%	95.4%	99.2%	98.0%
Alternative 3	94.8%	94.1%	94.7%	99.8%	95.5%
Alternative 4	97.2%	99.9%	93.7%	98.9%	97.8%



Summary – Terminal to Terminal Travel Times

	Terminals	Dir	Travel Times (h:mm:ss)				
			Scheduled	Average Simulated			
				Alternative 1	Alternative 2	Alternative 3	Alternative 4
Blue Line	Draper Town Center	NB	1:02:00	1:05:51	1:06:17	1:06:25	1:05:51
	Airport	SB	1:03:00	1:06:07	1:06:05	1:05:53	1:06:08
Red Line	Daybreak Parkway	NB	1:03:00	1:05:04	1:05:06	1:05:35	1:04:52
	Medical Center	SB	1:01:00	1:03:30	1:03:00	1:04:25	1:03:05
Green Line	West Valley Central	NB	0:38:00	0:42:12	0:41:48	0:42:15	0:42:05
	Salt Lake Central	SB	0:38:00	0:40:44	0:40:46	0:41:26	0:40:54
Orange Line	Arapeen	NB	0:48:00/ 0:44:00	0:50:09	0:49:40	0:45:22	0:49:34
	Airport	SB	0:47:00/ 0:43:00	0:48:18	0:48:30	0:44:33	0:48:09



Summary – Equipment Needs

	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Red	10	10	10	10
Green	7	7	7	7
Blue	10	10	10	10
Orange	8	8	8	8
Total	35	35	35	35



Terminal Turn Times

	Terminal	Scheduled Turn Time (mm:ss)			
		Alternative 1	Alternative 2	Alternative 3	Alternative 4
Blue Line	Draper Town Center	12:00	12:00	16:00	12:00
	Airport	13:00	13:00	09:00	13:00
Red Line	Daybreak Parkway	14:00	14:00	10:00	14:00
	Medical Center	12:00	12:00	16:00	12:00
Green Line	West Valley Central	22:00	22:00	09:00	22:00
	Salt Lake Central	08:00	08:00	20:00	08:00
Orange Line	Arapeen	16:00	16:00	24:00	16:00
	Airport	09:00	09:00	09:00	09:00

Scheduled Headways	15:00
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Individual Alternative Results



Alternative 1 – On-Time Performance

Lateness Threshold	00:00:00		00:03:00		00:04:59		00:10:00		All Stops	
	Stops	Pct (%)	Stops	Pct (%)	Stops	Pct (%)	Stops	Pct (%)	Stops	Pct (%)
Blue Line (701)	262	6%	3460	79%	4266	97.7%	4368	100%	4368	100%
Red Line (703)	445	10%	3679	84%	4375	99.5%	4396	100%	4396	100%
Green Line (704)	186	8%	1735	70%	2311	93.8%	2464	100%	2464	100%
Orange Line	527	19%	2534	92%	2726	99.0%	2752	100%	2754	100%
Combined	1420	10%	11408	82%	13678	97.8%	13980	100%	13982	100%



Alternative 1 – Terminal Turn Times

	Terminal	Scheduled Turn Time (mm:ss)
Blue Line	Draper Town Center	12:00
	Airport	13:00
Red Line	Daybreak Parkway	14:00
	Medical Center	12:00
Green Line	West Valley Central	22:00
	Salt Lake Central	08:00
Orange Line	Arapeen	16:00
	Airport	09:00
Scheduled Headways		15:00



Alternative 1 – Terminal to Terminal Travel Times

	Terminals	Dir	Travel Time (h:mm:ss)	
			Scheduled	Average Simulated
Blue Line	Draper Town Center	NB	1:02:00	1:05:51
	Airport	SB	1:03:00	1:06:07
Red Line	Daybreak Parkway	NB	1:03:00	1:05:04
	Medical Center	SB	1:01:00	1:03:30
Green Line	West Valley Central	NB	0:38:00	0:42:12
	Salt Lake Central	SB	0:37:00	0:40:44
Orange Line	Arapeen	NB	0:48:00	0:50:09
	Airport	SB	0:47:00	0:48:18

Current Red Line	Daybreak Parkway	NB	1:01:00
	Medical Center	SB	1:00:00



Alternative 2 – On-Time Performance

Lateness Threshold	00:00:00		00:03:00		00:04:59		00:10:00		All Stops	
	Stops	Pct (%)	Stops	Pct (%)	Stops	Pct (%)	Stops	Pct (%)	Stops	Pct (%)
Blue Line (701)	265	6%	3353	77%	4238	97.0%	4368	100%	4368	100%
Red Line (703)	505	11%	3887	88%	4384	99.7%	4396	100%	4396	100%
Green Line (704)	202	8%	1822	74%	2351	95.4%	2464	100%	2464	100%
Orange Line	503	18%	2518	91%	2733	99.2%	2753	100%	2754	100%
Combined	1475	11%	11580	83%	13706	98.0%	13981	100%	13982	100%



Alternative 2 – Terminal Turn Times

	Terminal	Scheduled Turn Time (mm:ss)
Blue Line	Draper Town Center	12:00
	Airport	13:00
Red Line	Daybreak Parkway	14:00
	Medical Center	12:00
Green Line	West Valley Central	22:00
	Salt Lake Central	08:00
Orange Line	Arapeen	16:00
	Airport	09:00
Scheduled Headways		15:00



Alternative 2 – Terminal to Terminal Travel Times

	Terminals	Dir	Travel Time (h:mm:ss)	
			Scheduled	Average Simulated
Blue Line	Draper Town Center	NB	1:02:00	1:06:17
	Airport	SB	1:03:00	1:06:05
Red Line	Daybreak Parkway	NB	1:03:00	1:05:06
	Medical Center	SB	1:01:00	1:03:00
Green Line	West Valley Central	NB	0:38:00	0:41:48
	Salt Lake Central	SB	0:37:00	0:40:46
Orange Line	Arapeen	NB	0:48:00	0:49:40
	Airport	SB	0:47:00	0:48:30

Current Red Line	Daybreak Parkway	NB	1:01:00
	Medical Center	SB	1:00:00



Alternative 3 – On-Time Performance

Lateness Threshold	00:00:00		00:03:00		00:04:59		00:10:00		All Stops	
	Stops	Pct (%)	Stops	Pct (%)	Stops	Pct (%)	Stops	Pct (%)	Stops	Pct (%)
Blue Line (701)	228	5%	3284	75%	4142	94.8%	4365	100%	4368	100%
Red Line (703)	420	10%	3346	76%	4137	94.1%	4382	100%	4396	100%
Green Line (704)	210	9%	1742	71%	2334	94.7%	2464	100%	2464	100%
Orange Line	556	21%	2439	94%	2597	99.8%	2601	100%	2601	100%
Combined	1414	10%	10811	78%	13210	95.5%	13812	100%	13829	100%



Alternative 3 – Terminal Turn Times

	Terminal	Scheduled Turn Time (mm:ss)
Blue Line	Draper Town Center	16:00
	Airport	09:00
Red Line	Daybreak Parkway	10:00
	Medical Center	16:00
Green Line	West Valley Central	09:00
	Salt Lake Central	20:00
Orange Line	Arapeen	24:00
	Airport	09:00
Scheduled Headways		15:00



Alternative 3 – Terminal to Terminal Travel Times

	Terminals	Dir	Travel Time (h:mm:ss)	
			Scheduled	Average Simulated
Blue Line	Draper Town Center	NB	1:02:00	1:06:25
	Airport	SB	1:03:00	1:05:53
Red Line	Daybreak Parkway	NB	1:03:00	1:05:35
	Medical Center	SB	1:01:00	1:04:25
Green Line	West Valley Central	NB	0:38:00	0:42:15
	Salt Lake Central	SB	0:38:00	0:41:26
Orange Line	Arapeen	NB	0:44:00	0:45:22
	Airport	SB	0:43:00	0:44:33

Current Red Line	Daybreak Parkway	NB	1:01:00
	Medical Center	SB	1:00:00



Alternative 4 – On-Time Performance

Lateness Threshold	00:00:00		00:03:00		00:04:59		00:10:00		All Stops	
	Stops	Pct (%)	Stops	Pct (%)	Stops	Pct (%)	Stops	Pct (%)	Stops	Pct (%)
Blue Line (701)	265	6%	3448	79%	4246	97.2%	4360	100%	4368	100%
Red Line (703)	506	12%	4024	92%	4392	99.9%	4396	100%	4396	100%
Green Line (704)	174	7%	1765	72%	2308	93.7%	2464	100%	2464	100%
Orange Line	559	20%	2552	93%	2724	98.9%	2752	100%	2754	100%
Combined	1504	11%	11789	84%	13670	97.8%	13972	100%	13982	100%



Alternative 4 – Terminal Turn Times

	Terminal	Scheduled Turn Time (mm:ss)
Blue Line	Draper Town Center	12:00
	Airport	13:00
Red Line	Daybreak Parkway	14:00
	Medical Center	12:00
Green Line	West Valley Central	22:00
	Salt Lake Central	08:00
Orange Line	Arapeen	16:00
	Airport	09:00
Scheduled Headways		15:00



Alternative 4 – Terminal to Terminal Travel Times

	Terminals	Dir	Travel Time (h:mm:ss)	
			Scheduled	Average Simulated
Blue Line	Draper Town Center	NB	1:02:00	1:05:51
	Airport	SB	1:03:00	1:06:08
Red Line	Daybreak Parkway	NB	1:03:00	1:04:52
	Medical Center	SB	1:01:00	1:03:05
Green Line	West Valley Central	NB	0:38:00	0:42:05
	Salt Lake Central	SB	0:37:00	0:40:54
Orange Line	Arapeen	NB	0:48:00	0:49:34
	Airport	SB	0:47:00	0:48:09

Current Red Line	Daybreak Parkway	NB	1:01:00
	Medical Center	SB	1:00:00



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Attachment G3: Economic Opportunity Memorandum



Photo courtesy of Roger McDonough at KCPW (January 27, 2022)



Utah Transit Authority TechLink TRAX Study

Economic Opportunity Memorandum October 2024



ZIONS PUBLIC FINANCE, INC.

Executive Summary

The TechLink TRAX Study, led by Utah Transit Authority (UTA) in collaboration with the Redevelopment Agency of Salt Lake City (RDA), Salt Lake City (SLC), the University of Utah, Wasatch Front Regional Council (WFRC), and the Utah Department of Transportation (UDOT) is considering a range of transit alternatives to provide enhanced TRAX (light rail) service and to create a direct connection from the Salt Lake City International Airport to the University of Utah Research Park through the proposed Orange Line, a realignment of the Red Line through the Granary District between 400 South and the Ballpark Station, and swapping of the northern termini of the Blue Line and the Green Line (Figure 1). A range of four alternatives, based on robust previous studies, have been developed and include new stations along 400 South, in the Granary District, and into Research Park.

REPORT PURPOSE

The purpose of this report is to analyze geographic locations along the proposed routes to identify economic factors that could impact utilization of public transit and generation of economic development opportunities as well as better understand socioeconomic conditions (population and employment distribution) to evaluate the benefits of improved transit options. Identifying areas of economic opportunity along the route aids in the prioritization of transit routes and station locations for the screening and evaluation phase of the study. Because the alternatives analyzed follow very similar alignments, two main alignments (Alternative 1, 2, and 4 as one alignment and Alternative 3 as the second alignment) were evaluated in this report and are shown in Figure 1 and Figure 2:

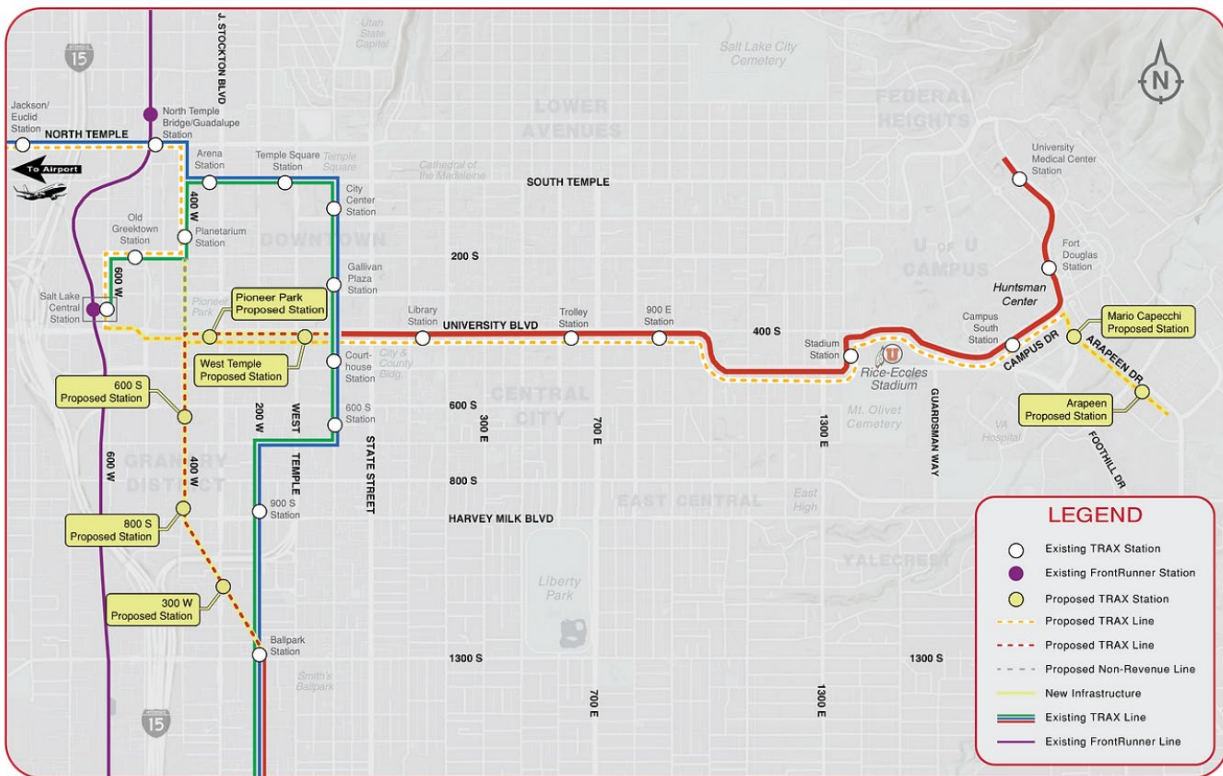


Figure 1. Alternative 1 – Future of Light Rail Baseline, with Orange Line routing through Salt Lake Central

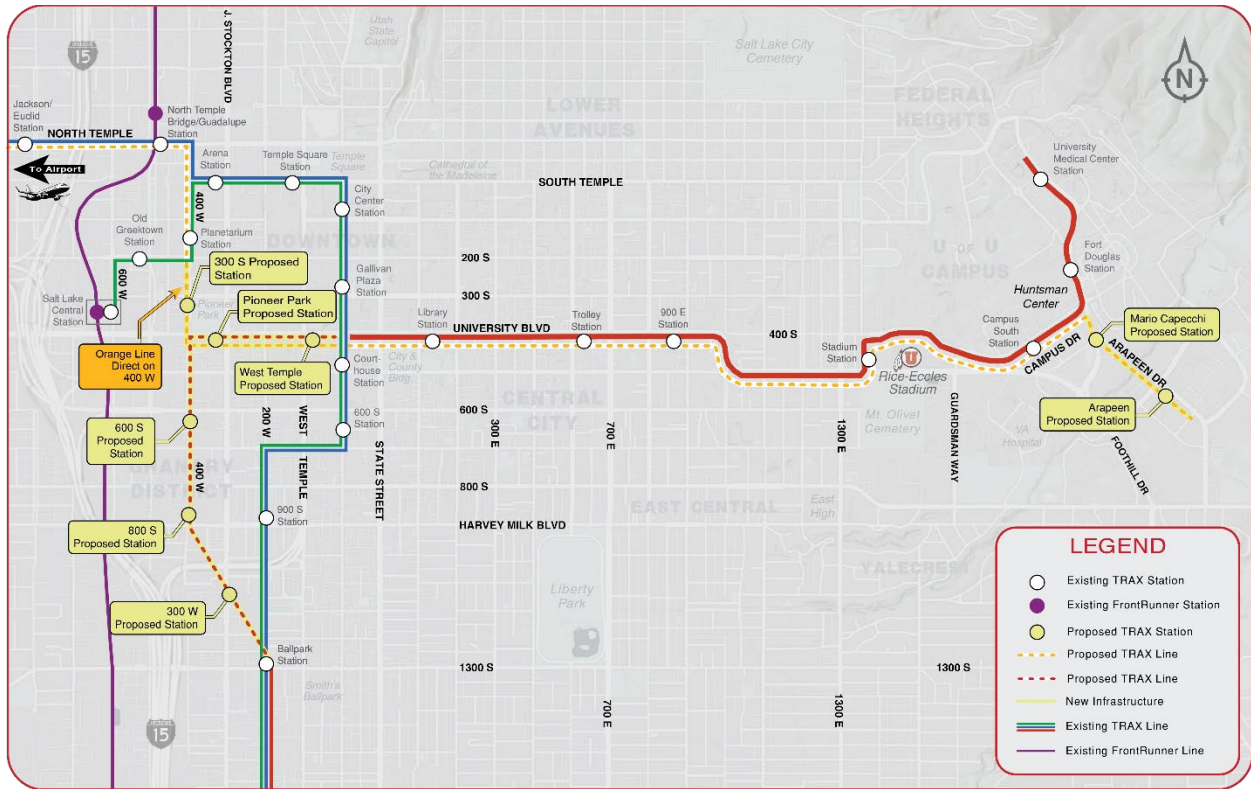


Figure 2. Alternative 3 – Direct on 400 West

TWO MAIN ALTERNATIVES WERE EVALUATED IN THIS REPORT:

- **Alternative 1 – Future of Light Rail Baseline:** Routing the proposed Orange Line through Salt Lake Central and Old Greektown Stations)
- **Alternative 3 – Direct on 400 West:** Routing the Orange Line directly along 400 West to connect to the TRAX Planetarium Station and North Temple FrontRunner Station

Comparisons between alternatives were made by evaluating building permit activity, real estate values, year built, population density, and employment with the most up-to-date information available as of the writing of this report. Evaluations were conducted considering existing conditions data and indicators for potential redevelopment opportunities. It is worth noting, however, that future funding opportunities through the Federal Transit Administration (FTA) Capital Investment Grants program rely on *existing* development, along with existing local plans and policies to support economic development, and not future planned development as part of project scoring for competitiveness.

KEY OBSERVATIONS FROM THE REPORT INCLUDE:

Building Permit Activity:

- In Salt Lake City, high-value commercial building permit activity tends to agglomerate around light rail stations.
- Most high-value commercial development activity is already well-served by light rail.
- The Granary District area has widespread high-value projects without existing light rail service.

Property Values:

- City Center in Downtown Salt Lake City shows high improvement values relative to land values, surrounded by a ring of underutilized parcels to the west, southwest, and south of City Center.
- The Granary District area, southwest of City Center, shows both opportunity and demand with a mix of high- and low-improvement values relative to land values.

Age of Buildings:

- Buildings tend to be newer surrounding existing TRAX stops, especially around TRAX stations served by multiple lines.
- The Granary District shows a mix of old and new buildings, reflecting both opportunities for development and high market demand.

Population and Employment:

- The Granary District area has high levels of existing population and employment density but currently lacks light rail stations.
- Within the Granary District, population and employment is concentrated to the east of 500 West.
- Relatively minimal population and employment currently exists between I-15 and 500 West.
- New stations in the Granary District will increase access to transit and economic opportunity.

CONCLUSION

Both main alternatives will increase access to economic opportunity and support redevelopment potential. Alternative 1, routing through Salt Lake Central, is farther from *existing* centers of population, employment, and recent development, but could serve more additional opportunities for potential redevelopment. Alternative 3, routing directly along the 400 West corridor to North Temple, has fewer opportunities for potential redevelopment directly adjacent, but is closer to in-demand development areas with high densities of existing employment and population.

Existing Conditions

The Blue, Green, and Red TRAX Lines serve 24 stations within Salt Lake City (Figure 3). In addition, the S-Line Streetcar serves three stations in the Sugar House neighborhood.

Sixteen of Salt Lake City’s TRAX stations provide access to only one line each. The Green Line serves all five stations on North Temple, the Airport Station, and the North Temple FrontRunner Station. The Blue Line serves the Salt Lake Central, Old Greektown, and Planetarium Stations. The Red Line serves all seven TRAX stations east of State Street in Salt Lake City, running east on 400 South to the University of Utah. All these stations improve transit access by widening the geographic reach of the TRAX system, while two of these stations provide regional connectivity via FrontRunner connections.

Eight of Salt Lake City’s TRAX stations provide access to multiple lines, including four stations served by all three Blue, Green, and Red Lines. These multi-line stations improve connectivity by allowing transit riders to transfer lines, providing centralized access to a wide geographic area. Stations served by multiple lines benefit from higher frequencies due to the staggered arrivals of TRAX cars on different lines.

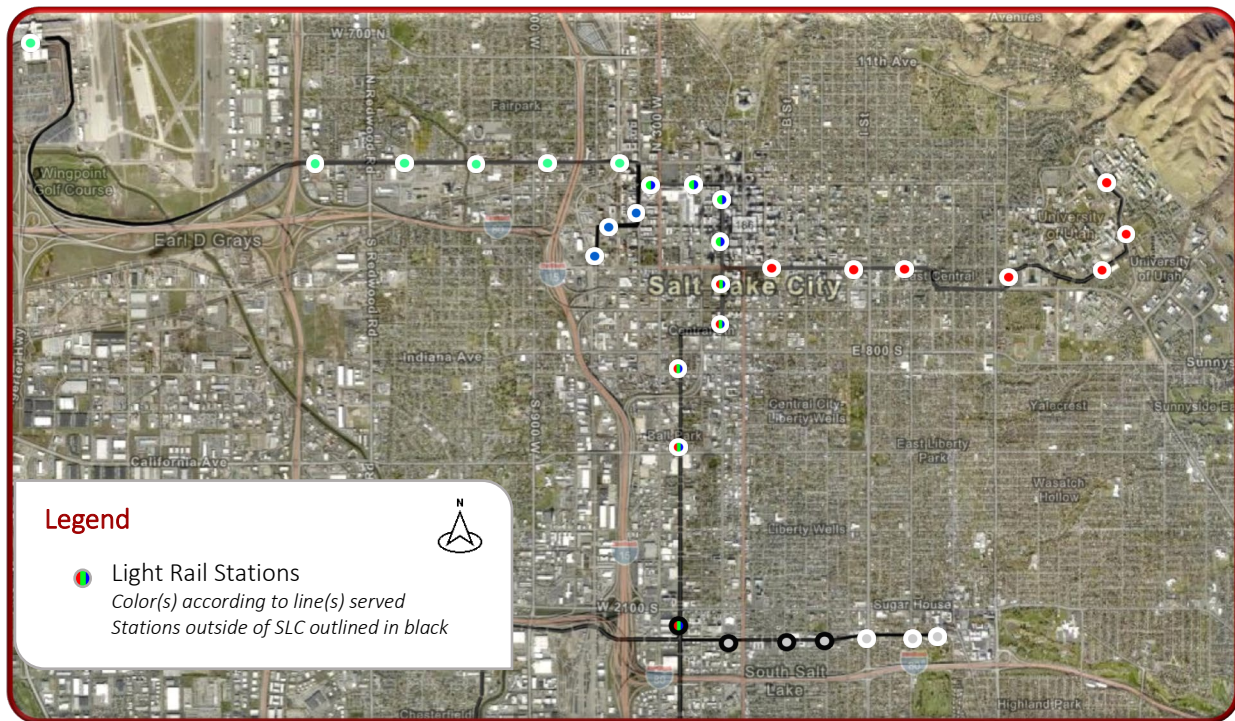


Figure 3. Existing Light Rail Stations, Salt Lake City Area (2024)

POTENTIAL IMPROVEMENTS: OPERATIONAL CHANGES, ORANGE LINE, AND NEW STATIONS

Four alternatives that include new track as well as operational changes were considered as part of this study. In each alternative, a new TRAX Orange Line would create a direct connection along North Temple utilizing existing stations from the Salt Lake City International Airport (currently served by the Green Line alone) and along 400 South to the University of Utah (currently served by the Red Line). Alternatives 1, 2 and 4 would connect to Salt Lake Central Station, while Alternative 3 would connect directly along 400 West and to the North Temple TRAX and FrontRunner Stations. All alternatives would provide direct access between the Airport, FrontRunner, and the University of Utah. Current connections to bus service would

be similar for both alternatives as well, but the connection points would be slightly different. All identified alternatives include new stations in the Granary and Ballpark neighborhoods at 600 South and 800 South (both running along 400 West) and at 300 West near Brooklyn Avenue. Each alternative includes two new stations at the University of Utah's Research Park, one at Mario Capecchi Drive, and one at Arapeen Drive. Additionally, all alternatives include two new stations at Pioneer Park and at West Temple, both along 400 South. All alternatives also include an operational change of switching the northern termini of the Blue Line to the Airport and the Green Line to Salt Lake Central – this change would use existing infrastructure.

In addition to the Alternative 1 – Future of Light Rail Baseline (Figure 4 and Figure 5), the other alternatives consider various new station locations and routing options.

Two alternatives have only marginal differences in terms of impacts on economic development:

- **Alternative 2 – Elevated on 400 West.** This alternative considers an elevated station at 600 South, with elevated track from 400 South to 700 South, rather than the ground-level station proposed in other alternatives.
- **Alternative 4 – University of Utah Realignment.** While the Stadium Station could be relocated to the southeast of its current location, the University of Utah faces different incentives, policies, and regulations regarding its land use compared to other landowners. In terms of development potential, these land use considerations overshadow the influence of the potential station relocation.

Only one alternative could potentially change economic development potential compared to Alternatives 1, 2, and 4:

- **Alternative 3 – Direct on 400 West.** This alternative would route the Orange Line directly on 400 West between North Temple and 400 South. While the Orange Line would not connect to Salt Lake Central Station in this scenario, as noted previously, nearly the same connections to bus and rail transit can still be made at other stations along the Orange Line, including a connection to FrontRunner at the North Temple Station. A new station would be provided on 400 West, just south of 300 South, which is different than Alternatives 1, 2, and 4.



Figure 4. TechLink Alternative 1, 2, and 4 Proposed Improvements

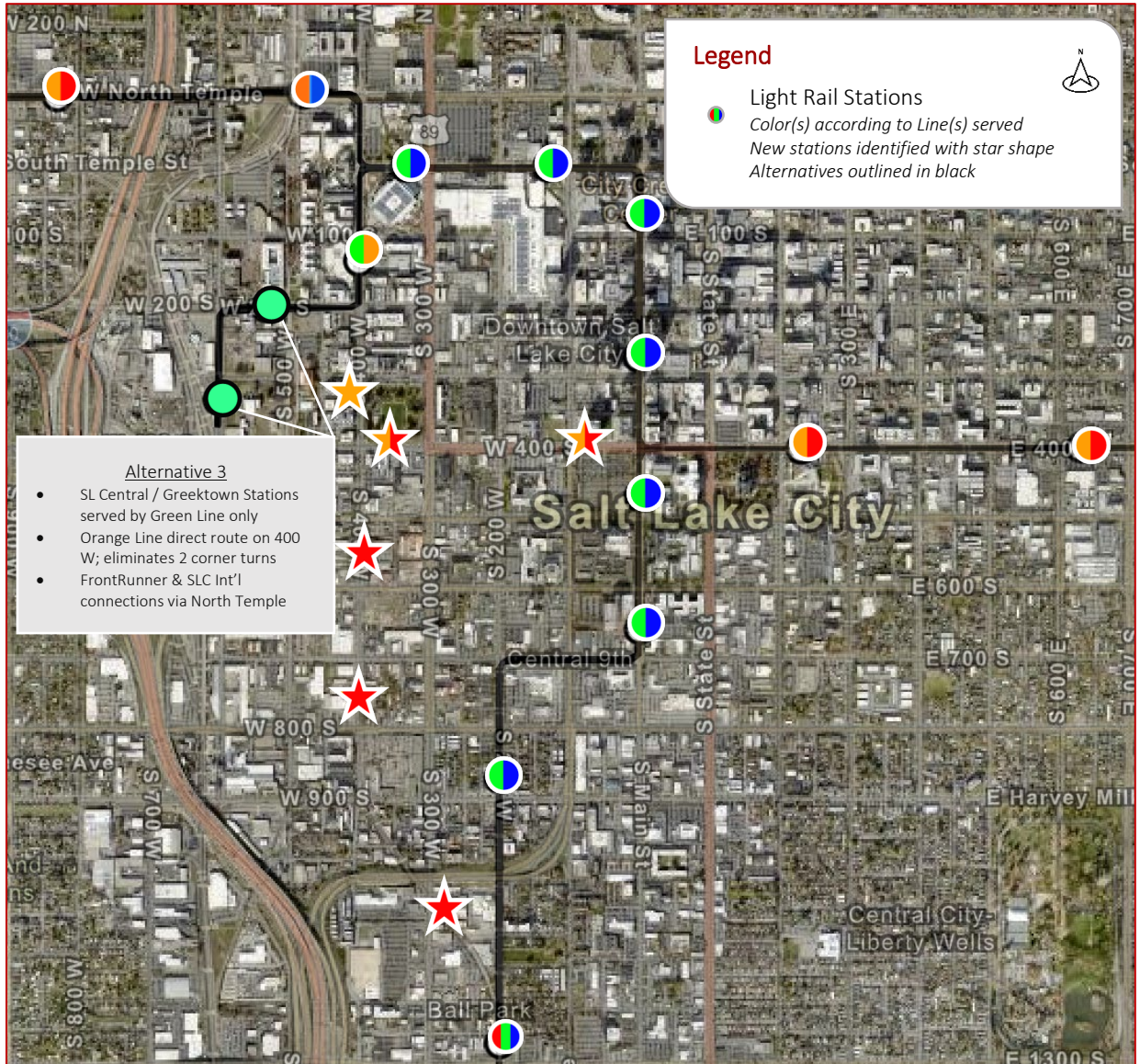


Figure 5. TechLink Alternative 3 – Direct on 400 West Proposed Improvements

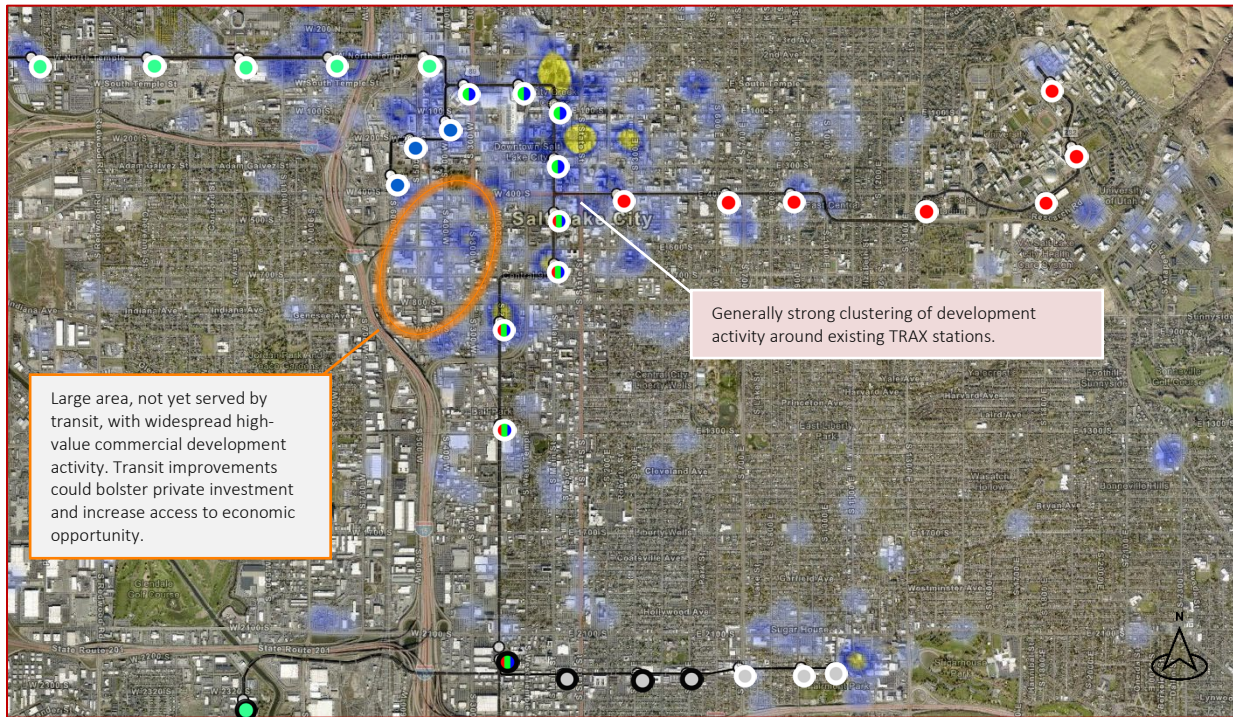
Economic Factors

The economic opportunity evaluation analyzed the impacts of the proposed TechLink improvements on real estate redevelopment activity and access to economic opportunity surrounding the TRAX light rail system. While the TechLink TRAX Study includes the University of Utah and Research Park, this report focuses on the proposed operational changes and improvements in and around the Granary District and Depot District area of Salt Lake City. To analyze the potential for economic stimulus and redevelopment, the following subsections consider current development activity, real estate values, existing land uses, and the differences between proposed TechLink alternatives.

CURRENT DEVELOPMENT ACTIVITY: HIGH-VALUE COMMERCIAL BUILDING PERMITS

Active commercial building permits reflect ongoing investments in retail, office, multifamily, and other commercial real estate in Salt Lake City. Areas with high concentrations of active permits reveal market

demand. The following map shows the concentration of active commercial building permits with total project values exceeding \$1 million within Salt Lake City. These high-value developments generally cluster in areas already well-served by transit; TRAX stations often have a cluster of high-value permits directly adjacent. This pattern creates a strong visual correlation between high-value commercial permits and light rail stations, suggesting that proximity to transit positively affects commercial development activity (Figure 6).



Legend

- Existing Light Rail Stations
Color(s) according to Line(s) served
Stations outside of SLC outlined in black

High
Concentration of Commercial Building Permits
Valued at over \$1 million
Active permits as of October 2023
Low

Figure 6. High-Value Commercial Building Permit Heat Map

Only a handful of stations lack a high-value permit cluster. Stations at the University of Utah lack adjacent commercial permits largely due to the non-commercial, educational nature of the State institution. Additionally, some parts of the City see significant development activity without proximate light rail. The areas directly east and southwest of Downtown (including the Granary District) show substantial clustering of high-value permits without adjacent light rail stations. Other discrete clusters with lower activity are scattered throughout the City (Figure 7).

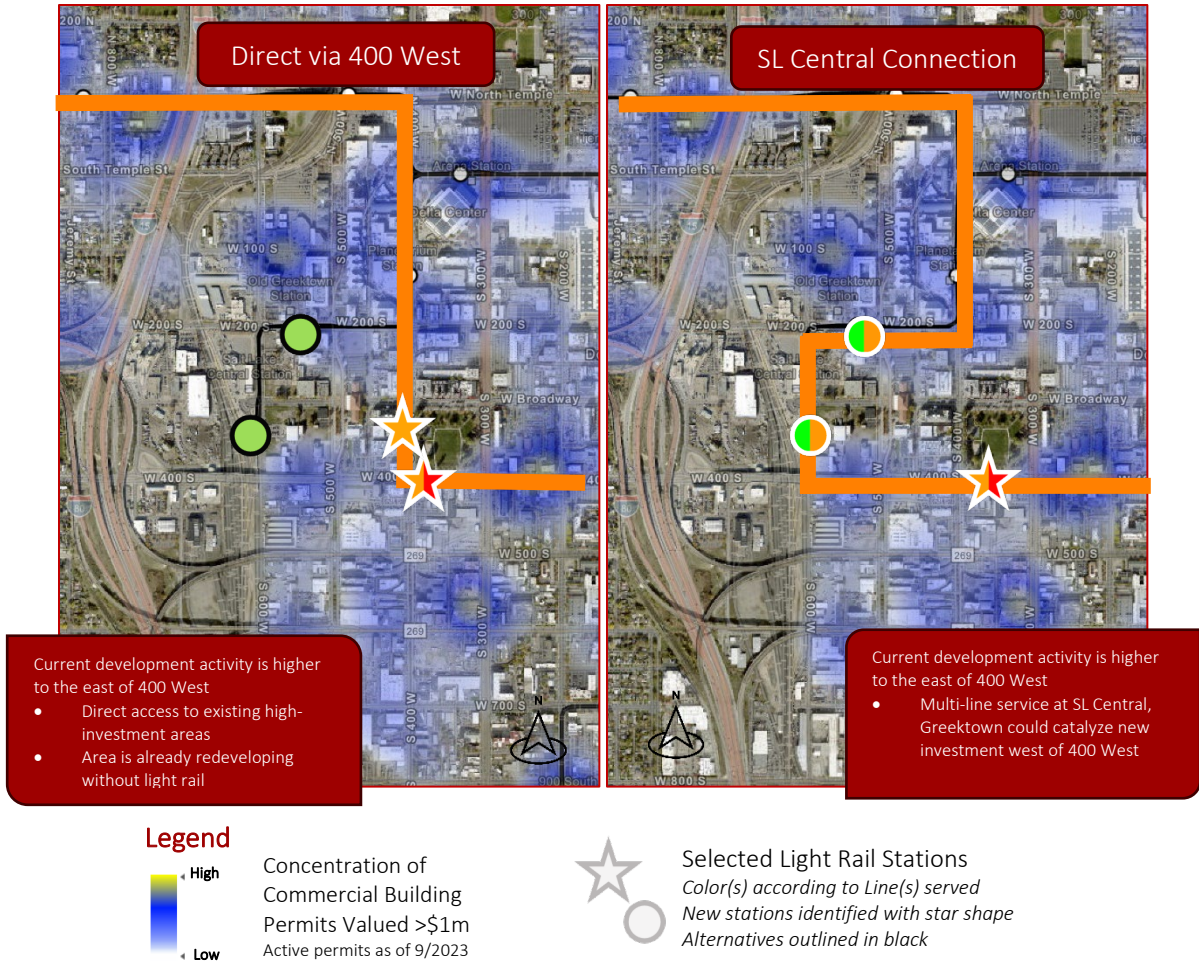


Figure 7. High-Value Commercial Building Permit Heat Map, Downtown and Depot District Areas (Alternative Evaluation), Source: Salt Lake City Accele Building Permit Database (October 2023); ZPFI

The direct route on 400 West creates a more efficient route to the northern end of the TRAX system while the route through Salt Lake Central serves additional existing stations. In terms of spurring new investment and redevelopment, the route through Salt Lake Central could better catalyze a wider area by adding new multi-line service west of 400 West. In terms of access to existing economic opportunity, the direct route along 400 West would provide more efficient access to areas with recent and ongoing investment.


PAST DEVELOPMENT ACTIVITY: YEAR BUILT

While active building permits reflect ongoing development activity, an analysis of parcels by year-built highlights recently completed improvements. In Figure 8, darker parcels indicate more recent completions, additions, or renovations, while the lighter yellow portions mark older buildings and properties in the City. As buildings age and depreciate, the opportunity for redevelopment grows.

Darker orange-to-purple parcels surround many existing light rail stations, indicating somewhat newer buildings. Newer improvements are especially concentrated around the multi-line stations. The single-line stations show a mix of older and newer buildings.



Legend

-  Existing Light Rail Stations
Color(s) according to line(s) served
Stations outside of SLC outlined in black

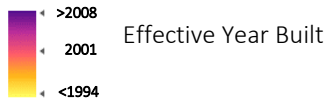


Figure 8. Effective Year Built by Parcel, Salt Lake City (09/2023), Source: Salt Lake County Assessor (2023); ZPFI

As previously discussed, Alternative 3 proposes a direct route for the Orange Line on 400 West, whereas Alternative 1 routes the Orange Line through Salt Lake Central, providing a new multi-line service at both Salt Lake Central Station and Old Greektown Station. The parcels surrounding these stations show many older buildings and several new buildings, while the direct route on 400 West between 200 South and 400 South shows mostly newer buildings with a handful of older buildings. The mix of old and new buildings around the Granary District and in the Depot District reflects demand and opportunity for redevelopment (Figure 9).

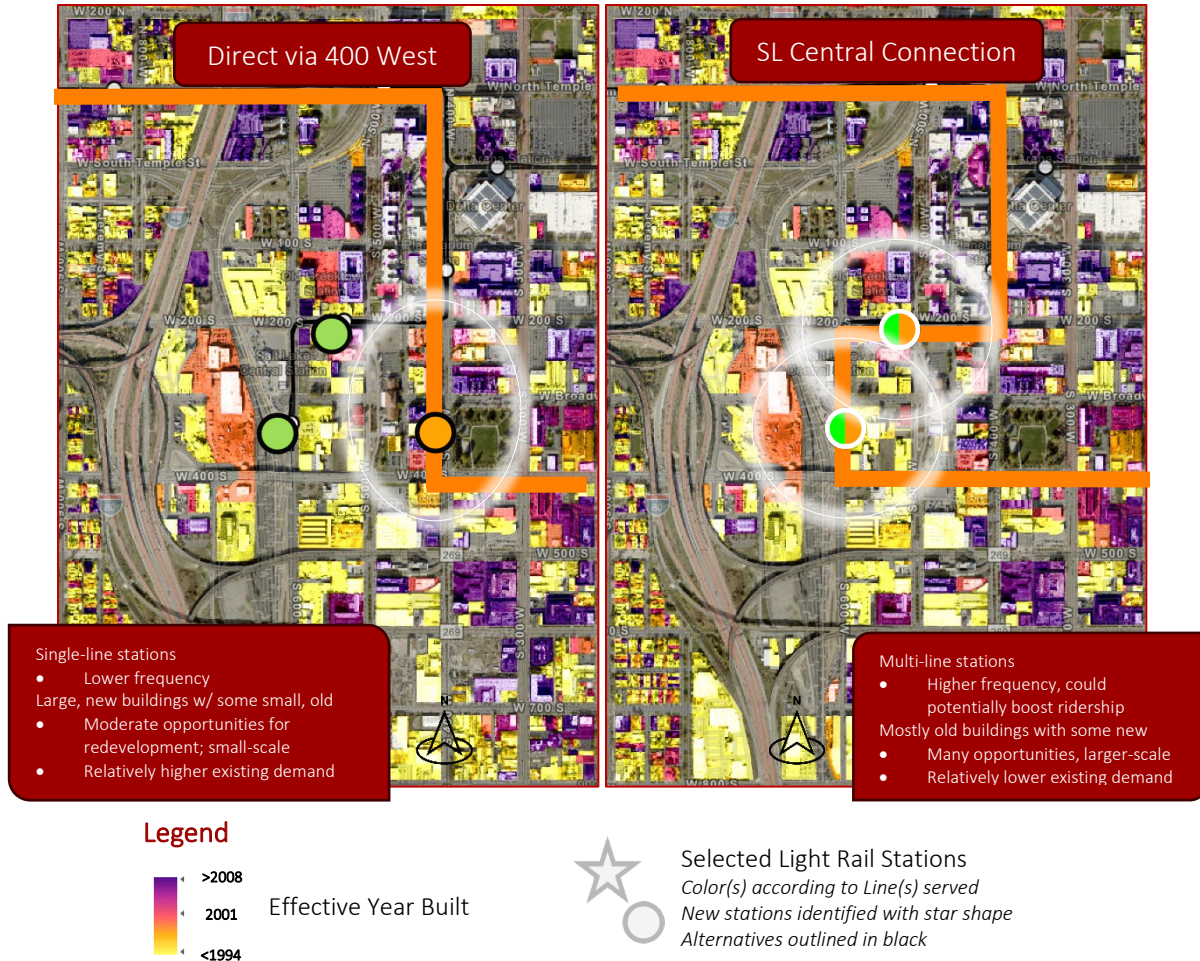


Figure 9. Effective Year Built by Parcel, Downtown and Depot District Areas (Alternative Evaluation), Source: Salt Lake County Assessor (2023); ZPFI

A combination of opportunity and demand is necessary to spur new investment. New multi-line service could help to catalyze investment in areas with high redevelopment opportunity around Salt Lake Central. Potential redevelopment opportunities exist in this area through the proposed Rio Grande District (roughly between 400 West and 600 West and 200 South and 400 South) and at the Salt Lake Central Station. On the other hand, the route through 400 West would bolster existing high demand by providing direct access to areas with recent development.

The area surrounding the 400 West direct route shows more parcels built recently, reflecting high demand in the area. However, older buildings in this area are fewer and more scattered, offering smaller-scale opportunities for redevelopment. The resulting development activity could occur relatively quickly due to high existing demand.

Conversely, the route through Salt Lake Central provides access to widespread areas with older buildings where redevelopment may be feasible. However, with relatively fewer new buildings, existing demand is lower. Private development might not occur until demand grows or public investment spurs new activity.

LAND USE AND ASSET UTILIZATION: IMPROVEMENT VALUE RELATIVE TO LAND VALUE

The two components of market value – land value and improvement value – together reflect different aspects of land use and asset utilization. High land value with low improvement value is a symptom of underutilization; these parcels are not meeting their “highest and best use.” The following map shows relative improvement values, reflecting significant investments in Salt Lake City and highlighting areas with opportunities for redevelopment. The light yellow areas (Figure 10) highlight potentially underutilized properties, while darker purple parcels generally approach their highest and best use.

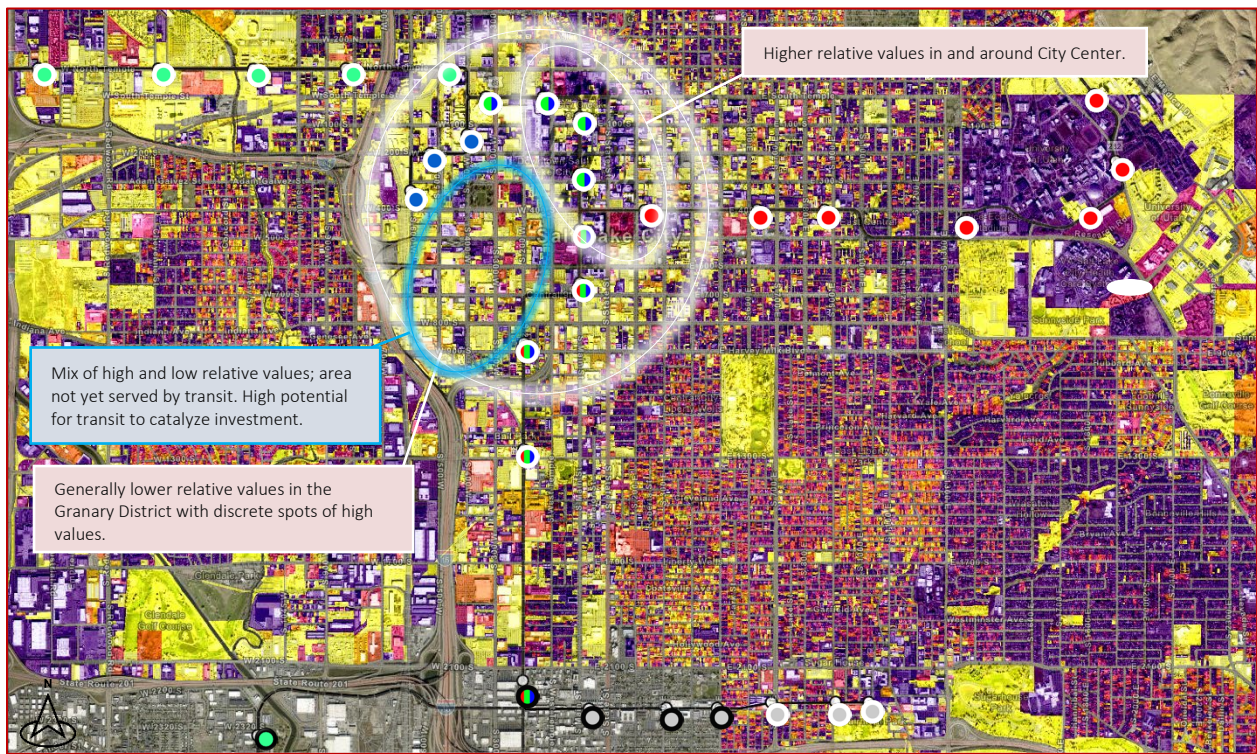


Figure 10. Relative Improvement Value by Parcel, Salt Lake City, Source: Salt Lake County Assessor (2023); ZPFI

Legend

- Light Rail Stations
Color(s) according to line(s) served
Stations outside of SLC outlined in black
- Improvement Value as a % of Land Value
 - >200%
 - +125%
 - <50%

Areas with widespread low improvement values may have opportunities for redevelopment but generally lack the demand. Conversely, areas with widespread high improvement values reflect high demand but generally lack feasible opportunities for redevelopment due to the opportunity cost of losing the current use.

Strong signs of redevelopment potential are often where low- and high- relative value properties abut one another – those “high contrast” areas (Figure 11) with a mix of light yellow and dark purple parcels. Currently, the areas surrounding TRAX stations see a variety of improvement values relative to land values. Notably, the Downtown area shows high relative improvement values to the northeast of City Center, surrounded by a ring of largely underutilized parcels. This ring represents significant opportunities and demand for redevelopment.

In the area surrounding the alternative direct on 400 West, parcels show comparatively high relative improvement values. The adjacent street to the west, 500 West, shows a mix of high and low relative improvement values, revealing both opportunities and demand for redevelopment.

Demand indicators are stronger along the 400 West direct route, though redevelopment opportunities are more widespread around Salt Lake Central. With mostly low relative improvement values around Salt Lake Central, opportunities for redevelopment are significant but demand is lagging. Public investment around Salt Lake Central could increase demand to spur redevelopment. For the direct route on 400 West, public investment would bolster existing demand for more rapid redevelopment.

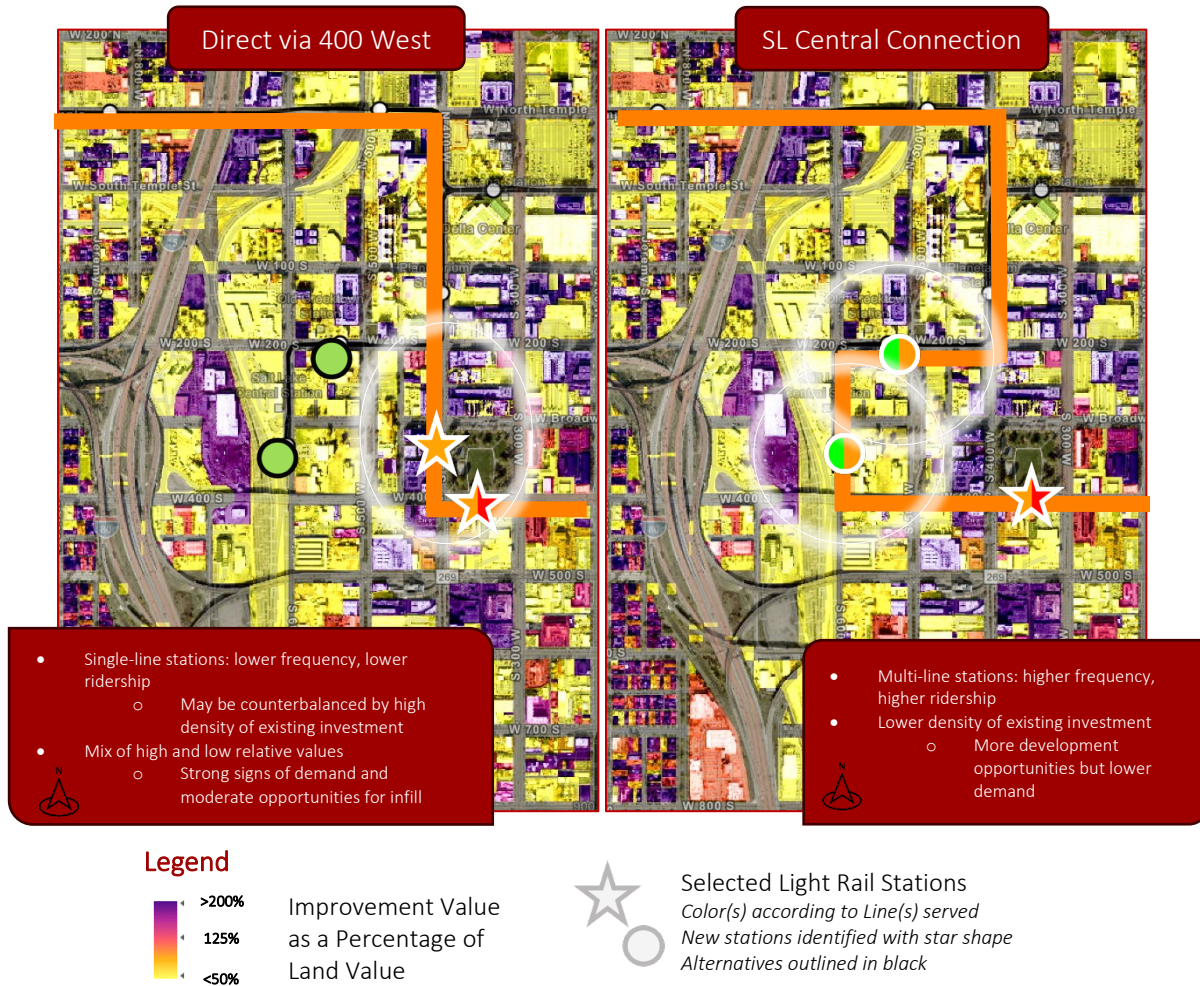


Figure 11. Relative Improvement Value by Parcel, Downtown and Depot District Areas (Alternative Evaluation), Source: Salt Lake County Assessor (2023); ZPFI

POPULATION AND EMPLOYMENT

For reference, the following maps show residential (Figure 12 and Figure 13) and employment densities (Figure 14 and Figure 15) around Salt Lake City, Downtown, and the Granary/Depot Districts. Revealing existing sources of ridership, these visualizations may supplement the evaluation of alternatives.

POPULATION DOT DENSITY

The following maps (Figure 12 and Figure 13) visualize population density by Census Block, with each red dot representing one person. However, this population density data is from the 2020 United States Census and does not reflect the substantial housing growth over the past few years. Since Census Day on April 1, 2020, Salt Lake City has issued building permits for 11,760 housing units, according to the Ivory-Boyer Construction Database.

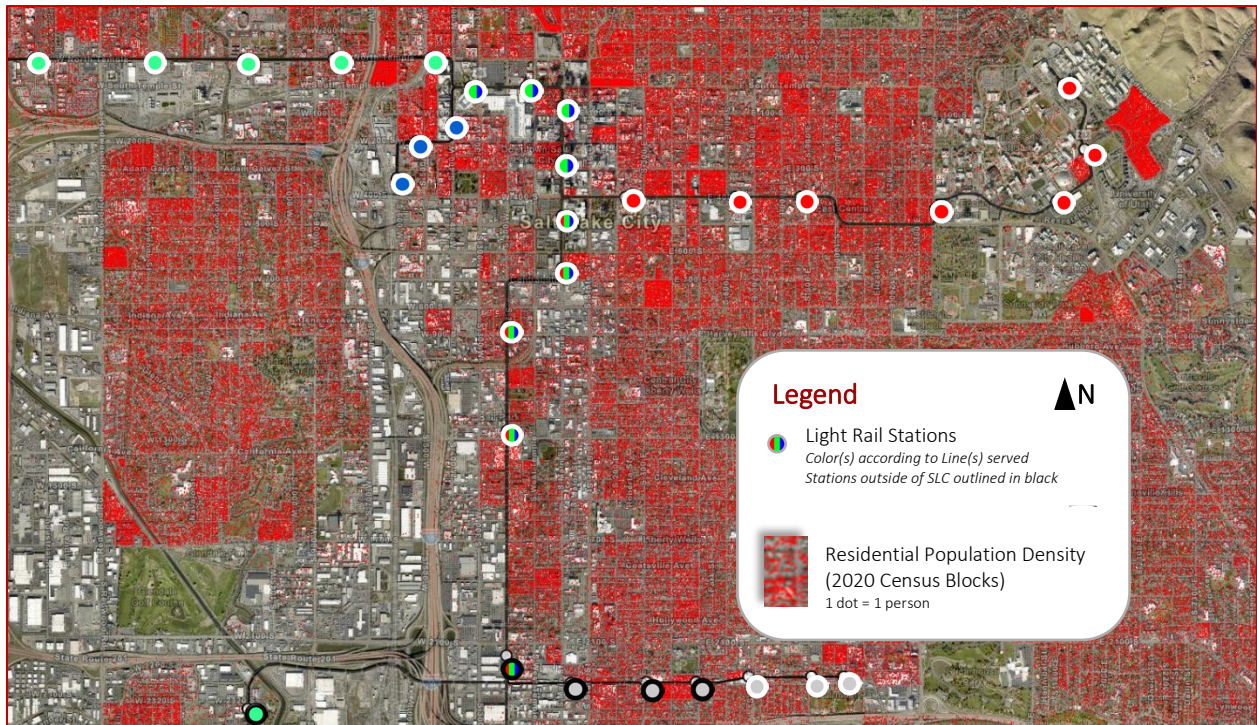


Figure 12. 2020 Residential Population Density by Census Block, Salt Lake City Area, Source: 2020 Decennial Census Redistricting Data

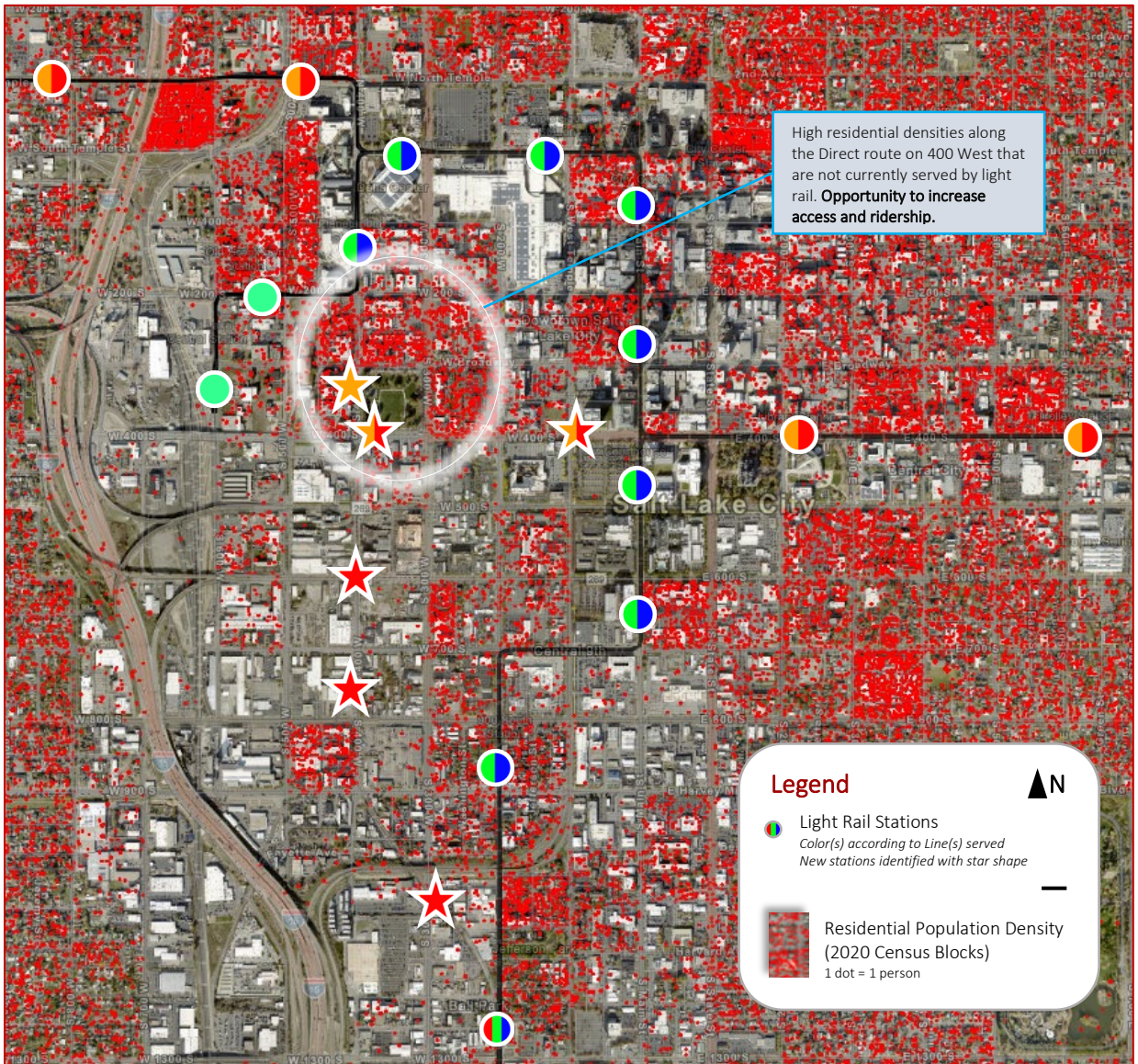


Figure 13. 2020 Residential Population Density by Census Block, Downtown and Depot/Granary District Areas, Source: 2020 Decennial Census Redistricting Data

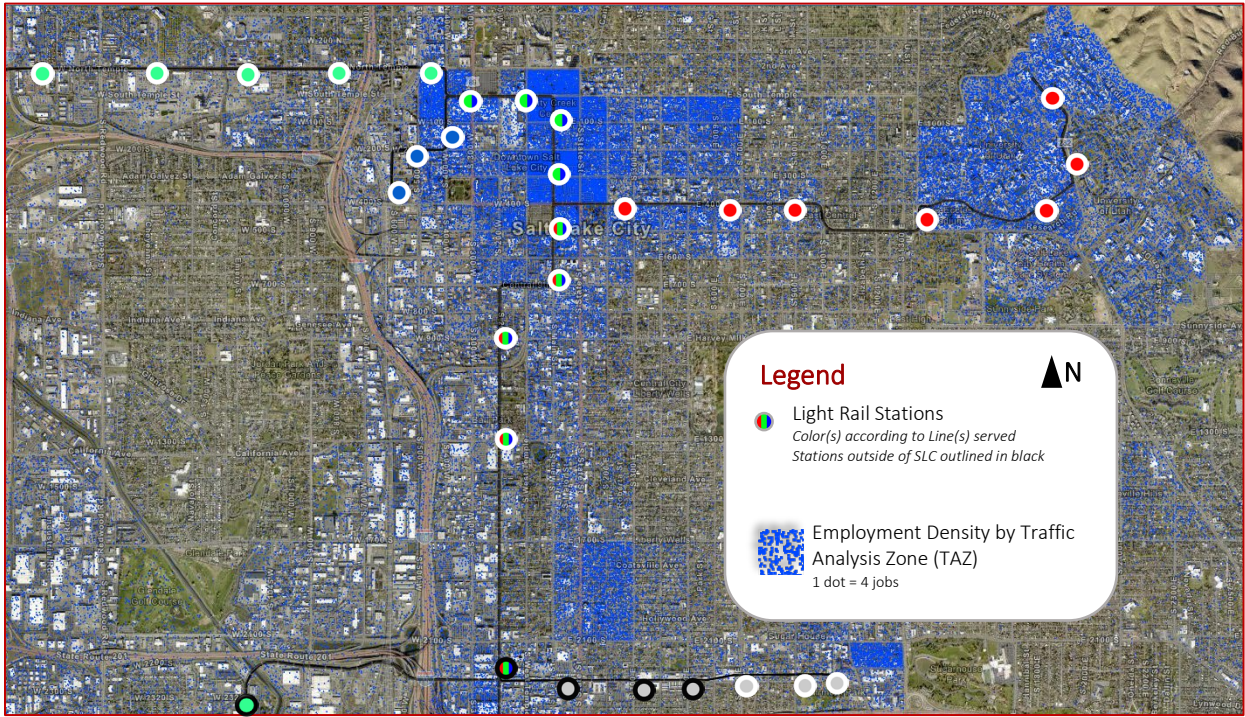


Figure 14. 2019 Employment Density by Traffic Analysis Zone (TAZ), Salt Lake City Area, Source: WFRC/MAG-TAZ Travel Demand Model, RTP 2023

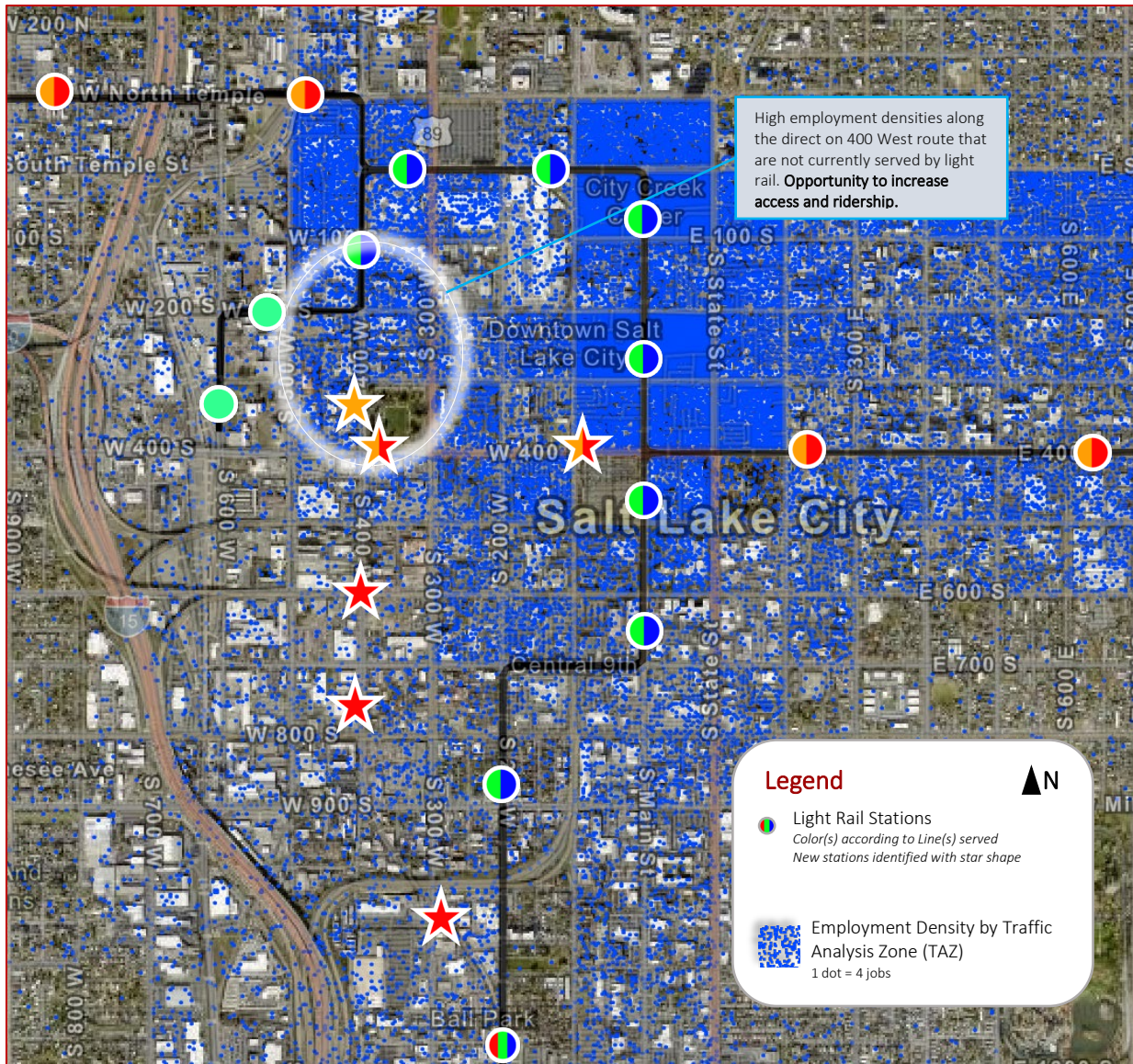


Figure 15. 2019 Employment Density by Traffic Analysis Zone (TAZ), Downtown and Granary District Areas, Source: WFRC/MAG-TAX Travel Demand Model, RTP 2023



Attachment G4: Equity Analysis Memorandum



TechLink TRAX Study

Equity Analysis Memorandum

Background

Providing equity through transit is a central component of the TechLink TRAX Study to aid in fair and just access to transportation services and infrastructure for all individuals, regardless of their socioeconomic status or geographical location. Identification of demographic conditions surrounding environmental justice populations is generally focused on minority or low-income populations; however, for the purposes of this study, a more comprehensive look at other socioeconomic indicators was conducted to better understand the needs and opportunities for diverse populations with varying transportation challenges.

Equity Analysis Goal: The evaluation of alternatives, through an equity lens, provides a better understanding of the potential impacts, both positive and negative, of the proposed transit alternatives on disadvantaged communities within the study area.

Drawing from the Existing and Future Conditions analysis conducted earlier in this study (Section 2 of the Final Report), the following socioeconomic indicators were selected to measure equity for disadvantaged communities across alternatives in comparison with the existing conditions:

- Minority Populations
- Low Income Populations
- Limited English-Speaking Households
- Zero Vehicle Households
- Populations with Disabilities
- Rent-Burdened Housing Units

The definitions for these communities can be found in Section 3.1 of the Final Report. Additionally, **access to opportunities** was evaluated by comparing the TechLink TRAX Study alternatives with the existing transit services and other current conditions. For this analysis, **opportunities** are defined as employment centers, educational institutions, medical and health care services, social services



providers, community centers, and public spaces. **Access to jobs** was evaluated using job data for the years 2023 and projected out to 2050.

Analysis Methodology

Analysis Overview

The access to opportunities and jobs evaluation quantified the number of individuals currently within each specified disadvantaged category who would benefit from enhanced transit frequency and more direct access/connectivity via these alternatives. This was followed by an analysis of new populations that would benefit from the added sections and alignments for new infrastructure. The detailed results of this analysis are described in greater detail below. Datasets collected for the TechLink Existing and Future Conditions Report (Appendix B of the Final Report) were utilized to conduct these analyses.

Analysis Area

The analysis area was set as a buffer of 0.25 miles for two key reasons. First, industry guidance from resources like Federal Highway Administration (FHWA), American Association of State Highway and Transportation Officials (AASHTO), and National Association of Transportation Officials (NACTO) have determined that people are generally willing to walk distances of 0.25 to 0.5 miles to access transit. As the distance to transit increases, the number of pedestrian trips decreases (see Figure 1). The Federal Transit Administration's (FTA) 2011 Final Policy Statement on Eligibility of Pedestrian and Bicycle Improvements under Federal Public Transportation Law (76 FR 52046) notes that all pedestrian improvements located within 0.5 miles and all bicycle improvements located within 3 miles of a public transportation stop or station shall have a de facto physical and functional relationship to public transportation and may qualify for FTA funding.

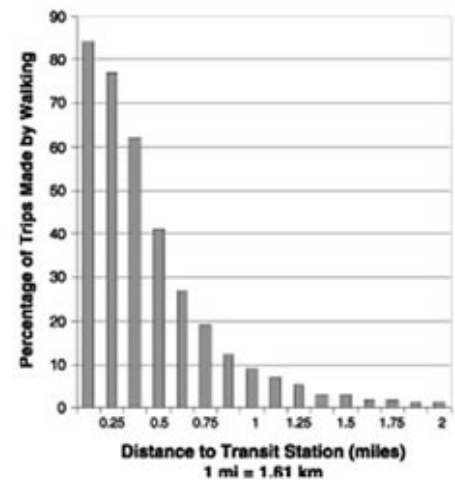


Figure 1. Percentage of Walking Trips by Distance to Transit Station (Source: FHWA Pedestrian Safety Guide for Transit Agencies)

Second, as depicted in Figure 2, increasing the buffer beyond 0.25-mile in this study area reveals a significant overlapping of the existing TRAX lines and the proposed alternatives, diminishing the ability

to adequately quantify differences between current and future conditions. To obtain a more accurate and detailed comparison of tradeoffs and benefits, a 0.25-mile buffer was selected for analysis.

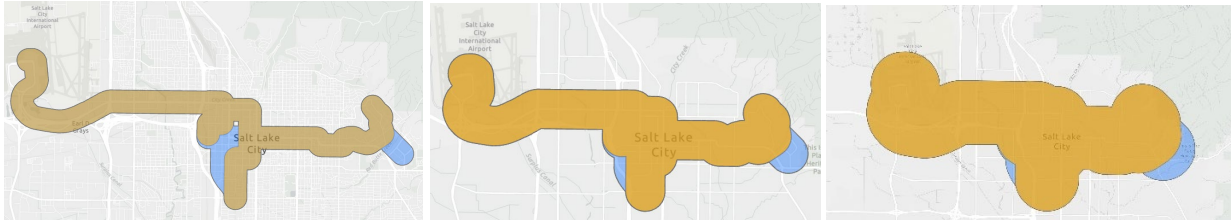


Figure 2. Left to right: 0.25-, 0.5-, and 1-mile Buffer of Alternatives (blue polygon) Versus Existing TRAX Lines Buffer (orange polygon)

Analysis Normalization

As Figure 3 shows, the 0.25-mile buffer of alternatives overlaps with the buffer around the existing transit service to varying extents. Census Tracts were overlaid to understand the varying community profiles along the study areas. Some Census Tracts are small and densely populated and fall fully within the analysis buffer and some overlap with the buffer partially. For example, in Census Tract A, the geographic area covered by the alternative's buffer exceeds the existing TRAX lines buffer, yet both buffers only partially overlap with Census Tract A. Without any normalization, the population within both buffers will be equal to the Census Tract A population, which is misleading for the purposes of this analysis.

To address this discrepancy, a normalization approach was considered, involving the calculation of the ratio of the buffer area in the Census Tract's area and multiplying this ratio by the population count of the Census Tract to obtain a more precise estimation.

In this example, the ratio of the existing TRAX lines buffer in Census Tract A is 0.21, and the ratio of the alternatives buffer is 0.29. Consequently, with a reported disabled population of 76 in Census Tract A, the disability population estimate within the existing TRAX lines buffer is 35 people, and within the alternatives buffer it is 48 people.

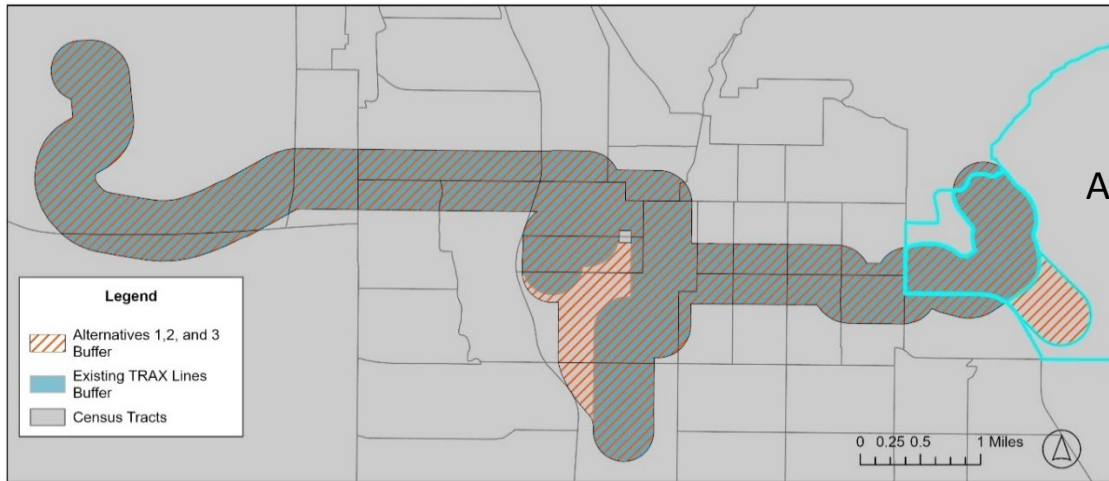


Figure 3. Analysis Normalization

Equity Evaluation and Findings

Since the 0.25-mile buffer for Alternative 1 – Future of Light Rail Baseline, Alternative 2 – Elevated on 400 West, and Alternative 3 – Direct on 400 West are similar, these alternatives were evaluated as one package (Figure 4). Alternative 4 – University of Utah Realignment was analyzed separately, as the analysis buffer was slightly different due to the proposed realignment of the TRAX line from South Campus Drive to 500 South near the University of Utah (Figure 5).

The analysis result shows that, overall, all four alternatives improve access to transit for the socioeconomic indicators outlined in Table 1 below, with Alternatives, 1, 2, and 3 having a greater positive impact compared to Alternative 4. Table 1 shows the equity analysis findings for the existing TRAX lines; Alternatives 1, 2, and 3; and Alternative 4.

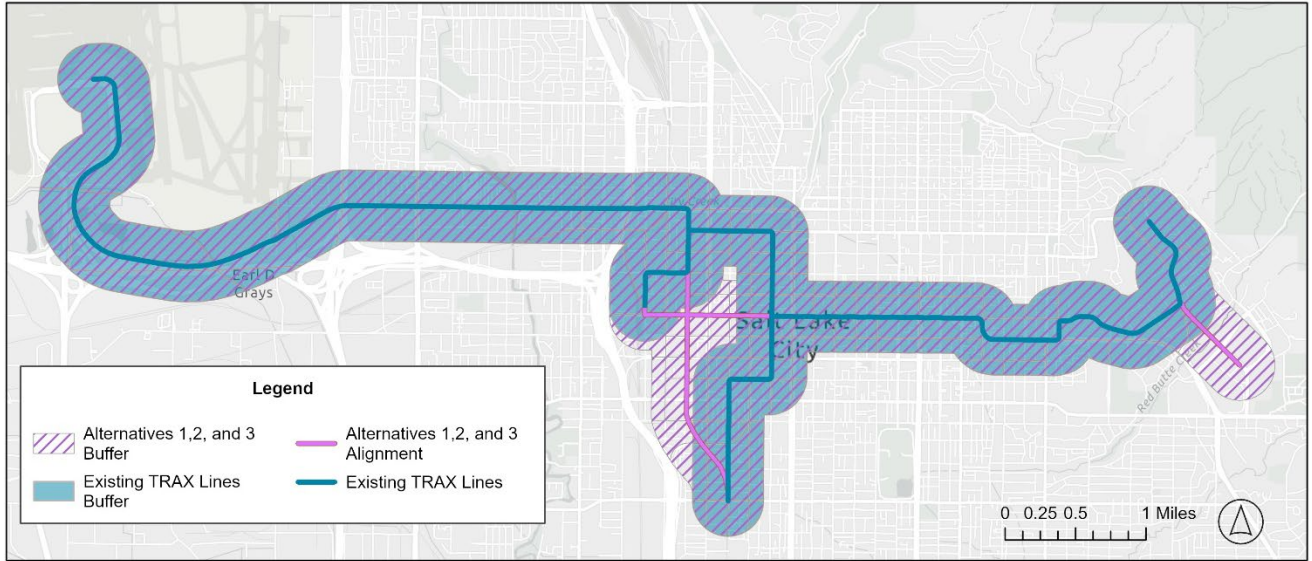


Figure 4. Alternatives 1, 2, and 3 Buffer and Existing TRAX Lines Buffer

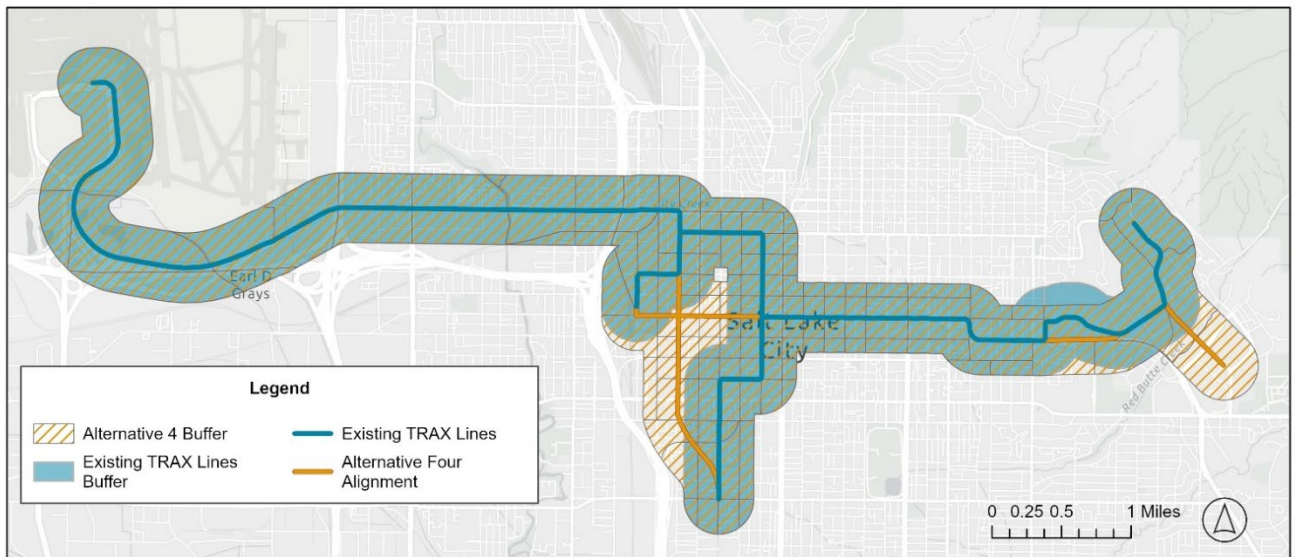


Figure 5. Alternative 4 Buffer and Existing TRAX Lines Buffer



Findings

The data in Table 1 indicate the disadvantaged populations and underserved households within the analysis buffer, and the percentages indicate the incremental improvements of the alternatives over the existing TRAX lines. For instance, Alternatives 1, 2, and 3 see an improvement in access for minority populations by 4.5% (467 people) compared to the existing TRAX lines. Among all socioeconomic indicators outlined in Table 1, Alternatives 1, 2, and 3 show that positive impacts for rent-burdened housing units are slightly higher than other indicators.

Regarding access to opportunities, analysis results show that access to jobs will increase through implementing any of the alternatives. For the year 2023, the increase between Alternatives 1, 2, and 3 and the existing TRAX lines is 9.3%, increasing to 10.67% by the year 2050.

It is important to note that the alternatives buffer intersects with the Granary District, which is a fast-growing area. While precise data on the exact number of jobs and population influx into this area is currently unavailable, it is anticipated to surpass the numbers presented in the table below.

Consequently, this suggests that the incremental improvements offered by the alternatives compared to the existing TRAX lines, particularly for indicators such as access to jobs, may actually be greater than reflected in Table 1.

Although the incremental improvements across all indicators are less than 10%, it is important to note that the existing TRAX lines already provide substantial coverage for disadvantaged communities. Currently, 38% of the minority population lives within a 0.25-mile buffer of the existing TRAX lines.

Table 1. Equity Evaluation - Socioeconomic Indicators and Access to Opportunities

Socioeconomic Indicators	Existing TRAX Lines 0.25-mile Buffer	Alternatives 1, 2, and 3 0.25-mile Buffer	Alternative 4 0.25- mile Buffer
Total Population	27,849	29,151	28,875
Minority Populations	10,470	10,937 (+4.5%)	10,879 (+3.9%)
Low-Income Populations	11,588	12,102 (+4.4%)	11,965 (+3.2%)
Limited English-Speaking Households	657	682 (+3.8%)	680 (+3.5%)
Population with a Disability	3,668	3870 (+5.5%)	3852 (+5%)
Zero-Vehicle Households	2,555	2,705 (+5.9%)	2,694 (+5.4%)



Rent-Burden Housing Units	6,440	6,848 (+6.3%)	6,785 (+5.4%)
Access to Opportunities	Existing TRAX Lines 0.25-mile Buffer	Alternatives 1, 2, and 3 0.25-mile Buffer	Alternative 4 0.25- mile Buffer
Access to Jobs 2023	143,380	156,750 (9.3%)	154,034 (7.4%)
Access to Jobs 2050	186,633	206,553 (10.67%)	203,304 (8.9%)

Measuring Gentrification and Displacement

Research on how transit investments, like light rail, are directly correlated to displacement is very new. Most light rail and transit-oriented development (TOD) studies use property value increases spurred by the investment to measure displacement potential and therefore assumed gentrification. To be responsive to the goals outlined by this study and the definition developed for gentrification, socioeconomic indicators are used to set a baseline for measuring displacement potential. Table 2 shows the indicators used based on the defined at-risk populations to measure gentrification and displacement.

Displacement and gentrification often happen over time following developments and growth adjacent to transit improvements. Therefore, this study includes a list of anti-displacement strategies, which can be found in the TechLink Existing and Future Conditions Memorandum.

Table 2. Equity Evaluation – Gentrification and Displacement

Indicators	Definitions	Alternatives Impact
Age	Older populations are at a higher risk for being displaced	Natural, alternatives do not impact this indicator directly. However, over time, with future growth and without an anti-displacement strategy, this may cause negative impacts.
Race/Ethnicity	Non-white and Hispanic populations are at a higher risk for being displaced	Natural, alternatives do not impact this indicator directly. However, over time, with future growth and without an anti-displacement strategy, this may cause negative impacts.
Low Income	Low-income households and individuals are at a higher risk for being displaced	Natural, alternatives do not impact this indicator directly. However, over time, with future growth and without an



		anti-displacement strategy, this may cause negative impacts.
--	--	--

Conclusion

All four alternatives perform similarly in terms of providing **access to opportunities** and **access to jobs** and show a net benefit across all. The addition of service frequency between the Salt Lake City International Airport and the University of Utah/Research Park and new track and service into the Granary District will provide greater mobility for a variety of users and is responsive to the growth and redevelopment in many areas of Salt Lake City.



Attachment G5: Opinion of Probable Cost Report



OPINION OF PROBABLE COST REPORT

FOR

Alternative 1, Future of Light Rail Baseline

Alternative 2, Elevated on 400 West

Alternative 3, Direct on 400 West

Alternative 4, University of Utah Realignment

BY



December 18, 2024



Opinion Of Probable Cost Report December 18, 2024

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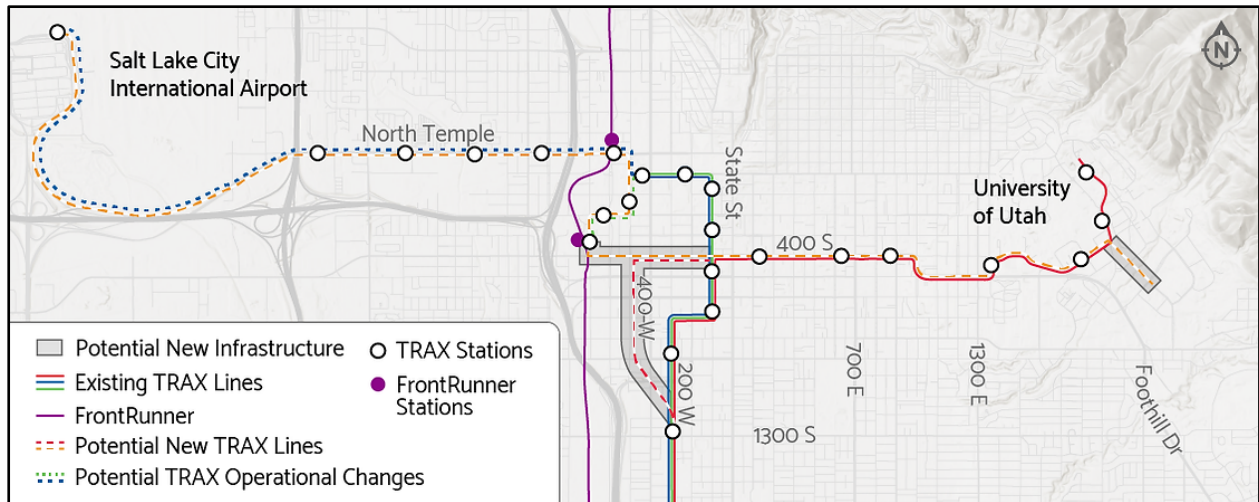


Opinion Of Probable Cost Report

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Study Overview

Utah Transit Authority (UTA), in partnership with Salt Lake City (SLC), University of Utah (U of U), Wasatch Front Regional Council (WFRC) and the Utah Department of Transportation (UDOT), is conducting the TechLink TRAX Study to improve east-west, downtown Salt Lake City, and regional TRAX connectivity in Salt Lake City.



Study Area Map

The TechLink TRAX Study is building on previous studies and plans and will analyze potential light rail (TRAX) improvements including:

- Realignment of the TRAX Red Line, with new service through the Granary District to the Ballpark Station
- A new TRAX Orange Line, connecting Salt Lake City International Airport directly to the University of Utah, with improved service along the way and new service into Research Park
- Modified TRAX Blue and Green Line operations

The TechLink TRAX Study team will take a close look at these improvements, develop and screen equitable and sustainable transit alternatives and prepare a final report that can then move into the federal environmental process.

The Primary alternatives being studied are:

- Alternative 1, Future of Light Rail Baseline
- Alternative 2, Elevated on 400 West
- Alternative 3, Direct on 400 West
- Alternative 4, University of Utah Realignment



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Alternative Scope

The table below provides a broad overview of the scope of the each of the alternatives included in this study.

Properties	Alternative 1 Future of Light Rail Baseline	Alternative 2 Elevated on 400 West	Alternative 3 Direct on 400 West	Alternative 4 University of Utah Realignment
Length - Route Miles	3.07	3.07	2.77	3.73
Number of Stations - Each	7	7	8	8
Right of Way (ROW) - Acres	3.54	3.54	2.70	6.43
No of Vehicles - Each	4	4	4	4

Executive Summary

This cost study examined four Primary Alternatives that have been evaluated based on key factors including route feasibility, environmental impact, traffic disruptions, construction costs, and operational efficiency. These Class 5 estimates aim to provide stakeholders with a comprehensive understanding of the financial implications and logistical considerations associated with each alternative. The estimate costs presented herein include allocated contingencies but exclude escalation and unallocated contingencies.

Expected Estimate cost range for the four Primary Alternatives, based on the AACE Estimate Classification and expected accuracy using a low of -25% and a high of +40% are listed below:

Expected Estimate Cost Range

		Low Range (-25%)	Current Estimate	High Range (+40%)
Alternative 1	Future of Light Rail Baseline	\$347,134,000	\$462,845,000	\$647,983,000
Alternative 2	Elevated on 400 West	\$380,640,000	\$507,520,000	\$710,528,000
Alternative 3	Direct on 400 West	\$298,151,000	\$397,534,000	\$556,548,000
Alternative 4	University of Utah Realignment	\$430,598,000	\$574,130,000	\$803,782,000

Basis of Estimate

The basis of the estimates are conceptual alignments which outline the proposed paths of the rail and roadway impacts reflected in google earth KMZ files (TechLink Options Analysis_Detailed Alignments_R7.kmz and Techlink_RW Impacts XREF_R2.kmz). Parametric quantities were developed from CAD files and pricing was supplemented by historical cost data from similar projects along with estimator judgement.



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Estimate Assumptions

The following list of assumptions apply to the estimate:

- Roadway – Mill & Overlay, 3" deep was assumed within limits of existing pavement, where existing pavement limits are anticipated to be exceeded full depth reconstruction was quantified.
- Roadway – Full Depth Reconstruction
 - 12" Aggregate Base course
 - 4" Binder Course
 - 2" Wearing Course
- Drainage structures are assumed at 100' on centers for curb inlets and other storm drainage structures
- Purchase of Real Estate within Street ROW. UTA anticipates access to existing right of way (ROW) via easement from SLC and UDOT, similarly through U of U controlled property.
- Anticipate purchase of 3rd party real estate as needed beyond limits of road ROW per Appendix.
- 3 Desired Crossovers were included at a total cost of \$17M (Green, Cyan & Dark Green Segments, colors reference the kmz)
- 115RE Rail on concrete ties in ballasted areas.
- Rail to be electric flash-butt welded to 1,200 foot lengths.
- Space is available on site for welding and stock-piling welded rail.
- Field thermite welds for adjoining welded rail strings and installation of bonded insulated joint rails.
- All turnouts for ballasted tracks are purchased and delivered to the site as panelized turnout packages.
- Ballasted track built through grade crossings is built to grade crossing standards, i.e. 10' ties compatible with crossing panels, geotextile fabric under ballast, etc.
- All embedded track surface is completed in concrete throughout each alignment.
- Track circuits do not exceed 3500'
- Prioritization with highway traffic controller and highway signal system for semi-exclusive and mixed-use guideway.
- Rail vehicle detection loop on track and use of LRT signals at intersections.
- Substation feed required for traction power approximately every 10,500 feet of guideway.
- The estimate assumes OCS poles every 100' based previous projects.
- Stations are inclusive of fare collection system and equipment, public address system and any electronic/automatic reader board system
- Active grade crossing system not required for at-grade crossing in yard limits.
- Drain inlets along the track are based on one per 500 feet of embedded track.
- Curb & gutter quantities are based on 50% of the embedded track lengths (rounded).
- 6' wide sidewalk quantities are based on the embedded track guideway length (rounded).
- The unit cost of \$6M/per light rail vehicle was provided to the project team by UTA via correspondence dated 10/4/2024.

Estimate Exclusions

The following list of exclusions apply to the estimate:

- Electric Flash-butt welding of joints in track.



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- Any cementitious or asphaltic underlayment below ballast.
- Cost to project by utilities provided for project systems, i.e. electricity (substations), data communications, etc.
- RF communications for rail vehicles
- Support facilities: yards, shops, administration buildings
- Hazardous. material, contaminated soil removal/mitigation, ground water treatments
- Environmental mitigation, e.g. wetlands, historic/archeologic, parks
- Public Art
- Financial obligations for assets removed (Alternate #4, University of Utah Stadium Realignment)
- Construction Management performed on the Owner's behalf
- Project Management performed on the Owner's behalf
- Owner Controlled Insurance Program (OCIP)
- Escalation
- Unallocated contingencies
- Project finance cost



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Estimate Classification

The estimate is Class 5 Estimate by AACE International (Association for the Advance of Cost Engineering) Estimate Classification (see table).

COST ESTIMATE MATRIX FOR THE BUILDING AND GENERAL CONSTRUCTION INDUSTRIES

ESTIMATE CLASS	Primary Characteristic	Secondary Characteristic		
	MATURITY LEVEL OF PROJECT DEFINITION DELIVERABLES Expressed as % of complete definition	END USAGE Typical purpose of estimate	METHODOLOGY Typical estimating method	EXPECTED ACCURACY RANGE Typical variation in low and high ranges at an 80% confidence interval
Class 5	0% to 2%	Functional area, or concept screening	SF or m ² factoring, parametric models, judgment, or analogy	L: -20% to -30% H: +30% to +50%
Class 4	1% to 15%	or Schematic design or concept study	Parametric models, assembly driven models	L: -10% to -20% H: +20% to +30%
Class 3	10% to 40%	Design development, budget authorization, feasibility	Semi-detailed unit costs with assembly level line items	L: -5% to -15% H: +10% to +20%
Class 2	30% to 75%	Control or bid/tender, semi-detailed	Detailed unit cost with forced detailed take-off	L: -5% to -10% H: +5% to +15%
Class 1	65% to 100%	Check estimate or pre bid/tender, change order	Detailed unit cost with detailed take-off	L: -3% to -5% H: +3% to +10%

Table 2

Pricing

Pricing reflects the early concept study definition and is heavily reliant on historical inhouse data and estimator judgement.

This estimate was developed in 2024 US dollars. Construction craft rates are based on local Salt Lake City, Utah prevailing wages. Equipment and material prices reflect procurement and delivery cost for Salt Lake City, Utah at the time of the estimate.

This estimate has been prepared using best practices, skill, and care typical of similar projects and estimating standards. However, due to the indeterminate variables associated with future market conditions, Parsons does not warranty that the indicative cost estimates will match eventual actual costs of the contract.



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Documents Used to Prepare the Estimate

- UTA Light Rail Strategic Plan Prepared by HATCH and dated January 2023
- Utah Transit Authority Reference Drawings
- TechLink Options Analysis Detailed Alignments R7.kmz prepared by Parsons
- Techlink RW Impacts XREF R2.kmz.
- Quantity prepared by Parsons

Cost Comparison

HDR Capital Cost Estimate (Excerpt)

SCC	Description	A	C	A+C
		Table 59 Granary District, Ballpark Spur And 400 South Extensions	Table 61 Research Park Branch	TOTAL By SCC
10	GUIDEWAY & TRACK ELEMENTS	\$ 25,190,000	\$ 4,570,000	\$ 29,760,000
20	STATIONS, STOPS, TERMINALS, INTERMODAL	\$ 20,640,000	\$ 4,130,000	\$ 24,770,000
30	SUPPORT FACILITIES: YARDS, SHOPS, ADMIN. BLDGS	\$ -	\$ -	\$ -
40	SITework & SPECIAL CONDITIONS	\$ 9,380,000	\$ 2,060,000	\$ 11,440,000
50	SYSTEMS	\$ 22,320,000	\$ 8,130,000	\$ 30,450,000
	Construction Subtotal (10 - 50)	\$ 77,530,000	\$ 18,890,000	\$ 96,420,000
60	ROW, LAND, EXISTING IMPROVEMENTS	\$ 1,320,000	\$ -	\$ 1,320,000
70	VEHICLES (number)	\$ -	\$ -	\$ -
80	PROFESSIONAL SERVICES (applies to Cats. 10-50)	\$ 16,490,000	\$ 4,510,000	\$ 21,000,000
	Subtotal (10 - 80)	\$ 95,340,000	\$ 23,400,000	\$ 118,740,000
90	UNALLOCATED CONTINGENCY	\$ 28,602,000	\$ 7,020,000	\$ 35,622,000
	Subtotal (10 - 90)	\$ 123,942,000	\$ 30,420,000	\$ 154,362,000
100	FINANCE CHARGES	\$ -	\$ -	\$ -
	Total Project Cost (10 - 100)	\$ 123,942,000	\$ 30,420,000	\$ 154,362,000



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COST COMPARISON

CODE	SCC CATEGORY	X (x000) ALTERNATIVE 1	Y (x000) HDR ESTIMATE Tables 59 & 61	Z (X-Y) (x000) DELTA	G COMMENT
10	GUIDEWAY & TRACK ELEMENTS (route miles)	\$ 114,363	\$ 29,760	\$ 84,603	Alt 1 has a full grand union at 400 S/400 W, and connection from 400 W to SL Central along 400 S.
20	STATIONS, STOPS, TERMINALS, INTERMODAL (number)	\$ 15,873	\$ 24,770	\$ (8,897)	Alt 1 has an added station at Research Park
30	SUPPORT FACILITIES: YARDS, SHOPS, ADMIN. BLDGS	\$ 762	\$ -	\$ 762	Yard Track
40	SITWORK & SPECIAL CONDITIONS	\$ 92,253	\$ 11,440	\$ 80,813	Alt 1 includes General Conditions/Requirements \$32M, Utility Relocation \$16M
50	SYSTEMS	\$ 103,832	\$ 30,450	\$ 73,382	
	Construction Subtotal (10 - 50)	\$ 327,083	\$ 96,420	\$ 230,663	
60	ROW, LAND, EXISTING IMPROVEMENTS	\$ 11,235	\$ 1,320	\$ 9,915	Increased acquisitions along 400 S anticipated & Current Acquisition Costs
70	VEHICLES (number)	\$ 26,400	\$ -	\$ 26,400	Alt 1 includes the cost for 4 new cars
80	PROFESSIONAL SERVICES (applies to Cats. 10-50)	\$ 98,127	\$ 21,000	\$ 77,127	
	Subtotal (10 - 80)	\$ 462,845	\$ 118,740	\$ 344,105	
90	UNALLOCATED CONTINGENCY	\$ -	\$ 35,622	\$ (35,622)	
	Subtotal (10 - 90)	\$ 462,845	\$ 154,362	\$ 308,483	
100	FINANCE CHARGES	\$ -	\$ -	\$ -	
	Total Project Cost (10 - 100)	\$ 462,845	\$ 154,362	\$ 308,483	

The table above is a cost comparison between the Capital Cost estimates provided in the "UTA Light Rail Strategic Plan, Future of Light Rail Study dated January 2023" produced by Hatch and HDR. Note that the total shown for the HDR estimate is the summation of "Table 59 - Granary District, Ballpark Spur and 400 South Extensions Capital Cost Estimate" and "Table 61 - Research Park Branch Capital Cost Estimate". Note the HDR estimates in the strategic plan do not appear to include cost for the design show in Figure 36 of that document which depicts a Revised Connection from Ballpark Spur to Salt Lake Central via 400 South/600 West.



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Alternative 1 Future of Light Rail Baseline Federal Transit Administration (FTA) Summaries

MAIN WORKSHEET - BUILD ALTERNATIVE

(Rev.12, July 31, 2009)

UTAH TRANSIT AUTHORITY (UTA)

Today's Date **12/18/24**

ALTERNATIVE 1, FUTURE OF LIGHT RAIL BASELINE

Yr of Base Year \$ **2024**

CONCEPTS

Yr of Revenue Ops **TBD**

	Quantity	Base Year Dollars w/o Contingency (X000)	Base Year Dollars Allocated Contingency (X000)	Base Year Dollars TOTAL (X000)	Base Year Dollars Unit Cost (X000)	Base Year Dollars Percentage of Construction Cost	Base Year Dollars Percentage of Total Project Cost	YOE Dollars Total (X000)
10 GUIDEWAY & TRACK ELEMENTS (route miles)	3.07	87,970	26,393	114,363	\$ 37,252	35%	25%	
10.01 Guideway: At-grade exclusive right-of-way	0.59	3,578	1,074	4,652	\$ 7,885			
10.02 Guideway: At-grade semi-exclusive (allows cross-traffic)	2.47	8,525	2,558	11,083	\$ 4,487			
10.03 Guideway: At-grade in mixed traffic								
10.04 Guideway: Aerial structure	0.01	1,025	307	1,332	\$ 133,200			
10.05 Guideway: Built-up fill								
10.06 Guideway: Underground cut & cover								
10.07 Guideway: Underground tunnel								
10.08 Guideway: Retained cut or fill								
10.09 Track: Direct fixation								
10.10 Track: Embedded		14,799	4,441	19,240				
10.11 Track: Ballasted		2,284	685	2,969				
10.12 Track: Special (switches, turnouts)		57,759	17,328	75,087				
10.13 Track: Vibration and noise dampening								
20 STATIONS, STOPS, TERMINALS, INTERMODAL (number)	7.00	12,210	3,663	15,873	\$ 2,268	5%	3%	
20.01 At-grade station, stop, shelter, mall, terminal, platform	7.00	12,210	3,663	15,873	\$ 2,268			
20.02 Aerial station, stop, shelter, mall, terminal, platform								
20.03 Underground station, stop, shelter, mall, terminal, platform								
20.04 Other stations, landings, terminals: Intermodal, ferry, trolley, etc.								
20.05 Joint development								
20.06 Automobile parking multi-story structure								
20.07 Elevators, escalators								
30 SUPPORT FACILITIES: YARDS, SHOPS, ADMIN. BLDGS	3.07	586	176	762	\$ 248	0%	0%	
30.01 Administration Building: Office, sales, storage, revenue counting								
30.02 Light Maintenance Facility								
30.03 Heavy Maintenance Facility								
30.04 Storage or Maintenance of Way Building								
30.05 Yard and Yard Track		586	176	762				
40 SITEWORK & SPECIAL CONDITIONS	3.07	70,963	21,290	92,253	\$ 30,050	28%	20%	
40.01 Demolition, Clearing, Earthwork		1,684	505	2,189				
40.02 Site Utilities, Utility Relocation		11,499	3,450	14,949				
40.03 Haz. mat'l, contam'd soil removal/mitigation, ground water treatments								
40.04 Environmental mitigation, e.g. wetlands, historic/archeologic, parks								
40.05 Site structures including retaining walls, sound walls		1,830	549	2,379				
40.06 Pedestrian / bike access and accommodation, landscaping		904	271	1,175				
40.07 Automobile, bus, van accessways including roads, parking lots		28,089	8,428	36,517				
40.08 Temporary Facilities and other indirect costs during construction		26,957	8,087	35,044				
50 SYSTEMS	3.07	79,868	23,964	103,832	\$ 33,821	32%	22%	
50.01 Train control and signals		17,232	5,171	22,403				
50.02 Traffic signals and crossing protection		12,499	3,750	16,249				
50.03 Traction power supply: substations		7,465	2,240	9,705				
50.04 Traction power distribution: catenary and third rail		37,171	11,152	48,323				
50.05 Communications		1,781	534	2,315				
50.06 Fare collection system and equipment		1,281	384	1,665				
50.07 Central Control		2,439	733	3,172				
Construction Subtotal (10 - 50)	3.07	251,597	75,486	327,083	\$ 106,542	100%	71%	
60 ROW, LAND, EXISTING IMPROVEMENTS	3.07	10,214	1,021	11,235	\$ 3,660			
60.01 Purchase or lease of real estate		10,214	1,021	11,235				
60.02 Relocation of existing households and businesses								
70 VEHICLES (number)	4	24,000	2,400	26,400	\$ 6,600			
70.01 Light Rail	4	24,000	2,400	26,400				
70.02 Heavy Rail								
70.03 Commuter Rail								
70.04 Bus								
70.05 Other								
70.06 Non-revenue vehicles								
70.07 Spare parts								
80 PROFESSIONAL SERVICES (applies to Cats. 10-50)	3.07	75,480	22,647	98,127	\$ 31,963			
80.01 Preliminary Engineering		7,548	2,265	9,813				
80.02 Final Design		17,612	5,284	22,896				
80.03 Project Management for Design and Construction		12,580	3,774	16,354				
80.04 Construction Administration & Management		15,096	4,529	19,625				
80.05 Professional Liability and other Non-Construction Insurance		7,548	2,265	9,813				
80.06 Legal; Permits; Review Fees by other agencies, cities, etc.		5,032	1,510	6,542				
80.07 Surveys, Testing, Investigation, Inspection		5,032	1,510	6,542				
80.08 Start up		5,032	1,510	6,542				
Subtotal (10 - 80)	3.07	361,291	101,554	462,845	\$ 150,764		100%	
90 UNALLOCATED CONTINGENCY								
Subtotal (10 - 90)	3.07			462,845	\$ 150,764		100%	
100 FINANCE CHARGES								
Total Project Cost (10 - 100)	3.07			462,845	\$ 150,764		100%	
Allocated Contingency as % of Base Yr Dollars w/o Contingency								
Unallocated Contingency as % of Base Yr Dollars w/o Contingency								
Total Contingency as % of Base Yr Dollars w/o Contingency								
Unallocated Contingency as % of Subtotal (10 - 80)								
YOE Construction Cost per Mile (X000)								
YOE Total Project Cost per Mile Not Including Vehicles (X000)								
YOE Total Project Cost per Mile (X000)								

ALLOCATED CONTINGENCY BASIS

UTAH TRANSIT AUTHORITY (UTA)
ALTERNATIVE 1 (FUTURE OF LIGHT RAIL BASELINE)

DESCRIPTION	Sys Qty	Measured Work	Allowances	Total w/o Contency	%age Contingency on Measured Work	Amount	Total w/ Contingency
10 GUIDEWAY & TRACK ELEMENTS (route miles)	3.07	87,969,809		87,969,809		26,390,943	114,360,752
10.01 Guideway: At-grade exclusive right-of-way	0.59	3,578,224		3,578,224	30%	1,073,467	4,651,691
10.02 Guideway: At-grade semi-exclusive (allows cross-traffic)	2.48	8,525,004		8,525,004	30%	2,557,501	11,082,505
10.03 Guideway: At-grade in mixed traffic							
10.04 Guideway: Aerial structure	0.01	1,024,587		1,024,587	30%	307,376	1,331,963
10.05 Guideway: Built-up fill							
10.06 Guideway: Underground cut & cover							
10.07 Guideway: Underground tunnel							
10.08 Guideway: Retained cut or fill							
10.09 Track: Direct fixation							
10.10 Track: Embedded		14,799,456		14,799,456	30%	4,439,837	19,239,293
10.11 Track: Ballasted		2,283,771		2,283,771	30%	685,131	2,968,902
10.12 Track: Special (switches, turnouts)		57,758,767		57,758,767	30%	17,327,630	75,086,397
10.13 Track: Vibration and noise dampening							
20 STATIONS, STOPS, TERMINALS, INTERMODAL (route miles)	7	12,209,663		12,209,663		3,662,899	15,872,562
20.01 At-grade station, stop, shelter, mall, terminal, platform	7	12,209,663		12,209,663	30%	3,662,899	15,872,562
20.02 Aerial station, stop, shelter, mall, terminal, platform							
20.03 Underground station, stop, shelter, mall, terminal, platform							
20.04 Other stations, landings, terminals: Intermodal, ferry, trolley, etc.							
20.05 Joint development							
20.06 Automobile parking multi-story structure							
20.07 Elevators, escalators							
30 SUPPORT FACILITIES: YARDS, SHOPS, ADMIN. BLDGS	3.07	586,037		586,037		175,811	761,848
30.01 Administration Building: Office, sales, storage, revenue counting							
30.02 Light Maintenance Facility							
30.03 Heavy Maintenance Facility							
30.04 Storage or Maintenance of Way Building							
30.05 Yard and Yard Track	0.31	586,037		586,037	30%	175,811	761,848
40 SITEWORK & SPECIAL CONDITIONS (LS)	3.07	70,962,010		70,962,010		21,288,603	92,250,613
40.01 Demolition, Clearing, Earthwork		1,683,611		1,683,611	30%	505,083	2,188,694
40.02 Site Utilities, Utility Relocation		11,499,197		11,499,197	30%	3,449,759	14,948,956
40.03 Haz. mat'l, contam'd soil removal/mitigation, ground water treatments							
40.04 Environmental mitigation, e.g. wetlands, historic/archeologic, parks							
40.05 Site structures including retaining walls, sound walls		1,829,620		1,829,620	30%	548,886	2,378,506
40.06 Pedestrian / bike access and accommodation, landscaping		903,504		903,504	30%	271,051	1,174,555
40.07 Automobile, bus, van accessways including roads, parking lots		28,089,371		28,089,371	30%	8,426,811	36,516,182
40.08 Temporary Facilities and other indirect costs during construction		26,956,707		26,956,707	30%	8,087,012	35,043,719
50 SYSTEMS (route foot)	3.07	79,868,416		79,868,416		23,960,525	103,828,941
50.01 Train control and signals		17,232,472		17,232,472	30%	5,169,742	22,402,214
50.02 Traffic signals and crossing protection		12,498,628		12,498,628	30%	3,749,588	16,248,216
50.03 Traction power supply: substations		7,465,310		7,465,310	30%	2,239,593	9,704,903
50.04 Traction power distribution: catenary and third rail		37,171,241		37,171,241	30%	11,151,372	48,322,613
50.05 Communications (Sta)		1,780,538		1,780,538	30%	534,161	2,314,699
50.06 Fare collection system and equipment		1,280,734		1,280,734	30%	384,220	1,664,954
50.07 Central Control		2,439,493		2,439,493	30%	731,848	3,171,341
Construction Subtotal (10 - 50)	3.07	251,595,935		251,595,935		75,478,781	327,074,716
60 ROW, LAND, EXISTING IMPROVEMENTS	3.07	10,213,569		10,213,569		1,021,357	11,234,926
60.01 Purchase or lease of real estate		10,213,569		10,213,569	10%	1,021,357	11,234,926
60.02 Relocation of existing households and businesses							
70 VEHICLES (number)	4	24,000,000		24,000,000		2,400,000	26,400,000
70.01 Light Rail	4	24,000,000		24,000,000	10%	2,400,000	26,400,000
70.02 Heavy Rail							
70.03 Commuter Rail							
70.04 Bus							
70.05 Other							
70.06 Non-revenue vehicles							
70.07 Spare parts							
80 PROFESSIONAL SERVICES (applies to Cats. 10-50)	3.07	75,478,781		75,478,781		22,643,634	98,122,415
80.01 Preliminary Engineering		7,547,878		7,547,878	30%	2,264,363	9,812,241
80.02 Final Design		17,611,715		17,611,715	30%	5,283,515	22,895,230
80.03 Project Management for Design and Construction		12,579,797		12,579,797	30%	3,773,939	16,353,736
80.04 Construction Administration & Management		15,095,756		15,095,756	30%	4,528,727	19,624,483
80.05 Professional Liability and other Non-Construction Insurance		7,547,878		7,547,878	30%	2,264,363	9,812,241
80.06 Legal; Permits; Review Fees by other agencies, cities, etc.		5,031,919		5,031,919	30%	1,509,576	6,541,494
80.07 Surveys, Testing, Investigation, Inspection		5,031,919		5,031,919	30%	1,509,576	6,541,494
80.08 Start up		5,031,919		5,031,919	30%	1,509,576	6,541,494
Subtotal (10 - 80)	3.07	361,288,285		361,288,285		101,543,772	462,832,056
90 UNALLOCATED CONTINGENCY							
Subtotal (10 - 90)	3.07	361,288,285		361,288,285		101,543,772	462,832,056
100 FINANCE CHARGES							
Total Project Cost (10 - 100)	3.07	361,288,285		361,288,285		101,543,772	462,832,056



Opinion Of Probable Cost Report December 18, 2024

Alternative 2 Elevated on 400 West Federal Transit Administration (FTA) Main Worksheet

MAIN WORKSHEET - BUILD ALTERNATIVE

(Rev.12, July 31, 2009)

UTAH TRANSIT AUTHORITY (UTA)
 ALTERNATIVE 2, ELEVATED ON 400 WEST
 CONCEPTS

Today's Date **12/18/24**
 Yr of Base Year \$ **2024**
 Yr of Revenue Ops **TBD**

	Quantity	Base Year Dollars w/o Contingency (X000)	Base Year Dollars Allocated Contingency (X000)	Base Year Dollars TOTAL (X000)	Base Year Dollars Unit Cost (X000)	Base Year Dollars Percentage of Construction Cost	Base Year Dollars Percentage of Total Project Cost	YOE Dollars Total (X000)
10 GUIDEWAY & TRACK ELEMENTS (route miles)	3.07	113,439	34,034	147,473	\$ 48,037	41%	29%	
10.01 Guideway: At-grade exclusive right-of-way	0.59	3,578	1,074	4,652	\$ 7,885			
10.02 Guideway: At-grade semi-exclusive (allows cross-traffic)	2.07	8,722	2,618	11,340	\$ 5,478			
10.03 Guideway: At-grade in mixed traffic								
10.04 Guideway: Aerial structure	0.18	22,683	6,805	29,488	\$ 163,822			
10.05 Guideway: Built-up fill								
10.06 Guideway: Underground cut & cover								
10.07 Guideway: Underground tunnel								
10.08 Guideway: Retained cut or fill	0.23	3,104	932	4,036	\$ 17,548			
10.09 Track: Direct fixation		1,518	455	1,973				
10.10 Track: Embedded		13,791	4,137	17,928				
10.11 Track: Ballasted		2,284	685	2,969				
10.12 Track: Special (switches, turnouts)		57,759	17,328	75,087				
10.13 Track: Vibration and noise dampening								
20 STATIONS, STOPS, TERMINALS, INTERMODAL (number)	7.00	12,514	3,757	16,271	\$ 2,324	5%	3%	
20.01 At-grade station, stop, shelter, mall, terminal, platform	6.00	10,465	3,141	13,606	\$ 2,268			
20.02 Aerial station, stop, shelter, mall, terminal, platform	1.00	1,744	524	2,268	\$ 2,268			
20.03 Underground station, stop, shelter, mall, terminal, platform								
20.04 Other stations, landings, terminals: Intermodal, ferry, trolley, etc.								
20.05 Joint development								
20.06 Automobile parking multi-story structure								
20.07 Elevators, escalators		305	92	397				
30 SUPPORT FACILITIES: YARDS, SHOPS, ADMIN. BLDGS	3.07	586	176	762	\$ 248	0%	0%	
30.01 Administration Building: Office, sales, storage, revenue counting								
30.02 Light Maintenance Facility								
30.03 Heavy Maintenance Facility								
30.04 Storage or Maintenance of Way Building								
30.05 Yard and Yard Track		586	176	762				
40 SITEWORK & SPECIAL CONDITIONS	3.07	71,622	21,490	93,112	\$ 30,330	26%	18%	
40.01 Demolition, Clearing, Earthwork		1,714	515	2,229				
40.02 Site Utilities, Utility Relocation		11,465	3,441	14,906				
40.03 Haz. mat'l, contam'd soil removal/mitigation, ground water treatments								
40.04 Environmental mitigation, e.g. wetlands, historic/archeologic, parks								
40.05 Site structures including retaining walls, sound walls		1,830	549	2,379				
40.06 Pedestrian / bike access and accommodation, landscaping		845	254	1,099				
40.07 Automobile, bus, van accessways including roads, parking lots		25,979	7,794	33,773				
40.08 Temporary Facilities and other indirect costs during construction		29,789	8,937	38,726				
50 SYSTEMS	3.07	79,868	23,964	103,832	\$ 33,821	29%	20%	
50.01 Train control and signals		17,232	5,171	22,403				
50.02 Traffic signals and crossing protection		12,499	3,750	16,249				
50.03 Traction power supply: substations		7,465	2,240	9,705				
50.04 Traction power distribution: catenary and third rail		37,171	11,152	48,323				
50.05 Communications		1,781	534	2,315				
50.06 Fare collection system and equipment		1,281	384	1,665				
50.07 Central Control		2,439	733	3,172				
Construction Subtotal (10 - 50)	3.07	278,029	83,421	361,450	\$ 117,736	100%	71%	
60 ROW, LAND, EXISTING IMPROVEMENTS	3.07	10,214	1,021	11,235	\$ 3,660			
60.01 Purchase or lease of real estate		10,214	1,021	11,235				
60.02 Relocation of existing households and businesses								
70 VEHICLES (number)	4	24,000	2,400	26,400	\$ 6,600			
70.01 Light Rail	4	24,000	2,400	26,400				
70.02 Heavy Rail								
70.03 Commuter Rail								
70.04 Bus								
70.05 Other								
70.06 Non-revenue vehicles								
70.07 Spare parts								
80 PROFESSIONAL SERVICES (applies to Cats. 10-50)	3.07	83,410	25,025	108,435	\$ 35,321			
80.01 Preliminary Engineering		8,341	2,503	10,844				
80.02 Final Design		19,462	5,839	25,301				
80.03 Project Management for Design and Construction		13,901	4,171	18,072				
80.04 Construction Administration & Management		16,682	5,005	21,687				
80.05 Professional Liability and other Non-Construction Insurance		8,341	2,503	10,844				
80.06 Legal; Permits; Review Fees by other agencies, cities, etc.		5,561	1,668	7,229				
80.07 Surveys, Testing, Investigation, Inspection		5,561	1,668	7,229				
80.08 Start up		5,561	1,668	7,229				
Subtotal (10 - 80)	3.07	395,653	111,867	507,520	\$ 165,316		100%	
90 UNALLOCATED CONTINGENCY								
Subtotal (10 - 90)	3.07			507,520	\$ 165,316		100%	
100 FINANCE CHARGES								
Total Project Cost (10 - 100)	3.07			507,520	\$ 165,316		100%	
Allocated Contingency as % of Base Yr Dollars w/o Contingency								
Unallocated Contingency as % of Base Yr Dollars w/o Contingency								
Total Contingency as % of Base Yr Dollars w/o Contingency								
Unallocated Contingency as % of Subtotal (10 - 80)								
YOE Construction Cost per Mile (X000)								
YOE Total Project Cost per Mile Not Including Vehicles (X000)								
YOE Total Project Cost per Mile (X000)								



Opinion Of Probable Cost Report December 18, 2024

Alternative 3 Direct on 400 West Federal Transit Administration (FTA) Main Worksheet

MAIN WORKSHEET - BUILD ALTERNATIVE

(Rev.12, July 31, 2009)

UTAH TRANSIT AUTHORITY (UTA)
 ALTERNATIVE 3, DIRECT ON 400 WEST
 CONCEPTS

Today's Date **12/18/24**
 Yr of Base Year \$ **2024**
 Yr of Revenue Ops **TBD**

	Quantity	Base Year Dollars w/o Contingency (X000)	Base Year Dollars Allocated Contingency (X000)	Base Year Dollars TOTAL (X000)	Base Year Dollars Unit Cost (X000)	Base Year Dollars Percentage of Construction Cost	Base Year Dollars Percentage of Total Project Cost	YOE Dollars Total (X000)
10 GUIDEWAY & TRACK ELEMENTS (route miles)	2.77	73,649	22,096	95,745	\$ 34,627	34%	24%	
10.01 Guideway: At-grade exclusive right-of-way	0.59	3,578	1,074	4,652	\$ 7,885			
10.02 Guideway: At-grade semi-exclusive (allows cross-traffic)	2.17	7,472	2,242	9,714	\$ 4,487			
10.03 Guideway: At-grade in mixed traffic								
10.04 Guideway: Aerial structure	0.01	1,025	307	1,332	\$ 133,200			
10.05 Guideway: Built-up fill								
10.06 Guideway: Underground cut & cover								
10.07 Guideway: Underground tunnel								
10.08 Guideway: Retained cut or fill								
10.09 Track: Direct fixation								
10.10 Track: Embedded		13,024	3,908	16,932				
10.11 Track: Ballasted		2,284	685	2,969				
10.12 Track: Special (switches, turnouts)		46,266	13,880	60,146				
10.13 Track: Vibration and noise dampening								
20 STATIONS, STOPS, TERMINALS, INTERMODAL (number)	8.00	13,954	4,187	18,141	\$ 2,268	6%	5%	
20.01 At-grade station, stop, shelter, mall, terminal, platform	8.00	13,954	4,187	18,141	\$ 2,268			
20.02 Aerial station, stop, shelter, mall, terminal, platform								
20.03 Underground station, stop, shelter, mall, terminal, platform								
20.04 Other stations, landings, terminals: Intermodal, ferry, trolley, etc.								
20.05 Joint development								
20.06 Automobile parking multi-story structure								
20.07 Elevators, escalators								
30 SUPPORT FACILITIES: YARDS, SHOPS, ADMIN. BLDGS	2.77	247	74	321	\$ 116	0%	0%	
30.01 Administration Building: Office, sales, storage, revenue counting								
30.02 Light Maintenance Facility								
30.03 Heavy Maintenance Facility								
30.04 Storage or Maintenance of Way Building								
30.05 Yard and Yard Track		247	74	321				
40 SITEWORK & SPECIAL CONDITIONS	2.77	61,487	18,449	79,936	\$ 28,910	29%	20%	
40.01 Demolition, Clearing, Earthwork		1,519	456	1,975				
40.02 Site Utilities, Utility Relocation		10,350	3,106	13,456				
40.03 Haz. mat'l, contam'd soil removal/mitigation, ground water treatments								
40.04 Environmental mitigation, e.g. wetlands, historic/archeologic, parks								
40.05 Site structures including retaining walls, sound walls		1,830	549	2,379				
40.06 Pedestrian / bike access and accommodation, landscaping		787	236	1,023				
40.07 Automobile, bus, van accessways including roads, parking lots		23,954	7,187	31,141				
40.08 Temporary Facilities and other indirect costs during construction		23,047	6,915	29,962				
50 SYSTEMS	2.77	65,769	19,735	85,504	\$ 30,924	31%	22%	
50.01 Train control and signals		14,842	4,454	19,296				
50.02 Traffic signals and crossing protection		10,955	3,288	14,243				
50.03 Traction power supply: substations		6,599	1,980	8,579				
50.04 Traction power distribution: catenary and third rail		27,866	8,360	36,226				
50.05 Communications		1,604	481	2,085				
50.06 Fare collection system and equipment		1,464	439	1,903				
50.07 Central Control		2,439	733	3,172				
Construction Subtotal (10 - 50)	2.77	215,106	64,541	279,647	\$ 101,138	100%	70%	
60 ROW, LAND, EXISTING IMPROVEMENTS	2.77	6,901	691	7,592	\$ 2,746			
60.01 Purchase or lease of real estate		6,901	691	7,592				
60.02 Relocation of existing households and businesses								
70 VEHICLES (number)	4	24,000	2,400	26,400	\$ 6,600			
70.01 Light Rail	4	24,000	2,400	26,400				
70.02 Heavy Rail								
70.03 Commuter Rail								
70.04 Bus								
70.05 Other								
70.06 Non-revenue vehicles								
70.07 Spare parts								
80 PROFESSIONAL SERVICES (applies to Cats. 10-50)	2.77	64,530	19,365	83,895	\$ 30,342			
80.01 Preliminary Engineering		6,453	1,937	8,390				
80.02 Final Design		15,057	4,518	19,575				
80.03 Project Management for Design and Construction		10,755	3,227	13,982				
80.04 Construction Administration & Management		12,906	3,873	16,779				
80.05 Professional Liability and other Non-Construction Insurance		6,453	1,937	8,390				
80.06 Legal; Permits; Review Fees by other agencies, cities, etc.		4,302	1,291	5,593				
80.07 Surveys, Testing, Investigation, Inspection		4,302	1,291	5,593				
80.08 Start up		4,302	1,291	5,593				
Subtotal (10 - 80)	2.77	310,537	86,997	397,534	\$ 143,774		100%	
90 UNALLOCATED CONTINGENCY								
Subtotal (10 - 90)	2.77			397,534	\$ 143,774		100%	
100 FINANCE CHARGES								
Total Project Cost (10 - 100)	2.77			397,534	\$ 143,774		100%	
Allocated Contingency as % of Base Yr Dollars w/o Contingency Unallocated Contingency as % of Base Yr Dollars w/o Contingency Total Contingency as % of Base Yr Dollars w/o Contingency Unallocated Contingency as % of Subtotal (10 - 80) YOE Construction Cost per Mile (X000) YOE Total Project Cost per Mile Not Including Vehicles (X000) YOE Total Project Cost per Mile (X000)								



Opinion Of Probable Cost Report December 18, 2024

Alternative 4 University of Utah Realignment Federal Transit Administration (FTA) Main Worksheet

MAIN WORKSHEET - BUILD ALTERNATIVE

(Rev.12, July 31, 2009)

UTAH TRANSIT AUTHORITY (UTA)

Today's Date **12/18/24**

ALTERNATIVE 4, UNIVERSITY OF UTAH REALIGNMENT

Yr of Base Year \$ **2024**

CONCEPTS

Yr of Revenue Ops **TBD**

	Quantity	Base Year Dollars w/o Contingency (X000)	Base Year Dollars Allocated Contingency (X000)	Base Year Dollars TOTAL (X000)	Base Year Dollars Unit Cost (X000)	Base Year Dollars Percentage of Construction Cost	Base Year Dollars Percentage of Total Project Cost	YOE Dollars Total (X000)
10 GUIDEWAY & TRACK ELEMENTS (route miles)	3.73	101,643	30,495	132,138	\$ 35,397	32%	23%	
10.01 Guideway: At-grade exclusive right-of-way	0.59	3,578	1,074	4,652	\$ 7,885			
10.02 Guideway: At-grade semi-exclusive (allows cross-traffic)	3.13	10,812	3,244	14,056	\$ 4,486			
10.03 Guideway: At-grade in mixed traffic								
10.04 Guideway: Aerial structure	0.01	1,025	307	1,332	\$ 133,200			
10.05 Guideway: Built-up fill								
10.06 Guideway: Underground cut & cover								
10.07 Guideway: Underground tunnel								
10.08 Guideway: Retained cut or fill								
10.09 Track: Direct fixation								
10.10 Track: Embedded		20,739	6,223	26,962				
10.11 Track: Ballasted		2,284	685	2,969				
10.12 Track: Special (switches, turnouts)		63,205	18,962	82,167				
10.13 Track: Vibration and noise dampening								
20 STATIONS, STOPS, TERMINALS, INTERMODAL (number)	8.00	15,625	4,688	20,313	\$ 2,539	5%	4%	
20.01 At-grade station, stop, shelter, mall, terminal, platform	8.00	15,625	4,688	20,313	\$ 2,539			
20.02 Aerial station, stop, shelter, mall, terminal, platform								
20.03 Underground station, stop, shelter, mall, terminal, platform								
20.04 Other stations, landings, terminals: Intermodal, ferry, trolley, etc.								
20.05 Joint development								
20.06 Automobile parking multi-story structure								
20.07 Elevators, escalators								
30 SUPPORT FACILITIES: YARDS, SHOPS, ADMIN. BLDGS	3.73	586	176	762	\$ 204	0%	0%	
30.01 Administration Building: Office, sales, storage, revenue counting								
30.02 Light Maintenance Facility								
30.03 Heavy Maintenance Facility								
30.04 Storage or Maintenance of Way Building								
30.05 Yard and Yard Track		586	176	762				
40 SITEWORK & SPECIAL CONDITIONS	3.73	102,013	30,605	132,618	\$ 35,526	32%	23%	
40.01 Demolition, Clearing, Earthwork		9,241	2,772	12,013				
40.02 Site Utilities, Utility Relocation		18,274	5,483	23,757				
40.03 Haz. mat'l, contam'd soil removal/mitigation, ground water treatments								
40.04 Environmental mitigation, e.g. wetlands, historic/archeologic, parks								
40.05 Site structures including retaining walls, sound walls		3,420	1,026	4,446				
40.06 Pedestrian / bike access and accommodation, landscaping		1,108	332	1,440				
40.07 Automobile, bus, van accessways including roads, parking lots		36,140	10,843	46,983				
40.08 Temporary Facilities and other indirect costs during construction		33,830	10,149	43,979				
50 SYSTEMS	3.73	95,879	28,769	124,648	\$ 33,391	30%	22%	
50.01 Train control and signals		20,663	6,199	26,862				
50.02 Traffic signals and crossing protection		16,530	4,960	21,490				
50.03 Traction power supply: substations		8,708	2,614	11,322				
50.04 Traction power distribution: catenary and third rail		43,849	13,155	57,004				
50.05 Communications		2,165	650	2,815				
50.06 Fare collection system and equipment		1,525	458	1,983				
50.07 Central Control		2,439	733	3,172				
Construction Subtotal (10 - 50)	3.73	315,746	94,733	410,479	\$ 109,960	100%	71%	
60 ROW, LAND, EXISTING IMPROVEMENTS	3.73	12,822	1,283	14,105	\$ 3,778			
60.01 Purchase or lease of real estate		12,822	1,283	14,105				
60.02 Relocation of existing households and businesses								
70 VEHICLES (number)	4	24,000	2,400	26,400	\$ 6,600			
70.01 Light Rail	4	24,000	2,400	26,400				
70.02 Heavy Rail								
70.03 Commuter Rail								
70.04 Bus								
70.05 Other								
70.06 Non-revenue vehicles								
70.07 Spare parts								
80 PROFESSIONAL SERVICES (applies to Cats. 10-50)	3.73	94,723	28,423	123,146	\$ 32,988			
80.01 Preliminary Engineering		9,472	2,843	12,315				
80.02 Final Design		22,102	6,631	28,733				
80.03 Project Management for Design and Construction		15,787	4,737	20,524				
80.04 Construction Administration & Management		18,945	5,684	24,629				
80.05 Professional Liability and other Non-Construction Insurance		9,472	2,843	12,315				
80.06 Legal; Permits; Review Fees by other agencies, cities, etc.		6,315	1,895	8,210				
80.07 Surveys, Testing, Investigation, Inspection		6,315	1,895	8,210				
80.08 Start up		6,315	1,895	8,210				
Subtotal (10 - 80)	3.73	447,291	126,839	574,130	\$ 153,799		100%	
90 UNALLOCATED CONTINGENCY								
Subtotal (10 - 90)	3.73			574,130	\$ 153,799		100%	
100 FINANCE CHARGES								
Total Project Cost (10 - 100)	3.73			574,130	\$ 153,799		100%	
Allocated Contingency as % of Base Yr Dollars w/o Contingency								
Unallocated Contingency as % of Base Yr Dollars w/o Contingency								
Total Contingency as % of Base Yr Dollars w/o Contingency								
Unallocated Contingency as % of Subtotal (10 - 80)								
YOE Construction Cost per Mile (X000)								
YOE Total Project Cost per Mile Not Including Vehicles (X000)								
YOE Total Project Cost per Mile (X000)								



Opinion Of Probable Cost Report December 18, 2024

Alternative 1 Future of Light Rail Baseline Summary Report Level 1



Techlink - Opinion of Probable Cost
Draft Concepts

SUMMARY REPORT

Estimate Date: 10/15/2024 ; Rev. No. 01
 Client: Utah Transit Authority (UTA)
 Estimator: B. Frazier, M. Jackson
 Checked By: M. Jackson
 Doc Scope Date: July 2024

LEVEL DESCRIPTION	TOTAL
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UTA Techlink	\$361,288,287
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ALT. 1 Alternative 1 - Future of Light Rail Baseline	\$361,288,287
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C Construction (SCC 10-50)	\$251,595,937
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BRN Brown Segment	\$42,491,495
10 Guideway & Track Elements	\$10,332,960
20 Stations, Stops, Terminals, Intermodal	\$3,854,399
40 Sitework & Special Conditions	\$7,757,403
50 Systems	\$20,546,733
GRN Green Segment	\$38,261,641
10 Guideway & Track Elements	\$20,870,743
20 Stations, Stops, Terminals, Intermodal	\$1,927,200
40 Sitework & Special Conditions	\$6,427,234
50 Systems	\$9,036,465
CYN Cyan Segment	\$23,953,606
10 Guideway & Track Elements	\$14,097,907
40 Sitework & Special Conditions	\$4,936,587
50 Systems	\$4,919,112
DGR Dark Green Segment	\$48,434,072
10 Guideway & Track Elements	\$22,405,750
20 Stations, Stops, Terminals, Intermodal	\$3,854,399
40 Sitework & Special Conditions	\$9,631,786
50 Systems	\$12,542,137
PUR Purple Segment	\$29,231,534
10 Guideway & Track Elements	\$9,257,054
30 Support Facilities: Yards, Shops, Admin Bldgs.	\$586,038
40 Sitework & Special Conditions	\$5,106,660
50 Systems	\$14,281,782
ORG Orange Segment	\$38,607,640
10 Guideway & Track Elements	\$12,689,007
20 Stations, Stops, Terminals, Intermodal	\$3,854,399
40 Sitework & Special Conditions	\$8,462,022
50 Systems	\$13,602,212
40 Sitework & Special Conditions	\$26,956,707
40.08 Temporary Facilities and other indirect costs during construction	\$26,956,707
50 Systems	\$3,659,240
50.03 Traction power supply: substations	\$1,219,747
50.07 Central Control	\$2,439,493

60 ROW, Land, Existing Improvements	\$10,213,569
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Techlink - Opinion of Probable Cost
Draft Concepts

SUMMARY REPORT

Estimate Date: 10/15/2024 ; Rev. No. 01
Client: Utah Transit Authority (UTA)
Estimator: B. Frazier, M. Jackson
Checked By: M. Jackson
Doc Scope Date: July 2024

LEVEL DESCRIPTION	TOTAL
70 Vehicles	\$24,000,000
80 Professional Services - (Applies to SCC 10-50)	\$75,478,781



Opinion Of Probable Cost Report December 18, 2024

Alternative 1 Future of Light Rail Baseline Summary Report Level 2



Techlink - Opinion of Probable Cost
Draft Concepts

SUMMARY REPORT

Estimate Date: 10/15/2024 ; Rev. No. 01
 Client: Utah Transit Authority (UTA)
 Estimator: B. Frazier, M. Jackson
 Checked By: M. Jackson
 Doc Scope Date: July 2024

LEVEL DESCRIPTION	TOTAL
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UTA Techlink	\$361,288,287
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ALT. 1 Alternative 1 - Future of Light Rail Baseline	\$361,288,287
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C Construction (SCC 10-50)	\$251,595,937
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BRN Brown Segment	\$42,491,495
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10 Guideway & Track Elements	\$10,332,960
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Ballasted Section	\$3,930,166
Remove Existing Track	\$3,578,224
Remove Pavement - Ballasted	\$271,661
Earthwork - Ballasted	\$80,281
Embedded Section	\$1,437,778
Remove Pavement - Embedded	\$161,851
Earthwork - Embedded	\$32,398
Drainage - Embedded	\$742,155
Guideway - Paved	\$501,374
Trackwork	\$4,965,016
Install Track	\$4,004,297
Install Ballasted Track	\$2,283,771
Install Ballasted Track	\$2,250,616
Install At Grade Panelized Crossing	\$33,154
Paxton Ave.	\$8,851
300 W	\$14,214
American Ave	\$10,089
Install Embedded Track (Concrete)	\$1,720,527
Construct Transition Slab	\$26,356
Construct Track Slab	\$942,834
Install Embedded Track (Concrete)	\$751,337
Special Trackwork	\$960,719
Install #10 Turnout	\$825,204
Crossing Diamond	\$135,515

20 Stations, Stops, Terminals, Intermodal	\$3,854,399
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Station - (Ballast)	\$1,927,200
Station - Grade	\$1,927,200

40 Sitework & Special Conditions	\$7,757,403
---	--------------------

40.02 Site Utilities, Utility Relocation	\$3,363,695
40.07 Automobile, bus, van accessways including roads, parking lots	\$4,393,708
Traffic Control	\$506,326
Modification to Existing Intersections	\$3,354,303
Lane Replacement	\$316,557
Full Depth Pavement Replacement - Asphalt	\$55,000
Curb and Gutter	\$77,356
Curb Inlet/Storm Drain	\$67,620
Sidewalk	\$116,581
Mill and Overlay Existing Pavement	\$216,522

50 Systems	\$20,546,733
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50.01 Train Control and Signals	\$4,696,023
Traffic Signals and Crossing Protection - At-Grade. exclusive ROW	\$2,835,907



Techlink - Opinion of Probable Cost
Draft Concepts

SUMMARY REPORT

Estimate Date: 10/15/2024 ; Rev. No. 01
 Client: Utah Transit Authority (UTA)
 Estimator: B. Frazier, M. Jackson
 Checked By: M. Jackson
 Doc Scope Date: July 2024

LEVEL DESCRIPTION	TOTAL
Crossing Protection - At-Grade. exclusive ROW *	\$1,372,211
Traffic Signals	\$1,463,696
50.02 Traffic Signals and Crossing Protection - Semi Exclusive ROW	\$1,195,710
Crossing Protection - Semi Exclusive ROW	\$219,913
Traffic Signals	\$975,797
50.03 Traction Power Supply: Substation	\$1,701,979
Traction Power Distribution	\$1,701,979
50.04 Traction power distribution: Catenary and third rail	\$9,566,605
Foundations	\$722,973
Catenary Structures	\$6,043,578
OCS O/H Conductors	\$1,655,033
Rail Equipment	\$1,145,021
50.05 Communications	\$550,510
GRN Green Segment	\$38,261,641
10 Guideway & Track Elements	\$20,870,743
Embedded Section	\$1,631,950
Remove Pavement - Embedded	\$183,708
Earthwork - Embedded	\$36,773
Drainage - Embedded	\$842,383
Guideway - Paved	\$569,085
Trackwork	\$19,238,793
Install Track	\$2,345,775
Install Embedded Track (Concrete)	\$2,345,775
Construct Track Slab	\$1,305,462
Install Embedded Track (Concrete)	\$1,040,313
Special Trackwork	\$16,893,018
Install Full Grand Union	\$13,262,281
Install Special Trackwork Grand Union	\$10,887,684
Install Embedment	\$2,374,597
Install Double Crossover (Desired)*	\$3,630,737
Install Turnouts for Double Crossover	\$2,532,038
Install Embedment Double Crossover	\$1,098,699
20 Stations, Stops, Terminals, Intermodal	\$1,927,200
Station - Grade	\$1,927,200
40 Sitework & Special Conditions	\$6,427,234
40.02 Site Utilities, Utility Relocation	\$1,449,059
40.07 Automobile, bus, van accessways including roads, parking lots	\$4,978,175
Traffic Control	\$1,076,634
Modification to Existing Intersections	\$2,744,430
Lane Replacement	\$786,240
Full Depth Pavement Replacement - Asphalt	\$442,388
Curb and Gutter	\$96,695
Curb Inlet/Storm Drain	\$101,430
Sidewalk	\$145,727
Mill and Overlay Existing Pavement	\$370,872
50 Systems	\$9,036,465
50.01 Train Control and Signals	\$2,117,180
50.02 Traffic Signals and Crossing Protection - Semi Exclusive ROW	\$1,793,566
Crossing Protection - Semi Exclusive ROW	\$329,870
Traffic Signals	\$1,463,696
50.03 Traction Power Supply: Substation	\$767,329
Traction Power Distribution	\$767,329
50.04 Traction power distribution: Catenary and third rail	\$4,121,234
Foundations	\$311,452
Catenary Structures	\$2,603,536



Techlink - Opinion of Probable Cost
Draft Concepts

SUMMARY REPORT

Estimate Date: 10/15/2024 ; Rev. No. 01
 Client: Utah Transit Authority (UTA)
 Estimator: B. Frazier, M. Jackson
 Checked By: M. Jackson
 Doc Scope Date: July 2024

LEVEL DESCRIPTION	TOTAL
OCS O/H Conductors	\$712,978
Rail Equipment	\$493,268
50.05 Communications	\$237,156
CYN Cyan Segment	\$23,953,606
10 Guideway & Track Elements	\$14,097,907
Embedded Section	\$921,749
Remove Pavement - Embedded	\$103,761
Earthwork - Embedded	\$20,770
Drainage - Embedded	\$475,790
Guideway - Paved	\$321,428
Trackwork	\$13,176,158
Install Embedded Track (Concrete)	\$1,512,265
Construct Track Slab	\$841,600
Install Embedded Track (Concrete)	\$670,665
Special Trackwork	\$11,663,893
Install Half Grand Union	\$8,033,155
Install Special Trackwork Half Grand Union	\$4,429,130
Install Embedment	\$3,604,026
Install Double Crossover (Desired)*	\$3,630,737
Install Turnouts for Double Crossover	\$2,532,038
Install Embedment Double Crossover	\$1,098,699
40 Sitework & Special Conditions	\$4,936,587
40.02 Site Utilities, Utility Relocation	\$818,450
40.07 Automobile, bus, van accessways including roads, parking lots	\$4,118,138
Traffic Control	\$740,436
Modification to Existing Intersections	\$2,744,430
Lane Replacement	\$346,985
Full Depth Pavement Replacement - Asphalt	\$133,912
Curb and Gutter	\$58,017
Curb Inlet/Storm Drain	\$67,620
Sidewalk	\$87,436
Mill and Overlay Existing Pavement	\$286,287
50 Systems	\$4,919,112
50.01 Train Control and Signals	\$1,364,895
50.02 Traffic Signals and Crossing Protection - Semi Exclusive ROW	\$597,855
Crossing Protection - Semi Exclusive ROW	\$109,957
Traffic Signals	\$487,899
50.03 Traction Power Supply: Substation	\$494,679
Traction Power Distribution	\$494,679
50.04 Traction power distribution: Catenary and third rail	\$2,327,734
Foundations	\$175,913
Catenary Structures	\$1,470,516
OCS O/H Conductors	\$402,700
Rail Equipment	\$278,605
50.05 Communications	\$133,949
DGR Dark Green Segment	\$48,434,072
10 Guideway & Track Elements	\$22,405,750
Embedded Section	\$2,098,868
Remove Pavement - Embedded	\$236,269
Earthwork - Embedded	\$47,295
Drainage - Embedded	\$1,083,398
Guideway - Paved	\$731,907
Trackwork	\$20,306,881
Install Track	\$3,413,863



Techlink - Opinion of Probable Cost
Draft Concepts

SUMMARY REPORT

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 Client: Utah Transit Authority (UTA)
 Estimator: B. Frazier, M. Jackson
 Checked By: M. Jackson
 Doc Scope Date: July 2024

LEVEL DESCRIPTION	TOTAL
Install Embedded Track (Concrete)	\$3,413,863
Construct Track Slab	\$1,899,871
Install Embedded Track (Concrete)	\$1,513,992
Special Trackwork	\$16,893,018
Install Full Grand Union	\$13,262,281
Install Special Trackwork Grand Union	\$10,887,684
Install Embedment	\$2,374,597
Install Double Crossover (Desired)*	\$3,630,737
Install Turnouts for Double Crossover	\$2,532,038
Install Embedment Double Crossover	\$1,098,699
20 Stations, Stops, Terminals, Intermodal	\$3,854,399
Station - Grade	\$3,854,399
40 Sitework & Special Conditions	\$9,631,786
40.02 Site Utilities, Utility Relocation	\$1,863,651
40.07 Automobile, bus, van accessways including roads, parking lots	\$7,768,135
Traffic Control	\$1,153,384
Modification to Existing Intersections	\$4,878,986
Lane Replacement	\$1,044,266
Full Depth Pavement Replacement - Asphalt	\$558,366
Curb and Gutter	\$135,373
Curb Inlet/Storm Drain	\$146,510
Sidewalk	\$204,017
Mill and Overlay Existing Pavement	\$691,498
50 Systems	\$12,542,137
50.01 Train Control and Signals	\$3,081,183
Traffic Signals and Crossing Protection - At-Grade. exclusive ROW	\$945,302
Crossing Protection - At-Grade. exclusive ROW	\$457,404
Traffic Signals	\$487,899
50.02 Traffic Signals and Crossing Protection - Semi Exclusive ROW	\$1,793,566
Crossing Protection - Semi Exclusive ROW	\$329,870
Traffic Signals	\$1,463,696
50.03 Traction Power Supply: Substation	\$1,116,713
Traction Power Distribution	\$1,116,713
50.04 Traction power distribution: Catenary and third rail	\$5,300,365
Foundations	\$400,562
Catenary Structures	\$3,348,436
OCS O/H Conductors	\$916,969
Rail Equipment	\$634,397
50.05 Communications	\$305,009
PUR Purple Segment	\$29,231,534
10 Guideway & Track Elements	\$9,257,054
Embedded Section	\$1,217,918
Remove Pavement - Embedded	\$137,101
Earthwork - Embedded	\$27,444
Drainage - Embedded	\$628,667
Guideway - Paved	\$424,706
Trackwork	\$8,039,137
Install Track	\$1,775,370
Install Embedded Track (Concrete)	\$1,775,370
Construct Transition Slab	\$26,356
Construct Track Slab	\$973,355
Install Embedded Track (Concrete)	\$775,659
Special Trackwork	\$6,263,767
Install Turnout	\$2,440,295
Install Turnout	\$2,440,295



Techlink - Opinion of Probable Cost
Draft Concepts

SUMMARY REPORT

Estimate Date: 10/15/2024 ; Rev. No. 01
 Client: Utah Transit Authority (UTA)
 Estimator: B. Frazier, M. Jackson
 Checked By: M. Jackson
 Doc Scope Date: July 2024

LEVEL DESCRIPTION	TOTAL
Install Double Crossover	\$3,823,472
Install Turnouts for Double Crossover	\$2,724,773
Install Embedment Double Crossover	\$1,098,699
30 Support Facilities: Yards, Shops, Admin Bldgs.	\$586,038
Trackwork	\$586,038
Install Ballasted Track	\$586,038
Install Ballasted Track	\$582,185
Install At Grade Panelized Crossing	\$3,852
Yard Crossing - 2 Track	\$3,852
40 Sitework & Special Conditions	\$5,106,660
40.02 Site Utilities, Utility Relocation	\$1,081,427
40.07 Automobile, bus, van accessways including roads, parking lots	\$4,025,233
Traffic Control	\$594,486
Modification to Existing Intersections	\$2,744,430
Lane Replacement	\$475,578
Full Depth Pavement Replacement - Asphalt	\$214,020
Curb and Gutter	\$77,356
Curb Inlet/Storm Drain	\$67,620
Sidewalk	\$116,581
Mill and Overlay Existing Pavement	\$210,739
50 Systems	\$14,281,782
50.01 Train Control and Signals	\$2,390,159
Traffic Signals and Crossing Protection - At-Grade. exclusive ROW	\$945,302
Crossing Protection - At-Grade. exclusive ROW	\$457,404
Traffic Signals	\$487,899
50.02 Traffic Signals and Crossing Protection - Semi Exclusive ROW	\$597,855
Crossing Protection - Semi Exclusive ROW	\$109,957
Traffic Signals	\$487,899
50.03 Traction Power Supply: Substation	\$866,265
Traction Power Distribution	\$866,265
50.04 Traction power distribution: Catenary and third rail	\$9,305,212
Foundations	\$703,219
Catenary Structures	\$5,878,447
OCS O/H Conductors	\$1,609,811
Rail Equipment	\$1,113,735
50.05 Communications	\$176,989
ORG Orange Segment	\$38,607,640
10 Guideway & Track Elements	\$12,689,007
10.02 Embedded Section	\$2,548,410
Remove Pavement - Embedded	\$286,874
Earthwork - Embedded	\$57,424
Drainage - Embedded	\$1,315,443
Guideway - Paved	\$888,668
10.04 Aerial Structure	\$1,024,587
Trackwork	\$9,116,009
Install Track	\$4,031,657
Install Embedded Track (Concrete)	\$4,031,657
Construct Transition Slab	\$61,758
Construct Track Slab	\$2,209,314
Install Embedded Track (Concrete)	\$1,760,585
Special Trackwork	\$5,084,353
Install #8 Turnout	\$1,453,615
Install #8 Turnout	\$1,216,763
Install Embedment Turnout(Concrete)	\$236,852
Install Double Crossover	\$3,630,737



Techlink - Opinion of Probable Cost
Draft Concepts

SUMMARY REPORT

Estimate Date: 10/15/2024 ; Rev. No. 01
 Client: Utah Transit Authority (UTA)
 Estimator: B. Frazier, M. Jackson
 Checked By: M. Jackson
 Doc Scope Date: July 2024

LEVEL DESCRIPTION	TOTAL
Install Turnouts for Double Crossover	\$2,532,038
Install Embedment Double Crossover	\$1,098,699
20 Stations, Stops, Terminals, Intermodal	\$3,854,399
Station - Grade	\$3,854,399
40 Sitework & Special Conditions	\$8,462,022
40.02 Site Utilities, Utility Relocation	\$2,303,065
40.05 Site Structures Including Retaining Walls, Sound Walls	\$1,829,620
40.07 Automobile, bus, van accessways including roads, parking lots	\$4,329,337
Traffic Control	\$777,843
Modification to Existing Intersections	\$2,744,430
Lane Replacement	\$681,272
Full Depth Pavement Replacement - Asphalt	\$124,347
Curb and Gutter	\$154,712
Curb Inlet/Storm Drain	\$169,050
Sidewalk	\$233,162
Mill and Overlay Existing Pavement	\$125,793
50 Systems	\$13,602,212
50.01 Train Control and Signals	\$3,583,033
50.02 Traffic Signals and Crossing Protection - Semi Exclusive ROW	\$1,793,566
Crossing Protection - Semi Exclusive ROW	\$329,870
Traffic Signals	\$1,463,696
50.03 Traction Power Supply: Substation	\$1,298,598
Traction Power Distribution	\$1,298,598
50.04 Traction power distribution: Catenary and third rail	\$6,550,091
Foundations	\$495,008
Catenary Structures	\$4,137,935
OCS O/H Conductors	\$1,133,172
Rail Equipment	\$783,976
50.05 Communications	\$376,925
40 Sitework & Special Conditions	\$26,956,707
40.08 Temporary Facilities and other indirect costs during construction	\$26,956,707
50 Systems	\$3,659,240
50.03 Traction power supply: substations	\$1,219,747
50.07 Central Control	\$2,439,493
60 ROW, Land, Existing Improvements	\$10,213,569
70 Vehicles	\$24,000,000
80 Professional Services - (Applies to SCC 10-50)	\$75,478,781



Opinion Of Probable Cost Report December 18, 2024

Alternative 1 Future of Light Rail Baseline Detail Report

Parsons Transportation Group



Techlink - Opinion of Probable Cost
Draft Concepts

PROJECT ESTIMATE DETAIL REPORT
BY UNIT PRICE

Estimate Date: 10/15/2024 ; Rev. No. 01
Client: Utah Transit Authority (UTA)
Estimator: B. Frazier, M. Jackson
Checked By: M. Jackson
Charge #:
Doc Scope Date: July 2024

LEVEL DESCRIPTION	QTY	U/M	UNIT PRICE	TOTAL
UTA Techlink	1	LS	\$361,288,286.61	361,288,287
ALT. 1 Alternative 1 - Future of Light Rail Baseline	3	RM	\$117,683,480.98	361,288,287
C Construction (SCC 10-50)	1	LS	\$251,595,936.50	251,595,937
BRN Brown Segment	5,014	RFT	\$8,474.57	42,491,495
10 Guideway & Track Elements	5,014	RFT	\$2,060.82	10,332,960
Ballasted Section	3,111	RFT	\$1,263.31	3,930,166
Remove Existing Track	5,810	FT	\$615.87	3,578,224
DETAILS				
Minor site demolition, railroad ties and track, remove, excludes hauling	5,810	L.F.	\$7.76	45,101
Selective demolition, dump charges, typical urban city, building construction materials, includes tipping fees only	28,852	Ton	\$122.46	3,533,124
Remove Pavement - Ballasted Guideway Width = 50'-0"	3,111	RF	\$87.32	271,661
DETAILS				
Selective demolition, saw cutting, asphalt, up to 3" deep	6,222	L.F.	\$2.01	12,531
Selective demolition, saw cutting, each additional inch of depth over 3"	18,666	L.F.	\$1.17	21,752
Demolish, remove pavement & curb, remove bituminous pavement, 4" to 6" thick, excludes hauling and disposal fees	17,284	S.Y.	\$8.49	146,770
Loading, 4 C.Y. bucket, front end loader, wheel-mounted	4,321	L.C.Y.	\$1.27	5,501
Cycle hauling(wait, load, travel, unload or dump & return) time per cycle, excavated or borrow, loose cubic yards, 30 min load/wait/unload, 20 C.Y. truck, cycle 30 miles, 35 MPH, excludes loading equipment	4,321	L.C.Y.	\$13.57	58,651

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LEVEL DESCRIPTION	QTY	U/M	UNIT PRICE	TOTAL
Selective demolition, dump charges, typical urban city, building construction materials, includes tipping fees only	216	Ton	\$122.46	26,456
Earthwork - Ballasted	8,642	BCY	\$9.29	80,281
DETAILS				
Excavating, bulk, dozer, open site, bank measure, common earth, 80 HP dozer, 150' haul	8,642	B.C.Y.	\$7.91	68,345
Fine grading, large area, 6,000 S.Y. or more	5,920	S.Y.	\$1.26	7,449
Compaction, 4 passes, 12" lifts, riding, sheepsfoot or wobbly wheel roller	5,761	B.C.Y.	\$0.78	4,487
Embedded Section	1,903	RFT	\$755.53	1,437,778
Remove Pavement - Embedded Guideway Width = 28'-0"	1,903	RF	\$85.05	161,851
DETAILS				
Selective demolition, saw cutting, asphalt, up to 3" deep	3,806	L.F.	\$2.01	7,665
Selective demolition, saw cutting, each additional inch of depth over 3"	11,418	L.F.	\$1.17	13,306
Demolish, remove pavement & curb, remove bituminous pavement, 4" to 6" thick, excludes hauling and disposal fees	5,920	S.Y.	\$8.49	50,274
Loading, 4 C.Y. bucket, front end loader, wheel-mounted	4,321	L.C.Y.	\$1.27	5,501
Cycle hauling(wait, load, travel, unload or dump & return) time per cycle, excavated or borrow, loose cubic yards, 30 min load/wait/unload, 20 C.Y. truck, cycle 30 miles, 35 MPH, excludes loading equipment	4,321	L.C.Y.	\$13.57	58,648
Selective demolition, dump charges, typical urban city, building construction materials, includes tipping fees only	216	Ton	\$122.46	26,456
Earthwork - Embedded	2,960	BCY	\$10.94	32,398
DETAILS				
Excavating, bulk, dozer, open site, bank measure, common earth, 80 HP dozer, 150' haul	2,960	B.C.Y.	\$7.91	23,412
Fine grading, large area, 6,000 S.Y. or more	5,920	S.Y.	\$1.26	7,449
Compaction, 4 passes, 12" lifts, riding, sheepsfoot or wobbly wheel roller	1,973	B.C.Y.	\$0.78	1,537

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LEVEL DESCRIPTION	QTY	U/M	UNIT PRICE	TOTAL
Drainage - Embedded	1,903	RF	\$389.99	742,155
DETAILS				
18" Dia. (average) Trunk Drain Lines including Excavation	1,903	FT	\$182.96	348,177
Drainage Structures	38	EA	\$6,098.73	231,752
8" PVC Laterals	760	FT	\$30.49	23,175
Track Drain	76	EA	\$1,829.62	139,051
Guideway - Paved	1,903	RF	\$263.47	501,374
DETAILS				
Barrier Curb	3,806	LF	\$21.96	83,562
Slab on Grade - Reinforced, 18" Thick	22,836	SF	\$18.30	417,812
Trackwork	1	LS	\$4,965,015.81	4,965,016
Install Track	9,582	TF	\$417.90	4,004,297
Install Ballasted Track	6,462	TF	\$353.42	2,283,771
Install Ballasted Track	6,462	TF	\$348.28	2,250,616
DETAILS				
Running Rail, 115RE 115lb/yd) 2 rails per TF -Ballasted Track	124	TON	\$3,680.27	455,912
Weld 80' Stick Rail to 1,200 FT strings -Ballasted Track	12,924	TF	\$3.19	41,274
Stockpile and Distribute welded Rail -Ballasted Track	12,924	LF	\$3.57	46,192
Concrete Ties, L=8'-3" (24" Centers)	3,231	EA	\$360.92	1,166,146
Clips (4 Ea. per Tie)	12,924	EA	\$5.92	76,566
Insulation Kit (2 Ea. per Tie)	6,462	Kit	\$9.59	61,973
Subballast, #4 AREMA Wood Ties) -Ballasted Track	4,068	CY	\$35.41	144,080

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Ballast, #4 AREMA -Ballasted Track	3,590	CY	\$35.41	127,145
Geotextile -Ballasted Track	2,120	SY	\$0.67	1,412
Insulated Rail Joint, 20 FT 115 RE -Ballasted Track	4	EA	\$2,864.88	10,571
Construct Ballasted Track	6,462	TF	\$1.23	7,980
Place and Compact Subballast and Ballast	2,010	SY	\$3.06	6,141
Welding, Field Joints -Ballasted Track	129	EA	\$456.24	58,965
Insulated Joints -Ballasted Track	4	EA	\$6.89	25
Field Welds, Insulated Joints (Includes Rail Grinding) -Ballasted Track	7	EA	\$177.35	1,311
Surface Ballasted Track	6,462	TF	\$2.86	18,466
Destress Welded Rail -Ballasted Track	6,462	TF	\$4.09	26,457
Install At Grade Panelized Crossing	3	EA	\$11,051.45	33,154
Paxton Ave.	60	TF	\$147.51	8,851
DETAILS				
Install Concrete Crossing Panels 1 crossing - 1 Track (Existing track crossing to remain), Includes sidewalk	60	TF	\$20.64	1,238
Geotextile Fabric - Grade Crossing	167	SY	\$1.64	273
Misc. Material, Equipment and Sundries - Grade Crossing	1	LS	\$7,339.41	7,339
300 W	150	TF	\$94.76	14,214
DETAILS				
Install Concrete Crossing Panels - 2 Track , Includes sidewalk	300	TF	\$20.64	6,192
Geotextile Fabric - Grade Crossing	417	SY	\$1.64	683
Misc. Material, Equipment and Sundries - Grade Crossing	1	LS	\$7,339.41	7,339
American Ave	60	TF	\$168.16	10,089
DETAILS				
Install Concrete Crossing Panels - 2 Track, Includes sidewalk	120	TF	\$20.64	2,477
Geotextile Fabric - Grade Crossing	167	SY	\$1.64	273
Misc. Material, Equipment and Sundries - Grade Crossing	1	LS	\$7,339.41	7,339

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LEVEL DESCRIPTION	QTY	U/M	UNIT PRICE	TOTAL
Install Embedded Track (Concrete)	3,120	TF	\$551.45	1,720,527
Construct Transition Slab	20	TF	\$1,317.78	26,356
DETAILS				
C.I.P. concrete forms, slab on grade, edge, wood, over 12", 4 use, includes erecting, bracing, stripping and cleaning	68	SFCA	\$6.80	465
Reinforcing steel, in place, slab on grade, #3 to #7, A615, grade 60, incl labor for accessories, excl material for accessories, #6, Longitudinal and Transverse	1	Ton	\$3,748.88	3,037
High chair, for reinforcing steel, continuous (CHC), stainless tipped legs, 4" high, legs 8" OC, includes material only	9	C.L.F.	\$1,125.29	10,465
Bag ties, for reinforcing steel, plain steel, 16 ga., 4" long, includes material only	6	C	\$1.79	11
Structural concrete, ready mix, heavyweight, 5000 psi, includes local aggregate, sand, Portland cement (Type I) and water, delivered, excludes all additives and treatments	2	C.Y.	\$282.88	699
Structural concrete, placing, slab on grade, pumped, over 6" thick, includes leveling (strike off) & consolidation, excludes material	2	C.Y.	\$19.05	47
Expansion joint, premolded, bituminous fiber, 1/2" x 6"	31	L.F.	\$1.44	45
Neoprene bearing pad, 1/2" x 7" 80 Duro	31	L.F.	\$373.80	11,588
Construct Track Slab	3,120	TF	\$302.19	942,834
DETAILS				
C.I.P. concrete forms, slab on grade, edge, wood, over 12", 4 use, includes erecting, bracing, stripping and cleaning	16,848	SFCA	\$6.80	114,556
Reinforcing steel, in place, slab on grade, #3 to #7, A615, grade 60, incl labor for accessories, excl material for accessories, #4, Longitudinal	7	Ton	\$3,746.22	27,310
Reinforcing steel, in place, slab on grade, #3 to #7, A615, grade 60, incl labor for accessories, excl material for accessories, #5, Hoop and Transverse	27	Ton	\$3,743.81	101,120
Epoxy coating, for reinforcing steel, add to plain steel rebar pricing for epoxy-coated rebar	34	Ton	\$1,861.92	63,864
High chair, for reinforcing steel, continuous (CHC), stainless tipped legs, 4" high, legs 8" OC, includes material only	328	C.L.F.	\$1,125.29	368,647

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LEVEL DESCRIPTION	QTY	U/M	UNIT PRICE	TOTAL
Bag ties, for reinforcing steel, plain steel, 16 ga., 4" long, includes material only	505	C	\$1.79	903
Structural concrete, ready mix, heavyweight, 5000 psi, includes local aggregate, sand, Portland cement (Type I) and water, delivered, excludes all additives and treatments	830	C.Y.	\$282.98	234,893
Structural concrete, placing, slab on grade, pumped, over 6" thick, includes leveling (strike off) & consolidation, excludes material	830	C.Y.	\$19.06	15,820
Expansion joint, polyethylene foam, 1" x 12"	416	L.F.	\$14.13	5,879
Dowel sleeve base, plastic, for 1" smooth dowel, fasten to edge form	208	Ea.	\$7.74	1,611
Reinforcing steel, in place, dowels, smooth, 24" long, 1" diameter, A36, galvanized	208	Ea.	\$39.57	8,231
Install Embedded Track (Concrete)	3,120	TF	\$240.81	751,337
<u>DETAILS</u>				
Running Rail, 115RE 115lb/yd 2 rails per TF (100 TF = 200 LF)	60	TON	\$3,680.38	220,087
Stockpile and Distribute welded Rail	6,240	LF	\$3.57	22,303
Weld 80' Stick Rail to 1,200 FT strings	3,120	TF	\$3.19	9,964
Steel Leveling Tie, 115RE, with 2 leveling legs (1 per 10' on Tangent and 1per 5' in curves) 4,320	312	EA	\$153.09	47,764
Clips (4 Ea. per Tie)	1,248	EA	\$5.92	7,394
Railboot, 115RE, Includes Cuffs and Tape	6,240	LF	\$17.41	108,653
Insulated Rail Joint, 20 FT 115 RE	4	EA	\$2,862.88	11,452
Construct Embedded Track - (Includes Destressing)	3,120	TF	\$15.62	48,720
Field Welds (Includes Rail Grinding)	3	EA	\$456.24	1,186
Insulated Joints	4	EA	\$6.25	25
Field Welds (Includes Rail Grinding)	8	EA	\$177.47	1,420
Misc. Material, Equipment and Sundries	1	LS	\$48,946.52	48,947
Reinforcing steel, in place, slab on grade, #3 to #7, A615, grade 60, incl labor for accessories, excl material for accessories, #4, Longitudinal	8	Ton	\$3,743.88	31,224
Epoxy coating, for reinforcing steel, add to plain steel rebar pricing for epoxy-coated rebar	8	Ton	\$1,861.70	15,527
Bag ties, for reinforcing steel, plain steel, 16 ga., 4" long, includes material only	4	C	\$1.79	7
Structural concrete, ready mix, heavyweight, 5000 psi, includes local aggregate, sand, Portland cement (Type I) and water, delivered, excludes all additives and treatments	557	C.Y.	\$282.98	157,503
Structural concrete, placing, slab on grade, pumped, over 6" thick, includes leveling (strike off) & consolidation, excludes material	557	C.Y.	\$19.06	10,608

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Expansion joint, polyethylene foam, 1" x 6"	416	L.F.	\$14.13	5,879
Expansion joint, rubberized asphalt, fuel resistant, 1" x 2", hot applied	416	L.F.	\$6.43	2,676
Special Trackwork	1	LS	\$960,718.56	960,719
Install #10 Turnout	1	EA	\$825,203.58	825,204
DETAILS				
Install #10 Turnout	1	EA	\$605,528.50	605,528
Turnout Surfacing, Ballasted Track,	400	TF	\$2.86	1,143
Insulated Rail Joint, 20 FT 115 RE - Turnout	8	EA	\$2,862.88	22,903
Insulated Joints - Turnout	8	EA	\$6.88	55
Field Welds (Includes Rail Grinding) - Turnout	16	EA	\$177.47	2,839
Misc. Material, Equipment and Sundries - Turnout	1	LS	\$192,734.45	192,734
Crossing Diamond	1	EA	\$135,514.98	135,515
DETAILS				
Install Crossing Diamond	1	EA	\$96,672.16	96,672
Insulated Joints- Crossing Diamond	8	EA	\$2,869.94	22,959
Field Welds (Includes Rail Grinding)- Crossing Diamond	16	EA	\$456.24	7,300
Track Surfacing, Ballasted Track,- Crossing Diamond	200	TF	\$2.86	572
Misc. Material, Equipment and Sundries- Crossing Diamond	1	LS	\$8,011.94	8,012
20 Stations, Stops, Terminals, Intermodal	2	EA	\$1,927,199.63	3,854,399
Station - (Ballast)	1	EA	\$1,927,199.63	1,927,200
DETAILS				
Station - Allow	1	EA	\$1,927,199.63	1,927,200
Fare Collection	(1)	LS	\$182,961.99	(182,962)
Fare Collection	1	LS	\$182,961.99	182,962

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Station - Grade	1	EA	\$1,927,199.63	1,927,200
DETAILS				
Station - Allow	1	EA	\$1,927,199.63	1,927,200
Fare Collection	(1)	LS	\$182,961.99	(182,962)
Fare Collection	1	LS	\$182,961.99	182,962
40 Sitework & Special Conditions	1	LS	\$7,757,403.29	7,757,403
40.02 Site Utilities, Utility Relocation	5,014	RFT	\$670.86	3,363,695
DETAILS				
Utility Relocation - Allowance	5,014	RTF	\$670.86	3,363,695
40.07 Automobile, bus, van accessways including roads, parking lots	1	LS	\$4,393,708.09	4,393,708
Traffic Control	1	LS	\$506,325.54	506,326
DETAILS				
Movement of Traffic (MOT) - Low, Allowance 5% of Guideway Cost (SCC 10)	0	PCT	\$10,126,510.70	506,326
Modification to Existing Intersections	1	LS	\$3,354,303.15	3,354,303
DETAILS				
Modifications to existing road crossing and Intersections, Low, - Allowance	2	EA	\$304,936.65	609,873
Modifications to existing road crossing and Intersections, Moderate, - Allowance	3	EA	\$914,809.95	2,744,430
Lane Replacement	4,600	SF	\$68.82	316,557

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Full Depth Pavement Replacement - Asphalt	4,600	SF	\$11.96	55,000
DETAILS				
Selective demolition, saw cutting, asphalt, up to 3" deep	383	L.F.	\$2.01	772
Selective demolition, saw cutting, each additional inch of depth over 3"	1,150	L.F.	\$1.17	1,340
Demolish, remove pavement & curb, remove bituminous pavement, 4" to 6" thick, excludes hauling and disposal fees	511	S.Y.	\$8.49	4,340
Haul Demolished Debris	128	L.C.Y.	\$13.57	1,734
Fine grading, grade subgrade for base course, roadways	511	S.Y.	\$0.79	402
Compaction, riding, vibrating roller, 4 passes, 6" lifts	170	B.C.Y.	\$0.60	103
Compaction, water for, 3,000 gallon truck, 3 mile haul	170	B.C.Y.	\$3.24	552
Base course drainage layers, aggregate base course for roadways and large paved areas, stone base, compacted, 3/4" stone base, to 12" deep	511	S.Y.	\$23.61	12,068
Haul Base Course Material	221	L.C.Y.	\$13.57	3,006
Plant-mix asphalt paving, pre-treatment for paving, prime coat, emulsion, 0.30 gallons/S.Y., 1000 S.Y.	511	S.Y.	\$5.12	2,617
Plant-mix asphalt paving, for highways and large paved areas, binder course, 4" thick, no hauling included	511	S.Y.	\$31.13	15,910
Plant-mix asphalt paving, pre-treatment for paving, tack coat, emulsion, 0.10 gallons/S.Y., 1000 S.Y.	511	S.Y.	\$2.32	1,187
Plant-mix asphalt paving, for highways and large paved areas, wearing course, 2" thick, no hauling included	511	S.Y.	\$17.79	9,091
Haul Paving Material	128	L.C.Y.	\$13.57	1,734
Painted pavement markings, acrylic waterborne, white or yellow, 4" wide, 3,000-16,000 LF	383	L.F.	\$0.37	143
Curb and Gutter	2,000	LF	\$38.68	77,356
DETAILS				
Demolish, remove pavement & curb and gutter, excludes hauling and disposal fees	2,000	L.F.	\$4.56	9,119
Haul Demolished Debris	259	L.C.Y.	\$13.57	3,519
Fine grading, grade subgrade for base course, roadways	556	S.Y.	\$0.79	437
Compaction, riding, vibrating roller, 4 passes, 6" lifts	185	B.C.Y.	\$0.60	112
Compaction, water for, 3,000 gallon truck, 3 mile haul	185	B.C.Y.	\$3.24	600
Base course drainage layers, aggregate base course for roadways and large paved areas, stone base, compacted, 3/4" stone base, to 12" deep	556	S.Y.	\$23.61	13,117

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Haul Base Course Material	241	L.C.Y.	\$13.57	3,268
Cast-in place concrete curbs & gutters, radius, machine formed, 6" high curb, 6" thick gutter, 30" wide, includes concrete	2,000	L.F.	\$23.59	47,184
Curb Inlet/Storm Drain	6	EA	\$11,270.00	67,620
DETAILS				
Selective demolition, manholes & catch basins, manhole or catch basin, precast or brick, over 8' deep, excludes excavation	36	V.L.F.	\$136.79	4,924
Haul Demolished Debris	36	L.C.Y.	\$13.57	489
New Curb Inlet/Storm Drain	6	EA	\$4,878.99	29,274
Extend Laterals including excavation - Assume 18" RCP	120	LF	\$182.96	21,955
Connect To Existing	6	EA	\$1,829.62	10,978
Sidewalk	2,000	LF	\$58.29	116,581
DETAILS				
Demolish, remove pavement & curb, remove concrete, mesh reinforced, to 6" thick, hand held equipment, excludes hauling and disposal fees	12,000	S.F.	\$1.34	16,118
Haul Demolished Debris	333	L.C.Y.	\$13.57	4,524
Fine grading, grade subgrade for base course, roadways	1,334	S.Y.	\$0.79	1,049
Compaction, riding, vibrating roller, 4 passes, 6" lifts	445	B.C.Y.	\$0.60	268
Compaction, water for, 3,000 gallon truck, 3 mile haul	445	B.C.Y.	\$3.24	1,441
Base course drainage layers, aggregate base course for roadways and large paved areas, compacted, 3" deep, crushed 3/4" stone base	1,334	S.Y.	\$6.83	9,101
Haul Base Course Material	144	L.C.Y.	\$13.57	1,959
Sidewalks, driveways, and patios, sidewalk, concrete, cast-in-place with 6 x 6 - W1.4 x W1.4 mesh, broomed finish, 3,000 psi, 4" thick, excludes base	12,000	S.F.	\$6.84	82,122
Mill and Overlay Existing Pavement	59,900	SF	\$3.61	216,522
DETAILS				
Cold milling asphalt paving, asphalt pavement, 1" to 3" deep, removal from concrete base, rip, load and sweep, excludes hauling	6,655	S.Y.	\$0.78	5,224
Haul Demolished Debris	721	L.C.Y.	\$13.57	9,784
Plant-mix asphalt paving, pre-treatment for paving, tack coat, emulsion, 0.10 gallons/S.Y., 1000 S.Y.	6,655	S.Y.	\$2.32	15,459

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Plant-mix asphalt paving, for highways and large paved areas, wearing course, 3" thick, no hauling included	6,655	S.Y.	\$25.98	172,897
Haul Paving Material	832	L.C.Y.	\$13.57	11,295
Painted pavement markings, acrylic waterborne, white or yellow, 4" wide, 3,000-16,000 LF	4,992	L.F.	\$0.37	1,865
50 Systems	9,582	TF	\$2,144.31	20,546,733
50.01 Train Control and Signals	9,582	TF	\$490.09	4,696,023
DETAILS				
CIH - Interlocking/Intermediate	3	EA	\$248,381.97	745,146
3/4" x 8' lg - copper alloy	12	EA	\$659.07	7,909
Ground wire, bare solid copper, #6	180	FT	\$1.99	359
Mech Conn to Case	12	EA	\$85.52	1,026
Exothermic Conn to Rod	12	EA	\$240.40	2,885
Test Well for Ground	3	EA	\$152.85	459
Batteries 240 AH	18	EA	\$547.16	9,849
Foundations	12	EA	\$16,757.40	201,089
2-1/c#6 TW PR Track Circuit	3,350	LF	\$290.23	972,256
#6 RHW Stranded wire	240	LF	\$45.03	10,808
CHICKEN HEAD - PIN BOND	40	EA	\$42.79	1,711
SLEEVE SPLICE NICOPRESS	40	EA	\$18.74	750
CADWELD TRACK CONNECTION	40	EA	\$115.60	4,624
Track drill & bits	4	ea	\$248.23	993
Signal head, Number Plate, Mast & Base	7	EA	\$10,907.42	76,352
Structural Steel Support - Fabricated	7	EA	\$6,935.79	48,551
5c#9 Signal Lamp Cable	2,700	LF	\$452.64	1,222,135
Electric Switch Machine - M3	5	EA	\$55,144.51	275,723
Electric Switch Rod Set - G&W	5	EA	\$36,396.40	181,982
2C#4 - Switch machine	600	LF	\$297.21	178,325
8C#10 - Switch machine	600	LF	\$302.49	181,493
Switch Heat Cabinet & Control Panel	2	EA	\$7,449.60	14,899
Track Switch Heater / Crib heater & Cal Rod	10	EA	\$6,578.71	65,787
Junction Box	10	EA	\$817.25	8,173
2C#4 - Switch heat	555	LF	\$297.21	164,951
8C#10 - Switch heat	600	LF	\$302.49	181,493
Head Bonds #6	16	EA	\$18.38	294

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LEVEL DESCRIPTION	QTY	U/M	UNIT PRICE	TOTAL
Head Bonds 250	16	EA	\$25.82	413
LRT Bar Signals, incl. foundation	4	EA	\$30,604.44	122,418
Control switches, push button, maintained contact, button 6 V #12 lamp, w/double block 2NO 2NC w/guard, 600 V 10 A	4	Ea.	\$314.19	1,257
misc. mat. - allow	12	EA	\$992.91	11,915
Traffic Signals and Crossing Protection - At-Grade. exclusive ROW	3	EA	\$945,302.18	2,835,907
Crossing Protection - At-Grade. exclusive ROW *	3	EA	\$457,403.54	1,372,211
DETAILS				
CIH - Interlocking/Intermediate	3	EA	\$248,381.97	745,146
3/4" x 8' lg - copper alloy	12	EA	\$659.07	7,909
Ground wire, bare solid copper, #6	180	FT	\$1.99	359
Mech Conn to Case	12	EA	\$85.52	1,026
Exothermic Conn to Rod	12	EA	\$240.40	2,885
Test Well for Ground	3	EA	\$152.85	459
Batteries 240 AH	36	EA	\$547.16	19,698
Foundations	12	EA	\$5,285.30	63,424
2c#6 TW PR Track Circuit	3,000	LF	\$36.73	110,193
#6 RHW Stranded wire	600	LF	\$35.08	21,046
10c#9 Signal Cable	375	LF	\$56.80	21,302
CHICKEN HEAD - PIN BOND	60	EA	\$37.48	2,249
SLEEVE SPLICE NICOPRESS	60	EA	\$3.81	228
CADWELD TRACK CONNECTION	60	EA	\$100.67	6,040
Track drill & bits	12	shift	\$249.60	2,995
Crossing signal mast with 2 flasher pairs, gate mechanism, barrier arm and bell	12	EA	\$30,604.44	367,253
Traffic Signals	3	EA	\$487,898.64	1,463,696
DETAILS				
Traffic signals, single direction allowance - engineering, materials, installation, and testing	3	EA	\$487,898.64	1,463,696

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50.02 Traffic Signals and Crossing Protection - Semi Exclusive ROW	2	EA	\$597,855.19	1,195,710
Crossing Protection - Semi Exclusive ROW	2	EA	\$109,956.55	219,913
DETAILS				
LRT Bar Signals, incl. foundation	4	EA	\$30,604.44	122,418
9c#9 signal lighting cable	500	LF	\$16.31	8,154
Rail Traffic Loop Detection System, Feeds Traffic Signal Controller	2	EA	\$44,670.62	89,341
Traffic Signals	2	EA	\$487,898.64	975,797
DETAILS				
Traffic signals, single direction allowance - engineering, materials, installation, and testing	2	EA	\$487,898.64	975,797
50.03 Traction Power Supply: Substation	9,582	TF	\$177.62	1,701,979
Traction Power Distribution	9,582	TF	\$177.62	1,701,979
DETAILS				
Substation Power Cubicle - Assume 10,375 TF spacing	1	EA	\$659,890.95	640,094
Impedance Bond (4) each location per track: Assume 10,375' spacing	4	EA	\$29,482.40	114,097
Medium-cable single cable, copper, negative return, 350 kcmil, in conduit, exclsplicing & terminations	17	C.L.F.	\$2,669.05	45,427
Medium-cable single cable, copper, positive feeders, 500 kcmil, in conduit, excl splicing & terminations	41	C.L.F.	\$3,088.45	125,391
Cable terminations, insulation diameter range, 350 KCMIL & 500 KCMIL	166	EA	\$598.75	99,583
PIN CONN - CABLE TO RAIL (8 required per location)	8	EA	\$199.93	1,547
Signal and Traction Power Boxes	8	EA	\$3,517.24	27,223
Elastomer Grout, transition at signal and traction box, place material by pump and pressurize	17	C.F.	\$230.59	4,017
Disconnecting switches, single pole switches, 13 to 26 kV	3	EA	\$6,894.34	19,994

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Enclosure panels, 84" x 46", NEMA 12 & 4	3	EA	\$29,102.14	84,396
Structural concrete, in place, equipment pad (3000 psi), 8' x 8' x 10", includes forms(4 uses), Grade 60 rebar, concrete (Portland cement Type I), placing and finishing	1	EA	\$952.37	924
Electrical underground ducts and manholes, PVC, with DB coupling, schedule 80, 4" diameter, installed by direct burial in slab or duct bank, excludes excavation, backfill and cast in place concrete	15,162	L.F.	\$33.93	514,439
Electrical underground ducts and manholes, bell end and plug, PVC, schedule 80, 4" diameter, installed by direct burial in slab or duct bank, excludes excavation, backfill and cast in place concrete	54	EA	\$73.99	4,007
Electrical underground ducts and manholes, 90° elbows, PVC, schedule 80, 4" diameter, installed by direct burial in slab or duct bank, excludes excavation, backfill and cast in place concrete	39	EA	\$115.16	4,454
Electrical underground ducts and manholes, 45° elbows, PVC, schedule 80, 4" diameter, installed by direct burial in slab or duct bank, excludes excavation, backfill and cast in place concrete	8	EA	\$115.16	891
Electrical underground ducts and manholes, base spacer, PVC, schedule 80, 4" diameter, installed by direct burial in slab or duct bank, excludes excavation, backfill and cast in place concrete	812	EA	\$19.07	15,493
50.04 Traction power distribution: Catenary and third rail	5,014	RFT	\$1,907.98	9,566,605
Foundations	5,014	RFT	\$144.19	722,973
DETAILS				
Fixed end caisson piles, for mobilization, 50 mile radius	1	Ea.	\$2,404.73	2,405
Fixed end caisson piles, open style in stable ground, to 10' deep, 36" diameter,	510	V.L.F.	\$32.87	16,764
Casing left in place	72,930	Lb.	\$3.31	241,376
Reinforcing steel, in place, #3 to #7, A615, grade 60 - #4 Ties	3	Ton	\$4,482.91	12,911
Reinforcing steel, in place, #8 to #18, A615, grade 60 - #9 Vertical Bars	16	Ton	\$3,743.88	58,442
Structural concrete, ready mix, heavyweight, 4000 psi, includes local aggregate, sand, Portland cement (Type I) and water, delivered, excludes all additives and treatments	365	C.Y.	\$268.08	97,851
Structural concrete, placing, pumped, over 5 C.Y., includes leveling (strike off) & consolidation, excludes material	365	C.Y.	\$23.52	8,585
Cut Casing	51	EA	\$1,643.51	83,819

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Load Surplus	417	L.C.Y.	\$2.50	1,044
Haul Surplus Materials Off Site	417	L.C.Y.	\$18.13	7,561
Embedment Plate Assembly	3,830	LBS	\$4.14	15,845
Anchor Bolt Template	7,371	LBS	\$4.14	30,495
Anchor Bolt - 2" x 8'-0" Long	408	EA	\$124.11	50,638
Hex Nuts	2,040	EA	\$16.55	33,759
Plate Washers	816	EA	\$4.14	3,376
Standard Washers	816	EA	\$4.14	3,376
Set Foundation Imbeds, Plates, Template, Bolts, etc.	51	Sets	\$549.91	28,046
Grounding Assembly, cable, clamps, Lugs - Allow	51	Sets	\$248.23	12,660
Set Grounding Assembly	51	Sets	\$274.96	14,023
Catenary Structures	5,014	RFT	\$1,205.34	6,043,578
<u>DETAILS</u>				
Electrical utility pole, catenary, galvanized steel, round, 25	51	EA	\$57,919.59	2,953,899
Cantilever Assemblies	102	EA	\$2,482.27	253,191
Other Misc. Assemblies	102	EA	\$3,971.63	405,106
Pre-assembly Cantilever Assemblies	102	EA	\$11,918.54	1,215,691
Erect Catenary Frames (Pole + Assemblies.)	51	EA	\$23,837.07	1,215,691
OCS O/H Conductors	5,014	RFT	\$330.08	1,655,033
<u>DETAILS</u>				
Overhead line conductors & devices, per wire,500 kcmil, messenger wire	2	Mile	\$41,031.47	77,960
Overhead line conductors & devices, per wire, 350 kcmil grooved, contact wire	2	Mile	\$41,031.47	77,960
1" 37 STRAND GALV. E.H.S - GUY WIRE	2	Mile	\$9,929.07	18,865
Overhead line conductors & devices, protective devices, allow 6 per span per track	600	Ea.	\$2,120.82	1,272,491
Flexible Hangar Assy, Multiple, assume 100' span typical, average 8 ea.@ 1.6' =12.76' hanger per 100' Span, one track	800	Ea.	\$144.29	115,434
Continuity Jumper allow 50 spans @ 4 per span per track	400	EA	\$230.81	92,323
Rail Equipment	1	LS	\$1,145,020.67	1,145,021
<u>DETAILS</u>				
Flatcar (2)	24	Months	\$29,787.22	714,893

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LEVEL DESCRIPTION	QTY	U/M	UNIT PRICE	TOTAL
High Rail Crane - 22 Tons (2)	24	Months	\$17,921.98	430,127
50.05 Communications	5,014	RFT	\$109.79	550,510
DETAILS				
Electrical underground ducts and manholes, PVC, with DB coupling, schedule 80, 1-1/2" diameter, installed by direct burial in slab or duct bank, excludes excavation, backfill and cast in place concrete	20,028	L.F.	\$9.06	181,431
Electrical underground ducts and manholes, bell end and cap, PVC, schedule 80, 1-1/2" diameter, installed by direct burial in slab or duct bank, excludes excavation, backfill and cast in place concrete	31	Ea.	\$38.81	1,203
Electrical underground ducts and manholes, elbows, PVC, schedule 80, 1-1/2" diameter, installed by direct burial in slab or duct bank, excludes excavation, backfill and cast in place concrete	31	Ea.	\$44.29	1,373
Electrical underground ducts and manholes, PVC, with DB coupling, schedule 80, 2" diameter, installed by direct burial in slab or duct bank, excludes excavation, backfill and cast in place concrete	3,102	L.F.	\$11.56	35,852
Electrical underground ducts and manholes, elbows, PVC, schedule 80, 2" diameter, installed by direct burial in slab or duct bank, excludes excavation, backfill and cast in place concrete	62	Ea.	\$58.96	3,656
Electrical underground ducts and manholes, bell end and plug, PVC, schedule 80, 2" diameter, installed by direct burial in slab or duct bank, excludes excavation, backfill and cast in place concrete	62	Ea.	\$45.48	2,820
Electrical underground ducts and manholes, base spacer, PVC, schedule 80, 2" diameter, installed by direct burial in slab or duct bank, excludes excavation, backfill and cast in place concrete	5,007	Ea.	\$18.28	91,527
Fiber optic cable, 24 strand, single mode, indoor/outdoor	12	M.L.F.	\$7,137.55	88,220
Fiber optic patch panel, 24 ports, stations, crossings, intersections, interlockings, TPSS, interlockings, headquarters building	13	Ea.	\$815.12	10,197
Fiber optic patch panel, 24 ports, stations, crossings, intersections, interlockings, headquarters building	13	Ea.	\$156.83	1,964
Fiber optic cable, 48 strand, single mode, indoor/outdoor	11	M.L.F.	\$7,137.55	75,729
Fiber optic patch panel, 48 ports, stations, headquarters building	3	Ea.	\$815.10	2,445
Fiber optic patch panel, 48 ports, stations, headquarters building	3	Ea.	\$187.89	564
Fiber optics cable enclosure, splice w/enclosure encapsulant	16	Ea.	\$618.54	9,594
Switching and routing equipment, network switch, 10/100/1000 Mbps, 8 port, industrial ethernet type	16	Ea.	\$2,832.65	43,934

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GRN Green Segment	2,160	RFT	\$17,713.72	38,261,641
10 Guideway & Track Elements	2,160	RF	\$9,662.38	20,870,743
Embedded Section	2,160	RF	\$755.53	1,631,950
Remove Pavement - Embedded Guideway Width = 28'-0"	2,160	RF	\$85.05	183,708
DETAILS				
Selective demolition, saw cutting, asphalt, up to 3" deep	4,320	L.F.	\$2.01	8,700
Selective demolition, saw cutting, each additional inch of depth over 3"	12,960	L.F.	\$1.17	15,103
Demolish, remove pavement & curb, remove bituminous pavement, 4" to 6" thick, excludes hauling and disposal fees	6,720	S.Y.	\$8.49	57,064
Loading, 4 C.Y. bucket, front end loader, wheel-mounted	4,904	L.C.Y.	\$1.27	6,244
Cycle hauling(wait, load, travel, unload or dump & return) time per cycle, excavated or borrow, loose cubic yards, 30 min load/wait/unload, 20 C.Y. truck, cycle 30 miles, 35 MPH, excludes loading equipment	4,904	L.C.Y.	\$13.57	66,569
Selective demolition, dump charges, typical urban city, building construction materials, includes tipping fees only	245	Ton	\$122.46	30,029
Earthwork - Embedded	3,360	BCY	\$10.94	36,773
DETAILS				
Excavating, bulk, dozer, open site, bank measure, common earth, 80 HP dozer, 150' haul	3,360	B.C.Y.	\$7.91	26,573
Fine grading, large area, 6,000 S.Y. or more	6,720	S.Y.	\$1.26	8,455
Compaction, 4 passes, 12" lifts, riding, sheepsfoot or wobbly wheel roller	2,240	B.C.Y.	\$0.78	1,745
Drainage - Embedded	2,160	RF	\$389.99	842,383
DETAILS				
18" Dia. (average) Trunk Drain Lines including Excavation	2,160	FT	\$182.96	395,198

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LEVEL DESCRIPTION	QTY	U/M	UNIT PRICE	TOTAL
Drainage Structures	43	EA	\$6,099.00	263,050
8" PVC Laterals	863	FT	\$30.49	26,305
Track Drain	86	EA	\$1,829.70	157,830
Guideway - Paved	2,160	RF	\$263.47	569,085
DETAILS				
Barrier Curb	4,320	LF	\$21.96	94,847
Slab on Grade - Reinforced, 18" Thick	25,920	SF	\$18.30	474,237
Trackwork	1	LS	\$19,238,793.25	19,238,793
Install Track	4,320	TF	\$543.00	2,345,775
Install Embedded Track (Concrete)	4,320	TF	\$543.00	2,345,775
Construct Track Slab	4,320	TF	\$302.19	1,305,462
DETAILS				
C.I.P. concrete forms, slab on grade, edge, wood, over 12", 4 use, includes erecting, bracing, stripping and cleaning	23,328	SFCA	\$6.80	158,615
Reinforcing steel, in place, slab on grade, #3 to #7, A615, grade 60, incl labor for accessories, excl material for accessories, #4, Longitudinal	10	Ton	\$3,743.94	37,814
Reinforcing steel, in place, slab on grade, #3 to #7, A615, grade 60, incl labor for accessories, excl material for accessories, #5, Hoop and Transverse	37	Ton	\$3,743.66	140,013
Epoxy coating, for reinforcing steel, add to plain steel rebar pricing for epoxy-coated rebar	48	Ton	\$1,861.62	88,427
High chair, for reinforcing steel, continuous (CHC), stainless tipped legs, 4" high, legs 8" OC, includes material only	454	C.L.F.	\$1,125.29	510,434
Bag ties, for reinforcing steel, plain steel, 16 ga., 4" long, includes material only	700	C	\$1.79	1,251

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Structural concrete, ready mix, heavyweight, 5000 psi, includes local aggregate, sand, Portland cement (Type I) and water, delivered, excludes all additives and treatments	1,149	C.Y.	\$282.98	325,237
Structural concrete, placing, slab on grade, pumped, over 6" thick, includes leveling (strike off) & consolidation, excludes material	1,149	C.Y.	\$19.06	21,905
Expansion joint, polyethylene foam, 1" x 12"	576	L.F.	\$14.13	8,141
Dowel sleeve base, plastic, for 1" smooth dowel, fasten to edge form	288	Ea.	\$7.74	2,230
Reinforcing steel, in place, dowels, smooth, 24" long, 1" diameter, A36, galvanized	288	Ea.	\$39.57	11,396
Install Embedded Track (Concrete)	4,320	TF	\$240.81	1,040,313
DETAILS				
Running Rail, 115RE 115lb/yd 2 rails per TF (100 TF = 200 LF)	83	TON	\$3,680.38	304,735
Stockpile and Distribute welded Rail	8,640	LF	\$3.57	30,880
Weld 80' Stick Rail to 1,200 FT strings	4,320	TF	\$3.19	13,796
Steel Leveling Tie, 115RE, with 2 leveling legs (1 per 10' on Tangent and 1per 5' in curves) 4,320	432	EA	\$153.09	66,135
Clips (4 Ea. per Tie)	1,728	EA	\$5.92	10,237
Railboot, 115RE, Includes Cuffs and Tape	8,640	LF	\$17.41	150,442
Insulated Rail Joint, 20 FT 115 RE	6	EA	\$2,862.09	15,856
Construct Embedded Track - (Includes Destressing)	4,320	TF	\$15.62	67,459
Field Welds (Includes Rail Grinding)	4	EA	\$456.24	1,642
Insulated Joints	6	EA	\$6.24	35
Field Welds (Includes Rail Grinding)	11	EA	\$177.42	1,966
Misc. Material, Equipment and Sundries	1	LS	\$49,110.22	67,772
Reinforcing steel, in place, slab on grade, #3 to #7, A615, grade 60, incl labor for accessories, excl material for accessories, #4, Longitudinal	12	Ton	\$3,743.13	43,233
Epoxy coating, for reinforcing steel, add to plain steel rebar pricing for epoxy-coated rebar	12	Ton	\$1,861.33	21,498
Bag ties, for reinforcing steel, plain steel, 16 ga., 4" long, includes material only	6	C	\$1.79	10
Structural concrete, ready mix, heavyweight, 5000 psi, includes local aggregate, sand, Portland cement (Type I) and water, delivered, excludes all additives and treatments	771	C.Y.	\$282.98	218,081
Structural concrete, placing, slab on grade, pumped, over 6" thick, includes leveling (strike off) & consolidation, excludes material	771	C.Y.	\$19.06	14,688
Expansion joint, polyethylene foam, 1" x 6"	576	L.F.	\$14.13	8,141
Expansion joint, rubberized asphalt, fuel resistant, 1" x 2", hot applied	576	L.F.	\$6.43	3,705

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Special Trackwork	1	LS	\$16,893,018.14	16,893,018
Install Full Grand Union	1	LS	\$13,262,280.67	13,262,281
Install Special Trackwork Grand Union	1	LS	\$10,887,683.83	10,887,684
DETAILS				
Install #10 Turnout	8	EA	\$605,528.50	4,844,228
Install #8 Turnout	8	EA	\$440,043.95	3,520,352
Install Crossing Diamond	16	EA	\$96,672.16	1,546,755
Insulated Rail Joint, 20 FT 115 RE - Turnout	16	EA	\$2,862.88	45,806
Insulated Joints - Turnout	16	EA	\$6.25	100
Field Welds (Includes Rail Grinding) - Turnout	32	EA	\$177.47	5,679
Switch machine Box Frame and Lid	16	EA	\$2,482.27	39,716
Switch Housing, 2 per switch	32	EA	\$12,411.34	397,163
Elastomer Grout, under ties using form-and-pour techniques (ACI RAP-5), place repair material by pump and pressurize	1,280	C.F.	\$230.59	295,151
Misc. Material, Equipment and Sundries	1	LS	\$192,734.45	192,734
Install Embedment	1	LS	\$2,374,596.84	2,374,597
DETAILS				
Construct Embedded Track - Closure and Cross Tracks (Includes Destressing)	1,780	TF	\$15.62	27,795
Running Rail, 115RE 115lb/yd 2 rails per TF (100 TF = 200 LF)	68	TON	\$3,680.56	251,124
Stockpile and Distribute welded Rail	3,560	LF	\$3.57	12,724
Weld 80' Stick Rail to 1,200 FT strings	1,780	TF	\$3.19	5,685
Insulated Rail Joint, 20 FT 115 RE	30	EA	\$2,862.88	85,886
Insulated Joints	30	EA	\$6.25	187
Field Welds (Includes Rail Grinding)	60	EA	\$177.47	10,648
Traction Power/Signal Connection Boxes	60	EA	\$3,206.61	192,397



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Electrical underground ducts and manholes, PVC, with DB coupling, schedule 80, 4" diameter, installed by direct burial in slab or duct bank, excludes excavation, backfill and cast in place concrete	14,280	L.F.	\$33.93	484,514
Electrical underground ducts and manholes, bell end and plug, PVC, schedule 80, 4" diameter, installed by direct burial in slab or duct bank, excludes excavation, backfill and cast in place concrete	160	Ea.	\$73.99	11,838
Electrical underground ducts and manholes, 90° elbows, PVC, schedule 80, 4" diameter, installed by direct burial in slab or duct bank, excludes excavation, backfill and cast in place concrete	92	Ea.	\$115.16	10,595
Electrical underground ducts and manholes, 45° elbows, PVC, schedule 80, 4" diameter, installed by direct burial in slab or duct bank, excludes excavation, backfill and cast in place concrete	92	Ea.	\$115.16	10,595
Electrical underground ducts and manholes, base spacer, PVC, schedule 80, 4" diameter, installed by direct burial in slab or duct bank, excludes excavation, backfill and cast in place concrete	298	Ea.	\$19.07	5,675
Norm C.I.P. concrete forms, slab on grade, edge, wood, over 12", 4 use, includes erecting, bracing, stripping and cleaning	534	SFCA	\$6.80	3,631
Norm Reinforcing steel, in place, elevated slabs, #4 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	20	Ton	\$2,269.45	44,413
Norm Epoxy coating, for reinforcing steel, add to plain steel rebar pricing for epoxy-coated rebar	20	Ton	\$1,861.70	36,433
Norm High chair, for reinforcing steel, continuous (CHC), stainless tipped legs, 4" high, legs 8" OC, includes material only	187	C.L.F.	\$1,125.29	210,318
Norm Bag ties, for reinforcing steel, plain steel, 16 ga., 4" long, includes material only	288	C	\$1.79	515
Norm Track Slab, Structural concrete, in place, slab on grade (3500 psi), over 10000 S.F., 10.775" thick, includes concrete (Portland cement Type I), placing and finishing, excludes forms and reinforcing	14,240	S.F.	\$10.08	143,493
Norm Second Pour, Structural concrete, in place, slab on grade (3500 psi), over 10000 S.F., 7.225" thick, includes concrete (Portland cement Type I), placing and finishing, Incl. 4 mil sheeting, excludes forms and reinforcing	14,240	S.F.	\$6.91	98,400
Norm First Pour, Elastomer Grout, Surface repairs using form-and-pour techniques (ACI RAP-5), place repair material by pump and pressurize	38	C.F.	\$230.59	8,686
Norm Second Pour Elastomer Grout, Surface repairs using form-and-pour techniques (ACI RAP-5), place repair material by pump and pressurize	61	C.F.	\$230.59	14,087
G.U. Bathtub, Structural concrete, in place, slab on grade (3500 psi), over 10000 S.F., 6" thick, includes concrete (Portland cement Type I), placing and finishing, excludes forms and reinforcing	14,546	S.F.	\$10.08	146,577
G.U. C.I.P. concrete forms, bathtub slab on grade, edge, wood, over 12", 4 use, includes erecting, bracing, stripping and cleaning	4,694	SFCA	\$6.80	31,916

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LEVEL DESCRIPTION	QTY	U/M	UNIT PRICE	TOTAL
G.U. Reinforcing steel, in place, elevated slabs, #4 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	20	Ton	\$2,269.45	44,413
G.U. Epoxy coating, for reinforcing steel, add to plain steel rebar pricing for epoxy-coated rebar	20	Ton	\$1,861.70	36,433
G.U. High chair, for reinforcing steel, continuous (CHC), stainless tipped legs, 4" high, legs 8" OC, includes material only	187	C.L.F.	\$1,125.29	210,318
G.U. Bag ties, for reinforcing steel, plain steel, 16 ga., 4" long, includes material only	288	C	\$1.79	515
G.U. Track Slab, Structural concrete, in place, slab on grade (3500 psi), over 10000 S.F., 10.775" thick, includes concrete (Portland cement Type I), placing and finishing, excludes forms and reinforcing	12,536	S.F.	\$10.08	126,322
G.U. Second Pour, Structural concrete, in place, slab on grade (3500 psi), over 10000 S.F., 7.225" thick, includes concrete (Portland cement Type I), placing and finishing, Incl. 4 mil sheeting, excludes forms and reinforcing	8,613	S.F.	\$6.91	59,517
Misc. Material, Equipment and Sundries	1	LS	\$48,946.52	48,947
Install Double Crossover (Desired)*	1	EA	\$3,630,737.48	3,630,737
Install Turnouts for Double Crossover	1	EA	\$2,532,038.08	2,532,038
<u>DETAILS</u>				
Install #8 Turnout	4	EA	\$440,043.95	1,760,176
Switch machine Box Frame and Lid	16	EA	\$2,482.27	39,716
Switch Housing, 2 per switch	32	EA	\$12,411.34	397,163
Insulated Rail Joint, 20 FT 115 RE - Turnout	32	EA	\$2,862.88	91,612
Insulated Joints - Turnout	32	EA	\$6.25	200
Field Welds (Includes Rail Grinding) - Turnout	64	EA	\$177.47	11,358
Elastomer Grout, Insulate rail boot to bath tub termination, place material by pump and pressurize	169	C.F.	\$230.59	39,079
Misc. Material, Equipment and Sundries - Turnout	1	LS	\$192,734.45	192,734
Install Embedment Double Crossover	1	EA	\$1,098,699.39	1,098,699
<u>DETAILS</u>				
Traction Power/Signal Connection Boxes	64	EA	\$3,206.61	205,223

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T.O. Bathtub, Structural concrete, in place, slab on grade (3500 psi), over 10000 S.F., 6" thick, includes concrete (Portland cement Type I), placing and finishing, excludes forms and reinforcing	3,981	S.F.	\$10.08	40,116
T.O. C.I.P. concrete forms, bathtub slab on grade, edge, wood, over 12", 4 use, includes erecting, bracing, stripping and cleaning	1,239	SFCA	\$6.80	8,424
T.O. Reinforcing steel, in place, elevated slabs, #4 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	5	Ton	\$2,267.96	10,659
T.O. Epoxy coating, for reinforcing steel, add to plain steel rebar pricing for epoxy-coated rebar	5	Ton	\$1,860.48	8,744
T.O. High chair, for reinforcing steel, continuous (CHC), stainless tipped legs, 4" high, legs 8" OC, includes material only	512	C.L.F.	\$1,125.29	575,588
T.O. Bag ties, for reinforcing steel, plain steel, 16 ga., 4" long, includes material only	68	C	\$1.79	122
T.O. Track Slab, Structural concrete, in place, slab on grade (3500 psi), over 10000 S.F., 9" thick, includes concrete (Portland cement Type I), placing and finishing, excludes forms and reinforcing	13,405	S.F.	\$10.08	135,078
T.O. Second Pour, Structural concrete, in place, slab on grade (3500 psi), over 10000 S.F., 6.625" thick, includes concrete (Portland cement Type I), placing and finishing, Incl. 4 mil sheeting, excludes forms and reinforcing	8,607	S.F.	\$6.91	59,472
Norm First Pour, Elastomer Grout, Surface repairs using form-and-pour techniques (ACI RAP-5), place repair material by pump and pressurize	4	C.F.	\$230.59	835
Norm Second Pour Elastomer Grout, Surface repairs using form-and-pour techniques (ACI RAP-5), place repair material by pump and pressurize	10	C.F.	\$230.47	2,196
Electrical underground ducts and manholes, PVC, with DB coupling, schedule 80, 4" diameter, installed by direct burial in slab or duct bank, excludes excavation, backfill and cast in place concrete	690	L.F.	\$33.93	23,411
Electrical underground ducts and manholes, bell end and plug, PVC, schedule 80, 4" diameter, installed by direct burial in slab or duct bank, excludes excavation, backfill and cast in place concrete	64	Ea.	\$73.99	4,735
Electrical underground ducts and manholes, 90° elbows, PVC, schedule 80, 4" diameter, installed by direct burial in slab or duct bank, excludes excavation, backfill and cast in place concrete	64	Ea.	\$115.16	7,370
Electrical underground ducts and manholes, 45° elbows, PVC, schedule 80, 4" diameter, installed by direct burial in slab or duct bank, excludes excavation, backfill and cast in place concrete	128	Ea.	\$115.16	14,740
Electrical underground ducts and manholes, base spacer, PVC, schedule 80, 4" diameter, installed by direct burial in slab or duct bank, excludes excavation, backfill and cast in place concrete	104	Ea.	\$19.07	1,984

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LEVEL DESCRIPTION	QTY	U/M	UNIT PRICE	TOTAL
20 Stations, Stops, Terminals, Intermodal	1	EA	\$1,927,199.63	1,927,200
Station - Grade	1	EA	\$1,927,199.63	1,927,200
DETAILS				
Station - Allow	1	EA	\$1,927,199.63	1,927,200
Fare Collection	(1)	LS	\$182,961.99	(182,962)
Fare Collection	1	LS	\$182,961.99	182,962
40 Sitework & Special Conditions	1	LS	\$6,427,234.18	6,427,234
40.02 Site Utilities, Utility Relocation	2,160	RFT	\$670.86	1,449,059
DETAILS				
Utility Relocation - Allowance	2,160	RFT	\$670.86	1,449,059
40.07 Automobile, bus, van accessways including roads, parking lots	1	LS	\$4,978,175.22	4,978,175
Traffic Control	1	LS	\$1,076,634.04	1,076,634
DETAILS				
Movement of Traffic (MOT) - Low, Allowance 5% of Guideway Cost (SCC 10)	0	PCT	\$21,532,680.72	1,076,634
Modification to Existing Intersections	1	LS	\$2,744,429.85	2,744,430
DETAILS				
Modifications to existing road crossing and Intersections, Moderate, - Allowance	3	EA	\$914,809.95	2,744,430
Lane Replacement	37,000	SF	\$21.25	786,240

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Full Depth Pavement Replacement - Asphalt	37,000	SF	\$11.96	442,388
DETAILS				
Selective demolition, saw cutting, asphalt, up to 3" deep	3,083	L.F.	\$2.01	6,210
Selective demolition, saw cutting, each additional inch of depth over 3"	9,250	L.F.	\$1.17	10,779
Demolish, remove pavement & curb, remove bituminous pavement, 4" to 6" thick, excludes hauling and disposal fees	4,111	S.Y.	\$8.49	34,909
Haul Demolished Debris	1,028	L.C.Y.	\$13.57	13,949
Fine grading, grade subgrade for base course, roadways	4,111	S.Y.	\$0.79	3,233
Compaction, riding, vibrating roller, 4 passes, 6" lifts	1,370	B.C.Y.	\$0.60	826
Compaction, water for, 3,000 gallon truck, 3 mile haul	1,370	B.C.Y.	\$3.24	4,440
Base course drainage layers, aggregate base course for roadways and large paved areas, stone base, compacted, 3/4" stone base, to 12" deep	4,111	S.Y.	\$23.61	97,066
Haul Base Course Material	1,782	L.C.Y.	\$13.57	24,182
Plant-mix asphalt paving, pre-treatment for paving, prime coat, emulsion, 0.30 gallons/S.Y., 1000 S.Y.	4,111	S.Y.	\$5.12	21,046
Plant-mix asphalt paving, for highways and large paved areas, binder course, 4" thick, no hauling included	4,111	S.Y.	\$31.13	127,973
Plant-mix asphalt paving, pre-treatment for paving, tack coat, emulsion, 0.10 gallons/S.Y., 1000 S.Y.	4,111	S.Y.	\$2.32	9,549
Plant-mix asphalt paving, for highways and large paved areas, wearing course, 2" thick, no hauling included	4,111	S.Y.	\$17.79	73,125
Haul Paving Material	1,028	L.C.Y.	\$13.57	13,949
Painted pavement markings, acrylic waterborne, white or yellow, 4" wide, 3,000-16,000 LF	3,083	L.F.	\$0.37	1,152
Curb and Gutter	2,500	LF	\$38.68	96,695
DETAILS				
Demolish, remove pavement & curb and gutter, excludes hauling and disposal fees	2,500	L.F.	\$4.56	11,399
Haul Demolished Debris	324	L.C.Y.	\$13.57	4,399
Fine grading, grade subgrade for base course, roadways	694	S.Y.	\$0.79	546
Compaction, riding, vibrating roller, 4 passes, 6" lifts	231	B.C.Y.	\$0.60	140
Compaction, water for, 3,000 gallon truck, 3 mile haul	231	B.C.Y.	\$3.24	750
Base course drainage layers, aggregate base course for roadways and large paved areas, stone base, compacted, 3/4" stone base, to 12" deep	694	S.Y.	\$23.61	16,397

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Haul Base Course Material	301	L.C.Y.	\$13.57	4,085
Cast-in place concrete curbs & gutters, radius, machine formed, 6" high curb, 6" thick gutter, 30" wide, includes concrete	2,500	L.F.	\$23.59	58,980
Curb Inlet/Storm Drain	9	EA	\$11,270.00	101,430
DETAILS				
Selective demolition, manholes & catch basins, manhole or catch basin, precast or brick, over 8' deep, excludes excavation	54	V.L.F.	\$136.79	7,386
Haul Demolished Debris	54	L.C.Y.	\$13.57	733
New Curb Inlet/Storm Drain	9	EA	\$4,878.99	43,911
Extend Laterals including excavation - Assume 18" RCP	180	LF	\$182.96	32,933
Connect To Existing	9	EA	\$1,829.62	16,467
Sidewalk	2,500	LF	\$58.29	145,727
DETAILS				
Demolish, remove pavement & curb, remove concrete, mesh reinforced, to 6" thick, hand held equipment, excludes hauling and disposal fees	15,000	S.F.	\$1.34	20,148
Haul Demolished Debris	417	L.C.Y.	\$13.57	5,655
Fine grading, grade subgrade for base course, roadways	1,667	S.Y.	\$0.79	1,311
Compaction, riding, vibrating roller, 4 passes, 6" lifts	556	B.C.Y.	\$0.60	335
Compaction, water for, 3,000 gallon truck, 3 mile haul	556	B.C.Y.	\$3.24	1,801
Base course drainage layers, aggregate base course for roadways and large paved areas, compacted, 3" deep, crushed 3/4" stone base	1,667	S.Y.	\$6.83	11,377
Haul Base Course Material	180	L.C.Y.	\$13.57	2,448
Sidewalks, driveways, and patios, sidewalk, concrete, cast-in-place with 6 x 6 - W1.4 x W1.4 mesh, broomed finish, 3,000 psi, 4" thick, excludes base	15,000	S.F.	\$6.84	102,652
Mill and Overlay Existing Pavement	102,600	SF	\$3.61	370,872
DETAILS				
Cold milling asphalt paving, asphalt pavement, 1" to 3" deep, removal from concrete base, rip, load and sweep, excludes hauling	11,400	S.Y.	\$0.78	8,948
Haul Demolished Debris	1,235	L.C.Y.	\$13.57	16,758
Plant-mix asphalt paving, pre-treatment for paving, tack coat, emulsion, 0.10 gallons/S.Y., 1000 S.Y.	11,400	S.Y.	\$2.32	26,479

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Plant-mix asphalt paving, for highways and large paved areas, wearing course, 3" thick, no hauling included	11,400	S.Y.	\$25.98	296,147
Haul Paving Material	1,425	L.C.Y.	\$13.57	19,346
Painted pavement markings, acrylic waterborne, white or yellow, 4" wide, 3,000-16,000 LF	8,550	L.F.	\$0.37	3,194
50 Systems	4,320	TF	\$2,091.77	9,036,465
50.01 Train Control and Signals	4,320	TF	\$490.09	2,117,180
DETAILS				
CIH - Interlocking/Intermediate	1	EA	\$248,848.55	335,946
3/4" x 8' lg - copper alloy	5	EA	\$659.08	3,566
Ground wire, bare solid copper, #6	81	FT	\$1.99	162
Mech Conn to Case	5	EA	\$85.52	463
Exothermic Conn to Rod	5	EA	\$240.40	1,301
Test Well for Ground	1	EA	\$153.14	207
Batteries 240 AH	8	EA	\$546.84	4,440
Foundations	5	EA	\$16,757.85	90,660
2-1/c#6 TW PR Track Circuit	1,510	LF	\$290.23	438,337
#6 RHW Stranded wire	108	LF	\$45.04	4,873
CHICKEN HEAD - PIN BOND	18	EA	\$42.79	772
SLEEVE SPLICE NICOPRESS	18	EA	\$18.74	338
CADWELD TRACK CONNECTION	18	EA	\$115.62	2,085
Track drill & bits	2	ea	\$248.69	448
Signal head, Number Plate, Mast & Base	3	EA	\$10,893.33	34,423
Structural Steel Support - Fabricated	3	EA	\$6,926.83	21,889
5c#9 Signal Lamp Cable	1,217	LF	\$452.64	550,994
Electric Switch Machine - M3	2	EA	\$55,248.10	124,308
Electric Switch Rod Set - G&W	2	EA	\$36,464.76	82,046
2C#4 - Switch machine	271	LF	\$297.21	80,397
8C#10 - Switch machine	271	LF	\$302.48	81,825
Switch Heat Cabinet & Control Panel	1	EA	\$7,463.59	6,717
Track Switch Heater / Crib heater & Cal Rod	5	EA	\$6,576.45	29,660
Junction Box	5	EA	\$816.97	3,685
2C#4 - Switch heat	250	LF	\$297.21	74,367
8C#10 - Switch heat	271	LF	\$302.48	81,825
Head Bonds #6	7	EA	\$18.39	133

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Head Bonds 250	7	EA	\$25.84	186
LRT Bar Signals, incl. foundation	2	EA	\$30,661.93	55,191
Control switches, push button, maintained contact, button 6 V #12 lamp, w/double block 2NO 2NC w/guard, 600 V 10 A	2	Ea.	\$314.78	567
misc. mat. - allow	5	EA	\$992.93	5,372
50.02 Traffic Signals and Crossing Protection - Semi Exclusive ROW	3	EA	\$597,855.19	1,793,566
Crossing Protection - Semi Exclusive ROW	3	EA	\$109,956.55	329,870
DETAILS				
LRT Bar Signals, incl. foundation	6	EA	\$30,604.44	183,627
9c#9 signal lighting cable	750	LF	\$16.31	12,231
Rail Traffic Loop Detection System, Feeds Traffic Signal Controller	3	EA	\$44,670.62	134,012
Traffic Signals	3	EA	\$487,898.64	1,463,696
DETAILS				
Traffic signals, single direction allowance - engineering, materials, installation, and testing	3	EA	\$487,898.64	1,463,696
50.03 Traction Power Supply: Substation	4,320	TF	\$177.62	767,329
Traction Power Distribution	4,320	TF	\$177.62	767,329
DETAILS				
Substation Power Cubicle - Assume 10,375 TF spacing	0	EA	\$655,871.59	288,583
Impedance Bond (4) each location per track: Assume 10,375' spacing	2	EA	\$29,563.24	51,440
Medium-cable single cable, copper, negative return, 350 kcmil, in conduit, excl splicing & terminations	8	C.L.F.	\$2,670.22	20,481
Medium-cable single cable, copper, positive feeders, 500 kcmil, in conduit, excl splicing & terminations	18	C.L.F.	\$3,089.18	56,532
Cable terminations, insulation diameter range, 350 KCMIL & 500 KCMIL	75	EA	\$598.78	44,897

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PIN CONN - CABLE TO RAIL (8 required per location)	3	EA	\$199.90	698
Signal and Traction Power Boxes	3	EA	\$3,516.78	12,274
Elastomer Grout, transition at signal and traction box, place material by pump and pressurize	8	C.F.	\$230.70	1,811
Disconnecting switches, single pole switches, 13 to 26 kV	1	EA	\$6,880.94	9,014
Enclosure panels, 84" x 46", NEMA 12 & 4	1	EA	\$29,045.53	38,050
Structural concrete, in place, equipment pad (3000 psi), 8' x 8' x 10", includes forms(4 uses), Grade 60 rebar, concrete (Portland cement Type I), placing and finishing	0	EA	\$946.58	416
Electrical underground ducts and manholes, PVC, with DB coupling, schedule 80, 4" diameter, installed by direct burial in slab or duct bank, excludes excavation, backfill and cast in place concrete	6,836	L.F.	\$33.93	231,933
Electrical underground ducts and manholes, bell end and plug, PVC, schedule 80, 4" diameter, installed by direct burial in slab or duct bank, excludes excavation, backfill and cast in place concrete	24	EA	\$74.00	1,806
Electrical underground ducts and manholes, 90° elbows, PVC, schedule 80, 4" diameter, installed by direct burial in slab or duct bank, excludes excavation, backfill and cast in place concrete	17	EA	\$115.15	2,008
Electrical underground ducts and manholes, 45° elbows, PVC, schedule 80, 4" diameter, installed by direct burial in slab or duct bank, excludes excavation, backfill and cast in place concrete	3	EA	\$115.14	402
Electrical underground ducts and manholes, base spacer, PVC, schedule 80, 4" diameter, installed by direct burial in slab or duct bank, excludes excavation, backfill and cast in place concrete	366	EA	\$19.07	6,985
50.04 Traction power distribution: Catenary and third rail	2,160	RFT	\$1,907.98	4,121,234
Foundations	2,160	RFT	\$144.19	311,452
DETAILS				
Fixed end caisson piles, for mobilization, 50 mile radius	0	Ea.	\$2,409.16	1,036
Fixed end caisson piles, open style in stable ground, to 10' deep, 36" diameter,	220	V.L.F.	\$32.87	7,222
Casing left in place	31,418	Lb.	\$3.31	103,983
Reinforcing steel, in place, #3 to #7, A615, grade 60 - #4 Ties	1	Ton	\$4,485.39	5,562
Reinforcing steel, in place, #8 to #18, A615, grade 60 - #9 Vertical Bars	7	Ton	\$3,746.49	25,176

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Structural concrete, ready mix, heavyweight, 4000 psi, includes local aggregate, sand, Portland cement (Type I) and water, delivered, excludes all additives and treatments	157	C.Y.	\$268.08	42,154
Structural concrete, placing, pumped, over 5 C.Y., includes leveling (strike off) & consolidation, excludes material	157	C.Y.	\$23.52	3,698
Cut Casing	22	EA	\$1,643.55	36,109
Load Surplus	180	L.C.Y.	\$2.50	450
Haul Surplus Materials Off Site	180	L.C.Y.	\$18.13	3,257
Embedment Plate Assembly	1,650	LBS	\$4.14	6,826
Anchor Bolt Template	3,175	LBS	\$4.14	13,137
Anchor Bolt - 2" x 8'-0" Long	176	EA	\$124.12	21,815
Hex Nuts	879	EA	\$16.55	14,543
Plate Washers	352	EA	\$4.14	1,454
Standard Washers	352	EA	\$4.14	1,454
Set Foundation Imbeds, Plates, Template, Bolts, etc.	22	Sets	\$549.93	12,082
Grounding Assembly, cable, clamps, Lugs - Allow	22	Sets	\$248.23	5,454
Set Grounding Assembly	22	Sets	\$274.96	6,041
Catenary Structures	2,160	RFT	\$1,205.34	2,603,536
DETAILS				
Electrical utility pole, catenary, galvanized steel, round, 25	22	EA	\$57,920.86	1,272,521
Cantilever Assemblies	44	EA	\$2,482.32	109,073
Other Misc. Assemblies	44	EA	\$3,971.72	174,517
Pre-assembly Cantilever Assemblies	44	EA	\$11,918.80	523,712
Erect Catenary Frames (Pole + Assemblies.)	22	EA	\$23,837.60	523,712
OCS O/H Conductors	2,160	RFT	\$330.08	712,978
DETAILS				
Overhead line conductors & devices, per wire,500 kcmil, messenger wire	1	Mile	\$40,956.82	33,585
Overhead line conductors & devices, per wire, 350 kcmil grooved, contact wire	1	Mile	\$40,956.82	33,585
1" 37 STRAND GALV. E.H.S - GUY WIRE	1	Mile	\$9,911.01	8,127
Overhead line conductors & devices, protective devices, allow 6 per span per track	258	Ea.	\$2,120.79	548,181
Flexible Hangar Assy, Multiple, assume 100' span typical, average 8 ea.@ 1.6' =12.76' hanger per 100' Span, one track	345	Ea.	\$144.29	49,728
Continuity Jumper allow 50 spans @ 4 per span per track	172	EA	\$230.80	39,772

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LEVEL DESCRIPTION	QTY	U/M	UNIT PRICE	TOTAL
Rail Equipment	0	LS	\$1,147,134.37	493,268
DETAILS				
Flatcar (2)	10	Months	\$29,784.48	307,972
High Rail Crane - 22 Tons (2)	10	Months	\$17,920.33	185,296
50.05 Communications	2,160	RFT	\$109.79	237,156
DETAILS				
Electrical underground ducts and manholes, PVC, with DB coupling, schedule 80, 1-1/2" diameter, installed by direct burial in slab or duct bank, excludes excavation, backfill and cast in place concrete	8,628	L.F.	\$9.06	78,160
Electrical underground ducts and manholes, bell end and cap, PVC, schedule 80, 1-1/2" diameter, installed by direct burial in slab or duct bank, excludes excavation, backfill and cast in place concrete	13	Ea.	\$38.83	518
Electrical underground ducts and manholes, elbows, PVC, schedule 80, 1-1/2" diameter, installed by direct burial in slab or duct bank, excludes excavation, backfill and cast in place concrete	13	Ea.	\$44.31	591
Electrical underground ducts and manholes, PVC, with DB coupling, schedule 80, 2" diameter, installed by direct burial in slab or duct bank, excludes excavation, backfill and cast in place concrete	1,336	L.F.	\$11.56	15,445
Electrical underground ducts and manholes, elbows, PVC, schedule 80, 2" diameter, installed by direct burial in slab or duct bank, excludes excavation, backfill and cast in place concrete	27	Ea.	\$58.96	1,575
Electrical underground ducts and manholes, bell end and plug, PVC, schedule 80, 2" diameter, installed by direct burial in slab or duct bank, excludes excavation, backfill and cast in place concrete	27	Ea.	\$45.48	1,215
Electrical underground ducts and manholes, base spacer, PVC, schedule 80, 2" diameter, installed by direct burial in slab or duct bank, excludes excavation, backfill and cast in place concrete	2,157	Ea.	\$18.28	39,429
Fiber optic cable, 24 strand, single mode, indoor/outdoor	5	M.L.F.	\$7,143.74	38,005
Fiber optic patch panel, 24 ports, stations, crossings, intersections, interlockings, TPSS, interlockings, headquarters building	5	Ea.	\$815.01	4,393
Fiber optic patch panel, 24 ports, stations, crossings, intersections, interlockings, headquarters building	5	Ea.	\$156.93	846
Fiber optic cable, 48 strand, single mode, indoor/outdoor	5	M.L.F.	\$7,138.68	32,624
Fiber optic patch panel, 48 ports, stations, headquarters building	1	Ea.	\$816.61	1,053

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Fiber optic patch panel, 48 ports, stations,headquarters building	1	Ea.	\$188.24	243
Fiber optics cable enclosure, splice w/enclosure encapsulant	7	Ea.	\$618.69	4,133
Switching and routing equipment, network switch, 10/100/1000 Mbps, 8 port, industrial ethernet type	7	Ea.	\$2,833.34	18,927
CYN Cyan Segment	1,220	RFT	\$19,634.10	23,953,606
10 Guideway & Track Elements	1,220	RF	\$11,555.66	14,097,907
Embedded Section	1,220	RF	\$755.53	921,749
Remove Pavement - Embedded Guideway Width = 28'-0"	1,220	RF	\$85.05	103,761
<u>DETAILS</u>				
Selective demolition, saw cutting, asphalt, up to 3" deep	2,440	L.F.	\$2.01	4,914
Selective demolition, saw cutting, each additional inch of depth over 3"	7,320	L.F.	\$1.17	8,530
Demolish, remove pavement & curb, remove bituminous pavement, 4" to 6" thick, excludes hauling and disposal fees	3,796	S.Y.	\$8.49	32,231
Loading, 4 C.Y. bucket, front end loader, wheel-mounted	2,770	L.C.Y.	\$1.27	3,527
Cycle hauling(wait, load, travel, unload or dump & return) time per cycle, excavated or borrow, loose cubic yards, 30 min load/wait/unload, 20 C.Y. truck, cycle 30 miles, 35 MPH, excludes loading equipment	2,770	L.C.Y.	\$13.57	37,599
Selective demolition, dump charges, typical urban city, building construction materials, includes tipping fees only	139	Ton	\$122.46	16,961
Earthwork - Embedded	1,898	BCY	\$10.94	20,770
<u>DETAILS</u>				
Excavating, bulk, dozer, open site, bank measure, common earth, 80 HP dozer, 150' haul	1,898	B.C.Y.	\$7.91	15,009
Fine grading, large area, 6,000 S.Y. or more	3,796	S.Y.	\$1.26	4,776
Compaction, 4 passes, 12" lifts, riding, sheepsfoot or wobbly wheel roller	1,265	B.C.Y.	\$0.78	985

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Drainage - Embedded	1,220	RF	\$389.99	475,790
DETAILS				
18" Dia. (average) Trunk Drain Lines including Excavation	1,220	FT	\$182.96	223,214
Drainage Structures	24	EA	\$6,099.12	148,574
8" PVC Laterals	487	FT	\$30.49	14,857
Track Drain	49	EA	\$1,829.74	89,145
Guideway - Paved	1,220	RF	\$263.47	321,428
DETAILS				
Barrier Curb	2,440	LF	\$21.96	53,571
Slab on Grade - Reinforced, 18" Thick	14,640	SF	\$18.30	267,856
Trackwork	1	LS	\$13,176,157.56	13,176,158
Install Embedded Track (Concrete)	2,785	TF	\$543.00	1,512,265
Construct Track Slab	2,785	TF	\$302.19	841,600
DETAILS				
C.I.P. concrete forms, slab on grade, edge, wood, over 12", 4 use, includes erecting, bracing, stripping and cleaning	15,039	SFCA	\$6.80	102,256
Reinforcing steel, in place, slab on grade, #3 to #7, A615, grade 60, incl labor for accessories, excl material for accessories, #4, Longitudinal	7	Ton	\$3,744.65	24,378
Reinforcing steel, in place, slab on grade, #3 to #7, A615, grade 60, incl labor for accessories, excl material for accessories, #5, Hoop and Transverse	24	Ton	\$3,743.80	90,263
Epoxy coating, for reinforcing steel, add to plain steel rebar pricing for epoxy-coated rebar	31	Ton	\$1,861.75	57,007
High chair, for reinforcing steel, continuous (CHC), stainless tipped legs, 4" high, legs 8" OC, includes material only	292	C.L.F.	\$1,125.31	329,064

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LEVEL DESCRIPTION	QTY	U/M	UNIT PRICE	TOTAL
Bag ties, for reinforcing steel, plain steel, 16 ga., 4" long, includes material only	451	C	\$1.79	806
Structural concrete, ready mix, heavyweight, 5000 psi, includes local aggregate, sand, Portland cement (Type I) and water, delivered, excludes all additives and treatments	741	C.Y.	\$282.98	209,672
Structural concrete, placing, slab on grade, pumped, over 6" thick, includes leveling (strike off) & consolidation, excludes material	741	C.Y.	\$19.06	14,122
Expansion joint, polyethylene foam, 1" x 12"	371	L.F.	\$14.13	5,248
Dowel sleeve base, plastic, for 1" smooth dowel, fasten to edge form	186	Ea.	\$7.74	1,438
Reinforcing steel, in place, dowels, smooth, 24" long, 1" diameter, A36, galvanized	186	Ea.	\$39.57	7,347
Install Embedded Track (Concrete)	2,785	TF	\$240.81	670,665
<u>DETAILS</u>				
Running Rail, 115RE 115lb/yd 2 rails per TF (100 TF = 200 LF)	53	TON	\$3,680.32	196,455
Stockpile and Distribute welded Rail	5,570	LF	\$3.57	19,908
Weld 80' Stick Rail to 1,200 FT strings	2,785	TF	\$3.19	8,894
Steel Leveling Tie, 115RE, with 2 leveling legs (1 per 10' on Tangent and 1per 5' in curves) 4,320	279	EA	\$153.09	42,636
Clips (4 Ea. per Tie)	1,114	EA	\$5.92	6,600
Railboot, 115RE, Includes Cuffs and Tape	5,570	LF	\$17.41	96,986
Insulated Rail Joint, 20 FT 115 RE	4	EA	\$2,863.29	10,222
Construct Embedded Track - (Includes Destressing)	2,785	TF	\$15.62	43,489
Field Welds (Includes Rail Grinding)	2	EA	\$456.41	1,059
Insulated Joints	4	EA	\$6.25	22
Field Welds (Includes Rail Grinding)	7	EA	\$177.49	1,267
Misc. Material, Equipment and Sundries	1	LS	\$49,091.06	43,691
Reinforcing steel, in place, slab on grade, #3 to #7, A615, grade 60, incl labor for accessories, excl material for accessories, #4, Longitudinal	7	Ton	\$3,746.15	27,871
Epoxy coating, for reinforcing steel, add to plain steel rebar pricing for epoxy-coated rebar	7	Ton	\$1,862.83	13,859
Bag ties, for reinforcing steel, plain steel, 16 ga., 4" long, includes material only	4	C	\$1.79	7
Structural concrete, ready mix, heavyweight, 5000 psi, includes local aggregate, sand, Portland cement (Type I) and water, delivered, excludes all additives and treatments	497	C.Y.	\$282.98	140,592
Structural concrete, placing, slab on grade, pumped, over 6" thick, includes leveling (strike off) & consolidation, excludes material	497	C.Y.	\$19.06	9,469

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Expansion joint, polyethylene foam, 1" x 6"	371	L.F.	\$14.13	5,248
Expansion joint, rubberized asphalt, fuel resistant, 1" x 2", hot applied	371	L.F.	\$6.43	2,389
Special Trackwork	1	LS	\$11,663,892.81	11,663,893
Install Half Grand Union	1	EA	\$8,033,155.35	8,033,155
Install Special Trackwork Half Grand Union	1	LS	\$4,429,129.62	4,429,130
DETAILS				
Install #10 Turnout	6	EA	\$605,528.50	3,633,171
Install Diamond Crossover	3	EA	\$96,672.16	290,016
Switch machine Box Frame and Lid	6	EA	\$2,482.27	14,894
Switch Housing, 2 per switch	12	EA	\$12,411.34	148,936
Insulated Rail Joint, 20 FT 115 RE - Turnout	12	EA	\$2,862.88	34,355
Insulated Joints - Turnout	12	EA	\$6.88	83
Field Welds (Includes Rail Grinding) - Turnout	24	EA	\$177.47	4,259
Elastomer Grout, under ties using form-and-pour techniques (ACI RAP-5), place repair material by pump and pressurize	480	C.F.	\$230.59	110,682
Misc. Material, Equipment and Sundries	1	LS	\$192,734.45	192,734
Install Embedment	1	LS	\$3,604,025.72	3,604,026
DETAILS				
Construct Embedded Track - Closure and Cross Tracks 1,780 TF (Includes Destressing)	890	TF	\$15.62	13,898
Running Rail, 115RE 115lb/yd 2 rails per TF (100 TF = 200 LF)	34	TON	\$3,680.02	125,562
Stockpile and Distribute welded Rail	1,780	LF	\$3.57	6,362
Weld 80' Stick Rail to 1,200 FT strings	890	TF	\$3.19	2,842
Insulated Rail Joint, 20 FT 115 RE	13	EA	\$2,862.88	37,217
Insulated Joints	13	EA	\$6.25	81
Field Welds (Includes Rail Grinding)	26	EA	\$177.47	4,614
Traction Power/Signal Connection Boxes	26	EA	\$2,895.98	75,295

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Electrical underground ducts and manholes, PVC, with DB coupling, schedule 80, 4" diameter, installed by direct burial in slab or duct bank, excludes excavation, backfill and cast in place concrete	8,940	L.F.	\$33.93	303,330
Electrical underground ducts and manholes, bell end and plug, PVC, schedule 80, 4" diameter, installed by direct burial in slab or duct bank, excludes excavation, backfill and cast in place concrete	44	Ea.	\$73.99	3,256
Electrical underground ducts and manholes, 90° elbows, PVC, schedule 80, 4" diameter, installed by direct burial in slab or duct bank, excludes excavation, backfill and cast in place concrete	50	Ea.	\$115.16	5,758
Electrical underground ducts and manholes, 45° elbows, PVC, schedule 80, 4" diameter, installed by direct burial in slab or duct bank, excludes excavation, backfill and cast in place concrete	50	Ea.	\$115.16	5,758
Electrical underground ducts and manholes, base spacer, PVC, schedule 80, 4" diameter, installed by direct burial in slab or duct bank, excludes excavation, backfill and cast in place concrete	186	Ea.	\$19.07	3,553
Norm C.I.P. concrete forms, slab on grade, edge, wood, over 12", 4 use, includes erecting, bracing, stripping and cleaning	2,694	SFCA	\$6.80	18,317
Norm Reinforcing steel, in place, elevated slabs, #4 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	10	Ton	\$2,268.29	22,207
Norm Epoxy coating, for reinforcing steel, add to plain steel rebar pricing for epoxy-coated rebar	10	Ton	\$1,860.75	18,217
Norm High chair, for reinforcing steel, continuous (CHC), stainless tipped legs, 4" high, legs 8" OC, includes material only	94	C.L.F.	\$1,125.29	105,260
Norm Bag ties, for reinforcing steel, plain steel, 16 ga., 4" long, includes material only	144	C	\$1.79	258
Norm Track Slab, Structural concrete, in place, slab on grade (3500 psi), over 10000 S.F., 10.775" thick, includes concrete (Portland cement Type I), placing and finishing, excludes forms and reinforcing	7,120	S.F.	\$10.08	71,747
Norm Second Pour, Structural concrete, in place, slab on grade (3500 psi), over 10000 S.F., 7.225" thick, includes concrete (Portland cement Type I), placing and finishing, Incl. 4 mil sheeting, excludes forms and reinforcing	7,120	S.F.	\$6.91	49,200
Norm First Pour, Elastomer Grout, Surface repairs using form-and-pour techniques (ACI RAP-5), place repair material by pump and pressurize	269	C.F.	\$230.59	62,118
Norm Second Pour Elastomer Grout, Surface repairs using form-and-pour techniques (ACI RAP-5), place repair material by pump and pressurize	710	C.F.	\$230.59	163,644
G.U. Bathtub, Structural concrete, in place, slab on grade (3500 psi), over 10000 S.F., 6" thick, includes concrete (Portland cement Type I), placing and finishing, excludes forms and reinforcing	7,689	S.F.	\$10.08	77,480
G.U. C.I.P. concrete forms, bathtub slab on grade, edge, wood, over 12", 4 use, includes erecting, bracing, stripping and cleaning	3,542	SFCA	\$6.80	24,080

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G.U. Reinforcing steel, in place, elevated slabs, #4 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	9	Ton	\$2,269.45	21,151
G.U. Epoxy coating, for reinforcing steel, add to plain steel rebar pricing for epoxy-coated rebar	9	Ton	\$1,861.70	17,351
G.U. High chair, for reinforcing steel, continuous (CHC), stainless tipped legs, 4" high, legs 8" OC, includes material only	2,030	C.L.F.	\$1,125.29	2,284,349
G.U. Bag ties, for reinforcing steel, plain steel, 16 ga., 4" long, includes material only	1,312	C	\$1.79	2,345
G.U. Track Slab, Structural concrete, in place, slab on grade (3500 psi), over 10000 S.F., 10.775" thick, includes concrete (Portland cement Type I), placing and finishing, excludes forms and reinforcing	2,055	S.F.	\$10.08	20,708
G.U. Second Pour, Structural concrete, in place, slab on grade (3500 psi), over 10000 S.F., 7.225" thick, includes concrete (Portland cement Type I), placing and finishing, Incl. 4 mil sheeting, excludes forms and reinforcing	1,320	S.F.	\$6.91	9,121
Misc. Material, Equipment and Sundries	1	LS	\$48,946.52	48,947
Install Double Crossover (Desired)*	1	EA	\$3,630,737.48	3,630,737
Install Turnouts for Double Crossover	1	EA	\$2,532,038.08	2,532,038
<u>DETAILS</u>				
Install #8 Turnout	4	EA	\$440,043.95	1,760,176
Switch machine Box Frame and Lid	16	EA	\$2,482.27	39,716
Switch Housing, 2 per switch	32	EA	\$12,411.34	397,163
Insulated Rail Joint, 20 FT 115 RE - Turnout	32	EA	\$2,862.88	91,612
Insulated Joints - Turnout	32	EA	\$6.25	200
Field Welds (Includes Rail Grinding) - Turnout	64	EA	\$177.47	11,358
Elastomer Grout, Insulate rail boot to bath tub termination, place material by pump and pressurize	169	C.F.	\$230.59	39,079
Misc. Material, Equipment and Sundries - Turnout	1	LS	\$192,734.45	192,734
Install Embedment Double Crossover	1	EA	\$1,098,699.39	1,098,699
<u>DETAILS</u>				
Traction Power/Signal Connection Boxes	64	EA	\$3,206.61	205,223

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T.O. Bathtub, Structural concrete, in place, slab on grade (3500 psi), over 10000 S.F., 6" thick, includes concrete (Portland cement Type I), placing and finishing, excludes forms and reinforcing	3,981	S.F.	\$10.08	40,116
T.O. C.I.P. concrete forms, bathtub slab on grade , edge, wood, over 12", 4 use, includes erecting, bracing, stripping and cleaning	1,239	SFCA	\$6.80	8,424
T.O. Reinforcing steel, in place, elevated slabs, #4 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	5	Ton	\$2,267.96	10,659
T.O. Epoxy coating, for reinforcing steel, add to plain steel rebar pricing for epoxy-coated rebar	5	Ton	\$1,860.48	8,744
T.O. High chair, for reinforcing steel, continuous (CHC), stainless tipped legs, 4" high, legs 8" OC, includes material only	512	C.L.F.	\$1,125.29	575,588
T.O. Bag ties, for reinforcing steel, plain steel, 16 ga., 4" long, includes material only	68	C	\$1.79	122
T.O. Track Slab, Structural concrete, in place, slab on grade (3500 psi), over 10000 S.F., 9" thick, includes concrete (Portland cement Type I), placing and finishing, excludes forms and reinforcing	13,405	S.F.	\$10.08	135,078
T.O. Second Pour, Structural concrete, in place, slab on grade (3500 psi), over 10000 S.F., 6.625" thick, includes concrete (Portland cement Type I), placing and finishing, Incl. 4 mil sheeting, excludes forms and reinforcing	8,607	S.F.	\$6.91	59,472
Norm First Pour, Elastomer Grout, Surface repairs using form-and-pour techniques (ACI RAP-5), place repair material by pump and pressurize	4	C.F.	\$230.59	835
Norm Second Pour Elastomer Grout, Surface repairs using form-and-pour techniques (ACI RAP-5), place repair material by pump and pressurize	10	C.F.	\$230.47	2,196
Electrical underground ducts and manholes, PVC, with DB coupling, schedule 80, 4" diameter, installed by direct burial in slab or duct bank, excludes excavation, backfill and cast in place concrete	690	L.F.	\$33.93	23,411
Electrical underground ducts and manholes, bell end and plug, PVC, schedule 80, 4" diameter, installed by direct burial in slab or duct bank, excludes excavation, backfill and cast in place concrete	64	Ea.	\$73.99	4,735
Electrical underground ducts and manholes, 90° elbows, PVC, schedule 80, 4" diameter, installed by direct burial in slab or duct bank, excludes excavation, backfill and cast in place concrete	64	Ea.	\$115.16	7,370
Electrical underground ducts and manholes, 45° elbows, PVC, schedule 80, 4" diameter, installed by direct burial in slab or duct bank, excludes excavation, backfill and cast in place concrete	128	Ea.	\$115.16	14,740
Electrical underground ducts and manholes, base spacer, PVC, schedule 80, 4" diameter, installed by direct burial in slab or duct bank, excludes excavation, backfill and cast in place concrete	104	Ea.	\$19.07	1,984

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40 Sitework & Special Conditions	1	LS	\$4,936,587.48	4,936,587
40.02 Site Utilities, Utility Relocation	1,220	RFT	\$670.86	818,450
DETAILS				
Utility Relocation - Allowance	1,220	RFT	\$670.86	818,450
40.07 Automobile, bus, van accessways including roads, parking lots	1	LS	\$4,118,137.51	4,118,138
Traffic Control	1	LS	\$740,435.77	740,436
DETAILS				
Movement of Traffic (MOT) - Low, Allowance 5% of Guideway Cost (SCC 10)	0	PCT	\$14,808,715.38	740,436
Modification to Existing Intersections	1	LS	\$2,744,429.85	2,744,430
DETAILS				
Modifications to existing road crossing and Intersections, Moderate, - Allowance	1	EA	\$914,809.95	914,810
Modifications to existing road crossing and Intersections, High, - Allowance	1	EA	\$1,829,619.90	1,829,620
Lane Replacement	11,200	SF	\$30.98	346,985
Full Depth Pavement Replacement - Asphalt	11,200	SF	\$11.96	133,912
DETAILS				
Selective demolition, saw cutting, asphalt, up to 3" deep	933	L.F.	\$2.01	1,880
Selective demolition, saw cutting, each additional inch of depth over 3"	2,800	L.F.	\$1.17	3,263
Demolish, remove pavement & curb, remove bituminous pavement, 4" to 6" thick, excludes hauling and disposal fees	1,244	S.Y.	\$8.49	10,567

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LEVEL DESCRIPTION	QTY	U/M	UNIT PRICE	TOTAL
Haul Demolished Debris	311	L.C.Y.	\$13.57	4,222
Fine grading, grade subgrade for base course, roadways	1,244	S.Y.	\$0.79	979
Compaction, riding, vibrating roller, 4 passes, 6" lifts	415	B.C.Y.	\$0.60	250
Compaction, water for, 3,000 gallon truck, 3 mile haul	415	B.C.Y.	\$3.24	1,344
Base course drainage layers, aggregate base course for roadways and large paved areas, stone base, compacted, 3/4" stone base, to 12" deep	1,244	S.Y.	\$23.61	29,382
Haul Base Course Material	539	L.C.Y.	\$13.57	7,320
Plant-mix asphalt paving, pre-treatment for paving, prime coat, emulsion, 0.30 gallons/S.Y., 1000 S.Y.	1,244	S.Y.	\$5.12	6,371
Plant-mix asphalt paving, for highways and large paved areas, binder course, 4" thick, no hauling included	1,244	S.Y.	\$31.13	38,738
Plant-mix asphalt paving, pre-treatment for paving, tack coat, emulsion, 0.10 gallons/S.Y., 1000 S.Y.	1,244	S.Y.	\$2.32	2,890
Plant-mix asphalt paving, for highways and large paved areas, wearing course, 2" thick, no hauling included	1,244	S.Y.	\$17.79	22,135
Haul Paving Material	311	L.C.Y.	\$13.57	4,222
Painted pavement markings, acrylic waterborne, white or yellow, 4" wide, 3,000-16,000 LF	933	L.F.	\$0.37	349
Curb and Gutter	1,500	LF	\$38.68	58,017
DETAILS				
Demolish, remove pavement & curb and gutter, excludes hauling and disposal fees	1,500	L.F.	\$4.56	6,839
Haul Demolished Debris	194	L.C.Y.	\$13.57	2,639
Fine grading, grade subgrade for base course, roadways	417	S.Y.	\$0.79	328
Compaction, riding, vibrating roller, 4 passes, 6" lifts	139	B.C.Y.	\$0.60	84
Compaction, water for, 3,000 gallon truck, 3 mile haul	139	B.C.Y.	\$3.24	450
Base course drainage layers, aggregate base course for roadways and large paved areas, stone base, compacted, 3/4" stone base, to 12" deep	417	S.Y.	\$23.61	9,838
Haul Base Course Material	181	L.C.Y.	\$13.57	2,451
Cast-in place concrete curbs & gutters, radius, machine formed, 6" high curb, 6" thick gutter, 30" wide, includes concrete	1,500	L.F.	\$23.59	35,388
Curb Inlet/Storm Drain	6	EA	\$11,270.00	67,620
DETAILS				

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Selective demolition, manholes & catch basins, manhole or catch basin, precast or brick, over 8' deep, excludes excavation	36	V.L.F.	\$136.79	4,924
Haul Demolished Debris	36	L.C.Y.	\$13.57	489
New Curb Inlet/Storm Drain	6	EA	\$4,878.99	29,274
Extend Laterals including excavation - Assume 18" RCP	120	LF	\$182.96	21,955
Connect To Existing	6	EA	\$1,829.62	10,978
Sidewalk	1,500	LF	\$58.29	87,436
DETAILS				
Demolish, remove pavement & curb, remove concrete, mesh reinforced, to 6" thick, hand held equipment, excludes hauling and disposal fees	9,000	S.F.	\$1.34	12,089
Haul Demolished Debris	250	L.C.Y.	\$13.57	3,393
Fine grading, grade subgrade for base course, roadways	1,000	S.Y.	\$0.79	787
Compaction, riding, vibrating roller, 4 passes, 6" lifts	333	B.C.Y.	\$0.60	201
Compaction, water for, 3,000 gallon truck, 3 mile haul	333	B.C.Y.	\$3.24	1,081
Base course drainage layers, aggregate base course for roadways and large paved areas, compacted, 3" deep, crushed 3/4" stone base	1,000	S.Y.	\$6.83	6,826
Haul Base Course Material	108	L.C.Y.	\$13.57	1,469
Sidewalks, driveways, and patios, sidewalk, concrete, cast-in-place with 6 x 6 - W1.4 x W1.4 mesh, broomed finish, 3,000 psi, 4" thick, excludes base	9,000	S.F.	\$6.84	61,591
Mill and Overlay Existing Pavement	79,200	SF	\$3.61	286,287
DETAILS				
Cold milling asphalt paving, asphalt pavement, 1" to 3" deep, removal from concrete base, rip, load and sweep, excludes hauling	8,800	S.Y.	\$0.78	6,907
Haul Demolished Debris	953	L.C.Y.	\$13.57	12,936
Plant-mix asphalt paving, pre-treatment for paving, tack coat, emulsion, 0.10 gallons/S.Y., 1000 S.Y.	8,800	S.Y.	\$2.32	20,440
Plant-mix asphalt paving, for highways and large paved areas, wearing course, 3" thick, no hauling included	8,800	S.Y.	\$25.98	228,604
Haul Paving Material	1,100	L.C.Y.	\$13.57	14,934
Painted pavement markings, acrylic waterborne, white or yellow, 4" wide, 3,000-16,000 LF	6,600	L.F.	\$0.37	2,466
50 Systems	2,785	TF	\$1,766.29	4,919,112

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50.01 Train Control and Signals	2,785	TF	\$490.09	1,364,895
DETAILS				
CIH - Interlocking/Intermediate	1	EA	\$248,937.94	216,576
3/4" x 8' lg - copper alloy	3	EA	\$658.65	2,299
Ground wire, bare solid copper, #6	52	FT	\$1.99	104
Mech Conn to Case	3	EA	\$85.47	298
Exothermic Conn to Rod	3	EA	\$240.24	838
Test Well for Ground	1	EA	\$153.19	133
Batteries 240 AH	5	EA	\$547.34	2,863
Foundations	3	EA	\$16,746.79	58,446
2-1/c#6 TW PR Track Circuit	974	LF	\$290.23	282,585
#6 RHW Stranded wire	70	LF	\$45.03	3,141
CHICKEN HEAD - PIN BOND	12	EA	\$42.77	497
SLEEVE SPLICE NICOPRESS	12	EA	\$18.73	218
CADWELD TRACK CONNECTION	12	EA	\$115.56	1,344
Track drill & bits	1	ea	\$248.78	289
Signal head, Number Plate, Mast & Base	2	EA	\$10,931.83	22,192
Structural Steel Support - Fabricated	2	EA	\$6,951.31	14,111
5c#9 Signal Lamp Cable	785	LF	\$452.64	355,213
Electric Switch Machine - M3	1	EA	\$55,267.94	80,139
Electric Switch Rod Set - G&W	1	EA	\$36,477.86	52,893
2C#4 - Switch machine	174	LF	\$297.21	51,830
8C#10 - Switch machine	174	LF	\$302.49	52,751
Switch Heat Cabinet & Control Panel	1	EA	\$7,466.27	4,330
Track Switch Heater / Crib heater & Cal Rod	3	EA	\$6,570.78	19,121
Junction Box	3	EA	\$816.27	2,375
2C#4 - Switch heat	161	LF	\$297.21	47,943
8C#10 - Switch heat	174	LF	\$302.49	52,751
Head Bonds #6	5	EA	\$18.38	85
Head Bonds 250	5	EA	\$25.83	120
LRT Bar Signals, incl. foundation	1	EA	\$30,672.94	35,581
Control switches, push button, maintained contact, button 6 V #12 lamp, w/double block 2NO 2NC w/guard, 600 V 10 A	1	Ea.	\$314.90	365
misc. mat. - allow	3	EA	\$992.28	3,463

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LEVEL DESCRIPTION	QTY	U/M	UNIT PRICE	TOTAL
50.02 Traffic Signals and Crossing Protection - Semi Exclusive ROW	1	EA	\$597,855.18	597,855
Crossing Protection - Semi Exclusive ROW	1	EA	\$109,956.54	109,957
DETAILS				
LRT Bar Signals, incl. foundation	2	EA	\$30,604.44	61,209
9c#9 signal lighting cable	250	LF	\$16.31	4,077
Rail Traffic Loop Detection System, Feeds Traffic Signal Controller	1	EA	\$44,670.62	44,671
Traffic Signals	1	EA	\$487,898.64	487,899
DETAILS				
Traffic signals, single direction allowance - engineering, materials, installation, and testing	1	EA	\$487,898.64	487,899
50.03 Traction Power Supply: Substation	2,785	TF	\$177.62	494,679
Traction Power Distribution	2,785	TF	\$177.62	494,679
DETAILS				
Substation Power Cubicle - Assume 10,375 TF spacing	0	EA	\$664,438.67	186,043
Impedance Bond (4) each location per track: Assume 10,375' spacing	1	EA	\$29,609.07	33,162
Medium-cable single cable, copper, negative return, 350 kcmil, in conduit, exclsplicing & terminations	5	C.L.F.	\$2,667.35	13,203
Medium-cable single cable, copper, positive feeders, 500 kcmil, in conduit, excl splicing & terminations	12	C.L.F.	\$3,088.54	36,445
Cable terminations, insulation diameter range, 350 KCMIL & 500 KCMIL	48	EA	\$598.76	28,944
PIN CONN - CABLE TO RAIL (8 required per location)	2	EA	\$199.89	450
Signal and Traction Power Boxes	2	EA	\$3,516.66	7,912
Elastomer Grout, transition at signal and traction box, place material by pump and pressurize	5	C.F.	\$230.73	1,167
Disconnecting switches, single pole switches, 13 to 26 kV	1	EA	\$6,917.99	5,811

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Enclosure panels, 84" x 46", NEMA 12 & 4	1	EA	\$29,202.00	24,530
Structural concrete, in place, equipment pad (3000 psi), 8' x 8' x 10", includes forms(4 uses), Grade 60 rebar, concrete (Portland cement Type I), placing and finishing	0	EA	\$958.91	268
Electrical underground ducts and manholes, PVC, with DB coupling, schedule 80, 4" diameter, installed by direct burial in slab or duct bank, excludes excavation, backfill and cast in place concrete	4,407	L.F.	\$33.93	149,521
Electrical underground ducts and manholes, bell end and plug, PVC, schedule 80, 4" diameter, installed by direct burial in slab or duct bank, excludes excavation, backfill and cast in place concrete	16	EA	\$73.98	1,164
Electrical underground ducts and manholes, 90° elbows, PVC, schedule 80, 4" diameter, installed by direct burial in slab or duct bank, excludes excavation, backfill and cast in place concrete	11	EA	\$115.18	1,295
Electrical underground ducts and manholes, 45° elbows, PVC, schedule 80, 4" diameter, installed by direct burial in slab or duct bank, excludes excavation, backfill and cast in place concrete	2	EA	\$115.14	259
Electrical underground ducts and manholes, base spacer, PVC, schedule 80, 4" diameter, installed by direct burial in slab or duct bank, excludes excavation, backfill and cast in place concrete	236	EA	\$19.07	4,503
50.04 Traction power distribution: Catenary and third rail	1,220	RFT	\$1,907.98	2,327,734
Foundations	1,220	RFT	\$144.19	175,913
DETAILS				
Fixed end caisson piles, for mobilization, 50 mile radius	0	Ea.	\$2,437.94	585
Fixed end caisson piles, open style in stable ground, to 10' deep, 36" diameter, Casing left in place	124	V.L.F.	\$32.87	4,079
Reinforcing steel, in place, #3 to #7, A615, grade 60 - #4 Ties	17,745	Lb.	\$3.31	58,731
Reinforcing steel, in place, #8 to #18, A615, grade 60 - #9 Vertical Bars	1	Ton	\$4,487.77	3,141
Structural concrete, ready mix, heavyweight, 4000 psi, includes local aggregate, sand, Portland cement (Type I) and water, delivered, excludes all additives and treatments	4	Ton	\$3,742.11	14,220
Structural concrete, placing, pumped, over 5 C.Y., includes leveling (strike off) & consolidation, excludes material	89	C.Y.	\$268.09	23,809
Cut Casing	89	C.Y.	\$23.52	2,089
	12	EA	\$1,643.41	20,395

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LEVEL DESCRIPTION	QTY	U/M	UNIT PRICE	TOTAL
Load Surplus	101	L.C.Y.	\$2.50	254
Haul Surplus Materials Off Site	101	L.C.Y.	\$18.13	1,840
Embedment Plate Assembly	932	LBS	\$4.14	3,855
Anchor Bolt Template	1,794	LBS	\$4.14	7,420
Anchor Bolt - 2" x 8'-0" Long	99	EA	\$124.12	12,321
Hex Nuts	496	EA	\$16.55	8,214
Plate Washers	199	EA	\$4.14	821
Standard Washers	199	EA	\$4.14	821
Set Foundation Imbeds, Plates, Template, Bolts, etc.	12	Sets	\$549.88	6,824
Grounding Assembly, cable, clamps, Lugs - Allow	12	Sets	\$248.21	3,080
Set Grounding Assembly	12	Sets	\$274.94	3,412
Catenary Structures	1,220	RFT	\$1,205.34	1,470,516
DETAILS				
Electrical utility pole, catenary, galvanized steel, round, 25	12	EA	\$57,916.11	718,739
Cantilever Assemblies	25	EA	\$2,482.12	61,606
Other Misc. Assemblies	25	EA	\$3,971.39	98,570
Pre-assembly Cantilever Assemblies	25	EA	\$11,917.82	295,800
Erect Catenary Frames (Pole + Assemblies.)	12	EA	\$23,835.64	295,800
OCS O/H Conductors	1,220	RFT	\$330.08	402,700
DETAILS				
Overhead line conductors & devices, per wire,500 kcmil, messenger wire	0	Mile	\$41,237.13	18,969
Overhead line conductors & devices, per wire, 350 kcmil grooved, contact wire	0	Mile	\$41,237.13	18,969
1" 37 STRAND GALV. E.H.S - GUY WIRE	0	Mile	\$9,978.83	4,590
Overhead line conductors & devices, protective devices, allow 6 per span per track	146	Ea.	\$2,120.84	309,621
Flexible Hangar Assy, Multiple, assume 100' span typical, average 8 ea.@ 1.6' =12.76' hanger per 100' Span, one track	195	Ea.	\$144.30	28,087
Continuity Jumper allow 50 spans @ 4 per span per track	97	EA	\$230.80	22,464
Rail Equipment	0	LS	\$1,160,853.95	278,605
DETAILS				
Flatcar (2)	6	Months	\$29,785.43	173,947

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LEVEL DESCRIPTION	QTY	U/M	UNIT PRICE	TOTAL
High Rail Crane - 22 Tons (2)	6	Months	\$17,920.90	104,658
50.05 Communications	1,220	RFT	\$109.79	133,949
DETAILS				
Electrical underground ducts and manholes, PVC, with DB coupling, schedule 80, 1-1/2" diameter, installed by direct burial in slab or duct bank, excludes excavation, backfill and cast in place concrete	4,873	L.F.	\$9.06	44,146
Electrical underground ducts and manholes, bell end and cap, PVC, schedule 80, 1-1/2" diameter, installed by direct burial in slab or duct bank, excludes excavation, backfill and cast in place concrete	8	Ea.	\$38.83	293
Electrical underground ducts and manholes, elbows, PVC, schedule 80, 1-1/2" diameter, installed by direct burial in slab or duct bank, excludes excavation, backfill and cast in place concrete	8	Ea.	\$44.31	334
Electrical underground ducts and manholes, PVC, with DB coupling, schedule 80, 2" diameter, installed by direct burial in slab or duct bank, excludes excavation, backfill and cast in place concrete	755	L.F.	\$11.56	8,724
Electrical underground ducts and manholes, elbows, PVC, schedule 80, 2" diameter, installed by direct burial in slab or duct bank, excludes excavation, backfill and cast in place concrete	15	Ea.	\$58.95	890
Electrical underground ducts and manholes, bell end and plug, PVC, schedule 80, 2" diameter, installed by direct burial in slab or duct bank, excludes excavation, backfill and cast in place concrete	15	Ea.	\$45.46	686
Electrical underground ducts and manholes, base spacer, PVC, schedule 80, 2" diameter, installed by direct burial in slab or duct bank, excludes excavation, backfill and cast in place concrete	1,218	Ea.	\$18.28	22,270
Fiber optic cable, 24 strand, single mode, indoor/outdoor	3	M.L.F.	\$7,131.43	21,466
Fiber optic patch panel, 24 ports, stations, crossings, intersections, interlockings, TPSS, interlockings, headquarters building	3	Ea.	\$816.17	2,481
Fiber optic patch panel, 24 ports, stations, crossings, intersections, interlockings, headquarters building	3	Ea.	\$156.64	478
Fiber optic cable, 48 strand, single mode, indoor/outdoor	3	M.L.F.	\$7,142.01	18,426
Fiber optic patch panel, 48 ports, stations, headquarters building	1	Ea.	\$815.05	595
Fiber optic patch panel, 48 ports, stations, headquarters building	1	Ea.	\$187.89	137
Fiber optics cable enclosure, splice w/enclosure encapsulant	4	Ea.	\$619.18	2,334
Switching and routing equipment, network switch, 10/100/1000 Mbps, 8 port, industrial ethernet type	4	Ea.	\$2,835.56	10,690

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LEVEL DESCRIPTION	QTY	U/M	UNIT PRICE	TOTAL
DGR Dark Green Segment	2,778	RFT	\$17,434.87	48,434,072
10 Guideway & Track Elements	2,778	RF	\$8,065.42	22,405,750
Embedded Section	2,778	RF	\$755.53	2,098,868
Remove Pavement - Embedded Guideway Width = 28'-0"	2,778	RF	\$85.05	236,269
DETAILS				
Selective demolition, saw cutting, asphalt, up to 3" deep	5,556	L.F.	\$2.01	11,190
Selective demolition, saw cutting, each additional inch of depth over 3"	16,668	L.F.	\$1.17	19,424
Demolish, remove pavement & curb, remove bituminous pavement, 4" to 6" thick, excludes hauling and disposal fees	8,643	S.Y.	\$8.49	73,390
Loading, 4 C.Y. bucket, front end loader, wheel-mounted	6,308	L.C.Y.	\$1.27	8,030
Cycle hauling(wait, load, travel, unload or dump & return) time per cycle, excavated or borrow, loose cubic yards, 30 min load/wait/unload, 20 C.Y. truck, cycle 30 miles, 35 MPH, excludes loading equipment	6,308	L.C.Y.	\$13.57	85,615
Selective demolition, dump charges, typical urban city, building construction materials, includes tipping fees only	315	Ton	\$122.46	38,620
Earthwork - Embedded	4,321	BCY	\$10.94	47,295
DETAILS				
Excavating, bulk, dozer, open site, bank measure, common earth, 80 HP dozer, 150' haul	4,321	B.C.Y.	\$7.91	34,176
Fine grading, large area, 6,000 S.Y. or more	8,643	S.Y.	\$1.26	10,875
Compaction, 4 passes, 12" lifts, riding, sheepsfoot or wobbly wheel roller	2,881	B.C.Y.	\$0.78	2,244
Drainage - Embedded	2,778	RF	\$389.99	1,083,398
DETAILS				
18" Dia. (average) Trunk Drain Lines including Excavation	2,778	FT	\$182.96	508,268

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LEVEL DESCRIPTION	QTY	U/M	UNIT PRICE	TOTAL
Drainage Structures	55	EA	\$6,099.00	338,311
8" PVC Laterals	1,109	FT	\$30.49	33,831
Track Drain	111	EA	\$1,829.70	202,987
Guideway - Paved	2,778	RF	\$263.47	731,907
DETAILS				
Barrier Curb	5,556	LF	\$21.96	121,984
Slab on Grade - Reinforced, 18" Thick	33,336	SF	\$18.30	609,922
Trackwork	1	LS	\$20,306,881.15	20,306,881
Install Track	6,287	TF	\$543.00	3,413,863
Install Embedded Track (Concrete)	6,287	TF	\$543.00	3,413,863
Construct Track Slab	6,287	TF	\$302.19	1,899,871
DETAILS				
C.I.P. concrete forms, slab on grade, edge, wood, over 12", 4 use, includes erecting, bracing, stripping and cleaning	33,950	SFCA	\$6.80	230,837
Reinforcing steel, in place, slab on grade, #3 to #7, A615, grade 60, incl labor for accessories, excl material for accessories, #4, Longitudinal	15	Ton	\$3,743.63	55,031
Reinforcing steel, in place, slab on grade, #3 to #7, A615, grade 60, incl labor for accessories, excl material for accessories, #5, Hoop and Transverse	54	Ton	\$3,743.60	203,764
Epoxy coating, for reinforcing steel, add to plain steel rebar pricing for epoxy-coated rebar	69	Ton	\$1,861.83	128,690
High chair, for reinforcing steel, continuous (CHC), stainless tipped legs, 4" high, legs 8" OC, includes material only	660	C.L.F.	\$1,125.30	742,847
Bag ties, for reinforcing steel, plain steel, 16 ga., 4" long, includes material only	1,018	C	\$1.79	1,820

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Structural concrete, ready mix, heavyweight, 5000 psi, includes local aggregate, sand, Portland cement (Type I) and water, delivered, excludes all additives and treatments	1,673	C.Y.	\$282.98	473,325
Structural concrete, placing, slab on grade, pumped, over 6" thick, includes leveling (strike off) & consolidation, excludes material	1,673	C.Y.	\$19.06	31,879
Expansion joint, polyethylene foam, 1" x 12"	838	L.F.	\$14.13	11,847
Dowel sleeve base, plastic, for 1" smooth dowel, fasten to edge form	419	Ea.	\$7.74	3,246
Reinforcing steel, in place, dowels, smooth, 24" long, 1" diameter, A36, galvanized	419	Ea.	\$39.57	16,585
Install Embedded Track (Concrete)	6,287	TF	\$240.81	1,513,992
DETAILS				
Running Rail, 115RE 115lb/yd 2 rails per TF (100 TF = 200 LF)	121	TON	\$3,680.40	443,488
Stockpile and Distribute welded Rail	12,574	LF	\$3.57	44,941
Weld 80' Stick Rail to 1,200 FT strings	6,287	TF	\$3.19	20,078
Steel Leveling Tie, 115RE, with 2 leveling legs (1 per 10' on Tangent and 1per 5' in curves) 4,320	629	EA	\$153.09	96,248
Clips (4 Ea. per Tie)	2,515	EA	\$5.92	14,899
Railboot, 115RE, Includes Cuffs and Tape	12,574	LF	\$17.41	218,942
Insulated Rail Joint, 20 FT 115 RE	8	EA	\$2,862.97	23,076
Construct Embedded Track - (Includes Destressing)	6,287	TF	\$15.62	98,174
Field Welds (Includes Rail Grinding)	5	EA	\$456.17	2,390
Insulated Joints	8	EA	\$6.25	50
Field Welds (Includes Rail Grinding)	16	EA	\$177.47	2,861
Misc. Material, Equipment and Sundries	2	LS	\$48,826.92	98,630
Reinforcing steel, in place, slab on grade, #3 to #7, A615, grade 60, incl labor for accessories, excl material for accessories, #4, Longitudinal	17	Ton	\$3,742.91	62,918
Epoxy coating, for reinforcing steel, add to plain steel rebar pricing for epoxy-coated rebar	17	Ton	\$1,861.22	31,287
Bag ties, for reinforcing steel, plain steel, 16 ga., 4" long, includes material only	8	C	\$1.79	15
Structural concrete, ready mix, heavyweight, 5000 psi, includes local aggregate, sand, Portland cement (Type I) and water, delivered, excludes all additives and treatments	1,122	C.Y.	\$282.98	317,379
Structural concrete, placing, slab on grade, pumped, over 6" thick, includes leveling (strike off) & consolidation, excludes material	1,122	C.Y.	\$19.06	21,376
Expansion joint, polyethylene foam, 1" x 6"	838	L.F.	\$14.13	11,847
Expansion joint, rubberized asphalt, fuel resistant, 1" x 2", hot applied	838	L.F.	\$6.43	5,393

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Estimator: B. Frazier, M. Jackson
Checked By: M. Jackson
Charge #:
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LEVEL DESCRIPTION	QTY	U/M	UNIT PRICE	TOTAL
Special Trackwork	1	LS	\$16,893,018.14	16,893,018
Install Full Grand Union	1	LS	\$13,262,280.67	13,262,281
Install Special Trackwork Grand Union	1	LS	\$10,887,683.83	10,887,684
<u>DETAILS</u>				
Install #10 Turnout	8	EA	\$605,528.50	4,844,228
Install #8 Turnout	8	EA	\$440,043.95	3,520,352
Install Diamond Crossover	16	EA	\$96,672.16	1,546,755
Insulated Rail Joint, 20 FT 115 RE - Turnout	16	EA	\$2,862.88	45,806
Insulated Joints - Turnout	16	EA	\$6.25	100
Field Welds (Includes Rail Grinding) - Turnout	32	EA	\$177.47	5,679
Switch machine Box Frame and Lid	16	EA	\$2,482.27	39,716
Switch Housing, 2 per switch	32	EA	\$12,411.34	397,163
Elastomer Grout, under ties using form-and-pour techniques (ACI RAP-5), place repair material by pump and pressurize	1,280	C.F.	\$230.59	295,151
Misc. Material, Equipment and Sundries	1	LS	\$192,734.45	192,734
Install Embedment	1	LS	\$2,374,596.84	2,374,597
<u>DETAILS</u>				
Construct Embedded Track - Closure and Cross Tracks Dressing)	1,780	TF	\$15.62	27,795
Running Rail, 115RE 115lb/yd) 2 rails per TF (100 TF = 200 LF)	68	TON	\$3,680.56	251,124
Stockpile and Distribute welded Rail	3,560	LF	\$3.57	12,724
Weld 80' Stick Rail to 1,200 FT strings	1,780	TF	\$3.19	5,685
Insulated Rail Joint, 20 FT 115 RE	30	EA	\$2,862.88	85,886
Insulated Joints	30	EA	\$6.25	187
Field Welds (Includes Rail Grinding)	60	EA	\$177.47	10,648
Traction Power/Signal Connection Boxes	60	EA	\$3,206.61	192,397



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Electrical underground ducts and manholes, PVC, with DB coupling, schedule 80, 4" diameter, installed by direct burial in slab or duct bank, excludes excavation, backfill and cast in place concrete	14,280	L.F.	\$33.93	484,514
Electrical underground ducts and manholes, bell end and plug, PVC, schedule 80, 4" diameter, installed by direct burial in slab or duct bank, excludes excavation, backfill and cast in place concrete	160	Ea.	\$73.99	11,838
Electrical underground ducts and manholes, 90° elbows, PVC, schedule 80, 4" diameter, installed by direct burial in slab or duct bank, excludes excavation, backfill and cast in place concrete	92	Ea.	\$115.16	10,595
Electrical underground ducts and manholes, 45° elbows, PVC, schedule 80, 4" diameter, installed by direct burial in slab or duct bank, excludes excavation, backfill and cast in place concrete	92	Ea.	\$115.16	10,595
Electrical underground ducts and manholes, base spacer, PVC, schedule 80, 4" diameter, installed by direct burial in slab or duct bank, excludes excavation, backfill and cast in place concrete	298	Ea.	\$19.07	5,675
Norm C.I.P. concrete forms, slab on grade, edge, wood, over 12", 4 use, includes erecting, bracing, stripping and cleaning	534	SFCA	\$6.80	3,631
Norm Reinforcing steel, in place, elevated slabs, #4 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	20	Ton	\$2,269.45	44,413
Norm Epoxy coating, for reinforcing steel, add to plain steel rebar pricing for epoxy-coated rebar	20	Ton	\$1,861.70	36,433
Norm High chair, for reinforcing steel, continuous (CHC), stainless tipped legs, 4" high, legs 8" OC, includes material only	187	C.L.F.	\$1,125.29	210,318
Norm Bag ties, for reinforcing steel, plain steel, 16 ga., 4" long, includes material only	288	C	\$1.79	515
Norm Track Slab, Structural concrete, in place, slab on grade (3500 psi), over 10000 S.F., 10.775" thick, includes concrete (Portland cement Type I), placing and finishing, excludes forms and reinforcing	14,240	S.F.	\$10.08	143,493
Norm Second Pour, Structural concrete, in place, slab on grade (3500 psi), over 10000 S.F., 7.225" thick, includes concrete (Portland cement Type I), placing and finishing, Incl. 4 mil sheeting, excludes forms and reinforcing	14,240	S.F.	\$6.91	98,400
Norm First Pour, Elastomer Grout, Surface repairs using form-and-pour techniques (ACI RAP-5), place repair material by pump and pressurize	38	C.F.	\$230.59	8,686
Norm Second Pour Elastomer Grout, Surface repairs using form-and-pour techniques (ACI RAP-5), place repair material by pump and pressurize	61	C.F.	\$230.59	14,087
G.U. Bathtub, Structural concrete, in place, slab on grade (3500 psi), over 10000 S.F., 6" thick, includes concrete (Portland cement Type I), placing and finishing, excludes forms and reinforcing	14,546	S.F.	\$10.08	146,577
G.U. C.I.P. concrete forms, bathtub slab on grade, edge, wood, over 12", 4 use, includes erecting, bracing, stripping and cleaning	4,694	SFCA	\$6.80	31,916

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G.U. Reinforcing steel, in place, elevated slabs, #4 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	20	Ton	\$2,269.45	44,413
G.U. Epoxy coating, for reinforcing steel, add to plain steel rebar pricing for epoxy-coated rebar	20	Ton	\$1,861.70	36,433
G.U. High chair, for reinforcing steel, continuous (CHC), stainless tipped legs, 4" high, legs 8" OC, includes material only	187	C.L.F.	\$1,125.29	210,318
G.U. Bag ties, for reinforcing steel, plain steel, 16 ga., 4" long, includes material only	288	C	\$1.79	515
G.U. Track Slab, Structural concrete, in place, slab on grade (3500 psi), over 10000 S.F., 10.775" thick, includes concrete (Portland cement Type I), placing and finishing, excludes forms and reinforcing	12,536	S.F.	\$10.08	126,322
G.U. Second Pour, Structural concrete, in place, slab on grade (3500 psi), over 10000 S.F., 7.225" thick, includes concrete (Portland cement Type I), placing and finishing, Incl. 4 mil sheeting, excludes forms and reinforcing	8,613	S.F.	\$6.91	59,517
Misc. Material, Equipment and Sundries	1	LS	\$48,946.52	48,947
Install Double Crossover (Desired)*	1	EA	\$3,630,737.48	3,630,737
Install Turnouts for Double Crossover	1	EA	\$2,532,038.08	2,532,038
<u>DETAILS</u>				
Install #8 Turnout	4	EA	\$440,043.95	1,760,176
Switch machine Box Frame and Lid	16	EA	\$2,482.27	39,716
Switch Housing, 2 per switch	32	EA	\$12,411.34	397,163
Insulated Rail Joint, 20 FT 115 RE - Turnout	32	EA	\$2,862.88	91,612
Insulated Joints - Turnout	32	EA	\$6.25	200
Field Welds (Includes Rail Grinding) - Turnout	64	EA	\$177.47	11,358
Elastomer Grout, Insulate rail boot to bath tub termination, place material by pump and pressurize	169	C.F.	\$230.59	39,079
Misc. Material, Equipment and Sundries - Turnout	1	LS	\$192,734.45	192,734
Install Embedment Double Crossover	1	EA	\$1,098,699.39	1,098,699
<u>DETAILS</u>				
Traction Power/Signal Connection Boxes	64	EA	\$3,206.61	205,223

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LEVEL DESCRIPTION	QTY	U/M	UNIT PRICE	TOTAL
T.O. Bathtub, Structural concrete, in place, slab on grade (3500 psi), over 10000 S.F., 6" thick, includes concrete (Portland cement Type I), placing and finishing, excludes forms and reinforcing	3,981	S.F.	\$10.08	40,116
T.O. C.I.P. concrete forms, bathtub slab on grade, edge, wood, over 12", 4 use, includes erecting, bracing, stripping and cleaning	1,239	SFCA	\$6.80	8,424
T.O. Reinforcing steel, in place, elevated slabs, #4 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	5	Ton	\$2,267.96	10,659
T.O. Epoxy coating, for reinforcing steel, add to plain steel rebar pricing for epoxy-coated rebar	5	Ton	\$1,860.48	8,744
T.O. High chair, for reinforcing steel, continuous (CHC), stainless tipped legs, 4" high, legs 8" OC, includes material only	512	C.L.F.	\$1,125.29	575,588
T.O. Bag ties, for reinforcing steel, plain steel, 16 ga., 4" long, includes material only	68	C	\$1.79	122
T.O. Track Slab, Structural concrete, in place, slab on grade (3500 psi), over 10000 S.F., 9" thick, includes concrete (Portland cement Type I), placing and finishing, excludes forms and reinforcing	13,405	S.F.	\$10.08	135,078
T.O. Second Pour, Structural concrete, in place, slab on grade (3500 psi), over 10000 S.F., 6.625" thick, includes concrete (Portland cement Type I), placing and finishing, Incl. 4 mil sheeting, excludes forms and reinforcing	8,607	S.F.	\$6.91	59,472
Norm First Pour, Elastomer Grout, Surface repairs using form-and-pour techniques (ACI RAP-5), place repair material by pump and pressurize	4	C.F.	\$230.59	835
Norm Second Pour Elastomer Grout, Surface repairs using form-and-pour techniques (ACI RAP-5), place repair material by pump and pressurize	10	C.F.	\$230.47	2,196
Electrical underground ducts and manholes, PVC, with DB coupling, schedule 80, 4" diameter, installed by direct burial in slab or duct bank, excludes excavation, backfill and cast in place concrete	690	L.F.	\$33.93	23,411
Electrical underground ducts and manholes, bell end and plug, PVC, schedule 80, 4" diameter, installed by direct burial in slab or duct bank, excludes excavation, backfill and cast in place concrete	64	Ea.	\$73.99	4,735
Electrical underground ducts and manholes, 90° elbows, PVC, schedule 80, 4" diameter, installed by direct burial in slab or duct bank, excludes excavation, backfill and cast in place concrete	64	Ea.	\$115.16	7,370
Electrical underground ducts and manholes, 45° elbows, PVC, schedule 80, 4" diameter, installed by direct burial in slab or duct bank, excludes excavation, backfill and cast in place concrete	128	Ea.	\$115.16	14,740
Electrical underground ducts and manholes, base spacer, PVC, schedule 80, 4" diameter, installed by direct burial in slab or duct bank, excludes excavation, backfill and cast in place concrete	104	Ea.	\$19.07	1,984

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LEVEL DESCRIPTION	QTY	U/M	UNIT PRICE	TOTAL
20 Stations, Stops, Terminals, Intermodal	2	EA	\$1,927,199.63	3,854,399
Station - Grade	2	EA	\$1,927,199.63	3,854,399
DETAILS				
Station - Allow	2	EA	\$1,927,199.63	3,854,399
Fare Collection	(2)	LS	\$182,961.99	(365,924)
Fare Collection	2	LS	\$182,961.99	365,924
40 Sitework & Special Conditions	1	LS	\$9,631,785.82	9,631,786
40.02 Site Utilities, Utility Relocation	2,778	RFT	\$670.86	1,863,651
DETAILS				
Utility Relocation - Allowance	2,778	RFT	\$670.86	1,863,651
40.07 Automobile, bus, van accessways including roads, parking lots	1	LS	\$7,768,134.99	7,768,135
Traffic Control	1	LS	\$1,153,384.40	1,153,384
DETAILS				
Movement of Traffic (MOT) - Low, Allowance 5% of Guideway Cost (SCC 10)	0	PCT	\$23,067,687.92	1,153,384
Modification to Existing Intersections	1	LS	\$4,878,986.40	4,878,986
DETAILS				
Modifications to existing road crossing and Intersections, Low, - Allowance	1	EA	\$304,936.65	304,937
Modifications to existing road crossing and Intersections, Moderate, - Allowance	1	EA	\$914,809.95	914,810
Modifications to existing road crossing and Intersections, High, - Allowance	2	EA	\$1,829,619.90	3,659,240

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LEVEL DESCRIPTION	QTY	U/M	UNIT PRICE	TOTAL
Lane Replacement	46,700	SF	\$22.36	1,044,266
Full Depth Pavement Replacement - Asphalt	46,700	SF	\$11.96	558,366
DETAILS				
Selective demolition, saw cutting, asphalt, up to 3" deep	3,892	L.F.	\$2.01	7,838
Selective demolition, saw cutting, each additional inch of depth over 3"	11,675	L.F.	\$1.17	13,605
Demolish, remove pavement & curb, remove bituminous pavement, 4" to 6" thick, excludes hauling and disposal fees	5,189	S.Y.	\$8.49	44,061
Haul Demolished Debris	1,297	L.C.Y.	\$13.57	17,606
Fine grading, grade subgrade for base course, roadways	5,189	S.Y.	\$0.79	4,080
Compaction, riding, vibrating roller, 4 passes, 6" lifts	1,729	B.C.Y.	\$0.60	1,043
Compaction, water for, 3,000 gallon truck, 3 mile haul	1,729	B.C.Y.	\$3.24	5,604
Base course drainage layers, aggregate base course for roadways and large paved areas, stone base, compacted, 3/4" stone base, to 12" deep	5,189	S.Y.	\$23.61	122,513
Haul Base Course Material	2,249	L.C.Y.	\$13.57	30,521
Plant-mix asphalt paving, pre-treatment for paving, prime coat, emulsion, 0.30 gallons/S.Y., 1000 S.Y.	5,189	S.Y.	\$5.12	26,564
Plant-mix asphalt paving, for highways and large paved areas, binder course, 4" thick, no hauling included	5,189	S.Y.	\$31.13	161,522
Plant-mix asphalt paving, pre-treatment for paving, tack coat, emulsion, 0.10 gallons/S.Y., 1000 S.Y.	5,189	S.Y.	\$2.32	12,052
Plant-mix asphalt paving, for highways and large paved areas, wearing course, 2" thick, no hauling included	5,189	S.Y.	\$17.79	92,296
Haul Paving Material	1,297	L.C.Y.	\$13.57	17,606
Painted pavement markings, acrylic waterborne, white or yellow, 4" wide, 3,000-16,000 LF	3,892	L.F.	\$0.37	1,454
Curb and Gutter	3,500	LF	\$38.68	135,373
DETAILS				
Demolish, remove pavement & curb and gutter, excludes hauling and disposal fees	3,500	L.F.	\$4.56	15,958
Haul Demolished Debris	454	L.C.Y.	\$13.57	6,158
Fine grading, grade subgrade for base course, roadways	972	S.Y.	\$0.79	765

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Compaction, riding, vibrating roller, 4 passes, 6" lifts	324	B.C.Y.	\$0.60	195
Compaction, water for, 3,000 gallon truck, 3 mile haul	324	B.C.Y.	\$3.24	1,050
Base course drainage layers, aggregate base course for roadways and large paved areas, stone base, compacted, 3/4" stone base, to 12" deep	972	S.Y.	\$23.61	22,956
Haul Base Course Material	421	L.C.Y.	\$13.57	5,718
Cast-in place concrete curbs & gutters, radius, machine formed, 6" high curb, 6" thick gutter, 30" wide, includes concrete	3,500	L.F.	\$23.59	82,572
Curb Inlet/Storm Drain	13	EA	\$11,270.00	146,510
DETAILS				
Selective demolition, manholes & catch basins, manhole or catch basin, precast or brick, over 8' deep, excludes excavation	78	V.L.F.	\$136.79	10,669
Haul Demolished Debris	78	L.C.Y.	\$13.57	1,059
New Curb Inlet/Storm Drain	13	EA	\$4,878.99	63,427
Extend Laterals including excavation - Assume 18" RCP	260	LF	\$182.96	47,570
Connect To Existing	13	EA	\$1,829.62	23,785
Sidewalk	3,500	LF	\$58.29	204,017
DETAILS				
Demolish, remove pavement & curb, remove concrete, mesh reinforced, to 6" thick, hand held equipment, excludes hauling and disposal fees	21,000	S.F.	\$1.34	28,207
Haul Demolished Debris	583	L.C.Y.	\$13.57	7,917
Fine grading, grade subgrade for base course, roadways	2,334	S.Y.	\$0.79	1,835
Compaction, riding, vibrating roller, 4 passes, 6" lifts	778	B.C.Y.	\$0.60	469
Compaction, water for, 3,000 gallon truck, 3 mile haul	778	B.C.Y.	\$3.24	2,521
Base course drainage layers, aggregate base course for roadways and large paved areas, compacted, 3" deep, crushed 3/4" stone base	2,334	S.Y.	\$6.83	15,927
Haul Base Course Material	253	L.C.Y.	\$13.57	3,428
Sidewalks, driveways, and patios, sidewalk, concrete, cast-in-place with 6 x 6 - W1.4 x W1.4 mesh, broomed finish, 3,000 psi, 4" thick, excludes base	21,000	S.F.	\$6.84	143,713
Mill and Overlay Existing Pavement	191,300	SF	\$3.61	691,498
DETAILS				

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Cold milling asphalt paving, asphalt pavement, 1" to 3" deep, removal from concrete base, rip, load and sweep, excludes hauling	21,255	S.Y.	\$0.78	16,684
Haul Demolished Debris	2,302	L.C.Y.	\$13.57	31,246
Plant-mix asphalt paving, pre-treatment for paving, tack coat, emulsion, 0.10 gallons/S.Y., 1000 S.Y.	21,255	S.Y.	\$2.32	49,371
Plant-mix asphalt paving, for highways and large paved areas, wearing course, 3" thick, no hauling included	21,255	S.Y.	\$25.98	552,172
Haul Paving Material	2,657	L.C.Y.	\$13.57	36,071
Painted pavement markings, acrylic waterborne, white or yellow, 4" wide, 3,000-16,000 LF	15,942	L.F.	\$0.37	5,956
50 Systems	6,287	TF	\$1,994.93	12,542,137
50.01 Train Control and Signals	6,287	TF	\$490.09	3,081,183
DETAILS				
CIH - Interlocking/Intermediate	2	EA	\$248,177.49	488,910
3/4" x 8' lg - copper alloy	8	EA	\$659.36	5,189
Ground wire, bare solid copper, #6	118	FT	\$1.99	236
Mech Conn to Case	8	EA	\$85.56	673
Exothermic Conn to Rod	8	EA	\$240.50	1,893
Test Well for Ground	2	EA	\$152.72	301
Batteries 240 AH	12	EA	\$547.18	6,462
Foundations	8	EA	\$16,764.88	131,940
2-1/c#6 TW PR Track Circuit	2,198	LF	\$290.23	637,922
#6 RHW Stranded wire	157	LF	\$45.03	7,092
CHICKEN HEAD - PIN BOND	26	EA	\$42.78	1,123
SLEEVE SPLICE NICOPRESS	26	EA	\$18.74	492
CADWELD TRACK CONNECTION	26	EA	\$115.58	3,034
Track drill & bits	3	ea	\$248.66	651
Signal head, Number Plate, Mast & Base	5	EA	\$10,914.27	50,097
Structural Steel Support - Fabricated	5	EA	\$6,940.15	31,855
5c#9 Signal Lamp Cable	1,772	LF	\$452.64	801,875
Electric Switch Machine - M3	3	EA	\$55,155.11	180,909
Electric Switch Rod Set - G&W	3	EA	\$36,403.39	119,403
2C#4 - Switch machine	394	LF	\$297.21	117,004
8C#10 - Switch machine	394	LF	\$302.48	119,082
Switch Heat Cabinet & Control Panel	1	EA	\$7,462.41	9,776

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Track Switch Heater / Crib heater & Cal Rod	7	EA	\$6,579.97	43,165
Junction Box	7	EA	\$817.41	5,362
2C#4 - Switch heat	364	LF	\$297.21	108,229
8C#10 - Switch heat	394	LF	\$302.48	119,082
Head Bonds #6	11	EA	\$18.37	193
Head Bonds 250	11	EA	\$25.82	271
LRT Bar Signals, incl. foundation	3	EA	\$30,657.05	80,321
Control switches, push button, maintained contact, button 6 V #12 lamp, w/double block 2NO 2NC w/guard, 600 V 10 A	3	EA	\$314.73	825
misc. mat. - allow	8	EA	\$993.35	7,818
Traffic Signals and Crossing Protection - At-Grade. exclusive ROW	1	EA	\$945,302.18	945,302
Crossing Protection - At-Grade. exclusive ROW	1	EA	\$457,403.54	457,404
DETAILS				
CIH - Interlocking/Intermediate	1	EA	\$248,381.96	248,382
3/4" x 8' lg - copper alloy	4	EA	\$659.07	2,636
Ground wire, bare solid copper, #6	60	FT	\$1.99	120
Mech Conn to Case	4	EA	\$85.52	342
Exothermic Conn to Rod	4	EA	\$240.40	962
Test Well for Ground	1	EA	\$152.84	153
Batteries 240 AH	12	EA	\$547.16	6,566
Foundations	4	EA	\$5,285.30	21,141
2c#6 TW PR Track Circuit	1,000	LF	\$36.73	36,731
#6 RHW Stranded wire	200	LF	\$35.08	7,015
10c#9 Signal Cable	125	LF	\$56.80	7,101
CHICKEN HEAD - PIN BOND	20	EA	\$37.48	750
SLEEVE SPLICE NICOPRESS	20	EA	\$3.81	76
CADWELD TRACK CONNECTION	20	EA	\$100.67	2,013
Track drill & bits	4	shift	\$249.60	998
Crossing signal mast with 2 flasher pairs, gate mechanism, barrier arm and bell	4	EA	\$30,604.44	122,418

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LEVEL DESCRIPTION	QTY	U/M	UNIT PRICE	TOTAL
Traffic Signals	1	EA	\$487,898.64	487,899
DETAILS				
Traffic signals, single direction allowance - engineering, materials, installation, and testing	1	EA	\$487,898.64	487,899
50.02 Traffic Signals and Crossing Protection - Semi Exclusive ROW	3	EA	\$597,855.19	1,793,566
Crossing Protection - Semi Exclusive ROW	3	EA	\$109,956.55	329,870
DETAILS				
LRT Bar Signals, incl. foundation	6	EA	\$30,604.44	183,627
9c#9 signal lighting cable	750	LF	\$16.31	12,231
Rail Traffic Loop Detection System, Feeds Traffic Signal Controller	3	EA	\$44,670.62	134,012
Traffic Signals	3	EA	\$487,898.64	1,463,696
DETAILS				
Traffic signals, single direction allowance - engineering, materials, installation, and testing	3	EA	\$487,898.64	1,463,696
50.03 Traction Power Supply: Substation	6,287	TF	\$177.62	1,116,713
Traction Power Distribution	6,287	TF	\$177.62	1,116,713
DETAILS				
Substation Power Cubicle - Assume 10,375 TF spacing	1	EA	\$666,638.89	419,983
Impedance Bond (4) each location per track: Assume 10,375' spacing	3	EA	\$29,473.20	74,862
Medium-cable single cable, copper, negative return, 350 kcmil, in conduit, exclsplicing & terminations	11	C.L.F.	\$2,668.39	29,806

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LEVEL DESCRIPTION	QTY	U/M	UNIT PRICE	TOTAL
Medium-cable single cable, copper, positive feeders, 500 kcmil, in conduit, excl splicing & terminations	27	C.L.F.	\$3,088.30	82,272
Cable terminations, insulation diameter range, 350 KCMIL & 500 KCMIL	109	EA	\$598.73	65,339
PIN CONN - CABLE TO RAIL (8 required per location)	5	EA	\$199.87	1,015
Signal and Traction Power Boxes	5	EA	\$3,516.15	17,862
Elastomer Grout, transition at signal and traction box, place material by pump and pressurize	11	C.F.	\$230.58	2,636
Disconnecting switches, single pole switches, 13 to 26 kV	2	EA	\$6,904.37	13,118
Enclosure panels, 84" x 46", NEMA 12 & 4	2	EA	\$29,144.50	55,375
Structural concrete, in place, equipment pad (3000 psi), 8' x 8' x 10", includes forms(4 uses), Grade 60 rebar, concrete (Portland cement Type I), placing and finishing	1	EA	\$947.09	606
Electrical underground ducts and manholes, PVC, with DB coupling, schedule 80, 4" diameter, installed by direct burial in slab or duct bank, excludes excavation, backfill and cast in place concrete	9,948	L.F.	\$33.93	337,537
Electrical underground ducts and manholes, bell end and plug, PVC, schedule 80, 4" diameter, installed by direct burial in slab or duct bank, excludes excavation, backfill and cast in place concrete	36	EA	\$73.99	2,629
Electrical underground ducts and manholes, 90° elbows, PVC, schedule 80, 4" diameter, installed by direct burial in slab or duct bank, excludes excavation, backfill and cast in place concrete	25	EA	\$115.15	2,923
Electrical underground ducts and manholes, 45° elbows, PVC, schedule 80, 4" diameter, installed by direct burial in slab or duct bank, excludes excavation, backfill and cast in place concrete	5	EA	\$115.12	585
Electrical underground ducts and manholes, base spacer, PVC, schedule 80, 4" diameter, installed by direct burial in slab or duct bank, excludes excavation, backfill and cast in place concrete	533	EA	\$19.07	10,166
50.04 Traction power distribution: Catenary and third rail	2,778	RFT	\$1,907.98	5,300,365
Foundations	2,778	RFT	\$144.19	400,562
<u>DETAILS</u>				
Fixed end caisson piles, for mobilization, 50 mile radius	1	Ea.	\$2,422.42	1,332
Fixed end caisson piles, open style in stable ground, to 10' deep, 36" diameter,	283	V.L.F.	\$32.87	9,288
Casing left in place	40,407	Lb.	\$3.31	133,734

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LEVEL DESCRIPTION	QTY	U/M	UNIT PRICE	TOTAL
Reinforcing steel, in place, #3 to #7, A615, grade 60 - #4 Ties	2	Ton	\$4,470.75	7,153
Reinforcing steel, in place, #8 to #18, A615, grade 60 - #9 Vertical Bars	9	Ton	\$3,743.32	32,380
Structural concrete, ready mix, heavyweight, 4000 psi, includes local aggregate, sand, Portland cement (Type I) and water, delivered, excludes all additives and treatments	202	C.Y.	\$268.08	54,214
Structural concrete, placing, pumped, over 5 C.Y., includes leveling (strike off) & consolidation, excludes material	202	C.Y.	\$23.52	4,756
Cut Casing	28	EA	\$1,643.30	46,440
Load Surplus	231	L.C.Y.	\$2.50	578
Haul Surplus Materials Off Site	231	L.C.Y.	\$18.13	4,189
Embedment Plate Assembly	2,122	LBS	\$4.14	8,779
Anchor Bolt Template	4,084	LBS	\$4.14	16,896
Anchor Bolt - 2" x 8'-0" Long	226	EA	\$124.11	28,056
Hex Nuts	1,130	EA	\$16.55	18,704
Plate Washers	452	EA	\$4.14	1,870
Standard Washers	452	EA	\$4.14	1,870
Set Foundation Imbeds, Plates, Template, Bolts, etc.	28	Sets	\$549.85	15,539
Grounding Assembly, cable, clamps, Lugs - Allow	28	Sets	\$248.20	7,014
Set Grounding Assembly	28	Sets	\$274.92	7,769
Catenary Structures	2,778	RFT	\$1,205.34	3,348,436
DETAILS				
Electrical utility pole, catenary, galvanized steel, round, 25	28	EA	\$57,912.38	1,636,604
Cantilever Assemblies	57	EA	\$2,482.40	140,280
Other Misc. Assemblies	57	EA	\$3,971.84	224,449
Pre-assembly Cantilever Assemblies	57	EA	\$11,919.16	673,552
Erect Catenary Frames (Pole + Assemblies.)	28	EA	\$23,834.11	673,552
OCS O/H Conductors	2,778	RFT	\$330.08	916,969
DETAILS				
Overhead line conductors & devices, per wire,500 kcmil, messenger wire	1	Mile	\$41,136.68	43,194
Overhead line conductors & devices, per wire, 350 kcmil grooved, contact wire	1	Mile	\$41,136.68	43,194
1" 37 STRAND GALV. E.H.S - GUY WIRE	1	Mile	\$9,954.53	10,452
Overhead line conductors & devices, protective devices, allow 6 per span per track	332	Ea.	\$2,120.81	705,022

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Flexible Hangar Assy, Multiple, assume 100' span typical, average 8 ea.@ 1.6' =12.76' hanger per 100' Span, one track	443	Ea.	\$144.29	63,956
Continuity Jumper allow 50 spans @ 4 per span per track	222	EA	\$230.81	51,151
Rail Equipment	1	LS	\$1,153,449.40	634,397
DETAILS				
Flatcar (2)	13	Months	\$29,780.88	396,086
High Rail Crane - 22 Tons (2)	13	Months	\$17,918.16	238,312
50.05 Communications	2,778	RFT	\$109.79	305,009
DETAILS				
Electrical underground ducts and manholes, PVC, with DB coupling, schedule 80, 1-1/2" diameter, installed by direct burial in slab or duct bank, excludes excavation, backfill and cast in place concrete	11,096	L.F.	\$9.06	100,522
Electrical underground ducts and manholes, bell end and cap, PVC, schedule 80, 1-1/2" diameter, installed by direct burial in slab or duct bank, excludes excavation, backfill and cast in place concrete	17	Ea.	\$38.80	667
Electrical underground ducts and manholes, elbows, PVC, schedule 80, 1-1/2" diameter, installed by direct burial in slab or duct bank, excludes excavation, backfill and cast in place concrete	17	Ea.	\$44.28	761
Electrical underground ducts and manholes, PVC, with DB coupling, schedule 80, 2" diameter, installed by direct burial in slab or duct bank, excludes excavation, backfill and cast in place concrete	1,719	L.F.	\$11.56	19,864
Electrical underground ducts and manholes, elbows, PVC, schedule 80, 2" diameter, installed by direct burial in slab or duct bank, excludes excavation, backfill and cast in place concrete	34	Ea.	\$58.97	2,025
Electrical underground ducts and manholes, bell end and plug, PVC, schedule 80,2" diameter, installed by direct burial in slab or duct bank, excludes excavation, backfill and cast in place concrete	34	Ea.	\$45.48	1,562
Electrical underground ducts and manholes, base spacer, PVC, schedule 80, 2" diameter, installed by direct burial in slab or duct bank, excludes excavation, backfill and cast in place concrete	2,774	Ea.	\$18.28	50,711
Fiber optic cable, 24 strand, single mode, indoor/outdoor	7	M.L.F.	\$7,135.51	48,878
Fiber optic patch panel, 24 ports, stations, crossings, intersections, interlockings, TPSS, interlockings, headquarters building	7	Ea.	\$815.26	5,650

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LEVEL DESCRIPTION	QTY	U/M	UNIT PRICE	TOTAL
Fiber optic patch panel, 24 ports, stations, crossings, intersections, interlockings, headquarters building	7	Ea.	\$156.76	1,088
Fiber optic cable, 48 strand, single mode, indoor/outdoor	6	M.L.F.	\$7,135.68	41,958
Fiber optic patch panel, 48 ports, stations, headquarters building	2	Ea.	\$816.15	1,355
Fiber optic patch panel, 48 ports, stations, headquarters building	2	Ea.	\$188.13	312
Fiber optic cable enclosure, splice w/enclosure encapsulant	9	Ea.	\$618.78	5,315
Switching and routing equipment, network switch, 10/100/1000 Mbps, 8 port, industrial ethernet type	9	Ea.	\$2,833.74	24,342
PUR Purple Segment	1,612	RFT	\$18,133.71	29,231,534
10 Guideway & Track Elements	1,612	RF	\$5,742.59	9,257,054
Embedded Section	1,612	RF	\$755.53	1,217,918
Remove Pavement - Embedded Guideway Width = 28'-0"	1,612	RF	\$85.05	137,101
DETAILS				
Selective demolition, saw cutting, asphalt, up to 3" deep	3,224	L.F.	\$2.01	6,493
Selective demolition, saw cutting, each additional inch of depth over 3"	9,672	L.F.	\$1.17	11,271
Demolish, remove pavement & curb, remove bituminous pavement, 4" to 6" thick, excludes hauling and disposal fees	5,015	S.Y.	\$8.49	42,587
Loading, 4 C.Y. bucket, front end loader, wheel-mounted	3,660	L.C.Y.	\$1.27	4,660
Cycle hauling(wait, load, travel, unload or dump & return) time per cycle, excavated or borrow, loose cubic yards, 30 min load/wait/unload, 20 C.Y. truck, cycle 30 miles, 35 MPH, excludes loading equipment	3,660	L.C.Y.	\$13.57	49,680
Selective demolition, dump charges, typical urban city, building construction materials, includes tipping fees only	183	Ton	\$122.46	22,410
Earthwork - Embedded	2,508	BCY	\$10.94	27,444
DETAILS				
Excavating, bulk, dozer, open site, bank measure, common earth, 80 HP dozer, 150' haul	2,508	B.C.Y.	\$7.91	19,832

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LEVEL DESCRIPTION	QTY	U/M	UNIT PRICE	TOTAL
Fine grading, large area, 6,000 S.Y. or more	5,015	S.Y.	\$1.26	6,310
Compaction, 4 passes, 12" lifts, riding, sheepsfoot or wobbly wheel roller	1,672	B.C.Y.	\$0.78	1,302
Drainage - Embedded	1,612	RF	\$389.99	628,667
DETAILS				
18" Dia. (average) Trunk Drain Lines including Excavation	1,612	FT	\$182.96	294,935
Drainage Structures	32	EA	\$6,098.58	196,313
8" PVC Laterals	644	FT	\$30.49	19,631
Track Drain	64	EA	\$1,829.57	117,788
Guideway - Paved	1,612	RF	\$263.47	424,706
DETAILS				
Barrier Curb	3,224	LF	\$21.96	70,784
Slab on Grade - Reinforced, 18" Thick	19,344	SF	\$18.30	353,922
Trackwork	1	LS	\$8,039,136.51	8,039,137
Install Track	3,221	TF	\$551.19	1,775,370
Install Embedded Track (Concrete)	3,221	TF	\$551.19	1,775,370
Construct Transition Slab	20	TF	\$1,317.78	26,356
DETAILS				
C.I.P. concrete forms, slab on grade, edge, wood, over 12", 4 use, includes erecting, bracing, stripping and cleaning	68	SFCA	\$6.80	465
Reinforcing steel, in place, slab on grade, #3 to #7, A615, grade 60, incl labor for accessories, excl material for accessories, #6, Longitudinal and Transverse	1	Ton	\$3,748.88	3,037

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LEVEL DESCRIPTION	QTY	U/M	UNIT PRICE	TOTAL
High chair, for reinforcing steel, continuous (CHC), stainless tipped legs, 4" high, legs 8" OC, includes material only	9	C.L.F.	\$1,125.29	10,465
Bag ties, for reinforcing steel, plain steel, 16 ga., 4" long, includes material only	6	C	\$1.79	11
Structural concrete, ready mix, heavyweight, 5000 psi, includes local aggregate, sand, Portland cement (Type I) and water, delivered, excludes all additives and treatments	2	C.Y.	\$282.88	699
Structural concrete, placing, slab on grade, pumped, over 6" thick, includes leveling (strike off) & consolidation, excludes material	2	C.Y.	\$19.05	47
Expansion joint, premolded, bituminous fiber, 1/2" x 6"	31	L.F.	\$1.44	45
Neoprene bearing pad, 1/2" x 7" 80 Duro	31	L.F.	\$373.80	11,588
Construct Track Slab	3,221	TF	\$302.19	973,355
<u>DETAILS</u>				
C.I.P. concrete forms, slab on grade, edge, wood, over 12", 4 use, includes erecting, bracing, stripping and cleaning	17,393	SFCA	\$6.80	118,264
Reinforcing steel, in place, slab on grade, #3 to #7, A615, grade 60, incl labor for accessories, excl material for accessories, #4, Longitudinal	8	Ton	\$3,744.23	28,194
Reinforcing steel, in place, slab on grade, #3 to #7, A615, grade 60, incl labor for accessories, excl material for accessories, #5, Hoop and Transverse	28	Ton	\$3,744.40	104,394
Epoxy coating, for reinforcing steel, add to plain steel rebar pricing for epoxy-coated rebar	35	Ton	\$1,861.94	65,931
High chair, for reinforcing steel, continuous (CHC), stainless tipped legs, 4" high, legs 8" OC, includes material only	338	C.L.F.	\$1,125.31	380,580
Bag ties, for reinforcing steel, plain steel, 16 ga., 4" long, includes material only	522	C	\$1.79	933
Structural concrete, ready mix, heavyweight, 5000 psi, includes local aggregate, sand, Portland cement (Type I) and water, delivered, excludes all additives and treatments	857	C.Y.	\$282.98	242,497
Structural concrete, placing, slab on grade, pumped, over 6" thick, includes leveling (strike off) & consolidation, excludes material	857	C.Y.	\$19.06	16,332
Expansion joint, polyethylene foam, 1" x 12"	429	L.F.	\$14.13	6,070
Dowel sleeve base, plastic, for 1" smooth dowel, fasten to edge form	215	Ea.	\$7.74	1,663
Reinforcing steel, in place, dowels, smooth, 24" long, 1" diameter, A36, galvanized	215	Ea.	\$39.57	8,497

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LEVEL DESCRIPTION	QTY	U/M	UNIT PRICE	TOTAL
Install Embedded Track (Concrete)	3,221	TF	\$240.81	775,659
DETAILS				
Running Rail, 115RE 115lb/yd) 2 rails per TF (100 TF = 200 LF)	62	TON	\$3,680.13	227,211
Stockpile and Distribute welded Rail	6,442	LF	\$3.57	23,024
Weld 80' Stick Rail to 1,200 FT strings	3,221	TF	\$3.19	10,287
Steel Leveling Tie, 115RE, with 2 leveling legs (1 per 10' on Tangent and 1per 5' in curves) 4,320	322	EA	\$153.09	49,310
Clips (4 Ea. per Tie)	1,288	EA	\$5.92	7,633
Railboot, 115RE, Includes Cuffs and Tape	6,442	LF	\$17.41	112,170
Insulated Rail Joint, 20 FT 115 RE	4	EA	\$2,862.53	11,822
Construct Embedded Track - (Includes Destressing)	3,221	TF	\$15.62	50,297
Field Welds (Includes Rail Grinding)	3	EA	\$456.95	1,225
Insulated Joints	4	EA	\$6.25	26
Field Welds (Includes Rail Grinding)	8	EA	\$177.44	1,466
Misc. Material, Equipment and Sundries	1	LS	\$49,059.22	50,531
Reinforcing steel, in place, slab on grade, #3 to #7, A615, grade 60, incl labor for accessories, excl material for accessories, #4, Longitudinal	9	Ton	\$3,743.87	32,235
Epoxy coating, for reinforcing steel, add to plain steel rebar pricing for epoxy-coated rebar	9	Ton	\$1,861.70	16,029
Bag ties, for reinforcing steel, plain steel, 16 ga., 4" long, includes material only	4	C	\$1.79	8
Structural concrete, ready mix, heavyweight, 5000 psi, includes local aggregate, sand, Portland cement (Type I) and water, delivered, excludes all additives and treatments	575	C.Y.	\$282.98	162,602
Structural concrete, placing, slab on grade, pumped, over 6" thick, includes leveling (strike off) & consolidation, excludes material	575	C.Y.	\$19.06	10,951
Expansion joint, polyethylene foam, 1" x 6"	429	L.F.	\$14.13	6,070
Expansion joint, rubberized asphalt, fuel resistant, 1" x 2", hot applied	429	L.F.	\$6.43	2,763
Special Trackwork	1	LS	\$6,263,766.61	6,263,767
Install Turnout	4	EA	\$610,073.67	2,440,295

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LEVEL DESCRIPTION	QTY	U/M	UNIT PRICE	TOTAL
Install Turnout	4	EA	\$610,073.67	2,440,295
DETAILS				
Install #8 Turnout	2	EA	\$440,043.95	880,088
Install #6 Turnout	2	EA	\$340,753.22	681,506
Turnout Surfacing, Ballasted Track,	1,600	TF	\$2.86	4,572
Insulated Rail Joint, 20 FT 115 RE - Turnout	32	EA	\$2,862.88	91,612
Insulated Joints - Turnout	32	EA	\$6.88	220
Field Welds (Includes Rail Grinding) - Turnout	64	EA	\$177.47	11,358
Misc. Material, Equipment and Sundries - Turnout	4	LS	\$192,734.46	770,938
Install Double Crossover	1	EA	\$3,823,471.93	3,823,472
Install Turnouts for Double Crossover	1	LS	\$2,724,772.54	2,724,773
DETAILS				
Install #8 Turnout	4	EA	\$440,043.95	1,760,176
Switch machine Box Frame and Lid	16	EA	\$2,482.27	39,716
Switch Housing, 2 per switch	32	EA	\$12,411.34	397,163
Insulated Rail Joint, 20 FT 115 RE - Turnout	32	EA	\$2,862.88	91,612
Insulated Joints - Turnout	32	EA	\$6.25	200
Field Welds (Includes Rail Grinding) - Turnout	64	EA	\$177.47	11,358
Misc. Material, Equipment and Sundries - Turnout	1	LS	\$192,734.45	192,734
Elastomer Grout, Insulate rail boot to bath tub termination, place material by pump and pressurize	169	C.F.	\$230.59	39,079
Misc. Material, Equipment and Sundries - Turnout	1	LS	\$192,734.45	192,734
Install Embedment Double Crossover	1	LS	\$1,098,699.39	1,098,699
DETAILS				
Traction Power/Signal Connection Boxes	64	EA	\$3,206.61	205,223
T.O. Bathtub, Structural concrete, in place, slab on grade (3500 psi), over 10000 S.F., 6" thick, includes concrete (Portland cement Type I), placing and finishing, excludes forms and reinforcing	3,981	S.F.	\$10.08	40,116

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T.O. C.I.P. concrete forms, bathtub slab on grade , edge, wood, over 12", 4 use, includes erecting, bracing, stripping and cleaning	1,239	SFCA	\$6.80	8,424
T.O. Reinforcing steel, in place, elevated slabs, #4 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	5	Ton	\$2,267.96	10,659
T.O. Epoxy coating, for reinforcing steel, add to plain steel rebar pricing for epoxy-coated rebar	5	Ton	\$1,860.48	8,744
T.O. High chair, for reinforcing steel, continuous (CHC), stainless tipped legs, 4" high, legs 8" OC, includes material only	512	C.L.F.	\$1,125.29	575,588
T.O. Bag ties, for reinforcing steel, plain steel, 16 ga., 4" long, includes material only	68	C	\$1.79	122
T.O. Track Slab, Structural concrete, in place, slab on grade (3500 psi), over 10000 S.F., 9" thick, includes concrete (Portland cement Type I), placing and finishing, excludes forms and reinforcing	13,405	S.F.	\$10.08	135,078
T.O. Second Pour, Structural concrete, in place, slab on grade (3500 psi), over 10000 S.F., 6.625" thick, includes concrete (Portland cement Type I), placing and finishing, Incl. 4 mil sheeting, excludes forms and reinforcing	8,607	S.F.	\$6.91	59,472
Norm First Pour, Elastomer Grout, Surface repairs using form-and-pour techniques (ACI RAP-5), place repair material by pump and pressurize	4	C.F.	\$230.59	835
Norm Second Pour Elastomer Grout, Surface repairs using form-and-pour techniques (ACI RAP-5), place repair material by pump and pressurize	10	C.F.	\$230.47	2,196
Electrical underground ducts and manholes, PVC, with DB coupling, schedule 80, 4" diameter, installed by direct burial in slab or duct bank, excludes excavation, backfill and cast in place concrete	690	L.F.	\$33.93	23,411
Electrical underground ducts and manholes, bell end and plug, PVC, schedule 80, 4" diameter, installed by direct burial in slab or duct bank, excludes excavation, backfill and cast in place concrete	64	Ea.	\$73.99	4,735
Electrical underground ducts and manholes, 90° elbows, PVC, schedule 80, 4" diameter, installed by direct burial in slab or duct bank, excludes excavation, backfill and cast in place concrete	64	Ea.	\$115.16	7,370
Electrical underground ducts and manholes, 45° elbows, PVC, schedule 80, 4" diameter, installed by direct burial in slab or duct bank, excludes excavation, backfill and cast in place concrete	128	Ea.	\$115.16	14,740
Electrical underground ducts and manholes, base spacer, PVC, schedule 80, 4" diameter, installed by direct burial in slab or duct bank, excludes excavation, backfill and cast in place concrete	104	Ea.	\$19.07	1,984
30 Support Facilities: Yards, Shops, Admin Bldgs.	1	LS	\$586,037.50	586,038

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LEVEL DESCRIPTION	QTY	U/M	UNIT PRICE	TOTAL
Trackwork	1	LS	\$586,037.50	586,038
Install Ballasted Track	1,656	TF	\$353.89	586,038
Install Ballasted Track	1,656	TF	\$351.56	582,185
DETAILS				
Running Rail, 115RE 115lb/yd) 2 rails per TF -Ballasted Track	32	TON	\$3,679.86	116,835
Weld 80' Stick Rail to 1,200 FT strings -Ballasted Track	3,312	TF	\$3.19	10,577
Stockpile and Distribute welded Rail -Ballasted Track	3,312	LF	\$3.57	11,837
Concrete Ties, L=8'-3" (24" Centers)	828	EA	\$360.92	298,845
Clips (4 Ea. per Tie)	3,312	EA	\$5.92	19,621
Insulation Kit (2 Ea. per Tie)	1,656	Kit	\$9.59	15,882
Subballast, #4 AREMA Wood Ties) -Ballasted Track	1,043	CY	\$35.41	36,923
Ballast, #4 AREMA -Ballasted Track	920	CY	\$35.41	32,583
Geotextile -Ballasted Track	543	SY	\$0.67	362
Insulated Rail Joint, 20 FT 115 RE -Ballasted Track	1	EA	\$2,851.70	2,709
Construct Ballasted Track	1,656	TF	\$1.23	2,045
Place and Compact Subballast and Ballast	515	SY	\$3.06	1,574
Welding, Field Joints -Ballasted Track	33	EA	\$456.24	15,111
Insulated Joints -Ballasted Track	1	EA	\$6.85	7
Field Welds, Insulated Joints (Includes Rail Grinding) -Ballasted Track	2	EA	\$177.71	336
Surface Ballasted Track	1,656	TF	\$2.86	4,732
Destress Welded Rail -Ballasted Track	1,656	TF	\$4.09	6,780
Misc. Material, Equipment and Sundries -Ballasted Track	1	LS	\$5,425.48	5,425
Install At Grade Panelized Crossing	2	EA	\$1,926.19	3,852
Yard Crossing - 2 Track	40	LF	\$96.31	3,852
DETAILS				

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LEVEL DESCRIPTION	QTY	U/M	UNIT PRICE	TOTAL
Install Concrete Crossing Panels - 1 Track,	40	TF	\$20.64	826
Geotextile Fabric - Grade Crossing	56	SY	\$1.64	91
Misc. Material, Equipment and Sundries - Grade Crossing	0	LS	\$7,339.41	2,936
40 Sitework & Special Conditions	1	LS	\$5,106,659.94	5,106,660
40.02 Site Utilities, Utility Relocation	1,612	RFT	\$670.86	1,081,427
DETAILS				
Utility Relocation - Allowance	1,612	RTF	\$670.86	1,081,427
40.07 Automobile, bus, van accessways including roads, parking lots	1	LS	\$4,025,232.61	4,025,233
Traffic Control	1	LS	\$594,486.32	594,486
DETAILS				
Movement of Traffic (MOT) - Low, Allowance 5% of Guideway Cost (SCC 10)	0	PCT	\$11,889,726.38	594,486
Modification to Existing Intersections	1	LS	\$2,744,429.85	2,744,430
DETAILS				
Modifications to existing road crossing and Intersections, Moderate, - Allowance	1	EA	\$914,809.95	914,810
Modifications to existing road crossing and Intersections, High, - Allowance	1	EA	\$1,829,619.90	1,829,620
Lane Replacement	17,900	SF	\$26.57	475,578
Full Depth Pavement Replacement - Asphalt	17,900	SF	\$11.96	214,020
DETAILS				
Selective demolition, saw cutting, asphalt, up to 3" deep	1,492	L.F.	\$2.01	3,004

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LEVEL DESCRIPTION	QTY	U/M	UNIT PRICE	TOTAL
Selective demolition, saw cutting, each additional inch of depth over 3"	4,475	L.F.	\$1.17	5,215
Demolish, remove pavement & curb, remove bituminous pavement, 4" to 6" thick, excludes hauling and disposal fees	1,989	S.Y.	\$8.49	16,889
Haul Demolished Debris	497	L.C.Y.	\$13.57	6,748
Fine grading, grade subgrade for base course, roadways	1,989	S.Y.	\$0.79	1,564
Compaction, riding, vibrating roller, 4 passes, 6" lifts	663	B.C.Y.	\$0.60	400
Compaction, water for, 3,000 gallon truck, 3 mile haul	663	B.C.Y.	\$3.24	2,148
Base course drainage layers, aggregate base course for roadways and large paved areas, stone base, compacted, 3/4" stone base, to 12" deep	1,989	S.Y.	\$23.61	46,959
Haul Base Course Material	862	L.C.Y.	\$13.57	11,699
Plant-mix asphalt paving, pre-treatment for paving, prime coat, emulsion, 0.30 gallons/S.Y., 1000 S.Y.	1,989	S.Y.	\$5.12	10,182
Plant-mix asphalt paving, for highways and large paved areas, binder course, 4" thick, no hauling included	1,989	S.Y.	\$31.13	61,911
Plant-mix asphalt paving, pre-treatment for paving, tack coat, emulsion, 0.10 gallons/S.Y., 1000 S.Y.	1,989	S.Y.	\$2.32	4,620
Plant-mix asphalt paving, for highways and large paved areas, wearing course, 2" thick, no hauling included	1,989	S.Y.	\$17.79	35,377
Haul Paving Material	497	L.C.Y.	\$13.57	6,748
Painted pavement markings, acrylic waterborne, white or yellow, 4" wide, 3,000-16,000 LF	1,492	L.F.	\$0.37	557
 Curb and Gutter	 2,000	 LF	 \$38.68	 77,356
<u>DETAILS</u>				
Demolish, remove pavement & curb and gutter, excludes hauling and disposal fees	2,000	L.F.	\$4.56	9,119
Haul Demolished Debris	259	L.C.Y.	\$13.57	3,519
Fine grading, grade subgrade for base course, roadways	556	S.Y.	\$0.79	437
Compaction, riding, vibrating roller, 4 passes, 6" lifts	185	B.C.Y.	\$0.60	112
Compaction, water for, 3,000 gallon truck, 3 mile haul	185	B.C.Y.	\$3.24	600
Base course drainage layers, aggregate base course for roadways and large paved areas, stone base, compacted, 3/4" stone base, to 12" deep	556	S.Y.	\$23.61	13,117
Haul Base Course Material	241	L.C.Y.	\$13.57	3,268
Cast-in place concrete curbs & gutters, radius, machine formed, 6" high curb, 6" thick gutter, 30" wide, includes concrete	2,000	L.F.	\$23.59	47,184

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LEVEL DESCRIPTION	QTY	U/M	UNIT PRICE	TOTAL
Curb Inlet/Storm Drain	6	EA	\$11,270.00	67,620
DETAILS				
Selective demolition, manholes & catch basins, manhole or catch basin, precast or brick, over 8' deep, excludes excavation	36	V.L.F.	\$136.79	4,924
Haul Demolished Debris	36	L.C.Y.	\$13.57	489
New Curb Inlet/Storm Drain	6	EA	\$4,878.99	29,274
Extend Laterals including excavation - Assume 18" RCP	120	LF	\$182.96	21,955
Connect To Existing	6	EA	\$1,829.62	10,978
Sidewalk	2,000	LF	\$58.29	116,581
DETAILS				
Demolish, remove pavement & curb, remove concrete, mesh reinforced, to 6" thick, hand held equipment, excludes hauling and disposal fees	12,000	S.F.	\$1.34	16,118
Haul Demolished Debris	333	L.C.Y.	\$13.57	4,524
Fine grading, grade subgrade for base course, roadways	1,334	S.Y.	\$0.79	1,049
Compaction, riding, vibrating roller, 4 passes, 6" lifts	445	B.C.Y.	\$0.60	268
Compaction, water for, 3,000 gallon truck, 3 mile haul	445	B.C.Y.	\$3.24	1,441
Base course drainage layers, aggregate base course for roadways and large paved areas, compacted, 3" deep, crushed 3/4" stone base	1,334	S.Y.	\$6.83	9,101
Haul Base Course Material	144	L.C.Y.	\$13.57	1,959
Sidewalks, driveways, and patios, sidewalk, concrete, cast-in-place with 6 x 6 - W1.4 x W1.4 mesh, broomed finish, 3,000 psi, 4" thick, excludes base	12,000	S.F.	\$6.84	82,122
Mill and Overlay Existing Pavement	58,300	SF	\$3.61	210,739
DETAILS				
Cold milling asphalt paving, asphalt pavement, 1" to 3" deep, removal from concrete base, rip, load and sweep, excludes hauling	6,478	S.Y.	\$0.78	5,084
Haul Demolished Debris	702	L.C.Y.	\$13.57	9,522
Plant-mix asphalt paving, pre-treatment for paving, tack coat, emulsion, 0.10 gallons/S.Y., 1000 S.Y.	6,478	S.Y.	\$2.32	15,046
Plant-mix asphalt paving, for highways and large paved areas, wearing course, 3" thick, no hauling included	6,478	S.Y.	\$25.98	168,278
Haul Paving Material	810	L.C.Y.	\$13.57	10,993

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LEVEL DESCRIPTION	QTY	U/M	UNIT PRICE	TOTAL
Painted pavement markings, acrylic waterborne, white or yellow, 4" wide, 3,000-16,000 LF	4,858	L.F.	\$0.37	1,815
50 Systems	4,877	TF	\$2,928.39	14,281,782
50.01 Train Control and Signals	4,877	TF	\$490.09	2,390,159
DETAILS				
CIH - Interlocking/Intermediate	2	EA	\$247,882.84	379,261
3/4" x 8' lg - copper alloy	6	EA	\$658.82	4,025
Ground wire, bare solid copper, #6	92	FT	\$1.99	183
Mech Conn to Case	6	EA	\$85.49	522
Exothermic Conn to Rod	6	EA	\$240.30	1,468
Test Well for Ground	2	EA	\$152.55	233
Batteries 240 AH	9	EA	\$547.26	5,013
Foundations	6	EA	\$16,751.10	102,349
2-1/c#6 TW PR Track Circuit	1,705	LF	\$290.23	494,854
#6 RHW Stranded wire	122	LF	\$45.04	5,501
CHICKEN HEAD - PIN BOND	20	EA	\$42.78	871
SLEEVE SPLICE NICOPRESS	20	EA	\$18.74	382
CADWELD TRACK CONNECTION	20	EA	\$115.59	2,353
Track drill & bits	2	ea	\$247.73	505
Signal head, Number Plate, Mast & Base	4	EA	\$10,916.08	38,861
Structural Steel Support - Fabricated	4	EA	\$6,941.30	24,711
5c#9 Signal Lamp Cable	1,374	LF	\$452.64	622,036
Electric Switch Machine - M3	3	EA	\$55,250.36	140,336
Electric Switch Rod Set - G&W	3	EA	\$36,466.27	92,624
2C#4 - Switch machine	305	LF	\$297.20	90,763
8C#10 - Switch machine	305	LF	\$302.48	92,375
Switch Heat Cabinet & Control Panel	1	EA	\$7,434.63	7,583
Track Switch Heater / Crib heater & Cal Rod	5	EA	\$6,578.39	33,484
Junction Box	5	EA	\$817.21	4,160
2C#4 - Switch heat	282	LF	\$297.21	83,956
8C#10 - Switch heat	305	LF	\$302.48	92,375
Head Bonds #6	8	EA	\$18.38	150
Head Bonds 250	8	EA	\$25.84	210
LRT Bar Signals, incl. foundation	2	EA	\$30,542.94	62,308

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LEVEL DESCRIPTION	QTY	U/M	UNIT PRICE	TOTAL
Control switches, push button, maintained contact, button 6 V #12 lamp, w/double block 2NO 2NC w/guard, 600 V 10 A	2	Ea.	\$313.56	640
misc. mat. - allow	6	EA	\$992.53	6,064
Traffic Signals and Crossing Protection - At-Grade. exclusive ROW	1	EA	\$945,302.18	945,302
Crossing Protection - At-Grade. exclusive ROW	1	EA	\$457,403.54	457,404
DETAILS				
CIH - Interlocking/Intermediate	1	EA	\$248,381.96	248,382
3/4" x 8' lg - copper alloy	4	EA	\$659.07	2,636
Ground wire, bare solid copper, #6	60	FT	\$1.99	120
Mech Conn to Case	4	EA	\$85.52	342
Exothermic Conn to Rod	4	EA	\$240.40	962
Test Well for Ground	1	EA	\$152.84	153
Batteries 240 AH	12	EA	\$547.16	6,566
Foundations	4	EA	\$5,285.30	21,141
2c#6 TW PR Track Circuit	1,000	LF	\$36.73	36,731
#6 RHW Stranded wire	200	LF	\$35.08	7,015
10c#9 Signal Cable	125	LF	\$56.80	7,101
CHICKEN HEAD - PIN BOND	20	EA	\$37.48	750
SLEEVE SPLICE NICOPRESS	20	EA	\$3.81	76
CADWELD TRACK CONNECTION	20	EA	\$100.67	2,013
Track drill & bits	4	shift	\$249.60	998
Crossing signal mast with 2 flasher pairs, gate mechanism, barrier arm and bell	4	EA	\$30,604.44	122,418
Traffic Signals	1	EA	\$487,898.64	487,899
DETAILS				
Traffic signals, single direction allowance - engineering, materials, installation, and testing	1	EA	\$487,898.64	487,899
50.02 Traffic Signals and Crossing Protection - Semi Exclusive ROW	1	EA	\$597,855.18	597,855

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Crossing Protection - Semi Exclusive ROW	1	EA	\$109,956.54	109,957
DETAILS				
LRT Bar Signals, incl. foundation	2	EA	\$30,604.44	61,209
9c#9 signal lighting cable	250	LF	\$16.31	4,077
Rail Traffic Loop Detection System, Feeds Traffic Signal Controller	1	EA	\$44,670.62	44,671
Traffic Signals	1	EA	\$487,898.64	487,899
DETAILS				
Traffic signals, single direction allowance - engineering, materials, installation, and testing	1	EA	\$487,898.64	487,899
50.03 Traction Power Supply: Substation	4,877	TF	\$177.62	866,265
Traction Power Distribution	4,877	TF	\$177.62	866,265
DETAILS				
Substation Power Cubicle - Assume 10,375 TF spacing	0	EA	\$664,881.75	325,792
Impedance Bond (4) each location per track: Assume 10,375' spacing	2	EA	\$29,478.41	58,072
Medium-cable single cable, copper, negative return, 350 kcmil, in conduit, exclsplicing & terminations	9	C.L.F.	\$2,669.90	23,121
Medium-cable single cable, copper, positive feeders, 500 kcmil, in conduit, excl splicing & terminations	21	C.L.F.	\$3,089.10	63,821
Cable terminations, insulation diameter range, 350 KCMIL & 500 KCMIL	85	EA	\$598.77	50,686
PIN CONN - CABLE TO RAIL (8 required per location)	4	EA	\$199.90	788
Signal and Traction Power Boxes	4	EA	\$3,516.77	13,856
Elastomer Grout, transition at signal and traction box, place material by pump and pressurize	9	C.F.	\$230.49	2,044
Disconnecting switches, single pole switches, 13 to 26 kV	1	EA	\$6,875.83	10,176
Enclosure panels, 84" x 46", NEMA 12 & 4	1	EA	\$29,024.04	42,956
Structural concrete, in place, equipment pad (3000 psi), 8' x 8' x 10", includes forms(4 uses), Grade 60 rebar, concrete (Portland cement Type I), placing and finishing	0	EA	\$959.58	470

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LEVEL DESCRIPTION	QTY	U/M	UNIT PRICE	TOTAL
Electrical underground ducts and manholes, PVC, with DB coupling, schedule 80, 4" diameter, installed by direct burial in slab or duct bank, excludes excavation, backfill and cast in place concrete	7,717	L.F.	\$33.93	261,837
Electrical underground ducts and manholes, bell end and plug, PVC, schedule 80, 4" diameter, installed by direct burial in slab or duct bank, excludes excavation, backfill and cast in place concrete	28	EA	\$73.99	2,039
Electrical underground ducts and manholes, 90° elbows, PVC, schedule 80, 4" diameter, installed by direct burial in slab or duct bank, excludes excavation, backfill and cast in place concrete	20	EA	\$115.14	2,267
Electrical underground ducts and manholes, 45° elbows, PVC, schedule 80, 4" diameter, installed by direct burial in slab or duct bank, excludes excavation, backfill and cast in place concrete	4	EA	\$115.14	454
Electrical underground ducts and manholes, base spacer, PVC, schedule 80, 4" diameter, installed by direct burial in slab or duct bank, excludes excavation, backfill and cast in place concrete	413	EA	\$19.07	7,886
50.04 Traction power distribution: Catenary and third rail	4,877	RFT	\$1,907.98	9,305,212
Foundations	4,877	RFT	\$144.19	703,219
DETAILS				
Fixed end caisson piles, for mobilization, 50 mile radius	1	Ea.	\$2,411.36	2,339
Fixed end caisson piles, open style in stable ground, to 10' deep, 36" diameter, Casing left in place	496	V.L.F.	\$32.87	16,306
Reinforcing steel, in place, #3 to #7, A615, grade 60 - #4 Ties	70,937	Lb.	\$3.31	234,781
Reinforcing steel, in place, #8 to #18, A615, grade 60 - #9 Vertical Bars	3	Ton	\$4,485.00	12,558
Structural concrete, ready mix, heavyweight, 4000 psi, includes local aggregate, sand, Portland cement (Type I) and water, delivered, excludes all additives and treatments	15	Ton	\$3,744.74	56,845
Structural concrete, placing, pumped, over 5 C.Y., includes leveling (strike off) & consolidation, excludes material	355	C.Y.	\$268.08	95,177
Cut Casing	355	C.Y.	\$23.52	8,350
Load Surplus	50	EA	\$1,643.39	81,529
Haul Surplus Materials Off Site	406	L.C.Y.	\$2.50	1,015
Embedment Plate Assembly	406	L.C.Y.	\$18.13	7,354
Anchor Bolt Template	3,725	LBS	\$4.14	15,412
	7,170	LBS	\$4.14	29,661

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Anchor Bolt - 2" x 8'-0" Long	397	EA	\$124.11	49,255
Hex Nuts	1,984	EA	\$16.55	32,836
Plate Washers	794	EA	\$4.14	3,284
Standard Washers	794	EA	\$4.14	3,284
Set Foundation Imbeds, Plates, Template, Bolts, etc.	50	Sets	\$549.88	27,279
Grounding Assembly, cable, clamps, Lugs - Allow	50	Sets	\$248.21	12,314
Set Grounding Assembly	50	Sets	\$274.94	13,640
Catenary Structures	4,877	RFT	\$1,205.34	5,878,447
DETAILS				
Electrical utility pole, catenary, galvanized steel, round, 25	50	EA	\$57,915.51	2,873,188
Cantilever Assemblies	99	EA	\$2,482.34	246,273
Other Misc. Assemblies	99	EA	\$3,971.75	394,037
Pre-assembly Cantilever Assemblies	99	EA	\$11,918.90	1,182,474
Erect Catenary Frames (Pole + Assemblies.)	50	EA	\$23,835.39	1,182,474
OCS O/H Conductors	4,877	RFT	\$330.08	1,609,811
DETAILS				
Overhead line conductors & devices, per wire,500 kcmil, messenger wire	2	Mile	\$40,989.01	75,830
Overhead line conductors & devices, per wire, 350 kcmil grooved, contact wire	2	Mile	\$40,989.01	75,830
1" 37 STRAND GALV. E.H.S - GUY WIRE	2	Mile	\$9,918.80	18,350
Overhead line conductors & devices, protective devices, allow 6 per span per track	584	Ea.	\$2,120.80	1,237,722
Flexible Hangar Assy, Multiple, assume 100' span typical, average 8 ea.@ 1.6' =12.76' hanger per 100' Span, one track	778	Ea.	\$144.29	112,280
Continuity Jumper allow 50 spans @ 4 per span per track	389	EA	\$230.81	89,800
Rail Equipment	1	LS	\$1,148,180.11	1,113,735
DETAILS				
Flatcar (2)	23	Months	\$29,792.62	695,360
High Rail Crane - 22 Tons (2)	23	Months	\$17,925.23	418,375

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50.05 Communications	1,612	RFT	\$109.79	176,989
DETAILS				
Electrical underground ducts and manholes, PVC, with DB coupling, schedule 80, 1-1/2" diameter, installed by direct burial in slab or duct bank, excludes excavation, backfill and cast in place concrete	6,439	L.F.	\$9.06	58,330
Electrical underground ducts and manholes, bell end and cap, PVC, schedule 80, 1-1/2" diameter, installed by direct burial in slab or duct bank, excludes excavation, backfill and cast in place concrete	10	Ea.	\$38.80	387
Electrical underground ducts and manholes, elbows, PVC, schedule 80, 1-1/2" diameter, installed by direct burial in slab or duct bank, excludes excavation, backfill and cast in place concrete	10	Ea.	\$44.27	441
Electrical underground ducts and manholes, PVC, with DB coupling, schedule 80, 2" diameter, installed by direct burial in slab or duct bank, excludes excavation, backfill and cast in place concrete	997	L.F.	\$11.56	11,527
Electrical underground ducts and manholes, elbows, PVC, schedule 80, 2" diameter, installed by direct burial in slab or duct bank, excludes excavation, backfill and cast in place concrete	20	Ea.	\$58.97	1,175
Electrical underground ducts and manholes, bell end and plug, PVC, schedule 80, 2" diameter, installed by direct burial in slab or duct bank, excludes excavation, backfill and cast in place concrete	20	Ea.	\$45.48	906
Electrical underground ducts and manholes, base spacer, PVC, schedule 80, 2" diameter, installed by direct burial in slab or duct bank, excludes excavation, backfill and cast in place concrete	1,610	Ea.	\$18.28	29,426
Fiber optic cable, 24 strand, single mode, indoor/outdoor	4	M.L.F.	\$7,144.27	28,363
Fiber optic patch panel, 24 ports, stations, crossings, intersections, interlockings, TPSS, interlockings, headquarters building	4	Ea.	\$815.52	3,278
Fiber optic patch panel, 24 ports, stations, crossings, intersections, interlockings, headquarters building	4	Ea.	\$156.64	631
Fiber optic cable, 48 strand, single mode, indoor/outdoor	3	M.L.F.	\$7,139.88	24,347
Fiber optic patch panel, 48 ports, stations, headquarters building	1	Ea.	\$818.92	786
Fiber optic patch panel, 48 ports, stations, headquarters building	1	Ea.	\$188.77	181
Fiber optics cable enclosure, splice w/enclosure encapsulant	5	Ea.	\$618.10	3,084
Switching and routing equipment, network switch, 10/100/1000 Mbps, 8 port, industrial ethernet type	5	Ea.	\$2,830.64	14,125
ORG Orange Segment	3,433	RFT	\$11,246.04	38,607,640

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Draft Concepts

PROJECT ESTIMATE DETAIL REPORT
BY UNIT PRICE

Estimate Date: 10/15/2024 ; Rev. No. 01
Client: Utah Transit Authority (UTA)
Estimator: B. Frazier, M. Jackson
Checked By: M. Jackson
Charge #:
Doc Scope Date: July 2024

LEVEL DESCRIPTION	QTY	U/M	UNIT PRICE	TOTAL
10 Guideway & Track Elements	3,433	RT	\$3,696.19	12,689,007
10.02 Embedded Section	3,373	RF	\$755.53	2,548,410
Remove Pavement - Embedded Guideway Width = 28'-0"	3,373	RF	\$85.05	286,874
DETAILS				
Selective demolition, saw cutting, asphalt, up to 3" deep	6,746	L.F.	\$2.01	13,586
Selective demolition, saw cutting, each additional inch of depth over 3"	20,238	L.F.	\$1.17	23,584
Demolish, remove pavement & curb, remove bituminous pavement, 4" to 6" thick, excludes hauling and disposal fees	10,494	S.Y.	\$8.49	89,109
Loading, 4 C.Y. bucket, front end loader, wheel-mounted	7,659	L.C.Y.	\$1.27	9,750
Cycle hauling(wait, load, travel, unload or dump & return) time per cycle, excavated or borrow, loose cubic yards, 30 min load/wait/unload, 20 C.Y. truck, cycle 30 miles, 35 MPH, excludes loading equipment	7,659	L.C.Y.	\$13.57	103,952
Selective demolition, dump charges, typical urban city, building construction materials, includes tipping fees only	383	Ton	\$122.46	46,892
Earthwork - Embedded	5,247	BCY	\$10.94	57,424
DETAILS				
Excavating, bulk, dozer, open site, bank measure, common earth, 80 HP dozer, 150' haul	5,247	B.C.Y.	\$7.91	41,496
Fine grading, large area, 6,000 S.Y. or more	10,494	S.Y.	\$1.26	13,204
Compaction, 4 passes, 12" lifts, riding, sheepsfoot or wobbly wheel roller	3,498	B.C.Y.	\$0.78	2,724
Drainage - Embedded	3,373	RF	\$389.99	1,315,443
DETAILS				
18" Dia. (average) Trunk Drain Lines including Excavation	3,373	FT	\$182.96	617,131
Drainage Structures	67	EA	\$6,099.06	410,772
8" PVC Laterals	1,347	FT	\$30.49	41,077

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Track Drain	135	EA	\$1,829.58	246,463
Guideway - Paved	3,373	RF	\$263.47	888,668
DETAILS				
Barrier Curb	6,746	LF	\$21.96	148,111
Slab on Grade - Reinforced, 18" Thick	40,476	SF	\$18.30	740,557
10.04 Aerial Structure	60	RF	\$17,076.45	1,024,587
DETAILS				
Elevated Guideway - Allow	1,680	SF	\$609.87	1,024,587
Trackwork	1	LS	\$9,116,009.49	9,116,009
Install Track	7,311	TF	\$551.45	4,031,657
Install Embedded Track (Concrete)	7,311	TF	\$551.45	4,031,657
Construct Transition Slab	47	TF	\$1,317.65	61,758
DETAILS				
C.I.P. concrete forms, slab on grade, edge, wood, over 12", 4 use, includes erecting, bracing, stripping and cleaning	160	SFCA	\$6.80	1,089
Reinforcing steel, in place, slab on grade, #3 to #7, A615, grade 60, incl labor for accessories, excl material for accessories, #6, Longitudinal and Transverse	2	Ton	\$3,745.02	7,116
High chair, for reinforcing steel, continuous (CHC), stainless tipped legs, 4" high, legs 8" OC, includes material only	22	C.L.F.	\$1,125.42	24,523
Bag ties, for reinforcing steel, plain steel, 16 ga., 4" long, includes material only	15	C	\$1.79	26



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Structural concrete, ready mix, heavyweight, 5000 psi, includes local aggregate, sand, Portland cement (Type I) and water, delivered, excludes all additives and treatments	6	C.Y.	\$282.78	1,637
Structural concrete, placing, slab on grade, pumped, over 6" thick, includes leveling (strike off) & consolidation, excludes material	6	C.Y.	\$19.04	110
Expansion joint, premolded, bituminous fiber, 1/2" x 6"	73	L.F.	\$1.44	105
Neoprene bearing pad, 1/2" x 7" 80 Duro	73	L.F.	\$373.80	27,153
Construct Track Slab	7,311	TF	\$302.19	2,209,314
DETAILS				
C.I.P. concrete forms, slab on grade, edge, wood, over 12", 4 use, includes erecting, bracing, stripping and cleaning	39,479	SFCA	\$6.80	268,435
Reinforcing steel, in place, slab on grade, #3 to #7, A615, grade 60, incl labor for accessories, excl material for accessories, #4, Longitudinal	17	Ton	\$3,744.56	63,995
Reinforcing steel, in place, slab on grade, #3 to #7, A615, grade 60, incl labor for accessories, excl material for accessories, #5, Hoop and Transverse	63	Ton	\$3,743.92	236,952
Epoxy coating, for reinforcing steel, add to plain steel rebar pricing for epoxy-coated rebar	80	Ton	\$1,861.79	149,650
High chair, for reinforcing steel, continuous (CHC), stainless tipped legs, 4" high, legs 8" OC, includes material only	768	C.L.F.	\$1,125.30	863,838
Bag ties, for reinforcing steel, plain steel, 16 ga., 4" long, includes material only	1,184	C	\$1.79	2,117
Structural concrete, ready mix, heavyweight, 5000 psi, includes local aggregate, sand, Portland cement (Type I) and water, delivered, excludes all additives and treatments	1,945	C.Y.	\$282.98	550,418
Structural concrete, placing, slab on grade, pumped, over 6" thick, includes leveling (strike off) & consolidation, excludes material	1,945	C.Y.	\$19.06	37,071
Expansion joint, polyethylene foam, 1" x 12"	975	L.F.	\$14.13	13,777
Dowel sleeve base, plastic, for 1" smooth dowel, fasten to edge form	487	Ea.	\$7.74	3,775
Reinforcing steel, in place, dowels, smooth, 24" long, 1" diameter, A36, galvanized	487	Ea.	\$39.57	19,286
Install Embedded Track (Concrete)	7,311	TF	\$240.81	1,760,585
DETAILS				
Running Rail, 115RE 115lb/yd) 2 rails per TF (100 TF = 200 LF)	140	TON	\$3,680.31	515,722
Stockpile and Distribute welded Rail	14,622	LF	\$3.57	52,261

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Weld 80' Stick Rail to 1,200 FT strings	7,311	TF	\$3.19	23,348
Steel Leveling Tie, 115RE, with 2 leveling legs (1 per 10' on Tangent and 1per 5' in curves) 4,320	731	EA	\$153.09	111,924
Clips (4 Ea. per Tie)	2,924	EA	\$5.92	17,325
Railboot, 115RE, Includes Cuffs and Tape	14,622	LF	\$17.41	254,602
Insulated Rail Joint, 20 FT 115 RE	9	EA	\$2,863.82	26,834
Construct Embedded Track - (Includes Destressing)	7,311	TF	\$15.62	114,164
Field Welds (Includes Rail Grinding)	6	EA	\$456.43	2,780
Insulated Joints	9	EA	\$6.25	59
Field Welds (Includes Rail Grinding)	19	EA	\$177.43	3,327
Misc. Material, Equipment and Sundries	2	LS	\$49,014.90	114,695
Reinforcing steel, in place, slab on grade, #3 to #7, A615, grade 60, incl labor for accessories, excl material for accessories, #4, Longitudinal	20	Ton	\$3,744.43	73,166
Epoxy coating, for reinforcing steel, add to plain steel rebar pricing for epoxy-coated rebar	20	Ton	\$1,861.97	36,383
Bag ties, for reinforcing steel, plain steel, 16 ga., 4" long, includes material only	10	C	\$1.79	18
Structural concrete, ready mix, heavyweight, 5000 psi, includes local aggregate, sand, Portland cement (Type I) and water, delivered, excludes all additives and treatments	1,304	C.Y.	\$282.98	369,072
Structural concrete, placing, slab on grade, pumped, over 6" thick, includes leveling (strike off) & consolidation, excludes material	1,304	C.Y.	\$19.06	24,857
Expansion joint, polyethylene foam, 1" x 6"	975	L.F.	\$14.13	13,777
Expansion joint, rubberized asphalt, fuel resistant, 1" x 2", hot applied	975	L.F.	\$6.43	6,271
Special Trackwork	1	LS	\$5,084,352.52	5,084,353
Install #8 Turnout	2	EA	\$726,807.52	1,453,615
Install #8 Turnout	2	EA	\$608,381.53	1,216,763
DETAILS				
Install #8 Turnout	2	EA	\$440,043.95	880,088
Switch machine Box Frame and Lid	2	EA	\$2,482.27	4,965
Switch Housing, 2 per switch	4	EA	\$12,411.34	49,645

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LEVEL DESCRIPTION	QTY	U/M	UNIT PRICE	TOTAL
Insulated Rail Joint, 20 FT 115 RE - Turnout	14	EA	\$2,862.88	40,080
Insulated Joints - Turnout	14	EA	\$6.88	96
Field Welds (Includes Rail Grinding) - Turnout	28	EA	\$177.47	4,969
Elastomer Grout, Insulate around frogs and under ties, place material by pump and pressurize	192	C.F.	\$230.59	44,185
Misc. Material, Equipment and Sundries - Turnout	1	LS	\$192,734.45	192,734
Install Embedment Turnout(Concrete) ~130 TF	2	EA	\$118,426.00	236,852
DETAILS				
Electrical underground ducts and manholes, PVC, with DB coupling, schedule 80, 4" diameter, installed by direct burial in slab or duct bank, excludes excavation, backfill and cast in place concrete	930	L.F.	\$33.93	31,554
Electrical underground ducts and manholes, bell end and plug, PVC, schedule 80, 4" diameter, installed by direct burial in slab or duct bank, excludes excavation, backfill and cast in place concrete	28	Ea.	\$73.99	2,072
Electrical underground ducts and manholes, 90° elbows, PVC, schedule 80, 4" diameter, installed by direct burial in slab or duct bank, excludes excavation, backfill and cast in place concrete	14	Ea.	\$115.16	1,612
Electrical underground ducts and manholes, 45° elbows, PVC, schedule 80, 4" diameter, installed by direct burial in slab or duct bank, excludes excavation, backfill and cast in place concrete	14	Ea.	\$115.16	1,612
Traction Power/Signal Connection Boxes	14	EA	\$3,206.61	44,893
T.O. Bathtub, Structural concrete, in place, slab on grade (3500 psi), over 10000 S.F., 6" thick, includes concrete (Portland cement Type I), placing and finishing, excludes forms and reinforcing	1,990	S.F.	\$10.08	20,053
T.O. C.I.P. concrete forms, bathtub slab on grade, edge, wood, over 12", 4 use, includes erecting, bracing, stripping and cleaning	1,201	SFCA	\$6.80	8,166
T.O. Reinforcing steel, in place, elevated slabs, #4 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	2	Ton	\$2,273.19	4,433
T.O. Epoxy coating, for reinforcing steel, add to plain steel rebar pricing for epoxy-coated rebar	2	Ton	\$1,864.77	3,636
T.O. High chair, for reinforcing steel, continuous (CHC), stainless tipped legs, 4" high, legs 8" OC, includes material only	32	C.L.F.	\$1,125.29	36,009
T.O. Bag ties, for reinforcing steel, plain steel, 16 ga., 4" long, includes material only	42	C	\$1.79	75

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T.O. Track Slab, Structural concrete, in place, slab on grade (3500 psi), over 10000 S.F., 10.775" thick, includes concrete (Portland cement Type I), placing and finishing, excludes forms and reinforcing	1,900	S.F.	\$10.08	19,146
T.O. Second Pour, Structural concrete, in place, slab on grade (3500 psi), over 10000 S.F., 7.225" thick, includes concrete (Portland cement Type I), placing and finishing, Incl. 4 mil sheeting, excludes forms and reinforcing	1,900	S.F.	\$6.91	13,129
Norm First Pour, Elastomer Grout, Surface repairs using form-and-pour techniques (ACI RAP-5), place repair material by pump and pressurize	2	C.F.	\$230.59	417
Norm Second Pour Elastomer Grout, Surface repairs using form-and-pour techniques (ACI RAP-5), place repair material by pump and pressurize	5	C.F.	\$230.59	1,098
Misc. Material, Equipment and Sundries	1	LS	\$48,946.52	48,947
Install Double Crossover	1	EA	\$3,630,737.48	3,630,737
Install Turnouts for Double Crossover	1	EA	\$2,532,038.08	2,532,038
<u>DETAILS</u>				
Install #8 Turnout	4	EA	\$440,043.95	1,760,176
Switch machine Box Frame and Lid	16	EA	\$2,482.27	39,716
Switch Housing, 2 per switch	32	EA	\$12,411.34	397,163
Insulated Rail Joint, 20 FT 115 RE - Turnout	32	EA	\$2,862.88	91,612
Insulated Joints - Turnout	32	EA	\$6.25	200
Field Welds (Includes Rail Grinding) - Turnout	64	EA	\$177.47	11,358
Elastomer Grout, Insulate rail boot to bath tub termination, place material by pump and pressurize	169	C.F.	\$230.59	39,079
Misc. Material, Equipment and Sundries - Turnout	1	LS	\$192,734.45	192,734
Install Embedment Double Crossover	1	EA	\$1,098,699.39	1,098,699
<u>DETAILS</u>				
Traction Power/Signal Connection Boxes	64	EA	\$3,206.61	205,223
T.O. Bathtub, Structural concrete, in place, slab on grade (3500 psi), over 10000 S.F., 6" thick, includes concrete (Portland cement Type I), placing and finishing, excludes forms and reinforcing	3,981	S.F.	\$10.08	40,116
T.O. C.I.P. concrete forms, bathtub slab on grade, edge, wood, over 12", 4 use, includes erecting, bracing, stripping and cleaning	1,239	SFCA	\$6.80	8,424

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T.O. Reinforcing steel, in place, elevated slabs, #4 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	5	Ton	\$2,267.96	10,659
T.O. Epoxy coating, for reinforcing steel, add to plain steel rebar pricing for epoxy-coated rebar	5	Ton	\$1,860.48	8,744
T.O. High chair, for reinforcing steel, continuous (CHC), stainless tipped legs, 4" high, legs 8" OC, includes material only	512	C.L.F.	\$1,125.29	575,588
T.O. Bag ties, for reinforcing steel, plain steel, 16 ga., 4" long, includes material only	68	C	\$1.79	122
T.O. Track Slab, Structural concrete, in place, slab on grade (3500 psi), over 10000 S.F., 9" thick, includes concrete (Portland cement Type I), placing and finishing, excludes forms and reinforcing	13,405	S.F.	\$10.08	135,078
T.O. Second Pour, Structural concrete, in place, slab on grade (3500 psi), over 10000 S.F., 6.625" thick, includes concrete (Portland cement Type I), placing and finishing, Incl. 4 mil sheeting, excludes forms and reinforcing	8,607	S.F.	\$6.91	59,472
Norm First Pour, Elastomer Grout, Surface repairs using form-and-pour techniques (ACI RAP-5), place repair material by pump and pressurize	4	C.F.	\$230.59	835
Norm Second Pour Elastomer Grout, Surface repairs using form-and-pour techniques (ACI RAP-5), place repair material by pump and pressurize	10	C.F.	\$230.47	2,196
Electrical underground ducts and manholes, PVC, with DB coupling, schedule 80, 4" diameter, installed by direct burial in slab or duct bank, excludes excavation, backfill and cast in place concrete	690	L.F.	\$33.93	23,411
Electrical underground ducts and manholes, bell end and plug, PVC, schedule 80, 4" diameter, installed by direct burial in slab or duct bank, excludes excavation, backfill and cast in place concrete	64	Ea.	\$73.99	4,735
Electrical underground ducts and manholes, 90° elbows, PVC, schedule 80, 4" diameter, installed by direct burial in slab or duct bank, excludes excavation, backfill and cast in place concrete	64	Ea.	\$115.16	7,370
Electrical underground ducts and manholes, 45° elbows, PVC, schedule 80, 4" diameter, installed by direct burial in slab or duct bank, excludes excavation, backfill and cast in place concrete	128	Ea.	\$115.16	14,740
Electrical underground ducts and manholes, base spacer, PVC, schedule 80, 4" diameter, installed by direct burial in slab or duct bank, excludes excavation, backfill and cast in place concrete	104	Ea.	\$19.07	1,984
20 Stations, Stops, Terminals, Intermodal	2	EA	\$1,927,199.63	3,854,399

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Station - Grade	2	EA	\$1,927,199.63	3,854,399
DETAILS				
Station - Allow	2	EA	\$1,927,199.63	3,854,399
Fare Collection	(2)	LS	\$182,961.99	(365,924)
Fare Collection	2	LS	\$182,961.99	365,924
40 Sitework & Special Conditions	1	LS	\$8,462,021.85	8,462,022
40.02 Site Utilities, Utility Relocation	3,433	RFT	\$670.86	2,303,065
DETAILS				
Utility Relocation - Allowance	3,433	RTF	\$670.86	2,303,065
40.05 Site Structures Including Retaining Walls, Sound Walls	1	LS	\$1,829,619.90	1,829,620
DETAILS				
Retained Cut Or Fill - Allowance	1	LS	\$1,829,619.90	1,829,620
40.07 Automobile, bus, van accessways including roads, parking lots	1	LS	\$4,329,337.41	4,329,337
Traffic Control	1	LS	\$777,843.26	777,843
DETAILS				
Movement of Traffic (MOT) - Low, Allowance 5% of Guideway Cost (SCC 10)	0	PCT	\$15,556,865.26	777,843
Modification to Existing Intersections	1	LS	\$2,744,429.85	2,744,430
DETAILS				
Modifications to existing road crossing and Intersections, Moderate, - Allowance	3	EA	\$914,809.95	2,744,430

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Lane Replacement	10,400	SF	\$65.51	681,272
Full Depth Pavement Replacement - Asphalt	10,400	SF	\$11.96	124,347
DETAILS				
Selective demolition, saw cutting, asphalt, up to 3" deep	867	L.F.	\$2.01	1,745
Selective demolition, saw cutting, each additional inch of depth over 3"	2,600	L.F.	\$1.17	3,030
Demolish, remove pavement & curb, remove bituminous pavement, 4" to 6" thick, excludes hauling and disposal fees	1,156	S.Y.	\$8.49	9,812
Haul Demolished Debris	289	L.C.Y.	\$13.57	3,921
Fine grading, grade subgrade for base course, roadways	1,156	S.Y.	\$0.79	909
Compaction, riding, vibrating roller, 4 passes, 6" lifts	385	B.C.Y.	\$0.60	232
Compaction, water for, 3,000 gallon truck, 3 mile haul	385	B.C.Y.	\$3.24	1,248
Base course drainage layers, aggregate base course for roadways and large paved areas, stone base, compacted, 3/4" stone base, to 12" deep	1,156	S.Y.	\$23.61	27,283
Haul Base Course Material	501	L.C.Y.	\$13.57	6,797
Plant-mix asphalt paving, pre-treatment for paving, prime coat, emulsion, 0.30 gallons/S.Y., 1000 S.Y.	1,156	S.Y.	\$5.12	5,916
Plant-mix asphalt paving, for highways and large paved areas, binder course, 4" thick, no hauling included	1,156	S.Y.	\$31.13	35,971
Plant-mix asphalt paving, pre-treatment for paving, tack coat, emulsion, 0.10 gallons/S.Y., 1000 S.Y.	1,156	S.Y.	\$2.32	2,684
Plant-mix asphalt paving, for highways and large paved areas, wearing course, 2" thick, no hauling included	1,156	S.Y.	\$17.79	20,554
Haul Paving Material	289	L.C.Y.	\$13.57	3,921
Painted pavement markings, acrylic waterborne, white or yellow, 4" wide, 3,000-16,000 LF	867	L.F.	\$0.37	324
Curb and Gutter	4,000	LF	\$38.68	154,712
DETAILS				
Demolish, remove pavement & curb and gutter, excludes hauling and disposal fees	4,000	L.F.	\$4.56	18,238
Haul Demolished Debris	519	L.C.Y.	\$13.57	7,038
Fine grading, grade subgrade for base course, roadways	1,111	S.Y.	\$0.79	874

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Compaction, riding, vibrating roller, 4 passes, 6" lifts	370	B.C.Y.	\$0.60	223
Compaction, water for, 3,000 gallon truck, 3 mile haul	370	B.C.Y.	\$3.24	1,200
Base course drainage layers, aggregate base course for roadways and large paved areas, stone base, compacted, 3/4" stone base, to 12" deep	1,111	S.Y.	\$23.61	26,235
Haul Base Course Material	481	L.C.Y.	\$13.57	6,535
Cast-in place concrete curbs & gutters, radius, machine formed, 6" high curb, 6" thick gutter, 30" wide, includes concrete	4,000	L.F.	\$23.59	94,368
Curb Inlet/Storm Drain	15	EA	\$11,270.00	169,050
DETAILS				
Selective demolition, manholes & catch basins, manhole or catch basin, precast or brick, over 8' deep, excludes excavation	90	V.L.F.	\$136.79	12,311
Haul Demolished Debris	90	L.C.Y.	\$13.57	1,222
New Curb Inlet/Storm Drain	15	EA	\$4,878.99	73,185
Extend Laterals including excavation - Assume 18" RCP	300	LF	\$182.96	54,889
Connect To Existing	15	EA	\$1,829.62	27,444
Sidewalk	4,000	LF	\$58.29	233,162
DETAILS				
Demolish, remove pavement & curb, remove concrete, mesh reinforced, to 6" thick, hand held equipment, excludes hauling and disposal fees	24,000	S.F.	\$1.34	32,236
Haul Demolished Debris	667	L.C.Y.	\$13.57	9,048
Fine grading, grade subgrade for base course, roadways	2,667	S.Y.	\$0.79	2,097
Compaction, riding, vibrating roller, 4 passes, 6" lifts	889	B.C.Y.	\$0.60	536
Compaction, water for, 3,000 gallon truck, 3 mile haul	889	B.C.Y.	\$3.24	2,881
Base course drainage layers, aggregate base course for roadways and large paved areas, compacted, 3" deep, crushed 3/4" stone base	2,667	S.Y.	\$6.83	18,203
Haul Base Course Material	289	L.C.Y.	\$13.57	3,917
Sidewalks, driveways, and patios, sidewalk, concrete, cast-in-place with 6 x 6 - W1.4 x W1.4 mesh, broomed finish, 3,000 psi, 4" thick, excludes base	24,000	S.F.	\$6.84	164,243
Mill and Overlay Existing Pavement	34,800	SF	\$3.61	125,793
DETAILS				

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Draft Concepts

PROJECT ESTIMATE DETAIL REPORT
BY UNIT PRICE

Estimate Date: 10/15/2024 ; Rev. No. 01
Client: Utah Transit Authority (UTA)
Estimator: B. Frazier, M. Jackson
Checked By: M. Jackson
Charge #:
Doc Scope Date: July 2024

LEVEL DESCRIPTION	QTY	U/M	UNIT PRICE	TOTAL
Cold milling asphalt paving, asphalt pavement, 1" to 3" deep, removal from concrete base, rip, load and sweep, excludes hauling	3,867	S.Y.	\$0.78	3,035
Haul Demolished Debris	419	L.C.Y.	\$13.57	5,684
Plant-mix asphalt paving, pre-treatment for paving, tack coat, emulsion, 0.10 gallons/S.Y., 1000 S.Y.	3,867	S.Y.	\$2.32	8,981
Plant-mix asphalt paving, for highways and large paved areas, wearing course, 3" thick, no hauling included	3,867	S.Y.	\$25.98	100,447
Haul Paving Material	483	L.C.Y.	\$13.57	6,562
Painted pavement markings, acrylic waterborne, white or yellow, 4" wide, 3,000-16,000 LF	2,900	L.F.	\$0.37	1,083
50 Systems	7,311	TF	\$1,860.51	13,602,212
50.01 Train Control and Signals	7,311	TF	\$490.09	3,583,033
DETAILS				
CIH - Interlocking/Intermediate	2	EA	\$248,271.26	568,541
3/4" x 8' lg - copper alloy	9	EA	\$658.77	6,034
Ground wire, bare solid copper, #6	137	FT	\$1.99	274
Mech Conn to Case	9	EA	\$85.48	783
Exothermic Conn to Rod	9	EA	\$240.29	2,201
Test Well for Ground	2	EA	\$152.78	350
Batteries 240 AH	14	EA	\$547.32	7,515
Foundations	9	EA	\$16,749.94	153,429
2-1/c#6 TW PR Track Circuit	2,556	LF	\$290.23	741,824
#6 RHW Stranded wire	183	LF	\$45.03	8,247
CHICKEN HEAD - PIN BOND	31	EA	\$42.79	1,306
SLEEVE SPLICE NICOPRESS	31	EA	\$18.74	572
CADWELD TRACK CONNECTION	31	EA	\$115.60	3,528
Track drill & bits	3	ea	\$248.39	758
Signal head, Number Plate, Mast & Base	5	EA	\$10,909.36	58,256
Structural Steel Support - Fabricated	5	EA	\$6,937.03	37,044
5c#9 Signal Lamp Cable	2,060	LF	\$452.64	932,481
Electric Switch Machine - M3	4	EA	\$55,216.38	210,374
Electric Switch Rod Set - G&W	4	EA	\$36,443.83	138,851
2C#4 - Switch machine	458	LF	\$297.21	136,061
8C#10 - Switch machine	458	LF	\$302.49	138,478
Switch Heat Cabinet & Control Panel	2	EA	\$7,430.05	11,368

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Track Switch Heater / Crib heater & Cal Rod	8	EA	\$6,578.65	50,195
Junction Box	8	EA	\$817.25	6,236
2C#4 - Switch heat	423	LF	\$297.21	125,856
8C#10 - Switch heat	458	LF	\$302.49	138,478
Head Bonds #6	12	EA	\$18.37	224
Head Bonds 250	12	EA	\$25.82	315
LRT Bar Signals, incl. foundation	3	EA	\$30,624.23	93,404
Control switches, push button, maintained contact, button 6 V #12 lamp, w/double block 2NO 2NC w/guard, 600 V 10 A	3	Ea.	\$314.39	959
misc. mat. - allow	9	EA	\$992.46	9,091
50.02 Traffic Signals and Crossing Protection - Semi Exclusive ROW	3	EA	\$597,855.19	1,793,566
Crossing Protection - Semi Exclusive ROW	3	EA	\$109,956.55	329,870
DETAILS				
LRT Bar Signals, incl. foundation	6	EA	\$30,604.44	183,627
9c#9 signal lighting cable	750	LF	\$16.31	12,231
Rail Traffic Loop Detection System, Feeds Traffic Signal Controller	3	EA	\$44,670.62	134,012
Traffic Signals	3	EA	\$487,898.64	1,463,696
DETAILS				
Traffic signals, single direction allowance - engineering, materials, installation, and testing	3	EA	\$487,898.64	1,463,696
50.03 Traction Power Supply: Substation	7,311	TF	\$177.62	1,298,598
Traction Power Distribution	7,311	TF	\$177.62	1,298,598
DETAILS				
Substation Power Cubicle - Assume 10,375 TF spacing	1	EA	\$659,983.09	488,387
Impedance Bond (4) each location per track: Assume 10,375' spacing	3	EA	\$29,510.21	87,055

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LEVEL DESCRIPTION	QTY	U/M	UNIT PRICE	TOTAL
Medium-cable single cable, copper, negative return, 350 kcmil, in conduit, excsplicing & terminations	13	C.L.F.	\$2,668.25	34,661
Medium-cable single cable, copper, positive feeders, 500 kcmil, in conduit, excl splicing & terminations	31	C.L.F.	\$3,088.20	95,672
Cable terminations, insulation diameter range, 350 KCMIL & 500 KCMIL	127	EA	\$598.75	75,981
PIN CONN - CABLE TO RAIL (8 required per location)	6	EA	\$199.78	1,181
Signal and Traction Power Boxes	6	EA	\$3,514.61	20,771
Elastomer Grout, transition at signal and traction box, place material by pump and pressurize	13	C.F.	\$230.61	3,065
Disconnecting switches, single pole switches, 13 to 26 kV	2	EA	\$6,902.70	15,255
Enclosure panels, 84" x 46", NEMA 12 & 4	2	EA	\$29,137.43	64,394
Structural concrete, in place, equipment pad (3000 psi), 8' x 8' x 10", includes forms(4 uses), Grade 60 rebar, concrete (Portland cement Type I), placing and finishing	1	EA	\$952.52	705
Electrical underground ducts and manholes, PVC, with DB coupling, schedule 80, 4" diameter, installed by direct burial in slab or duct bank, excludes excavation, backfill and cast in place concrete	11,569	L.F.	\$33.93	392,514
Electrical underground ducts and manholes, bell end and plug, PVC, schedule 80, 4" diameter, installed by direct burial in slab or duct bank, excludes excavation, backfill and cast in place concrete	41	EA	\$73.98	3,057
Electrical underground ducts and manholes, 90° elbows, PVC, schedule 80, 4" diameter, installed by direct burial in slab or duct bank, excludes excavation, backfill and cast in place concrete	30	EA	\$115.17	3,399
Electrical underground ducts and manholes, 45° elbows, PVC, schedule 80, 4" diameter, installed by direct burial in slab or duct bank, excludes excavation, backfill and cast in place concrete	6	EA	\$115.07	680
Electrical underground ducts and manholes, base spacer, PVC, schedule 80, 4" diameter, installed by direct burial in slab or duct bank, excludes excavation, backfill and cast in place concrete	620	EA	\$19.07	11,821
50.04 Traction power distribution: Catenary and third rail	3,433	RFT	\$1,907.98	6,550,091
Foundations	3,433	RFT	\$144.19	495,008
<u>DETAILS</u>				
Fixed end caisson piles, for mobilization, 50 mile radius	1	Ea.	\$2,421.29	1,646

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Fixed end caisson piles, open style in stable ground, to 10' deep, 36" diameter,	349	V.L.F.	\$32.87	11,478
Casing left in place	49,934	Lb.	\$3.31	165,266
Reinforcing steel, in place, #3 to #7, A615, grade 60 - #4 Ties	2	Ton	\$4,487.20	8,840
Reinforcing steel, in place, #8 to #18, A615, grade 60 - #9 Vertical Bars	11	Ton	\$3,743.14	40,014
Structural concrete, ready mix, heavyweight, 4000 psi, includes local aggregate, sand, Portland cement (Type I) and water, delivered, excludes all additives and treatments	250	C.Y.	\$268.08	66,997
Structural concrete, placing, pumped, over 5 C.Y., includes leveling (strike off) & consolidation, excludes material	250	C.Y.	\$23.52	5,878
Cut Casing	35	EA	\$1,643.45	57,389
Load Surplus	286	L.C.Y.	\$2.50	715
Haul Surplus Materials Off Site	286	L.C.Y.	\$18.13	5,177
Embedment Plate Assembly	2,622	LBS	\$4.14	10,849
Anchor Bolt Template	5,047	LBS	\$4.14	20,879
Anchor Bolt - 2" x 8'-0" Long	279	EA	\$124.11	34,671
Hex Nuts	1,397	EA	\$16.55	23,114
Plate Washers	559	EA	\$4.14	2,311
Standard Washers	559	EA	\$4.14	2,311
Set Foundation Imbeds, Plates, Template, Bolts, etc.	35	Sets	\$549.90	19,202
Grounding Assembly, cable, clamps, Lugs - Allow	35	Sets	\$248.22	8,668
Set Grounding Assembly	35	Sets	\$274.95	9,601
Catenary Structures	3,433	RFT	\$1,205.34	4,137,935
DETAILS				
Electrical utility pole, catenary, galvanized steel, round, 25	35	EA	\$57,917.65	2,022,484
Cantilever Assemblies	70	EA	\$2,482.18	173,356
Other Misc. Assemblies	70	EA	\$3,971.50	277,369
Pre-assembly Cantilever Assemblies	70	EA	\$11,918.14	832,363
Erect Catenary Frames (Pole + Assemblies.)	35	EA	\$23,836.27	832,363
OCS O/H Conductors	3,433	RFT	\$330.08	1,133,172
DETAILS				
Overhead line conductors & devices, per wire,500 kcmil, messenger wire	1	Mile	\$41,059.79	53,378
Overhead line conductors & devices, per wire, 350 kcmil grooved, contact wire	1	Mile	\$41,059.79	53,378
1" 37 STRAND GALV. E.H.S - GUY WIRE	1	Mile	\$9,935.92	12,917

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LEVEL DESCRIPTION	QTY	U/M	UNIT PRICE	TOTAL
Overhead line conductors & devices, protective devices, allow 6 per span per track	411	Ea.	\$2,120.82	871,253
Flexible Hangar Assy, Multiple, assume 100' span typical, average 8 ea.@ 1.6' =12.76' hanger per 100' Span, one track	548	Ea.	\$144.29	79,036
Continuity Jumper allow 50 spans @ 4 per span per track	274	EA	\$230.81	63,212
Rail Equipment	1	LS	\$1,152,905.96	783,976
DETAILS				
Flatcar (2)	16	Months	\$29,791.55	489,475
High Rail Crane - 22 Tons (2)	16	Months	\$17,924.58	294,501
50.05 Communications	3,433	RFT	\$109.79	376,925
DETAILS				
Electrical underground ducts and manholes, PVC, with DB coupling, schedule 80, 1-1/2" diameter, installed by direct burial in slab or duct bank, excludes excavation, backfill and cast in place concrete	13,713	L.F.	\$9.06	124,223
Electrical underground ducts and manholes, bell end and cap, PVC, schedule 80, 1-1/2" diameter, installed by direct burial in slab or duct bank, excludes excavation, backfill and cast in place concrete	21	Ea.	\$38.80	824
Electrical underground ducts and manholes, elbows, PVC, schedule 80, 1-1/2" diameter, installed by direct burial in slab or duct bank, excludes excavation, backfill and cast in place concrete	21	Ea.	\$44.28	940
Electrical underground ducts and manholes, PVC, with DB coupling, schedule 80, 2" diameter, installed by direct burial in slab or duct bank, excludes excavation, backfill and cast in place concrete	2,124	L.F.	\$11.56	24,547
Electrical underground ducts and manholes, elbows, PVC, schedule 80, 2" diameter, installed by direct burial in slab or duct bank, excludes excavation, backfill and cast in place concrete	42	Ea.	\$58.96	2,503
Electrical underground ducts and manholes, bell end and plug, PVC, schedule 80, 2" diameter, installed by direct burial in slab or duct bank, excludes excavation, backfill and cast in place concrete	42	Ea.	\$45.48	1,930
Electrical underground ducts and manholes, base spacer, PVC, schedule 80, 2" diameter, installed by direct burial in slab or duct bank, excludes excavation, backfill and cast in place concrete	3,428	Ea.	\$18.28	62,667
Fiber optic cable, 24 strand, single mode, indoor/outdoor	8	M.L.F.	\$7,139.81	60,403

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LEVEL DESCRIPTION	QTY	U/M	UNIT PRICE	TOTAL
Fiber optic patch panel, 24 ports, stations, crossings, intersections, interlockings, TPSS, interlockings, headquarters building	9	Ea.	\$814.69	6,982
Fiber optic patch panel, 24 ports, stations, crossings, intersections, interlockings, headquarters building	9	Ea.	\$156.87	1,344
Fiber optic cable, 48 strand, single mode, indoor/outdoor	7	M.L.F.	\$7,141.96	51,851
Fiber optic patch panel, 48 ports, stations, headquarters building	2	Ea.	\$816.71	1,674
Fiber optic patch panel, 48 ports, stations, headquarters building	2	Ea.	\$188.27	386
Fiber optics cable enclosure, splice w/enclosure encapsulant	11	Ea.	\$618.51	6,569
Switching and routing equipment, network switch, 10/100/1000 Mbps, 8 port, industrial ethernet type	11	Ea.	\$2,832.50	30,081
40 Sitework & Special Conditions	1	LS	\$26,956,707.43	26,956,707
40.08 Temporary Facilities and other indirect costs during construction	1	LS	\$26,956,707.43	26,956,707
DETAILS				
Indirect Cost - Allow 12%	0	PCT	\$224,639,228.59	26,956,707
50 Systems	1	LS	\$3,659,239.80	3,659,240
50.03 Traction power supply: substations	1	LS	\$1,219,746.60	1,219,747
DETAILS				
Substations - Allow	2	EA	\$609,873.30	1,219,747
50.07 Central Control	1	LS	\$2,439,493.20	2,439,493
DETAILS				
Modifications to Central Control - Allow	1	LS	\$2,439,493.20	2,439,493
60 ROW, Land, Existing Improvements	1	LS	\$10,213,569.01	10,213,569
DETAILS				
Land Acquisition, Purple Segment - Allow	1	Acres	\$3,943,622.31	3,312,643
Land Acquisition, Dark Green Segment - Allow	1	Acres	\$6,882,643.30	4,817,850
Land Acquisition, Brown Segment - Allow	0	Acres	\$4,307,865.43	1,507,753
Land Acquisition, Orange Segment - Allow	2	Acres	\$348,680.64	575,323
70 Vehicles	4	EA	\$6,000,000.00	24,000,000
DETAILS				

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LEVEL DESCRIPTION	QTY	U/M	UNIT PRICE	TOTAL
81' Light Rail Vehicle	4	EA	\$6,000,000.00	24,000,000
80 Professional Services - (Applies to SCC 10-50)	1	LS	\$75,478,781.10	75,478,781
DETAILS				
Project Development - 3%	0	PCT	\$251,595,937.00	7,547,878
Engineering - 7%	0	PCT	\$251,595,937.00	17,611,716
Project Management for Design and Construction - 5%	0	PCT	\$251,595,937.00	12,579,797
Construction Administration & Management - 6%	0	PCT	\$251,595,937.00	15,095,756
Professional Liability and other Non-Construction Insurance - 3%	0	PCT	\$251,595,937.00	7,547,878
Legal, Permits, Review Fees by other agencies, cities, etc. - 2%	0	PCT	\$251,595,937.00	5,031,919
Surveys, Testing, Investigation, Inspection - 2%	0	PCT	\$251,595,937.00	5,031,919
Start up - 2%	0	PCT	\$251,595,937.00	5,031,919



Opinion Of Probable Cost Report December 18, 2024

Appendix



Opinion Of Probable Cost Report December 18, 2024

ROW Estimate

Right of Way (ROW) Cost Basis

Corridor	Group	Parcels	PARCEL NUMBER	OWNER NAME (verified with County)	PROPERTY ADDRESS	ZONED	Estimated PRICE PER SQ FT.	PARCEL PE AREA (sq ft)	PARCEL TCE AREA (sq ft)	FEE Estimate	PE Estimate 90% of Value	TCE Estimate 10% of Value	Cost of Land/Easements Estimate Total	Estimated Improvements Acquired (\$4.00 per square foot)	Estimated Cost to Cure (\$8.00 per square foot)	Total Original Estimated Cost for Parcel Acquisition/Relocation	PARCEL PE AREA (ACRES)	
600 W	West Side	PUR-01	15-01-501-004-0000	UNION PACIFIC RAILROAD COMPANY	606 W 600 S, Salt Lake City, UT 84101	905: Vacant Land-Comm	\$70.00	16,925		\$0	\$1,066,275	\$0	\$1,066,275	\$0	\$135,400	\$1,201,675	0.39	
400 S (West to East)	North Side (600 W-500 W)	PUR-02	15-01-302-008-0000	UNIVERSITY OF UTAH RESEARCH FOUNDATION	570 W 400 S, Salt Lake City, UT 84101	550: Ind-Light-Mfg	\$85.00	3,174		\$0	\$242,790	\$0	\$242,790	\$0	\$25,390	\$268,180	0.07	
		PUR-03	15-01-302-009-0000	UNIVERSITY OF UTAH RESEARCH FOUNDATION	570 W 400 S, Salt Lake City, UT 84101	915: Associated Industrial	\$85.00	1,016		\$0	\$77,719	\$0	\$77,719	\$0	\$8,127	\$85,846	0.02	
		PUR-04	15-01-302-010-0000	UNIVERSITY OF UTAH RESEARCH FOUNDATION	570 W 400 S, Salt Lake City, UT 84101	915: Associated Industrial	\$85.00	1,195		\$0	\$91,417	\$0	\$91,417	\$0	\$9,560	\$100,977	0.03	
		PUR-05	15-01-302-011-0000	UNIVERSITY OF UTAH RESEARCH FOUNDATION	550 W 400 S, Salt Lake City, UT 84101	537: Service Garage	\$85.00	922		\$0	\$70,552	\$0	\$70,552	\$0	\$7,378	\$77,930	0.02	
		PUR-06	15-01-302-012-0000	UNIVERSITY OF UTAH RESEARCH FOUNDATION	550 W 400 S, Salt Lake City, UT 84101	902: Vacant Lot-Ind	\$85.00	971		\$0	\$74,272	\$0	\$74,272	\$0	\$7,767	\$82,039	0.02	
		PUR-07	15-01-302-013-0000	UNIVERSITY OF UTAH RESEARCH FOUNDATION	570 W 400 S, Salt Lake City, UT 84101	902: Vacant Lot-Ind	\$85.00	982		\$0	\$75,103	\$0	\$75,103	\$0	\$7,854	\$82,957	0.02	
		PUR-08	15-01-302-017-0000	REDEVELOPMENT AGENCY OF SALT LAKE CITY	540 W 400 S, Salt Lake City, UT 84101	905: Vacant Land-Comm	\$150.00	1,760		\$0	\$237,571	\$0	\$237,571	\$0	\$14,078	\$251,649	0.04	
		PUR-09	15-01-302-021-0000	REDEVELOPMENT AGENCY OF SALT LAKE CITY	346 S 500 W, Salt Lake City, UT 84101	905: Vacant Land-Comm	\$150.00	2,250		\$0	\$303,685	\$0	\$303,685	\$0	\$17,996	\$321,681	0.05	
		PUR-10	15-01-302-022-0000	REDEVELOPMENT AGENCY OF SALT LAKE CITY	336 S 500 W, Salt Lake City, UT 84101	550: Ind-Light-Mfg	\$150.00	4,231		\$0	\$571,232	\$0	\$571,232	\$0	\$33,851	\$605,083	0.10	
		South Side (500 W-400 W)	PUR-11	15-01-329-001-0000	PACKAGING CORPORATION OF AMERICA	473 W 400 S, Salt Lake City, UT 84101	905: Vacant Land-Comm	\$70.00	596		\$0	\$37,551	\$0	\$37,551	\$0	\$4,768	\$42,319	0.01
	PUR-12		15-01-329-003-0000	PACKAGING CORPORATION OF AMERICA	475 W 400 S, Salt Lake City, UT 84101	915: Associated Industrial	\$70.00	2,709		\$0	\$170,650	\$0	\$170,650	\$0	\$21,670	\$192,320	0.06	
	TOTAL PURPLE:																\$3,312,655	TOTAL PURPLE (acres):

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Corridor	Group	Parcels	PARCEL NUMBER	OWNER NAME (verified with County)	PROPERTY ADDRESS	ZONED	Estimated PRICE PER SQ FT.	PARCEL PE AREA (sq ft)	PARCEL TCE AREA (sq ft)	FEE Estimate	PE Estimate 90% of Value	TCE Estimate 10% of Value	Cost of Land/Easements Estimate Total	Estimated Improvements Acquired (\$4.00 per square foot)	Estimated Cost to Cure (\$8.00 per square foot)	Total Original Estimated Cost for Parcel Acquisition/Relocation	PARCEL PE AREA (ACRES)
400 S (West to East)	South Side (400 W-300 W)	DG-01	15-01-404-001-0000	LEDALO LLC	321 W 400 S, Salt Lake City, UT 84101	550: Ind-Light-Mfg	\$85.00	992		\$0	\$75,909	\$0	\$75,909	\$0	\$7,938	\$83,847	0.02
		DG-02	15-01-404-002-0000	LEDALO LLC	315 W 400 S, Salt Lake City, UT 84101	915: Associated Industrial	\$85.00	486		\$0	\$37,182	\$0	\$37,182	\$0	\$3,888	\$41,070	0.01
		DG-03	15-01-404-003-0000	400 MAZIK LLC	404 S 300 W, Salt Lake City, UT 84101	584: Retail Service	\$130.00	1,090		\$0	\$127,578	\$0	\$127,578	\$0	\$8,723	\$136,301	0.03
	North Side (200 W-W Temp)	DG-04	15-01-428-014-0000	KA SLC DOWNTOWN, LLC	130 W 400 S, Salt Lake City, UT 84101	548: Hotel-Limited	\$85.00	33		\$0	\$2,495	\$0	\$2,495	\$0	\$261	\$2,755	0.00
		DG-05	15-01-428-015-0000	KA SLC DOWNTOWN, LLC	130 W 400 S, Salt Lake City, UT 84101	919: VAC ASSC HOTEL	\$85.00	924		\$0	\$70,696	\$0	\$70,696	\$0	\$7,393	\$78,090	0.02
		DG-06	15-01-428-030-0000	370-390 SOUTH WEST TEMPLE CONDOMINIUM OA INC	370 S WESTTEMPLE ST, Salt Lake City, UT 84101	700: Common Area	\$150.00	2,865		\$0	\$386,733	\$0	\$386,733	\$0	\$22,917	\$409,650	0.07
	South Side (200 W-W Temp)	DG-07	15-01-429-001-0000	150 WEST, LLC ET AL	150 W 500 S, Salt Lake City, UT 84101	905: Vacant Land-Comm	\$120.00	3,614		\$0	\$390,267	\$0	\$390,267	\$0	\$28,909	\$419,175	0.08
		DG-08	15-01-429-002-0000	150 WEST, LLC ET AL	150 W 500 S, Salt Lake City, UT 84101	919: VAC ASSC HOTEL	\$120.00	907		\$0	\$97,971	\$0	\$97,971	\$0	\$7,257	\$105,228	0.02
		DG-09	15-01-429-003-0000	SLC 150 W 500 S, LLC	150 W 500 S, Salt Lake City, UT 84101	919: VAC ASSC HOTEL	\$120.00	1,849		\$0	\$199,658	\$0	\$199,658	\$0	\$14,789	\$214,447	0.04
		DG-10	15-01-429-004-0000	SLC 150 W 500 S, LLC	150 W 500 S, Salt Lake City, UT 84101	919: VAC ASSC HOTEL	\$120.00	466		\$0	\$50,373	\$0	\$50,373	\$0	\$3,731	\$54,104	0.01
		DG-11	15-01-429-005-0000	SLC 150 W 500 S, LLC	150 W 500 S, Salt Lake City, UT 84101	919: VAC ASSC HOTEL	\$120.00	19		\$0	\$2,004	\$0	\$2,004	\$0	\$148	\$2,153	0.00
		DG-12	15-01-432-008-0000	PROPERTY RESERVE, INC	79 W 400 S, Salt Lake City, UT 84101	904: Comm-Parkg Lot	\$200.00	2,233		\$0	\$401,881	\$0	\$401,881	\$0	\$17,861	\$419,743	0.05
		DG-13	15-01-432-009-0000	PROPERTY RESERVE, INC	65 W 400 S, Salt Lake City, UT 84101	904: Comm-Parkg Lot	\$200.00	2,175		\$0	\$391,501	\$0	\$391,501	\$0	\$17,400	\$408,901	0.05

Right of Way (ROW) Cost Basis

Corridor	Group	Parcels	PARCEL NUMBER	OWNER NAME (verified with County)	PROPERTY ADDRESS	ZONED	Estimated PRICE PER SQ FT.	PARCEL PE AREA (sq ft)	PARCEL TCE AREA (sq ft)	FEE Estimate	PE Estimate 90% of Value	TCE Estimate 10% of Value	Cost of Land/Easements Estimate Total	Estimated Improvements Acquired (\$4.00 per square foot)	Estimated Cost to Cure (\$8.00 per square foot)	Total Original Estimated Cost for Parcel Acquisition/Relocation	PARCEL PE AREA (ACRES)
	South Side (W Temp - Main)	DG-14	15-01-432-004-0000	CITY CREEK RESERVE, INC	55 W 400 S, Salt Lake City, UT 84101	904: Comm-Parkg Lot	\$200.00	1,466		\$0	\$263,966	\$0	\$263,966	\$0	\$11,732	\$275,698	0.03
		DG-15	15-01-432-005-0000	CITY CREEK RESERVE, INC	39 W 400 S, Salt Lake City, UT 84101	905: Vacant Land-Comm	\$200.00	2,381		\$0	\$428,574	\$0	\$428,574	\$0	\$19,048	\$447,622	0.05
		DG-16	15-01-432-006-0000	CITY CREEK RESERVE, INC	27 W 400 S, Salt Lake City, UT 84101	904: Comm-Parkg Lot	\$200.00	3,644		\$0	\$655,930	\$0	\$655,930	\$0	\$29,152	\$685,083	0.08
		DG-17	15-01-432-007-0000	CITY CREEK RESERVE, INC	23 W 400 S, Salt Lake City, UT 84101	904: Comm-Parkg Lot	\$200.00	1,697		\$0	\$305,489	\$0	\$305,489	\$0	\$13,577	\$319,066	0.04
		DG-18	15-01-433-004-0000	CITY CREEK RESERVE, INC	410 S MAIN ST, Salt Lake City, UT 84101	904: Comm-Parkg Lot	\$200.00	3,803		\$0	\$684,520	\$0	\$684,520	\$0	\$30,423	\$714,943	0.09

TOTAL DARK GREEN: **TOTAL DARK GREEN (acres):**
 \$4,817,877 0.70

Right of Way (ROW) Cost Basis

Corridor	Group	Parcels	PARCEL NUMBER	OWNER NAME (verified with County)	PROPERTY ADDRESS	ZONED	Estimated PRICE PER SQ FT.	PARCEL PE AREA (sq ft)	PARCEL TCE AREA (sq ft)	FEE Estimate	PE Estimate 90% of Value	TCE Estimate 10% of Value	Cost of Land/Easements Estimate Total	Estimated Improvements Acquired (\$4.00 per square foot)	Estimated Cost to Cure (\$8.00 per square foot)	Total Original Estimated Cost for Parcel Acquisition/Relocation	PARCEL PE AREA (ACRES)
Ballpark Spur	SW Quad of 400 W & 900 S	BN-01	15-12-180-025-0000	RUECO, LLC	919 S 400 W	905: Vacant Land-Comm	\$70.00	12,328		\$0	\$776,692	\$0	\$776,692	\$0	\$98,628	\$875,320	0.28
		BN-02	15-12-180-024-0000	AMERICAN PHOENIX, LLC	372 W AMERICAN AVE	594: Storage Warehouse	\$70.00	2,205	3,000	\$0	\$138,940	\$21,000	\$159,940	\$200,000	\$41,643	\$601,583	0.05
	NW Quad of 200 W & Paxton	BN-03	15-12-456-001-0000	JOHNSON, LISA; TR (EZE FAM REV TRUST)	1112 S 200 W	915: Associated Industrial	\$50.00	582		\$0	\$26,178	\$0	\$26,178	\$0	\$4,654	\$30,832	0.01
TOTAL BROWN:																\$1,507,734	0.35

Right of Way (ROW) Cost Basis

Corridor	Group	Parcels	PARCEL NUMBER	OWNER NAME (verified with County)	PROPERTY ADDRESS	ZONED	Estimated PRICE PER SQ FT.	PARCEL PE AREA (sq ft)	PARCEL TCE AREA (sq ft)	FEE Estimate	PE Estimate 90% of Value	TCE Estimate 10% of Value	Cost of Land/Easements Estimate Total	Estimated Improvements Acquired (\$4.00 per square foot)	Estimated Cost to Cure (\$8.00 per square foot)	Total Original Estimated Cost for Parcel Acquisition/Relocation	PARCEL PE AREA (ACRES)	
500 S (West to East)	North Side (Univ St-Guards man)	RD-01	16-04-304-001-0000	UNIVERSITY OF UTAH	101 S WASATCH DR	954: School	\$0.00	66,436			\$0	\$0	\$0	\$0	\$0	\$531,490	\$531,490	1.53
		RD-02	16-04-326-001-0000	UNIVERSITY OF UTAH	1575 E 500 S	954: School	\$0.00	18,593			\$0	\$0	\$0	\$0	\$0	\$148,747	\$148,747	0.43
	South Side (Univ St-Guards man)	RD-03	16-04-353-001-0000	MOUNT OLIVET CEMETERY	1342 E 500 S	961: CEMETERY	\$70.00	6,301	2,600		\$0	\$396,977	\$18,200	\$415,177	\$0	\$71,210	\$486,386	0.14
		RD-04	16-04-376-003-0000	UNITED STATES OF AMERICA	1578 E 500 S	953: Gov Bldg / Land	\$70.00	10,358	800		\$0	\$652,573	\$5,600	\$658,173	\$0	\$89,266	\$747,439	0.24
		RD-05	16-04-376-004-0000	DIVISION OF STATE LANDS & FORESTRY	592 S GUARDSMAN WY	953: Gov Bldg / Land	\$0.00	4,510	400		\$0	\$0	\$0	\$0	\$0	\$39,282	\$39,282	0.10
	North Side (Guards man-1725 E)	RD-06	16-04-326-001-0000	UNIVERSITY OF UTAH	1575 E 500 S	954: School	\$70.00	7,321			\$0	\$461,243	\$0	\$461,243	\$0	\$58,571	\$519,814	0.17
		RD-07	16-04-200-002-0000	UNIVERSITY OF UTAH	110 S FORT DOUGLAS BLVD	954: School	\$0.00	11,449			\$0	\$0	\$0	\$0	\$0	\$91,590	\$91,590	0.26
	South Side (e/o Guards man)	RD-08	16-04-377-002-2000	STATE OF UTAH	595 S GUARDSMAN WY	953: Gov Bldg / Land	\$70.00	678			\$0	\$42,728	\$0	\$42,728	\$0	\$5,426	\$48,154	0.02
TOTAL RED:																\$2,612,902	TOTAL RED (acres):	2.88

Right of Way (ROW) Cost Basis

Corridor	Group	Parcels	PARCEL NUMBER	OWNER NAME (verified with County)	PROPERTY ADDRESS	ZONED	Estimated PRICE PER SQ FT.	PARCEL PE AREA (sq ft)	PARCEL TCE AREA (sq ft)	FEE Estimate	PE Estimate 90% of Value	TCE Estimate 10% of Value	Cost of Land/Easements Estimate Total	Estimated Improvements Acquired (\$4.00 per square foot)	Estimated Cost to Cure (\$8.00 per square foot)	Total Original Estimated Cost for Parcel Acquisition/Relocation	PARCEL PE AREA (ACRES)	
Arapeen Connector	Mario to Pollock	OR-01	16-03-100-008-0000	UNITED STATES OF AMERICA	295 S WASATCH DR	504: Apt Mixed	\$0.00	50,093		\$0	\$0	\$0	\$0	\$0	\$400,747	\$400,747	1.15	
	East Red Butte to Wakara	OR-02	16-03-300-002-2000	UNIVERSITY OF UTAH	480 S WAKARA WY	954: School	\$0.00	5,175		\$0	\$0	\$0	\$0	\$0	\$41,401	\$41,401	0.12	
	West Red Butte to Wakara	OR-03	16-03-300-002-6021	UNIVERSITY OF UTAH	438 S WAKARA WY	919-VAC ASSC-HOTEL	\$0.00	16,647		\$0	\$0	\$0	\$0	\$0	\$133,174	\$133,174	0.38	
TOTAL ORANGE:																\$575,323	TOTAL ORANGE (acres):	1.65
Total Alt 1 & 2:																\$10,213,589		3.54
Total Alt 3 (no purple)																\$6,900,934		2.70
Total Alt 4																\$12,826,491		6.43



Opinion Of Probable Cost Report December 18, 2024

Vehicle Assumptions

Excerpt from “UTA Light Rail Strategic Plan: Future of Light Rail Study” dated January 2023

Table 6 - Projected Light Rail Strategic Plan Fleet Requirements						
Service	Future Baseline		Strategic Plan (Full - RTP Phase 3)		Strategic Plan (Interim - RTP Phase 2)	
	Trains	Cars/Train	Trains	Cars/Train	Trains	Cars/Train
Blue Line	11	4	10	3	10	3
Red Line	12	4	10	3	10	3
Green Line	8	2	7	2	7	3
Orange Line	--	0	8	3	4	3
S-Line Streetcar	2	1	2	1	2	1
Total Peak Cars	110		100		95	
Total Fleet Requirement (with 20% Spares)	133		121		115	
New Cars Required	16		4		(2)	