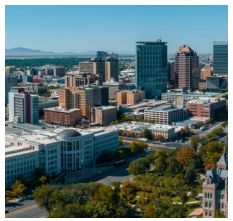
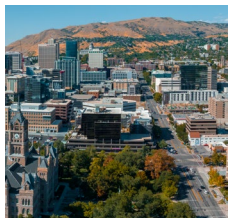
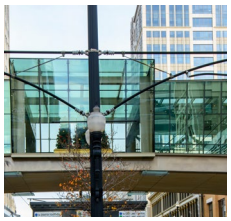
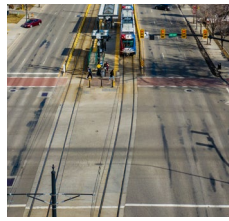
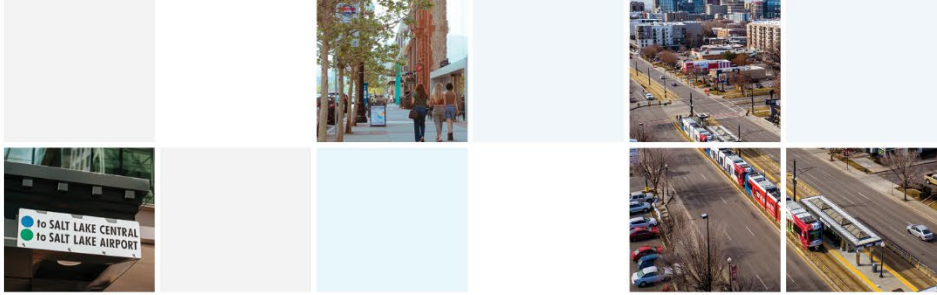


APPENDIX G:
ALTERNATIVES EVALUATION REPORT





TechLink TRAX Study

Alternatives Evaluation Report
November 2024

Prepared for

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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.

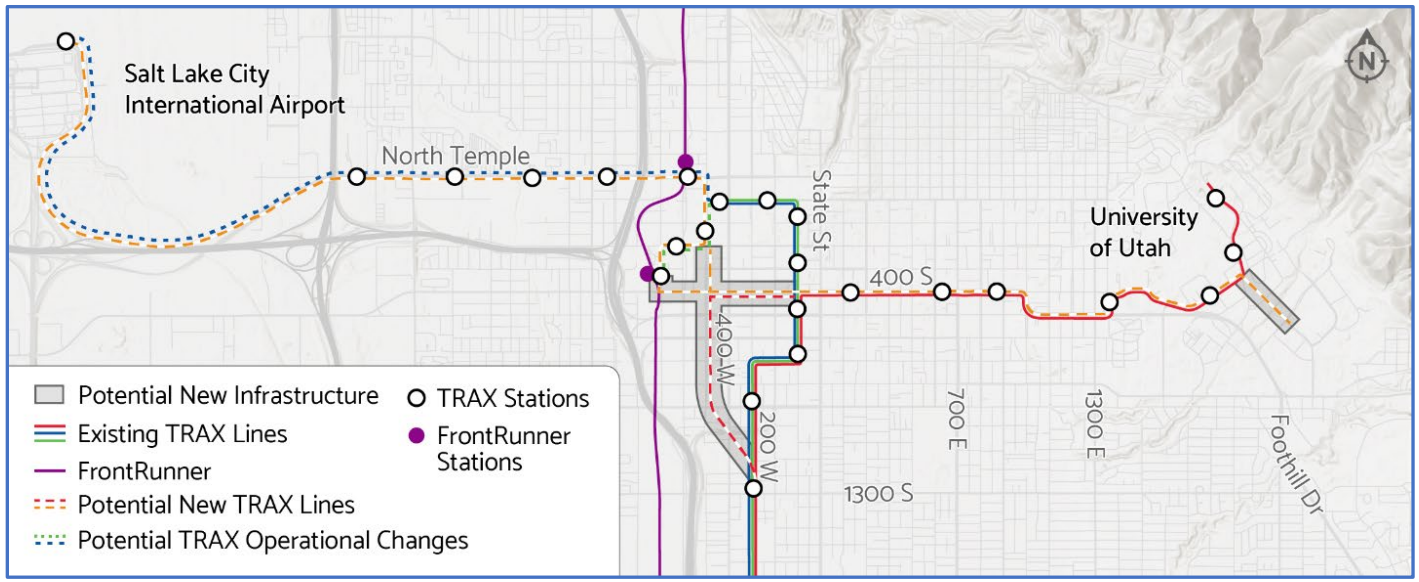


Figure 1. TechLink TRAX Study Area

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.

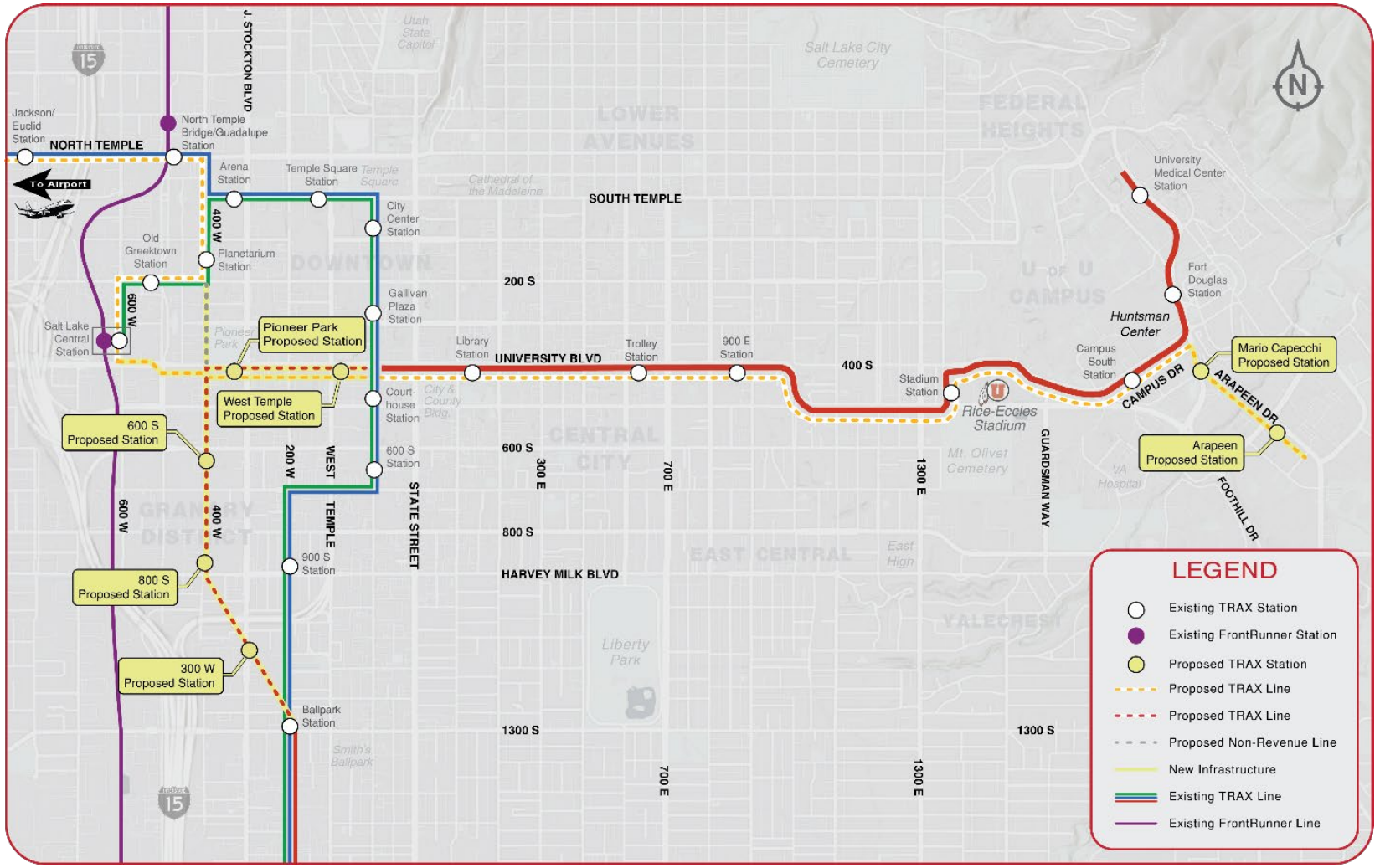


Figure 2. Alternative 1 - Future of Light Rail Baseline

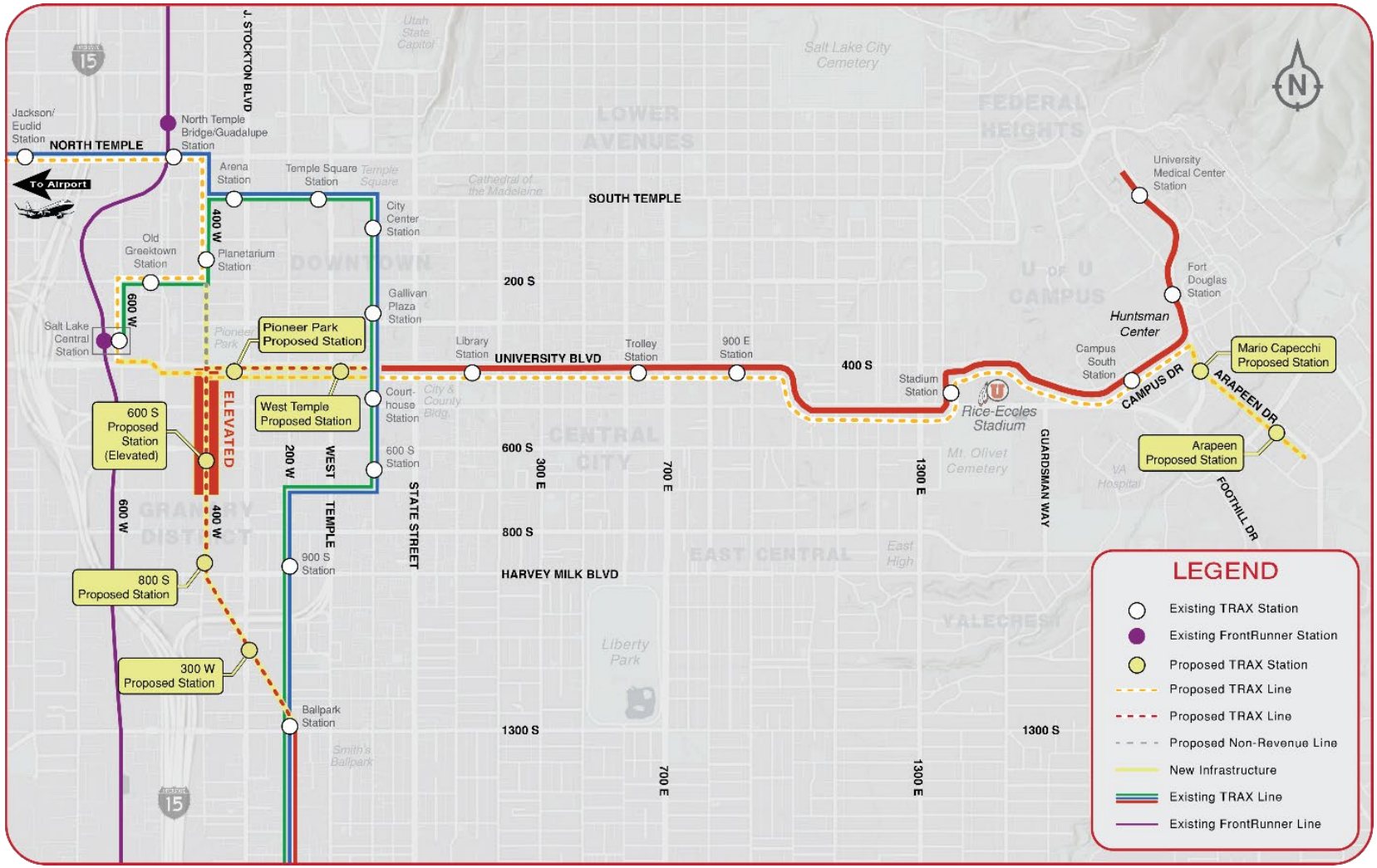


Figure 3. Alternative 2 - Elevated on 400 West

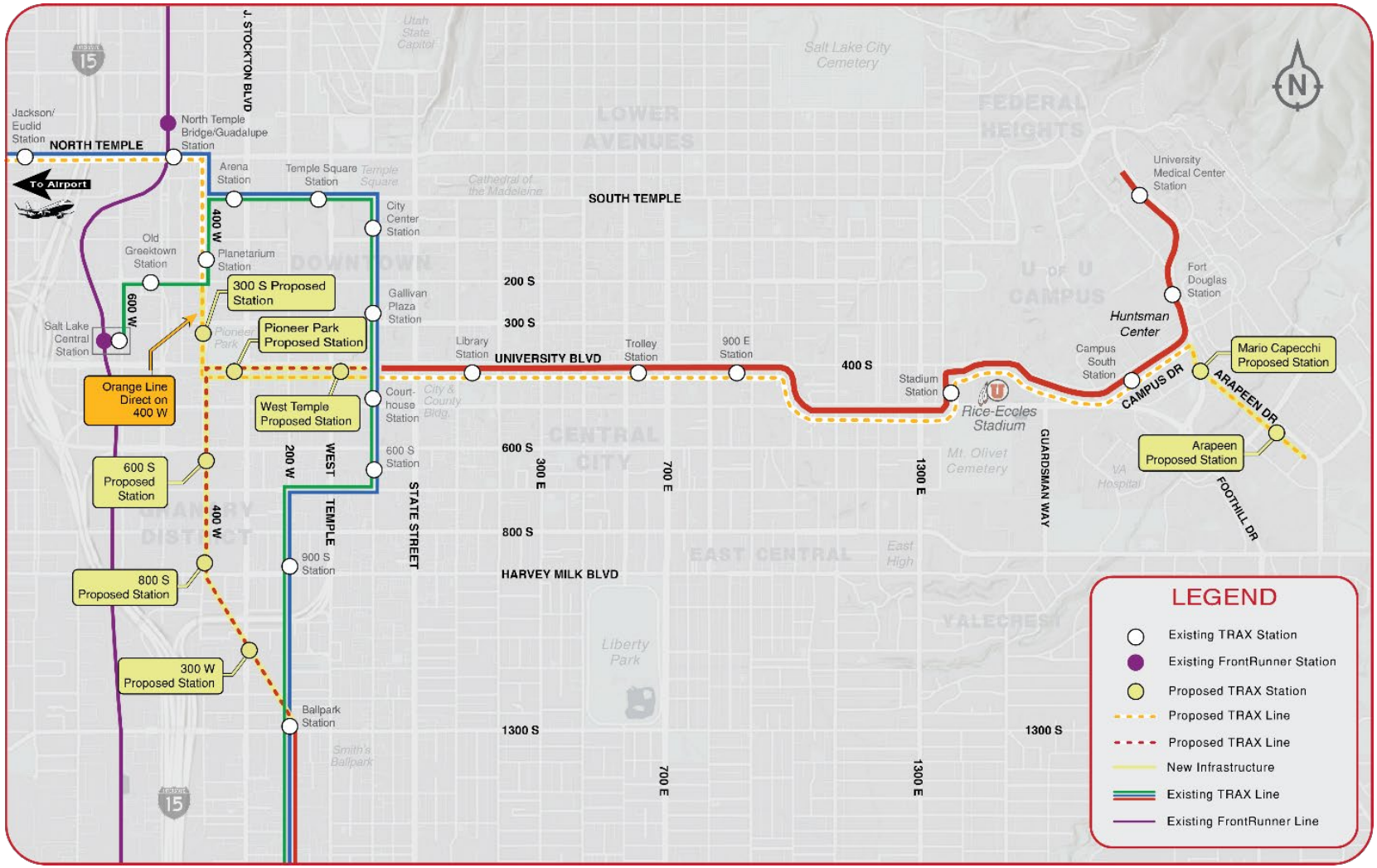


Figure 4. Alternative 3 - Direct on 400 West

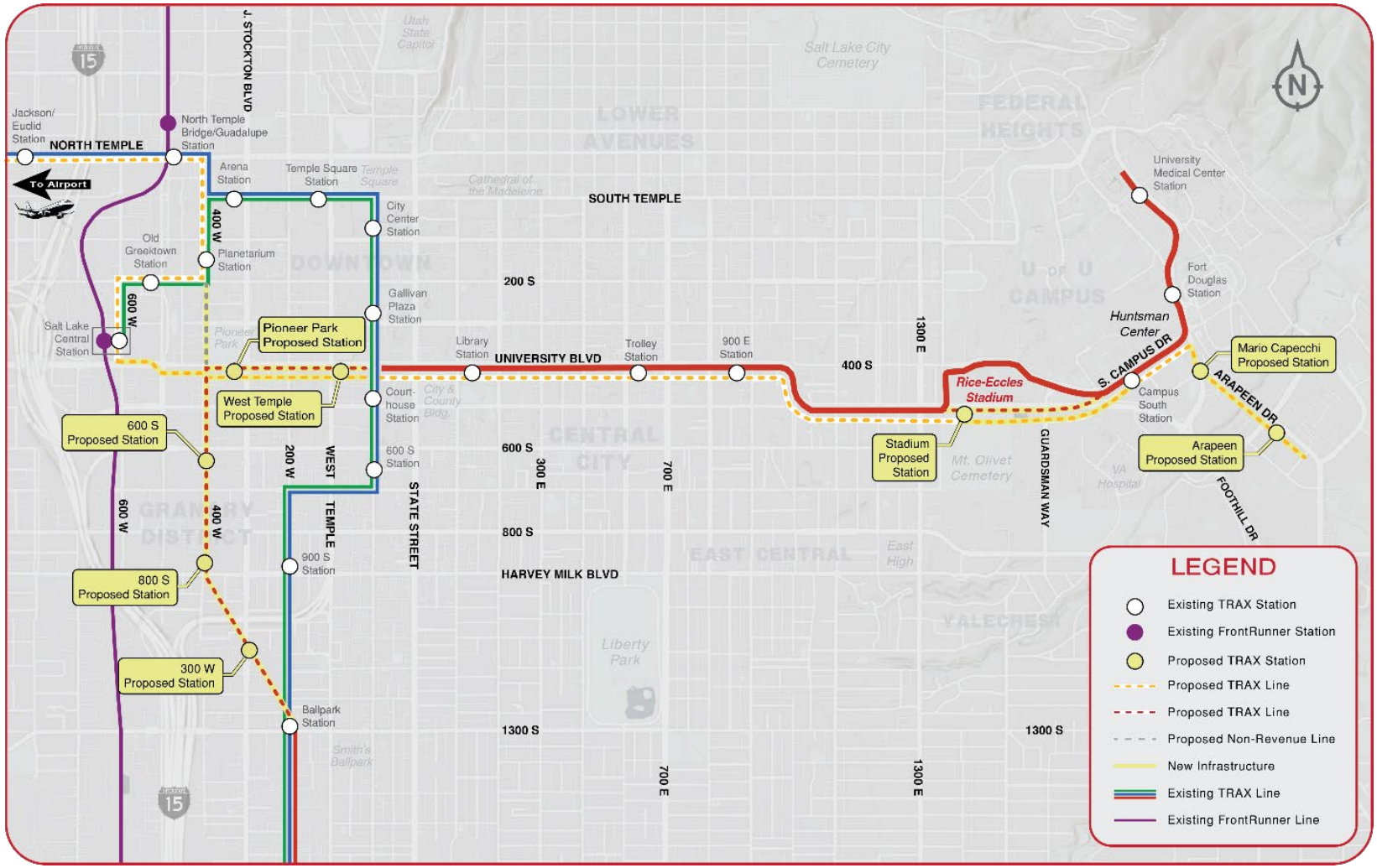


Figure 5. Alternative 4 – University of Utah Realignment

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: • 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	• 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	• 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	▪ Orange Line travel time: 4 minutes slower ▪ Similar for other lines	▪ Orange Line travel time: 4 minutes slower ▪ Similar for other lines	▪ Orange Line travel time: 4 minutes faster ▪ Similar for other lines	▪ Orange Line travel time: 4 minutes slower ▪ Similar for other lines
Economic Development Potential	▪ Directly serves potential redevelopment ▪ Close to existing development	▪ Directly serves potential redevelopment ▪ Close to existing development	▪ Directly serves existing development ▪ Close to potential redevelopment	▪ Directly serves potential redevelopment ▪ 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 Evaluation[1]

[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 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.

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.

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 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%.

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.

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).

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.

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.

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 *existing* residential and employment do not indicate a strong current demand for ridership today.	Higher densities of *existing* 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 *directly* 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 *indirectly* (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.

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%.

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).

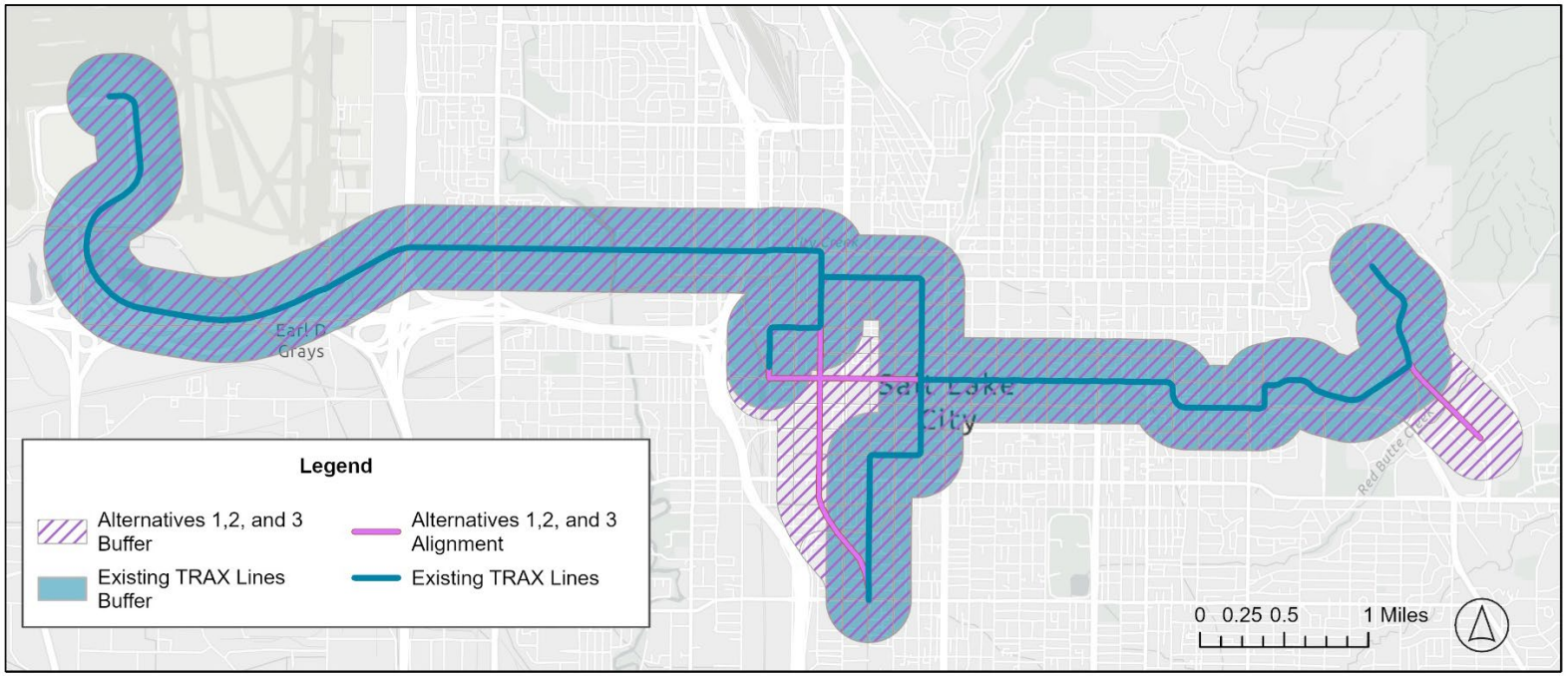


Figure 7. Alternatives 1, 2, and 3 Buffer and Existing TRAX Lines Buffer

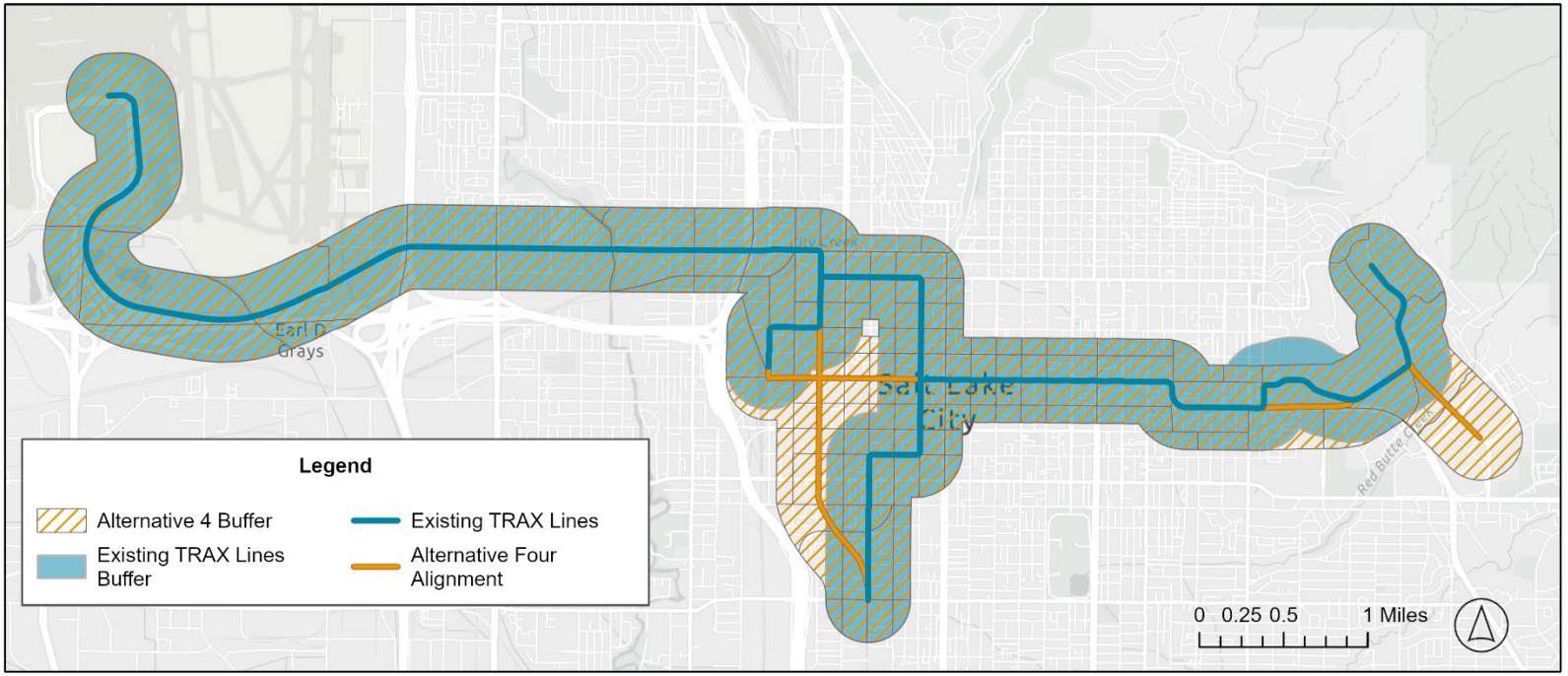


Figure 8. Alternative 4 Buffer and Existing TRAX Lines Buffer

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

<table>
<tr><th>Environmental Resource</th><th>Alternative 1</th><th>Alternative 2</th><th>Alternative 3</th><th>Alternative 4</th></tr>
<tr><td rowspan="2">Acquisitions and Relocations</td><td colspan="4">• Potential ROW acquisition along 400 South, Ballpark spur line, and within Research Park
• One potential building demolition on Ballpark spur line</td></tr>
<tr><td></td><td></td><td>Fewer ROW Acquisitions (no ROW acquisition on 400 South west of 400 West)</td><td>Potential additional ROW acquisition south of Rice-Eccles Stadium along 500 South</td></tr>
<tr><td>Cultural, Historic, and Archaeological Resources</td><td colspan="4">• 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</td></tr>
</table>

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	• Potential for increased vibration to one Category 1 receiver (Noorda Oral Health Sciences building), approximately 420 feet from the proposed alignment			
	• 69 potential noise impacts • 26 potential vibration impacts	• 69 potential noise impacts • 26 potential vibration impacts	• 67 potential noise impacts • 24 potential vibration impacts	• 70 potential noise impacts • 26 potential vibration impacts
Section 4(f) Resources	• 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	• 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	• 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.	• 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 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.

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.

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.

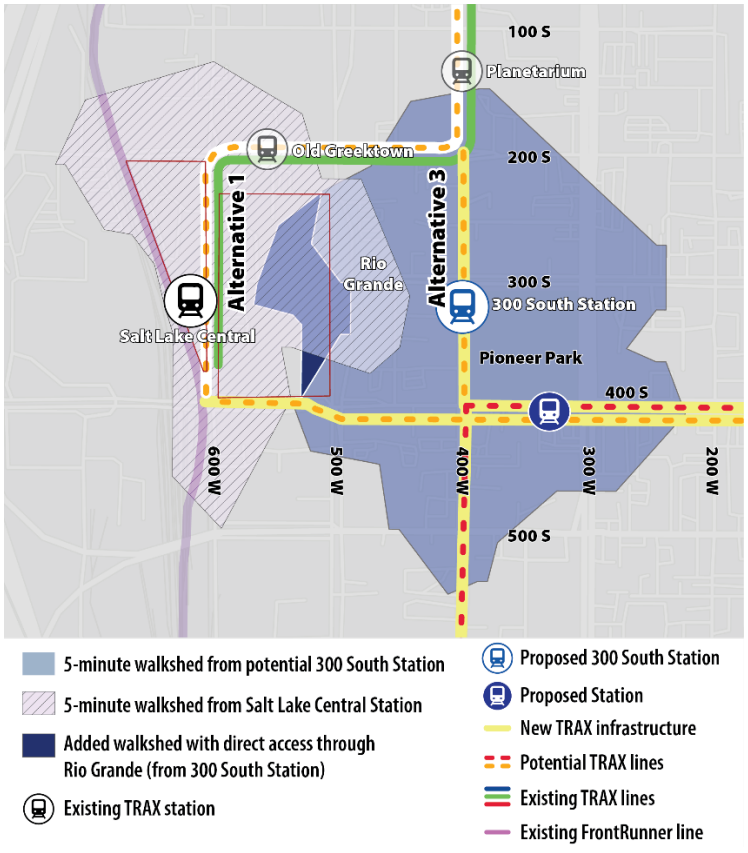
Figure 9. Alternatives 1 and 3 Transit Connections

4.2.2 Walkshed Access to Economic Redevelopment Opportunities

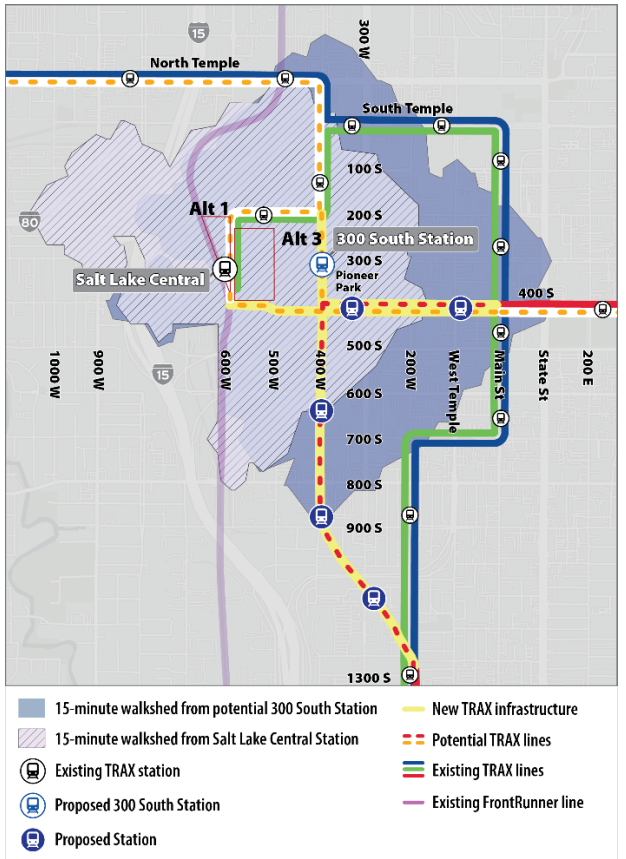
The study team looked specifically at transit access to Alternative 1 and 3 from proposed economic redevelopment opportunities, specifically a 5-minute and 15-minute walkshed (Figure 10). The 5-minute walkshed also depicts the added walkshed if direct access through the Rio Grande Building is provided.

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



15-minute Walkshed

Figure 10. Walkshed Access

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

RSG
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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 Circuity	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

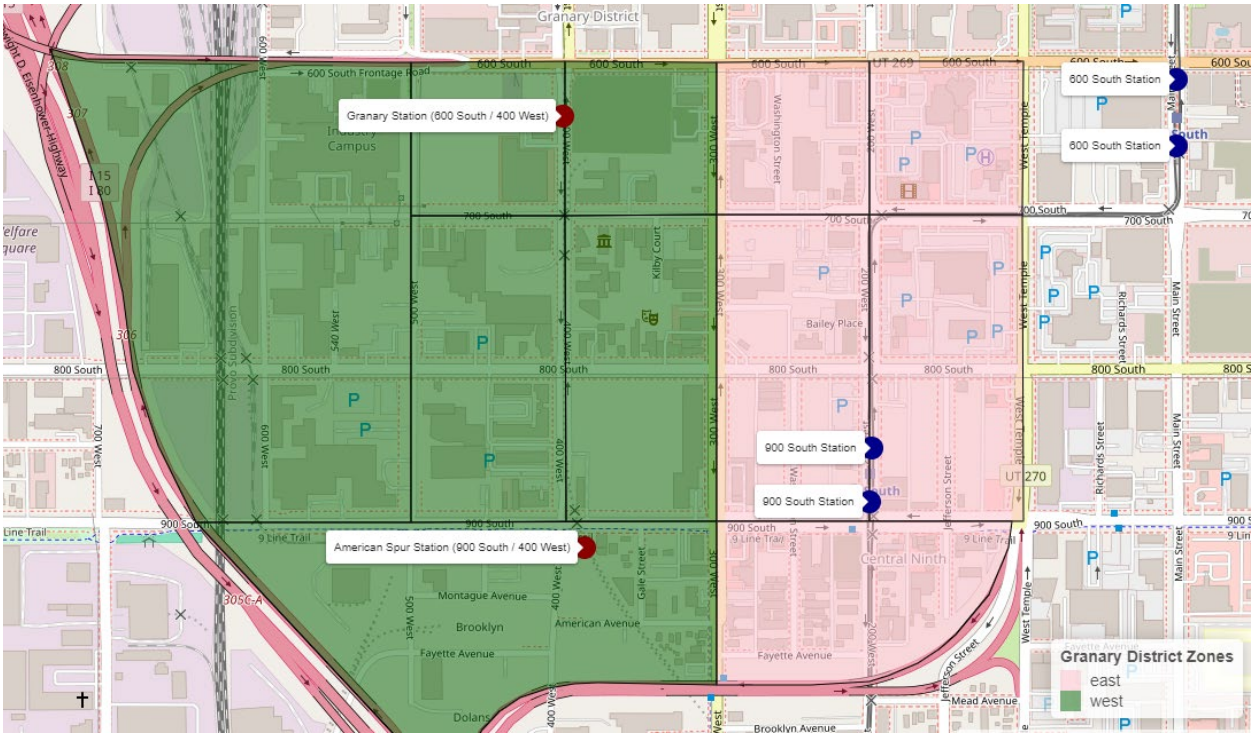
The base year for modeling is set to 2023, to be consistent with the existing transit counts and the transit network GTFS used in the model. The horizon year is set to 2045.

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)

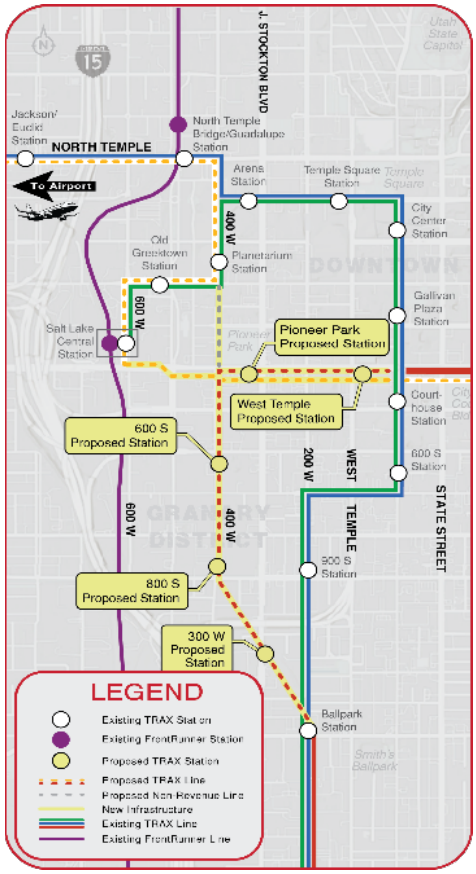


FIGURE 4: BUILD ALTERNATIVE 2 – ELEVATED ON 400 WEST (DOWNTOWN DETAIL)

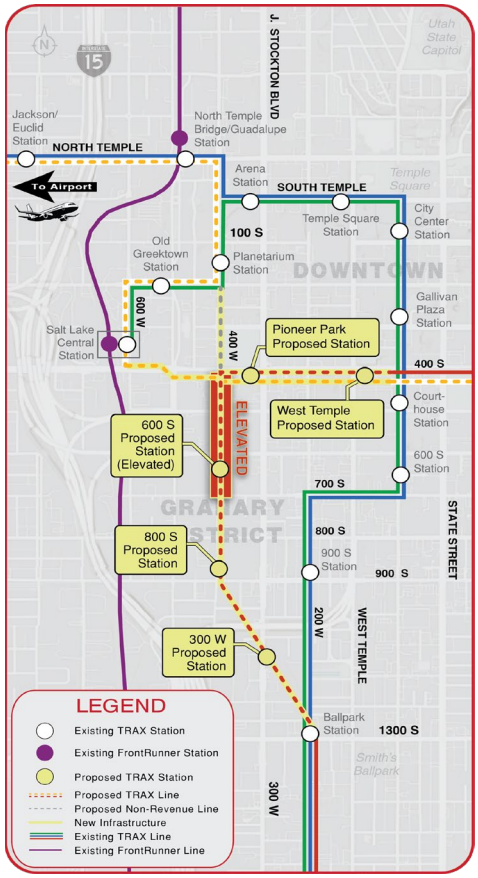


FIGURE 5 : BUILD ALTERNATIVE 3 – DIRECT ON 400 WEST (DOWNTOWN DETAIL)

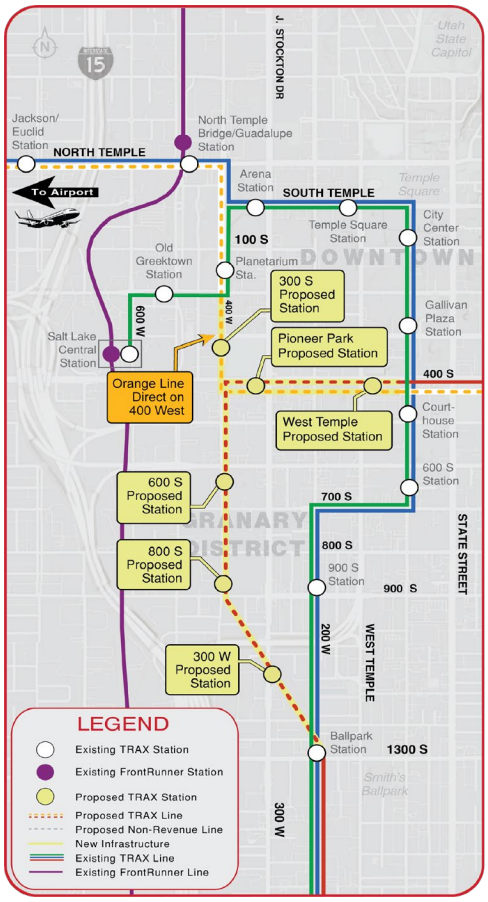
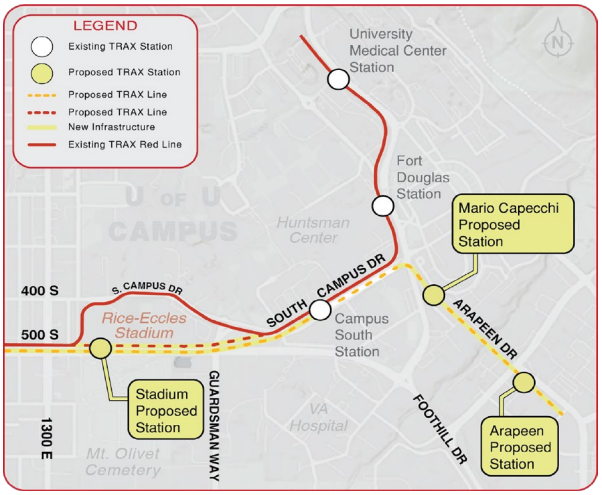


FIGURE 6: BUILD ALTERNATIVE 4 – UNIVERSITY OF UTAH REALIGNMENT (STADIUM DETAIL)



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

RSG
the science of insight®

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)

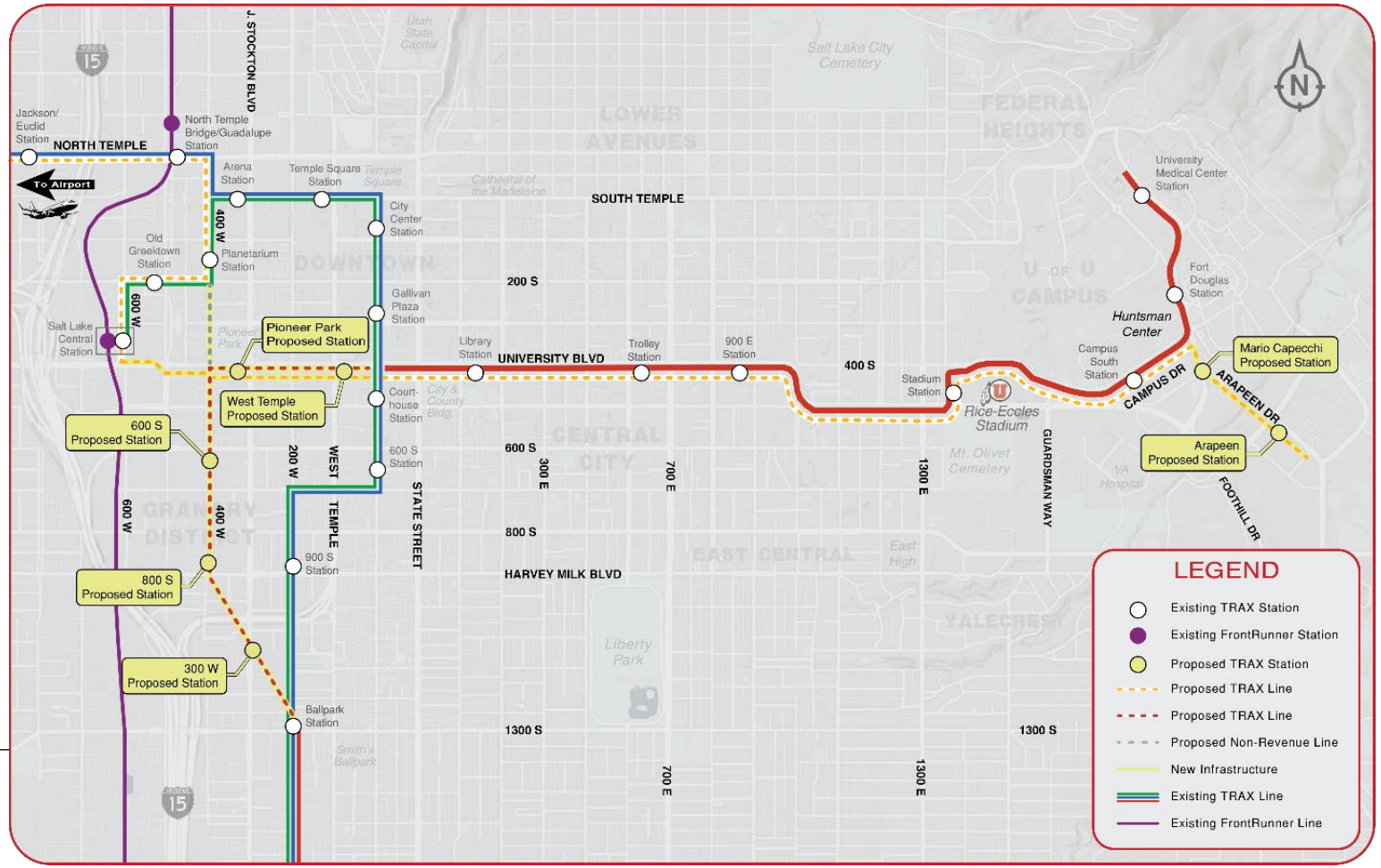
- Existing Transit Network Spring 2023 (11/27/22 through 4/16/2023)
- Route and Stop counts to average weekday Spring 2023 (11/27/22 through 4/16/2023)
- Population and Employment Forecasts (provided by WFRC – up to date per mid 2023)
- Automobile Skims (from latest WFRC model – up to date per mid 2023)
- 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



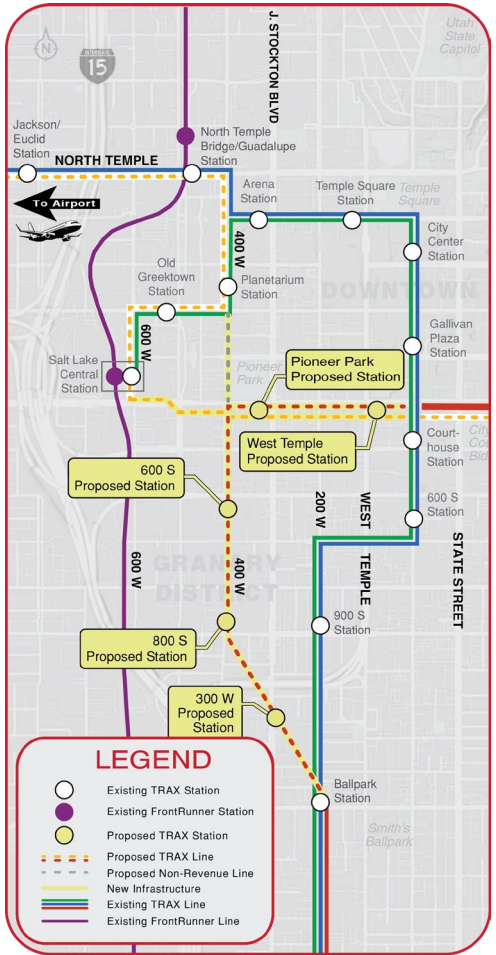
Station Group	Existing Boarding headway	Build Boarding Headway	Difference
Red/Orange to University	15	7.5	add orange
Blue/Red Trunk	7.5	7.5	
Blue/Red/Green Trunk	5	7.5	red through granary
Blue/Green Downtown (To Arena)	7.5	7.5	
Blue South End	15	15	
Red South End	15	15	
Green South End	15	15	
Blue (Green) 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

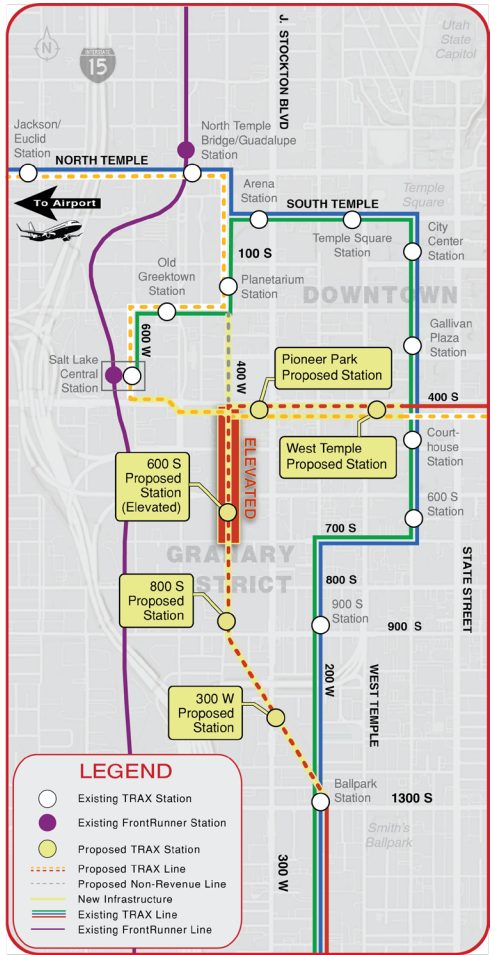
Alternative 1

- Orange Line to Salt Lake Central



Alternative 2

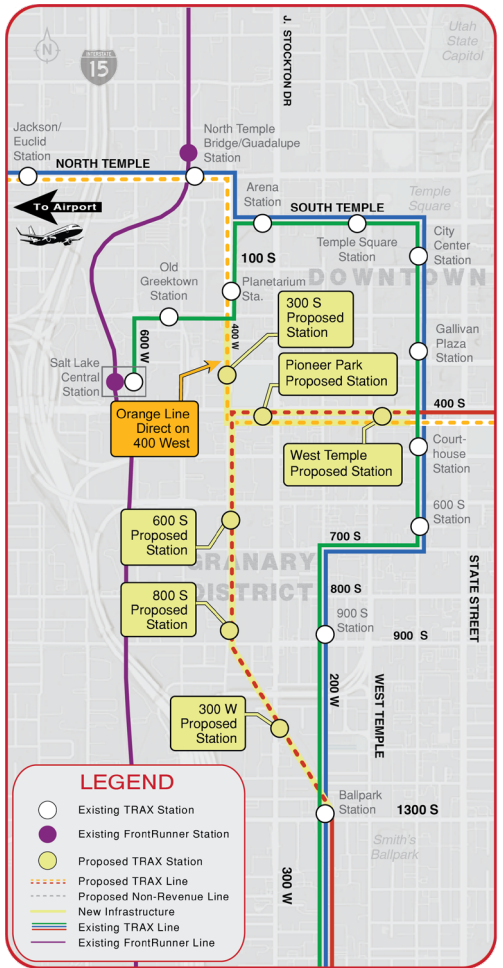
- Elevated station coded in STOPS as type 3 (one floor up)



Build Network

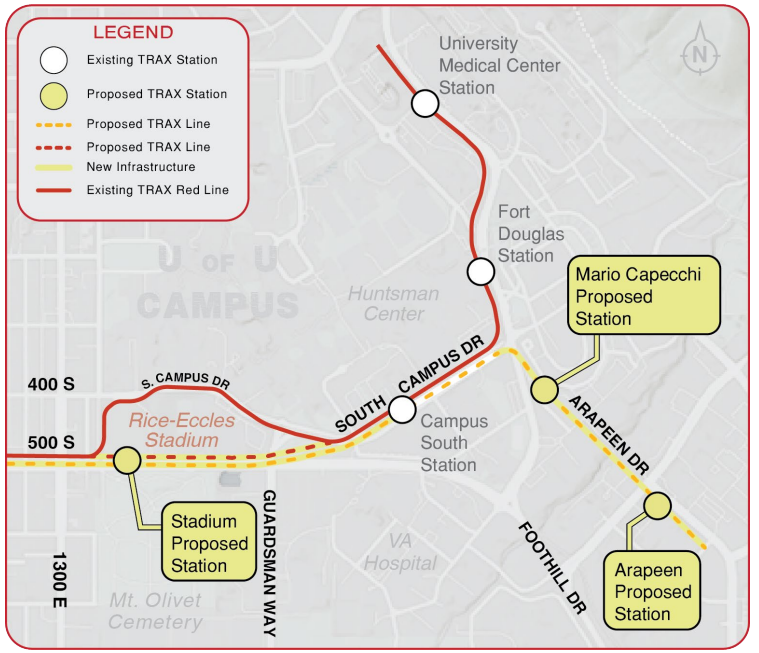
Alternative 3

- 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

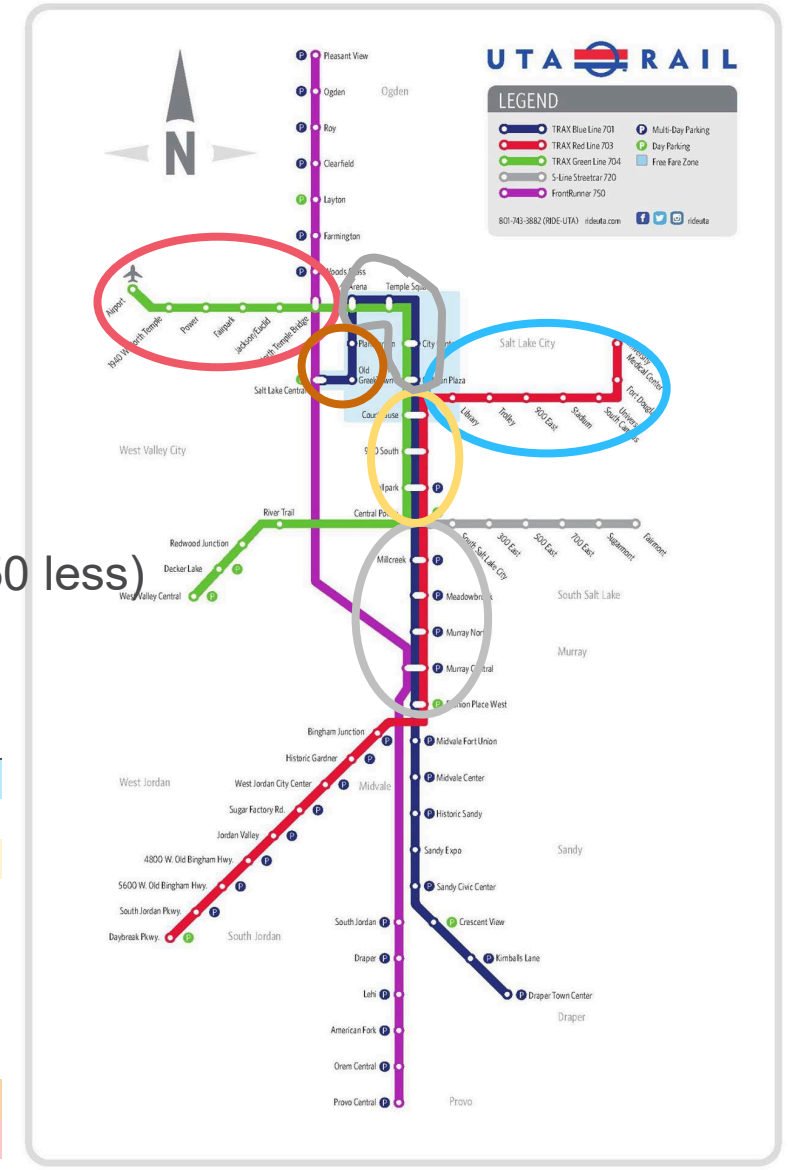
2045 Results	**2045: Alternative 1**	**2045: Alternative 2**	**2045: Alternative 3**	**2045: Alternative 4**
*** WEEKDAY LINKED TRANSIT TRIPS (All Transit/All car HH) ***	86,834	86,818	86,846	86,801
*** WEEKDAY UNLINKED TRANSIT TRIPS (All Transit/All car HH) ***	119,019	118,923	118,913	118,875
*** WEEKDAY 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	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
Total	*74,146*	*85,898*	*86,834*	*86,818*	*86,846*	*86,801*	*936*	*920*	*948*	*903*

All Fixed Guideway: 2045 No-Build

No-Build

Frontrunner, UVX and Frontrunner/TRAX Transfers

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

Trips between Downtown/UofU and Salt Lake County

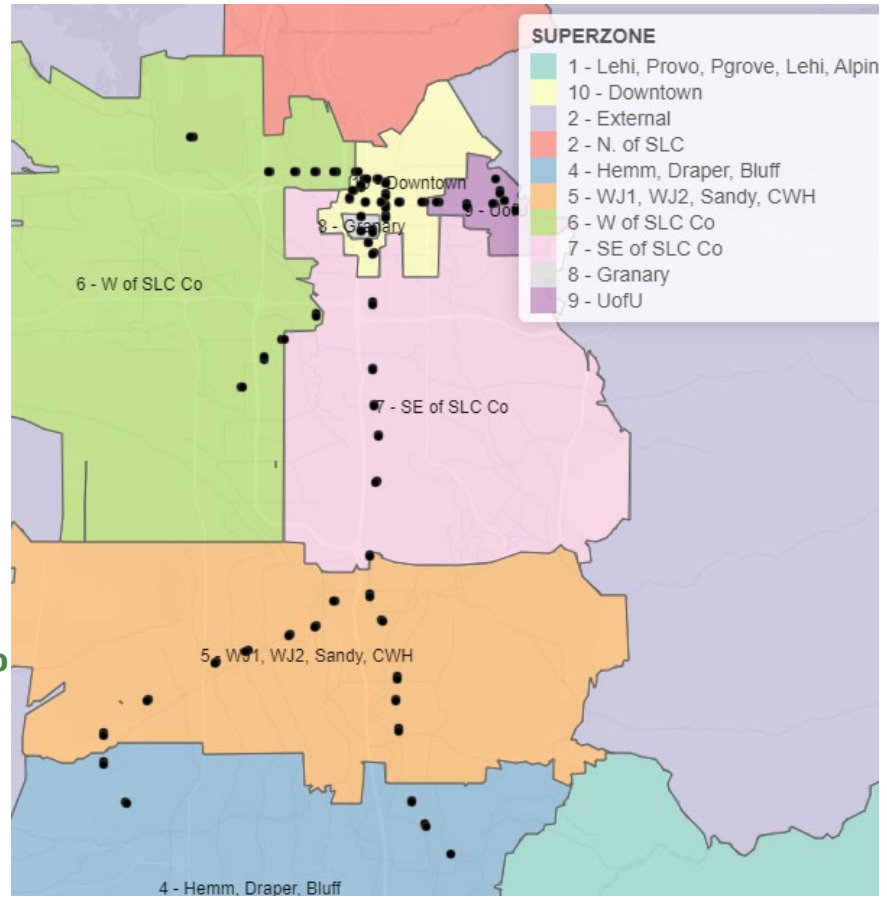
TL5v2 (2045): No-Build	South Utah	N of SLC	External	Hemm, Draper, Bluff	WJ, Sandy, CWH	W SLC	SE SLC	Downtown	UofU	Gran	***Total***
South Utah	7,816	141	0	355	249	512	223	2,293	769	2	***12,360***
N of SLC	283	1,297	0	135	53	562	211	1,640	207	11	***4,399***
External	308	190	0	12	80	48	115	284	39	0	***1,076***
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	+20%
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	+40%
Granary to Other	222	1,028	72	81	78	72	+32% / +90%
Other Markets	17,559	20,190	11	1	105	12	
Total	***42,708***	***53,218***	***1,810***	***1,793***	***1,753***	***1,697***	



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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 (Alternative 1)	Build – No-Build (Alternative 1)	Build (Alternative 2)	Build – No-Build (Alternative 2)	Build (Alternative 3)	Build – No-Build (Alternative 3)	Build (Alternative 4)	Build – No-Build (Alternative 4)
750-FRONTRUNNER	11,698	11,698	11,846	148	11,821	123	12,006	308	11,847	149
Total Frontrunner	*11,698*	*11,698*	*11,846*	*148*	*11,821*	*123*	*12,006*	*308*	*11,847*	*149*
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
Total Trax	*31,546*	*31,546*	*32,494*	*948*	*32,463*	*917*	*32,783*	*1,237*	*32,379*	*833*
830X-- UVX	7,481	7,481	7,485	4	7,485	4	7,479	-2	7,485	4
Total for UVX	*7,481*	*7,481*	*7,485*	*4*	*7,485*	*4*	*7,479*	*-2*	*7,485*	*4*
All Other Routes	*51,843*	*51,843*	*51,694*	*-149*	*51,691*	*-152*	*51,303*	*-540*	*51,660*	*-183*
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

RSG

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 (Alternative 1)	Build – No-Build (Alternative 1)	Build (Alternative 2)	Build – No-Build (Alternative 2)	Build (Alternative 3)	Build – No-Build (Alternative 3)	Build (Alternative 4)	Build – No-Build (Alternative 4)
750-FRONTRUNNER	11,698	15,283	15,113	-170	15,090	-193	15,219	-64	15,115	-168
Total Frontrunner	*11,698*	*15,283*	*15,113*	*-170*	*15,090*	*-193*	*15,219*	*-64*	*15,115*	*-168*
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
Total Trax	*31,546*	*41,295*	*42,433*	*1,138*	*42,363*	*1,068*	*42,671*	*1,376*	*42,320*	*1,025*
830X-- UVX	7,481	7,061	7,052	-9	7,052	-9	7,046	-15	7,052	-9
Total for UVX	*7,481*	*7,061*	*7,052*	*-9*	*7,052*	*-9*	*7,046*	*-15*	*7,052*	*-9*
All Other Routes	*51,843*	*54,645*	*54,421*	*-224*	*54,418*	*-227*	*53,977*	*-668*	*54,388*	*-257*
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	***Total***
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	***Total***
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	***Total***
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***

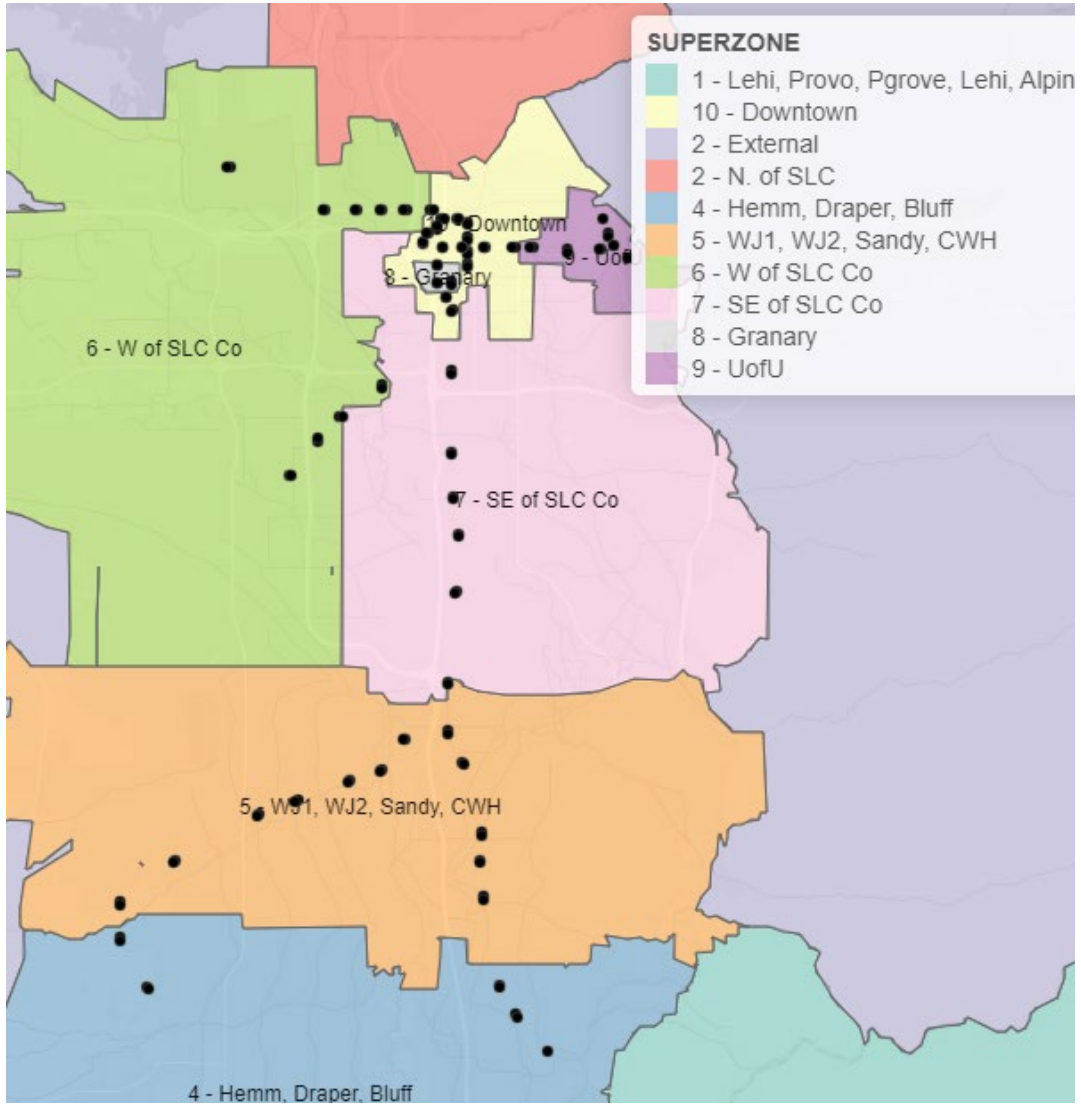
All Fixed Guideway: 2045 Incremental

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	***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	-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***

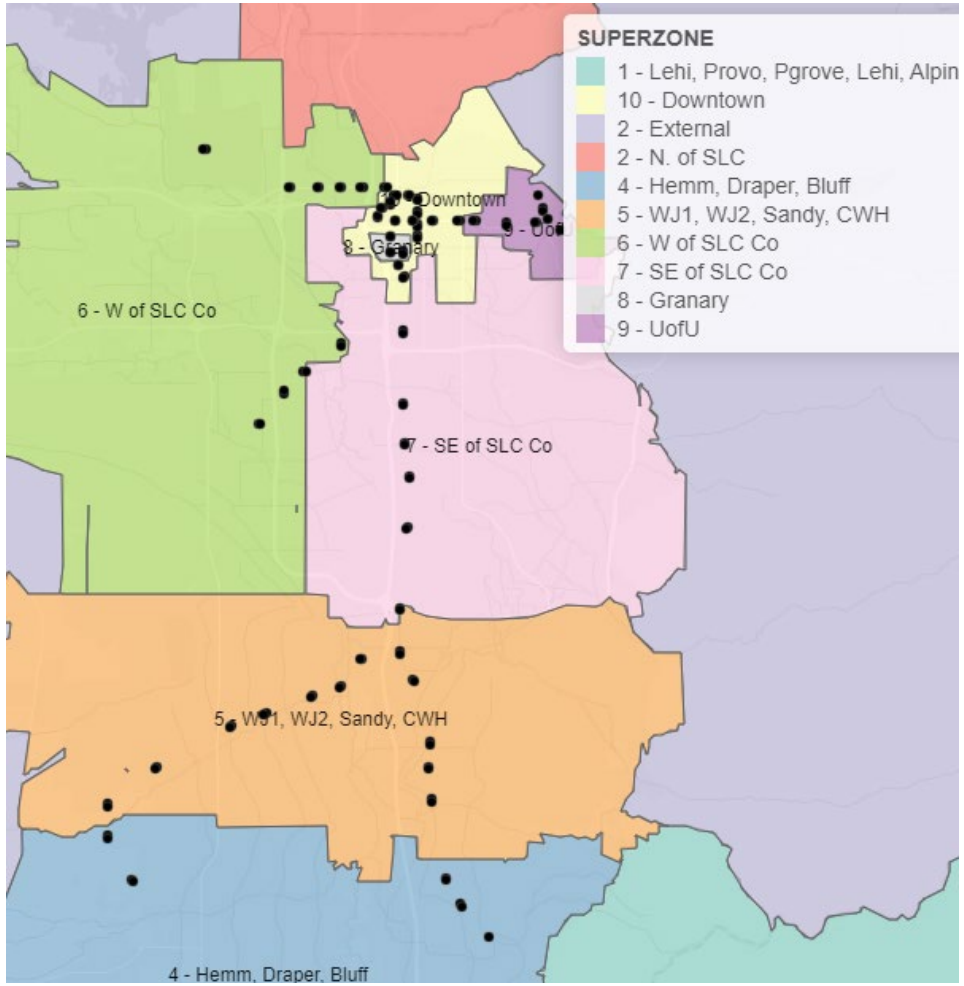
All Transit: 2045 Incremental

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

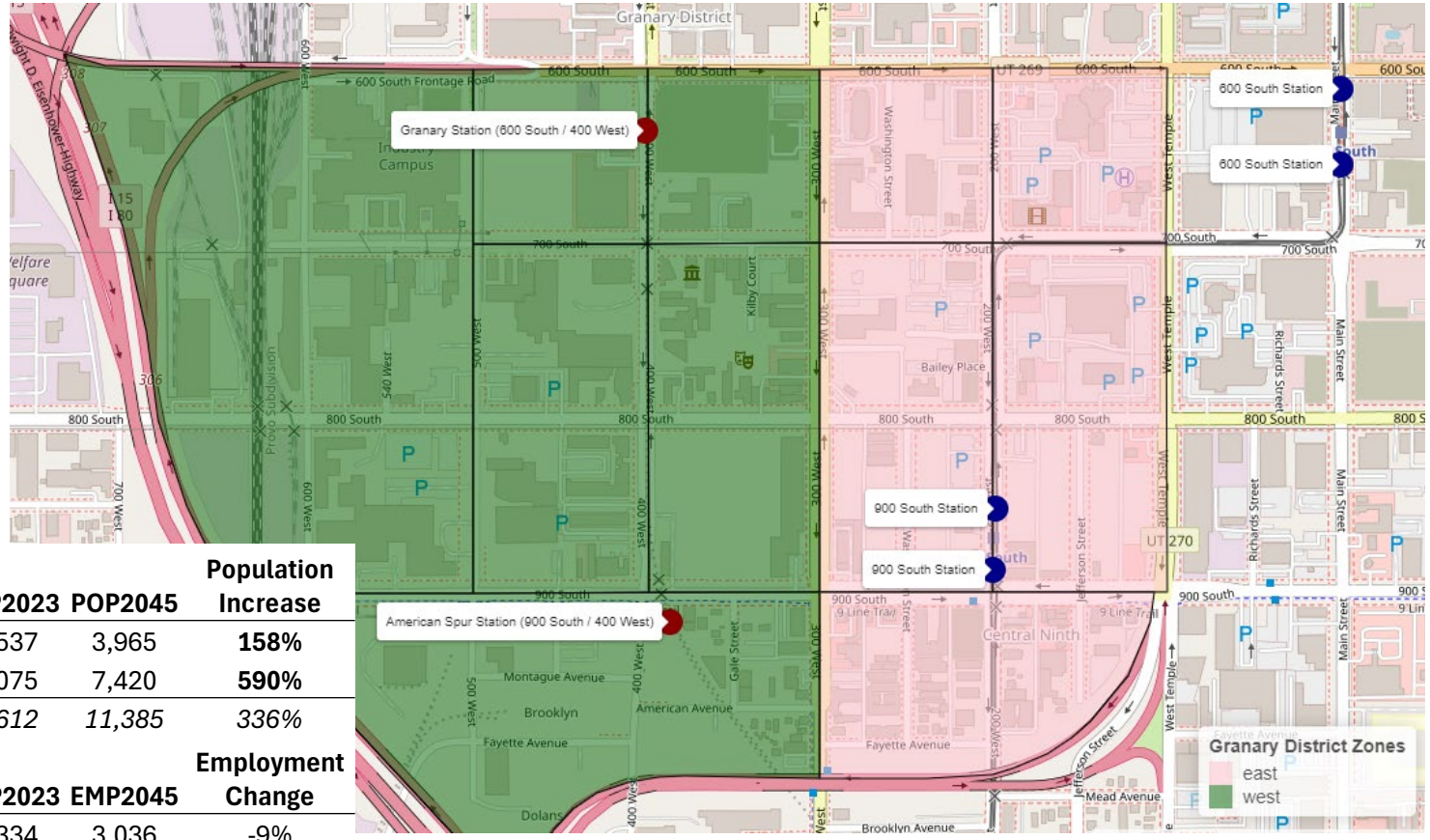
Base Ridership Data

- 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%
Subtotal Fixed Guideway	*90,908*	*50,945*	*56%*
Subtotal Bus	*66,662*	*55,003*	*83%*
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: All	Production: HBW	Production: HBO	Production: NHB	POP2023	POP2045	Population Increase
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: All	Attractions: HBW	Attractions: HBO	Attractions: NHB	EMP2023	EMP2045	Employment 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%*

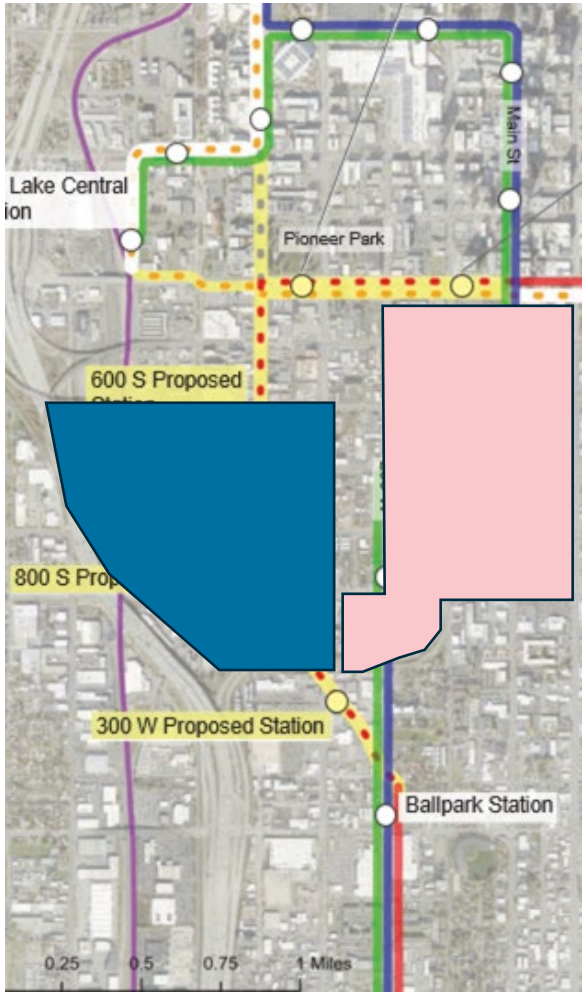
Effect of the Red Line Reroute

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%



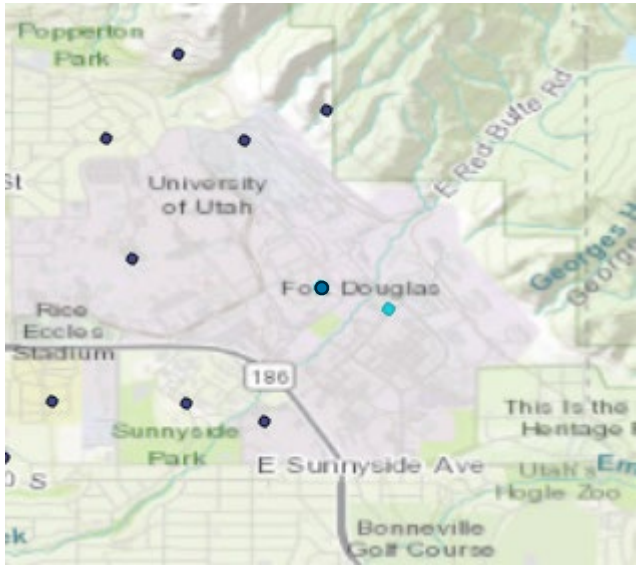
Expected Research Park Growth

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 (Frontruner 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

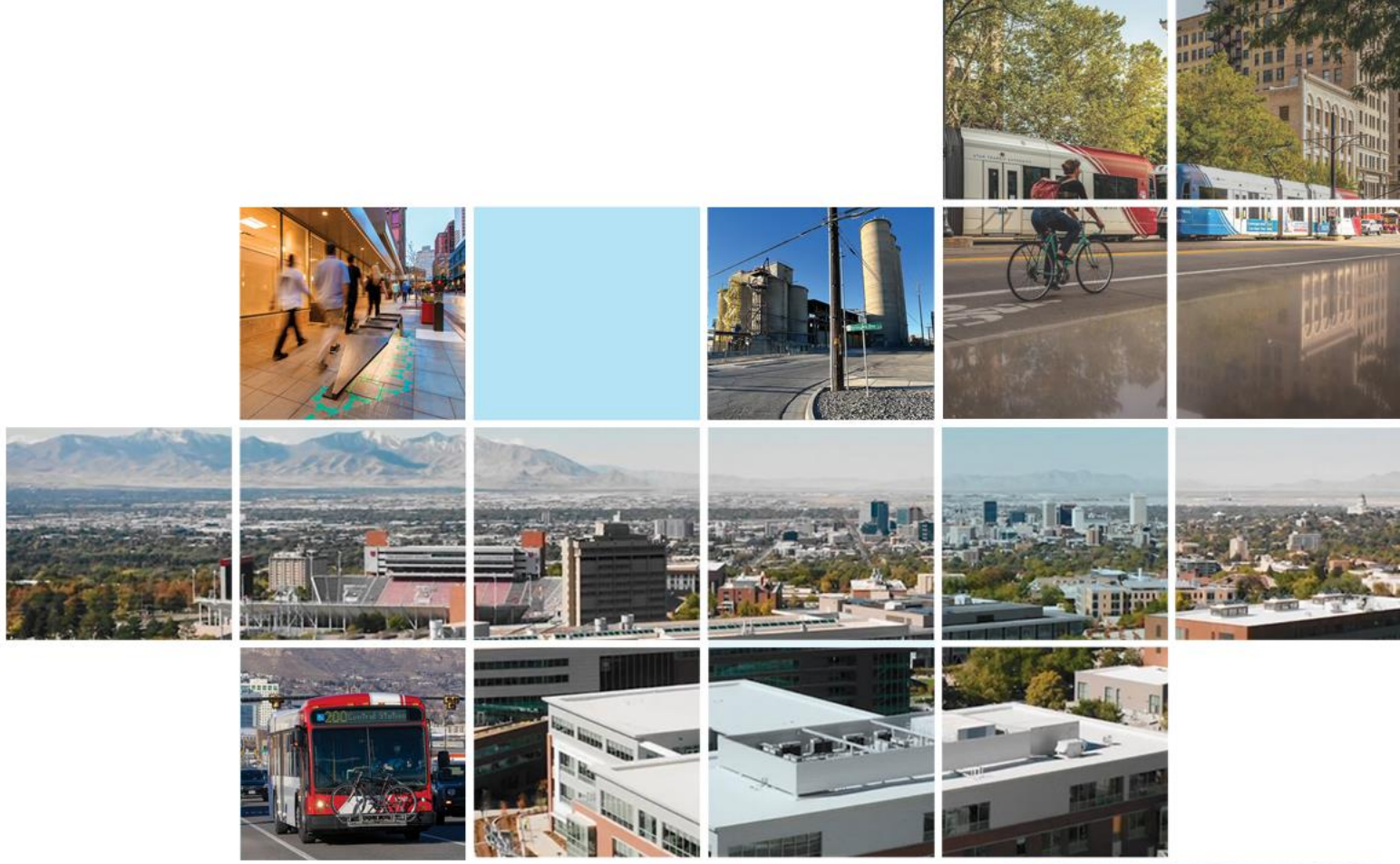
Build Alternative 3	Wait 1	Wait 2
Towards Daybreak/Airport	4 Minutes	11 Minutes
Towards UofU	6 Minutes	9 Minutes

Attachment G2: Rail Operations Simulation Findings Memorandum

TECH LINK

TRAX Study

UTA



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.

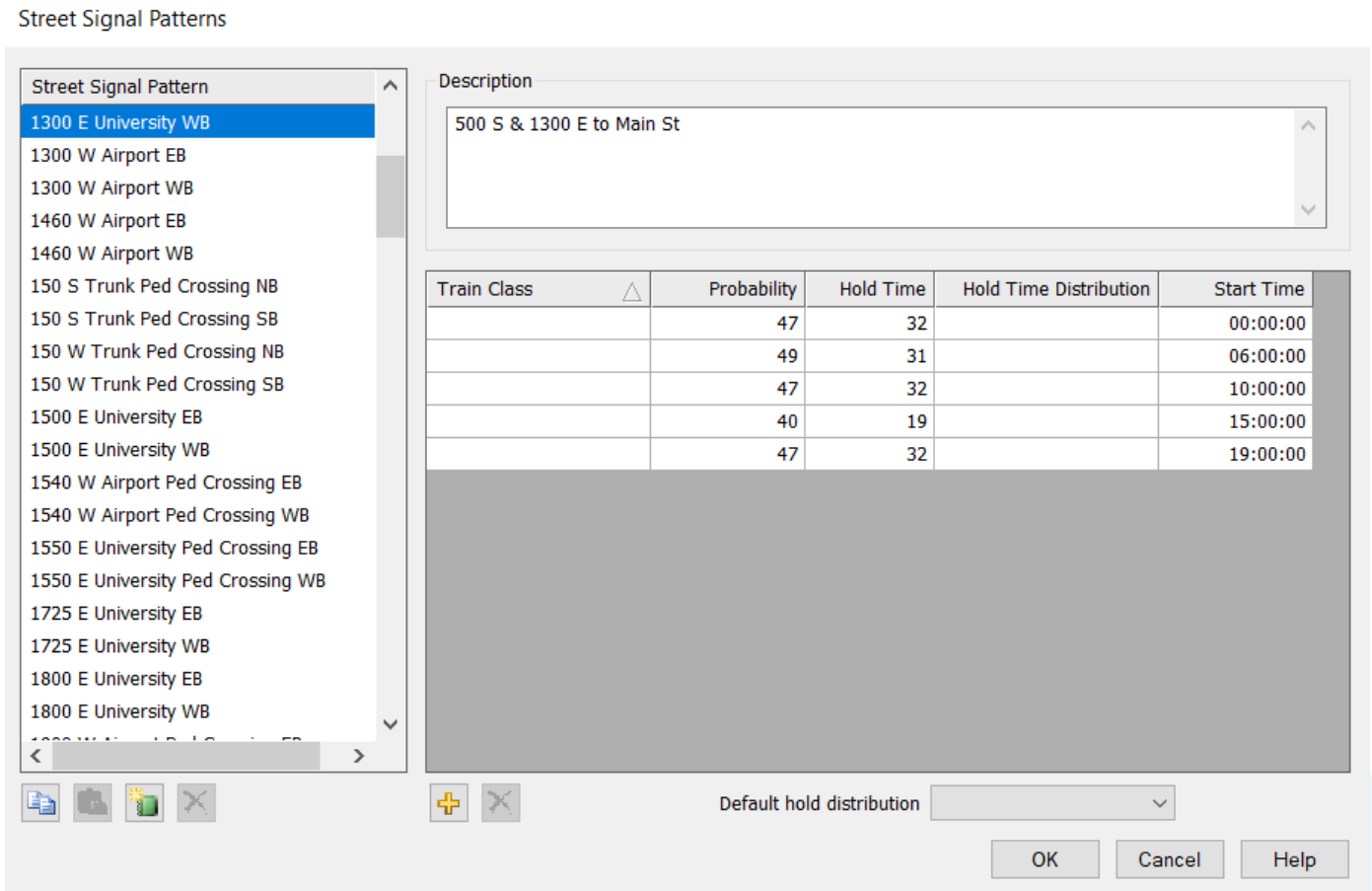
TrainOps® Software Overview

- 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.

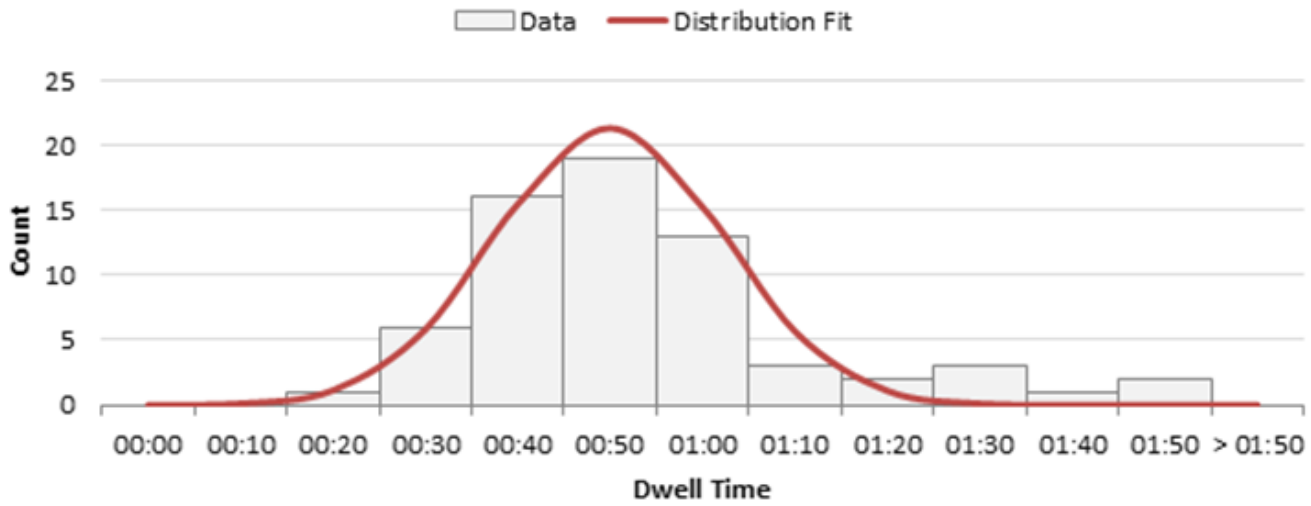
Model Development

- 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



Example of Dwell Data for Normal Distribution (seconds)

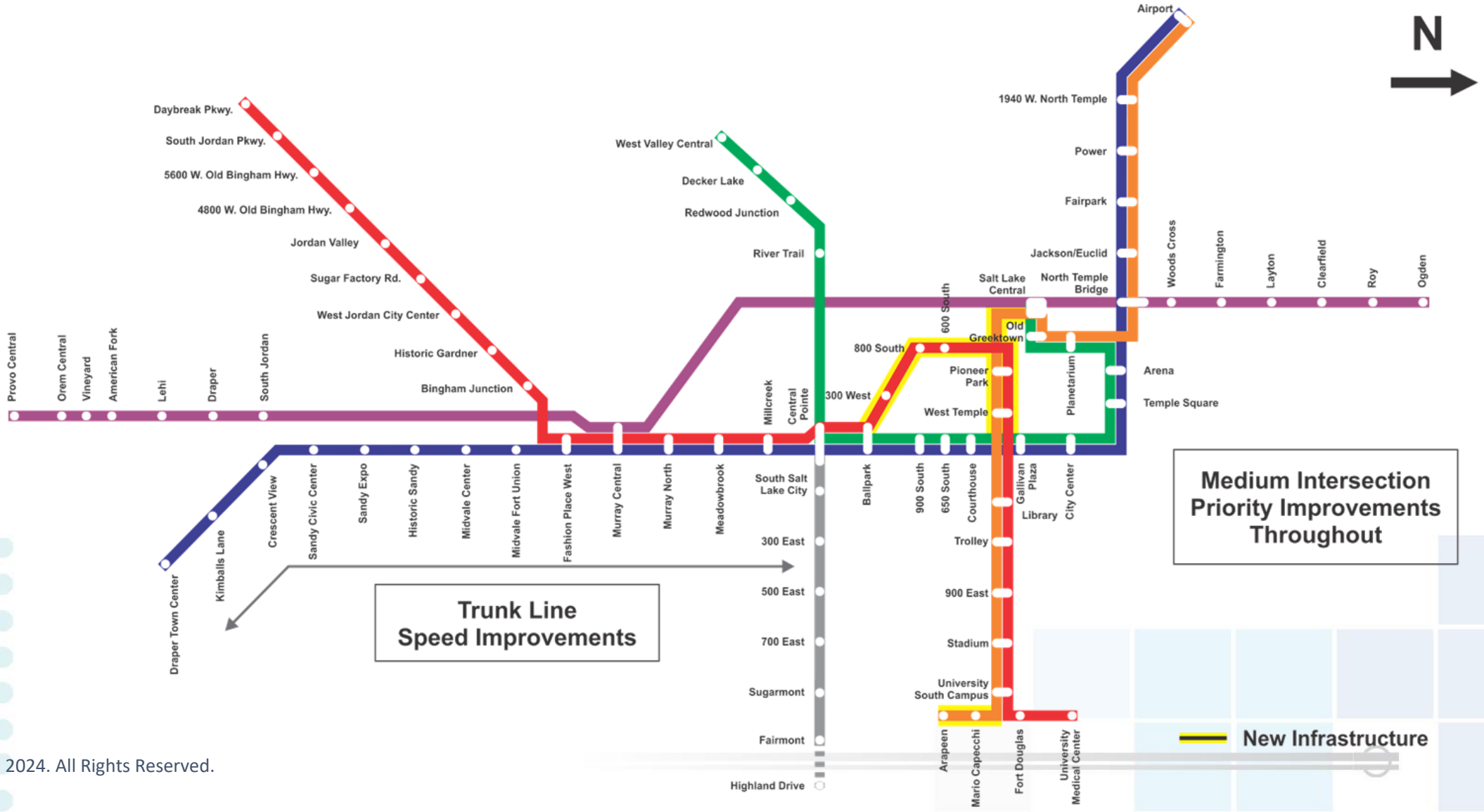


	Min	Max	Mean	Standard Deviation
G-1940 W North Temple-PM Peak-NB	18	76	39	25
G-1940 W North Temple-PM Peak-SB	19	63	35	21
G-1940 W North Temple-AM Peak-NB	18	57	32	18
G-1940 W North Temple-AM Peak-SB	19	63	34	22
G-1940 W North Temple-Off-Peak-NB	18	56	31	21
G-1940 W North Temple-Off-Peak-SB	17	56	30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

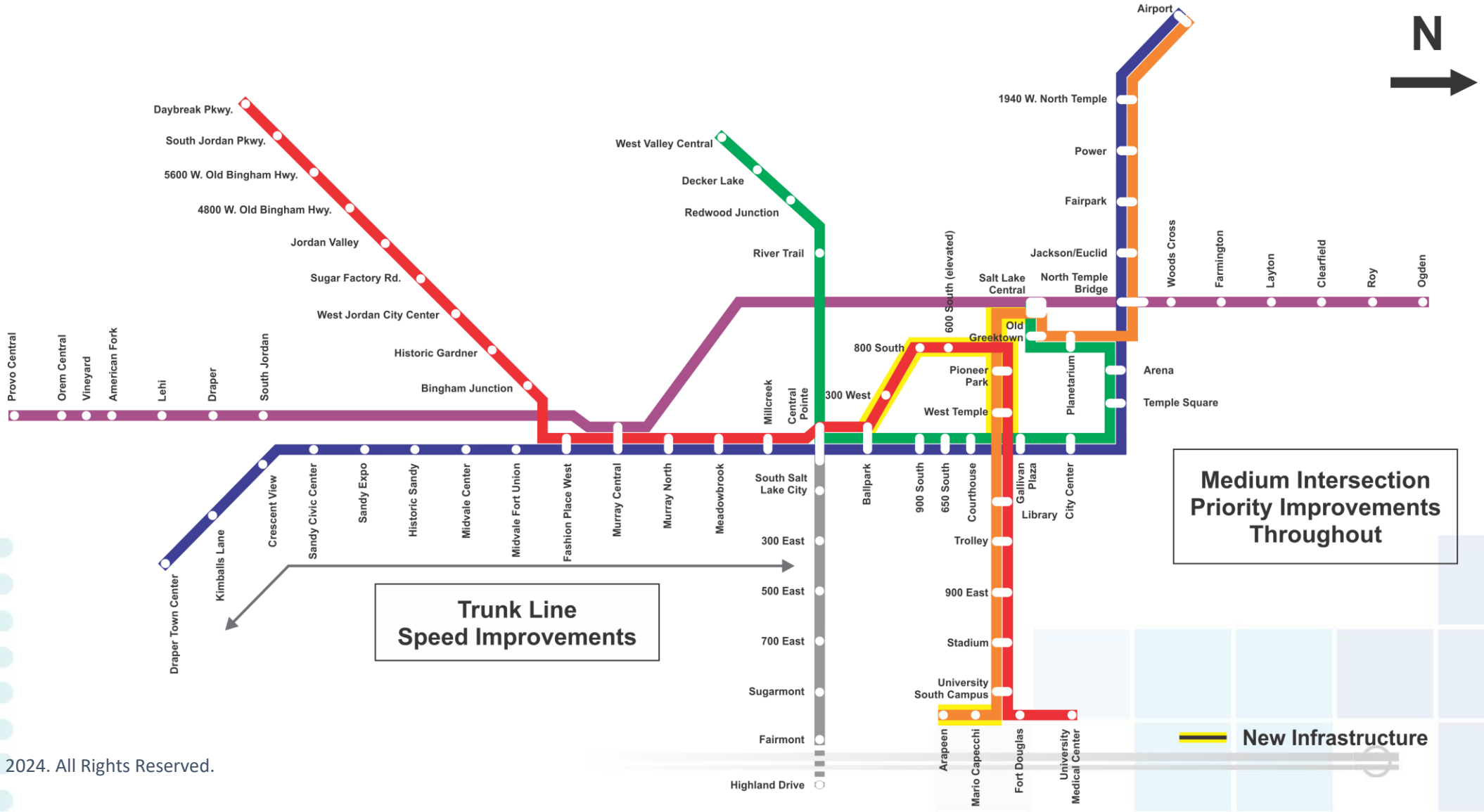
Alternatives Overview

Schematic – Future Baseline

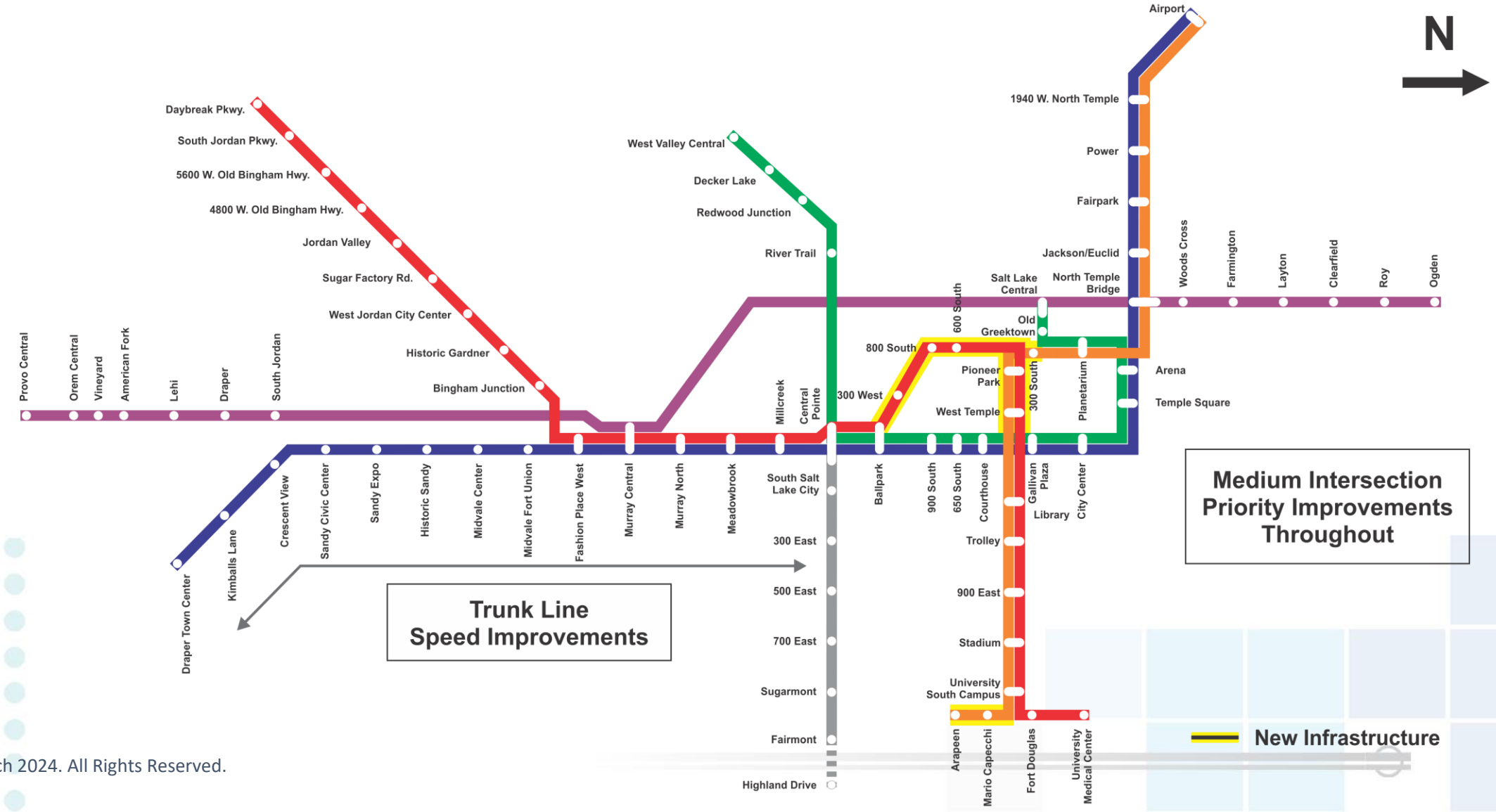
Schematic – Alternative 1



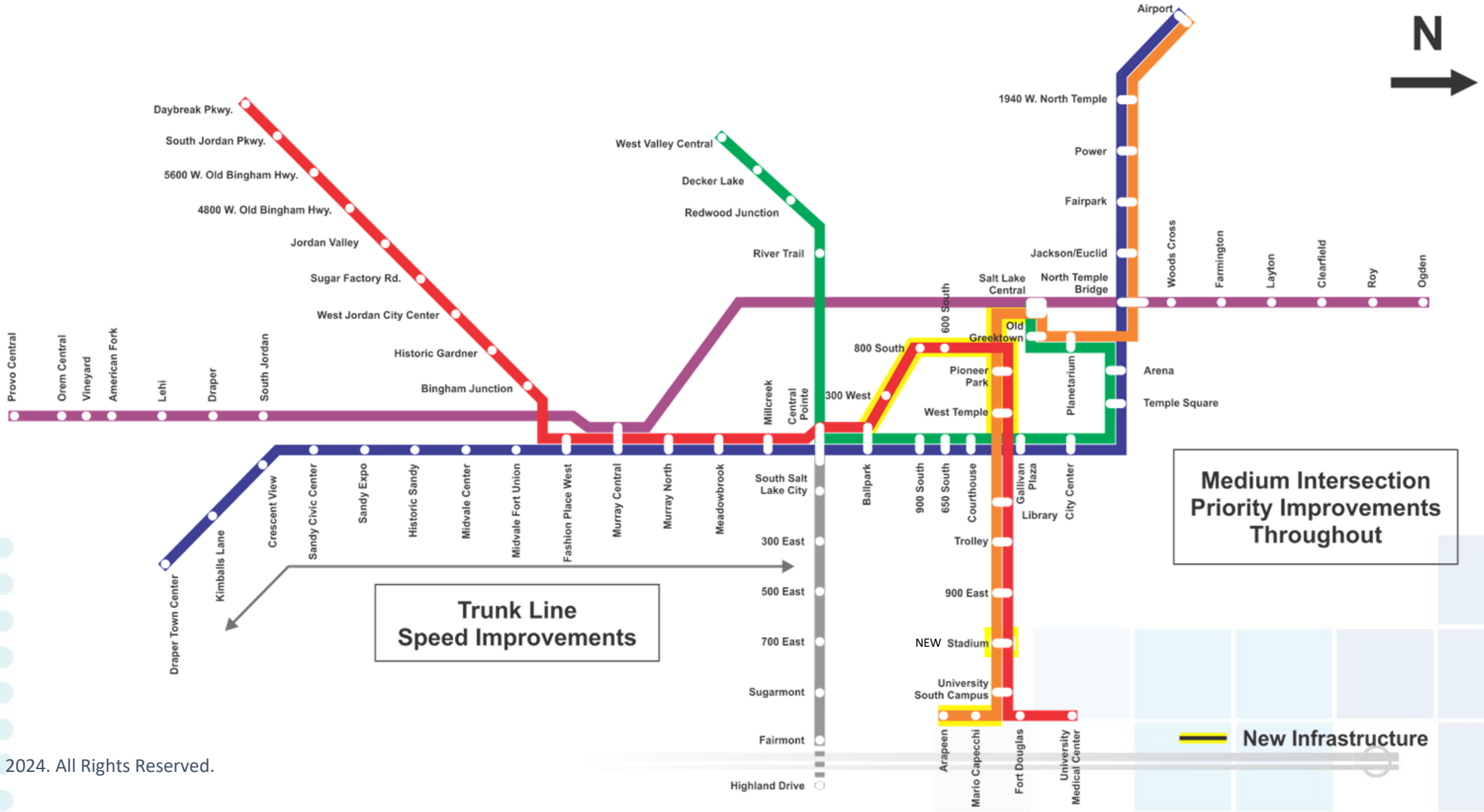
Schematic – Alternative 2



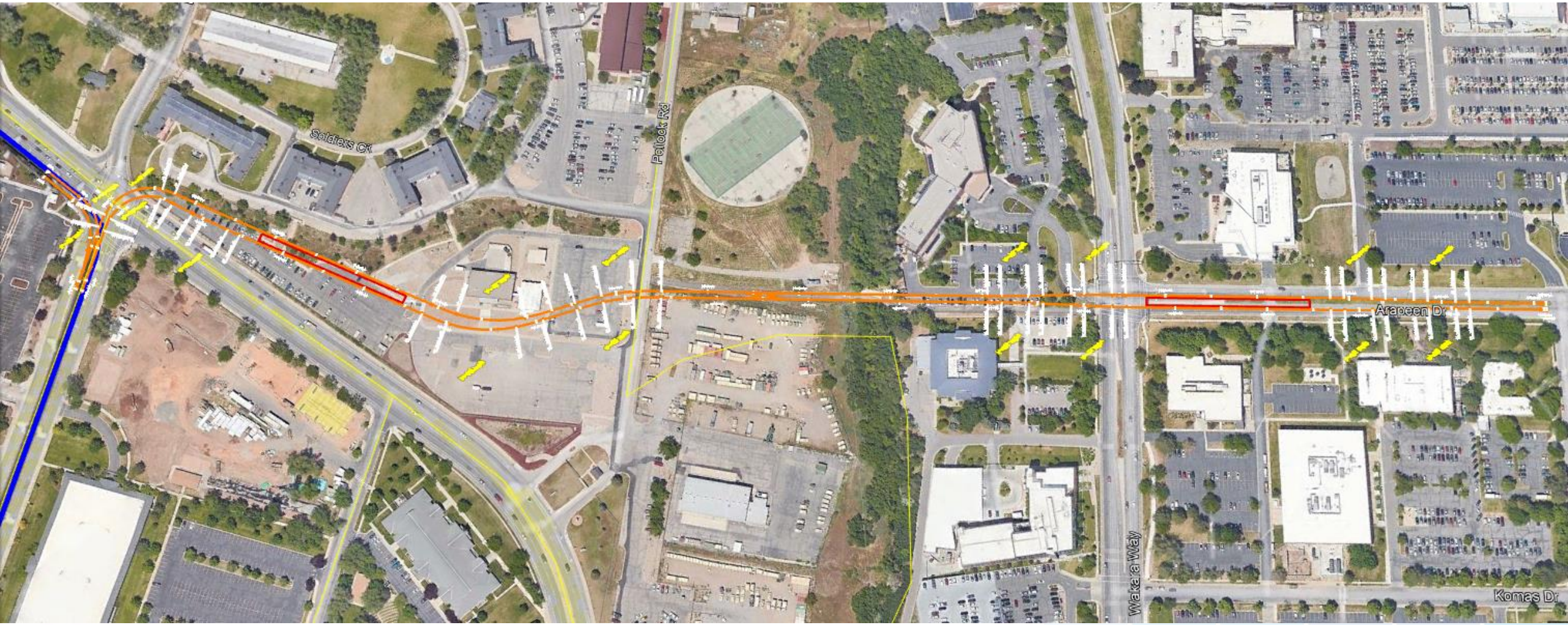
Schematic – Alternative 3



Schematic – Alternative 4

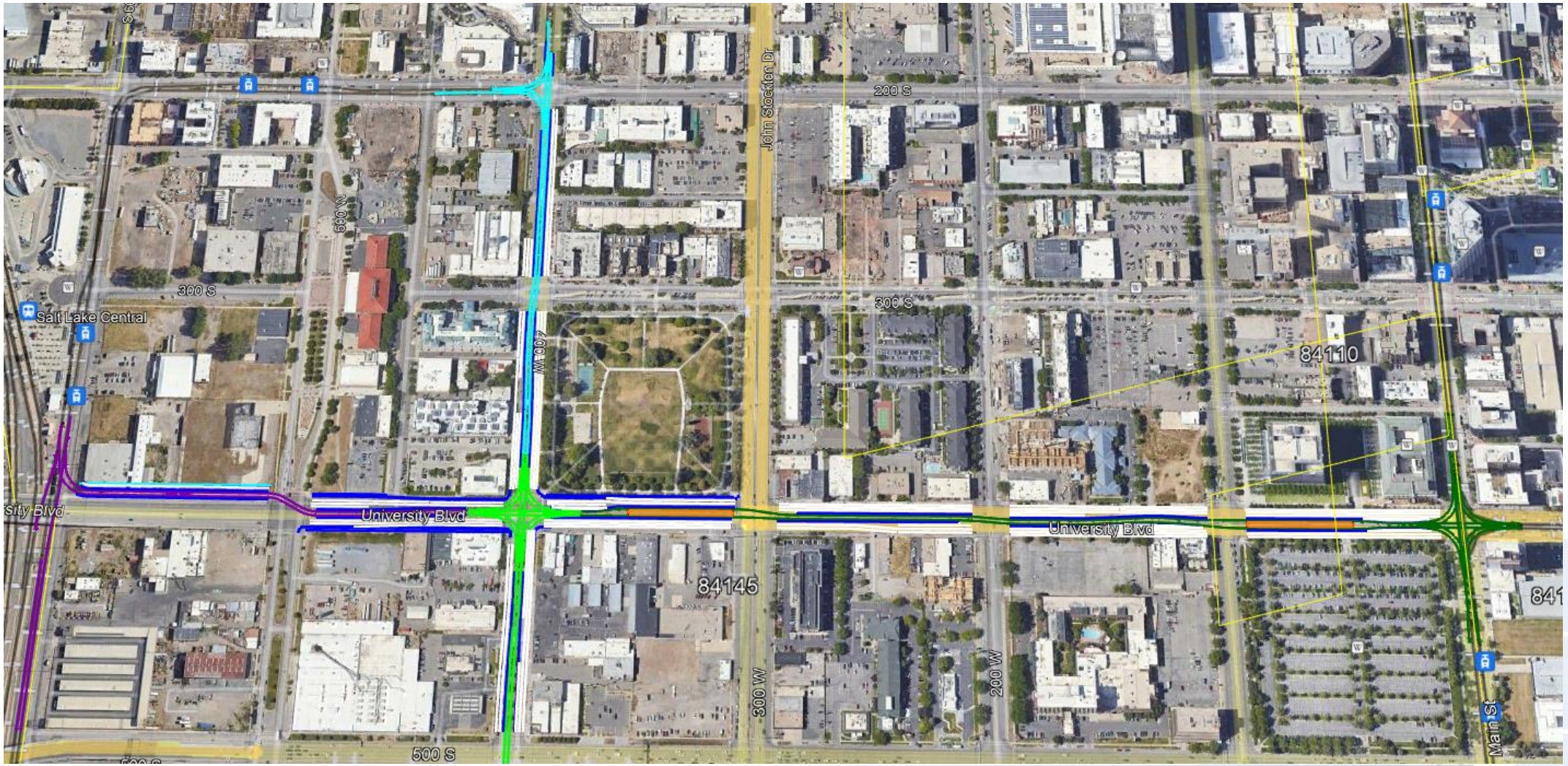


Additional Tracks - Orange Line Terminal (Research Park)

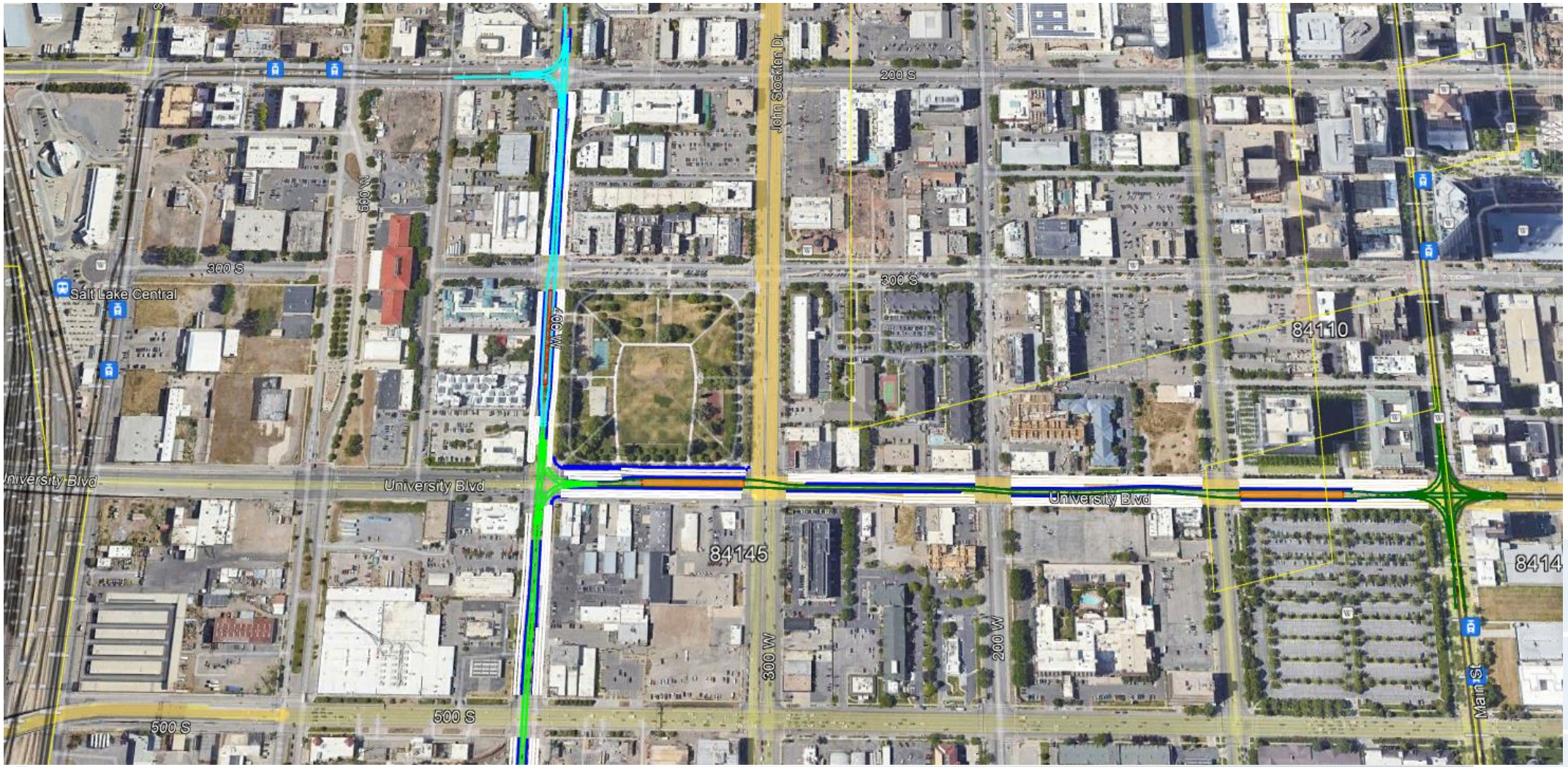


Additional Tracks – Ballpark Spur

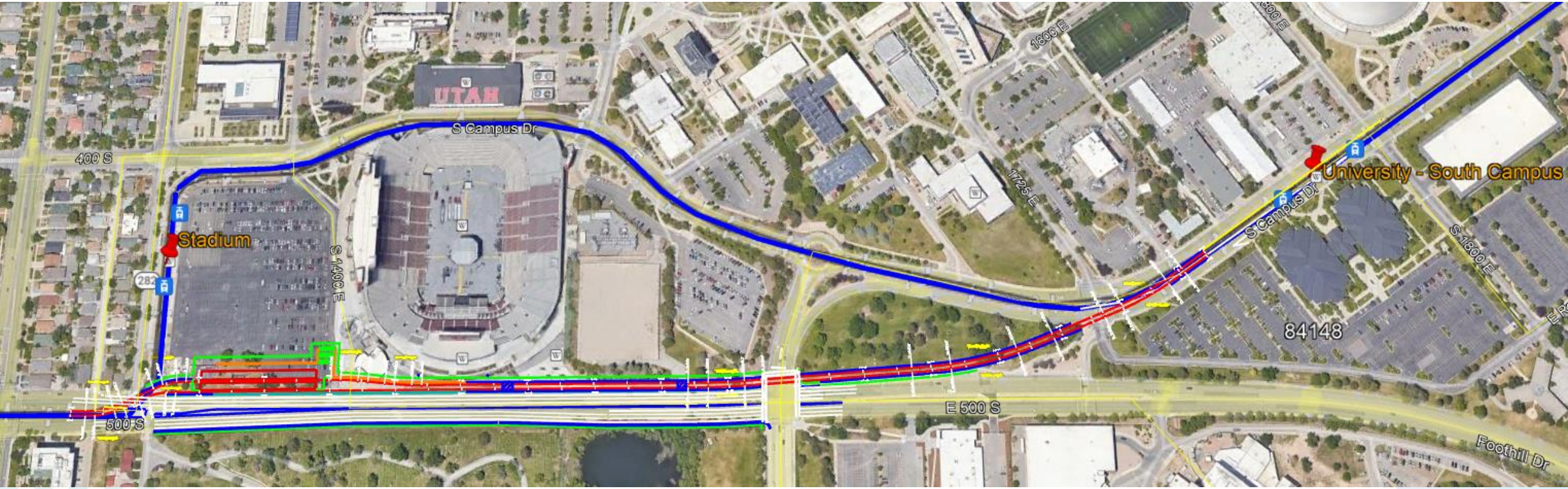
Additional Tracks – Alternative 1, 2 & 4



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					
	TRAX Train Line				
Combined Average	Blue Line	Red Line	Green Line	Orange Line	Combined Average
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**	

Individual Alternative Results

Alternative 1 – On-Time Performance

Lateness Threshold	00:00:00		00:03:00		00:04:59		00:10:00		All Stops	
Train Class	**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	
Train Class	**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	
Train Class	**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	
Train Class	**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:

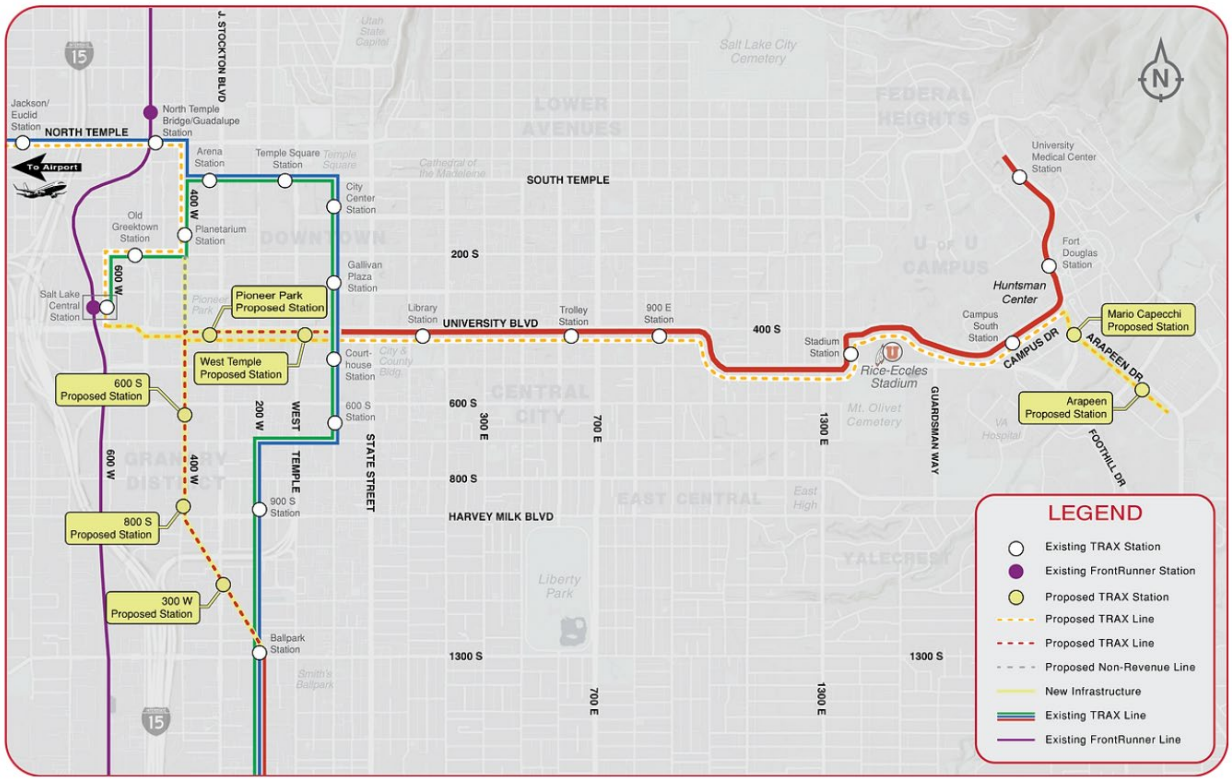

Figure 1. Alternative 1 – Future of Light Rail Baseline, with Orange Line routing through Salt Lake Central

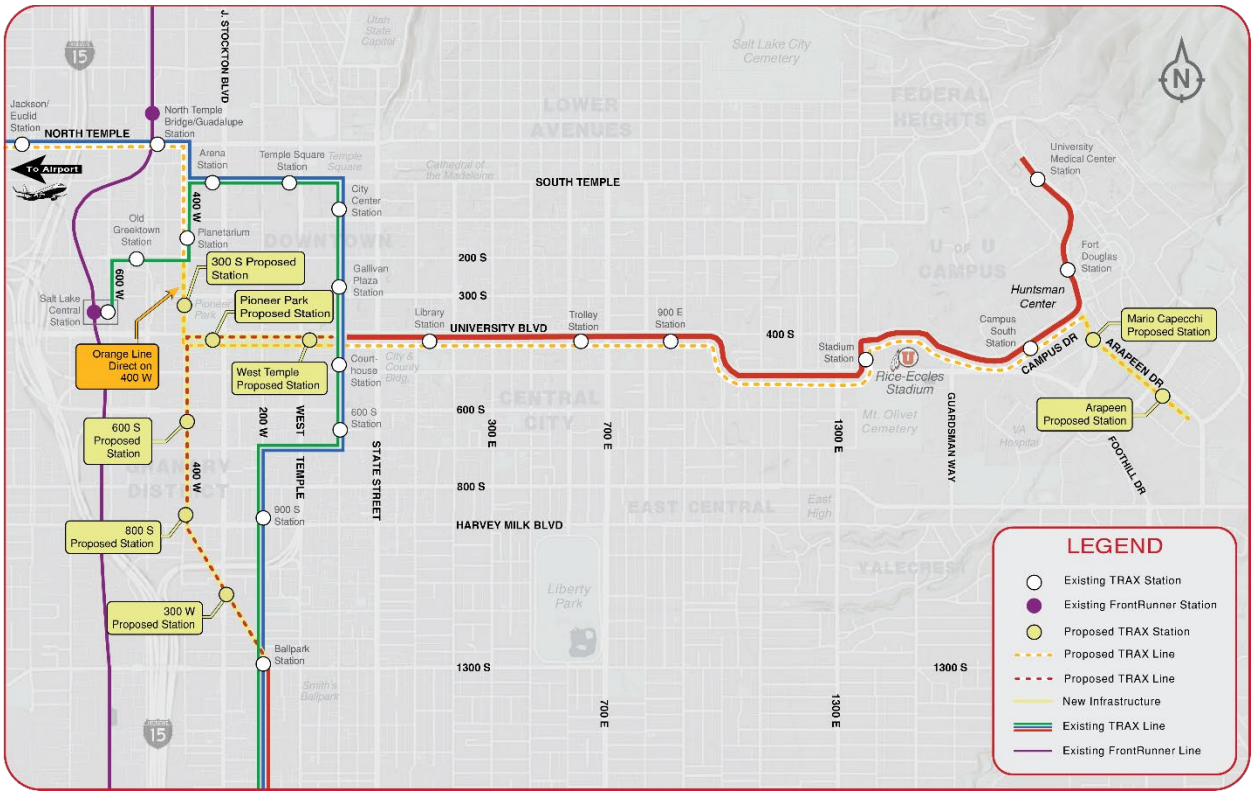

Figure 2. Alternative 3 – Direct on 400 West

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.

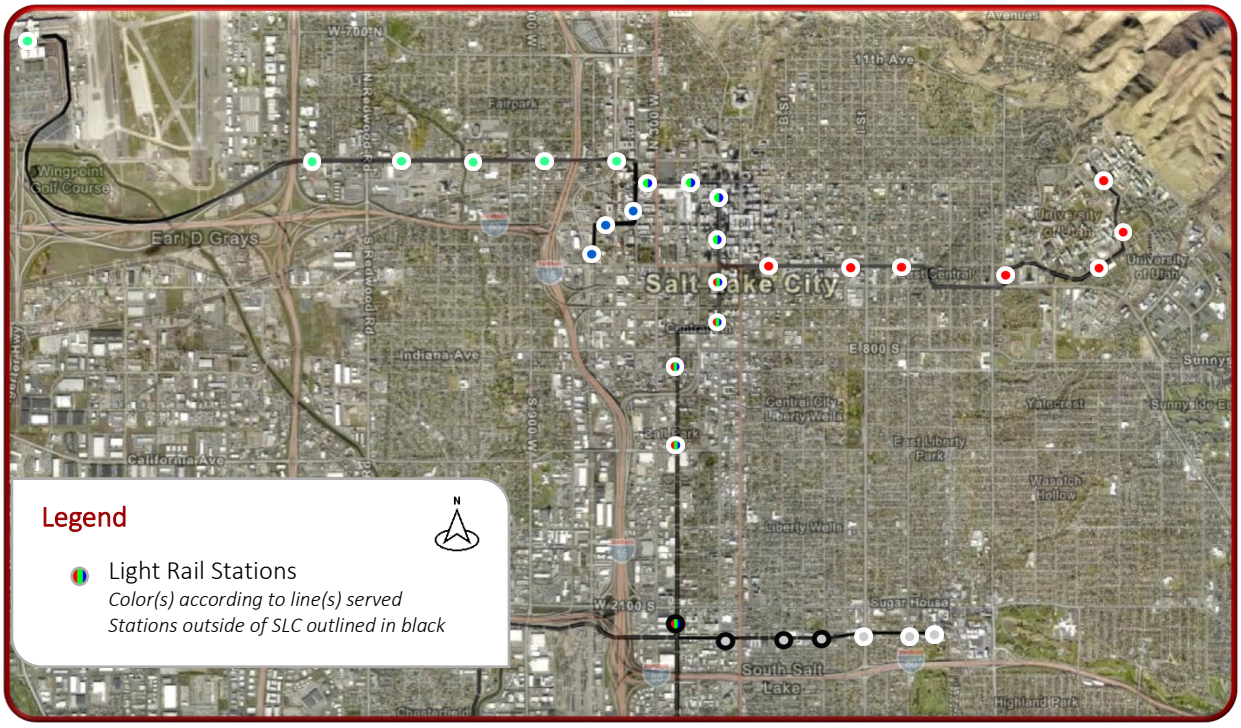

Figure 3. Existing Light Rail Stations, Salt Lake City Area (2024)

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

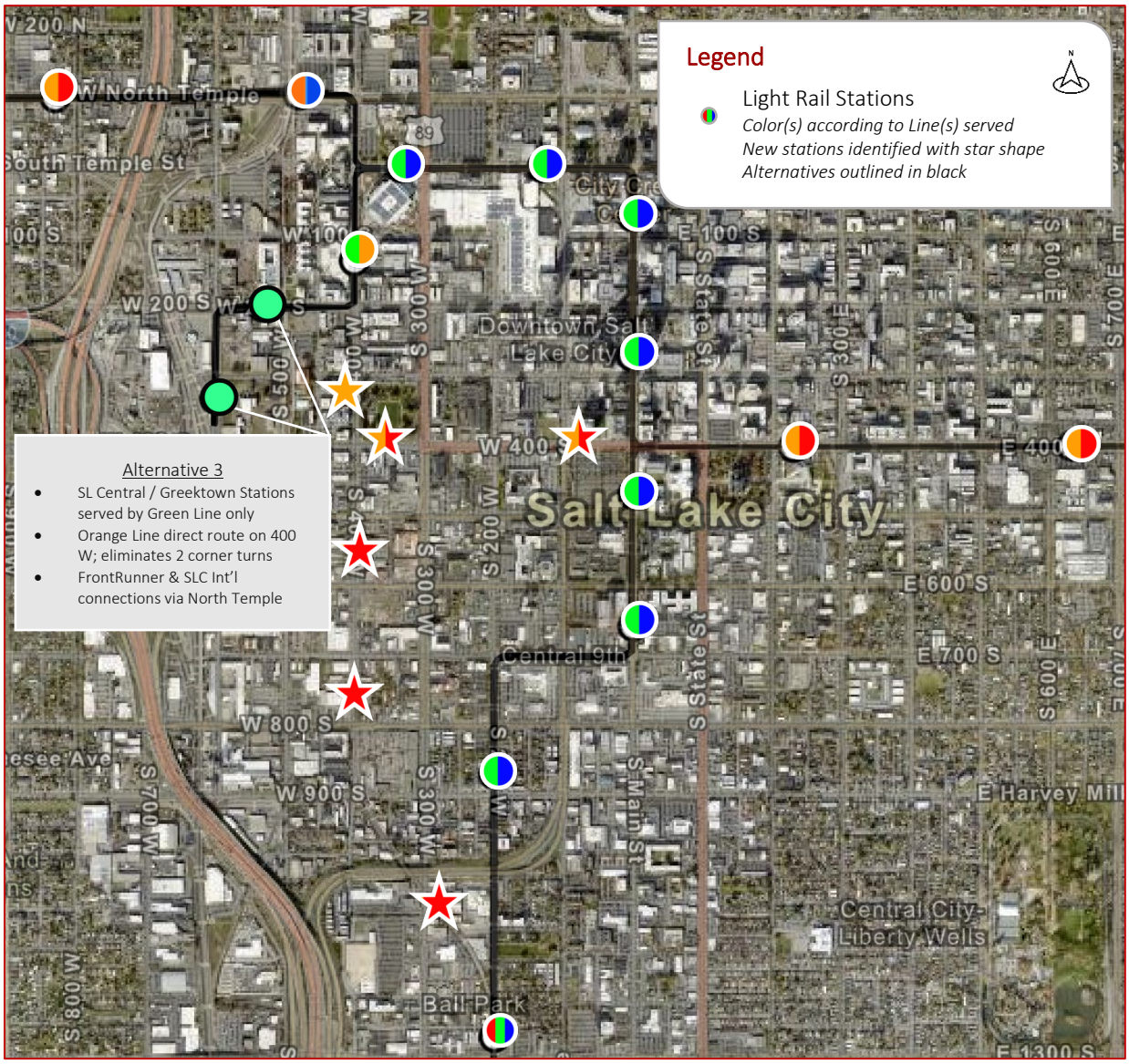

Figure 5. TechLink Alternative 3 – Direct on 400 West Proposed Improvements

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).

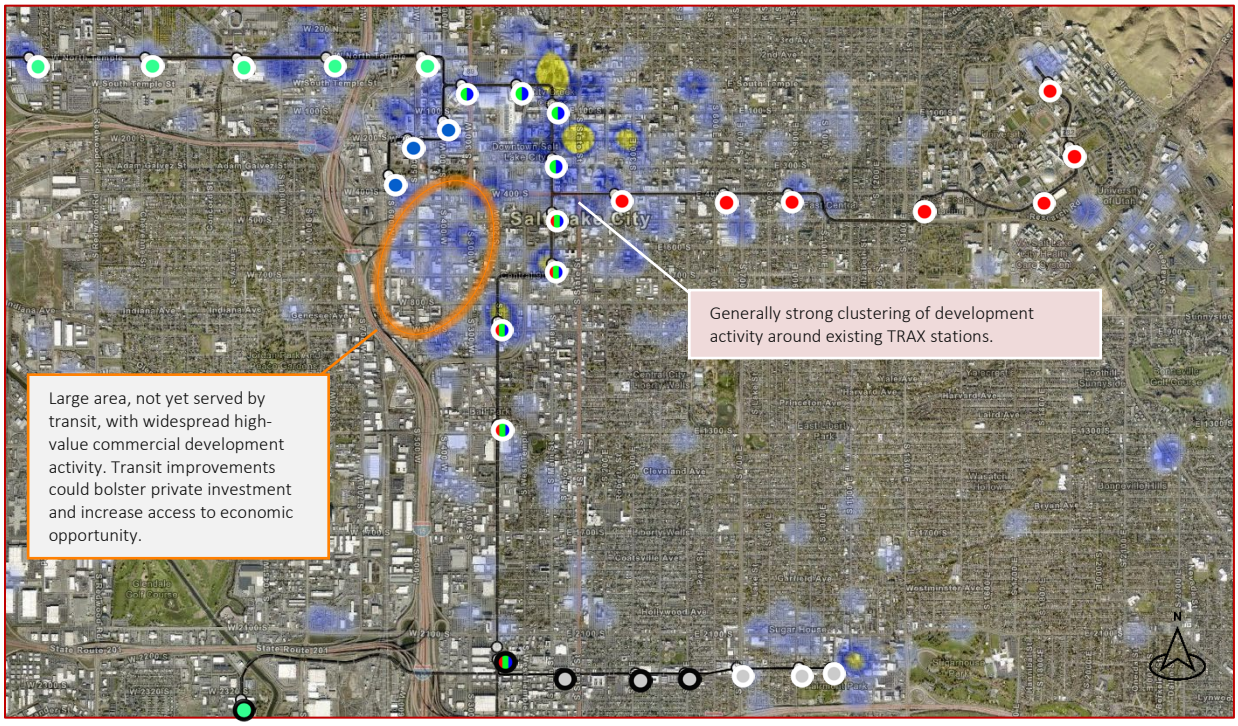

Figure 6. High-Value Commercial Building Permit Heat Map

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).

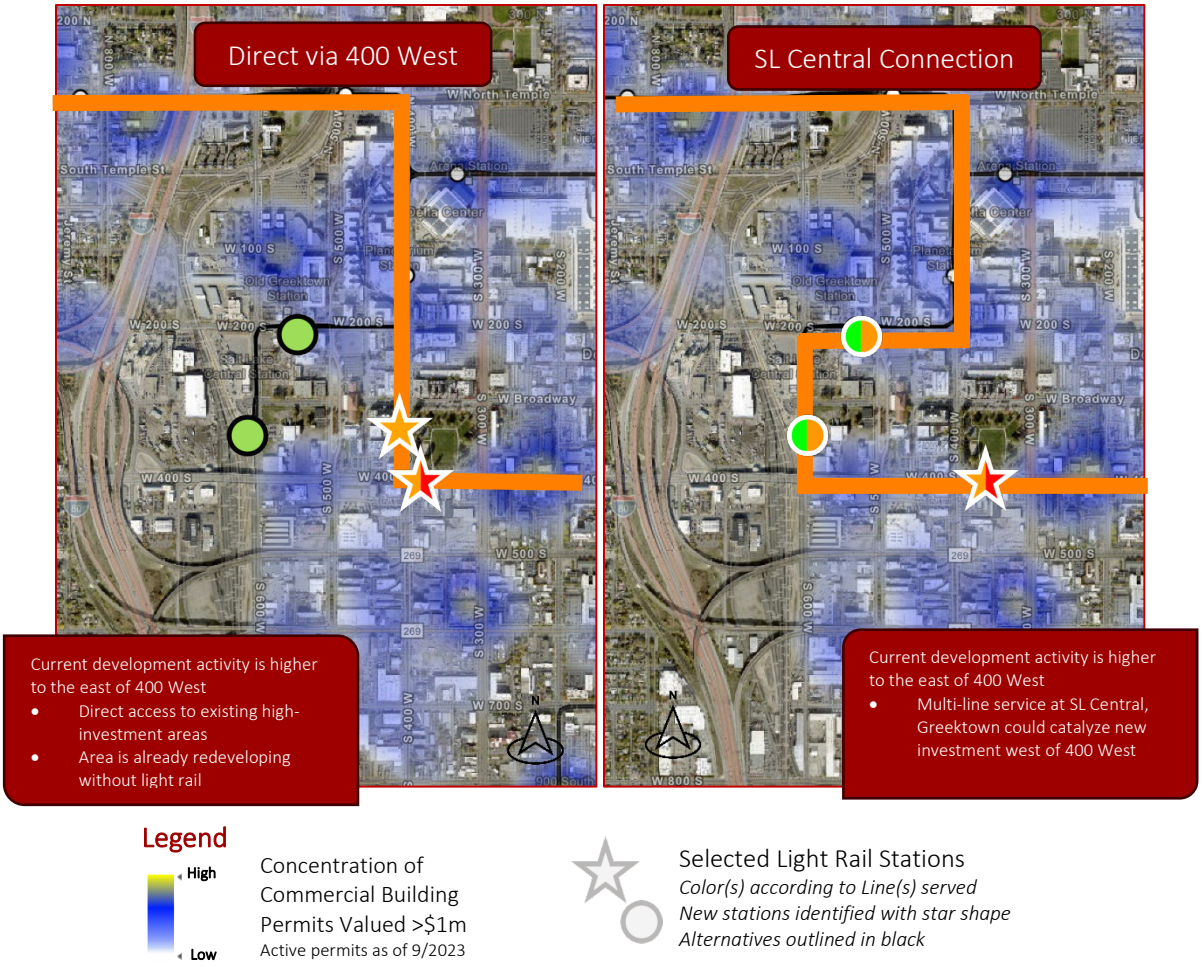

Figure 7. High-Value Commercial Building Permit Heat Map, Downtown and Depot District Areas (Alternative Evaluation), Source: Salt Lake City Accela Building Permit Database (October 2023); ZPFI

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.

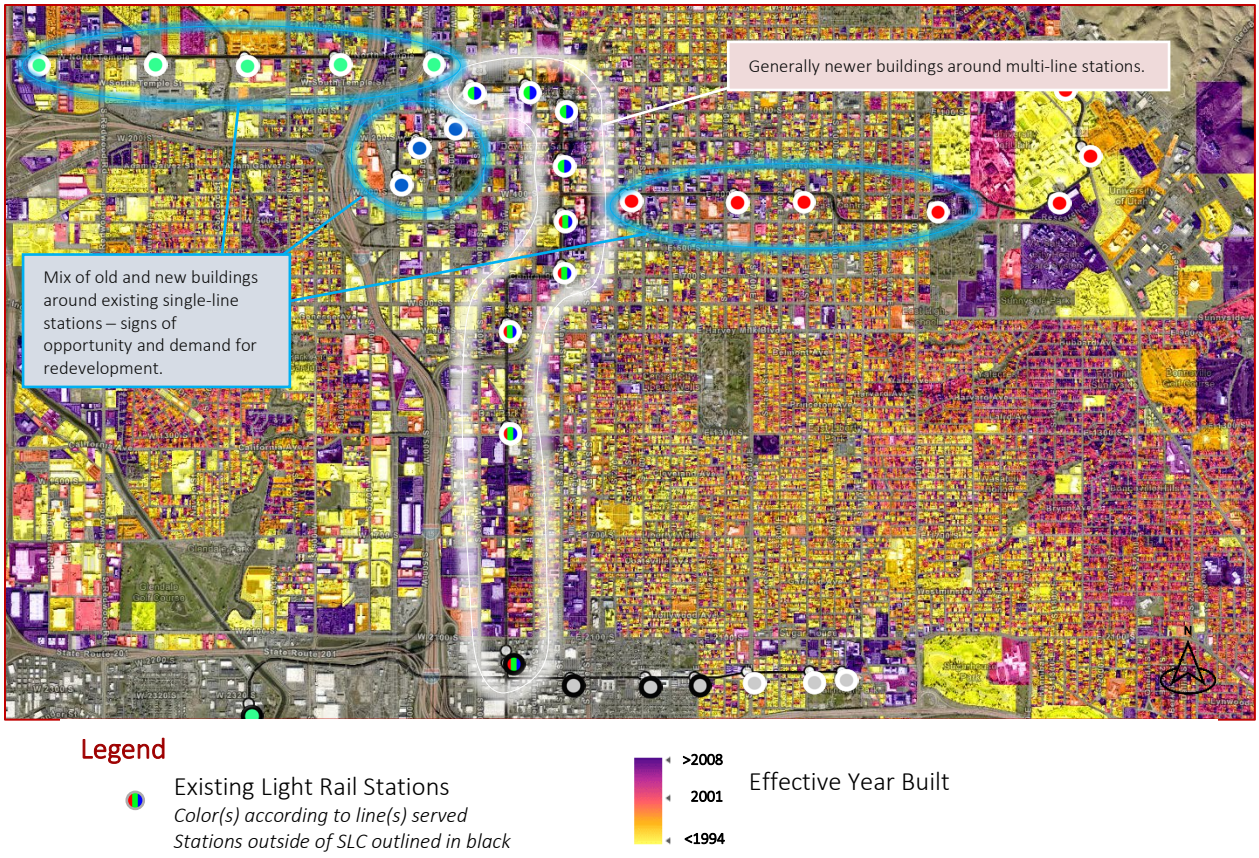

Figure 8. Effective Year Built by Parcel, Salt Lake City (09/2023), Source: Salt Lake County Assessor (2023); ZPFI

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).

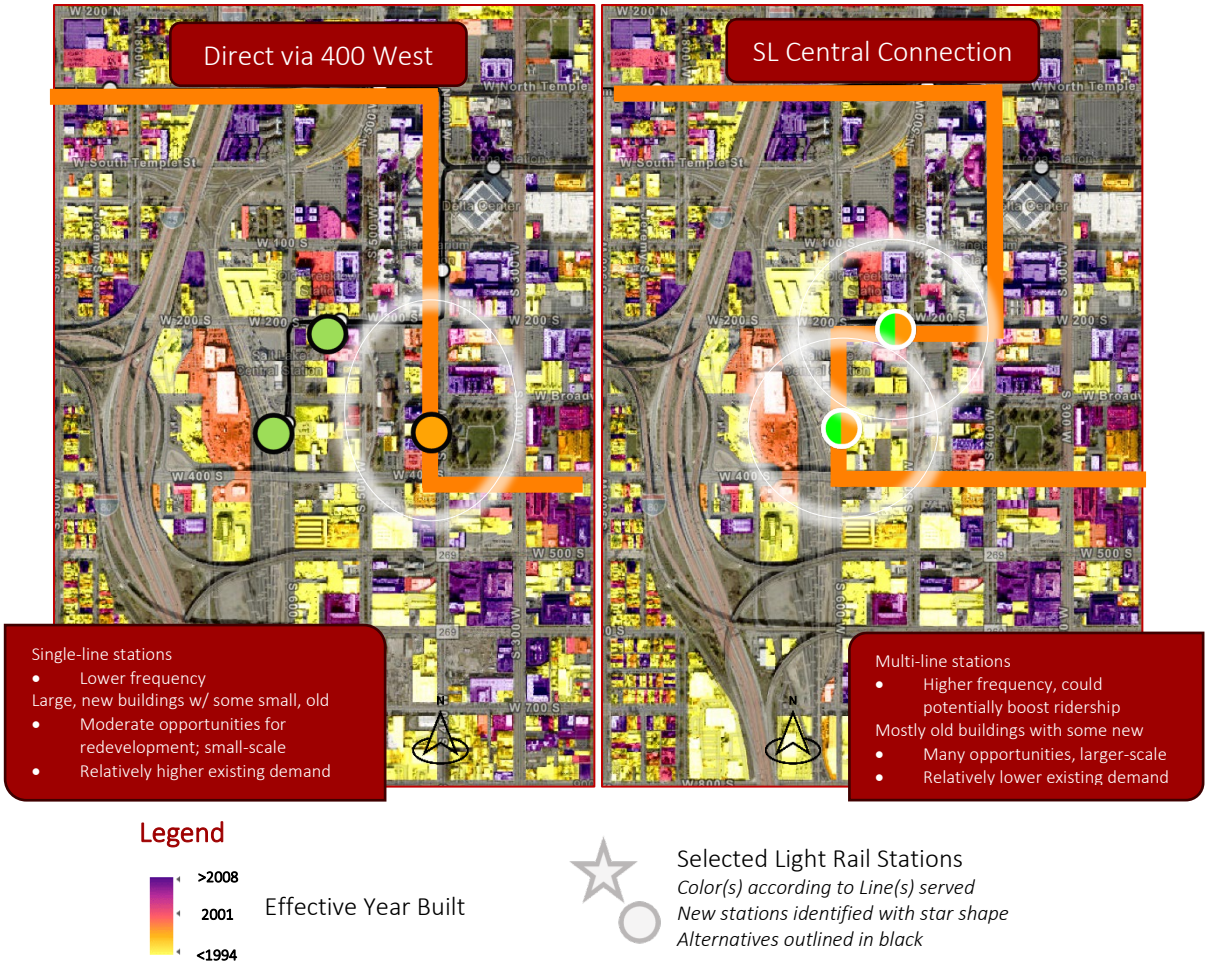

Figure 9. Effective Year Built by Parcel, Downtown and Depot District Areas (Alternative Evaluation), Source: Salt Lake County Assessor (2023); ZPFI

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.

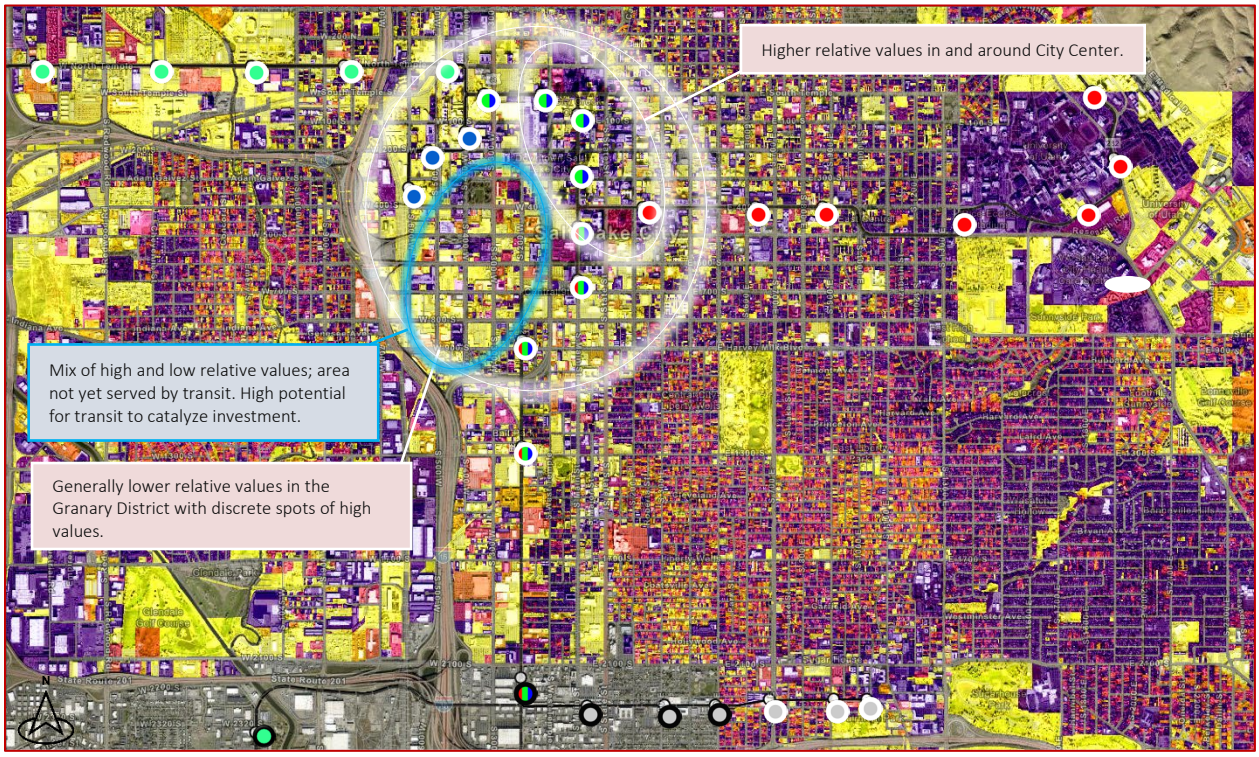

Figure 10. Relative Improvement Value by Parcel, Salt Lake City, Source: Salt Lake County Assessor (2023); ZPFI

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.

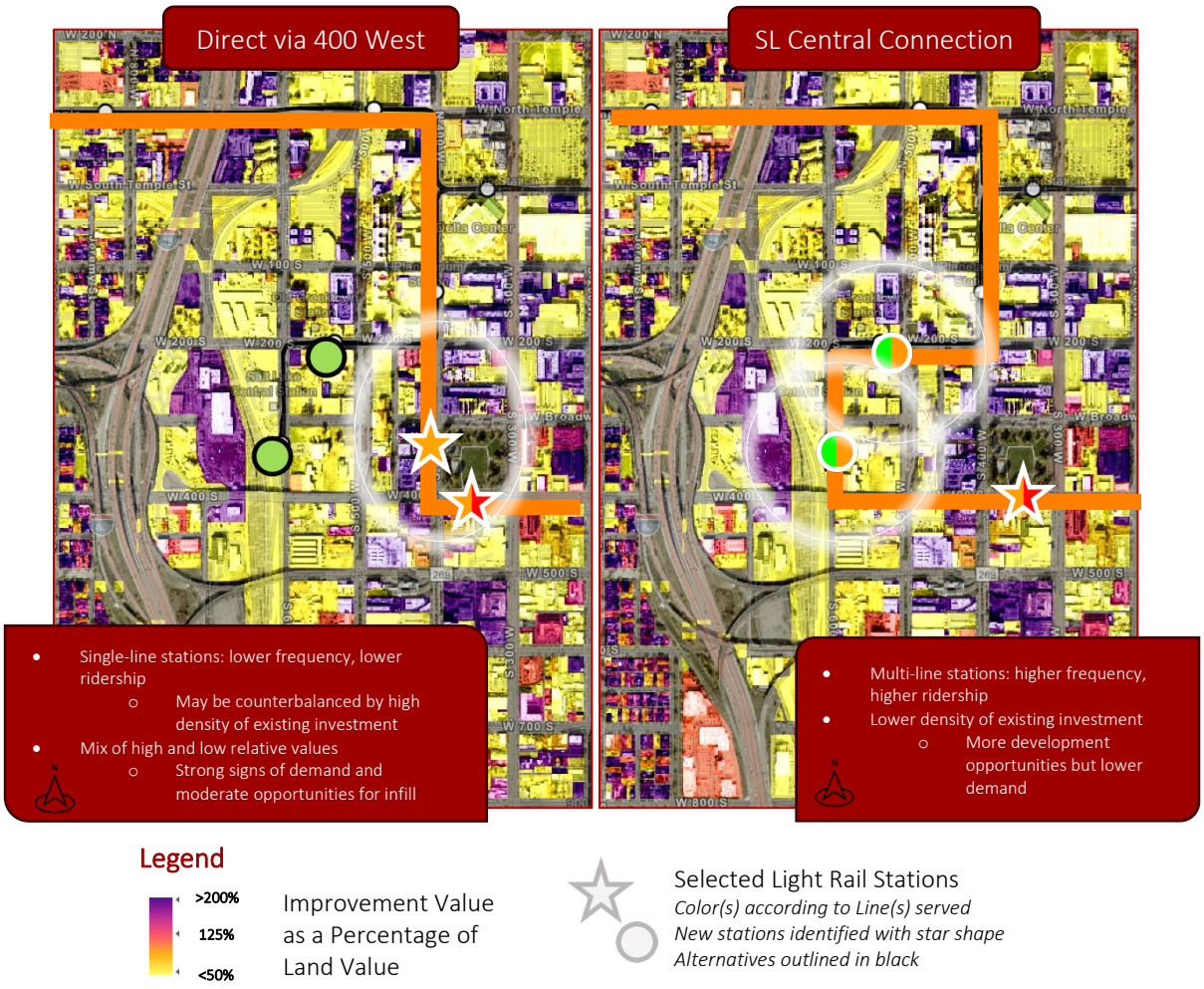

Figure 11. Relative Improvement Value by Parcel, Downtown and Depot District Areas (Alternative Evaluation), Source: Salt Lake County Assessor (2023); ZPFI

Population and Employment

For reference, the following maps show residential (Figure 12and 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.

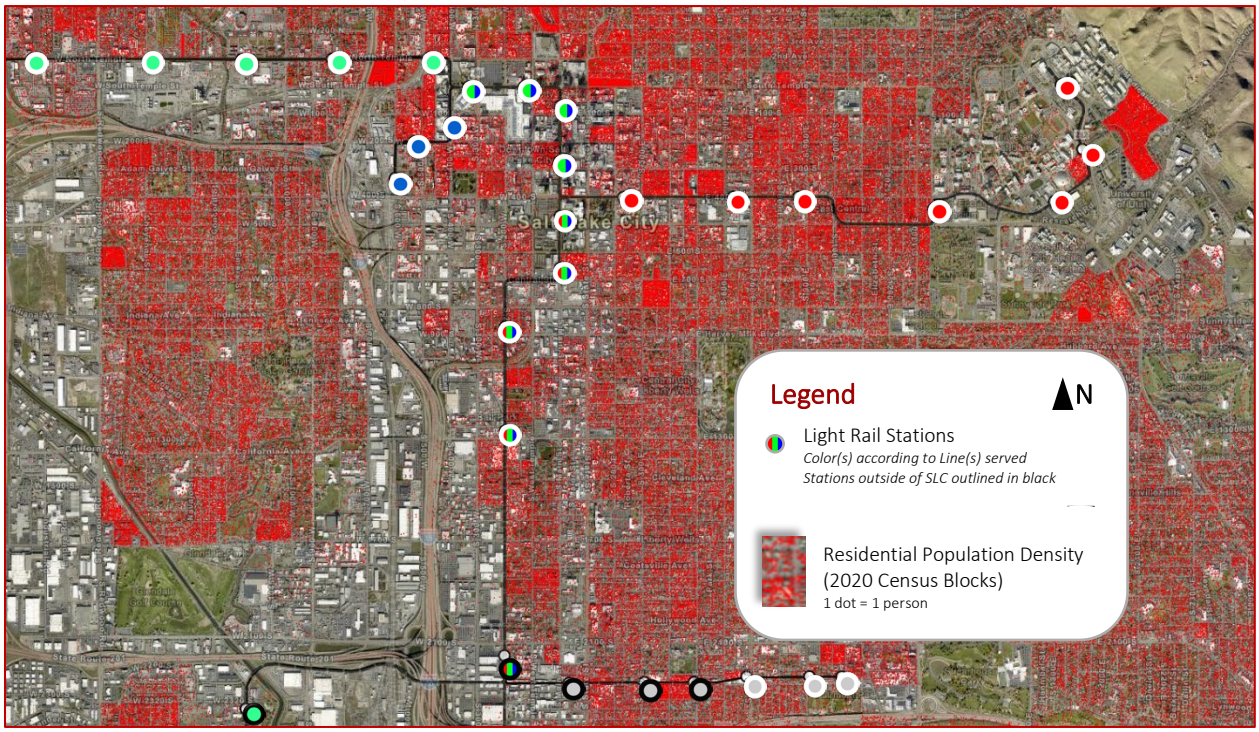

Figure 12. 2020 Residential Population Density by Census Block, Salt Lake City Area, Source: 2020 Decennial Census Redistricting Data

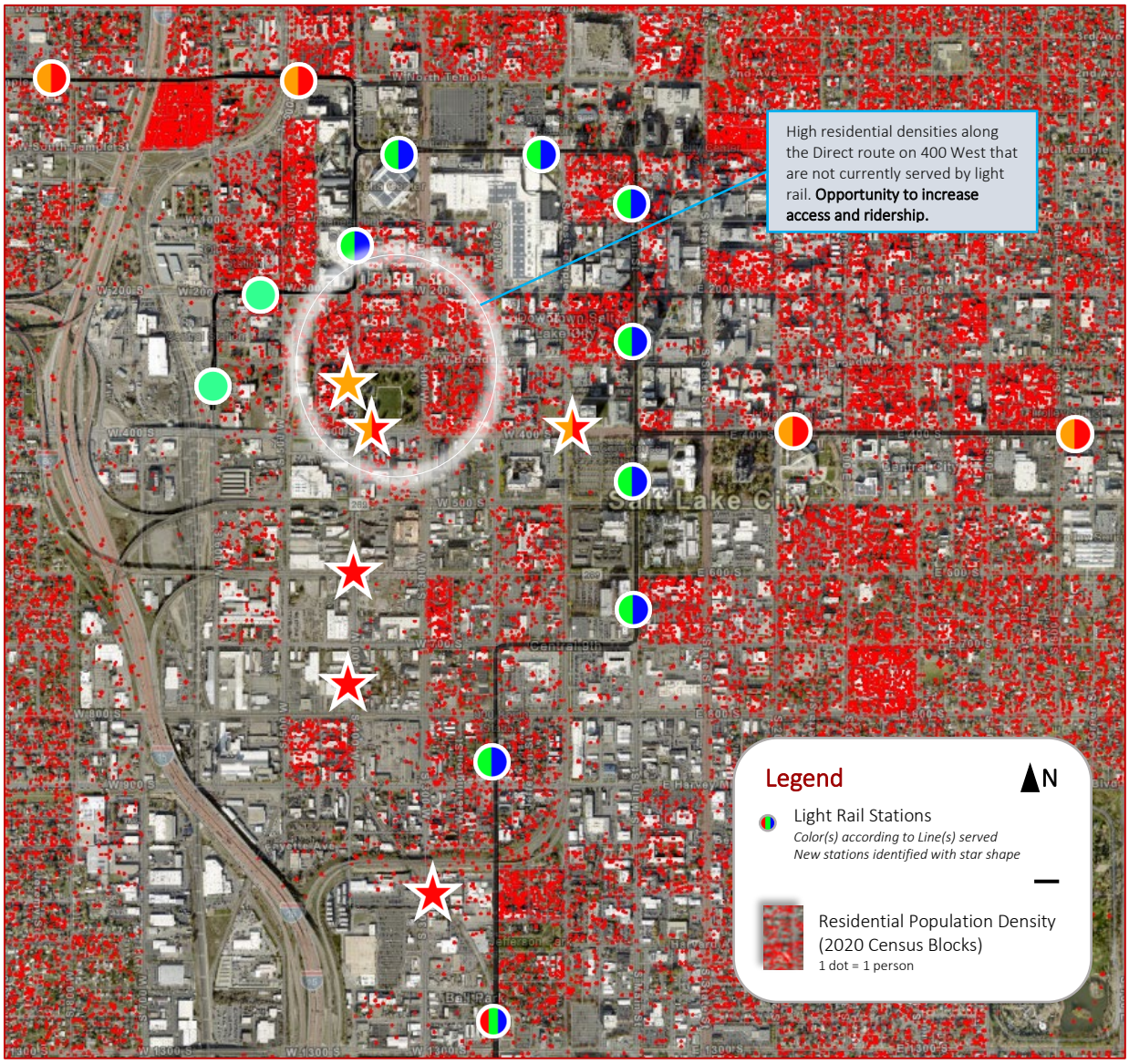

Figure 13. 2020 Residential Population Density by Census Block, Downtown and Depot/Granary District Areas, Source: 2020 Decennial Census Redistricting Data

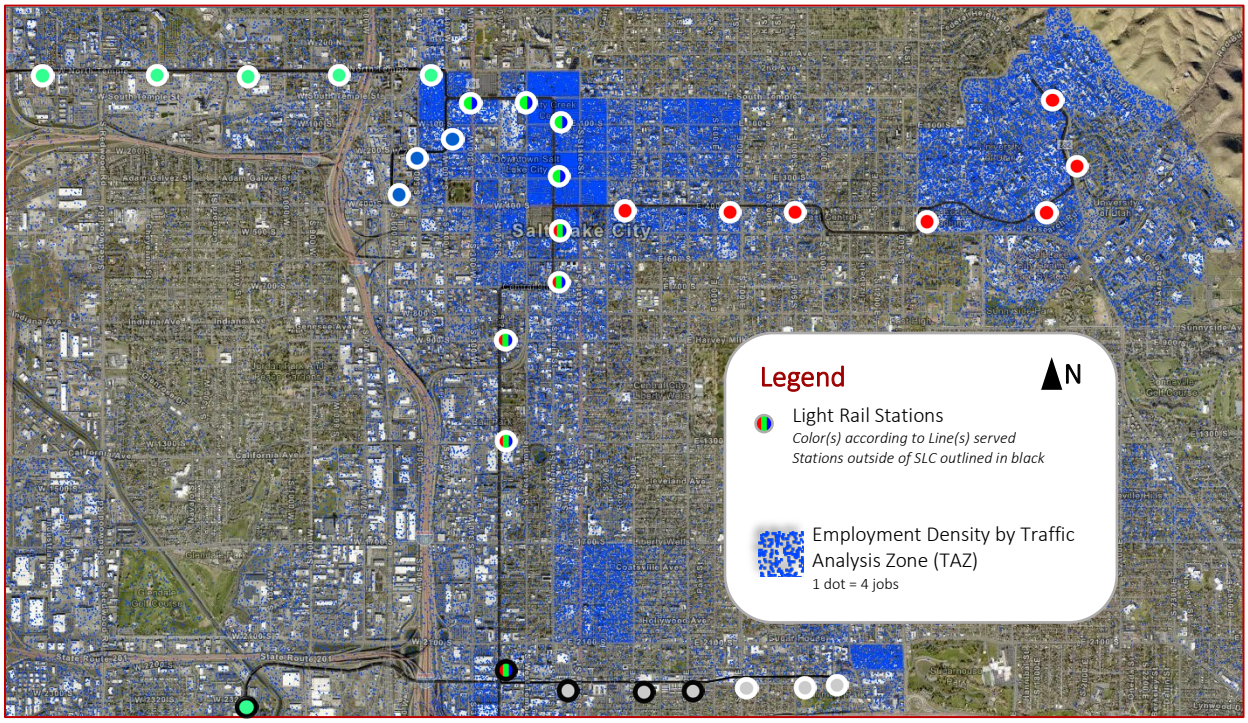

Figure 14. 2019 Employment Density by Traffic Analysis Zone (TAZ), Salt Lake City Area, Source: WFRC/MAG-TAZ Travel Demand Model, RTP 2023

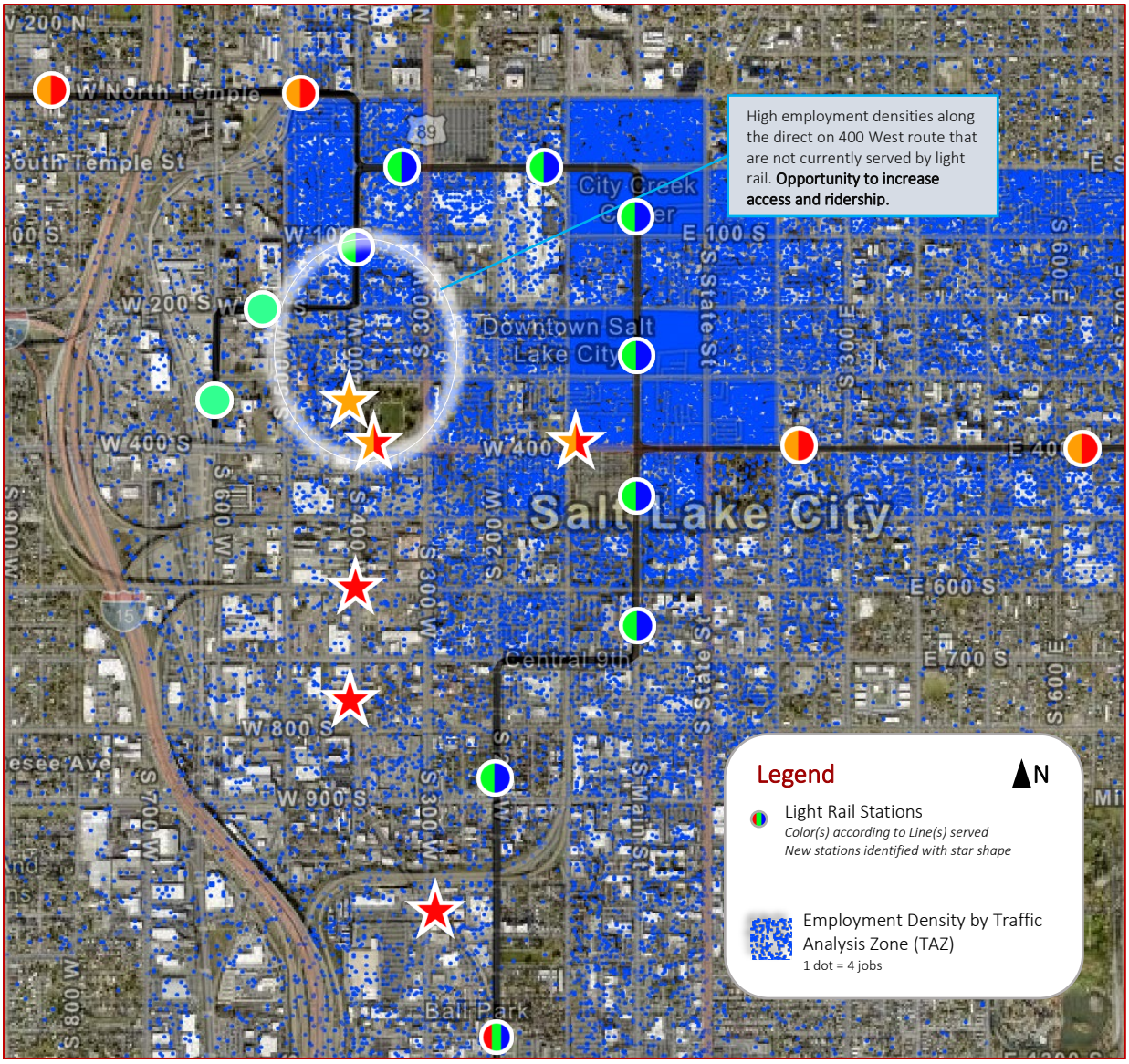

Figure 15. 2019 Employment Density by Traffic Analysis Zone (TAZ), Downtown and Granary District Areas, Source: WFRC/MAG-TAX Travel Demand Model, RTP 2023

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.

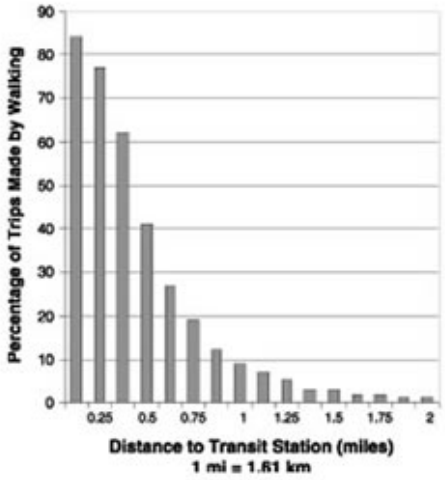

Figure 1. Percentage of Walking Trips by Distance to Transit Station (Source: FHWA Pedestrian Safety Guide for Transit Agencies)

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.

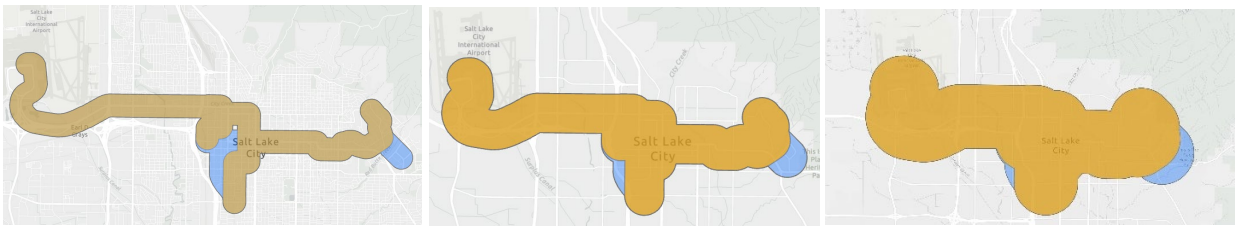

Figure 2. Left to right: 0.25-, 0.5-, and 1-mile Buffer of Alternatives (blue polygon) Versus Existing TRAX Lines Buffer (orange polygon)

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 overlayed 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.

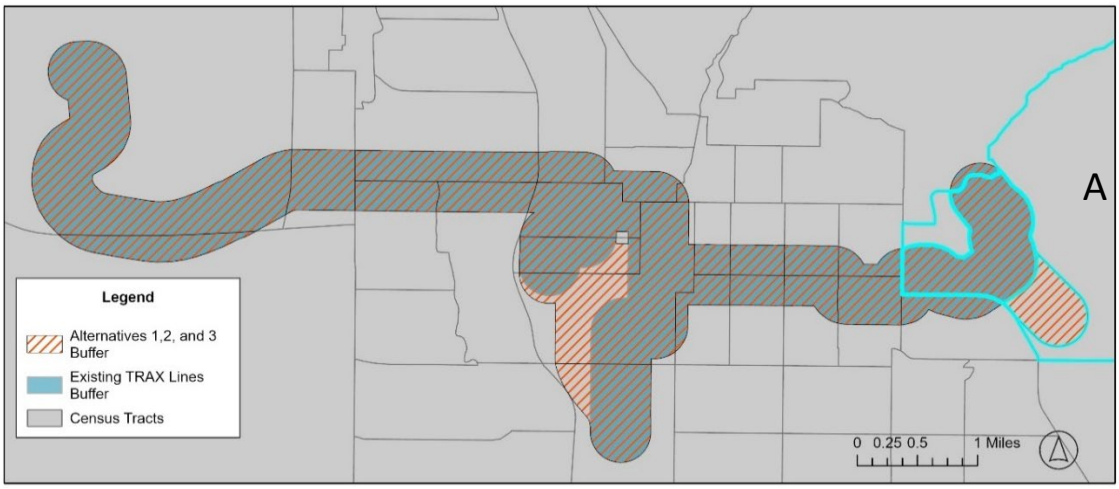

Figure 3. Analysis Normalization

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.

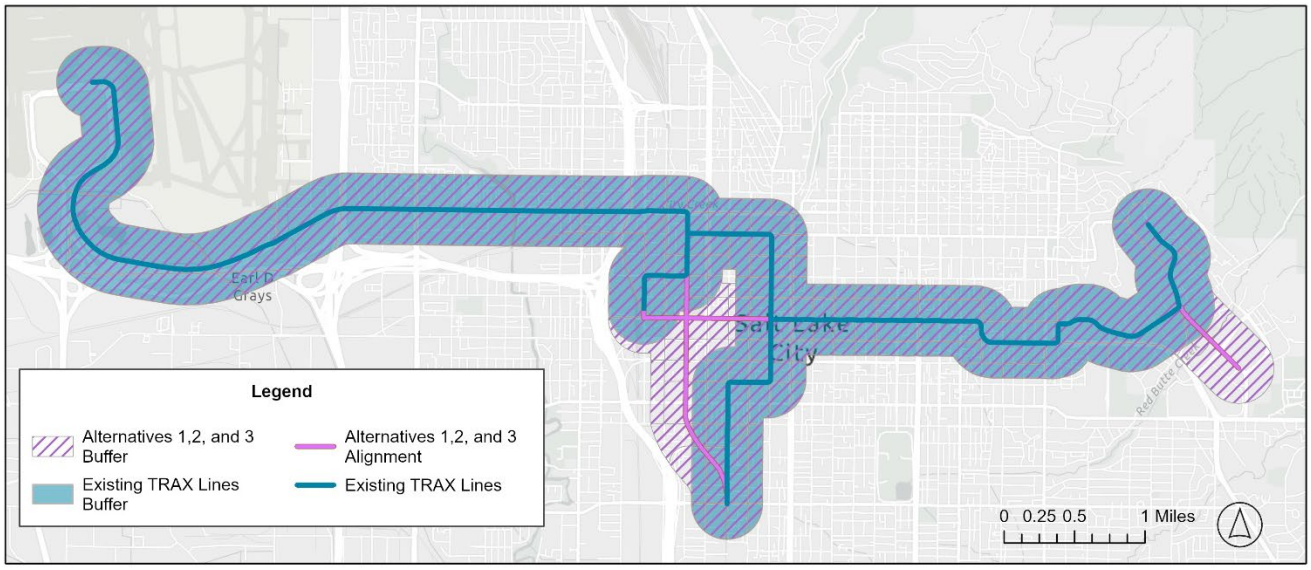

Figure 4. Alternatives 1, 2, and 3 Buffer and Existing TRAX Lines Buffer

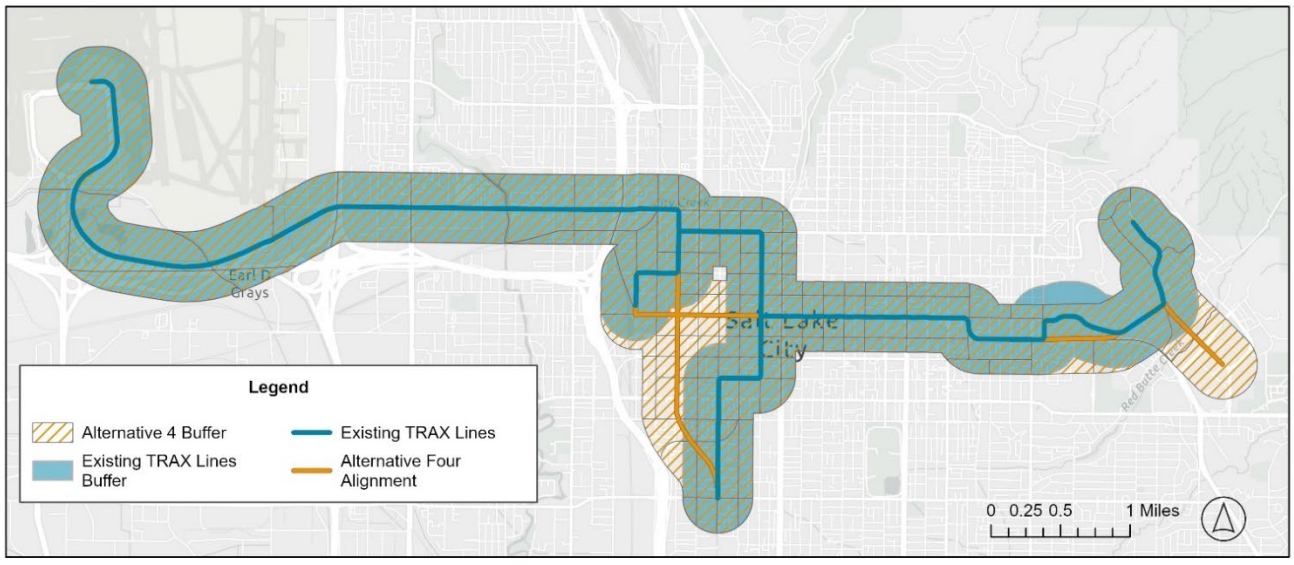

Figure 5. Alternative 4 Buffer and Existing TRAX Lines Buffer

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

PARSONS

December 18, 2024

Opinion Of Probable Cost Report
December 18, 2024

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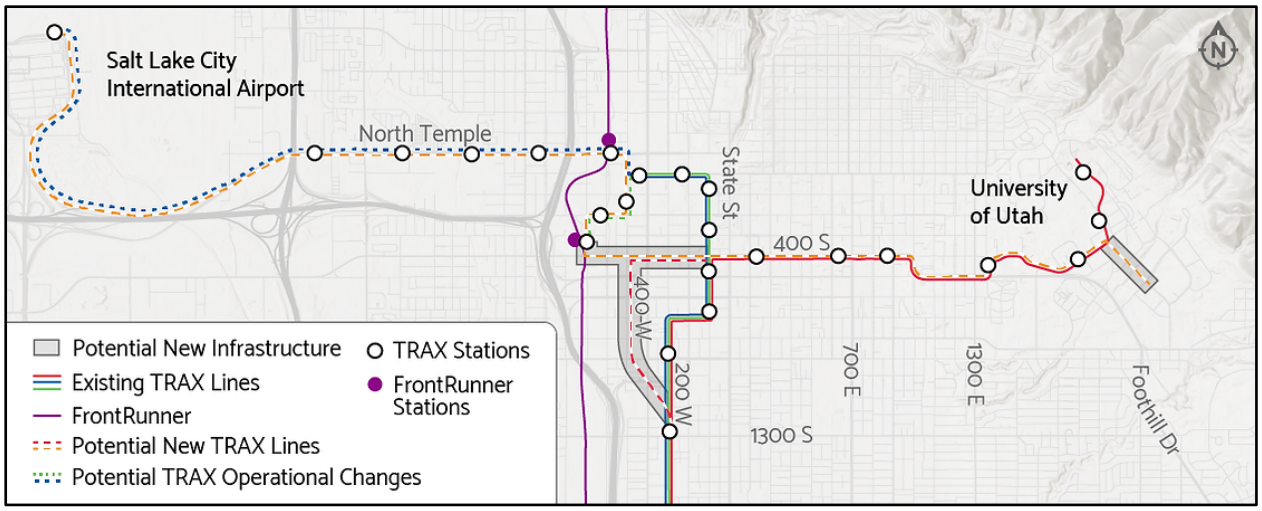
SUMMARY REPORTS AND ESTIMATES

APPENDIX

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

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.

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.

- 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

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

	Primary Characteristic	*Secondary Characteristic*		
ESTIMATE CLASS	**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.

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 Table 59 Granary District, Ballpark Spur And 400 South Extensions	C Table 61 Research Park Branch	A+C 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**

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	SITEWORK & 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.

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**

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) — Today's Date **12/18/24**

ALTERNATIVE 2, ELEVATED ON 400 WEST — 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**	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)

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) — Today's Date **12/18/24**

ALTERNATIVE 3, DIRECT ON 400 WEST — 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)	**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)

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)

Alternative 1
Future of Light Rail Baseline
Summary Report
Level 1

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
UTA Techlink	**$361,288,287**
ALT. 1 Alternative 1 - Future of Light Rail Baseline	**$361,288,287**
C Construction (SCC 10-50)	**$251,595,937**
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**

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

Alternative 1
Future of Light Rail Baseline
Summary Report
Level 2

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
UTA Techlink	**$361,288,287**
ALT. 1 Alternative 1 - Future of Light Rail Baseline	**$361,288,287**
C Construction (SCC 10-50)	**$251,595,937**
BRN Brown Segment	**$42,491,495**
10 Guideway & Track Elements	**$10,332,960**
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**
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**
50.01 Train Control and Signals	$4,696,023
Traffic Signals and Crossing Protection - At-Grade. exclusive ROW	$2,835,907

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

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

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 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

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

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**

Alternative 1
Future of Light Rail Baseline
Detail Report

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**

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
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**

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
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**

PROJECT ESTIMATE DETAIL REPORT
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Checked By: **M. Jackson**
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LEVEL DESCRIPTION	QTY	U/M	UNIT PRICE	TOTAL
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, Longitudinaland 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
DETAILS				
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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LEVEL DESCRIPTION	QTY	U/M	UNIT PRICE	TOTAL
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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LEVEL DESCRIPTION	QTY	U/M	UNIT PRICE	TOTAL
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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LEVEL DESCRIPTION	QTY	U/M	UNIT PRICE	TOTAL
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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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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Checked By: **M. Jackson**
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LEVEL DESCRIPTION	QTY	U/M	UNIT PRICE	TOTAL
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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LEVEL DESCRIPTION	QTY	U/M	UNIT PRICE	TOTAL
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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LEVEL DESCRIPTION	QTY	U/M	UNIT PRICE	TOTAL
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
DETAILS				
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
DETAILS				
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
DETAILS				
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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LEVEL DESCRIPTION	QTY	U/M	UNIT PRICE	TOTAL
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 1,780 TF (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), over10000 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), over10000 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
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
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
DETAILS				
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), over10000 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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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**	**RTF**	$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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LEVEL DESCRIPTION	QTY	U/M	UNIT PRICE	TOTAL
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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LEVEL DESCRIPTION	QTY	U/M	UNIT PRICE	TOTAL
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, exclsplicing & 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
DETAILS				
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
DETAILS				
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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LEVEL DESCRIPTION	QTY	U/M	UNIT PRICE	TOTAL
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
DETAILS				
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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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	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), over10000 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), over10000 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
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
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
DETAILS				
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), over10000 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**	**RTF**	$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**

PROJECT ESTIMATE DETAIL REPORT
BY UNIT PRICE

Estimate Date: **10/15/2024** ; *Rev. No.* ***01***
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Estimator **B. Frazier, M. Jackson**
Checked By: **M. Jackson**
Charge #:
Doc Scope Date: **July 2024**

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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LEVEL DESCRIPTION	QTY	U/M	UNIT PRICE	TOTAL
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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LEVEL DESCRIPTION	QTY	U/M	UNIT PRICE	TOTAL
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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LEVEL DESCRIPTION	QTY	U/M	UNIT PRICE	TOTAL
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,	**124**	**V.L.F.**	$32.87	**4,079**
Casing left in place	**17,745**	**Lb.**	$3.31	**58,731**
Reinforcing steel, in place, #3 to #7, A615, grade 60 - #4 Ties	**1**	**Ton**	$4,487.77	**3,141**
Reinforcing steel, in place, #8 to #18, A615, grade 60 - #9 Vertical Bars	**4**	**Ton**	$3,742.11	**14,220**
Structural concrete, ready mix, heavyweight, 4000 psi, includes local aggregate, sand, Portland cement (Type I) and water, delivered, excludes all additives and treatments	**89**	**C.Y.**	$268.09	**23,809**
Structural concrete, placing, pumped, over 5 C.Y., includes leveling (strike off) & consolidation, excludes material	**89**	**C.Y.**	$23.52	**2,089**
Cut Casing	**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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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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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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Estimator **B. Frazier, M. Jackson**
Checked By: **M. Jackson**
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LEVEL DESCRIPTION	QTY	U/M	UNIT PRICE	TOTAL
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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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
DETAILS				
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
DETAILS				
Construct Embedded Track - Closure and Cross Tracks 1,780 TF (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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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	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), over10000 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), over10000 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
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
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
DETAILS				
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), over10000 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**	**RTF**	$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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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	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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LEVEL DESCRIPTION	QTY	U/M	UNIT PRICE	TOTAL
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
	DETAILS				
	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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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 optics 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, Longitudinaland 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
DETAILS				
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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Checked By: **M. Jackson**
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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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LEVEL DESCRIPTION	QTY	U/M	UNIT PRICE	TOTAL
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), over10000 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
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
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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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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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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Checked By: **M. Jackson**
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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,	**496**	**V.L.F.**	$32.87	**16,306**
Casing left in place	**70,937**	**Lb.**	$3.31	**234,781**
Reinforcing steel, in place, #3 to #7, A615, grade 60 - #4 Ties	**3**	**Ton**	$4,485.00	**12,558**
Reinforcing steel, in place, #8 to #18, A615, grade 60 - #9 Vertical Bars	**15**	**Ton**	$3,744.74	**56,845**
Structural concrete, ready mix, heavyweight, 4000 psi, includes local aggregate, sand, Portland cement (Type I) and water, delivered, excludes all additives and treatments	**355**	**C.Y.**	$268.08	**95,177**
Structural concrete, placing, pumped, over 5 C.Y., includes leveling (strike off) & consolidation, excludes material	**355**	**C.Y.**	$23.52	**8,350**
Cut Casing	**50**	**EA**	$1,643.39	**81,529**
Load Surplus	**406**	**L.C.Y.**	$2.50	**1,015**
Haul Surplus Materials Off Site	**406**	**L.C.Y.**	$18.13	**7,354**
Embedment Plate Assembly	**3,725**	**LBS**	$4.14	**15,412**
Anchor Bolt Template	**7,170**	**LBS**	$4.14	**29,661**

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LEVEL DESCRIPTION	QTY	U/M	UNIT PRICE	TOTAL
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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LEVEL DESCRIPTION	QTY	U/M	UNIT PRICE	TOTAL
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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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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LEVEL DESCRIPTION	QTY	U/M	UNIT PRICE	TOTAL
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, Longitudinaland 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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LEVEL DESCRIPTION	QTY	U/M	UNIT PRICE	TOTAL
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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LEVEL DESCRIPTION	QTY	U/M	UNIT PRICE	TOTAL
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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LEVEL DESCRIPTION	QTY	U/M	UNIT PRICE	TOTAL
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), over10000 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
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**
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
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**
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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LEVEL DESCRIPTION	QTY	U/M	UNIT PRICE	TOTAL
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), over10000 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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LEVEL DESCRIPTION	QTY	U/M	UNIT PRICE	TOTAL
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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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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LEVEL DESCRIPTION	QTY	U/M	UNIT PRICE	TOTAL
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, exclsplicing & 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
	DETAILS				
	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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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**

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
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				

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
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

Appendix

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:	**TOTAL PURPLE (acres):**
																$3,312,655	**0.84**

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)
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:	**TOTAL BROWN (acres)**
																$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-Guardsman)	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-Guardsman)	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 (Guardsman-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 Guardsman)	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:	**TOTAL RED (acres):**
																$2,612,902	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:	TOTAL ORANGE (acres):
$575,323	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

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						
	Future Baseline		Strategic Plan (Full – RTP Phase 3)		Strategic Plan (Interim – RTP Phase 2)	
Service	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)	