Final Report

Downtown Salt Lake City Rail Extensions & Connections Feasibility Study

April 2021

Prepared by WSP USA

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Appendices

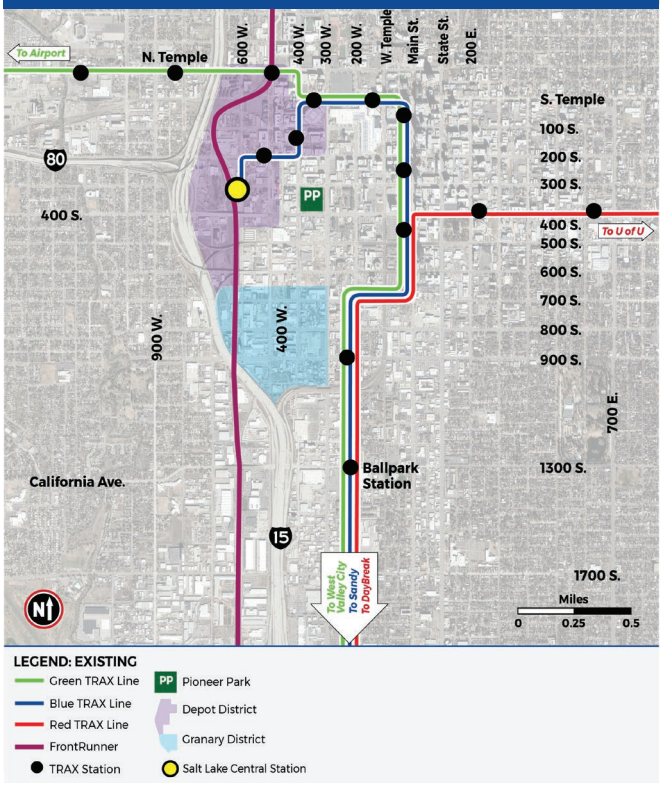


1. Introduction

Salt Lake City is the largest city in Utah and a center of business for the Wasatch Front and the entire Intermountain West. An economic driver for the State and the region, Salt Lake City's population and employment have been growing at a rapid pace. With that growth comes an increase in travel. The City and the region seek to maximize the number of trips made on transit to reduce the effects of growth on highway congestion, air pollution, and greenhouse gas emissions, along with facilitating economic development, redevelopment and adaptive reuse. Transit also provides mobility for those without access to an automobile, and for those who prefer not to drive.

The Utah Transit Authority (UTA) initiated this study to identify and assess opportunities to improve regional connectivity and serve growing areas on the west side of downtown Salt Lake City with light rail. The study builds upon and continues the conversation started in a number of prior studies including the Salt Lake City Redevelopment Agency's (RDA) Downtown Streetcar Study (2010), Salt Lake City's Downtown Plan (2016), Salt Lake City's Transit Master Plan (2017), the Wasatch Front Regional Council's Regional Transportation Plan 2019-2050, and the RDA's Central Station Area Plan (2019).

Figure 1: Existing TRAX System in Downtown Salt Lake City



UTA's existing TRAX light rail system provides 42.5 miles of light rail service in Salt Lake County, with three lines operating at up to 15-minute headways. The three lines are denoted by different colors – Red, Blue and Green – and share a common alignment between Courthouse station in downtown Salt Lake City and 2100 South. The Blue and Green Lines share a common alignment to serve the historic office and retail core of Salt Lake City, clustered near Temple Square and along Main Street between South Temple and 400 South. The Red Line extends east to the University of Utah along the 400 South corridor.

As the City grows, mixed use redevelopment is occurring in downtown, east along the Red Line on 400 South, and to areas south and west of the historic core that are not well served by TRAX, including the Granary and Depot Districts. Salt Lake City is seeking to develop an innovation center near downtown and to take full advantage of development incentives like Opportunity Zones.




This study is focused on TRAX lines and routing within the core area of Salt Lake City, defined as the area between North Temple, I-15, 2100 South, and 300 East. Figure 1 (previous page) illustrates the existing TRAX system within the study area and denotes the location of the Granary District and Depot District redevelopment areas.

TRAX connects with UTA's FrontRunner commuter rail system at two places in the study area – at Salt Lake Central and at the North Temple Bridge/Guadalupe. FrontRunner runs the length of the Wasatch Front, paralleling I-15 and connecting Ogden, Salt Lake City, Provo and Orem. At Salt Lake Central, FrontRunner passengers can transfer to the TRAX Blue Line. The North Temple Bridge station serves transfers between FrontRunner and the Green Line. This study assumes that the FrontRunner tracks and stations will remain in their current location for the foreseeable future.

The purpose of this focused feasibility study is to identify and provide a preliminary evaluation of TRAX routing alternatives (subsequently referred to in this study as investment scenarios) within the study area. Decisions on a preferred alternative or scenario will be made later. The results of this study will be integrated into UTA's concurrent Future of Light Rail study which is assessing opportunities for the regional TRAX system in greater detail, including operational simulations and ridership forecasts.

2. Goals

Five goals were identified to provide a basis for identifying and evaluating TRAX investment scenarios in this study:

1. Enhance regional connectivity via the rail network, reducing transit travel time between major origins and destinations and creating a regional transit hub.
2. Improve rail access to the western area of downtown Salt Lake City, an existing and growing regional employment, cultural, entertainment and residential center.
3. Facilitate synergistic land use, urban design and placemaking in an area of regional and statewide importance.
4. Enhance operations and provide operational redundancy.
5. Advance economic development, improve quality of life, and promote access to equitable opportunities.

The existing Salt Lake Central station can offer a starting point for developing a regional transit hub that enhances regional connectivity and promotes economic development. Minimalist in design, Salt Lake Central provides connections in a relatively diffused manner between FrontRunner, TRAX, UTA buses, Amtrak and intercity buses. It is currently served by only one TRAX Line, the Blue Line, which operates on 15-minute headways and follows a circuitous path to downtown, making it a less than ideal transfer point for many. A Blue Line trip from Salt Lake Central to City Center Station in the heart of downtown Salt Lake City takes 10 minutes. In 2019, the Salt Lake Central station averaged 992 TRAX boardings per day, less than two percent of all TRAX boardings. The walking distance from Salt Lake Central to City Center is 1.3 miles.

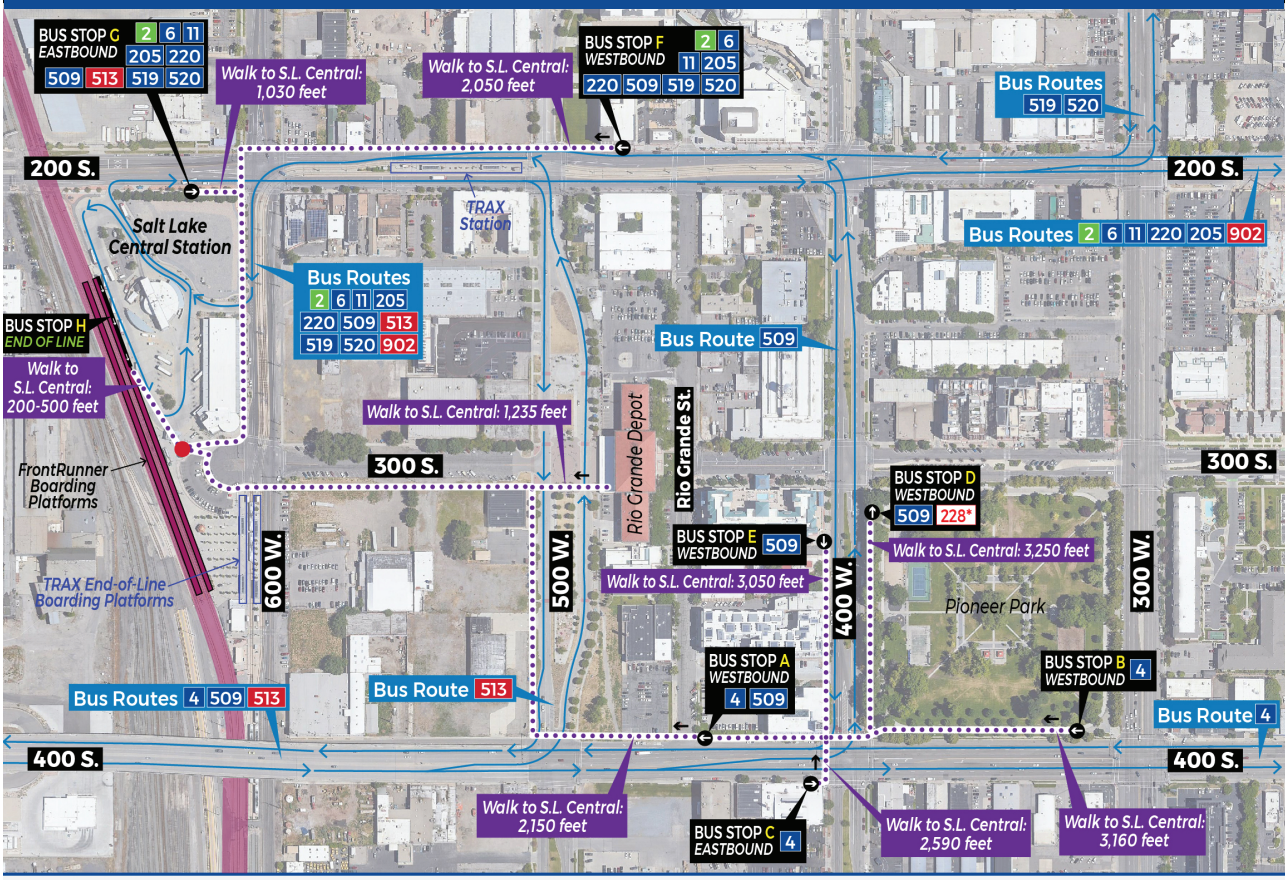
Opportunities to transfer between FrontRunner and UTA buses also exist near Salt Lake Central. Figure 2 identifies UTA bus stops within a six square block area and the distance between Salt Lake Central and those stops.

The western area of downtown mentioned in the second goal includes the Granary and Depot Districts which the City has targeted for redevelopment and adaptive reuse. Based upon Salt Lake City's 2016 Downtown Plan, the Granary District is generally defined as the area bounded by 600 South, 300 West, the People's Freeway at approximately 1000 South, and I-15. The City intends that the Granary "continue its transition from primarily industrial uses and warehouse buildings and is repurposed for creative industries and supports office, retail, and restaurants." The Depot District is generally the area bounded



by North Temple Street, 300 West, 700 South, and I-15. According to the 2016 plan, "The future of the Depot District is a dense urban neighborhood that provides a full range of housing options and is served

Figure 2: UTA Bus Stops and Public Spaces in the Vicinity of Salt Lake Central



LEGEND:

- Salt Lake Central Station*
  *Walking distances are measured to this point.
- FrontRunner Tracks

Bus Routes: Frequency

- # Bus Runs Every 15 minutes
- # Bus Runs Every 30 minutes
- # Peak Only or Express

Bus Stop Walking Route to S.L. Central Station*
*Walking distances are approximate and are measured to S.L. Central

Bus Route & Direction

Scale in Feet: 0 250 500

228* Route appears on bus stop sign but is no longer in service

BUS STOP A WESTBOUND 4 509

Approximate Location: 440 W. on north side of 400 S.

Walk to S.L. Central: 2,150 feet

BUS STOP B WESTBOUND 4

Approximate Location: 310 W. on north side of 400 S.

Walk to S.L. Central: 3,160 feet

BUS STOP C EASTBOUND 4

Approximate Location: 410 W. on south side of 400 S.

Walk to S.L. Central: 2,590 feet

BUS STOP D WESTBOUND 509 228*

Approximate Location: 310 S. on east side of 400 W.

Walk to S.L. Central: 3,250 feet

BUS STOP E WESTBOUND 509

Approximate Location: 320 S. on west side of 400 W.

Walk to S.L. Central: 3,050 feet

BUS STOP F WESTBOUND 2 6 11 205 220 509 519 520

Approximate Location: 480 W. on north side of 200 S.

Walk to S.L. Central: 2,050 feet

BUS STOP G EASTBOUND 2 6 11 205 220 509 513 519 520

Approximate Location: 610 W. on south side of 200 S.

Walk to S.L. Central: 1,030 feet

BUS STOP H END OF LINE

Location: Adjacent to North end of FrontRunner Boarding Platforms

Walk to S.L. Central: 200-500 feet




by all modes of transit." In 2019, the Redevelopment Agency (RDA) of Salt Lake City and UTA collaborated in the development of a Central Station Area Plan covering much of the Depot District.

3. Scenarios

In collaboration with UTA, Salt Lake City and the study team identified three conceptual routing scenarios to bracket the reasonable range of potential opportunities for additional TRAX coverage and service within downtown Salt Lake City. The intent was not to identify all possible routing options, but rather to identify and evaluate a range of concepts that respond to the goals. Each of the three scenarios adds a new Orange Line running east-west between the University of Utah and Salt Lake International Airport and relocates one of the existing TRAX lines to a new alignment serving the Granary District. This section provides an overview of the scenarios; Appendix C presents further details on the conceptual design assumptions made for the purpose of this feasibility study.

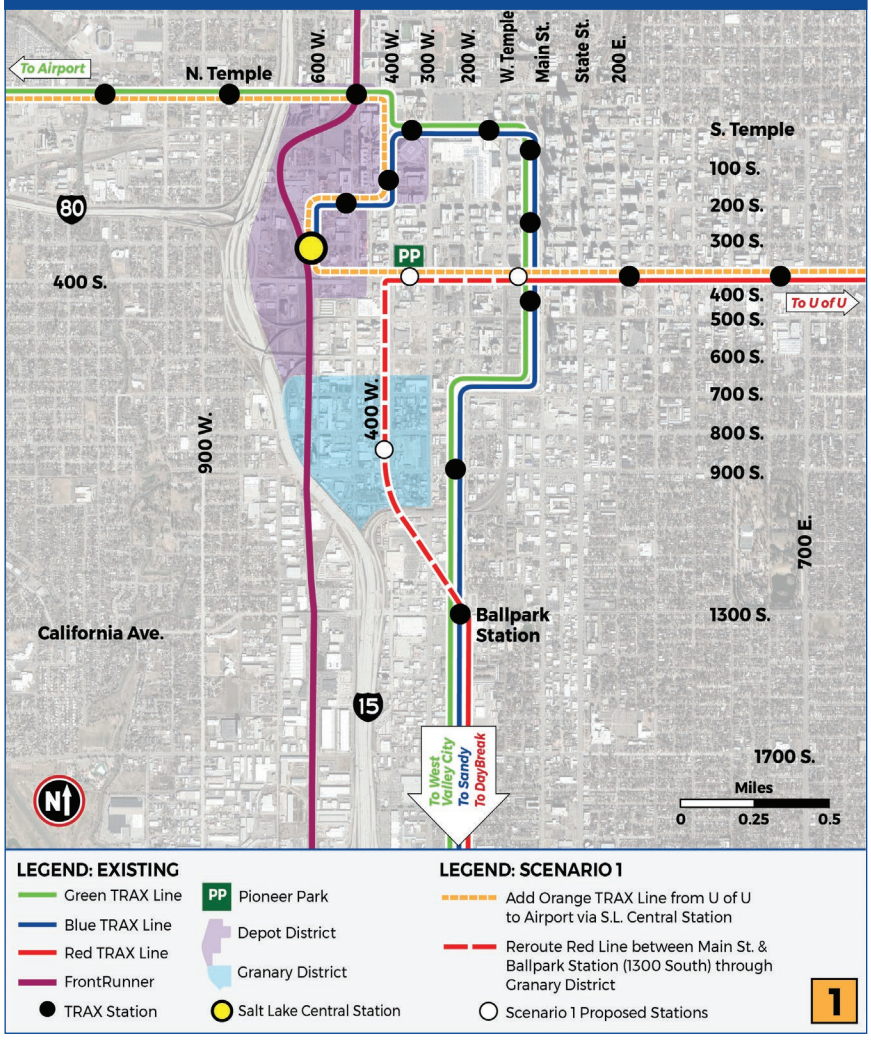
As these three scenarios were discussed with UTA, City and RDA staff, several alternative routings were identified to address access issues and trade-offs in the vicinity of Salt Lake Central. These alternative routings are presented in the Challenges/Issues section of this report.

1 Scenario 1: Red Line Extension via Granary & New East-West Connection via Salt Lake Central

Scenario 1 includes two elements: a new Orange Line and relocation of a short section of the Red Line. The new Orange Line would extend from the University of Utah on the east to Salt Lake International Airport on the west via the existing Salt Lake Central FrontRunner station.

The Orange Line would require the construction of a new double-track alignment along 400 South from 600 West to Main Street. This roadway is currently owned by the City from 600 West to 300 West and by the Utah Department of Transportation (UDOT) from 300 West to Main Street. Sketch level plans indicate that new Orange Line tracks could be added in the center of 400 South if the parking lane were removed and existing travel

Figure 3: Scenario 1



lanes narrowed to 10½ feet wide. Additional right-of-way may be needed where new stations are added. Between 500 West and 600 West, the Orange Line would transition from the center to the north side of 400 South and follow the existing Frontage Road to Salt Lake Central. New right-of-way would need to be obtained north of the 400 South Frontage Road.

With this scenario, transfers between FrontRunner and the Orange Line would require only a short walk, similar to transfers between FrontRunner and Blue Line trains today.

The relocated Red Line would diverge from the existing alignment, which it shares with the Blue and Green Lines, just north of the Ballpark Station and would follow an abandoned railroad right-of-way to the intersection of 900 South and 400 West. It would then proceed north along 400 West to 400 South. At 400 South the Red Line would turn east and share tracks with the new Orange Line. Transfers between FrontRunner and the Red Line would involve a three-block or more walk from Salt Lake Central to a new Red Line station at Pioneer Park.

As shown on Figure 3, three new TRAX stations are contemplated under Scenario 1:

- Red Line station on 400 West between 800 South and 900 South (Granary)
- Red and Orange Line station on 400 South between 400 West and 300 West (Pioneer Park)
- Red and Orange Line station on 400 South between West Temple and Main Street (Courthouse)

The assumption of three new stations is consistent with UTA's current station spacing south of downtown. Further study and coordination with the City, RDA and potential private interests would occur in future planning to finalize the number and location of new stations.

All three scenarios utilize the abandoned railroad right-of-way that diverges from the existing TRAX alignment just north of the Ballpark Station (1300 S. & 200 W.) The alignment heads northwesterly toward 400 W., then north in the center of 400 W. through the Granary District.

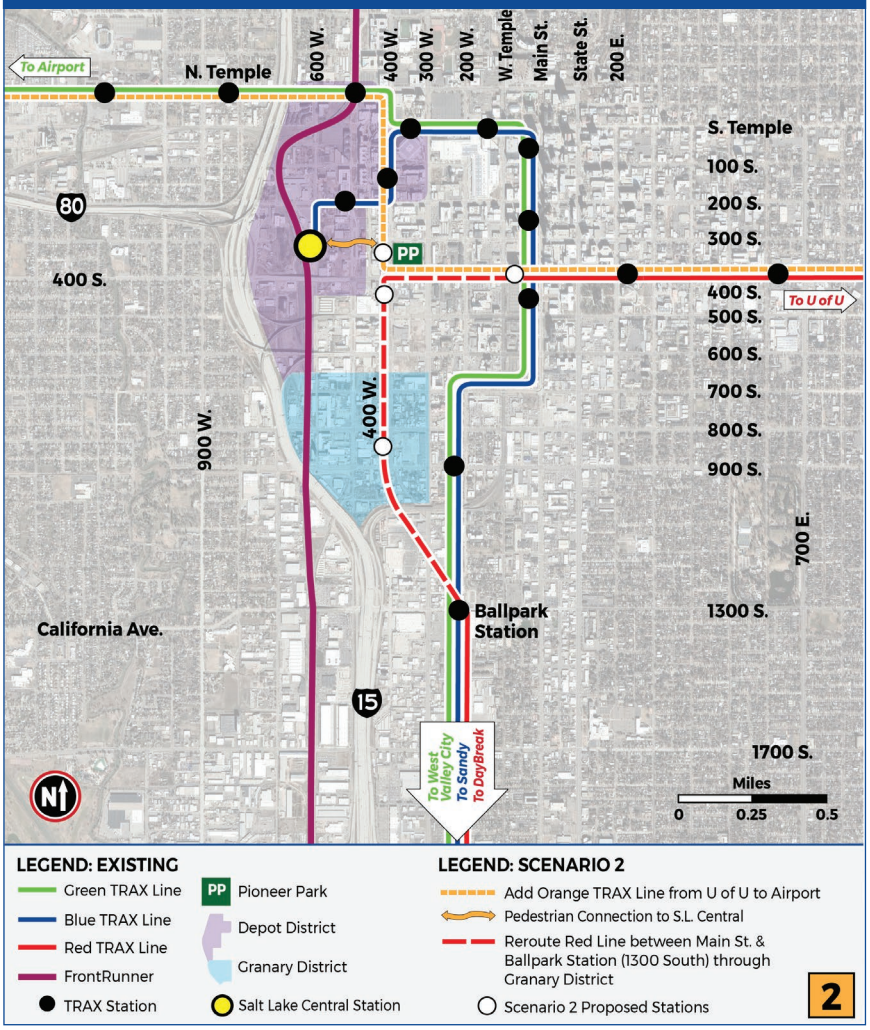
Photo Key




2 Scenario 2: Red Line Extension via Granary plus New East-West Connection to Salt Lake Central via Walking/Rolling Link

Scenario 2 reduces the length of the Orange Line alignment, reduces the number of ninety degree turns (which slow operations and create wear and tear, noise and other issues further discussed below), and reduces TRAX travel time. However, the Orange Line station closest to Salt Lake Central is located two blocks away from the FrontRunner station, near 400 West and 300 South, and is connected to Salt Lake Central by a pedestrian walkway along 300 South.

Figure 4: Scenario 2



The pedestrian walkway would pass through or around the Rio Grande Depot and would be designed in such a way as to stimulate and enhance development within the Depot District, essentially creating an activity center that could be an attraction by itself. Appendix A describes examples of rail stations elsewhere in the country have utilized an "Open Transit Design" concept that integrates transit modes, that is oriented towards real estate development and creating value, and that creates iconic urban spaces. This concept builds upon the existing diffuse character of transit services in and around Salt Lake Central - it is not a tightly focused transit hub today and would need to be radically redesigned to become one. Yet Salt Lake Central it need not be radically redesigned to operate effectively while imparting substantial indirect benefits.

The Red Line in Scenario 2 is identical to Scenario 1 except that the station at Pioneer Park is moved from 400 South to 400 West.

Four new TRAX stations are contemplated under Scenario 2. While further study and coordination with the City, RDA and potential private interests would need to occur in future planning, to finalize station locations, the following locations are assumed for purposes of this feasibility study:

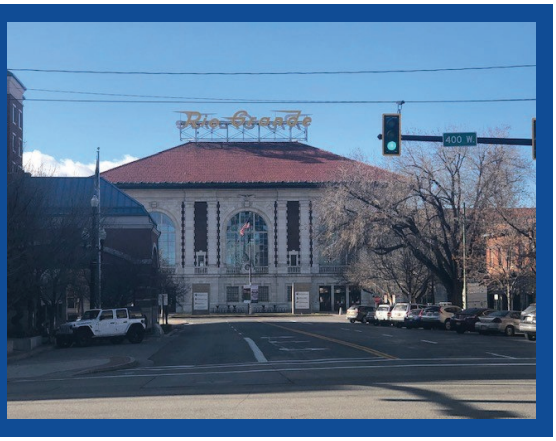
- Red Line station on 400 West between 800 South and 900 South (Granary)




- Red Line station on 400 West between 400 South and 500 South (Pioneer Park)
- Orange Line station on 400 West between 300 South and 400 South (Rio Grande Depot)
- Red and Orange Line station on 400 South between West Temple and Main Street (Courthouse)

Scenario 2 envisions a two-block pedestrian connection between a TRAX station at 400 West and Salt Lake Central. The connection would pass through the Rio Grande Depot, stimulating development in the Depot District.

Rio Grande Depot is currently owned by the State of Utah and houses the state's Department of Heritage and Arts.

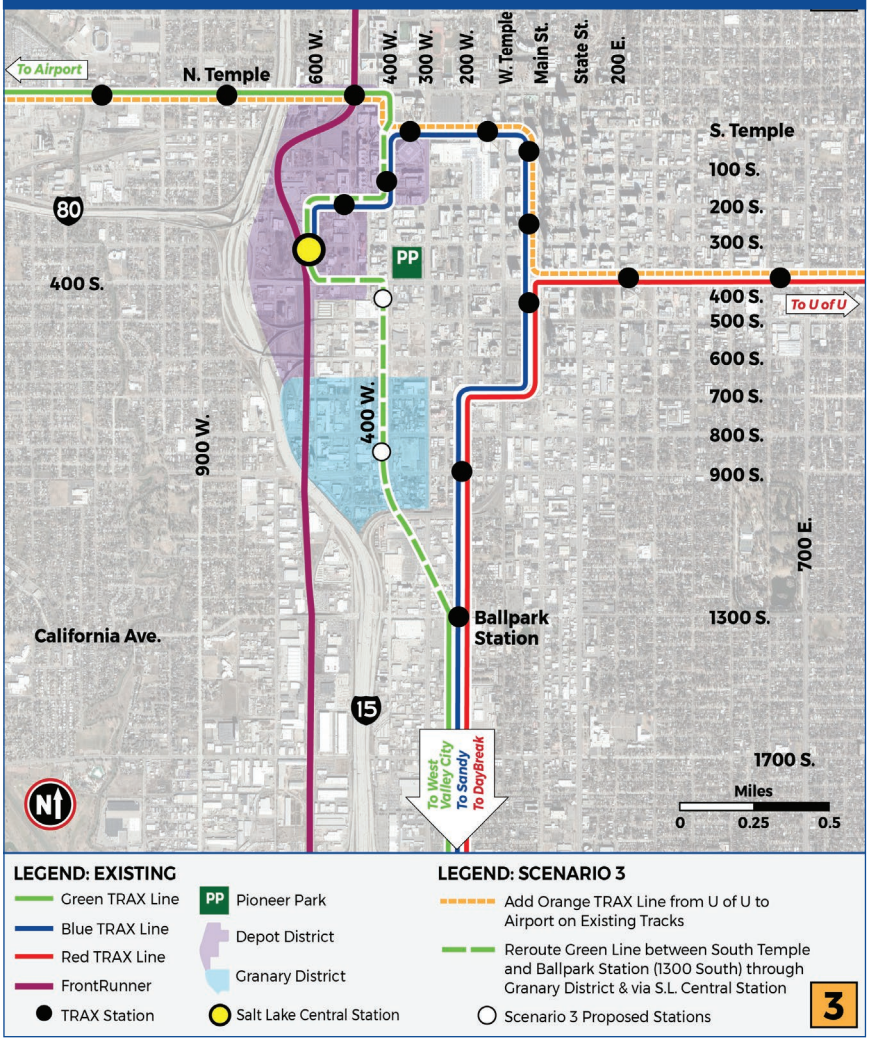


3 Scenario 3: Green Line Extension via Granary and Salt Lake Central Plus New East-West Connection via Downtown

Scenario 3 is significantly different from the other two concepts in that the new Orange Line uses the existing TRAX alignment through downtown and the Green Line is relocated to the new alignment along 400 West, stopping at Salt Lake Central before continuing on to the Airport. Figure 5 illustrates this concept. This scenario would offer a one-seat ride between the Airport, downtown Salt Lake City and the University of Utah. FrontRunner passengers heading to the University would likely transfer to the Orange Line at the North Temple Bridge/ Guadalupe station.

Scenario 3 is derived from the Green Line TRAX Reconfiguration Project that is included in the Wasatch Front Regional Council's (WFRC) adopted Regional Transportation Plan (RTP). That plan shows the Green Line diverging from the

Figure 5: Scenario 3






Red Line and the Blue Line just north of the Ballpark TRAX station, following the rail corridor to 400 West at 900 South. The WFRC plan shows the Green Line continuing north on 400 West, remaining two blocks east of Salt Lake Central (similar to Scenario 2), and connecting to the existing TRAX system at 200 South. Scenario 3 differs from this concept in that the Green Line would turn to the west at 400 South to directly serve Salt Lake Central.

Two new TRAX stations are contemplated under Scenario 3. While further study and coordination with the City and potential private interests would need to occur in future planning, to finalize station locations, the following locations are assumed for purposes of this feasibility study:

- Green Line station on 400 West between 800 South and 900 South (Granary)
- Green Line station on 400 West between 400 South and 500 South (Pioneer Park)

4. Opportunities

This section describes of the many opportunities provided by the three scenarios described in Section 3. These include enhancing regional connectivity, reducing transit travel time, supporting planned development and adding redundancy to the system. By making TRAX more frequent and reliable, and expanding coverage within downtown, the scenarios also identify opportunities to increase ridership once the economy and public health recover.

Regional Connectivity

The UTA's transit system, including TRAX, FrontRunner, and buses, is of vital Importance to State and Region. The system serves many who lack access to an automobile and offers an alternative means of travel for many others, reducing emissions, traffic, and auto crashes. UTA provides an integrated transit system connecting the entire Wasatch Front.

The Salt Lake Central and North Temple Bridge stations currently serve as the primary connections between FrontRunner and TRAX within the downtown area. Only one of the three TRAX lines, the Blue Line, currently serves Salt Lake Central, and its circuitous alignment between Salt Lake Central and downtown is slow. Only the Green Line serves the North Temple Bridge. The scenarios identified above offer the opportunity to better connect FrontRunner with TRAX and to serve important regional destinations like downtown Salt Lake City, the University of Utah ("the U"), and Salt Lake International Airport with more frequent and more direct connections.

FrontRunner's success in attracting riders has led UTA and other officials to seek improvements including new stations and double tracking that will allow for increased frequency and capacity. The benefits of these investments can be maximized if FrontRunner is well connected to trip origins and destinations. Each of the three scenarios in this study would provide more frequent connections between TRAX and FrontRunner, and better transit service between FrontRunner and destinations of regional importance.

Transit Travel Time

The three scenarios would reduce transit travel time between key regional origins and destinations. This reduction would result in part from more direct routing and fewer transfers for certain trips, such as trips between the Intermodal Hub and the U. Travel time savings would also result from




the added service offered by the new Orange Line. Implementation of traffic signal priority could further reduce transit travel times. Faster transit travel times would encourage additional ridership, reducing the need for riders to time their trips based on the TRAX schedule.

Table 1 provides a preliminary assessment of the opportunity to reduce travel time with the three scenarios, assuming that headways on the existing TRAX lines are unchanged and that headways on the new Orange Line match those on the other lines. A more precise assessment would require service planning and scheduling.

Table 1: Relative Change in Travel Time from Existing Conditions

Trip	Scenario 1	Scenario 2	Scenario 3	Comments
1. Provo/Orem to downtown SLC (City Center Station)	0	0	0	All three scenarios rely on existing Blue Line connection from S.L. Central to downtown
2. Provo/Orem to University of Utah	+	0	0	Riders from Provo to the U currently transfer to the Red Line at Murray. In Scenario 1, direct connection from SL Central to U is likely to have shorter travel time. In scenarios 2 and 3, transferring at Murray may still offer shorter travel time. Further analysis needed.
3. Ogden/Farmington to downtown SLC (City Center Station)	0	0	0	Scenarios 1 and 2 rely on existing Green Line connection at N. Temple Bridge. Scenario 3 provides new direct connection from N. Temple Bridge on Orange Line, equivalent to current Green Line connection.
4. Ogden/Farmington to University of Utah	+	+	+	All scenarios provide new direct connection from SL Central and/or N. Temple Bridge to the U, removing need to transfer at Courthouse.
5. Airport to City Center Station	0	0	0	Headways from Airport to downtown remain at 15 minutes in all scenarios. In Scenario 3, if the Green Line is relocated before the Orange Line is implemented, trips from the Airport to downtown would require a transfer to Blue Line.
6. West Valley City to City Central Station	0	0	-	Realignment of Green Line in Scenario 3 means trips from West Valley City to downtown SLC would require a transfer to Blue Line.
7. Daybreak to University of Utah	0	0	0	While Red Line is ~2 blocks longer in Scenarios 1 and 2, removal of two 90-degree turns may increase speed to compensate.
8. City Center Station to University of Utah	+	+	++	Scenario 3 offers one seat ride on Orange Line. Scenarios 1 and 2 require transfer at Courthouse, but doubled frequency on 400 South reduces transfer time.
9. Airport to University of Utah	0	++	+	Orange Line offers one seat ride in all scenarios. Scenario 2 is fastest, with fewest 90 degree turns. Scenario 1 is slowest, and may be no better than existing trip on Green Line and transfer at Courthouse.
10. Airport to FrontRunner	+	+	+	TRAX service doubles along No. Temple in all scenarios.

KEY
0 *No Significant Change in Travel Time*
\+ *Reduction in Travel Time*
++ *Significant Reduction in Travel Time*
\- *Increase in Travel Time*




Ridership

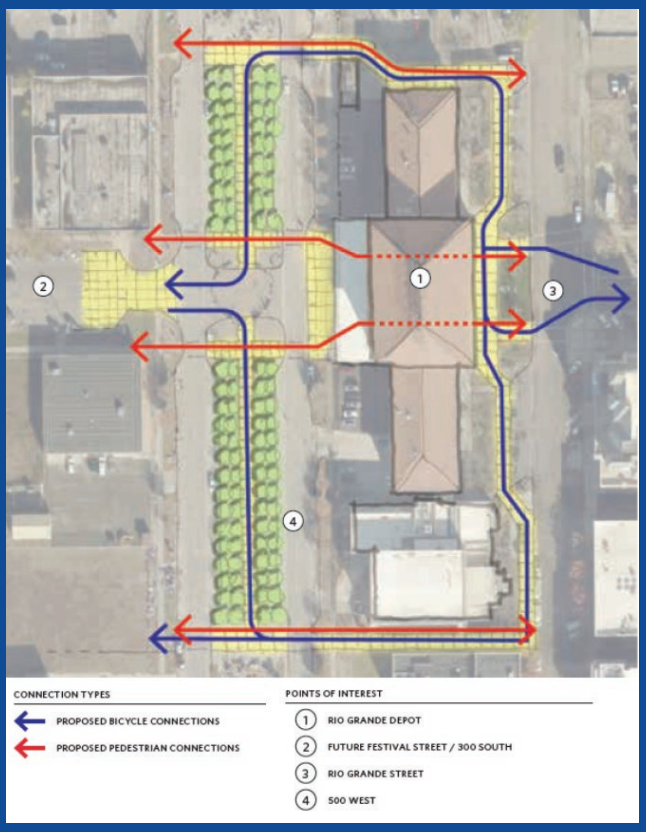
Increased coverage, increased frequency, and reduced transit travel time will make transit a more attractive alternative that it is today, leading to higher TRAX ridership. To the extent that new development is stimulated near TRAX, ridership will also be higher. While this study has not included a forecast of future ridership, added coverage in the downtown area, increased frequency, and reduced need to transfer are likely to lead to increased ridership, and consequently, less roadway traffic and fewer air pollutant emissions. Future studies will estimate the number of new riders likely to be attracted to transit.

Support for Development

Improved rail access and more frequent service to growing parts of SLC – such as the Granary District, the Depot District, 400 South, and North Temple – will make those areas more attractive for redevelopment and adaptive reuse consistent with the City's 2016 Downtown Plan. The Downtown Plan seeks a transition in the Granary District from industrial and warehouse buildings to more creative industries, office, retail, restaurants, and residential uses. The district is currently served by buses on 900 South and 300 West, but the closest TRAX station at 900 South and 200 West is several blocks away. A TRAX station within the District would make the district more accessible by rail, reduce the need for constructing or maintaining costly parking facilities, and demonstrate the City's commitment to support redevelopment.

The Depot District is served by Blue Line and TRAX stations at Salt Lake Central, Old Greektown, Aquarium, and Arena, as well as Green Line stations at North Temple Bridge and Arena, providing a direct connection to downtown Salt Lake City. Both lines operate on 15-minute headways but travel to downtown tends to be slow. Additional TRAX service to the southern part of the Depot District

Figure 6: Redevelopment Agency of Salt Lake City and UTA Central Station Area Plan, 2019



The City's RDA owns developable land between the Rio Grande Depot and Salt Lake Central. The Station Center property, shown in these photos, is being marketed based on its proximity to all forms of transit.




offering more direct connections would provide an added inducement for redevelopment. Appendix D identifies recently approved and pending development projects near Salt Lake Central.

The 2019 Central Station Area Plan developed by the RDA and UTA offers a vision of potential development in proximity to Salt Lake Central Station. The plan recommends public infrastructure improvements, open spaces and streets, as well as the form and character of architecture within the neighborhood. The 2019 plan did not recommend future TRAX alignments, but it did identify potential improvements that are relevant to the current consideration of potential TRAX routings and station locations. It suggested, for example, improved pedestrian and bicycle connections to Salt Lake Central, including a pedestrian connection through the Rio Grande Depot and a future festival street on 300 South between Rio Grande Depot and Salt Lake Central as illustrated in Figure 6. These recommendations are complementary to the TRAX alignments proposed here, and particularly to Scenario 2, which proposes a pedestrian connection from Salt Lake Central, through the Rio Grande Depot to a TRAX station on 400 West. Such a connection would offer an opportunity for creative urban design and placemaking, taking advantage of the transit access and the historic depot structure to create a node of regional and statewide importance.

Operational Redundancy

With the current TRAX system, the Green, Blue and Red Lines all operate on the same set of tracks between the 2100 South and Courthouse stations. An incident along that common segment can disrupt operations on the entire system. In 2019 there were two separate TRAX derailments at the intersection of 400 South and Main Street, causing major delays for passengers on all three TRAX lines. From time to time, as the system ages, UTA may also need to shut down service on the common segment to perform maintenance and repairs. By providing a second set of tracks into downtown, each of the three scenarios routings would give UTA the ability to bypass future incidents and perform maintenance and repairs along the common segment north of the Ballpark Station. Where feasible, the preliminary plans in Appendix C include connections between lines to give UTA operational flexibility and redundancy.

5. Challenges/Issues

Each of the scenarios also faces a number of challenges that would need to be addressed in future studies. This section identifies those that are most evident at this early stage of planning.

Operations

Scenarios 1 and 3 connect directly to Salt Lake Central, allowing for essentially a cross-platform transfer between FrontRunner and TRAX. Accessing Salt Lake Central, however, requires a longer and more circuitous alignment, and introduces a number of 90-degree turns that would reduce operating speed to approximately 10 miles per hour. The longer alignment and slower speeds will add to travel time for TRAX, making TRAX less attractive to those passengers who are not boarding or alighting at Salt Lake Central. Ninety-degree turns also add to the wear and tear on tracks and wheels and can create wheel squeal that may be an annoyance to nearby residents. For all of these reasons, UTA prefers to avoid 90-degree turns wherever possible. Scenario 2 offers an alignment that would increase speed and reduce the number of vehicle miles and hours for UTA, while reducing travel time for those passengers who are not transferring to or from FrontRunner.

With Scenario 3, only the Blue Line would operate between the southern parts of the TRAX service area and downtown Salt Lake City. Unlike today, northbound riders on the Green Line would need to transfer to the Blue Line for trips to downtown. This would increase travel time for those riders and may overload Blue Line trains in peak periods.




Transfers and Walking Distance

Scenarios 1 and 3 offer the opportunity to locate a new Orange or Green Line station right at Salt Lake Central, facilitating transfers between FrontRunner and TRAX. Scenario 2, on the other hand, increases TRAX speed and reduces travel time, but increases the walking distance between Salt Lake Central and a new Orange Line station two blocks away at 400 West. Further, in this scenario the Rio Grande Depot would be a visual barrier and possibly a physical barrier if a passageway through the depot building cannot be secured. Some riders transferring between FrontRunner and the Orange Line may prefer to do so at the North Temple Bridge station to avoid the walk.

Recognizing the disadvantage of locating a new Red Line station several blocks from Salt Lake Central in Scenario 1, and the disadvantage of locating the new Red and Orange Line stations several blocks from Salt Lake Central in Scenario 2, the study team identified alternative routings along 500 West, thereby reducing the walk distance by a block. An Orange Line alignment along 500 West would shorten the walk distance from TRAX to Salt Lake Central to a single block. It would also eliminate the visual barrier created by the Rio Grande Depot, while preserving the opportunity for creating a walkway that could be an urban design and placemaking amenity between 500 West and Salt Lake Central. Figure 7 illustrates the Scenario 1 route alternatives and Figure 8 illustrates the Scenario 2 route alternatives.

Routing TRAX along 500 West rather than 400 West would increase the length of new trackage, add ninety degree turns to the alignment, and increase travel time for those not boarding or alighting at Salt Lake Central. It would also need be coordinated with City and RDA plans to create park blocks on 500 West as part of a Green Loop Linear Park System around downtown. Creative design could possibly integrate light rail tracks and a TRAX station on 500 West into the space west of the Rio Grande Depot. Vehicular access to the proposed Central Station development would also need to be factored into the design. The Red Line routing alternatives between 400 West and 500 West can be expected to require property acquisitions, although the City may be able to reserve the required right-of-way in conjunction with redevelopment plans.

Figure 7: Alternatives Routes for Scenario 1

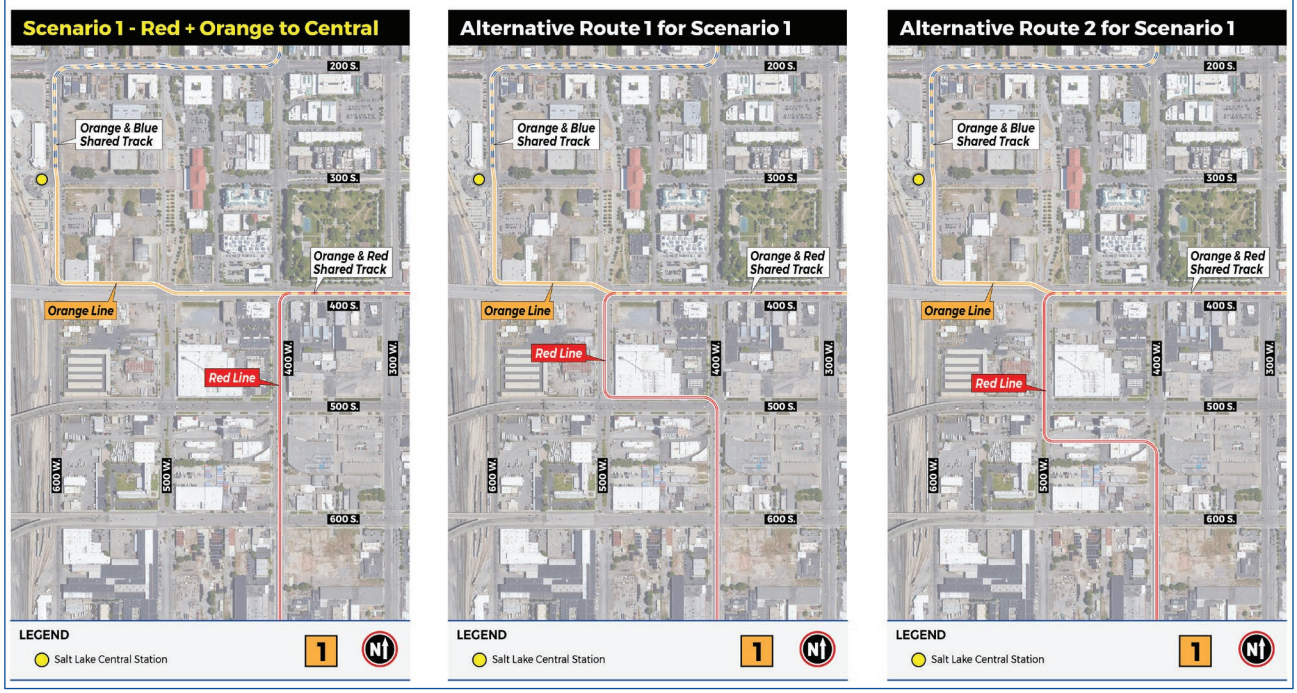
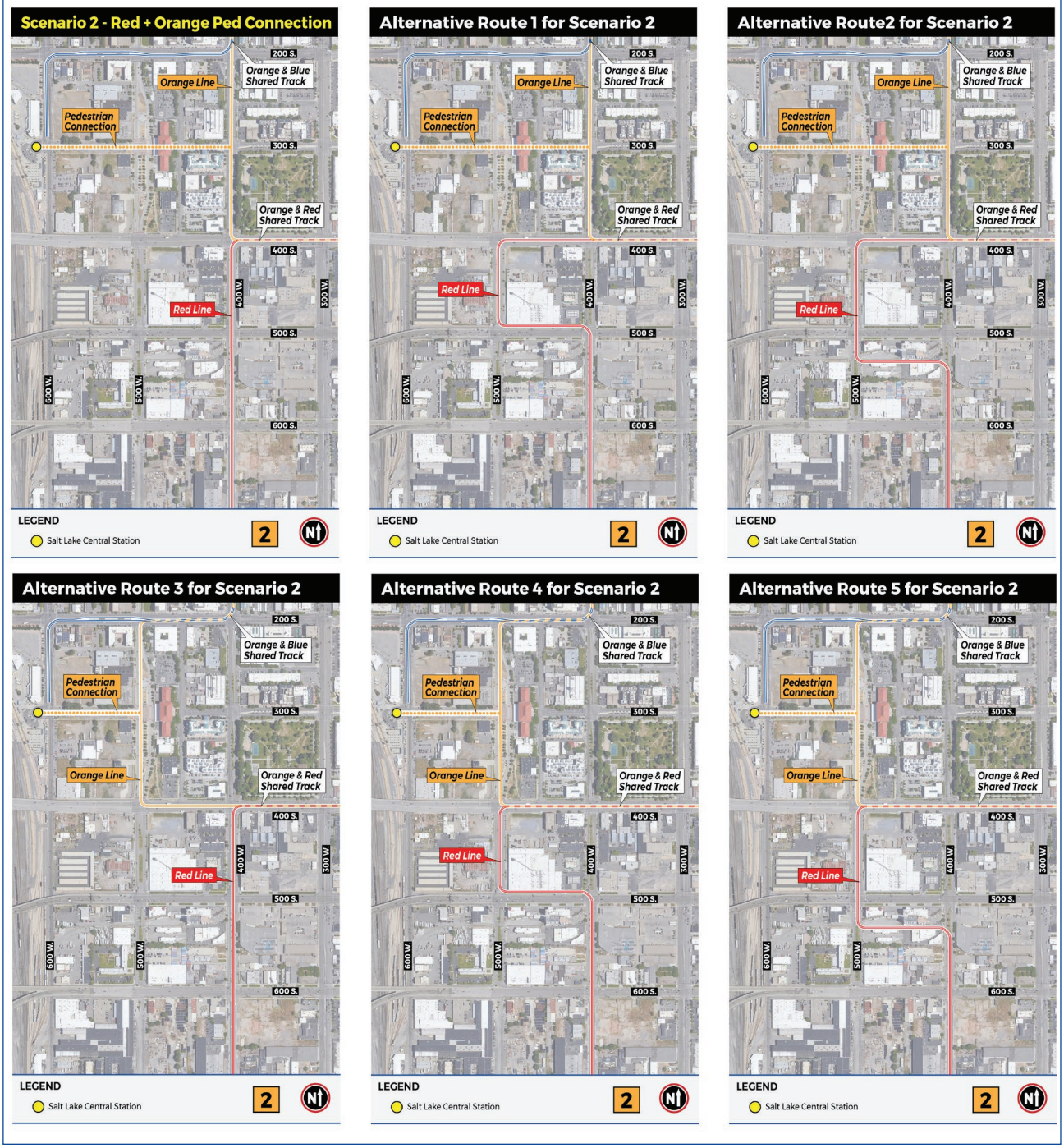


Figure 8: Alternatives Routes for Scenario 2



The Courthouse TRAX station currently experiences more boardings than any other station in the system, as riders transfer among the Red, Green and Blue Lines. These transfers all occur on a single platform in the center of Main Street. In Scenarios 1 and 2, transfers between the Red Line and the Green or Blue Lines will be required to walk between platforms and cross Main Street and 400 South, increasing transfer time. In all scenarios, TRAX riders desiring to transfer between the Red and Green/Blue Lines may find it more convenient to switch trains at other stations, such as Ballpark and Central Pointe, where transfers can be made on a single platform.




Ridership

As noted in the prior discussion on transfers and walking distance, there is a relationship between ridership and the ease of making a transfer. Transfers not only add travel time, but also add a level of uncertainty to the overall trip time and arrival time at one's destination. Thus, travel forecasting models tend to place a value on "out of vehicle" time that is twice the value of time spent in a moving vehicle. The walk distance and associated walk time between FrontRunner and the Orange Line in Scenario 2 can be expected to add out of vehicle time for those riders transferring at Salt Lake Central.

There is also a significant walk distance between FrontRunner and a new Red Line station. In Scenario 1, however, FrontRunner passengers traveling east on the Red Line toward the University have the option of using the Orange Line rather than the Red Line. If Orange Line and FrontRunner schedules can be coordinated, there would be little reason for a FrontRunner passenger to transfer to the Red Line for a trip toward the U. It is expected that few FrontRunner passengers would desire to travel south on the Red Line toward the Granary District, Ballpark Station and Murray. Those passengers have other options for avoiding a two or three block walk to a Red Line station south of Pioneer Park. A FrontRunner passenger from the north could transfer to a southbound Green Line train at North Temple Bridge/Guadalupe, while a passenger from the south could transfer to a northbound TRAX train at Murray.

It is expected that Green Line ridership would be reduced under Scenario 3, as the Green Line would no longer serve downtown Salt Lake City or another destination with a critical mass of transit riders. Green Line riders traveling to downtown would need to transfer to the Blue Line, which would have a negative impact on ridership and could overload the Blue Line in peak periods.

Right-of-Way Constraints

Based on preliminary concept-level plans developed in this study, and presented in Appendix C, it appears overall that little new right-of-way would be needed for any of the scenarios. Nearly all of the required land is currently in public ownership. However, inserting new TRAX stations along 400 South could require the acquisition of right-of-way, even if the width of the travel lanes is reduced to 10 ½ feet as assumed for the purpose of this feasibility study. Scenario 1 envisions two new TRAX stations within 400 South (Pioneer Park and Courthouse transfer station), while Scenario 2 envisions one (Courthouse transfer station). No new stations on 400 South are contemplated in Scenario 3.

Right-of-way acquisition between 500 West and 600 West is also contemplated in Scenarios 1 and 3, where the TRAX alignment would follow the 400 South Frontage Road north of the 400 South overpass. The frontage road is currently one lane wide. A two-track TRAX alignment would require acquisition on the north side of the frontage road, currently occupied by a one-story industrial building. The City may be able to reserve the required right-of-way in conjunction with redevelopment plans.

Rights, responsibilities, and actualities for the abandoned railroad right-of-way between the Ballpark Station and 400 South are complex, and will need to be further researched and addressed in future project planning studies.

Traffic Impacts

The scenarios are not expected to significantly affect traffic on arterial roadways. Red and Orange Line trains could be added to 400 South without removing any through travel lanes. Where feasible, left turn lanes would be retained where they now exist. At-grade crossings of the 500 South and 600 South one-way couplet at 400 West would occur at existing signalized intersec-



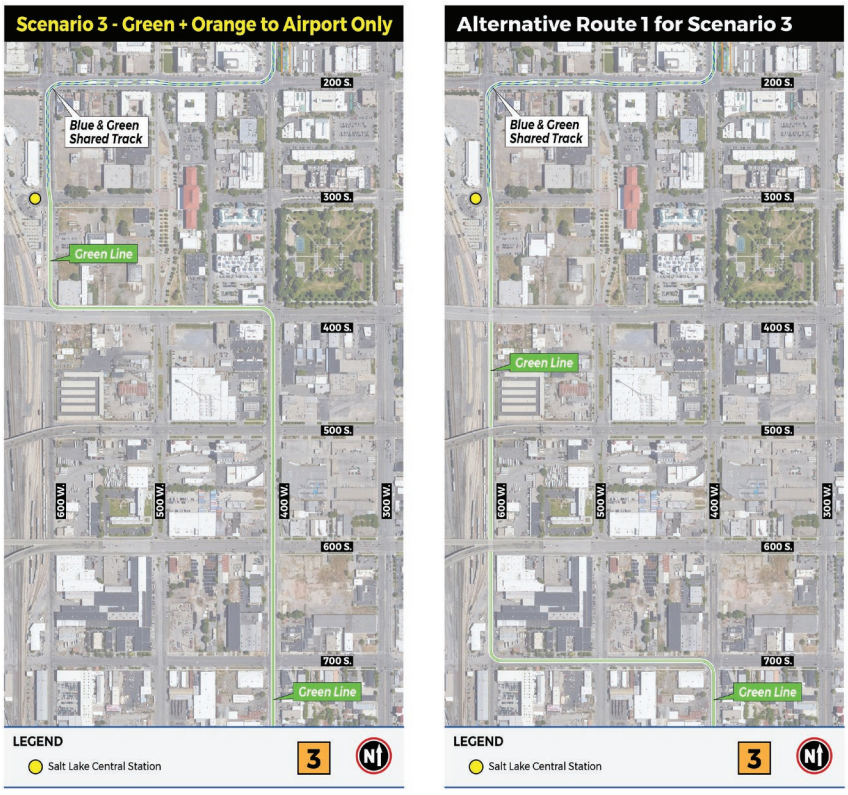
tions and would not require new signal phases. Traffic signal priority with combined 7.5-minute headways (15 minutes in each direction) crossing these one-way streets would not be expected to significantly degrade vehicular traffic level of service.

With Scenarios 1 and 3, a new signal phase would be required where the TRAX alignment on 400 South transitions from the center to the north side of the roadway between 400 West and 500 West. This signal would delay traffic when trains make that maneuver, approximately every 7½ minutes. With Scenario 2, the traffic signal system at 400 South and 400 West would need to be modified to accommodate turning trains. Initial discussions with UDOT did not identify any fatal flaws. It is expected that UTA and UDOT would be able to work out solutions as operational impacts are evaluated in future phases of project planning.

The study team did identify an alternative routing for Scenario 3 that would avoid 400 South entirely and avoid the at-grade crossing of 500 South and 600 South. Northbound Green Line trains would turn west on 700 South, travel two blocks west to 600 West, then follow 600 West to Salt Lake Central.

Figure 9 illustrates this alternative. Given the current width of 600 West, this alternative would likely require significant right-of-way takes from business on the east side of 600 West and/or an easement from the Union Pacific Railroad which owns right-of-way on the west side. This route would appear to offer less opportunity for adding a TRAX station to support planned development in the Depot District.

Figure 9: Alternatives Routes for Scenario 3



Cost and Funding

Implementation of any of these scenarios would require a capital investment that is not currently included in UTA's Five-Year Capital Plan 2020-2024. The added service envisioned in the scenarios would also increase operating and maintenance costs. With a horizon year of 2050, the Wasatch Front Regional Council's adopted Regional Transportation Plan (RTP) identifies a Green Line TRAX Reconfiguration project operating on 400 West between 200 South and 1300 South. The project is included within Financially Constrained Phase 2 of the RTP.

Table 2 offers a preliminary opinion on the capital cost of each scenario. Appendix B provides further information on the estimate and underlying assumptions, including the assumed alignments and station footprints. This preliminary opinion may be useful for understanding the trade-offs and making relative comparisons between the three scenarios. The estimate is based on the very



limited level of design performed in this study and does not have the benefit of the service planning to be conducted in the Future of Light Rail Study. There are many unknowns at this stage of planning, including the amount and cost of right-of-way and utility relocation costs. The cost of developing a pedestrian connection in Scenario 2 depends upon future design and the level of amenities; these costs are not included and may be covered in part by future development. The optional alignments for each scenario (shown in Figures 7, 8 and 9) would involve additional track miles and/or additional right-of-way acquisition, which would likely lead to higher costs than the associated scenario.

Table 2: Preliminary Opinion of Capital Cost (million 2020 dollars)

Item	Scenario 1	Scenario 2	Scenario 3
Guideway and Track	$ 23.7 M	$ 27.0 M	$ 12.2 M
Stations, Stops, Terminals	$ 4.4 M	$ 5.8 M	$ 2.9 M
Site work and Special Conditions	$ 40.7 M	$ 40.9 M	$ 29.1 M
Systems	$ 28.5 M	$ 28.5 M	$ 22.7 M
Right-of-Way	$ 8.8 M	$ 1.6 M	$ 1.6 M
Vehicles*	$ 99.0 M	$ 99.0 M	$ 99.0 M
Professional Services	$ 19.1 M	$ 20.1 M	$ 13.2 M
Unallocated Contingency	$ 37.6 M	$ 37.2 M	$ 24.5 M
TOTAL	$ 261.8 M	$ 260.1 M	$ 205.2 M

This estimate assumes 22 new light rail vehicles would be required to operate six 3 car trains on the new Orange Line in peak periods at 15-minute headways. Includes 20% spares.

As the project is further defined, funding will need to be identified and secured. One potential source of funding would be the Federal Transit Administration's (FTA) discretionary Capital Investment Grants (CIG) program, which might help fund the capital cost if FTA procedural requirements and criteria are met. Currently authorized at $2.3 billion per year, the CIG program funds new fixed guideway systems and extensions. Other federal discretionary funds (e.g., BUILD/TIGER grants) and Utah Department of Transportation grants might be pursued for capital funding. Tax Increment Financing (TIF) funds might also be obtained for either capital or operating expenses. TIF offers an opportunity to capture some of the added land value created by the transit investment. If used for capital expenditures, TIF revenues might be leveraged with financing through programs like the USDOT's TIFIA program.

There may be opportunities for private contributions and revenue generating opportunities as well. The institution of special districts or zoning overlays that offer developers incentives to develop additional square footage or provide pedestrian oriented space have also been implemented in cities to generate revenue, encourage better connectivity between transportation elements, and to drive real estate value.

UTA's Tentative Operations Budget for 2021 is $326.5 million, of which $55 million is budgeted for operating TRAX. Nearly two-thirds of the 2021 operating budget is expected to be covered by sales tax revenues. Operation of a new Orange Line between the airport and the University can




be expected to increase TRAX operating and maintenance cost. While future operations planning will develop a more precise service plan and cost estimate, an order of magnitude estimate in the range of $15 to $20 million per year might be anticipated. This estimate reflects an assumption of 82,000 vehicle revenue hours per year (based existing TRAX headways, 360 service days per year, train consists averaging 2 car trains and a 19 hour per day span of service) and a cost of $197 per vehicle revenue hour for TRAX (based on the 2018 National Transit Database). A source of funding for this increase would need to be identified.

6. Summary Comparison of Scenarios

This section offers a preliminary evaluation of the three scenarios. It includes a relative comparison of the scenarios in terms of effectiveness – that is, how well they address the goals presented in Section 2. Table 3 (pages 20-22) presents this comparison. The routing alternatives shown in Figures 7, 8 and 9 may offer opportunities to optimize the alignment to enhance effectiveness.

Beyond considerations of effectiveness, the relative costs of the different scenarios will factor into an evaluation of cost effectiveness and financial feasibility. While those considerations will benefit from further analysis in future phases, each of the scenarios would require an investment of several hundred million dollars and would depend upon an increase in UTA's operating and maintenance budget by more than $15 million per year. Implementation of any of the scenarios could be phased over time as transit ridership demand grows.

An optimal solution that balances the operating needs of UTA with the desire of passengers for shorter travel times and convenient transfers is likely to call for a creative design solution. The pedestrian walkway along 300 South, essentially expanding the footprint of Salt Lake Central and moving its entry point to 500 West or 400 West, offers one possible design solution. If TRAX were to be aligned on 500 West, west of the Rio Grande Depot, a creative design that integrates TRAX with the City's desire for a park-like Green Loop would present yet another opportunity

Appendix A provides examples of how such ideas have been carried out in other rail station areas around the country. Denver's Union Station – which provides a transfer point for commuter rail, light rail, bus rapid transit and the 16th Mall shuttle – may be of particular relevance to Salt Lake City. Denver offers a model of the emerging trend in intermodal hubs, where they are combined with and help stimulate mixed use development, which in turn can help to pay for the transit infrastructure.

7. Next Steps

This feasibility study identifies a range of potential TRAX investment scenarios to enhance service within the greater downtown area. These scenarios serve as input to UTA's systemwide Future of Light Rail Study, which will perform further analyses of systemwide operations, ridership, and investment priorities. If UTA decides that a project in this area is a priority to move forward toward implementation, key steps include Alternatives Analysis, Environmental Review, and Funding.

Alternatives Analysis

Transit planning typically includes a step called alternatives analysis to support decisions on mode and general alignment within a corridor. The scenarios and alignment alternatives identified in this feasibility study could serve as a starting point for a more detailed analysis involving conceptual engineering, cost estimating, ridership forecasting, and impact assessments. A typical alternatives analysis would also consider potential bus alternatives. Robust public and stakeholder engagement would be a key component of this step in the process. (Engagement for this study was handled at a high, partner level since the purpose of this study was to identify a reasonable range of scenarios that might be considered further in the future.) A typical alternatives analysis will also




include a comprehensive evaluation of each alternative's benefits and costs, as well as financial planning sufficient to support the selection of a preferred alternative and a delivery strategy.

Environmental Review

An environmental review phase is also part of transit planning and decision-making. To be eligible for federal funding, requirements of the National Environmental Policy Act must be satisfied. If a project is advanced without federal funding, UTA follows its own environmental procedures. The environmental review may be combined with the alternatives analysis step.

Following environmental review, and as funding is secured, a project can advance into more detailed engineering, design, right-of-way acquisition, procurement, and construction. Stakeholder engagement would continue during these phases.

Funding

Implementation of new TRAX infrastructure and service depends upon securing funds for project delivery and operation. As planning continues, UTA would evaluate available federal, state and local funding sources and develop a funding plan for whichever alternative is preferred. It would also monitor events in Washington as Congress takes up the reauthorization of the FAST Act, and as Congress and the Biden Administration entertain additional infrastructure spending.

The Federal Transit Administration's (FTA) discretionary Capital Investment Grant (CIG) program would be one potential source of capital funding, as the scenarios presented here could be a good fit for either Small Starts or New Starts funding.* The CIG program has unique process requirements. FTA funding decisions rely on a set of project justification, financial commitment, and readiness criteria that would be addressed as the project advances.

Salt Lake City has helped fund several recent bus service enhancements, and could potentially contribute to the operating and maintenance cost of new TRAX services in downtown as well. Given the prospect that a TRAX investment in this area could foster redevelopment, the City's tax increment financing program could be a suitable source of funds for capital and/or operating funds.

**Under current law, there are three categories of eligibility for CIG funding: New Starts, Small Starts, and Core Capacity. New Starts are fixed guideway projects that either cost more than $300M or the sponsor is seeking $100M (both in year of expenditure dollars) or more from the CIG program. Small Starts are fixed guideway or corridor-based bus projects that cost less than $300M and the sponsor is requesting less than $100M. FTA's process for Small Starts is simpler than the process for New Starts. For fixed guideway projects costing over $200M, however, a larger grant amount can potentially be obtained by following the New Starts process.*



Table 3: Goals Achievement Matrix (1 of 2)

Goal 1: Enhance regional connectivity via the rail network, reducing transit travel time between major origins and destinations and creating a regional transit hub.

	Scenario 1	Scenario 2	Scenario 3
Transit Travel Time	++ • Reduces travel time for 4 of 10 origin/ destination pairs analyzed (see Table 1). • Cuts headways to the U & Airport in half • Offers one-seat ride from SL Central to 400 S. and the U.	++ • Reduces travel time for 4 of 10 origin/ destination pairs analyzed (see Table 1). One O/D pair gets ++. • Cuts headways to the U & Airport in half • Most direct route with fewest 90 degree turns, reducing travel time for riders who do not board or alight at SL Central, but adds 2 block walk for those who do.	++ • Reduces travel time for 4 of 10 origin/ destination pairs analyzed (see Table 1). One O/D pair gets ++. • Cuts headways to the U & Airport in half • Offers one-seat ride from No. Temple Bridge and downtown to 400 S. & the U.
Regional Transit Hub	++ • Provides more frequent and direct TRAX service to SL Central via new Orange Line, linking SL Central to the U & Airport.	+ • Provides more frequent TRAX service to vicinity of SL Central via Orange Line, linking SL Central to the U and Airport. However, transfer from FrontRunner to Orange Line requires two-block walk.	++ • Provides more frequent and direct TRAX service to SL Central via relocated Green (or Blue) Line. • Allows riders from south of downtown to access SL Central faster by bypassing downtown.
Regional Connectivity	++ • Provides two TRAX lines that connect to SL Central (Orange and Blue Lines). • Provides a direct FrontRunner to the U connection via Orange Line.	+ • Provides two TRAX lines that serve SL Central – Blue Line and Orange Line (with two-block walk). • Provides a FrontRunner to the U connection via Orange Line.	+ • Provides a direct TRAX connection between Granary and SL Central via the Green Line (without transfers). • Provides a FrontRunner to the U connection via Orange Line.

Goal 2: Improve rail access to the western area of downtown Salt Lake City, an existing and growing regional employment, cultural, entertainment and residential center.

	Scenario 1	Scenario 2	Scenario 3
Access to Granary & Depot Districts	++ • Access to Granary District: Provides direct TRAX service to Granary District via Red Line, connecting Granary to the U. • Access to Depot District: Provides additional TRAX service to Depot District via Orange and Red Lines connecting to the U and Airport.	++ • Access to Granary District: Provides direct TRAX service to Granary District via Red Line, connecting Granary to the U. • Access to Depot District: Provides additional TRAX service adjacent to Depot District via Orange and Red Lines, connecting to the U and Airport.	+ • Access to Granary District: Provides direct TRAX service to Granary District via Green Line, connecting Granary to SL Central and Airport. • Access to Depot District: Provides additional TRAX service to Depot District via Green Line to Airport.

Goal 3: Facilitate synergistic land use, urban design and placemaking in an area of regional and statewide importance.

	Scenario 1	Scenario 2	Scenario 3
Urban Design & Placemaking	+ • Creates new TOD opportunity in the Granary District around Red Line TRAX station.	++ • Creates new TOD opportunity in the Granary District around Red Line TRAX station. • Creates new placemaking and urban amenity opportunity along walkway connecting SL Central to Orange Line station at 300 S and 400 W.	+ • Creates new TOD opportunity in the Granary District around Red Line TRAX station.




Table 3: Goals Achievement Matrix (2 of 2)

Goal 4: Enhance operations and provide operational redundancy.

	Scenario 1	Scenario 2	Scenario 3
Enhance Operations	+ • Eliminates the Red Line's 90 degree turn from Main Street to 400 S.	++ • Eliminates the Red Line's existing 90 degree turn from Main Street to 400 S. • Fewest 90 degree turns and least out of direction travel of the three scenarios, increasing average speed and reducing O&M cost.	- • Forces Green Line riders with destinations in downtown SLC to transfer to the Blue Line, which may overload Blue Line trains.
Operational Redundancy	++ • Allows trains to bypass the shared track between Ballpark & Courthouse stations in the event of an incident. NB trains could follow the Red Line routing or the Red and Orange Line routing to access downtown. • Offers potential for loop around downtown.	++ • Allows trains to bypass the shared track between Ballpark & Courthouse stations in the event of an incident. NB trains could follow the Red Line routing or the Red and Orange Line routing to access downtown, Airport. Scenario 2 is more direct than other scenarios. • Offers potential for a loop around downtown.	+ • Allows trains to bypass the shared track between Ballpark & Courthouse stations in the event of an incident. NB trains could follow the Green Line outing and enter downtown from the North.

Goal 5: Advance economic development, improve quality of life, and promote access to equitable opportunities.

	Scenario 1	Scenario 2	Scenario 3
Economic Development	++ • Improves rail access to Granary and Depot Districts, helping to foster planned development.	+ • Improves rail access to Granary and Depot Districts, helping to foster planned development. • Walkway from new station at 400 W and 300 S could be catalyst for redevelopment.	+ • Improves rail access to Granary and Depot Districts, helping to foster planned development and providing a direct connection between these two development nodes.
Quality of Life	+ • Provides additional TRAX service and connections which will lead to greater ridership and reduced GHG and air pollutant emissions.	+ • Provides additional TRAX service and connections which will lead to greater ridership and reduced GHG and air pollutant emissions.	+ • Provides additional TRAX service and connections which will lead to greater ridership and reduced GHG and air pollutant emissions.
Access to Equitable Opportunities	++ • Increases TRAX network coverage and access to jobs in a larger downtown area. • Doubles TRAX service to lower income areas on the westside along N. Temple.	++ • Increases TRAX network coverage and access to jobs in a larger downtown area. • Doubles TRAX service to lower income areas on the westside along N. Temple.	++ • Increases TRAX network coverage and access to jobs in a larger downtown area. • Doubles TRAX service to lower income areas on the westside along N. Temple.




Appendix A

Station Area Development Case Studies

Appendix A

Station Area Development Case Studies

1. Introduction: The Changing Role of Train Stations

The role of mass transit stations is increasingly transforming from a focus only on attracting and moving travelers, into activity centers and revenue generators attracting shoppers, visitors and travelers. Transit facilities are becoming true "places" and destinations rather than only a means to get somewhere else and transfer between modes. Transit station success is no longer simply measured by the number of passengers moving through the facility, they are now assets judged on the connections they create internally and into the community, experiences and amenities they offer, the revenue and value they generate, and their impact on surrounding development. New stations provide an experience for riders connecting from one mode to another through retail and entertainment corridors connecting various parts of their facilities, like the oculus in Downtown NYC, Transbay in San Francisco and Denver Union Station. Creating these connections becomes a driving force and a feature rather than an obstacle. Denver's Union Station and Washington DC's planned Union Station provide the total experience connecting shopping, lodging, entertainment, commercial and residential amenities.

Creating a destination station is becoming more and more desirable. While they don't have to be at the scale of Grand Central Terminal in New York City, although that landmark generates tremendous retail revenue and the design attracts visitors, shoppers and tourists, in additional to 750,000 daily travelers. Models exist for different scales and with different goals in mind. The success of the modern station depends on several principles, best described through the concept of "Open Transit Design":

- Integration of all available transit modes
- An orientation towards real estate development and creating value
- Architecture that makes iconic spaces
- Integration of culture with transit design
- Appeal for non-transit users[1]

The "Open Transit Design" concept creates opportunities, drawing customers and catalyzing development. Ultimately, success depends on many aspects of a station. Creating a destination where people want to live, work and recreate will spur growth around the station area, increase local property values and ridership, revenue and quality of life.

This appendix presents five examples from across the country illustrate different scales of station design and connectivity being planned and implemented, along with a summary of applicability to the TRAX routing scenarios developed in this feasibility study.

[1] *https://www.planetizen.com/node/58529*




2. Union Station, Denver, CO

This station becomes a destination in itself, not just a means to get to another destination. Union Station in Denver supports a hotel and several restaurants and retailers. Self-proclaimed "Denver's living room", Union Station supports an array of local restaurants, bars and shops. The area around the station has separate, diffuse Bus, LRT and Amtrak facilities connected by vibrant pedestrian amenities that create a connected feeling and network . Transportation elements are tied together above ground by public spaces and landscape elements such as the 17 St. Promenade/Gardens, Wynkoop Plaza, the 16th Street Mall and several other public plazas . The station transformation has spurred redevelopment of the LoDo area around the station which is now one of Denver's liveliest entertainment areas.

- Applicability to SLC – Union Station links disparate commuter rail, bus and Light rail assets through vibrant, revenue producing pedestrian connections. It provides a model of potential retail opportunities along 400S and 300S, connecting scenario alignments to the SLC Central Station. Also, redevelopment of Union Station itself attracted development to the area which is a goal for the area surrounding SLC Central Station.
- Redevelopment and economic impact - Transformed 19.5 acres of abandoned rail yard into a cohesive, inviting urban center featuring new office, retail and residential developments surrounding the freshly renovated Union Station, including 1.5 million square feet of private development.
- Delivery method - Public private partnership where the Master Developer led all planning and design efforts for both the public and private elements – including assembling the design and construction team, and a public finance package combining public and private sources and two federal loan programs in a unique structure that has never been done before. Successfully obtained federal loans through both the TIFIA program and the Railroad Rehabilitation and Improvement Finance (RRIF) program.
- Applicable Open Transit Design principles:
  - Integration of all available transit modes
  - An orientation towards real estate development
  - Architecture that makes iconic spaces
  - Integration of culture with transit design
  - Appeal for non-transit users

[2] *https://unionstationindenver.com/*
[3] *https://en.wikipedia.org/wiki/Denver_Union_Station*
[4] *https://continuumpartners.com/project-page/union-station-district/#:~:text=Denver%20Union%20Station%2C%20located%20in,created%20by%20the%20Continuum%20co%2D*




Figure A-1: Union Station Area Before Redevelopment, Denver, CO

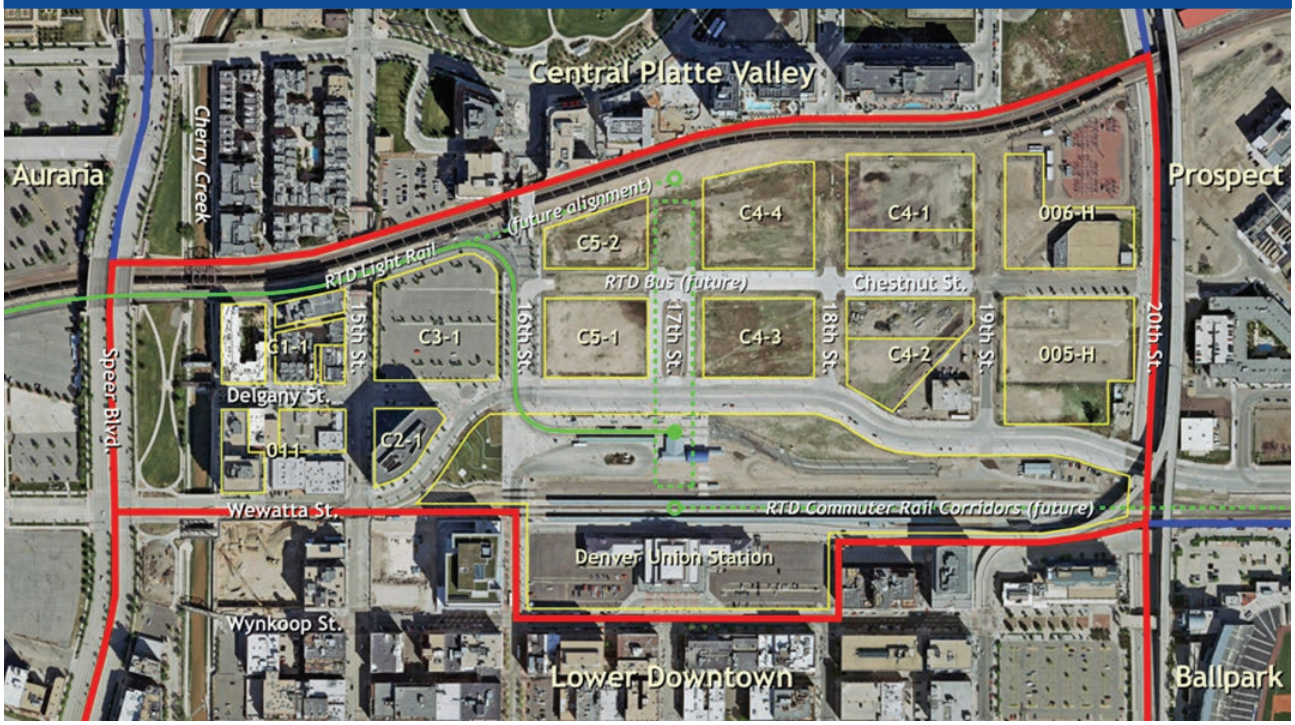


Figure A-2: Plan to link LRT station, BRT and Commuter rail, Denver, CO

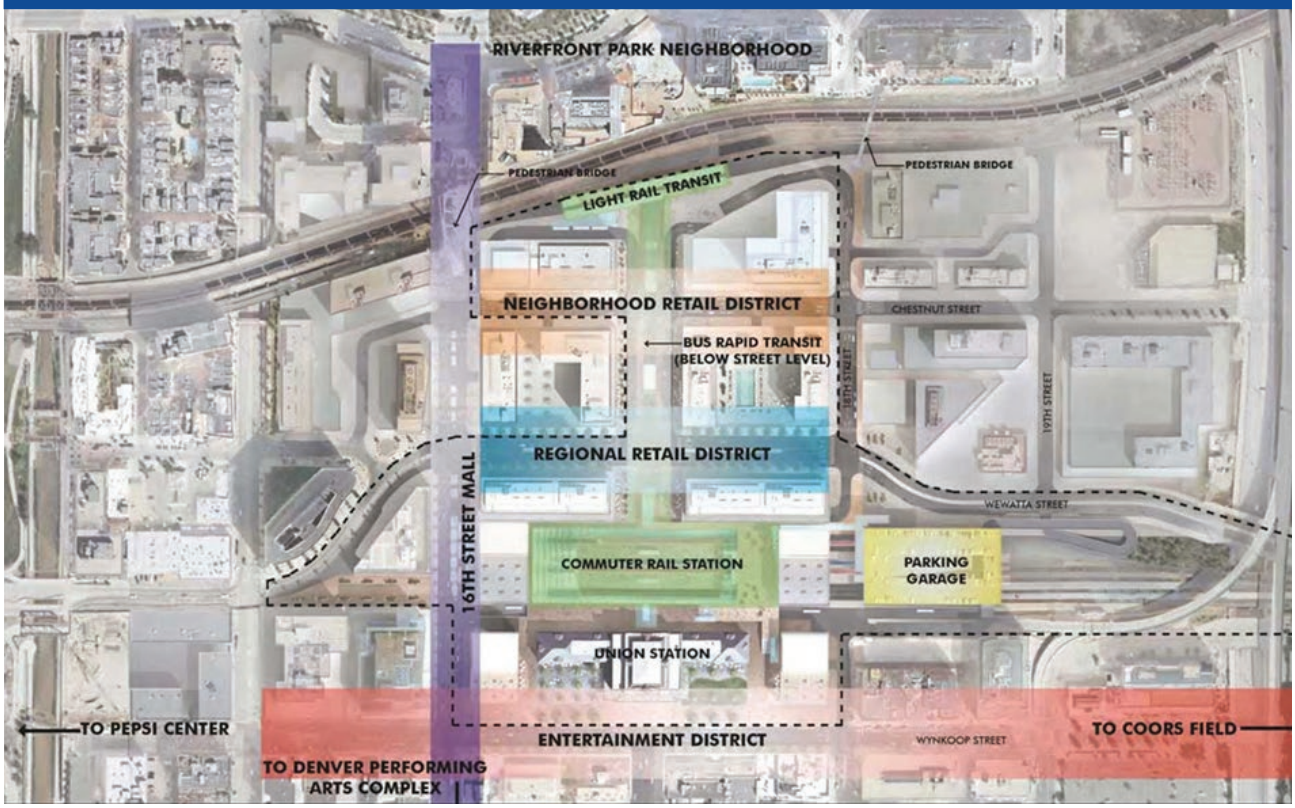





Figure A-3: Union Station Rendering of potential build out Denver, CO

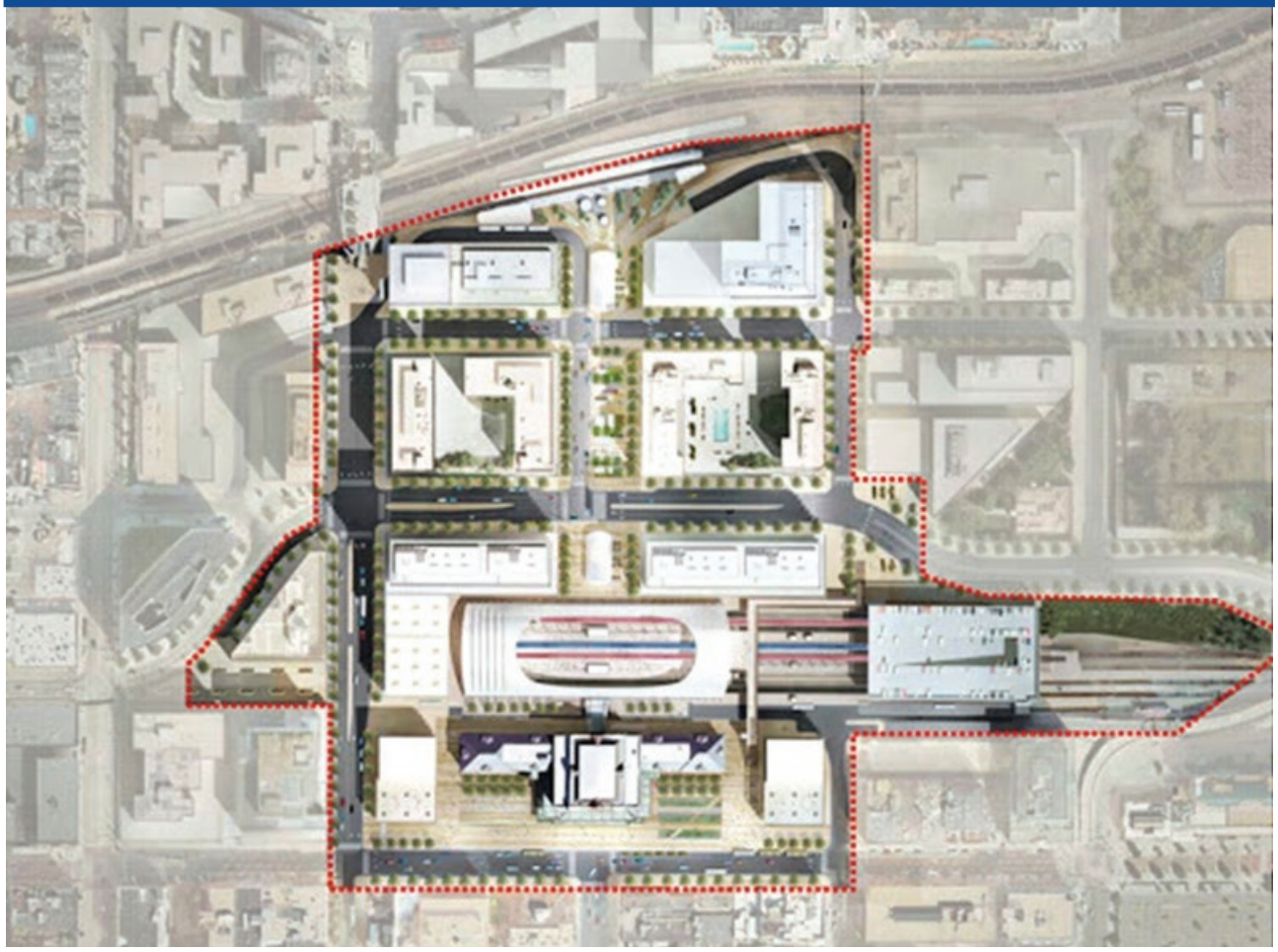


Figure A-4: Union Station Photos, Denver, CO

3. Exchange Street Station, Buffalo, NY

This new station is designed in scale with the surrounding neighborhood. The station incorporates walkability, a pedestrian plaza and will utilize an existing raised roadway to provide a covered pedestrian connection to the Buffalo Metro Link Light Rail Station. The current station supports Amtrak service.

- Applicability to SLC – Exchange Street Station links disparate commuter rail, bus and Light rail assets through a vibrant pedestrian connection under an elevated roadway. This example is applicable to station and connectivity possibilities under each of the scenarios. The scale of this station could also be appropriate for a station serving the Granary District.
- Redevelopment and economic impact – The new station will promote economic activity and tourism for the entire Western New York region and further Buffalo's continued resurgence by making it easier to visit the area's many attractions.
- Delivery method - The New York State Department of Transportation assumed control of the project to replace the train station after the city of Buffalo conducted a location study. NY state awarded a $27.7 million design-build contract for the construction of the new station. The design-build project delivery method - where both the engineering design and the construction of a project are contracted by a single entity known as the design-builder - was employed to save time and reduce costs .
- Applicable Open Transit Design principles:
  - Integration of all available transit modes
  - Architecture that makes iconic spaces
  - Integration of culture with transit design

[5]*https://www.masstransitmag.com/rail/infrastructure/press-release/21162071/office-of-new-york-governor-andrew-cuomo-new-intermodal-transportation-hub-for-in-downtown-buffalo-completed*



Figure A-5: Exchange Street Station Rendering, Buffalo, NY

Figure A-6: Exchange Street Station Pedestrian Transit Connection Rendering, Buffalo, NY

4. L Street Station, Boston, MA

Boston plans to create a destination station to spur redevelopment in South Boston. L Street station is a new mixed-use community-based environment with a broad mix of adaptive re-use and new development totaling approximately 2.1 million SF. It will transform an area of Boston that is currently walled off and inaccessible to the public into a vibrant and connected extension of the South Boston neighborhood. It would offer the community direct access to the waterfront as well as open spaces and gathering areas to connect with friends and neighbors. The site covers 15 acres and will create activity and engagement with housing, retail, a 344-key hotel, two commercial buildings and space for the arts; all of which will be anchored by the new station built out of an old power station, a historic landmark. The interior station features vibrant retail, entertainment and connectivity activities. Although this is not a transit station, it creates a destination with transit accessibility very close by, promoting increased ridership and activity around those transit facilities.

- Applicability to SLC – In this example, L Street Station, a historic landmark is converted into a vibrant, revenue producing, development inducing center of activity in an area of Boston that is underdeveloped. This example could be a model for a station in the Granary District or a reimagined SLC Central Station. It could also serve as a model for an activity center in Scenario 2, such as retrofitting the Denver and Rio Grande Railroad Station into a destination full of vibrant services and amenities, further enhancing a pedestrian connection.
- Redevelopment and economic impact – The L Street Station project spurs new development totaling approximately 2.1 million SF containing housing, retail, a 344-key hotel, two commercial buildings and space for the arts.
- Delivery method – Privately funded. In Final Planning stage.
- Applicable Open Transit Design principles:
  - An orientation towards real estate development
  - Architecture that makes iconic spaces
  - Appeal for non-transit users

Figure A-7: L Street Station Rendering, Boston, MA

[6]*https://www.redgate-re.com/properties/l-street-station-redevelopment/*

5. Union Station, Washington, DC

An intermodal facility, Union Station serves MARC and VRE commuter rail services, the Washington Metro, the DC Streetcar, intercity bus lines, and local Metrobus buses. Today, Union Station is one of the busiest rail facilities and shopping destinations in the United States, and is visited by over 40 million people a year . A master plan for redevelopment of the station is now undergoing environmental review. Several of the goals relate to redevelopment of areas surrounding the station including enhancing integration with the adjacent businesses, neighborhoods, and planned land uses . The project will also include new retail and office space within the footprint of the station property. Renderings of the proposed project depict mixed use redevelopment, pedestrian amenities and linking different transit modes through an active and vibrant plaza.

- Applicability to SLC – Union Station in Washington, DC links commuter rail, bus and Light rail assets through vibrant, pedestrian friendly plaza and gathering space. The concept can be applied to creating pedestrian connections with activities, and creation of inviting and vibrant pedestrian plazas, connecting the Scenario alignments to the SLC Central Station and boosting development potential in the surrounding area.
- Redevelopment and economic impact – Creates a new transit-oriented urban neighborhood known as the Burnham Place project. Includes three million square-foot mixed-use development over the existing rail yard featuring retail, hotel, office and residential space – all interspersed with open public spaces including a green linear park connecting pedestrians and bikers north to Montgomery County in Maryland .
- Delivery method - Funding and delivery method for thus project has not yet established. Amtrak officials anticipate that 50 percent to 80 percent of the project could be covered by federal funds . Partners in the project include: Amtrak, Union Station Redevelopment Corporation (USRC), Akridge, US DOT / Federal Railroad Administration (FRA), Ashkenazy, Maryland Transit Administration (MTA) / MARC, Virginia Railway Express (VRE), District of Columbia DOT .
- Applicable Open Transit Design principles:
  - Integration of all available transit modes
  - An orientation towards real estate development
  - Architecture that makes iconic spaces
  - Integration of culture with transit design
  - Appeal for non-transit users

[7] *https://en.wikipedia.org/wiki/Washington_Union_Station*
[8] *https://planning.dc.gov/washington-union-station*
[9] *https://nec.amtrak.com/project/washington-union-stations-2nd-century/*
[10] *https://www.governing.com/topics/transportation-infrastructure/gov-union-station-plan-announced.html*
[11] *https://nec.amtrak.com/project/washington-union-stations-2nd-century/*




Figure A-8: Union Station Rendering, Washington, DC

Figure A-9: Union Station Pedestrian Plaza Rendering, Washington, DC

6. Transbay Project, San Francisco, CA

Although it is at a different scale than what is envisioned for Salt Lake City, Transbay Transit Center is worth noting due to its amenities and benefits. It will replace the Transbay Terminal with a new multimodal transportation center. Spanning several city blocks, the Transbay Program will link 11 transportation systems under a single roof, and create a pedestrian and bike friendly community with access to public transit, shopping, open space, and other amenities.

- Applicability to SLC – The Transbay Transit Center itself is not at the scale that would be implementable in Salt Lake City. However, the facility links disparate commuter rail, bus and Light rail assets through vibrant, facility with multiple amenities, including pedestrian connections and an innovative rooftop park, creating development opportunities for the surrounding neighborhood.
- Redevelopment and economic impact – The Program will create an estimated 125,000 jobs, directly, indirectly and induced, including approximately 8,300 construction and 27,000 permanent jobs. Construction of the Transit Center and buildout of the surrounding Transbay neighborhood will generate more than $87 billion in Gross Regional Product and $52 billion in personal income through 2030. The Transbay Program and related amenities are expected to result in about $3.9 billion in premium value for existing and new commercial and residential properties within an about ¾ mile zone around the Transit Center.
- Delivery method - The San Francisco Redevelopment Agency (SFRA) in collaboration with the Transbay Joint Powers Authority is developing the project through competitive bid by private developers under the SFRA's Redevelopment plan. The transit tower joint development project is enabled by a Right-of-Way Use Agreement .
- Applicable Open Transit Design principles:
  - Integration of all available transit modes
  - An orientation towards real estate development
  - Architecture that makes iconic spaces
  - Integration of culture with transit design
  - Appeal for non-transit users

[12] *https://tjpa.org/project/economic-benefits*
[13] *https://www.fhwa.dot.gov/ipd/project_profiles/ca_transbay_transit.aspx*




Figure A-10: Transbay Transit Center Pedestrian Activity Rendering, San Francisco, CA

Figure A-11: Transbay Transit Center Rooftop Park Rendering, San Francisco, CA

Figure A-12: Transbay Transit Center Station Area Development Rendering, San Francisco, CA

Appendix B

Conceptual Cost Estimates

Appendix B

Conceptual Cost Estimates

The Preliminary Opinion of Cost was developed using the concept-level design found in Appendix C: TRAX Alignment Concepts. This design is based upon UTA's Light Rail Design Criteria (Revision 6, February 2015) and the Utah Department of Transportation Roadway Design Manual (April 2020).

The Preliminary Opinion of Cost is in 2020 dollars. Data from the following projects were used to estimate and escalate unit costs:

- Ogden BRT
- Airport LRT (escalated costs)
- West Valley LRT (escalated costs)

Where possible, unit costs from the Ogden BRT project were used as those costs are true 2020 dollars. Unit costs that were not available from the Ogden BRT were determined by escalating costs from the Airport and West Valley projects to 2020 dollars.

The cost for a full grand union at 400 South and Main Street was assumed to be approximately 133% the cost of a half grand union. It was assumed the existing half grand at that location would be completely rebuilt and no components of the existing half grand would be utilized.

Utilities were not designed; utility costs were determined using an overall ratio of cost per rail-foot from both the Airport and West Valley projects and applied to these quantities.

Professional services costs were determined by applying a total of 22% to the construction items. A 30% unallocated contingency was applied to all costs except vehicles. A breakdown can be found in this Appendix B.

Quantities were generated from the conceptual designs in Appendix C and rounded to the nearest hundred or thousand, whichever is reasonable for each item.

There are several important items to note on the design that will impact the quantities and cost. Right-of-way impacts and costs can vary greatly based on the final design. The design can be altered to mitigate certain right-of-way impacts, but those alterations may create other significant impacts and right-of-way conflicts. The designs in Appendix C were created to balance impacts and cost. The minimal right-of-way impacts in this design are based on the above assumptions, without which right-of-way requirements will significantly increase.

Total acquisitions of two properties were assumed in Scenario 1:

- 379 S 300 W [$800,000]
- 268 W 400 S [$1,950,000]

Additional survey work is required to determine the need of right-of-way acquisition. It is possible this alternative is feasible without the significant right-of-way acquisition costs included in this report.

A six-foot temporary construction easement was assumed to be required along the entire area of road reconstruction, other than where a building abuts the property line. The duration of this temporary construction easement was assumed to be three years. A larger temporary construction easement or one that is needed for a longer duration would increase the associated costs.

Rights, responsibilities, and actualities for the abandoned railroad right-of-way between the Ballpark Station and 400 South are complex, and will need to be further researched and addressed in future project planning studies. The cost estimate assumes that the project would be able to obtain rights to use this right-of-way at no cost.



UTA DOWNTOWN SLC LIGHT RAIL FEASIBILITY STUDY

PRELIMINARY OPINION OF COST

				Scenario 1: Red-Orange		Scenario 2: Red-Orange 400 W		Scenario 3: Green Line	
		UNIT PRICE	UNIT	QTY	TOTAL COST	QTY	TOTAL COST	QTY	TOTAL COST
10 GUIDEWAY & TRACK ELEMENTS					**$ 21,162,100**		**$ 24,131,200**		**$ 10,930,400**
10.03	Guideway: At-grade in mixed traffic								
	Excavation	$ 38.00	CY	16,000	$ 608,000	16,000	$ 608,000	12,000	$ 456,000
	Scarify/Recompact Guideway	$ 0.30	SF	342,000	$ 102,600	349,000	$ 104,700	248,000	$ 74,400
	Guideway Grading	$ 0.50	SF	342,000	$ 171,000	349,000	$ 174,500	248,000	$ 124,000
	Embedded Guideway Curb	$ 45.00	LF	20,400	$ 918,000	20,200	$ 909,000	15,300	$ 688,500
10.10	Track: Embedded (exclusive) (double track)	$ 800.00	LF	10,200	$ 8,160,000	10,100	$ 8,080,000	7,700	$ 6,160,000
10.10	Track: Embedded (intersections/cross-traffic) (double track)	$ 675.00	LF	2,100	$ 1,417,500	2,400	$ 1,620,000	1,300	$ 877,500
10.11	Track: Ballasted	$ 350.00	LF	1,100	$ 385,000	1,100	$ 385,000		
10.12	Track: Special (switches, turnouts)								
	No 10 Embedded Double Crossover	$ 1,100,000.00	EA	2	$ 2,200,000	2	$ 2,200,000	2	$ 2,200,000
	No 10 Ballasted Turnout	$ 175,000.00	EA	2	$ 350,000	2	$ 350,000	2	$ 350,000
	Embedded Half Grand	$ 2,850,000.00	EA	1	$ 2,850,000	2	$ 5,700,000		
	Embedded Full Grand	$ 4,000,000.00	EA	1	$ 4,000,000	1	$ 4,000,000		
20 STATIONS, STOPS, TERMINALS, INTERMODAL					**$ 3,900,000**		**$ 5,200,000**		**$ 2,600,000**
20.01	At-grade station, stop, shelter, mall, terminal, platform	$ 1,300,000.00	EA	3	$ 3,900,000	4	$ 5,200,000	2	$ 2,600,000
	400 W at 800 S		SF	6,346		6,346		6,346	
	400 S at Pioneer Park		SF	6,346					
	400 S at Main Street		SF	5,754		5,754			
	400 W at 400 S		SF			6,346		6,346	
	400 W at 300 S		SF			6,346			
40 SITEWORK & SPECIAL CONDITIONS					**$ 36,351,177**		**$ 36,521,921**		**$ 26,000,633**
40.01	Demolition, Clearing, Earthwork								
	Remove Curb and Gutter	$ 7.00	LF	16,000	$ 112,000	17,000	$ 119,000	10,000	$ 70,000
	Remove Sidewalk	$ 2.00	SF	110,000	$ 220,000	118,000	$ 236,000	53,000	$ 106,000
	Remove Asphalt	$ 1.75	SF	778,000	$ 1,361,500	814,000	$ 1,424,500	435,000	$ 761,250
40.02	Site Utilities, Utility Relocation								
	Drainage	$ 278.12	RF	12,300	$ 3,420,876	12,100	$ 3,365,252	8,900	$ 2,475,268
	Waterlines	$ 123.67	RF	12,300	$ 1,521,141	12,100	$ 1,496,407	8,900	$ 1,100,663
	Sanitary Sewer	$ 72.52	RF	12,300	$ 891,996	12,100	$ 877,492	8,900	$ 645,428
	Dry Utilities	$ 109.02	RF	12,300	$ 1,340,946	12,100	$ 1,319,142	8,900	$ 970,278
40.06	Pedestrian / bike access and accommodation, landscaping								
	Landscape & Irrigation (Parkstrips)	$ 3.50	SF	43,000	$ 150,500	71,000	$ 248,500	27,000	$ 94,500
40.07	Automobile, bus, van accessways including roads, parking lots								
	Curb and Gutter	$ 45.00	LF	16,000	$ 720,000	17,000	$ 765,000	10,000	$ 450,000
	Sidewalk	$ 10.00	SF	93,000	$ 930,000	98,000	$ 980,000	54,000	$ 540,000
	Pedestrain Ramp	$ 2,500.00	EA	1,000	$ 2,500,000	1,000	$ 2,500,000	1,000	$ 2,500,000
	Roadway Excavation (Roadway Only) [24 INCH DEPTH]	$ 40.00	CY	39,000	$ 1,560,000	39,000	$ 1,560,000	19,000	$ 760,000
	Roadway Grading	$ 0.30	SF	516,000	$ 154,800	524,000	$ 157,200	252,000	$ 75,600
	Asphalt Paving [6 INCH DEPTH]	$ 100.00	TN	20,000	$ 2,000,000	20,000	$ 2,000,000	10,000	$ 1,000,000
	Granular Borrow [18 INCH DEPTH]	$ 51.00	CY	6,000	$ 306,000	2,000	$ 102,000	6,000	$ 306,000
	Untreated Base Course [6 INCH DEPTH]	$ 70.00	CY	10,000	$ 700,000	10,000	$ 700,000	5,000	$ 350,000
40.08	Temporary Facilities and other indirect costs during construction								
	Payment/Performance Bond	0.70%	$	61,538,059	$ 430,766	62,238,093	$ 435,667	45,985,487	$ 321,898
	Contractor's Insurance not Covered by OCIP	0.65%	$	61,538,059	$ 399,997	62,238,093	$ 404,548	45,985,487	$ 298,906
	Contractor's Insurance - OCIP	3.00%	$	61,538,059	$ 1,846,142	62,238,093	$ 1,867,143	45,985,487	$ 1,379,565
	Project Management & Supervision - Construction	13.43%	$	61,538,059	$ 8,264,561	62,238,093	$ 8,358,576	45,985,487	$ 6,175,851
	Design & Construction QA/QC Plan & Program Admin	2.83%	$	61,538,059	$ 1,741,527	62,238,093	$ 1,761,338	45,985,487	$ 1,301,389
	Security, Safety Plan & Program Admin	0.83%	$	61,538,059	$ 510,766	62,238,093	$ 516,576	45,985,487	$ 381,680
	Contractor's Temporary Facilities & Equipment	2.98%	$	61,538,059	$ 1,833,834	62,238,093	$ 1,854,695	45,985,487	$ 1,370,368
	Construction Survey & Layout	1.34%	$	61,538,059	$ 824,610	62,238,093	$ 833,990	45,985,487	$ 616,206

UTA DOWNTOWN SLC LIGHT RAIL FEASIBILITY STUDY

PRELIMINARY OPINION OF COST

				Scenario 1: Red-Orange		Scenario 2: Red-Orange 400 W		Scenario 3: Green Line	
		UNIT PRICE	UNIT	QTY	TOTAL COST	QTY	TOTAL COST	QTY	TOTAL COST
	Public Information, Community Relocations & Mitiga	0.52%	$	61,538,059	$ 319,998	62,238,093	$ 323,638	45,985,487	$ 239,125
	Mobilization	0.21%	$	61,538,059	$ 129,230	62,238,093	$ 130,700	45,985,487	$ 96,570
	Maint of Traffic Plan, Implementation & Operations	2.47%	$	61,538,059	$ 1,519,990	62,238,093	$ 1,537,281	45,985,487	$ 1,135,842
	Railroad Flagging	0.50%	$	61,538,059	$ 307,690	62,238,093	$ 311,190	45,985,487	$ 229,927
	Erosion Control & Implementation	0.54%	$	61,538,059	$ 332,306	62,238,093	$ 336,086	45,985,487	$ 248,322
50 SYSTEMS					**$ 25,436,200**		**$ 25,416,400**		**$ 20,250,100**
50.01	Train control and signals								
	Train Signals including train circuits	$ 500.00	RF	12,300	$ 6,150,000	12,100	$ 6,050,000	8,900	$ 4,450,000
50.02	Traffic signals and crossing protection								
	Traffic Signals	$ 86,000.00	EA	17	$ 1,462,000	19	$ 1,634,000	8	$ 688,000
50.03	Traction power supply: substations								
	New Traction Power Substations	$ 3,000,000.00	EA	2	$ 6,000,000	2	$ 6,000,000	2	$ 6,000,000
	Upgrade to 2.0 MW Substation	$ 2,000,000.00	EA	1	$ 2,000,000	1	$ 2,000,000	1	$ 2,000,000
50.04	Traction power distribution: catenary and third rail								
	OCS Pole Foundations	$ 5,500.00	EA	100	$ 550,000	102	$ 561,000	73	$ 401,500
	OCS System	$ 580.00	RF	12,300	$ 7,134,000	12,100	$ 7,018,000	8,900	$ 5,162,000
50.05	Communications								
	Communications System	$ 54.00	RF	12,300	$ 664,200	12,100	$ 653,400	8,900	$ 480,600
50.08	Systems Ductbanks								
	Signal & Communications Ductbanks-Backbone	$ 120.00	LF	12,300	$ 1,476,000	12,500	$ 1,500,000	8,900	$ 1,068,000
Construction Subtotal Less 40.08					$ 68,388,059		$ 72,598,093		$ 45,985,487
Construction Subtotal w/o Markup					$ 86,849,477		$ 91,269,521		$ 59,781,133
Contractor Markup of 12%					$ 10,421,937		$ 10,952,343		$ 7,173,736
Construction Subtotal (10 - 50)					$ 97,271,414		$ 102,221,863		$ 66,954,869
60 ROW, LAND, EXISTING IMPROVEMENTS					**$ 8,800,400**		**$ 1,586,200**		**$ 1,636,320**
60.01	Purchase or lease of real estate								
	ROW Purchase		SF	30,020	$ 3,655,000	700	$ 91,000	9,000	$ 720,000
	Temporary Construction Easement	$ 20.00	SF	74,520	$ 1,490,400	74,760	$ 1,495,200	45,816	$ 916,320
70 VEHICLES (number)					**$ 99,000,000**		**$ 99,000,000**		**$ 99,000,000**
70.01	Light Rail								
	S70 Vehicles	$ 4,500,000.00	EA	22	$ 99,000,000	22	$ 99,000,000	22	$ 99,000,000
80 PROFESSIONAL SERVICES (applies to Cats. 10-50)					**$ 19,106,885**		**$ 20,079,295**		**$ 13,151,849**
80.01	Project Development	4%			$ 3,473,979		$ 3,650,781		$ 2,391,245
80.02	Engineering	8%			$ 6,947,958		$ 7,301,562		$ 4,782,491
80.03	Project Management for Design and Construction	5%			$ 4,342,474		$ 4,563,476		$ 2,989,057
80.04	Construction Administration & Management	2%			$ 1,736,990		$ 1,825,390		$ 1,195,623
80.06	Legal; Permits; Review Fees by other agencies, cities, etc.	1%			$ 868,495		$ 912,695		$ 597,811
80.08	Start up	2%			$ 1,736,990		$ 1,825,390		$ 1,195,623
Subtotal (10 - 80)					$ 224,178,699		$ 222,887,358		$ 180,743,038
90 UNALLOCATED CONTINGENCY (applies to Cats. 10-60, 80)		**30%**			**$ 37,553,609.63**		**$ 37,166,207.40**		**$ 24,522,911.51**
Subtotal (10 - 90)					$ 261,732,308		$ 260,053,565		$ 205,265,950
TOTAL PROJECT COST					**$ 261,732,308**		**$ 260,053,565**		**$ 205,265,950**
YOE Construction Cost per Mile					**$ 41,755,534**		**$ 43,178,515**		**$ 39,280,190**
YOE Total Project Cost per Mile Not Including Vehicles					**$ 69,855,820**		**$ 68,029,026**		**$ 62,342,691**
YOE Total Project Cost per Mile					**$ 112,353,381**		**$ 109,846,626**		**$ 120,422,691**

Appendix C

TRAX Alignment Concepts

Appendix C

TRAX Alignment Concepts

Basis of Design

The three scenarios are concepts developed using the UTA's Light Rail Design Criteria (Revision 6, February 2015) and the Utah Department of Transportation Roadway Design Manual (April 2020) as a basis. The scenarios aim to achieve the stated project goals and balance adverse impacts.

Assumptions

The design is also based on the following assumptions:

- UDOT Region 2 will approve 2-foot lane offsets through intersections
- Design will receive UTA approval for a narrow suburban-style station platform on 400 S at West Temple
- Street parking is removed on 400 South
- Lane width is reduced to 10.5 feet on 400 South
- Shoulder width is 2 feet, including gutter

Design Decisions

The Salt Lake City Pedestrian & Bicycle Master Plan (December 2015) calls for a bike lane on 400 South west of 300 West in the 0-10 year recommendations. This is not feasible in the included designs without a reduction in travel lanes. Sidewalks can be converted to a shared-use path with appropriate signage to achieve some of the Master Plan goals.

Per direction of UTA and Salt Lake City, the design is based on 10.5-foot travel lane widths. Reduced travel lane widths may lead to slower travel speeds which can lead to increased safety for drivers, cyclists, and pedestrians. Existing travel lane width is typically 12-feet. Existing travel lane width along 400 South where there is a light rail alignment is 11-feet. Wider travel lanes would require significant right-of-way acquisitions to preserve the number of travel lanes and lane alignment through intersections. The Salt Lake City Street Typology (May 2020) document includes 10.5-foot travel lanes on the Destination Thoroughfare typology, which is most compatible with this design.

These scenarios include 400 West with the existing lane configurations, with two travel lanes north of 600 South and one travel lane south of 600 South. It is feasible to continue two travel lanes throughout the street, although walkability benefits can be achieved by not expanding the roadway. The available right-of-way could also be used to include other features such as on-street parking or bike lanes.

Left turn lanes were not preserved at the following intersections:

- 400 South at 500 West (east traveling west)
- 400 South at 400 West (east traveling west)
- 400 South at West Temple (east traveling west)
- 400 South at Main Street (west traveling east)

Including left turn lanes at these locations would have significantly increased impacts and right-of-way acquisitions. This approach balanced the existing vehicle traffic needs with the surrounding urban fabric.

A full grand union is included at the intersection of 400 South and Main Street to provide system redundancy. In order to provide for this full grand union, the proposed new Courthouse Station on 400 South was placed at the West Temple end of the block. This design requires the left turn

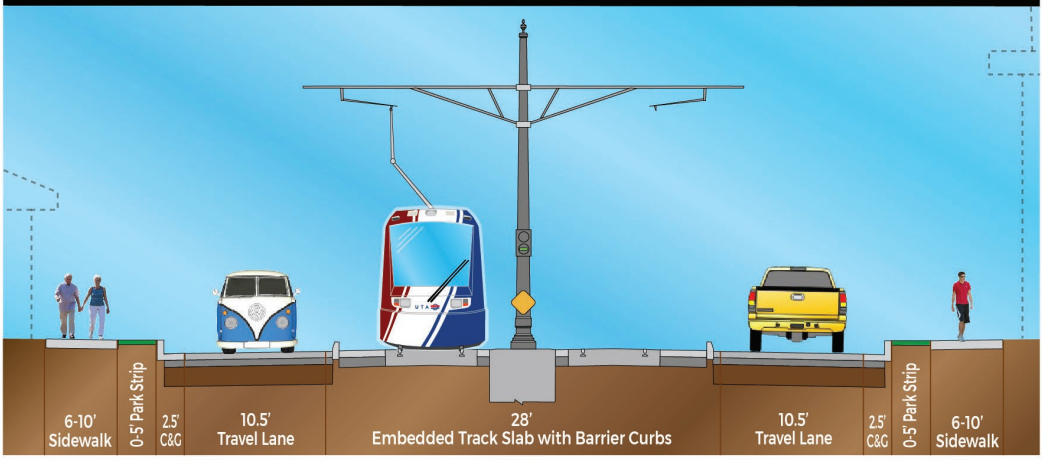



lane from westbound 400 South to southbound West Temple to be removed. Both 400 South and West Temple are state routes in this location, there future studies will need to coordinate the design with UDOT. An improved pedestrian connection should be considered in any future redevelopment of the city-owned parking lot between this proposed station and the existing Courthouse Station.

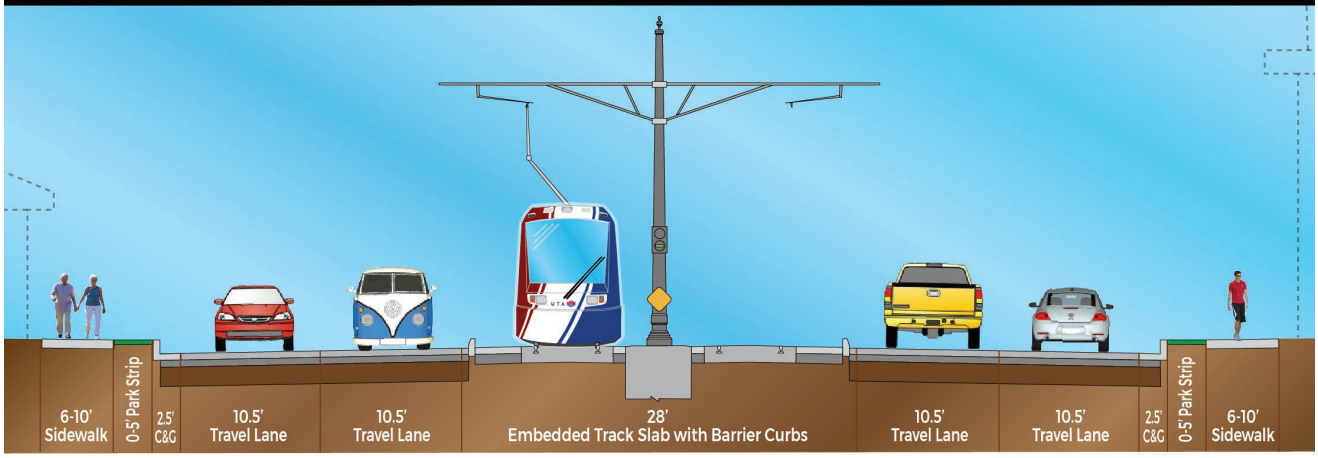


Potential Typical LRT Cross-Sections *(p. 1 of 2)*

Potential Typical LRT Cross Section *(400 West - Two Traffic Lanes)*



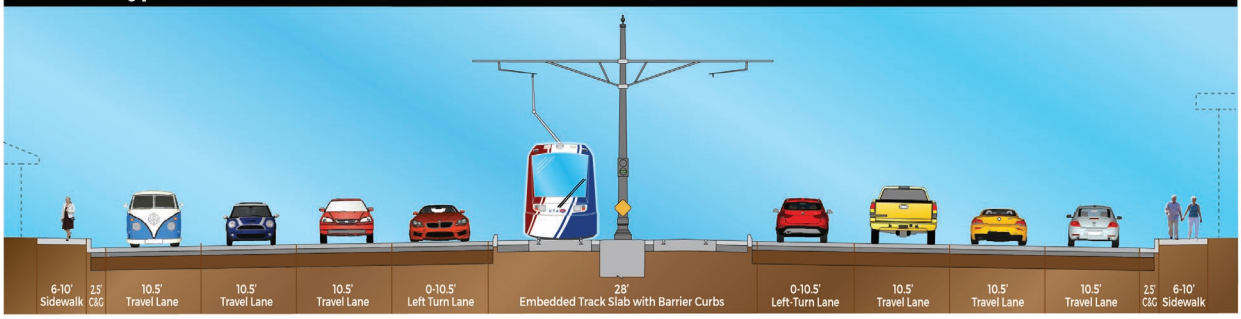
Potential Typical LRT Cross Section *(400 West - Four Traffic Lanes)*



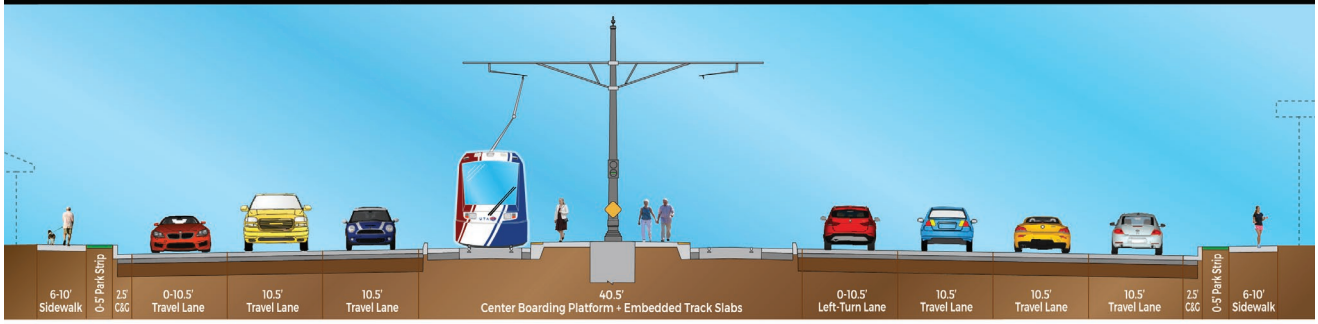



Potential Typical LRT Cross-Sections *(p. 2 of 2)*

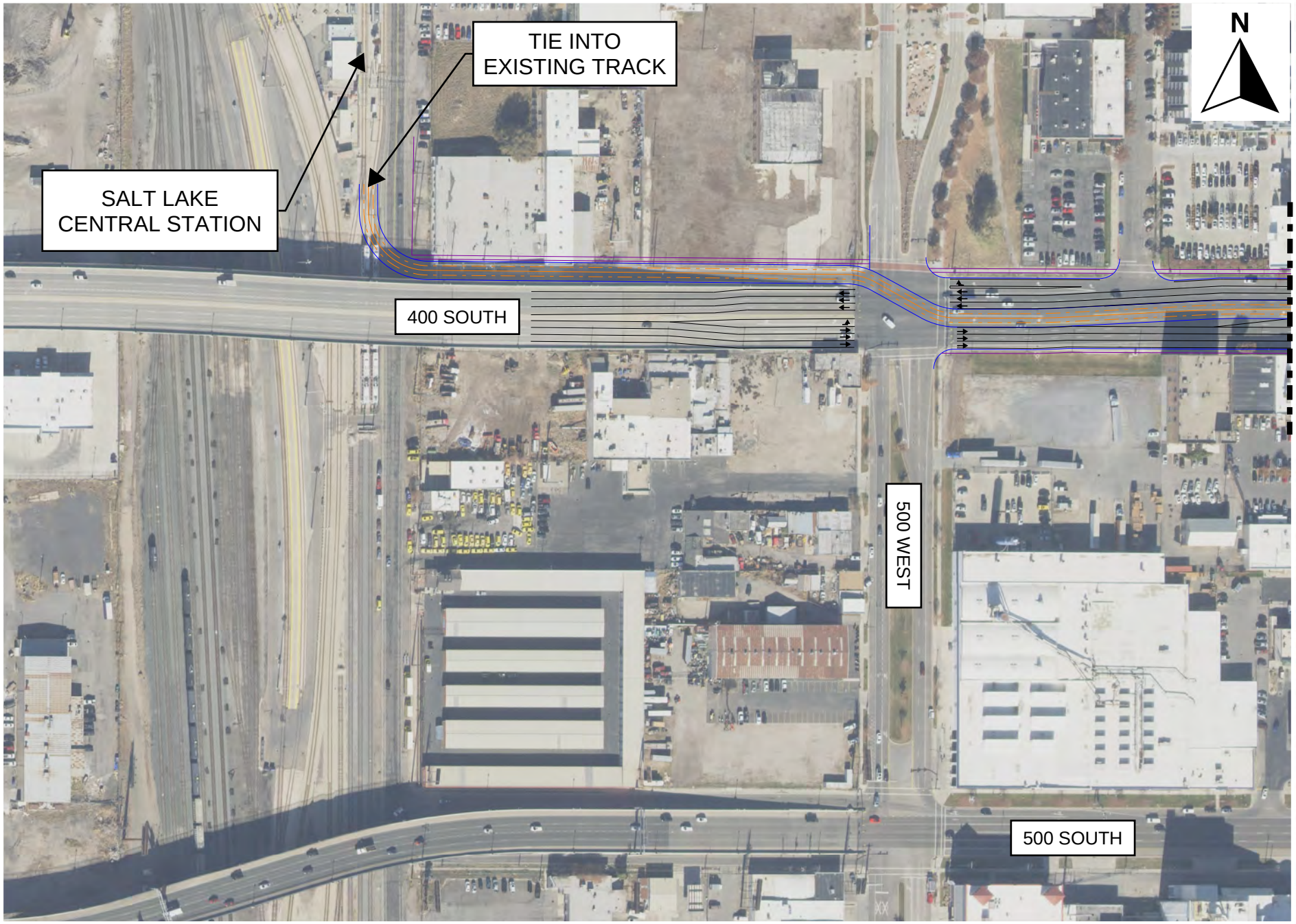
Potential Typical LRT Cross Section ***(400 South - Six Traffic Lanes)***



Potential Typical LRT Center Boarding Platform Station Cross Section





REV	DATE	Description

Submitted By:

Approved By:

UTAH TRANSIT AUTHORITY

Designed By:	JAH
Drawn By:	MEL
Checked By:	JAH
Approved By:	

Downtown Salt Lake City
Rail Feasibility Study

Scenario 1

Scale:	1" = 200'
CADD Filename:	
Submitted Date:	April 7, 2021
UTA Contract No.:	22910
Drawing No.:	S1
Sheet No.:	01

REV	DATE	Description

Submitted By:

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Downtown Salt Lake City Rail Feasibility Study

Scenario 1

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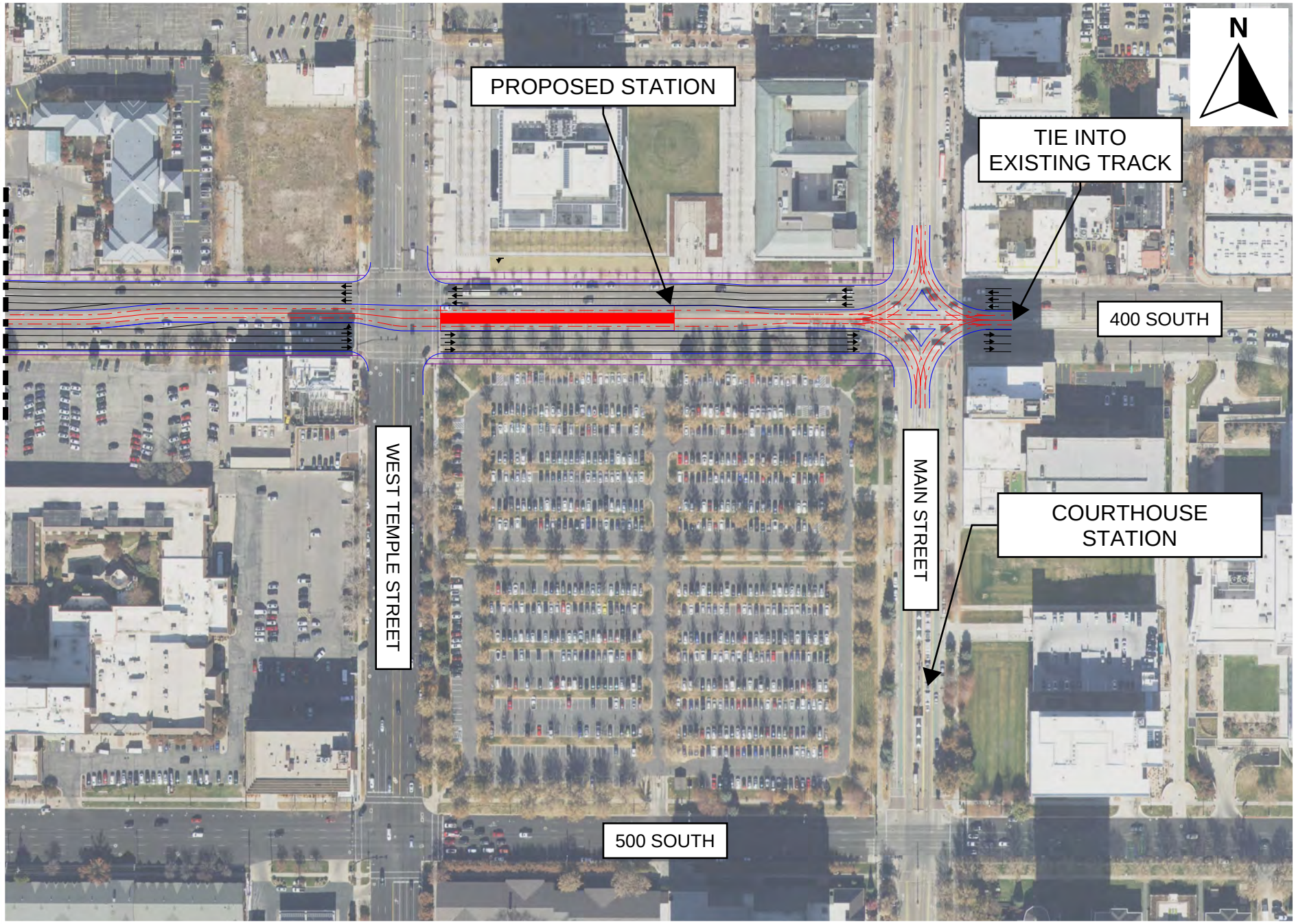
UTA Contract No.:	22910
Drawing No.:	S1
Sheet No.:	02



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Downtown Salt Lake City
Rail Feasibility Study

Scenario 1

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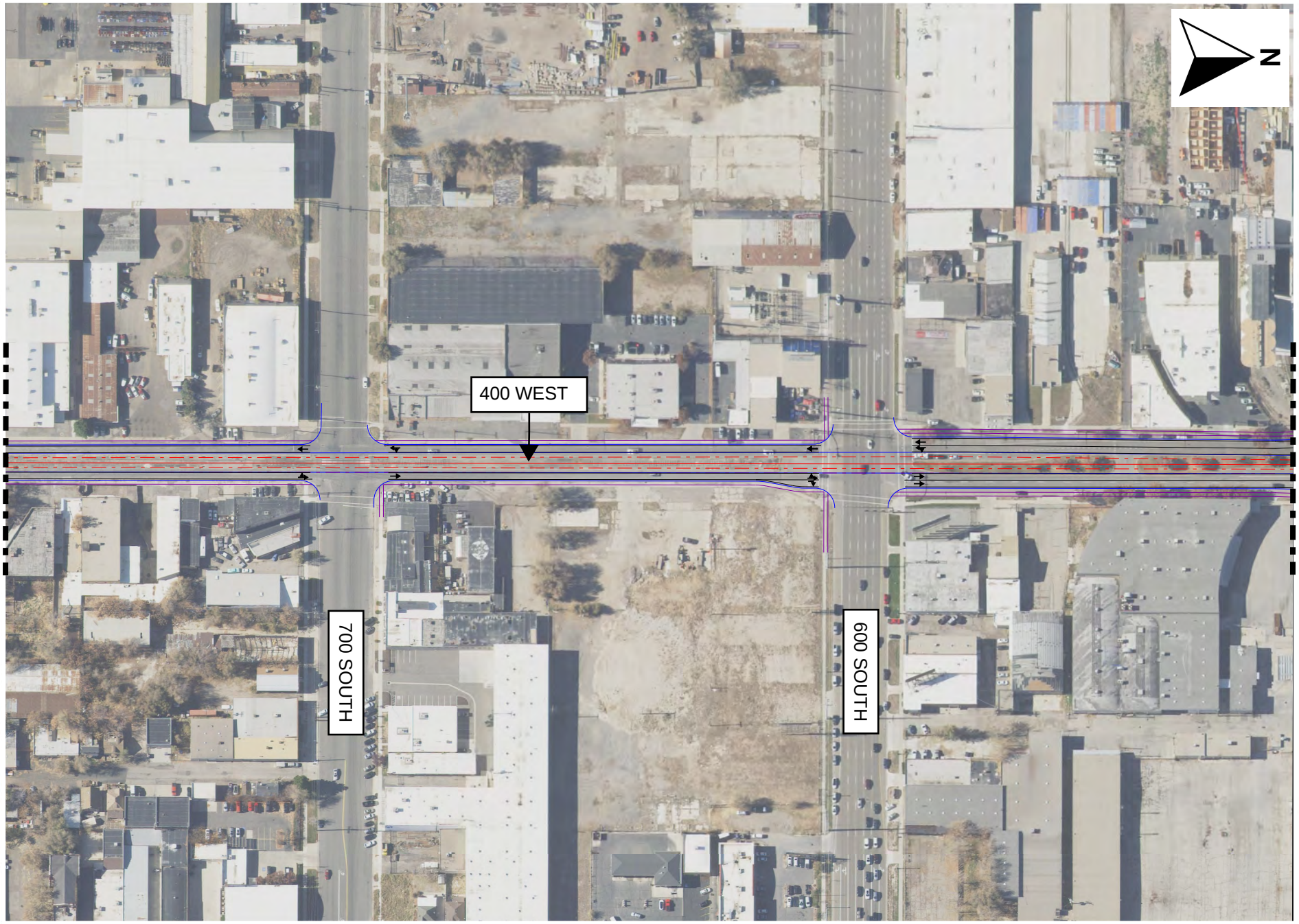

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Approved By:	

Downtown Salt Lake City Rail Feasibility Study

Scenario 1

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Submittal Date:	April 7, 2021
UTA Contract No.:	22910
Drawing No.:	S1
Sheet No.:	04

REV	DATE	Description

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Approved By:	

Downtown Salt Lake City Rail Feasibility Study

Scenario 1

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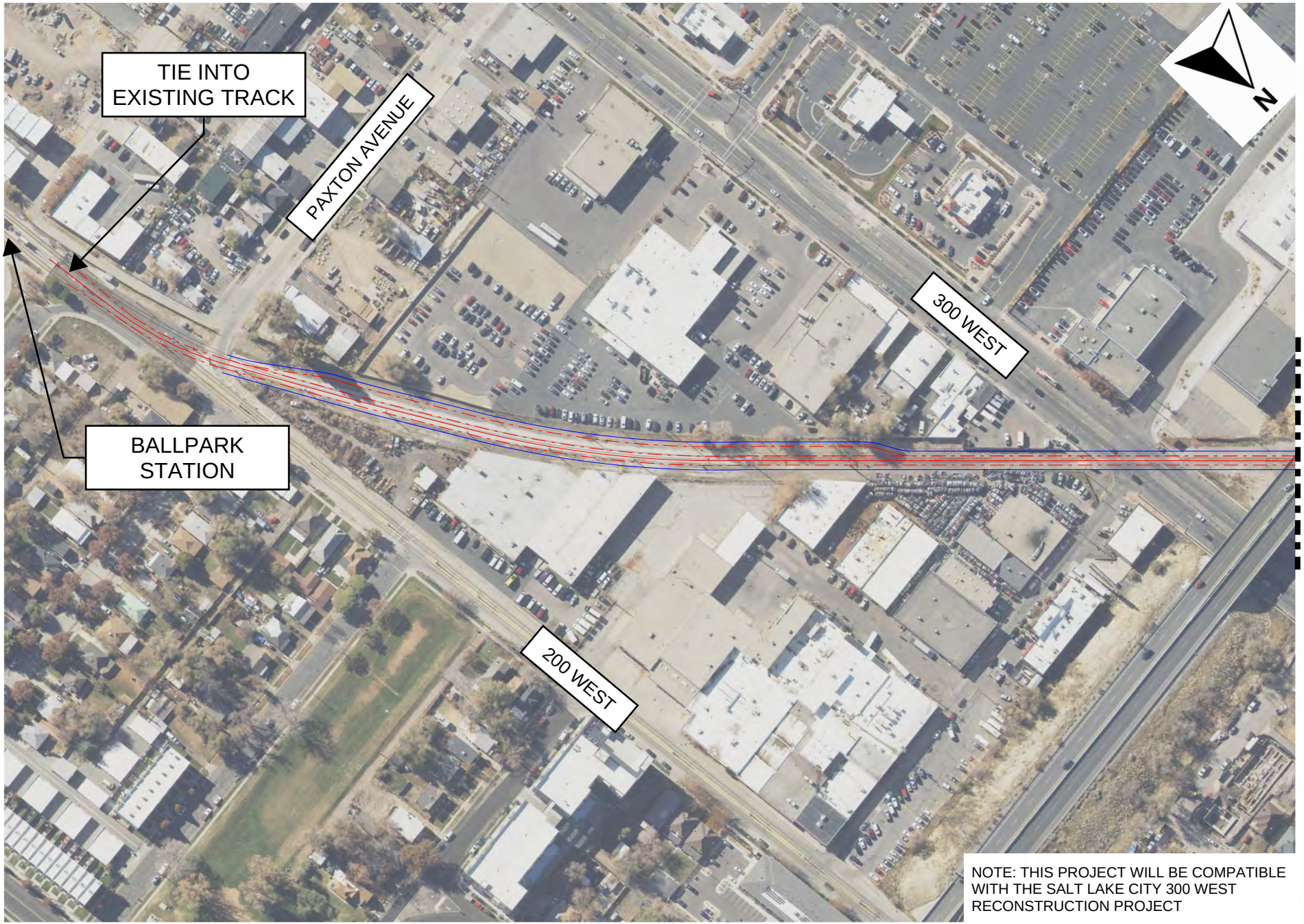

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Approved By: _____

UTAH TRANSIT AUTHORITY

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Approved By:

Downtown Salt Lake City
Rail Feasibility Study

Scenario 1

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UTA Contract No.: 22910
Drawing No.: S1
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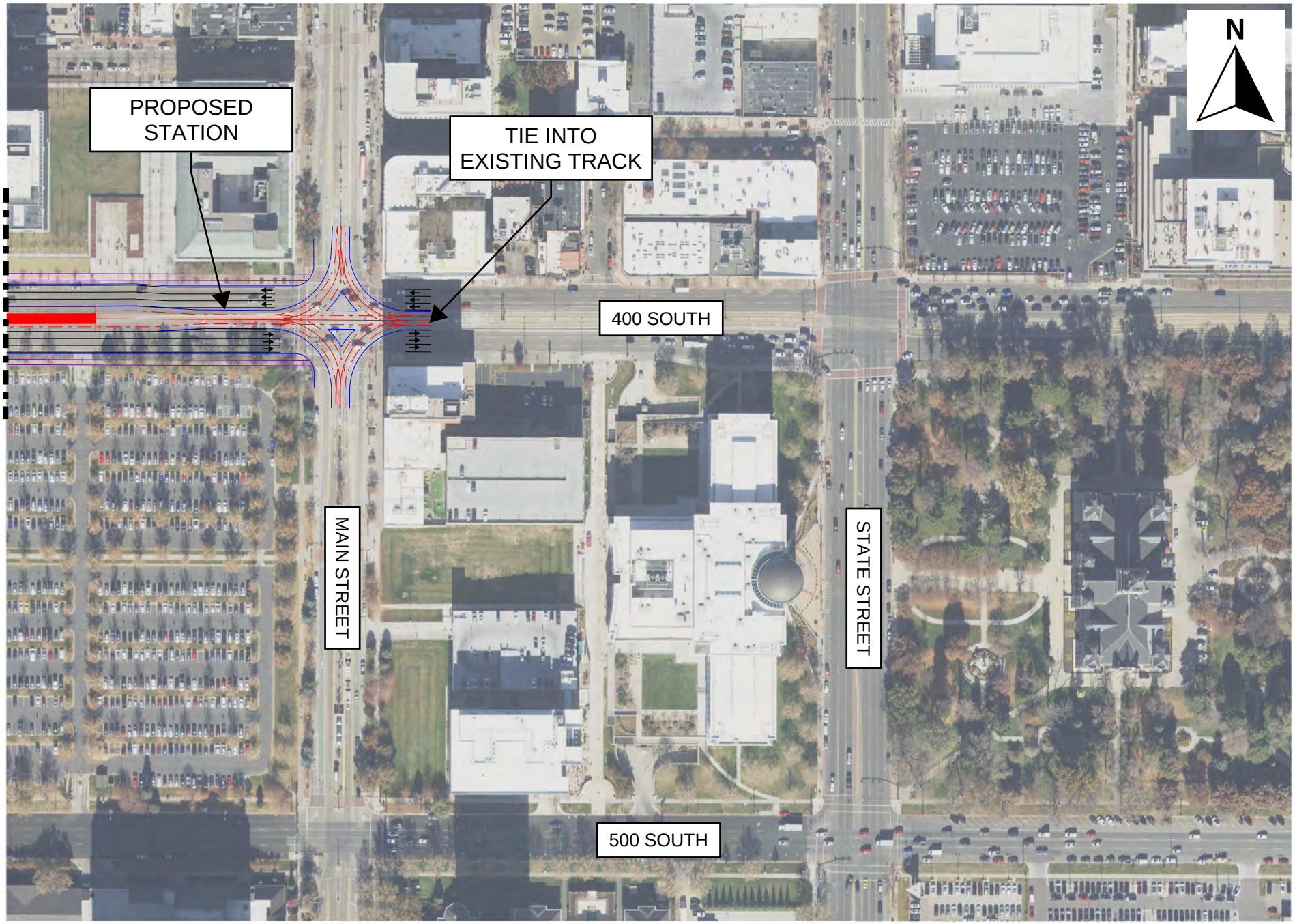

REV	DATE	Description

Submitted By: _____

Approved By: _____

UTAH TRANSIT AUTHORITY

Designed By:	JAH
Drawn By:	MEL
Checked By:	JAH
Approved By:	

Downtown Salt Lake City Rail Feasibility Study

Scenario 2

Scale:	1" = 200'
CADD Filename:	
Submittal Date	April 7, 2021
UTA Contract No.:	22910
Drawing No.:	S2
Sheet No.:	01

REV	DATE	Description

Submitted By: _____

Approved By: _____

UTAH TRANSIT AUTHORITY

Designed By:	JAH
Drawn By:	MEL
Checked By:	JAH
Approved By:	

Downtown Salt Lake City
Rail Feasibility Study

Scenario 2

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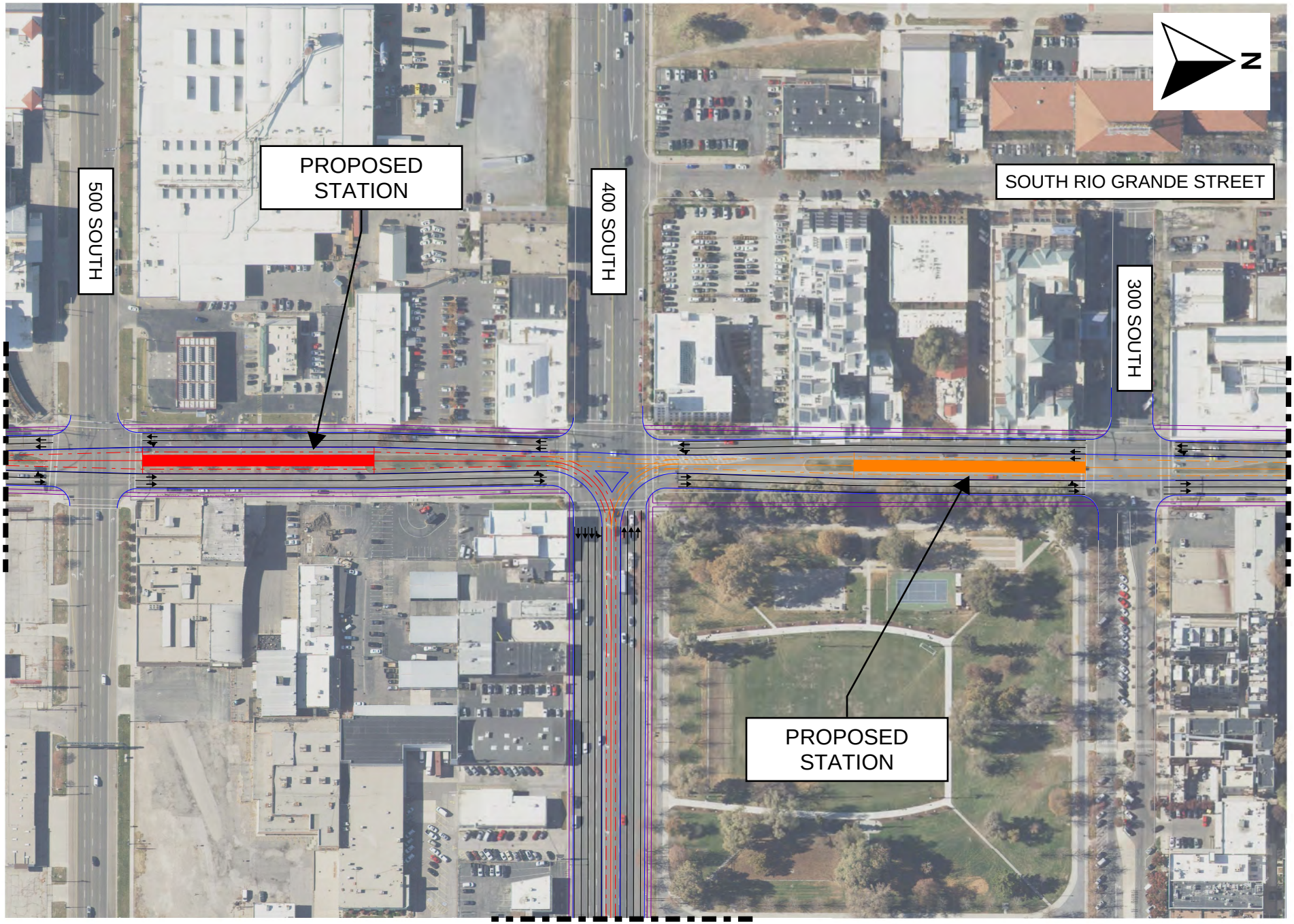
Submitted Date:	April 7, 2021
UTA Contract No.:	22910
Drawing No.:	S2
Sheet No.:	02



REV	DATE	Description

Submitted By:

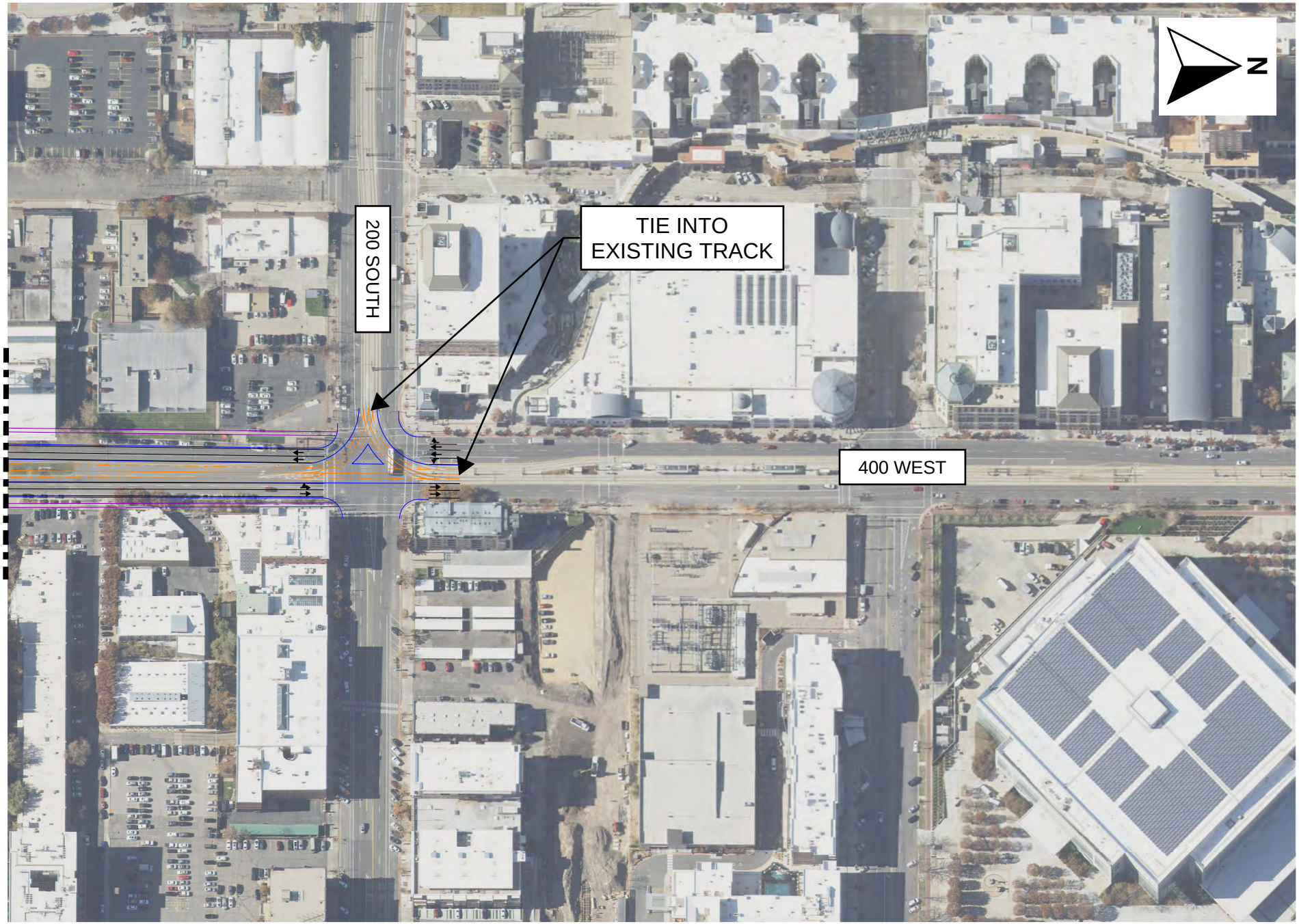
Approved By:

Designed By:	JAH
Drawn By:	MEL
Checked By:	JAH
Approved By:	

Downtown Salt Lake City Rail Feasibility Study

Scenario 2

Scale:	1" = 200'
CADD Filename:	
Submitted Date:	April 7, 2021
UTA Contract No.:	22910
Drawing No.:	S2
Sheet No.:	03



REV	DATE	Description

Submitted By: _____

Approved By: _____

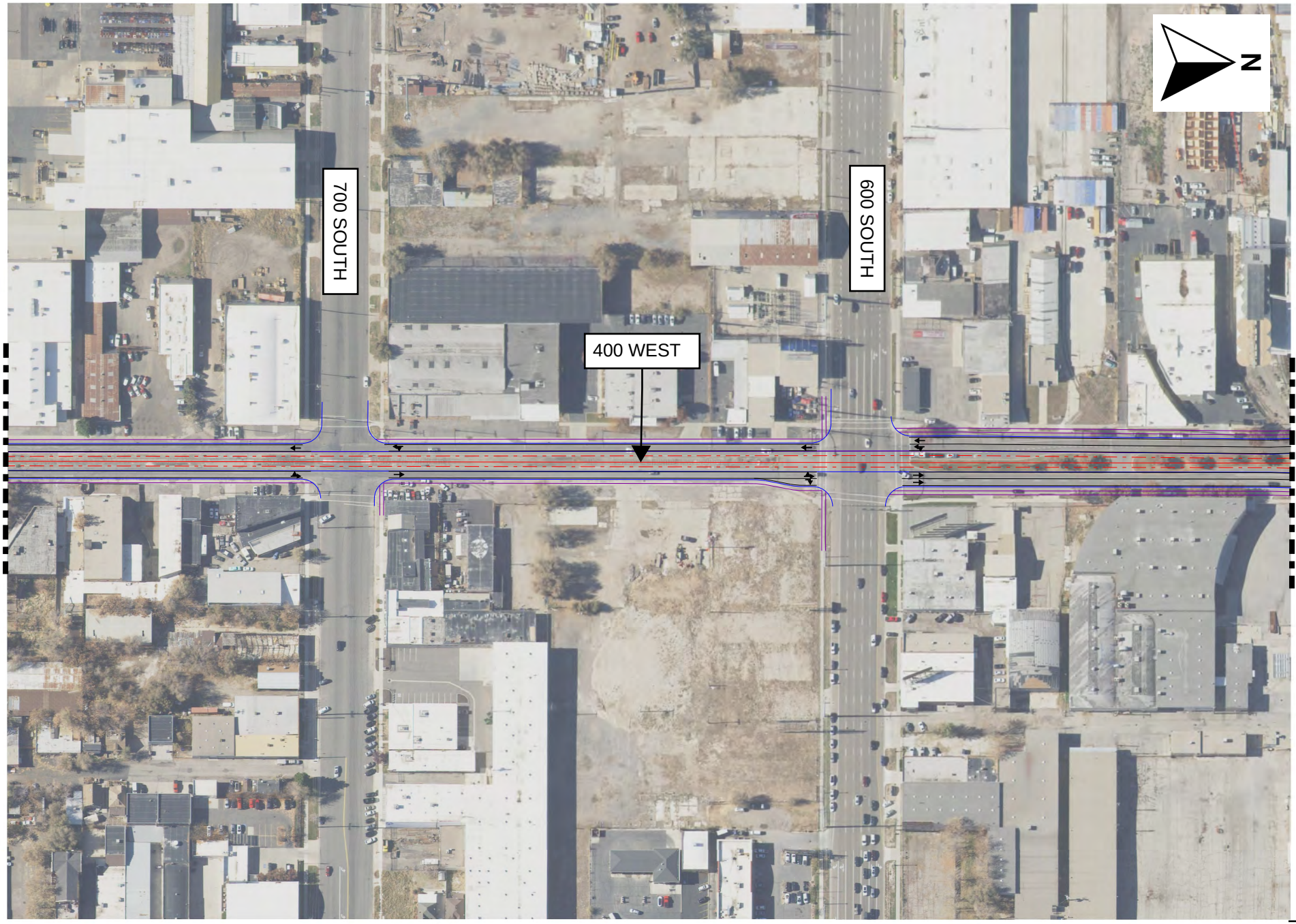
UTAH TRANSIT AUTHORITY

Designed By:	JAH
Drawn By:	MEL
Checked By:	JAH
Approved By:	

Downtown Salt Lake City
Rail Feasibility Study

Scenario 2

Scale:	1" = 200'
CADD Filename:	
Submittal Date	April 7, 2021
UTA Contract No.:	22910
Drawing No.:	S2
Sheet No.:	04



REV	DATE	Description

Submitted By:

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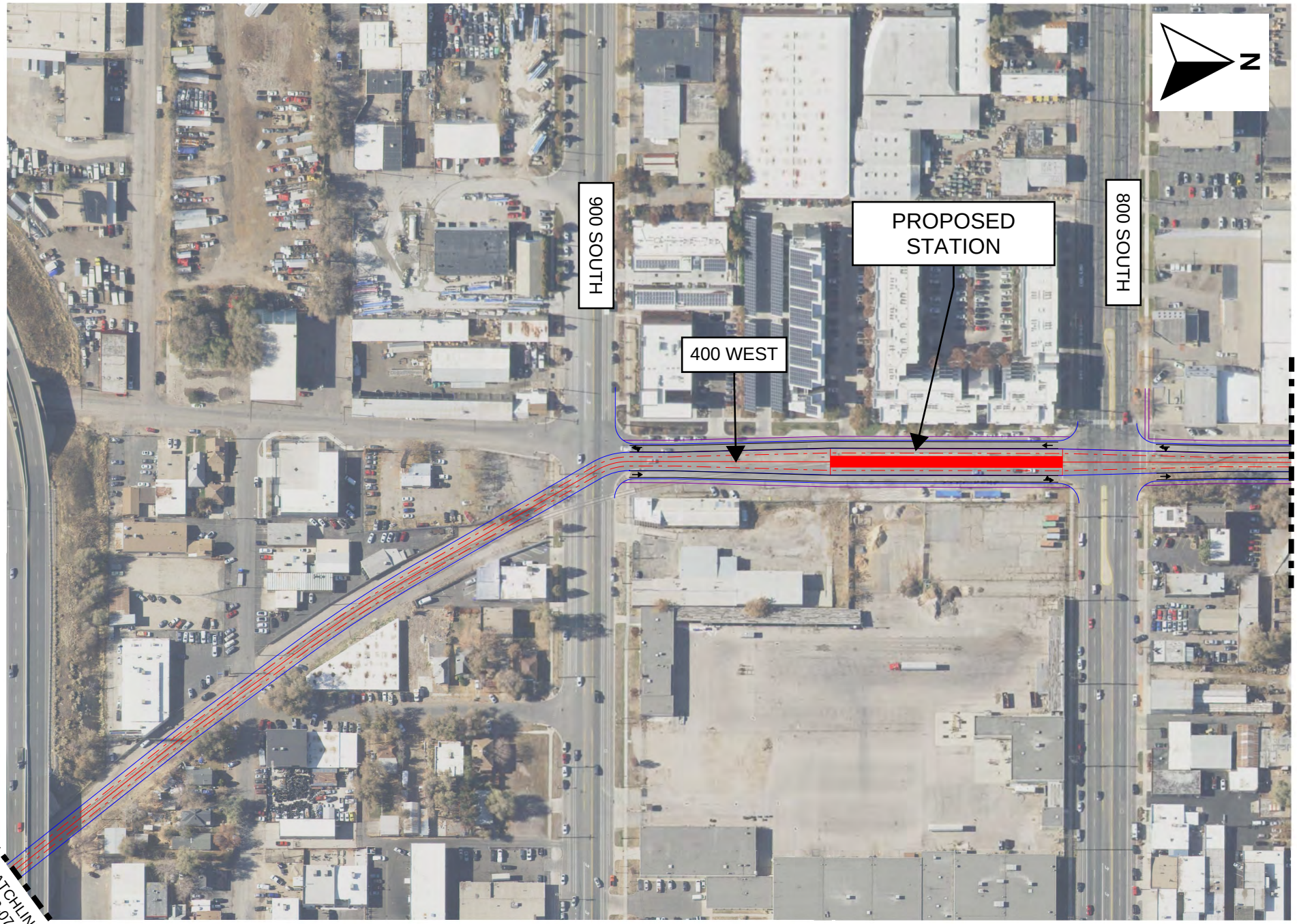
UTAH TRANSIT AUTHORITY

Designed By:	JAH
Drawn By:	MEL
Checked By:	JAH
Approved By:	

Downtown Salt Lake City Rail Feasibility Study

Scenario 2

Scale:	1" = 200'
CADD Filename:	
Submitted Date:	April 7, 2021
UTA Contract No.:	22910
Drawing No.:	S2
Sheet No.:	05



REV	DATE	Description

Submitted By:

Approved By:

UTAH TRANSIT AUTHORITY

Designed By:	JAH
Drawn By:	MEL
Checked By:	JAH
Approved By:	

Downtown Salt Lake City Rail Feasibility Study

Scenario 2

Scale:	1" = 200'
CADD Filename:	
Submittal Date:	April 7, 2021
UTA Contract No.:	22910
Drawing No.:	S2
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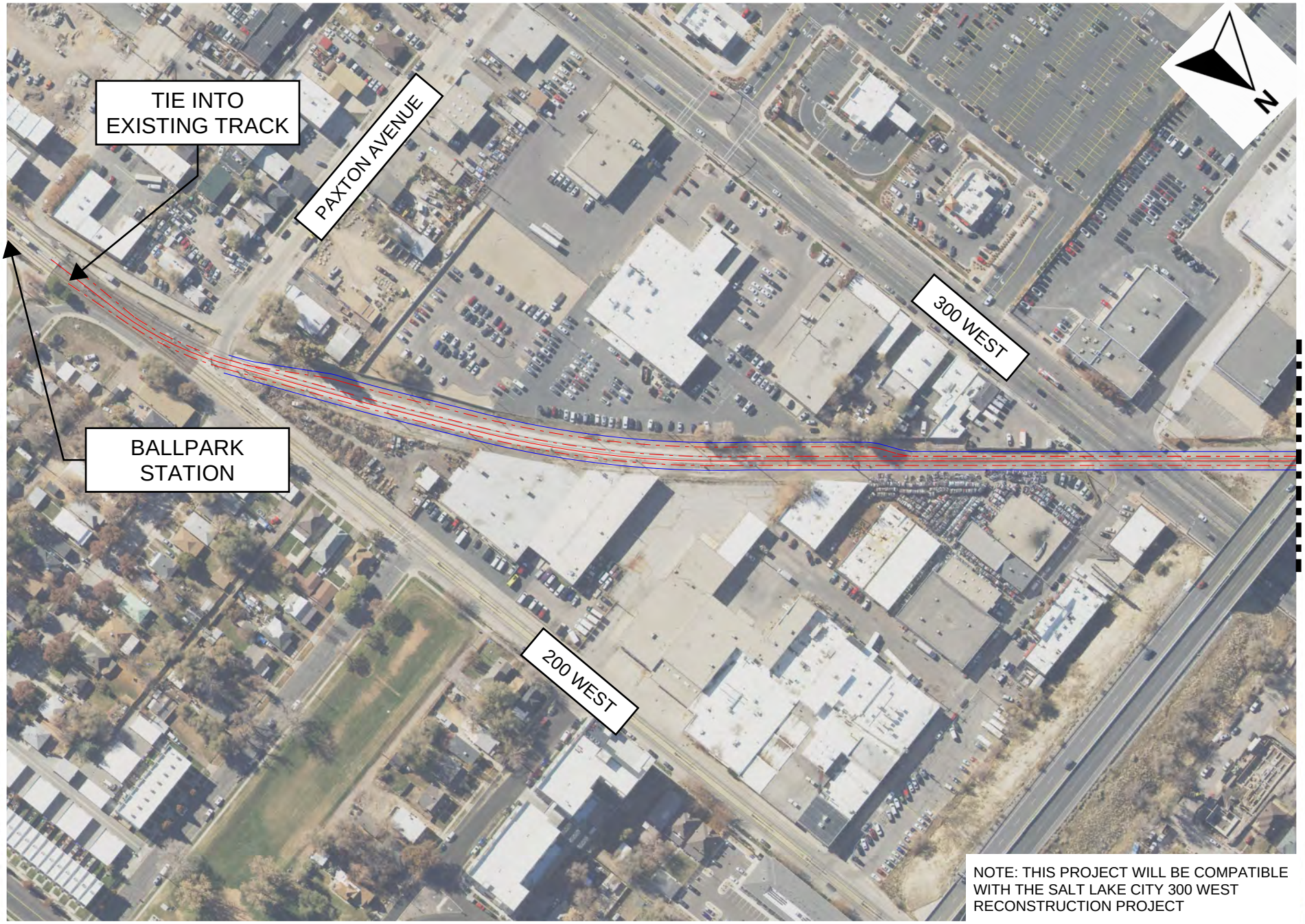


REV	DATE	Description

Submitted By: _____

Approved By: _____

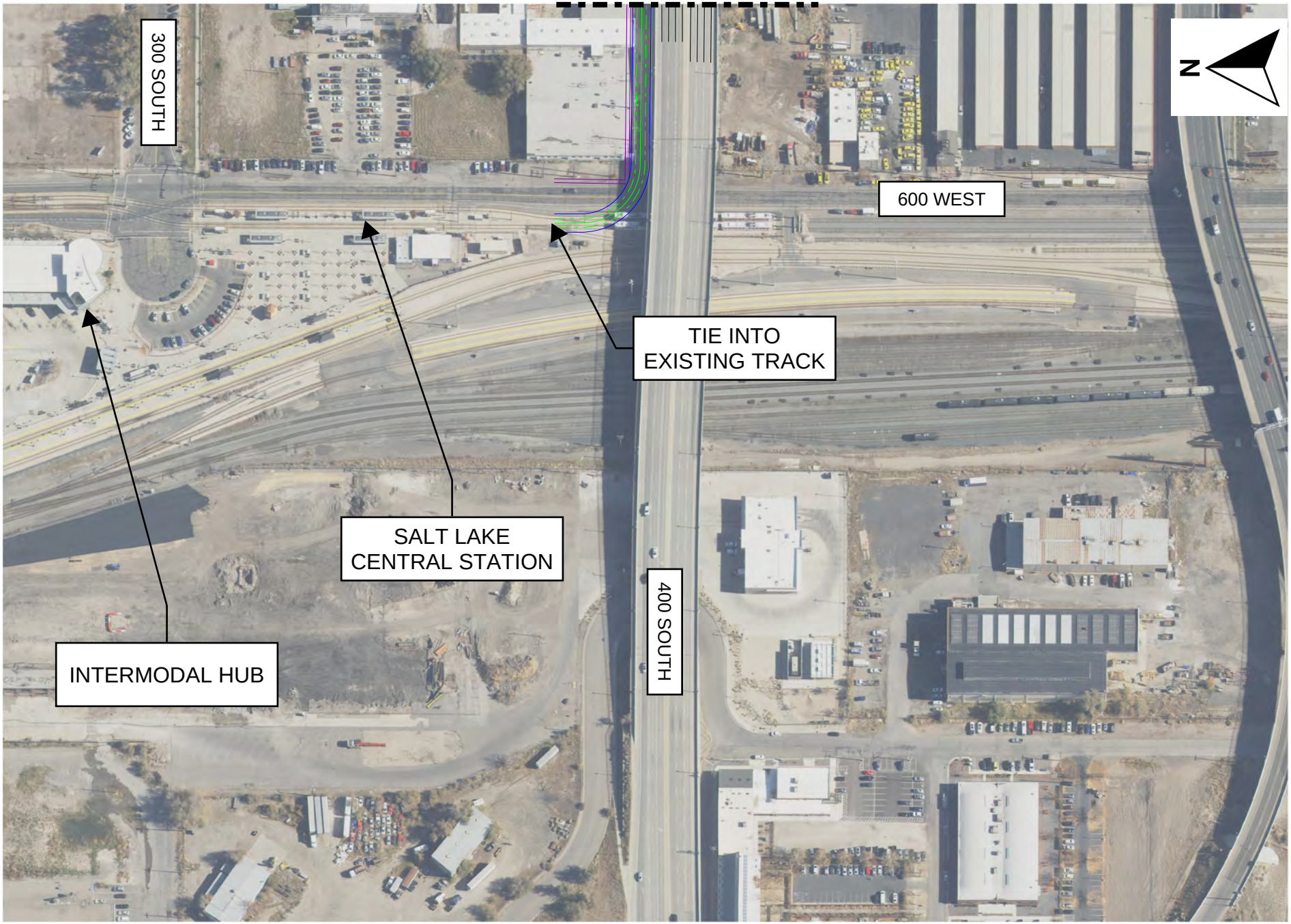
UTAH TRANSIT AUTHORITY

Designed By: JAH
Drawn By: MEL
Checked By: JAH
Approved By:

Downtown Salt Lake City
Rail Feasibility Study

Scenario 2

Scale: 1" = 200'
CADD Filename:
Submittal Date: April 7, 2021
UTA Contract No.: 22910
Drawing No.: S2
Sheet No.: 07



REV	DATE	Description

Submitted By: _____

Approved By: _____

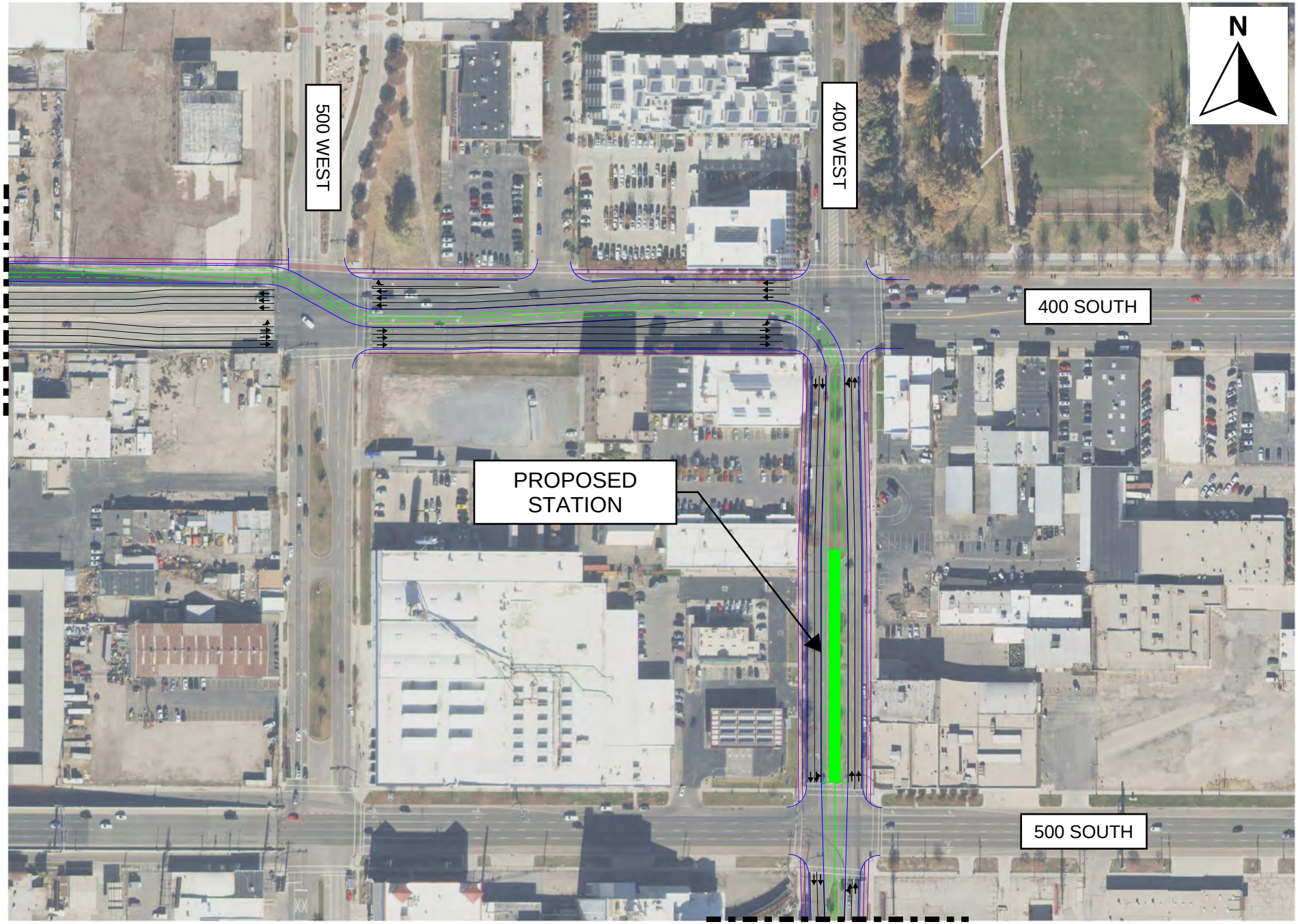
UTAH TRANSIT AUTHORITY

Designed By:	JAH
Drawn By:	MEL
Checked By:	JAH
Approved By:	

Downtown Salt Lake City Rail Feasibility Study

Scenario 3

Scale:	1" = 200'
CADD Filename:	
Submittal Date	April 7, 2021
UTA Contract No.:	22910
Drawing No.:	S3
Sheet No.:	01



REV	DATE	Description

Submitted By: _____

Approved By: _____

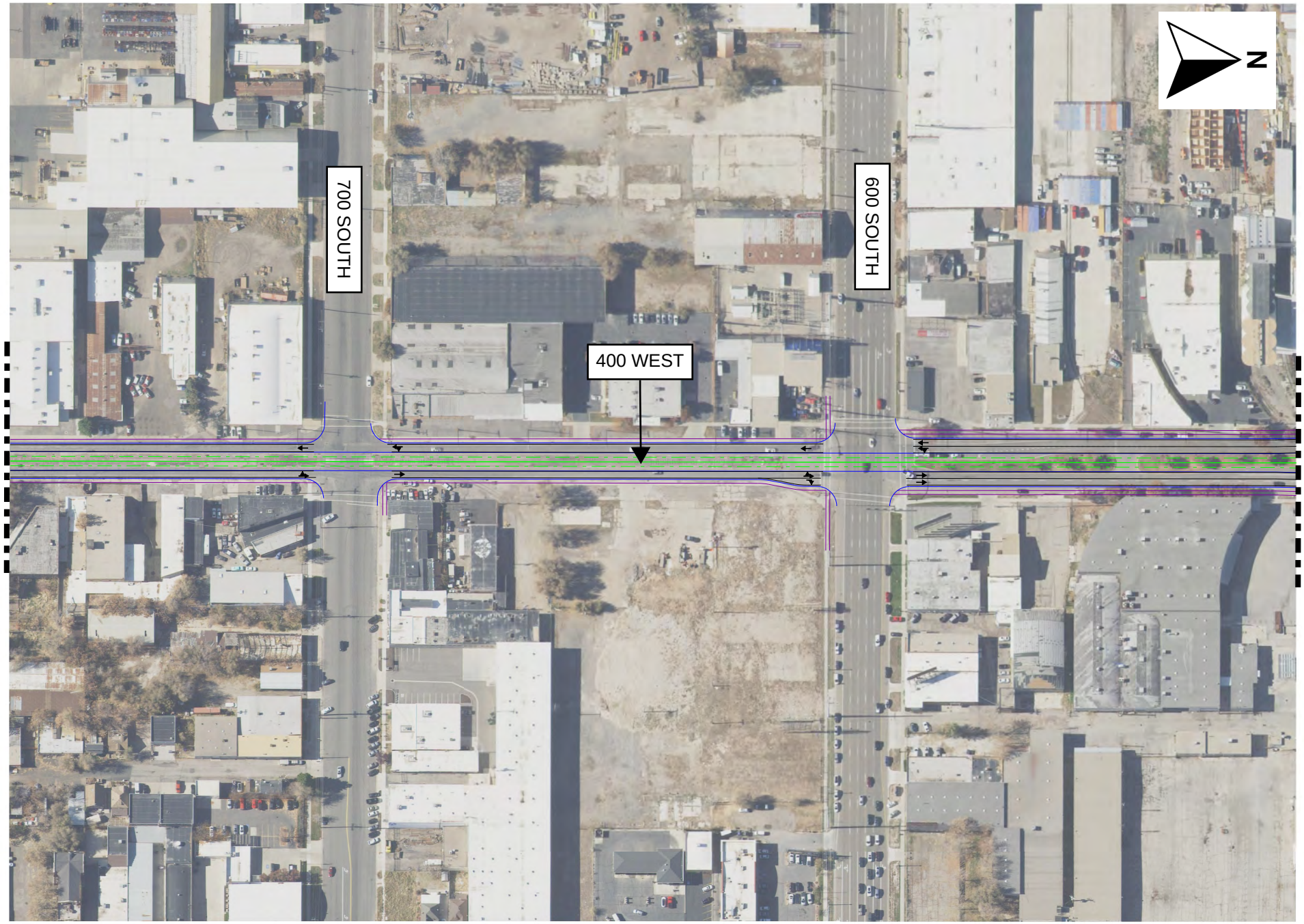
UTAH TRANSIT AUTHORITY

Designed By:	JAH
Drawn By:	MEL
Checked By:	JAH
Approved By:	

Downtown Salt Lake City Rail Feasibility Study

Scenario 3

Scale:	1" = 200'
CADD Filename:	
Submittal Date	April 7, 2021
UTA Contract No.:	22910
Drawing No.:	S3
Sheet No.:	02



REV	DATE	Description

Submitted By: _____

Approved By: _____

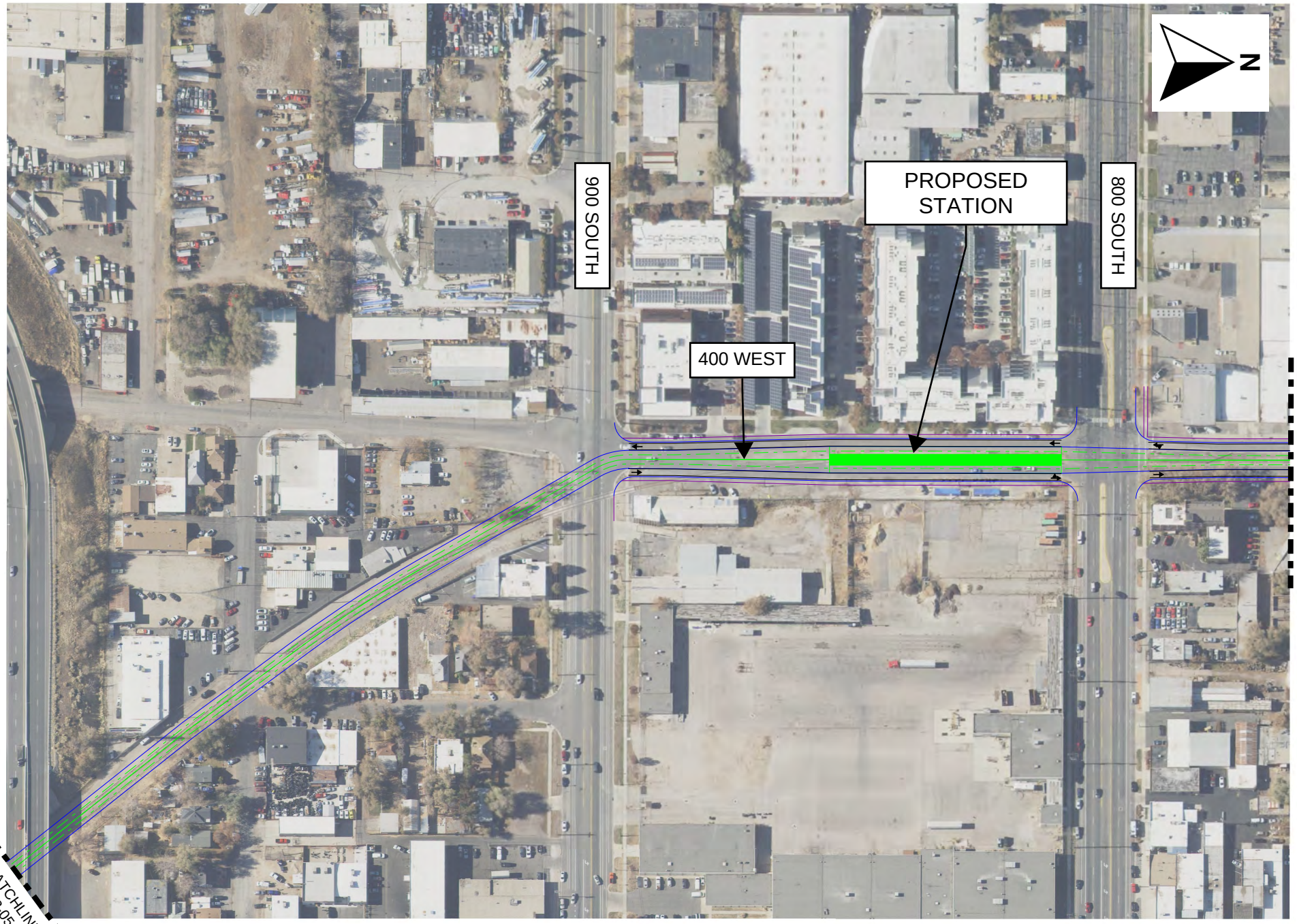
UTAH TRANSIT AUTHORITY

Designed By:	JAH
Drawn By:	MEL
Checked By:	JAH
Approved By:	

Downtown Salt Lake City Rail Feasibility Study

Scenario 3

Scale:	1" = 200'
CADD Filename:	
Submittal Date:	April 7, 2021
UTA Contract No.:	22910
Drawing No.:	S3
Sheet No.:	03



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Submitted By: _____

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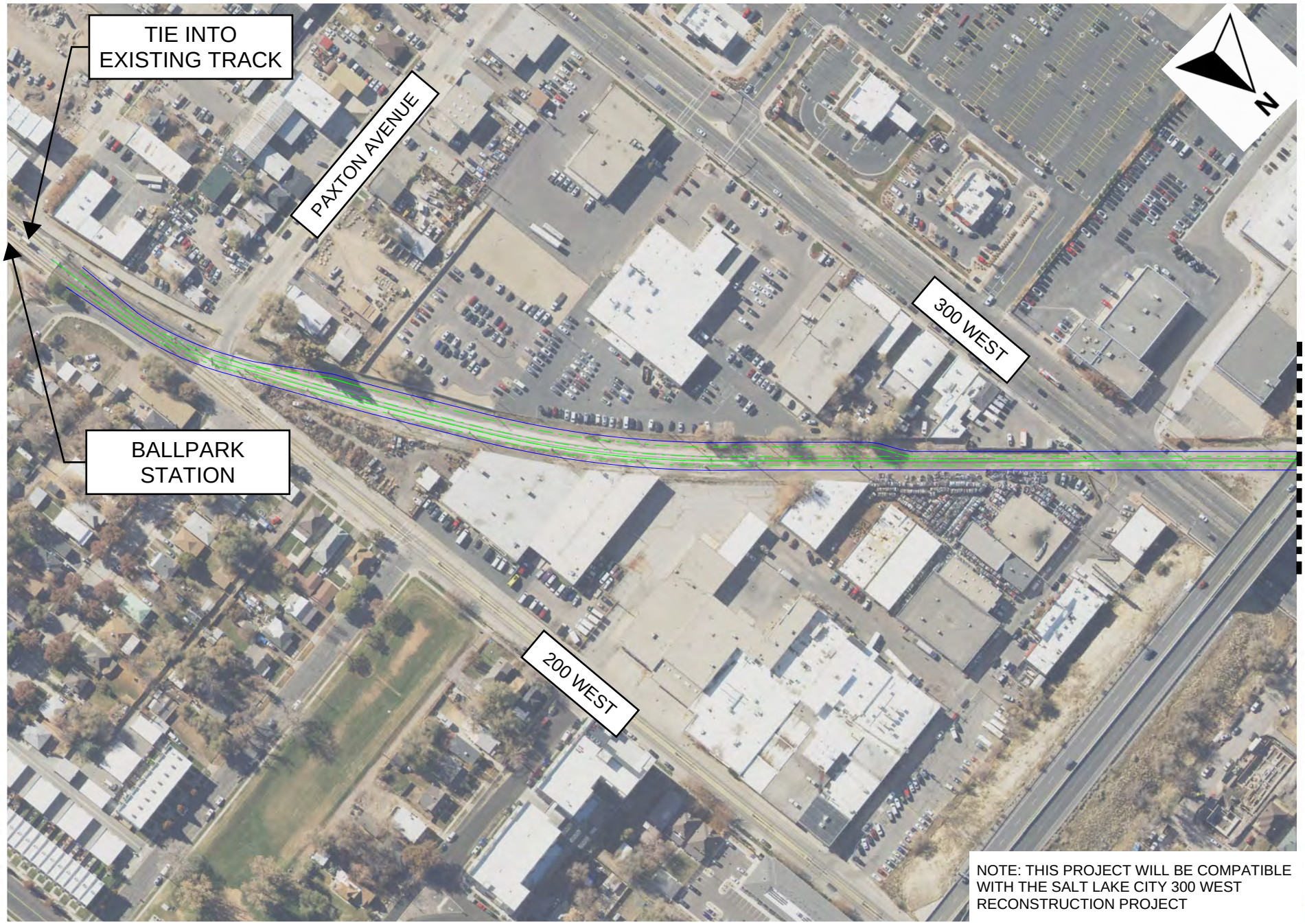
Designed By:	JAH
Drawn By:	MEL
Checked By:	JAH
Approved By:	

Downtown Salt Lake City Rail Feasibility Study

Scenario 3

Scale:	1" = 200'
CADD Filename:	
Submitted Date:	April 7, 2021
UTA Contract No.:	22910
Drawing No.:	S3
Sheet No.:	04



NOTE: THIS PROJECT WILL BE COMPATIBLE WITH THE SALT LAKE CITY 300 WEST RECONSTRUCTION PROJECT

REV	DATE	Description

Submitted By: _____

Approved By: _____

UTAH TRANSIT AUTHORITY

Designed By: JAH
Drawn By: MEL
Checked By: JAH
Approved By:

Downtown Salt Lake City Rail Feasibility Study

Scenario 3

Scale: 1" = 200'
CADD Filename:
Submittal Date: April 7, 2021
UTA Contract No.: 22910
Drawing No.: S3
Sheet No.: 05

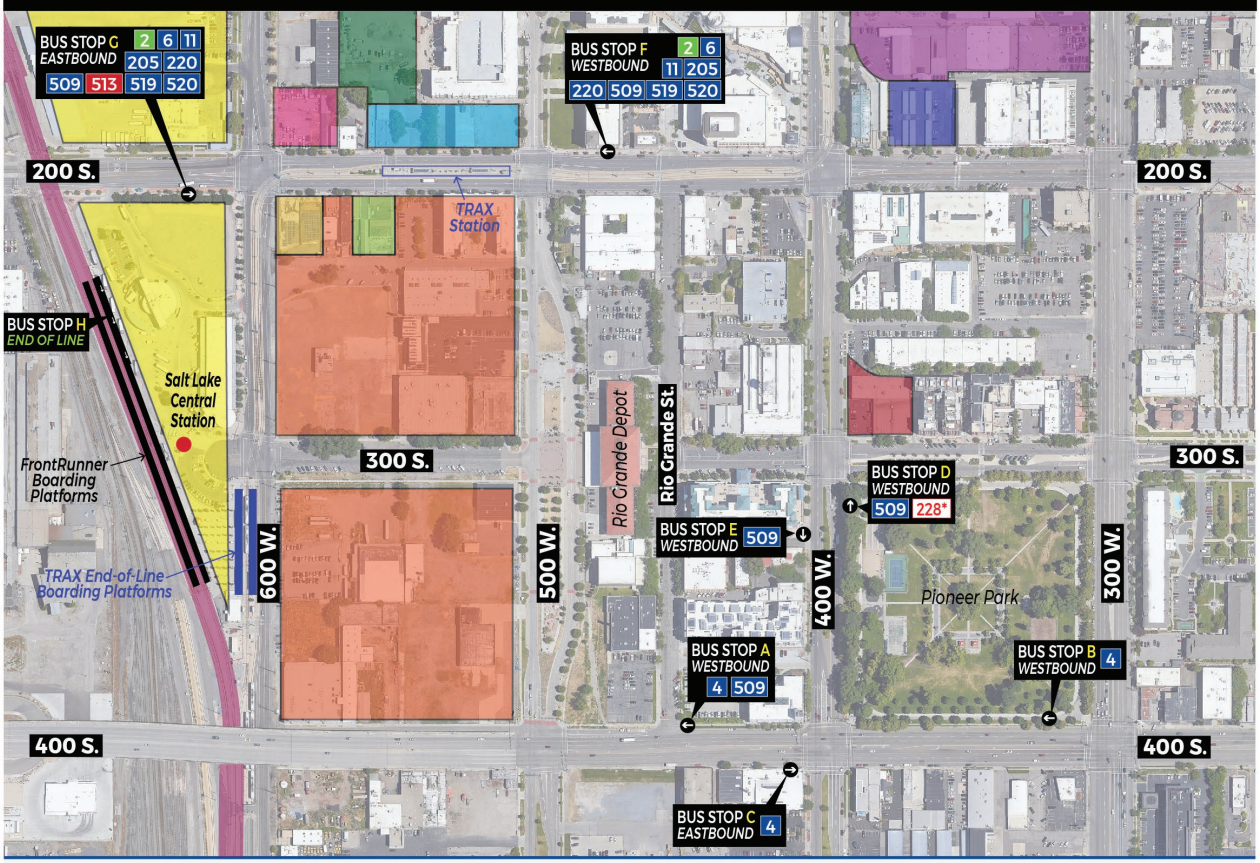
Appendix D

Current and Future Development Projects in the S.L. Central Station Area

Appendix D

Current and Future Development Projects in the S.L. Central Station Area

Current and Future Projects *(Between 200 S. to 400 S. & 600 W. to 300 W.)*



LEGEND:

Scale in Feet: 0 250 500

Current & Future Projects *(Source: Salt Lake City + SLC RDA, February 2021)*

- *Greenprint Gateway Apartments*
- *Central West Apartments*
- *The Zephyr Lofts*
- *The Olive*
- *Alta Depot Apartments*
- *Central Station Apartments*
- *S.L. Central Station future redevelopment area (UTA)*
- *CINQ Apartments*
- *Paperbox Lofts*
- *Station Center future redevelopment area (SLC RDA)*

BUS STOP A WESTBOUND 4 509

Approximate Location: 440 W. on north side of 400 S.

BUS STOP B WESTBOUND 4

Approximate Location: 310 W. on north side of 400 S.

BUS STOP C EASTBOUND 4

Approximate Location: 410 W. on south side of 400 S.

BUS STOP D WESTBOUND 509 228*

Approximate Location: 310 S. on east side of 400 W.

BUS STOP E WESTBOUND 509

Approximate Location: 320 S. on west side of 400 W.

BUS STOP F WESTBOUND 2 6 11 205 220 509 519 520

Approximate Location: 480 W. on north side of 200 S.

BUS STOP G EASTBOUND 2 6 11 205 220 509 513 519 520

Approximate Location: 610 W. on south side of 200 S.

BUS STOP H *END OF LINE*

Location: Adjacent to North end of FrontRunner Boarding Platforms