

The

Rio Grande

Plan



**A PLAN FOR URBAN GROWTH ON
SALT LAKE CITY'S WEST SIDE
BASED ON RESTORED RAIL SERVICE
TO THE RIO GRANDE DEPOT**

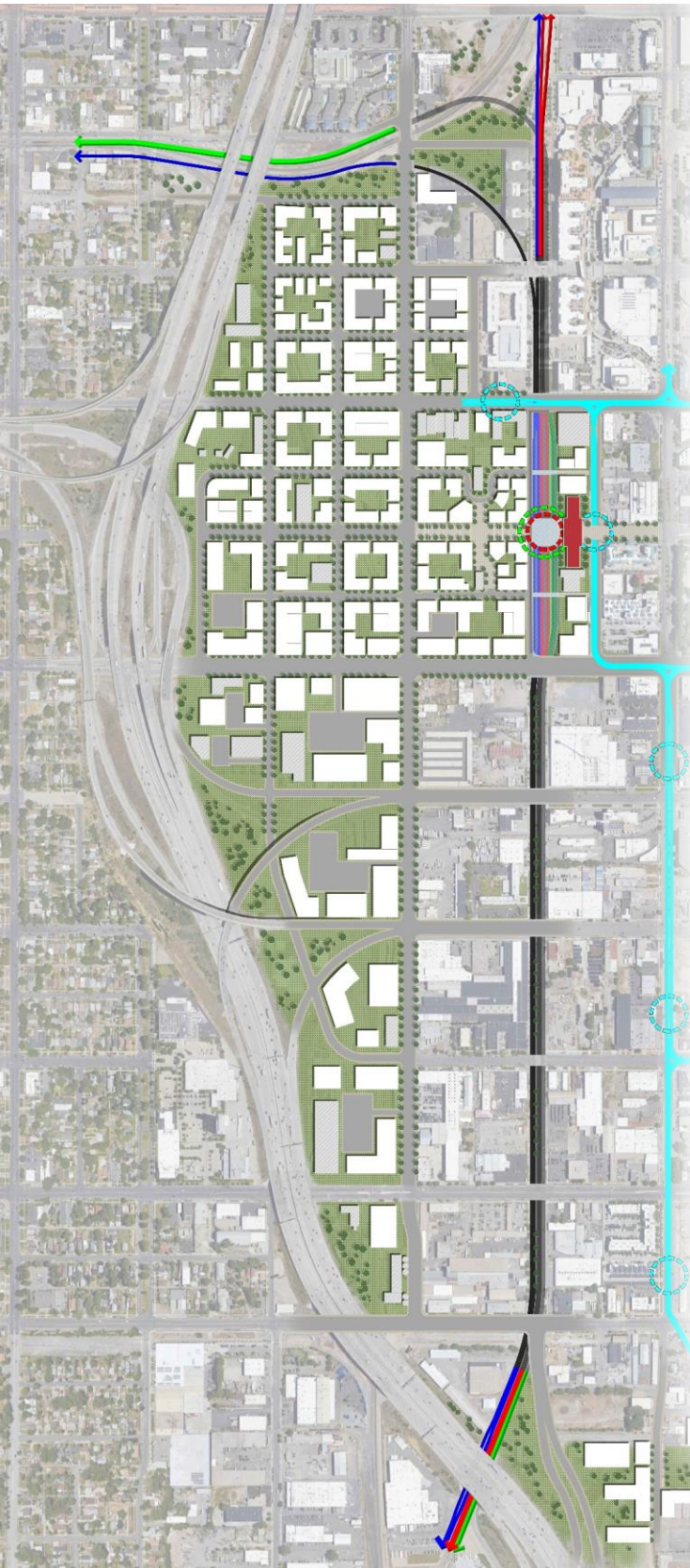
What are the Problems?

- For the last 20 years, Salt Lake City's main train station has been a temporary mobile structure that is only open during the night. The lack of passenger amenities is limiting ridership, turning away future rail and transit users, and stalling passenger rail projects in the state of Utah.
- Development around Salt Lake Central Station has not happened. Vacant lots have sat unused for over a decade. 300 South, which is blocked by the Rio Grande Depot, is a lifeless street. On the east side of the depot, 300 South and Pioneer Park are underutilized and overlooked.
- To the south and west of Salt Lake Central Station, mostly-abandoned railyards sprawl over 50 acres of otherwise prime land, creating an enormous 'dead zone' on the west side of downtown.
- Massive bridges span the rail yards at 400, 500, and 600 South. These disrupt the traffic flow on surface streets for vehicles and pedestrians alike, as well as consuming valuable street front.
- Major railroad crossings at 900, 800, and 200 South interrupt and often block travel between downtown and neighborhoods further west, as well as posing serious safety hazards.
- The design of Salt Lake Central Station is 'flat', meaning passengers must cross active railroad tracks to reach most platforms. This design creates significant safety hazards and limits the capacity of the station. Upgrades will required in the near future, and will cost millions of dollars.



The current, isolated, and supposedly 'temporary' Amtrak station at Salt Lake Central (Top Left) and the empty lots that surround it (Bottom Left) compared to a rendering of the historic Rio Grande depot with restored rail service and surrounding developments (Right).

What are the Solutions – and the Benefits?



1. The Rio Grande Plan proposes returning trains to the Rio Grande depot through a below-grade 'train box'. Passenger, freight, and commuter trains will travel between 900 South and 100 South beneath a reconstructed 500 West, and all railroad tracks on the surface will be removed.
2. The new rail station at the Rio Grande depot will be entirely grade-separated. There will be no crosswalks over any railroad tracks. Safety, convenience, and efficiency will be greatly enhanced in preparation of increased ridership.
3. The Rio Grande Plan expands on the RDA's redevelopment plans for the Depot District. Current plans will not need to be altered.
4. 52 acres of new land will be opened for development on the former rail yards site.
5. Four major railroad crossings will be eliminated, and the bridge at 400 South can be replaced with a surface street, opening 5 blocks of street frontage.
6. Future projects can cut back the freeway ramps at 500 South and 600 South. These will be able to tie into surface streets at 600 or 700 West, depending on direction, creating 6 additional blocks of street frontage.
7. Removal of the rail yards, industry, and bridges will create better connections between Downtown, Poplar Grove, and the Jordan River.
8. With the removal of the 400 South bridge, new TRAX lines will be enabled, bringing new connectivity and Transit Oriented Development to the Granary and Depot Districts.
9. A future realignment of the 900 South freeway ramps from West Temple to 500 West will create a major transit corridor between 900 South and the Rio Grande Depot at 400 South. The removal of the freeway ramps will also open another 17 acres for redevelopment and public space.

Potential redevelopment scheme. See page 9 for details.

The Station

The Rio Grande Depot served as an active rail hub from 1910 until 1999. Because the tracks were removed so recently, the Right-of-Way along 500 West remains unobstructed by new developments.

The Rio Grande Plan calls for the construction of a 'train box' below 500 West, between 900 South and 100 South, a distance of 1.25 miles. This box will be wide enough to contain six separate railroad tracks:

- 2 tracks for Union Pacific Railroad and intercity Amtrak service
- 2 tracks for UTA's existing *FrontRunner* service between Ogden and Provo (and future extensions)
- 2 tracks for a future commuter rail service between Tooele Valley, Salt Lake City, and Park City. This route will also be used for High Speed Rail access to Salt Lake City in the distant future.

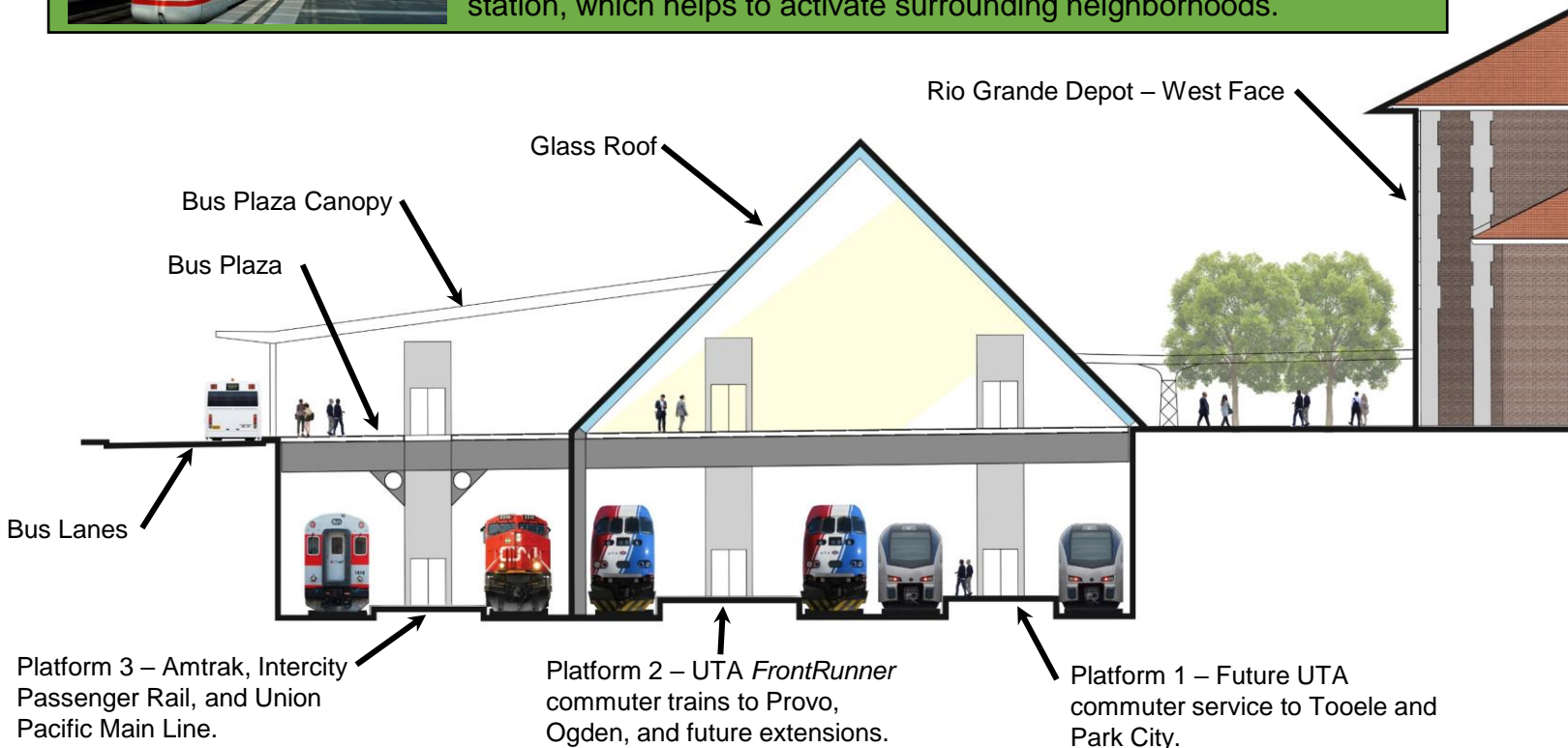
Between 400 South and 200 South, these six tracks will spread out into the footprint of the historic tracks and platforms west of the depot. **The 500 West rail corridor will be constructed entirely within the existing public Right-of-Way. No private property will need to be acquired.**

Access to trains will be via three platforms, which will connect to ground level by stairs and elevators at the centers and ends of each platform. A signature glass canopy will be constructed over the commuter rail platforms in order to protect passengers and machinery from snow and weather.

The freight and Amtrak tracks will be covered by a pedestrian and bus plaza. This bus plaza will span the length of the rail platforms, and will be a major hub for transit and intercity buses.



Glass roofs are used to protect rail platforms in hundreds of train stations across the globe, such as in London, Beijing, Helsinki, Amsterdam, Frankfurt, Berlin (Pictured), and New York City. Enclosed stations provide greater passenger comforts and require less upkeep in snowy and icy conditions. By establishing a unique sense of 'place,' passengers will be encouraged to linger longer at and around the station, which helps to activate surrounding neighborhoods.



Cross-section view of the underground Train Hall and Bus Plaza, looking north on 500 West. The historic Rio Grande depot building is to the right.

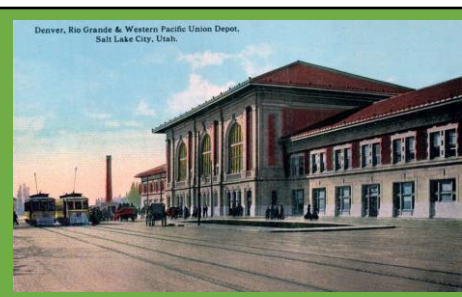


On the east side of the depot, two TRAX platforms will be constructed on the west side of Rio Grande Street. These platforms will provide separate access to northbound and southbound TRAX trains, with the tracks crossing over between the platforms. With this arrangement, passengers transferring from TRAX to other modes will never need to cross an active rail line at-grade.

Cross-section view of the front (east side) of the Rio Grande Depot, looking north on Rio Grande Street.



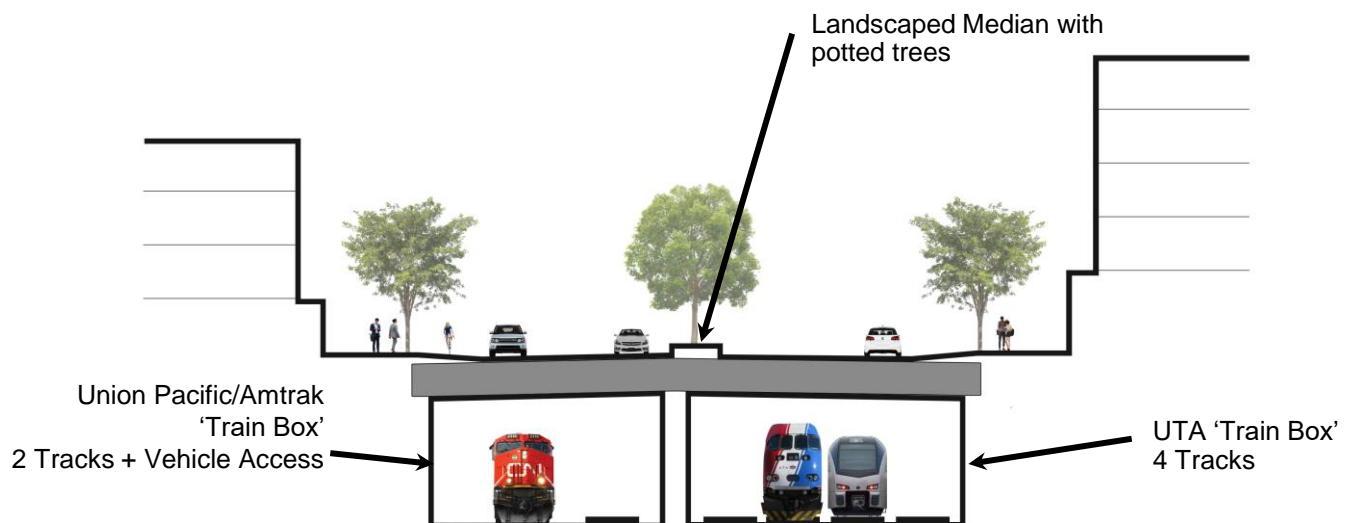
The front of major rail stations often serve as the core of the local surface transit network, including light rail, buses, and taxis. Amsterdam Central Station (Left) is a major hub for that city's tram network. The Rio Grande depot once had streetcar service to its east side (Right).



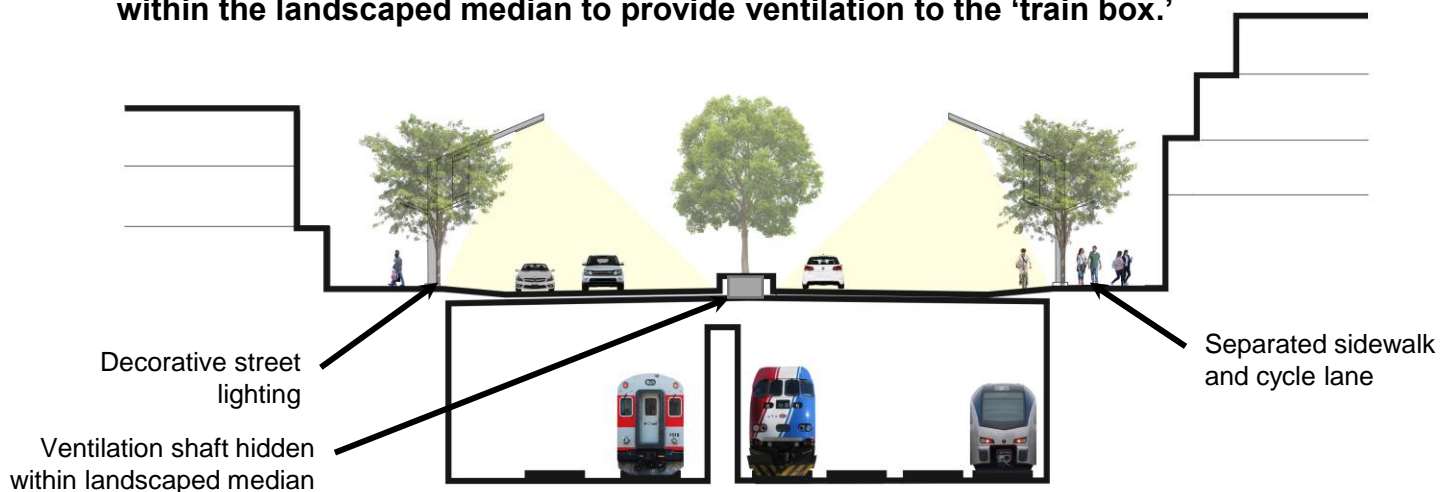
Grade Separation

Every railroad crossing – be it a road with vehicles or a walkway for pedestrians – is a continual source of congestion, delays, maintenance, and safety hazards. Excluding human life and suffering, each accident costs time, money, and resources that could have been better spent elsewhere. Additionally, for each train that is delayed, the reliability of rail transit is diminished and riders will begin to turn to other modes for dependable transportation. **The Rio Grande Plan calls for closing 4 major road-rail crossings, closing 11 minor crossings, and eliminating all pedestrian at-grade crossings of commuter and intercity rail in the downtown area.**

These goals will be accomplished by placing all train tracks between 100 South and 900 South in a below-grade 'train box,' also called a covered trench. This box will consist of a concrete floor 33 feet below ground level, and two retaining walls 100 feet apart. An additional structural wall will separate the box into two parts, for UTA and Union Pacific tracks. Once these are in place, bridge beams will be laid across the top of the box, and the roadway surface of 500 West will be restored for public use. Below-grade construction by this method is **significantly cheaper** than tunnel boring and even cut-and-cover tunnels, since the end result is a single integrated structure.



Cross-section views of the 'train box' below 500 West, looking north. When support beams across the 'train box' are present (Above), potted trees and landscaping in the park strips and median will disguise the presence of the 'train box'. In the space between support beams (Below), poles for street lights and traffic signals can be placed using normal methods, and grated openings will be installed within the landscaped median to provide ventilation to the 'train box.'

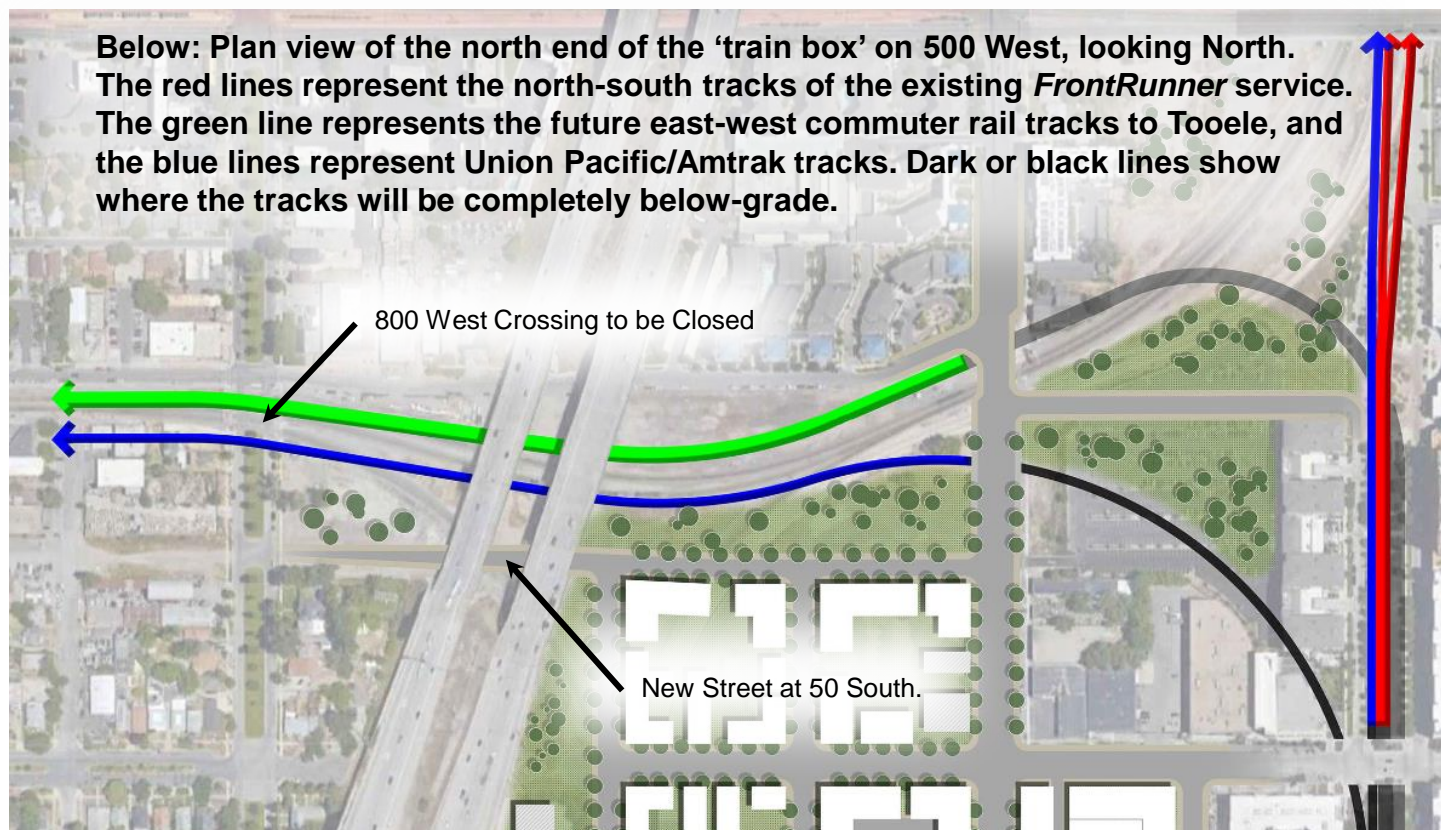


Once the new below-grade tracks and station are completed, rail operations will be shifted to the new alignment on 500 West. There will be no major disruptions to rail service during construction. Additionally, due to the generous width of 500 West, the 'train box' will fit within the public ROW for its entire length. **No private property will need to be acquired** or demolished along 500 West.

After this new line is open, the old tracks at ground level between 900 South and 100 South will be permanently removed. Railroad tracks will no longer cross 900 South, 800 South, and 200 South at-grade, and two of the four tracks at the 600 West crossing will also be removed. Due to the tracks transitioning between ground level and the below-grade 'train box,' the crossing at 800 West will be permanently closed to vehicles and pedestrians, though a new road at 50 South will ensure this neighborhood will not become a dead-end. **Together, these five crossings host over 300 activation events per day**, which, since 1976, have resulted in:

- 28 recorded accidents
- 11 major injuries
- 4 fatalities

Closing these crossings will remove a significant safety hazard from downtown. Also eliminated will be the countless combined hours of delays as cars, pedestrians, cyclists, and emergency vehicles wait for crossings to clear. Noise, smells, and pollution from passing trains will also be eliminated, resulting in a higher demand for properties in the Depot District, Poplar Grove, and the west side of downtown.



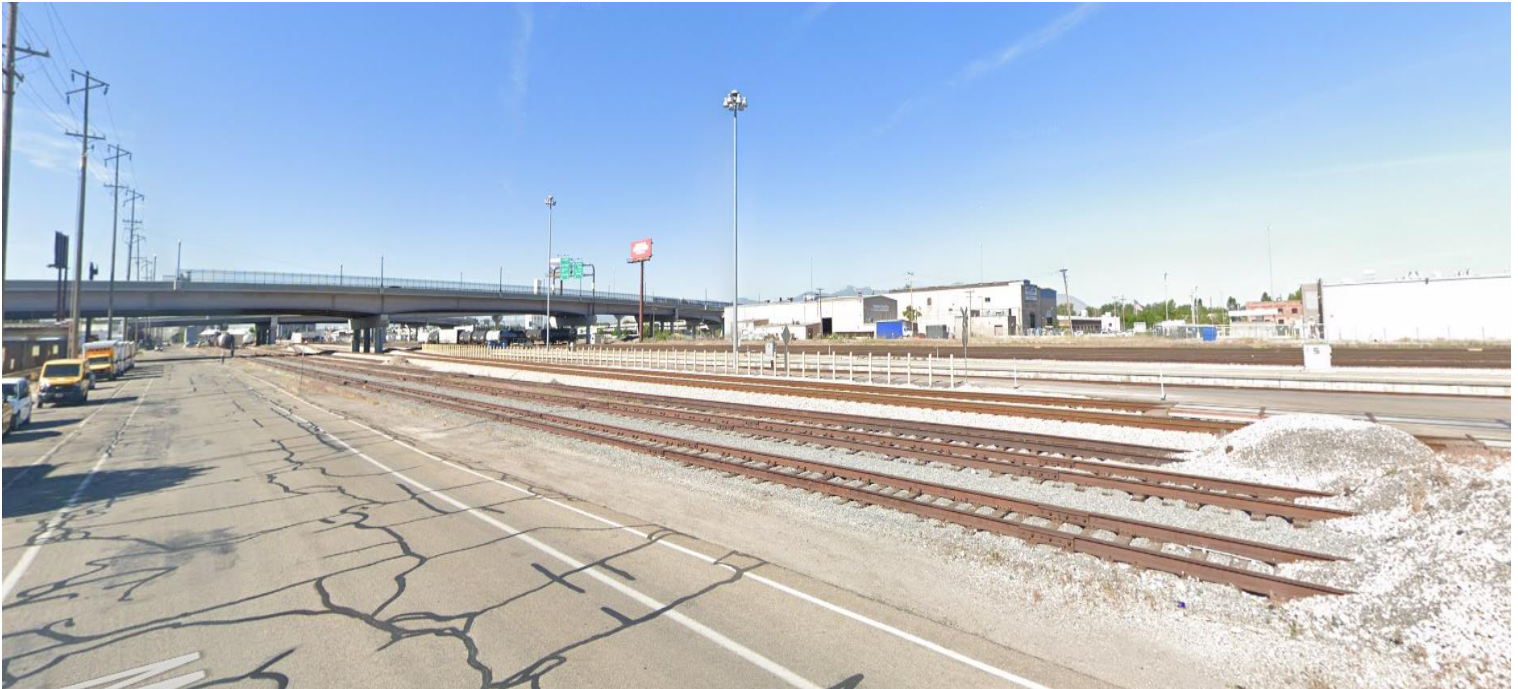
Below: Cross-section view of the platforms at the Rio Grande Depot, showing full grade separation between platforms and pedestrian plazas. In addition to added safety, grade separation will also increase capacity, allowing for more trains per hour and shorter station stops.



Redevelopment

The land in downtown Salt Lake City between 600 West and I-15 is currently occupied by an underutilized light-industrial area. The freight yard of the former Denver Rio Grande & Western Railroad – now owned by Union Pacific Railroad – occupies approximately 50 acres of land immediately adjacent to 600 West. Multiple roadway overpasses viaducts, and railroad tracks make the area a maze of accessibility. In the 10 years since the opening of Salt Lake Central Station, urban development has not occurred, despite the area having the highest concentration of public transit services in the state Utah.

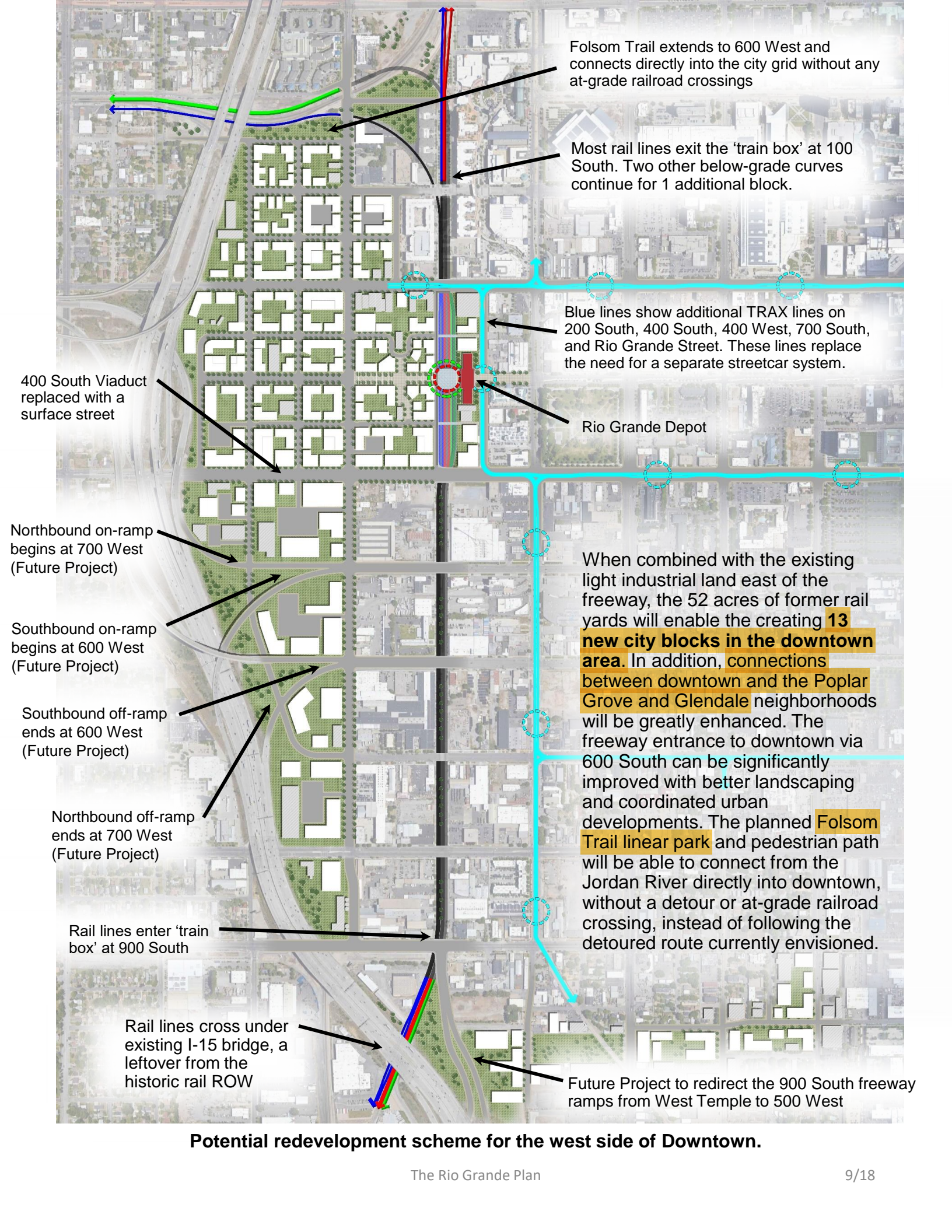
By removing the railroad tracks between 900 South and South Temple, **over 52 acres of land will become available for new urban developments**. Roads that have been closed off for over a century can be reconnected. A new residential neighborhood with all levels of housing can transform the dynamics of downtown's west side – especially at a time when a housing shortage has become a serious threat to sustained growth. The new tax revenue from such a dense new neighborhood will compensate for the cost of the Rio Grande Plan, but will also ensure a financial stability for both city and state



View of the rail yards west of 600 West. 52 Acres of developable land will open when these tracks are removed.



Many cities across America are replacing disused and underutilized railyards with urban developments in an effort to combat crime and housing shortages. Some examples include Denver, Sacramento, Albuquerque, Hoboken, Sioux Falls, Austin, Washington DC, New York City, Seattle, Spokane, Chicago, and Los Angeles.



Folsom Trail extends to 600 West and connects directly into the city grid without any at-grade railroad crossings

Most rail lines exit the 'train box' at 100 South. Two other below-grade curves continue for 1 additional block.

Blue lines show additional TRAX lines on 200 South, 400 South, 400 West, 700 South, and Rio Grande Street. These lines replace the need for a separate streetcar system.

Rio Grande Depot

400 South Viaduct replaced with a surface street

Northbound on-ramp begins at 700 West (Future Project)

Southbound on-ramp begins at 600 West (Future Project)

Southbound off-ramp ends at 600 West (Future Project)

Northbound off-ramp ends at 700 West (Future Project)

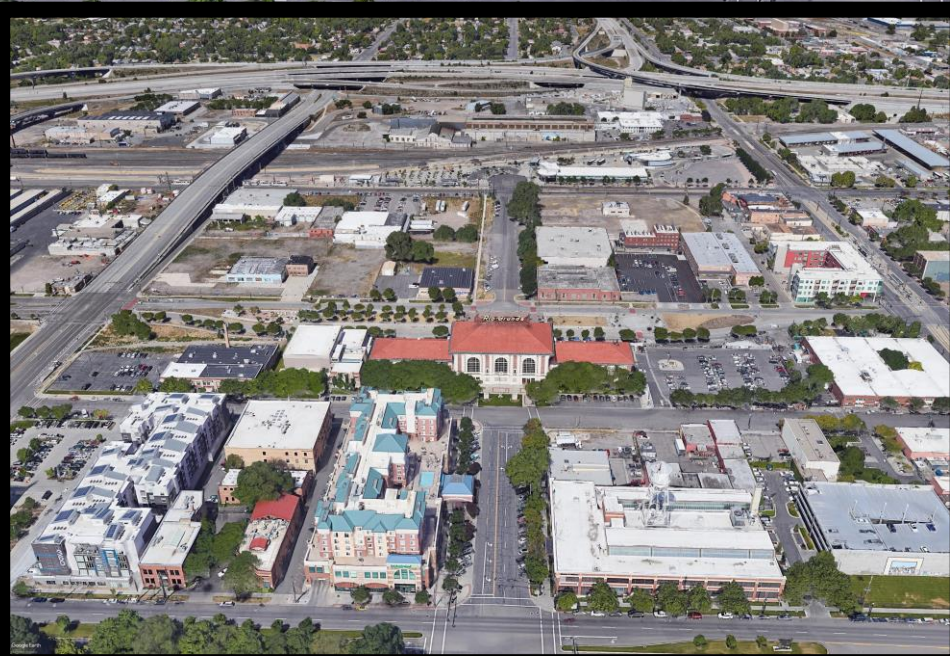
Rail lines enter 'train box' at 900 South

Rail lines cross under existing I-15 bridge, a leftover from the historic rail ROW

Future Project to redirect the 900 South freeway ramps from West Temple to 500 West

When combined with the existing light industrial land east of the freeway, the 52 acres of former rail yards will enable the creating **13 new city blocks in the downtown area**. In addition, connections between downtown and the Poplar Grove and Glendale neighborhoods will be greatly enhanced. The freeway entrance to downtown via 600 South can be significantly improved with better landscaping and coordinated urban developments. The planned **Folsom Trail linear park** and pedestrian path will be able to connect from the Jordan River directly into downtown, without a detour or at-grade railroad crossing, instead of following the detoured route currently envisioned.

Potential redevelopment scheme for the west side of Downtown.



Aerial view looking west – existing (Left) and proposed (Above). In the foreground, 300 South has become a pedestrian mall between Rio Grande Street and 400 West. This half-block section of 300 South has only one business driveway, which can be relocated, creating a valuable new public space. Also visible are the two TRAX stations, the historic Rio Grande Depot, and the glass roof over the train hall and bus plaza. To the west are a restored street grid and new developments built on the former rail yards and UTA bus barns.

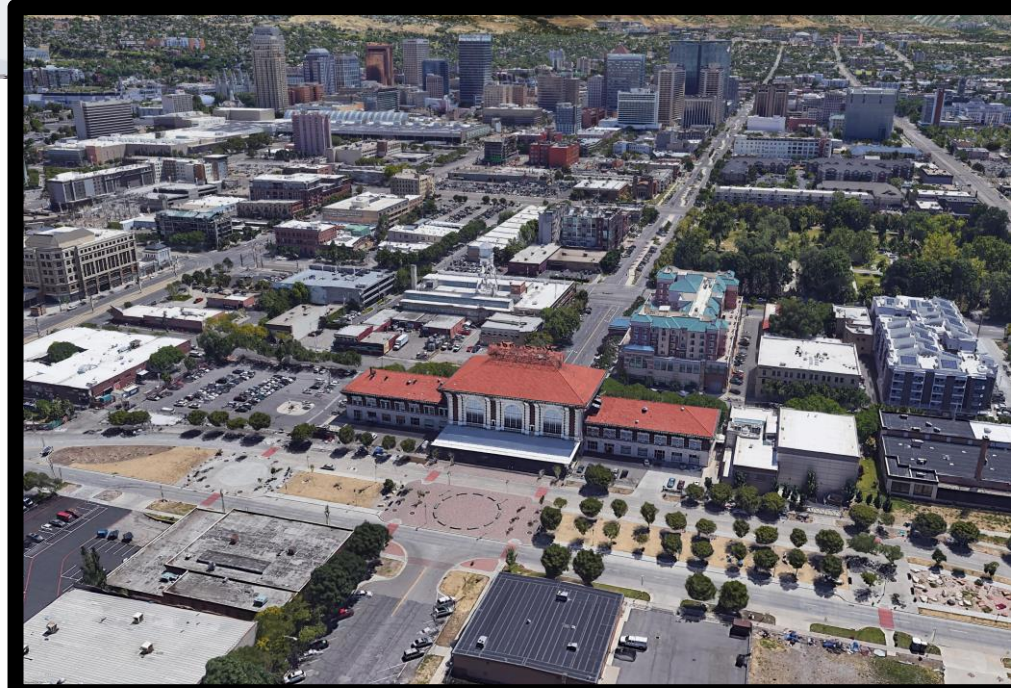
Pedestrian plazas and rail stations often go together, such as the new Vanderbilt Plaza at Grand Central Terminal in New York City. Plazas provide places for gatherings, art, and performances, and provide a first impression of the city to visitors. The pedestrian mall on 300 South will provide such a place in Salt Lake City.





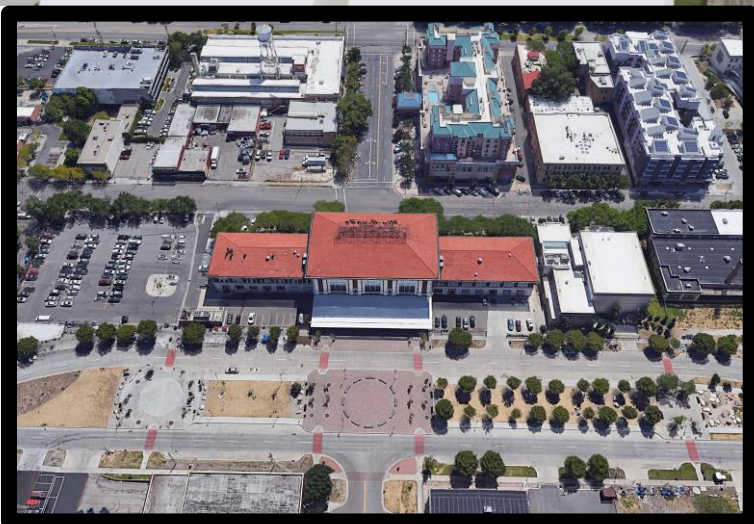
Aerial view looking east – existing (Right) and proposed (Above). Planned and new developments will tie in directly with the new train hall and bus platform, while walkways to the north and south of the depot will provide alternatives to walking through the depot Main Hall.

Because of their close proximity, Pioneer Park will become a major gathering place for residents and visitors alike, while 300 South will become a prominent pedestrian thoroughfare between the Depot District and Main Street.



Pedestrian-Oriented Streets, such as Denver's 16th Street Pedestrian Mall (pictured Left and Right) connect urban districts and create vibrant corridors for local businesses. By replacing the median parking on 300 South with pedestrian space between 400 West and State Street – a distance of 5 blocks (4/5 of a mile) – Salt Lake City can tightly connect the Downtown core with the Depot District.



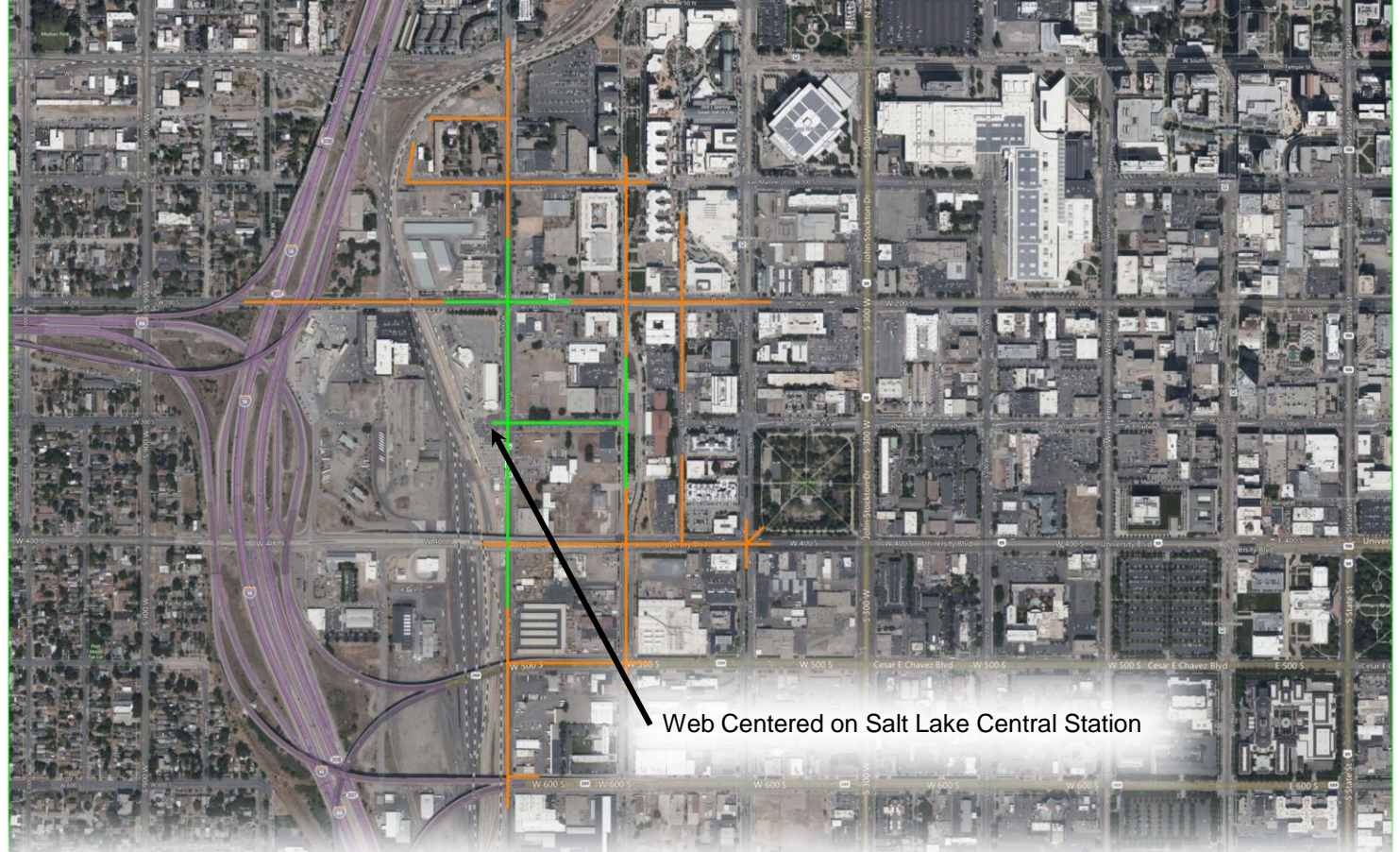


Aerial view looking east – existing (Left) and proposed (Above). The bus platform, UTA commuter rail platforms, and pedestrian plazas are visible through the glass canopy. The entire complex is designed to fit within existing public Right-of-Ways. No additional property will be required, and current RDA plans for redevelopment will not be affected.

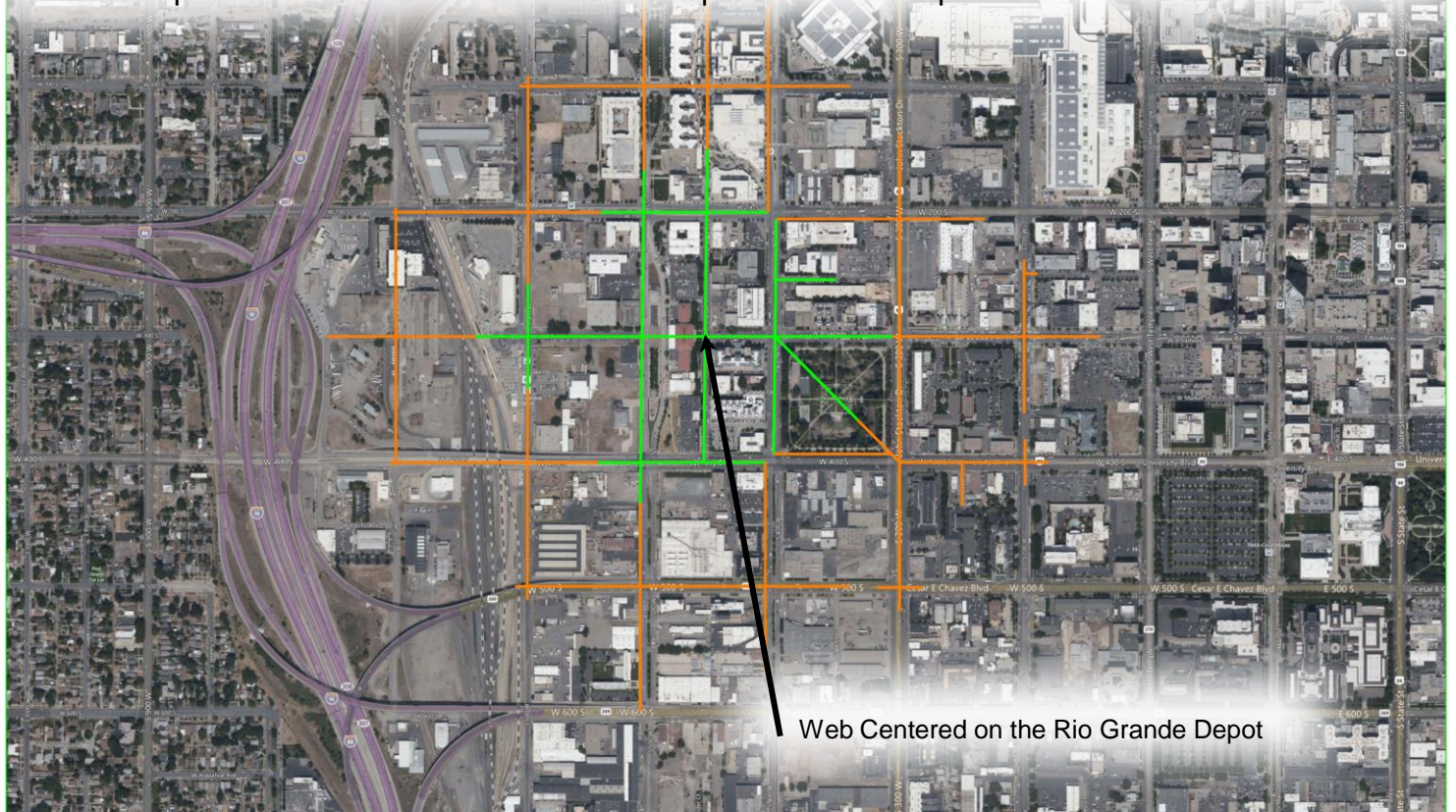
Additionally, the Rio Grande depot will not need major refurbishments in order to resume its role as a major train station. Private developments, such as restaurants or other retailers, will be able to lease space in and around the depot, bringing in revenue that will pay for depot operation and maintenance.

Beyond its chief purpose of protecting passengers and platforms from sun, rain, snow, and ice, the roof over the station has become an iconic architectural symbol in several cities, such as Denver (pictured). The modern design of the train hall canopy compliments the classical architecture of the station's main headhouse. The canopy structure has become such an iconic symbol of Denver that it has been featured in national advertisements and TV as a symbol of the city's success.





Two aerial views of the Depot District, containing 'access webs' for the current Salt Lake Central Station (Above) and the Rio Grande depot (Below). The lines in green show all possible walking paths up to a quarter mile from the depot, while orange lines extend to a half-mile, which is the typical limit of a pedestrian's walking range. These figures show that while pedestrian traffic to Salt Lake Central Station may reach as far as the Gateway or the corner of Pioneer Park, the better location of the Rio Grande Depot places the Vivint Arena, Japan Town, 200 West, and the entirety of the Pioneer Park area within easy walking distance. In total, the street front available to pedestrians from the Rio Grande depot is 20,660 feet, compared to Salt Lake Central's 12,100 feet. **The Rio Grande Depot opens twice as much street front to pedestrian traffic compared to Salt Lake Central Station,** which will spur denser and more desirable developments in the Depot District.



Similar Projects: Denver, CO

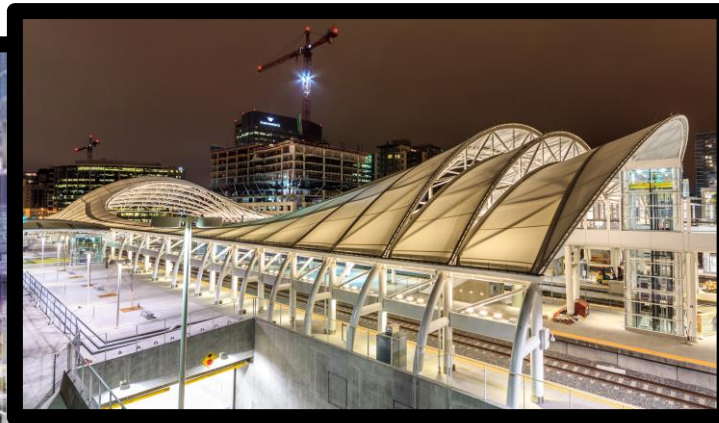
Denver Union Station and the Lo Do neighborhood were both very recently empty space on the edge of downtown. Between 2012 and 2014, land previously occupied by a former rail yard and industrial properties were transformed into a major transit hub and a thriving urban district of high rises. In total, this project included:

- A new underground bus terminal with 22 gates
- A new rail terminal with 5 platforms, 8 tracks, no at-grade crossings, and a signature overhead canopy.
- A relocation of the former Union Station light rail line, abandoning half a mile of track.
- 42 acres of new urban developments, including residential and commercial uses.

The project was enabled by federal loans, which are being repaid with the tax revenue from the new urban developments. Revenues have so far exceeded expectations, and the federal debt is now projected to retired **10 years ahead of schedule**.

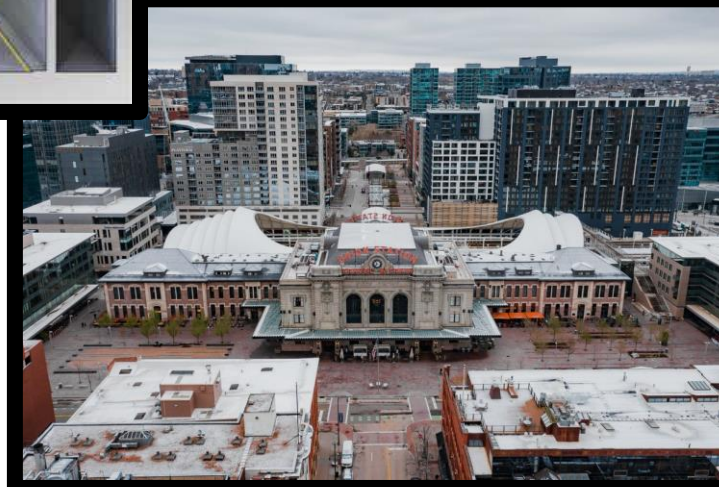


Above: A cross-section view of the renovated Denver Union Station, with train hall, pedestrian mall, urban developments, and the underground bus terminal. The bus terminal is over 120 feet wide, 750 feet long, and approximately 30 feet deep, giving it the same volume as the below-grade rail platforms proposed for the Rio Grande depot in Salt Lake City.



Above: The signature roof over the train hall, which has become a city icon.

Below: The historic headhouse flanked by the residential and office towers constructed over the old rail yards.



Reno, NV

Union Pacific Railroad's busy transcontinental rail route used to run at-grade through downtown Reno, between 3rd Street and Commercial Row. Frequent trains often blocked crossings and effectively divided downtown in two. In 2005, the city opened a new rail route along the same corridor, but in a below-grade 'train box' that passed beneath cross-streets instead of through them. The historic Southern Pacific Railroad depot was also extensively renovated, and a below-grade passenger platform was added in the 'train box'. The project included:

- A 2.25 mile-long trench or 'train box,' 33 feet deep and 54 feet wide.
- Permanent closure of 11 railroad crossings that saw upward of 50 trains a day each.
- 2 new mainline tracks for Union Pacific Railroad, along with an access road through the 'train box.'
- A complete upgrade and renovation of the historic train station, including the foundations.
- Between Western street and Virginia Street, the 'train box' is covered with a concrete roof, which provides space at ground level for a public park and meeting space.



Above: Reno before the grade-separation project, with a freight train blocking multiple crossings.

Above Right: The new below-grade passenger platform at the historic Southern Pacific depot.

Right: Public gathering and green space built over the underground 'train box'.

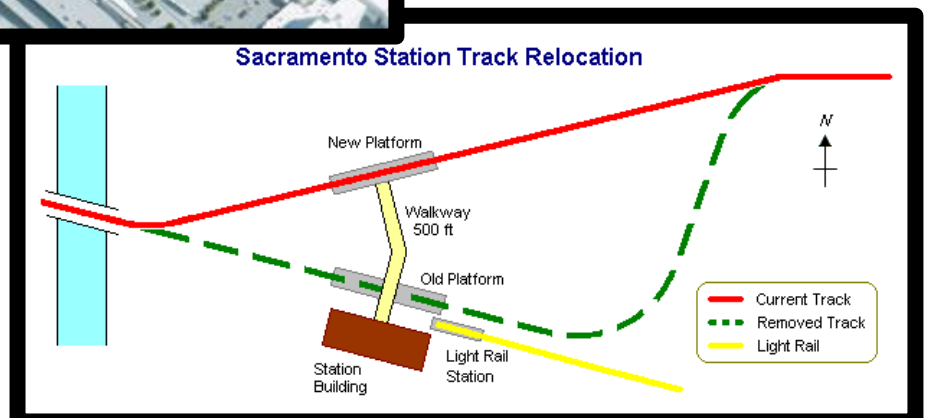
Sacramento, CA

In 2015, Union Pacific Railroad sold its former rail yards in Sacramento, located just north of Old Town. The sale opened up more than 70 acres to new developments, but first a major realignment of the railroad tracks was required. Included in the new route were two new platforms for the Sacramento Valley Amtrak station, which are connected to the historic Southern Pacific depot by an underground walkway.

Future plans for development include an above-grade connection to the platforms with an elevated concourse. This new station will integrate with other new developments under construction in the area.



Above: Rendering of the new rail station and elevated concourse.
Left: Rendering of planned developments (shown in gray) around the new rail station (shown in color).
Below: Detail of the new rail alignment through downtown Sacramento.



Costs and Funding

Costs

At this early stage, there is no detailed cost projection for the Rio Grande Plan. However, it is possible to estimate the total cost of the project based on the comparable projects previously listed.

- The grade separation project in Reno cost ~\$300 million, for a 'train box' that is twice as long as one proposed in the Rio Grande Plan. However, since the planned 'train box' in Salt Lake City is twice as wide, the ~\$300 million total cost should be comparable.
- The final cost of Denver's Union Station's renovations was \$500 million. This included the restoration of the historic headhouse, removal and reconstruction of light rail tracks, construction of an underground bus terminal, and construction of an entirely new train hall. \$300 million dollars of this total came from federal loans, while the remaining \$200 million was provided locally.

It is anticipated that the total cost of the Rio Grande plan will fall between these two values – \$300-\$500 million – depending on specific design decisions. It is also important to consider some of the main factors that will keep project costs low:

- By building new rail infrastructure in a new ROW, the **current infrastructure and transit operations will not be disrupted during construction**, minimizing delays and remediations.
- Due to the width of 500 West and the lingering remnants of former rail ROW, **no private property will need to be acquired** along 500 West.
- The Rio Grande plan fits in with existing infrastructure. Though this plan will enable freeway ramps to be shortened or realigned, **no ramps, bridges, or major roads will need to be altered**.
- The Rio Grande depot itself has been well preserved by the State of Utah, and **will not need significant upgrades** in order to handle the anticipated passenger demands.

Funding

Funding for the project will come from a variety of sources:

- A special tax district that will be created to capture value from the new developments, comparable to the successful Denver Union Station redevelopment project. A similar funding plan is under consideration for future railyard redevelopments near Union Station in Ogden.
- Union Pacific railroad, which will benefit enormously by closing its at-grade crossings in Salt Lake City. Other railroads that use Union Pacific's tracks – such as the Utah Railway, BNSF Railway, Amtrak, or the Salt Lake Garfield and Western Railroad, will also be invited to contribute.
- The Utah Department of Transportation, which has jurisdiction over all at-grade crossings in the state of Utah. Since 2012, UDOT has completed four grade-separation projects in Orem, Salt Lake City, and Clearfield, averaging around \$70 million per bridge. **By contributing to the Rio Grande project, UDOT will save money compared to grade-separating each crossing individually.**
- The Federal Government, which has contributed significantly to past projects, such as UTA's rail and bus expansions, UDOT's grade separation projects, and the original creation of Salt Lake Central Station in 1999.

In summery, funding the Rio Grande Plan will be similar to other current infrastructure projects, such as the Highway 89 Widening Project (\$489M), the Mountain View Corridor (~\$400M per segment), the West Davis Corridor (\$725M), and the I-15 Tech Corridor (\$415M). The Rio Grande Plan will make use of current funding mechanisms and will not require new taxes, special provisions, or new debt to any participating organization.

Conclusion

Restoring rail service to the historic Rio Grande depot is not only technically feasible, but also extremely beneficial:

- The safer design of below-grade tracks will save lives and prevent gridlock.
- The new rail station will have a higher capacity than the current Downtown station.
- The 52 acres of newly open land is equivalent to over 5 city blocks, and will provide room for tens of thousands of people to live and work in Downtown Salt Lake City.
- A more central location for Downtown's rail terminal will result in more pedestrian activity, particularly on 300 South.
- Without the rail yards in the way, Downtown will become better connected to the West Side, Poplar Grove neighborhood, and the Jordan River.
- The new station will become an icon of Salt Lake City, the Wasatch Front, and the State of Utah.

The solutions presented in this Rio Grande Plan have all been successfully employed in other locations – particularly in neighboring states. Salt Lake City is not alone among western cities seeking to modernize their downtowns – but it is so far alone in ignoring the potential of its historic train station.

As the population of Salt Lake City continues to rise – and as more workers commute into downtown every day – the infrastructure of the city must grow to keep up. The current Salt Lake Central Station was a good first-draft, but it will take many tens – if not hundreds – of millions of dollars to upgrade it to handle the anticipated passenger demand. Salt Lake City has an opportunity to build anew, and prepare itself for the near future when trains run more frequently, service more destinations, and carry vastly more people downtown than they do today. By adopting the Rio Grande Plan, Salt Lake City can reconnect with its past, improve its current infrastructure, and position itself for the future as the unrivaled hub of innovation and prosperity in the mountain west.

- Christian Lenhart, PE & Cameron Blakely ASLA

