UNIVERSITY OF TEXAS AT AUSTIN

COMMUNITY AND REGIONAL PLANNING

GETTING ON TRACK:

Optimizing Rail for the Austin-San Antonio Megaregion

Spring 2023

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i. Course Introduction

This report was prepared by students in the Community and Regional Planning master's program within the School of Architecture at the University of Texas at Austin. As part of the core curriculum, students enroll in a Planning Practicum, which is the program's equivalent to a studio. The Planning Practicum is a project-based research course where students apply learned skills to real-world planning problems, often partnering with a client. The objective of this practicum is to use theories, methods, and techniques learned from prior courses to analyze practical solutions for infrastructure development. By assessing existing case studies, projecting market demand, and evaluating policy and plan alternatives, the students should be able to deliver products of professional quality on planning for passenger rail success. This course was a six-hour course offered over two semesters.

In the Fall 2022 semester, the Intercity Passenger Rail Planning Practicum developed a baseline understanding of opportunities and barriers to developing intercity passenger rail and high-speed rail in the United States. After conducting research on international and domestic case studies and identifying why the U.S. is behind other developed countries, the students applied these findings to a local case study: the Austin-San Antonio rail corridor, formerly known as Lone Star Rail. By the end of this semester, a Strengths, Weaknesses, Opportunities, and Threats analysis was presented to the course advisors. In the Spring 2023 semester, the students developed a series of recommendations for developing the corridor for passenger rail and positioning it for success. This report describes these recommendations in detail.

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iii. Acknowledgements

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iv. Executive Summary

Austin and San Antonio are among the nation's largest and fastest-growing cities. Much of their growth and economic success is attributable to their location along major rail infrastructure. A large workforce, cheap land, and easy access to ports and customers have always made Texas an attractive place to do business. Today, 48% of NAFTA trade moves through the I-35 corridor[10]. Just as the freight industry was instrumental in the foundation and growth of Austin and San Antonio, so too will they be in serving the emerging Austin-San Antonio Metroplex.

While proximity to rail infrastructure was crucial to the growth of these cities, the region's rapidly growing population, as well as recent catastrophes involving freight rail derailments and resulting hazard material spills, have once again brought into question the suitability of freight routes near major population centers.

Widespread shortages, delayed production, and decreased capacity during the COVID-19 pandemic also highlighted the weaknesses of global supply chains. Therefore, in addition to already increased local economic development, North American cities, particularly those proximate to Mexico, are also seeing a re-domestication of manufacturing activity. All these factors create a busy and growing trade corridor that is also increasingly population dense.

Equally as important, population growth in the Central Texas region has led to more cars, longer commutes, and more pollution throughout a densely populated and environmentally sensitive area. Each of these contributes to climate change and threatens the natural environment of Central Texas. Residents relocate to the areas between Austin and San Antonio to escape higher housing prices and to have increased access to both cities, but the further suburbanization of these areas increases highway demand and commute times for Central Texans. While leaders work to improve connectivity in the region by measures such as TXDOT's Capital Express project, such measures increase highway capacity but will not fix traffic as the region continues to grow.

Currently, most Texans must drive an automobile, as it is the only certain way to get around and between Texas cities. Alternative options are unreliable, inconvenient, or do not address the problems we need to solve. We also must move more people more efficiently and produce less carbon emissions to respond to climate change.

Texas cities have increasing global importance as economic centers and should offer transportation options on par with cities of similar status. Both nationally and internationally, residents of major cities have dependable commuter and, in the international context, high-speed rail options to travel between destinations. Texas has formidable institutional and economic power, a strong workforce, and a demonstrated demand for similar services.

Past efforts to connect Austin and San Antonio, such as Lone Star Rail, failed because they have treated the endeavor as one project to create reliable passenger rail service

between these cities. We instead propose two projects to optimize freight and passenger rail between Austin and San Antonio.

Freight operations should relocate farther east and be equipped with safety upgrades to minimize the likelihood and impact of derailments as well as preserve the Edwards Aquifer zone, and residents of Austin, San Antonio, and the connecting communities should have more sustainable options which are mutually dependent on the other's success.

Rural stakeholders to the east are already at risk of development and speculation pressure as manufacturing firms continue to show interest in the region. As such, any project must also account for the power and needs of these landowners and others, engage them respectfully, and compensate them appropriately.

Over the past fifty years, residents, industry leaders, developers, and local officials throughout the area have demonstrated repeated interest in dependable and high-quality passenger rail in Texas. The failure of these initiatives has been largely attributable to lack of vision or political will to identify a revenue source, lack of consistent leadership, and partisan interest. The expansion of freight will expand and connect the economies of the Austin-San Antonio metroplex, and its relocation to the east will provide an opportunity to future-proof and limit chances for freight derailment. The introduction of reliable and attractive passenger rail will mitigate increasing commutes in the growing region.

The following report serves as a starting point for local and regional stakeholders as well as those of communities with similar needs. The **Bluebonnet Bypass** and the ***Bluebonnet Express*** will improve Central Texans' quality of life, facilitate more sustainable growth in the region, and help support the emergence of the Austin-San Antonio metroplex.

v. What this report won't cover and why

This report will provide recommendations for advancing better freight and passenger rail options in Central Texas and suggest ways to overcome challenges faced in previous efforts to implement high performance passenger rail in Texas. These include political, systemic, land use and financial barriers. In this report, we will identify potential supporters for the two separate but related efforts: relocating Union Pacific's freight line to a more optimal corridor and developing a new passenger line connecting Austin and San Antonio, as well as potential entities to govern the project. These proposed champions and entities are not confirmed candidates for assuming the responsibility. Rather, this report will address the current political environment, identify key players, and suggest best practices for navigating the political climate.

This report will estimate total project costs by looking at the cost per mile of peer projects and applying that to the estimated mileage of the new Union Pacific route and the passenger line. For the sake of better understanding the benefits received from both the relocation of freight and the implementation of highly efficient passenger rail, some of the benefits have been quantified to reflect cost savings from each benefit. However, we acknowledge that the model from a 2008 study included its own data gaps and our calculations may not represent accurate cost savings estimations. The report still showcases these estimates to give an idea of the magnitude of potential savings. This report will not cover operating and maintenance costs, nor will it cover run times and ticket sale estimations. While figuring out O&M and ticket sales are integral to the long-term success of the project, this report is concerned with the upfront capital costs.

Additionally, there will be multiple route options suggested for moving the Union Pacific freight line farther east. Although each alignment alternative has been carefully thought through, there will not be any engineered drawings that include exact mileage and technical specifications because we are not concerned that any technical design challenges stand in the way of these projects coming to fruition. We are focused on the political and economic support needed to get this done. Once support for the project and funding challenges have been overcome, engineers will be able to configure the route regardless of who will govern the project, who will pay, and which route proceeds to project development.

1. History

1.1. Freight Line History

The Austin-San Antonio corridor owes much of its economic growth to the Union Pacific Railroad (UP), which facilitated trade and access not only between the two cities but also throughout the wider Texas region. The rail line between Austin and San Antonio was originally established by the International-Great Northern Railroad (IGN) in the 1880s and was later acquired by the Missouri Pacific Railroad (MP) in the early 1920s.[1] MP continued to operate the line until it merged with UP in 1982, and UP still operates the line today as part of its Sunset Route, which is a major rail corridor linking the Gulf Coast with Southern California.[2] Today, this corridor is an integral part of freight transportation in the Texas Triangle, and even acts as an international access point, with companies taking advantage of NAFTA to move goods from Mexico through Texas to customers across the U.S. and Canada.

1.2 Freight Rail Safety Deregulation

The national deregulation of freight safety requirements over the last century has been a contentious issue. Proponents argue that deregulation has led to increased competition, lower costs, and greater efficiency, while critics argue that it has led to lower safety standards and increased risk for workers and the general public. One of the key deregulatory efforts in the railway freight industry was The Staggers Rail Act of 1980, which Congress passed in response to declining profits and increasing bankruptcies in the industry. The act removed many of the regulatory restrictions on railroad rates and services.[3]

Furthermore, the Trump administration rolled back many safety regulations in the name of increased competition and lower costs. One such effort was the repeal of the Federal Railroad Administration's regulations on electronically controlled pneumatic (ECP) braking systems in 2019.[4] These regulations had been proposed in 2015 to improve safety in the transport of hazardous materials. Another key deregulation effort was the reduction of certain reporting requirements for railroads under the Federal Railroad Administration's Safety Data Reporting rule.[5] In 2017, the Trump administration announced that it was reducing safety audits and vehicle brake standards for trains with hazardous materials arguing that the rules had become overly burdensome and were not providing significant safety benefits.[6]

[1] Werner, "Missouri Pacific System."
[2] Werner.
[3] Vuchic, *Urban Transit Systems and Technology*.
[4] Federal Railroad Administration, "Electronically Controlled Pneumatic Brake Systems."
[5] Lowy and Krisher, "AP Exclusive: Transport Safety Rules Rolled Back under Trump."
[6] Duncan, "Transportation Department CementsTrump Adiminstrations Deregulatory Policies with a 'Rule on Rules.'"

Many industry experts have suggested that the recent lack of oversight has directly led to a higher risk of accidents, including derailments and collisions, which have had serious consequences for both workers and the general public. This has led to public outrage in recent months, as multiple high-profile derailments have caused serious public health and environmental damage.

1.3 Texas Context

Texas lags behind other states when it comes to the development of passenger rail for several reasons. One of the primary reasons is the lack of clear goals and initiatives for passenger rail at the federal level. Unlike many other developed countries, the United States has historically prioritized government investment in highway and air travel over passenger rail. The federal government's role in funding and regulating passenger rail has been limited, leaving states and private entities to bear most of the responsibility. While there have been some efforts to promote passenger rail at the federal level, such as the creation of Amtrak in 1971, these initiatives have not been enough to create a comprehensive passenger rail system. This, combined with Texans' affinity towards the automobile and the Texas Legislature's conservative bent, has made it difficult to create passenger rail within the state.

1.4 Regional Growth

According to a study by the Austin-San Antonio Corridor Council, the population of the region grew from 1.2 million in 1980 to 4.3 million in 2010, representing a 258% increase over three decades.[7] The significant growth experienced in industries such as technology, healthcare, and education has attracted a highly educated and skilled workforce that in turn attracts additional jobs and investment in these industries.[8] In addition, the region's access to major transportation routes, such as I-35 and the Union Pacific railroad line, has made it an attractive location for businesses seeking access to markets across the United States and even into Mexico. Investments in transportation infrastructure, including highways, railroads, and airports, have helped to facilitate the movement of people and goods in the region. Finally, investments in education and healthcare infrastructure have helped to retain its highly educated workforce.

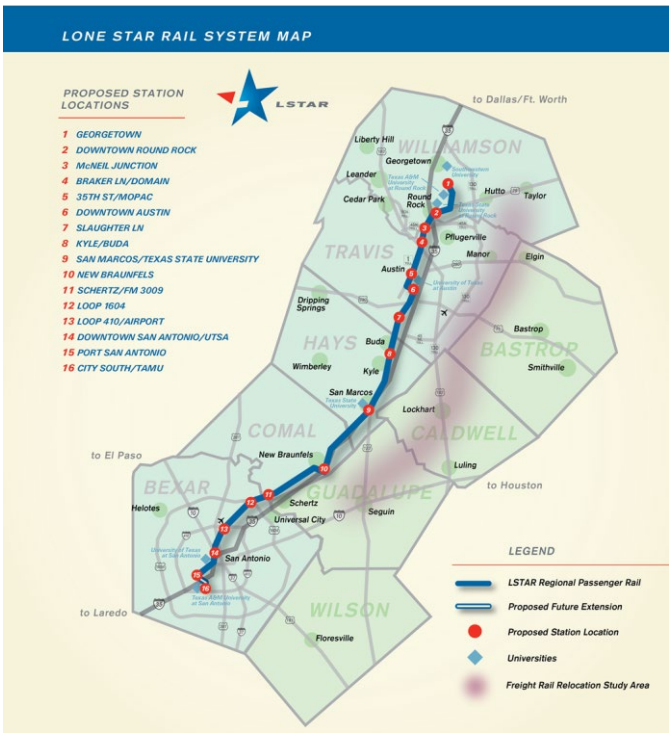
[7] Salinas, "Austin-San Antonio Transportation Study : Mobility Strategies in the Central Texas Corridor."
[8] Cisneros et al., *The Texas Triangle*.

1.5 Past Efforts

1.5.1 Lonestar Rail Effort

Lone Star Rail was a proposed passenger rail line intended to serve the San Antonio-Austin corridor by connecting both cities with commuter rail. The project was spearheaded by the Lone Star Rail District (LSRD), a regional transportation authority that was created to plan and implement the rail line. The dissertation by Dr. Robert Andrews entitled "The Demise of the Lone Star Rail District: A Case Study in the Failure to Expand Passenger Rail Service in Texas," cites seven key reasons for the project's failure:[9]

Figure 1: Lone Star Rail Alignment (Source: City of Austin)



1. **Lack of political will:** The project lacked the necessary political support and vision from local, state, and federal officials to make it a reality.
2. **Funding challenges:** The project was unable to secure sufficient funding from local, state, and federal sources to finance the construction and operation of the rail line.
3. **Opposition from freight rail companies:** The project faced significant opposition from freight rail companies, who did not want to share their tracks or compromise their operations for passenger rail service.
4. **Limited public support:** The project failed to generate widespread public support due to a lack of public awareness and outreach efforts.
5. **Complexity of governance and coordination:** The project involved multiple jurisdictions, agencies, and stakeholders, which made it difficult to coordinate and manage effectively.
6. **Changes in the transportation industry:** The transportation industry was undergoing significant changes, including the rise of ride-sharing and autonomous vehicles, which made the rail project less attractive to investors and policymakers.
7. **Lack of a clear and compelling business case:** The project failed to make a clear and compelling case for why passenger rail service was necessary or economically viable for the region.

[9] Andrews, Jr., "The Demise of the Lone Star Rail District."

Figure 2: Texas Central Alignment (Source: KBTX)

Overall, the failure of the Lone Star Rail project demonstrates the challenges of implementing large-scale transportation infrastructure projects, particularly when faced with political opposition, funding challenges, and organizational issues.

1.5.2 What Has Changed Since Lone Star Rail?

Since the failure of the Lone Star Rail project, there have been some key changes in the political and social environment related to building a passenger rail line in the San Antonio Austin corridor. These differences include a growing support base, additional funding sources, an evolving transportation landscape, and an increased awareness of environmental concerns.

In recent years, there has been growing support for building a passenger rail line between San Antonio and Austin. This support has come from a variety of groups, including business leaders, environmental advocates, and transportation practitioners. This growing support may help to overcome some of the political opposition that doomed the Lone Star Rail project. Unlike the Lone Star Rail project, which had limited access to federal funds, a current passenger rail project could access the $32B available to passenger rail development as a result of the Consolidated Rail Infrastructure and Safety Improvements (CRISI) program, the Railroad Rehabilitation and Improvement Financing (RRIF) program, and the Transportation Infrastructure Finance and Innovation Act (TIFIA) program. Together these provide powerful funding sources to help provide the necessary financing.

Furthermore, the transportation landscape in Texas has evolved in recent years, with population booming and I-35 congestion worsening. As the regional population growth is projected to continue to rapidly expand, transportation alternatives are becoming increasingly sought after by local governments hoping to move away from an unsustainable status quo. A passenger rail system between the two cities would be a sustainable way to relieve some of this transit pressure currently building in the region.

Finally, there is a need to reduce carbon emissions and address climate change, which may make a passenger rail line a more attractive option for policymakers and the public. In addition, the recent freight train derailments have incentivized people to imagine other uses for freight rail corridors in high population areas.

Overall, while there are still significant challenges to building a passenger rail line between San Antonio and Austin, these key differences in the political and social environment make such a project much more feasible than it was during the Lone Star Rail era.

1.5.3 What Central Texas Can Learn from Texas Central

The Texas Central high-speed rail project was a proposed 240-mile high-speed rail line that would connect Dallas and Houston. This project was first proposed in 2012 and was spearheaded by a private company, Texas Central Partners. Despite facing significant opposition from lawmakers and landowners along the proposed route, the project received several key approvals, including a draft environmental impact statement from the Federal Railroad Administration in 2017,[10] and the powers of eminent domain granted by the Texas Supreme Court in 2022.[11] Unfortunately, this project ultimately failed due to its refusal to pursue public subsidies, stark opposition from ranchers, and a costly eminent domain process.

. In 2017, the project costs were estimated to be $12 billion. Texas Central was sure that no public subsidy would be needed and that the taxpayer dollars would not be used. They believed that major institutional investors throughout the country were hungry for infrastructure assets, therefore planned to get one-third of the funds from private investors and two-thirds of the funds from debt.[12] Texas Central claimed they had raised $450 million in private funding, with $300 million of that a loan from the Japanese Bank for International Cooperation. Texas Central planned to use ticket sales and smaller side revenues (station parking fees and concessions) to pay for O&M costs. With an expected ridership of 5 million people per year, and an expected increase to 10 million people within 25 years, Texas Central expected to raise enough in ticket revenues to fully finance the project.[13] Critics immediately pointed out that very few rail lines in the world are profitable from ticket sales alone and most receive significant public subsidy. One contrary argument worth noting is that private investors, especially when investing such large sums of money, will want to make sure the numbers are exactly right to make their investment worth it.

However, the project faced a major setback when Texas Central Partners announced that it was suspending all development activities due to financial challenges. The company cited difficulties in securing the necessary funding to complete the project, which had increased to cost around $20 billion. Although Texas Central won their case in the Supreme Court, litigation costs drained the company. In addition, landowners remained concerned about the potential impact of the high-speed rail line on property values and the environment. Finally, the lengthy NEPA process took much longer than initially estimated, largely due to the project's lack of clear project definition. While the Texas Central high-speed rail project was initially seen as a promising development towards sustainable regional transportation in Texas, it faced significant financial and political challenges that ultimately led to its suspension.

[10] Garnham, "High-Speed Train between Dallas and Houston Gets Federal Approval."
[11] Nair, "Texas Supreme Court Upholds Texas Central Right to Eminent Domain Power."
[12] Cowan, "How to Pay for a $12 Billion Bullet Train without Asking Texas for Money."
[13] Texas Central, "The Project."

2. The Problem & The Opportunity

2.1. Freight Rail in Cities: Clear and Present Environmental Dangers

2.1.1. Climate Change Considerations

The clear and present danger that exists within the Austin-San Antonio megaregion travel corridor is two-fold. First, the climate change crisis caused by the emission of greenhouse gases into the atmosphere requires immediate action to reduce emissions as much as possible. This includes reducing emissions from personal vehicle transportation and freight movement from trucking, since the transportation sector accounts for 30% of the energy-related carbon dioxide emissions in Texas.[14] A more efficient and sustainable form of transportation is necessary to mitigate the repercussions of climate change. According to the European Environment Agency,[15] rail is among the most efficient modes of both passenger and freight transportation.

2.1.2. Hazardous Freight Derailments

Figure 3: East Palestine Chemical Burn after Norfolk Southern Derailment (Source: NPR)

[14] U.S. Energy Information Administration, "Energy-Related CO2 Emission Data Tables."
[15] European Environment Agency, "Energy Efficiency."

The second present danger is the freight derailments that have been brought to national attention recently. In particular, the hazardous material train derailment in East Palestine, Ohio has underscored the need to improve freight rail safety. This incident, which occurred February 3, 2023, released hazardous materials into East Palestine's air, soil, and surface waters.[16] The hazardous materials included vinyl chloride, butyl acrylate, ethylhexyl acrylate, and ethylene glycol monobutyl ether, which are flammable gasses and combustible liquids that are known to be toxic.[17] The derailment in East Palestine and subsequent exposure of residents to hazardous materials has galvanized bipartisan support of legislation like the Railway Safety Act and RAIL Act that would strengthen the safety requirements of trains carrying hazardous materials.

Freight rail is by far the safest land-based method of transportation for hazardous material when compared to truck transport.[18] In 2022, there were 23,189 highway hazardous material incidents reported to the U.S. Bureau of Transportation Statistics, while rail only had 356 reported hazardous material incidents.[19] Despite rail's relative safety, derailments and accidents do occur and have potential for disastrous environmental, health, and social impacts on communities. In the East Palestine area, hundreds of residents were forced to evacuate their homes and businesses while responders managed the controlled release of toxic materials via fire. When given the safety clearance to return home, many concerns arose and have persisted. Uncertainty regarding issues such as health problems, water quality, food safety, and home values shook the community.[20] It is not difficult to envision how much more these issues would be exacerbated in the case of a hazmat train derailment in the Austin or San Antonio metropolitan areas, which contain over two million people each.[21]

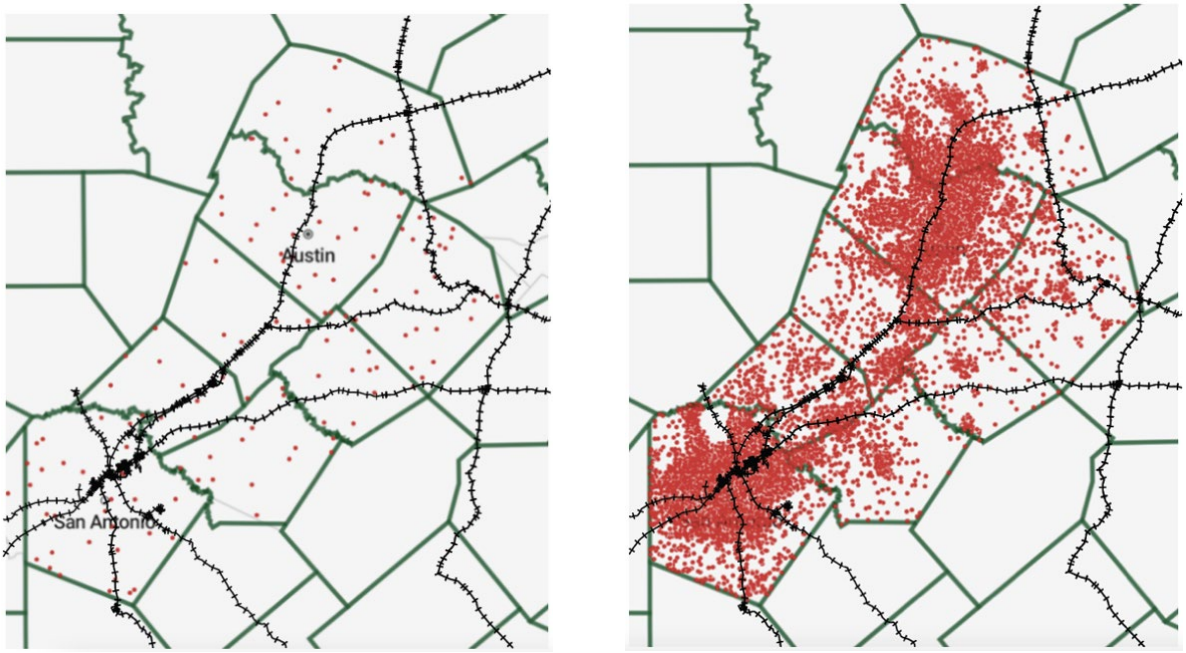
While the exact materials and quantities of hazardous materials that travel along the Austin-San Antonio Corridor are not readily accessible due to security concerns, the possibility of an accidental hazmat release on the rail route makes millions of people, along with sensitive aquifer recharge areas, vulnerable to hazmat exposure. The solution to the twofold problems described here is to first relocate freight rail away from areas of dense population by constructing new tracks with state-of-the-art safety features to the east of the existing line. This strategy is not novel and has been studied by numerous parties, including TxDOT in the early 2000s. Secondly, the old UP line, which lies along the heavily traveled I-35 route between Austin and San Antonio, could be utilized for passenger rail. Under this proposal, the efficiency of rail could be realized for the movement of both goods and passengers.

The Austin-San Antonio regions have seen immense growth and significant changes over the decades, making the highway between them insufficient for daily traffic. Likewise, the development and density of the region has changed to the point that the rail line originally built in the 1870s[22] is no longer best suited for freight rail. Instead, because of the number

[16] El-Zein, "Norfolk Southern East Palestine Train Derailment General Notice Letter."
[17] US EPA, "TRAIN 32N - EAST PALESTINE - Derail List Norfolk Southern Document"; Fortin, "Ohio Train Derailment."
[18] Federal Railroad Administration, "Hazardous Materials Transportation."
[19] US DOT, "Hazardous Materials Fatalities, Injuries, Accidents, and Property Damage Data."
[20] Hauser, "After the Ohio Train Derailment."
[21] Thompson, "Report."
[22] Texas Transportation Museum, "History (Railroad Overview)."

of daily vehicle trips between Austin and San Antonio, the highest and best use for the rail line now appears to be passenger rail transportation.

Figure 4: Central Texas population 1870 (left) and 2020 (right). Each dot represents 500 residents. (Source: Social Explorer)



2.2. Future Problems

2.2.1. Regional Growth

The Austin - San Antonio region's growth of 3% year over year has meant that infrastructure development has not been able to keep pace. This excessive growth has led to increased demand for housing, transportation, and other infrastructure, which has in turn contributed to the expansion of the region's urban footprint. As of 2020, the region was home to 4.3 million people. According to the Greater Austin - San Antonio Corridor Council, this number is expected to double by 2030, with most of the growth occurring in suburban areas.[23]

The main drivers of sprawl include the vast expansion of roads, auto-dependent zoning practices, and the high cost of development in city centers. As reported by the Austin American-Statesman, the region's public transportation systems have struggled to keep up with the growing demand, leading most residents to rely on cars as their main transportation mode.[24] According to 2020 ACS data, San Antonio has a high rate of car ownership, with over 95% of households owning at least one car.[25] This has contributed to the expansion of the suburbs and the proliferation of car-centric development patterns.

[23] Gore, "Honk If You Agree."
[24] The Greater Austin - San Antonio Corridor Council, "About Us."
[25] Data USA: San Antonio, "San Antonio, TX | Data USA."

Another factor contributing to urban sprawl in the region is zoning policy. Austin's zoning policies allow for low-density, single-family homes to be built on large lots. This has led to a fragmented and auto-dependent urban landscape. As Bloomberg reports, despite efforts from the Austin City Council to promote more compact and walkable communities by trying to update the city's zoning code, opposition from some neighborhood groups remains a significant barrier to sustainable growth.[26] In addition, the availability of cheaper land on the outskirts of both Austin and San Antonio has enabled developers to build housing and commercial complexes on large tracts of land outside of the city centers, which has led to the proliferation of low-density, car-dependent development patterns. As the San Antonio Express-News reported, urban sprawl has been creeping around the edges of city-owned natural areas, as depicted in**Error! Reference source not found.**.[27] Despite its efforts, San Antonio does not have a coherent long-term plan to protect its natural habitats. Overall, while this growth has brought economic benefits to the region, it has also contributed to a range of social and environmental challenges, including congestion, housing unaffordability, pollution, and loss of natural spaces.

Figure 5: Development encroaching natural landscape in San Antonio (Source: expressnews.com)

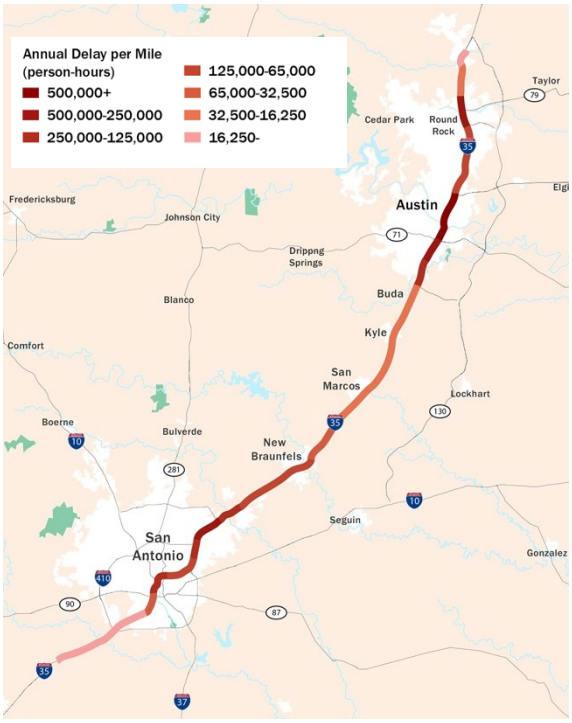
[26] Kimble, "Desperate for Housing, Austin Seeks Relief in Rezoning."
[27] Tedesco, "Urban Sprawl Encroaching on San Antonio's Untouched Natural Areas."

2.2.2. Congestion on Interstate Highway 35

About 48% of U.S. NAFTA products are transported through Texas using the I-35 corridor.[31]

Interstate 35 (I-35) is the only major throughway connecting Austin and San Antonio and other smaller cities along the way. The highway has become increasingly congested in recent years as the population grows. Historically, for each 1% increase in population, there is a 3-4% increase in traffic on I-35.[28] According to a Texas A&M Transportation Institute report, the segment of I-35 that goes through Downtown Austin was the third most congested roadway in the state and the most congested road overall for trucks in Texas.[29] This costs drivers $203.5 million in annual congestion and an average delay of 32 minutes per trip during peak hours.[30]

Figure 6: I-35 congestion (Data source: Texas A&M Transportation Institute)



About 48% of U.S. NAFTA products are transported through Texas using the I-35 corridor.[31] Congestion in the Austin – San Antonio stretch has a significant economic and environmental impact on businesses and communities due to increased travel times, wages, and fuel consumption. Additionally, the high traffic volumes can contribute to air pollution and other environmental concerns, as well as an increased risk of accidents and injuries.

To address congestion on I-35, efforts to expand and modernize the highway are underway. However, this would only solve the problem temporarily because of the induced demand phenomenon. Induced demand happens when we add lanes to alleviate congestion on a road. Congestion will be reduced temporarily; however, additional traffic will feel incentivized to use the expanded highway, and the congestion will return. Other efforts, such as commuter rail and bus rapid transit, were proposed, yet these face significant funding and political challenges.

[28] The Greater Austin - San Antonio Corridor Council, "About Us."
[29] Texas A&M Transportation Institute, "Texas' Most Congested Roadways - Mobility Division."
[30] Texas A&M, "Texas' Most Congested Roadways — Mobility Division."
[31] The Greater Austin - San Antonio Corridor Council, "About Us."

2.2.3. Existing Amtrak Services

Amtrak provides once-daily passenger rail service between Austin and San Antonio as a segment along its long-distance route, the Texas Eagle. It is an alternative to driving or taking a bus along I-35, but it does not maintain a reliable schedule. Therefore, Amtrak is not a reliable alternative for everyday trips. In large part because Amtrak uses the existing Union Pacific tracks and must yield to the schedule needs of freight operations, Amtrak experiences delays of an hour or more about 70% of the time.[32] The service operates one train traveling northbound from San Antonio to Austin in the morning (7:00 am) and one train traveling southbound from Austin to San Antonio in the evening (6:30 pm). The train makes a stop in San Marcos before arriving in San Antonio. Several amenities are available for the trip, such as sleeper cars with different accommodation options, restrooms, and a dining car. The price of a one-way trip starts at $8 and varies as demand increases and the date approaches.

Table 1: Existing Station Conditions

Station	Taylor	Austin	San Marcos	San Antonio
Centrally Located	✓	✓	✗	○
Multimodal Connectivity	✗	○	✓	○
Shelter/Building	Shelter	Building	Shelter	Building
Ticket Counter/ Kiosk	✗	✓	✗	✓
Bathroom	✗	✓	✓	✓
Wifi	✗	✗	✗	✗
Vending Machines	✗	✓	✓	✓
Cafe	✗	✗	✗	✗
Nearby Amenities	✓	✗	✗	○
✓ = present ✗ = absent ○ = present to a degree				

The service between Austin and San Antonio faces several challenges stemming from unpredictable access to the tracks. Passenger trains take second priority to UP freight

[32] Wear, "Amtrak Ridership in Austin Slips the More Economy Improves."

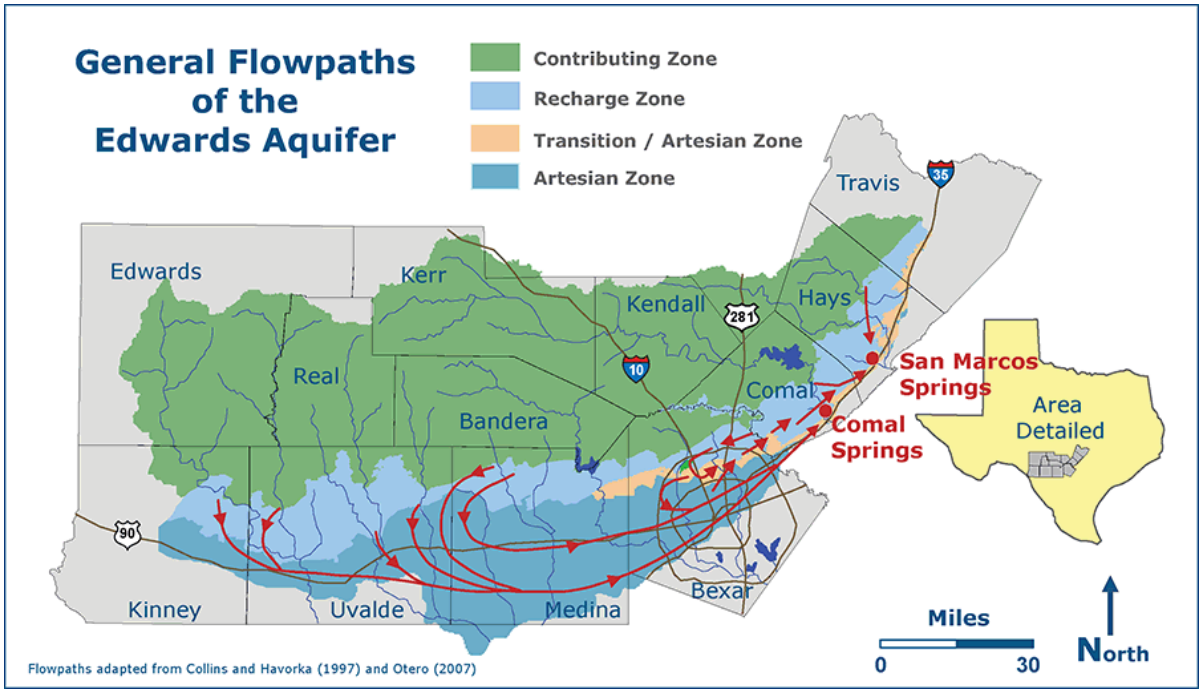
trains in the corridor, even though legislation exists to counteract this. The Amtrak Improvement Act of 1973 mandated that intercity and commuter passenger operators should have priority access over freight trains who share the same line. Yet, this law is often ignored by the railroads as it is difficult for Amtrak to enforce it.[33] Freight trains also set the travel speed in the corridor, as UP trains travel at an average of 35 mph. These slower speeds dramatically increase trip times for Amtrak, which takes 2.5 hours in the morning and 3.5 hours in the evening to make the 74-mile trip between the two cities. In comparison, it takes 1.5 to 2 hours to drive on I-35 the same distance when there is no traffic.

There are four existing stations along the Austin – San Antonio corridor: Taylor, Austin, San Marcos, and San Antonio. Not all these stations are equipped with essential amenities such as multimodal connectivity, ticket service, bathrooms, or spaces to purchase food, and none of the are equipped with Wi-Fi, as shown in Table 1. Only the San Antonio and Austin stations have actual buildings, but these are not accessible or safe for passengers. The stations are not leveled with the train's doorways; passengers must step up and down to get on and off the train cars. There are also no barriers to prevent passengers from getting on the tracks. Overall, the Amtrak stations in the Austin-San Antonio corridor lack features of an inviting transit station experience.

2.3. Cost of Doing Nothing

2.3.1. Risk to Drinking Water

Figure 7: General Flowpaths of the Edwards Aquifer (source: Gregg Eckhardt, The Edwards Aquifer Website)



[33] Amtrak, "Freight Delays and Your Amtrak Service."

The current Union Pacific alignment through the Austin-San Antonio corridor traverses the Edwards Aquifer Region. Preservation of the Edwards Aquifer is a vital environmental concern. The aquifer feeds the many lakes, rivers, and springs that in turn support plants and wildlife native to Central Texas.[34] Our water resources also significantly contribute to the quality of life for the many Central Texans who pass hot summers floating, boating, fishing, and swimming in the region's bodies of water. In addition to environmental and recreational importance to the region, the Edwards Aquifer supports municipal, industrial, and agricultural uses.[35] In short, the most important function of the Edwards Aquifer is its role in the sustenance of Central Texas residents and the successful operation of municipal services and the regional economy. The Biden Administration's focus on the expansion of rail and the documented tragedies befalling communities located along freight service lines (most recently in East Palestine, OH) have prompted a much-needed renewed interest in the role of rail infrastructure and necessary safety regulations in the emerging Austin-San Antonio metroplex.[36] Hazardous material in or near the Edwards Aquifer zone introduces the significant threat of groundwater contamination.[37] If the Aquifer is compromised, it will impact access to drinking water. Allowing hazardous materials to move through densely populated and environmentally sensitive ecosystems, particularly those possessing a resource which serves as the main source of drinking water for millions of residents – including those of the City of San Antonio – is irresponsible, negligent, and a failure of stewardship of public resources.

2.3.2. Injury, Chronic Health Conditions, and Death

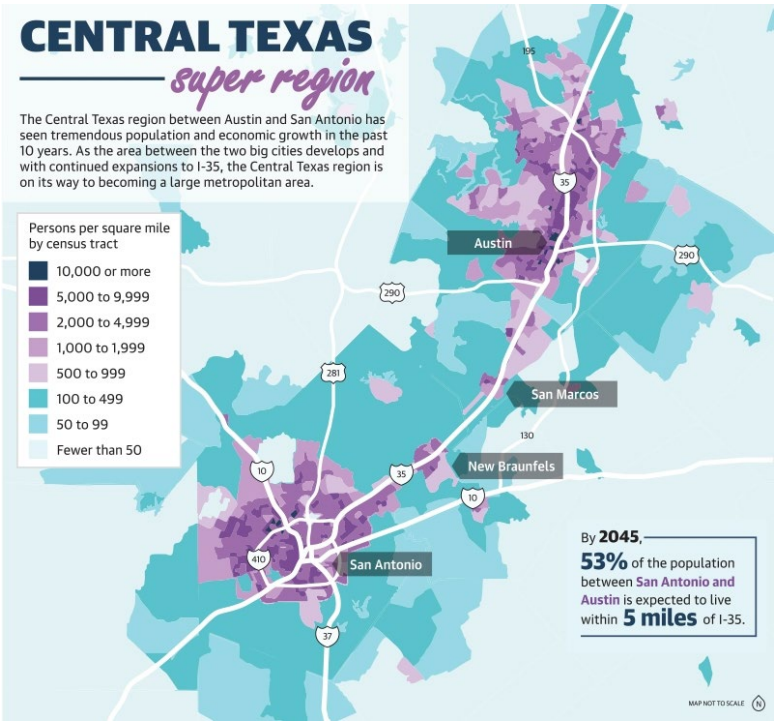
Around 66.2% of Austin commuters and 74.6% of San Antonio commuters drive alone.[38] Thus, as the populations of San Antonio and Austin grow, so too will the number of commuters. Proximity to highways and prevalence of vehicular use is linked to exposure to carcinogens and damage to the neurological, cardiovascular, respiratory, and immune systems.[39] Offering Central Texans a high quality of life also requires consideration of residents' air quality and other factors that may compromise human health. Reduction of vehicle trips would decrease auto emissions and toxins but also the number of accidents that occur on congested roadways. The cost of these accidents includes more time spent in traffic and higher insurance premiums as well as the unquantifiable loss of community members.

[34] "Edwards Aquifer Protection | The Nature Conservancy."
[35] "Regulatory History of the Edwards Aquifer"; "Edwards Aquifer Protection Program."
[36] "Biden-Harris Administration, USDOT Make an Unprecedented $1.4 Billion in Rail Grants Available Through Bipartisan Infrastructure Law | FRA"; Parsons, "EPA Takes Over Ohio Rail Spill Cleanup"; El-Zein, "Norfolk Southern East Palestine Train Derailment General Notice Letter."
[37] "Human-Caused Disasters and Their Associated Hazards"; Idaho Washington Aquifer Collaborative, "Emergency Planning for Aquifer Protection"; U.S. Geological Survey and San Antonio Water System, "Vulnerability of Ground Water to Contamination, Edwards Aquifer Recharge Zone, Bexar County, Texas, 1998"; Zappitello, Johns, and Hunt, "Summary of Groundwater Tracing in the Barton Springs Edwards Aquifer from 1996 to 2017."
[38] U.S. Census Bureau, "Table S0801 - Commuting Characteristics by Sex."
[39] Burns and Cornelius Brown, "Does Your Commute Impact Your Health?"; Health Effects Institute, "Traffic-Related Air Pollution: A Critical Review of the Literature on Emissions, Exposure, and Health Effects"; P et al., "Traffic-Related Air Pollution and Birth Weight"; EPA, "Research on Near Roadway and Other Near Source Air Pollution."

2.3.3. Forgone Economic Activity

Work on the part of local government officials, chambers of commerce, and others to attract capital and investment in the form of firm (re)locations to Texas have proved beneficial as the Central Texas region has emerged as home to new technological and manufacturing firms. These efforts are precipitated on the assumption that areas receiving new development have the capacity to support such expansion activities, including transportation, municipal, and social services infrastructure. As the regional economy expands, it becomes increasingly important that employers have access to as many workers as possible. This maximizes employee choice regarding where they work and ensures that Texas employers have as large a labor pool as possible to remain competitive. Failing to seize this opportunity as the region grows and travel times increase will limit local labor pools for both cities. As such, any threats to regional infrastructure or natural resources should also be recognized as threats to the regional economy.

Figure 8: Central Texas Super Region (Source: Community Impact)



2.3.4. Increased Cost of Highway Expansion and Maintenance with no alternatives

Highways are expensive to maintain, and the cost of maintenance has increased by 50% in the last two years.[40] Highways are directly exposed to increasingly harsh elements and a growing number of users. Most initial highway investments were made when costs were lower, and residents were more willing to shoulder cost burdens. Highways will continue to be expanded and maintained, so it is imperative that they only carry users who must use them and those who choose to use them. We must facilitate opportunities for mode shifts for residents who would prefer to use alternative means for travel. Fewer cars moving through publicly maintained roadways will decrease maintenance costs and maximize the useful lives of our publicly financed infrastructure assets.

[40] "Appendix A: Highway Investment Analysis Methodology - Policy | Federal Highway Administration"; "Highway Construction Costs Have Risen 50% in Two Years."

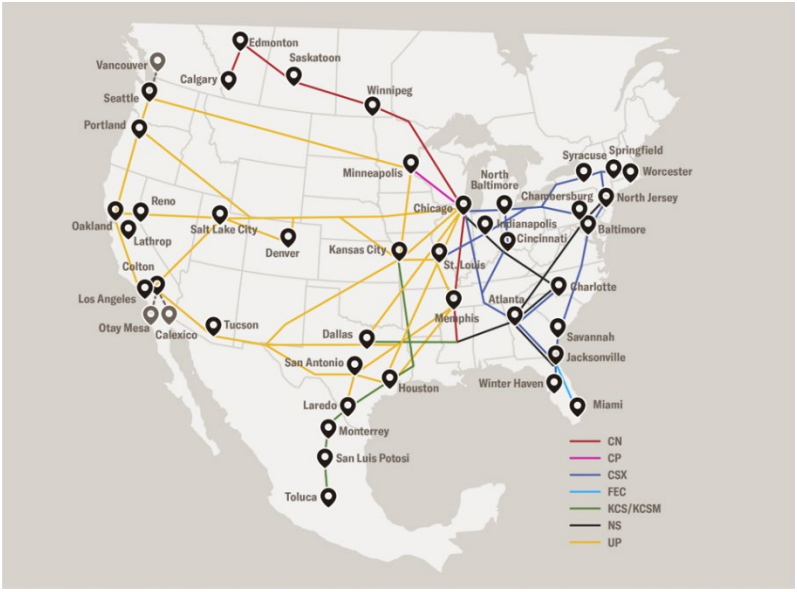
2.3.5. Time Wasted in Traffic

Residents of San Antonio and Austin spend countless hours in delayed traffic – estimates indicate commuters in each city experience an aggregate loss between 45,000,000 and 80,000,000 hours annually.[41,42] These two cities serve as hubs for Texas economic, cultural, political, and social assets and activity. It benefits all Texans for the cities to be more easily linked and accessible to one another. Travelers between these two centers may commute for business or recreation, and as the region grows, so do commute times. Indeed, the average one-way commute to work reached an all-time high in 2019.[43] Time saved from travel is time spent enjoying the region's amenities, at home with family, or more productively at work. Maximization of choice is imperative. Households who have been pushed out to the more affordable peripheries of San Antonio and Austin – many of them not by choice – should be able to access either city with ease, as they would in most other large U.S. urban areas. In addition, more time in traffic necessitates more vehicle maintenance, thus more money spent on vehicle ownership.

2.4. The Opportunity

Over the past decade, the rising costs of production in China and increasing tensions with the United States have led many American companies to consider "re-domesticating" their manufacturing operations to NAFTA countries. One of the most promising destinations for near-shoring is Mexico. As explained in Forbes, "Mexico has emerged as an attractive alternative to China for companies seeking to keep their supply chains closer to home."[44] According to a report by the Center for Globalization at Rice University, moving production from China to Mexico makes sense from a cost perspective and can also help strengthen North American relations.[45] The report notes that Mexico's proximity to the United States makes it an ideal

Figure 9: North American Freight Rail Companies (Source: trains.com)



[41] Schrank, Eisele, and Lomax, "2019 Urban Mobility Report"; Schrank et al., "2021 Urban Mobility Report."
[42] These numbers are inclusive of 2019 & 2021 estimates for the cost of congestion. The latest 2021 figures were not used exclusively because of the decline in travel and congestion resulting from COVID-19 lockdown and shifts to work from home (WFH). While WFH options have certainly become more common, there are not nearly as common as they were throughout 2020.
[43] U.S. Census Bureau, "Census Bureau Estimates Show Average One-Way Travel Time to Work Rises to All-Time High."
[44] Conerly, "Near-Shoring."
[45] Ruxer-Frankling, "Moving American Business Operations from China to Mexico Strengthens All of North America, Says Report."

location for companies looking to reduce transportation costs and speed up delivery times. Additionally, by investing in Mexican manufacturing, American companies can help create jobs and boost economic growth in Mexico and the United States.[46]

Despite the benefits of near-shoring to Mexico, there are still challenges that need to be addressed. One of the biggest obstacles is the country's infrastructure, which is often inadequate for the needs of modern manufacturing. However, as the Rice University report notes, steps can be taken to address these issues, including investing in transportation infrastructure.[47] Freight companies are aware of this and are moving to be competitive. We can look at the Canadian Pacific and Kansas City Southern merger into CPKC for proof. This was a strong indication that market demand for through-traffic in the NAFTA corridor is increasing. CPKC's new single-line service enables it to be competitive in the Chicago - Mexico corridor, which is currently dominated by UP.[48] CPKC also announced a multi-year agreement with Schneider to handle cross-border intermodal shipments between the Midwest and Mexico.[49] [50] This move threatens UP's dominance in this particular market, yet it represents an opportunity to upgrade its operations and infrastructure to remain competitive.

However, there are emerging signs that UP is responding to the market in creative ways. At the time of this report's initial publishing (April 2023), Union Pacific announced a partnership with Canadian National and Grupo México for the fastest direct Mexico, US, and Canada route. The intermodal route, called the Falcon Premium Intermodal Service, will connect trade through Chicago. Fernando López, the CEO of Grupo México, said the following in a press release on the topic:[51]

> "The Falcon Premium service is tailor-made with the objective of providing new solutions to customers catering to the requirements of nearshoring demands."

To prevent losing business to its competitors and maintain its edge, UP should invest in its infrastructure and expand its own capabilities now. According to an article by Trains.com, UP has struggled with a number of operational issues that have led to delays, including congestion in key intermodal hubs and insufficient track capacity.[52] These delays have caused frustration for customers and contributed to UP's declining market share in certain areas.[53] UP may currently dominate the I-35 corridor, but if they can't meet demand, customers will have to look elsewhere, like to CPKC.

[46] Ruxer-Frankling.
[47] Ruxer-Frankling.
[48] Stephens, "CPKC to Handle Schneider's Cross-Border Intermodal Shipments between the Midwest and Mexico."
[49] Luczak, "CPKC Lands Schneider Business."
[50] Perelman, "CPKC Announces Multi-Year Agreement with Schneider."
[51] Union Pacific, "CN, UP, and GMXT Announce New Transformational Mexico-US-Canada Intermodal Service."
[52] Stephens, "Union Pacific Has Lost Its Way."
[53] Stephens.

3. The Solution: A Tale of Two Projects

3.1. Introduction

Establishing passenger rail in Texas faces several challenges in the realms of funding, politics, and spatiality. For Austin-San Antonio passenger rail to have the best opportunity for successful project delivery, proposals to Union Pacific must be made to relocate and enhance its freight operations to develop an economically sustainable and thriving rail network in Central Texas.

As such, there are two projects that will need to be completed: 1) Union Pacific's relocation to a new alignment east of Austin (known in this report as the Bluebonnet Bypass) and 2) the establishment of passenger rail between Austin and San Antonio (known in this report as the Bluebonnet Express). Such proposals must address how the freight relocation and subsequent passenger rail will be funded, identify who will stand to benefit from these two projects, and respond to those who would oppose these plans.

From Union Pacific's perspective, there is currently little incentive to relocate their operations. Our proposals, therefore, must highlight not only the benefits relocating would bring UP but also the dangers in not doing so.

To shepherd the launch of both projects, this report is proposing the creation of a regional government corporation called Texas Rail Advancement Corporation (TRAC) that will lead processes to deliver both projects. TRAC's executive board will consist of a governor-appointed TxDOT executive director, local legislators from the Austin and San Antonio areas, executives from industry, and directors of transit agencies in the region. TRAC will guide decisions on alignment alternatives, funding and revenue streams, and station locations, as well as serve as the lead agency for the projects' NEPA processes. Throughout the project timeline, TRAC will manage relationships with freight organizations, local, state, and federal governments, transit agencies and the public. TRAC will ensure that the goals and values in the report's plan are upheld and that the best possible project is delivered.

3.2. Alternatives

Figure 10: Alignment Options

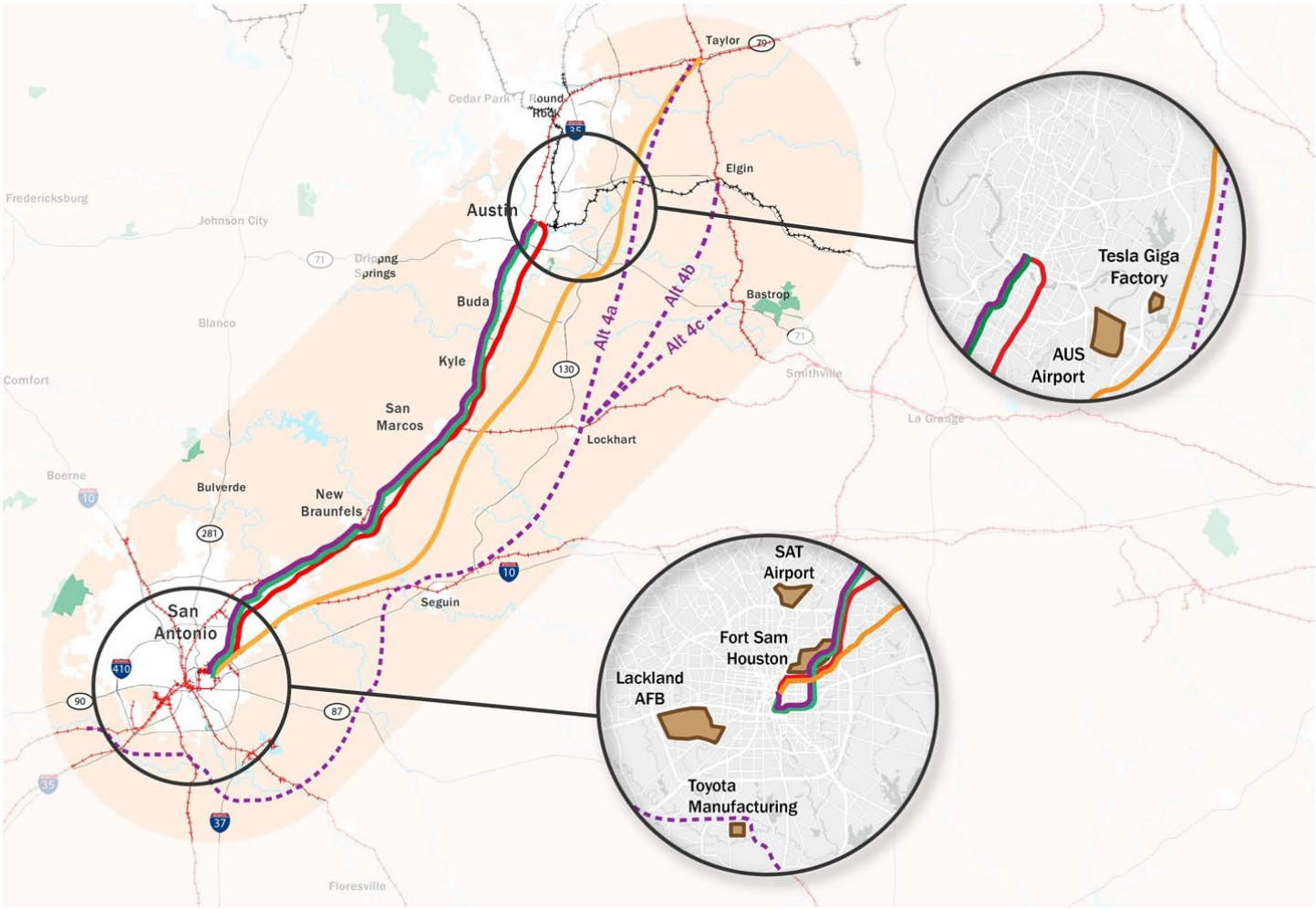
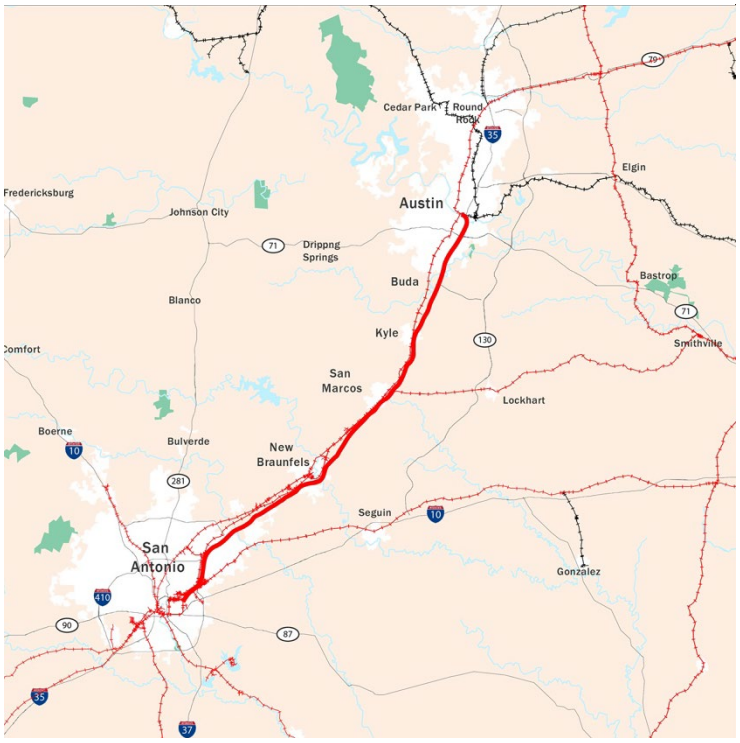


Table 2: Alternatives Analysis

Alternative	Benefits for UP	Drawbacks for UP	Benefits for residents	Drawbacks for residents
1. I-35	None	• Hazardous chemicals remain in heavily populated areas	• Stations would be located near existing population centers • Freight and passenger trains operate on separate ROWs • Potentially little displacement along route	• Hazardous chemicals remain in heavily populated areas • Curvature of highway would require trains to go slower • Would require significant political capital to get TXDOT on board
2. New Greenfield Passenger Alignment	None	• Hazardous chemicals remain in heavily populated areas	• Freight and passenger trains operate on separate ROWs	• Hazardous chemicals remain in heavily populated areas • Would require significant displacement at high cost or would be located far from existing population centers
3. Add additional tracks for passenger rail on existing Union Pacfic ROW	• Upgraded track • Grade separated crossings	• Hazardous chemicals remain in heavily populated areas	• Stations would be located near existing population centers	• Hazardous chemicals remain in heavily populated areas • Freight and passenger trains operate on the same ROW
4. Relocate freight rail to eastern alignment	• Faster travel times between Taylor and San Antonio • New track with the latest safety enhancements • Grade separated crossings • Removes hazardous chemicals from heavily populated areas • New freight line is potentially located near emerging industries	• Some existing costumers, such as quarries, may no longer be served	• Removes hazardous chemicals from heavily populated areas • Stations would be located near existing population centers • Freight and passenger trains operate on separate ROWs • Potentially little displacement along route	• Potential displacement of rural homeowners • Hazardous chemicals still located near smaller population centers
UP = Union Pacific, ROW = right of way				

3.2.1. Alternative 1: I-35

Figure 11: Alternative 1 (I-35)



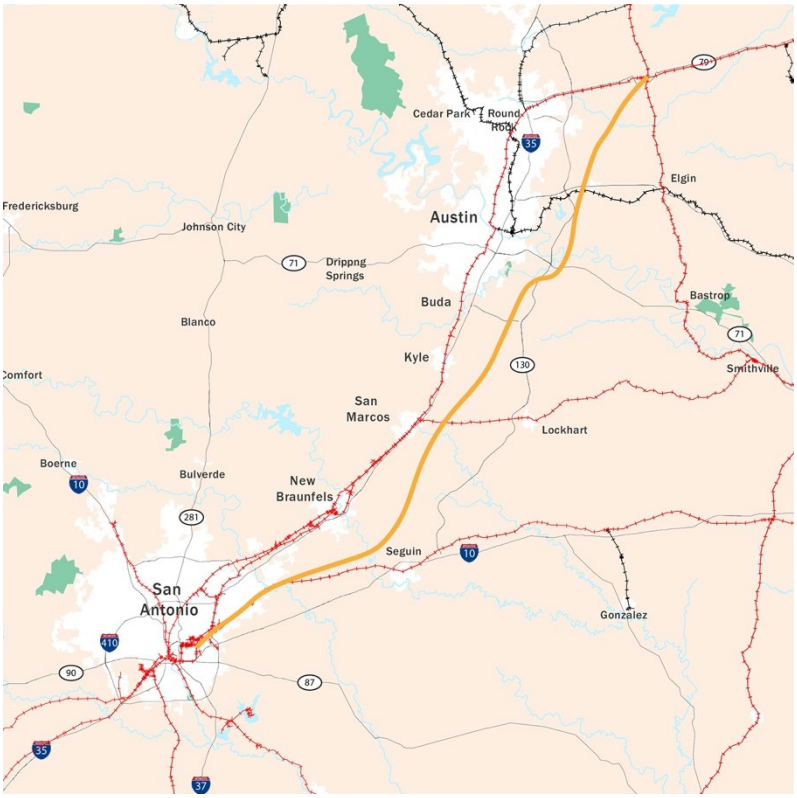
Alternative 1, a potential alignment for passenger rail between Austin and San Antonio within the I-35 right-of-way is the least feasible. , The alignment's would hypothetically include acquiring minimal new right-of-way, a proximity to existing development within the I-35 corridor, and no shared right of way with Union Pacific, which would reduce conflicts and ensure efficient operations.

However, there are several cons to this alignment that make it difficult to consider seriously. The largest obstacle is that the Texas Department of Transportation (TXDOT) is not willing to fund it, as they are not in the business of building passenger rail. The funding and support required for such a project would have to come from other sources, which may be difficult to secure. An additional challenge is that the I-35 alignment has several curves that would require a higher-speed train to slow down, which could affect the travel time and overall efficiency of the rail system. Moreover, UP would not benefit from the passenger rail project in any way with this project, which could make it difficult to obtain their support and truly create the cooperative solution we hope to provide. Finally, this I-35 alignment does nothing to move hazardous materials away from the urban core and would retain the danger to the environment and public that exists with the status quo.

Unfortunately, the cons outweigh the pros of the potential alignment for passenger rail between Austin and San Antonio along I-35. While it may seem like a reasonable option due to the ease of the alignment and existing right of way, the difficulties in funding, the issues with curves, and the lack of benefit to UP make it challenging to consider this alignment further. Therefore, it is unlikely to be a feasible option for a passenger rail system between Austin and San Antonio.

3.2.2. Alternative 2: New Greenfield Alignment – Passenger Rail

Figure 12: Alternative 2 (greenfield passenger)



Alternative 2 proposes a greenfield alignment for a passenger rail service. This alignment could be located anywhere in the corridor, yet due to the high cost, both social and economic, of land acquisition in heavily populated areas, we determined that this alternative would need to be located on the outskirts of the north-eastern cities in the corridor. An eastward alignment avoids encroaching on the Edwards Aquifer, meaning less environmental constraints and lower development costs. The new alignment would start by connecting to the existing Taylor station. It would head south, avoiding highly urbanized zones in the Austin Metro Area but passing near significant manufacturing plants such as the Samsung Semiconductor Plant and the new Tesla Giga Factory. The Austin stop would be located near Austin-Bergstrom International Airport. The alignment continues south, passing east of San Marcos and New Braunfels and becoming parallel to FM 78 until reaching Downtown San Antonio.

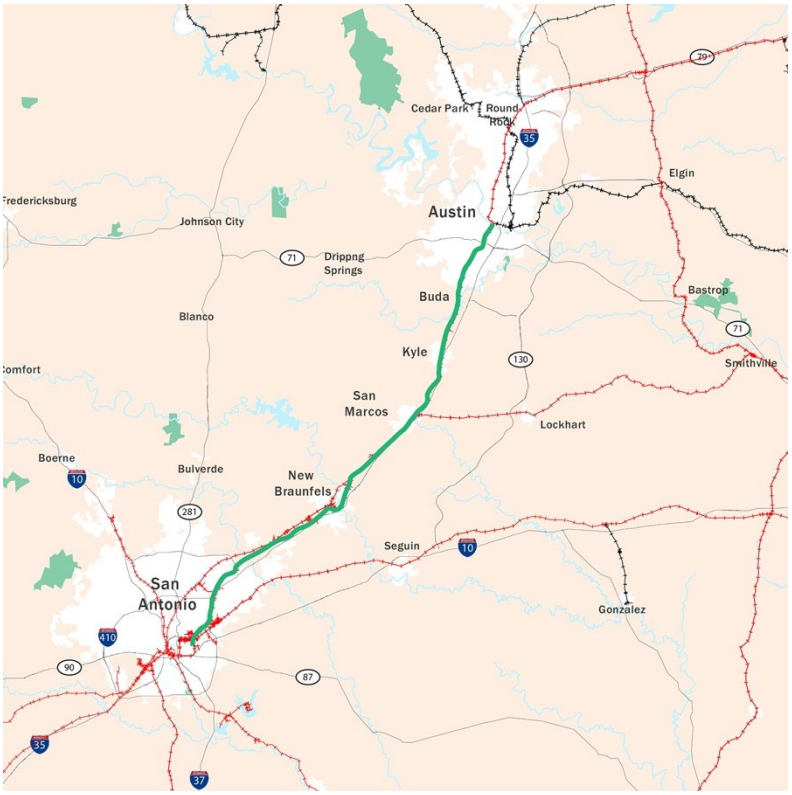
This alternative has several trade-offs. Benefits include not having to share ROW with other rail services. The line would be exclusive for passenger rail and could be managed by one or multiple operators. The alignment could potentially be developed for high-speed (220 – 250 mph) – or higher-speed (110 – 125 mph) service. High-speed train travel cannot be achieved using the existing I-35 ROW or UP's alignment since, as mentioned previously, they are designed with curve radii that are too small for higher-speed railroad operations. The line would also bring opportunities for new transit-oriented development to the east, thereby protecting the Hill Country and its natural resources from sprawl.

Despite its benefits, this alternative is flawed because it does not address the need to move the transportation of hazardous materials elsewhere, as UP would continue using its existing route and half of the goals for this report would not be met. The alternative does not directly serve the population density that triggers the need for expanded passenger transit, increasing the possibility of the line not meeting its ridership goals. Another significant challenge would be the land acquisition process. In Texas, landowner

rights are protected by law and are considered a fundamental aspect of property ownership. Pushback from landowners, stakeholders, and activists would be expected and can prolong the NEPA process and increase expenses.

3.2.3. Alternative 3: Expanded Union Pacific Right of Way

Figure 13: Alternative 3 (existing Union Pacific ROW)



Alternative 3 is the expansion and use of the existing UP ROW for passenger rail. Under this alternative, there would be two parallel tracks, one for existing freight rail and one for the Bluebonnet Express. This would require purchasing additional right of way along the Austin-San Antonio corridor to create two tracks so both freight and passenger rail can run concurrently. While this alternative this provides some benefits, it does not address the most pressing danger: the movement of hazardous chemicals through heavily populated areas. Like alternative 1, the passenger rail's proximity to population centers would increase ridership, but proximity to freight operations is potentially hazardous.

Additionally, the existing UP line's proximity to existing population centers makes any land acquisition a challenging proposition under alternative 3. Land in developed areas along I-35 would be more expensive than land in the other alternatives, and the potential for the displacement of homes and businesses is higher. There is also the danger of a head on collision between freight and passenger trains, as happened in Greece in February 2023.[54] The Federal Railroad Administration (FRA) recommends that there is at least 25 feet between the center lines of passenger and freight tracks.[55] Less than 25 feet would likely require mitigation in the form of inspection strategies, signaling systems, rolling stock safety standards, intrusion detection systems, and crash walls. Concrete crash walls are built to prevent a head on collision between a freight and passenger train, but they are extremely expensive. Crash walls between freight and passenger rail have delayed projects in Minneapolis and Washington, D.C., with walls costing approximately $100

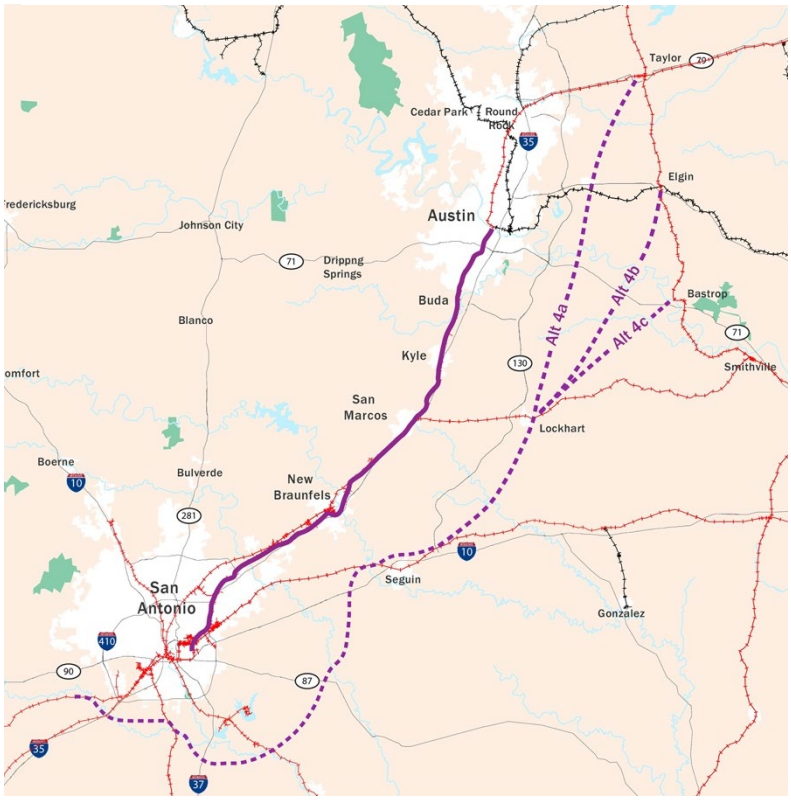
[54] Beake and Armstrong, "Greece Train Crash."
[55] Federal Railroad Administration, "Investigating Technical Challenges and Research Needs Related to Shared Corridors for High-Speed Passenger and Railroad Freight Operations."

million per mile.[56] Although it is possible that UP will not require a crash wall along the entire length of the shared corridor, the exorbitantly high cost of building a crash wall, along with the fact that alternative 3 does not remove potentially hazardous chemicals from populated areas, makes the alternative undesirable.

3.2.4. Alternative 4: Relocate Union Pacific Tracks

Alternative 4 involves two parts: relocating UP operations to the east and developing passenger rail on the existing UP corridor. This is the preferred alternative. Alternative 4 has three options for rerouting UP to bypass the I-35 corridor between San Antonio and Austin. These are named Alternatives 4a, 4b, and 4c, and shown on Figure 14. New track would be constructed from Southwest San Antonio to Taylor, Elgin, or Bastrop. The existing UP Austin subdivision mainline 2 between Austin and San Antonio would be upgraded to support passenger rail. Alternative 4 has numerous benefits to UP and the public. Most importantly, *alternative 4 the only option that relocates potentially hazardous cargo to less populated areas.* Additionally, like alternatives 1 and 2, alternative 4 does not involved a shared right of way with UP. This means that the risk of freight and passenger collisions is virtually non-existent, no crash wall is required, and TRAC would have complete control over the passenger rail corridor. Because alternative 4 would locate passenger rail on the current UP corridor, the rail line and rail stations would be located in population centers along I-35. The population located within a few miles of the stations is more likely to produce higher ridership.

Figure 14: Alternative 4 (relocate Union Pacific)



Alternative 4 would construct completely new tracks for freight using the most up to date technology and safety measures. It could also potentially include grade-separated crossings. This new construction will require the purchase of land southeast of I-35, which could prove litigious and expensive. However, land acquisition in the mostly rural land

[56] Moore, "Cost of Crash Wall on Southwest LRT Route Surges"; Shaver, "Builders of Purple Line Say They Need More Time and Money: 5 Months and $187.7 Million - The Washington Post."

south of the Austin-San Antonio metroplex would likely be cheaper than attempting to acquire land near the existing I-35 corridor. Lastly, potentially hazardous chemicals would be relocated to the new freight corridor, endangering a new set of Texas residents. However, the new technologically advanced and safe track would significantly reduce the likely hood of a spill. Central Texas is a massive NAFTA freight corridor and is only expected to continue to grow due to the domestication of production largely from China to Mexico. The movement of freight north that will follow makes it imperative that Central Texas is a safe and efficient place to move goods.

Alternative 4 can be undertaken in two phases, if needed. The first phase would be the Austin bypass that removes hazardous materials from the most dangerous part of the corridor, the S-curves through downtown Austin, and allows for the development of passenger rail. In conclusion, complete TRAC ownership of the passenger line right of way, the location of passenger stations in already developed areas, the chance to remove potentially hazardous cargo from those areas, faster run times for UP, rural land acquisition costs, and the chance for UP to be positioned near emerging industries make Alternative 4 the most desirable option.

4. Freight Considerations

4.1. A Win-Win

Alternative 4 separates and prioritizes the relocation of freight rail. This relocation provides benefits to Union Pacific in that new tracks could allow for faster and safer movement of goods. The public would also benefit from the incredible efficiency of freight rail transportation, since it supports regional manufacturing and industries without the use of large trucks that cause emissions and wear and tear on highways. Rail service to the existing Central Texas quarries is a significant consideration for the potential relocation of Union Pacific. Possible remedies to continue freight rail service for the remainder of the quarries' useful lives are to have spur lines or allow the occasional freight train to run along the new passenger right of way. The superiority of freight rail energy efficiency and safety when compared to trucking calls for investment and support of Union Pacific's operations.

4.1.1. Wins for Freight

As described previously, greenfield relocation of freight to the east of the current corridor appears to be the optimal alternative. Union Pacific could utilize this relocation as an opportunity to provide improved service to the growing manufacturing industry in the region. The Tesla Giga Factory and Samsung's semiconductor plant are just two examples of freight customers in the Austin area that would benefit from closer access to UP. Service times along this new freight line could be improved from current conditions, which would increase profits for the railroad. The geometry and grade crossings along the current corridor require freight trains to slow down through towns and urban areas. According to the FRA, hazards are introduced every time a train changes speed, due to buff and draft coupling forces.[57] A new line could be constructed with grade separation so that freight trains could serve customers quickly and safely. Other safety elements could be included in the design of the greenfield freight relocation. Construction of new tracks creates the opportunity to implement new and state-of-the-art safety technology such as sensors and detectors. Finally, since a new line would be for freight only, UP would not have to maintain these tracks at more expensive Class 6 standards for passenger trains and could instead maintain them for slower speeds at Class 4 or 5 levels.

4.1.2. Wins for the Public

Freight relocation also provides benefits for the public. In the dense population centers along the I-35 corridor, safety would be enhanced due to the elimination of hazmat traveling by rail. This is important in terms of health risks and environmental risks due to hazmat exposure. In the smaller population centers along the proposed freight relocation route, benefits come from support to manufacturing industries. While hazardous material would be rerouted though these communities, safety measures should ensure that freight trains do not interfere with or endanger the communities. The public would also benefit

[57] Federal Railroad Administration, "Track Frequently Asked Questions."

from the opportunity that freight relocation provides for passenger rail development, which will be discussed in section 5. Overall, freight relocation in alternative 4 provides the public with environmental benefits and risk reduction while preserving the economic asset of freight rail.

4.2. NEPA

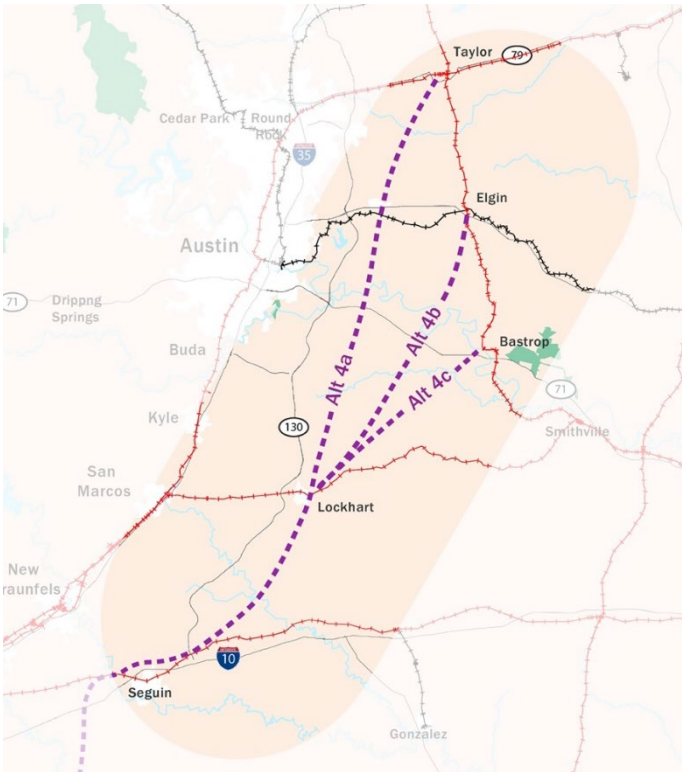
NEPA is a complicated process with components that include data collection, document collection, public engagement, and legal hurdles. The NEPA process itself can be enough to dissuade Union Pacific from embarking on the project given its labor-intensive tasks and financial unknowns. To avoid dissuading Union Pacific from engaging in the project, we recommend that TRAC assist UP throughout the NEPA process by conducting much of the data and document collection, as well as subsidizing aspects of the process. We anticipate that the NEPA process will demonstrate that the Bluebonnet Bypass and the Bluebonnet Express are projects that will fill needs for economic and community development that will thrust Central Texas squarely on the world stage. These two projects are necessary to continue the growth and vitality of Central Texas's economy and relevance to other regions in the United States and around the world.

4.3. Alignment Details

Relocating freight operations southeast of the I-35 corridor will require over 100 miles of new freight track and includes both a San Antonio and Austin bypass. The San Antonio bypass would be from Macdona to Seguin, around the southeastern fringe of San Antonio. The Austin bypass would be from Seguin to either Taylor, Elgin or Bastrop. Alternative 4a would require the most new track, but it is the shortest total route. Alternative 4c would require the least amount of new track, but it would be the longest total route. Alternative 4a alignment has been studied by TXDOT in 2008 and was determined to be a viable relocation corridor. Alternative 4a also positions Union Pacific near emerging industries such as the Tesla giga factory outside of Austin, the Samsung semi-conductor plan outside of Taylor, and the existing Toyota manufacturing plant outside of San Antonio. The growth of manufacturing in the region and the re-domestication of production in the North American continent make it necessary for freight to move safely and quickly through Central Texas.

4.4. Benefits

Figure 15: Alternative 4 (relocate Union Pacific) freight options



The primary benefit for Union Pacific under any of the three Alternative 4 options is the opportunity to achieve higher speeds through this corridor. By avoiding population centers, avoiding 90 degree turns in the Austin and San Antonio downtowns, and adding grade separated crossings on the new route, the trainsets would be able to reach and sustain reliably higher speeds. This would result in reduced travel times, which means increased capacity and, therefore, increased revenue. Speed limitations are not the only limiting factor for UP and other private freight train companies' profit margins, but to address speed limitations requires major infrastructural investment. Other considerations such as the logistics of unloading or separating cars within a rail yard may still limit the benefits of achieving increased speeds, but solving such localized issues does not require the same massive level of political and financial capital expenditure. Thus, this opportunity to increase speeds with public political and financial support is worthwhile even if UP still most overcome other logistical hurdles to realize the full benefits increased speeds might provide.

Speed: Alternative 4 runs from Macdona at the south end to Taylor at the north end, with three possible routes in the northern segment from Taylor to Seguin. Table 3 below shows the possible speed, capacity, and cost savings across these three routes following assumptions laid out in the 2007 Austin-San Antonio Financial and Economic Benefits report prepared for the LSRD.[58] Assumptions include:

- Current average speed through the corridor is 25 mph
- 30 trains per day
- 300 operational days per year
- According to Union Pacific, they save $460 per hour of travel time saved ($709 in 2023 dollars);[59]

[58] Carter Burgess and Cambridge Systematics, "Financial & Economic Benefits Study."
[59] Colorado Department of Transportation, DMJM Harris, and HDR Inc., "Public Benefits & Costs Study of the Proposed BNSF/UP Front Range Railroad Infrastructure Rationalization Project."

With these assumptions, scenarios for average speeds increased to 30mph (a moderate increase) and 59mph (the max speed for Class 4 tracks)[60] are shown in the Table 3.

Again, the realization of time cost savings is dependent upon UP's ability to solve logistical limitations in their rail yards. The figures in Table 3 assume UP's stated cost savings per hour of travel time saved, but the authors of this report recognize that this only one aspect of such cost savings calculations. Still, Table 3 helps illustrate the potential benefits to UP's bottom line that increased speeds through this corridor could provide.

Table 3: Cost Savings by Route and Speed Scenarios

	Existing freight track	**4a freight track**	**4b freight track**	**4c freight track**
Route	Taylor > Austin > San Marcos > New Braunfels > San Antonio > Macdona	Taylor > Lockhart > Seguin > Macdona	Taylor > Elgin > Lockhart > Seguin > Macdona	Taylor > Elgin > Bastrop > Lockhart > Seguin > Macdona
Total distance (appx. Miles)	127	145	148	155
Current avg. speed	25			
New avg. speed (low)		30	30	30
New avg. speed (high)		60	60	60
Current time (hours) from Taylor to SA	5.08			
New time (hours) from Taylor to SA (low)		4.83	4.93	5.17
New time (hours) from Taylor to SA (high)		2.42	2.47	2.58
Daily trains	30	30	30	30
Operational days	300	300	300	300
Current time cost per trip	$ (3,601.72)			
Estimated 1-year cost	$ (32,415,480.00)			
Time savings (hours) compared to current system (low)		0.25	0.15	-0.09
Time savings (hours) compared to current system (high)		2.66	2.61	2.50
Avg. benefit per hour of travel time savings ($460 in 2005 dollars adjusted to 2023 value)	$ (709)	$ 709	$ 709	$ 709
Estimated 1-year savings (low)		$ 1,573,980	$ 935,880	$ (553,020)
Estimated 1-year savings (high)		$ 310,210,472	$ 107,613,722	$ 35,898,372
Estimated savings over 20 years (low)		$ 31,479,600	$ 18,717,600	$ (11,060,400)
Estimated savings over 20 years (high)		$ 6,204,209,432	$ 2,152,274,432	$ 717,967,432

Beyond time cost savings, an investment in developing a more efficient line through this corridor provides important benefits to Union Pacific. First, between land acquisition, construction, materials, and soft costs, the price tag associated with major infrastructure projects like this rise quickly as time passes. Especially in this corridor, eastward expansion of Austin and San Antonio will only continue to drive property values up. UP has a strong incentive to make this move sooner rather than later.

For public entities that might invest in UP's relocation eastward, they should be sure to recognize the major benefits to Texans that come with a construction project of this magnitude. According to Caltrain, their 51-mile track upgrade project is expected to generate 33,000 jobs.[61] At 145-155 miles, this project has the potential to generate many thousand more jobs than that across the several years it would take to complete.

4.5. Costs

New freight lines of significant length are rare, and their cost estimates are not publicly available as those for transit projects typically are. Therefore, this analysis uses construction cost figures of commuter rail projects to create likely figures for greenfield

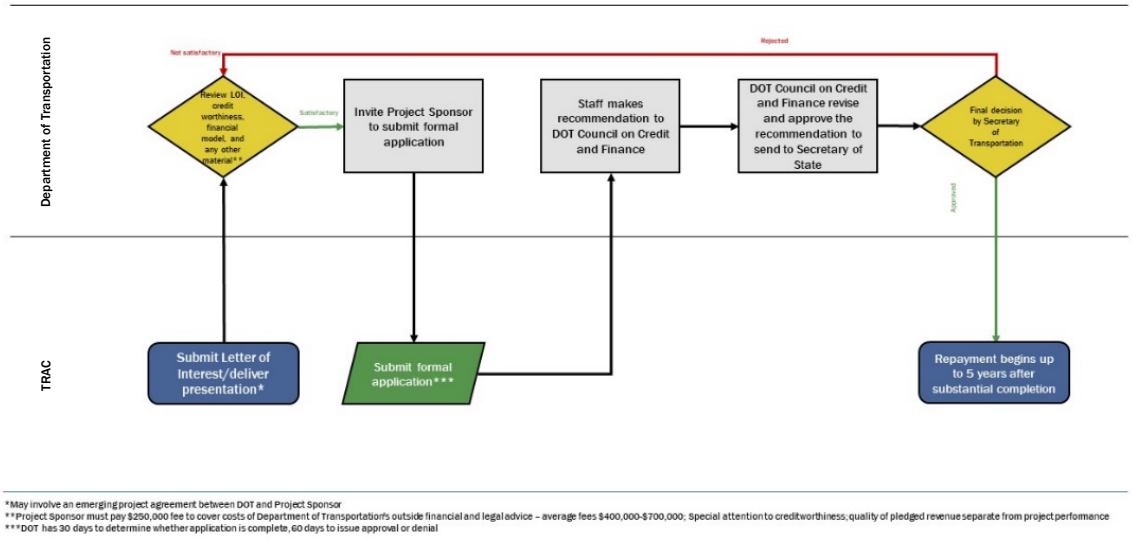
[60] Cornell Law School, "49 CFR § 213.9 - Classes of Track."
[61] Caltrain, "Creating Jobs in California and Across the Country."

freight construction. After excluding figures from the older and cheaper lines, this selection of projects represents an average cost per mile of about $54M. To create a continuous double-tracked alignment, the research team estimates that the cost of building new freight for this corridor would fall between $14B and $16B (Alternative 4a – $15.9B, Alternative 4b - $15.3B, and Alternative 4c – $15.3B).

4.6. Financing Streams

The Railroad Rehabilitation and Improvement Financing (RRIF) Program authorizes the Federal Railroad Administration (FRA) to provide direct loans and loan guarantees up to $35B to finance development of railroad infrastructure. The funding may be used to acquire, improve, or rehabilitate rail-related facilities or equipment. These can include tracks and its components, bridges, yards, buildings, and shops. It can also be used to refinance outstanding dept and develop or establish new rail-related intermodal or railroad facilities. While direct loans can fund up to 100% of a railroad project, FRA prefers the provision of equity of projects. The loan term period is up to 35 years. TRAC is eligible for RRIF, and the research team recommends this being one of the funding sources.

Figure 16: Railroad Rehabilitation & Improvement Financing (RRIF) Program



The Texas Rail Relocation and Improvement Fund (Appropriate Fund 0306) was issued in 2005 and is an active fund source that is authorized to receive proceeds from bonds and notes as well as dedications by the legislature. In 2022, Texas State Representative Stan Gerdes filed a rider to the Texas House Appropriations bill that, if accepted and approved, would direct $200 million in General Revenue Funds to the Texas Railroad Relocation and Improvement Fund. This is the first time that the fund would receive a boost from the legislature since the voter approval of RRIF in 2005. The funds can be used for relocation and improvement of privately and publicly owned passenger and freight rail facilities. The recommendation is for RRIF to be funded regularly to match grants from the Federal Government for future relocation and improvement projects. This will also satisfy the

expectations from Texas voters who approved the fund. The RRIF fund will especially be helpful in the event of UP relocation to the east between Austin and San Antonio.

Eligible applicants for TIFIA assistance include state and local governments, railroad companies (including Amtrak), transit agencies, and private entities. The DOT encourages project sponsors to reach out prior to submitting a letter of interest to maximize the likelihood of developing a successful application. In application evaluation, DOT and third-party advisors pay special attention to creditworthiness and quality of pledged revenue. The TIFIA program provides funding for up to 49% of total project costs (though DOT tends to award no more than 33% to share risk). The senior debt obligations and ability to repay must receive 1-2 investment-grade ratings, and debt must be repaid with a dedicated revenue stream. Loans and letters of credit are offered at a fixed treasury rate. Loans may be deferred for up to five years after substantial completion of the project for a term up to 35 years and is typically subordinate debt. TIFIA eligible projects are generally also eligible for tax-exempt private activity bonds. The TIFIA program is seen as predictable but slow and bureaucratic, as well as increasingly risk–averse as recent awards have gone to relatively low-risk projects which could secure more conventional sources of funds.

Tax Increment Reinvestment Zones (TIRZ) have been implemented all across Texas since 1981, when the program became a law. Nationally, TIFs are implemented through a TIF district; TIRZ are the Texas version of TIF districts. A TIRZ is the geographical zone that is delegated to collect the incremental tax revenue. A TIRZ, and tax increment financing in general, is not a new tax but rather a redirecting of the ad valorem tax from infrastructure improvements that can be used to finance new or existing projects in the zone. One major benefit of using TIRZ is that it helps build needed public infrastructure in areas that lack adequate development, which can then attract businesses and growth. Because TIRZ encourages development, it thereby increases property values and long-term property tax collections. Additionally, TIRZ can reduce the cost of private development by providing reimbursement for eligible improvements made to public infrastructure. In Texas, a TIRZ can be created in one of two ways: property owners can start a citizen-led petition if they constitute at least 50% of the zone's appraised value, or Tax Code Section 311.005 can be adopted by a governing body.

Chapter 311 of the Texas Tax Code outlines the basic requirements for using TIRZ. The Tax Code refers primarily to TIF when discussing governance, but later defines the 8-step process for creating a TIRZ. In Texas, only a city or a county can initiate a TIF. Once initiated, other taxing units, including school districts and special purpose districts, can participate in the zone. One main challenge with implementing a TIRZ is that there are criteria that the area being considered for the zone must be "blighted". In other words, the area must have deteriorating buildings or faulty street layouts. Additionally, the city or county must determine that investment in the area would not otherwise occur solely through private investment, and the land in the area must substantially hinder the "sound growth" of the city or county. For citizen-led petitions to start a TIRZ, no blight criteria apply. Though this standard can be challenging, the subjective nature of what is considered "blight" means the criteria can be relatively easy to meet. Another challenge associated with the implementation of a TIRZ is that evaluating the success of the TIRZ is difficult to measure.

Although quantifying revenue may be simple, evaluating the effectiveness and progress of each TIRZ is not as simple.

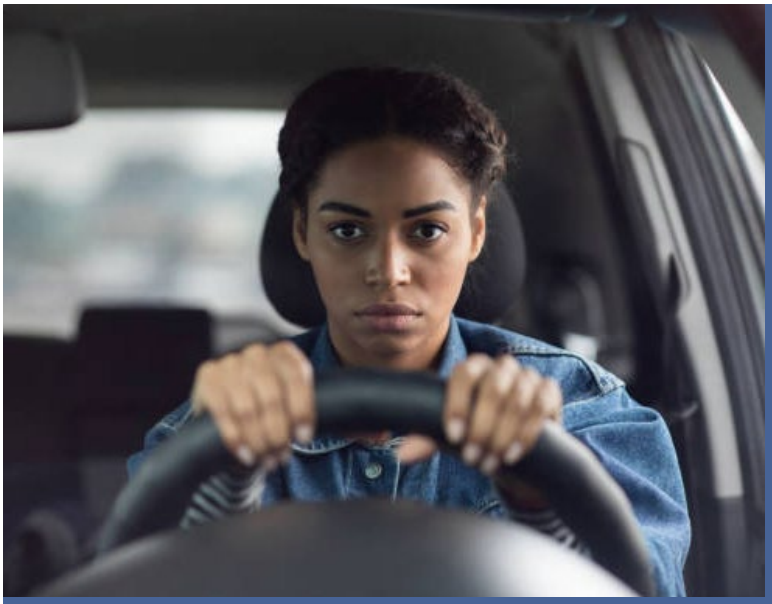
5. Passenger Considerations

5.1. The Vision

Essential to this project is a shared vision among Central Texans. The potential for high-performance passenger rail service connecting the thriving urban hubs of Austin and San Antonio and the burgeoning communities between is transformative. At present, only car owners can easily imagine a day trip between the two cities. Commuters must drive. Highways are at capacity. Cars are expensive for drivers to take care of, and highways are expensive for taxpayers to maintain and expand. But with a reliable, frequent, expeditious rail option available, all of those concerns could be alleviated, and a new normal would have room to flourish.

Most Austin and San Antonio residents have had little-to-no opportunity to take the train as their substantive means of transportation, so to help spark the imagination, an example is shown that demonstrates how transformative high-performance passenger rail in this corridor could be.

Shireen today:



Shireen lives in San Marcos. She just graduated from Texas State with a degree in computer science. She is excited to find a job in Austin's hopping tech scene, but she'd like to stay in San Marcos where rents are cheaper and her partner is finishing their last year in school. She applied to several jobs and landed an excellent offer from Google in their new office that just opened downtown.

Unfortunately, Shireen has to drive during rush hour, so her commute is around 1 hour 15 minutes one way. In case traffic is bad, though, she usually leaves by 7am to be sure to reach office before 9am. Once in downtown Austin, she still has to park and walk to her office, adding another 10 minutes. After work, it's the same long drive back home. She averages almost 3 hours commuting daily and gets home exhausted at around 6:30pm on a good day. With the cost of gas (not to mention parking and vehicle maintenance), she pays a hefty price in both time and money.

Shireen with the Bluebonnet Express:

Shireen lives in San Marcos. She just graduated from Texas State with a degree in computer science. She is excited to find a job in Austin's hopping tech scene, but she'd like to stay in San Marcos where rents are cheaper and her partner is finishing their last year in school. She applied to several jobs and landed an excellent offer from Google in their new office that just opened downtown.

Thankfully, Shireen lives in a new apartment development that just opened right by the train station, so she's just a 10-minute walk away. She catches the 8am every morning and is able to grab coffee and breakfast on her 10-minute walk to the office. She leaves work at 5pm, catches the 5:30 train, sends a quick work email, takes a little power nap, and walks through her door just after 6pm. Since Google pays for Shireen's monthly train pass, her only cost is time: less than an hour each way.

5.2. Political Environment

It is imperative that backers of freight and passenger rail projects between Austin and San Antonio understand the politics involved in both undertakings. This section outlines these political considerations, including which elected roles are best positioned to champion the projects.

The projects intersect various scales of political geography, including municipalities, counties, metropolitan planning organizations, state house and senate districts, U.S. house districts, and statewide offices like governor and U.S. senator. Project backers must form relationships with these elected officials and engage them early and often throughout project planning and implementation. Without support from key elected officials, neither project will be viable. Because both the passenger and freight rail alignments run through areas with Republican and Democratic elected officials, supporters must employ tactful political arguments that at once appeal to both sides of the aisle without repelling either side. As discussed in Section 3, supporters should gather support for both the freight rail project and passenger rail at the same time. The sections below detail considerations for each relevant political office.

5.2.1. Texas Governor

The Governor must support the passenger and freight rail projects and would ideally be the lead champion for both. As the most powerful statewide official, the governor can spearhead both projects, gather supporters and stifle political opponents, set legislative priorities, sign and veto bills, and appoint members to the Texas Transportation Commission, the body that governs and sets priorities for the Texas Transportation Department. Opposition from the governor likely means neither project will happen.

The current Republican governor, Greg Abbott, has mostly opposed passenger rail. In 2017, for example, he signed a bill[62] prohibiting the state of Texas from spending money on private high-speed rail projects.[63] While Abbott did send a letter to Japanese Prime Minister Yoshihide Suga expressing support for Japan's involvement in Texas Central, he withdrew his support shortly thereafter, perhaps after gaining a better understanding of the project's lack of viability and receiving political pushback for his support for passenger rail from members of his party.[64] He also expressed strong support for protecting the property rights of landowners along the Texas Central alignment.

Given Abbott's public stances against passenger rail, supporters will likely have to wait until Abbott leaves office to find a champion in the Governor's mansion – an assertion advisors to this report have also made. Abbott will serve until at least 2026. Since there are no term limits for governor in Texas, he may serve longer. When a new governor is elected, project backers must seize the opportunity to gain their support; it will be at least four years, and possibly many more, before another governor is elected.

5.2.2. Texas State Legislature

Legislators from the Texas State Senate and House of Representatives whose districts encompass the alignments are essential political supporters. These officials can use their political capital to champion the projects and lobby other elected officials, including the Governor and local and regional officials. The support of State Senators and Representatives is particularly important for securing legislative actions needed for both projects to succeed (see Section 5.5.5). Without the backing of every State Senator and Representative along both alignments, both projects could be imperiled, and the legislative asks are unlikely to pass. These representatives will be more sensitive to opposition from their constituents than statewide officials, perhaps especially sensitive to opposition from powerful landowners along the freight alignment.

5.2.3. Local and regional officials

Mayors and city council members, as well as county judges and commissioners, are key political supporters. This is especially true for those sitting on the boards of the Capital Metropolitan Planning Organization (CAMPO) and the Alamo Area Metropolitan Planning

[62] Texas State Legislature, "85(R) SB 977."
[63] Garnham, "More than Eight Years in, Texas High-Speed Rail Company Still Lacks Permits to Build Dallas-to-Houston Route."
[64] Garnham.

Organization (AAMPO), bodies that allocate state transportation funds. During the Lone Star Rail era, local elected officials along the passenger rail alignment were mostly in support. This will likely be the case going forward. Officials in urban areas, who are mostly Democratic, are generally inclined to support investment in non-automotive transportation. Officials along the freight alignment, however, may be inclined to oppose the project due to its implications for landowners. The mayors of Austin and San Antonio, though they have the same voting power as other Council members, are better positioned to champion regional projects that will positively affect their cities and may possess more political capital to sway state-level officials. The projects do not need every local official to be on board; both only need a majority of members on city councils, county commissions, and MPO boards. While local officials opposed to the projects could stoke broader opposition, supporters should not focus their lobbying efforts on these officials if they are in the minority.

5.2.4. Federal officials

While local and state-level officials are likely the most important political stakeholders, U.S. Representatives should be involved in both projects, particularly when it comes to gathering support for federal investment. Congressional representatives should work with state and local representatives to engage officials with the Federal Railroad Administration (FRA) to secure grant funding. U.S. Senators are less likely to play a role in the projects, though their support should still be courted.

5.2.5. Interest groups, landowners, and other stakeholders

Rail supporters should court a variety of interest groups for their support and keep in mind the considerations outlined below.

Environmental groups will likely oppose projects that negatively impact the existing physical environment. While environmental groups may oppose freight relocation for its negative impacts to rural land, they may also support arguments in favor of moving toxic material transport from densely populated areas to less densely populated areas. Environmental groups will likely support passenger rail since it is a less carbon-intensive mode of transportation compared to cars, though they may raise concerns about construction near sensitive environmental features along the alignment, namely springs and rivers in the Edwards Aquifer recharge zone.

Real estate developers are likely to support passenger and freight rail projects when they see the projects increasing market demand for homes, offices, commercial space, or industrial facilities. Transit-oriented development planning and associated land development code changes near passenger rail stations could spur investment from developers. Supporters should leverage the support of developers since they form an important political constituency at the local and state level. Private investment in passenger rail may even come from developers hoping to capitalize on transit-oriented development, as exemplified by Brightline in Florida.

Landowners near passenger rail stations will likely support the investment, as land values may increase near station areas. Landowners along the passenger rail alignment but farther away from stations will most likely support the project or remain neutral. They could benefit from fewer or no freight trains running near them and less risk for hazardous chemical spills. Companies who own land near the freight rail alignment might support the project, especially if they could ship goods more efficiently or cost effectively with relocated freight rail. These might include existing manufacturers like Tesla or Samsung, or any other company considering investment in this emerging manufacturing corridor. Ranchers, however, will likely oppose freight rail; large and established ranchers pose an enhanced risk to the freight project because they may hold sway with elected officials and could bankroll organized opposition.

Union Pacific must support vacating their existing right of way and relocating their freight line, as other sections detail. Elected officials, especially those at the state level, are best positioned to negotiate with UP.

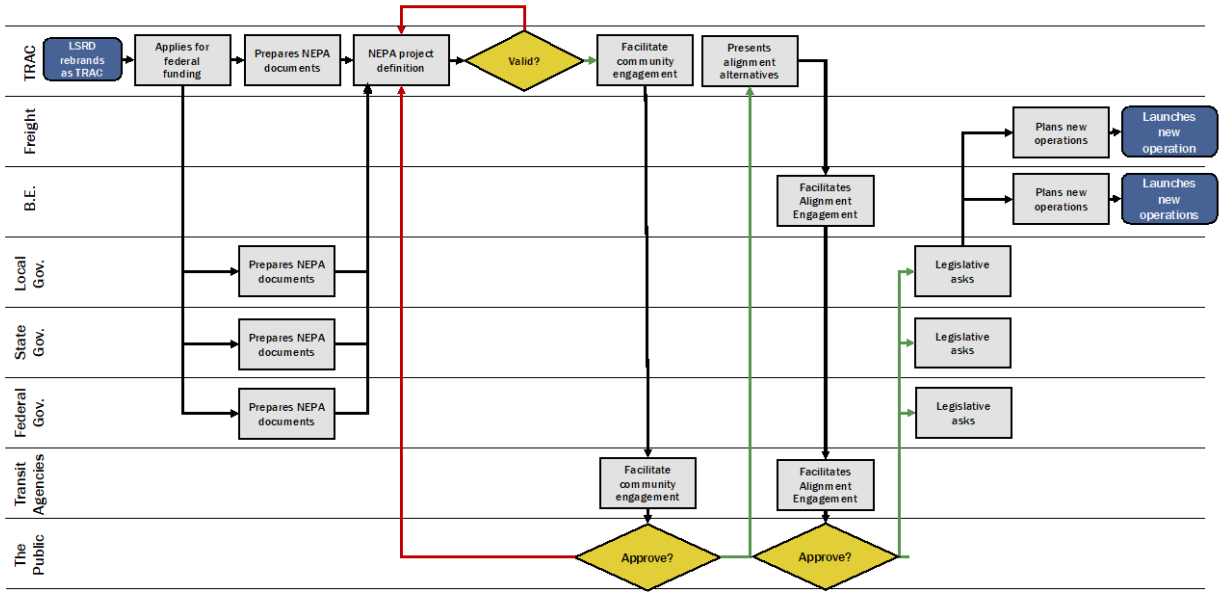
5.3. Governance Structure

To launch the passenger rail project, TRAC must coordinate with governments, industry entities, transit agencies and community members. Each project is divided into the following parts:

- Applying for funding
- NEPA
- Legislation
- Alternative selection
- Operational decisions

By explicitly plotting when actions will happen and who will take them, the process map will address several of the reasons why LSRD failed, as articulated by Dr. Andrews. The process map features TRAC as the leader on many of the iterative tasks involved in project delivery. As the guiding entity throughout both the freight relocation and passenger rail projects, TRAC will advance each project by initiating the next stage of project delivery. Even in the Bluebonnet Bypass's process map, TRAC will assist Union Pacific in their NEPA processes to ensure timely delivery to advance to the next stages of the project. Below is the general process map for project delivery for both the Bluebonnet Bypass and the Bluebonnet Express.

Figure 17:Bluebonnet Bypass and Bluebonnet Express Project Delivery



5.4. Alignment Benefits

A central location for passenger rail is essential to achieving high ridership, reducing travel times, and increasing connectivity. The existing UP freight alignment is ideal for an intercity passenger rail system because it passes directly through each city or town center in the corridor. By locating the alignment and stations in central business districts and other heavily populated areas, intercity passenger rail can tap into existing demand for transportation and attract riders who might not have considered rail as an option. According to the National Association of Railroad Passengers (NARP), intercity passenger rail can be particularly effective in connecting urban and suburban areas, as well as linking major economic hubs.[65] This can help reduce highway congestion and promote economic growth by providing access to jobs and commerce. Employers in Austin and San Antonio would have access to a larger labor market of people living in Kyle, Buda, New Braunfels, and San Marcos.

The location of intercity passenger rail stations can also significantly impact travel times, as placing stations in central locations with easy access to local roadways and other transit options saves passengers time on their journeys. According to a Federal Railroad Administration (FRA) report, the possibility of reducing commuting time is key to making intercity passenger rail more attractive to riders.[66] This is particularly true in regions with heavy traffic congestion, such as the Austin-San Antonio region, where intercity passenger rail can offer a more efficient alternative to driving.

[65] National Association of Railroad Passengers, "Long Distance Trains: A Foundation for National Mobility."
[66] Federal Railroad Administration, "Regional Rail Planning."

5.5. Financing and Funding

5.5.1. Benefits

Implementing an efficient passenger rail system in the Austin-San Antonio corridor would bring benefits to commuters in time and cost savings; the economy in job creation; the environment from pollution reduction; and federal, state, and local governments in reduced highway maintenance and construction savings. Many of these estimations were modeled after the 2007 Austin – San Antonio Commuter Rail Project Financial and Economic Benefits Report.

Estimated time savings: Commuter rail passengers would realize between $4.3 million and $8.8 million in annual savings in delay time.[67]

Estimated CO2 emission savings from lowered congestion: Commuter rail will result from the removal of 5.3 million vehicle trips/year, resulting in reduced traffic congestion, idling time, and auto emissions. Pollution reduction benefit of $1.9 million to $2.3 million per year.[68]

Congestion mitigation: When more people ride the train there will be less drivers on the road. The time and cost savings from this congestion reduction would equal approximately $25.14 per person hour, according to the Texas Transportation Institute.[69]

Estimated lives saved due to less highway traffic accidents: In 2020, there were 36 fatal crashes on the I-35 corridor through Travis, Hays, Comal, and Bexar counties. These 36 crashes culminated in 40 fatalities according to the USDOT. Less highway traffic will lead to fewer fatal accidents.[70]

Estimated tax revenues for station areas: Estimated net taxable sales from station retail equals $638,688,095.24 a year.

Extend life of highways: The construction cost for an Interstate freeway is $2.7 million per mile. The construction cost savings for two new lanes within the 112-mile corridor between Austin and San Antonio is approximately $586,584,086. Additionally, the annual maintenance cost for two interstate lanes is $137,000 per mile. The cost savings for maintenance on two lanes within the 112-mile corridor is approximately $15,354,701.[71]

Estimated cost savings to potential drivers: For current drivers who switch to taking the train and get rid of their car, potential savings of between $23,169 - $39,950, which is the average cost of a car plus the average cost of insurance. Additionally, when figuring the average cost of a two-way, 112-mile trip between Austin and San Antonio with an

[67] Carter Burgess and Cambridge Systematics, "Financial & Economic Benefits Study."
[68] Carter Burgess and Cambridge Systematics.
[69] Carter Burgess and Cambridge Systematics.
[70] Texas Department of Transportation, 2020 Crash Statistics
[71] Carter Burgess and Cambridge Systematics, "Financial & Economic Benefits Study."

average fuel consumption of 15 miles per gallon and an average fuel price of $3/gallon, an estimated annual fuel cost savings of $118,720,000 could be realized.[72]

Better service: More efficient service will be able to offer faster, and more frequent trips, in addition to better on-train amenities such as wi-fi, bike racks, food and beverage.

Reduced engine noise: Electrifying the corridor greatly reduces engine noise and may also have positive effects on residential real estate values.

Job creation: Project-related: In California, the CalTrain electrification project, which spans 51 miles, will generate 33,000 jobs – 10,000 of which will be across the country. Considering the same assumptions, our project would generate 51,117 project related jobs.

Permanent jobs: For a full-service plan, employment is projected to increase by 2,327 to 2,821 permanent jobs.

Unknown benefits of linking the two economies: Perhaps the most exciting benefit is the unknown opportunities that will come from better linking Austin and San Antonio. If more people can travel between the cities more frequently and reliably, and at a lower cost, more interactions between these cities will ensue. When connecting people and places, innovation is soon to follow, and we can only imagine what the people of these great cities will come up with.

5.5.2. Costs

Most passenger rail projects in Texas have consisted of those which retrofit former (or currently operating) freight facilities to handle the higher speeds supported by passenger rail service. Since rail infrastructure was integral to the growth of cities, freight tracks are typically very conducive to facilitating maximum ridership. In addition to leveraging their orientation to large population centers, retrofitting projects also allow for cost-savings when compared to greenfield railroad projects.

Table 4: Commuter Rail Cost Comparisons

	Cost per Mile
TRE	$4.8M
Caltrain	$47.8M
LSRD estimate	$8.6M
TEXRail	$39.8M
Silver Line	$73.1M
Red Line	$7.3M

[72] Carter Burgess and Cambridge Systematics.

As is true for any major construction project, costs are expensive and will never be cheaper. Further supporting this notion, *Table 4* shows selected retrofit projects, including the DART/Trinity Metro-owned Trinity Railway Express and CapMetro's Red Line. These projects were delivered in 1996 and 2010 respectively and thus represent substantially cheaper project costs.

California's current high-speed rail endeavor is also a retrofit but includes the cost of electrification of tracks that will also support diesel locomotives. Officials and transportation experts have previously regarded electrification as economically feasible only for very long distances, across which operators can offer higher or high-speed service that can justify higher fares, or very short distances, such as light rail in densely populated urban areas that can leverage high ridership. Though the Bluebonnet Express would not fall into either of these categories, rising total project delivery costs reflect a decreasing premium associated with electrification.

Further, part of the problem the Bluebonnet Express is intended to address is the climate imperative. Electrification of the tracks (as well as future rail infrastructure going forward) should be the standard. As such, the research team's cost estimates for the construction of the Bluebonnet Express is $3-5B, and reflects the assumption that TRAC will shepherd a project which includes not only the necessary upgrades to the current UP ROW for enhanced speed and safety but also electrification of the tracks.

5.5.3. Funding Streams

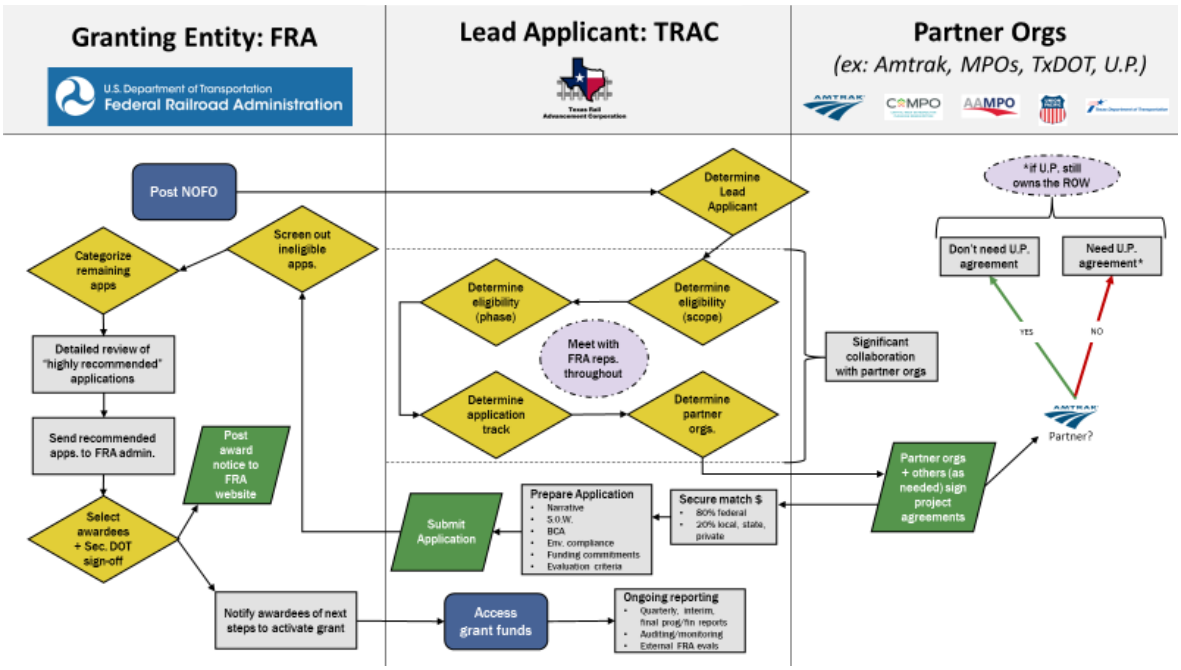
Federal Transit Administration Urbanized Area Formula Grants[73]

This program makes federal funds available for transit capital and operating assistance as well as transportation planning in urbanized areas. For the past several years, apportionments to this program have amounted to about $5B.[74] As a result of the Bipartisan Infrastructure Bill, the latest apportionment was nearly $7B for FY 2022, with Austin, San Antonio, and San Marcos receiving $44M, $43M, and $4M respectively.

Federal Highway Administration (FHWA) Congestion Mitigation and Air Quality Improvement (CMAQ) Program[75]

This program provides funding for state DOTs, local governments, and transit agencies for projects that reduce emissions and reduce regional congestion. Projects must be in EPA-designated nonattainment or maintenance areas.

[73] "Urbanized Area Formula Grants - 5307 | FTA."
[74] "Fy-2022-Full-Year-Apportionment-Table-3-Section-5307-Urbanized-Area-Formula.Xlsx."
[75] "Alternative Fuels Data Center."



Federal-State Partnership for Intercity Passenger Rail Grant Program[76]

Reflecting the Biden administration's prioritization of rail infrastructure, the federal government made over $4.5B in funding available for capital projects outside the Northeast Corridor intended to reduce the state of good repair backlog, improve performance, or expand or establish new intercity passenger rail service, including privately operated intercity passenger rail service.

Rebuilding American Infrastructure with Sustainability and Equity (RAISE), formerly BUILD Grants[77]

This program provides aid to projects with significant local or regional impact, particularly those that are harder to support through other DOT programs. Projects are evaluated on criteria such as sustainability, mobility, community connectivity, innovation, and opportunity, among others.

Restoration and Enhancement (R&E) Program[78]

The R&E program funds operating assistance grants for intercity rail transportation. Eligible projects could add frequency to current service, offer new on-board service, establish new service, extend of current service, or restore previously operated service.

[76] "Competitive Discretionary Grant Programs | FRA."
[77] "RAISE Discretionary Grants | US Department of Transportation."
[78] "Restoration and Enhancement Grant Program | FRA."

Consolidated Rail Infrastructure and Safety Improvements (CRISI) Program

The Consolidated Rail Infrastructure and Safety Improvements (CRISI) Program funds projects to improve safety, efficiency, and reliability of intercity passenger and freight rail. This program invests in a range of projects within the United States to improve railroad safety, efficiency, and reliability, and to mitigate congestion at both intercity passenger and freight rail levels to support more efficient travel and goods movement[79]. The Federal share of total costs for CRISI Program projects don't exceed 80%, and the minimum of the remaining 20% needs to be covered by the public or private sector. We recommend that the state designate money to put towards CRISI grants to have matching funds available for both freight and passenger rail projects. This can be done by establishing a banking system for states to use for capital projects and having the state allocate funds to that account every fiscal renewal.

FHWA Surface Transportation Block Grant (STBG) Program[80]

The Surface Transportation Block Grant program (STBG) provides flexible funding that may be used by states and localities for projects to preserve and improve the conditions and performance on any federal-aid highway, bridge and tunnel projects on any public road, pedestrian and bicycle infrastructure, and transit capital projects, including intercity bus terminals. At the least, this program could be used to fund auxiliary construction needed to make the *Bluebonnet Express* achieve optimal pedestrian connectivity.

Federal Transit Administration Capital Investment Grant (CIG) Program[81]

CIG funds transit investments, including various types of rail transit, rapid bus, and street cars. The program requires agencies seeking funds to complete project development and engineering before receiving a construction grant agreement. Projects must also be rated by FTA at various points.

Federal Transit Administration State of Good Repair Grant Program[82]

This program provides capital assistance for maintenance, replacement, and rehabilitation projects of high-intensity fixed guideway and bus systems to help transit agencies maintain assets in a state of good repair. Funds are capped at 80% of the net capital project cost.

[79] Federal Railroad Administration, "Consolidated Rail Infrastructure and Safety Improvements (CRISI) Program."
[80] "Bipartisan Infrastructure Law - Surface Transportation Block Grant (STBG) Fact Sheet | Federal Highway Administration."
[81] "Capital Investment Grants Program | FTA."
[82] "State of Good Repair Grants - 5337 | FTA."

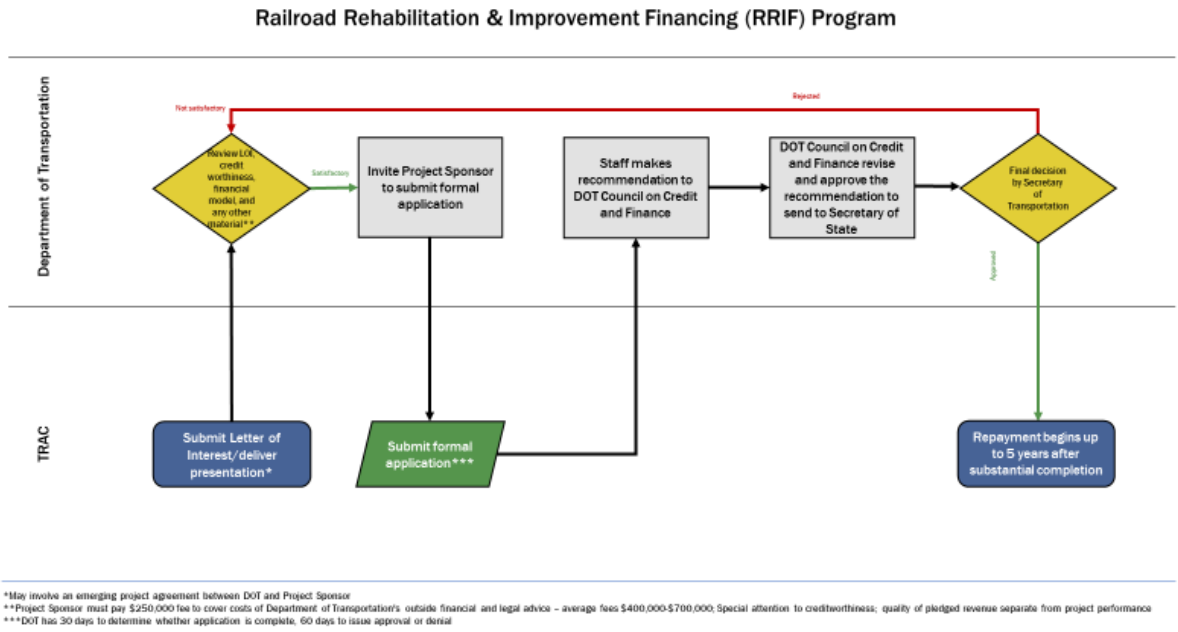
Table 5: Fiscal Year 2018 Federal Expended by Transit Agency (Millions USD)

Commuter System	FTA Capital Investment Grant Program	FTA State of Good Repair Program	FTA Urbanized Area Formula Grant Program	FTA Urbanized Area Formula Grant Program - O&M	Other DOT grant programs	Total DOT Funds
Trinity Railway Express (TRE)	$7.2	$8.6	$62.8	-	$6.1	$84.8
MetroRail	$1.3	$3.2	-	$51.6	$7.1	$63.2
A-train	-	-	$1.6	$2.8	-	$4.3
TEXRail, TRE	$192.4	-	$13.9	-	-	$206.3
Caltrain	$116.3	$26.6	$33.7	-	$0.2	$176.8

5.5.4. Financing Streams

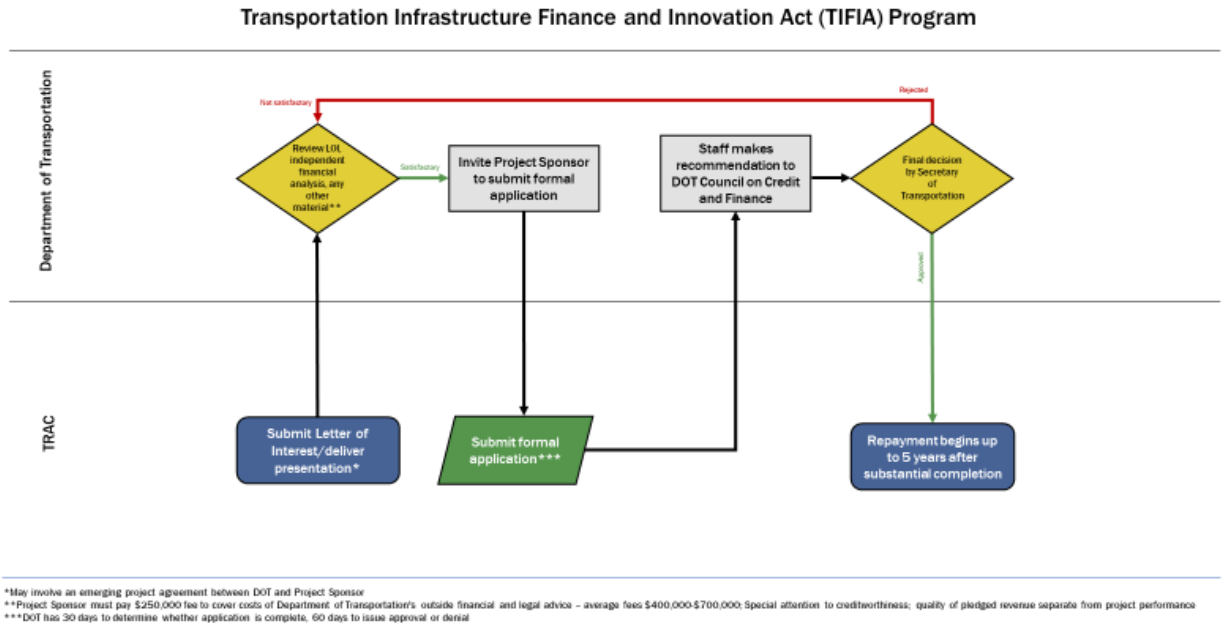
RRIF

The Railroad Rehabilitation and Improvement Financing (RRIF) Program authorizes the Federal Railroad Administration (FRA) to provide direct loans and loan guarantees up to $35B to finance development of railroad infrastructure. The funding may be used to acquire, improve, or rehabilitate rail-related facilities or equipment. These can include track and its components, bridges, yards, buildings, and shops. It can also be used to refinance outstanding dept and develop or establish new rail-related intermodal or railroad facilities. While direct loans can fund up to 100% of a railroad project, FRA prefers the provision of equity of projects. The loan term period is up to 35 year. TRAC is eligible for RRIF and the research team recommends this being one of the funding sources.



TIFIA

Eligible applicants for TIFIA assistance include state and local governments, railroad companies (including Amtrak), transit agencies, and private entities. DOT encourages project sponsors to reach out prior to submitting a letter of interest in order to maximize the likelihood of developing a successful application. In application evaluation, DOT and third-party advisors pay special attention to creditworthiness and quality of pledged revenue separate from project performance. The TIFIA program provides funding for up to 49% of total project costs (though DOT tends to award no more than 33% to share risk). The senior debt obligations and ability to repay must receive 1-2 investment-grade ratings, and debt must be repaid with dedicated revenue stream. Loans and letters of credit are offered at a fixed treasury rate. Loans may be deferred for up to five years after substantial completion of the project for a term up to 35 years and are typically subordinate debt. TIFIA eligible projects are generally also eligible for tax-exempt private activity bonds. The TIFIA program is seen as predictable but slow and bureaucratic as well as increasingly risk–averse as recent awards have gone to relatively low-risk projects which could secure more conventional sources of funds.



5.5.5. Legislative asks

The NEPA process aims to assess and clearly disclose the environmental impacts of federal actions to both decision makers and the public at large. It requires federal actions to be considered for their potential impacts on the environment (ecological, aesthetic, historical, cultural, economic, social, health-related). It is estimated that a typical Environmental Impact Statement (EIS) costs between $250,000 and $2 million.[83] To be federally funded, an infrastructure process must go through a NEPA process. The research team recommends that the State of Texas make the funding available to finance these processes either through various infrastructure funds or through infrastructure banks.

In March 2023, the Norfolk Southern train derailment in East Palestine, Ohio highlighted some of the shortcomings of freight rail regulations. On February 3, 2023, Senators Brown, Vance, Casey, Rubio, Fetterman, and Hawley introduced the Railway Safety Act of 2023. This legislation has the goal of preventing and mitigating any further derailments of trains carrying hazardous materials.[84] The key provisions include: enhancing safety procedures for all trains carrying hazardous materials; preventing wheel bearing failures; requiring two-person crews; making rail carriers pay for their wrongdoing; supporting communities impacted by rail disasters; and, investing in the next generation of safety improvements. To assure the safety of all its constituents, we recommend that the State of Texas supports all the federal safety regulations pertaining to freight rail and add further safety regulations when needed.

[83] Government Accountability Office, "Little Information Exists On NEPA Analyses."
[84] Brown et al., "One Pager for Railway Safety Act of 2023."

State Infrastructure Banks (SIB) are transportation loan programs that provide innovative financing methods to communities to help them with infrastructure needs. The program allows borrowers to access capital funds at or below-market interest rates. It also operates as a revolving fund, where the account balance grows through the monthly interest earned and repaid principal and interest payments. In Texas, SIB financial assistance can be granted to any public or private entity authorized to construct, maintain, or finance an eligible transportation project. Most of the eligible projects need to be on TxDOT highway system. The research team recommends that Texas SIB expands their program to fund a more extensive range of programs and not just the ones that are related to highways. Communities may apply for at-grade crossing improvements and other rail-adjacent improvements.[85]

As NAFTA trade keeps growing and bringing more products through Texas, it brings many benefits to job creation in the Lone Star State and the country. However, about 48% of U.S. NAFTA products are transported through Texas using the I-35 corridor, which puts a big strain on the Austin-San Antonio corridor. There is a need for a NAFTA freight development program with a private user fee bond to finance capital projects. This way, a better and faster rail line can be built with user fees and can increase the efficiency of freight transit through Texas, without putting a strain on the residents of the state.

5.5.6. Operations

Table 6: FY 2019 Operating Cost by Commuter System (Millions USD)

Commuter Rail System	Route Miles	Stations	Operating Costs
TRE	34	10	$33.8
Red Line	64	9	$19.3
A-train	43	6	$15.4
TEXRail	52	9	$19.2
Caltrain	155	32	$136.3

[86]

Figure 18 shows how selected commuter rail lines are funded. Of the Texas examples, most seem to be funded overwhelmingly by local government and taxes. As such, operating expenses for the Bluebonnet Express should be shared between cities that have stations, with Austin and San Antonio covering the largest shares. These expenses can be covered by federal grant programs or various local revenue sources.

[85] Federal Highway Administration, "State Infrastructure Bank (SIB) - Transportation Loan Program."
[86] Von Ah, "Commuter Rail: Information on Benefits and Funding Challenges for Service in Less Urbanized Communities."

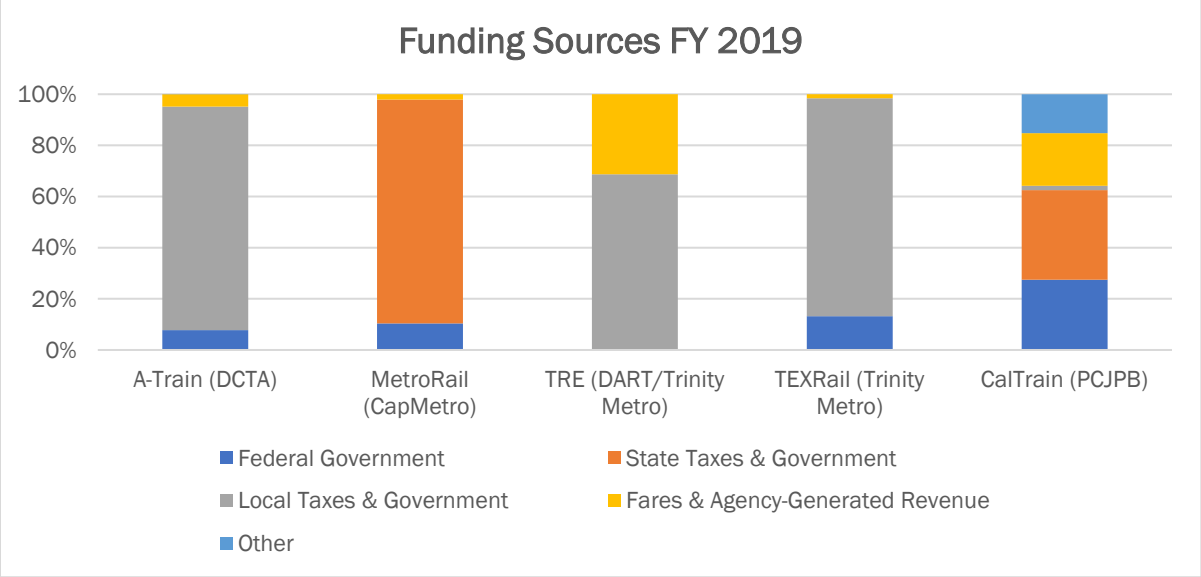
Restoration and Enhancement (R&E) Program[87]

The R&E program funds operating assistance grants for intercity rail transportation. Eligible projects include additional frequency of current service, offering new on-board service, establishing new service, extension of current service, and restoration of previously operated service.

State and Local Financing Funding Sources for Commuter Rail

- Motor Fuels Tax
- Dedicated Specific Fees/Taxes
- State Transportation Fund
- State General Fund
- Regional Transportation Authorities
- State and Local Bonds

Figure 18: Funding Sources for Operating Expenses (Source: Von Ah)



5.6. Station Areas

A new commuter rail system between Austin and San Antonio would provide a unique opportunity to develop/redevelop the areas near rail stations. A high-performance rail station is a valuable amenity that can be used to attract residents, investments, businesses and jobs, express and defined community character, and serve as a hub for other types of mobility. Unlike financing and governance structures, stations and station areas are the visible, tangible portions of implementing high-performance rail. Stations

[87] "Restoration and Enhancement Grant Program | FRA."

and station areas are public-facing physical objects that residents will interact with regularly and largely serve as the face of the system. For this reason, it is important that station areas are beautiful, sustainable, culturally appropriate, and context sensitive. This portion of the report will highlight best practices in station area land use, station design, and multi-modal connections.

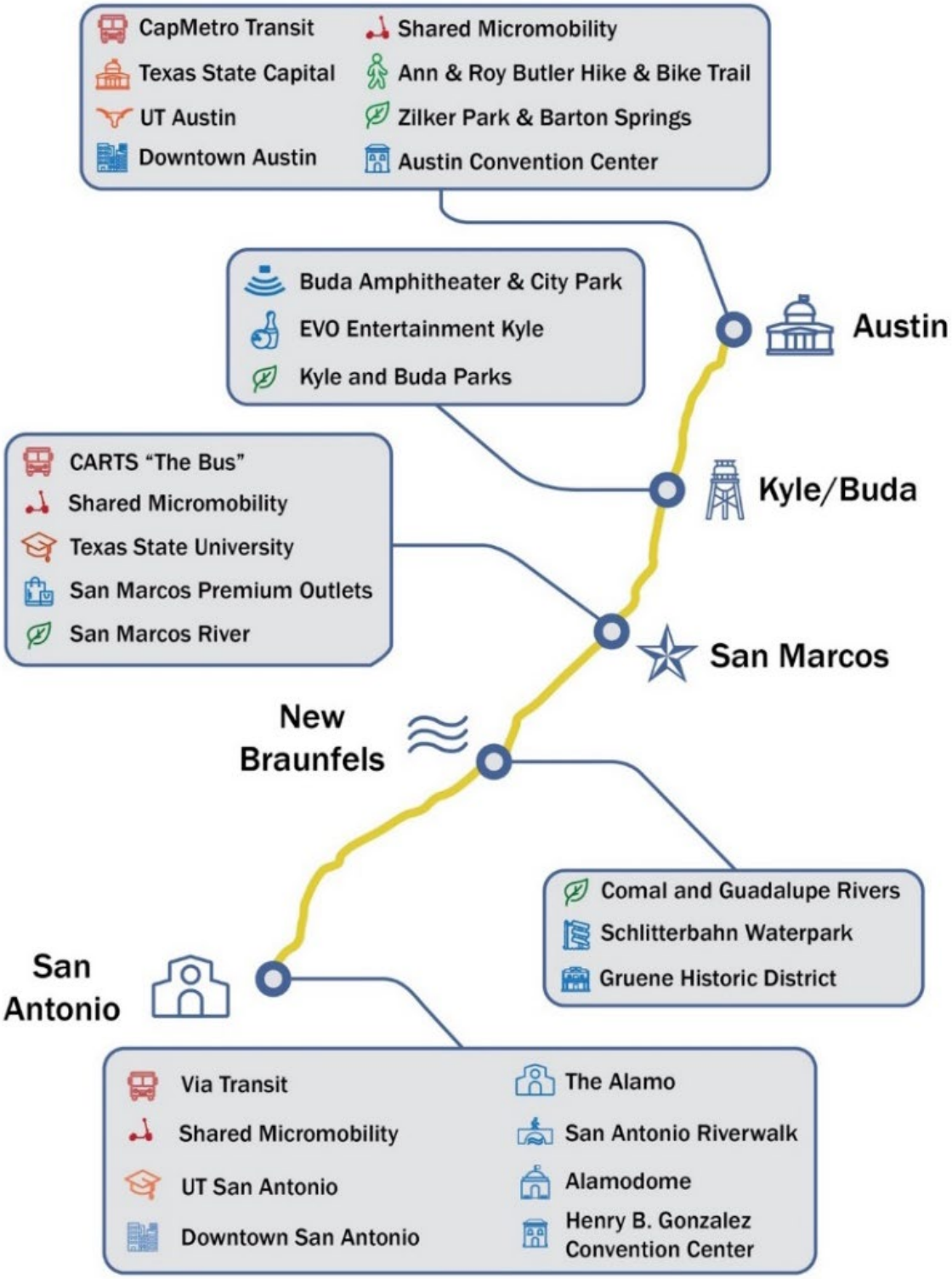
5.6.1. Station Locations

The preferred alternative has five proposed passenger rail stops:

- Downtown Austin (existing)
- Kyle/Buda
- San Marcos (existing)
- New Braunfels
- Downtown San Antonio (existing)

The stops in Austin, San Marcos, and San Antonio are proposed to be at the existing Amtrak stations. We are proposing a joint Kyle/Buda station located between the two cities, but stopping in both downtown Kyle and downtown Buda is another alternative. Stops in both Kyle and Buda would slow travel times between Austin and San Antonio but would also serve the growing downtowns of both cities. The New Braunfels stop would likely be located at the current Union Pacific railyard in downtown New Braunfels. We are proposing to connect the major population and employment centers with this passenger rail line, with an eye towards potential expansion in a later phase. Expansion would occur in the Austin and San Antonio suburbs including Round Rock, Cedar Park, Live Oak, and southwest San Antonio.

Figure 19: Existing transit providers and destinations at stations



5.6.2. Land Use

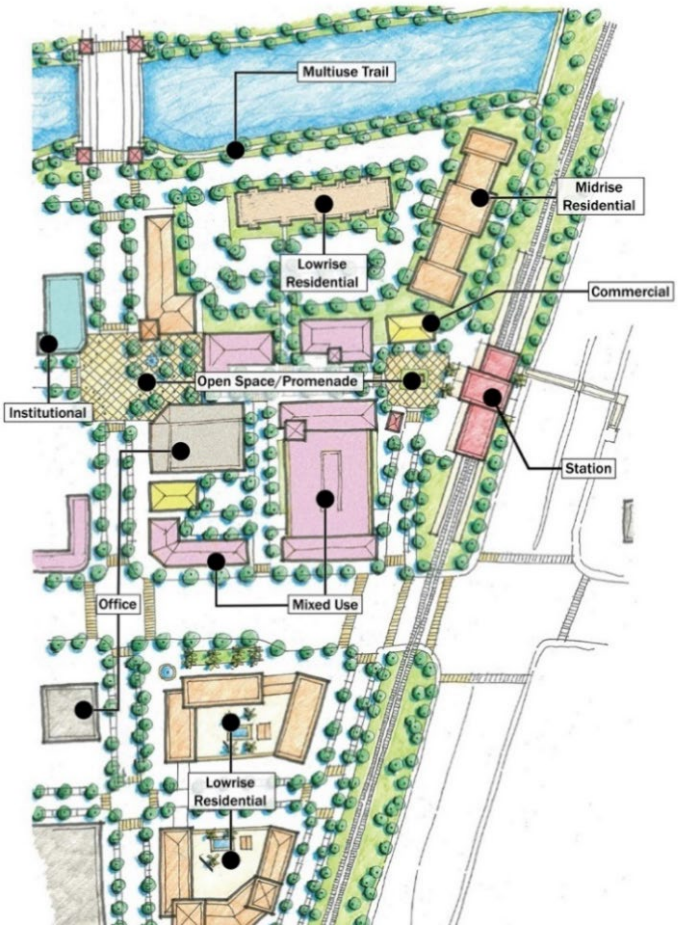
Land use is key to getting the most out of station areas—both for citizen quality of life and as a source of revenue. The amenity of station can be surrounded with other complimentary amenities, services, and features to create *a destination.* Because land values are highest near the stations and decrease the farther away a development is, developers are incentivized to build up, not out. This creates density of homes, jobs, and amenities. When density is centered around a transportation amenity, it is often called transit-oriented development, or TOD. By positioning jobs, housing, and services near a transit stop, you make them more easily accessible by walking or biking, thus reducing or eliminating automobile trips. This reduces congestion, greenhouse gas and emissions, automobile dependency, and increases transit ridership [88]. However, density provides many other benefits besides those directly tied to transportation, accessibility, and mobility. Some of the main benefits are listed below:

- Lower infrastructure costs for governments – By concentrating development, jurisdictions are able to reduce the per-unit cost of public services such as utility lines, roads, and fire protection.[89]
- Can attract new employers – By making transportation to work easy and being located near amenities, density has the chance to attract new employers.[90]
- Support local businesses and retail that relies on foot traffic – Cafes, restaurants, and boutique retailers all benefit from increased foot traffic that comes with more people and less auto trips.[91]
- Increased tax base – more businesses, more residents, and more jobs within the same area increases the tax base and revenue for a jurisdiction.[92]
- Walkability improves health - Compact cities have been shown to have lowers rates of diabetes, cardiovascular disease, and respiratory disease.[93]
- Better for the environment – Besides reducing greenhouse gas emissions from cars, high density development is more energy efficient, produces less air and water pollution, and allows for more natural areas.[94]
- Increased housing supply and affordability – Density does exactly what is says: provides more houses on a unit of land, thus increasing the potential housing supply. When housing is in greater supply, it is generally cheaper.[95]

[88] Federal Transit Administration, "Transit-Oriented Development"; Haughey, "Higher Density Development: Myth and Fact"; MetroTex, "Pros and Cons of High Density Housing"; US EPA, "Smart Growth and Affordable Housing."
[89] Haughey, "Higher Density Development: Myth and Fact"; MetroTex, "Pros and Cons of High Density Housing"; Partnership for Strong Communities, "The Benefits of Density & Affordability"; US EPA, "Smart Growth and Affordable Housing."
Haughey, "Higher Density Development: Myth and Fact"; MetroTex, "Pros and Cons of High Density Housing"; Partnership for Strong Communities, "The Benefits of Density & Affordability"; US EPA, "Smart Growth and Affordable Housing."
[90] MetroTex, "Pros and Cons of High Density Housing." MetroTex.
[91] Schuetz, Baca, and McAnanney, "'Gentle' Density Can Save Our Neighborhoods." Schuetz, Baca, and McAnanney.
[92] MetroTex, "Pros and Cons of High Density Housing." MetroTex.
[93] Stevenson et al., "Land Use, Transport, and Population Health."Stevenson et al.
[94] Federal Transit Administration, "Transit-Oriented Development"; Haughey, "Higher Density Development: Myth and Fact"; Schuetz, Baca, and McAnanney, "'Gentle' Density Can Save Our Neighborhoods"; US EPA, "Smart Growth and Affordable Housing"; US EPA, "Protecting Water Resources with Higher-Density Development."
[95] Federal Transit Administration, "Transit-Oriented Development"; Partnership for Strong Communities, "The Benefits of Density & Affordability"; Schuetz, Baca, and McAnanney, "'Gentle' Density Can Save Our Neighborhoods."

- Profitability for developers – By lower land cost per housing unit, developers can turn more profit.[96]
- Increase overall affordability and equity – Transportation costs are the second highest household expenditure (behind housing itself) and disproportionally burden low-income residents.[97] Although housing cost may be lower farther from a city center, transportation costs increase. Density can be a way to drive down housing plus transportation (H+T) costs.[98]
- More social mixing – Density, particularly when it has housing, jobs, and amenities that cater to a mixed of incomes, increases social mixing, which can lead to more diversity, tolerance, understanding, and innovation.[99]

Figure 20: Example TOD (Source: City of North Miami Beach)



Zoning is the primary way to increase density. Zoning "establishes the types of uses permitted on a parcel of land. Zoning also sets the development standards for a site such as building height, setbacks, floor to area ratio, neighborhood compatibility, screening, landscaping, and impervious cover limits."[100] By adjusting zoning to allow for multifamily housing or mixed-use buildings to be built on certain parcels, a jurisdiction can promote density. Near the Kyle/Buda, San Marcos, and New Braunfels stations, low- to mid-rise apartment buildings, rowhouses, cottage courts, quadplexes, triplexes, and duplexes are appropriate. In Austin and San Antonio low- and mid-rise apartments are more appropriate. Zoning can also be altered using a zoning area or station overlay, where the base zoning remains in place unless specifically altered to increase density. Permitting accessory dwelling units (ADUs) and making the

[96] Federal Transit Administration, "Transit-Oriented Development"; Partnership for Strong Communities, "The Benefits of Density & Affordability."
Federal Transit Administration, "Transit-Oriented Development"; Partnership for Strong Communities, "The Benefits of Density & Affordability."
[97] Buraeu of Transportation Statistics, "Transportation Economic Trends."
Buraeu of Transportation Statistics.
[98] US EPA, "Smart Growth and Affordable Housing."
US EPA.
[99] Jacobs, *The Death and Life of Great American Cities*.
Jacobs.
[100] City of Austin, "Neighborhood Plan Contact Team Training Sheet: Land Use and Zoning."
City of Austin.

subdivision of lots simple is another way to increase density on single-family lots.

Lastly, it is important to note that transportation-induced displacement can be a negative byproduct of densifying station areas. Rail projects have been shown to gentrify neighborhoods through changing cultural characteristics and displace existing residents because of increased costs.[101] It is important to pair densifying station areas with anti-gentrification and anti-displacement measures. This can include the provision of affordable housing in new development, homestead exceptions, and/or culturally sensitive businesses, art, and space programming.

5.6.3. Station Design

Figure 21: An artist's rendering of the San Marcos station for Lone Star Rail (Source: KVUE)

Station design itself is also an important feature of a successful transit system. As noted earlier in this report, some of the existing Amtrak stations lack basic amenities such as ticket kiosks, bathrooms, or hot food or drink. None of the stations are inviting to passengers and some lack vital safety and accessibility design elements. New stations on a high-performance rail line between Austin and San Antonio must be an upgrade to the existing stations. Stations act as a gateway to both the rail system and the community the station is in and is thus a representation of both. Distinctive stations grounded in local culture can provide a distinct placemaking experience for cities. The stations should be functional, accessible, safe, and beautiful. More details are provided below:

- Functional: Most importantly, stations need to have basic amenities. This includes seating, bathrooms, water fountains, trash cans, ticket counter/kiosks, wifi, vending machines, and

[101] Bardaka, Delgado, and Florax, "Causal Identification of Transit-Induced Gentrification and Spatial Spillover Effects"; Hess, "Light-Rail Investment in Seattle."

optimally hot food and drink. Additional functional elements include outlets, system information, helpful wayfinding and signage, lockers, and good lighting. All stations should also have a fully enclosed structure with air conditioning and heating. Station size should be consistent with expected ridership.

- Accessible: All stations should be ADA compliant. Other accessibly elements include tactile strips on pavement, both auditory and visual announcements, elevators when necessary, platforms level with train boarding height, and wheelchair accessible ticket services, water fountains, door, and walkways.
- Safe: Safety is an important concern in station design, especially if users of the system will be expected to cross the railroad tracks at grade. Track crossings should have visual and auditory signals that warn of an oncoming train, as well as barriers to stop people from crossing the tracks. Fences, hard curbs, rumble strips, and more can be used to separate people, bikes, and vehicles from the tracks. Stations and waiting platforms should also be well lit to promote safety.
- Beautiful: Stations should also be pleasant to look at and be inside of. Context sensitive art, landscaping, and design elements are key to creating a beautiful station.

Statement architectural pieces can make for a beautiful train station, but they must be backed up by basic amenities, accessible elements, and safe design.[102]

Figure 22: Beautiful train stations from around the world

Figure 23: Wardlow Station, CA (Source LA Metro Callouts: report authors)

[102] METRA, "Commuter Rail Station Guidelines and Standards"; Metropolitan Council, "Station and Support Facility Design Guidelines User Guide"; NACTO, "Transit Street Design Guide."

Figure 24: Leipzig Station, Germany (Source: Der Spiegel Callouts: report authors)

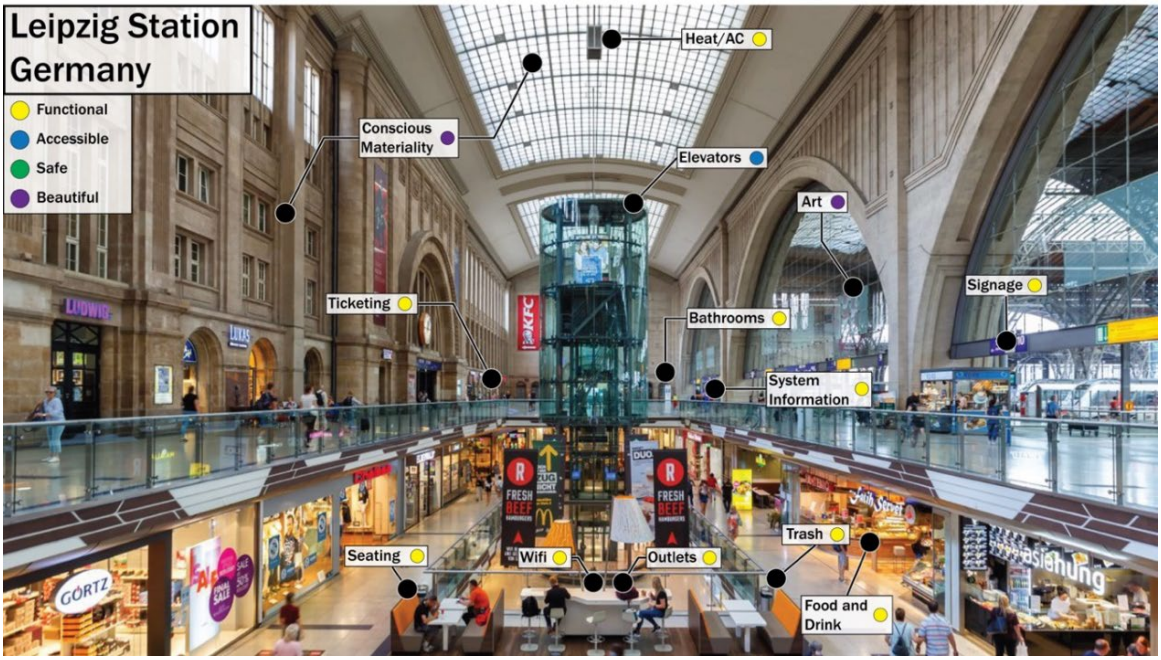
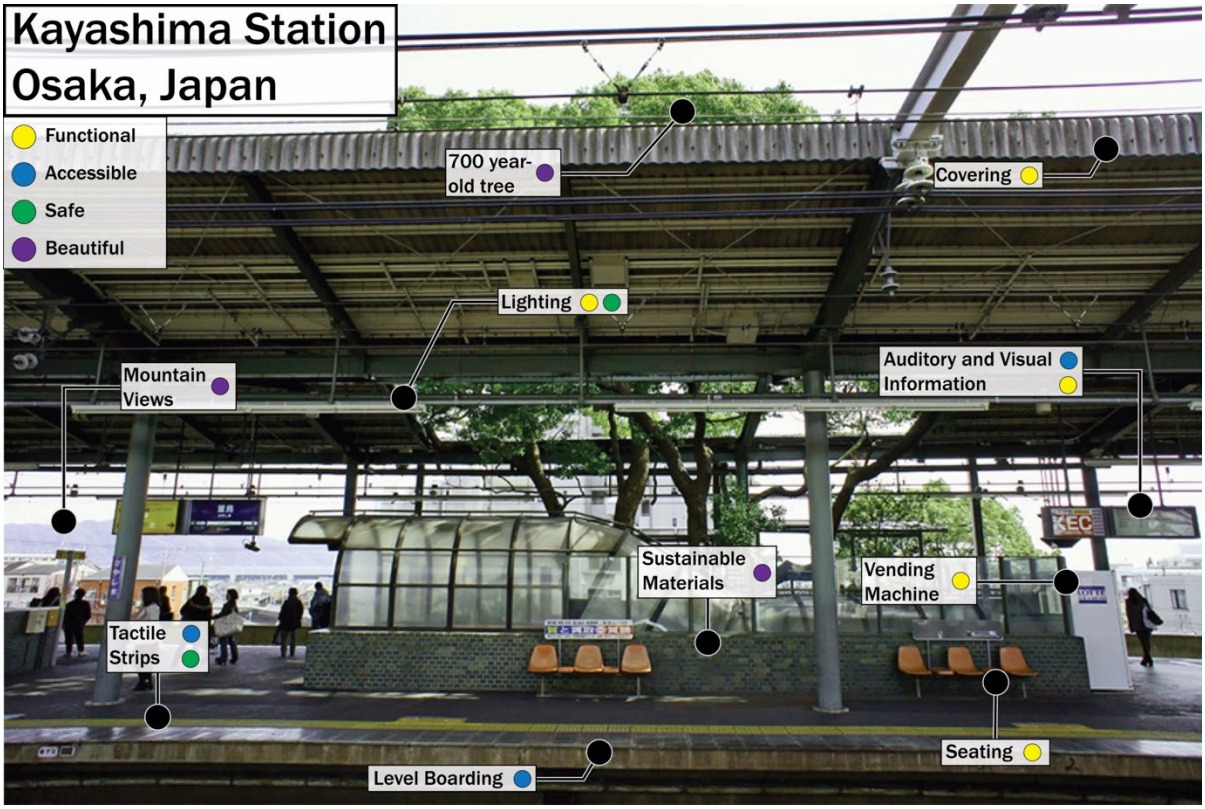


Figure 25: Kayashima Station, Osaka, Japan (Source: This is Colossal Callouts: report authors)

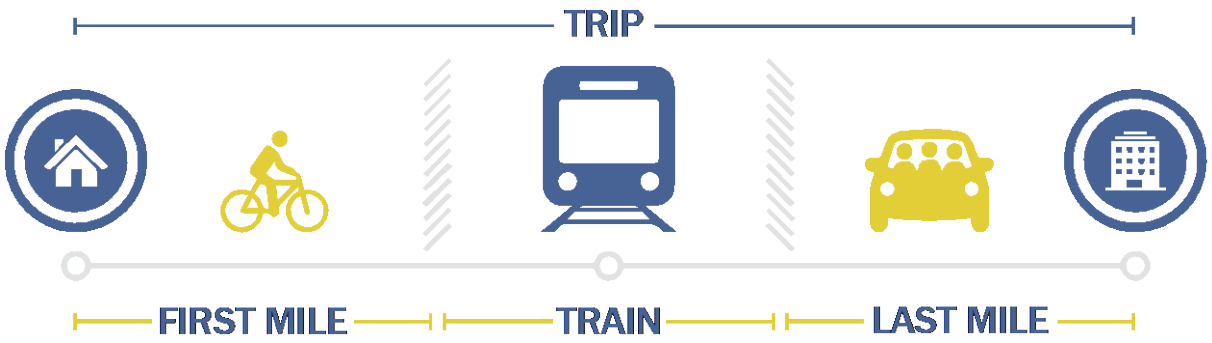


5.6.4. Multimodal Connections

Multimodal connections are key to increasing ridership and improving quality of life. Current modal multimodal connections at the Taylor, Austin, San Marcos, and San Antonio stations are lacking and/or unsafe. By expanding access to rail stations to people without a car, agencies make train stations accessible for all residents and thus increase ridership. Designing stations and the surrounding areas to encourage walking, biking, micro-mobility, transit, TNCs[103], and, as a last resort, park-n-rides, has been proven to increase rail ridership and expands network coverage.[104] Timed bus transfers are particularly crucial to ensuring that multimodal connections boost ridership. By providing options for the first/last mile to/from transit, agencies encourage people of all incomes, ages, and abilities to use rail. The 'first mile' is getting from your start point (e.g., your home) to a stop/station. The 'last mile' is getting from the station/stop to your final destination (e.g., your job).[105] Providing multimodal options at stations helps solve the first/last mile problem.

[103] Uber, Lyft, or similar
[104] Freeland et al., "Walking Associated With Public Transit"; Geurs, La Paix, and Van Weperen, "A Multi-Modal Network Approach to Model Public Transport Accessibility Impacts of Bicycle-Train Integration Policies"; Nam et al., "Designing a Transit-Feeder System Using Multiple Sustainable Modes"; Teng et al., "High-Speed Rail Station Interconnectivity and Ridership."
[105] RTD, "First and Last Mile Strategic Plan."

Figure 26: First and last mile (Source: RTD Denver)



The following strategies can be used to provide multimodal infrastructure and services to/from stations[106]:

- Timed transit (local bus, BRT, and light rail) routes that are based on train departure/arrival times
- Bike parking, as well as safe bike routes to and from stations
- Allow bikes on trains
- Showers and changing areas
- Sidewalk and trail connections
- Crosswalks, pedestrian signals, and sufficient crossing times
- Location of jobs, services, and housing units near stations
- Bike and scooter share options
- Designated TNC pick-up/drop-off areas
- Some vehicle parking

[106] US DOT, "Multimodal Access to Public Transportation."

Figure 27: Anaheim Regional Transportation Intermodal Center (Source: Rethinking the Future Callouts: report author)

6. Conclusion

The difficult job of imagining what does not already exist has been done. This report set out to create a vision that inspires: an Austin-San Antonio corridor optimized for safety and connectivity and that serves a 21st century Central Texas. Reasons to pick up the charge are many, while reasons not to do so are inadequate and unimaginative.

Ongoing high-speed rail efforts in Florida and California prove that this country is still capable of building large projects. If it can be done elsewhere, it can be done here, and there is no cheaper or more appropriate time than the present.

Texas's location and resources should not be taken for granted. Rather, we should endeavor to keep building a Texas that remains competitive and ready to lead the economy of the future. This will require commitment of resources and political will, but by making these commitments, we can meet the demands of incredible growth, expanding economic activity, and a climate imperative.

Projects as large in scope as the **Bluebonnet Bypass** and the ***Bluebonnet Express*** represent an investment beyond mere physical infrastructure into what the future of Central Texas can look like. These projects would allow for a Central Texas with connected cities and clean multimodal options, preserved natural amenities, and expanded economic capacity; that is the example this region can set for our state and the rest of the nation.

7. Glossary

ADU:	Accessory Dwelling Unit
BRT:	Bus rapid transit
CRISI:	The Consolidated Rail Infrastructure and Safety Improvements Program
FRA:	Federal Railroad Administration
FTA:	Federal Transit Administration
Hazmat:	Hazardous Materials
LSRD:	Lone Star Rail District
NAFTA:	North America Free Trade Act
NARP:	National Association of Railroad Passengers
TNC:	Transportation network company
TRAC:	Texas Rail Advancement Corporation
TOD:	Transportation Oriented Development
TXDOT:	Texas Department of Transportation
UP:	Union Pacific Railroad

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