EXECUTIVE SUMMARY

This report is the start of a conversation to address deficiencies in the Houston region’s freight network (roads, ports, and railroads) and to develop ways to accommodate and capitalize on future freight movements. It identifies improvements that may provide relief to residents and the traveling public adversely affected by delays, interruptions, and noise attributed to the movement of freight within the region. It also identifies alternatives that may improve regional freight rail capacity by enhancing the efficiency and operations of the railroads.

This report identifies nearly $3.4 billion of improvements for the eight-county Houston region comprised of Harris, Fort Bend, Montgomery, Galveston, Waller, Brazoria, Liberty, and Chambers Counties, which are categorized as:

- Grade Separations (bridges to separate the railroad from streets) - $808 million
- Grade Crossing Closures (closing and rerouting the street at the intersection with the railroad) - $5.2 million
- Improvements to Existing Railroad Infrastructure (improving capacity and connectivity on existing rail lines) - $1.4 billion
- New Railroad Corridors - $1.1 billion

It is anticipated that the Houston region, through a cooperative effort of local governments, ports, and the newly-formed Gulf Coast Freight Rail District, will study this report – and add, subtract, modify, or use this information to develop a regional freight plan. The developed plan can then be incorporated into the region’s long range transportation plan developed by the Houston-Galveston Area Council, the designated metropolitan planning organization (MPO) for the region.

This report is the result of a two year Houston regional freight analysis, contracted by the Texas Department of Transportation (TxDOT), under the guidance of a regional steering committee chaired by TxDOT Houston District Engineer Gary K. Trietsch, P.E. The steering committee was comprised of representatives from local governments, transportation and transit agencies, major railroad companies, ports, congressional staff, chambers of commerce, industry representatives, the MPO, and other interested parties.
The Houston Region Freight Study identifies existing and projected truck and freight rail transportation operations, bottlenecks, and constraints with the goal of establishing a slate of potential infrastructure improvements geared toward providing solutions that may resolve the problems associated with rising congestion levels and the expected growth of commodity movements in Houston.

Over the next twenty years, given growth rates for both vehicle and train traffic, the total public cost of delay at the roadway-rail crossings in the eight-county Houston region is estimated to be more than $2.6 billion. The cost of lost time is estimated at $2.3 billion; the cost of collisions is estimated at $146 million; and the combined cost of emissions and wasted fuel is $191 million. The estimated public benefit of the grade separations and crossing closures identified in this report is more than $828 million.

Houston’s freight movement is forecasted to nearly double in volume by 2025, causing concerns of how this will impact regional mobility, and where future infrastructure investments should be made.

There are approximately 1,200 roadway-railroad crossings with a daily volume of almost five million vehicles within the Houston region. The Federal Railroad Administration (FRA) has reported for Harris County alone, more than 300 incidents between trains and vehicles at public and private railroad crossings occurring since January 2000, including more than 90 injuries and seven fatalities. The grade separations and crossing closures identified in this report play an instrumental role in improving public safety at roadway-rail crossings within the region.

An improved rail system can promote continued growth in the local economy as well as support the shifting of truck cargo to rail cars, potentially providing congestion relief on regional freeways. It can strengthen the region's global competitiveness in goods movement, and help citizens reap the benefits associated with economic growth and vitality. This report recognizes that improvements made to the region’s transportation infrastructure must describe both public and private benefits, so that the costs for the improvements are apportioned in a fair and balanced manner to all parties involved.
Identified Improvements
At an estimated cost of **$808 million**, 55 identified grade separations would separate railroad lines from streets, thereby reducing safety hazards and delays. For the citizens in Houston’s inner city neighborhoods, it means freedom from blocked intersections and backed-up vehicles on the streets. It also means improved safety by allowing emergency and law enforcement vehicles to respond without delay, while improving the quality of life for residents in the impacted neighborhoods. The estimated public benefit value of the identified grade separations totals nearly **$730 million**.

Also identified are 63 locations where grade crossings may be closed with an estimated cost of **$5.2 million**. These safety improvements minimize conflict points between trains and cars by closing crossings and encouraging motorists to use grade separated roadways, or alternate streets, which have better safety systems in place. The estimated public benefit value for the crossing closures totals more than **$98 million**.

Five of the crossing closures analyzed in this report include pedestrian bridges. For example, a pedestrian bridge is shown for the Runnels Street crossing located in downtown Houston where children cross the railroad tracks to travel between home and school. The photos below show before and after pictures of a potential pedestrian bridge at Runnels Street. These pedestrian bridges improve community safety by providing a safer route of travel between homes, commercial areas, and schools.

In addition to improvements addressing safety to the traveling public, the report also identifies 33 rail capacity improvements, at an estimated cost of **$1.4 billion**. Two separate rail relocation alternatives at an estimated cost of nearly **$1.1 billion** were also investigated.
Rail capacity enhancements augment economic growth of the region by improving the efficiency of freight rail operations as well as minimizing disturbances to residents thus improving their quality of life. Improvements to the rail system relieve congestion along existing rail corridors, permitting the trains to pass through the region more quickly. The rail improvements analyzed can be categorized as follows:

- Adding a mainline track
- Adding track adjacent to existing mainlines at strategic locations to allow trains to pass one another or to idle without causing delays
- Constructing connections from one rail line to another to improve rail traffic mobility
- Expanding rail yard capacity
- Relocating rail yards and/or facilities that accommodate trailers and containers by ship, rail, and truck referred to as “intermodal facilities.”

**Existing Freight Rail Operations**

Approximately 2,200 trains per week travel within the Houston regional rail network, which is comprised of tracks owned and operated by the Union Pacific Railroad (UPRR), the BNSF Railway Company (BNSF), and the Port Terminal Railroad Association (PTRA). The Kansas City Southern Railway Company (KCS) has the right to operate their trains over the UPRR and BNSF tracks as well. The region’s infrastructure includes more than 800 miles of mainline tracks and 21 miles of railroad bridges.

The activity at the major rail yards located within the region is a contributing source of the congestion-related delay, and the key to delay relief. Almost half (48%) of all the trains in the network are local trains and rail yard engines. Of the trains in the Houston regional network simulation model, less than five percent operate completely through the region without having to stop in Houston to pick up or drop off rail cars.

The freight trains in the Houston region carry freight cars coming into, or leaving, the Houston, Dayton, Baytown, Bayport, and Beaumont industrial complexes. The freight carried on these trains is mostly for local business, and since it is shipped in carloads, must be sorted by destination (customer) at one or more of the major Houston yards. This traffic is predominantly local business, for local customers. Most of the trains carry chemicals, and/or heavy bulk commodities like coal, grain, rock/aggregate, and coke. This heavy industrial cargo accounts for about 84% of Houston’s rail activity.
Within the Houston region, the railroads provide rail service to more than 900 customers. Although not a direct indication of the location of each and every customer within Houston’s IH-610 loop, Figure 1 shows the general locations, excluding those that are along the ship channel or the Port areas, of existing tracks that extend out from the main tracks that could serve rail customers.

![Figure 1: Approximate Industry/Customer and Spur Track locations](image)

Rail improvements investigated to relieve rail congestion and test alternative routes were analyzed using Rail Traffic Controller (RTC), the same freight rail traffic modeling software used by the freight railroads. Four planning cases, representing a total of 12 improvements and/or relocations, were investigated with the ultimate goal of improving train mobility and efficiency, and addressing the areas of greatest congestion within the network.

As a result, the planning case improvements primarily address large terminals, such as Settegast and Englewood Yards, and bottlenecked locations such as single track bridges that connect double mainline tracks.
Public and Private Benefits
The public benefits estimated for the rail improvement planning cases were determined based on the change in the volume of train traffic at roadway-rail crossings in the region due to the improvements. The impact of potential commuter rail operations on existing rail infrastructure has not been included in the current public benefits calculations.

Anticipated public benefits of identified improvements include reduced vehicular delay times due to passing trains at roadway-rail crossings, reduced vehicle and locomotive fuel consumption, improved air quality, improved public safety, improved mobility for vehicular and freight traffic, reduced noise and vibration, and increased freight movement capacity.

The private benefit values were estimated based on calculated delay hours per day operated over the Houston rail network for each planning case. An average cost of $303 per train delay hour, based on estimated costs applicable to fuel consumption for idling locomotives, train crew labor costs, and the unavailability of locomotive power was used to determine an estimated private burden.

Planning Case Results and Comparisons
In general, the planning cases consisted of:

- Planning Case 1 – which tested improvements intended to unlock the congestion at the locations identified as most problematic;
- Planning Case 2 – which tested improvements that add capacity to existing mainline tracks, increasing train speeds and improving train performance;
- Planning Case 3 – which investigated creating a new rail corridor in Fort Bend County that bypasses the existing Rosenberg to Houston line; and
- Planning Case 4 – which investigated creating a new rail corridor that bypasses the east side of Houston.

More than $1.4 billion of the $3.4 billion in identified improvements were tested in the planning cases described above, which included establishing estimated public and private benefits for each planning case as shown below in Table 1.

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<th>Planning Case</th>
<th>Total Estimated Cost*</th>
<th>Total Estimated NPV Private Benefit (over Base Case)**</th>
<th>Total Estimated NPV Public Benefit (over Base Case)**</th>
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*Planning case costs are cumulative and rounded up to three significant figures. For example, Planning Case 3 costs include the costs of Planning Case 1 and 2 improvements as detailed on the following pages.

**Estimated private and public benefits shown are based on a 20-year study period.
As shown in Table 1, Planning Case 1 is the least expensive group of improvements, yet yields the highest benefit/cost ratio. This package of improvements significantly reduces the congestion-related delay on the railroad subdivisions that currently experience the worst problems.

The improvements included in Planning Case 2 build upon those identified in Planning Case 1. The additional main track from Dawes to Sheldon produced the best railroad results. An additional track from Rosenberg to West Junction in Houston, significantly reduced train delays along that line; however, adding capacity along this rail line may be opposed by the communities in the area.

The need for additional capacity, as described in Planning Case 2, serves as the foundation for testing a potential new rail corridor in Fort Bend County in Planning Case 3. Although the bypass alternative imposes a public cost burden by introducing train traffic along the new bypass route and increasing the number of trains on the existing Popp Subdivision and in East Houston, this burden is offset by a reduction in the public burden along the Glidden and Terminal Subdivisions, since the volume of train traffic on these subdivisions would be reduced. The additional train route miles associated with the Fort Bend bypass route in Planning Case 3 have shown to carry additional annual private burden to the operating railroads based on fuel consumption, train crew hours, and general transportation costs per track mile, and may therefore be opposed by the railroad companies.

The Dayton-Cleveland route included in Planning Case 4 was shown to benefit both the private and public sectors by reducing train traffic in the east end of Houston. The bypass alternative imposes a public cost burden due to the introduction of train traffic on the new Dayton to Cleveland route; however, this burden is offset by a reduction in the public burden along existing subdivisions such as the East Belt and Lafayette Subdivisions, since the number of freight trains along existing rail lines on the east side of Houston would be decreased.

The relocation of carload switching operations that currently take place at New South and Pearland (Mykawa) Yards may ultimately increase the benefits of this improvement. Initial analysis of hypothetical cases in which carload switching is relocated outside of Houston has shown that there may be a four to nine percent reduction in the number of trains operating on the East Belt Subdivision, and a 12 to 15 percent reduction in the number of trains operating on the West Belt Subdivision.

In summary, for an estimated cost of $195 Million, the relocation of carload switching operations at New South and Pearland Yards is estimated to produce a public benefit of approximately $64 Million. The estimated NPV private benefit to the railroads of the relocation is approximately $5.8 Million.

The planning cases are described in further detail in the following pages.
Planning Case 1
Planning Case 1 includes the following improvements as shown in Figure 2:

- Construct separate switching leads at Settegast Yard – will keep trains entering or leaving Settegast Yard off of the East Belt Subdivision main tracks. Estimated Cost: $6.3 million.
- Construct a separate switching lead between the north end of North Yard and Hunting Bayou – will keep trains entering or leaving PTRA North Yard off of the East Belt Subdivision main tracks. Estimated Cost: $8.5 million.
- Construct a second main track between Galena Junction and Manchester Junction – a new bridge and second track over Buffalo Bayou will relieve congestion on the PTRA Subdivision. Estimated Cost: $39 million.
- Construct a second main track between Sinco Junction and Deer Park Junction – will allow local service trains to operate on the PTRA while allowing additional trains to enter and leave the PTRA Subdivision. Estimated Cost: $28 million.
- Construct a second bridge across Buffalo Bayou on the East Belt - a new bridge and second main track over Buffalo Bayou will relieve congestion on the East Belt Subdivision. Estimated Cost: $9.6 million.
Planning Case 2 (2a and 2b)
Planning Case 2 includes all of the improvements in Planning Case 1 in addition to the following improvements as shown Figure 3:

- **2a:** Expand Englewood East to Dawes – will increase the receiving and departure capacity of Englewood Yard. Estimated Cost: $5 million.
- **2a:** Extend the existing second main track east from Dawes to Fauna and upgrade the trackage connecting the East Belt with the Lafayette Subdivision at Dawes – permit movements between New South Yard or points on the East Belt Subdivision south of Englewood and Dayton to take place without trains having to stop. Estimated Cost: $43 million.
- **2a:** Extend the second track on the West Belt Subdivision north from Freight Junction through Belt Junction to connect with the Palestine Subdivision – will remove the single track bottleneck between the two double track segments at Belt Junction. Estimated Cost - $4 million.
- **2a:** Remove train stopping requirements on the West Belt from Cullen Boulevard north to Tower 26 – either grade separate or close all of the crossings along this segment to allow for trains to stop without causing delays or safety hazards to the public. Estimated Cost: $50 million.
- **2b:** Add a second main track between Rosenberg and West Junction on the Glidden Subdivision – will relieve congestion by allowing trains to pass one another along the highly trafficked Glidden Subdivision. Serves as a basis of comparison against the Fort Bend bypass route included in Planning Case 3. Estimated Cost: $137 million.

Figure 3: Planning Case 2 Improvements
Planning Case 3 – Ft. Bend County Bypass Alternative

Planning Case 3 includes all of the improvements from Planning Cases 1 and 2 (2a), with the second track on the Glidden Subdivision from Planning Case 2 (2b) replaced by the Fort Bend bypass as shown in Figure 4, which is estimated to cost $880 million.

![Figure 4: Planning Case 3 Fort Bend Bypass](image)

The Fort Bend County bypass route would remove most through-freight trains from portions of the UPRR Glidden Subdivision between Rosenberg and West Junction, as well as UPRR’s Terminal Subdivision between West Junction and Eureka.

There are approximately 2,400 additional train miles weekly required with the Fort Bend Bypass scenario, which equates to between 124,000 and 125,000 additional train miles annually. These added miles accrue because the bypass route is longer than the present, more direct route via the Terminal and Glidden Subdivisions.
Planning Case 4 – Dayton to Cleveland Rail Corridor
Planning Case 4 includes all of the improvements from Planning Cases 1 and 2 in addition to a new bypass around the east side of Houston as shown in Figure 5, which is estimated to cost $212 million. This 34-mile long bypass would run from a junction with the Baytown Subdivision, near Dayton, north and west to a connection with the Lufkin Subdivision near Cleveland.

Trains that could be rerouted to this alignment include BNSF through trains operating between Beaumont or points east, and points west/northwest of Houston such as Temple and/or Teague. Trains that originate or terminate at Dayton, conveying traffic to or from Dayton, and which would not have to work at any other point in the Houston terminal, also were directed to this alignment.
Next Steps
As part of the Texas statewide analysis of freight mobility, in particular understanding the movement of freight by rail and the inherent relationships that exist between rail, trucking, and maritime freight shipments, this study was conducted to establish a needs assessment report for the stakeholders in the Houston region that outlines potential infrastructure improvements, and their associated order of magnitude costs.

The improvements outlined in this report are intended to provide the foundation for a conversation on infrastructure and facility modifications that will benefit the quality of life in the local communities, reduce the public’s exposure to freight movements, enhance economic growth and development, and improve passenger and freight mobility throughout the Houston region.

This needs assessment ultimately will assist the Texas Transportation Commission, and the State Legislature in understanding the magnitude and extent of the investment required to improve regional mobility, thus allowing them to adequately fund the Texas Rail Relocation and Improvement Fund (TRRIF).

Once the TRRIF has been funded, regional agencies such as the Gulf Coast Freight Rail District, in cooperation with the Texas Department of Transportation, the Ports of Houston, Galveston, Beaumont, and Freeport, the Houston-Galveston Area Council, as well as the freight railroads serving the Houston region, and other public and private partners will work together to determine which improvements will become prioritized projects. The chosen improvements will then undergo the rigorous project development schedule that includes environmental and public involvement processes.

Meeting this region’s transportation needs, for both people and goods requires collaboration, cooperation, and an understanding that the region will continue to grow. The region requires a multi-modal solution that provides economic, efficient, and safe transportation infrastructure.

Further information on improvements identified in the Houston Region Freight Study can be viewed on the following web address: http://www.houstonrailplan.com