ABSTRACT

The confluence of five major freight and passenger rail routes brings more than 100 trains through Tower 55 daily, making Fort Worth’s interlocker one of the nation’s busiest. The congestion required staging trains 150 miles away and 90-minute delays, resulting in operational, economic and environmental impacts.

Union Pacific Railroad and BNSF Railway assembled a public-private partnership to detangle the web with innovative surface improvements. Using advanced modeling and economic analysis, they demonstrated project benefits to help secure TIGER Grant funding. Intricate construction sequencing and efficient design reduced the budget and schedule.

The project returned $1.1 billion in public benefits, including $30 for every federal dollar invested. Improvements allow 40 percent more rail traffic to traverse Tower 55, avoiding $996 million in additional supply chain costs. Eliminating at-grade crossings improves safety and reduces motorist and pedestrian delays by 100,000 hours annually. Other benefits include fuel savings and lower greenhouse gas emissions.

BACKGROUND

A Vision of a Tarantula Puts Tower 55 on the Map

In 1873, B.B. Paddock envisioned Fort Worth as a bustling railroad town. The entrepreneur and newspaper editor—who eventually became mayor—published a “Tarantula Railroad Map” depicting nine rail lines stretching out from the city’s center like a spider’s legs.
Paddock’s concept came to fruition, as one by one the railroads constructed tracks reaching Fort Worth. A major junction developed near downtown, where Texas & Pacific’s east/west mainline crossed three other carriers’ major north/south mainlines. By 1904, the railroads collaborated to construct Tower 55—an interlocker, or railroad intersection controlled by a tower operator or dispatcher.

The railroads supported the burgeoning cattle industry, and later the rise of oil and natural gas markets. Fort Worth became the railroad hub Paddock imagined. Population followed industry, and the region grew exponentially.

More than a century after its installation, Tower 55 remains a critical connector of rail traffic throughout the United States and into Canada and Mexico. Union Pacific Railroad (UP) and BNSF Railway, the nation’s two largest freight railroads, move high-priority intermodal goods, agricultural products, low-sulfur coal, and industrial and manufactured goods through this pivotal at-grade junction. Amtrak and the Trinity Rail Express (TRE) also use the interlocker.

The Drawbacks of Popularity

Tower 55 handles more than 100 trains per day, making it one of the busiest at-grade rail intersections in the United States. Five major freight and passenger rail routes converge at the junction, which includes a shared double-track north/south mainline and two east/west double-track mainlines. An additional 70 passenger trains pass by each weekday on the adjacent Trinity Railway Express. This heavy traffic causes congestion—resulting in significant transportation, economic, operational and environmental impacts.

The shear volume of traffic caused many trains to come to a complete stop on sidings miles away prior to being cleared to pass Tower 55. BNSF dispatchers staged trains as far south as Temple and as far north as Gainesville, up to 120 miles from the site. UP trains staged as far as 150 miles away while awaiting clearance. Once trains arrived at Tower 55, they faced delays of up to 90 minutes per train.

The delays slowed critical shipments, increasing supply chain costs and creating an economic drag. The stopped trains often blocked at-grade crossings, causing an average of 100,000 hours of vehicular and pedestrian delays each year. Additionally, the lengthy train diversion routes, idling trains and slower speeds increased fuel consumption and greenhouse gas emissions.

Tower 55 needed a new vision.

Defining Goals to Poise Tower 55 for the Future

Much like the collaboration to build Tower 55 more than a century ago, modern rail players recognized public benefits to partnering on a new vision for the intersection. UP, BNSF, the North Central Texas Council of Governments (NCTCOG), the City of Fort Worth, and the Texas Department of Transportation (TxDOT) worked together to devise an implementable, cost-effective and unobtrusive solution that would provide immediate jobs, benefit the community and improve the flow of commerce.
The team set the Tower 55 Multimodal Improvement Project objective “to enhance the capacity and productivity of this significant intersection in the national rail network by increasing throughput and average speeds of freight and passenger trains with routes intersecting at Tower 55.”

They set the following goals for the improvements:

- Generate economic stimulus by creating jobs in eight surrounding economically distressed counties
- Minimize the economic impact to national and international goods movement caused by rail delays on primary BNSF and UP rail routes connecting the West Coast, Midwest, Gulf Coast, Southeast, Canada and Mexico
- Enhance supply chain efficiency for manufacturers, shippers, receivers and consumers
- Avoid circuitous rail diversions caused by Tower 55 exceeding its saturation capacity (maximum train volume within allowable operating velocity metrics)
- Reduce rail emissions by limiting train delays
- Reduce at-grade crossing delays for vehicles and pedestrians
- Reduce passenger train delays and improve on-time performance of Amtrak’s Heartland Flyer and Texas Eagle services
- Improve safety through elimination of at-grade pedestrian/vehicular crossings

To bring about those benefits, the enhancements include adding a third north/south mainline through Tower 55, four new train slots to the north and one to the south. By improving track alignment and crossovers, the project increases simultaneous train movement and allows faster travel speeds. Building and improving staging tracks near the interlocker enables more efficient train flow through the area, reducing lengthy diversions for staging. The upgrades also include installation of a modern signaling and control system with Positive Train Control (PTC) compatibility, a new federally mandated rail safety system.

In addition to the rail improvements, the scope involved significant infrastructure upgrades providing safety benefits for drivers and pedestrians. The work improved drainage, constructed or replaced several bridges, and delivered arterial street/intersection enhancements. New emergency vehicle access allows a faster response time to a school and the nearby neighborhood.

**Investment Pays Off with Major Public Benefits**

The enhancements to Tower 55 deliver wide-ranging benefits to people’s lives, the economy and the environment. The project team completed work in just 17 months and nearly two weeks ahead of schedule, with economists estimating a public benefit return of $30 for every federal dollar invested.

“With over $1.1 billion in public benefits, the Tower 55 Project has addressed needed network capacity and eliminated a key freight and passenger rail bottleneck through implementing a creative engineering approach and extraordinary collaboration between two western Class I railroads and the creation of a public private partnership,” said Ed Hamberger, president and chief executive officer of the Association of American Railroads (AAR).

Tower 55’s upgrade generated about 900 jobs and benefits railroads and the public. The project helps avoid nearly $667 million in transportation costs. It reduces motorist and pedestrian delays by 100,000 hours annually at at-grade crossings and bridges affected by Tower 55 train traffic. Other benefits include reduced greenhouse gas emissions and fuel savings for motorists and railroads.

**INNOVATION**

With congestion at Tower 55 impacting the community, economy and environment, everyone recognized the need for a solution. But detangling the spider web of tracks and modernizing the interlocker without causing greater disruption posed a major design challenge. Solving that riddle required major innovation—including cutting edge modeling and analysis, unique funding and collaboration, and cost- and time-saving design and construction techniques.
Advanced Modeling, Analysis Demonstrate Need for Project

The collaborative team of UP, BNSF and TxDOT conducted detailed rail capacity modeling, engineering, environmental review, cost-benefit analysis and economic analysis to build a case for the project. The Tower 55 Rail Reliever Study included those team members, as well as Amtrak and the Fort Worth Transportation Authority.

UP and BNSF teamed to use Rail Traffic Controller (RTC) analysis to compare the “build” and “no build” scenarios for Tower 55 improvements. Made by Berkeley Simulation Software, this latest modeling software simulates operations on complex rail networks and provides capacity analysis. The modeling can help estimate train performance, diagnose bottlenecks, project fuel consumption, analyze schedule changes, evaluate new alignments and assess the impact of potential improvement projects. RTC provides a more dynamic costing and multi-train view that replicates the performance of human dispatchers by constantly re-computing to ensure that high-priority trains stay on schedule to the extent possible, given a specific track configuration. This simulated train performance at Tower 55 under a “no build” scenario as the intersection reached its saturation point of 102 trains per day, as well as projecting performance results under a scenario with significant grade improvements.

To help secure Transportation Investment Generating Economic Recovery (TIGER II) Grant funding, the team turned to HDR to conduct a rigorous public cost-benefit analysis and economic impact analysis. The analyses compared costs to benefits for improving track, signaling and railway/roadway at-grade crossings in accordance with the guidelines of the TIGER Act of 2009 and subsequent guidance issued by the U.S. Department of Transportation relating to the TIGER Act.

The analyses identified changes in operating and capacity conditions and national transportation impacts that could be reasonably expected to occur as a result of project construction.

The modeling and analysis determined three overarching project benefits:

1. The project increases capacity and reduces train delays associated with Tower 55, enabling the crossing to accept more trains per time period and enabling those trains to transit more quickly through the network. In turn, this decreases negative effects such as emissions from idling trains, effects on motorists of trains moving slowly through at-grade crossings, and effects on shippers of their rail freight shipments moving on longer diversion routes to bypass Tower 55 congestion, increasing shipment transit time and supply chain costs.
2. The project closes at-grade vehicle crossings adjacent to the interlocker as well as grade separation improvements to several other vehicular and pedestrian crossings. This increases safety, decreases vehicle emissions, decreases motorist delays and improves neighborhood livability adjacent to Tower 55 mainlines.
3. The modeling helped develop a dispatching protocol that has been instituted since project completion. This protocol is a joint effort between the UP and BNSF dispatching centers. It has allowed more fluid train movement through this area.

A Textbook Case of Successful P3 Funding

Tower 55 proved an exemplary case of a viable public private partnership, with strong support from local, regional and state agencies. Their partnership with the railroads helped devise an innovative funding mechanism for the project.
The benefits demonstrated through extensive modeling, cost-benefit analysis and economic analysis proved enough for a TxDOT selection committee to rate the Tower 55 Multimodal Improvement Project as the highest priority TIGER project in Texas. The project successfully received a $34 million TIGER II Grant, with the project offering a $30 return for every federal dollar spent.

The $114.5-million project received funding from the following sources:

- UP – $39 million
- BNSF – $37 million
- TIGER II Grant – $34 million
- NCTCOG – $2.5 million
- TxDOT – $1 million
- City of Fort Worth – $1 million

**Design Features Advanced CTC System**

To enhance operational performance, Tower 55 leverages recent advancements in railroad technology. To improve interlocker safety and fluidity, the design incorporates an advanced centralized traffic control (CTC) interlocker system. This new control system includes improvements to the interlocker’s existing CTC system to accommodate speed increases to 30 miles per hour for north/south and 40 miles per hour for east/west movements, benefiting both passenger and freight rail movements. In addition, the new signal and interlocking systems provide PTC compatibility to meet requirements of the Rail Safety Improvements Act of 2008.

Given the area’s complexity and the magnitude of routes available, replacing signals with high-conspicuity LED signals has resulted in increased route understanding by the train crews. The crews consistently have noted the signal improvement, which ultimately increases the fluidity through the area.

**Two Unique Projects with Intricate Construction Sequencing**

One of Tower 55’s unique elements involved separating the enhancements into two projects—with UP and BNSF leading distinct projects with separate contractors. This required intense collaboration and detailed construction sequencing to keep rail traffic operational and limit outages to just three weekends—for diamond and bridge replacements—during the 22-month construction schedule.

BNSF’s portion included construction of approximately 9,000 linear feet of second mainline track from near the Northside Drive overpass southward to Tower 55. This portion entailed replacing three existing railroad bridges with two new double-track bridges and a reinforced box culvert, closing three existing at-grade railroad crossings and constructing two traffic signals for improved emergency access to adjacent neighborhoods. BNSF also constructed about 9,500 linear feet of second mainline track southward from Tower 55 parallel to the existing track to just north of South Hemphill Street. This also required constructing an additional railroad bridge over East Rosedale Street, adjacent to existing railroad structures.

Meanwhile, UP installed a new second mainline track from near the SP 280 overpass northward to just south of the Trinity River. UP’s project included new crossovers and connection tracks west, north and south of Tower 55 to allow greater operational versatility between the two railroads and the respective routes to be traveled. UP installed a new railroad signal system within the Tower 55 signal block to
provide a modern and dependable system. This element improves efficiencies in train movements, prevents delays and increases the safety for train crews and the public traveling via Amtrak.

The project required the expertise of engineering departments and consultants as well as planning for multiple construction phases and track interruptions. The team developed mainline track alignments and crossovers based upon operations models provided by the railroads and consultants. This included the turnouts, crossovers and connection tracks within and between BNSF and UP. The railroads and design team coordinated the proposed and interim track geometry to ensure proper alignments. The design team also evaluated and coordinated bridge clearances with City of Fort Worth and the railroads’ structures departments. Closing two of the existing at-grade crossings required an appearance before the Fort Worth Planning and Development Board on behalf of BNSF.

Coordination with train operations from each railroad occurred from planning and design through construction. Trains needed to continue operation throughout the entire project, including construction. The team developed 25 construction phases to ensure minimal train impacts and reduced track outages during work windows. Both railroads coordinated their system train movements to redirect traffic to other subdivisions or via track agreements to relieve track demand during high construction activity. The team moved diamond replacements, the expansion of the Stephenson Avenue bridge and demolition/construction of the East Lancaster Bridge to the end of scheduled phasing, consisting of three consecutive weekend work windows in August 2014 to minimize closures.

The existing grade separations at multiple locations never previously allowed bus or emergency vehicle passage due to low vertical and constricting horizontal clearances. The railroads’ structures departments, consultants and the City of Fort Worth assessed existing conditions at the structures and conceptualized proposed improvements. The final designs provided the most economical solutions, including life-cycle cost reductions to the railroads.

Coordination with the City of Fort Worth demanded a substantial portion of the design and review, even though improvements to the municipal infrastructure amounted to substantially less than the rail improvements. BNSF proceeded through the City of Fort Worth Planning and Development Department to close two existing at-grade crossings. Both railroads submitted plans for City of Fort Worth Bureau of Fire Prevention review. The team coordinated with the City of Fort Worth Transportation and Public Works Department for improvements to city streets, sidewalks and retaining walls. Other city services requiring coordination through design and construction included stormwater management, water/sanitary sewer, traffic engineering and tree permitting. This process yielded multiple plan reviews and comment resolutions.

The City of Fort Worth required executing a Community Facilities Agreement (CFA) with each railroad for the portion of city infrastructure design and construction for each contract. This portion made up about 35 percent of BNSF’s contract and 5 percent of UP’s contract.

**Innovations Lower Costs, Expedite Schedule**

Saving time and money is always a goal on transportation projects, but it became a mantra for Tower 55. The team employed several advanced techniques that will benefit future rail engineering and construction efforts.

The project team recommended and constructed retaining walls to reduce expensive right-of-way procurement, lessening increased property tax burdens for BNSF. In addition, designers replaced a
timber trestle bridge with a reinforced concrete box for utilitarian reasons to reduced life-cycle costs for BNSF.

BNSF utilized an aggressive roadbed construction schedule to deploy their track laying machine in the project’s first four months in spring 2013. BNSF scheduled the machine a year in advance of the grading completion. When it became obvious the roadbed embankment would not be completed by the time the track laying machine arrived on site for track construction, contractors replaced lime stabilization on BNSF roadbed with geogrid, a geosynthetic material used to reinforce soils and similar materials. Using geogrid reduced the net installation time by approximately four weeks, keeping the schedule on track.

Prior to constructing and installing the crossing diamonds, UP conducted an extensive survey, including ground-penetrating radar and sample bores, to better assess the unknown subgrade conditions. This information helped devise a nine-layer system to stabilize and fortify the subgrade conditions under the newly installed diamonds.

The railroads coordinated train operations with each other, as well as with Amtrak. Amtrak utilized a “bus bridge,” which involved actually busing passengers between Fort Worth and Cleburne for two different trains per day over a period of eight weeks. This allowed BNSF and UP construction efforts to be completed by the end of summer 2014.

Finally, to minimize traffic disruption, UP phased the tower diamond removal and replacement toward the end of the project in a single weekend work window. The construction team executed demolition and reconstruction of the East Lancaster Bridge super-structures in two consecutive weekend work windows scheduled at the end of the project as well.

As a result, all new mainline tracks and signals were operational by August 25, 2014. Both individual railroads executed all contracts within the Federal Railroad Administration Flow-Down Agreement guidelines—one time and within budget.

SAFETY

Improvements Make Railroads, Community Safer

The enhancements to Tower 55 make operations safer for the railroads, motorists and pedestrians.

“Safety is our highest priority and these upgrades at Tower 55 will help further reduce the already declining number of grade crossing accidents in Texas,” said U.S. Transportation Secretary Anthony Foxx. “This is a winning investment because it improves safety, increases efficiency and strengthens the local and national economies.”

Installing modern signaling and control system upgrades included PTC compatibility, bringing the intersection online with the latest safety technology as mandated by the Rail Safety Improvement Act of 2008. PTC refers to communication-based/processor-based train control technology that provides a system capable of reliably and functionally preventing train-to-train collisions, over-speed derailments, incursions into established work zone limits, and train movement through a mainline switch in the improper position. The new railroad signal system installed within the Tower 55 signal block increases safety for train crews and the public traveling via Amtrak and TRE.
The project directly benefited Fort Worth residents near Tower 55 with greater pedestrian and motorist safety at crossings and bridges. Eliminating three at-grade crossings improved safety for school children and other pedestrians who previously had to cross the tracks. One of the replaced at-grade crossings previously served as a principal pedestrian route for school children between a residential neighborhood on the east side of the main tracks and Nash Elementary School on the west side.

Nash Elementary School previously called parents to pick up their children from school if a train blocked the at-grade crossing to prevent children from walking through a stopped train to get home. The project added an improved pedestrian/bicycle route, reducing the risk of children walking across the tracks or crawling between rail cars of stopped trains waiting to proceed through Tower 55.

To mitigate at-grade crossing closures, arterial route and intersection signaling improvements were designed and constructed to help with vehicular traffic flow in adjacent areas. Motorist safety increases from fewer at-grade road crossings, improved vertical clearance under two replaced bridges, and better road geometry and motorist lines of sight. Some of the road widening and geometric improvements occurred along a road that makes up part of the city’s bicycle route.

The roadway improvements, including increased vertical clearances below two bridges, allows city fire and police to respond more quickly to the school and nearby neighborhoods. The railroads incorporated the idea for better emergency vehicle access after a series of public meetings with city officials, stakeholders and residents.

Another unique project challenge arose from the junction being the confluence of five unique subdivisions across the two railroads. The team recognized that traditional on-track safety methods for this many unique train routes would not work for this situation. The railroads collaborated to devise a combined subdivision on-track safety protocol to protect the workers and move trains through the area efficiently. Team members executed the plan to perfection with an around-the-clock command center in the tower building high above the diamond location. This unprecedented protocol’s safety and innovation will serve as a model for future projects.

SERVICE PERFORMANCE AND RELIABILITY
Redesign Accommodates 40% More Rail Traffic

The enhanced Tower 55 accommodates 40 percent greater throughput in rail traffic to meet the region’s needs for the next 20 years. That translates into meaningful economic figures. The project provides $1.1 billion in public benefits, or $30 per dollar spent in federal investment.

The capacity increase reduces train delays at the junction, enabling more trains to pass through Tower 55 and transit through the network. With trains previously restricted to as low as 10 miles per hour in some places, the enhanced CTC signal and interlocker system—combined with additional trackage and connections—increased maximum rail speeds to a minimum of 30 miles per hour for the north/south lines and 40 miles per hour on east/west tracks. By eliminating the need to re-route trains because of congestion, an average of over 700,000 rail miles traveled per year can be eliminated. This remedies one of the most significant rail chokepoints in the United States and improves transportation in the most rail-dependent state in the country, avoiding nearly $667 million in transportation costs.
Reducing train delays and re-routing avoids $996 million in additional supply chain costs, benefiting manufacturers, shippers, receivers and consumers. The project supports their growth by avoiding the need to increase inventory associated with slower transit times and reduced rail reliability, minimizes the probability of a delay-caused production outage or stock and allows shippers to continue moving their goods by rail rather than on highways. A train can carry 280 truck trailers, helping ease highway congestion while providing greater sustainability and better air quality.

Project construction generated nearly 900 jobs, with 2,000 job-years of employment and 700 direct jobs created in eight economically distressed counties. Economists projected Tower 55’s economic impact at $138 million.

The new alignments and switches also raise commuter rail reliability and performance throughout North Texas, with an expected double-digit improvement to Amtrak’s on-time performance. Amtrak’s Heartland Flyer and Texas Eagle services connect to Fort Worth’s Intermodal Transportation Center by way of Tower 55. Prior to the project, passenger rail delays reached 30 minutes at the junction. In 2008, Amtrak incurred 225 delays on BNSF’s tracks alone because of congestion at Tower 55. Models project significant improvements to passenger rail operations because of the at-grade improvement project.

The economic benefits even reach pedestrians and motorists. The faster train movement, new bridges and arterial intersection improvements reduce delays by 100,000 hours per year for pedestrians and motorists. The reduced delays will save motorists $6.8 million annually.

Project Tracks Remarkable Environmental Benefits
Improving traffic flow reduces idling trains and vehicles, making a measurable environmental impact. The project reduces carbon dioxide emissions by more than 93,000 tons per year—equivalent to eliminating more than 15,000 cars per year from the road. It also decreases nitrogen oxide emissions by 13,000 tons over 20 years. The better efficiency reduces fuel consumption by 22,600 gallons per day, which saves 165 million gallons of fuel over the next 20 years. And making rail more efficient also means fewer trucks on the highway. Trains can move a ton of freight 435 miles on one gallon of diesel, making the transport of goods more sustainable and lessening the impact on air quality. In addition to the improved air quality, the elimination of at-grade crossings reduces horn noise through the area.

CONCLUSION
The Tower 55 team envisioned the big picture, much like B.B. Paddock in 1873.

UP, BNSF, NCTCOG, the City of Fort Worth, TxDOT and Amtrak—among many others—collaborated as a seamless public-private partnership to make the innovative project a reality. The team employed advanced modeling, cost-benefit analysis and economic analysis to assemble a creative funding package that included $34 million in TIGER II Grant funding.

Working with designers and contractors, the railroads reduced the budget and schedule through intricate construction sequencing and smart design. The project returns $1.1 billion in public benefits, including $30 for every federal dollar invested. The resulting efficiency allows 40 percent more rail traffic to pass through Tower 55, eliminating 93,000 tons of carbon dioxide emissions per year. The project avoids $996 million in additional supply chain costs and created 900 jobs during construction. The improvements also make the community safer for pedestrians and motorists.

The new vision of Tower 55 demonstrates the best of innovative railway engineering collaboration to improve rail performance and benefit the community the railroads serve.
Tower 55 - Fort Worth, TX
Multimodal Improvement Project
A Successful Partnership Beyond Your Typical P3

Patrick Halsted
General Director Construction
Union Pacific Railroad

Brian Large
Director, Engineering Services
BNSF Railway
HISTORY
Buckley Burton Paddock saw the potential for Fort Worth as a major rail hub

1930s Looking South
Source: John W. Barriger III National Railroad Library.

1930s Looking North
Source: John W. Barriger III National Railroad Library.

1963

1963

TODAY

TOWER 55 TRAFFIC FLOWS
- UPRR: approx 2/3 of traffic
- BNSF: approx 1/3 of traffic (N/S)
- AMTRAK
- Fort Worth and Western Railroad

Tower 55 Overview
Movement Counts by Section
UP 71.9
BNSF 27.0
Amtrak 6.0
Other 1.7
Total: 106.6

Source: Google Maps

A Public Private Partnership

• 2008-09'
  • At Grade Alternative Developed
  • PPP Opportunity Develops
  • TIGER I Grant Process Announced

• 2010
  • TIGER I, Tower 55 rejected
  • Received $2.5M from NCTCDG

• 2011-12'
  • TIGER II T55 Application Funded
  • Agreement Phase

• 2013-14 - Construction

Public Benefits

• 93,000 tons of carbon dioxide emissions reduced from vehicles annually
• 100,000 hours saved by motorists and pedestrians annually
• 22,600 gallons of vehicular fuel saved daily
• Crossing closures, enhanced arterial intersections and emergency vehicle access
• Estimated 25% more train traffic, eliminating significant train delays

Source: Google Maps
Key Stakeholders
- US DOT
- FRA
- TXDOT
- COFW
- NCTCOG
- Contractors
- Suppliers
• TOTAL COST $104M
  - UP $32.7M
  - BNSF $33.5M
  - TIGER $34.0M
  - Other $2.0M

Project Objectives
• UP Improvements
  - 3rd north/south mainline
  - Four slots north of tower
  - Reduced curvature and switch improvements west of tower
  - Widened bridges
  - Signal Improvements
  - Increased mainline speed

Project Objectives
• BNSF Improvements
  - 24,000 TF of new rail
  - 3 new bridges
  - Pedestrian & ROW improvements
  - Signal Improvements
  - 3 at-grade crossing closures

Tower 55 Project - By the Numbers
• Duration
  - 3+ years agreement negotiation
  - 17 months actual construction (Mar. 2013 – Aug. 2014)
• Work Phases
  - UP
    - 5 Preliminary and 23 Construction phases
  - BNSF
    - 23 Construction phases
• Curfews
  - Over 200 hours of absolute curfews – four 24 hr curfews
  - 20 days of signal suspension through Tower area

Train Operations
• ~25% increase in train volume
• Reroutes during construction
  - 400+ trains in August alone

Construction Time Lapse Video
Challenges

- Confined work area
- Overhead and pier obstructions - Interstates 30 and 35W
- Coordination with stakeholders
- Subgrade condition under the diamonds
- Working under traffic
- Neighborhood relationships
- Federal reporting

Project Success

- Implementation Success
  - Project delivered safely
  - Construction complete ~2 wks early
  - Network reroute & resource deployment strategy
  - Minimized customer shipment delays
  - Shining example of PPP success

Key Vendors and Suppliers

- Jay Reese Contractors Inc.
- AUI Contractors
- HDR Engineering
- HNTB
- Paxton & Vierling Steel
- Hirschfeld Industries, LP
- Enterprise Precast Concrete, Inc.
- voestalpine Nortrak
- Progress Rail Services
- Many Others!

Questions

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