Volume I. Summary Report

New Orleans to Mobile Corridor Development Plan

Prepared for

The Southern Rapid Rail Transit Commission

By

BURK-KLEINPETER, INC.

In Association with

Parsons Transportation Group

AECOM Consult

CSX Transportation

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Gulf Coast High-Speed Rail Corridor

New Orleans to Mobile Corridor Development Plan

Volume II. Technical Appendices

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The Southern Rapid Rail Transit Commission

By
BURK-KLEINPETER, INC.
Engineers, Architects, Planners
and Environmental Engineers
4176 Canal Street
New Orleans, LA 70119

Tel: (504) 486-5901
Fax: (504) 483-6228

In Association with
Parsons Transportation Group
1133 15th Street, NW
Washington, DC 20005

AECOM Consult
2751 Prosperity Avenue, Suite 300
Fairfax, Virginia 22031

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Executive Summary

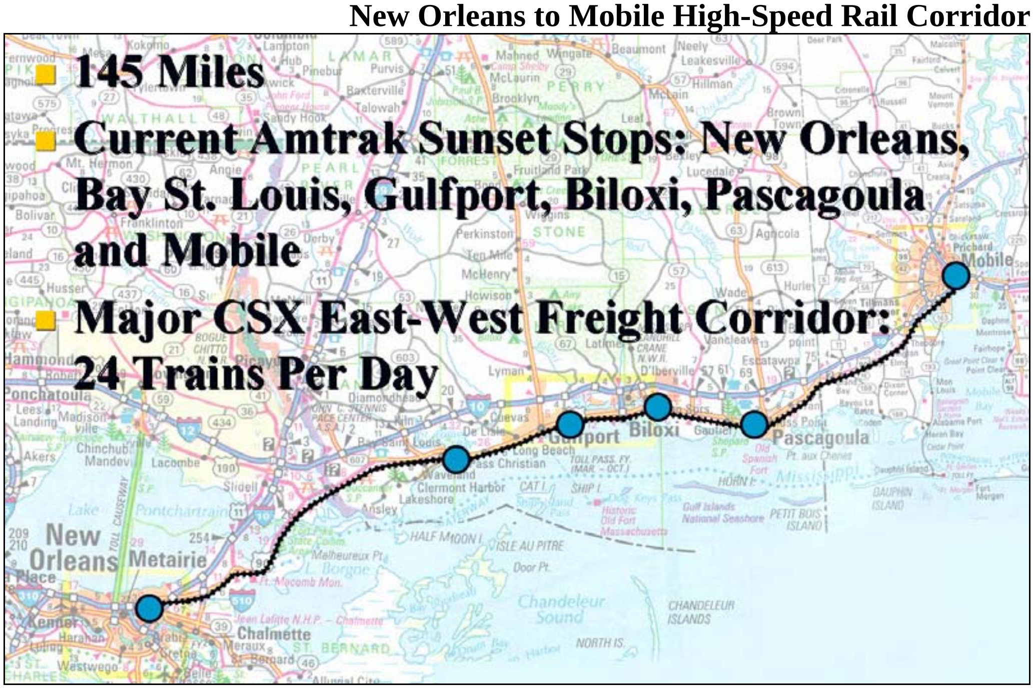
This corridor transportation plan investigates whether, and how, the states of Alabama, Mississippi and Louisiana could upgrade the railroad corridor between New Orleans, LA and Mobile, AL to achieve those states' passenger train travel time goals, with reliable on-time performance for all freight and passenger operations.

The Corridor Today (Chapter 2)[1]

The rail corridor between Mobile and New Orleans is a critical link in a longer rail route that connects Florida with Texas and the West Coast. The corridor consists of three distinct components, as shown in Figure ES-1, below:

- The NO&M Subdivision of the CSXT Corporation between Mobile and New Orleans,
- The NS Back Belt between NE Tower/Elysian Fields and East City Junction, and
- The New Orleans Union Passenger Terminal (NOUPT) track between East City Junction and NOUPT.

Figure ES-1
New Orleans to Mobile High-Speed Rail Corridor



Source: Burk-Kleinpeter, Inc., 2006.

[1] Chapter references are to Volume I, the Main Report.

Of the 145 miles between Mobile Station and New Orleans Union Pubic Terminal (NOUPT) approximately 137 miles belong to the CSXT, 3.6 miles to Norfolk Southern, and 2.9 miles to the NOUPT. Table ES-1 presents a summary of current track ownership and operating control.

Table ES-1.
Track Ownership and Operating Control

Milepost	Route-Miles	Locations	Owner and Operator	Dispatched From
0.0 – 3.9	3.9	NOUPT – East City Jct	Amtrak	Chicago
3.9 – 7.5	3.6	East City Jct - NOT Jct	NS	Birmingham, AL
803.7 – 666.4	137.3	NOT Jct – Mobile Station	CSX	Jacksonville, FL
Total	144.8			

Source: Parsons Transportation Group, 2005.

At the time this investigation took place, the study team considered all three segments of the corridor to be in a “state of good repair,” that is, that the track was of a quality that met or exceeded the requirements of the Federal Railroad Administration’s (FRA’s) railroad safety regulations for the speeds and traffic types that it supported.

It should be noted that most of the analysis of the corridor was conducted and completed prior to August 29, 2005, the day that Hurricane Katrina devastated the central Gulf Coast between Mobile and New Orleans. The CSXT Railroad was particularly hard hit, with all seven of its bridges severely damaged and many miles of track destroyed. CSX’s Gentilly Yard was under several feet of water for two weeks. Despite this catastrophe, CSX made a commitment to rebuild the railroad as quickly as possible. By February of 2006, rail traffic was rolling again between Mobile and New Orleans. Spot inspections in the field by the study team indicate that the railroad has once again been brought to a “state of good repair” and, in fact is probably better than it was before, given the installation of newer, more modern hardware (mitre joints on the bridges, for example).

Service Goals for the Corridor (Chapter 3)

The service goals of this project are to introduce intercity passenger service to the corridor as soon as possible on a limited basis and to grow that service over the next twenty years, while maintaining the current excess capacity in the corridor to support increased freight traffic. All operators and sponsors—intercity passenger and freight—intend the services on the New Orleans-Mobile Corridor in the planning year, 2025, to be more reliable than those operating on the Corridor at present. The envisioned mix of services is presented in Table ES-2.

Table ES-2
Railroad Services Envisioned for 2025 in the New Orleans-Mobile Corridor

		Number of Daily Train Movements (RoundTrips)
Service	**Route**	**New Orleans to Mobile**
Amtrak		
Corridor-type services	**New Orleans to Mobile**	**6**
Total Corridor-type services		**6**
Long-distance services	**Sunset Limited**	**0.43**
	Crescent	**2**
	City of New Orleans	**2**
Total, Long-distance service		
Total Amtrak		
Freight[2]	**CSXT**	**23**
	NS	**n/a**
	NOPB	**n/a**
Total,Freight Service		
Grand Total New Orleans to Mobile Corridor (Amtrak and CSXT inclusive)		

Source: Burk-Kleinpeter, Inc., 2005.

It should be noted that the *Sunset Limited* long distance service between Orlando and Los Angeles has been suspended by Amtrak east of New Orleans. When, or whether, this service will be reinstated is not known at this time.

Methodologies and Operations Analysis (Chapters 4 and 5)

The analysis was undertaken by the Operations and Planning Division of CSXT. In an iterative process, the study team combined its knowledge of existing conditions on the lines in question, with conceptual plans for a number of fixed facility improvements that would raise train speeds, improve capacity, and meet safety, operational, and marketing prerequisites. Simulations of train performance in the project planning year of 2025 were conducted over various hypothetical fixed facility configurations, and with various performance specifications assumed. These simulations were of two types:

[2] Because of the variability and directional imbalance of freight traffic, the numbers shown here (expressed as daily round trips for comparability with the other services) are rough approximations.

- Calculations of pure train performance in the absence of interference from other trains, and

- Seven-day simulations of the performance of, and interference among, all the freight and intercity passenger train movements envisioned in Table ES-2, above. (Commuter trains are not envisioned in the future.) For this purpose, hypothetical schedules for all these movements were developed; the simulation technique modeled the effects of randomness, for example in the arrival of long-distance trains at entry points to the corridor.

The results of these analyses were as follows:

- The service objectives, under current conditions, are not achievable. The high-speed trains were only able to operate at 61% on-time reliability in the second iteration of the full service simulation. The primary reason for this is CSXT's seven drawbridges in the corridor, which are required to open on signal for marine traffic. The study team has provided suggestions to mitigate delays at the drawbridges as a means to increase the reliability of freight train operations, as well as those of the HSR trains.

- Train equipment exists that could reliably travel between New Orleans and Mobile in two hours and twenty-two minutes with five intermediate stops, subject to the completion of the improvements contemplated in this study.

- The system configuration that would allow the trip time goals to be met would include:

  - Maximum authorized speeds of 90 mph;
  - Non-electric trainsets, with one locomotive and one or two cars, or possibly DMUs;
  - Unbalanced alignment of up to seven inches;
  - The recommended alignment, as described in Chapters 7 and 8; and
  - Changes to the "open on demand" requirements of the CSXT bridges.

- To the extent that the states were to substitute other system configurations and improvements for those contemplated in this report, the alterations would need to have the same net effect on speed, capacity, safety, and marketability as those described in this report, for the goals to be reliably met.

Environmental/Historic Factors (Chapter 6)

The central Gulf Coast is one of the oldest inhabited parts of the United States, with a rich history dating back to before the arrival of Europeans. The rail corridor itself was developed in the 1860's, after the Civil War. The contemplated plant improvements are located within the existing corridor and, consequently, should not impact any significant cultural or archaeological resources.

On the other hand, coastal Alabama, Mississippi and Louisiana are characterized by numerous streams, creeks and bayous, which meander through swamps and marshes. These wetlands support a wide variety of plants and wildlife and are protected by the Clean Water Act and other federal and state regulations. The study team mapped the corridor on USGS quad sheets for the purpose of detecting the likely presence of wetlands subject to regulatory protection. In preparing the conceptual plant improvements, especially new or lengthened sidings, care was taken to avoid areas with obvious wetland issues. The result was the "Dry Land Plan," which concentrated plant improvements in more upland areas.

The Contemplated Improvements (Chapters 7 and 8)

This Section describes the improvements identified as part of the Mobile to New Orleans Gulf Coast High-Speed (GCHSR) Rail Corridor Study. The study team classifies corridor improvements according to two main categories: (1) Systemic upgrades of corridor-wide railroad components (i.e., the signaling system), discussed in Chapter 7, and (2) Site-specific projects (i.e., track reconfigurations), which are discussed in Chapter 8.

The network of improvements necessary to provide adequate track structure and sufficient capacity reliably to operate freight and high-speed passenger service between Mobile and New Orleans has been defined. Ultimately, the types of improvements that would be included are projects to:

- Upgrade the track structure
- Upgrade signal systems
- Realign selected curves to permit higher operating speeds and reduce trip time
- Reconfigure, relocate, eliminate, or install interlockings to improve operating flexibility
- Install additional trackage to reliably accommodate increased freight and passenger traffic levels
- Upgrade movable bridges
- Improve safety at the highway-rail grade crossings
- Install right-of-way fencing
- Improve stations

The following sections summarize the major elements of the contemplated improvement program, for both systemic and site specific projects. It should be noted that the improvements identified, thus far, to implement the Mobile - New Orleans High-Speed Rail Service assume that:

- Improvements to minimize train delays through Mobile resulting from operations at Sibert Yard are implemented; and

- Improvements to minimize train delays resulting from operations at Gentilly Yard, in New Orleans, are implemented.

The following additional improvements would be required to upgrade the existing railroad infrastructures to support high-speed rail service between Mobile and New Orleans. The initial improvements Mobile to New Orleans to support the initial limited level of passenger service are described by category below, followed by the final Mobile to New Orleans improvements to support the recommended full intercity service is described.

1) Track geometry (curves, spirals, superelevation)

   The recommended alignment improvements would allow higher train speeds to be sustained over longer distances. Despite challenges, and regardless of the equipment type used, the Train Performance Calculator (TPC) trip time simulations revealed that increasing speeds above the present speeds on the corridor would necessitate a number of different types of modifications to curves, their approaches, and their operating characteristics. These modifications can be applied individually or in combination:

   - Increase superelevation to the maximum allowable for a particular track alignment;
   - Increase the amount of unbalanced superelevation used to calculate speeds through curves to minimize track shifts; and
   - Modify spirals (the length of track that provides a smooth transition from tangent track to curved track) to provide a smoother ride.

   <u>Criteria for Realignments</u>
   To maximize performance while fully adhering to safety requirements and the dictates of passenger comfort, all the altered curves would have geometric characteristics meeting the following criteria:

   - Maximum actual superelevation should not exceed five inches.
   - Actual superelevation was chosen in increments commensurate with the speed assumed to be authorized for each curve, and with the runoff rates specified by CSXT.
   - Maximum unbalanced superelevation should not exceed seven inches, which assumes use of tilting equipment. The study found that the use of tilting equipment at higher levels of unbalanced superelevation would be essential to optimizing the trip time goals.[3]

[3] Of course, actual use of the tilting equipment at the higher unbalanced levels of superelevation would be subject to review and approval by FRA's Office of Safety.

- Maximum lateral acceleration parallel to the floorboards should not exceed 0.15 g.
- For conventional coach equipment at a theoretical six inches of unbalanced superelevation, the roll angle should be 2.87 degrees.
- All actual superelevation should be introduced and removed over the entire length of the spiral—not within the curve itself or on the tangents adjacent to the spirals.
- Maximum jerk rate through the spiral should be 0.04 g per sec.
- Track twist rates for alignments at proposed speeds are as specified by CSX and NS in their internal engineering standards.

2) Track structure (ordinary track components and special trackwork)

3) Bridges, culverts, and other structures

Seven movable railroad bridges - Pascagoula River, Biloxi Bay, Bay St. Louis, Pearl River, Rigolets, Chef Menteur, and the New Orleans Industrial Canal – are located between Mobile and New Orleans. The MAS for passenger trains is 30 mph (25 for freight trains) over the first six bridges, the MAS over the Industrial Canal varies by track – 40 mph for track 1 and 20 mph for track 2.

The movable bridges consist of approach spans and a movable section, that either pivots on its center, or lifts from one end. The speed limit is over the movable segments is the restricted speeds listed above. The time lost varies according to the speed limits at each end of the bridges, but, for example, at Bay St Louis the time lost is approximately 30 seconds. Furthermore, frequent problems associated with the bridge structure and the signal system result in the failure of the signal system to return to a go signal (green) from a stop signal after the bridge has been closed. The result can be a significant level of delay to trains in both directions. The amount of delay can be acerbated by the isolated nature of the bridges, which delays access by maintainers that may be required to assist in solving the problem.

Thus, the movable bridges result not only in lost travel time but in a level of uncertainty, which is not conducive to reliability of either intercity passenger or freight train operations.

4) Highway-railroad crossings (general treatments; specific major projects go in Chapter 8)

North Carolina’s Sealed Corridor Project, an effort to systematically improve safety at the highway-rail grade crossings on the North Carolina Railroad, has established the principle that improved rail passenger service can and should be accompanied by reduced risk of motor vehicle/train collisions. Accordingly, this study has developed a preliminary program to deal with the approximately 183 public and private crossings on the active and abandoned rail lines.

Contemplated Grade Crossing Program

Based on all the considerations described above, the study team developed a potential list of grade crossing actions that would support the trip-time goals and safety prerequisites of high-speed rail development in the Corridor. These grade crossing actions are summarized in Table _ for 79 mph and 90 mph. In this table, the possible enhancements could have included:

- Elimination, which can be effected by:
  - Closing the crossing to vehicular traffic
  - Providing a grade separation
  - Relocating the railroad
- Upgrading of protection devices, for example from crossbucks to gates and flashing lights, or from gates that cover only half the road in each direction, to four-quadrant gates that cover the entire road, thereby blocking drivers from “running around” the crossing
- Keeping the crossing as-is, where the level of protection is already appropriate for the contemplated train speeds and road traffic levels
- Expanding or moving a crossing to comply with the engineering improvements described in other sections of this document. For example, new sidings or changes to curves; or adding well-protected crossings where they do not exist today

Fencing

Installation of right-of-way fencing at selected security-related locations, parklands, schools, service facilities, stations, and other locations would be evaluated as part of the final design, project implementation phase. For this document, it was assumed that fencing of both sides of the right-of-way to improve the safety and minimize the potential for trespassing was not required for the 90 mph full service initiative.

5) Electrification (if applicable)

Electrification of the corridor is not anticipated.

6) Signals and train control

Signal system upgrades should be implemented incrementally to handle increased train traffic efficiently on the route and to permit improved intercity passenger service with greater safety, as passenger train service and maximum authorized speeds are increased. These improvements also would enable freight service safely and efficiently to operate on the same tracks.

FRA regulations require that, where any train operates at a speed of 80 or more miles per hour, there must be in place an automatic cab signal, automatic train stop or continuous automatic train control system. The current ABS system on the CSXT Main Line has none of these additional systems, and therefore it is limited to a top speed of only 79 miles per hour. The installation of an automatic cab signal, an automatic train stop, or automatic train control system would be necessary in order to allow the higher speeds contemplated for the Mobile to New Orleans high-speed service.

The signal system would be upgraded to support the higher speeds. A cab signal system (necessary to operate passenger trains at speeds greater than 79 mph), a new block layout[4], and new signal aspects, would be installed incrementally, to accommodate speeds up to 90 miles per hour. Block spacing would anticipate increased train speeds. Reverse signaling would be installed on double track segments throughout the route.

Ultimately, a new signal system would improve the reliability of train operations for all services, contribute to reducing maintenance-related operating costs, and would be a component critical to enabling higher speed train operations.

7) Support facilities

Sufficient yard storage capacity should be provided to handle layovers, and to store equipment-awaiting maintenance in Mobile. Yard lighting, water and power hookups, a fueling facility, crew quarter facilities, employee locker room, and supervisory office space would be included. Commissary facilities to service train sets presently exist in New Orleans.

As of this time, a location to service trains that would be stored in Mobile between runs has not been identified. An efficient storage yard and maintenance facility near the station would be necessary to properly clean and inspect trains. Initially Choctaw Yard was considered, however, further evaluation of train operations through the area, and potential locations, would be required to finalize the location. Minimizing conflicts between passenger train yard moves and freight train moves between Sibert Yard and Brookley would be a primary concern

8) Stations and parking

Significant enhancements to the existing stations located between Mobile and New Orleans were not developed. The existing station buildings, platforms, and parking

[4] The block layout would define the spacing between signals that represents the best compromise maximizing capacity (more signals, closer together, creating shorter blocks) and economy (fewer signals, further apart, creating longer blocks).

areas were considered adequate for the initial service level and improvements for the full service would depend upon the ultimate ridership and demand for parking at each station – Pascagoula, Biloxi, Gulfport, and Bay St. Louis. Budgets for potential enhancements were established.

Mobile Station

An additional platform, to provide operational flexibility in this congested segment of the railroad, most likely will be required to support the full service operation. Parking in the vicinity of the station appears to be adequate.

Mobile Beltway Station

In many major rail transportation markets, Amtrak serves “beltway” or “suburban” stations, with good access to and from the highway system, as well as downtown stations. The benefit to both modes successfully has been demonstrated at the New Carrollton, MD station, located north of Washington, DC, and Metropark in northern New Jersey, both located on the Northeast Corridor. A beltway station should be in a location that has both space for parking and other facilities, and good highway access, to attract riders from the widest possible area, particularly those who would rather not “backtrack” to access a center-city station to travel to a destination in the opposite direction of the station from their residence.

The team’s analysis indicated that an ideal Mobile location would be at the location where the Dauphin Island Parkway passed over the railroad at MP 671.6 between North and South Brookley. The station would be located northeast of the intersection of I-10 and I-65. The location has the further advantage of being located adjacent to the Mobile Regional Airport.

Site-Specific Investments

Site-specific projects are discusses in detail in Chapter 8. The planning and design of the GCHSR Corridor high-speed service, Mobile to New Orleans, will provide, when implemented, cost-effective improvements necessary to increase capacity on the existing rail line to support six HSR intercity passenger train round trips a day, while minimizing conflicts with freight operations. The increased levels of 2025 freight and passenger service resulted in a larger number of passenger trains overtaking freight trains, resulting in delays to lower priority merchandise trains delayed by intermodal freight trains.

High-Speed passenger trains would be overtaking, or conflicting with, slower freight trains and passenger trains in the opposite direction on the line between Mobile and New Orleans. Improvements that would increase rail capacity at strategic locations, and thus serve to make high-speed train operations be transparent to freight train operations have been evaluated. Reduced trip times and improved capacity would enable the high-speed service to operate reliably without adversely affecting, or being delayed by the large number of long freight trains.

Five strategies were pursued in designing the physical plant and rail operations plans to minimize the probability of schedule conflicts in this critical segment of the corridor:

- Provide tracks to support the operation of trains serving local industries, modify interlockings, and make additional operational improvements that would result in segments of track where freight and passenger train conflicts would be minimized;
- Provide additional passing sidings, or sections of double track, of sufficient length in the most effective locations where passenger and freight trains could overtake, meet, and/or pass trains on the single-track rail line[5];
- Re-spacing of the existing sidings to provide for more uniform siding-to-siding running time;
- Lengthening of existing sidings and upgrading them from controlled to signaled to increase the speed into and through the sidings to 30 mph;
- Design passenger schedules so that trains traveling in opposite directions "meet" in stations or "pass" at locations where freight operations would be minimally disrupted.

Program Summary and Conclusions (Chapter 9)

Tables ES-3 (Cost Estimates for the Initial Service) and ES-4 (cost Estimates for the Full Service) list the corridor-wide and site-specific improvements identified in Chapters 7 and 8 as addressing the Year 2025 requirements underlying the study. The tables identify the objectives and estimated cost of each line item. The projected total cost of all the identified potential improvements (exclusive of rolling stock requirements and items not estimated in the study) currently stands at approximately $730 million (2004 dollars).

Tables ES-3 and ES-4 include cost estimates only for those infrastructure items covered in the study scope. Items omitted from the study scope are "to be determined (tbd)" – such as improvements to Sibert and Gentilly Yards - and are excluded from the totals shown. Some of the items may be essential prerequisites to upgraded service on the line and would need to undergo further studies or implementation plans. This engineering report does not address the financing or institutional options which may enter into project implementation.

Detailed engineering construction plans need to be prepared for the various improvements; the plans would necessarily support a detailed segmentation, prioritization, and sequencing of these projects. As an example of segmentation, a major effort like the extension of double track from Choctaw to Fowl River Siding, including the construction of Choctaw Siding, which this report describes in broad outlines, would lend itself to subdivision into a number of interrelated projects. The engineers would then evaluate these separate projects in terms of their cost-effectiveness in fulfilling capacity, re-capitalization and trip-time needs. Experience on the Phase I, Meridian to New Orleans study, and other recent HSR studies has shown the benefit of prioritizing capacity improvements based on an evaluation of their urgency and return on investment.

[5] While minimizing the time that trains would be required to stop on the passing sidings.

The addition of increased levels of intercity passenger service in a primarily single track railroad, operating at speeds in excess of freight train operations, must be accompanied by an investment in siding improvements that would optimize spacing and provide sidings sufficiently long to accommodate train meets by easily having room for freight trains. The increase in capacity improves the reliability of passenger train operations while not denigrating freight train operations. These capacity enhancements accompanied by signal system improvements and continuous upgrading of track speeds also provide a large share of the trip time benefits. Rehabilitation projects that upgrade drawbridges also will contribute to increases in passenger and freight train speeds in the New Orleans-Mobile Corridor. Finally, the study's 20-year planning horizon allows for a phased implementation of the contemplated program to match the rail operators' staged introduction of service improvements and the availability of an ongoing infusion of capital funding to the states and transportation agencies. Thus, closer scrutiny would assist high-speed rail partners in fashioning a detailed program that is affordable, timely, and efficacious.

Table ES-3
Cost Estimate of Contemplated Improvements to Support the Initial Service

Improvements Sibert Yard to Elysian Fields	(In Millions)
Signal Upgrades Sibert to Mobile Station	$3.9
Double Track Mobile Station to Brookley	$27.2
Track and Signal Upgrades Brookley to Fowl River	$1.5
Fowl River Siding	$11.2
Track and Signal Upgrades Fowl River to Little Franklin	$1.7
Little Franklin Siding	$12.5
Track and Signal Upgrades Little Franklin to Orange Grove	$2.1
Orange Grove Siding	$6.6
Track and Signal Upgrades Orange Grove to Gautier	$1.4
Gautier Siding	$8.5
Track and Signal Upgrades Gautier to Ocean Springs	$1.0
Ocean Springs Siding	$13.2
Track and Signal Upgrades Ocean Springs To Beauvoir	$4.5
Double Track Beauvoir to Harbin	$63.4
Track and Signal Upgrades Beauvoir to Nicholson	$4.5
Nicholson Siding	$8.1
Track and Signal Upgrades Nicholson to Claiborne	$5.3
Claiborne Siding	$4.5
Track and Signal Upgrades Claiborne to Lake Catherine	$4.6
Lake Catherine Siding	$9.2
Track and Signal Upgrades Lake Catherine to Gentilly Yard	$9.2
Track and Signal Upgrades Gentilly Yard to NS Railroad Back Belt	$7.6
Subtotal	$211.7
Movable Bridge Improvement Program	$34.3
Station Improvement Program	$6.0
Subtotal	$252.0
Common Improvements NO&NE Tower to New Orleans UPT	$7.6
TOTAL	**$259.6**

Source: Parsons Transportation Group, 2006.

Table ES-4
Cost Estimate of Contemplated Improvements to Support the Full Service

Improvements Sibert Yard to NO&NE Tower	(In Millions)
Signal Upgrades Sibert to Mobile Station	$4.0
Double Track Mobile Station to Fowl River	$80.2
Track and Signal Upgrades Fowl River to Little Franklin	$4.7
Little Franklin Siding	$26.2
Track and Signal Upgrades Little Franklin to Orange Grove	$1.4
Orange Grove Siding	$19.9
Track and Signal Upgrades Orange Grove to Pascagoula	$0.8
Pascagoula Siding	$14.9
Track and Signal Upgrades Pascagoula to Gautier	$0.2
Gautier Siding	$10.8
Track and Signal Upgrades Gautier to Ocean Springs	$1.1
Ocean Springs Siding	$25.4
Track and Signal Upgrades Ocean Springs To Beauvoir	$4.7
Double Track Beauvoir to Harbin	$65.1
Track and Signal Upgrades Beauvoir to Nicholson	$4.5
Nicholson Siding	$14.9
Track and Signal Upgrades Nicholson to Claiborne	$2.0
Claiborne Siding	$21.0
Track and Signal Upgrades Claiborne to Pearl River	$0.1
Pearl River Siding	$26.3
Track and Signal Upgrades Pearl River to Lake Catherine	$0.3
Lake Catherine Siding	$31.9
Track and Signal Upgrades Lake Catherine to Gentilly Yard	$12.3
Track and Signal Upgrades Gentilly Yard to NS NO&NE Tower	$4.0
Subtotal	$376.6
Movable Bridge Improvement Program	$27.4
Station Improvement Program	$2.5
Subtotal	$406.5
Common Improvements NO&NE Tower to New Orleans UPT	
Elysian Fields Connection	$12.7
Third Track Elysian Fields to Marconi Drive	$20.9
Track and Signal Upgrades Marconi Drive to East City Jct	$0.3
Track and Signal Upgrades East City Jct to New Orleans UPT	$30.6
Subtotal	$64.5
TOTAL	**$471.0**

Source:Parsons Transportation Group, 2006.

Major Study Conclusions

Protection of all freight and passenger services

Numerous computerized simulations of the operations of all users of this Corridor (freight and intercity passenger) have identified a number of specific infrastructure changes that would provide the capacity to handle all existing and projected services without deteriorating freight train performance. Even with these changes, close scheduling and dispatching coordination among CSXT and the intercity passenger service operator extending to other contiguous routes would be necessary to optimize the use of the improved facility and preserve the dependability and marketability of all passenger and freight operations.

This study of the 145-mile New Orleans-Mobile Corridor represents a significant application of the transportation planning concepts that evolved in the Northeast Corridor Improvement Project - America's premier high-speed rail development effort to date - to a primarily single-track railroad with heavy through and local freight traffic.

Capacity Requirements

The importance of freight traffic, coupled with the bottlenecks inherent in single-track operation, makes protecting the reliability of all services a paramount concern in planning - secondary only to safety. As a result, for this corridor to fulfill its potential:

- Significant additional capacity must be provided.
- This capacity may take the obvious form of additional tracks, mainly passing sidings but in some instances midpoint interlockings in longer sidings, new interlockings, and improved connections between rail lines.
- More subtle - but of equal importance - are the detailed improvements that would allow freight trains to enter and exit the main line more quickly, and that would lessen the delays occasioned by interference among all rail services. These include upgrading turnouts for higher operating speeds and providing improved paths for all types of trains through complex yard areas.
- Combined with the need for careful attention to engineering detail is the requirement for collegial operations planning, over the long-term, among all the operators and service sponsors in the corridor.

With the betterments identified in this study, it would be feasible to upgrade intercity passenger service to achieve reliable travel times of less than 2.4 hours between New Orleans and Mobile. This scheduled running time, while not approaching the average speed of high-speed trains in the Northeast Corridor (NEC), would significantly exceed present rail passenger travel times in the corridor. More importantly, the reliability would approximate that achieved in the NEC, thereby providing a competitive travel mode in this segment of the GCHSR Corridor.

These intercity passenger rail service improvements could occur without adverse impacts to freight operations in this very busy territory. Indeed, all freight services would benefit from the improved traffic flows made possible by the initiatives described in this report.

Chapter 1 – Introduction

The New Orleans to Mobile Corridor Development Plan has been produced under the auspices of the Federal Railroad Administration (FRA) and the Southern Rapid Rail Transit Commission (SRRTC) in furtherance of the implementation of the Gulf Coast High-Speed Rail Corridor. The study was conducted between 2002 and 2006 by Burk-Kleinpeter, Inc. (BKI), in association with AECOM Consult, Inc., the Parsons Transportation Group (PTG), and CSX Transportation. Copies of this Executive Summary can be obtained from the SRRTC by contacting the New Orleans Regional Planning Commission at (504) 568-6611.

Rationale for the study

The central gulf coast has experienced dynamic economic and population growth in the past decade, fueled by a new gaming industry that has flourished in Louisiana and the Mississippi Gulf Coast.[1] It is felt that the development of intercity high-speed rail passenger service would help accommodate this growth by providing additional transportation choices, relieving congestion on crowded highways, and providing connections to airports with limited room for expansion of parking, all while providing an environmentally acceptable and relaxing way to travel.

Population increase in the Gulf Coast has been concentrated in the suburban areas of metropolitan regions, particularly along the Interstate-10 corridor. Increasing urban and suburban congestion is being experienced along I-10 throughout the project corridor. A recent study for the National I-10 Freight Corridor indicated that parts of the I-10 corridor in Louisiana, Mississippi, and Alabama are currently experiencing congestion (defined as Level of Service E or F) and that most of the I-10 corridor in those states will be experiencing severe congestion by 2025.[2]

Purpose and Approach

The purpose of this study was to identify the engineering and financial requirements to introduce high-speed intercity passenger rail service between New Orleans and Mobile by incrementally upgrading the existing freight rail corridor. This information will be used by the FRA, SRRTC, Amtrak, and the states of Louisiana, Mississippi, and Alabama, as well as other stakeholders, to make an initial assessment of the feasibility of implementing the proposed service.

1 Southern Rapid Rail Transit Commission, Gulf Coast High Speed Rail Corridor Feasibility Study, Phase II. Morrison Knudsen Corporation, June 1999.
2 The National I-10 Freight Corridor Study, Executive Summary. Wilbur Smith Associates, 2004.

The approach to this study was in accordance with the FRA's "Railroad Corridor Transportation Plans A Guidance Manual," revised December 16, 2002. This study did not include an Alternate Route Selection because there are no existing available alternate routes between New Orleans and Mobile that could reasonably be expected to provide competitive service to the automobile; however, there was an independent study, conducted by the state of Mississippi, to evaluate the potential to relocate the CSXT to the north of the coastal cities. The study did feature an independent ridership and revenue forecast for the corridor prepared by AECOM Consult.

In accordance with established policies, the study evaluated the requirements for incrementally improving an existing freight rail corridor to accommodate an increasing number of passenger trains operating at higher speeds. This evaluation included an inventory of the existing fixed plant and current users and services; the development of service goals for future passenger and freight services; travel time analyses; capacity analysis for the existing and future (2025) condition; development of a program of improvements for start-up and build-out scenarios; and cost estimates for those scenarios.

CSXT Relocation Study

As mentioned above, the state of Mississippi conducted an independent evaluation of the potential to relocate the CSXT north of the coastal cites (Pass Christian, Waveland, Bay St. Louis, Long Beach, Gulfport, Biloxi Ocean Springs and Pascagoula). The reasons for this study were two-fold: (1) to improve safety by reducing the number of highway-rail grade crossings in the corridor and (2) improving highway transportation by replacing the railroad corridor with a highway corridor. The SRRTC received regular updates on this project until it was put on hold in 2004, reportedly due to the high projected costs of the relocation. The study was resumed in 2005 with a reduced scope.

CSXT Relocation Post-Katrina

In the months after Hurricane Katrina ravished the central Gulf Coast on August 29, 2006, there was considerable discussion of the proposed relocation of CSXT away from the coast. The railroad, after all, had been virtually destroyed between Mobile and New Orleans. CSXT, however, did not hesitate and immediately began rebuilding the railroad at a cost of $250 million, with service between Mobile and New Orleans being restored in February of 2006. (The corridor was restored to its pre-existing condition, with the exception that much of the hardware – miter joints at the movable bridges, for example – was replaced by newer and better equipment.)

Reconstruction of the railroad did not end speculation that the railroad would be moved, as the Governor, Haley Barbour, and Senators Lott and Cochran, supported by recommendations by urban planners brought in by FEMA to plan for the state's recovery, pushed for federal funding to relocate the railroad away from the hurricane damage zone. CSXT seemed willing to consider the proposition.

Amtrak, initially forced to suspend the *Sunset Limited* service between Orlando and New Orleans because of the damage to the corridor, eventually suspended the service indefinitely after freight service was restored.

As of the writing of this report, there has been no definitive resolution of the issue regarding the proposed relocation of the CSXT. Opposition to the relocation seems to be getting better organized, while few details of the proposed relocation have been made public.

In light of this uncertainty, this report can only continue in its original mission: to discuss the origin and purposes of the underlying studies; the corridor's current condition and usage; its intended role in the 21st Century; the methodology for analyzing the corridor's investment requirements; and a set of improvements – both corridor-wide and site-specific – that would allow the New Orleans to Mobile Corridor to provide enhanced intercity passenger and freight train services.

In expressing no opinion whatsoever on the desirability, prudence, or merit of the projects it describes, this report is not a policy document and simply imparts, to the member states of the SRRTC and to the public, the results of the engineering and operational analysis undertaken at public expense. Should the states choose to affect their rail travel time goals for this corridor, they will need to undertake a set of projects having similar effects on train performance as those enumerated herein.

The Environmental Process

All projects that use public funds must first examine potential environmental impacts as part of the public decision-making process. "The Federal Railroad Administration has found that railroad corridor programs or projects lend themselves to tiered environmental documentation. Since funding design and construction improvements to railroad corridors generally extends over decades, a tiered first level Environmental Impact Statement (EIS) of Programmed Environmental Impact Statement (PEIS) is usually the appropriate form of documentation. This allows for identification of the full scope of projected improvements or modifications and either full analysis of identified elements or deferral of site-specific clearance of elements to later documentation.'[3]

"Typically, a long-range transportation plan is necessary to identify all project elements and for preparation of the initial environmental document. It is possible that the PEIS or first Tier EIS may categorically exclude work that does not impact environmentally or historically

[3] Railroad Corridor Transportation Plans, A Guidance Manual. Office of Railroad development, Federal Railroad Administration, revised July 8, 2005.

sensitive resources (for example: installing welded rail, replacing ties, installing a new signal system, or reinstalling track on an old roadbed) and may also identify other elements for separate environmental documentation (such as new stations, curve eliminations, new maintenance shops, and so forth). This type of documentation can incorporate by reference many elements of a corridor transportation plan and thus simplify the clearance process."[4]

This study proceeded independently of the preparation of the PEIS for several reasons:

- In order to describe the infrastructure improvements necessary to provide high-speed intercity passenger rail service in one segment of the Gulf Coast HSR Corridor, the New Orleans and Mobile segment,
- Because of the length of the Gulf Coast HSR Corridor – 1,025 miles – it may take years to complete the transportation plan in the remaining segments, and
- Since the PEIS process will require matching funds from the states, completion of the transportation plan will provide the states with the information they need to make a decision to proceed forward with the PEIS, or not.

Completion of the transportation plan for the entire Gulf Coast HSR Corridor is prerequisite to development of the PEIS.

Organization of the Report

This report is organized into nine chapters, as shown below:

1. Introduction
2. The Corridor Today
3. Service Goals for the Corridor
4. Methodologies
5. Operations Analysis
6. Environmental/Historic Factors
7. Corridor-wide Improvements
8. Site-specific Improvements
9. Program Summary and Conclusions

[4] Ibid.

Chapter 2 - The Corridor Today

The conditions described herein are based on data collected and observations made before August 29, 2005, when Hurricane Katrina hit the central gulf coast, essentially destroying the entire CSX Transportation (CSXT) Railroad between Pascagoula, MS and New Orleans, LA. CSXT has repaired the damage and rebuilt the railroad as it existed before Katrina and service between Mobile and New Orleans was resumed in February of 2006.

1) Fixed Plant

The focus of this study is the CSXT line segment between the Mobile, AL Amtrak station and the New Orleans Union Passenger Terminal (NOUPT), depicted in Figure 2-1.

a) Location (include map)

The New Orleans-Mobile Corridor is a segment of the Gulf Coast Corridor, which the Secretary of Transportation formally designated as an emerging high-speed rail line under the Intermodal Surface Transportation Efficiency Act of 1991. Depicted in Figure 2-2, the Gulf Coast Corridor reaches from New Orleans to Mobile; New Orleans to Houston; and New Orleans to Atlanta. For convenience, the present report refers to the Gulf Coast Corridor segment between New Orleans and Mobile as the New Orleans-Mobile Corridor.

The corridor can be described as a coastal route, lying just inland from the Gulf of Mexico, the Mississippi Sound, and Lake Borgne. Refer to Figure 1 on the following page. Not surprisingly, the railroad runs through large areas of coastal wetlands and crosses numerous streams, bayous, and rivers, including several navigable waterways such as the Pascagoula and Pearl Rivers, and the two tidal passes, the Rigolets and Chef Menteur Pass. Through large segments of Mississippi, the railroad crosses through the heart of several coastal cities, including Pascagoula, Ocean Springs, Biloxi, Gulfport, Long Beach, Bay St. Louis, Waveland, and Pass Christian.

b) Background

The New Orleans Mobile & Texas Railroad Company (NM&T) was chartered on November 24, 1866 with the intent to build a line of road between Mobile and New Orleans. The construction was a challenge from an engineering standpoint - the line included nine miles of bridges and trestles – but was eventually completed in 1870.

Figure 2-1
The New Orleans to Mobile Corridor

Figure 2-2
The Gulf Coast High-Speed Rail Corridor

Source: Burk-Kleinpeter, Inc., 2006

According to the L&N Museum's "A Brief History of the L&N Railroad," the NM&T was acquired in 1880 by the Louisville & Nashville Railroad (L&N) in order to extend its sphere of influence internationally through the ports of Mobile and New Orleans for agricultural and manufacturing products produced along its line. At the same time, the L&N also acquired the oldest railroad west of the Alleghenies, known locally as "Smoky Mary." This line was five miles long and extended in a straight line from the Mississippi River along Elysian Fields to Lake Pontchartrain. The L&N operated the line until 1982 when it was purchased by the Seaboard Coast Line, which quickly merged with the Chessie System to become CSX Transportation Company (CSXT).

c) Length and Ownership

Of the 145 miles between Mobile Station and New Orleans Union Pubic Terminal (NOUPT) approximately 137 miles belong to the CSXT, 3.6 miles to Norfolk Southern, and 2.9 miles to the NOUPT Table 2-1 presents a summary of current track ownership.

Table 2-1
Track Ownership and Operating Control

Milepost	**Route-Miles**	**Locations**	**Owner and Operator**	**Dispatched From**
0.0 – 3.9	3.9	NOUPT – East City Jct	Amtrak	Chicago, IL
3.9 – 7.5	3.6	East City Jct - NOT Jct	NS	Birmingham, AL
803.7 – 666.4	137.3	NOT Jct – Mobile Station	CSX	Jacksonville, FL
Total	144.8			

Source: Parsons Transportation Group, 2005.

d) Operating Control

Also presented in is the operating control of the various segments of the New Orleans-Mobile Corridor. Operating control currently matches ownership.

e) Data sources for the condition descriptions that follow

Data collected from CSXT, including: track charts, timetables, personal interviews, a high-rail inspection, FRA Office of Safety (grade crossing data), USGS quad sheets, aerial photography, and photographs taken by team members.

f) Trackage and Track Conditions

The main line of road between Mobile and New Orleans, with the exception of 2 double track sections around Sibert Yard in Mobile and Gentilly Yard in New Orleans, is mainly single track with passing sidings. At Gentilly Yard, there is a 14.1-mile section of double track, while at Sibert there is a short 1.8-mile section of double track. The rest of the road is single track.

There are ten passing sidings between Mobile and New Orleans. Table 2-2, below, provides a summary of the sidings, indicating the name of the siding, length in feet, indication of whether the siding is signaled or controlled[1], milepost of the center of the siding, siding-to-siding spacing (including and excluding a short siding at Ocean Springs). Generally, trains are built in a way so that they do not exceed 7,400 feet. This way they can fit into receiving/departure (RD) tracks at the Gentilly yard and the shortest siding (with the exception of Ocean Springs) at Lake Catherine, which is 7,480 feet long. It is generally accepted that a well-designed single line, should have siding spacing of 12 to 15 miles. If the short siding at Ocean Spring (3000 ft.) is taken out of the equation, then the siding-to-siding spacing exceeds this threshold between Brookley-to-Elmo and Gautier-to-Beauvoir.

CSXT and NS, the owner/operators of approximately 97 percent of the Corridor, have maintained the Corridor in a condition satisfactory for the current designated operating speed class.

The authorized speed over most of the corridor is 79 mph for passenger and 60 mph for freight trains. On all drawbridges, the speed is limited to 30 mph

[1] The following definitions of terminology are contained in the Railroad Dictionary contained on the CSX Corporate Web Site, CSX.com:

- A **Siding** is "an auxiliary track for meeting or passing trains. It is designated in special instructions."
- A **Controlled siding** is "a siding equipped with controlled signals that are used to authorize trains to enter or leave the siding. Such signals do not govern movements on the siding." And
- A **Signaled Siding** is a "siding equipped with block signals that govern train movements on the siding."

Accordingly, in compliance with FRA regulations speed on **controlled sidings** cannot exceed restricted speed: "A speed that will permit stopping within one-half the range of vision, but not exceeding 20 miles per hour." However, speeds on a signaled siding are controlled by the block signal indications, which could enable trains to exceed 20 mph entering and operating over the siding.

The requirement that a long heavy freight stop within one half the range of vision in territory with visibility limiting curves frequently results in train speeds in the vicinity of 5 mph, which results in a mile long train taking 10-15 minutes to clear the main line.

Table 2-2
Sidings in the Mobile to New Orleans Corridor

Siding	Length (ft)	Type	Center Of Siding Milepost	Siding-to-Siding Spacing with Ocean Springs	Siding-to-Siding Spacing without Ocean Springs
Brookley	10,395	Controlled	670.8		
Elmo	8,855	Controlled	686.5	15.7	15.7
Orange Grove	8,910	Controlled	700.3	13.8	13.8
Gautier	7,865	Controlled	710.6	10.3	10.3
Ocean Springs	3,000	Controlled	722.7	12.2	
Beauvoir	8,085	Controlled	731.1	8.3	20.5
Harbin	8,910	Controlled	746.0	14.9	14.9
Nicholson	8,615	Controlled	755.5	9.5	9.5
Claiborne	10,020	Controlled	767.5	12.0	12.0
Lake Catherine	7,480	Controlled	781.1	13.6	13.6
			Average	12.3	13.8

Source: CSXT, 2005.

for passenger and 25 mph for freight trains. On the Norfolk Southern portion of the corridor the authorized speed is 40 mph for the passenger and 30 mph for the freight trains. On the Amtrak territory, the authorized speed is limited to 20 mph.

Slow orders, requiring trains to operate at slower than the specified maximum speeds, if and when they are necessary, are efficiently removed to facilitate train operations.

While the mainline is maintained to FRA class 4 track (79 MPH maximum), the sidings are maintained at a lower level This is because the signal system at the sidings and turnout sizes in use do not allow a higher speed. The standard turnout size in use is a #15 which allows a speed of 25 mph for diverging moves. As the corridor is upgraded and improvements are made to the signal system, the sidings should be upgraded to be equivalent to the mainline to allow passenger trains to utilize the sidings for full speed meets.

Limited field investigations performed early at various times in 2003 and 2004, confirm that the Corridor has been maintained to a reasonable level of good repair. There is no evidence to indicate that CSX, as the majority owner of the Corridor, intends to reduce annual maintenance programs. CSX has for several years shut down the line for several weeks to perform programmed maintenance of the track, bridge structures, and grade crossings.

Typical Standard sections of the roadbed and ballasts are included in the appendix. The entire line consists of timber ties on ballast except for the bridges. The drawbridges often have the timber ties directly on the steel girder. On roadbed, typically 8" of ballast is required under the tie and 6" of compacted subballast is required below the ballast.

Large portions of the corridor were recently reconstructed because of damage from Hurricane Katrina. The following describes track conditions prior to the hurricane damage. Revised track charts should be consulted upon the completion of repairs.

<u>Mobile Al, (Sibert) Yard to Pascagoula, MS</u>

The track consists mostly of 132lb to 141lb welded rail. Predominately, the rail is 132lb dating mostly from 1959 and 1979. Ties date from 1995 from Sibert to the Alabama/Mississippi state lane and mostly 2001 from the state line to Pascagoula, Mississippi. The track from MP 671.5 to the East Pascagoula River MP 706.8 is exclusively 79 MPH indicating a Class 4 track.

<u>Pascagoula, MS to Gulfport, MS</u>
The track from Pascagoula to Gulfport consists of 132lb welded rail dating mostly prior to 1980. Two large tie replacements appear to have occurred in 1998 and 2002 encompassing the entire segment.

<u>Gulfport, MS to Mississippi/Louisiana State line</u>

This track consists of 132lb welded rail from mostly dating from 1978 and 1981. Ties date from 1998 and 1997.

<u>Mississippi/Louisiana State Line to Gentilly Yard</u>

Most of the rail from the state line to Michoud consists of rail dating from 1981. Along the double track from Michoud to Gentilly yard, the rail dates from 1961 and 1998. From MP 772 (near Northside Siding) to MP 794 (near Michoud), crossties date from 2002 except for the Rigolets Pass Bridge which date from 1998. This section from Northside to Michoud is one of the segments which travel through a marsh and the Bayou Sauvage Refuge. From Michoud to Gentilly Yard, ties date from 1998.

Surfacing

Previous track surfacing dates are also shown on the track charts, but much of this is expected to be outdated information. The track surface in many locations is difficult to maintain due to the location of the corridor just inland from the Gulf of Mexico, the Mississippi Sound, and Lake Borgne. The roadbed in these areas has sections where both settlement and erosion can be expected. Erosion occurs because of the soft soils through the marshes and erosion can occur because some segments can be subject to wave action. In these locations, the roadbed maybe subject to wave action. Riprap and timber sheeting is used for wave breaks in some of these locations.

The segments of track through coastal wetlands affect both vertical and horizontal alignment and the track would require more frequent surfacing to support HSR passenger service. Additionally, construction of sidings in these areas can be affected by differential settlement between the exiting established roadbed and the roadbed constructed for a new siding.

g) Alignment

Train speed is fundamentally not limited by the horizontal curvature present in the alignment; the exceptions are about 25 percent of the more than 55 curves between New Orleans and Mobile. These curves are located on the approaches to New Orleans and Mobile. The line includes more than 183 grade crossings; however, numerous crossings are located in towns and cities, such as Biloxi, Mississippi City, Gulfport, and Bay St. Louis. While the track condition may be suitable for higher speeds, locations of high densities of grade crossings generally have 45 mph speed restrictions for freight and passenger trains. Also the drawbridges located along the line are restricted to 30 mph for passenger trains and 25 mph for freight trains. The clusters of grade crossings and condition of the drawbridges are two conditions that severely constrain intercity train trip times.

A track geometry report was included in the Physical Inventory: Interim Report, July 2003. This geometry report presented in charts was generated by a rail geometry car which measures superelevation, degree of curvature, spiral length and curve length. Superelevation, measured in inches, is the vertical distance in which the outside rail on a curve is raised above the inner rail. Spirals are used to transition from a tangent section to a curve and are also used to increase the superelevation from zero in a tangent section to the required value for the curve so that there is no vertical transition in the curve itself. The measured values of curve, superelevation, and spiral length can then be used to calculate allowable speed in the curves and recommend changes to superelevation or curvature can be recommended to increase speed through the curves. The geometry report also includes a column of maximum calculated speed using several assumed values of superelevation. Several of the curves in the report can have their speeds raised by increasing superelevation and still be within the CSX allowable maximum superelevation. Increasing the superelevation may require the spiral lengths to be increased in some curves. Because this alignment was constructed prior to the introduction of spirals, the spirals may have been retrofitted to the curves and may not meet current recommended lengths. As planning for the corridor progresses, the geometry should be reviewed for both passenger comfort and performance.

h) Bridges, culverts, and other structures

There are numerous bridges and culverts along the corridor, including seven drawbridges between Mobile and NOUPT. (Refer to the New Orleans to Mobile Physical Inventory, July 2003.) The draw bridges are located at Pascagoula, Biloxi Bay, Bay St. Louis, Pearl River, Rigolets Pass, Chef Menteur Pass, and the Industrial Canal just southwest of the Gentilly Yard. Currently, water traffic has an absolute priority over trains. Further, the bridge openings appear to be random, with the exception that boats seem to operate mostly in daytime.

i) Highway/railroad grade crossings

There are 183 public and private grade crossings in the corridor. A complete listing is provided in the New Orleans to Mobile Physical Inventory, published in July of 2003. Of these crossings, some 177 (97%) are for public use and 6 (3%) allow access to private property. Crossings are protected by a combination of crossbucks, stop signs, flashing lights, gates, and ringing bells.

The SRRTC has received previous federal appropriations which have been and are currently being utilized to implement safety improvements at grade-crossings along the Gulf Coast High Speed Rail Corridor in Alabama, Louisiana and Mississippi. Each member-State has its own grade crossing program, administered through their respective Departments of Transportation, which has received the benefit of these funds. Extensive improvements to key grade-crossings have been made in all three States.

j) Electrification

The rail corridor is not electrifified.

k) Train Control, Signals, Communications

(1) Train Control

Centralized Train Control (CTC) is the train operation and control system for the corridor; designated segments of Yard Limits in Mobile and Gentilly Yard are the exception.

(2) Signals

Signal aspect charts showing what aspects are displayed and indicate the signal location and length of blocks were reviewed as part of the analysis. These charts can be made available with prior approval from CSX.

These charts indicate that track circuits to the approach of the interlocking are approximately 2 miles in length. The circuits for blocks further removed from interlocking are longer and can be as long as 5 miles in length. These longer blocks may need to be shortened for future demand based upon the results of the simulations to increase capacity between sidings. Decreasing the block length would not benefit meets, but may benefit overtakes. These block lengths shown on the charts would have been verified using braking curves and grades for the freights to verify that the block lengths are sufficient for the aspects that are shown in each signal location.

A hindrance to higher speed use of the sidings is the existence of dwarf signals at the end of sidings. The low level dwarf signals cannot be seen in advance as can the mast mounted signals used elsewhere in the corridor. Because a train must be prepared to stop at the end of the siding if a stop signal is given, the engineer must assume that the signal is red and be able to stop the train before reaching the switch and may not be able to travel at the rated speed of the siding until a clear signal is seen. The signals should be upgraded to give more aspects allowing passenger trains to approach the ends of sidings at full speed if the next block is clear.

(3) Communications

While pole lines and cable are still present north of Mobile in the M&M subdivision and appear to have been only recently abandoned, the M&M subdivision and the NO&M subdivision currently use a wayside communication system of base stations along the track which transmit and receive radio signals to remote stations. This system allows both voice communication and signal information to be transmitted back to the dispatcher. These base stations are tied into the CSX dispatch system and voice communication system using telephone land lines. No pole lines or buried conduit are used for communications.

l) Support facilities

Support Facilities include both CSX owned terminals and yards and an Amtrak operated maintenance facility in New Orleans on NOUPT property.

CSX operates terminals at their Sibert and Gentilly Yards. Sketches of these yards are included in the appendix. There is a 5 track yard at Bayou Cassotte from MP 702 to MP 705 and a small yard (Watts Yard) at MP 707 which is adjacent to Ingalls Ship Yard. Storage tracks or house tracks are located near St. Elmo (MP 685), Pascagoula (MP 706), Ocean Springs (MP 722), Bay St. Louis (MP 754), Rigolets (MP 776), Lake Catherine (MP 780), Chef Menteur (MP 787), and Michoud (MP 794). These may be used by CSX for either car set-offs or to store maintenance of way equipment.

The Amtrak operated maintenance facility on the NOUPT property provides servicing for the two long distance intercity trains (City of New Orleans and Crescent) which terminate in New Orleans and the Sunset Limited which stops in New Orleans for light servicing. The facility also includes a car shop and engine shop for maintenance.

m) Stations and parking

Passenger stations are located in Mobile, Pascagoula, Biloxi, Gulfport, Bay St. Louis, and New Orleans. Adequate parking for present intercity rail operations is available at each station. An inventory of station ownership appears in Table 2-3.

n) Right of Way (Fencing, Utility Leases, Aerial Rights of Way)

(1) Right of Way Fencing

There is no significant fencing of any portion of the right of way.

Table 2-3
Station Ownership and Use[2]

Milepost	Location	User	Owner: Land	Owner: Station	Owner: Parking
NOUPT 0	New Orleans Union Passenger Terminal	Amtrak	City	City	City
754	Bay St. Louis	Amtrak	City	City	City
739	Gulfport	Amtrak	City	City	City
727	Biloxi	Amtrak	City	City	City
707	Pascagoula	Amtrak	City	City	City
666	Mobile	Amtrak	CSXT	CSXT	CSXT

Source: Parsons Transportation Group, 2005.

(2) Utility Leases

The major utility leases for the corridor are fiber optic conduits which run the entire corridor from Mobile to New Orleans. These lines consist of four conduits. Three of the conduits are leased to three different communication companies and the fourth remains currently unused. Lease agreements vary from the communication company paying for relocation to the government paying for the relocation for government funded projects. These lease agreements would require review should improvements require relocations of the fiber optic lines.

(3) Aerial rights of Way.

The only known aerial easement excluding overpasses and grade separation structures is the Mobile Convention Center which straddles the tracks south of Sibert Yard.

2) Users and Services

a) Entities

There are three operating entities in this corridor, CSXT, NS, and Amtrak. All

[2] As of December 2005.

passenger trains are operated by Amtrak. The relationships of Amtrak to the track owners are established in operating agreements.

b) Services

(1) Intercity passenger

The *Sunset Limited*, operating between Orlando, FL and Los Angeles, CA, is the only passenger train that runs on the corridor between New Orleans and Mobile. This train departs Orlando on Sunday, Tuesday, and Thursday, and from Los Angeles on Wednesday, Saturday, and Monday.

The *Crescent* operates between New Orleans and New York City; the service departs the corridor at NOT Jct.

The *City of New Orleans* operates into NOUPT from the north and departs the Corridor at Carrollton Jct.

(2) Corridor

There are no corridor passenger rail services in this corridor.

(3) Other

There no intra-corridor intercity passenger rail operations in the corridor.

c) Commuter (there may be more than one type)

There are no commuter rail services in this corridor.

d) Freight (Through and local; there may be multiple types)

There is a daily average of 19.1 trains between Mobile and Gentilly Yard, consisting of 0.9 passenger trains, 5.4 intermodal trains, 12.1 manifest trains and 0.7 bulk trains[3]. There are no unit trains running in this territory and only a limited number of bulk trains (less than 1 per day on average). Thus, the majority of trains running in this corridor are intermodal and manifest. Almost all trains terminate at Gentilly Yard, although some traffic is for western destinations and is interchanged with other railroads, mainly the Union Pacific.

[3] Based on average train operations in a two-week period in May 2004.

The principal intermediate freight origin/destination in this corridor are the ports of Mobile, Pascagoula, Gulfport, Bienville, and New Orleans and several industries located along the line of road.

Freight operations are much more variable than passenger services in terms of arrival and departure times, train size, train performance, and frequency in a given period of time. Freight trains vary significantly in their performance capabilities and compatibility with passenger operations: for example, unit trains of coal and grain generally have a lower horsepower-to-tonnage ratio and poorer performance than more time-sensitive operations. Thus, a general merchandise or intermodal train ordinarily takes less time to clear a given route segment than a unit coal train.

The nineteen trains per day described above do not include local industrial switchers, which usually run short distances and frequently reverse directions. The following is a list of switchers operating in the territory in question.

M728 –Train is on duty from Theodore into Mobile, works Sea-Pak (mp 675.7 NO&M Sub) , then goes back to Theodore.

Y321 – Switches at Brookley (mp 670.0) off the siding.

M724 - Switches at Brookley (mp 670.0) off the siding and Theodore (mp 680.0) off the mainline.

M733 – Switches at Pascagoula (mp 706.3) off the siding.

K970 – Works at Gautier (mp 710.65), Ocean Springs (mp 722.7), and Harbin (mp 746.0) off the siding.

M732 – Works at Bienville (mp 764.1) off the main.

M725 – Works off main between Orange Grove and Pascagoula. Works off main between Ocean Spring Beauvoir.

M723 Works at South Pascagoula off the main.

The need to efficiently manage peak traffic will become even more critical in the future: not only will rail passenger travel increase between Gentilly Yard and Mobile, but CSXT has also projected higher levels of freight traffic as a result of the growth of traffic through the New Orleans Gateway. Current service levels appear in Table 2-4, on the following page.

(1) NS Freight Service

Oliver Yard, the primary NS freight yard in New Orleans is located to the south of NOT Jct. NS freight trains operate to Meridian, Birmingham, and other northern destinations. The NS freight trains cross the Corridor at NO&NE Tower, which is controlled by NS. Almost all trains terminate at Oliver Yard, although some traffic is for western destinations and is interchanged with other railroads.

(2) New Orleans Public Belt

New Orleans Public Belt (NOPB) operates between NOPB Interlocking and Gentilly Yard. NOPB trains also cross the corridor to access a yard north of the CSXT main line.

e) Summary description of existing service quality

Heretofore, CSXT has not run its freight operations on a scheduled basis (though this might be changing), so factors like average speed, unscheduled delay, and dwell time have not been a major concern.

The service quality for the *Sunset Limited*, on the other hand, has been less than impressive. In a typical week, the train heading for Orlando could be 9 to 11 hours late at Mobile. This poses an operational problem for CSXT. Since the main line at Sibert and Gentilly yards is usually occupied by trains being assembled and by trains doing pick up and/or set off of cars, the policy is that if this Amtrak train is on time, an open slot is kept. If it is late, then it may be routed through the yard tracks, which results in additional delays. Keeping an open slot for these trains, even if they are on time, poses a challenge for the dispatchers and the yard personnel.

Table 2-4
Existing Railroad Services on the New Orleans-Mobile Corridor

		Number of Daily Train Movements (Round-Trips)
Service	**Route**	**New Orleans to Mobile**
Amtrak		
Corridor-type services	**New Orleans to Mobile**	**0**
Total Corridor-type services		**0**
Long-distance services	**Sunset Limited**	**0.43**
	Crescent	**2**
	City of New Orleans	**2**
Total, Long-distance service		**4.43**
Total Amtrak		
Freight	**CSXT**	**19**
	NS	**n/a**
	NOPB	**n/a**
Total,Freight Service		**19**
Grand Total New Orleans to Mobile Corridor (Amtrak and CSXT inclusive)		**23.43**

Source: Parsons Transportation Group, 2005.

Chapter 3 - Service Goals

The service goals of this project are to introduce intercity passenger service to the corridor as soon as possible on a limited basis and to grow that service over the next twenty years, while maintaining the current excess capacity in the corridor to support increased freight traffic. All operators and sponsors—intercity passenger and freight—intend the services on the New Orleans-Mobile Corridor in the planning year, 2025, to be more reliable than those operating on the Corridor at present. The envisioned mix of services is presented in Table 3-1 and described below.

Table 3-1
Railroad Services Envisioned for 2025 in the New Orleans-Mobile Corridor

		Number of Daily Train Movements (RoundTrips)
Service	**Route**	**New Orleans to Mobile**
Amtrak		
Corridor-type services	**New Orleans to Mobile**	**6**
Total Corridor-type services		**6**
Long-distance services	**Sunset Limited**	**0.43**
	Crescent	**2**
	City of New Orleans	**2**
Total, Long-distance service		**4.43**
Total Amtrak		
Freight [1]	**CSXT**	**19**
	NS	**n/a**
	NOPB	**n/a**
Total,Freight Service		**19**
Grand Total New Orleans to Mobile Corridor (Amtrak and CSXT inclusive)		**29.43**

Source: Burk-Kleinpeter, Inc., 2006.

Covering a typical 24-hour period, the numbers of daily trains envisioned in Table 3-1 do not adequately depict the congestion potential on the Corridor because intercity passenger trains are concentrated into an 18-hour – rather than a 24-hour – day, since operations between 11:00 PM and 5:00 AM are minimal. To assess that potential requires contemplation of the movements in each direction through the Corridor during the hours that HSR intercity

[1] Because of the variability and directional imbalance of freight traffic, the numbers shown here (expressed as daily round trips for comparability with the other services) are rough approximations.

passenger trains will operate. In view of the varying performance profiles and station stop requirements of the passenger and freight services, as well as the needs for diverging, combining, and conflicting moves at numerous locations, the need for such capacity additions as this report suggests is underscored.

1) Intercity passenger

   A demand would exist for corridor-type high-speed intercity train service between New Orleans and Mobile if such service were to be provided. This is the message of a ridership study prepared for this plan by AECOM Consult, Inc., which projected significant demand for intercity rail travel on the New Orleans-Mobile Corridor by the year 2025 if high-speed rail service is implemented. To satisfy this latent demand, most of which would relieve overburdened highways of intercity travelers, the 2025 service would include six daily trains servig the following stops, as follows:

   - New Orleans, LA
   - Bay St. Louis, MS
   - Gulfport, MS
   - Biloxi, MS
   - Pascagoula, MS
   - Mobile-West, AL (a new station near I-65 west of Mobile), and
   - Mobile, AL.

   If a trip time of less that two and a half hours can be achieved between New Orleans and Mobile, high-speed rail would be competitive with the automobile in a corridor experiencing increasing congestion.

2) Commuter-type Services

   There are no commuter rail servies anticipated.

3) Long Distance Trains

   The Sunset Limited, normally operating between Orlando, FL and Los Angeles, CA is the only passenger train that runs on this corridor. This train departs Orlando on Sunday, Tuesday , and Thursday, and from Los Angeles on Wednesday, Saturday, and Monday. Service east of New Orleans has been indefinetly suspened by Amtrak.

4) Freight

This study used existing levels of freight service, augmented by changes projected by CSX. The average daily train count between new Orleans and Mobile is 19 trains, made up of one passenger train, five intermodal trains, twelve manifest trains, and one bulk train. Thus, the majority of trains running in this corridor are intermodal and manifest.

Chapter 4 - Methodologies

Sources for this study included reports prepared for the Louisiana Department of Transportation and Development (DOTD), the Regional Planning Commission (RPC), the SRRTC, track diagrams, maps, equipment specifications, and other engineering and ownership documentation. Limited field investigations took place to verify existing conditions. Also, the study team consulted with appropriate RPC, local, CSX, NS, NOPB, and Amtrak officials to assess the status of their respective plans, and to assemble a consensus list of possible projects that would assist all operators to meet their service goals. Extensive inputs, review, and comments were solicited from these agencies and railroads, and numerous meetings were held, jointly and separately, to discuss the effort and resolve differences. The work process is described in subsequent subsections.

1) Work Performed by the SRRTC

   In the 1990s two reports on the Gulf Coast Corridor were published:

   - Deep South High Speed Rail Corridor Feasibility Study, and
   - Gulf Coast High Speed Rail Corridor Feasibility Study, Phase II

   The reports described key elements that determine the feasible approaches to creating a high-speed rail corridor on the Gulf Coast. The studies defined the rail corridor through the States of Louisiana, Mississippi, and Alabama, with connections to Pensacola, Florida and Houston, Texas. The Phase II report provided an action plan - the "incremental approach" - that would lead towards implementation of HSR passenger rail service in the Corridor.

2) Work Performed By the DOTD/RPC

   In September 2002, a report entitled *New Orleans Rail Gateway Regional Rail Operational Analysis* was released. The report presented the results of a detailed evaluation of current rail operations within the New Orleans Gateway. The study supporting the report identified specific deficiencies/problems that resulted in congestion and inefficiency in the rail system. A plan of action to address the issues was recommended.

   The implementable Rail Gateway Action Plan had the goal of improving the region's competitive position in the transportation marketplace so that it will support existing and future economic activity and associated goods movement needs while minimizing community impacts and improving the overall intermodal transportation system operations in the region and nation.

3) Data collection and Organization

Development of this New Orleans-Mobile study included a limited review of the current (2005) condition of the rail Corridor and its ability to safely and efficiently handle the existing levels of rail services operated by Amtrak and CSX/NS. The review included, but was not limited to, track conditions and configurations, roadbed and under-grade bridge conditions, signal and traffic control systems, passenger stations, and maintenance facilities.

In the interest of efficiency, and to reduce the number of requests for data from concerned government agencies and organizations, the data collection processes for the state of the rail Corridor analysis, and this report, were combined whenever possible. Consultations were held with the appropriate staffs of Amtrak and CSXT who were involved with rail operations in the Corridor. The objective was to obtain data on existing and projected 2025 train operations and to obtain information on presently planned improvements to the Corridor.

CSXT and Amtrak supplied the latest track charts and track maintenance program information. The data served as an input to the subsequent analyses. Information developed for the Phase I Meridian to New Orleans study was evaluated and used as needed.

Available maps and documents were collected and reviewed, and on-site inspections were made. Current information on existing usage and any current plans for upgrading the Corridor were obtained and reviewed. The results of investigations of current conditions in the Corridor were reviewed with, and comments were obtained from, Amtrak and state and local transportation agencies so that their concerns and needs were known and resolved prior to the preparation of this report.

A summary level description of the condition of the existing New Orleans-Mobile Corridor rail plant was developed (see Chapter 2). The description was based on the results of reviews of documentation previously prepared, augmented, as needed, by the results of field inspections. Summary descriptions of current and 2025 service levels for commuter, intercity, and freight operations also were prepared and are presented in Chapters 2 and 3.

Data on track and station ownership, lease, operating and occupancy rights to the land, equipment and fixtures that was readily available was reviewed and summarized.

4) Initial Development of Improvements

Draft documentation detailing the program of improvements in the New Orleans-Mobile Corridor was prepared and submitted to participating railroads and agencies for review and comment. The documentation included recommendations for enhancements and modifications thought to be necessary for upgrading the New Orleans-Mobile facilities so they could handle the projected levels of intercity and freight service safely and efficiently in 2025.

A list of planned, proposed and desired Corridor improvement projects was compiled to establish a "control list" of projects as well as the elements to be included in the preliminary program of projects to be recommended. The list was developed by reviewing prior reports, documents, and improvement programs; consultation with the owners and operators of the railroads; Federal, state, and local government agencies; and field investigations to verify existing conditions. The projected operating schedules of all Corridor users over the next 20 years also were obtained and a determination was made as to whether the planned improvements were adequate to handle the projected traffic levels.

Specific projects that needed further analysis or conceptual development were identified, and additional information was gathered to enable recommendations to be developed. Projects that were reviewed included proposals to:

- Upgrade the track structure;
- Install new signaling and traffic control systems;
- Realign selected curves to increase operating speeds and reduce trip time;
- Reconfigure, eliminate, or install interlockings to improve operating flexibility;
- Install trackage to accommodate increased traffic levels; and
- Initiate station improvements.

Reports, plans, drawings, schematics, schedules, results of operational analyses, and budgets were reviewed to identify areas requiring follow-on investigations. Photographs and aerial photographs also were used in the analytical process.

As each planned, proposed, or potential project that might affect rail operations was identified, a project description was initiated. The information included, wherever possible: a description, location on the Corridor, and the rationale for the improvement.

After the proposed projects were identified, evaluated and documented, summary geographical presentations illustrating existing and proposed spatial interrelationships were developed.

The preparation of the preliminary list of projects to meet program goals was a limited iterative process. The process resulted in a list of projects that would:

- meet intercity rail service goals based on reduced running times and higher frequency of service;
- enable other services to coexist at their present levels without degradation; and
- Accommodate projected or future growth or changing conditions, such as increased commuter rail operations in the Corridor.

Scenarios to achieve the best integration of intercity and freight rail services were prepared, based on operational constraints identified from analyses of the projected 2025 intercity, commuter, and freight volumes.

As necessary, alternative projects, beyond those initially proposed, that would enable attainment of the stated goals were developed, analyzed, and included.

5) Analysis of Operations

This section summarizes the essential lines of the analysis, and then provides selected details.

a) Overview of the Analysis

The analysis compared the services as presently envisioned by the operators for 2025, with the fixed plant as configured today and as upgraded with various carefully-ordered combinations of improvements. The analysis focused on two questions:

- Can individual trains meet their trip-time goals, irrespective of other traffic? and
- Can all the services operate in combination at intended speeds and schedules over the Corridor, while still meeting their reliability imperatives?

To answer the first question, the study team used a computer model known as a train performance calculator (TPC) to model the operation of a single train, with defined performance characteristics, over a traffic-free railroad with profile, alignment, and maximum speeds as specified for each segment. The

TPC was applied to prototypical freight and intercity passenger trains, to assess their optimal performance over the Corridor under different sets of conditions. However, it must be remembered that the mere physical possibility of operating a given train over a given right-of-way at a given trip time offers no assurance that a combination of services can reliably operate on the Corridor.

To answer the second question, the study team applied detailed simulations - modeling sophisticated, random variations in operating conditions and performance - to the full spectrum of freight, intercity passenger, and commuter services on the New Orleans-Mobile Corridor. These simulations assessed the impacts of changes in both schedules and fixed plant capabilities on all services operating simultaneously over a hypothetical seven-day test period.

Taken together, the TPC runs and the detailed operating simulations permitted the analysts to compare intended schedules, optimal running times, and expected performance for all services. The effects of alternative schedules and fixed plant capabilities were evaluated through numerous model runs. By these means the study team developed a preliminary list of potential projects and priorities that would meet the trip time and reliability goals of the study. This report synthesizes the results of investigations to date and defines a plan that can serve as a basis for further design, environmental work, and partnership and financial development for the New Orleans-Mobile Corridor.

b) Simulation Techniques

Manual and computerized operational simulation techniques were used to analyze the reliability of the projected intercity, commuter, and freight services operating on the same trackage between New Orleans and Mobile. The sophisticated computerized simulations were performed using CANAC's Railway Analysis and Interactive Line Simulator (RAILS2000). Details of the simulations performed are contained as an Appendix in Volume II of this report.

The purpose of the line capacity study is to quantify the impact of increasing existing Amtrak trains speed and running of additional passenger trains between New Orleans, LA, (Union Passenger Terminal) and Mobile, AL. The study is to determine, test and evaluate alternative plant enhancements, to accommodate an increase in existing Amtrak trains speed and to allow running of additional passenger trains with minimal adverse effect on CSXT freight train performance. Two levels of additional passenger trains are under consideration:

- Limited Service - 4 trains per day running at 79 mile per hour
- Full service – 12 trains per day running at 90 miles per hour

c) Cost Estimates

Conceptual, order-of-magnitude estimates for each project identified as necessary were developed in 2004 dollars. Appropriate levels of contingency, reflecting the level of project development, were included.

d) Project Categories

Each proposed improvement was assigned to one of two major categories defining the basic purpose of the work: Trip Time-Related Projects and Capacity-Related Projects. While this categorization is useful analytically, the categories can overlap: some trip time-related projects would help to improve capacity, and some capacity-related projects would help to reduce trip times.

e) Trip Time-Related Projects

Projects generally contributing directly to lower trip times or permitting higher operating speeds were included in this category:

- curve and spiral modifications,
- signal modifications for higher speeds, and
- Use of high performance trains.

f) Capacity-Related Projects

Projects providing additional railroad capacity to preserve attainment of the trip time, while accommodating higher train frequencies were included in this category:

- interlocking reconfigurations,
- installation of passing tracks, and
- Higher speed turnouts and crossovers.

6) Preliminary Project Phasing

A detailed project schedule for constructing these projects was not developed. Instead, a preliminary phasing analysis was performed to identify project priorities and the relative interface of projects based on an analysis of improvements required to support the start-up level of service. The second level of improvements included those required to support the full build-out level of service. These analyses established an agreed priority for projects and individual construction work items. This approach included a preliminary analysis of constraints associated with projects that would depend on track availability for construction. Ultimately, as preliminary engineering proceeds the phasing analysis would consider logistics and procurement of materials and equipment, availability of resources, environmental approvals, real estate acquisitions, track availability, and funding availability.

7) Assessment of Projects

The benefits associated with individual projects were not identified. Detailed environmental analysis was not performed; however, experience gained from prior projects was reviewed to ensure that recommended projects could reasonably be assumed to be implemented with a minimum of environmental disruption. Further, work to identify the potential changes in intercity ridership, revenues, and costs as the result of implementing the program of projects, and the proposed 2025 intercity rail service schedules, was not performed.

8) Key Assumption: Condition of the Underlying Railroad

As previously noted, the Corridor, as a principal east-west freight route, has been maintained to facilitate safe and expeditious freight movements. Therefore, this study assumes that the freight railroads, as owners of the fixed plant, will continue to maintain it in the state of good repair that characterizes the main line portions today. Therefore, the investment requirements contained in this report do not include replacement in kind of key existing track components (ties, rail, and the like)—in railroad parlance, "program maintenance."

On the other hand, this report provides for a significant upgrade in capacity to assure safe, expeditious passenger and freight service.

Chapter 5 - Analytical Results

This study contained three distinct analyses; (1) Travel Time Analysis, (2) Ridership and Revenue Forecasts, and (3) Capacity Analysis. The results of these three analyses are summarized in this chapter. Voume II of this report contains detailed technical memoranda discussing the ridership and revenue forecast and the capacity analysis.

Travel Time Analyses

The Project Team performed a series of TPC (train performance calculator) analyses to determine unimpeded running times over the route's current configuration. Changes in the route's basic engineering—track connections, curve realignments to obtain goal speeds (particularly lengthened spirals to ensure passenger comfort at the increased levels of ***maximum authorized speed*** [MAS]), elimination of speed restrictions due to track condition or municipal speed restrictions—were evaluated using the TPC to determine the actual transit time improvements that would be achieved in the New Orleans to Mobile corridor. Improved train speeds will be essential if the railroad is to establish a competitive position in the intercity passenger market.

The TPC running times included two-minute stations stops at Biloxi and the Mobile Beltway Station, and one-minute station stops at Bay St. Louis, Gulfport, and Pascagoula. The initial TPC runs were made with a maximum passenger train speed of 110 mph. Additional runs were made to evaluate the running times for 90 mph and 79 mph train services. A schedule "pad" of 13 percent was used to provide for schedule reliability to produce the passenger schedules used in the ***Ridership and Revenue Analyses***. The passenger train running times were slightly faster westward than eastward. The results are shown in Table 5-1, below.

Table 5-1
TPC Runing Times, New Orleans to Mobile

Speed	East	West
79 mph MAS	2:25	2:25
90 mph MAS	2:17	2:16
110 mph MAS	2:03	2:02

Source: Parsons Transportation Group, 2006.

The running times for various types of CSXT freight trains also were evaluated using the TPC. The freight trains were run in both directions to determine probable running times.

Passenger train schedules for Gulf Coast High-Speed rail services other than the New Orleans to Mobile corridor have yet to be developed. The schedules for the Gulf Coast High-Speed Rail corridors would be integrated, utilizing New Orleans as a hub. Of course, the schedules would assume the continued operation of existing long-distance passenger trains, which would share the routes and station stops.

Ridership and Revenue Forecasts

Ridership and revenue forecasts were prepared for each of the alternatives. Table 5-2 on the following page summarizes the forecasts results for year 2025, with revenue expressed in 2003 dollars. These forecasts include riders and revenue on both the proposed corridor trains and the *Sunset Limited*, which is assumed to operate as it does today. In all of the above scenarios, the new train frequencies serve the following stops:

- New Orleans, LA
- Bay St. Louis, MS
- Gulfport, MS
- Biloxi, MS
- Pascagoula, MS
- Mobile-West, AL (a new station near I-65 west of Mobile)
- Mobile, AL

The forecast results show the impact of changes in frequency and speed as service is improved from 1 round trip at a 79 mph maximum speed to 12 round trips at a 110 mph maximum speed. In general, the results show that:

- Increases in maximum operating speeds result in

  - 12 to 17 percent increase in ridership/revenue from 79 to 90mph
  - 13 to 15 percent increase in ridership/revenue from 90 to 110mph

- Increases in frequency result in

  - more than twice as much ridership/revenue from 1 to 2 daily round trips
  - about twice as much ridership/revenue from 2 to 4 daily round trips

Table 5-2

Summary of 2025 Forecast Results

		Annual Ridership	Annual Revenue	Annual Pas-Miles	Annual Train-Miles	Revenue/ Passenger	Revenue/ Pas-Mile	Revenue/ Train-Mile	Pas-Mile/ Train-Mile
Base	Sunset Only	1,000	$10,000	70,000	50,000	$10.00	$0.14	$0.200	1.400
Alternative 1a	1 Train - 79 mph	46,000	$650,000	4,700,000	150,000	$14.13	$0.14	$4.333	31.333
Alternative 1b	1 Train - 90 mph	51,600	$730,000	5,280,000	150,000	$14.15	$0.14	$4.867	35.200
Alternative 2a	2 Trains - 79 mph	104,700	$1,460,000	10,520,000	260,000	$13.94	$0.14	$5.615	40.462
Alternative 2b	2 Trains - 90 mph	122,500	$1,710,000	12,400,000	260,000	$13.96	$0.14	$6.577	47.692
Alternative 3a	4 Trains - 79 mph	210,400	$2,900,000	20,920,000	470,000	$13.78	$0.14	$6.170	44.511
Alternative 3b	4 Trains - 90 mph	240,700	$3,310,000	23,900,000	470,000	$13.75	$0.14	$7.043	50.851
Alternative 3c	4 Trains - 110 mph	272,900	$3,750,000	27,050,000	470,000	$13.74	$0.14	$7.979	57.553
Alternative 4a	6 Trains - 79 mph	282,800	$3,850,000	27,710,000	680,000	$13.61	$0.14	$5.662	40.750
Alternative 4b	6 Trains - 90 mph	327,400	$4,450,000	32,010,000	680,000	$13.59	$0.14	$6.544	47.074
Alternative 4c	6 Trains - 110 mph	375,300	$5,100,000	36,620,000	680,000	$13.59	$0.14	$7.500	53.853
Alternative 5a	8 Trains - 79 mph	327,800	$4,450,000	31,930,000	890,000	$13.58	$0.14	$5.000	35.876
Alternative 5b	8 Trains - 90 mph	380,500	$5,150,000	36,950,000	890,000	$13.53	$0.14	$5.787	41.517
Alternative 5c	8 Trains - 110 mph	437,200	$5,910,000	42,360,000	890,000	$13.52	$0.14	$6.640	47.596
Alternative 6a	12 Trains - 79 mph	399,800	$5,380,000	38,540,000	1,320,000	$13.46	$0.14	$4.076	29.197
Alternative 6b	12 Trains - 90 mph	464,500	$6,240,000	44,660,000	1,320,000	$13.43	$0.14	$4.727	33.833
Alternative 6c	12 Trains - 110 mph	533,500	$7,160,000	51,200,000	1,320,000	$13.42	$0.14	$5.424	38.788

Source: AECOM Consult, Inc., 2006.

Note: All revenue is expressed in 2003 dollars

- about 33 to 37 percent more ridership/revenue from 4 to 6 daily round trips
- about 15 to 16 percent more ridership/revenue from 6 to 8 daily round trips
- about 21 to 22 percent more ridership/revenue from 8 to 12 daily round trips

Note that the results show a diminishing impact of frequency increases, particularly at the higher 8- and 12- train level. This diminishing impact is caused largely by the expansion of service into less productive late evening time slots. The performance of the 8- and 12- train scenarios may be increased by re-positioning these trains into other time slots.

Ridership and revenue forecasts were also prepared for years 2005, 2010, 2015, and 2020. Table 5-3 on the following page summarizes these forecasts results along with the year 2025 results. Once again, all revenue forecasts are expressed in 2003 dollars. As these results show, the ridership and revenue forecasts increase over time, although at a diminishing rate. The average annual growth rate between 2005 and 2010 is about 1.1 percent and the average annual growth rate between 2020 and 2025 is about 0.9 percent. These trends track similar diminishing growth rates in the population and employment forecasts over these years.

Capacity Analyses

This section discusses results of the model simulations as outlined in the Terms of Reference for the "Capacity Study of CSX Corridor Between New Orleans and Brewton" and summarizes the capacity improvements needed for the introduction of a Limited Intercity Service (four trains per day) and Full Intercity Service (twelve trains per day) between New Orleans, LA and Mobile, AL.

The purpose of the line capacity study was to quantify the impact of increasing existing Amtrak trains speed and running of additional passenger trains between New Orleans, LA, (Union Passenger Terminal) and Mobile, AL. The study was to determine, test and evaluate alternative plant enhancements, to accommodate an increase in existing Amtrak train speeds and to allow running of additional passenger trains with minimal adverse effect on CSXT freight train performance. Two levels of additional passenger trains are under consideration:

- Limited Service - 4 trains per day running at 79 mile per hour
- Full service – 12 trains per day running at 90 miles per hour

<u>Calibrating the Model: the Base Case</u>

Running commuter and passenger trains in a predominantly freight corridor presents a number of challenges under the best of circumstances. A mix of trains that run at different speeds consumes more capacity than the same number of trains running at similar speeds. Moreover, passenger trains are expected to operate with reasonable on-time performance,

Table 5-3

Summary of Forecast Results by Year

		Annual Ridership					Annual Revenue (millions)				
		2005	2010	2015	2020	2025	2005	2010	2015	2020	2025
Alternative 1a	1 Train - 79 mph	37,700	39,800	41,900	44,000	46,000	$0.55	$0.57	$0.59	$0.62	$0.65
Alternative 1b	1 Train - 90 mph	42,300	44,600	47,000	49,400	51,600	$0.60	$0.64	$0.67	$0.70	$0.73
Alternative 2a	2 Trains - 79 mph	85,400	90,200	95,100	100,100	104,700	$1.19	$1.26	$1.33	$1.40	$1.46
Alternative 2b	2 Trains - 90 mph	99,900	105,500	111,300	117,100	122,500	$1.41	$1.49	$1.56	$1.63	$1.71
Alternative 3a	4 Trains - 79 mph	171,100	180,900	190,900	201,000	210,400	$2.37	$2.51	$2.64	$2.77	$2.90
Alternative 3b	4 Trains - 90 mph	195,600	206,900	218,400	230,000	240,700	$2.71	$2.87	$3.02	$3.17	$3.31
Alternative 3c	4 Trains - 110 mph	221,800	234,600	247,600	260,700	272,900	$3.09	$3.25	$3.42	$3.59	$3.75
Alternative 4a	6 Trains - 79 mph	229,400	242,800	256,400	270,100	282,800	$3.16	$3.33	$3.51	$3.69	$3.85
Alternative 4b	6 Trains - 90 mph	265,500	281,000	296,800	312,700	327,400	$3.66	$3.85	$4.05	$4.26	$4.45
Alternative 4c	6 Trains - 110 mph	304,400	322,300	340,300	358,400	375,300	$4.17	$4.40	$4.64	$4.88	$5.10
Alternative 5a	8 Trains - 79 mph	265,700	281,400	297,200	313,100	327,800	$3.64	$3.85	$4.05	$4.25	$4.45
Alternative 5b	8 Trains - 90 mph	308,400	326,600	345,000	363,400	380,500	$4.21	$4.45	$4.69	$4.93	$5.15
Alternative 5c	8 Trains - 110 mph	354,200	375,100	396,300	417,600	437,200	$4.83	$5.10	$5.38	$5.66	$5.91
Alternative 6a	12 Trains - 79 mph	323,600	342,900	362,300	381,700	399,800	$4.41	$4.65	$4.90	$5.15	$5.38
Alternative 6b	12 Trains - 90 mph	376,100	398,400	420,900	443,500	464,500	$5.10	$5.39	$5.68	$5.97	$6.24
Alternative 6c	12 Trains - 110 mph	431,900	457,600	483,500	509,400	533,500	$5.86	$6.19	$6.52	$6.85	$7.16

Source: AECOM Consult, Inc., 2006.

which puts additional demand on the host railroad, which is primarily in the business of running freight trains.

The CSXT corridor from New Orleans to Mobile presents considerably more challenges to running additional passenger trains than might be expected elsewhere. This corridor, in its present configuration, is difficult to operate even with the present levels of traffic and solutions to the existing bottlenecks and limitations are difficult and potentially expensive.

One impediment to running reliable passenger service is the existence of seven drawbridges between Mobile and New Orleans UPT. Water traffic (boats) has an absolute priority over trains, and the bridge openings appear to be a random process, with the exception that boats seem to operate mostly in daytime.

While drawbridge openings constitute an irritant to the operation of the freight trains, they hamper on-time performance of the passenger trains. As the bridge opening process is random, a passenger train may run sometimes without a single hit, while other times get delayed at more than one drawbridge, making its transit time unpredictable. Possible solutions to this problem include:

- Imposing a curfew on boats for the duration of time sensitive service
- Provide for buffer in the schedules of the passenger trains (but this negates the benefit of having high-speed passenger service).
- Live with irregularities of the service (might not be practical for passenger trains)

In the current operation, Gentilly and Sibert yards are bottlenecks. These yards have long outgrown their original purpose and currently operate substantially over capacity. These yards are in the center of the urban areas and cannot be substantially modified due to the lack of available space. Due to yard physical and operating constraints, the yard operations spill over on to the main line, and use up mainline infrastructure that is meant to facilitate passage of trains, meets and overtakes for trains running on the mainline. Solving the Gentilly and Sibert yard problems are prerequisite to the introduction of additional passenger trains.

The study addressed the yard operations at a macro level. Nevertheless, we were successful in determining that the scope of the yard problems goes beyond any initiative that might contemplate modifications to both yards at the present locations. Possible solutions include relocation of both yards, or, at least, building staging facilities on approaches to the yards. The area on approach to the Gentilly yard is located in wetlands and it may be difficult to find an appropriate location for a staging facility. The area on approach to the Sibert yard contains numerous road crossings that would constitute an impediment to building a staging facility in direct proximity to the yard.

Results of the Simulations for the Initial Limited Service

This study subsequently focused on the plant improvements that would have to be made to the mainline in order to accommodate the additional passenger trains. Possible modifications were carefully chosen with the consideration of natural impediments, such as wetlands and road crossings.

This study concludes that in order to run four additional passenger trains at 79 mph, the mainline modifications would need to include:

- Re-spacing of the existing sidings to provide for more uniform siding-to-siding running time. This would include relocating two existing sidings and building one new siding. However, it may be more practical to leave the two sidings, which need to be relocated, in place and build three new sidings, keeping in view that they would probably be needed in the future for the full service. Additionally, the remaining sidings would be extended for approximately 8.9 miles in total. All sidings would be upgraded from controlled to signaled, allowing increasing the speed through the sidings to 30 mph.

- Constructing an 11.3-mile section of double track between Beauvoir and Harbin sidings and both sidings to be reconfigured to form pocket tracks at the end of the double track section.

- The double track at Sibert would be extended from milepost 667.0 to 671.8. This would be achieved by extending the Brookley siding north by 1.3 miles (already included in the previous bullet item) and by upgrading one Choctaw yard track to the mainline standard.

- The main track at Gentilly yard would be separated from the yard operations and upgraded to allow the speed of 60 mph.

Results of the Simulations for the Full Service

Simulations of the Full Service scenario (12 intercity trains a day) showed that the previously described problem with drawbridges only gets exacerbated as traffic levels increase even after sufficient plant has been added in order to keep the operation of the host railroad whole. On-time performance for the intercity trains dropped from 93% in the Limited Service scenario to 61% in the Full Service scenario.

This very low and unacceptable level of on-time passenger train performance is as a result of three main factors. The move to increase passenger train speed to 90 mph and increase in speed differential between the passenger and freight trains requires more overtakes. Second, the inflexibility in the physical plant to allow overtakes to occur as and when they are needed. And, lastly, the observations of traffic patterns in the simulations lead to a conclusion that drawbridges are responsible for not only primary, but also for secondary delays to the Intercity trains, with secondary delays becoming more pronounced with increased traffic levels. A primary delay occurs when a drawbridge opens in the face of an incoming intercity train and forces it to stop. An example of a secondary delay is a case where a freight train gets stopped by a drawbridge and sends a ripple wave of delays that affects trains behind him, including high priority intercity trains.

Possible solutions to the drawbridge problem include:

- Imposing a curfew on boats for the duration of time sensitive service
- Provide for buffer in the schedules of the passenger trains but this negates the benefit of having high-speed passenger service.
- Live with irregularities of the service (might not be practical for passenger trains)

This study subsequently focused on the plant improvements that would have to be made to the mainline in order to accommodate the additional passenger trains. Possible modifications were carefully chosen with the consideration of natural impediments, such as wetland and road crossings. The extent of the necessary plant improvement was such, that all remaining land outside the wetland was used. Thus, the plant simulated in this scenario might be referred to as a "Dry Land Plant". The significance of this is that additional plant improvements (for example modifications in order to improve on-time performance) would have to be done on the wetland, making them very costly.

Due to the significant difference in speeds between passenger and freight trains, the driving force behind the designs principles was to provide a maximum overtake capacity. To this end, a number of "super sidings" were provided. For the purpose of this study, a Super Siding is a short section of double track with a crossover in the middle. Such Super Siding is capable of handling a multiple complex traffic situations such as simultaneous meet between two freights and a passenger overtake, two on two meets between 4 freight trains, or limited running meets between two opposing trains. A different concept, whereby a continuous double track between Sibert and Gentilly is constructed was also evaluated (although not simulated). This solution would be very costly, as parts of the double track sections would have to be built on the wetlands. Moreover, with the traffic density in question, it might be expected that bi-directional running patterns would be enforced that would sandwich passenger trains between freights, without any possibility of overtakes, thus making the on-time performance of the intercity trains unacceptable.

Chapter 6-Environmental/Historic Factors

All projects that use public funds must first examine potential environmental impacts as part of the public decision-making process. "The Federal Railroad Administration has found that railroad corridor programs or projects lend themselves to tiered environmental documentation. Since funding design and construction improvements to railroad corridors generally extends over decades, a tiered first level Environmental Impact Statement (EIS) of Programmed Environmental Impact Statement (PEIS) is usually the appropriate form of documentation. This allows for identification of the full scope of projected improvements or modifications and either full analysis of identified elements or deferral of site-specific clearance of elements to later documentation.'[1]

"Typically, a long-range transportation plan is necessary to identify all project elements and for preparation of the initial environmental document. It is possible that the PEIS or first Tier EIS may categorically exclude work that does not impact environmentally or historically sensitive resources (for example: installing welded rail, replacing ties, installing a new signal system, or reinstalling track on an old roadbed) and may also identify other elements for separate environmental documentation (such as new stations, curve eliminations, new maintenance shops, and so forth). This type of documentation can incorporate by reference many elements of a corridor transportation plan and thus simplify the clearance process."[2]

This study proceeded independently of the preparation of the PEIS for several reasons:

- In order to describe the infrastructure improvements necessary to provide high-speed intercity passenger rail service in one segment of the Gulf Coast HSR Corridor, the New Orleans and Mobile segment,
- Because of the length of the Gulf Coast HSR Corridor – 1,025 miles – it may take years to complete the transportation plan in the remaining segments, and
- Since the PEIS process will require matching funds from the states, completion of the transportation plan will provide the states with the information they need to make a decision to proceed forward with the PEIS, or not.

Completion of the transportation plan for the entire Gulf Coast HSR Corridor is prerequisite to development of the PEIS.

This corridor transportation plan is not intended to be an environmental or historic assessment of any of the proposed actions. It does provide a general awareness of sensitive environmental areas or historic properties that could possibly be affected by proposed

[1] Railroad Corridor Transportation Plans, a Guidance Manual. Office of Railroad development, Federal Railroad Administration, revised July 8, 2005.
[2] Ibid.

changes. According to the National Environmental Policy Act (NEPA), "effects" include:

- Direct effects, which are caused by the action and occur at the same time and place.
- Indirect effects, which are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect effects may include growth inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems.

Effects and impacts as defined by NEPA are synonymous. Effects includes ecological (such as the effects on natural resources and on the components, structures, and functioning of affected ecosystems), aesthetic, historic, cultural, economic, social, or health, whether direct, indirect, or cumulative. Effects may also include those resulting from actions which may have both beneficial and detrimental effects, even if on balance the agency believes that the effect will be beneficial.

Environmental and historic concerns in the New Orleans to Mobile Corridor generally fall into two categories:

- Dredge and fill projects in wetlands and waterways;
- Section 106 or 4F issues in urban areas;

Wetlands and Waterways

The central Gulf Coast can be characterized as a low-lying coastal plain containing numerous streams, bayous and rivers, interspersed with fresh and brackish marshes and interdistributary swamps. Between Mobile and New Orleans, the CSXT traverses some forty-seven small creeks and streams, seven navigable waterways, two bays and a lake. Each of these water features is associated to some extent with wetlands of some type ranging from the forested wetlands of south Alabama to the prarie marshes of eastern New Orleans.

Potential Impacts

All proposed improvements, from straightening curves to lengthening or creating new sidings, have the potential to impact wetlands. Throughout this study, the study team has been careful to review USGS topographic maps and available aerial photography in order to avoid, to the greatest extent possible, impacting wetlands. This was done for two reasons, to keep project costs down and to minimize environmental impacts. The result is what the study team refers to as the "Dry Land Plan," which attempts to keep all physical improvements on uplands or non-wetlands. Nonetheless, more detailed investigations into wetland impacts will have to be made during the Tier 1 and Tier 2 processes.

Section 106 and 4F issues

The subject corridor connects two of the oldest and most historic cities on the central Gulf Coast, New Orleans (1718) and Mobile (1702). Naturally, both of these cities, as well as the smaller towns in between, contain numerous cultural resources of a historic nature. Since the railroad, itself, dates back to the late 1860's, it can be anticipated that there will be a significant number of historic sites within eyesight and earshot of the railroad. This is not surprising, as the construction of the railroad was a spur to development all along the gulf coast.

Potential Impacts

Because of the closely-spaced streets within the coastal cities, resulting in numerous grade crossings, emphasis was placed by the study team in trying to identify sites for new or expanded sidings that would not create new grade crossings. This has tended to push the proposed improvements out of the towns and into the countryside, away from most of the historic sites.

Within the towns, implementation of the Full Service would result in a significant increase in the number of passenger trains (six round trips per day). The significance of the increased traffic will be addressed in the PEIS.

Chapter 7 - Corridor-wide Investments

This Section describes the improvements identified as part of the Mobile to New Orleans Gulf Coast High-Speed (GCHSR) Rail Corridor Study. It outlines an initial broad range of improvements considered necessary to support the introduction of high-speed rail service, while providing the same level of service and operational capacity for freight operations that presently exists in the corridor. Finally, the report describes the additional improvements deemed necessary to support the recommended full service plan. This chapter describes the contemplated system-wide improvements, while site-specific improvements are described in detail in Chapter 8.

CSXT Fundamental Requirements to Be Fulfilled Before New Passenger Service Begins

The stated position of the railroad is that prior to initiation of new passenger service on their tracks, the proposed operation must:

- Improve safety of all rail operations in the area;
- Be transparent to freight operations, i.e., sufficient infrastructure must be provided to enable freight trains and passenger trains to operate without delay to either, and to allow for the growth of both; and
- Furnish sufficient indemnity for liability.

In addition, CSXT states that they will retain control of dispatching of trains on all tracks over which their freight trains will operate after inauguration of the high-speed passenger service.

Identification of Corridor-wide Improvements

The networks of improvements necessary to provide adequate track structure and sufficient capacity reliably to operate freight and high-speed passenger service between Mobile and New Orleans have been defined. Ultimately, the types of improvements that would be included are projects to:

- Upgrade the track structure
- Upgrade signal systems
- Realign selected curves to permit higher operating speeds and reduce trip time
- Reconfigure, relocate, eliminate, or install interlockings to improve operating flexibility
- Install additional trackage to reliably accommodate increased freight and passenger traffic levels
- Upgrade movable bridges
- Improve safety at the highway-rail grade crossings

- Install right-of-way fencing
- Improve stations

As previously described, a series of alternative alignments and operational scenarios were evaluated to achieve the maximum integration of intercity and freight rail services. A series of train operations simulations, which included anticipated future freight and passenger volumes, to quantify the impact of increasing existing Amtrak trains speed and running of additional passenger trains between New Orleans and Mobile were performed. The list of improvements is intended to be an additive list of improvements that will:

- Enable the specified running times for the Mobile - New Orleans intercity passenger service to be achieved
- Provide capacity required to accommodate future long-term growth in freight service volumes
- Provide safety-related improvements

The list of improvements reflects the results of the operations and facility planning analysis, and operations simulations. Chapter 8 will include:

- A description of the project
- Location on the route
- Project cost
- The rationale for the improvemen

The improvements identified, thus far, to implement the Mobile - New Orleans High-Speed Rail Service assume that:

- Improvements to minimize train delays through Mobile resulting from operations at Sibert Yard are implemented; and
- Improvements to minimize train delays resulting from operations at Gentilly Yard, in New Orleans, are implemented.

The following additional improvements would be required to upgrade the existing railroad infrastructures to support high-speed rail service between Mobile and New Orleans. The initial improvements Mobile to New Orleans to support the initial limited level of passenger service are described by category below, followed by the final Mobile to New Orleans improvements to support the recommended full intercity service is described.

1) Track geometry (curves, spirals, superelevation)

The recommended alignment improvements would allow higher train speeds to be sustained over longer distances.

Background

The rail lines comprising the corridor were built between the mid-19th century and early 20th century. Although a few line relocations have been constructed, the corridor still has a significant number of curves. At many locations, adjacent communities have developed in a manner that precludes reducing the track curvature through relocation and other modifications. In addition, environmental concerns may make other potential track alignment improvements challenging.

Despite these challenges, and regardless of the equipment type used, the Train Performance Calculator (TPC) trip time simulations revealed that increasing speeds above the present speeds on the corridor would necessitate a number of different types of modifications to curves, their approaches, and their operating characteristics. These modifications can be applied individually or in combination:

- Increase superelevation to the maximum allowable for a particular track alignment;
- Increase the amount of unbalanced superelevation used to calculate speeds through curves to minimize track shifts; and
- Modify spirals (the length of track that provides a smooth transition from tangent track to curved track) to provide a smoother ride.

The following modifications were not recommended for implementation on the corridors:

- Reducing the degree of curvature either within the existing right-of-way or by acquiring a limited amount of land outside the right-of-way, to ease speed restrictions that adversely affect trip time; and
- Relocating limited sections of the rail line in a cost-effective and environmentally sensitive manner to eliminate sharp curves. Sometimes, multiple curves can be ameliorated or eliminated in a single relocation project.

The work required to modify the curves can be categorized into three levels of shift:

- Less than six inches: These shifts can normally occur during planned surfacing and line maintenance activities.

- Between six and 36 inches: Shifts greater than six inches are assumed to require specific scheduled work outside of the normal maintenance requirements. Shifts less than 36 inches can usually be accommodated within the existing rail alignment; and
- Between 36 inches and ten feet. Shifts in this category could fall somewhat outside the existing rail alignment, which could require construction of significant new roadbed.

A fourth level of shift would not be required:

- Over ten feet: Shifts in this category could have required the curves to be relocated in excess of 10 feet to obtain the desired spiral or superelevation modifications.

Criteria for Realignments

To maximize performance while fully adhering to safety requirements and the dictates of passenger comfort, all the altered curves would have geometric characteristics meeting the following criteria:

- Maximum actual superelevation should not exceed five inches.
- Actual superelevation was chosen in increments commensurate with the speed assumed to be authorized for each curve, and with the runoff rates specified by CSXT.
- Maximum unbalanced superelevation should not exceed seven inches, which assumes use of tilting equipment. The study found that the use of tilting equipment at higher levels of unbalanced superelevation would be essential to optimizing the trip time goals.[1]
- Maximum lateral acceleration parallel to the floorboards should not exceed 0.15 g.
- For conventional coach equipment at a theoretical six inches of unbalanced superelevation, the roll angle should be 2.87 degrees.
- All actual superelevation should be introduced and removed over the entire length of the spiral—not within the curve itself or on the tangents adjacent to the spirals.
- Maximum jerk rate through the spiral should be 0.04 g per sec.
- Track twist rates for alignments at proposed speeds are as specified by CSX and NS in their internal engineering standards.

[1] Of course, actual use of the tilting equipment at the higher unbalanced levels of superelevation would be subject to review and approval by FRA's Office of Safety.

2) Track structure (ordinary track components and special trackwork)

3) Bridges, culverts, and other structures

Seven movable bridges - Pascagoula River (Figure 7-1), Biloxi Bay, Bay St. Louis, Pearl River, Rigolets, Chef Menteur, and the New Orleans Industrial Canal – are located between Mobile and New Orleans. The MAS for passenger trains is 30 mph (25 for freight trains) over the first six bridges, the MAS over the Industrial Canal varies by track – 40 mph for track 1 and 20 mph for track 2. The movable bridges consist of approach spans and a movable section, that either pivots on its center, or lifts from one end. The speed limit is over the movable segments is the restricted speeds listed above. The time lost varies according to the speed limits at each end of the bridges, but, for example, at Bay St Louis the time lost is approximately 30 seconds. Furthermore, frequently problems associated with the bridge structure and the signal system result in the failure of the signal system to return to a go signal (green) from a stop signal after the bridge has been closed. The result can be a significant level of delay to trains in both directions. The amount of delay can be acerbated by the isolated nature of the bridges, which delays access by maintainers that may be required to assist in solving the problem.

Figure 7-1
Pascagoula Bridge MP 706.8

Source: Parsons Trnasportation Group, 2005.

Thus, the movable bridges result not only in lost travel time but in a level of uncertainty, which is not conducive to reliability of either intercity passenger or freight train operations.

Recent CSXT Experience with Maintenance and Operating Problems

Over the last several years CSXT has invested heavily in the movable bridges on the line to improve the reliability of the service. This has included the standardization of miter rails; the installation of a solid 'packed' bridge tie design under the miters to improve the structural soundness of the suppors, numerous other structural upgrades, and upgrades to the signal system. The increased traffic volume on the line - from 35 mgt in the 90s to almost 55 mgt today – was the primary reason for the investments.

In the late 1990s, CSXT experimented with raising the speed over the bridges to 45 mph, but found that signal system reliability degraded, and returned the speed to 25 mph for freight trains. CSXT found that this reduced speed, in combination with the bridges' structural and signal systems upgrades, provided a reasonably reliable train performance.

The operating problems that CSXT has had with the bridges has to do with the movement of the rails and ties under the trains, which at times results in the 'proximity' switches in the signal system measuring an unacceptable amount of horizontal or lateral movement of the rails, which causes the signal system to 'drop' behind the train, i.e., the signals to turn to red. This results in the following trains or the next train in the opposite direction being stopped at the approach to the bridge. The problem is alleviated by a combination of activities that require support from train control and signal maintenance personnel not located on site. The bridge has to be reset (raised and lowered to restore proper rail alignment as measured by the signal system (almost same as rebooted) to clear the signals.

The correction process is made more difficult by the lack of accessibility of the bridges. This makes it difficult at times, particular in inclement weather, for the signal maintainer to reach the bridge.

The Movable Bridges

The rail line and its structures were built by the Louisville and Nashville (L&N) railroad. The movable bridge design is different from the design used by other railroads. The stringers are on 9-foot centers, rather than the more common 6-foot 6-inch centers.

The stringers are the longitudinal structural members that directly support the ties and track from underneath. The stringers, in the typical floor system, are supported by transverse floor beams that carry the train load to the main trusses. Wide stringer spacing means that the ties must span a greater distance than typical and either must be very thick or are more flexible than with many bridges that use narrower stringer spacing. This greater flexibility may be a contributing factor with the excessive deflection problem. One solution sometimes used is to add additional stringers inside of the two at 9-foot spacing at the end panels under the miter rail joints (joints shown in Figure 7-2). This could give 4 stringers at 3-foot spacing, for example, to bracket each side of the miter rails. This would give a much more rigid support of the miter rails, particularly if accompanied by the addition of steel ties.

Thus although the bridges are considered basically structurally sound, additional enhancements would be required to reliably support increased levels of freight and passenger train speeds.

Reportedly, an additional problem with the structures is that some truss ends are not founded on rigid concrete piers, but on much more flexible timber or exposed steel pile piers. This is presumably due to the soft deep soil conditions in the area at and east of New Orleans. This design may cause a lot of movement of bridge ends, let alone the miter rail joints.

Figure 7-2
Rigolets Bridge MP 775.4 (miter rails and bridge truss looking southward)

Source: Parsons Transportation Group, 2005.

Recommended Improvements

The study team did not make site-specific, detailed evaluations of bridge conditions and potential enhancements. This would have required access to detailed plans of the substructure and superstructure to evaluate further and to come up with practical recommendations for reinforcement. These further evaluations were outside the scope of the study; therefore, instead, the team established budgets that would be subject to further refinement. The budgets anticipate structural enhancements to reduce the level of deflections and the installation of an improved miter rail design, which is described in the following paragraph.

Miter Rail Improvements

Miter rails are joints that allow bridges to open for water traffic while supporting trains when the bridge is closed. The joints are located on the ends of the bridge spans. Recently, an improved miter rail design has been developed and tested at the Pueblo Test Center. The miter rails are based on a design developed by Amtrak; Amtrak's goal was to develop a miter rail that would enable them to reliably upgrade speeds over Portal Bridge, on the approach to Penn Station in New York, and other locations. The tests at the Pueblo facility have been encouraging, however, the proximity switches continue to be a problem. Additional switch designs will be tested.

4) Highway-railroad crossings (general treatments; specific major projects go in Chapter 8)

North Carolina’s Sealed Corridor Project, an effort to systematically improve safety at the highway-rail grade crossings on the North Carolina Railroad, has established the principle that improved rail passenger service can and should be accompanied by reduced risk of motor vehicle/train collisions. Accordingly, this study has developed a preliminary program to deal with the approximately 183 public and private crossings on the active and abandoned rail lines.

Crossing Safety Improvements

The improvement program can address safety issues at highway-rail grade crossings by either:

- Eliminating crossings through closure;
- Separating crossings through construction of a bridge or underpass; or
- Improving the level of protection through the installation of more extensive and more highly visible protection devices.

Creative solutions, including four-quadrant gates, longer gate arms, inexpensive median barriers, and video enforcement, have been implemented by numerous states to treat the different types of crossings across a specific route. Video surveillance at specific unimproved and improved crossings has demonstrated that advanced highway-rail crossing protection systems, such as four quadrant gates and median barriers, reduce driver "run-around" violations by as much as 98 percent and thus significantly reduce the risk of train/auto collisions.

Potential Grade Crossing Improvements

Basic information on highway-railroad grade crossings in the Mobile–New Orleans Corridors was presented in a previous section. With respect to future grade crossing safety activities, this section presents some engineering considerations and describes a set of actions that would complement the other corridor betterments contemplated in the report.

Implementation of high-speed rail on the Mobile–New Orleans Corridor would result in higher train speeds and frequencies over existing rail lines. Therefore, highway-rail crossing safety would require concerted attention as the planning and design process continues. In particular, each crossing would require study, both individually and in combination with neighboring crossings, to assess the degree of risk that it poses, the opportunities for mitigating that risk, and the cost-effectiveness of the various treatment options. “Risk” depends on a host of factors, including the geometry of the crossing, the type, speed, and volume of motor vehicle and rail traffic, and the protective devices in place or available. Community needs, such as access to nearby properties, obviously demand careful attention.

Any comprehensive grade crossing plan needs to address the full range of improvement options. These include consolidating groups of crossings; grade-separating heavily used crossings; closing selected crossings; and applying known techniques for reducing hazards at the remaining crossings. In addition, proper treatments must be applied to private crossings, where fatalities can and do occur despite the infrequency of use by motor vehicles.

Specific Considerations[2]

Many engineering and operational considerations would affect the details of a comprehensive grade crossing plan. The considerations are discussed in the following sections.

[2] The information in the following sections is based on material initially developed for the 2004 *Transportation Planning for the Mobile-New Orleans Corridor* Report published by the FRA.

Train Speeds

All other things being equal, as a minimum, gates and flashers would be provided at those remaining crossings though which passenger trains would operate. Improved protection and elimination of selected crossings would be considered for crossings through which passenger trains would operate at speeds in excess of 79 mph.

Constant Warning Times

Higher train speeds would require the timing in the track circuits (which actuate grade crossing gates and flashing lights) to be lengthened to initiate warnings sufficiently in advance of the arrival of the faster trains. Faster trains take less time to traverse the length of the circuit, and reach the crossing sooner than slower trains. At crossings with fixed circuits, warning time must be set for the fastest possible train. This creates a potential problem: when a slow train approaches the crossing, the gates are held down for an inordinate amount of time. Some motorists lose patience with the situation, and drive around the gate at the risk of a collision. Constant Warning Time circuits can offset this problem by automatically adjusting the length of the warning to a time appropriate to the speed of each individual oncoming train. The system has the ability to determine the speed of an approaching train, and initiate the crossing warning cycle so that a predetermined period of warning will have transpired when the train reaches the crossing, regardless of the train speed.

Four-Quadrant Gates; Median Barriers

Another innovation with application to many crossings is a system of four-quadrant gates, wherein four gates, instead of two, are lowered across the traffic lanes, blocking both directions on both sides, and median barriers are placed down the center of the roadway.

North Carolina's Sealed Corridor Initiative has shown that four-quadrant gates and median barriers effectively prevent motor vehicle operators from driving around the gates after they are lowered.

Effect on Train Speed of Crossings Located on Curves

Raising the MAS on a curve containing a grade crossing creates serious concerns. In numerous instances, an increase in superelevation would be necessary to attain the projected increase in train speed planned over the crossings and to reduce the lateral acceleration forces felt by rail passengers.

With superelevation, the outside rail on each track on the curve is raised as much as five inches above the level of the inside rail. With a multiple-track crossing, which many crossings are and would be after the improvements, a series of inclines would need to be crossed, one between the rails of each track, and a dip from the slope of one track to the next. There is also likely to be a slope upward to the tracks on each side, the one on the outside of the curve being significantly greater than the one on the inside of the curve. This is not practical on a heavily traveled street or highway, and may require that these crossings be closed, or grade-separated. Analysis will be required to develop a recommendation for each crossing.

Sidings and Crossings

Sidings to be constructed new or extended should be placed to minimize the number of grade crossings that would be blocked by freight or passenger trains stopped waiting to meet or be overtaken by another train. Conversely, planning for crossing improvements needs to take the location of sidings into consideration. This is more than a matter of convenience to motor vehicle flow, community needs for access by emergency motor vehicles demand careful attention in the locating, treatment, or elimination of highway-rail grade crossings.

<u>Contemplated Grade Crossing Program</u>

Based on all the considerations described above, the study team developed a potential list of grade crossing actions that would support the trip-time goals and safety prerequisites of high-speed rail development in the Corridor. These grade crossing actions are summarized in Table _ for 79 mph and 90 mph. In this table, the possible enhancements could have included:

- Elimination, which can be effected by:
  - Closing the crossing to vehicular traffic
  - Providing a grade separation
  - Relocating the railroad
- Upgrading of protection devices, for example from crossbucks to gates and flashing lights, or from gates that cover only half the road in each direction, to four-quadrant gates that cover the entire road, thereby blocking drivers from "running around" the crossing
- Keeping the crossing as-is, where the level of protection is already appropriate for the contemplated train speeds and road traffic levels
- Expanding or moving a crossing to comply with the engineering improvements described in other sections of this document. For example, new sidings or changes to curves; or adding well-protected crossings where they do not exist today

Fencing

Installation of right-of-way fencing at selected security-related locations, parklands, schools, service facilities, stations, and other locations would be evaluated as part of the final design, project implementation phase. For this document, it was assumed that fencing of both sides of the right-of-way to improve the safety and minimize the potential for trespassing was not required for the 90 mph full service initiative.

5) Electrification (if applicable)

Electrification of the corridor is not anticipated.

6) Signals and train control

Signal system upgrades should be implemented incrementally to handle increased train traffic efficiently on the route and to permit improved intercity passenger service with greater safety, as passenger train service and maximum authorized speeds are increased. These improvements also would enable freight service safely and efficiently to operate on the same tracks.

FRA regulations require that, where any train operates at a speed of 80 or more miles per hour, there must be in place an automatic cab signal, automatic train stop or continuous automatic train control system. The current ABS system on the CSXT Main Line has none of these additional systems, and therefore it is limited to a top speed of only 79 miles per hour. The installation of an automatic cab signal, an automatic train stop, or automatic train control system would be necessary in order to allow the higher speeds contemplated for the Mobile to New Orleans high-speed service.

The signal system would be upgraded to support the higher speeds. A cab signal system (necessary to operate passenger trains at speeds greater than 79 mph), a new block layout[3], and new signal aspects, would be installed incrementally, to accommodate speeds up to 90 miles per hour. Block spacing would anticipate increased train speeds. Reverse signaling would be installed on double track segments throughout the route.

Ultimately, a new signal system would improve the reliability of train operations for all services, contribute to reducing maintenance-related operating costs, and would be a component critical to enabling higher speed train operations.

[3] The block layout would define the spacing between signals that represents the best compromise maximizing capacity (more signals, closer together, creating shorter blocks) and economy (fewer signals, further apart, creating longer blocks).

7) Support facilities

Sufficient yard storage capacity should be provided to handle layovers, and to store equipment-awaiting maintenance in Mobile. Yard lighting, water and power hookups, a fueling facility, crew quarter facilities, employee locker room, and supervisory office space would be included. Commissary facilities to service train sets presently exist in New Orleans.

As of this time, a location to service trains that would be stored in Mobile between runs has not been identified. An efficient storage yard and maintenance facility near the station would be necessary to properly clean and inspect trains. Initially Choctaw Yard was considered, however, further evaluation of train operations through the area, and potential locations, would be required to finalize the location. Minimizing conflicts between passenger train yard moves and freight train moves between Sibert Yard and Brookley would be a primary concern

8) Stations and parking

Significant enhancements to the existing stations located between Mobile and New Orleans were not developed. The existing station buildings, platforms, and parking areas were considered adequate for the initial service level, and improvements for the full service would depend upon the ultimate ridership and demand for parking at each station – Pascagoula, Biloxi, Gulfport, and Bay St. Louis. Budgets for potential enhancements were established. Refer to Figure 7-3.

<u>Mobile Station</u>

An additional platform, to provide operational flexibility in this congested segment of the railroad, most likely will be required to support the full service operation. Parking in the vicinity of the station appears to be adequate.

Mobile Beltway Station

In many major rail transportation markets, Amtrak serves “beltway” or “suburban” stations, with good access to and from the highway system, as well as downtown stations. The benefit to both modes successfully has been demonstrated at the New Carrollton, MD station, located north of Washington, DC, and Metropark in northern New Jersey, both located on the Northeast Corridor. A beltway station should be in a location that has both space for parking and other facilities, and good highway access, to attract riders from the widest possible area, particularly those who would rather not “backtrack” to access a center-city station to travel to a destination in the opposite direction of the station from their residence.

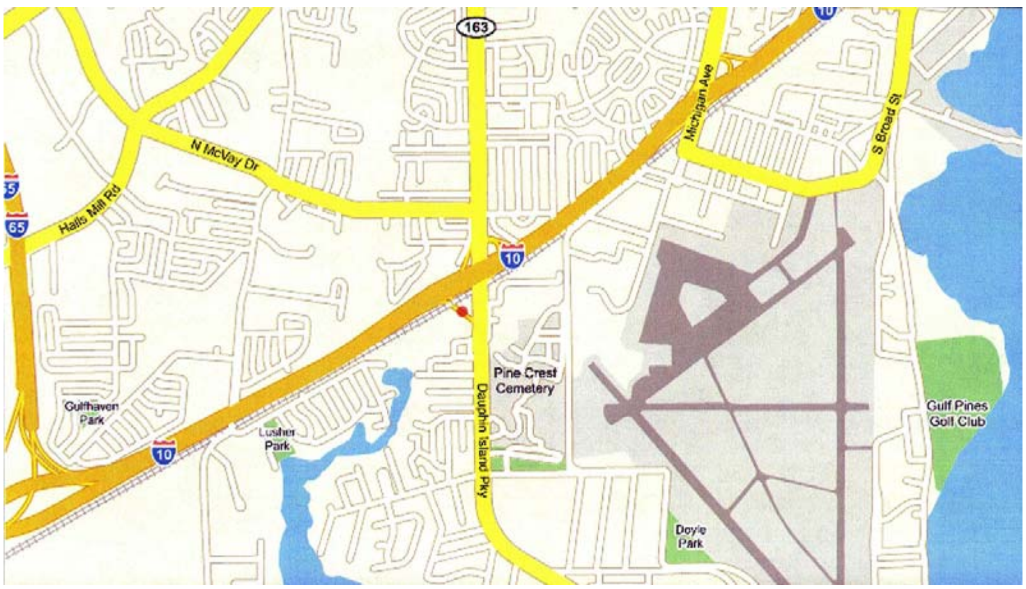
Figure 7-3
Corridor Passenger Stations

	
Mobile	Pascagoula
	
Biloxi	Gulfport
	
Bay St Louis	Approach to New Orleans Station Tracks

Source: Parsons Transportation Group, 2005.

The team's analysis indicated that an ideal Mobile location would be at the location where the Dauphin Island Parkway passed over the railroad at MP 671.6 between North and South Brookley. The station would be located northeast of the intersection of I-10 and I-65. The location has the further advantage of being located adjacent to the Mobile Regional Airport (Figure 7-4). The map shows the intersection of I-10 and the Dauphin Island Parkway. The red dot indicates a possible location for the beltway station.

Figure 7-4
Proposed Mobile Beltway Station MP 671.6



Map courtesy of Google

<u>New Orleans Union Passenger Terminal</u>

The proposed GCHSR intercity passenger operations will require a significant modification to the rail approaches to the station but further enhancements to the station facilities were not deemed necessary.

New Orleans Beltway Station

The study team evaluated several locations for a beltway station east of New Orleans but concluded that no adequate location that would not conflict with freight rail operations near Gentilly Yard existed.

Chapter 8 - Site-specific Investments

The planning and design of the GCHSR Corridor high-speed service, Mobile to New Orleans, will provide, when implemented, cost-effective improvements necessary to increase capacity on the existing rail line to support six HSR intercity passenger train round trips a day, while minimizing conflicts with freight operations. The simulation model showed that increased levels of 2025 freight and passenger service resulted in a larger number of passenger trains overtaking freight trains, resulting in delays to lower priority merchandise trains delayed by intermodal freight trains.

The resultant overall delays would be mitigated by the addition of additional double track segments, the modification of initial build sidings to double their length and enable them to accommodate multi-train meets, and finally by the installation of numerous industrial lead tracks to enable local freight trains to serve local industries without tying up the main track.

Route Capacity

On a single-track main line, such as CSXT's Mobile to New Orleans route, a number of factors, including the location, size, and types of switches associated with the passing sidings, as well as speed limits within a specific segment significantly impact the capacity of any segment. The availability of sidings is important because - since the freights generally make way for the passenger service - a key objective of the proposed high-speed rail program is to ensure that the freight service is upgraded as well or, at least, that the passenger service is "transparent" to the freight operations. Appropriately positioned passing sidings of the right size can improve both the passenger service and the freight service. Table 2-1 shows the name and location of all existing controlled sidings between Mobile and New Orleans.

The average length of these sidings is about 1.7 miles. The effective length of the sidings, the distance over which a train conveniently can be parked on a siding is less than 8,300 feet. CSXT data evaluated from May 2004 indicated that the average length of train operated between Mobile and New Orleans was less than 5,500 feet. Thus, only a limited number of small trains can use Ocean Springs; which is only 3,030 feet long. This increases the distance between Gautier and Beauvoir to 20.4 miles and increases the average siding spacing to almost 14 miles. CSXT's present optimum design for new sidings is four miles; quite often, CSXT installs a center pair of crossovers between the ends of the siding to enable two trains in opposing directions to occupy the siding. Obviously, the existing sidings are substandard and require modification to enable even a limited passenger service to be operated.

Table 8-1
Existing Passing Sidings, Mobile to New Orleans

Siding Name	Existing North End	Existing South End	Mp Length (South (-) North)	Length (ft.)	Mid Point	Distance Between Mid Points
Choctaw (End Double Track)	665.40					
Brookley	669.70	671.80	2.10	10395	670.75	
Saint Elmo	685.60	687.30	1.70	8855	686.45	15.70
Grove	699.30	701.20	1.90	8910	700.25	13.80
Gautier	709.80	711.50	1.70	7865	710.65	10.40
Ocean Springs	722.30	723.10	0.80	3080	722.70	12.05
Beauvoir	730.20	731.90	1.70	8085	731.05	8.35
Harbin	745.00	746.90	1.90	8910	745.95	14.90
Nicholson Avenue	754.60	756.40	1.80	8635	755.50	9.55
Claiborne	766.20	768.10	1.90	10020	767.15	11.65
Lake Catherine	780.20	781.90	1.70	7480	781.05	13.90
Michoud (Start Double Track)	793.20					
Average			1.72	8224		12.26

Source: Parsons from CSXT Atlanta Division Timetable No. 2, April 2003.

Siding Spacing and Capacity

The capacity of a single-tracked line depends mostly on how long trains occupy the segments of single track between the sidings. Most discussions of capacity revolve around the spacing between sidings in miles; however that criterion alone is insufficient. Time between sidings is a more critical consideration. The time between sidings includes the time to traverse the distance between the ends of the adjacent sidings and the time to enter the next siding and have the main line signals cleared to allow a train in the opposite direction to proceed.

By upgrading the track between the same two points to increase allowable train speed and/or increasing the turnout size at the ends of the sidings, capacity can be increased without adding new sidings.[1] Long freight trains may consume as much as six minutes clearing or entering the main line when 15 mph turnouts are used, so if the siding is long enough, installing 30 mph turnouts can reduce that time to 3.0 minutes. Reducing the degree of restricting curves to enable trains to operate faster through them and adding locomotives to a train to increase the speed they can attain on long ascending grades also can reduce the time between sidings. Therefore, capacity can be increased by reducing the time between sidings by increasing speed or reducing the distance by adding more sidings.

Increasing speed is not always possible; so in that case the only way to increase capacity is to increase the number of sidings, thereby reducing the distance, and hence the time, between sidings.

Frequently, the ultimate capacity of a single-tracked line is considered achieved when a meet occurs at every siding, but the ultimate capacity is not a practical operating capacity that can be operated satisfactorily day in and day out. A catastrophic locomotive failure may cause a siding to be occupied or a terminal problem may make it necessary to store some trains on sidings. In those cases, certain sidings may be out of service or unavailable for a prolonged period. Yet, the line must still have capacity to continue operating reasonably well. For this reason, capacity should not be based on using every siding but <u>every other siding</u>, so that the real capacity is about one-half of the theoretical capacity.

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[1] The following definitions of terminology are contained in the Railroad Dictionary contained on the CSX Corporate Web Site, CSX.com:

- A **Siding** is "an auxiliary track for meeting or passing trains. It is designated in special instructions."
- A **Controlled siding** is "a siding equipped with controlled signals that are used to authorize trains to enter or leave the siding. Such signals do not govern movements on the siding." And
- A **Signaled Siding** is a "siding equipped with block signals that govern train movements on the siding."

Accordingly, in compliance with FRA regulations speed on **controlled sidings** cannot exceed restricted speed: "A speed that will permit stopping within one-half the range of vision, but not exceeding 20 miles per hour." However, speeds on a signaled siding are controlled by the block signal indications, which could enable trains to exceed 20 mph entering and operating over the siding.

The requirement that a long heavy freight stop within one half the range of vision in territory with visibility limiting curves frequently results in train speeds in the vicinity of 5 mph, which results in a mile long train taking 10-15 minutes to clear the main line.

Practical capacity is mostly subjective; it depends upon how much delay a railroad is willing to accept. Data on acceptable delay develop by CSXT has been used by this study to analyze the effectiveness of alternative siding configurations and spacings.

Recommended Improvements for the Initial Limited Intercity Service

The planning and design of the GCHSR Corridor high-speed service, Mobile to New Orleans, will provide, when implemented, cost-effective improvements necessary to increase capacity on the existing rail line, and minimize conflicts with freight operations.

High-Speed passenger trains would be overtaking, or conflicting with, slower freight trains and passenger trains in the opposite direction on the between Mobile and New Orleans. Improvements that would increase rail capacity at strategic locations, and thus serve to make high-speed train operations be transparent to freight train operations have been evaluated. Reduced trip times and improved capacity would enable the high-speed service to operate reliably without adversely affecting, or being delayed by the large number of long freight trains.

Five strategies were pursued in designing the plant and operations to minimize the probability of schedule conflicts in this critical segment of the corridor:

- Provide tracks to support the operation of trains serving local industries, modify interlockings, and make additional operational improvements that would result in segments of track where freight and passenger train conflicts would be minimized;
- Provide additional passing sidings, or sections of double track, of sufficient length in the most effective locations where passenger and freight trains could overtake, meet, and/or pass trains on the single-track rail line[2];
- Re-spacing of the existing sidings to provide for more uniform siding-to-siding running time;
- Lengthening of existing sidings and upgrading them from controlled to signaled to increase the speed into and through the sidings to 30 mph;
- Design passenger schedules so that trains traveling in opposite directions “meet” in stations or “pass” at locations where freight operations would be minimally disrupted.

Given their higher speeds, passenger trains would occupy the shared main line segment between Mobile Station and Gentilly Yard for a shorter period of time than a long freight train. The higher rate of passenger train speed also would mean that any delay to freight trains held up from entering the main track would be reduced.

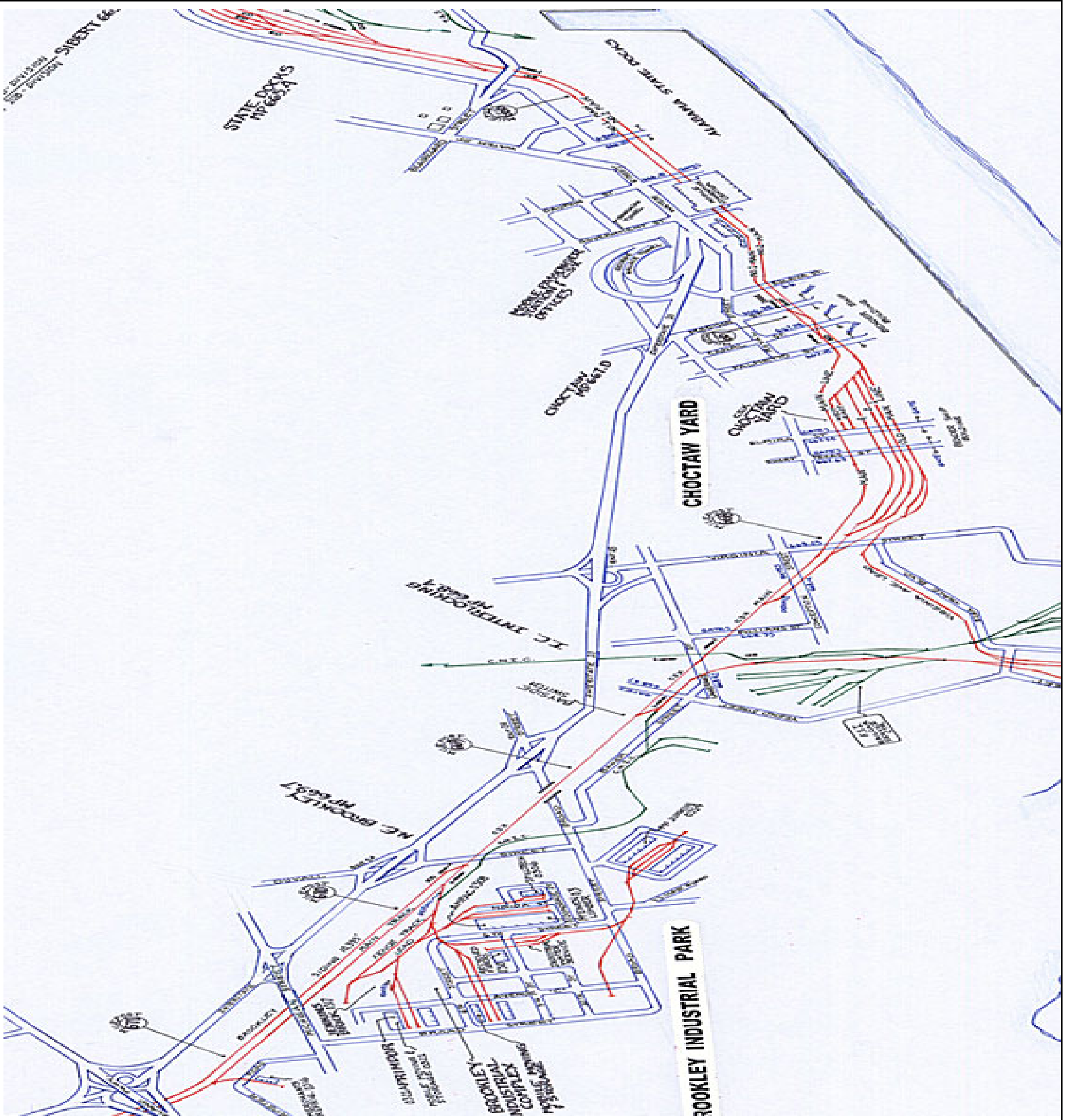
The recommended improvements are described in sequence from Mobile to New Orleans. The CSXT Employees Timetable defines the direction from Mobile to New Orleans as north to south and this report follows that standard.

[2] While minimizing the time that trains would be required to stop on the passing sidings.

Choctaw Yard – South of Mobile Passenger Station

Choctaw Yard (shown in Figure 8-1 on the following page) is located south of the Mobile Passenger Station. Access to the McDuffie Island Coal Terminal is provided by the Old Main Line Track, which is an extension of No. 2 Main.

Figure 8-1
Choctaw Yard



Source: Parsons Transportation Group, 2006.

Choctaw Interlocking (667.0) is the end of the short double track segment that starts at State Docks (665.4). Refer to the photograph in Figure 8-2(A).

The main line track curves to the north around the track that remains at Choctaw Yard, as shown in Figure 8-2(B). The yard is relatively short, approximately 5,000 feet long. A recent aerial photo indicates that three yard tracks, in addition to the Old Main Line, remain in the yard. Two grade crossings traverse the main body of the yard to provide access to businesses on the geographic south side of the yard. Two grade crossings are located at the south end of the yard, the second of which is located immediately north of the access switch from the main track to the south end of the yard, as shown in Figure 8-2(C). The yard lead track leading to the switch appears to be rusty in a recent photo, which indicates that the track is relatively little used. .

Figure 8-2
Choctaw Yard

(A) Interlocking

(B) Main Line

(C) Grade Crossings

Source: Parsons Transportation Group, 2006.

CN/IC At-Grade Railroad Crossing

The CN/IC Railroad At-Grade crossing is located at 668.4 (Figure 8-3 on the following page). The switch leading to the interchange tracks (Bayside switch) is located south of the crossing. The IC apparently does not use the branch leading to McDuffie Island and the crossing is little used, if at all. It would appear that it could be abandoned.

IC Crossing to Brookley

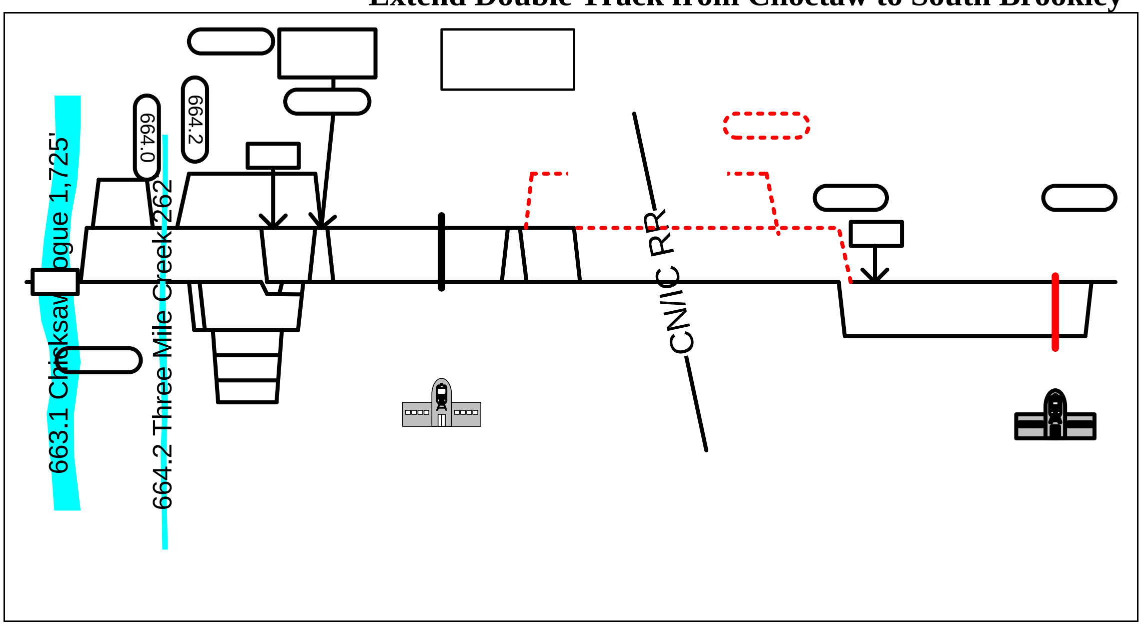
The single track main line extends 1.3 miles to Brookley from the IC Crossing. The track passes over Washington Avenue, nearly half-way between the two locations. Duval Street crossing is located immediately north of the North End of Brookley Siding (Figure 8-3).

The crossing is located less than 250 feet from an access road, which parallels I-10. The grade crossing is four lanes wide, but just to the right Duval narrows from 4 to 2 lanes and intersects Washington Avenue about 1,000 feet geographically south of the railroad, where it ends. Washington Avenue, which passes under the railroad, is about 0.5 miles away. Michigan Avenue, another roadway under the railroad, is a mile south of Duval. The access road to the north of the railroad also goes all the way down to Washington Avenue. This site has great potential to be the Mobile Beltway Station.

Extend Double Track from Choctaw Yard to Brookley Siding

It is recommended that the existing double track main line be extended from Choctaw (667.0) to the South End of Fowl River Siding (682.2)[3]. As a minimum, the double track would extend 6.4 miles from South Docks (665.4) to NE Brookley. The recommended configuration is shown in Figure 8-3, below. It also is recommended that a 10,700-foot long Choctaw Siding be constructed. The siding would extend from Choctaw to the north end of the Washington Avenue Bridge. The siding would provide the capacity to store a train waiting either to work at Sibert Yard or head towards Flomaton.

Figure 8-3
Limited Service Improvements
Extend Double Track from Choctaw to South Brookley



Source: Parsons Transportation Group, 2006.

[3] Fowl River is a siding, 679.9 to 682.2, that would be constructed as part of the initial build.

Reduce Spacing between Brookley and St Elmo Sidings (Figure 8-4)

The study assumed that Fowl River siding (2.3 miles long between MP 679.9 and MP 682.2) would be constructed to eliminate the 1.7 mile-long St. Elmo siding. The distance between South Brookley Interlocking (which would become the new end of double south of Mobile Station) and the north end of Fowl River, would be 8.1 miles, or 5.7 miles closer than the north end of St Elmo. At an average freight train speed of 30 mph, this would change would bring the sidings about 11 minutes closer together.

Construct Little Franklin Siding to Optimize spacing between the new Fowl River Siding and the existing Orange Grove Siding (Figure 8-5)

The study assumed that Little Franklin siding (2.4 miles long between MP 688.9 and MP 691.3) would be constructed. The north end of Little Franklin would be located 1.6 miles south of the south end of St. Elmo. The distance between South Fowl River Interlocking (the south end of Fowl River) and the north end of Little Franklin, would be 6.7 miles. Little Franklin was placed between Fernland Road and Potter Tract Road (north to south) to minimize the impact on local highway traffic as the result of trains blocking the crossing as they are parked on the siding.

Lengthen Orange Grove Siding from 1.9 to 2.6 miles in length (Figure 8-5)

The study assumed that Orange Grove siding would be extended southward 0.7 miles to MP 701.9, just north of the Kreole Road grade crossing. The north end of Orange Grove would be located 8.0 miles south of the south end of Little Franklin.

The alterations between SE Brookley and SE Orange Grove would result in three sidings (Fowl River, Little Franklin, and Orange Grove) spaced 9.6 miles apart, rather than two sidings (St Elmo and Orange Grove) spaced 14.75 miles apart.

Figures 8-4 and 8-5 are shown on the following page.

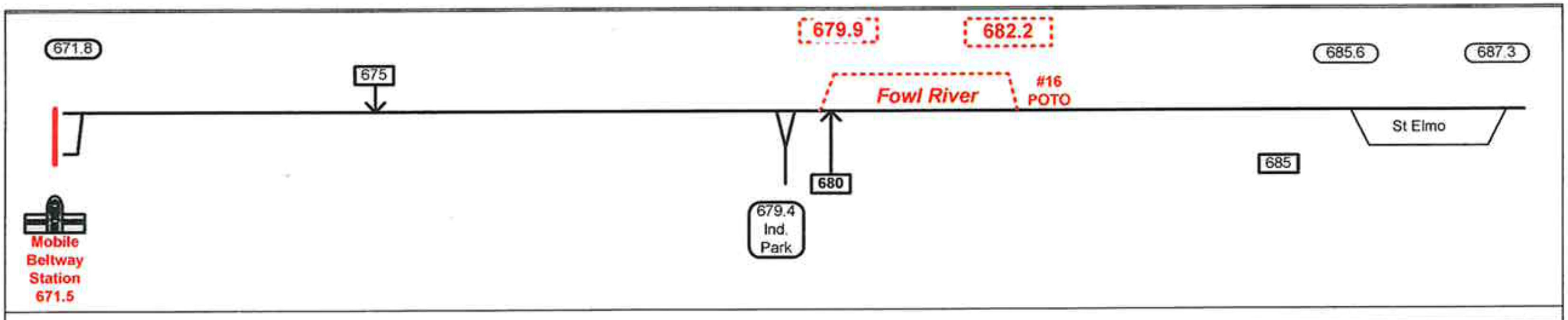


Figure 8-4. Limited Service Initial Improvements Reduce Spacing between Brookley and St Elmo Sidings

Source: Parsons Transportation Group, 2006.

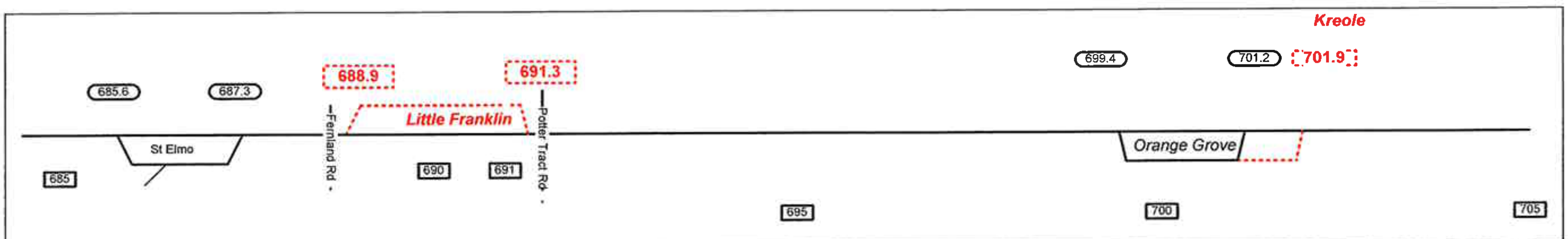


Figure 8-5. Limited Service Initial ImprovementsConstruct Little Franklin Siding to Optimize spacing between the New Fowl River Siding and the lengthened Orange Grove Siding

Source: Parsons Transportation Group, 2006.

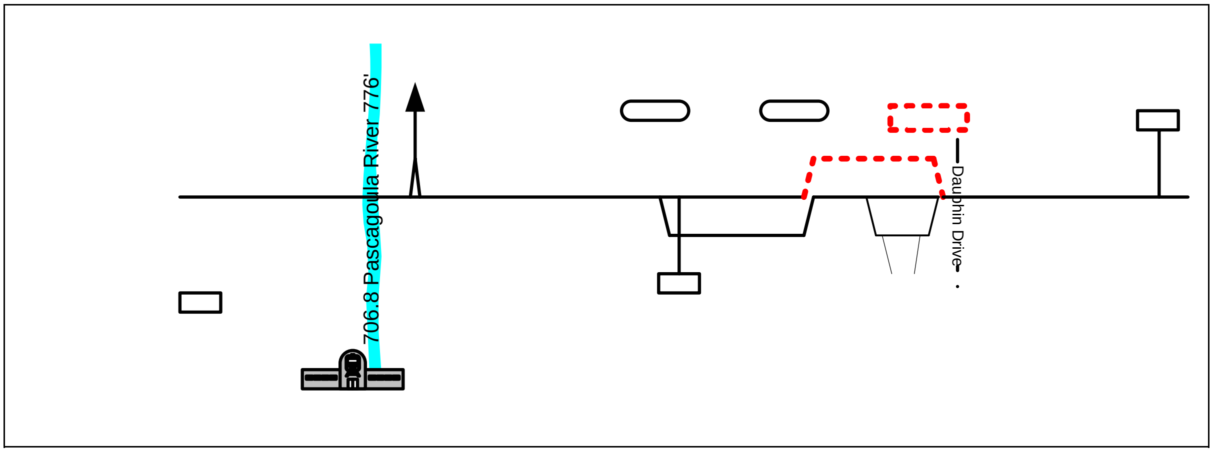
Lengthen Gautier Siding from 1.7 to 2.8 miles in length

The study assumed that Gautier siding would be extended southward 1.1 miles to MP 712.6, just north of the Dauphin Drive grade crossing. The north end of Gautier would be located 7.9 miles south of the south end of Orange Grove. The Gautier Siding extension would be constructed to retain the industrial siding at Quinn that serves the Mallett Brothers plant.

Pascagoula Station and the Pascagoula River Movable Bridge are located on the single track segment between Orange Grove and Gautier. The initial build passenger train schedules were constructed to avoid having two passenger trains attempting to stop at the station at about the same time.

Figure 8-6. Limited Service Initial Improvements

Lengthen Gautier Siding from 1.7 to 2.8 miles in length



Source: Parsons Transportation Group, 2006.

Construct a relocated Ocean Springs siding to Optimize spacing between the Gautier Siding and the Beauvoir Siding (Figure 8-7)

The study assumed that the existing 0.8 mile Ocean Springs siding would be retained as an industrial lead track and that a new Ocean Springs siding (2.3 miles long between MP 718.6 and MP 720.9) would be constructed. The north end of Ocean Springs would be located 6.0 miles south of the south end of Gautier. The distance between South Ocean Springs Interlocking (the south end of Ocean Springs) and the north end of Beauvoir, would be 9.3 miles.

The new Ocean Springs siding was placed between Henshaw Road and Hanley Road (north to south) to minimize the impact on local highway traffic as the result of trains blocking the crossing as they are parked on the siding. The alterations between SE Orange Grove and SE Beauvoir (the configuration of the siding is described in the following subsection) would result in three sidings longer than two miles (Gautier, Ocean Springs, and Beauvoir) spaced 10.0 miles apart center to center, rather than two sidings (Gautier and Beauvoir) spaced 15.4 miles apart.

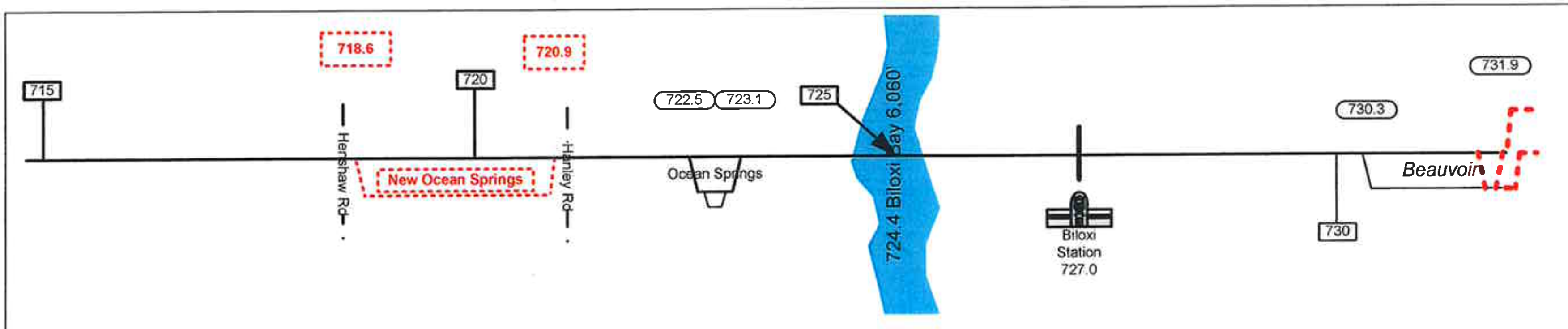


Figure 8-7. Limited Service Initial Improvements - Construct a relocated Ocean Springs siding to Optimize spacing between the Gautier Siding and the Beauvoir Siding

Source: Parsons Transportation Group, 2006.

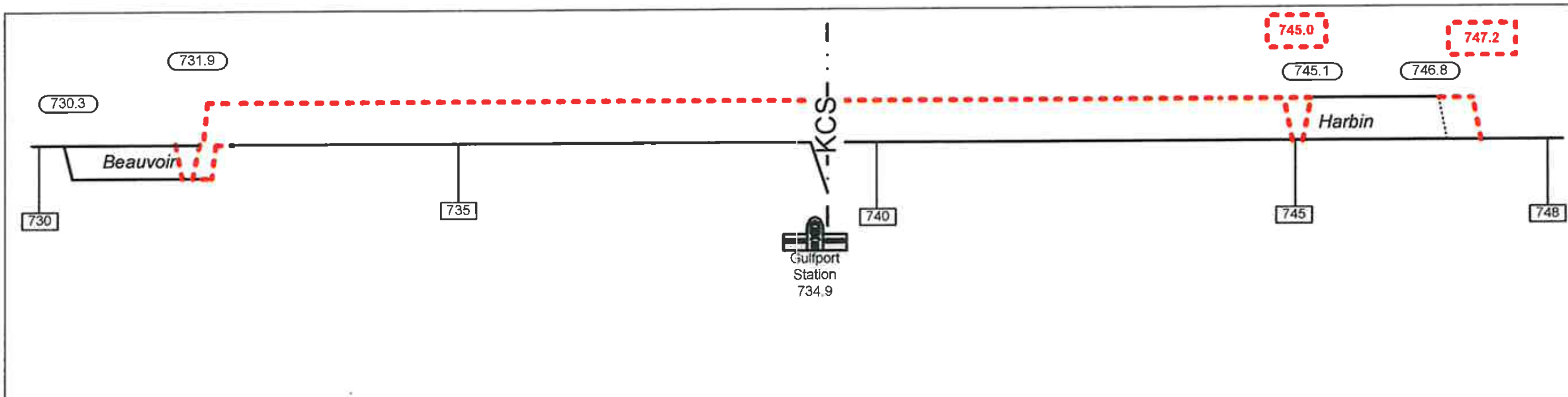


Figure 8-8. Limited Service Initial Improvements - Construct a 17.0-mile segment of double track between NE Beauvoir and SE Harbin

Source: Parsons Transportation Group, 2006.

Construct a 17.0-mile segment of double track between NE Beauvoir and SE Harbin (Figure 8-8)

The study assumed that the existing 1.7-mile Beauvoir siding and the 1.9-mile Harbin Siding would be connected by a 13.1 mile section of double track. (Refer to Figure 8-8 on the preceeding page.) The resultant configuration would retain a modified Beauvoir siding and Harbin siding as pocket tracks at each end. The SE of Beauvoir would be relocated 0.6 miles south to increase the length of the pocket siding to 2.3 miles. SE Beauvoir would be configured as a pair of 30 mph crossovers that would enable trains in both directions to runaround a train stored on the pocket track. The SE of Harbin would be relocated 0.3 miles south to increase the length of the pocket to 2.2 miles. The NE of Harbin would be configured the same as the SE of Beauvoir with two 30 mph crossovers.

Gulfport station is located north of the at-grade rail crossing with the KCS at about 739.4. The presently proposed HSR schedules have a pair of opposing trains passing without conflict on this segment of double track. The double track segment would pass through Mississippi City and Gulfport and requires that some fifty-seven crossings either be eliminated or upgraded by extending the crossing to include the second track and upgrading or relocating the grade crossing protection at each crossing.

Lengthen Nicholson Avenue Siding from 1.8 to 3.1 miles in length (Figure 8-9)

The study assumed that Nicholson Avenue siding would be extended northward 0.4 miles to 754.2 (and be located south of the Bay St Louis bridge and north of the one-degree curve located south of the bridge) and southward 0.9 miles to 757.3, just north of the Coleman Avenue grade crossing. The northward extension includes the upgrading of the House Track to include it within the limits of the siding. A determination would have to be made as to whether the House Track would be required in the future. The north end of Nicholson would be located 7.0 miles south of the south end of Harbin.

Bay St Louis Station is located at the eastern end of the siding. The initial build passenger train schedules were constructed to avoid having two passenger trains attempting to stop at the station at about the same time.

Lengthen Claiborne Siding from 1.9 to 3.0 miles in length (Figure 8-9)

The study assumed that Claiborne siding would be extended northward 1.1 miles to 765.1 (moved to a location just south of the Ansley grade crossing. NE Claiborne would be located 7.8 miles south of the SE of Nicholson Avenue, two miles closer than it is today.

Lengthen Lake Catherine Siding from 1.7 to 2.5 miles in length (Figure 8-10)

The study assumed that Lake Catherine Siding would be extended northward 0.8 miles to 779.4. Extending the siding southward is restricted by the 554-foot long Lake Catherine bridge. NE Lake Catherine would be located 11.3 miles from SE Claiborne, 0.8 miles closer than today. This spacing end-to-end, Claiborne to Lake Catherine, would be the longest

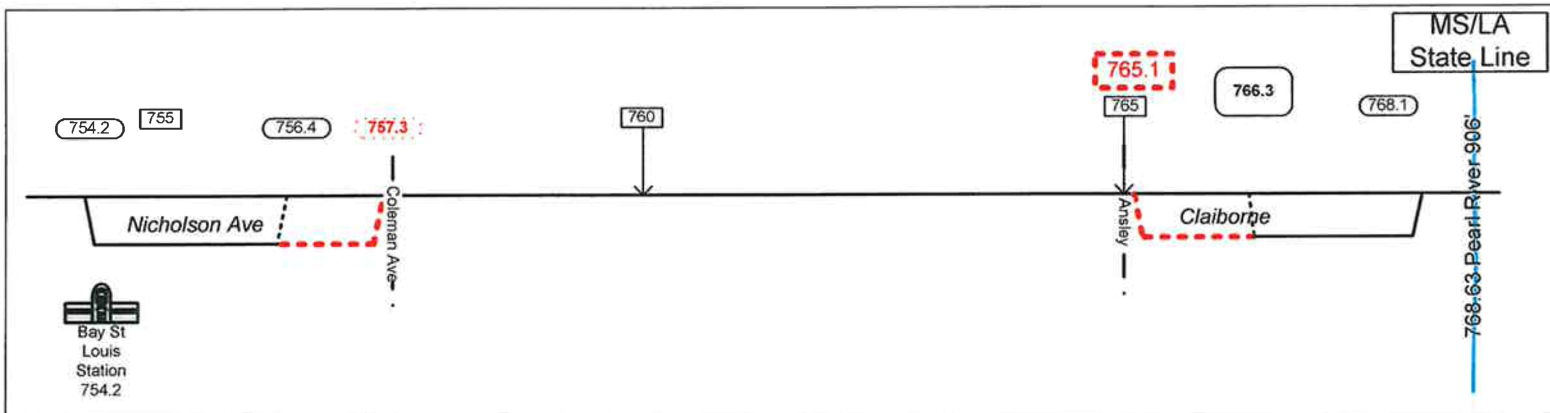


Figure 8-9. Limited Service Initial Improvements – Lengthen Nicholson Avenue and Claiborne Sidings

Source: Parsons Transportation Group, 2006.

Figure 8-10. Limited Service Initial Improvements – Lengthen Lake Catherine Siding

Source: Parsons Transportation Group, 2006.

single track stretch between Mobile and New Orleans once the initial build improvements were constructed.

Lake Catherine to Michoud – No Proposed Improvements

Further improvements south of Lake Catherine were not necessary to achieve a reasonable level of reliability for freight and passenger operations. The segment between the SE Lake Catherine and Michoud also would be 11.3 miles.

Recommended Improvements for the Full Intercity Service

The planning and design of the GCHSR Corridor high-speed service, Mobile to New Orleans, will provide, when implemented, cost-effective improvements necessary to increase capacity on the existing rail line to support six round trips a day, and minimize conflicts with freight operations. The increased levels of 2025 freight and passenger service resulted in a larger number of passenger trains overtaking freight trains and resultant delays to lower priority merchandise trains delayed by intermodal freight trains.

The resultant overall delays would be mitigated by the addition of additional double track segment(s), the modification of initial build sidings to double their length and enable them to accommodate multi-train meets, and finally by the installation of numerous industrial lead tracks to enable local freight trains to serve local industries without tying up the main track.

Ultimately, the alignment of the rail line adjacent to the Gulf of Mexico through various bayous and wetlands presents a constructibility challenge that the lack of adequate mapping prevented the team from addressing. The team was not able to determine whether additional sidings or segments of double track could be constructed in various locations between Bay St Louis and Chef Menteur.

Extend Double Track Brookley to Fowl River

The full intercity service scenario assumed that the double track segment between State Docks (665.4) and SE Brookley (671.8) would be extended to SE Fowl River siding (682.2). The double track segment would extend the north end of Fowl River siding 8.1 miles northward to SE Brookley, thereby creating a 16.8-mile segment of double track south of Sibert Yard. The configuration would include the Choctaw Siding and convert Fowl River to a pocket track (similar to Beauvoir and Harbin in the initial build). Industrial sidings to serve the Brookley and Theodore Industrial Parks would be provided.

Convert Little Franklin Siding to a 5.7-mile Siding with a pair of Center Crossovers to facilitate multiple-train meets

The full intercity service scenario assumed that Little Franklin siding (2.4 miles long between MP 688.9 and MP 691.3) would be extended 3.3 miles northward to the location of the present NE St. Elmo. The pair of mid-point crossovers would replace the turnout at the NE of

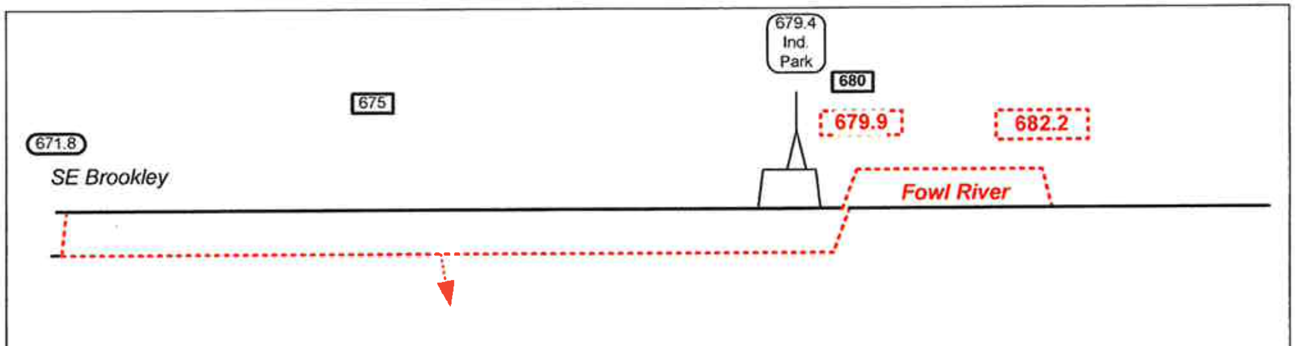


Figure 8-11. Full Service Build Out - Extend Double Track SE Brookley to SE Fowl River

Source: Parsons Transportation Group, 2006.

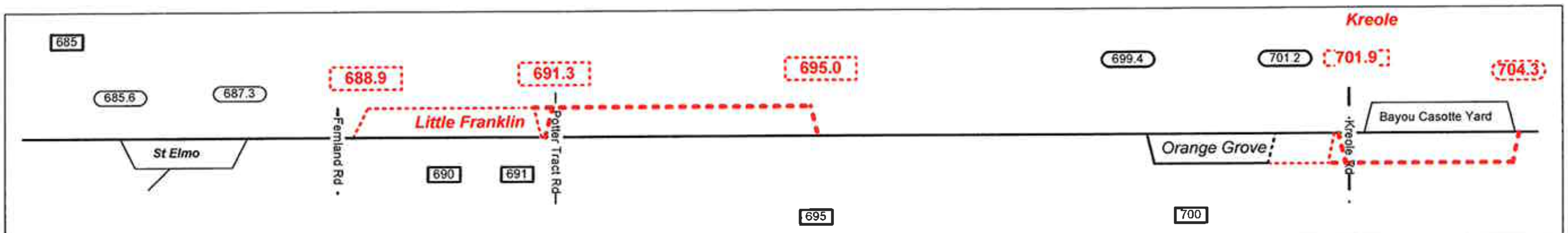


Figure 8-12. Full Service Build Out - Lengthen Little Franklin and Orange Grove Sidings, each with a pair of Center Crossovers to facilitate multiple-train meets

Source: Parsons Transportation Group, 2006.

the initial service Little Franklin Siding. The distance between NE St Elmo and SE Little Franklin would be 3.4 miles.

Lengthen Orange Grove Siding from 2.6 to 4.9 miles in length with a pair of Center Crossovers to facilitate multiple-train meets (Figure 8-12)

The full intercity service scenario assumed that the initial service Orange Grove Siding would be extended southward 2.3 miles to MP 704.3. The relocated SE Orange Grove would be located the south end of Bayou Casotte Yard. The pair of mid-point crossovers would replace the turnout at the NE of the initial service Orange Grove Siding. The north end of Orange Grove would remain 8.0 miles south of the south end of Little Franklin.

The alterations between SE Brookley and SE Orange Grove would result in two sidings (Little Franklin, and Orange Grove) spaced about 9.8 miles apart.

Construct 2.2-Mile Pascagoula Siding Between East and Middle Pascagoula Rivers (Figure 8-13)

The full intercity service scenario assumed that the 2.2-mile Pascagoula Siding would be constructed between 707.0 and 709.2. An industrial siding to serve the Ingalls Ship Yard and other rail facilities would be constructed at the north end of the siding.

The siding would enable provide a double track alignment up to the south end of the Pascagoula Movable Bridge, thereby reducing the delay resulting from northbound and southbound trains meeting during a bridge opening. The NE Pascagoula would be 2.7 miles south of SE Orange Grove.

Lengthen Gautier Siding from 2.8 to 4.0 miles in length (Figure 8-13)

The full intercity service scenario assumed that initial build Gautier siding would be extended further southward 1.2 miles to MP 713.8. The north end of Gautier would be located 0.6 miles south of the south end of Pascagoula Siding. The Gautier Siding extension would be constructed to retain the industrial siding at Quinn that serves the Mallett Brothers plant.

Lengthen the relocated Ocean Springs from 2.3 to 4.5 miles in length with a pair of Center Crossovers to facilitate multiple-train meets (Figure 8-14)

The full intercity service scenario assumed that the new Ocean Springs siding (4.5 miles long between MP 718.6 and MP 723.1) would be constructed and that the existing 0.8 mile Ocean Springs siding would be retained as an industrial lead track that ended just north of SE Ocean Springs. The pair of mid-point crossovers would replace the turnout at the SE of the initial service Ocean Springs Siding. The north end of Ocean Springs would be located 4.8 miles

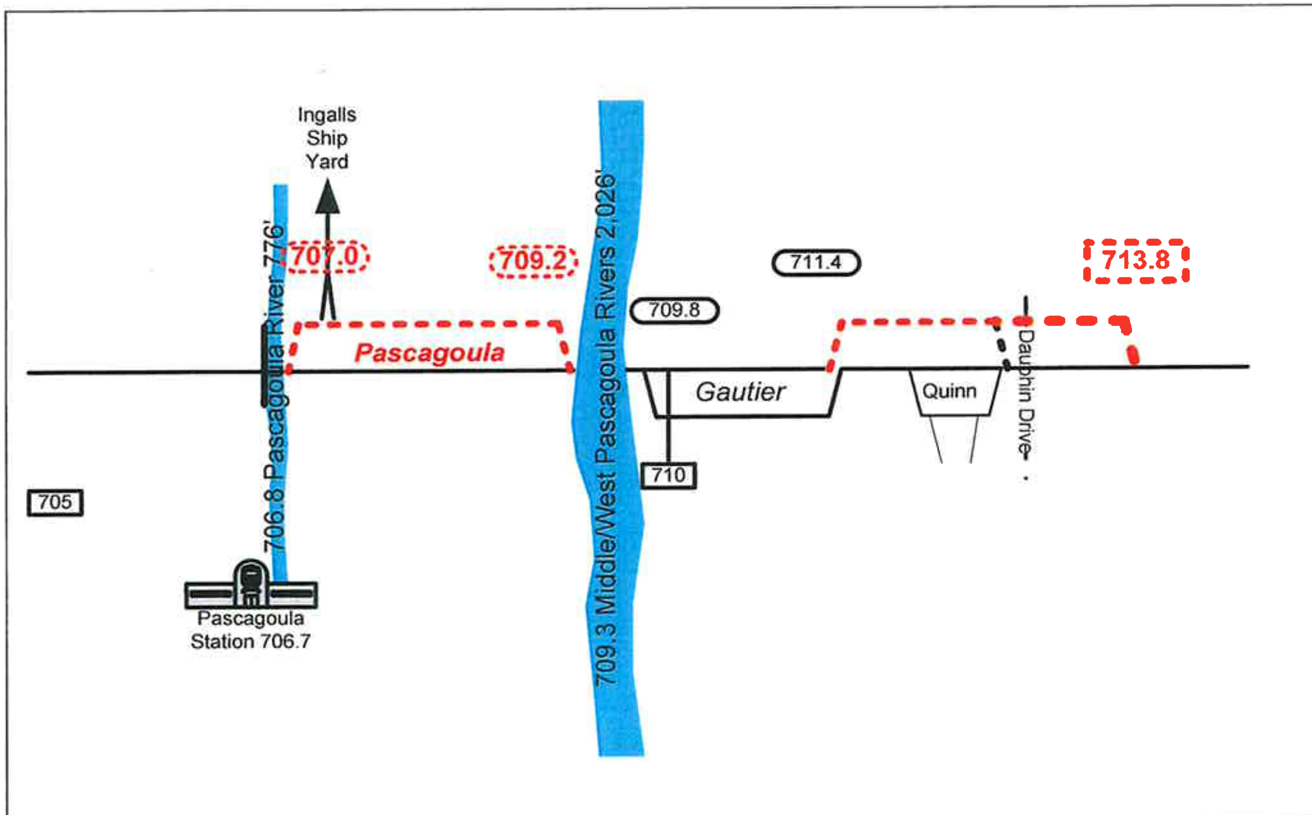


Figure 8-13. Full Service Build Out – Construct Pascagoula Siding and Extend Gautier Siding

Source: Parsons Transportation Group, 2005.

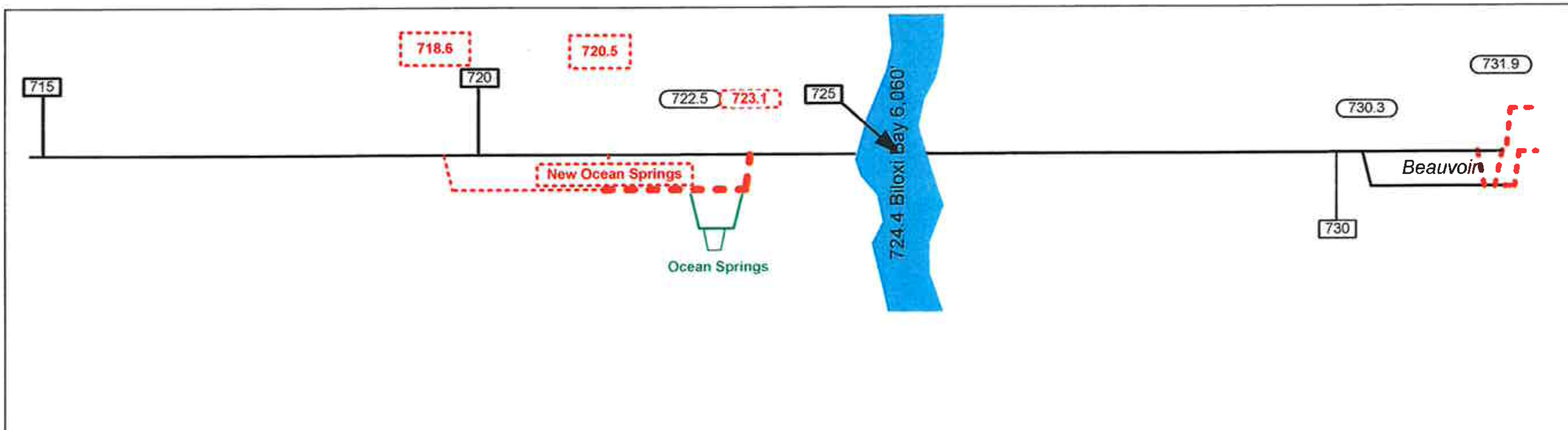


Figure 8-14. Full Service Build Out – Extend New Ocean Springs Siding with a pair of Center Crossovers to facilitate multiple-train meets

Source: Parsons Transportation Group, 2006.

south of the south end of lengthened Gautier. The distance between the lengthened South Ocean Springs Interlocking and the north end of Beauvoir, would be 7.1 miles.

The alterations between SE Orange Grove and SE Beauvoir (the configuration of the siding is described in the following subsection) would result in four sidings longer than two miles (Pascagoula, Gautier, Ocean Springs, and Beauvoir) spaced 7.4 miles apart center to center, rather than two sidings (Gautier and Beauvoir) spaced 15.4 miles apart.

Construct a 17.0-mile segment of double track between NE Beauvoir and SE Harbin (Figure 8-8)

The full intercity service scenario assumed that the full intercity service scenario was the same as the limited service scenario. (Refer to Figure 8-8.) The existing 1.7-mile Beauvoir siding and the 1.9-mile Harbin Siding would be connected by a 13.1 mile section of double track. The resultant configuration would retain a modified Beauvoir siding and Harbin siding as pocket tracks at each end. The SE of Beauvoir would be relocated 0.6 miles south to increase the length of the pocket siding to 2.3 miles. SE Beauvoir would be configured as a pair of 30 mph crossovers that would enable trains in both directions to runaround a train stored on the pocket track. The SE of Harbin would be relocated 0.3 miles south to increase the length of the pocket to 2.2 miles. The NE of Harbin would be configured the same as the SE of Beauvoir with two 30 mph crossovers.

Gulfport station is located north of the at-grade rail crossing with the KCS at about 739.4. The presently proposed HSR schedules have a pair of opposing trains passing without conflict on this segment of double track.

Lengthen Nicholson Avenue Siding from 1.8 to 3.1 to 4.3 miles in length (Figure 8-15)

The full intercity service scenario assumed that Nicholson Avenue siding would be extended northward 0.4 miles to 754.2 (and be located south of the Bay St Louis bridge and north of the one-degree curve located south of the bridge) and southward 2.1 miles to 758.5, in Waveland. The Waveland House Track would be retained by being relocated geographically north of the siding.

The northward extension includes the upgrading of the House Track to include it within the limits of the siding. A determination would have to be made as to whether the House Track would be required in the future. The north end of Nicholson would be located 7.0 miles south of the south end of Harbin.

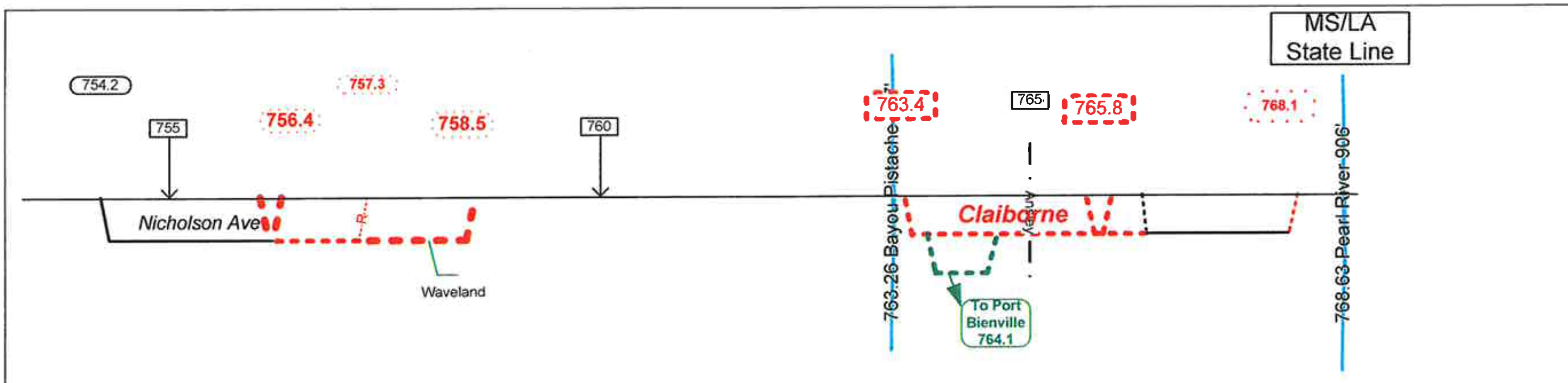


Figure 8-15. Full Service Build Out – Extend Nicholson Avenue and Claiborne Sidings, both with a pair of Center Crossovers to facilitate multiple-train meets

Source: Parsons Transportation Group, 2006.

Lengthen Claiborne Siding from 1.9 to 3.0 to 4.7 miles in length with a pair of Center Crossovers to facilitate multiple-train meets (Figure 8-15)

The full intercity service scenario assumed that Claiborne siding would be extended northward 2.8 miles to 763.4 (moved to a location just south of the Bayou Pistache Bridge). NE Claiborne would be located 4.9 miles south of the SE of Nicholson Avenue, 4.9 miles closer than it is today.

Lengthen Lake Catherine Siding from 1.7 to 2.5 to 4.8 miles in length with a pair of Center Crossovers to facilitate multiple-train meets (Figure 8-16)

The full intercity service scenario assumed that Lake Catherine Siding would be further extended northward 3.1 miles to 777.1, just south of the Little Rigolets bridge. Extending the siding southward is restricted by the 554-foot long Lake Catherine bridge. NE Lake Catherine would be located 9.0 miles from SE Claiborne, 3.1 miles closer than today. This spacing end-to-end, Claiborne to Lake Catherine, would be the second longest single track stretch between Mobile and New Orleans once the full intercity scenario improvements were constructed.

Shorten the distance between SE Lake Catherine and Michoud by one-mile (Figure 8-16)

Extend Michoud one-mile northward to 792.1. The segment between the SE Lake Catherine and Michoud would be 10.2 miles, the longest segment of single track between Mobile and New Orleans.

Recommended Common Improvements – NE Tower to New Orleans – The Full Intercity Service Alternative

NE Tower is the location where the proposed Atlanta to New Orleans and Mobile to New Orleans intercity passenger services merge/diverge. The recommended improvements between NE Tower and New Orleans Union Passenger Terminal are thus common and required to provide reliable passenger and freight operations between NE Tower and East City Jct., the location where passenger trains diverge from the NS Back Belt line. The improvements include a third track between Elysian Fields and Marconi Drive, north of East City Jct. that initially were proposed by the freight railroads as part of their recently completed New Orleans Gateway Analysis.

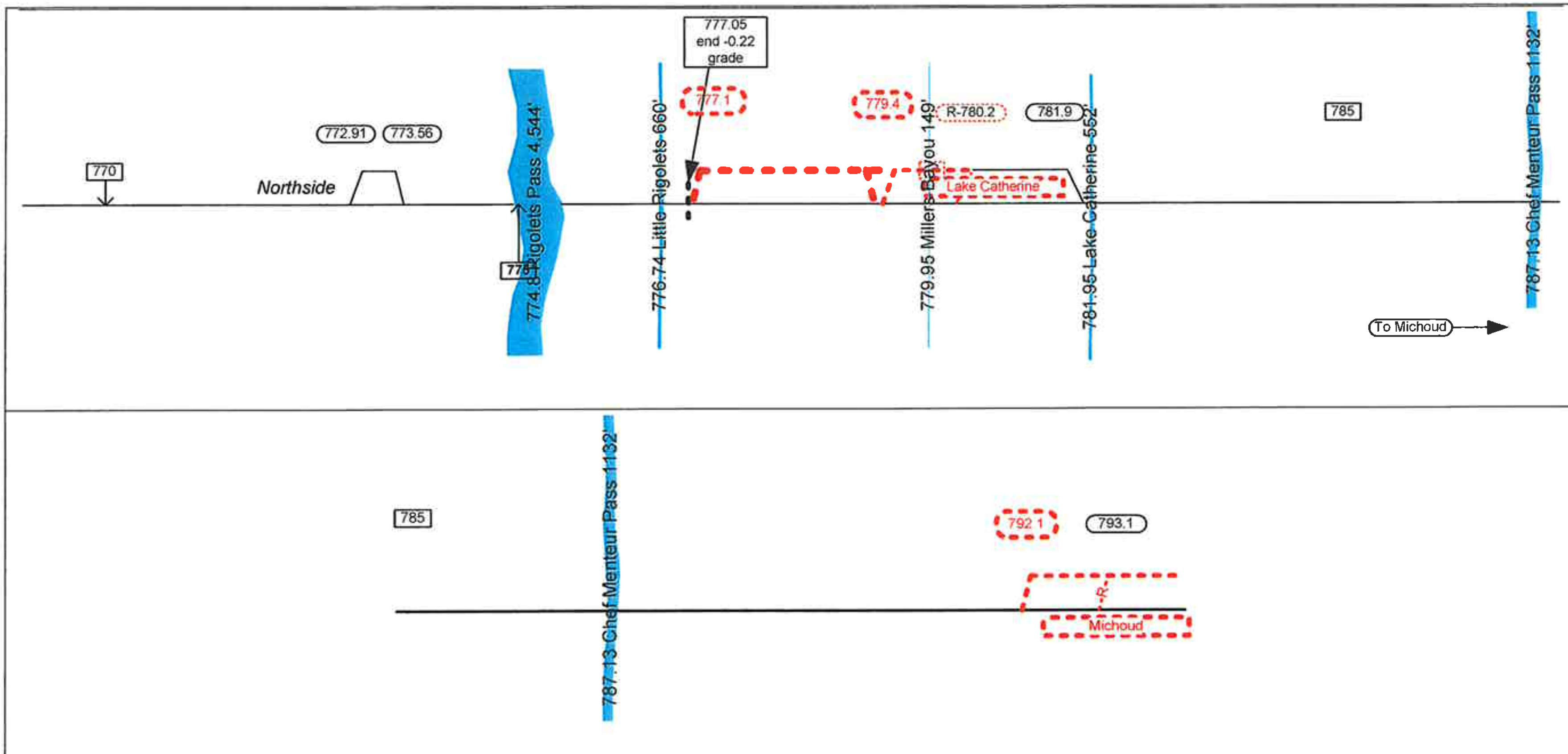


Figure 8-16. Full Service Build Out – Extend Lake Catherine Siding with a pair of Center Crossovers to facilitate multiple-train meets and Extend Michoud Northward

Source: Parsons Transportation Group, 2006.

Elysian Fields Improvements – NE Tower to NOT Jct\Elysian Fields

The Phase I study determined that an Amtrak Meridian-bound train consumes four minutes 5 seconds to travel the 1.27 miles from the CSX switch in Track 1 Elysian Fields to the CSX at-grade crossing with the NS at NE Tower – the average speed is 18.6 miles per hour. Mobile-bound Amtrak trains use the 0.92 mile length of CSX track that currently extends between Elysian Fields and NE Tower then northward to Gentilly Yard (Figure 8-17). A connection between the New Orleans to Meridian segment and the CSXT New Orleans to Mobile line does not exist and therefore the Meridian-bound trains must use the longer, slower route. Construction of a connection between the CSX and NS alignments at NE Tower potentially could save over two minutes, if an average speed of 30 mph could be achieved.

Freight trains using the route would save four minutes or more depending whether the trains were stopped at the junctions. The improved track configuration at NOT Jct also would improve the speeds of Mobile-New Orleans passenger trains and freight trains transferring to and from Gentilly Yard.

Changes Phase I to Phase II

The initial concept has been modified to extend the Marconi Drive third track (see below) northward to NE Tower, resulting in a three-track configuration between NE Tower and NOT Junction/Elysian Fields. An open track space, north of and adjacent to the CSX tracks, exists for the entire distance between NE Tower and NOT Junction \Elysian Fields, including a track span in the bridge over Franklin Ave. The revised configuration maintains NS access to Oliver Junction and Oliver Yard.

Marconi Drive Third Track Improvements – Elysian Fields to Marconi Drive

Recent studies have identified the approximately 3.5-mile section on the NS Back Belt between NOT Jct. (7.08) and East City Jct. (3.5). This section poses capacity problems as it is used to stage westbound trains for interchange with UP. CSXT and NS train crews bring the westbound interchange trains to Marconi Drive, located just east of the East City Jct. These trains are left on the main and wait for the UP crew to pick them up. The average waiting time is around 5 hours, effectively blocking one of the double main tracks in this area. The eastward interchange traffic is more fluid as trains are delivered directly to CSX's Gentilly yard and NS's Oliver yard.

The freight railroads have proposed the addition of a third track in this section and this study has incorporated that recommendation. The track would be constructed on the rail berm that parallels I-10. The line is adjacent to the London Avenue Canal for the first 0.7-mile south of NOT Jct. The rail line passes over and under several roads and requires the construction of new bridges over Broad Avenue, the London Avenue Canal, Gentilly Boulevard, Paris Avenue, St. Bernard Avenue, Bayou St John, a pedestrian access roadway, and Hospital Street.

The Marconi Drive interlocking (NT4.3) would facilitate parallel moves at the location where the three tracks merge into two tracks. The 0.6-mile segment between Marconi Drive and East City Junction would remain double tracked.

East City Jct to Carrollton Jct Improvements

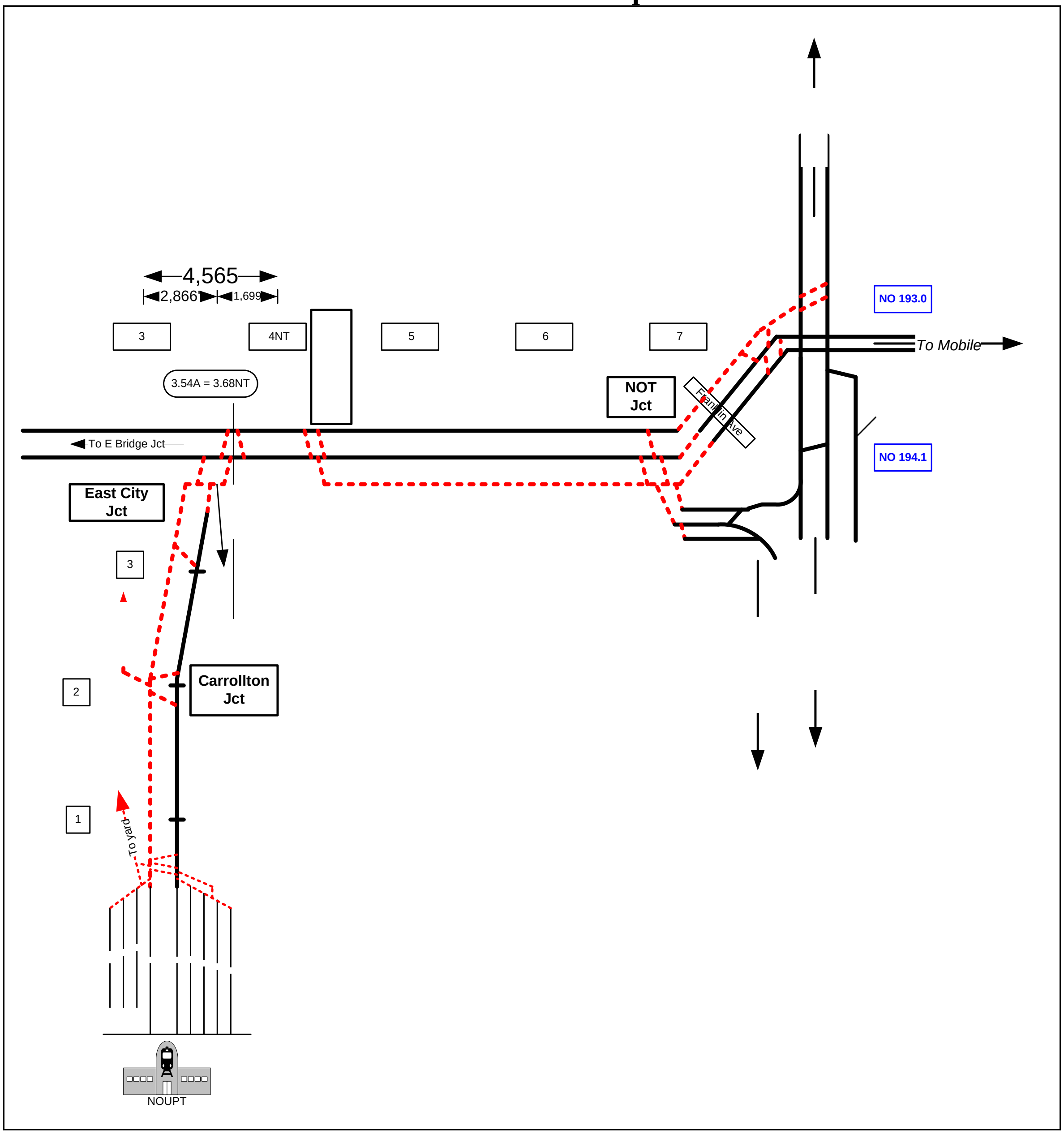
Passenger train service diverges from the Back Belt at East City Jct. Presently the line is single tracked to Carrollton Jct, the location where passenger trains to Chicago and Houston diverge, and then to the start of the station tracks. The proposed increased level of passenger service requires that the line be double tracked to avoid conflicts and delays.

East City Jct would be configured to enable passenger trains to meet and pass each other without delay. The revised junction also would provide flexibility to minimize conflicts with freight trains on the Back Belt. The reconfigured Jct would provide access to the NS local industrial track.

Carrollton Jct to New Orleans Union Passenger Terminal Improvements

The single track lead to the nine-track station does not provide flexibility to make moves to and from the yard as well as operate the proposed Gulf Coast HSR passenger service and the existing Amtrak intercity trains. The double track lead and the upgraded interlocking at Clara Tower, the interlocking at the north end of the station, would provide this flexibility.

Figure 8-17. Full Service Build Out Shared Improvements NE Tower to NOUPT



Source: Parsons Transportation Group, 2006.

Areas of Special Concern

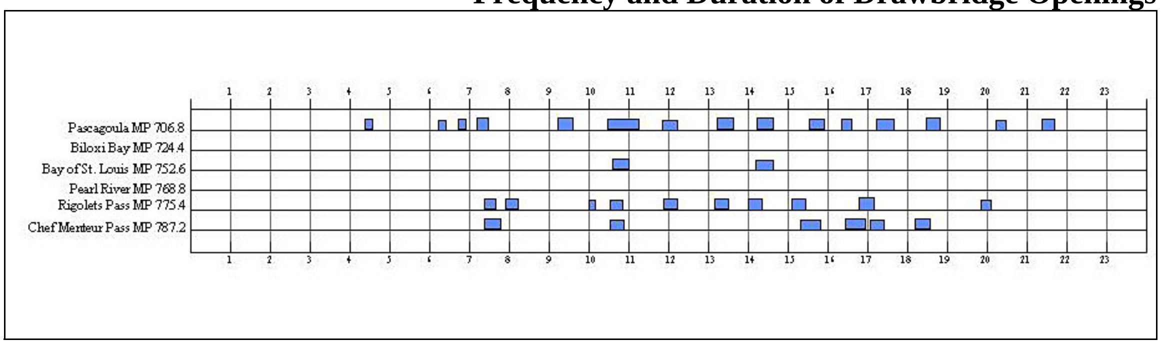
The mix of facilities, services, and surrounding land uses poses special challenges in the following locations. In addition the seven drawbridges have a unique effect on trip time and reliability of freight and passenger train operations.

Drawbridges

There are 7 drawbridges between Mobile and NOUPT. They are located at MP 706.8 (Pascagoula), MP 724.4 (Biloxi Bay), MP 752.6 (Bay of St. Louis), MP 768.8 (Pearl River), MP 775.4 (Rigolets Pass), MP 787.2 (Chef Menteur Pass) and MP 801.5 (Industrial Canal - just south/west of Gentilly yard).

The study team conducted an analysis of frequency and duration of openings for all drawbridges between New Orleans and Mobile[4] for an 8-day period for the purpose of inclusion of bridge openings in the simulation of the corridor. Figure 8-18 illustrates a one-day sample of bridge openings. (Further data for the other days is included in an Appendix taken from the CANAC Tech Memo 1 & 2; Appendix 3. It contains the data for the full period of 8 days.)

Figure 8-18
Frequency and Duration of Drawbridge Openings



Source: CANAC, 2006.

On this bar chart, the horizontal axis represents a 24-hour period and the blue bars represent durations of bridge opening. Each drawbridge is shown on the vertical axis. In most cases a single boat requires a 10-minute opening, although the 8-day period indicated that 20-minute openings are not unusual. There are frequent occurrences however, where more than one boat uses one opening. In these cases, the duration of bridge openings can approach one-hour.

4 Four drawbridges east of Mobile were included in the analysis. The simulations performed for this analysis extended east of Mobile to a location known as Brewton.

The obvious problem comes when boaters want the bridges up when a train is coming. The letter of the law says no bridge has to open until requested to do so by the skipper. Once the opening has been requested water traffic has an absolute priority over trains. The study team's analysis indicated that the bridge openings in the New Orleans to Mobile Corridor appear to be a random process with the exception that boats seem to operate mostly in daytime.

While drawbridge openings constitute an irritant to the operation of the freight trains, it can be foreseen that they will turn out to be a major hurdle in the operation of time-sensitive passenger service. As the bridge opening process is random, a passenger train may be able to run over the corridor without encountering a single opening or conversely the train could encounter many openings. The possibility of numerous openings would have a deleterious effect on transit time, thus the on-time performance and reliability of the scheduled service.

Possible solutions to this problem exist. As described below actions on Amtrak's Northeast Corridor north of New Haven have resulted in an agreed solution relative to the coordination of bridge openings to mitigate delays to trains and boats the issue.

Amtrak and boating agencies, including the Coast Guard, marina operators, commercial boaters, fishermen, and others acted proactively to accommodate Amtrak's Acela service between New York and Boston, which must pass over five drawbridges between New Haven and Boston, all in Connecticut. As an initial step a Movable Bridge Advisory Board that meets quarterly was established. After numerous false starts and differences of opinion the group has worked together and institutionalized the process of addressing bridge issues. The agreements ultimately reached also managed to mollify pleasure and commercial boaters.

The plan that was developed has been geared in such a way as to help the boaters accommodate the train traffic, not the other way around. The agreement has the blessing of the coast Guard, the Federal Railroad Administration (FRA), and the Connecticut Department of Environmental Protection; the three agencies that have oversight of the plan.

The Plan: On each movable bridge, Amtrak has installed a countdown clock indicating to boaters the approximate number of minutes until the bridge will be open. The agreement has resulted in the trains having priority over boat traffic. This may not occur every time, but experience has shown that every effort is made to make sure that boats rarely delay trains.

Another implication of the random delays to trains from bridge openings is that any future plant enhancements cannot be designed on an assumption that two opposing passenger trains will always meet at the same location, and hence additional plant will be needed to overcome the variability in performance of trains and the meet locations.

Gentilly and Sibert Yards

Gentilly and Sibert yards are two major choke points on the corridor. Gentilly Yard is located about ten miles east of NOUPT; while Sibert Yard is located east of the Mobile Station; technically the yard is not located in the New Orleans-Mobile Corridor, however, freight operations into, out of, and by the yard potentially would affect the proposed HSR intercity passenger service.

The two yards have a major impact on the fluidity and capacity of the mainline; congestion in the two yards results in freight trains having to be held on the main. These trains tie up mainline and sidings. The study team's analysis of train operations in May 2004 included identification of situations in which three consecutive sidings adjacent to either of the yards were occupied by trains waiting to enter the yard. For example, due to congestion at Gentilly yard, sidings at Lake Catherine, Claiborne, and Nicholson were occupied. Consequently, these sidings became non-operational for the purpose of meets and overtake. As a result, the distance from the middle of the first available siding (Harbin) to the beginning of the double track at Michoud turned into 47.1 miles stretch. This spacing is three to four times greater then the desired spacing for reliable train operations. The net effect is that these situations significant reduce the capacity of the mainline.

Both Gentilly and Sibert Yards have physical limitations and the yard processes/processing time of trains is a major problem. Based on the average siding-to-siding spacing and the volume of trains, the New Orleans-Mobile Corridor has the capacity to handle more trains than presently, however, Gentilly and Mobile yards act as choke points to limit the volume of traffic that can be handled on the corridor.

A variety of reasons, including funding limitations, led the study team to focus on the capacity of the mainline. Consequently, it was decided to isolate the impact of yards on the line of road and treat the issues of mainline and the yard capacity independent of each other. The study quantified the capacity shortfall in the yards, but did not develop any recommended solutions to the complex yard operation issues. Instead, the study concentrated on analyzing the capacity of the main line to handle the projected growth in freight traffic and the proposed intercity passenger service.

Gentilly Yard

Gentilly yard presently has six receiving and departure tracks. The number of receiving and departure tracks is insufficient, and the mainline tracks within the yard limits also are used to supplement receiving and departure track capacity, specifically, quite frequently both tracks are used to assemble many trains before their departure. The usage of the mainline track for receiving and departure activities is facilitated by the fact that most freight trains terminate or must be handled in some manner at Gentilly; the exception being some interchange traffic.

The Sunset Limited passenger train, which runs with frequency one train per day, 6 days a week (three eastbound and three westbound) is the only other through train that operates in the New Orleans to Mobile Corridor. This one per day passenger train is often delayed as the result of the functioning of the yard; quite frequently the train has to operate through the yard as the main tracks have not been freed in advance to allow this train to run by the yard. The CSXT policy is that the mainline be kept open for this train, but only if it runs on time; which occurs infrequently, particularly eastbound trains. Operating the train through the yard is slow and time-consuming and quite often is disruptive to the yard operation.

Prior to developing the model and performing the simulations the study team conducted detailed analysis of receiving and departure tracks occupancies at Gentilly yard. These occupancies were than related to particular arriving and departing trains. Special attention was given to occupancies that resulted in arriving trains being held in sidings on the approach to the yard, because there was no room in the yard to accommodate them.

Figure 8-19 illustrates a sample of receiving and departure track occupancies at Gentilly yard[5]. The top of the chart illustrates time of arrival. If a train was held on the mainline in one of the sidings, or in the double track section between Michoud and the yard, a horizontal thick line shows duration of the wait. After a train was placed in one of the receiving tracks, a horizontal bar shows how long cars from this train occupied the track in question. In some instances, trains arrived directly to one of the classification tracks. In those cases, a vertical line was drawn from the arrival time to the middle of the chart, and no occupancy is shown (sink approach).

The bottom of the chart shows time of departure. A vertical line was drawn upwards to the track on which the train was assembled, and a horizontal bar indicates the duration of making up of the train. It should be noted that 3 trains on that day were assembled on the mainline within yard limits.

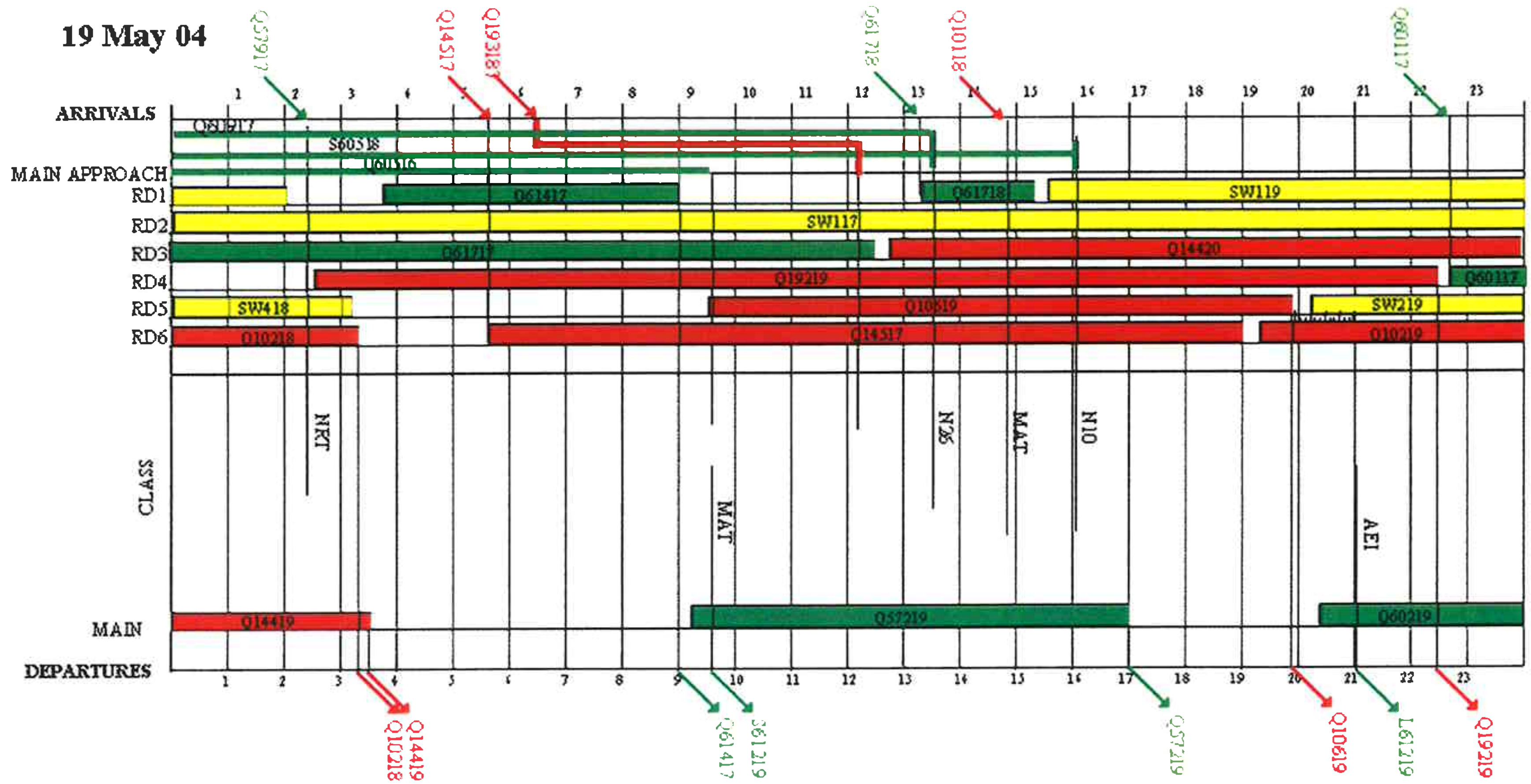
The study team calculated that the average track occupancy in the Gentilly Yard for the 7 days that was subsequently modeled amounted to 85%.A general guideline in smooth operation of a yard is that the yard track occupancy should be around 50%.At 85% yard occupancy excessive queue and waiting time can be expected.

<u>Sibert Yard</u>

By contrast, Sibert yard is mostly a through yard, with only a few trains terminating or originating there. All trains, with the exception of passenger trains and unit trains destined for Choctaw, have crews changed there. Trains that do not set off and/or pickup cars can be handled at the Sibert siding. The whole operation of changing crews is scheduled to take 20 minutes, but often takes longer.

[5] Appendix 6 contains a full set of track occupancies for the modeled period. The horizontal axis pertains to time, a 24 hours period in this case.

Figure 8-19
Sample of Track Occupancies at Gentilly Yard



Source:CSXT, 2006.

The trains that pick up and/or set off cars are handled on the mainline within the yard limits. The remaining tracks in the yard are too short for this operation. The problem with the Sunset Limited passenger train mirrors that at the Gentilly yard. Both the main track within the yard limits and the Sibert siding has a potential to be occupied at the time of the arrival of a passenger train. In this case, one of these tracks needs to be freed up in advance, or the passenger train will incur a delay.

Figure 8-20 illustrates a sample of track occupancies at Sibert yard. As it was the case with the Gentilly yard, the graph illustrates that the excessive occupancy of tracks where the through trains are handled results in backlogs.

Effect of removing yards from simulation

To properly understand line capacity issues in the New Orleans to Mobile corridor, it was first necessary to separate yard capacity from line capacity. To this end, the results of two simulations were compared:

- The Base Case with Present Traffic on Present Plant; and
- The Base Case with the constraints at Gentilly and Sibert yards removed by providing ample receiving/departure capacity.

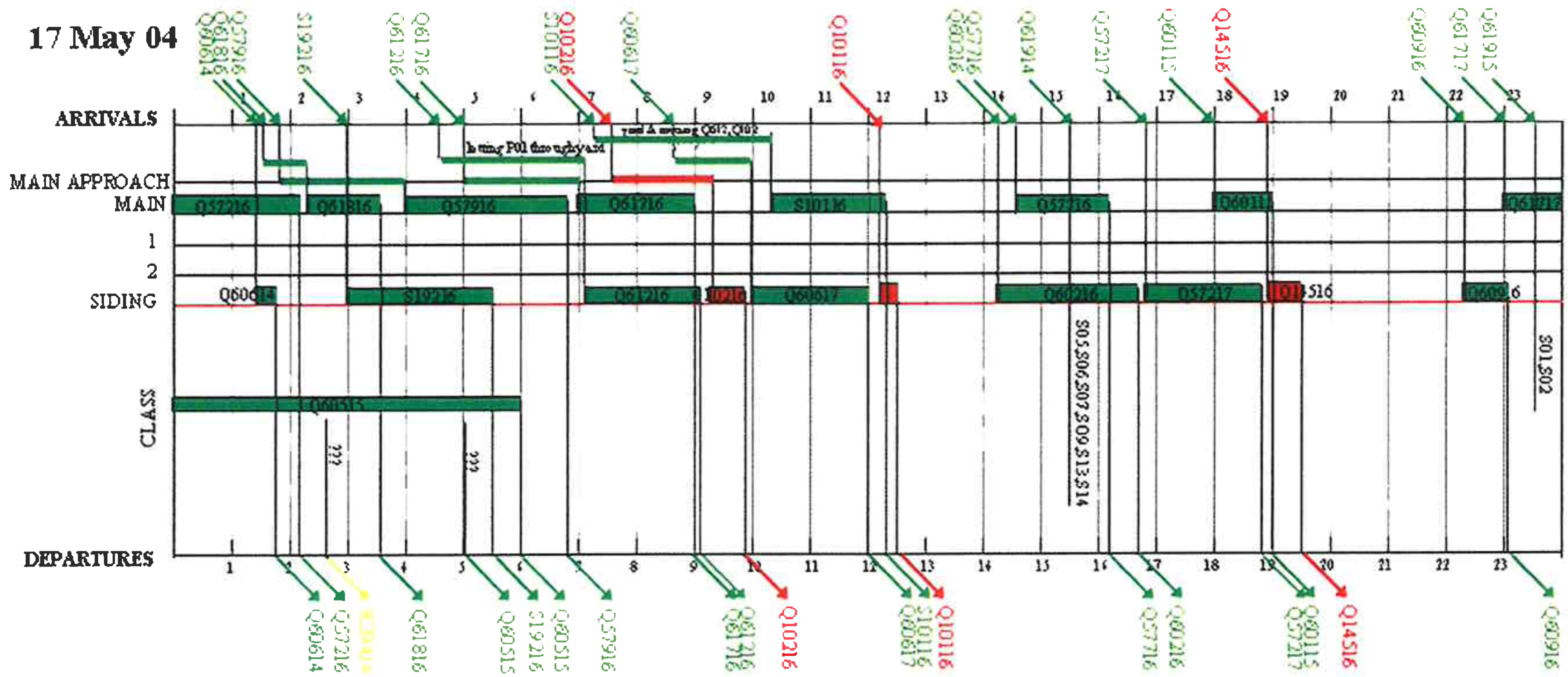
Unscheduled Delay per 100 train miles is a measure used by CSXT and other railroads to analyze existing operations and evaluate the effect of proposed operational or facility changes. The results of the two simulations are compared in Table 8-2.

The total unscheduled delay, in minutes, was reduced 67 percent, 31,078 minutes, by eliminating the constraints at Gentilly and Sibert yards. This clearly illustrates the need for detailed analyses of the improvements to the facilities and operations at the two yards. Analysis of the Receiving and Departure track occupancies at both facilities led to the conclusion show that in to prevent spilling of the yard operations into the mainline, and to free the mainline within the yard limits at Gentilly and Sibert yards, 5 additional Receiving and Departure tracks would have to be added at Gentilly and 4 tracks at Sibert.

Total Capacity of the Line between New Orleans and Mobile

Once yard constraints were removed from the Mobile to New Orleans corridor, CSXT considered that the mainline was capable of accommodating more trains. CSXT expects that this excess of mainline capacity would be preserved for growth freight traffic. **The total capacity of the line is understood herein not so much as the maximum number of trains that can be run on the line, but rather the maximum number of trains that can be run on the line to meet expected performance.** Since freight trains do not have schedules in a

Figure 8-20
Sample of Track Occupancies at Sibert Yard



Source: CSXT, 2006.

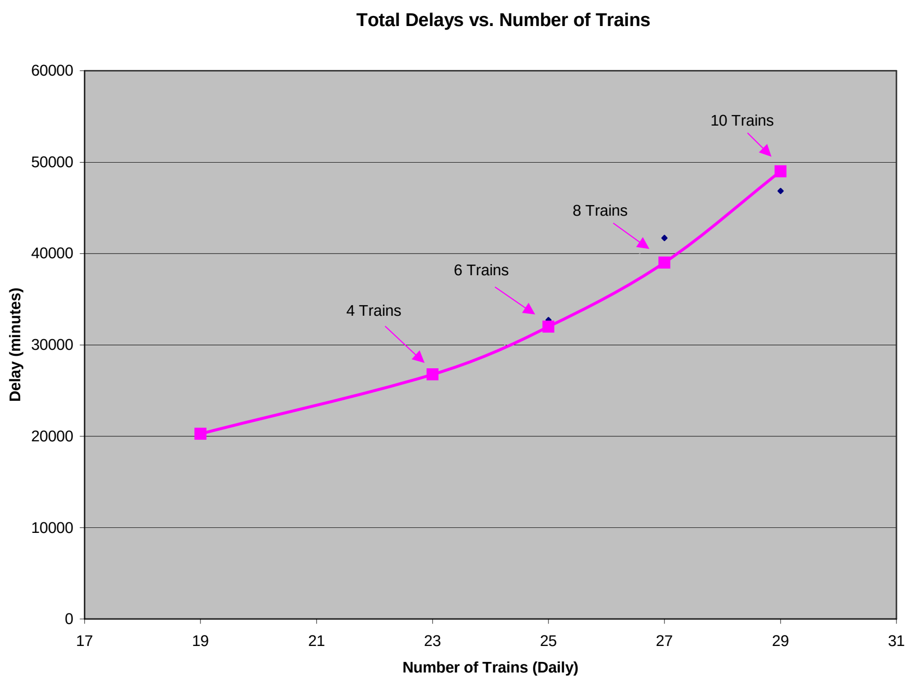
Table 8-2 Effect of Excluding Gentilly and Sibert Yards from Base Case Simulation

	Base Case Simulation Including Gentilly and Sibert Yards			Base Case Simulation Excluding Gentilly and Sibert Yards			
Type	Train Miles	Total Unscheduled Delay	Unscheduled Delay/100 miles	Train Miles	Total Unscheduled Delay	Unscheduled Delay/100 miles	Unscheduled Delay/100 miles Difference
		(Minutes)	(Minutes)		(Minutes)	(Minutes)	
Passenger	1,205	223	19	1,295	146	11.27	-64%
Intermodal	8,694	10,964	126	8,475	1,906	22.49	-461%
Manifest	19,275	31,724	165	19,053	10,860	57.00	-189%
Unit	1,789	2,149	120	1,796	1,559	86.80	-38%
Bulk	1,583	1,733	109	1,584	1,281	80.87	-35%
Grain	26	37	141	26	-	-	0%
Total	32,572	46,830	144	32,229	15,752	48.88	-194%
Note: Does not include local trains and interchange operations west of Gentilly Yard							

Source: Parsons Transportation Group, 2006.

way passenger trains do, delays per 100 miles are usually used as a measure of the performance. One indication that the traffic level approaches the limit of capacity is an exponential growth of delays as additional trains are added to the traffic. Thus, to find the total capacity of the line, a series of iterations/simulations with increasing the numbers of trains, 4, 6, 8 and 10 trains over the current volume, were run by the study team. Delays per hundred miles were then analyzed as well as the delay curve versus the number of trains. The characteristics of the growth trains were provided by CSXT, while departure times were established using random generator. Half of the additional trains were intermodal and the other half manifest. The result of the simulations is shown in Figure8-21.

Figure 8-21
Comparison of Delays as the Number of Trains Increased



Source: CANAC, 2006.

The analysis of the study team indicated that 8 and 10 additional trains exceeded the total capacity of the line. This left the choice of 4 and 6 additional trains. A further analysis of the delay suggests that after 4 trains, the delay curve becomes exponential, and that 4 additional trains might be considered as the limit of capacity on this corridor.

Thus, the conclusion of this scenario is that the total capacity of the mainline between New Orleans and Mobile is 23 trains (19 trains currently in operation plus 4 additional/growth freight trains.). The four additional trains resulted in an increase of over 6,000 unscheduled delay minutes and an increase of nine minutes per 100 miles (15 percent). (Refer to Table 8-3.)

New Orleans Terminal Issues

NOUPT is the study limit on the west, New Orleans, side of the corridor. The approximately 9.7 miles section of the corridor to the west of the Gentilly yard (CSXT MP 800.4 to NOUPT MP 2.8) is part of the New Orleans Terminal. This corridor is shared by the various railroads operating in the New Orleans Terminal (CSXT, NS, UP, Amtrak, Kansas City Southern, New Orleans Public Belt [NOPB]) and by the CSXT and NS to interchange traffic with UP. The approximately 3.5-mile Norfolk Southern Back Belt Line (BBL) section between NOT Jct. (BBL MP 7.08) and East City Jct. (BBL MP 3.5) or the "Back Belt Section" is of particular concern.

NS and CSXT use the Back Belt section to stage westbound trains for interchange with the UP and the interchange process creates potential capacity constraints. The respective train crews bring the westbound interchange CSXT and NS trains to Marconi Drive located just east of East City Jct. The crews leave the trains on the main to wait for UP crews to pick them up. Five hours is the average waiting time on the BBL, which effectively blocks one of the two main tracks, there are no sidings in this section of the BBL. At times two or more trains may be stored waiting for UP Crews. The eastward interchange traffic is more fluid as UP delivers an average of eight trains per day directly to CSXT's Gentilly yard and NS's Oliver yard. One KCS (Kansas City Southern) also operates in the Easterly direction. The Passenger traffic on this section is an average of 1.4 trains per day, in each direction. The Passenger traffic consists of Sunset Limited trains, and the Southern Crescent, which operates a round trip a day to Birmingham and ultimately New York City on the NS's line to Birmingham. The train presently departs the corridor at Oliver Jct.

The New Orleans Terminal has been the subject of a few recent studies. The complexity of the operation and the interest on the part of the freight railroads, Amtrak, and state and local agencies to increase train fluidity in the Gateway Corridor, and eliminate the effect of slow and stopped train movements on the local citizenry, were the primary factors that lead to the studies. The many railroads having to share the corridor while attempting to meet their individual service requirements complicates train operations in the New Orleans Gateway. The current traffic and the interchange trains occupying the main would interfere with the running of additional intercity passenger trains. It is desirable to have a measure of the impact and interference that can be expected on the proposed passenger service in the Back Belt Section; however, for modeling, details of traffic and other aspects of the operation of each of the railroads are needed, which were not available to this study.

Table 8-3. Effect of Adding Four Trains to Base Case Simulation

	Base Case Simulation Excluding Gentilly and Sibert Yards			Base Case Simulation Excluding Gentilly and Sibert Yards with Four Additional Trains			
Type	Train Miles	Total Unscheduled Delay	Unscheduled Delay/100 miles	Train Miles	Total Unscheduled Delay	Unscheduled Delay/100 miles	Unscheduled Delay/100 miles Difference
		(Minutes)	(Minutes)		(Minutes)	(Minutes)	
Passenger	1,295	146	11	1,295	230	18	37%
Intermodal	8,475	1,906	22	10,920	4,023	37	39%
Manifest	19,053	10,860	57	22,178	14,372	65	12%
Unit	1,796	1,559	87	1,807	1,763	98	11%
Bulk	1,584	1,281	81	1,584	1,349	85	5%
Grain	26	-	-	26	30	115	100%
Total	32,229	15,752	49	37,810	21,767	58	15%
Note: Does not include local trains and interchange operations west of Gentilly Yard							

Source: Parsons Transportation Group, 2006.

Study team member CANAC conducted a study of the New Orleans Terminal, including the NS Back Belt, a few years ago. The study resulted in the development of a number of operational and physical plant change recommendations and summarized its findings in a report entitled *New Orleans Rail Gateway Regional Rail Operational Analysis*. By necessity the information that was included in the report had to be generalized in order to respect and protect the privacy and confidentiality requirement of the participating railroads.

CSXT confirmed that there have been no substantial changes in the traffic or interchange policy in this corridor. Analysis of CSXT's recent experience (December 2004 data) of the dwell of westbound trains, as measured by the two AEI scanners indicated an average dwell of 4.87 hours, which was comparable to the level observed in the earlier study. The study effort used the information that was included in the CANAC report and developed a general guideline of the improvements that may be needed on the Black Belt to accommodate the increase in passenger traffic.

Lake Catherine to Michoud

Analysis of delays by location indicated some elevation of delays in the southern portion of the route with Lake Catherine being the highest. This is explainable by a relatively long grid between Michoud and Lake Catherine (11 miles) and two drawbridges between Claiborne and Lake Catherine. Plant improvements in this area are difficult to realize as this portion of the corridor is on wetlands.

Figure 8-22 on the following page shows the extension south of Pearl River Draw, to Rigolets Pass. If the initial full-service implementation experiences delays in this area, this is, for all practical purposes, the only addition that could be made between Bay St. Louis and Michoud. The 5.9-mile siding would keep some trains moving and allow for more passing meets.

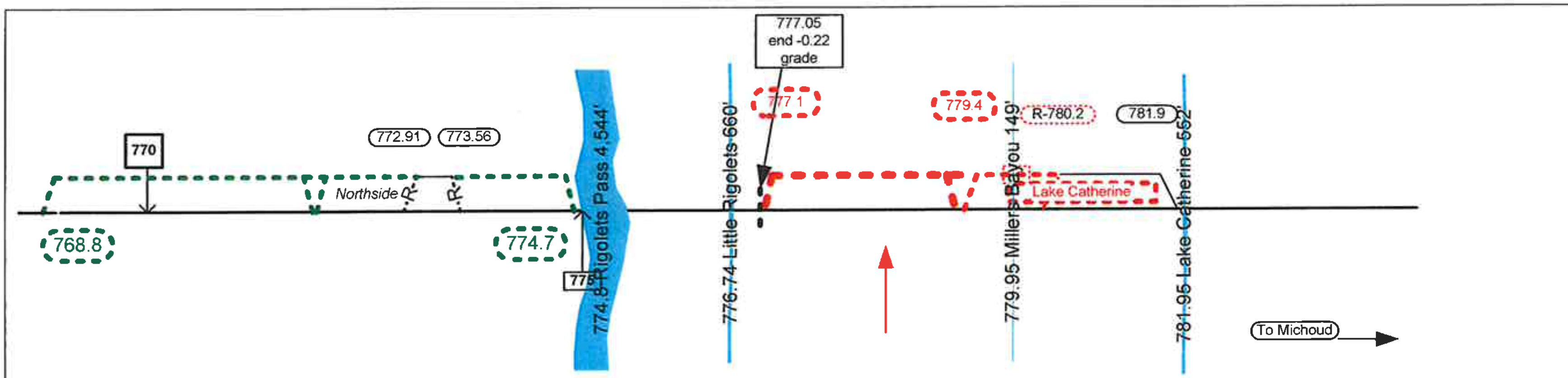


Figure 8-22. Full Service Build Out Plus– Extend Lake Catherine Siding and Extend Northside, both with a pair of Center Crossovers to facilitate multiple-train meets

Source: Parsons Transportation Group, 2006.

Chapter 9 – Program Summary and Conclusions

This chapter recapitulates the nature and cost of the potential improvements to the New Orleans-Mobile Corridor, and summarizes major conclusions of the study.

Recapitulation of Potential Improvements

Tables 9-1 and 9-2 list the corridor-wide and site-specific improvements identified in Chapters 7 and 8 as addressing the Initial Service and Full Service requirements underlying the study. The tables identify the objectives and estimated cost of each line item. The projected total cost of all the identified potential improvements (exclusive of rolling stock requirements and items not estimated in the study) currently stands at approximately $730 million (2004 dollars).

Tables 9-1 and 9-2 include cost estimates only for those infrastructure items covered in the study scope. Items omitted from the study scope are labeled “to be determined (tbd)” and are excluded from the totals shown. Some of the items “to be determined” may be essential prerequisites to upgraded service on the line (e.g., improvements to Sibert and Gentilly Yards) and would need to enter into further studies or implementation plans. This engineering report does not address the financing or institutional options which may enter into project implementation.

Detailed engineering construction plans need to be prepared for the various improvements; the plans would necessarily support a detailed segmentation, prioritization, and sequencing of these projects. As an example of segmentation, a major effort like the extension of double track from Choctaw to Fowl River Siding, including the construction of Choctaw Siding, which this report describes in broad outlines, would lend itself to subdivision into a number of interrelated projects. The engineers would then evaluate these separate projects in terms of their cost-effectiveness in fulfilling capacity, re-capitalization and trip-time needs. Experience on the Phase I, Meridian to New Orleans study, and other recent HSR studies have shown the benefit of prioritizing capacity improvements based on an evaluation of their urgency and return on investment.

The addition of increased levels of intercity passenger service in a primarily single track railroad, operating at speeds in excess of freight train operations, must be accompanied by an investment in siding improvements that would optimize spacing and provide sidings sufficiently long to accommodate train meets by easily having room for freight trains. The increase in capacity improves the reliability of passenger train operations while not denigrating freight train operations. These capacity enhancements accompanied by signal

Table 9-1
Cost Estimate of Contemplated Improvements to Support the Initial Service

Improvements Sibert Yard to Elysian Fields	(In Millions)
Signal Upgrades Sibert to Mobile Station	$3.9
Double Track Mobile Station to Brookley	$27.2
Track and Signal Upgrades Brookley to Fowl River	$1.5
Fowl River Siding	$11.2
Track and Signal Upgrades Fowl River to Little Franklin	$1.7
Little Franklin Siding	$12.5
Track and Signal Upgrades Little Franklin to Orange Grove	$2.1
Orange Grove Siding	$6.6
Track and Signal Upgrades Orange Grove to Gautier	$1.4
Gautier Siding	$8.5
Track and Signal Upgrades Gautier to Ocean Springs	$1.0
Ocean Springs Siding	$13.2
Track and Signal Upgrades Ocean Springs To Beauvoir	$4.5
Double Track Beauvoir to Harbin	$63.4
Track and Signal Upgrades Beauvoir to Nicholson	$4.5
Nicholson Siding	$8.1
Track and Signal Upgrades Nicholson to Claiborne	$5.3
Claiborne Siding	$4.5
Track and Signal Upgrades Claiborne to Lake Catherine	$4.6
Lake Catherine Siding	$9.2
Track and Signal Upgrades Lake Catherine to Gentilly Yard	$9.2
Track and Signal Upgrades Gentilly Yard to NS Railroad Back Belt	$7.6
Subtotal	$211.7
Movable Bridge Improvement Program	$34.3
Station Improvement Program	$6.0
Subtotal	$252.0
Common Improvments NO&NE Tower to New Orleans UPT	$7.6
TOTAL	**$259.6**

Source: Parsons Transportation Group, 2006.

Table 9-2
Cost Estimate of Contemplated Improvements to Support the Full Service

Improvements Sibert Yard to NO&NE Tower	(In Millions)
Signal Upgrades Sibert to Mobile Station	$4.0
Double Track Mobile Station to Fowl River	$80.2
Track and Signal Upgrades Fowl River to Little Franklin	$4.7
Little Franklin Siding	$26.2
Track and Signal Upgrades Little Franklin to Orange Grove	$1.4
Orange Grove Siding	$19.9
Track and Signal Upgrades Orange Grove to Pascagoula	$0.8
Pascagoula Siding	$14.9
Track and Signal Upgrades Pascagoula to Gautier	$0.2
Gautier Siding	$10.8
Track and Signal Upgrades Gautier to Ocean Springs	$1.1
Ocean Springs Siding	$25.4
Track and Signal Upgrades Ocean Springs To Beauvoir	$4.7
Double Track Beauvoir to Harbin	$65.1
Track and Signal Upgrades Beauvoir to Nicholson	$4.5
Nicholson Siding	$14.9
Track and Signal Upgrades Nicholson to Claiborne	$2.0
Claiborne Siding	$21.0
Track and Signal Upgrades Claiborne to Pearl River	$0.1
Pearl River Siding	$26.3
Track and Signal Upgrades Pearl River to Lake Catherine	$0.3
Lake Catherine Siding	$31.9
Track and Signal Upgrades Lake Catherine to Gentilly Yard	$12.3
Track and Signal Upgrades Gentilly Yard to NS NO&NE Tower	$4.0
Subtotal	$376.6
Movable Bridge Improvement Program	$27.4
Station Improvement Program	$2.5
Subtotal	$406.5
Common Improvements NO&NE Tower to New Orleans UPT	
Elysian Fields Connection	$12.7
Third Track Elysian Fields to Marconi Drive	$20.9
Track and Signal Upgrades Marconi Drive to East City Jct	$0.3
Track and Signal Upgrades East City Jct to New Orleans UPT	$30.6
Subtotal	$64.5
TOTAL	**$471.0**

Source:Parsons Transportation Group, 2006.

system improvements and continuous upgrading of track speeds also provide a large share of the trip time benefits. Rehabilitation projects that upgrade drawbridges also will contribute to increases in passenger and freight train speeds in the New Orleans-Mobile Corridor. Finally, the study's 20-year planning horizon allows for a phased implementation of the contemplated program to match the rail operators' staged introduction of service improvements and the availability of an ongoing infusion of capital funding to the states and transportation agencies. Thus, closer scrutiny would assist high-speed rail partners in fashioning a detailed program that is affordable, timely, and efficacious.

Major Study Conclusions

Protection of all freight and passenger services

Numerous computerized simulations of the operations of all users of this Corridor (freight and intercity passenger) have identified a number of specific infrastructure changes that would provide the capacity to handle all existing and projected services without deteriorating freight train performance. Even with these changes, close scheduling and dispatching coordination among CSXT and the intercity passenger service operator extending to other contiguous routes would be necessary to optimize the use of the improved facility and preserve the dependability and marketability of all passenger and freight operations.

This study of the 145-mile New Orleans-Mobile Corridor represents a significant application of the transportation planning concepts that evolved in the Northeast Corridor Improvement Project - America's premier high-speed rail development effort to date - to a primarily single-track railroad with heavy through and local freight traffic.

Capacity Requirements

The importance of freight traffic, coupled with the bottlenecks inherent in single-track operation, makes protecting the reliability of all services a paramount concern in planning - secondary only to safety. As a result, for this corridor to fulfill its potential:

- Significant additional capacity must be provided.
- This capacity may take the obvious form of additional tracks, mainly passing sidings but in some instances midpoint interlockings in longer sidings, new interlockings, and improved connections between rail lines.
- More subtle - but of equal importance - are the detailed improvements that would allow freight trains to enter and exit the main line more quickly, and that would lessen the delays occasioned by interference among all rail services. These include upgrading turnouts for higher operating speeds and providing improved paths for all types of trains through complex yard areas.

- Combined with the need for careful attention to engineering detail is the requirement for collegial operations planning, over the long-term, among all the operators and service sponsors in the corridor.

With the betterments identified in this study, it would be feasible to upgrade intercity passenger service to achieve reliable travel times of less than 2.4 hours between New Orleans and Mobile. This scheduled running time, while not approaching the average speed of high-speed trains in the Northeast Corridor (NEC), would significantly exceed present rail passenger travel times in the corridor. More importantly, the reliability would approximate that achieved in the NEC, thereby providing a competitive travel mode in this segment of the GCHSR Corridor.

These intercity passenger rail service improvements could occur without adverse impacts to freight operations in this very busy territory. Indeed, all freight services would benefit from the improved traffic flows made possible by the initiatives described in this report.

Implications for subsequent GCHSR and other Corridor Studies

Because the New Orleans-Mobile Corridor consists of a primarily single track freight main line that requires not only the construction of numerous capacity improvements to accommodate higher speed passenger trains and increased levels of freight train operations as well as a rethinking of rail dispatching policies and procedures, the present study contains information that will be useful to the study team as it evaluates the remaining segments of the GCHSR Corridor in subsequent phases of this study. The study also will provide useful information to intercity and commuter rail corridor planners in many other regions of the country where analogous situations prevail. Heavy freight routes with limited capacity exist in other designated corridors, and the techniques employed to overcome the varied challenges in the New Orleans-Mobile route will apply elsewhere as well. In particular, planners and decision-makers need to keep in mind the special characteristics of single-track routes - and of high-density freight lines - and the careful attention to operational planning and engineering detail that is prerequisite to their successful adaptation for high-speed rail service.