SOUTHERN RAPID RAIL
TRANSIT COMMISSION

Gulf Coast High Speed Rail Corridor Development Plan

Phase I:
Improvement Implementation Plan-
Meridian to New Orleans

Volume I: Summary Report

Prepared for

SOUTHERN RAPID RAIL TRANSIT COMMISSION

Prepared by

BKI BURK-KLEINPETER, INC.
ENGINEERS, ARCHITECTS, PLANNERS, ENVIRONMENTAL SCIENTISTS

In association with
PARSONS TRANSPORTATION GROUP

September 2002

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Table of Contents

List of Figures

List of Tables

Executive Summary

SOUTHERN RAPID RAIL TRANSIT COMMISSION

Executive Summary

This document is Volume I of the Summary Report to the Southern Rapid Rail Transit Commission (SRRTC) on the findings of the Phase I: Improvements Implementation Plan (New Orleans to Meridian) of the Gulf Coast High Speed Rail Corridor Development Plan. A separate document, Volume II, contains the technical analyses, track charts, and crossing data that support these findings.

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The Southern Rapid Rail Transit Commission (SRRTC) and Amtrak, desiring to achieve some travel-time savings and, more importantly, improved reliability, on the Norfolk Southern (NS) route between Birmingham and New Orleans, entered into a contract with Burk-Kleinpeter, Inc. to identify, develop, test, and estimate the cost of improvements that would reduce running time for passenger service between Meridian and New Orleans in the immediate future. The proposed improvements were to be developed in sufficient detail to allow them to be evaluated, ranked, and prioritized by the Federal Railroad Administration (FRA) in time to be included in the first Federal Fiscal Year in which funding is expected to be available (e.g., FY 2003). A second round of improvements was to be similarly developed to cover the short- and mid-term period (FY 2004 and FY 2005 and beyond).

Funding

The SRRTC has not previously received federal assistance for physical and operational improvements to the Gulf Coast High Speed Rail Corridor. However, as a result of this study, an initial program of improvements has been identified which will result in speed improvements for passenger trains along the Corridor and allow more flexible scheduling of freight and passenger service. The source of funding for the initial program of improvements has not yet been identified.

Background

The Southern Rapid Rail Transit Commission and the Gulf Coast High Speed Rail Corridor have been in existence in one name or another since 1982. The corridor had originally been conceived to include only the existing Sunset Limited route across Louisiana, Mississippi, and Alabama, with logical termini in Texas (Houston) and Florida (Pensacola or Jacksonville). It was subsequently modified to include another essential link in the emerging national high-speed rail network, the route from New Orleans to Atlanta via Hattiesburg, Meridian, Tuscaloosa, and Birmingham.

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- The Crescent which makes one trip daily each way between New Orleans and New York via Hattiesburg, Meridian, Tuscaloosa, Birmingham, Anniston, Atlanta, and Washington; and
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Previous Studies

In June of 1999, Morrison Knudsen Corporation published the Gulf Coast High Speed Rail Corridor Feasibility Study, Phase II. The objectives of this study were to:

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- Provide an action plan that will lead toward implementing HSR passenger rail service in the corridor.

The study recommended development of the HSR passenger rail corridor by means of "incremental" upgrades on existing rail lines/rights-of-way rather than constructing a brand new HSR alignment on a new right-of-way.

Project Selection Criteria

With the commencement of the Phase I Study, Meridian to New Orleans, in the fall of 2001, the Project Team laid out some basic ground rules for the identification and evaluation of prospective projects to be suggested for Fiscal Year 2003 funding. These criteria included:

- Projects identified in the Morrison Knudsen Feasibility Study would be the starting point for the current effort;

- No land acquisition process should be required, i.e., the projects have to be contained within current right-of-way;
- No projects involving environmental clearances beyond Categorical Exclusions or Environmental Assessments would be considered; and
- The project must have benefits to both the high-speed passenger rail service and the freight service.

Recommendations

After extensive analysis of Train Performance Calculations (TPC), Norfolk Southern track charts, Amtrak videos, field inspections, and discussions with Federal Railroad Administration, Norfolk Southern, and Amtrak representatives, a comprehensive and coordinated approach to implementing high-speed rail service in the New Orleans to Meridian corridor has been advanced by the Consultant Team. The projects recommended in this memo are designed to either eliminate conditions that require trains to slow down or upgrade the operating system to allow generally higher speeds throughout the corridor.

The underlying principle shaping the Consultants' recommendations is that, in the long run, high-speed passenger service in this corridor can only be attained by the installation of Centralized Traffic Control (i.e., remotely directed, computerized control of rail traffic flow) and Automatic Train Stop/Cab Signals (i.e., apparatus installed on locomotives that will automatically bring a train to a safe stop if it is danger of colliding with another train. CTC allows more reliable operation and more capacity for additional trains, and ATS/CS is required by statute in order to operate at 90 mph.

There are two general categories of improvements recommended in this report: (1) speed adjustments to existing main line track segments and (2) improvements to sidings. Speed adjustments can refer to a number of different types of structural or non-structural projects, from straightening out or super-elevating curves and grades to upgrading structures (bridges or trestles), to merely updating the Timetable to account for grade crossing safety improvements made by others (e.g., state departments of transportation).

Improvements to sidings refer to upgrading individual sidings as well as addressing the entire system of sidings within a given corridor. On a single-track main line, sidings allow the meeting and passing of opposing and overtaking trains. The optimal spacing between sidings is a function of topography, operating speeds, and train frequency. There is no absolute standard (i.e., intervals in miles) for the spacing of sidings; however, optimum spacing in a corridor can be (and was) simulated through TPC. In general, frequent, long passing sidings increase track capacity. Longer individual sidings would accommodate longer freight trains and/or allow "running" meets where neither train has to stop. The objective is to provide the minimum number of sidings of the proper size to support the anticipated type and level of traffic in the corridor. This report recommends improving sidings in three ways:

- Upgrade well-located existing sidings of the proper length (around 11,000 LF) for CTC (No. 20 powered turnouts allow 45 mph),
  - Basic (MP 13.35)
  - Heidelberg (MP 40.65)
  - Hawkes (MP 50.75)
  - Shows Field (MP 59.4)
  - Dragon (MP 81.3)
  - Richburg (MP 94.6)

- Extend well-located, but short, existing sidings and upgrade them for CTC,
  - Barnett (MP 29.55)
  - Lumberton (MP 111.9)
  - Derby (MP 130.2)
  - Pearl River (MP161.4)

- Add new long (11,000 LF) sidings in strategic locations and install CTC.
  - Moselle (MP 71.6)
  - Carriere MP 143.5)

These improvements are listed in Table ES-1 on the following page. In all, improvements are recommended for the existing twelve sidings between Meridian and New Orleans, plus two new sidings in Carriere and Moselle.

Speed adjustments are recommended in the cities of Laurel and Slidell, as well as the Lake Pontchartrain, Seabrook, and Pearl River bridges. The bridge recommendations require further engineering analysis. The NOUPT/Carrollton Curve improvement is the most significant speed adjustment.

The costs associated with implementing CTC total nearly $64 million - more than half of total project costs of $113.6 million - and largely reflect the cost to install No. 20 powered switches and upgrade the ABS system.

It should be noted that all recommended improvements are subject to modification after further analysis.

Table ES-1
Summary of Short and Long Term Project Recommendations

Initial Funding			
Project		**Cost $MM**	**Time Savings**
Barnett	Extend Barnett Siding	$2.94	0:00:00
CTC Installation	Initial	$10.38	0:00:00
Derby	Upgrade Derby Siding	$2.29	0:00:00
Carriere	Construct Carriere Siding	$3.75	0:00:45
East City Jct	Adjust Speeds: SE 191.1 - NE East City Jct	$1.03	0:00:28
NOUPT	NE East City Jct to NO Terminal	$3.23	0:02:18
Total		**$23.61**	**0:03:31**

Long-term Funding			
Project		**Cost $MM**	**Time Savings**
Meridian	Meridian Upgrades	$4.12	0:00:04
Basic	Upgrade Basic Siding	$1.91	0:01:24
Barnett Long	Upgrade Barnett Siding	$1.16	0:00:00
Heidelberg	Extend Heidelberg Siding	$2.86	0:01:20
Hawkes	Upgrade Hawkes Siding	$2.18	0:00:11
Laurel	Reduce Speed Restrictions	$0.00	0:02:13
Shows Field	Upgrade Shows Field Siding	$1.69	0:02:34
Moselle	Construct Moselle Siding	$6.22	0:01:20
Dragon	Upgrade Dragon Siding	$1.68	0:00:27
Richburg	Upgrade Richburg Siding	$3.02	0:01:42
Lumberton	Extend Lumberton Siding	$5.67	0:01:07
Derby Long	Extend Derby Siding	$2.00	0:01:13
Pearl River	Extend Pearl River Siding	$3.30	0:02:01
Slidell	Adjust Speeds: Slidell	$0.00	0:02:21
Woods	Upgrade Woods Siding	$1.54	0:01:42
Lake Pontchartrain	Adjust Speeds: Lake Pontchartrain	*t.b.d.*	0:03:20
Seabrook Drawbridge	Adjust Speeds: Seabrook Drawbridge	*t.b.d.*	0:01:05
New Connection	NE Tower - Elysian Fields	*t.b.d*	0:02:00
CTC Installation	Final	$53.68	0:00:00
Total		**$91.03**	**0:26:04**
	TOTALS	**$114.64**	**0:29:35**

Benefits

What are the benefits associated with the capital expenditure of $114 million on this rail line? There are a number of benefits, including travel time reductions for passenger trains and, to a lesser extent, freights and increased capacity which will enhance reliability. Further, there should be more train slots for passenger and freight trains as well as a signal system that makes for safer operations for both passenger and freight services.

Limits of the Study

- This study presents a conceptual plan, as no funding currently exists to implement the projects.
- No simulation model runs at high speeds with additional trains have been performed as part of this study.
- To qualify as a high-speed corridor for the FRA, the corridor would need to support operations at 90 mph, or more, with at least six additional passenger trains.

Future Actions

This report provides a framework for improvements in the Norfolk Southern line between Meridian and New Orleans, which should serve as a beginning point for discussions about an agreement with the railroad regarding additional operating slots for passenger service. The agreement should specify a project, or projects, to reach milestones, the number of passenger trains that may be slotted, track speeds to be attained, model trip times, and specific superelevation of rail in curves, including the acceptable underbalance (in inches).

1. Introduction

SOUTHERN RAPID RAIL TRANSIT COMMISSION

Introduction

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Funding Deadlines

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The study recommended development of the HSR passenger rail corridor by means of "incremental" upgrades on existing rail lines/rights-of-way rather than constructing a brand new HSR alignment on a new right-of-way.

Project Approach

Morrison Knudsen's incremental approach assumes that investment occurs in stages or phases rather than all at once. The report pointed out a number of good reasons for adopting the incremental approach:

- Total investment is significantly less because the new investment builds upon existing value: i.e., the private railroads already possess main line rights-of-way capable of being adapted to more and higher speed service;

- Financing requirements are spread out over time, as compared with the cost impacts of a major new infrastructure project, which must be constructed all at once if it is to have any substantial utility;

- The level of investment can be tailored, by timing and line segment, to the development of demand. Some sectors may never warrant the level of investment appropriate for the most heavily utilized segments;

- The incremental improvements to the existing infrastructure can be utilized to enhance rail passenger service as each is completed, providing identifiable benefits derived from each level of investment;

- Environmental impacts should be less where existing rail lines are being upgraded or existing roadbeds are being used, as opposed to the impacts of new or "greenfield" alignments;

- Incremental improvements on existing lines tend to provide service that goes closer to the major origins and destinations than do new alignments, which must necessarily avoid built-up areas. There are exceptions to this rule: as cities spread into the suburbs, the older rail terminals downtown may be in the wrong places. That does not appear to be the case in the Gulf Coast High Speed Rail Corridor, which would serve the downtown areas of Houston, Baton Rouge, New Orleans, Mobile, Pensacola, Meridian, and Birmingham. In fact, one of the benefits of the approach taken is that the metropolitan centers in these cities benefit from increased utility in the passenger rail system.

The Burk-Kleinpeter, Inc./Parsons Transportation Group Team has adhered to the incremental approach as laid out in the Feasibility Report.

Project Selection Criteria

With the commencement of the Phase I Study, Meridian to New Orleans, in the fall of 2001, the Project Team laid out some basic ground rules for the identification and evaluation of prospective projects to be suggested for Fiscal Year 2003 funding. These criteria included:

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Report Organization

This report is organized into five chapters, including this Introduction. The following chapters provide the following information:

- Chapter 2 discusses the existing conditions and identifies alternative projects to improve speed and reliability in the New Orleans to Meridian segment of the High Speed Rail Corridor;

- Chapter 3 provides detailed descriptions of the projects recommended for the initial phase (Fiscal Year 2003);

- Chapter 4 provides detailed descriptions of the projects recommended for the second and third funding cycles (Fiscal Years 2004 and 2005 and beyond);

- Chapter 5 provides a detailed analysis of and recommendations for the Kansas City Southern/Norfolk Southern interlocking in Meridian

- Chapter 6 discusses the timesaving associated with the proposed improvements.

2. Existing Conditions and Program Options

SOUTHERN RAPID RAIL TRANSIT COMMISSION

Existing Conditions and Program Options

The purpose of this chapter is to describe the conditions that currently exist in the New Orleans-to-Meridian corridor, identify opportunities to increase train speeds, and discuss the analysis of options available to improve track infrastructure so that it can more efficiently support freight and high-speed passenger service.

Existing Conditions

The 204-mile Norfolk Southern route from New Orleans to Meridian passes through rural countryside that includes many rolling hills. This results in an alignment with many short grades and sharp curves. The route also passes through a number of small towns, including Laurel, Hattiesburg, and Picayune, Mississippi and Slidell, Louisiana. Refer to the map in Figure 2-1.

Line Use

The route is a heavily used segment of NS's mainline system. Line use averages sixteen trains per day, not including local freight service, but including Amtrak's north and southbound *Crescent.*

Track Characteristics

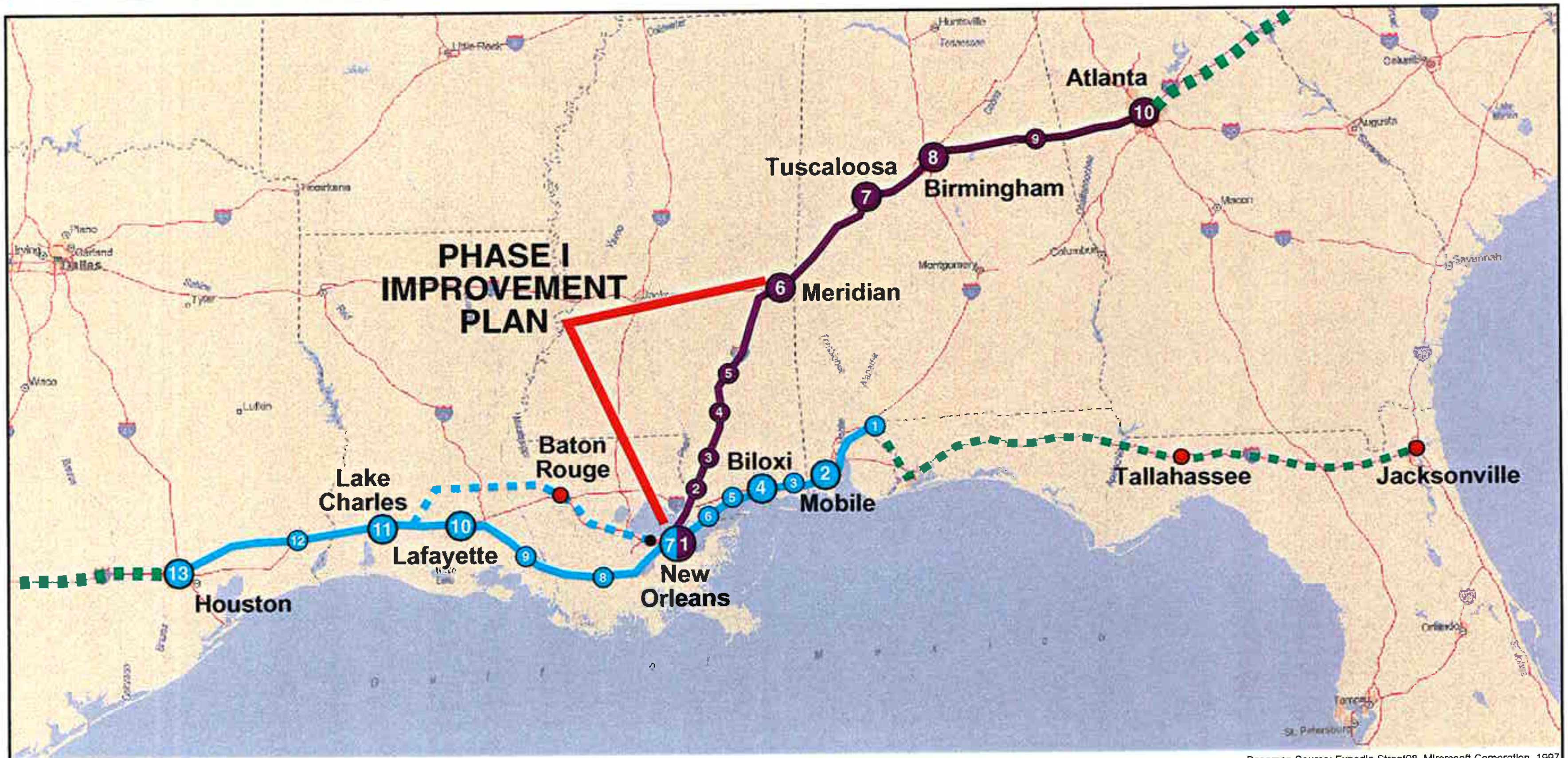
The trackage from Meridian to New Orleans is mainly single-track with a mix of small and long passing sidings throughout the corridor. In general, a siding exists every ten to twenty miles for shorter trains to use. Longer length sidings, 10,000 feet or greater, are located every twenty to thirty miles. The entire route is laid with 132-lb. welded rail with mixed hardwood crossties on crushed stone ballast.

Operating Speed

Although the maximum speed limit for passenger trains on portions of the route is currently 79 mph, there are many areas where the timetable speed is lower because of grades and curves. Further, speeds are reduced over a large number of bridges and crossings over waterways, including navigable waterways.

Train Control

There are no automatic interlockings currently in place between New Orleans and Meridian. In this system, every time a train meets an opposing train at a siding, one of the trains must stop, a crewmember must manually align the switch to the siding, and then realign the switch after the train leaves the siding. The crewmember then walks



Basemap Source: Expedia Street98, Microsoft Corporation, 1997

LEGEND:

- North- East segment
- East - West segment
- Existing Service Extensions

SUNSET LIMITED SERVICE

1. Atmore, AL
2. Mobile, AL
3. Pascagoula, MS
4. Biloxi, MS
5. Gulfport, MS
6. Bay St. Louis, MS
7. New Orleans, LA
8. Schriever, LA
9. New Iberia, LA
10. Lafayette, LA
11. Lake Charles, LA
12. Beaumont, TX
13. Houston, TX

● Louis Armstrong N. O. Int. Airport

CRESCENT SERVICE

1. New Orleans, LA
2. Slidell, LA
3. Picayune, MS
4. Hattiesburg, MS
5. Laurel, MS
6. Meridian, MS
7. Tuscaloosa, AL
8. Birmingham, AL
9. Anniston, AL
10. Atlanta, GA

Figure 2-1
Phase I
Project Corridor

the length of the train to re-board the locomotive. This process results in lost time for freights, which take the sidings to allow the *Crescent* to pass.

Currently all siding switches on the route are hand-operated. While spring switches have been installed so that trains without cabooses can leave a siding without having to stop to restore the switch, a train cannot enter a siding without reversing a switch by hand and the train must be stopped and restarted to do that.

NS tries to arrange for the first train to arrive at a siding for a meet to pull to the far end of the siding. The crew of that train will reverse the switch for the train that will enter the siding. When that train has entered the siding the first train will restore the switch to its normal position and proceed. Both trains are delayed with this procedure.

When the meet is with an Amtrak train, NS's normal procedure is to have the freight train entering the siding restore its own switch so that Amtrak is not delayed; however, this requires that the conductor must walk the entire length of his train after having restored the switch. That can take as long as twenty, or more, minutes. While it is true that some or most of the walking time can be concurrent to the waiting time, the fact remains that the time lost by a freight train meeting a passenger train is usually greater than when a freight train meets another freight train.

If it is known that a train arriving for a meet will experience a long wait, having the conductor of the entering train restore his own switch is the preferred method. In that way the train being met will not be slowed and the conductor's walk to the head end is totally concurrent to the wait. Besides NS does not like to have a reversed main line switch be left unattended even though protected by an automatic signal.

Route Capacity

On a single-track main line, such as NS's Meridian to New Orleans route, the capacity of any segment is significantly impacted by a number of factors, including the location, size, and types of switches associated with the passing sidings, as well as speed limits within the 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 passing sidings between Meridian and New Orleans while their locations are shown in Figure 2-2.

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

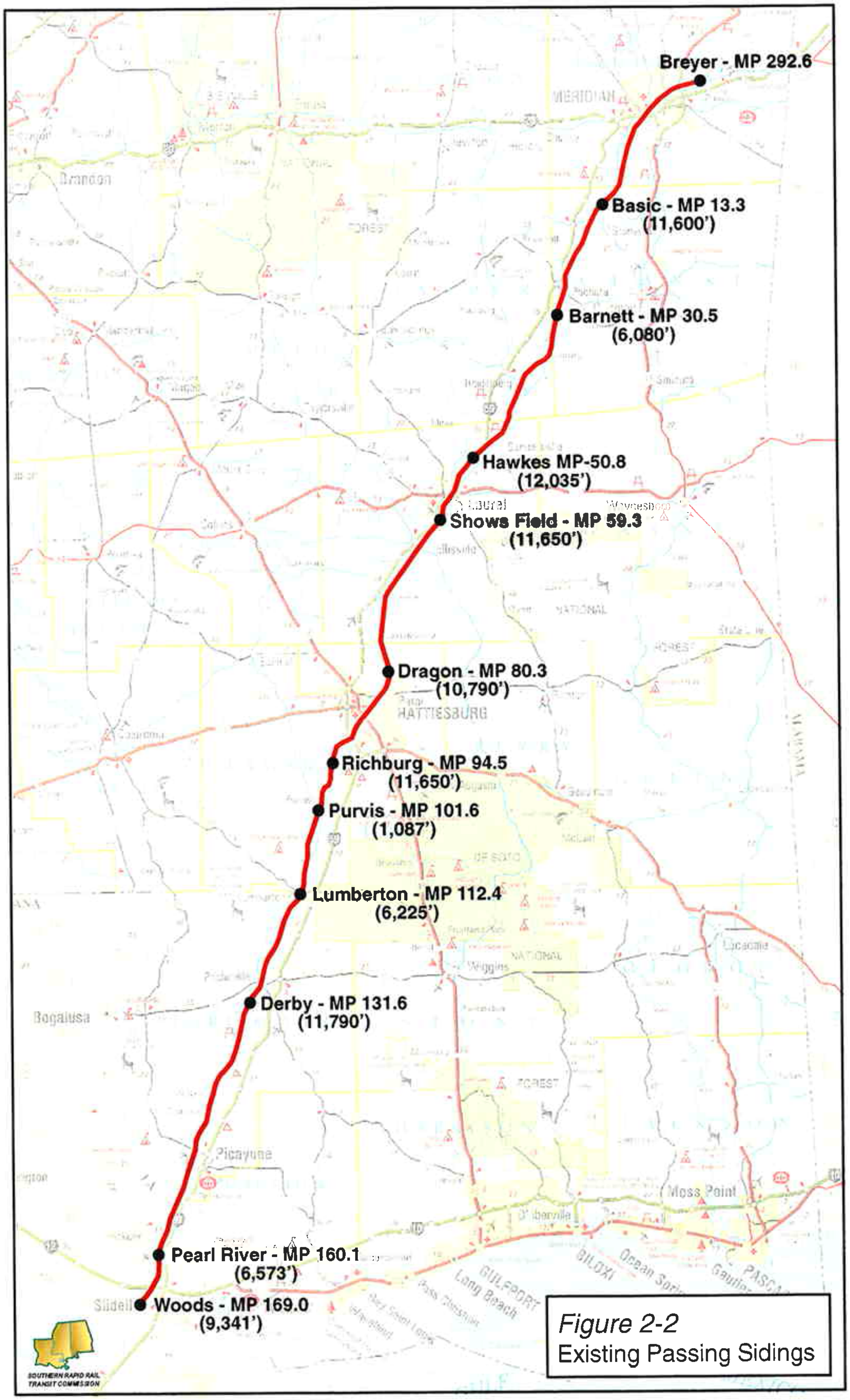


Figure 2-2
Existing Passing Sidings

around the spacing between sidings in miles. This discussion will show that that criterion alone is insufficient. As an example, assume a single-tracked line equipped with single train length sidings and the sidings are spaced twenty miles apart. Assume that a northward train at Point A takes 40 minutes, including clearing time, to traverse the twenty miles to the next siding at Point B. A southward train may pass Point B after the northward train passes Point B. If the southward train takes 45 minutes to clear the single track at Point A, another northward train cannot pass Point A for 85 minutes. That will allow a maximum of only 16.9 meets per day at Point A. Since two trains are involved in a "meet," this would yield a theoretical capacity of 33.8 trains per day.

Table 2-1
Existing Passing Sidings, Meridian to New Orleans

Siding Milepost	Timetable Milepost	Siding	Length (LF)
NO 0.0 - NO 3.2	0.9	*Meridian Station*	
NO 12.2 - NO 14.5	13.3	Basic	11,600
NO 29.4 - 30.7	30.5	Barnett	6,080
NO 49.6 - NO 51.9	50.8	Hawkes	12,035
	56.4	*Laurel Station*	
NO 58.2 - 60.6	59.3	Shows Field	11,650
NO 80.2 - NO 82.6	80.3	Dragon	10,790
	85.3	*Hattiesburg Station*	
NO 93.4 - NO 95.8	94.5	Richburg	11,650
NO 101.2 - NO 101.7	101.6	Purvis	1,087
NO 112.1 - NO113.4	112.4	Lumberton	6,225
NO 129.7 - NO131.9	131.6	Derby	11,790
	149.0	*Picayune Station*	
NO 160.2 - NO 161.5	160.1	Pearl River	6,573
	167.3	*Slidell Station*	
NO 168.1 - NO 169.9	169.0	Woods	9,341

Source: BKI from NS Track Charts, June 2002.

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. Long freight trains may consume as much as six minutes clearing or entering the main line when number ten turnouts are used, so if the siding is long enough, installing number twenty turnouts can reduce that time to 2.5 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.

If a combination of these enhancements reduces the time so that the same two trains now take 30 and 35 minutes respectively, successive southward trains can pass Point A every 65 minutes. The theoretical capacity is increased to 44 trains per day, but the siding spacing remains twenty miles; therefore, the distance between sidings alone does not define capacity. 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 time between sidings.

Some would suggest that the ultimate capacity of a single-tracked line has been reached 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 "yard" 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 every other siding, so that the real capacity is about one-half of the theoretical capacity.

Practical capacity is mostly subjective; it depends upon how much delay a railroad is willing to accept. In the first example above, the operating capacity would be about 16-18 trains per day. In the second example, the operating capacity would be increased to about 20-24 trains per day.

Train Performance Simulations

Train Performance Calculator (TPC) analyses of northward and southward freight trains near the maximum tonnage ratings show that trains slow in many locations between New Orleans and Meridian. (Refer to Table 2-2.) While southern Mississippi is generally considered as being relatively flat, numerous hogbacks exist that have a short one percent

Table 2-2
Capacity Estimates of Existing Configuration Using Simulated Freight Train Times

Mile Middle of Siding SB	Siding	Distance to Next Siding (miles)	Time to next siding (SB, minutes)	Time from next siding (NB, minutes)	Combined time (minutes)	Clearance time (minutes)	Cycle time (minutes)	Capacity Estimate (trains per day)
3.3	Meridian EDT	10.05	0:13:22	0:12:39	0:38:00	0:10:00	0:00:00	
13.35	Basic	16.70	0:22:03	0:21:22	0:43:25	0:10:00	0:53:25	27
30.05	Barnett	20.70	0:27:58	0:28:43	0:56:41	0:10:00	1:06:41	22
50.75	Hawkes	8.65	0:12:00	0:12:23	0:24:23	0:10:00	0:34:23	42
59.4	Shows Field	21.90	0:29:28	0:29:45	0:59:13	0:10:00	1:09:13	21
81.3	Dragon	13.30	0:30:56	0:25:57	0:56:53	0:10:00	1:06:53	22
94.6	Richburg	18.15	0:25:12	0:24:17	0:49:29	0:10:00	0:59:29	24
112.75	Lumberton	18.05	0:24:41	0:26:38	0:51:20	0:10:00	1:01:20	23
130.8	Derby	30.10	0:38:14	0:42:17	1:20:31	0:10:00	1:30:31	16
160.9	Pearl River	8.10	0:15:10	0:15:02	0:30:12	0:10:00	0:40:12	36
169	Woods	12.90	0:19:17	0:17:59	0:37:16	0:10:00	0:47:16	30
181.9	X Tower							

Source: Parsons Transportation Group

grade for a few miles in both directions. (A hogback is a ridge with a narrow elongated crest that can be part of a hill or mountain.) These grades will slow heavy trains to 15-20 mph on the grades, so while the freight trains are allowed to operate at 50-mph maximum speed the average speed is only about 40 mph.

No switching en route or temporary speed restrictions were assumed in the TPC simulations. In the Amtrak video a number of these temporary speed restrictions were in effect. One was at a bridge renewal location and another was over a stretch of track that had just been tamped and had not yet compacted. These conditions further reduce average train speed, so the TPC simulations represent a best-case situation rather than a typical situation.

The current number of trains operating between Meridian and New Orleans is about 16 trains per day. Table 2-2 clearly demonstrates that the capacity to operate these trains exists today; however, the Derby to Pearl River segment is already at capacity and several other segments between Basic and Pearl River are nearing capacity. Before adding more passenger trains, certain improvements are required.

Current Passenger Service

According to the *Crescent's* Timetable, the trip from Meridian to New Orleans takes three hours and fifty-one minutes. (This time closely matches the TPC results.) This time yields an average speed of about 53 mph, inclusive of stops at Laurel, Hattiesburg, Picayune and Slidell. The timetable for the existing Amtrak Crescent is shown in Table 2-3, below. It is the intention of this study to identify improvements to the rail infrastructure to achieve increased average speeds and reduce total trip time for the passenger service while also reducing or eliminating delays for the freights.

Table 2-3
Gulf Coast High Speed Rail Corridor
Running Times for Passenger Trains (Amtrak *Crescent*)
New Orleans to Meridian

Station Stops	Distance	Timetable	Avg. Speed
New Orleans to Slidell	37 miles	55 minutes	40 mph
Slidell to Picayune	18 miles	20 minutes	54 mph
Picayune to Hattiesburg	64 miles	64 minutes	60 mph
Hattiesburg to Laurel	29 miles	31 minutes	56 mph
Laurel to Meridian	56 miles	61 minutes	55 mph
TOTAL	204 miles	231 minutes (3hrs: 51min)	53 mph

Source: Amtrak, 2002.

Compatibility of Existing and Proposed Corridor Operations

Rail freight and passenger services have very different operational characteristics, requirements, and priorities. As long as only one railroad is involved, traffic densities are light, and train speeds are reasonable, most issues can be resolved. However, as train frequency and the number of railroad authorities increase, interaction between the freight and passenger railroad operations becomes more complicated and difficult to mesh. In some cases, dual freight and passenger operations are simply not possible. In fact, Norfolk Southern has a policy that limits passenger train operations to 90 mph on the same track as NS freight operations. Speeds higher than that would require separate dedicated tracks; however, according to the FRA, the final decision lies with DOT. The FRA will not fund additional (dedicated) track.

Regulations and Guidelines

Federal regulations and guidelines govern permissible train operating speeds. Governing factors include track condition (as described by Federal Railroad Administration Track Safety Classification), train control systems, and highway/rail grade crossing characteristics. Corridor planning must be done within the context of these regulations and guidelines.

Physical Conflicts

Physical conflicts between freight and passenger operations include superelevation of curves to support authorized train speeds, the level of maintenance required for high-speed trains vs. heavy freights, and the impact on signal systems created by the difference in speeds between freight and passenger trains.

These potential problems must be identified and considered in the planning to develop a high-speed corridor between Meridian and New Orleans.

Options for Improving Speeds

The track and infrastructure improvement options available to achieve maximum operating speeds of 79 mph wherever possible - and to prepare the route for 90 mph maximums in the future - range from eliminating speed restrictions to increasing line capacity from Meridian to New Orleans. These and other options are discussed below.

Eliminate Speed Limitations

Typically, railroad speed restrictions - an operating speed less than the maximum permissible for a line segment - fall into one of these general categories:

- Governmental Ordinances

  Where railroad policies restrict speeds in accordance with municipal or county ordinances, these policies can be periodically reviewed and amended. Improvements to grade crossings in urban areas can help to increase train speeds. It is up to the railroad to keep abreast of improved grade crossings that will permit higher speeds.

- Turnouts/Crossovers

  Turnouts (track switches which divert a train from one track to another) are rated according to the angle of divergence. A No. 10 turnout is of such an angle that a train diverging from the main line to the siding can proceed through the turnout at approximately 20-mph. A No. 15 turnout allows a train speed of 35-mph and a No. 20 turnout allows a train speed of approximately 40-mph for freights and 65-mph for passenger trains.

- Curvature

  Straightening or lessening of curvature accomplished where possible without requiring major cuts or fills would reduce the number of speed restrictions. Increasing the super-elevation (i.e., spiral or degree of banking) can also increase speeds through curves.

- Miscellaneous (yard limits, crossings of other railroads, bridges, etc.)

  Where train speeds are restricted because of structural inadequacies, they can be improved through structural upgrades, though these could often prove to be extremely costly.

While restrictions in all of these categories exist on the subject route, the most prevalent are due to curvature.

Increase Line Capacity

Capacity considerations are important to the freight operations, as it is generally the case that freight trains pull into sidings to allow passenger trains to pass. This naturally results in delays to the freight train because of the reduced speeds of the turnouts, the need to manually realign switches, waiting for the *Crescent* to pass, and simply stopping and re-starting the tonnage-laden freights.

For these reasons, the distance between passing sidings, the time it takes to go from siding to siding, the length of the siding, and the type of switches (manual or automated) are key elements determining the capacity of a line segment. Further, in the future, if additional passenger service is added to the segment, passenger trains will have to meet one another, so line capacity will become a concern of the passenger service as well.

A point to remember is that the number of meets on a single track increases as the square of the number of trains operated. If the number of trains doubles, the number of meets would be four times greater, not merely double. Consequently, increasing the number of passenger trains on a single track can have major capacity consequences, if mitigating improvements such as Centralized Train Control (CTC) are not implemented in connection with the increase of trains.

Implement Centralized Train Control (CTC)

Centralized Train Control allows the train dispatcher to remotely direct trains into and out of passing sidings. With a CTC system it is possible for opposing trains to have running meets, with neither train coming to a complete stop if the passing siding is long enough. This requires automated switches and long sidings.

Install Higher Speed Turnouts

CTC requires the installation of switches remotely controlled by the train dispatcher. Furthermore, as the sidings are upgraded, the higher-speed turnouts cannot be thrown by hand.

Extend Existing Short Passing Sidings

Long sidings accommodate longer freight trains, enable trains to enter the siding at higher speed, and may allow "running" meets where neither train has to stop. A cost effective way to create longer sidings is to identify short sidings (i.e. one mile) that can be significantly lengthened to two miles.

Install New Long Sidings

Where an analysis of train operations indicates that a new siding is needed, it should be constructed with CTC operations in mind, be constructed with high-speed turnouts and be long enough (i.e., at least two-miles) to support the proposed train operations.

The combined effect of improving track, straightening curves, installing higher speed turnouts and longer sidings should improve overall average train speeds and increase the capacity of the system.

Route Analysis

The analysis of the Meridian to New Orleans segment began with a review of the track charts, timetables, USGS quadrangle maps, aerial photography, and field reconnaissance, including a video provided by Amtrak and a Hi-Rail inspection of the track courtesy of Norfolk Southern. The analyses focused on identifying general improvements related to speed restrictions (curves), capacity enhancements associated with the installation of CTC, and specific capacity or speed constraints on this NS route.

Curvature Analysis

Straight track is referred to as "tangent," while curves are measured in degrees. Wherever possible, main lines try not to exceed curves of one to two degrees; however, in some settings, such as the rolling hill country between Meridian and Picayune, Mississippi, some curves greater than two degrees are inevitable.

Curves present both safety and passenger comfort issues. The speed at which a passenger train may negotiate a curve without causing discomfort to passengers or climbing off the track is determined by two things: (1) the sharpness of the curve and (2) the amount of spiral or "superelevation." Superelevation means raising the outer rail on a curve to compensate for the effect of centrifugal force. This tips the cars inward and is similar to the "banking" on a highway. Superelevation is often referred to as "tilt" or "cant."

One of the principal reasons for superelevating curves, in addition to enabling trains to safely operate at proposed trains speeds, is to ensure passenger comfort. Superelevating a curve both increases the maximum safe speed and enhances rider comfort. The maximum superelevation or "banking" ordinarily used on a standard-gauge line carrying general traffic is six inches.

Six inches of superelevation fully compensates for centrifugal force at about 45 mph on a five-degree curve. According to current FRA regulations, operation at speeds resulting in an outward force greater than that compensated for by the "cant" equivalent to four or five inches may be allowed. This is the maximum "cant deficiency" (i.e., non-existent super-elevation or "unbalance") that is permitted in setting speed limits without a waiver.

Under most freight traffic situations, railroads will limit cant deficiency to a lower figure because larger amounts of unbalanced superelevation can produce higher maintenance costs. (If heavy trains run curves at much less than the speed for which they are

The TPC calculations were used to establish the travel time between sidings. The installation of CTC will minimize the delay caused when a train must enter a siding. Our evaluation of corridor operations confirms earlier recommendations made by others to replace the existing signal system with a CTC system, including power-operated turnouts at the end of each passing siding. The recommended arrangement of sidings, including the practical capacity that would result from the improvements, is shown in Table 2-5.

The proposed configuration features new long sidings at Heidelberg, Moselle and Carriere and extended sidings at Barnett, Lumberton, and Pearl River.

Centralized Traffic Control (CTC)

Installation of CTC would cost in excess of $60 million (all costs in this report are year 2001 dollars) and would be installed in phases over the course of several years. The analysis has been directed towards the maximization of the benefit to be derived from the initial short-term investments in the corridor. To that end it is essential that the first CTC segment coincide with the siding improvements that will enhance capacity in the most restrictive single-track segment of the corridor.

Consequently, it is recommended that CTC initially be installed between the South End of the existing Lumberton Siding (NO 113.4) and the North End of the existing Picayune Siding (NO 148.9). This will coincide with the improvements described below for the Derby to Pearl River segment of the corridor. The length represents a reasonable first investment.

Table 2-4
Capacity Estimates of Proposed Configuration Using Simulated Freight Train Times

Mile	Siding	Distance to Next Siding (miles)	Time to next siding (minutes)	Time from next siding (minutes)	Combined time (minutes)	Clearance time (minutes)	Cycle time (minutes)	Capacity Estimate (trains per day)
3.3	South Meridian	10.05	0:13:21	0:12:38	0:25:59	0:08:00	0:33:59	
13.35	Basic	16.20	0:21:24	0:20:45	0:42:09	0:08:00	0:50:09	29
29.55	Barnett (extend)	11.10	0:16:33	0:16:10	0:32:44	0:08:00	0:40:44	35
40.65	Heidelberg (new)	10.10	0:12:10	0:13:08	0:25:19	0:08:00	0:33:19	43
50.75	Hawkes	8.65	0:12:01	0:12:24	0:24:25	0:08:00	0:32:25	44
59.4	Shows Field	12.20	0:17:41	0:16:24	0:34:06	0:08:00	0:42:06	34
71.6	Moselle (new)	9.70	0:11:47	0:13:21	0:25:08	0:08:00	0:33:08	43
81.3	Dragon	13.30	0:24:05	0:22:11	0:46:16	0:08:00	0:54:16	27
94.6	Richburg	17.30	0:24:12	0:23:12	0:47:24	0:08:00	0:55:24	26
111.9	Lumberton (extend)	18.30	0:25:04	0:26:57	0:52:01	0:08:00	1:00:01	24
130.2	Derby	13.30	0:17:07	0:19:02	0:36:09	0:08:00	0:44:09	33
143.5	Carriere (new)	17.90	0:22:41	0:24:45	0:47:26	0:08:00	0:55:26	26
161.4	Pearl River (extend)	7.60	0:12:30	0:12:08	0:24:38	0:08:00	0:32:38	44
169	Woods	12.90	0:18:42	0:20:31	0:39:13	0:08:00	0:47:13	30
181.9	X Tower	-						

Source: Parsons Transportation Group

Potential Improvements Between Derby and Pearl River

The capacity between Derby and Pearl River (Table 2-2) is 16 trains per day. In emergency situations time consuming meets can be made at Picayune, but numerous grade crossings in Picayune make this an undesirable location to hold a freight train on a siding.

A new Carriere Siding (MP 142.5 – MP 144.5) would eliminate the problem of long trains on the Picayune Siding blocking the crossings and would serve to equalize the segment capacities between Derby and Pearl River. The siding would result in a capacity of 33 trains per day between Derby and Carriere, and 26 trains per day between Carriere and Pearl River. The imbalance in capacity between Derby and Pearl River indicates that the new Carriere Siding is located somewhat too far north to ideally equalize the time between sidings. Initially, it was anticipated that the siding could be located between mileposts 144 and 146, however it was moved northward to avoid constructing an overpass for US Route 11 (NO 144.9).

To optimize the utilization of this enhanced capacity it is recommended that the Derby Siding be upgraded and be included in the initial stretch of CTC that is subsequently recommended. The turnouts at the end of the sidings would be replaced with number 20 turnouts. Ultimately, in the long term the north end of Derby would be extended northward 1.1 miles, but initially it is advisable to upgrade the existing siding.

Pearl River Siding would be extended southward as a long-term improvement.

Potential Improvements Between Barnett and Hawkes

The current Barnett siding is only 6,080 feet long. In an earlier analysis, a southward coal train, which operating at its authorized speed of 50 mph, was slowed to 19 mph on a major hogback at Vossburg (MP 36.1). The combined northward and southward times for an intermodal train is 56.7 minutes, or nearly an hour. That would suggest that in a situation in which trains are meeting at every siding a southward train could pass Barnett each hour, however, that should not be the real-world situation.

Experience indicates that a reasonable assumption would be that the real capacity between these two sidings is 50 percent of the theoretical capacity, or 22 trains per day. However this analysis is based on an assumption that all trains will fit into Barnett Siding. It is known that all trains cannot fit but the percentage of trains that cannot fit is not known. All that can be said is that the capacity for this segment is probably overstated and the actual capacity might be as low as 20 trains per day.

It is recommended that Barnett Siding be extended one mile north to increase its length to in excess of 11,000 feet. The revised Siding would extend between MP 28.4 and MP 30.7. The longer siding would allow longer trains to clear the main track.

Special Projects

The route analysis uncovered a number of special problems that contribute to delays or speed reductions on the route. These problems range from speed restrictions through towns, bridge structures, and interlocked at-grade crossings with other railroads. These special projects are identified in Figure 2-3 on the following page and briefly described below.

<u>Speed Restrictions in Laurel, Mississippi and Slidell, Louisiana</u>

In numerous locations, speed restrictions are the result of concerns for safety at grade crossings and, as a result, the speed of trains has been reduced to limit the risk. The grade crossing programs in Louisiana and Mississippi are working to eliminate as many crossings as possible and make the remaining crossings safer. The closing of grade crossings in Laurel, Mississippi and Slidell, Louisiana offer the opportunity to raise speeds through these towns. In Laurel, three crossings have been closed and others are being upgraded. In Slidell, two crossings have been eliminated. Consultation with the municipalities should seek to raise train speeds.

In general, however, our initial field work shows a significant number of unprotected crossings remain along the route. This corridor could benefit from a comprehensive review of corridor crossings, an analysis of pedestrian and vehicular traffic, and potential use of quadrant gating and median barriers as crossing safety enhancements. A closed corridor grade crossing analysis of the corridor is highly recommended.

<u>Pearl River, Lake Pontchartrain, and Seabrook Drawbridges</u>

The speed over all three of these drawbridges is currently 40 mph; however, in 1992, the speed over the Pearl River and Seabrook drawbridges was 45 mph. The speed over the Lake Pontchartrain trestle was only 30 mph at that time, but the entire causeway has since been replaced. Significant time reductions for passenger trains can be achieved by increasing the speed to 60 mph over these bridges.

Both the Lake Pontchartrain and Seabrook contain sections of drawbridges. On moveable bridges the rails cannot be continuous, they must have a gap, which is provided by devices called mitre rails. Mitre rails have two purposes: (1) to serve as expansion joints between the bridge and the fixed track on either side and (2) to allow the bridge to

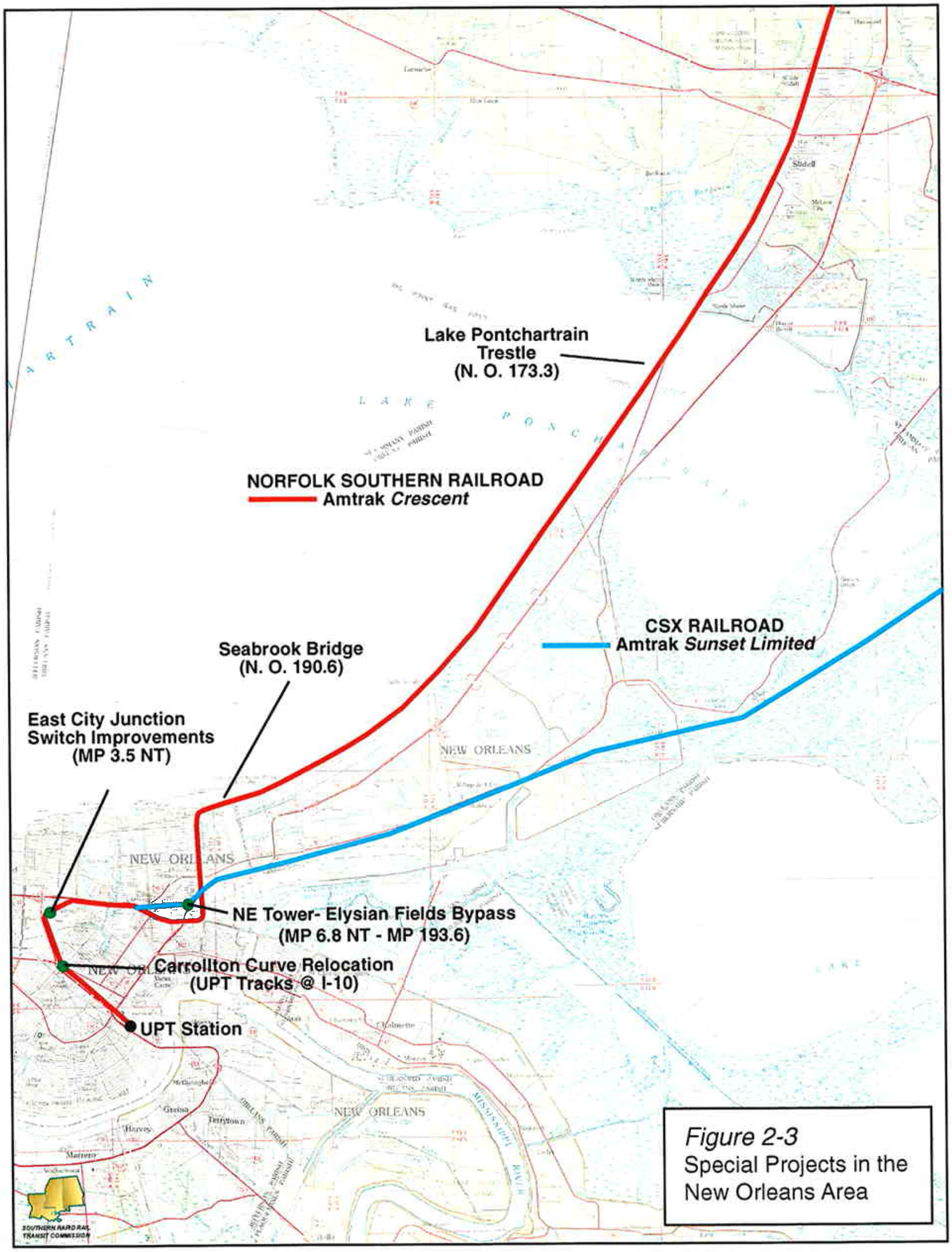


Figure 2-3
Special Projects in the New Orleans Area

be moved laterally or lifted. Because of the needed gap, mitre rails are susceptible to incessant pounding, similar to that received at crossing "frogs" as wheels jump the gap. For this reason, most railroads restrict the speed over drawbridges to protect both the mitre rails and the bridge structure itself.

There is wide disagreement over what is a safe speed over mitre rails. Lake Pontchartrain is unique because it consists of a nearly six-mile long trestle with a lift bridge near the north end of the trestle. Whatever speed is placed on the lift bridge is most likely applied to the entire bridge.

A review with Norfolk Southern of safe operating speeds on these bridges may yield significant trip time reductions. (It has been suggested that "Conley Joints" would allow 70 mph with steel crossties.)

Intersection with CSX Railroad at NE Tower to Oliver Junction

The existing southbound route for Amtrak passenger trains and NS freight trains as they approach New Orleans is as follows:

- NS NO District Main Line over the at grade intersection with CSX at NE Tower to Oliver Junction,
- Oliver Junction to Terminal Junction (NT 7.7),
- Terminal Junction through Elysian Fields (NT 7.0) and Frenchmen Street (NT 6.7) to East City Junction (NT 3.6), and
- East City Junction to New Orleans Union Passenger Terminal (NOUPT).

The southbound move between Oliver and Terminal Junctions is essentially a right angle turn, restricted to 15 mph. The move is slow. A review of a recent Amtrak video from the northbound Crescent reveals that a northward Amtrak train takes four minutes and five seconds to cover the approximately 1.3 miles between the CSX crossing at NE Tower to the CSX switch in Track 1 at Elysian Fields. The average speed is less than 19 miles per hour. Evaluations indicate that the time can be cut in half.

Presently, Amtrak passenger trains and NS freight trains heading north on the NS New Orleans Terminal (NT) District from Elysian Fields make a left hand turn on a single tracked wye starting at Terminal Junction that connects the NT and the NO Lines at Oliver Junction. The degree of curve as measured from USGS maps and aerial photos appears to be about ten degrees. A clever arrangement of spring switches allows nonstop moves in both directions at Terminal Junction.

CSX trains moving from the NS Back Belt (the New Orleans Terminal District) to Gentilly Yard (located east of the rail crossing at NE Tower) diverge at Elysian Fields. The CSX route between Elysian Fields and NE Tower forms the hypotenuse (is the direct route) between the two legs NS of the NS route and is 0.92 miles in length.

If a curve were built at NE to a new NS track parallel to the north side of the two CSX tracks, and if an average speed of 30 mph could be achieved, an Amtrak passenger train would save over two minutes. A connection at NE Tower having a curvature of about 8.8 degrees would appear not to encroach on the bridge piers supporting I-10 over the NS line. The connection would require construction of a bridge over the drainage ditch paralleling the NS NO line. A turnout would be constructed at Elysian Fields to connect the track would to the NT line.

<u>NOUPT/Carrollton Curve</u>

The number-ten turnout at Carrollton Avenue Junction greatly impacts the transit time between NOUPT and East City Junction by requiring a speed of 15 mph. Several alternatives to increase the speed to 40 mph for this route were evaluated.

The preferred option is to place a right-hand number-twenty turnout good for 40 mph about 600 feet south of the Carrollton Avenue Bridge. The East City line would then use the east bay that today has abandoned track on it. Doing that will gain sufficient tangent length to allow an installation of a five-degree curve that can be operated around at 40 mph with 2.75 inches of superelevation and 2.85 inches unbalanced elevation.

Therefore the assumed curve should be able to be constructed and operated at 40 mph. The very same length curve with 186-foot spirals and 3 inches superelevation is also feasible. The curvature increases to 5.12 degrees, and the unbalanced superelevation decreases slightly to 2.73 inches. Since the degree of curve has increased, a support pier of the elevated overpass above the tracks becomes more of a problem. The offset Y would increase to 3.45 feet, which is very close to the minimum allowed; therefore, the five-degree curve is preferred even with the greater unbalanced superelevation.

<u>East City Junction</u>

The turnout at East City Junction from the Norfolk Southern mainline onto the Union Passenger Terminal (UPT) tracks is limited to 15 mph. While the switch is a true Number 20 powered switch, the switch points are not of the correct length, thus limiting both converging and diverging moves to 15 mph. Reworking the turnout should allow NS to adjust the maximum timetable speed upward.

Interlocking with Kansas City Southern Railroad in Meridian

The Kansas City Southern and Norfolk Southern Railroads have yards adjacent to each other in Meridian. Both yards are on the southern side of the tracks as they pass through town, but the KCS tracks are north of the NS tracks. This causes the KCS trains to cross the NS tracks as the trains are made up or as they pass through Meridian. The NS track charts indicate three crossings with the KCS in Meridian. The upshot of these entanglements is slow speeds and delays. A comprehensive solution to this "Gordian Knot" is discussed in Chapter 5.

Recommendations

After extensive analysis of Train Performance Calculations (TPC), Norfolk Southern track charts, Amtrak videos, field inspections, and discussions with Federal Railroad Administration, Norfolk Southern, and Amtrak representatives, a comprehensive and coordinated approach to implementing high-speed rail service in the New Orleans to Meridian corridor has been advanced by the Consultant Team. The projects recommended in this memo are designed to either eliminate conditions that require trains to slow down or upgrade the operating system to allow generally higher speeds throughout the corridor.

The underlying principle shaping the Consultants' recommendations is that, in the long run, high-speed passenger service in this corridor can only be achieved within the context of a Centralized Train Control (CTC) system (i.e., remotely directed, computerized, powered switching). Consequently, all individual project recommendations are intended to be compatible with or directly advance CTC in this corridor. This is to ensure that improvements made in the short term are not abandoned or replaced (with added costs) in the near future as CTC is implemented.

There are two general categories of improvements recommended in this report: (1) speed adjustments to existing main line track segments and (2) improvements to sidings. Speed adjustments can refer to a number of different types of structural or non-structural projects, from straightening out (or super-elevating) curves and grades to upgrading structures (bridges or trestles), to merely updating the Timetable to account for grade crossing safety improvements made by others (e.g., state departments of transportation).

Improvements to sidings refers to upgrading individual sidings as well as addressing the entire system of sidings within a given corridor. On a single-track main line, sidings allow the meeting and passing of opposing and overtaking trains. The optimal spacing between sidings is a function of topography, operating speeds, and train frequency. There is no absolute standard (i.e., intervals in miles and running time between adjacent sidings) for the spacing of sidings; however, optimum spacing in a corridor can be (and was) determined using running times from the TPC. In general, frequent, long passing sidings increase track capacity. Longer individual sidings would accommodate longer freight trains and/or allow "running" meets where neither train has to stop. The objective is to provide the minimum number of sidings of the proper size to support the anticipated type and level of traffic in the corridor. This report recommends improving sidings in three ways:

- Upgrade well-located existing sidings of the proper length (around 11,000 LF) for CTC (install No. 20 powered switches) at:
    - Basic
    - Hawkes
    - Shows Field
    - Dragon
    - Richburg
    - Woods
- Extend well-located, but short, existing sidings and upgrade them for CTC at:
    - Barnett
    - Lumberton
    - Derby
    - Pearl River
- Add new long sidings in strategic locations and install CTC at:
    - Heidelberg
    - Moselle
    - Carriere

These improvements are listed in Table 2-6 and shown in Figure 2-4 on the following page. In all, improvements are recommended for the existing twelve sidings between Meridian and New Orleans, plus two new sidings in Carriere and Moselle, and a rebuilt siding at Heidelberg.

Speed adjustments are recommended in the cities of Laurel and Slidell, as well as the Lake Pontchartrain, Seabrook, and Pearl River bridges. The bridge recommendations require further engineering analysis. The NOUPT/Carrollton Curve improvement is the most significant speed adjustment.

The costs associated with implementing CTC total nearly $64 million - more than half of total project costs of $113.6 million - and largely reflect the cost to install No. 20 powered switches and upgrade the ABS system.

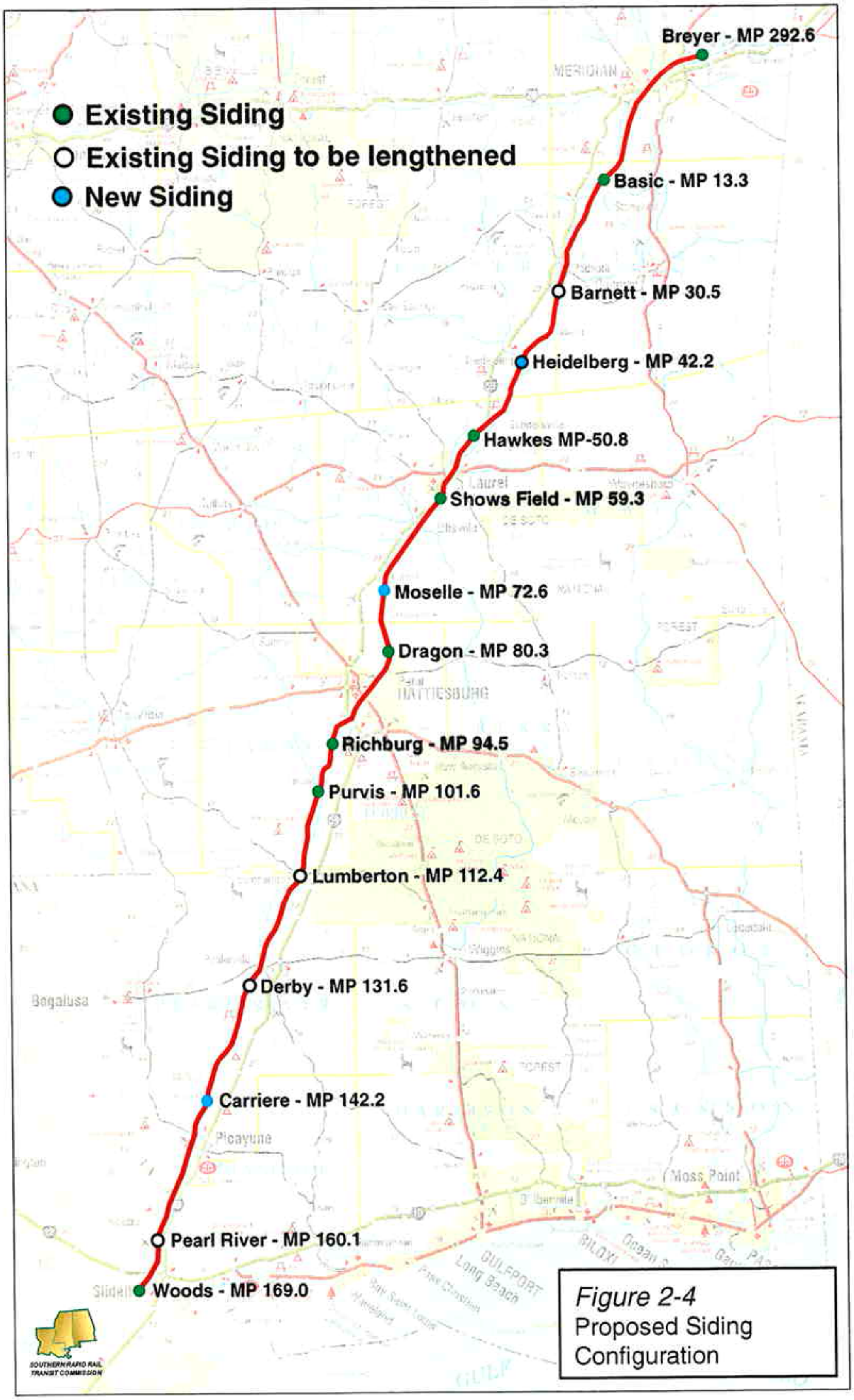


Figure 2-4
Proposed Siding Configuration

Table 2-5
Summary of Short and Long Term Project Recommendations

Initial Funding			
Project		**Cost $MM**	**Time Savings**
Barnett	Extend Barnett Siding	$2.94	0:00:00
CTC Installation	Initial	$10.38	0:00:00
Derby	Upgrade Derby Siding	$2.29	0:00:00
Carriere	Construct Carriere Siding	$3.75	0:00:45
East City Jct	Adjust Speeds: SE 191.1 - NE East City Jct	$1.03	0:00:28
NOUPT	NE East City Jct to NO Terminal	$3.23	0:02:18
Total		**$23.61**	**0:03:31**
Long-term Funding			
Project		**Cost $MM**	**Time Savings**
Meridian	Meridian Upgrades	$4.12	0:00:04
Basic	Upgrade Basic Siding	$1.91	0:01:24
Barnett Long	Upgrade Barnett Siding	$1.16	0:00:00
Heidelberg	Extend Heidelberg Siding	$2.86	0:01:20
Hawkes	Upgrade Hawkes Siding	$2.18	0:00:11
Laurel	Reduce Speed Restrictions	$0.00	0:02:13
Shows Field	Upgrade Shows Field Siding	$1.69	0:02:34
Moselle	Construct Moselle Siding	$6.22	0:01:20
Dragon	Upgrade Dragon Siding	$1.68	0:00:27
Richburg	Upgrade Richburg Siding	$3.02	0:01:42
Lumberton	Extend Lumberton Siding	$5.67	0:01:07
Derby Long	Extend Derby Siding	$2.00	0:01:13
Pearl River	Extend Pearl River Siding	$3.30	0:02:01
Slidell	Adjust Speeds: Slidell	$0.00	0:02:21
Woods	Upgrade Woods Siding	$1.54	0:01:42
Lake Pontchartrain	Adjust Speeds: Lake Pontchartrain	*t.b.d.*	0:03:20
Seabrook Drawbridge	Adjust Speeds: Seabrook Drawbridge	*t.b.d.*	0:01:05
New Connection	NE Tower - Elysian Fields	*t.b.d*	0:02:00
CTC Installation	Final	$53.68	0:00:00
Total		**$91.03**	**0:26:04**
	TOTALS	**$114.64**	**0:29:35**

Source: Parsons Transportation Group, 2002.

3. Immediate and Short Term Program of Improvements

SOUTHERN RAPID RAIL TRANSIT COMMISSION

Short-Term Program of Improvements

Based on the analyses presented in the previous chapter, the Consultants recommend a number of structural improvements to the Meridian to New Orleans Corridor in the immediate future to support high-speed rail and the more efficient movement of freight. These improvements by themselves will not achieve high-speed passenger service, but they are a necessary prelude to such operations.

In general, the proposed improvements are of two types: (1) track improvements that permit higher operating speeds for the passenger service and (2) capacity improvements that will prevent the existing freight service from being negatively impacted by the faster-moving and, perhaps in the future, more frequent passenger trains.

The most significant capacity improvement recommendation is the introduction of Centralized Train Control (CTC) throughout the corridor. CTC currently exists on the NS route east of Meridian into Alabama and beyond, but is absent from Meridian until the rail line approaches Oliver Yard in New Orleans. Our analysis suggests CTC should be installed in logical segments, starting with the segment extending from south of Lumberton to north of Picayune. CTC, including cab signals if passenger train speeds are to exceed 79 mph, is absolutely imperative in an environment where high-speed passenger trains are operating on the same tracks as slow-moving freights. CTC allows trains to move through turnouts without having to stop to set the switches. Powered No. 20 switches and longer sidings may also permit running meets, which will reduce delays for all trains operating in the system. Cab signals are a safety enhancement required by the FRA on rail lines where the maximum authorized speed will exceed 79 mph.

Track Improvements

The most pressing areas for immediate track improvements are in the New Orleans area approaches to the Union Passenger Terminal. Our analysis indicates the following projects would yield immediate benefits to the operation of Amtrak trains:

1. Upgrade the track alignment between East City Junction and the north end of the New Orleans Union Passenger Terminal (NOUPT) to eliminate restricted speed operations in this four-mile segment of the corridor.

2. Upgrade the turnouts at East City Junction to eliminate the existing slow-speed passenger train moves at this location.

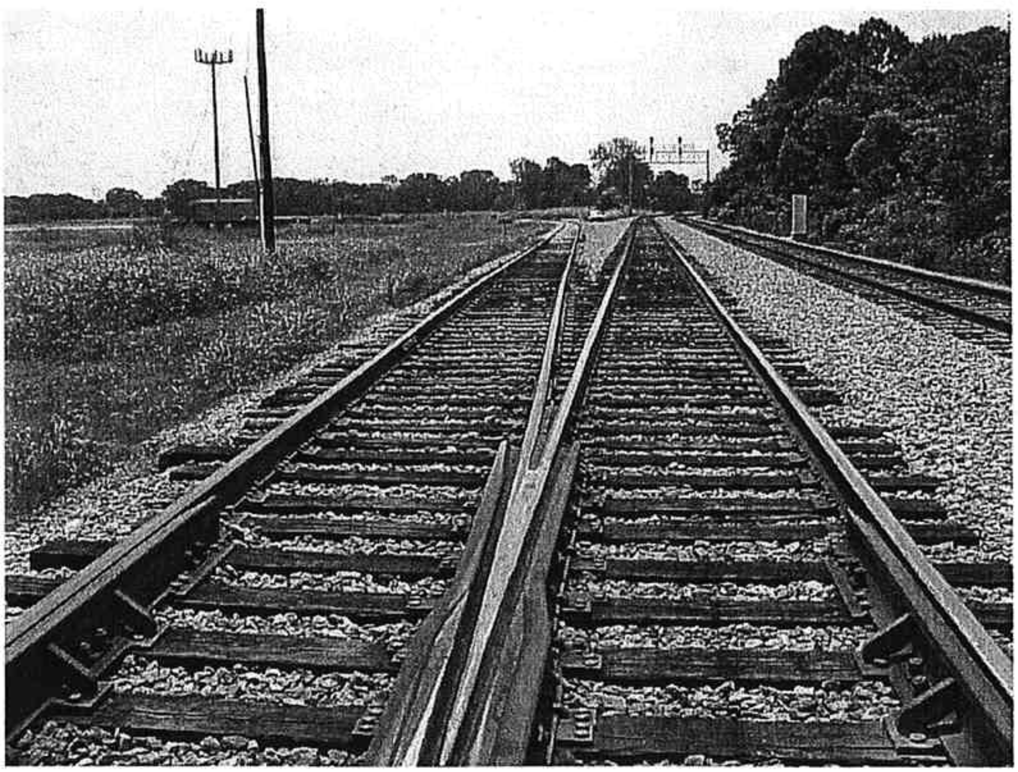
UPT/Carrollton Curve

Moving the junction toward the UPT can increase the timetable speed through the Carrollton Junction. This would be accomplished by placing a right-hand number-twenty turnout good for 40 mph about 600 feet south of the Carrollton Avenue Bridge. The East City line would then use the east bay that today has abandoned track on it. This improvement will gain sufficient tangent length to allow an installation of a five-degree curve that can be operated around at 40 mph. Refer to Figure 3-1 on the following page.

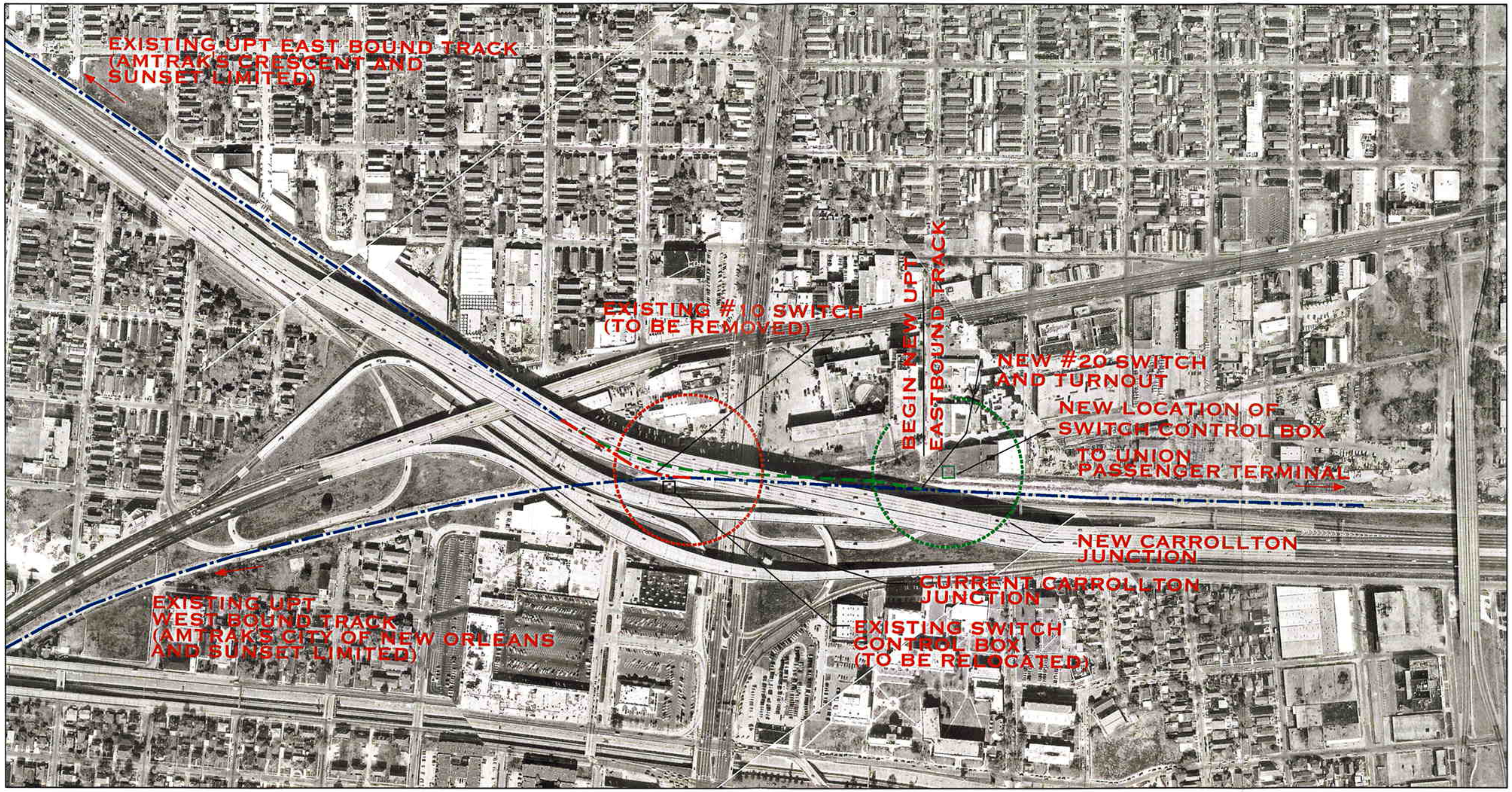
East City Junction

The turnout at East City Junction from the Norfolk Southern mainline onto the Union Passenger Terminal (UPT) tracks is limited to 15 mph. While the switch is a true Number 20 powered switch, the switch points are not of the correct length, thus limiting both converging and diverging moves to 15 mph. Reworking the turnout should allow NS to adjust the maximum timetable speed upward. Refer to Figure 3-2 below.

Figure 3-2
Looking south on the NS line at the No. #20 Switch at East City Junction, the Entry Point to the NOUPT (left)



Source: Burk-Kleinpeter, Inc., June 2002.



LEGEND

EXISTING UPT MAINLINE TRACK	— · — · — (blue)
PROPOSED UPT EASTBOUND MAINLINE TRACK	— — — — (green)
EXISTING MAINLINE TRACK (TO BE REMOVED)	— · — · — (red)

N

0 200 400
FEET

FIGURE 3-1

UPT IMPROVEMENTS

(RELOCATION OF CARROLLTON JUNCTION)

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Capacity Enhancements

Capacity enhancements will be developed within the context of a Centralized Train Control system ultimately extending from Meridian to New Orleans. As previously discussed, installation of CTC would cost in excess of $60 million and would be installed in phases over the course of several years. Installing CTC basically consists of upgrading the interlockings (powered switches), installing Automated Block Signals (including cab signals if train speeds in excess of 79 mph are anticipated), the installation of electric locks on turnouts that would not be CTC-controlled, and repositioning wayside signals.

Our analysis has been directed towards the maximization of the benefit to be derived from the initial short-term investments in the corridor. To that end it is essential that the first CTC segment coincide with the siding improvements that will enhance capacity in the most restrictive single-track segment of the corridor, that being the Derby to Pearl River segment. It is therefore recommended that CTC initially be installed between the south end of the existing Lumberton Siding (NO 113.4) and the North End of the existing Picayune Siding (NO 148.9). This 35.5-mile length represents a reasonable first investment in CTC.

The following recommendations represent the highest priority, short-term CTC improvements for the Meridian to New Orleans corridor:

1. Install CTC between South End of the existing Lumberton Siding (NO 113.4) and the North End of the existing Picayune Siding (NO 148.9) as a first step in installing CTC for the entire length between Meridian and New Orleans. This area is chosen because it is illogical to build a new siding at Carriere and upgrade the siding at Derby without power switches.

2. Extend Barnett Siding to eliminate the constraint between Basic and Hawkes Sidings resulting from the present 6,080-foot length of the Barnett Siding. Temporarily, until CTC is installed in a later phase, a spring switch should be installed at the north end of the extended siding.

3. Replace the Picayune Siding with a new Carriere Siding with CTC to enhance capacity between Derby and Pearl River.

New Carriere Siding (MP 142.5 – MP 144.5)

The capacity between Derby and Pearl River has been shown to be 16 trains per day. In emergency situations, time consuming meets can be made at Picayune, but as previously mentioned, the grade crossing issue makes this an undesirable alternative. A new siding at Carriere would eliminate the problem of long trains on the Picayune Siding blocking the crossings and would serve to equalize the segment capacities between Derby and Pearl River. Construction of the Carriere Siding would result in a capacity of 33 trains per day between Derby and Carriere, and 26 trains per day between Carriere and Pearl River. The imbalance in capacity between Derby and Pearl River indicates that the new Carriere Siding is located somewhat too far north to ideally equalize the time between sidings, but it was the only reasonable option. The proposed new siding is shown in Figures 3-3A, 3B, and 3C on the following pages.

To optimize the utilization of this enhanced capacity it is recommended that the **Derby Siding** be upgraded and included in the initial stretch of CTC. The turnouts at the end of the Derby Siding would be replaced with No. 20 turnouts. Ultimately, in the long-term the north end of Derby Siding would be extended northward about 1.1 miles, but initially it is advisable to merely upgrade the existing siding for CTC.

LEGEND

EXISTING NORFOLK SOUTHERN R.O.W.	-··-··-··- (red)
EXISTING MAINLINE TRACK	—·—·— (blue)
EXISTING SIDING	------------ (black)
PROPOSED SIDING	— — — — (green)
MILEPOST (REFERENCES DISTANCE FROM MERIDIAN, MS.)	136

N

FIGURE 3-3A
NEW CARRIERE SIDING
(IN PEARL RIVER COUNTY, MS. BETWEEN OZONA AND CARRIERE)

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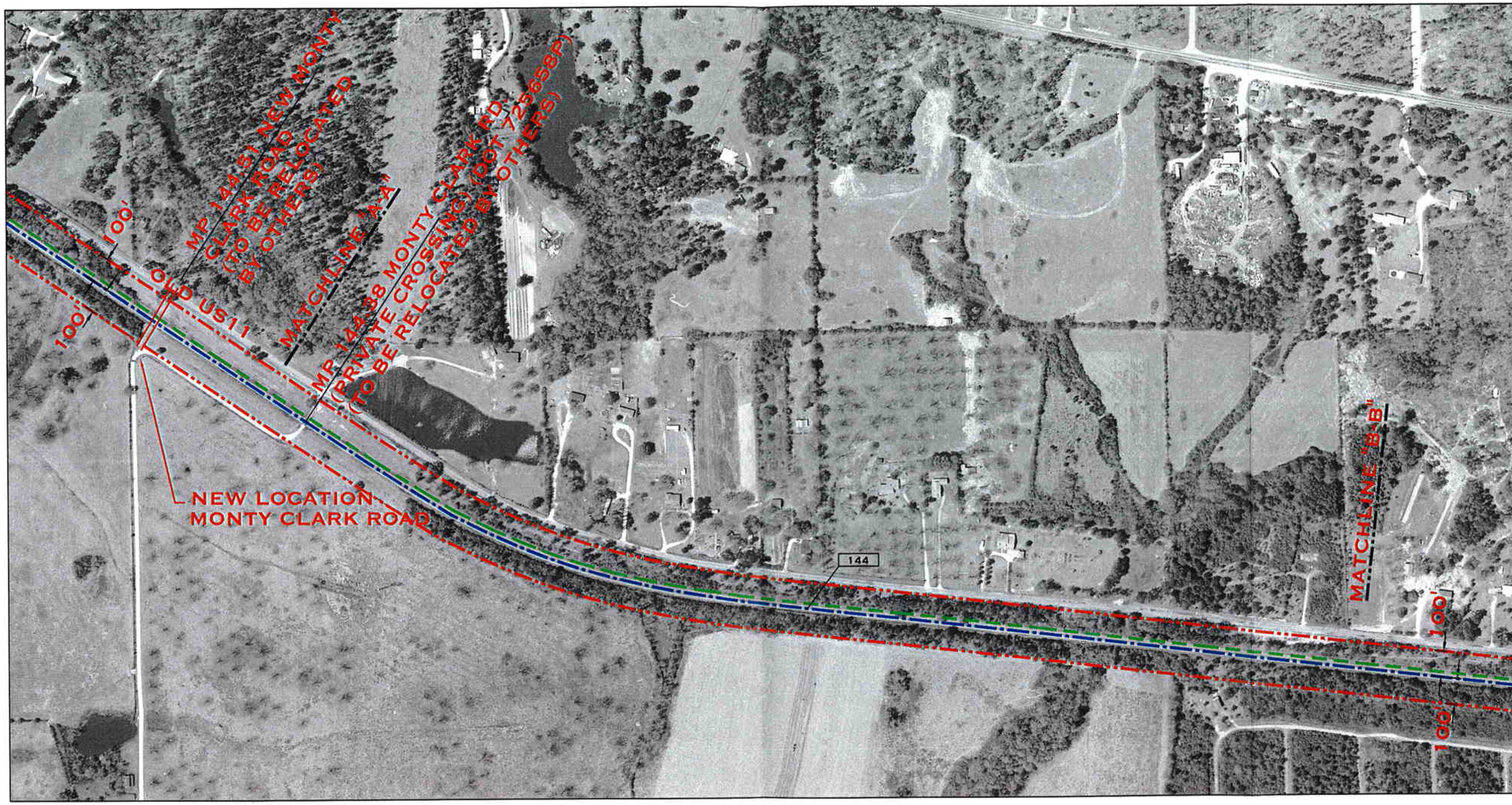

LEGEND

EXISTING NORFOLK SOUTHERN R.O.W.	red dash-dot-dot line
EXISTING MAINLINE TRACK	blue dash-dot line
EXISTING SIDING	black dotted line
PROPOSED SIDING	green dashed line
MILEPOST (REFERENCES DISTANCE FROM MERIDIAN, MS.)	136

N

FIGURE 3-3B
NEW CARRIERE SIDING
(IN PEARL RIVER COUNTY, MS. BETWEEN OZONA AND CARRIERE)

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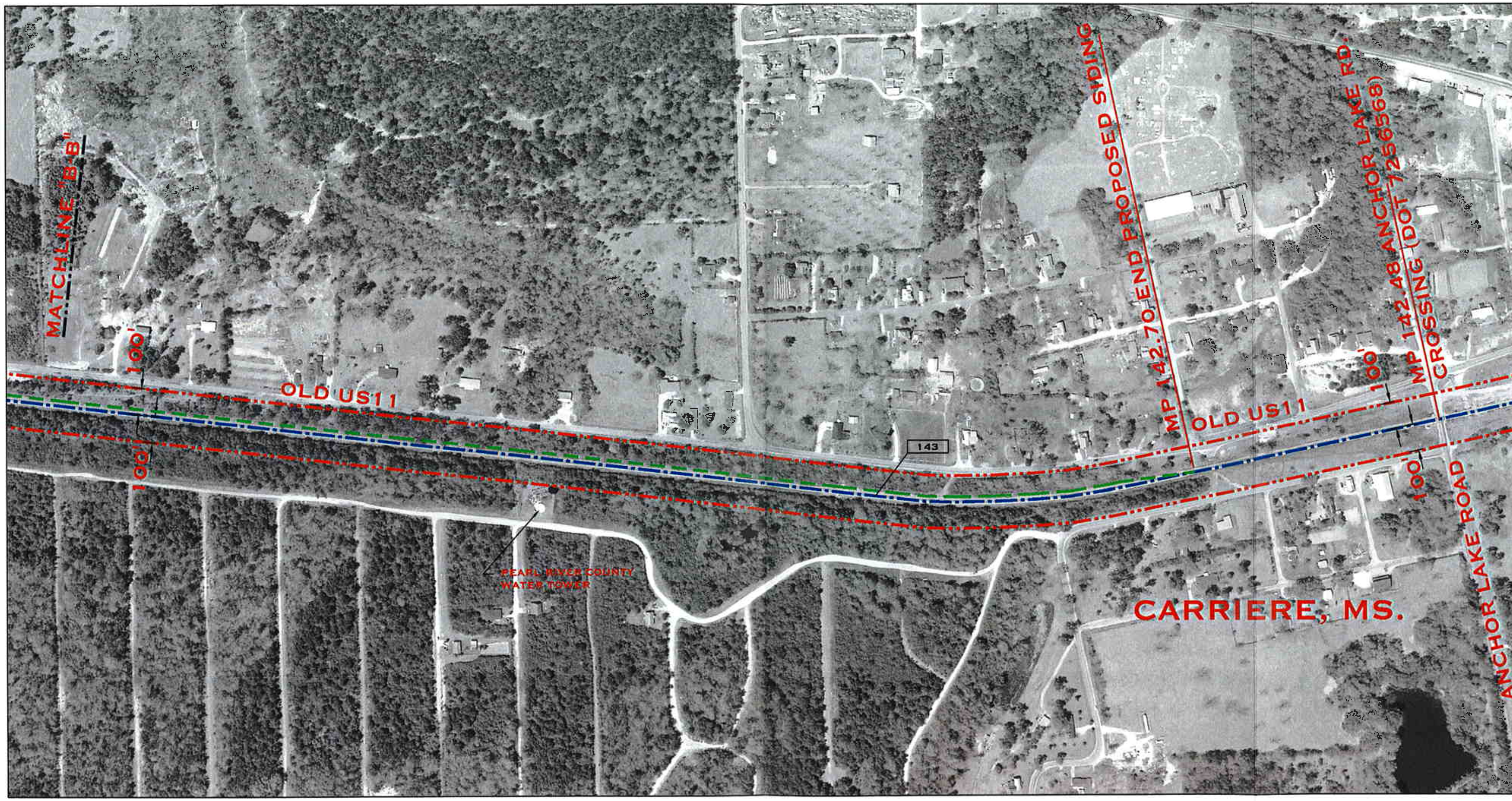

LEGEND

EXISTING NORFOLK SOUTHERN R.O.W.	—··—··—··—
EXISTING MAINLINE TRACK	—·—·—
EXISTING SIDING	··················
PROPOSED SIDING	— — — —
MILEPOST (REFERENCES DISTANCE FROM MERIDIAN, MS.)	136

FIGURE 3-3C
NEW CARRIERE SIDING
(IN PEARL RIVER COUNTY, MS. BETWEEN OZONA AND CARRIERE)

N

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Barnett Siding (NO 29.4 – 30.7)

The current Barnett siding is only 6,080 feet long. It is recommended that it be extended one mile north to increase its length in excess of 11,000 feet. The lengthened siding would extend between MP 28.4 and MP 30.7, as shown in Figures 3-4A and 3-4B on the following pages. The longer siding would allow longer trains to clear the main track.

LEGEND

EXISTING NORFOLK SOUTHERN R.O.W.

EXISTING MAINLINE TRACK

EXISTING SIDING

PROPOSED SIDING

MILEPOST (REFERENCES DISTANCE FROM MERIDIAN, MS.) 136

N 0 200 400 FEET

FIGURE 3-4A

BARNETT SIDING EXTENSION

(IN CLARKE COUNTY, MS. BETWEEN PACHUTA AND BARNETT)

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LEGEND

EXISTING NORFOLK SOUTHERN R.O.W.	-··-··-··- (red)
EXISTING MAINLINE TRACK	-·-·-·- (blue)
EXISTING SIDING	··········
PROPOSED SIDING	— — — — (green)
MILEPOST (REFERENCES DISTANCE FROM MERIDIAN, MS.)	136

FIGURE 3-4B

BARNETT SIDING EXTENSION

(IN CLARKE COUNTY, MS. BETWEEN PACHUTA AND BARNETT)

SOUTHERN RAPID RAIL TRANSIT COMMISSION

N

0 200 400
FEET

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Cost Estimates

The order of magnitude cost estimate to complete the short-term program of improvements is about $23.6 million as shown below in Table 3-1. The CTC work consists of interlocking, Automatic Block Signaling and electric locks. Trackwork refers to the installation of new switches and track adjustments around the switches; structures refers to modifications to bridges, trestles, or culverts; and cut/fill refers to earthwork to support the new alignments. Curve work refers to the trackwork associated with the adjustments to the superelevation at numerous locations throughout the corridor. Detailed locations of curve work are provided in the description of segment phasing in Chapter 4.

Table 3-1
Order of Magnitude Cost Estimates
For the Short Term Improvements

Centralized Train Control		**Interlocking**	**ABS**	**Electric Locks**	**Total**
Barnett Siding		$1,386,834	$2,845,426	$218,679	$4,450,939
Derby Siding		$1,388,586	$879,282	$145,786	$2,413,654
Carriere Siding		$1,388,586	$2,052,358	$72,893	$3,513,837
East City Junction		$894,426	$136,134	-	$1,030,560
UPT Carrollton Curve		$1,681,619	$737,894	-	$2,419,513
Total CTC Upgrades		$6,740,051	$6,651,094	$437,358	$13,828,503
Siding Work	**Track Work**	**Curve Work**	**Structures**	**Cut/Fill**	**Total**
Extend Barnett Siding	$1,288,429	$286,670	$345,903	$1,020,725	$2,941,727
Upgrade Derby Siding	$1,510,014	$0	$115,301	$663,942	$2,289,257
Construct Carriere Siding	$2,301,858	$78,728	$115,301	$1,251,401	$3,747,288
UPT Carrollton Curve	$708,141	$97,653	-	-	$805,794
Total CTC Upgrades	$5,100,301	$463,051	$576,505	$2,936,068	$9,784,066
				TOTAL	**$23,612,569**

Source: Parsons Transportation Group,
as modified by Burk-Kleinpeter, Inc., June 2002.

4. Long Term Projects

SOUTHERN RAPID RAIL TRANSIT COMMISSION

Mid-and Long-Term Recommendations

As discussed in the immediate recommendations for the 2002-2003 fiscal year, the initial improvements were ones that were assumed to be of immediate benefit and may be implemented without performing an Environmental Analysis (EA) or Environmental Impact Statement (EIS)[1]. The improvements listed in this Chapter address recommendations that require more time to implement than the short-term recommendations and were not determined to be able to commence in the fiscal year 2003.

Description of Improvements

The mid- term improvements consist of the following components

- Curve Modifications to increase speed
- Installation of New Sidings and Extensions of Existing Sidings to increase capacity
- Centralized Traffic Control Upgrades to turnouts and switches by installing larger turnouts to increase speed through sidings and automatic switches to avoid stopping to hand throw switches

Curve Improvements

For this project, curve improvements were considered only if the curves would remain on the existing roadbed. Each curve in the alignment was analyzed to determine if modifications could yield a higher allowable speed. Using a curve that has a larger radius, appropriate-length spirals, and an increased amount of superelevation is recommended and permits higher allowable speeds through curves. The tables in this chapter show that much of the curve work consists of increasing the superelevation and adjusting spiral lengths. Several of the curves are recommended for superelevation values higher than the current maximum value that Norfolk Southern currently accepts and will require the railroad to waive their maximum superelevation requirement at those locations.

[1] It has been suggested that in many cases an EIS is required despite a project being contained entirely within an existing railroad right-of-way. This necessity should be considered in the design phase of all recommendations made in this report.

Siding Improvements

Siding improvements consist of enlarging turnout sizes, lengthening sidings, and constructing new sidings based upon optimizing spacing between existing sidings. The siding extensions and new locations went through an iterative process by which new locations were chosen by looking at track charts, and calculating running times between sidings to increase capacity. Distance is only one of the issues, because in portions of the corridor, curves and grades limit speeds making it necessary to locate the sidings closer together to equalize capacity.

The sidings are mostly lengthened to permit longer trains to use them, but three relevant issues also went into the recommendations for lengthening and/or relocating sidings. First, the sidings should be lengthened to allow for near full speed entry and exit as CTC is installed, since trains will not need to stop prior to entering or upon leaving a siding to hand-throw switches. Second, longer sidings are needed so that a train does not need to begin slowing before it completely enters a siding. For example, a train should be able to enter a siding at a speed near the rating of the turnout because it would then have an adequate distance to decelerate before it neared the far end of the siding where it would typically wait for the approaching train to pass. Thirdly, the sidings were relocated to allow longer siding segments that are not broken by grade crossings, which results in highway traffic not being delayed when it becomes necessary to hold a train in a siding.

After determining where siding locations were needed for the purposes outlined above, the locations were reviewed with Norfolk Southern to determine applicability to their operations. Norfolk Southern requested that sidings not be located on grades because they have found sidings in these locations difficult to use. Several locations were adjusted to comply with their request. Norfolk Southern also mentioned locations such as towns where under existing operations and that grade crossings cannot be blocked for even short periods while passing maneuvers occur. This grade crossing restriction was also addressed as the final siding recommendations were chosen. Thus, both theoretical capacity calculations and daily operations were used in the siding review in finalizing siding locations.

CTC Upgrades

Centralized Traffic Control (CTC), which enables switches and signals to be controlled from the central dispatch office, will become a necessity in the development of the high-speed corridor. The system will lessen the delay resulting from meeting trains, thereby decreasing travel time and increasing track capacity. The increased capacity and decrease in travel time will benefit both Amtrak (possible future service) and Norfolk Southern's freight service. Because of the necessity of CTC in a high-speed corridor, CTC has been suggested in logical phases upon consultation with the needs of the railroad. These locations were then evolved into segments by choosing beginning and ending points in the corridor to implement the changes. The CTC cost estimates included with the segment descriptions consist of Interlocking (INT), Automatic Block Signals (ABS), and Electric Locks (EL) improvements.

Segment Phasing

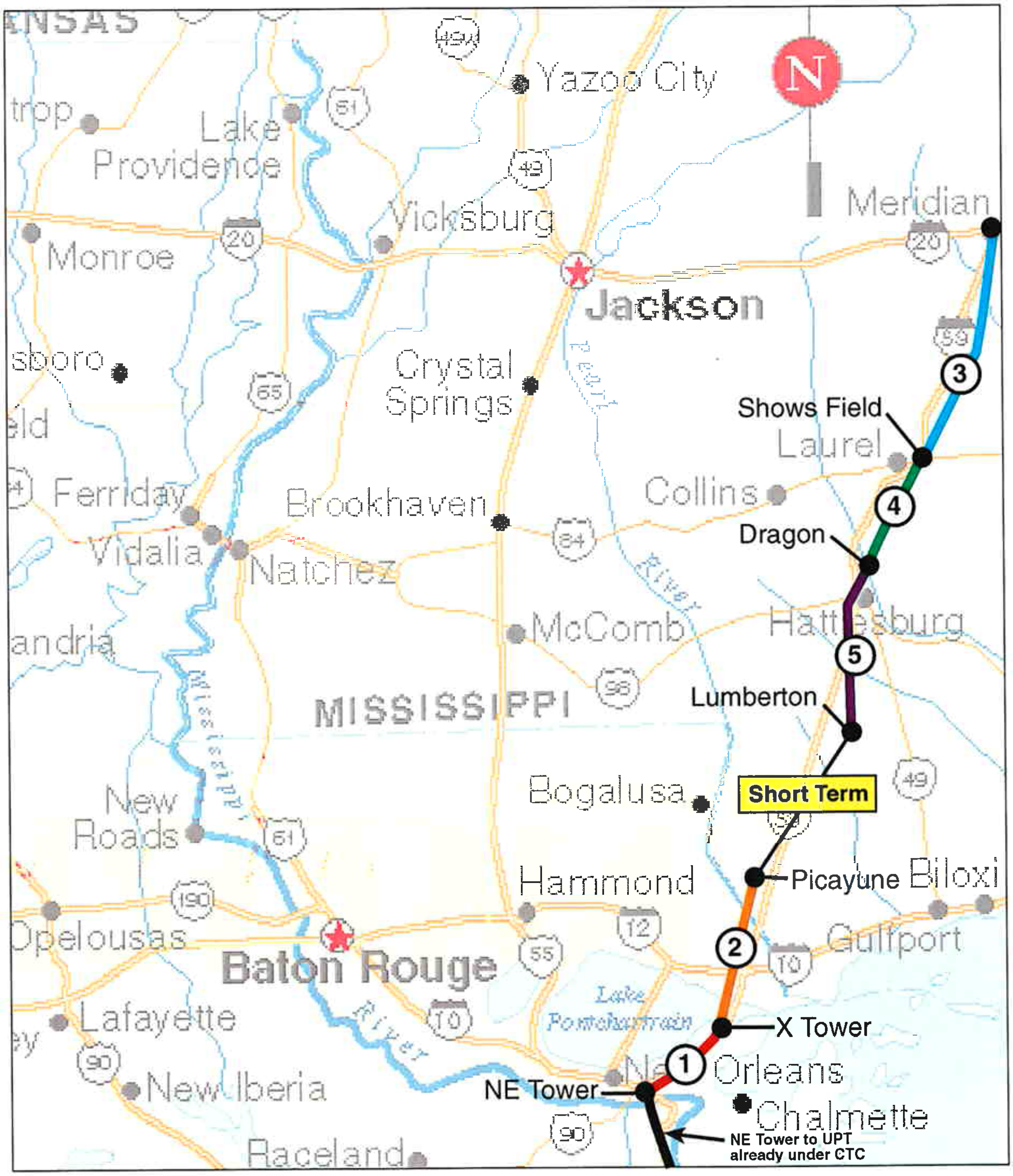
Because many of the improvements will enhance normal operations of the railroad, Norfolk Southern was consulted as to the priority of the projects. The phasing assumes that all components for a segment will be installed in the same timeframe, enabling a total timesavings and a total cost per segment to be estimated. The phasing of improvements further allows the segments to be upgraded incrementally or even re-prioritized if funding is received in separate earmarks or over several fiscal years. It is also recommended that the curve work and new installations/extensions of sidings be done concurrently with the CTC upgrades in order to fully utilize the scheduled track outages and provide fully upgraded sections of track upon completion of the phase.

The recommended phases are shown in Figure 4-1.

Phasing of Route Segments

1. South End of Lumberton to North End of Picayune (MP 121.0 to MP 148.9)[2]
2. X Tower to NE Tower Improvements (MP 181.9 to MP 193.6)
3. North End of Picayune to X Tower (MP 148.9 to MP 181.9)
4. South End of Shows Field to South End of Dragon (MP 63 to MP 87.8)
5. South End of Meridian to South End of Shows Field (MP 3.3 to MP 63)
6. South End of Dragon to South End of Lumberton (MP 87.8 to MP 121.0)
7. NE Tower to Oliver Yard (MP 193.6 to MP 194.1) and Oliver Yard to East City Junction (MP 3.6NT to 8.1NT) (Currently under CTC)

[2] The estimates and description for this segment are included as a short-term project in Chapter 3.



CTC and Segment Phasing

	Phase	Segment Description
	Short Term	Lumberton to Picayune
Long Term	1	X Tower to NE Tower
	2	Picayune to X Tower
	3	Meridian to Shows Field
	4	Shows Field to Dragon
	5	Dragon to Lumberton

Figure 4-1
New Orleans to Meridian Segment Phasing

Gulf Coast High Speed Rail Corridor

SOUTHERN RAPID RAIL TRANSIT COMMISSION

The following sections describe the improvements for each of these segments along with project summaries, preliminary plans on aerials or track charts, and costs. The tables for each segment include the total project costs and show the timesavings per project. Most of the timesavings are for current operations and are available only for curve improvements. Current Norfolk operations allow the *Crescent* priority in that it normally does not have to enter sidings. Norfolk Southern freight trains normally wait in sidings for the *Crescent* to pass so that under most ordinary circumstances the *Crescent* should run at or near the timetable speed between Meridian and New Orleans.

Thus, trip time reductions are not equated to CTC improvements for the reason that the consultants reviewed only current operations of Amtrak's *Crescent* where there is never more than one *Crescent* in the New Orleans to Meridian Corridor at any one time. CTC improvements allow trains to enter/leave sidings quicker because the turnouts can be larger and stopping to throw the switches is not required. Upon successful implementation of a high-speed corridor handling multiple trains a day, multiple Amtrak trains will be in the corridor, and logical meeting points for Amtrak trains will be required. At such time, Amtrak trains will benefit from the installation of CTC.

Curve and Superelevation Improvement Calculations

For each segment, tables are included that recommend modifications to many of the curves of the alignment. These tables include the following information: milepost of curve, current degree of curvature, existing superelevation, existing timetable speed, proposed superelevation, proposed timetable speed and the expected horizontal shift. These results were derived by using a calculation model that factors the degree of curvature and the superelevation and then correlates a proposed timetable speed with a proposed new superelevation.

Two cases can be mentioned that can lead to a better understanding of the results included in these tables. The first case involves changes that are proposed to the curve yet there is not an increase in timetable speed. This can occur through differences in the models used by the consultants and NS or from the possible "smoothing" that is performed to the speed profile after the timetable is calculated. The second case is locations where no work is performed, yet an increase in speed is proposed. Again, this could result from differences between the two models, or possible field conditions that NS feels are reasons to have the timetable speed lower than the calculated maximum speed.

South End of Lumberton to North End of Picayune (MP 121.0 to MP 148.9)

Upgrading the segment between Lumberton and Picayune by installing CTC and a new siding added near the town of Carriere, Mississippi was recommended as part of the short-term recommendations. These upgrades included installing No. 20 powered switches at both the Lumberton and Derby Sidings and performing the required signal work. The long-term improvements include extending the Derby Siding northward and curve improvements throughout the segment. A description of the Derby Siding follows.

Derby Siding

Ultimately, after an analysis of potential sidings location between Dragon and Derby and discarding the Purvis and Hillsdale locations, it was determined that an additional siding was still needed. Therefore, the Derby siding was extended 1.2 miles northward to MP 128.5 to equalize capacity in the segment. The upgraded siding would be 3.2 miles in length, and the center-of-siding to center-of-siding distance between Lumberton and Derby would be maintained at 18 miles. This would also give an approximate two-mile segment of the siding (MP 128.5 to 130.5) that would be unbroken by crossings.

This unbroken length increases the utility of the siding because it can hold a train for an extended period without need for the time consuming process of breaking, reassembling, and air testing of the train to clear blocked crossings.

Figure 4-2 includes a track chart of the Derby Siding Extension. Table 4-1 summarizes the curve and superelevation work between South Lumberton and North Picayune. Table 4-2 summarizes the estimated costs and timesaving for the long-term portion of the segment of the Derby Extension.

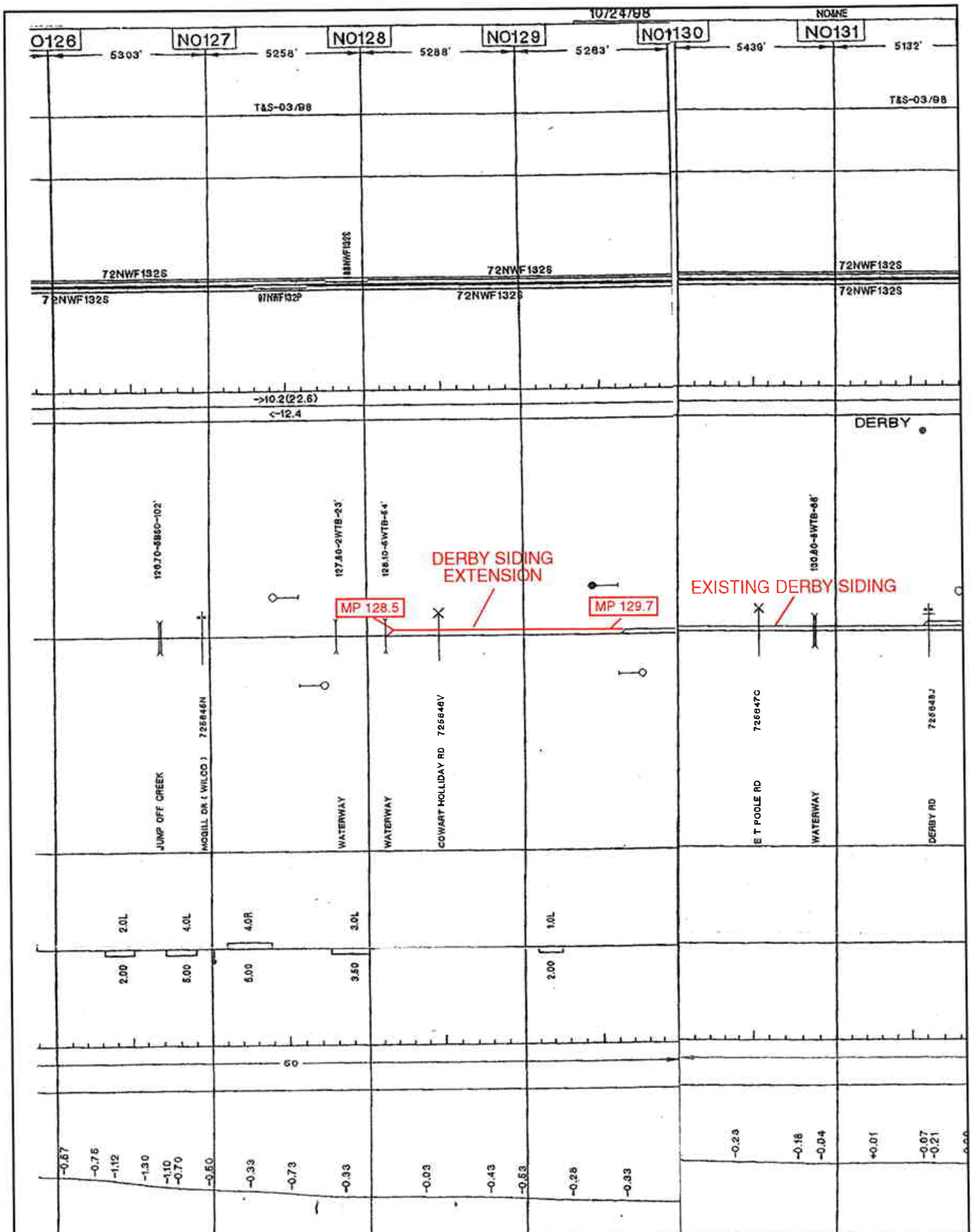


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Figure 4.2
DERBY SIDING EXTENSION

Table 4.1: Curve and Superelevation Improvements

South of Lumberton to North End of Picayune (MP 121.0 To MP 148.9)

Milepost	Current Degree of Curvature	Exist Ea (inches of Super-elevation)	Time Table Speed (mph)	Prop'd Avg Ea (inches of Super-elevation)	Proposed Maximum Speed (mph)	Expected Horizontal Shift (ft)
123.0	4.0	4.0	45	4.0	50	0.10
123.1	5.0	5.0	45	5.0	45	0.45
124.0	3.0	3.5	50	3.5	55	2.12
124.1	4.0	5.0	50	5.0	50	0.46
124.2	3.8	4.5	50	4.5	50	1.31
125.0	3.0	3.5	50	3.5	55	1.30
125.1	4.0	5.0	50	5.0	50	0.10
126.0	2.0	2.0	50	5.0	75	1.96
126.1	4.0	5.0	50	5.0	50	1.44
127.0	4.0	5.0	50	5.0	50	0.32
127.1	3.0	3.5	50	3.5	50	1.08
129.0	1.0	2.0	79	2.5	79	0.00
133.0	2.0	3.0	79	5.0	75	0.06
133.1	3.0	5.0	60	5.0	60	0.06
134.0	2.0	3.0	79	5.0	75	0.05
135.0	1.0	2.0	79	2.5	79	1.91
135.1	1.0	2.0	79	2.5	79	0.05
137.0	1.0	2.0	79	2.5	79	0.00
138.0	2.0	3.5	65	5.0	75	0.10
140.0	1.0	2.0	79	2.5	79	0.10
140.1	1.0	2.0	79	2.5	79	0.10
141.0	2.0	3.5	65	5.0	75	1.29
142.0	1.0	2.0	79	2.5	79	0.10
142.1	2.0	3.5	79	5.0	75	0.10
143.0	2.0	3.5	65	5.0	75	1.30
145.0	1.0	2.0	79	2.5	79	0.10
146.0	1.0	2.0	79	2.5	79	1.30

Source: Parsons Transportation Group, September 2002

Table 4.2: Estimated Construction Costs and Time Savings

South of Lumberton to North End of Picayune (MP 121.0 To MP 148.9)

SUBTOTAL CURVE IMPROVEMENTS (see previous page for locations)				**$**	**515,857**
CTC	Interlocking	ABS	Electric Locks	Subtotal	
Extend Derby Siding	*$ 2,773,667*	*$ 1,061,465*	*$ 145,786*	*$*	*3,980,918*
SUBTOTAL CTC UPGRADES				**$**	**3,980,918**
Siding Work	Track Work	Structures	Cut/ Fill	Subtotal	
Extend Derby Siding	*$ 1,551,119*	*$ 224,188*	*$ 115,301*	*$*	*3,980,918*
SUBTOTAL SIDING UPGRADES				**$**	**3,980,918**
TOTAL PHASE IMPROVEMENTS				**$**	**8,477,694**

TOTAL TIME SAVINGS (min:sec)	**1:58**

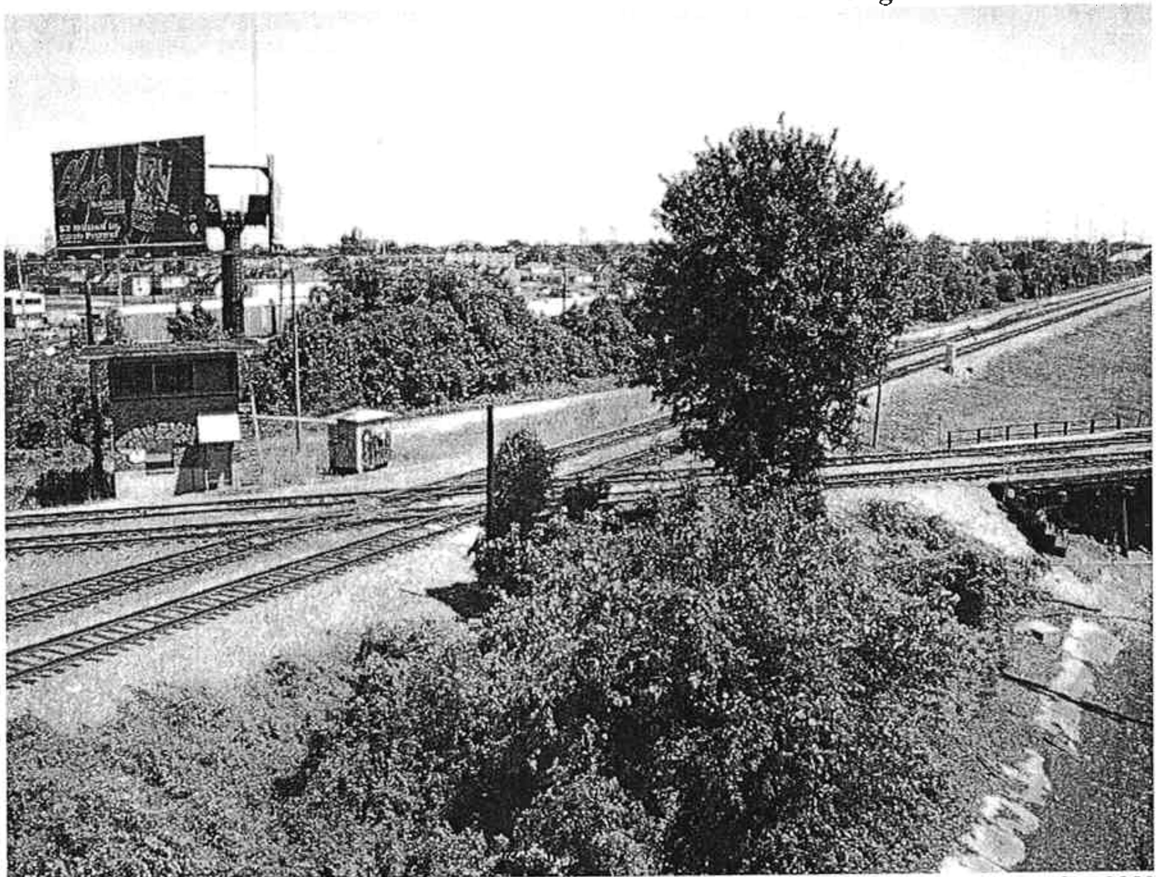
Source: Parsons Transportation Group, September 2002

X Tower to NE Tower Improvements (MP 181.9 to MP 193.6)

The segment of the route between X Tower and NE Tower (Figure 4-3) consists of approximately 12.6 miles of double track. All switches are hand thrown and the ability to centrally control freights and passenger trains to utilize both tracks to their capacity does not exist. Better control would allow same direction trains to pass each other without significant starting and stopping to throw and reverse switches, and allow better dispatching of Amtrak trains approaching and leaving the Union Passenger Terminal and Norfolk Southern trains entering and leaving Oliver Yard.

Capacity improvements presently are not recommended in this segment. Instead, future analysis should consider the potential for enhancements that would increase passenger train, and possibly freight train speeds, over the Lake Pontchartrain causeway and over the Seabrook Drawbridge as discussed in the preceding section. Increases to the almost seven miles of restricted 40 mph operation would result in significant time savings.

Figure 4-3: NE Tower



Source: Burk-Kleinpeter, Inc., September 2002

Table 4-3 includes curve and superelevation work, and Table 4-4 includes the estimated costs and time savings for all upgrades in the segment.

Table 4.3: Curve and Superelevation Improvements

X Tower to NE Tower Improvements (MP 181.9 To MP 193.6)

Milepost	Current Degree of Curvature	Exist Ea (inches of Super-elevation)	Time Table Speed (mph)	Prop'd Avg Ea (inches of Super-elevation)	Proposed Maximum Speed (mph)	Expected Horizontal Shift (ft)
178.0	1.5	1.0	45	2.0	60	0.00
178.1	2.0	1.0	45	2.5	60	0.00
184.0	0.1	1.0	79	1.0	79	0.00
190.0	0.1	1.0	79	1.0	79	0.00
191.0	3.5	4.5	50	5.0	60	0.00
191.1	3.5	4.5	50	5.0	60	0.00

Source: Parsons Transportation Group, September 2002

Table 4.4: Estimated Construction Costs and Time Savings

X Tower to NE Tower Improvements (MP 181.9 To MP 193.6)

SUBTOTAL CURVE IMPROVEMENTS (see previous page for locations)				**NA**
Miscellaneous Speed Improvements				
CTC	Interlocking	ABS	Electric Locks	Subtotal
Seabrook Drawbridge	*$ 694,293*	*$ 1,916,709*	*$ 291,573*	*$ 2,902,575*
SUBTOTAL MISCELLANEOUS IMPROVEMENTS				**$ 2,902,575**
TOTAL PHASE IMPROVEMENTS				**$ 2,902,575**

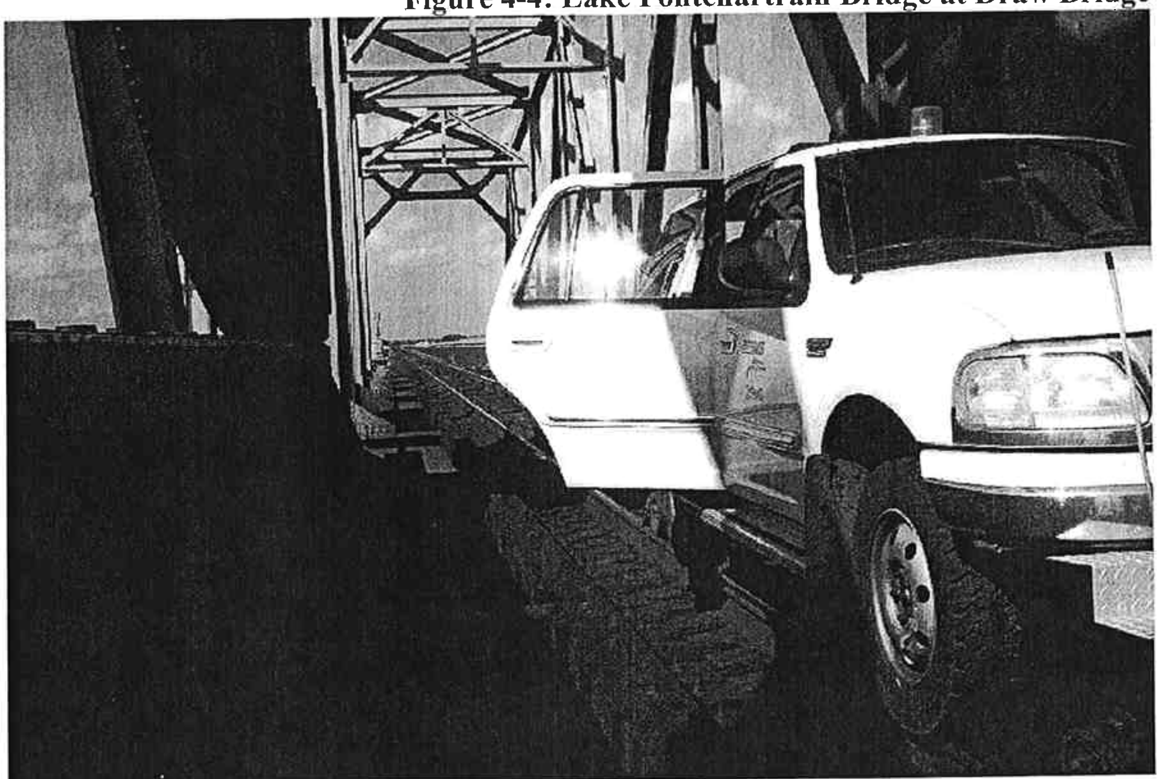
TOTAL TIME SAVINGS (min:sec)	**2:49**

Source: Parsons Transportation Group, September 2002

North End of Picayune to X Tower (MP 148.9 to MP 181.9)

The section between X Tower and Picayune includes the Picayune Siding, the Pearl River Siding, the City of Slidell, the Woods Siding, and the single-track Lake Pontchartrain Bridge (Figure 4-4). It is recommended that this segment be upgraded to CTC and the Pearl River Siding extended southward. These recommendations (and other recommendations that were considered and later discarded) are discussed below.

Figure 4-4: Lake Pontchartrain Bridge at Draw Bridge



Source: Burk-Kleinpeter, Inc., 2002

Picayune Siding and Woods Siding

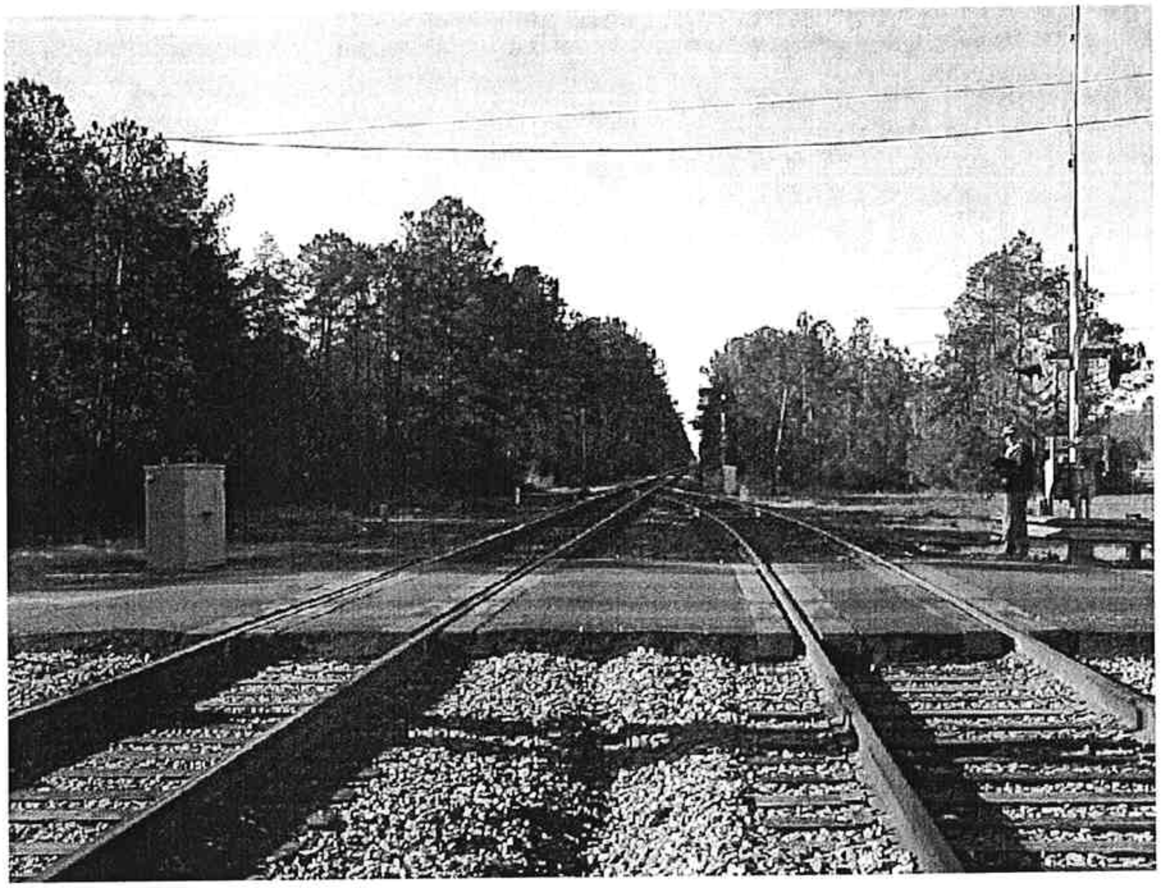
Both the Picayune Siding and the Woods Siding were considered for extensions. The Picayune Siding is located in the center of the City of Picayune and several streets cross the siding, which limits the standing time that trains can actually use the siding to allow another train to pass. Also, the local Norfolk Southern operations use the siding to deliver and pick up cars from industries near Picayune. The Picayune Siding is not being recommended to be included in the CTC system. The construction of a siding at Carriere (see discussion in previous chapter) should make it unnecessary to continue to use this siding as a passing siding. The siding would then be used only for local storage and switching. The new Carriere Siding, recommended as a short-term improvement, is only about 6 miles from Picayune and can be used to minimize the need to pass and meet trains in Picayune.

The approximately 1.7-mile long Woods Siding was also considered for extension. Its remote location approximately two miles north of the Lake Pontchartrain Bridge would have made it a better siding than the Picayune or Pearl River Sidings to use. However, the area directly south of the Woods Sidings is assumed to be a protected wetlands area and it is expected that extending the siding would be hindered by environmental concerns related to constructing the additional roadbed. It is only recommended that Woods Siding be upgraded by installing 40 mph turnouts at each end in place of the 15 mph turnouts that are located at the ends of the existing siding.

Pearl River Siding

Extending the Pearl River Siding approximately one-mile to the South toward St. Joe Road and upgrading it to CTC is recommended. The existing Pearl River Siding is 6,573 feet long; however, two grade crossings located within the limits of the siding restrict the free standing room for a freight train to about 4,000 feet. Figure 4-5 shows the south end of the existing Pearl River Siding.

Figure 4-5: South End of Pearl River Siding



Source: Burk-Kleinpeter, Inc., September 2002

Figure 4-6 depicts a track chart of the Pearl River Siding extension. Table 4-5 includes curve and superelevation work for the segment and Table 4-6 includes the estimated costs and timesavings for all upgrades in the segment.

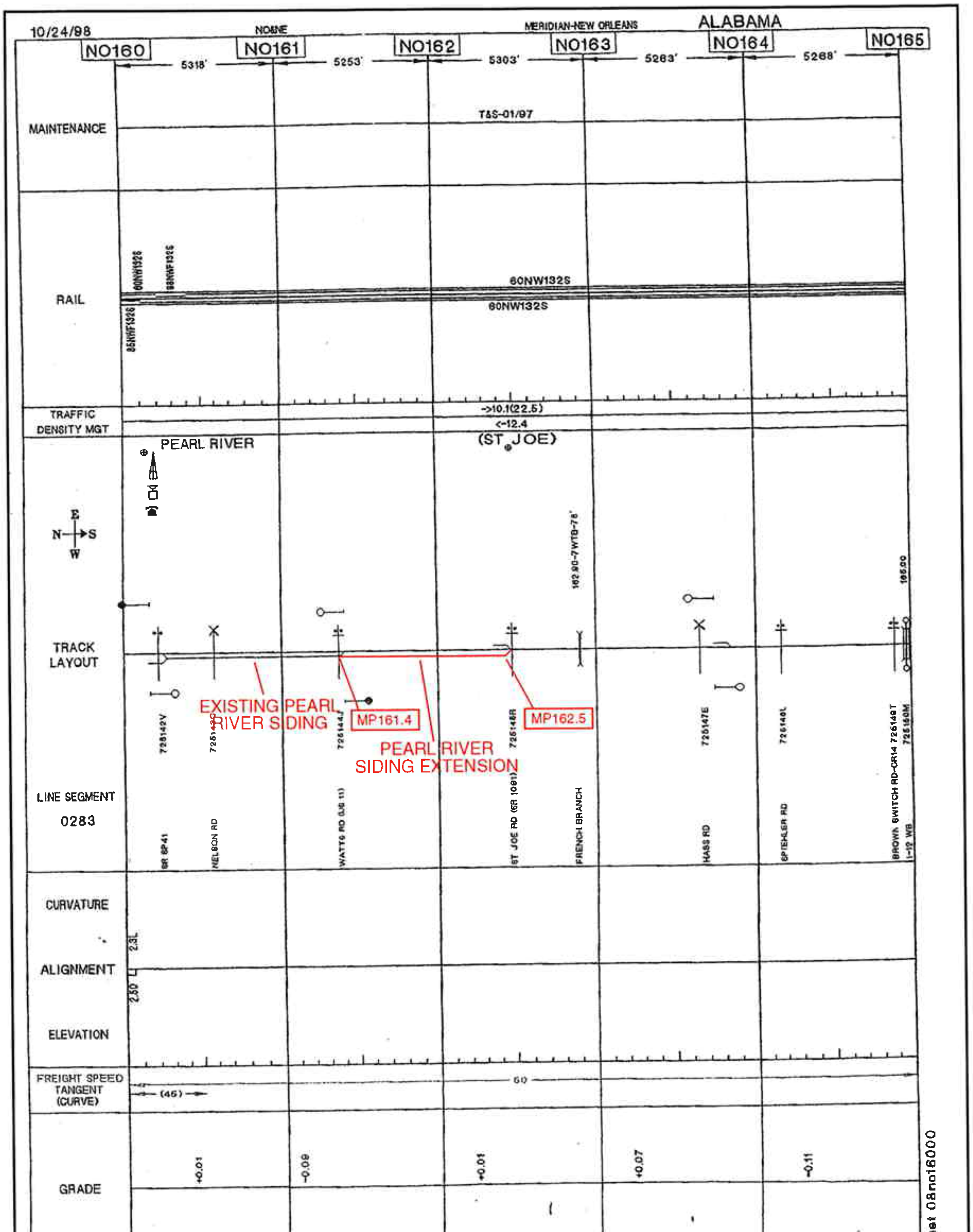


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Figure 4.6
PEARL RIVER SIDING EXTENSION

Table 4.5: Curve and Superelevation Improvements

North End of Picayune to X Tower (MP 148.9 To MP 181.9)

Milepost	Current Degree of Curvature	Exist Ea (inches of Super-elevation)	Time Table Speed (mph)	Prop'd Avg Ea (inches of Super-elevation)	Proposed Maximum Speed (mph)	Expected Horizontal Shift (ft)
151.0	0.5	1.0	79	1.5	79	0.00
153.0	1.0	2.0	79	2.5	79	2.46
153.1	0.5	1.0	79	1.5	79	2.46
159.0	2.3	2.5	45	5.0	70	0.10
159.1	2.3	2.5	79	5.0	79	0.13
167.0	1.0	2.0	35	2.0	50	0.00
169.0	1.0	2.0	79	2.5	79	0.49

Source: Parsons Transportation Group, September 2002

Table 4.6: Estimated Construction Costs and Time Savings

North End of Picayune to X Tower (MP 148.9 To MP 181.9)

SUBTOTAL CURVE IMPROVEMENTS (see previous page for locations)				**$ 59,983**
CTC	Interlocking	ABS	Electric Locks	Subtotal
Extend Pearl River Siding	*$ 1,388,586*	*$ 1,940,470*	*$ 801,825*	*$ 4,130,881*
Upgrade Woods Siding	*$ 1,479,733*	*$ 1,553,732*	*$ 145,786*	*$ 3,179,252*
SUBTOTAL CTC UPGRADES				**$ 7,310,133**
Siding Work	Track Work	Structures	Cut/ Fill	Subtotal
Extend Pearl River Siding	$ 2,215,580	$ 115,301	$ 905,047	$ 3,235,928
Upgrade Woods Siding	$ 1,421,167	$ 115,301	$ -	$ 1,536,468
SUBTOTAL SIDING UPGRADES				**$ 4,772,396**
TOTAL PHASE IMPROVEMENTS				**$ 12,142,512**

TOTAL TIME SAVINGS (min:sec)	**3:43**

Source: Parsons Transportation Group, September 2002

South End of Shows Field to South End of Dragon (MP 63 to MP 87.8)

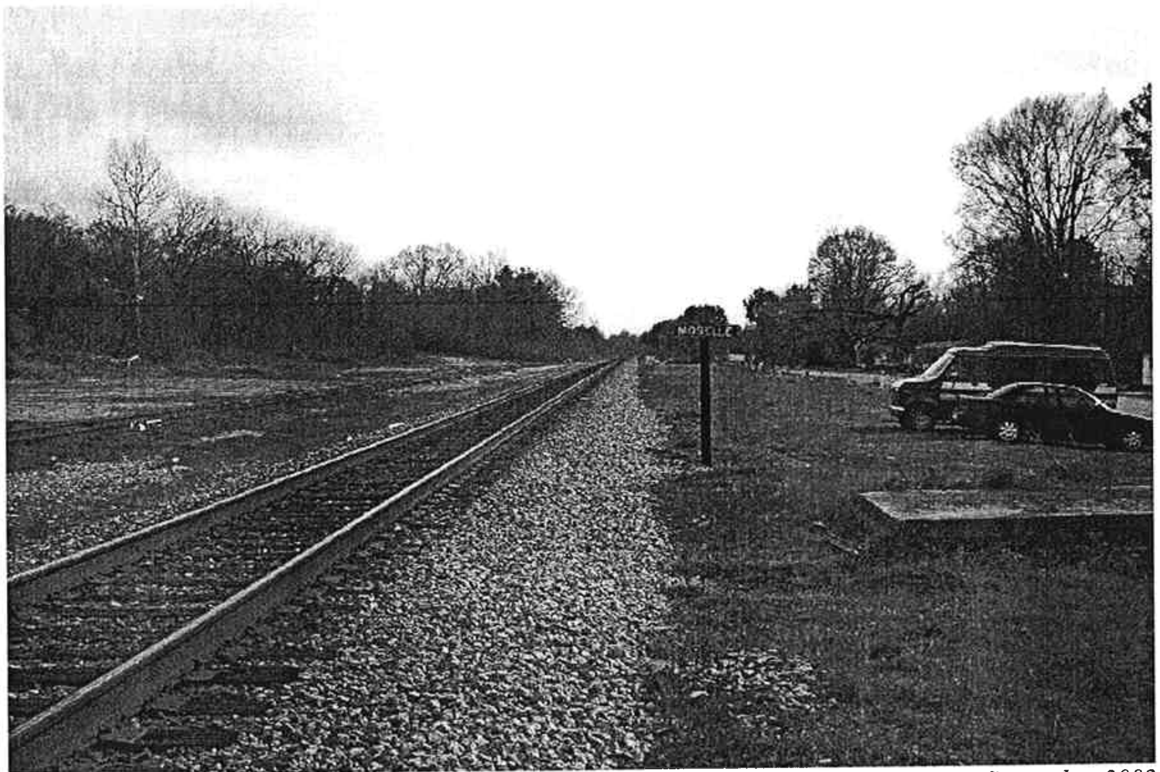
The Shows Field to Dragon segment involves upgrading the Shows Field and Dragon Sidings to CTC and construction of a new Moselle Siding.

Moselle Siding

It is recommended that a new siding be constructed at Moselle (Figure 4-7), between MP 70.6 and MP 72.6, to increase the capacity between Shows field and Dragon. One crossing, Ovett Road (DOT 725579D) at MP 72.4 has crossbucks and apparently has not been upgraded to include automatic crossing protection. MDOT's statewide grade crossing plan should be consulted to determine if the crossing is to be closed or upgraded. If the crossing can be closed, there is a road on both sides of the track and people could use the protected Union Road crossing (DOT 725580E) at MP 72.7.

The location of this Moselle Siding was chosen because the preferred location for a siding near Tawanta (MP 68.8) was discarded because of its location at the apex of two intersecting grades. Norfolk Southern felt that they would not be able to properly start and stop trains that used a siding at this location. An alternate location near Eastabuchie (MP 77.4) was also discarded because it is too close to Dragon to effectively split the difference between the Shows Field and Dragon Sidings. Constructing the new Moselle Siding would increase the capacity between Shows Field and Moselle to 34 trains per day and between Moselle and Dragon to 43 trains per day.

Figure 4-7: Moselle Signpost viewed from Union Road (MP 72.6)



Source: Burk-Kleinpeter, Inc., September 2002

Figure 4-8 includes a track chart of the Moselle Siding extension, Table 4-7 includes curve and superelevation work, and Table 4-8 includes the estimated costs and time savings for all upgrades in the segment.

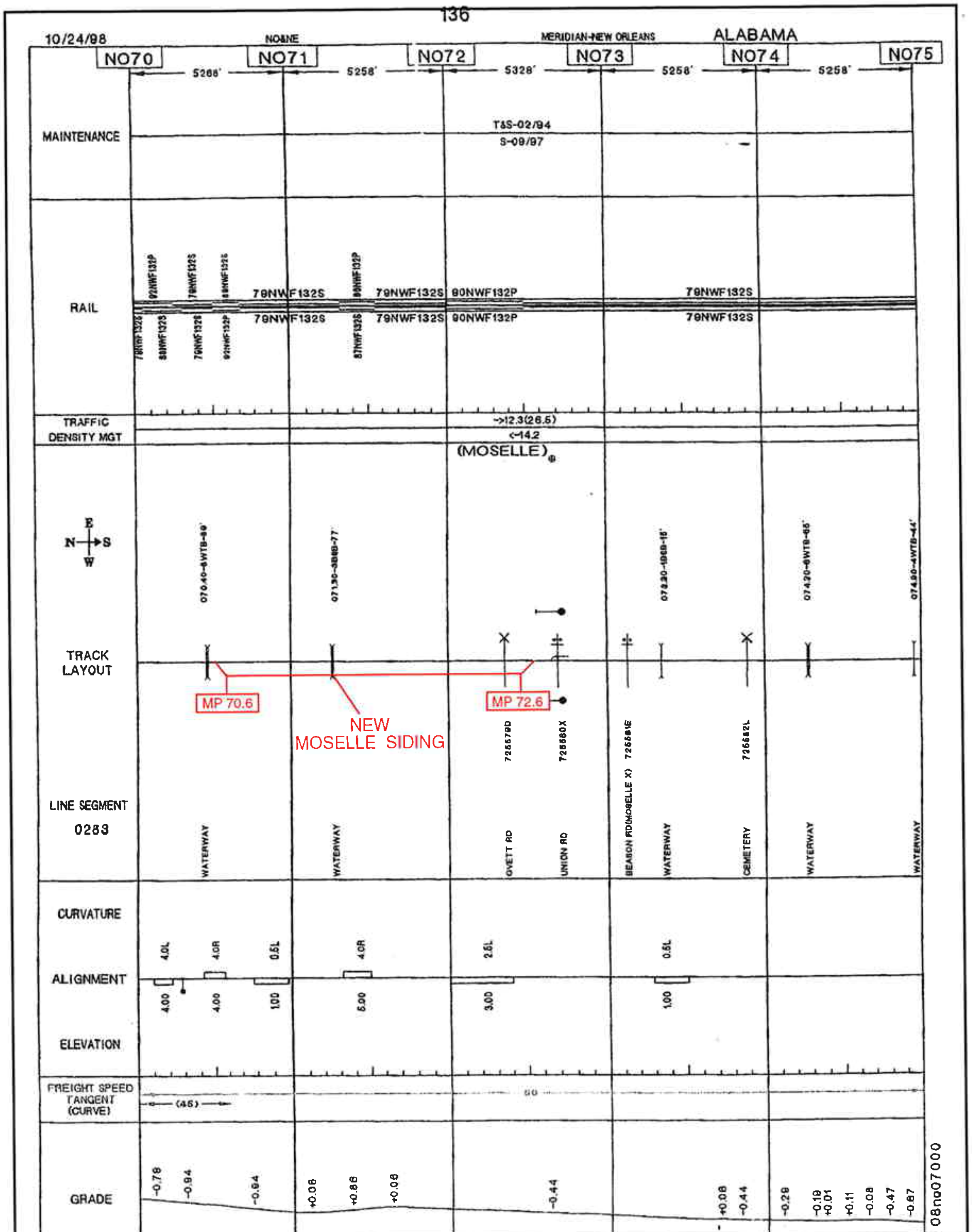


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Figure 4.8
NEW MOSELLE SIDING

Table 4.7: Curve and Superelevation Improvements

South End of Shows Field to South End of Dragon (MP 63 To MP 87.8)

Milepost	Current Degree of Curvature	Exist Ea (inches of Super-elevation)	Time Table Speed (mph)	Prop'd Avg Ea (inches of Super-elevation)	Proposed Maximum Speed (mph)	Expected Horizontal Shift (ft)
63.0	1.0	1.5	79	2.5	79	0.19
63.1	2.0	3.0	60	5.0	75	2.01
64.0	2.0	3.0	60	5.0	75	1.97
64.1	3.0	3.5	50	5.0	60	1.04
65.0	4.0	5.0	50	5.0	50	0.08
66.0	3.0	3.5	50	5.0	60	1.02
66.1	2.0	2.0	50	5.0	75	2.25
67.0	2.0	2.0	50	5.0	75	2.25
68.0	2.0	2.0	50	5.0	75	2.48
68.1	4.0	5.0	50	5.0	50	0.07
68.2	2.0	2.0	50	5.0	75	2.27
68.3	2.0	2.0	50	5.0	75	2.27
69.0	2.0	2.0	79	5.0	75	2.27
70.0	4.0	4.0	45	4.0	50	0.00
70.1	4.0	4.0	45	4.0	50	0.00
70.2	0.5	1.0	79	1.5	79	0.00
71.0	4.0	5.0	50	5.0	50	0.09
72.0	2.5	3.0	50	5.0	65	2.52
73.0	0.5	1.0	79	1.5	79	0.00
75.0	1.0	2.0	79	2.5	79	0.10
76.0	2.0	4.0	79	5.0	75	0.92
81.0	1.0	2.0	79	2.5	79	0.10
83.0	1.3	2.5	79	3.0	79	0.16
84.0	0.5	1.0	79	1.5	79	0.00
85.0	5.2	1.0	25	1.0	25	0.00
85.1	4.8	1.0	25	1.0	25	0.00
85.2	3.5	1.0	25	1.0	25	0.00
85.3	3.0	1.0	25	1.0	25	0.00
87.0	2.0	3.0	60	5.0	75	1.30

Source: Parsons Transportation Group, September 2002

Table 4.8: Estimated Construction Costs and Time Savings

South End of Shows Field to South End of Dragon (MP 63 To MP 87.8)

SUBTOTAL CURVE IMPROVEMENTS (see previous page for locations)				**$ 487,365**
CTC	Interlocking	ABS	Electric Locks	Subtotal
Upgrade Shows Field Siding	*$ 1,388,586*	*$ 414,054*	*$ 72,893*	*$ 1,875,533*
Construct Moselle Siding	*$ 1,388,586*	*$ 2,242,487*	*$ 218,679*	*$ 3,849,753*
Upgrade Dragon Siding	*$ 1,798,238*	*$ 783,545*	*$ 437,359*	*$ 3,019,141*
SUBTOTAL CTC UPGRADES				**$ 8,744,428**
Siding Work	Track Work	Structures	Cut/ Fill	Subtotal
Upgrade Shows Field Siding	*$ 1,687,278*	*$ -*	*$ -*	*$ -*
Construct Moselle Siding	*$ 2,301,858*	*$ 451,375*	*$ 1,481,460*	*$ 1,988,393*
Upgrade Dragon Siding	*$ 1,682,622*	*$ -*	*$ -*	*$ -*
SUBTOTAL SIDING UPGRADES				**$ 1,988,393**
TOTAL PHASE IMPROVEMENTS				**$ 11,220,186**

TOTAL TIME SAVINGS (min:sec)	**1:47**

Source: Parsons Transportation Group, September 2002

South End of Meridian to South End of Shows Field (MP 3.3 to MP 63)

The recommended Meridian to Shows Field improvements include upgrading the following to CTC: the previously extended Barnett Siding (a Short Term Improvement); the Basic Siding; the Hawkes Siding; and re-installing tracks and adding CTC to the abandoned Heidelberg Siding. Discussions on the upgrades to the Barnett and Heidelberg Sidings follow.

Barnett Siding

It was recommended under the short-term recommendations that the Barnett Siding (Figure 4-9) be extended approximately one-mile northward. As part of the CTC improvements, it is also recommended that the No. 10 turnouts be replaced with No. 20 powered turnouts and the signaling be upgraded as needed.

Figure 4-9: Hand thrown No. 10 Turnout at south end of Barnett Siding

Source: Burk-Kleinpeter, Inc., September 2002

It was recommended that Barnett Siding be extended immediately in the short-term because it would provide an immediate benefit to both Norfolk Southern and Amtrak. Because a Norfolk Southern freight train enters the siding in advance of the *Crescent*, a southbound freight train commonly enters the Basic Siding and waits for the northbound Crescent for much longer than necessary because the freight may not be able to fit in the Barnett Siding. This can be explained by describing the adjacent sidings at Basic and Hawkes. The track north of Hattiesburg has the highest freight volume and a 37 mile length between the Basic Siding (MP 13.3) and Hawkes Siding (MP 50.8) with the Barnett Siding (MP 30.6) in between. Currently if a train is longer than the current Barnett Siding length and cannot reach the Hawkes Siding, it must wait at Basic Siding for at least an hour to avoid delaying the northbound *Crescent*. (Amtrak delay reports were unavailable, but it is assumed that Norfolk Southern freight trains do not regularly delay the Crescent for this maneuver.) If sidings are used to store freight trains headed for the Meridian Yard, the possibility for delay increases. Amtrak will benefit from the extension of the Barnett Siding because the potential for delay is less likely.

Heidelberg Siding

It is recommended that a new Heidelberg Siding (Figure 4-10) be constructed from MP 39.6 to MP 41.7. The Heidelberg Siding would be a viable project for the reason that the project can utilize an existing roadbed located on the east side of the current tracks to minimize the cut/fill and roadbed construction costs associated with construction of a track at a location where a track previously did not exist. A siding at Heidelberg existed at one time and was apparently removed. Reinstallation of the siding will increase, and equalize, capacity in the Meridian to Shows Field segment.

Figure 4-10: North End of Proposed Heidelberg Siding

Source: Burk-Kleinpeter, Inc., September 2002

Figure 4-11 includes a track chart of the Heidelberg Siding extension, Table 4-9 includes curve and superelevation work, and Table 4-10 includes the estimated costs and time savings for all upgrades in the segment.

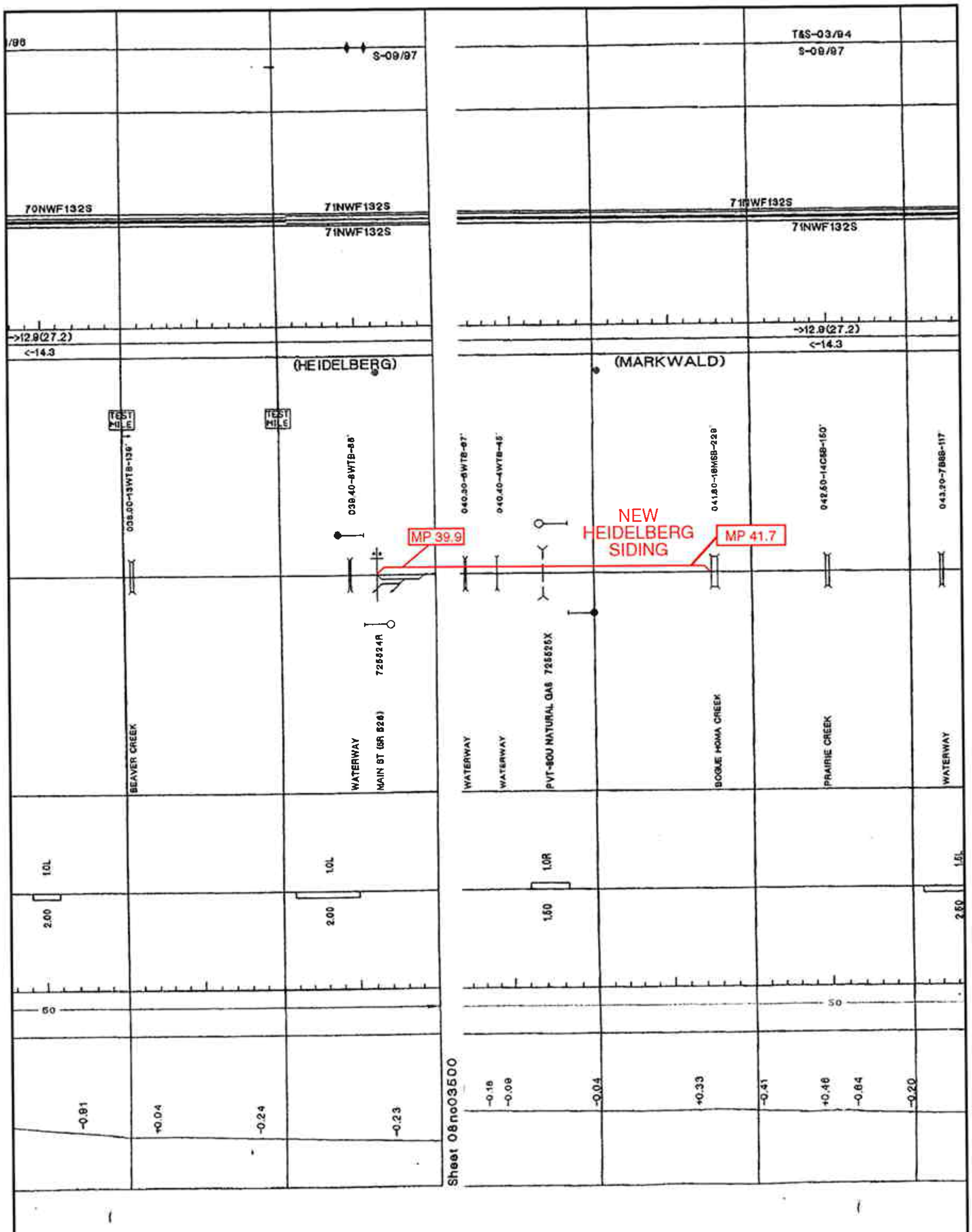

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Figure 4.11
NEW HEIDELBERG SIDING

Table 4.9: Curve and Superelevation Improvements

South End of Meridian to South End of Shows Field (MP 3.3 To MP 63)

Milepost	Current Degree of Curvature	Exist Ea (inches of Super-elevation)	Time Table Speed (mph)	Prop'd Avg Ea (inches of Super-elevation)	Proposed Maximum Speed (mph)	Expected Horizontal Shift (ft)
43.0	1.5	2.5	70	4.0	79	0.71
44.0	1.5	2.5	70	4.0	79	0.71
45.0	2.0	4.0	70	5.0	75	0.92
49.0	1.0	1.5	70	2.5	79	0.19
49.1	1.0	1.5	70	2.5	79	0.19
51.0	0.5	1.0	79	1.5	79	0.00
53.0	1.0	2.0	79	2.5	79	0.10
55.0	2.0	2.5	40	5.0	75	2.12

Source: Parsons Transportation Group, September 2002

Table 4.10: Estimated Construction Costs and Time Savings

South End of Meridian to South End of Shows Field (MP 3.3 To MP 63)

SUBTOTAL CURVE IMPROVEMENTS (see previous page for locations)				**$ 736,545**
CTC	Interlocking	ABS	Electric Locks	Subtotal
Upgrade Barnett Siding	$ 694,293	$ 414,054	$ -	*$ 1,108,347*
Upgrade Basic Siding	$ 1,388,586	$ 2,874,785	$ 364,466	*$ 4,627,837*
Extend Heidelberg Siding	$ 1,388,586	$ 2,239,795	$ 364,466	*$ 3,992,847*
Upgrade Hawkes Siding	$ 1,388,586	$ 1,074,795	$ 583,145	*$ 3,046,526*
SUBTOTAL CTC UPGRADES				**$ 12,775,557**
Siding Work	Track Work	Structures	Cut/ Fill	Subtotal
Upgrade Barnett Siding	$ 1,160,387	$ -	$ -	*$ 1,160,387*
Upgrade Basic Siding	$ 1,681,515	$ 227,187	$ -	*$ 1,908,702*
Extend Heidelberg Siding	$ 2,567,675	$ 176,451	$ 115,301	*$ 2,859,427*
Upgrade Hawkes Siding	$ 1,731,649	$ 46,237	$ 230,602	*$ 2,008,488*
SUBTOTAL SIDING UPGRADES				**$ 7,937,004**
TOTAL PHASE IMPROVEMENTS				**$ 21,449,106**

Total Time Savings (min:sec)	**5:29**

Source: Parsons Transportation Group, September 2002

South End of Dragon to South End of Lumberton (MP 87.8 to MP 121.0)

The Dragon to Lumberton segment is recommended as the last phase of the corridor improvements. Work needed in this segment involves increasing the size of the turnouts at the Richburg and Lumberton Sidings from No. 10's to No. 20's, swapping the mainline and siding tracks at Richburg, and extending the Lumberton Siding approximately one mile to the north.

Richburg Siding

The Richburg Siding is currently located on the west side of the mainline track. A coal-powered electric plant is located on the east side of the mainline track, opposite the siding. Therefore, trains must use a turnout off the mainline to back coal cars into the plant. Swapping the mainline track and the siding would eliminate this mainline switching maneuver, thereby, enhancing the capacity of the rail line. As part of the reconfiguration of the mainline and siding tracks, the switches will be upgraded to be under CTC control and the turnouts enlarged to No. 20's.

Lumberton Siding Extension

The capacity table (Table 2-2) details that additional capacity is needed near Lumberton because of the spacing of the sidings[3]. Originally, it was considered to relocate the Lumberton Siding south of town to equalize capacity and eliminate the presence of grade crossings within the siding. However, ultimately it was decided not to construct a new siding south of Lumberton at Hillsdale (MP 116-118). The relocated Lumberton Siding would have been closer to Derby (129.7 to 131.9). However, the siding would have been constructed on a significant grade and was, therefore, deemed undesirable.

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[3] 18 miles north to Richburg and 18 miles south to Derby, which result in capacities per day of 24 and 23 trains.

Figure 4-12: Lumberton Siding

Source: Burk-Kleinpeter, Inc., September 2002

It is recommended that the existing Lumberton Siding be extended northward to MP 110.4. The new 3-mile siding would be upgraded by installing 40 mph turnouts at each end in place of the 15 mph turnouts that are located at the ends of the existing siding. The option of constructing a new siding south of Purvis (between MP 102-104) to increase capacity by reducing the distance between the upgraded Lumberton Siding and the Richburg Siding was considered, but later discarded. Even though there would not have been any grade crossings in the siding, it would have been located in a vertical sag curve and heavy, costly grading would have been involved and also the siding would have been located too close to the Richburg Siding. Therefore, the Purvis Siding option was discarded in favor of the Lumberton Siding extension and the previously discussed Derby Siding extension.

Figures 4-13 and 4-14 include track charts of the Richburg and Lumberton Siding extension Table 4-11 includes curve and superelevation work, and Table 4-12 includes the estimated costs and time savings for all upgrades in the segment.

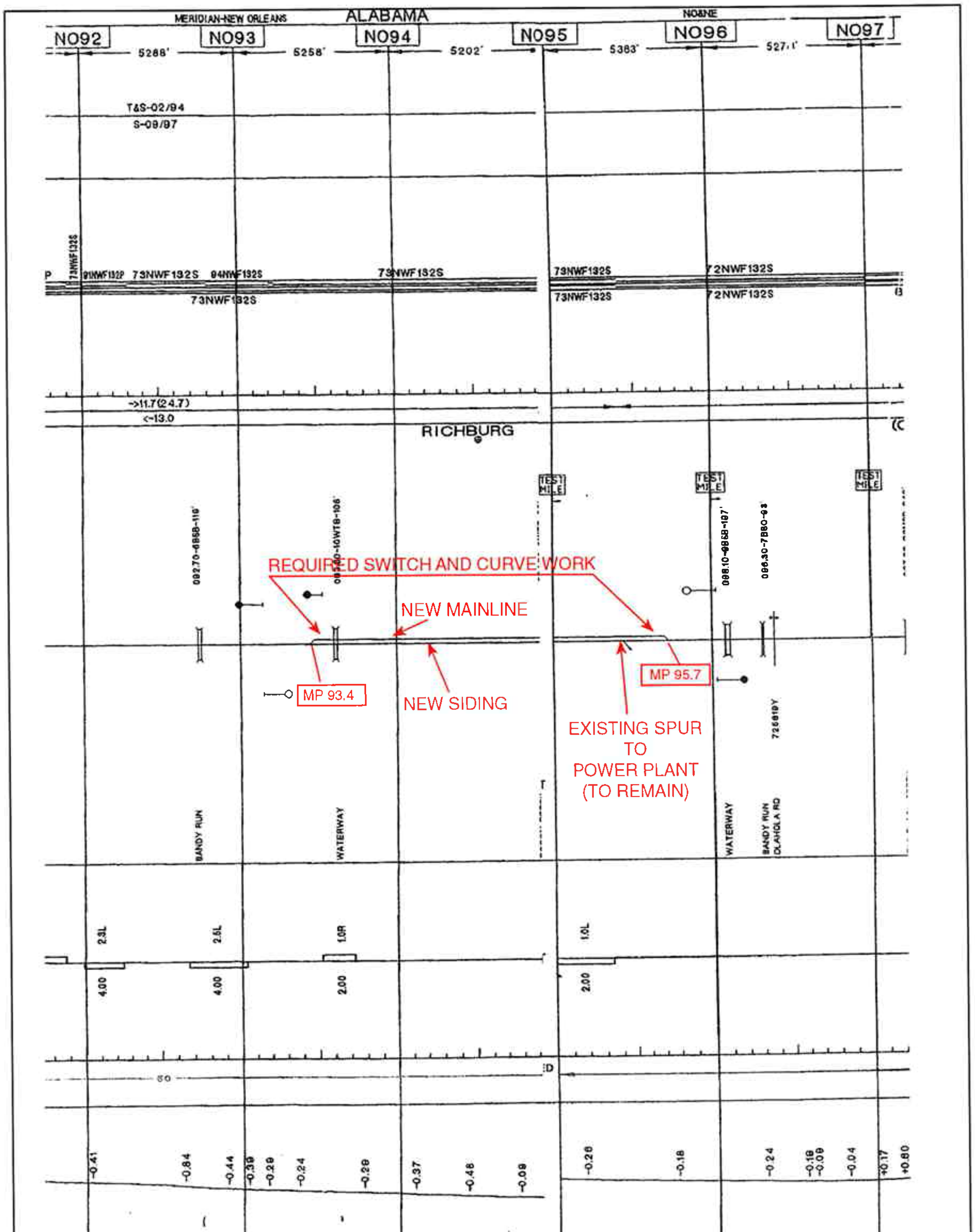

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Figure 4.13
RICHBURG MAINLINE SIDING SWAP

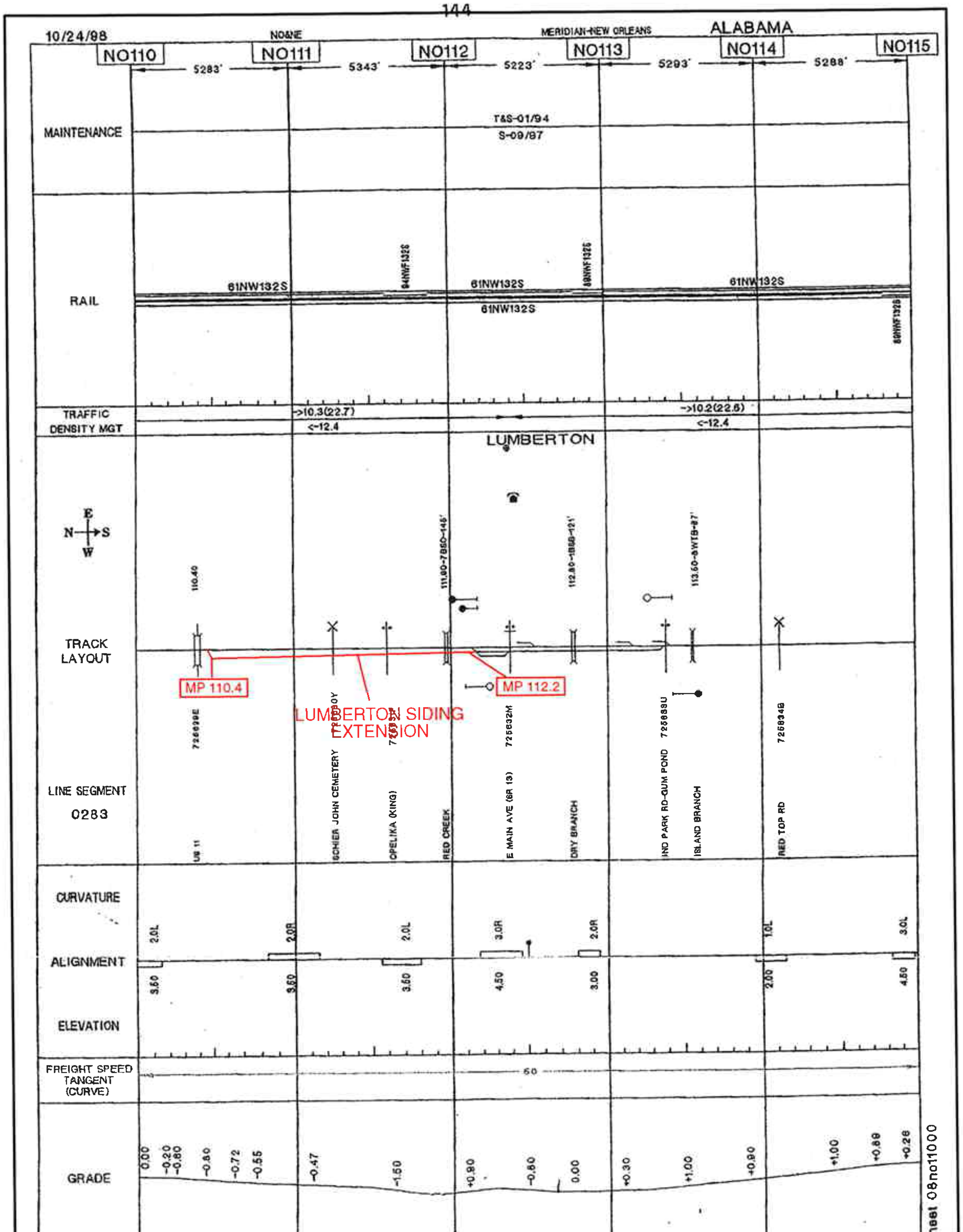

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Figure 4.14
LUMBERTON SIDING EXTENSION

Table 4.11: Curve and Superelevation Improvements

South End of Dragon to South End of Lumberton (MP 87.8 to MP 121.0)

Milepost	Current Degree of Curvature	Exist Ea (inches of Super-elevation)	Time Table Speed (mph)	Prop'd Avg Ea (inches of Super-elevation)	Proposed Maximum Speed (mph)	Expected Horizontal Shift (ft)
88.0	2.0	3.0	60	5.0	75	0.00
88.1	2.0	3.0	60	5.0	75	0.10
89.0	2.0	3.0	60	5.0	75	0.00
89.1	6.0	5.0	40	5.0	40	0.19
90.0	5.0	4.5	40	4.5	45	2.25
91.0	2.3	4.0	79	5.0	70	0.11
91.1	2.3	4.0	60	5.0	70	0.00
92.0	2.5	4.0	60	4.5	65	2.24
93.0	1.0	2.0	79	2.5	79	0.26
94.0	1.0	2.0	79	2.0	75	2.67
97.0	2.0	3.5	65	5.0	75	2.48
98.0	2.0	3.5	65	5.0	75	0.07
100.0	2.0	3.5	65	5.0	75	2.27
100.1	2.0	3.5	65	5.0	75	2.27
100.2	2.0	3.5	65	5.0	75	2.27
101.0	2.0	3.5	65	5.0	75	0.00
105.0	0.8	1.5	79	2.5	79	0.00
108.0	1.0	2.0	79	2.5	79	0.00
109.0	2.0	3.5	65	5.0	75	0.09
110.0	2.0	3.5	65	5.0	75	2.52
111.0	2.0	3.5	65	5.0	75	0.00
112.0	3.0	4.5	79	5.0	65	0.10
112.1	2.0	3.0	79	5.0	75	0.92
113.0	1.0	2.0	79	2.5	79	0.10
114.0	3.0	4.5	55	5.0	60	0.16
115.0	2.0	2.5	55	5.0	75	0.00
116.0	3.0	4.5	55	5.0	60	0.00
116.1	2.0	3.5	65	5.0	75	0.00
117.0	2.0	3.5	79	5.0	75	0.00
117.1	1.0	2.0	79	2.5	79	0.00
118.0	2.0	3.0	60	5.0	75	1.98
119.0	2.5	4.0	60	4.5	65	1.96
119.1	5.0	5.0	45	5.0	45	1.96
120.0	4.0	4.0	79	5.0	55	1.96
121.0	0.5	1.0	79	1.5	79	1.57

Source: Parsons Trasnportation Group, September 2002

Table 4.12: Estimated Construction Costs and Time Savings

South End of Dragon to South End of Lumberton (MP 87.8 to MP 121.0)

SUBTOTAL CURVE IMPROVEMENTS (see previous page for locations)							**$**	**1,034,713**
CTC	Interlocking		ABS		Electric Locks		Subtotal	
Upgrade Richburg Siding	*$*	*1,388,586*	*$*	*1,838,003*	*$*	*291,573*	*$*	*3,518,162*
Extend Lumberton Siding	*$*	*2,773,667*	*$*	*2,864,705*	*$*	*1,093,397*	*$*	*6,731,769*
SUBTOTAL CTC UPGRADES							**$**	**10,249,931**
Siding Work	Track Work		Structures		Cut/ Fill		Subtotal	
Upgrade Richburg Siding	*$*	*1,814,672*	*$*	*345,654*	*$*	*115,301*	*$*	*742,926*
Extend Lumberton Siding	*$*	*2,794,298*	*$*	*937,989*	*$*	*115,301*	*$*	*1,825,098*
SUBTOTAL SIDING UPGRADES							**$**	**2,568,024**
TOTAL PHASE IMPROVEMENTS							**$**	**13,852,668**

TOTAL TIME SAVINGS (min:sec)	**2:49**

Source: Parsons Transportation Group, September 2002

NE Tower to Oliver Yard (MP 193.6 to MP 194.1) and Oliver Yard to East City Junction (MP 3.6NT to 8.1NT)

The segment between NE Tower and the beginning of the New Orleans Union Passenger Terminal tracks just south of East City Junction includes two projects to decrease travel time. This segment's tracks consists of two Norfolk Southern segments. The first is the final portion of track of the line between New Orleans and Meridian. The second is the New Orleans Terminal (NT) segment, which heads west from Oliver Yard toward Metairie. The first project is to upgrade the turnout near MP 3.6NT, which connects the Union Passenger Terminal track to the Norfolk Southern track near East City Junction. In addition, this first project is relatively easy to implement and inexpensive and was discussed as a short-term recommendation. The second project involves constructing approximately 1-mile of track to connect the New Orleans to Meridian segment to the New Orleans Terminal segment. Furthermore, this project requires further review to determine if it can fit within available clearances and determine if CSX will cede a portion of their right-of-way, but the project appears viable and is worth mentioning because it could save as much as two minutes of travel time.

Elysian Fields to NE Tower

Timing from the Amtrak video reveals that a northward Amtrak train takes four minutes five seconds from the CSX switch in Track 1 Elysian Fields to the CSX at-grade crossing with the NS at NE Tower. The track-distance is approximately 1.27 miles, which indicates that the average speed is 18.6 miles per hour.

A short length of CSX track currently forms the hypotenuse between the two NS legs of the New Orleans Meridian segment and the New Orleans Terminal segment, and is 0.92 miles in length. From the aerial photographs and USGS maps, it appears feasible that a curve could be built beginning at NE Tower and a new NS track constructed parallel to the CSX tracks. The new track would connect to the New Orleans Terminal segment at Elysian Fields. See Figure 4-15 and Figure 4-16. If an average speed of 30 mph could be achieved, over two minutes would be saved.

LEGEND

NS MAINLINE — — — —

CSX MAINLINE —·—·—·—

FIGURE 4-15

NE TOWER CONNECTION

NE TOWER TO ELYSIAN FIELDS BYPASS

N

0 200 400
FEET

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LEGEND

NS MAINLINE — — — —

CSX MAINLINE —·—·—·—

FIGURE 4-16
ELYSIAN FIELDS CONNECTION
NE TOWER TO ELYSIAN FIELDS BYPASS

N

0 200 400 FEET

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Analysis

A connection at NE having a curvature of about 8.8 degrees appears not to encroach on the overhead highway-bridge columns. This connection will be discussed in detail later in the report. A bridge over the north-south running canal drainage ditch would also be needed.

An open track space, north of and adjacent to the CSX tracks, exists over the entire distance between NE Tower and Elysian Fields, including a track span in the bridge over Franklin Ave. The open track bay, where a track previously existed, is visible from aerial photography. Aerial photos show these tracks; however, it is known that CSX has since removed all tracks except the two main tracks.

From the Amtrak video, the connections to CSX at Elysian Fields are No. 10 turnouts. The Northward CSX track crosses NS Track 2 over a moveable point crossing. A rather sharp curve, which appears to be about 9.5 degrees as measured from USGS maps and aerial photos, is behind the crossing going north on CSX.

Going north on NS from Elysian Fields, the NS track makes a right degree turn on a single tracked wye starting at Terminal Junction that connects the NT and the NO Lines at Oliver Junction. The degree of curve as measured from USGS maps and aerial photos appears to be about ten degrees. An arrangement of spring switches allows nonstop moves in both directions.

Current Operations

NS Southward Moves
Starting at NE southward NS trains encounter the following situations.

1. They cross the flow of southward CSX trains at NE.
2. They cross the flow of northward CSX trains at NE.
3. They operate through the spring switches at Oliver and Terminal Junctions.
4. They traverse the 15 mph single-track wye between Oliver and Terminal Junctions and conflict with northward NS trains there.
5. They cross the flow of northward CSX trains again at Elysian Fields at the No. 10 moveable point crossing.
6. CSX merges into NS Track 2 at Elysian Fields.

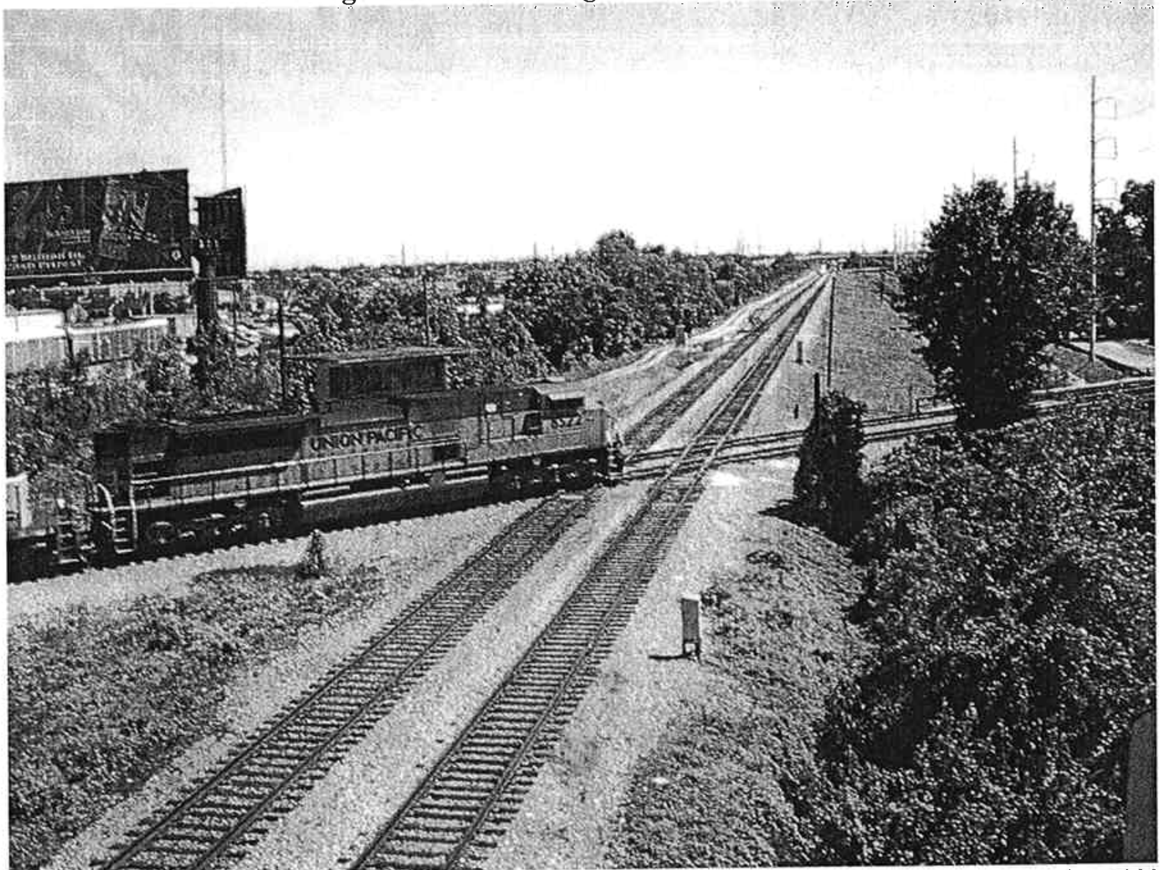
NS Northward Moves
Starting at Elysian Fields northward NS trains encounter the following situations.

1. They operate through the spring switches at Oliver and Terminal Junctions.
2. They traverse the 15 mph single-track wye between Oliver and Terminal Junctions and conflict with southward NS trains there.
3. They cross the flow of northward CSX trains at NE.
4. They cross the flow of southward CSX trains at NE.

CSX Southward Moves
Starting at NE southward CSX trains encounter the following situations.

1. They cross the flow of northward NS trains at NE.
2. They cross the flow of southward NS trains at NE.
3. They merge into NS Track 2 at 15 mph at Elysian Fields.

Figure 4-17: SB freight on CSX Track 2 in front of NE Tower



Source: Burk-Kleinpeter, Inc., September 2002

CSX Northward Moves
Starting at Elysian Fields northward CSX trains encounter the following situations.

1. They diverge from NS Track 1 at Elysian Fields over a 15 mph turnout.
2. They cross the flow of southward NS trains at the No. 10 moveable point crossing.
3. They again cross the flow of southward NS trains at NE.
4. They cross the flow of northward NS trains at NE.

Proposed Operations

The following section discusses the proposed operations of the NS and CSX freight. Figure 4-15 and Figure 4-16 can be used as a reference in this discussion.

NS Southward Moves
Starting at NE southward NS trains moving from the NO Line to the NT Line encounter the following proposed situations.

1. Traverse the new Track 1
2. Crossing the flow of southward CSX trains at NE is eliminated.
3. Crossing the flow of northward CSX trains at NE is eliminated.
4. Operation through the spring switches at Oliver and Terminal Junctions is eliminated.
5. Traversing the 15 mph single-track wye between Oliver and Terminal Junctions and conflicts with northward NS trains there are eliminated.
6. Re-crossing the flow of northward CSX trains at Elysian Fields at the No. 10 moveable point crossing is eliminated.
7. The No. 10 moveable point crossing is eliminated.
8. The CSX merge into NS Track 2 at Elysian Fields remains.
9. Trains save 0.35 miles in distance.
10. Passenger trains will save two minutes
11. Freight trains will save four minutes or more depending upon whether they were stopped at the junctions.

NS Northward Moves Using the Current Route
Starting at Elysian Fields northward NS trains has two options. The first is to use the current route and the second is to use the new track, which is the preferred route. Using the current route, the northward NS trains encounter the following situations.

1. They operate through the spring switches at Oliver and Terminal Junctions.

2. They traverse the 15 mph single-track wye between Oliver and Terminal Junctions but the conflict with southward trains is eliminated because they will use the new track. Building the new track creates a double track for NS.

3. They cross the flow of northward CSX trains at NE.

4. They cross the flow of southward CSX trains at NE.

5. Nonstop passenger and freight trains save no time.

NS Northward Trains using the New Track between Elysian Fields and NE
Starting at Elysian Fields, the northward NS trains using the new track encounter the following situations.

1. Traverse the new Track 1

2. They cross the flow of southward CSX trains at Elysian Field instead of at NE using No. 20 turnouts at 35 mph.

3. The operation through the spring switches at Terminal and Oliver Junctions is eliminated.

4. The operation around the 15 mph wye track between Terminal and Oliver Junctions is eliminated.

5. Crossing the flow of northward trains at NE is eliminated.

6. Crossing the flow of southward trains is transferred to Elysian Fields.

7. Trains save 0.35 miles in distance.

8. Passenger trains will save two minutes.

9. Freight rains will save about four minutes or more depending whether the trains were stopped at the junctions.

CSX Southward Moves
Starting at NE, the southward CSX moves encounter the following situations.

1. They cross the flow of fewer southward NS trains at NE.

2. They cross the flow of fewer northward NS trains at NE.

3. They merge onto NS Track 2 at Elysian Fields at 35 mph rather than at 15 mph.

<u>CSX Northward Moves</u>

Starting at Elysian Fields, the northward CSX trains encounter the following situations.

1. They diverge from NS Track 1 at Elysian Fields at 35 mph rather than 15 mph. The No. 10 moveable point crossing allows realignment of the track to install No. 20 turnouts.

2. They cross the flow of fewer southward NS trains at NE.

3. They cross the flow of fewer northward NS trains at NE.

Proposed Track Changes at NE Tower

The following discusses the proposed track changes at NE Tower. Figure 4-15 and Figure 4-16 can be used as a reference in this discussion.

Two tracks of NS cross two tracks of CSX at NE Tower. The crossing angle as measured from aerial photos is 42 degrees. A drainage ditch also runs parallel to NO Line Track 1 at about 100 feet. CSX tracks cross this ditch. An aerial photo shows the area being discussed. The goal speed for the curve is 30 mph.

It is proposed that a track be constructed north of the two CSX tracks between NE Tower and Elysian Fields This would give NS a new higher speed Track 2 between NE Tower and Elysian Fields, eliminating many of the conflicts at the two locations discussed above. It also would give CSX a higher speed junction at Elysian Fields. That will be discussed in the next section.

A complicating factor in constructing a curve at NE Tower to connect NS Track 2 to the new track is the presence of an overhead highway bridge paralleling the CSX tracks. The south edge of the highway-bridge is about 215 feet north of the southward CSX track (200 feet from the point of intersection with the new track). The new track must be constructed to miss the support posts of the highway bridge. Also to fit a curve, the current Track 1 (southward track) between NE Tower and Oliver Junction would have to be removed. That should not cause any operational problems because a new and better Track 1 is being constructed. A pair of No. 15 or No. 20 interlocked crossovers would be provided north of the highway bridge to gain access to the remaining Track 2 (northward track). The crossovers are out of view on the photo.

From the Amtrak video, it appears that four or five feet might be available to move the track under the highway-bridge and maintain a ten-foot distance from the center of the track and the face of a post. The aerial photo gives a better estimate. A juncture between bridge slabs parallels NS Track 2 about 17 feet from the center of the Track 1, as scaled from the aerial photo. It is assumed that the row of posts is centered under the juncture. If the posts are five feet in diameter, the existing spacing between the center of Track 1 and the face of the posts could be about 14.5 feet. Therefore, the maximum movement of the track can be about four to 4.5 feet. Of course, this all must be verified by field measurements.

The movement of the track toward the posts is necessary to fit an acceptable curve, so the point of curve will be located under the bridge. The copy of an aerial photo shows how a nine-degree curve would fit without a spiral. It shows that the track is moved about two feet at the edge of the bridge. To install a spiral at the end of the curve the entire curve would be moved towards the posts even more. The sum of the two movements should not exceed four feet.

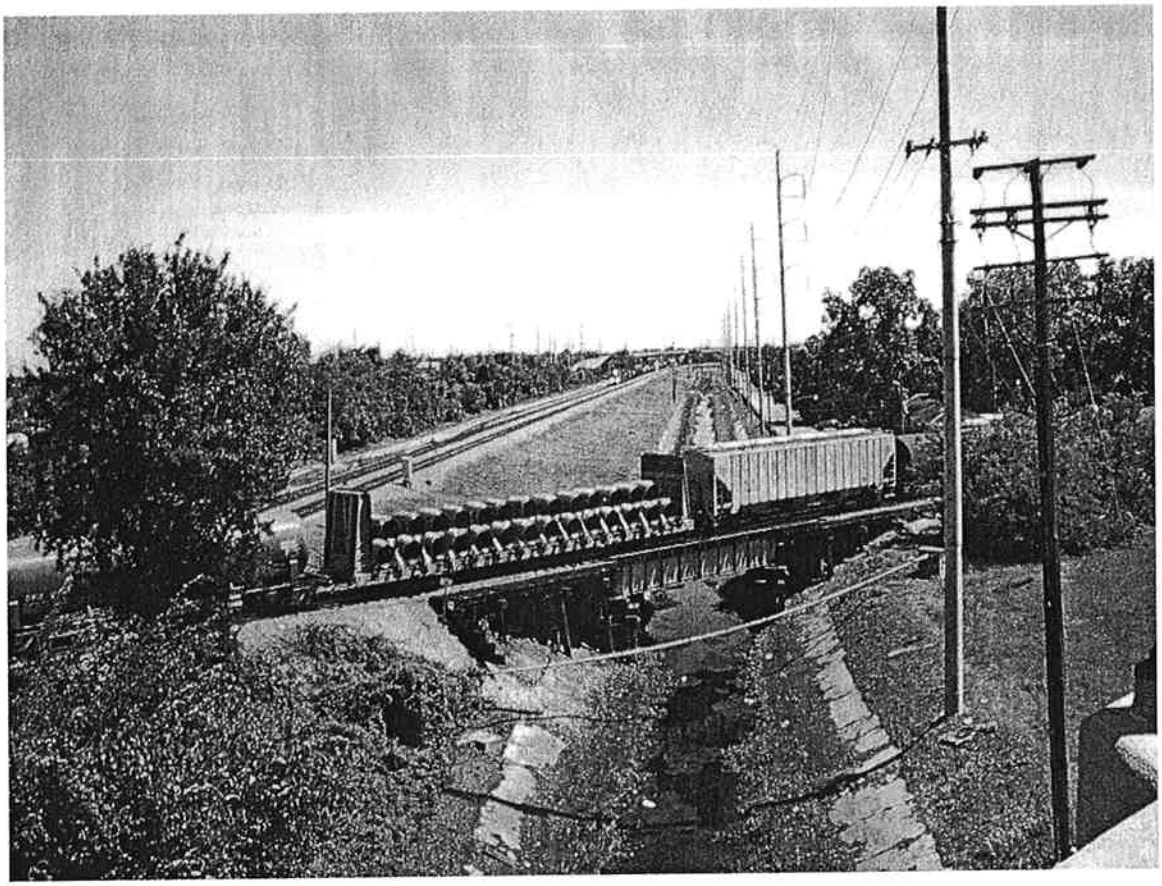
For a 42-degree intersection angle the tangent distance for an 8.8-degree curve is 250 feet and would place the point of curve at the midpoint of the overhead bridge. To achieve 30 mph, a spiral of about 200 feet is required (actually 186 feet is the minimum) to run in three inches superelevation. The imbalance would be 2.54 inches.

Calculations show that an 8.8-degree curve would move the track towards the post 1.92 feet as shown at the edge of the bridge on the photo. A 200-foot spiral would offset that 2.55 feet more for a total of 4.47 feet, which may too much. However, a 186-foot spiral would move the track only 2.2 feet for a total of 4.13 feet. Another possibility would be to lower the degree of curvature to 8.5 degrees in order to lengthen the tangent distance for the curve to 259 feet and start the curve further under the bridge rather than the center. That would move the track 2.58 feet at the edge of the bridge. A 150-foot spiral would move it an additional 1.39 feet, a total of 3.97 feet, which would be acceptable. With 2.5 inches superelevation, the imbalance at 30 mph would be 2.85 inches, which is barely acceptable. It is concluded that pushing the speed to 30 mph might move the track inward too much and make the imbalance too much. That cannot be ascertained with the data available.

Therefore, a 25-mph speed on the curve might be the best that can be expected. That speed would require a 150-foot spiral to run in two or 2.5 inches superelevation. A 150-foot spiral would move the track 1.44 feet, or a total of 3.35 feet.

Finally, at NE Tower, a new bridge over the existing drainage canal will be needed.

Figure 4-18: SB freight on CS Track 2 over drainage canal. NB Norfolk Southern train in distance.



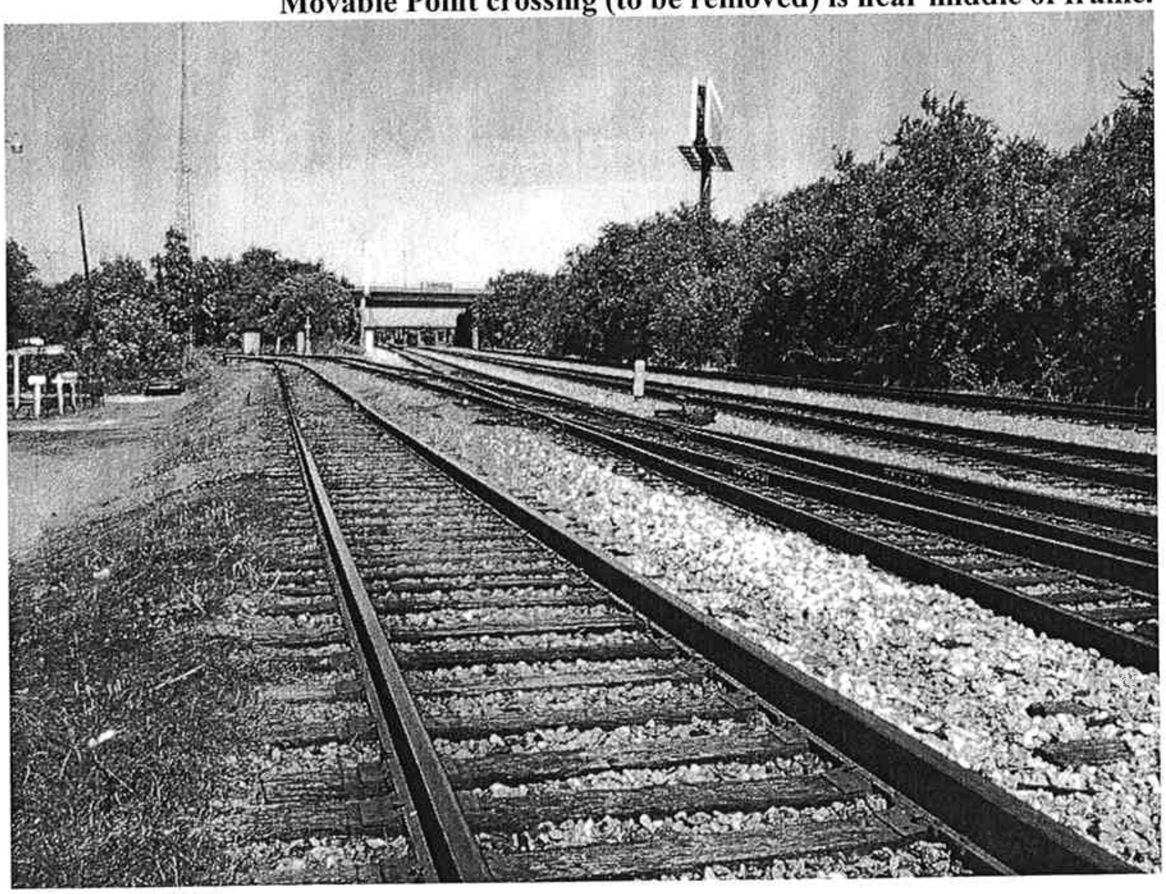
Source: Burk-Kleinpeter, Inc., September 2002

Proposed Track Changes at Elysian Fields

The following discussed proposed track changes at Elysian Fields. Figure 4-15 can be used as reference in this discussion.

The key to reconfiguring the interlocking and increasing the speed for CSX is eliminating the No. 10 moveable point crossing. Because the new southward track provides a higher speed route, NS Track 2 (southward track) between Elysian Fields and Terminal Junction can be removed, which eliminates the crossing. This is shown in Figure 4-16.

Figure 4-19: CSX/NS Junction near Elysian Fields. Movable Point crossing (to be removed) is near middle of frame.



Source: Burk-Kleinpeter, Inc., September 2002

With the crossing removed a No. 20 turnout can be placed into NS NT Track 1 at the appropriate location and that leaves room to realign the 9.5-degree curve to 6.5 degrees, giving a 35 mph route for northward CSX trains instead of the current 15 mph.

Connecting the new NS track to NT Track 2 is more complicated. The current left-hand No. 10 crossover located just east of MP NT 7 will be replaced by a new left-hand No. 20 turnout at Frenchman Street. The current No. 10 turnout in Track NT 2 leading to CSX will be replaced with a No. 20 turnout.

Figure 4-20: CSX Track 2 on right meeting NS Track 2.

This turnout is to be replaced with a No. 20 turnout.
Source: Burk-Kleinpeter, Inc., September 2002

Going north, the new NS track begins by installing about 400 feet of a left-hand 1.75-degree curve (the curvature of a No. 20 turnout). That curve would begin where the current crossover is located at MP NT 7.1. In that curve, a No. 20 turnout will be installed to lead to the southward CSX track. The lead to CSX will be straight and the turnout side will lead to the new NS track. The curve behind the frog connecting to the southward CSX track appears to be about 6 degrees, good for 35 mph for CSX. The curve to the new NS track compounds to about a six-degree curve, also good for 35 mph.

Items To Be Clarified Upon Further Review

1. Although it is recommended that the new connector track be owned and operated by Norfolk Southern, CSX presumably still owns the right-of-way that their track was previously on. An arrangement between the two railroads would be required.

2. Norfolk Southern should be consulted to determine if they would be willing to own and maintain the track. The number of run-through trains from Norfolk Southern or other railroads that utilize the New Orleans Terminal tracks that do not stop at Oliver yard is unknown. These trains that bypass Oliver Yard would benefit from this new connector.

3. Surveys of the site are needed to determine if the radius of the size recommended could be installed at the I-610 overpass could be installed. If the tangent must be lengthened and a smaller radius used, the utility of the connection could be reduced because of the reduction in speed.

Table 4-13 includes the estimated costs and timesavings for this segment of the project.

Table 4.13: Estimated Construction Costs and Time Savings

NE Tower to Oliver Yard (MP 193.6 to MP 194.1) and
Oliver Yard to East City Junction (MP 3.6NT to 8.1NT)

CTC Upgrades	Interlocking	ABS	Electric Locks	Subtotal	
Elysian Fields-NE Tower	*$ 4,830,141*	*$ 1,324,451*		*$*	*6,154,592*
SUBTOTAL CTC UPGRADES				**$**	**6,154,592**
	Cut/Fill	Track	Structures	Subtotal	
Elysian Fields-NE Tower	*675,479*	*3,422,227*	$2,183,965		6,281,672
SUBTOTAL TRACK WORK				**$**	**6,281,672**
TOTAL PHASE IMPROVEMENTS				**$**	**12,436,264**

TOTAL TIME SAVINGS (min:sec)	**2:00**

Source: Parsons Transportation Group, September 2002

5. KCS/NS Meridian Interlocking

SOUTHERN RAPID RAIL TRANSIT COMMISSION

Review of Meridian Operations and Infrastructure

The overlapping and complex interlocking relationship between KCS and NS at Meridian, MS was reviewed as part of this study to:

1. Determine if the current operations and infrastructure could be improved to reduce travel times, and

2. Determine if the possible future operations of an Amtrak western route to Dallas could be coordinated at the Meridian station.

A home video of the KCS Meridian Subdivision copyrighted by Pentrex in 1999 contributed greatly to knowledge of the operations at Meridian. The Pentrex video was supplemented by an Amtrak video taken April 2001 from the head end of trains 19 and 20; some on-the-ground views were filmed at the same time. Both railroads were also contacted to determine if either had plans or methods of addressing operational and infrastructure issues in Meridian.

Because the two railroads and Amtrak should have operating agreements in place before a final recommendation or any work being commenced, additional detail needs to be obtained, which addresses typical train movements of the existing schedules and any future Amtrak routes.

NS and KCS Interfaces in Meridian

Both the KCS and NS railroads have yards adjacent to each other in Meridian. Both yards are on the southern side of the mainline tracks as they pass through Meridian; however the KCS tracks are north of the NS tracks, which causes KCS trains to cross the NS tracks as the trains are built or pass through Meridian. NS timetables and track charts identify three interfaces with the KCS in Meridian:

- The first interface is an automatic interlocking at MP 294.8, about 0.2 miles north of the passenger station where two NS tracks cross one KCS track. The KCS line was formerly a main line of the GM&O between St. Louis and Mobile. Today, it is no longer a through route but a route that is referred to as the Artesia line.

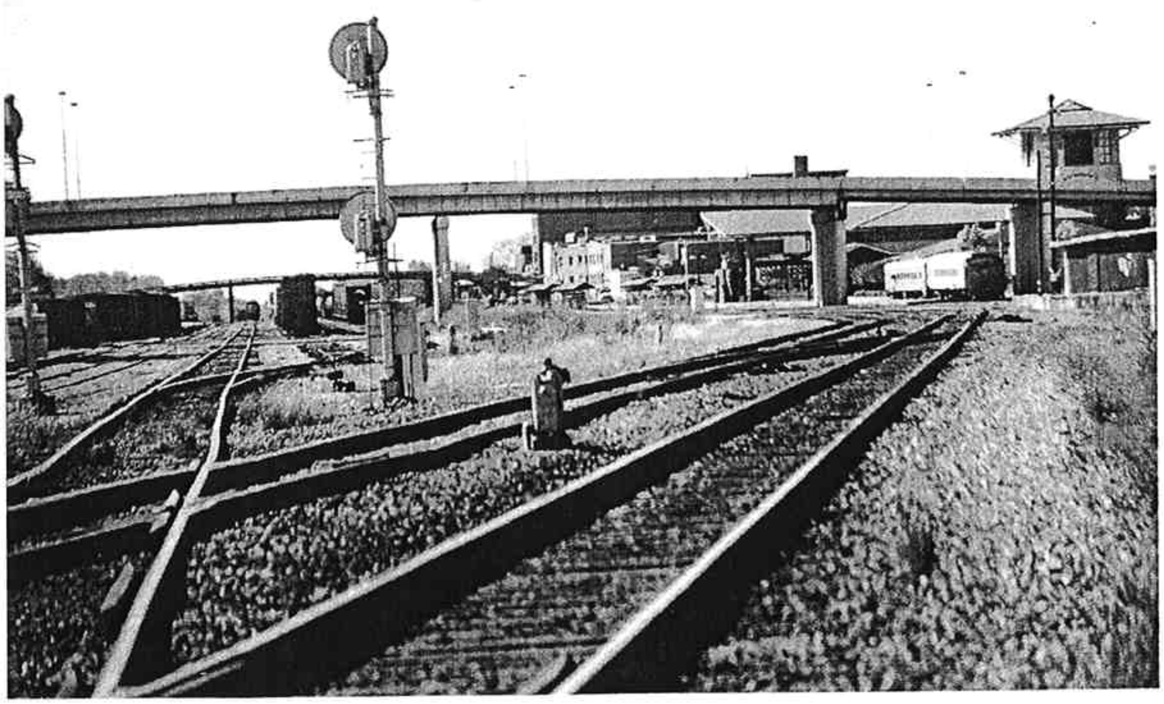
- The second interface is an unnamed KCS crossing located about 2,500 feet south of the Meridian station at MP NO 0.2[1]. KCS owns and maintains this

[1] MP NO 0.0 is located about 1500 feet south of the station at NS MP 295.44.

junction. In addition, this interface, near the south-end of the NS double track, may be owned and maintained by KCS, according to conversations in the Amtrak video.

- The third interface is located at MP NO 1.8 (also KCS MP 1.8). It is not identified as a crossing in the NS timetable, but rather as a non-interlocked junction at 49th Avenue. The junction at 49th Avenue consists of a hand-operated crossover between KCS and the NS single-track and two hand-operated crossovers between the NS main track and the first adjacent NS yard track. When the three crossovers (1, 2 and 3) are in their normal positions, dwarf signals display green for NS straight main track moves; however, they convey no block authority. Four additional hand-operated crossovers between NS yard tracks complete the junction and function as a ladder at the south end of the NS yard.

Figure 5-1
Diamond Crossing of NS tracks by single KCS track near Meridian Station (Looking south towards Meridian station at right of frame)



Source: Burk-Kleinpeter, Inc., September 2002

Existing Facility Usage and Operation in Meridian

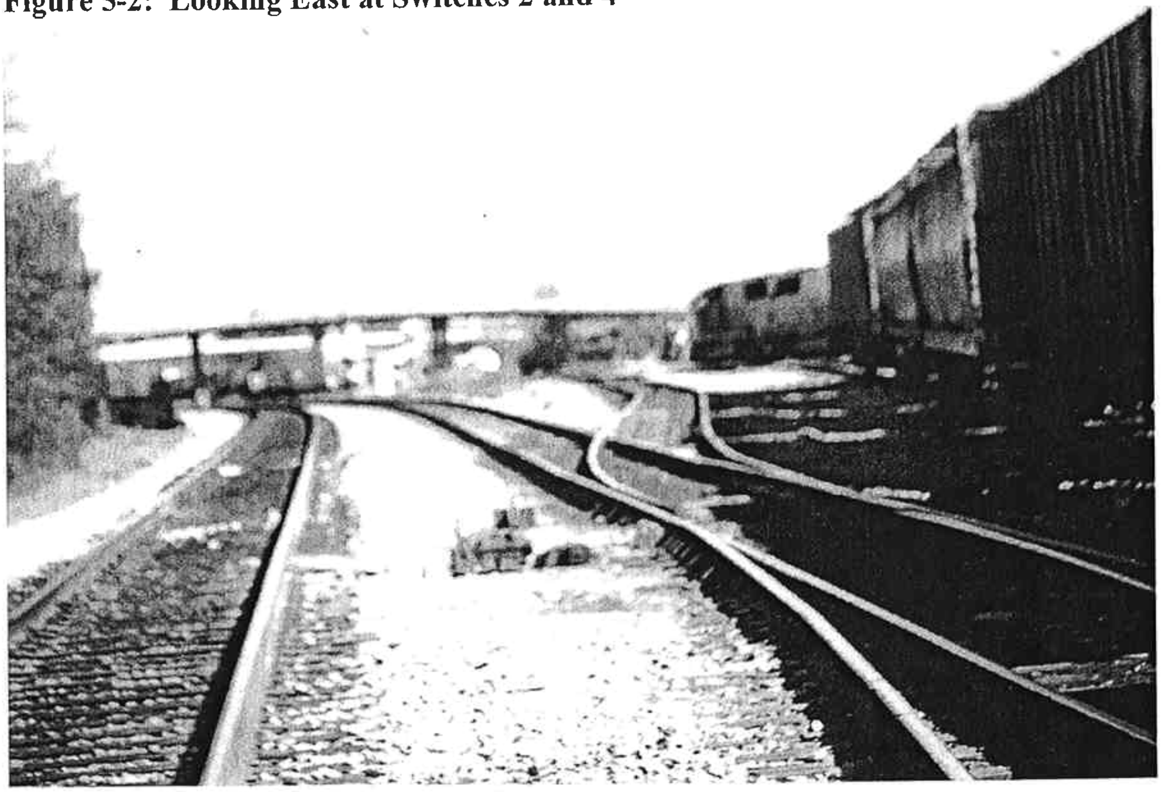
How these junctions are currently used and how they were historically used is important to understanding train operations in and through Meridian. According to the commentary on the Pentrex video, KCS uses the former Gulf, Mobile & Ohio (GM&O) Yard mostly as a dead-end yard. Only a few local trains to a former GM&O line depart from the south end of the yard; none of the local train moves involves NS operations. This former GM&O Yard is annotated on the aerial photograph as the KCS yard (See Figure 5-3). The former GM&O was a north-south route through Meridian to Mobile. The other segment of KCS trackage in Meridian is the former Illinois Central (IC) route to Shreveport, LA from Meridian, MS via Vicksburg, MS. This is now an important transcontinental route for KCS and NS-KCS interchange run through trains. This IC/KCS line terminates at Meridian. Norfolk Southern uses the former Southern (SOU) mainline that passes through Meridian in an almost east-west direction and parallels the KCS route on the southern side for almost two miles into Meridian.

The former IC and the former Southern used the current passenger station, as did the GM&O; however, now only Amtrak serves the station. In 1941, two sleeping cars (one from New York-Shreveport and the other from Atlanta-Shreveport) were interchanged nightly between the SOU and the IC at Meridian. This information indicates that the interchange and switching of passenger traffic at Meridian that is currently being proposed by the Amtrak Crescent Star is not a new proposition.

KCS Hand Operated Switches at MP NO 0.2 (Meridian Jct.)

The connection at MP NO 0.2 (also KCS MP 0.2) is the main crossing and junction point between NS and KCS trains. Figure 5-4 shows the layout. For identification purposes, this location will be referred to as Meridian Junction. The junction is located on a four-degree curve (according to an 1979 ICG track chart) and consists of one crossover between the NS main tracks (switches 1 and 2) and two other turnouts (switches 3 and 4).

Figure 5-2: Looking East at Switches 2 and 4



Source: Burk-Kleinpeter, Inc., September 2002

A third turnout (5), which is the north end of the yard track between Meridian Junction and 49th Avenue, does not involve NS tracks. The Pentrex video shows a local KCS train departing from the section of the GM&O yard designated as B on Figure 5-3. It used the track via A to exit the GM&O Yard and cross the NS. Instructions in the KCS timetable state that all switches of the "crossover" must be lined to establish block protection. After lining the crossover switches, a train has to wait five (5) minutes before fouling the "crossover." Reversing a switch–aligning the route for KCS trains - causes the NS main line signals to display "stop"; however, the meaning of the term crossover is not clear from the timetable. It is unclear whether that means a "crossing" with several switches or a single crossover between two tracks. In this case, it is assumed that "crossover" means the entire "crossing." Nothing is mentioned concerning restoring these switches to their normal positions, nor what the normal positions are.

FIGURE 5-3
RAIL MAP CITY OF MERIDIAN, MISSISSIPPI

LEGEND

- NORFOLK SOUTHERN MAINLINE AND TRACK 1 (green)
- NORFOLK SOUTHERN TRACK 2 (blue)
- KANSAS CITY SOUTHERN MAINLINE (yellow)
- KANSAS CITY SOUTHERN SIDING (red)
- TURNOUT OR CROSSOVER (pink)

N

0 400 800 FEET

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LEGEND

- NORFOLK SOUTHERN MAINLINE AND TRACK 1 (green)
- NORFOLK SOUTHERN TRACK 2 (blue)
- KANSAS CITY SOUTHERN MAINLINE (yellow)
- KANSAS CITY SOUTHERN SIDING (red)
- TERMINAL TRACK 1 (black)
- TURNOUT OR CROSSOVER (red)

N
0 100 200
FEET

FIGURE 5-4
"MERIDIAN JUNCTION"
NS-KCS INTERCHANGE

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In the Pentrex video, a yard crew is shown making up a large train - KCS Train 72 - but the train is not shown departing the yard. Points on Figure 5-3 are referenced in this discussion. Furthermore, the video does show the departing KCS Train 72 passing 49th Avenue on the former IC main track and KCS Train 72 definitely was not using the junction at 49th Avenue. Therefore, Train 72 had crossed the NS at point A on Figure 5-3, and therefore freight trains could depart the KCS yard in one of three ways:

- The trains could be made up in one piece and the rear of the trains would be backed across the automatic interlocking east of the station (Point D) before pulling forward to Point A.

- The trains could be made up in pieces on tracks in the portion of the yard shown with a B and then doubled out by the road crew and air tested while blocking the NS crossing.

- A yard crew could build the train on the siding between Meridian Junction and 49th Avenue.

The latter is the operation that seems most appropriate for the track configuration. The latter two methods require switching over the NS main tracks, but all three block the NS main tracks. Unless KCS has someone assigned to normalize the switches for NS trains at Meridian Junction, the switches would be left as last used. The NS timetable states that a train must approach these switches expecting them to be set against the move regardless of what signal aspect is displayed.

The Amtrak video shows a KCS locomotive standing on the siding at 49th Avenue with cars behind it. The Pentrex video does not show Train 72 being made up on this track. It makes little difference what method KCS uses because it is clear that the current layout of the KCS yard is not well suited for yarding and dispatching long trains from/to the former IC line.

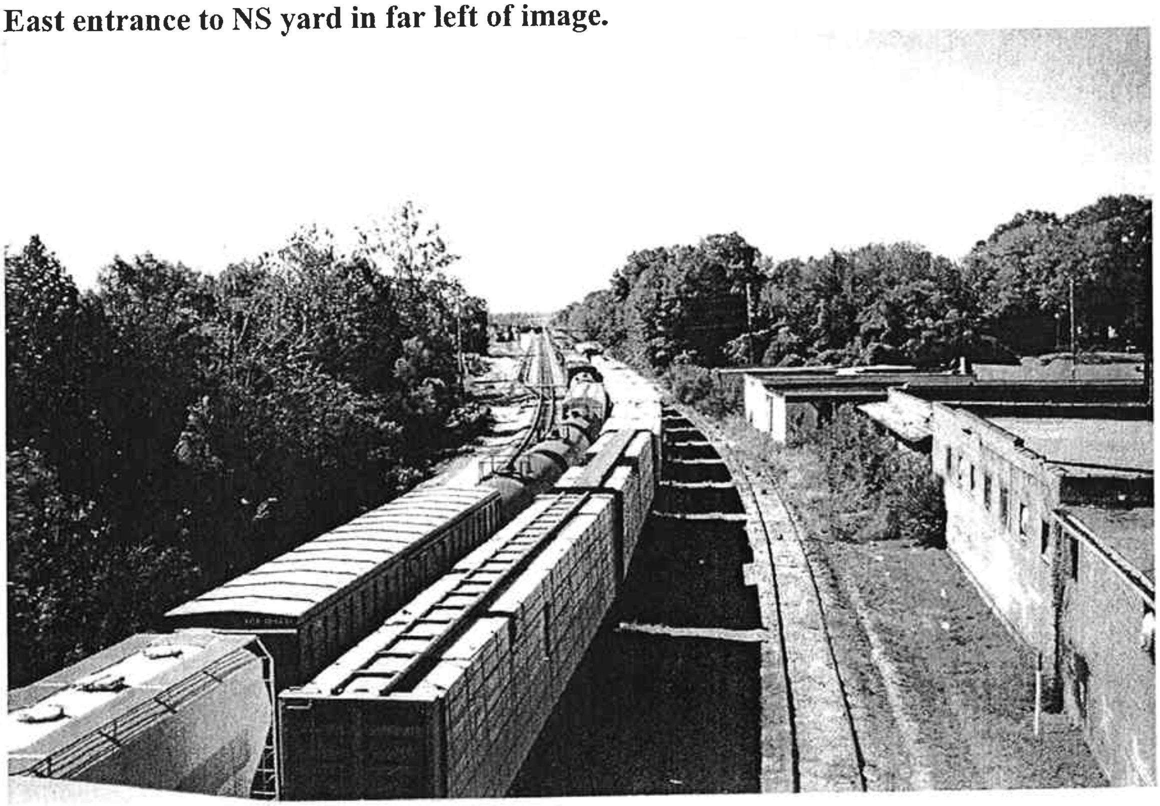
If the junction at 49th Avenue were an acceptable alternative for KCS trains to cross NS, the problem of switching over the NS main tracks at Meridian Junction could be almost entirely eliminated. Long KCS trains could be yarded and dispatched better by using a running track through the joint interchange yard via Point C; however, a bridge in disrepair over a waterway that connects these two yards would have to be rebuilt. For that reason, this is not the recommended solution. Having long trains snake through five successive crossovers to cross NS tracks at 49th Avenue, even if they were interlocked, would be an undesirable operation. In addition, reconstruction of the bridge would be costly. Even if this crossing were being used, Meridian Junction would continue to be necessary to handle run-through trains.

The Pentrex video indicates that Meridian is a crew-change point for NS; therefore, no NS freight train passes through Meridian without stopping. A southward NS train was shown passing the passenger station and the train stopped to change crews, according to the Pentrex commentary. The NS double track ends on a curve at a spring switch aligned and locked for movement to the northward track at 27th Avenue (MP NO 0.4). The end of double track has a 15-mph speed limit since the turnout is off the inside of the four-degree curve and is sprung going south.

As soon as a northward freight train passed the station in the Pentrex video, the southward freight train began to move. Apparently, the southward freight train had stopped at the end of the double-track and then waited for the northward freight train, which must have changed crews while on the single track. KCS Junction was blocked the entire time this encounter was taking place. It is assumed that NS trains, except for the NS-KCS run through trains, change crews at the NS Yard.

The Amtrak video shows a standing coal train being refueled; it was blocking the KCS crossing, the end of the double-track, and the single-track at the NS yard. Refueling a train at Meridian apparently is not an isolated operation, as NS has installed a main track fueling facility near MP NO 1.0. A run-through Atlanta–Fort Worth intermodal train was stopped behind the coal train being refueled and waited until the fueling was finished. During this time, trains could not pass through Meridian on either railroad and all grade crossings in town, except 49th Avenue, were blocked. Fortunately, multiple overpasses enable automobiles to cross the tracks. The crossing at 31st Avenue is apparently blocked hours on end by standing KCS cars. Automobiles use the 29th Street overpass to avoid being delayed.

Figure 5-5
KCS trains stopped on siding and mainline near 29th Avenue.
East entrance to NS yard in far left of image.



Source: Burk-Kleinpeter, Inc., September 2002

Run Through Trains

The arrival of the run-through Atlanta–Fort Worth intermodal train is another informative scene in the Pentrex video. The intermodal train pulled into the junction and stopped short of the switches. This intermodal train became KCS Train 8. The NS crew (three men) detrained as a KCS crew (two men) arrived. Before entraining Train KCS 8, the conductor threw a manually operated switch immediately in front of the locomotive to move from the NS to the KCS. That would be switch 4 in Figure 5-4. Figure 5-4 clearly shows that these switches are on a right hand curve. The NS end of double track also is clearly shown as being on the curve.

If a KCS crew were not immediately available, a south or westward freight train would stand on the NS main track (as the coal train did) until a crew became available or other arrangements to handle the train were made. For example, the train could be pulled into the NS yard, and the KCS train could depart via the junction at 49th Avenue after a crew became available. Alternatively: 1) a merchandise train may have a Meridian block of cars on the head end to set off into the NS yard; 2) NS may wish to add through KCS cars to the head of the train; or 3) power is to be exchanged between NS and KCS freight trains. The freight train would then proceed to 49th Avenue to set the cars off, add cars, exchange power, or all three. Restoring the NS main track switches after the rear of the train has entered the KCS main track at 49th Avenue could take many minutes. Either a KCS person, other than the conductor, could restore the switches, or the conductor could restore them and walk the length of the train to reach the locomotive. Another likely alternative is that the entire train could be backed eastward over 49th Avenue (the conductor would protect the crossing) on the KCS main track to pick up the conductor, but only if the track to Meridian Junction is free.

Eastward run-through trains would stand on the KCS main track if an NS crew or exchange power were not immediately available. While run-through power appears to be the norm for intermodal trains, it is likely that power will be exchanged at times. In the Amtrak video, a 1.3-mile long cut of cars, with no power attached to either end, was standing on the KCS main between 49th Avenue and Meridian Junction. It is not clear whether these cars were a run-through train awaiting NS power, or whether they were a terminating train that had been yarded on the main because of insufficient yard space, or lack of time. The operational impact is the same in either case. In this case, it is believed that the train was a run-through train because at least five NS road locomotive units were in the NS engine facility.

49th Avenue

The Amtrak video also shows that the KCS yard was rather full at the time, but the KCS yard locomotive was idle. At the same time, the KCS siding was occupied for its entire length (1.3 miles) by a westward train with a locomotive attached to the west-end of the cars at 49th Avenue. It is not apparent whether or not a KCS crew was aboard the train. However, if the train had a crew aboard it most likely would be awaiting an eastward KCS train.

The next siding west of Meridian on the KCS line is at Meehan, but it is only 4,942 feet long. The next siding of significant length (8,952 feet) is at Hickory 20 miles away. The waiting train, if indeed it was waiting, could not move until the eastward train, if there was one, has passed. However, the eastward train could not pass 49th Avenue until the cut of cars on the main with no locomotive attached was moved. In the case just described, the dispatcher would probably hold the eastward train at Hickory so the westward train on the siding at 49th Avenue could depart and free up a track. The manner in which the main track switch at 49th Avenue is restored is the problem.

KCS-NS Interchange of Cars

The NS timetable has a reference to flagging crossings on the interchange with the Meridian and Bisbee Railroad (M&B). The NS access to the interchange requires crossing the GM&O yard from Point A or entering KCS at Point C, which it cannot accomplish since a bridge connecting the two yards is in disrepair (See Figure 5-3). The Pentrex video shows the KCS yard engine delivering a number of loaded wood chip cars to the M&B. The switch to the M&B is clearly seen in the Pentrex video; it is located under the 22nd Avenue overhead highway bridge just west of the passenger station.

Not all interchange between the KCS and NS is made using run-through trains. The normal interchange procedure is that the delivering road places the interchange cars into a designated interchange track or into the receiving road's yard. A NS train of either direction may contain a Meridian block that may contain cars for a KCS destination other than that of a run-through train. In that case, the NS road crew would set off the block into the NS yard. Subsequently, an NS yard crew would deliver the cars to the KCS yard or a designated interchange track.

A KCS train terminating in Meridian may also have cars going to the NS and it is likely that a KCS yard crew would deliver the cars to the NS. The interchange yard, since it does not involve the NS main track, would be an appropriate location. Another possibility is that cars going to a northward run-through train's destination would be placed in a block of cars that would be set onto the head of a run-through train at Meridian Junction. The handling of these cars would be minimized and transit time would be saved. If that were done, power would be exchanged between the two railroads.

Future Operations

Amtrak is planning to operate a new train between Meridian and Fort Worth. The current configuration of the Meridian station will not support the interchange of cars between the Crescent and the new train. Therefore, in order to create a suitable facility, it is proposed that a former station track (Terminal Track 1 on Figure 5-4) be reactivated and reconnected on both ends to the NS southward main Track 1. All passenger operations in Meridian would then use the reactivated Terminal Track 1 and NS Track 1.

A number of factors must be considered and addressed before operations to Fort Worth could begin:

- First, the northward Crescent would have to reverse the spring switch at the end of the double track in order to access the station, and then restore it, unless the switch is made power operated.
- Second, movement of northward trains on NS Track 1 would be against the current flow, and NS Track 1 is not signaled for northward moves.
- While a northward train is on NS Track 1 in the Meridian station making half-hour-long switching moves, southward freight trains would have to be held at Toomsuba Siding, 13 miles north of Meridian.
- Reverse signaling Track 2 through Meridian would remedy that situation. The north end of double track at Breyers (MP 292.7) is now a powered turnout and is the south end of CTC on the NS.
- The train that arrives first should enter the track farthest from the station so that it will not block platform access nearest to the station. If the first train is short enough, it could be possible to use the track nearest the station by pulling the rear of the train clear of the walkway after unloading passengers.

Recommendations

The following recommendations have been reviewed with both NS and KCS. After much discussion over many months, both railroads have tentatively approved the general plan, pending further detailing.

Minor Track Reconfiguration at Meridian Junction

It would appear that relocating the end of NS double track (MP NO 0.3) from the curve would be a first step in making operations move more freely. The speed for southward trains through the spring switch is 15 mph and moving the turnout to straight track should enable the speed to be raised to 25 mph or more.

The KCS crossing at Meridian Junction is the second area that must be addressed (Refer to Figure 5-4). If the end of NS double track could be moved northward, a simpler track configuration could be used. The current facing switch (4) to the KCS in NS Track 1, located on the curve, invites derailments, especially when switching moves are made.

The Amtrak video indicates that a switch point guardrail protects this switch . When reversed, the left-hand switch point rests against the outer rail of a four-degree curve. The presence of the switch point guardrail makes it apparent that the switch has been a trouble spot in the past. The guardrail is placed just ahead of the right hand switch point so that it holds the wheels from chewing at or climbing the left-hand point. This turnout appears to have a number 10 frog; therefore, the turnout curvature exceeds ten degrees, and may be as much as twelve degrees. This sharp curvature alone should be justification to alter the alignment, especially if Amtrak is to use it.

One option would be to install an interlocked solid crossing of one KCS track over one NS track. That configuration would eliminate switches 1 and 3, but would also eliminate the route for eastward KCS/NS run-through trains. Then, an additional interlocked crossover between the NS tracks would be needed to recreate the route. No reduction in switches would result and the crossing frog would become an additional facility to maintain; however, a solid crossing is NOT being proposed as a solution.

Instead, it is proposed that the end of NS double track be moved east so that it is located east of switch 3. Moving the end of the double track would then allow the following improvements to be made:

- A No. 15 crossover be installed in the tangent between the switch to Terminal 1 and the curve (See Figure 5-4)
- CTC be extended westward from Breyer, 2.5 miles east of Meridian, to include this crossover leaving switches 1, 2, 3 and 5 where they are currently located.

It is important that the crossover be located in the position shown in Figure 5-4, so that northward NS trains from the NS single track may go to:

- NS track 2
- NS track 1
- Terminal 1
- KCS yard

The same four tracks can also be accessed from the KCS main and the KCS siding. Such an arrangement would allow future operations to include the Crescent Star. However, if the proposed Fort Worth passenger train does not materialize, a less confined and a more desirable layout is possible because access to Terminal Track 1 will not be needed.

If the Meridian to Fort Worth Amtrak train does not materialize, the alternate layout would have the crossover located in the west portion of the curve in track 1 at 22nd Avenue, so that the straight side of the turnout is NS Track 1 leading to the end of double track. The turnout is deliberately placed in that location on the curve to minimize the number of trains making diverging moves. The right hand curved side would lead to NS Track 1, which would become a lead to the KCS for run-through trains.

In both layouts, the east turnout of the proposed crossover would replace the troublesome switch 4 in Figure 5-4, and the west turnout of the crossover would replace troublesome switch 6. From a track standpoint, the southward NS speed could be increased from 15 mph to 30 mph. For identification purposes, the relocated new crossover and the switch to Terminal 1 would be called Meridian Interlocking and would be controlled by NS. (KCS has already stated that they do not agree with a solution that would have them relinquish control of the interlocking at Meridian, but a solution that is agreeable to all parties is not currently available.)

Two levels of controlling the switches are possible: manually and interlocked. If switches 1, 2 and 3 remain manually operated and normally locked (switches are not normally locked today) for movements on the new NS single-track crossing, the normal and locked position of switch 2 would be set for movements to and from the new NS/KCS lead track because the switches 1 and 2 must be aligned to make parallel or non-conflicting moves. Having switches set in the manner just described allows:

- Westward NS/KCS run-through trains to move between NS Track 1 and KCS main track without operating any hand- operated switches.
- Eastward KCS/NS run-through trains to operate between the KCS main track and NS Track 1 without operating any hand-operated switches, provided that NS Track 1 between Breyer and Meridian is clear of southward trains.

Both conditions are improvements over today's operations. Manually operating switches 1 and 2, as is currently done, will be required to provide access to NS Track 2. That is not an improvement.

Interlocking turnouts 1, 2 and 3 will provide the following additional improvements:

- KCS/NS run-through trains would have interlocked access to NS track 2 using turnout 1.
- The five-minute wait[1] that is required each time these switches are used plus the time it takes to align all of the switches would be eliminated.
- The need for NS trains to approach this area as if the switches were aligned against their movement would be eliminated.

Consequently, it is proposed that the switches 1, 2 and 3 be powered and interlocked and controlled locally at Meridian. It is proposed that the routes be normally set and signals displayed for NS single-track movements. A move to or from the KCS would require that the switches be thrown. It is also proposed that switch 5 remain manually operated.

Local control of the crossing is proposed so that a person who is directly involved in making the numerous switching moves will handle the switches rather than having a dispatcher located hundreds of miles away do it. Local control does not mean having an additional full time person, such as a tower operator, assigned to throwing the switches. All moves on KCS in Meridian Yard, including the use of the switches in Meridian Junction, are under the verbal control of the KCS yardmaster, so it is logical that the yardmaster also be in control of the powered junction switches. The operation of the interlocking could be as follows:

- When no KCS moves are being made or planned, the interlocking would be in an automatic mode, which would normally allow NS trains to cross the junction without delay. Switches would be aligned for NS trains, but the KCS yardmaster would have a manual override. The same NS signals controlling movement through Meridian Interlocking would also control NS main line moves through Meridian Junction.
- When a move involving KCS tracks is to be made, the KCS yardmaster will choose the route to be taken such as KCS-KCS, KCS-NS or NS-KCS. The switches for the chosen route will operate and the appropriate signal will be displayed, provided that NS is not occupying interlocking circuits.

[1] According to the KCS timetable.

- After the KCS move has been completed, which is when the track circuits have been released, the interlocking would revert back to an automatic mode without manual intervention. The interlocking will also revert to an automatic mode after a KCS route has been displayed and not used for a given amount of time. All signals for moves to and from the KCS would be a restricting aspect, because all or part of the movement would be on yard tracks.

Possible KCS Operational Changes

It is proposed that the KCS siding to 49th Avenue be used as a one-track departure yard for KCS trains originating at Meridian. If room exists for a second track to the north of that track, a two-track departure yard would be advantageous. A yard crew would pull cuts of cars from the portion of the yard east of Point A on Figure 5-4 across NS through the siding west toward 49th Avenue.

When a second pull from the yard is required to make up a longer train, a new manually operated left-hand crossover between the main track and the siding, located about the midpoint of the siding, would allow the second cut to be pulled across the NS tracks rather than being shoved. The yard crew could pull up to the crossover and travel to the KCS main track, if it is free. If the main track were occupied with standing cars, as earlier discussed, the outbound cars would have to be pushed across the NS. Either the yard crew or the outbound road crew could make the track 'solid', which is coupling the cuts of cars together. It would be better if the yard crew did this work so that the road crew would need only to perform the outbound air brake test. The time saved by the road crews on both the NS and KCS means increased efficiency because it could:

- Potentially reduce the incidences of re-crewing en route,
- Potentially reduce overtime,
- Increase locomotive availability, and
- Increase track capacity.

Changes at 49th Avenue

It is also proposed that the west-end of the KCS siding at 49th Avenue be equipped with a spring switch or, preferably, be interlocked and controlled by the yardmaster. In that way the outbound trains made up on the siding would not have to restore the switch to its normal position after the train had departed.

On the NS at 49th Avenue, it is proposed that the crossovers 1, 2 and 3 in Figure 5-6 would be equipped with electric locks controlled by the NS dispatcher and the dwarf signals removed. If the switch to the west-end of the siding, described in the previous paragraph, is interlocked, crossover 1 also should be interlocked and controlled jointly by the NS dispatcher and the KCS yardmaster. Automatic block signals would protect the non-interlocked turnouts. In addition, speed on the main track should be increased to whatever the three-degree curve would permit.

Proposal from Norfolk Southern

The consultant group was not able to prepare a solution that was agreeable to both railroads. The recommendations presented should alleviate some delays by moving and eliminating switches at Meridian Junction. Further work and the final disposition on the Crescent Star are required before a final Meridian solution can be prepared.

NS has developed a plan for Meridian that involves removing the current KCS mainline track from near 49th Avenue to near the end of the NS double track and using the KCS siding and the current NS mainline as a shared mainline for operations in Meridian. Both tracks would be placed under CTC control along with the switches shown at the Meridian Junction in a similar arrangement to what the consultants recommend. NS suggested that they control the interlocking of these switches. While the consultant group is not opposed to the solution prepared by NS, the group is reluctant to recommend this solution without acceptance from KCS and a track for KCS to replace the siding that was now used as a mainline track. A possible solution is to add a siding north of the terminal along a track that KCS refers to as their Artesia connection. NS will then need to approve any switching maneuvers that the Crescent Star requires on their tracks in Meridian.

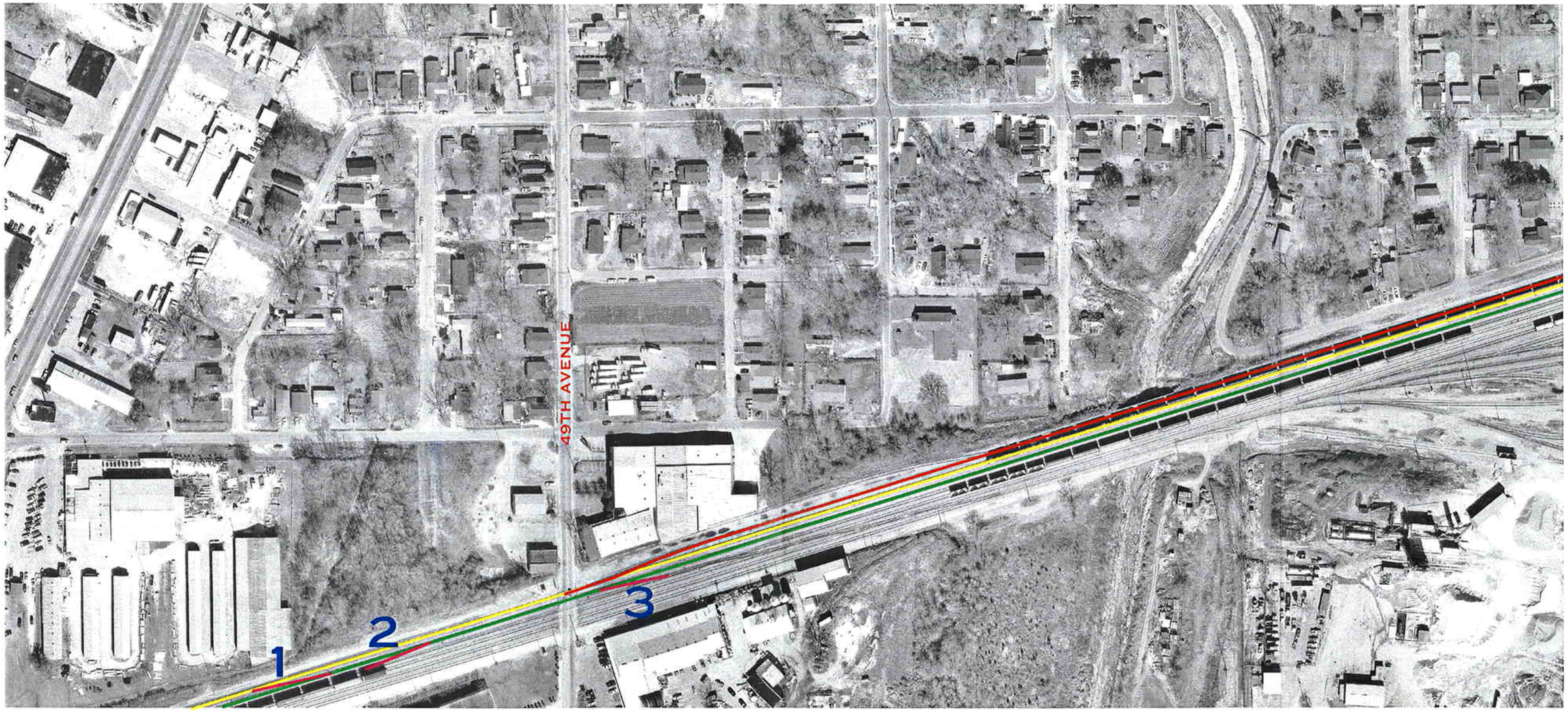
Table 5-1: Estimated Construction Costs and Time Savings
Meridian Junction Order of Magnitude Cost Estimates

CTC Upgrades	Interlocking	ABS	Electric Locks	Subtotal
Meridian Junction	*$ 3,511,780*	*$2,302,124*	*$ 874,718*	*$ 6,688,622*
SUBTOTAL CTC UPGRADES				**$ 6,688,622**
	Track Work	Structures	Cut/ Fill	Subtotal
Meridian Junction	*4,118,970*	0	-	*4,118,970*
SUBTOTAL TRACK WORK				**$ 4,118,970**
TOTAL PHASE IMPROVEMENTS				**$ 10,807,592**

TOTAL TIME SAVINGS[1] (min: sec)	**:04**

Source: Parsons Transportation Group, September 2002

[1] This timesavings is a TPC calculation that represents running time changes only and does not account for improvements from interlocking the switches so that a train can travel through Meridian without having to align switches or wait if tracks are blocked. Quantifying the switch only improvements could yield a 2-3 minute time savings, but additional review and a true commitment from the railroads is necessary.



LEGEND

NORFOLK SOUTHERN MAINLINE AND TRACK 1	green line
NORFOLK SOUTHERN TRACK 2	blue line
KANSAS CITY SOUTHERN MAINLINE	yellow line
KANSAS CITY SOUTHERN SIDING	red line
TERMINAL TRACK 1	black line
TURNOUT OR CROSSOVER	magenta line

FIGURE 5-6
49TH AVENUE INTERFACE

N

0 100 200 FEET

SOUTHERN RAPID RAIL TRANSIT COMMISSION

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JOB NO.			SHEET NO.
9855	DESIGNED J.A.G.	SCALE NOTED	
	DETAILED G.A.D.	DATE SEPT.2002	
	CHECKED M.D.C.	FILE NO.	

6. Time Savings

SOUTHERN RAPID RAIL TRANSIT COMMISSION

Trip Time Savings

Parsons Transportation Group ran TPCs with the following assumed consists:

- 1xP42DC-10 Trailing Cars
- 2xP42DC-10 Trailing Cars
- 1xP42DC-5 Trailing Cars.

The "1xP42DC-10 Trailing Cars" would be assumed as the base until a regional service is initiated. This would assume present Crescent-type service. Although the second locomotive has apparently been dropped recently, it does save time. Consist size would be tailored to meet passenger demands once a regional service starts.

We have subdivided the railroad into segments based on locations of assumed sidings and other physical assumptions. The segments are shown in Table 1.

Curve Improvements

We have made a variety of assumptions relative to speed improvements based upon:

- Maximum unbalanced superelevation of 3 inches, and
- Maximum actual superelevation of 5 inches[1].

We have not done a field inspection to investigate physical practicality of each curve and have only ensured that we have not violated basic assumptions relative to jerk rate, unbalanced superelevation, and distance between spirals. The speeds were calculated using the PTG Corridor Toolbox.

We also have assumed certain improvements to eliminate existing speed restrictions resulting from short turnouts/crossovers. One example is East City Junction, where we assumed installation of a No. 20 crossover in place of an apparent No. 10 crossover, and removal of short switch points that restricted speed through an existing No. 20 turnout. We also assumed speed upgrades between East City and NOUPT. After the related improvements speeds would be raised from 15 mph to 40 mph.

[1] Numerous curves on line already have five inches.

Table 6-1
Recommended Subdivision of Meridian to New Orleans Corridor

DESCRIPTION	Start (Mile)	End (Mile)
Meridian to MP North End of Curve 26	-	26.570
Extend Barnett Siding	26.570	35.000
North end of Curve 34.1 to North end of Curve 39	35.000	39.376
Extend Heidelberg/New Haney Siding	39.376	52.233
South end of Curve 51 to North end of Curve 64	52.233	64.382
Construct Moselle Siding	64.382	77.273
South end of Curve 76 to North end of Curve87	77.273	88.044
Construct Richburg Siding	88.044	95.686
South end of Curve 94 to North End Curve 97	95.686	97.806
Construct Purvis Siding	97.806	105.371
South end of Curve 105 to North End Curve 112	105.371	111.209
Construct Hillsdale Siding	111.209	120.409
South end of Curve 121 to North end of Curve 138	120.409	138.015
Construct Carriere Siding	138.015	144.760
North end of Curve 145 to MP 158.9	144.760	158.423
Extend Pearl Siding	158.423	166.403
MP 166.7 (Gause Road) to North end of Lake Pontchartrain Bridge	166.403	171.876
North end of Lake Pontchartrain Bridge to South end of Curve 178.1[2]	171.876	177.983
South end of Curve 178.1 to MP 190	177.983	189.704
MP 190 to South end of Curve 191.1 Seabrook Drawbridge[1]	189.704	191.348
South end of Curve 191.1 to East City Jct	191.348	198.057
East City Jct Upgrade (To Carrollton Ave)	198.057	199.717
Carrollton Ave to Broad Street	199.717	200.892
Broad Street to New Orleans Terminal	200.892	202.017

Source: Parsons Transportation Group. June 2002.

[2] To measure time savings from raising speed across bridge.

TPC Results

The initial results are summarized in the following table:

Table 6-2
Initial TPC Results for Three Operating Scenarios

TOTAL TRIP TIME	*North Bound*		*South Bound*	
	Existing	*Proposed*	*Existing*	*Proposed*
1xP42DC-5Trailing Cars	3:45:44	3:22:47	3:46:23	3:22:36
1xP42DC-10Trailing Cars	3:56:28	3:33:55	3:56:10	3:32:37
2xP42DC-10Trailing Cars	3:49:35	3:25:59	3:50:07	3:25:26

Source: Parsons Transportation Group, June 2002.

The existing time for the 1-and-10 is revealing in that this is the same time shown in the present schedule: depart New Orleans 07:00/Meridian 10:56. This is an indication that there is no recovery time in the northbound schedule.

The time that would be saved by operating a regional type service is significant, as indicated in the following table:

Table 6-3
TPC Results for Regional Service

TIME Saved by Removing 5 CARS	***North Bound***		***South Bound***	
	Existing	***Proposed***	***Existing***	***Proposed***
1xP42DC-5Trailing Cars	0:10:44	0:11:08	0:09:47	0:10:01

Source: Parsons Transportation Group, June 2002.

It's interesting to note that southbound is slower for 1-5 and 2-10, but not 1-10. We are not sure why.

The time saved by the assumed routing and curve improvements is summarized in the following table:

Table 6-4
Total Trip Time Savings by Operating Scenario

TIME SAVED	*North Bound*	*South Bound*
	Proposed	*Proposed*
1xP42DC-5Trailing Cars	0:22:57	0:23:47
1xP42DC-10Trailing Cars	0:22:33	0:23:33
2xP42DC-10Trailing Cars	0:23:36	0:24:43

Source: Parsons Transportation Group, June 2002.

The time saved southbound for each segment of the corridor has been calculated. The southbound results are shown in the following table. A northbound summary also can be made available.

Table 6-5
Total Trip Time Savings by Segment (Southbound)

DESCRIPTION	Start (Mile)	End (Mile)	1xP42DC-5Trail Cars Time Saved Minutes	1xP42DC-10Trail Cars Time Saved Minutes	2xP42DC-10Trailing Cars Time Saved Minutes
Meridian to MP North End of Curve 26	-	26.570	0:01:25	0:01:17	0:01:25
Extend Barnett Siding	26.570	35.000	0:00:15	0:00:12	0:00:14
North end of Curve 34.1 to North end of Curve 39	35.000	39.376	0:00:14	0:00:13	0:00:15
Extend Heidelberg/New Haney Siding	39.376	52.233	0:00:55	0:00:56	0:00:55
South end of Curve 51 to North end of Curve 64	52.233	64.382	0:02:50	0:02:52	0:03:03
Construct Tawanta Siding	64.382	77.273	0:01:31	0:01:08	0:01:27
South end of Curve 76 to North end of Curve87	77.273	88.044	0:01:04	0:00:48	0:00:56
Construct Richburg Siding	88.044	95.686	0:00:43	0:00:29	0:00:43
South end of Curve 94 to North End Curve 97	95.686	97.806	0:00:02	0:00:01	0:00:01
Construct Purvis Siding	97.806	105.371	0:00:33	0:00:27	0:00:35
South end of Curve 105 to North End Curve 112	105.371	111.209	0:00:15	0:00:15	0:00:15
Construct Hillsdale Siding	111.209	120.409	0:01:02	0:00:57	0:00:58
South end of Curve 121 to North end of Curve 138	120.409	138.015	0:00:39	0:00:36	0:00:39
Construct Carriere Siding	138.015	144.760	0:00:34	0:00:38	0:00:35
North end of Curve 145 to MP 158.9	144.760	158.423	0:00:05	0:00:08	0:00:08
Extend Pearl Siding	158.423	166.403	0:03:51	0:04:08	0:04:01

(Table Continued of Following Page)

MP 166.7 (Gause Road) to North end of Lake Pontchartrain Bridge	166.403	171.876	0:01:06	0:01:07	0:01:17
North end of Lake Pontchartrain Bridge to South end of Curve 178.1	171.876	177.983	0:03:02	0:03:02	0:03:04
South end of Curve 178.1 to MP 190	177.983	189.704	0:00:17	0:00:29	0:00:17
MP 190 to South end of Curve 191.1 Seabrook Drawbridge	189.704	191.348	0:00:16	0:00:19	0:00:20
South end of Curve 191.1 to East City Jct	191.348	198.057	0:00:37	0:00:55	0:00:53
East City Jct. Upgrade (To Carrollton Ave)	198.057	199.717	0:02:06	0:02:25	0:02:25
Carrollton Ave to Broad Street	199.717	200.892	0:00:25	0:00:11	0:00:16
Broad Street to New Orleans Terminal	200.892	202.017	0:00:00	0:00:00	0:00:01
TOTAL TIME SAVED			0:23:47	0:23:33	0:24:43

Source: Parsons Transportation Group, June 2002.

Analysis

The TPC runs for the existing and proposed 2-10 runs are provided in Volume II. Technical Documents. (File southbound tpc pl0t.xls). The shaded area represents the time savings.

The TPC speed deck assumed that the passenger train speed across the Lake Pontchartrain bridge would be increased to 60 mph, from its existing 40 mph.

SOUTHERN RAPID RAIL
TRANSIT COMMISSION

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