NORTH CAROLINA RAILROAD COMPANY

SHARED CORRIDOR
COMMUTER RAIL CAPACITY STUDY

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Greensboro to Burlington
Burlington to Raleigh
West Durham to Goldsboro
Chapel Hill / Carrboro to West Durham

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HNTB

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SUMMARY REPORT

The North Carolina Railroad Company (NCRR) is a private railroad company founded in 1849 whose stock is owned by the State of North Carolina. The NCRR owns the 317 mile long, 200 foot wide rail corridor that extends from the Port at Morehead City to Charlotte. The railroad was built in the 1850's to open the State for economic development by providing a means to get products and people into and around the State. Today, through a trackage rights agreement with NCRR, Norfolk Southern (NS) operates approximately 70 freight trains daily on the NCRR and the segment from Greensboro to Charlotte serves as a part of the NS mainline. The NCRR is a major rail transportation artery for North Carolina, touching 24% of the state's economy and working with public and private partners to attract new industries and create jobs.

The Mission of the North Carolina Railroad Company

To manage, improve and protect the State of North Carolina's rail properties and corridors in a manner that will enhance passenger and freight service and promote economic development

Eight Amtrak trains travel its tracks daily, with an additional Raleigh to Charlotte Amtrak train scheduled for 2009. Because communities, businesses and industries grew up along the rail corridor, it passes through many key employment centers and a large part of the state's population lives in close proximity to the rail line. As a result, its use is under consideration as a part of the transit plans of several communities and the Southeast High Speed Rail Plan. In response to questions by interested parties about its use as a resource for commuter rail service, the NCRR initiated this study to determine if commuter and freight trains could share the tracks, and if so, how much would it cost to build the infrastructure required to accommodate the increased traffic. In October, 2007, NCRR retained HNTB Engineering (HNTB) to conduct the study.

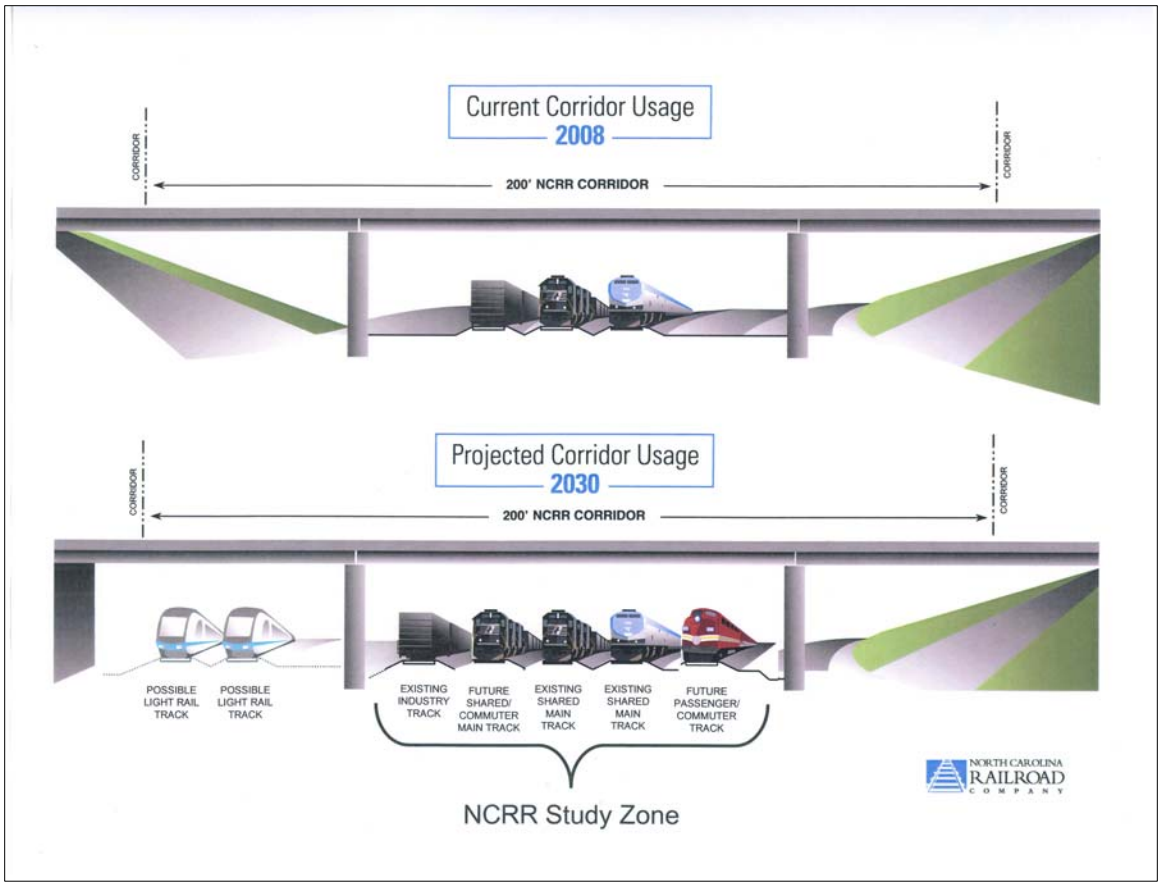
NCRR and Norfolk Southern Partnership

Norfolk Southern, or its predecessors, have been the freight operators on the NCRR since 1871. The NCRR owns the 200 ft. corridor, allowing for multiple tracks and other railroad infrastructure without significant additional land purchases. The NCRR is a key economic development asset for the State of North Carolina; a billion dollar asset that would be nearly impossible to assemble today. Because of its existence, NC communities have a significant advantage over other states that are considering commuter rail services because additional right of way would not have to be acquired—a major part of the cost of such services.

NS operates and maintains the rail line under a long term trackage rights agreement with NCRR that was signed in 1999. NS has exclusive track access rights to operate freight trains and maintain the NCRR line for 15 years, renewable for two additional 15 year periods. NCRR uses revenues from that agreement to make capital improvements to the rail and NCRR receives no state appropriations to support this effort to upgrade the rail line. Since 2000, NCRR has spent $60 million to modernize its railroad, primarily from Raleigh to the Port at Morehead City. The North Carolina Department of Transportation (NCDOT) has provided state and federal funds for capital improvements designed specifically to enhance passenger rail service and to greatly improve safety at grade crossings. NCRR, along with NCDOT and NS, are in the middle of a $161 million, 12-year capital improvement program.

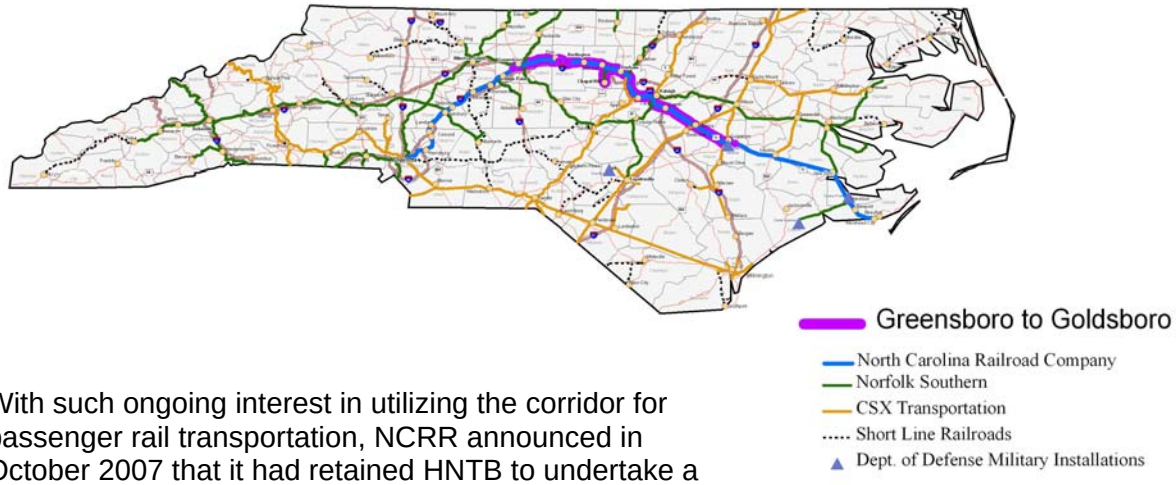
NCRR's agreement with Norfolk Southern makes provision for commuter rail to be operated on shared tracks with freight and other passenger trains if certain conditions are met. (The NCRR-NS agreement also makes provision for higher frequency "light rail" on a separately dedicated track system, but light rail is not the scope of this study – please see note below.) Key among these conditions is that any such service (commuter or light rail) will not interfere with NS freight operations.

Passenger Rail and the North Carolina Railroad Corridor



In addition to the existing Amtrak service sponsored by NCDOT, state and local agencies have recently expressed interest in using the NCRR corridor for passenger rail. Some expressed a desire to use the existing track while others studied the possibility of constructing entirely new passenger rail systems within the NCRR corridor, separate from the freight tracks. It is important to note that commuter rail on shared track would not preclude the potential for separate transit systems (for example, light rail and high speed rail) in the NCRR corridor as long as the conditions in NCRR's agreement with Norfolk Southern are satisfied.

To date, no studies have been completed that evaluate the need for additional infrastructure required to operate commuter rail trains along with existing and projected freight trains on the NCRR tracks.



With such ongoing interest in utilizing the corridor for passenger rail transportation, NCRR announced in October 2007 that it had retained HNTB to undertake a Shared Corridor Commuter Rail Capacity Study for the 143-mile Greensboro to Goldsboro section of its rail line (including a line to Chapel Hill which is owned jointly by NS and NCRR). NCRR chose this segment for its study because it passes through counties with a population of two million people, and could serve 15 colleges and universities, 3 community colleges, and major employment centers, including state government in Raleigh, medical centers in Durham and Chapel Hill, the Research Triangle Park, RDU airport (with connector service), and employment centers in Burlington and Greensboro. NCRR contracted HNTB, a national engineering firm that has significant experience in the passenger and freight rail service planning and engineering, to conduct the study. The purposes of this study are to identify and evaluate the additional infrastructure that would need to be constructed in the NCRR rail corridor to accommodate commuter rail operations along with freight and Amtrak operations and to determine if they could co-exist. HNTB and Woodside Consulting utilized the Berkeley Rail Traffic Controller (RTC) operations model to simulate the operations of the NCRR corridor with the proposed commuter service and the projected growth in freight and Amtrak passenger service.

The NCRR agreement with Norfolk Southern includes provisions for allowing shared freight and passenger use of the NCRR tracks so long as NS's capacity for freight service to existing and future industries is protected. Norfolk Southern participated in the NCRR study by providing freight and operating data and opportunity for comment.

It is absolutely essential for NCRR that the following principals be incorporated into any proposal to use the NCRR corridor for passenger service:

- NCRR and NS must maintain the ability to serve existing and future freight customers 24/7 without delay
- Safety is paramount - some grade crossings will need additional protection, elimination or grade separation.
- Single dispatcher for all passenger and freight trains
- All passenger equipment must meet Federal Railroad Administration crashworthiness standards

Commuter Rail Service

Commuter rail passenger transportation commonly operates on tracks along with freight and intercity passenger trains. Its focus is primarily on providing transportation for commuters between suburbs and city centers. The majority of service is provided in the morning and afternoon rush hours with limited service or no service provided at night and on weekends except for special events. Passenger stations are generally spaced between 2 and 10 miles apart. Equipment is generally either a push-pull arrangement of locomotive and coaches or diesel multiple units. Some commuter systems operate electrical multiple units.

Commuter rail systems are located in several North American cities including Albuquerque, Nashville, Dallas-Ft. Worth, Chicago, Boston, Seattle, and South Florida.

Other types of passenger rail: (not a part of this study)

- "Light rail" service is usually operated several times per hour at each station throughout the day. Station spacing is generally ¼ to 2 miles apart. Most light rail systems are powered by overhead electric systems. They are not compatible with freight train operations and must operate on separate tracks or on a time separated basis from freight trains. An example of a light rail system is Charlotte's LYNX.
- "Heavy rail" is often found in cities with large populations and major employments centers. These systems operate with electrically powered vehicles on dedicated tracks. Stations are relatively closely spaced and a high level of service is often provided. Examples of this type of service would be Metrorail in Washington, D.C. and MARTA in Atlanta.
- "Intercity" passenger rail operates over long distances on a regular schedule between major city centers. Station spacing is usually over 30 miles. In the United States, Amtrak provides this service. NCDOT supports the Piedmont and Carolinian services that operate between Rocky Mount/Raleigh and Charlotte.

Commuter Rail Capacity Study

The commuter rail service scenario selected for this study was "employment transportation" consisting of four rush hours commuter trains in the morning and afternoon peak periods and one mid-day round trip. This operating scenario is fairly typical of start-up commuter rail operations in the United States. It is a cost efficient first step for communities considering commuter service.

Face-to-face conversations and meetings were held with more than 90 community leaders, including representatives of universities, government, transit organizations, business executives, and the general public. The study process and goals were discussed at these meetings and valuable input was received. This input was used to refine the characteristics of the proposed commuter rail services being studied.

Within the limits of the study area, four commuter rail service segments were identified for evaluation: Burlington to West Greensboro (green line); Greensboro / Burlington to Raleigh (blue line); Goldsboro to Durham via Raleigh (red line); and University Station Road to Chapel Hill (yellow line). The first three segments are part of the NCRR corridor. The Chapel Hill segment is a separate 10 mile long freight line currently owned jointly by Norfolk Southern and other shareholders, including NCRR.

A total of 29 station areas were identified for service. These locations were selected based on their proximity to major trip generators and highway facilities. Many of these stops are located at existing Amtrak facilities and at stations identified in other studies. **This capacity analysis study was not intended to propose exact station locations. Rather, general station areas were incorporated in the modeling process to ensure that the stopping and starting characteristics of the rail operations were accurately simulated.**

Commuter Trains and Schedules Evaluated in the Study

Preliminary schedules were developed for input to the modeling process. For the **Green Line** between Burlington and Greensboro, the proposed schedule has four trains leaving Burlington between 6:15 AM and 8:15 AM and arriving in Greensboro between 6:49 AM and 8:49 AM. The return trips depart Greensboro between 4:28 PM and 6:28 PM and arrive in Burlington between 5:09 PM and 7:09 PM. The distance between Burlington and Greensboro is approximately 22 miles.

The original service for the **Blue Line** was for trains to originate in Burlington and travel through Durham and Research Triangle Park to Raleigh. However during the community meetings a strong interest was expressed to extend at least some of the service so that it begins and ends in Greensboro. As a result, the schedule for the Blue Line has two trains originating in Greensboro and two trains originating in Burlington between 5:45 AM and 7:45 AM and arriving in Raleigh between 7:25 AM and 9:25 AM. The afternoon trains leave Raleigh between 3:50 PM and 5:50 PM and arrive in Burlington between 5:30 PM and 7:30 PM. The trip from Raleigh to Burlington is approximately 60 miles. The trips originating and terminating in Greensboro would travel an additional 24 miles. Each train would connect with the Yellow Line trains to Chapel Hill/Carrboro at University Station Road. Locations served by these trains include Durham, Research Triangle Park, and Cary. A midday trip would originate in Raleigh at 10:40 AM and arrive in Greensboro at 1:11 PM. It would then return to Raleigh, arriving at 3:25 PM.

The **Red Line** illustrates service from Goldsboro to University Station Road. The original assumption was for this service to terminate this service at West Durham, but interest was expressed in the community meetings to extend two of these trains to University Station Road so that riders could connect to the Yellow Line to Chapel Hill and Carrboro. The proposed schedule for this line has trains leaving Goldsboro between 5:19 AM and 7:09 AM and arriving in Durham between 7:23 AM and 9:13 AM. The afternoon departures from Durham would be between 3:55 PM and 5:55 PM with arrivals in Goldsboro between 5:59 PM and 7:59 PM. Station stops would include Selma, Clayton, Garner, Raleigh, RTP and Durham. The proposed midday trip of the Red Line would originate at West Durham at 10:45 AM and arrive in Goldsboro at 12:55 PM. The return trip would leave Goldsboro at 1:04 PM and arrive back in West Durham at 3:14 PM.

All Blue Line trains and two of the four peak hour red line trains would connect to the **Yellow Line** at University Road Station. Trains on this 10 mile route would shuttle between Chapel and Carrboro and University Road to allow passengers to make a cross platform transfer to and from the Blue and Red Lines. Trains would run from 5:54 PM to 8:55 AM and from 4:23 PM to 7:21 PM. Two round trip midday trips would operate between 11:17 AM and 2:48 PM and be scheduled to meet the midday Blue and Red Line trains at University Road Station.

Recommended Rail Infrastructure Improvements and Cost Estimates

The RTC rail line capacity model was used to simulate future railroad operations to determine the impact of the proposed commuter service would have on the projected 2012 levels of freight and Amtrak intercity passenger service. Norfolk Southern has projected a net increase of 19 unit trains and 5 additional intermodal trains per week. In addition existing intermodal, merchandise and coal trains are projected to be longer and heavier to accommodate projected growth. In addition, NCDOT is planning to implement two proposed additional round trip Piedmont Amtrak service intercity passenger trains by 2012 on the NCRR line, using the same tracks.

The goal of the RTC modeling effort was to identify the infrastructure that needed to be added to provide sufficient capacity on all line segments so that train performance stays at least comparable to 2007 operations. Key metrics used to calculate performance are average train speed and minutes of delay per 100 train miles. The model was used to identify key bottlenecks, and improvements were developed and incorporated in the model to mitigate the identified delay.

Through this modeling process, the study identified significant railroad infrastructure improvements that would be necessary to make the commuter rail service compatible with freight trains. These improvements include:

- the construction of additional track and railroad signals,
- improvements at grade crossings, and
- bridge improvements and replacements.

Major investments will also be needed for the passenger cars and locomotives to operate the service and for maintenance facilities, storage tracks, stations and parking lots and other facilities to support the commuter rail operations. With these improvements, overall train performance can be maintained at levels comparable to current performance as shown in Table 2.

Table 2
Overall Train Performance

Type of Train	Average Train Speeds (mph)		Delay Minutes per 100 Train Miles	
	2007	2012	2007	2012
Passenger	41.76	30.75	7.49	5.52
Expedited	12.52	12.07	30.71	36.48
Freight	16.45	16.81	33.44	38.03
System Average	**19.87**	**23.55**	**25.63**	**17.08**

Costs

It was assumed that all of the improvements identified in this study would be built within the existing 200 ft. wide NCRR corridor. Therefore no costs for the purchase of land for right of way are included in these estimates. Purchase of right-of-way is often a significant cost for implementing commuter rail service. Because NCRR owns the rail corridor, those costs can be substantially avoided.

The costs for improvements were estimated using 2008 unit costs for materials, supplies and labor. Allowances were included for mobilization (5%), railroad engineering (5%), railroad force accounts (5%) and engineering and construction management (15%). An additional contingency of 30% was added to all estimates, and the numbers were inflated by 15% to represent year 2010 costs of construction.

The total costs for upgrading the railroad infrastructure are shown in Table 3a. These cost estimates include the costs of installing new and upgraded tracks and signals where necessary, grading and drainage and erosion control. This cost also includes the cost of upgrading and/or replacing 36 bridges and other structures and the cost of upgrading the safety protection at 96 grade crossings.

Table 3a
Estimated Capital Cost of Track, Signal, and Station Improvements
Costs in 2010 Dollars

Segment	Length (Miles)	Summary of Improvements	Est. Cost (Millions)	Est. Cost per mile (Millions)
Greensboro to Burlington	23	• 2.3 mi 3rd track at Greensboro • 21.9 mi 2nd main track Greensboro-Burlington • 5 stations	$212.9	$9.3
Burlington to University Station Road	24	• 1.5 mi 2nd main track at Burlington • 0.6 mi extension of Mebane Siding • New Efland Siding • 3 stations	$55.9	$2.3
University Station Road to Raleigh	35	• 26.6 mi 2nd main track Glenn – Cary • New main track at Raleigh • Reconfigure interlocking at Cary • 9 stations	$249.3	$7.1
Raleigh to Goldsboro	49	• 2.8 mi 2nd main track Wilson's Mill to Selma • Install signals Pine Level to Goldsboro • 9 stations	$115.7	$2.2
University Road to Chapel Hill	10	• 0.2 mi siding at Eubanks Rd. • 0.2 mi siding at Bolin Creek • 4 stations	$23.6	$2.4
Totals	**141**		**$657.4**	**$4.7**

The estimated cost for commuter rail equipment and facilities is shown in Table 3b. This cost estimate includes vehicles, equipment, maintenance facilities and layover yards. The vehicle cost estimates include a 15% allowance for engineering and construction management. The maintenance facility and yard construction estimates include allowances for mobilization (5%), railroad engineering (5%), railroad force accounts (5%) and engineering and construction management (15%). An additional contingency of

30% was added to all estimates, and the numbers were inflated by 15% to represent 2010 costs of construction. A cost breakdown by county is attached (Attachment A).

Table 3b
Commuter Rail Equipment and Facilities
Costs in 2010 Dollars

Description	Quantity	Description of Improvements	Est. Cost (Millions)
Vehicles	13 trainsets 3 DMU's	• 13 locomotives • 52 passenger cars • 3 2-car Diesel Multiple Units	$282.6
Maintenance Facility	1	• Centralized maintenance facility for all operating equipment	$58.3
Layover Yards	5	• Burlington • West Durham • Raleigh • Goldsboro • Chapel Hill/Carrboro	$14.6
Totals			**$355.5**

Table 3c
Total Commuter Rail Capital Costs
Costs in 2010 Dollars

Description	Estimated Cost (Millions)
Track, Signals, and Stations	$657.5
Locomotives, Cars, and Facilities	$355.5
Totals	**$1,013.0**
Total Cost Per Mile (143.9 Miles)	**$7.0**

Next Steps

While much work would have to be done by regional agencies, MPO's, and civic leaders to determine whether commuter rail would be cost effective, this study provides basic cost information that can be used by transportation planners, economic developers, and local leaders as they evaluate future transportation options. NCRR is willing to work with those communities that might be interested in exploring whether commuter rail service could be a part of the solution to their transportation challenges in the greater Triangle and Triad regions of North Carolina. NCRR is currently working with the Charlotte Area Transit System on CATS use of the NCRR corridor in its transit plans.

This study demonstrates that it is feasible to run commuter rail service within the study corridor, but significant capital infrastructure investments would be needed to ensure that the new service does not negatively impact the core freight movement business of the NCRR by Norfolk Southern for North Carolina freight customers.

This study is only an initial step toward evaluating whether a commuter rail system on the NCRR corridor is feasible. If pursued, further steps would need to include:

- A ridership study to assess market demand for a commuter rail service. This study did not include any such assessment.
- Detailed environmental studies.
- Evaluation of operating, maintenance and insurance costs.
- Developing transit-oriented development and safety standards that take into account existing and future freight operations in the NCRR corridor (see full report).
- Evaluating funding requirements and identifying sources for those funds.

It is important to note that the entire commuter rail system described in this study would not need to be built simultaneously. It would be possible to build a route, or a portion of the route that served a clearly defined commuter market. Further analysis of the markets for commuter rail service would need to be completed to determine which segment(s) could be operated as an independent route.

A Look Ahead

During the course of this 11-month study a remarkable shift in public perception of passenger train travel has occurred. The events and issues that have spurred that change include:

- Successful start-up of the LYNX light rail in Charlotte and other rail transit services throughout the United States.
- $4.00 per gallon gasoline prices and gasoline shortage.
- Recommendations by the 21st Century Transportation Commission for state legislation that would authorize local governments to raise taxes to help finance local transportation construction and create a state fund to assist such projects.
- Recommendations by the Special Transit Advisory Commission (STAC) for a high-quality, regional transit system to serve North Carolina's greater Triangle region.
- Rapidly growing highway construction costs and increased congestion.
- Mounting air quality and other environmental concerns.

Across the state and in the country passenger train travel is up significantly. This study provides significant practical information about new options for passenger rail as North Carolina continues to grow at a record pace.

In developing a long range (2030) vision for the NCRR corridor, NCRR's Board of Directors and management invite open and frank discussion about the costs and benefits of commuter rail in North Carolina on the NCRR lines. This discussion will inform the Board's decisions about the highest and best uses of the key rail corridor for which it is responsible for managing in the best interests of all of the state's citizens.

ATTACHMENT A
Capital Costs by County

Segment No.	Commuter Rail Lines	County							
		Guilford	Alamance	Orange	Durham	Wake	Johnston	Wayne	Total
1		$13,116,060							
2		$13,278,000							
3		$25,242,900							
4		$19,667,800							
5			$27,023,300						
6			$11,231,400						
7			$6,552,800						
8			$0						
9			$5,486,500						
10				$16,745,200					
11				$11,641,500					
12				$0					
13					$0				
14					$3,333,900				
15					$40,994,900				
16					$712,000				
17					$27,544,100				
18						$29,027,300			
19						$7,908,000			
20						$28,389,000			
21						$1,475,000			
22							$1,475,000		
23							$15,397,200		
24							$1,675,000		
25								$18,227,500	
26				$12,147,700					
Sub-total		$71,304,760	$50,294,000	$40,534,400	$72,584,900	$66,799,300	$18,547,200	$18,227,500	$338,292,060
Mobilization (5%)		$3,565,238	$2,514,700	$2,026,720	$3,629,245	$3,339,965	$927,360	$911,375	$16,914,603
Railroad Engineering (5%)		$3,565,238	$2,514,700	$2,026,720	$3,629,245	$3,339,965	$927,360	$911,375	$16,914,603
Railroad Force Account (5%)		$3,565,238	$2,514,700	$2,026,720	$3,629,245	$3,339,965	$927,360	$911,375	$16,914,603
Engineering & Const. Mgmt. (15%)		$10,695,714	$7,544,100	$6,080,160	$10,887,735	$10,019,895	$2,782,080	$2,734,125	$50,743,809
Contingency (30%)		$27,808,856	$19,614,660	$15,808,416	$28,308,111	$26,051,727	$7,233,408	$7,108,725	$131,933,903
Inflation to 2010 (15%)		$18,075,757	$12,749,529	$10,275,470	$18,400,272	$16,933,623	$4,701,715	$4,620,671	$85,757,037
County Total		$138,580,801	$97,746,389	$78,778,606	$141,068,753	$129,824,440	$36,046,483	$35,425,146	$657,470,619