The North Carolina Railroad Improvement Project

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6534 words & 3 figures
ABSTRACT

The North Carolina Department of Transportation (NCDOT) Rail Division, working with the North Carolina Railroad (NCRR), Norfolk Southern (NS), and CSXT Transportation (CSXT), began implementing the “North Carolina Railroad Improvement Project” (NCRRIP) in late 2001. This project includes improvements to 173 miles of NCRR’s corridor between Raleigh, Greensboro, and Charlotte to increase speeds for state-sponsored passenger trains. The NCRR Company owns and manages this segment as part of their 317-mile railroad. NS has exclusive trackage rights over NCRR except for an 8-mile segment between Raleigh and Greensboro over which CSXT also operates.

NCRRIP consists of several project elements that incrementally increase passenger train speeds and railroad capacity. The current work involves upgrading 73 miles of non-signaled railroad between Cary and Greensboro by installing a traffic control signal system, extending existing sidings and installing larger turnouts, adding superelevation in curves, and major modifications to two interlockings. Work was completed the summer of 2004, improving the maximum speed from 59 mph to 79 mph and reducing the travel time by 20 minutes. Additional improvements are planned for this route involving both NS and CSXT. These include number 32.7 turnouts, 13 miles of double track along the NCRR/NS 92-mile Greensboro to Charlotte Main Line, and upgrading the 8-mile NS/CSXT segment.

In addition, a Tier I Environmental Impact Statement selected this route as part of the Southeast High Speed Rail Corridor serving Washington, Richmond, Raleigh, and Charlotte. The paper will discuss how this has impacted engineering for the NCRRIP.

Key words: NCDOT, NCRRIP, NCRR, NS, Passenger
INTRODUCTION

Project Goal
The North Carolina Department of Transportation (NCDOT) Rail Division desired to make improvements to an existing passenger train corridor. These improvements had been discussed and envisioned since the early 1990’s. Construction of the improvements began in earnest in late 2001. The goal was to reduce travel time and increase reliability to make rail travel a more competitive alternate form of transportation.

Since there is not a dedicated public funding source for public passenger rail and other railroad improvements as exists for highways and mass transit, all projects along a rail corridor cannot be pursued at one time. It is therefore necessary to use the limited funding available to make incremental improvements to existing passenger train service to increase ridership. This is the philosophy adopted by NCDOT. Increased ridership increases public support and interest in train service that can lead to support to provide more funding.

In order to achieve the project goal, it was necessary to pursue improvements to increase passenger train speeds and railroad capacity. Increasing train speeds reduces the travel time and increased capacity of the rail line translates into reliability. If the intent is to operate passenger trains on existing private freight railroad lines, then capacity must be built into the corridor. Passenger trains cannot consume existing and future freight capacity needs.

HISTORY OF THE CORRIDOR
The route NCDOT desired to improve was primarily the Raleigh/Greensboro/Charlotte segment of the North Carolina Railroad (NCRR), a 173 mile portion of the 317-mile NCRR. The NCRR extends from Morehead City to Charlotte (Figure 1). The NCRR, a private railroad company owned by the State of North Carolina and held as a public real estate trust, owns and manages the corridor. The State of North Carolina built this rail line in the early 1850’s for economic development of North Carolina. Until the 1890’s, the NCRR was an operating railroad. At that time, it leased the track to the Southern Railway,
now Norfolk Southern (NS), under a 99-year lease. The lease provided for Southern Railway to manage the property and operate trains. That lease expired in 1994. A new lease was negotiated and signed with Norfolk Southern in July 1999. The lease agreement provides NS exclusive trackage rights over NCRR except for an 8-mile segment west of Raleigh over which CSXT also operates.

EXISTING PASSENGER RAIL CORRIDORS IN NORTH CAROLINA

There are currently several existing passenger rail routes in North Carolina (Figure 1) over which Amtrak provides service. These routes are a part of Amtrak’s long-haul national intercity network. The passenger trains on each NC route operate daily in each direction with trains providing service from New York to Florida and Washington, DC to Atlanta, Georgia.

In addition to the Carolinian that travels over the entire 173-mile Raleigh to Charlotte segment of NCRR, and other intercity passenger trains that operate partially over various portions of the route, the state-funded passenger train the Piedmont also provides in-state passenger service over this entire segment of track. Both the Carolinian and the Piedmont serve the same nine stations with the Carolinian also providing out-of-state service to New York. The departure times of each train from Raleigh and Charlotte closely compliment each other in making their daily round trips.

The Piedmont service, started in 1995, is funded entirely by the State of NC and is operated under contract by Amtrak using state-owned locomotives and passenger equipment. The Carolinian initially began service for one year in 1984 and was resurrected in 1990. The operational costs of the Carolinian in NC were also funded by the state until recently when it became a part of Amtrak’s system. Because of NC’s financial interest in the Carolinian, some track improvements were also desired along the 28-mile segment of NCRR from Raleigh to Selma.

PRE-PROJECT CONDITIONS

The Raleigh/Greensboro/Charlotte corridor has a wide range of existing physical and operating conditions involving three railroads. The corridor is 173 miles long with a 200-foot wide right-of-way. However,
encroachments such as buildings, streets, driveways, and parking lots now occupy portions of the right-of-way. Approximately 204 public (state and municipal) grade crossings and 59 private crossings existed along the corridor.

The first eight miles of the NCRR corridor between Raleigh and Cary consist of an NCRR/NS track known as the H-line. A CSXT track, known as the S-line, joins the NCRR right-of-way in downtown Raleigh and parallels the H-line to Cary. The S-line was originally part of the Seaboard Railroad’s Richmond to Florida Main Line. The Raleigh to Cary segment is double track automatic block signal territory, single direction signaling, and dispatched by CSXT in Jacksonville, Florida. The maximum authorized speed for passenger trains on both tracks is 60 mph. The NS track consists of 132 pound welded rail and is maintained to FRA class 4 with maximum authorized freight speeds of 50 mph. The CSXT track consists of 115 pound jointed rail and is maintained to FRA class 3 with maximum authorized freight speeds of 40 mph. Timber ties are used on both tracks.

In Cary at Fetner interlocking, the CSXT S-line diverges from the NCRR right-of-way and continues south to Florida. The NCRR right-of-way and H-line continue westward to Durham and Greensboro, a distance of 73 miles. At Durham, a CSXT branch line from the south crossed the NCRR/NS H-line and a NS branch line at-grade with diamonds. Approximately 40 curves in the three to four degree range exist along this segment of NCRR with speeds restricted to as low as 40 mph on a few curves. The NCRR/NS segment from Cary to Greensboro was Track Warrant Control territory with no wayside signals and 132 pound welded rail on timber ties. It was maintained to FRA class 4 with maximum authorized speeds of 49 mph for freight trains and 59 mph for passenger trains. Three passing sidings exist along the Cary to Greensboro H-line. NS dispatches this corridor H-line from Greenville, SC.

In Greensboro at Elm interlocking, the NCRR/NS H-line joins the NS Washington, DC to Atlanta, Georgia Main Line that is located within the NCRR right-of-way from Greensboro to Charlotte. At Greensboro, the NCRR right-of-way turns southward towards Charlotte and continues 92 miles to the Charlotte Amtrak Station. This segment consists of 132 pound welded rail and was double track the entire length until the
late 1960’s when four sections totaling 35 miles were single-tracked as part of a centralized traffic control (CTC) signal system project. The existing railroad has a CTC system and is maintained to FRA Class 4 with maximum authorized speeds of 50 mph for general freight trains, 60 mph for intermodal trains, and 79 mph for passenger trains. NS also dispatches the Greensboro to Charlotte Main Line from Greenville, SC.

**TRAIN TRAFFIC**

Daily train traffic along the Raleigh to Charlotte segment of NCRR is as follows:

Raleigh to Cary: Approximately 12 NS and CSXT freight trains and six passenger trains.

Cary to Greensboro: Up to eight NS freight trains and four passenger trains.

Greensboro to Charlotte: Up to 34 NS freight trains, 10 of which are intermodal trains, and six passenger trains.

**FALSE START**

The initial project to improve passenger train speeds on the NCRR Raleigh to Charlotte segment was conceived and started in 1995. This project was known as “Rail Impact”. The goal of the project was to make quick and inexpensive improvements that resulted in moderate travel time savings. All the improvements were to be made from Greensboro to Cary. The project was halted due to expiration of the 1895 lease agreement between NCRR and Southern Railway (now NS) pending agreement on a new lease agreement.

The “Rail Impact” project involved installation of train control signals, superelevation of curves, installation of power switches at sidings, and lengthening of grade crossing circuits.

**NEW BEGINNING**

Upon the signing of the new NCRR lease agreement with NS in July 1999, NCDOT developed a new project plan to improve passenger train speeds. This new plan involved many of the old "Rail Impact"
projects plus other new additions. The new project was called “The North Carolina Railroad Improvement Project” or NCRRIP.

AUTHORITY TO GOVERN WORK

Following the new NCRR/NS trackage rights agreement of July 1999, a three-party project Master Agreement between the NCDOT Rail Division, NCRR, and NS was developed to set terms and govern the desired improvements for NCRRIP. This agreement was finalized and approved in December 2001.

The Master Agreement identified the desired initial improvement projects. This agreement can be supplemented with additional projects as they are identified and funds become available. The agreement stipulates that the maximum authorized speed will be increased to 79 mph upon completion of the projects. It also stipulates that NCDOT pays for the increase in incremental maintenance costs associated with the speed increase.

Separate Project Agreements were also developed with CSXT to cover the improvements required at D&S Junction at Durham, NC and upcoming improvements to the CSXT track between Cary and Raleigh.

FUNDING SOURCES

Funding comes from a variety of federal and state sources. A portion of Federal National Highway System funds was earmarked for the traffic control signal system. Federal Congestion Mitigation Air Quality (CMAQ) funds were used for those projects in metropolitan counties that do not meet federal standards for air quality. State Transportation funds contributed to the balance of the project costs. A new state transportation initiative called “Moving Ahead” instigated by Governor Easley in 2003 to advance projects ready for construction is providing some funding for upcoming projects.

PROJECT SELECTION AND IMPLEMENTATION PROCEDURES

NCDOT desired to make incremental improvements due to the availability of funding and the desire to show some improvement in speeds as soon as possible. With this method, it was desirable to first pursue
the projects that could be completed in the timeliest manner, at the least expensive cost, and would yield the greatest travel time savings. In other words, “Pick the low hanging fruit first”. Using this common sense approach, it was not desired to initially pursue projects that would yield little travel time savings at great cost and take a greater time to implement. Such low priority projects were determined to be those requiring bridge construction, acquisition of right-of-way, or those with major environmental issues.

Prior to NCRRIP, studies were commissioned by NCDOT to analyze this corridor. These studies were consulted to verify that other parties had also identified the selected projects as necessary improvements. One such study was the “Civil Engineering Evaluation of the Piedmont High Speed Rail Corridor – Raleigh to Charlotte, NC” completed by Amtrak in September 1996. Another such study is the “Technical Monograph: Transportation Planning for the Richmond-Charlotte Railroad Corridor – Volumes 1 and 2” completed by the Federal Railroad Administration in January 2004.

After selecting a NCRRIP project for implementation, the NCDOT Rail Division provided preliminary plans and quantities to NS and NCRR detailing the desired improvements. NS and NCRR then approved the NCDOT project for implementation. NS also provided preliminary cost estimates to NCDOT and NCRR, who subsequently reviewed and authorized the work. After authorization by NCDOT and NCRR, NS performed field surveys and prepared final plans. Following review and approval of the final plans by NCDOT and NCRR, NS advertised the project(s) and, together with NCDOT and NCRR, selected the low qualified bidder to perform the work along with NS personnel. NS, along with NCDOT, oversaw the project construction using materials furnished by NS. NCDOT paid for all material costs along with all other project costs as invoiced by NS.

Phase I of NCRRIP, or the projects initially included in the project Master Agreement, concentrated mostly on those projects located on the NCRR/NS H-line between Greensboro and Cary. The projects on this line were determined to be “low hanging fruit”, yielding the greatest travel time savings at the least cost in the timeliest manner. These improvements would also increase capacity on the line yielding reliability of service for passenger and freight trains.
Other projects have been added to the original first phase list as they were identified and availability of funding was determined.

**CURRENT PROJECTS (Figure 2)**

**Traffic Control Signal System**

In order to raise the maximum authorized speed for passenger trains and eliminate the need for train crews to manually operate siding switches and copy track warrants, NCDOT determined a wayside traffic control signal system on the Greensboro to Cary H-line would be an integral part of NCRRIP. NCDOT worked closely with NS C&S Engineers to develop the signal system layout. Control points were located at ends of sidings, junctions and at intermediate hold-out locations in single track. Intermediate, or automatic, signal locations were spaced to allow the maximum braking distance for freight trains while keeping blocks closely spaced to improve line capacity. The distance between automatic signals is roughly two miles, allowing future addition of a cab signal system with cut-sections approximately every mile. Also important was the strategic placement of block signals in view of the train stations. This allows trains that stop at the station to depart at track speed instead of having to proceed at restricted speed for some distance until the next signal indication is visible. Signals were also spaced to reduce insulated joints in crossing circuits. Insulated joints in crossing circuits require additional grade crossing predictor units and cable which adds considerable cost. This was a major factor as there are 85 grade crossings with automatic warning devices on this 73-mile line.

Control points are controlled by 900 mhz radio from antennas mounted on five existing tower sites. Originally, it was thought that dedicated microwave towers would be constructed in accordance with standard NS practice. This became difficult as land was not available and local regulations required towers be constructed so that they may fall on the property which they stand. NCDOT found success through coordination with the North Carolina State Highway Patrol and Wake/Durham County Emergency Management Services about using four publicly owned towers along the railroad corridor. Three of the towers chosen for use were existing and one was under construction and near completion. The chosen
tower locations provided radio overlap to ensure reliable operation at each control point. The towers receive signal code from the NS Greenville, South Carolina dispatching center using redundant leased telephone lines to transmit signal code to the towers.

Since this was a major project, NCDOT authorized purchase of long lead time materials early in the process to ensure timely delivery. NCDOT and NS jointly selected a contractor to design the system and to perform installation of all devices. NS signal construction forces performed the cut-ins and the work on live track.

**Curve Superelevation and Track Surfacing Improvements**

Since the signal system allowed the maximum authorized speed to be increased on the H-line in accordance with FRA regulations, almost all of the 110 curves on the H-line required modest realignment and additional superelevation to realize their full speed potential. The H-line primarily exists in its original 1850’s alignment with more than 40 three and four degree curves with short spirals restricting train speeds to around 40 mph on a few curves. NCDOT and NS determined a solution for each curve to develop the best geometry and speed possible working within NS standard parameters. Those included a maximum three inch cant deficiency and NS superelevation and runoff criteria (NS limits superelevation to four inches, runoff to 3/8” per 31 feet for speeds over 60 mph). Existing curve geometry was determined primarily through stringlining. Speed smoothing over long segments involving several curves of varying geometry was considered in order to limit the amount of unnecessary acceleration and deceleration on curves.

The curve superelevation work also required new timber decks on several open deck steel span bridges, raising of concrete ballast deck bridge curbs, and widening of the roadbed on the high side of the curve and associated culvert extensions. There were also several turnouts located in spirals that were relocated or removed entirely to add superelevation and increase speed.
All of the existing road crossings were resurfaced as part of the track surfacing project. Vehicular detour routes had to be arranged in advance with NCDOT Division of Highways using a traffic control contractor. The NCDOT Rail Division’s construction inspector served as the coordinator of the work between NS crews, local towns, and the traffic control contractor’s personnel. This process ensured advance notice to local towns of traffic interruptions and allowed NS personnel to concentrate on track surfacing work. An NS paving contractor and NCDOT Highway forces repaved the crossing surfaces.

As an add-on to the original first phase work, NCDOT and NS developed a plan to also pursue increases in curve superelevation for 45 curves on the Greensboro to Charlotte Main Line in conjunction with an NS regularly scheduled track surfacing project.

Interlocking Improvements

*Elm*

As previously noted, Elm is the location where the H-line diverges east from the NS Washington to Atlanta Main Line. This junction was plagued with several sharp curves on the H-line, a Number 14 crossover in the Main Line, non-electrically locked switches, and yard limits restricting speed to 20 mph for approximately one mile. By sharing ideas, NS and NCDOT developed some innovative track and signal solutions resulting in raising the speed through the entire 20 mph segment to 45 mph for passenger trains. One idea resulted in the elimination of a turnout allowing curvature to be reduced. Another innovative idea of a specialized Number 8 turnout with a gantlet section allowed an electric lock to be added to a turnout on a bridge with tight clearances. The signal system and replacement of the Number 14 crossover with a Number 20 crossover also contributed to the speed increase.

The project at Elm is interwoven with the relocation of the passenger station from the NS Pomona Yard office to the historic station site in downtown Greensboro. This ongoing major renovation project requires 3,000 feet of double track to be extended along the H-line through the station area so that multiple trains can be accessed at the same time from a center island platform. New crossovers on the Main Line west
of the station will allow parallel movements from the H-line onto the Main Line. The restored station will open to passengers in the summer of 2005.

_D&S Junction_

D&S Junction is the location where CSXT’s former Durham & Southern line from the south crosses NCRR to reach numerous CSXT customers on the north side of NCRR/NS in Durham. The existing CSXT crossing consisted of at-grade crossings, or diamonds, over two NCRR/NS tracks. The speed through the interlocking was often temporarily restricted to a grueling 10 mph from an already slow 20 mph when the diamonds were in need of maintenance. NCDOT initiated the project to replace the diamonds with a series of crossovers to raise the speed to 79 mph. The existing diamonds were also located at the west end of a curve on the H-line which restricted spiral length, superelevation, and speed in the curve.

This project quickly became complex as three railroads were involved. A separate Project Agreement was needed between NCDOT and CSXT to cover CSXT’s portion of the project. In addition, a revision to the interlocking facilities agreement between NS and CSXT was necessary to address the changes in operations. The entire process to engineer and execute agreements took almost two years.

The project also included reconstruction and extension of a parallel NS industrial siding on the south side of the H-line. This track now allows the industry to be served while keeping the main track clear for through trains. A parallel CSXT track on the north side of the H-line was also upgraded to accommodate the new operations.

_Passing Siding Improvements_

The three existing passing sidings on the single track Greensboro to Cary H-line are located at McLeansville, Milepost H-8.0, Mebane, Milepost H-32.0, and Funston, Milepost H-48.0. These range in length from 6,500 feet at Funston to 8,963 feet at McLeansville. They were operated by hand throw Number 10 turnouts and the speed in the sidings was 10 mph. NCDOT determined that to increase capacity on the H-line segment, the sidings would be equipped with Number 20 turnouts at each end,
lengthened to better than 10,000 feet to handle the longest freight trains, and upgraded so that the speed in the siding would be 40 mph for freight trains and 45 mph for passenger trains.

**McLeansville Siding**

In addition to the above noted improvements to passing sidings, there is one item of note concerning this siding. McLeansville was extended approximately 1,200 feet west to place the new Number 20 turnout on tangent track as the existing Number 10 turnout at the west end was located in a curve. The siding was extended through a road crossing resulting in a siding length of 10,100 feet.

**Mebane Siding**

In addition to the above noted improvements to passing sidings, there are several other items of note about this siding. The required extension of the east end of the siding by 4,000 feet provided a siding much longer than the desired 10,000 feet. This was necessary in order to extend the siding beyond a curve in the H-line and place the Number 20 turnout on tangent track. Extension eastward was the only option as extension westward would have extended the siding through several grade crossings in downtown Mebane. Extensive coordination was also necessary with the NCDOT Division of Highways because the NCDOT Rail Division included the closure of a road crossing at the east end of the existing siding. A turnout and unused spur track just beyond the existing east end of the siding were also removed.

**Funston Siding**

In addition to the above, Funston siding had many additional issues compared with the other sidings. Funston siding was extended to the west due to a road crossing near the east end. Only 3,000 feet was available for the extension west due to a bridge, rendering the extended siding only 9,500 feet long. A speed-limiting four degree curve was also located to the west. NCDOT desired to flatten this curve as part of the siding extension project rather than relocating the siding and H-line in the future when other curve projects are pursued. The NCRR Company acquired the right-of-way for the future curve realignment prior to commencement of construction. NCDOT also desired to make the existing siding
location the main line, and vice versa, to prepare for a possible future four mile main line relocation project west of Funston.

**ISSUES ASSOCIATED WITH COMPLETED PROJECTS**

Projects completed under the initial phase of work encountered issues related to environmental documentation, permitting, and weather. Since these projects were publicly funded, they were subject to particular requirements of the National Environmental Policy Act (NEPA). Because construction to date was contained within the existing right-of-way, the NEPA requirements allowed for a checklist document known as a Programmatic Categorical Exclusion to be used for environmental concurrence. Future work will require more complicated documents as public involvement for property takes and relocations will be necessary.

Obtaining permits for culvert replacements and stream relocations was a more complicated process. NCDOT worked with the Army Corp of Engineers (ACOE), responsible for wetlands and stream permits, and the North Carolina Department of Environment and Natural Resources (DENR), responsible for water quality and erosion control permits. As NCDOT discovered, the two agencies often have conflicting requirements. This culminated at McLeansville siding, where a 100 foot stretch of existing parallel railroad ditch was determined to be a stream, under the jurisdiction of the ACOE. Through much coordination with both agencies, it was decided to produce a natural stream design, using a meandering alignment with tiers of smooth river rock. The concepts learned at McLeansville were applied to Funston and future projects.

As with all construction projects, weather played a major role in the construction schedule. Record drought in Spring 2002 was followed by heavy rains in the Summer just as construction was getting underway, eroding new embankment and filling ditches. The ice storm of December 2002 halted all work on the signal system east of Burlington, delaying all projects including Mebane siding.
RESULTS TO DATE

Prior to NCRRIP and the sealed corridor crossing improvements, the schedule time for the Carolinian and the Piedmont passenger trains between Raleigh and Charlotte was 3 hours 45 minutes with seven station stops. A typical automobile trip takes just under three hours without traffic delays. Today, following the initial completed improvements, these schedules have been reduced to 3 hours 22 minutes for the Carolinian and 3 hours 15 minutes for the Piedmont, a schedule time reduction of 30 minutes. Dwell times at the seven station stops between termini and recovery times are included in the schedule times. Raleigh to Greensboro schedule time has been reduced about 20 minutes as a result of completed NCRRIP construction projects. Approximately $20 Million has been spent towards construction between Raleigh and Greensboro translating to an approximate cost of $1 Million per minute saved. The ten minute reduction in schedule time between Greensboro and Charlotte is attributed mainly to grade crossing circuitry improvements and the elimination of local speed ordinances. Approximately 10 more minutes will be saved when the remainder of the speed related improvements on the H-line and Main Line are completed. The travel time for passenger trains and automobiles from Raleigh to Charlotte will then be very competitive.

FUTURE NCRRIP IMPROVEMENTS (Figure 2)

NCDOT will continue to identify and pursue other improvements along the Raleigh to Charlotte corridor of NCRR. Some of these improvements will take longer to construct, be more expensive, and yield smaller travel time savings than previously experienced. The future projects primarily increase capacity and reliability in the corridor.

Future H-line Improvements

East Durham Siding

Environmental and preliminary design work is already underway for a new 10,200 feet siding in East Durham to reduce the 23-mile single-track gap between Funston siding and the double track at Fetner. A new main track will be built and the existing main track will become the siding. The track will extend from the recently reconstructed D&S Junction at milepost H-57 to a new control point one half mile east of NS'
East Durham Yard. The siding will serve multiple purposes including an auxiliary track for NS freight trains to work from when picking up and setting out cars at the yard, a process that currently occupies the main track up to an hour.

**Haw River Siding**

A siding is also proposed at Haw River, milepost H-24, to reduce the 22-mile single-track gap between McLeansville and Mebane sidings. This 10,000 feet siding will include major realignments at both ends to raise the speed from 50 mph to 70 mph in this segment. This project will require NCDOT to purchase right-of-way and perform business relocations.

**Cary to Raleigh Upgrade**

The existing conditions along this segment of NCRR were previously noted in Pre-Project Conditions. NCDOT is currently coordinating with NS and CSXT to upgrade the CSXT track to 141 pound welded rail, rebuild and rearrange the Fetner interlocking with Number 20 turnouts, install bi-directional traffic control between Cary and Raleigh, convert a steel open deck bridge to ballast deck, and add superelevation to curves to allow 79 mph operation. Capacity will be greatly improved when trains are able to move in both directions on both tracks at maximum speed.

**Crash Beams at Low Clearance Bridges**

Several bridges on the H-line have low vertical clearance, causing them to be struck by trucks whose drivers do not pay attention to low-clearance signage. This is a significant safety issue as the track over the bridge is often knocked out of alignment leading to the potential for derailments. This project proposes to install crash beams to protect the bridges from impact. A pilot project in Durham has been successful, as this crash beam has protected the bridge from being struck several times a month.
Future Main Line Improvements

Cox to Hoskins Double Track

The most costly single project to date is the proposed replacement of nine miles of double track between Greensboro and High Point, between Cox and Hoskins interlockings. Single-tracked in the 1960’s as part of a rationalization project, this segment now encounters many passenger train delays, from both freight train and opposing passenger movements. Double tracking this segment was a primary element of a rail congestion mitigation study performed by NCDOT in 1999.

Major elements of this project include construction of the NS typical roadbed section for the new track, major improvements to two bridges, replacement of equilateral Number 20 turnouts at each end of the existing single track with universal number 20 crossovers, culvert, and signal work.

Elm to Cox Auxiliary Track

On the double main tracks between Elm and Cox interlockings in Greensboro, both intermodal and mixed freights pick up and set out cars for Pomona Yard. Freight trains currently work the yard from one of the main tracks, leaving only one main track to run passenger trains and run-through freights. To increase capacity, NCDOT proposes to rebuild four miles of existing 20 mph yard lead and construct one mile of new track as a 40 mph freight auxiliary track. The new signaled track will extend to the proposed universal crossovers at Cox interlocking. Trains will work Pomona Yard from the new track, leaving both main tracks open for through movements. Changes to the north and south throats of Pomona Yard and a new bridge are required.

Bowers to Lake Double Track

The second double track project is planned for this four-mile stretch near Lexington, NC. Extensive environmental work is anticipated as this location is surrounded by wetlands. Fortunately, the roadbed for the former double track is still present. Three bridges and numerous culverts are involved. A single, universal Number 20 crossover is planned and equilateral turnouts will be removed at the existing ends of single track.
Number 32.7 Turnouts

Probably the most innovative project planned to date is the replacement of equilateral Number 20 turnouts located at the ends of double track with lateral Number 32.7 turnouts. The replacement will increase the speed at these locations from 50 mph for both tracks to the maximum track speed of 79 mph. NS agreed to investigate the installation of the turnouts at two test locations. The 420 foot turnouts with five switch machines each will be placed at North Kannapolis and Junker interlockings near Charlotte.

RELATED PROJECTS

Several additional state projects have contributed to the success of NCRRIP as track and signal improvements are not enough by themselves to improve ridership. Funding for these projects is from other sources than NCRRIP. These include passenger station upgrades, train equipment improvements, the Sealed Corridor grade crossing safety initiative, the Private Crossing Safety Initiative (PCSI), public awareness campaigns, and marketing campaigns for state sponsored passenger train services.

With the help of federal ISTEA and TEA-21 funds, NCDOT has improved numerous stations on Amtrak routes throughout the state. NCDOT understands attractive, clean, and ergonomic stations are essential to growing ridership on passenger trains. The most notable recent station improvements include Rocky Mount, Wilson, Selma, Cary, Greensboro, High Point, and Kannapolis. NCRR and Amtrak have also improved the stations at Burlington and Raleigh.

Attractive, clean trains also contribute to increased ridership. NCDOT is currently working on the first major overhaul of its passenger equipment. New equipment purchases are planned for future service enhancements.

The Sealed Corridor grade crossing initiative was begun in 1992 to comprehensively improve the 204 public crossings along the federally designated high speed rail corridor between Raleigh and Charlotte.
This program, separate from NCRRIP, played a major role in providing speed increases and safety. Safety improvements to the crossings included outright closure, closure with consolidation to another nearby crossing, grade separation, and installation of median barriers, long gate arms, or four-quadrant gates. 46 crossings have been closed since the start of this project. Crossing closures have been particularly successful through the participation of communities in the study process, notable examples being the cities of Thomasville and Salisbury. For remaining crossings, constant warning time devices were included to ensure the same activation times for a variety of train speeds, and circuit lengths were lengthened for the maximum train speed of 79 mph. Some issues remain with public grade crossings that affect train speed, particularly train acceleration from station stops. The PCSI project has closed 12 private crossings and is in process of closing or improving the remaining 47.

Further contributing to the success of passenger rail in this corridor, the Rail Division performs extensive marketing of its passenger trains through materials, media releases, and a toll free number posted on roadside signs. The marketing program also spearheaded a public and media awareness campaign alerting everyone of the upcoming train speed increases, a fundamental step in ensuring safety for the new operations.

OTHER PROJECTS IN THE CORRIDOR

The Rail Division is coordinating with the NCDOT Division of Highways on more than 60 highway projects that propose widening parallel to or grade separation of the corridor. The NCDOT has learned that early coordination is fundamental to the success of rail and highway corridor planning, as additional tracks or line relocations must be considered. Early coordination is fundamental to the success of the highway project as project planning for highway improvements can begin as early as seven years in advance of construction. Railroad issues can greatly delay highway projects if not addressed until late in the planning process. The Rail Division is committed to coordination to eliminate the needless rebuilding of new facilities for future rail improvements and the associated costs, to improve project schedules, and to improve public perception of rail projects.
A regional rail project in the Raleigh-Durham area has also been considered in the planning and design for NCRRIP, with potential for similar projects in Charlotte and Greensboro-High Point. This project intends to share the NCRR right-of-way with conventional rail, requiring extensive coordination between the affected parties. The Triangle Transit Authority (TTA) in the Raleigh-Durham area is the most advanced project in the NCRR corridor. Considerable coordination between NCDOT and TTA was necessary to ensure current and projected NCDOT NCRRIP improvements allow for future TTA tracks.

THE FUTURE

Beyond the current improvements to conventional rail service between Raleigh and Charlotte, higher speed rail service is also being pursued in NC. In 1992, the Washington, DC to Charlotte Southeast High Speed Rail Corridor (SEHSR) was named one of the original five federally designated high speed rail corridors. This corridor has since been extended to Atlanta, Georgia and Jacksonville, Florida.

NCDOT Rail Division, working with the Virginia Department of Rail and Public Transportation (VDRPT), completed a Tier I Environmental Impact Statement (EIS) in October of 2002. The Tier I EIS process selected the corridor (Figure 3).

As the Charlotte to Raleigh segment is a portion of the SEHSR, NCRRIP projects were designed to allow future higher speeds. The current trackage rights agreement between NCRR and NS stipulates that trains may not exceed 90 mph on tracks shared by freight and passenger. Therefore, certain project elements were designed to allow for at least the 90 mph threshold. These include the realignment of certain curves and the lengthening of spirals for future increases in cant deficiency. Major realignments of curves associated with interlocking and passing siding improvements received the new geometry. In addition, block signals were spaced to allow for a future cab signal system, necessary for speeds above 79 mph.

A Tier II EIS is now underway on the Raleigh to Petersburg segment of SEHSR to evaluate in detail the environmental impacts associated with placing high speed rail service on this downgraded and partially
abandoned CSXT route. Studies have shown that this faster, more reliable connection to the northeast is essential to the success of train service in North Carolina, including the NCRR corridor.

Several Tier II EIS’s are also anticipated in the future for the segment between Raleigh and Charlotte as major line relocations and other improvements requiring right-of-way are evaluated.

CONCLUSION

Several aspects of NCRRIP have contributed to its success. The State of North Carolina’s commitment to improved passenger rail service has led to project funding, and the dedication of staff and resources by the freight railroads has led to a successful partnership. Each party sought to understand each other’s needs and together developed a plan to accomplish them. The coordination, cooperation and development of working relationships among NCRR, NS, CSXT, and NCDOT was critical to the success of the project. Communication among the parties was fostered through monthly meetings to discuss issues concerning current and future projects. In general, the participants share in the enjoyment of the work and a belief in the project as beneficial to all interests.

NCDOT has learned much through NCRRIP. In particular, that the process for multiple party agreements, environmental documentation and permitting, and other planning work associated with public rail projects must begin early to implement projects in a timely manner. In addition, as these improvements are incremental in nature, current projects must be designed to allow for future work to occur with as little additional cost as possible. A project master plan was essential in determining the scope of current and future projects.

Current NCRRIP improvements were crafted primarily to contribute to increased passenger train ridership through decreased travel time. There is still much to be done concerning the other major contributor to ridership, schedule reliability. The next phase of NCRRIP work focuses on many capacity projects to allow for freight and passenger traffic growth. In addition, NCDOT continues to coordinate with the freight railroads to ensure best possible dispatching of the passenger trains.
As an integral part of North Carolina’s passenger rail program, NCRRIP is contributing to increased passenger train ridership. Along with station renovation and equipment upgrades, the NCRRIP corridor upgrades are preparing North Carolina passenger rail for the future.

ACKNOWLEDGEMENTS

The NCDOT Rail Division would like to thank the following for their contributions toward this project:

Scott Saylor and Glenn Hartsoe of NCRR Company;
Larry Etherton, NS project manager, and a host of NS staff in Design & Construction, MOW & Structures, Communications & Signals, and Transportation;
Gray Chandler, latest CSXT project manager, and other CSXT personnel
Richard B. Whalen for assistance with signal review;
Art Misiaszek and Stan Slater of Amtrak

Report and other information located at www.bytrain.org.
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Figure 2: NCRRIP Improvement Locations

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