BURKE, JAMES C., Ph.D. North Carolina's First Railroads, A Study in Historical Geography. (2008)
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Part One of this study is a historical narrative that addresses the political, economic, and technological factors associated with the building of the first railroads in North Carolina, and their relationship to the railroad in Virginia. Both the Raleigh & Gaston Rail Road and the Wilmington & Raleigh Rail Road were completed in 1840. The latter did not run to Raleigh, as was the original intention when it was incorporated in 1833, but rather it terminated near the Weldon Toll Bridge on the Roanoke River where it connected to the Portsmouth & Roanoke Rail Road. The Raleigh & Gaston Rail Road, incorporated in 1835, connected to the Greensville & Roanoke Rail Road, a branch line of the Petersburg Rail Road, by its own bridge over the Roanoke approximately twelve miles west of Weldon. The two North Carolina railroads lacked the benefit of a connection that would bring them into a network. This part of the study concludes with the assessment that trade competition between the commercial centers of Norfolk and Petersburg adversely influenced early railroad development in North Carolina.

Part Two of this study presents two spatial hypotheses. The first advances the position that early railroad development in North Carolina would mirror railroad development in southern Virginia to form an alignment of commercial centers north-to-south rather than east-to-west within physiographic regions. The second hypothesis suggests that the early railroads in North Carolina could have intersected north-to-south and east-to-west to form a productive network across physiographic regions. Of the many railroads proposed in North Carolina during the 1830s, the Waynesborough and Raleigh route seems the most likely component of an alternative network that would support the second hypothesis, if its practicality can be demonstrated by a plausible model. The empirical model prepared for this study replicates the conventions of a period railroad survey utilizing modern geographic tools and resources. The analysis of the resulting estimate supports the proposition that this railroad could have been built at that time had the interests in Raleigh and Wilmington agreed to one railroad to the Roanoke. The viability of other options suggests the possible that the rail network in North Carolina could have evolved differently under the same conditions.

NORTH CAROLINA'S FIRST RAILROADS,

A STUDY IN HISTORICAL GEOGRAPHY

by

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Approved by

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Committee Chair

In Memory of My Mother,

Anne Rhodes Burke

APPROVAL PAGE

This dissertation has been approved by the following committee of the Faculty of The Graduate School of The University of North Carolina at Greensboro.

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After completing this assignment, I had a strong desire to continue the research. Under the guidance of Dr. W. Frank Ainsley of the Earth Sciences department at UNC-Wilmington, I began preparing a survey of the existing railroad-related structures and architecture along the 161½ miles of the route of the Wilmington & Weldon Railroad. Dr. Ainsley has maintained an unflagging interest in my research since that time, and I am honored the he chose to serve as the outside member of my dissertation committee.

Upon entering the Historic Preservation program at the University of North Carolina at Greensboro in 2002, Dr. Jo Ramsay Leimenstoll encouraged me to continue my research by exploring the relationship between railroad development in Eastern North Carolina and the diffusion of stylistic innovations in domestic architecture within the rail corridor. This research served as a foundation for preparing several chapters and appendices presented here.

In 2004, I was granted the privilege of being accepted into the Ph.D. Program in the Department of Geography at UNC-Greensboro, where I encountered a faculty that led me to expand the scope of my research to embrace the many spatial aspects of the topic.

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PREFACE

Throughout the preparation of this work, the author considered several different approaches to organizing its content. Ordinarily, empirical studies in geography follow the traditional form of introduction of the hypotheses, a review of the literature, a description of the research methodology, analysis of the acquired data, discussion, and conclusions. However, the research topic of this study is obscure, being concerned with complex, unfamiliar details of the distant past, and lacking any substantial body of current research. To overburden the reader with purely historical research while at the same time introducing theoretical research associated with the analytical methods seems counterproductive. To present a complete part dedicated to the history of the early railroads of North Carolina with detailed attention to the early railroad technology, survey and construction methods, finance, and planning becomes a matter of necessity. In addition, this part should illumine the related history of the internal improvement movement in the state as well as the political environment in which it emerged. Extrinsic factors, such as Jacksonian economic policy, British investment practices and iron manufacturing, and the evolution of the American civil engineering tradition are relevant to railroad development in North Carolina. To introduce hypotheses after the reader acquire an overview of the subject in the historical narrative is appropriate.

The second part of this work follows the accepted form for empirical research in geography. It uses data gleaned from early railroad surveys undertaken by civil engineers, treatises on railroad technology, annual reports of several period railroad companies, and statistics compiled by the State of North Carolina and the United States Census. In addition, modern geological and topographical geodatasets are used for GIS applications employed throughout the part. The research problem is simple, and the hypotheses draw upon the historical research presented in the first part. Many proposed railroad projects were under consideration in North Carolina during the 1830s. Some of these were impractical, and these can be disregarded in the analysis based upon information present in the historical narrative. One or more of these plans cannot be dismissed. They present the possibility that the early railroads of North Carolina could have been shaped into an alternative network. If there is a strong economic or technical factor that influences the model of these possible routes or the alternative network adversely, it is likely the early railroads constructed in North Carolina represent the best available option under particular conditions, regardless of their redundancy. However, if a more efficient alternative network was possible, the planners of the early railroads were in error.

Modeling an alternative railroad, or network of railroads, is a form of counterfactual analysis. This approach, usually finding applications in sociology and history, is particularly well suited for certain geographic problems. Geographic modeling is often directed towards "what if" propositions related to an actual landscape with measureable properties. It is easier to place hypothetical objects on a landscape, past or present, and to produce a plausible model of their cost and economic impact than to defend an alternative outcome for historical events based upon the addition or removal of certain causal factors. The methodology employed by the author to produce counterfactual models in the second part of this work involves an examination of the topography of the landscape on the probable route of a proposed railroad, and rendering its profile as code sequences that correspond with the railroad construction conventions employed by civil engineers during the 1830s. By comparing the calculations from the extant railroad for excavation, embankment, trestlework, and grades appropriate for the available locomotive technology, it is possible to do so for the counterfactual model for estimating its cost. The analysis is aided by the fact that some of the railroads were constructed at a later time, and one of particular interest was under the direction of the same civil engineer responsible for some of the early railroads. Foreseeing the likelihood that at least one model would have feasible, the analysis should continue with a comparison using more conventional statistical methods. The existing data on the change in land values, agricultural output, and population within the corridors of the early railroads, the counties through which the counterfactual railroads would have passed, and the actual railroads that took the routes of the models at a later time should yield a plausible estimate of the earning potential of the counterfactual model.

The final part of this work includes a set of appendices that address certain topics in depth that could not be included in the historical narrative, but rather supplement its reading. Many of these appendices are separate studies unto themselves on specific topics. These are followed by the bibliography.

The continuous pagination throughout these parts reflects the author's desire that the work should be viewed a whole, regardless of length, rather than an empirical study rooted in purely geographic concepts sutured to historical narrative. Together the parts comprise a single work in the field of historical geography, and cannot as standalone works fully answer the host of questions surrounding the origins of the early railroads in North Carolina, let alone establish their significance.

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PART ONE

CHAPTER I

INTRODUCTION

What conditions influenced the evolution of North Carolina's antebellum rail network? In several aspects of planning, including route selection, the earliest railroads in the state appear to deviate from the more frequently observed models of railroad development.

D.W. Meinig, in his examination of two different railroad networks, one in the Columbia Basin of the United States and the other in south Australia, observed that the designers of both intended to connect farming districts with the coast. One was built and operated by a private corporation, and the other was a state supported railroad. The first railroad had been an improvement upon an existing transportation system that connected steamboat landings on the Columbia River with grain producing areas in the interior (Meinig, 1962, 395-396). North Carolina's first railroads included a railroad in the Piedmont that terminated at the Roanoke River, and a railroad that traversed the Coastal Plain from the port of Wilmington to the town of Weldon on the Roanoke.

The first was a private corporation, and the second was a corporation chartered under a public act, with the state holding two-fifths of the capital stock. Both connected to Virginia railroads, and their termini were located at the ends of the Roanoke Canal. Their Virginia counterparts had built their railroads to the river first, but not to transport produce from the interior to river landings. It was entirely the reverse. These railroads intercepted produce transported on the Roanoke before and after it passed through the canal. Early railroad promoters in North Carolina also proposed plans that would involve connecting inland water routes to commercial towns by rail to intercept produce transported by river to out-of-state markets.

James Iredell, Jr., governor of North Carolina from 1827 through 1828, recommended building an experimental railroad from Fayetteville to Campbellton, a distance of approximately two miles. John Owen, his successor, suggested that such a railroad should extend to the Yadkin or Great Pee Dee (Owen, 1828, 11). The idea of connecting the Great Pee Dee to the Cape Fear appeared as early as 1820. Steamboat transport from Cheraw, South Carolina, on the Great Pee Dee sufficed for the time. However, some in Cheraw envisioned that a railroad from there to Wilmington would be practical with steam locomotives at a future date. The promoters of this plan revived it in 1833 when they anticipated that a railroad would extend from Virginia to the South Carolina line (*The People's Press and Wilmington Advertiser*, December 4, 1833, October 15, 1834).

Some early proposals aimed to achieve the same ends by using railroads as a substitution for canals to facilitate west-to-east river transportation patterns. During his tenure as engineer for the State of North Carolina, Hamilton Fulton proposed the construction of "timber railways" as a cost saving method of connecting Raleigh to the Neuse River along Crabtree Creek with another railway paralleling Walnut Creek (North Carolina, 1821, 30-33). The competition between regional markets and state markets was the prevailing influence behind these plans.

The state contemplated railroad construction as an alternative to roads and canals that would direct produce to internal commercial towns. Regional commercial towns, even across state lines, wanted to construct railroads to attract produce away from established river routes. In both cases, these plans aimed to supplant established routes rather than improve them. River transport was a source of input to the railroads, whereas the early railroads of the Columbia Basin delivered agricultural output to the steamboats of the Columbia River.

Taaffe, et al. (1963) described the typical sequence of transportation network development in underdeveloped countries. Using observations from Ghana and Nigeria, these researchers identified a pattern of lines of transportation emerging from coastal ports and penetrating the interior. Feeder lines, interconnections, and "high priority" corridors evolved from these interior connections. The initial motives for establishing these connections were administrative, defence, or gaining access to agricultural or mineral resources.

One of the early North Carolina railroad proposals did fit this port to interior model. Joseph Caldwell, the first president of the University of North Carolina, proposed a plan for a Central Rail Road spanning the state from Beaufort to the mountains in *The Numbers of Carlton* in 1828. Caldwell, a mathematician, provided a route for this railroad than can be determined indirectly from a table of places in the state and their distance from the line. The work also included useful statistics on the cost of transportation of crops to market by the prevailing means (Caldwell, 1828, 21-23, 41-47). For the time, the plan was both visionary and impractical. However, the idea of the Central Rail Road took hold of the public mind, particularly in the piedmont.

On August 1, 1828, two hundred people attended a meeting held at William Albright's home in Chatham County to listen to Dr. Caldwell. The address and resolutions of that meeting were published (Mebane and Heartt, 1828). By the early 1830s, this plan was at the core of the state's policy on projected internal improvements. The North Carolina Railroad, completed from Charlotte to Goldsboro in 1856, and the Atlantic & North Carolina Railroad, completed from Goldsboro to Beaufort in 1858, represents the late realization of the policy. The Cape Fear & Yadkin Rail Road, a plan to connect the port of Wilmington to Morganton via Fayetteville, was another railroad proposal of the port-to-interior model. However, the project languished during the antebellum period and was final constructed toward the end of the century. The evolution of the early rail network of North Carolina did not follow the model suggested by Taaffe and colleagues (Taaffe, 1963). The organization of transportation under a central authority to achieve such a state system was not established. The railroad routes ran from the port of Wilmington and at Raleigh, the state capital, terminating to north through their respective physiographic regions without connecting.

Did the early promoters of railroads fully understand the nature and expense of rail transportation? In the 1830s, every railroad was an experiment in so much as each was testing a new technology under unique economic and geographic conditions (Ruffin, 1836, 766-767). That the early promoters of railroads, particularly those supporting extensive projects, fully understood the limitations or the unique nature of railroads is doubtful. The American press touted the advantages of railroads over canals in the early 1820s. This was remarkable, as locomotives were still in the experimental stage and had not yet proven their reliability.

The pioneer in the field of locomotive design, English engineer George Stephenson, would produce a suitable design by the late 1820s, build a first full-scale locomotive in 1825, and perfect it in 1827. An actual steam railroad opened between the port of Liverpool and the manufacturing town of Manchester in 1829 (*The American Farmer*, October 15, 1824, March 4, 1825; *Niles' Weekly Register*, March 26, 1825; Stearns, 1998, 31).

The excitement of the press of the mid-1820s was conjectural. The few successful experiments with locomotives prompted the logical conclusion that putting down lengths of track was easier than excavating canals. Joseph Caldwell, the author of the Central Rail Road plan, suggested that the rails would accommodate horse drawn wagons and any person providing his own vehicle could use the railroad by paying a toll. There would be sidetracks for passing traffic every third of a mile (Brown, 1928, 15-16). While the idea of making railroads suitable for both locomotives and horses was common in this period, Caldwell's suggestion that anyone with the properly fitted wagon could use the tracks at will implies that he was thinking of the railroad as a type of turnpike. Others, such as the promoters of the Cape Fear & Yadkin Rail Road, assumed that constructing large-scale railroads was merely a matter of economy of scale. Private investors in different communities through which the rails would pass could share the cost of construction and operation. They would enjoy the profits, both in dividends and increased commerce. However, the task of constructing and managing railroads required an organization of labor and capital that was qualitatively different from any economic activity that preceded it.

Did the primitive railroad technology limit the selection of routes, and retard the development of the network? The developers of later railroads enjoyed the benefits of knowing these limitations prior to planning a connection or network. The civil engineers employed by the railroads to conduct surveys and recommend construction methods were refining their craft on the job. The prevailing methods of construction had inherent weaknesses that created long-term financial liability for the companies. The abundance of wood and the scarcity of domestic iron suggested using strap iron wooden rails for the initial construction of the way, but the longer these rails remained in use, the higher cost of maintenance caused profits to decrease. An east-to-west railroad like the Central Rail Road, the key element of early state policy, appears incompatible with 1830s technology.

How did the nationwide financial downturn of the late 1830s and early 1840s derange the early plans for a rail system, and what was the long-term impact on its future development? The completion of the Wilmington & Raleigh Rail Road and the Raleigh & Gaston Rail Road coincides with the destabilization of the financial base of the United States economy that began with the Panic of 1837. The economy remained depressed through the mid-1840s, and recovery in the Southern states lagged behind other sections of the Union. Work had commenced during a period of prosperity, and both railroads strived to achieve north-to-south connection through the state. The Raleigh & Gaston Rail Road would form a link between the Petersburg Rail Road and the projected Raleigh

& Columbia Rail Road. Efforts to capitalize on the latter failed, and the Raleigh & Gaston's finances began to deteriorate before it was completed, with diminishing profits forcing it into foreclosure. The plan for an interior corridor through Raleigh failed to materialize during the antebellum period. The North Carolina Railroad displaced the interior corridor to the west. The Wilmington & Raleigh survived the financial downturn, and through its steamboat service to Charleston established the north-to-south corridor. However, it struggled with debt, and the company deferred construction of a branch line connecting to the interior and south. Without branch lines, it did not serve the interest of the interior regions, or improve its profits with a through rail to the south.

What were the strengths and weakness of the North Carolina's policy on internal improvements? One of the key functions of government is to build and maintain a transportation infrastructure that serves the most remote reaches of its domain so that all its citizens have the opportunity to enjoy the benefits of communication and commerce. In theory, all regions within a state should be equally represented in the process of the planning a transportation network, with their particular needs and resources considered only in the context of the whole. The citizenry must come to an equitable arrangement on the distribution of the tax burden that will finance it. If a state fails to develop a comprehensive policy for transportation, or lacks the political will to abide by one, the transitory demands of the market will assume the deciding role in public work. The resulting network, in the form of permanently established routes, will preserve sectional differences within a state even though the former economic interests in these sections are no longer relevant.

The history of the internal improvements in antebellum North Carolina is inseparable from the political character of the state as it developed after the Revolution. Richard Hartshorne observed that in most state areas physical or cultural barriers, to a degree, separate regions; regions have varying relationships with outside states; and regions differ from each other in population, economy, and political attitudes (Hartshorne, 1950, 105). Four distinct physiographic regions, the outer coastal plain or tidewater, the inner coastal plain, the Piedmont, and the mountains divide North Carolina. The Cape Fear Region, the Eastern Region, the Piedmont Region, and the Mountain Region comprise the current cultural and economic divisions of the state. A delegate to the 1835 North Carolina Constitutional Convention described the state's divisions as an obstacle to internal improvements.

> It is a lamentable fact, that there exists a mutual jealousy all over out State, not only between East and West, but between the Cape Fear, the Neuse, the Roanoke, &c. And the consequence is, whenever any improvement is proposed in one section, an opposition arises in another, and a resort must be had to that odious system, known by the name log-rolling, to carry any point.
>
> – (North Carolina, 1836, 124) –

Logrolling – the exchange of political favors to achieve a regional goal – is not a device that has faded from politics. However, the "mutual jealousy" described by the delegate is defined by the major river basins and physiographic regions. The organization of pre-railroad antebellum political factions appears to have oriented around river transportation routes in the east, and land transportation routes in the west. The lack of equal representation in the legislature was a defect in the North Carolina State

Constitution of 1776; it became apparent only as the western part of the state was gradually settled, and each section began to agitate for internal improvements. The ambitious plan proposed by Archibald Murphey in the 1810s and the state plan proposed by the Internal Improvement Conventions of 1833 required a unified legislature to move forward. The ratification of the North Carolina State Constitution of 1835 resolved some of the inequities of the early constitution, but it took more than a decade before North Carolina acted on a state plan.

Finally, the State of North Carolina as a political whole fashioned its internal improvement policy from the beginning around preventing commerce from being carried out of state to Virginia and South Carolina. However, the diverse sections of North Carolina had trading relationships with different commercial centers of in these states, and these connections tended to interfere with policy-making. Further complicating the process, Virginia and South Carolina were also plagued by sectional rivalries.

CHAPTER II

THE ECONOMIC BACKGROUND

The economic Railroad development in the United States took it first great strides in the antebellum South. The Baltimore & Ohio and the Charleston & Hamburg railroads pioneered large-scale railroad construction in the late 1820s. Compelled by the region's extensive geography, the early southern railroads exceeded their northeastern counterparts in length. Many historians have advanced the conclusion that the southern railroads failed to evolve into a coherent network because of undercapitalization, poor planning, nonstandard construction techniques and gauges, and the lack of rail connections between cities and the rest of the country. James A. Ward, author of *Railroads and the Character of America, 1820-1887*, found that many of these assumptions about the inferiority of southern railroads emanate from a narrow scope of research, much of it concerning the network's wartime inadequacies. Using Albert Fishlow's regional-capital-investment series for railroads and Henry V. Poor's compilation of yearly railway mileage, Ward found that southern railroads met or exceeded the national average capitalization per mile between 1837 and 1842. The lack of standardization of gauge was a problem throughout the Union, not limited to the southern railroads. Additionally, he noted the primary function of these railroads was to provide transportation to the nearest market, not to supply the needs of bordering states. Ward attributes the decline in the gross capitalization per mile in the South after 1842, thus the rate of railroad development, to the region's slow recovery from the nationwide depression that followed the Panic of 1837. The scarcity of technical expertise brought about by service of West Point-trained civil engineers in the Mexican War and construction of the foreign money markets following the outbreak of the Crimean War prevented many southern railroads from upgrading the 1830s technology of their initial construction (Ward, 1973).

The impact of the economic downturn of the late 1830s influenced the developments of North Carolina's antebellum rail network. Advocates of internal improvements had devised a state plan for a network consisting of intersecting north-to-south and east-to-west corridors in 1833. The state granted charters to a number of promising railroad projects that year. By the beginning of 1840, the Wilmington & Raleigh Rail Road and the Raleigh & Gaston Rail Road were nearing completion. When the North Carolina General Assembly met in their 1848-49 session, the state did not actually have a rail network, merely two fragments of a state system of internal improvements that evolved contrary to earlier plans. At this point, both railroads were on the verge of becoming inoperable. The tracks of the Raleigh & Gaston Rail Road and the Wilmington & Raleigh Rail Road, originally constructed with perishable strap-iron wooden rails, needed reconstruction with durable heavy iron (Graham, 1848, 3-8). The Raleigh & Gaston was then, for all purposes, a state-owned railroad. After defaulting on interest payments for state endorsed bonds, North Carolina instituted foreclosure proceedings against the company in 1845, and took possession of the railroad the following year. Throughout its existence as a private company, its net profits proved insufficient to service its debt and balance expenditures. The State of North Carolina had also endorsed the bonds of the Wilmington & Raleigh Rail Road, and it was the railroad's largest shareholder. The company, though deeply in debt, was profitable and its future prospects appeared encouraging. The company had yet to declare dividends. Regardless of the productiveness of these investments the state was obliged, for the sake of the public good, to facilitate the rebuilding of these railroads and lend its support to the long awaited east-to-west trunk line that would bring the existing railroads into a state network (Brown, 1928, 33-39, 53-58). Disruptive external economic forces contributed to the conditions of the railroads in 1848. This was compounded by earlier planning decisions made by the individual railroad companies and the inability of the state to adopt a comprehensive system of internal improvements that left the railroads open to the ill effects of the depression.

The Causes of the Financial Disruption

Andrew Jackson's opposition to the re-chartering of Second Bank of the United States was a key element in the origin of the financial crisis. Several significant individuals had played key roles in the formation of the bank, the financiers, John Jacob Astor, David Parish, Stephen Girard, Jacob Barker, and two politicians, Alexander James Dallas and John C. Calhoun. The charter of the first Bank of the United States expired in 1811. Within a year, foreign investors withdraw seven million dollars from the nation's economy. The War of 1812 demonstrated to lawmakers that the United States lacked the military or financial resources for national defense. By 1814, Dallas was attempting to garner support in Washington for a National Bank – among these, Nathaniel Macon – arguing that not only was such an institution necessary, but concerns about its constitutionality were unfounded. Dallas was seeking a bank to serve the government's interest in wartime. Nothing became of this, or the efforts aimed at creating a commercially oriented national bank. In March of 1816, Congress considered the Dallas-Calhoun Bill. During the debates, it met with opposition from the likes of the Federalist Daniel Webster, and the Democratic-Republican John Randolph. Supporters included Henry Clay. The bill passed the House by a narrow margin, and the Senate by a wide margin. James Madison signed the bill into law on 10 April 1816 (Walters, 1945, 115-130).

The Bank of the United States functioned opposite of the Federal Reserve Banks that exist today. The private banks were indebted to this central bank rather than acting as its creditors. It exercised its control of banks by restricting the capital available for lending so that their notes would not depreciate. It was unpopular with state and private banks because it restricted their lending power. Hard currency Democrats favored the stabilizing influence of precious metals over paper currency, and a limit on credit to curb market volatility. The pro-bank Democrats favored a system that would support business, growth, and speculation. Both factions historically opposed a national bank. Thomas Jefferson had tolerated the First Bank of the United States because it functioned well and there was not enough resistance to it within his party. Jackson was motivated by a hard currency ideology and pressure from private banks. Biddle's attempt to renew the bank's charter in advance of its expiration was impulsive and ill-timed (Hammond, 1947).

Jackson, in his state of the union message to Congress in 1829, began his attack on the second Bank of the United States after becoming aware of an effort by the bank's supporters to have its charter renewed in advance of its expiration in 1836. Nicolas Biddle, the bank's president, sought Jackson's support for the re-charter bill as Congress considered it in 1832. Jackson did not want the government to be a stockholder in the bank, yet he wanted directors appointed by the President of the United States serving on the board of the bank in Philadelphia and its branches. He also believed the bank was engaging in real estate speculation, so he wanted limits set on the time the bank could hold the property it had obtain through defaulted loans; and also wanted the bank to pay state taxes on its branch properties at the same rate used for taxing similar property owned by state banks. Biddle agreed to the proposed amendments to the charter. The bank's opponents, however, delayed action on passing the bill through Congress. Allies of the administration in the Senate proposed amendments to the bill that required the bank to surrender its privileges of being the only nationally chartered bank. Foreigners were ineligible to hold stock in the bank, and the bank accepted bank notes as payment of debt from individuals under the same rules applicable to state chartered banks. The branch properties were subject to state taxes. These amendments failed, and the bill passed through Congress. On 10 July 1832, the president returned it to Congress with his veto message. The bank's failure to negotiate a compromise was both impolitic and shortsighted (Perkins, 1987, 532-538).

In late 1833, Biddle to cause a contraction of the earning assets and demand liabilities of the bank in response to Jackson's decision to remove federal deposits from the second Bank of the United States to state banks. The Deposit Act of 1836 dispersed all but five million dollars of the federal surplus to the states. Biddle's motives appear intended to force the return of deposits or obtaining a new charter. Meerman's analysis of financial statistics of the period indicates that the impact of the contraction was not crippling because specie was entering the country due to falling imports and increasing exports. The recession that followed the contraction was likely the product of market uncertainty (Meerman, 1963, 378-388). The timeline of events began with the ratification of the Deposit Act on 23 June 23, 1836. Supplemental Transfers commenced on 1 August 1, 1836. Specie Circular went into effect on August 15, 1836, and the first and second distributions of the federal surplus occurred on January 1, 1837 and April 1, 1837. New York banks suspended specie payment on May 10, 1837. Shortly thereafter, the Bank of England rejected commercial bills of discount from Anglo-American mercantile houses (Rousseau, 459, 484).

George Macesich advances the hypothesis that the primary source of the monetary disturbance in the United States between 1834 and 1845 was external, though he does note the influence of internal events. His examination provides an explanation of the nineteenth century international specie standard. Counties had to fix and maintain specie value, imports and exports of specie had to move freely, specie movement influenced domestic money supply, and there had to be a reasonable level of price flexibility. Macesich, using statistical methods, determined that the collapse of the banking system was an adjustment in the larger international economic structure that was dependent of the maintenance of the specie standard, not the influence of Jacksonian monetary policy alone. The British had invested heavily in the United States during the 1830s. A number of external events in Europe, such as crop failure in England in 1838 and a decline in the demand for British textiles, placed strains on the Bank of England, prompting the bank to borrow gold from France. The liberality of the London money market was constrained (Macesich, 1960).

After the Second Bank of the United States failed to secure it charter in 1836, the bank obtained a charter under the State of Pennsylvania. The bank, still the nation's largest corporation, assumed a policy of extending credit to internal improvement projects and financing cotton, the United States' leading export. These investments comprised one-third of the bank's earning assets. The economy of the South was at a standstill. During the summer of 1839, Biddle embarked on a campaign to gain dominance of the banks of New York and Boston. The Bank of the United States withdrew large amounts in specie from these banks, and shipped large quantities of gold to England. The specie, obtained on London and Paris drafts, then sent to Europe to pay the draft at a loss, created a loss. The bank's agent in London, Samuel Jaudon, secured capital from the Paris Rothchilds with drafts, and attempted to obtain a loan from the Bank of England. He eventually accepted loans from private individuals backed with American securities. In spite all efforts, the Bank of the United States was falling victim to the maturing postnotes it had sold to bring down its competitors. Unable to meet its obligations, the bank was suspended and subsequently declined to ruin in 1841. Wall Street remained intact, recognized abroad as a center of legitimate banking (Hammond, 1947).

Richard H. Timberlake would address the question of the central bank in the early 1960s after the publication of Bray Hammond's critical work *Banks and Politics in America*. He presented a thesis quite different from Hammond on the demise of early central banking. This is, central banking policy was incompatible with the specie standard. Society resented a central bank in the United States. The development of banks chartered by Congress occurred for fiscal purposes, and "the central banking idea developed residually as an 'external economy' to the public character of these institutions." There was not a safe ground for these institutions to exist. The Treasury was the appropriate repository of public funds, and the authority over currency. Their functions could not assume control over hard currency. The commercial banking activities of a central bank appeared to tend towards a monopoly. President Tyler, a Whig, vetoed a bill that would create a central bank like the Bank of the United States in the early 1840s. The Democratic position was that the centralized monetary policy was the responsibility of the Treasury. The bank was never revived (Timberlake, 1961).

The impact of Jacksonian monetary policy on North Carolina came with the distribution of the federal surplus. The General Assembly enacted *An Act to Aid the Internal Improvements of the State* that directed the surplus revenue towards the purchase of stock in the Wilmington & Raleigh Rail Road and several other projects (North Carolina, 1837, 349-352). North Carolina was slow to obtain a Jacksonian "pet bank" after the distributions of federal deposits from the Bank of the United States in 1833. In 1835, Romulus M. Saunders, a Democrat, successfully persuaded the administration to direct deposits to the Bank of North Carolina (Gatell, 1964, 54). Jacksonian monetary policy had the double impact of providing the State of North Carolina with the unexpected capital to finance internal improvements, but the individual shareholders of the companies – mostly merchants and planters – experienced the resulting deleterious effects of the Panic of 1837 and the depression that followed. James Owen, president of the Wilmington & Raleigh Rail Road, describes the burden of shareholders in his 1840 report to North Carolina Board of Internal Improvement a few months after the railroad was completed. In the years before the crisis, many of the shareholders had subscribed liberally to the stock of the company. During the downturn, the directors of the company chose to exercise forbearance with the distressed shareholders that were unable to pay the scheduled installment on the shares rather than press for payment (Wilmington & Raleigh Rail Road Company, 1840, 7). Owens's perspective is that of the eastern counties, and the planter-merchant class that enjoyed the benefits of external trade. It is unlikely that the yeoman farmer of the interior felt the impact of the downturn severely, if at all.

Historian Bill Cecil-Fronsman noted in *Common Whites: Class and Culture in Antebellum North Carolina* that two economies existed in the state, a modernized market based economy and a subsistence economy. Morton Rothstein suggested the concept of a dual economy for the antebellum South in 1967. Few historians thought it appropriate to consider the plantation economy "modernized," yet most agree that the practice of semi-subsistence agriculture in the South represented an independent economic sector. In North Carolina, the underdeveloped transportation network of the state deprived many farmers of any alternatives other than growing for local consumption. It would be pointless to grow more than could be consumed, and transporting elsewhere would have been costly. Economic realities shaped their culture (Cecil-Fronsman, 1992, 97-109). The currency of yeoman farmer and his immediate community was produce. The source of wealth was on his land, and supremely tangible. Andrew Jackson emerged from this background, and had little sympathy for concentrations of capital in Philadelphia, Wall Street, or London. The economic crisis of Jacksonian Era was a defining moment in the economic history of the United States for those who had access to external markets. Therefore, external variables determined the economic reality upon which their culture was organized.

The development of the antebellum railroad network in North Carolina is, above all, one event in the historical geography of capitalism. The steam locomotive was a technological tool for reorganizing spatial and temporal function of landscape to maximize capital. The accumulation of profit drove an outward search for a larger market (Saunders, 1995, 9-12). There were traditionalists, such as North Carolina's elder statesman Nathaniel Macon, which advocated a different set of principles on which to organize the spatial functions of the state so it might maintain its independence from the influence and instabilities of outside markets. Their influence had prevailed in state government from the end of the Revolution, and their unswerving resistance to centralization shaped the internal improvement movement in North Carolina. They feared the emergence of a plutocracy that would overthrow the accomplishments of the Revolution and link the fate of the state to foreign interest. Internal improvements was the domain of individual and private corporations, not the state, and accepting the aid of the federal government for improvements would oblige the state to support its policies.

This political philosophy is Antifederalism and its core concepts were incorporated in Jeffersonian Democracy and the State's Rights Ideology that define the character of the antebellum period.

CHAPTER III

THE TRANSFER OF TECHNOLOGY

Many of the railroads of North Carolina and Virginia mentioned here were built under the direction of Major Walter Gwynn, a West Point trained civil engineer. His career in North Carolina and the neighboring states would continue through the antebellum period, and include a number of hydrological projects, bridge designs, and railroad surveys. The American school of civil engineering was still in its formative years when the railroad movement began. The science and craft of this new technology was European, and the emerging tradition of civil engineering in the United States was the agency of its transfer and refinement. The American school possessed both the advantages and defects of the English and French schools of thought that influenced its development.

West Point trained engineers formed the foundation of civil engineering in the United States; and while the states were reluctant to seek government aid in financing public works, they were more than willing to employ army engineers. The passage of the General Survey Act of 1824 and the creation of the Board of Engineers for Internal Improvements provided turnpike, canal and railroad companies with army engineers. Through projects such as the Baltimore and Ohio Railroad and the Charleston and Hamburg Railroad surveys, engineers such as Major William G. McNeill and Lieutenant

George W. Whistler refined the craft of the railroad survey. Throughout the 1830s, Army engineers offered technical support that aided the construction of 1,879 miles of track. The War Department and Congress began the practice of loaning Army engineers to these private companies in the mid-1830s. The Topographical Bureau understood that the railroads were of military as well as commercial significance and served the national good. If the army withheld its engineering expertise, these worthy projects would suffer. After the repeal of the General Survey Act in 1838, many of the West Point trained-engineers who participated in these surveys would later become presidents, chief engineers, or engineering staff for railroads and canal companies (Hill, 1951, 235-242, 244-245).

The threat of slave insurrections and hostile incursions by Native Americans prompted the War Department to consider the military potential of this new technology; railroad companies, eager to receive technical aid, were quick to call attention to the logistical value of their particular railroads. The companies gave army engineers in the service of railroads considerable independence. They located routes to avoid steep grades, "deep cuttings and heavy embankments, and long viaducts." Army engineers , unfortunately, often recommended different track gauges advocated in various textbooks, and acquiesced to advocating the use of less durable wooden rails – at least for initial construction – because wood was cheap and abundant. Walter Gwynn, in his capacity as chief engineer for the Portsmouth & Roanoke Rail Road advocated wooden rail construction. The government and military did not actively pursue a standard of construction to avoid the perception of federal interference (Angevine, 2001, 292-318).

The training of army engineers at West Point followed the French scientific school more so than the tradition of British technical artisanship. Colonel Claudius Crozet, a graduate of the Ecole Polytechnique and a professor at West Point, emphasized the practical application of mathematics in the curriculum during the early 1800s. The French had made considerable advances in the science of hydraulics. The cadets needed to conceptualize a project in detail and prepare plans before they could build. Crozet introduced Sganzin's *Program d'un Course de Construction*, a textbook on transportation surveying, to his classes in 1816, "the first textbook in America to discuss reservoirs and advocate locks and dams in natural channels." Captain Dennis Hart Mahan, a West point graduate and professor of mathematics (1824), continued his study of engineering in France in 1826, and returned to the academy as the best-educated engineer in America. His tenure at West Point continued until his death in 1871. However, the influence of the French school left the U.S. Army Corps of Engineers with a focus on large-scale federally sponsored navigation projects, and thus out of the political and economical mainstream (Shallat, 1990, 22-24, 28-32, 49-50).

The field of civil engineering attracted some outside of the military. Charles S. Storrow, a graduate of Harvard, continued his education in France at the Ecole des Ponts et Chaussees during the early 1830s. During 1831, Storrow visited Britain to examine that country's engineering achievements. There he prepared drawings of the roadbed of the Liverpool and Manchester Railway. These proved their worth shortly after his return to Boston. The Boston and Lowell Railroad hired him as assistant engineer. In 1835, he published his *Treatise* on hydraulic engineering. It was a landmark work in the history of

American engineering, and one of the earliest written in English to build on the theoretical advances made in the field by the French. Storrow's work was quickly taken up by Dennis Hart Mahan and became the standard introductory text in hydraulics at West Point, and was cited by Mahan in his own works (Ford, 1993, 271-276, 281, 288-292).

The Ecole Polytechnique graduated engineers that were also concerned with types of engines. Nicholas Leonard Sadi Carnot's *Reflections on the Motive Power of Heat* (1824) was an obscure work cited by the influential French engineer Benoit Pierre Emile Clapeyron, and eventually attracted the attention of William Thomson, Lord Kelvin. Though Carnot did not live to explore thermodynamics beyond the *Reflections*, his latter notes suggest a revision of his concepts in a similar direction as those expressed by James Prescott Joule on the conservation of energy (Kerker, 1957, 143-149). Francois Marie Guyonneau, le Comte de Pambour, another graduate of the Ecole Polytechnique, published *Traite des Locomotives* (1835) and *Theorie de la Machine a Vapeur* (1844). These works employed a high degree of mathematical facility, and remained standard texts for decades (Kerker, 1960, 267-268). De Pambour's equations are cited extensively in *the Report from The Secretary of War in compliance With a resolution of the Senate of 24th January, 1838, with a report of the survey of the Charleston and Cincinnati railroad* (United States, 25th Congress, 2nd Session, Senate, 1838, 157: 27-32).

The transfer of British engineering knowledge to the United States appears to be more direct. Benjamin Henry Latrobe, a British professional engineer became the engineer for the Philadelphia Waterworks and he was also the architect of the Capitol;

considered the father of [professional] architecture and civil engineering in the United States, his American career spanned the years 1796 until his death in 1820 (Buchanan, 1986, 506). Hamilton Fulton, civil engineer for North Carolina, consulted Latrobe on the possibility of uniting at least two of the great rivers of North Carolina (North Carolina, 1819, 22, 32). The British firm of Robert Stephenson and Company at Newcastle-upon-Tyne supplied some of the early locomotives used on the American railroads (Buchanan, 511). The Wilmington & Raleigh owned two Stephenson locomotives (Wilmington Advertiser, 10 November 1837). American engineers added some useful modification to this English equipment, and eventually developed locomotives more appropriate to the topography of the American landscape and the cheap methods of rail construction (Cal. Scientific Press, 1880, 35).

Horatio Allen, an engineer for the Delaware & Hudson Canal Company, later the chief engineer of the Charleston & Hamburg Rail Road, studied railroad technology first hand while on an iron purchasing mission to England at the behest of the Delaware & Hudson in 1828. Allen was an early advocate of steam power over animal traction. In England, he made the acquaintance of George Stephenson who accompanied him on an examination of the Liverpool & Manchester Railway, and observed iron rails on wood spaced four feet eight inches apart on the Stockton & Darlington Railway. He placed orders for the Delaware & Hudson Canal Company for three locomotives from Foster, Rastrick & Co. of Stourbridge, and an order for one locomotive from Stephenson. The Foster, Rastrick locomotive “The Stourbridge Lion” proved to be too heavy for the track of the Delaware & Hudson when it was tested. This was a slight setback. Allen accepted the appointment of chief engineer for the Charleston & Hamburg Rail Road in 1828. Confident in the future of steam locomotives, he advised the company to build their railroad for steam locomotives from the start. His plan for construction was timber rails top with iron held in place by spikes. At least eight early English locomotives were used on this railroad (Carlson, 1960, 144-146-147).

George Stephenson had used a track gauge of four feet and eight inches on the Stockton and Darlington railroad in 1825. The short railroad was adapted to use as an existing tramway used for carrying coal wagons. Stephenson placed iron on the timbers at the gauge used by the colliery that employed him. He later used the same gauge on the Liverpool and Manchester Railway. He and his son Robert built locomotives for this gauge unless a company ordered otherwise. The British engineer Isambard Kingdom Brunel experimented with the seven feet gauge. He believed the larger gauge would allow the locomotive and car to travel with greater stability and high speeds. The British government commissioned trials between the different gauges where the broad gauge track proved to be superior. However, the officials from the Board of Trade recommended the four feet eight and a half gauge since it was already in wide use (Siddall, 1969, 32-33). American engineers planning the Baltimore & Ohio visited Stephenson's Liverpool & Manchester Railway in 1829. Stephenson had expanded the gauge by one half inch to allow more room between the rail and the wheel flange. The American engineers came away from the experience with the conviction that the Liverpool & Manchester was the model for their railroad in all aspects, including track gauge. They altered their original plans for using four feet six inch gauge to standard gauge. Other visiting engineers from the United States tended towards round measure measurements such as four feet nine inches and four feet ten inches. The five feet gauge was widely accepted by American engineers, and its use by the Charleston & Hamburg Rail Road prompted the planners of other southern railroads to adopt the gauge. Other American engineers, impressed by stability of the ride of the seven feet gauge of the British Great Western Railway recommended broad gauges to their companies. The six feet gauge was used by the New York and Erie Railroad. Before 1850, the railroads of the United States and Canada would use a large range of different rail gauges (Puffert, 2000, 934-944).

Methods of rail construction were as varied as the selection of rail gauge. Walter Gwynn, chief engineer for the Portsmouth & Raleigh Rail Road and the Wilmington & Raleigh Rail Road, recommended strap iron wooden rail construction. This consisted of iron bar, two-inch wide by one-half inch thick, spiked to heart pine rails resting on oak sills. The sills were notched to receive the rails and oak wedges held the rails in place (Gwynn, 1833, 5). The Charleston & Hamburg Rail Road used four different methods of construction, two types of sleeper construction, pile construction, and truss construction. The first sleep construction was the least expensive and suitable for solid ground. Six by ten inch wooden rails were set in ten by twelve inch sleepers spaced six and a half feet apart. The ground was excavated or filled as needed. With the second sleeper plan, the rails are placed three inches into caps, secured with wedges, held in place with a two-inch spike, and the sill is bedded lengthwise nearly to its depth in the ground. The size of the rail is the same. The sills are nine feet long, and the sills are placed three feet from the center of the road under the rails. The sills are nine by nine inches. The rail is held in place by the cap, and the cap is set in the sill. The third construction method used piles. These piles were pine logs (?) ten to fifteen inches long driven into the ground by a pile driving machine. The company furnished these machines to the contractors working on the road. They had a special spade attachment, much like a posthole digger, that excavated a hole three and a half feet deep. The piles were placed in the hole, and hammered into the soil with a 600-1,000 pound hammer falling along guides. The machine stood fifteen feet high, and was mounted on wooden rollers. The piles were driven to depths not less than four feet in the ground. They were driven six feet apart transversely, and six and a half feet apart longitudinally. When in place, they were cut to level, and capped with nine feet six by nines. The truss method was used for very high elevations of the track. A foundation of piles had to be placed first. Then an arrangement of four eight by ten inch timbers were built into the form of an inverted "W," and capped with a ten by twelve. The bottom sills were twelve by twelve inches. The cost of this type of construction ranged from $6,000 to $10,000 per mile (Ruffin, 1833). Strap iron wooden rail construction was significantly different than the latter method employed using heavy iron rails.

George W. Whistler, a West Point trained engineer and pioneer in railroad surveying and construction in the United States, was employed by the Czar of Russia as a consultant on the St. Petersburg and Moscow Railroad in the early 1840s. In a letter to Count Kleinmichel in September of 1842, Whistler summed up the arguments for and against the use of wide gauges. The advantages included greater stability, a reduction of frication, and the potential for greater speeds. The disadvantages included the increased length of axles and their consequent weight, and the cost of material on the road associated with the greater width. Significantly, he recommends the use of heavy iron rails of sixty pounds per yard supported every three feet. The *chair*, a cast iron fitting between the base of the rail and supporting wood or stone, were commonly used at each bearing point on European railroads of the day, but only on the ends where rails joint on American railroads. Whistler recommended, based on his own experiences, that the use of the H-rail provided greater stability and economy than the more common T-rail (Vanderblue and Whistler, 1939).

The differing selection of gauge, construction methods, and equipment used by the early American railroads is attributable to the diffusion of British technology through the agency of West Point-trained civil engineers. The passage of the General Survey Act of 1824 filled the need for professional engineers for canal and railroad projects by lending Army engineers. The American school of civil engineering was influenced by the scientific French school; however its emphasis on hydrologic problems rather than the new railroad technology led many to seek their knowledge though the few treatises on the subject or through visits to England. The American railroad evolved with built-in disadvantages, particularly different rail gauges and perishable wooden construction, that inhibited the formation of networks.

CHAPTER IV

THE RAILROAD SURVEYS

In the previous chapter, this work explored the origin of the American school of civil engineering, the role of United States Topographical Bureau engineers in early railroad development, and some techniques used in railroad surveys. This chapter will examine a number of surveys from the 1830s in detail to determine what construction techniques they recommended for particular terrains.

United States Civil Engineer DeWitt Clinton conducted a survey for a railroad from the Portage Summit of the Ohio Canal to the Hudson River in the early 1830s. He submitted his report to Lt. Colonel John J. Abert of the Topographical Bureau on 26 January 1832, and the report was transmitted to Congress on 29 February 1832.

> I should, however, propose that it should be double track, and that locomotive engines should be used entirely on it, to supercede [supersede] the necessity of the horse path. The rails should also be elevated on suitable blocks, some inches above the ground, to admit of their being freed, in the easiest manner, from the snow and sleets which would lodge on them during winter. The great error of the roads in operation, or building, in this county, is, having the rails nearly on the level of the horse path. I would also propose, in deep cuts, that the roads should have an [a] uniform declivity, to admit of the water which may collect to be drained in the easiest manner; and, on heavy embankments, that the road should be constructed of wood, and that suitable turn outs should be made from one track to the other.
>
> – (United States, 1832a, 18-19) –

The horse path also appears in Walter Gwynn's survey for the Portsmouth & Roanoke Rail Road. The centers of the sills (crossties) were to be cut for the construction of the path. Though it was a single-track railroad, the drainage ditches were positioned with the idea of allowing space for double-track. When the section of that railroad had been completed between Portsmouth and Suffolk, a large drainage ditch was dug through the Dismal Swamp alongside the path of the track and the excavated material was used to build up the track bed. It was topped with a layer of approximately a foot of sand. Seventeen miles of track were completed by the time Gwynn made his report. He makes mention of Claudius Crozet's estimate of $90,563 for this section of the line, but it had been completed for $75,000 (Gwynn, 1833, 5-6). The method described by Gwynn for the section of track between Portsmouth and Suffolk involved placing the sills at least half-way into the ground to accommodate the horse path. This would allow the bottom of the rail to touch the ground, the method that Clinton advised against. The sills on the Wilmington & Raleigh Rail Road originally were buried one-quarter in dirt to which the company reported in 1850 that they lasted from five to six years. Sills later completely covered with dirt lasted only three years (Wilmington & Raleigh Rail Road Company, 1850, 11). The method described – excavation and embankment – is common practice for railroad construction. The excavations cut into the slope of the land.

> The graduated surface of the road-bed in excavations, will vary from 13 to 16 feet in width, the slopes being 45º. The graded surface on embankments will present a uniform width of 12½ feet, with slopes of 33½º or 1½ base to 1 perpendicular.
>
> – (Gwynn, 1833, 6) –

During the course of locating the route of a railroad, stakes are placed at intervals along a centerline. The 100-feet stakes, starting from the beginning of the road, are called *full stations*, and all others are *plus stations*. For example, a stake set at 5280 feet (a mile) is number "52 + 80." A profile of the slope of the land is obtained by level-rod readings at each stake and intervening points where the slope of the land changes. This practice is called *profile leveling* (Davis, Foote, and Kelly, 1966, 213-215). In the report of the 1837 survey of the Western & Atlantic Railroad in Georgia, Lt. Colonel S. H. Long includes a profile map of the route. The base measurement is the level of the Oostanaula River (United States, 1837a, Document A). The route of the railroad began at the Chattahoochee River south of Marietta, Georgia, crossed the Etowah River, and followed the valley of the Chickamauga River to the Tennessee line. Major James D, Graham conducted a survey for a railroad from Pensacola, Florida to Columbus, Georgia in 1836 that also followed the river course.

> The profile of the route will present inclinations nowhere greater than ten or fifteen feet rise or fall per mile, except to avoid the circuit of the valley of the Chattahoochee just before it receives the Oochee. In order to gain the valley of the latter stream by a shorter route, the trace of the road will be rendered more straight, but it may be necessary to admit one or two short inclinations not exceeding thirty feet per mile.
>
> – (United States, 1836, 6) –

The terrain on the Pensacola to Columbus route follows the alluvial basin of the Escambia River from Pensacola to its confluence with the Conecuh in southeastern Alabama. The route parallels the Conecuh to its head and turns east towards Columbus. The river network is oriented north to south. This 210-mile railroad became another victim to the Panic of 1837. Work on the project ceased. Graham estimated that the railroad would cost about $6,800 per mile. The director of the company recommended strap iron wooden rail construction (Turner, 2003, 18-19).

The Charleston & Hamburg Rail Road employed a different method of construction. This was described in the *Farmers' Register* as partially resting on the ground, but elevated five to six feet above the ground for most of its length. The 135-mile railroad ascended 510 feet to its highest point before descending into the Savannah River valley. The grade at this point was steep, and two 25 horsepower stationary engines were employed to help trains up an inclined plane. The first of four methods used on this railroad – *Sleeper plan No. 1* - was used on clay or gravel soil using fill, excavation, and ditching. The sills were covered with soil. The cost of the track alone cost the company $1450 per mile. There were over five miles of track on the railroad put down with this method. Another arrangement – *Sleeper plan No. 2* – consisted of sills oriented in the direction of the rails, buried in the soil, with a cap connecting the rail to the sill. This was the method employed on the inclined plane. There were 18 miles of this type of track, and each mile cost between $1800 and $2200 per mile. The other methods used on this railroad are *Pile construction* and *Truss construction*. Piles less than 7 feet in height did not require additional bracing, while some at 15 feet were braced from the on both sides. Piles from 7 feet to 10 feet had a single brace, and those above 10 feet had cross braces. Pile construction cost between $1,900 and $3,000 per mile, with the average being $2,300. Truss construction, as explained earlier in this work, used in work over 12 feet, required a pile foundation, and assumed an upside down "W" form. The Charleston and

Hamburg line contained 5 miles of truss construction averaging between $6,000 and $10,000 per mile. (Ruffin, 1833, 261-262).

The 10 miles between Main Street in Suffolk and Station 290 on the Portsmouth & Roanoke Rail Road contains six truss bridges totaling $600, and four stone drains totaling $1,000. Station 290 to station 525 on the west bank of the Blackwater River (near the present-day town of Franklin, VA) contained 20 truss bridges at $1,500, but the bridge across the river had stone abutments and piers at a total of $9,500. Gwynn includes a truss bridge at $120 over Buckhorn Run, a bridge over the Meherrin River at $14,500, and several more truss bridges and stone drains totaling $1,600 (Gwynn, 1833, 8-9). The overall cost per mile for embankments and excavations varied for the nine divisions of the railroad between Suffolk and the Roanoke. Excavation costs dropped in the 5.43 miles leading to the Nottoway River and approximately four miles before the Meherrin River. The most costly embankment occurred 5.29 miles after the crossing of the Meherrin, followed by a sharp reduction of costs over the 4.46 miles before the Summit at Station 1406, 12.35 miles from the Roanoke River (Figure 1). The profile of the route from the Meherrin River at the Virginia-North Carolina line to Station 1288 (5.29 miles) shows an elevation gain of 84.23 feet; however, the climb distance is 2.63 miles. The track runs along the west bank of Cypress Creek until it crosses it south of Margarettsville, North Carolina. A sharp ascent begins on the south bank of the creek (Figure 2). The greatest cost for embankment apparently was incurred in smoothing this grade.

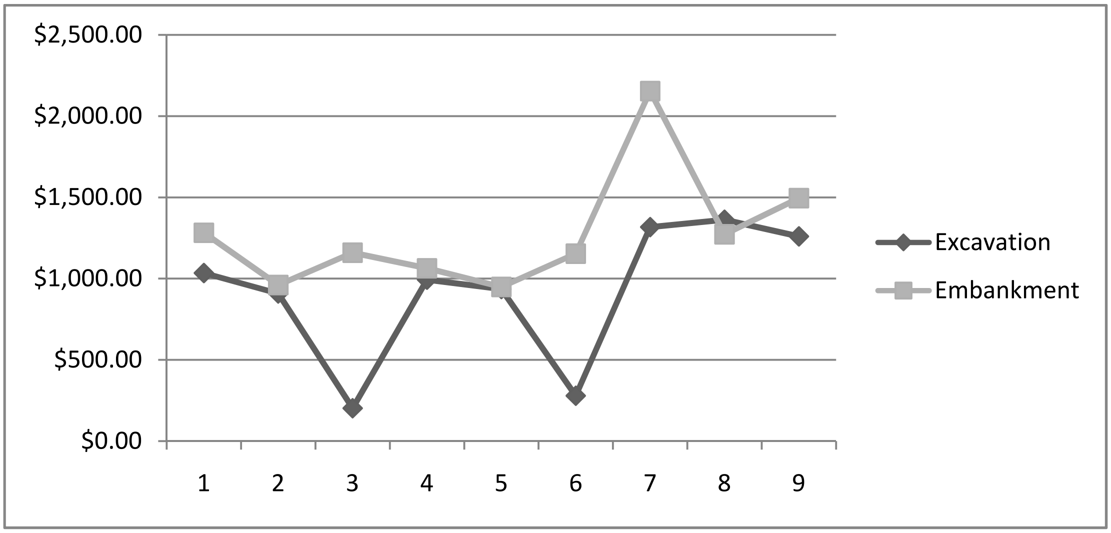

Figure 1. The cost per mile for excavation and embankments derived from the construction estimates prepared by Walter Gwynn for the Portsmouth & Roanoke Rail Road.

Data Source: Gwynn, Walter. (1833). *Report of Walter Gwynn, Esq. Engineer, to The President and Directors of the Portsmouth & Roanoke Rail Road Company*. Norfolk: T.G. Broughton

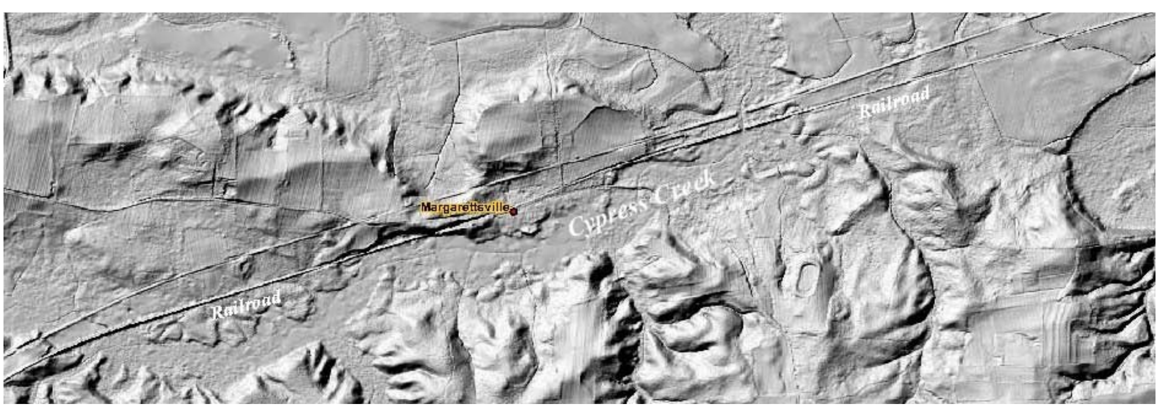

Figure 2. The route of the Portsmouth & Roanoke Rail Road entered North Carolina after crossing the Meherrin River. It followed the west bank of Cypress Creek until the bend past Margarettsville. It immediately begins an ascent to the "summit" at 144 feet.

Source: USGS. (2008). "1/3 ArcSecond NED CONUS, North Carolina-1/9 ArcSecond." *The National Map*.

The survey for the Winchester and Potomac Railroad was conducted in 1832, and presented to the Twenty-fifth US Congress in 1838. It contains maps, tables, and associated technical documents that illustrate the science behind the early surveys. Lieut. Colonel Long's formula, $(b\text{-}c/2a + b + c) \times m/n = h/l$, is used for the height per length of the plane, or grade. The weight of the cars being pulled by the train is *a*, *b* is greater net tonnage and *c* is the lesser tonnage in both directions, and *m*/*n* is the opposing force of friction as compared to level. The weight of the engine and tender is represented by *E*, and added to the weight of the cars and tonnage in both directions $(2E + 2a + b + c)$. It is a measure of power necessary to maintain equilibrium against gravity on an incline. James Adamson's formula, $W = E\,(a - \sin i\,) / (\int / n) + \sin i$, determines the appropriate weight for an incline. Here, *E* is again the weight of the engine, *a* is the weight necessary for friction with the track to allow motion (*Ea* is traction at level), $\int / n$ is the resistance of friction at level, and *i* is the angle of incline. The engine used in some of the examples given in the text is 4.5 tons capable of pulling a 50-ton load at 10 to 15 miles per hour at level. The weight of a tender, with fuel and water, is 3 tons. Using these formulas, the text includes a brief table of maximum tonnage on several grades on the line of survey. The estimate planned for strap iron wooden rail construction and a horse path with sleepers placed 4 feet apart and 6' by 6' rails (United States, 1838e, 30-34).

The essence of these calculations becomes clear when contemplated in a form that is more familiar. The parallel and downhill component of weight is usually expressed as $ma = W \sin \alpha$, where the weight is multiplied by the sine of the angle of the incline. The resultant *R* of reactions (normal) of the plane on the body is the weight multiplied by the cosine of the same angle, $R = W \cos \alpha$. If the carload is at rest, the force acting against the weight of the car from the rails will cancel the normal component of its weight; it is in a state of equilibrium. The sum of vertical forces equals zero, the sum of the horizontal forces equals zero, and sum the moments of those force at any point on the plane is zero in statics ($\sum H = 0$, $\sum V = 0$, $\sum M = 0$), all derived from Isaac Newton's *Third Law*. [However, it is possible for an entire structure to be in motion and still be in a state of equilibrium when the individual parts of the structure do not move with respect to each other.] Other forces apply to bodies in motions, and figure into the equations for statics where necessary (Cabannes, 1968, 92-93; McCormac, 1967, 11-12). In a frictionless model, the sine of the angle of incline equals the force required to pull an object up the incline divided by the mass of object times gravity (9.8 m/s^2), $\sin \alpha = F_{vertical} / mg$. Friction must be added to the parallel (downward component) of the weight on ascent and subtracted on descent.

Walter Gwynn recommends the use of a 5-ton locomotive on the Portsmouth & Roanoke Rail Road since the grade along the whole extent of the line would not exceed 20 feet per mile. He notes that the performance of this engine at that grade equals a 6-ton engine at 30 feet per mile grade (Gwynn, 1833, 6). The 1838 report by engineers Wilmington Gibbs McNeill and W.G. Williams on the survey for the Louisville, Cincinnati & Charleston Rail Road is one of the most exhaustive reports of the early railroad era, and contains a wealth of information of grades, locomotives, construction, and topography. Drawing from the research of De Pambour, these engineers explored the cylinder, wheel diameter, length of stroke in connection, pressure per square inch in connection with type of engines required for steep grades. For example, a locomotive of twelve tons, under 70 lbs of pressure per square inch, traveling 10 miles per hour on a grade of 60 feet per miles would have a cylinder diameter of 1.6 feet, a wheel diameter of 4.5 feet, and a stroke length of 1.33 feet. In the pages of calculation presented in the text, there is the formula $((T + E)/ h)$ 2,240, where *T'* is the load, *E* is the weight of the engine in tons, *h* is the incline of the plane in the ratio 1 to *h*, and the friction of the load is 2,240 pounds, $(T' \times F)$. Using this formula to calculate for the power of tractions with engine on a grade of 60 feet per mile and traveling 10 miles per hour, the loads per engine would be 78.4 tons (United States, 1838, 28-30).

Insomuch as these documents provide fascinating insights into the science of early railroad technology, the locomotives described therein – 5 tons, 6 tons, 12 tons – were still primitive machines. Grades had to be moderate to accommodate these engines, increase their efficiency, and load capacity. The various construction methods including excavating, embankment, piles and trestlework, smoothed out ascents and descents. As evident by some of the surveys for railroad in mountainous terrain, the need for heavier engines made it necessary to space sills more closely. Where possible, the engineers located the routes along the courses of rivers. Walter Gwynn's survey for the Wilmington & Halifax (Wilmington & Raleigh) passes through the alluvial plane of the Cape Fear River basin for much of its extent. The directors of the company selected the "Western Route" that proceeds west of the Northeast Cape as far as Faison. Gwynn noted that, outside of bridging a few minor streams, a few excavations of no more than ten feet, and embankments of two or three feet, the railroad could be built in nearly a straight line over level ground (Ruffin, 1836, 348). An examination of the terrain along the route of the Wilmington & Raleigh Rail Road between Wilmington and Faison on the Coastal Plain of North Carolina verifies Gwynn's observations. In most places the modern rails rest on a modest layer of ballast, and it is likely the original railroad rests on a layer of sand like its counterpart, the Portsmouth & Roanoke Rail Road (Figure 3). The first great obstacle that the railroad had to cross was the Northeast Cape Fear River. As mentioned earlier, this required a 360-foot lattice truss bridge with stone piers. However, the levels of the banks of this section of the river are not steep (Figure 4). The Northeast Cape Fear makes a bend westward approximate 6 miles east of this position as it makes its way to the confluence with the Northwest Cape Fear. On its way northward to Faison, the railroad follows the high ground on the west side on the Northeast Cape Fear – to use the analogy "cutting with the grain." Outside of crossing the difficult Burgaw Swamp, Rockfish Creek, Stewart Creek, and other minor streams, the line of the railroad is straight (Figure 5). The site of the most extensive section of trestlework south of Faison was at Bear Swamp. It was mentioned in the 1856 stockholders report as the highest trestlework on the entire line. The longest section of trestlework was through Goshen Swamp (Wilmington & Weldon Railroad, 1856, 6). It is now a high embankment (Figure 6). At Faison, the line of the railroad takes an arc into Goshen Swamp (Figure 7). There is still an impressive wooden trestle crossing the stream running through Goshen Swamp. Piles were driven into the soil of the streambed, the outer piles set at an angle, a cap on the piles, and extensive bracing (Figure 8).

Figure 3. This photograph, taken on the north side of Smith Creek in New Hanover County, NC, illustrates the level character of the alluvial land of the Lower Cape Fear. The modern railroad track is set in a modest layer of ballast. Photograph by James C. Burke

Figure 4. The NE Cape Fear River, approximately 10 Miles from Wilmington, is the first significant obstacle on the route of the Wilmington & Raleigh Rail Road. The modern railroad bridge in this photograph shows how close the levels of the banks are to the surface of the river. Photograph by James C. Burke

Figure 5. The terrain at Bowdens, 4.3 miles from Faison and approximately 60 miles from Wilmington, remains level. This view shows the track looking south. It follows a straight patch from north of Rocky Point to Faison. Photograph by James C. Burke

Figure 6. The most extensive embankment on the Wilmington to Faison section of the Wilmington & Raleigh Rail Road is at Bear Swamp, a short distance from Faison. It was originally trestlework, and was filled in during the renewal of the road in the 1850s. Photograph by James C. Burke

Figure 7. Goshen Swamp, located north of Faison, is an extensive pocosin. The longest section of trestlework of the original railroad was built through this area. The railroad began filling in the trestlework in this section after 1856. Photograph by James C. Burke

Figure 8. Modern trestlework is used on the railroad at Goshen Swamp. The method is still practiced in railroad construction, and this example resembles the description of the high trestles on the Charleston & Hamburg Rail Road in many aspects. Photograph by James C. Burke

The landscape changes as the route of the Wilmington & Raleigh Rail Road continues to the Neuse River. Walter Gwynn notes this fact in the report of his survey.

> Here the first undulation in the plane of the road worthy of notice occurs, a descent and immediately an ascent of 30 feet to the mile is unavoidable, and some comparatively deep cutting, and heavy embankments are encountered. Immediately on ascending the valley Goshen, the route reaches a dry, level, open woods through which it passes over Brooks' Branch … After making a slight undulation in crossing Brooks' Branch, which is a very inconsiderable stream, it arrives at the same level, on which it continues to the head of Yellow Marsh; along the margin of which, it descends to the valley of the Neuse River, encountering in its descent, some heavy cuttings, which consist, however, entirely of sand.
>
> – (Ruffin, 1836, 348) –

This work discusses Brooks' Branch (or Brooks Swamp) in the context of the stagecoach line of the Wilmington & Raleigh Rail Road. The piles and trestlework at Brooks' Branch are those mentioned in Frances Kemble's *Journal of a Residence on a Georgian Plantation*. During her trip south from Philadelphia, Mrs. Kemble traveled on the yet to be completed Wilmington & Raleigh Rail Road. The ravines in her text are in Brooks' Swamp (Appendix E). The high embankments at Brooks Swamp, traversing a distance of approximately 1.3 miles, south of Dudley, North Carolina (Figure 9). The head of the Northeast Cape Fear commences on the east side of Mt. Olive, and the Goshen Swamp drains into the river. Therefore, a large part of the route of the Wilmington & Raleigh Rail Road follows the course of the Northeast Cape Fear to its headwaters. Between Dudley and Brogden, the excavation is extensive as Gwynn's report indicates (Figure 10).

Figure 9. The car in this photograph provides a sense of scale for the embankments at Brooks Swamp, south of Dudley in Wayne County. The original piles and trestlework are mention in *Journal of a Residence on a Georgian Plantation* by Frances Anne Kemble. Photograph by James C. Burke

Figure 10. This photograph, taken at Brogden looking south toward Dudley, shows how the track following the undulations of the terrain. There are several deep cuts in this section. Photograph by James C. Burke

The route of the Wilmington & Raleigh Rail Road from the turn at Faison to Weldon follows a different pattern. It crosses two major rivers, the Neuse and the Tar, and a number of small streams such as Nahunta Swamp, Black Creek, and Contentnea Creek. The route of the railroad runs perpendicular to the prevailing stream flow. A railroad that runs parallel to the prevailing stream utilizes the advantage of the level ground of the river floodplains and basin divides. It does not matter if the river is flowing north to south or west to east. This is apparent from the survey of the Pensacola to Columbia, the Western and Atlantic route, and the Winchester and Potomac route. The railroad has to cross minor tributaries that drain from hillside hollows or higher planes of the river divide. When a route starts running perpendicular to the prevailing stream flow, it might cross from one river basin to another. The relics of prior stream action, hills and declivities, must be cut and filled to make a smooth grade. In the case of the Wilmington & Raleigh Rail Road, it passed over terrain worked by the ancient wave action – scarps and terraces. It passed through Wilson, Edgecombe, and Halifax counties, the route passes through area of the Coastal Plain Province that contains Precambrian and Paleozoic granitic rock covered by a thin layer of Coastal Plain sediments (Daniels, Gamble, Wheeler, and Holzhey, 1972; Councill, 1954, 7, 10-12, 15).

The route of the Raleigh & Gaston Rail Road, built through the Northeast Piedmont, encountered bands of Precambrian and Paleozoic granitic rock, lower Paleozoic slates, flows, and pyroclastics (Councill, 7, 15). Charles F.M. Garnett, chief engineer for the company [also the chief engineer of the Western & Atlantic during the early 1840s], mentioned that the presence of rock along the route caused the price of excavations and embankments to be costly. In addition, the railroad had to construct five bridges, of which the one over the Tar River was the highest. These bridges, totaling 3,240 feet, cost the company $155,000 (Ruffin, 1839, 388).

There are distinct differences between railroad construction on the Coastal Plain and the Piedmont. The task of bridging rivers and streams is different because of the stream cross-section through rock and residual soil and that of sand and alluvial clay.

In codifying the information about terrain for use in route analysis there are several factors to consider. The first is the location of the route parallel or perpendicular to the prevailing direction of the drainage network regardless of geological province. Second, the location of route on the Coastal Plain differs for that of the Piedmont and Mountain terrain in bridging, trestlework, excavation, and embankment because of stream hydrology and soil. Third, crossing major rivers is costly wherever they are located. Coastal rivers will spread out over a floodplain and tend to be shallow, but a bridge there will have a longer span than one crossing at some point upriver. Piedmont rivers will have higher banks and require tall piers. Finally, by early antebellum standards, the weight of a locomotive and the tonnage it is able to haul is proportional to the steepness of the grades along the line; heavier loads require closer spacing of sills.

Could a railroad be built in the early years that could pass between the Coastal Plain and the Piedmont, or the Piedmont and Mountains? Walter Gwynn, serving at the chief engineer of the North Carolina Rail Road in 1851, recommended that the route of the railroad should commence at Waynesborough, then pass four miles north of Smithfield and continue to Raleigh. From there it would continue its arc through the piedmont to Charlotte (North Carolina Rail Road Company, 1851, 4-6). The Waynesborough to Raleigh section of the road fulfilled the intentions of those that first proposed a railroad between Wilmington and Raleigh in 1833. On the *Map of North Carolina* of 1882 prepared by state geologist W.C. Kerr and civil engineer William Cain, the Raleigh & Augusta Air Line Railroad extends from Raleigh to the town of Hamlet in Richmond County, not far from Rockingham and on a line to Cheraw. There, it forms a junction with the Carolina Central Railroad on its westerly route to Charlotte. In many respects, it follows the projected route of the Raleigh & Columbia Rail Road. To the north, the Raleigh & Gaston extends from Gaston to Weldon with the Greensville branch of the Petersburg Rail Road removed. The Cape Fear & Yadkin Valley Railroad, however, extends from Fayetteville past Greensboro into Stokes County rather than to the Narrows of the Yadkin as originally proposed (Cumming, 1966, Plate XIV). Not only does this prove that many of the early plans were viable when the technology improved and the capital was available, many in fact followed their projected route. The Waynesborough to Raleigh segment of the North Carolina Railroad is particularly significant because Walter Gwynn directed the survey. While it is difficult to prove he would have recommended the exact route to the Wilmington & Raleigh Rail Road had the company built its Raleigh branch line from Waynesborough, it is unlikely his sensibilities would have strayed from finding the most efficient and economical route. The deviation of the Raleigh & Augusta and the Cape Fear & Yadkin Valley routes appears motivated by the development of the Chatham coalfields and the domestic iron production (Appendix H). Both railroads intersected at the town of Sanford. The fact remains that since these railroads existed, they have left an impression on the physical landscape that provides reference for models of the proposed railroads of the 1830s that follow their routes.

With iron rails, closely spaced crossties, and heavy 4-4-0 locomotives, all the routes mentioned were possible in the late antebellum and later. Taking a closer look at these routes and looking for the steep grades, deep excavations, and extensive bridging can contribute to determining the technical demands of these routes if they were built during the 1830s.

CHAPTER V

BRITISH IRON ON AMERICAN RAILROADS

The first great railroads in America were built with British iron. Wood was readily available, but there was no reliable source of domestic railroad iron. The United States Government offered remission of duties on imported iron to railroad companies to encourage construction. As the original rails started to fail after about ten years of use, the railroads returned to the foreign market for new heavy iron rails rather than buy from domestic manufacturers, even though the quality of domestic iron had improved and was produced in quantity. American ironmasters began petitioning Congress for a resumption of duties on imported iron, but the railroads mounted stiff resistance. The integration of the manufacturing organizations and financial institutions of Europe, and particularly those of England, continued to recommend their iron to the American railroads throughout the antebellum period.

In May of 1849, Dr. Armand J. DeRosset, Jr. left on the steamer *America*, sailing from New York to Liverpool to negotiate the purchase of new iron for the relaying of the Wilmington & Raleigh Rail Road. By the end of July, it appears that he had succeeded. The *Wilmington Journal* announced that he had made a contract for 9000 tons of heavy T-iron, enough to relay 120 miles of the line. The terms of this contract were not disclosed at the time, but they were considered equitable. The arrival of the first load of 273 tons of T-iron from Cardiff, Wales arrived at Wilmington, North Carolina in October on the brig *Albemarle* (*Wilmington Journal*, 25 May 1849; 27 July 1849; 12 October 1849). The Company desperately needed to replace their deteriorating strap iron wooden rails put down in the late 1830s. Years earlier, the Petersburg Rail Road Company, completed in 1833, had to replace their perishable wooden rails. In May of 1843, the Petersburg Rail Road had relaid all but two miles of their road with heavy T-iron, as well as nearly completing their bridge over the Roanoke at Weldon. Three thousand tons of iron had to be put down before a specified date or the company would have to pay $75,000 in duties (*Wilmington Chronicle*, 24 May 1843; Ruffin, 1843, 165-166).

A Bill for the Relief of the Petersburg Railroad Company, presented by the Committee on Finance in the United State Senate on 17 January 1843, required that the company provide proof that they had put down all the iron by 1 December 1844. The bill was a continuation of duty free privileges granted on 13 August 1842, and expired 3 March 1843. The iron had to arrive before that date. There were one thousand tons put down in 1842; and an additional two thousand tons had arrived at City Point in February of 1843, and then sent by wagon to the depot to be sent down the road for installation. This was done without an interruption of service (United States, 1843; Ruffin, 1843). The particular circumstances of the Wilmington & Raleigh Rail Road and the Petersburg Rail Road represent the general state of early railroads built with strap iron wooden construction: the rails lasted for about ten years.

The United States at the dawn of the railroad era was an agricultural nation that had no means of manufacturing iron in the quantities necessary for building railroads; its engineering tradition was in its infancy, and the lack of regional investment capital inhibited most large scale internal improvement projects. By contrast, Britain, the preeminent industrial nation-state of the early nineteen century, had developed mass production techniques for the manufacturing of iron; its engineering tradition had established the first standards for locomotive design and railroad hardware. The banking houses of London dominated international finance, and had a reputation for providing investment capital to foreign ventures, both directly and through intermediaries. The first railroad companies in America had little choice but to purchase their iron and equipment from British manufactures, and to seek part of the necessary investment capital in European bonds. As early as 1828, the Baltimore and Ohio Rail Road Company had prepared a memorial to congress for a remission of duties on imported iron; the memorial was referred to the Committee on Finance (United States, 1828, 994-996). The remissions of duties on foreign iron for railroads soon became a matter of policy.

The use of foreign iron on American railroads started to become a contentious issue during the 1840s as the domestic equivalent became more available and of comparable quality. The *Memorial of a Number of Ironmasters at Lexington, Virginia, in relation to An increase of duty of imported iron*, 14 March 1842, stated that the iron interests of Virginia cannot sustain themselves without increased duties on English iron (United States, 1842, 5). It would seem that the Petersburg Rail Road Company could have saved time and expense had they patronized Virginia's burgeoning iron industry, but they chose to remain with foreign manufactures. The Virginia ironmasters failed to persuade Congress to alter policy. Ten years later, the Legislature of New Jersey castigated the general government for its failure to enact a national policy to support domestic manufacturing of iron while noting that "the principle governments of Europe lavish the most generous encouragement on the production of the mines and various manufactures of iron" (United States, 1852, 1). The "generous encouragement" appears to have been reserved for the railroads.

The "Statement of the amount of duties on railroad iron refunded, annually, from the year 1831 to 1841" reported by the Treasury Department in 1842 amounted to a total of $4,800,183.84 for the entire period. Beginning with $6,847.90 refunded to the Baltimore and Ohio in 1831, the amount jumped to $336,709.19 in 1832 as seven railroads came under construction. The United States government cancelled the bonds for duties when the particular shipment of imported iron was laid down. The amount for 1833 had dropped to $202,210.70; however, another railroad (Boston) was added in 1834, and the amount climbed to $421,010.34, and continued to rise in 1835 to $529,529.79. The amount for 1836 was $234,194.74; it was $407,517.05 in 1837, $910,011.66 in 1838, and $672,376.86 in 1839. The Wilmington & Raleigh Rail Road received a refund of $38,455.65 during this year. It was the only refund of duties for that railroad listed. The amount for 1840 was $688,510.97, and for part of 1841, the amount was $391,264.64. Tables for iron imported under the tariffs of 1842 and 1846 for years 1843 through 1838, including articles, quantities, values, and duties, are found in the *Letter from the Secretary of the Treasury* dated 16 January 1849. It is apparent that there was a pressing need for iron products of all kinds. However, the need for imported railroad iron was so pervasive during the early days of railroad construction that the citizens of Pennsylvania were petitioning Congress for a reduction in duty on this product in 1835 (United States, 1842a, 4-5; 1849, 1-16; 1835, 1-2). It would take more than petitions and memorials to make domestic iron competitive: the transportation infrastructure had to exist first.

Congress passed an act on 14 July 1832 to refund duties on railroad iron providing that that it was installed permanently; however, some clarity was needed on railroad hardware. The Baltimore & Susquehanna Rail Road Company ordered 320,000 iron fastenings for their track known as dog-tooth clamps and was erroneously charged the duty as if they were ordinary hardware. The company petitioned Congress in 1837 for remission of duties on such items (United States, 1837, 1-2). Other situations were more serious, and reflected the general derangement of the American economy during the late 1830s and early 1840s. The State of Michigan had a different problem with their railroad iron. The last of its imported iron arrived in New York on 10 May 1839 and 23 May 1839, and was intended for immediate use, but that state had negotiated its loans with the United States Bank in Philadelphia and the Morris Canal and Banking Company. These banks failed, and because that state no longer had the funds to continue the project, the railroad put down the iron in1842. The state missed the deadline for remission of duties on the iron. The United States brought a suit against James H. Whitney, bondsman for the State of Michigan, and he was ordered to pay $8,428.19 in damages and $50 for the cost of court. The State of Michigan, in 1844, sought relief from this judgment citing the failure of the banks as the cause of the delay, not the negligence of the state (United States, 1844, 1-2).

The predicament in which the State of Michigan found itself in the late 1830s was not an isolated event. The early American railroads relied on bonds rather than stock for raising capital because distant investors favored the secure profits they offered. Some companies went directly to London to obtain sterling bonds, and others utilized the agency of large northern banks such as Nicholas Biddle's Bank of the United States in Philadelphia. This practice continued through the antebellum period. Sterling bonds helped finance the Petersburg Rail Road, the Raleigh & Gaston Rail Road, and the Wilmington & Raleigh Rail Road. The Bank of the United States failed in 1840. Other financers, such as the Boston firm of Henshaw and Ward helped reorganize the failed Portsmouth & Roanoke Rail Road as the Seaboard & Roanoke Rail Road utilizing New England Capital in the late 1840s. During the 1850s, Wall Street, with the backing of European banks, emerged as the center for railroad securities (Chandler, 1954, 248-249, 251n, 253, 257, 262-263). The Deposit Act of 1836, the product of Jacksonian monetary policy, entailed the shift of hard currency, known as specie, from the nation's economic center to state banks in order to accomplish the distribution of the federal surplus. Its dispersal disrupted commercial intercourse, and eroded investor confidence at home and abroad. The Panic of 1837, and the subsequent depression that followed, undermined the stability of the American financial market (Rousseau, 2002, 459, 484-486). As a result, the advance of domestic industry was set back; the railroad companies and their shareholders struggled to maintain solvency; and the primacy of British iron and capital was preserved.

The *Letter and Memorial of Isaac K. Lippincott, On the manufacture of iron and the operation of the present tariff laws* of 31 December 1841 noted that under the existing conditions brought about by the closing of furnaces in New York, New Jersey, Pennsylvania, and in all the seaboard states, reduced duties had brought British iron into direct competition with domestic iron. Lippincott recommended the building of a National Foundry as first presented in a report to the House of Representatives on 12 January 1839. He was especially supportive of the idea of locating such a facility in Lancaster County, Pennsylvania where there were 102 iron foundries within fifty miles of the town of Lancaster. In the same year, the citizens of Danville, Pennsylvania had prepared a memorial advocating their region as the site of the National Foundry based upon their proximity to the necessary materials of iron smelting, transportation connections, and their safe removal from the threat of invasion. William Cost Johnson's report from the Select Committee on the National Foundry of 23 February 1843 titled *National Foundry* is an extensive and fascinating document on this subject that is worthy of further examination; however, the purpose of the foundry is clearly stated within the opening pages. Not only was there a need for a National Foundry for the production of munitions and ordinance; such an institution would establish national standards for iron manufacturing through "scientific study and practical experiment" (United States, 1841, 1-5; 1841a, 1-3; 1843a, 1).

The proposed revision of the Tariff of 1846 by the Taylor administration brought forth the all too familiar economic complaints of the era, the propping up of northern industry on the backs of the south and the west. For the State of North Carolina specifically, two hundred and sixty miles of railroad needed to be re-laid or built; and tariff duties would make the task unnecessarily expensive. The *Wilmington Journal* expressed these views a month after Dr. DeRossett's departure. The writer was referring to the cost of iron for relaying the Wilmington & Raleigh Rail Road.

> Now, taking 50 tons as an average per mile, (an exceedingly low estimate,) we have 32,500 tons of iron as the total amount necessary. This can be procured, we suppose at $45 per ton, $1,462,500 in all. Under such a tariff as the iron men want, it would cost $60, a total of $1,950,000, or a difference of nearly half a million of dollars, out of which North Carolina would be *protected* for the benefit of Pennsylvania. These calculations are made somewhat hastily and without pretending to accuracy in the details, yet we feel certain that the relative proportion of prices will be found pretty much as we have placed them.
>
> – (*Wilmington Journal*, 22 June 1849) –

The newspaper later reported that a comparison of the English iron with American railroad iron manufactured at Danville, Pennsylvania – both used on the Harrisburg & Lancaster Rail Road – found that the American product was tougher; yet it cost about five dollars a ton more than the Wilmington railroad was paying for their British iron. However, it later cited articles in the *Washington Republic* and *New Haven Register* that were more critical of the cost and strength of American made iron: still, the main complaint was that the American product cost more (ibid, 21 September 1849, 5 October 1849).

The debate over imported railroad iron would continue into the 1850s. Thomas Clingman of North Carolina, during his career in the House of Representatives, spoke at length on the floor on the subject of duties on imported railroad iron noting that the railroads of North Carolina were in essence public works in which the farmer asks how much he can afford for such improvements and then he purchases shares. Citing the Wilmington & Raleigh Rail Road's seventy cents to the dollar share value, he does not consider North Carolina's railroad stock the type of investment for the capitalist seeking large and immediate returns. The railroads enable the farmer to get his produce to market, and yield their dividends in the form of public good, not profits. To these statements, he elicited the concurrence of his fellow Representative from North Carolina, William S. Ashe, later president of the Wilmington & Weldon Railroad (United States, 1852a, 1056). Among the Resolutions of the North Carolina Legislature presented to the Thirty-second Congress was a resolution calling for the abolition of duties on railroad iron (United States, 1853, 1-2). The following year, a convention was held in Richmond for the purpose of persuading Congress to approve a refund of all the duties collected on imported railroad iron between 1851 and 1854 because the duties had been imposed differently for various railroads depending on the rates in force at the time of construction. The amount of the duties totaled $10,072,977.60 on $33,576,592 worth in iron. The *Memorial* of the convention explains these inequities.

> While some States made their railroads when iron was admitted duty free, or when the price of iron was so low was to compensate, in some measure, for the oppressive duty, other States were so misfortunate as to construct their most important works when the duty, added to the high price of iron, rendered it an intolerable burden. If it be just and equitable to encourage railroads by continuing this exemption from duty for a longer period, it is equally so to refund the duties paid by those companies which have borne the pressure of the high duty and the high price combined.
>
> – (United States, 1855, 5) –

Part of the success of the British product had been the introduction of the hot-air blast in their iron manufacturing. This process forces a reaction between carbon monoxide and iron ore that yields molten iron and carbon dioxide. Lippincott mentioned this method and another discovery whereby anthracite coal could be used in smelting iron when he referred to cheaply made iron from England, Scotland, and Wales. The British had been in the iron business for a long time, and it perfected the production of it in quantity. They had also pioneered railroad technology, and could produce all the specialized hardware that their clients required. Pennsylvania, Virginia, and North Carolina, all rich in the raw materials for iron making, would need decades of organization before their iron manufactories would be ready to mass-produce iron rail.

The British could also offer another service that was not readily available in the United States of the 1840s, credit. Dr. DeRosset not only went to England to purchase iron; he also negotiated a mortgage on the company to pay for the iron. The 1850 stockholder's report records "Mortgage Bonds payable in London and due in 1869, this amounted issued for Iron purchased bearing 6 per cent interest … [$] 355,555.56." The company still had its debt of $222,666.67 in English bonds due in 1858. There were also bonds due to the United States for duties on the iron for the amount of $39,424.13 payable in annual installments over the course of four years (Wilmington & Raleigh Rail Road Company, 1850, 8-9). The raising of money to pay freight and duties on iron was a key issue at the 1849 meeting of the stockholders. The *Wilmington Journal* reported the proceedings of this meeting. The company was apparently in such want of cash that it had to appeal to the stockholders to endorse bonds for the transportation of their new iron

(*Wilmington Journal* 10 November 1849). The amount of the company's early debt to the English banks for its initial construction made it likely that they would return to finance its reconstruction; and likewise, the English financiers would sooner lend more for improvements rather than risk their investment.

British iron and European capital would remain an essential element of the American railroad economic culture until the Civil War forced a reorganization of production, labor, transportation, and capital to achieve military objectives. There is a difference between the transfer of technology and the creation of an industry. The market for British locomotives in the United States existed briefly. American craftsmen wasted little time in adapting British locomotive technology to the nation's diverse landscapes and the special needs of its various companies. Even the Wilmington & Raleigh Rail Road had its own foundry for manufacturing replacement parts, and managed to construct a few of its own locomotives. By contrast, American iron was manufactured by the same class of craftsmen, working autonomously in close proximity to the raw materials, but often removed from the existing transportation network. While they were able to produce iron of the same quality as their foreign counterparts, they lacked the command of capital to produce it cheaply and in quantity. The British had more than a century's experience in industrial capitalism: raw materials, manufacturers, labor, transportation, consumers, investors, financial institutions, insurers, and government worked in concert to supply an international market. Only during the Post-war period, when the demand for railroad iron would become overwhelming, would the same elements unify to give form to the American steel industry.

CHAPTER VI

THE CANAL ERA

The debates surrounding the Bonus Bill of 1817 records the exhaustive effort on the part of Congressmen John C. Calhoun and Henry Clay to seek the application of federal funds for road and canal improvements. Albert Gallatin had proposed a national system of roads and canals in his *Report of the Secretary of the Treasury on the Subject of Roads and Canals* in 1808. Calhoun and Clay had hoped see this plan put into action. As the bill made its way through Congress, it was weakened by amendments that compromised its design – shifting control of such projects away from the federal government, and distributing funds to the states according to population. President James Madison vetoed the bill.

> The Bonus Bill threatened the balance that was the heart of Madison's constitution. Nothing prevented lawmakers from using the funds it would establish to cultivate majorities and to dominate Congress contrary to public interest. Proportional spending protected nothing and even fostered something-for-everyone distributions … Presidents and experts would be powerless to impose order and fairness on networks of trade. The strong would crush the weak, and while states plundered the federal treasury, politicians would erect nationwide factions on the backs of public works.
>
> – (Larson, 1987, 383) –

The future of a national system of internal improvements was curtailed, and the responsibility fell upon the states to take up their own programs of public works. The federal government, with the exception of projects on national interest, was relegated to the role of providing technical support. Funding for such projects in the states was seriously hampered by a long-standing resistance to federal involvement in such projects. Antifederalist opposition to ratification of the United States Constitution was the origin of these sentiments. After ratification, the prevailing commitment to the ideals of Jeffersonian Democracy preserved the fear of central authority.

The obvious strength of the Federalist argument was its emphasis on national defense. The generation of the American Revolution would have been all too aware that their military conflict with the British could have easily had a different outcome; and the revolution's accomplishments could be undone in some future conflict. The European powers had been, and in all likelihood, would continue to be engaged in "territorial disputes, and commercial rivalries." Inevitably, the European powers would exploit the vulnerability of the states; or the European powers could draw individual states into alliances that would threaten their confederation (Ferling, 2003, 304-306). Having an organized national military was not in dispute. It had proved its worth during the revolution. However, the Antifederalists saw the military as only being necessary during wartime; a permanent military force carried with it the potential of nurturing a dictator that would overturn the rule of the people, and use the military to enforce his rule on the states. Additionally, the Articles of Confederation forbid Congress from maintaining such a military; and the forces it could assemble in peacetime were limited to the function of internal defense (Main, 1961, 143-149, 160). When James Madison submitted a proposal to Congress to include a Bill of Rights in 1789 as amendments, many of the opponents of the Constitution were mollified (Cavanagh, 1989, 9-17). The Federalists carried the day during the early years of the republic. However, there were many, such as John Randolph of Virginia and Nathaniel Macon of North Carolina, that continued the opposition to the Federalist agenda by aligning themselves with Thomas Jefferson and his allies. By 1796, James Madison had resigned from Congress to take a seat in the Virginia legislature for the sole purpose of garnering support for Jefferson. Nathaniel Macon recruited Joseph Gales, a young newspaper editor that had fled England, to set up a newspaper, the *Register*, in Raleigh to counter the capital's Federalist newspaper (Dodd, 1908, 156-159). Jefferson considered the entrenched Federalist in government positions a type of aristocracy. He set about removing a number during his term as president between 1801 and 1805 (Prince, 1970).

The Antifederalist representatives to the First Congress not only maintained a discussion about issues that they asserted remained unresolved by the ratification of the Constitution; they were also suspicious of Alexander Hamilton's fiscal policies. Many felt that under the new Constitution, the financial elite had the opportunity to subvert the government and create an aristocracy of wealth (Aldrich and Grant, 1993, 296, 299-301). The previous discussion on the Second Bank of the United States illustrates the apprehension that Jackson and his supporters entertained over the public/private nature of that institution. The states, with their reluctance to accept aid for internal improvements, assumed considerable debts. As a result, sectional interests often entangled public funding for internal improvements. In Virginia, corporations were set up to receive both the investment of private shareholders and the state.

By 1838, Virginia had amassed $6,662,180 in debt for its support of canals, railroads, turnpikes, and miscellaneous improvements whereas the State of North Carolina was debt free. Virginia had created a fund for internal improvement and a board to administer it – the Board of Public Works – in 1816. The board could authorize the subscription on the part of the commonwealth to two-fifths of stock of companies engaged in improvement projects while private investors subscribed to three-fifths of the stock. The investors had to pay for at least one-fifth of the stock subscriptions. The state deemed this method appropriate for small- scale projects; but great works, such as navigation improvements to the James River by the James River Company, were beyond the means of private capital. The commonwealth bought up interests in the company and contracted its officials to carry through the work. By 1823, the management of the company was transferred to state officials. This pattern continued with other large-scale canal and turnpike projects, and the railroad companies received aid in the form of state funded stock subscriptions. Virginia borrowed funds on the credit of the state. By 1837, Virginia had incurred debts of $1,324,500 for the James River Company and $780,000 for the James River & Kanawha Company. The state debts for the several railroads projects included $250,000 to the Portsmouth & Roanoke Railroad Company, $206,800 to the Richmond, Fredericksburg & Potomac Railroad Company, and $80,000 to the Petersburg Railroad Company. The Winchester & Potomac Railroad Company received $120,000 in aid from the state. The remaining companies the state aided received amounts below $64,200 (Morton, 1917, 343, 349, 356-359, 361-362, 366). The first significant public works project in Virginia, the Dismal Swamp Canal, would affect the economy of North Carolina and influence the development of the state's first plans for a system of internal improvements. It would also spark the trade competition between the commercial centers of southern Virginia.

The Dismal Swamp Canal connected the Elizabeth River at Portsmouth, Virginia to the Pasquotank River in Camden County, North Carolina. The canal, completed in 1805 and subsequently improved to handle more traffic, diverted the commerce from northeastern North Carolina to Norfolk. The federal government required the increase in depth to facilitate the passage of larger craft from the North Carolina sounds, but it also allowed craft passing through the Roanoke Canal to travel to Portsmouth and Norfolk. This required change in the Dismal Swamp Canal by the federal government had a twofold impact. Opposition to federal funding by central Virginia thwarted the subscription to the company stock. There would be several lotteries held to aid the canal. Notices for the Virginia State Lottery (Fifth Class-For the benefit of the Dismal Swamp Canal Co.) appeared in North Carolina newspapers. Congress eventually subscribed to shares in the company stock (*Raleigh Register*, 12 January 1827, 10 April 1827). The new depth of the canal made it possible to ship produce from the upper Roanoke Valley via the Roanoke Canal to Portsmouth and Norfolk. In short, it contributed to a trade imbalance between Petersburg and the Hampton Roads region (Stewart, 1973).

Judge Archibald Murphey, a visionary North Carolina state senator, labored to create the state's first policy on internal improvements. In 1815, he chaired a committee on inland navigation. The *Report of the Committee on Inland Navigation* concluded that river improvements would lead to the growth of commercial towns on the state's major rivers. His report to the legislature of the following year notes that trade from the Roanoke was entering the Norfolk market via Albemarle Sound, thus drawing off potential revenue (Conner, 1930, 31; North Carolina, 1815, 7; 1818, 18). The *Memoir* was a comprehensive plan of improvements that would transform the state's rivers into a transportation network. It recommended a system of canals to bypass the falls on the major rivers and proposed a connection between at least two of them (Murphey, 1819, 17-19). The state made a step forward towards this goal when it hired its first professional civil engineer.

Hamilton Fulton arrived in North Carolina to begin his employment as the state civil engineer in 1819. Fulton examined the work of the Roanoke Navigation Company at the Great Falls, and noticed problems with it; and in the course of developing plans for similar works, consulted civil engineer Benjamin H. Latrobe on problems concerning the physical geography of North Carolina. He also observed Franklin, Granville, Warren, and Halifax counties in North Carolina sent tobacco and wheat by wagon to the Virginia markets, likely destined for the Petersburg market (North Carolina, 1819, 5, 8, 21-32, 42-44, 49). The *Annual Report of the Board of Public Improvements* for 1820 included examinations of the progress of the Clubfoot and Harlowe Creek Canal, the Fayetteville Canal, a joint report on the Roanoke Canal by the state engineer for Virginia, Thomas Moore, and Hamilton Fulton, and Mr. Fulton's report on the practicality of reopening Roanoke Inlet. There are also reports concerning other projects on coastal navigation, the Cape Fear, the Broad, the Yadkin and the Catawba rivers (North Carolina, 1820, 1-37). *The Annual Report of the Board of Public Improvements* for 1821 includes a report by the

United States' engineers on the practicality of reopening Roanoke Inlet, and Mr. Fulton's reports on the progress of the Roanoke Canal – including his plans for the aqueduct over Chockoyotte Creek. He also mentions the possible useful application of a timber railroad in connection with improvements on the Neuse River. His report on the Clubfoot and Harlowe Canal indicates that the design for a lock constructed for that canal was defective. This document also contains a report from Denison Olmsted, professor of chemistry and mineralogy at the University of North Carolina, on the mineral resources of the state. While much of Mr. Fulton's report is fascinating, the 1821 *Annual Report* is significant because it defines the objects of a system for internal improvements in North Carolina: to provide all the citizens of the state with a way of getting the "productions of their industry" to market; and to "fix that market within our own limits." The means of paying for this system involved the state taking out a loan of $500,000 at an annual rate not exceeding six per cent; and the Treasurer would issue certificates of stock. The state would subscribe to $225,000 in shares of the canal and navigation companies (North Carolina, 1821, 13-29, 38-41, 62-67, xix-xxiii). Murphey's plan for internal improvements received the attention of the national press for its comprehensive approach and scope (North American Review, 1821). Very little came of these plans; however, the fact it established a dialogue on internal improvement policy is significant.

Hamilton Fulton's plan to reopen Roanoke Inlet is particularly interesting. The port towns of Albemarle Sound had enjoyed accessed to the Atlantic via Roanoke Inlet during colonial times, however the inlet closed in the mid-1790s. Reopening the inlet became an important element of North Carolina's internal improvement policy during the antebellum period. Several plans recommended by engineers for the state and the United States Topographical Bureau received consideration, but the project never advanced to far beyond the planning stage (Appendix A). The great disappointment of public works undertaken in North Carolina during the nineteenth century was the Clubfoot and Harlowe Creek Canal. The project, conceived before the Revolution and finally completed in 1827, never proved very useful. Its purpose was to facilitate navigation between the Neuse River and Beaufort harbor. The canal had consumed tens of thousands of dollars of public funds over many decades; yet, when opened the tolls were merely a fraction of the investment required to build it and revenue continued to diminish year after year. The anticipated traffic on the canal never materialized, and the canal fell into disrepair. The state was unable to sell the canal until 1872 (Watson, 2002, 81-85).

The first attempt at a state system of internal improvements was underfunded and mismanaged. Its defects included the lack of engineering expertise to oversee the various projects, the absence of a sufficient labor force, and a waste of funds (Owen, 1829, 4; Brown, 1928, 12-13). Some of the more profound defects were intrinsic and would have an impact on the development of railroads. There was a widely held belief that private corporations could carry through internal improvement projects more effectively; and the power bloc of the eastern counties opposed plans that they perceived as possible suggest taxation for improvements, which would benefit the west at their expense. North Carolina's veteran politician and unshakeable Antifederalist, Nathaniel Macon, was opposed to soliciting aid from the general government for internal improvements. He also believed that the state had little commercial potential, and tax revenues would be better applied to education (Price, 2001, 209-210; Turner, 1971, 69; Jeffery, 1978, 114; Price, 2004, 297, 290-291; Dodd, 1908, 388-390). When all factors are considered, it appears that Archibald Murphey's plan for a state system was beneficial insomuch as it focused attention towards the need for transportation policy in North Carolina, and identified the causes of the degradation of its economy. The Roanoke Canal, constructed by the Roanoke Navigation Company and jointly supported by North Carolina and Virginia, was the principal work completed out during this period; as it came into operation, its existence would exert attraction for the early railroads built in both states.

The Roanoke River crosses the political boundary between North Carolina and Virginia. Through its tributaries, the Staunton and Dan, its basin extends deep into the interior of both states. The river courses south through the coastal plan North Carolina, and empties into Albemarle Sound. In 1663, the Lord Proprietors set the boundary between Virginia and Carolina at 36 degrees north. In 1728, it was surveyed to thirty miles east of the Blue Ridge and has remained since (Merrens, 1964, 19-31). The earlier line would have placed most of the basin within Virginia. For the early railroads, the river served as a *de facto* economic boundary. The Petersburg Company completed their railroad to the north side of the Roanoke in 1833, and the Portsmouth & Roanoke Rail Road followed in 1837. The latter used the toll bridge to carry their trains to Weldon on the south side of the river. Each railroad was an extension of a commercial center in Virginia, and both were competing for the agricultural output of the entire basin. The rivalry between Norfolk and Petersburg had its origin in previous internal improvement projects.

The Roanoke Canal was thirty feet wide at the bottom with slopes of one and a half feet to one foot, and three feet deep. The total length at the water's surface was thirty-nine feet and a towpath that was ten feet wide (North Carolina, 1821, 22-23). The Clubfoot & Harlowe Creek Canal was four feet deep and fourteen feet wide at its bottom. The slopes were one and half feet to one foot, and the total width at the surface of the water was twenty-six feet. The towpath was eight feet wide (North Carolina, 1820, 2). The Roanoke Canal extended approximately eight miles, of which a little more than seven miles remain. The stone culverts, massive aqueduct, and locks remain. The upper sections of the canal are dry (Figure 11). The Clubfoot & Harlowe Creek Canal also remains, but water still flows in it (Figure 12). Though slightly larger when completed and now silted to half its original depth, it is apparent to the observer that small shallow-draft bateau navigated these canals.

The Roanoke Navigation Company continued its improvements of the Dan and Staunton rivers after the Roanoke Canal was in operation (North Carolina, 1829). By 1831, the Virginia & North Carolina Transportation Company was operating eight boats of sixty tons burthen between Norfolk and Weldon. The trip took between eight and thirteen days. The monthly average loads on these boats included 400 hogsheads of tobacco, 1200 barrels of flour, and 800 bales of cotton. The company put two steamboats in service on the lower river for towing boats to Norfolk. The steamboats carried their own load for freight (Roanoke Navigation Company, 1831).

Figure 11. The remains of the upper locks of the Roanoke Canal are located at Roanoke Canal Museum in Roanoke Rapids, North Carolina. The narrow width of the locks was designed for bateau, a shallow-draft boat of about eight feet in beam. The bateau could carry ten to twelve hogsheads. Photograph by James C. Burke

Figure 12. The Clubfoot & Harlowe Creek Canal is located in Craven and Carteret counties and can be accessed from NC 101. It connects the Neuse River with the Newport River. Its promoters hope to improve commerce by creating a channel between New Bern and Beaufort. Photograph by James C. Burke

In the same year, the State of North Carolina received the sum of $875 as dividends on its 500 shares of stock in the Roanoke Navigation Company (Coon, 1908, 539).

In 1821, the Board of Public Improvements of North Carolina proposed a plan for borrowing $500,000 on the credit of the state to help pay for transportation improvements. The board recommended that the state invest nearly half of this amount in the stock of the Roanoke Navigation Company, the Yadkin Navigation Company, the Cape Fear Navigation Company, the Tar Navigation Company, The Neuse Navigation Company, the Catawba Navigation Company, and the Clubfoot & Harlowe Creek Canal Company. The remainder was committed to a number of coastal navigation projects and road projects in the western part of the state. The citizens of the state were adverse to paying for improvements with high taxes, so the board recommended that the treasurer of the state issue certificates on the debt payable bearing six percent interest annually. The board also notes that some projects, such as improving access to the port of Beaufort, had commercial advantages over other projects. They were of the opinion that the jealousy between commercial towns interfered with developing a general plan of internal improvements. Each town supported the projects that would direct commerce to their neighborhood (North Carolina, 1821, xx-xxviii). The state could not accomplish Judge Murphey's plan for internal improvements. The Roanoke Navigation Company proved a successful investment, but it benefited Norfolk more than the other commercial towns in North Carolina and Virginia. As South Carolina and Virginia pored capital into public works, North Carolina made plans, and invested in the stock of the several navigation companies.

The lack of a national plan for internal improvements placed the full burden of financing state projects on citizens that resisted taxation for improvements that would benefit another region of the state. The jealousy between towns and regions in North Carolina cannot be understated. This is the central theme of early railroad development in North Carolina. Different sections of the state, with their respective commercial towns, would align their interests with commercial centers in Virginia. Weldon, at the lower end of the Roanoke Canal, became the focus early railroad construction. At the time when Petersburg was contemplating a railroad to the Roanoke, the Roanoke Navigation Company anticipated the transport of 4,800 hogsheads of tobacco, 14,400 barrels of flour, and 9600 bales of cotton on the Roanoke River annually. They estimated that the actual annual agricultural output of the Roanoke Valley included 15,000 hogsheads of tobacco and 20,000 bales of cotton (Roanoke Navigation Company, 1831, 6).

CHAPTER VII

EARLY PLANS FOR RAILROADS IN NORTH CAROLINA

The early period of railroad development in North Carolina has received only passing attention from historians, and the few existing scholarly works on the subject are dated. It is appropriate to review the earliest railroads that were proposed and/or incorporated in North Carolina before 1835. The failure of these plans demonstrated to early promoters and legislators that there was insufficient private investment capital across the different regions of the state to support the building of large-scale railroads. On closer examination, it is apparent that the early railroad surveys were flawed, and the cost estimates were inaccurate. Further, the early promoters clearly did not have a full understanding of the nature of railroads. They conceived their plans under the notion that railroads would function much like canals and public roads. By 1833, delegates from across the state met in Raleigh for two internal improvements conventions to formulate a comprehensive plan for submission to the North Carolina General Assembly for state support. Two years later, agitation for internal improvements would figure significantly in the debates of the North Carolina State Constitutional Convention. The events of this period provide a foundation for determining the significance of the state's policy for railroad development throughout the antebellum period.

Joseph Caldwell, the first president of the University of North Carolina, proposed a Central Rail Road spanning the state from Beaufort to the mountains in *The Numbers of*

Carlton in 1828. Caldwell, a mathematician, provides a route for this road that can be determined indirectly from a table of places in the state and their distance from the line (Figure 13). In addition, the work includes useful statistics on the cost of transportation of crops to market by the prevailing means (Caldwell, 1828, 21-23, 41-47). For the time, the plan was both visionary and impractical. However, the idea of a Central Rail Road took hold of the public mind, particularly in the piedmont. On 1 August 1828, a meeting was held at the home of William Albright in Chatham County to consider the need for a Central Rail Road. Two hundred people attended the meeting, and listened to an address by Dr. Caldwell. The address and resolutions of that meeting were thereafter published (Mebane and Heartt, 1828, 1-8). By the early 1830s, the plan was at the core of the state's policy on projected Internal Improvements. In theory, the projected railroad would be accessible to many farmers of the interior (Appendix B).

James Iredell, Jr., governor of North Carolina from 1827 through 1828, recommended building an experimental railroad from Fayetteville to Campbellton - a distance of approximately two miles; this plan was supported by his successor John Owen. Owen went further by recommending that the Cape Fear River should be connected to the Yadkin in North Carolina or to the Great Pee Dee in South Carolina by a turnpike or railroad (Owen, 1829, 11). In January of 1830, a steam locomotive demonstration was set up at the Court House in Fayetteville for citizens to take a ride on a circular track. The General Assembly of North Carolina passed *An Act to incorporate a Company styled "The Fayetteville Rail Road Company,"* during their 1830-31 Session.

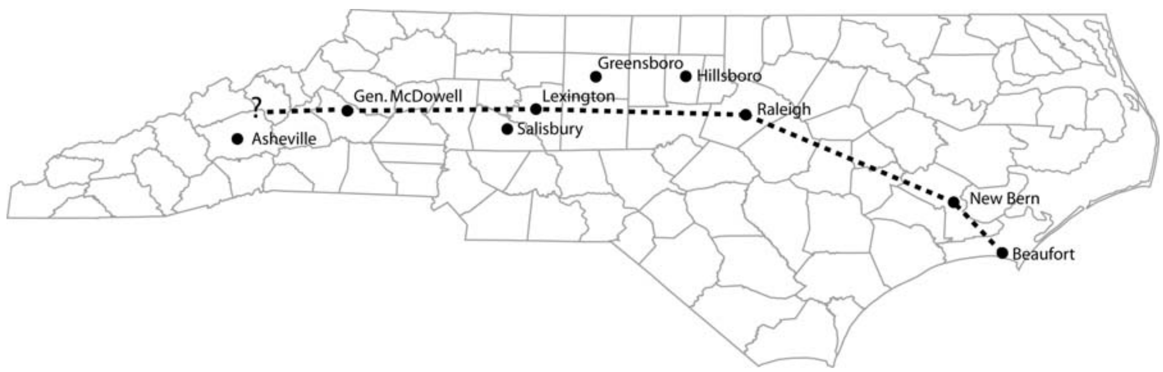

Figure 13. This is the Central Rail Road as Joseph Caldwell described it in his 1828 *The Numbers of Carlton*. The locations illustrated on the line of the route appear in a table provided in the text (Appendix B). The route is mapped on the present counties for reference. It is unclear how it would extend to the Tennessee line as latter promoters suggested. By 1831, the Central Rail Road plan was a route from Salisbury to Beaufort. The Central Rail Road concept matured into the North Carolina Railroad in 1849. The route extended north through Greensboro and Hillsboro then to Raleigh.
Data Sources: Caldwell, Joseph. (1828). *Numbers of Carlton*. New York: G. Long; Cumming, W.P. (1966). *North Carolina in Maps*. Raleigh: State Department of Archives and History, Plate XI; US Census Bureau. (2000). Census 2000 TIGER/Line ® Files [machine-readable data files]. *MAPdata USA 2000*. Ontario, Canada: Avenza Systems, Inc. Disk 37.

This "experimental railroad" was to be built from Fayetteville to Campbellton on the Cape Fear River. The two-mile steam railroad was to be capitalized at $20,000 with a single share costing $100. Though the distance of this railroad seems insignificant, the use of a steam locomotive is its remarkable feature. To put this into perspective, the Charleston & Hamburg Rail Road, the only commercial railroad in the United State using steam power exclusively at that time, was only in operation over five miles of its length. The estimated cost of Fayetteville's railroad was estimated to be $16,000 for 2 miles of railroad at $8000, an engine at the river costing $4000, a locomotive engine costing $3000, and other fixtures costing $1000. When the books were opened to subscribers in March of 1831, the citizens of Fayetteville subscribed liberally to the stock of the company. At the close of the books, $52,300 of subscriptions had been taken. This was $32,000 in excess of what was required to capitalize the company, and all but $1000 was subscribed to by citizens of Fayetteville. However, work would not commence on this project for another three years (*Carolina Observer*, 13 January 1830, 6 January 1831, 13 January 1831, 3 March 1831, 17 March 1831; *People's Press and Wilmington Advertiser*, 21 May 1834).

About noon on Sunday 29 May 1831, the citizens of Fayetteville emerged from church to find their town in flames. The fire that had started at the kitchen of James Kyle on the Market Square quickly consumed much of the town, including businesses, public buildings, hotels, churches, and the Academy. A detailed account of the terrific property losses can be found in the *Carolina Observer* that was published the same day. In short order, another instance of fire transformed Fayetteville's loss into a political opportunity.

The North Carolina Capitol building caught fire less than a month later, on Tuesday 21 June 1831. John M Mason, John Bell and William Adams, workers employed to apply zinc to the building's roof, were blamed for accidentally causing the conflagration that reduced the structure to the point that its walls fell in. Governor David L. Swain would give a firsthand account of the fire in the 1860s (*Carolina Observer*, 29 May 1831, 28 June 1831; Swain, 1867, 9, 37).

The destruction of the State House in Raleigh roused slumbering ambitions in Fayetteville and the Cape Fear region. Fayetteville had, following the Revolution, anticipated being the seat of government for the state; and had commenced the building of a graceful designed brick State House in 1787, only to be disappointed when the General Assembly chose to locate the capital in Wake County the following year (Cavanaugh, 1989, 4). It is perhaps a cruel irony that Fayetteville could no longer offer the use of this facility to the homeless legislature following the burning of the capital building, for the State House in Fayetteville had been one of the structures destroyed in that town's great fire. However, the ensuing debate concerning the relocation of the capital to Fayetteville would have far-reaching consequences: it exposed the need to resolve by convention problems with the state's constitution; it magnified the political frictions between the State's regions; and it prompted further discourse on internal improvements. The Cape Fear political faction, with its economic interests in the southwest, would do anything – even force a constitutional convention – to remove the political center of gravity to its domain (Schauinger, 1949, 135-137). The Piedmont and port towns of the extreme East, though very different from each other, couldn't possibly benefit from having the state's capital so closely located to the favorable port of Wilmington. At the same time, two plans for east-west railroads were evolving that mirrored the geopolitical divisions.

Railroad legislation and the debate over relocating the Capitol also brought back to the Legislature one of the state's greatest minds – Judge William Gaston. In May of 1831 at New Bern, he had expressed his support for a railroad from Beaufort to New Bern and thence to Raleigh to be known as the *North Carolina Central Rail Road* to be built with the aid of the state (ibid, 131-133). At about the same time, J.S. Smith, P.H. Winston, and Walker Anderson of Orange County were drafting a memorial to the legislature concerning a variant of the *Central Rail Road* that would extend from Beaufort to Salisbury with the potential for connecting spurs to the Cape Fear and the Roanoke (Schauinger 131-133; North Carolina, 1831).

On the day that the particulars of the burning of the capitol building appeared in the *Carolina Observer*, another article in the same issue suggested that the building of a railroad from Fayetteville to the interior of the state would aid the town's recovery. The plan received the immediate support of Charles Fisher, Speaker of the North Carolina House of Commons. However, his open support of a competing plan for the Central Rail Road from Salisbury to Beaufort led the *Carolina Observer* to remark that he had abandoned Fayetteville's plan, his "first love." However, another prominent supporter, John Pearson, introduced a resolution at a meeting at Salisbury for the preparation of a memorial to the legislature to commission a survey of a route from Fayetteville to the Yadkin River above the Narrows. In December, a resolution was introduced in the North

Carolina Senate to incorporate a Cape Fear to Yadkin railroad, owned by individual stockholders, to connect Haywood, at the confluence of the Cape Fear and the Haw in Chatham County, to Louisburg in Franklin County where it could connect with the Petersburg Rail Road. Senator Williams introduced a resolution to inquire into a Haywood to Louisburg to Halifax route. At the same time, a committee in Wilmington was preparing another memorial for the upcoming meeting of the General Assembly for proposing a railroad that would run from Wilmington, to Fayetteville, to the Yadkin and thence to Morganton (Figure 14). On 19 December 1831, this memorial was presented to the General Assembly; and several days later in the session, Judge Gaston introduced a bill for surveying the route of the *Cape Fear and Yadkin Rail Road* from the ocean to the mountains at the state's expense. The bill passed, and the railroad moved towards a beginning. The Cape Fear & Yadkin Rail Road was incorporated during the 1831-32 Session of the General Assembly and the capital stock of the company was to be $2,000,000. The state paid the cost of the survey. The books were open for subscription on 8 May 1832. A notice in the Wilmington newspaper, *The People's Press*, a year later marks the demise of this plan to connect the mountains with the coast. The subscribers were informed that their money would be returned (*Carolina Observer*, 28 June 1831, 24 August 1831, 7 December 1831, 14 December 1831, 21 December 1831, 21 December 1831, 23 December 1831, 4 January 1832; Brown, 1928, 17; *The People's Press and Wilmington Advertiser*, 29 May 1833, 1 May 1833).

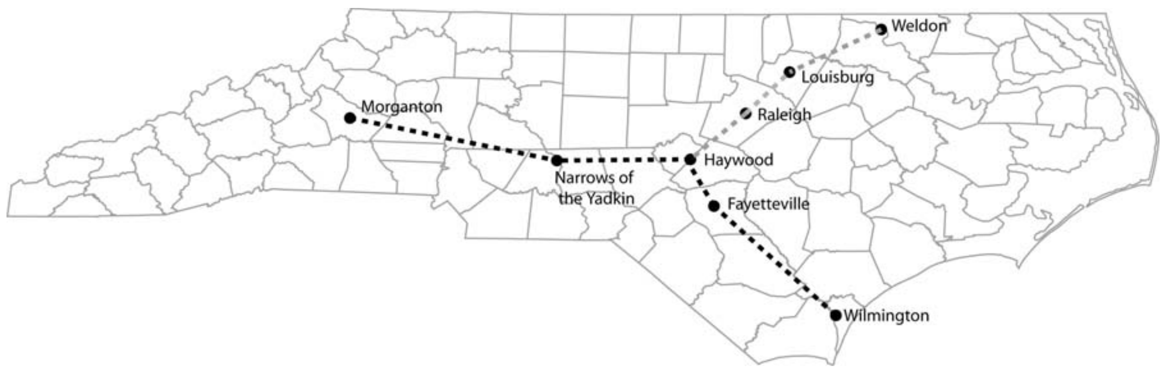

Figure 14. The 1832 route of the Cape Fear & Yadkin Rail Road extended from Wilmington to Morganton. North Carolina State Senate member Williams introduced a resolution to connect the Cape Fear and Yadkin to the Petersburg Rail Road from Haywood via Louisburg. This branch line would have passed through Raleigh. The Petersburg Rail Road, completed in 1833, ended at Blakeley on the Roanoke close to Weldon's Orchard (Weldon).
Data Sources: *The Carolina Observer*; *The People's Press and Wilmington Advertiser*; Cumming, W.P. (1966). *North Carolina in Maps*. Raleigh: State Department of Archives and History, Plate XI; US Census Bureau. (2000). Census 2000 TIGER/Line ® Files [machine-readable data files]. *MAPdata USA 2000*. Ontario, Canada: Avenza Systems, Inc. Disk 37.

Some blamed the engineer employed by the state to survey the route. The claim was that the engineer ignored the council of locals who said a route could be devised that would avoid the physical obstacles that might be encountered by terminating the road at Flat Swamp Creek where it joins the Yadkin, on the Davidson and Rowan county line. Wilmingtonians tended to blame the citizens of Fayetteville, citing local rivalries for the cause of the failure. Others suggested that the original plan to connect Wilmington to the mountains would have been the preferred route, but the commissioners of Fayetteville caused the route from Fayetteville to the mountains to be surveyed first without allowing Wilmingtonians to have a say in the matter. The editor of the *Carolina Observer* refuted accusations that the citizens of Fayetteville did not fully support the project. Though he implied that the impetus for obtaining the charter started with Wilmington, he clearly stated that the citizens of Fayetteville had subscribed liberally; however, the western counties received blame for not subscribing (*The People's Press and Wilmington Advertiser*, 8 May 1833, 13 May 1833, 22 May 1833, 29 May 1833).

An examination of articles from the Raleigh newspaper provides further insight into the failure of the *Cape Fear & Yadkin Rail Road.* The 7 May 1833 issue of the weekly *Raleigh Register* reported that Dr. William P. Hort was prepared to return money to the investors, and adds that the western counties "failed to subscribe a cent towards affecting the proposed object." The failure of the proposed Central Railroad effort is mentioned in the same article. Nearly a week later, *The Raleigh Register* included an excerpt from a letter by James Wyche, the Superintendent of Internal Improvements for North Carolina, and a citation from engineer Mr. Rawle's estimate of the cost of one mile of track (single and double). Francis William Rawle, a civil engineer from Pennsylvania, had been hired to survey both the Cape Fear and Yadkin Valley route and the Central Rail Road route. Mr. Wyche stated that the estimate was based on building a permanent way that was designed for double track on well-made embankments executed by experienced contractors and varying types of labor. Mr. Rawle's figures place cost per mile for single track at $2, 278.64, and $4,557.28 for double track (Appendix C). In the same issue, the *Raleigh Register* cites the editor of the *Carolina Observer's* statements that a railroad could be built to the Narrows of the Yadkin, but the conditions set forth by the charter would require too much capital, and that amendments to the charter would be addressed at the next session of the General Assembly. The commissioners at Fayetteville persisted in making it known that they had not abandoned the project. The most obvious problem for the project was the company's failure to secure the necessary funds. Alan D. Watson, in his book *Wilmington, North Carolina to 1861*, notes that even though subscriptions amounting to more than $100,000 in stock had been secured in the Cape Fear region (two-thirds of it by Wilmingtonians), the conditions of the company's charter required $300,000 in subscriptions to secure their charter. The disappointment that resulted from the failure of the Cape Fear & Yadkin Rail Road Company to meet the $300,000 in subscriptions required by its charter led the citizens of Wilmington to consider a plan to build a railroad between Wilmington & Raleigh (*Raleigh Register*, 7 May 1833; North Carolina, 1833a, 100; 1833b, 141; *Raleigh Register*, 14 May 1833, 11 June 1833; Watson, 2003, 221).

Forty-eight of North Carolina's then sixty-four counties were represented at the internal improvements convention held in Raleigh on 25 November 1833. Early in the convention, a committee under the chairmanship of Duncan Cameron was formed consisting of one member of each of the state's Congressional districts. The primary objective of the committee was to determine what plans embraced the interests of the state's different regions, and recommend a plan of internal improvements to the General Assembly for state patronage. First, they defined five sections of the state having different needs for addressing their respective markets. Of the many plans that the committee considered, they excluded those that were only of local benefit, and those beyond the resources of the state. The general plan of the committee recommended a rail from Edenton to the Portsmouth & Roanoke Rail Road, or a canal to the Dismal Swamp Canal for the northern counties and those below Halifax. The remainder of their general plan recommends any combinations of roads, railroads, river routes and canals to serve the other regions of the state. They noted that the route should establish the standards, by which a particular project can be judged, not the mode that is employed.

> They propose further a communication, by rail road, river, or canal, or any two of them, or all *united*, from some point on the seaboard of the State, to the Tennessee line; and another communication of the same kind from some point on the Roanoke river, running southwardly, to the South Carolina line. These two latter works, it is believed, will fully answer the purposes of the other remaining portions of the State; while the whole combined will, it is hoped, meet the wants of the State at large, and all, and every part, readily fall in with, and form a part of, any internal communication which it may be hereafter thought necessary to form between the eastern, western, northern and southern portions of the Union.
>
> – (North Carolina, 1833c, 4) –

The committee further recommended that any company incorporated in the state for improving transportation should be allowed to intersect with, or cross, any other project completed or planned by another such company. The companies could, when three-fifths of their capital stock was subscribed to, request the General Assembly consider a subscription by the state to the remaining two-fifths of the shares. The *Memorial* continues with an estimate for a general plan that involves building thirty-five miles of railroad, at a cost of $280,000, for the northern counties, one hundred and fifty miles of a north-to-south railroad costing $1,200,000, an east-to-west railroad costing $2,920,000, and a ship channel from New Bern to Beaufort that would cost $600,000 (Figure 15). The estimate for the railroads is $8000 per mile. The total cost of this plan is given at $5,000,000 and the committee recommended that this amount could be borrowed in Europe for a rate or four or five per cent. The financial resources of the state are listed as $1,067,000 in actual property, and $706,000 in uncertain items. The actual property includes $500,000 in bank stock, and shares in the Roanoke Navigation Company, the Cape Fear Navigations Company, the Pungo and Plymouth Road, and the Buncombe Turnpike; loans to the Clubfoot and Harlowe Canal Company, the Tennessee Turnpike Company, and the Swannanoa Turnpike Company. Included in the state's assets are land bonds amounting to $440,000. The state's claim for military expenditures during the War of 1812, and the proportion of western lands are the uncertain items. The annual interest on the actual property at four per cent is given as $42,680, and other regular sources of income amount to $8375 (North Carolina, 1833c).

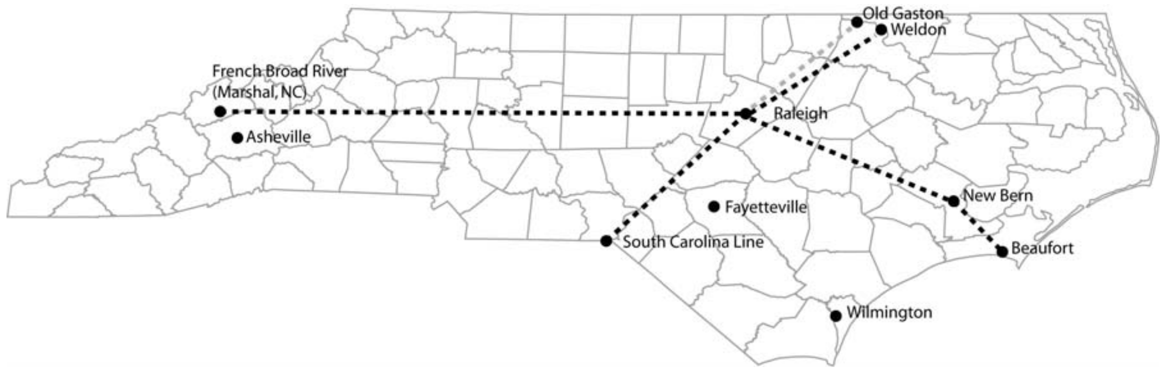

Figure 15. The *Memorial* of the Internal Improvements convention held in November of 1833 recommended to the General Assembly two railroads that would cross the state. The north-to-south railroad would span 150 miles and the east-to-west railroad would extend 365 miles to the mountains. In this map, the east-to-west route begins at Beaufort and ends to the French Broad River near present-day Marshall. The point on the South Carolina Line is place north on a line to Cheraw, South Carolina. A continuation of this line would extend to Columbia, South Carolina. The dark line extending to Weldon represents a connection with the Virginia railroads. The length of the route is approximately 164 miles. The gray line represents an extension from Raleigh to Old Gaston (Wilkins Ferry) where the railroad would connect to Petersburg Rail Road via the Greensville & Roanoke Rail Road. The latter was incorporated in North Carolina after the Memorial was prepared. The distance of the entire route is approximately 158 miles.
Data Sources: North Carolina.(1833). *Memorial of the Convention upon the Subject of Internal Improvements held in Raleigh, November 1833, to the General Assembly of North Carolina*. Raleigh, NC: Lawrence and Lemay

The North Carolina Legislature responded to the *Memorial of the Convention upon the Subject of Internal Improvements* by assembling the Joint Select Committee on Internal Improvements to prepare a report. While the committee concurred with the memorialists on the necessity of a general program of internal improvements, they did not recommend any immediate action. They recommended that further surveys and estimates should be made before the state should commit to a plan (North Carolina Legislature, 1833d). Their position was understandable, considering both the multitude of projects being considered and the dismal performance of past programs of internal improvements. The 1833 *Report of the Board of Internal Improvements* identifies the cause of past failure as too many projects undertaken at one time. The survey of the Central Rail Road and the Cape Fear & Yadkin Rail Road cost the state $7022.46, and both railroads had failed to raise the capital required by their charter. The board considered two important objectives as part of a general plan: there must be a good outlet to the ocean and a railroad should be connected to that outlet. A railroad from the Roanoke to South Carolina is also considered important, with a connection between Raleigh and Wilmington (North Carolina, 1833e). The *Report of the Committee on Internal Improvements* expands on the report of the board, recommended changes to its membership with one member acting as superintendent of public works, and pointed out that the citizens of North Carolina were quick to realize the potential of the steam locomotive; they support the convention's proposal for a policy of two-fifths investment on the part of the state (North Carolina, 1833f). In addition, the committee recommended that the state should employ a topographical engineer, perhaps from the topographical bureau of the United States government, to make estimates and surveys of the proposed routes (Coon, 1908, 641).

During the 1833-34 Session of the General Assembly, an act to incorporate the Halifax and Weldon Rail Road Company passed, and an act to incorporate the Halifax Rail Road Bridge Company passed. Other acts and acts to amend acts concerning railroads were presented to the General Assembly that session. These included the Lumber River and Cape Fear Canal and Rail Road Company, the Greensville & Roanoke Rail Road Company, the Roanoke & Raleigh Rail Road Company, the Roanoke & Yadkin Rail Road Company, the Fayetteville & Campbellton Rail Road Company. In the same session of the General Assembly, the representatives from New Hanover County voted against an appropriation for railroad surveys against the wishes of their constituents. There was a bill presented to amend the charter of the Petersburg Rail Road so that they could continue from the Roanoke to Raleigh (North Carolina, 1834a, 70, 73, 75, 81, 97, 99, 105; *Raleigh Register*, 24 December 1833, 25 March 1834, 17 November 1833).

Some of the most interesting amendments presented during that session pertain to the charter for the Weldon Toll Bridge. During the 1832-33 session of the General Assembly, an act to incorporate the Portsmouth & Roanoke Rail Road Company, passed by the Virginia Legislature on 8 March 1832, was read. Mr. Mathews, the same senator that introduced the Halifax & Weldon Rail Road bill in 1833, moved that the words “at any point on the Roanoke below Weldon” be changed to the words “opposite Weldon.” The bill was then sent on to the House of Commons for their approval. On the bills return to the senate, the words “opposite” and “or below” had not been agreed upon. The Weldon Toll Bridge was incorporated during the same session. A year later, the company presented amendments to their charter. A motion was presented to amend the bill by adding to the third section a paragraph that would set the annual tolls at fifteen per cent of the cost of the bridge and its railroad until the project had paid for itself. Thereafter, the tolls would be regulated by the legislature. The president and directors of the company were required to submit an annual report. This amendment was rejected. The fifth section of the bill was amended with a paragraph that made the company and its agents liable for the loss of service due to disrepair of the bridge and railroad, and prescribed a penalty for overcharging or undercharging the toll. This change was accepted, and the bill was sent on to the House (North Carolina, 1833a, 111, 129, 131; 1834a, 114-115). It is clear from this bill that the Weldon Toll Bridge Company originally had control of the bridge and the railroad track that crossed it. Of the many railroads incorporated during the 1833-34 session of the General Assembly, the most significant included the Wilmington & Raleigh Rail Road, the North Carolina Centre & Seaport, the Roanoke & Raleigh, and the Greensville & Roanoke (Brown, 1928, 27). The Halifax & Weldon Rail Road and the Weldon Toll Bridge are significant because they constituted a crossing of the Roanoke. The projected network of railroad at the end of 1833 connected the ports of Beaufort and Wilmington to Raleigh and the Roanoke. The Fayetteville to the Yadkin River route was revived (Figure 16).

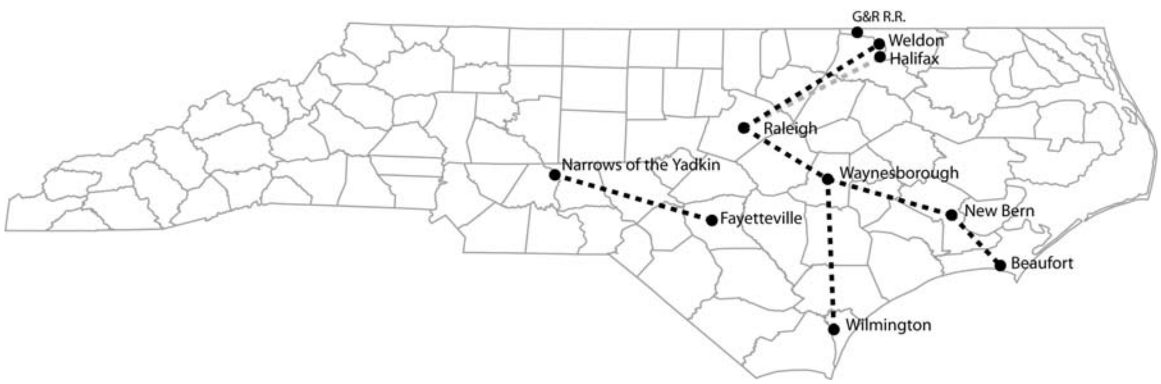

Figure 16. The network of proposed railroad incorporated at the end of 1833 included the Roanoke & Raleigh connecting the capital to Weldon or Halifax, the Halifax & Weldon, the Wilmington & Raleigh connecting through Waynesborough, the North Carolina Centre & Seaport connecting Beaufort to Raleigh or the Wilmington & Raleigh, and the revived Cape Fear to Yadkin River route. The Greensville & Roanoke was an extension of the Petersburg Rail Road that terminated on the north side of the Roanoke River west of Weldon.
Data Source: Brown, C.K. (1928). *A State Movement in Railroad Development*. Chapel Hill: The University of North Carolina Press, 26-27.

CHAPTER VIII

THE ORIGIN OF WILMINGTON & RALEIGH RAIL ROAD

The Wilmington & Raleigh Rail Road began with a proposal to construct a turnpike between the port and the capital immediately after the Cape Fear & Yadkin Rail Road failed to meet the subscription required by its charter. Some citizens of Wilmington presented the idea in the *Raleigh Register* in advance of the Internal Improvements Convention of 4 July 1833. The editor of the paper printed the suggestion that an extension from Raleigh's Experimental Rail Road to Wilmington and New Bern would be a better plan than a turnpike. By the close of the Convention, the promoters of the scheme met in Waynesborough, the projected junction of the branch lines from New Bern and Wilmington, to arrange a drive from subscriptions to the railroad. By year's end, the North Carolina General Assembly chartered the Wilmington & Raleigh Rail Road Company. The route was set between Wilmington and Raleigh. During 1834, controversy erupted between the company and interest in Raleigh and the Petersburg Rail Road when the railroad's directors attempted to change the termination of route from Raleigh to Halifax. However, the General Assembly of North Carolina ratified the amendment to the charter in 1835. In its new incarnation, the Wilmington & Raleigh Rail Road was an experiment in multimodal transportation. During its construction, it operated a stagecoach line forming a connection between its northern and southern divisions. It fleet of steamboats provided regular service between Wilmington and Charleston.

This period in the history of the Wilmington & Raleigh Rail Road has received little attention from scholars. Unfortunately, it is difficult to understand the relationship between this railroad and the Virginia railroads without understanding the origins of the conflict between Wilmington and Raleigh over the route change. Much of the material necessary to prepare a cohesive narrative of these events comes from primary sources.

The first railroad built into North Carolina territory was the Petersburg Rail Road. The Experimental Rail-road Company was incorporated during the 1832-33 Session of the General Assembly; in addition to carrying stone from the quarry for use in building the new State House, the company's charter set the price for hauling stone for any future public building (North Carolina, 1833a, 29). It was the first railroad in the state built by North Carolinians. Governor David Swain later reported that one of Raleigh's most respected and enlightened women originally suggested it, Mrs. Sarah Polk (Swain, 1867, 34-37). During the Internal Improvement Convention held in Raleigh during November of 1833, Edmund Ruffin's monthly publication the *Farmers' Register* published an article entitled "Memoranda and Scraps from a Traveler's Note Book" that provides an outsider's perspective to the proceedings. During his stay in Raleigh, the writer had an opportunity to examine the Experimental Rail Road.

> A rail-way of 1¼ miles was made from the quarry to the statehouse, solely to bring the stone, and has yielded profitable dividends to the proprietors, and at the same time enabled the transportation of the stone to be effected at one-third of the expense (as I heard,) that it would have otherwise cost. This facility also induces a much larger use of granite for new houses which are erecting on Fayette[ville] street, and will ultimately cause the town of Raleigh to show more beauty than many others of thrice its wealth and population … of the 2200 yards of the whole road, 1304 required either excavation or embankment, the greatest depth being apparently four feet, and the greatest height eight, judging by my eye. The length

> of the places excavated and embanked, was counted by sills. The total cost of the rail-way, 2200 yards, including every material, and every source of expense, amounted to only $2,700, or $2,160 the mile. It is true that the sills are not of as large, nor of as good timber, as a work intended for permanent use would require, and that the iron strips are not more than one-sixth of an inch in thickness. But if the timber and iron had been such as were used on the Petersburg and Roanoke rail-way, it would have scarcely have made this cost $3,000 the mile; and yet this work, from the far greater unevenness of surface, must be more costly for its extent, than would be a rail-way from Roanoke, by Fayetteville, to South Carolina, exclusive of the viaducts over rivers.
>
> – (Ruffin, 1834, 467) –

Following the disappointment of the failure of the Cape Fear & Yadkin Rail Road project, the citizens of Wilmington proposed a plan to the citizens of Raleigh to connect their cities by means of a turnpike via Clinton (People's Press and Wilmington Advertiser, 29 May 1833). In their response, the *Raleigh Register* advanced an idea that some had suggested (the article does not mention who they were) of extending the Experimental Rail Road in Raleigh to the town of South Washington on the Northeast Cape Fear. In the same article, a plan submitted was by individuals in New Bern for a railroad connecting Raleigh to some point on the Neuse that could support navigation.

> The proposition from Wilmington, is to connect Raleigh with that town by means of a Turnpike, on a simple and cheap plan. This plan, we fear, though preferable on the score of cheapness would not answer the purpose intended, to say nothing of the constant repairs required on a road so constructed. The main idea of connecting the two places is however, so obviously important, that it must not be lost sight of. A plan [which] we have heard mentioned, and with general approbation is this: By a *bona fide* Rail Road. From the termination of our Experimental Rail-Road, to connect this City with South-Washington, in New Hanover county, making that place the head of Navigation. We understand from a most respectable source, that the distance between Raleigh and that point is *only* 75 miles in a direct line, and that from thence, boats, drawing three or four feet of water, can at any season of the year ascend and descend the river. Such are the

> great advantages of location and convenience of timber, on this route, that it is believed a Road could be constructed for about $2,000 per mile.
>
> – (*Raleigh Register*, 11 June 1833) –

Prior to the Internal Improvements Convention held in Raleigh on 4 July 1833, the delegates from Wilmington, New Hanover County and the surrounding area assembled at a public meeting at the courthouse in Wilmington. Their committee instructed them to cooperate with the citizens of Raleigh and others in the construction of a railroad between Raleigh and Wilmington; and to protest plans that would carry resources out of the state (*The People's Press and Wilmington Advertiser*, 26 June 1833; *Raleigh Register*, 25 June 1833). At the July Internal Improvements Convention, the survey and estimates from the Cape Fear were referred to the general committee, and a number of railroad projects were discussed. These included a railroad from the Roanoke running west, a railroad from the Cape Fear running west, a railroad from Raleigh to the Roanoke, and a railroad from Raleigh to Fayetteville. John D. Jones of Wilmington introduced a proposal for a railroad from Wilmington to Raleigh. Jones was a lawyer by trade, but was also an agriculturalist, a member of the House of Commons, and president of the Bank of the Cape Fear and is associated with a deed of land to the Wilmington & Raleigh Rail Road on the northern outskirts of Wilmington (Brown, 1928, 31; Sprunt, 1916, 249-250; New Hanover County, 1840, 210). Judge William Gaston presented a resolution to build a railroad from Raleigh to Waynesboro. Gaston, a statesman of great reputation both in the state and nationally, had come out of retirement after the State House fire for the sole purpose of preserving the Capital at Raleigh and championing the plan for the Central Rail Road. In the Legislature, he was active in supporting railroad projects, and he introduced the resolution to build the railroad from Raleigh to Waynesborough with branch lines to Wilmington and/or New Bern. From this point, the railroad could be extended to New Bern or Wilmington. On the same day that the minutes of the convention were printed in the *Raleigh Register*, an appeal commenced to build a railroad from Raleigh to Waynesboro.

> Rail-Road to Waynesborough - It has been determined to make a vigorous and united effort to raise subscriptions to effect the construction of a Rail Road from this City to some point on the Neuse River, at or very near Waynesborough, to be continued from thence to Newbern, or to Wilmington, or to both places. We have been requested to publish the annexed form of a caption, to be used in securing a pledge of subscription to the stock of a Company to be incorporated for this purpose: "The Subscribers bind and oblige themselves severally, to take the number of Shares attached to their names, in a Company to be formed and incorporated for the erection of a Rail Road from Raleigh to or near to Waynesborough. The said Shares at the prices of 100 Dollars each, and the Subscribers respectfully ask the General Assembly to grant a charter of Incorporation, and they hereby submit to have themselves charged by enactments in said charter with the amount of Stock herein subscribed.
>
> – (*Raleigh Register*, 16 July 1833) –

The notice concluded with a statement for committees who wanted to open a subscription to continue the railroad to New Bern or Wilmington.

When the books were opened at Waynesborough, $25,000 in stock was subscribed to immediately by an unnamed gentleman from Wilmington. In August, a meeting was held at Roles' Store in the northern part of Wake County. Col. Allen Rogers was appointed chairman, and Joseph Fowler served as secretary. Governor Swain and William H. Haywood addressed the assembly. The purpose of this meeting was to determine the amount of subscriptions that could be expected from the area. Wilmington had at this point subscribed to $100,000 in stock, and the promoters hoped Wake County would subscribe to enough stock to carry the proposed railroad from Raleigh to some point on the Neuse. The resolutions adopted at this meeting included instructions to be given to the representatives from Wake County to the next General Assembly, urging the representatives to support a system of internal improvements and seek state funds to aid in their realization. During September, an additional eight subscribers from Pittsboro subscribed to $15,000 in stock, and the railroad was first referred to as the "Raleigh & Wilmington Rail Road" (Figure 17). When the General Assembly met in 1833, "The engrossed bill from the House of Commons, to incorporate the Wilmington & Raleigh Rail-road Company" was read the first time and passed on 23 December 1833 (*Richmond Enquirer*, 16 August 1833; *Raleigh Register*, 30 July 1833, 13 August 1833, 3 September 1833, 17 September 1833, 31 December 1833, 7 January 1834).

During the year of 1834, the Wilmington Committee would have a long running battle of words over statements presented in the *Address of the Internal Improvement Central Committee.* Gavin Hogg, one of the original commissioners at Raleigh listed in the charter of the Wilmington & Raleigh Rail Road, authored it. At the heart of this dispute was with the proposal set forth in the statements in the *Address* that the first railroad in the state should be built from the South Carolina line, through the piedmont, to the Roanoke.

Figure 17. This map of eastern North Carolina illustrates the evolution of the Wilmington & Raleigh Rail Road concept through the year 1833. It began with a proposal from citizens in Wilmington to the citizens of Raleigh to build a turnpike between Wilmington and Raleigh via Clinton. The editor of the Raleigh Register suggested extending the Experimental Rail Road in Raleigh to the head of navigation on the Northeast Cape Fear at South Washington. During the Internal Improvements Convention held in Raleigh in early July, the promoters of the scheme began an effort to secure subscription for a railroad between Raleigh and Waynesborough with branch lines to Wilmington and/or New Bern. The Wilmington & Raleigh Rail Road was chartered at the 1833-34 session of the North Carolina General Assembly. The Halifax & Weldon Rail Road, later to merge with the Wilmington & Raleigh, was chartered the same year.
Data Sources: *The People's Press and Wilmington Advertiser*, 26 June 1833; *Raleigh Register*, 25 June 1833, 16 July 1833, 30 July 1833, 13 August 1833, 3 September 1833, 17 September 1833, 31 December 1833, 7 January 1834; *Richmond Enquirer*, 16 August 1833

> We object to the proposition to construct the *first* rail road, from the southern boundary to form a connection with those from Petersburg and Norfolk. Such a road would be intersected by every road, river and canal conveying produce from the interior; and this produce would consequently go to Petersburg or Norfolk. The current of trade, thus firmly established could never be diverted, and the interior of the State would become tributary to Virginia, and the whole sea-board abandoned to utter ruin. Under such circumstances, what rational hope could the people of the sea-board entertain from constructing a road to intersect the great transverse route, what would the citizens in the interior care about such a route to our own seaboard, possessing already one of primary importance to Norfolk! If the object to the Committee be to divert the trade of North Carolina from South Carolina and Virginia, the *first* rail road constructed should be from the interior of the State to Beaufort, or some other port in North Carolina. No connection should be formed with those of Norfolk and Petersburg, until the current of trade is firmly established in its proper channel. This being accomplished, the people in this quarter would not wish to interfere, to retard the general plan of internal transportation, that our Legislature or the citizens of the State may think proper to adopt.
>
> – (*People's Press and Wilmington Advertiser*, 14 May 1834) –

Gavin Hogg responded to the New Hanover committee in July. He accused the town leaders of having a leaning towards commerce, not agriculture; they inclined to condemn any plan that did not bring the resources of the state into their commercial sphere. The Wilmington committee responded with a rebuttal stating that the entire trade of the seaboard would be ruined by building a railroad from Fayetteville, or the South Carolina line, to meet the Virginia railroads at the Roanoke. Interests in Halifax were also critical of the Central Committee's *Address*: the adoption of the plan would carry commerce out of the state to Virginia and South Carolina (*Raleigh Register*, 15 July 1834, 12 August 1834, 16 September 1834).

The *Report of the Board of Internal Improvements of North Carolina, transmitted by the Governor to the General Assembly, December 10th, 1834* stated that of all the railroad companies incorporated during the last session of the General Assembly, only a part of the Cape Fear and Yadkin Rail Road from Fayetteville to Campbellton was under way. The board was of the opinion "that no general system of improvement can be effected in North Carolina by incorporated companies," and that each of the companies needed one principal engineer with assistants. A resolution was introduced to the General Assembly whereby two-fifths of the stock of any chartered railroad in the State should be supported by the State. During the same session, Edward B. Dudley, representing New Hanover County, attempted to introduce a bill in the House of Commons to amend the charter of the Wilmington & Raleigh Rail Road. Samuel Smallwood, the representative of Beaufort County, motioned that the bill be laid on the table until 3 November 1835 during the next session of the General Assembly. The motion passed seventy-one to thirty (North Carolina, 1834b, 3-4; *People's Press and Wilmington Advertiser*, 17 December 1834; *Raleigh Register*, 13 January 1835).

The major railroads that were chartered in 1833 include the Wilmington & Raleigh Rail Road, the Roanoke & Raleigh Rail Road, the Greensville & Roanoke Rail Road, and the Halifax & Weldon Rail Road. Of these, the Roanoke & Raleigh, a plan to connect Raleigh with Halifax or Weldon, failed to progress beyond its incorporation. The change of route of the Wilmington & Raleigh has been suggested by Brown to be a practical decision based upon the commercial potential afforded by connecting to the Virginia railroads, and noting Sprunt, mentioned that Raleigh may have been indifferent to the project (Brown, 27, 31-32). Sprunt, however, also mentions that at the time the railroad was chartered in 1833, that the company had not considered the advantages of building to the Roanoke (Sprunt, 150). An exchange of letters that were printed in the Wilmington Chronicle in 1840 between writers “Petersburg” and “Roanoke” yields a clue to the nature of the outside forces that were acting upon railroad planning in North Carolina. Writer “Roanoke” clearly states that both the Petersburg Rail Road and Raleigh were displeased by the Wilmington & Raleigh Rail Road’s change of route.

> He says, first, “that when the Wilmington Rail Road was first commenced, the Petersburg Company was of course very anxious to see it carried to Raleigh – but when they found the Company intended to run it to the Roanoke, they were equally as anxious to have a good connexion with it there.” He does not say, but I shall say it for him, that as soon as it was mentioned that the Wilmington Road would not go to Raleigh, but would go to the Roanoke River, his Company made the most imperious threats of opposition, which threats were energetically carried out, by the united influence of Petersburg and Raleigh, and even the lobbies of the Legislature Halls of North Carolina were besieged by this Petersburg Company, urging the defeat of the Wilmington Road – and I call on “Petersburg” if he denies this, to show forth the correspondence which then took place between Messrs. Osborne and Dudley, Presidents of these respective Companies, upon this very subject. Nor was this opposition of short duration, but continued unrelentingly, until it was seen the Wilmington Company would succeed in despite of their efforts … and then was expressed this great anxiety to connect with the Wilmington Company at the Roanoke. This was a wonderful exhibition of good feeling towards the Wilmington Road, truly, and worthy of all consideration by your community. And here we want it to be borne in mind, that during all this conflict, the much abused Portsmouth Company was lending its feeble aid to the Wilmington Company, and has never ceased to continue this friendly feeling, because it is its interest to do so.
>
> – (*Wilmington Chronicle*, 11 November 1840) –

The promoters of railroads in North Carolina had fallen under the influence of two opposing factions. The interests in Raleigh had aligned themselves with the Petersburg Rail Road. The Wilmington & Raleigh Rail Road, through its change of route to Halifax, would open the entire market of eastern North Carolina to the Portsmouth &

Roanoke Rail Road, as well as creating the opportunity for a through ticket to the south. When the Petersburg Rail Road sought to establish a connection to the Roanoke by way of the Greensville & Roanoke Rail Road in 1833, the continuation of service through Raleigh and Wilmington would have given the Petersburg market the advantage. The Greensville & Roanoke Rail Road could only realize its potential if railroads extended from its terminus on the Roanoke at (Old) Gaston to Raleigh, then Fayetteville, and eventually to Columbia, South Carolina. This arrangement would constitute an interior through route that could compete with the coastal through route.

As early as August of 1833, the residents of the Cape Fear had voiced concerns about the Petersburg Rail Road's plans to extend their railroad south to Fayetteville, and hoped the delegates to the Internal Improvements Convention would support plans that encouraged commerce within the state. By year's end, the Petersburg Rail Road Company had moved to have their charter amended to extend the railroad from the Roanoke to Raleigh. Bills to incorporate the Halifax & Weldon Rail Road Company, the Weldon Toll Bridge Company, and the Halifax Rail Road Bridge Company were presented to the North Carolina General Assembly in 1833. These separate private corporations in total were intended to be used by the Portsmouth & Roanoke Rail Road (*The People's Press*, 6 March 1833; *Raleigh Register*, 13 August 1833, 17 November 1833, 24 December 1833; Wilmington & W.R. Co. v. Alsbrook, Sheriff, 1892, 279, 164). This was a very practical type of arrangement. The Halifax & Weldon Company did not have to acquire locomotives and rolling stock. The company would construct what amounted to an extension of the Portsmouth & Roanoke Rail Road while remaining an independent entity. Walter Gwynn, acting as chief engineer for the Portsmouth & Roanoke Rail Road, reported in his 1833 survey for that company that an extension of the railroad past the Roanoke by "enterprizing citizens of North Carolina" was favorable (Gwynn, 1833, 10). The *New York Farmer*, reprinting an article from the *Farmers' Register* published on 1 December 1836, explains why the Petersburg Rail Road, in essence, created the Greensville & Roanoke Rail Road. Not long after reaching Blakeley, the Portsmouth & Roanoke Rail Road was projected to terminate four miles upriver at Weldon. Petersburg responded by planning a railroad that would extend from Hicksford (Emporia) to Wilkes' Ferry (Gaston). The bridge over the Roanoke at that point was to be built by the Raleigh & Gaston Rail Road (New York Farmer, 29 May 1837).

The Wilmington & Raleigh Rail Road managed to overcome opposition to the changes in its charter by the time the General Assembly met in late 1835. There are several notable compromises in the plan, some of which would be rendered moot by subsequent developments. In early December, the company came to agreement with interests in New Bern that the route pass as close as possible to Waynesborough, the head of navigation of the Neuse. Branch lines were projected to be built to Raleigh and New Bern after the completion of the main line; and the project would proceed without any provisions for the state to take stock in the company (Raleigh Register, 6 December 1835, 29 December 1835). Building the railroad through Waynesborough was logical. It had been part of the original plan, and it was not too far removed west from a direct line from Wilmington to Halifax. The state would later become the railroad's largest shareholder, and its branches to Raleigh and New Bern would not be built by the company. The

Raleigh & Gaston Rail Road was also incorporated during this session of the General Assembly.

CHAPTER IX

THE ORIGIN OF THE RALEIGH & GASTON RAIL ROAD

During the 1834-35 Session of the North Carolina General Assembly, legislators considered a bill to amend the charter of the Raleigh & Roanoke Rail Road and a bill to construct a railroad from Gaston, at the termination of the Greensville & Roanoke Rail Road, to Raleigh – the Raleigh & Gaston Rail Road. The bill to incorporate the Raleigh & Gaston excited interest because it had not been before any committee. The incorporators had observed that the legislature had been liberal about granting charters to railroads if they were not seeking state aid; thus, the railroad was chartered as a private undertaking (*Raleigh Register*, 3 December 1835, 15 December 1835; Brown, 45).

Three months after the company was incorporated, an article from a writer identified as "Petersburg," reprinted from the *Petersburg Intelligencer*, appeared in the *Farmer's Register*.

> We have been going on very quietly with the subscription to the Raleigh and Gaston Rail Road Company – little has been said and much done. But so much may be said in favor of the scheme that I think it would be proper to publish in your paper some of the reasons on which the friends of the work rely to recommend it to the public.
>
> – (Ruffin, 1836a, 652) –

There was a strong connection between the officers of the Raleigh & Gaston Rail Road and Petersburg interests. Charles F. Osborne, president of the Petersburg Rail Road, was a business associate in cotton and textile manufacturing in Petersburg with investor Samuel Mordecai, an officer in the Petersburg Rail Road Company. George W. Mordecai, the half-brother of Samuel, was the first president of the Raleigh & Gaston Rail Road. Osborne also served on the board of the Raleigh & Gaston Rail Road, and his name appears conspicuously in the company's second annual report (Wyatt, 1937, 21-22, 25n; Ruffin, 1838, 740, 742). The Greensville & Roanoke Rail Road, the Raleigh & Gaston Rail Road, and the proposed Raleigh & Columbia were to serve as a *de facto* extension of the Petersburg's market influence. The 1836 "Proceedings of the Petersburg Rail Road Company" printed in the *Farmers' Register* states this goal outright. The company projected an extension of their market to the Yadkin.

> On the south within the short space of a year, we have grafted on our road the Greensville and Roanoke Rail Road; and proposals will soon be submitted for a bridge across the Roanoke at Gaston, connecting that improvement with the Raleigh and Gaston Rail Road – and satisfactory assurances are given us that before the present year rolls away, the connexion will be complete, and part of the road on the other side of the Roanoke so far made, that it may be used for travel and transportation … at no distant day a connexion with the Yadkin country, (perhaps the finest in the south,) either at Raleigh or at Oxford, we are insured a continued and increased value to our investment: nor is it too much to anticipate, that the period is almost at hand when from the profit on travel alone, we shall declare such dividends to our stockholders, as will amply satisfy them, and consequently have it in our power to reduce the rates of transportation of produce, to the mere expense of its receipt and delivery.
>
> – (Ruffin, 1836, 762) –

The assumed destiny of Virginia's railroads was perceived before these railroads were built. An article in the *Richmond Enquirer* published not long after the Fayetteville Rail Road was incorporated suggests that Petersburg would eventually extend their railroad to

Fayetteville, and Norfolk would build a railroad to Raleigh via Halifax (*Richmond Enquirer*, 13 March 1831).

The Raleigh & Gaston Rail Road had commenced work with several built-in handicaps: it was a private corporation owned by individual stockholders; work on the railroad had to begin at the Roanoke River, not Raleigh; and the company had to build a bridge over the Roanoke. The Wilmington & Raleigh Rail Road was incorporated under a public act, had benefited from having merged with the Halifax & Weldon Rail Road, and had received the two-fifths investment on the part of the state. The latter was only possible because of the distribution of the federal surplus to the states, an element of Jacksonian monetary policy. The same policy would trigger the Panic of 1837, and the subsequent depression. This subject was touched on briefly in the discussion of railroad iron. Its impact on the Raleigh & Gaston was crippling, setting it on a path to insolvency.

In the months before the Panic of 1837, the *Raleigh Register* celebrated a burgeoning new era of internal improvements beginning with Governor Edward B. Dudley's inaugural speech, and William Graham's speech on the application of public moneys for railroads and canals. Work on the Raleigh & Gaston Rail Road had commenced, though by February there were reports of an outbreak of smallpox along the line. The first meeting of the Raleigh & Columbia Rail Road had taken place, and the first annual meeting of the company was scheduled for that month. The Raleigh and Gaston was constructing their bridge over the Roanoke: three piers and one abutment of the bridge at Gaston had been constructed, and iron for the rails had been ordered from Maury, Latham and Company of Liverpool and A & G Ralston of Philadelphia (*Raleigh*

Register, 3 January 1837, 17 January 1837, 7 February 1837, 41 February 1837, 28 February 1837).

On 2 May 1837, eight days before the onset of the Panic, the *Raleigh Register* reported that the Warren County Superior Court was considering the constitutionality of the condemnation of land for use by the Raleigh & Gaston Rail Road. It was unclear that the charter of the company provided for it. The company had 1200 laborers employed on the line by late July, and the five stone piers – 160 feet apart – and the abutments of the bridge at Gaston were finished. The total length of the bridge was 1000 feet. The sixth installment on the stock of the Raleigh & Gaston was announced in September, and installments came due in the next month. As the year was drawing to a close, the Weldon Toll Bridge was nearly finished and several cars were taken across by horses; the Wilmington & Raleigh Rail Road had finished work on the bridge across the Northeast Cape Fear ten miles from Wilmington (*Raleigh Register*, 2 May 1837, 31 July 1837, 4 September 1837, 23 October 1837, 30 October 1837; *Wilmington Advertiser*, 10 November 1837).

The second annual meeting of the stockholders of the Raleigh & Gaston Rail Road was held on 22 January 1838 at the state bank in Raleigh. The railroad clearly was experiencing some problems, even though the tone of the text appears to be optimistic. Thirty-eight miles of the road had been graded, a shipment of iron had been received, and they expected forty-eight miles of the railroad to be in operation by June. Sills could not been laid on the roadbed due to the frost. The company had expended considerable time and capital building their bridge over the Roanoke. However, it had yet to be completed.

Deliveries of timber had been delayed by low water levels on the Roanoke. The company admitted it did not have the capital to finish the project, and offered its remaining shares for subscription as well as contemplated pursuing a loan in England (Ruffin, 1838, 740, 742). George Mordecai failed in his attempt to secure money in Europe; however, he managed to purchase 800 tons of iron at a low rate. The North Carolina General Assembly in their 1838-39 Session passed "An Act for the relief of the Raleigh and Gaston Rail Road Company" wherein the state endorsed the bonds of the company to the amount of $500,000, and required the railroad to mortgage their property to secure the state from any loss. The General Assembly would later foreclose on the mortgage when the company became insolvent (*The American Farmer*, 1839, 78; Brown, 53-54; North Carolina, 1845, 96-102).

In an obvious way, the Raleigh & Gaston Rail Road needed to be connected south or east. The projected Raleigh & Columbia Rail Road failed to meet the subscriptions to its stock required by its charter. By the time of their annual meeting in 1839, the company reported that there were five bridges on the route of the railroad and their total cost was estimated to be $155,000. The cost of the railroad, including the bridges, was $14,378 per mile. The report mentioned that travelers were deterred by the difficult stage ride from Columbia and Augusta to Raleigh, but they still anticipated the eventual benefits of a Raleigh to Columbia railroad (Figure 18).

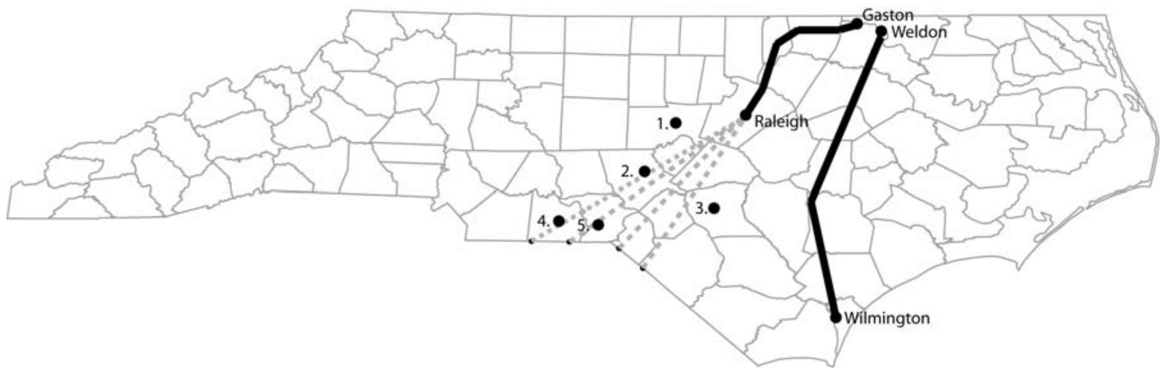

Figure 18. This map illustrates the routes of the Raleigh & Gaston Rail Road and the Wilmington & Raleigh Rail Road. By its charter, the projected Raleigh & Columbia Rail Road could extend from the Raleigh & Gaston to any point on the South Carolina line within thirty miles of Rockingham (5). The gray dotted lines indicate possible routes ending fifteen miles apart of the state line. The number point are the towns where that towns where subscription were taken, Pittsboro (1), Carthage (2), Fayetteville (3), Wadesboro (4). The second line west of Fayetteville is the shortest. However, line passing through Rockingham is in a direct line to Columbia, South Carolina.
Data Source: North Carolina. (1837). *Laws of the State of North Carolina Passed by the General Assembly at the Session of 1836-37*. Raleigh: Thomas J. Lemay, 207-207

They dismissed the merits of an inland rail connection between Wilmington and Charleston that would replace that company's steamship line (Ruffin, 1838, 740, 742; 1839, 388). It is significant that the officers of the Raleigh & Gaston Rail Road were perpetually enamored with their connections to Petersburg, and never abandoned the dream of pushing their railroad south to Columbia. This connection was an element of their plans despite the proposed building of any railroad link between Wilmington and Raleigh. It was, in essence, the official position presented in Gavin Hogg's *Address of the Internal Improvement Central Committee*. Had the Raleigh & Columbia Rail Road been constructed, it would have diverted north-to-south traffic away from the coast.

The Raleigh & Gaston had anticipated carrying the "Great Mail," through its connection with the Greensville and Roanoke at Gaston, rather than via the junction of the several railroads at Weldon. Others were of the opinion, such as early promoter Judge Duncan Cameron, that the Weldon junction would "command the transportation of the mails." The company suffered the loss of a significant source of income when the contract was awarded to the Wilmington & Raleigh (Brown, 46, 55). Cameron's reasoning was fatally flawed. If there were a first law of transporting the mails, major junctions on operating networks would be favored over dead-ends on projected networks. Connecting the Raleigh & Gaston Rail Road to Weldon was inevitable, and is evidenced by the fact the Post Office Department had determined that its First Class – the "Great Atlantic line" from Boston to New Orleans – should connect south via Charleston. Once set, it would be developed from Charleston southward to New Orleans via Augusta and Covington, Georgia by rail and Mobile to New Orleans by steamboat. The Wilmington to

Charleston steamboat connection, albeit the weakest link, was the most direct. The Greensville & Roanoke Rail Road and the Raleigh & Gaston Rail Road were Second Class routes. The difference in the contract was significant. The Wilmington & Raleigh Rail Road received $75,000 annually to carry the mails from Weldon to Charleston seven times a week. The Petersburg Rail Road received $15,200 annually to carry the mails to Weldon seven times a week. The Greensville & Roanoke Rail Road received $2,000 annually to carry the mails to Gaston six times a week, and the Raleigh & Gaston Rail Road received $8,000 annually to carry the mails to Raleigh six times a week. The Norfolk to Weldon route and the Charleston to Savannah steamboat route were Second Class routes (United States, 1845, 105: 1-7).

The Weldon to Charleston route had a somewhat controversial beginning. The *Memorial of Many Inhabitants of the City of Charleston Praying that the Southern Mail be carried by way of Halifax and Wilmington* dated 27 November 1837 and signed by David Alexander, president of the Charleston Chamber of Commerce was submitted to Congress and was referred to the Committee on the Post Office and Post Roads on 14 February 1838. The memorial notes that the State of North Carolina had subscribed to two-fifths of the stock of the Wilmington & Raleigh Rail Road, sixty miles of the railroad would be completed by 1 May 1838, and in the interim, four horse coaches would run the line. Two steamboats would complete the connection from Wilmington to Charleston. The memorialists present a timetable that shows that the change of route would result in a saving of time over the Halifax to Columbia route, via Fayetteville, Cheraw, and Camden. This memorial did not merely suggest the creation of a new route. It recommended the changing of the “Southern Great Mail” route – that is, all the mail dispatched south. This memorial was protested by the citizens of Cheraw in their *Petition of the Citizens of Cheraw*. They challenged Charleston’s estimates of the times on the existing route, noting that the Raleigh & Gaston Rail Road would be completed by the following summer and the Raleigh & Columbia Rail Road had recently been incorporated by the North Carolina Legislature. Additionally, an application was made to the South Carolina Legislature for the incorporation of a railroad to run from the South Carolina line to Columbia. The *Petition of the Citizens of Camden* noted that the Wilmington & Raleigh Rail Road route to Charleston was at the extreme east of both North Carolina and South Carolina. The Wilmington to Charleston steamboat connection excluded an extensive area of commercial towns, coastal and interior, from direct distribution of mails. The interior route was geographically situated to distribute the mails east and west. The *Memorial of John Bryce and 212 Others, Inhabitants of Columbia, S.C., and Vicinity, Remonstrating against the removal of the great Southern mail route* argued in favor of the superior efficiency of the interior route when the projected Raleigh & Gaston and Raleigh & Columbia would be completed. On 7 July 1838, Congress ratified *An Act to establish certain post routes and to discontinue others*. This piece of legislation is significant in two aspects. “Section Two” of the acts makes all railroads in the United States, in existence or thereafter to be built, post routes, and “Section One” establishes a route from Weldon to Charleston via Halifax, Enfield, Waynesborough, South Washington, and Wilmington. The route changes mentioned in the act in “Section Three” were to go into effect on 1 July 1839 or sooner (United States, 1838, 1838a, 1838b, 1838c).

The awarding of the Southern Great Mail contract to the Wilmington & Raleigh Rail Road illustrates the fact that there were two great rail networks developing to the north and south that were independent of the influence of Petersburg and Norfolk. The decision on the part of the Petersburg Rail Road to build to Blakely had determined the subsequent development of the network to the south of the Roanoke. The building of the Greensville & Roanoke was a wasted move, for there was one direction to take after reaching the Roanoke, which was to cross it. The building of the Portsmouth & Roanoke Rail Road, and the subsequent bridging of the Roanoke at Weldon, established a new objective, Halifax. Had the original Roanoke & Raleigh Rail Road scheme proceeded, Raleigh would have connected to Weldon or Halifax (Brown, 27). To the north, the railroads being built from New York, to Philadelphia, and to Fredericksburg were trending south. The early construction of the Charleston & Hamburg Rail Road established a westward trending rail network below the Santee River. These networks, even if one only considers the transport of Great Mail, needed to be linked. The early construction of the Petersburg Rail Road established a southward trending rail network to intersect the South Carolina railroads. The Petersburg Rail Road became aware of this when the 1838 changes brought about a change in the designation of the express mail route.

The *Memorial of The Petersburg Railroad Company, praying the payment of a sum of money withheld from them, under their contract for the transportation of the mail* dated 27 December 1838, and signed by Charles F. Osborne, expresses the company's bewilderment of a loss of $8,000 from their contract for changes brought about in 1838. The changes, issued to the company by S.R. Hobbie of the Contract Office of the Post Office Department, placed the beginning of the express mail route going south at Gaston and the end of express mail service north of Petersburg. In a letter to the company, included in a report to the Committee on the Post Office and Post Roads of the Senate dated 23 January 1839, Postmaster General Kendall explained to the company that Petersburg was the last distributing post office going south and the first going north. The express mail began at Gaston and extended south. The Post Office Department had also given contracts to the railroads operating from Richmond to Philadelphia, thus there was no longer a need to provide express service – being that all the mail from the Roanoke to New York City traveled by rail. The mail separated from the total dispatch at Gaston as express mail, even if it arrived there from New York in a separate express pouch, was not express mail until it left Gaston south. The express mail arriving at Gaston from the south, was part of the great mail traveling north on the Petersburg Rail Road (United States, 1838d, 1839). This is more than an interesting piece of historical trivia. The fact that the express dispatch had been changed from Blakely to Gaston - the Petersburg Rail Road had to wait for its scheduled arrival at Gaston – indicates that the Great Mail was dispatched on the Wilmington & Raleigh Rail Road. The express dispatch was not needed at this junction with the Petersburg Rail Road; and the discontinuation of the express service north of Gaston indicates that the railroads north of Petersburg had formed a continuous network. The merger of the Weldon & Halifax and the Wilmington

& Raleigh, and the early operation of this road with its mix of rail, stage, and steamboat connections, ensured that it would receive the contract for the Southern Great Mail – the validation that the Wilmington & Raleigh Rail Road was the only trunk line passing through North Carolina.

The "Report of Walter Gwynn, Esq., Engineer, to the President and Directors of the Wilmington and Raleigh Rail Road Company," prepared in 1836, justified the route to Halifax in the conclusion to his survey.

> Routes passing through the interior, with a view to divert travel, must be regarded as experiments, running counter to all experience, and of very doubtful success. And I lay it down as an incontrovertible fact, that those works which will prove most profitable, and conducive to the great and varied interests of the country, may be classified under two heads. Those which connect the commercial cities, and those which lead from commercial towns by the most direct routes to the interior and western portions of our country … All the improvements which are contemplated from the sea-board to the western part of your state, must cross the line of your railway; and to whatever point destined, will find it to their interest, to some extent, to pursue it, in order to make of the most favorable location. Under this aspect, your rail road presents itself to the state in a peculiarly interesting point of view. It traverses it nearly through its entire length from north to south, and forms the basis upon which the internal improvement scheme of the Raleigh Convention may be most economically carried out.
>
> – (Ruffin, 1836, 348) –

Gwynn noted three additional significant features of the route that recommended its acceptance. The railroad, through its connections with the Portsmouth & Roanoke and Petersburg railroads to the north and connection to Charleston by steamboat to the south, made the railroad a work of national importance. The railroad could serve a strategic function for the concentration of troops and munitions for the defense of the seaboard. The scope of the project placed it "beyond the reach of competition" (Ruffin, 1836, 348).

Contrary to the opinions of the critics of the Wilmington to Halifax route, the citizens of Wilmington could not do better by running their railroad to Raleigh. It does not matter that Raleigh interests did or did not support the Wilmington to Raleigh route, or the Wilmington & Raleigh Rail Road officials threatened commercial interests in Petersburg – and their Raleigh business partners – by upsetting their plans to create a monopoly on the agricultural output of North Carolina's piedmont. The benefits of maintaining competition between the Virginia railroads for market share at their junction near Weldon, in addition to opening up the Charleston market to the same, was obviously better for the citizens of the east than supporting the Petersburg monopoly. If Gwynn's assessment of the viability of routes were correct, the Central Rail Road, not the Raleigh & Gaston, would have served the best interests of the City of Raleigh and piedmont agriculturalists. By 1839, the incorporators of the Raleigh & Gaston Rail Road had joined with some who had served the Wilmington & Raleigh Rail Road to form the Weldon Rail Road Company to connect the Raleigh & Gaston to the Portsmouth & Roanoke at Weldon (Clark, 1877, 28). During the 1840s, the Petersburg Rail Road built its own bridge over the Roanoke at Blakeley; and by the end of the Civil War, the Raleigh & Gaston opted to use their connection to Weldon rather than rebuild their bridge at Gaston that was destroyed during the war. The Greensville & Roanoke Rail Road, with its connection south severed, would cease to exist.

CHAPTER X

THE STATE CONSTITUTIONAL CONVENTION OF 1835

The cause of internal improvements in North Carolina and the movement to amend the original state constitution are intimately connected. Thirty-five counties existed, and twenty-nine of these were in the eastern region in 1776. The old constitution allowed each county one senator and two representatives in the legislature. Seven borough towns sent one member to the House of Commons, representing the commercial interests of the state. As the population of the state grew, large counties in the central and western parts of the state were created. The smaller counties of the east retained control over the legislature, however. By 1821, representatives of the western counties introduced resolutions to amend the constitution, which the eastern majority rejected. After the State House fire in 1831, the controversy over relocation of the capital to Fayetteville set in motion a successful movement to amend the constitution (Conner, 1908, 3-8).

The North Carolina State Constitution of 1776 reflected the practical condition of wartime, and represented a compromise between radical and conservative elements of the revolutionary government. It was workable, through undemocratic, favoring the eastern planter and individualistic backcountry farmer. The radicals favored a break with the British traditions of government; the conservatives wanted to keep parts of it that would limit suffrage and give independence to the judiciary. The conservatives were in the minority, but they managed to influence the writing of the first constitution, which was ratified on 17 December 1776. The nature of North Carolina politics remained similarly arrayed after the Revolution. The conservatives argued for a tolerant policy toward former Loyalists, and the radicals opposed clemency on any level. The radicals' interests led them to promote a local, centered form of government, and they were averse to central authority and the restriction on the issuing of paper currency. These political divisions were not formal parties. However, during the debates over the ratification of Federal Constitution, the radical emerged as Antifederalists (Gilpatrick, 1931, 20-36).

Throughout the 1820s, the need for internal improvements was the greatest source of discord between the eastern and western counties. Sectional differences had hampered the realization of Archibald Murphey's plan for a state system. Easterners were inclined to relegate the execution of navigational improvements to private companies rather than accept state aid for the projects that would primarily serve their interest. This was motivated by the fear that state aid in the east would lead to state aid in other regions of the state, and the wealthy east would be taxed to pay for improvements in the west. The west, however, gradually was organizing into a political block with the persistence to attain greater representation. The State House fire in 1831 set in motion the alignment of interests in the Cape Fear counties and West. Westerners were not concerned about the location of the capital, but the friends of the movement to locate the capital to Fayetteville offered to support their efforts to amend the constitution. During the 1831-32 Session of the General Assembly, the alliance managed to defeat a bill to appropriate funds to rebuild the State House. However, the Cape Fear region was not supportive of the convention bill introduced by the West and it was defeated. The reformers managed to arrange an unofficial poll on the subject of a constitutional convention in 1833 that almost succeeded in convincing the General Assembly to pass a convention bill, but it was again defeated. The alliance between the east and western counties solidified after the 1833-34 Session of the General Assembly. Several railroads were incorporated during this session, but the conservatives blocked any recommendations for aid, including funding for surveys. This was particularly frustrating to eastern commercial interests (Jeffrey, 1989, 52-60).

The Internal Improvements Conventions of July and November, the *Memorial* of the convention, and growing enthusiasm for railroads in the public mind did not sway the General Assembly in 1833-34. By mid-1834, the improvement minded Whig Party was gaining ground in North Carolina. The Committee of Correspondence in Wilmington, the bane of Gavin Hogg, was a strong Whig presence in the Cape Fear. They railed against the Virginia-South Carolina interior railroad proposed in the *Memorial*. Edward B. Dudley belonged to the committee. He would become the first president of the Wilmington & Raleigh Rail Road and the first popularly elected governor of North Carolina. The question of amending the constitution and the prosperity of the port fused in the Whig leaning of Wilmington. Governor David L. Swain pressed the subject of a constitutional convention in his message to the General Assembly in 1834. The bill passed during the 1834-35 Session (Konkle, 1922, 144-148).

On the evening that the General Assembly rejected the bill for a constitutional convention during the 1833-34 Session, representatives of the counties favoring the convention met on 11 January 1834 to plan their next course of action. The representatives resolved to form an Executive Committee to prepare and publish essays on amending the constitution of the state. In addition, they planned to publish the bill rejected that day, and to establish committees in the individual counties to distribute the publications and collect contributions to offset costs (North Carolina, 1834c, 3-4). Through the spring and summer of 1834, the supporters of amending the state constitution began distributing pamphlets and holding rallies. The campaign extended into the eastern counties (Jeffrey, 1989, 62). The fund of a state system of internal improvements is discussed in the *Proceeding of a Meeting of Members of the Legislature, held in Raleigh, January 11, 1834; with an Address to the People of North-Carolina, on the Subject of Amending the Constitution of the State*.

> This subject presents a forcible appeal to such among you as *desire* to see the State embark upon a scheme of Internal Improvements. – Were a loan taken by the State, sufficient to commence operations such a work, the funds must be under the control of a Government whose *necessary* expenses exceed the ordinary revenue of $15,000 per year, and who does not know, that the system would be a "scapegoat," to the sin of all other expenditures, and become odious? Would the people at large be taught to discriminate when it is notorious that few among you possess or have sought after any knowledge of our finances for many years? Depend upon it, you will never command money for the expenditure, or enterprize to pursue a system of great public works, if you are to rely upon an increase of taxes equal to the present deficiency of revenue for governmental purposes, added to enlarged demand on it for the interest of a State debt.
>
> – (North Carolina, 1834c, 15) –

Simply stated, the expense of government had increased as new counties were added, yet many of these counties were not contributing enough in taxes to maintain their administration. While a program of internal improvements was necessary for the prosperity of the state, the increasing costs of government would continue to consume tax revenues and reduce available funds in the treasury to finance those improvements. A state program such as the one suggested in the *Memorial* of the Internal Improvements Convention, set aside by the General Assembly of 1833-34, required that the state secure loans totaling five million dollars in portions of one million annually.

The General Assembly approved the bill for the constitutional convention on 5 January 1835, and the convention convened on 4 June 1835. The delegates to the convention were freeholders of at least one hundred acres from each county. The most notable of these included Governor Swain, Judge William Gaston, and Charles Fisher. Nathaniel Macon, chosen president of the convention, would perform the last great service of his career (Konkle, 1922, 150-152). Macon, at seventy-eight years old, had spent much of his life in Congress and had known the framers of the first North Carolina State Constitution. While his selection as president did not hold special political significance, he was the undisputed authority on the 1776 constitution. Macon, Gaston, and Swain dominated the proceeding of the convention (Lefler and Newsome, 1973, 353-354).

The debates of the convention reflect the conflict between two visions of North Carolina. Nathaniel Macon clearly supported the cause of education, an issue that was linked to the internal improvement movement. However, he did not believe that North Carolina was a commercial state, and its lack of a good port along with the “sickly” environment of the southeast section placed it in a poor position to compete with other states. Promoting public education would make the citizens of North Carolina virtuous, if not great. Nathaniel Macon took a difference approach in some remarks about the degraded condition of the state, noting that North Carolinians were independent and "in general more happy," even though they lacked the more conspicuous trapping of prosperity (North Carolina, 1836, 43, 92). Macon did not want to see the constitution rewritten; he merely wanted amendments appropriate to meet the changed conditions and to satisfy the western section of the state. He wanted to see suffrage based on mature judgment rather than property, public education support by taxation, annual legislatures, the recording of individual votes – *viva voce* – in legislature, religious liberty, county integrity, and the election of state officers and judges to specific terms. He was not concerned with commercial fads or internal improvements (Dodd, 1903, 387-389). To a degree, the convention achieved many of these objects. However, Macon was disappointed that the convention approved biannual sessions.

In the course of the debates, James Wellborn, a delegate from Wilkes County, stated that the disparity between the representation of the east and west had been responsible for the failure of a system of internal improvements, including both the Central Rail Road and the plan to connect the Cape Fear and Yadkin. Mr. Wilson, of Perquimans, questioned the motives of the west in seeking equal representation. He believed that Mr. Wellborn's statements exposed the desire of the western counties to have railroad and canals to give them an outlet to the ocean. However, the opening of new territory to the south and west would continue to encourage outmigration from the state, and the soils of the western counties of North Carolina was exhausted. A railroad to the west could not reverse conditions. Jesse Speight, of Greene County, remarked that a railroad from the seaboard to the mountains was impossible. The state did not have the capital for such a project, and the profits from transporting produce would not sustain it. Railroads made their money from passenger service. Nevertheless, if the citizens of the east were to be taxed for railroads, they should have a say in how the money was distributed. Mr. Speight stated that a mutual jealousy existed in the state between east and west, and between all the river basins. The only possible way to get the cooperation of the representatives of the opposing sections of the state was to extend political favors. He hoped he could bring before the legislature a plan to build a railroad from Beaufort to New Bern and a railroad from Fayetteville to the west. He thought these projects were practical (North Carolina, 1836, 86-87, 98-99, 123-125).

The subjects of internal improvement and education intersect the debates on borough representation, the number of representatives in the House of Commons, and other administrative considerations. The convention embraced other proposed amendments such as the removal of religious qualifications of office holding. This provision of the 1776 constitution remained untested, and perhaps ignored. The new amendment changed the qualifications, but excluded non-Christians. The new constitution also abrogated the right of "Free Persons of Color" to vote. However, those constitutional changes that altered the nature of representation indirectly influenced the cause of internal improvements. Under the new constitution, the composition of the House of Commons consisted of 90 to 120 members, based on population numbers. This gave the western counties fair representation according to size. The east retained an advantage because three-fifths of its large slave population county was included in county population – the federal number. The Senate, apportioned to the tax value districts, gave the eastern counties additional advantages (Hamilton, 1916, 13-15).

The convention adjourned on 11 July 1835 and the constitution was put to popular vote several months later. The citizens ratified the North Carolina State Constitution of 1835 by a majority of 5165 votes. The vote was divided along sectional lines with most easterners voting for rejection (North Carolina, 1836, 400, 425). Contrary to the long accepted view, the movement to amend the convention involved bipartisan cooperation between the Democrats and the Whigs. The popular election of the governor, as Judge Gaston noted, would stimulate party politics within the electorate. The citizen would lend their support to the party that served the interests of the whole state (Jeffrey, 1989, 64-65). Edward B. Dudley, North Carolina's first popularly elected governor, would be elected in 1836. The citizens of the state continued to elect Whig governors until 1850. Charles Manly, the last Whig governor, left office in January of 1851. The politics of the improvement minded Whig party would shape the railroad movement in North Carolina during its first period of construction.

Edward B. Dudley was a harmonizing force in North Carolina politics. He focused on practical issues rather than partisan concerns, and entertained a liberal viewpoint. Having served in Congress from 1829 to 1831, he refused to run for another term. In 1830, he had published a circular that opposed the Cherokee removal that irritated some in the western most section of the state. However, when he ran for governor during 1836, his platform was unambiguous. His views on internal improvements made him an attractive candidate in the western counties in spite of being an easterner. He possessed a congenial personality, great wealth, and tendency to follow his principals doggedly (Hamilton, 1916, 36; Jeffrey, 1989, 75).

Governor Dudley, with the aid of his colleague William Graham, labored to reorganize the finances of the state during the 1836-37 Session of the General Assembly. The central achievement of this session was the two-fifths investment on the part of the state for several railroad projects, including the Cape Fear & Western Rail Road from Fayetteville to the Yadkin River, the Wilmington & Raleigh Rail Road, and the North Carolina Central Rail Road from Beaufort to Fayetteville (Konkle, 1922, 176). The new statute channeled the distribution of the federal surplus into the stock of the railroad companies and the dividends from the stocks would be applied to the fund for public education called the Literary Fund (North Carolina, 1837b, 346-352).

Without the constitutional reforms put in place during the North Carolina State Constitutional Convention of 1835, it is unlikely that railroad development would have progressed during the late 1830s. The failure of earlier railroad schemes and the inability of the General Assembly to adopt a state plan for internal improvements are strongly associated with the undemocratic nature of North Carolina politics under the North Carolina Constitution of 1776. The amendments to the constitution allowed for the development of political parties along the national model, the election of the governor by popular vote rather than by the legislature, and diminished the sectional nature of North Carolina politics. Internal improvement became central to future policy in this environment.

CHAPTER XI

THE BUILDING OF A RAILROAD

The Wilmington & Raleigh Rail Road was completed in March of 1840. At one hundred sixty-one and a half miles long, it was the longest railroad in the world, and it operated another one hundred fifty miles of steamboat service. During its construction, the company had operated a stagecoach line to bridge the gap in the rails between northern and southern sections, and its steamboats maintained regular service to Charleston. The railroad had actually been in service since mid-1837, providing a through ticket – "tri-weekly line of communication between Charleston and Weldon" (*Wilmington Advertiser*, 5 May 1837). It was a multimodal trunk linking north to south through relatively underdeveloped territory. By the early 1850s, the Wilmington & Manchester Railroad would replace the steamboat connection to Charleston through its junction with the South Carolina Railroad. There would not be another railroad route passing north to south through North Carolina until the Piedmont Railroad, between Danville and Greensboro, was built during the Civil War. The unprecedented length of the Wilmington & Raleigh Rail Road, and the interstate concepts behind its design, establish the significance of this railroad in the history of transportation planning. It was not merely a railroad for accumulation of agricultural produce for a regional commercial center, or a railroad connecting a port with the interior, or a railroad connecting commercial towns; it formed the original north/south trunk through North Carolina that would endure, with some changes, into the 20th century. It was the product of state and private capital, and was the only railroad of the several recommended for state investment in the mid-1830s that would proceed. While there were abundant surveys for vast railroads such as the Charleston & Cincinnati Rail Road, and there were many companies chartered to build stupendous railroads, the building of this railroad had actually proceeded to completion. Hitherto, the early history of the Wilmington & Raleigh Rail Road, both from a technical and economic perspective, has gone unexamined. For the success of this route to be fully appreciated, it is necessary to assemble from primary sources the details of its planning, construction, and equipment.

Walter Gwynn was one of nine West Point graduates on the team of topographical assistants selected by the principal engineers to undertake the survey of the Baltimore & Ohio Rail Road in 1828. During this survey, the engineers marked a 66-foot wide path with stakes. Stations, or places where instrument reading were taken, were numbered in sequence. Benchmarks were marked in red, and places that needed to be cut or filled were marked. The engineers and assistants required a team of men to set up instruments, clear undergrowth, set stakes, prepare meals, and drive the wagon. The survey party usually included fifteen men (Dilts, 1993, 63-65). Gwynn would work on the survey for the Petersburg Rail Road, and later become the chief engineer for the Portsmouth & Roanoke Rail Road (*Raleigh Register*, 2 October 1833). The exact date he became associated with the Wilmington & Raleigh Rail Road is uncertain. However, he was surveying the route for it in 1836. By April 1836, he had found three sites for crossing the Northeast Cape Fear River on the outskirts of Wilmington, and the company expected the survey to be done in time to lay a cornerstone for the Fourth of July (*Wilmington Advertiser*, 22 April 1836, 27 May 1836). The issues of *The Wilmington Advertiser* between July 1836 and March 1837 are missing, but other North Carolina newspapers contain articles that fill the gap. It appears that the survey took longer than anticipated.

> *Wilmington and Raleigh Rail Road*. – We are gratified to learn, that the Engineers of this road, have completed a survey of one entire line, running between the N. E. River and Long Creek, through Waynesboro to Halifax; and a part of another line from Goshen down on the west side of Long Creek. They are now engaged on a line, on the east side of the N. E. river by Rockfort, on the Neuse, through Tarborough.
>
> – (*Raleigh Register*, 5 July 1836) –

Walter Gwynn's report on the survey for the Wilmington & Halifax Railway (an early unofficial name of the Wilmington & Raleigh) appears in the October issue of *Farmers' Register*, a monthly journal published by Edmund Ruffin.

Gwynn proposed an eastern and a western route that would begin in the town of Wilmington and junction with the Halifax and Weldon Rail Road. The western route commences in the southeast of Wilmington at a place known as "Dry Pond" on the southern boundary of Wilmington. The line crosses Market Street, continuing to the site of "Love Grove," once a plantation, and crossing Smith Creek (Appendix D). The railroad continues to the site of the old bridge over the Northeast Cape Fear River. The route crosses Rockfish Creek and Stewart Creek to Bear Swamp in a direct line of forty-five miles. The railroad turns toward Waynesborough at Goshen Swamp, crosses Brooks Branch and Yellow Marsh, and enters near the town near to the site of the bridge that carries the stage road between Halifax and Fayetteville over the Neuse River. The route continues on to Enfield and Halifax. With the exception of the location of the starting point in Wilmington, the Western Route appears to be the selected route. Walter Gwynn includes a variant to the Western Route beginning at the "timber pens" presumably that that existed at Point Peter opposite Wilmington on the Cape Fear River, and proceeds across the "dividing ground" (Eagle Island) at the confluence of the northeast and northwest tributaries of the Cape Fear. It continues between Long Creek and Moore's Creek, between Moore's Creek and Rockfish Creek, to the head of Bear Swamp. This route would follow the course of the old 1890s route of the Cape Fear & Yadkin Railroad from Wilmington that parallels present-day US 421 to Montague, then follows a direct course to Bowdens (Figure 19). The Eastern Route differs significantly in that it crosses the Neuse River at Rockford Bridge (N 35.23348; W 77.82112) east of Goldsboro, then crosses Contentnea Creek at Edwards Bridge (N 35.41320; W 77.49667) at present-day Schuffleton on the Green/Pitt county line. It would then continue to Tarboro, and then pass through the divide between Deep Creek and Conoconnara Creek, and turn west to enter Halifax below Quankey Creek. The section of the later Seaboard Coastline Railroad between Scotland Neck to Halifax follows the general path suggested by Gwynn for the northern end of his eastern route. An abandoned section of railroad leading from Scotland Neck to Tarboro via the town of Speed appears to be a favorable continuation of the route south. However, Gwynn's estimate of 162 miles and 1504 feet of rails does not fit into this model. Starting at "Dry Pond" in Wilmington and proceeding in a direct line to Rockford Bridge, then directly to Edwards Bridge, to Tarboro, to Halifax, and then to Weldon, the length would be over 162.5 miles (Figure 20).

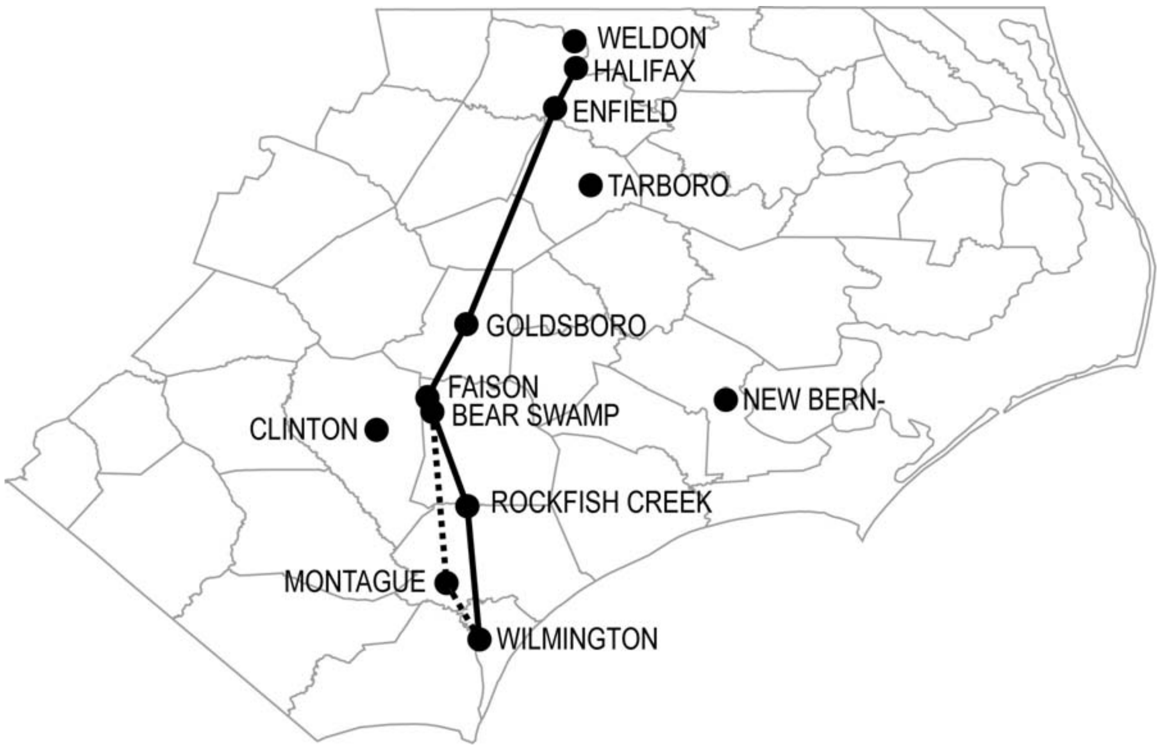

Figure 19. This map of modern eastern North Carolina illustrates Walter Gwynn's Western Route of the Wilmington & Raleigh Rail Road. The names of the places given are current and some are for reference purposes. The solid line represents the accepted variant of the Western Route. The distance is 161.5 miles. Walter Gwynn gives this distance in his survey. The railroad crosses Rockfish Creek and continues to Bear Swamp. The dotted line indicates the alternate route from Wilmington to Bear Swamp. The abandoned track of the 1890's Cape Fear & Yadkin Valley Railroad avoids the swamps of the Cape Fear Lowland by passing on the high ground between Moore's Creek and Long Creek as Gwynn described in his 1836 survey. The Cape Fear & Yadkin Valley Railroad turned northwest at Montague. This location is the first point offering the opportunity for a direct route to Bear Swamp over moderate ground.

Data Source: Ruffin, E. (1836). *The Farmers' Register*. 348-351.

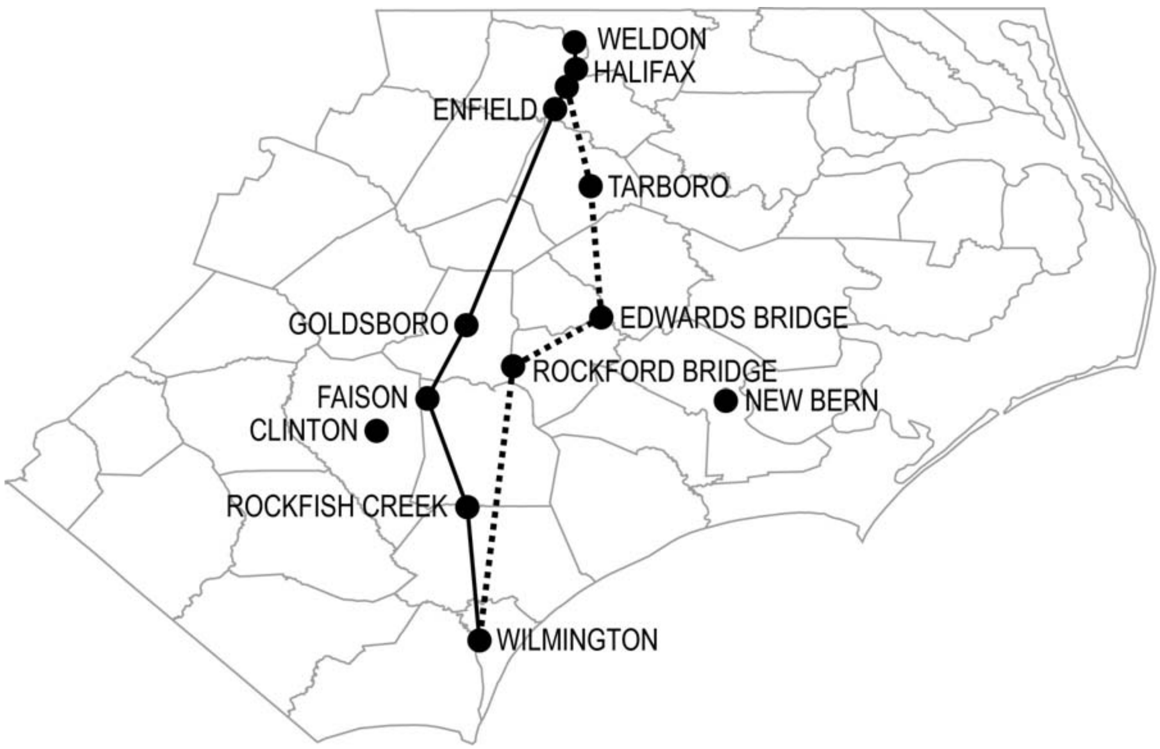

Figure 20. This map of modern eastern North Carolina illustrates Walter Gwynn's Eastern Route of the Wilmington & Raleigh Rail Road. The names of the places given are current and some are for reference purposes. The solid line illustrates the accepted route of the railroad. The broken line represents the Eastern Route. The total distance is 162.5 miles from Wilmington to Weldon. This distance matches Gwynn's calculations, and the map given here includes those places mentioned in the report.
Data Source: Ruffin, E. (1836). *The Farmers' Register*. 348-351.

The company selected the Western Route. It began on the north side of Wilmington at the river rather than at "Dry Pond," and it continued to Faison, where it arced towards Goldsboro (Waynesborough), and continued to Rocky Mount, Halifax, and Weldon. The total length of the route was 161.5 miles. The selection of this route is confirmed in the "Proceedings of the Second Annual Meeting of the Stockholders of the Wilmington & Raleigh Rail Road Company after construction was well underway."

> In laying before you an account of their transactions since the last annual meeting, the President and Directors have the satisfaction to state, that after the most thorough examination of this country through which the road is to pass, its location has been decided and fixed—passing ¾ of a mile east of Waynesborough, crossing the Tar River—through Enfield and Halifax to Weldon; making the total distance between Wilmington and Weldon 161 miles. Having carefully examined the several routes surveyed and reported to them, they concur entirely in the opinion, that the above is the most eligible; and their expectation of its speedy completion, at the original estimate, (as will appear by a communication from their Engineer) are now fully confirmed.
>
> – (*Wilmington Advertiser*, 18 May 1838) –

Governor Dudley commenced the work on the railroad by turning the first spade of earth on 25 October 1836 (Brown, 1928, 33). In November, the *Raleigh Register* carries an article concerning the stockholder meeting held November 7. Work was to begin at the Halifax division.

> From a Report made to the meeting, it appears that about 30 miles of the Road have been located, and 25 put under contract. The contracts, so far, have fallen within the estimates of the Engineer. Six hundred tons of Iron, spikes &c., two Locomotives, and Wheels and Axles for 50 Cars, have been ordered from England deliverable in March next.
>
> – (*Raleigh Register*, 29 November 1836) –

The plan involved eventually having two crews working at both ends of the road. The Wilmington crew would put down rail to Faison's Depot and turn north to join with the Halifax crew working toward Enfield. This was determined at the meeting of the stockholders on March 14 and 15 of that year. The first mention of the letting of contracts on the road appeared in the *Carolina Observer* (Fayetteville) in late January of 1837. At that time, the eighty-eight miles of the route from Wilmington to Waynesborough (Goldsboro) had been located, and the company had awarded contracts for fifty-two miles of grading. Contractors had cut a large portion of the timber for the superstructure. The officers of the company were happy to report to their stockholders by February that the stockholders of the Halifax & Weldon Rail Road Company agreed to merge their stock with Wilmington & Raleigh Rail Road Company. The contractor responsible for putting down rails began work in April (*Carolina Observer*, 26 January 1837, 9 March 1837; *Wilmington Advertiser*, 17 April 1837).

Contractors, with an average force of 900 laborers, were at work grading the road in early 1837. In addition to the extent of work reported in February, contractors were grading the twelve miles from Halifax to Enfield. The company issued contracts for rail and sills to landowners along 100 miles of the route. By November, fifty-tree miles of grading were completed, contractors were grading another forty-three miles, they had put down twenty-three and a half miles of rails, and thirty miles of rails were in progress. Two Stephenson locomotives had arrived and were being used to carry construction materials. Work on the bridge over the Northeast Cape Fear River, ten miles from Wilmington, was underway. The bridge was 360 feet long with three spans resting on two stone abutments and two stone piers. The water at this location was thirty-six feet deep. The shops and fixtures at Wilmington were under construction. The company's stagecoaches took two and half days to travel from Halifax to the company docks in Wilmington (*Wilmington Advertiser*, 5 May 1837, 10 November 1837; Appendix E).

In November of 1837, the train was in operation between Halifax and Weldon. This was the first regular train running over a significant distance in North Carolina. The locomotive and cars were in use every day except Sunday and Tuesday to convey passengers as far as the track was open in late December at Wilmington. Twenty miles of track were open on the southern division of the road as far as Armstrong's farm two months later. The daily schedule of departure from Wilmington was pushed back from 11 AM to 9:30 AM (*Raleigh Register*, 5 December 1837; Konkle, 1922, 182; *Wilmington Advertiser*, 12 January 1838, 2 March). In April, the *Wilmington Advertiser* reprinted an article from the *Raleigh Register* on the progress of the road:

> We learn that by the first of May, at farthest, this road will be completed in Teachy's, 3 miles above Rockfish, or 42 miles from Wilmington. One month thereafter, 7 miles more; on the first of July, 5 more; and by the middle of August, 5 more. This will make 59 miles, and reaches the cross roads from Duplin Old Courthouse, and thence to Limestone. It is expected that 20 miles, from Weldon to Enfield, will be opened by the first of June.
>
> – (*Raleigh Register*, 6 April 1838) –

The *Wilmington Advertiser* reported on 4 May 1838 "A most dreaded part of the road, the Burgaw Swamp, thirty miles from Wilmington is finished, and the cars will traverse it probably tomorrow." In the same article, it is stated, "A good deal of produce has already been brought to this market by way of the railroad, such as Turpentine, Tar, Bacon, Corn

&c." The schedule for departure from Wilmington Depot was pushed back another hour to 8:30 AM by mid-May. In October of 1838, the northern end of the line was in operation as far south as Enfield, and the southern end had extended service to Faison. The company's stagecoaches serviced the 90 miles between Faison Depot and Enfield. Twelve miles of track between Faison and Martin's farm (in the neighborhood of the present-day town of Dudley) was completed by mid-December, and the first train was sent over this stretch of track on 20 December 1838 (*Wilmington Advertiser*, 4 May 1838, 18 May 1838, 19 October 1838, 21 December 1838).

The remaining nine miles of track to Waynesborough lacked only the iron for completion. Shipped from New York and Philadelphia, it arrived in early 1839. On the occasion of Washington's Birthday in Waynesborough on 22 February 1839, the town was witness to the arrival of the first train as well as the first steamboat to navigate the Neuse River to that point. The vessel was the *E.D. McNair*. The union of river and rail transport at Waynesborough was significant in that the steamboat provided a connection to New Bern that served until a railroad was built between the towns. The train brought dignitaries from Wilmington, including the Wilmington Volunteers and their band (*Wilmington Advertiser*, 21 December 1838, 11 January 1839, 11 February 1839, 8 March 1839).

At the third annual meeting of the stockholders held at Waynesborough on the sixth and seventh of May that year, the company reported that 103 miles of the line were open. The company had ten locomotives in services, and four eight-wheeled passenger cars. Each had a capacity of fifty passengers each. Two sections of the line totaling about eighteen miles were expected to be open by July. This left fifty-eight miles of track to be completed. Iron for the railroad was being shipped to Wilmington and Portsmouth. By August, twenty-one miles in two sections was completed, thus reducing the distance between the two divisions to thirty-seven miles. The trains travelled ninety-three miles on the southern division, and thirty-one miles on the northern division. At this time, the stagecoaches ran forty-two miles, but this was reduced to thirty miles when twelve miles of track was opened in October (*Wilmington Advertiser*, 10 May 1839, 17 May 1839, 24 May 1839, 23 August 1839, 4 October 1839).

The opening of the line into the interior of the state improved commerce in both directions. By September, *The Wilmington Advertiser* quoted a report in *The Wilmington Chronicle* that twenty-three freight cars of "merchandise of various kind" had left the port for the rural markets along the line. Similarly, the opening of the last sections of the road brought the first load of bacon ever from Green County, a product previously shipped to New Bern. At this time, the stage route had been reduced to thirty miles.
On October 11, *The Wilmington Advertiser* announced that the ship *Oberlin* had arrived in New York with a shipment of 575 tons of iron from England for the railroad, and the same issue reported that a Norris locomotive had been purchased and was expected to be in place at the northern end of the road by early November (Appendix F). On 4 November 1839, the Wilmington & Raleigh Rail Road held its Fourth Annual Meeting (though the Third Annual Meeting had been held in May) in Wilmington. A total of 130 miles of the railroad was in use at that time (*Wilmington Advertiser*, 27 September 1839, 4 October 1839, 11 October 1839, 15 November 1839).

In early January of 1840, the *Wilmington Advertiser* published an article that provides details of the progress of the railroad up to that time. Trains ran daily over a 125½ miles of track from Wilmington to Tar River, and 29½ miles of track from Weldon to Battle's Depot – a total of 155 miles. This left only 6 miles to be completed. In addition to these facts, the *Wilmington Advertiser* includes detail on curves and grades:

> Only 21 1-2 miles 650 feet of this road are curved, leaving the unparalleled amount of 139 1-2 miles of straight road, in a total length of 161 miles. One of these straight lines is 47 miles long; others are 3 – 4 – 6 – 7 – 8 – and 15 miles in length. The shortest radius of curvature used is 5730 feet and most of the radii arc 12 – 20 and 30,000 feet, - the radius of one curve is 68,240 feet in length – which curve is considered equal to a straight line – The steepest grade on the road is 30 feet per mile – these occur only in approaching the few streams that cross the line – the grades generally are level or near approximations to level grades.
>
> – (*Wilmington Advertiser*, 3 January 1840) –

The remaining 30 miles would not be completed until March of 1840. Sprunt gives 7 March 1840 as the day on which the last spike was driven. Burton Alva Konkle states in his biography of John Motley Morehead that the exact time the last spike was driven that day was at 12 PM, and the first train from Wilmington arrived at Weldon at 9 PM. A celebration was held at Wilmington Depot on 15 April 1840. The Wilmington Volunteers provided music for the occasion, and food was provided for a crowd of 550. *The Wilmington Weekly Chronicle* gave a detailed account of the festivities (Sprunt, 1918, 150; Konkle, 1922, 200n; *Wilmington Chronicle*, 15 April 1840). The following map illustrates the timeline of construction (Figure 21)

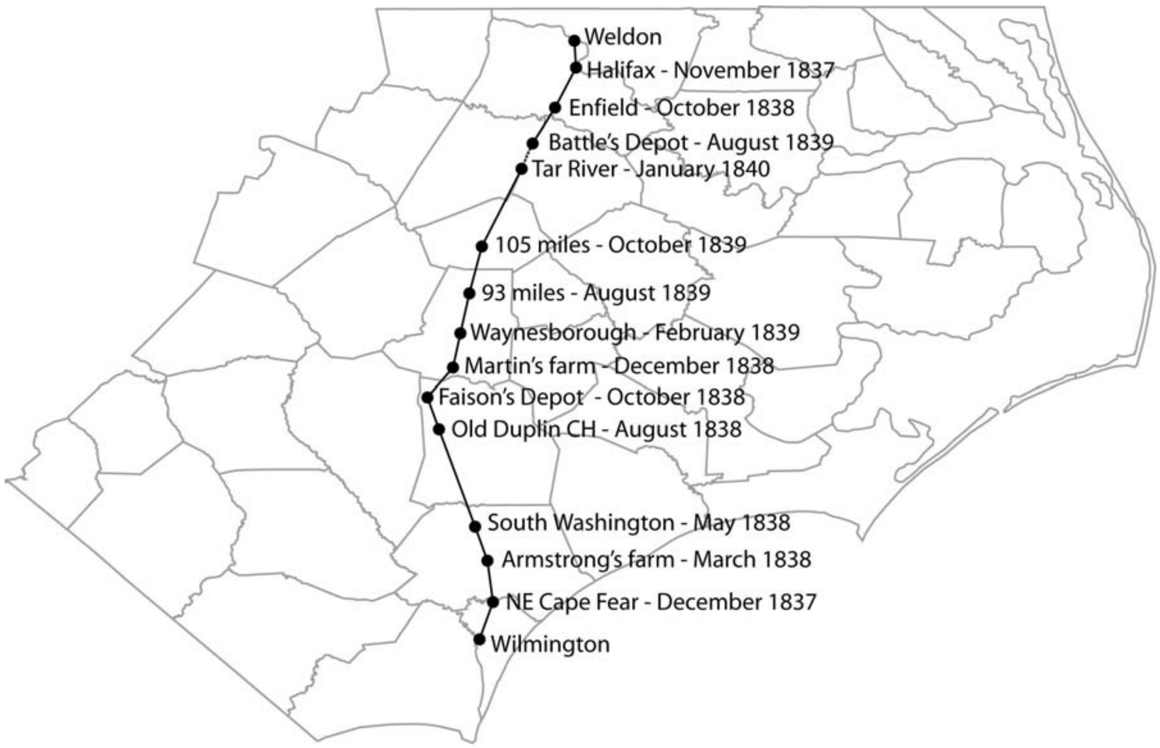

Figure 21. This map illustrates the timeline of construction for the Wilmington & Raleigh Rail Road. Each point represents a section of track that was opened for use based upon available documentation. Construction commenced at both the southern and northern divisions in 1837.
Data Sources: *Wilmington Advertiser*, 5 May 1837, 10 November 1837; *Raleigh Register*, 5 December 1837; *Wilmington Advertiser*, 12 January 1838, 2 March 1838, 6 April 1838, 4 May 1838, 18 May 1838, 19 October 1838, 21 December 1838, 11 January 1839, 11 February 1839, 8 March 1839, 17 May 1839, 24 May 1839, 23 August 1839, 4 October 1839, 11 October 1839, 15 November 1839, 3 January 1840

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The following statement of expenses was prepared by James S. Green, treasurer of the Wilmington & Raleigh Rail Road for their annual report to the Board of Internal Improvement in 1840. The figures , current to 1 May 1840, included:

> Survey and location of road, $18,879.27, Land damages, $16,262.60, Excavation and Embankment, $346,330.83, Rails, Sills and Knees,$244,330.83, Bridges and Truss work, $166,961.16, Iron, Spikes & Splicing plates, $257,145.38, Superstructure, $127,712.92, Depots, Turn Outs & Water, Stations on the Line, $22,166.17, Machine Shop & Ware Houses and Wharf at Wilmington$56,691.51, Shop, &c. at Weldon, $2,911.06, Engines, coaches and cars, $170,815.21, Mathematical instruments, $794.61, Engineering expenses, $58,867.25, Printing, and Advertising for Instalments on Stock &c., $1,198.50, Office Expenses, (Rent, Fuel, Stationary &c.) $1,584.16, Salaries to Officers and Clerks, $18,795.84, Interest on Loans &c., $27,191.01, Discount on English loan, $36,912.91, Contingent Expenses, (Postages, Commissions, Agents, &c.) $8,930.63, Halifax & Weldon Rail Road, $54,622.14."

The cost of the railroad had been $1,638,812.57 and the cost of the four steamboats and their fixtures had been $270,942.97; thus, the total cost amounted to $1,909,755.54 (North Carolina, 1840, Schedule A).

CHAPTER XII

THE STEAMBOAT LINE

The Wilmington & Raleigh Rail Road operated its steamship line between Wilmington and Charleston from 1837 until rendered unnecessary by the completion of the Wilmington & Manchester Rail Road in 1854. The company owned six ships during this period: the *Boston*, *North Carolina*, *Governor Dudley*, *C. Vanderbilt*, *Wilmington*, and *Gladiator,* all of which were side-paddle passenger vessels. The steamboat line was, in essence, an extension of the railroad into South Carolina that exploited a pre-established water route, and the railroad was able to provide this service almost immediately. While the steamboat line never carried the volume of the freight of railroad, it did provide passengers with the most convenient access to the south.

At the 1 May 1837 meeting of the stockholders, President James Owen reported that a steamboat had been purchased since their last meeting in February of that year, and it had arrived in advanced of the company's stagecoaches.

> Contracts have been entered into for another steamboat, under the supervision of one of the most skilful and scientific builders of our country, and she will be ready in the month of October, at which time we anticipate that 50 miles of the Rail Road will be completed, and furnished with coaches and cars for the transportation of passengers and produce.
>
> – (*Wilmington Advertiser*, 5 May 1837) –

The first steamship between Wilmington and Charleston in May was the 248-ton *Boston*. It was constructed in the shipyards of New York, New York in 1836, and its first homeport had been in Albany, New York (Vinson et al., 2006). References to this vessel appear in Annual Report submitted by president pro tem Alexander Anderson to the Board of Internal Improvement in 1838, along with the financial report prepared by company treasurer James S. Green. The company had paid $58,233.70 for the *Boston*, which was traded to the shipbuilding firm of Watchman & Bratt in partial payment for the new steamship *Wilmington* (North Carolina, 1838a; *Wilmington Advertiser* 14 June 1839; 23 August 1839; 27 September 1839).

During December of 1837, the 370-ton *North Carolina*, also built in the New York shipyards, was the second steamship to be put into service (Vinson et al, 2006). This ship had a brief and troublesome beginning with a return to New York for maintenance in 1838 (*Wilmington Advertiser*, 19 October 1838). In May of 1839, she collided with company steamship *C. Vanderbilt* off the South Carolina coast near Georgetown, and both ships were force to return to Charleston. An account of the collision appeared in the *Wilmington Advertiser*.

> The non-arrival of the Steamer Vanderbilt up to yesterday morning from Charleston, (due on Sunday morning) and the North Carolina being also due yesterday morning, without making their appearance caused an intense anxiety in our community. At about 10 o'clock A.M. yesterday, the Steamer Southerner, Capt Chase, arrived from Charleston bringing the unpleasant intelligence that the Vanderbilt and North Carolina came in contact with each other on Saturday night about 11 o'clock, off Georgetown light—the former on her way to this port, the latter hence to Charleston. The Vanderbilt struck the North Carolina, on her starboard beam, near the forward gangway, cutting her down to the copper line, and otherwise damaging her to a considerable extent. The injury received by the Vanderbilt was slight, and will be repaired in a few days. Both boats made

> directly for Charleston, where they arrived at 6 o'clock on Sunday morning. We have heard various accounts of this unfortunate occurrence, and of causes which led to it, but forbear at present any notice of them, as we are assured that the most prompt measures are now taken by the Company's Directors, to investigate the affair thoroughly, and that such action will be had, as will strongly guard against any thing of the kind in the future.
>
> – (*Wilmington Advertiser*, 10 May 1839) –

The captains of both ships were suspended pending an investigation by the company (ibid). As a result, Captain Davis of the *North Carolina* was relieved of his command. The *North Carolina* was expended to be ready for serve again by the first of June (ibid, 17 May 1839). A year later, on 25 July 1840, the company steamship *Governor Dudley* collided with the *North Carolina* as the two ships were passing. This time, the *North Carolina* was lost. The *Governor Dudley* was the third steamship of the company to be put into service. Frances Anne Kemble included details in her *Journal* of a voyage from Wilmington to Charleston on the *Governor Dudley*. Mrs. Kemble and her family set out to the railroad company's docks to board the ship in the afternoon of 24 December 1838. They had only arrived in Wilmington at five o'clock in the morning that same day. Mrs. Kemble, a perennial critic by nature with an almost pathological obsession with neatness, had been subjected to a two-day ordeal on the yet to be completed Wilmington & Raleigh Rail Road. She had been deprived of rest, jostled about on the stagecoach, exposed to the cold wind, and been offered strange, interrupted meals in dirty environments – all in the company of equally miserable strangers. Her experience on the *Governor Dudley* appears to be a relatively pleasant change, though she cannot repress the desire to criticize something.

> The afternoon was beautiful, golden, mild, and bright – the boat we were in extremely comfortable and clean, and the captain especially courteous. The whole furniture of the vessel was remarkably tasteful, as well as convenient – not forgetting the fawn-colored and blue curtains to the berths. But what a deplorable mistake it is – be-draperying up these narrow nests, so as to impede the meager mouthfuls of air which their dimensions alone necessarily limit one to. These crimson and yellow, or even fawn-colored and blue silk suffocators, are a poor compensation for free ventilation; and I always look at these elaborate adornments of sea beds as ingenious and elegant incentives to seasickness … The captain's wife and ourselves were the only passengers; and, after a most delightful walk on deck in the afternoon, and comfortable tea, we retired for the night, and did not wake till we bumped on the Charleston bar on the morning of Christmas Day [Tuesday, December 25, 1838].
>
> – (Kemble, 1863 [1984], 35-36) –

A more jovial writer T.A.R. composed a story for the March/April 1843 issue of *Orion, a Monthly Magazine of Literature and Art* entitled "Locomotion: Or, Lights and Shades of Travel" that describes his travel in the company of a friend on the Wilmington & Raleigh Rail Road trains, stagecoaches, and steamboats during 1838. The writer notes that "yellow Jack," meaning Yellow Fever, in the South had caused a "derangement and uncertainty in public conveyances to those latitudes." His observations on the coach ride and the eating arrangement along the route confirm Mrs. Kemble's experiences (Appendix E). T.A.R. notes that it was five in the morning when his company arrived in Wilmington. The steamboat Governor Dudley was scheduled to dock at eight, but T.A.R. reported that the steamship had been late for the last three of its tri-weekly trips. After waiting, the writer and his company chartered another steamboat, *Cotton Plant*, to take them as far as Smithville (now Southport), there to meet the *Governor Dudley* with instructions from the "Wilmington agency" to exchange passengers – the *Cotton Pant* returning to Wilmington and the *Governor Dudley* returning to Charleston. The *Cotton Plant* was prepared at one in the afternoon, and was ready to cast off at two. There were at least thirty-four passengers, seven of whom had been waiting for the boat to Charleston for more than a week. The passengers were required to pay for the trip to Smithville, but were reimbursed by the captain of the *Governor Dudley* (T.A.R., 1843, 342-352).

The *C. Vanderbilt* began her service on the railroad's Wilmington to Charleston Packet in December of 1838. Built new in 1837 for Daniel Drew and owned by Cornelius Vanderbilt, it weighed 346 tons and its first homeport had been New York, New York (Vinson et al, 2006). Upon adding the *C. Vanderbilt* to their fleet and a contract from the Post Office Department, the company began daily trips to Charleston. Outside the collision with the *North Carolina*, the ship appears to have required only a new boiler. The new boiler was constructed for the ship in the company shops at Wilmington (*Wilmington Advertise*, 4 January 1839; *Wilmington Chronicle*, 23 November 1842).

The editor of the *New Orleans Commercial Bulletin* expressed his satisfaction with the *Vanderbilt* when he opted, in 1849, to proceed north via the steamship line and railroads from Charleston rather than a steamer bound for New York.

> I wrote you a hasty letter from Charleston, yesterday, and immediately after closing it, made up my mind to come by the mail route instead of by the New York steamer, for as the weather continued blustering and threatening, I preferred the risk of twelve hours sea sickness to a delay of three days, and accordingly I was soon on board the Wilmington mail boat, the Vanderbilt, Capt. Marshall.—It has been very much the custom to decry this line of boats as inferior and unsafe, but I think without sufficient cause. We have recently been accustomed to the splendid modern Ocean steamers of 1,000, 1,500 and 2000 tons, fitted up with great style and luxury, that we look with contempt upon the small, snug and comfortable boats of a few years back, when they were considered all that was necessary or desirable; and I must confess, when I drove down, and saw only the

> wheelhouses and the chimneys of the Vanderbilt visible above the wharf, I felt a little disappointed, and cast another look upwards towards the unquite sky and lowering clouds, but when I got on board, found every thing so snug and comfortable, even though rather on the small scale, comparatively, that I felt no regret in having selected that route. The night proved very rough, with considerable sea, but the wind was favorable, and the boat made such rapid progress, that we had to go under very low steam, so as not to reach the bar before daylight, when the buoys could be distinguished. Notwithstanding all the complaints of the boats of this line, there has been none in the United States which have run with more success; for they seldom lose a mail, and only in weather when almost any boat would do so, as they are allowed but very little margin to schedule time, and I have no recollection of any serious accident having happened to any of them in many years. The accommodations on board, are very good, as is also the fare. They have an upper saloon or cabin on deck, where the meals are given, with windows all round as in a railroad car, which makes it both light and airy. These boats are owned by the Wilmington and Weldon Railroad Company, and they are a constant drain upon them, as the expense of keeping them up is far from being covered by their earnings; on the contrary, they draw heavily on the profits of the road. This of itself is a fair reason why largest and more expensive ones are not put on the line, besides as regards size, the water on the bar of the river to Wilmington, would not admit boats of heavy draft.

– (*Wilmington Journal*, 31 August 1849) –

The *Wilmington* was built in 1839 in Baltimore and put into service in September of the same year. The builder was Langley B. Cully, and its captain was Charles Ivey. It was one hundred seventy-two feet long by twenty-four feet wide, with a cargo hold ten feet deep, and was equipped with a 135-horsepower Watchman & Bratt engine. It had a dining hall forty feet long by twelve feet wide with eleven windows on each side, and was decorated with faux porcelain pilasters between the windows, cornice work, and gilding. The saloon woodwork was of crotch mahogany and curly maple (Vinson et al, 2006). The woodwork was executed by T. Morris & Son, and was perceived to be an example of fine craftsmanship, "We understand that $10,000 or $15,000 more have been expended upon the Baltimore boat than the builders are to receive by the contract"

(*Wilmington Advertiser*, 14 June 1839). A more detailed account of the vessel's specifications appears in the *Wilmington Advertiser* in late September. The editor derived some of his material from *Lyford's Price Current*, a weekly commercial published in Baltimore.

> Upon the delivery of the Wilmington by Watchman & Bratt, the building contractors, to the agents of the Wilmington & Raleigh Rail Road Company; it was ascertained before leaving the Chesapeake, that she was too slow for the purpose of carrying the Great Southern mail, for which she was designed. She was consequently returned to these contractors for the purpose of making the necessary alterations. Watchman & Bratt having satisfactorily ascertained that she could not generate steam as fast as she could consume it, the furnace draught was increased by adding 12 feet to the length of her smoke stack, which partially remedied the defect. She then left Baltimore for Wilmington, and arrived here on the 20th. On the 21st she made her first to Charleston and on the 24th her second. The return passage of the latter, was performed in 16 hours—and the distance from Smithville to Wilmington—28 miles—in two hours by our editorial chronometer--___ favourable … The Wilmington is a new boat, just finished, and left our waters for the first time on Thursday last for Wilmington, N.C. in charge of Capt. Ivey. She is owned by the Wilmington and Raleigh Rail Road Company, for whom she was built by contract with, and under the supervision of Messrs. Watchman & Bratt, distinguished Machinists and Engine Builders of Baltimore. Mr. Langley B. Cully was the Shipwright; and 'competent judges who have examined, have pronounced the workmanship faithfully executed; the materials not to be surpassed in quality; and her model is certainly beautiful.—Her length is 172 feet, breath of beam 24 feet, and depth of hold 30 feet, and her admeasurements about four hundred tons. Her bucket wheels are of iron, which is a new feature in building in this country; her Engine , one of Watchman & Bratt's best, 135 horses power, and she has one of Raub's patent double self-acting safety valves, the first which has ever been introduced to operate successfully, on board of any boats on our waters.—The accommodations are ample for 100 passengers, having that number of berths by each of which depends a life preserver.

– (*Wilmington Advertiser*, 27 September 1839) –

The article includes comments from the captain, Charles Ivey. He stated that the ships guards are eighteen inches higher above the waterline than other boats. In addition, the wheel buckets are made of iron, and the boiler burnt one cord of wood per hour (*Wilmington Advertiser*, 27 September 1839).

The *Gladiator* was the last vessel added to the railroad's steamship line. Built in New York in 1841, it became operational on the Wilmington to Charleston Packet in the same year. Its gross tonnage was 379 tons (Vinson et al, 2006). The sparse record that has survived appears to indicate that the *Gladiator* performed admirably. In 1849, the United States Government chartered the steamship to transport troops from Smithville to Palatka, Florida. The officers of the company, under the command of Captain A. Elzey, prepared a card that expressed their gratitutde to the captain and crew of the ship.

> The undersigned, passengers on the steamer Gladiator, one of the Wilmington and Charleston Line of Steamboats, recently chartered to transport Company E, 2nd Regiment of Artillery, fro, Fort Johnson, N. C., to Pilatka, Florida, take pleasure in testifying to her merits as a fine sea boat, where no effort is spared to contribute to the comfort of the passengers. We also avail ourselves of this opportunity to tender our grateful acknowledgements to her gentlemanly commander, Capt. Isaac B. Smith, and to the officers and crew generally, for the highly creditable manner in which the trip was performed, and the uniform kindness and attention shown us during the passage.

– (*Wilmington Journal*, 5 October 1849) –

The steamboats were scheduled to arrive in Charleston at ten o'clock in the morning. It appears from the 1849 annual report that with four vessels operating up to the termination of the packet in February of 1854, the company employed crews for three – three captains, three first mates, three second mates, four first engineers, four second engineers, eight firemen, six wheelmen, nine deckhands, three stewards, three stewardesses, six waiters, three cooks, six knife boys and scullions, and an additional three deckhands that were slaves. The report of James T. Miller, the agent for the company's steamboat line, included in the 1850 annual report of the company a listing of three captains: Smith commands the *Gladiator*, Bates the *Governor Dudley*, and Sterrett the *Wilmington*. The *Governor Dudley*, from the description provided in the report, appears to have encountered hurricane conditions in August of that year, but still performed well. The *C. Vanderbilt* was out of order awaiting the delivery of a new boiler. The following year, at the next annual meeting, the company reported that the *Vanderbilt* has been completely "rebuilt from her keel up," including machinery, to the point being "a new boat in all but her name." An examination of the earlier 1847 annual report indicates that the Gladiator had undergone repairs during the year and was in need of having the copper lining of the hull replaced. The other three ships had been modified to remove a design flaw; the guards were removed to make them more navigable in bad weather (*Wilmington Journal*, 19 November 1847, 9 November 1849, 19 November 1849; Wilmington & Raleigh Rail Road Company, 1850, 7; *Wilmington Herald*, 5 November 1851; Wilmington & Weldon Rail Road Company, 1855, 15-16).

The end of the Wilmington to Charleston packet came with the competition of the Wilmington & Manchester Rail Road in 1854. The line had created a prolonged regular commercial intercourse between the ports. It was a *de facto* extension of the Wilmington & Raleigh Rail Road, but it also a temporary device whose demise was the intended outcome of a planned advancement of rails southward.

> This morning, for, we suppose, nearly about the last time, we heard the ringing of the steamboat bell on her arrival here from Charleston, and saw her sweep along the river front of town. Hereafter, we presume, all intercourse between this place

> and the Queen City must be carried on by way of the Wilmington and Manchester, and the South Carolina Rail Roads. A piece of open sea navigation like that between this place and Charleston, must always occasion a break and comparative uncertainty in the operation of lines composed of Rail Road travel, so that we must have looked for grumbling so long as it existed, --no matter how prompt and faithful the service performed by the boats; and no boats have done better service, or with less loss of life or property than those belonging to the Wilmington and Raleigh Rail Road Company. Still with all the grumbling we had come to regard them as old friends. Their commanders, too we have always found exceedingly clever gentlemen, and if one *did* puke a little in rough weather, it was all for the good of his or her wholesome.
>
> – (*Wilmington Journal*, 3 February 1854) –

During the following year, S.L. Fremont, engineer and superintendent of the company, reported at the 1855 annual meeting that "way travel," that is, from one place on the line to another place rather than "through travel," had increased since that steam packet had been discontinued (Wilmington & Weldon Rail Road, 1855, 15). This is in part due to the reduction of the Wilmington to Weldon ticket from "through" to "way" fare (Wilmington & Weldon Rail Road Company, 1855, 7).

The opening of the southeastern North Carolina and northeastern Southern Carolina by the Wilmington & Manchester Rail Road, and the connection between the North Carolina Rail Road and the Wilmington & Weldon Rail Road at Goldsboro, established a network with a multitude of passenger and freight destinations on the existing line. For example, the long anticipated rail connection between Raleigh and Wilmington was available, and counties of Brunswick and Columbus to the south of Wilmington acquired access to and from the port by rail. The steamboat packet could fulfill only so much within the limits of time and its connections. The accommodations the steamboats offered through passengers stand in stark contrast with the aggravations associated with stagecoach and railroad travel. The intent of the Wilmington to Charleston packet was not recreational. It was a necessary extension of the Wilmington & Raleigh Rail Road to the intended length. When the rails were down, the railroad could unburden itself of its steamboats and its obsolete corporate name. In the delivery of the Great Mail, the steamboat connection from Wilmington to Charleston was problematic. It accounted for a significant number of incidents of failure of the mails on the New York to New Orleans Great Mail route, and by 1845 the Wilmington to Charleston steamboat connection was the section of the route responsible for many failures and irregularities of the mails. The major cause of these delays was the weather. The Mobile to New Orleans steamboat connection also experienced similar difficulties (United States, 1839a, 2-4; 1840, 2, 6; 1845a, 2, 9-15). In the late 1840s, the Wilmington & Raleigh Rail Road anticipated a rail connection to South Carolina.

> We now confidently look forward to the time, when the Steam Boat line can be dispensed with, as there is every probability that the Wilmington and Manchester Road will be constructed. The completion of this Road would doubtless be of incalculable benefit to our Road, and every Stockholder is therefore deeply interested, in contributing to so desirable a result. The completion of the Wilmington and Manchester Rail Road, coupled with the renewal of our Road with heavy Iron, (while there would be a large diminution of expenses on our line) would secure an increase in speed of 24 hours, between the North and South, a large increase of our business, and safety and certainty, in the transmission of passengers, mail and freight.
>
> – (North Carolina, 1848, 7(C): 30) –

The docks of the steamboat packet of the Wilmington & Raleigh Rail Road in Charleston were located at the foot of Laurens Street south of the shipyards (Bridgens and Allen, 1852; Colton, 1855).

CHAPTER XIII

THE TRADE WAR

The trade war between Petersburg and Norfolk was the offshoot of several internal improvement projects. Peter C. Stewart traces the origins of the economic competition to the opening of the Dismal Swamp Canal in his article *Railroads and Urban Rivalries in Antebellum Eastern Virginia*. The climax of the struggle came when Petersburg gained control over a portion of the Portsmouth & Roanoke Rail Road's track in North Carolina, and shut the railroad down.

> Towards the end of the War of 1812 Norfolk merchants and North Carolina farmers happily witnessed the completion of the Dismal Swamp Canal, which permitted lighters and other small craft to bring the Old North State's lumber and agricultural products to the Elizabeth River. Narrow and shallow, the canal posed no threat to Petersburg, recently rebuilt after a disastrous fire and entering an era of significant growth as a textile and tobacco-processing center. Unfortunately for the relations between the two towns, the businessmen of Norfolk, noting that they controlled only a small fraction of the total commerce of their own state, tried to secure the tobacco and grain produced in considerable volume in the Roanoke Valley.
>
> – (Stewart, 1973, 4) –

Norfolk was able to exercise its early ambitions through investment in the Roanoke Navigation Company and continued support for increasing the depth and width of the Dismal Swamp Canal. The Roanoke Navigation Company, chartered in 1807 for keeping the Roanoke River clear of obstructions, did not commence a comprehensive program of improvements until North Carolina and Virginia re-organized the company under the aegis of both states in 1815. The Dismal Swamp Canal Company, incorporated in both North Carolina and Virginia in 1790, began work on the canal in 1793 and completed it in 1814. The canal improvements were completed in 1828. During the years 1828-29, the improvements to the Dismal Swamp Canal, coupled with the completion of the locks of the Roanoke Canal, allowed produce from the upper Roanoke Valley to bypass the Great Falls and continue to the Dismal Swamp Canal by way of Albemarle Sound. Prior to these improvements, boats would unload produce at the Great Falls, where it would be transported to Petersburg by wagon. Petersburg responded to the redirection of its share of incoming produce to the Norfolk markets by incorporating the Petersburg Rail Road in 1830. The purpose of this railroad was to intercept the produce passing through the Roanoke Canal near its outlet at Blakeley, North Carolina. Since the railroad was partly built in North Carolina, the company had to be incorporated in both states (Henderson, 1941, 107). Its railroad was completed in 1833.

Stewart's article provides an account of the Portsmouth & Roanoke Rail Road's control over the bridge spanning the Roanoke River, the attempt by the Petersburg Rail Road to drive the Portsmouth & Roanoke Rail Road Company out of business with reduced fares. Also, the advantages of the through ticket from Baltimore via the Baltimore and Norfolk Steam Packet Company and the clandestine acquisition of the debt of the North Carolina section of the Portsmouth & Roanoke Rail Road's track by a Petersburg politician named Francis Rives in 1843. Rives attempted to take up the track, but was thwarted by Walter Gwynn and the Sheriff of Northampton County. Rives was brought to trial in North Carolina, but could not be convicted. The Supreme Court of North Carolina determined that Rives had the right to control the section of track he had acquired. Rives shut down the track (the Petersburg Rail Road was paying him $2,500 quarterly to keep the line closed), and caused the railroad to fail. However, North Carolina would not grant Rives a charter to the track he controlled. Eventually, a new company was formed in Norfolk called the Seaboard & Roanoke Rail Road. The railroad was rebuilt, and service to the Roanoke resumed (Stewart, 1973, 9-14).There are several important aspects of the narrative that are missing in Stewart's article. For instance, the closing of Roanoke Inlet in the late 1700s left the Albemarle region of North Carolina without an outlet to the ocean, thus enhancing the success of the Dismal Swamp Canal. Also, the efforts of Petersburg and Norfolk to extend their railroads south of the Roanoke excited sectional rivalries in North Carolina, and upset the state's plans for an east to west railroad; and the State of North Carolina enacted legislation to counter the aggressiveness of the Petersburg interests, and assisted in the restoration of the Norfolk connection.

The maritime commerce of the Albemarle Sound region of North Carolina expanded during the closing decades of the Colonial Era as more land in the vast Roanoke River Basin was put under cultivation. The closing of Roanoke Inlet in the late 1790s curtailed the development of a major port in the state's northeast. Beaufort Harbor and the port of Wilmington were located too far to the south to be beneficial. The Dismal Swamp Canal, completed in 1805 (improved during the 1810s), attracted the produce entering Albemarle to the Norfolk market. As mentioned earlier, the State of North

Carolina commissioned plans for reopening Roanoke Inlet, but did not have the resources to undertake such an ambitious project (Appendix A).

The influence of the Petersburg and Norfolk interests on the development of the Raleigh to Gaston route and the Wilmington to Halifax route is apparent in the material already presented; but the details of the outcome of the conflict, with its disruptive effects, require closer examination. By the late 1830s, the Weldon Toll Bridge, with its railroad track, became the focus of the hostilities between the Virginia railroads (Figure 22, Figure 23). This bridge was the only means by which the Virginia railroads could access the Wilmington & Raleigh. The Petersburg Rail Road, upon reaching the Roanoke River at Blakely, had hoped to build a bridge there and continue their railroad south. The supporters of the Weldon Toll Bridge Company exercised their influence to prevent the North Carolina Legislature from granting the Petersburg company permission to build their own bridge. The Portsmouth & Roanoke Rail Road purchased the bridge in June of 1838 (*Wilmington Chronicle*, 28 October 1840, 11 November 1840). After acquiring the bridge, the company attempted to establish a joint arrangement for its ownership with the Petersburg Rail Road and the Wilmington & Raleigh Rail Road.

> Through the mediation of a committee from the Board, the Portsmouth Rail Road Company, who had recently become proprietors of the Weldon Toll Bridge, have sold one half of the bridge and rail road from Weldon to Gary's—4/10 to be paid for by the Petersburg Company, and 1/10 by this company; for which the company's bond is to be given for $10,000, payable three years after the execution of the title deed. A free connection is thereby secured with both the Petersburg and Portsmouth Rail Roads; and the vexatious delays and interruption to which our planters and merchants as well as travelers have been subjected, at the Roanoke will occur no more.
>
> – (North Carolina, 1840b, 10-11) –

Figure 22. The abandoned Seaboard Coastline Bridge over the Roanoke River at Weldon is located at the site of the Weldon Toll Bridge. Photograph by Cynthia Johnson in November 2000. Copyright owned by James C. Burke.

Figure 23. The Roanoke River at this location is broken by islands. The length of the bridge is greater than it appears in this photograph. Photograph by Cynthia Johnson in November 2000. Copyright owned by James C. Burke.

The Petersburg Rail Road backed out of the deal during the ensuing year; and the Wilmington & Raleigh Rail Road Company, disappointed by the prospects of a continuation of the delay in service, contemplated the need for a second bridge near Weldon. The Petersburg Rail Road Company obtained permission to build their bridge, and its construction was underway at the same time the company began the replacement of their rails (*Wilmington Chronicle*, 1 December 1841, 24 May 1843).

Stewart's article describes how Petersburg politician Francis Rives acquired the debt of the Portsmouth Company on the North Carolina portion of the railroad and then shut it down. The State of North Carolina stopped Rives from destroying the rails, and tried to prevent the loss of an important trade connection. An article in *American Law Magazine*, "Opinion of the Supreme Court of North Carolina in the Case of the State of North Carolina v. Francis E. Rives – December Term, 1844," (July 1845) provides a contemporary view of the controversial legal decisions, and explains the events surrounding the Francis Rives case in more depth than Stewart.

> At the fall term of 1842, of the superior court of Halifax county in North Carolina, Rochelle and Smith recovered a judgment against the Portsmouth and Roanoke Rail Road company a large debt, to wit: $16,846.80, besides interest and cost. Upon this judgment a writ of *fieri facias* was issued, directing the sheriff of the county of Northampton in that state, against the goods and chattels, lands and tenements of the company. Under this *fi. fa.* The sheriff went upon the road at Garysburg in Northampton and declared his levy, as follows: "Levied upon the Portsmouth and Roanoke Rail-road, from Roanoke to the depot at Margaretsville and the warehouses at Concord and Margaretsville depots, together with the land on which they are placed." What was so levied on was sold by the sheriff at the road near Garysburg, and Rochelle became the purchaser. When the sale was concluded, the sheriff said to Rochelle the property was his.
>
> – (American Law Magazine, 1845) –

Rochelle sold the property to Francis E. Rives, who obtained a deed from the sheriff on 1 December 1843. According to the article, Rives attempted to negotiate a deal with the railroad, but the company and their lawyers did not believe that the sheriff's sale was legitimate. On 6 January 1844, Rives began to dismantle the section of track that he had acquired. In the spring of that year, he was indicted on charges in superior court of Northampton County. The court decision was against Rives based on provisions within the charter of this railroad (and included in the charters of other railroads incorporated in North Carolina) that there was a penalty for injuring the road and the railroad. The privileges granted in the railroad's charter to condemn land and to enter upon adjacent lands for building material implied that the railroad was authorized to act in the public good. The state could not authorize a company to take from private property owners what was rightfully theirs unless it was for the public good. This had been tested in a previous case, Raleigh & Gaston Rail Road Company vs. Davis, where the railroad was considered on par with a public road; thus, injuring or obstructing the railroad was akin to doing so to a public road. The court also determined that the company's right to sell the iron and wood of the track ended when it was put down for use, then it became part of the public way and the company would violate its charter if they removed the track for reasons other than its repair or improvement. The court determined that Rives did not have a right to a title, and fined him twenty-five dollars. The court was lenient because Rives acted after consulting a lawyer (ibid). In "Opinion of the Supreme Court of North Carolina in the Case of the State of North Carolina v. Francis E. Rives – December Term, 1844," the writer discusses the decision of the Supreme Court of North Carolina that overturned the conviction of the lower court. The higher court determined that Rives had purchased the section of railroad legitimately, and was the rightful owner (American Law Magazine, 1845).

The North Carolina General Assembly of 1844-45 passed “An Act to provide for the reorganization of the Portsmouth and Roanoke Rail Road Company.”

> Whereas the Portsmouth and Roanoke Rail Road Company is laboring under the pressure of heavy embarrassment which greatly injure and impair its public utility, and from which it is represented, that it may be relieved by a new organization, whereby the public interests of the late may be protected and continued, and without injustice to its creditors ...
>
> – (North Carolina, 1845, Laws, 107) –

This act allowed the governor of North Carolina – in conjunction with the Governor of Virginia – to appoint commissioners to oversee the sale of the railroad, but preserved the rights of those “claiming by purchase any part of the said Rail Road” and the charter of the original corporation and its provisions. The engines and cars had to be sold separately from the road. The purchaser of the bridge and track in North Carolina had to execute a bond with the Literary Fund of North Carolina. The Petersburg Rail Road would have use of the disputed bridge and track to Garysburg on terms set by the governors of Virginia and North Carolina and the commissioners. A majority of the stockholders of the company had to agree to the sale, and the railroad bridge was to be included in the sale to the new company. Further, the act clarified and reinforced penalties for injuring the railroad that were part of the original charter and added “all such acts as are now offences against the State.” Another act passed during the 1844-45 session of the North Carolina

General Assembly allows the Portsmouth and Roanoke Rail Road to turn the railroad bridge into a toll bridge for horse drawn vehicles and pedestrians (North Carolina, 1845, 108-111, 119).

In 1850, the State of North Carolina authorized the Seaboard and Roanoke Railroad Company, the antecessor of the failed Portsmouth & Roanoke Rail Road, to issue bonds, and mortgage the company to John J. Palmer of New York. The mortgage held by the State on the Weldon Toll Bridge would be transferred to the Seaboard & Roanoke Railroad in exchange for bonds on the mortgage. By *An Act concerning the Seaboard and Roanoke Rail Road* (ratified on 28 January 1851), the Seaboard & Roanoke Railroad was allowed to change or alter its route from or near Margarettsville in Northampton County, near the Virginia line, to cross the Roanoke anywhere between Halifax and Weldon. There it would make a connection to the Wilmington & Raleigh Rail Road (the route was not changed), and form a through ticket with other companies. The Seaboard & Roanoke Railroad and Roanoke Railroad (a North Carolina company) was granted the privilege to effect a junction with the Raleigh & Gaston Rail Road. An *Act to incorporate the Roanoke Valley Railroad Company* is the realization of the proposal contemplated by the citizens of Warren County in April of 1833 – a connection to Weldon. Sections 29 and 30 of this act add a provision for transporting troops in the employment of the State and exempting railroad employees from militia duty (North Carolina Laws, 1851, 282, 284-302). Eventually, all the railroads connected at Weldon (Figure 24).

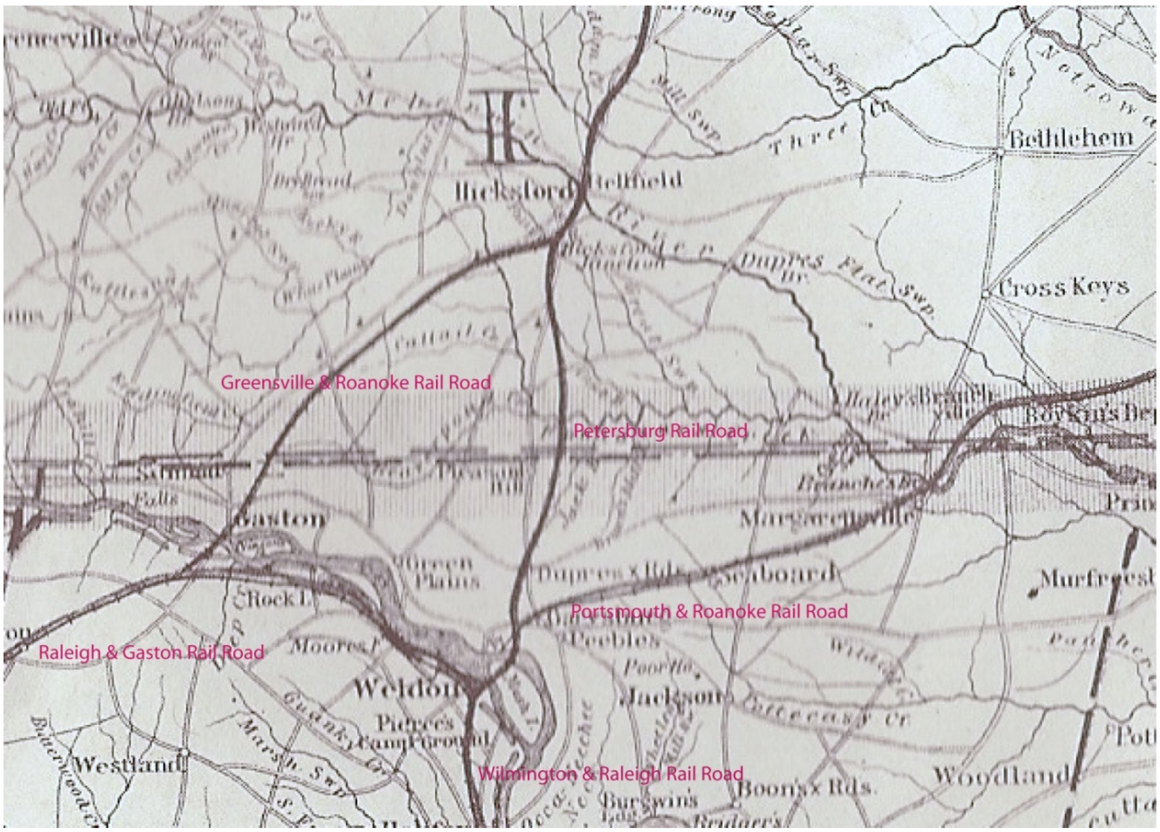

Figure 24. Details from the U.S. Coast Survey map of 1865 show the convergence of the original railroads of the 1830-40s on the Roanoke River between Weldon and Gaston. Francis Rives shut down the tracks of Portsmouth & Roanoke Rail Road between Margarettsville and Weldon. The railroad reorganized as the Seaboard & Roanoke Rail Road. It resumed service to Weldon in 1851. The Raleigh & Gaston Rail Road established a connection to Weldon in 1853. Source: Cumming, W.P. (1966). *North Carolina In Maps*. Raleigh, NC: State Department of Archives and History, Plate XIII

The idea of the Portsmouth & Roanoke Rail Road was conceived and promoted by Author Emerson of Portsmouth as a response to Petersburg's railroad. Petersburg blocked state aid to the railroad in 1833, but failed to repeat their success the following year. However, the choice of inexpensive strap iron wooden rail construction began to fail early. On 10 December 1837, a train derailed because of a loose iron bar and two people were killed in the accident. When North Carolinian Andrew Joyner became president of the company, he set about making improvements to the railroad and its equipment. The company took on additional debt. The railroad failed to meet the expectations of Norfolk investors at a time when the area's businessmen were experiencing the deleterious effect of Jackson's monetary policy. The fatal debt of the company was to Clements and Rochelle, the builders of the Weldon Toll Bridge. Rives' plot was deliberate and malicious. This is evident by the damage he inflicted on the bridge over Troublefield Creek (N 36.45396, W 77.54260) near Garysburg, and the disposal of iron rails into the same creek. For his efforts, the city of Petersburg would eventually elect Rives as their mayor. Boston investors would acquire what remained of the Portsmouth & Roanoke Rail Road in 1846 (Parramore, Stewart, and Bogger, 1994, 162-163,172-175).

The extension of the Raleigh & Gaston to Weldon was inevitable. The Raleigh interests that aligned with Petersburg made a fatal blunder. Weldon was truly the tollgate to North Carolina (Appendix G). This was made manifest by the construction of the Wilmington & Raleigh Rail Road with its steamboat line to Charleston. The railroad might have remained solvent had it connected to Weldon, as was the original plan of the Roanoke & Raleigh Rail Road plan of 1833.

In 1877, Walter McKenzie Clark published *History of the Raleigh & Gaston Rail Road Company Including All the Acts of the General Assembly of North Carolina Relating Thereto*.

> The Company was originally chartered in 1835, to run from Gaston to Raleigh. Work commenced soon thereafter. The road was completed through to Raleigh in 1843. It existed under great difficulties until it was finally sold under a foreclosure directed by act of the General Assembly ratified 6th January, 1845. At the sale in pursuance thereof the State of North Carolina, through its then Governor, Hon. William A. Graham, bought the entire property and franchises. It was then run entirely as a State institution until its reorganization under the acts of the General Assembly, ratified January 29th, 1851, and 25th December, 1852 … The first meeting of stockholders to organize under the new charter was held at Warrenton, N. C., 11th and 12th September, 1851, when George W. Mordecai was elected President and W. W. Vass, Secretary and Treasurer. The first stockholders' meeting held thereafter met at Henderson 14th and 15th January, 1852, when resolutions were introduced and adopted looking to a connection with the Seaboard Railroad at Weldon. The President also recommended an actual connection at Raleigh with the North Carolina Railroad. The road from Gaston to Weldon and the entire reconstruction of the whole line was completed in 1853. The new bridge at Gaston was completed in 1858. It was burnt down on their retreat by the Confederate forces in 1865, and has not been rebuilt.
>
> – (Clark, 1877, 137-138) –

During the fall of 1838, the Raleigh & Gaston Rail Road agreed to mortgage "the whole property" of the company to the Literary Fund of North Carolina for the sum of fifty thousand dollars. The Board took $50,000 of the bonds in March of 1839. On 3 June 1839, the Literary Board agreed that the balance of the surplus that belonged to the Board should be used for purchasing the bonds of the Raleigh & Gaston Rail Road, secured by the bonds of the Wilmington & Raleigh Rail Road so as to make the company responsible. The Board purchased seventeen thousand dollars of Wilmington & Raleigh bonds in August. James Owen, the president of the company, noted in a letter to Governor Dudley that contractors placed demands on the company at the end of each month, and the stockholders were short on funds because they had not brought in their crops yet; and the company had to pay forty thousand dollars on a shipment of iron. The board purchased more bonds from both railroads that year (Coon, 1908, 988-991, 1012, 1024-1026, 1033-1037, 1039, 1044). In 1842, the Literary Board purchased bonds for the Raleigh & Gaston amounting to $140,000 as of 1 January 1841, and had increased the amount to $165,300 by 1 December 1842. For the same period, the bonds of the Wilmington and Raleigh increased from $85,000 to $87,000 (North Carolina, 1842, Statement A, Statement D). The Treasurer of North Carolina reported on 17 December 1844 that the state had received $1,433,757.39 of the federal surplus; and this sum was dispersed for redemption of State Stock in the Bank of Cape Fear, $300,000, the Literary Fund, $200,000, Internal Improvement Fund, $533,757.39, Public Fund, $100,000 (Coon, 802). "An Act to authorize the foreclosure of the Mortgage of the Raleigh and Gaston Rail Road" was ratified on 6 January 1845. The state treasurer was appointed commissioner by the court to sell the railroad. The governor was "authorized and directed to bid" on the railroad for the state.

> That should the Governor of the State, under the preceding section, become the purchaser, for the State, of the road and other property, it shall be the duty of the board of commissioners hereinafter named to appoint a President and other officers necessary to manage and conduct the same on behalf of the State, until such time as the State can make some other disposition of the same …
>
> – (North Carolina Laws, 1845, 99) –

The state paid $286,500 in principal and $472,913.10 in interest between 1843 and 1854 on the debt of the Raleigh & Gaston, and $62,443.48 in associated expenses (Brown, 69).

The victims of the trade war, the Portsmouth & Roanoke and the Raleigh & Gaston, succumbed to the influence of external forces. These included the financial downturn following the Panic of 1837, and the strategic maneuvers of their rivals. However, geographic factors contributed to their disadvantages. Portsmouth and Norfolk fit the model of what James E. Vance, Jr. called "misplaced cities." That is, in colonial times they were well situated to serve the existing settlement patterns and engage in economic intercourse with Britain. After the Revolution, the former fifteen colonial ports competed for metropolitan status. Each sought to attract the business from the newly settled interior away from mercantile rivals. For some commercial centers, such as those of the southern tidewater of Virginia, inland navigation was suitable during the early years of the nineteenth century. Railroads in the United States were originally designed to enhance the economy and status of the original commercial centers. This model differed from the European one of railroad construction in that the United States railroads exploited? the advantages of the existing settlement pattern (Vance, 1995, 22-25). Petersburg was an interior commercial center with access to the Appomattox and James rivers as well as interior land routes. Norfolk has the Chesapeake Bay to the north, and the Dismal Swamp to the south. Its access to interior commerce before the Portsmouth & Roanoke Rail Road was by way of the Dismal Swamp Canal and the James River. Its connection to Baltimore and points north was by way of steamboat. The railroad put it on a competitive plain with Petersburg, and losing its degraded ability to compete as Petersburg strengthened its position by forming a connection to Richmond.

The geographic disadvantages of the Raleigh & Gaston Rail Road are more complex. Raleigh came into existence for political rather than commercial reasons. It was not suitably located for inland navigation. Without an interior railroad connection running south, a through passage to places south was impractical. It was for all purposes an incomplete railroad. The railroad was merely an extension of the Petersburg market into the middle piedmont of North Carolina. The Raleigh & Gaston did not share the fate of the Portsmouth & Roanoke. While most of the original investors in the railroad were ruined, the railroad itself continued to operate under the management of the state, and that did not fall into the hands of outside investors is significant. The Francis Rives affair represented the degree to which the public good could be compromised by unconstrained capitalism.

CHAPTER XIV

THE WILMINGTON & RALEIGH RAIL ROAD IN THE 1840s

This chapter will cover two topics. The first is the expense of maintaining the early railroads in North Carolina. Second is the problem associated with the protracted undertaking of reconstruction of these roads, and the efforts to replace the steamship line of the Wilmington & Raleigh with the Wilmington & Manchester Rail Road. The author has elected to focus primarily on events surrounding the operations of the Wilmington & Raleigh Rail Road, not only because the company was able to survive through this difficult period, but also because by 1854, the company had achieved a connection to the South Carolina railroads through its sister company. From 1843 to 1854, the Raleigh & Gaston cost the state $821,856.58 in principal and interest for the bonds it had endorsed (Brown, 59). The company was finally reorganized under "An Act to incorporate the Raleigh & Gaston Rail Road Company" during the 1850-51 Session of the General Assembly (North Carolina, 1851, 250-258).

It would be naïve to assume that the Wilmington & Raleigh Rail Road could have fared better if left to its own devices during the 1840s. The General Assembly of 1848-49 delivered the salvation of the company on 27 January 1849 – a new issue of bonds endorsed by the state (Brown, 40).

> An act concerning the Wilmington and Raleigh Rail Road Company. Provides that the Company be authorized to mortgage the Road for the sum of $620,000 to

> raise money to repair the same; and gives a priority to this mortgage over the State's holding as former mortgage. Also, extends the credit on the bond of the Company for ten years.
>
> – (*Wilmington Journal*, 2 February 1849) –

The fragile and perishable wooden rails of the original construction were a liability that limited the earning potential of both railroads; and the State of North Carolina, faced with the potential loss a valuable transportation resource, had little recourse but to continue its financial involvement.

The receipts for the railroad of the Wilmington & Raleigh Rail Road Company for the 1844 were $158,705.34, while its expenditures were $131,646.15, leaving a profit of $27,059.19; the receipts of its steamboat line were $130,828.41, with expenditures of $71,987.69, leaving a profit of $58.841.32. The total profit of the railroad and steamboats was $85,900.51 (*Wilmington* Chronicle, 20 November 1844). The following table is derived from statistics presented at the ninth annual meeting of the stockholders held 14 November 1844 at Wilmington (Table 1). The average monthly expenditures for the steamboats decline over the four-year period, whereas the expenditures for the railroad had risen from $5,848.01 in 1843 to $10,970.51. The years 1842 and 1843 reflect a decline in receipts. An examination of the proceedings of the annual stockholders meeting held on 9 November 1842 cites several reasons that can be associated with the decline in receipts. A meeting was held in Washington, DC earlier that year between the several companies that served the Atlantic states to establish more uniform rates: a ticket from Baltimore to Charleston was agreed to cost twenty-two dollars.

YEAR	RAILROAD RECEIPTS	STEAMBOAT RECEIPTS	RAILROAD EXPENDITURES	STEAMBOAT EXPENDITURES
1841	13,552.34	11,216.69	10,948.76	9,213.85
1842	10,736.60	8,496.71	8,818.85	7,825.93
1843	10,175.73	8,672.02	5,848.01	6,499.17
1844	13,225.45	10,902.37	10,970.51	5,998.92

Table 1. Average monthly receipts and expenditures for the railroad and steamboats of the Wilmington & Raleigh Rail Road Company for years 1841 through 1844. Data Source: *Wilmington* Chronicle, 20 November 1844

A cheap, competing, route south from New York to New Orleans via Philadelphia, Baltimore, Wheeling, the Ohio River and the Mississippi River had been established. A ticket from Philadelphia to New Orleans would cost between thirty-three and thirty-five dollars, and the value of money had appreciated with the improving financial state of the nation. However, the liabilities of the company were problematic.

> It will be seen by the report of your committee that the liabilities of the Company, vary but little from the last year. That about one hundred thousand dollars are required of the old debts to which the creditors are justly entitled, and from their representations stand greatly in need. Many of them have been generously forbearing, but others have indulged in vexatious suits and levied executions on the hire of the negroes employed on repairs, whose attention is daily required to watch over the Road and keep it safe for the passage of the Trains. They were seized and taken away regardless of consequences, in the hope of coercing payment, when the Company had it not. Without provision is made for these debts these scenes will probably be acted over again. The Directors can suggest no other way but an appeal to the Legislature, for the postponement of the payment of the Bond due next January, and the endorsement of fifty thousand more to pay these debts. Having already paid fifty thousand dollars on which the State was security, the further assistance would only place her liabilities at the

same amount first granted. Such a measure or some other equally efficient is required in justice to the creditors and for the protection of the credit of the Company.

– (*Wilmington Chronicle*, 23 November 1842) –

The liabilities of the company as of 1 October 1845 amounted to $668,817.52. This included $222,666.67 in bonds sold in England, $85,000 owed to the Literary Board with six percent interest, and $250,000 in bonds endorsed by the State bearing seven percent. Also included were $15,000 in bills payable at six percent, $42,272.86 in bills payable at six percent, $12,793 in script bonds to due to contractors, and $3,939.48 on bonds for the hire of slave laborers (the Negro Bonds) due on 1 January 1846. The amount of $18,270 in bonds for slave hire was due on 1 January 1847 and $30,875.08 in payments due for materials and labor to various individuals. In the midst of this complex debt structure, the company sought to have the state relinquish the mortgage it held on the railroad's boats and wharf so that it could borrow more money to extend their rails to South Carolina. In addition, the company wanted to establish a sinking fund to service their existing debt through a five dollar per share payment from the stockholder beginning in 1847, and lasting for five years. The profits from the company, after paying expenses and the interest on the debt, were to be applied to the sinking fund. The shareholders were to have their contributions to the sinking fund returned with interest after the debt was extinguished (*Wilmington Journal*, 28 November 1846).

The year ending 30 September 1847 reflected $331,480.20 in receipts, and $259,912.60 in expenses, the remainder was $71,567.60. Repairs to the road had cost the company $82,479.03, whereas, $42,093.11 was spent on repairing the boats. The

President's Report from the 1847 annual meeting notes that the cost for repairing the boats was very large compared to previous years, and the road repairs would increase because the rails needed to be replaced. During the summer of that year, a committee from the company traveled north to submit statistics (collected on the counties through which the proposed Wilmington & Manchester Rail Road would pass) to experts who would determine the accuracy of the company's prediction on the profits of its sister road. The experts tended to think the profits would be greater than the company predicted and that the stock of that company would be taken up quickly. The company had, in fact pledged to take $100,000 of stock in the Wilmington & Manchester, payable from the sale of its steamboats and other property, when the railroad was completed. The report continues a projection of profit for the new railroad based on the business of the existing railroad for the population of the counties. The population of the counties through which the Wilmington & Raleigh Rail Road passed was 76,850, and the business for the previous year had been $102,243.14. The population along the route of the Wilmington & Manchester was 130,967. Based on the assumption that revenue is proportional to population, the predicted annual income of the new railroad would have been $174,241.73.Some $70,479.62 could be added to this amount for the transport of the mails (*Wilmington Journal*, 19 November 1847).

The Legislature, however, did not act upon the company's resolution regarding the sinking fund, and the need to replace the rails of the Wilmington & Raleigh. By this time, it was widely recognized as a built-in flaw that plagues many of the other railroads of the South.

> In the original outlay for construction, the limited means of the Company, no doubt, influenced the Engineer to recommend, and the Board to adopt, the flat Rail. This has been the unfortunate mistake in the construction of many of our Southern Roads, and is the chief cause why they have been unprofitable to Stockholders, while in almost every instance in our county where the Iron Rail has been used, the Roads have proven profitable to the Stockholders. When we look at the business done on our Road, and the great annual increase in freight and local travel, we cannot doubt that if we could command the means to renew the Whole Road with Iron Rail, that the local business alone would support it, independent of the transportation of the Mail and the long or through travel.
>
> – (*Wilmington Journal*, 19 November 1847) –

The receipts for the railroad and steamboats ending 1 October 1847 were $331,480.20, and expenditures were $259,942.60. The net profits left were $71,537.60. The cash on hand left from 1846 was $3,358.56, and the amount in the hands of agents was $7,704.09. This added up to a profit of $82,630.25. However, $27,791.52 had been applied to the reduction of the debt, $37,121.82 was used toward the payment of interest, and $909.42 had been submitted to the Treasurer of State of North Carolina for payment of interest. This, with several lesser expenses, left $8,547.18 in the hands of the treasury of the company. During the period from 1841 to 1847, the number of way passengers increased from 5,498 to 25,396: the number of through passengers peaked at 14,018 in 1845. In 1844, the company showed its highest profits at $85,900.51; but in 1846, profits dropped to their lowest level at $28,140.04. During this year, the receipts were $317,822.49, the highest amount to date, and the number of passengers, 11,885 through passengers and 20,498 way passengers, was high; however, the expenses for their year were $289,682.45. Four hundred fifty-eight people were employed by the company during 1847. Two hundred three were slaves on road repairs (North Carolina, 1848, C: 16-18, 20-21).

The receipts for the year ending 30 September 1848 included $113,078.22 from through passenger fares, $53,092.04 from way passengers, $12,466.63 for steamboat freight, $51,534.51 for railroad freight, and $77,344.79 for the transport of the mails and rents. The company had been selling its worn out iron rails and copper from its boats, and for this year they received $9,943.31. Their total annual receipts for 1848 were $317,459.50; however, the expenses of the year were $238,133.79. These expenses are broken down into the major categories of transportation, steamboats, and road repairs. The transportation expenses totaled $75,872.13: $13,580.57 for repairing locomotives; $12,754.39 for rolling stock; $43,337.17 for payroll and expenses of this department; and three new passengers cars were added to the rolling stock at a cost of $6,200.00. The steamboat department reported only $8,413.41 in repairs, but the subsistence and pay for officers and crew amounted to $60,012.39. Added to $29,648.14 for fuel, the steamboat department accounted for expenses totaling $98,073.94. The road repair department reported costs amounting to $63,977.04. Of this amount, $30,146.92 was spent on materials, $25,800.52 was spent on labor, and $8,029.60 for subsistence and clothing for the labor force. Office expenses amounted to 210.68 during that year. Of the remaining receipts of $79,325.71, $35,909.68 was applied to interest on the debt, and $37,195.07 went to the purchase of new iron. This left $6,219.96 in the company treasury (North Carolina, 1848, 24-25).

> It will be seen by a reference to the foregoing statement of the accounts, that a large sum has been expended for New Iron. This was found to be absolutely necessary, to maintain the road in safe running order, for without this outlay, the operation of the Company must have necessarily been greatly embarrassed; as we could not have continued to run our trains over it with regularity or even with safety.—Being satisfied that it was indispensably necessary to the operations of the Company, if not to its very existence, that the Road should be preserved in good condition, your Board has applied to the purchase of New Iron all the means at their disposal, not required for the necessary current expenses of the Company; and being further satisfied that it was false economy to continue the use of the light bar, first laid on our Road, and that permanence and stability could only be hoped for, by adopting a heavy rail in its stead, they have not hesitated to substitute the one for the other.
>
> – (North Carolina, 1848, 25-26) –

The Wilmington & Raleigh Rail Road as it existed in 1848 was in a precarious position: the company was carrying $651,783.16 in debt as of 1 October 1848 (North Carolina, 1848, 33), and paying on the interest; the flat iron, wooden rail system that it had original adopted was consuming a large portion of the company's receipts in repairs. The company was in need of a further extension of credit to replace the entire one hundred six-one miles of the line with heavy iron. The company was at least solvent, and the railroad had experience a steady increase of business since its completion. The failure of the Raleigh & Gaston had taken place because the company did not generate the net profits to maintain the road and make the interest payment on the state endorsed bonds. The company defaulted on its interest payments that came due on 1 January 1843. However, the net profits of the company had been $31,340.15 for 1841, $27,867.07 for 1842, and $23,250.95 in 1843. It was in 1844, when the receipts had fallen to $53,460.77 and the expenditures had risen to $49,470.67, that the net profits of the Raleigh & Gaston had fallen by nearly $20,000 (Brown, 1928, 50). The Wilmington & Raleigh Rail Road had been making its interest payments, but net profits after this adjustment were meager. From the perspective of the investor, the stock of the company was truly "of undetermined value." If the flat iron wooden rails were to continue to be used, the cost of repairs would overtake the profits and the State of North Carolina would find itself running two railroads, paying off the bonds on both, and paying the cost to renewing the rails from the public funds. The latter would have cost the state another half million dollars.

> The cost of relaying our Road (162 miles) with an Iron Rail of 52 lbs. to the yard, at the present price of Iron, from which deduct the value of the old Iron about $84,000, and we have the sum of $516,000. The interest on this sum at 6 per cent, per annum, would be $30,960, which being deducted from 86,252.11—the difference in the expense of the two kinds of rail as before ascertained, and we should make a saving annually of $55,252.11—a sum nearly double the interest of the cost of the heavy Iron. To this add the great additional facilities which such a Road would give to the Company in their transportation, and it must be manifest to any one who examines the subject, that the true economy of the Company would be to substitute the heavy rail.
>
> – (North Carolina, 1848, 27-28) –

The total cost to the state on the accounts of the Raleigh & Gaston Rail Road between 1843 and 1854 had been $821,856.58 (Brown, 1928, 59). The state's role as the largest shareholder in the Wilmington & Raleigh made it a hostage to its own creation, for in this position it was responsible for the health of the railroad as were the private investors. It is doubtful that the merchants and planters of the east would have been able to build the railroad to its extraordinary length without the investment on the part of the state. Under these conditions, they were legally bound and socially obligated to promoting the success of the railroad – lest it be forgotten that the dividends on the state's shares were destined to fund its schools.

"A Bill concerning the Wilmington and Raleigh Rail Road Company", *Senate Document No. 9*, provides for the mortgaging of the entire property of the railroad, except its steamboats and the wharf in Charleston, for the relaying of the road in heavy iron.

> *Whereas,* The said Wilmington and Raleigh Rail Road Company is desirous of improving the said Road by relaying it with new and heavy iron, which will greatly enhance the value of the stock held by the State, as well as the individual stockholders, and, *whereas,* to effect that object, it may be necessary for said Company to contract a loan. *Be it therefore enacted by the General Assembly of the State of North Carolina, and it is hereby enacted by the authority of the same,* That the said Wilmington and Raleigh R. R. Company shall be, and are hereby authorized to borrow a sum not exceeding $520,000, for the purposes mentioned, and shall be authorized, if found necessary, to mortgage the Road, and all the property and effects belong to the said Company, for the security of said loan; which mortgage, it is hereby declared and enacted, shall be preferred to the mortgage, and pledge to be executed under the previous provisions of this Act, and all such other mortgages and pledges as may have been heretofore executed by said Company, to secure the State against its loss by reason of her endorsement for said Company, and in case of default by said Company, the said mortgage so to be executed shall be first satisfied.
>
> – (North Carolina, 1848a, 9: Section 10) –

The same bill gave the state the power to seize the profits of the company if the interest on the bonds were not paid in a timely fashion. Also included was the power to foreclose on the mortgage and sell the road for payment of the bonds, and the transfer of half of the state's stock in the Wilmington & Raleigh Rail Road back to the company for investment in the Wilmington & Manchester Rail Road. The latter provision was dependent on the Wilmington & Manchester first securing $400,000 in subscriptions from other sources. On 28 January 1851, the state exchanged 2,000 shares of Wilmington

& Raleigh Rail Road, with a par value of $60 per share, for a like number shares in the Wilmington & Manchester Rail Road, thus allowing the state to take one of its four directors from Wilmington & Raleigh and place a single director in the Wilmington & Manchester. The state's investment in Wilmington & Manchester was valued at $203,000 – more than the State of South Carolina and the Town of Wilmington, but less than the total shares of private investors (Brown, 1928, 40-43). Brown had overlooked the significance of the exchange of stock; however, such an arrangement gave the state leverage in both companies. The report of the Wilmington & Raleigh Rail Road from 1841 to 1849 was printed in the *Wilmington Journal* in November of 1849 (Table 2).

				NO. OF PASSENGERS.	
Years.	Receipts.	Expenditures.	Profits.	Through	Way.
1841	297,228.39	241,945.34	55,283.05	9,742	5,498
1842	211,977.48	180,892.65	31,084.83	*	*
1843	257,257.82	179,251.00	78,206.82	8,450	13,574
1844	289,533.75	203,633.24	85,900.51	10,358	16,041
1845	288,493.45	212,091.20	76,402.25	14,018	16,393
1846	317,822.49	289,681.45	28,140.04	11,885	20,498
1847	331,480.20	259,912.60	71,567.60	13,073	25,396
1848	317,459.50	275,228.86	42,130.64	11,456	28,327
1849	310,397.00	245,998.58	64,698.42	11,207	27,575

Table 2. This table was reproduced from the 19 November 1849 issue of the *Wilmington Journal*. It summarizes the business of the Wilmington & Raleigh Rail Road over nine years. The missing passenger statistics for 1843 are the result of loosing documents to fire (North Carolina, 1848, 18).

The total liabilities of the company as of 1 October 1849 amounted to $637,294.55, including $222,666.67 in English bonds, $250,000.00 in bonds endorsed by the State of North Carolina, $85,000.00 in bonds due the Literary Fund of North

Carolina, $16,300.00 due bills payable to banks, and $31,100.30 due to contractors. Negro Bonds for the years 1843, 1845 – 1850 amounted to $22,928.99; and the amount due on payrolls was $8,505.16. There remained $793.43 due to contractors on scrip bonds (*Wilmington Journal*, 19 November 1949). The payroll of the company included the following (Table 3 and 4). Four hundred seventy-one people worked for the Wilmington & Raleigh Rail Road Company in 1849, of which two hundred thirty-five were slaves included in the Negro Bonds. Two hundred twenty-two slaves were engaged in repairs to the railroad. By 1860, the company had acquired twelve slaves at a cost of $13,750, but the Negro Bonds due from 1844 through 1860 amounted to $34, 806.48. Eleven of the slaves were listed as mechanics and laborers in the shops, or working the depots, and were valued at $13,500 – the report does not explain the twelfth slave. The superintendent's report recommends the purchase of an additional twenty slaves to work the trains and warehouse, noting that the cost of slave hire had risen about fifteen dollar per annum to two hundred and ten dollars per slave. That year, the company paid $11,955.30 in subsistence, clothing, and medical care as part of its general expenses. The report expressed discouragement in the White laborers hired due to the difficulty in finding slaves and free Blacks. The White laborers tended to quit after they had made enough money to satisfy their most pressing needs (Wilmington & Weldon Rail Road Company, 1860, 20-21, 27, 32, 47).

PERSONEL	SALARY	PERSONEL	SALARY
President	2,000	1 Boiler Maker	1.75 per day
Secretary and Treasurer	1,500	1 Boiler Maker	1.50 per day
Clerk to the Treasurer	600	2 Engineers	65.00 per month
Superintendent of Road repairs	850	7 Engineers	60.00 per month
Assistant for Superintendent	150	1 Engineer	25.00 per month
Steamboat Agent at Wilmington	800	1 Engineer	20.00 per month
Clerk for Steamboat Agent	200	9 Firemen	20.00 per month
Steamboat Agent at Charleston, and mail carrier, including wharf hands	1,400	1 Coach repairer in shop	1.00 per day
Transportation Agent at Wilmington	800	1 Coach repairer in shop	. 87 ½ per day
Agent at Weldon	800	1 Carpenter on coaches and cars	2.25 per day
Superintendent of Shops and Machinery	1,000	6 Carpenter on coaches and cars	1.50 per day
Finishers	2.00 per day	4 Carpenter on coaches and cars	1.25 per day
Finishers	1.75 per day	5 Carpenter on coaches and cars	1.00 per day
Finishers	1.50 per day	2 Carpenter on coaches and cars	. 62 ½ per day
Blacksmith	2.25 per day	1 Overseer on road repairs	40.00 per month
Blacksmith	2.00 per day	1 Overseer on road repairs	35.00 per month
Blacksmith	1.87 ½ per day	12 Overseer on road repairs	30.00 per month
Blacksmith	1.50 per day	3 Carpenters	35.00 per month
Pattern Maker	2.00 per day	1 Painter	10.00 per month
2 Moulders	2.00 per day	5 Conductors on Trains	42.00 per month
1 Brass Moulder	1.37 ½ per day	3 Train hands	18.00 per month
1 Moulder	20.00 per month	2 Train hands	10.00 per month
1 Apprentices	20.00 per month	2 Yard hands	8.34 per month
2 Apprentices	25.00 per month	Agents at Depots and water stations, aggregate per annum	2,666
1 Apprentices	18.00 per month	14 Spike Drivers	182
1 Apprentices	15.00 per month	12 Laborers on Road repairs	1,524
1 Apprentices	12.50 per month	4 Black carpenters on Road repairs	756
2 Helpers	18.00 per month	6 Hands on Sunday at water stations	78
1 Helper	12.50 per month	8 Hands on Timber Trains	864
1 Helper	7.00 per month	222 Negroes on Road repairs, &c., including those on boats and wharf	18,593
1 Boiler Maker	2.25 per day	*Continued on Table*	

Table 3. The personnel of the Wilmington & Raleigh Rail Road printed in *Wilmington Journal*, 19 November 1949

PERSONEL	SALARY
3 Captains	1,000 per annum
3 First Mates	420
3 Second Mates	240
4 First Engineers	720
4 Second Engineers	480
8 Firemen	192
6 Wheelsmen	192
9 Deck hands	120
3 Stewards	240
3 Stewardesses	96
6 Waiters	120
3 Cooks	180
6 Knife boys and scullions	72
3 Deck hands included in Negro bonds	
10 Wharf hands included in Negro bonds	

Table 4. Employees and Labor of the Wilmington & Raleigh Rail Road from the 1849 Annual Report on the steamboats (cont)
Source: *Wilmington Journal*, 19 November 1949

The statistics from the 1848 annual report and 1849 annual report provide enough data to approximate the cost per slave "hire" in payment of the bond, subsistence, clothing, and other needs at $120 per annum. The annual report from 1858 provides a sum of $190 per slave including hire, subsistence, clothing, and medical care per annum (North Carolina, 1848, 25; *Wilmington Journal* 19 November 1849; Wilmington & Weldon Rail Road Company, 1858, 2). .

The recovery of the company from the Great Fire of 1843 appears to have been aided by the intervention of Edward B. Dudley, former governor and then president of the Wilmington & Raleigh Rail Road. Robert H. Cowan's oration on the life of Governor

Dudley given on 8 November 1855, after Dudley had died, describes how the company struggled to obtain credit after the fire.

> When your offices, and your warehouses, and your work shops, and all of your machinery which was not then in actual use, were laid in ruins by the terrible fire of 1843, when a heap of smoldering embers marked the spot where all of your possessions in Wilmington the day before had stood; when your most ardent friends had begun to despair; when your own merchants had refused to credit you, and regarded in a business point of view merely, had justly refused, because they had already extended their confidence beyond the limits of prudence; when your long sinking credit was at last destroyed, and your failure seemed inevitable; Gov. Dudley came forward and pledged the whole of his private estate as your security; and thus, with renewed public confidence in your solvency your were enabled to go on to that complete success which awaited you entirely through his exertions.
>
> – (Wilmington & Weldon Rail Road Company, 1855, 63) –

As stated earlier, the company had spent $8000 in 1843 to replace "provisions, fixtures &c." destroyed by the fire; and it was reported that the "Machine shop, Warehouse, Offices, &c., are nearly rebuilt" by the end of the summer. The cost of building the shop, warehouse, wharf, associated building at Wilmington had been $56,691.51. The company had fourteen locomotives in 1840; and the total value of locomotives and rolling stock was $170,815.21 (). The average cost of the locomotives in 1838 had been $7,500 apiece, passenger cars had cost $2,250 apiece, and freight cars cost $300. "Five locomotives and some cars" were damaged in the fire, though it was believed that some could have been repaired. It appears that several engines were not operational, or had been lost, but the addition of a new freight locomotive was supposed to make up for the deficiency in motive power completely. It appears the railroad quickly recovered from this setback (*Wilmington Chronicle*, 15 November 1843, 23 August 1843; North

Carolina, 1840, 10, Schedule B; 1838, Schedule A; *Fayetteville Observer*, 3 May 1843; *Wilmington Chronicle*, 17 May 1843, 6 December 1843). The net profits of the company by year's end were $78,206.82; it was an increase of more than double the previous year's profits of $31,084.83 (Table 2).

Regardless of whatever differences might have existed among the estimated losses, actual losses, and the ultimate expenditures associated with the fire, the loss of the company facilities at Wilmington apparently damaged confidence in the company. The more serious problem had existed before the fire. On 17 January 1843, the Literary Board was authorized to buy up $50,000 worth of the company's bonds that had fallen due on the first day of the year to prevent the company from defaulting. After the fire, the Treasurer of the State of North Carolina had to buy up the issue of bonds due on 1 January 1844 (Brown, 1928, 38-39). Cowan's statements, in essence, indicted that the company had exceeded its credit limit – so to speak. When Dudley offered his personal estate as collateral for the company after the fire, it is a sure measure of the desperate financial condition of the company.

In an 1843 article entitled "Railroads of Virginia and North Carolina" that appears in the *Farmer's Register*, a writer identified only as a stockholder cites several causes why the railroads in these states have not be able to declare dividends. In Virginia, the competition between the Petersburg Rail Road and the Portsmouth & Roanoke Rail Road diminishes the profits of the Petersburg road while incurring loss to the Portsmouth & Roanoke. The change of route of the Wilmington & Raleigh Rail Road to Weldon to make connect with the Portsmouth road deprived the port of access to the more fertile regions of the state west of Raleigh. The Petersburg Rail Road, already ten years old, had to replace its rail with heavy iron, and this will have to be done to all the railroads using strap iron rail construction (Ruffin, 1843, 165). It is certain that the strip-iron rail construction was a major factor in the companies' financial difficulties, but the assumption that building the Wilmington & Raleigh Rail Road to Raleigh would have opened the port to the produce of the west was mere speculation. The Raleigh & Gaston with "their friends in Petersburg and Richmond" did not see these great profits coming from the west of Raleigh. The great benefit of both railroads was not to the shareholder, but to the citizens of the state. This becomes unmistakably clear when the particulars are stated by Governor William Graham in his 1848 *Message to the Senate of North Carolina*.

> These works, though profitless as stock, have yet given advantages to the inhabitants of the sections which they traverse, of which they would not willingly be deprived ... we must bear in mind, that if these Rail Roads shall cease to operate, and the people in their neighborhood shall be driven back to the old modes of conveyance, that the change will be equal to the imposition upon them, of a tax of certainly Eighty, and perhaps not less than One Hundred Thousand Dollars, per year.
>
> – (Graham, 1848, 8:6-7) –

The financial woes of these companies can be reduced to a single problem that was known to all after the failure of the Cape Fear & Yadkin Valley effort: the building of extensive railroads was beyond the means of private capital. That some capitalists such as the directors of both railroads could acquire the means by mortgaging their company property did not carry with it the certainty that the profits of the company would be able to service the loans. The State of North Carolina, however, understood that these railroads were actually *public* works in function and could easily become public works in fact.

CHAPTER XV

SUMMARY OF THE HISTORICAL RESEARCH

One of the key functions of government is to build and maintain a transportation infrastructure that serves the most remote reaches of its domain, so that all of its citizens have the opportunity to enjoy the benefits of communication and commerce. In theory, all regions within a state should be equally represented in the process of planning of a transportation network with their particular needs and resources considered only in context of the overall welfare of the state as a whole. Thus the burden imposed on the citizenry to finance the undertaking is an equitable arrangement.

If a state fails to develop a comprehensive policy for transportation improvements, or if it lacks the political will to abide by one, the transitory demands of the market place will assume the deciding role in these public works. The resulting network, could as a set of permanently established routes, preserve sectional divisions within a state even though the former economic interests of these sections are no longer relevant.

This volume commenced with a reference to Richard Hartshorne's "The Functional Approach in Political Geography." It concludes by returning to the same article. Particularly, that a state must have a *raison d'être* – or reason for being – is vital and this idea must embrace all sections throughout that state as a whole. This might have been easier to define at the Provisional Congress at Halifax in 1776 than in the years preceeding the North Carolina Constitional Convention of 1835. The planter of the east desired the *status quo*, while the farmers of the west needed access to distant markets. The merchants of the commerical towns lemented to loss of trade to neignboring states. All the while, the North Carolina Legislature was reluctant to fund the preperation of accurate state maps (Cumming, 1966, 21-27). North Carolina was an aggregation of regions, each with its own reason for being and affinities for interests outside the state. The state would not have its *raison d'être* until its people had a transportation system that embraced all regions, public education, and balenced representation. The aggitation for railroads propelled political reform, and without political reform the early railroads of North Carolina could not be built. Without the aid of the state, if built, they would have quickly fallen into ruin. However, the early history of the railroads, with the nessary intervention of the state, set the pattern for the extensive railroad construction that followed. It appears that the antebellum reason for being was very close to the means of being. The very rational idea of the state using the dividends from its shares in railroads to fund public education could work if the railroads did not declare them.

The Memorial of the Convention on Internal Improvement, November 1833 outlined a system: the state would be bisected north to sound and east to west by two routes – rail or combination of rail, navigation, and turnpike – whereby even remote communities would be within a reasonable distance from these trunks. The State of North Carolina did not adopt this plan; rather they put in a place a policy that allowed for a two-fifths investment on the part of the state in certain corporations that had been established to undertake internal improvement projects when private investors had subscribed to three-fifths of the capital stock. While the state extended this form of aid to a number of worthy projects, the Wilmington & Raleigh Rail Road was the only significant project barely able to secure the private capital necessary to qualify for the state's investment. The Raleigh & Gaston Rail Road, an ambitious undertaking chartered without the provision of state aid, required state endorsement of its bonds even before it was completed. By the end of 1848, the Raleigh & Gaston Rail Road Company had defaulted on its mortgage and had, in essence, become a state-owned railroad. The Wilmington & Raleigh Rail Road was steeped in debt, and had yet to declare a dividend. Both railroads needed to be rebuilt with heavy iron to remain in operation. None of the plans to connect east to west by rail, particularly the long anticipated Central Rail Road, had been realized. Only at this point did the state bring to bear the political will to move towards a state system of railroad.

A review of the history of internal improvements in North Carolina exposes several questions about the routes selected for these railroads. What was the cause of the paradigm shift from canal projects to railroads? Who proposed the early railroad routes, and how were these routes different? Why were the earliest railroads in North Carolina built in obscure places on the Roanoke River rather than between the state's commercial towns or connecting with those in South Carolina? The author identified a single answer for all these questions. Escalating trade competition between the Virginia commercial centers of Petersburg and Norfolk influenced railroad planning in North Carolina. A sequence of navigational improvements on the Roanoke River caused the regional shares of agricultural resources from the vast river basin to be shifted between these Virginia markets unevenly, thus triggering railroad building as a countermeasure. The main purpose behind the plans for building these early railroads was intercepting river commerce. Ample documentation supports the position that interests in Petersburg and Norfolk subverted railroad development in North Carolina. In fact, nothing testifies more to that fact than the significance of Weldon – the "tollgate of North Carolina" – for it offered nothing more than a bridge to the lower basin of the Roanoke Canal and the agriculture south of the Roanoke. It was the like junction of the North Carolina railroads, but the Raleigh & Gaston was drawn into the fatal agreement to build a bridge upriver.

The trade war between Petersburg and Norfolk was wasteful. When a through corridor was established to the north of Petersburg and south to Charleston via Wilmington, the bounty of the upper Roanoke was of minor importance. The steamboat line of the Wilmington & Raleigh gave that railroad an immediate advantage. The demise of the Raleigh & Columbia Rail Road scheme sealed the fate of the Raleigh & Gaston. The consequences of Jacksonian monetary policy were twofold. The federal surplus provided that state with the capital to invest in the Wilmington & Raleigh, and the Panic of 1837 undermined the finances of private investors in both railroads. It would be safe to say that the *economic stream piracy hypothesis* applies many aspects of the historic record. However, the trade conflict between Petersburg and Norfolk was a local phenomenon that involved southern Virginia, and was given scope through the collective negligence of the legislatures of Virginia and North Carolina.

David F. Lindenfeld, in his essay on the end of the Weimar Republic, discusses the empowering and constraining causes of specific human actions, and applicable aspects of chaos theory. The similarity across differences of scale concept and branching concept represent the latter. Structure-like and event-like features exist at the level of individual behavior and on the impersonal institutional level. The distinction between empowering and constraining causes, as opposed to the relationship between cause and conditions, is a more direct approach to finding meaningful patterns in history (Lindenfeld, 1999). The constraining causes in the development of the early railroads of North Carolina are readily identifiable and have been discussed at length in the early chapters of this volume. These include the Panic of 1837 and subsequent national economic collapse, the primitive and perishable nature of strap iron wooden rail construction, some aspects of the developing American school of civil engineering, the absence of a reliable source of domestic iron, and duties imposed on imported iron. In North Carolina specifically, the lack of sufficient local investment capital, a poor understanding of the nature of railroad construction and the geography of the state by railroad promoters, and sectional rivalries constrained early development. North Carolina's vague *raison d'être* based on Jeffersonian Democracy, the interests of the eastern planter class, and the notion that private corporations were the appropriate agents of creating state infrastructure retarded internal improvements long before the railroad era. The empowering causes range from beneficial policies such as the General Survey Act to the ratification of "An Act to Aid the Internal Improvements of This State" by the North Carolina General Assembly. There are also a number of negative and unforeseen events, such as Fayetteville's "Great Fire" followed by the "State House Fire," that upturned the *status quo*, but ultimately empowered the advocates of constitutional reform and internal improvements. This was the "eye-of-the-needle" event, the North Carolina State Constitutional Convention of 1835. All the disparate strands of the historical narrative converge at this moment, and state government emerges as a fit agency for subsequent developments in the uncertain enterprize of building railroads. However, it would be naïve to think that the cause of internal improvements was the sole force behind constitutional reform, or that the state's two-fifths investment policy was a qualitative improvement over its investment in the earlier navigation companies. Lindenfeld provides an alternative methodology for resolving some of the conflicts between contributing factors with vague beginnings and events that have a clearly defined period. He refers to the causal relationship as "sensitive dependence on local conditions" meaning "long-term trends have states at particular places and times, and these must be considered as components of causal analysis" (Lindenfeld, 1999, 288). The long-term trend of the development of North Carolina's early railroads was sensitive dependent to the particular moment when the Wilmington & Raleigh Rail Road Company expressed a desire to change their route. This action seriously altered the presumed geography of the proposed state system, and undermined the ambitions of Petersburg interests.

The similarity across differences of scale concept and branching concept from chaos theory is applicable to the historical narrative of all antebellum railroads. This includes both the nature of railroads, and the prevailing financial instruments used to finance their construction. Railroads are merely another species of road. They did not evolve from some pre-existing transportation network, be it turnpike, canal, the colonial highways, or Native American trading paths. It is amply clear from the engineers' surveys that the primary objective in construction was to place track as close to a direct line between specific points as possible. In the process, they bisected the meandering road networks of the pass, crossed rivers, and traversed area where roads did not exist. It relationship to anything of the past is merely coincidental. Railroad iron was precious, locomotives worked best when the rails followed a straight path, and spurs could be added as needed. The operation of railroad required organization of time, capital, and labor on unprecedented scale. The preferred financial instrument used by the companies to fund construction costs was the bond. Its recurring sequence of interest payments, coupled with practice of using one issue of bonds to secure a new issue, was a debt generator. The State of North Carolina used the mortgages of the railroads to secure bonds for the railroads, thus making the state liable for the debt should the company default and obligated to take over the operation of the railroad. In addition, bonds were used to pay for labor, and pay the duties on iron. The one period cycle of decay for the original construction was superimposed upon the recurring cycles of bond payments. This is a very precarious structure, susceptible to any unforeseen perturbation in the general financial environment, and entirely dependent upon receipts.

Hitherto, this study has been concerned with providing the historical background of the early railroad in North Carolina, and many proposals for railroads that were entertained during the late 1820s through the 1830s. The historical record strongly suggests that the routes of the railroads that were built were strongly influenced by the commercial conflict between Petersburg and Norfolk. However, the direction of research must shift to geographic analysis to determine what other route options, if any, were practical alternatives that may have had a more favorable outcome. Since these railroads and/or route were proposed but not carried, this analysis is a type of *counterfactual geography*. The counterfactual reasoning, advanced by Max Weber, has proven a useful tool in historic analysis. It is appropriate for the geographic phenomena of routes and railroad construction because the construction methods and cost for the railroads that were built are known, the physical geography of landscape where the proposed railroads were projected has remain stable, and census records along with other primary documents provide statistics about the counties. The existing annual reports of the railroads also contribute data about the resources of the companies, their operation, and the volume of business conducted on the roads. Together, these sources of data allow for the creation of empirical models. If a model proposed railroad proves unworkable, it limits the available options. In this way, the particular can be set apart from the flux of unforeseen events brought about through the ambition and folly of men.

END OF PART ONE

PART TWO

CHAPTER XVI

INTRODUCTION

Statement of Problem

The historical narrative presented in Part One suggests that one alternative rail network could have been constructed in North Carolina during the 1830s. This network would have been the Wilmington & Raleigh Rail Road as constructed to Weldon, and its branch line to Raleigh as originally intended. The branch line would have followed the later route of the North Carolina Railroad from Waynesborough (Goldsboro) to Raleigh. Given the lack of investment capital and the limited time favorable for new construction before the economic downturn of the 1840s, this network would have connected the interior of North Carolina to the port of Wilmington and the Virginia markets. It also would have formed the first connection in the long anticipated east-to-west Central Rail Road. What remains is to prove that the railroad technology of the 1830s was appropriate for making an economical crossing of the transition zone between the Coastal Plain and Piedmont, and the resulting connection between Raleigh and Waynesborough was potentially profitable.

Objectives

The current trend of transportation analysis assumes a socioeconomic equilibrium that serves as the background for the spatial activities of a diverse assemblage of individuals, each negotiating the constraints that separate thought from action. The antebellum period of American History does not offer a background of socioeconomic equilibrium; rather society and economy, as currently defined, do not necessarily converge equally in regions and states. The early development of railroads in North Carolina is a multifaceted topic that embraces several sub-disciplines of geography; however, a single geographic hypothesis should explain the early evolution of this particular network and satisfy all the questions stated previously.

Hypotheses

The author suggests two hypotheses, one based on free market competition and state government intervention that allows for multiple strategies, errors, and chance; the other is deterministic, governed by the route selection of earlier railroads and constrained by the limits of finance and technology, where railroads align to form the only possible interstate corridor. It seemed appropriate that the author call the first the *Economic Stream Piracy Hypothesis*, named for a phenomenon whereby one stream cuts an intersection with another and diverts flow to its own channel. This analogy takes on a more literal connotation when one considers that the competing commercial towns of Petersburg and Norfolk used their railroads to intercept produce transported on the Roanoke River. Most of the early railroad proposals under consideration in North Carolina involved building railroads to river landings to stem the transport of produce by river to out of state markets. The diversion of the interstate passenger travel and the Great Southern Mail from the established route through the interior of North Carolina to the railroad and steamboat line of the Wilmington & Raleigh Rail Road appears to fit this hypothesis. The railroad company that is quick to exploit opportunities, becomes operational along its full extent at the earliest possible date, and has the resources to maintain solvency, if only marginally, determines the route of the interstate corridor until another company establishes a more efficient route.

The *Only Option Hypothesis* uses prior route selection as the basis for determining geographic advantage. Chance, error, and strategies only delay the inevitable. The network will conform to the best opportunities that the landscape provides in time. Under such constraints, technical and economic factors of an alternative network are unfavorable in relationship to the railroads that were built, even if these railroads performed poorly.

Assumptions

The model of an alternative rail network in the North Carolina of the 1830s is counterfactual, and based upon the limited available data derived from the reports of railroads built in North Carolina during this period along with reports and surveys from their contemporary works. The model assumes that by removing the Raleigh & Gaston Rail Road from the network, sufficient capital investment would be available from the Piedmont to build the Waynesborough to Raleigh branch line. While it is doubtful that the Petersburg interests would find the route as attractive as the Raleigh & Gaston would, the supporters of the Central Rail Road concept within the Piedmont could have appreciated access to the ports with little more than half the railroad to put down. The only evidence of this assumption is the early subscriptions taken for the Wilmington & Raleigh Rail Road during 1833.

In addition, the economic development that occurred in the Wilmington & Raleigh Rail Road and Raleigh & Gaston Rail Road corridors in the decades following their construction might support the anticipated development within the corridor of counterfactual model. The construction of the North Carolina Railroad during the 1850s included this route in its extent and certainly contributed revenue to the earlier railroads; however, its length was greater. Economy development based on land values, crop production, and population growth on the county level for the counties of North Carolina that had railroads must serve as the measure of development for the counties included in the counterfactual model.

CHAPTER XVII

THE STUDY AREA

Walter Gwynn was the chief engineer for the North Carolina Railroad connected Raleigh and Waynesborough (later Goldsboro) in the early 1850s. Earlier in his career, he had been the chief engineer for the Wilmington & Raleigh Rail Road, and the Portsmouth & Roanoke Rail Road. After the completion of the Weldon branch of the Wilmington & Raleigh, Gwynn conducted a survey of the branch line of that railroad from Waynesborough to Raleigh. In his report to that company, he noted that he did not consider it a practical undertaking at the time, but he did not state the particulars that led him to this conclusion. For this reason, it is worth examining the Waynesborough to Raleigh section of the North Carolina Railroad with a view of the limitations of 1830s rail technology.

The route passes through the transition between the Piedmont Province and the Coastal Plain Province. The nature of this landscape becomes apparent when viewed as elevations. The map given below uses 1 ArcSecond NED data of the region between the Waynesborough (west Goldsboro) and Raleigh. The route appears as a white line beginning at the junction with the Wilmington & Raleigh Rail Road in Waynesborough (Figure 25). The lowlands of the Neuse floodplain are the prominent feature of the landscape in the Coastal Plain section of the route.

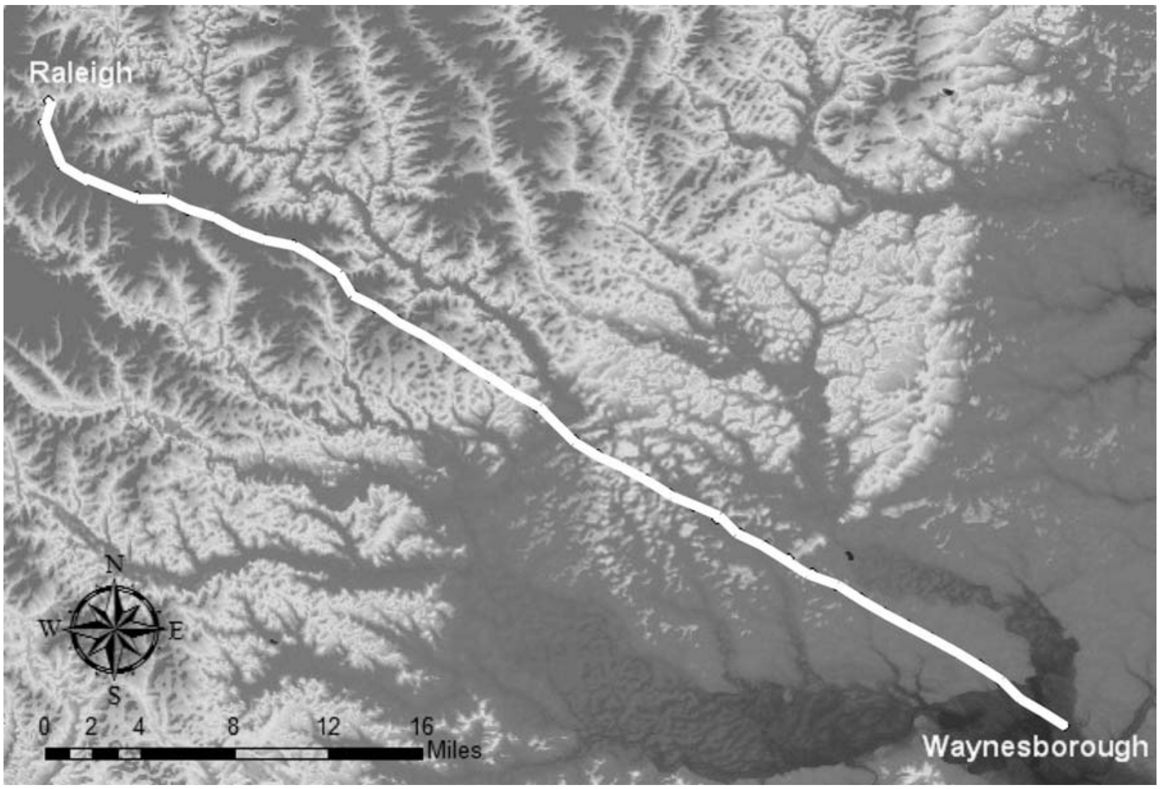

Figure 25. Walter Gwynn, the chief engineer for the Wilmington & Raleigh Rail Road, was also appointed the chief engineer for the North Carolina Railroad in the late 1840s. If an earlier connection between Raleigh and Waynesborough (now Goldsboro) had been constructed by the Wilmington company, it appears likely that it would have followed the same route selected for the later North Carolina Railroad between these places. This map illustrates the route divided as a white line beginning at the present junction with the CSX railroad (antecessor to the Wilmington & Raleigh). It is layered over elevation data illustrating the transition between the Coastal Plain Province and Piedmont Province of North Carolina between Waynesborough and Raleigh.
Data Source: USGS. (2008) 1 ArcSecond NED 69222342. *The National Map Seamless Server*.

The area depicted in this map combines some similarities of terrain of the Wilmington & Raleigh Rail Road and the Raleigh & Gaston Rail Road. The section of the route extending from Waynesborough to the Neuse River (22 miles) traverses the terraced alluvial landscape of the Coastal Plain within the floodplain of the Neuse River Basin. The full extent of the Wilmington & Raleigh Rail Road, built on the Coastal Plain topography, passes near a strip of subsurface igneous rock between the Contentnea Creek area and Halifax County (Councill, 1954, 10-15). This has a negligible influence on the grade of the road. The section of the Waynesborough to Raleigh route from the Neuse River west of Selma to Raleigh (27.5 miles) crosses terrain similar to that found on the route of the Raleigh & Gaston Rail Road. The builders of the Raleigh & Gaston located their road over the rolling hills and ridges of the Piedmont. Significant changes in elevation are apparent between these features, including locations that required excavation through rock. The cost per mile for building the Wilmington & Raleigh Rail Road was approximately $7,000, compared to $12,000 for the Raleigh & Gaston Rail Road was $12,000. These figures exclude the cost of bridges (Ruffin, 1838; North Carolina, 1840b). To estimate the cost of building a railroad from Waynesborough to Raleigh, based upon the cost of 22 miles of Coastal Plain topography and 27.5 miles of Piedmont topography, as $484,000 without bridges, equipment, and facilities seems simple enough. However, this does not prove that a railroad crossing these two physiographic regions could be constructed at the cost per mile as those railroads confined within these regions.

The section of the route from the Neuse River ascends the Wilson Mills Scarp, the Coats Scarp, and enters the Piedmont Province in the neighborhood of Clayton. The Piedmont of North Carolina, considered an *exotic terrain*, was created when the Blue Ridge Province collided with a volcanic island arc during the Middle Ordovician 450 mya. The elevation of the Piedmont Province at its interface with the Inner Coastal Plain ranges from 300 to 600 feet above sea level (Thornbury, 1965, 30-36; Daniels, Gamble, Wheeler, and Holzhey, 1972, 11-16; Daniels and Gamble, 1978, 44-48; North Carolina Geological Survey, 1991).

The profile of the likely route of a railroad from Raleigh to Waynesborough, following the route of the North Carolina Railroad from Raleigh to Goldsboro, shows a rise in elevation from 62.38 feet above sea level to a maximum elevation of 406.79 feet near the granite quarry between Auburn and Garner. The "Generalized Geologic Map of North Carolina" in *The Commercial Granites of North Carolina* by Richard Councill indicates that the Precambrian and Paleozoic granitic rock of the eastern section of Wake County extends into Johnston County near the neighborhood of Clayton. East of Clayton, the lower Paleozoic slate, flows and pyroclastics occupy more than half of the county to the boundary of the Coastal Plain (Councill, 1954, 7). Between Selma and Rosewood, the land is a relative smooth terrace averaging approximately 150 feet above sea level (Figure 26). In its extent, the route does not appear to demand extensive excavation into rock until it enters Wake County. However, the ascent west of the Neuse River suggests that heavy locomotives would have been needed to overcome the grades if the railroad were built during the 1830s.

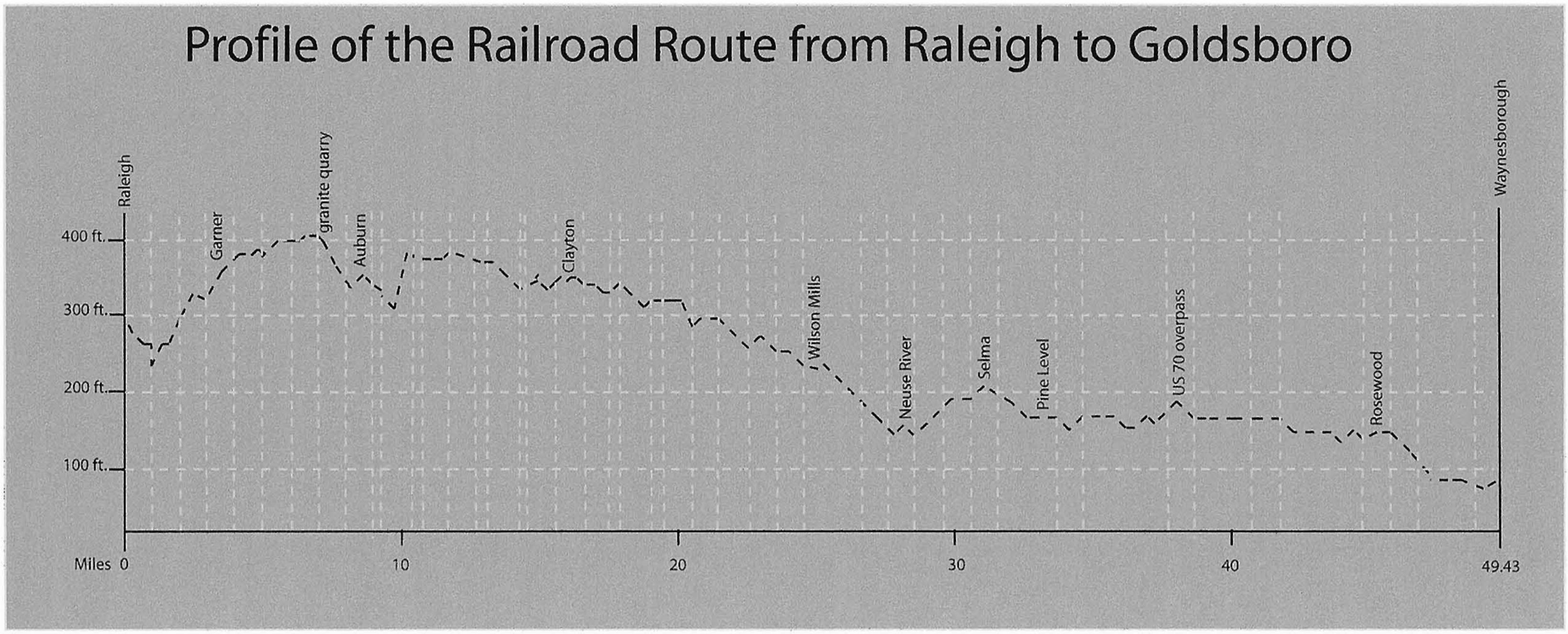

Figure 26. This profile illustrates the route between Raleigh and Goldsboro following the North Carolina Railroad. It is likely that Walter Gwynn would have selected this route earlier for the Waynesborough to Raleigh branch of the Wilmington & Raleigh Rail Road.

CHAPTER XVIII

REVIEW OF THE LITERATURE

Counterfactual Causal Analysis

The review of archival resources and related scholarly works presented thus far fail to provide conclusive support for either of the hypotheses. A geographic counterfactual analysis, based upon concrete geographic data and the extant technical and financial records of the actual railroads, appears appropriate for the resolution of this problem. For example, the route of a proposed railroad can be projected on the actual physical geography, and technological data from historical railroad surveys can be used to create a counterfactual survey. If the mock survey proves the project technically or financially impractical relative to the actual railroads, the plan can be dismissed as visionary but unworkable. Otherwise, the performance of the actual railroads must be the standard for measuring the proposed route.

Counterfactual analysis is well established in history, but the complexity of human interactions, extrinsic events, missing information, and the unexpected influence of chaos confound its use on a large scale. In addition, the further a particular event recedes into the past, the more the opportunities for acquiring new information decrease and what remains is that which survives as a fragment of the general culture. In geography, the modeling of probable outcomes of changes on the physical landscape is standard. The field of urban and regional planning is rooted in (spatial) counterfactual reasoning. Planners weight the benefits of proposed improvements based on empirical data, and recommend those most likely to succeed. Applying counterfactual analysis to historical geography offers several advantages over its application in history. Areal units are unique in location and many of their qualities are quantifiable. In most instances, barring catastrophic events, the physical landscape preserves human activities and environmental changes. The site of past human activities, in most cases, can be examined directly. Physical features of the landscape, again barring catastrophic events, can be treated as a constant in the context of human activity. The projection of alternate land usages and/or the construction of cultural landscape elements can be expressed in quantifiable units. The object of a spatial counterfactual analysis in historical geography is to generate empirical data for hypothetical changes to the cultural landscape that can be compared to data from actual human undertakings on the same landscape.

History is concerned with actual events, not possible events. However, it is difficult to assess the significance of an event without considering the consequence of the event not having happened, or contributing antecedent events altering the nature of the significant event, or the alternative histories that might have taken place if things had happened differently. Epistemological problems associated with counterfactual claims. There is no way of validating assumptions about the significance of something that did not happen. Yet, the counterfactual claim, as explained by Johannes Bulhof, takes the form of a conditional statement such as "if *p* then *q* where *p* and *q* are any sentence which is either true or false." When *p* is a counterfactual then the sentence is false. Thus, counterfactuals are modal in that they present a possibility and what follows from it. Modal claims are useful in studying the past in that they provide insight into why something happened (Bulhof, 1999, 145-146, 159-167).

De Mey and Weber describe the function of "thought experiments" in analyzing causal relationships. While it is obvious one cannot experiment in the past, these authors introduce the concept of "experimental questions." These fit within a logical framework: "Why does object *a* have property P (at time *t*)?" and extend with contrasts such as "Why does object *a* have property P (at time *t*) rather than property P'?" and so on. Using several forms, numerous contrast questions are to objects, properties, and times. The object can be as discrete as a single individual or as broad as the national economy. Some answers to these questions would yield "complete explanations" and others "partial explanations." The first statement attempts to define the only cause of the phenomenon, whereas the second statement is a contributing cause of the phenomenon for the same question. A contrasting question that presents an alteration of the variables in the original question leads to the rejection of some earlier explanations and the strengthening or weakening of others. Explanations of the facts and the contrasts can be "weighted" to segregate all the contributory causes that differentiate one event from the other that is being drawn into comparison (De Mey and Weber, 2003, 28-38). The logical structure of counterfactual models has led some researchers to design programs for helping students of history understand the causal relationships contributing to certain events. This method allows the student to develop the mental skills for recognizing causal relationships rather than extracting this information under the guidance of an instructor (Blow, 2001, 118-121).

German sociologist Max Weber (1864-1920) advanced a methodology utilizing counterfactual reasoning and comparison in his writings in which a causal analysis of the actions of individuals also includes their desires for given outcomes and their notions on how their desires are to be realized. Psychologist Johannes von Kries influenced the development of aspects of this methodology. Von Kries addressed the incomplete and generalized nature of human perception. Even descriptions of the results of causal antecedents are incomplete. Determining the causal relationship between one event and another is a question of "objective probability." Weber was attracted to the quantitative aspects of von Kries's methods; however, he placed an emphasis on counterfactual reasoning as an essential element of causal analysis. He noted that should a historical fact with a large historical context be altered or absent it would bring about a divergent course of history, and determine the "historical significance" of a fact. Weber considered counterfactual reasoning as "conjectural sorting and ranking of possible causes." The absent, altered, or inventing cause is weighted on its influence on the course of subsequent events (Ringer, 2002, 163-168). The historical record contains in every recorded documented detail a particular context that somebody took pains to preserve. Some of this information is critical to establishing significance, and some is inconsequential. That the significance of certain recorded events is not fully understood is quite possible, and the historian might be unaware of critical information missing from the historical record. The weighting of causes in counterfactual reasoning isolates critical and/or contributing events from the mass of historical facts and identifies gaps in the record.

The holes in the historic record are problematic for several reasons. Hans Kellner identifies four responses to missing information. First, there is a tendency to ignore the gaps and pull together facts into a seamless narrative. Second, the absence of information appears as an obvious break in the narrative. The historian presents an "irritated apology" for the gaps in the narrative. Third, the historian relinquishes the role of "omniscient narrator" to take a qualified hypothetical approach to certain assertions while avoiding the impression that the whole of the work is speculation. Finally, the historian adopts the strategy of addressing the nature of the missing information and the mechanism behind its loss. Kellner, however, continues with a discussion of the selective processes, both from a philosophical and psychological perspective, involved with perceiving and preserving information. Culture preserves itself through documents, and uses the most "fit" – in the Darwinian sense – to reconstruct a representation of the past. Unrecorded information is significant because we have first-hand experience of lost information, we judge time and space to be continuous in our experience, and intuitively perceive that there is a more of a past than we know about. Kellner continues by describing historic records that were destroyed, "information that exists but is *unfound*," information that is "*non-existent in time and space*," and information "*not imaginable*." The "*non-existent in time and space*" includes objects of historical imaginations – "what if" scenarios. The last category, the "*not imaginable,*" is particularly enigmatic and serious because knowledge of the past informs subsequent events, and we anticipate the discovery of information in the future that could change the context of our knowledge of the past (Kellner, 2001, 275-290).

History is inexorably connected to a place. Even if its agents are in motion, they follow a route that has length and direction through the concrete medium of place(s). Specific locations can be associated with geographic coordinates and unique positions as well as relationships to other places. On any particular day of any particular year, the sunrise occurred at a specific time, the moon transits at a specific time. This information is historical, but derived through calculation. The soil in a location maintains a record of natural and human activities. Tree rings reflect the climate from year to year. Setting an event, actual or counterfactual, in a location imposes a set of physical limitations. The historical narrative, as mentioned above, is selective in what it records. Authors of the narrative's frequency provide problematic references to places. Even in old surveys, one might find a passage such as "two hundred poles from Mr. Johnson's gate to the large oak." If these features are gone, the research must start at the identifiable points, and reconstruct the parcel from the distance and bearings provided.

David Henige discusses a number of specific cases where researchers attempted to find exact locations of a place mentioned in texts. Not only is he concerned with historical documents, but also locations mentioned in legends and those made famous in works of fiction. If the place actually exists or existed, the search for its location is often hampered by incomplete references in the text. The names of places and the meanings of certain words might have changed over time, or place names mistranslated. The work might be written in the form of a firsthand account, but in reality, the author merely recorded the accounts of others. Instances also exist in which where the description of a place in a text makes it appear real when it is not. If the text of a real event is exaggerated, the researcher attempting to find the location might select the wrong site. The extrinsic significance of a text, political or ideological, might taint the researcher's objectivity in identifying a site. Henige recommends that researchers should exercise caution in accepting or rejecting sites of historic events. Evidence and argument establish the validity of a possible site regardless of the need to find such a place. The researcher must examine the surviving primary sources and other versions of the text in order to identify discrepancies, as well as consulting the critical scholarly works associated with the text (Henige, 2007, 237-253).

Spatial Knowledge in Historical Narrative

Hitherto, much of this essay has discussed the testing of historical statements, the identification of gaps and missing information, and the difficulties of associating places mentioned in historical texts that can be associated with a specific location. The content of the text transmits information about place, and recognition of spatial form in a text is essential to understanding the places it describes. It follows that the reader must possess a refined level of geographic knowledge to interpret the text fully. The geographically naïve reader conceives a neutral landscape of vague dimensions where the noun assumes the iconic form in which the person first became acquainted. River is the primal icon for all rivers – the spatial image that the individual has acquired in the learning of the word. This form of the word is a pragmatic device that allows the reader to progress through a text using mental stagecraft. The backdrop of human actions described in the text is the reader's personal stock of stereotypical impressions. This psychological phenomenon facilitates the comprehension of traditional narrative form by replacing the need for detailed descriptions of actual or imagined places with categorical descriptions that draw up the imagination of the reader. This is a legitimate device in fiction and drama, but it can deprive the historical record of geographic context. However, without the addition of long discursive notes on the actual geographic context, the reader's comprehension of the text is part fact and part fantasy. As a result, even the astute reader will disregard the significance of the location of the narrative if the writer places the entire burden of establishing the representation of place on the imagination of the reader. Landscape is more than a scene. It is a unit of the environment, possessing both dimensional properties and spatial meaning, which extend beyond the narrative.

> Landscape is an ordering of reality from different angles. It is both a vertical view and a side view. The vertical view sees the landscape as domain, a work unit, or a natural system necessary to human livelihood in particular and to organic life in general; the side view sees the landscape as space in which people act, or as scenery for people to contemplate. The vertical view is, as it were, objective and calculating … The side view, in contrast, is personal, moral, and aesthetic … If the essential character of landscape is that it combines these two views (objective and subjective), it is clear that the combination can take place only in the mind's eye. Landscape appears to us through an effort of the imagination exercised over a highly selected array of sense data. It is an achievement of the mature mind.
>
> – (Tuan, 1979, 90) –

Yi-Fu Tuan ended his statement with the words "mature mind" for an appropriate reason: he continues with an examination of how children perceive landscape with greater clarity as they acquire a greater understanding of individual elements and envision the activities associated with a particular landscape (90-91). The astute reader of history is a “mature mind” by definition, and it follows that if given enough information about a historical landscape, he or she will achieve understanding of place that is a unity of the objective and subjective at a point in time.

Reginald G. Golledge, in his 2002 presidential address to the Association of American Geographers entitled “The Nature of Geographic Knowledge,” discussed the transition from phenomena focused research in geography to “intellectual” conceptual and theoretical expansion within the discipline over a span of fifty years. Technological innovations in spatial representation added this development. A significant body of research on cognitive aspects – “understanding ‘why’ and ‘how’ in addition to ‘what’ and ‘where’” – was undertaken during the latter decades of the twentieth century.

> The accumulation of geographic knowledge has consequently changed from item recognition, place labeling, and place inventory or gazetteering to feature and distribution matching in real or image settings, item manipulation, item transformation (e.g., using logical reasoning, deductive and inductive inference, analysis of complex forms, and multi-modal representation).
>
> – (Golledge, 2002, 1) –

It is not a flight of metaphysical fancy to realize that “why” and “how” involves a conceptual leap into the past. If we anticipate some future “why” and “how,” we assume the *a tergo* perspective of the projected event. Therefore, spatial reasoning allows the mind to contemplate categories of geographic knowledge akin to those for history described by Kellner; however, the implied causal relationships in these geographies are ground in the concrete world. Geographies non-existent in time and space and include mundane plans for subdivisions, artificial lakes, sewer systems, public parks, and so forth. The projected outcomes of these manipulations of the physical landscape involve change in the objective and subjective character of a measurable space, whereas, imagined consequences of non-existent historical event presents difficulties because actual events occupy all moments in time. Lost geographies are actually unfound geographies: paleontology, archeology, genetics, and geology contribute location specific data that can be realized as geographic knowledge. The truly lost geographies are histories of things in motion that have no observed recurrent period and leave no identifiable impression on the landscape.

How much of geographic knowledge is history? History, as a discipline, is the study of actual events; and it is a selective study of those significant events. Significant events are those deemed to share a causal relationship with latter events also considered significant. All history is a type of geographic knowledge as far as all events have a spatial existence. Even ideas are spatial events because they are formulated in a location and diffused across space. However, geographic knowledge is not history *per se*; rather it is the record of place. The geographer is concerned with the significance of place, regardless of causal disconnects in the historical record. Geographic knowledge is a function of spatial visualization. Golledge, Dougherty and Bell examined the mental processes associated with acquiring spatial knowledge, the required components of geographic knowledge.

> Spatial visualization is the ability to mentally manipulate, rotate, twist or invert two- and three-dimensional pictorially presented visual stimuli. This ability involves recognition, retention, and recall of two- or three- dimensional structures

> in which change among the internal parts is depicted. It may also refer to an object manipulated in three-dimensional space.
>
> – (Golledge, Dougherty, and Bell, 1995, 136) –

These researchers continue by explaining spatial orientation, the ability to comprehend visual patterns from different viewpoints, and the understanding of spatial relations, necessary for acquiring geographic knowledge. Their study involved testing survey-level knowledge, or the "bird's-eye view," and route-learned spatial information. The results showed that map learners excelled in understanding spatial relations within the environment, and prior training in geography was an aid in route-learning situations (136, 151-155). The survey-level knowledge is the objective view described by Tuan. The route-leaned knowledge is initially subjective, but the mind forms its objective counterpart. Understanding the spatial relations depicted on the objective view of a map aids individual spatial understanding on the route-level subjective.

The theoretical support for use of counterfactual analysis in the historical rests upon the realization that the mature mind has the innate ability to gather information concerning spatial relations, intellectually manipulate them, and project their qualities into an objective view that exists outside experience. Geographic knowledge is the product of spatial reasoning, and its representations as map images and map features – such as contour lines, isohyets, symbols, boundaries – and transcends what can be observed on the ground. Maps illustrate the concrete and quantifiable, the objective. The objects of maps are associated with physical properties and tangible quantities beyond what is depicted. Therefore, the representations on maps can be manipulated logically, as with the elements of geometry, to form meaningful proofs. A geographic counterfactual analysis disregards the intangible qualities of history, and renders the historical landscape as a spatial system. Having established this principal, there remains the task of discussing the nature of the human landscape, and the appropriate means by which its empirical expressions can be used in a counterfactual analysis. The limits of geographic counterfactual analysis are that its processes are tautological and beginning with a body of data related to an actual landscape. Conceivably, the complexity of such an analysis would be proportional to the size of the study area and its content. Therefore, the accuracy of the method should be greater at smaller scales and for a specific geographic topic. Like the temporal constraints of counterfactual analysis in history, the size of the area introduces more variables and unknowns. Finally, the analysis cannot embrace influences that emanate from the human disposition that are beyond quantification, and addresses only their use of the land. What remains is the domain of history.

At this point, it is necessary to expand the discussion from the view of landscape to the qualities of landscape. Carl Sauer, in his seminal work "The Morphology of Landscape," explains the division between the natural and cultural landscape.

> The area prior to the introduction of man's activity is represented by one body of morphological facts. The forms that man has introduced are another set. We may call the former, with reference to man, the original, natural landscape. In its entirety it no longer exists in many parts of the world, but its reconstruction and understanding are the first part of formal morphology … The works of man express themselves in the cultural landscape. There may be a succession of these landscapes with the succession of cultures. They are derived in each case from the natural landscape, man expressing his place in nature as a distinct agent of modification.

– (Sauer, 1925, 37) –

In other words, the natural landscape is significant in that humans use it and the cultural landscape emerges connected to it. Sauer stated many years later that the spatial differentiation of nature and culture was “the first exercise in learning geography” (Sauer, 1974, 190). The natural landscape is a starting point for analysis, for its unique character cannot fully be divorced from the human landscape it supports; nor with the most rigorous efforts can its qualities be completely obliterated.

The cultural landscape is considered by some to be a historical contingent process. Allan Pred, in the early 1980s, explored the integration of time-geography and the social theory of *Structuration* to develop a regional geography based on particular historical conditions of place rather than all-encompassing general laws. Applications of the *Time Geography* proposed by Torsten Hagerstrand are most closely associated with transportation planning in the urban context and the concepts of space-time autonomy in describing the mobility of individuals and classes of individuals. There are three categories of constraints on mobility. *Capability constraints* are limitations on what tasks can be accomplished in an interval of time with a specific transportation technology. *Coupling constraints* are transportation problems that arise from the need to have coordinated schedules and tasks with others taking a different path. *Authority constrains* are “the social, political, and legal restrictions on access” (Hagerstrand, 1970; Hanson, 2004, 3-8). *Structuration*, as defined by social theorist Anthony Giddens, is “the structuring of social relations across time and space, in virtue of the duality of structure” (Giddens, 1984, 376). In many ways, the theory deals with the dialectic between individuals, groups, and large social systems as their social interactions are produced and reproduced - often mediated by technology. Pred builds on the work of Hagerstrand and Giddens to create a regional model whereby two processes are seen as occurring simultaneously over time and space. The first process involves the “intersection of individual paths and institutional projects (practice)” becoming “established, reproduction, and transformation of power relations” (structure), and the reverse. The second process involves the *genres de vie*, and social reproduction includes the “spatial and social division of labor (production and distribution)” and “sedimentation of other cultural and social forms” becoming biography formation, socialization (pertains to individual development within the social structure) and the “transformation of nature” (changes to the environment brought about through human agency). All processes occur simultaneously (Pred, 1984, 282-291). It is a model of an interdependent totality that is perpetually regenerating and recreating itself. Unlike Ratzel’s “organism attached to the land,” it is an engine of new combinations.

In many ways, this system is analogous to harmonics. That is, harmonic relationships – clear consonances and dissonances – are present in the most random sounding of tones by many voices. Waveforms will reinforce themselves and produce an increase in amplitude, and thus emerge from a background of cacophony or noise. The sounding of a tone and the fifth above it will produce a resultant octave below the fundamental. If all the voices are sounding the same sequence of tones repeatedly, but at different starting points, different transpositions, and different rhythms, there will be moments of random order where the harmonies will appear composed. In the music of the twentieth century, many composers experimented with systems and techniques that ranged from the repetitive combinations (*minimalism*) to the controlled chaos of aleatoric music to rule-oriented twelve tone rows (*serialism*). On the landscape, paths and patterns – periodically adjusted – form the framework for channeling the lower level ordering of project activities and the movements of individual volition. One set of activities rises to dominate then fades into noise, followed by other combinations, and the areal structure evolves to a new configuration.

States are cultural spatial units that usually interact with other states. As a result, there exists the potential for the transfer of technology and/or culture. The widely accepted concept for this process in past geographic thought has been *diffusionism*. However, in recent decades scholars challenged its validity because of its tendency of being culturally biased, the assumption of a one-way outflow of innovation, and the elitist view that the masses are inclined to imitate. J.M. Blaut, during the late 1980s, presented a theoretical alternative to diffusionism: *uniformitarianism*. While this approach does not attempt to diminish the significance of individual invention, it recognizes the mediating force of a feedback effect whereby invention is improved, modified, and obtains new applications in the cultural landscape. Blaut defines the seven diffusion processes of uniformitarianism as cellular, ultra-rapid, crisscross, dependent, disguised, phantom, and displacement (Blaut, 1987, 30-31, 35-39).

The form of diffusion in the uniformitarianism approach that appears most relevant to counterfactual analysis is dependent.

> In dependent diffusion, assume the diffusion in the same space-time of two traits, *x* and *y*; *y* is dependent of *x* if the diffusion of *x* is an autonomous process, explainable in terms of a definite causal model, and if the diffusion of *y* is wholly

> explained by the fact that wherever we find *x* we tend to find *y* (for wherever reason). Trait *y* may covary spatially with *x*, or it may simply be an adventitious attachment to *x*. In such cases we would be in error if we explained the diffusion of *y* with a model postulating an autonomous cause of the diffusion.
>
> – (Blaut, 37) –

The strength of a counterfactual model in geography rests on proving that the presence or absence of a diffused element of the human landscape would affect its spatial organization with respect to its concomitant dependent being diffused or not. For example, introducing fertilizers into a region where they had not been previously used can encourage the cultivation of certain crops that the soil could not previously support. Consequently, the introduction of this new crop might change the regional economy. Yet, the introduction of the fertilizer might be connected to other changes unrelated to this crop. Both changes brought about by the fertilizer and crop could bring about innovations from within the region, such as a new food product, that would defuse outward. The other types of diffusion described by Blaut are associated with very specific situations, such as innovation developing in isolated pockets within a region, the rapid introduction of innovations into undeveloped regions, diffusion throughout a region in the absence of inhibiting factors, and a few novel situations. The dependent form, however, suggests a linear association.

The prevailing direction of geographic thought does not preclude the use of counterfactual analysis for the identification of causal relationships for specific spatial phenomena. The quantifiable nature of spatial information, the necessary “objective” projection required of spatial reasoning, the inseparability of the physical and human landscape, and the diffusion patterns of innovations recommend its use in geography. The use of causal models in the physical sciences is commonplace. Insomuch as geography is the study of spatial patterns, paths, and movements and these quantities find their ultimate expression in graphic form, counterfactual analysis in these fields offers the potential for more productive results than its use in history. This is not meant to suggest that it substitutes for rigorous historical research. However, grounding history in the physical and cultural realities of place removes the tendency to place past events within the mental scenery of personal stereotypes. The selective nature of the historical narrative often excludes the particular qualities of landscape, and there are likely instances where the answers to causal questions are found only in mundane concrete realities of landscape.

Codifying the Paths

Having discussed the theoretic foundation for the use of counterfactual analysis in historical geography, the task of selecting a method of codifying the complexities of spatial information used in the analysis remains. *Locations* and *paths* are the base categories of classifying space, or in geometric terms, points and lines. Locations in terrestrial space have *XY* coordinates and elevations to define their position. Paths connect locations and any collinear points between defined locations that in total define the topographic profile. A set of paths radiating out from central locations can provide enough data to produce a representation of the topography of an area in three dimensions. However, the "code key" to all this data is the earth, and given enough locations and paths of varying distances and directions, one can calculate the size of the earth and thus the global system of longitudes and latitudes – the key is within the code.

Path in the context of human geography includes the dimension of time. Culture at all levels involves some type of transaction in space-time. It has inseparable mechanical and conceptual aspects that resist reduction to standard units. While the movements of humans and the distribution of their activities involve the expenditure of energy in the pure sense, the evidence of their efforts exists in artifacts. The paths of individual activities are often ephemeral. Noam Shoval and Michal Isaacson, using GPS logs and *ClustalG* software, illustrated the visualization of space-time paths using sequence alignment for visitors to Akko's Old City in northern Israel. The site has a number of significant locations available to visitors, starting and ending at a common location. The visitor paths and time spent at each location vary, and there are several mandatory locations on the tour. The use of the *ClustalG* software allows for the comparison of sequences of time-space activity, and the creation of a taxonomic tree that describes classes of visitors.

> The research methods used in this study, combining as they do sequence analysis with high-resolution spatial data, have potential, not least in opening up new, previously infeasible lines of inquiry in geography in general, and in that of time geography in particular, where "sequences" are of key importance. The application of sequence analysis in the context of time geography would allow researchers to aggregate, to create generalized space-time paths, and thereby typologies of space-time activities.
>
> – (Shoval and Isaacson, 2007, 295) –

ClustalG is a general version of that program ClustalX, developed for biochemical applications – nucleic acid and protein. This command-line version *ClustalW* and the graphic version *ClustalX* are available with detailed documentation on the Clustal website (Conway Institute UCD Dublin, 2008).

Clarke Wilson of the Canada Mortgage and Housing Corporation published several articles in *Environment and Planning* that advocated the use of sequence alignment analysis over the prevailing practice time-budget analysis. He argued that the time-budget studies concentrate on aggregate data while overlooking the more detailed and qualitative aspects of individual level data. While researchers can analyze simple alignments by conventional means, Wilson recommended the *Clustal* software used in molecular biology for multiple alignments. The software had its limits because it was designed to use alphabets of four letters for nucleotides or twenty letters for the amino acids (Wilson, 1998). The problem was resolved with *ClustalG*.

Andrew Abbott and Angela Tsay reviewed all the known studies on optimal matching and sequence analysis in the social sciences in an article in *Sociological Methods & Research* in 2000. They detail the history of its applications on various data, define its processes, and isolate types of problems.

> OM algorithms generally work by defining simple algebras that permit the creation of metric distances between sequences. These simple algebras involve at a minimum the operations of replacement, insertion, and deletion, the latter two often known simply as indel. The distance between one sequence and another is defined as the minimum combination of replacements and indels required to transform one of the pair of sequences into the other. Different replacements can be weighted differently in accordance with some theoretically driven scheme. Indels can be weighted linearly or, as is more common in the biological literature,

> assigned a single "gap cost" that may or may not be augmented by a smaller cost linear in the length of the inserted (or deleted) material.
>
> – (Abbot and Tsay, 2000, 5-6) –

Abbott and Tsay note that some information loss can occur when multidimensional forms are reduced to one-dimensional forms, as well as the problems associated with setting high-cost indels greater than half the largest substitution cost (12).

Codifying the Landscape

The development of a methodology the uses sequences representing the physical characteristic of landscape is a different problem from representing spatial behavior. The underlying geology and the geomorphic processes acting upon the surface determine the particular conditions of landscape. Commonalities exit between different landscape structures throughout the globe, but they are diverse in extent and detail. Likewise, the context in which a landscape is being examined contributes its own information to the methodology. For example, this study is concerned with the feasibility of building a railroad from Waynesborough (Goldsboro) to Raleigh using the railroad technology and construction practices of the 1830s. The questions that must be answered is how much excavation, embankment, trestlework, and bridging is required to create a railroad bed of 16 feet in width over a distance of 49.43 miles. While an actual railroad was built along this route during the 1850s, an earlier railroad must conform to the grade appropriate for the use of the lightweight locomotives of the 1830s. This statement is expressed in the present tense because it is a doable experiment, albeit an impractical one. The past does not erase technology; it simple removes the practitioners. A counterfactual model of a technological object, such as a railroad, is an empirical representation of the thing itself. A sequence of code that represents a civil engineer's approach to topography is a shorthand of a survey. Therefore, the researcher must begin with an examination of the motive power of the locomotive, and then select the appropriate grade for optimal performance of the same. Economics determine how much effort is expended on achieving the level grade. If it is more cost effective to employ a power locomotive on steep grade rather than excavating for a level grade for a light locomotive, the engineer will elect to do so. It follows that there are many possible ways to reduce these practices to code sequences. The topography is specific and unique, but there a many combinations of methods – thus, many possible sequences representing these methods – for traversing the same topography.

The codifying of the landscape for construction of a railroad imitates the procedures of the survey. The methods mentioned above concerning the use of code sequences to describe individual and collective paths are useful in analyzing the function of a railroad. The author intends to apply some form of both to the problem presented in this work.

CHAPTER XIX

METHODOLOGY

In Chapter XVII, the profile of the actual topography of the route was plotted (Figure 26). The alignment of the counterfactual railroad grade on the profile provides a framework for its division into categories of construction methods – trestlework, excavation, embankment, and bridging. Rather than using a large set of characters to reference all the details of the topography, the characters will represent the railroad construction method likely to have been used with a particular element of the terrain – *grading* (G), *embankment* (M), *excavation* (X), *piles* (P), *trestlework* (T), and *bridging* (B). "Grading," used here, refers to leveling the rail bed on a near flat terrain, "embankment" is building up the rail bed to level the grade through depressions and inclines, and "excavation" is the removal hillside structures. Piles, according to the specification described for the Charleston & Hamburg Rail Road, are used in soft soil and are less than 15 feet high, but usually 7 to 10 feet (Ruffin, 1833, 263). Trestlework is appropriate for crossing swamps and lower order streams such as creeks, and bridges are needed for higher order streams such as rivers.

The junction of the North Carolina Railroad and the Wilmington & Weldon Railroad occurred on the south side of Goldsboro at N35.37326º, W78.00729º. This is the point where a likely Waynesborough to Raleigh connection could have commenced. In this study, the divisions of the route are associated with three terrains, Coastal Plain, Transition Zone, and Piedmont. In this way, the code can be associated with an actual landscape. The specifications and related costs for the construction of piles and trestlework are available in several period documents including all the surveys previously mentioned, as well as *A Treatise of Wooden Trestle Bridges according to the Present Practice on American Railroads* by Wolcott C. Foster (Foster, 1904, 1-153). The cost estimates provided in the survey for the Portsmouth & Roanoke Rail Road by Walter Gwynn allow for the preparation of a table for excavations and embankments up to 36 inches. Here it receives the term “G” for grading because it is below the height for piles and the depth of earth that is removed and is merely a rise in the terrain. Establishing the cost of grading as a constant for the entire length of the Waynesborough to Raleigh route will isolate the most costly works that this route might have entailed had it been built during the same period as the Wilmington & Raleigh Rail Road, the Raleigh & Gaston Rail Road, and their counterparts in neighboring states. Reducing it to several constants for different sections corresponding to the two physiographic regions can achieve the same ends. A table for the cost per mile in cubic yards of inches of earth removed or added can be produced from Walter Gwynn’s specifications for embankments and excavations for the Portsmouth & Roanoke Rail Road, along with his estimates (Table 5). The median volume for embankment on nine of the ten divisions of this railroad (the first is not itemized) is 11,185.08 cubic yards per mile, at a cost of $1,118.50. This is approximately six inches of earth added. The median volume for excavation is 10,094.33 cubic yards per mile, at a cost of $908.49. This is nearly six inches of earth removed.

INCHES	CUBIC YARDS PER MILE	COST OF EMBANKMENT	COST OF EXCAVATION
1	1,851.67	$185.17	$166.65
2	3,740.00	$374.00	$336.60
3	5,665.00	$566.50	$509.85
4	7,626.67	$762.67	$686.40
5	9,626.00	$962.60	$866.34
6	11,660.00	$1,166.00	$1,049.40
7	13,731.67	$1,373.17	$1,235.85
8	15,840.00	$1,584.00	$1,425.60
9	17,985.00	$1,798.50	$1,618.65
10	20,166.67	$2,016.67	$1,815.00
11	22,385.00	$2,238.50	$2,014.65
12	24,640.00	$2,464.00	$2,217.60
13	26,931.67	$2,693.17	$2,423.85
14	29,260.00	$2,926.00	$2,633.40
15	31,625.00	$3,162.50	$2,846.25
16	34,026.67	$3,402.67	$3,062.40
17	36,465.00	$3,646.50	$3,281.85
18	38,940.00	$3,894.00	$3,504.60
19	41,451.67	$4,145.17	$3,730.65
20	44,000.00	$4,400.00	$3,960.00
21	46,585.00	$4,658.50	$4,192.65
22	49,206.67	$4,920.67	$4,428.60
23	51,865.00	$5,186.50	$4,667.85
24	54,560.00	$5,456.00	$4,910.40
25	57,291.67	$5,729.17	$5,156.25
26	60,060.00	$6,006.00	$5,405.40
27	62,865.00	$6,286.50	$5,657.85
28	65,706.67	$6,570.67	$5,913.60
29	68,585.00	$6,858.50	$6,172.65
30	71,500.00	$7,150.00	$6,435.00
31	74,451.67	$7,445.17	$6,700.65
32	77,440.00	$7,744.00	$6,969.60
33	80,465.00	$8,046.50	$7,241.85
34	83,526.67	$8,352.67	$7,517.40
35	86,625.00	$8,662.50	$7,796.25
36	89,760.00	$8,976.00	$8,078.40

Table 5. This table shows the cost per mile for inches of embankment or excavation based upon the estimates for the Portsmouth & Roanoke Rail Road.

The total cost of embankment and excavation for the Wilmington & Raleigh Rail Road was $346,330.83 in total, or $2,151.12 per mile. This is only a difference of $124.13 from the median cost of $2,026.99 per mile for embankment and excavation on the Portsmouth & Roanoke Rail Road. What parts of these routes are similar to the Waynesborough to Neuse River route? For example, the scarp located in the third mile of the Waynesborough to Raleigh route – with its rise of 20 feet in two-tens of a mile – is similar to the scarp at Rose Hill on the route of the Wilmington & Raleigh Rail Road (Figure 27). Beginning one mile south of town on the line of the railroad (N34.81258º, W78.02464º) and ending at Ridge Street in Rose Hill (N34.83636º, W78.02982º), there is an elevation gain of 13.1 feet. The rise does not appear extreme when viewed from the surface (Figure 28). By comparison, the elevation gain at Wilmington from the level of Front Street at the railroad depot site to Fifth Street in the railroad cut is a rise of 13 feet, followed by a descent to the upper yards of 22 feet. However, the rise from the river through the inclined plane to Fifth Street is a rise of approximately 30 feet. In the early years of the railroad, the locomotives in use on the Wilmington & Raleigh Rail Road lacked the power to make the grade from the river. Flights of stairs led from the steamboat dock to the rails at Front Street. An inclined plane of approximately 400 feet in length was constructed during the early 1840s, and in late 1854, a train descending the incline, unable to stop, ran into the Cape Fear River (Sprunt, 1916, 194-195; *Wilmington Chronicle*, 17 May 1843; *Wilmington Journal*, 23 December 1854). However, the approximate length of the incline was 400 feet and its height was approximately 30 feet – or 30 feet in one-thirteenth of a mile.

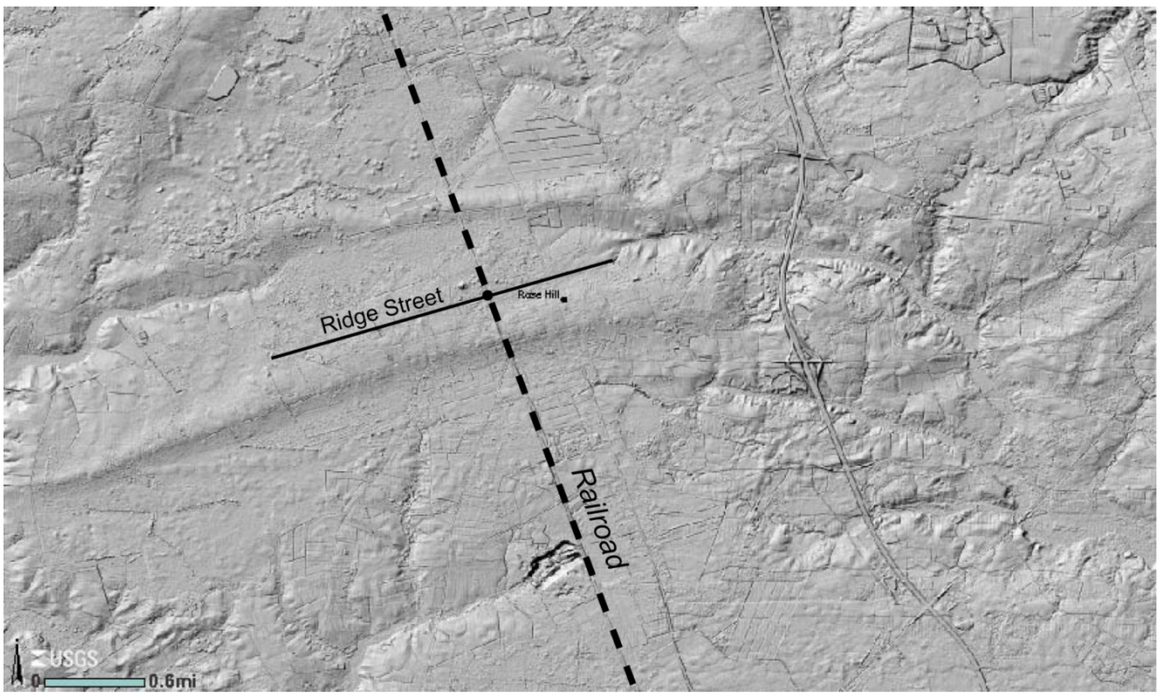

Figure 27. This image depicts the elevations of the scarp at Rose Hill. The ascent reaches a level of 13.1 feet at Ridge Street. The steepest rise is 10 feet in one-eighth of a mile up the face of the scarp.
Source: USGS. (2008). "1/3 ArcSecond NED CONUS, North Carolina-1/9 ArcSecond." *The National Map*.

Figure 28. This photograph shows a view looking south at Rose Hill towards the bluff of the scarp on the route of the Wilmington & Raleigh Rail Road. The rails follow the topography without extensive excavations or embankments. Photograph by James C. Burke

The steepest section of the rise at Rose Hill is an ascent of 10 feet in height over the distance of approximately one-eighth of a mile. The Coastal Plain section of the Waynesborough to Raleigh route as far as the Neuse River near Selma does not appear to present any unusual qualities of topography that would require extensive grading or excavation, and it seems appropriate for light locomotives. The costs for excavations and embankments on the Wilmington & Raleigh Rail Road, at $2151.12 per mile, seem to be reasonable benchmark for estimating the cost of this section of the Waynesborough to Raleigh route. The variable costs are associated with the construction of bridges, trestlework, and piles.

Calculating the volume for large-scale excavations or embankments requires the calculation of the area of cross-sections. The formula for the regular cross-section is $A = c(d + \frac{w}{2})$ where *A* is the area of a level section of the road, *c* is the centerline, *d* is distance between the slopes from center, and *w* is width of the roadbed. The area of the three-level cross-section divides the roadbed into triangles (Figure 29). Its formula is expressed as $A = \frac{w}{4}\ (h_l + h_r) + \frac{c}{2}\ (d_l + \ d_r)$ where one-fourth of the width of the roadbed is multiplied by the sum of the height of the sides and then added to the sum of the distances of the slopes multiplied by half the center measurement (Davis, Foote, and Kelly, 1966, 240-241). This is the basic formula illustrated by John Woodbridge Davis in his *Formulæ for the Calculation of Railroad Excavation and Embankment* published in 1877. Here, the same figure is described in slightly different terms. The area section formula is $A = \frac{1}{2}w(c + Sb) - Sb^2$, where *w* is the width between the top of the slopes, *b* is the width of the roadbed, and *c* is the center measurement.

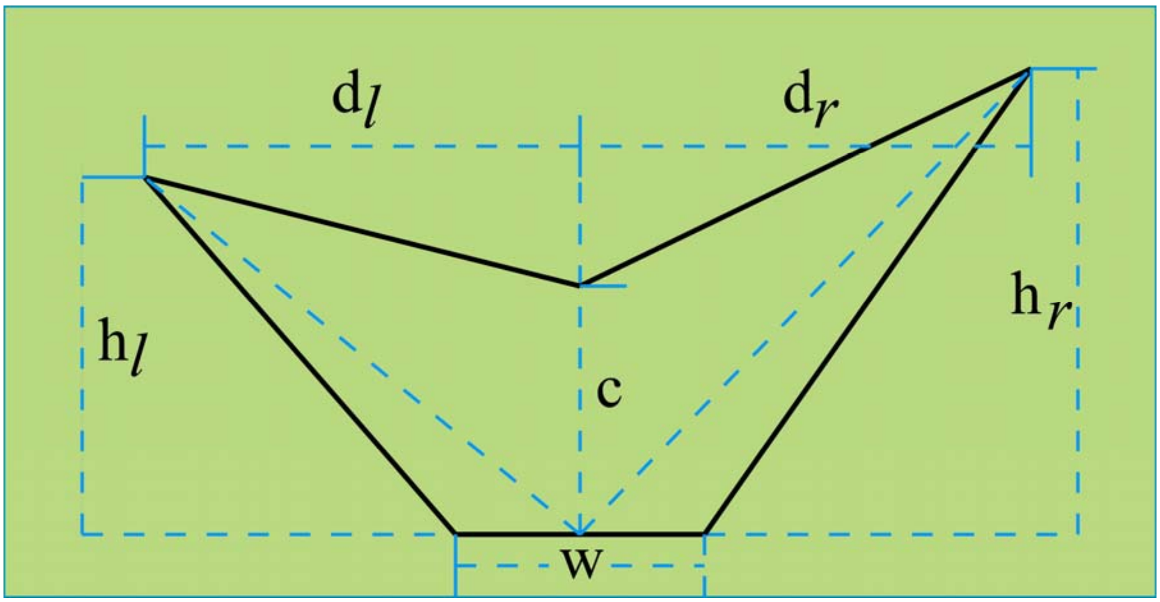

Figure 29. This diagram illustrates the three-level cross-section of a railroad excavation. The terms d_l and d_r represent the distance from center on the left and right to the top of the slopes. The measurement from the roadbed *w* to the top of the center cut is *c*. The terms h_l and h_r represent the height of the slopes on the left and right sides.
Data Source: Davis, R.E, Foote, F.S., and Kelly, J.W. (1966). *Surveying Theory and Practice, Fifth Edition*. New York: McGraw-Hill Book Company.

The term S is the ratio of the slope where $S = \frac{r}{r"} = \frac{l}{l'}$ and $r = Sr'$, $l = Sl'$ giving $\frac{1}{2}\,Sb(r' + l') + \frac{1}{2}c(r' + l' + 2b)$ for the cross-section area.

> Supposing w', c' to represent width and centre at next station, the area of its cross-section may be expressed by a formula similar to the above: half the sum of these, multiplied by dist., *D*, between, and divided by 27, gives a near approximate of the volume bet. In cu. yds.
>
> – (Davis, 1877, 7-8) –

The volume between these two cross-section can be expressed as $V = [(c + w'c') + Sb(w + w') - 4Sb^2]\frac{D}{108}$ where the w' and c' are the width between the slopes and the center measurement of the second cross-section.

The *prismoidal formula* $V = \frac{l}{6}\,(A_1 + 4A_m + A_2)$ is a common method of determining the volume of excavation in cubic yards for railroads and other earthworks. The term l is length between the surveyor's stations, usually 100 feet, A_1 and A_2 are the areas of the end sections, and A_m is the area in the middle derived by averaging the linear dimensions of the end sections. The prismoidal formula yields only significantly different values from the *average ends areas* method $V = \frac{l}{2}\,(A_1 + A_2)$ when there is an abrupt change in cross-section (Davis, Foote, and Kelly, 1966, 245-247).

Walter Gwynn, in his report on the survey for the Portsmouth & Roanoke Rail Road, provides specifications for excavations that allow for a different approach to calculating estimates. The length of the roadbed was 13 to 16 feet wide and the slopes were to be at 45 degrees, thus the area removed amounts to a rectangle (Figure 30).

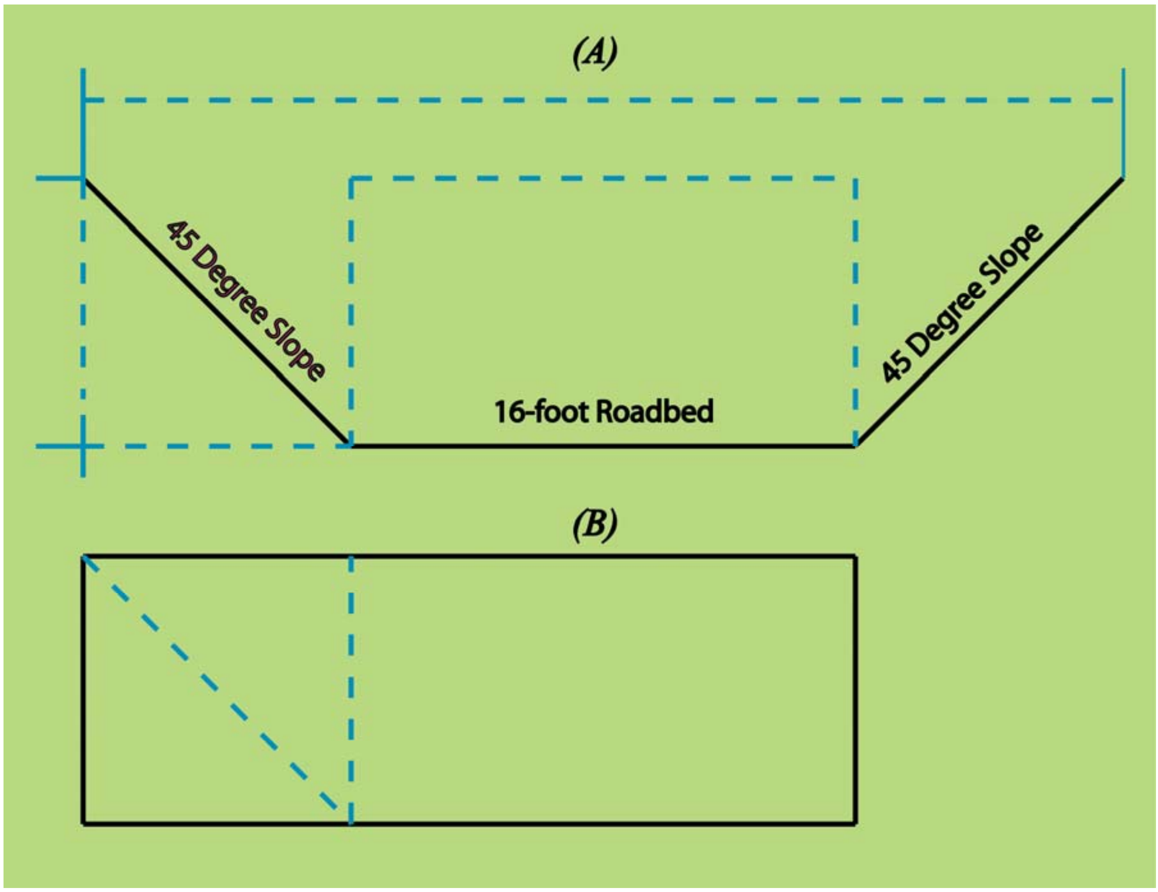

Figure 30. Walter Gwynn specified in his report on the survey of the Portsmouth & Roanoke Rail Road that excavations should have the roadbed at 13 to 16 feet wide and the angle of 45 degrees for the slopes (A). Fortunately, the angle of the area allows the cross-section to be calculated as a rectangle where the height multiplied by the height plus the width of the roadbed equals the area of the excavation into a level surface (B).

The geometric relationships that result from the requirement to have the slopes set at 45 degrees present the opportunity to determine the volume of excavation through a nearly symmetrical hillside. Since the sum of two right triangles of the 45-degree slopes form a square, and the width times the height of the roadbed for another square or rectangle, the sum of the area of both can be expressed as a single square or rectangle. In this instance, the volume of excavation is a uniform slice into the landscape where the width of the roadbed, for the purposes of this study set at 16 feet, is added to the width of the square or rectangle formed from the slopes determined by the height of the cut. Turning from the perspective of the cut to that of the profile, the area of the profile above the aligned grade of the railroad can be multiplied by the total width of the cut to yield the volume of the excavation. This is like cutting a shape from a sheet of paper, and using it as a template to cut the same shape from a thick plank of wood. The profile of some hills fit the shape of a parabola, whereas the shape in three dimensions would be a paraboloid. The area of an ellipse is $A = \pi ab$ where a and b are the semiaxes, a is one-half of the horizontal chord and b is the semiaxis perpendicular to a at the center. If a parabola is the area of a hill profile, the volume of the cut is that area multiplied by the width of the roadbed plus the height, since the angle of the slope is 45 degrees (Figure 31). The formula is $V = \left[\frac{1}{2}(\pi\left(\frac{l}{2}\right)h)\right] \times [w + (h \times \tan 45°)]$. Since w is 16 feet and the tangent of 45 degree is 1.00, it is reduced to the expression $V = [.5(\pi\,(.5l)h)] \times [16 + h \times 1]$. The volume of the excavation is in cubic feet, and must be converted into cubic yards. The formula can be modified for different proportions such as 1.5:1.

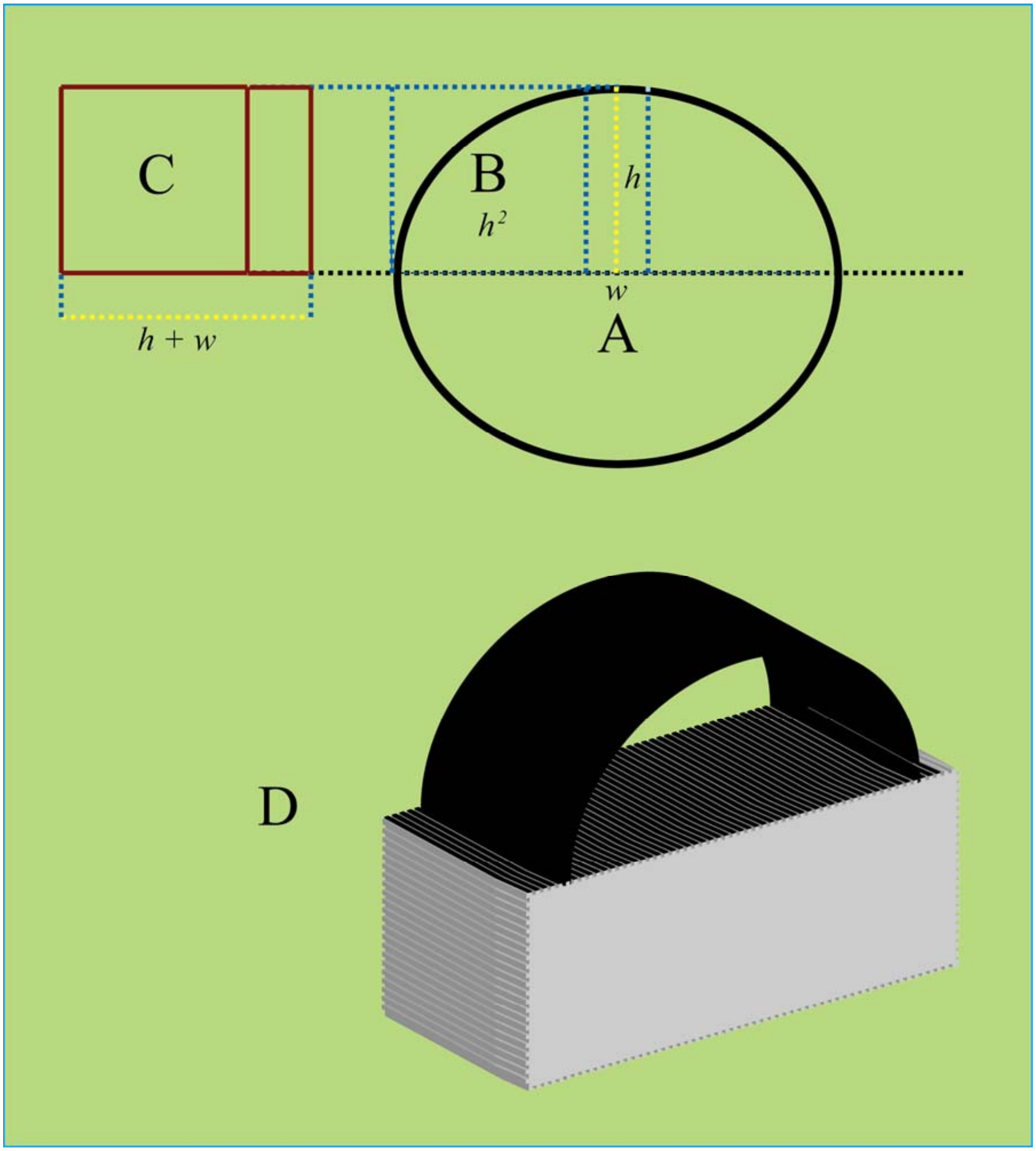

Figure 31. This diagram illustrates a method of calculating the volume of excavation for a hill profile that fits the shape of a half ellipse (A). The slope of the sides are at a 45 degree angle. The combined area of the two slopes is the square of the height *h* (B), and the sum of the width of the roadbed and the height is the width of the cut (C). The volume of excavation is the area inside the parabola and the total width of the cut, or the volume within the arch, and less than the volume of the box below it (D).

Calculating the volume of excavation from profile measurements can never be as accurate as from measurements from a three-dimensional rendering or from survey data. However, there are two compelling reasons to apply this methodology to particular problems. First, if the researcher is working with a limited body of information, such as topographic maps, and survey data are not available, the profile is sufficient for a rough estimate. Second, if the purpose of the study is to estimate the cost of a hypothetical project in relationship to similar works, the average cost of constructing these examples from the real world places a constraint upon the variables in the model. The estimated cost of the model fits within a *constraint equation*. For example, if the cost for a railroad constructed in the Piedmont is $12,000 per mile, the variables of construction must adjust to this constraint. The variables include grade, motive power, excavation, and other factors.

The counterfactual model of the Waynesborough to Raleigh route can be divided into three divisions, Waynesborough to the Neuse River, the Neuse River to modern town of Clayton, and from Clayton to Raleigh. Each of these divisions corresponds to a change in terrain, and for this reason, it follows that the alignment of grade, the application of construction techniques, and the cost per mile for construction would be different for each.

CHAPTER XX

ANALYSIS

Motive Power and Grade

While later generations of American locomotives had the power to ascend steep grades, that a five or six-ton engine of the 1830s would be up to the task is doubtful. However, in a table prepared by Jonathan Knight and cited by William Gibbs McNeill and W.G. William in their report on the survey for the Louisville, Cincinnati, and Charleston Railroad, that larger locomotives had been tested on grades as steep as 92 feet per mile is apparent. Knight, chief engineer for the Baltimore and Ohio, observed that a 7.5-ton locomotive with a 4.5-ton tender could pull a load of 8 tons up an incline of 92 feet per miles a speed of 10 miles per hour. An 8.5-ton locomotive with a 5.5-ton tender could negotiate the same grade pulling a load of 36 tons at the same speed. However, the efficiency of both locomotives was decreased by half with an incline of 25 feet per mile, and again by nearly half again at an incline of 50 feet per mile. For example, the 8.5-ton locomotive with the 5.5-ton tender could pull a 200-ton load at level, a 100-ton load at 25-feet per mile, and a load of 63-tons at 50 feet per mile. The 7.5-ton locomotive with a 4.5-ton tender decreased from a 175-ton load at level to a 54-ton load at 50 feet per mile. McNeill and Williams noted that many sections of the Baltimore and Susquehannah, under construction, had a grade of 90 feet per mile, and the company intended to use 14-

ton locomotives (United States, 1838, 33-34). For reference, 54 tons are approximately the same load as 6.75 bateau-loads.

A 7.5-ton Norris locomotive named the *George Washington*, having 10.25" by 17.625" cylinders and 48" drivers could haul a weight of 137 gross tons in 35 cars. It had been tested on 10 July 1836 on a 377-foot per mile incline, and managed to haul a load of 9.6 tons. The Wilmington & Raleigh Rail Road had ordered a locomotive capable of hauling 170 tons in 1843. By 1845, the Baldwin Locomotive Works had produced a 15-ton locomotive with 14" by 18" cylinders and 42" drivers to address the growing demand for greater hauling capacity (Warner, 1924, 5; *Wilmington Chronicle*, 6 December 1843). That the early locomotives lost a considerable degree of their hauling efficiency, according to the Knight tables, at a grade of 25 feet per mile. To expend resources on making a smooth grade with a low incline for the light locomotives was practical, such as was practiced in England during the period, rather than have an uneven grade with steep inclines and dips using heavy locomotives.

The cost of constructing the 86-mile long Raleigh & Gaston Rail Road, without locomotives, rolling stock, fixtures, and bridges, was $12,540 per mile, according to their chief engineer Charles F.M. Garnett. The cost of the 3,240 feet of bridges cost $155,000 (Ruffin, 1839, 388). Walter Gwynn estimated the cost of the Portsmouth & Roanoke Rail Road without equipment and fixtures to be $405,133. If the cost of the bridge over the Meherrin River ($14,500) and bridge over the Nottoway River ($11,100) are subtracted, the amount remaining is $379,533, or $4,929 per mile (Gwynn, 1833, 6-10). The Wilmington & Raleigh cost an average of $7,094.34 per mile, but this includes bridges and trestlework. Excavation and embankment cost an additional $2,151 per mile, and the completed track $3,906 per mile (North Carolina, 1940b, Schedule A). Applying the cost per mile for rail construction to the Wilmington & Raleigh Rail Road, the cost of the rails from Waynesborough to Raleigh would have been $179,684.60. The cost for excavation, embankment, and trestlework is complicated. Gwynn's estimates for the Portsmouth & Roanoke Rail Road itemize the cost of each. Pile construction on the Charleston & Hamburg Rail Road averaged $2,300 per miles, and trestlework between $6,000 and $10,000 per mile (Gwynn, 1833; Ruffin, 1833).

The 1856 stockholders meeting of the Raleigh & Gaston indicates that the company was engaged in filling in the original trestlework of the road, and cutting ditches between the Warrenton area and Gaston (Raleigh & Gaston Railroad Company, 1856, 8-9, 15-16). From an examination of a section of the Raleigh & Gaston near Macon in Warren County and commencing at N36.43581º, W78.11362º, it is apparent that the locomotives used by the company could make a grade 82.50 feet in a mile. This is 370.45 feet above sea level to 453.33 feet above sea level (Figure 31). In a similar vein, the inclined plane on the Charleston & Hamburg Rail Road, at Aiken, South Carolina, overcame an even greater change in elevation with the aid of stationary engines. This excavation of the inclined plane is a visible feature on the landscape (Figure 32).

> One hundred and eighty feet of this descent to the valley of the Savannah, is conquered at the point by an inclined plane, 3,800 feet long, have three grades of ascent, the steepest of which is 1 in 13. From the foot of the plane, the remainder of the descent is overcome in 10 miles, having an average inclination of 18 feet in a mile.
>
> – (Ruffin, 1833, 261-262) –

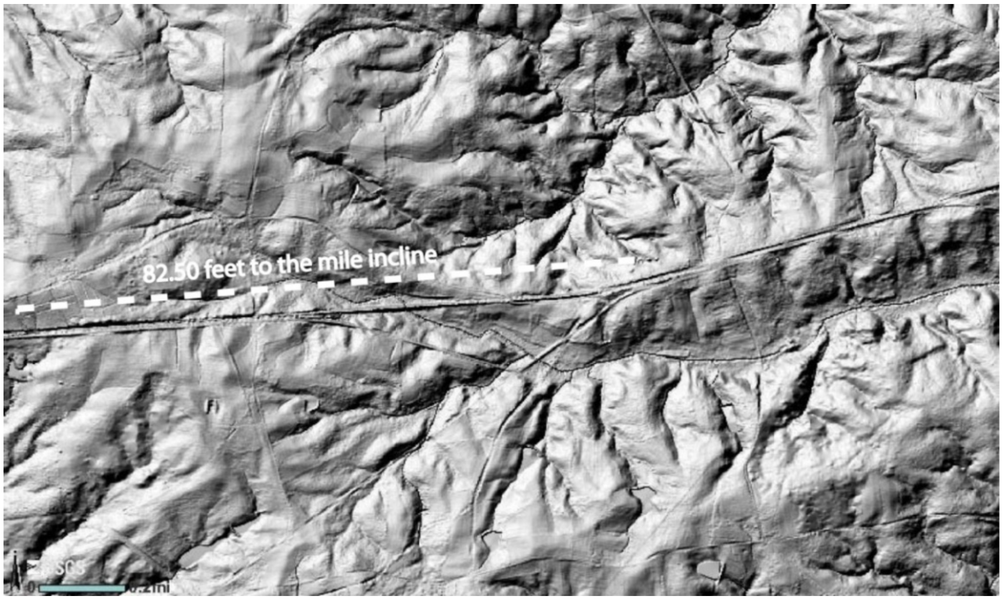

Figure 27. This image illustrates the ascent of 82.50 feet over the distance of a mile on the route of the Raleigh & Gaston Rail Road west of Macon, North Carolina. Source: USGS. (2008). "1/3 ArcSecond NED CONUS, North Carolina-1/9 ArcSecond." *The National Map*.

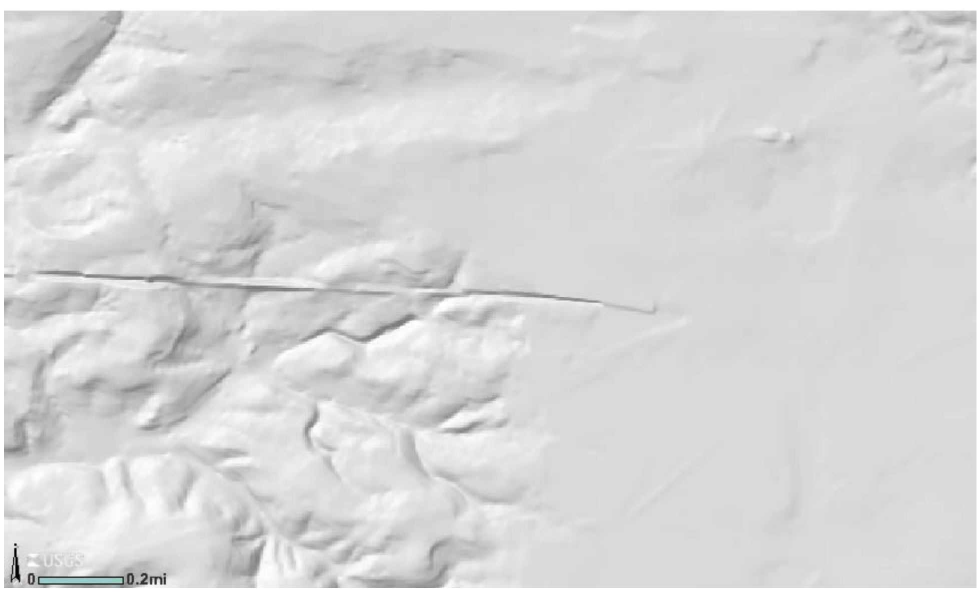

Figure 28. The line in the center of this image is the site of the inclined plane on the Charleston & Hamburg Rail Road at Aiken, South Carolina. This manmade feature can be seen from outer space.
Source: USGS. (2008). "1/3 ArcSecond NED CONUS, *The National Map*.

That the change of elevation between the Coastal Plain and the Piedmont transition at the Neuse River along the projected Waynesborough to Raleigh route would not have been so great an obstacle seems probable. However, a distinct difference exists between the eastern and western sections of this route. The elevation gains on the Waynesborough to the Neuse River section do not exceed 40 feet over a mile in ascent or 30 feet in descent, but on the Neuse River to Raleigh section, the maximum ascent is 73 feet, and the maximum descent is 70 feet.

The Counterfactual Railroad

Let the model of the Waynesborough to Raleigh route begin with construction of the road at both of the lines. The model is set in early 1837 at the time work commences on the Wilmington & Raleigh Rail Road. The objective of the planners is to have the route open to Raleigh when the Wilmington & Raleigh reaches Waynesborough in February 1839. While the Raleigh Division initially would have to proceed without iron, the grading and the preparation of the rails to receive the iron could proceed. The Raleigh Division will commence at the point where the latter North Carolina Railroad enters the Raleigh yards near Cabarrus Street, N35.77406º, W78.64459º, at an elevation of 312 feet above sea level. The Waynesborough Division would begin at the junction with the Wilmington & Raleigh Rail Road, N35.37326º, W78.00729º, at an elevation of 78 feet above sea level. Iron would be delivered to Beaufort, transported through the Clubfoot & Harlowe Creek Canal to New Bern, thence to Waynesborough by steamboat. Ten miles of this division would come into operation first, and subsequently, the next opening brings the railroad to the Neuse. A third group, the Neuse Division, would have been working on a bridge over the river, and preparing the grade for putting down sleepers and wooden rails.

The Waynesborough Division

Preparing the first string of code to represent the Waynesborough to Raleigh route starts with the key (WR0), followed by the assumed method for the flat terrain of the first two-tenths of a mile, grade (G). A shallow first-order stream empties into the Neuse River in the second two-thirds of a mile. This suggests the use of piles (P). The third and forth two-tenths are nearly level with the first, represented with grade (G). The fifth section of the mile is nearly occupied by the Little River, a tributary of the Neuse. This would be bridged (B). The final element of the code is the elevation gain, positive or negative, over the distance of the miles rounded to the nearest whole numbers in feet. The full code for the first mile of this route from Waynesborough to Raleigh, following the approximate course of Walter Gwynn's survey for the North Carolina Railroad, is expressed as WR0 GPGGB -6. The second mile rises from the floodplain of the Little River and regains 6.64 feet over six-tenths of a mile. The code would read as follows: WR1 MMMGG +7. The third mile of the route proceeds on a gentle incline for eight-tenths of a mile until it encounters a scarp with a sudden rise of approximately 20 feet in the last two-tenths of a mile (Figure 29). This feature would require excavation to improve the incline. This code would read as WR2 GGGGX +36.

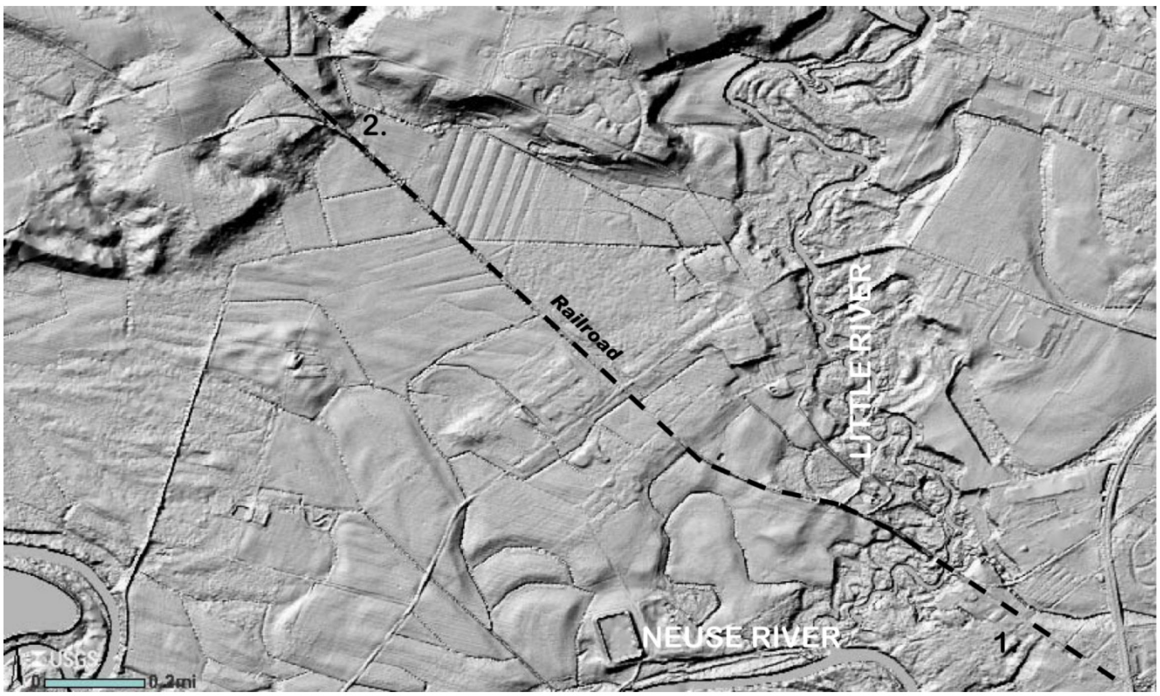

Figure 29. This image illustrates the elevation data for the terrain containing the three-mile section of railroad previously coded. *Number 1*, in the lower right, is a first order stream flowing into the Neuse River. The route of the railroad crosses the Little River, a tributary of the Neuse. *Number 2*, in the upper left, shows the line of the railroad ascending a scarp.
Source: USGS. (2008). "1/3 ArcSecond NED CONUS, North Carolina-1/9 ArcSecond." *The National Map*.

While such a code is merely shorthand for a particular method of railroad construction, and based upon the interpretation of a limited body of information, it originates with an examination of modern USGS topographic quadrangle maps. Therefore, one can use the coordinates provided in the table to verify the actual topography through available geodatasets and aerial photographs, or field methods.

The next two miles of the Waynesborough and Raleigh route, based upon the actual route of the relevant division of the North Carolina Railroad, continue through Coastal Plain terrain with an elevation gain of 22.5 feet, and ending on the edge of a first order stream. The code sequences for these two miles are WR3 XGPPG +20 and WR4 MGGXX +2 respectively. The entire five miles of the route, with coordinates beginning each sequence, are compiled together (Table 6). The combined sequences without reference keys appear as GPGGBMMMGGGGGGXXGPPGMGGXX, a form representing a mirror of the profile. Grouping the elements of this sequence into categories over distance produces an easy to read form (Table 7). The totals for the sequence are 13G + 4M + 4X + 3P + B, or 2.6 miles of grading, 0.8 miles of embankment, 0.8 miles of excavation, 0.6 miles of piles, and 1 bridge. While the bridge does not take up a full two-tenths of a mile, it is the predominate feature in that segment.

The next five miles of the route are a smooth ascent with a net elevation gain of 24 feet. The route crosses three tributaries of Charles Branch. All are first order streams, but the cut in the terrain is wide and deep. It resembles the streams of Brooks Swamp on the Wilmington & Raleigh Rail Road, and for this reason, it seems likely that trestlework is appropriate for this feature (Table 8, Appendix E).

Reference	Sequence	Elevation Gain	Coordinates
WR00	GPGGB	-6	N35.37326º, W78.00729º
WR01	MMMGG	7	N35.38134º, W78.02177º
WR02	GGGGX	36	N35.38948º, W78.03579º
WR03	XGPPG	20	N35.40035º, W78.04754º
WR04	MGGXX	2	N35.41057º, W78.06002º

Table 6. This table includes the elements of the survey code sequences and coordinates at the start of each mile for the first five miles of the Waynesborough to Raleigh route.

G	*	**G**	**G**	*	*	*	*	**G**	**G**	**G**	**G**	**G**	**G**	*	*	**G**	*	*	**G**	*	**G**	**G**	*	*
*	*	*	*	*	**M**	**M**	**M**	*	*	*	*	*	*	*	*	*	*	*	*	**M**	*	*	*	*
*	*	*	*	*	*	*	*	*	*	*	*	*	*	**X**	**X**	*	*	*	*	*	*	*	**X**	**X**
*	**P**	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	**P**	**P**	*	*	*	*	*	*
*	*	*	*	**B**	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
0 0	*	*	*	*	0 1	*	*	*	*	0 2	*	*	*	*	0 3	*	*	*	*	0 4	*	*	*	*

Table 7. The elements of the five miles of the code sequence appear in this table divided by category and distance.

Reference	Sequence	Elevation Gain	Coordinates
WR05	GGPTT	-7	N35.41868º, W78.07476º
WR06	TGGGG	14	N35.42682º, W78.08946º
WR07	MGGGG	7	N35.43495º, W78.10416º
WR08	GGGGG	3	N35.44314º, W78.11881º
WR09	GMGGG	7	N35.45131º, W78.13348º

Table 8. The table shows the code sequences and coordinates for the next five miles. The only significant difference is the character “T” for trestlework. Trestlework was selected for crossing the three tributaries of Charles Branch based upon the use of trestlework at Brooks Swamp on the Wilmington & Raleigh Rail Road (Appendix E).

The route continues through the Coastal Plain for approximately another twelve miles until it reaches the transition into the Piedmont at the Neuse River (Figure 30). The last three miles of this section of the line are a descent onto the floodplain of the river (Table 9). When divided into categories, the elements of the complete section from the junction at Waynesborough with the Wilmington & Raleigh Rail Road to the Neuse River represent a steady ascent over moderate topography. The prevailing construction method is grading. Two bridges (on the same line with trestlework) exist, one at the Little River and the other over the Neuse. Trestlework corresponds with low order streams that cut deep ravines into Coastal Plain sediment. Piles, placed over shallow streams, appear occasionally in the table. Embankments appear between slight undulations in the terrain, and excavations cut into the same. This section of the route does not seem to present any difficulties beyond those found on the Wilmington to Waynesborough section of the Wilmington & Raleigh.

A difficult grade does commences, however, at the Neuse River, an elevation rise of 59.12 feet, although the bridge height relative to the bank of the river does reduces the ascent from an elevation of 155 feet above sea-level on its east bank to approximately 175 feet above sea-level on its west bank. The combined span of the hypothetical 1830s trestlework and bridge covers eight-tenths of a mile. The extreme change in elevation in the route from the Neuse to the outskirts of 1834 Raleigh, near the site of the old Government House, occurs about two miles from town at Walnut Creek where the descent of 70 feet is followed by an ascent of 73 feet (Swain, 1867; Table 10; Table 11). There is a steep ascent and descent near White Oak Creek nine miles from Raleigh.

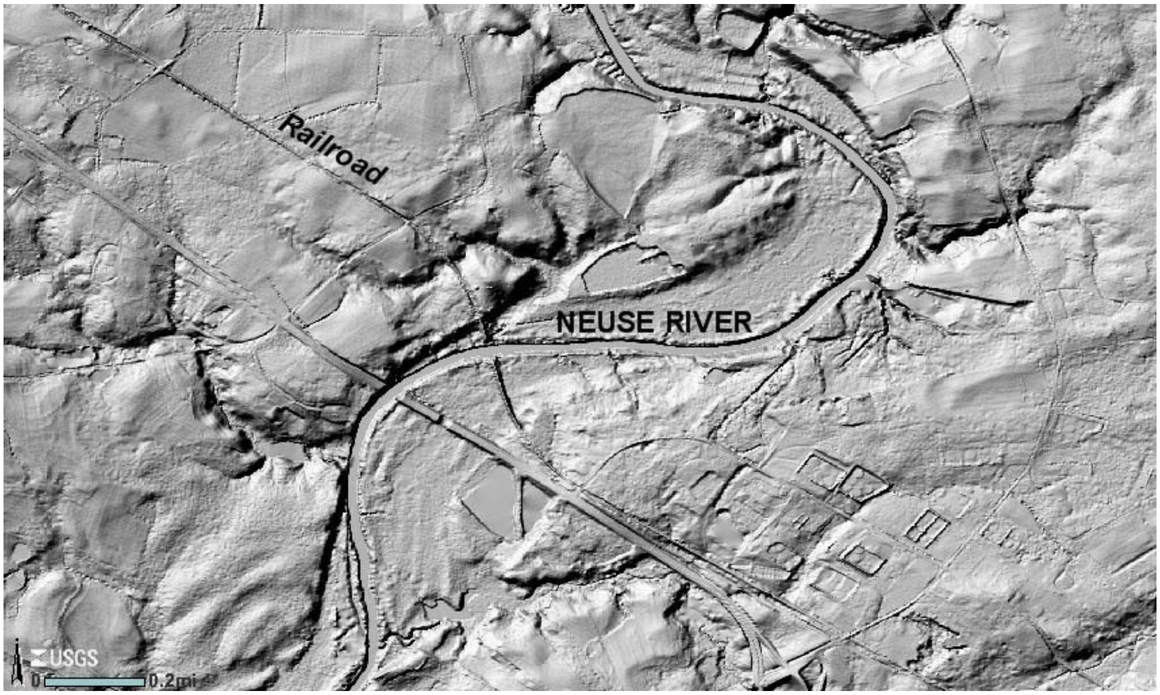

Figure 30. The route of the railroad crosses the Neuse River 22 miles from its starting point at Waynesborough (Goldsboro) where the route begins to transition for Coastal Plain terrain to Piedmont terrain.
Source: USGS. (2008). "1/3 ArcSecond NED CONUS, North Carolina-1/9 ArcSecond." *The National Map*.

Reference	Sequence	Elevation Gain	Coordinates
WR10	MMMGG	-4	N35.45945º, W78.14817º
WR11	GGGGM	1	N35.46765º, W78.16284º
WR12	XTPXP	-9	N35.47570º, W78.17767º
WR13	TTTTG	13	N35.48394º, W78.19233º
WR14	PTTMM	3	N35.49209º, W78.20705º
WR15	GGPPX	-5	N35.50024º, W78.22175º
WR16	XGGGP	3	N35.50841º, W78.23643º
WR17	XGGGG	28	N35.51660º, W78.25098º
WR18	GGGGG	0	N35.52465º, W78.26580º
WR19	GGGGG	-24	N35.53274º, W78.28057º
WR20	GTTGT	-19	N35.54088º, W78.29536º
WR21	TTGTB	-28	N35.54903º, W78.31009º

Table 9. This table shows the code sequences, elevation gain, and coordinates of 12 miles of the Waynesborough to Raleigh route ending at the crossing of the Neuse River.

G	*	**G**	**G**	*	*	*	*	**G**	**G**	**G**	**G**	**G**	**G**	*	*	**G**	*	*	**G**	*	**G**	**G**	*	*
*	*	*	*	*	**M**	**M**	**M**	*	*	*	*	*	*	*	*	*	*	*	*	**M**	*	*	*	*
*	*	*	*	*	*	*	*	*	*	*	*	*	*	**X**	**X**	*	*	*	*	*	*	*	**X**	**X**
*	**P**	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	**P**	**P**	*	*	*	*	*	*
*	*	*	*	**B**	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
0 0	*	*	*	*	0 1	*	*	*	*	0 2	*	*	*	*	0 3	*	*	*	*	0 4	*	*	*	*

G	**G**	*	*	*	*	**G**	**G**	**G**	**G**	*	**G**	**G**	**G**	**G**	**G**	**G**	**G**	**G**	**G**	**G**	*	**G**	**G**	**G**
*	*	*	*	*	*	*	*	*	*	**M**	*	*	*	*	*	*	*	*	*	*	**M**	*	*	*
*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
*	*	**P**	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
*	*	*	**T**	**T**	**T**	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
0 5	*	*	*	*	0 6	*	*	*	*	0 7	*	*	*	*	0 8	*	*	*	*	0 9	*	*	*	*

*	*	*	**G**	**G**	**G**	**G**	**G**	**G**	*	*	*	*	*	*	*	*	*	*	**G**	*	*	*	*	*
M	**M**	**M**	*	*	*	*	*	*	**M**	*	*	*	*	*	*	*	*	*	*	*	*	*	**M**	**M**
*	*	*	*	*	*	*	*	*	*	**X**	*	*	**X**	*	*	*	*	*	*	*	*	*	*	*
*	*	*	*	*	*	*	*	*	*	*	*	**P**	*	**P**	*	*	*	*	*	**P**	*	*	*	*
*	*	*	*	*	*	*	*	*	*	*	**T**	*	*	*	**T**	**T**	**T**	**T**	*	*	**T**	**T**	*	*
1 0	*	*	*	*	1 1	*	*	*	*	1 2	*	*	*	*	1 3	*	*	*	*	1 4	*	*	*	*

G	**G**	*	*	*	*	**G**	**G**	**G**	*	*	**G**	**G**	**G**	**G**	**G**	**G**	**G**	**G**	**G**	**G**	**G**	**G**	**G**	**G**
*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
*	*	*	*	**X**	**X**	*	*	*	*	**X**	*	*	*	*	*	*	*	*	*	*	*	*	*	*
*	*	**P**	**P**	*	*	*	*	*	**P**	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
1 5	*	*	*	*	1 6	*	*	*	*	1 7	*	*	*	*	1 8	*	*	*	*	1 9	*	*	*	*

G	*	*	**G**	*	*	*	**G**	*	*
*	*	*	*	*	*	*	*	*	*
*	*	*	*	*	*	*	*	*	*
*	*	*	*	*	*	*	*	*	*
*	**T**	**T**	*	**T**	**T**	**T**	*	**T**	**B**
2 0	*	*	*	*	2 1	*	*	*	*

Table 10. These sequences represent the route from Waynesborough to the Neuse River. It is entirely in the Coastal Plain physiographic region.

In order that the code sequences describe the conditions of the landscape so the estimate approaches accuracy, the characters M, X, P, T, and B must be assigned dimensions. This is possible by deriving the length and depth of these works from the profile of the landscape, and adding these figures to the charters as a subscript. For example, trestlework over a ravine 313 feet wide and 21 feet at its maximum depth is expressed as $T_{(313,21)}$. The cost of track construction is a set of variables that can be plugged into the length of the projected route, and these figures are derived from the estimates for the railroad's closest neighbors at a particular time. Grading, the predominate character in the sequences, is the building up of the rail bed to level below the height required for piles. Walter Gwynn provided in his survey for Portsmouth & Roanoke Rail Road the width the roadbed at 12.5 feet with slopes of 33.3º. He also included the cost of nine and a half cents per cubic yard for excavation, and ten cents per cubic yard for embankments (Gwynn, 1833, 6-7). The cubic yards of earth above and below the level line to three feet can be calculated as a constant for the whole line. Embankments are three to six feet above level, and excavations are cuts exceeding three feet. The area of each can be calculated in cubic yards and added as a subscript for M and X.

It follows that two or more characters of the same type following consecutively are part of the same structure (B in one sequence followed by B in the next sequence is the same bridge). The same is true for the other characters, so their lengths combine. The depth, however, is not added. It appears as the third or more subscript character, such as $T_{(313, 21, 18).}$ This means that the length of 131 feet is that of one trestle occupying conjoining parts of two different two-tenths of mile units. Both numbers are measured at the lowest point in the units, thus with the length they describe a curve. The same is true of embankments and excavations. The code is reduced by removing characters that describe the same structure, and those costs that are constant for the whole route.

Two rivers flow within this twenty-one mile section, the Little River (at approximately 150 feet) and the Neuse (at approximate 100 feet). Their widths are close to the lengths of the Meherrin and Nottoway rivers on the line of the Portsmouth & Roanoke Rail Road. Walter Gwynn gives the cost of the bridges over these rivers, including abutments, as $14,500 and $11,100 respectively. These figures will suffice for the hypothetical bridges over the Little and Neuse rivers, $B_{(150)} + B_{(100)}$ = $25,600. A level line, run across the minor streams and their low-lying areas provides the length (Level Length) and height (Height at Level) for piles and trestlework alone the same section of the line (Table 11). The first stream on the route is a shallow stream, WR00 – $P_{(528, 3.59)}$, followed by the Little River, WR00 – $P_{(844.80, 14.5)}$. However, this segment contains a bridge. The 150 feet of the bridge and its abutments replaces this element, thus WR00 - $P_{(528, 3.59)} B_{(150, 14.5)}$. The flood plain of the Little River is set with piles at a maximum of 6.9 feet at level for a length of 483.36 feet, WR01 – $P_{(483.36, 6.9)}$. Charles Branch is a large feature with three contributing first order streams covering parts of WR05 and WR06. The first two streams are at the level that requires piles, and is expressed as WR05-06 – $P_{(2816.55, 14.05, 3.58)}$ where the total length of piles is 2,816.55 feet, and the heights are 14.5 feet (high) and 3.58 feet (low). This would bring the grade close to level.

Mile	Coordinates	Stream Name	Level Length	Height at Level	Method
WR00	N35.37479º, W78.01098º	Unnamed	528.00	3.59	piles
WR00	N35.37972º, W78.01938º	Little River	844.80	14.5	piles
WR01	N35.38668º, W78.03283º	Little River	483.36	6.9	piles
WR05	N35.42144º, W78.07981º	Charles Branch (1)	686.40	3.58	piles
WR05	N35.42328º, W78.08315º	Charles Branch (2)	2,130.15	14.05	piles
WR06	N35.42654º, W78.08905º	Charles Branch (3)	897.60	19.47	trestle
WR12	N35.47571º, W78.17769º	Unnamed	3,801.60	25.41	trestle
WR12	N35.48204º, W78.18895º	Unnamed	1,267.20	16.65	piles
WR13	N35.48393º, W78.19234º	Unnamed	4,488.00	16.93	piles
WR15	N35.50177º, W78.22342º	Moccasin Creek	4,699.20	20.05	trestle
WR20	N35.54089º, W78.29537º	Unnamed	3,220.80	22.24	trestle
WR20	N35.54785º, W78.30795º	Unnamed	792.00	10.13	piles
WR21	N35.55176º, W78.31493º	Unnamed	1,742.40	18.16	trestle
WR21	N35.55568º, W78.31982º	Neuse River	1,278.40	19.02	trestle

Table 11. This table illustrates the length and height of hypothetical pile and trestlework construction at streams and lowlands along the route from Waynesborough to the Neuse River through the Coastal Plain.

The third stream at Charles Branch has a depth from level that requires trestlework, WR06 – $T_{(897.06,\ 19.47)}$. The entire expression for Charles Branch is WR05-06 – $P_{(2816.55,\ 14.05,\ 3.58)}$ $T_{(897.06,\ 19.47)}$. An unnamed set of first order streams with lowlands between miles 12 and 13 requires trestlework and piles, WR12-13 – $T_{(3801.6,\ 25.41)}$ $P_{(5755.2,\ 16.65,\ 16.93)}$. Moccasin Creek requires trestlework with a maximum height from level at 20.5 feet, WR15 – $T_{(4699.2,\ 20.5)}$. At miles 20 and 21, the route crosses a lowland cut with three low order streams and crosses the Neuse River, WR20-21 – $T_{(3220.8,\ 22.24)}$ $P_{(792,\ 10.13)}$ $T_{(1742.4,\ 18.16)}$ $B_{(100)}$. The entire sequence for this leg of the Waynesborough to Raleigh route is expressed as WR00-21 – $P_{(528,\ 3.59)}$ $B_{(150,\ 14.5)}$ $P_{(483.36,\ 6.9)}$ $P_{(2816.55,\ 14.05,\ 3.58)}$ $T_{(897.06,\ 19.47)}$ $T_{(3801.6,\ 25.41)}$ $P_{(5755.2,\ 16.65,\ 16.93)}$ $T_{(4699.2,\ 20.5)}$ $T_{(3220.8,\ 22.24)}$ $P_{(792,\ 10.13)}$ $T_{(1742.4,\ 18.16)}$ $B_{(100)}$. The sum of the lengths of pilings for the entire section is $\sum L_P$ = (528 + 483.36 + 2816.55 + 5755.2 + 792.4) = 10,375.51 = 1.96 miles. Using the estimates for pile construction on the Charleston & Hamburg Rail Road, averaging $2,300 per mile, the total cost of piles on this section would be $4,508. The sum of lengths of the trestlework is expressed as $\sum L_T$ = (897.06 + 3801.6 + 4699.2 + 3220.8 + 1742.4) = 14,361.06 = 2.72 miles. The estimates for the trestlework on the Charleston & Hamburg Rail Road range from $6,000 to $10,000 per mile. Using an average of $8,000 per mile, the total for the 2.72 miles of trestlework becomes $21,760. The total cost estimates for this section of the route include the sum of the cost of piles and trestlework, the total cost of bridges (B), the cost of grading mile times the number of miles (G), and the cost per mile for rails and superstructure (S). This expressed as $\sum (L_P + L_T + B + 21G + 21S)$ = 4,508 + 21,760 + 25,600 + 45,173.52 + 81,776.17 = $178,817.70 or $8,515.13 per mile. This is greater than the $7,094.34 per mile costs for the Wilmington & Raleigh Rail Road by $1,420.79, but far less than the $12,540 per mile cost of the Raleigh & Gaston Rail Road. Even if the hypothetical estimate were high, it is within a reasonable cost range relative to the Wilmington & Raleigh.

The Raleigh Division

The sequences for Raleigh Division will be given the prefix RW, representing Raleigh to Waynesborough. For convenience, locations that appear on modern maps will be referenced in the analysis. Period maps, such as the MacRae-Brazier Map of 1833, do not include enough readily recognizable places in eastern Wake County to be helpful. The first section of the road is five miles in length, RW00-05, extending along the route of the North Carolina Railroad from the southern end of the yards at Raleigh to the neighborhood of Garner. An examination of the profile of the landscape on this route illustrates the several problems that the chief engineer would have encountered immediately. Unlike the Waynesborough Division, the route of the railroad would involve steep grades and excavation through rock. The first challenge is the descent to Walnut Creek. The ascent from this point must deviate from a straight line in a series of curves to avoid heavy excavation (Figure 31). Over this distance, the track makes a steep descent to, and steep ascent from, Walnut Creek. The remaining distance of the five-mile section includes inclines ranging from a descent of 14.13 feet to ascents of 33.52 feet (Table 12). A civil engineer, working within the constraints of 1830s railroad technology, would have faced substantial challenges.

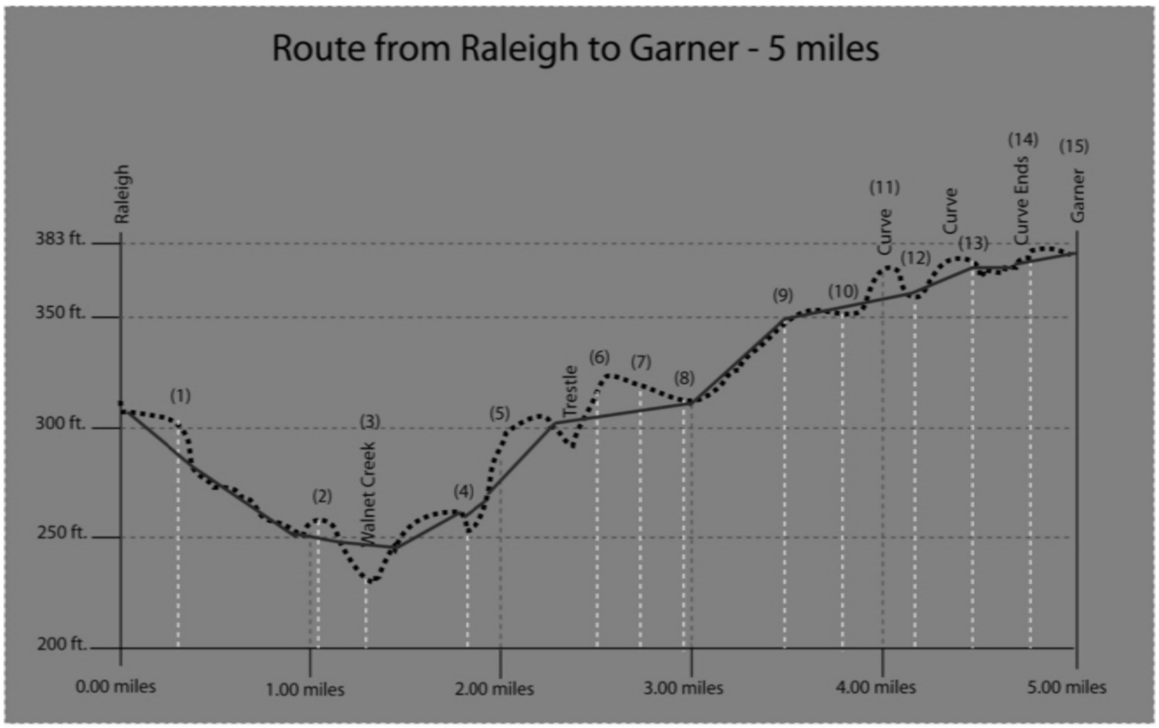

Figure 31. The profile of the terrain from Raleigh to the present-day city of Garner, five miles to the south, illustrates the difficulties in locating the line of the railroad. The alignment of the route as it appears on modern topographic maps, in solid back, includes several curves that pass around hills rather than through them in a straight line. The descent to, and ascent from Walnut Creek is steep. Each of the numbers on the profile corresponds to selected changes in elevation on the grade of the railroad.

Item	Coordinates	Elevation in Feet	Distance in Miles	Rise in Feet	Run in Miles
1	N35.77062º, W78.64205º	308.18	0.28	-3.82	0.28
2	N35.76069º, W78.63601º	259.19	1.04	-48.99	0.76
3	N35.75674º, W78.63442º	229.32	1.33	-29.87	0.29
4	N35.74976º, W78.63472º	253.49	1.83	24.17	0.5
5	N35.74609º, W78.63670º	301.43	2.1	47.94	0.27
6	N35.73869º, W78.63731º	320.16	2.64	18.73	0.54
7	N35.73687º, W78.63619º	317.77	2.79	-2.39	0.15
8	N35.73478º, W78.63493º	312.04	2.95	-5.73	0.16
9	N35.72904º, W78.62906º	345.56	3.47	33.52	0.52
10	N35.72537º, W78.62683º	349.93	3.75	4.37	0.28
11	N35.72185º, W78.62697º	371.11	4	21.18	0.25
12	N35.71969º, W78.62649º	356.98	4.15	-14.13	0.15
13	N35.71615º, W78.62454º	377.53	4.42	20.55	0.27
14	N35.71295º, W78.62050º	378.13	4.75	0.6	0.33
15	N35.71134º, W78.61644º	373.99	5	-4.14	0.25

Table 12. Items 1 through 5 represent the descent to and ascent from Walnut Creek over a distance of approximately two miles. The remaining distance includes ascents and descents through curves that avoid extensive excavations.

Before addressing other aspects of this five-mile section of the railroad, the problem of traversing the area of Walnut Creek must be solved. An examination of the modern landscape through field study shows that the modern railroad follows the contour of the valley, passing below an interchange on present-day Interstate 40. A wider view using 1/9 ArcSecond elevation data gives a fair impression of the size of this valley, and the continuation of the incline beyond (Figure 32). Since the route of the North Carolina Railroad is the route of the counterfactual model, it is easy enough to assume that an earlier incarnation of road could negotiated the near fifty feet per mile undulation with the right motive power, say a locomotive of 20 to 30 tons. However, such locomotives were a feature of the second generation of railroads. Further, the wooden rails were ill suited to the stress on downhill curves (Boyden, 1830). This situation suggests several solutions: the use of stationary engines on inclined planes, the construction of an extensive bridge such as George Stephenson's Sankey Viaduct on the Liverpool & Manchester Railway, or start work on the railroad south of Walnut Creek. The latter option would place the beginning of the railroad 2.01 miles from Raleigh, and that the shareholders would approve the proposition is unlikely. The use of stationary engines, such as were used on the Charleston & Hamburg Rail Road to assist trains on their descent to and ascent from Walnut Creek, might be the most economical approach, but it not necessarily the most practical solution. By contrast, building a viaduct one and three-quarters miles long would be a prolonged undertaking that would consume too much capital. The Raleigh & Gaston's bridge on the Roanoke was only 1,000 feet, including abutments (*Raleigh Register*, 31 July 1837).

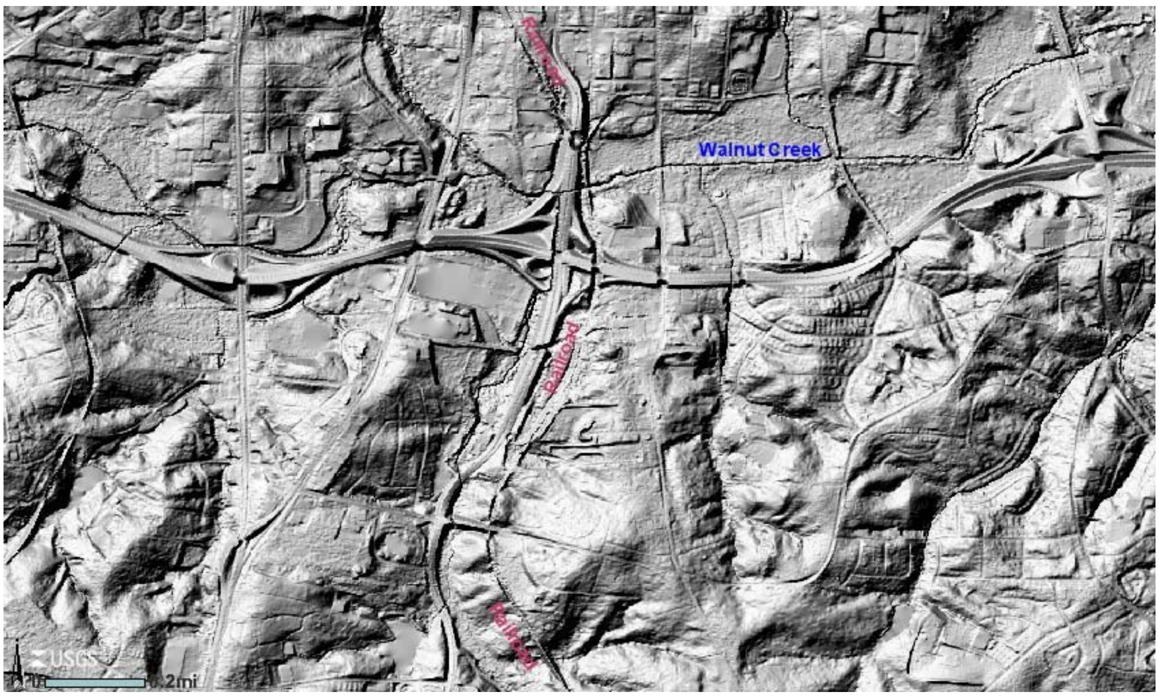

Figure 32. The elevation of the route of the North Carolina Railroad in the area of Walnut Creek, built during the early 1850s, would present significant challenges to a civil engineer during the 1830s. The methods of the latter construction involved deep excavations into the banks on each side of the ravine, and cutting curves around hills.
Source: USGS. (2008). "1/3 ArcSecond NED CONUS, North Carolina-1/9 ArcSecond." *The National Map*.

Several period documents suggest other aspects and alternatives solutions to this problem. The 1838 survey for the Winchester & Potomac Railroad cites similar circumstance of steep inclines on the Liverpool & Manchester Railway.

> Upon the Liverpool and Manchester railroad, in England, which is considered the greatest work of this description in Europe, heavy and bulky articles of commerce are transported daily, by locomotive steam-engines, surmounting, at rapid velocities in each direction of the trade, an inclination as great as 1 in 96, or 55 feet ascent per mile for 1½ mile in length. These inclinations (called the "Whiston and Sutton planes") are more than once and a half as great, and are just once and a half as long, as the greatest inclination which would occur upon the eastern route of the Winchester and Potomac railroad, in case it should occupy the valley of Long Marsh as a portion of the route. It is true, that in order to maintain the desired speed in surmounting the elevations of the Whiston and Sutton planes, the load of each locomotive engine is reduced, and assistant engines become necessary, capable of ascending those planes with twelve tons of goods at ten miles per hour. Upon other parts of the road, varying in its profile from a level to inclinations of 1 in 880, or 6 feet rise per mile, the loads for each locomotive is 20 tons of goods, exclusive of the weight of the wagons, conveyed with a speed of 12 miles per hour.
>
> – (United States, 1838e, 11) –

Albert Johnson, master mechanic for the Raleigh & Gaston Rail Road during the 1850s, previously with the Richmond, Fredericksburg & Potomac Railroad during the mid-1830s, describes a Stephenson locomotive owned by the company as being eight tons in weight, having 10" by 16" cylinders, and four driving wheels. This railroad featured more bridging than the Petersburg Rail Road, and the cost per mile was $13,934. However, the Greensville & Roanoke Rail Road had four ascents of 32.20 feet per mile, one descent of 50.15 feet per mile, and one descent of 93.45 feet per mile. Some embankments reached the height of 32 feet, and excavation existed that were as deep as 30 feet near the Roanoke (Johnson, 1858; Ruffin, 1839, 388; RJ, 1837). Given this set of facts, it is likely that the five miles would have used construction practices similar to those of the Greensville & Roanoke Rail Road and those built in the Piedmont of Virginia. Like these railroads, the five miles of the counterfactual model follow a north-to-south route, crosses streams that are flowing west to east, and the terrain ranges from 250 to 350 feet above sea level with ascents reaching beyond 400 feet above sea level. An engine of eight and a half tons with a five and a half ton tender would be sufficient to pull a 100-ton load up a grade of twenty-five feet per miles, or a sixty-three ton load up a grade of fifty feet per mile (United States, 1838, 34). Therefore, it would appear best to excavate the descent from Raleigh so that the grade would not exceed fifty feet per mile, and the ascent should be the same.

Walnut Creek is approximate 55 feet across with banks at an elevation of 226-230 feet above sea level at the point where the railroad bridges it. The center of the stream is 1.33 miles into the route. For the first mile from Raleigh, the elevation descends from 312 feet to 257 feet. Looking ahead, the change of elevation from 3.00 miles to 3.60 miles is 41.93 feet. The two-mile section of railroad will be divided in section of three-tenths of a mile because this subdivision best fits the shape of the valley and the desired grade. The first three-tenths (1,584 feet) involves grading from 312 feet to 300 feet in elevation. The elevation at 0.6 miles is 271.44 feet, at 0.9 miles is 254.39 feet, and at 1.2 miles it is 242.49 feet. If the descent begins from 300 feet in elevation at 0.3 miles, elevation at 250 feet must be set at 1.3 miles into the route, or 6,864 feet. The elevation at this point on the profile is 232.16 feet, where the height of the grade should be 250 feet if the grade is to be 50 feet per mile. The 1830s solution to the problem is to build one mile of trestlework from 0.03 miles to 1.30 miles. The trestlework would average 18 to 20 feet in height, or $G_{(1584)}$ $T_{(5280, 20, 18)}$, followed by a bridge with abutments and embankments, all totaling 1,056 feet and leveled at an elevation of 250 feet. As stated above, Walnut Creek is 55 feet across at this point, and the height to the bridge is approximately 25 feet above the creek. The Rockfish Creek Bridge on the Wilmington & Raleigh Rail Road appears closest to the design that an engineer of the period would select for Walnut Creek, namely a lattice truss bridge resting on stone piers with brick or stone abutments. However, the original cost of this bridge is not available. The stone bridge over the Nottoway River on the Portsmouth & Roanoke Rail Road was estimated at $11,100, and the one hundred and eighty-foot bridge over Fontaine's Creek on the Greensville & Roanoke Rail Road cost $10,500 (Gwynn, 1833, 7; *New York Farmer*, 29 May 1837). Of these two bridges, the description of the bridge over the Greensville & Roanoke, including its abutments, pier spacing, and embankments appears close to the needs of this section of the line. The ascent from this bridge retains the grade of 50 feet per mile. The line reaches an elevation of 275 feet at the second mile, with the incline beginning with 1,525.6 feet of excavation into the hillside beyond the bridge. Like its latter counterpart, the railroad ascends the west side of the hill in a curve. After rounding the hill, the railroad should cross 897.6 feet of trestle, then begin the ascent of another hill. The second mile ends with 216.8 feet (Figure 33). The term $T_{(897, 15)}$ can be included in the sequence. To determine the depth and shape of the excavation, the topography must be examined to determine the slope of the hillsides beginning at 250 feet elevation, ending at the 270 feet elevation. The base width is set at a hundred feet.

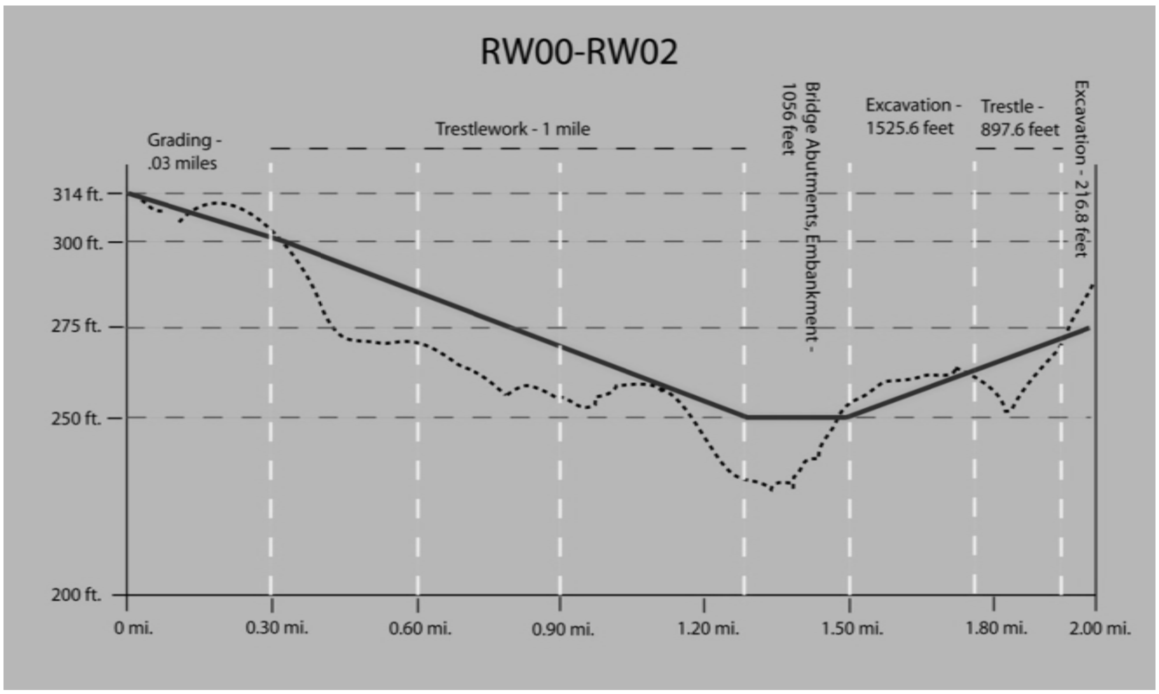

Figure 33. The line of the railroad, in solid black, has been aligned to the profile so the maximum grade is 50 feet per mile. Modern road embankments and overpasses are edited from the profile. The two miles of the profile are divided into units of three-tenths of a mile. The line of the railroad curves around hills rather than cutting through them.

The distance of one hundred feet is selected because to measure this distance on the topographic maps and datasets used in this study is easier. Direct observations would of course be more precise. At the beginning of the first excavation, the slope of the hill is five feet higher from center and two feet lower from center across the width of one hundred feet. At the end of the excavation, the upper part of the slope is four feet higher from center, and the lower is one foot below. The cross-section of the slope of the first hill is a rise of three feet over a distance of 100 feet. Using the formula $\alpha = arctan\ \frac{\Delta h}{d}$, wherein the angle of incline is the arctangent of the rise divided by the run, the angle of the incline of the hill is 1.72 degrees. If the roadbed is 16 feet and the tangent of 1.72 degrees is 0.03, then the rise over 16 feet is 0.48 feet. The rise at the center of the roadbed is 0.24 feet. If the angle is 1.72 degrees, the height is 5 feet at 100 feet on level and 2 feet at 0.00 feet on level for the beginning cut, then the vertex of the angle is at -66.5 feet. The height of the center of the railroad cut at center is 0.03 multiplied by 74.5 (66.5 plus 8), or 2.24 feet. Since the beginning of the 100-foot measure begins at the roadbed, the level-line is the 250 feet level of the bridge, and the roadbed is 2 feet below the hillside as it comes off the bridge, the cut is 2.00 at 0.00 feet width, 2.24 at 8.00 feet width, and 2.48 feet at 16.00 feet width. Using a 1.5:1 proportion, a common ratio for uneven sides for canals and railroad, the downhill line would be -3 feet from the from 0, and uphill line would be 3.72 feet from 16 feet at 19.72 feet. The total width across the cut, including sides, would be 22.72 feet. The uphill elevation at width 19.72 is 2.59 feet, on level cut the height should be 2.48 feet. The downhill elevation is 1.9 feet, whereas on a level cut is should be two. The appropriate formula for determining the area of the excavation cross-section is the *Three-level Section*, $A = \frac{w}{4}\,(h_l + h_r) + \frac{c}{2}\,(d_l + \; d_r)$. Here, w is the roadbed width at 16 feet, c is the center height at 2.24 feet, h_l is 1.9 feet, and h_r is 2.59 feet. The right hand distance from center to the top of the cut is 11.72 feet, and the left hand distance from center is 11 feet. The result is $\frac{16}{4}\,(1.9 + 2.59) + \frac{2.24}{2}(11.72 + 11) = 45$ square feet. The same process can be applied to the end cut at the top of the hill. The angle remains the same. The area for this cut is $\frac{16}{4}(0.97 + 1.52) + \frac{1.25}{2}(9 + 9.48) = 21.51$ square feet. The *Average End Areas* formula, $V = \frac{l}{2}(A_1 + A_2)$, is sufficient to determine the approximate volume of this excavation. The result is 50,733.83 cubic feet, or 1,879.03 cubic yards.

The profile is somewhat deceptive on the second hill. The line of the railroad crosses the trestle to an elevation of 273.45 feet, and rises to 275 feet at the end of the second mile. It cuts into a mound that has an elevation of 288.42 feet at the end of the second mile. The elevation of the hillside at the end of the trestle is 276 feet. The center measurement of cut is 2.55 feet. The left and right side are symmetrical because the top of the mound is flat: thus the *Regular Cross-sections* formula, $A \;= c(d + \frac{w}{2})$ can be used. The distance of the top width is 23.65 feet, and the area of this first cut is 80.71 square feet. The center of the end cut is 13.42 feet, and the top width is 56.26 feet. The top of the cut appears flat. Using the same formula, the total is 862.37 square feet, and applying the average ends areas formula, the volume becomes 102,230 cubic feet, or 3786.3 cubic yards. The sequence for this two-section can be expressed as RW00-01 – $G_{(1584)}$ $T_{(5280, 20, 18)}$ $B_{(\$10500)}$ $X_{(1879.03\ cy)}$ $T_{(897, 15)}$ $X_{(3786.3\ cy)}$.

The object of aligning the next three miles of the route is to ascend from 275 feet to 325 feet in 1.25 miles, then ascend another 49.32 feet over a distance of 1.75 miles to an elevation of 374.32 feet. The first ascent curves upward from the base of a hill, where a stream runs between it and a hill west of it, and several first order streams flow down the side of the first hill. By following these streams up through the crenulations on the hillside, one finds that the top of the hill is 335 feet in elevation. The profile of the landscape on the route of the railroad at the base of the hill has elevations of 294.04 feet at 0.3 miles, 323.88 feet at 0.6 miles, 312.63 feet at 0.9 miles, and 320.9 feet at 1.2 miles. On a rise of 50 feet over a distance of 1.25 miles, the grade should increase by 12 feet in 0.3 miles, in this case, starting from the elevation of 275 feet and ending at 287 feet. The excavation depth, or the difference in elevation between the ground line and the grade line, is 7.04 feet. The differences between the ground line and the grade line for the entire 1.25 miles measured at 0.3-mile increments are 12.47 feet at 0.0 miles, 7.04 feet at 0.3 miles, 20.6 feet at 0.6 miles, 2.00 feet at 0.09, -1.65 feet at 1.2 miles, and -3.73 feet at 1.25 miles. The regular cross-section formula can be used for estimating the areas for the first three cuts. The cross-section areas are 432.77 square feet at 0.00 miles, 130.66 square feet at 0.3 miles, and 966.14 square feet at 0.6 miles. Excavation ends at 0.69 miles, or 3,643.2 feet, where a stream crosses the route of the road. The end cut at 0.69 miles is 16.47 feet deep, and the cross-section area is 670.41 square feet. The total volume of the excavation of this section of the road is 84,388.86 cubic yards. The trestlework that follows is 1,108.8 feet long and 16 feet high. From 0.9 miles to 1.2 miles, 19 inches of embankment consisting of 12,435.5 cubic yard of earth needs building up, followed by 264 feet of embankment built to 3.73 feet, or 4,920.66 cubic yards.

Beginning at 325 feet at 1.25 miles, the ground line reaches the elevation of 347.74 feet at 1.5 miles. The grade line is 0.46 feet at 1.27 miles and climbs to 337.03 feet at 1.5 miles, 7.03 feet below the ground line. The total volume is 4,362.17 cubic yards. At 1.65 miles, the grade line is 18.17 feet below the ground line. The volume of this 792-foot section of excavation is 14,259.52 cubic yards. The depth of the cut decreases to 7.31 feet at 1.80 miles, another section of 792 feet with a volume of 14,418.06 cubic yards. At 2.00 miles into this section, the ground line is 370.94 feet and the grade line is 346.08 feet. The cut is 24.86 feet at this point, and total volume of excavation from 1.80 to 2.00 miles is 29,761.6 cubic yards. The ground line is 7.03 feet above the grade line at 2.15 miles, and the excavation between 2.00 and 2.15 miles is 22,167.2 cubic yards. From 2.15 to 2.40 miles, the cut ranges from 7.03 to 20.2 feet, and the volume of excavation is 27,423.49 cubic yards. The cut diminishes to 6.35 feet at 2.52 miles with a volume of 12,842.72 cubic yards. The ascent reaches its maximum at 2.88 miles with the last cut at 10.39 feet to the grade line. After the last excavation of 17,132.54 cubic yards, the grade is level. The entire section of three miles would require the excavation of 226,756.2 cubic yards, the building up of 4,920.66 cubic yards of embankment, and 1,108.8 feet of trestlework.

All of the terms that describe the first five miles of the Raleigh Division can be combined into a single sequence, RW00-04 – $G_{(1584\ cy)}$ $T_{(5280,\ 20,\ 18;\ 1108.8,\ 16;\ 897,\ 15)}$ $B_{(\$10,500)}$ $X_{(232421.8\ cy)}$ $M_{(4920.66\ cy)}$. In estimating the cost of excavation and embankment, the price of 15 cents per cubic yard seems appropriate for the soil of this region. It has more clay and rock that the Coastal Plain soils, and might fit more closely to the soils on parts of the Western & Atlantic Railroad (United States, 1837a, 33). If so, the cost of excavation and embankment on this section of the road would have been $35,601.37. The cost of grading of 1,584 cubic yards at the same rate would be $237.60. The estimated cost of the trestlework, based upon the average of $8,000 per mile, would be $11,037.88. The cost of rails and superstructure would have been $19,470.52. The total cost for this section of five miles of track amounts to $35,601.37 + $237.60 + $11,037.88 + $19,470.52 = $66,347.37, or $13,269.47 per mile. This is approximately $1,270 greater than the average per mile cost of the Raleigh & Gaston.

In the next two miles, the elevation of the terrain climbs from 374.32 feet to its maximum of 406.82 feet two miles into this section. In the third mile, the elevation descends to 330.24 feet. The proximity of a quarry near along the route suggests that excavations might have to be made into granitic formations. This should be avoided when possible. The nine large crenulations in the hillside suggest the need for culverts (Figure 34). Using Walter Gwynn's estimates for stone drains from his survey for the Portsmouth & Roanoke Rail Road, each drain or culvert would have cost $1,000. The grade line rises to 16.22 feet at one mile, and 32.44 feet at two miles. The ground line is 3.26 feet below the grade line at one mile. It appears that embankments are needed for some, if not most, of the two-mile section. The method used to estimate the volume of the embankments is based upon averages derived from the profile (Davis, Foote, and Kelly, 1966, 247-249). The average height of the ground line will be measured at regular intervals for two miles.

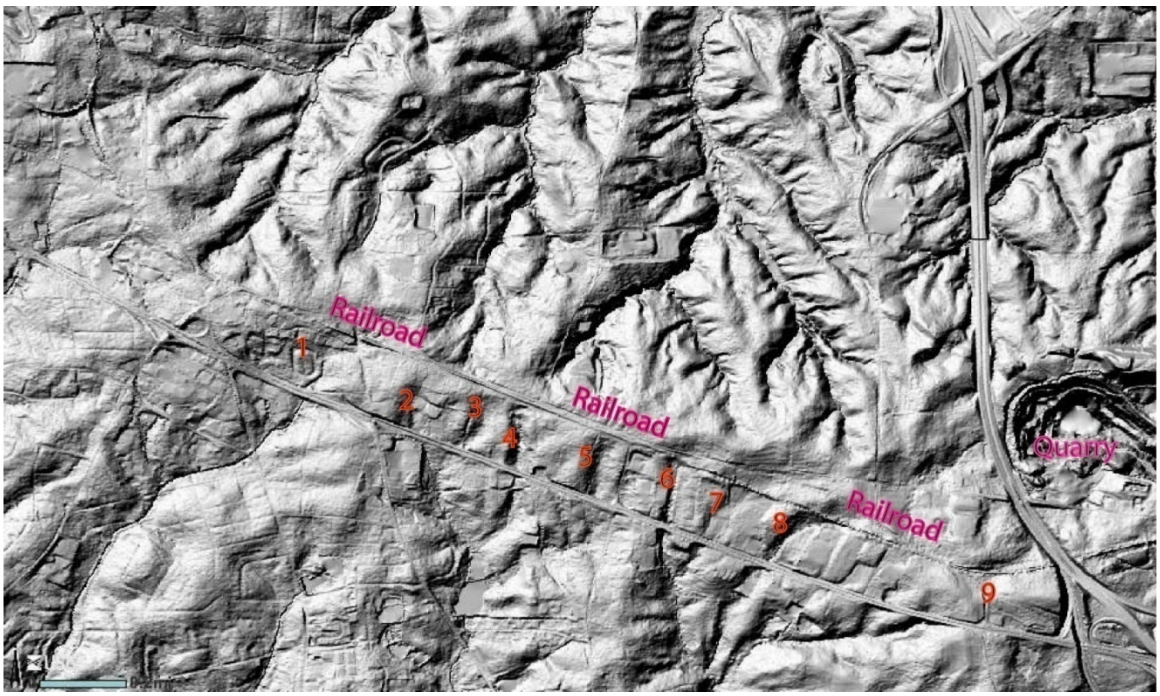

Figure 34. The landscape at Garner on the route of the North Carolina Railroad, and the route of the counterfactual model, is cut with at least nine substantial crenulations. The presence of a quarry in the lower right suggests that the builders would have to excavate granitic rock in places.
Source: USGS. (2008). "1/3 ArcSecond NED CONUS, North Carolina-1/9 ArcSecond." *The National Map*.

This will be compared to the measurement of the grade line at the same intervals, and the differences will be averaged. The average measurement below the grade line is 5.73 feet, and the average measurement above the grade line is 2.22 feet (Table 13). These measurements give a general impression of the profile compared to the grade from the beginning of the fifth mile to the beginning of the seventh mile, or a total of 10,560 feet (Figure 35). The next task is to measure the length of the portion of the length below and above the grade line. The length of the ground line below the grade in the first mile is 3,960 feet, and the length above is 1,320 feet. In the second mile, the length below is 3,168 feet, and the length above is 897.6 feet. The remaining 1,214.4 feet is so close to the grade that it would be categorized as grading at six inches. The total length of embankment for the two-mile section is 7,128 feet, the total length of excavation is 2,217.6 feet, and the total length of grading is 1,214.4. Since the average height of embankment is 5.73 feet, the distance to slope stake is $d = \frac{w}{2} + cs$ = 8.00 + 1.5 + 5.73 = 15.23 feet. The average cross-sectional area is $A = c\,(\frac{w}{2} + d)$ = 5.73(8 + 15.23) = 133.11 square feet, and the total volume of the embankment is $V = \frac{133.11 \times 7128}{27}$ = 35,140.48 cubic yards. The volume of excavation is 3,595.80 cubic yards, and the volume of grading to six inches for a length of 1,214.4 feet is 2,681.8 cubic yards (Table 5). In preparing the sequence for these two miles, the nine culverts can be included in the category of bridges for the sake of convenience, $B_{(\$9000)}$. The volume of earthworks is expressed as $G_{(2681.8\ cy)}$ $X_{(3595.80\ cy)}$ $M_{(35140.48\ cy)}$. The cost of grading and embankment can be set at fifteen cents per mile as with the previous section. However, the proximity of rock suggests the cost of excavation is much higher than through gravel and clay.

Distance in Miles	Grade Line in Feet	Ground Line in Feet	Difference in Feet
0.00	374.32	374.32	0
0.1	375.94	368.17	7.77
0.2	377.56	374.33	3.23
0.3	379.18	377.24	1.94
0.4	380.81	374.16	6.65
0.5	382.43	370.92	11.51
0.6	384.05	379.77	4.28
0.7	385.67	387.39	-1.72
0.8	387.29	392.99	-5.7
0.9	388.92	389.43	-0.51
1	390.54	392.04	-1.5
1.1	392.16	384.12	8.04
1.2	393.78	398.13	-4.35
1.3	395.4	385.48	9.92
1.4	397.03	389.98	7.05
1.5	398.65	390.03	8.62
1.6	400.27	396.1	4.17
1.7	401.89	403.55	-1.66
1.8	403.51	403.63	-0.12
1.9	405.14	404.34	0.8
2	406.76	406.19	0.57

Table 13. This table shows the difference in between the grade line and the ground line for miles RW05-06 measured every tenth of a mile.

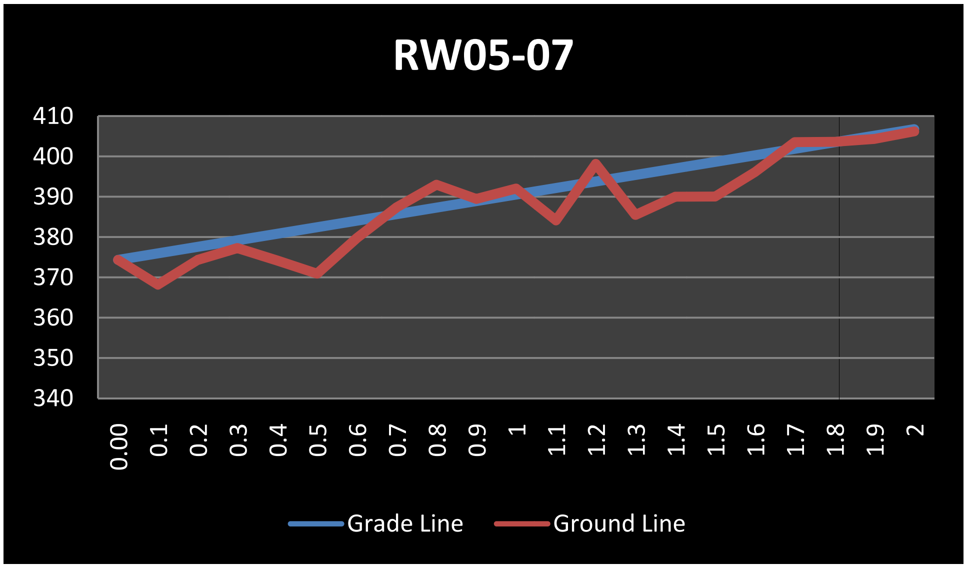

Figure 35. This graph illustrates the difference in elevation in feet between the grade line and ground line for the two-mile section identified as RW05-07. It is divided into tenths of a mile. The average of the measurements below the grade is 5.73 feet, and the average of the measurements above grade is 3.33 feet.

The cost of excavation through rock given for the survey of the Charleston & Cincinnati was $1.25 per cubic yard (United States, 1838, 39). However, none of the excavation appears extensive as in cutting into a mountainside, and the average depth of the excavation is 2.22 feet. Assuming that the excavation would be through surface clay with loose rock brought down from the higher elevations, the cost could be set at half that of cutting into rock, or $0.75 per cubic yard. There cost estimates are $402.27 for grading, $5,271.07 for embankment, $2,696.85 for excavation, and $9,000 for culverts. The total cost for this section is $17,370.19, or $8,685.09 per mile.

Between RW07.01 and RW08, the elevation drops from 405.30 feet to 352.92 feet, or a grade of 52.38 feet in a mile. The ground line follows the grade line, at 50 feet per mile so closely that the entire mile can be graded at 14 inches. This is approximately half the difference between the ground and the grade over the entire distance, or 29,260 cubic yards. This would have cost $4,389 at $0.15 per mile. The grading can be continued into the next mile for 1,372.8 feet, costing $1,141.14. It was followed by 475.2 feet that required an embankment of 5.85 feet. The volume is 6,545.17 cubic yards calculated from the average depth. The cost, at $0.15 per mile, is $981.77. The next 2,112 feet from 3.35 miles to 3.75 miles of this section involve an ascent up several hills to 10.26 feet with a midway height of 6.62 feet. In the sequence it can be represented as $P_{(2112, 6.62, 10.26)}$. This is a location where embankments are preferable. However, piles could suffice for initial construction. In addition, between 3.15 miles and 4.14 miles of this section, has a total descent of approximately a foot, so the object is to level out the grade. Using piles for the 2,112 feet, estimated at an average cost of $2,300 per mile on the Charleston & Hamburg Rail Road, would produce a cost of $920.

At 3.48 miles, there is a hill 1,267.2 feet in length and 6.72 feet in height, that requires excavation. Using the procedures as above, the estimate of the volume is 7,931.09 cubic yards. Applying the hard gravel rate of $0.25 per mile used on the Charleston & Cincinnati survey, this excavation would have cost $1,982.77. The railroad in the final mile of this section needs to cross three branches of White Oak Creek. The next mile of this division present several difficulties. The problem is clearly visible in the North Carolina-1/9 ArcSecond elevation data image. The construction of the roadbed of the North Carolina Railroad at White Oak Creek involved deep excavations into the hills between the branches of the creek (Figure 36). It is necessary to address construction on both RW09 and RW10 because the physical landscape on both belongs to creek catchment.

Beginning in RW09, the first excavation begins at 0.00 feet and ends at 1,056 feet. At this point, the cut has descended to a depth of 5.54 feet from an elevation of 343.58 feet to 338.04 feet. The volume of this excavation can be estimated from the profile to be 2,496.07 cubic yards, costing $374.41 at the loose gravel rate of $0.15. This figure is the result of treating the top of the cut as a level, and the descent of the cut as an angle. The first branch of White Oak Creek commences at the end of this cut. It takes 422.4 feet of piles with a maximum length of 8 feet to cross this stream, costing $184. The next cut begins at a depth of 1 foot on the opposite side of the stream. It extends for a distance of 528 feet to the next branch, whereupon it is at a depth of 5.9 feet. However, the cut is 6.81 feet at the middle of its length, at 264 feet. Using the prismoidal formula, the estimate for the volume of this cut is 2,668.55 cubic yards, costing $400.28. A trestle, with an average height of 14 feet, extends 792 feet over the second branch, costing $900. Over this span, the railroad descends 5.8 feet from an elevation of 330.8 feet to 325 feet. The next 792 feet of the route pass over near-level ground. It requires grading at 12 inches, and the resulting volume is 3,696 cubic yards, costing $554.4. The last stream in mile RW09 is situated at the base of a ravine that measures on the level line of 325 feet for a distance of 1,689.6 feet. The actual stream is insignificant, and flows at the base of the ravine 35 feet below at center. However, only 475.2 feet of the ravine are below an elevation of 300 feet.

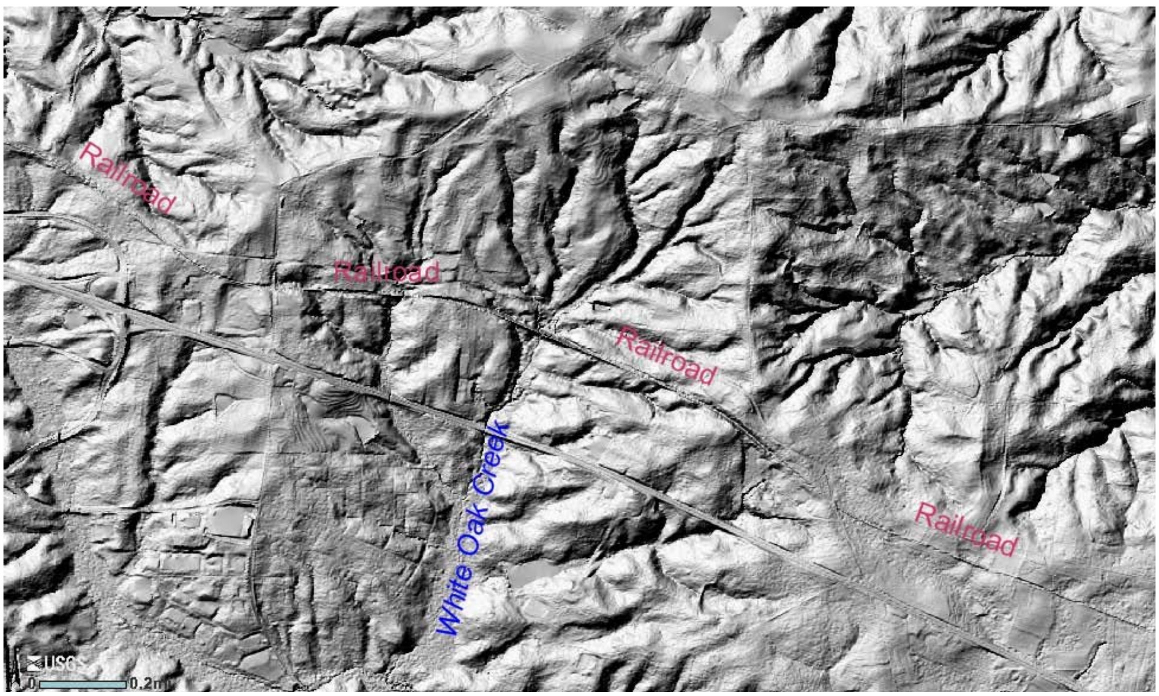

Figure 36. This image illustrates the hillside hollow at the head of White Oak Creek. The deep excavations are clearly visible in the hills on either side of the creek. Source: USGS. (2008). "1/3 ArcSecond NED CONUS, North Carolina-1/9 ArcSecond." *The National Map*.

The engineer of the 1830s would have preferred to keep the track at the 325-foot level across this ravine because on the opposite side deep excavations are required to maintain the rise of 39 feet per mile through RW10. The 475.2 feet need a bridge with stone abutments and piers. The bridge over the Northeast Cape Fear River on the Wilmington & Raleigh Rail Road was 360 feet long with two stone abutments, two stone piers that were 36 feet in height, divided into three spans (*Wilmington Advertiser*, 10 November 1837). It follows that a bridge of 475 feet would have four spans, three stone piers, and two abutments. The Charleston & Cincinnati railroad survey provides estimates for the construction of bridges extending 600 feet over the French Broad River, and four bridges between Butt Mountain Gap to five miles beyond Asheville that were 100 feet long. The cost of constructing the superstructure of a bridge that was 600 feet in length was $6,000. However, the masonry for the same cost $13,334. The total cost of the bridge over the Meherrin River on the Portsmouth & Roanoke was $14,500 in total (United States, 1838, 37, 40; Gwynn, 1833, 8). By taking 4.75 of cost of one of the bridge on French Broad, including the masonry, the estimate is $15,306. It is safe to assume for the purpose of this study that the high estimate for the bridge over the last branch is $16,000. The remaining 1,214 feet on sides of the bridge, being above the 300-foot level, are trestlework with a maximum height of 25 feet, costing $2,300. To this, $19,470.52 is added for rails and superstructure for the last five miles.

The mile RW10 is entirely excavation of an ascent of 39.25 feet over the distance of 5,016 feet. The relationship between the ground line and the grade allows for a rough estimate of the volume of the excavation. By drawing a perpendicular line from the rising grade line at 2,745 feet to the highest point on the ground line, at an elevation of 374.11, the height of the perpendicular is 29.36 feet, or round to 30 feet since this is a round estimate. The grade line can be considered the base of a triangle, the perpendicular its height, and the ground line follows closely the hypotenuse in this particular case. The area of this triangle is 41,175 square feet. Since the proportion of the slopes of the cut is 1.5:1, the width of the top of the cut is the sum of the width of the roadbed and the height of the cut multiplied by one and a half, 16 + (30 × 1.5) = 61 feet. The left and right slopes mirror each other, so one inverted forms the same width in the opposite direction. The area of the triangle is multiplied by the width to estimate the volume, 41,175 × 61 = 2,511,675 cubic feet, or 93,025 cubic yards. In like fashion, another triangle fits the remainder of the grade, using the same perpendicular with a base of 2,271 feet. It terminates at the end of the excavation, and has a volume of 2,077,416 square feet, or 76,941 cubic yards. The total estimated volume for RW10 is 169,966 cubic yards. At $0.15 per mile, the cost of the excavation would be $25,494.90. The rails and superstructure for RW10 would cost $3,894.10. Thus far, maintaining a grade appropriate for the light locomotives has been costly on the Raleigh division of the route. The total cost for the eleven miles is $162,704.70, or averaging at this point $14,791.33 per mile.

Mile RW11 requires 732.9 feet of grading at 24 inches, and 36 inches of grading for 944.1 feet. The total volume of grading would be 20,204.8 cubic yards over a distance of 1,677 feet. From here, the route encounters a ridge, presumably sediment washed down from higher elevation, which covers a distance of 1,795.2 feet and reaches a height of 12.77 feet. The center cuts are 3.26 feet, 5.34 feet, 9.02 feet, 10.24 feet, 12.77 feet, 3.34 feet, 5.75 feet, and 3.35 feet. Over a distance of 105.6 feet, the cut decreases to level from 3.35 feet. The distances between the measurements are 158.4 feet, 264 feet, 158.4 feet, 158.4 feet, 580.8 feet, 105.6 feet, 264 feet, and 105.6 feet. The cross-sectional areas in square feet are 55.06, 106.85, 230.28, 278.63, 397.85, 56.81, 118.59, and 57.03. The volume is 318,698.10 cubic feet, or 11,803.63 cubic yards. The remaining 1,795.2 feet of the miles can be grade at six inches, amounting to 3,964.4 cubic yards of roadbed. Toward the end of the mile, the route enters Johnston County. The subtotals for this mile are 24,169.20 cubic yards of grading at $3,625.38, and 11,803.63 cubic yards of excavation at $1,770.54. Without rails and superstructure, the estimated cost of this mile is $5,395.92.

There is a relatively smooth descent in RW12 that extends for 4,647 feet from 364.42 feet to 325.22 feet, a fall in elevation of 39.2 feet. It requires grading at an elevation of one foot over this distance. The volume amounts to 21,683.2 cubic yards. The soil appears by its proximity to several streams to be a mix of loam and clay. The cost of grading can be reduced to $0.10 per mile, as with the soil on the Waynesborough division. The cost of grading on this mile is $2,169.32. Towards the end of the mile, the road encounters the lowlands draining into Little Creek. Here, 633 feet of piles are needed to level the road at an elevation of 325 feet. The cost estimate for the piles is $289.

Two miles remain to the Raleigh division. Trestlework begins at the start of mile RW13 as it passes over a small stream. It ascends from 325 feet to 334 feet over a distance of 1,000 feet to avoid the same ascent at steeper angle on the opposite side of the stream. The estimate for the trestlework is $1,515.20. The height of the trestlework is approximately 20 feet directly above the stream, but it diminishes in height in relation to the stream bank on its ascent. There is a mound, 369 feet wide and 5.67 feet in height, at the end of the trestlework. It has a rounded profile, and it is necessary to cut through it to continue trestlework over a second stream. The formula suggested in Chapter XIX for rounded hills, with modifications for 1.5:1 slopes, $V = [.5(\pi\ (.5l)h)] \times [16 + (h \times 1.5)]$, appears appropriate for this feature The estimated volume of this excavation is 40,158.30 cubic feet, or 1,487.34 cubic yards at a cost of $148.73. This is followed by 633 feet of piles that cross the second stream and ascend 10 feet to an elevation of 344 feet. The cost for piles is $275.74. There is a second mound at the end of the piles that is 792 feet in length and 9.21 feet at its center. The estimated volume of the excavation is 6,326.25 cubic yards, costing $623.63. For the remaining distance in this mile, grading at 24 inches is needed for 1,267 feet followed by grading at 1,162 feet of grading at 12 inches. The volume of the grading is 18,515 cubic yards, costing $1,851.50. The total cost of RW12 and RW13, without rails and superstructure, is $6,873.12.

RW14 is the last mile of the Raleigh division and it terminates in the center of the modern town of Clayton in Johnston County. Since this is an urban landscape, one has to exercise care in distinguishing manmade structures, such as highway embankments, from the natural topographic features. The level line is set at 334 feet for the entire mile. After taking eleven measurements for cuts ranging from 0.1 to 13.89 feet, the volume can be determined using the average end areas formula, 20,202.83 cubic yards. The cost of this final mile of excavation is $2,020.28. The estimated cost of miles RW11 through RW14 is \$29,865.72 with rails and superstructure. The total estimate for the Raleigh division is \$192,570.42, or \$12,838.03 per mile.

The sequences of this division include RW00-04 – $G_{(1584\ cy)}$ $T_{(5280,\ 20,\ 18;\ 1108.8,\ 16;\ 897,\ 15)}$ $B_{(\$10,500)}$ $X_{(232421.8\ cy)}$ $M_{(4920.66\ cy)}$, RW05-06 – $B_{(\$9000)}$ $G_{(2681.8\ cy)}$ $X_{(3595.80\ cy)}$ $M_{(35140.48\ cy)}$, RW07-08 – $G_{(29260\ cy)}$ $G_{(7607.6\ cy)}$ $M_{(6545.17\ cy)}$ $P_{(2112,\ 6.62,\ 10.26)}$ $P_{(2112,\ 8)}$ $X_{(7931.09}$ cy), RW09 – $X_{(2496.07\ cy)}$ $P_{(422..4,\ 8)}$ $X_{(2668.55\ cy)}$ $T_{(792,\ 14)}$ $G_{(3696\ cy)}$ $B_{(\$16000)}$ $T_{(1241,\ 25)}$, RW10 – $X_{(169966\ cy)}$, RW11 – $G_{(20205.8\ cy)}$ $X_{(11803.63\ cy)}$ $G_{(3964.4\ cy)}$, RW12 – $G_{(21683.2\ cy)}$ $X_{(147.34\ cy)}$ $P_{(633,\ 10)}$ $X_{(6326.25\ cy)}$$G_{(18515)}$, RW14 – $X_{(20202.83)}$.

The Neuse Division

The Neuse Division (identified by the letter "N") begins at the abutment of the bridge on the west side of the Neuse River. This is mile NR00, meaning the first mile at the Neuse built in the direction of Raleigh. For the Waynesborough Division, the total rise in elevation from the site of Waynesborough to the present day town of Selma, two miles east of the Neuse River, is approximately 88 feet. After crossing the Neuse River, the line of the railroad ascends 36.77 feet in the next mile followed by a climb of 45.14 in the following mile. The topography does not present a smooth incline; it is an undulating landscape of hills requiring excavations. For example, in NR00 the ascent does not begin at the elevation of river but at the bridge abutment. The maximum elevation within this mile is 179.20 feet above sea level. The abutment of the bridge is at 150 feet above sea level, and 30 feet above the bed of the Neuse. Trestlework of 528 feet in length must be built from the abutment to the bridge, at \$1,000 The hill at the end of the trestlework is rounded nearly symmetrically (Figure 37). Applying the formula $.5[\pi(.5l)h]$ gives the area of the cross-section of hill from the 150-foot level, $0.5[\pi(0.5 \times 580)8.5] =$ 3,945.78 square feet. The area under the grade line, a right triangle, is subtracted from the profile from level line, 3,945.78 – 1,026.60 = 2,919.18 square feet. Following the grade line to the center of the hill, the measure to the top of the hill is 6.88 feet, and is the maximum depth of the cut. To get a rough estimate of the excavation, the area of the resulting cross-section is multiplied by the width of the cut, including sides, 16 + (1.5 × 6.88) = 26.32 feet. The resulting volume is 2,845.66 cubic yards. Since this cut is located at a bend in the river and gravel pits are located in this area, the estimate will use the per cubic yard rate of $ 0.25 for hard gravel (United States, 1838, 39). The estimate for this excavation is $711.42.

After excavating through the first hill in mile NR00, a small stream needs to be crossed with 792 feet of piles with a maximum height of 11 feet, costing $345. The next excavation begins at the end of the piles at an elevation of 158.38 feet. The cut depths to the grade line measured from the start of the mile are 7.95 feet at 2,587.2 feet, 3.85 feet at 2,649 feet, 8.97 feet at 3,009.6 feet, and 0.00 feet at 3,590 feet from the ground line. Applying the regular cross-section formula, the volume of this excavation is 6,409.64 cubic yards. The cost at $0.25 per cubic yard is $1,602.51. This mile also contains 1,300 feet of grading at 25 inches, totaling 14,106 cubic yard. The cost at $0.15 per cubic yard is $2,115.90. The route of the railroad ascends 45.57 feet over a mile, from 179.20 feet to 224.77 feet, in NR01. The grade line closely follows the ground; grading at 12 inches should suffice for the whole distance.

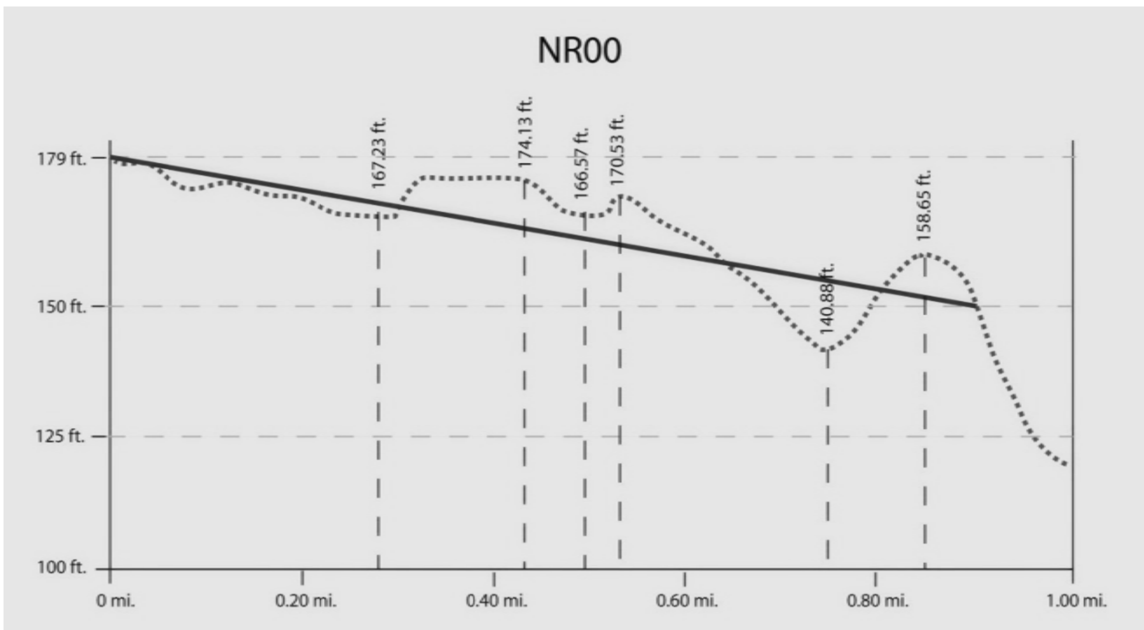

Figure 37. Mile NR00 is the first mile of the Neuse Division. The solid black line indicates the grade of the railroad from the end of the trestlework at 150 feet to 179 feet in elevation over a distance of 4752 feet.

This will yield the addition or removal, in places, of 24,640 cubic yards of earth. The route has diverged from the Neuse depositions of gravelly sediments so the estimate per cubic yard can be reduced to $0.10. Grading of the whole mile would amount to $2,464. There is a rise of 19.41 feet, from 224.09 to 243.50, in mile NR02. However, there is as sudden rise 1,584 feet into the mile NR03. This appears to be the Wilson Mills Scarp (Daniels, Gamble, Wheeler, and Holzhey, 1972, 11). By applying pile construction on an incline from 224.09 to 232.30 feet in elevation for a distance of approximately 2,059 feet, the scarp can be traversed economically for $897. The maximum height of the piles is approximately 12 feet. The remaining 3,221 feet in the mile can be graded at 36 inches. This would yield a total of 54,757 cubic yards of earth moved at a cost of $5,475.70.

Beginning 316 feet into mile NR03, the grade line must ascend 5.00 feet from 243.50 feet to 250 feet in elevation over a distance of 1,109 feet. This distance can be crossed with piles at a maximum height of 12 feet. Within this mile, the railroad crosses two first order streams that ultimately drain into Poplar Creek. Piles at a maximum height of 12 feet extending 845 feet in length can be used for the first stream, and 1,605 feet of piles at a height of 14 feet will cross the second stream. At a distance of 4,987 feet into this mile, 293 feet of piles measuring 4.00 feet in height are necessary to maintain an elevation of the grade at 250 feet. In total, 3,852 feet of piles at an average cost of $2,300 per mile totals $1,677.45. The remaining 1,428 feet in the mile require grading at 16 inches to maintain the grade, the volume of which is 9,202.66 cubic yards. The proximity of a gravel pit within this mile suggests that the rate of $0.15 per cubic yards is appropriate. The estimate for grading in this mile is $1,380.40.

The grade in mile NR04 is influenced by the ascent that occurs in NR05. A steep incline in RW05 rises from 256 feet to 296 feet in 0.8 miles. To extend this rise to a full mile would be better. The grade reaches the elevation of 250 feet in NR03. It will be necessary to ascend 5.00 feet half way into NR04 to be at level when beginning the ascent in NR05. The Carolina Bay in NR04 can be traversed with 2,429 feet of piles with a height of 10 feet. The piles follow a grade that ascends 6 feet. The estimated cost of the piles is $1,058 (Figure 38). At this point a hill appears that has a maximum height of 11 feet above the grade line and extends a distance of 1,795.2 feet in NR04. Applying the regular cross-section formula for cuts in feet at 8.39, 10.73, 8.48, 9.96, 6.52, and 6.79, the volume of this excavation is 8,850.5 cubic yards. The cost at $0.10 per cubic yard amounts to $885.05. The proximity of the Carolina Bay suggests that this structure is sand and loam, is therefore less expensive to excavate. The last 1,050 feet of this mile are relatively level with the grade line, and they can be graded at 6.00 inches. This would amount to 2,330 cubic yards moved at a cost of $233.

The grade line in mile NR05 rises 40 feet over a mile, or a rise of approximately 8.00 feet every 0.2 miles. The median difference between the ground line and the grade line over the entire mile is 5.00 feet. By applying the formula for regular cross-section, $A = c(d + \frac{w}{2})$, the volume of the excavation can be calculated at 22,977.9 cubic yards. The cost of this excavation would amount to $2,297.79. Mile NR06 is relatively level for 2,745 feet; thereafter, the grade ascends 18 feet, with an intervening descent of 16 feet. Trestlework, extending 2,534 feet with a maximum height of 25 feet, is needed to overcome this undulation in the terrain.

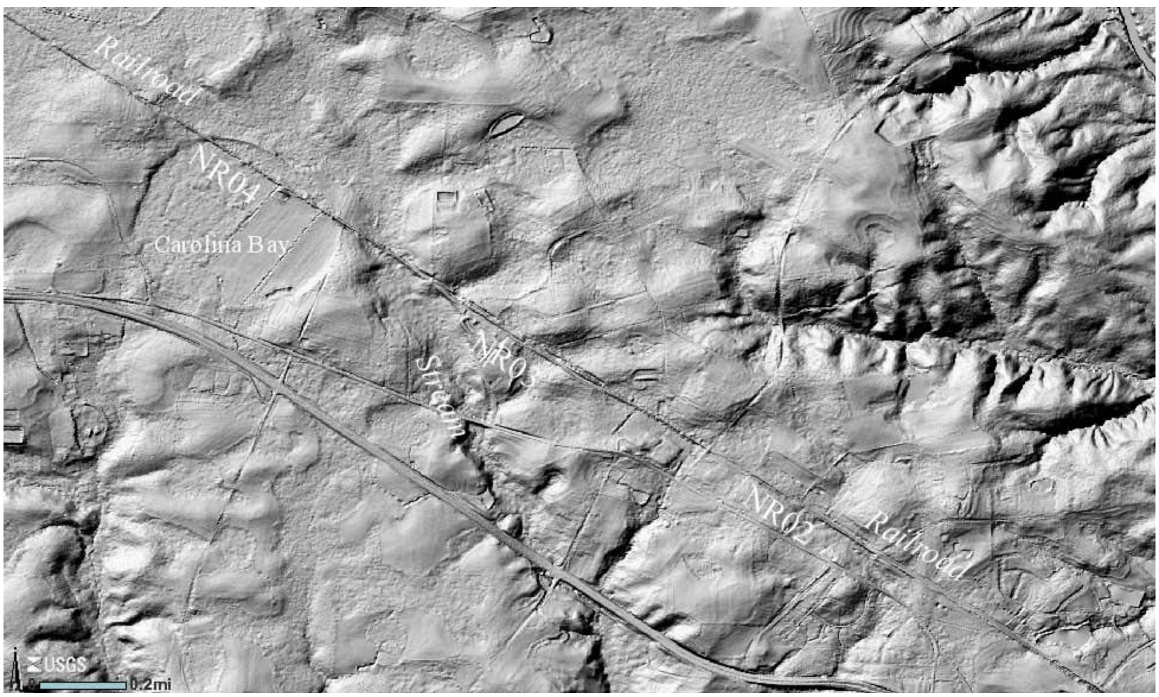

Figure 38. This image illustrates the elevation data for the area that includes NR02 through NR04. The grade must traverse three first order streams in NR03, and a Carolina Bay in NR04.
Source: USGS. (2008). "1/3 ArcSecond NED CONUS, North Carolina-1/9 ArcSecond." *The National Map*.

The cost, based upon the high estimate of $10,000 per mile for such work on the Charleston & Hamburg Rail Road, would be $4,800. The first 2,745 feet of this mile must be graded to a height of 12 inches. This would entail the moving of 1,268.8 cubic yards of earth, at a cost of $126.88. The trestlework continues into NR07, rising from 313 feet in elevation to 319 feet over a distance of 2,851.2 feet. However, the maximum height of this trestlework is 14 feet. The estimated cost is $4,831.82. At the end of the trestlework, the ground line remains level at elevation of 319 feet for a distance of 528 feet. Grading at 9.00 inches is sufficient to prepare the ground for the superstructure of the road. The volume of earth moved during the grading is 1,798.5 cubic yards, costing $179.85. Trestlework resumes 3,379 feet into mile NR07. The maximum height of the trestlework in the remainder of the mile, 1,900 feet, appears to be no more than 10 feet; however, the grade line must ascend to an elevation of 313 feet at a distance of 2,006 feet into NR08. This means that the trestlework will ascend 5.35 feet by the end of mile NR07. As a result, the maximum height of the trestlework at the end of this mile is approximately 16 feet. The cost of this section of trestlework is $3,598.48.

Two full miles remain in this division, NR08 and NR09. The route of the railroad is now entering Piedmont terrain. In both miles, there are ridges approximately 340 feet in elevation, and declivities that are as deep as 20 feet, but average around 12 feet. As with other parts of the road, the preferred method for initial construction is trestlework and piles. Thereafter, these works can be filled in with embankments for the "permanent way." Mile NR08 begins with 2,006 feet of trestlework with a maximum height of 12 feet, at a cost of $3,799.24. It is followed by 580 feet of grading at 24 inches on the first ridge of this mile. The volume of grading is 6,002 cubic yards, costing $600.20. Piles, extending 739.2 feet from the first ridge to the second ridge, ascend 8.00 feet from 300 feet in elevation to 338 feet. The maximum height of the piles is approximately 14 feet, at a cost of $332. The second ridge requires grading at 12 inches for a distance of 897.6 feet. The volume of grading is 4,188.8 cubic yards, costing $418.88. The last 1,425.6 feet of NR08 contains piles with a maximum height of 14 feet, at an expense of $621.

Mile NR09 enters modern-day Clayton at approximately 2,798.4 feet into its extent. This length can be traversed with piles set on a level grade line of 338 feet. The maximum height of the piles is 22 feet; however, most range between 10 and 18 feet in height. The piles would cost $1,219. The next 475.2 feet require grading at 36 inches. The volume of the grading amounts to 8,078.4 cubic yards at a cost of $807.84. The last portion of this mile should contain 1,476 feet of piles with a maximum height of 11 feet, and 530.43 feet of grading at 36 inches. The expense of the piles amounts to $642.94. The grading, amounting to 9,017.31 cubic yards of earth moved, would cost $901.73.

In mile NR09 + 1,445 feet, the Neuse Division and the Raleigh Division join. The grade over this length is a gentle descent from 338 feet to 334 feet. Grading to receive the superstructure at 9 inches is all that is required for this section of the road. The volume of the grading is 4,922 cubic yards, at a cost of $492.20.

The sequence for the Neuse Division is NR00 – $T_{(528, 30)}$ $X_{(2845.66 \text{ cy})}$ $P_{(792, 11)}$ $X_{(6409.64 \text{ cy})}$ $G_{(14106)}$, NR01-02 – $G_{(24640, 12 \text{ cy})}$ $P_{(2059, 12)}$ $G_{(54757 \text{ cy})}$, NR03 – $P_{(3852, 12, 12, 14, 4)}$ $G_{(9202.66 \text{ cy})}$, NR04 – $P_{(2429, 10)}$ $X_{(8850.5 \text{ cy})}$ $G_{(2330 \text{ cy})}$, NR05 – $X_{(22977.9 \text{ cy})}$, NR06 – $T_{(2534, 25)}$ $G_{(1268.8 \text{ cy})}$, NR07 – $T_{(2851.2, 14)}$ $G_{(1798.5 \text{ cy})}$ $T_{(1900, 16)}$, NR08 – $T_{(2006, 12)}$ $G_{(6002 \text{ cy})}$ $P_{(739.2, 14)}$

$G_{(4188.8\ cy)}$ $P_{(1425.6,\ 14)}$, NR09 – $P_{(2798.4,\ 10,\ 18,\ 22)}$ $G_{(8078.4\ cy)}$ $P_{(1476,\ 11)}$ $G_{(9017.31\ cy)}$, NR09+1,445 feet – $G_{(4922\ cy)}$. The total cost of this division of the road is $45,504.58, excluded rail and superstructure, or approximately $5,000 per mile. With rails and superstructure, this division would cost $82,771.11. The topography of the Neuse Division was suitable for the use of piles and trestlework. This reduced the need for heavy excavation and the building of embankments

The Estimate

The cost of building the railroad, including rails and superstructure is estimated at $178,817.70 for the Waynesborough Division, $192,570.42 for the Raleigh Division, and $82,771.11 for the Neuse Division. In all, the total is $452,099.23, or approximately $10,000 per mile. The sequences for the individual division illustrate three distinct construction practices. The Waynesborough Division traverses the flood plains and terraces of the Coastal Plain. The banks of rivers are low, so the bridges do not require towering piers. Many streams can be bridged with trestlework. Piles and grading are the most common practices, and the line of the railroad is straight. Ascents and descents in arcs are typical of the Raleigh Division. Heavy excavation and embankments are required to keep a smooth grade, and the bridging of minor streams often involves building high bridges at great expense. The sequences reflect the topography of the Piedmont. The Neuse Division represents the transition between the Coastal Plain and the Piedmont. A few heavy excavations are required amid rolling hills; however, the climb in elevation is gradual. Piles and trestlework are adequate substitutes for embankments because the line of the railroad is straight, and the inclines over a mile are small.

This estimate is based on a maximum grade of 50 feet per mile, and even through it follows the route of the North Carolina Railroad, it resembles it only slightly. The grade of this railroad is more difficult that the counterfactual model. The accuracy of the model is limited. Linear measurements within a mile can be off by ± 52.8 feet, or 0.01 miles. Depth measurements are more accurate; usually to the nearest foot. The per cubic yard rate for excavation are judgments based an interpretation of topographic quadrangle maps, and tend to err towards a great expense than might have been incurred.

Based upon early subscriptions taken for the Wilmington & Raleigh in 1833 that amounted to $520,000, from Wake, Johnston, Chatham, Sampson, Duplin, Brunswick, and New Hanover, it seems within reason that the subscriptions for this railroad could have been solicited within the state (*Raleigh Register*, 3 September 1833, 17 September 1833). For the purposes of this study, it is safe to say that the topography does not present any problems that the prevailing locomotive and rail construction could not overcome. The construction of a railroad between the Coastal Plain and Piedmont on North Carolina was a realistic project, had it been undertaken in the 1830s. In fact, most of the counterfactual railroad has the advantages of passing through the Coastal Plain for most of its extent. Further, its total cost and per mile cost is less than the Raleigh & Gaston Rail Road, though greater than that of the Wilmington & Raleigh.

The counterfactual model of a railroad from Waynesborough to Raleigh could have been built during the 1830s had the financial interests in Raleigh and Wilmington maintained their commitment to connect the two towns. From a technical standpoint, the project was practical within the limits of the technology, and sections of the route resembled railroads that had been completed before 1840. In terms of the cost of construction, the model falls below the cost of the Raleigh & Gaston. It has the unique advantage of practically fulfilling the long anticipated Central Rail Road by forming its stem. As to its potential to turn a profit and enhance the economy of the middle Piedmont at that earlier date remains the question. One can only estimate these "what if" situations based upon the economic impact the actual railroads had upon the economies of the counties through which they passed up to the year 1860. Census data is the most reliable source to draw such conclusions. The annual reports of the Wilmington & Raleigh Rail Road (later the Wilmington & Weldon Railroad) should reflect the change in transportation patterns and revenue after the connection to the Piedmont was established in the 1850s. The historical record either supports the model of the counterfactual network, or renders evidence that it would have been productive, regardless of the practicality of its construction.

Pattern of Transportation

The "General Return of Receipts and Expenditures of the Wilmington & Raleigh Rail Road Company from first May to first November, 1840" appears in the company's annual report to the Board of Internal Improvements for that year. This sheet of tabulations breaks down the month-to-month activities of the company in the half-year after its completion. Fortunately, it includes freight volumes and a breakdown of passenger the line (Wilmington & Raleigh Rail Road Company, 1840). This is the first document that illustrates the pattern of transportation with the railroad function without interruptions due to construction. Passengers and freight could pass freely along its whole extent. The pattern becomes obvious when this data is graphed.

The volume of "way" passengers, those travelling from one station to another on the line, fluctuated by a few hundred during the six-month period. However, the volume of "through" passenger, travelers using the railroad to pass from one end of the line to the other, displays a distinct pattern over the same period. In essence, "through" passengers were using the Wilmington & Raleigh as a conduit for destination to the north and south. During the summer months, the volume of traffic trended toward northern destinations. The pattern reversed in the fall. Overall, the number of "through" passenger far exceeded those making trips along the line (Figure 39). The Wilmington & Raleigh functioned as the rail corridor through North Carolina. Its steamship line completed the connection to South Carolina (Figure 40). The receipts from freight remained nearly flat during this period, which the volume of freight fluctuated by approximate 20,000 tons in both the positive and negative direction (Figure 41, Figure 42). In 1841, there were 9,742 "through" passengers and 5,498 "way" passengers. Unfortunately, the passenger statistics for 1842 were lost in the "Great Fire" of 30 April 1843. The statistics that have survived for the years 1843 through 1849 show an increase in "way" travel that climbs to more than twice the traffic to the adjoining states. From 1847 through 1860, "way" passenger increased far ahead of "through" passenger travel. By examining the mouth-to-month passenger volumes for the year 1854-55 and 1859-60, it becomes clear that the yearly patterns of both “way” and “through” travel retain seasonal oscillations. However, the differences between north and south travel through the years was less pronounced by 1860, and the volume of “way” travel had increased (North Carolina, 1848, 18; Figure 43; Wilmington & Weldon Rail Road Company, 1855, 20, 26; Wilmington & Weldon Rail Road Company, 1860, 45-46; Figure 44; Figure 45; Figure 46).

Overall, the growth in “way” travel along the line of the Wilmington & Raleigh (Weldon) Rail Road suggests economic development within the counties in the corridor. The growth of “through” traffic increased between 1854 and 1857. In 1854, the Wilmington & Manchester Railroad replaced the steamboat line of the Wilmington & Raleigh, thus facilitating travel to the South. Still, “through” passenger statistics represent the normal flow of communications between North and South, and the volumes had been constant over the railroad’s twenty-year history. The former emphasis placed upon interstate travel in the early plans proves to be less significant when viewing the statistics for latter regional travel. While the revenue from “way” travel is less, its volume reflects regional economic growth. The North Carolina Railroad was completed within ten miles of Raleigh by September 1854, and was expected to be in operation by November (*Wilmington Journal*, 18 September 1854). Little mention of it was made in the 1855 annual report of the Wilmington & Weldon, but by the next year, the company witnessed an increase in freight receipts of $42,000 before transportation on the North Carolina Railroad fully organized.

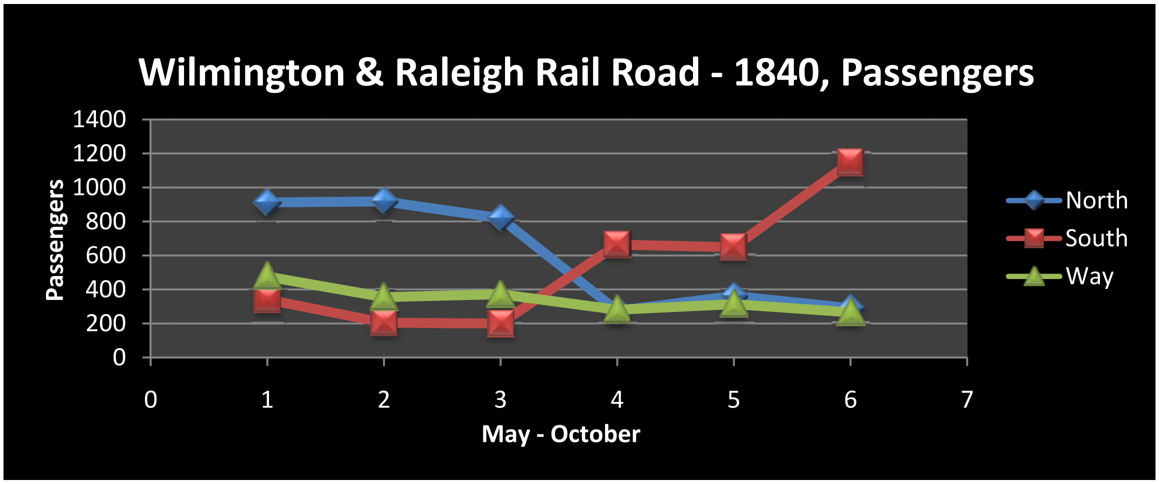

Figure 39. During its first six months of operation after completion, the tabulation of the number of passenger using the railroad Wilmington & Raleigh Rail Road displays a pattern of seasonal travel to destination to the north and south, and a small base of travelers to stations along the line.
Source: North Carolina. (1840). *Fifth Annual Report of the President and Directors of the Wilmington & Raleigh Rail Road Company*. Schedule B.

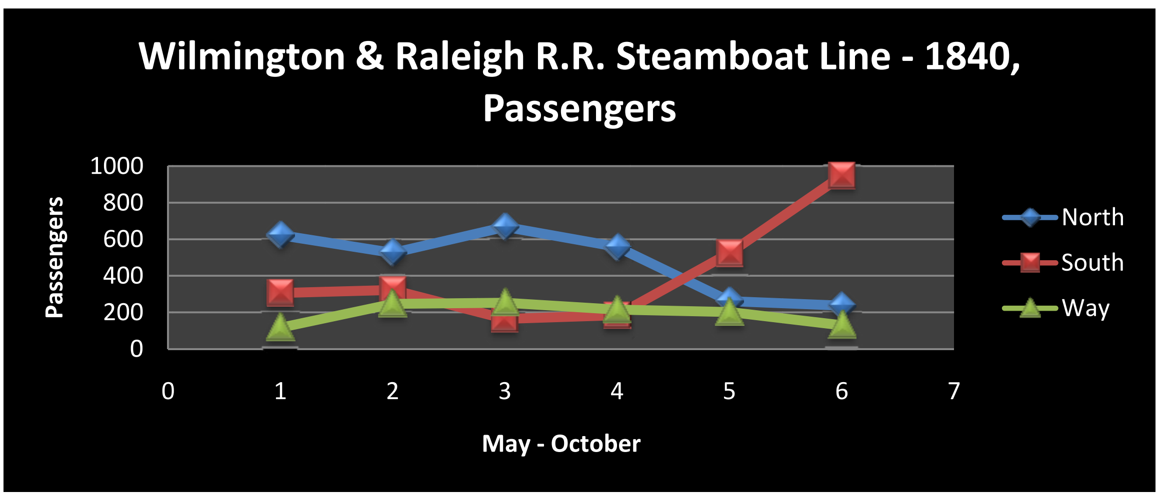

Figure 40. The number of passengers on the steamboat line of the Wilmington & Raleigh Rail Road for the same period illustrates a similar pattern as the passenger tabulation for the railroad. Way passenger travelled from Wilmington to Charleston (and Smithville). Most were travelling to destinations outside North Carolina.
Source: North Carolina. (1840). *Fifth Annual Report of the President and Directors of the Wilmington & Raleigh Rail Road Company*. Schedule B.

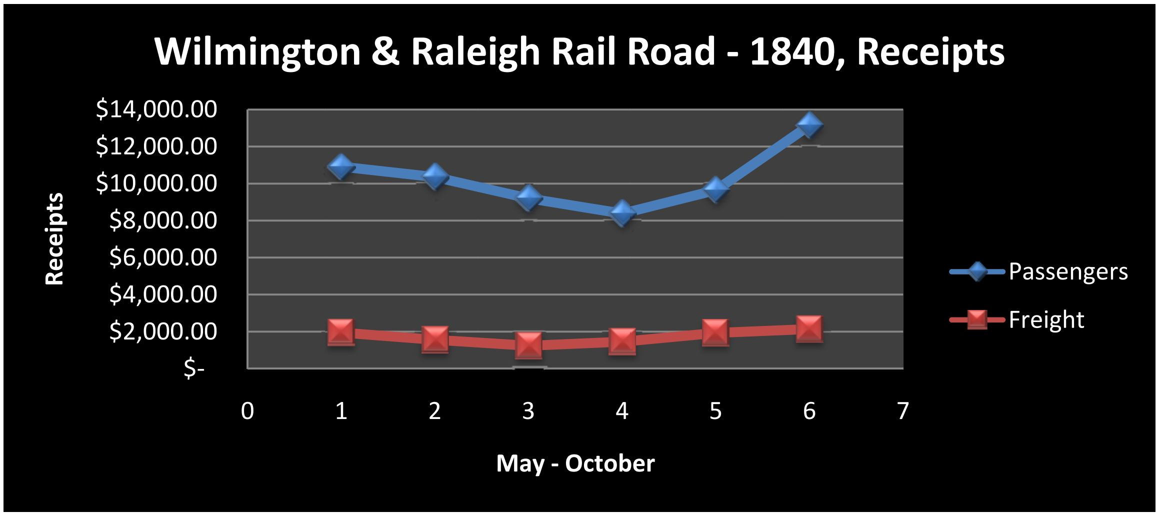

Figure 41. Passenger receipts constituted a significant source of revenue for the Wilmington & Raleigh Rail Road during the same six-month period of 1840. Source: North Carolina. (1840). *Fifth Annual Report of the President and Directors of the Wilmington & Raleigh Rail Road Company*. Schedule B.

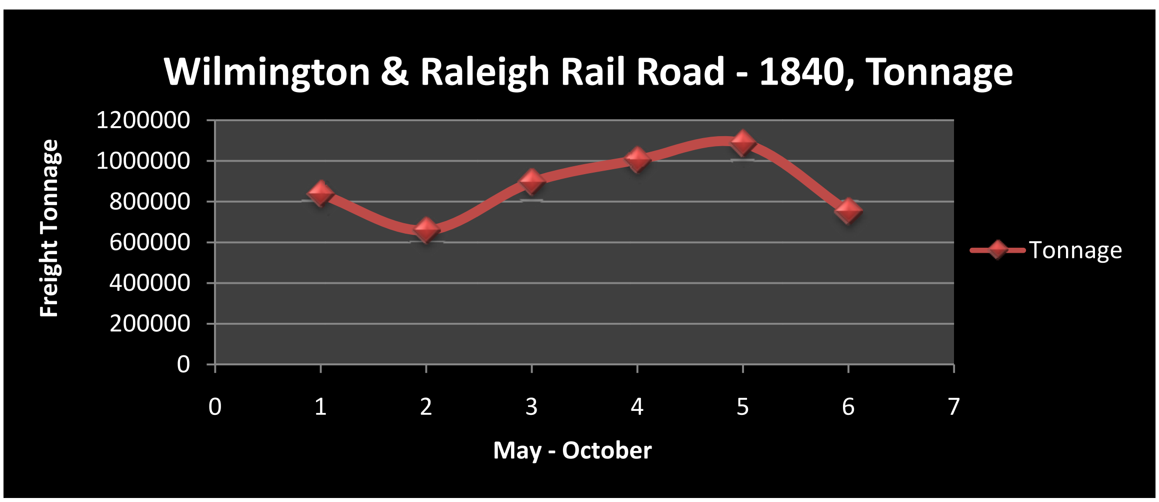

Figure 42. While freight receipts did not vary significantly from month-to-month during the same period, the tonnage of freight increase over the summer. Source: North Carolina. (1840). *Fifth Annual Report of the President and Directors of the Wilmington & Raleigh Rail Road Company*. Schedule B.

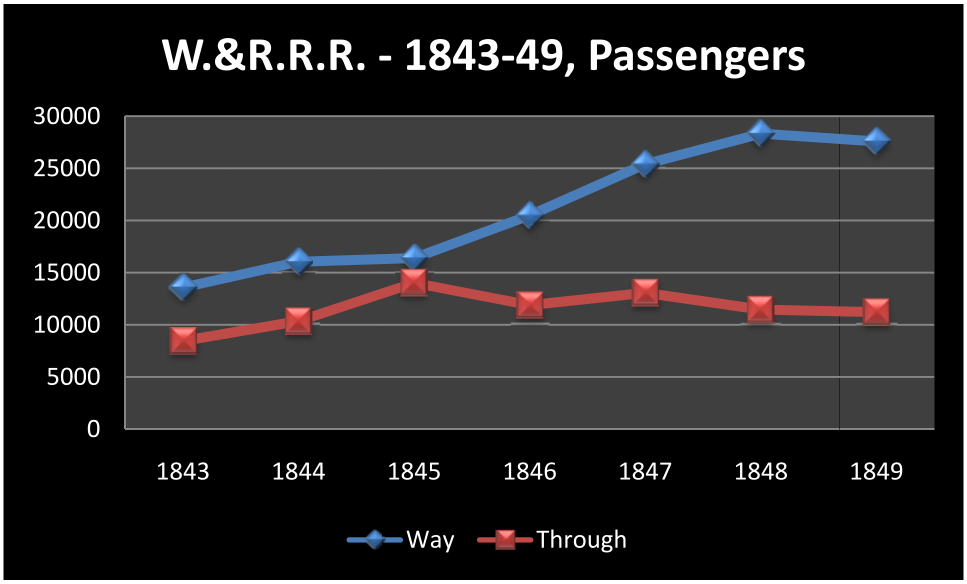

Figure 43. Throughout the 1840s, the volume of “way” passengers traveling between stations of the Wilmington & Raleigh Rail Road increased dramatically. Sources: North Carolina. (1848). *Report of the Board of Internal Improvements*, 18; Wilmington & Weldon Rail Road Company. (1855). *Proceedings of the Stockholders* …, 26

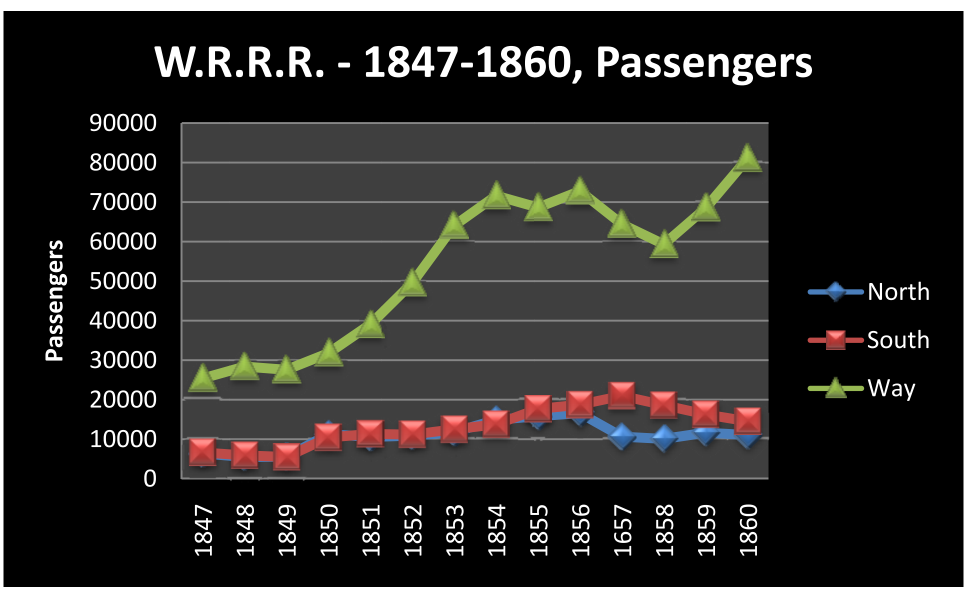

Figure 44. The volume of “Way” travel on the Wilmington & Raleigh Rail Road (Wilmington & Weldon) continued to increase through the 1850s. Source: Wilmington & Weldon Rail Road Company. (1860). *Annual Reports of the President and Directors* …, 45

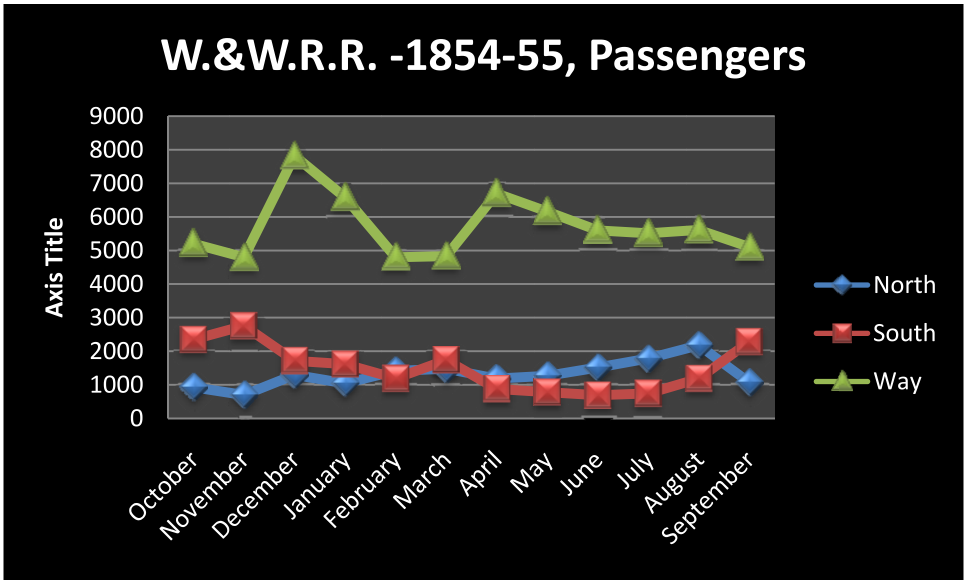

Figure 45. This graph illustrates the passenger statistics on the Wilmington & Weldon Rail Road from October 1854 to September 1855.
Source: Wilmington & Weldon Rail Road Company. (1855). *Proceedings of the Stockholders …*, 20

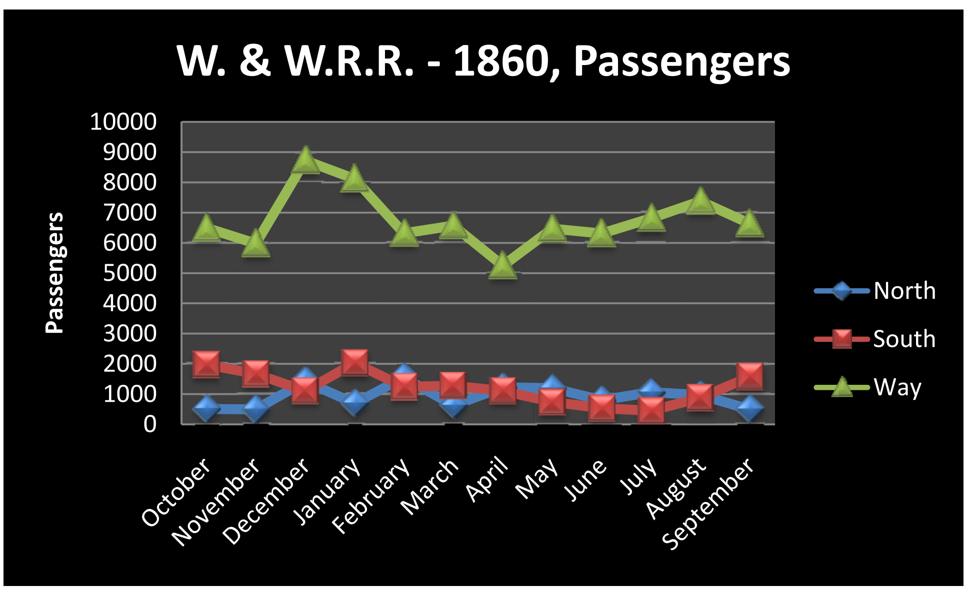

Figure 46. In the last year of the antebellum period, the passenger statistics follow a similar pattern as they had five years earlier. "Way" travel had increased in the months of February and March.
Source: Wilmington & Weldon Rail Road Company. (1860). *Annual Reports of the President and Directors …*, 46

> The North Carolina Rail Road has, as was anticipated by its projectors, been productive of a large increase of business to this Road. The receipts from freight alone from that Road, during the last fiscal year, have been more than $42,000, tho' the business has not yet assumed a form of order and regularity. The citizens of Wilmington foresaw, at an early day, that this great work must be the means of bringing to their town the bulk of the produce of Western North Carolina.— Liberal aid was therefore extended to the work, for which they may now, if they will, reap a plentiful harvest. With 43 miles of Rail Road distance in their favor, it is impossible for any market town beyond the limits of the State to compete with them successfully for this trade. This Road is, however, open to all. *Free trade* is the policy of its messengers. Those who prefer going to Portsmouth or Petersburg can do so by this Road, via Goldsboro' and Weldon, upon the same terms they can come here. That is, the cost for transportation to Weldon is the same as it is to Wilmington. Arrangements were made in May last, with the North Carolina Rail Road Company, to run freight trains through from Charlotte to Wilmington, so that we can now guarantee the most prompt delivery of freight in the West or East. A similar arrangement will soon be perfected with the same Company and the Sea Board and Roanoke Company, by which freight from Portsmouth can reach points West of Raleigh as soon and as cheap as by any other route.
>
> – (Wilmington & Weldon Rail Road Company, 1856, 13-14) –

The advantage of the 43 miles, the direct distance between Raleigh and Goldsboro, gave the farmers of the middle Piedmont more market options than sending their produce to Petersburg. This had always been the case on the Wilmington & Raleigh; farmers had the choice of Petersburg, Portsmouth, or Wilmington. Goldsboro, having become a receiving point for cotton, received 6,104 bales in 1860, and all but one bale of that was delivered to Wilmington. The other stations along the line of the Wilmington & Weldon received far less (Wilmington & Weldon Rail Road Company, 1860, 39). This fact supports the statement that the connection to the North Carolina Railroad would place Wilmington ahead of the out-of-state competition.

The decline of freight and passenger travel on the Wilmington & Weldon Rail Road in 1858 can be attributed to the Panic of 1857, and the directors acknowledge this in their 1858 report to the stockholders (Wilmington & Weldon Rail Road Company, 1860, 3-4). The national recession that followed the Panic of 1857 lasted from one to one and half years in most of the eastern commercial centers, and its impact was felt in rural communities. In the interior, westward expansion was disrupted as railroads failed and their bonds fell in value. The initial cause can be traced to the failure of railroads in the western lands, mortgage defaults of the same lands that followed a period of land speculation, declining commodity prices, and a lack of liquidity in the eastern banks, because of the declining value of mortgages and railroad bonds that could be unloaded (Calomiris and Schweikart, 1991, 808-815). The contemporary reader is familiar with this type of financial derangement. It differs from the Panic of 1837 in that it was not driven by the ideology of decentralization of capital, or the power struggle between Jackson and Biddle, and their supporters. Speculation was the root cause of this economic downturn, and its evolution was propelled by a few notable unforeseen events. While the Panic of 1857 belongs to the continuation of this work, that merchants, banks, and railroad in the South were more effective in coordinating their response to the recession than other regions is worth noting (Calomiris and Schweikart, 1991, 831-832).

The freight receipts for the Wilmington & Raleigh Rail Road/Wilmington & Weldon Rail Road steadily increased from 1847 to 1860, with plateaus between 1852-53 and 1857-58 (Figure 47). Between 1854 and 1860, traditional products of the Coastal Plain Region such as naval store went into decline as cotton continued its rise. Wheat and flour production spiked during 1857-58, but declining demand for grain forced down prices at the end of the Crimean War. However, the market for cotton increased

(Calomiris and Schweikart, 1991, 813, 815-816; Figure 48). By 1860, the total receipts of the company from all sources were $500,209.56, the greatest amount to date (Wilmington & Weldon Rail Road Company, 1860, 33). The relaying of the Wilmington & Raleigh's rails in the early 1850s had contributed to the company's efficiency, but connection with the North Carolina Railroad had enhanced its service.

Patterns of Economic Development

Between 1815 and 1833, land value had declined significantly. The counties that experienced the greatest loss in land values, with the exception of Randolph and Rowan counties, were east of the fall line (Coon, 1908, 622-623; Table 14). An examination of the cash value of farms, from *The Seventh Census of the United States* for the same set of counties shows a substantial increase in the value of agricultural land in 1850 relative to general land values in 1833. The routes of the early railroads passed through several that had shown increases in farm value (United States, 1853a, 318-319; Table 15). By 1860, the cash value of farms in the 32 counties that had the greatest decrease in land values in 1833 increased from their 1850 cash values significantly (United States, 1864, 104, 108). Most increased by double, and some by three times. The median increase across the whole group was 90.87 percent. By this time, several railroads had been built in these counties, or were under construction. These included the North Carolina Railroad that passed through Carteret, Craven, Lenoir, Wayne, and Johnston counties in the east; and in the Piedmont, Rowan County, one of the two counties to the west on the original list. The Wilmington & Manchester Railroad passed through Brunswick County, and the Wilmington, Charlotte, & Rutherford Railroad passed through Bladen County.

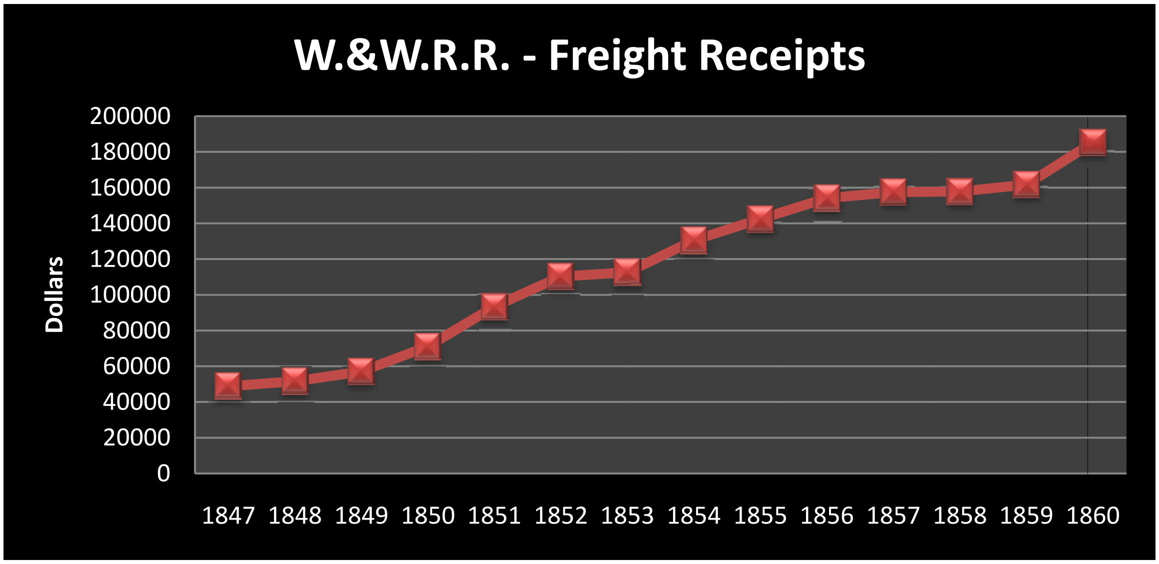

Figure 47. The freight receipts of the Wilmington & Raleigh Rail Road (later the Wilmington & Weldon Rail Road
Source: Wilmington & Weldon Rail Road Company. (1860). *Annual Reports of the President and Directors* …, 33

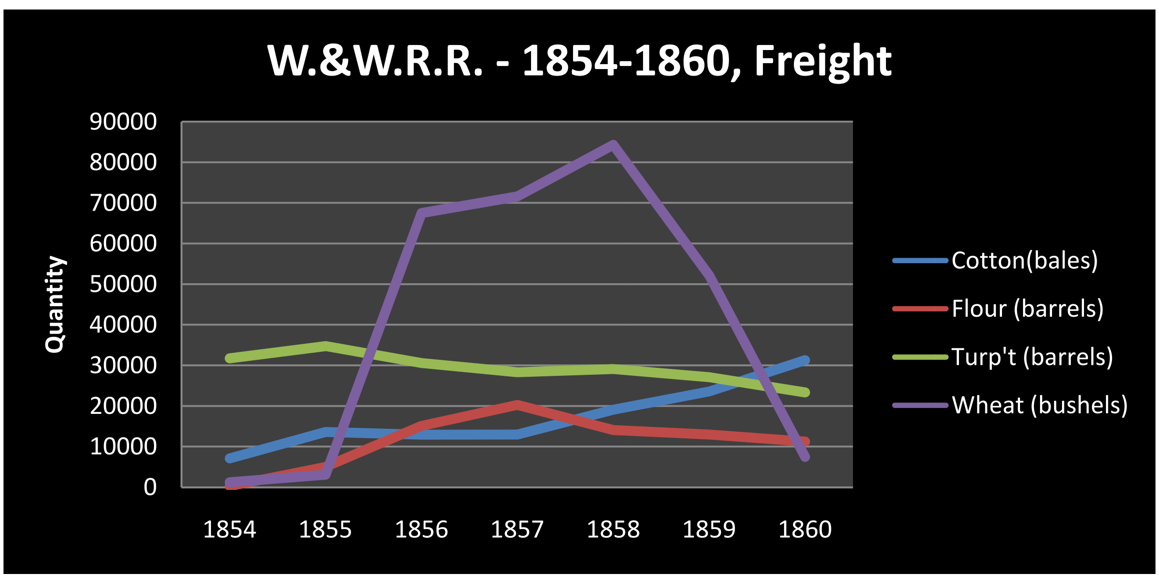

Figure 48. The volumes of the commodities in this graph are expressed in different units, bales, bushels, and barrels. The rise in cotton volumes is a significant trend.
Source: Wilmington & Weldon Rail Road Company. (1860). *Annual Reports of the President and Directors* …, 39

County	Land Value in 1815	Land Value in 1833	Decrease	Percentage of Decrease
Hyde	813,287	238,615	574,672	71%
Craven	1,787,931	691,646	1,096,285	61%
Lenoir	724,996	333,491	391,505	54%
Washington	437,512	227,072	210,440	48%
Brunswick	516,189	289,277	226,912	44%
Jones	711,020	399,702	311,318	44%
Rowan	2,176,720	1,389,009	787,711	36%
Camden	412,618	272,539	140,079	34%
Wayne	1,144,620	770,431	374,189	33%
Currituck	343,473	232,185	111,288	32%
Sampson	769,301	528,104	241,197	31%
Pitt	1,399,719	961,499	438,220	31%
Onslow	605,153	416,192	188,961	31%
Greene	549,244	382,964	166,280	30%
Carteret	385,131	276,016	109,115	28%
Cumberland	1,293,805	942,721	351,084	27%
Hertford	830,081	606,206	223,875	27%
Bertie	1,350,096	995,809	354,287	26%
Nash	703,034	518,871	184,163	26%
Tyrrell	332,014	247,141	84,873	26%
Beaufort	810,819	605,040	205,779	25%
Johnston	846,865	632,947	213,918	25%
Duplin	729,097	550,812	178,285	24%
Halifax	2,061,540	1,569,893	491,647	24%
Chowan	645,360	497,921	147,439	23%
New Hanover	1,293,399	998,902	294,497	23%
Granville	1,161,446	901,545	259,901	22%
Franklin	916,713	716,220	200,493	22%
Bladen	554,276	435,645	118,631	21%
Perquimans	563,021	445,351	117,670	21%
Edgecombe	1,926,572	1,524,986	401,586	21%
Randolph	891,207	712,392	178,815	20%

Table 14. The greatest loss in land values in North Carolina between 1815 and 1833 occurred, with the exception of Randolph and Rowan counties (in blue), in the counties east of the fall line.
Data Source: Coon, Charles L. (1908). *The Beginnings of Public Education in North Carolina*, Raleigh: Edwards & Broughton Printing Company, 622-623.

County	Land Value in 1833	Farm Value in 1850	Increase	Percentage Increase
Hyde	238,615	1,141,635	903,020	378.44%
Camden	272,539	981,280	708,741	260.05%
Lenoir	333,491	1,191,461	857,970	257.27%
Sampson	528,104	1,804,729	1,276,625	241.74%
Currituck	232,185	736,357	504,172	217.14%
Duplin	**550,812**	**1,407,443**	**856,631**	**155.52%**
Perquimans	445,351	1,032,968	587,617	131.94%
Wayne	**770,431**	**1,613,294**	**842,863**	**109.40%**
Bladen	435,645	882,413	446,768	102.55%
Greene	382,964	767,803	384,839	100.49%
Brunswick	289,277	521,059	231,782	80.12%
Washington	227,072	367,882	140,810	62.01%
Johnston	632,947	1,025,006	392,059	61.94%
Chowan	497,921	794,615	296,694	59.59%
Granville	**901,545**	**1,406,027**	**504,482**	**55.96%**
Randolph	712,392	1,031,503	319,111	44.79%
Cumberland	942,721	1,295,053	352,332	37.37%
Edgecombe	**1,524,986**	**2,030,223**	**505,237**	**33.13%**
Tyrrell	247,141	319,493	72,352	29.28%
Onslow	416,192	536,676	120,484	28.95%
Bertie	995,809	1,209,847	214,038	21.49%
Nash	**518,871**	**629,556**	**110,685**	**21.33%**
Jones	399,702	467,271	67,569	16.90%
Franklin	**716,220**	**832,196**	**115,976**	**16.19%**
Pitt	961,499	1,115,174	153,675	15.98%
Craven	691,646	778,301	86,655	12.53%
Hertford	606,206	616,879	10,673	1.76%
New Hanover	**998,902**	**1,002,957**	**4,055**	**0.41%**
Beaufort	605,040	605,014	(26)	0.00%
Halifax	**1,569,893**	**1,546,642**	**(23,251)**	**-1.48%**
Rowan	1,389,009	1,071,546	(317,463)	-22.86%
Carteret	276,016	151,900	(124,116)	-44.97%

Table 15. By 1850, many of the same North Carolina counties that had experienced a decline in land values between 1815 and 1833 showed a higher cash value for farms than previous land values. Of these counties, those through which the early railroads passed, with the exception of New Hanover and Halifax, showed high farm values relative to earlier land values (in bold). Beaufort, Brunswick, Carteret, Craven, Onslow, and New Hanover are coastal counties. Randolph and Rowan are Piedmont counties (in blue).
Data Sources: Coon, Charles L. (1908). *The Beginnings of Public Education in North Carolina*, Raleigh: Edwards & Broughton Printing Company, 622-623; United States. (1853a). *The Seventh Census of the United States: 1850.* Washington: Robert Armstrong, 318-319.

The Wilmington & Weldon Railroad had built a branch line to Tarboro in Edgecombe County (Table 16). Now, nearly all these countries were within a reasonable distance of a railroad, or could access one by river. The significance of the east to west corridor, the North Carolina Raleigh, is fully demonstrated by the increased farm values. That it was the agency of economic development in the Piedmont is well known. However, in the east it brought the Wilmington & Raleigh (Weldon) and the Raleigh & Gaston into a network.

The increased volume of cotton transported on the Wilmington & Raleigh (Weldon) Rail Road during the 1850s was documented in the company's annual reports (Figure 48). Agricultural data from the Census of the United States for 1840, 1850, and 1850 illustrate the changing proportions of cultivation of this crop in the counties on the route of the Raleigh & Gaston, the Wilmington & Raleigh (Weldon), and the neighboring county of Wake (Table 17). The two railroads share Johnston County as a neighbor. Wake, Franklin, Granville, and Warren counties, and the neighboring counties of Wake, Chatham and Orange counties, were within the service area of the Raleigh & Gaston Rail Road. New Hanover, Duplin, Edgecombe, Nash, and Halifax counties are on the route of the Wilmington & Raleigh (Weldon) Rail Road.

Cotton is not the type of crop that a farmer would cultivate in great quantities if there were not a specialized market for it. In 1840, Wake County produced 2,391,996 pounds of cotton, 14 percent of the output of the counties having access to railroads for the same crop; whereas the counties along the route of the Raleigh & Gaston and the neighboring counties around Wake County cultivated very little cotton (Figure 49).

County	Farm Value in 1850	Farm Value in 1860	Increase	Percentage
Franklin	**832,196**	**2,453,250**	**1,621,054**	**194.79%**
Nash	**629,556**	**1,736,608**	**1,107,052**	**175.85%**
Pitt	1,115,174	3,052,010	1,936,836	173.68%
Rowan	**1,071,546**	**2,924,631**	**1,853,085**	**172.94%**
Carteret	**151,900**	**411,945**	**260,045**	**171.19%**
Bladen	**882,413**	**2,244,488**	**1,362,075**	**154.36%**
Onslow	536,676	1,337,923	801,247	149.30%
Granville	**1,406,027**	**3,457,365**	**2,051,338**	**145.90%**
Edgecombe	**2,030,223**	**4,974,920**	**2,944,697**	**145.04%**
Halifax	**1,546,642**	**3,699,426**	**2,152,784**	**139.19%**
Duplin	**1,407,443**	**3,131,621**	**1,724,178**	**122.50%**
Greene	767,803	1,658,998	891,195	116.07%
Hertford	616,879	1,321,818	704,939	114.28%
Jones	467,271	963,266	495,995	106.15%
Lenoir	**1,191,461**	**2,432,030**	**1,240,569**	**104.12%**
Washington	367,882	704,919	337,037	91.62%
Camden	981,280	1,865,734	884,454	90.13%
Beaufort	605,014	1,130,020	525,006	86.78%
Wayne	**1,613,294**	**3,012,511**	**1,399,217**	**86.73%**
Craven	**778,301**	**1,376,387**	**598,086**	**76.85%**
Randolph	1,031,503	1,791,483	759,980	73.68%
Sampson	1,804,729	3,110,749	1,306,020	72.37%
Johnston	**1,025,006**	**1,750,771**	**725,765**	**70.81%**
Bertie	1,209,847	2,061,153	851,306	70.36%
Currituck	736,357	1,175,495	439,138	59.64%
Hyde	1,141,635	1,700,075	558,440	48.92%
Perquimans	1,032,968	1,537,770	504,802	48.87%
Brunswick	**521,059**	**755,766**	**234,707**	**45.04%**
Tyrrell	319,493	455,845	136,352	42.68%
New Hanover	**1,002,957**	**1,381,687**	**378,730**	**37.76%**
Chowan	794,615	989,606	194,991	24.54%
Cumberland	1,295,053	1,536,839	241,786	18.67%

Table 16. This table illustrates the increase in the cash value of farms from 1850 to 1860 in the same counties that had the worse decline in land values between 1815 and 1833. All the counties in bold type have railroads running through them, including Rowan Counties in the Piedmont (in bold blue).
Data Source: United States. (1853a). *The Seventh Census of the United States: 1850.* Washington: Robert Armstrong, 318-319; United States. (1964). Agriculture of the United States in 1860. Washington, DC: Government Printing Office, 104, 108).

County	Cotton, 1840	Cotton, 1850	Cotton, 1860
Chatham	399,728	276,000	320,000
Duplin	1,346,229	184,400	468,400
Edgecombe	2,445,000	1,238,800	7,655,200
Franklin	538,320	352,000	1,069,200
Granville	479,499	30,400	51,200
Halifax	2,905,573	696,000	4,172,800
Johnston	401,169	301,200	1,156,800
Nash	5,210,724	138,000	1,102,400
New Hanover	50,728	1,200	52,000
Orange	253,437	922,000	339,200
Wake	2,391,996	823,600	2,444,800
Warren	380,954	66,000	62,800
Wayne	402,175	134,000	1,624,800

Table 17. This table shows the volume of cotton cultivated, in pounds, from the United State Census for the counties on the Raleigh & Gaston, and the neighboring counties around Wake County; and the counties through which the Wilmington & Raleigh (Weldon) Rail Road are included.
Data Sources: United States. (1841d). Compendium of the Sixth Census. Washington, DC: Thomas Allen, 180; United States. (1853a). *The Seventh Census of the United States: 1850.* Washington: Robert Armstrong, 318-319; United States. (1864). *Agriculture of the United States in 1860*. Washington, DC: Government Printing Office, 105, 109).

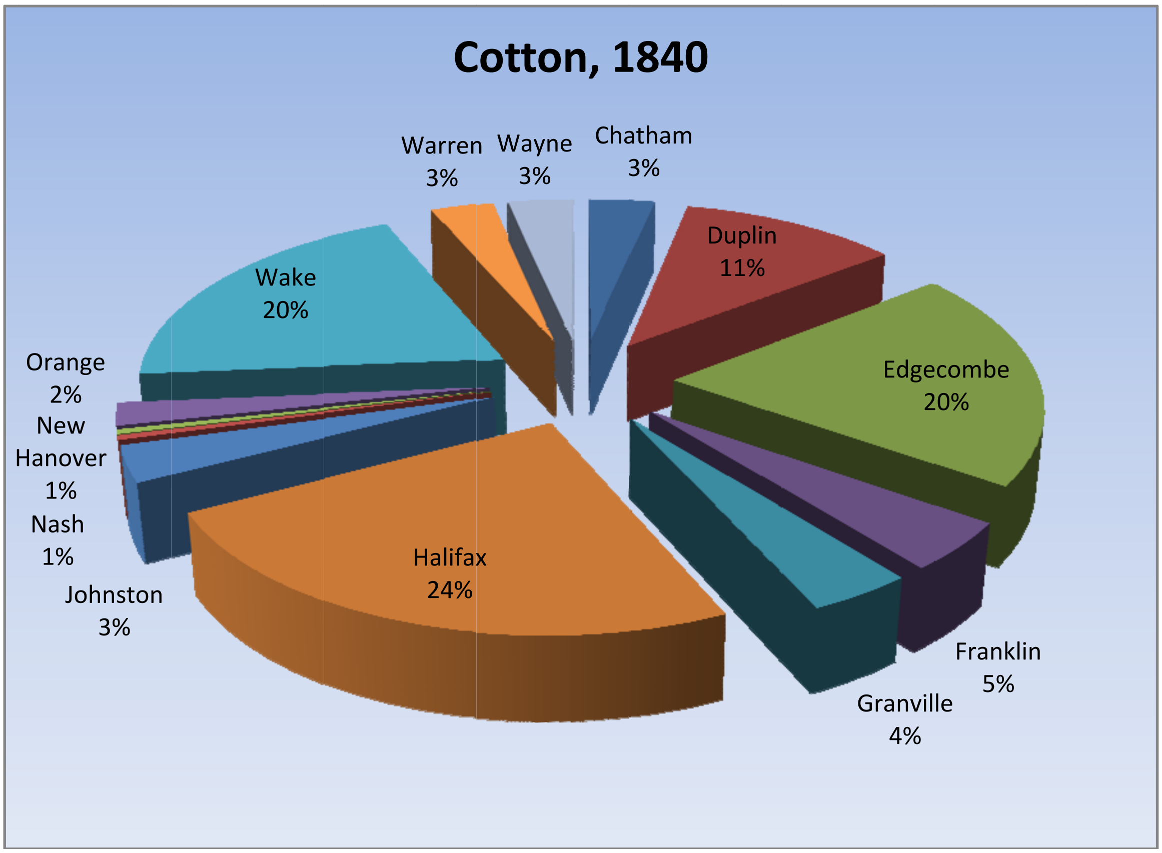

Figure 49. This chart illustrates the distribution of cotton cultivation within the set of counties through which the Raleigh & Gaston and Wilmington & Raleigh pass, and the neighboring counties to Wake County.
Data Source: United States. (1841d). Compendium of the Sixth Census. Washington, DC: Thomas Allen, 180.

Petersburg, Virginia was a center for cotton processing, and the only market within a reasonable distance for this product. Though these figures were recorded in 1840 census after the Raleigh & Gaston was completed, this might explain both the appeal of the Raleigh to Gaston route and the resistance put up by interests in Raleigh and Petersburg when it was learned that the officers of the Wilmington & Raleigh had changed the route.

By 1850, almost all of the counties were producing less cotton than they had in 1840. Orange County was the exception, producing 253,437 pounding in 1840, increasing to 922,000 pounds in 1850. Wake County decreased cotton cultivation to 823,600 pounds (Table 17). The proportions of cultivation within this set of counties show increased percentages for the low volume counties such as Chatham, Franklin, and Johnston; and decreased percentages for the high volume counties such as Edgecombe, Halifax, and Wake (Figure 50). The spatial distribution of this commodity is less concentrated at nodes, and concentrations of volumes are developing on the periphery. Edgecombe, Halifax, and Wake counties emerge as the leaders in cotton cultivation in 1860. However, Wake County had not increased much above the 1840 volume; Halifax had increased cultivation by over a million pounds, and Edgecombe was over five million pounds. The percentages show the high proportion of production in Halifax and Edgecombe (Figure 51). Wayne County has more than tripled its volume since 1840, and Johnston County production has doubled. Johnston County decreased volume by approximately 100,000 pound in 1850, but increased it to 1,156,800 pounds in 1860. As mentioned earlier, Goldsboro had received 6,104 bales, or 2,441,600 pounds, of cotton in 1860. The counterfactual model of an early railroad connecting Waynesborough to

Raleigh through Johnston County could have been productive. On the weight of the data presented on just one commodity, cotton, the large volumes cultivated in Johnston and Wake in 1840 could have passed half the distance to Waynesborough. From there, the farmer could direct it to one of three markets, Wilmington, Petersburg, or Norfolk.

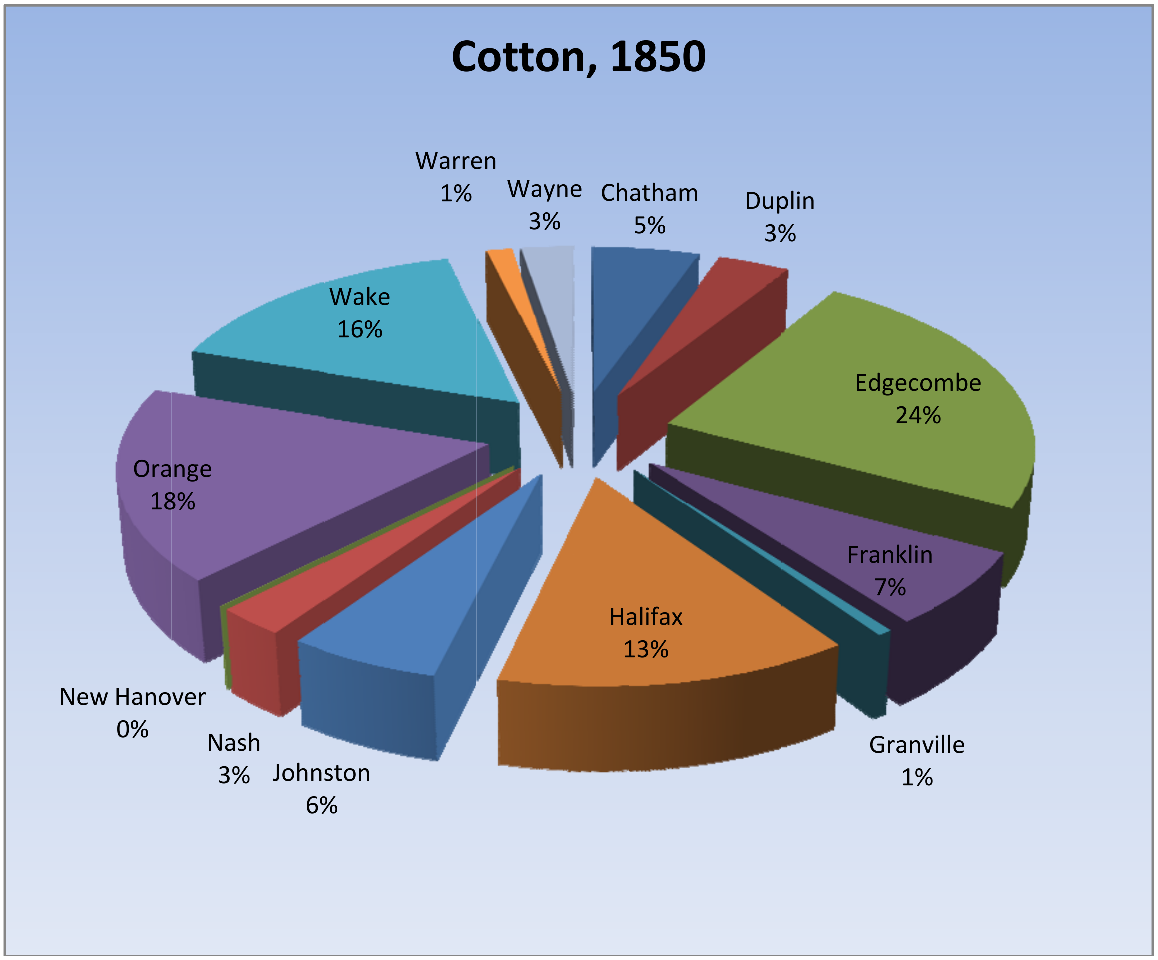

Figure 50. By 1850, the volume of cotton cultivation had decreased in all counties of the set except for Orange County. This distribution of the percentages had changed since 1840.
United States. (1853a). *The Seventh Census of the United States: 1850.* Washington: Robert Armstrong, 321-322.

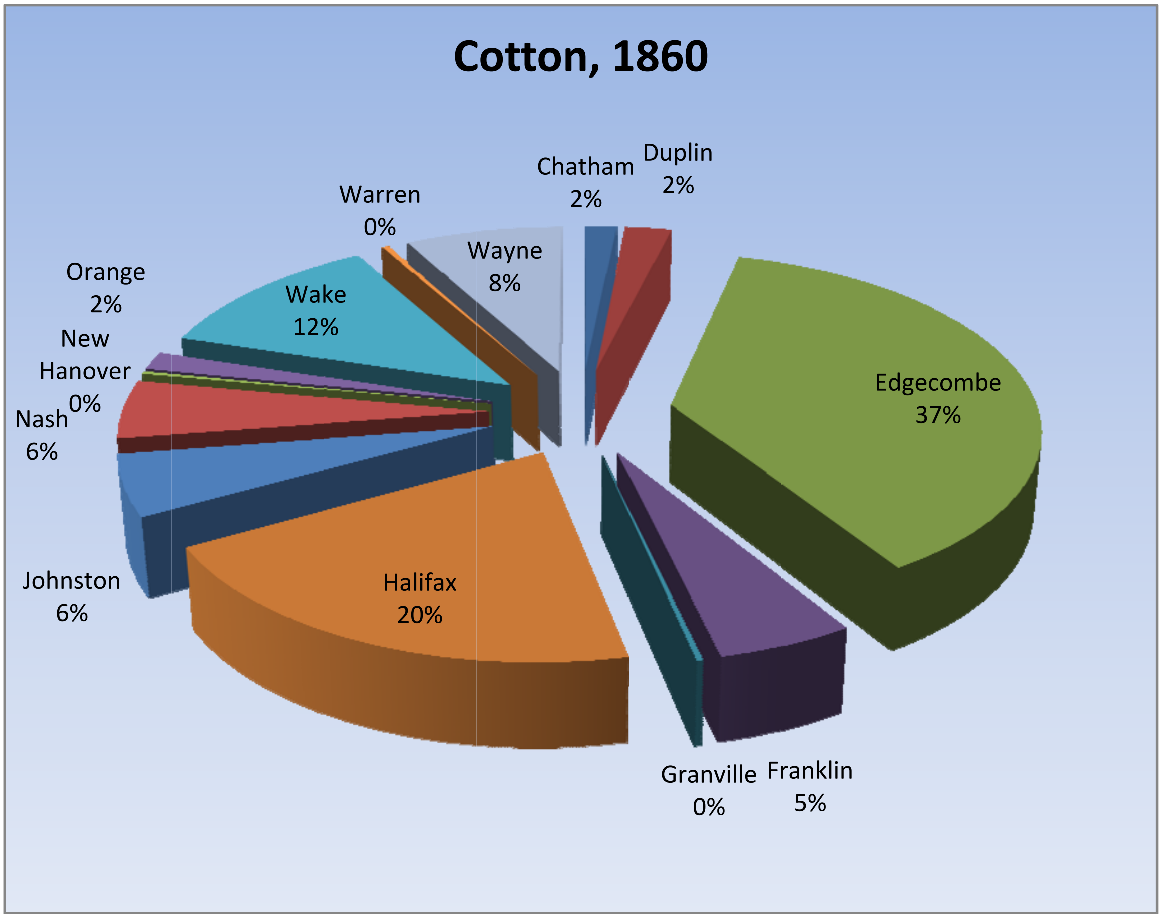

Figure 52. This chart shows the proportions of the volume of cotton produced in the counties served by the Raleigh & Gaston Railroad, the Wilmington & Weldon Railroad, and a portion of the North Carolina Railroad. Edgecombe and Halifax counties emerge as the most substantial growers of this commodity. Data Source: United States. (1864). *Agriculture of the United States in 1860*. Washington, DC: Government Printing Office, 105, 109).

CHAPTER XXI

CONCLUSIONS

General Conclusions

The counterfactual model of a railroad between Raleigh and Waynesborough presented in this research supports the *economic stream piracy hypothesis*. That the investors in Raleigh and the Piedmont who supported the original route of the Wilmington & Raleigh Rail Road could have gone with the original plan to connect these places after learning that the commissions of that company wanted to change the route is a possibility. That Walter Gwynn, chief engineer of the Wilmington & Raleigh Rail Road, would survey the route for a Raleigh branch line commencing at Waynesborough on completion of that railroad's main trunk, and latter oversee its construction as part of the North Carolina Railroad, reinforces the decision to select the existing the model. While adjusting the grade along this route to accommodate the railroad technology of the 1830s, a maximum grade of 50 feet per mile for 8.5-ton locomotives pulling maximum loads of 100-ton, entailing extensive excavation, embankment, and bridging within a short distance of Raleigh, the task did not exceed the technological limitations of the period. Further, a greater portion of the route could be undertaken using the same techniques proven effective on the Charleston & Hamburg Rail Road.

From an economic standpoint, the counterfactual model shows, even though its estimated costs are based upon a small body of period surveys and treatises, that building a railroad between Waynesborough and Raleigh would have cost at least half that of the Raleigh & Gaston Rail Road. Even if it had cost $12,000 per mile, it would have achieved the same ends, connecting to Petersburg, providing that the Wilmington & Raleigh Rail Road connected to Weldon; and adding the advantage of also connecting to Wilmington and Norfolk. Given such opportunities for success, why was the Raleigh & Gaston construction chosen instead?

There are several interrelated explanations for the building of the Raleigh & Gaston, all associated with the change of route of the Wilmington & Raleigh Rail Road. The historical record evidence is sparse and contradictory. James Sprunt records long after the fact, and without references, that the commissioner of the Wilmington & Raleigh Rail Road changed the route because the people of Raleigh did not support it. However, period newspaper accounts of early efforts to secure subscriptions for the railroad in 1833 show that there was support in Raleigh and the other places in the Piedmont. The letters by writers “Roanoke” and “Petersburg” in the *Wilmington Chronicle* years latter testify to active resistance put forth by interests in Raleigh and Petersburg upon learning that the Wilmington & Raleigh Rail Road would go to Weldon. To understand why investors in the Piedmont would not support the building of a railroad between Wilmington and Raleigh that would enhance their commerce is difficult. Unless they labored under the illusion that investors in the east would undertake the project anyway, or they anticipated greater profits from connections elsewhere, the notion that interest in Raleigh would reject forming a connection to Wilmington without cause seems unlikely.

A scenario that seems more plausible, but difficult to verify, is that the investors at Wilmington and their associates in the eastern counties perceived an obvious opportunity. Their railroad could join with the Halifax & Weldon Rail Road, take advantage of the existing Weldon Toll Bridge to connect to the Virginia railroads, and use the port of Wilmington to establish immediate connections to the south. While the *Memorial* of the November 1833 convention on internal improvements advocated a monumental plan to expend five million dollars on a state system that would relegate the port of Wilmington to an outpost off the main line, and Gavin Hogg, in his report of the Selection Committee on Internal Improvements denigrated the commerce of the port, an unnamed few in the east took the "go it alone" approach. The interests in Raleigh and Petersburg were of course blindsided.

Regardless of the particulars, the changing of the route of the Wilmington & Raleigh was a sound planning decision because it utilized existing advantages, could be set in operation early, and constituted with its steamship line a completed and economical route connecting south. By contrast, the Raleigh & Gaston had immense disadvantages. Some were rooted in the mythology of the so-called "Metropolitan Route" through the interior advocated by Colonel Long and others. The success of the Raleigh & Gaston and the Greensville & Roanoke depended on the construction of the Raleigh & Columbia Rail Road. If there were a first law of planning, it would be *never* to undertake a commercial project that cannot function profitably as a "stand alone" entity in the event that the projected works of others never materialized. The building of the Raleigh & Columbia Rail Road would have involved putting down a greater length of track than the

Wilmington & Raleigh, would have required the transportation of iron from the coast and sources of capital from South Carolina. When the line was completed to the North Carolina, a considerable distance to Columbia would remain. This, however, is not the only flaw of the Raleigh & Gaston. It was incorporated in haste without an appeal for state investment, and it was undercapitalized. The chief logical obstacle of the company was having to build its own bridge over the Roanoke River, and receive shipments of iron and equipment via Petersburg. The Wilmington & Raleigh could receive iron and equipment at both end of construction, Norfolk and Wilmington. It could also offer a "through ticket" to Charleston while still running stages. For an unbiased position, in spite of the state's extraordinary efforts to preserve the Raleigh & Gaston, the rail was a lost cause from the moment that the Post Office Department awarded the contract for the "Southern Great Mail" to the Wilmington & Raleigh in 1838. Yet, as early as 1835, had the investors in the Raleigh & Gaston put their support behind the established Raleigh & Roanoke Rail Road with a route that would have formed a connection near Weldon and was slated for state investment, the outcome might have been less dire. This was, decades later, a connection that determined the future of the Raleigh & Gaston, and the route has survived to this day. History has consumed the Greensville & Roanoke Rail Road, the old town of Gaston, and the bridge over the Roanoke build by the Raleigh & Gaston Rail Road Company.

The conditions of North Carolina in the 1830s, including intrinsic and extrinsic factors, favored building the first railroad from the coast to the interior, and north-to-south within the Coastal Plain. State investment in railroad projects was necessary. The amount of private investment capital was insufficient to support the construction of extensive railroads. In addition, as evidenced by the Panic of 1837 and subsequent depression, an event that hurt both the shareholders of the Raleigh & Gaston and the Wilmington & Raleigh, the role of the State of North Carolina as shareholder ensured the survival of the railroad even though private investors were ruined.

The Hypothesis

The first period of railroad development was influenced by the desire of the Virginia commercial centers of Norfolk and Petersburg to gain control of the agricultural output of the Roanoke River Basin. The completion of the Dismal Swamp Canal, in combination with the earlier closing of Roanoke Inlet, allowed Norfolk to enjoy trade with the lower reaches of the Roanoke Valley through Albemarle Sound. The opening of the Roanoke Canal around the Great Falls of the Roanoke gave Norfolk an advantage over the interior market of Petersburg because the produce from the upper reaches of the Roanoke could proceed to Norfolk without breaking bulk at the fall. Formerly, wagons would transport these products to Petersburg. The building of the Petersburg Rail Road to Blakeley, opposed the lower outlet of the Roanoke Canal at Weldon, and gave Petersburg the advantage in 1833. The construction of the Portsmouth & Roanoke Rail Road, along with its arrangement to use and later purchase the Weldon Toll Bridge, shifted the advantage to Norfolk in 1837. The incorporation of the Halifax & Weldon Rail Road in 1833 threatened to allow the Portsmouth & Roanoke Rail Road to extend farther into North Carolina.

The pivotal event during this period was the blocking of the Petersburg Rail Road's petition to the General Assembly of North Carolina by the friends of the Weldon Toll Bridge Company to build a bridge over the Roanoke near Weldon. The Petersburg Rail Road opted to support the building of the Greensville & Roanoke Rail Road instead. This railroad was a spur of the Petersburg Rail Road to be built to a landing above the Great Falls for the purpose of intercepting produce before it was transported through the Roanoke Canal. In name, these early Virginia railroads were public works, but in essence they were instruments of trade warfare, *economic stream piracy*.

North Carolina had a history of endorsing grand plans for a system of internal improvements, which time proved to be increasingly necessary, but the state lacked the political consensus to carry them into reality. This condition was exaggerated by the ideology that the construction of public works is better left to private companies that are apt to guided by self-interest; and the perennial cultural phenomenon of sectional differences. By the early 1830s, progressive individuals within the state perceived the potential of building railroads rather than a system of canals. Joseph Caldwell and James Iredell, Jr., were early proponents of this technology in the late-1820s. Iredell proposed a railroad from Fayetteville to the Yadkin River to stem the transport of produce into the markets of South Carolina, and Caldwell proposed a grand scheme to build a railroad from Beaufort Harbor to the North Carolina mountains. While the latter was decades ahead of the existing technology, the idea of build railroads to traverse vast distances shaped the character of early railroad planning in the state. The early plan to build a railroad from Wilmington to Morganton via Fayetteville, the first Cape Fear & Yadkin

Valley Rail Road, proved beyond the means of private investors when it failed to meet the capital required of its charter. The Central Rail Road also suffered the same setback. The purpose of the two internal improvement conventions of 1833 was to define a state system of internal improvements that would benefit for all regions of the state, and to seek the support of the state by appealing to the General Assembly. In theory and in spirit, the state plan expressed in the *Memorial* of the convention embodied the desire to seek the greater good for the citizens of North Carolina, but its plan for great railroads, or some combination of railroad, canals, and roads, to span the state from the Roanoke to the South Carolina and from the coast to the mountains, was as visionary as any scheme that had come before.

The plan to build a railroad between Wilmington and Raleigh emerged from the meeting of the convention on internal improvements on 4 July 1833. Its demise was not the result of any technical difficulty associated it might encounter in its execution, or the expense of building the distance from Waynesborough to Raleigh. Investors at Wilmington and in the east recognized what they believed to be a course of action that offered the potential of greater returns on their investment that was in direct conflict with the objectives of certain commercial interests in Raleigh and Petersburg's lobbyists in the North Carolina Legislature. Apparently, the General Assembly of 1835 was not particularly sympathetic to their exertions to withhold a new charter to the Wilmington & Raleigh.

Through this conflict, which has garnered little attention, one can see the evolution of a state policy. The commercial conflict between Norfolk and Petersburg represented an extreme of *laissez faire* capitalism given scope in an underdeveloped nation to the point where regional centers behaved as slightly more constrained Italian city-states presided over by a merchant ruling class. In practice, Adam Smith's "hidden hand" often gropes in the dark and guides men to selfish acts. When Francis Rives began to dismantle the Portsmouth & Roanoke Rail Road, the State of North Carolina had no recourse but intervene. While failing to secure a conviction of Rives, the State blocked his petition for a charter, and aided the reorganization of the Norfolk company. Indeed, this was the proper action, for Rives and his masters in Petersburg compromised the trust of the State of North Carolina. Not only was the taking up of the track of the Portsmouth & Roanoke Rail Road an affront to the people of North Carolina who had become dependent upon it for their convenience and commerce, but it also overlooked the fact that the state had granted the privilege of its existence in the first place. With the incorporation of the North Carolina Railroad in 1849, transportation policy and commercial interests were brought into balance for the public welfare.

Recommendations for Further Study

This volume is merely an exploration into the beginning of North Carolina's railroad history, and its assembly has been tempered by requests from preservationists and archaeologists working with structures and artifacts to establish the significance of North Carolina's first railroads in the context of the history of the American railroads. The research presented here provides some information on the technology, cultural, and economic particulars relevant to the construction of the first railroads; however, this work can be expanded to provide the practitioner with the tools to interpret the places that remain on the landscape and the artifacts in its soil.

END OF PART TWO

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APPENDIX A

ANTEBELLUM PLANS FOR REOPENING ROANOKE INLET

Roanoke Inlet closed between 1792 and 1798, thus depriving the northeastern North Carolina port towns of an outlet to the Atlantic. In 1820, Hamilton Fulton, civil engineer to the State of North Carolina, devised a plan for reopening the inlet. During the next twenty-five years, civil engineers in the employment of the State of North Carolina and engineers of the United States Army Topographical Bureau conducted a number of surveys of the Albemarle Sound region while Congress considered the practicality of the plan. The project was never undertaken.

The maritime commerce of the Albemarle Sound region of North Carolina expanded during the closing decades of the Colonial Era as more land in the vast Roanoke River Basin came under cultivation. The closing of Roanoke Inlet in the late 1790s curtailed the development of a major port in the state's northeast. Beaufort Harbor and the port of Wilmington were located too far to the south to be beneficial; and the Dismal Swamp Canal, completed in 1805 (improved during the 1810s), attracted the produce entering Albemarle to the Norfolk market. Hamilton Fulton, while serving as civil engineer for the State of North Carolina, prepared a plan for reopening Roanoke Inlet in 1820. The plan involved dredging Roanoke Inlet and closing Croatan and Roanoke sounds to prevent the flow from Albemarle Sound to Pamlico Sound from causing Roanoke Inlet to close again (Combs, 2003, 1:1-27; Merrens, 1964, 85-172;

Murphey, 1818, 18; North Carolina, 1820, 11, 14-15). The State of North Carolina did not have the resources to undertake such an ambitious project at the time. The United States Government, considering the project's potential for improving commerce and national defence, commissioned additional surveys.

The sequence of gradual changes that occurred around Roanoke Island prior to Fulton's visit is recorded on several historic maps. The Edward Moseley Map of 1733 shows marshland extending across Croatan Sound between Roanoke Island and the mainland. He labels Croatan Sound "The Narrows," and includes a note about Roanoke Inlet: "Roanoke Inlet has generally 10 feet at low water, where it rises commonly about 4 feet, but those Shoals shifting, it was not thought proper to lay them down at large, as ye other Harbours. The Channel may be seen within from ye Mast head (tho' ye Bar breaks) so as to guide a Vessel in." The John Collet Map of 1770 provides more detail of shoals surrounding Roanoke Island. The narrow channel through Croatan Sound is labeled as "Through Fare," and there is a cluster of marshes between Roanoke Island and the mainland at the southern mouth of this channel. The Price-Strother Map of 1808 shows in intricate detail the marshland connecting Roanoke Island to the mainland. The passage through the marshland is little more than a ditch. The shoaling of Roanoke Inlet appears to be filling in the passage from the sound side. The MacRae-Brazier Map of 1833 shows the area of Roanoke Inlet completely filled in, and the marshes of Croatan Sound partially scoured out (Cumming, 1966, Plate VI, Plate VII, Plate IX, X).

In 1882, W.C. Kerr, the geologist for the State of North Carolina, prepared a map of the state incorporating information from surveys undertaken from 1820 to that date. He identifies several former inlets on the Outer Banks and the dates these inlets closed. Cheeseman's Inlet, south of Beaufort, closed in 1806; Cedar Inlet, north of Cape Lookout, in 1805; Chickamicamico (Chickinocommock) Inlet, north of Cape Hatteras, in 1795; Roanoke Inlet, east of Roanoke Island, als in 1795; New Currituck Inlet, east of Knotts Island, in 1828; and Currituck Inlet, near the Virginia line, in 1775 (Cumming, Plate XIV). Oregon Inlet, Hatteras Inlet, and Ocracoke Inlet have remained open.

Hamilton Fulton had arrived in North Carolina to begin his employment as the state civil engineer in 1819. The Board of Public Improvements gave Mr. Fulton instruction to investigate the possibility of opening an inlet at the lower end of Albemarle Sound. Fulton reports having visited Roanoke Island on 14 March 1820. His initial comments to the Board suggest that he does not consider the reopening of Roanoke Inlet a practical undertaking. He believes that the closing of the inlet was associated with the increase of flow between Albemarle Sound and Pamlico Sound. He also thought that the sand that made the closure had been shifted south across Roanoke Sound from Nags Head. Residents of Roanoke Island gave Fulton an idea of the rate of this change.

> There are people now alive on Roanoke Island, who remember the passage between Albemarle and Pamplico Sounds being confined to what is still called the ship channel. Since that time another channel has gradually opened, which is now one mile and a quarter in width, with soundings, in some places, twenty-four, and others thirty feet deep. This circumstance plainly shews the effect of the waters passing and repassing through the marshes. It became a matter of course, as these channels increased in width, so did the quantity of water issuing into the Sea by the Inlet decrease in a proportional degree.
>
> – (North Carolina, 1820, 15) –

Fulton proposed that dams made of piles with stone embankments should be built across both Roanoke Sound and Croatan Sound, and that Roanoke Inlet be reopened by dredging. These embankments would have spanned Croatan Inlet from Fleetwood's Fishery to Pork Point on Roanoke Island, and from the east side of Roanoke Island to Ballast Point across Roanoke Sound (Figure A4). He estimated that the cost of this project would cost $2,363,483 for the stone embankments and dredging, and $1,157,186 for timber and earth embankments (North Carolina, 1820, 16-22). Mr. Fulton's plans were submitted to the United States Engineers (administered by the War Department under then Secretary of War, John C. Calhoun), and their report was printed in the *Report to the Board of Public Improvements of North Carolina* the following year. The report of General Bernard, Colonel Gratiot, and Major Totten, prepared by Col. W. K. Armistead, Commander of the U.S. Engineers, supported Fulton's plan. However, there was some concern that sediment would eventually be deposited on the ocean side of the opened inlet and render it too shallow to be useful; and it also concerned them that the water in Albemarle Sound would find a new outlet to Pamlico Sound when Croatan and Roanoke sounds were closed. The most obvious difference between Fulton's 1820 map and the present geography of Croatan Sound is that Fulkers Island, the nearby islands, and the marshes at the southern end of the sound are gone.

The United State Engineers expressed their concern about the waters of Albemarle Sound forcing a new channel through lowlands west of Croatan Sound. They anticipated that the water level in Albemarle would rise. Mr. Fulton, in his response to this report, does not believe this is possible, but he cites an unnamed source that he does not place any reliance that a canoe can travel from the Alligator River to Pamlico Sound by way of connecting creeks. He also notes that fresh stumps of pine and cedar on the seashore at Nags Head indicated a recent encroachment by the ocean (North Carolina, 1821 16, 21).

An alternative plan is suggested by Captain Hartman Bache, of the Topographical Engineers that is based upon a survey carried out from 1827-1828. Bache, like Fulton before him, cites historical sources for the previous condition of Roanoke Inlet. James Wimble's 1838 chart of the coast of North Carolina with soundings, later incorporated into Captain John Collet's 1770 map of North Carolina, as well as *The History of Carolina, by John Lawson, Gentleman Surveyor General of North Carolina* published in 1709. Bache notes that there is little doubt that Roanoke Inlet had been used by small vessels. He also mentions that even though the soundings for the former inlet were at nine feet on the bar, the sound was merely six feet. He agreed that the washing away of the marshes on Croatan Sound had caused the inlet to fill, and he believes that "no human foresight can predict the precise result" of an improvement when the forces involved are "so various and powerful." Yet, Bache had determined the project would be useful, and he offers a less expensive alternative to Fulton's plan. This plan featured a tide lock so that outbound vessels could gain access to the ocean with the channel being ten feet wide and three hundred feet long, lined with stone, and set at a depth of ten feet "below the common level of the sound." While the channel would not benefit ships attempting to enter Albemarle Sound, it would provide outbound trade with a direct outlet (United States, 1829, 12-22, 24).

The Letter from the Secretary of War, transmitting A Report of the Survey of Roanoke Inlet and Sound, in the State of North Carolina dated 24 February 1829 is a recapitulation of the afore mentioned surveys for the US House of Representatives (United States, 1829a). The *Resolution of the Legislature of North Carolina, Upon the subject of re-opening the Old Roanoke Inlet* was authored by Charles Fisher and D.F. Caldwell, transmitted by Governor Stokes; and intended to solicit aid from the Federal Government for the languishing project (United States, 1831). The following year, a report on Roanoke Inlet was referred to the Committee on Internal Improvements of the House of Representatives to accompany H.R. 517 confirming the acts of incorporation for the Roanoke Inlet Company granted by the North Carolina Legislature in 1821 and 1828, and to consider re-surveying the inlet. On 15 February 1830, a convention was held at Edenton, North Carolina to discuss reopening the inlet. The citizens of the eastern section of North Carolina prepared a memorial to Congress to encourage action on the project (United States, 1832).

In the spring of 1840, civil engineer Walter Gwynn undertook a survey for North Carolina's Board of Internal Improvements to determine the practicality of reopening Roanoke Inlet. Gwynn, a West Point trained civil engineer, had already distinguished himself in Virginia as well as North Carolina as the chief engineer for several early railroads. The report of his survey contains more information about hydrologic processes than the previous reports. Like his predecessors, he agreed that the opening of the marshes at Croatan Sound was the cause of the closing of Roanoke Inlet; but he provides more information about the extreme nature of the cutting through of the water from Albemarle Sound.

> And, all along above the marshes, we have evidence of the continuing encroachment of the waters of the sound. Stumps are found as high up as Mann's point, both on the shores of Roanoke island and the main land, stretching out from a hundred yards to a mile into the sound, and, in some places, reaching nearly across it; and the recent abrasion of the banks is shown by bare roots of hundreds of trees – some recently fallen, others in a tottering condition.
>
> – (United States, 1841, 3) –

Noting accounts of older local residents, he learned that the channel through the marshes was once narrow enough to be crossed with a fence rail. He suspected that at some distant time Roanoke Island was connected to the mainland. Like Fulton, he verified that the water level in Albemarle Sound was higher than that of Pamlico Sound; but he noted that the water flowing into Pamlico Sound had not brought about any improvement to Ocracoke Inlet. The current coming from Albemarle Sound interfered with the combined currents of the Neuse and Pamlico rivers, and the reduced velocity caused sediments to fall out of suspension to form shoals at the entrance to Ocracoke Inlet. Based on his own observations and those of others, he dismisses the notion that Roanoke Inlet was filled by blown or shifting sand from Nags Head; and the sediment deposited at the site of the old inlet was not brought there by ocean currents (United States, 1841, 3-7).

The final historical document worth noting is entitled *Roanoke Inlet, At Nag's Head* dated 10 February 1846 and presented to the Committee on Commerce of the US House of Representatives – read, and laid upon the table. The report, authored by Captain

Campbell Graham of the Corps of Topographical Engineers, contains a few details related to the closing of Roanoke Inlet. Graham accompanied Walter Gwynn on his 1840 survey, and they observed that the current between Albemarle and Pamlico had carried away several islands. Further, they determined from interviews that Roanoke Inlet began closing in 1792, about the same time the marshes on Croatan Sound started to give way. Referring to the recently published *Westover Manuscripts* of William Byrd, Graham notes that a storm had opened a New Currituck Inlet five miles south of Old Currituck Inlet in 1713. Prior to this event, the Northwest River, in Currituck County, had not been known to ebb and flow. Byrd observed that Old Currituck Inlet was closing in 1728. Graham's research found no instance of an inlet closing as the result of a storm; rather the outflow through an inlet was diverted to other channels that had been opened. Graham places the closing of Roanoke Inlet to be complete in 1798, the closing of the New Currituck to be about ten to twelve years prior to his report, and he was not sure when Caffee Inlet closed. Graham recommended omitting the embankment across Roanoke Sound in Hamilton Fulton's plan, or leaving a section open so that water could pass from Albemarle Sound to Pamlico Sound to the east of Roanoke Island as it once did. He estimated that the watershed feeding into Albemarle Sound covered about seventeen thousand square miles yielding 44, 944,903 cubic yards of water per day (United States, 1846, 3-9).

APPENDIX B

THE CENTRAL RAIL ROAD

Joseph Caldwell (1773-1835), the first president of the University of North Carolina published the discourses on the concept of a Central Rail Road under the *nom de plume* "Carlton" in 1828. Caldwell began formulating his ideas after a trip to Europe in 1824 to purchase books and scientific instruments for the university. The railroad was to span the length of the state from the mountains to Beaufort harbor (Caldwell, 1860, 62-63). On pages forty-three through forty-five of *The Numbers of Carlton*, Caldwell provided a table of locations throughout North Carolina within a distance of approximately fifty miles of the projected route of his Central Rail Road (Caldwell, 1828, 43-45). The author has selected locations within thirty miles of the proposed route that are readily identifiable on *The First Actual Survey of the State of North Carolina* of 1808 by Jonathan Price and John Strother (Cumming, 1966, Plate IX). Using known locations of places and streams, the 1808 map was georeferenced with modern USGS 7.5 Minute Topographic Quadrangle Maps to obtain map coordinates (Table B1, Table B2). The distance of thirty miles approximates about an eight-hour day travelling by wagon at four miles an hour, a figure given in Caldwell's text for a regular line of horse-drawn carriages (Caldwell, 1828, 23). These coordinates describe locations on the Price-Strother map, and may not be accurate for identifying the exact locations of places such as a courthouse, plantation, or ironworks.

Location	Distance From Track (ml)	Coordinates
New Bern	0	N35.10849, W 77.03825
Beaufort	0	N34.71911, W76.66319
Raleigh	0	N35.78031, W78.63881
Lexington	0	N35.82401, W80.25341
Boon's Ford	0	N35.77820, W80.46423
Jones Ferry	0	N35.83277, W79.21912
Cross Roads, Randolph	0	N35.82891, W79.86516
Gen. McDowell	0	N35.81130, W81.70553
Redfield Ford	3	N35.73147, W79.10655
Bethany Church	3	N35.86264, W79.81376
Statesville	5	N35.78262, W80.88731
Pittsborough	5	N35.72014, W79.17727
Kinston	6	N35.26603, W77.58738
Green, C.H.N.E.	6	N35.39882, W77.96450
Randolph C.H.	6	N35.70803, W79.81376
Island Ford	6	N35.75570, W81.08788
Morganton	7	N35.74539, W81.68481
Quaker M.H. Cane Creek	8	N35.87950, W79.31006
Smithfield, S.W.	9	N35.50847, W78.33948
Salisbury	10	N35.67097, W80.47416
Swanano Gap	12	N35.59789, W82.39989
Col. Carson	12	N35.61931, W81.96930
Trenton	12	N35.06699, W77.35281
Allemance Church	13	N35.96625, W79.57803
Concord Iron Works	14	N35.81599, W81.41506
New Garden M.H.	18	N36.01829, W79.82560
Hillsborough	20	N36.07538, W79.09974

Table B1. These locations given in Joseph Caldwell's *The Number of Carlton* are twenty mile or less from the projected railroad. Many appear on the 1808 *First Actual Survey of the State of North Carolina* by Jonathan Price and John Strother. By georeferencing locations on the Price-Strother map with USGS Topographic Quadrangle Maps, coordinates can be assigned to these locations.
Data Sources: Caldwell, Joseph. (1828). *Numbers of Carlton*. New York: G. Long; Cumming, W.P. (1966). *North Carolina in Maps*. Raleigh: State Department of Archives and History, Plate XI.

Location	Distance From Track (ml)	Coordinates
Wilkesborough	21	N36.14674, W81.16072
Greensborough	21	N36.07255, W79.79211
Salem	21	N36.06290, W80.23149
Greenville	22	N35.61123, W77.37278
Asheville	22	N35.59512, W82.55143
Narrows of the Yadkin	22	N35.41815, W80.09225
Lincolnton	25	N35.47385, W81.25466
Concord	26	N35.41117, W80.57132
Washington	26	N35.54678, W77.05226
Bethany, Stokes	26	N36.18167, W80.34059
Montgomery C.H.	26	N35.35847, W79.89451
Flint Hill	27	N35.45213, W81.66650
Henderson, Montgomery	28	N35.34186, W80.07359
Forney's Iron Works	30	N35.63394, W81.22924
Louisburg	30	N36.09967, W78.30113
Hopewell Church	30	N35.35366, W80.88877
Moore C.H.	30	N35.34586, W79.41700

Table B2. These locations given in Joseph Caldwell's *The Number of Carlton* are between twenty-one and thirty miles from the projected railroad.
Data Sources: Caldwell, Joseph. (1828). *Numbers of Carlton*. New York: G. Long; Cumming, W.P. (1966). *North Carolina in Maps*. Raleigh: State Department of Archives and History, Plate XI.

A modern map of counties in North Carolina using a Census 2000 TIGER/Line® Files polygon geodataset illustrates the present county orientation of these coordinates (US Census Bureau, 2000). Placing these locations on the present-day map of the counties is a convenience. Many new counties were created after 1828. It is apparent that the route of Caldwell's Central Rail Road follows a straight line from Raleigh to the mountains bypassing many towns that later became large urban centers. Locations listed in Caldwell's table as zero miles appear of the map legend as stations even though this is not his terminology. Presumably, they would be stations if the plan was realized exactly (Figure B1).

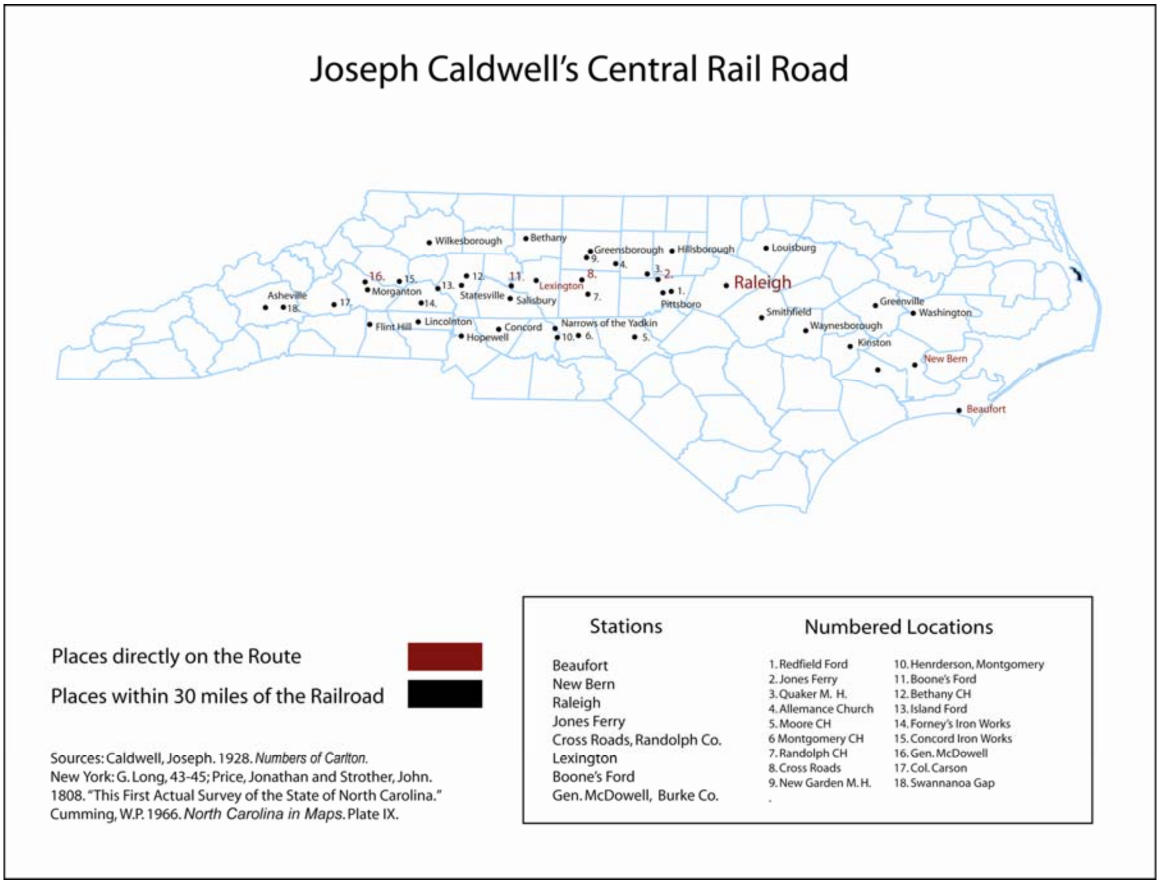

Figure B1. The route of Joseph Caldwell's Central Road and locations within thirty miles can be mapped using the 1808 Price-Strother *The First Actual Survey of the State of North Carolina* georeferenced to USGS 7.5 Minute Topographic Quadrangle maps. The coordinated are then located on a modern map of North Carolina counties. Stations, or locations in Caldwell's table given as zero, are illustrated in red. Recognizable towns and places within thirty miles of the line (but not on it) appear in black. Less familiar places or physical features are numbered.

Data Sources: Caldwell, Joseph. (1828). *Numbers of Carlton*. New York: G. Long; Cumming, W.P. (1966). *North Carolina in Maps*. Raleigh: State Department of Archives and History, Plate XI; US Census Bureau. (2000). Census 2000 TIGER/Line ® Files [machine-readable data files]. *MAPdata USA 2000*. Ontario, Canada: Avenza Systems, Inc. Disk 37.

APPENDIX C

NOTES ON THE ESTIMATES FOR THE CAPE FEAR & YADKIN RAIL ROAD

The Cape Fear & Yadkin Rail Road scheme represents a testing of limits: the commercial centers of the lower Cape Fear provided all the investment capital - about a third of what was required - and the west was unable to raise any funds. It was clear that railroad projects of great length that crossed into different economic regions could not be funded with local investment capital alone. Investment on the part of the state, or money borrowed from large domestic financial institutions and/or foreign banks, or both of these sources, would be required. Even more significant, there were a number of technical problems that were associated with building this railroad and others like it - a type that was unprecedented in the early 1830s - that shed light on the difficulty of uniting North Carolina east to west by rail. On cost per mile alone, there were issues that had to be addressed. For example, Mr. Rawle's survey placed the cost per mile for single track at $2,278.64, yet the cost per mile for the experimental Fayetteville Rail Road was $4000 per mile. The investors in the Cape Fear & Yadkin Rail Road apparently expected a lower estimate. To obtain a more realistic idea of the possible cost, it is useful to examine data from a survey from a contemporary railroad that was actually built. The *Report of Walter Gwynn, Esq. Engineer to the President and Directors of the Portsmouth and Roanoke Rail Road Company* of 1833 is an appropriate source to examine for several reasons. Gwynn, a West Point graduate, had acquired extensive knowledge and experience from his work on the Baltimore & Ohio Rail Road survey, and his work on the Petersburg Rail Road before becoming engineer for the Portsmouth & Roanoke Rail Road; and he would serve as chief engineer for the Wilmington & Raleigh Rail Road and the North Carolina Railroad. The report itemizes the cost of construction for ten divisions of the line. Topographic information for specific geographic locations and the length of grades are included, and the report also describes the methods of construction and type of materials used.

Division II of the Portsmouth & Roanoke Rail Road began at Main Street in Suffolk and continued southwest for ten miles. The estimated cost of this section of railroad was $55,846.18, which included excavation of 108,923 cubic yards of earth at $10,347.68, 128,213 cubic yards of embankment at $12,821.30, four stone drains costing $1000, the abutment and bridge at Smith's Branch costing $4200, six truss bridges at $600, one hundred and sixty tons of iron at $7,200, six tons of spikes at $1188, $150 for splicing plates, 105,600 lineal feet of heart pine rails at $5,280, 10,560 sills (crossties) at $5,280, 21,120 oak wedges at $739.20, and $7,040 for carpenters' work (Portsmouth and Roanoke Rail Road Company, 1833, 7). This estimate comes close to $5,600 per mile. If Walter Gwynn's estimates are reflective of the most durable method of construction considering the availability of materials, Mr. Rawle's estimate was not realistic, and the cost per mile for the experimental railroad at Fayetteville did not even represent the cost of traversing the coastal topography, much less the piedmont and mountains. Gwynn gave the intended length of the Portsmouth & Roanoke Rail Road at 77 miles, and he estimated its total construction cost at $405,133.76 without warehouses, shops, and other accoutrements (ibid, 4, 10). Using these figures, it would take at least $500,000 to build a railroad from Wilmington to Fayetteville that commenced on the west bank of the Cape Fear. The distance is about 90 miles over coastal plain topography. This does not include the cost of locomotives, rolling stock, shops, depots, and warehouses. If track construction costs alone were considered for a railroad with a direct route without topographic considerations (as the crow flies) from Wilmington to Morganton via Fayetteville, the Narrows of the Yadkin, and Salisbury (247 miles), the cost for materials would have been $663,862 or $2688 per mile - a figure close to Mr. Rawle's estimate, but completely detached from the necessity to build bridges, trestles, and embankments in greater expense and difficulty as the railroad advanced through the state's diverse geomorphic regions.

Though there were other methods of rail construction in use by the 1830s, the wooden rail method was cheap and allowed for quick construction. Walter Loring Webb provides an illustration of this system in his book, *Railroad Construction, Theory and Practice* (Webb, 1945, 303-319). The cross-section illustration of a wooden rail from the Quincy Rail Road of 1826 in his chapter on rails shows that the inner third of the rail was mitered to accommodate the wheel flange. Iron straps were mounted on the middle third of the top of the rail, and the outer third of the rail's upper surface remained bare. Mr. Rawle's estimate includes specifications for rail construction. The rails should be made of 5" by 9" heart pine, the sills should be 1 foot, and the iron should be 2 inches by ½ of inch (Raleigh Register, 17 May 1833). Walter Gwynn's instructions are more detailed. He also includes a modification of the stills that would allow horses to be used on the railroad.

> The superstructure, then, which I propose to adopt, will be heart pine rails, nine by five inches, plated with iron bars two inches wide, and half an inch thick, resting on white or post oak sills, ten by twelve inches, and eight feet long, placed across the road, five feet apart from centre to centre. The rails will be placed parallel to each other four feet eight and a half inches apart, let into the sills and properly secured by white oak wedges. The sills will be notched for the reception of the rails and wedges and hollowed out in the middle, so as to admit of the construction of a path over them, which will add considerable stiffness to the road, at a very moderate expense - and adapt it to the use of either horse or locomotive power, or both.
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> – (Gwynn, 1833, 5) –

It should be apparent that the materials used for constructing the early rails was perishable and would require constant maintenance during its brief period of service. It is indicative of a need to build quickly and cheaply. Hopefully, the revenues from its use could keep pace with the mounting expenses if sections of the line were put into use during construction. The Cape Fear & Yadkin Rail Road plan along with its companion in length, the Central Rail Road, required a more durable construction. Such epic undertakings would require many years to complete and even longer to show a profit. Planners of these railroads would have had to anticipate the inevitable tendency to build faster and more powerful locomotives. Unfortunately, railroad technology was still in its infancy in the 1830s, and civil engineers had not established standards for construction. T-iron rails on closely spaced crossties answered the needs of the great railroads, but it would not become apparent until the short-line regional railroads had to replace their wooden rails with iron.

Another technical concern is the relationship between grade, velocity, and maximum load. Throughout the 1830s, engineers in Europe and America conducted experiments with various locomotives on inclined planes. De Pambour's study of locomotive power was the most rigorous and empirical. His calculations considered all conditions of the machine and the required tasks from the length of the stroke to the resistance of the atmosphere. G.W. Whistler conducted traction experiments on the Boston & Lowell Rail Road using a locomotive of his own design with an engine weight of nine tons and having five tons instant weight on the driving wheels. This locomotive was able to pull 388 tons without losing traction. These engineers represent only a few that were adopting scientific methods in an effort to understand the potential and limitations of the steam locomotive. Grade tables, such as those included in a report prepared by the office of the Secretary of War concerning the survey of the Charleston & Cincinnati Rail Road, were one of the products of this research. These tables were highly useful in determining what size and power a locomotive needed to possess to negotiate certain grades (United States, 1838, 30-34).

While the report mentioned above post-dates the survey for the Cape Fear & Yadkin Rail Road by several years, it illustrates the potential problems that would result from using the method of rail construction described by Rawle and Gwynn for any railroad that was intended to be built in or to western North Carolina. Heavy, powerful locomotives would be required for even modest grades, yet the trade off would be track damage and excessive maintenance; or if less powerful locomotives were used, the initial cost of grading and embankment would fall far beyond what was estimated. The type of locomotive Walter Gwynn recommended for the Portsmouth & Roanoke Rail Road was a light engine of no more than five tons so as to reduce "wear and tear and repairs" to the track (Portsmouth and Roanoke Rail Road Company, 1833, 4-5). It should be noted that the Petersburg Rail Road, completed in 1833, had to replace its wooden rails with T-iron ten years later (*Wilmington Chronicle*, 24 May 1843), and the Wilmington & Raleigh Rail Road Company elected to replace their original rails - also of the same type of construction - in 1849 with 50 lbs per yard iron rail (*Wilmington Journal*, 26 January 1849). In addition to the rail, the company had to replace the crossties.

> In relaying the Road, we found that the Sill were so much decayed that it would be bad policy to let them remain, especially, those that had been covered up with earth. The Road had been originally laid with the Sill 3/4th exposed to the action of the atmosphere, the plan of covering them up afterwards adopted, with the view of rendering the road-way more firm and steady. Experience has proven to us, that the durability of the Sill or cross ties, thus covered up, when compared with those exposed in part, is in the proportion of 3 to 5 - the sills left exposed lasting 5 to 6 years, while those that had been covered up with earth, but 3 years.
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> – (Wilmington and Raleigh Rail Road, 1850, 11) –

It can be hypothesized that if the Cape Fear and Yadkin Rail Road and Central Rail Road were built in the early 1830s using the wooden rail method, the problems associated with grade would not be the roads' only problems. The eastern section of the roads would be plagued by rotting sills three to six years after they were laid while the western section would be pounded to splinters by heavy locomotives. When the

Wilmington & Raleigh Rail Road replaced 161½ miles of rails and crossties, it cost the company $538,801.62 (Wilmington and Raleigh Rail Road, 1850, 7).

APPENDIX D

THE DEPOT SITE AT WILMINGTON

The Western Route of Walter Gwynn's 1835 survey of the Wilmington & Raleigh Rail Road begins at in an area of Wilmington known as "Dry Pond" (Ruffin, 1836, 348). John MacLaurin writing under the *nom de plume* Senex, Jr., describe "Dry Pond" as a "bounteously full of water in the wet season and guiltless of moisture in the dry, the sat placidly on the snow-white sand amid the scrubby oaks and prickly pears and wire grass" located on the southern boundary of Wilmington. The site of John Barnes' farm was located beyond "Dry Pond" at would become the block bounded by Wooster, Queen, Seventh, and Eighth streets. The east-to-west boundary of Wilmington extended from Fifth Street to the Cape Fear River; and the north-to-south boundary extended from Campbell Street to "Dry Pond." The farm covering approximately five acres and MacLaurin describes it as a "little plot of bald sand-hill land" (Sprunt, 1916, 160-162, 169). Gwynn's survey continue by indicating the route continue "due north to the head of market street" and east toward a "Love Grove" where it crosses Smith's Creek (Ruffin, 1836). MacLaurin gives the location of the head of Market Street as between Seventh and Eighth streets, and Love Grove Plantation as being on Smith's Creek (Sprunt, 1916, 162, 169). The survey continues over level ground to Prince George's Creek, crossing between the Burgwyn dwelling and mill, and continuing to the Northeast Cape Fear River near the site of the old bridge. The Burgwyn plantation was located near Prince George's Creek east of the Castle Haynes estate across the county road (Sprunt, 1916, 72). The western route continues from the Northeast Cape Fear for forty-seven mile to the head of Bear Swamp, cross both Rockfish Creek and Stewart Creek; passing west within two and half miles of South Washington and seven miles of Kenansville. With the exception of the section of the route in Wilmington, the track from Smith's Creek the Northeast Cape Fear River appears conform to the survey. An alternate to this route provided in the survey begins at the timber pens on the west side of the Cape Fear River at Wilmington, and then follows the one mile where it "crosses over and passes along the dividing ground of the Cape Fear and the Northeast Cape Fear to the head of Long Creek. The tracks would follow the divide between Long and Moore's creeks, and between Moore's and Rockfish creeks with crossing of Turkey and Stewart creeks; final reaching the head of Bear Swamp (Ruffin, 1836).

The Wilmington & Raleigh Rail Road had acquired a number of parcels in New Hanover County were consolidated into a single deed in 1840. The parcels in this deed are listed below in chronological order.

1. M. McKay conveyed to the Wilmington & Raleigh Rail Road Company by a deed dated 19 April 1834 the southwest corner parcel of Lot 22 of the Marsden Campbell Plot (drawn up by Alexander MacRae). The parcel measure 165 feet fronted the northern boundary of town, from the southwest corner of Lot 22 running east to a parcel owned by Pompy Mazell, and 66 feet parallel to Front Street. There was another parcel associated with this deed, also in Lot 22 of the Campbell Plot, that fronted the boundary of town on the south, Front Street on the west, and Second Street on the east, and Lot 23.

2. A parcel containing approximately six acres was conveyed by Robert S. McCombs by a deed dated 18 November 1836 to the Wilmington & Raleigh Rail Road. The was a lot of about six acres, located 430 feet

from the town line, on the south side of Market Street. The lot extends on the north side of Market Street. For the description in the deed, the parcel appears to be two blocks, 20 poles squares (330 feet by 330 feet), with and additional 60 feet, and the northern side of the north parcel is angled at 80º west.

3. P.K. Dickinson conveyed by a deed dated December 1836 the lots 132 through 134 A on west side Front Street in the town of Wilmington to the Wilmington & Raleigh Rail Road. The length fronting the street was 198 feet.

4. A deed dated 4 December 1836 conveyed by A.A. Wanett to the Wilmington & Raleigh Rail Road lots 3, 4, and 5 of the Campbell land at the northwest corner of the northern boundary street. Beginning 132 feet from the corner, continuing 198 feet on Front Street, then 135 feet west towards the Cape Fear River.

5. William Calder Frederick and Edwin Kidder conveyed to the Wilmington & Raleigh Rail Road on 3 December 1836 a parcel measuring 66 feet by 135 feet referred to a lot number 2 in the Campbell plot located 66 feet from the northwest corner of the street on the northern boundary of town.

6. A parcel of 150 acres, less one-forth acre reserved to John D. Jones for a tomb and house, in Love Grove, was conveyed to the Wilmington & Raleigh Rail Road on 14 February 1837. The beginning of this parcel was at a stake on the bank of Smiths Creek on the old ferry landing a little above or nearly opposite where the cause way leads to the ferry or bridge, the running 3º west a distance of 18 pole (297 feet), then 187 poles (3085.5 feet) "to a stake at the crossing of the old road," then turning 50º degrees east and proceeding 180 poles (2970 feet) "to a spruce pine at the corner of Campbell's field," then 46 poles (759 feet) to a cider on the creek bank growing among some lime stones partly above the ground there down the various courses of the creek to the First Station."

7. E.E. Piece and William Armstrong conveyed a parcel to the Wilmington & Raleigh Rail Road on 15 November 1837 containing 561.5 acres. It is described as beginning at a pine stump on Smith's Creek then running 80º east a distance of 213 poles (3514.5 feet), then 10º west 340 pole (5619 feet) to a stump near Hugh Cowan's gate, the west six poles (99

feet) to a swamp stream, then following the western branch of the stream 42 pole (693 feet), then west 298 pole (4917 feet) to a stake in a bay, then 206 pole (3399 feet) east, the, turning 86º a distance of 84 poles (1419 feet) to a pine of the south side of the branch, then east 150 poles (2475 feet) to the First Station.

8. P.W. Fanning conveyed to the Wilmington & Raleigh Rail Road by a deed dated 23 December 1839 a parcel beginning the near the northern boundary of town, 77.5 feet to an alley then eastward running alley 130 feet, then 77.5 feet southward parallel Second Street, then westward 130 feet to the beginning of the tract.

All the parcels are within New Hanover County, and the consolidated deed can be found in the office of the Register of Deeds for New Hanover County (New Hanover County, 1840).

A closer examination of the 1840 deed brings to light several items of interest. The oldest of the deeds incorporated in this deed is the 19 April 1834 McKay parcel. The acquisition of this property predates the company's 1835 charter. The lots of the Marsden Campbell plot comprise the railroad's land on the east bank of the Cape Fear River. Marsden Campbell's plantation was named Clarendon and the division of his land into individual parcels follows a scheme of block of 330 feet square separated by streets of 66 feet in width. Each block is divided in to five 66 feet by 330 feet lots that are in some case subdivided into lots that are 66 feet by 165 feet (Sprint, 1916, 57). The original scheme of the Campbell Plot is preserved on modern parcel map because the railroad occupied this land for over a century and none of it was subdivided into smaller parcels (New Hanover County, 2000, 2000a). This section of a modern parcel map of part of the railroad property bounded by Front Street, Third Street, and Red Cross Street preserves the divisions of the Campbell Plot. These are the 330 feet by 300 feet blocks, the five 66 feet by 330 feet lots, the 66 feet by 165 feet subdivided lots, and the 66 feet wide streets.

On the modern map, parcel number 6533 appears to contain the land that the railroad acquired in 1834 at the corner of the northern boundary (now Red Cross Street) and Front Street. This later became the southwest corner of Block 232 on the town plot; and this number appears in the triangle in the center of this map. A.C. Dickinson's *Plan of Wilmington, North Carolina as extended by Act of Legislature 1848, Survey'd By A. C. Dickinson* illustrates the track arrangement of the Wilmington & Raleigh Rail Road from its dock at the foot of Campbell Street to it northeast turn towards Love Grove. Each block is divided in to five lots that are 66 feet wide. The J.L. Becton map of 1929 shows the entire extent of the dept facilities at Wilmington. This includes the vast ACL Upper Yards at Love Grove. The "old road" referred to in the deed dated 14 February 1837 appears to be McRae Street. Sprunt places the location of the Cowan plantation "Paradise" on the bluff beyond Harnett Street; and the land below the bluff at Bladen Street was a swamp (Sprunt, 1916, 160). The old road presumable led to the cause way and old ferry landing mentioned in same deed. If so, it appear that this public road was preserved.

However, of the deeds complied into the consolidated deed dated 11 September 1840, the parcels on Market Street deeded to the railroad by Robert S. McCombs on 18 November 1836 have no relationship to any railroad facilities or extent of track in the railroad's history. While the remaining deeds were incorporated in the railroad's property and remain so well into the twentieth century, and they are all located on the northern boundary of town; the Market Street parcels are remotely located, and appear to have been sold off at some point. Why would the railroad acquire this land?

The site of the depot and shops was not chosen until early 1837 (*Carolina Observer*, January 26, 1837). The company had acquired lots at the river in early December. The lots on Market Street were acquired in November, three months after Walter Gwynn's survey was submitted (New Hanover County, 1840). Further, it seems unlikely that the railroad, in 1837, could have foreseen the need for acquiring so much land on Smith's Creek for what would become the Upper Yards. Hypothetical, the company may have considered placing their railroad depot at the head of the town's main street, and run track along the eastern boundary of town to the southern boundary. In this instance, the docks at the foot of this boundary could be used for the steamboat line. It would seem probably if when the dimensions of the parcel, beginning 430 feet from the eastern boundary at Fifth Street, form a polygon that abuts a track arrangement of a north-to-south section extending from Market Street to the southern boundary of town; and a section, extending from Market Street to the southern tip of the lands that would become the Upper Yards, which paralleled the angle of old road.

On a modern topographic quadrangle map of the City of Wilmington a line can be drawn from Castle Street (the Dry Pond area) to Market Street along Seventh Street, and another from the corner of Seventh and Market streets, along the line of the old road (McRae Street) to the western edge of the Upper Yards. This seems to be a reasonable interpretation of Walter Gwynn's recommendation of the tracks through Wilmington. The survey of the parcels found in the 1840 is a little more difficult to interpret: the deed includes references such as “thence No. 82 East 360 feet” and “then No. 12 west 40 poles.” These markers are not helpful. However, the size of the parcel convey to the railroad was approximately six acres.

A town block was 330 feet by 330 feet and four of them together would have made ten acres i.e. a square that is 40 poles on each side not including avenues dividing them. Five acres would consist of two town blocks; and an additional 43560 square feet (132 feet by 300 feet) would make six acres. By dividing this rectangular parcel into two angle using the *Pythagorean Theorem* ($a^2 + b^2 = c^2$, $132^2 + 330^2 = x^2$, $17424 + 108900 = x^2$, $126324 = x^2$, $\sqrt{126324} = x = 355.42$), the resulting triangular parcel would measure 132 feet by 330 feet by 355.42 feet. Since 132 is one forth of 330, and their intersection form a right triangle, the angles are 14.03 degrees, 75.97 degrees, and 90 degrees. This is close to measurements mentioned in the 1840 deed, but it mentions specifically the measurements of 80 degrees and 360 feet; thus with the base of the angle being 330 feet and the hypotenuse being 360 feet, the remaining measurement is 143.87 feet. This yield a triangle with the angles 12.95 degrees, 77.05 degree, and 90 degrees, and the remaining portion of the acre would be less than half an acre. If the hypotenuses of these triangles are extended towards Love Grove they will overshoot the old road; however, a line running east 14.03 degrees from the corner of Market and Seventh streets will join the main track in the Upper Yards more directly than following the old road. Fifth Street, the old eastern boundary, is 100 feet wide, so the 430 feet mentioned in the 1840 deed would place the beginning stake at the east side of Sixth Street. The survey of the parcel eventually returns to this stake. While it is difficult to ascertain the actual shape and orientation of the parcel with the limited, and sometimes contradictory, information provided in this deed, it would be safe to conclude that it was a two and one quarter block situated lying between Fifth and Seventh streets being bisected by Market Street or located on its northern side.

The acquisition of the of the town lots of Front Street from P.K. Dickinson and the river side lots outside the northwest boundary of town from A.A. Wanett, William Calder Frederick and Edwin Kidder in December of 1836 indicate that the company intended to locate its docks on the northern boundary of town. The lots at the river that are described in these deeds appear on the modern parcel (New Hanover County, 2000). They are situated around the Front Street Bridge and extend to the Cape Fear River, and are bounded on the south by Red Cross Street, the former northwester boundary of Wilmington. The east bank of the Cape Fear River was much closer to Front Street in the 1830s: according to the Wanett deed, the low water mark was 135 feet from Front Street at this location. The bridge at Front Street crossed a ravine in which a small street one coursed. The stream extended towards the Upper Yards; and since the track at the Wilmington facilities were abandoned in the 1980s, the stream has emerged again since the drainage system at the tracks ceased to be maintained (Figure D1). This stream is also mentioned in the deed dated 14 February 1837 in the consolidated deed of 1840 as a creek with partially exposed deposits of limestone leading down to the First Station. The track, as it appears in the 1848 Dickinson map, was originally run through this ravine to the river; and later when the railroad acquired land north of the ravine, the tracks were add on this land.

Figure D1. The stream running through the ravine of the railroad cut at Wilmington is still visible east of Fourth Street. Photograph by James C. Burke

As of 1837, the railroad had six acres at Market Street, its docks at the Cape Fear outside the northern boundary of Wilmington, a few lots on Front Street, and 150 acres at Love Grove.

The abundance of space in Love Grove would seem a likely place to set up the shops; however, in order that the locomotives and ships could be maintained together, the railroad began building the shops and depot close to the river (*Wilmington Advertiser*, 10 November 1837; 23 November 1842). The land deeded to the company by Piece and Armstrong in November of 1837 cover 561.5 acres. As stated earlier, four town blocks amounted to ten acres; thus, forty bocks would amount to one hundred acres. The total land conveyed to the company by this deed was equal to 244.6 blocks – nearly equal to fifteen blocks by fifteen blocks square. While some of this land was necessary for the railroad facilities, the likely use for this land may have been for wood.

The Nicholas Schenk *Diary* notes that the railroad company built a trestle from the bluff to the docks to deliver wood to the steamboats (Schenk, 1905, 119). The company's steamship *Wilmington*, for example, burned a cord of wood an hour (*Wilmington Advertiser*, 27 September 1839). The amount of space the railroad facilities occupied, and the blocks through which its track cut, is a small fraction of the land the company acquired. The stockholders report of 1860 provides a total of 5596.625 cord used in its "Consolidated Report of the Service of Locomotives" for the year; and list twenty-two stations (Wilmington & Weldon Rail Road Company, 1860, 17, 35). The 1855 stockholders report states that six to eight station were used for taking on wood and water; and the average passenger train used 5918 cords per year at forty miles per cord, and a freight train would use 2975 cords per year at 29 miles per cord (Wilmington & Weldon Rail Road Company, 1855, 15-17). Thus, it can be assumed that at least one-tenth of the wood consume must have been loaded at Wilmington before the locomotive had to be refueled. This would mean that between 500-600 cords per year had to be cut at Wilmington. Over a period of twenty year of operation, the volume of wood from Wilmington, by these estimates, would have been between 1,280,000 and 1,536,000 cubic feet. The land above Campbell Street, the site of the railroad cut, was woods and swampland, and the land on the eastern boundary was woods (Sprunt, 1916, 160, 162). However, situating the docks, warehouse, shops, and depot at the river on the northern boundary of town is advantageous. The distance between the company docks and the later become the Upper Yards was approximately 2.74 times shorter than the distance by rail and road to the river on the southern boundary. It would also take 1.7 times the length of track; and based upon the cost of Gwynn's survey of the Portsmouth & Roanoke Rail Road, the track across town would have cost the company approximately $6700 with no particular advantages (Gwynn, 1833, 7).

Gwynn's alternate location for the beginning of the railroad was on the west bank of the Cape Fear River opposite Wilmington. This site is the approximate location of the 1890 terminus of the Cape Fear & Yadkin Valley Railroad (Sprunt, 1896, XLIX).

> The line commences at the timber pens, and runs upwards along the margin of the river about a mile; thence it crosses over and passes the dividing ground between the Cape Fear and its north-west branch, to nearly the head of Long Creek.
>
> – (Ruffin, 1836, 348) –

The location has its disadvantages. The land on the west bank of the Cape Fear River opposite Wilmington is an extensive marsh, and a ferry was the only means of crossing the Cape Fear to the town until after the Civil War when a iron Bollman Truss bridge with caissons was constructed.

APPENDIX E

THE STAGECOACH LINE OF THE WILMINGTON & RALEIGH RAIL ROAD

The stagecoach line of the Wilmington & Raleigh Rail Road existed briefly between 1837 and 1840 as the railroad was being constructed. As it advanced from the north and south, the length of stage route decreased. The southern route from Wilmington to Waynesborough followed roads that paralleled the projected railroad. The northern route, however, traversed areas of Edgecombe County, Wilson County (formed later), and Wayne County that were bypassed by the railroad – particularly, the towns of Tarboro and Stantonsburg.

The history of the stage route was documented in several period North Carolina newspapers. The acquisition of stagecoaches and horses was mentioned at a meeting of the stockholders of the company held on 1 May 1837 at Wilmington. The following month, an article in the *Wilmington Advertiser* notes that double teams of horses had been stationed along the stagecoach route in advance of the arrival of the coaches. The stagecoach line had proven to be successful after its first month of service. An announcement in the 3 January 1838 issue of the *Raleigh Register* in early January stated that the winter route for the southbound stages of the railroad started at Halifax and included a stopover at South Washington. The 18 May 1838 issue of the *Wilmington Advertiser* and the 9 June 1838 issue of the *Tarboro Press* reported the proceeding of the second annual meeting of the stockholders of the Wilmington & Raleigh Rail Road held earlier that month. The director considered and rejected a plan to change the stagecoach route from "Enfield, by Tarboro, to Stantonsburg, to the route by Rockymount" at this meeting. An article in the 27 October 1838 issue of the *Tarboro Press*, reprinted from the *Wilmington Advertiser*, announced the opening of section of the railroad from Halifax to Enfield in the north and a section to Faison's Depot in the south. After the last spike of the railroad was driven on 7 March 1840, the stagecoach line was phased out. The stagecoaches were sold to C.W. Hause of Leechville in Beaufort County, North Carolina (*Wilmington Advertiser*, 5 May 1837, 9 June 1837, 18 January 1838, 18 May 1838, 28 July 1841; *Raleigh Register*, 3 January 1838; *Tarborough Press*, 9 June 1838, 27 October 1838).

At least three of these pieces of information found in newspaper articles are necessary for this study because they help establish locations along the route that can be associated with the narrative of traveling on the stagecoach line provided by Frances Anne Kemble. A notice from the office of the Petersburg Rail Road Company dated 27 October 1838 announced to planters and farmers sending produce north consigned loads to their agent (Major B.F. Halsey) or the agent for the Wilmington & Raleigh Rail Road Company at Enfield. The *Wilmington Advertiser*, two days before Mrs. Kemble's stagecoach ride, names the southern termination of the stagecoach line in an article. Mrs. Kemble substantiates what the newspaper reports on the southern extent of the railroad. She notes that the stagecoach had traveled about ten miles after a stop in Waynesborough, and that a group of locals had gathered at the place where the stage stops to meet the train from Wilmington to see the locomotive “come up for only the third time into the midst of their savage solitude.” An article reporting an example of fish being purchased in Wilmington and arriving in Tarboro the next day by way of the railroad’s stagecoaches indicates that the stagecoach line was still servicing Tarboro in late 1838 (*Tarborough Press*, 17 November 1838, 22 December 1838; Kemble, 27-28). The two sections of the railroad that are in operation and towns located on the stagecoach route can be mapped out using the information provided in these articles for Mrs. Kemble’s trip on 23 December 1838 (Figure E1).

Mrs. Kemble, after departing Weldon by train between eight and nine o’clock in the evening, arrives four hours later at the end of the northern section of the railroad.

> Between twelve and one o’clock [in the early morning of Sunday, December 23, 1838], the engine stopped, and it was announced to us that we had traveled as far upon the railroad as it was yet completed, and that we must transfer ourselves to the stagecoaches; so in the dead middle of the night we crept out of the train, and taking our children in our arms, walked a few yards into an open space in the woods, where three four-horse coaches stood waiting to receive us.
>
> – (Kemble, 22) –

Mrs. Kemble’s description of a group of men warming themselves by a fire at the end of the railroad most likely was a work crew, and the opening in the woods suggests that railroad construction had advanced a short distance south of Enfield. The log road that her stagecoach traveled that night went through swampland. The stage arrived at Stantonsburg shortly after sunrise. Though Kemble writes a single paragraph about the night’s journey, it would be safe to assume that the journey was miserable.

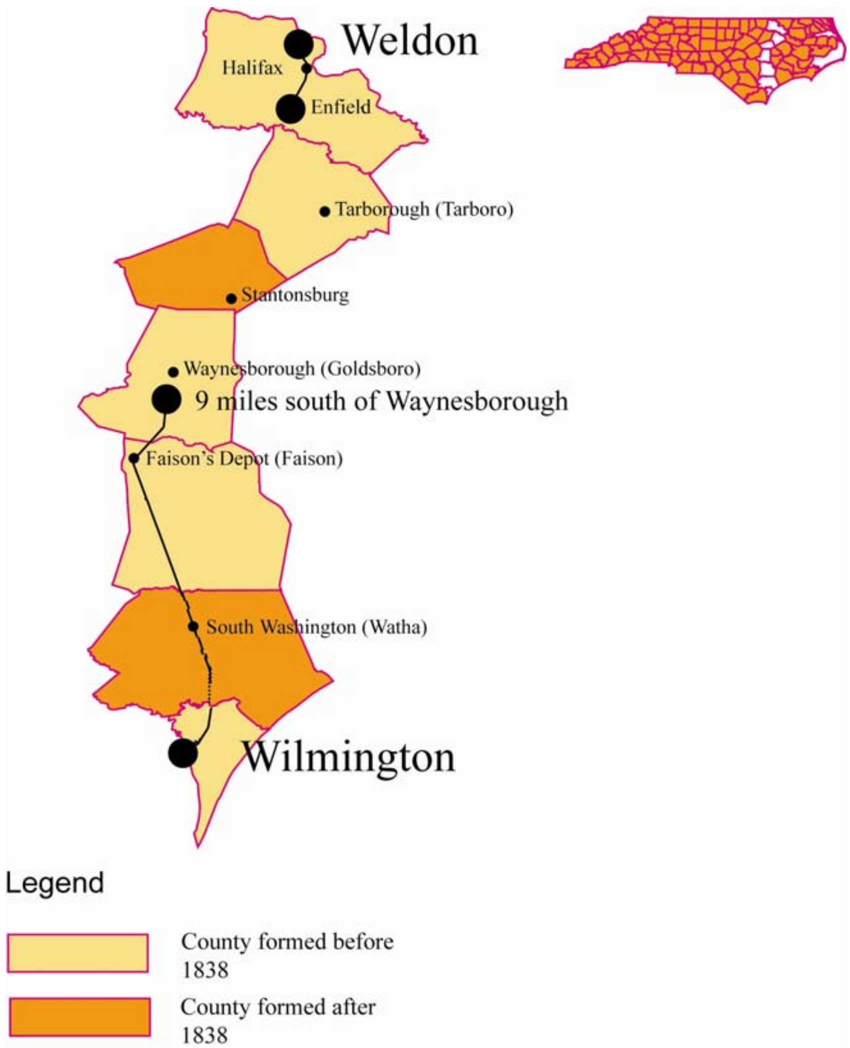

Figure E1. Map of the progress of construction on the Wilmington and Raleigh Rail Road during 1838, as reported in the area newspapers. The railroad was finished in March 1840. The total length of the railroad from Wilmington to Weldon was 161.5 miles. The stagecoach line of the railroad operated during construction. By May 1838, the stage line ran from Halifax to South Washington. A section from Halifax to Enfield was completed in October 1838, and the southern section was completed to Faison's Depot. By the last week of December, the railroad was within nine miles of Waynesborough.

There had been only a four-hour respite at Weldon from the time she left Portsmouth, Virginia the previous morning. In addition, she was nursing a baby (Kemble, 19-23). It is evident from her account that both the Portsmouth & Roanoke Rail Road and the Wilmington & Raleigh Rail Road had subjected their passengers to an unimaginable ordeal to meet the scheduled connections. Mrs. Kemble and her family arrived at Wilmington at 5 AM on 24 December 1838 deprived of sleep and adequate nourishment after nearly two days of travel.

Other sources are available for determining the duration of the stage ride from Enfield to Stantonsburg, and the approximate speed of the stage. The US Naval Observatory in Washington, DC, calculates that sunrise at Stantonsburg (W 077° 49’, N 35° 36’) on 23 December 1838 occurred at 7:18 AM (United States Navy, 2007). Given Mrs. Kemble’s observation that her stage trip began around 12:30 AM, the stage ride lasted approximately seven hours. Frederick Law Olmsted recounted a similar journey by stagecoach through southeastern North Carolina while traveling on the yet to be completed Wilmington & Manchester Rail Road in *A Journey in the Seaboard Slave States with Remarks on their Economy*. His stagecoach also traveled during the winter over log roads through swampland. The driver and teams changed out about every ten miles (Olmsted, 380).

Applications of the *Time Geography* proposed by Torsten Hagerstrand are most closely associated with transportation planning in the urban context and the concepts of space-time autonomy in describing the mobility of individuals and classes of individuals (Hanson, 2004). The aspects of *Time Geography* that are applicable to the problem addressed in this study involve determining what route through the road network of 1830s Edgecombe County would allow a trip by stagecoach that would begin in the neighborhood of Enfield, pass near Tarboro, and terminate at Stantonsburg within the span of approximately seven hours. The distance "as the crow flies" between Enfield (N 36° 10.858', W 77° 40.000') to Stantonsburg (N 35° 36.408', W 77° 49.401') is 40.64 miles; the distance between Enfield and Tarboro (N 35° 53.808', W 77° 32.150') is 20.96 miles; and the direct distance between Tarboro and Stantonsburg is 25.72 miles. Thus, the ideal road network for a route between Enfield and Stantonsburg via Tarboro would be 46.68 miles long. If a stagecoach traveling at an average speed of 7 mph were to take this ideal route, it would take 6.668 hours. At an average speed of 8 mph, the trip would last 5.838 hours. If it the historic route between Enfield and Stantonsburg took seven hours (by Mrs. Kemble's account), the distance traveled at 7 mph would be 49 miles, and for 8 mph would be 56 miles. The direct distance between Stantonsburg and Waynesborough (Goldsboro) is 20.61 miles. The distance by rail to Faison's Depot to the end of the completed railroad in December of 1838 is ten miles (Figure E2).

The mileage of stagecoach travel appears in the *Wilmington Advertiser* several times between 1838 and 1840. In October of 1838, the stage trip between Faison and Enfield was ninety miles (*Wilmington Advertiser*, 19 October 1838).

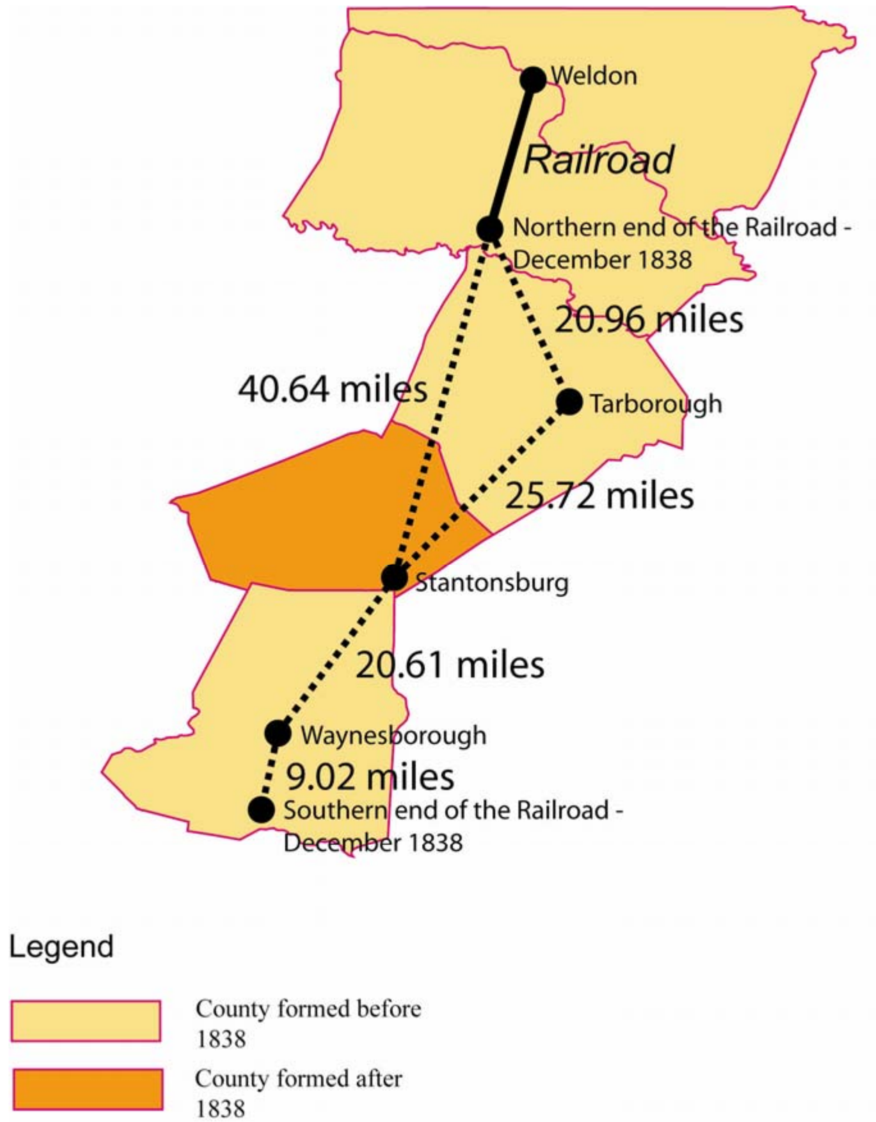

Figure E2. This map illustrates the direct distances between Enfield, Tarborough, Stantonsburg, Waynesborough, and the southern end of the railroad as of 21 December 1838. The stagecoach route during this period time included stops at Tarborough and Stantonsburg. As the railroad progressed beyond Waynesborough and Enfield, the route excluded these stops. The antebellum road network of these counties should approach the direct distances. Sources: Kemble, F. (1984). *Journal of A Residence on a Georgian Plantation in 1838-1839*. Athens, GA: The University of Georgia Press, 22-33; *Tarborough Press*, 22 December 1838; *Wilmington Advertiser*, 19 October 1838, 17 November 1838, 21 December 1838, 23 August 1839

The modern highway equivalent from Faison to Enfield via Goldsboro, Stantonsburg, and Tarboro, US 117, NC 111, NC 222, NC 33, and NC 44, to SR 1103, is 90.75 miles. However, in August of 1839 the southern division of the railroad had advanced to the ninety-three mile mark (in the neighborhood of Pikeville) and the northern division had advanced to Battle's Depot (Battleboro). The stage route was forty-two miles (*Wilmington Advertiser*, 23 August 1839). The direct distance between these locations is 40.32 miles and the route by modern highways is 42.70 (US 177 and US 301). Stantonsburg and/or Tarborough could not be on the stage route at this point. By October, the southern division added twelve miles (near the site of present-day Contentnea Junction) and the train still stopped at Battle's Depot in the north. The stage route was thirty miles (*Wilmington Advertiser*, 4 October 1839). The direct distance between these locations is twenty-nine miles. On modern roads, US 177 and US 301, the distance is 30.43 miles. The obvious empirical conclusion, with some variation, is that the antebellum roads are the foundation of the modern roads. An examination of historic maps can determine whether the road network of the 1830s through 1860s in Edgecombe (Wilson) and Wayne counties contained roads that would allow a route that satisfies these time/distance conditions.

In 1863, Jeremy Francis Gilmer, a Confederate Army engineer, prepared the *Field Map of Lieut. Koener's Military Survey Between Neuse and Tar Rivers North Carolina*. This map, though more than twenty-year years later than the completion of the railroad, illustrates the road network and topography of several counties from the Neuse River to the Virginia in fine detail (Gilmer, 1863). What is immediately obvious is that many of the roads depicted in this map approximate modern roads in the same counties. The Stantonsburg-Tarborough Road follows the route of modern NC 222/111, and the distance between the centers of both towns is 27.23 miles (Figure E3). However, there are several possible routes from Enfield to Tarborough on the Gilmer map that approximate modern roads. These are even apparent on the earlier 1833 MacRae-Brazier *A New Map of the State of North Carolina* and the 1865 U.S. Coast Survey (Cumming, 1966, Plate X, Plate XII). Three bridges crossing Fishing Creek are depicted in all the historic maps thus mentioned. These are Daniel's Bridge (or Wyatt's Bridge), Spear's Bridge, and Cofield's Bridge (Field's Bridge), with the most direct route between Enfield and Tarborough passing over Spear's Bridge. On a modern map, the approximate location of Spear's Bridge is the crossing of Fishing Creek on SR 1109 (W 77º 37' 38.97", N 36º 06' 50.83") and the approximate location of Cofield's Bridge is the crossing of Fishing Creek on SR 1429 (W 77º 33' 5.54", N 36º 05' 55.22"). The routes crossing these points on Fishing Creek converge near the town of Leggett (W 77º 34' 53.03", N 35º 59' 28.88"). The crossing at the former location of Daniel's Bridge follows the modern roads US 301, Speight's Chapel Road, and NC 33 that eventually passes through Leggett. The route crossing Fishing Creek at the site of Spear's Bridge is 22.49 miles. The road from Enfield to Tarboro via Bell's Bridge, and the Tarboro-Stantonsburg Rd. were on post routes: these routes were twenty-four miles from Enfield to Tarboro, and forty-six miles from Tarboro to Waynesboro via Pitts Cross Roads, Oak Grove, and Stantonsburg (Grundy and Robinson, 1834; United States, 1831a, 7-8, 1834, 20, 1841b, 23).

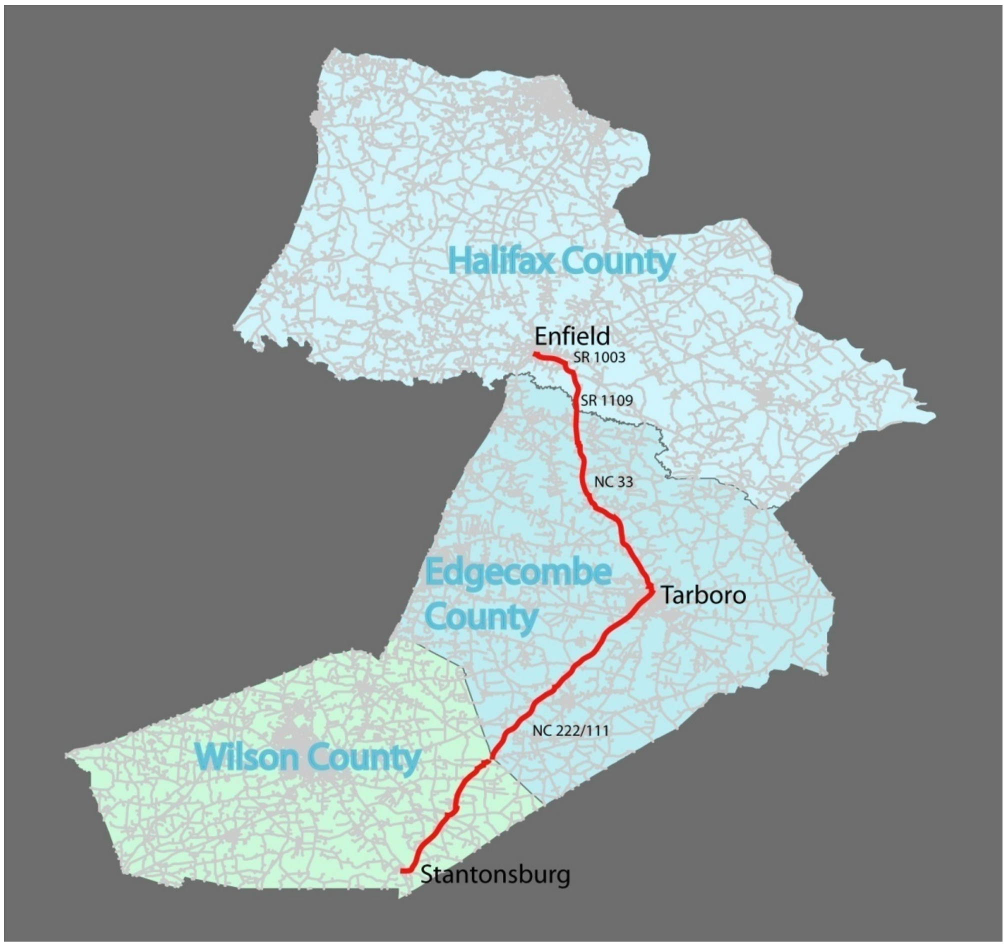

Figure E3. The red line denotes the most direct route from Enfield to Stantonsburg via Tarborough (Tarboro). The road is referred to as the Stantonsburg-Tarborough Road on historic maps, and NC 222/111 on modern maps. On historic maps, this road crossed the Tar River at Bell's Bridge and Fishing Creek at Spear's Bridge. It is SR 1003 to SR 1109 to NC 33 on modern road maps.

The old Stantonsburg-Tarborough Road follows the present-day NC 111/ NC 222, and remains the most direct route to Stantonsburg. This road also passes through Pitt's Crossroads. That fact that the railroad was able to deliver fish from Wilmington to Tarboro by their stagecoaches in late December of 1838 suggests that a Tarboro stop was on the route. It follows that the best route of the stages would match the post route. The route from Enfield to Tarborough via the supposed Cofield's Bridge site on SR 1429 is 24.60 miles, the distance by US 301 to NC 33 by the supposed site of Daniel's Bridge is 24.70 miles, and by SR 1109 to NC 33 the distance is 22.49 miles. Given the selection of the three, the direct route of 22.49 falls under twenty-four miles with 1.51 miles to spare. The other two routes are above twenty-four miles. It is not likely that the railroad would have selected the most direct route.

NC 111/NC 222 (called the Good News Church Road, Saratoga Road and Pinetops-Tarboro Road at various points between Tarboro and Stantonsburg) is the most direct route. However, it is still necessary to prove that the modern roads are built on the path of the nineteen-century roads. The MacRae-Brazier map shows the intersection of two important roads near Toisnot Swamp. One of the roads connected Tarboro to Smithfield, with the other connecting Stantonsburg to Nashville (NC). These roads remain in the United States Coast Survey map three decades later. In this map, the intersection now has the name of Wilson. In the modern city of Wilson, the intersection of Tarboro and Nash Streets preserve the place where the two earlier roads crossed. If Tarboro Street is traced east from Wilson, it becomes NC 42. After this highway enters Edgecombe County, NC 42 divides into NC 124 and NC 42. NC 124 intersects NC 111 at

Pitt's Crossroads. If Nash Street is traced east from Wilson, it becomes NC 58/US 264 and passes through Stantonsburg on NC 58. The town of Saratoga, appearing on the United States Coast Survey map, also connects to Wilson. The modern NC 91 retains the curves of the road depicted on the historic map. The relationships between the modern roads and their earlier manifestations suggest that NC-111/NC-222 retains much the same path as it followed in the 1830s. The total distance of the route between Enfield and Stantonsburg using the modern road network is 49.77 miles. This route is remarkably close to the 46.69 miles of direct distance between Enfield to Stantonsburg via Tarboro.

The distance for the post route from Tarborough to Waynesborough was forty-six miles. There are two sets of modern roads approximating this road on the Gilmer map between western Goldsboro, the former site of Waynesborough, and present-day Tarboro. The first includes NC 581, US 117, SR 1537, NC 222/ NC 111, NC 111, SR 1006, SR 1205, US 64A, and SR 1289. The total distance is 46.96 miles. The other set of roads includes NC 581 to NC 111, SR 1543, SR 1537, NC 222/ NC 111, NC 111, SR 1006, SR 1205, US 64A, and SR 1289. Both roads are slightly over forty-eight miles, but the increase in distance is associated with the less direct modern urban block network of Goldsboro. The latter route, passing through Stony Creek and Patetown, follow the "County Road" depicted by Gilmer. In this map, he included the bridge across Nahunta Swamp, and on the modern maps, this road is still known as the Seven Bridges Road. This is the only factor that recommends that set of roads as the stage route leading from Stantonsburg to Waynesborough.

This stage route distances mentioned in issues of the *Wilmington Advertiser* from 23 August 1839 to 3 January 1840 do not fit with the existing road network on the Gilmer map or any early map. The equivalent of present-day US 117 did exist between beyond the northern outskirts of Waynesboro. The modern roads follow the paths of the earlier roads but none run directly north. Only the railroad formed a continuous path between Waynesborough and the Tar River. The shorter distance given in the Wilmington newspaper suggest that some of the graded sections of railroad might have been used, or the writer was merely referring to the distance of the railroad that was not open. It is unclear. However, the section of railroad between Enfield at Battle's Depot (Battleboro) traverses the marshland of Swift Creek. This is the type of topography where the early builders of railroad would have driven pilings (Ruffin, 1833). These structures would not have been suitable for stagecoaches or any other vehicle other that locomotives and railroad cars. On a modern topographic quadrangle map, US 301 crossed the Swift Creek marshes. All other roads go around it. For this reason, it is highly unlikely the stagecoach followed the route of the railroad on departing from Enfield. There were two roads leading from Rocky Mount to Tarborough. Both paralleled the Tar River. The road on the north bank of the river proceeded east to a crossing of the river at Teat's Bridge or Bell's Bridge. After crossing the river, it joined the road on the south bank that entered Tarborough on the north side of town (Gilmer, 1862; Cumming, 1866, Plate X). The present-day roads that follow their paths are Alt US 64 and NC 97. Dunbar Road, SR 1252, crosses the Tar River near the site of Teat's Bridge. Mrs. Kemble's journal entries become problematic because she is unaware of the established (Kemble, 25).

Mrs. Kemble, by her own admission, "endeavored in vain to guess at the nature of the country through which we were traveling" (Kemble, 22). Can this be attributed to the fact that most of the journey was undertaken in the dead of night? The railroad was, and still is, located to the west of Halifax. The town of Enfield was not originally oriented on the line of the railroad; rather it was centered along the old road to Halifax that crosses the railroad above the town and continues at an angle to the west (Gilmer, 1862). That Mrs. Kemble boarded the stagecoach from here rather than a mile or so further down the track is possible. In this instance, the stagecoach could have followed the road from Enfield to Tarboro that crosses Daniel's Bridge. There are two possibilities on this leg of the journey that would conform to both the *Time Geography* constraints and the ground control points. The first route would proceed from south of Enfield to a crossing of the Tar River at Teat's Bridge that would skirt Tarboro to the west (Figure E4). The second route would commence at Enfield and Tarboro via Bell's Bridge over the Tar River. Because the rate of travel is ten miles per hour or less, time constraints do not permit a route that both crosses the Tar at Teat's Bridge and enters Tarboro. That fact that railroad was able to deliver fish from Wilmington to Tarboro by their stagecoaches in late December of 1838 suggests that a Tarboro stop was on the route. It follows that the best route of the stages would match the post route. Mrs. Kemble's failure to realize that she traveled through Halifax, Enfield, Tarboro, and Stantonsburg can be attributed to the darkness, her fatigue, and her metropolitan mindset. The stage route from Enfield to Waynesborough was likely the most direct route that falls within the mileage of staging given in available sources (Figure E5).

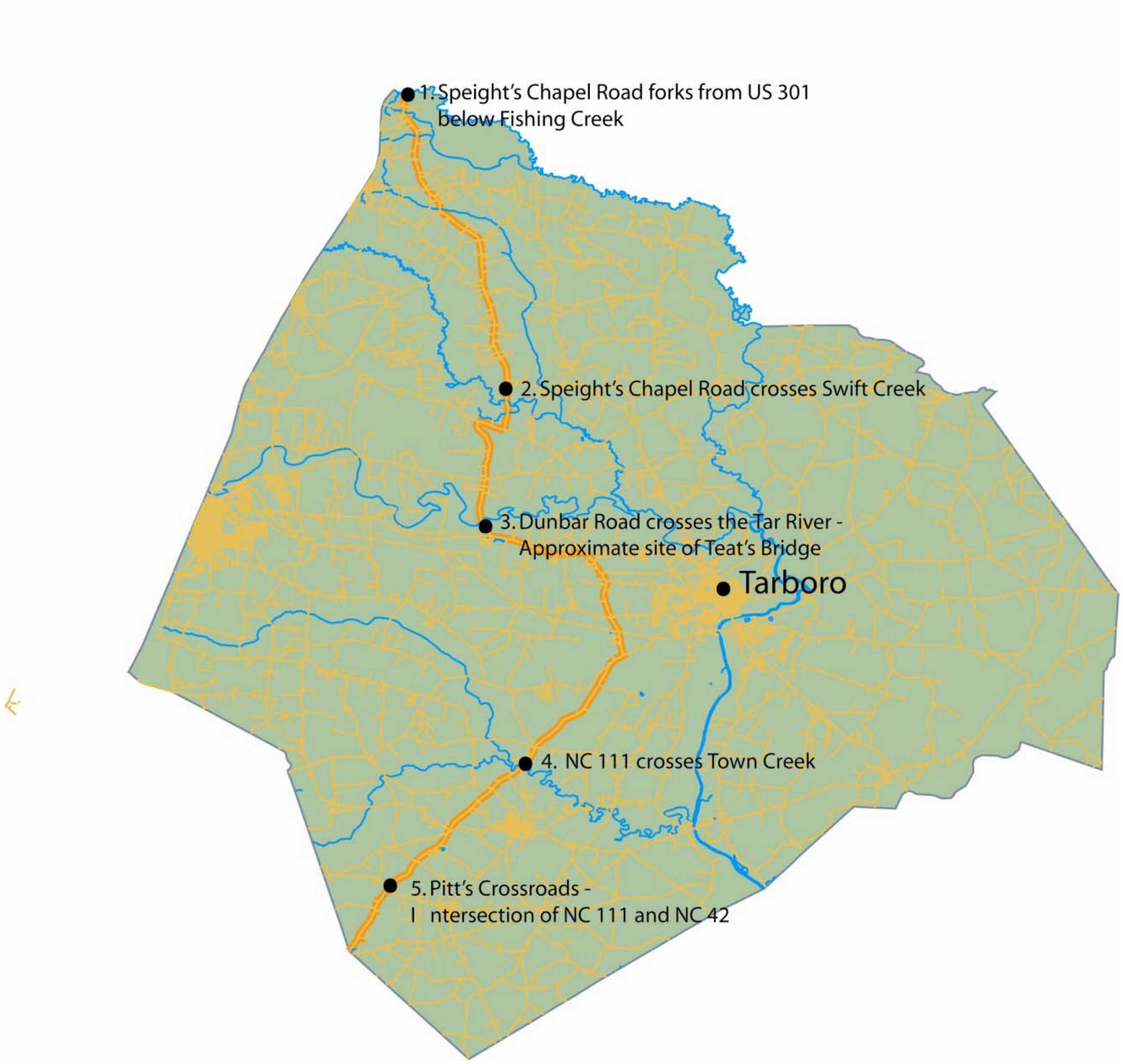

Figure E4. Mrs. Kemble's *Journal* makes no mention of passing any towns on the night stagecoach ride to Stantonsburg. This map of present-day Edgecombe County illustrates a route that conforms to the distance requirements of forty-nine miles established earlier in this study without entering Tarborough. The crossing of streams illustrated in the 1833 MacRae-Brazier map and the 1865 U.S. Coast Survey map were compared to the modern road network in the county to approximate the earlier route.
Source: Cumming, W.P. (1966). *North Carolina In Maps*. Raleigh, NC: State Department of Archives and History, Plate X, Plate XIV

Figure E5. This map illustrates the most probable route of the stagecoach line of the Wilmington & Raleigh Rail Road as of late December of 1838.

The author has selected Mrs. Butler's (Kemble's) 1842 article in *Bentley's Miscellany* to deconstruct not only because it is an earlier version of the same account published in her 1863 *Journal*, but also because it is contemporary with the response. In like fashion, the response from "The Boors of Carolina" in *Niles' National Register* also will be examined. The only elements of both documents that can be assumed to be true without proof is that the writers had submitted the work of their own hands, their observation came from personal experience, and they were not writing fiction.

The most basic question in the Kemble texts center around what railroad in North Carolina she was traveling. There were two railroads under construction in the state in 1838, the Raleigh & Gaston Rail Road and the Wilmington & Raleigh Rail Road. The Raleigh & Gaston, as the name suggests, was constructed from the town of Gaston on the Roanoke River to Raleigh. It connected to the Petersburg Rail Road via the Greensville & Roanoke Rail Road. The other railroad, the Wilmington & Raleigh, extended from the town of Weldon on the Roanoke to the port of Wilmington. The name of the company is deceptive, because its incorporators originally intended to build a railroad between Raleigh & Wilmington, but the route was changed to Weldon and the name of the company was not changed to the Wilmington & Weldon Railroad until much later. This railroad provided a steamboat connection from Wilmington to Charleston. It connected to the Portsmouth & Roanoke Rail Road and the Petersburg Rail Road at its northern terminus. Details contained in the "A Winter's Journey to Georgia U.S." exclude all but the Wilmington & Raleigh Rail Road.

Mrs. Kemble traveled from Suffolk to Wilmington; she waited for the train at Weldon; it took her to a stagecoach that passed through Stantonsburg and Waynesborough; when she resumed rail travel, the train took her to Wilmington; and she took the steamboat from Wilmington to Charleston (Kemble-Butler, 1842, 12:6, 8-10, 113, 115). The Raleigh & Gaston Rail Road operated in a different part of the state, and none of the places mentioned are located on its route.

The next task is to determine how far the Wilmington & Raleigh Rail Road Company had advanced in construction, and what sections were in operation in December of 1838. The answer is in several articles published in the *Wilmington Advertiser*. The remaining nine (miles) of track to Waynesborough (Goldsboro) lacked only the iron to make it complete (*Wilmington Advertiser*, 21 December 1838). Does this agree with Mrs. Kemble's narrative? Remarkably, she records that the distance of the stagecoach ride from the bridge over the Neuse River at Waynesborough to the place where they were to meet the train from Wilmington was ten miles (Kemble-Butler, 11). The distance between the modern town of Dudley and Goldsboro is approximately nine miles. Mrs. Kemble gives the distance as ten miles, and she reports that the distance from where the stagecoach stopped and the home of the Colonel was one mile along the course of the track, so the area to be examined should include the land fronting the railroad two miles north and two miles south of Dudley. The texts are examined for geographic references. From this point, these references will appear underscored in block quotes through this study. An examination of the Kemble narrative begins after her stagecoach crossed the Neuse River.

> The ten miles which followed were over heavy sandy roads, and it was near sunset when we reached the place where we were to take the railroad. The train, however, had not arrived, and we sat still in the coaches, there being neither town, village, nor even road-side inn at hand, where we might take shelter from the bitter blast which swept through the pine-woods by which we were surrounded; and so we waited patiently, the day gradually drooping, the evening air becoming colder …

– (Kemble-Butler, 11) –

What does this mean in geographic (also climatic) terms? The sandy soil and pine-woods are characteristics found in the coastal plain region of North Carolina. The road intersects or parallels the railroad, and the section of railroad completed is between towns. The rapid temperature drop at sunset is indicative of low humidity, and the bitter blast is likely a cold air mass moving in from the north. Two questions should be asked about this location. Why is this section of the railroad open to this point, and how long has it been in use? The answer to the first question is found in "Section Twenty-six" of an *Act to Incorporate the Wilmington and Raleigh Rail Road Company* passed by the North Carolina General Assembly in 1833, and reprinted in the 1855 annual report to the stockholders.

> *Be it further enacted,* That so soon as ten miles of said rail road shall be completed, and as often thereafter as any other section of like length shall be completed, the said company, or the president and directors, may transport all produce or other commodities, that shall be deposited convenient to the said road for that purpose, and which they may be required to convey to any point on said road …

– (Wilmington & Weldon Rail Road Company, 1855, 39) –

This section of the act puts a legal limit on the minimum length the company can open for traffic: it had to be at least ten (miles) of track. Thus, if the railroad was abiding by their charter, they had opened a section of track at least ten miles in length. The article in the Wilmington Advertiser is dated *two days* before Mrs. Kemble was there.

> The section of the Wilmington and Raleigh Rail Road between Faison's and Martin's, 12 miles long, was traveled over **yesterday** for the first time by the passenger's train. The remaining section—nine miles—between Wilmington and Waynesboro' is finished, except the iron, which will be nailed down as speedily as possible.
>
> – (*Wilmington Advertiser*, 21 December 1838) –

It follows that the total number of miles between Faison's Depot and Waynesborough by rail is twenty-one miles. Thus, this section was first used on 20 December 1838. The actual distance between Faison's and these other places mentioned needs to be measured on an accurate map – both direct distances and distances by rail – since that depot site still exists. The newspaper article provides a new location to consider: Martin's. The train stops at this undefined place; it may have been located twelve (miles) from Faison's Depot, and the Slocomb plantation is in the neighborhood. Continuing the analysis of the Kemble text, she makes note that a group of local people had gathered at the site where the stagecoach was waiting "to see the hot-water carriages come up for only the third time into the midst of their savage solitude" (Kemble-Butler, 11). This appears likely since the newspaper account suggests that the first passenger train arrived here on 20 December 1838. The title of the article, "Staging reduced and the comfort of travelers advanced," suggests the stages were also at this point for the first time on the same date

(*Wilmington Advertiser*, ibid). The Kemble text also makes mention of the gentlemen of her party seeking a meal at "a miserable farm-house across the fields" (Kemble-Butler, 11). An inventory of the geographic references that have been gleaned from the texts so far would include these elements: the stages had stopped at a location called Martin's that is twelve (miles) north from Faison, and approximately nine miles south of Waynesborough Depot by rail. There is a stand of pines on one or the other side of the railroad, and a farmhouse separated by a field on the other side of the track. If a road is paralleling the track, the house could be facing the road. If it is actual an intersection, it could also be facing the other road. Whatever direction the house is facing, it is likely that the house was built with the front of the house facing an established road. This consideration may be insignificant, but should be noted if additional archival and map research exposes references to Martin's Crossroads, Martin's Farm, or anything similar.

The gentlemen travelers agreed that they would seek shelter at the farm of "a man of some standing in the neighborhood" who lived about one mile away on the railroad. The luggage, women, and children were loaded on to an "empty baggage-car, or rather a mere platform on wheels," and utilized the Black laborers that were there to push it along the railroad. It took nearly a half an hour to reach the Colonel's plantation. She and a companion sheltered the babies in their arms to shield them from "the bleak north wind that whistled over us" (Kemble-Butler, 11-12). With a baby in her arms, it is likely she had her back to the wind.

> The last embers of daylight were dying out in dusky red streaks along the horizon, and the dreary waste around us looked like the very shaggy edge of all creation. The men who pushed us along encouraged each other with wild shouts and yells,

> and every now and then their labour was one of no little danger, as well as difficulty – for the road crossed one or two deep ravines and morasses at a considerable height, and nothing but the iron rails were laid across piles driven into these places, it became a service of considerable risk to run along these narrow ledges, at the same time urging our car along … we presently beheld, with no satisfaction**,** a cluster of houses in the fields at some little distance from the road.
>
> – (Kemble-Butler, 12) –

The Sun and Moon data for the coordinates of this area of Wayne County, North Carolina, for Sunday 23 December 1838 as calculated by the US Naval Observatory are as follows: sunset was at 5:05 PM, with evening civil twilight ending at 5:33. The Moon transit was at 6:02 PM, and it was a first quarter Moon (United States Navy, 2007). That Mrs. Kemble could distinguish the houses in the field at the site of the Colonel's plantation suggests that civil twilight had not yet ended. The first quarter Moon would not have provided enough light for that extremely dangerous trip there on the flat car if it were later. Her narrative does not indicate the direction they are traveling, but the "ravines and morasses" she describes suggest unique landscape features that might appear on topographic maps and these could be observed on a site visit.

Several problems in Mrs. Kemble's narrative need to be addressed before continuing with her description of the interior of the Colonel's home. It was getting dark, and the train from Wilmington was overdue. If they started at the end of the newly opened twelve miles of track, the Black laborers are pushing the women and children on a flat car south, are pushing them in the direction the train will be coming. Not only that, the car is being pushed over trestlework. No mention is made of the stagecoach leaving, and if it had left, there was a group of laborers at hand to help them carry their luggage an extra mile down the road. That is, if there is a road parallel to the railroad. If not, the railroad is the only direct means to get to the plantation. What happens with the flat car when they arrive at the Colonel's plantation? It cannot be left there because the engineer would not expect it, and probably would not be able to avoid it the dark. Would the Black laborers, already familiar with the locomotive, have taken a big risk pushing the car along at twilight more than double the risk by pushing it back at dusk? Now, if the flat car was being pushed north, there must be a reason why the railroad is not using the remaining miles of track. This is a return to the ten miles/twelve miles puzzle presented earlier. The charter of the company required ten miles of track to be put down before the section was open, but what if the ten-mile mark places the train on trestlework over a ravine or in a swamp? The train needed a place to take on freight and passengers that was accessible by an existing road, and it had to be where there was enough space to construct an arrangement of track and switches to get the locomotive and tender pointed in the right direction for the return trip. If such a place were at the eight-mile mark, it could not be used until the company built ten miles of new track. The text has presented so many questions about this short length of track, there needs to be proof that such a landscape exists *here*.

In 1836, Ruffin's *Farmer's Register* published "Extracts from the Report of Walter Gwynn, Esq., Engineer, to the President and Directors of the Wilmington and Raleigh Rail Road Company." The *Western Route* is the one that was selected, and the block quote below concerns the section of track between Faison's Depot and the Neuse River. Gwynn refers to Goshen in his text. Goshen Swamp begins just north of Faison

Depot, and covers a large area, but it is outside the study area. The relevant streams and landscape features will appear underscored.

> Immediately on ascending from the valley of Goshen, the route reaches a dry, level, open woods through which it passes to Brook's Branch. The formation of the rail road on this portion of the route will consist, chiefly, in cutting down large trees which overspread the track, and hewing and preparing them for the reception of the iron rails. After making a slight undulation in crossing Brook's Bran**ch**, which is a very inconsiderable stream, it arrives at the same level ground, on which it continues to the head of Yellow Marsh; along the margin of which, it descends to the valley of the Neuse River …
>
> – (Ruffin, 1836, 348) –

"Revolutionary Reminiscences. Fanny Kemble in North Carolina" was first published in the *Charleston Courier*, and then republished in *Niles' National Register* on 1 October 1842. The writer, referring to Mrs. Kemble's denigrating remark about the country people that had come to see the train from Wilmington, signs his response "The Boors of Carolina."

> Mrs. B. gives a very correct account of the colonel and of his mansion as it appeared by night. It is a common two story frame house, very ancient – and so was its master, for I regret to say the venerable Colonel died on the 4th day of July 1840, in the 89th year of his age … The house fronts the east, and an avenue of half a mile in length, and almost 150 feet in breadth, stretches to the easternmost side of the plantation, where was a highway, and beyond that, open grounds partly dry meadow and partly sand barren. This avenue was lined on the south side by a high fence and a thick hedge row of forest trees now removed and replaced by the pride of India and other ornamental trees; on the north the common rail fence of seven or eight feet high, such as is seen on all plantations of good farmers in the low country where the necessary timber is convenient …
>
> – (The Boors of Carolina, 1842) –

The writer includes additional details of the plantation when he describes an event that occurred during the American Revolution. Col. Slocomb and members of the local militia narrowly escaped when they unknowingly came upon the British encamped on the plantation grounds.

> Quick as thought they again wheeled their horses and dashed down the avenue directly toward the house, where stood the quarter guard to receive them. On reaching the garden fence, a rude structure, which we call a wattled fence, they leapt that, the next, amid a shower of balls from the guard, cleared the canal, a tremendous leap, and scouring across the open field to the northwest, were sheltered in the wood before their pursuers could clear the fences of the enclosure. This description should excite the curiosity of any traveling reader, he may see the whole ground as he passes over the Wilmington rail road, 1½ miles south of Dudley depot.
>
> – (The Boors of Carolina, 1842) –

From the details provided by the writer, the plantation was located south of Dudley. Brogden and Yellow Marsh Branch can be excluded from the examination. The trestlework traversing "one or two deep ravines and morasses at a considerable height" must have been located where the railroad crosses the two tributaries of Brook's Swamp. The two-story frame house faced east at least one half mile from the highway. There is a road on the topographic map located between the two streams at Brook's Swamp, almost two miles south of Dudley, which is one half mile in length and intersects with a road east of the railroad. This may be the relic of the "avenue." The combination of roads that joins both the suspected half-mile avenue and the railroad appears on modern road maps as Kelly Springs Road SE and Everette Road SE. The distance between the point where

Everette Road SE intersects the railroad and the western end of Parker Road SE is 1.3 miles north by the railroad.

The geometry of the modern arrangement of roads suggests two hypotheses that maybe verified, in part, with additional examination. The first is that the stagecoach stopped at a point that is now the intersection of Everette Road SE and Old Mt. Olive Road (3.1 miles) from Dudley). For lack of a road, the passengers followed the railroad 1.3 miles to the site of the modern Parker Road SE, the suspected "avenue" on the Slocomb plantation. The second possibility is that the stage arrived at the site of what would be Dudley Depot, and they followed the railroad 1.8 miles to the same point. The first hypothesis has the advantages of being the shorter distance and utilizing a direction away from the expected train. In addition, we can also hypothesize that the Black laborers were not merely "loitering about" as Mrs. Kemble put it; that they were connected to the construction and/or operation of the railroad, and the flat "baggage" car had been left there to be loaded with the passengers' luggage. The latter may be difficult to prove, but seems odd that luggage would be unloaded from the stage onto a car used by the construction crew for hauling iron, wood, or dirt; or that the stage would deposit the passengers and their luggage without receiving those coming up the road from Wilmington.

The last fragment of text to be examined in Mrs. Kemble's article is her description of the interior of the Colonel's home.

> To the principal one I made my way, followed by the rest of the poor womankind, and, entering the house without further ceremony, ushered them into a large species of wooden room, where blazed a huge pine-wood fire. By this welcome

> light we descried, sitting in the corner of the vast chimney, an old ruddy-faced man … His residence (considering his rank) was quite the most primitive imaginable, – a rough brick-and-plank chamber, of considerable dimensions, not even whitewashed, with great beams and rafters by which it was supported displaying the skeleton of the building, to the complete satisfaction of any who might be curious in architecture. The windows could close neither at the top, bottom, sides, nor middle, and were, besides, broken so as to admit several delightful currents of air, which might be received as purely accidental.
>
> – (Kemble-Butler, 12) –

Kemble states that the same room contained a clock, a bed, and a number of rush-bottom chairs of many sizes. Turkey-feather fans, dried herbs, medicine bottles, and one or two firearms were hung from the wall. Sometime past eight o'clock, they were informed that the train from Wilmington had arrived (Kemble-Butler, 12).

The article written by "The Boors of Carolina" refers to the house having a "piazza," meaning a covered arcade or a verandah; and during the British occupation of the plantation during the Revolution, that Mrs. Slocomb "withdrew to her room" after being assured by the British commander, Tarleton, that his soldiers would not loot her home. He also mentions a skirmish between a "platoon" of troops under the direction of a Tory captain and the militiamen of Col. Slocomb and Major Williams in the woods and field near the canal. At the time the article was written, the local residents still called this "dead man's field." The writer corrects Mrs. Kemble's remark that the Colonel served homemade wine. It was actually peach brandy prepared under Col. Slocomb's supervision from the fruit of his own orchard, "the orchard and field to the right" (The Boors of Carolina). The article contains many details such as the names of British and

American officers and their outfits, the locations of encampments, and the type of food that would have been served in the region.

Now, the elements of the text must be reassembled into statements that describe the whole spatial event in concise, disinterested terms:

1) On the afternoon of 23 December 1838, the British actress Frances Anne Kemble-Butler traveling with her husband and infant children on the yet to be completed Wilmington & Raleigh Rail Road, arrived at a location in the neighborhood of the present-day town of Dudley in Wayne County, North Carolina. They had traveled approximately ten miles from the crossing of the Neuse River at Waynesborough (now a part of Goldsboro) by stagecoach to a point where the existing road intersected the open section of railroad. The text does not provide enough information to determine the exact point; yet Mrs. Kemble records that the distance between this point and the home of the Colonel is one mile by rail. At the point where the stage had stopped, there were a field and farmhouse on one side of the road and pine forest on the other. Colonel Ezekiel Slocomb is the only possible candidate for Kemble's unnamed Colonel: he was a veteran of the American Revolution, his wife died in 1836, and his home was located on the railroad near the section of the railroad that had been open on 20 December 1838. His acquaintances recognized his thinly cloaked identity when Mrs. Butler (Mrs. Kemble) published her article in 1842. The descriptions of the interior of the Colonel's house in the Kemble text can be connected with the exterior descriptions provided by "The Boors of Carolina."

2) Colonel Slocomb owned a plantation near Dudley. The half-mile, one-hundred fifty foot wide road leading to the Colonel's house fronted an old highway on the east. There was once a seven or eight-foot high fence and a hedgerow that ran along the south side of the "avenue" leading to the plantation house. There were "sand barrens," or sandy patches that would not support vegetation, near the highway. On the northwest corner of the plantation, visible from the railroad, being one and a half miles south of Dudley Depot, was an open field with woods on the north side and a canal on the south side. The plantation house, surrounded by outbuildings, was a short distance from the railroad track, and its front faced the east. It was a two-story frame structure of brick and plank construction. It had a verandah, and/or cover walkway. The framework was exposed in the interior, it was not painted, and the windows were set in unmovable frames. There was at least one large fireplace, and the room that contained it was large. The plantation had a peach orchard, and the "Pride of India," that term being applied to both the crape myrtle and the chinaberry tree, would have been used later as ornamental plants along the "avenue."

3) Sunset occurred at 5:05 PM that day. The wind was blowing from the north. Mrs. Kemble, her children, and the other women passengers boarded the available flat car that was used to haul baggage, and were pushed by Black laborers one mile along the railroad through Brook's Swamp to the rear of Colonel Slocomb's plantation. Ten male passengers followed behind the flat car.

Testing of the two hypotheses presented in the previous section involves identifying the "one or two deep ravines and morasses" within a three mile distance south of the site of Dudley Depot on the line of the railroad. This is the only landscape element linking the two documents analyzed. It can also be defined in a specific set of X, Y coordinates representing movement from one location to another along a fixed route: Mrs. Kemble was pushed a distance of approximately one mile on a railroad car from the site where the stagecoaches were to meet the train from Wilmington to the home of the Colonel. The sand barrens, the canal, "dead man's field," the site of the peach orchard, and the plantation house are all unknowns on a parcel of undetermined dimensions; and though they were observable in 1842, there is no reason to assume any of them remain.

As stated earlier, the purpose of this study is to glean enough information from the historic texts to *recommend* a site for further inquiry. Taking this recommendation as a starting point, the historic preservation profession and/or archaeologist must determine the significance of the site and make the appropriate arrangements with the property owners. The professional must then first examine the life and career of Colonel Ezekiel Slocomb to establish his place in North Carolina's antebellum history, or else establish the significance of the plantation and whatever opportunities it may present in expanding what is known about antebellum material culture. Otherwise, several purely historical topics arise from the questions posed by the examination of the text. Knowing the identity of the "Colonel" and details about his place of residence enhances the interpretation of Frances Anne Kemble's *Journal of a Residence on a Georgian Plantation in 1838-1838.* The text illustrates how the *Wilmington & Raleigh Rail Road,* an example of early railroad construction in the United States, employed a trestlework of pilings for crossing some stretches of uneven ground rather than earth embankments. In addition, the Southern antebellum railroads used slave labor in the construction of their railroads, and in some aspects of operating these railroads. The Kemble narrative contains two accounts of groups of Black laborers encamped at the end of both divisions of construction. This is one of the few written accounts of the working and living conditions of this type of work force. Finally, the two documents provide insight into the life of a veteran of the American Revolution.

The methods selected for testing the two hypotheses involve map analysis and a site examination of the section of railroad running through Brook's Swamp. The author downloaded a 1/3 ArcSecond NE CONUS Elevation map from *The National Map* website, hosted by the USGS, for the map extent of 35º 12'35" N to 35º 16'30" N and 77º 59'9" W to 78º 5'43" W – Geographic Coordinate System WGS84 (USGS, 2007, The Nation Map, http://nationalmap.gov/; last accessed on 18 December 2007). At this point, the only quality of landscape that needs to be examined is elevation. The heavy black line marks the route of the railroad. The second layer of this map consists of sections of the modern road network east of the railroad taken from US Census TIGER/Line Files (Figure E6). These roads appear as thin black lines. The road network west of the road has been excluded because there are no roads in this section intersecting the railroad through Brook's Swamp below Dudley. *Point A* marks the intersection of Everette Road with the railroad; *Point B* marks the intersection of Parker Road with Kelly Springs Road; *Point D* marks the intersection of Brewinton Road with the railroad; and *Point E* is the

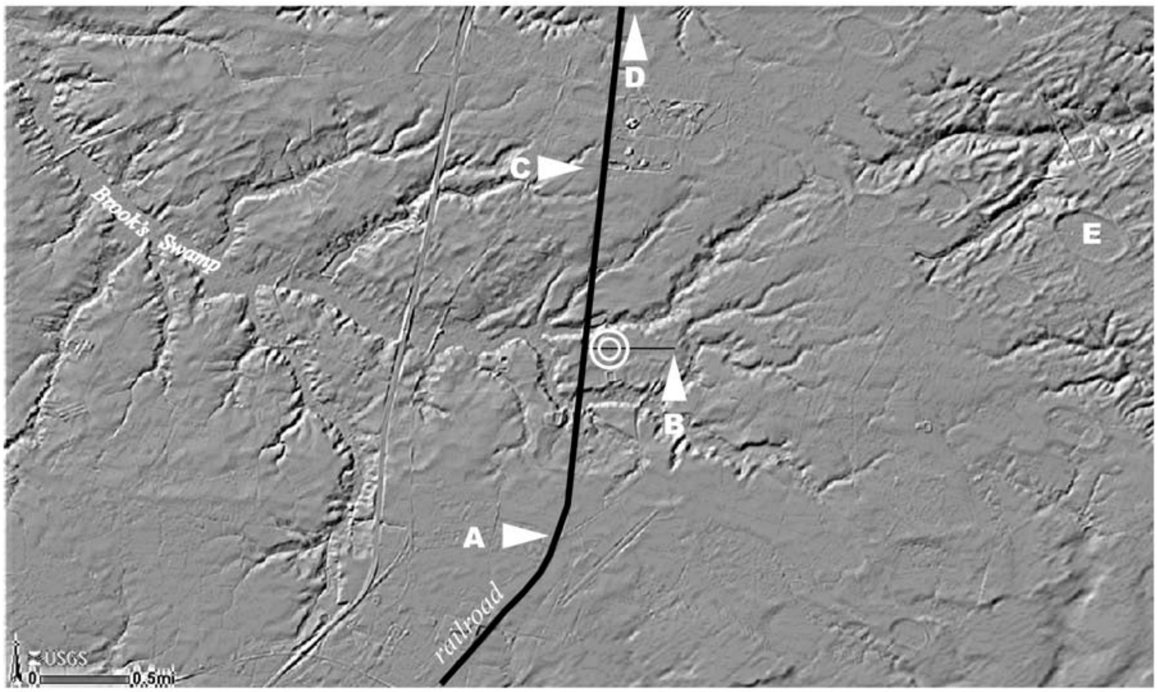

Figure E6. *Point A* marks the intersection of Everette Road with the railroad; *Point B* marks the intersection of Parker Road with Kelly Springs Road; *Point D* marks the intersection of Brewinton Road with the railroad; and *Point E* is the intersection of Sleepy Creek Road/Dudley Road with the railroad – the approximate site of the old Dudley Depot. The elliptical, crater-like, formations like the one marked by *Letter E* are Carolina Bays. The *Letter C* is the location marked by the double circle is the probable place where the "avenue" leading through Colonel Slocomb's plantation intersected with the railroad.
Source: 1/3 ArcSecond NE CONUS Elevation map from *The National Map* website, hosted by the USGS, for the map extent of 35º 12'35" N to 35º 16'30" N and 77º 59'9" W to 78º 5'43" W – Geographic Coordinate System WGS84; from US Census TIGER/Line Files (US Census Bureau, 2000, North Carolina; Avenza Systems, Disk 37).

intersection of Sleepy Creek Road/Dudley Road with the railroad – the approximate site of the old Dudley Depot. For those unfamiliar with the geomorphology of the Coastal Plain of North Carolina, the elliptical, crater-like, formations like the one marked by *Letter F* are Carolina Bays. The *Letter C* is the location marked by the double circle is the probable place where the "avenue" leading through Colonel Slocomb's plantation intersected with the railroad (Figure E9). The distance by the railroad between Everette Road (Point A) and Parker Road (at Letter C) is 1.3 miles. The distance between the railroad and Kelly Springs Road (Point B) by Parker Road is 0.5 miles. The distance by railroad between Parker Road and Brewinton Road (Point D) is 1.2 miles; and the distance between Parker Road and Sleepy Creek Road/Dudley Road (Point E) is 1.8 miles. The distance between Everette Road and Sleepy Creek Road/Dudley Road is 3.1 miles; and the distance between Everette Road and Brewinton Road by the railroad is 2.5 miles. By querying the elevation data on the 1/3 ArcSecond NE CONUS Elevation map, there is about a foot gained in elevation between *Point A* and *Point D*; however, the streams running through the two branches of Brook's under the railroad are over forty feet lower than *Point A* and *Point D*. At this point, it seems likely Mrs. Kemble could have traveled on high trestlework over "ravines and morasses" for about a mile from either direction. This is not necessarily so, however. The railroad could have chosen to descend gradually from the higher elevation to the south by trestlework to some safe level over the bank full level of the streams. From this point, the railroad could have followed the terrain on its ascent.

By 1858, all the original trestlework below the Neuse River had been filled as embankments (Wilmington & Weldon Railroad, 1858, 7). Since it is more likely that the company would have smoothed out the descent and ascent rather than cut it more deeply, the height of the present embankment on the railroad should reflect, to a degree, the construction on the height of the original trestle. Since trains have run over this section of track regularly since 1838, it is not likely the line has been shut down to elevate the track too much higher or lower than it was originally.

The geographic statements the period documents match a common location, Colonel Ezekiel Slocomb's plantation. An examination of the physical landscape along the railroad track within 3.1 miles of the former Dudley depot site affirms the hypothesis that Mrs. Kemble was pushing north in the "baggage car" from the approximate location that can be represented on a map with the coordinates N35.223938º, W78.042719º to N35.24236, W78.04032. The northward direction of travel would carry the car over the "ravine and morasses" at a dangerous height, if the present day embankments are a good indication of the height of the original trestlework. The second set of coordinates can with associated with the approximate location of the "avenue" passing through the Slocomb plantation. These conclusions are the best that can be obtained with the available sources, and are subject to slight revisions if additional research should prove the need to do so. The author suggests that a further inquiry into the life, military career, and plantation of Colonel Ezekiel Slocomb would enhance the available body of research on North Carolinians that participated in the American Revolution.

APPENDIX F

LOCOMOTIVES AND ROLLING STOCK

The 14 locomotives that ran the line in 1840 were the best of English and American technology at the time. The first two engines delivered, built by the English Stephenson firm, arrived in late 1837. Illustrations accompanying the Wilmington & Raleigh Rail Road's advertisements in the Wilmington newspaper and the impression of the company seal on early documents in the North Carolina State Archives suggest the Stephenson "Planet" class locomotive (North Carolina, 1840b, 10; *Wilmington Advertiser*, 10 November 1837; Konkle, 1922, 171). The Smithsonian Institute preserved Stephenson locomotive the *John Bull* used on the Baltimore & Ohio Rail Road is a modified "Planet" class locomotive, as is the reproduction of the Raleigh & Gaston's locomotive *Raleigh* housed at the North Carolina Transportation Museum in Spencer.

Three Norris engines and one Baldwin engine, both made in Philadelphia, are mentioned in the *Wilmington Advertiser*, along with three passenger cars and four baggage cars built by the firm of Betts, Pusey & Harlan, whose shops were located in Wilmington, Delaware. Eight wheels supported these passenger cars, and the engine tenders for passenger trains were also fitted with eight wheels. This arrangement was adopted for reasons of safety, and to reduce the need for "frequent stoppages for water and fuel" (*Wilmington Advertiser*, 11 January 1839, 24 May 1839). Another Norris engine was ordered for the northern end of the line.

The company also owned locomotives built by D. J. Burr and Company. The 1838 report given by Alexander Anderson, President pro tem of the Wilmington & Raleigh Rail Road, before the North Carolina Legislature's Board of Internal Improvements, provides a detailed account of the company's resources, equipment, and the cost of purchase. Included in the report are the following items: 12 locomotives with tenders, $90,000; 8 coaches capable of carrying 56 passengers each ($2,250 each), $18,000; and 80 burthen cars ($300 each), $24,000 (Wilmington Advertiser, 11 October 1839; North Carolina, 1838, 17-18).

The paint scheme for the locomotives and car is a matter of speculation. However, the paint shop inventory of the company included in the 1856 annual stockholders report includes large quantities of the Brandon paint, also called *ochre*, a clay base containing iron used in preparing paint, including Venetian red, vermillion, chrome green and chrome yellow. Other pigments listed in the 1858 report include India red, vermillion red, chrome green, chrome yellow, and black (Wilmington & Weldon Rail Road Company, 1856, 20; 1858, 16) suggesting a similar selection of colors to that of the *Raleigh*, but perhaps used in a different way. Assuming the paint scheme was selected early in the history of the company, the locomotive and cars were likely decorated with some arrangement of these cheerful colors.

James Sprunt, in *Chronicles of the Cape Fear River*, provides more details about these first locomotives.

> Twelve locomotives, which were named, *Nash*, *Wayne* (built by R. Stephenson & Co., Newcastle-on-Tyne, England), *New Hanover*, *Edgecombe*, *Brunswick*, and

> *Bladen* (built by William Norris, Philadelphia, Pa.), *Greene*, *Halifax*, and *Sampson* (built by Burr & Sampson, Richmond, Va.), etc.
>
> – (Sprunt, 1916, 150) –

The *Brunswick* was the first engine to run over the entire railroad when it was completed from Wilmington to Weldon, and it was still in service as a supply train in 1858 (Wilmington & Weldon Rail Road, 1858, 8). Another engine that survived into the 1850s was the *Edgecombe*. After 1840, other locomotives were added periodically over the decade. During the *Great Fire of 1843*, five of the locomotives were damaged.

> All the Rail Road Depot, buildings, of every description, including five Locomotives, some cars, the bridge over the ravine, and two or three yards of the road where there were several tracks …
>
> – (*Carolina Observer*, 3 May 1843) –

Shortly thereafter, the *Wilmington Chronicle* reports that some of the locomotives could possibly be repaired. At the annual meeting of the stockholders held on 9 November 1843, $8000 was determined to be the cost of replacing "provisions, fixtures, &c." due to the fire . This amount seems small compared to the original cost of the $90,000 it took to purchase the original 12 locomotives. However, by that December a powerful new engine was added to the road, and another like it is had been ordered, to compensate for the loss of locomotives due to the fire (*Wilmington Chronicle*, 17 May 1843, 15 November 1843, North Carolina, 1838, 17).

> In consequence of the loss of several locomotives by the fire last spring, there has since been a lack of motive power on the Wilmington Rail Road, especially felt in the heavy freight transportation. The deficiency is now however partly supplied,

> and will be entirely very soon. An engine capable of hauling a train of 6 or 700 bbls. Turpentine, weighing alone 100 to 120 tons, has just been put upon the Road, and another which it is supposed will be able to take along a train of a thousand bbls., or about 170 tons, is expected shortly.
>
> – (*Wilmington Chronicle*, 6 December 1843) –

The available surviving record does not provide enough information to determine what happened to the all the damaged engines. It might be safe to speculate that they were eventually restored or their salvageable components could have been used in engines made in the company shops.

Mention of four new locomotives, two new coaches, and a large number of "trucks" having been purchased appears in a report of the annual meeting of the stockholders of 1846 (*Wilmington Journal*, 20 November 1846). During the 1840s, the company acquired a number of new locomotives. The *J. C. Calhoun*, an M. W. Baldwin locomotive, was put into service in 1841. The *James K. Polk*, also by M. W. Baldwin, followed in 1842. The *William A. Graham*, by M. W. Baldwin, and two Burr, Pea & Sampson locomotives, *E. B. Dudley* and *Wm. H. Haywood*, were purchased in 1846; followed in 1847 by the *Perseverance*, by M. W. Baldwin locomotive. During 1850, the company shops built the *J. M. Morehead* and the *Saxapahaw*. *Mechanic*, a Norris Brothers locomotive was also added in 1850. This first generation of passenger locomotives were lightweight and managed an average speed of 22 miles per hour (Wilmington & Weldon Rail Road, 1955, 22). In 1891, Albert Johnson, engineer whose career had started with the Richmond and Fredericksburg Railroad in the 1830s, gives a description of the early locomotives on the Wilmington & Raleigh Rail Road.

> They had no pilot, no headlight and no cab. English fashion, the driver or engineer stood out in the weather. The first engines on the Wilmington and Weldon railway weighed ten tons each. They were the Dudley, the Haywood, the Green and the Sampson.
>
> – (*Wilmington Messenger*, 3 September 1891) –

These early locomotives, as with all locomotives built prior to the Elijah McCoy's invention of the "Lubricator Cup" in the late 19th century, had to be oiled frequently during its run. The average oil consumption for these early locomotives was one pint every 10 miles. Other organic lubrications available at time also included animal fats that were used as grease, and cottonseed oil. That the railroad became a heavy consumer of tallow and cotton waste is not surprising.

Some of these first generation engines were rebuilt and used for varying tasks until the 1860s. The *Brunswick*, *Edgecombe*, *E. B. Dudley*, *W. A. Graham*, *J. C. Calhoun*, and *W. H. Haywood* – all put into service between 1838 and 1846 – were rebuilt during the 1850s. Even when they were worn out, the company shops were able to rebuild them. The *Edgecombe,* along with the *Cumberland* and *J. C. Calhoun*, are listed as worn out and irreparable in the 1856 "Consolidated Report of Locomotives." Other older engines listed in this report are the *W. A. Graham,* valued at $1000 and considered not worth rebuilding. The *Saxapahaw* (a shifting engine built by the company shops in 1850) was valued at $500 and considered worn out; the *W. H. Haywood,* at $3000 and the *E. B. Dudley* at $800 were considered worth rebuilding. Surprisingly, by 1860, the *J. C. Calhoun* was being repaired and the *E. B. Dudley* had been rebuilt (Wilmington & Weldon Rail Road, 1856, 23; 1860, 37).

Between 1851 and 1855, eleven new locomotives were in use. These new locomotives, the second generation to be put into service on the Wilmington & Raleigh Rail Road, were truly American machines. They were almost evenly divided between the M. W. Baldwin and Norris Brothers (*See* Table F1.) Norris and Baldwin had developed locomotives that were dependable, durable, and could perform well on less than perfect rail arrangements. American railroads at that time had been built in a quick economic fashion, and many railroads during the 1850s, particularly in the South, were still using strap iron on wooden rail. Others were using an assortment of different iron rail sizes and designs. Even when the "T" rail became the standard, it was manufactured in many weights and sizes. There was not a universal track gauge at that time. The American railroads were longer than most of their European counterparts and covered diverse terrain. The design had to be such that a railroad could repair a locomotive in their shops. The American locomotive of the 1850s was twice the weight of its predecessors, weighing 20 to 25 tons, and weight was distributed over a greater area. The 4-4-0 configuration with its four large driver wheels was the standard American locomotive of the 19th century, and many builders used this design well into the early 20th century. It is worth noting that the durability of Norris locomotives was such that the Seaboard Air Line was using one for instructing engineers in the late nineteenth century - the company made its last locomotive in 1867 (Sinclair and White, 1970, 643). Likewise, the Baldwin locomotives were equally durable. Following the Civil War, the *Goldsboro* and *Industry* were rebuilt, and another engine, the *Guilford*, had been recovered from the Roanoke River and was being repaired.

Name of Locomotive	Builder	Put into service	Usage
J. M. Morehead	Company Shops	1850	Timber
Saxapahaw	Company Shops	1850	Dirt
Mechanic	Norris Brothers Co.	October, 1850	Passenger
Farmer	Norris Brothers Co.	May, 1851	Passenger
Merchant	M. W. Baldwin	June, 1851	Freight
Industry	M. W. Baldwin	February, 1852	Freight
Director	Norris Brothers	February, 1852	Passenger
Quickstep	Norris Brothers	March, 1852	Passenger
Engineer	Norris Brother	April, 1852	Passenger
President	R. Norris & Son	February, 1853	Passenger
Express	R. Norris & Son	March, 1854	Passenger
Treasurer	M. W. Baldwin	May, 1855	Passenger
Guilford	M. W. Baldwin	August, 1855	Freight
Orange	Manchester Locomotive Works	September, 1855	Passenger

Table F1. Locomotives put into service on the Wilmington & Raleigh Rail Road between 1850 and 1855 (from the 1855 Report to the Stockholders).

M. W. Baldwin built all three locomotives. The *Orange*, built by Manchester Locomotive Works in New Hampshire and put into service in 1855, was still in service after the war (*Wilmington Journal*, 19 November 1869). The arrival of one of the Norris engines in 1851 is mentioned in *The Wilmington Herald*.

> We take the liberty in connection with this subject of stating that A New Locomotive, from the manufactory of Norris & Bros., has received by the Company. It is called "The Farmer," a good name, and it looks like a splendid engine.
>
> – (*Wilmington Herald*, 21 May 1851) –

Angus Sinclair provides a description of several Norris locomotives, quoted from an 1853 article in the "American Railway Journal", in his book *Development of the Locomotive Engine*. Several Norris locomotives are listed in this article. It is probable that the reporter for *The Herald* saw a locomotive with similar features.

> No 10, by Norris, outside cylinders 12⅜ inch by 26 inch; 4 drivers 5 feet diameter on truck; heating surface, 708 square feet in tubes, 54 in firebox, and 10 square feet grate area; weight 43,920, of which 26,880 are on drivers.
>
> – (Sinclair and White, 1970, 266) –

While the available documentation does not reveal the actual specifications of the *Farmer*, the 1856 report to the stockholders indicates that for the year ending on 30 September that the engine ran 11, 853 miles, hauled 341 cars, consumed 201 cords of wood, and was in service 79 days (Wilmington & Weldon Rail Road, 1856, 21). It appears the *Farmer* averaged 59 miles to the cord of wood while hauling 4.3 cars.

By 1856, the Wilmington & Weldon (changed from the Wilmington & Raleigh) Rail Road had ten passenger locomotives, seven of which were built by Norris. The names of these locomotives were *Mechanic*, *Director*, *President*, *Engineer*, *Express*, *Farmer*, and *Quickstep*. Manchester Locomotive works had built the *Orange*, and M. W. Baldwin had built the *Treasurer*. One new passenger locomotive, the *Alexander McRae*, had been built in the company shops. M. W. Baldwin built all seven of the regular freight locomotives. The names of these locomotives were *Guilford*, *North Carolina*, *Merchant*, *Industry*, *Perseverance*, *James K. Polk*, and *J. M. Morehead*. The inventory of locomotives given in the annual report to the stockholder in 1860 indicates a total of 26 (*See* Table F2). On the eve of the Civil War, the Wilmington & Weldon Rail Road was outfitted with an exceptional number of first-rate locomotives, and had managed to keep some of the older locomotives in service for maintaining the line. Paul T. Warner's *Motive Power Development on the Pennsylvania Railroad System, 1831-1924*, published in 1924 by Baldwin Locomotives, contains a number of illustrations of locomotives of the antebellum period along with their specifications (Warner, 1924, 4-7). In general, the American railroad tended towards purchasing the locomotives with the classic 4-4-0 configuration since the four-wheeled leading truck proved it usefulness in negotiating the grades, curves, and other defects in the rails. The pace of construction for American railroads was primary, and the quality of the road was secondary to placing it in operation expediently. By contrast, the English placed an emphasis on extensive excavations, embankments, and quality construction of the rail superstructure to produce the well engineer road, or as they termed it the *permanent way*.

Number	Name of Locomotive	Names of Builder	Condition	Usage
22	Orange	Manchester Locomotive Works	Running	Passenger
23	Wilmington	Manchester Locomotive Works	Running	Passenger
24	Gov. Bragg	Manchester Locomotive Works	Running	Passenger
17	President	R. Norris & Son	Running	Passenger
18	Express	R. Norris & Son	Running	Passenger
21	Alex. McRae	Company's Shops	Running	Passenger
9	Weldon	Norris Brothers	Running	Passenger
25	P. K. Dickinson	M. W. Baldwin & Company	Running	Passenger
26	Gov. Ellis	M. W. Baldwin & Company	Running	Passenger
19	Goldsboro	M. W. Baldwin	Running	Passenger
14	Director	Norris Brothers	Running	Freight
15	Quickstep	Norris Brothers	Running	Freight
20	Guilford	M. W. Baldwin	Running	Freight
12	Merchant	M. W. Baldwin	Running	Freight
13	Industry	M. W. Baldwin	Running	Freight
4	W. H. Haywood	Burr, Pea & Sampson	Running	Freight
27	Gilbert Potter	M. W. Baldwin & Company	Running	Freight
28	E. P. Hall	Rogers	Running	Freight
6	J. K. Polk	M. W. Baldwin	Running	-
7	Perseverance	M. W. Baldwin	Running	-
10	North Carolina	M. W. Baldwin	Running	-
1	Brunswick	William Norris	Running	-
8	J. M. Morehead	Company's Shops	Running	-
11	Farmer	Norris & Brothers	Laid up	-
3	J. C. Calhoun	M. W. Baldwin	Laid up	-
5	E. B. Dudley	Burr, Pea & Sampson	Rebuilding	-

Table F2. Inventory of Locomotives taken from the 1860 W. & W. R. R. Annual Report.

APPENDIX G

THE LETTERS OF P.Q. AND G.L.C.

Edmund Ruffin's *Farmers' Register* became the arena for a debate when two writers that identified themselves only as P.Q. and G.L.C. began a discussion of railroad routes in February 1836. Their literary joust, replete with classical references, antiquated wit, and chivalrous concessions, is both amusing and somewhat annoying to the current reader; yet, when all the gentlemanly conceit is set aside, the letters detail the merits and defects of the planned rail routes that were being discussed in North Carolina. Writer P.Q. signs his letters from Raleigh, and favors the Raleigh to Gaston route as well as its extension to the Pee Dee and beyond. G.L.C., signing his initial letter from Camden, South Carolina, prefers a route from Weldon to Waynesborough, and defends the Wilmington to Halifax route.

G.L.C. began the contest with a critique that expressed regret that the Petersburg Rail Road had constructed two branch lines to the Roanoke rather than applying the funds to building a railroad from Raleigh to Fayetteville. The writer saw Petersburg's redundant routes to the Roanoke as a waste. He was critical of the opinions of writer "Raleigh" in the *Raleigh Register* who had proclaimed that the Raleigh & Gaston would attract the produce of the western portion of the state, while the east would continue to ship produce from its coast (Ruffin, 1836d). P.Q. responded from Raleigh with an accusation that his rival was trying to envision the whole system of internal improvements for much of the

Union – as it existed – without full consideration of the landscapes of these different states, or desires of communities that have long supported a "favorite scheme." He asserted that "every rail road is an invention, so far that one was never tried before, under the same circumstance," and he did not believe the Wilmington to Halifax route would work. In general, he believed the state should carefully consider when granting charters whether a new railroad would weaken one that already existed. He was also sure that the west would support the Raleigh & Gaston, and that Wilmington would have been better off had they built their railroad to Raleigh (Ruffin, 1836c, 766).

In his response, writer G.L.C. expressed his doubts about the effectiveness of legislatures to manage railroads and noted that the North Carolina Legislature refused to grant funds to build the experimental railroad to Swift Creek that was recommended by Hamilton Fulton. He did not think legislatures should be entrusted with the authority to protect railroads from competition, and he lectured P.Q. on "odious" monopolies. He also referred to a report by Lt. Col. S.H. Long of the United States Topographical Engineers titled "Railroads – Atlantic to the Mississippi" that supported a Darlington to Halifax route. The report had been transmitted by Lewis Cass, the Secretary of War (Ruffin, 1836e). The text of this document describes a central trunk line.

> Among the numerous opportunities presented for connecting the contemplated railroad with important points on the Atlantic seaboard, by means of lateral branches, there is one of no less moment than that relating to the main stem, as already described. We allude to a route which is to be regarded as a part or prolongation of the main road itself rather than a branch leading from it, and which is as follows: Commencing at the crossing of the Oconee at the point designated, the route may be extended in a northeasterly direction, through the broad and flat diluvial region bordering upon the Atlantic coast of Georgia, South Carolina, North Carolina, and Virginia, and passing the vicinity of

> Swainsborough, in Georgia; Barnwell, Sumterville, Darlington, Harleesville, South Carolina; Fayetteville, Waynesborough, Tarboro', and Halifax, North Carolina; and then by the Portsmouth and Roanoke railroad, to Norfolk, in Virginia, or by the Petersburg railroad to Richmond, and thence, by the Richmond and Fredericksburg railroad, to Fredericksburg; and thence, by some route situated more or less remote from the Potomac river, passing perhaps through Falmouth and Stafford, and in rear of Dumfries and Alexandria, in a direction to meet the Washington and Baltimore railroad at Washington City …
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> – (United States, 1835a, 51-52) –

P.Q. responded again on 25 May 1836. After lengthy formalities, he asserted that the Halifax to Fayetteville via Waynesborough route would not secure travel unless it were to be connected through Raleigh; and if both the other coastal route and in inland route from Raleigh south were completed, the Raleigh route would prove superior. He supposed, since the Raleigh & Gaston Rail Road was on its way to being realized, that Col. Long's opinion could be adapted to the new situation; and disagreed that Weldon should be the only place on the Roanoke to terminate a railroad from Raleigh. The last letter written by G.L.C on the subject appeared in the October 1836 issue of the *Farmers' Register*. He reiterated his support for the Halifax to Darlington line, and added that it could be constructed more cheaply than the interior route. Also, he pointed out the military advantages of this route. Briefly, he mentioned the dangers of monopolies and joint stock companies, and recommended a two-fifths investment on the part of the federal government in exchange for the mails and the transport of troops. The editor of the *Farmers' Register* recommended in a closing note that should P.Q. and G.L.C. wish to continue their discussion that they should begin a new series that sets forth their view on the subject of the two important routes (Ruffin, 1836f, 1836g). The letters ended at this point.

APPENDIX H

THE POTENTIAL OF A RAILROAD FROM FAYETTEVILLE TO THE WEST

The principal advantage to the development of industry that such a railroad could offer is the integration of these mineral rich counties into an existing rail network both to the east and to the west. The direct distance between the Egypt coalfields and Salisbury is approximately seventy miles. It might be appropriate to dismiss the construction of a railroad from Fayetteville to the Yadkin, or Wilmington to Morganton as financial and technically impractical for the early 1830s; but it seems incomprehensible two decades later when Wilmington had commenced work on the Wilmington, Charlotte, & Rutherford Railroad – a railroad that would pass due south of Fayetteville at Lumberton with a branch line to that town and its railroad. In the late nineteenth century, North Carolina historian James Sprunt briefly described the early efforts to build a railroad from Fayetteville to the west. On the eve of the Civil War, the Western Railroad (chartered in 1852) extended from Fayetteville to the Chatham County coal fields at Egypt (near Gulf, North Carolina) and was isolated from the state's other railroads. Fayetteville's connection to the west was by way of plank roads. Sprunt expressed his puzzlement as to why it took so long to build a railroad to the Yadkin Valley when its vast resources had been widely known, and considered vital to the state's interests (Sprunt, 1896, XLVI-LI).

Throughout the antebellum period, Fayetteville was a receiving point for the produce of the southwestern counties, and its plank road system extended west to Charlotte, south to Cheraw, and north to Winston-Salem (Cumming, 1966, 28-29). The town had been a commercial center since the colonial era and had enjoyed the advantages of its location: it was situated at the head of the navigation of the Cape Fear, and also well positioned on an evolving road network extending in a direct line along the Atlantic States north to south (today, it is the I-95 corridor). Yet, it had no other option but to rely on river transport for its exports, for north to south rail traffic was deflected from the direct line a considerable distance to Wilmington. Was this sufficient?

Frederick Law Olmsted's *A Journey in the Seaboard Slave States; With Remarks on Their Economy* is a valuable resource in understanding the conditions of transportation and the agricultural economy of North Carolina during the early 1850s. For example, Olmsted describes the transition between the coastal plain soils and the Piedmont soils, and the crops associated with each, between Weldon and (Old) Gaston on the roads following the south bank of the Roanoke. His experience with the poor operation of the stagecoach between Weldon and Gaston, the inadequate upkeep of the roads, and inaccurate scheduling of the train from Raleigh to Gaston belie serious organizational problems between the different railroads providing a "through ticket" south. In addition, Olmsted notes that the Raleigh & Gaston Rail Road had new "U" iron rails, but its cars were "old, dirty, and with dilapidated and moth-eaten furniture"; and the intervening agricultural land between Gaston and Raleigh appear "unproductive" (Olmsted, 1856, 315, 208-318).

His observations on the road from Raleigh to Fayetteville are of particular interest. Olmsted mentions two places along the route that help identify his route – Bank's Plantations and Mrs. Barley's – and notes that the last ten miles of the journey were on a plank road (Olmsted, 322-332). These locations appear on the Mac Rae – Brazier Map of 1833 and the United States Coast Survey Map of North Carolina of 1865 (Cumming, 1955, Plate X; Plate XIII). Banks and Barkclaysville are located on the modern North Carolina roads SSR 1006 followed by SSR 1769 – together named the "Old State Road." The Old Stage Road begins outside Raleigh on US 401, and continues to Erwin where it joins SR 217. The text does not contain enough details to trace the remaining miles from the crossing of the Cape Fear River at Erwin to Fayetteville, but it is likely that the ten miles of plank road was that which approximates US 401.

Outside Raleigh, Olmsted examined cornfields and spoke with a farmer who considered twenty-five bushels (per acre) of corn a large crop, but the average crop was about fifteen bushels. The farmer stated that it cost too much to take the corn to market. Olmsted had been on foot ahead of the stage, and had not yet walked ten miles south of Raleigh. At Mrs. Barkley's, he observed turpentine and rosin production (Olmsted, 320-321, 328). It is likely, owing to fact that the Cape Fear River was about half the distance from the Barkley farm than Raleigh, the output of these works would have eventually found their market at Fayetteville (then downriver to Wilmington), rather than the Petersburg market.

Olmsted witnessed the arrival of wagons of produce from the western counties during his visit at Fayetteville, and notes that some had come from as far away as the

Blue Ridge. These wagons, drawn by as many as six horses, could hold a load of about seventy-five bushels of grain. The wagons also carried cotton. He notes that the plank roads are a significant improvement in safety and efficiency in the transport of produce, and suggests that the region's farmers might prefer this mode to railroads. However, he cites a story he heard from a farmer near Raleigh who sold his grain for a higher price by sending it to Petersburg by train rather than selling it locally; and he mentions both the efforts to build a railroad from Fayetteville to the coal field in Chatham County, and the town's somewhat wasteful investment of $100,000 in 1820 to make the upper Cape Fear fit for navigation (361-363). When he departs Fayetteville by steamboat for Wilmington, he observes that the greater portion of the freight that was taken downriver to the port was turpentine (Olmsted, 358-359, 363-365, 369).

It might be safe to conjecture that Fayetteville's far-flung network of plank roads sufficed to bring in produce from the western regions, but it was merely an improvement upon what had existed before. The railroads being built in the regions around it during the late antebellum period, such as the North Carolina Railroad in the Piedmont, and the Wilmington, Charlotte, and Rutherford Railroad to the south, threaten to enclose this of south central North Carolina. Thus, the produce from the mountains would be closer to railheads at Charlotte, Salisbury, and Greensboro; and the produce of the Yadkin and upper Pee Dee would be intercepted south of Fayetteville. The travelers going south from Raleigh would have to make their way by Charlotte or Wilmington, or endure the painful, inefficient stagecoach ride such as Olmsted experienced. The most serious drawback to Fayetteville's plank road network was its limiting effect upon industrial development.

During the Civil War, and for a period starting during the 1870s, the Endor Iron Works operated a successful smelting operation. It was ideally located near the Egypt coalfields (Cumnock). The Fayetteville & Western Railroad serviced the coalfields at this time. The coal and iron industry could have been established in the region earlier – its potential had been recognized earlier – had the railroad connections existed. While the navigation of the Cape Fear River from Fayetteville to Wilmington appears to have been both adequate and appropriate for transporting bulk such as iron and coal, a rail connection been the two towns was reconsidered during the early 1850s.

> We had an opportunity recently of hearing from one of the most liberal and intelligent merchants which that or any other community can boast of, that he favors a rail road from Wilmington to Fayetteville to connect with our Western Road to the Deep River Coal Mines, and thence to the N.C. Road at the Eastern terminus of the Western extension. And we learn that a correspondence has been going on between himself and a gentleman here on the subject. And further, we understand from the paragraph which we quoted in our last from the Wilmington Journal, that some such views were presented to the late meeting in that town to consider of the proposed road to Charlotte. These facts induce us to say a few words, which in their absence we should consider wasted, in support of the connection via Fayetteville. There was a time when we thought the idea of a rail road from Wilmington to Fayetteville was supremely ridiculous. That was when no *successful* rail road existed in the State, and when the experiment of running a rail road on the banks of a navigable stream had not even been made, much less shown to be eminently successful; and when our means could be better employed than opening a channel where Nature had already placed one which answered the purpose tolerable well, to say the least. But that time is past.

– (*Wilmington Journal*, 16 June 1854) –

Unlike the Cape Fear River, with its course set by nature, a railroad from Chatham County through Fayetteville to Wilmington would offer the possibility of additional connections.

> It seems to me that there are two important sections of North Carolina to be *tapped* by local Roads, in the first instance; but one of these local Roads will become a great line from East to West. That is, the region of the country from Fayetteville, West, through the coal and iron counties of Moore and Chatham, to Salisbury, requires at this moment a local Road to Wilmington, through Fayetteville.
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> – (*Wilmington Journal*, 3 July 1854) –

The author of this article recognizes the potential of carrying the railroad to Salisbury, where it would intersect the North Carolina Railroad, and recommends branch lines into Robeson, Anson, Richmond, Union and Mecklenburg counties.

The Report of the Committee on Int. Improvements on the Cape Fear and Deep River Navigation Company which was presented to the North Carolina General Assembly during their 1845-55 Session, discouraged the further use of railroads to exploit the coal and iron resources of the Deep River while continuing the support funding of the ongoing navigational improvements to the Cape Fear and Deep River drainage network. River transport, unfortunately, was linked to the existing operations at the coalfields.

> We cannot omit to mention, that from testimony before us, that a fatal blow will be given to these vast resources, should the Bill now before us, or some other suitable measure of relief, be rejected by the present General Assembly, for we are assured by Mr. McLane, that he is under express orders from his employers, to remove the force and machinery of every kind, under his charge, now on Deep River, and to abandon the coal field, if the Legislature refuse to grant the necessary relief, inasmuch as water transportation is so much cheaper and more desirable for coal than Railroads, and because no one Railroad, nor any number that are likely to be built, will be competent to carry off the coal that is expected to be taken out, and further, that another company, now ready to commence shipping coal, has suspended operations, until further aid is granted to the River.
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> – (North Carolina, 1855, 7) –

The report indicates that seventeen of twenty-two locks and fourteen of seventeen dams, planned by an engineer named Douglass who had worked on the Lehigh Canal in Pennsylvania, had been completed. The works at Jones' Falls, eight mile above Fayetteville, Smiley's Falls, near Erwin, are mentioned favorably in allowing free navigation from Fayetteville to Haywood in Chatham County. A canal, one mile in length, needed to be cut around Pullen's Falls, and the canal at Buckhorn Falls required additional excavation to make it wider and deeper. The existing locks and dams needed improvements as well. The committee presented some information on the coal and iron deposits of the Deep River, noting that the quality of the iron ore was suitable for the manufacturing of rails; and two companies manufacturing iron – one in Petersburg, Virginia and the other in Pottsville, Pennsylvania – had subscribed to $10,000 of stock in a proposed company that would be set up to smelt iron in the area (North Carolina, 1855, 1, 6-7). A correspondence to the *New York Times* dated 10 December 1860 described the activities and facilities of the Deep River Coal and Iron Company and the Cape Fear Coal and Iron Company. In addition to smelting iron, the Deep River company had the capacity of producing 10,000 barrels of coal oil daily (*New York Times*, 22 January 1861).

The history of the effort to improve navigation on the upper Cape Fear had always been problematic. The duration of construction for the multiple canals around the several falls appears to have been protracted. Hamilton Fulton, in his 1821 report to the Board of Public Improvements, noted that the dams above Branson's Mill were so low that the canal needed to be excavated a foot from Buckhorn Falls to Haywood; however, he recommended that the dams be raised in spite of Mr. Branson's objections – Fulton refers the board to Branson for an explanation of these objections. His estimates for cutting and lockage for the new canal is $3,348, and $3,554 for improving Parker's Creek (North Carolina, 1821, 30-32). In a letter to Governor Edward B. Dudley dated 16 February 1837, George McNeill, agent for the Cape Fear Navigation Company, reports that the company had achieved, in part, a bateau navigation from Haywood to Buckhorn Falls. However, Mr. Wyche of the Board of Internal Improvements, under the direction of Mr. Kerr, determined without consulting that company that Buckhorn Falls could be circumvented by sluicing, and that the locks should be abandoned. The company had by that time, spent $40,000 on the canal and locks (Dudley, 1837-1840, 41-45).

The plank roads and canals, in spite of the confidence expressed by antebellum officials, were less efficient forms of transportation for developing an iron industry in North Carolina. That they were cheaper in the end is questionable. They certainly were not permanent. The Cape Fear and Deep rivers were are rich with the raw materials of iron production, and this was known since the early nineteenth century; and so the building of a railroad west from Fayetteville offered the potential for early industrial development. A connection between Wilmington and Salisbury during the 1850s would have provided a distribution network for iron product, and allowed for the emergence of manufacturing of finished iron products such as iron rails, boilers, hardware, and consumer products such as stoves at the commercial towns along the way.

Olmsted's description of the arrival of wagons in Fayetteville and the subsequent intercourse between the merchants of that town and the drivers on the purchase of the goods was a far different economic culture than the relentless flow of arrivals that had to be contracted for in advance. The turnpike and river were open to all at their pleasure, whereas the railroad operated on a schedule. A train of cars functioned as a mobile warehouse – a natural domain of agents and brokers – that could receive goods from all places on the route. Thus, the merchants of a town such as Fayetteville could have been relieved of bargaining in the street with their suppliers; rather the task would be reserved to a network of agents working in concert over a large area. They could keep the price of commodities uniform, and the warehouses of the commercial town would be adequately stocked to support permanent local industry. That the merchant could make the transition to industrialist is possible, but it is perhaps a vision too far removed from an economy based on agriculture and wood products to project a coherent system of production and consumption where tasks are fragmented over space with the whole process dependant on the timely delivery of raw materals. The ideology underpinning work culture of the south was Jeffersonian Democracy, with its emphasis on individual self-reliance and local autonomy. It follows that the means and the mode of transportation – if sufficient – should favor an *ad hoc* relationship between suppliers of raw materals or crops, artificers, middlemen, and brokers. At the time, it was the accepted practice almost everywhere.