Project Scorpion

CCX Evaluation

Evaluation of a Proposed Intermodal Terminal

Confidential

Revised Report July 2016

State of North Carolina Department of Transportation

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Table of Contents

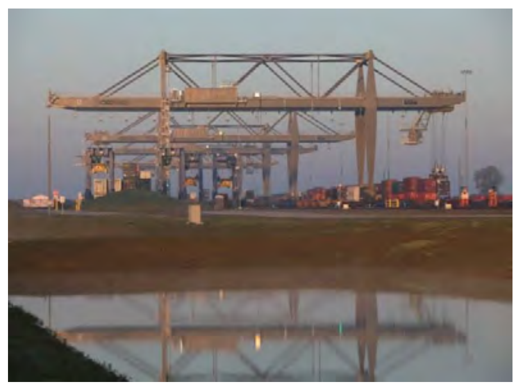
List of Tables

List of Figures

Chapter 1: Background

In response to the growth of intermodal transportation, CSX continues to examine opportunities to expand its network of intermodal terminals. North Carolina is one of several states in the Southeast being considered as a location for a terminal. A North Carolina facility (CCX) would be designed to serve two purposes. One purpose would be to provide accessible intermodal service for eastern and central North Carolina, driving economic growth in the region. An example of such a facility is the recently opened CSX Winter Haven intermodal facility, which was announced, in the following news release:

> *"State-of-the-Art Terminal Begins Operations in Winter Haven"*
>
> *WINTER HAVEN, Fla. – April 2, 2014 – Evansville Western Railway, an affiliate of CSX, today announced the start of operations at the state-of-the-art intermodal terminal located just off State Road 60. Known as the Central Florida Intermodal Logistics Center (ILC), this facility serves as a centralized hub for transportation, logistics, and distribution serving Orlando, Tampa and South Florida.*
>
> *The 318-acre intermodal terminal is surrounded by 930 acres that is planned for development of up to 7.9 million square feet of warehouse distribution centers, light industrial and office facilities. The terminal features five 3,000-foot loading tracks and two 10,000-foot arrival and departure tracks. It's estimated the terminal will process up to 300,000 containers a year.*



> *"The Central Florida ILC will add yet another transportation and logistics capability in a state that's already known for excellent ports, great highways, and extensive railroad connectivity," said Clarence Gooden, Executive Vice President and Chief Commercial Officer at CSX. "The terminal will provide an anchor for economic development in the region and position Florida for future growth while reducing congestion on the highways.""*

While every market is different the NC facility is expected to process 240,000 to 505,000 containers per year over the 20 year planning horizon with 60% of those container attributed to the local market.

The second function of the North Carolina terminal would be to serve as a transfer facility for containers moving between other markets on the CSX network. In 2011, CSX initiated the hub and spoke business model for segments of its intermodal business centered on a new terminal in Northwest Ohio. Through the use of high productivity cranes, containers are quickly transferred between inbound and outbound trains making transshipments competitive with motor carriers. The advantage of the hub and spoke model is that, through consolidation, it enables intermodal service to markets with inadequate traffic volume to support direct services.

The transfer function would also directly benefit the intermodal traffic originating in North Carolina or from NC ports. With access to the traffic lanes served by the hub, local shippers will benefit from a more expansive market reach.

An example of a terminal designed as a hub for container transfers is the CSX Northwest Ohio facility, which exceeded its capacity within the first year. Because its location is not in proximity to a local market, economic development was not expected but has occurred both near the terminal and in larger markets in Ohio. US DOT Secretary Foxx toured the facility with CSX officials and the following comments were reported from that visit.

> *"Infrastructure projects like this cutting-edge facility are the backbone of a growing American middle class and a thriving American economy," said Anthony Foxx, Secretary, U. S. Department of Transportation. "This facility provides tremendous benefits locally, regionally and for the entire nation."*
>
> *"In an area where service from East Coast ports once took up to a week, it now only takes two to three days for goods to be shipped through the facility and delivered to the customer's door," said Oscar Munoz, executive vice president and chief operating officer, CSX Transportation.*
>
> *CSX Press Release - November 6, 2013*

To demonstrate the benefits of a North Carolina facility to both the state and the broader U. S. economy, CSX conducted a study, which consisted of the following:

- Market assessment - The market assessment estimated the number and mileage of truck trips that would be diverted to rail as a result of the facility's construction. The primary data source used to estimate truck trips was the IHS Global Insight TRANSEARCH database. The primary method used to identify diverted truck trips was to apply percentage diversion rates to truck flows between origin/destination pairs depending upon length of haul and the presence or absence of another intermodal solution. Presumably, freight was further defined by truck type, since usually dry van cargoes are more divertible to intermodal rail service than bulk shipments.
- A benefit/cost analysis (BCA) - This analysis compared the relative costs under a "build" and a "no build" scenario. Under the no build scenario, freight would be carried by truck, whereas under the build scenario, freight would be carried by truck/rail intermodal. The resulting reduction in costs between the build and no build scenarios are the benefits.

- An economic impact analysis - This analysis estimated changes to the North Carolina economy that would result from the project.

The analysis completed by CSX indicates the following:

Potential outcomes for North Carolina

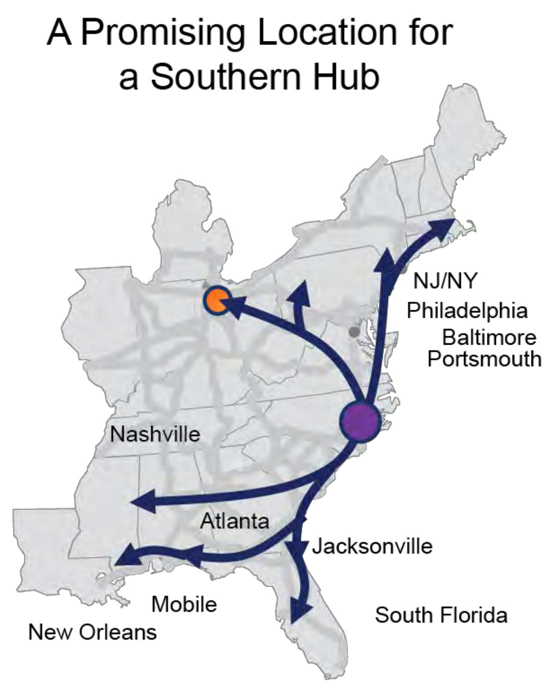
- Efficient, state-of-the art facility creates density, connects midsize markets, drives growth
- 60 percent of projected volume will serve the eastern North Carolina market
- Increased opportunity for growth of logistics and distribution clusters in the region
- Direct intermodal rail access and new service offerings, including NY/NJ, the Midwest, West Coast and Southeast markets, including Florida
- Creates greater potential intermodal access for the Port of Wilmington
- Reduces through truck traffic on I-95 and I-85
- Helps to deliver Governor McCrory's 25-Year Vision to develop intermodal train service at the Port of Wilmington and develop intermodal facilities along the I-95 corridor to support freight shipping[1]

Better connects people and economic centers

- Saves nearly $240 million in logistics costs
- Saves $32 million in congestion costs
- Greater potential access for state ports
- Cost-competitive supply chain networks underpin industry growth

Expand industry and jobs

- Operation of the intermodal facility will generate over 860 permanent jobs in NC in 2018
- Over 40 percent of these jobs are anticipated in the transportation/warehousing industry as the facility will attract new warehousing and distribution tenants
- Over the long-term, the project will create over 1,500 direct and indirect jobs in NC by 2035 *(Note: Jobs are estimated using a number of jobs per 1000 lifts. This estimate represents five jobs per 1000 lifts while others have used 50 jobs per 1000 lifts as a conservative number.)*



Improve quality of life

- Improves air quality with nearly 1.6 million tons of CO_2 emissions saved
- Over $35 million in safety benefits

Subsequent to the completion of the study commissioned by CSX, NCDOT determined that it would be prudent to commission an independent assessment of the facility. The NCDOT study asks many of the

[1] http://www.ncdot.gov/ncvision25/

same questions as the CSX study, as well as explores additional issues of concern to the State of North Carolina. [2]

Recognizing the urgency to understand the benefits of the terminal, a preliminary analysis of the benefits was conducted. Parsons Brinckerhoff reviewed documents provided by CSX and its consultant, and the analyses appear consistent with accepted practice. Selected information from those documents has been relied on to develop the initial BCA.

The purpose of this document is to provide an independent evaluation of the proposed facility. It includes the following:

- Description of the regional economy and need for the facility
- Analysis of the market for the facility and development of projections of container volumes
- Analysis of benefits and costs, economic impact
- Terminal related land use alternatives and conceptual plan
- Identification and evaluation of funding alternatives

If a determination is made to pursue state funding for the facility, all applicable state and federal laws will be followed, including, but not limited to, the North Carolina Environmental Policy Act. [3]

The current proposed location is subject to change as is the implementation schedule. Neither change would materially affect the findings of the evaluation presented in this document.

[2] https://connect.ncdot.gov/resources/RailPoliciesDocument/2015%20Comprehensive%20State%20Rail%20Plan-%20Full%20Report.pdf
[3] North Carolina General Statute (G.S.) 113A 1-13.

Chapter 2: The Eastern North Carolina Economy and Intermodal Transportation

Accessible intermodal transportation in eastern North Carolina can provide economic advantages to the state in four ways:

- Businesses and other segments of the economy will be able to improve the transportation and logistics of shipping and receiving goods, reducing costs, making industries more productive, and attracting and supporting growth.
- The development of a transportation hub will lead to an expansion of the state's distribution and logistics services, boosting jobs and economic development.
- Consumers will benefit from less expensive goods to the extent that transportation cost savings are passed on to them.
- The development of improved rail services means lower cost rail transportation replaces trucking, which reduces truck traffic and results in other environmental benefits.

The principal direct advantage of CCX to North Carolina industries will be greater market access due to improved and less expensive freight transportation for goods shipped, both outbound and inbound. Often this will involve replacing transportation of goods moved by truck with intermodal transportation by truck and rail.

Sections that follow examine these potential benefits further, from an industry and product perspective, using data from the US Commodity flow survey, US Census Bureau County Business Patterns statistics, and US Census Bureau international trade data. These sections cover:

- Wholesale distribution
- Manufacturing industries

Wholesale Distribution

The attraction of jobs and economic growth in distribution, manufacturing, and associated global trade is driven by well-established site selection criteria. [4] Chief among these criteria are access to markets and suppliers, availability of multimodal transportation, labor and workforce characteristics, and the total cost environment. Rail intermodal services are an essential component of the multimodal portfolio, not only because they expand transportation capacity and competitive alternatives, but also because they improve access to North American and global markets and reduce costs – thus meeting three of the top four selection criteria. A major manufacturer recently reported that the availability of rail reduced financing costs for its new facilities because of the value rail adds to operational locations. [5] Intermodal rail options moreover have become increasingly important as driver shortages and other influences are constraining trucking capacity, and the expansion of shorter haul intermodal services by eastern railroads is responding to this. Because the same factors that attract industry also help to retain it and

[4] See for example NCFRP Report 13 "Freight Facility Site Selection"
[5] Parsons Brinckerhoff interview with confidential client, 2014

facilitate its growth, the introduction of new rail intermodal services can be an economic catalyst for a region.

Distribution in the Southeast has long been dominated by metropolitan Atlanta. Its large population at the crossroads of major highways, rail lines and air routes and its efficient links to the container port of Savannah has made it a natural location for regional distribution centers serving multiple states. Motor carriers, railroads and airlines have established hubs in Atlanta because of these network advantages and the business volume that has grown up around them, creating a positive feedback loop whereby hubs attract industry and industry supplies traffic to hubs. The distribution profile of the Southeast is summarized in Table 1, which displays wholesale and warehouse employment for the seven top metropolitan markets serving the region in 2007 and 2012. The figures are focused on containerized products – generally, consumer goods – and include market shares for each of the seven metro areas compared to the total of the group.

Table 1: Southeastern US Logistics Trends

Top Southeast Distribution Markets: Change in Distribution Employment 2007-2012 Containerizable Goods - Source: County Business Patterns, US Dept. of Census						
MSA Metro Market	Employment		Share of Top Metro's		2007-2012	
	2007	2012	2007	2012	Absolute	Percent
FL Miami-Fort Lauderdale-Port St. Lucie	112,569	109,087	25%	26%	-3,482	-3.1%
FL Orlando-Deltona-Daytona Beach	38,324	31,500	8%	7%	-6,824	-17.8%
GA Atlanta-Athens-Clarke County-Sandy Springs	146,910	137,503	32%	32%	-9,407	-6.4%
NC Charlotte-Concord (NC Part)	55,855	48,878	12%	11%	-6,977	-12.5%
NC Greensboro-Winston-Salem-High Point	31,981	29,646	7%	7%	-2,335	-7.3%
NC Raleigh-Durham-Chapel Hill	32,022	33,005	7%	8%	983	3.1%
TN Nashville-Davidson-Murfreesboro	39,416	36,322	9%	9%	-3,094	-7.8%
Sum of Top Metro Markets	457,077	425,941	100%	100%	-31,136	-6.8%
Subtotal: 3 NC Metro's	119,858	111,529	26%	26%	-8,329	-6.9%
Raleigh Share of 3 NC	27%	30%				
Charlotte Share of 3 NC	47%	44%				
Greensboro Share of 3 NC	27%	27%				
Comparision: 3 NC Metro's as % of Atlanta	82%	81%				

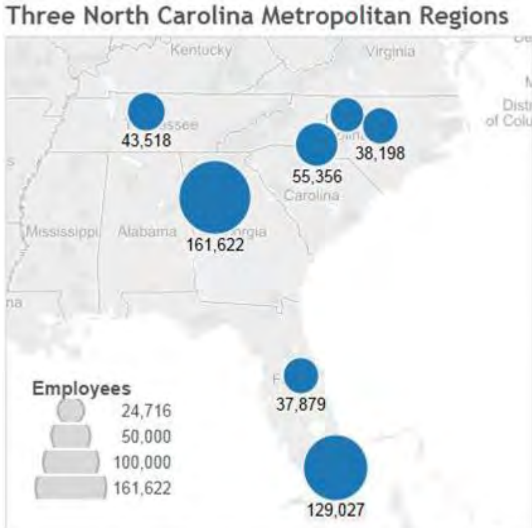
Several points are apparent from this table:

- Atlanta had the top position in both years, and retained market share despite a drop in employment.
- Miami had the second position, yet is a special case: with a very large population at the far end of a four-hundred-mile peninsula, its distribution services tend to be localized in South Florida.
- Almost all metro areas suffered a decline in employment from the pre-recession peak of 2007 with the exception of Raleigh, which produced a small increase. (Distribution traffic volumes did not necessarily suffer a commensurate decline because of possible productivity gains from

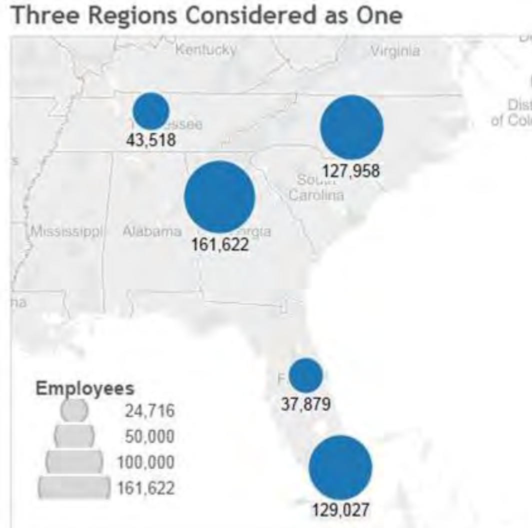
automation and other sources, but relative employment should be a reasonable indicator of relative market position.[6])

- The three metropolitan markets of the North Carolina Piedmont are individually smaller, yet all of them made the Southeast top seven, and in combination, they form a distribution corridor that is four-fifths the size of market leader Atlanta, as the maps below illustrate.
- Within the North Carolina Piedmont, Charlotte is the largest location, yet it has lost share to Raleigh. Raleigh's increase is aided by electronic products distribution, but it is also a fast growing part of the state in its own right, and more distant from the orbit of Atlanta.

High population growth in the North Carolina Piedmont should continue to stimulate distribution activity as the growth fosters a large local market. To step up to the status of a major regional logistics center, however, requires expanded intermodal services and associated global connections similar to those that Atlanta offers and North Carolina to date has lacked. Besides benefitting from the expanded market reach offered by the hub-and-spoke model, CCX will benefit the CSX Charlotte intermodal terminal, which is near capacity. From this perspective, CCX provides an opportunity to grow employment, compete more effectively for new business location, and graduate to a leading position in Southeast distribution.



Three North Carolina Metropolitan Regions



Three Regions Considered as One

North Carolina Manufacturing

Manufacturing industries are major shippers of products, accounting for 94 million tons of goods shipped from North Carolina establishments, or 43 percent of the state total, according to US Commodity Flow Survey data. Since the Commodity Flow Survey samples goods from where they originate, these volume totals and shares do not portray the goods shipped to manufacturing locations, i. e. the inputs to the manufacturing process.

[6] The federal 2012 Commodity Flow Survey suggests that traffic volumes in Southeast distribution have grown in the period, but the flow data are much less robust than the employment figures.

Table 2 includes 21 industries at the NAICS 3-digit code level. Of these, a few industries are heavily bulk product oriented, and products shipped by these industries are therefore unlikely to be transported in intermodal containers. These industries include petroleum products and non-metallic minerals.

Table 2: North Carolina 2012 Manufacturing Industry Shipments and Employment

NAICS	Industry	Tons (000)	Employees	Industry Shares Tons	Industry Shares Employees
31----	**Manufacturing**	**93,885**	**408,716**	**100. 0%**	**100. 0%**
327	Nonmetallic mineral product manufacturing (1)	18,161	12,474	19. 3%	3. 1%
321	Wood product manufacturing (1)	17,444	17,319	18. 6%	4. 2%
311	Food manufacturing	15,143	48,499	16. 1%	11. 9%
325	Chemical manufacturing (1)	13,108	36,560	14. 0%	8. 9%
322	Paper manufacturing	5,741	16,209	6. 1%	4. 0%
312	Beverage and tobacco product manufacturing	5,066	9,719	5. 4%	2. 4%
324	Petroleum and coal products manufacturing (1)	3,258	912	3. 5%	0. 2%
326	Plastics and rubber products manufacturing	2,854	31,709	3. 0%	7. 8%
332	Fabricated metal product manufacturing	2,255	34,136	2. 4%	8. 4%
331	Primary metal manufacturing	2,161	6,926	2. 3%	1. 7%
313	Textile mills	1,978	25,152	2. 1%	6. 2%
333	Machinery manufacturing	1,605	30,883	1. 7%	7. 6%
336	Transportation equipment manufacturing	1,600	29,296	1. 7%	7. 2%
337	Furniture and related product manufacturing	1,035	31,909	1. 1%	7. 8%
335	Electrical equip. , appliance, and component manufacturing	862	14,869	0. 9%	3. 6%
314	Textile product mills	581	8,256	0. 6%	2. 0%
323	Printing and related support activities	489	12,138	0. 5%	3. 0%
339	Miscellaneous manufacturing	252	14,299	0. 3%	3. 5%
334	Computer and electronic product manufacturing	151	16,976	0. 2%	4. 2%
315	Apparel manufacturing	137	9,834	0. 1%	2. 4%
316	Leather and allied product manufacturing	2	641	0. 0%	0. 2%

Sources: US Census Bureau County Business Patterns and US Commodity Flow Survey
Note (1) Industries with products not typically shipped in containers

The following section examines the regional location of manufacturing industries within North Carolina that are able to benefit from the CCX development. Since US Commodity Flow Survey information is only available at the metropolitan area level (and an aggregate for the state remainder that is not included in metropolitan areas) this section uses employment data from US County Business Patterns to provide a view of industry location by region, developed from county components.

Manufacturing Industries' Regional Location

One of the most basic measures of industry activity is the number of employees. Through an annual survey, the US Census Bureau's US County Business Patterns data includes estimates of employment for almost all industries. In aggregate, the portion of the state closest to the CCX development (defined here as within a 120-mile radius or about a two-hour truck trip) covers 62 percent of North Carolina's 2012 manufacturing base measured by employment. The Charlotte region includes another 21 percent.

As Table 3 depicts, most of the important industries of the state are concentrated within these two regions, and for most of those, the majority of employment lies within the 120-mile radius of CCX - referred to as the Eastern region in the table. Industries with especially high shares of employees in the Eastern region include food manufacturing, chemicals, and electronics.

Table 3: Regional Shares of Manufacturing Industries' Employment

				Regional Shares	
NAICS	Industry	Employees		Eastern	Charlotte
31----	**Manufacturing**	**408,716**		**62%**	**21%**
311	Food manufacturing	48,499		70%	17%
325	Chemical manufacturing (1)	36,560		72%	20%
332	Fabricated metal product manufacturing	34,136		59%	27%
337	Furniture and related product manufacturing	31,909		48%	9%
326	Plastics and rubber products manufacturing	31,709		56%	25%
333	Machinery manufacturing	30,883		63%	23%
336	Transportation equipment manufacturing	29,296		49%	38%
313	Textile mills	25,152		57%	23%
321	Wood product manufacturing (1)	17,319		63%	18%
334	Computer and electronic product manufacturing	16,976		73%	12%
322	Paper manufacturing	16,209		60%	16%
335	Electrical equip. , appliance, and component manufacturing	14,869		48%	14%
339	Miscellaneous manufacturing	14,299		66%	21%
327	Nonmetallic mineral product manufacturing (1)	12,474		62%	24%
323	Printing and related support activities	12,138		61%	29%
315	Apparel manufacturing	9,834		79%	9%
312	Beverage and tobacco product manufacturing	9,719		84%	11%
314	Textile product mills	8,256		54%	24%
331	Primary metal manufacturing	6,926		44%	43%
324	Petroleum and coal products manufacturing (1)	912		70%	24%
316	Leather and allied product manufacturing	641		54%	12%

Source: US Census Bureau County Business Patterns and Parsons Brinckerhoff Analysis

Note (1) Industries with products not typically shipped in containers

The ability of the North Carolina manufacturing base to benefit from the proposed expanded intermodal service is especially significant because of the economic importance of so-called traded industries. Traded industries sell products and services outside their region to domestic and foreign markets. In other words, they generate goods that are “made here, shipped there” - and the manufacturing base is the source of such goods. According to research, traded industries have higher wage growth and much higher productivity; they create demand for local industries and influence their wage rates; and they “appear to heavily influence the relative prosperity of regions.”[7] Because new intermodal services will reduce costs for these industries, improve their access to domestic and foreign markets, and effectively facilitate their ability to trade, CCX development contributes in this way to the economic wellbeing of the state and its citizens.

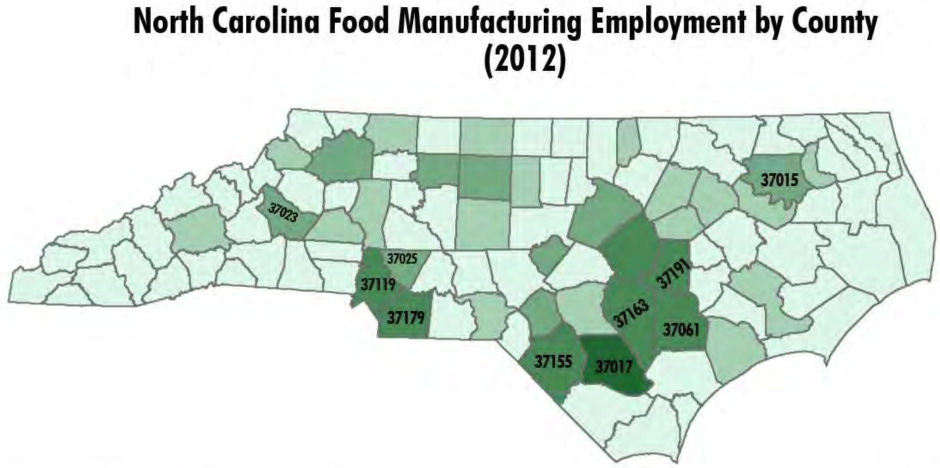
Food manufacturing is the industry that would most greatly benefit from an intermodal terminal in the region. It is the largest manufacturing industry and relies heavily on van transportation, thus a strong candidate for intermodal container transportation. A discussion of the food industry follows.

Food Manufacturing (NAICS 311)

Food manufacturing is North Carolina’s largest manufacturing industry, with 48,500 employees representing 12 percent of total state manufacturing employment in 2012. About half of the tonnage and over two-thirds of the value of the state’s food production is shipped to other parts of the country and to international markets. The industry is principally concentrated in eastern North Carolina, with a smaller concentration in the Charlotte region, as shown in Figure 1. About 70 percent of 2012-industry employment was in the Eastern region and about 17 percent in the Charlotte region.

[7] *The Economic Performance of Regions*, Michael Porter, Institute for Strategy and Competitiveness, Harvard Business School, April 2003.

Figure 1: North Carolina Food Manufacturing Employment by County in 2012



		CBP YEAR	
County	County Name	2007	2012
37017	Bladen	6,500	6,500
37061	Duplin	3,300	3,300
37155	Robeson	3,300	3,300
37119	Mecklenburg	2,705	2,869
37191	Wayne	2,581	2,666
37179	Union	1,500	2,431
37163	Sampson	2,609	2,170
37025	Cabarrus	1,513	1,603
37015	Bertie	1,500	1,500
37023	Burke	1,500	1,500

North Carolina's food manufacturing is dominated by animal processing which represented 62 percent of statewide food manufacturing employment in 2012. Of this total about 65 percent was poultry processing for which Duplin and Robeson Counties had the largest numbers of employees in 2012. The second largest 4-digit food manufacturing industry was bakeries at 17 percent of the statewide total.

Table 4: North Carolina Food Manufacturing Employment by 4-Digit NAICS Industry

NAICS	Industry	Employees	Share
311	**Food Manufacturing**	**48,499**	**100. 0%**
3116	Animal Slaughtering and Processing	29,885	61. 6%
3118	Bakeries and Tortilla Manufacturing	8,128	16. 8%
3119	Other Food Manufacturing	3,194	6. 6%
3114	Fruit and Vegetable Preserving and Specialty Food Manufacturing	3,167	6. 5%
3115	Dairy Product Manufacturing	1,615	3. 3%
3112	Grain and Oilseed Milling	1,098	2. 3%
3111	Animal Food Manufacturing	862	1. 8%
3113	Sugar and Confectionery Product Manufacturing	413	0. 9%
3117	Seafood Product Preparation and Packaging	137	0. 3%

Source: US Census Bureau County Business Patterns

The Raleigh area is expanding its participation in global and domestic supply chains for all products produced in the state. Although still behind Atlanta in volume of logistics activity, logistics employment is growing in Raleigh while decreasing elsewhere in the Southeast. Within North Carolina itself, the Raleigh area is the dominant region of the state. While existing intermodal terminals in the state are reachable by Raleigh industries, the proposed CCX location is significantly more accessible to the Raleigh region.

The following chapters will provide projections of the level of intermodal activity at CCX and estimates of the social and economic benefits.

Chapter 3: CCX Diversion Analysis

The terminal market analysis focuses on the ability of CSX to convert truck traffic to rail. Intermodal freight projected to be handled by CCX would be drawn solely from existing truck traffic diverting to intermodal service, thus would be entirely new intermodal business for CSX.

Existing Truck Flows

Potential truck traffic that could divert to truck-rail intermodal was identified through the TRANSEARCH freight flow database, a proprietary data product purchased from IHS Economics. A particular copy of the TRANSEARCH database was purchased with the following characteristics:

- The database only includes truck trips that are routed through North Carolina or portions of southern Virginia. Truck trips that do not "touch" these states are not included.
- Geographic origins and destinations are defined by Business Economic Areas (BEAs) outside of North Carolina and southern Virginia and by county within North Carolina and southern Virginia. BEAs are defined by the U. S. Department of Commerce and represent collections of counties that share a common economic center, typically an urban area.
- Flows are shown as truckload units (units) and weight (short tons) for 2013.
- Truck body types are identified as dry van, reefer (refrigerated van), or other.

Existing Intermodal Market

Information about existing demand for intermodal rail service to, from, or across North Carolina was obtained from the U. S. Surface Transportation Board (STB) Carload Waybill Sample for the state. This database represents a survey of terminating waybills for rail carriers terminating over 5,000 carloads of freight per year. The database includes information of railcar type, which can be used to identify intermodal units.

CCX Origins/Destination Pairs identified by CSX

CSX previously analyzed potential freight markets for truck/rail diversion to be handled by CCX. The company provided the resulting service matrix to the study team. To complete its diversion analysis, CSX used the same general source data as Parsons Brinckerhoff, the TRANSEARCH database, however, the specific characteristics, such as geographic definitions and extent of the CSX dataset, have not been fully established. .

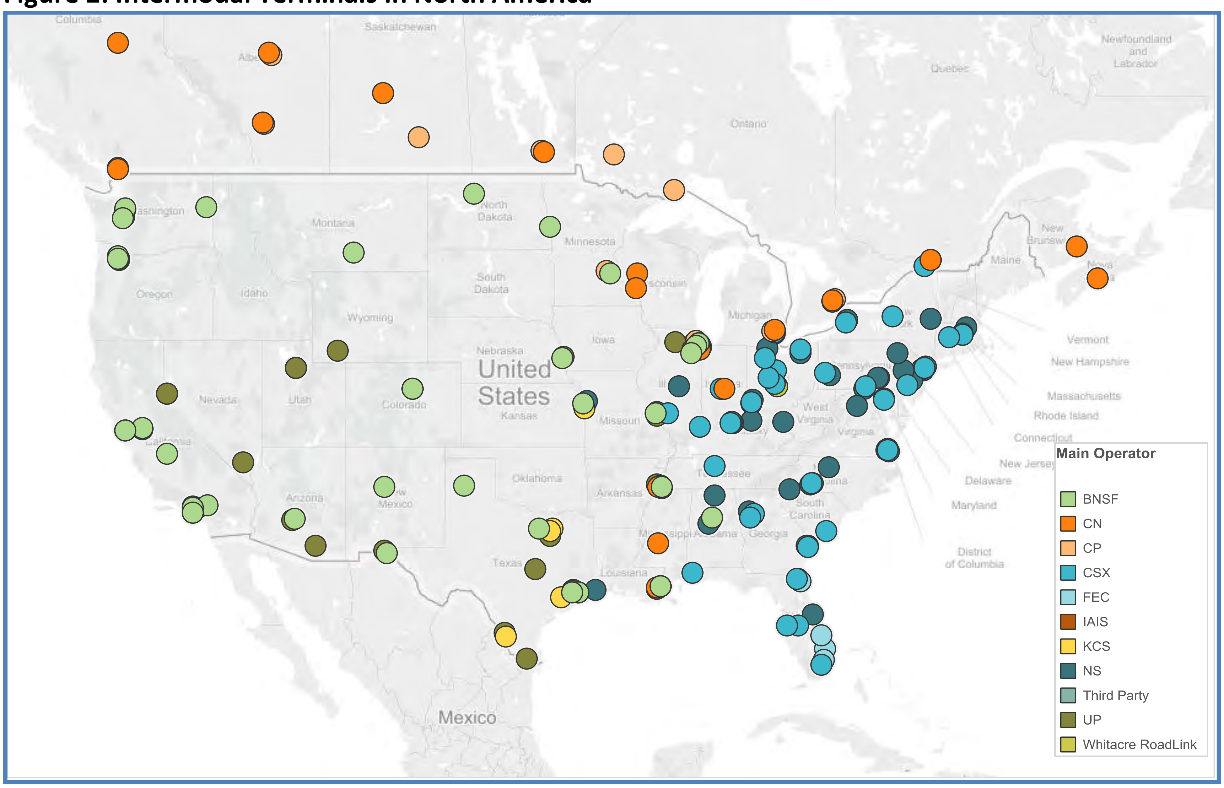
CSX made the following assumptions: 1) CCX would only handle traffic for markets that had no preexisting intermodal service, and 2) intermodal market share increases with shipment distance. CSX applied a series of assumed intermodal market share ratios based on distance to those corridors that are not currently connected by preexisting intermodal services.

Diversion Analyses

Parsons Brinckerhoff performed two sets of analyses to investigate potential truck/rail diversions handled by CCX.

1. **Evaluated routes that CSX had previously identified.** The origin/destination pairs from the CSX matrix represent those that the company has expressed a willingness or intention to serve. CSX has investigated these lanes and considers serving them to be feasible. Therefore, these routes were considered the most realistic alternatives, and developing an independent assessment of these lanes was the focus of Parsons Brinckerhoff's efforts. The analysis of CSX-identified lanes represents the Parsons Brinckerhoff "base case".
2. **Evaluated all potential routes**. Routes were considered "feasible" if they fit the following criteria: 1) over 250 miles of length, 2) are served by a CSX terminal at origin and/or destination, 3) if not served by a CSX terminal at both origin and destinations, served by a non-Norfolk Southern (NS) terminal in addition to a CSX terminal. Figure 2 below displays intermodal terminals throughout the U. S. and Canada that were considered in this analysis. The analysis was later refined to exclude markets that already had an existing intermodal service. The primary purpose of this analysis was to determine whether there might be other feasible routes in addition to those identified by CSX.

Figure 2: Intermodal Terminals in North America



Truck-to-Rail Diversion

For all analyses, potentially divertible traffic was limited to existing truck traffic carried in either dry van or reefer truck body types. Dry van moves as short as 250 miles were considered, however, for reefer traffic, only corridors longer than 500 miles were considered. This reflects the reality that reefer traffic is less prone to divert in shorter corridors. Other types of equipment, such as flat beds, tank trucks, etc. were not considered divertible to intermodal rail.

The BEAs served by each intermodal terminal were defined as those located within 100 miles of the terminal. Clusters of terminals that serve common BEAs were grouped together. In cases where there was preexisting intermodal traffic between origins and destinations, this preexisting traffic was eliminated from the estimated diversion. The data source for the estimated preexisting intermodal freight was the STB Waybill Sample.

The percentage of diversion to rail intermodal was estimated as a function of distance and route density (defined as the total demand for moving containers along a corridor). Below certain distances, using rail is much more expensive than trucking because of the fixed costs associated with intermodal moves. These costs remain the same whether a shipment is sent 100 or 1,000 miles. As shipment distances increase, rail becomes more competitive as line-haul economies take hold.

Lane density also affects mode share. At a minimum, enough demand is needed to operate train services at an acceptable frequency. With a greater concentration of freight on a corridor, railroads can operate longer trains decreasing the cost per unit. The cost of terminals is spread across a larger volume of freight. For this reason, lane density can signal the level of intermodal costs. The higher the concentration of freight the lower the costs of providing intermodal service, and the lower the rate paid by the shipper, all things being equal.

Research using the STB Waybill Sample and TRANSEARCH database found a strong correlation between route density, distance, and intermodal market share. The relationships are shown in Table 5 below.

Table 5: Average intermodal market share by shipment distance and market demand (IHS Global Insight)

Shipment Distance (Miles)	Average Lane Density from 2002 - 2008 (Thousands of Metric Tons)						
	10 - 31. 6	31. 6 - 100	100 – 316	316 - 1000	1,000 – 3,162	3,162 – 10,000	10,000+
250	0. 10%	0. 20%	0. 20%	0. 30%	0. 30%	0. 10%	0. 50%
500	0. 20%	0. 40%	0. 90%	1. 10%	2. 40%	2. 60%	1. 00%
750	0. 20%	0. 90%	2. 60%	6. 20%	8. 40%	8. 40%	8. 40%
1,000	0. 40%	1. 10%	3. 30%	7. 70%	17. 40%	31. 70%	31. 70%
1,500	0. 70%	1. 90%	5. 30%	10. 00%	14. 10%	55. 20%	55. 20%
2,000	1. 30%	2. 60%	7. 70%	15. 20%	39. 50%	71. 40%	71. 40%
2,500	1. 90%	4. 70%	15. 40%	25. 90%	37. 90%	65. 20%	80. 20%
3,000	9. 40%	20. 50%	30. 50%	37. 20%	37. 20%	37. 20%	37. 20%
3,500	13. 30%	21. 40%	28. 60%	30%	38. 50%	38. 50%	38. 50%

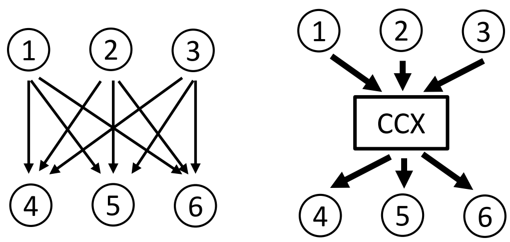
*Lane Density is defined as the total demand for truck and rail for a specific corridor

This analysis was designed specifically to fit the unique circumstances of CCX. The key economic advantage of CCX facility (shown in Figure 3) is that it will act as an intermodal hub, increasing the lane density on corridors that were previously not served by traditional intermodal service.

Figure 3: CCX Hub

As Figure 4 demonstrates, the use of a hub decreases the number of lanes that are needed to service demand from the hypothetical terminals 1, 2, and 3 to terminals 4, 5, and 6. This concept has been widely adopted in air transportation over the last several decades, but it has not been equally embraced by railroads.

Figure 4: Effect of Hubs On Lane Density



The only intermodal terminal in the US that is currently used to transship containers is the Northwest Ohio terminal operated by CSX. This facility, opened in February 2011, contains five wide-span cranes that reposition containers from one train to another as shown in Figure 5. There are plans to add two more cranes in 2015 to meet rapidly rising demand for intermodal service. The Northwest Ohio facility also allows trains to bypass congested yards in Chicago, reducing travel times on many corridors.

Figure 5: CSX Northwest Ohio Intermodal Terminal

Photo credit: Joc. com

Because of the hub, densities on traffic lanes served by CCX will be higher than they otherwise would have been. Containers on corridors that share the same origin, for example, will be able to be placed on same train to CCX facility irrespective of ultimate destination, where they will be sorted into trains that share the same destination. This was taken into consideration in applying the factors from Table 5 with lane densities between two locations adjusted to reflect this consolidation.

Intermodal Growth and Ramp-up Period

Once the facility opens in 2019, it is assumed that it would require four years for volume to ramp-up to its full potential. After operations have ramp-up, it is assumed that intermodal traffic grows at a rate of 2.2 percent per year, CBO's long-term projection for real GDP growth.

Estimated Diversions

Table 6 shows the expected diversions following the four-year ramp-up period. A total of 271,547 truckloads are expected to divert to intermodal service after the ramp-up, with around 44 percent terminating or originating in the Raleigh area and 56 percent passing through. This represents a 4.8 percent diversion rate.

Table 6: CCX Terminal Volume in 2022 after Ramp-up Period

			All Truck Miles			North Carolina Truck Miles			
	Units Diverted	% of Truck Units Diverted	Line-haul Truck Miles Diverted (millions)	Truck Drayage Miles Added (million)	Net Truck Miles Reduced (million)	Truck Miles Diverted in NC (millions)	Drayage Truck Miles Added in NC (million)	Net Truck Miles Reduced in NC (millions)	% of Truck Miles Diverted in NC
Raleigh + Greensboro	119,443	4. 8%	110. 25	11. 94	98. 31	12. 29	5. 97	6. 31	6. 4%
Pass-through	152,103	4. 7%	114. 43	15. 21	99. 22	15. 12	1. 94	13. 18	13. 3%
Total	271,547	4. 8%	224. 68	27. 15	197. 52	27. 41	7. 92	19. 49	9. 9%

Shifting truckloads to rail will have the effect of reducing line-haul truck miles, but local truck miles will increase due to drayage to intermodal terminals. It is estimated that Raleigh-based and pass-through diversions will reduce truck miles by 197. 5 million after increases in drayage are considered. It is also estimated that 9.9 percent of the miles saved would have accrued in North Carolina.

The intermodal mileage added to the rail network will be significantly larger than the reductions in trucking mileage because of circuity attributable to rail network and the use of a hub. A factor of 1.4 rail miles to truck miles was used to account for these differences.

Figure 6 and Figure 7 graphically display estimated diversions over time, both in truckloads and in truck miles.

Figure 6: Projected Diverted Truckloads

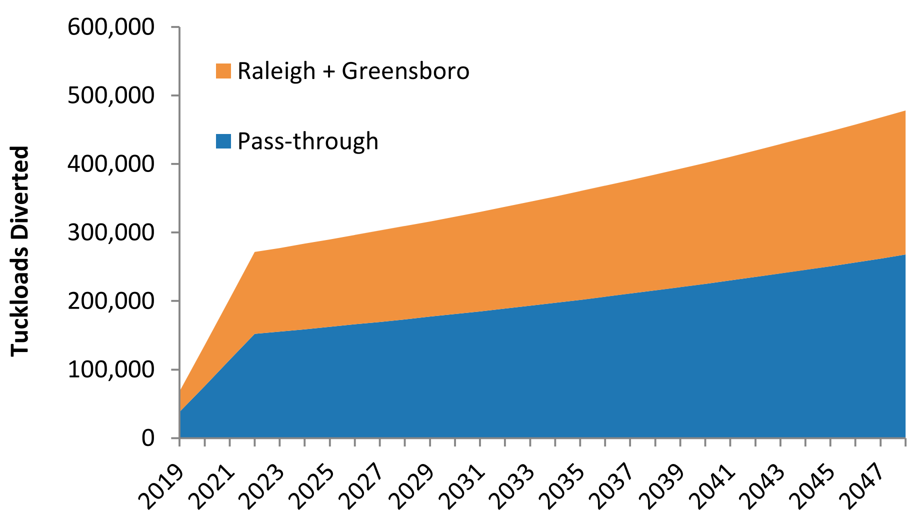


Figure 7: Projected Truck Miles Eliminated

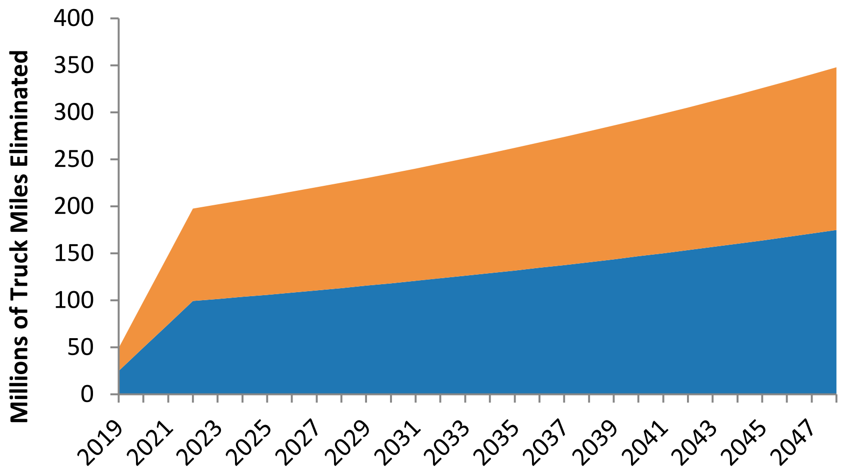
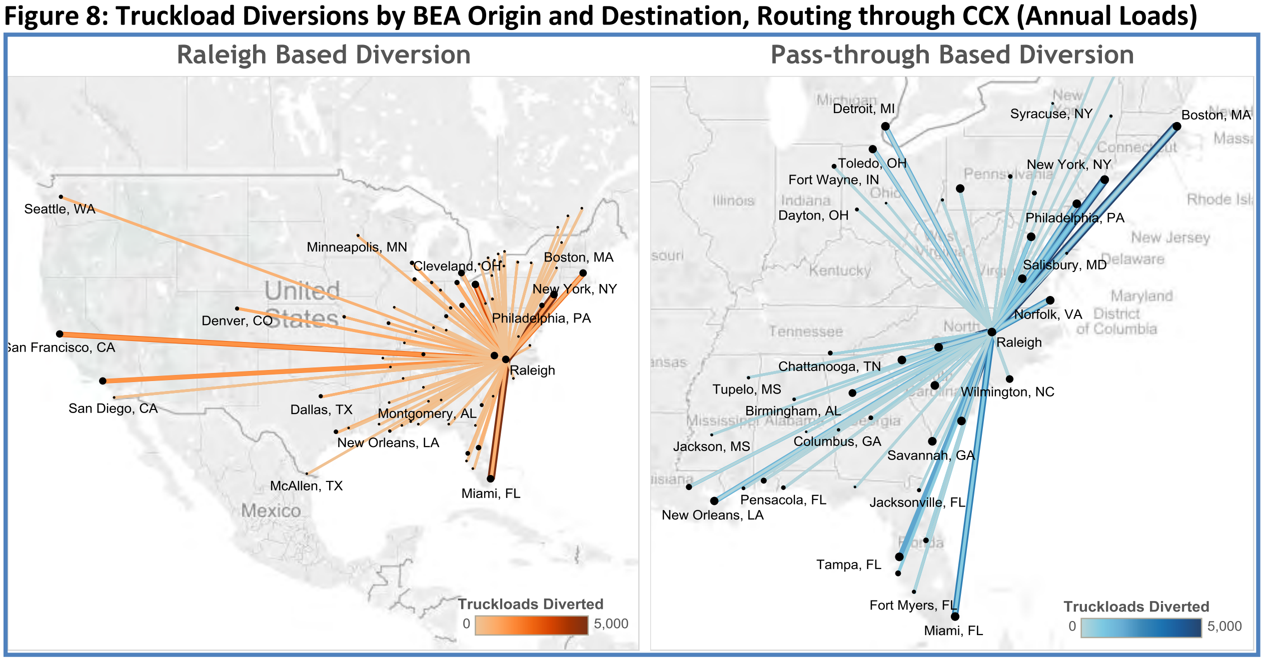


Figure 8 graphically presents the diversion results on a corridor level. Truckloads that divert to or from the Raleigh area originate or terminate all over the U. S., including the West Coast. On the other hand, diverted pass-through traffic is concentrated mostly on corridors in the Southeast, Northeast and Midwest. A large portion of these diversions originate or terminate at population centers along the East Coast: Miami, Tampa, Philadelphia, Atlanta, New York, and Boston. Additionally, locations associated with logistics infrastructure such as ports also are prominent in this figure. This includes Savannah, Norfolk, New Orleans, Wilmington, etc. The average length of Raleigh-based diverted truck trips is 896 miles and the average length of a pass-through diverted truck trips is 793 miles.

Figure 8: Truckload Diversions by BEA Origin and Destination, Routing through CCX (Annual Loads)



**Pass-through traffic was routed through Raleigh on map*

Figure 9 displays diversions estimates by trip distance. The size of the bubble represents the number of truckloads diverted in that corridor, and the color indicates the type of diversion. From this map, it can be seen that most diversions occur in the 400 – 1,000 mile range, and no pass-through diversion is predicted on corridors longer than 1600 miles.

Figure 9: Truckload Diversions by OD Distance and Market Share (Labeled by Origin/Destination State)

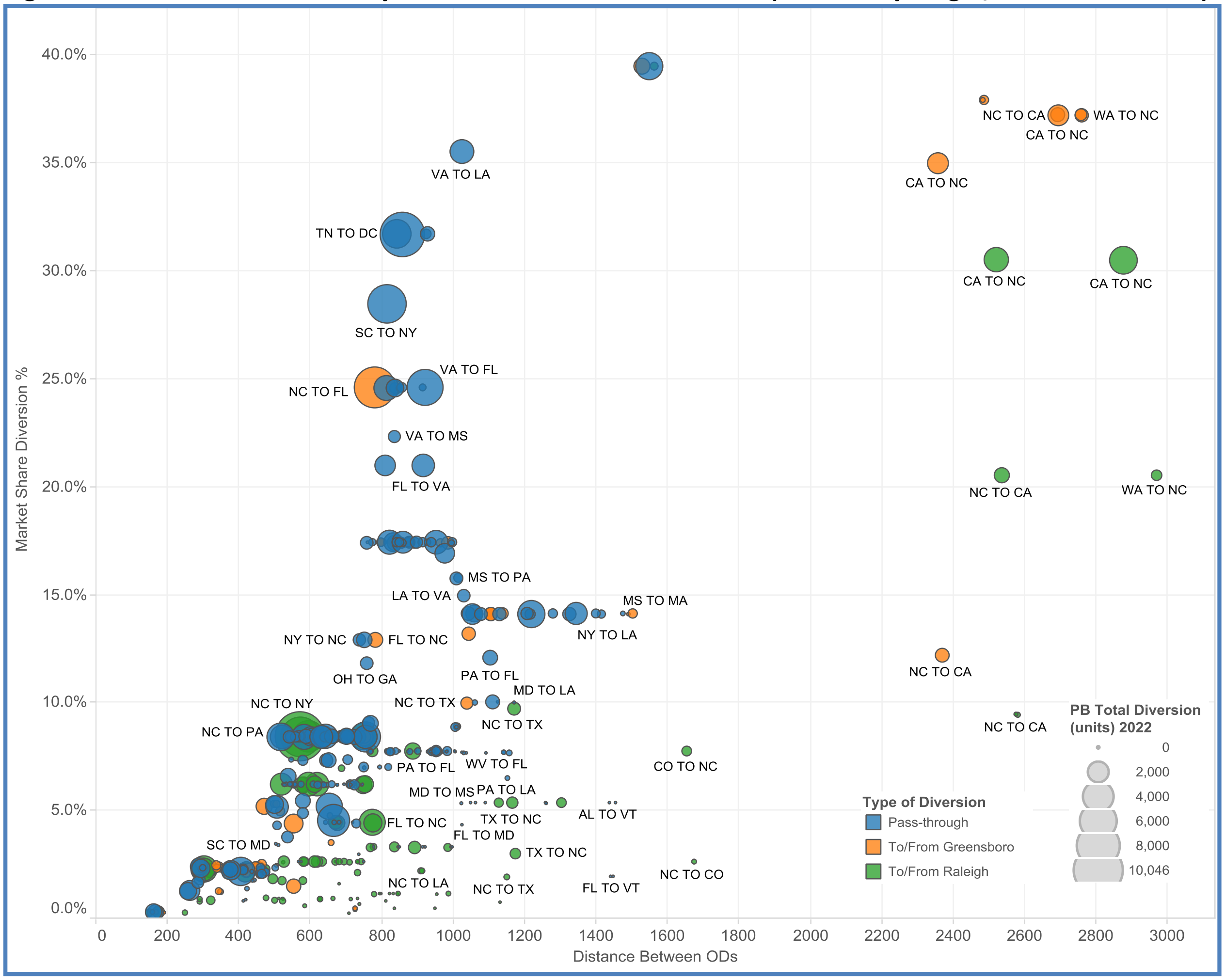
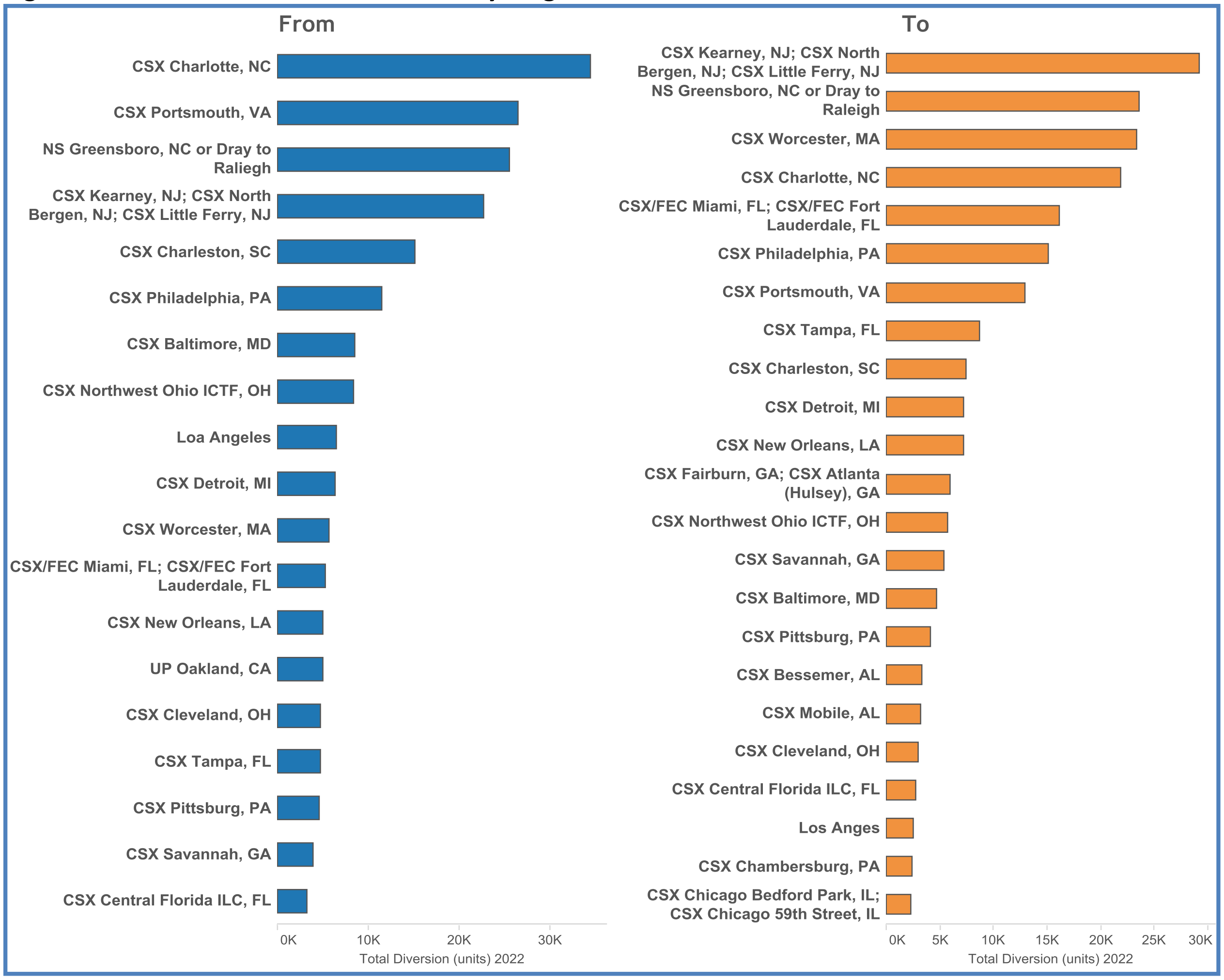


Figure 10 presents diversions by intermodal terminal. The top CSX terminals for originating intermodal units are Charlotte, Portsmouth, Kearney/North Bergen/Little Ferry, Charleston, and Philadelphia. Significant flows are also expected from Greensboro.

The principal CSX intermodal terminals exchanging traffic with CCX are Kearny/North Bergen/Little Ferry, Worcester, Charlotte, Philadelphia, and Portsmouth. Greensboro also receives substantial intermodal traffic. Note that the specific terminal results should be interpreted as approximations, since the markets of intermodal terminals in the same region overlap.

Figure 10: Truckload Diversions in 2022 by Origin and Destination Terminal



Diversion Sensitivity Analysis

Diversion estimates were also prepared under two alternative assumptions to explore the sensitivity of the results and benefits.

A **conservative scenario** was constructed with rail service levels playing a more significant role in determining lanes that would be competitive with trucking. CSX provided expected transit times between different origins and destinations for CCX service. The transit times were compared with estimated truck transit times. Truck transit times were estimated by dividing trip distance by an assumed truck speed of 550 miles per day, rounded up to the nearest day. Corridors were eliminated as susceptible to diversion where the difference between truck and rail was more than five days. An exception was made for corridors involving a large seaport at either end, defined as handling more than 900,000 TEUs in 2013. International shipments are considered less sensitive to differences of a couple of days in the transit time over land. Applying both of these filters reduced diverted units by around 10 percent.

An **optimistic scenario** was developed in which additional lanes not identified by CSX as CCX-served were included in the analysis. These routes have no current intermodal service, but could be candidates for service in the future. The additional lanes include Memphis and several destinations in the Northeast, including New York, Boston, and Baltimore as well as Raleigh-Baltimore. This lane may have been excluded by CSX due to its short distance. However, the truck volume between Raleigh/Durham and the Washington, DC/Baltimore metropolitan area is substantial. Given the high volume, even at the short distance, an intermodal service may be viable. In addition, while CSX identified New York to Mobile as a potential route for traffic to divert to CCX, CSX did not identify Mobile to New York as a possibility. However, an assessment by Parsons Brinckerhoff found substantial potential diversion for this route.

The criterion used to select the lanes was the level of truck volume. In doing so, we do understand that other factors such as container balance, truck-intermodal rate differentials, network fit, among others, contribute to establishment of service.

Table 7: CCX Terminal Volume in 2022 after 4 Year Ramp-up Period

Assumptions		Type	Units Diverted per year	Net Truck Miles Reduced (millions)	Net Truck Miles Reduced in NC (millions)	% of Truck Miles Diverted in NC
Conservative	CSX Identified Lanes w/ Service Filter	**Raleigh + Greensboro**	105,571	88. 49	5. 66	6. 4%
		Pass-through	141,578	90. 50	11. 57	12. 8%
		Total	***247,148***	***178. 99***	***17. 23***	***9. 6%***
Base	CSX Identified Lanes	**Raleigh + Greensboro**	119,443	98. 31	6. 31	6. 4%
		Pass-through	152,103	99. 22	13. 18	13. 3%
		Total	***271,547***	***197. 52***	***19. 49***	***9. 9%***
Optimistic	CSX Identified Lanes w/ Potential Lanes (Memphis-Northeast, Mobile-New York, Raleigh-Washington DC)	**Raleigh + Greensboro**	125,233	99. 69	6. 52	6. 4%
		Pass-through	174,724	121. 14	14. 37	12. 8%
		Total	***299,957***	***220. 83***	***20. 89***	***9. 6%***

Chapter 4: Benefit Cost Analysis

The preceding chapter described the diversion analysis and the traffic that could be expected to convert from truck to rail due to the services offered by the CCX facility. This chapter presents the public benefits attributable to that traffic being removed from the highway network.

BCA Methodology

The methodology used to calculate public benefits attributable to CCX is that recommended by USDOT. It suggests estimating several categories of benefits: state of good repair, economic competitiveness, quality of life, environmental sustainability, and safety.

Diversion Estimates

As shown in Table 6**,** 271,500 units (base scenario) are expected to shift from truck to rail during 2022, the first full year of operation. Removing these units from the highway network will eliminate more than 197 million truck miles on the nation's roadways. North Carolina will benefit from a reduction of 19 million vehicle miles, nearly 10 percent of the total reduction.

Project Timing

The analysis has been based on a three-year development period starting in 2016 with the terminal beginning operations at the beginning of 2019. Environmental studies would be conducted in 2016 with construction taking place in 2017 and 2018. The actual schedule is subject to change, however, with no material impact on the analyses.

The CSX analysis assumes that the terminal operates for 30 years, which seems reasonable and has been adopted. A four-year ramp up period for diversions is assumed, which is with CSX assumptions.

Forecasts

CSX assumes a 2.3 percent annual growth rate in traffic based on real GDP growth. Since that study was published, GDP growth projections have been modified. After the facility opens, annual growth is projected to fall to be 2.2, which is used in this analysis.

This represents a conservative approach as recent intermodal growth trends have exceeded that rate. Growth in U. S. intermodal traffic over the past 13 years has averaged 3.2 percent (including the economic recession of 2008), while the 5 year average has been 6.4 percent. Recent forecasts for the American Trucking Associations (ATA) by IHS Global Insight estimate annual growth of 5.1 percent between 2013 and 2025.

Discount Rate

The standard discount rate of 7 percent per USDOT guidance is used.

Residual Value

Residual value represents the value of the project asset at the end of the project's useful life. For the purposes of this analysis, the terminal itself is assumed to be fully depreciated at the end of the project analysis period. However, the land retains its initial value.

State of Good Repair

US DOT recognizes pavement damage as an important measure of the state of good repair. Trucks deteriorate pavement and increase pavement damage repair costs reducing the state of good repair.

By decreasing truck miles, CCX will reduce highway maintenance costs. The CSX analysis relies on a commonly accepted study, the *Addendum to the 1997 Federal Highway Cost Allocation Study Final* Report, May 2000 since few comparable studies have been completed since that time. The *Highway Cost Allocation* study provides a range of estimates of pavement damage per VMT depending upon the weight of the truck, number of axles, type of truck, type of roadway and whether the highway is in urban or rural areas. Because the pavement damage ranges from $0.01 per VMT for a 40,000 pound gross vehicle weight (GVW) 4 axle single unit truck on a rural interstate to $0.409 per VMT for an 80,000 pound 5 axle combination truck on an urban interstate, results from using the *Cost Allocation* Study vary widely.

The CSX study assumes that 95 percent of the diverted trucks would be 60,000 pounds gross vehicle weight (GVW) and 5 percent would be 80,000 pounds GVW. The split in pavement miles would be 35 percent urban and 65 percent rural. Recalculating average pavement cost and updating the result to 2014 using the Consumer Price Index – All Urban Consumers (CPI-U) yields the same result as the CSX study, $0. 09/VMT. This value is on the lower end of parameters often used for trucking, but intermodal containers are generally lighter than general truck cargo, and therefore should cause less pavement deterioration.

Table 8 presents the estimated reduction in highway maintenance costs by eliminating the truck competitive traffic from the roadways across the country.

Table 8: Nationwide State of Good Repair Savings, in 2015 Dollars

	30 Year
Reduced Truck Miles - 30 Years	7,475,267,000
Repair Cost per Truck Mile	$. 0918
Undiscounted Value of Reduced Pavement Repair Cost	$686,230,000
Discounted Value of Reduced Pavement Repair Cost	$197,803,000

Economic Competiveness

USDOT considers customer costs as a measure of economic competiveness - the lower the cost the more competitive a good is in the global market place. . The impact of intermodal transportation on logistics costs is usually evaluated as two components. The first is the transportation cost savings that arise from switching to rail. The second is the cost penalty that arises from the slower transit times of intermodal. Usually, this is provided as an inventory carrying cost, essentially a value of time that is applied to freight.

Both intermodal and truck rates are determined by the market place reflecting the competitive environment. Rather than try to anticipate market conditions and estimate rates, we adopted the rates used in the CSX report as it best understands the discount from truck rates to convert truckloads to intermodal. The annual inventory cost was assumed to be 30 percent of the value of the inventory per industry rule of thumb.

Table 9 shows the estimated nationwide decrease in customer costs based on the estimated traffic diverted. The truck and rail costs are weighted average rates of local traffic and transshipment traffic.

Table 9: Nationwide Economic Competiveness Impact - Transportation Cost, in 2015 Dollars

	30 Year
Reduced Truck Miles	7,475,267,000
Customer Truck Cost per Truck Mile	$1. 63
Customer Rail Cost per Equivalent Truck Mile	$1. 23
Undiscounted Customer Cost Savings	$2,973,662,000
Discounted Customer Cost Savings	$857,146,000

Offsetting the reduction in transportation costs is the increase in inventory carrying costs due to additional transit time of shipping by rail in the undiscounted value of $110,082,000 and discounted value of $31,731,000. Inventory costs were calculated following a methodology from the Highway Economic Requirements System State Version (HERS-ST) of the Federal Highway Administration.

Livability

Reduced roadway traffic congestion is a livability benefit. This is calculated on a per VMT basis. The CSX study relies on the same *Highway Cost Allocation Study* to estimate congestion benefits as used for the pavement damage estimates. For now, this value is adopted in the current BCA analysis. Table 10 describes the benefits associated with reducing highway congestion.

Table 10: Nationwide Reduced Congestion Impact, in 2015 Dollars

	30 Year
Reduced Truck Miles	7,475,267,000
Average Congestion Cost per Truck Mile	$. 011
Undiscounted Truck Congestion Savings	$838,725,000
Discounted Truck Congestion Savings	$241,759,000

Sustainability

The Project will create environmental and sustainability benefits from the reduction of air pollution associated with trucks. Four forms of emissions were identified, measured, and monetized: nitrous oxide (NOx), particulate matter (PM), volatile organic compounds (VOC), and carbon dioxide (CO2). The emission rates for trucks can be found in Table 11 and the emission rates for rail can be found in Table 12. These emission rates decrease substantially over time in response to improvements in vehicle technology and the expected introduction of stricter emissions standards. While these year over year improvements are speculative in nature because of the inherent challenges in forecasting technological advancements, the rates of improvements are in-line with historical trends and are likely to provide a better assessment of impacts than assuming constant emission rates.

Table 11: Truck Emissions Rates (grams per mile)

Emissions Type	2015	2020	2030	2040
NO_X	6. 22	3. 40	1. 70	1. 31
PM	0. 43	0. 21	0. 07	0. 04
VOC	0. 24	0. 13	0. 06	0. 04

Source: EPA MOVES[8]

Table 12: Rail Emissions Rates (grams per mile)

Emissions Type	2015	2020	2030	2040
NO_X	129	99	53	28
PM	3. 4	2. 3	1. 0	0. 4
VOC	6. 0	3. 8	2. 0	1. 1

Source: EPA 2009[9]

Because emission rates for railroads are specified per gallon of fuel used, it was necessary to obtain information about how the fuel efficiency of the trains will improve over time. Records were obtained from CSXT (see Table 14) that show their fuel efficiency has been improving at a rate of 1.5 percent per year (in ton-miles) over the last 15 years.

Table 13: Rail Emissions Rates (grams per mile)

Emissions Type	2015	2020	2030	2040
Tons-miles / gallon	483. 0	520. 3	603. 9	700. 8

Source: Based on information provided by CSXT

Emission rates of CO2 are simpler to calculate because they are a direct function of fuel consumption. Each gallon emits 22.4 lbs of CO2.

Value of Emissions

The value of emissions were obtained from USDOT guidance on TIGER applications. This guidance in turn references a National Highway Traffic Safety Administration study that calculated valuations for metric tons emitted of NOx, PM and VOC. These values, shown in Table 14, were inflated to 2015 dollars.

Table 14: Non-CO_2 Emissions Costs per Metric Ton, in 2015 Dollars

Emissions Type	Cost Per Ton
NO_X	$7,937
PM_{10}	$363,113
VOCs	$2,046

[8] EPA MOVES Model, assumed long-haul Long-Combination Vehicles driving at 55 mph

[9] EPA 2009, Emission Factors for Locomotives, Office of Transportation and Air Quality, EPA-420-F-09-025 April 2009. http://www.epa.gov/nonroad/locomotv/420f09025.pdf

The per-ton costs of carbon were also derived from USDOT guidance for TIGER applications. These values were in turn obtained from a Technical Support Document published by the Interagency Working Group on Social Cost of Carbon. [10]

Table 15: CO_2 Emissions Costs per Metric Ton, in 2015 Dollars

	2015	2020	2030	2040
Social Cost of Carbon	$45. 34	$52. 39	$63. 48	$74. 56

Source: U. S. EPA, 2013; Parsons Brinckerhoff, 2015

As summarized in Table 16, total discounted sustainability savings were estimated to be $296 million over the analysis horizon, which is a substantially higher estimate than found by CSX. These benefits are driven primarily by the large reductions in CO2 emissions that would result from shifting freight from trucks to rail, through the CCX hub. Additionally, these savings are weighed more heavily in the analysis because they are discounted at 3 percent per year instead of 7% per year, as are the other emission categories (following the USDOT guidance mentioned above).

For the other types of emissions, we observed that VOC emissions are anticipated to increase while PM and NOx emissions are anticipated to decrease. However, when these impacts are monetized, the reductions in PM and NOx emissions more than off-set in benefits for the costs associated with the increase in VOC emissions. This, combined with the substantial reductions of CO2 emissions that are expected, leads us to conclude that the CCX project will have a highly favorable impact on the environment. The increase in VOC emissions is insignificant in the analysis.

Table 16: Nationwide Sustainability Savings, in 2015 Dollars

	30 Years
Reduced NOX metric tons	903
Reduced PM metric tons	287
Reduced VOC metric tons	(22)
Reduced CO2 metric tons	7,013,000
Undiscounted Savings of NOX	$7,170,000
Undiscounted Savings of PM	$104,187,000
Undiscounted Savings of VOC	$(45,000)
Undiscounted Savings of CO2	$472,346,000
Total Discounted Sustainability Savings	$296,118,000

Safety

Rail is a relatively safe mode of transportation with a lower rate of injuries and fatalities than trucking. The cost savings that arise from a reduction in the number of accidents include direct savings (e. g. , reduced personal medical expenses, lost wages, and lower individual insurance premiums), as well as significant avoided costs to society (e. g. , second party medical and litigation fees, emergency response

[10] https://www.whitehouse.gov/sites/default/files/omb/assets/inforeg/technical-update-social-cost-of-carbon-for-regulator-impact-analysis.pdf

costs, incident congestion costs, and litigation costs). The value of all such benefits – both direct and societal – could also be approximated by the cost of service disruptions to other travelers, emergency response costs to the region, medical costs, litigation costs, vehicle damages, and economic productivity loss due to workers' inactivity. The costs of each injury and each fatality were taken from 2014 TIGER Benefit-Cost Analysis (BCA) resource guide published by USDOT. These have been adjusted by 2 percent to account for inflation since 2013. Values used to calculate accident savings are presented in Table 16.

Table 17: Values Used to Calculate Accident Savings

	Incident Rates and Costs	Source
Rail Fatal Crashes per 100 M ton-miles	140	FRA
Rail Injury Crashes per 100 M ton-miles	580	FRA
Rail Damage Crashes per 100 M ton-miles	1,770	FRA
Fatal Crashes per mil. Truck VMT	0. 012500	FMCSA
Injury Crashes per mil. Truck VMT	0. 224550	FMCSA
Damage Crashes per mil. Truck VMT	0. 785910	FMCSA
Value per Fatal Crash (2015 dollars)	$9,572,000	US DOT
Value per Injury Crash (2015 dollars)	$114,455	US/NC DOT
Value per Damage Crash (2015 dollars)	$4,087	US DOT

Sources: US DOT[11]; NC DOT[12]; FMCSA[13]; FRA[14]

The terminal is expected to reduce fatalities by 76 and injuries by 1,558 over the 30 year period.

[11] http://www.dot.gov/sites/dot.gov/files/docs/TIGER_BCARG_2014.pdf

[12] https://connect.ncdot.gov/business/DMV/.../2012%20Crash%20Facts.pdf – *weighted average product of total non-fatal, non-PDO accidents and accident monetized values.*

[13] Large Truck and Bus Crash Facts 2012. FMCSA-RRA-14-004. Analysis Division, Federal Motor Carrier Safety Administration, U.S. Department of Transportation. June 2014.

[14] One Year Accident/Incident Overview – Combined (2012). Office of Safety Analysis, Federal Railroad Administration, U.S. Department of Transportation. 2014.

Table 18: Nationwide Safety Savings

	30 Year
Fatal Crashes from Rail	23
Injury Crashes from Rail	96
Property Damage Crashes Rail	292
Fatal Crashes Avoided from Truck	93
Injury Crashes Avoided from Truck	1,679
Property Damage Crashes Truck	5,875
Fatal Crashes Avoided	70
Injury Crashes Avoided	1,583
Property Damage Crashes Avoided	5,583
Value per Fatal Crash (2015 dollars)	$9,572,000
Value per Injury Crash (2015 dollars)	$114,455
Value Per Property Damage Crash (2015 dollars)	$4,087
Value of Fatal Crashes Avoided (2015 dollars)	$673,271,000
Value of Injury Crashes Avoided (2015 dollars)	$181,168,000
Value of Property Damage Crashes Avoided (2015 dollars)	$22,809,000
Undiscounted Value of All Crashes Avoided (2015 dollars)	$877,248,000
Discounted Value of All Crashes Avoided (2015 dollars)	$252,863,000

Investment Costs of Facility

Project development costs are anticipated to total $271. 5 million over three years. This includes $237. 5 million to build the CCX facility and $34 million for complementary investments. CSX had originally assumed a project completion date of April 2018, but after subsequent information was received, the project completion date was postponed to December 2018. Development costs were pushed back to reflect this change in timing.

Table 19: Timing of Development Costs

	Terminal Costs	Road Improvements	Total
2015	--	--	--
2016($)	41. 1	5. 9	47. 0
2017($)	98. 2	14. 1	112. 3
2018($)	98. 2	14. 1	112. 3
Total Costs ($)	237. 5	34. 0	271. 5
Discounted Total Costs (2015$)	--	--	233. 6

Note: Schedule is subject to change

Summary

Table 19 compares the results of this analysis and analysis conducted by CSX. The benefit-cost ratios are very similar although the distributions of benefits are different.

Table 20: Summary of Discounted Nationwide Public Benefits of CCX (Millions of 2015$)

	Parsons Brinckerhoff	CSX-HDR
Pavement Maintenance Savings	$197. 8	$169. 4
Shipper Savings	$825. 4	$825. 6
Congestion Savings	$241. 8	$204. 3
Noise Pollution Savings	--	$35. 1
Emission Savings	$296. 1	$201. 6
Accident Savings	$252. 9	$244. 6
Total Discounted Benefits	$1,814. 0	$1,680. 6
Total Discounted Development Costs	$231. 5	$223. 2
Net Present Value	$1,582. 5	$1457. 4
Benefit Cost Ratio	7. 8	7. 5
Total Discounted O&M Costs	$183. 2	$183. 2
Net Present Value (w O&M)	$1,362. 1	$1,274. 1
Benefit Cost Ratio (w O&M)	4. 3	4. 1

Net present value and benefit cost ratios are presented in two forms: excluding operating costs (USDOT methodology) and including maintenance cost, the approach adopted by CSX-HDR.

Benefits to North Carolina

The TRANSEARCH database used to estimate truck diversion also included information about truck routing. This supported calculating the mileages within North Carolina if pass-through and Raleigh-based truck trips had not been diverted.

In all, it was found that for Raleigh-based truck diversion 6.4 percent of miles would have been incurred in North Carolina. This value was higher for pass-through traffic at 12.8 percent of total miles, principally because nearly each trip traverses the state. For all diversions, it was estimated that 9.6 percent of truck miles reduced would have occurred in North Carolina. Therefore, for savings that vary linearly with truck mileage, such as in emissions, congestion, pavement maintenance, and accidents, it was assumed that 9.6 percent of the benefits would accrue to the state.

For customer savings, it was assumed that only North Carolina-based trips would benefit customers in the state. Approximately 57 percent of the diversions have an origin or destination in North Carolina, either in Raleigh, Greensboro, or Charlotte. For trips to/from these locations, it was assumed that half of the benefits would accrue within the state reflecting that some benefits accrue to the shipper and others to the receiver. This led to estimate that 28.5 percent of shipper savings associated with CCX would accrue within North Carolina. Table 21 describes the benefits to North Carolina.

Table 21: Summary of Discounted Public Benefits of CCX for North Carolina (Millions of 2015$)

	Nationwide	North Carolina
Pavement Maintenance Savings	$197. 8	$19. 6
Shipper Savings	$825. 4	$235. 2
Congestion Savings	$241. 8	$23. 9
Reduction in Noise Pollution		
Emission Savings	$296. 1	$29. 32
Accident Savings	$252. 9	$25. 0
Total Benefits	$1,814. 0	$333. 1

Sensitivity of Results

The diversion analysis was conducted with two alternative sets of assumptions. Table 22 summarizes the BCA results for the three analyses. Despite the differences among the assumptions, the final benefit-cost results were very similar suggesting a marginal impact of changes in traffic. Moreover, it is likely that in reality several of the service constraints in the conservative scenario will materialize, but be offset by demand in some of the corridors in the optimistic scenario.

Table 22: Sensitivity of Results

	Units Diverted in 2022	Net Truck Miles Reduced in 2022 (millions)	Net Truck Miles Reduced in NC in 2022 (millions)	% of Truck Miles Diverted in NC	Total Benefits (millions of $ in 2015)	Benefits in NC (millions of $ in 2015)	Net Present Value (millions of $ in 2015)	Benefit Cost Ratio
Conservative	247,148	178. 99	17. 23	9. 6%	$1,643. 5	$301. 8	$1,412. 0	7. 1
Base	271,547	197. 52	19. 49	9. 9%	$1,814. 0	$331. 7	$1,582. 4	7. 8
Optimistic	299,957	220. 83	20. 89	9. 6%	$2,028. 8	$372. 6	$1,797. 3	8. 8

Chapter 5: Economic Impacts

The CCX facility will increase economic activity in North Carolina creating jobs, income, and additional economic output within the state. The economic activity will be a result of a number of different factors.

- Local labor will be employed in the building of CCX and materials for construction will be purchased in North Carolina.
- CCX will directly employ individuals to operate lift equipment, gates, etc.
- The locating of complementary industries in the vicinity of CCX. Intermodal terminals often generate synergistic economic development projects with employers attracted to the vicinity of the terminal.
- CCX will provide new transportation options for shippers in the Raleigh-Durham area and within North Carolina in general. Those industries for which intermodal is an economical option will be able to save shipping costs. This in turn will enable these companies to spend money on other goods, services, or employment.
- The presence of better transportation options will make the region and the state better able to attract new employers, not just within the immediate vicinity of CCX, but also within the overall market area for which containers are shipped through CCX.

Impacts from Construction

The construction of CCX is expected to create short-term economic impacts on the State of North Carolina, driven by the increase in construction spending in the region. These project expenditures would generate a short term increase in demand for engineering and technical services, as well as construction-related labor and materials.

To quantify the near-term economic impacts of this project, this analysis used an input-output modeling framework based on multipliers from MIG Inc. the developers of IMPLAN. [15] U. S. National data were selected for the economic profile and multiplier set.

Two types of economic impacts are included in this analysis.

- **Direct/Indirect Impacts**: Direct impacts represent new spending, hiring, and production by civil engineering and construction companies in providing resources to complete the project. Indirect impacts result from inter-industry purchases necessary to support the increase in construction industry activity. The other industries providing goods and services required by the construction industry will also increase their production and, if necessary, hire new workers to meet the additional demand.
- **Induced Impacts:** Induced impacts stem from the spending of wages earned by workers benefitting from the direct and indirect activity within the area. For example, if the construction activity leads to new employment and additional earnings in other industries, both the construction workers and workers in the other industries will spend some proportion of their

[15] http://implan.com/V4/Index.php

increased income at local retail shops, restaurants, and other places of commerce, which would further stimulate economic activity.

Three types of economic impacts are estimated.

- **Employee person years**: 100 person-years may translate into 50 jobs supported for 2 years or 100 jobs supported for 1 year.
- **Earnings -** All forms of employment income, including employee compensation (wages and benefits) and proprietor income.
- **Output:** The value of industry production. For manufacturers this would be sales plus/minus change in inventory. For service sectors production equals sales. For Retail and wholesale trade, output equals gross margin (as opposed to gross sales).

CSX estimates that the cost of the facility along with line of road projects comprising double tracking, grade separations and the expansion of the Dixie storage track will cost approximately $272 million to construct, however the entire amount would not contribute to economic growth. Some expenditure, such as land acquisition, would not have an economic impact on North Carolina. Furthermore, much of the $272 million would flow to suppliers outside of the state. CSX has estimated that only about $55. 7 million of the $272 million would flow to North Carolina. Total construction expenditures and expenditures in North Carolina are shown in Table 23 below.

Table 23: CCX Cost of Construction ($Millions)

Cost Category	Total	North Carolina
Construction of new Intermodal facility	105. 8	43. 7
Construction machinery	40. 1	6. 0
Technology	5. 0	0. 3
Environmental permitting/wetland mitigation	5. 8	5. 2
Landscape	0. 5	0. 5
Land acquisition, contingency, legal and other costs	114. 8	0. 0
Total	272. 0	55. 7

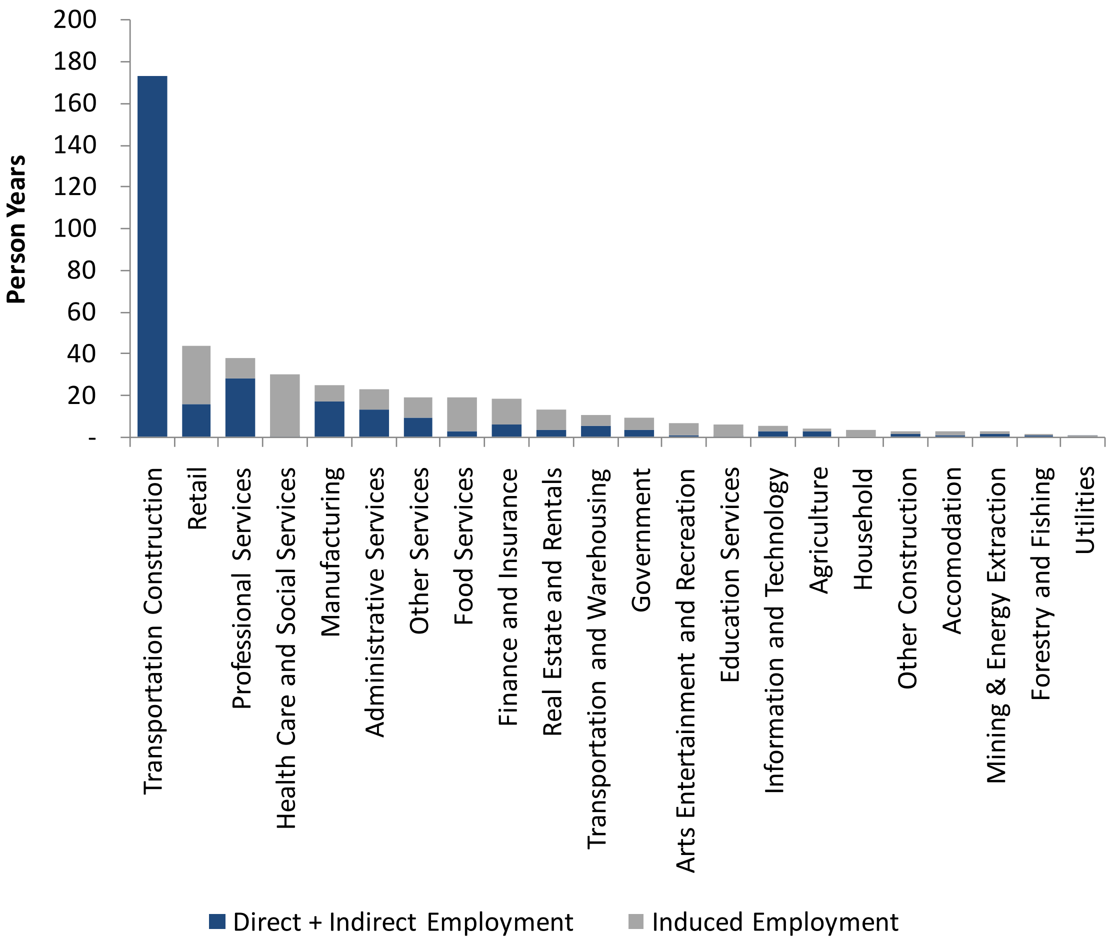
A summary of the short term economic impacts to North Carolina based on the in-state expenditures are shown in Table 24.

Table 24: Summary of Near-Term Economic Impacts

PB Estimated Impacts	Direct	Indirect	Induced	Total
Employment (Person Years)	383	109	160	652
Earnings (millions of 2015$)	$19. 4	$6. 1	$6. 7	$32. 1
Output (millions of 2015 $)	$51. 7	$18. 8	$20. 2	$90. 8
CSX HDR Estimated Impacts	**Direct**	**Indirect**	**Induced**	**Total**
Employment (Annual Average)	353	144	164	662
Earnings (millions of 2015 $)	$18. 7	$7. 7	$6. 8	$33. 2
Output (millions of 2015 $)	$55. 7	$21. 3	$20. 6	$97. 5

Figure 11 shows the distribution of jobs by industry and type of impact. The civil engineering construction industry is estimated to receive the largest increase in jobs from the project (170 person-years), almost all of which are direct jobs created. The other industries that will see the largest number of jobs created include retail (40 person-years) professional services (38 person-years), health care and social services (35 person-years), manufacturing (30 person-years), and administrative services (22 person-years).

Figure 11: Breakdown of Job Creation by Industry and Type of Impact



Ongoing Employment at CCX Facility

Most of the statewide economic impact associated with CCX, will be related to the facility's users, cost savings and benefits that will accrue to North Carolina's shippers. Additionally, as discussed in the next section, it is expected that the number of jobs that are expected to develop in areas surrounding the intermodal facility in Rocky Mount are anticipated to reach 13,000 jobs based on the number of local lifts the first year of full operations. However, ongoing operations of the facility itself will employ 109 people its opening year, 149 people by 2023, and 236 people by 2035. Similar to the case of the short-term construction employment, the operating labor will generate induced and indirect economic impacts. The terminal operator will need to purchase supplies, equipment, and services, a significant portion of which will be obtained from sources in North Carolina, thus producing the indirect economic impacts. Employees at CCX will spend money in the local economy, generating the induced economic impacts. Table 25 and Table 26 compare the economic impacts of employment at CCX estimated by Parsons Brinckerhoff and CSX-HDR.

Table 25: Summary of Short-Term and Long-Term Economic Impacts

PB Estimated Impacts 2019	Direct	Indirect	Induced	Total
Employment (Annual Average)	109	93	104	306
Earnings (millions of 2015 $)	$10.97	$5.48	$4.33	$20.78
Output (millions of 2015 $)	$33.92	$14.96	$13.07	$61.95
PB Estimated Impacts 2035	**Direct**	**Indirect**	**Induced**	**Total**
Employment (Annual Average)	236	187	208	632
Earnings (millions of 2015 $)	$22. 1	$11. 0	$8. 7	$41. 8
Output (millions of 2015 $)	$68. 4	$30. 1	$26. 3	$124. 7

Table 26: Short-Term and Long-Term Economic Impacts Estimated by CSX-HDR

CSX HDR Estimated Impacts 2019	Direct	Indirect/Induced	Total
Employment (Annual Average)	161	377	538
Earnings (millions of 2015 $)	$11.3	$13.9	$25.2
Output (millions of 2015 $)	$50.1	$39.6	$90.1
CSX HDR Estimated Impacts 2035	**Direct**	**Indirect/Induced**	**Total**
Employment (Annual Average)	236	552	788
Earnings (millions of 2015 $)	$22.0	$27.2	$49.3
Output (millions of 2015 $)	$98.7	$77.5	$176.2

CSX also included 767 jobs in 2035 that were attributable to drayage operations resulting in 1,500 jobs in 2035. WSP | Parsons Brinckerhoff did not have enough information to estimate drayage related employment. The effect of excluding drayage jobs from the economic impact analysis is minimal, as the increase in drayage employment will be offset by the reduction in long-haul trucking jobs as intercity truck traffic is converted to intermodal rail transportation.

Economic Impacts from Development in Areas Surrounding CCX

Although CSX did not estimate the impacts of related local development, the impact of an intermodal terminal on the local and regional economies is far greater than that attributable to the operations of the facility itself. Intermodal transportation provides shippers with economies that are not found in the competing truck transportation alternative. The consolidation of individual shipments into trainloads at intermodal terminals significantly reduces cost. The closer shippers can locate to the terminal, the greater the benefit as trucking costs to the terminal are reduced. Thus, terminals spawn new manufacturing activity in close proximity to the facility. This includes transportation dependent industries as well as their suppliers.

Although a less significant employment generator, warehouses and distribution centers also locate near intermodal terminals. One recent example of a facility that has helped to generate significant nearby development is the CSX Northwest Ohio ICTF near North Baltimore, Ohio. This facility is similar to CCX, since it also performs a hub function. While North Baltimore facility was originally solely intended to be a transfer hub, local freight has materialized as has local economic development.

Wood County, where the Northwest Ohio ICTF is located, and the surrounding area are hosts to several new or expanded distribution centers, including facilities owned by Home Depot and Calphalon constructed in 2013. FedEx, Walgreen's, Kohl's, Best Buy, UPS, Menards, BX Solutions, and Lowe's have developed new facilities or expanded existing ones since the opening of the terminal.

Figure 12 displays the CSX facility and nearby major distribution centers or manufacturers.

Figure 12: NW Ohio Logistics Development

While it is difficult to predict the type of economic activity and precise employment attributable to a new terminal, benchmarks relating employment to terminal container volume can be used. This approach is based on the premise that economic development is proportional to terminal volume.

CSX used this methodology in its National Gateway application for a TIGER grant estimating job creation based on information on several intermodal facilities. Table 26 applies these factors used in that application to our projected CCX volumes.

If CCX were to generate the same number of jobs per TEU as the average of the terminals below, the annual economic impact would be around 13,000 jobs based on the number of local lifts the first year of full operations. If the terminal were to generate employment analogous to the Rickenbacker Intermodal Facility, in this high scenario, the annual employment would be around 20,000 based on the local container volume the first year of full operations. However, if the facility were to generate economic impacts similar to Logistics Park-Chicago, the number jobs generated would be around 8,000 based on the local container volume the first full year of operations. The economic development surrounding CCX would be long-term, perhaps reaching full potential after 10 or 15 years.

Table 27: Estimation of Jobs Generated by CCX Based on Forecast Lifts

Comparable Facility	Jobs Per 1,000 TEUs	Annual TEUs	Terminal Status
Virginia Inland Port	116. 8	56,000	Operational
Logistics Park - Alliance, TX	33. 3	600,000	Operational
Logistics Park-Chicago	27. 4	365,000	Operational
Rickenbacker Intermodal Facility	68. 0	300,000	Planned
Prince George Intermodal Terminal	6. 0	124,000	Planned
Choctaw Point Intermodal Facility	5. 3	320,000	Planned
Average All	42. 9		
Average Completed	59. 2		
	2025	**2035**	
Estimated CCX Local TEUs	298,488	374,699	
Estimated Jobs Average	12,805	16,075	
Estimated Jobs High	20,297	25,480	
Estimated Jobs Low	8,179	10,267	

Note: Terminal Status is at the time the estimates were developed; Source: National Gateway TIGER Grant Application, PB Analysis

As indicated by Table 27 above, economic impacts of intermodal terminals expressed in jobs per 1,000 TEUs vary considerably. On the one extreme is the Virginia Inland Port (VIP) with 116.8 jobs per 1,000 TEU, while at the other extreme is the projected impact of the Choctaw Point Intermodal Facility with only 5.3 jobs per 1,000 TEU. Because these impacts differ by an order of magnitude, it is worthwhile to consider the drivers of these differences. Part of the difference lies in the analytical approaches used. Half of the estimates that appear in Table 26 above are forecasts, not based on actual experience. For Choctaw Point, for example, the analysts simply assumed that the overall new employment directly attributable to the terminal would be 800 and then applied a multiplier to account for indirect and induced impacts.

The approach used in forecasting can explain part of the differences. However, there are three other drivers of note as well as well:

- Relationship between the intermodal terminal and regional economic development initiatives

- Overall desirability of the location for logistics development
- The nature of the intermodal service that the terminal supports

Generally, those intermodal terminals that are credited with generating the most jobs and greatest economic impacts are coupled with major economic development initiatives. From Table 27 above, the Rickenbacker Intermodal Facility was forecast to generate a significant number of jobs. The terminal, however, is one component of a broader economic development initiative, the Rickenbacker Inland Port. The Columbus Regional Airport Authority has been marketing development sites in the area as the Rickenbacker Global Logistics Park. This includes up to 29 million square feet of additional development floor space to complement the 40 million square feet of existing space. One of the most prominent logistics facilities is the BNSF terminal at Alliance, Texas. This is part of a 17,000-acre master-planned, mixed-use development. Alliance credits itself with having created over 139,348 jobs and over $55 billion in economic impact since 1990. While one could dispute whether all of these economic impacts are a direct result of constructing an intermodal terminal, it seems that logistics facilities have the highest economic impact if they are coupled with economic development initiatives. Intermodal facilities and other components of logistics parks mutually support each other.

Table 28 shows the economic impacts that would be expected from nearby development, in the years 2025 and 2035. These were developed with the IMPLAN model, assuming that the job creation figures shown above in Table 27 materialize in the warehousing and storage industry.

Table 28: Summary of Economic Impacts from nearby Development

PB Estimated Impacts 2025	Direct	Indirect	Induced	Total
Employment (Annual Average)	12,805	4,455	4,898	22,157
Earnings (millions of 2015 $)	$594	$186	$204	$984
Output (millions of 2015 $)	$1,277	$564	$618	$2,459
PB Estimated Impacts 2035	**Direct**	**Indirect**	**Induced**	**Total**
Employment (Annual Average)	16,075	3,562	4,100	23,737
Earnings (millions of 2015 $)	$504	$149	$171	$824
Output (millions of 2015 $)	$1,021	$451	$517	$1,990

The Virginia Inland Port, estimated to have generated the greatest number of jobs per TEU, was not linked to a specific development project. This terminal was originally constructed to help the Port of Virginia compete with the Port of Baltimore by intercepting containers destined for Baltimore. The Virginia Inland Port was constructed at a highly strategic location - the intersection of Interstates 66 and 81. I-81 is one of the most heavily used truck routes in the United States and I-66 is the primary highway that links I-81 to the Washington, DC metropolitan area, consistently one of the fastest growing metropolitan areas over the past several decades. Good highway connections are attractive both for intermodal terminals and for distribution centers and other logistics facilities. One could argue that shippers may have constructed warehouses and distribution facilities in the area around Front Royal regardless of the Virginia Inland Port due to the strategic intersection of highways, but the presence of the Virginia Inland Port could have tipped shippers' decisions. Figure 13 displays the density of truck traffic on the U. S. National Highway Network.

In addition to stimulating economic growth in the region, CCX could have a significant impact on the Port of Wilmington. The role of the terminal as a hub with connections to many markets could facilitate the establishment of dedicated intermodal rail service to the Port of Wilmington. Competitive intermodal service will support the Port in meeting its objective of doubling its container volume to 530,000 TEUs in 2020 as outlined in the North Carolina State Port Authority 2015 Strategic Plan. Reliable intermodal service is required to expand the geographic reach of the Port beyond its current truck market. Dedicated rail intermodal service would assist the Port of Wilmington in attracting targeted new container services:

- Far East super post-Panamax service
- Far East Panamax service
- Trans-Atlantic service
- South Atlantic service

These services are expected have a $7.1 billion impact on the North Carolina economy. [16]

[16] North Carolina State Ports Authority, "Economic Contribution of the North Carolina Ports", 2014

Figure 13: Average Daily Long-Haul Traffic on the National Highway System in 2011

Source: FHWA

CCX would also enjoy an advantage in this respect. I-95, I-40, and US 64 (future I-495) in North Carolina are busy freight corridors. CCX would be strategically located near the intersection of these major east-west/north-south corridors.

Finally, intermodal terminals solely represent a gateway to an intermodal network. The desirability of an intermodal terminal from a shippers' perspective relates to the types and extent of intermodal services available. Many small intermodal terminals provide limited service options, enabling shipments between markets on a single train's route. This is analogous to a small airport's limited service offerings compared to those of a major hub airport. With CCX as hub, shippers will have access to nearly any point in the CSX network. Therefore, from a shipper's perspective and from the perspective of a tenant in a nearby logistics park, CCX would be an attractive terminal near which to locate.

One would expect CCX's economic development prospects to be relatively bright, based upon the following considerations:

- Availability of nearby land to create an integrated logistics center;

- Strategic location near I-95, I-40, and US 64 (future I-495) three busy freight corridors;
- The breadth of the intermodal service offerings that will be available at CCX.

Another consideration will be the desirability of economic development for the region. If the employment in Johnston County and nearby areas of eastern North Carolina were at capacity, the benefits of bringing additional jobs to the area would be minor. Employment associated with CCX would just be pulling jobs away from other industries. However, the economic conditions of Johnston County are in some ways below U. S. average. The U. S. Economic Development Administration (USEDA) considers regions to be distressed if the average income per capita of that area is 80 percent or lower than the national average or the unemployment rate is one percentage point higher than the national average. In the case of Johnston County, unemployment is somewhat lower than the national average, however, per capita income is lower, and by some statistics, the county would qualify as economically distressed.

Table 29: Johnston County Measures of Economic Distress

Indicator of Economic Distress	Region	U. S.	Threshold Calculations
24-month Average Unemployment Rate (BLS) period ending February 2015	5. 97	6. 58	-0. 61
2013 Per Capita Money Income (3-year ACS)	$22,255	$27,884	79. 81%
2013 Per Capita Money Income (5-year ACS)	$22,410	$28,155	79. 60%
2013 Per Capita Personal Income (BEA)	$36,391	$44,765	81. 29%
2000 Per Capita Money Income (Decennial Census)	$18,788	$21,587	87. 03%

Source: Statsamerica.org

However, CCX could also provide employment opportunities for employees from counties to the south and east of Johnston County, which would be considered economically distressed by all USEDA approved indicators. As shown in Table 30**,** Harnett, Sampson, Wayne, and Wilson Counties have unemployment rates over a percent higher than the U. S. average and income per capita that is lower than 80 percent of the U. S. average, regardless of how measured.

Table 30: Economic Distress Measures for Harnett, Sampson, Wayne, and Wilson Counties

Indicator of Economic Distress	Region	U. S.	Threshold Calculations
24-month Average Unemployment Rate (BLS) period ending February 2015	7. 80	6. 58	1. 22
2013 Per Capita Money Income (3-year ACS)	$20,277	$27,884	72. 72%
2013 Per Capita Money Income (5-year ACS)	$20,710	$28,155	73. 56%
2013 Per Capita Personal Income (BEA)	$33,254	$44,765	74. 28%
2000 Per Capita Money Income (Decennial Census)	$16,605	$21,587	76. 92%

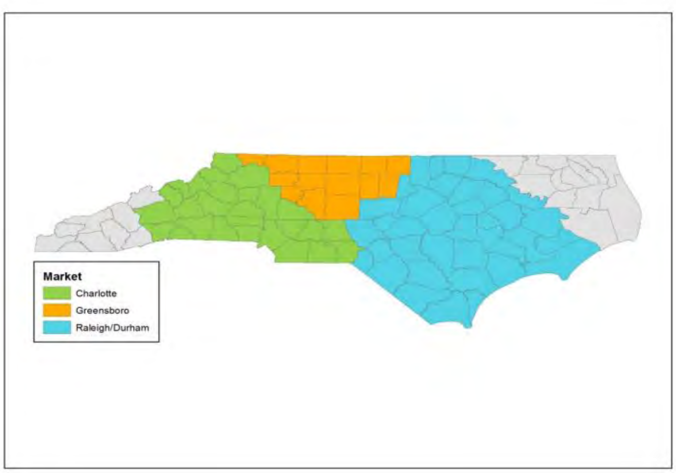
Source: Statsamerica.org

Johnston County, and its hinterland, are one example of a region that would significantly benefit from intermodal terminal related development. Other counties such as Edgecombe, similarly if not more economically distressed, would benefit from such a facility.

Economic Impacts to Shippers in Raleigh-Durham Area

CCX would generate jobs, not only associated with development in the immediate vicinity of the facility, but also the overall Raleigh-Durham area, as well as other parts of North Carolina. Any business that could truck a container to or from CCX could potentially benefit. The presence of the facility would also make the region a more attractive location for new firms to locate. As described earlier, the market capture area includes all counties that are either within a 100-mile radius of Johnston County or closer to CCX than competing intermodal terminals in Hampton Roads, Virginia, Greensboro, or Charlotte. CCX, however, could serve the Greensboro and Charlotte terminal markets as well, given that the service offering of CCX will be much more extensive than those of these other terminals.

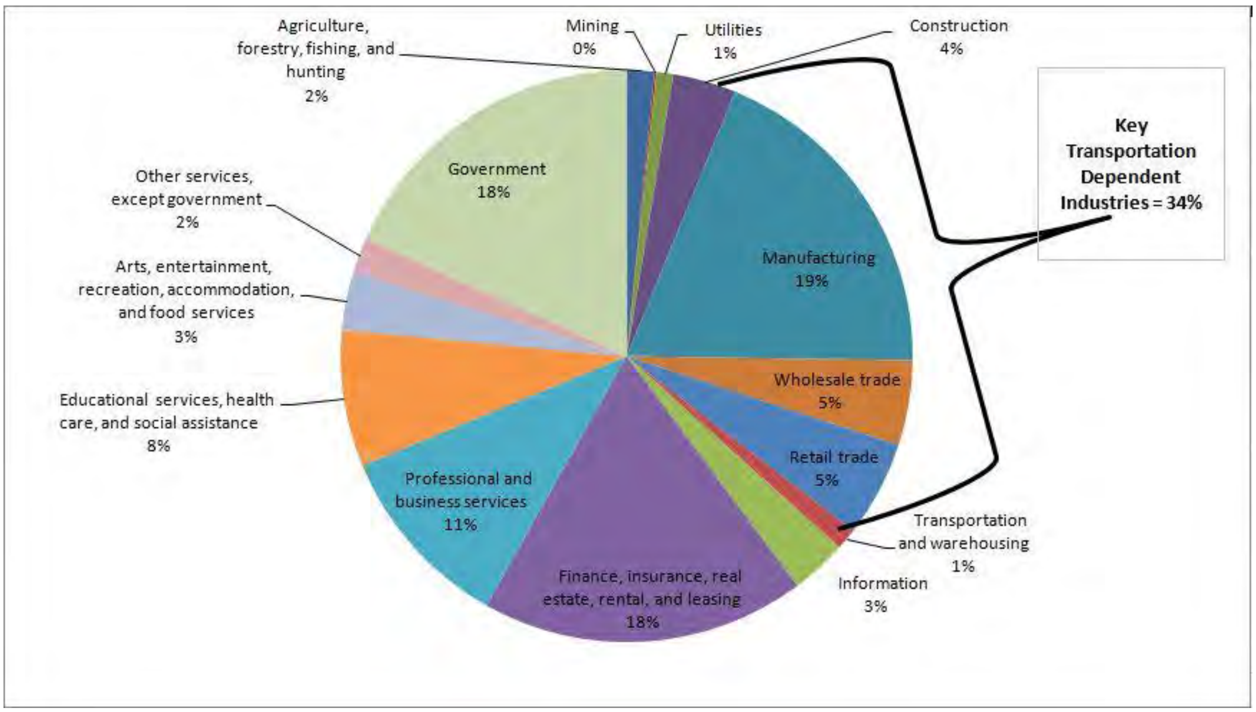
Figure 14: Raleigh-Durham, Greensboro, and Charlotte Intermodal Market Areas



Raleigh-Durham Freight Transportation Dependent Industries

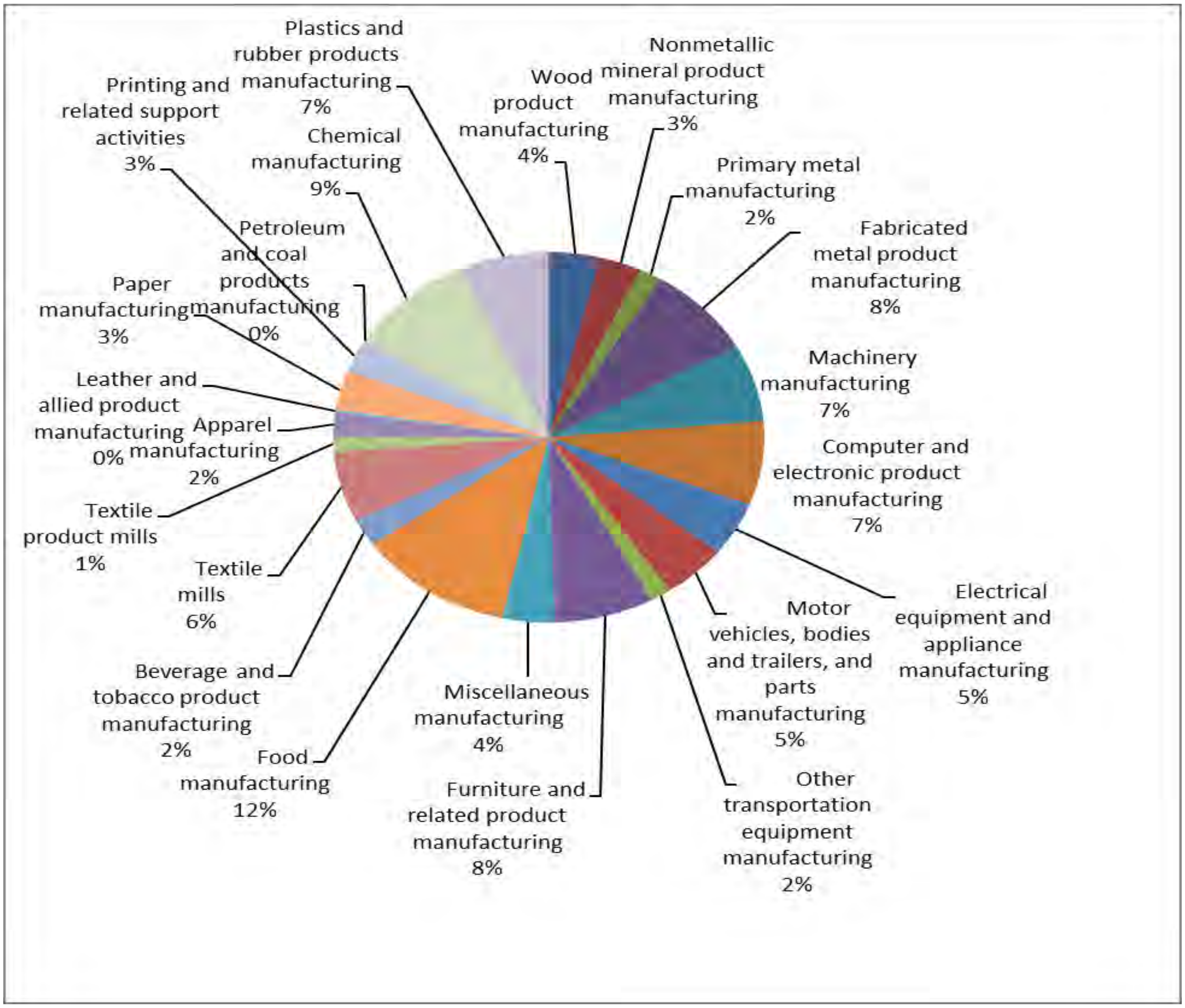
Within the Raleigh-Durham area, about 34 percent of the economy can be considered *freight transportation dependent*, i.e. requiring the movement of goods to or from the area. These firms account for approximately $66 billion in gross domestic product.

Figure 15: Key Intermodal Dependent Industries in the Raleigh-Durham Area



By GDP, manufacturing is 19 percent of the economy of the Raleigh-Durham market. Overall employment in manufacturing statewide is about 9 percent of total employment. With the exception of continuous manufacturing subsectors (manufacture bulk products such as chemicals), most of these manufacturing subsectors are of industries that could potentially benefit from improved intermodal service.

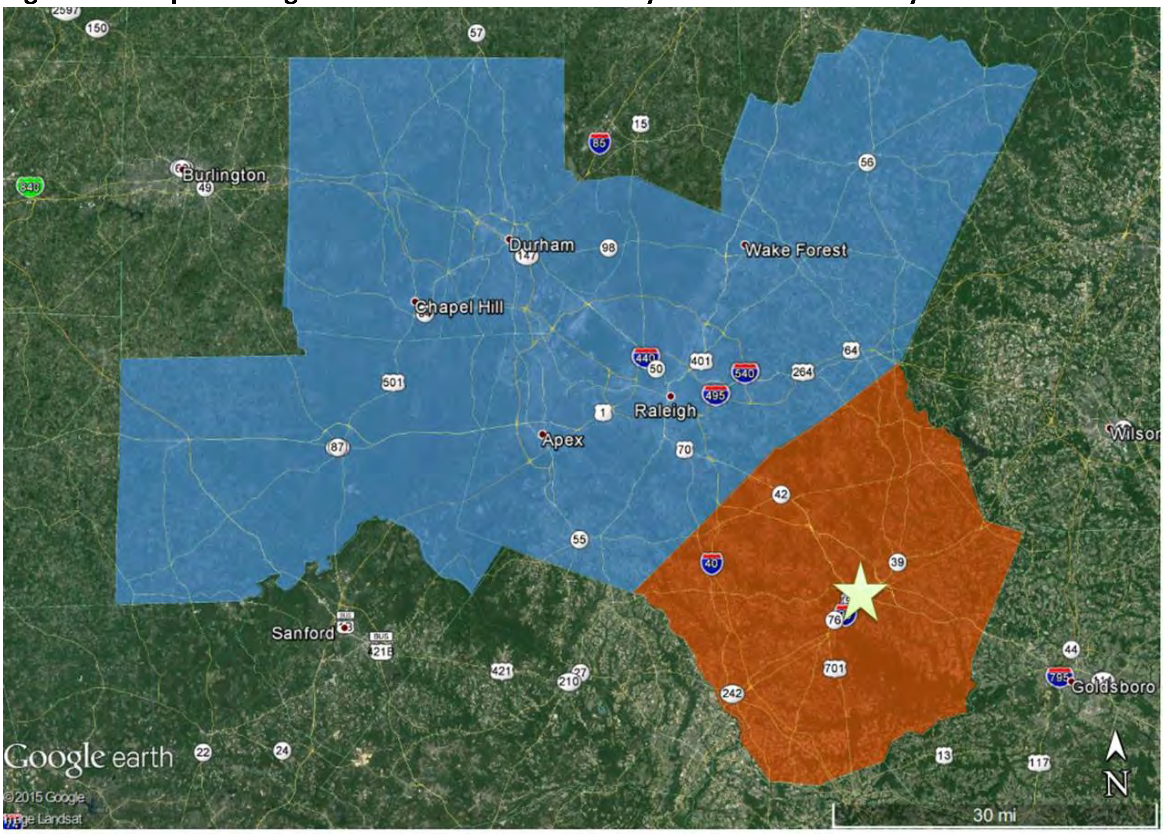
Figure 16: Subsector Share of Total Manufacturing Employment in North Carolina



Chapter 6: Industrial Development Opportunities

An intermodal facility has the potential to be a strong catalyst for investment in new industrial real estate development in the surrounding area, especially in light of the ample developable land inventory highlighted above. This is especially true for the industrial land uses such as warehousing and manufacturing as proximity to intermodal facilities reduces supply chain costs. Developable land parcels in the immediately surrounding area will be far more attractive to industrial developers and end users with an intermodal facility in place. A market-based estimate of this impact on the local industrial real estate inventory follows. Figure 17 shows the counties comprising local market area of CCX.

Figure 17: Map of Raleigh Industrial Market Boundary and Johnston County Submarket



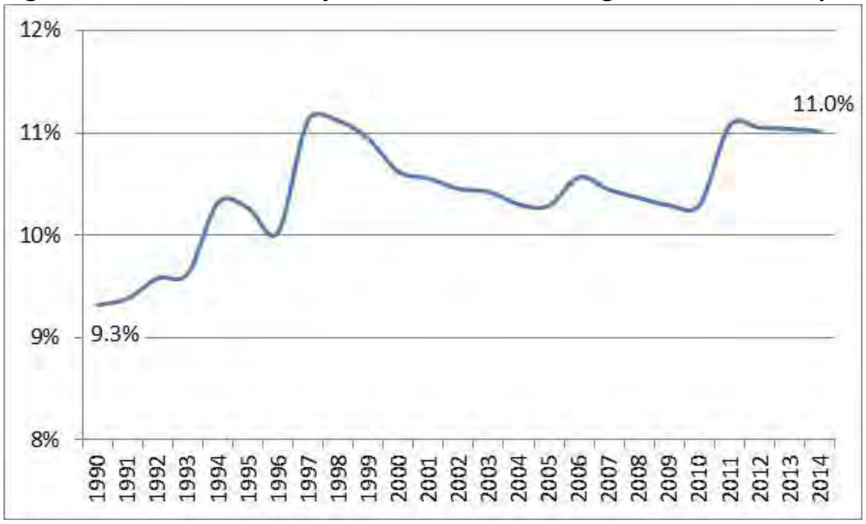
Source: Google Earth Pro, CBRE, Parsons Brinckerhoff Analysis

The following describes Johnston County's historical role in the regional industrial real estate market. Based on the potential catalytic impact of an intermodal facility located in the heart of the county, it is anticipated that the surrounding area would capture more than its historical share of the regional market for industrial development going forward.

Market Inventory Overview

Historical industrial development data suggest that Johnston County has represented a relatively small but growing percentage of the overall Raleigh regional inventory of industrial space. Since 1990, Johnston County has maintained a share of the overall market ranging from 9 percent to 11 percent.

Figure 18: Johnston County Historical Share of Regional Industrial Space, 1990-2014

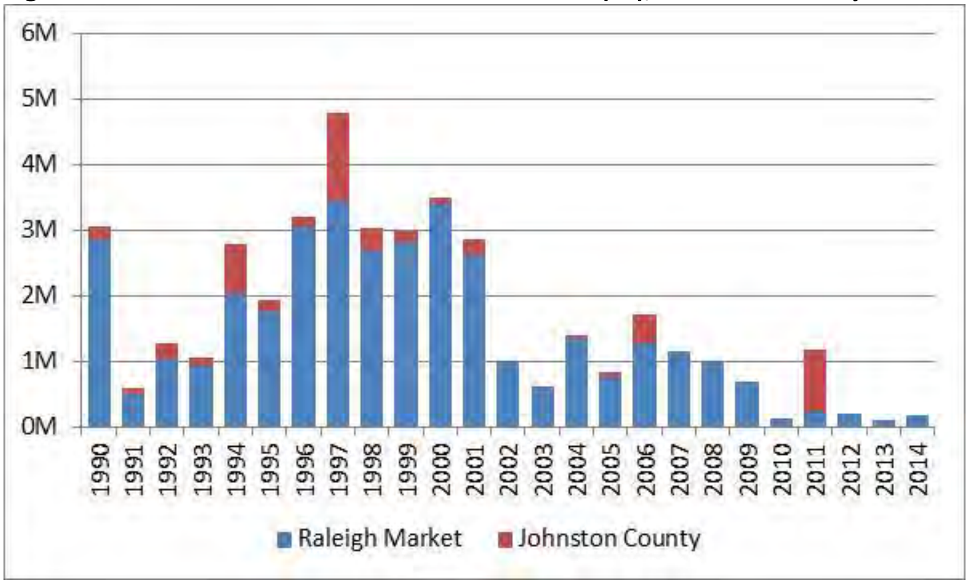


Source: CBRE, Parsons Brinckerhoff Analysis

Since 1990, the county has averaged 220,000 square feet of new construction per year, although on an annual basis, the actual amount delivered has ranged from zero square feet in some years to as much as 1.4 million square feet in others. Notable large-scale industrial developments include the Novo Nordisk pharmaceutical manufacturing plant in 1997, the Sysco food distribution facility in 2006, and Becton Dickinson's East Coast distribution center in 2011.

Over the past 10 years, the county averaged 150,000 square feet of new construction per year, although this figure includes five years of no activity due in part to the Great Recession. This trend of diminished activity in recent years is also reflected at the regional level. Although the Raleigh market as a whole has averaged 1.7 million square feet of new construction per year since 1990, the 10-year average is less than half that at just over 700,000 square feet per year.

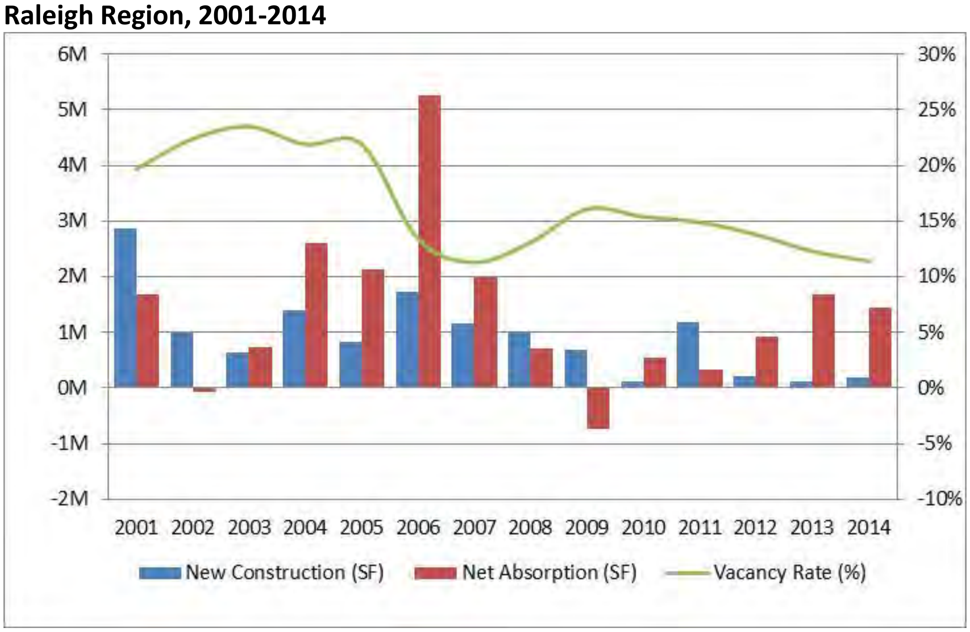
Figure 19: Historical Industrial New Construction (SF), Johnston County and Raleigh Region, 1990-2014



Source: CBRE, Parsons Brinckerhoff Analysis

Like most markets throughout the country, the Raleigh real estate market experienced historically low levels of industrial construction activity as a consequence of the Great Recession. This decline in new inventory over several years combined with a strengthening economy has improved overall industrial real estate market conditions in the region.

Figure 20: Historical Industrial New Construction (SF), Net Absorption (SF), and Vacancy Rate (%), Raleigh Region, 2001-2014



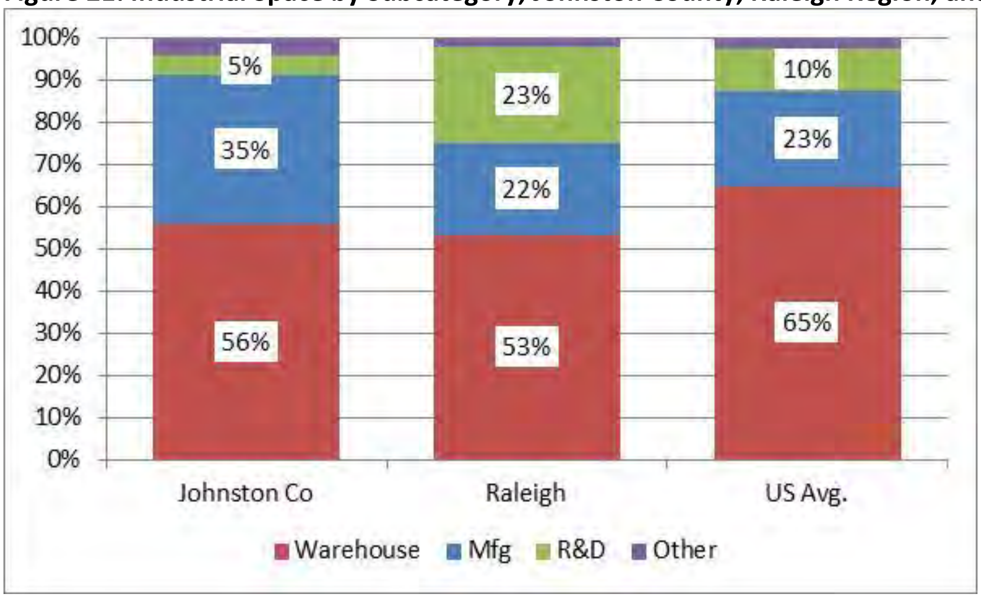
Source: CBRE, Parsons Brinckerhoff Analysis

As result, there have been five consecutive years of positive net absorption of industrial space in the region coupled with a steadily declining average vacancy rate. These trends suggest a healthy industrial real estate market that is well positioned to absorb new inventory delivery in the near term.

Industrial Inventory by Subsector

The breakdown of industrial space by major subcategory in Johnston County suggests that an intermodal facility located in the area will complement the existing mix of inventory in the surrounding area. Warehouse and manufacturing space comprise over 90 percent of the Johnston County inventory, compared to 75 percent of the Raleigh market as a whole.

Figure 21: Industrial Space by Subcategory, Johnston County, Raleigh Region, and US, 2014

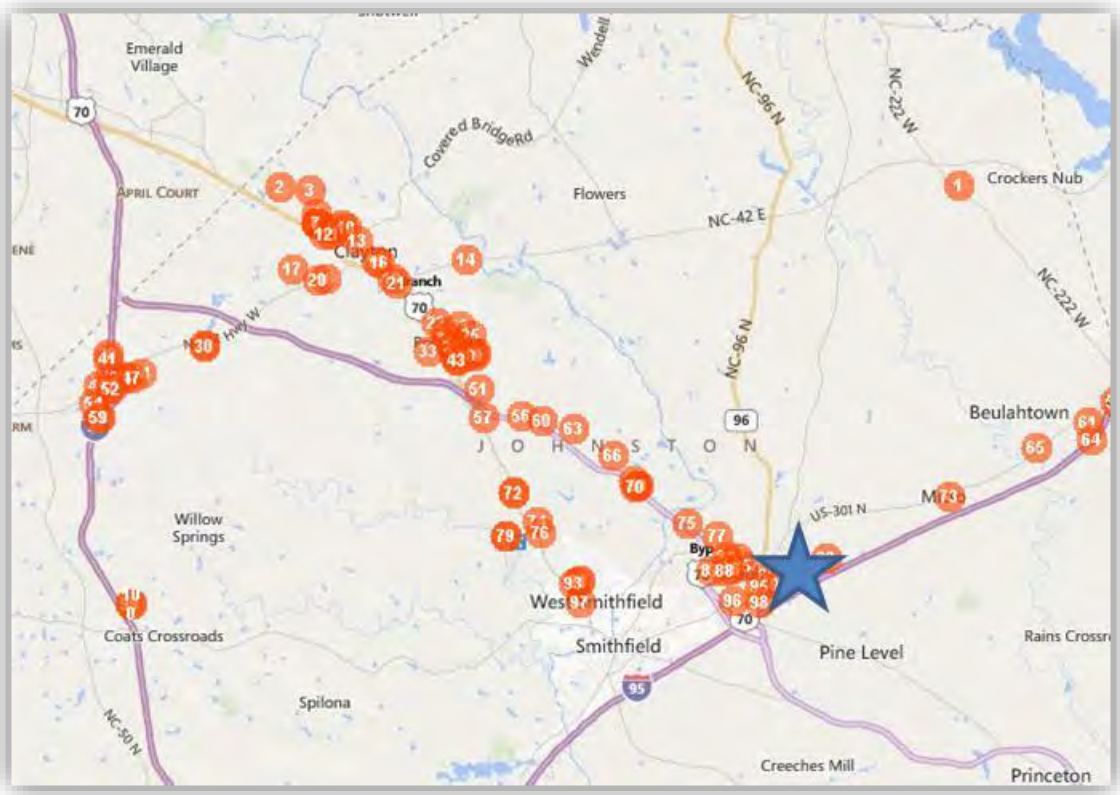


Source: CBRE, Parsons Brinckerhoff Analysis

Johnston County inventory is made up of a significantly lower amount of research and development (R&D) industrial space compared to the overall Raleigh market, which is strongly influenced by elements of the Research Triangle economic drivers. Compared to the national average, the Raleigh market as a whole has more than twice the percentage of space devoted to R&D while Johnston County has half. While clusters of R&D activity have evolved in other parts of the region, Johnston County holds a larger share of manufacturing inventory. Johnston County also benefits from its strategic location providing connectivity between the rest of the Raleigh region and I-95. This suggests that the proposed regional location of the facility will complement the existing pattern of industrial site selection, given that warehouse and manufacturing users are more likely to be attracted to proximity to intermodal access.

Not surprisingly given the breakdown highlighted above, existing industrial facilities in the county demonstrate a distinct preference for close proximity to major highways.

Figure 22: Map of Existing Industrial Property Locations, Johnston County, 2014



Source: CBRE, Parsons Brinckerhoff Analysis

Potential Industrial Real Estate Impacts

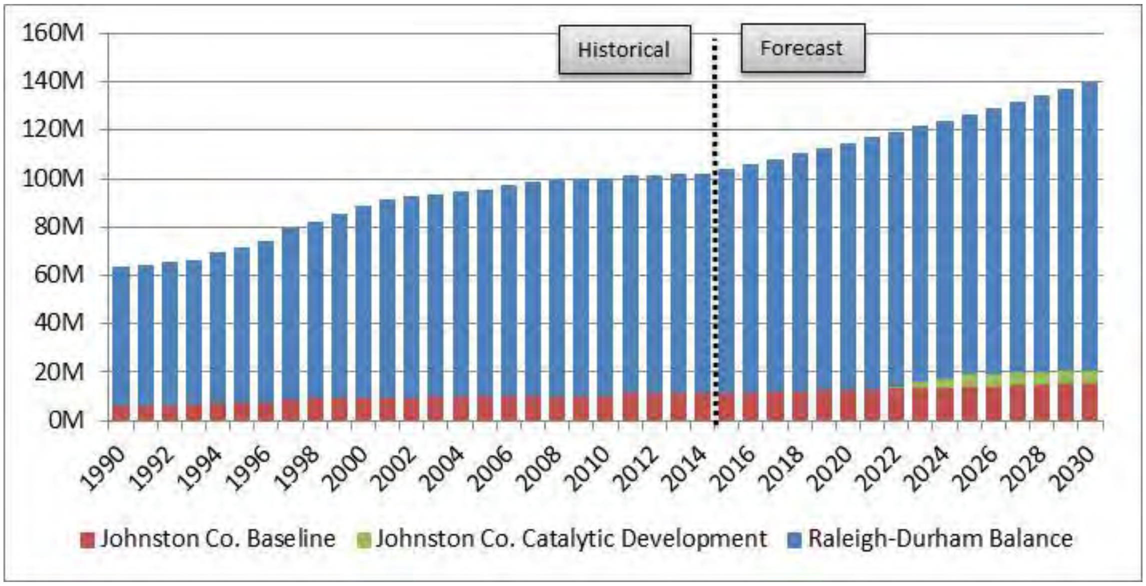
Based on preliminary research, there appears to be little available data or analysis quantifying the impacts of an intermodal facility on the local industrial real estate market. There is, however, plenty of anecdotal evidence from other new facilities around the country that suggests that it can serve as a strong catalyst for new manufacturing and warehouse development in the immediately surrounding areas. A recent analysis by Jones Lang LaSalle suggests that 31 new intermodal facilities built or planned since 2000 have the potential to generate over 170 million square feet of new industrial development in the immediately surrounding area (5. 6 million square feet per facility). [17] CSX's own experience from previous intermodal developments supports these assertions. Development surrounding the Chambersburg, PA facility included large-scale expansions by major businesses, including Target, Wal-Mart, Kmart, and Rubbermaid, and many new, large-scale buildings were constructed near its Fairburn intermodal facility 20 miles southwest of Atlanta.

Although it is unknown how much new development the intermodal facility will generate, a preliminary, market-based analysis suggests that it could be in the millions of square feet over the long term. Johnston County's historical share of the overall Raleigh market was 11 percent as of 2014. Assuming

[17] *The Re-emergence of the Iron Horse; the Growth of Inland Ports and their Impact on Industrial Real Estate,* Jones Lang LaSalle, 2014

the Raleigh industrial real estate inventory continues to grow at its long-term compound annual growth rate of 2.0 percent (from 1990-2014), and the intermodal facility causes Johnston County's capture rate to ramp up from 11 percent to 15 percent over time, this would result in an additional 5. 1 million square feet of industrial space. It should be noted that this is an extremely high-level calculation.

Figure 23: Johnston County Historical and Forecast Share of Raleigh Industrial Inventory; Catalytic Scenario; 1990-2030



Source: CBRE, Parsons Brinckerhoff Analysis

This forecast uses a long-term historical growth rate that incorporates very strong regional growth during the 1990s, however, it also factors in relatively flat growth in more recent years. Real estate trends tend to be highly cyclical and extremely sensitive to economic conditions. Because the forecast period is straight-lined, it does not reflect any likely expansionary or recessionary economic periods. Although the catalytic development appears relatively small in the above chart, over 5 million additional square feet of space does represent dramatic growth at the Johnston County submarket level. A variety of factors, including weak economic conditions and local market land speculation, could serve to reduce this amount, or decelerate it such that it takes place over a longer period. As such, this catalytic forecast may represent the best-case scenario in terms of scale and timing of delivery. In less optimistic cases, the scale of new development spin-off is still likely possible, but would occur over a longer timeframe than the 5-year period reflected in the above chart.

Preliminary Employment and Fiscal Impacts

The potential delivery of as much as 5 million square feet of new space would yield a significant amount of new employment in the area. Using basic industry rule-of-thumb factors for employment per square foot, this amount of space could result in as many as 3,200 new employees. This calculation assumes the following:

- Two thirds of the new inventory spurred by the intermodal facility is comprised of warehouse uses and the remaining third is made up of manufacturing based uses. This is based on the existing mix of Johnston County industrial inventory by subcategory discussed above. It also assumes that the intermodal facility will not directly result in any new space for the R&D or "other" sub-categories.

- 2,114 square feet per employee for warehouse space based on an estimate from the U. S. Department of Energy.
- 535 square feet per employee for manufacturing space based on an estimate from the Institute of Transportation Engineers.

This estimated number of jobs does not take into consideration any indirect or induced increases in employment resulting from the new economic activity in the area.

The extent of spin-off development will also have a significant positive impact on county- and state-level fiscal revenue. In Johnston County, property taxes represent the majority of revenue generated. Although time constraints limit the ability to conduct detailed research and analysis of industrial property values in the county and region, a sampling of sales transactions from a recent CBRE quarterly report suggest that $70 to $80/square foot is a conservative estimate of industrial property value in the region. Without adjusting for existing land value, this suggests that an additional 5.1 million square feet of development in the surrounding area would increase the county's property valuation by approximately $400 million. Applying the county's tax rate of $0.78 per $100 would yield an additional $3. 1 million per year in property tax revenue.

This analysis represents a preliminary, cursory calculation, and a comprehensive fiscal impact analysis is recommended to more accurately estimate the full fiscal impact of new industrial development in the area, as well as any potential indirect impacts from increased housing demand, retail sales, and other revenue sources. Although this new construction may require public sector investments in infrastructure upgrades, once these industrial uses are delivered, they will not require significant increases in county / city services relative to the development of other land uses such as residential units, which serve to increase school capacity requirements and greater need for public safety services.

At the state government level, the majority of general revenue is comprised of individual income taxes and sales and use taxes. While the forecasted new development will contribute to increases in these revenue sources, a detailed analysis is recommended to estimate the extent of these increases, and to determine how much new employment generated will pull from beyond the state.

Land Inventory

In the Raleigh region, the average coverage ratio (building-to-land ratio) for modern (built in the last 10 years) manufacturing and warehouse properties is 0.16. This indicates that for 5.1 million square feet of new space to be delivered, over 700 acres of non-contiguous developable land would be required in the surrounding area.

Chapter 7: Local Land Use Alternatives

Selma, NC is located in Johnston County approximately 30 miles (25 minutes) southeast of Raleigh and covers a total area of 3.2 square miles. The major designated routes and highways that pass through or near Selma include U. S. Highway 70 and 301, North Carolina Highway 39 and 96, and Interstate 95. The current rail operations in the area include services by CSX and Norfolk Southern, which run adjacent to Selma. The CSX mainline is located 5 miles to the north, parallel to I-95. The proposed Intermodal CCX facility site is located east of Selma between the I-95 and CSX corridors.

Demographics and Workforce

Demographics, socioeconomic environment, and workforce are important factors in intermodal terminal-related development. As logistics services are becoming more sophisticated and supply chains more complex, there is an increasing need for highly skilled labor.

Average worker age, earnings, and education serve as an indicator of labor skills. Looking at Johnson County, 24.4 percent of the population is less than 29 years old, while 57.3 percent is between 30 and 54 years old. This suggests a relatively large labor pool that is young and trainable for employment. The local population is also educated with 17.5 percent of the worker age population having a bachelor or advanced degree, 23.4 percent of the population having a high school or equivalent education, and 24 percent with some college or associates degree. Only 10.3 percent of the population has less than a high school degree. The age and education level of the population are a good indicator of a healthy labor market.

To provide further perspective on the labor force, Johnston County was compared to two counties with major intermodal logistics centers, Polk County (Central Florida Intermodal Logistics Center) and Franklin County (Chambersburg, PA).

Table 31 shows that Johnston County compares favorably with the two counties having similar distributions of worker age, earnings, and worker education attainment. These demographics are reasonably conducive to attracting intermodal logistics facilities and supportive freight facilities to the area.

Table 31: Labor Force Benchmarking

	Johnston County (Selma)		Polk County (Winter Haven, FL)		Franklin County (Chambersburg, PA)	
Population Estimate 2013	177,967		623,009		152,085	
Labor Force						
Total All Jobs -2011						
	Count	Share	Count	Share	Count	Share
Total	43,186	100%	201,702	100%	50,249	100%
Worker Age						
	Count	Share	Count	Share	Count	Share
Age 29 or younger	10,546	24. 4%	42,780	21. 2%	11,861	23. 6%
Age 30 to 54	24,741	57. 3%	113,318	56. 2%	27,484	54. 7%
Age 55 or older	7,899	18. 3%	45,604	22. 6%	10,904	21. 7%
Earnings						
$1,250 per month or less	13,217	30. 6%	51,013	25. 3%	13,930	27. 7%
$1,251 to $3,333 per month	18,805	41. 9%	87,539	43. 4%	19,635	39. 1%
More than $3,333 per month	11,884	27. 5%	63,150	31. 3%	16,684	33. 2%
Worker Education Attainment						
Less than high school	4,463	10. 3%	22,143	11. 0%	4,004	8. 0%
High school or equivalent, no college	10,106	23. 4%	47,381	23. 5%	13,873	27. 6%
Some college or Associates degree	10,524	24. 4%	51,663	25. 6%	12,306	24. 5%
Bachelor's degree or advanced degree	7,547	17. 5%	37,735	18. 7%	8,205	16. 3%

Source: U. S. Census Bureau, OnTheMap Application

Johnston County has a younger and better paid labor force than either Polk County or Franklin County. While it ranks behind Polk County in percentage of college graduates, Johnston County has a higher percentage than Franklin County. Johnston County also falls between the two other counties in labor force with less than high school education.

Freight and Logistics Facilities

Logistics services are provided by several types of facilities with each having a different purpose and different location requirements. Each, however, will have an impact on corollary land uses and traffic. For example, a distribution center will increase truck traffic in the immediate area contributing to congestion and reduced air quality. On the other hand, these facilities can also be a catalyst for economic growth by spurring new development or redevelopment of existing underutilized land, increasing property value. They also generate income for the community and state directly in the form of property tax and indirectly through employees or vendors making local purchases.

Below is a table of representative examples of freight and logistics facilities.

Table 32: Freight Facility Alternatives

Facility Type	Name of Facility	Size	Direct and Indirect jobs	Transportation Access	Freight handled	Freight Volume
Inland Port	Virginia Inland Port	161 acres	17 direct jobs, over 8,000 indirect jobs	One Class 1 Railroad (NS), within 5 miles of I-66 and I-81	Intermodal containers	33,600 Containers
Intermodal Terminal	Rickenbacker Intermodal Terminal (Columbus, OH)	175 acres	Approximately 150 direct jobs at Intermodal facility , projections of 20,000 jobs at freight industrial park	Two Class 1 Railroads (NS& CSX), within 5 miles of I-270 and Highways 23 and 33 Airport 1 mile	Primary intermodal containers	250,000 annual container movements
Bulk or Transload Terminal	Savage Safe Handling (Auburn, ME)	210 Acres	100 direct jobs	One Shortline Railroad (SLA), within 3 miles of I-95	Chemicals, plastic pellets, liquid fuels	500,000 tons per year – 5,000 railcars per year
Distribution Center	Family Dollar	75 acres, 1.2 million sq.ft. for buildings	515 direct jobs , catalyst to another 155 DC jobs	Direct ramp to I-10 Highway	Consumer retail goods	90 trucks / day – 32,000 trucks per year
Intermodal Logistics Center	Central Florida ILC (Winter Haven)	900 acres	55 direct jobs-terminal 8000 jobs-ILC	Class 1 Railroad CSX State Road 60	Primarily Intermodal containers	300,000 intermodal rail lift per year
Hub Terminal	Old Dominion (Morristown , TN)	65 acres		Adjacent to I-81	Consumer retail goods	75-90 trucks per day

Source: NCFRP Report 13

While CCX will serve the role of intermodal terminal, it will attract other of the logistics services to Selma and the region. Distribution centers will locate in the area with the potential for collocation with other facilities in an integrated intermodal logistics center. Although, logistics development would be expected to be focused on containerized shipments, facilities handling bulk or other non-containerized products could also locate in the region.

Table 33 presents the requirements for representative industrial uses including logistics and manufacturing. It shows that intermodal rail access is typically required within 100 miles of many industrial uses.

Table 33: Industrial Facility Requirements

Industry	Industrial Distribution	Modal Facility	Heavy Industrial/ Manufacturing	General Manufacturing	Hi-Tech Mfg. & Processing
Example	***Auto parts***	***Truck terminal***	***Machinery***	***Plastics***	***Electronics***
Size (Contiguous, Developable Acres)	Minimum **25** acres	Minimum **15** acres ; Medium **25** acres for hub or large LTL.	Min. **25** acres	Minimum **10**	Minimum **25**
Security	Manageable at site	Manageable at site	Manageable at site	Manageable at site	Manageable at site
Population w/in 1 hr. drive	>20,000	>200,000	>30,000	>30,000	>50,000
Public Transit	Accessible	Accessible	Accessible	Accessible	Accessible
Skills	As defined by the specific industry	Basic logistics, Driver, material handling, technician	As defined by the specific industry	As defined by the specific industry	Strong engineering and IT skills across broad range
Other Economic Network	Proximity to end markets	Ability to serve immediate region	Proximity to supplier/vendor base	Proximity to supplier/vendor base	Proximity to strong, specialized supplier/vendor base
Highway Access	Interstate, state highway or major arterial within 5 miles	Interstate, state highway or major arterial within 1 mile or less	Interstate, state highway or major arterial within 20 miles	Interstate, state highway or major arterial within 30 miles	Interstate, state highway or major arterial within 15 miles
Intermodal Rail Access	Within 100 miles	As defined by mode	Within 100 miles	Within 100 miles	Not typically required
Port Access	N/AP	Variable	Bulk B/B & Project	Bulk B/B	N/AP

CSX Chambersburg and Fairburn (Georgia) intermodal terminals provide examples of the type of development that is likely to occur. The Chambersburg facility has attracted Target, Rubbermaid, Wal-Mart, Kmart, Schneider Logistics, and Franklin Logistics. Locating near Fairburn have been production facilities: Clorox, SC Johnson, Smuckers, Navistar, Exel, Purin, Unilever, and Georgia Pacific.

Freight Facility Location Criteria

Beyond demographics, other criteria are important in logistics facility location. Key criteria include:

Accessibility to key markets- Proximity to population and economic centers is an important consideration in the location of logistics facilities.

Congestion-free connectivity with markets and production locations - A congestion free local and regional roadway as well as rail network is extremely important. A fluid surface transportation network increases reliability and speed as well as reduces cost. The facilities are usually located on property along major highways or where multiple highways converge, near railroad terminals or major sea and air ports.

Availability of suitable facilities or land - Another consideration in logistics facility site selection is land or facility availability. Each type of logistics activity has specific land or facility size requirements driven by the processing and product storage conducted at the facility as well as commercial vehicle parking need. Land or facility cost is equally important as acreage or floor space. Zoning is a factor that contributes to space availability and cost.

Ease of permitting and no burdensome regulation - Permitting and regulatory procedures can impact the logistics facility location decision. Where a community is already experienced with freight facilities and their operations/process, that understanding can positively influence a company locating a facility in that area.

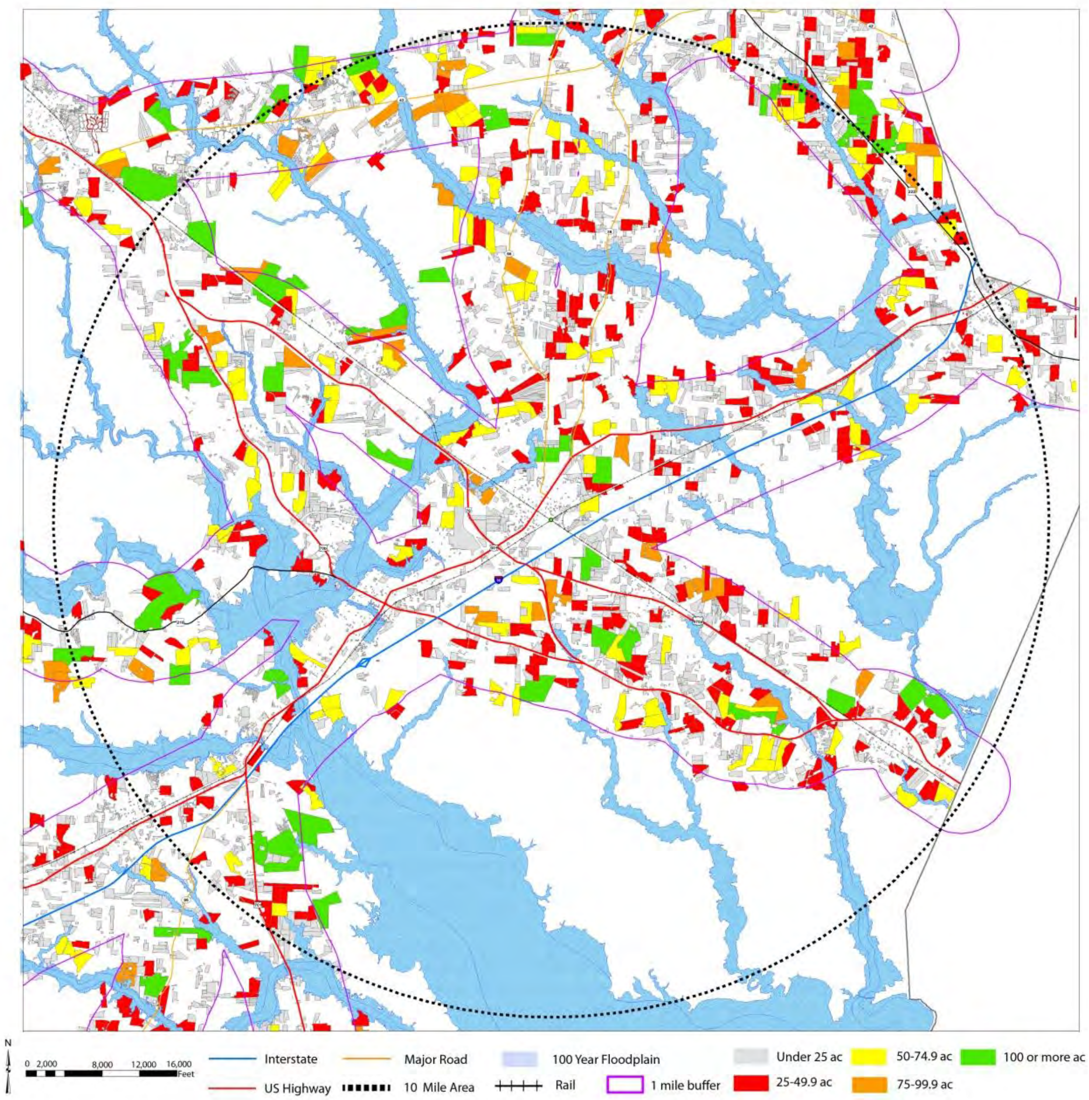
Favorable tax environment- Income, sales, real estate, and other property taxes can affect the logistics facility location decision as any of these can materially affect cost.

Favorable climate and minimal natural hazards - Unfavorable climatic conditions and natural hazard can affect both operating costs and employee safety.

Freight Dependent Industry and Logistics Services Site Inventory

Several sites suitable for industrial facilities within a 10-mile radius from the proposed intermodal facility were identified and shown in Figure 24. Potential sites were examined in terms of physical constraints and opportunities. Properties were selected based on size and configuration; ease of access to and distance from key transportation points (highways, intermodal facilities), rail access, and environmental considerations (floodplain, wetlands), and a vacant land use classification. Figure 25 shows parcels and corresponding acreage. In addition, parcels are identified that are within one-mile of major highways. These are considered to be located in preferred development zones (PDZ).

Figure 24: Site Inventory: 10 Mile Radius of CCX



Focus Area for Related Facilities

While the 10-mile analysis area identified a large number of vacant parcels of different sizes, it is also important to look at potential sites that could be developed closer to the CCX terminal. Sites closer to the terminal will be more attractive for development in the near term, than sites further away from the terminal, due to proximity to the terminal and the lack of increased competitive land prices. Additionally, sites closer to the terminal could attract higher land values in the future and could create demand to assemble contiguous vacant and underutilized parcels.

Four (4) mile catchment defines primary employment area. Based on the specific geographic context of the CCX terminal, including the locations of major roadways proximate to the terminal, a 4-mile catchment area has been defined (Figure 25) where most of the vacant and underutilized parcels are within 1-mile of a major roadway. The 4-mile area constitutes the potential “employment area” based on industrial investments. These parcels could qualify as suitable sites for industrial facilities.

Value of underutilized parcels - Since the 4-mile area represents a more competitive area than farther away from the terminal, parcels identified in this area were classified as vacant and as underutilized. In this context, underutilized parcels were identified where the land improvements are less than ten percent (10%) of the land value. For instance, this occurs when the land value of a parcel may be valued at $100,000, and the improvement (or structure) on the land is valued at less than $10,000. This is significant because the cost to acquire these parcels is relatively the same as the cost of vacant land, and identification of highly underutilized parcels can show patterns of lands that have the potential to be assembled into productive job centers. Figure 25 illustrates the mix of vacant and underutilized parcels. Vacant properties are shown in green. Properties that are underutilized are shown in other colors (i.e. residential, non-residential, and other). Note the clusters of contiguous parcels that are formed to the northeast of the terminal, to the north of the terminal and to the southwest of the terminal.

Figure 25: Site Inventory: 4 Mile Radius of CCX

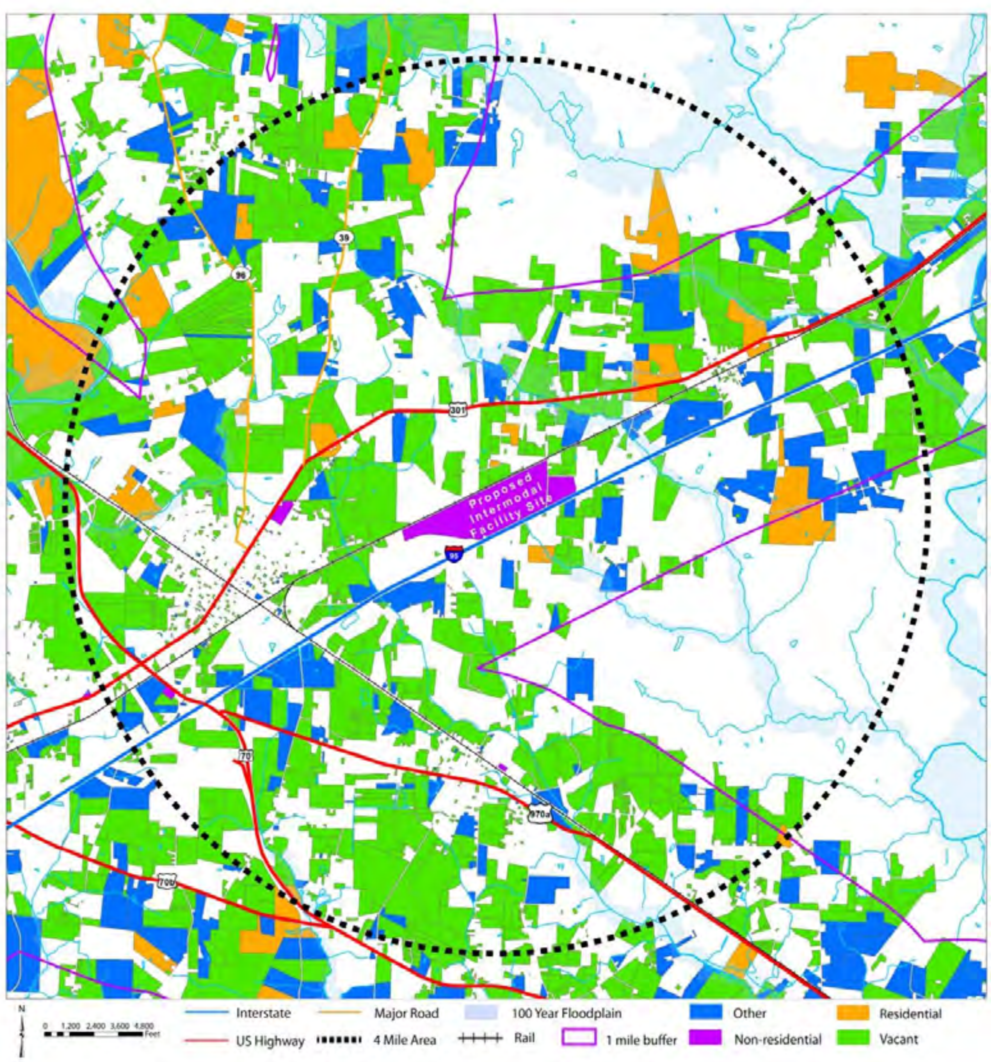
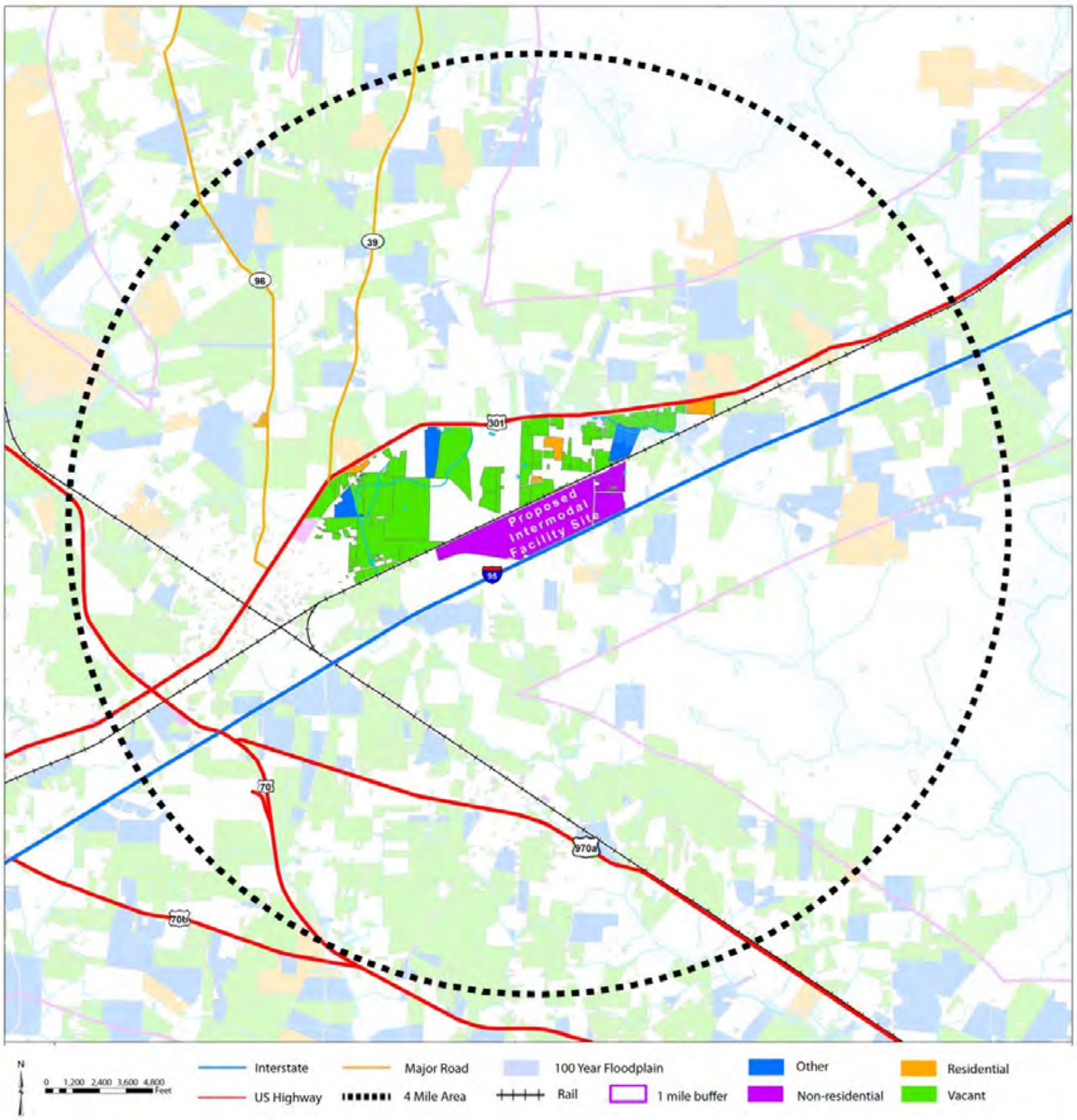


Figure 26 illustrates several attractive parcels within the 4 mile radius area that could be consolidated for freight generating facilities. These were selected based on adjacency to the proposed intermodal facility site, easy access to the transportation network, access to rail and availability of suitable parcels (i.e. vacant or underutilized parcels).

Figure 26: High-Potential Sites for Freight Facilities



Intermodal Logistics Center

Figure 26 suggests an opportunity for the development of an intermodal logistics center (ILC). An ILC is a site or area hosting a cluster of industrial, distribution, and logistics infrastructure and supporting uses. The ILC can incorporate an intermodal terminal or it can be adjacent to the terminal permitting the movement of cargo without the need to use public thoroughfares. The central feature of the ILC is high-quality connections to intermodal and other transportation infrastructure (road, rail, air, and barge) that enable the fast and flexible transportation of freight. Because of the development costs, many ILCs are funded by large private developers who also serve as integrators or through public-private partnerships.

A distinguishing characteristic of an ILC is shared access to facilities, equipment, and services among firms located on site. This access can include common intermodal infrastructure, customs and quarantine services, cleaning and repair areas, information technology and telecommunications, and security areas.

ILCs add significant value to the supply chain through their diversity of collocated facilities, services, and infrastructure. The combination of freight generators with multiple modes of transportation, logistics activities, and commercial support services at a location near markets can increase regional competitiveness. An ILC can have a large impact on a number of freight-related processes and provide additional value, to the extent that services can be coordinated.

Selma ILC Example

Shown in Figure 27 are parcels north of the proposed CCX facility that were found to be potential candidates for inclusion in an ILC due to the ability to assemble large contiguous or proximate sites (over 500 acres), proximity to the CCX terminal, and availability of highway transportation (less than one mile from a major roadway). The ILC could support warehousing and distribution centers, office, light industry, and manufacturing and assembly.

Figure 27: Candidates Sites for an intermodal logistics center

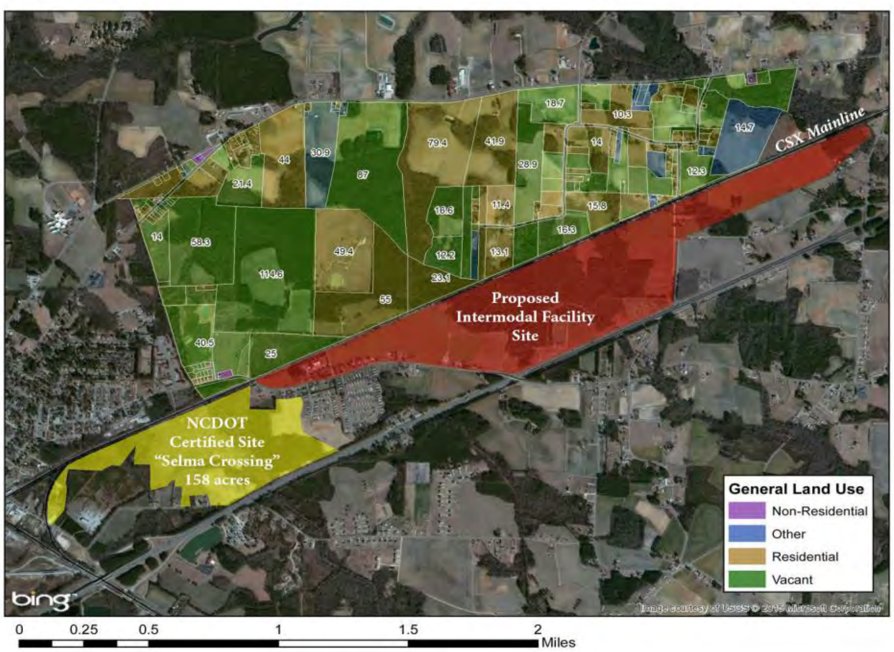
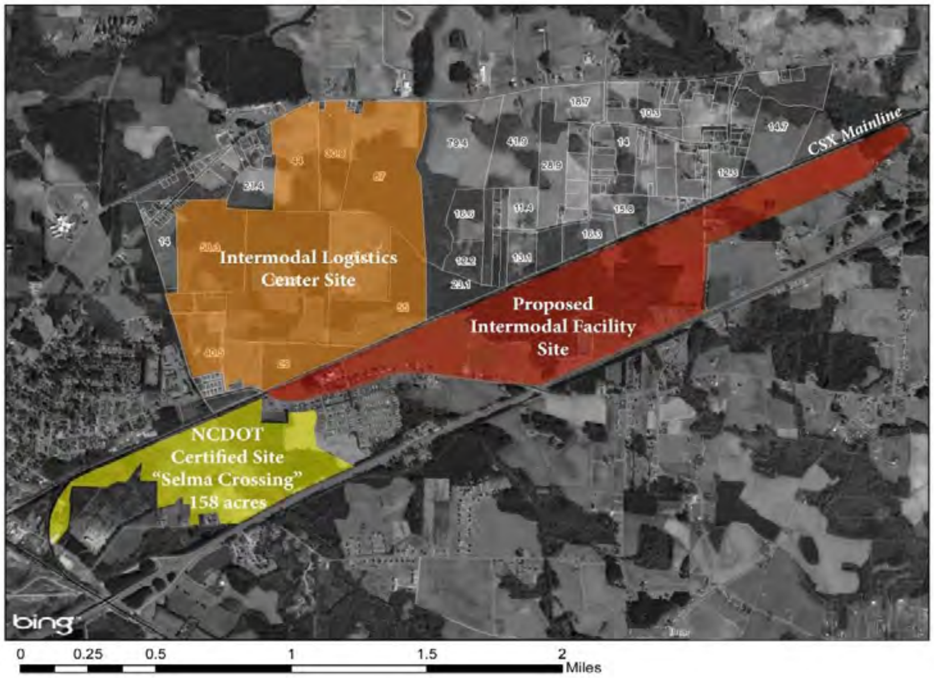


Figure 28 Illustrates one example of an ILC footprint on a 550 acre site assembled from large parcels of vacant land.

Figure 28: Intermodal Logistics Center Site Example



Available land in close proximity to the CCX facility presents a local opportunity to leverage the benefits of the terminal.

Typically, warehouse buildings are estimated to occupy somewhere between a quarter and a fifth of the land on sites where they are located. The remaining land is devoted to parking lots, roadways, and landscaping. A reasonable estimate is for a warehouse to occupy roughly 12,000 square feet per acre. The U. S. Energy Information Administration (EIA) estimates that the employment density of warehousing is about 1,700 square feet per worker. [18] Based on those assumptions, the estimated employment generated by a 550 acre ILC is 3,880 jobs.

[18] http://www.eia.gov/consumption/commercial/data/2003/pdf/b2.pdf

Chapter 8: Capacity Assessment

CCX Terminal Capacity

Limited information on the CCX facility and its operations precluded conducting capacity analysis. The CSX Northwest Ohio Intermodal ICTF in North Baltimore, however, provides a benchmark to assess broadly the capacity of CCX as its operating model is similar to that being proposed for CCX. The North Baltimore facility is used to process railcars traveling between western rail carriers and the CSX system. The terminal is also used for local shipments to or from Northwest Ohio.

The CSX $175 million Northwest Ohio ICTF began operations in early 2011. In two years, CSX saw the need to expand the terminal as lift activity began to increase significantly. The expansion, which extended eight 3,000 foot processing tracks to 5,300, added two additional cranes, and increased the number of receiving and departure tracks and cost $42 million increasing investment in the facility to $217 million.

CSX provided a potential footprint for the proposed CCX facility, a schematic of a typical cross section of the terminal, and basic information about assumed track length, container dwell time, container sizes, and train lengths.

While this information is insufficient to develop a quantitative assessment of the capacity or scalability of the terminal, it does permit a high order evaluation of capacity to be made.

The capacity of the Northwest Ohio ICTF is 2 million lifts per year. It processes 30 trains per day. The traffic analysis included in this study estimates that containers handled by CCX will grow through the last analysis year of this study, 2048. Under the base traffic scenario, the CCX terminal will handle approximately 478,000 loaded containers in 2048, and under the high traffic scenario, CCX will handle approximately 528,000 containers that year. Using the very conservative assumption that both the full local containers and transfer containers would generate a complementary empty container move, the total required capacity would be 1,056,000 units or lifts per year under the high scenario.

Benchmarking the proposed CCX layout under full build out to the Northwest Oho ICTF is shown in Table 34.

Table 34: Comparison of CCX to Northwest Ohio ICTF

Metric	Northwest Ohio ICTF	CCX
Total Acreage	500	Approx. 450
Total Length Along Mainline (feet)	10,560	Over 10,000
Total width, i.e. perpendicular distance from mainline to far end of truck parking area (feet)	726	646 or 803 (2,000 width of footprint)
Number of Support Tracks	9	12
Avg. Length of Support Tracks (feet)	8,631	8,500
Number of Process Tracks	8	8
Avg. Length of Process Tracks (feet)	3,953	4,300
No. of Rail Mounted Gantry Cranes	5	6
Lanes for Straddle Carriers	3	0
Width of Container Stacking Area (container widths)	5	5
Number of Wheeled Spaces	Approx. 450	1,200

As shown, most of the proposed dimensions of CCX are at least as sizeable as the Northwest Ohio ICTF. This would suggest that CCX should have more than enough capacity to handle the approximately one million lifts that would be required at full build out. However, the mix of local and transfer containers handled would differ. The differing proportions of local and through freight could cause the capacities of the two terminals to differ.

Rail Network Capacity

This section assesses the ability of CSXT's rail network to support the incremental train traffic that is expected from the proposed CCX terminal. The terminal will route cargo with origins and destinations throughout the US through North Carolina, which will increase train volumes in and around the state. The rail network needs to have enough spare capacity to accommodate this increase without seeing a significant degradation of service quality. Moreover, because these new trains will be providing high-priority intermodal service, speeds and reliability need to remain high in order to be competitive in targeted markets. Many of these rail lines also have high volumes of passenger trains, requiring service to remain fast and reliable in order to meet schedules.

This capacity assessment was performed using the information provided by CSXT. CSXT maintains detailed data on train operations throughout their network, and constantly looks for ways to improve fluidity by removing bottlenecks. Most of this information is proprietary and not commonly shared with consultants or the general public. However, in this case we received historical performance data on a couple of segments that CSXT had identified as representing bottlenecks in the region. Our assessment focused on this data, describing how capacity was inferred, and benchmarking results with nationwide averages.

CSXT's Approach for Identifying Rail Bottlenecks and Choosing Solutions

1) Demand Forecast: CSXT used models of economic activity and freight demand to project current traffic into the future, with and without the CCX facility.

2) Critical Segment Identification: CSXT identified critical segments in their rail network by estimating practical capacity from historical data, and making a comparison to their traffic forecasts.

3) Simulation of Capacity Issues and Solutions: Each critical segment identified is then modeled using simulation software to single-out the specific issues or conflicts causing performance degradations and evaluate potential solutions.

4) Engagement of Local Resources: CSXT presents their findings to the local resources that manage and operate the critical segments to validate simulation results and provide a ground-level perspective on issues causing capacity constraints.

5) Project Selection: CSXT then considers all of the evidence obtained and selects the projects that have

Capacity Constrained Segments

Rail capacity is a difficult concept to quantify because it is a function of performance. Just like vehicles operating on highways, there is an optimal point at which the throughput of trains cannot be maximized without seeing a major degradation of speeds and performance. After this point, if more trains are added to the segment, performance will decline and conditions on the corridor could resemble gridlock on highways. However, unlike in highways, trains are scheduled by railroads and operations are rarely allowed to reach a point of congestion. The flow of trains through the corridor is restricted in order to achieve required performance levels that allow rail to be competitive against other modes. In other words, capacity is defined more by the ability to provide a competitive service that is desired by end users and less about the physical limitations of the infrastructure on throughput. This is particularly important for passenger and intermodal trains, which require significantly higher travel speeds and greater reliability.

CSXT provided data on two segments that it found were operating near capacity: the SE-Line and A-Line. Train performance was found to be worse on the SE-Line between Pembroke and Hamlet, as can be seen in Figure 30. Even though the SE-Line carries lower priority merchandise trains, degradations in performance occur at much lower volumes due to inadequate infrastructure capacity, and lower speeds extend throughout a greater range of operations. Adding an intermodal train on this segment would be practically impossible given these operations—the speeds are too low and unreliability too great.

Figure 29 and Figure 30 show performance data on these segments that demonstrate how both of these are currently operating near operational capacity. Using these flow-density diagrams to display the performance data is useful because they simultaneously show the relationship between flows, speeds, and reliability. Flows can be read on the y-axis, while speeds can be read as the slope of the line connecting each record to the origin. Reliability, then, is a function of the range of speeds (distance along the x-axis) for a given level of flow. As expected, in both of these figures, speeds and reliability decrease with higher train flows.

For the A-Line between Rocky Mount and Selma, performance degradation is clearly observed when volumes approach 28 trains per day. With 2015 YTD 85th percentile volume[19] currently at 29 trains per day, additional volume growth across this segment will push CSXT into a situation where, based on current infrastructure limitations, congestion and reliability will increase nonlinearly (as seen in Figure 29). In other words, without capacity investments, the risk profile of operations across this segment will increase markedly with additional growth—a situation that CSXT cannot accept due to the substantial passenger volume on the corridor.

The performance of trains was found to be worse on the SE-Line between Pembroke and Hamlet, as can be seen in Figure 30. Even though the SE-Line carries lower priority merchandise trains, degradations in performance occur at much lower volumes due to inadequate infrastructure capacity, and lower speeds extend throughout a greater range of operations. Adding an intermodal train on this segment would be practically impossible given these operations—the speeds are too low and unreliability too great.

[19] 85th percentile volume is the volume metric CSXT uses to compare to infrastructure capacity to avoid the risk of working with averages, which do not account for day of week variability. Using the 85th percentile volume helps CSXT ensure that its infrastructure capacity is sized to reliably handle normal day-to-day variability that is experienced across the railroad.

Figure 29: Performance of CSXT A-Line (Rocky Mount – Selma) as a Function of Intermodal Train Volumes, 2008 to 2015

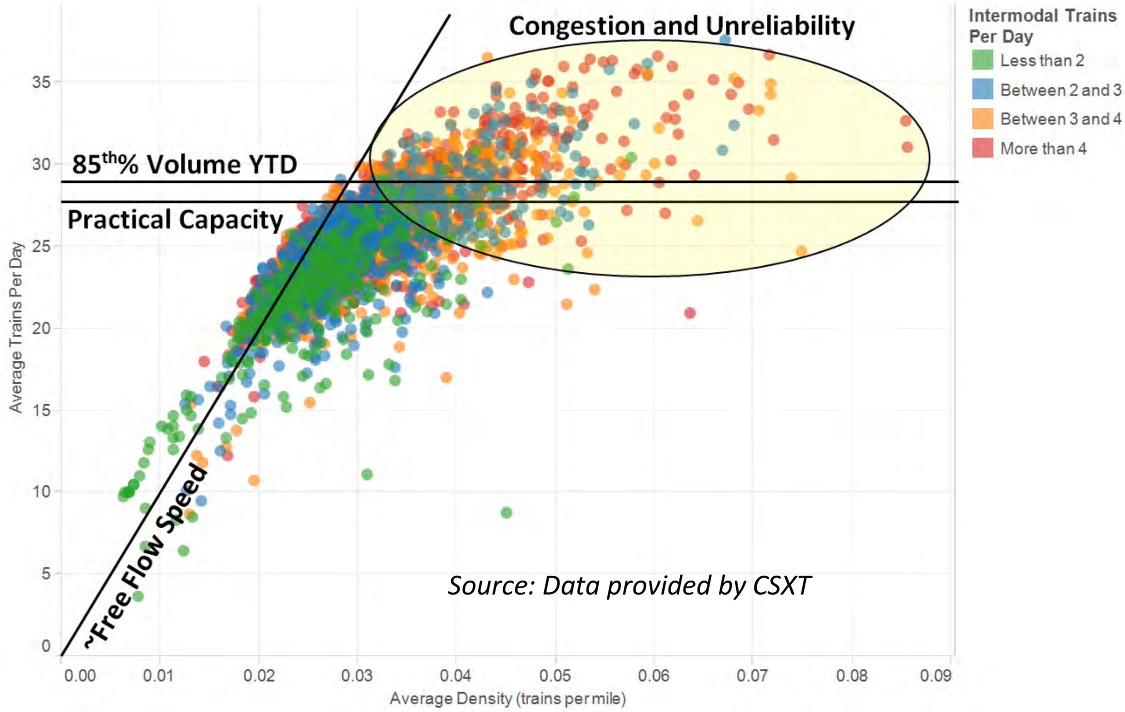
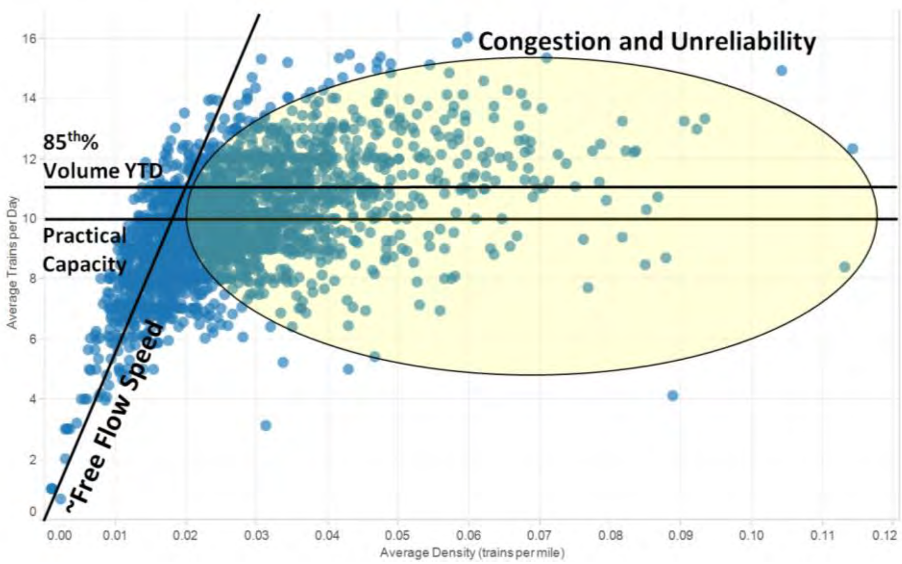


Figure 30: Performance of CSXT SE-Line (Pembroke – Hamlet), 2008 to 2015



Source: Data provided by CSXT

Rail Capacity Benchmarks

It is difficult to benchmark the capacity estimates presented in the previous section because of the wide variety of factors that come into play. Tracks that appear similar on the surface can have very different capacities depending on the train mix, schedules of passenger and intermodal trains, frequency of sidings, conflicts with local trains, etc. However, the estimates in Table 34 provide a reasonable starting point for benchmarking the volumes on the A- and SE- Lines. This table was generated by a study that obtained capacity information from Railroads all over the US, including a wide range of infrastructure characteristics and operating conditions.

The A-Line can be best represented in Table 35 as a single track using centralized traffic control to move multiple types of trains. Given these conditions, one would anticipate the A-Line having a capacity of 30 trains per day based on the information in the table. This value is only slightly higher than the capacity estimated in the previous section, of 28 trains per day. This implies that the historical analysis of performance data for this Line provides a reasonable estimation of capacity that is comparable to what is observed elsewhere in the US.

On the other hand, the historical analysis of performance data for the SE-Line show a capacity estimate that is much lower than the values in Table 34. Even an uncontrolled single track should have a higher capacity than what was estimated from this analysis. The reason for this discrepancy, which CSXT discovered from talking with their local operators, is that the storage track on this Line is not long enough to accommodate local trains, causing conflicts on the main line. This was preventing the SE-Line from reaching expected performance levels.

Table 35: Average Capacities of typical Rail-Freight Corridors

		Trains per Day	
Number of Tracks	Type of Control	Practical Maximum If Multiple Train Types Use Corridor*	Practical Maximum If Single Train Type Uses Corridor**
1	N/S or TWC	16	20
1	ABS	18	25
2	N/S or TWC	28	35
1	CTC or TCS	30	48
2	ABS	53	80
2	CTC or TCS	75	100
3	CTC or TCS	133	163
4	CTC or TCS	173	230
5	CTC or TCS	248	340
6	CTC or TCS	360	415

Key: N/S-TWC – No Signal/Track Warrant Control.
ABS – Automatic Block Signaling.
CTC-TCS – Centralized Traffic Control/Traffic Control System.

Source: AAR: National Rail Freight Infrastructure Capacity and Investment Study, September 2007.

Capacity Enhancements Needed

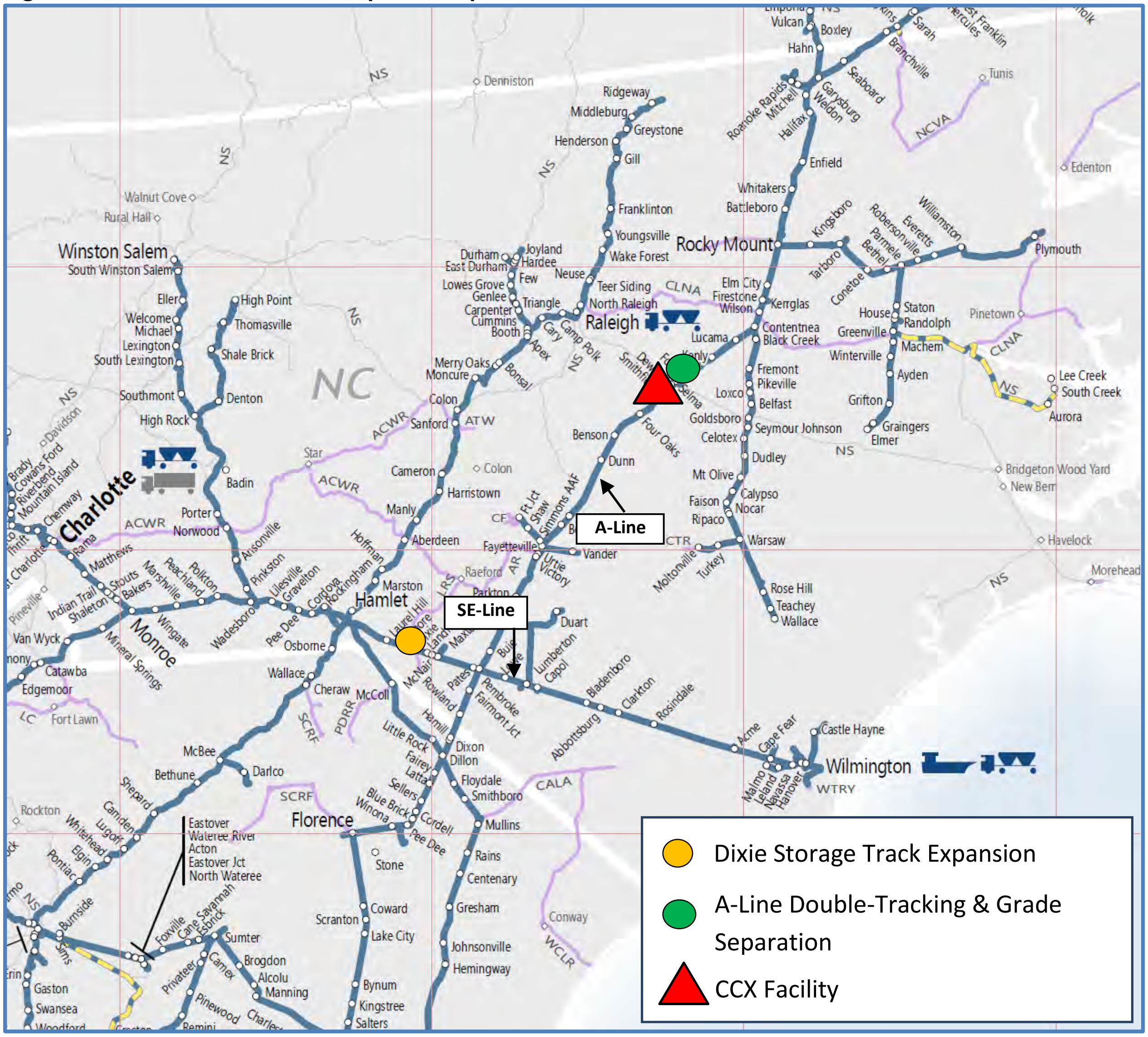
After analysis , it was determined that three investments are required in North Carolina to accommodate incremental train traffic from CCX (see Figure 31). These included:

1. **Double-tracking a segment of the A-Line in Selma, NC:** The A-Line is the CSXT main line and its sole connection east of the Appalachians between the northern and southern halves of its network. This lynchpin not only joins CSXT lines in the northern and southern portions of North Carolina, it connects the southeastern and northeastern regions and markets of the United States. The analysis of performance data indicated that this line is unlikely to be able to support the additional traffic of CCX facility without seeing significant degradations of performance,

which is unacceptable given the importance of this line to the whole network and its high volume of passenger trains. It is necessary to double-track 3. 9 miles of this rail line immediately north of the proposed CCX to facilitate the entry and exit of trains, and improve the ability of the line to support the wide range of train types it carries. This will allow non-intermodal trains to travel through this segment without major interruptions, eliminating the capacity issues identified in previous sections.

2. **Constructing a grade separation to cross the new double-track:** Pittman Rd crosses the A-Line north of the CCX facility, right where the double-tracking is proposed. The CCX facility itself will increase the frequency of train crossings, but the double tracking will amplify this effect because both lines would be used simultaneously. This will significantly eliminate the need to slow trains approaching the crossing. This crossing has a large impact on vehicular traffic because it is located less than half a mile from an I-95 interchange. This road is often used as a release valve for I-95 when there is a service disruption and vehicles seek alternative routes, principally US301. To preserve this option, and limit disruptions to existing traffic, it is been recommended that this grade separation project be included with the double tracking of the A-Line.
3. **Extending the Dixie Storage track on the SE-Line (Wilmington Subdivision) in Laurinburg, NC:** As seen in the previous section, a line with the characteristics of the SE-Line should be able to support higher volumes before having capacity conflicts and seeing a degradation of service. The reason, it turns out, for the poor performance of this line is the insufficient length of the Dixie Storage Track, which causes local trains to back up into the mainline. Fixing this issue would allow the SE-Line to support significantly higher volumes at higher speeds, enabling intermodal trains to traverse this segment. Currently no intermodal trains travel along this route for this reason.

Figure 31: CSXT Network and Proposed Improvements



Source: CSXT Rail Network

Roadway Capacity

A significant share of the intermodal containers handled by the CCX facility will come from or be delivered to local sources. Businesses around the CCX facility, including Raleigh and even out to Greensboro, would now have the option to ship their products throughout the US by intermodal trains. This will generate additional truck drayage activity on the roads leading up to CCX. This section provides a high-level assessment of the traffic impacts that this drayage activity would have on the access roads leading to the facility. Traffic generated by employees of the facility is also considered.

The traffic analysis focused on the I-95 & Pittman Rd interchange as most of the incremental vehicular activity will use this road. Figure 32 below identifies the study area and intersections included in the analysis: (1) Pittman Road & I-95 Southbound Ramp, (2) Pittman Road & I-95 Northbound Ramp, and (3)

Batten Road & I-95 Southbound Ramp. Both the capacity of the intersections and the roadways were assessed using Level of Service criteria.

Figure 32: Study Area

Methodology

Existing Network

Current traffic data (2013 Average Annual Daily Traffic (AADT)) for Pittman Road were obtained from the NCDOT Traffic Survey Group. Traffic data, however, were not available for Batten Road due to its rural status and short length; the 2013 AADT for Batten Road were assumed to be half of Pittman Road. The AADT data were converted to peak hour data assuming a K-factor of 10 percent and D-factor of 50 percent. The peak hour volumes for the 2013 Existing scenario are shown in Figure 33 at the end of this chapter.

Horizon Network without CCX

The traffic analysis was conducted for two horizon years, 2035 and 2048. A growth rate of 2 percent compounded annually was applied to the 2013 peak hour volumes of passenger vehicles to determine the horizon year volumes. The peak hour volumes for the 2035 and 2048 horizon network without CCX are shown in Figure 34 and Figure 35, respectively.

Horizon Network with CCX

The truck volumes that are expected to be generated by the facility were 2035 and 2048 were based on the diversion analysis presented elsewhere in this report. Table 36 illustrates the additional truck volume anticipated in the network.

Table 36: Projected Truck Traffic

	2035		2048	
	Inbound	Outbound	Inbound	Outbound
Yearly	120,333	124,103	173,260	167,996
Daily	330	340	475	460

Once the truck traffic reaches the Pittman Road interchange, 85 percent was assumed to travel south on I-95 and 15 percent was assumed to travel north on I-95. This split was calculated from an analysis of the counties generating the bulk of the traffic. In most cases, trucks will take the south I-95 route to exit the facility as it connects most directly to Raleigh and Greensboro. The routing, but in reverse, was also used for inbound drays. Ten percent of the daily truck volume was assumed to occur in the peak hour. The truck distribution percentages are shown in Figure 37.

The 9th Edition of the Institute of Transportation Engineers (ITE) Trip Generation Manual was used to estimate the number of proposed trips generated by employees during the peak hour. Table 36 identifies the volumes generated by a typical distribution center with 236 employees, which is the anticipated employment of the facility in 2035[20].

Table 37: Projected Employee Traffic

	Average Daily Trips			Peak Hour Trips		
	Inbound	Outbound	Total	Inbound	Outbound	Total
Distribution Center (236 employees)	459	459	918	49	90	139

Typically, there are two peak periods each day: AM peak (7am-9am) and PM peak (4pm-6pm). Only the PM peak hour was used for this analysis, since this peak represents the worst case scenario. The expected truck volume peak is during the middle of the day; however, to illustrate a worst-case scenario, the truck volume peak was added to the horizon year PM peak hour traffic volumes. Within the study area, 75 percent of employee traffic was assumed to travel south on I-95, 10 percent traveled north on I-95, 10 percent traveled south on Pittman Road and 5 percent traveled north on Pittman Road. The employee distribution percentages are shown in Figure 37. The combined 2035 and 2048 build volumes (horizon year + truck + employee) are shown in Figure 38 and Figure 39, respectively.

Intersection delay and congestion is commonly measured according to a level of service (LOS) scale. The LOS scale rates existing or projected intersection operations on a scale of A (best) to F (worst), according to the average motorist delay and congestion levels estimated. The LOS criteria for signalized and

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[20] Information provided by CSXT

unsignalized intersections as provided in the *2010 Highway Capacity Manual* (HCM) are described in Table 38**.**

Table 38: Level of Service Criteria

Signalized Intersections		Unsignalized Intersections	
LOS	Delay per Vehicle (seconds)	LOS	Delay per Vehicle (seconds)
A	≤10	A	≤10
B	>10 and ≤20	B	>10 and ≤15
C	>20 and ≤35	C	>15 and ≤25
D	>35 and ≤55	D	>25 and ≤35
E	>55 and ≤80	E	>35 and ≤50
F	>80	F	>50

SYNCHRO Version 9.0 was used to analyze the three intersections that were identified within the study area. The roadway network, intersection geometries, and traffic volumes were input into a SYNCHRO network in order to analyze the intersection operations. The HCS 2010 software was used to analyze the roadway capacity of Pittman Road and Batten Road.

Results

The results of the analysis are shown below in Table 39 and Table 40**.**

Table 39: HCS Roadway Capacity Analysis

	2035		2048	
	LOS	v/c ratio	LOS	v/c ratio
Pittman Road	B	0. 10	C	0. 13
Batten Road	B	0. 13	C	0. 16

The results of the HCS analysis indicate that both Pittman Road and Batten Road can accommodate the additional truck traffic associated with the proposed development in the 2035 and 2048 horizon years, based on the assumptions used in the analysis. Both roadways operate at acceptable levels of service and v/c ratios in the horizon years. There is an increase in LOS between 2035 and 2048; however, this is expected due to the additional background growth of traffic in the study area.

The results of the Synchro analysis indicate that all three intersections within the study area can accommodate the additional traffic associated with the proposed development in the 2035 and 2048 horizon years, based on the assumptions used in the analysis. All three intersections operate at acceptable levels of service and v/c ratios in the horizon years. There was only one increase in LOS at the Batten Road & I-95 Southbound Ramp intersection. The change in LOS can be attributed to the increase in background growth in the study area. Additionally, the Batten Road & I-95 Southbound Ramp intersection serves as the main ingress and egress intersection that distributes traffic through the network. As a result, some degradation would be expected at this intersection. Due to this, reconfiguration of the interchange ramp and Batten Road will be required. Further analysis will be conducted to determine the actual reconfigured design of the intersection.

Table 40: Synchro Intersection Capacity Analysis

	2035		2048	
	LOS	v/c ratio	LOS	v/c ratio
Pittman Road & I-95 Northbound Ramp	B	0. 17	B	0. 23
Pittman Road & I-95 Southbound Ramp	B	0. 10	B	0. 14
Batten Road & I-95 Southbound Ramp	A	0. 21	B	0. 25

Conclusions

Based on this preliminary analysis, the CCX facility would have a minimal impact on the roadways and intersections within the study area. Queuing is not expected to be a concern onto I-95, traffic signals are not expected to be required at the intersections, and widening would not be required on Pittman Road or Batten Road to accommodate the additional truck and employee traffic due to the projected operating characteristics of the study area network.

The existing network consists of local service roads that tie directly into all four of the interchange ramps, which creates a two-way pattern on the ramp. The additional traffic, associated with the CCX facility, creates a safety concern due to the high truck volumes that would utilize the interchange ramps. A realignment of the service roads and Batten Road is recommended to eliminate any two-way patterns on the interchange ramps.

As this project moves forward, further analysis relating to the Batten Road & I-95 Southbound Ramp configuration will be required. The next phase of the project will need to collect new traffic volume data and complete an evaluation of the impacts and possible roadway revisions and reconfigurations.

Figure 33: Existing Peak Hour Traffic Volumes

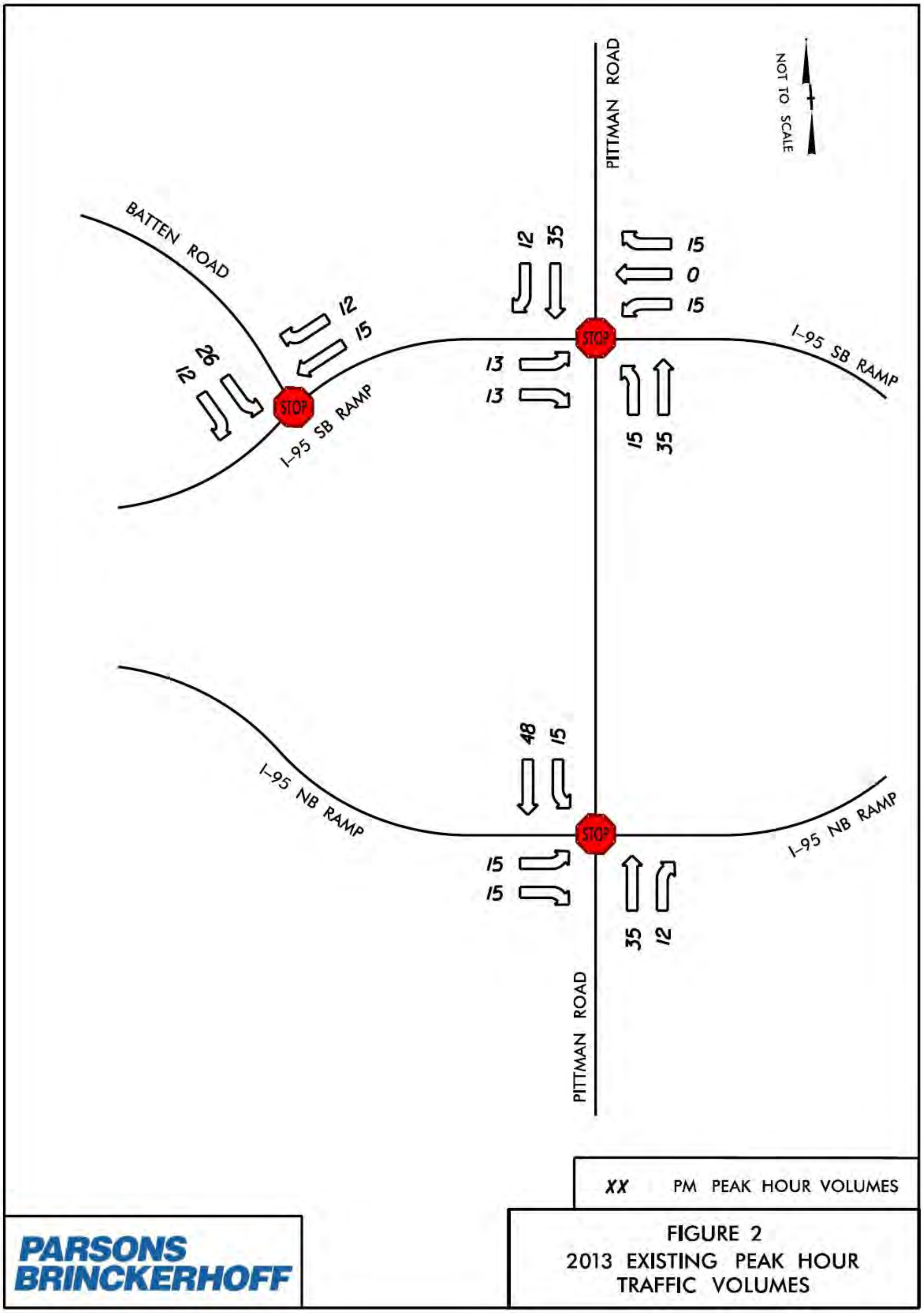


Figure 34: 2035 Horizon without CCX Peak Hour Traffic Volumes

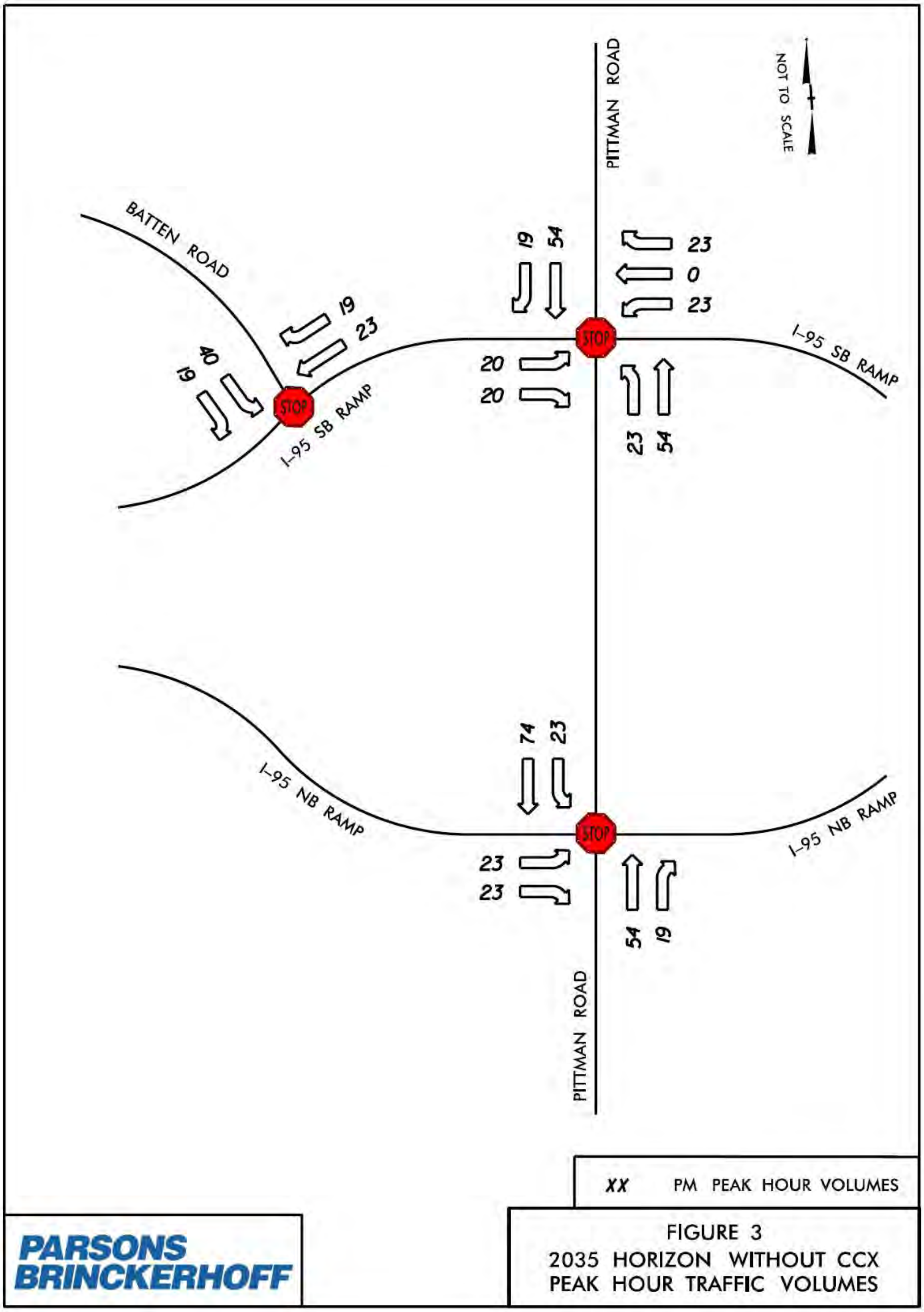


Figure 35: 2048 Horizon without CCX Peak Hour Traffic Volumes

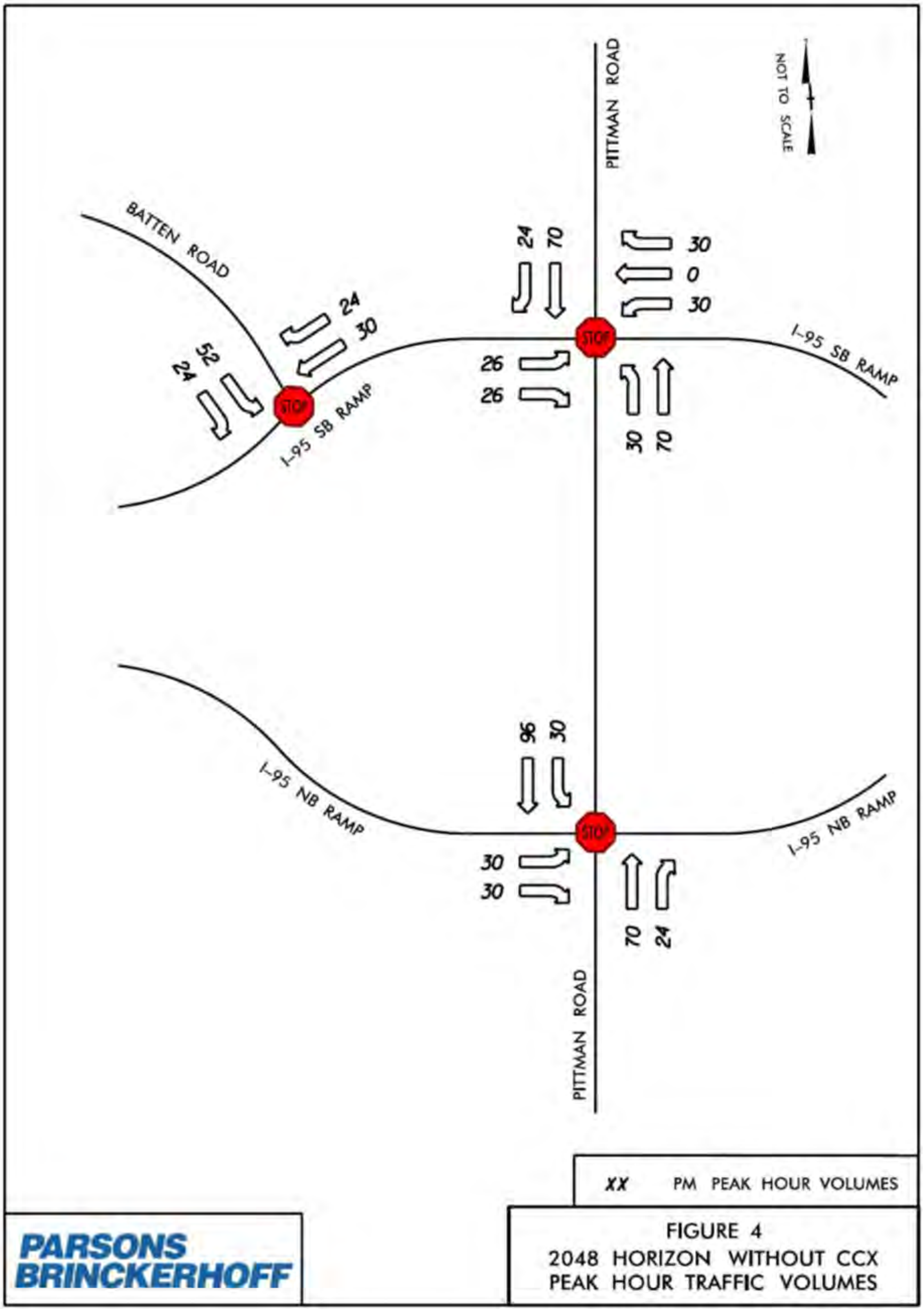


Figure 36: Distribution of Incremental Trucks

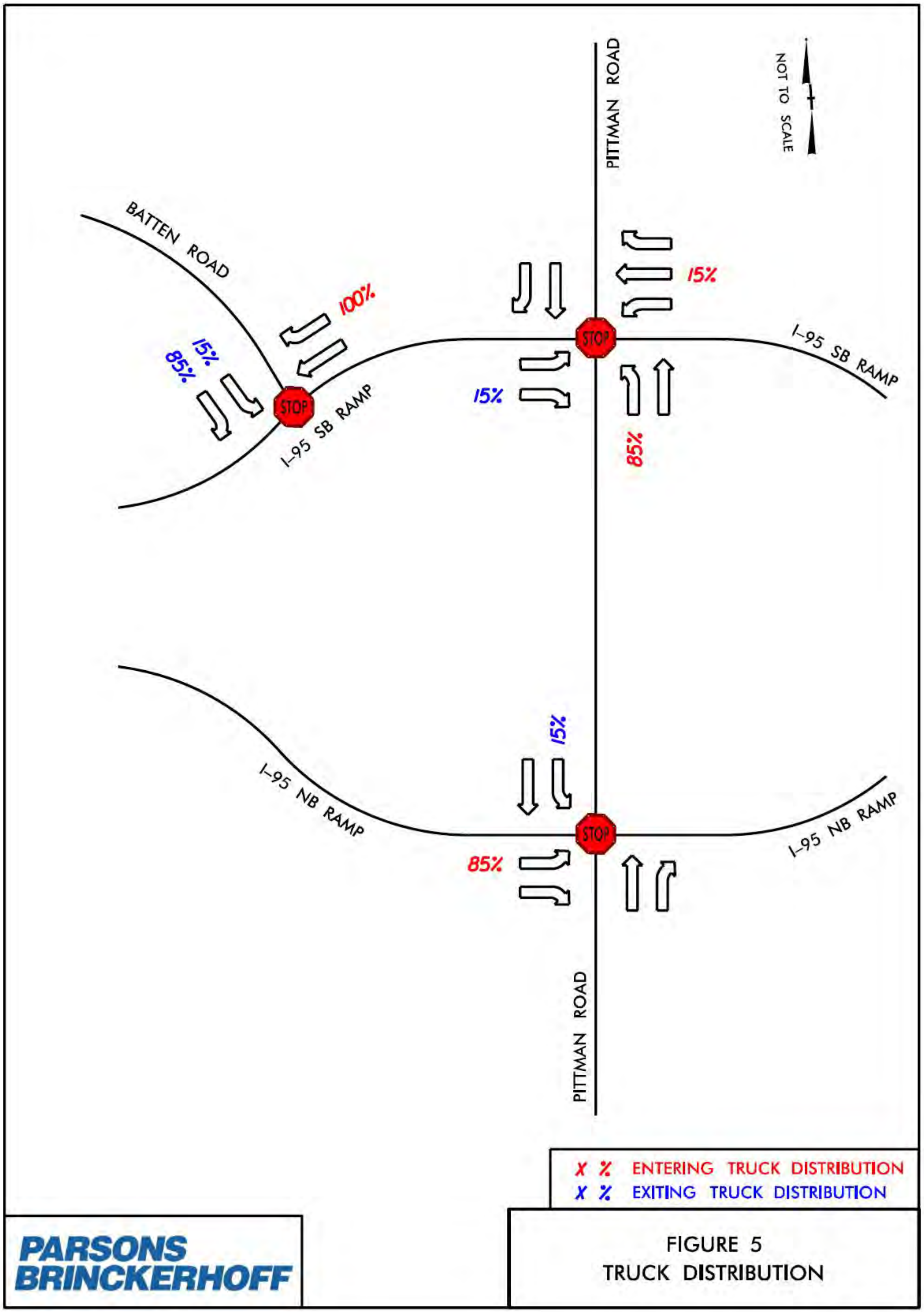


Figure 37: Distribution of CCX Employee Vehicles

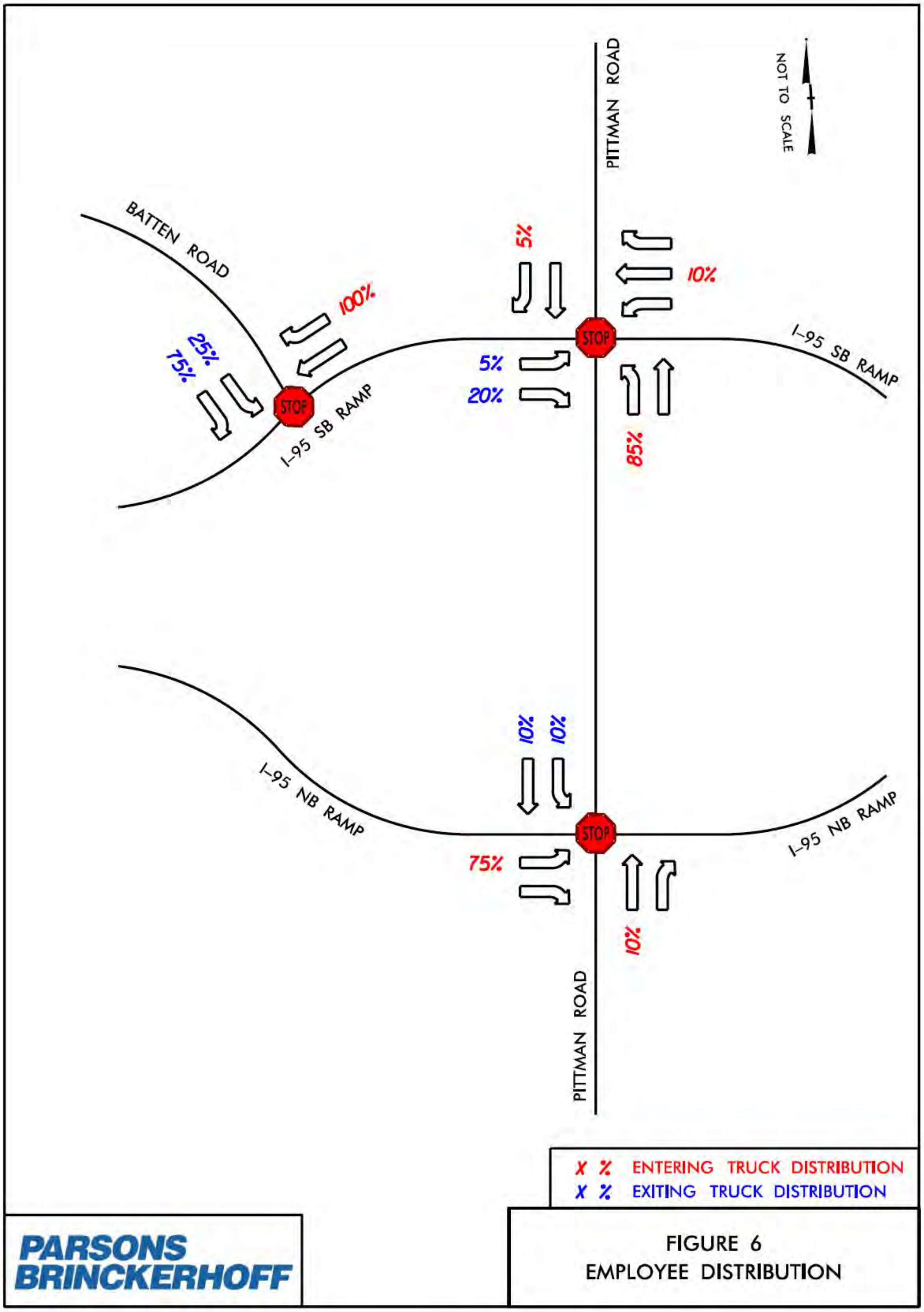


Figure 38: 2035 Horizon with CCX Peak Hour Traffic Volumes

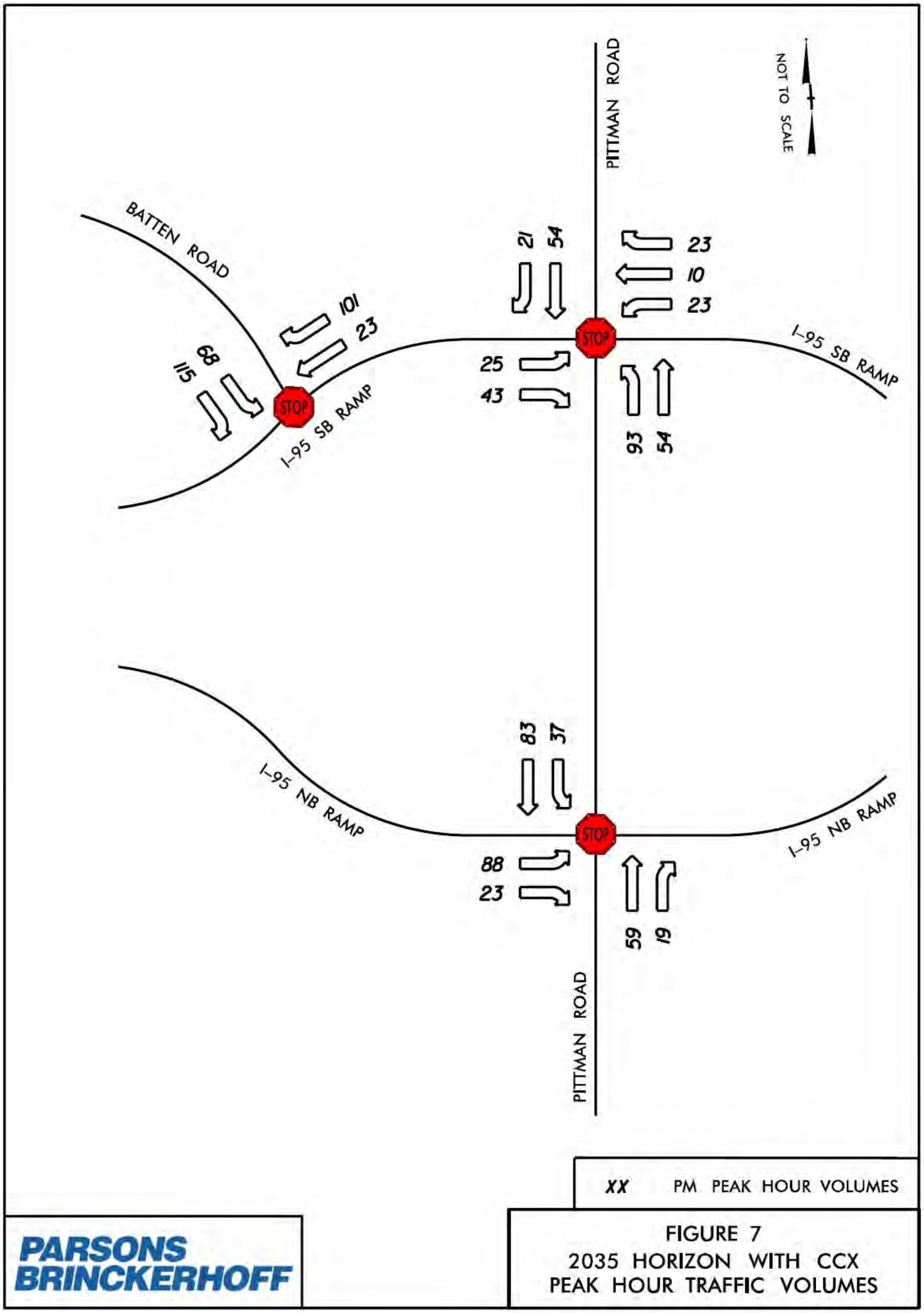
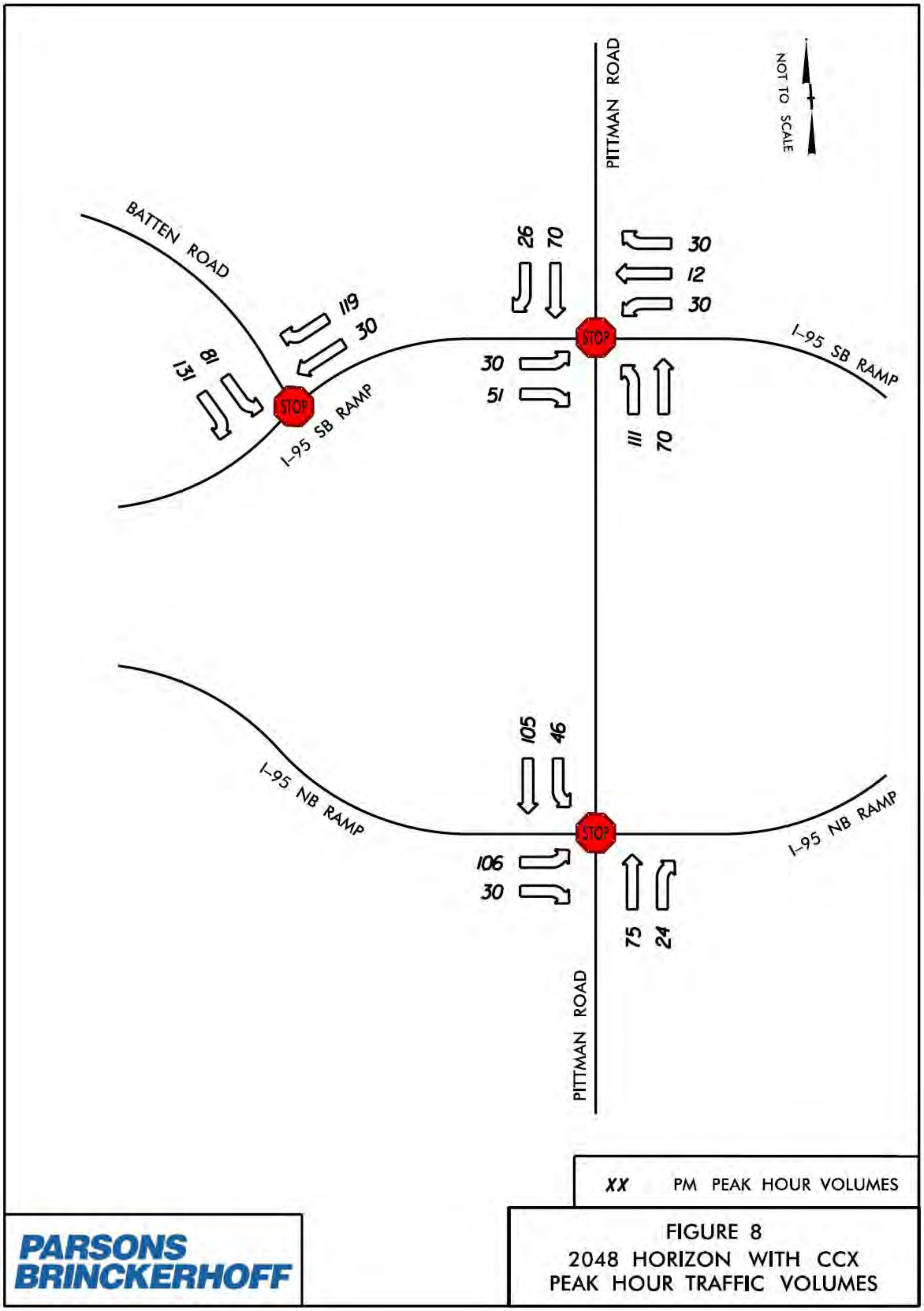


Figure 39: 2048 Horizon with CCX Peak Hour Traffic Volumes



Chapter 9: Intermodal Funding Options

Rarely is a single funding source used to cover the costs for a major freight rail project, partially due to the high cost of facilities and partially due to the availability of public funds. With the advent of public interest in freight rail projects, railroads no longer rely solely on internal resources to fund infrastructure development projects choosing to use a combination of public and private funding. Combinations of federal, state, and local funding programs are employed dictated by both availability and expected benefits.

Federal Programs

Transportation Investment Generating Economic Recovery Program

In February 2009, Congress passed the American Recovery and Reinvestment Act (ARRA). The act provided $1. 5 billion in multi-modal funding to be distributed through a discretionary grant program, established by USDOT as the Transportation Investment Generating Economic Recovery, or TIGER Discretionary Grant program. These grants have been awarded on a competitive basis for surface transportation projects that the USDOT believes will have a significant economic impact on the nation, a metropolitan area, or a region. Since the first round of TIGER grants, six additional rounds have been awarded with an eighth round in April 2016. . The recently passed Fixing America's Surface Transportation Act (FAST Act) authorized $500 million for the recent round of TIGER grants Because of the overwhelming demand, the success rate has been low with six percent of the applications successfully receiving funding.

One of the initial TIGER grant awards was made to the *National Gateway Project.* This project eliminated clearance constraints on a CSX line that connects eastern seaboard ports and markets with the Midwest. The grant funded $98,000,000 of the project's expected cost of $842 million. The CCX terminal will benefit from that project, as it will improve access to many markets served by the proposed terminal.

Listed below are other examples of intermodal projects that were successful in receiving funding in prior rounds of the TIGER Discretionary Grant program.

<u>2010</u>

Crescent Corridor Improvement – the project improves Norfolk Southern's rail lines and facilities between the Gulf Coast and the Northeast including new intermodal terminals in Birmingham Memphis, and Franklin County, PA. The award was in the amount $105,000,000 of a total expected cost of $2. 5 billion.

Port of Providence – the project includes the replacement of port cranes to handle container traffic. The program funded $10,500,000 of a total project cost of $39,463,976.

Port of Miami Rail Access – the project establishes intermodal container rail service, transfer facility, and crane at the port. The program funded $22,767,000 of a total project cost of $46,907,800.

2011

Rutherford Intermodal Facility Expansion – the project expands the facility to accommodate an additional 125,000 lifts by improving track, parking, and cranes. The program funded $15,000,000 of a total project cost of $60,500,000.

Prichard Intermodal Facility – the project constructs a new intermodal terminal along a rail corridor. The program funded $12,000,000 of a total project cost of $35,000,000.

Dames Point Intermodal Container Facility – the project includes a rail yard, cranes, and operational area improvements. The program funded $10,000,000 of a total project cost of $45,000,000.

2012

Port of Oakland Intermodal Rail Improvements – the project enhances rail access and capacity at the port. The program funded $15,000,000 of a total project cost of $43,000,000.

Garrows Bend Intermodal Container Transfer Facility – the project connects a container facility with the national rail system. The program funded $12,000,000 of a total project cost of $28,800,000.

South Hudson Intermodal Facility – the project builds a new intermodal facility to expand the capacity of an East Coast port. The program funded $11,400,000 of a total project cost of $125,000,000.

2013

Port of Pascagoula Intermodal Improvement – the project upgrades the rail connection to the port. The program funded $14,000,000 of a total project cost of $44,000,000.

Port of Tucson: Container Export Rail Facility – the project extends a siding to improve operational efficiency at an inland port. The program funded $5,000,000 of a total project cost of $13,054,575.

2014

Port Newark Container Terminal Access Improvement and Expansion Project – the project updates the operational layout and capacity of the port to handle containerized goods. The program funded $14,800,000 of a total project cost of $53,869,000.

Norfolk International Terminals – the project includes highway improvements, a service gate, and container storage for the port. The program funded $15,000,000 of a total project cost of $31,000,000.

In 2015, NCDOT applied for a $19.4 million TIGER grant for infrastructure improvements that would support the CCX terminal: the 3.9 mile double track, expansion of the Dixie Storage track, and the highway grade separation crossing the new double track. NCDOT was unsuccessful in obtaining the funding.

FAST Act

In addition to the TIGER funding, the FAST Act provides that $0.63 billion in National Highway Freight Program (NHFP) funds be dedicated to rail and port projects. Also, $0. 5 billion of the Nationally Significant Freight and Highway Projects (NSFHP) competitive grant funds are to be used for rail and port related projects. In March of 2016, the U. S. DOT issued its initial Notice of Funding Opportunity for the Department of Transportation's Nationally Significant Freight and Highway Projects (FASTLANE Grants) under the FAST Act with applications due in April.

Section 130 Highway/Rail Grade Crossing Program

The Section 130 program provides federal support for public highway/rail grade crossings safety improvement projects. States may use funds for installing or upgrading warning devices, eliminating grade crossings through grade separation, or consolidating or closing grade crossings. The federal share of these funds is 90 percent. Annual funding from the program is $220 million. Each state is guaranteed a minimum of ½% of the available funding. Funding is based on a combination of a state's share Federal-aid highway lane miles, Federal-aid highway vehicle miles and payments to the Highway Trust Fund, and the number of grade crossings.

Congestion Mitigation and Air Quality Improvement Program (CMAQ)

Through this program, funding is available for areas that do not meet the National Ambient Air Quality Standards (nonattainment areas) as well as former nonattainment areas that are now in compliance (maintenance areas). The program funds transportation projects and programs that reduce transportation-related emissions of pollutants specified by the Clean Air Act's National Ambient Air Quality Standards. These include ozone, carbon monoxide, and particulate matter. Examples of CMAQ-funded rail projects include diesel engine retrofits, idle-reduction projects in rail yards, and projects that encourage substitution of rail for truck transportation such as intermodal terminals or rail capacity improvements. Recent language from MAP-21 places considerable emphasis on selected project types including electric and natural gas vehicle infrastructure and diesel retrofits. State departments of transportation and metropolitan planning organizations (MPO) select and approve projects for funding. The federal share is 80 percent with a non-federal match of 20 percent. The high-end of CMAQ awards is typically in $1,000,000 -$10,000,000 range.

Surface Transportation Program

The Surface Transportation Program is a general grant program available for improving federal-aid highway, bridge, or transit capital projects. Eligible rail improvements include lengthening or increasing the vertical clearance of bridges, eliminating crossings, and improving intermodal connectors. The federal share is 80 percent with a non-federal match of 20 percent.

Federal Transportation Funding in North Carolina

Although the state was not successful in obtaining TIGER grant funding for CCX related projects, North Carolina has received federal funding for various elements of NS Charlotte Regional Intermodal Facility at Charlotte Douglas International Airport through the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users Act (SAFETEA-LU):

- $5. 0 million for the Charlotte Douglas International Airport Freight Intermodal Facility
- $4. 0 million for NS Intermodal System improvements in Charlotte
- $7. 5 million for Construction of Charlotte Douglas International Distribution Center

Other Federal Funding Programs Relevant to Rail

U. S. Department of Commerce Economic Development Administration

The Economic Development Assistance Programs under the Economic Development Administration (EDA) provides grants for projects in economically distressed areas. The program provide between 50 to 80 percent of the total project cost, depending upon the level of economic distress in the area. The Public Works program is aimed at helping areas improve physical infrastructure to attract new industry, encourage business expansion, diversify local economies, and generate or retain long-term, private-sector jobs, and investment. The Economic Adjustment Assistance program helps communities that are experiencing economic disruptions such as natural disasters, military base closures, trade-related disruptions, and major private-sector employer restructurings.

Federal Financing Programs Applicable to Rail

Railroad Rehabilitation and Improvement Financing Program (RRIF)

The Railroad Rehabilitation and Improvement Financing Program (RRIF) provides direct federal loans and loan guarantees to finance the development of railroad infrastructure. Eligible applicants include railroads, state and local governments, government-sponsored authorities and corporations, joint ventures, and shippers served by one railroad who wish to build a connection to a competing carrier. Eligible projects include improvements to, rehabilitation, or acquisition of freight and passenger railroad equipment, track and structures, new multimodal facilities, and refinancing of associated debt. Direct loans can provide up to 100 percent of project cost with repayment periods up to 35 years. Interest rates are equal to the U. S. Treasury rate, but fees must be paid to defray the cost to the government of making the loan. These include a Credit Risk Premium, which depends upon the level of risk of the loan, and an investigative fee if outside professional services are necessary to issue the loan.

Transportation Infrastructure Finance and Innovation Act

The Transportation Infrastructure Finance and Innovation Act (TIFIA) program provides credit assistance for large projects. A major requirement is that projects must have a capital cost of at least $50 million or 33.3 percent of a state's annual apportionment of Federal-aid funds, whichever is less. The credit assistance is limited to a maximum of 33 percent of project costs. Eligible applicants include state and local governments, transit agencies, railroads, special authorities, special districts, and private entities. TIFIA provides three types of financial assistance.

- Secured direct loans. These have a maximum term of 35 years after project completion. Repayment may begin up to five years after project completion.

- Loan guarantees. The federal government guarantees a borrower's repayments to a non-federal lender. Loan repayments to the lender must begin no later than five years after completion of the project.
- Standby line of credit. A federal loan serves as a contingent source of cash to supplement project revenues. Standby financing is available during the first ten years after project completion.

Federal credit assistance cannot exceed 33 percent of project costs. Interest rates are equal to treasury rates and are fixed. All projects eligible for Surface Transportation Program funds are eligible for TIFIA, as well as intercity passenger rail facilities and vehicles, publicly owned freight rail facilities, intermodal freight transfer facilities, access to intermodal freight transfer facilities, and projects located within the boundary of a port terminal under certain conditions. Projects must be included in the state's Transportation Improvement Program (TIP). TIFIA loans have helped to finance the establishment of a commuter rail service, in addition to several passenger intermodal projects, of which commuter and intercity rail were components.

Private Activity Bonds

A private activity bond is a bond issued by or on behalf of local or state government for the purpose of financing the project of a private user. These bonds enjoy the same tax-exempt status as other state and local bonds. Up to $15 billion can be used for transportation infrastructure, and freight transfer facilities, such as rail-truck facilities, qualify among the types of private activities for which these bonds may be issued.

State Funding

Several sources of North Carolina state funds are available for components of the project. Each is under evaluation as to applicability to the CCX project, amount, and timing.

State Highway Funds

State highway funds are possibly available for funding highway improvements related to the project.

Intermodal Tax Credit

The intermodal tax credit is available to any entity that constructs or leases an eligible railroad intermodal facility in the state and places it in service during the taxable year. The tax credit is equal to 50 percent of the cost of construction or lease. The credit can be applied to the state franchise tax or state income tax, but not both. Unused portions may be carried forward.

State Sales Tax Refund

Refund of sales tax paid on construction expenditures made in the state for economic development projects by interstate carriers.

Strategic Transportation Investments Fund (STI)

STI provides Highway Trust Fund monies for non-highway projects through a project scoring formula. STI categorizes projects as statewide mobility, regional impact, or division needs, each with different funding levels and scoring. Intermodal terminal development on a Class I railroad falls into the statewide category, and as such, project selection decisions are based entirely on a date-driven scoring system. The rail project scoring system considers:

- Cost-effectiveness which is a combination of a return on investment index and regional job creation index
- System health which is a combination of a capacity index and accessibility / connectivity index
- Safety and suitability which is based on a safety index
- Project support which is based on a funding leverage index

In recent scoring association with the prioritization process (Prioritization 4.0), CCX received the highest score of any infrastructure project. The STI includes $100 million of capital funding for CCX.

Several other rail improvement projects that benefit intermodal systems have been funded through the STI fund:

- Development of container parking/storage adjacent to the NS Greensboro Intermodal Facility – total cost $1. 7 million
- 10,000-foot siding extension on the CSX line in Stouts – total cost of $10. 6 million

In each case, the state contributed half of the development cost.

Golden LEAF Foundation

The Golden LEAF Foundation of North Carolina is a nonprofit corporation based in Rocky Mount that promotes social welfare through grants to nonprofits and government entities. Priorities are placed on improving the agriculture sector, job creation and retention, and workforce preparedness for economically distressed or tobacco-dependent regions of North Carolina.

Chapter 10: Conclusion

The proposed CCX terminal in eastern North Carolina would prove to stimulate economic growth and reduce the adverse impacts of truck transportation producing significant benefits to the state. Increased employment and associated economic benefits would be a result of terminal construction, terminal operations, and local logistics and manufacturing development. The favorable economic impact would be complemented by benefits associated with the reduction in truck traffic including reduced pavement damage, congestion, emissions, and motor vehicle accidents.

WSP | Parsons Brinckerhoff Project Team

Joe Bryan - Principal-In-Charge

Joe Bryan, located in Boston, directs the firm's practice in freight transportation and logistics policy, planning and management. He possesses broad practical experience in freight carrier management in multiple modes. Joe has been a leading contributor to the development of public and public-private freight planning in the U.S., working at the urban, corridor and national levels, and he assists private- and public-sector clientele in strategy development, policy and operations analysis, and market assessment. He is currently leading the FAST Act update of the Illinois state freight plan, managing urban freight plans in Phoenix and Raleigh, and will serve as principal in charge for new NCFRP research on supply chain resiliency. Joe is a member of the US Department of Commerce's Committee on Supply Chain Competitiveness, which pioneered freight fluidity measures in the United States, he successfully piloted its new approaches in a feasibility study for FHWA and the I-95 Corridor Coalition, and he will co-lead the follow-on project implementing these measures. Joe is past chair of the Transportation Research Board (TRB) Urban Freight Committee, an author of the original AASHTO Freight Rail Bottom Line Report and principal-in-charge for the 2015/2016 update of this report, which is AASHTO's key position paper on freight rail issues. He also held management positions with several railroads and trucking companies. Joe has a BA from Princeton University and an MBA from the Tuck School, Dartmouth University.

Joe Gurskis – Project Manager

Joe Gurskis, located in Herndon, Virginia, leads WSP | Parsons Brinckerhoff's state rail planning practice area and is an experienced transportation and logistics professional with extensive knowledge of the railroad industry operations, markets and economics. He has supported several states in the development of PRIIA and FRA compliant state rail plans, serving as the project manager for the Kansas, North Dakota, Oklahoma, Ohio, New Jersey, Virginia, and District of Columbia state rail plans as well as senior advisor on the Arkansas, Colorado, Delaware, and Vermont state rail plans. In addition to his state rail plan experience, Joe has conducted intermodal terminal feasibility studies for several states including Minnesota, North Dakota, and West Virginia. He is currently managing the firm's activities with the Great Northern Corridor Coalition, a coalition of states, ports, and a class I railroad focused on improving freight mobility in the Northern Tier of the US. Prior to becoming a consultant, he held management positions with several railroads, the last as Vice President Fleet Management at the former Southern Pacific Railroad. Joe holds a BS in Economics from the Wharton School, University of Pennsylvania and a Master of City Planning degree from Harvard University.

Deputy Project Manager

Scot Sibert
Charlotte, North Carolina

Technical Staff

Ximena Atterbury
Tempe, Arizona

Tim Brock
Raleigh, North Carolina

Jason Gorrie
Charlotte, North Carolina

Sebastian Guerrero
Washington, DC

Tom Hester
Tempe, Arizona

Alex King
Glastonbury, Connecticut

Cache Owens
Charlotte, North Carolina

Scudder Smith
Boston, Massachusetts

Tim Thornton
Denver, Colorado