NORTH CAROLINA
MARITIME Strategy

Mapping Port Competitiveness & Market Opportunities for Economic Development in North Carolina

Alixandra Demers, AECOM

Eddie McFalls, AECOM

NCAMPO Meeting

May 2013

AECOM URS

Background / Key Initiatives

- House Bill 1005 – Develop a Statewide Logistics Plan
- Executive Orders 32 and 111 – Established the Governor's Logistics Task Force (GLTF) with a mission to strategically create jobs and recruit industry by developing an efficient and cost effective vision plan for the seamless movement of people, goods and information throughout the state of North Carolina.
- Senate Bill 900 - Tasked GLTF to study combining operations & governing authority of the GTP, NCSPA and NCRR. Study establishing Class I Rail Service by more than one RR to both the NCSP's & GTP.
- GLTF recommended NCDOT conduct a study to address the ports' role and provide a third party assessment of the Southport container terminal concept

Maritime Strategy Scope

- Evaluate North Carolina's position, opportunities and challenges as a portal for global maritime commerce;
- Examine the role of North Carolina ports in sustaining and strengthening the State's economy;
- Obtain input from freight transportation, economic development, and community interests, and
- Identify specific strategies to optimize benefits received from the State's investments in port and associated transportation infrastructure.

Maritime Advisory Council

- Public and private sector industry representatives from shippers, shipping lines, trucking, railroad, agricultural and manufacturing interests, along with government, policy, academic and community-at-large representatives
- Provide guidance to the project team, based on mission defined by the Maritime Study Executive Team
- As a hands-on, engaged advisory body, the Advisory Council will meet three to four times during the year to support strategy development at major project milestones

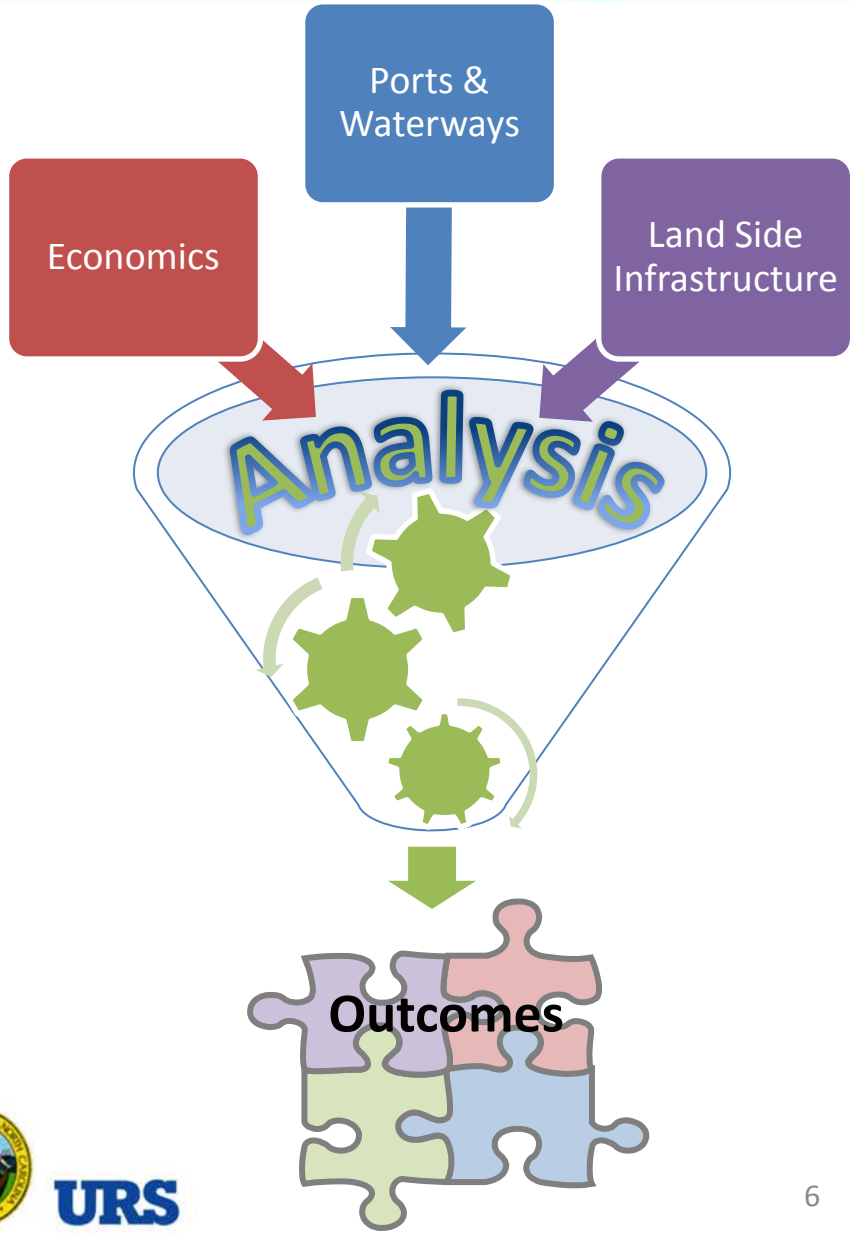
Industry and Stakeholder Meetings

- Industry Workshops
  - Agriculture
  - Break-Bulk
  - Shipping Lines
  - Logistics & Special Zones
  - Non-Ag Shippers
  - Military
  - Railroad & Trucking

  Effort supported by hands-on Maritime Advisory Council
- Focused discussions and interviews
  - Metropolitan Planning Organizations
  - Economic Development Commissions
  - NC Department of Commerce
  - NC Department of Transportation
  - NC State Ports Authority
  - NC Railroad
  - UNC Wilmington
  - Southport/Oak Island Chamber of Commerce
  - US Army Corps of Engineers
  - Progress Energy
  - No Port Southport
  - Save the Cape
  - Clean Carteret County Coalition
  - Morehead City Port Committee
  - YesPort NC
- Public workshops

Methodology

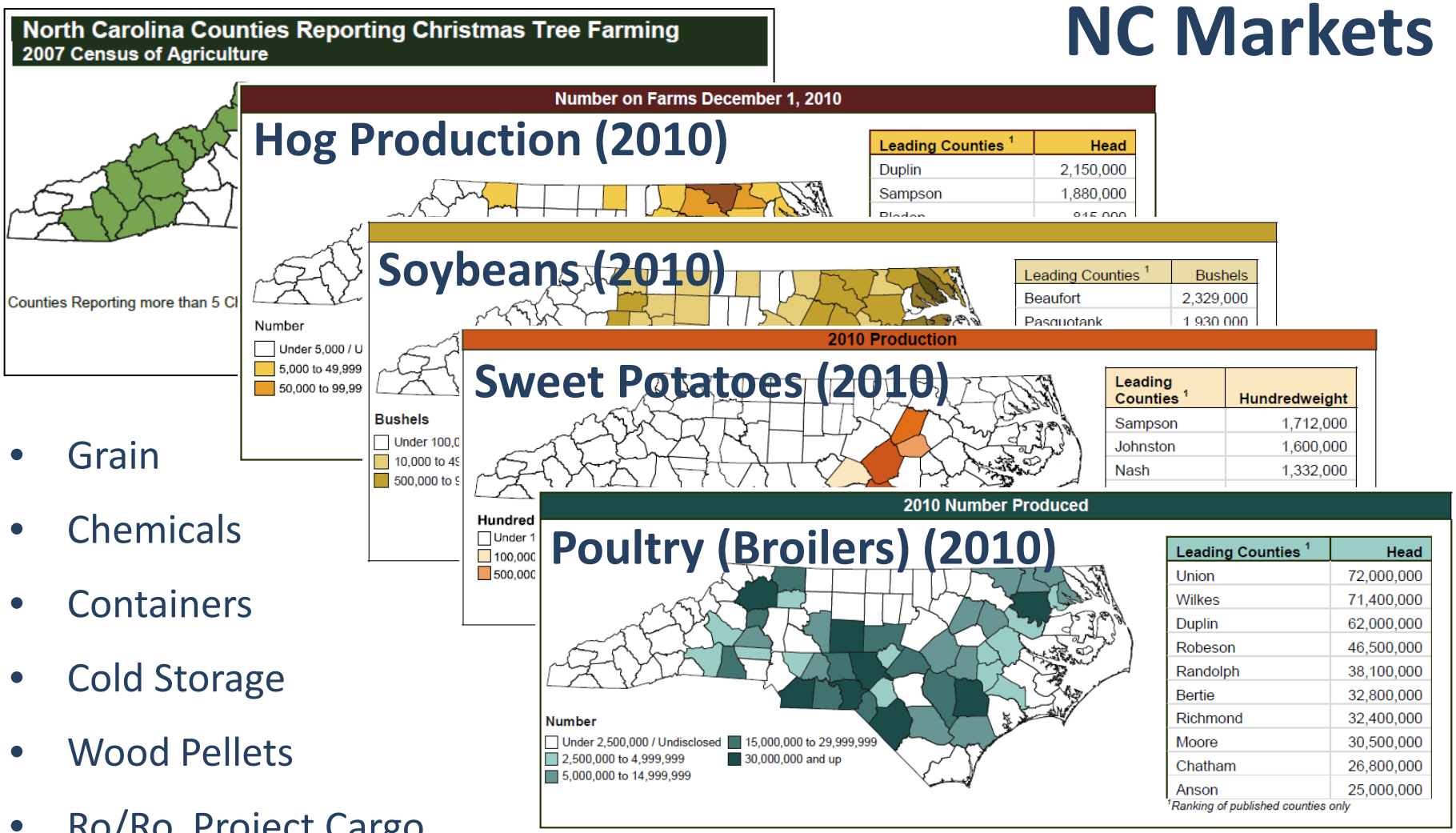
- Pool data
- Pool experts
- Conduct analyses
- Assess results



Data Sets

- FAF – Freight Analysis Framework (used as a proxy for Statewide TDM)
- PIERS – Port Import Export Reporting Service – bill of lading data for every waterborne shipment
- Thrive NC – manufacturing & business centers
- USDA & NC Dept. of Agriculture – agriculture production centers
- Transportation network maps – highway, rail, marine
- Environmental maps – USGS, water depths, wind maps, historical and/or protected lands

NC Markets

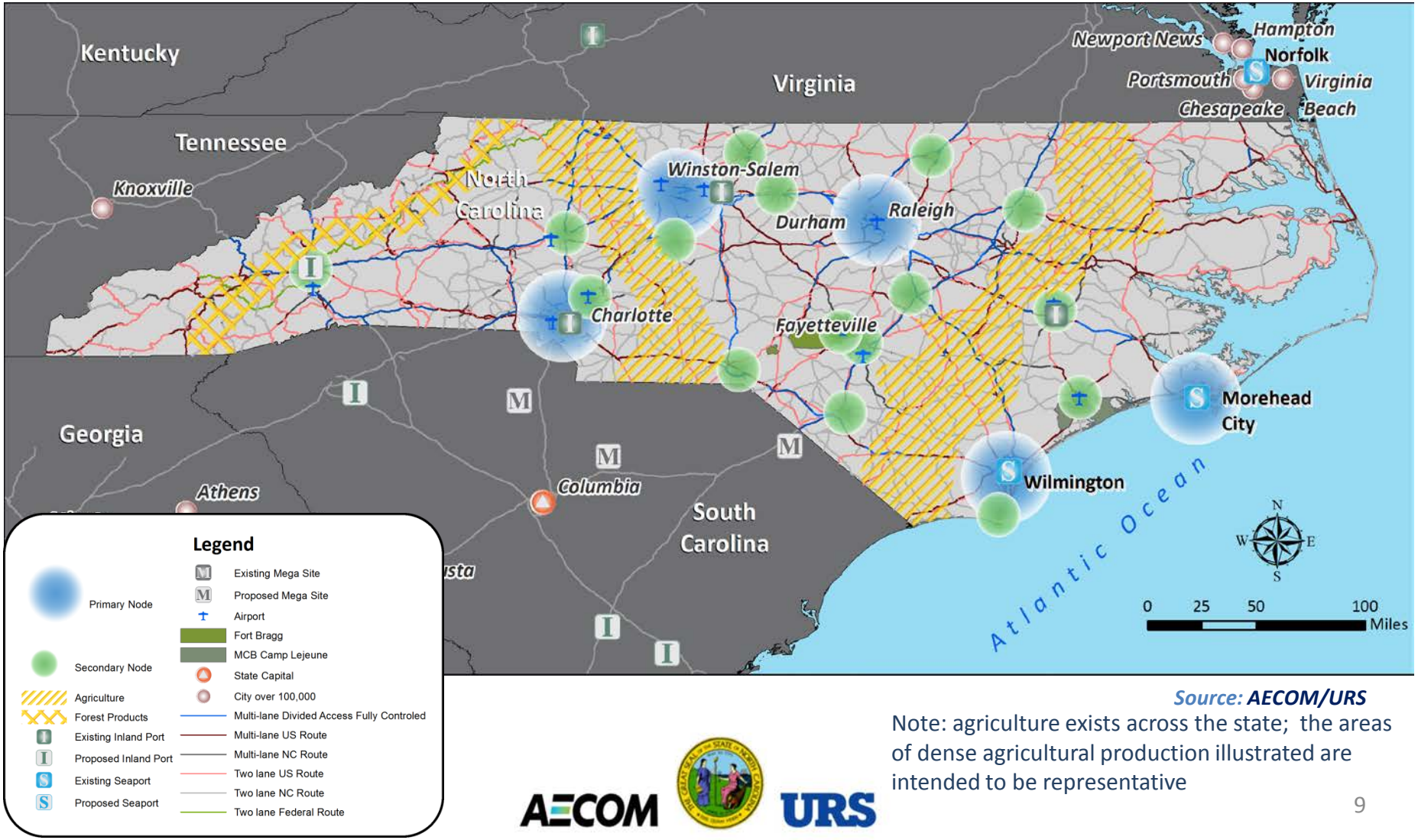


- Grain
- Chemicals
- Containers
- Cold Storage
- Wood Pellets
- Ro/Ro, Project Cargo
- Military

Source: USDA National Agricultural Statistics Service

AECOM URS

NC Freight Nodes and Facilities



Source: ***AECOM/URS***

Note: agriculture exists across the state; the areas of dense agricultural production illustrated are intended to be representative

AECOM URS

Evaluation of Container Port Sites

Initial Screening

Water Suitability

- Offers ocean access
- Provides adequate protection from wind and wave action

Land Suitability

- Avoids National Parks, Wilderness, and Refuge Areas
- Avoids Military Lands
- Complies with Coastal Barrier Resources Act (COBRA)
- Limits displacement of other uses: vacant lands or existing port use
- Meets minimum port terminal requirements: 200 acres, 3000' berth

Site Analysis

Comparative Cost and Impact

- Limits extent and cost of dredging as compared to alternatives
- Offers opportunity for cost-efficient container terminal operation
- Offers opportunity for cost-effective land access
- Limits environmental impacts as compared to alternatives*

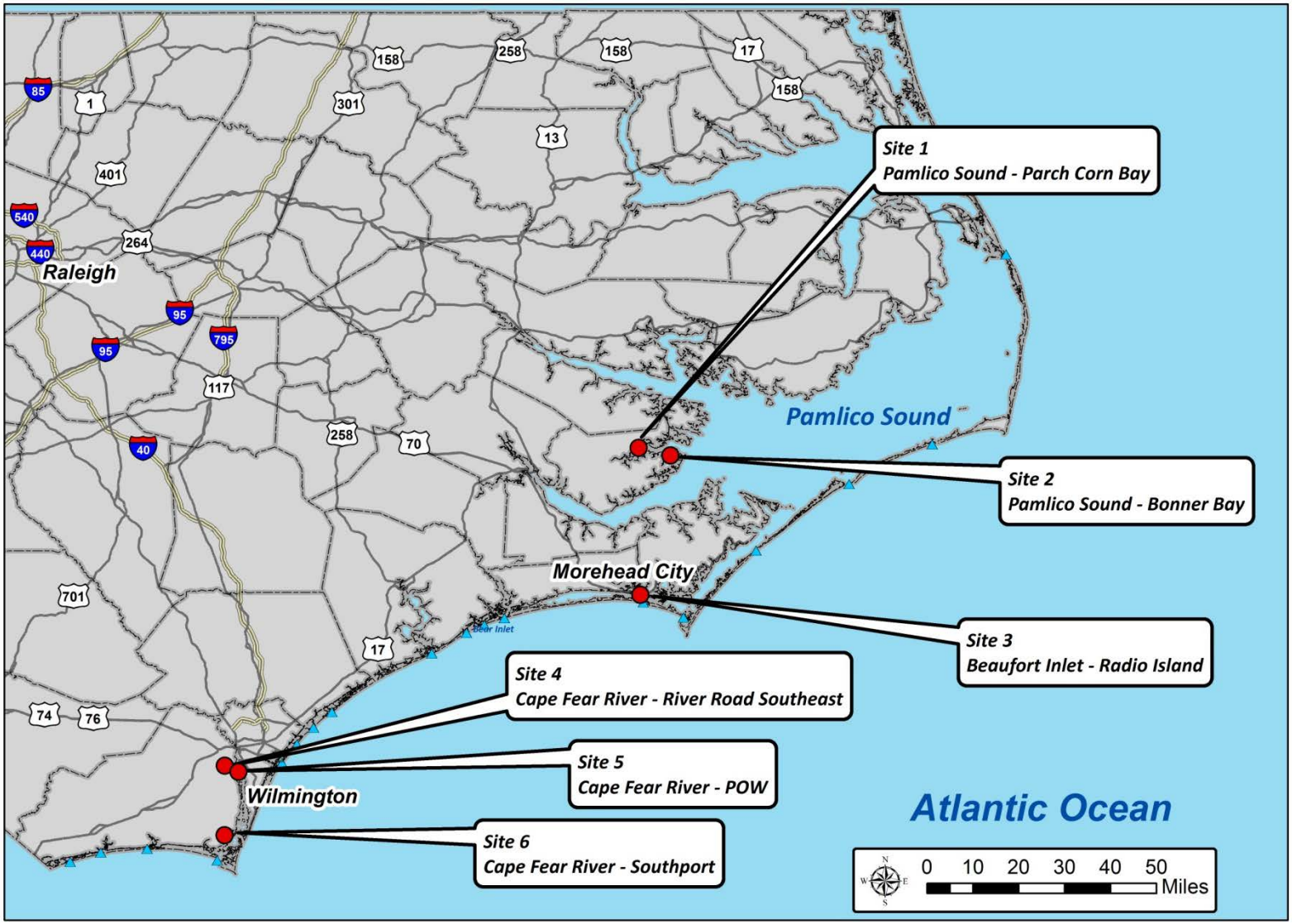
Comparative Benefit

- Proposed terminal size and expansion capability are well-matched to projected market demand

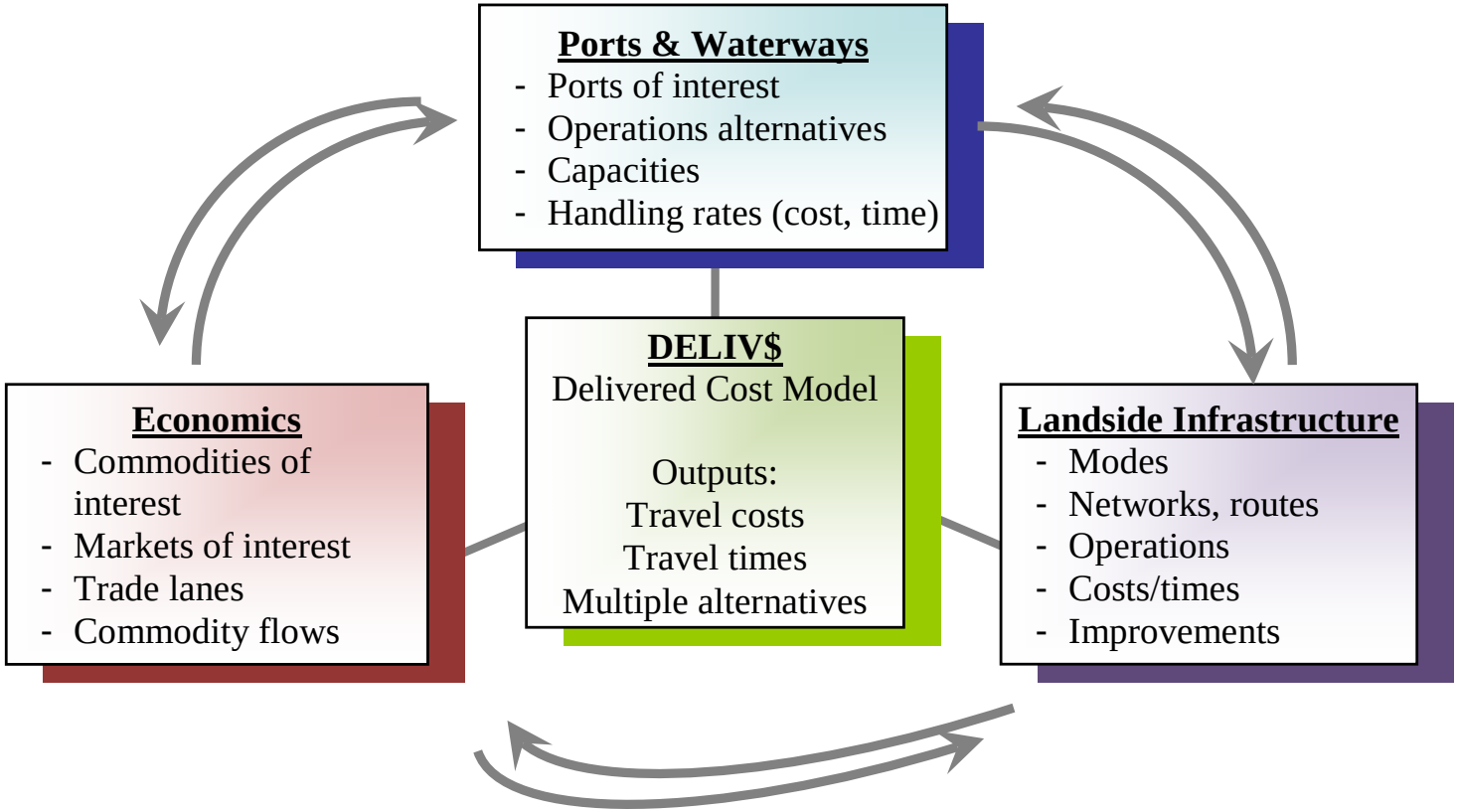
* Environmental screening does not include full environmental impact analysis

NORTH CAROLINA
MARITIME Strategy

Candidate Container Port Sites

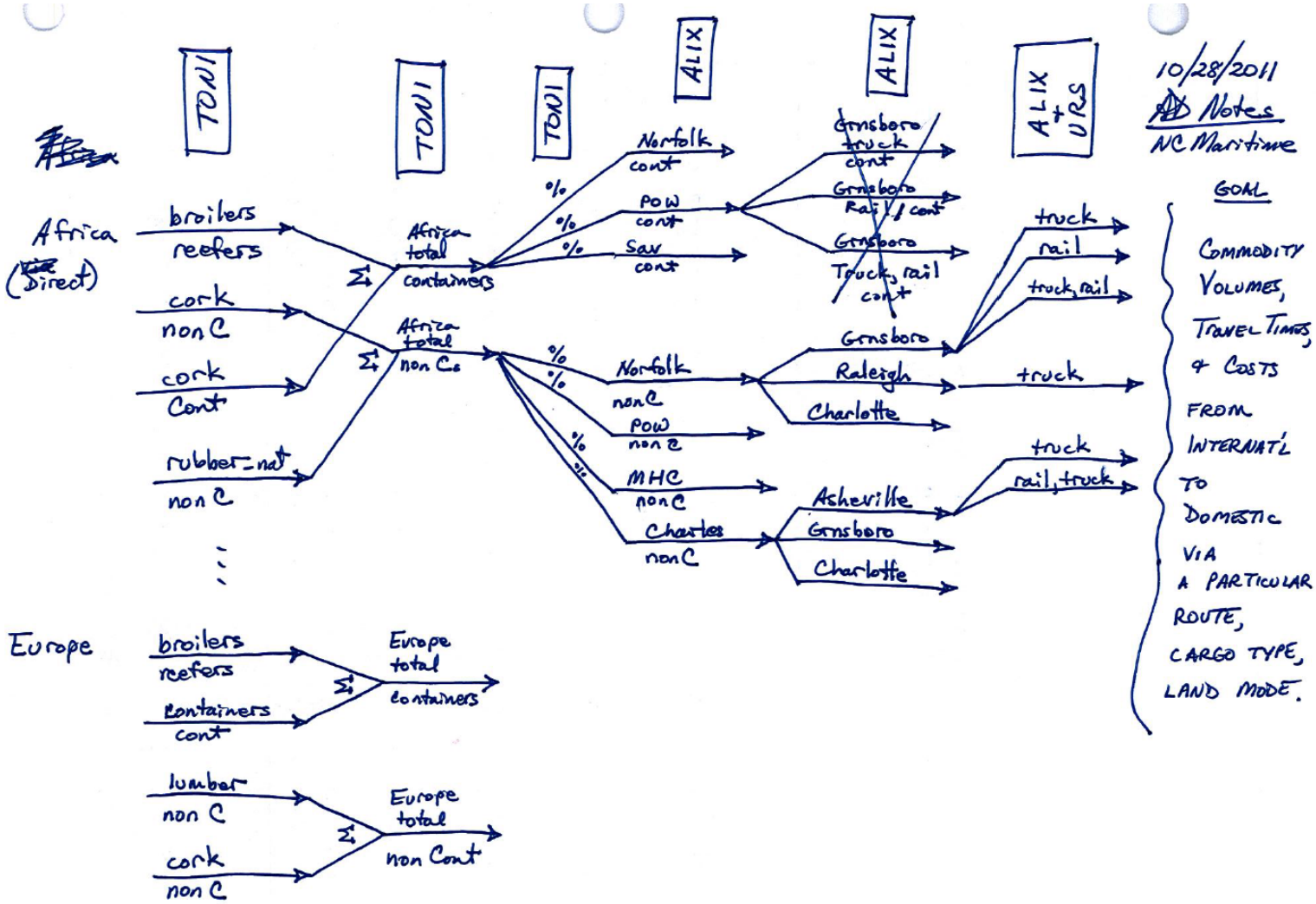


Pulling Data Together from Multiple Disciplines



AECOM URS

Early diagram of freight flow & staff tasks



A Simple Trip

1. Shanghai → Norfolk via Panama Canal

→

2. Unload OGV, load truck

→

3. Norfolk → Greensboro

MODE: OGV	Norfolk	MHC	POW	Charleston	Savannah
Panama	**3 days**				
Suez Canal					
Europe					
Canada					
. . .					

ACTION: Ship to Truck Transfer	Norfolk	MHC	POW	Charleston	Savannah
Bulk: conveyor					
Breakbulk: ro ro					
Breakbulk: crane/lo lo					
Project: crane					
Container: gantry crane	**40 min**				
. . .					

MODE: Truck	Norfolk	MHC	POW	Charleston	Savannah
Raleigh					
Charlotte					
Greensboro	**4 hrs**				
GTP					
Asheville					
. . .					

3 days
$250/container

+

40 minutes
$100/container

+

4 hours
$120/container

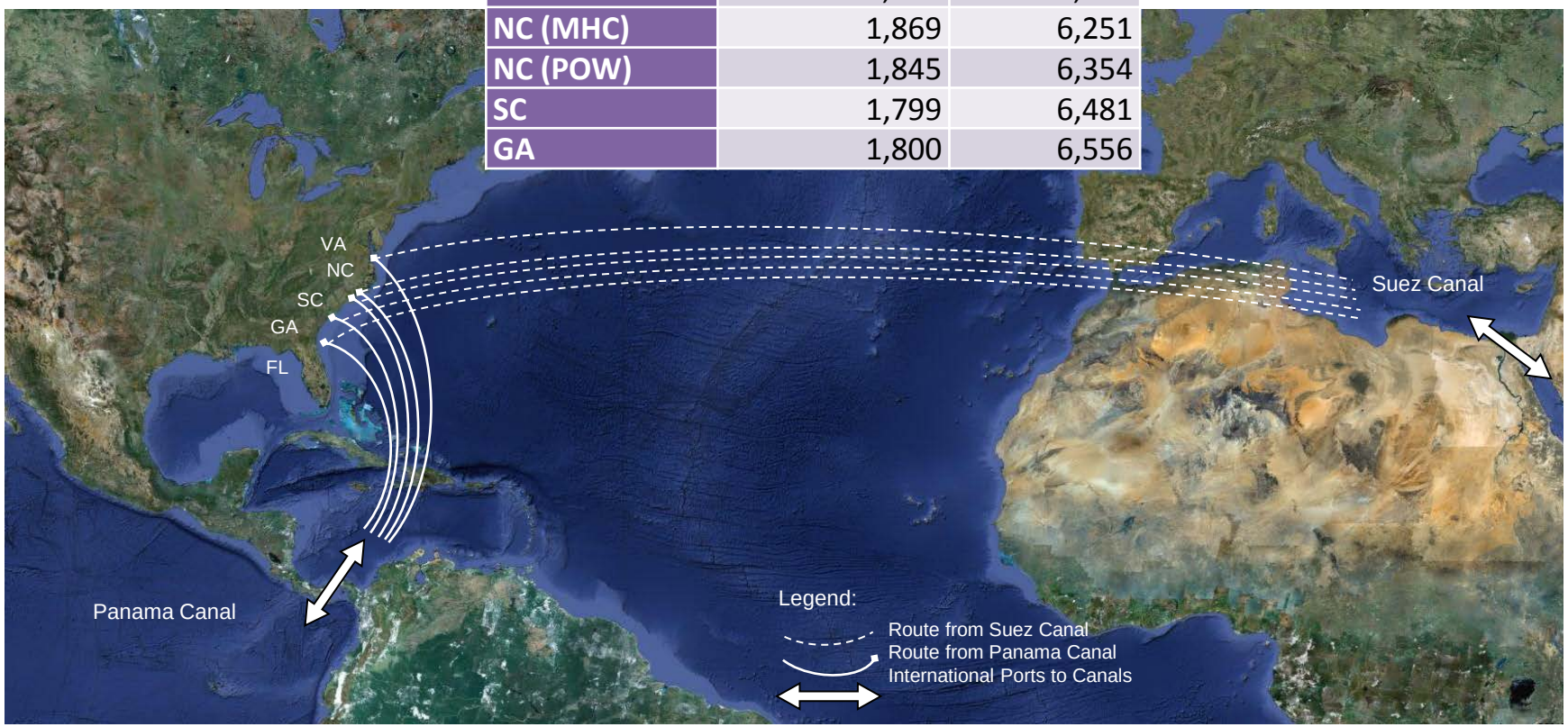
=

3.27 days
$370/container

Note: All numbers shown in this figure are fictitious and for illustrative purposes only.

Global Shipping Lanes – Routes of Interest

Distance (mi)	Panama Canal	Suez Canal
VA	2,050	6,718
NC (MHC)	1,869	6,251
NC (POW)	1,845	6,354
SC	1,799	6,481
GA	1,800	6,556



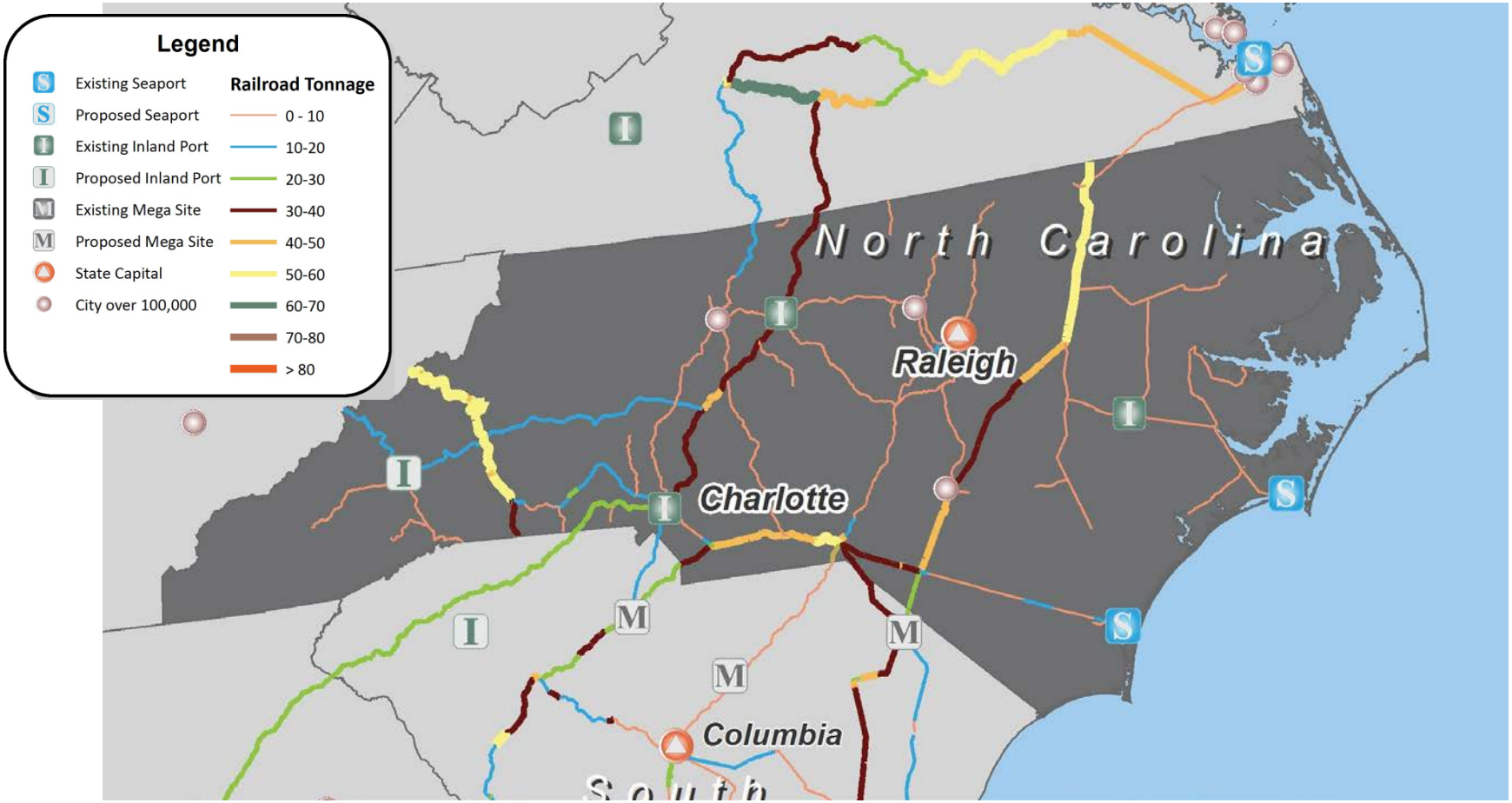
Source: AECOM and Google Maps, 2012. Not to scale.

Evaluation of Highway Network

Source: AECOM/URS compiled from ESRI, NCDOT, and USGS ThematicMapping

AECOM URS

Evaluation of Freight Rail Network



Source: AECOM/URS compiled from ESRI, NCDOT, CSX, Norfolk Southern, USGS ThematicMapping world borders dataset

AECOM URS

NORTH CAROLINA
MARITIME Strategy

Norfolk Southern Domestic Intermodal

		DESTINATIONS																												
		NY	GA	GA	MA	MD	PA	NY	NC	IL	OH	NJ	NJ	NC	PA	AL	FL	MO	TN	FL	PA	VA	PA	GA	PA	MO	PA	FL	OH
ORIGINS		ALBANY	ATLANTA	AUSTELL	AYER	BALTIMORE	BETHINTERMODAL	BUFFALO	CHARLOTTE	CHICAGO	CINCINNATI	CROXTON	ERAIL	GREENSBORO	HARRISBURG	HUNTSVILLE	JACKSONVILLE	KANSAS CITY	MEMPHIS	MIAMI	MORRISVILLE	NORFOLK	PITTSBURGH	PORT WENTWORTH	RUTHERFORD	ST LOUIS	TAYLOR	TITUSVILLE	TOLEDO
ALBANY	NY									A																			
ATLANTA	GA								D			A		E			C		D	A	B	B			A			C	
AUSTELL	GA									A	C							B											
AYER	MA									A																			
BALTIMORE	MD									E																			
BETHINTERMODAL	PA									A								B								B			
BUFFALO	NY									A																			
CHARLOTTE	NC									B		B								D									
CHICAGO	IL	A		A	A	E	A	A	B		A	A	B	E	B		A			A	A	B	A	B	E		A	A	C
CINCINNATI	OH									A							A			A									
CROXTON	NJ		A						B	A				E														A	A
ERAIL	NJ									B								B	B							B			
GREENSBORO	NC		E							E		E								E									
HARRISBURG	PA									B								B								B			
HUNTSVILLE	AL											B					B			B	B				B			B	
JACKSONVILLE	FL		C							A	A							B	B						B	B			
KANSAS CITY	MO			B			B						B		B		B			B	B							B	
MEMPHIS	TN												B				B			B	B				A				
MIAMI	FL		A						B	A	A			E		B			B							B			
MORRISVILLE	PA		B							A								B	B							B			
NORFOLK	VA		B							B																D			
PITTSBURGH	PA									A								B											
PORT WENTWORTH	GA									B																			
RUTHERFORD	PA		A							E							A		A	A									
ST LOUIS	MO			B			B						B		B		B			B	B	D							
TAYLOR	PA									A																			
TITUSVILLE	FL		C							A								B											
TOLEDO	OH				A					C		A																	

A = 53' EMP, 53' Private Containers & Private Trailers
B = 53' EMP & 53' Private Containers
C = Private Containers and Private Trailers
D = Private Containers Only
E = Private Trailers Only

Mode of Travel by Weight, 2010

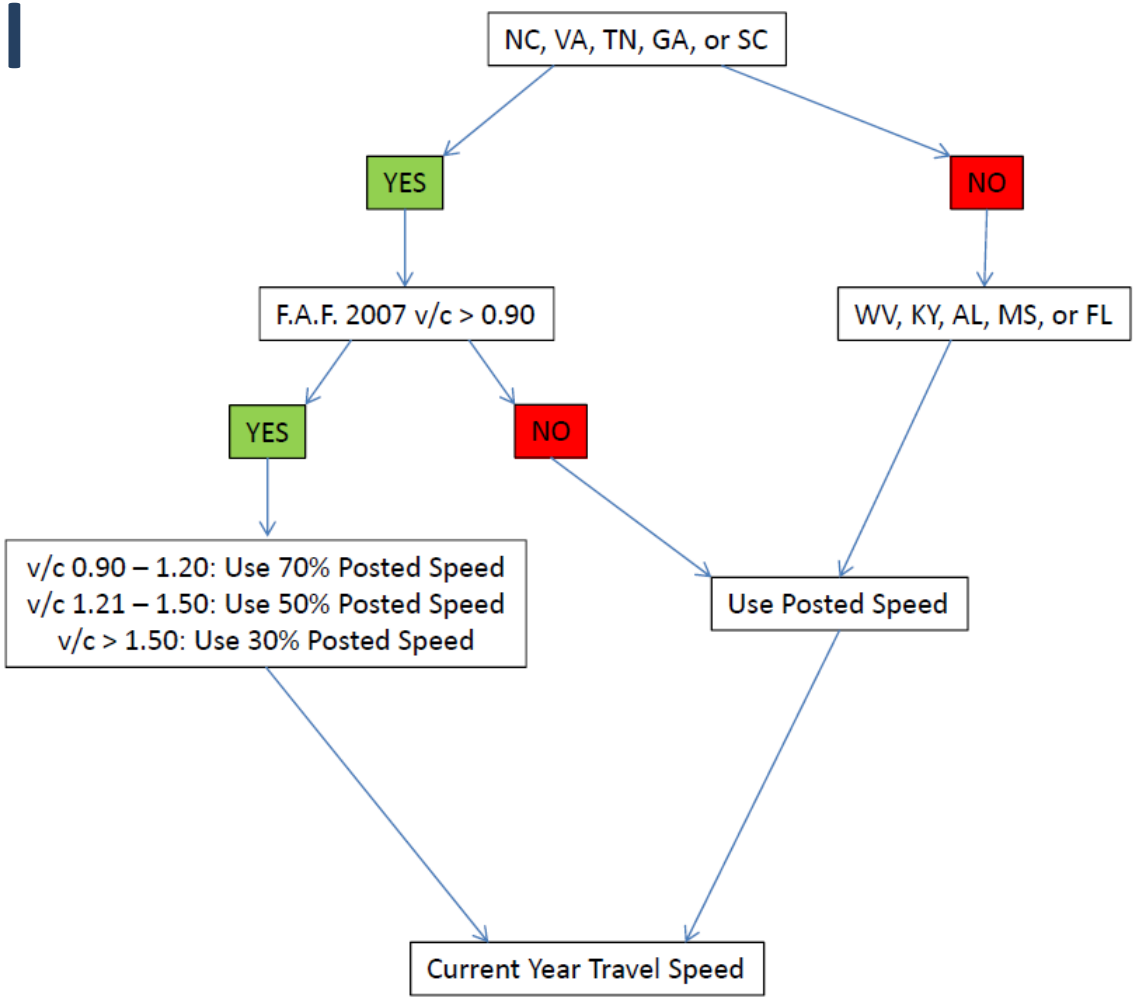
Port	NC Exports Leaving from Port (A)			Goods Imported to NC Arriving at Port (B)		
	% Trucks Only	% Rail Only	% Other Modes including Multiple Modes	% Trucks Only	% Rail Only	% Other Modes including Multiple Modes
North Carolina	97.3	0.3	2.5	94.8	4.6	0.7
Norfolk	83.8	3.2	13.0	90.8	0.0	9.2
Charleston	83.2	3.3	13.5	70.8	14.2	15.0
Savannah	55.9	2.8	41.3	91.9	1.7	6.4

Source: FAF, 3.1
Note: Because of their spatial proximity, the North Carolina ports cannot be isolated in the FAF, 3.1 commodity data. (A) North Carolina exports shipped to the port by the mode indicated. (B) North Carolina imports shipped inland from the port by the mode indicated.

Calculating Travel Times

- FAF volumes, v/c's affect speeds
- Capacity improvements assumed to return facility to posted speed

Current Year Vehicle Speed Flowchart



Travel Times to Regional Seaports from NC Nodes (2007)

NC Node → / ↓ Regional Port	Asheville	Jacksonville	Benson	Burlington	Charlotte	Henderson	Monroe	Raleigh-Durham	Rocky Mount	Fayetteville	Global TransParkt	Piedmont Triad	Statesville
Morehead City, NC	7:37	0:55	2:26	4:11	6:01	4:00	5:18	3:23	2:49	3:01	1:28	4:59	5:49
Wilmington, NC	6:09	1:13	1:31	3:16	4:18	3:11	3:35	2:28	2:22	2:04	2:06	4:04	4:54
Norfolk, VA	7:35	4:19	3:10	4:18	6:31	2:39	6:02	3:31	2:18	3:45	3:18	4:56	5:47
Charleston, SC	4:38	5:10	3:58	5:13	4:19	5:38	3:38	4:55	4:49	3:23	5:11	5:16	5:23
Savannah , GA	5:09	5:59	4:28	5:43	4:31	6:08	4:09	5:25	4:20	3:53	5:41	5:46	5:54
Jacksonville, FL	7:27	8:18	6:47	8:02	6:50	8:27	6:27	7:44	7:39	6:12	8:00	8:05	8:12

*Source: **AECOM/URS, from ArcMap analysis of FAF 3.1 data***

AECOM URS

Truck Turns

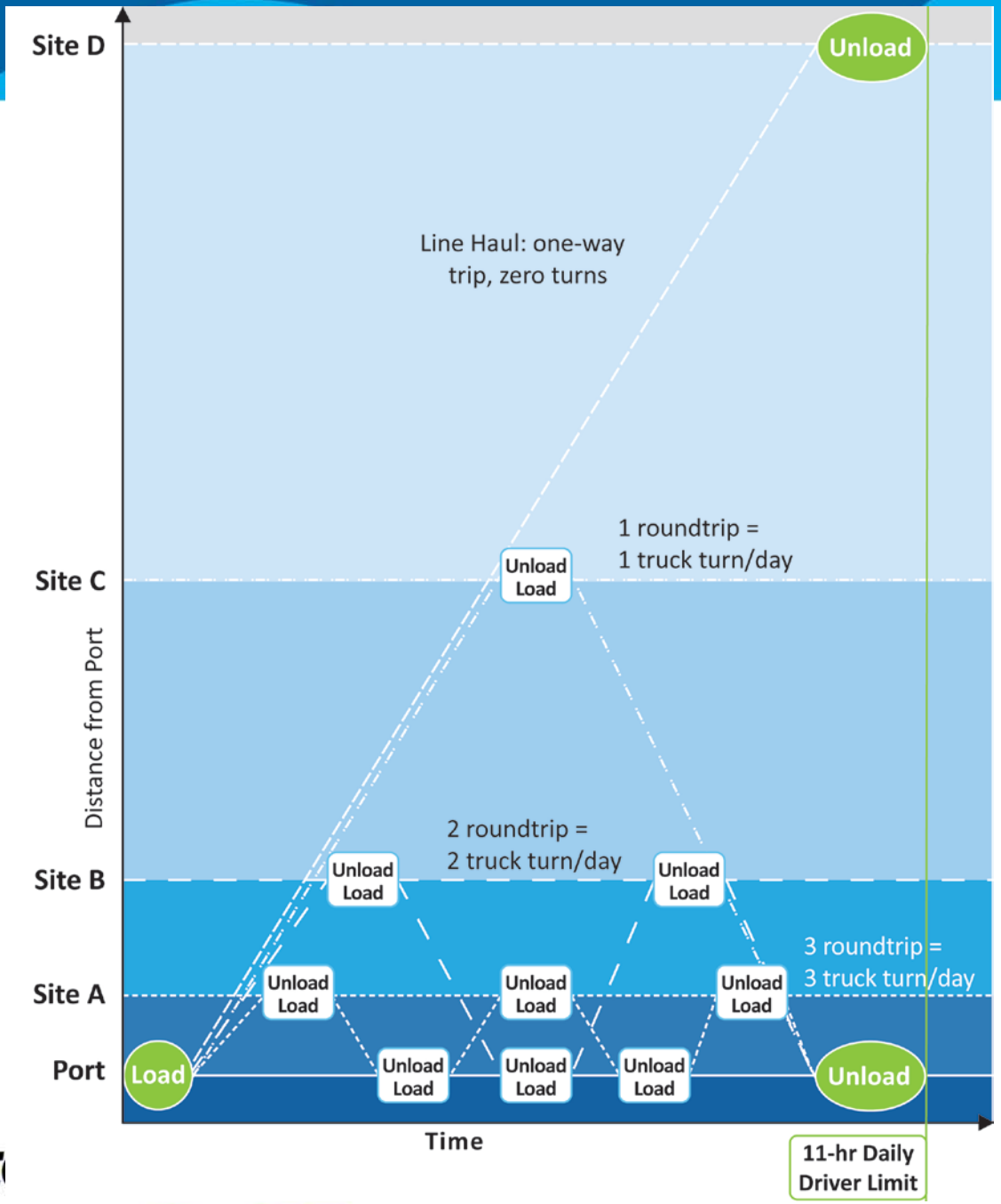
- A consideration of trucking companies that plays into their rate structure and ability to serve an area efficiently is the number of roundtrips (or truck turns) a particular driver-truck pair can accomplish within the legal limits of daily hours of service (HOS).
- To keep truck drivers and other vehicle operators safe, the number of hours a trucker can drive in any 24-hour period is capped at 11 hours.
- Therefore, the maximum distance coverable in a day is constrained by HOS, road network characteristics (terrain, speed limits), load/unload times, weather, and other externalities.

NORTH CAROLINA
MARITIME Strategy

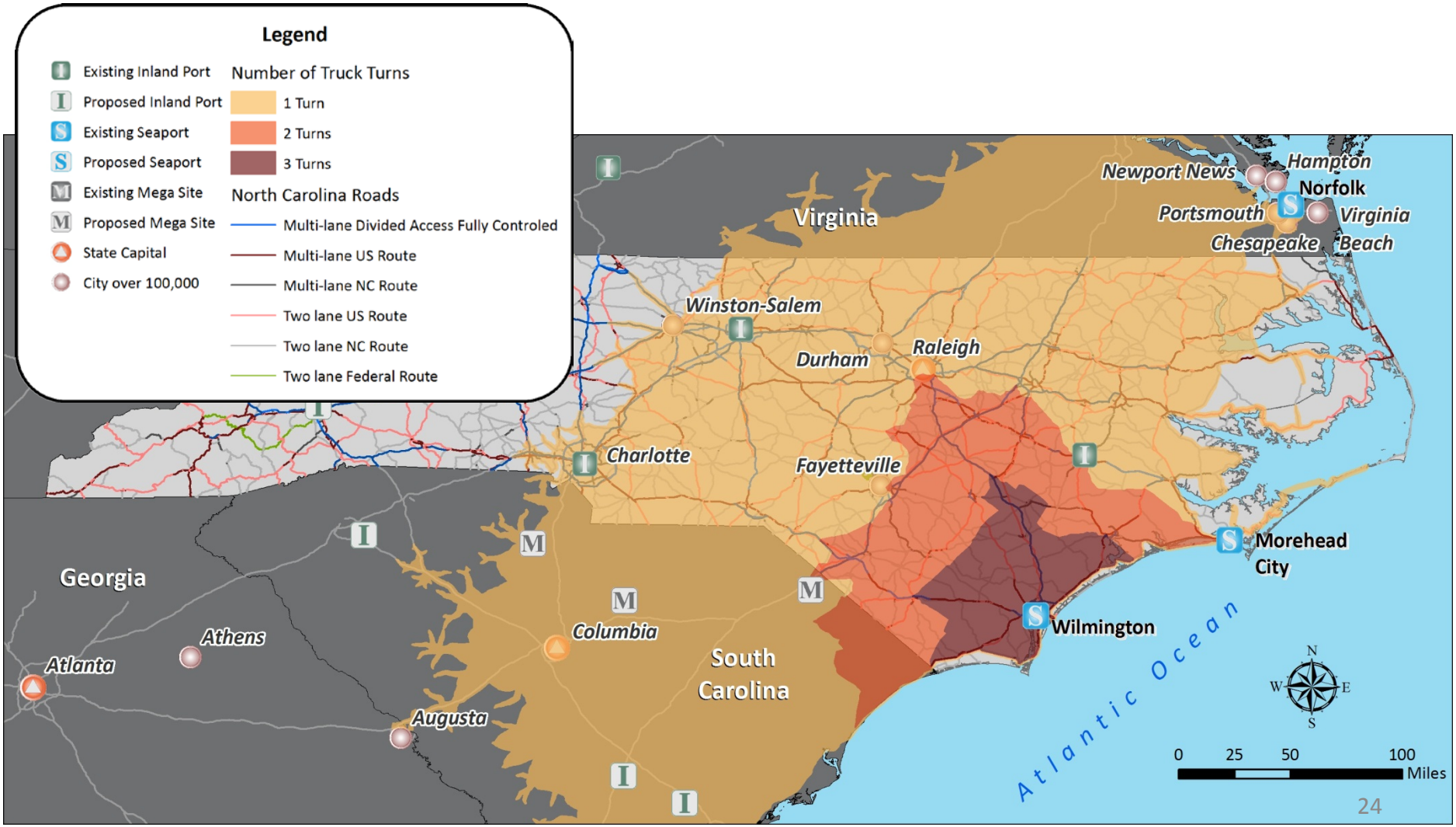
Truck Turns

2040 STIP PLUS mode_TRUCK Line Haul reach	EastNCAg	GTP	Fayetteville	Raleigh-Durham	Greensboro_WS	Charlotte	Asheville	WestNCAg
Norfolk	1	1	1	1	1	0	0	0.5
MHC	1	1	1	1	1	1	1	1
POW	1	1	1	1	1	1	1	1
Charleston	0.5	1	1	0	1	1	0.5	0.5
Savannah	0.5	1	1	0	0.5	1	1	0.5

2040 STIP PLUS mode_TRUCK One Truck Turn reach	EastNCAg	GTP	Fayetteville	Raleigh-Durham	Greensboro_WS	Charlotte	Asheville	WestNCAg
Norfolk	0.5	1	0	0	0	0	0	0
MHC	1	1	1	0	0.25	0	0	0
POW	1	1	1	0.5	0	0	0	0
Charleston	0	0	0	0	0	0	0	0
Savannah	0	0	0	0	0	0	0	0

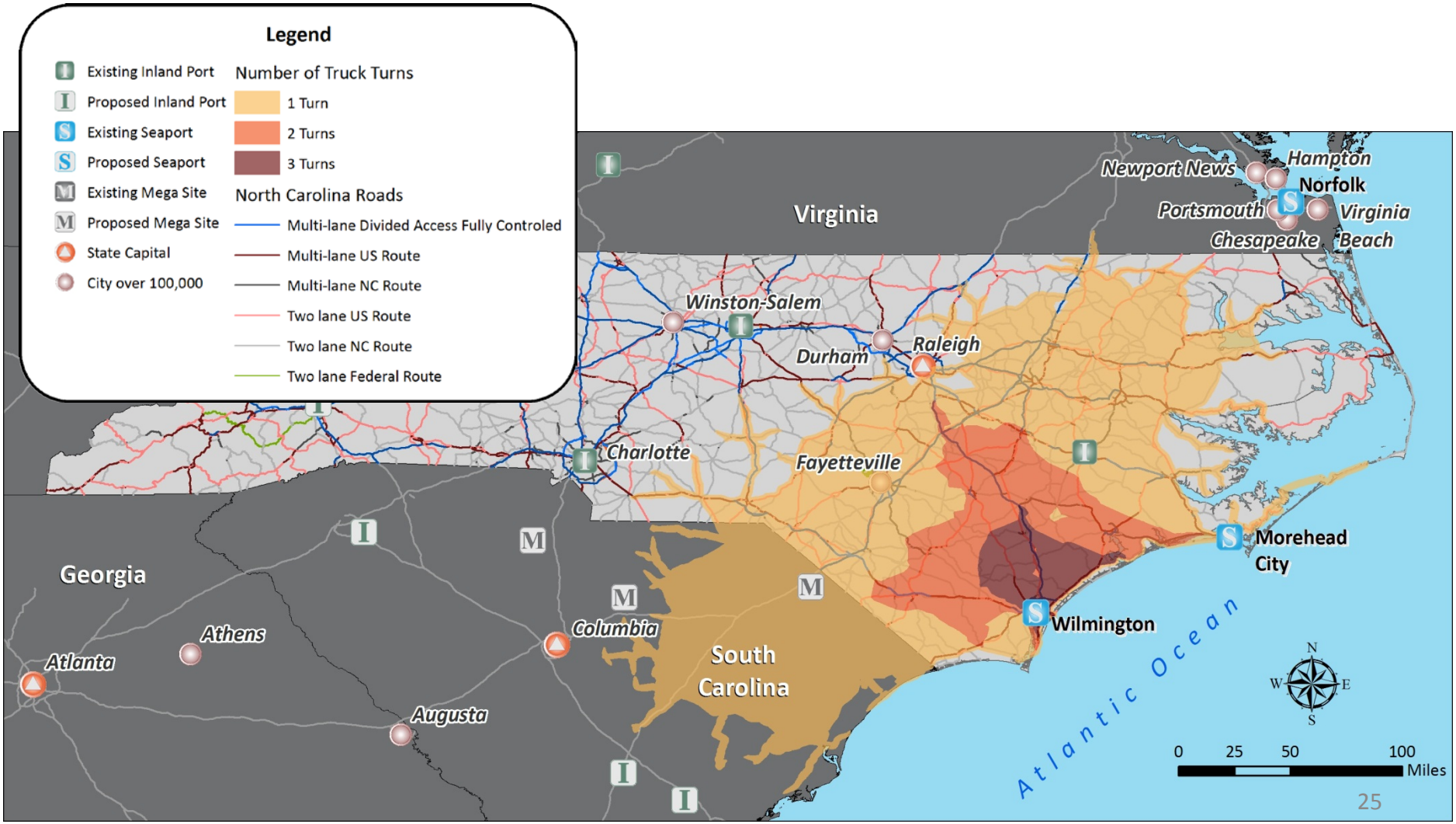


Truck Turn Distances—Wilmington (2007)



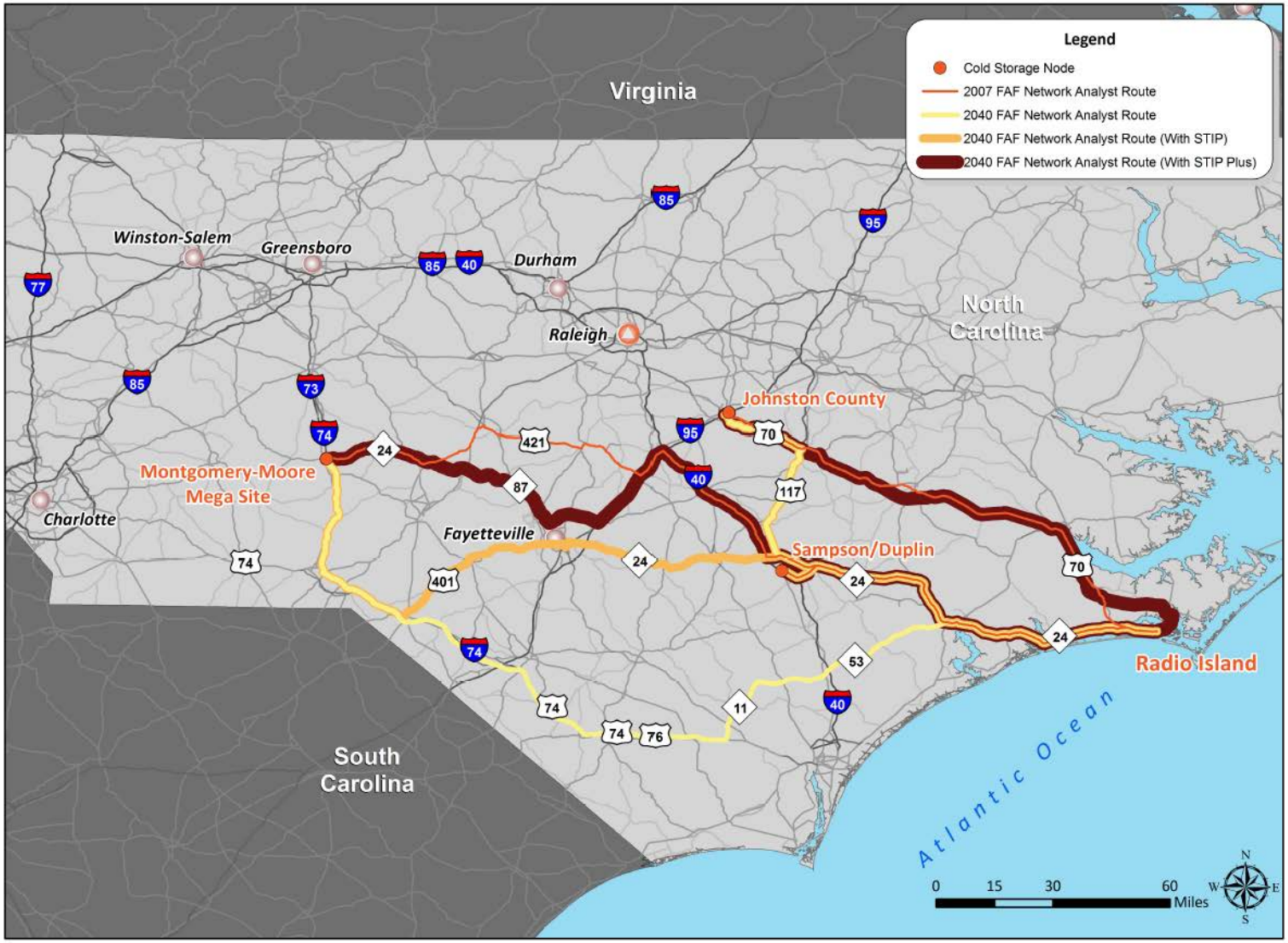
Source: AECOM/URS compiled from ESRI, NCDOT, USDOT FAF 3.1, and USGS ThematicMapping

Truck Turn Distances—Wilmington (2040)



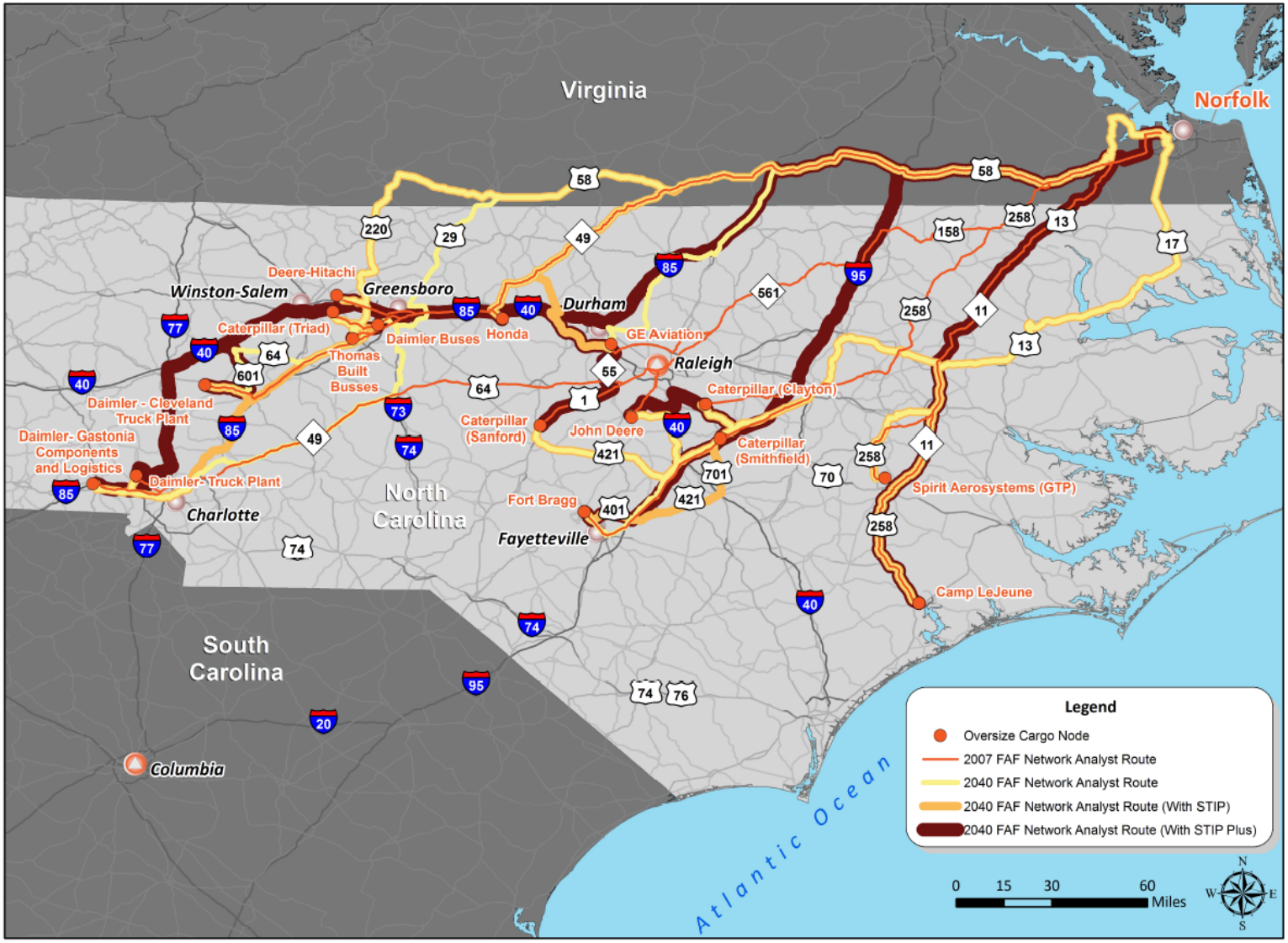
Source: AECOM/URS compiled from ESRI, NCDOT, USDOT FAF 3.1, and USGS ThematicMapping

Cold Storage Cargo Network Analyst Route Evaluation From Radio Island



Source: ESRI, NCDOT, USDOT Freight Analysis Framework v3.1, USGS ThematicMapping world borders dataset

Oversize Cargo Network Analyst Route Evaluation From Norfolk



Source: ESRI, NCDOT, USDOT Freight Analysis Framework v3.1, USGS ThematicMapping world borders dataset

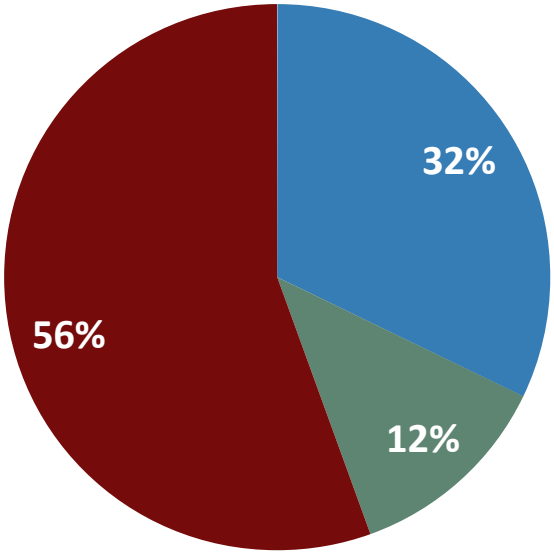
Analysis Tools

- ArcGIS Network Analyst → possible routes
- Delivered Cost Model → travel times & costs
- Algorithm for impact of road improvements
- **Collectively staring at maps**
  - Do the data make sense?
  - How does an element translate to an outcome?
  - Brainstorming from different perspectives

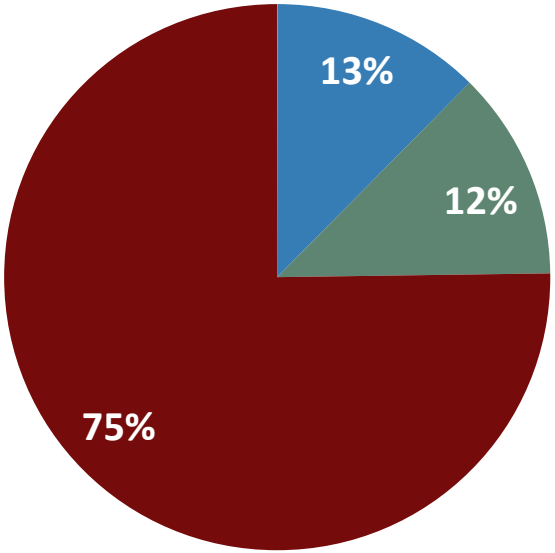
Results of Delivered Cost Model & Land Side Infrastructure Analysis

Infrastructure Influence on Delivered Costs

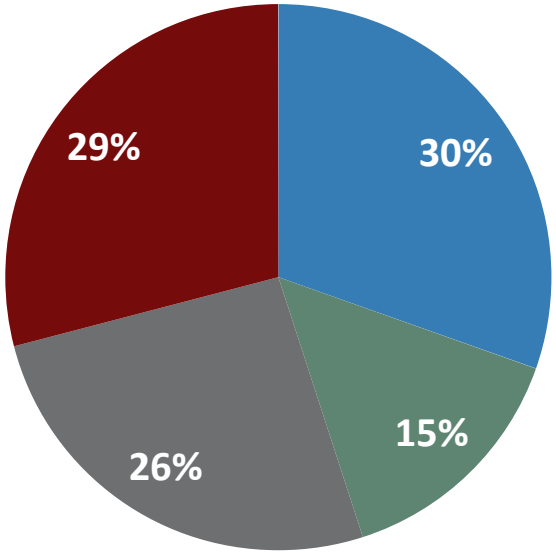
Sample Split of Containerized Transport Costs, from Wilmington (2040)



$635 per TEU
To Greensboro intermodal terminal via truck



$630 per TEU
To existing Charlotte terminals via truck



$535 per TEU
To new east Charlotte intermodal terminal via truck and rail

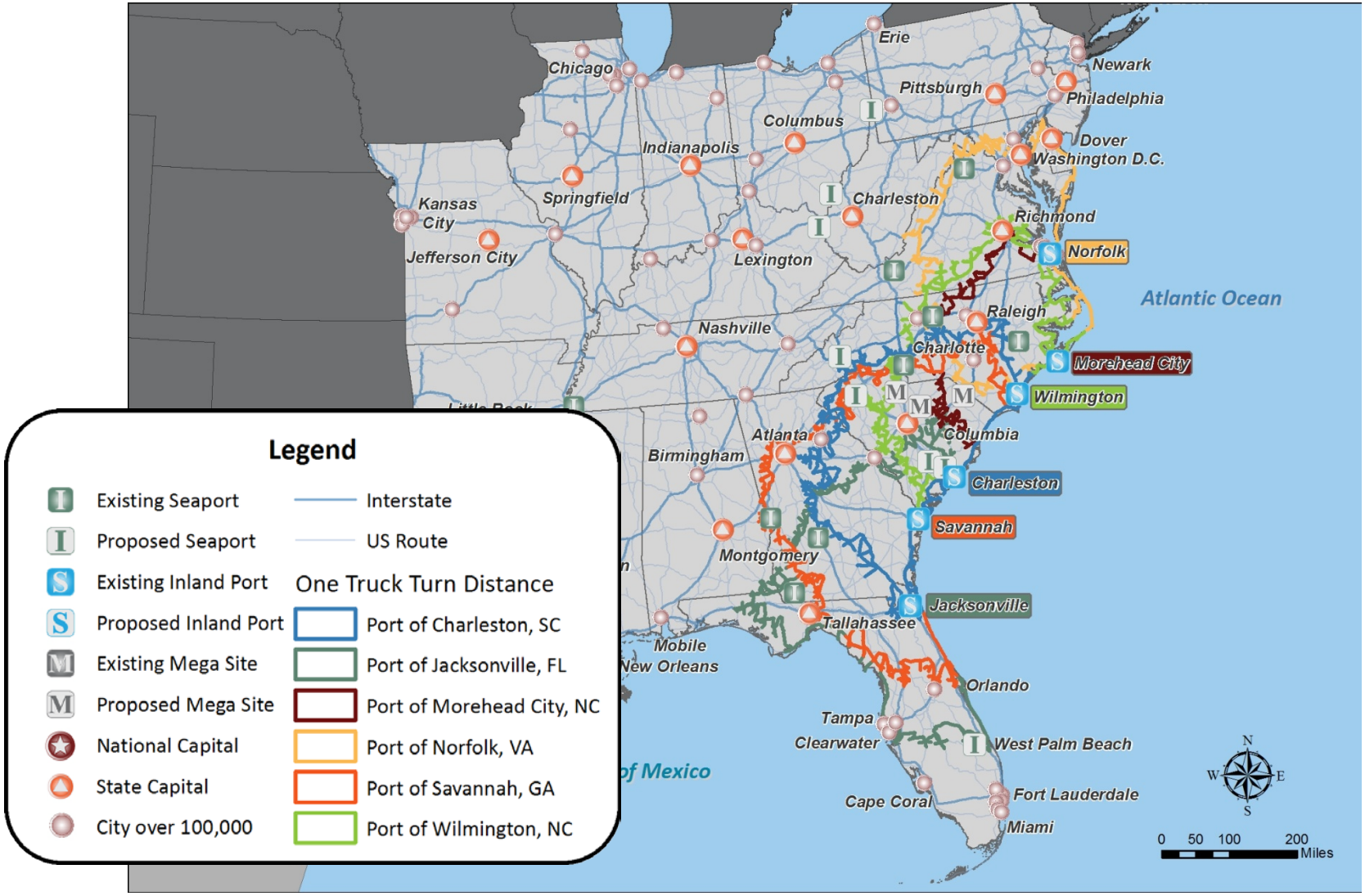
- Ocean Transport
- Truck Transport
- Port Handling
- Rail Transport

*Source: **AECOM/URS***

AECOM URS

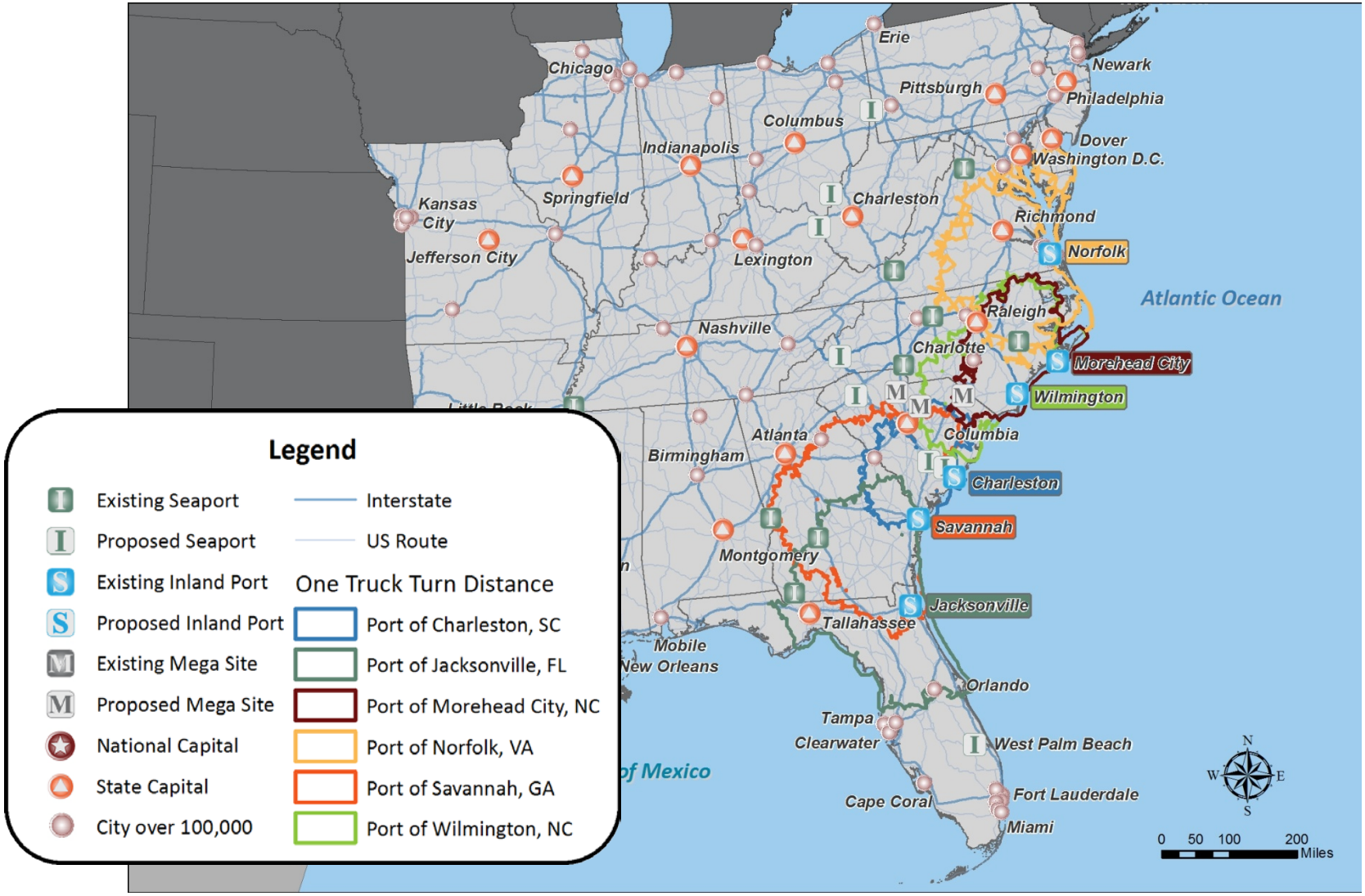
NORTH CAROLINA
MARITIME Strategy

Regional Ports—Truck Turn Distance (2007)



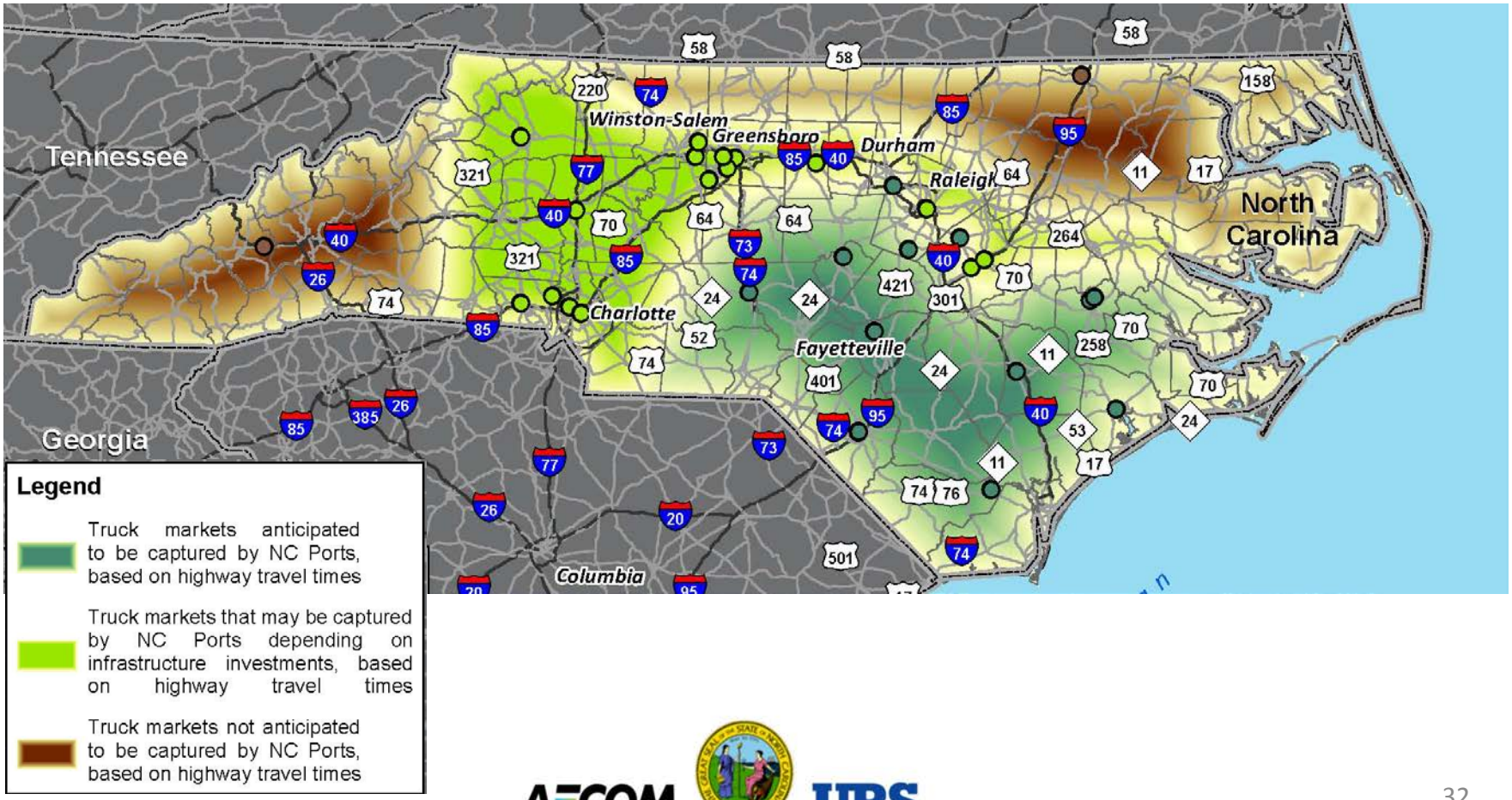
Source: AECOM/URS compiled from ESRI, NCDOT, USDOT FAF 3.1, and USGS ThematicMapping

Regional Ports—Truck Turn Distance (2040)



Source: AECOM/URS compiled from ESRI, NCDOT, USDOT FAF 3.1, and USGS ThematicMapping

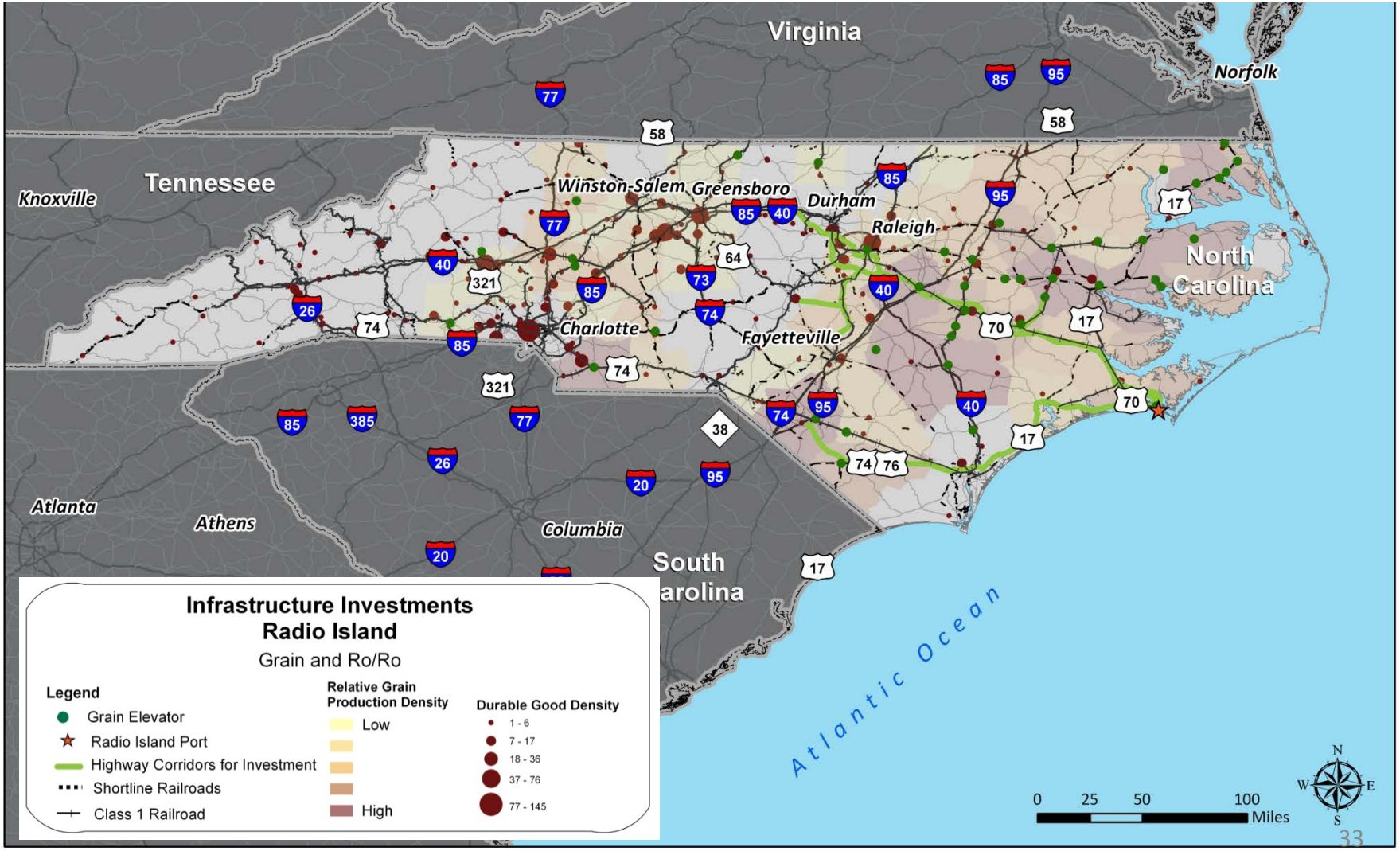
Truck-Served NC Market Areas Benefitting from Highway Investment



AECOM URS

NORTH CAROLINA
MARITIME Strategy

Targeted Highway Corridors - Radio Island



Source: ESRI, NCDOT, USDOT Freight Analysis Framework v3.1, USGS ThematicMapping world borders dataset

Technical Analyses Lessons Learned

- Grid out the state for spatial analysis
- Considered NC ports as second ports of call instead of first ports of call
- Do as many calculations within GIS database as possible

www.ncmaritimestudy.com

Alixandra Demers, AECOM
Eddie McFalls, AECOM