

DEVELOPMENT OF A STATEWIDE MODEL FOR HEAVY TRUCK FREIGHT MOVEMENT ON EXTERNAL ROAD NETWORKS CONNECTING WITH FLORIDA PORTS

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Introduction

- **Four Phases**

- **Phase I:**

- **OBJECTIVE:** Develop truck trip generation and forecasting models for the Port of **Miami** (completed 1998)

- **Phase II:**

- **OBJECTIVE:** Develop truck trip generation and forecasting models for 4 more Florida Ports (completed July 2001)

- **Ports included:** **Palm Beach, Everglades, Tampa, Jacksonville**

Introduction

- **Four Phases**

- **Phase III** (in progress):

- **OBJECTIVE**: Develop truck route assignment models for two Florida Ports.

- Ports included: **Tampa, Canaveral**

- **Phase IV** (under review):

- **OBJECTIVE**: Development of statewide truck model for transportation networks connecting with deep seaports in Florida and forecast truck volumes on key interstate routes.

Phase II Overview

- Investigate the potential of Artificial Neural Networks (ANN) for forecasting inbound and outbound heavy truck trips at seaports
- Develop a methodology for forecasting future truck volumes at seaports

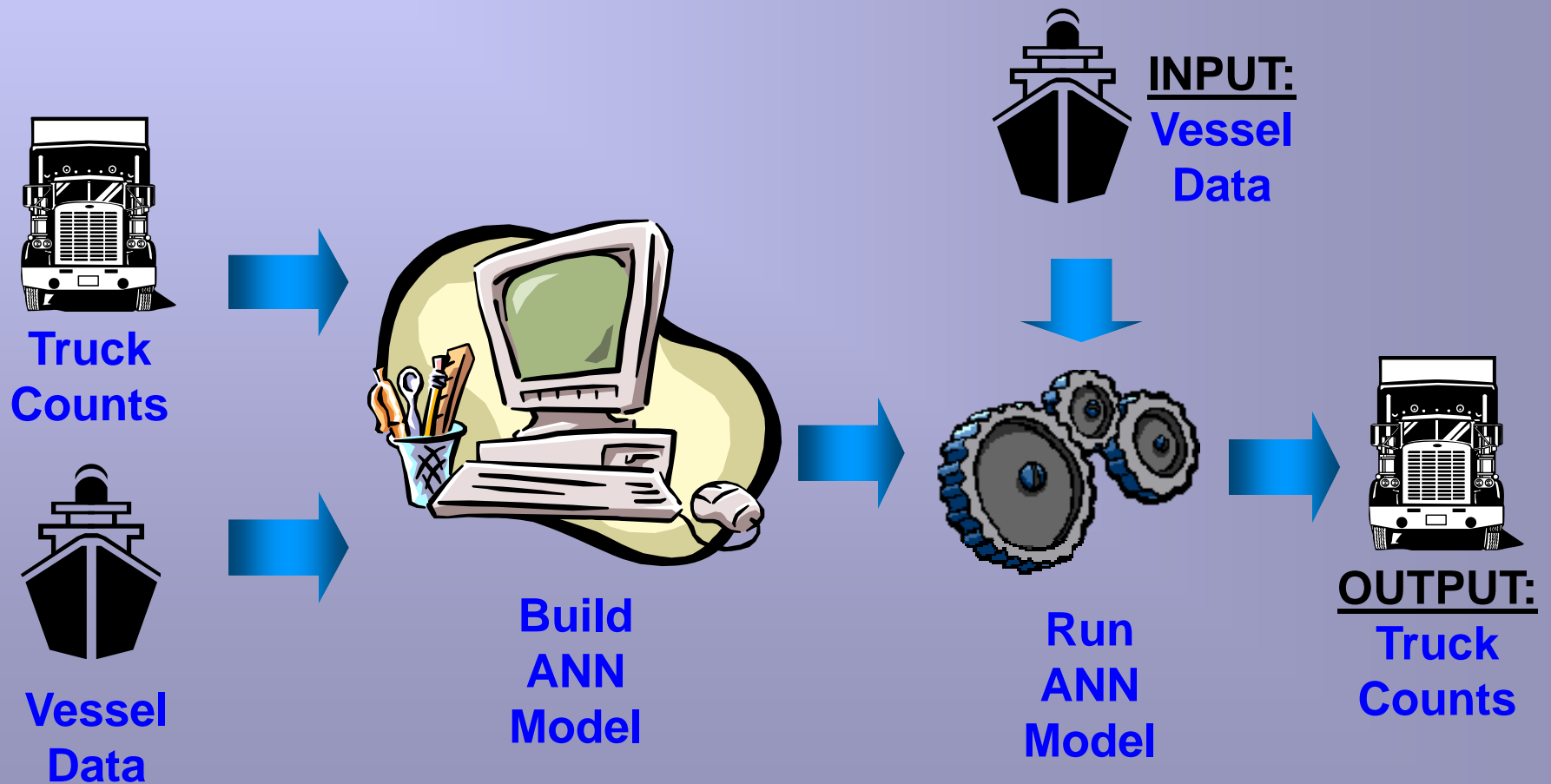
View of Port of Palm Beach looking southwest

Photo by Wright

PHASE II

Phase II Overview

(Artificial Neural Network Development)



Phase II Overview

- **ANN used to model all ports**
 - **Palm Beach, Everglades, Tampa, Jacksonville.**
- **Separate models developed – Each port has unique characteristics.**
- **Forecast freight data using historical data for input to ANN models**
- **Port Everglades example...**

Phase II Overview



(Port Everglades: site specific data)

- Imported petroleum is very significant (barrels)
- Exported petroleum is insignificant (barrels)
- High containerized cargo activity
- Three main access roads (Eller Dr., Spangler Blvd., Eisenhower Blvd.)

Phase II Overview

(Port Everglades ANN Data)



Input Data

- Date
- Daily Containers (import/export)
- Daily Tonnage (import/export)
- Monthly Barrels (import)
- Saturday or Sunday

Output Data

- Date
- Daily Trucks (inbound/outbound)

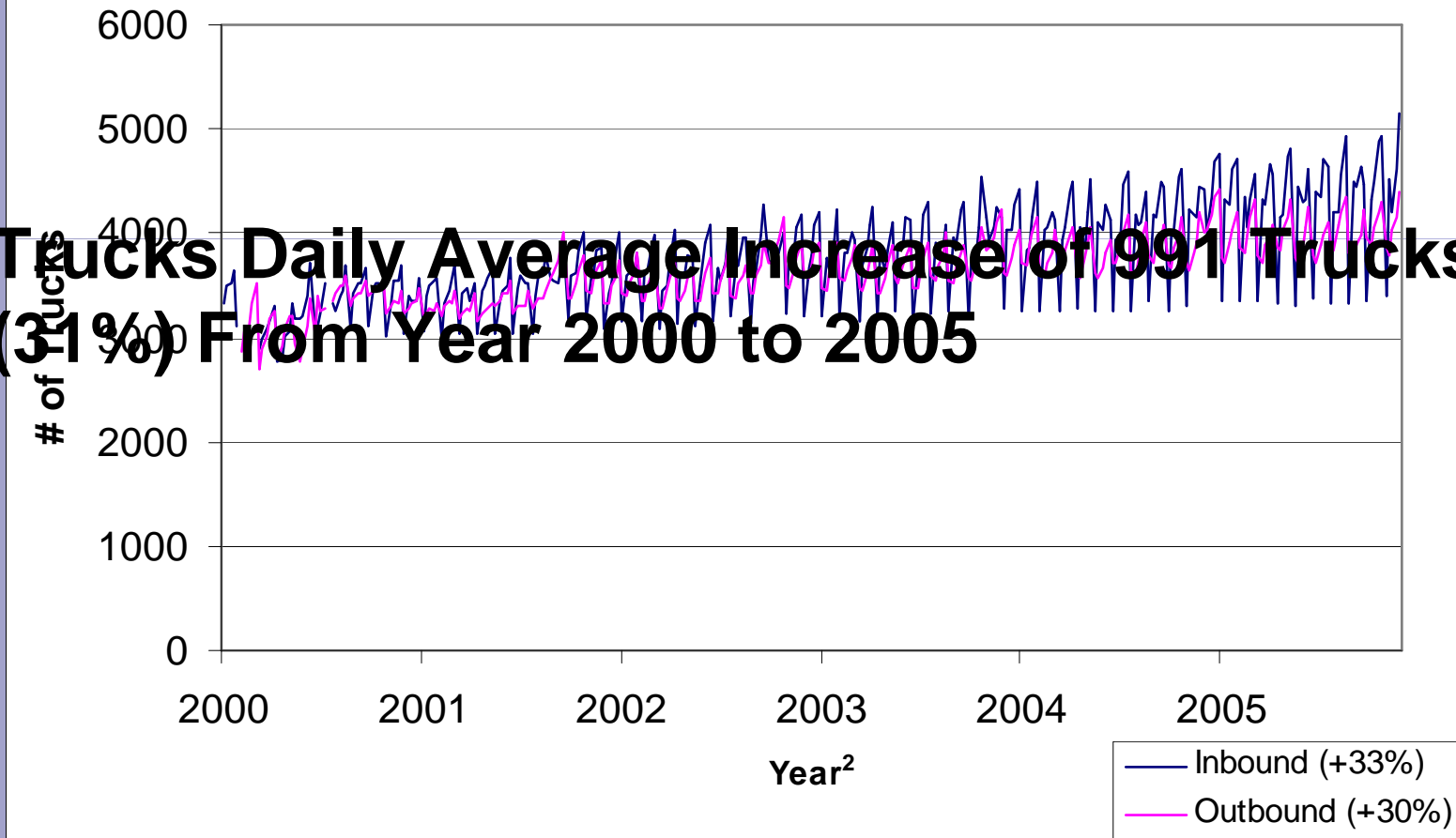


Phase II Overview

(Port Everglades Forecast Results)



Everglades Truck Counts (Year 2000-2005)¹

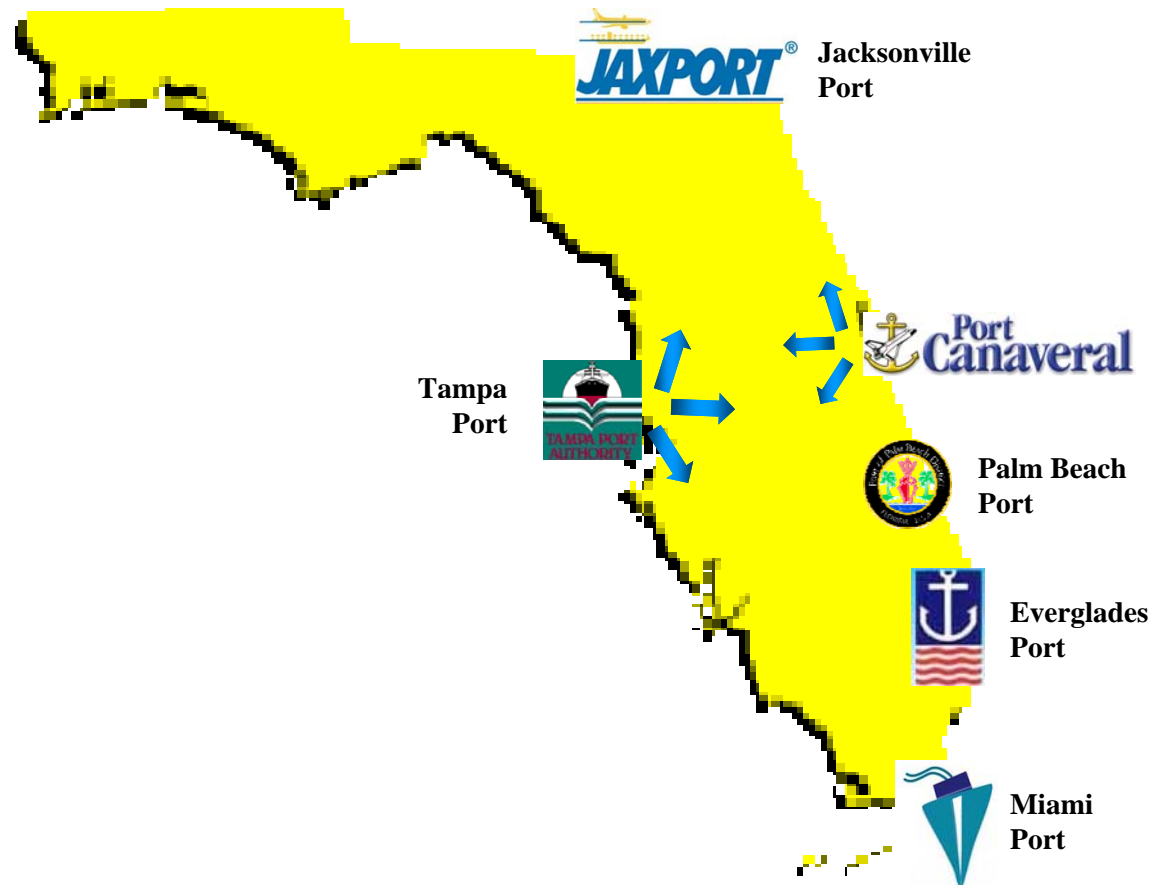


¹excludes weekends

²annual counts using one week from each month of the year (84 data points)

Phase III (in progress)

Objective: Develop a predictive truck route assignment model for adjacent highway networks connecting to Florida ports



Phase III Overview

(Port of Tampa)



- **Three main port locations/five main access roads**
- **Network Definition**
 - **21 Nodes**
 - **Geometry, turning movements, traffic control & signal timing**
 - **30 Links (road segments)**
 - **Geometry, AADT data (FDOT), phase II truck counts, phase III truck counts on selected links (master links)**
 - **Highways (I-4, I-75, I-275, SR-41, SR-618, SR-92 and SR-60)**
 - **Arterials (for example: 22nd street)**

Phase III Overview

(Simulation Packages)

- FSUTMS
 - 2 network models available for the Tampa Bay Region
- CORSIM
 - Well known and widely used by government agencies
- VISSIM
 - Explore new software and verify results

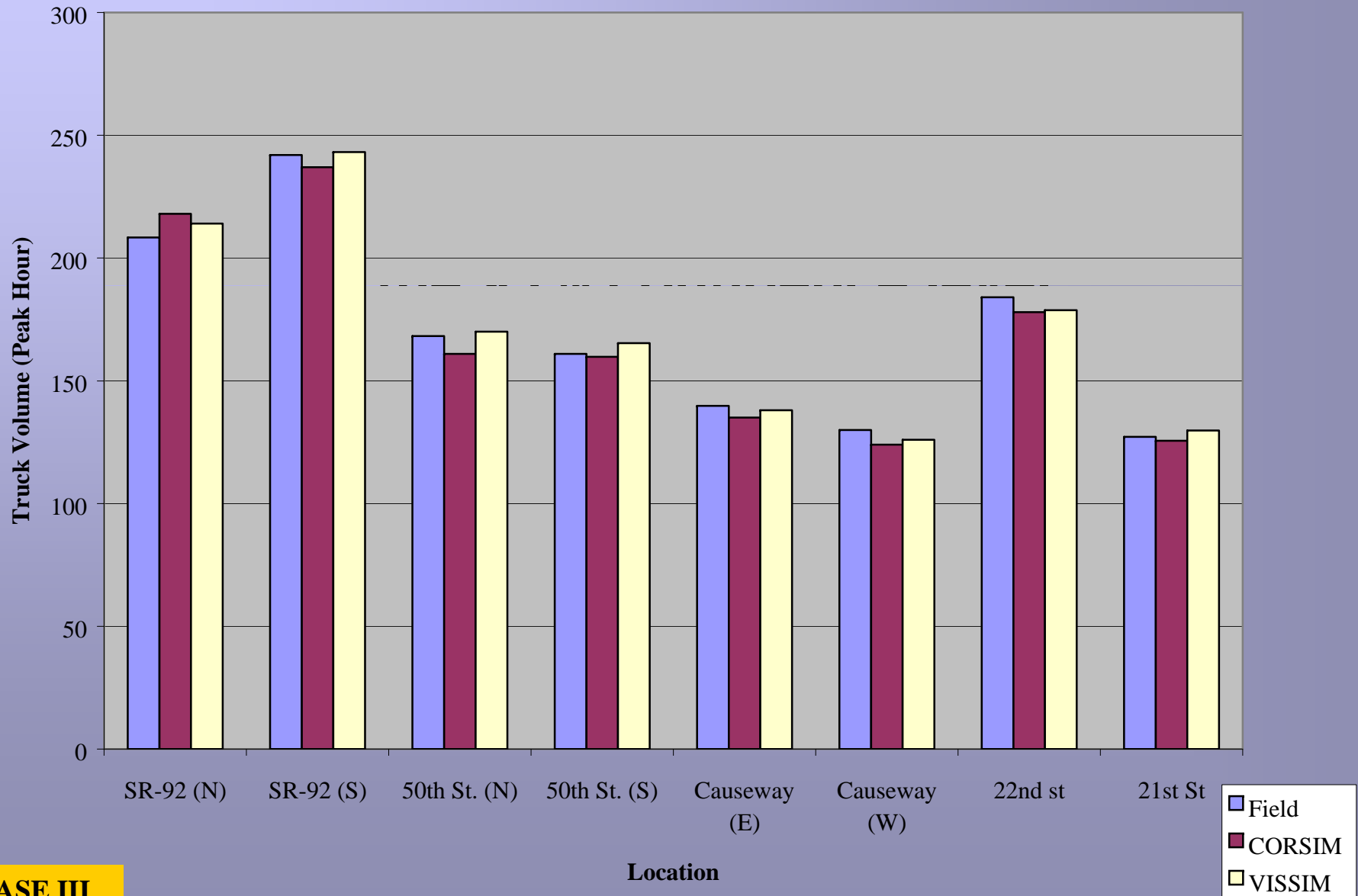


Phase III Overview (Port of Tampa)

- Origin/Destination (O/D) Matrix Definition
 - FDOT data
 - Trucking company information
 - Field truck counts (34 days)
 - Model Calibration (23 days)
 - Model Validation (11 days)
- Forecasting
 - Tampa ANN Model truck volume forecast results used for input

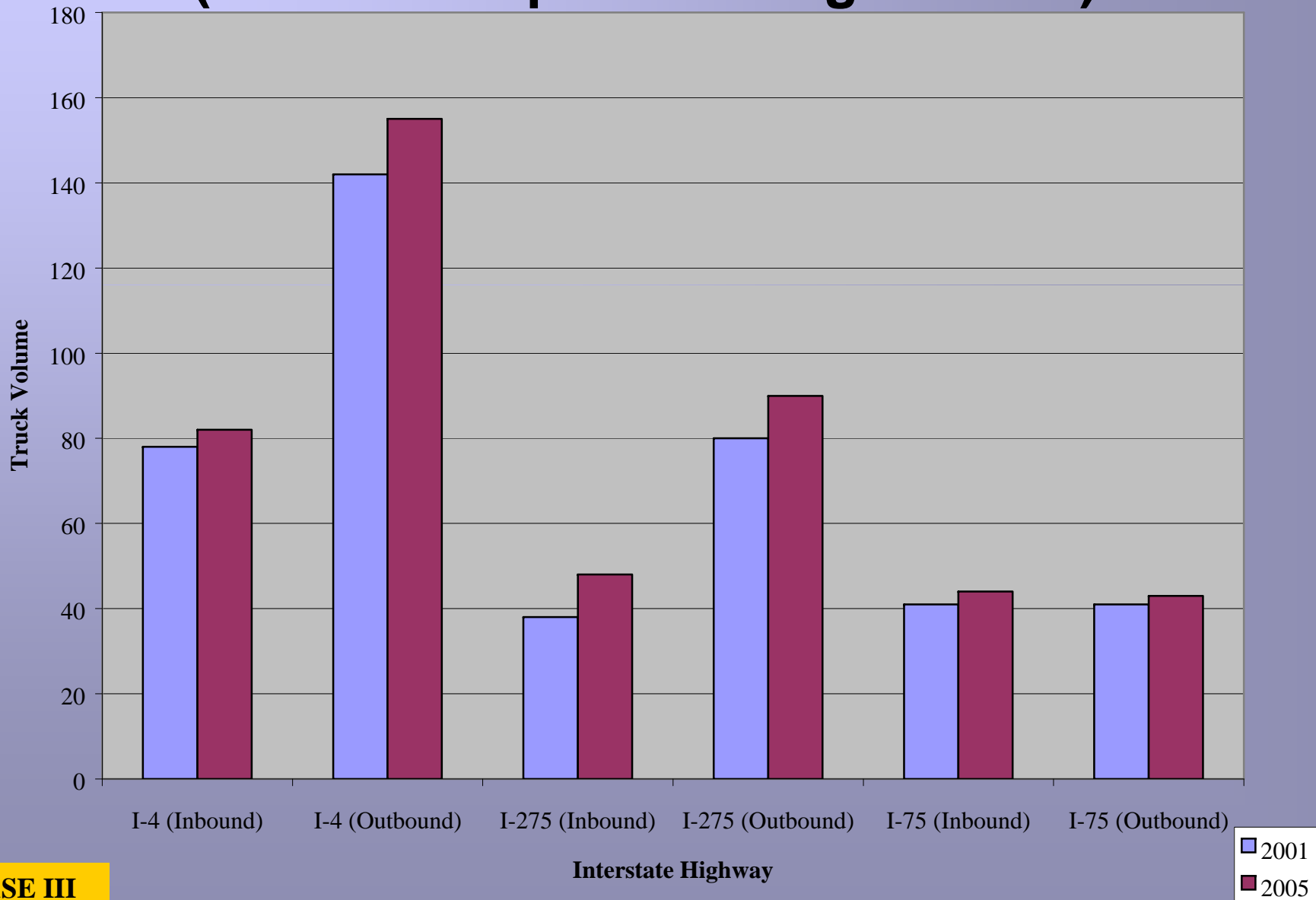


Phase III Overview (CORSIM and VISSIM)





Phase III Overview (Port of Tampa Modeling Results)



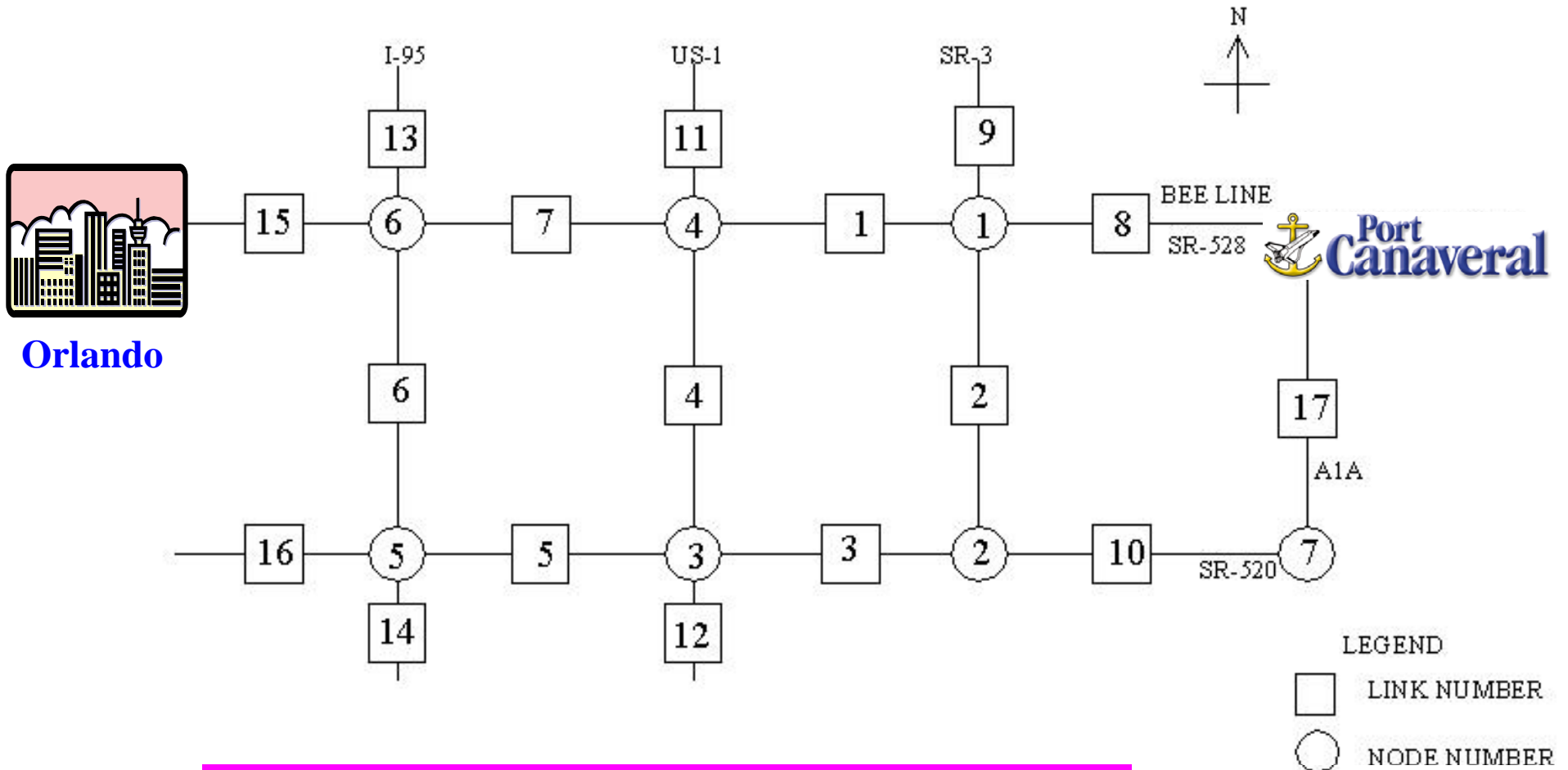
Phase III Overview Port Canaveral

(Port Canaveral)

- Define initial highway network
- Develop ANN model
 - Forecast port truck volumes
- Model Port Canaveral highway network
 - Current year
 - Forecasted year

Phase III Overview Port Canaveral

(Port Canaveral)



7 Nodes 17 Links

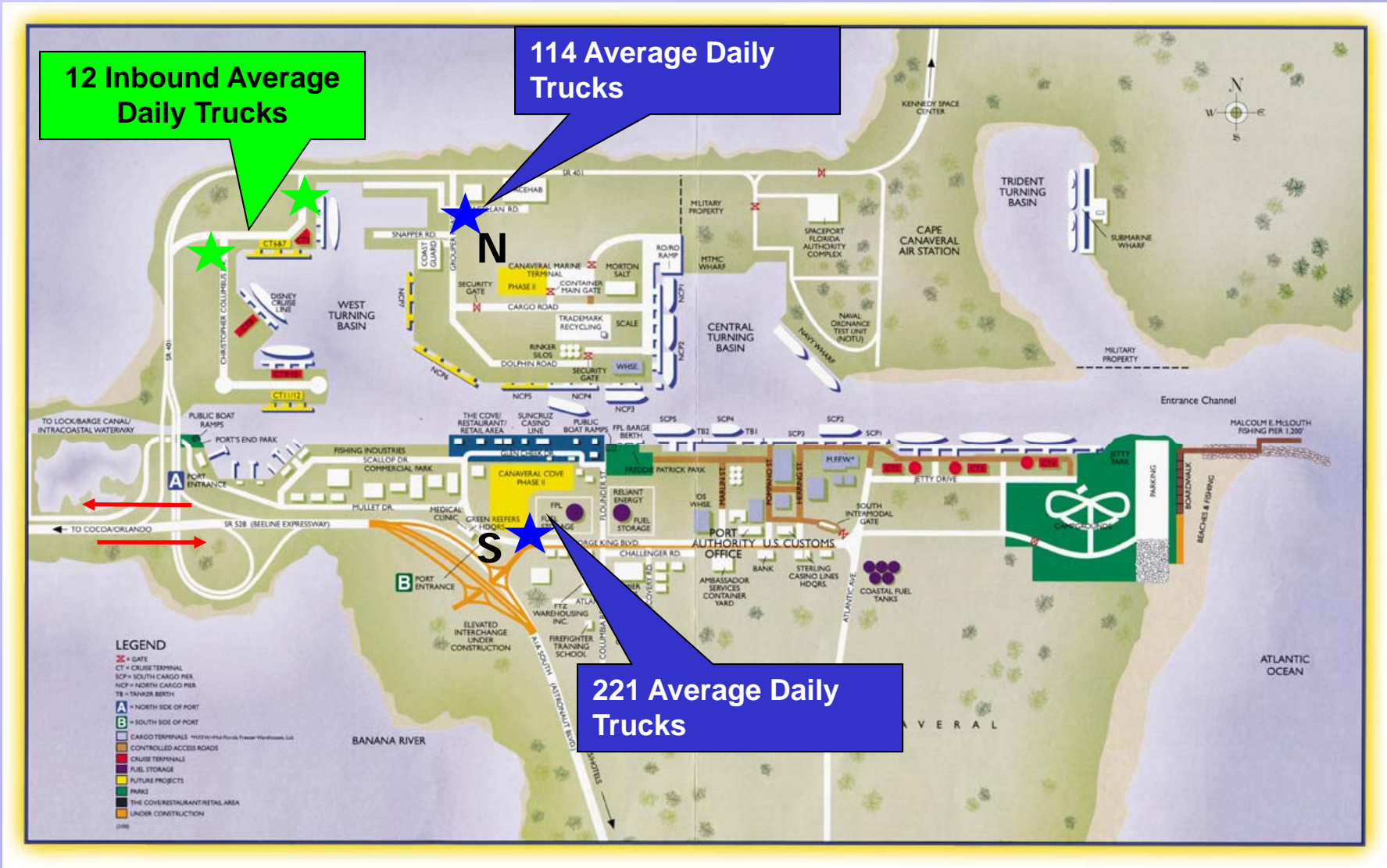
Highways: I-95, US 1, SR 3, SR 520, SR 528

PHASE III

Port Canaveral



(Daily Truck Counts for ANN Model)



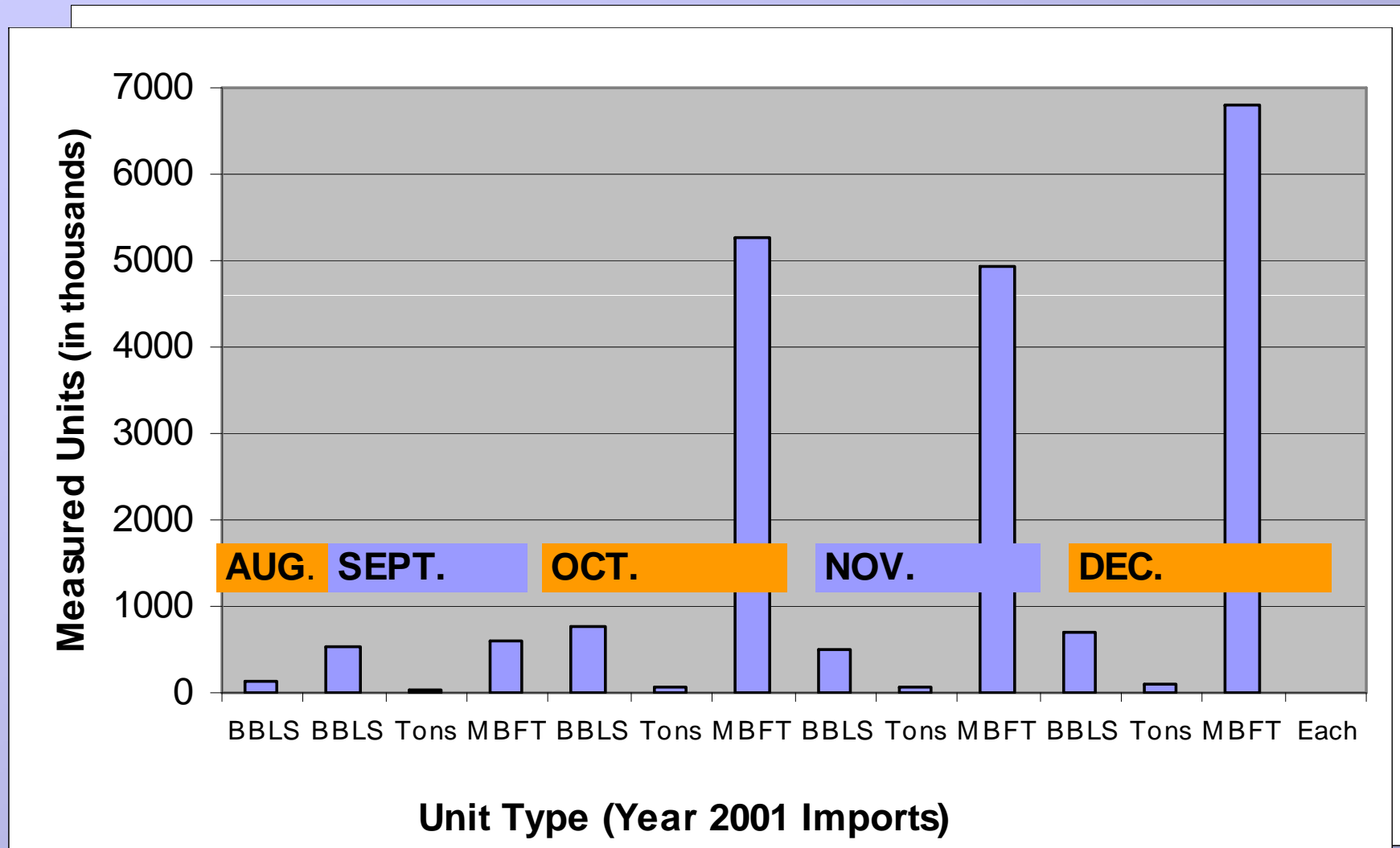
Port Canaveral

(Vessel Data)

Commodities by Unit Type

Barrels (BBL)	Tonnage (TONS)		(EACH)
Diesel	Accomm. Units	Rebar	20' Container
Oil	Cars	Salt	20' Container
Prem Gas	Cement	Scrap Steel	(Empty)
Reg.Unl. Gas	Citrus	SS Juice	20' Tank
Sp.Unl. Gas	Concentrate	Treatment Plant	Containers
Unknown	Gen'l Misc	Truck	
	Hooper	Vehicles	(MBFT)
	Newsprint	Wrapper & Headers	Lumber
	PCS Equipment		

Port Canaveral (Daily Vessel Data)



Port Canaveral (Historical Vessel Data)

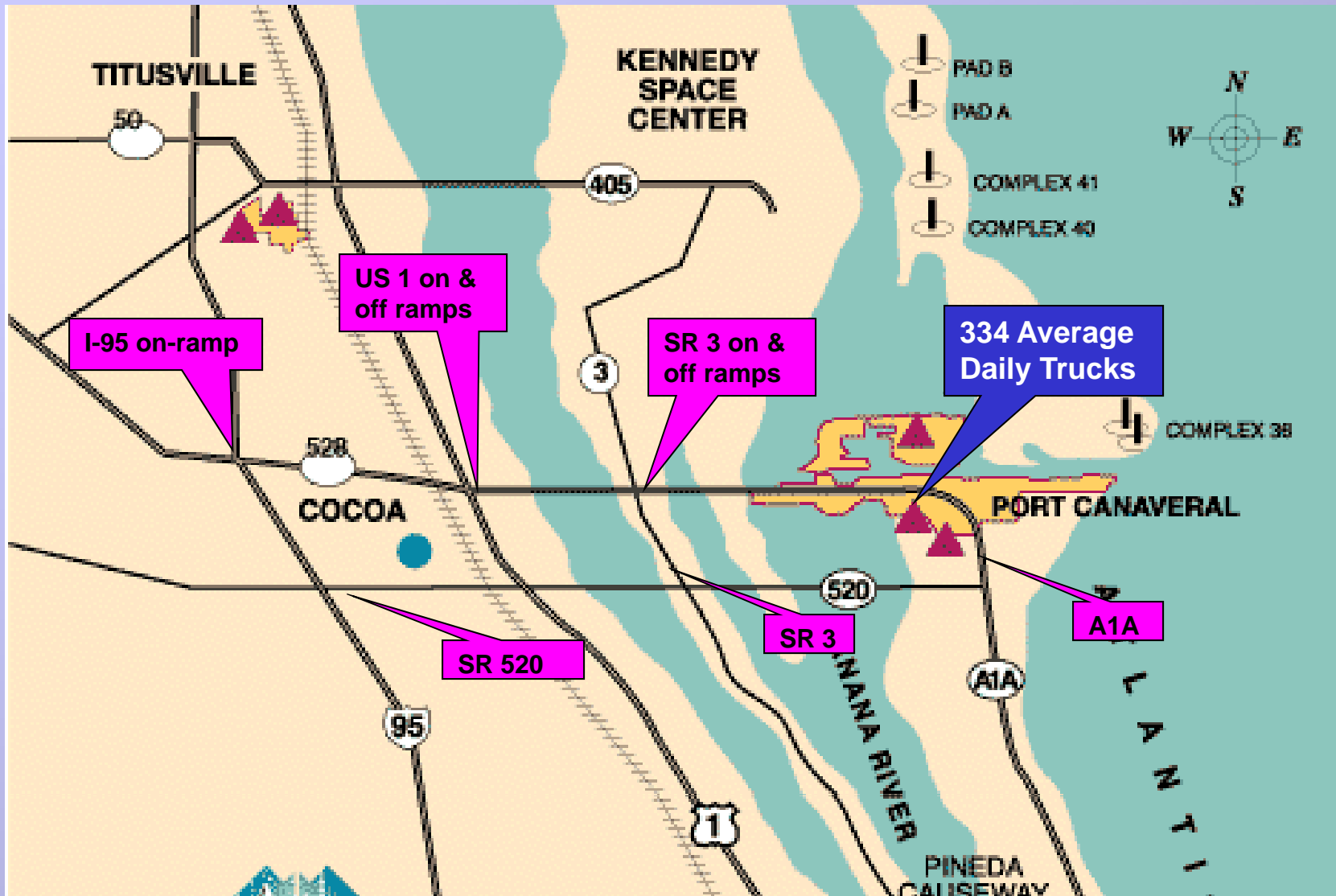


Port Canaveral (Network Modeling)



- Origin/Destination (O/D) Matrix Definition
 - FDOT data
 - Tennant Listing (for truck route info)
 - Field truck counts
- Network Forecasting
 - Future truck volumes from ANN model used
 - Historical vessel data generates future vessel data
 - Future vessel data input to ANN model

Port Canaveral (Network Truck Counts)



Phase IV (under review)

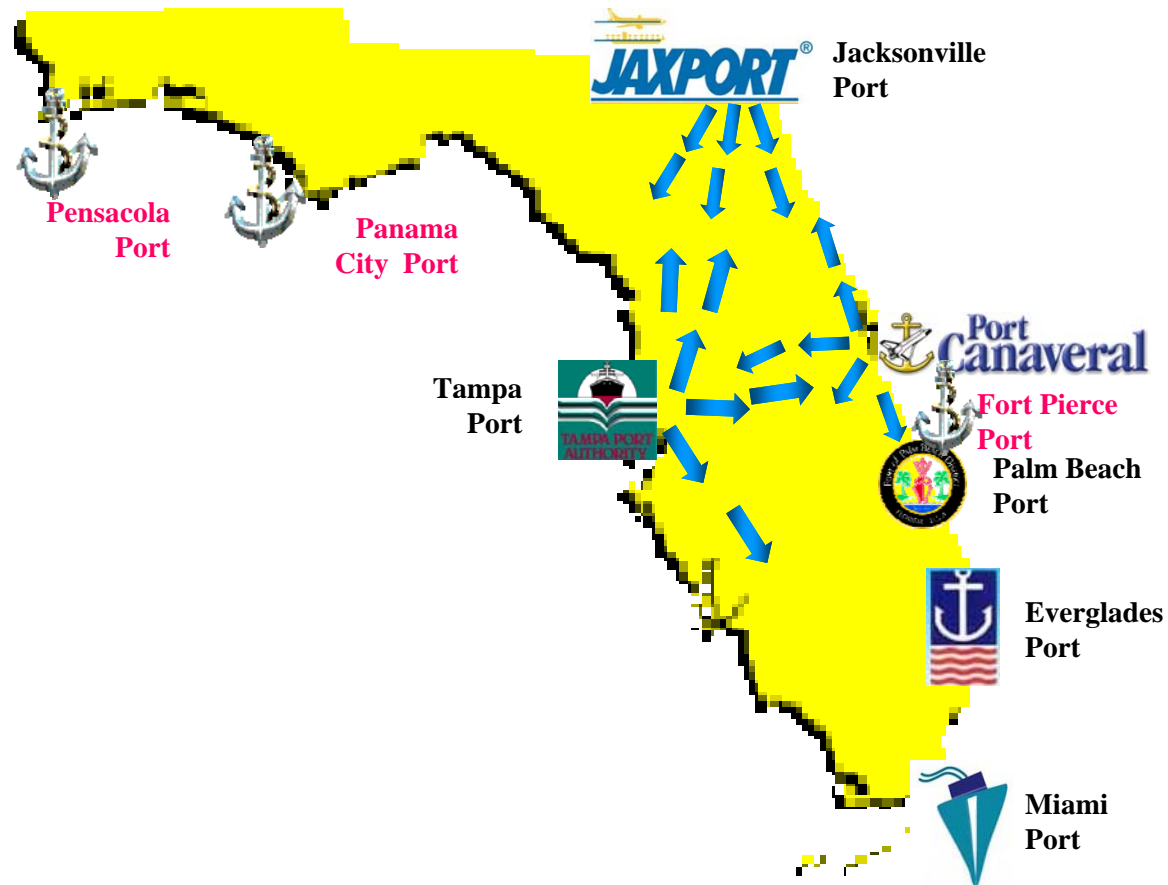
- **Determine Origin/Destination of trucks**

- **Accomplish this by:**

- Phase II ANN application
- Phase III network definition and modeling
- GPS tracking
- Database information
- Interviews with trucking companies

Phase IV (under review)

Determine truck routes on external road network and apply methodology to a low tonnage port.



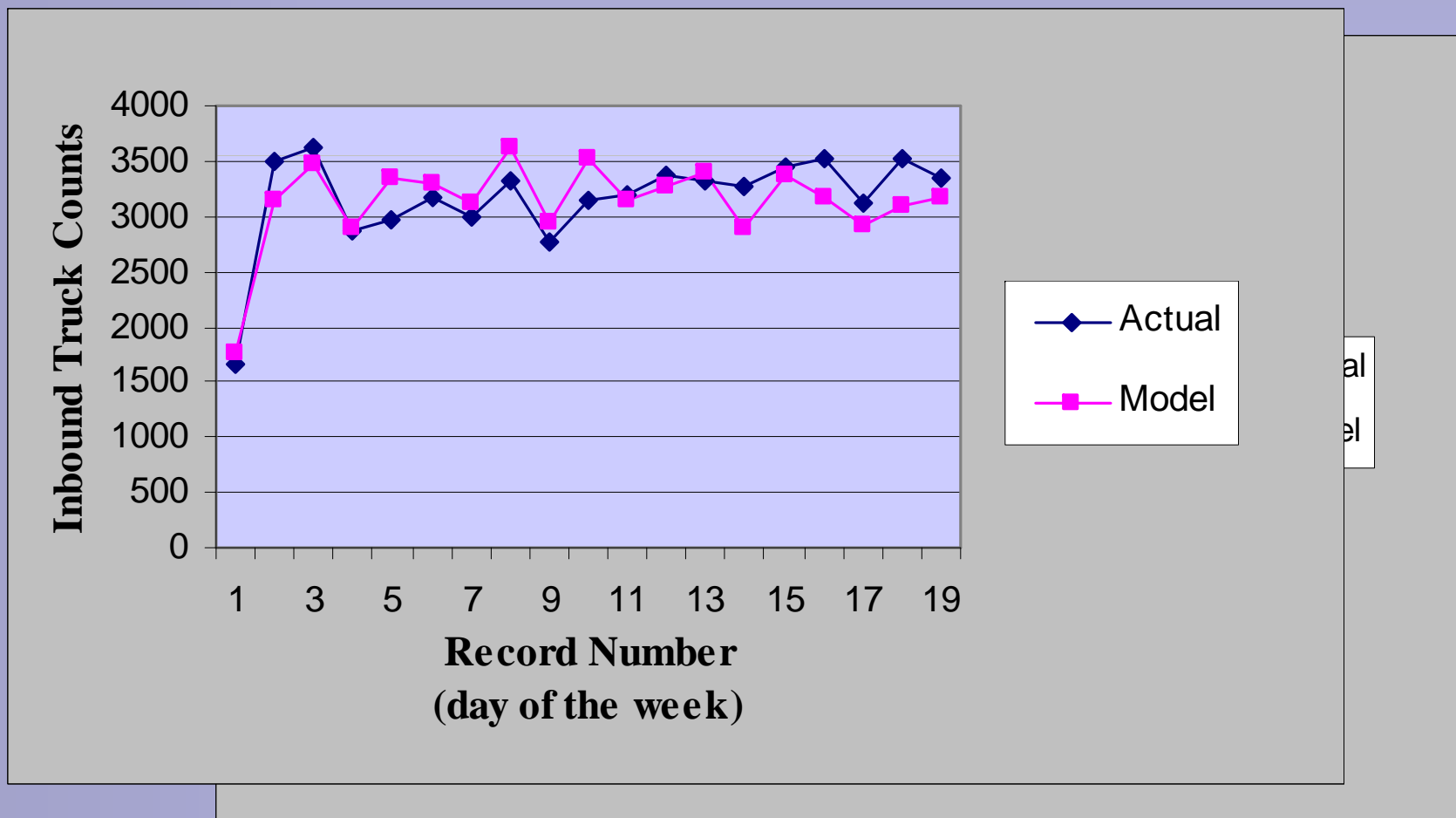
Thank You

Phase II Overview

(Port Everglades ANN Results)



- No significant difference at the 95% conf. level

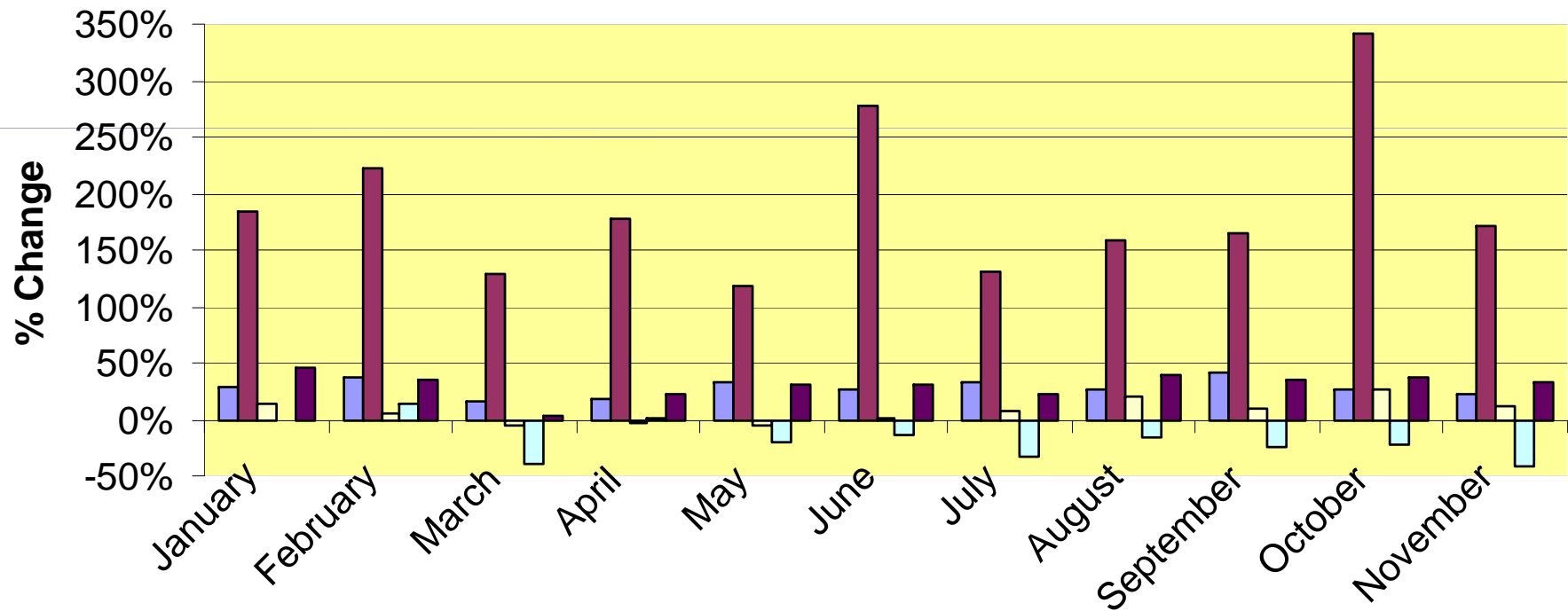


Phase II Overview

(Port Everglades Forecast Results)



% Change of Everglades Forecasted Freight Input Variables (Yr 00-05)



■ Imported Barrels (+28%)
 ■ Imported Tonnage (+189%)
 ■ Imported Containers (+7%)
■ Exported Tonnage (-18%)
 ■ Exported Containers (+31%)

Phase III Overview

(Port of Tampa)



Total Port Generated Truck Volumes by Percentage on Interstate Highways

Year 2001

- Interstate 4
 - Inbound: 22%
 - Outbound: 38%
- Interstate 275
 - Inbound: 11%
 - Outbound: 22%

Year 2005

- Interstate 4
 - Inbound: 22%
 - Outbound: 37%
- Interstate 275
 - Inbound: 15%
 - Outbound: 22%

Port Canaveral



(Outbound Network Truck Counts)

