

Concordance of Maritime Performance Measures

for Deepwater, Waterway and Landside Systems

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presented by

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Background

- Efforts to standardize maritime performance have been stymied by
 - » Unique cargo profile at every port
 - » Different ways of defining success
- The overall performance of the maritime system is contingent on three very different yet interrelated systems
 - » Deepwater ports, inland waterways and landside connections.
- Cambridge Systematics reviewed waterborne performance measures as part of TxDOT Waterborne Freight Corridor Study
 - » Suggested a number of potential measures for the State's 17 ports.

Study Organization

- The study was completed in coordination with the project's Stakeholder Advisory Committee
 - » representatives of each of the State's ports
 - » other users such as the military and key shippers
- Identify ongoing and future actions that TxDOT can take to further integrate the State's waterborne freight system into its multimodal planning efforts
- Texas does not yet use official statewide metrics for tracking maritime performance

Texas Port System



Phased Approach

Phase I

- Describe current and future conditions, marine terminals, navigable waterways, inland highway, and rail connections
- Identify critical bottlenecks and needs across the entire system

Phase II

- Develop infrastructure and operational solutions to bottlenecks and needs
- Describe the costs and benefits of these solutions
- Develop a phased implementation strategy for consideration by TxDOT and other stakeholders

Why Were Performance Measures Examined?

- Ports proposed a multitude of different projects
 - » Seaside
 - » Landside
 - » Waterway infrastructure
- Identify ongoing and future actions that TxDOT can take to further integrate the State's waterborne freight system into its multimodal planning efforts
- CS created a prioritized list of system-level project and solutions
 - » Sought a coherent method for weighing the benefits of these projects and assessing condition and needs

Identification of Infrastructure Packages

- Packages of infrastructure investments tied to alternative goals
 - » Improve Ports and Waterway Access
 - » Improve Gulf Intracoastal Waterway
 - » Maximize Cargo Capacity
 - » Create System Redundancy
 - » Focus Resources on Key Industries
 - » Positioning for Economic Growth
- Each goal produces a unique set of preferred investments
- Performance measures must first address the overarching policy goal

Identifying Performance Measures

- TxDOT asked CS to take a broad brush approach
- World Economic Forum surveys business executives to rank economic competitiveness
 - » “Port facilities and inland waterways in your country are (1 = underdeveloped, 7 = as developed as the world’s best)”
- Some pre-existing sources reviewed
 - » NCFRP Report 10- Performance Measures for Freight Transportation
 - » Recent research on terminal performance – Tioga
 - » PIANC Working Group
 - » Oregon State University/Oregon Department of Transportation

Development of a Comparison Table

- Recognized that some measures dealt primarily with ports, other with waterways and others with landside systems
- PM's were checked if they served as a measure for each of these systems. Some were found to be applicable to two or three of the categories.
- Proposed PM's were then arranged in accordance with the goals of the TxDOT Strategic Plan
- Over 40 measures were placed “on the table”
 - » Intended to spur broader discussion

Congestion Related Measures (Proposed)

Category	Performance Metric	WW	P	L
Congestion	Total stop of navigation on a specific waterway section measured in days	✓	✓	
	Total navigable days per year within a maritime corridor	✓	✓	
	Average vessel delay at locks	✓		
	Frequency and duration of lock closures	✓		
	Number of lockages/lock capacity	✓		
	Truck turn time		✓	✓
	Container throughput and land utilization: (TEUs per Container-Yard acre/year)		✓	
	Container dwell time		✓	
	Ship unload rate (time per container or per ton)		✓	
	Ship load rate (time per container or per ton)		✓	
	Average time in transit per barge tow on GIWW	✓		
	Annual TEU or Tons per Crane		✓	
	Port-handling capacity per quay meter and per truck loading bay		✓	✓

WW – Inland Waterway, P – Deepwater Port, and L – Landside Infrastructure.

Congestion Related Measures (Proposed)

Category	Performance Metric	WW	P	L
Congestion (continued)	Rail movement constraints on port access tracks: delay from at-grade rail/street crossings		✓	✓
	Average ship travel time in bottleneck areas		✓	
	Miles of the GIWW with unsuitable channel width, as defined by TxDOT	✓		
	Miles of the GIWW with unsuitable channel depth, as defined by TxDOT	✓		
	Miles of the GIWW with difficult turns and one-way zones, as defined by TxDOT	✓		

Safety Measures (Proposed)

Category	Performance Metric	WW	P	L
Safety	Vessel to vessel collisions (annually)	✓	✓	
	Vessel to fixed object collisions (annually)	✓	✓	
	Percentage of port containers inspected annually		✓	
	Hazardous spills by water modes/hazmat carried by water	✓	✓	
	Number of locations to park a barge along the GIWW (mooring structures)	✓		

Economy Measures (Proposed)

Category	Performance Metric	WW	P	L
Economy	Number of direct jobs sustained through waterborne commerce	✓	✓	✓
	Ratio of imports/exports		✓	✓
	Logistics cost/percentage of state GDP	✓	✓	✓
	Tons of traffic arriving at key ports by barge/alternative modes	✓	✓	
	Annual TEU or tonnage per berth		✓	
	Total tons and value of freight moving on the GIWW	✓		
	Total tons and value of freight moving on the GIWW			
	Total value of key industries income generated by the GIWW (for example, total weight and value of shrimp, oysters and finfish facilitated by the GIWW)	✓		

System Preservation Measures (Proposed)

Category	Performance Metric	WW	P	L
System Preservation	Acres of land available for future maritime industrial use		✓	
	Number of rail miles abandoned			✓
	Average age of waterway infrastructure assets	✓	✓	
	Average age of cranes and other major cargo handling assets		✓	
	Dollars spent on freight marketing and education to the general public	✓	✓	✓
	Annual increase in acreage of developed properties along navigable waterways	✓	✓	
	Total cost of maintenance per lock, per month	✓		
	Cubic yards of sediment dredged/projected	✓	✓	

Emissions Measures (Proposed)

Category	Performance Metric	WW	P	L
Emissions	Tons of CO ₂ , PM, SO _x , NO _x , HC related to marine engine combustion	✓	✓	
	Discharge of waste and ballast water		✓	
	GHG emissions/tonnage	✓	✓	✓
	Evaporative emissions by vessels in transit	✓	✓	

Implementation and Conclusions

- A key problem within the MTS is that it is viewed as an accumulation of assets, not a system
- The codification of performance measures that take into account port, waterway or landside orientation will help policymakers better understand the MTS
- Key Policy Questions:
 - » How to account for differences in port types
 - » Potential role of shipper surveys to assess system performance
 - » How to prevent measures from becoming ossified
 - » Determining the optimal number of measures