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16. Abstract This implementation project was based upon work undertaken as part of the Texas Department of Transportation's Project 0-1833, which assessed containership activity in the Gulf of Mexico. Report 1833-2 addressed an identification process and evaluation framework for Texas Gulf containerports. The report begins by identifying and discussing relevant topics of port development and operations in four general areas: infrastructure demands; environmental constraints; locational attraction and landside access; and port finance. After introducing the issues surrounding these topics, the report proposed a load center selection process suitable for mega-containerships and a container port evaluation process. In its conclusion, the report recommended that these techniques be reviewed and tested on selected Texas ports and the data collected from the implementation be stored and updated in a database maintained for TxDOT's future use. In January 2002, TxDOT approved implementation of the findings from Project 0-1833, specifically in relation to Report 1833-2, and this report addresses the findings of that exercise.			
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# Infrastructure Impacts and Operational Requirements Associated with the Next Generation Containerships (Megaships) on the Texas Transportation System

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Implementation Report 1833-01-imp-1

Implementation Project 5-1833-01  
*Infrastructure Impacts and Operation Requirements  
Associated with the Next Generation Containerships*

Conducted for  
Texas Department of Transportation  
in cooperation with  
U.S. Department of Transportation  
Federal Highway Administration  
by the  
Center for Transportation Research  
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# **Infrastructure Impacts and Operational Requirements Associated with the Next Generation Containerships (Megaships) on the Texas Transportation System**

## **Background**

This implementation study was based upon the Texas Department of Transportation's (TxDOT) Project 0-1833, which assessed containership activity in the Gulf of Mexico. The research project, undertaken by staff at the Center for Transportation Research at The University of Texas at Austin, was designed with two primary goals. First, the project was to address the planning, institutional, and financial issues associated with increased containerized freight traffic moving through Texas deep-water ports. The second goal was to assess the demand on the multi-modal highway transportation system in Texas, contingent upon the operation of large containerships in the Gulf of Mexico. This second goal was later modified to address the impacts of all types of containerships calling at Texas ports, including the new mega-containerships.

Report 1833-2 (Bomba and Harrison, 2000) addressed an identification process and evaluation framework for Texas Gulf containerports. The report identified and discussed relevant topics of port development and operations in four general areas: infrastructure demand; environmental constraints; locational attraction and landside access; and port finance. After introducing the issues surrounding these topics, the report proposed a load center selection process suitable for mega-containerships and a container port evaluation process. The procedure for constructing a load center selection process concentrated on the following: heuristic methods; selecting matrix parameters; parameter criteria; and the scoring and weighting of these parameters and criteria. The port evaluation process focused on identifying base line characteristics, determining objectives and alternatives, assessing these objectives and alternatives, and identifying a preferred alternative and its constraints. In its conclusion, the report recommended that these techniques be reviewed and tested on selected Texas ports and the data collected for the project tools be stored and updated in a database maintained for TxDOT's future use. In early 2002, TxDOT approved the implementation of Project 0-1833 (specifically in relation to Report 1833-2) and this report addresses the findings of that exercise.

## **Implementation Objectives**

The series of 1833 reports (1, 2, 3, 4, and 5) generated considerable interest from a number of staff at the 12 Texas deep-water ports, particularly those considering future container activity at their ports as an opportunity for growth. In addition to the general support for the project received from Texas ports, there were *specific suggestions* for future development of the project's evaluation method. In particular, staff at the Port of Texas City noted that the issue of channel safety was not directly addressed in the evaluation method. It is important to note that safety

in this context represents the risk of increased accidents due to ship channel congestion, and not due to terrorist activity. The Port of Texas City staff pointed out that the growth of international trade combined with the growth estimates of the specific commodities—like petroleum—forecasted over the next 20 years, together with the predicted growth in barge use, suggested a future problem of congestion in its channel and a degradation of current safety levels. They suggested including channel safety as part of the evaluation process.

In addition to concerns associated with congestion and safety, the tragic events of September 11, 2001 elevated the role of security within the evaluation of deep-water ports. Although security is not the prime concern of a Department of Transportation, it may be the case that changes to the handling of containers (after security assessments at each port) will impact commercial traffic flows on key arterials near deep-water ports. In this sense, there is a link between heightened security and highway use. It was agreed, therefore, that the implementation activities would include both channel safety and the impacts of increased port security.

The findings of 1833-2 were presented at a meeting of the Texas Port Association in July 2002. There appeared to be substantial interest from a number of Texas ports that offered to contribute to the implementation project proposed as part of study 1833. Approximately nine ports (not all deep-water) requested an evaluation but it was decided, after meeting with both the Project Director and the Multi-Modal (MMO) Director of TxDOT, that this implementation exercise should focus first on four key deep-water ports associated with current container flows or proposed container programs.

The summarized implementation objectives were:

1. Test the evaluation method on a sample of deep-water ports with an interest in serving containers. It was agreed that these ports would be in the cities of Houston, Texas City, Corpus Christi, and Brownsville.
2. The matrix developed under 1833-2 would be tested and recommendations would be made for incorporating it into regular Multi-Modal Office planning.

## **What We Did**

Trips were made to each of the deep-water ports selected for the sample evaluation. These trips were made on the following dates: July 17, 2002 to the Port of Brownsville; August 8, 2002 to the Port of Corpus Christi; and August 30, 2002 to both the Port and the City of Texas City, as well as the Port of Houston. Each port has a different interest in the subject of containerized traffic and port planning. Houston is the major deep-water containerport for Texas, accounting for over 95% of the containers handled at Texas Gulf ports in 2001. As such, the Port of Houston's interest is in maintaining its current competitive position and in moving ahead to build its new Bay Port facility, a complement to the now congested facilities at Barbours Cut. The Port of Houston is working closely with the Houston

Metropolitan Planning Organization (MPO), TxDOT Houston District, and Texas DOT Multi-Modal Office to maintain links to the multi-modal corridors supporting both the current container flows and those projected in the future. Finally, the Port of Houston has concerns about how security improvements will impact container operations.

The City of Texas City is planning a new container facility, which will not become operational for several years. However, the Port of Texas City (which is not affiliated with the planned containerport) relies on substantial traffic from oil and petroleum products. A concern is that future operations of a containerport should not adversely impact the traffic now flowing through the port. The issues surrounding Texas City, therefore, center on general planning, safety, and security associated with the proposed container handling facility.

The Port of Corpus Christi also has plans for a new container facility but has not yet broken ground, nor is there a steamship liner service scheduled to call on the port. The Port of Corpus Christi's strategic thinking is focused on maintaining momentum to develop the new container port facility, as well as exploring links with Mexican maritime ports and other multi-modal destinations outside of Texas. These linkages could include a mini-landbridge with the Los Angeles area.

The Port of Brownsville is exploring the potential for starting container operations and is exploring its relationship with Mexican customers to develop new origins and destinations for containerized traffic. In addition to exploring the break-even level for sustaining regular steamship liner operations, the Port is seriously examining the possibility of putting containers onto barges, as well as its link with other ports on the Gulf Intracoastal Waterway (GIWW) to develop a container business.

It can be seen from this general discussion that, while the sample is small, the range of issues is wide and these ports have the potential to generate most of the responses to the evaluation matrix developed in 1833-2. The method for each visit remained relatively constant. First a visit was arranged and a copy of Report 1833-2 was mailed ahead of time to all members scheduled to attend the meeting. At the meeting, both the study and the evaluation process were presented and discussed. Each port was asked to present its containerization plans and how these plans might best fit into TxDOT's multi-modal planning process. Then the implementation/evaluation process was discussed in some detail, together with the parameters and criteria for its use. Next, a general discussion was held on the materials that were appropriate for security and safety, and these were then summarized for use in this implementation study. The agenda for these meetings was structured to support the objectives of the implementation study which were to enhance TxDOT's planning process with respect to port operations and to commit the development of a regular process for updating these data.

## **What We Found**

As previously stated, each port has a different perspective with respect to container operations. Therefore, there were different outcomes from each meeting. However, some important general findings were identified to guide and fine-tune

TxDOT port operations and the role of deep-water ports in statewide multi-modal planning.

The findings are as follows:

1. Each port was interested to meet the implementation team and all were constructive in their approach to both the formal agenda and to answering the questions that arose from the implementation exercise. When port staff were asked whether they would be willing to meet regularly with TxDOT to discuss issues arising from container movements; they answered in the affirmative. These findings strongly suggest that TxDOT should take advantage of the ports' willingness to meet and share information useful to the transportation planning process.
2. Specifically, ports are willing to plan with District staff on transportation matters. The focus of this research was on the landside transportation side of deep-water ports and this emphasis, therefore, did not include the substantial part of activities that occur within the port's boundaries. Again, the recommendation is that TxDOT's District personnel should take advantage of the willingness of port staff to meet on a variety of transportation matters, including future transportation plans that would have an impact on the highway system in Texas.
3. District staff seemed most interested in staying within the current transportation planning processes that they manage and understand. In this regard, they were more passive than is desirable. The current planning process tends to focus on smaller, immediate projects, such as those related to signalization and small-scale highway improvements for the port. The finding is that a wider vision needs to be given to the process, so that it will encourage District staff to understand and support longer range projects.
4. TxDOT requested that the implementation project examine who should take the initiative with respect to the planning activities developed at deep-water Texas ports. The interviews clearly showed that port staff are willing to share information related to planning for both immediate and future programs and, therefore, we recommend that TxDOT develop and implement a port planning process related to landside access issues, but completed by the port staff through a series of regular interviews. All deep-water ports have long-term strategies and some of these extend over a ten-year period. It is recommended that when TxDOT's staff are introduced to these longer term projects, they ask port staff to suggest "milestones" which represent the stages that a project must accomplish from concept to operation. We recommend that the milestones then be reexamined at regular intervals to see whether or not the ideas are moving towards operational reality. However, the previous finding—that District staff did not appear



particularly interested in the broader port matters—suggests that the process, which captures these milestones, must be implemented as an inter-departmental process within TxDOT. Perhaps this process would be instigated by the Multi-Modal Office (MMO) within the Transportation Planning and Programming Division (TPP), then given to the Districts to undertake the actual field work.

5. The port staff agreed that safety as it relates to congestion and marine traffic is an issue that warrants inclusion in the evaluation process. At this time it would appear that security is more problematic among the two issues. The main reason is that all deep-water ports will be required to undertake a federal security audit, under the auspices of the U.S. Coast Guard and the U.S. Department of Transportation Maritime Administration—MARAD. These audits will occur over the next two years and are likely to produce, at times, recommendations that impact connectivity to TxDOT and MPO highway networks. We recommend, as ports complete their security audit, that they contact TxDOT to update the evaluation matrix and identify transportation consequences contingent on the findings of the audit. This suggests that these activities must be scheduled over the next 36 months.
6. The changes to the evaluation matrix developed in 1833-2 resulted from the port visits and are shown in Appendix 1 of this report. New criteria were added to the sub-sections of some parameters, landside access was made a separate parameter, and a safety and security parameter was added. The parameter criteria that were suggested during the meetings with port officials will require augmentation and specification, before they would be appropriate for use in the selection and evaluation process. It is anticipated that these improvements will occur when they are necessary and when better information is available. Additionally, the criteria of the port security parameter will change substantially after completion of the required security audits being conducted at all U.S. deep-water ports. The Port of Corpus Christi is undertaking the first security audit of any Texas deep-water port, and it is recommended that MMO staff meet with port staff to revise the parameter characteristics once the audit is complete.
7. In general, the implementation activity was extremely constructive in that it showed an unprecedented interest on the part of Texas ports of being included in TxDOT's planning process. This has significant consequences, ranging from short term activities (such as connectivity) to the longer term investments related to new containerport facilities, such as those at Bay Port, Shoal Point, and La Quinta. How do we ensure that TxDOT is both aware and responsive to the needs of Texas ports, particularly as they relate to surface transportation? The main recommendation of this implementation study is that there should be a new process developed within TPP and linked to District operations to capture these issues. This process is described below.

## Recommended Port Planning Process

Figure 1 proposes a draft process for enhancing TxDOT port planning. It builds off the regular port planning operations undertaken by the multi-modal office (MMO) as part of the Transportation, Planning, and Programming Division (TPP) of TxDOT. These are shown as central, linear connections between the TPP senior management and the MMO office, and capture the various port requests and needs generated in the development of a DOT multi-modal strategy. Once the MMO has set its business plan, there will be regular communication between it and the various districts containing deep-water gulf ports. These discussions might extend to various planning issues, concerns related to budgeting and planning, and related modal activities undertaken by the MMO, including work related to the Gulf Intracoastal Waterway (GIWW). At the district level, meetings will be held with the port on matters related to TxDOT's main asset base—the highway system. These may focus on local projects aimed at addressing specific mobility issues at the port—for example traffic lights, trucks merging with other users, queuing and general ingress and egress from the port facility. These planning activities have been undertaken on a regular basis for many years and have become effective mechanisms for addressing local problems that the District is best able to address.

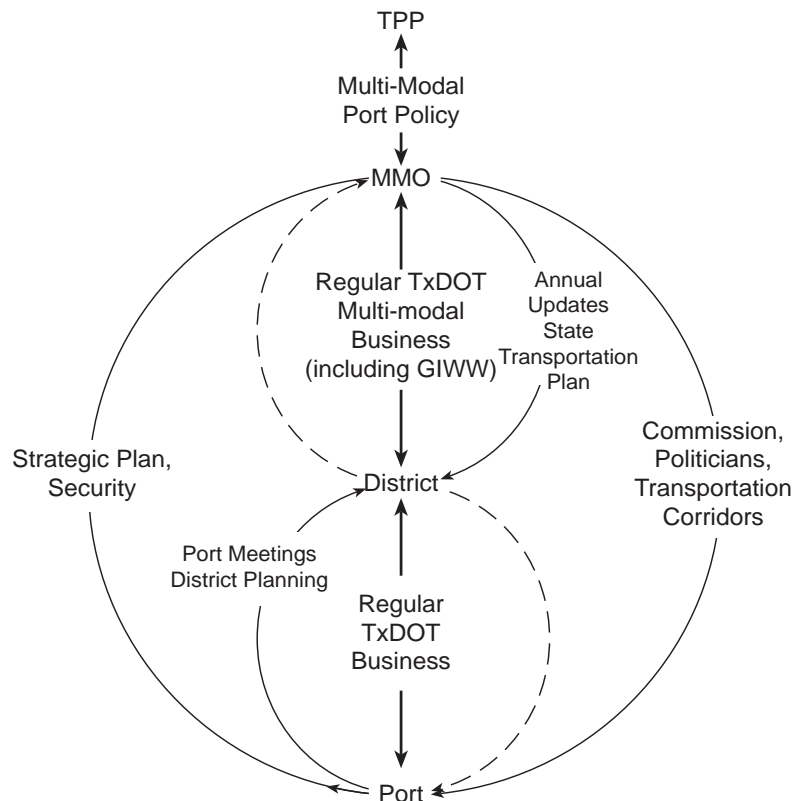


Figure 1. Draft Process for TxDOT Port Planning

Figure 1 proposes to separate one or two major functions, which will support the regular business but would be treated in a less formal manner. This implementation study has concentrated on evaluating the assets of the ports and on capturing new investment programs being undertaken by the ports, which will affect demand on the local highways and on the regional transportation corridors. We believe that scheduling a regular annual meeting for examining the information from the previous year, and updating where appropriate, is the best mechanism for conducting this review. Moreover, at irregular intervals, information may need to be collected for statewide transportation planning. We propose that the MMO Director arrange meetings for annual updates and convey this to the relevant Districts, who will then make arrangements with the Port to attend these meetings. In addition to these regular annual meetings, we believe there is a need for the MMO to make direct contact with port officials to address specific needs of a more urgent nature. These can come through the TxDOT commission, questions from a TxDOT Commissioner, interactions with state politicians and their staff, and information that is required for federal initiatives related to port activities. In addition, information may be required for broader planning activities carried out at individual districts. As an example, the development of regional transportation corridors will probably require the MMO to be able to directly contact ports to gain information for planning purposes.

Under this process, the ports themselves have an important part to play in updating information for transportation planning. This process begins with regular interaction with District staff on local matters related to highways. In addition, we are recommending a meeting with the port prior to the development of annual District plans so that the port's needs can be scheduled into the program of District projects that will be submitted to the Texas Transportation Commission. Here we see an information relationship that makes the Port-District the main link, with the District updating the MMO, depending on the nature of the information being reported. We also see that, from time to time, there will be a need for the port to directly contact and set up meetings with MMO staff. We suggest that issues such as broad strategy planning and needs could be one such subject for these meetings; and the growing needs of security, particularly where additional investment is required, are arguably matters for the MMO and TTP offices rather than the District. In any event, we envision a regular line of communication from the ports to the MMO office to facilitate expeditious answers and mutually advantageous agreements with respect to specific infrastructure, investments, and policy changes. Finally, all of these lines are not competitive and are seen more as layers of the same process, which is essentially attempting to improve and strengthen the relationships and specific skills held at the three levels in the process.



## References

- Bomba, M., and R. Harrison. *An Identification Process and Evaluation Framework for Texas Gulf Containerships*, Research Report 1833-2, Center for Transportation Research, The University of Texas at Austin, December 2000.
- Figliozi, M., and R. Harrison. *Impact of Containership Size, Service Routes, and Demand on Texas Gulf Ports*, Research Report 1833-3, Center for Transportation Research, The University of Texas at Austin, December 2001.
- Figliozi, M., Walton, C. M., and R. Harrison. *Mega-Containerships and Mega-Containerports in the Gulf of Mexico: A Literature Review and Annotated Bibliography*, Research Report 1833-1, Center for Transportation Research, The University of Texas at Austin, May 2000.
- Sivakumar, A., and C. Bhat. *Freight Modal Split Modeling: Conceptual Framework, Model Structure, and Data Sources*, Research Report 1833-4, Center for Transportation Research, The University of Texas at Austin, August 2000.
- Sivakumar, A., Srinivasan, A., and C. Bhat. *Freight Modal Split: Estimation Results and Model Implementation*, Research Report 1833-5, Center for Transportation Research, The University of Texas at Austin, July 2001.



## **Appendix One**

Evaluation Tables from Report 1833-2 (Tables 6.2-6.6)  
Modified to Reflect Port Interviews





Table 6.2. Criteria for the Existing Infrastructure Parameter

## **I. Marine Access**

### ***Channel***

Depth

Width

Length

a. Distance from GIWW

b. Distance from Blue Sea

Overhead clearance

Submerged obstacles (i.e., extensive pipeline systems, tunnels, etc.)

Corps permit for further dredging

Bedrock depth

### ***Turning Basins***

Depth

Turning area diameter

Length

Width

### ***Berths***

Length of the longest berth

Number of berths

### ***Congestion at Sea***

Average queuing time for a ship entering the container facility

Adequate number of pilots?

## **II. Port Operations**

### ***Container Facilities***

Existing container facilities

Container movement efficiency

Acreage available for future development

### ***Cranes***

Number of Panamax cranes

Number of Post-Panamax cranes

Number of Post-Panamax cranes capable of serving a mega-containership

### ***Dockside Congestion***

Dockside container-moving equipment

At least 50 acres per ship berth?

Sufficient space for the container staging area

(Continued on next page.)

<p><b><i>Rail Access</i></b></p> <p>Dockside Adjacent to container facility Outside Port (give miles)</p> <p><b><i>Congestion within the port</i></b></p> <p>Average time for trucks to enter, load/unload and leave Average time for trains to enter, load/unload, and leave</p>
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*Table 6.3. Criteria for the Environmental Impacts Parameter*

<p><b>I. Ecological Impacts</b></p> <p>Endangered species habitat or observations within or surrounding the port area Presence of unique aquatic or terrestrial fauna and vegetation within or surrounding the port area Areal disruption of previously undisrupted habitat</p>
<p><b>II. Air, Water, and Waste</b></p> <p>EPA air-quality certification (e.g., nonattainment) Number of ongoing waterway clean-up projects required and overseen by the now called Texas Commission on Environmental Quality or the EPA Does Port have Spill Management Facilities? If yes, how many staff? Number of hazardous waste spills in the last five years Presence of hazardous waste disposal facilities Number of port or tenant hazardous waste disposal violations within the last five years Number of ongoing hazardous waste clean-up projects overseen by the Texas Commission on Environmental Quality or the EPA Number of EPA Superfund sites within the port boundary</p>
<p><b>III. Dredging Impacts and Coastal Zone Management</b></p> <p>Approved location for the disposal of dredging spoil</p> <ol style="list-style-type: none"> <li>Traditional shore/near shore sites</li> <li>Beneficial use</li> <li>Off-shore dumping</li> </ol> <p>Estimated area of sediment contamination within the port channel Substantial saltwater encroachment into fresh water habitats? Are port expansions consistent with the statewide Coastal Zone Management Plan?</p>
<p><b>IV. Human Environment</b></p> <p>Estimated area of residential development within one-half mile of the port's perimeter Number of schools, hospitals, nursing homes, etc. surrounding the port Do current noise impacts from the port require mitigation? Number of archeological or historical sites (terrestrial or submerged) located within the port or its channel</p>

*Table 6.4. Criteria for the Port Financing Parameter*

<p><b>I. Estimated Costs</b></p> <p>Estimated costs of all port infrastructure improvements to serve containerships</p> <ul style="list-style-type: none"> <li>a. Panamax</li> <li>b. Post-Panamax</li> <li>c. Mega-containership</li> </ul> <p>Estimated costs of all landside improvements outside of the port</p>
<p><b>II. Public-Private Sector Port</b></p> <p>Public or private port</p> <p>Operating Port or Landlord port?</p> <p>Value of current private sector improvements to the port</p>
<p><b>III. Bonds Issuance and Taxing Authority</b></p> <p>Does the port have the legal authority to issue bonds?</p> <p>Most recent Moody's (or Standards and Poor's) bond rating of borrowing entity</p> <p>Current bond debt-to-revenue ratio</p> <p>Special taxing district or taxing authority?</p>
<p><b>IV. General Financial Characteristics (if available)</b></p> <p>Is the port self-sufficient (using definitions under Scenario 1 of Figure 7.1)?</p> <p>Is the port profitable (port shows a net profit before taxes and contributions)?</p> <p>Assets-to-liabilities ratio</p> <p>Debt-to-revenue ratio</p>
<p><b>V. Intergovernmental Grants</b></p> <p>Total local government funding received over the past 5 years</p> <p>Total nonlocal government funding received over the past 5 years</p>

*Table 6.5. Criteria for the Locational Attraction Parameter*

<p><b>I. Market Area</b></p> <p>Estimated population within 50 miles of the port</p> <p>Estimated manufacturing and warehousing employment within 50 miles of the port</p> <p>Value of goods transported to customers located outside of Texas</p> <ul style="list-style-type: none"> <li>a. Domestic markets</li> <li>b. International markets</li> </ul>
<p><b>II. Proximity to Texas' Central Metropolitan Areas</b></p> <p>Estimated travel time to downtown Houston</p> <p>Estimated travel time to downtown Dallas</p> <p>Estimated travel time to downtown San Antonio</p>
<p><b>III. Proximity to Mexico</b></p> <p>Estimated travel time to Monterrey, Mexico</p> <p>Estimated travel time to San Luis Potosi</p> <p>Estimated travel time to Laredo-Nuevo Laredo</p> <p>Estimated travel time to El Paso-Ciudad Juarez</p>
<p><b>IV. Proximity to Pacific Ports</b></p> <ul style="list-style-type: none"> <li>a. Travel time (rail) to West Coast U.S. Port (specify)</li> <li>b. Travel time (truck or rail – specify) to Mexican Pacific Port (specify)</li> </ul>

*Table 6.6 Landside Access Parameter*

<p><b>I. Rail</b></p> <p>Presence of rail service within the port</p> <p>Number of companies servicing the port</p> <p>Presence of rail switching yard</p>
<p><b>II. Roads</b></p> <p>Number of road lanes connecting the port to interstates and controlled access highways</p> <p>Responsibility for maintenance and rehabilitation (miles)</p> <ul style="list-style-type: none"> <li>a. City</li> <li>b. County</li> <li>c. TxDOT</li> <li>d. Port</li> <li>e. Other (specify)</li> </ul> <p>Quality of road connections</p> <ul style="list-style-type: none"> <li>a. Geometry</li> <li>b. Surface quality</li> </ul> <p>Does Port have an overweight corridor?</p> <p>Are there plans to enhance road links?</p> <ul style="list-style-type: none"> <li>a. Corridor</li> <li>b. Tolloed</li> <li>c. Other (specify)</li> </ul>
<p><b>III. Congestion outside of the Port</b></p> <p>Travel time necessary to leave the metropolitan area surrounding the port by road</p> <p>Direct access to interstate highways or controlled access highways connecting to interstate highways</p> <p>North-south and east-west access to interstate highways</p> <p>Travel time necessary to leave the metropolitan area surrounding the port by rail</p> <p>At-grade crossings</p> <p>Adequate clearance for double-stack containers</p> <p>Is safety record on Port connections acceptable?</p>

*Table 6.7 Safety and Security*

<b>I. Safety – Channel</b>  Does projected growth in channel use over next ten years prejudice safety? Do barges compromise channel safety?
<b>II. Safety – Adjacent Facilities</b>  Do adjacent facilities share safety responses and shut down levels with Port?
<b>III. Security</b>  Has the port conducted a U.S. Coast Guard/MARAD Security Audit? Did the security audit make substantial landside transportation recommendations?