0-5538-P2

CONTAINERIZATION AND RELATED TRENDS AT TEXAS DEEP WATER PORTS

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Background and Introduction

The U.S economy has undergone profound changes in the twenty years ending 2006 as real Gross Domestic Product grew from $4.2 to $13.2 trillion (1). This not only altered the composition and size of its business sector but also the role the nation now plays in the global economy. It is now firmly international and the economy of Texas reflects this focus, benefiting first from the extensive border it shares with Mexico – thus dominating U.S-Mexico NAFTA trade – to the current export and import markets served by the Texas transportation system, especially its maritime components. Total U.S. exports for 2006 were $1.1 trillion and, for the fifth consecutive year, Texas was ranked as the number one state by export revenue with some $151 billion originating in the state. Imports were even higher, influenced by energy and petroleum prices and, in the same year, reached $245 billion moved through Texas seaports (2).

In 2005, the Bureau of Transportation Statistics reported (3) that the value of U.S international merchandise trade (exports and imports) by mode was water (43.5%), followed by air (25.3%), truck (19.0%), rail (4.5%) and pipeline (2.0%). Clearly, marine ports play an important role in the current modal split for global trade and this is unlikely to change in the next decade. At present, four Texas deep-water ports rank in the top 10 U.S water ports by shipment weight. They are Houston (#2), Beaumont (#4), Corpus Christi (#6) and Texas City (#9). The percentage increases in tonnage for these ports between 1991 and 2001 are: Houston (41%), Beaumont (254%), Corpus Christi (31%) and Texas City (44%). It is therefore vital that the TxDOT mission to promote an effective state transportation system should include current and planned activities at Texas ports. This should include maintaining an accurate picture of port impacts on the state and regional economies and an ability to review the economic impacts of Texas port operations and their transportation investment programs.

In 1996, Research Report 7-2994, "The Value of Texas Seaports," sought to quantify the cumulative benefits to the state economy derived from the Texas maritime industry (4). In describing the value of ports to the state economy, the researchers cited factors such as the importance of trade, the inherent efficiencies of maritime transport, and the necessity of supplying goods to a growing and geographically diverse population. In the decade since this report was published, all of these factors have grown even more salient. International trade is a more integral component of the Texas economy now than it was in the mid 1990's. The high price of oil, which has tripled since the mid 1990s, has made the tremendous energy efficiencies of maritime transport more compelling. Finally, the population of Texas has grown an additional 15% since the study was performed, driving up demand for all water borne commodities (5).

Other factors that would have been largely unforeseen at the time the report was written include a dramatic increase in containerized imports from China and other developing Asian economies that has at times overwhelmed port capacity on the West Coast and led shippers to examine gateway alternatives like those in Texas to deliver goods to the American heartland. The lowered cost of technology has meant that ports now have the

ability to become both more productive and efficient assuming they receive the requisite technological improvements. Safety and security have gained a new dimension in the last decade and the advent of the Transportation Workers Identification Credential (TWIC) will require port terminals to adopt further approved technologies for insuring that the wide varieties of staff that work or enter port facilities meet safety and security requirements (6). Furthermore, legislation at the federal and state level has made it easier for ports to collaborate with Metropolitan Planning Organizations, rail interests, and inland distribution centers. This has had the effect of making the operations and economic vitality of ports more salient to the well being of all Texans, as the cooperative schemes may now impact even those who live far from the coast.

The rapid growth of the U.S cruise industry has also benefited Texas greatly and will become a more significant element of Texas port operations when the new Houston Bayport terminal enters the 2008 market. Finally, Texas ports have become a critical component in sustaining military operations and in the past two years, 40% of all military equipment moving through U.S. seaports to the Middle East passed through Texas.

The increasing value that maritime commerce plays in the American economy has resulted in securing the resources necessary for adequately maintaining access channels and other port infrastructure. Furthermore, as ports have grown more congested and extended their hours of operations, the logistics of efficiently maintaining ports have grown more complicated. Yet, the true cost of deferring maintenance is often not realized until the cost of corrective actions is high. While Texas has been working hard to expand its port capacity, other states have been making similar investments and also hope to gain market share in global and interstate commerce. The emergence of mega-containerships, the consolidation of shipping lines, and the growing size of distribution centers have all been positive developments for the overall efficiency of commerce. However, these developments have simultaneously made ports more susceptible to sudden and dramatic reductions in business if they allow their infrastructure to stagnate.

Study 0-5538 Method

Collectively, these issues stimulated TxDOT to sponsor a research project through its Research Technology and Implementation (RTI) Division to first update the earlier 7-2994 Technical Report and then to address the whole range of port needs, including those smaller ports that lacked resources to commission their own economic impact studies. In addition, state and federal interest in containerization, stimulated perhaps by the 2004 difficulties at southern Californian terminals which created severe congestion and consequent delays to U.S and Texas shippers, led the Department to specifically request the examination of container operations in greater detail. Thus, while the title element "increasing global trade" suggests all commodity groups, the study was actually focused on containerization and its distribution. The study was awarded in 2005 (7) to a joint University team comprising staff from the Center for Transportation Research (CTR) at The University of Texas at Austin and the Texas Transportation Institute (TTI) at A&M University.

The CTR-TTI study work plan proposed to estimate the basic economic impacts of Texas ports using a commonly-used method derived from input-output modeling. The core of an input-output model is tables of data that describe the transaction flows among the various sectors of the economy, where the *output* of one sector can provide *input* to another. The inclusion of these tables allows the model to trace the *direct* and *indirect effects* of an increase in demand for a given commodity or service. Input-output models also commonly allow for *induced effects* that arise from direct and indirect effects—the idea is that the gains in employment will translate to gains in household income, which, by boosting consumer demand, will further stimulate the economy. As an example, a recent study of the economic impacts of the port of Corpus Christi estimated a gain to Texas of about 39,000 additional jobs; of these, about 11,000 were generated directly, 9,000 indirectly, and another 19,000 induced.

Other measures of economic impacts besides the change in employment are also common in input-output analysis: the changes in value added, output or, sometimes, tax revenues. In addition, the geographic level of the economy considered also varies. Some analyses focus on the state economy, while other studies target the regional economy around the port. Other differences among studies include the particular set of port-related activities and types of ports chosen for analysis. Depending on the questions that motivate the analysis and the research budget, researchers may be more attracted to one input-output model than another.

The CTR team met with both the RTI Project Monitoring Committee and the Texas Ports Association (comprising all active Texas ports, some 25 in all) in early 2006 after a delay of six months. At that meeting, changes were made to the study method because many of the larger ports had recently sponsored economic impact work in preparation for the 2007 state legislative session. These studies were undertaken by the same consultant – Martin and Associates, a respected company in the marine economics sector. Accordingly, the following changes were agreed upon and subsequently incorporated into the study contract.

1. All Texas ports that had commissioned an economic impact study would share the information with CTR and it would be incorporated into the study documentation. This would avoid any confusion created by comparing the results from two impact studies and finding variations created by different methodological approaches.

2. The CTR team would undertake economic impact studies at the remaining ports.

3. The TTI team would undertake (a) a deep water channel impact study and (b) a Gulf Intracoastal Waterway (GIWW) impact study, examining the cost consequences of allowing channels in both systems to silt up by a certain amount.

4. The CTR team would examine the opportunity to represent all of the Texas seaports by determining if their collective impact on the national (rather than state) economy could be measured. This approach was designed to take results from TTI's task 3, above, as model inputs.

5. The CTR team would undertake a forecast of container volumes through the Houston terminals based on time series data. In addition, they would review the current status of container distribution and activities at other Texas deep water ports contemplating container business.

This report is the second Product developed from study 0-5538 – the first Product is an illustrated guide of key findings that could be distributed to TxDOT partners considering transportation system improvements at the various deep water ports (7). It addresses the requirements described in Task 5 above.

Literature Review

While the input-output modeling has not been undertaken by any Texas university since 2000, other pieces of work sponsored by TxDOT relevant to port activities have been studied and reported. The key reports are now summarized and details of work undertaken at various times over the past 7 years are described. They are grouped into general trade – where all commodities are recorded – and containerized trade alone, although there is understandably some mild overlap. The reports are presented in chronological order.

Study 0-1833-3. Impacts of Containership Size, Service Routes, and Demand on Texas Gulf Ports (8)

This is the final TxDOT Project 0-1833 report which assessed containership activity in the Gulf of Mexico as (a) new containership designs were being introduced on global shipping lanes and (b) demand for containerized cargo was rising strongly. The research had two primary goals. First, the project addressed the planning, institutional, and financial issues associated with increased containerized freight traffic moving through Texas ports. The second goal assessed the demand on the multi-modal transportation system in Texas, contingent upon the operation of very 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 so-called mega-containerships. This report considered the impact of ship size, liner service routes, and container demand for Texas Gulf seaports serving containerships. In particular, it described containership fleets, vessel choices, containership technology and costs, containership routes to Gulf coast ports, and container demand. The report provided forecasts of future container demand in the North Atlantic and Gulf ports and summarized the researchers' conclusions with respect to state transportation planning in Texas.

Study 0-4410-1. What We Know About Containerized Freight Movement in Texas (9)

Worldwide container demand by 2002 increased significantly over the previous decade, due to growing international trade and the introduction of larger containerships on certain trade routes. This TxDOT study examined containerized freight movements in Texas with the objective of gaining a better understanding of how containers move across the state, what commodities are shipped in these containers, what degree container shippers utilize the Texas-Mexico ports of entry, and to examine the potential for diverting containers from key highway corridors to rail. This report summarized available information and data on the container sector and on container movements in and through Texas. A GIS platform (TransCAD) was used to map and display the available data. The final report of this study examined the potential for diverting containerized traffic from Texas highway corridors to other modes, specifically rail.

Study 0-4410-2. Diverting Containerized Freight from Key Texas Corridors (10)

This report examined container flows in Texas, displayed available data using a GIS platform, and evaluated the potential for diverting containerized traffic from Texas highways to other modes, such as rail and barge. It gave a background of the growth of rail-containerized flows and reported on the current flows of containers in the state. It next described current developments in containerized flows on rail and the potential for growth. If greater volumes were to move on rail, a more structured relationship between TxDOT, the rail sector, and other private entities was required. This required an understanding of the nature and characterization of public-private partnerships, and the report shed light on that subject. Finally, it summarized the findings and made recommendations based on the conducted research, including some policy options to divert additional containers to rail.

Study 0-4437-1. Landside Access Needs for Deepwater Ports (11)

This report chronicled the landside access needs at Texas deepwater seaports. It focused on how the needs for landside access improvements are assessed, planned and financed. Trends in maritime trade in Texas were also analyzed. The report finally provided guidelines for Metropolitan Planning Organizations and ports when prioritizing their landside access needs.

Study 0-5068-1. Planning for Container Growth Along the Houston Ship Channel and Other Texas Seaports: An Analysis of Corridor Improvement Initiatives for Intermodal Cargo (12)

This report examined Texas port and rail infrastructure and its suitability for handling increased volumes of containers in the near future. Four ports and their corresponding rail corridors were covered within the report. They were the Ports of Beaumont, Houston,

Corpus Christi and Brownville. The report reviewed recent actions taken by each of these ports to improve efficiencies of container handling and/or efficiencies of inland intermodal corridors. The researchers concluded that demographic and economic changes in Texas may lead to an intrastate diversification of container flows away from west coast terminals resulting in more Texas terminals handling inbound container shipments. Increasing energy prices and constraints on the trucking industry could also create incentives for greater reliance on rail for intermodal movements, especially for out of state destinations.

Study 0-5068-2. Planning for Container Growth on the Houston Ship Channel and at other Texas Seaports (13)

Study 0-5068 examined corridor improvement initiatives at all Texas sea ports contemplating future container operations, with a primary focus on rail systems and current facilities under the Port of Houston Authority (POHA). The work estimated annual container demand at POHA terminals from 2004 to 2020. It then described the Port Terminal Railroad Association (PTRA) which operates its own network and serves more than 173 major industrial sites and terminals along the Houston Ship channel. Next, it examined issues related to highway movement of containers from the POHA terminals. The pattern of distribution centers in Houston serving as the most common first land-side destinations for POHA containers was then described and this serves as an important companion piece to the information contained in this product (0-5538-P2). A survey of the Houston dray industry and its driver workforce was then reported. Because other deep water Texas Gulf locations may have container terminals in the future, consideration was given to the proposed terminals at Corpus Christi and Texas City. Finally, conclusions and recommendations from the two-year study were given, emphasizing issues most likely to impact and benefit transportation planning and programming in Texas.

These reports can be supplemented by a wide variety of other related research projects, papers and trade journal articles spawned by the growth of international trade and its impact on U.S infrastructure and transportation policy. In the past five years these included projects on short sea shipping (14), papers on the container on barge sector (15) and articles on Texas ports in trade journals (16). What can we learn from these works that are relevant to containerization at Texas ports? Several overall lessons have emerged through the course of these studies. It appears that the Texas port infrastructure is comparatively well-suited to handle a moderate degree of continued container growth. The Port of Houston, in particular, has made a series of investments over the past decade that have placed it in a more favorable position to handle increased container flows when compared with other states in the region. This includes not only the completion of the Bayport Phase I and planned future phases, but also a series of logistical and technological enhancements at the existing Barbours Cut terminal. The success of Houston in retaining and expanding its regional market for containers has, to a certain extent, tempered the effort to establish new container-handling facilities. In the long run, the need for additional container handling capacity outside the Houston area will grow stronger. In the longer term, it seems likely that the Ports of Houston and Galveston may develop a third terminal on Pelican Island, nearer open water.

The rationale for expanding Texas' container handling capacity outside Houston is multifaceted. Reasons include:

1) higher inland transportation costs to move containers to other areas of the state that could theoretically more efficiently served by another deep water port terminal,

2) a current lack of an efficient intermodal rail corridor connecting the Port of Houston terminals,

3) rail and highway congestion in the Houston area that impairs efficient truck movements, and so raises costs,

4) Houston's non-attainment air quality status and associated mobile source restrictions, and finally

5) the need for redundancy in the transportation system in the case of a hurricane or other emergency occurring that paralyzes Houston terminals.

A critical transportation issue is the challenge of predicting the future volume of containers at Texas deep-water port terminals. As noted above, TxDOT technical report 0-5068-2 contained a container forecast to the year 2020. The new forecast uses a similar time series methodology but uses more econometric models and also cross references data from other container ports that share one or more salient characteristics with Houston.

Container Forecast for Texas Terminals

The project required that a forecast be made of container growth in the Houston ship channel over the next 20 years – a similar period to some of the TxDOT planning cycles for highway investment. Forecasts of transportation demand in general are risky and frequently problematic. Not only are data hard to come by and future operations difficult to time but expectations on the part of the various players may exert inappropriate biases into the work. Recent, extensive work (see Box 1) examining 210 projects in 14 nations worth over $59 billion indicates that many public works projects are overestimated (17). For example, 9 out of 10 passenger rail projects overestimated demand by an average of 106%. Are container forecasts any easier to predict?

Box 1. How Accurate are Demand Forecasts?

Road project differentials between actual and forecasted traffic exceed +/- 20 percent, while for rail projects it exceeds +/-100 percent. The study data show that forecasts have not become more accurate over the 30 year period studied, despite claims to the contrary by forecasters.

Source: Ref 17

The answer, it would seem, is no. Several years ago a U.S Chamber of Commerce study, undertaken by TranSystems – a respected port terminal design and operations consulting company – used an econometric model to predict container volumes through U.S port terminals (18). The work, when presented, did not include specific container terminal forecasts and mention was made only of aggregate U.S volumes doubling or tripling over the twenty-year period. In 2006, presentations made by senior U.S. DOT staff addressing

the need for a National Freight Policy in the U.S cited container forecasts derived from a simple trend analysis of container growth in the 1990s extended out to 2020 (19). The results for individual ports were significant, for example they suggested that over 60 million TEUs could be processed by terminals in Southern California by 2020. Most planners agree that such a figure could only be possible in the (unlikely) event that completely new, environmentally-friendly and highway-free, region-wide systems were employed to process the boxes. Furthermore, because the forecast only used existing 1990s terminals, the contribution to moving future container volumes through new locations and over transportation corridors such as Prince Rupert to Chicago and Memphis, and Lazaro Cardenas to Kansas City were entirely omitted.

Challenges in developing accurate container forecasts were recently enumerated by the Citigroup transportation research unit in Hong Kong, examining carrier and shipper contract negotiations (20). The study highlights the great difficulties in determining good forecasts, as shown in Box 2. The study termed the shipping industry to be "a graveyard of forecasts, with an upside and downside that are continuously underestimated by analysts, consultants and companies alike." Academics need also to be added to that illustrious group as they access the same inadequate data and qualitative information from the industry. The central issue raised by the study centers is the lack of a centralized global database that can be accessed by carriers and shippers alike. The study used data from the key global providers of shipping data – Drewry, Clarkson, Dynamar and PIERS – but then failed to give good discrimination because the aggregated data lacked "a way of stripping out the double counting, transshipments and empties." In addition, though data are good for the Asia-Europe and trans-Pacific regions, data for "north-south, intra-Asia, tramps and regional trades are not being properly analyzed." The study concludes that a lack of understanding on container moves along the non-long haul routes, where growth may be high (or low) is also contributing to weak and inaccurate forecasts.

Box 2. <u>Black Magic – Container Statistics Do Not Add Up</u>

"Efficiency gains have been tremendous. Container vessel turns can be underestimated, and so can the capacity added to a service as a result of additional port calls. We do not know how busy non-long haul lanes are and we do not know their utilization levels. That is why container shipping forecasting is like black magic"

Source: Charles de Trenck (20)

The 0-5538 contract required researchers to undertake a forecast of Texas landed container growth, notwithstanding the challenges identified in the Citigroup study above. This Texas container forecast, which is detailed the Technical Report 0-5538-1 appendix, is now summarized to broadly define the magnitude of the potential demand driving the Texas container-oriented initiatives described later in this document. The objective of the exercise was to forecast the number of container TEUs (both import and export) that the port of Houston (or another Texas port) might handle at a future point of time. This is crucial for many reasons, allowing the port to determine capacity expansion requirements

and investigate changes in port operation policies to better handle future container volumes.

The number of containers that a port will handle (as opposed to attract) depends mainly on the characteristics of the port's hinterland, the infrastructure and technology of various port facilities, the operational policies of the port (all supply side factors) as well as the global trade and economic trends (demand side factors). In addition, other important factors identified on the Citigroup work include vessel capacities, route (string) characteristics and vessel speed. The resources of the 0-5538 team were not capable of capturing all these factors and the study forecast was developed based on historic port time series data.

Annual time series TEU data handled by the Port of Houston were available over a period of about 35 years (1970-2004). A regression model with just 35 data points may not produce efficient estimates of the parameters, so this study pooled similar time series data from several other U.S. ports to create a sizeable panel dataset for efficient parameter estimation. However, as panel data from several ports may not be able to capture heterogeneity (affects specific to individual ports), sophisticated panel data models that can incorporate heterogeneity were used in this approach. The annual container counts from 1984 to 2005 (22 observations each) of 9 different US ports (Miami, Honolulu, Houston, Savannah, Charleston, Tacoma, Seattle, Oakland, and Hampton Roads) were collected and used as the dependent variable in the study. The annual population estimates of the corresponding counties of all the ports, the annual Gross State Product (GSP) of the corresponding states of the ports, the U.S. population estimates, and the Import Price Index (IPI) of all products are used as the independent variables. The pooled panel data hence consisted of 198 total observations, corresponding to 22 observations from each of the nine ports.

Six different panel data models were considered in this study based on the different ways through which heterogeneity (individual effects of the ports) can be introduced (see 0-5538-1F Appendix 1 for details). The simplest of these is the pooled ordinary least square (POLS) regression estimation, which estimates OLS regression estimation on the pooled data. While the least square dummy variable (LSDV) model introduces heterogeneity by estimating different constants for different ports, the random effects (RE) model captures heterogeneity by introducing one constant (considering average effect over pooled data) and considers the differences across the ports in the error terms.

In the random effects with autocorrelation (RE-Ar) model, autocorrelation is introduced in the RE model in the usual AR (1) process. By adopting a somewhat different modeling context, two different covariance structure models are considered. Here, heterogeneity takes the form of different variances rather than shifts in the means. Hence, the correlation across different ports becomes a part of the specification. Data are pooled similar to an OLS model and the errors are assumed to be correlated across panels. Further, based on the autocorrelation and heteroskedasticity, two variations of this model are considered in this study (heteroskedastic with correlation across panels and auto

correlated (cov1 model), and heteroskedastic without correlation across panels and auto correlated (cov2 model)).

The Cov2 model, from the six models considered in this study, had the least sum of squares of errors, and was therefore used to determine future predictions of container counts at the Port of Houston. The results are graphed in Figure 1. The average growth rate of the independent variables between consecutive years from 1984 to 2005 is used to augment the independent variables over the period from 2005 to 2025. The dependent variable over the period 2005-2025 is calculated with the Cov2 model regression equation. The cov2 model predicts counts of just above 3,000,000 for the year 2020. However, the estimates provided by the cov2 model can be used as a lower bound for the future, as the recent trend (2001-2005) from the port of Houston suggests a sharp rise on container volumes. This is hardly surprising given the impact of the new Bayport terminal (still only in phase 1 form) and the size of the ships calling Houston, particularly those from Asia using the Panama Canal.

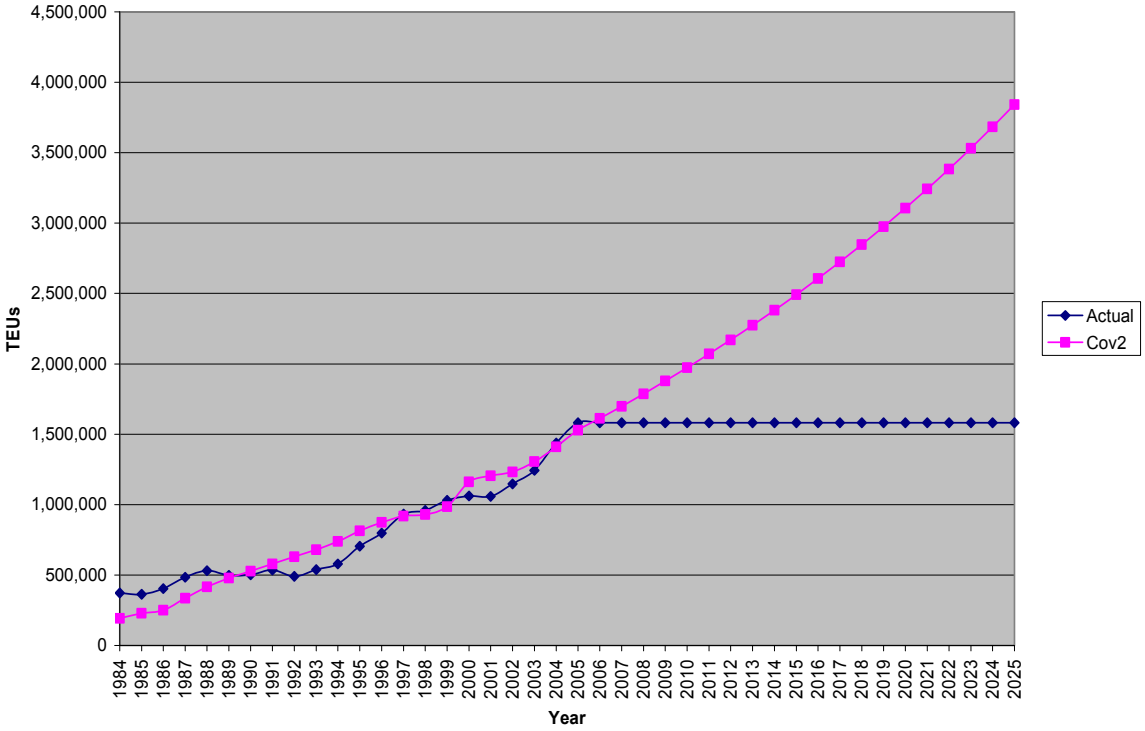

Figure 1: Houston container count predictions using the Cov2 model (1984-2025)

This work complements a larger effort detailed in TxDOT Report 0-5068-2 (13) which examined the origins of the recent container trade growth in greater detail. It examined Houston's trading partners, the emergence of Chinese trade at Houston's terminals, the causes of growth in container volumes at the port, and finally, predicted TEU growth to 2020 using a simpler regression form to that reported above. In this earlier work, a critical variable used to predict future volumes was the population growth in Harris County and in Texas as a whole. This leads to a higher forecast than the one reported above – by around 25 percent – 4,536,482 TEU by 2020. This latter figure also captures

the impact of the new Bayport facility when built out – something not reflected in the time series data used in the cov2 model specified above. At this time, it is best to regard these two forecasts as likely lower and upper boundaries to the Port of Houston terminal throughput to 2020 given current operating practices (especially hours of operation) and no third Port of Houston terminal. The volume of containers processed by Texas deep water port terminals could change substantially over the period to 2020 if new terminals are opened at other Texas locations. The next section provides a mid-2007 update to report potential sites where additional state capacity could be provided.

Port Updates

Corpus Christi: La Quinta Container Terminal

As reported in project 0-5068, the La Quinta container terminal in Corpus Christi is the most significant planned container facility in Texas outside the greater Houston area. With a channel that is deep enough to accept large containerships and efficient highway and rail connections, La Quinta has the potential to initially handle 250,000 and eventually reach a capacity of 1.2 million annual TEU's. The justification for La Quinta was predicated, in large part on the ability of the port to serve out of state markets with efficient intermodal service, thereby offering a strategic advantage when compared with the more congested Houston (21).

In 2005, the Port entered into an exclusive negotiating agreement with Dragados S.P.L. of Spain. This exclusive contract for developing the new terminal was renewed in 2006, however according to Jake Jacobi, chief consultant for the project, the Port decided to let its exclusive negotiating period with Dragados lapse in July, 2007 because the port felt that Dragados bid was too low. The Port has now hired JP Morgan as a Financial Advisor to "package the project" for an auction. The project will likely be put out for auction in November. Prior to the auction, the port expects to complete a new market study to update the existing study that was performed by Mercator Transport Group of Bellvue, Washington in 2005. Mercator will not be a candidate for completing the new study because it is linked to Macquarie Bank – a potential bidder at the auction. The envisioned physical dimensions and capacity of the terminal, however, have not been changed.

The failure to come to an agreement with Dragados will delay the timeline of when the La Quinta terminal could be up and running. According to Mr. Jacobi, the earliest that construction could commence, provided that an acceptable bidder is found and in the absence of further delays, is in the second quarter of 2009. The terminal, therefore, would not begin operations until late 2010 or 2011.

There are two other issues that the Port authority must resolve prior to the possible opening of the terminal. The first issue is channel deepening, which has now been approved by the house as part of the 2007 Water Resources Development Act. The House

approved the bill on August 1, 2007. The senate will most likely hold a vote at some point after Labor Day (22). The second issue is ensuring a competitive environment for rail shipments. UP will be the primary rail carrier; however the port is trying to ensure that both the BNSF and the Kansas City Southern have competitive access to the terminal.

When the Dragados deal was signed, the La Quinta facility was scheduled to come online at the same time or prior to the opening of the Bayport Phase II. This is an important consideration due to fact that while the Bayport Phase I does not have convenient rail head access, a rail connection is planned for the phase II, to be completed in 2009. The rail focus of the phase II of Bayport will make it a more direct competitor of the La Quinta facility than the heavily-trucked Bayport phase IA. If the Bayport phase II creates a fluid system for intermodal rail deliveries to an expanded hinterland, including to south Texas and northern Mexico, this could have the effect of dampening the attractiveness of La Quinta for shippers. It is important for La Quinta to offer a different type of service than what is offered by Houston. An appropriate model for La Quinta at this stage of development might be the Port of Tacoma which, like La Quinta, was established in a comparatively small, urban area but was able to compete against the larger and more conveniently located Port of Seattle by principally targeting out of state markets (23). After long being dominated by Seattle, Tacoma has now reached virtual parity due to the fact that the overwhelming majority of its containers are efficiently transferred out of state via Intermodal rail.

Bayport Phase's IB and II

The Bayport Phase IA opened in February 2007. It has seen a robust business with its first major client, CMA-CGM and is preparing to host a second major shipping line – Mediterranean Shipping.

Some of the ships used by CMA-CGM for the PEX 3 rotation have a nominal TEU capacity of over 5000, making them some of the largest container ships that have ever come through the Panama Canal. Nevertheless, Mediterranean Shipping has indicated that its will be bringing even larger ships to call at the Port. For this reason, the third berth, which constitutes the completion of Bayport Phase IB, will be lengthened to accommodate ships of 1000 feet (26). By comparison, the length overall (L.O.A.) of the CMA-CGM Blue Whale, one of the largest to have called Bayport thus far, is 294 meters or 965 feet. When Phase I and Phase II have been completed along with the associated rail assets, the overall structure of the terminal will be solidified. Phase III, which is slated for completion by 2012, will expand grounded storage and docking capacity at the terminal.

Data is now available for the first months of Bayport's operation showing that from February through June of 2007, the terminal handled 79,237 TEU's. This represented slightly under 10% of the 828,000 TEU's handled by the Port of Houston during this period. It should be noted that the high season for container shipments occurs in the fall; therefore, the numbers cannot simply be doubled to project the annual total. It is

interesting to note that in the first six months of 2007, exports for the entire Port of Houston system (421,594 TEU) actually outstripped imports (407,323 TEU). Once again, these ratios could be impacted by the peak season in which imported consumer goods dominate. It should also be noted that empty containers that are returned to their country of origin are also counted in the outbound category. Therefore, balanced TEU totals do not always equal balanced trade.

Brownsville

Brownsville is often described as an intuitive location for container activity. The combined Brownsville-Matamoros urban area is now a major population center which is also a major center of maquiladora activity. There is no functioning container port within Southeast Texas or Northeast Mexico. The researchers spoke with the then acting Port Director, Donna Eymard as well as German Rico regarding the port's current path towards containerization. As reported in 0-5068, for the last few years the Port of Brownsville has taken several actions to facilitate container handling, the most significant of which was the acquisition of a mobile harbor crane. Brownsville had also established a relationship with Osprey line for containerized shipments using the retrofitted oil service vessel named the Sea Trader. Having been purchased by Kirby Marine, Osprey has consolidated its routing and no longer runs regular services to Brownsville. Furthermore, the Sea Trader is no longer an active container carrier.

Rick Couch, who previously owned and operated the Sea Trader service to Brownsville, is currently constructing a fleet of three self propelled vessels that would be capable of using the Gulf Intracoastal Waterway (GIWW). Mr. Couch stated that he would possibly include Brownsville in a rotation of smaller gulf ports to be serviced beginning in 2009. German Rico, Director of Business Development at the Port of Brownsville, stated that one firm, named Sea Bridge, is currently negotiating with the Port to run container carrying deck barges between Brownsville and Tampa via a blue water service. Mr. Rico has also received representatives from National Shipping of America, the short sea service that is scheduled to begin calling Port Freeport in 2008. In short, it appears that Brownsville is ready to accept new containerized business if it materializes but is not presently in the midst of a major initiative to make containerized cargo a substantial share of the port's cargo profile.

Texas City: Shoal Point

In 2000, Stevedoring Services of America (SSA) along with the City of Texas City and Americana Ships signed a formal arrangement to develop a container terminal on a dredge disposal site near the rail port of Texas City. For the past seven years, SSA has attempted to find a workable solution to finance and develop the terminal. The successful realization of Bayport severely undercut the originally envisioned rationale for the terminal. Furthermore, Americana Ships which included Lykes Lines and Transportation Maritima Mexicana (TMM) was absorbed first into CP Ships and then again when CP Ships was acquired by Hapag Lloyd in 2005. However, several factors including the

continued growth in container demand in the Gulf Coast, the announcement of the Panama Canal expansion, and disruptions at the Port of New Orleans convinced stakeholders that the Texas City concept was still justified even alongside Bayport. SSA applied for and received environmental clearance from the Army Corps of Engineers in 2003. According to Alex Parkman, SSA's Texas City based representative; the most important impediment in the planned terminals near future is the impending expiration of the environmental permit. For this reason, Mr. Parkman stated that if construction has not commenced by late Fall 2007, the project will probably not come to fruition. Given that SSA has yet to secure a financial backer for the project, it is currently unlikely that the project will move forward.

Port Freeport

Port Freeport is currently the only port in addition to Houston that regularly handles containerized cargo. Freeport's container trade is concentrated principally on fresh fruit by producers such as Dole, Chiquita and Turbana. Container trade at Port Freeport has been remarkably consistent for the last five years. In 2006, the Port handled 54,644 TEU's (27). For 2007, the port expects a total of approximately 60,000 TEU. This higher total results in part from the containerization of some cargo that previously moved in palletized form. With the acquisition of a mobile harbor crane, the port now unloads a greater percentage of containers as opposed to relying on shipboard cranes.

Port Freeport plans to host a new container service starting in 2008 that would move between Freeport and Chester, Pennsylvania. The service, to be operated by National Shipping of America, would be a unique example of a domestic, container route that would be competitive with truck and rail shipments. The service will use a 400 TEU Jones Act certified vessel and will call at Freeport's general cargo docks.

Freeport is also planning to construct a new general use terminal, called the Velasco Terminal, which will handle containers as well as general and project cargo. While boosting containers is a significant priority for the port, the growth of project cargo has been equally important in driving dock construction as well as the planned acquisition of two more Gottwald container cranes.

The potential growth of the Velasco site for containers could be aided by a number of factors. For one, the proximity to Barbours Cut and Bayport, while producing direct competition, also gives Freeport access to the Houston network of trucking firms, distribution centers and other port support assets. Unlike La Quinta, the role of rail in the future development of Freeport's container operation is likely to be minor. Freeport lacks the efficient near-dock rail facilities that could be offered by La Quinta. For this reason, intermodal activity originating from Freeport would most likely rely on a dray move to a nearby Intermodal yard. Union Pacific's planned relocation of its major east-west intermodal yard from Englewood to Rosenberg may aid Freeport in offering dray rates that are competitive with Barbours Cut and Bayport.

Victoria

Victoria transports several commodity types that are capable of traveling in either containerized or non-containerized form. Frequently, cargo from the Port of Victoria is transported to Houston in bulk, at which point it is containerized and exported overseas. The port currently has a plan to containerize product from major clients such as Dow in the Victoria area and then to send the cargo by means of deck barges to Houston where it could be loaded directly onto ships for export. The port believes that containerizing these products locally would lead to lower overall total transportation costs and become an economic generator for the area. The Port estimates that a bi-weekly service would produce 160 containers per week. Although several commodities could possibly be containerized and sent by barge, palletized resins are the strongest candidate.

Discussions with Frontier Logistics, which runs a Dow distribution center in nearby Long Mott, Texas, confirmed that the company is examining the economics of using barges to move its containerized product, via the Victoria Barge Canal, to Houston. The current Long Mott facility, which opened in 2005, generates about 100, 40-foot container shipments per week. The containers are currently delivered to the Port of Houston by truck. Frontier believes that once the second phase of the distribution center is completed, sufficient container volumes will exist to justify a barge shipment.

Beaumont

Port activity has also been significantly impacted by the growth of project cargoes, in particular wind turbines. In the past year, the Port has handled approximately 300 turbines. Logistics and Public Affairs Director John Roby states that project cargoes are seen as one of the Port's most promising areas of growth.

The Port of Beaumont has seen modest amounts of container flows in connection with its regular military deployments to the Persian Gulf. These shipments are handled along the port's general cargo docks alongside other military cargoes such as roll-on, roll-off (RO/RO). The port is currently seeking to develop a 455-acre intermodal industrial park that would be located across the Sabine-Neches waterway. The industrial park would have barge docks as well as access to all three Class I railroads. Project 0-5695 identified the Port of Beaumont as an appropriate destination for container feeder services emanating from the port of Houston provided that nearby warehousing and distribution facilities could be found. The planned industrial park, therefore, has the potential to fill the missing piece of the puzzle for establishing a viable container on barge system.

Conclusions

Recent container-oriented developments at Texas ports show a mixed picture. With regard to the most critical consideration, it appears that Texas ports are on course to handle the projected growth in container demand in the near future. On the other hand, most of the developments continue to be focused in or near the greater Houston area – leading to a situation that remains singularly concentrated in a state as geographically vast as Texas. The market shows that there are economic advantages to the current concentration of container services at the prevailing price structure. However, there are security disadvantages as well as economic benefits, in the shape of a real risk of a future hurricane passing over the Houston channel – as Katrina did with New Orleans – and adversely impacting the state's ability to handle sea borne containers. The development of a container on barge network that would involve smaller ports has proceeded more slowly than some observers might have projected, although beneath the surface a series of capital investments at smaller ports have been made that may favor greater container activity in the future. The sharp growth in project cargo has, in some cases, partially displaced some of the attention that was previously focused on container growth at several Texas ports. In summary, container growth is proceeding at a robust but manageable pace although it remains geographically concentrated around the Houston ship channel.

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