Economic Development Planning, Summary 14

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Title: Logistics Capacity Study of the Guaymas-Tucson Corridor: A Report to the Arizona Department of Transportation

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Source: Arizona State University, Department of Industrial Engineering and Department of Supply Chain

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Summary: Arizona has long looked at the potential development of the Port of Guaymas in Sonora, Mexico as a key to increasing shipping to and from Tucson. If the port is to emerge as an alternative port to Los Angeles/Long Beach, Calif., it must be capable of providing reliable, efficient service to and from the United States. That will require improvement of the port, including dredging, new terminals and installation of cranes.

Sectors: International trade, freight (truck, rail and ship).

Geographic impact: Southern Arizona (Tucson, Nogales), Port of Guaymas and Sonora, Mexico.

Key actors: Port of Guaymas, Sonora; Mexico; city of Tucson; Tucson business community; Arizona Department of Transportation; Arizona-Mexico Commission; Arizona Commerce Authority; Tucson Regional Economic Opportunities, Pima Association of Governments, Southern Arizona Logistics Education Organization, and Mariposa Port of Entry in Nogales.

Major challenges: The Port of Guaymas lacks quay, sea-to-shore cranes, and an operating container terminal. It lacks a regularly scheduled container service and an efficient rail service to move containers between Guaymas and Tucson.
Progress to date: The Mexican government announced in 2013 that the Port of Guaymas is to be developed in two phases, starting with dredging in the spring followed 15 months later with the construction of 10 terminals. The project is estimated to cost $565 million with an annual capacity of 30 million tons compared to 7 million tons today. The port will handle cargo from Sonora and Sinaloa and replace the proposed Punta Colonet port in Baja California state. Cargo will include the traditional markets of agricultural and mineral bulk, plus containerized cargo.

Major implications: An expanded Port of Guaymas can serve as a strategic point of collaboration between Arizona and Sonora. Guaymas is an attractive place to establish industries because of its competitive labor costs and lower tariffs charged to products produced there.

Among the possibilities: Send subassemblies from the Far East to Guaymas for assembly, ship to Tucson to be sent on to other U.S. destinations. Or, send unfinished products to Guaymas via Tucson for assembly, and then ship on to other countries through the Port of Guaymas.

Opportunities for alignment: City of Tucson, Tucson Regional Economic Opportunities and Arizona Department of Commerce working with counterparts in Sonora as well as railroads (Ferromex and Union Pacific) to open the way for shipping to become a reality between Port of Guaymas and Nogales and Tucson. Opportunities begin with shipping companies working with producers of copper and other minerals, agriculture and non-oil fluid and railroads and trucking companies. Opportunities exist to do business with Asian firms shipping to Guaymas.

Background: With the installation of more container-moving equipment and other minor improvements, the Port of Guaymas in Sonora could launch a container service comparable to other regional seaports in Mexico. The main limitation to the port is the lack of quay, sea-to-shore cranes, which precludes Guaymas from being able to offer efficient turnaround services to modern container ships that do not carry their own cranes.

Because of its location, it’s going to be difficult for Guaymas to attract, in the short term, a company to provide direct service to Asia. However, the port is well positioned to serve as a regional port. It may be appropriate for Guaymas to initially operate as a feeder port for Sonora-destined business until the steamship lines begin regular longer-haul business, and efficient rail service for containers is secured.

It’s estimated the container capacity of the Guaymas-Tucson multimodal corridor could handle an estimated 175,000 TEU (20-foot equivalent units) per year if both the Mariposa and DeConcini ports of entry are operational, and a railroad container service is available between Guaymas and Tucson.

Establishing a baseline for cargo: No steam shipping line currently serves the Port of Guaymas with a scheduled container service. The preliminary view is that a weekly demand of 400 TEU would be enough to appeal to a shipping company to make a regular stop in the Port of Guaymas. That level of demand (400 TEU) is the...
equivalent of a weekly unit train from the Port of Guaymas to Tucson. The potential use of a unit container train would help to make the project attractive for Union Pacific and Ferromex.

The Ports of Ensenada and Mazatlan were used as benchmark references to study the potential container business of Port of Guaymas. In 2004, the Port of Mazatlan handled a load of containers equivalent to 320 TEU per week.

The Port of Ensenada represents what the Port of Guaymas should aim for in the short- to mid-term. Ensenada has a fully functional container terminal with four quay cranes. Ensenada handled 748 TEU per week in 2004 and was expected to handle 1,300 TEU in 2005. A major shortcoming of the Ensenada port is that it does not have rail. Thus, all containers leave by truck. Only a small portion of the containers enters the United States; most go to the nearby city of Tijuana. However, the Ensenada port has captured some container cargo originating in Sonora and headed to the Far East.

Apart from the availability of quay cranes, the three ports are not every different from each other in terms of port infrastructure. The Mazatlan and Ensenada ports have based their operations on cargo generated by the regional economy and, in the case of Ensenada, experienced high levels of growth.

The question is whether the regional economy of Sonora can support a regularly scheduled container service at Guaymas. This phase of the study cannot answer the question specifically, but researchers operate under the assumption that it can do so.

The question then is what level of cargo would be enough to entice a steam shipping line to offer a regular container service to Guaymas. The assumption is that it would take a level of 400 TEU per week, which is higher than the current levels of cargo handled in either Mazatlan or Ensenada by the average shipping company. It’s estimated that at least 160 TEUs per week from Sonora move through the ports of Mazatlan and Ensenada.

**Port of Guaymas infrastructure:** The Port of Guaymas does not have an operating container terminal. But it has six berths in the general dock area. The master plan calls for consolidating berths 2, 3 and 4 into two berths with a depth of 11 meters and a length of 288.5 meters each. Berths 5 and 6 have a depth of 13 meters and length of 175 meters. Berth 1 has a depth of 3 meters and length of 297 meters.

The Port of Guaymas has deeper docking positions than the Port of Mazatlan and slightly shallower positions than the main docking position of the Port of Ensenada. To ensure the Port of Guaymas has the flexibility to grow in the future, the study recommends a strategic analysis of the depth of the different navigational areas and terminal area of the port.

**The simulation model:** Without an operating container terminal, it is not possible to establish the capacity of a container terminal for the Port of Guaymas. Simulation models were built that included such factors as current and predicted levels of infrastructure, scheduled arrivals of container ships, and rail and truck processes. A
baseline of 400 TEU per week was used, with expanded scenarios of 1,200 TEUs and 2,000 TEUs per week.

A key finding was that the installation of a quay crane was the main determinant of the capacity of the operation of a container terminal. The use of a quay crane cut the average turnaround time of a ship from 26.34 hours to 11.73 hours.

**Summary of the Port Guaymas infrastructure:** From the standpoint of infrastructure, the Port of Guaymas is ready to start a container service comparable to that of the Port of Mazatlan with some minor improvements, including the acquisition of additional container handling yard equipment.

However, the lack of quay cranes precludes the Port of Guaymas from being able to offer efficient turnaround services to modern container ships that are not equipped with their own cranes. This may limit the potential of the port as an efficient gateway port for container service beyond the local region. It's thought that at least two quay cranes are needed.

**The Mariposa Port of Entry:** Simulation models were run to determine the impact on the Mariposa Port of Entry in Nogales if shipments were trucked from the Port of Guaymas. Mariposa POE currently runs at over 85 percent during the peak time of the year (produce season in Mexico, which is winter). So any additional traffic can have a significant impact on operations if not managed well. The maximum number of trucks handled by the port of entry is about 1,500 daily. Current demand is up to 1,300 a day. So, the port can only serve about 200 more trucks a day at peak times without significant waiting times.

If 239 trucks with containers were to leave the Port of Guaymas in a single day and reach the Mariposa Port of Entry, the expected average time to go through the POE would increase from a current 45.67 minutes to a worst case scenario of 101.86 minutes. Processing of the additional demand could require up to 2.2 additional hours of operation of the port of entry personnel.

**Highway infrastructure supporting the Port of Guaymas:** On the Mexican side, Federal Highway 15 is the main transportation link between the Port of Guaymas and Nogales, Sonora. On the U.S. side of the border, I-19 connects Nogales, Ariz. with Tucson. Analysis suggests there is enough capacity to handle additional traffic from Guaymas to Tucson, which would increase at most 1 to 2 percent.

There is not a significant point of congestion along the Mexican highway linking Guaymas and Nogales, Sonora. However, the checkpoint station at Benjamin Hill, Sonora, is a potential bottleneck, with wait times averaging an hour. The Mariposa Port of Entry in Nogales also could see longer wait times, as outlined above. The entrance to the city of Tucson also sees heavier traffic, as does the intersection of the highways I-19 and I-10 during peak hours.

**Railroad infrastructure supporting the Port of Guaymas:** The railroads linking Guaymas to Nogales, Sonora and Nogales, Ariz., to Tucson are the second major transportation mode. Ferromex owns the segment between Guaymas and Nogales, Sonora, and the Union Pacific owns the line from Nogales, Ariz., to Tucson, as well as
to El Paso, Texas and Yuma. Union Pacific has a stake in Ferromex, so there is some potential for coordination between the two railroads. Analysis suggests there is still enough capacity in both railways to grow and handle two additional railways, one each way.

The Mexican checkpoint for trains is at Empalme, with the military inspection lasting around two to three hours per train. On the U.S. side, railroad inspections and other activities are performed at the Deconcini Port of Entry and Rio Rico facilities.

Summary of findings:

• Current capacity of the Guaymas-Tucson multimodal corridor is estimated to be 175,000 TEU per year if both ports of entry are operational, and a railroad container service between Guaymas and Tucson is available. However, this capacity drops to 104,000 TEU per year if a railroad service is not available. If only rail is used, the capacity would be 120,000 TEU per year.

• Main bottlenecks of the corridor, in order of impact, are the Mariposa Port of Entry, the railroads border crossing infrastructure, and the Port of Guaymas.

• A major obstacle to container service between Guaymas and Arizona is the lack of an integrated service that includes shipping lines, railroads and freight forwarding services. The railroads are indispensable for the creation of an economically feasible container corridor between the Port of Guaymas and Arizona. Ferromex appears more interested in the corridor than the Union Pacific.

• Even if container traffic were attracted to the Port of Guaymas, the main interest of U.S. railroads is Midwest-East destined freight, while Ferromex is willing to handle shorter haul business.

• Because of its location, it’s going to be difficult for Guaymas to attract, in the short term, a company to provide direct service to Asia. However, the port is well positioned to serve as a regional port. It may be appropriate for Guaymas to initially operate as a feeder port for Sonora-destined business until the steamship lines begin regular longer-haul business, and efficient rail service for containers is secured.