

GCT Bayonne: award-winning terminal operations



Rich Ceci, *Project Manager of the GCT Bayonne Expansion Project (GEP),
GCT, New Jersey, USA*

Project overview

Located in one of the densest consumer markets, the GCT Bayonne Expansion Project is the first brownfield container terminal in the Western Hemisphere to be converted to semi-automation, the first terminal in North America to implement the Navis N4, the only big ship ready facility in the port of New York and New Jersey, and remains the only facility worldwide to implement an

RMG and RTG terminal on the same overall footprint. The facility is a 146-acre container terminal located in the Port of New York / New Jersey.

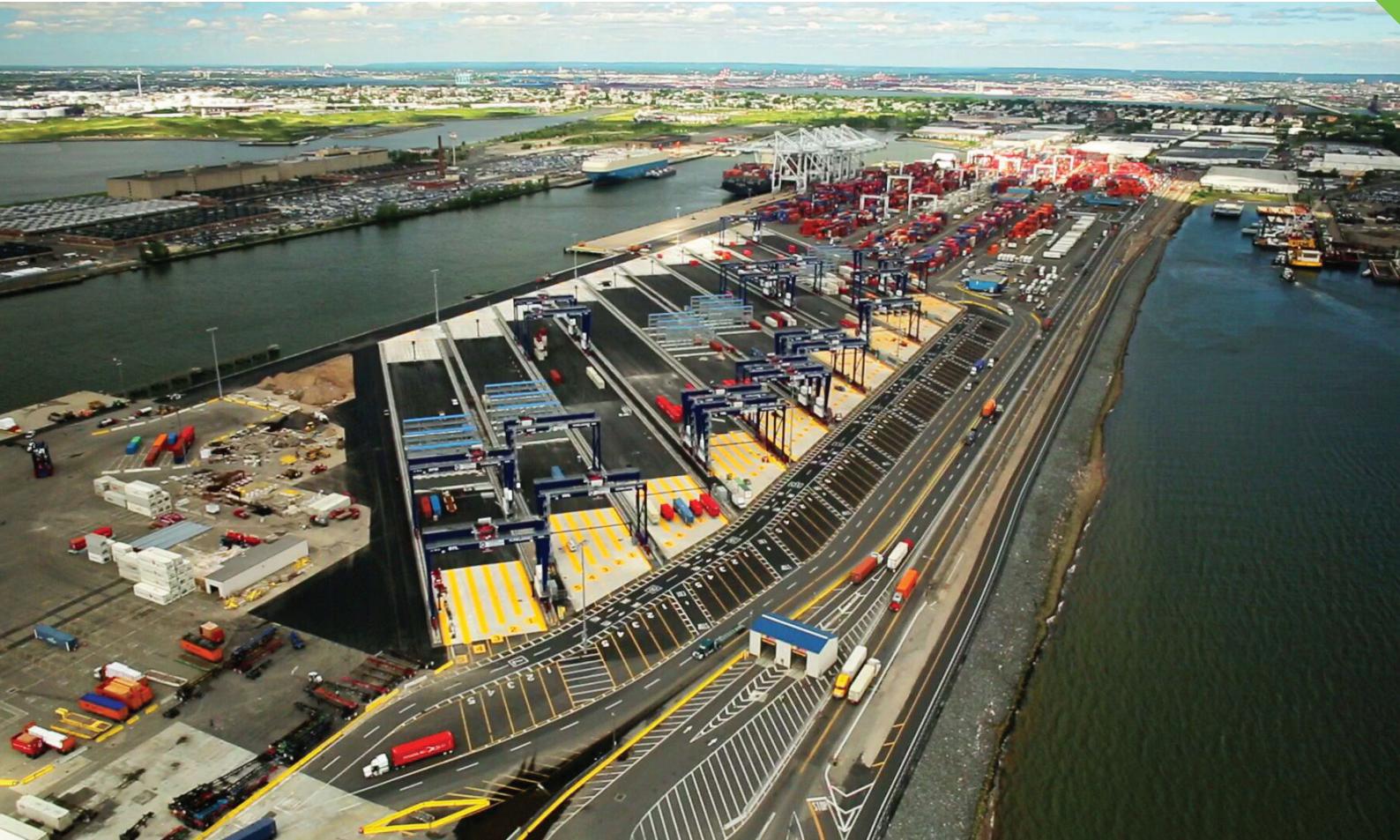
GCT Bayonne is split between a traditional RTG operation and ten semi-automated RMG stacks. Horizontal transport between the vessel and RMGs is done by manned 1 over 1 shuttle trucks. Each of the ten stacks features two RMG cranes that operate

automatically 90% of the time. The architecture allows for the separation of waterside and landside operations. Waterside operations are totally automated, while landside operations employ a remote crane operator to raise and lower containers the last ten feet to/from a chassis.

The shuttle trucks and STS cranes all employ differential GPS systems to track the movement of containers.

Technology Deployment Matrix

| Technology | RMG | STS | CHE (TPS, MTH) | UTR | OTR | Shuttle Truck | RTG | In Portal | InGate Dispatch | Gate IN | Out Portal | Gate OUT | Driver Asst. | Yard | Reefer Racks | RMG LS | RMG WS | Rail Area | Cassette | Foreman Truck | Light Pole | Reefer Mechanic | Customs | #### |
|--|-----|-----|-------------------|-----|-----|---------------|-----|-----------|-----------------|---------|------------|----------|--------------|------|--------------|--------|--------|-----------|----------|---------------|------------|-----------------|---------|------|
| OCR Reader | X | | | | | | X | | | X | | | | | | | | | X | | | | | |
| Image Capture | X | X | | | | | | X | | | X | | | | | | | | X | | | | | |
| CCTV | X | X | | | | | | | | X | | X | X | X | X | X | X | X | | | | X | | |
| DGPS | X | X | X | | X | X | | | | | | | | | | | | | | | | | | |
| RFID Tag | | | X | X | X | | | | | | | | | | | | | | | | X | | | |
| RFID Exciter | | X | X | | | X | X | X | X | X | X | X | X | | | | | | | | | | | |
| RFID Reader | | | | | | | | | | | | | | | | | | | | | | | X | |
| PLC | X | X | X | X | | X | X | | | | | | | | | | | X | X | X | X | | | |
| Driver Display (IVP) | | X | X | | X | X | | | | | | | | | | | | | | | | | | |
| TWIC Reader | | | | | | | | | X | | | | | | | | | | | | | | | |
| Ticket Printer | | | | | | | | | | X | | X | X | | | | | | | | | | | |
| Biometric Validation | | | | | | | | | | X | | | | | | | | | | | | | | |
| Remote Controlled Container Processing | | | | | | | | | | | X | X | | | | | | | X | X | | | | |
| Collision Avoidance | X | | | | | | | | | | | | | | | | | | X | X | X | | | |
| Voice Radio | | X | X | X | | X | X | | | | | | | | | | | | | | | X | X | |
| VOIP Communications | | | | | | | | | X | X | | X | X | | | | | X | | | | | | |
| Tablet PC | X | | | | | | | | X | | | | | X | | | | X | | X | X | X | | |
| Weigh Scales | | | | | | | | | | X | | | | | X | | | X | | X | | | | |
| Laser | X | | | | | X | | | | | | | | | X | | | X | | X | | | | |
| Transponder | X | | | | | | | | | | | | | | | | | | | | X | | | |
| AEI Reader | | | | | | | | | | | | | | | | | | | | | X | | | |
| WiFi Network | | X | X | | | | X | | X | X | | X | X | X | X | X | X | X | X | X | | X | | |



Furthermore, all street trucks in the Port of New York and New Jersey are required to have RFID tags, these tags are part of a port security system and also support the port authority's clean truck initiative. The RFID technology is leveraged throughout the terminal to pace truck activities at various points in the process. The STS cranes consist of 6 older cranes, and two new cranes, which have all been fitted with STS optical character recognition (OCR).

GCT Bayonne makes extensive use of wireless network technology. Every light pole features an access point, RTLS receivers, as well as CCTV cameras to support security and operational needs. Each light pole is connected directly to the main network, and every terminal vehicle (RTG, UTR, top tick, shuttle truck, and pickup truck) is equipped with a wireless bridge device.

Construction on GEP began in 2010 and the expanded terminal completed its first commercial lift on June, 2014. In July 2014, the facility began processing the largest containerships calling at the US East Coast.

Technology

The on-crane network in use at GCT Bayonne is very important. We deploy

ten to thirty cameras at strategic locations on our cranes. While some suppliers claim they can support this on a wireless bridge, for cranes without fibre optics in their power cables, I would strongly not recommend this approach. Once integrated, STS OCR reliability becomes a major success factor to smooth vessel operations. In systems without STS OCR, labour will almost always be deployed at the crane with a tablet device (hatch checker). When OCR is involved, the support labour will be in a remote room with cameras. The cameras approach is ok for failure rates of 2-5%, but gets very tedious if the OCR systems fail and 100% of the moves require manual image review.

During the design of the project, gate suppliers were asked to quote both STS OCR and truck OCR at the same time with the hope that a single supplier for OCR could be used. That did not work out. When the gate decision was made in 2012, there was no clear supplier that had the capability to do both. This has changed somewhat and it might now warrant revisiting this strategy on a new project. There are some significant differences between the application of gate and STS OCR. The key feature for the gate OCR was the need to

perform remote damage inspection of the images. Line scan technology in the gate OCR was deemed critical, as a single continuous image of the side and top of trucks transiting the portal was important. The images must be very high quality, and we wanted to limit the number of images an inspection required (5 for containers and 2 extra for the chassis if necessary).

Some controversy exists about whether portal buildings are required. If the images are used for damage inspection, the buildings are mandatory. Without a building, glare from the sun will wash out portions of the images and it will be impossible to see all sides of the container.

In 2011, the Port of New York and New Jersey began a program to install RFID tags on all trucks. To date, over 16,000 trucks have been equipped with tags. Non-compliant trucks are turned away. GCT Bayonne adopted the RFID technology throughout the terminal and data from weigh scales in one stage is linked to another via the RFID tag presence at each stage. Trucks with missions in the RMG stacks back up into one of 50 lanes. Before a truck starts moving, the system knows whether it is in the right stack, and can queue the

work to be performed to the proper lane.

The vehicles also include a "Vehicle System", and I have debated whether to call this the "DGPS system" since that's the technology most people are concerned about. There are several choices regarding the DGPS's that are available. We wanted a solution that allowed us to assist the driver in adhering to the process and that entails in-vehicle screens which provide visual assists related to location and target containers.

At GCT Bayonne, high-definition, axis fixed, pan / tilt / zoom (PTZ) cameras were deployed. The cameras were connected to a security and camera management system. Additional cameras were also added to support operations. One area that must be covered is the transfer zones at both ends of the stacks. These views are essential for diagnosing system issues. You will never imagine the insanity that can happen in a transfer zone – cameras will save you many sleepless nights.

Future

The most important immediate future trend relates to regulating the flow of trucks to the terminal. Truck Reservation Systems, Truck Management Systems, Appointment Systems – whatever you want to call them, will happen. And in our case, it will happen very soon.

A Truck Management System will be a paradigm shift for the logistics chain and will have some implementation pain. But it will work, and in 5 years' time people will wonder how they ever operated the other (current) way. The arguments generally follow the same trend: that a Truck Management System will not fix all the problems; that the lack of a chassis is a big issue, and what happens if a big company gobbles up all the time slots?

The answers are simple: this system is not intended to fix all problems, but it will make a significant contribution to ameliorating current problems. It will not fix chassis shortage issues, but also does not hinder the solution to that problem. Companies will only be able to make appointments for work they have, such as specific containers. Limitations can also be implemented to prevent time slot hoarding. It has also been tried and works well in other countries such as Australia and New Zealand, as well as at certain US West Coast ports. Port Metro Vancouver, the home of our sister terminals GCT Vanterm and GCT Deltaport, have both been using appointments with great success since 2004-05. So we at GCT know that they can work.

Terminals have finite boundaries and deploy finite amounts of equipment. The

amount of equipment is variable based on the availability of labour, which is currently in short supply in the Port of New York and New Jersey. Furthermore, competing demands to service both ships and trucks can cause issues. This is especially true when a 5,500+ move ship starts operating for 50 consecutive hours. The boxes loading and discharging must come from and go to somewhere in the yard.

If a terminal is equipped to service 250 moves in an hour (250 containers in or out of the terminal) and 500 trucks show up in the first hour, some will remain on terminal for 2 hours. That's simple mathematics. Moreover, if you get 300 trucks per hour every hour, the problem will persist all day. That is a basic scenario, but the reality is much more complicated than that.

For example, if 50 trucks arrive at the terminal for service (recall capacity is 250), there could be a real problem. If by chance the desired containers (dictated by the driver mission) are all in the same area and the equipment in that zone can only perform 12 moves per hour, then some of those trucks will be on the terminal for 4 hours.

Furthermore, equipment in other areas may go unused. To add insult to injury, most trucking companies are given work lists which may involve as many as 100 containers to drop or pickup. And it could well be that if a container from an underutilised area was chosen, instead of contending with 49 other trucks to get a specific box out of a "hot area", a driver could be out of the terminal in 15 minutes. Injecting planning and structure into the logistics chain is the next big thing.

About the author

Richard Ceci joined GCT in August 2010 as Vice President of Information Technology and subsequently assumed the additional responsibilities of Project Manager for the Global Expansion Project (GEP). Previously Rich was the Senior Director of IT at APM Terminals where he was responsible for IT in the Americas Region. In addition, he was the IT lead on the APM Terminals Virginia project which opened in August, 2007. He has over 25 years of experience delivering automation systems to the automotive industry. His involvement has ranged from the boardroom to the factory floor. After spending 10 years at Ford Motor Company in the Electronic Engine Controls Group, Rich formed his own company focused on factory automation software systems. Eventually that company was sold and merged into a Fortune 1000 Automation company where Rich stayed on as Vice President of Technology. A native of Michigan, Rich received a B.S. degree in Chemical Engineering from Wayne State University in Detroit, and also has a Master's Degree in Business Administration from the University of Michigan in Ann Arbor, Michigan.

About the organisation



GCT (Global Container Terminals Inc.) is based in Vancouver, Canada and has been making waves in the container terminal industry for over a hundred years. GCT's subsidiary, GCT Canada (formerly TSI Terminal Systems Inc.), has been operating on the West Coast since 1907 and is responsible for running both GCT Vanterm and GCT Deltaport. Beyond operating these facilities, GCT Canada has also played a major role in developing Canada's Pacific Gateway. GCT has always been committed to the growth and sustainability of the communities and ports in which it operates. With a focus on the future and our customers' ever-growing needs, GCT is implementing several unique expansion projects that will strengthen its leadership position and support the growing capacity needs of the industry.

Enquiries

GCT Bayonne, LP
302 Port Jersey Blvd
Jersey City, NJ 07305

Phone: 201-706-4102
Email: rceci@globalterminals.com