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# Transmittal

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| To | James Heilbronner | Page | 1 |
| CC | | | |
| Subject | OGTIC Traffic | | |
| From | Mark Sisson and Kim Le | | |
| Date | March 15th, 2012 | | |

AECOM was retained by CCIG Global LLC to analyze the operations of the Oakland Global Trade and Industry Center (OGTIC). This terminal will feature the following operations:

- Intermodal railyard
- Warehouses served by rail and truck
- Warehouses served by truck only
- Bulk material terminal served by rail and ship

Figure 1 shows the terminal master plan. It illustrates two options are for the wharf 6-7 area. Option A is a bulk terminal that uses the wharves as a working waterfront and includes ships, bulk trains and switch locomotives for the bulk trains. Option B is a research development area that has the wharves as open space and includes buildings and parking for employee vehicles, also known as privately operated vehicles (POVs).

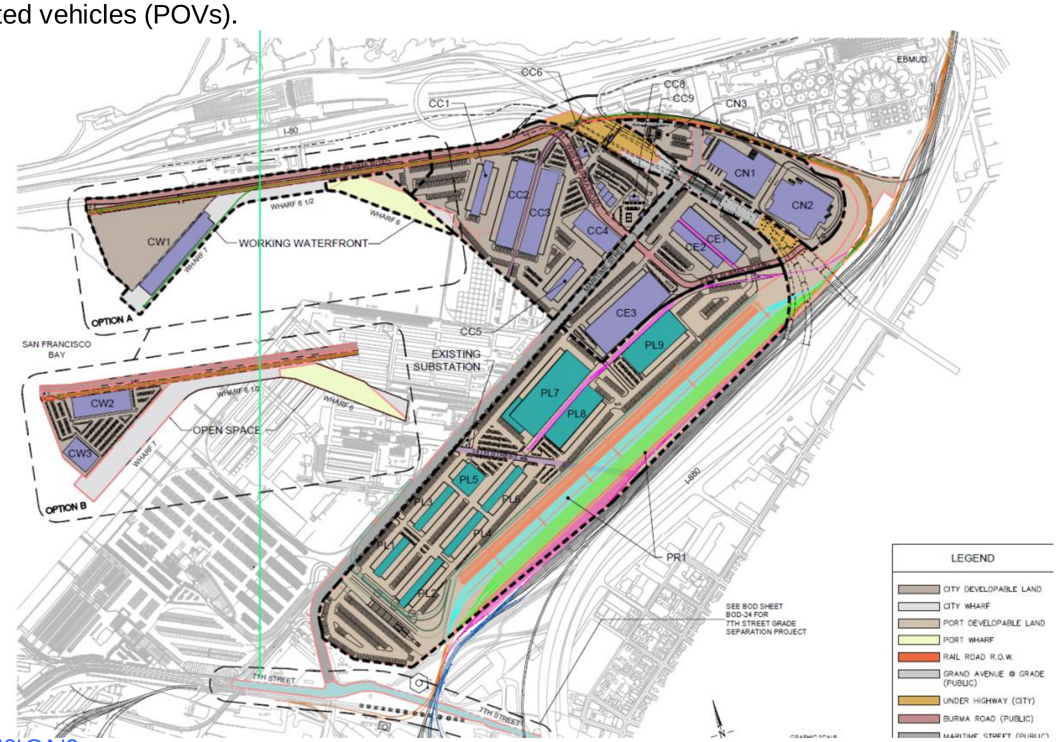


Figure 1
OGTIC Master Plan

The majority of the activity on the OGTIC will likely consist of intermodal container moves. The OGTIC will serve all marine container terminals at the Port of Oakland, but will be connected to the Ports America (PAG) Outer Harbor Terminal via a dedicated guideway that will allow PAG to access the OGTIC with terminal tractors. All other users will need to use street legal trucks to dray containers to and from the OGTIC.

Table 1a shows a summary table of the annual volume breakdown for the observed OGTIC site activities for the bulk terminal option. In Table 1b, the bulk line items (Bulk trains, Switch Locomotive for Bulk Trains and Ships) are taken out and replaced with research and development POVs. All trips are one-way trips. AECOM assumed that all trucks carrying containers only move one container per round-trip i.e. they generate one trip with a container and one trip without a container.

| Item | Units | Annual Volume | Mean Month | Annual work days | Volume per mean work day | Volume per mean calendar day | Quantity |
|---|---|---|---|---|---|---|---|
| Container trains | Trains | 1,513 | 126 | 362 | 4.18 | 4.14 | 4 locomotives |
| Bulk trains | Trains | 260 | 22 | 260 | 1.00 | 0.71 | 4 locomotives |
| Manifest trains | Trains | 208 | 17 | 260 | 0.80 | 0.57 | 4 locomotives |
| Switch Locomotive for Container Trains | Hours | 1,765 | 147 | 362 | 4.87 | 4.83 | 1 locomotive |
| Switch Locomotive for Bulk Trains | Hours | 910 | 76 | 260 | 3.50 | 2.49 | 1 locomotive |
| Terminal tractors to/from PAG marine terminal | Trips | 400,000 | 33,333 | 362 | 1,105 | 1,096 | Electric Vehicle |
| Drayage trucks to/from other P/Oak marine terminals | Trips | 400,000 | 33,333 | 362 | 1,105 | 1,096 | 1 Truck |
| Tractors moving Containers in Rail Yard | Hours | 4,000 | 333 | 362 | 11 | 11 | 1 Forklift |
| Reefer diesel genset | Hours | 480,000 | 40,000 | 365 | 1,315 | 1,315 | 1 Generator Set |
| Ships | Vessels | 53 | 4 | n/a | n/a | 0.10 | 1 Ship |
| Transload - Rail to Warehouse | Trips | 173,333 | 14,444 | 260 | 667 | 475 | 1 Truck |
| Transload - Trucks to Trucks | Trips | 120,587 | 10,049 | 260 | 464 | 330 | 1 Truck |
| Heavy Industrial Buildings | Trips | 63,517 | 5,293 | 260 | 244 | 174 | 1 Truck |
| Truck Terminals | Trips | 319,410 | 26,618 | 260 | 1,229 | 875 | 1 Truck |

Table 1a
OGTIC Annual Volume Summary
Variant 1 (Option A) Bulk Terminal

| Item | Units | Annual Volume | Mean Month | Annual work days | Volume per mean work day | Volume per mean calendar day | Quantity |
|---|---|---|---|---|---|---|---|
| Container trains | Trains | 1,513 | 126 | 362 | 4 | 4 | 4 locomotives |
| Manifest trains | Trains | 208 | 17 | 260 | 1 | 1 | 4 locomotives |
| Switch Locomotive for Container Trains | Hours | 1,765 | 147 | 362 | 5 | 5 | 1 locomotive |
| Terminal tractors to/from PAG marine terminal | Trips | 400,000 | 33,333 | 362 | 1,105 | 1,096 | Electric Vehicle |
| Drayage trucks to/from other P/Oak marine terminals | Trips | 400,000 | 33,333 | 362 | 1,105 | 1,096 | 1 Truck |
| Tractors moving Containers in Rail Yard | Hours | 4,000 | 333 | 362 | 11 | 11 | 1 Forklift |
| Reefer diesel genset | Hours | 480,000 | 40,000 | 365 | 1,315 | 1,315 | 1 Generator Set |
| Transload - Rail to Warehouse | Trips | 173,333 | 14,444 | 260 | 667 | 475 | 1 Truck |
| Transload - Trucks to Trucks | Trips | 120,587 | 10,049 | 260 | 464 | 330 | 1 Truck |
| Heavy Industrial Buildings | Trips | 63,517 | 5,293 | 260 | 244 | 174 | 1 Truck |
| Truck Terminals | Trips | 319,410 | 26,618 | 260 | 1,229 | 875 | 1 Truck |
| Research & Development POVs | Trips | 369,200 | 30,767 | 260 | 1,420 | 1,012 | 1 Auto |

Table 1b
OGTIC Annual Volume Summary
Variant 2 (Option B) Research & Development Buildings

The OGTIC capacity for container moves was given at 400,000 per year. This terminal is expected to serve the adjacent Ports America marine terminal via a dedicated internal roadway. This will allow Ports America to use terminal tractors to move containers to and from the OGTIC. Because electric terminal tractors are in use today at the prototype level, AECOM expects that by the time the OGTIC is operational, Ports America will be using electric tractors for their container moves.

Other marine terminals in the Port of Oakland will access the OGTIC using street-legal trucks that are expected to be diesel powered and travel via public roadways. The split between Ports America and the remainder of the terminals was given at 50% each. In our calculations, AECOM has assumed that trucks only carry containers in one direction. Our truck trip numbers are therefore conservative as terminals and trucking companies will strive to carry containers in both directions as much as possible. The complexities of coordination between terminals do not allow for a high fraction of “double moves” at the present time however.

AECOM was given a target throughput capacity for OGTIC of 400,000 rail lifts per year as a starting point for our analysis. Table 2 shows that just over 1,500 container unit trains per year, with three locomotives on each train, will be required to move 400,000 containers to and from the OGTIC. The calculations used in Table 1 are shown in the first column.

| | | |
|---|---|---|
| a | 400,000 | Annual capacity (lifts) |
| b | 1.8 | TEU per lift |
| c=a*b | 720,000 | Annual capacity (TEU) |
| d | 28 | Unit train length (5-pack well cars) |
| e | 270 | Length of one 5-pack railcar (feet) |
| f=d*e | 7,560 | Unit train length (feet) w/o locos |
| g | 20 | Maximum TEU capacity per railcar |
| h | 85% | Typical operating utilization |
| i=g*h | 17 | Mean TEU per railcar |
| j=d*i | 476 | TEU per unit train |
| k | 1,513 | One-way unit train trips per year |
| l | 362 | Working days per year |
| m=k/l | 4.18 | One-way train trips per mean day |
| n | 3 | Locomotives per unit train |
| o=k*n | 4,538 | Mainline locomotive arrival or departure trips per year |

Table 2
Annual Container Train Movements

Once the trains arrive at OGTIC, they will need to be switched onto working track in order to allow the yard cranes to lift containers onto and off of the trains. HDR Engineering, CCIG Global’s rail consultant, estimated that 25% of trains would arrive or depart directly from the working track, and the remaining 75% of trains would arrive or depart from the support track, also known as storage track.

Switching locomotives are used to transfer train segments between the working and storage track. Each working track at OGTIC is expected to be approximately equal to half of a unit train. A train that arrives onto the working tracks will require one switch move to relocate the back half of the train onto a parallel working track.

A train that arrives onto the storage track will require three switching moves, one to place the second half of the train onto a parallel storage track, and then two more to move each segment from storage to working track.

Table 3 shows the calculations for the number of switch movements per year to support 400,000 rail lifts, and the approximate hours of switch locomotive activity. Row “a” in Table 2 is taken from Row “k” in Table 1.

| | | |
|---|---|---|
| a | 1,513 | One-way unit train trips per year |
| b | 7,560 | Unit train length (feet) w/o locos |
| c | 3,780 | Mean working track length (feet) |
| d=b/c | 2 | Segments per unit train |
| e | 25% | Container trains arrive/depart to working tracks |
| f=1-e | 75% | Container trains arrive/depart via storage tracks |
| g | 1 | Segments moved per a/d on working tracks |
| h | 3 | Segments moved per a/d on storage tracks |
| i=a*e*g+a*f*h | 3,782 | Train segments switched per year |
| j | 1.5 | Miles of switch loco travel per segment switched |
| k | 5 | Mean switch engine speed (mph) |
| l=j/k | 0.3 | Hours of switch loco travel time per switch |
| m | 0.17 | Hours of standby time per segment switched |
| n=l+m | 0.47 | Total hours of switch loco time per segment switched |
| o=i*n | 1,765 | Total switch loco hours per year |
| p=o/362 | 4.87 | Swich loco hrs per mean work day |

Table 3
Switching Moves for 400,000 Container Lifts per Year

Each container that moves to and from a train on the OGTIC will spend time in a buffer. This will allow the terminal operator to effectively sort containers by destination, weight, length, and priority. It will also ensure that sufficient containers are present to fill a train before the train loading begins.

HDR estimated that the mean dwell time for dry (non-refrigerated) containers would be 2.0 days. Table 4 shows the mean buffer size in cross section is 22 containers or a stack approximately six wide by four high. This is consistent with master plan drawings for the OGTIC. The term twenty-foot ground slot (TGS) refers to a two-dimensional capacity; in other words, the number of painted slots on the ground. The TGS multiplied by the height of the stacks yields the three-dimensional TEU capacity for container storage.

| | | |
|---|---|---|
| a | 400,000 | Annual capacity (lifts) |
| b | 1.8 | TEU per lift |
| c=a*b | 720,000 | Annual capacity (TEU) |
| d | 2.0 | Container dwell time (days) |
| e=c/365*d | 3,945 | Mean container inventory (TEU) |
| f | 3,780 | Buffer storage length (feet) |
| g | 22 | Feet per TGS |
| h=f/g | 172 | Buffer storage length (TGS) |
| i=e/h | 23 | Mean buffer inventory by section (width*height) |

Table 4
Container Storage Buffer Size Calculations

Refrigerated containers, also known as reefers, are different than dry containers because they need to have access to electric power in order to maintain the proper temperature in the container. On ships and in marine terminals, reefers are plugged in to provide power. While reefers are being transported by trucks or trains, small diesel generators are attached to the reefers to provide power. Figure 2 shows reefer containers being transported by train. The mobile generators are on the front (the right side of the picture) of each container.


Figure 2
Reefer Containers on a Train

Because the generator sets have a limited fuel capacity (typically one week or less), cargo owners will try to minimize the overall journey time for reefers, and especially minimize the time that they spend in IY buffer areas. With this in mind, AECOM has used a mean reefer dwell time on OGTIC of half a day, as opposed to two days for dry containers. This should not be hard to achieve given the expected close coordination between Ports America and OGTIC.

Table 5 shows that when OGTIC is operating at capacity, approximately 55 reefers will be stored on the facility at any one time. Each of these will be hooked up to a diesel generator set that burns approximately one gallon of diesel fuel per hour.

| | | |
|---|---|---|
| a | 400,000 | Annual capacity (lifts) |
| b | 10% | Reefer fraction |
| c=a*b | 40,000 | Annual reefer moves at capacity |
| d | 0.5 | container dwell time (days) |
| e=c/365*d | 55 | Mean reefer containers stored on site (each w diesel genset) |

Table 5
Mean Reefer Inventory at Capacity

In addition to the truck trips to and from the marine terminals, there will be a certain amount of truck trips required to reposition containers within the trackside buffer. Figure 3 illustrates the issue. When a truck arrives with an import container at OGTIC, the terminal operating software will select a location in the buffer and the truck will drive to this location and an RMG will move the container from the truck into the buffer stack. This container will spend an average of two days in the buffer before it is loaded onto a train.

If at some point prior to loading, the terminal operating software determines that it will be preferable for this container to be moved a significant distance along the buffer, it will require multiple RMG handoffs unless a tractor is used to reposition the container along the stack. In the example terminal shown in Figure 3, one RMG would extract the container at position A and put it on a truck which would drive to position B and a different RMG would pick the container and place it into the stack.

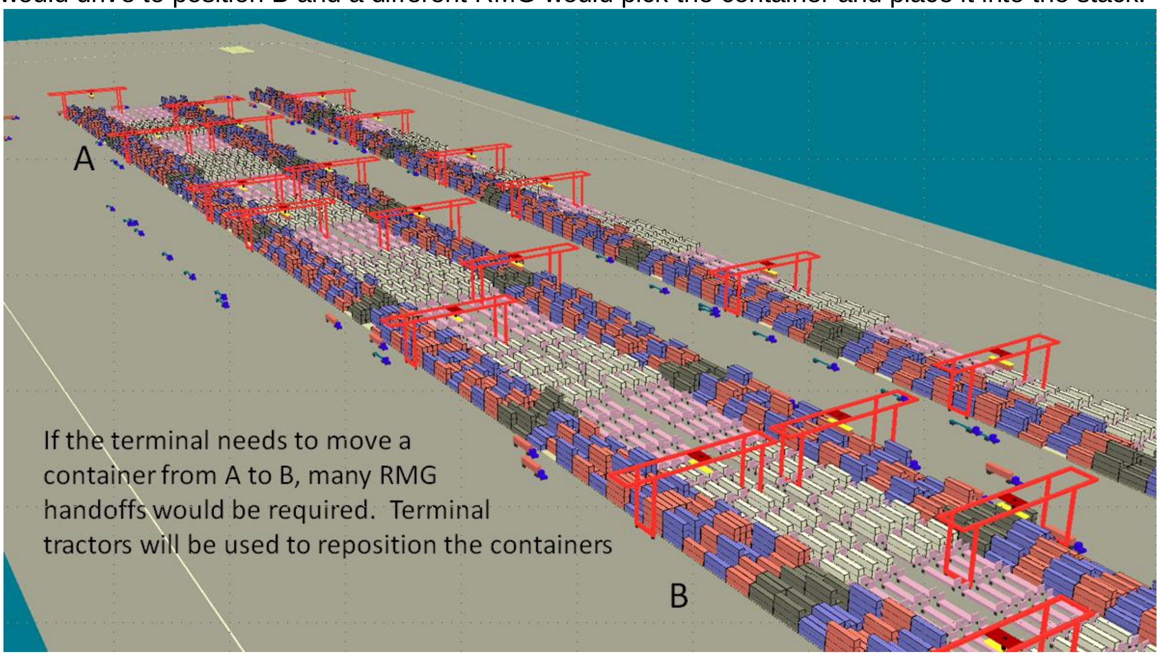


Figure 3
Example RMG Buffer Reposition Move

AECOM believes that up to 10% of import (eastbound) containers may need to be repositioned. Export containers discharged from a train will never need to be repositioned since the drayage truck can access any part of the buffer stack with equal ease.

Table 6 shows that approximately 4,000 tractor-hours of activity will be required to reposition 20,000 containers per year.

| | | |
|---|---|---|
| a | 400,000 | Annual capacity (lifts) |
| b | 50% | Import container fraction |
| c | 10% | Imports incorrectly positioned in buffer stack |
| d=a*b*c | 20,000 | Containers repositioned per year |
| e=d/362 | 55 | Containers repositioned per mean day |
| f | 5 | Reposition moves per tractor per hour |
| g=d/f | 4,000 | Annual tractor hours per year for repositioning |
| h=g/362 | 11 | Mean tractor hours per day for repositioning |

Table 6
Tractor Hours for Repositioning

The warehouses at OGTIC will support two types of activity: rail-to-truck, and truck-to truck. The table on the BOD-5.pdf drawing was used to find a building's area for buildings with and without rail. Because CN1 and CN2 are heavy manufacturing plants and CC6 through CC9 are used for truck service, the areas for those buildings were calculated separately from the cargo rail-to-truck and cargo truck-to-truck areas. The building area breakdown is shown in Table 7.

| **Building** | **Area (sf)** | **Cargo Rail-to-Truck** | **Cargo Truck-to-Truck** | **Heavy Manufacturing** | **Truck Service** |
|---|---|---|---|---|---|
| PL1 | 37,190 | -- | 37,190 | -- | -- |
| PL2 | 44,400 | -- | 44,400 | -- | -- |
| PL3 | 42,981 | -- | 42,981 | -- | -- |
| PL4 | 42,981 | -- | 42,981 | -- | -- |
| PL5 | 57,200 | -- | 57,200 | -- | -- |
| PL6 | 43,928 | -- | 43,928 | -- | -- |
| PL7 | 302,800 | 302,800 | -- | -- | -- |
| PL8 | 138,600 | 138,600 | -- | -- | -- |
| PL9 | 172,801 | 172,801 | -- | -- | -- |
| CE1 | 105,000 | 105,000 | -- | -- | -- |
| CE2 | 63,000 | 63,000 | -- | -- | -- |
| CE3 | 274,560 | 274,560 | -- | -- | -- |
| *CN1* | 188,485 | -- | -- | 188,485 | -- |
| *CN2* | 218,675 | -- | -- | 218,675 | -- |
| CC1 | 49,545 | -- | 49,545 | -- | -- |
| CC2 | 160,080 | 160,080 | -- | -- | -- |
| CC3 | 161,123 | 161,123 | -- | -- | -- |
| CC4 | 91,000 | -- | 91,000 | -- | |
| CC5 | 38,455 | -- | 38,455 | -- | |
| *CC6* | 8,008 | -- | -- | -- | 8,008 |
| *CC7* | 22,221 | -- | -- | -- | 22,221 |
| *CC8* | 4,241 | -- | -- | -- | 4,241 |
| *CC9* | 2,376 | -- | -- | -- | 2,376 |
| **Total** | 2,269,650 | **1,377,964** | **447,680** | **407,160** | **36,846** |

Table 7
Building areas from BOD-5.pdf drawing

Table 8 shows the rail-to-truck traffic for general cargo based on the number of manifest loads per day. HDR predicted that 53 railcars with manifest cargo (boxcars with general cargo) will visit the OGTIC each working day. This is adjusted to 50 railcars as buildings CN1 and CN2 are industrial recycling pant buildings and are not exclusively general cargo traffic. Given 50 boxcar loads per day and approximately 100 tons of cargo per boxcar, there is 5,000 tons of cargo per day. AECOM expects that these railcars are only loaded with cargo in one direction. Using 15 tons of cargo per truck, there are 333 truck visits per day. Having two one-way truck trips per visit gives 667 one-way truck trips per day and 173,333 one-way truck trips per year.

| | | |
|---|---|---|
| a | 50 | manifest (boxcar) loads per day |
| b | 100 | tons per boxcar |
| c=a*b | 5000 | tons of cargo per day |
| d | 15 | tons of cargo per truck |
| e=c/d | 333 | truck visits per day |
| f | 2 | one-way truck trips per visit |
| g=e*f | **667** | one-way truck trips per day |
| h | 260 | days per year |
| i=g*h | **173,333** | one-way truck trips per year |

Table 8
Rail-to-Truck General Cargo Traffic

For the truck-to-truck general cargo traffic, Table 9 below uses the data from the white paper by Fehr and Peers on warehouse truck traffic that presents 2.59 trips per 1,000 square feet of building area for truck to truck traffic to evaluate truck trips as used for ITE traffic data. The area for buildings without rail access in Table 7 comes out to roughly 447,680 square feet for warehouses. The numbers come out to 464 truck trips per day and 120,587 one-way truck trips per year.

| | | |
|---|---|---|
| a | 447,680 | sf of truck-to-truck warehouse |
| b | 2.59 | total trips (cars+trucks) per 1000 sf (ITE) |
| c | 40% | percent of truck traffic |
| d=(a/1000)*b*c | **464** | one-way truck trips per day |
| e | 260 | days per year |
| f=d*e | **120,587** | one-way truck trips per year |

Table 9
Truck-to-truck general cargo traffic

Table 10 shows the calculations for the CN1 and CN2 buildings. Because the recycling plant buildings are not entirely general cargo traffic, the ITE number for General Heavy Industrial was used to calculate the number of truck trips per year. The recycling plant is 407,160 square feet and with 1.5 trips per 1000 square feet and 40% of that being truck traffic, there are 244 one-way truck trips per day and 63,517 trips per year.

| | | |
|---|---|---|
| a | 407,160 | sf of industrial recycling plant warehouse |
| b | 1.5 | total trips (cars+trucks) per 1000 sf (ITE) |
| c | 40% | percent of truck traffic |
| d=(a/1000)*b*c | **244** | one-way truck trips per day |
| e | 260 | days per year |
| f=d*e | **63,517** | one-way truck trips per year |

Table 10
Traffic for Heavy Industrial Buildings

Buildings CC6 through CC9 cover 36,846 square feet of space on a 15 acre (653,400 sf) area. From the ITE manual, truck service areas have an average rate of 81.9 truck trips per acre. Taking this rate for the 15 acres of space, it comes out to roughly 1229 truck trips per day and 319,410 trips per year.

| | | |
|---|---|---|
| a | 15 | acres of truck service area |
| b | 81.9 | average truck trips per acre |
| c=a*b | **1229** | one-way truck trips per day |
| d | 260 | days per year |
| e=c*d | **319,410** | one-way truck trips per year |

Table 11
Traffic for Truck Service Areas

The bulk terminal at OGTIC is expected to handle iron ore or similar type of solid bulk products that arrive by rail and are exported by ship. A typical ore railcar is 40 feet in length with a capacity of 90 tons. A 7200' long unit train will consist of 180 railcars. Figure 4 shows typical iron ore railcars.

Figure 4
Iron Ore Railcars

Ore is discharged by gravity from the railcars onto conveyors in a pit. These conveyors transfer ore to a storage pile. A separate set of conveyors takes ore from the bottom of the pile to a vessel. Alternatively, vessels can be loaded with clamshell type grab cranes as shown in Figure 5.

Figure 5
Example Marine Bulk Cargo Operation

Table 12 shows that one Panamax ore ship with 80,000 ton capacity will need to call each week in order to balance the cargo flow from one ore train per work day at 260 work days per year. Although there are ore ships much larger that this in the world fleet, the largest ore ships cannot call in Oakland due to lack of adequate water depth.

| | | |
|---|---|---|
| a | 1 | train per day |
| b | 7,200 | feet per train |
| c | 40 | feet per railcar |
| d=b/c | 180 | railcars per ore train |
| e | 90 | tons of ore per railcar |
| f=d*e | 16,200 | tons of ore per train |
| g | 260 | work days per year |
| h=f*g | 4,212,000 | tons per year facility capacity |
| i | 80,000 | tons per vessel for Panamax ore ship |
| j=h/i | 53 | ships per year reqiured to serve facility at capacity |
| k=365/j | 6.9 | mean days headway between ship arrivals |

Table 12
Ore Train & Vessel Operations at OGTIC

Table 13 describes the amount of switching activity required to work the ore trains at OGTIC.

| | | |
|---|---|---|
| a | 260 | one-way unit train trips per year |
| b | 7,200 | unit train length (feet) w/o locos |
| c | 3,600 | mean working track length (feet) |
| d=b/c | 2 | segments per unit train |
| e | 0% | ore trains arrive/depart to working tracks |
| f=1-e | 100% | ore trains arrive/depart via storage tracks |
| g | 1 | segments moved per a/d on working tracks |
| h | 3 | segments moved per a/d on storage tracks |
| i=a*e*g+a*f*h | 780 | train segments switched per year |
| j | 5 | miles of switch loco travel per segment switched |
| k | 5 | mean switch engine speed (mph) |
| l=j/k | 1.00 | hours of switch loco travel time per switch |
| m | 0.17 | hours of standby time per segment switched |
| n=l+m | 1.17 | total hours of switch loco time per segment switched |
| o=i*n | 910 | total switch loco hours per year |
| p=o/362 | 2.51 | switch loco hrs per mean work day |

Table 13
Switching Moves for 260 Ore Trains per Year