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October 24, 2011

# Review of Martin Associates Economic Impact Study

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We have been asked by the management at SSA Marine to review the Economic Impact Study for the Gateway Pacific Terminal in Whatcom County, Washington state at Cherry Point prepared by Martin Associates in Lancaster, PA. The Martin Associates impact study is titled *The Projected Economic Impacts for the Development of a Bulk Terminal at Cherry Point* and was prepared on February 16, 2011. Table 1 contains an executive summary of our findings compared to Martin Associates'. Our respective findings and methodologies are then discussed in detail.

In brief, we find Martin Associates' estimates of the economic impact of the Gateway Pacific Terminal to be reasonable. Our analysis projects qualitatively similar direct employment impacts for the Construction of Phase I of the terminal and for total employment resulting from the Operation of Phase I of the terminal; however, we do diverge some on the induced and indirect employment impacts generated by the Construction of Phase I of the project. This difference most likely is attributable to different input-output models used by Martin Associates and us. Martin Associates and we both used nationally recognized and respected input-output models to estimate indirect and induced impacts. Input-output models are known to yield different results at times. Accordingly, the conservative reader could use our indirect and induced estimates as his or her preferred impact projections. The more optimistic reader could use Martin Associates'.

We want to emphasize that we have only been asked by SSA Marine management to corroborate and verify Martin Associates' findings of the employment impacts of the project. We make no attempt to determine the project's overall net benefits.

**Executive Summary -- Table 1**

Comparison of Our Analysis to Martin Associates' for the Construction of Phase I

| Jobs* | **Martin Associates** | **Our Analysis** |
|---|---|---|
| Direct | 1,781 | 1,648 |
| *Variance from Martin Associates* | -- | *-7.5%* |
| Employ. Multiplier | 2.36 | 1.80 |
| Induced/Indirect | 2,427 | 1,318 |
| *Variance from Martin Associates* | -- | *-45.7%* |

| | | |
|---|---|---|
| Total | 4,208 | 2,966 |
| *Variance from Martin Associates* | -- | *-29.5%* |

*Jobs are workers hired per year, assuming a 2-year construction period and that labor is smoothed out so that the number of workers utilized in the first year is the same as the second.

Comparison of Our Analysis to Martin Associates' for the Operation of Phase I

| | **Martin Associates** | **Our Analysis** -- BEA | **Our Analysis** -- IMPLAN |
|---|---|---|---|
| Employment Multipliers | 2.93 | ~2.8 | 2.96 |

**Summary of Martin Associates Report**

Martin Associates was provided by SSA Marine management key project specifications regarding the Gateway Pacific Terminal. In particular, Martin Associates was informed the Gateway Pacific Terminal project would be broken down into 2 main parts:

1. <u>The Construction Phase.</u> The construction phase, itself, would be broken down into two parts: Phase I provides for terminal throughput capacity of 25 million metric tons per year. Phase II, to be completed after Phase I is up and operational, will provide an *additional* 29 million metric tons per year. Phase II, when completed, will bring the total terminal capacity up to 54 million metric tons.

SSA Marine management estimates Phase I will cost $536 million in direct construction expenditures (these expenditures do not include the purchase of equipment from areas outside Whatcom County). The $536 million, therefore, represents the amount of expenditures expected to take place in the local community.[1] Martin Associates was asked by SSA Marine management to focus on local economic impacts only.

Based on the $536 million SSA Marine construction expenditure assumption, Martin Associates used a proprietary model to find the number of person-hours of employment (direct, indirect, and induced) Phase I will support.

Martin Associates abstained from converting person-hours into "jobs" because the length of the construction project is uncertain. We agree with Martin Associates' decision to leave employment impacts in person-hours since one generally measures jobs on an annual basis and in this case the number of years has not been clarified. It is thought, however, by SSA Marine management that construction of Phase I would likely last about two years, but is nonetheless unknown. The person-hours number, while more difficult for a typical person to interpret, does more accurately specify the employment impact. Martin Associates could convert person-hours directly into worker-years (i.e. the number of workers it would take to build the project in one

[1] The $536 million in expenditures can equivalently be thought of as revenue since every transaction has both a buyer and a seller.

year), which can be used as well in place of the number of "jobs" and would make the findings generally more interpretable.

SSA Marine management further estimates Phase II of the project will cost $129 million in direct construction expenditures. Martin Associates again used its proprietary model based on this assumption to find the number of person-hours of employment Phase II of the project will support.

Table 2 below lists the relevant Martin Associates findings.

**Table 2**
Martin Associates Findings of Economic Impacts
from Construction of Gateway Pacific Terminal

| Jobs (personhours) | **Phase I** | **Phase II** | **Total** |
|---|---|---|---|
| Direct | 7,406,880 | 1,782,560 | 9,189,440 |
| Induced/Indirect | 10,096,320 | 2,429,440 | 12,525,760 |
| **Total** | **17,503,200** | 4,212,000 | 21,715,200 |
| | | | |
| Personal Icnome (millions) | | | |
| Direct | $140.0 | $34.0 | $174.0 |
| Re-spending/Indirect | $191.0 | $46.0 | $237.0 |
| **Total** | **$331.0** | $80.0 | $411.0 |
| | | | |
| **Revenue (millions)** | **$536.0** | $129.0 | $665.0 |
| | | | |
| **Local Purchases (millions)** | **$503.0** | $121.0 | $624.0 |
| | | | |
| **State/Local Taxes (millions)** | **$57.0** | $13.8 | $70.8 |

2. The Operating Phase. Martin Associates secondly estimated the employment impacts of the operation phase of the Gateway Pacific Terminal. Table 3 contains the estimated number of jobs (direct, induced, and indirect) created in the operating phase on an annual basis. The operating phase is broken into two parts itself (Phase I and Phase II) representing the respective throughput capacities.

**Table 3**
Martin Associates Findings of Economic Impacts
From Operation of Gateway Pacific Terminal

| Jobs | Phase I | Phase II |
|---|---|---|
| Direct | 294 | 430 |
| Induced | 453 | 634 |
| Indirect | 116 | 165 |
| **Total** | **863** | **1,229** |
| | | |
| Personal Income (millions) | | |
| Direct | $29.5 | $40.8 |
| Re-Spending and Local Consumption | $56.5 | $78.2 |
| Indirect | $5.1 | $7.3 |
| **Total** | **$91.1** | **$126.3** |
| | | |
| **Business Revenue (millions)** | **$666.6** | **$1,437.8** |
| | | |
| **Local Purchases (millions)** | **$12.0** | **$17.1** |
| | | |
| **State and Local Taxes (millions)** | **$8.1** | **$11.2** |

Table 4 details the direct jobs created by job-type found by Martin Associates.

**Table 4**
Martin Associates Findings of Direct Jobs Created
by Job-Type from Operating the Gateway Pacific Terminal

| Categories | Direct Jobs/Phase I | Direct Jobs/Phase II |
|---|---|---|
| Railroads | 46 | 66 |
| Terminal Operators | 29 | 44 |
| ILWU | 170 | 213 |
| Pilots/Tugs | 17 | 36 |
| Maritime Services | 32 | 71 |
| **Total** | **294** | **430** |

**Our Thoughts on Martin Associates' Findings**

Our objective was to explore the Martin findings and either add assurance by corroborating the findings' reasonableness or refute them. Since the project is divided up into two parts – construction and operation – we will focus our analysis accordingly. In short, we find Martin Associates' estimates of the economic impact of the Gateway Pacific Terminal to be reasonable.

1. Construction Phase. As depicted in Table 2 and discussed above, Martin Associates offers that there will be 7.4 million person-hours of direct activity during Phase I of the construction phase, based on the $536 million in local construction spending assumption. Table 2 also implies an *employment multiplier* (how many induced and indirect person-hours of employment are created from each direct person-hour of employment) of 2.36. Martin Associates used the

RIMS II[2] multiplier for construction activity in Whatcom County that is prepared by the Bureau of Economic Analysis. Martin Associates found the total multiplier for construction to be about 16 per million of construction sales. It then multiplied this by the respective construction expenditures reported by SSA Marine's management. Induced and indirect jobs were backed into using the final demand job multipliers used by RIMS II for all of Washington State. The Whatcom county multiplier is what produced the total construction jobs.

We used IMPLAN[3], an economic impact modeling system, in an attempt to replicate Martin Associates' findings. IMPLAN, among other things, allows the researcher to choose the appropriate project classification and predict the number of direct, induced, and indirect jobs that will be created. One advantage of IMPLAN over the BEA's RIMS II multipliers is that it has a production function built into the model that allows the researcher to completely calculate the direct employment impact from a given dollar of expenditure. Martin Associates, using the RIMS II multipliers, needed to back into this number.

We entered $536 million (the assumption of construction expenditures provided by SSA Marine management) into IMPLAN and used the category "construction of new nonresidential structures." The program yielded 3,295 average worker-years of direct employment (note: IMPLAN shows the average worker-years rather than person-hours). If we assume 2,080 hours worked per year on average,[4] our 3,295 average worker-years equates to 6.9 million person-hours of direct employment created. This is about 0.5 million person-hours lower than Martin Associates' finding of 7.4 million person-hours or about 7.5 percent. So our findings are reasonably similar. Our employment multiplier, however, is only 1.80 compared to Martin Associates' implied employment multiplier of 2.36. We, thus, find total employment created from the construction of Phase I of the terminal to be lower than Martin Associates' findings. So it is possible that the induced/indirect employment estimates obtained by Martin Associates are a bit high. However, we need to emphasize that the IMPLAN category we used may not exactly fit the project at hand. The construction of a shipping terminal, in particular, may involve more workers than the construction of typical non-residential structures, may include higher paying jobs, and possibly more business-to-business expenditures (thereby giving it a larger multiplier).

As a robustness check, we modified the IMPLAN category to "construction of nonresidential manufacturing structures." This yielded qualitatively similar results to when we used the "construction of new nonresidential structures" described above.

We should emphasize that differences between our estimates and Martin Associates' could persist, even if our category selections are similar, because of the different input-output models used to find the induced and indirect employment impacts. Martin Associates used the RIMS II

[2] RIMS is a Regional Input-Output Modeling System produced by the Bureau of Economic Analysis, a division of the US Department of Commerce. The Bureau of Economic Analysis is the department that calculates US Gross Domestic Product numbers, among other national and regional estimates.

[3] IMPLAN (IMpact analysis for PLANning) is an economic impact modeling system. It can be used to create complete, detailed Social Accounting Matrices and Multiplier Models of local economies. IMPLAN was developed in 1993 by Scott Lindall and Doug Olson as part of their work with the University of Minnesota. Today it is a nationally recognized input-output model used by many researchers.

[4] If a person works on average 40 hours a week over a 52 week year (the equivalent of a full-time job) it equals 2,080 hours worked in one year.

input-output model produced by the Bureau of Economic Analysis. We used IMPLAN's input-output model. There are underlying differences in how these two models are constructed that could explain the discrepancies in our respective findings of the magnitude of the employment multiplier for construction of Phase I. IMPLAN relies on coefficients calculated with national data when describing the interdependencies in a region's economy. BEA uses a slightly different approach to calculate the coefficients and multipliers. In short, the different models tend to provide similar multipliers but differences can and do arise. We should say, though, that both BEA RIMS II and IMPLAN are nationally recognized and respected input-output models. Researchers across the country use both of these models to estimate economic impacts for a variety of projects on a regular basis. We feel both models are valid.

Table 5 lists our findings for the economic impacts of the construction phase derived from IMPLAN and places them next to those of Martin Associates derived from BEA's RIMS II. The table also shows the percentage difference between our findings and Martin Associates'. Overall, our direct employment impacts for the construction phase are reasonably similar to Martin Associates' but our induced and indirect impacts are smaller. The conservative reader could view our results as a lower bound on the projected employment impacts to be generated from the construction of Phase I of the terminal. Even if a lower bound, our analysis still suggests that the construction of Phase I of the terminal would create about 3,295 worker-years of *direct* employment and approximately 5,931 worker-years of *total* employment in the local area. If the project were to take two years to complete, as expected by SSA Marine management, it would equate to the creation of 2,966 annual, local jobs for two years. To put this number in local context, at the end of February 2011, Whatcom County had 9,990 unemployed persons according to the Washington State Employment Security. The temporary jobs created by the construction of the terminal, therefore, are equivalent to roughly 30 percent of the total unemployed capacity in our county.

**Table 5**
Comparison of Our Analysis to Martin Associates' for the Construction of Phase I

| Jobs (person-hours) | **Martin Associates** | **Our Analysis** |
|---|---|---|
| Direct | 7,406,880 | 6,853,600* |
| *Variance from Martin Associates* | -- | *-7.5%* |
| Employ. Multiplier | 2.36 | 1.80 |
| Induced/Indirect | 10,096,320 | 5,482,880 |
| *Variance from Martin Associates* | -- | *-45.7%* |
| Total | 17,503,200 | 12,336,480 |
| *Variance from Martin Associates* | -- | *-29.5%* |

*****Assumes 2,080 hours worked per year on average. This is the total hours an individual would

work in one year when averaging 40 hours per week over 52 weeks.

2. Operating Phase. We also attempted to replicate Martin Associates economic impact estimates for the operation of Phase I of the Gateway Pacific Terminal. Martin Associates used a proprietary model based on its experience with other port projects throughout the world and based on inputs obtained from SSA Marine and Burlington Northern Railroad management. In general, we find Martin Associates' findings of the direct employment and personal income generated from the operation of the terminal to be well-done. Martin Associates used inputs about terminal capacity, rail rates, number of cars per train, number of rail crew at the terminal, number of rail miles per train cycle, expected worker salaries, etc. to "add up" how many workers are needed to operate and support the terminal at a given capacity and calculate these workers' total salaries. Its proprietary model for calculating the direct effects, therefore, is fairly straightforward and formulaic. Martin Associates then used these direct impacts to calculate the induced and indirect employment impacts and personal income effects.

We took Martin Associates' direct impacts as given and focused on replicating the induced and indirect jobs or employment multiplier. Martin Associates shows direct employment from the operation of Phase 1 to be 294 jobs with an implied employment multiplier of 2.93 (see Table 3).

We called the Bureau of Economic Analysis (BEA) to ask what category they would use for the operation of something like a marine terminal. They said "48A000." Unfortunately, we did not have a recent set of RIMS II multipliers from the BEA for Whatcom County. We did, however, have them for other counties in the west. The employment multipliers tended to be around 2.8 and slightly above – similar in magnitude to what Martin Associates reported.

We also used IMPLAN and tried different categories to estimate the impacts. IMPLAN, unfortunately, does not have a category that matches exactly to 48A000 at the BEA. However, they had categories like "transport by water" and "transport by rail." Therefore, we placed the 294 direct jobs found by Martin Associates in Table 4 in the transport by water category. In doing so, we arrived at an employment multiplier of 2.96, quite similar to Martin Associates' multiplier of 2.93. We did not prepare a scenario in IMPLAN that had some jobs in the transport by rail category and some in transport by water, but are quite confident doing so would give us figures almost identical to those in the Martin Associates report.

Table 6 lists and compares Martin Associates' and our multipliers for the operation of Phase I of the terminal, based on the direct employment estimates obtained in the Martin report. Overall, these findings support the veracity of the estimates derived by Martin Associates for the operation of Phase I.

**Table 6**
Comparison of Our Analysis to Martin Associates' for the Operation of Phase I

| | **Martin Associates** | **Our Analysis** -- BEA | **Our Analysis** -- IMPLAN |
|---|---|---|---|
| Employment Multipliers | 2.93 | ~2.8 | 2.96 |

## Conclusion

On the whole, our analysis supports that Martin Associates' estimates of economic impacts of the Gateway Pacific Terminal are reasonable. With independent analysis we find similar employment multipliers for the induced and indirect impacts stemming from the operation of Phase I of the terminal. We also find marginally lower but similar direct impacts for the construction of Phase I of the project. Our key area of departure is in the calculation of indirect and induced impacts arising from the construction of the Phase I of the terminal. Our estimates here are approximately 45 percent lower. As we discussed, the difference could be due to our inability to find a strong classification match for the construction of a marine terminal leaving us using a more general and less precise construction classification. Moreover, we may diverge because we are using different input-output models [BEA/RIMS II (Martin Associates) vs. IMPLAN (us)].

As a final note, in performance of our analysis, we noticed the Gateway Pacific Terminal project has the potential to have a sizable impact on the local economy. Taking Martin Associates' findings as given, the project's construction of Phase I has the potential to produce $503 million in local purchases (see Table 2). If we assume a two year construction build out period and constant purchases in each year, this equates to $251.5 million in local purchases for each of the two years. According to the Bureau of Economic Analysis, GDP for Whatcom County was $7.01 billion in 2008. As a result, the construction of Phase I of the project could augment Whatcom County GDP by as much as 3.6 percent each year for two years.

Additionally, the operation of Phase I and Phase II is expected to create 1,229 long-term jobs (see Table 3). According to the Washington State Employment Security, there were 9,990 unemployed individuals in Whatcom County at the end of February 2011. The long-term jobs created by the operation of the Gateway Pacific Terminal constitute about 12 percent of our currently unemployed workforce.

**Appendix of Additional Comparison Tables**

Construction of Phase I

| Jobs* | **Martin Associates** | **Our Analysis** | **Average** |
|---|---|---|---|
| Direct | 1,781 | 1,648 | 1,715 |
| Employ. Multiplier | 2.36 | 1.80 | 2.08 |
| Induced/Indirect | 2,427 | 1,318 | 1,873 |
| Total | 4,208 | 2,966 | 3,587 |

*Jobs are workers hired per year, assuming a 2-year construction period and that labor is smoothed out so that the number of workers utilized in the first year is the same as the second.

Construction of Phase II

| Jobs* | **Martin Associates** | **Our Analysis** | **Average** |
|---|---|---|---|
| Direct | 429 | 372 | 401 |
| Employ. Multiplier | 2.36 | 1.80 | 2.08 |
| Induced/Indirect | 584 | 298 | 441 |
| Total | 1,013 | 670 | 842 |

*Jobs are workers hired per year, assuming a 2-year construction period and that labor is smoothed out so that the number of workers utilized in the first year is the same as the second.

Total Jobs Created from Construction of Phase I and Phase II

| Jobs* | **Martin Associates** | **Our Analysis** | **Average** |
|---|---|---|---|
| Direct | 2,210 | 2,020 | 2,115 |
| Employ. Multiplier | 2.36 | 1.80 | 2.08 |
| Induced/Indirect | 3,011 | 1,616 | 2,314 |
| Total | 5,221 | 3,636 | 4,429 |

*Jobs are workers hired per year, assuming a 2-year construction period and that labor is smoothed out so that the number of workers utilized in the first year is the same as the second.

Total Annual Jobs Created from the Operation of Phase I

| Jobs | **Martin Associates** | **Our Analysis** | **Average** |
|---|---|---|---|
| Direct** | 294 | 294 | 294 |
| Employ. Multiplier | 2.93 | 2.96 | 2.95 |
| Induced/Indirect | 569 | 576 | 573 |
| Total | 863 | 870 | 867 |

**We took Martin Associates' estimate of Direct Jobs Created as given and estimated the Employment Multiplier and the number of Induced and Indirect Jobs Created from the Operation of the Terminal.

Total Annual Jobs Created from the Operation of Phase II

| Jobs | **Martin Associates** | **Our Analysis** | **Average** |
|---|---|---|---|
| Direct** | 136 | 136 | 136 |
| Employ. Multiplier | 2.69 | 2.96 | 2.83 |
| Induced/Indirect | 230 | 267 | 249 |
| Total | 366 | 403 | 385 |

**We took Martin Associates' estimate of Direct Jobs Created as given and estimated the Employment Multiplier and the number of Induced and Indirect Jobs Created from the Operation of the Terminal.

Total Annual Jobs Created from the Operation of Phase I and Phase II

| Jobs | **Martin Associates** | **Our Analysis** | **Average** |
|---|---|---|---|
| Direct** | 430 | 430 | 430 |
| Employ. Multiplier | 2.86 | 2.96 | 2.91 |
| Induced/Indirect | 799 | 843 | 821 |
| Total | 1,229 | 1,273 | 1,251 |

**We took Martin Associates' estimate of Direct Jobs Created as given and estimated the Employment Multiplier and the number of Induced and Indirect Jobs Created from the Operation of the Terminal.