



Memorandum

Windy Corner Material Source/Transportation Brief (Spring 2017)

Background

In response to the request for proposal (RFP) prepared by the Department of Transportation and Public Facilities (DOT&PF) on January 24, 2017, we proposed and were subsequently awarded the Material Acquisition and Transportation Cost Estimating Services for Seward Highway: MP 105-107 Windy Corner project. The intent of the DOT&PF contract was to obtain an independent contractor's opinion of probable construction costs for purchasing and transporting materials to the project site. The following memorandum summarizes our assumptions, material sources, modes of transport, and cost summary.

Overview of Scope

Our review of the Seward Highway MP 105-107 project (Windy Corner) is focused exclusively on the logistics and costs associated with the material acquisition and transportation of those materials to the project location. In some cases we have identified specific locations that are currently used as material sites and in other cases identified approximate locations where new material sites could potentially be developed to supply materials that would meet the needs of the project. For sources that are currently developed and operational, we expect that we would be purchasing a product rather than paying a royalty for bulk materials. Beyond the material sources, we have evaluated delivery methods that could be used to deliver materials to the project site including marine, train, and conventional truck haul. The method evaluated is dependent on a number of factors including location, cost, and available existing infrastructure to support this method, in some cases more than one method of transportation could be used to move materials from a source to the project. Due to the requirement that this material is developed from a rock source other than alluvial (drill & blast quarry) evaluations are limited to the following material sources.

Material Sources

Primary Evaluations:

- MP 109 material site: This is a new site located approximately 2 miles north of the project, it is located directly adjacent to a material source that has been used in the past for materials but has previously been abandoned. This location would be a viable site to potentially utilize either train or truck for transport of materials. Since this would be a public source we do not anticipate any royalty cost and would plan on being the operator of the source producing products for the project as needed.

- Portage Valley (Turnagain Arm, AK): Within Portage Valley a number of locations have provided materials for previous DOT&PF projects, in addition some private landowners may have access to materials that would meet the project material needs. This location could be considered for transportation by train or truck. For this site we have assumed that we could be the primary operator of the source producing materials but that we would incur a royalty based cost for materials hauled from the site.
- Eklutna (Eklutna, AK): This area has the potential to produce materials that would meet the requirements for this project, much of this area is located adjacent to rail traffic and a potential source could be developed near this area. For this site we have assumed that we could be the primary operator of the source producing materials but that we would incur a royalty based cost for materials hauled from the site.
- Granite Cove Quarry (Kodiak, AK): This quarry is located on Kodiak Island and is limited to water access only. This quarry has been operational in the past and is currently active with an operator. We would anticipate that materials would be purchased at “market” based pricing for the project rather than being able to operate independently in this quarry and pay a royalty.
- Diamond Point Quarry (Iliamna Bay, AK): Located in Iliamna Bay off of Cook Inlet this site is tidewater influenced and limited to water access only. This quarry is a new site and has not been developed or provided materials previously. Since this is a new location, significant infrastructure will need to be constructed to accommodate operations on site along with substantial marine improvements to accommodate larger barge and tug drafts. Since this is a native corporation partnership with an operator, we would anticipate that materials would be purchased at “market” based pricing for the project rather than being able to operate independently in this quarry and pay a royalty cost for materials produced. In addition due to that amount of infrastructure development needed to meet the project needs, it’s uncertain that this source could meet the schedule.

Secondary Evaluations:

- Skookum Quarry (Chugiak, AK): This site is located near Chugiak off of the Old Glenn Highway, it is an active quarry site and supplies all types of manufactured rock products. Currently there are not rail lines or spurs adjacent to this source. The closest rail access would be approximately 4 miles. This quarry has been operational in the past and is currently active with an operator. We would anticipate that materials would be purchased at “market” based pricing for the project rather than being able to operate independently in this quarry and pay a royalty cost for materials produced.
- Mat-Su Valley sites (Wasilla, AK): Non-alluvial rock source locations in the Mat-Su Valley are limited and primarily located outside of Palmer or Wasilla. At this distance from the project, train and truck transport cost become prohibitive compared to other identified sources. For evaluation purposes we have selected a haul distance of 70 miles and assumed additional truck haul would be required to deliver material from a quarry to a suitable siding for loadout into train cars making these sources impractical for this project on anything other than very specific and limited scopes. For that reason we have not included any pricing information for comparisons in this exercise.

Modes of Transportation

Highway (truck): Since the location of material sources are located outside the project limits we have assumed all truck hauls would be limited by weight restrictions (legal loads). Due to the nature of the materials (shot rock) this material will be hauled in side-dump trucks with typical net capacities of 25 ton/load. The main factor affecting the haul cost will be the travel distance between the available source and the project. Due to the large number of trucks needed, significant traffic control will be required to manage traffic during the summer months on the Seward Highway. This will have an impact on the overall transportation cost associated with trucking. It may be necessary to predominately use night shift operations for importing materials to the project.

Marine (barge): Transportation by barge is the only feasible option for quarries that are located on the water and have the ability to load directly onto the barge. As with other modes of transportation, distance is one of the largest variable factors influencing the overall cost to deliver material to the project site. Marine transportation will present some significant challenges as this project is located on the Turnagain Arm and experiences substantial tidal swings upwards of 40 feet. With those extreme tides the delivery schedule for barges will be impacted and likely require that barges be capable of “going dry” during the offload of the barge at the site. In addition, a significant investment in infrastructure will be required at Windy Corner to facilitate offloading of the material from the barge to the site. Even with the utilization of larger barges (8,000 ton/load) the project will require almost 500 barge loads to be delivered to the site. Another consideration is during winter conditions, ice in Cook Inlet will prevent barge traffic. We anticipate the typical barge season as mid-April to mid-November with a 4-5 month shutdown during the winter months.

Rail (train): The current mainline rail runs through the project and is being relocated as part of the final design which makes delivery of materials by rail a feasible consideration. Unfortunately the track is the mainline track servicing all rail traffic running out of Anchorage headed south to Whittier and Seward. There is currently a rail siding located near Indian, AK that would accommodate a full work train of up to 85 cars, and a much smaller rail siding located near Rainbow that would not be capable of accommodating a project work train without being expanded. Delivery to the project location would be dependent on the regular train schedule or require a siding be built on the project to accommodate the work train. In addition, in order to load a train at the MP 109 quarry location, significant infrastructure will be required to facilitate material hauling. .

Assumptions for material sources and methods of transportation

Costs include only material purchase/development and transportation to the site. No placement cost of materials is included.

We did not evaluate the quality of the rock source other than assume each location would require drill and shoot excavation to produce material.

We assumed the permits needed for each location and method of delivery would be possible to obtain in a reasonable time window.

We have not evaluated each source to verify full quantity of material is available for the project.

Fuel cost is based on \$3.00/gallon (Marine option), \$3.50/gallon (Truck option), and no fuel surcharges for the Train option.

Notes and assumptions by option

MP 109 – Truck Haul

The truck haul from MP 109 to the project is approximately 2.5 miles. In order to maintain an import rate of 800 ton/hr on average 10-12 trucks will be needed. Using legal haul side dump trucks with an average net capacity of 25 ton/load results in approximately 150,000 loads being transported between the borrow source and project site. The average weather in Alaska could potentially allow this work to progress year round with limited shutdowns during heavy snow and icing conditions but for our estimate we have based our approach on working a reasonable season of April through November and shutting down during the peak winter months of December – March when the bulk of the snow falls. Traffic control will be an integral part of managing truck import operations for almost 500 shifts on the Seward Highway. It would be possible to utilize day shift, night shift, or both during this operation. During the summer months traffic can significantly impact truck haul times and traffic flow through a project on the Seward Highway. The rough order of magnitude (ROM) for Traffic Control for a truck haul operation from MP 109 to the project would range between \$1-2M in cost. In addition this option could result in significant acceleration in the “wear and tear” of the existing pavement between MP 109 and the project, to assign a value to this cost a ROM estimate to mill/fill/stripe that section of road after the project is completed is approximately \$800k.

MP 109 – Train Haul

The borrow source at MP 109 is located directly across the Seward Highway from the mainline railroad track running south from Anchorage and would be a feasible alternative to transport material from a borrow source located at MP 109. In discussions with Alaska Railroad (ARRC) they only retain a fleet of 31 air dump cars that net a capacity of 75 ton/car and they potentially have the ability to lease an additional 26 air dump cars with a net capacity of 50 ton/car depending on availability. The combined total of 57 cars would reasonably allow the ARRC to maintain a 17 car work train for internal maintenance crews and a 40 car train to support the project. Thus, we based our analysis on running a train compiled of 40 air dump cars. Based on an average of the two car types, we estimated a capacity of 2,500 ton/train and the ability to move 6 trains/shift (15,000 ton/shift) to the project from MP 109 during peak operations. Currently there is no siding located at either MP 109 or Windy Corner. This could necessitate the construction of roughly 2,500 lf of track siding or require that the schedule be flexible to work with other mainline rail traffic and allow the project train to travel to/from the nearest siding at Indian to allow regular traffic to pass through the project. Traffic control is likely still a significant consideration due to the need to transport material across the highway from the borrow source to the track for loading. Since this material is largely shot rock it is not reasonably feasible to convey the materials over/under the highway to load trains.

If a siding is needed to facilitate the work train schedule with other train traffic, then a ROM estimate of approximately \$240,000/siding is in order to provide the needed space for a 40 car train. This is based on previous construction cost for a similar siding. In addition, a fairly significant investment would need to be made in infrastructure to load the train, we have assembled a ROM estimate of \$540,000 to build out the basic needs for a train loadout facility.

A train transportation option would have the ability to work multiple shifts/day and would have similar operating conditions compared to a truck haul. One of the most significant will be cold weather effecting the efficient operations of air systems. As the temperatures get cold in the fall, moisture in the air systems for the dump cars will become problematic. Material will start to freeze in the car beds requiring additional time and cost to continue working. Traffic control will need to be maintained for trucks transporting material across the highway to load trains. For these reasons we would anticipate a season of April to November for typical train hauling operations.

Portage – Truck Haul

The truck haul from the Portage area to the project is approximately 28 miles. In order to maintain an import rate of 800 ton/hr, an average of 55 trucks will be needed. Based on running legal haul side dump trucks with an average net capacity of 25 ton/load results in approximately 150,000 loads being transported between a borrow source and the project site. The average weather in Alaska could potentially allow this work to progress year round with limited shutdowns during heavy snow and icing conditions but for our estimate we have based our approach on working a reasonable season of April through November and shutting down during the peak winter months of December – March when the bulk of the snow falls. Traffic control will be an integral part of managing truck import operations for almost 500 shifts on the Seward Highway. It would be possible to use day shift, night shift, or both during this operation. During the summer months traffic can significantly impact truck haul times and traffic flow through a project on the Seward Highway. Due to the high number of trucks on the road at any given time for this option, fluctuations in regular traffic volumes will have a significant impact on the project schedule and cost. There will be times during the season where peak traffic volumes result in excessive haul times and require the project to shut down any truck hauls of that distance. In comparing truck hauls of various lengths; as the distance increases the number of trucks will increase accordingly, as this number grows, the risk associated with effectively managing the risk (cost, schedule, and safety) also increases significantly.

Portage – Train Haul

A borrow source near Portage could support a train haul based off of the railroad siding at Portage which is large enough to support a 40 car train. Based on an average of the two car types we estimated a capacity of 2,500 ton/train and the ability to move 3 trains/shift (7,500 ton/shift) to the project from Portage during peak operations. Traffic is likely still a significant consideration due to the need to transport material down the highway from a borrow source to the track siding at Portage for loading. At this location it would be necessary to haul the borrow material from an identified source to the siding for train loadout.

A train haul from Portage will encounter similar constraints to the MP 109 train haul listed above.

Eklutna – Train Haul

A borrow source located along the main rail belt between Anchorage and Palmer would be a feasible alternative to transport material from a borrow source. Based on an average of the two available car types we estimated a capacity of 2,500 tn/train and the ability to move 2 trains/shift (5,000 ton/shift) to the project from the Eklutna area during peak operations. It is possible a new siding/spur would be needed to facilitate loading activities.

Chugiak – Truck Haul

The truck haul from Chugiak to the project is approximately 40 miles. In order to maintain an import rate of 800 ton/hr, an average of 81 trucks will be needed. It is questionable if this quantity of trucks could be obtained on a consistent basis to support the project needs.

Diamond Point – Barge Haul

Transportation distance one way from Diamond Point to Windy Corner is approximately 170 nm. Based on that distance and anticipated loading/unloading times, the estimated round trip time is 67 hours for each barge. We based our times and cost on running 3 “sets” of 8,000 ton barge and tug configurations, which essentially produces one delivery/day at the site. We have assumed that the deliveries are not impacted by weather, tides, mechanical availability, etc. (ideal conditions). Since the work will be performed over multiple seasons, a large cost will be incurred to mobilize and demobilize each season along with decking the barges each season to protect the barge decks while transporting and handling shot rock and large riprap. With the large tides, strong currents and winds present in Turnagain Arm we have included the cost for a full-time assist tug onsite at Windy Corner to help the barge in navigation and positioning during arrival and departures.

The source is currently undeveloped and will need a substantial amount of work prior to being able to access with large barges to load material. It will require dredging, piling, bulkhead construction in addition to overall development of the quarry for rock production. We assumed that since this is a private source in pre-development that the cost associated with this development will be borne by the quarry owner and that materials will be purchased based on “market” pricing from the quarry operator rather than the project contractor operating and producing materials and paying a royalty cost on products.

There are potentially a number of offload approaches that could be used at Windy Corner. Any method used will require a large investment in temporary infrastructure to support almost 500 barge landings over multiple seasons involving huge tidal swings and large ice movement during the winter months. We have not produced a ROM estimate but this would definitely exceed \$2M for a basic offload area involving piling, mooring dolphins, and a sheet pile bulkhead. An additional cost would include regular maintenance and operational cost of the offload infrastructure during construction of the project.

The risk associated with a marine operation in Cook Inlet and Turnagain arm carries a significant amount of risk to overall cost and schedule. The estimate we produced is based on ideal conditions during a mid-April to mid-November working season and does not take this overall risk into account.

Granite Cove – Barge Haul

Transportation distance one way from Granite Cove to Windy Corner is approximately 270 nm. Based on that distance and anticipated loading/unloading times, the estimated round trip time is 109 hours for each barge. We based our times and cost on running 3 “sets” of 8,000 ton barge and tug configurations which results in one delivery every day and a half at the site (an average of 5,300 ton/day). We have assumed that the deliveries are not impacted by weather, tides, mechanical availability, etc. (ideal conditions). Since the work will be performed over multiple seasons a large cost will be incurred to mobilize and demobilize each season along with decking the barges each season to protect the barge decks while transporting and handling shot rock and large riprap. With the large tides, strong currents

and winds present in Turnagain Arm we have included the cost for a full-time assist tug onsite at Windy Corner to help the barge in navigation and positioning during arrival and departures.

We assumed that since this is a privately developed source that the cost associated with any development will be borne by the quarry owner and that materials will be purchased based on “market” pricing from the quarry operator rather than the project contractor operating and producing materials and paying a royalty cost on products and that sufficient infrastructure is currently in place to facilitate staging and loading for 8,000 ton barges.

The cost and assumptions identified above for the prior barge offloading facilities will be the same here.

Evaluation of risk and other associated cost

Each method of transportation as well as each potential borrow source has risk associated with it. In some cases those risks can be quantified and a dollar value assigned to that risk. An example of this would be traffic control, for a typical truck haul it is relatively straight forward to analyze the number of shifts and routes of trucks to estimate the dollar value associated with traffic control needs. In other cases such as barging work, the weather, tide cycles, changing siltation patterns, etc. are very difficult to quantify and are pivotal factors in managing very expensive resources. As a result these unquantified risks require the assignment of a contingency, and for items like marine work those contingencies can be significant.

Methods for transportation ranked from least risk to highest risk (based on cost and schedule risk) are as follows:

1. Truck haul (least risk)
2. Train haul
3. Barge haul (highest risk)

Cost Summaries

Tables/Comparisons attached (attachment A)

Attachment A
Material Acquisition and Transportation Cost
Breakdown by Material and Haul Method

	Quantity Tons	MP 109		Portage Valley		Eklutna	Chugiak	Granite Cove	Diamond Point
		Truck	Train	Truck	Train	Train	Truck	Barge	Barge
203(6C) Borrow, Type C (shot rock)	3,316,000	\$5 \$16,580,000	\$7 \$23,212,000	\$15 \$49,740,000	\$15 \$49,740,000	\$12 \$39,792,000	\$20 \$66,320,000	\$25 \$82,900,000	\$17 \$56,372,000
203(6E) Borrow, Type E	280,000	\$10 \$2,800,000	\$11 \$3,080,000	\$20 \$5,600,000	\$19 \$5,320,000	\$16 \$4,480,000	\$25 \$7,000,000	\$30 \$8,400,000	\$21 \$5,880,000
301(1) Agg Base Course, D-1	9,900	\$22 \$217,800	\$22 \$217,800	\$22 \$217,800	\$22 \$217,800	\$19 \$188,100	\$31 \$306,900	\$36 \$356,400	\$28 \$277,200
214(1) Railroad Ballast	12,800	\$34 \$435,200	\$34 \$435,200	\$34 \$435,200	\$34 \$435,200	\$26 \$332,800	\$43 \$550,400	\$48 \$614,400	\$40 \$512,000
241(1S) Railroad Subballast	17,400	\$34 \$591,600	\$34 \$591,600	\$34 \$591,600	\$34 \$591,600	\$26 \$452,400	\$43 \$748,200	\$48 \$835,200	\$40 \$696,000
611(2) Riprap, Class 1	134	\$13 \$1,742	\$13 \$1,742	\$22 \$2,948	\$21 \$2,814	\$18 \$2,412	\$47 \$6,298	\$52 \$6,968	\$44 \$5,896
611(2D) Coastal Riprap, R360 (8" to 23")	121,000	\$13 \$1,573,000	\$14 \$1,694,000	\$22 \$2,662,000	\$22 \$2,662,000	\$19 \$2,299,000	\$53 \$6,413,000	\$58 \$7,018,000	\$50 \$6,050,000
611(2G) Coastal Armor, R3600 (31" to 44")	146,000	\$13 \$1,898,000	\$14 \$2,044,000	\$22 \$3,212,000	\$22 \$3,212,000	\$19 \$2,768,160	\$65 \$9,490,000	\$70 \$10,220,000	\$62 \$9,052,000
Estimated Total Cost		\$24,097,342	\$31,276,342	\$62,461,548	\$62,181,414	\$50,314,872	\$90,834,798	\$110,350,968	\$78,845,096