MEMORANDUM

State of Alaska

Department of Transportation & Public Facilities
Design and Engineering Services – Central Region
Preliminary Design & Environmental Section

TO: Project File

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SUBJECT: Seward Hwy: MP 105-107
Windy Corner Material
Acquisition and Transportation
Cost Analysis

Background

The Department of Transportation and Public Facilities (DOT&PF) published a request for proposal (RFP) on January 24, 2017. The RFP sought construction cost estimating services for material acquisition and transportation as part of the preconstruction effort on the Seward Highway: MP 105-107 Windy Corner project. The intent of the services was to obtain an independent contractor's opinion of probable construction costs for purchasing and transporting approximately 3.9 million tons of materials to project site. Specifically, the DOT&PF requested estimates for a broad spectrum of material sources and haul methods, including:

- A proposed material quarry site that would be permitted within Chugach State Park at MP 109;
- Existing material sources in Anchorage, Eklutna, and Palmer;
- Past material sites near Portage; and
- Material sites near Cook Inlet that could reasonably be barged to the site

The cost analysis findings by material and haul method are attached.

Selected Contractor

The contract was awarded to Granite Construction on March 7, 2017. Granite's qualifications include a number of projects along the Seward Highway corridor including:

- Seward Highway MP 99-100
- Seward Highway Turnouts MP 88
- Seward Highway MP 115-124
- Seward Highway MP 69-75
- Seward Highway MP 104-115

Work along the corridor gives Granite first-hand knowledge of the constraints resulting from traffic and seasonal constrictions.

Other Granite projects with similar challenges to those on Windy Corner include:

- Richardson Highway MP 174-185 – Large earthmoving project with extensive drilling and blasting along with several haul scenarios.
- Anchorage International Airport (AIA) runway 7-25 – Large earthmoving project with many constraints and tight schedule window
- Dalton Highway 260-321 – Remote large earthmoving project with logistical challenges
- Cantwell Hard Aggregate Production – Utilization of train haul for aggregate transport, including development of loadout area to load train cars efficiently
- AIA Runway 14-32 – Large earthmoving project during tight schedule window
- Seward Harbor – Production and placement of riprap and armor stone, large amount of marine placement and logistical support by water
- West Dowling Road – Large earthmoving and material transport project including off road and legal haul units

In addition to Granite's experience, they included Brice Marine, LLC as a subconsultant to provide input and support for the marine cost and logistics analysis. Brice was included given their experience executing marine based operations and infrastructure work. This was of particular importance in accurately evaluating potential barge operations given the extreme tides, currents, and limited work windows in Cook Inlet and Turnagain Arm.

Scope of Work

The scope focused exclusively on the logistics and costs associated with the material acquisition and transportation of materials to the project site. Granite identified specific locations that are currently used as material sites and identified approximate locations where new material sites could potentially be developed.

Granite evaluated delivery methods that could be used to deliver materials to the project site including marine, train, and conventional truck haul. The method evaluated was 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 was evaluated. Due to the project requirement that this material be developed from a rock source (not alluvial) evaluations were limited to the following material sources.

Material Sources

Primary Evaluations:

- MP 109 material site: New site located approximately 2.5 miles north of the project. This location was considered for transportation by train and truck.
- Portage Valley: A number of locations have provided materials for previous DOT&PF projects. This location was considered for transportation by train and truck.
- Eklutna: Potential source could be developed in this area that would meet the requirements for this project. This location was considered for transportation by train and truck.
- Granite Cove Quarry (Kodiak, AK): This quarry has been operational in the past and is currently active with an operator. This quarry is located on Kodiak Island and is limited to water access only.

- Diamond Point Quarry (Iliamna Bay, AK): This quarry is a new site and has not been developed or provided materials previously. Located in Iliamna Bay within Cook Inlet this site is tidewater influenced and limited to water access only.

Secondary Evaluations:

- Skookum Quarry: Active quarry site that supplies all types of manufactured rock products located near Chugiak off of the Old Glenn Highway. This location was considered for transportation by truck only. Currently there are not rail lines or spurs adjacent to this source.
- Mat-Su Valley sites: 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 this reason, Granite did not provide pricing information for this location.

Notes and Assumptions for Material Sources and Methods of Transportation

As part of the cost analysis, the following notes and assumptions were made.

General

- Costs include only material purchase/development and transportation to the site. No placement cost of materials is included.
- Each location will require drill and shoot excavation to produce material.
- Permits needed for each location and method of delivery would be possible to obtain in a reasonable time window.
- Evaluation did not include assessment of quality or quantity of rock.
- Fuel cost is based on $3.00/gallon (Marine option), $3.50/gallon (Truck option), and no fuel surcharges for the Train option.

Highway (truck)

- Truck hauls will be limited by weight restrictions given the location of material sources are located outside the project limits and require transportation via highway.
- Material will be hauled in side-dump trucks with typical net capacities of 25 ton/load.
- Estimating approximately 150,000 truckloads being transported between the material source and project site.
- Main factor affecting the haul cost is 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.
- It may be necessary to predominately use night shift operations for importing materials to the project.
- This hauling option could result in significant acceleration in the “wear and tear” of the existing pavement.
- As the truck haul distance increases the number of trucks will increase accordingly. As the truck numbers grow, the risk associated with effectively managing the risk (cost, schedule, and safety) also increases significantly.
- Anticipate a season of April to November, with a winter shutdown.

Rail (train)

- Granite discussed availability of air dump cars with Alaska Railroad Corporation (ARRC) and decided to base analysis on running a train consisting of 40 air dump cars.
- Estimated a capacity of 2,500 ton/train, the project will require approximately 1,500 train trips to the site.
- Existing rail siding located near Indian will accommodate a full work train of up to 85 cars.
- A much smaller rail siding located near Rainbow would not be capable of accommodating a project work train without being expanded.
- There are no sidings located at either MP 109 or Windy Corner, which could necessitate the construction of approximately 2,500 linear feet of track siding or require that the train schedule be flexible to work with other mainline rail traffic.
- If a siding is needed to facilitate the work train schedule with other train traffic, then a rough order of magnitude of approximately $240,000/siding is estimated.
- To load a train at the MP 109 quarry location, significant infrastructure will be required to facilitate material hauling.
- Anticipate a season of April to November, with a winter shutdown.

Marine (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 significant challenges as this project is located on the Turnagain Arm and experiences substantial tidal swings upwards of 40 feet.
- Likely requires that barges be capable of "going dry" during the offload of the barge at the site given extreme tides at project site.
- Using larger barges (8,000 ton/load) the project will require almost 500 barge loads to be delivered to the site.
- 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.
- 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.
- Assumed costs associated with 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.
- Offload approaches that could be used at Windy Corner will require a large investment in temporary infrastructure including piling, mooring dolphins, and a sheet pile bulkhead to support almost 500 barge landings over multiple seasons involving huge tidal swings and large ice movement during the winter months.
- 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 Turnigan arm carries a significant amount of risk to overall cost and schedule. The estimate is based on ideal conditions and does not take this overall risk into account.
- Anticipate the typical barge season as mid-April to mid-November, with a winter shutdown.

Notes and Assumptions by Option

MP 109 – Truck Haul

- The truck haul from MP 109 to the project location is approximately 2.5 miles.
- In order to maintain an import rate of 800 ton/hr, an average of 10-12 trucks will be needed.

MP 109 – Train Haul

- Estimated the ability to move 6 trains/shift (15,000 ton/shift) to the project from MP 109 during peak operations.
- Traffic control is likely 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.

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

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.
- Estimate the ability to move 3 trains/shift (7,500 ton/shift) to the project from Portage during peak operations.

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.

Granite Cove – Barge Haul

- Transportation distance one way from Granite Cove to Windy Corner is approximately 270 nm.
- Estimated round trip time is 109 hours for each barge based on distance and anticipated loading/unloading times.
- Assumes one delivery every day and a half at the site (an average of 5,300 ton/day).

Diamond Point – Barge Haul

- Transportation distance one way from Diamond Point to Windy Corner is approximately 170 nautical miles (nm).
- Estimated round trip time is 67 hours for each barge based on distance and anticipated loading/unloading times.
- Assumes one delivery approximately every day (an average of 8,000 ton/day).
- Source will require dredging, piling, bulkhead construction and overall development of the quarry for rock production prior to being able to access with large barges to load material.

Granite's cost estimate associated with the material acquisition and transportation of materials to the project site are shown in the following table. Attachment A provides additional cost breakdown.

TABLE 1 – Summary of Material Acquisition and Transportation Costs

Material Source – Haul Method	Estimated Total Cost
MP 109 – Truck	$24 Million
MP 109 – Train	$31 Million
Portage Valley - Truck	$62 Million
Portage Valley - Train	$62 Million
Eklutna - Train	$50 Million
Chugiak - Truck	$90 Million
Granite Cove - Barge	$110 Million
Diamond Point - Barge	$78 Million

Attachment A

Material Acquisition and Transportation Cost

Breakdown by Material and Haul Method

	Quantity	MP 109		Portage Valley		Eklutna	Chugiak	Granite Cove	Diamond Point
	Tons	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**