Final

Knik Arm Crossing
Conceptual Cost Estimate

January 2009

State Project No.: 56047
Federal Project No.: TBD

Prepared for:

Alaska Department of Transportation
and Public Facilities

Prepared by:
The National Constructors Group

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Prepared by:
The National Constructors Group
P.O. Box 2890
Napa, CA 94558

(707) 257-8994

Reviewed by:

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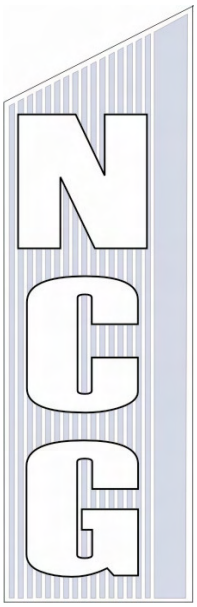

Section 1 – Executive Summary

Scope of Work

The Conceptual Construction Cost Estimate for the Knik Arm Crossing Project was prepared under contract with the Alaska Department of Transportation/Public Facilities (DOT/PF). It is based upon a design-build delivery strategy and a Notice to Proceed of April 1, 2009.

The Conceptual Construction Cost Estimate is based on the following limited conceptual design documents provided by the Alaska DOT/PF.

- Conceptual plan and profile for Segments No. 2 through 6, 8, and 9 (Segment No. 7 is included in Segment Nos. 6 and 8).
- Typical cross-sections and quantities for Segments No. 2 through 6, 8 and 9 (Segment No. 7 is included in Segment Nos. 6 and 8).
- Conceptual Plans for the Knik Arm Bridge.
- Artist renderings for Elmendorf Access by Port egress to be included with Segment No. 8.

The estimate is based upon procedures utilized by heavy civil engineering contractors in preparing "hard money" competitive bids to public transportation authorities.

The cost structure of the estimate includes current Alaska craft labor rates escalated to coincide with the construction schedule. Construction equipment ownership and operating costs are based on current data; permanent materials are based upon current cost indices. Indirect costs are estimated utilizing the detailed construction schedule for time related costs, coupled with historic indirect cost checklists.

The quantities of work have been verified or revised either by independent assessment or by development of conceptual designs, wherein lump sums are indicated, e.g. the cut-and-cover tunnel under Government Hill. However, quantities have not been verified for Segments No. 1,

2, 6, 8, and 9, roadway excavation, or embankment (due lack of information), asphalt concrete, and asphalt treated base, as a pavement thickness was not provided.

The baseline Knik Arm Crossing Bridge estimate is based upon the conceptual foundation design, while the superstructure estimate is based upon modifications identified during the construction engineering analysis. An alternative foundation concept has also been estimated for comparative purposes relative to constructability, environmental, cost, and schedule.

Construction Engineering Analysis

Foundation

A conceptual design has been developed for pile driving templates and a noise attenuation system. The concepts are based upon our experience with the construction of the California Department of Transportation's Seismic Toll Bridge Replacement Program in San Francisco Bay and Cook Inlet's Offshore Drilling Platforms. The noise attenuation systems are state-of-the-art and should comply with the Draft EIS requirements.

An important aspect of the foundation analysis was to have a basis for assessing the possibility of schedule slippage and cost growth, based upon the construction engineering, cost and schedule analyses.

An alternative foundation design has been developed based upon tolerance, constructability, geotechnical, environmental, compatibility with the modified superstructure design, schedule, and cost.

The cost of the greater risk associated with the base foundation design is reflected in the Indirect/Margin of the estimate.

Superstructure

Based upon constructability, construction tolerances, fabrication, erection, site conditions, and long-term maintenance, the superstructure concept design has been modified. As a result, a

third alternative has been developed that provides for future widening of the bridge to four lanes without modifying the two-lane configuration or affecting the marine environment.

West and East Approach Segments No. 3 and 5

The construction of the approach embankments are affected by weather, controlled work windows, tidal action, and ice flows. Tidal action and ice flows also can cause the loss of embankment material. Each of these items can have the effect of extending the overall construction duration.

The construction engineering analysis has provided possible alternative solutions to mitigate these risks:

- Construct the approach embankments to an approximate elevation of +29 with ±100-pound crushed rock containing minimal fines.
- Construct temporary walls around the work zone to extend the work window and avoid the loss of material due to tidal action and ice flow. This also provides a method to utilize embankment materials that are readily available at a reduced cost.

The following table provides the total estimated cost for each of the individual segments.

Conceptual Construction Cost Estimate Summary

Table 1 - West Approach Conceptual Construction Cost Estimate Summary

Segment Description	Two-Lane Alternative	Four-Lane Alternative
West Approach		
Segment No. 1	$18,416,739	$41,841,854
Segment No. 2	$24,999,992	$33,672,910
Segment No. 3	$50,787,044	$63,763,158
Subtotal	**$94,203,775**	**$139,277,922**
Construction		
Management	$2,233,500	$2,680,200
Quality Control	$695,500	$869,375
Survey	$464,100	$580,125
Design	$1,600,000	$3,000,000
Subtotal	**$4,993,100**	**$7,129,700**
West Side Total Construction Cost	**$99,196,875**	**$146,407,622**

Table 2 - East Approach Conceptual Construction Cost Estimate Summary

Segment Description	Two-Lane Alternative	Four-Lane Alternative
East Approach		
Segment No. 5	$109,353,365	$133,036,222
Segment No. 6	$6,332,272	$8,259,098
Segment No. 8	$52,064,804	$53,486,356
Segment No. 9	$35,687,960	$35,687,960
Subtotal	**$203,438,401**	**$230,469,636**
Construction		
Management	$4,232,200	$4,232,200
Quality Control	$895,900	$895,900
Survey	$685,100	$685,100
Design	$5,000,000	$5,000,000
Subtotal	**$10,813,200**	**$10,813,200**
East Side Total Construction Cost	**$214,251,601**	**$241,282,836**

Table 3 - Knik Arm Crossing Bridge Segment 4 Conceptual Construction Cost Estimate Summary

Cost Description	Two-Lane Base Alternative[1]	Four-Lane Base Alternative[1]	Four-Lane Added in the Future	Two-Lane with Foundation Alternative[2]	Four-Lane with Foundation Alternative[2]
Direct Cost					
Foundations	$102,315,126	$102,315,126	–	$99,560,377	$99,560,377
Superstructure	$174,362,062	$222,650,696	$73,702,792	$174,362,062	$222,650,696
Indirect/Margin	$68,796,231	$68,530,183	$27,585,361	$50,677,663	$50,677,663
Subtotal	**$345,473,419**	**$393,496,005**	**$101,288,153**	**$324,600,102**	**$372,888,736**
Survey	$1,277,409	$1,277,409	$724,019	$860,547	$860,547
Quality Control	$3,297,390	$3,292,396	$2,043,513	$1,985,940	$1,985,940
Design	$2,400,000	$2,400,000	$1,000,000	$2,400,000	$2,400,000
Mobilization	$4,674,445	$4,679,445	$4,566,445	$4,674,445	$4,674,445
Subtotal	**$11,649,244**	**$11,649,250**	**$8,333,977**	**$9,920,932**	**$9,920,932**
Total Cost	**$357,122,663**	**$405,145,255**	**$109,622,130**	**$334,521,034**	**$382,809,668**
Escalation	$16,070,520	$18,231,536		$11,708,236	$13,398,338
Total Cost Including Escalation	**$373,193,183**	**$423,376,791**	**$109,622,130**	**$346,229,270**	**$396,208,006**

[1] *From escalation calculation, average escalation is 5.21% per annum or 0.004% per month. 50% of 43 months = 21.5 months @ 0.004% = 9% at mid-point of expenditure.*

[2] *From escalation calculation, average escalation is 5.21% per annum or 0.004% per month. 50% of 33 months = 16.5 months @ 0.004% = 7% at mid-point of expenditure.*

For Segment No. 4 the quantities are very accurate and we are satisfied that there is no quantity contingency or other items required for Segment No. 4. For the rest of the segments, we considered this to be rural roadway construction and such items such as ITS and substantial changes in drainage and electrical elements, etc. were not required for the rural designation of the roadways. Since the quantities of the rest of the segments could not be verified, the variations of quantities was considered an Owner's risk and not included in the estimate.

Escalation

Conceptual Construction Cost Estimate Escalation Analysis

An escalation analysis has been established based upon Segment No. 4 Knik Arm Crossing the two-lane configuration with the conceptual baseline foundation.

The duration of this segment is 43 months, completing October of 2012. The midpoint of construction being December of 2010. Based upon the escalation analysis, the average escalation factor is 5.21% per annum.

Table 4 - Project Escalation Analysis

Escalation Items	Percent of Contract	2008 Plug Prices	Unit	2009 Plug Prices	Change	Item Escalation	Project Escalation
Craft Labor	***11.00%***					***3.00%***	***0.33%***
Permanent Materials	***51.00%***					***7.78%***	***3.97%***
- Cement	2.00%	$ 110.00	ton	$ 110.00	0.00%		
- Asphalt	1.00%	$ 80.00	ton	$ 85.00	6.25%		
- Rebar	2.00%	$ 2,000.00	ton	$ 2,125.00	6.25%		
- Structural Steel	45.00%	$ 3,000.00	ton	$ 3,250.00	8.33%		
- Miscellaneous	1.00%	$ -			3.00%		
Construction Materials	***10.00%***					***3.00%***	***0.30%***
Equipment Operating Expense	***22.00%***					***7.10%***	***1.56%***
- Fuel, Oil & Grease	8.00%	$ 1.75	gallon	$ 2.00	14.29%		
- Parts	14.00%	$ -		$ -	3%		
Sub-Contractors	***6.00%***					***3.00%***	***0.18%***
				2009 Escalation			***6.34%***

Escalation Items	Percent of Contract	2009 Plug Prices	Unit	2010 Plug Prices	Change	Item Escalation	Project Escalation
Craft Labor	***11.00%***					***3.00%***	***0.33%***
Permanent Materials	***51.00%***					***6.85%***	***3.49%***
- Cement	2.00%	$ 110.00	ton	$ 110.00	0.00%		
- Asphalt	1.00%	$ 85.00	ton	$ 85.00	0.00%		
- Rebar	2.00%	$ 2,125.00	ton	$ 2,125.00	0.00%		
- Structural Steel	45.00%	$ 3,250.00	ton	$ 3,500.00	7.69%		
- Miscellaneous	1.00%				3.00%		
Construction Materials	***10.00%***					***3.00%***	***0.30%***
Equipment Operating Expense	***22.00%***					***1.91%***	***0.42%***
- Fuel, Oil & Grease	8.00%	$ 2.00	gallon	$ 2.00	0.00%		
- Parts	14.00%	$ -		$ -	3%		
Sub-Contractors	***6.00%***					***3.00%***	***0.18%***
				2010 Escalation			***4.72%***

Escalation Items	Percent of Contract	2010 Plug Prices	Unit	2011 Plug Prices	Change	Item Escalation	Project Escalation
Craft Labor	***11.00%***					***3.00%***	***0.33%***
Permanent Materials	***51.00%***					***0.35%***	***0.18%***
- Cement	2.00%	$ 110.00	ton	$ 115.00	4.55%		
- Asphalt	1.00%	$ 85.00	ton	$ 90.00	5.88%		
- Rebar	2.00%	$ 2,125.00	ton	$ 2,125.00	0.00%		
- Structural Steel	45.00%	$ 3,500.00	ton	$ 3,500.00	0.00%		
- Miscellaneous	1.00%				3.00%		
Construction Materials	***10.00%***					***3.00%***	***0.30%***
Equipment Operating Expense	***22.00%***					***15.45%***	***3.40%***
- Fuel, Oil & Grease	8.00%	$ 2.00	gallon	$ 2.50	25.00%		
- Parts	14.00%	$ -		$ -	10%		
Sub-Contractors	***6.00%***					***6.00%***	***0.36%***
				2011 Escalation			***4.57%***

The current global economic condition and what may be the affect of the United States and other global stimulus packages upon the construction market is pure speculation. There is not historical data available that encompasses the global construction market under these conditions.

Of particular interest to this project is the fabricated structural steel cost. In January of this year on the East Coast, a bid was received for a bridge whose superstructure included structural

steel trapezoidal box girder. The unit price was $1.60 per pound… some 40% below a norm for this type of fabrication.

While permanent materials are a substantial part of cost, they are stabilized at the beginning of the project during the procurement process, in all the segments except Segment No. 4. Fuel escalation is included in the hourly construction equipment operating costs and labor escalation is minimal because a substantial amount of the work has been done in the first season and has been included in the craft labor rates.

Conceptual Construction Schedule

Two-Lane Alternative

Assuming an April 1st Notice to Proceed and the baseline foundation conceptual design, the construction duration is 43 months. Two parallel critical paths exist during the initial 28 months; being the bridge foundations and the bridge approach embankments. During the final 15 months, completion of the bridge approach embankments and bridge superstructure is critical.

The baseline conceptual construction schedule is based upon the base foundation concept and NCGs modified superstructure conceptual design. A "winter shutdown" for marine construction was assumed to be between November 1 and March 15, a period of 4.5 months, hereinafter referred to as "winter shutdown." The baseline schedule has been developed using multiple crews and production analysis based upon a five-day and six-day workweek, two shifts per day, ten hours per day. Holidays and assumed lost weather days from March 15 to November 1 are not incorporated into the schedules (see Appendix P). The findings of the crew and production analysis on a five-day workweek schedule analysis are that foundation work will not be completed until March 2011. To this must be added the winter shutdown, extending foundation completion to mid-July of 2011.

The findings of the multi-crew and production analysis based upon a six-day workweek schedule are that work would not be completed until January 2011. To this must be added the winter shutdown, extending the foundation completion until mid-May 2011. To this point in time holidays, assumed lost weather days during the construction season, and the extreme risk of the base foundation conceptual design have not been considered.

A five-day workweek would increase the projects duration by 12 months, which would result in an increase in the costs of the project that are difficult to asses but include, as a minimum:

- The loss of revenue service and the affects on financing cost.
- Time oriented indirect cost.
- Standby and the added duration of the construction equipment being on-site.
- Craft labor escalation.
- Increasing exposure to the volatility of structural steel mill and fabrication costs.
- Adding the volatility of another construction season relative to environmental impacts.
- Requires a second learning curve for foundation construction crews.
- Construction operations congestion if the attempt is made to add construction equipment and commence superstructure construction concurrently.
- Added owner program management costs.

A clear understanding of schedule slippage and its inherent added costs leads to the importance of developing an alternative conceptual foundation design, its schedule, and cost analysis.

The alternative foundation design developed by NCG provides a design concept that is not as vulnerable to schedule slippage, and therefore cost growth, as the baseline foundation concept. In the initial stages of procurement, increased amounts of permanent materials have price

stability. A decrease in craft labor reduces contractor's margin, and a decrease in time reduces all time related costs. Further, the greatly simplified geometry of the entire foundation simplifies permanent work.

The production risks are accounted for in the crew hours. The fuel exposure is accounted for in the construction equip hourly expense rates.

The conceptual construction schedule for the NCG alternative foundation/substructure conceptual design and the modified superstructure conceptual design was also developed using two workweek alternatives; a five-day, two-shift, ten-hours per shift and a six-day, two-shift, ten hours per shift. Holidays and assumed lost weather days from March 15 to November 1 were not incorporated into the schedules.

The finding for the multi-crew production analysis for the five-day workweek is the foundation/superstructure is completed November 17, 2010. Adding holidays and assumed lost weather days, this scenario does not meet the objective of shortest duration at the least cost.

The finding for the multi-crew production analysis for the six-day workweek is the foundation/superstructure is completed October 2010.

Assuming an April 1st Notice to Proceed and the alternative foundation conceptual design, the construction is 33 months, at a reduction in cost that exceeds $25 million. This savings does not include the benefits of commencing revenue service at the earliest possible date.

It must be recognized the schedule is controlled by environmental, geotechnical, and weather issues.

It is anticipated the maintenance facilities and sand storage building toll facilities will be constructed once access is available over the new bridge.

The east approach embankment Segment No. 5 is also of significant concern relative to schedule. In comparison to the west approach embankment Segment No. 3, quantities for the east approach embankment require an additional 609,000 cubic yards of embankment and an additional 178,500 cubic yards of armor stone, requiring the earliest possible start of placing Segment No. 5 embankment. NCGs approach to constructing the East Approach embankment is to transport embankment materials by rail.

It must be understood NOAA conditions have been accounted for in the direct cost estimate.

For security reasons, access to Segments No. 5, 6, and 8 is not available through the Port of Anchorage or through Elmendorf Air Force Base. Access will be developed as a first order of work by constructing the Government Hill cut-and-cover tunnel and the ground support systems included with the Scope of Segment No. 6 on an accelerated schedule.

The modified cut-and-cover tunnel design includes installing larger diameter secant piles that allow for excavation to subgrade prior to constructing the roof. The roof structure is also modified from the baseline "bulb" tee girders to box girders that also serve as struts.

Four-Lane Alternative

Assuming an April 1st Notice to Proceed and the alternative foundation conceptual design, the construction is 33 months. The construction duration is critical to commencement of revenue service. The bridge construction schedule is the same as the two-lane alternative. The foundation conceptual design is the same for both alternatives.

The superstructure addition of two lanes is an activity to be completed concurrent with the fabrication, transportation, and erection activities of the primary deck sections. The critical issues remain the same as the two-lane configuration. The added embankment material for Segments No. 3 and 5 does not significantly affect the overall schedule. There is considerable schedule float in Segments No. 1, 2, 6, 8, and 9.

Environmental Mitigation

Government Hill Cut-and-Cover Tunnel

The proposed Alternative No. 2 Conceptual Cut-and-Cover Tunnel Design reduces the construction duration of the cut-and-cover tunnel and disruption to the neighborhoods. Access roadway reconstruction is minimized, conforms with the A-C couplet. The cut-and-cover tunnel will provide general access to the worksite.

The proposed accelerated design and construction methods greatly reduce environmental issues related to noise, air pollution (dust), public safety, and traffic restrictions, while providing an area for public facilities upon completion. The disruption period can be reduced to six months to provide general access to Segments No. 4, 5, 6, and 8.

If contaminated material is encountered it can be encapsulated, as suggested in the Shannon Wilson report and by utilizing other containment practices proved by the EPA, within the project limits, thus avoiding off-site disposal.

Segment No. 5, East Approach Segment

The conceptual construction cost estimate for constructing the east approach embankment is based upon the delivery of all embankment materials by rail. This delivery method would avoid several environmental concerns such as traffic congestion on the Glen Highway and the Government Hill community, air pollution, noise, public safety, and extended working hours through the neighborhoods and adjacent schools. The approach also reduces the Port of Anchorage security concerns and greatly reduces exposure to fuel escalation.

National Oceanic and Atmospheric Association (NOAA)

Construction methods have been developed to meet or exceed the Draft EIS conditions.

Port of Anchorage

Port of Anchorage representatives, at a site conference in December 2008 with NCG representatives, stated that due to Port security restrictions, access, and hauling of materials through the Port property would not be allowed. Based upon these restrictions, NCG revised its original conceptual cut-and-cover design concept to a conceptual design that would shorten the construction duration of the cut-and-cover tunnel, thus providing earlier access to eastside Segments No. 5, 6, and 8. The development of this access must be the first order of work. To avoid transporting of embankment material through the Port of Anchorage, it is now planned that the embankment material be transported by rail, thus reducing the Elmendorf Air Base and the Port of Anchorage security concerns.

The estimate is based upon the Cherry Hill ground support cut-and-fill retaining wall structures. This alternative minimizes right-of-way impacts to the Port of Anchorage property.

Two Port of Anchorage and Elmendorf Air Force Base access scenarios were originally estimated separately, however, after NCGs site investigation it was determined that the geometrics of the architectural renderings were not accurate relative to the site conditions.

It is strongly recommended the Owner work in conjunction with the Public, the Air Force, and the Port of Anchorage in clearly defining the construction approach relative to access, logistics, public safety, and security.

Taxes

The conceptual construction cost estimate does not include sales tax, property tax, or gross receipts taxes. Payroll taxes are included with the craft and staff labor rates.

Potential Reductions in Cost

- Develop alternatives to armor rock; for example, precast concrete products such as "dolos" that are not susceptible to damage by ice flows.
- Develop an armor stone design that considers the mud flats, fetch distance, and wind conditions for significant portions of the approach embankments that are not subject to large waves and the affects of ice flows, and therefore may utilize smaller armor stone.
- Develop a method for constructing the approach embankments that is environmentally sound and reduces work window restraints and loss of material due to tidal action and ice flow, therefore allowing for the use of type C material above elevation +20.
- Agree to a foundation concept that reduces cost, can be constructed in a short time span, is NOAA acceptable, minimizes the possibility of damage from ice flow, and is compatible with the superstructure and seismic requirements.

Alternative Project Delivery (Procurement) Strategies

Although not included as part of NCGs scope, but as fallout from its cost estimating, scheduling, and construction engineering analysis; while having absolutely no knowledge of funding strategies, but considering the worldwide economic conditions and the limited contractor competition, it seems appropriate that the owner consider alternative project delivery procurement strategies.

Project delivery (procurement strategies) may well be the most significant owner risk to delivery of this project within budget.

Design/Construction Risks

The risks are identified in three categories:

- Contractor Risk – As specified in a standard State Department of Transportation design-build contract, if contract documents and geotechnical report are developed to 30% completion.
- Owner Risk
- Extraordinary Risk (see Risk Sharing discussion)
- All contractor risks are included in the estimate.

Segments No. 1, 2, and 3 (West Side)

Contractor Risk (included in estimate)

- Quality and production of armor stone affects schedule and protection of embankment slopes.
- The volatility of the cost of cement is NOT significant due to the minimum required quantity of this product.
- The volatility of the cost of fuel and asphalt.
  Note: Alaska DOT/PF has a material price adjustment specification for asphalt.
- Approval of incorporating rock for approach embankment to elevation ±29. The gravel findings technical report mentions that rock may be required to construct the core embankment.

Owner Risk (not included in estimate)

- Unsuitable subgrade (cut) section in existing roadways to be reconstructed.
- Variation in roadway excavation and embankment quantities (cross-sections were not available for quantity verification) Segments No. 1 and 2.
- Variations in quantities were considered Owner's risk since they could not be verified.

Extraordinary Risk (not included in estimate)

- Unknown archeology sites are discovered.
- NOAA discovers unknown species in tidal influenced areas.
- Tidal original ground settlement and/or scour is greater than reasonably assumed from Geotechnical Report.
- The "nose" armor stone on the West Approach embankment will require a design that accounts for turbulent wave action and the affects of accelerated ice flow.

Segment No. 4 (Knik Arm Crossing Bridge)

Contractor Risk (included in estimate)

- Environmental issues defined in the environmental documents related to foundation construction:
    - Reaching agreement on "soft start" techniques for impact pile hammer
    - Sound measurement relating to marine life
    - Safety zone monitoring relating to marine life
    - Anchoring logistics (establishing permanent anchors during construction)
    - Temporary "spud" for templates – Use of vibrating hammers in lieu of impact hammers for placing template "spud" piles
- Foundation work not being completed during the 2010 construction season.
- Affect of ice flow dynamics on foundation design.
- Ice flow (4 ½-feet thick) crushing loads on pile from transverse movement.
- If splicing (welding) is required by template design and/or derrick lifting capacity, the ability to "restart" the pile may be in question and require jetting. The pile driving WEEP analysis will assist in reviewing this issue.

- Adverse weather conditions affecting pile splicing (welding) operations.
- Template "spud" piles that cannot be extracted require cutoff at mud line causing the procurement of 5,385,600 pounds of additional template "spud" pile at +/- $.70/lb plus an additional 416 pile splices (see inset comment from KMF Foundation Manager for East Bay Span of SFOBB approach spans). This exposure becomes greater if NOAA will not allow "jetting" to assist in pile removal.

> *"After constructing the eastbound foundations, we wanted to reuse the five-foot diameter piles…*
>
> *the cost was too high to extract.*

- The sequence of activities required to construct the baseline foundations including the pile cap.
- The baseline foundation pile template requires to be left in place to complete pile cap installation, including tolerance and controlling pile deflection, thus increasing the cycle time for template reuse.
- The volatility of the cost of asphalt, cement, and fuel is NOT significant due to the minimum required quantities of these products.
- Adverse weather conditions including unusually early or late ice flows.
- Severe ocean storm resulting in loss of superstructure components requiring fabrication and delivery of added units (flexibility of design so any component can be placed in any span).

Owner Risk (not included in estimate)

- Geotechnical issues relative to pile driving (such as encountering large diameter boulders).
- Geotechnical conditions varying from assumptions made in geotechnical report.

- Scour affecting pile design requiring larger diameter and longer pile varying from assumption in the geotechnical report.
- Pile driving WEEP analysis proves to be incorrect, thus effecting estimated production and causing requests for equitable time and cost adjustment.

Extraordinary Risk (not included in estimate)

- NOAA revises restraints affecting schedule and cost.
- Changes in restraints by NOAA
- Delay beyond those currently in the environmental document for the Belugas in the proximity of pile driving.
- Noise frequency limitations due to the Air Forces' adjacent communication equipment.
- Volatility of steel mill prices affecting both steel pipe pile and the superstructure costs.

Segment No. 5 (East Approach)

Contractor Risk (included in estimate)

- Availability of embankment material in the quantities required to meet a reasonable schedule.
- Quality and production of armor stone affects schedule and protection of embankment slopes.
- Approval of incorporating rock for approach embankment to elevation ±29. The gravel findings technical report mentions that rock may be required to construct the core embankment.

Owner Risk (not included in estimate)

- Variations in quantities were considered Owner's risk since they could not be verified.

Extraordinary Risk (not included in estimate)

- Unknown archeology sites are discovered.
- NOAA identifies unknown marine species in tidal influenced areas.
- Tidal original ground settlement is greater than a reasonably assumed settlement quantity, giving rise to a dispute.
- Exposing unknown contaminated material from previous military operations.
- Unknown archeology sites found.
- Security requirements are modified by the Air Force or Port of Anchorage.
- The "nose" armor stone on the East Approach embankment will require a design that accounts for turbulent wave action and the affects of accelerated ice flow.

Segments No. 6, 8, and 9 (East Approach)

Contractor Risk (included in estimate)

- Placing of excavated "clay" material in embankments due to Alaska weather conditions.

Owner Risk (not included in estimate)

- The stability of "cut" slopes.
- Unsuitable material at the grading plane.
- Variants in roadway excavation and embankment quantities (cross-sections were not available for quantity verification).
- Shannon and Wilson's opinion of risk involving off-site disposal of contaminated material – a range of $370,000 to $1,680,000.
- Unidentified utilities requiring relocation, removal, or encapsulation.
- Groundwater is encountered in the slopes.

- Global instability of cut slopes.
- Variations in quantities were considered Owner's risk since they could not be verified.

Extraordinary Risk (not included in estimate)

- Exposing unknown contaminated material from previous military operations.
- Unknown archeology sites found.
- Security requirements beyond those discussed are modified by the Air Force or Port of Anchorage.
- The "nose" armor stone on the East Approach embankment will require a design that accounts for turbulent wave action and the affects of accelerated ice flow.

Design/Construction Opportunities

- Alternative design for armor rock.
- Alternative bridge foundation design.
- Cooperation with Port of Anchorage relative to lease of land for construction offices, personnel boat moorings, etc.
- Project delivery strategies compatible with current state of the economy. Project exemptions from future legislative taxes.
- Obtain approval of the Matanuska-Susitna Borough (MSB) assembly of material sites and royalty.

Risk Sharing

The design and construction risks for this Project are extraordinarily high. However, the risks are manageable if the Owner is agreeable to a contract that clearly identifies many of the risks and structures the contract to be equitable to the contracting parties.

Many examples of risk sharing on public works programs (with extraordinary risks) are available. It is NCGs opinion, after it's detailed analysis of the Project, that without an equitable risk sharing agreement, the Project will not be economically feasible if proposals are received wherein all risks are passed on to the contractor.

Examples of items wherein risk sharing may be applicable are:

- Archeological discoveries, disruption, or delay.
- Contaminated material encountered beyond an established baseline.
- Weather disruption or delay beyond an established working day baseline schedule.
- Differing site conditions – specific definitions of the scope and site conditions.
- Unknown manmade buried objects.
- Third party work restraints modified after contract proposals have been received.
- Equitable escalation clauses for fuel (earthwork segments only) and steel plate mill prices and rolling date slippages from an established baseline (bridge segment only).
- Owner provided OCIP insurance and safety program, including environmental and all risk insurance policies.
- Volcano eruption.