

**Kodiak Airport
Devils Creek Culvert Repair
Quantity Calculations**

Project No. 57474

AIP No. 3-02-0158-01_-201_

***Prepared for:*
State of Alaska
Department of Transportation and Public Facilities
Central Region**

***Prepared by:*
HDR Alaska, Inc.
2525 C Street, Suite 305
Anchorage, Alaska 99503-2569**

March, 2014

Computed: <i>JSW</i>	Date: <i>3/26/14</i>
Checked: <i>CS</i>	Date: <i>3/26/14</i>

Pay Item Number:	G-100a
Pay Item Description:	Mobilization and Demobilization
Location:	Project wide
Unit:	Lump Sum
Quantity:	All Required
Note:	

Computed: <i>26w</i>	Date: <i>2/12/14</i>
Checked: <i>CS</i>	Date: <i>3/26/14</i>

Kodiak Devils Creek Culvert Repair
Project 57474/AIP 3-02-0158-01x-2014

Pay Item Number:	G-115a																		
Pay Item Description:	Worker Meals and Lodging, or Per Diem																		
Location:	Project wide																		
Unit:	Lump Sum																		
Quantity:	All Required																		
Note:	<p>Estimate of personnel on project.</p> <table> <tr><td>Superintendent</td><td>1</td></tr> <tr><td>Foremen</td><td>1</td></tr> <tr><td>Office Engineer</td><td>1</td></tr> <tr><td>Environmental</td><td>1</td></tr> <tr><td>Surveyors</td><td>2</td></tr> <tr><td>Equipment Operators</td><td>5</td></tr> <tr><td>Truck Drivers</td><td>2</td></tr> <tr><td>Mechanics</td><td>1</td></tr> <tr><td>Laborers</td><td>4</td></tr> </table> <p>Total – 18</p> <p>Assume 50% local hire</p> <p>Days - 2015 - 150 days</p>	Superintendent	1	Foremen	1	Office Engineer	1	Environmental	1	Surveyors	2	Equipment Operators	5	Truck Drivers	2	Mechanics	1	Laborers	4
Superintendent	1																		
Foremen	1																		
Office Engineer	1																		
Environmental	1																		
Surveyors	2																		
Equipment Operators	5																		
Truck Drivers	2																		
Mechanics	1																		
Laborers	4																		

Computed: <i>JW</i>	Date: <i>3/26/14</i>
Checked: <i>CS</i>	Date: <i>3/26/14</i>

Pay Item Number:	G-130a
Pay Item Description:	Field Office
Location:	Project Wide
Unit:	Lump Sum
Quantity:	All Required
Note:	

Pay Item Number:	G-130b
Pay Item Description:	Field Laboratory
Location:	Project wide
Unit:	Lump Sum
Quantity:	All Required
Note:	

Computed: <i>JSW</i>	Date: <i>3/26/14</i>
Checked: <i>CS</i>	Date: <i>3/26/14</i>

Pay Item Number:	G-130j
Pay Item Description:	Engineering Communication
Location:	Project wide
Unit:	Contingent Sum
Quantity:	All Required
Note:	Contingent sum to allow recovery of communication costs.

Computed: <i>JSM</i>	Date: <i>3/26/14</i>
Checked: <i>CS</i>	Date: <i>3/26/14</i>

Kodiak Devils Creek Culvert Repair
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Pay Item Number:	G-135a
Pay Item Description:	Construction Surveying by the Contractor
Location:	Project wide
Unit:	Lump Sum
Quantity:	All Required
Note:	

Pay Item Number:	G-135b
Pay Item Description:	Extra Three Person Surveying Party
Location:	Project wide
Unit:	Hour
Quantity:	20
Note:	

Computed: <i>JW</i>	Date: <i>3/26/14</i>
Checked: <i>CS</i>	Date: <i>3/26/14</i>

Pay Item Number:	G-200a
Pay Item Description:	Contractor Quality Control Program
Location:	Project wide
Unit:	Lump Sum
Quantity:	All Required
Note:	

Computed: <i>slw</i>	Date: <i>3/18/14</i>
Checked: <i>CS</i>	Date: <i>3/26/14</i>

Kodiak Devils Creek Culvert Repair
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Pay Item Number:	G-300a
Pay Item Description:	CPM Scheduling
Location:	Project wide
Unit:	Lump Sum
Quantity:	All Required
Note:	

Computed: <i>JGW</i>	Date: <i>3/18/14</i>
Checked: <i>CS</i>	Date: <i>3/26/14</i>

Kodiak Devils Creek Culvert Repair
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Pay Item Number:	G-700a
Pay Item Description:	Airport Flagger
Location:	Project Wide
Unit:	Contingent Sum
Quantity:	All Required
Note:	

Computed:	<i>JSW</i>	Date:	<i>3/26/14</i>
Checked:	<i>CS</i>	Date:	<i>3/26/14</i>

Pay Item Number:	P-152ae
Pay Item Description:	Ditch Lining
Location:	Dike at upstream end of culvert
Unit:	Ton
Quantity:	230
Note:	<p>Slope lining will be used as a non-erodible cover for side slopes of the dike.</p> <p>Volume based on using 8" of slope lining over the 2:1 side slopes and verified by cross sections.</p> <p>130 c.y. x 27 c.y./c.y. x 130 lbs./2000 lbs./ton = 228 tons Use: 230 tons</p>

Computed: <i>26</i>	Date: <i>3/18/14</i>
Checked: <i>CS</i>	Date: <i>3/26/14</i>

Devils Creek Culvert Repair

Berm Quantities

2/28/2014

Berm 652 cy Embankment from autocad earthwork

RAP 31.9 cy 2" RAP thickness

Ditch Lining 129.4 cy 8" Ditch Lining thickness

RAP		RAP section area	
Station			
0	0.9631	212	distance
	1.8033		average area
	382.2996		volume
2+12	2.6435	80	distance
	2.83155		average area
	226.524		volume
2+92	3.0196	56	distance
	2.83155		average area
	158.5668		volume
3+48	2.6435	52	distance
	1.8033		average area
	93.7716		volume
4+00	0.9631		
	861.2		cf
	31.9		cy
			Total RAP Volume

Ditch Lining		Lining section area	
Station			
0	3.9829	212	distance
	7.3387		average area
	1555.8044		volume
2+12	10.6945	80	distance
	11.4402		average area
	915.216		volume
2+92	12.1859	56	distance
	11.4402		average area
	640.6512		volume
3+48	10.6945	52	distance
	7.3387		average area
	381.6124		volume
4+00	3.9829		
	3,493.3		cf
	129.4		cy
			Total Ditch Lining Volume

Pay Item Number:	P-152i(2)
Pay Item Description:	Borrow (<10% No. 200)
Location:	Dike at mouth of culvert
Unit:	Ton
Quantity:	1,355
Note:	

Computed: <i>ms</i>	Date: <i>3/18/14</i>
Checked: <i>CS</i>	Date: <i>3/26/14</i>

Kodiak Devils Creek Culvert Repair
Project 57474/AIP 3-02-0158-01x-2014

Devils Creek Culvert Repair

Berm Quantities

for Final PS&E

3/6/2014

Berm 652 cy Embankment from autocad earthwork
 RAP 28.3 cy 2" RAP thickness
 Ditch Lining 129.8 cy 8" Ditch Lining thickness

RAP		RAP section area				Total RAP Volume	
Station		distance	average area	volume		cf	cy
0	0.714	212	1.5598	330.6776			
2+12	2.4056	80	2.5643	205.144			
2+92	2.723	56	2.596	145.376			
3+48	2.469	52	1.5915	82.758			
4+00	0.714					764.0	28.3

Ditch Lining		Lining section area				Total Ditch Lining Volume	
Station		distance	average area	volume		cf	cy
0	3.9829	212	7.36105	1560.5426			
2+12	10.7392	80	11.3731	909.848			
2+92	12.007	56	11.4999	643.9944			
3+48	10.9928	52	7.48785	389.3682			
4+00	3.9829					3,503.8	129.8

$652 \text{ c.y.} \times 27 \times \frac{140 \text{ c.f.}}{2000 \text{ lbs}} = 1232 \text{ T}$
 $+10\% \text{ Use} = 1,355 \text{ T}$

Pay Item Number:	P-157a
Pay Item Description:	ESCP Administration
Location:	Project wide
Unit:	Lump Sum
Quantity:	All Required
Note:	

Pay Item Number:	P-157b
Pay Item Description:	Temporary Erosion, Sediment, and Pollution Control
Location:	Project wide
Unit:	Contingent Sum
Quantity:	All Required
Note:	

Computed: <i>Jew</i>	Date: <i>3/26/14</i>
Checked: <i>CS</i>	Date: <i>3/26/14</i>

Kodiak Devils Creek Culvert Repair
Project 57474/AIP 3-02-0158-01x-2014

Pay Item Number:	P-157f
Pay Item Description:	Withholding
Location:	Project Wide
Unit:	Contingent Sum
Quantity:	All Required
Note:	Generally set at \$0.

Pay Item Number:	P-157g
Pay Item Description:	SWPPP Manager
Location:	Project Wide
Unit:	Lump Sum
Quantity:	All Required
Note:	

Computed: <i>bw</i>	Date: <i>3/19/14</i>
Checked: <i>CS</i>	Date: <i>3/26/14</i>

Pay Item Number:	P-161b
Pay Item Description:	Recycled Asphalt Pavement
Location:	Used as cover non-creek side of dike
Unit:	Cubic Yard
Quantity:	30
Note:	

Computed: <i>lan</i>	Date: <i>2/12/14</i>
Checked: <i>CS</i>	Date: <i>2/26/14</i>

Kodiak Devils Creek Culvert Repair
Project 57474/AIP 3-02-0158-01x-2014

Devils Creek Culvert Repair
 Berm Quantities
 for Final PS&E
 3/6/2014

Berm 652 cy Embankment from autocad earthwork
 RAP 28.3 cy 2" RAP thickness
 Ditch Lining 129.8 cy 8" Ditch Lining thickness

RAP		RAP section area	
Station	RAP section area	distance	average area
0	0.714		
	212	212	1.5598
	330.6776		330.6776
2+12	2.4056		
	80	80	2.5643
	205.144		205.144
2+92	2.723		
	56	56	2.596
	145.376		145.376
3+48	2.469		
	52	52	1.5915
	82.758		82.758
4+00	0.714		
	764.0		764.0
	28.3		28.3
			Total RAP Volume

use 30 c.y.

Ditch Lining		Lining section area	
Station	Lining section area	distance	average area
0	3.9829		
	212	212	7.36105
	1560.5426		1560.5426
2+12	10.7392		
	80	80	11.3731
	909.848		909.848
2+92	12.007		
	56	56	11.4999
	643.9944		643.9944
3+48	10.9928		
	52	52	7.48785
	389.3682		389.3682
4+00	3.9829		
	3,503.8		3,503.8
	129.8		129.8
			Total Ditch Lining Volume

use 130 c.y.

Pay Item Number:	P-164a
Pay Item Description:	Hydrodemolition
Location:	Devils Creek Culvert
Unit:	Square Yare
Quantity:	1,600
Note:	Remove floor of both culvert tubes to below the level of existing top layer of rebar. 2 x 790' long x 9' wide x 1 s.y./9 s.f. = 1,580 s.y. Use: 1,600 s.y.

Computed: <i>jar</i>	Date: <i>7/18/14</i>
Checked: <i>CS</i>	Date: <i>3/26/14</i>

Kodiak Devils Creek Culvert Repair
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Pay Item Number:	P-164b
Pay Item Description:	Scarification
Location:	Devils Creek Culvert
Unit:	Square Yard
Quantity:	
Note:	<p>Remove the outer 1" of concrete for the walls of the culverts where erosion and deterioration of present to approximately 2' above floor.</p> <p>4 x 790' x 2' x 1/9 = 702 Use: 700 s.y.</p>

Computed: <i>JW</i>	Date: <i>3/26/14</i>
Checked: <i>CS</i>	Date: <i>3/26/14</i>

Kodiak Devils Creek Culvert Repair
Project 57474/AIP 3-02-0158-01x-2014

Pay Item Number:	P-165a(2)
Pay Item Description:	Removal of Structures
Location:	Project wide
Unit:	Lump Sum
Quantity:	All Required
Note:	<ol style="list-style-type: none"> 1. Removed Structures Designated for Disposal. <ul style="list-style-type: none"> • Remove gravel and other accumulation debris from the entrance and interior of the Devils Creek culvert. 2. Removed Structures Designated for Salvage. <ul style="list-style-type: none"> • None 3. Remove and Reinstall Structures. <ul style="list-style-type: none"> • Debris rack at south end of the Devils Creek culvert.

Computed: <i>JW</i>	Date: <i>4/14/14</i>
Checked: <i>CS</i>	Date: <i>4/16/14</i>

Pay Item Number:	P-511a
Pay Item Description:	Microsilica Modified Concrete
Location:	Floor of the culvert
Unit:	S. Y.
Quantity:	1,600
Note:	<p>Remove the outer 1" of concrete for the walls of the culverts where erosion and deterioration of present to approximately 2' above floor.</p> <p>4 x 790' x 2' x 1/9 = 702 Use: 750 s.y.</p> <p>Same area as P-164a, Hydrodemolition</p>

Computed: <i>JSW</i>	Date: <i>3/26/14</i>
Checked: <i>CS</i>	Date: <i>3/26/14</i>

Project:	Computed: <i>Jan</i>	Date: 3/17/14
Subject:	Checked:	Date:
Task:	Page:	of:
Job #:	No:	

Microsilica Modified Concrete

$$2 \times 790' \times 9' \times \frac{1}{9} = 1580 \text{ s.g.}$$

Use 1600

Pay Item Number:	P-511b
Pay Item Description:	Epoxy-Bonded Epoxy Mortar
Location:	Walls of the culvert
Unit:	S. Y.
Quantity:	700
Note:	<p>Item will repair the bottom 2' of the culvert walls. Same area as P-164b, Scarification</p> <p>$4 \times 790' \times 2' \times 1/9 = 702$ Use: 700 s.y.</p>

Computed: <i>ju</i>	Date: <i>4/14/14</i>
Checked: <i>CS</i>	Date: <i>4/16/14</i>

Pay Item Number:	P-610g
Pay Item Description:	Steel Reinforcement
Location:	Repair exposed rebar on interior of the culvert
Unit:	L.F.
Quantity:	7,000
Note:	<p>Each tube is approximately 720'. Transverse and longitudinal rebar is placed 10" o.c. Rebar is 3/8"</p> <p>Approximate length of transverse and longitudinal bars: Transverse – $2 \times 720' \times (1/0.83) \times 10' = 17,350$ l.f. Longitudinal – $2 \times 720 \times (10 \times (1/.83)) = 17,350$ l.f. Total potential rebar in top layer of rebar – 34,700' Assume that approximately 20% will need to be repaired. – 6,940 l.f. Use 7,000 l.f.</p> <p>The cost of 5/8" rebar is approximately \$10 per 10' length.</p>

Computed:	<i>kw</i>	Date:	<i>7/1/14</i>
Checked:	<i>CS</i>	Date:	<i>3/26/14</i>