



## **CONSTRUCTION COST ESTIMATE UPDATE OF THE MAIN SPAN OF THE KNIK ARM CROSSING**

T.Y. Lin International

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EKM Engineering

July 11, 2007

## Introduction

T.Y. Lin International, in conjunction with EKM Engineering, was retained by the Knik Arm Bridge and Toll Authority (KABATA) to make an independent estimate of the construction cost of the bridge portion of the proposed Knik Arm Crossing. The proposed bridge is 8100 feet long between approach embankments, as shown in the rendering on the title page of this report. It consists of twin orthotropic steel box girders supported on steel pile caps and steel piles. Conceptual drawings of the proposed structure are included as Appendix A; these drawings were provided by KABATA.

## Estimate Methodology

The items used in our cost estimate are those listed on the first sheet of the drawing set (Appendix A). Quantities of materials were taken from the same sheet. We did not make an independent estimate of quantities, only of cost. Thus, any difference between our cost estimate and any other cost estimate reflects a difference in estimated material cost, or a different appraisal of the work required to construct the bridge, or both of these.

The unit costs presented in this report were developed by considering the materials required for the project and the labor, equipment, and time required to fabricate and erect the structure. For each item in the cost estimate, a work procedure was envisaged; and the materials, labor, equipment and time required to complete the work was estimated. The unit cost of each item was computed considering the costs of raw materials, prevailing labor rates, equipment rental rates, etc.

This fundamental approach to estimating is necessary for a unique structure like the proposed Knik Arm Crossing. The construction of this bridge will require specialized equipment, tools, and procedures that will have to be developed specifically for it. This specialization makes it difficult to apply unit costs from any other structure. Estimators must rely on past experience to develop reasonable work procedures for each item, and estimate the materials, labor, equipment, and time associated with that item. The cost of each item follows from the necessary fundamental activities.

## Factors Influencing Construction Cost

There are several factors that influence the cost of a crossing of Knik Arm. These include:

- The temperature in Anchorage varies from a low of -35°F to a high of 85°F. A four month winter shutdown was assumed (November-February).
- The average tidal range in Knik Arm is 30 feet; the extreme range is 40 feet.
- Currents may be as high as 11 feet/second at the bridge site.
- Normally, piles for bridges are limited to a maximum batter of 4/12 or less, and arranged to minimize interference, both in the completed structure and during driving. The proposed structure includes 48 inch diameter steel pipe piles on 6/12 and 8/12 batters. The two interior piles in each bent are to be battered in skew directions to avoid physical interference.
- The piles have spin fins, which may make them more difficult to drive than otherwise. The extreme batter and the length of the piles (up to 140 feet between mudline and cut-

off) will make them very flexible. This flexibility will reduce the effectiveness of driving and increase costs.

- The pile arrangement and the extreme batters will necessitate the construction of a complex pile template for driving. Because of the batters it will be necessary to fully drive one pile before another pile at the same pier can be started. All of these factors increase the cost of the piling. Also, we estimate that they add one additional construction season to the project schedule. A purpose built pile template will be needed to install the piles. Given the batter and the length of the piles we envisage a frame type structure like that illustrated in Figure 1.
- There is only one galvanizing facility in the United States that can accommodate a 60' long, 48" diameter pipe pile, weighing 22.5 tons.

### Assumptions

- The conceptual bridge plans make no reference to corrosion protection of the structural steel, other than galvanizing the piles and metalizing the deck. We have assumed that the remaining structural steel will be painted, and have included the associated costs with the

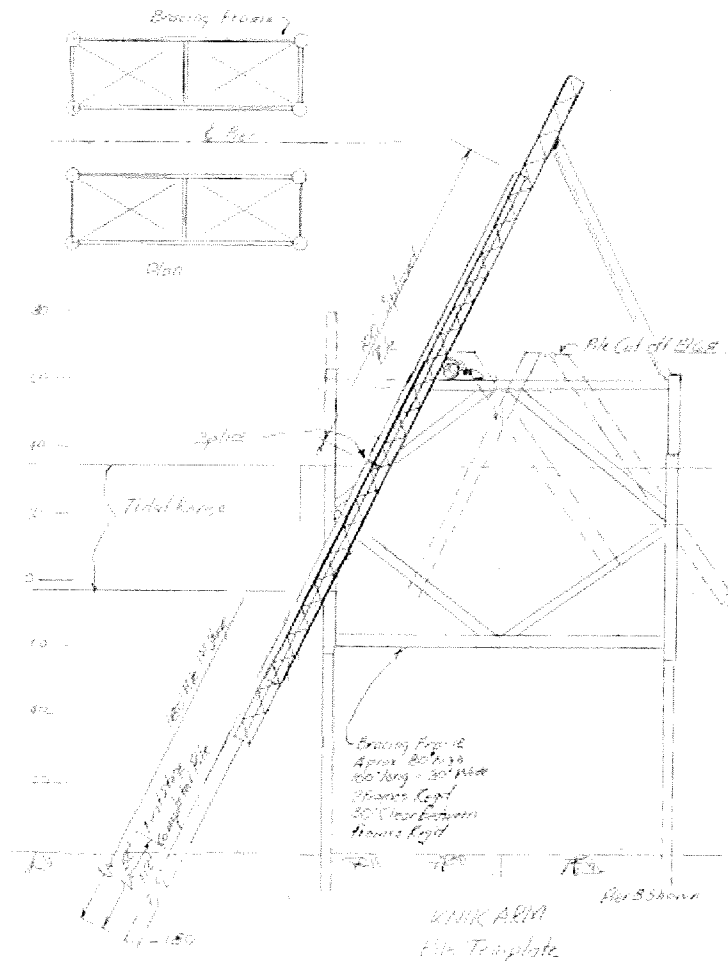


Figure 1, Pile Driving Template

superstructure structural steel item.

- We have assumed that modular expansion joints will be utilized, both at the center expansion joint, and at the abutments.
- We made some assumptions regarding the number and size of stiffeners in the pile caps, the thickness of the gussets connecting the piles to the pile caps, and regarding the details of the bridge bearings. These assumptions may be found in Appendix B.
- Hourly wage rates were developed from the “Schedule of Wage Rates to be used on Public Construction,” from the Alaska Department of Labor.
- We have assumed that the Federal “Buy America” clause will be in effect, and have assumed domestic fabrication of structural steel items.
- Mobilization was considered to be 10% of the Construction Cost Estimate Update

### Cost Estimate

Our estimate of the construction cost of the bridge portion of the Knik Arm Crossing is shown in Table 1. The cost is in 2007 dollars and does not consider inflation to later years. The cost is based on the conceptual plans in Appendix A, and the major assumptions listed above. Many other minor assumptions were made with respect to details that are not shown on the conceptual plans. The estimate must be considered preliminary and it should be updated when plans are further developed. The estimate does not include any contingency. KABATA may wish to apply its own estimate of contingency to the estimate.

No.	Item	Unit	Quantity	Unit Cost	Cost
1	48" Diameter Pipe Pile	Tons	12454	\$3,733	\$46,490,782
2	48" Diameter Pipe Pile (Driven)	Each	156	\$250,000	\$39,000,000
3	48" Diameter Pipe Field Splices	Each	0	\$0	\$0
4	Steel Pile caps	Tons	1200	\$5,475	\$6,570,000
5	Concrete Pile Fill	CY	7000	\$500	\$3,500,000
6	Abutment Concrete	CY	3000	\$725	\$2,175,000
7	Abutment Concrete RF	Tons	200	\$3,000	\$600,000
8	Superstructure Structural Steel	Tons	18700	\$7,080	\$132,396,000
9	Curb RF Concrete	CY	1430	\$800	\$1,144,000
10	Curb Reinforcing Steel	Tons	100	\$3,000	\$300,000
11	Bridge Rail	Tons	1200	\$6,325	\$7,590,000
12	Deck metalizing	SY	40000	\$72	\$2,880,000
13	Rubberized Asphalt Paving	Tons	4100	\$0	\$0
14	Asphalt Paving	Tons	8200	\$90	\$738,000
15	Lighting	LF	16500	\$61	\$1,006,500
16	Signs & Miscellaneous	Lump Sum			\$50,000
17	10' Diameter Energy Absorber	Each	12	\$85,000	\$1,020,000
18	Small Rubber Energy Absorber	Lump Sum			\$160,000
19	Mobilization (10%)	Lump Sum			\$27,300,000
<b>Total</b>					<b>\$273,000,000</b>

The detailed cost estimate was prepared by EKM Engineering. Their development of *unit costs* is attached as Appendix B<sup>1</sup>.

Construction cost is intimately related to schedule. The construction schedule developed in conjunction with the cost estimate is shown on the following page as Figure 2. This shows completion of the project in October of the fourth year of the schedule, after a notice to proceed on April 1<sup>st</sup> of the first year. As mentioned previously, the schedule includes a four month winter shut-down for weather.

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<sup>1</sup> The quantities appearing in Appendix B are not the same as those utilized in the main body of the report. Appendix B is used for unit costs only.

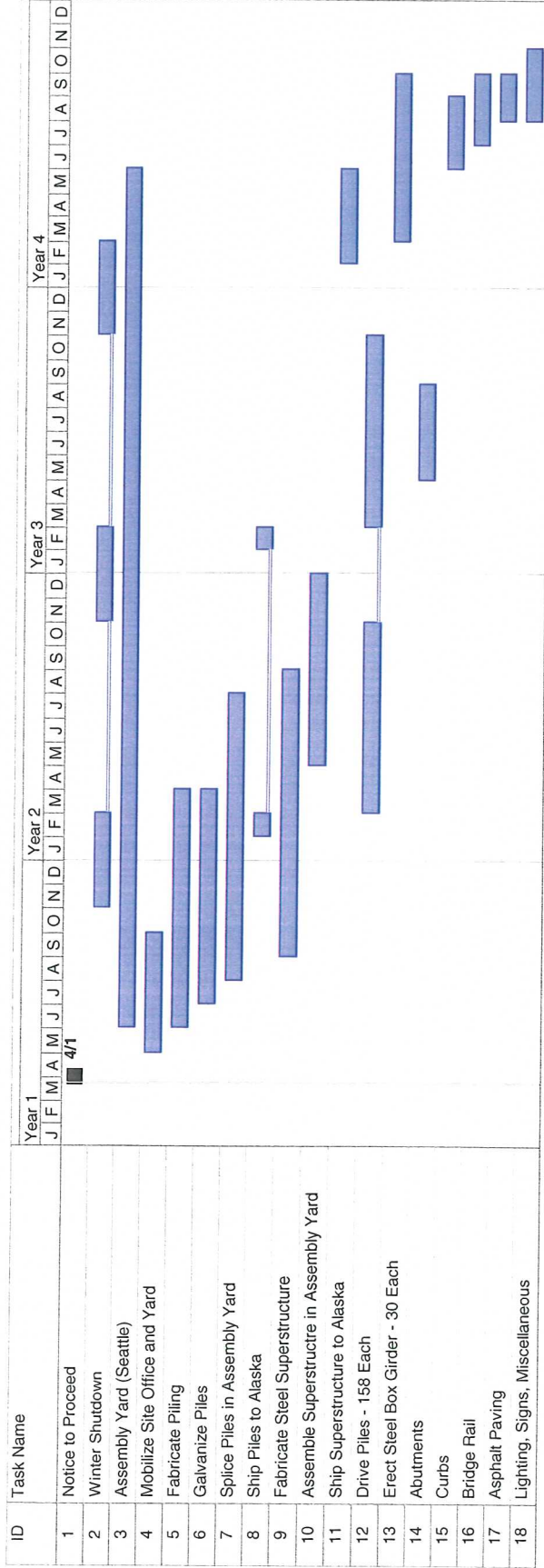


Figure 2, Construction Schedule

**CONSTRUCTION COST ESTIMATE UPDATE OF  
THE  
MAIN SPAN OF THE KNIK ARM CROSSING**

**APPENDIX A**

T.Y. Lin International

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EKM Engineering

March 23, 2007

**CONSTRUCTION COST ESTIMATE UPDATE OF  
THE  
MAIN SPAN OF THE KNIK ARM CROSSING**

**APPENDIX B**

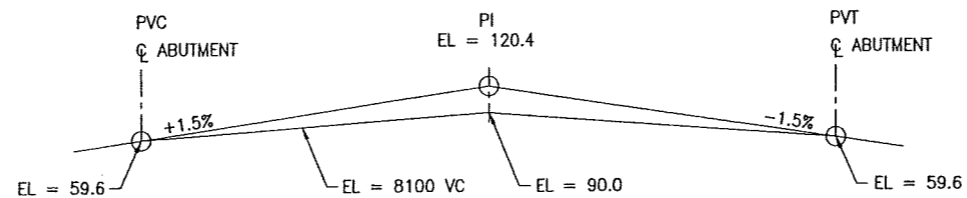
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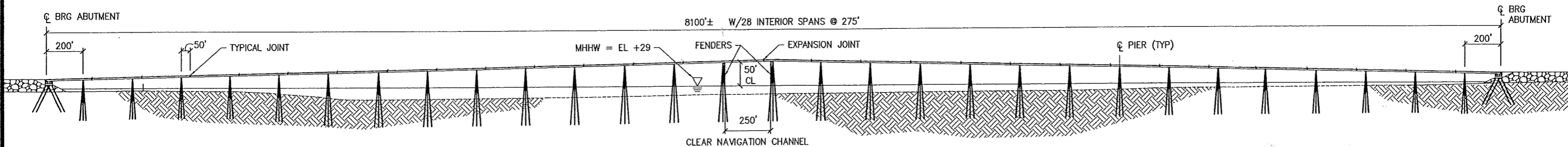
**BRIDGE PROFILE GRADE**

NTS

**KNIK ARM CROSSING ESTIMATE OF BRIDGE QUALITIES**

NUM.	ITEM	QUANTITY
1	48" $\phi$ PIPE PILES (SUPPLIED) (32,800 L.F., 25,000 L.F. GALV.)	12,454 TONS
2	48" $\phi$ PIPE PILES (DRIVEN)	156 EACH
3	48" $\phi$ PILE FIELD SPLICES	312 EACH
4	STEEL PILE CAPS	1,200 TONS
5	CONCRETE PILE FILL	7,000 CY
6	ABUTMENT REINFORCED CONCRETE	3,000 CY
7	ABUTMENT CONCRETE REINFORCING	200 TONS
8	SUPERSTRUCTURE STRUCTURAL STEEL	18,700 TONS
9	CURB REINFORCED CONCRETE	1,430 CY
10	CURB REINFORCING STEEL	100 TONS
11	BRIDGE RAIL (16,500 L.F.)	1,200 TONS
12	DECK METALIZING	40,000 SY
13	RUBBERIZED ASPHALT PAVING	8,200 TONS
14	LIGHTING	16,500 LF
15	SIGNS AND MISC.	ALL
16	10" $\phi$ RUBBER ENERGY ABSORBERS	12 EACH
17	SMALL RUBBER ENERGY ABSORBERS	8 EACH

NOTE: SUPERSTRUCTURE STRUCTURAL STEEL -- A588



**ELEVATION**

NTS

NOTE:  
DATUM MLLW = EL 0.0

**CONCEPT ONLY**

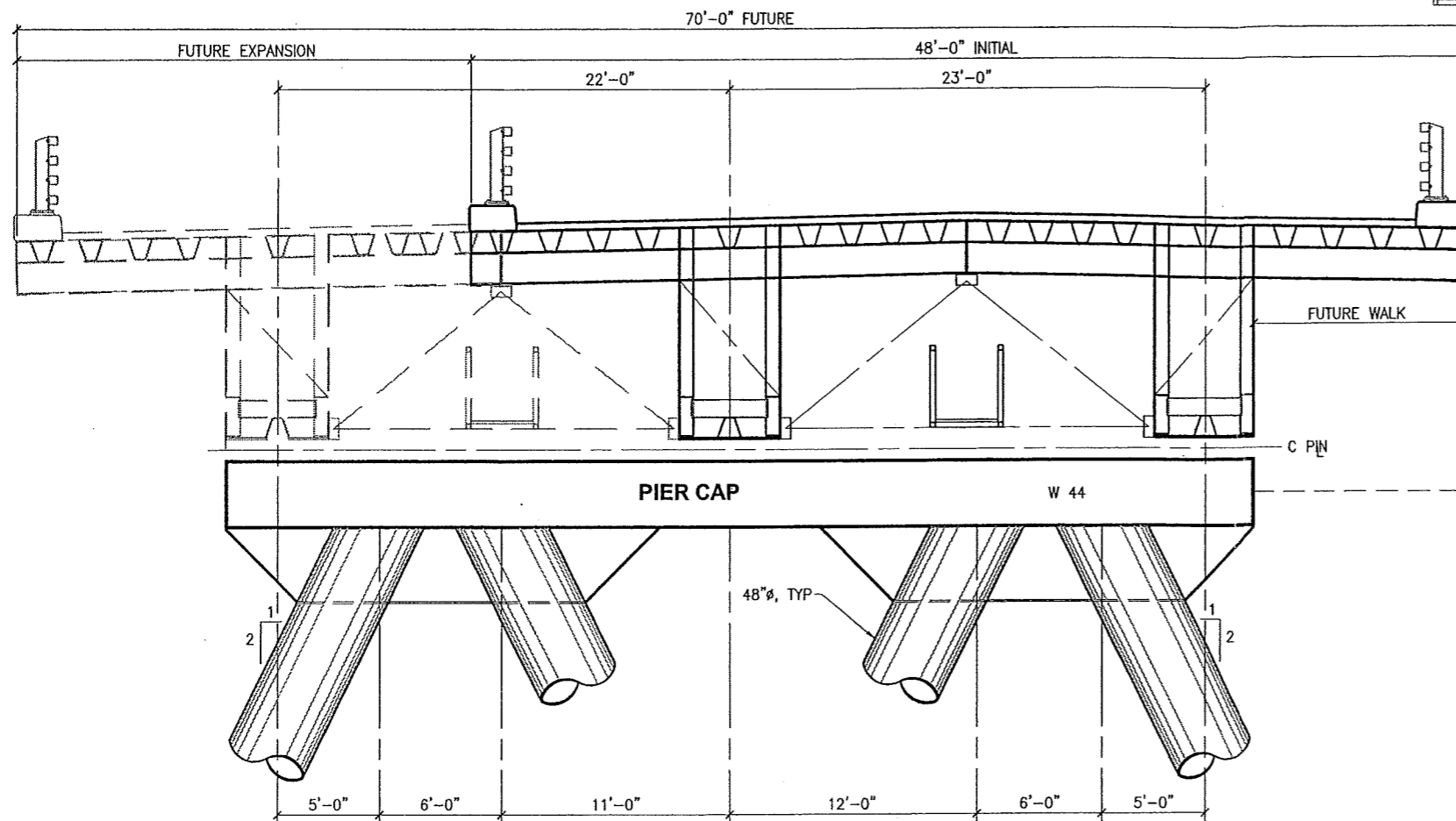
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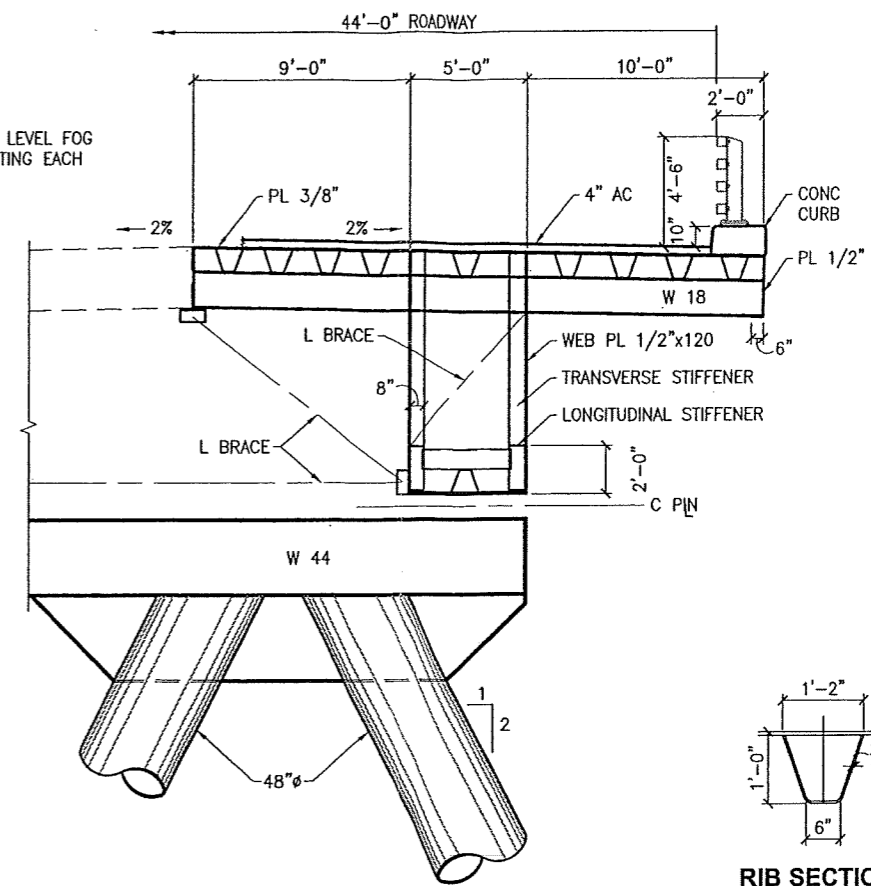
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PROJECT:		<b>KNIK ARM CROSSING</b>	
TITLE:		<b>BRIDGE ELEVATION</b>	
DESIGNED BY:	DN	DATE:	12/16/05
CHECKED BY:	DN	REVISION:	
		PROJECT NO:	041133
		SHEET NO:	<b>1</b>
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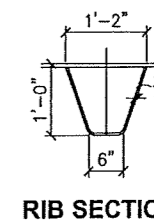
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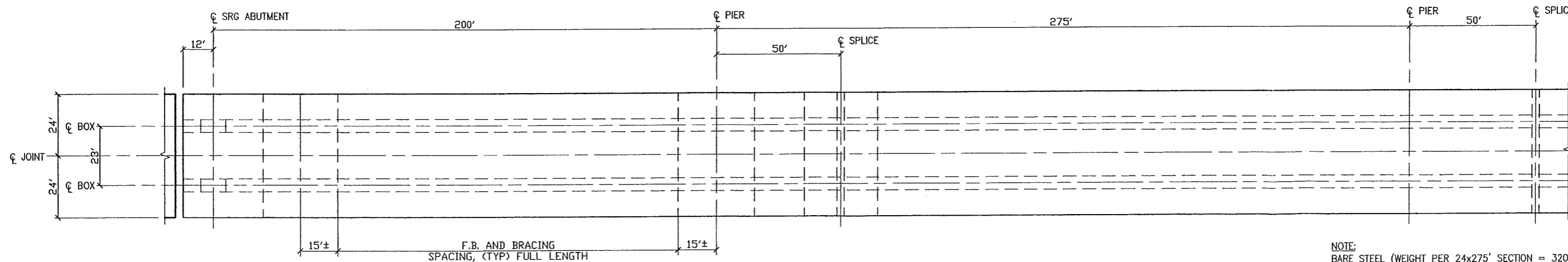
**TYPICAL BRIDGE SECTION**



**BRIDGE SECTION DETAILS**



**RIB SECTION**



**SUPERSTRUCTURE PARTIAL PLAN**

NOTE:  
BARE STEEL (WEIGHT PER 24x275' SECTION = 320 TONS)

ESTIMATE OF QUANTITIES  
SUPERSTRUCTURE STEEL - 18,700 TONS

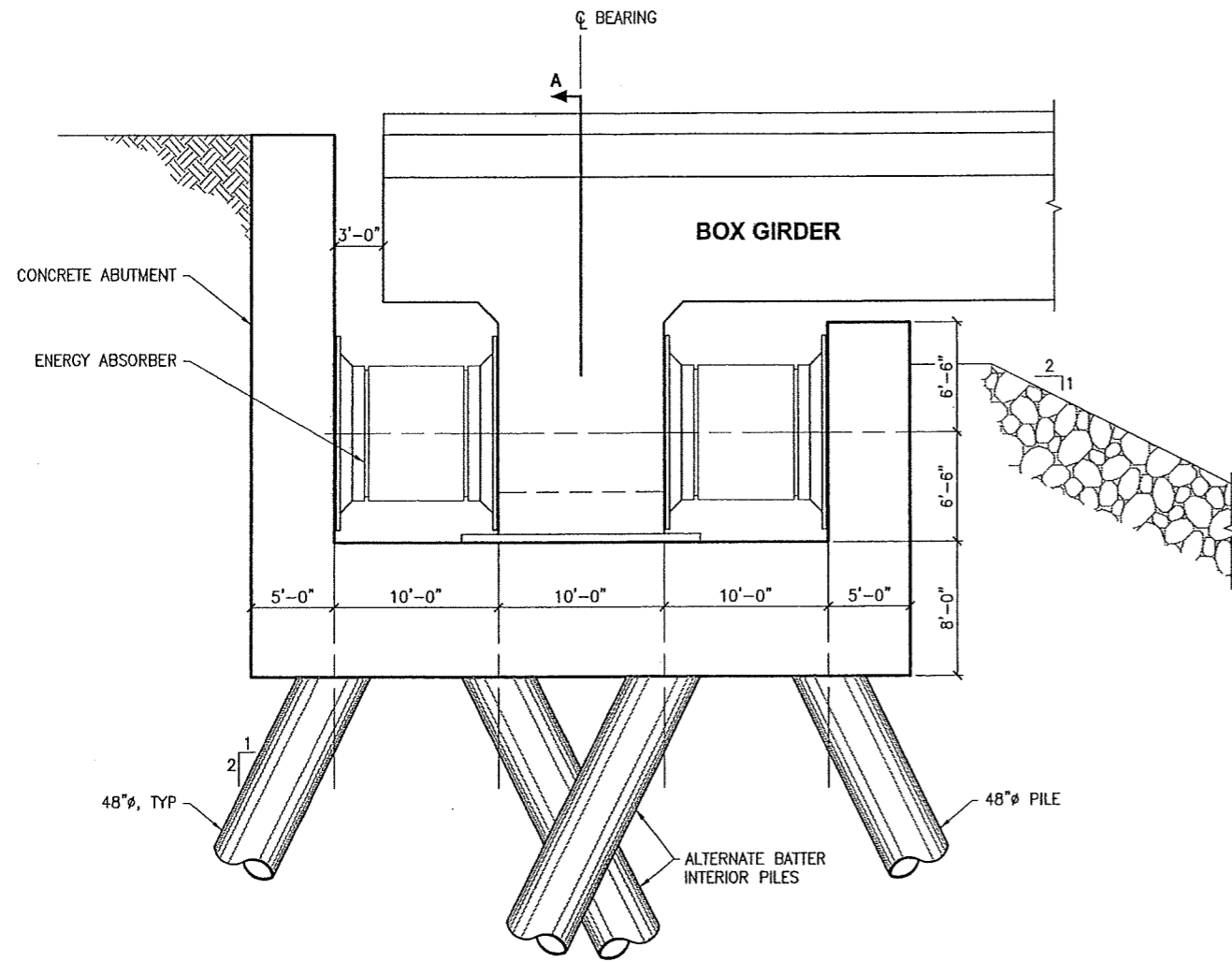
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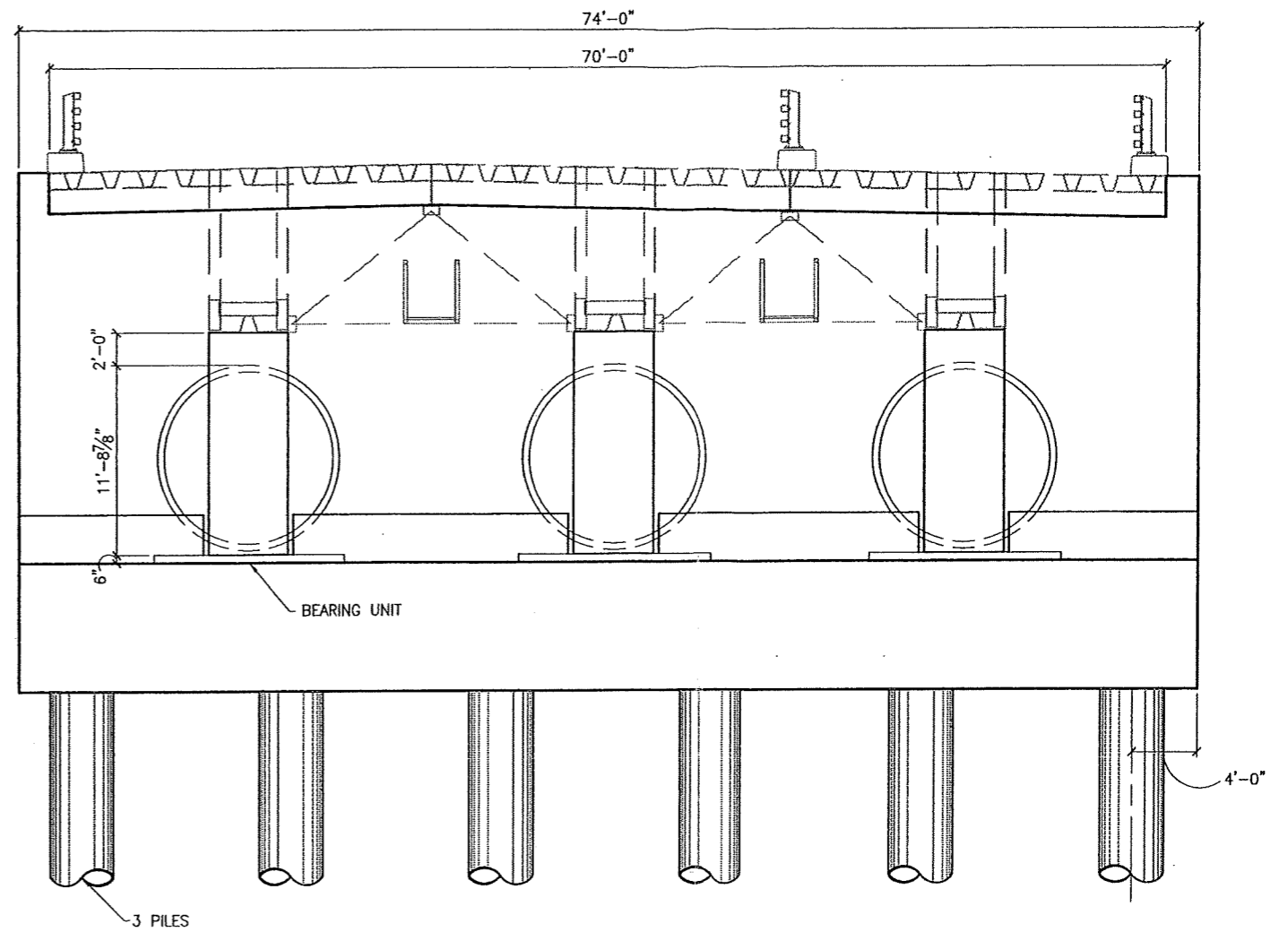


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			<b>2</b> OF



**ABUTMENT ELEVATION**



**ABUTMENT SECTION A**

2 - ABUTMENTS  
ESTIMATE OF QUANTITIES

CONCRETE	- 3000 CY
REINFORCING STEEL	- 200 TONS
ENERGY ABSORBING UNITS	- 12 EACH

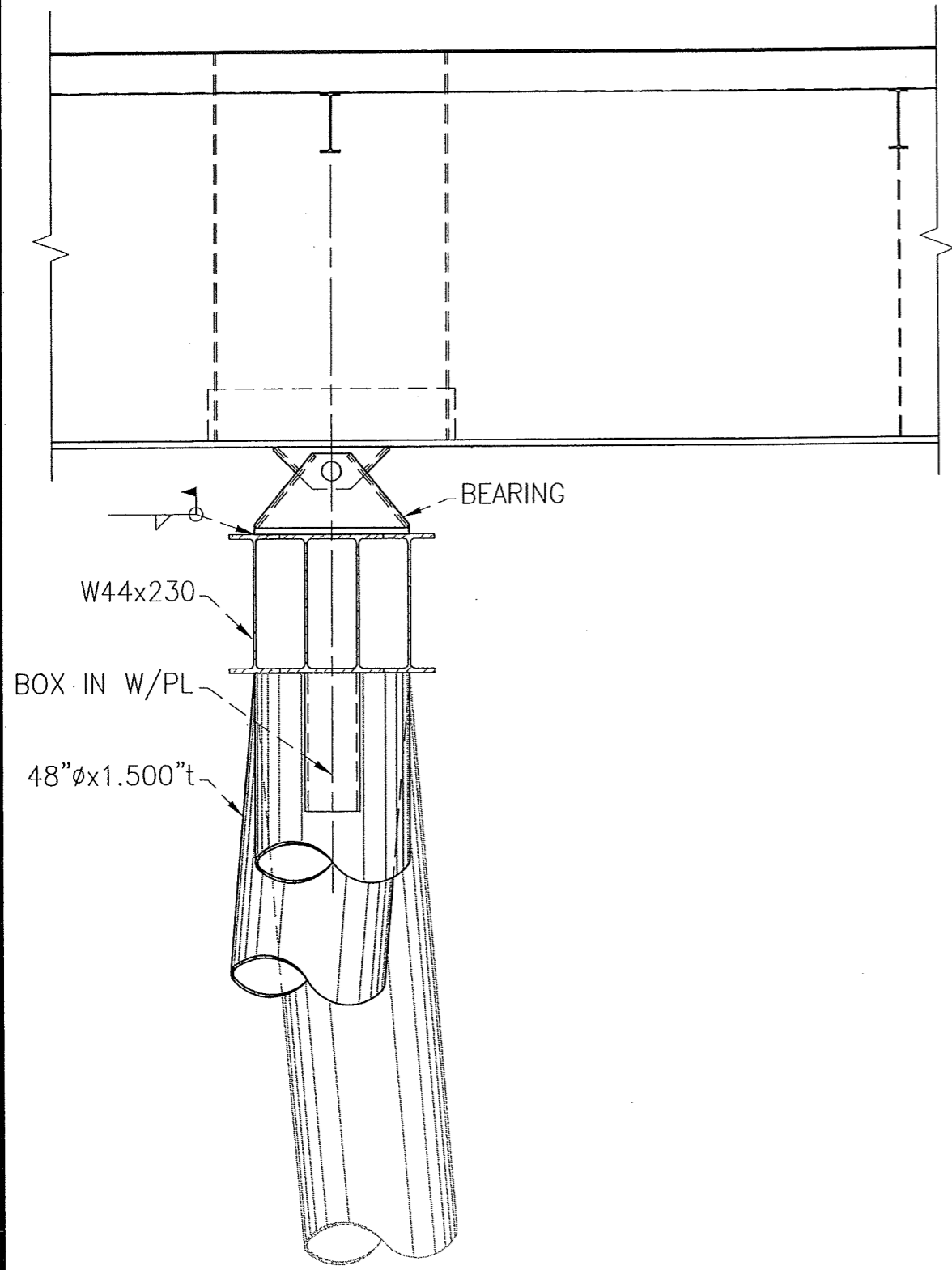
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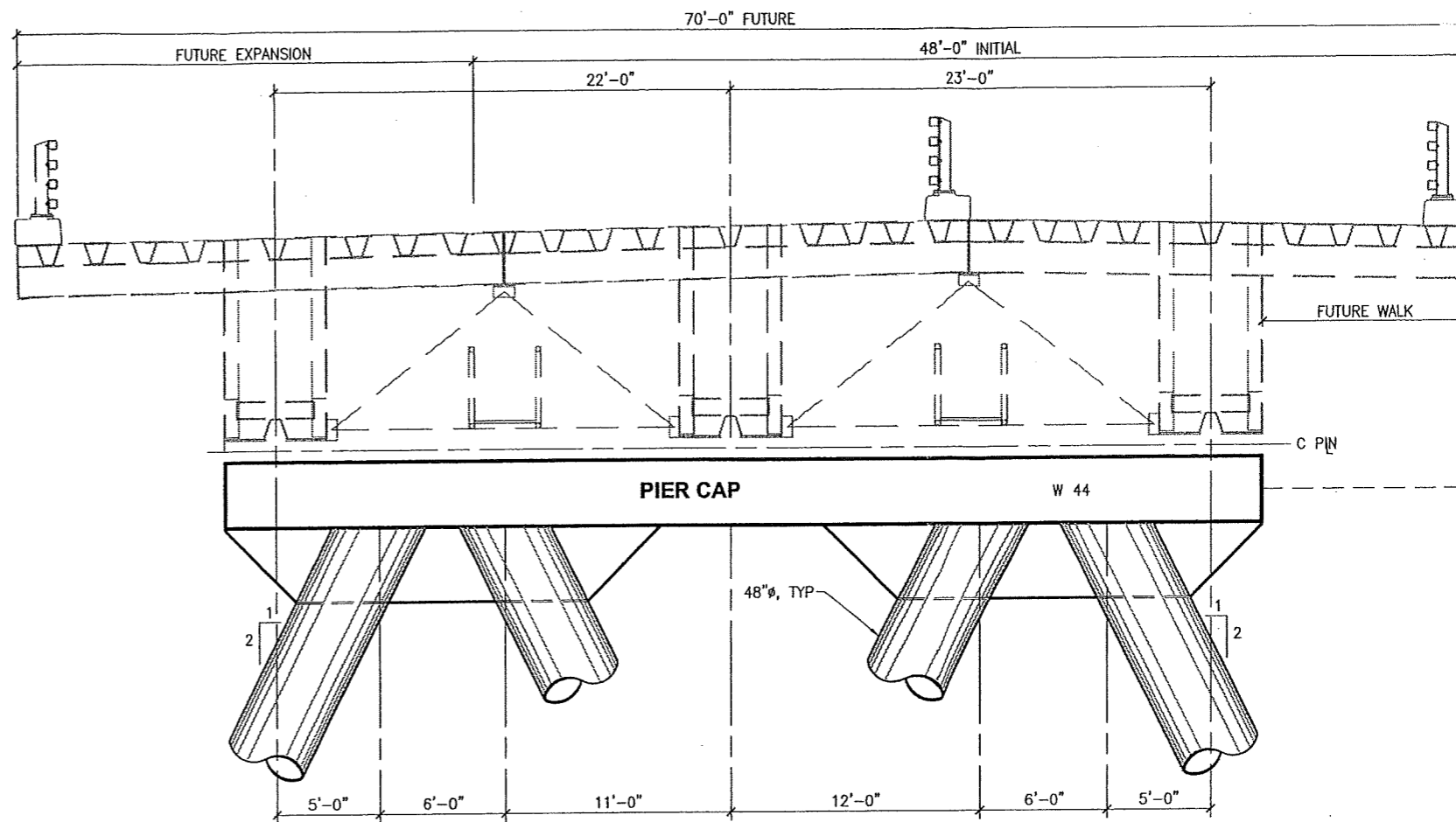


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**PIER END VIEW**



**PIER ELEVATION**

29 - PIER CAPS  
ESTIMATE OF QUANTITIES  
STRUCTURAL STEEL - 1200 TONS

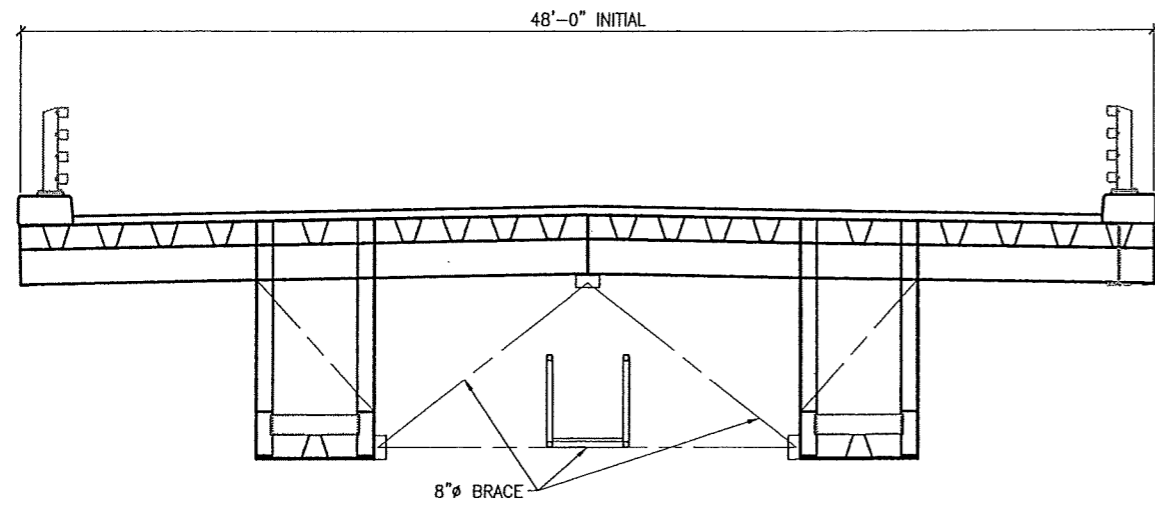
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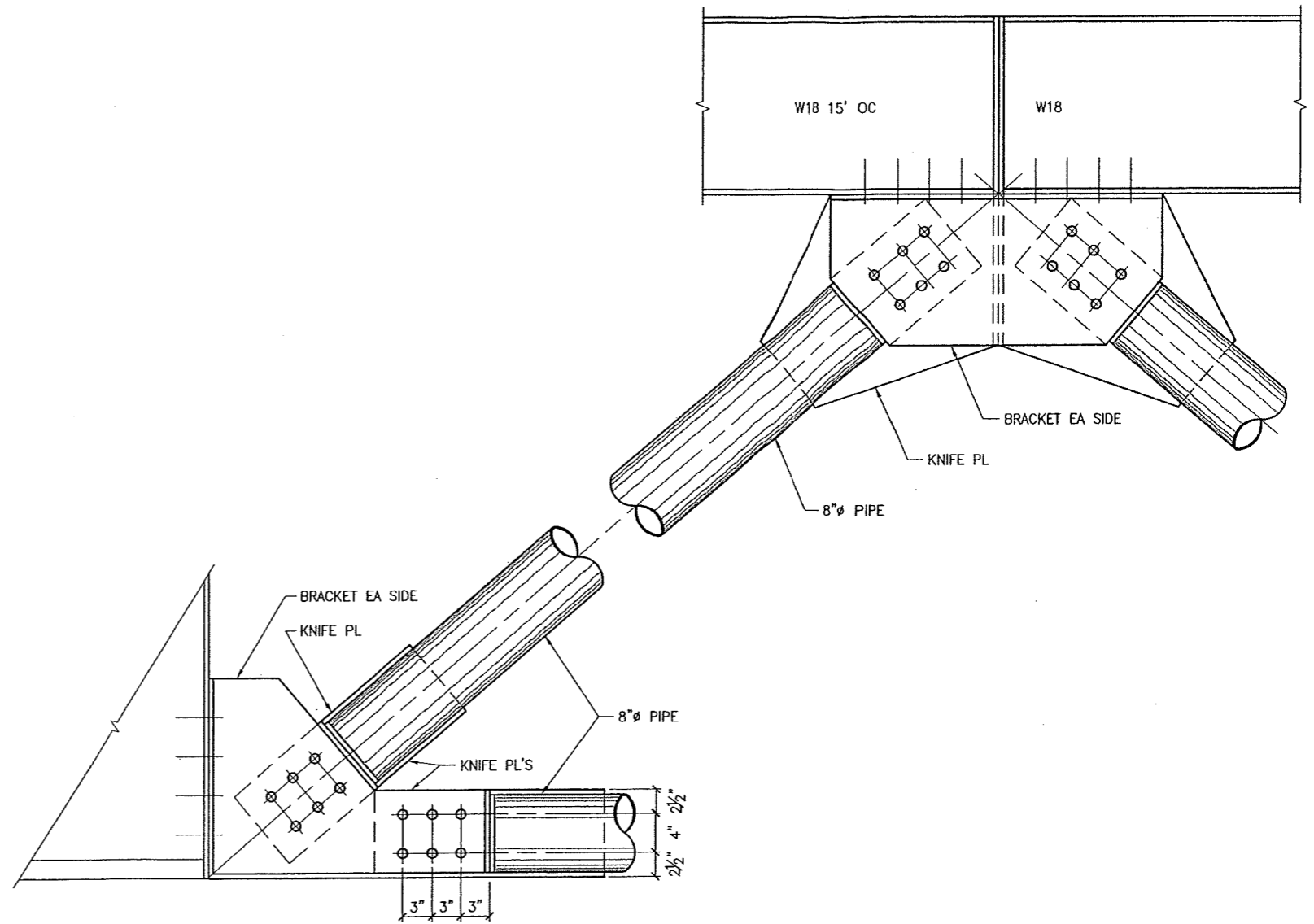


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**TYPICAL BRIDGE SECTION**



**BRACE DETAIL**

**CONCEPT  
ONLY**

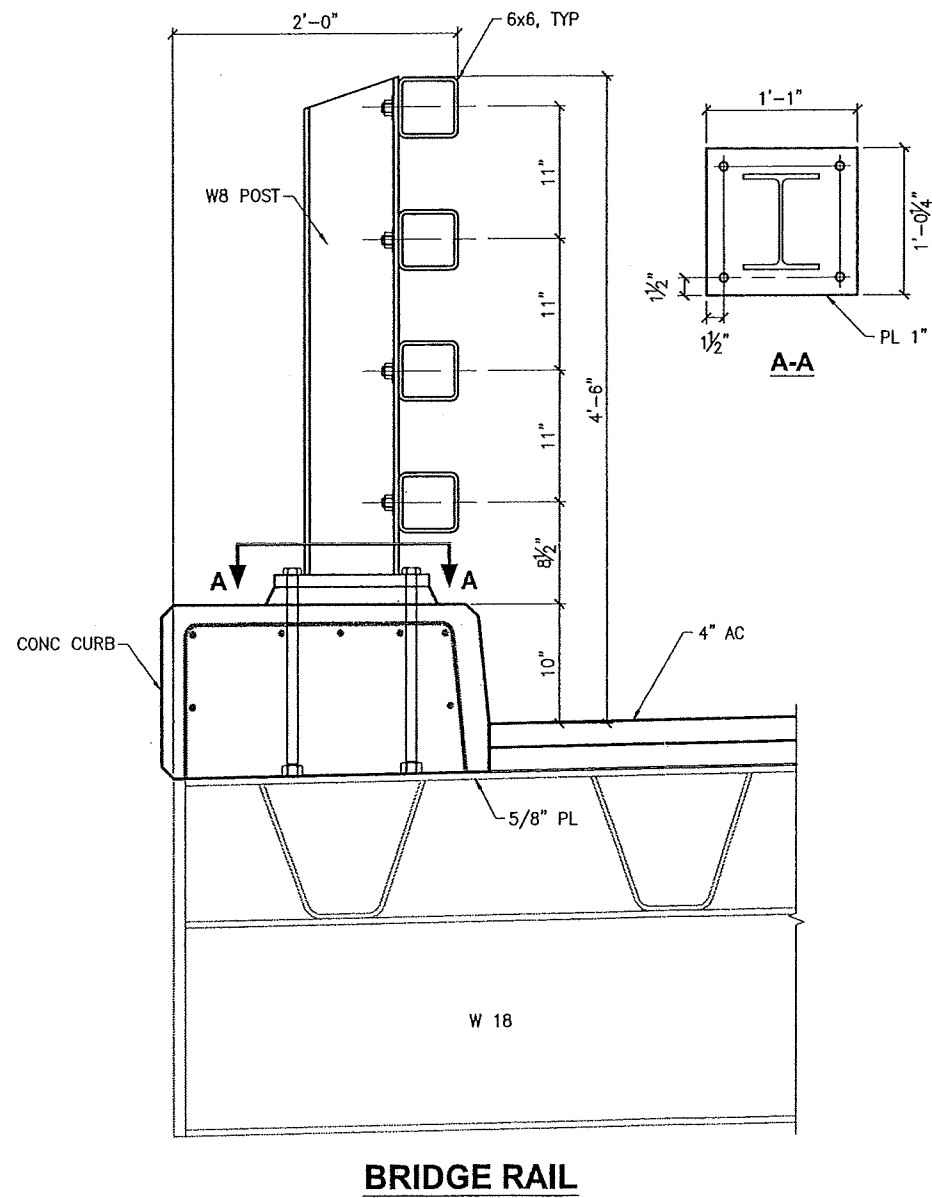
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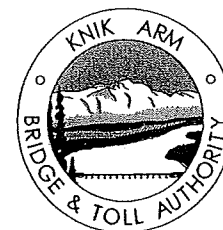


ESTIMATE OF QUANTITIES

CONCRETE	- 1430 CY
REINFORCING STEEL	- 100 TONS
BRIDGE RAIL STRUCTURAL STEEL	- 1200 TONS

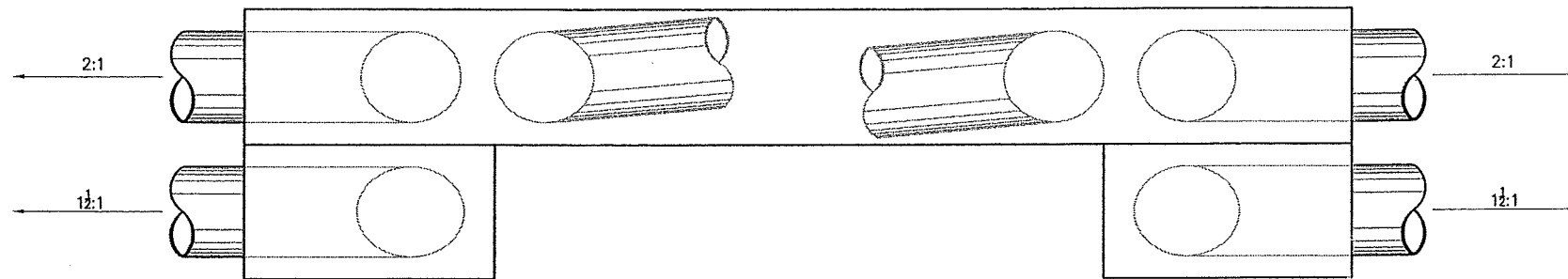
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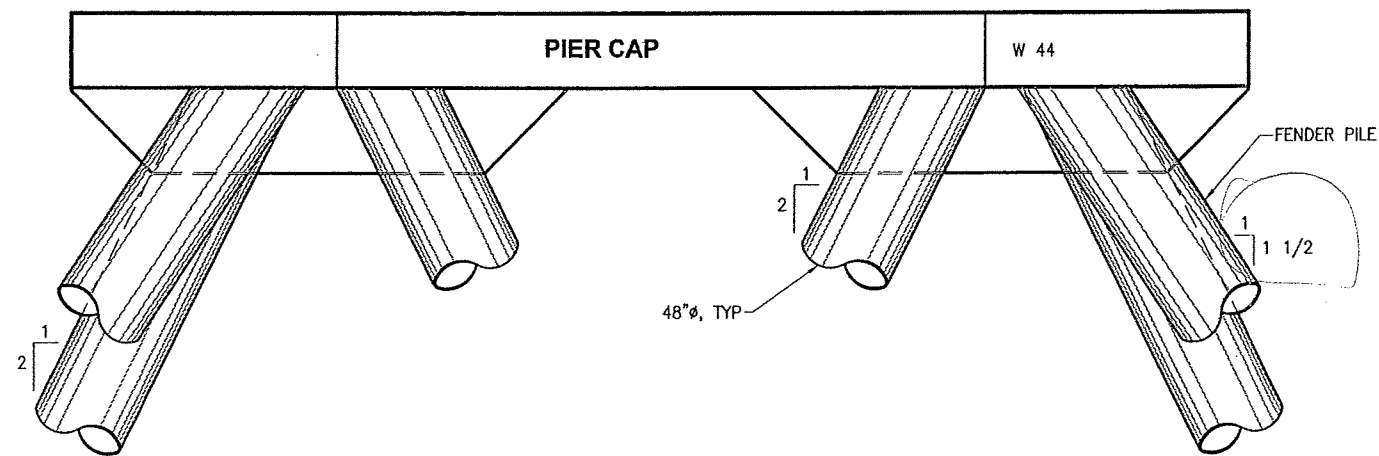
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BARGE CHANNEL →

**PLAN**



**FENDER ELEVATION**

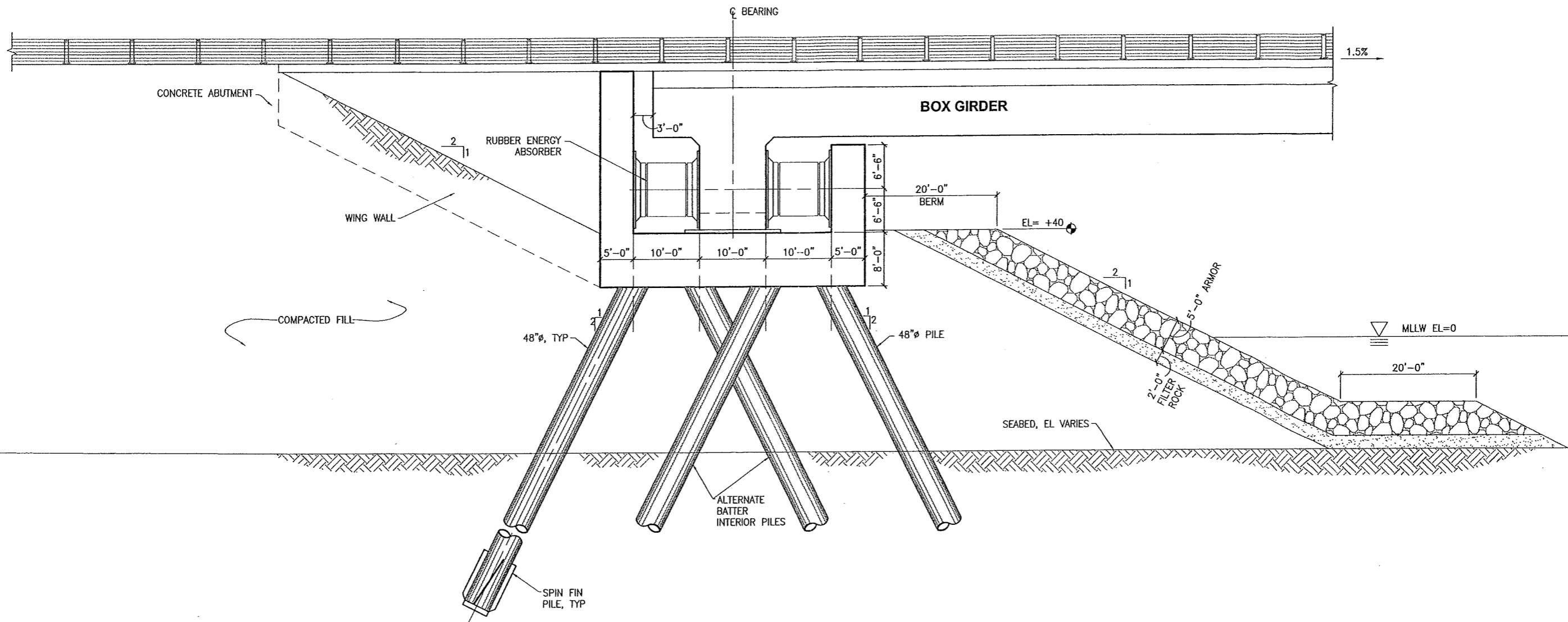
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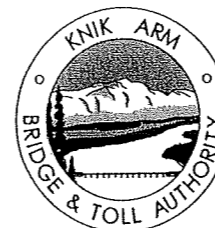
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**ABUTMENT SECTION**

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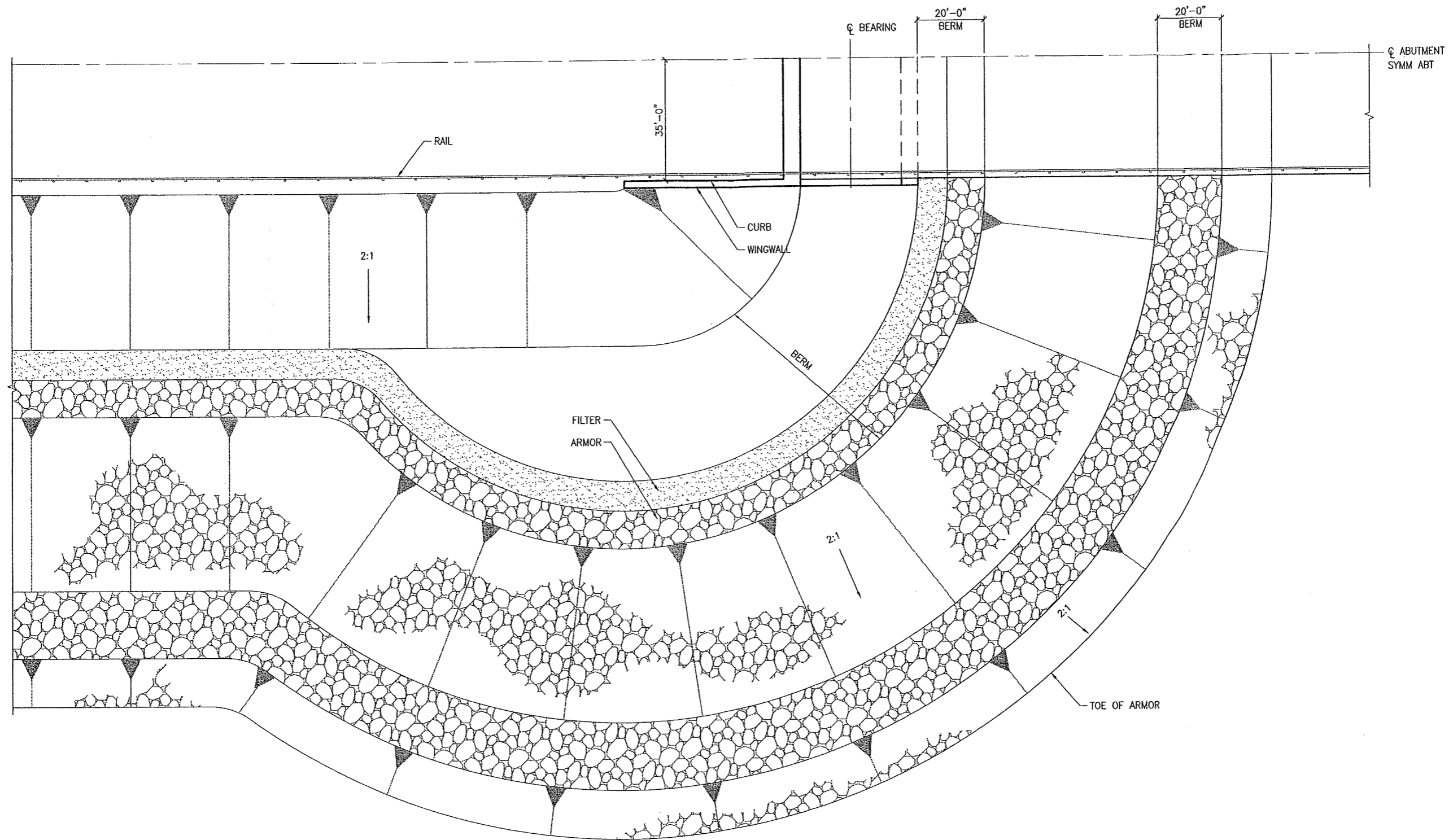
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**ABUTMENT PLAN**

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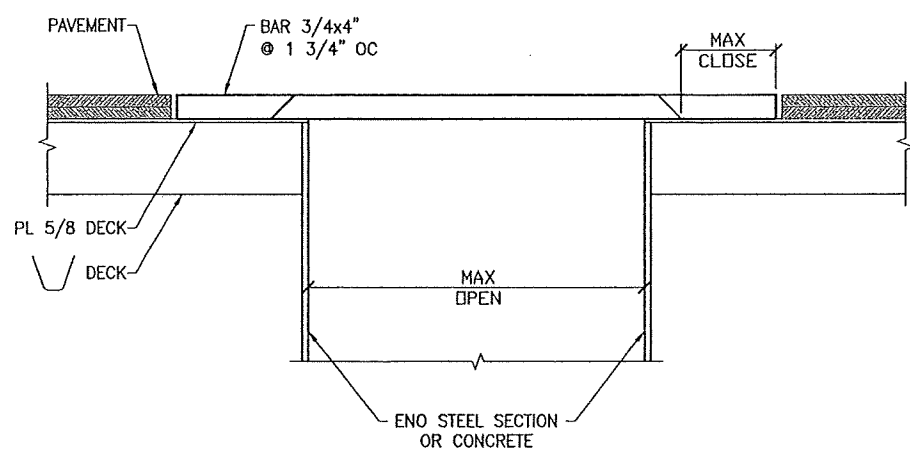
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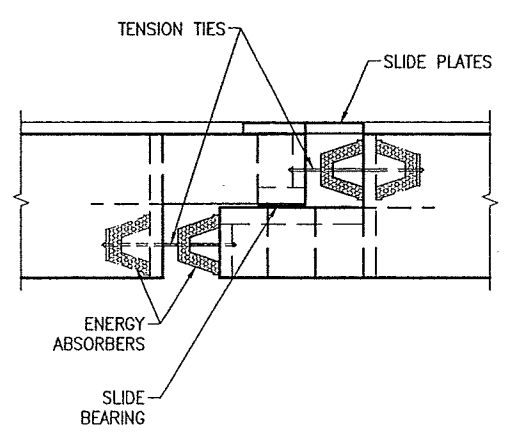
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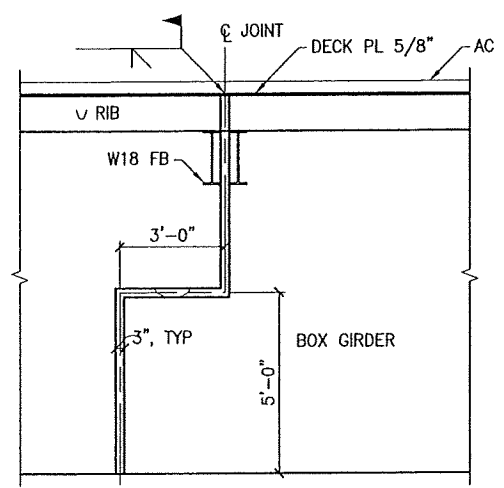
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**TYPICAL EXPANSION JOINT**



**EXPANSION JOINT DETAIL**



**TYPICAL SUPERSTRUCTURE JOINT**  
 (LOCATE 50' FROM PIER)

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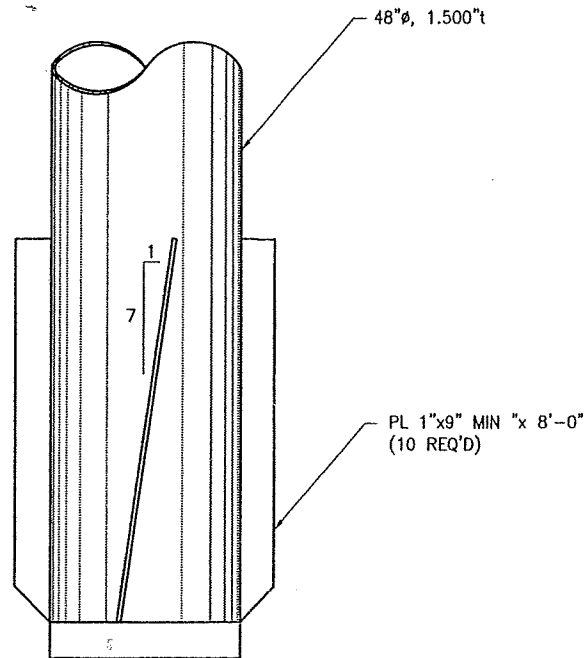


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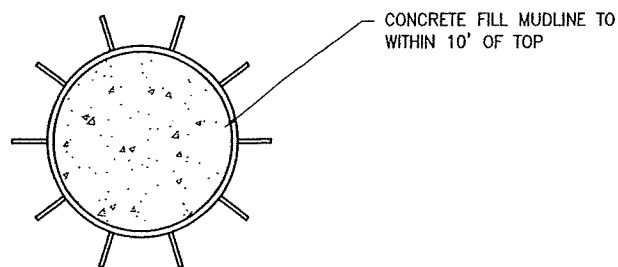
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**NOTE:**

1. DO NOT GALVANIZE BOTTOM 80'



**PILE TIP**



**SECTION**

**NOTE:**  
ESTIMATED PILE EMBEDMENT = 100 FEET

**ESTIMATE OF QUANTITIES**

48"Ø, 1,500"t PILES	- 156 EA
LENGTH RANGE	- 120' TO 280'
TOTAL LENGTH	- 32,800 LF
TOTAL LENGTH GALVANIZED	- 20,300 LF
WEIGHT	- 12,220 TONS
NO. 40' JOINTS	- 748
NO. FIELD WELDS	- 312
PILE TIPS	- 156 EACH
TIP STRUCTURAL STEEL	- 234 TONS
CONCRETE FILL	- 7,000 CY

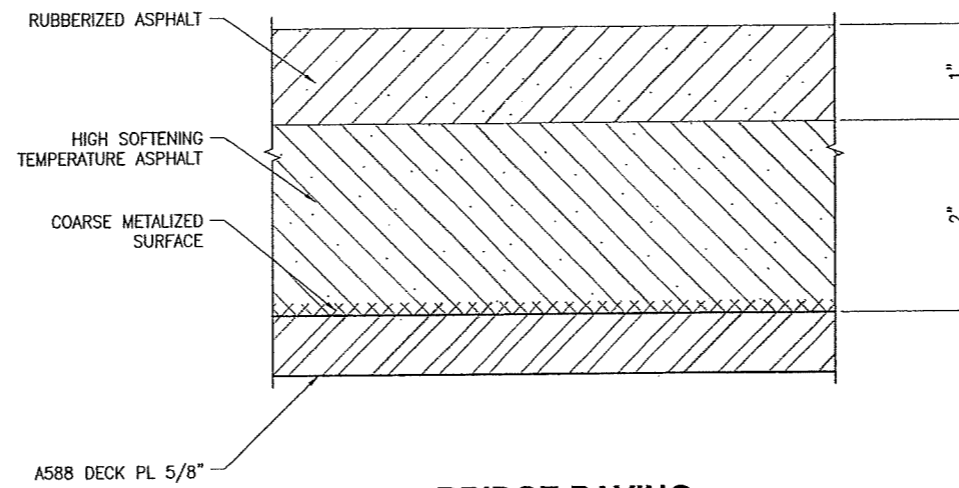
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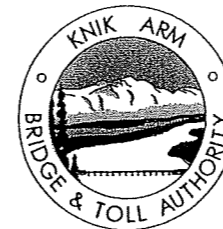


**BRIDGE PAVING**

ESTIMATE OF QUANTITIES  
 RUBBERIZED ASPHALT 8200 TONS  
 METALIZED SURFACE 40,000 SQ. YDS.

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# CONSTRUCTION COST ESTIMATE UPDATE OF THE MAIN BIDGE OF THE KNIK ARM CROSSING

## APPENDIX B

T.Y. Lin International

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EKM Engineering

March 23, 2007

# **EKM ENGINEERING INC.**

**4225 Wooster Ave. – San Mateo, California 94403 – (650) 578-1820 Fax (650) 345 4914**

March 12, 2007

## **COST ESTIMATE – KNIK ARM CROSSING**

Enclosed is the Cost Estimate for construction of the 8,100 ft. Knik Arm Bridge. The Cost Estimate was prepared in accordance with Drawing Nos. 1 through 11 of the plans prepared by PND Inc., when possible. The plans do not include all the necessary information. When information is missing assumptions as to what will be required have been made. Excluded from this Cost Estimate is the construction of the approach embankments.

Factors that influence construction:

Weather in Anchorage varies from a high of 85 degrees F to a low of -35 degrees F. A four month winter shut down was assumed.

Tides – the average tidal range is 30 ft. and the extreme tidal range is 40 ft. The current at the location of the bridge is up to 11'/sec.

There is no mention of corrosion protection for the structural steel above the piles except for the metalizing of the steel deck. It has been assumed that steel above the piles will be painted except for the section that will be metalized.

Normal practice for piling on a bridge is to limit the maximum batter to 4 to 12 or less and arrange the piles so that there will be no interference from adjacent piles in the same bent or footing.

The 48" steel pipe piles in this bridge are to be driven on a 6 to 12 and a 8 to 12 batter. The interior two piles in a typical 4 pile bent will have to be battered in two directions in order to be driven without interference from the adjacent pile. Spin Fins are to be welded to the tip of the piles. These fins will make the piles harder to drive because of the soil plug created at the tip of the pile.

It is not possible to drive the 48" piles on an 8 to 12 batter and it may not be possible to drive the longer piles battered at 6 to 12 because of the flexibility of these piles. As piles are driven they deflect, reducing the amount of energy available at the pile tip for advancement.

The pile arrangement and the 6 to 12 batters necessitate the installation of a complex pile template. Each pile in a pier must be completed before the next pile in the same pier can be started. All piles will have one welded field splice, which will be done on a second shift.

**The 6 to 12 batter and the pile arrangement shown on the plans will make the piling cost more than driving typical pile bents. This will add one additional construction season to the contract and add more than \$37,000,000 to the overall project costs.**

The structural integrity of these piles is suspect. The longest pile will sag 9.6" and will have a bending stress of 17KSI from the weight of the pile and the wet concrete at the time the concrete is placed. There is no protection for 120 of the piles from marine impact. Even a small barge hitting any one of these piles could make the whole bridge come down. This will require further investigation.

Corrosion protection of piling below the mud line or piles immersed in water 100% of the time is usually not required. There is only one galvanizing facility in the U. S. that can accommodate a 60' long, 48" diameter pipe pile that weighs 45,000 lbs.

The plans do not provide for adequate expansion or contraction due to temperature differential or to seismic movement. Modular expansion joints are included at both abutments and each expansion joint of the center span.

Assumptions were made as to the number and size of the stiffeners in the pile caps, the thickness of the gussets that connect the pile to the pile cap and to the details of the bearings.

Reference is made to Sheet 2 of the PND drawings. It appears that the web of the box girders is welded directly to the deck plate. It will be impossible to transport this section over land without splicing and extremely difficult to erect bracing members under the deck when erecting the girders. The erection scheme shown on the attached sheet was used for calculating costs.

It appears that the top flange of the box girder is the .625" deck plate. Usually flanges of a continuous girder of this span length are approximately 3" thick over the piers and somewhat less elsewhere. An average flange thickness of 2" was used in this estimate. Assumptions were also made as to the size and spacing of the transverse and longitudinal stiffeners and the internal angle brace. An assumption was also made as to the weight of the W18 floor beam and the number and size of stiffeners required.

The energy absorbers (sheet 3) will not work because they do not fully bear on the box girder. Additional money has been added to the estimate to widen the box girder to 10' to accommodate the energy absorbers. It should be possible to redesign the end of the box girder to avoid the 14' vertical extension required to accommodate the energy absorbers.

There is no published cost data base for heavy construction work that is applicable to most items encountered in building the Knik Arm Crossing.

Unit costs are obtained by developing a work procedure and allocating a specific number of labor hours, permanent material costs and expendable material costs to the particular item of work. The work is often of a specialized nature and special equipment, tools and procedures will have to be developed for the project. Estimators must rely on past experience in related work to develop reasonable procedures and unit costs. Usually, projects are not similar enough to use the unit costs of one project to estimate another project. There may be some items of work in a project that are similar to items on another project so that the same unit costs can be used. This, however, is more the exception rather than the rule for projects of this complexity.

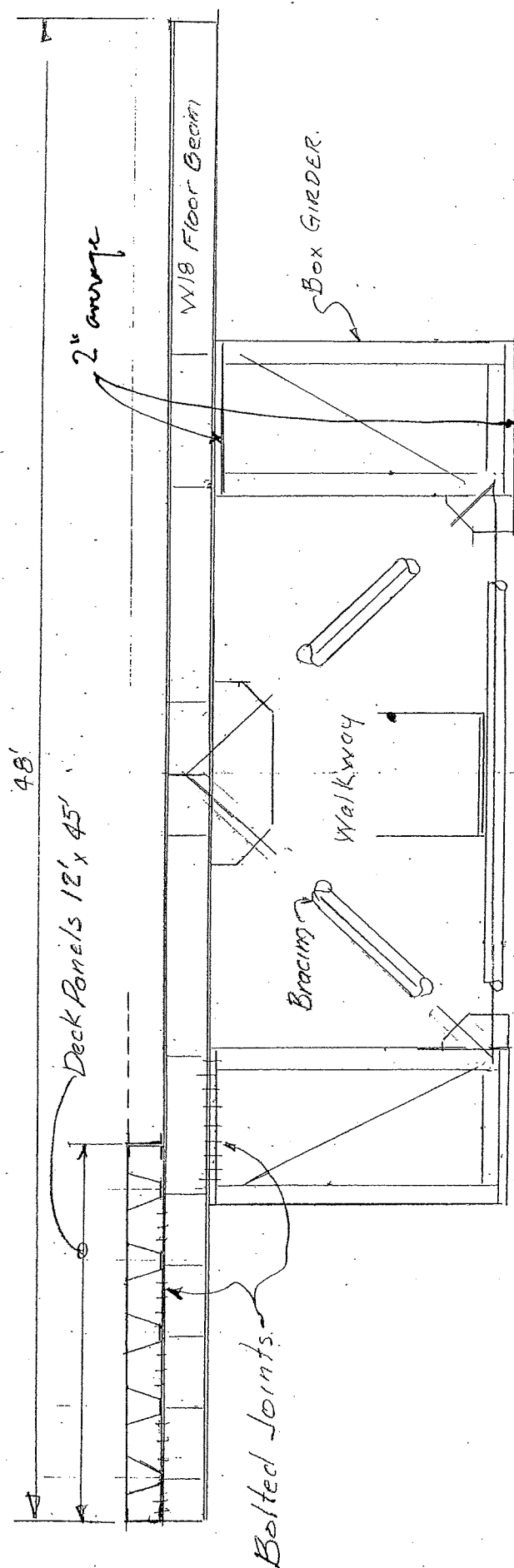
A list of hourly wage rates for estimating use on this project was developed from the "Schedule of Wage Rates to be used on Public Construction" – Alaska Department of Labor.

Quantities were obtained by making takeoffs from the attached plans.

The costs used in this estimate were obtained using today's prices. These costs were obtained from preliminary plans and assumptions regarding the extent of the work to be done were made. The results must be considered preliminary.

This cost estimate was prepared by EKM Engineering, with assistance from T. Y. Lin International and Glenn Gibson.





ERECTION OF SUPERSTRUCTURE

- 1) Bolt the Box Girders to the Floor Beam, Install Bracing Set Walkway and place on barge for shipment to Anchorage.
- 2) Lift off barge using large floating crane and erect into final location
- 3) Erect the Deck Panels working from the shore using erection equipment built for this purpose

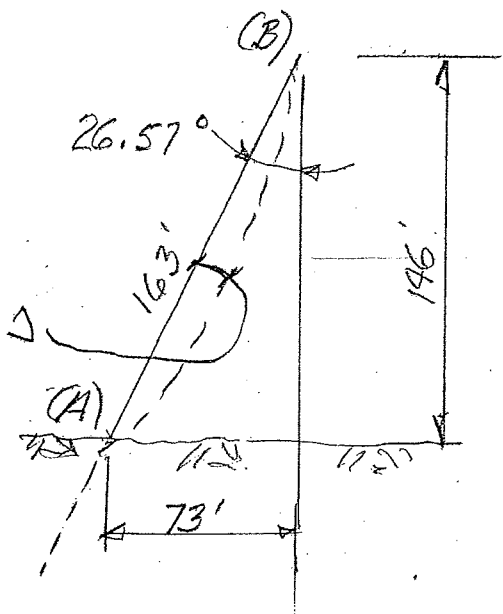
# EKM ENGINEERING

Job Knick Arm  
 Description 48"  $\phi$  Steel Pile

Item \_\_\_\_\_ Pg \_\_\_\_\_ of \_\_\_\_\_  
 By \_\_\_\_\_  
 Date \_\_\_\_\_

Pile is 48" Dia x 1.5" Wall  $A = 2190"$   
 $S = 2465117^3$   
 $I = 59200114$

Check Stress & Deflection on Pile from Pile Wt & Wet Concrete.  
 Mud Line to Cut off Pier B. = 146' (Prior to pile cap installation)



Wt of Pile 750 lbs/ft  
 Wt of Conc Fill @ 150 lb/ft<sup>3</sup> = 1658 lbs/ft.  
 Portion of Weight normal to pile  
 $= \sin 26.6 (750 + 1658) = 1.08 \text{ K/ft.}$

Check bending in pile - Assume ground conditions will be such that a span length of 163' and a hinge at (A) will be an adequate approximation of soil behavior.

Check Bending Stress Pile Wt & Wet Concrete.

$$f_b = (163^2 \times 1.08 / 8) \times 12 / 2465 = 17.5 \text{ KSI} \leftarrow$$

Check Deflection:

$$\Delta = \frac{5}{384} \times \frac{1.08 \times 163^4 \times 1728}{30000 \times 59200} = 9.7" \leftarrow$$



**KNIK ARM CROSSING  
PRELIMINARY CONSTRUCTION COST ESTIMATE  
SUMMARY**

EKM  
File Knik Arm Crossing

No	Description	Unit	Quantity	Direct Field Costs							Bid		Prices
				Labor	Equipment	Material	Supply	Sub	Unit	Extension	Unit	Amount	
1	Furnish 48" Dia Galvanized Steel Pipe Piles	LF	33,700	44.00	19.93	836.32	4.45	193.60	1,098.30	37,012,710	1,400.00	47,180,000	
2	Drive 48" Pipe Piles (incl Pile Cap Install)	EA	156	76,667.00	85,449.00	3,750.00	22,083.00		187,949.00	29,320,044	250,000.00	39,000,000	
3	Furnish Steel Pile Caps	EA	31			164,000.00			164,000.00	5,084,000	210,000.00	6,510,000	
4	Concrete Pile Fill	CY	5,930	84.99	58.51	148.37	11.38	43.42	344.67	2,043,893	500.00	2,965,000	
5	Abutment Concrete	CY	3,560	325.22	17.20	189.10	38.18		569.70	2,028,132	725.00	2,581,000	
6	Abutment Concrete - Reinforcing	LB	400,000					1.50	1.50	600,000	1.50	600,000	
7	Furnish Superstructure Structural Steel	LB	47,500,000	0.03	0.02	2.30		0.03	2.38	113,050,000	2.87	136,325,000	
8	Erect Superstructure Structural Steel	LB	47,500,000	0.10	0.09	0.01	0.01	0.01	0.22	10,450,000	0.45	21,375,000	
9	Bearings - Pile Caps	EA	58	1,620.97	62.58	9,022.45			10,706.00	620,948	14,000.00	812,000	
10	Bearings - Abutments	EA	4	1,620.97	62.58	9,022.45			10,706.00	42,824	14,000.00	56,000	
11	Curb Reinforced Concrete	CY	1,685	446.29		149.55	76.20		672.04	1,132,387	800.00	1,348,000	
12	Curb Reinforcing Steel	LB	200,000					1.50	1.50	300,000	1.50	300,000	
13	Bridge Rail (16,500 L.F.)	LF	16,500	20.50	337.61				388.11	5,908,815	460.00	7,590,000	
14	Clean and Paint Structural Steel	LS	1					5,500,000	5,500,000.00	5,500,000	7,000,000.00	7,000,000	
15	Deck Metalizing	SF	360,000					6.50	6.50	2,340,000	8.00	2,880,000	
16	Rubberized Asphalt Paving	TON	8,200					85.00	85.00	697,000	90.00	738,000	
17	Lighting Inlc Navigation Lights etc	LS	1					1,000,000	1,000,000.00	1,000,000	1,000,000.00	1,000,000	
18	Signs and Misc	ALL	1					50,000.00	50,000.00	50,000	50,000.00	50,000	
16	10' Dia Rubber Energy Absorbers	EA	8	4,200.00	750.00	62,500.00			67,450.00	539,600	85,000.00	680,000	
17	Small Energy Absorbers	EA	8	4,200.00	750.00	10,000.00			14,950.00	119,600	20,000.00	160,000	
18	Expansion Joint Movement Rating 48 Inch	LF	192	320.00	100.00	10,000.00	10.00		10,430.00	2,002,560	13,500.00	2,592,000	
20	Mobilization	LS	1	150,000.00	1,800,000.00		500,000.00		2,450,000.00	2,450,000	31,300,000.00	31,300,000	
	Assembly Yard - Seattle Area	LS	1	2,282,700	2,752,000		928,000		6,012,700	6,012,700			
	Jobsite Overhead	LS	1	6,118,000	380,000		7,304,400		13,802,400	13,802,400			
	Subtotal Field Cost	LS	1	31,149,715	30,172,626	148,430,538	13,136,034	19,218,801	242,107,614	242,107,614			
	Escalation (Labor, Equipment, Supply)	LS	1	3,114,971	3,017,253		1,313,603		7,445,828	7,445,828			
	<b>Total Field Cost</b>			<b>34,264,686</b>	<b>33,189,779</b>	<b>148,430,538</b>	<b>14,449,638</b>	<b>19,218,801</b>	<b>249,553,441</b>	<b>249,553,441</b>			
	Home Office Overhead (12% of Field Cost)								29,946,413	29,946,413			
	Profit (12% of all Costs)								33,539,982	33,539,982			
	<b>Total Bid</b>								<b>313,039,836</b>	<b>313,039,836</b>		<b>313,042,000</b>	

see next 2 pages

no bid today

KNIK ARM CROSSING  
 ENGINEERS COST ESTIMATE PRELIMINARY PLANS  
 PROJECT OVERHEAD

BY : EKM  
 DATE : 3/10/07  
 File: Kink Arm Crossing

DESCRIPTION	QUAN	UNIT	UNIT COST	TOTAL COST	TOTAL COST BREAKDOWN		
					LABOR	EQUIP	SUPPLY
<b>SALARIES</b>							
Project Manager	44	Mo	18,000	792,000	792,000		
Project Office Manager	44	Mo	11,000	484,000	484,000		
Project Engineer	48	Mo	14,000	672,000	672,000		
Construction Engineers	100	Mo	11,000	1,100,000	1,100,000		
Office Person	64	Mo	7,000	448,000	448,000		
Secretaries, Clerks	32	Mo	7,000	224,000	224,000		
Master Mechnic	36	Mo	16,000	576,000	576,000		
Assembly Yard Superintendent	36	Mo	14,000	504,000	504,000		
Site Superintendent	72	Mo	14,000	1,008,000	1,008,000		
<b>TOTAL SALARIES</b>	<b>476</b>	<b>Mo</b>	<b>12,202</b>	<b>5,808,000</b>	<b>5,808,000</b>		
<b>OVERHEAD MAINTENANCE</b>							
Employee Moving	18	EA	10,000	180,000			180,000
Travel to lower 48	50	EA	2,000	100,000			100,000
Travel & Expense Accounts	44	MO	3,000	132,000			132,000
Temp. Living	60	MO	5,000	300,000			300,000
Medical Exams	1	LS	10,000	10,000			10,000
Safety Meetings & Training (.5% Labor)		LS		150,000	150,000		
Pickups	400	MO	1,000	400,000			400,000
Flatrack part time use	24	MO	10,000	240,000	160,000	80,000	
Contributions	44	MO	1,000	44,000			44,000
<b>TOTAL OVERHEAD MAINTENANCE</b>				<b>1,556,000</b>	<b>310,000</b>	<b>80,000</b>	<b>1,166,000</b>
<b>OVERHEAD SERVICE</b>							
Accounting Service (.002 Job Costs)	1	LS	500,000	500,000			500,000
Legal Fees	1	LS	200,000	200,000			200,000
Audits	1	LS	100,000	100,000			100,000
Outside Const Engineering Not in Direct Costs	1	LS	150,000	150,000			150,000
Survey NOC	1	LS	100,000	100,000			100,000
Inspection of Welds - Outside Lab	1	LS	250,000	250,000			250,000
CPM Schedule	1	LS	25,000	25,000			25,000
<b>TOTAL OVERHEAD SERVICE</b>	<b>1</b>	<b>LS</b>		<b>1,325,000</b>			<b>1,325,000</b>
<b>PURCHASE ERECT DISMANTLE</b>							
Project Office All Costs	1	LS	75,000	75,000			75,000
Project Yard (@ Anchorage)	1	LS	100,000	100,000			100,000
Maintenance Shop	1	LS	100,000	100,000			100,000
'Warehouse	1	LS	100,000	100,000			100,000
Office Equipment & Furniture	1	LS	20,000	20,000			20,000
Engineering Equipment	1	LS	50,000	50,000			50,000
Job Telephone	1	LS	10,000	10,000			10,000
Job Water System	1	LS	20,000	20,000			20,000
Job Power System	1	LS	50,000	50,000			50,000
First Aid Facilities	1	LS	25,000	25,000			25,000
Fire Protection System	1	LS	5,000	5,000			5,000
Minor Equipment 1% of Labor	1	LS	300,000	300,000		300,000	
<b>TOTAL PURCHASE ERECT DISMANTLE</b>				<b>855,000</b>	<b>0</b>	<b>300,000</b>	<b>555,000</b>

## ENGINEERS COST ESTIMATE PRELIMINARY PLANS

BY : EKM

## PROJECT OVERHEAD

DATE : 3/10/07

Page 2 of 2

File: Kink Arm Crossing

DESCRIPTION	QUAN	UNIT	UNIT COST	TOTAL COST	TOTAL COST BREAKDOWN		
					LABOR	EQUIP	SUPPLY
<b>OPERATE &amp; MAINTAIN</b>							
Office & Yard Rental	44	MO	2,500	110,000			110,000
Office & Engineering Supplies	44	MO	2,000	88,000			88,000
Office Maintenance	44	MO	1,000	44,000			44,000
First Aid Supplies	44	MO	500	22,000			22,000
Shop & Warehouse Maintenance	44	MO	2,500	110,000			110,000
Power Charges	44	MO	5,000	220,000			220,000
Job Water	44	MO	500	22,000			22,000
Drinking Water	44	MO	100	4,400			4,400
Sanitary System	44	MO	1,000	44,000			44,000
Telephone Monthly Charge	44	MO	1,500	66,000			66,000
Radio & cell Phones	44	MO	2,000	88,000			88,000
Job Photos	1	LS	10,000	10,000			10,000
<b>TOTAL OPERATE &amp; MAINTAIN</b>				<b>828,400</b>			<b>828,400</b>
<b>INSURANCE</b>							
Public Liability (Incl in Labor Rates)	1	LS		0			
Builders Risk	1	LS		0			
Contractors Equip (Incl in Equip Rates)	1	LS		0			
Auto (Incl in Equip Rates)	1	LS		0			
Owner's Liability	1	LS		0			
Other	1	LS	300,000	300,000			300,000
<b>TOTAL INSURANCE</b>				<b>300,000</b>			<b>300,000</b>
<b>TAXES</b>							
Property Tax				0			
Sales Tax (Not Included in this estimate)				0			
Business Tax				0			
Gross Receipts							
Other Taxes ( Allow .003 of labor)	1	LS	100,000	100,000			
Permits & Licence	1	LS	30,000	30,000			
<b>TOTAL TAXES</b>	<b>1</b>	<b>LS</b>	<b>130,000</b>	<b>130,000</b>			<b>130,000</b>
<b>CONSTRUCTION BOND</b>							
(.01 x 300,000,000)	1	LS	3,000,000	3,000,000			3,000,000
<b>TOTAL PROJECT OVERHEAD</b>				<b>13,802,400</b>	<b>6,118,000</b>	<b>380,000</b>	<b>7,304,400</b>

**KNIK ARM CROSSING  
PRELIMINARY CONSTRUCTION COST ESTIMATE  
SUMMARY**

EKM  
File Knik Arm Crossing

No	Description	Unit	Quantity	Bid Prices	
				Unit	Amount
1	Furnish 48" Dia Galvanized Steel Pipe Piles	LF	33,700	1,400.00	47,180,000
2	Drive 48" Pipe Piles (incl Pile Cap Install)	EA	156	250,000.00	39,000,000
3	Furnish Steel Pile Caps	EA	31	210,000.00	6,510,000
4	Concrete Pile Fill	CY	5,930	500.00	2,965,000
5	Abutment Concrete	CY	3,560	725.00	2,581,000
6	Abutment Concrete - Reinforcing	LB	400,000	1.50	600,000
7	Furnish Superstructure Structural Steel	LB	47,500,000	2.87	136,325,000
8	Erect Superstructure Structural Steel	LB	47,500,000	0.45	21,375,000
9	Bearings - Pile Caps	EA	58	14,000.00	812,000
10	Bearings - Abutments	EA	4	14,000.00	56,000
11	Curb Reinforced Concrete	CY	1,685	800.00	1,348,000
12	Curb Reinforcing Steel	LB	200,000	1.50	300,000
13	Bridge Rail (16,500 L.F.)	LF	16,500	460.00	7,590,000
14	Clean and Paint Structural Steel	LS	1	7,000,000.00	7,000,000
15	Deck Metalizing	SF	360,000	8.00	2,880,000
16	Ruberized Asphalt Paving	TON	8,200	90.00	738,000
17	Lighting inc Navigation Lights etc	LS	1	1,000,000.00	1,000,000
18	Signs and Misc	ALL	1	50,000.00	50,000
<del>18</del> <sup>19</sup>	10' Dia Rubber Energy Absorbers	EA	8	85,000.00	680,000
<del>17</del> <sup>20</sup>	Small Energy Absorbers	EA	8	20,000.00	160,000
<del>18</del> <sup>21</sup>	Expansion Joint Movement Rating 48 Inch	LF	192	13,500.00	2,592,000
<del>20</del> <sup>22</sup>	Mobilization	LS	1	31,300,000.00	31,300,000
				<b>Total Bid</b>	<b>313,042,000</b>

**KNIK ARM CROSSING  
PRELIMINARY COST ESTIMATE  
LABOR RATES**

Classification	Base Rate	Fringes	Overtime Premium 15%	Sub Total	Payroll Expense 8%	Workmans Comp 50%	PL & PD 3%	Small Tools	Total Cost Per Hour
Carpenter	31.14	16.61	4.67	52.42	2.86	17.91	1.07	5.00	79.27
Laborer	27.83	13.40	4.17	45.40	2.56	16.00	0.96	5.00	69.93
Ironworker	29.89	17.68	4.48	52.05	2.75	17.19	1.03	5.00	78.02
Piledriver	31.14	16.61	4.67	52.42	2.86	17.91	1.07	5.00	79.27
Operating Engineer	34.46	12.60	5.17	52.23	3.17	19.81	1.19	5.00	81.40



KNIK ARM CROSSING  
 PRELIMINARY COST ESTIMATE  
 FURNISH GALVANIZED STEEL PIPE PILES  
 QUANTITY 33,700 LF

*20' below mud-line only*

BY : EKM  
 DATE : 3/2/07  
 File: Knik Arm Crossing

75 LABOR RATE

DESCRIPTION	QUAN	UNIT	PROD	MAN HR.	UNIT COSTS			SUBCONT	TOTAL	EXTENSION
					LABOR	EQUIP	MATL			
<b>FURNISH CASING</b>										
There are a total of 34,400 lin ft of piles of which 19,300 lin ft are galvanized.										
Also included in this item are the driving tips and the spin fins. Piles will be rolled in the mid west and shipped by rail to Kansas for galvanizing and then to the Seattle Area or directly to the Seattle Area if not galvanized. Piles will be assembled into the length required for driving. Quotes were obtained from the pile supplier and galvanizer <i>freight on board</i>										
Buy Piling Job Mill (3% allow for waste)										
(34710' @ 745 lb per ft)	12,930	TON		0	0.00	2,000.00		2,000.00		25,860,000
Rail Freight to Seattle Area	12,930	TON		0	0.00	120.00		120.00		1,551,600
Galvanize Piles 20300 lf	7,562	TON		0	0.00		725.00	725.00		5,482,450
Rail Freight to Kansas	7,562	TON		0	0.00		40.00	40.00		302,480
Buy Spins (2460 lb/pile)	383,760	LB		0	0.00			0.00		0
Buy Hardened Steel Pile Tips	100,000	LB		0	0.00	0.75		0.75		287,820
Butt Weld Piles in Staging Yard. Longest Pile will be 180' weigh 135 kips and have three welds. There are a total of 758 welds including the driving tip. 45 lbs of weld / splice Mobilize so that welding can be done at the rate of six welds per day.										
Install and Remove Welding Rolls	1	LS		1,200	90,000.00			90,000.00		290,000.00
Welding Time @ 10 hrs each	7,580	HR.	2.00	15,160	150.00			150.00		1,137,000
Weld Rod	40,000	LB.		0	0.00	2.00		2.00		80,000
Backup Bars and Misc	758	EA		0	0.00	150.00		150.00		113,700
Weld Spin Fins	1,580	EA	2.00	3,160	150.00	10.00		165.00		260,700
Testing of Welds	758	EA		0	0.00		250.00	250.00		189,500
Touch Up Galvanizing	500	EA	0.50	250	37.50	150.00		187.50		93,750
Barge Rental	20	MO		0	0.00			0.00		0
Tow to Anchorage (includes load and surveys)	2	EA		0	0.00	25,000.00		25,000.00		500,000
				0	0.00		275,000.00	275,000.00		550,000
				0	0.00			0.00		0
<b>TOTAL COST</b>				19,770	1,482,750	671,600	28,183,920	150,000	6,524,430	37,012,700
<b>UNIT COST</b>	33,700	LF		0.59	44.00	19.93	836.32	4.45	193.60	1,098.30

Note: The cost of the Assembly Yard is not included in the Furnish Pile Item

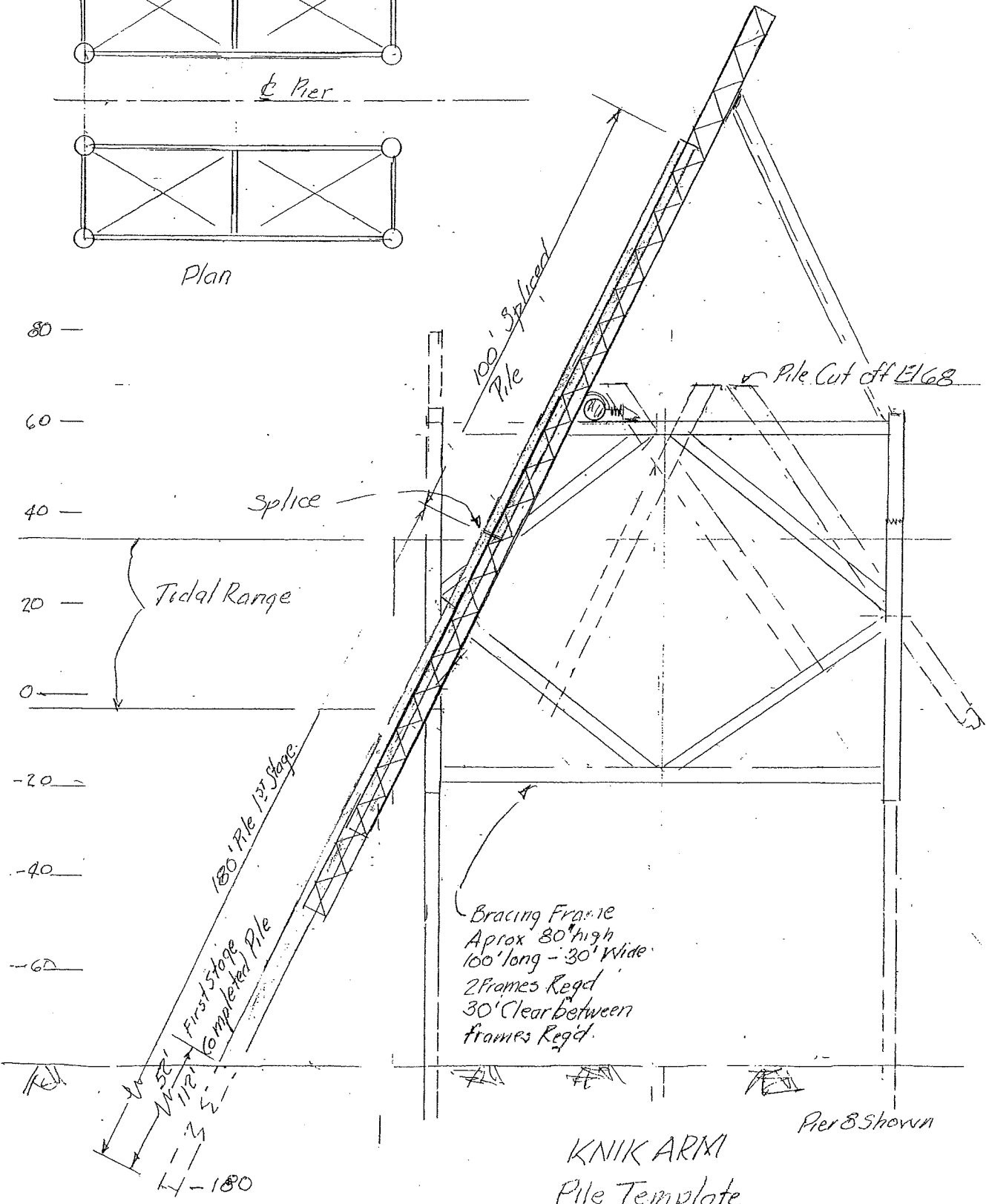
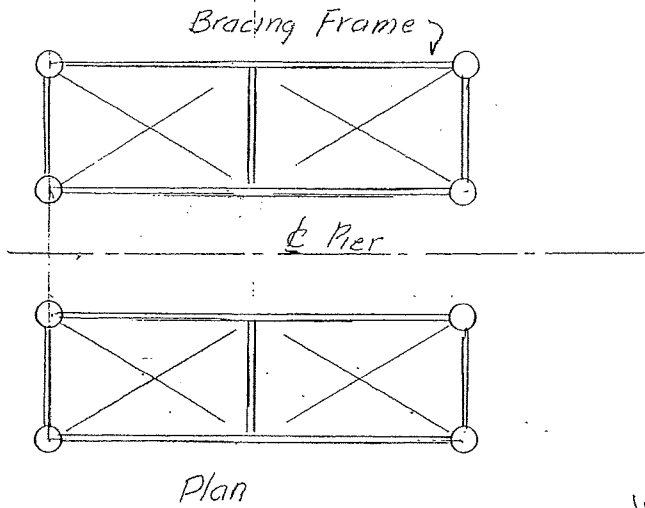
**KNIK ARM CROSSING  
PILE TAKEOFF**

By EKM

Date: 2/28/07

File Knik Arm Crossing

Location	Station	Elev Fin Grade	Elev Mud	Number	Tip	Cut Off	Length	Mud Line to Cut Off	Pile Fill CY	Total Length	Galv Len Ea	Galv Len Total
Abut 1	34+00	60	-10	18	-110	28	155	38	280	2,782	20	360
Pier 2	36+00	63	-12	4	-112	49	180	61	100	721	100	401
Pier 3	38+75	67	-15	4	-115	53	188	68	112	753	108	433
Pier 4	41+50	70	-18	4	-118	56	195	74	121	780	115	460
Pier 5	44+25	73	-20	4	-120	59	200	79	130	802	120	482
Pier 6	47+00	76	-30	4	-130	62	215	92	151	860	135	540
Pier 7	49+75	79	-70	4	-170	65	263	135	221	1,053	183	733
Pier 8	52+50	81	-80	4	-180	67	277	147	241	1,107	197	787
Pier 9	55+25	84	-70	4	-170	70	269	140	230	1,075	189	755
Pier 10	58+00	85	-70	4	-170	71	270	141	231	1,080	190	760
Pier 11	60+75	87	-65	4	-165	73	267	138	226	1,066	187	746
Pier 12	63+50	88	-60	4	-160	74	262	134	220	1,048	182	728
Pier 13	66+25	89	-60	4	-160	75	263	135	221	1,053	183	733
Pier 14	69+00	90	-55	4	-155	76	259	131	215	1,035	179	715
Pier 15	71+75	90	-50	6	-150	76	253	126	310	1,519	173	1,039
Pier 16	74+50	90	-50	6	-150	76	253	126	310	1,519	173	1,039
Pier 17	77+25	90	-50	4	-150	76	253	126	207	1,012	173	692
Pier 18	80+00	90	-50	4	-150	76	253	126	207	1,012	173	692
Pier 19	82+75	89	-50	4	-150	75	252	125	205	1,008	172	688
Pier 20	85+50	88	-50	4	-150	74	251	124	203	1,004	171	684
Pier 21	88+25	87	-50	4	-150	73	250	123	202	999	170	679
Pier 22	91+00	85	-50	4	-150	71	248	121	198	990	168	670
Pier 23	93+75	84	-30	4	-130	70	224	100	164	896	144	576
Pier 24	96+50	81	-25	4	-125	67	215	92	151	860	135	540
Pier 25	99+25	79	-25	4	-125	65	213	90	148	851	133	531
Pier 26	102+00	76	-25	4	-125	62	209	87	143	838	129	518
Pier 27	104+75	73	-25	4	-125	59	206	84	138	824	126	504
Pier 28	107+50	70	-25	4	-125	56	203	81	133	811	123	491
Pier 29	110+25	67	-25	4	-125	53	199	78	128	797	119	477
Pier 30	113+00	63	-15	4	-115	49	184	64	105	735	104	415
Abut 31	115+00	60	-10	18	-110	28	155	38	280	2,782	20	360
<b>Totals</b>				<b>156</b>			<b>7083</b>		<b>5,930</b>	<b>33,672</b>		<b>19,228</b>



Pier B Shown

KNIK ARMI  
Pile Template.

# EKM ENGINEERING

Job Krik Arm Crossing  
Description Pile Template

Item \_\_\_\_\_ Pg \_\_\_\_\_ of \_\_\_\_\_  
By \_\_\_\_\_  
Date \_\_\_\_\_

## Takeoff Pile Template Boxes

One Box

Pipe Sleeves 4@ 36" x 1/2" Wall x 80' x 200#/l	64000
Top & Btm Horiz 4@	60,000
Horiz between frames 6ea x 30' x 24" Pipe 130#/l	23400
Diag Brnly x 65' x 130#/l	67600
End & Cent Vert Braces 540' @ 50#/l	27000
all other	9000

Box Weight

250000

Total 6 Boxes Wt = 1360000 lbs

KNIK ARM CROSSING  
 PRELIMINARY COST ESTIMATE  
 DRIVE PILES AND INSTALL PILE CAPS  
 QUANTITY 156 EA

BY: EKM  
 DATE: 3/5/06  
 File: Knik Arm Crossing

80 LABOR RATE

DESCRIPTION	QUAN	UNIT	PROD	MAN HR.	UNIT COSTS					EXTENSION	
					LABOR	EQUIP	MATL	SUPPLY	SUBCONT		TOTAL
Work will be done a two shift basis.											
Day shift will drive piles and set the pile caps. The swing shift will weld the piles. Work will be done a 5 day 12 hr shift basis											
<b>Day Shift</b>											
Derrick Barge Monthly Charge (2 ea)	48	MO		0	0.00	90,000.00					90,000.00
Derrick Barge Operating Cost (2 ea)	9,000	HR	3	27,000	240.00	150.00					390.00
Pilebutt Crew	4,500	HR	7	31,500	560.00						560.00
Pilebutt Crew	4,500	HR	5	22,500	400.00						400.00
Welding Crew	4,500	HR	5	22,500	400.00	50.00	15.00				465.00
Crew Boat All Costs (2 ea)	9,000	HR		0	0.00	350.00					350.00
Pile Hammer Monthly Charge	22	MO				45,000.00					45,000.00
Pile Hammer Operating Cost	1,500	HR		0	0.00	100.00					100.00
Large Tug All Costs	4,500	HR		0	0.00	550.00					550.00
Medium Tug All Costs	4,500	HR		0	0.00	350.00					350.00
Small Flat Barge 3 total	60	MO		0	0.00	15,000.00					15,000.00
Surveyors	4,500	HR	2	9,000	160.00						160.00
<b>Swing Shift</b>											
Derrick Barge Operating Cost (1 ea)	4,500	HR	3	13,500	240.00	150.00					390.00
Welding Crew	4,500	HR	5	22,500	400.00	50.00	15.00				465.00
Crew Boat All Costs (1 ea)	4,500	HR		0	0.00	350.00					350.00
<b>Pile Template</b>											
Fabricated Steel Boxes job	3	EA		0	0.00						0.00
200' Custom Leads incl Rams	1,500,000	LB		0	0.00				1.25		0.00
All Other (work platforms etc)	1	LS		0	0.00	200,000.00					200,000.00
Assemble Boxes	1	LS		0	0.00	50,000.00					50,000.00
	200	HR	5.00	1,000	400.00	200.00					600.00
<b>Spud Piles (24 ea x 120' 30"x.75")</b>											
	700,000	LB		0	0.00				1.10		0.00
<b>Suplimental Other Equipment &amp; Supply</b>											
	1	LS		0	0.00	200,000.00			800,000.00		1,000,000.00
<b>TOTAL COST</b>	1	LS		149,500	11,960,000	13,330,000	585,000	3,445,000			29,320,000
<b>UNIT COST</b>	156	EA		958	76,667	85,449	3,750	22,083	0	0	187,949

KNIK ARM CROSSING  
 PRELIMINARY COST ESTIMATE  
 FURNISH PILE CAPS  
 QUANTITY 29 EA - 2,378,000 LBS

75 LABOR RATE

DESCRIPTION	QUAN	UNIT	PROD	MAN HR.	UNIT COSTS						EXTENSION	
					LABOR	EQUIP	MATL	SUPPLY	SUBCONT	TOTAL		
Buy Caps fob Assembly Yard	2,378,000	LB		0	0.00		2.00				0.00	0
The cost of off loading and barging to site is included in other items				0	0.00						0.00	0
				0	0.00						0.00	0
				0	0.00						0.00	0
				0	0.00						0.00	0
				0	0.00						0.00	0
				0	0.00						0.00	0
				0	0.00						0.00	0
				0	0.00						0.00	0
<b>TOTAL COST</b>	<b>1</b>	<b>LS</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>4,756,000</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>4,756,000</b>
<b>UNIT COST</b>	<b>29</b>	<b>EA</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>164,000</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>164,000</b>

BY: EKM  
 DATE: 3/5/06  
 File: Knik Arm Crossing

**KNIK ARM CROSSING  
PRELIMINARY COST ESTIMATE  
CONCRETE PLE FILL  
QUANTITY 5930 CY**

BY : EKM  
DATE : 3/5/06  
File: Knik Arm Crossing

80 LABOR RATE

DESCRIPTION	QUAN	UNIT	PROD	MAN HR.	UNIT COSTS					EXTENSION		
					LABOR	EQUIP	MATL	SUPPLY	SUBCONT		TOTAL	
All Piles in a Pier will be poured at one time. Largest pour is Aprox 300 CY Concrete will be placed using a pump on a small barge. concrete will be delivered by two ready mix trucks on a barge and loaded into a holding hopper on the pump barge production for two barges halting 20 cy each will 30 cy/hr There will be 8 hours per pour for mob and demob Total Crew Hrs 200 + 250 = 450				0	0.00					0.00	0	
Buy Concrete fob Anchorage Dock	6,200	CY		0	0.00		140.00				140.00	868,000
Hoppers, Conveyors and Misc Facilities	1	LS		0	0.00				100,000.00		100,000.00	100,000
Tug Time	450	HR		0	0.00				350.00		350.00	157,500
Pump	450	HR		0	0.00			350.00			350.00	157,500
Labor	450	HR	8	3,600	640.00						640.00	288,000
Misc Other	450	HR	2	900	160.00			125.00		150.00	435.00	195,750
Ready Mix Trucks	450	HR	4	1,800	320.00			300.00			620.00	279,000
				0	0.00						0.00	0
				0	0.00						0.00	0
<b>TOTAL COST</b>	<b>1</b>	<b>LS</b>		<b>6,300</b>	<b>504,000</b>	<b>348,750</b>	<b>868,000</b>	<b>67,500</b>	<b>257,500</b>	<b>2,045,750</b>	<b>2,045,750</b>	
<b>UNIT COST</b>	<b>5,930</b>	<b>CY</b>		<b>1.06</b>	<b>84.99</b>	<b>58.81</b>	<b>146.37</b>	<b>11.38</b>	<b>43.42</b>	<b>344.98</b>	<b>345</b>	

**KNIK ARM CROSSING**  
**PRELIMINARY COST ESTIMATE**  
**ABUTMENT CONCRETE**  
**QUANTITY 3560 CY**

BY: EKM  
 DATE: 2/28/07  
 File: Knik Arm Crossing

80 LABOR RATE

DESCRIPTION	QUAN	UNIT	PROD	MAN HR.	UNIT COSTS						EXTENSION	
					LABOR	EQUIP	MATL	SUPPLY	SUBCONT	TOTAL		
<b>Buy Concrete</b>												
Special Mix and access concerns	3,740	CY		0	0.00		180.00				180.00	673,200
				0	0.00						0.00	0
<b>Form Concrete</b>												
Base Slab	3,648	SF	0.33	1,204	26.40			4.00			30.40	110,899
Walls	21,428	SF	0.30	6,428	24.00			4.00			28.00	599,984
				0	0.00						0.00	0
<b>Pour Concrete</b>												
Pump Rental	200	HR		0	0.00		250.00				250.00	50,000
Pump Rental	3,740	CY		0	0.00		3.00				3.00	11,220
Crew incl set up	250	HR	6.00	1,500	480.00						480.00	120,000
				0	0.00						0.00	0
Finish and Misc	3,560	CY	1.50	5,340	120.00			10.00			130.00	462,800
				0	0.00						0.00	0
				0	0.00						0.00	0
				0	0.00						0.00	0
<b>TOTAL COST</b>				<b>14,472</b>	<b>1,157,779</b>		<b>61,220</b>		<b>135,904</b>	<b>0</b>	<b>2,028,103</b>	<b>1,354,903</b>
<b>UNIT COST</b>	<b>3,560</b>	<b>CY</b>		<b>4.07</b>	<b>325.22</b>		<b>17.20</b>		<b>38.18</b>	<b>0.00</b>	<b>569.69</b>	<b>2,028,103</b>



# EKM ENGINEERING

Items 6, 12  
16, 17, 18.

Job Knik Arm Crossing  
Description MISC Items

Item \_\_\_\_\_ Pg \_\_\_\_\_ of \_\_\_\_\_  
By FYM  
Date 3/4/07

## Item 16 Rubberized Asphalt Paving

Takeoff  $8'00 \times 44 \times 0.33 @ 140 \text{ lbs/cf} = 8232 \text{ Tons}$ .

Estimated Subcontract Price @  $25^{\text{c}}$ /ton which includes all tack coats Sealers Etc.

Note: In 2005 Rubberized AC cost  $\$80.76/\text{TONN}$   
ON  $70.76/\text{ton}$  in California (256,400 TONS)

Item 17 Lighting - Will include Navigation Lights Uncertain Scope  
Assume  $\$1,000,000$ .

Item 18 Signs and Misc Uncertain Scope

Assume  $\$500,000$  -

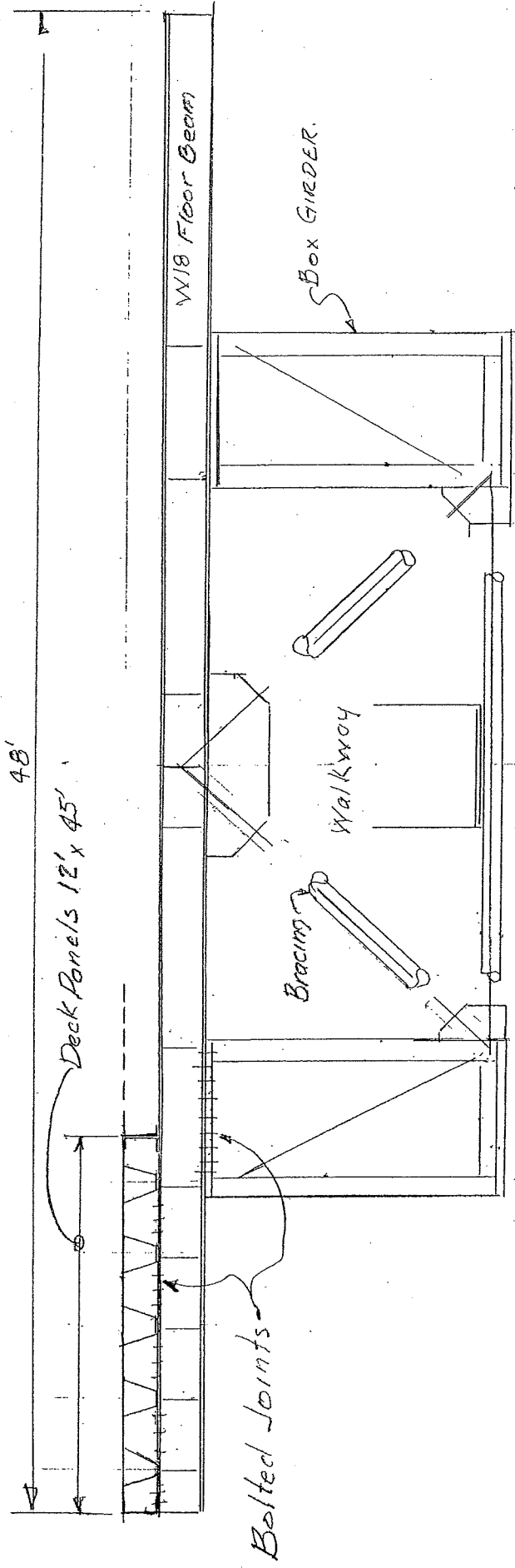
Items 6 & 12 Reinforcing Steel - Presently  $\approx \$1.00$  in SF Bay Area  
allow 1.25 in Alaska for rebar placed on land.  
Because of labor Insurance premium allow 1.50/lb.

**KNIK ARM CROSSING**  
**PRELIMINARY COST ESTIMATE**  
**FURNISH STRUCTURAL STEEL SUPERSTRUCTURE**  
**QUANTITY 47,500,000 LBS**

BY : EKM  
 DATE : 3/7/07  
 File: Knik Arm Crossing

75 LABOR RATE

DESCRIPTION	QUAN	UNIT	PROD	MAN HR.	UNIT COSTS					TOTAL	EXTENSION
					LABOR	EQUIP	MATL	SUPPLY	SUBCONT		
Fabricated Steel job Assembly Yard	47,500,000	LB		0	0.00					0.00	0
Assemble Walkway	80	HR	5.00	400	375.00					0.00	0
Total Time 80 Hrs (1000 ft/shift)				0	0.00					375.00	30,000
<b>Assemble Box Girders - 60 each</b>				0	0.00					0.00	0
Align 3 Segments and make 2 welds of 95 lbs of weld metal each				0	0.00					0.00	0
Completed Box weighs approx 420 kips. Two large cranes will be required.				0	0.00					0.00	0
Welding Crew (3 days/box)	1,800	HR	5.00	9,000	375.00	30.00		15.00		420.00	756,000
Weld Metal	11,500	LB		0	0.00		3.00			3.00	34,500
Lifting Lugs and Misc	1	LS		0	0.00			20,000.00		20,000.00	20,000
<b>Assemble on Barge</b>				0	0.00					0.00	0
Set and bolt into section containing 2 Box Girders, 18 Floor Beams				0	0.00					0.00	0
Walkway and Bracing. 3 Days per Section				0	0.00					0.00	0
Pile Butt Crew	900	HR	9.00	8,100	675.00					675.00	607,500
Dunnage and Misc	1	LS		0	0.00			150,000.00		150,000.00	150,000
Barge Rental	30	MO		0	0.00	25,000.00				0.00	0
Tow to Anchorage	4	EA		0	0.00			350,000.00		350,000.00	1,400,000
(includes load and surveys)				0	0.00					0.00	0
Crane cost included in the Assembly Yard Cost				0	0.00					0.00	0
<b>TOTAL COST</b>				17,500	1,312,500	804,000	109,284,500	197,000	1,400,000	112,998,000	112,998,000
<b>UNIT COST</b>	47,500,000	LB		0.00	0.03	0.02	2.30	0.00	0.03	2.38	112,998,000



ERECTION OF SUPERSTRUCTURE

- 1) Bolt the Box Girders to the Floor Beam, Install Bracing set Walkway and place on barge for shipment to Anchorage.
- 2) Lift off barge using large floating crane and erect into final location
- 3) Erect the Deck Panels working from the shore using erection equipment built for this purpose

**KNIK ARM CROSSING**  
**PRELIMINARY COST ESTIMATE**  
**ERECT STRUCTURAL STEEL SUPERSTRUCTURE**  
**QUANTITY 47,500,000 LBS**

BY : EKM  
 DATE : 3/8/07  
 File: Knik Arm Crossing

80 LABOR RATE

DESCRIPTION	QUAN	UNIT	PROD	MAN HR.	UNIT COSTS					TOTAL	EXTENSION	
					LABOR	EQUIP	MATL	SUPPLY	SUBCONT			
<b>Erect Box Girder including bracing</b>												
Erect one pair of Box Girder without deck in 3 shifts incl crane set up												
90 shifts. Allow 25% for weather, start and stop and misc. Total 113 shifts												
Derrick Barge Monthly Charge	12	MO		0	0.00	90,000.00					90,000.00	1,080,000
Derrick Barge Operating Cost	1,400	HR	3	4,200	240.00	150.00					390.00	546,000
Erection Crew	1,400	HR	9	12,600	720.00		20.00				740.00	1,036,000
Welding Crew	1,400	HR	3	4,200	240.00	50.00	15.00				305.00	427,000
Crew Boat All Costs (2 ea)	2,800	HR		0	0.00	350.00					350.00	980,000
Large Tug All Costs	1,400	HR		0	0.00	550.00					550.00	770,000
Medium Tug All Costs	1,400	HR		0	0.00	350.00					350.00	490,000
Small Flat Barge 3 total	20	MO		0	0.00	15,000.00					15,000.00	300,000
Surveyors	1,400	HR	2	2,800	160.00						160.00	224,000
<b>Erect Deck</b>												
There are a total of 720 sections approx 45' long by 12' wide weighing 28,000 lbs each. Sections can be set using a 40 ton hydro crane working from the previously set deck. sections will be delivered by truck from the abutment. Allow 2 hrs per section +25% = 1,800 hrs.												
Special Rolling Access Scaffolds	2	EA		0	0.00			75,000.00			75,000.00	150,000
40 ton hydro crane (site and yard)	3,600	HR	1.00	3,600	80.00	60.00		10.00			150.00	540,000
Yard Crew	1,800	HR	3.00	5,400	240.00						240.00	432,000
Set and Bolt Crew	1,800	HR	11.00	19,800	880.00			20.00			900.00	1,620,000
Delivery Trucks	2,700	HR		0	0.00				90.00		90.00	243,000
Weld Seams Submerged Arc	1,800	HR	3.00	5,400	240.00	50.00		5.00			295.00	531,000
Weld Metal	35,000	LB		0	0.00		3.00				3.00	105,000
Back Up Bars and Misc	33,000	LB		0	0.00		5.00				5.00	165,000
Surveyors	1,400	HR	2	2,800	160.00						160.00	224,000
<b>TOTAL COST</b>				<b>60,800</b>	<b>4,864,000</b>	<b>4,206,000</b>	<b>291,000</b>	<b>259,000</b>	<b>243,000</b>	<b>9,863,000</b>	<b>9,863,000</b>	<b>9,863,000</b>
<b>UNIT COST</b>	<b>47,500,000</b>	<b>LB</b>		<b>0.00</b>	<b>0.10</b>	<b>0.09</b>	<b>0.01</b>	<b>0.01</b>	<b>0.01</b>	<b>0.21</b>	<b>0.21</b>	<b>9,863,000</b>

KNIK ARM CROSSING  
 PRELIMINARY COST ESTIMATE  
 BEARINGS

BY: EKM  
 DATE: 2/28/07  
 File: Knik Arm Crossing

75 LABOR RATE

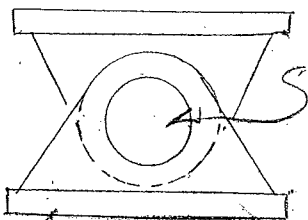
QUANTITY 58 EACH PILE CAPS, ABUTMENT 4 EACH

DESCRIPTION	QUAN	UNIT	PROD	MAN HR.	UNIT COSTS					TOTAL	EXTENSION	
					LABOR	EQUIP	MATL	SUPPLY	SUBCONT			
<b>Bearings</b>												
There are 58 each Bearings which will be welded to the Box Girder and the Pile Cap. Welding to the Pile Caps will be done when they are installed and welding to the Box Girder will be done after erection of the Box Girder												
Buy Bearing Assemblies	58	EA		0	0.00		9,000.00				9,000.00	522,000
Assembly Yard Time	58	EA	4.00	232	300.00						300.00	17,400
Welding at Site (12 lbs each)	696	LBS	1.50	1,044	112.50	5.00	2.00				119.50	83,172
				0	0.00						0.00	0
				0	0.00						0.00	0
ABUTMENT BEARINGS	4	EA	16.00	64	1,200.00	100.00	9,000.00				10,300.00	41,200
				0	0.00						0.00	0
<b>TOTAL COST</b>				<b>1,340</b>	<b>100,500</b>	<b>3,880</b>	<b>559,392</b>	<b>0</b>	<b>0</b>	<b>663,772</b>	<b>663,772</b>	
<b>UNIT COST</b>	<b>62</b>	<b>EA</b>		<b>21.61</b>	<b>1,620.97</b>	<b>62.58</b>	<b>9,022.45</b>	<b>0.00</b>	<b>0.00</b>	<b>10,706.00</b>	<b>663,772</b>	

# EKM ENGINEERING

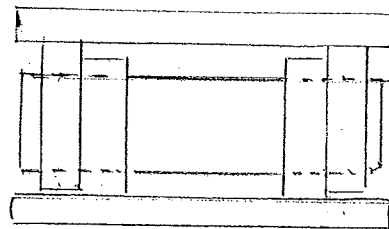
Job KNIK Arm  
 Description Bearings Total 58 EA. Pile Caps

Item \_\_\_\_\_ Pg \_\_\_\_\_ of \_\_\_\_\_  
 By \_\_\_\_\_  
 Date \_\_\_\_\_



8 dia pin  
 x 4'-6" long  
 Wt: 750 lbs.

2' x 4' x 2" Plate  
 650 lbs



3" Plate  
 Wt 200 lbs

Note: This sketch is not a bearing design - Approx Weight Only

Bearing Weight	Pin	750
Top & Btm Pl		1300
Side Plates		800
		2850
Total Wt		2850 lbs

KNIK ARM CROSSING  
 PRELIMINARY COST ESTIMATE  
 FURNISH CURB CONCRETE  
 QUANTITY 1685 CY

BY: EKM  
 DATE: 3/5/07  
 File: Knik Arm Crossing

80 LABOR RATE

DESCRIPTION	QUAN	UNIT	PROD	MAN HR.	UNIT COSTS							EXTENSION
					LABOR	EQUIP	MATL	SUPPLY	SUBCONT	TOTAL	EXTENSION	
Buy Concrete				0	0.00						0.00	0
	1,800	CY		0	0.00		140.00				140.00	252,000
Forms	38,000	SF	0.2	7,600	16.00			3.00			19.00	722,000
Pour Place and Finish	1,800	CY	1	1,800	80.00			8.00			88.00	158,400
				0	0.00						0.00	0
				0	0.00						0.00	0
				0	0.00						0.00	0
				0	0.00						0.00	0
				0	0.00						0.00	0
				0	0.00						0.00	0
<b>TOTAL COST</b>	<b>1</b>	<b>LS</b>		<b>9,400</b>	<b>752,000</b>	<b>0</b>	<b>252,000</b>	<b>128,400</b>	<b>0</b>	<b>1,132,400</b>	<b>0</b>	<b>1,132,400</b>
<b>UNIT COST</b>	<b>1,685</b>	<b>CY</b>		<b>5.58</b>	<b>446.29</b>	<b>0.00</b>	<b>149.55</b>	<b>76.20</b>	<b>0.00</b>	<b>672.05</b>	<b>0.00</b>	

**KNIK ARM CROSSING**  
**PRELIMINARY COST ESTIMATE**  
**BRIDGE RAIL**  
**QUANTITY 16,500 LF**

BY : EKM  
 DATE : 3/5/07  
 File: Knik Arm Crossing

80 LABOR RATE

DESCRIPTION	QUAN	UNIT	PROD	MAN HR.	UNIT COSTS					TOTAL	EXTENSION	
					LABOR	EQUIP	MATL	SUPPLY	SUBCONT			
Buy Bridge Rail fob Anchorage (incl galvanizing)	1,850,000	LB		0	0.00		3.00				3.00	5,550,000
Set Posts	2,062	EA	1	2,062	80.00						80.00	164,960
Grout Posts	2,062	EA	0.25	516	20.00		10.00				30.00	61,860
Set Rail	16,500	LF	0.1	1,650	8.00						8.00	132,000
				0	0.00						0.00	0
				0	0.00						0.00	0
				0	0.00						0.00	0
				0	0.00						0.00	0
<b>TOTAL COST</b>	<b>1</b>	<b>LS</b>		<b>4,228</b>	<b>338,200</b>	<b>0</b>	<b>5,570,620</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>-5,908,820</b>	<b>5,908,820</b>
<b>UNIT COST</b>	<b>16,500</b>	<b>LF</b>		<b>0.26</b>	<b>20.50</b>	<b>0.00</b>	<b>337.61</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>358.11</b>	



# EKM ENGINEERING

Items 14 and 15.

Job Krik Arm Crossing  
Description Clean and Paint Structural Steel.

Item \_\_\_\_\_ Pg \_\_\_\_\_ of \_\_\_\_\_

By EKM

Date 3/4/07

This Item includes the Pile Caps, Box Girder the underside of the Orthotropic Deck and Bracing.

Takeoff Square Ft.

Pile Caps 31ea @ 4275 = 132,525

Box Incl Deck Btm 60x40000 = 2400000

Bracing

100000

} 4700,000

Subtotal 2,632,525 Say 2,700,000

Shop Coat @ 2<sup>00</sup>/ft' = 5,400,000

Field Touch up. = 300,000

Total 5,500,000 L.S.

Deck Metalizing

If Applied in shop Typical Price is 5<sup>00</sup> to 6<sup>00</sup>/sf

Metal is prepared by white condition Sand Blast

Field Touch Up allow 50¢/sf total Say 6<sup>50</sup>/sf

Job Knik Arm Crossing  
 Description MISC Items

Item \_\_\_\_\_ Pg \_\_\_\_\_ of \_\_\_\_\_  
 By EYM  
 Date 3/4/07

Item 16 Rubberized Asphalt Paving

Takeoff  $8100 \times 44 \times 0.33 @ 140 \text{ lbs/cf} = 8232 \text{ Tons}$ .

Estimated Subcontract Price @  $85^{\text{cc}}$ /ton which includes all tack coats Sealers Etc.

Note: In 2005 Rubberized AC cost  $\$80.76/\text{TONN}$   
 ON  $72.76/\text{ton}$  in California (256,400 TONS)

Item 17 Lighting - Will include Navigation Lights Uncertain Scope  
 Assume  $\$1,000,000$ .

Item 18 Signs and Misc Uncertain Scope  
 Assume  $\$50,000$  -

Items 6 & 12 Reinforcing Steel - Presently  $\approx 1^{\text{cc}}$  in SF Bay Area  
 allow 1.25 in Alaska for rebar placed on land.  
 Because of labor insurance premium allow 1.50/lb.

**KNIK ARM CROSSING**  
**PRELIMINARY COST ESTIMATE**  
**10' DIAMETER RUBBER ENERGY ABSORBERS**  
**QUANTITY 8 EACH**

BY: EKM  
 DATE: 3/10/07  
 File: Knik Arm Crossing

80 LABOR RATE

DESCRIPTION	QUAN	UNIT	PROD	MAN HR.	UNIT COSTS					TOTAL	EXTENSION	
					LABOR	EQUIP	MATL	SUPPLY	SUBCONT			
Buy Energy Absorbers fob jobsite	8	EA					50,000.00				50,000.00	400,000
Box Girder must be 10' wide at the location where the absorbers are installed.											0.00	0
Added Box Girder Fabrication Cost	1	LS		0	0.00		100,000.00				100,000.00	100,000
Install Energy Absorbers	60	HR	7	420	560.00	100.00					660.00	39,600
				0	0.00						0.00	0
				0	0.00						0.00	0
				0	0.00						0.00	0
<b>TOTAL COST</b>	<b>1</b>	<b>LS</b>		<b>420</b>	<b>33,600</b>	<b>6,000</b>	<b>500,000</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>539,600</b>	<b>539,600</b>
<b>UNIT COST</b>	<b>8</b>	<b>EA</b>		<b>53</b>	<b>4,200</b>	<b>750</b>	<b>62,500</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>67,450</b>	

**KNIK ARM CROSSING**  
**PRELIMINARY COST ESTIMATE**  
**SMALL RUBBER ENERGY ABSORBERS**  
**QUANTITY 8 EACH**

BY : EKM  
 DATE : 3/10/07  
 File: Knik Arm Crossing

80 LABOR RATE

DESCRIPTION	QUAN	UNIT	PROD	MAN HR.	UNIT COSTS					TOTAL	EXTENSION	
					LABOR	EQUIP	MATL	SUPPLY	SUBCONT			
Buy Energy Absorbers fob jobsite	8	EA					10,000.00				10,000.00	80,000
				0	0.00						0.00	0
Install Energy Absorbers	60	HR	7	420	560.00	100.00					660.00	39,600
				0	0.00						0.00	0
				0	0.00						0.00	0
				0	0.00						0.00	0
<b>TOTAL COST</b>	<b>1</b>	<b>LS</b>		<b>420</b>	<b>33,600</b>	<b>6,000</b>	<b>80,000</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>119,600</b>	<b>119,600</b>
<b>UNIT COST</b>	<b>8</b>	<b>EA</b>		<b>53</b>	<b>4,200</b>	<b>750</b>	<b>10,000</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>14,950</b>	

KNIK ARM CROSSING  
 PRELIMINARY COST ESTIMATE  
 EXPANSION JOINT 48" MOVEMENT RATING  
 QUANTITY 192 FEET

BY: EKM  
 DATE: 3/10/07  
 File: Knik Arm Crossing

80 LABOR RATE

DESCRIPTION	QUAN	UNIT	PROD	MAN HR.	UNIT COSTS					TOTAL	EXTENSION
					LABOR	EQUIP	MATL	SUPPLY	SUBCONT		
Expansion Joints will be required at each abutment and two in the Box Girder at the center span. Modular Expense similar to those manufactured by the D S Brown were used as a basis for this cost estimate.											
Install Expansion Joints	192	LF	4.00	768	320.00	100.00	10,000.00	10.00		10,430.00	2,002,560
				0	0.00					0.00	0
				0	0.00					0.00	0
				0	0.00					0.00	0
				0	0.00					0.00	0
				0	0.00					0.00	0
<b>TOTAL COST</b>	<b>1</b>	<b>LS</b>		<b>768</b>	<b>61,440</b>	<b>19,200</b>	<b>1,920,000</b>	<b>1,920</b>	<b>0</b>	<b>2,002,560</b>	<b>2,002,560</b>
<b>UNIT COST</b>	<b>192</b>	<b>LF</b>		<b>4</b>	<b>320</b>	<b>100</b>	<b>10,000</b>	<b>10</b>	<b>0</b>	<b>10,430</b>	

**KNIK ARM CROSSING**  
**PRELIMINARY COST ESTIMATE**  
**SEATTLE AREA ASSEMBLY YARD**  
**QUANTITY 1 LS**

BY: EKM  
 DATE: 3/5/06  
 File: Knik Arm Crossing

75 LABOR RATE

DESCRIPTION	QUAN	UNIT	PROD	MAN HR.	UNIT COSTS					TOTAL	EXTENSION	
					LABOR	EQUIP	MATL	SUPPLY	SUBCONT			
An Assembly Yard in the Seattle area with a rail spur on the water will be required to assemble pile sections that come from the rolling mill in the mid west and the galvanized pile sections coming from Kansas. Section of the Box Girder will also be transported to the yard by rail in section and then welded into full length pieces. The assembled sections will then be loaded on barges for shipment to Anchorage. The Assembly Yard will be active for 3 years (not full time)												
Yard Rental (4 acre @ 5,000/mo/ Acre)	36	MO		0	0.00						20,000.00	720,000
Utilities	36	MO		0	0.00						3,000.00	108,000
Rock Roads Misc Mobilization	1	LS		0	0.00					50,000.00	50,000.00	50,000
Crane Manitowoc 2250 Bare Rental	44	MO		0	0.00	38,000.00					38,000.00	1,672,000
Crane Manitowoc 2250 Operation	6,600	HR	2.00	13,200	150.00	100.00					250.00	1,650,000
Forklift	4,000	HR		0	0.00	30.00					30.00	120,000
Yard Crew	6,600	HR	2.00	13,200	150.00						150.00	990,000
Hydro Crane 40 ton	4,000	HR	1.00	4,000	75.00	75.00					150.00	600,000
Forklift	36	MO	1.00	36	75.00						75.00	2,700
Dunnage and Misc	1	LS		0	0.00				100,000.00		100,000.00	100,000
<b>TOTAL COST</b>	<b>1</b>	<b>LS</b>		<b>30,436</b>	<b>2,282,700</b>	<b>2,752,000</b>	<b>0</b>	<b>928,000</b>	<b>50,000</b>	<b>6,012,700</b>	<b>6,012,700</b>	<b>6,012,700</b>

**KNIK ARM CROSSING  
PRELIMINARY COST ESTIMATE  
MOBILIZATION AND DEMOBILIZATION  
QUANTITY 1 LUMP SUM**

BY: EKM  
DATE: 3/10/07  
File: Knik Arm Crossing

80 LABOR RATE

DESCRIPTION	QUAN	UNIT	PROD	MAN HR.	UNIT COSTS					TOTAL	EXTENSION	
					LABOR	EQUIP	MATL	SUPPLY	SUBCONT			
This item includes the cost of towing equipment to and from Anchorage, constructing two docks, moorings etc												
<b>Tow to Alaska and Return</b>												
Two Derrick Barges (4 Trips)	4	EA		0	0.00	275,000.00					275,000.00	1,100,000
Barge Load incl Small Equip. Office and Yard Supplies etc	2	EA		0	0.00	275,000.00					275,000.00	550,000
				0	0.00						0.00	0
<b>Construct and Remove Docks</b>				1,250	50,000.00	50,000.00		200,000.00			300,000.00	600,000
				0	0.00						0.00	0
<b>Moorings and Misc</b>				0	50,000.00	50,000.00		100,000.00			200,000.00	200,000
				0	0.00						0.00	0
				0	0.00						0.00	0
				0	0.00						0.00	0
				0	0.00						0.00	0
				0	0.00						0.00	0
				0	0.00						0.00	0
				0	0.00						0.00	0
<b>TOTAL COST</b>	<b>1</b>	<b>LS</b>		<b>1,250</b>	<b>150,000</b>	<b>1,800,000</b>		<b>500,000</b>	<b>0</b>	<b>0</b>	<b>2,450,000</b>	<b>2,450,000</b>

**KNIK ARM CROSSING  
TAKEOFF**

EKM

3/6/07

File: Knik Arm Crossing

Description	No	L	W	H	Conc	Forms
Abutment Concrete						Vertical
Bot Slab	1	74.00	40.00	8.00	877.04	1,824
Front and Back Walls	2	74.00	5.00	24.00	657.78	7,584
	-2	5.50	5.00	11.00	(22.41)	250
Side Walls	2	30.00	5.00	24.00	266.67	2,880
<b>Total Concrete One Abutment</b>					<b>1,779.07</b>	<b>12,538</b>
<b>Concrete Curb</b>	<b>1</b>	<b>16,200.00</b>	<b>2.40</b>	<b>1.17</b>	<b>1,684.80</b>	<b>37,908</b>

Description	No	L (ft)	W (in)	H (in)	Wt/ft	Tot Wt
Steel Pile Caps						
W44x230	4	50.00			230.00	46,000
Base Plate under W44x230	4	5.00	60.00	2.00	408.00	8,160
Stiffeners at Piles	128	3.50	0.75	7.00	17.90	8,019
Stiffeners at Bearings	96	3.50	0.75	7.00	17.90	6,014
Plate Box	4	21.00	1.00	48.00	163.00	13,692
<b>Total Steel Weight Each Cap</b>						<b>81,886</b>

**Total Weight Each Cap Say 82,000 LBS. Total Weight 29 Caps is 2,378,000 LBS**

Description	No	L (ft)	W (in)	H (in)	Wt/ft	Tot Wt
Railing						
Posts W8	2026	3.30			31.00	207,260
Assume Posts @ 8' on centers						
Base Plate	2026	1.02	13	1	44.2	91,340
Rail Tube 6x6	4	16200			23.34	1,512,432
Bolts	8100	1.2			4	38,880
<b>Total Weight Steel Rail</b>						<b>1849911.98</b>
<b>Say 1,850,000 LBS</b>						



Typical Deck Section	No	L (ft)	W (in)	H (in)	Wt /ft	Tot Wt
Top Plate	1	275	288	0.625	615	169,125
Ribs	11	275			38.5	116,463
Rib Stiffeners	19	24	0.625	12	38.5	17,556
Rib Flange Plates	19	24	8	0.625	17	7,752
Rib Edge Plates	4	275	0.5	12	20.4	22,440
Web	2	275			205	112,750
Top and Bot Flange Avg Thick	2	275	60	2	408	224,400
Transverse Beams W18	19	24			90	41,040
Interior Stiffeners vertical	76	10	8	0.625	17	12,920
Interior Stiffeners longitudinal	2	275	8	0.625	17	9,350
Interior Diagonal 2 ea L6x6x.5	38	10			19.6	7,448
End Conditions and Pier Rib	3	1			8000	24,000
<b>Subtotal - Weight Typical Section</b>						<b>765,244</b>
<b>Total Weight 60 Sections</b>						<b>45,914,610</b>

**Walkway** 1 8100 75 607,500

**Bracing between Typical Deck Sections**

8 Inch Pipe - 20 Locations/ Span	600	18			29	313,200
8 Inch Pipe - 20 Locations/ Span	1200	10			29	348,000
Allowance for Gussets Bolts Etc 25%	1	1				165,300
<b>Total Bracing Weight</b>						<b>826,500</b>

**Added Weight at Abutments** 4 10000 40,000

**Added Weight at Expansion Joints** 4 20000 80,000

**Total Weight Structural Deck** 47,468,610

**Say 47,5000,000 LBS**