

ATTACHMENT E

# Scudder Falls Bridge Replacement

## Labor Quantification Analysis and Report

August 1, 2016



**Hill International**

# Labor Quantification Analysis and Report

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## I. Introduction

Hill International, Inc. (Hill) was retained by the Delaware River Toll Bridge Commission (Commission) to conduct a detailed review of the 60% cost estimate prepared by others to identify the skilled and un-skilled labor that will be needed to construct the new Scudder Falls Bridge and related work on both sides of the Delaware River.

The labor organizations which will provide workers for the project include the Philadelphia Building and Construction Trades Council (PBCTC), the Mercer County Building and Construction Trades Council (MCBCTC) and/or the United Steel Workers (USW), Local 15024.

A detailed review and analysis of the relevant Collective Bargaining Agreements (CBAs) for each trade was conducted to determine duration, jurisdiction, work rules, and wage rates. A matrix of the total labor rates by trade for both sides of the Delaware is attached as Table 1.

Utilizing the 60% cost estimate and the 60% design versions of the project plans and specifications an estimate of the approximate number of workers and man-hours by trade has been compiled and is attached as Table 2. The estimates by Michael Baker International, Inc. and GPI/WSP/PB were reviewed and analyzed using the wage rates of the Pennsylvania and New Jersey trades.

## II. Labor Pool – Collective Bargaining Agreements

The building and construction trades’ councils were contacted and provided Hill with required current Collective Bargaining Agreements (CBAs) and wage rate data for the trades which will be involved in project construction. The CBAs of the following trades were reviewed and analyzed to determine jurisdiction, expiration dates, work rules including start times, shifts, overtime, holidays, and apprentice ratios.

Laborers	Cement Masons
Carpenters	Painters
Ironworkers	Electricians
Operating Engineers	Dock Builders

## III. Labor Pool – Man-hours

Hill prepared a breakdown of the project work areas by cost and man-hours. The man-hours were then broken down by trade and by jurisdiction. Work areas that may be specifically identified as either New Jersey or Pennsylvania reflect that state’s prevailing wage rate. The New Jersey rate was utilized for the bridge work by agreement of the trades.

The methodology to develop the man-hour analysis consisted of the following steps:

1. Data was mined from the Michael Baker International, Inc. and the GPI/WSP/PB estimates to obtain overall cost information for the man-hour analysis.
2. Hill analyzed by line item and unit price each of the four (4) cost estimates developed by Michael Baker International, Inc. and GPW/WSP/PB – two (2) steel frame and two (2) concrete frame each
3. Utilizing cost data and experience, Hill determined the labor component included in each unit price.
4. Hill established a dollar value for labor included in each line item by trade.
5. We divided the labor component of each unit price item by the appropriate trade and jurisdiction wage rates to determine man-hours by trade and overall.
6. New Jersey Prevailing Labor rates were used to analyze the Bridge work and the New Jersey Road work. Pennsylvania Union Labor Rates were used to analyze the Pennsylvania Road Work.
7. A factor of 10% was added across the board to account for the use of apprentices by each trade.

## IV. Findings

- The overall labor portion of the total project construction cost is approximately 38%.
- A 10% contingency has been included to account for typical industry-wide variation in construction pricing, productivity, etc.
- Averaging the Michael Baker International, Inc. and GPI/WSP/PB 60% cost estimates for the steel superstructure construction alternative results an estimate of 1,724,600 labor hours for project construction. It is noted that the concrete superstructure construction alternative is approximately 8% higher in total labor hours.

# Scudder Falls Bridge Replacement Project Labor Analysis

## Table 1

### Matrix of Total Labor Rates by Trade

#### Prevailing Wage Rates Used in Analysis

#### New Jersey Prevailing Wage Rates

Bldg Trades	Base	Benefits	Misc/SSC	Workers Comp	Subtotal	15%		9%		Total Rate
						O&P	Subtotal	Esc.		
Laborers	\$ 36.75	\$ 27.53	\$ 1.47	\$ 4.62	\$ 70.37	\$ 10.55	\$ 80.92	\$ 7.28	\$	<b>88.20</b>
Carpenters	\$ 45.94	\$ 26.19	\$ 1.84	\$ 5.77	\$ 79.74	\$ 11.96	\$ 91.70	\$ 8.25	\$	<b>99.95</b>
Iron Workers	\$ 45.89	\$ 31.39	\$ 1.84	\$ 5.76	\$ 84.88	\$ 12.73	\$ 97.61	\$ 8.79	\$	<b>106.40</b>
Oper Eng	\$ 46.48	\$ 30.63	\$ 1.86	\$ 5.84	\$ 84.81	\$ 12.72	\$ 97.53	\$ 8.78	\$	<b>106.31</b>
Cement Masons	\$ 39.25	\$ 30.68	\$ 1.57	\$ 4.93	\$ 76.43	\$ 11.46	\$ 87.89	\$ 7.91	\$	<b>95.80</b>
Painters	\$ 52.38	\$ 36.92	\$ 2.10	\$ 6.58	\$ 97.97	\$ 14.70	\$ 112.67	\$ 10.14	\$	<b>122.81</b>
Electricians	\$ 49.18	\$ 31.19	\$ 1.97	\$ 6.18	\$ 88.51	\$ 13.28	\$ 101.79	\$ 9.16	\$	<b>110.95</b>
Dock Builders	\$ 43.60	\$ 35.23	\$ 1.74	\$ 5.48	\$ 86.05	\$ 12.91	\$ 98.96	\$ 8.91	\$	<b>107.86</b>
Staff	\$ 50.00	\$ 19.00	\$ 2.00	\$ 6.28	\$ 77.28	\$ 11.59	\$ 88.87	\$ 8.00	\$	<b>96.87</b>

#### Pennsylvania Wage Rates

Bldg Trades	Base	Benefits	Misc/SSC	Workers Comp	Subtotal	15%		9%		Total Rate
						O&P	Subtotal	Esc.		
Laborers	\$ 29.00	\$ 24.50	\$ 1.16	\$ 3.64	\$ 58.30	\$ 8.75	\$ 67.05	\$ 6.03	\$	<b>73.08</b>
Carpenters	\$ 44.41	\$ 25.99	\$ 1.78	\$ 5.58	\$ 77.75	\$ 11.66	\$ 89.42	\$ 8.05	\$	<b>97.47</b>
Iron Workers	\$ 44.70	\$ 28.14	\$ 1.79	\$ 5.61	\$ 80.24	\$ 12.04	\$ 92.28	\$ 8.31	\$	<b>100.58</b>
Oper Eng	\$ 47.10	\$ 24.50	\$ 1.88	\$ 5.92	\$ 79.40	\$ 11.91	\$ 91.31	\$ 8.22	\$	<b>99.53</b>
Cement Masons	\$ 35.15	\$ 29.16	\$ 1.41	\$ 4.41	\$ 70.13	\$ 10.52	\$ 80.65	\$ 7.26	\$	<b>87.91</b>
Painters	\$ 45.00	\$ 29.25	\$ 1.80	\$ 5.65	\$ 81.70	\$ 12.26	\$ 93.96	\$ 8.46	\$	<b>102.41</b>
Electricians	\$ 54.52	\$ 35.22	\$ 2.18	\$ 6.85	\$ 98.77	\$ 14.82	\$ 113.58	\$ 10.22	\$	<b>123.81</b>
Dock Builders	\$ 47.10	\$ 23.55	\$ 1.88	\$ 5.92	\$ 78.45	\$ 11.77	\$ 90.22	\$ 8.12	\$	<b>98.34</b>
Staff	\$ 50.00	\$ 19.00	\$ 2.00	\$ 6.28	\$ 77.28	\$ 11.59	\$ 88.87	\$ 8.00	\$	<b>96.87</b>

## Scudder Falls Bridge Replacement Project Labor Analysis

**Table 2**

### Project Man Hours

Labor Analysis is based on the 60% Design Cost Estimates by Michael Baker International, Inc. and GPI/WSP/PB for the steel superstructure bridge construction alternative

New Jersey Prevailing Wage Rates were used for the Bridge and New Jersey Road Work

Pennsylvania Prevailing Wage Rates were used for the Pennsylvania Road Work

#### Estimated Labor Hours Using the Steel Alternate

	Laborers	Carpenters	Iron Workers	Oper Eng	Cement Finishers	Painters	Electricians	Dock Builders	Staff	Total
PA ITEMS	252,000	35,400	12,100	102,300	1,000	2,700	7,200	-	1,500	414,200
Taylorsville Bridge Road	9,100	3,600	6,800	5,200	1,600	1,000	-	-	-	27,300
PA DE CANAL	9,800	4,400	5,100	4,000	1,900	100	-	-	-	25,300
Scudder Falls Brdige	42,200	27,600	45,700	16,000	12,800	-	2,200	37,300	-	183,800
ALT STEEL SUPERSTRUCTURE	39,600	29,000	150,600	25,800	17,600	-	400	-	-	263,000
ALT CONCRETE SUPERSTRUCTURE										--
PA Bike/Ped Bridge	2,100	1,700	2,200	800	400	-	-	-	-	7,200
PA Noise Walls	11,300	9,300	12,000	16,500	-	-	-	-	-	49,100
PA Utilities	10,800	-	-	-	-	-	12,100	-	200	23,100
NJ ITEM NUMBERS	57,600	14,400	4,500	32,100	1,000	300	15,700	-	400	126,000
Mainline Approach Bridge	16,400	11,900	16,900	8,900	1,600	600	700	-	-	57,000
NJ Ramp C	3,900	2,000	7,600	2,500	400	-	700	-	-	17,100
NJ RAMP G BRIDGE	4,000	2,300	4,600	2,100	400	-	100	-	-	13,500
NJ Bike/Ped Brdige	10,400	9,100	4,100	5,500	900	-	-	-	-	30,000
NJ RETAINING WALL	21,200	24,900	-	17,600	-	-	-	-	-	63,700
NJ Noisewalls	1,600	2,100	700	2,600	-	-	-	-	-	7,000
NJ SIGN STRUCTURE	-	-	2,100	400	-	-	100	-	-	2,600
NJ UTILITIES	-	-	-	-	-	-	10,400	-	100	10,500
Bridge Monitoring Building	1,600	3,600	1,400	900	500	200	1,200	-	-	9,400
Overhead Items	8,800	-	-	1,200	-	-	-	-	95,000	105,000
Factor for use of Apprentices	49,400	18,100	27,600	24,300	4,000	500	5,100	3,700	200	133,000
<b>Total Estimated Labor Hours</b>	<b>551,800</b>	<b>199,400</b>	<b>304,000</b>	<b>268,700</b>	<b>44,100</b>	<b>5,400</b>	<b>55,900</b>	<b>41,000</b>	<b>97,400</b>	<b>1,567,800</b>
Contingency	55,200	19,900	30,400	26,900	4,400	500	5,600	4,100	9,700	156,800
<b>Recommended Labor Hour Totals</b>	<b>607,000</b>	<b>219,300</b>	<b>334,400</b>	<b>295,600</b>	<b>48,500</b>	<b>5,900</b>	<b>61,500</b>	<b>45,100</b>	<b>107,100</b>	<b>1,724,600</b>