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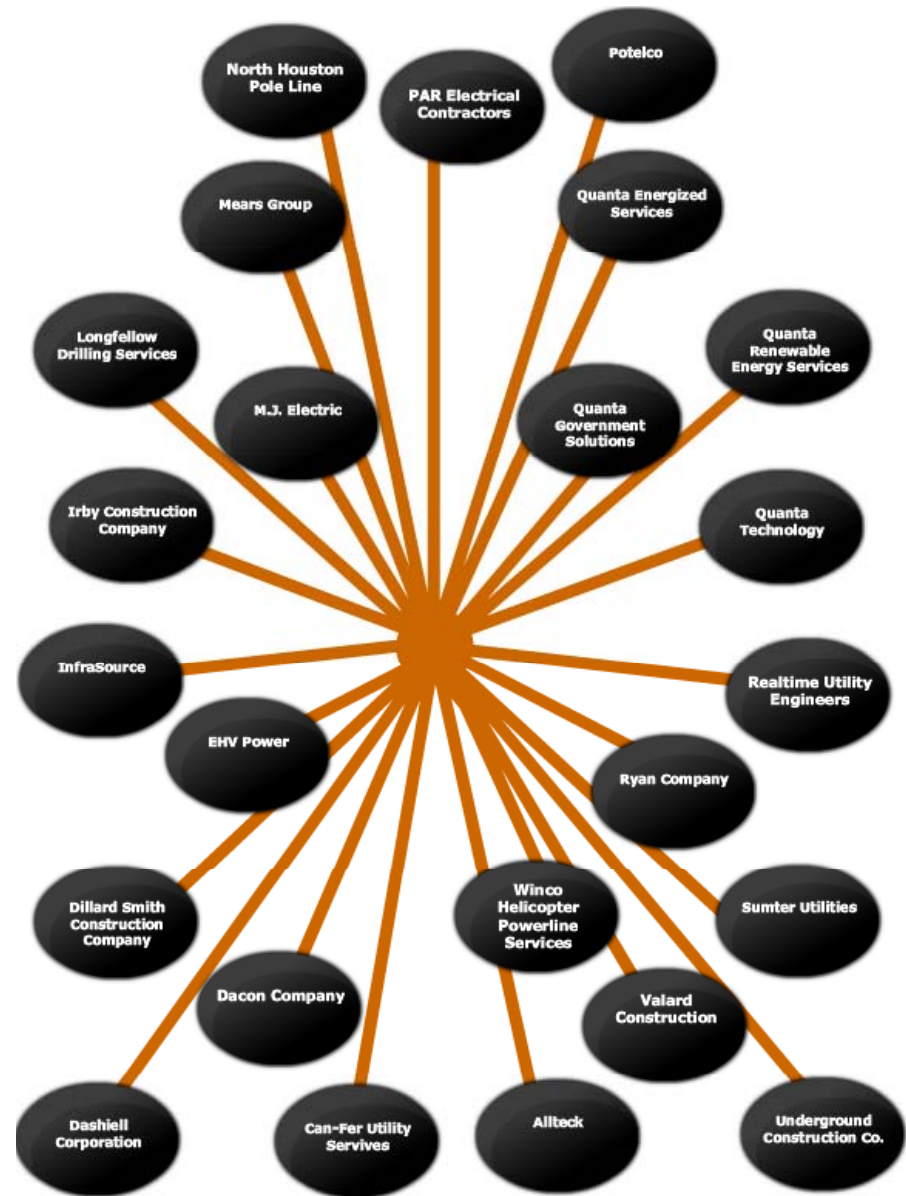
PSANI Project Cost Estimates

**Columbia Grid Executive
Committee**

*July 29, 2011
Revision 2*

About Quanta Technology

- ◆ Independent Consulting Arm of Quanta Services – Fortune 500 Company, “PWR”, \$3.9B in 2010
- ◆ Part of the Electric Division of Quanta Services
- ◆ 100+ Staff & Associates
- ◆ Senior staff have 25+ years industry experience
- ◆ Consulting and Utility Management Backgrounds



Presentation Outline

1. Project Overview
2. Cost Estimating Methodology
3. Key Cost Estimating Assumptions
4. Project Cost Estimates
 - i. Project Assumptions & Contingencies
5. Comparison with Columbia Grid Planning Cost Estimates

Project Overview

- ❑ Engaged by Columbia Grid Executive Committee to provide an independent, 3rd party cost estimate for PSANI Facilities Impacted by South to North Flows:
 1. Sammamish to Lakeside to Talbot Rebuild
 2. Bothell to SnoKing Reconductor
 3. SCL West Side Inductors
 4. Delridge to Duwamish Reconductor
 5. SnoKing to Maple Valley Reconductor
 6. Covington Transformer Addition

- ❑ Applied a common cost estimating methodology for each project
- ❑ Presented Quanta Technology draft cost estimates at July 15, 2011 Columbia Grid Executive Committee
- ❑ Revised based upon feedback
- ❑ Updated presentation on July 29, 2011

Quanta Technology Methodology

- ❑ Held face to face meeting with planning/engineering teams at PSE, SCL & BPA week of June 13th
- ❑ Determined specific construction scope of each project
- ❑ Collected project details such as:
 - Line Route & Substation Sites
 - Plan & Profile When Available
 - Layout Drawings When Available
 - Recent Project Cost Estimates
 - Equipment Budgetary Costs
- ❑ Applied Quanta Technology assumptions and developed initial project cost estimate
- ❑ Reviewed with each individual company for feedback
- ❑ Adjusted project cost estimate based upon executive committee feedback

Key Cost Estimating Assumptions

❑ Equipment

- Vendor budgetary quotes or recent purchase orders used for pricing

❑ Foundations

- Foundations selected are sizes that are typically used at this voltage for a competent soil
- Drilled pier foundations will be utilized for the support structures and pad foundations will be used for large equipment supports
- The Transformer base dimensions is 19'x10
- The Transformer containment pit shall be a concrete

❑ Structures

- Structures assumed are Dashiell (a Quanta Services Company) standard structures
- Substation equipment, bus, and switch supports will consist of typical tube shape steel members
- Dead-ends will consist of tapered tubular steel members

Key Assumptions cont.

❑ Transmission Lines

- Clear access to the site is available
- Self support structures used with no need for guy wires
- Direct-embedded steel poles for tangent and piered foundations for dead-ends
- NESC Heavy loading
- Reconductor projects assume no structure replacements will be required
- Engineering/Project Management/Internal assumed 14% of project cost
- Highway crossing control costs are \$25k per major intersection
- Highway repair costs estimated at \$25k per crossing (when needed)

❑ General

- Standard forty (40) hour work week
- No taxes are included
- All soil is non-contaminated
- Permitting estimates are included

Caveats

- No environmental or geotechnical data was available
- No highway repair costs currently identified as necessary for any of these projects
- No equipment specifications provided
- No one line diagrams for control and protection schemes provided
- No relay modification or upgrade work at remote stations were included
- Costs are in 2011 dollars
- Some equipment cost provided by vendors required a confidentiality agreement between Quanta Technology and the vendor

Sammamish to Lakeside to Talbot Rebuild

- Project includes:
 - Rebuilding the existing 115 kV double circuit line for 230 kV operation
 - Existing facilities are 2 115 kV wood H-frame structures in 100 ft ROW
 - Expanding the Lakeside Substation to add a 230 kV transformer
 - Initially operating one line at 230 kV and the other at 115 kV
- Two options under consideration for rebuilding the line
 1. Use double circuit towers
 2. Use two single circuit towers
- Total Cost Estimate
 1. W/ double circuit towers – \$60.8 Million
 2. W/ single circuit towers – \$64.5 Million

Sammamish-Talbot-Lakeside Single Circuit Cost Estimate

Transmission Line Estimate for Sammamish to Talbot 230 kV Transmission Line (SC)

Materials			
Sammamish to Lakeside			\$ 9,227,995
Lakeside to Talbot			\$ 9,673,256
	Total Materials		\$ 18,901,251
Labor			
Sammamish to Lakeside			\$ 4,307,760
Lakeside to Talbot			\$ 5,362,812
Mobilization and Demobilization			\$ 150,000
Public Outreach (In-House & Consultants)			\$ 600,000
3 FTEs x 2 years			\$ 2,000,000
Restoration & Mitigations			\$ 2,010,250
	Total labor		\$ 14,430,822
Overheads			
Engineering and Project Management		14%	\$ 4,666,490
Total			\$37,998,563

Contingency 15%

\$43,698,348

Sammamish-Talbot-Lakeside Double Circuit Cost Est.

Transmission Line Estimate for Sammamish to Talbot 230 kV Transmission Line (DC)

Materials		
Sammamish to Lakeside		\$ 8,826,440
Lakeside to Talbot		\$ 8,825,662
	Total Materials	\$ 17,652,102
Labor		
Sammamish to Lakeside		\$ 3,620,208
Lakeside to Talbot		\$ 4,506,492
Mobilization and Demobilization		\$ 150,000
Public Outreach (In-House & Consultants)		\$ 600,000
3 FTEs x 2 years		\$ 2,000,000
Restoration & Mitigations		\$ 2,010,250
	Total Labor	\$ 12,886,950
Overheads		
Engineering and Project Management	14%	\$ 4,275,467
Total		\$34,814,520

Contingency 15%

\$40,036,698



Lakeside Substation Addition Cost Estimate

■ Cost Breakdown to add a single 230/115 kV Transformer

BID SUMMARY July 12, 2011

PROJECT DATA

Project Title: Lakeside Substation w/1 Autotransformer
 Client: PSE

Price SUMMARY

	Subtotal	
Engineering & Services		
Engineering	\$ 621,345	25%
Field Services	\$ 312,500	13%
Subcontracts	\$ 1,295,275	53%
Const. & Proj. Mgmt	\$ 223,174	9%
Eng & Services:	\$ 2,452,294	

Materials		
Major Apparatus	\$ 5,744,900	65%
Misc. Apparatus	\$ 1,070,153	12%
Misc. Material	\$ 1,976,506	22%
Materials:	\$ 8,791,559	

Construction labor & Contingency		
All 3 substations	\$ 7,576,000	78%
10% Contingency	\$ 1,881,985	19%
Substation Security	\$ 200,000	2%
Construction labor	\$ 9,657,985	

Totals	TOTALS \$ 20,901,838.00	
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Sammamish-Lakeside-Talbot Project Assumptions

■ Key Project Assumptions

- 4 Major Highway Crossings
- \$140,000 for WA State Patrol and Traffic Control
- \$400,000 Permit Costs
- ROW was sufficient for project

■ Contingencies

- 10% contingency for substation cost because the actual layout of the substation expansion has not been determined
- 15% contingency for the line rebuilds since soil type is not yet determined and additional foundations may be required

Bothell to SnoKing Reconductor Project

- This project is a reconductoring of the existing Bothell to SnoKing 230 kV line
- New conductor would use High Temperature Low Sag composite core
- Two conductor sizes are under consideration – 795 and 886
- 3M indicates that the core is the same for both conductors

Cost Estimate: Bothell to SnoKing Reconductor 795 ACCR

Transmission Line Estimate for Snoking to Bothell 230 kV Transmission Line 795 ACCR

		Line Length	Miles			
			3.68			
Materials						
Item	Description	Details		Unit	Unit Cost	Total
1	Conductor	795 ACCR Drake		Foot	\$ 14.00	
5		Conductors per circuit	3			
6		Circuits	2			
7		Conductors Feet	116582.4			\$ 1,632,154
8	Structures					
9		No Changes				
14	Hardware					
15				Lot	4.00%	\$ 65,286
Materials						\$ 1,697,440

Labor						
Item	Description	Details	Hours/Week	Unit	Rate/Hours	Weekly Rate
18	Labor - Installation					
19	Crew Size	12	40	Manhrs	\$ 200.00	\$ 96,000.00
20						
21	Performance:	Miles per Week	Weeks Duration			Labor Total
22		2	3.68			\$ 353,280
27	ROW Clearing	ACRES	45	AC	\$ 800.00	\$ 35,685
	Mobilization & Demob					\$ 50,000
Total labor Costs						\$ 438,965
	Engineering, PM & Internal Review	14%				\$ 299,097
Total						\$ 2,435,501



Cost Estimate: Bothell to SnoKing Reconductor 886 T15

Transmission Line Estimate for SnoKing to Bothell 230 kV Transmission Line 886 -T15

Item	Description	Details	Unit	Unit Cost	Total
	Line Length	Miles	3.68		
Materials					
1	Conductor	ACCR 886-T15	Foot	\$ 15.71	
5		Conductors per circuit	3		
6		Circuits	2		
7		Conductors Feet	116582.4		\$ 1,831,510
8	Structures				
9		No Changes			
14	Hardware				
15			Lot	4.00%	\$ 73,260
Materials					\$ 1,904,770

Item	Description	Details	Hours/Week	Unit	Rate/Hours	Weekly Rate
18	Labor - Installation					
19	Crew Size	12	40	Manhrs	\$ 200.00	\$ 96,000.00
20						
21	Performance:	Miles per Week	Weeks Duration			Labor Total
22		2	3.68			\$ 353,280
27	ROW Clearing	ACRES	45	AC	\$ 800.00	\$ 35,685
	Mobilization & Demob					\$ 50,000
Total labor Costs						\$ 438,965
Engineering, PM & Internal Review		15%				\$ 351,560
Total						\$ 2,695,295

Bothell to SnoKing Assumptions

- Key Project Assumptions
 - Same basic line design as Maple Valley to SnoKing
 - No structural changes were needed
- Contingencies
 - No contingencies included since project appears to be well defined

Installing Two Inductors at SCL

- Two 6 ohm inductors
- One located at Broad St. Substation
- One located at NODO Substation

- Total Cost Estimate - \$11.6 M (no land included)

Broad St Inductor Cost Estimate

PROJECT DATA

Project Title:	Broad Street Substation Series Inductors
Client:	SCL

Price SUMMARY

	Subtotal	
Engineering & Services		
Engineering	\$ 372,807	30%
Field Services	\$ 75,000	6%
Subcontracts	\$ 569,275	46%
Const. & Proj. Mgmt	\$ 223,174	18%
Eng & Services:	\$ 1,240,256	

Materials		
Major Apparatus	\$ 3,014,550	79%
Misc. Apparatus	\$ 29,000	1%
Misc. Material	\$ 773,980	20%
Materials:	\$ 3,817,530	

Construction labor & Land		
Labor	\$ 900,000	75%
Land	\$ -	0%
SCL Inspection & Review	\$ 297,889	25%
Construction labor	\$ 1,197,889	

Totals		
TOTALS	\$ 6,255,675	

Contingency 15% \$ 7,194,026



NODO Inductor Cost Estimate

PROJECT DATA

Project Title:	Broad Street Substation Series Inductors
Client:	SCL

Price SUMMARY

	Subtotal	
Engineering & Services		
Engineering	\$ 155,336	27%
Field Services	\$ 75,000	13%
Subcontracts	\$ 242,000	42%
Const. & Proj. Mgmt	\$ 100,218	18%
Eng & Services:	\$ 572,554	

Materials		
Major Apparatus	\$ 1,370,250	63%
Misc. Apparatus	\$ 29,000	1%
Misc. Material	\$ 773,980	36%
Materials:	\$ 2,173,230	

Construction labor & Contingency		
Labor	\$ 900,000	83%
Land Contingency	\$ -	0%
SCL Inspection & Review	\$ 182,289	17%
Construction labor	\$ 1,082,289	

Totals		
TOTALS \$	3,828,073	

Contingency 15% \$ 4,402,284



Inductor Assumptions

■ Key Project Assumptions

- Land Cost for NODO was not included since real estate has been procured
- Land cost for Broad was not yet included
- 6 ohm inductor was assumed
- GIS breakers were assumed at Broad St and NODO
- One set of GIS breakers would be located by the inductors for the Broad St installation

■ Contingencies

- 15% since at very beginning of design stage in both locations

Delridge to Duwamish Reconductor Project

- This project is a reconductoring of the existing Delridge to Duwamish 230 kV line
- New conductor would use High Temperature Low Sag composite core
- Two conductor sizes are under consideration – 795 and 886
- 3M indicates that the core is the same for both conductors

Delridge to Duwamish 795 Reconductor Cost Estimate

Transmission Line Estimate for Duwamish to Delridge 230 kV Transmission Line 795

Materials		
Duwamish to Delridge		\$ 1,161,912
	Total Materials	\$ 1,161,912
Labor		
Duwamish to Delridge		\$ 239,520
Mobilization and Demobilization		\$ 100,000
Restorations & Mitigations		\$ 62,375
Traffic Control		\$ 50,000
	Total labor	\$ 451,895
Overheads		
Engineering and Project Management	14%	\$ 225,933
Total		\$1,839,739

Delridge to Duwamish 886 Reconductor Cost Estimate

Transmission Line Estimate for
Duwamish to Delridge 230 kV Transmission Line 886

Materials		
Duwamish to Delridge		\$ 1,303,831
	Total Materials	\$ 1,303,831
Labor		
Duwamish to Delridge		\$ 239,520
Mobilization and Demobilization		\$ 100,000
Restorations & Mitigations		\$ 62,375
Traffic Control		\$ 50,000
	Total labor	\$ 451,895
Overheads		
Engineering and Project Management	14%	\$ 245,802
Total		\$2,001,527

Delridge to Duwamish Assumptions

- Key Project Assumptions
 - No structural changes were needed
- Contingencies
 - No contingencies included since project appears to be well defined

Maple Valley to SnoKing Reconductor Project

- This project is a reconductoring of the existing Maple Valley to SnoKing 230 kV line
- New conductor would use High Temperature Low Sag composite core
- Two conductor sizes are under consideration – 795 and 886
- 3M indicates that the core is the same for both conductors

Cost Estimate: Snoking to Maple Valley Reconductor 795 ACCR

Transmission Line Estimate for Maple Valley to Snoking 230 kV Transmission Line 795 ACCR

		Line Length	Miles			
			24.4			
Materials						
Item	Description	Details		Unit	Unit Cost	Total
1	Conductor	795 ACCR Drake		Foot	\$ 14.00	
5		Conductors per circuit		3		
6		Circuits		2		
7		Conductors Feet	772992			\$ 10,821,888
8	Structures					
9		No Changes				
14	Hardware					
15				Lot	4.00%	\$ 432,876
Materials						\$ 11,254,764

Labor						
Item	Description	Details	Hours/Week	Unit	Rate/Hours	Weekly Rate
18	Labor - Installation					
19	Crew Size	12		40 Manhrs	\$ 200.00	\$ 96,000.00
20						
21	Performance:	Miles per Week	Weeks Duration			Labor Total
22		2	24.4			\$ 2,342,400
27	ROW Clearing	ACRES	296	AC	\$ 800.00	\$ 236,606
	Mobilization & Demob					\$ 150,000
Total labor Costs						\$ 2,729,006
	Engineering, PM & Internal Review	14%				\$ 1,957,728
Total						\$ 15,941,497



Cost Estimate: Snoking to Maple Valley Reconductor 886-T15

Transmission Line Estimate for Maple Valley to Snoking 230 kV Transmission Line 886 -T15

Line Length		Miles	24.4			
Materials						
Item	Description	Details		Unit	Unit Cost	Total
1	Conductor	ACCR 886-T15		Foot	\$ 15.71	
5		Conductors per circuit	3			
6		Circuits	2			
7		Conductors Feet	772992			\$ 12,143,704
8	Structures					
9		No Changes				
14	Hardware					
15				Lot	4.00%	\$ 485,748
Materials						\$ 12,629,452

Labor						
Item	Description	Details	Hours/Week	Unit	Rate/Hours	Weekly Rate
18	Labor - Installation					
19	Crew Size	12	40	Manhrs	\$ 200.00	\$ 96,000.00
20						
21	Performance:	Miles per Week	Weeks Duration			Labor Total
22		2	24.4			\$ 2,342,400
27	ROW Clearing	ACRES	296	AC	\$ 800.00	\$ 236,606
	Mobilization & Demob					\$ 150,000
Total labor Costs						\$ 2,729,006
Engineering, PM & Internal Review		14%				\$ 2,150,184
Total						\$ 17,508,643



Maple Valley to SnoKing Assumptions

- Key Project Assumptions
 - Same basic line design as Bothell to SnoKing
 - No structural changes were needed
- Contingencies
 - No contingencies included since project appears to be well defined

Covington 500 kV Transformer Addition Project

- One 500 kV transformer bank would be added at Covington
- Relocate existing 500 kV bank
- Grading work to expand the yard
- T-Line relocations required for reconfiguring 500 kV buses

Cost Estimate: Covington 500kV Transformer Addition

PROJECT DATA

Project Title: Covington Substation
 Client: BPA

Price SUMMARY

	Base	Subtotal	
Engineering & Services			
Engineering	\$	3,106,725	43%
Field Services	\$	937,500	13%
Subcontracts	\$	2,839,568	39%
Const. & Proj. Mgmt	\$	318,496	4%
Eng & Services:	\$	7,202,289	
Materials			
Major Apparatus	\$	25,241,600	84%
Misc. Apparatus	\$	1,920,960	6%
Misc. Material	\$	2,808,907	9%
Materials:	\$	29,971,467	
Construction labor & Contingency.....			
Both substations	\$	9,550,000	51%
20% Contingency	\$	9,344,751	49%
	\$	-	0%
Construction labor	\$	18,894,751	
Totals			
	TOTALS	\$	56,068,507.00



Covington Transformer Assumptions

- Key Project Assumptions
 - Covington is the site .vs. other locations still under consideration at Columbia Grid
- Contingencies
 - 20% since project is conceptual at this time

Project Notes:

- For high temp, low sag conductor 795 ACCR is recommended over 886 ACCR T15 based upon cost performance .vs. sag. Both satisfy CG loading requirements to achieve south to north TTC target with existing towers. Getting full current carrying capability of 886 ACCR T15 appears to require structural modifications based upon our preliminary review.
 - July 29th Update - Columbia Grid is currently recommending 795 ACCR for the reconductor projects
- BPA Covington Transformer Project was not as far developed as the other projects, therefore the QT Cost Estimate relies much more on QT assumptions than the other projects.
- Single Transformer cost was used for Lakeside since that is the basis for the cost estimate provided in the CG Report dated July, 2011.

CG Cost Estimate .vs. QT Cost Estimate (\$M)

Project	CG (1) Cost Estimate	QT Cost Estimate	Delta	Percent
Sammamish to Lakeside to Talbot & XFMR Sckt	\$65.0	\$64.5	-\$0.5	-0.8%
Sammamish to Lakeside to Talbot & XFMR Dckt	\$65.0	\$60.8	-\$4.2	-6.5%
Bothell to SnoKing Reconductor - 795 ACCR	\$3.0	\$2.4	-\$0.6	-20.0%
Bothell to SnoKing Reconductor - 886-T15	\$3.0	\$2.7	-\$0.3	-10.0%
SCL West Side Inductors (See Note 2)	\$13.0	\$11.6	-\$1.4	-10.8%
Delridge to Duwamish Reconductor (see Note 3)	\$2.0	\$1.8	-\$0.2	-10.0%
Covington Transformer (See Note 4)	\$60.0	\$56.1	-\$3.9	-6.5%
SnoKing to Maple Valley 795 ACCR	na	\$15.9	na	
SnoKing to Maple Valley 886-T15	na	\$17.5	na	

Notes:

- 1) Source is June, 2011 Report from Columbia Grid.
- 2) Land acquisition cost not included. CG still working out final sizing.
- 3) 795 conductor size used for this comparison
- 4) Construction project scope not as developed as other projects.

Questions?

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