ESTIMATE SUMMARY

NYSEG

150 MW - Advanced CAES Demonstration Plant: Cost Estimate

ACCOUNT	ITEM	QTY	UNIT	MATERIAL	LABOR	TOTAL	COMMENTS
	Procurement Packages						
11201	CAES Equipment			$ 48,900,000	$ 15,800,000	$ 64,700,000	
14001	Black Start Generator					$ -	
21401	Generator & Compressor Circuit Breakers			$ 690,000	$ 590,000	$ 1,280,000	
22101	Isolated Phase Bus Duct					$ -	
22201	Non-Seg Bus Duct					$ -	
23101	Raw Water Pumphouse MCC					$ -	
25101	Step-Up Transformer			$ 490,000	$ 330,000	$ 820,000	
25201	Aux Transformer					$ -	
25301	Miscellaneous Transformers					$ -	
51001	DCS			$ 650,000	$ 800,000	$ 1,450,000	
53201	CEMS					$ -	
93301	Ammonia Unloading, Storage & Forwarding					$ -	
95001	Water Treatment System			$ 190,000	$ 220,000	$ 410,000	
95101	Oil / Water Separator			$ 150,000	$ 220,000	$ 370,000	
95801	Packaged Sanitary System					$ -	
96101	Fuel Gas Compressor					$ -	
96301	Fuel Gas Conditioning					$ -	
96501	Fuel Gas Chromatograph					$ -	
102001	Bridge Crane					$ -	
154101	Circulating Water & Aux Cooling Water Pumps			$ 80,000	$ 90,000	$ 170,000	
154301	Sump Pumps					$ -	
157101	Fire Water Pumps					$ -	
157501	Miscellaneous Horizontal Pumps					$ -	
157601	Miscellaneous Vertical Pumps					$ -	
182001	Air Receiver & Dryer					$ -	
420201	Circ Water Pipe			$ 150,000	$ 130,000	$ 280,000	
491001	Power Distribution Center					$ -	
	Procurement Package Subtotal			$ 51,300,000	$ 18,180,000	$ 69,480,000	
						$ -	
	Construction Packages					$ -	
171001	Cooling Tower					$ -	
191101	Field Fabricated Tanks			$ 150,000	$ 170,000	$ 320,000	
591101	Initial Sitework			$ 20,000	$ 50,000	$ 70,000	
591102	Final Sitework			$ 520,000	$ 650,000	$ 1,170,000	
591201	Offsite Pipeline					$ -	
591401	Foundations & U/G Utilities			$ 410,000	$ 860,000	$ 1,270,000	
592101	Generation Building Erection					$ -	
592102	Admin / Maintenance and Mech Equipment Buildings					$ -	
592201	Pre-Engineered Buildings			$ 1,700,000	$ 400,000	$ 2,100,000	
592301	Raw Water Pumphouse					$ -	
593301	Mechanical Erection					$ -	
593401	Piping			$ 800,000	$ 520,000	$ 1,320,000	
593601	Fire Protection					$ -	
593701	Insulation			$ 50,000	$ 130,000	$ 180,000	
594101	Plant Switchyard					$ -	
594102	Interconnect Switchyard			$ 1,980,000	$ 660,000	$ 2,640,000	
594201	115kV Transmission Line					$ -	
594202	34.5kV Distribution Line					$ -	
594401	Electrical and I&C					$ -	
651001	Start-up Subcontracts					$ -	
	Construction Package Subtotal			$ 5,630,000	$ 3,440,000	$ 9,070,000	
	Purchase Order & Subcontract Package Subtotal			$ 56,930,000	$ 21,620,000	$ 78,550,000	
	Material & Design Development Allowance	1	LS			$ -	
	Subcontractor's Mark-up on Material	1	LS			$ -	
	Additional Premium Time Cost (5-10's)	1	LS			$ -	
	Overtime Productivity Cost	1	LS			$ -	
	Construction Subtotal			$ 56,930,000	$ 21,620,000	$ 78,550,000	
	PROFESSIONAL SERVICES:						
	Engineering, Construction Management, & Start-up Services	1	LS			$ 13,194,000	
	Engineering Subtotal					$ 13,194,000	
	OTHER COSTS:						
	Builder's All Risk Insurance	1	LS			$ -	
	Worker's Compensation & Employers' Liability	1	LS			$ -	
	Commercial General Liability	1	LS			$ -	
	Comprehensive Automobile Liability	1	LS			$ -	
	Contractor's Equipment & Automobile Physical Damage Insurance	1	LS			$ -	
	Transportation Insurance	1	LS			$ -	
	Payment & Performance Bond	1	LS			$ -	
	Escalation	1	LS			$ -	
	Sales & Use Tax	1	LS			$ 4,778,400	
	Warranty	1	LS			$ -	
	Permits & Fees	1	LS			$ -	
	Other Costs Subtotal					$ 4,778,400	
	SUBTOTAL COST					**$ 96,522,400**	
	Contingency - General	1	LS			$ 10,465,710	
	Contingency -Major Purchase Order Terms & Conditions	1	LS				
	Contingency - Technology Licensing Fees	1	LS				
	Contingency Subtotal					$ 10,465,710	
	TOTAL COST					**$ 106,988,110**	
	Fees					$ 734,700	
	Cavern & Well Sytem Deveopment			$ 5,000,000	$ 2,400,000	$ 7,400,000	
	AFUDC					$ 9,883,293	
	Owner's Costs					$ -	
	TOTAL					**$ 125,006,103**	

WorleyParsons
resources & energy

Compressed Air Energy Storage
Natural Gas Combined Cycle Plant

Estimate Basis

Prepared for:

NYSEG
18 Link Drive
Binghamton, NY 13902-5224

December, 2011

By:

WorleyParsons Group, Inc
2675 Morgantown Road
Reading, Pennsylvania 19607-9676

TABLE OF CONTENTS

SECTION		PAGE
1.0	Summary	1
2.0	Estimate Scope	1
3.0	Quantity Development (Cycles 1 & 2 only)	1
4.0	Equipment Pricing	3
5.0	Bulk Material Pricing	3
6.0	Construction Labor	4
6.1	Wage Rates / Construction Crews	4
6.2	Installation Hours	5
6.3	Labor Productivity	5
6.4	Labor Availability	5
6.5	Construction Indirects	5
7.0	Other Costs and Exclusions	7
7.1	Material Take-Off and Design Allowance	7
7.2	Contractor Markup on Materials	8
7.3	Professional Services	8
7.4	Escalation to Period of Performance	9
7.5	Project General Contingency	11
7.6	Project Specific Contingency	12
7.7	Other Exclusions	13
7.8	Typical Owner's Costs	13
8.0	Engineering, Procurement & Construction Management Approach	13
8.1	Procurement Approach	14
8.2	Contracting Approach	14
9.0	Estimate Results	15
10.0	Comparison Estimates	15

APPENDICES

A – Journeyman Wage Rates
B – Average Composite Labor Rate Breakdown
C – Escalation Percentages

1.0 Summary

WorleyParsons prepared three estimates for the NYSEG Compressed Air Energy Storage (CAES) project, two estimates based on Cycle 1 technology (Dresser-Rand) and one estimate based on Cycle 2 technology (ES&P / Man Diesel Turbo).

Initially, WorleyParsons' objective was to prepare two "bottom-up", +/-10% estimates, one for Cycle 1 and one for Cycle 2. Late in the project, it was determined that Cycle 1 could be more viable if output were increased. This resulted in the establishment of Cycle 1A. However, the timing did not allow for the development of the design to support a +/-10% estimate. Rather, the 1A estimate was developed by factoring from the Cycle 1 estimate. The below table summarizes the three estimates prepared by WorleyParsons.

Cycle	Compression (MW)	Output (MW)	Accuracy	Estimate Approach	Estimated Cost ($ Millions)	Estimated Cost ($/kW)
1	170	135	+/- 10%	Bottom Up	$337.8*	$2,502
1A	170	210	+/- 20%	Factored	$364.6*	$1,736
2	170	210	+/- 10%	Bottom Up	$380.0*	$1,810

* Excludes Cavern development costs, Owner's costs, Permit development costs and AFUDC

2.0 Estimate Scope

The scope of each estimate includes the following:

- All scope inside the plant boundary limits
- Offsite water intake structure and pipeline to plant
- Plant switchyard
- 115kV transmission line to interconnect point
- Interconnect switchyard
- 34.5kV distribution line to raw water intake.

3.0 Quantity Development (Cycles 1 & 2 only)

Equipment quantities for major equipment components are based on the plant layout and configuration and associated equipment list and P&ID's. Balance of plant equipment quantities are based on plant designs of similar size developed by WorleyParsons engineering.

Bulk material takeoffs were developed as follows.

Civil

Material take-offs were performed for the bulk civil items such as: stormwater control, fencing, plant roads, access roads, cut & fill, seeding & mulching and excavation.

Structural – Foundations
Concrete quantities for major and minor foundations were developed using in-house information for similarly sized equipment and structures where available. In cases where in-house information was not available, conceptual designs were developed for the purpose of bulk material quantification. Concrete quantities include foundations for all equipment and buildings.

Structural – Steel
Structural steel quantities were developed based on the preliminary design of the buildings and structures.

Piping
Process and Instrumentation Diagrams (P&ID's) were developed for several systems. Using the P&ID's, pipe quantities were developed by establishing a conceptual routing of the piping on the site plan. This was done for all of the major systems and several of the secondary systems.

Valves
In conjunction with in-house piping specifications, the P&ID's were used to establish the basis of the valve quantities.

Electrical – Ductbank
Ductbank quantities were developed using a conceptual ductbank layout.

Electrical – Cable Tray
Cable tray quantities were developed based on a conceptual cable tray layout.

Electrical Cable (Power, control)
Power and control cable quantities were developed using the conceptual layouts for cable tray and ductbank. Efforts were made to identify all of the power circuits required and to establish lengths for each of the various cable sizes.

Electrical Cable (Site Grounding)
A conceptual grounding grid was developed for the purpose of establishing quantities.

Insulation
Pipe insulation quantities were developed based on heat conservation and personnel protection requirements of the various piping systems. Equipment insulation quantities were developed based on conceptual equipment sizes and configurations.

A material take-off/design development allowance to account for quantity growth through the design process is included at the summary level of the estimate. (See Section 7.1 for an expanded discussion.)

4.0 Equipment Pricing

Vendor quotes were solicited from suppliers of the following equipment. Except as noted, the quotes are furnish-only. All quotes are based on "overnight" pricing. WorleyParsons adjusted the quotes to include items such as Technical Direction during Installation (TDI), freight and start-up spares, in cases where vendors omitted these costs.

- Process Air Compressors
- Combustion Turbine Generator
- Air Expanders
- Recuperator
- Cooling Tower (Furnish & Erect)
- Circulating Water Pumps
- Aux Cooling Water Pumps
- Vertical Pumps
- Emergency Generator
- Continuous Emissions Monitoring System (CEMS)
- Bridge Crane
- Fuel Gas Compressors
- Water Treatment System
- Generator Step Up Transformer
- Auxiliary Transformer
- DCS System
- Fire Protection Pumps
- Field Erected Storage Tanks (Furnish & Erect)

The total value of the above equipment as a percentage of Plant Capital Cost is tabulated below.

Quoted Equipment as a Percentage of Plant Capital Cost		
Cycle 1	Cycle 1A	Cycle 2
42%	41%	35%

Pricing for equipment where vendor quotes were not received is based on recent pricing for similar equipment from WorleyParsons estimating in-house data, adjusted to 4Q2011 dollars. WorleyParsons is able to draw from an extensive collection of pricing for a wide array of equipment and materials. This collection was generated and developed through many years of executing the design, procurement and construction management of various power-related projects.

5.0 Bulk Material Pricing

Bulk material pricing is applied to quantities developed for the project. In general, pricing is based on WorleyParsons in-house data. However vendor input was received for the following bulk commodities:

- Ready-mix concrete
- Reinforcing Steel
- Roofing
- Siding
- Select piping & valves

6.0 Construction Labor

Development of overall construction labor costs takes into account wage rates, installation hours, labor productivity, labor availability and construction indirect costs. A more detailed description and methodology is as follows.

6.1 Wage Rates / Construction Crews

Davis-Bacon prevailing rates were obtained from the GPO Access website for Davis-Bacon Wage Determination. Appendix A is a listing of Journeyman wage rates and fringe benefit rates used in the estimate. Rates are valid to May, 2012.

In calculating the average wage rate for any given craft, WorleyParsons assumes a ratio of 1 apprentice to 8 journeymen to 1 working foreman. It should be noted that there may be a requirement for a greater number of apprentices. The approach taken by WorleyParsons allows for a higher ratio of apprentices to journeymen without exceeding estimated costs. With respect to General Foreman, requirements vary among the construction trades. For trades that use General Foreman, WorleyParsons includes 1 General Foreman for every 35 craft.

WorleyParsons developed several construction crews that incorporate not only the above wage rates for the respective crafts, but also construction indirects (as more fully described in Section 6.5) specific to the respective crew. Below is a listing the crews used in the development of the estimate.

- Site Work-Light
- Site Work-Medium
- Site Work-Heavy
- Site Work-Extra Heavy
- Underground Electrical
- Electrical Bulks
- Electrical Equipment
- Insulation
- Instrumentation/Controls
- Mech. Equipment-General
- Combustion Turbine Erection
- Boiler Erection
- Expander Erection
- HVAC
- Underground Piping
- Above Ground Piping
- Fire Protection
- Plumbing
- Painting

- Concrete-Forms
- Concrete-Rebar
- Concrete-Placement & Finish
- Concrete-Complete
- Masonry
- Structural Steel
- Miscellaneous Steel
- Carpentry
- Roofing
- Siding
- General Architectural

6.2 Installation Hours

WorleyParsons maintains a database of standard unit installation hours. The database represents standard installation rates for US Gulf Coast Merit Shop. Standard unit installation rates were applied to the quantities and equipment in the estimate. The resultant hours were further adjusted for local productivity (described below).

Equipment setting man-hours were developed using a combination of several techniques. Installation was developed using equipment weights, equipment size, and fabrication completeness upon delivery. Bulk material man-hours are based on WorleyParsons data base.

6.3 Labor Productivity

The estimate reflects union productivity for the Schuyler County, NY area. In evaluating productivity, factors such as jobsite location, type of work (i.e.: new construction) and site congestion were considered. The average productivity factor included in the estimate is a 1.1 multiplier over US Gulf Coast Merit Shop, as described in Section 6.2 above. The increase in hours (or the decrease in productivity) is driven by the jurisdictional guidelines set forth in the union work rules, as opposed to individual craftsperson capabilities.

6.4 Labor Availability

Labor is based on a 50-hour work-week (5-10s). No additional incentives such as bonuses have been included to attract craft labor. The estimate is based on an adequate supply of qualified craft personnel being available to staff this project. It is estimated that about half of the craft required for the project will come from Rochester, NY, with the balance from either Elmira or Ithaca. The estimate includes a travel allowance of $80/day for half of the craft.

6.5 Construction Indirects

In addition to base wage rates and fringe benefits, labor costs include construction indirect costs. A listing of construction indirect costs and a brief description of each is as follows.

Category	Description
Payroll taxes and insurances	Includes employer portions of the following: • Worker's Compensation Insurance • FICA • Federal Unemployment Insurance • State Unemployment Insurance
Contractor's General Liability insurance	Covers the premiums anticipated to be incurred
Construction Supervision	Contractor's Supervision including: • Contractor's Site Management • Superintendents • Project Controls • Site Administrators • Site Quality Assurance • Inspectors • Site Clerical • Miscellaneous Supervision
Indirect Craft Labor	Non-Direct Craft Labor Items including: • Tool Control • Training • Welder Certification • Fire Watch • Site Cleanup • Dust Control • Miscellaneous Indirect Work
Scaffold Erection	Includes costs for rental, erection & removal of scaffolding.
Temporary Facilities	Includes any temporary structures (other than field office) or utilities required at the job site. Items include (but are not necessarily limited to) : • Temporary Warehouse • Site Security • Temporary Electric grid • Power consumed during construction • Water consumed during construction • Trash Hauling fees • Temporary sanitary connections • Temporary Sanitary Facilities • Change trailers
Field Office	Field Office Trailer costs including: • Trailer rental • Furniture • Office equipment • Computers • Site communication • Office supplies
Small Tools & Consumables	Small tools required for construction.

	Consumables such as welding gases and rods
Material Handling	Labor costs to receive, unload & properly store materials and equipment delivered to the site. Includes materials management. Labor to retrieve materials and equipment from storage and deliver to the worksite.
Safety / Incentives	Includes safety manager, personal protective equipment, drug testing kits including lab fees, jobsite orientation materials and materials required to maintain a safe jobsite.
Mobilization / Demobilization	Includes costs associated with mobilizing to the jobsite and demobilizing from the jobsite
Construction Equipment	Includes costs for rental of all construction equipment necessary to construct the project. Equipment operators are included with direct labor costs.
Fuel, Oil & Maintenance for Construction equipment	Includes costs for the fuel, oil & maintenance of the construction equipment above.
Contractor's Overhead and Profit (on labor and indirects)	Contractor's overhead and profit markup on all labor-related items as included above. (Contractor's markup on materials discussed in Section 7.2 below)

Appendix B presents a breakdown of the overall average composite wage rate used in the estimate.

7.0 Other Costs and Exclusions

7.1 Material Take-Off and Design Allowance

Material Take-off (MTO) and Design Allowances are included in the estimate and are intended to compensate for the degree of engineering that is incomplete. This allowance differs from contingency since it is a known "unknown", as opposed to contingency which is considered an assessment of unknown "unknowns".

The value for MTO and Design allowance was established by applying percentages to estimated costs for major bulk commodities. Percentages ranging between 5% and 10% were used. Percentages are based on a number of factors including historic percentage changes, degree of certitude in design features and overall confidence in developing quantities for the respective system. Based on WorleyParsons experience in combined cycle power plants, the following percentages were used:

Description	MTO %
Site Preparation	5
Concrete Work	5
Pipe, Valves & Fittings – Above Ground	6

Structural Steel	5
Instruments & Controls	5
Painting	10
Electrical	5
Insulation	6
Site Development, Roads & Paving	5
Buildings	5
Building Components & Fixtures	5
Pipe, Valves & Fittings – Below Ground	6

7.2 Contractor Markup on Materials

Contractor markup on materials reflects the markup that contractors will apply to materials provided under their respective contracts. A rate of 6% was used, based on WorleyParsons experience with current market conditions. This markup represents contractor's overhead & profit on materials purchased by the contractor. (Note that contractor's overhead & profit on labor and construction indirects is included in the composite labor rate). As more fully described in Sections 8.1 and 8.2 below, many items will be purchased via separate purchase orders by the EPCM contractor and delivered to the site for installation by the construction subcontractor. In keeping with the EPCM concept, no contractor's markup was applied to materials to be purchased under these purchase orders.

7.3 Professional Services

Costs for Engineering and Design, Construction Management, Start-up Services and home office support during construction and startup have been included as an allowance based on typical costs for similar projects. The specific services provided are as follows:

Engineering and Design

Engineering and Design includes all of the engineering, design, procurement and management required for the project. Tasks include but are not necessarily limited to:

- All Civil, Structural, Architectural, Mechanical, Piping, Electrical, Instrumentation and Controls Engineering.
- All Civil, Structural, Architectural, Mechanical, Piping, Electrical, Instrumentation and Controls Layout and Design work
- Specification of equipment and services.
- Development of contract documents for Purchase Orders and Construction Contracts
- Issuing Requests for Quotations (RFQ) and Requests for Proposals (RFP) for all Purchase Orders and Construction Contracts.
- Receiving all RFQs and RFPs, performing bid evaluations, participation in negotiations, and issuing Purchase Orders and Constructions Contracts.
- Serving as an agent for RGE in the Administration of the Purchase Orders and Construction Contracts.

- Providing home office engineering support during construction and commissioning.
- Providing overall design and project management including scheduling, estimating, project controls, document controls, general administration and clerical support.

Construction Management

Construction Management includes pre-construction support of engineering & procurement, and site construction management during construction. It is anticipated that the following personnel will be required to provide proper oversight of the construction contracts:

- Site Construction Manager
- Contracts Administration Specialist
- Quality Coordinator
- Safety Lead
- Warehouse Specialist
- Structural Discipline Lead
- Mechanical Discipline Lead
- Rotating Equipment Specialist
- Electrical Discipline Lead
- Instrumentation Discipline Lead
- Project Controls / Scheduling Lead
- Cost Analyst
- Administrative Assistant
- Document Control Clerk

Start-Up Services

Start-Up Services include the development and implementation of the procedures and testing in order to energize plant systems and turnover a fully operational facility to the owner.

7.4 Escalation to Period of Performance

The estimate includes escalation to the period of performance. There are two major steps in developing estimated costs for escalation – development of annual escalation percentages and application of annual escalation percentages.

Development of Annual Escalation Percentages

For annual escalation percentages, WorleyParsons sought input from Cambridge Energy Research associates (CERA). CERA is an independent research company serving the energy industry. For future escalation, CERA employs three different approaches. Below is a listing of the framework scenarios and a brief summary of each.

- Global Redesign "Reinvigorated market forces and shared interest among major powers to expand trade and investment foster robust economic growth"

- Metamorphosis "Describes an accelerated move toward a lower-carbon energy economy

- Vortex "Volatile economic growth returns with a vengeance in the early 2010's"

For this project, CERA provided future projected escalation rates for various categories for both Global Redesign and Vortex framework scenarios. Since Global Redesign is considered the "most-likely" scenario, they were chosen as the basis for the escalation percentages.

Projected annual escalation percentages used are shown in Appendix C.

Application of Annual Escalation Percentages

The annual escalation percentages were overlaid against the project schedule in order to develop values for escalation. More specifically, estimated items were divided into three major categories: equipment, bulk material and labor. The approach to each is more fully described below.

Equipment

Equipment was divided into Procurement Packages (See Section 8.1 for discussion regarding Procurement Packages) categories such as pumps, electrical equipment, tanks, etc. The project schedule was then used to determine the approximate date when a purchase order will be issued and when delivery of the goods under the purchase order will be made. The mid-point between these two dates is considered the date to which the respective category needs to be escalated. The escalation duration is the amount of time between the data date, which is November 2011 for all equipment, and the above midpoint. The annual escalation rates are applied to the escalation duration to determine the value for escalation.

Bulk Material

Bulk materials were divided into construction packages (See Section 8.2 for discussion regarding Construction Packages). The project schedule was then used to determine the approximate date when a construction contract will be issued and when installation will occur, recognizing that installation in many cases will occur over several months. The mid-point between these two dates is considered the date to which the respective category needs to be escalated. The escalation duration is the amount of time between the data date, which is November 2011 for all materials, and the above midpoint. The annual escalation rates are applied to the escalation duration to determine the value for escalation.

Labor

For labor, the Construction Package breakdown was used. Similar to both equipment and bulk materials, each category was compared against the schedule to establish a timeframe for expenditures. Labor escalation tends to be different from the escalation for equipment and bulk materials in that pay increases tend to occur once per year, generally around May or June. In order to determine the value of escalation, the following process was used for each category: Beginning with 2012, the schedule was evaluated to determine what percentage of the work would occur after each annual uplift. This percentage was then multiplied against the estimated value of labor for a given category. The resultant was then multiplied against the annual escalation percentage for the same year. This revised value becomes the starting point for determining the subsequent years' escalation. This process is repeated for all subsequent years requiring escalation.

Estimated escalation values for the above categories are summarized in Appendix L.

7.5 Project General Contingency

General contingency addresses unspecified elements of cost within the current defined project scope. It is expected that by the end of the project the entire contingency will be spent on either direct or indirect costs.

Project contingency is calculated by applying a range of factors to individual systems or components within the estimate. Contingency rates ranging from 3% to 24% were applied, depending on the likelihood for cost changes. In establishing percentages for contingency, the estimate was divided into four major categories: Equipment, Bulk Materials, Installation Labor and Professional Services

Key considerations for contingency by category are as follows:

Equipment:

- A large percentage of estimated equipment costs is based on either vendor quotes or recent in-house data, contributing significantly to pricing confidence.
- In WorleyParsons experience, equipment pricing tends to experience only minimal growth over a project's duration.

Bulk Materials:

- The design as estimated is subject to quantity growth. While MTO and design allowances are included to cover 'normal' quantity growth, it is conceivable that a greater than expected amount of growth could occur.
- Occasionally in the detailed design phase, the specification of a given item will be enhanced and, thus, more expensive.

- In WorleyParsons experience, the design team has a certain amount of control over issues such as quantity growth.

Installation Labor:

- Labor costs tend to be the most subjective costs within the estimate. Actual productivity can vary significantly from estimated productivity. Even a 5% reduction in productivity could translate into several million dollars.
- Depending on locally available resources, it could be necessary to go beyond the immediate area to staff the project. If so, incentives beyond overtime could be necessary.
- In WorleyParsons experience, the area that experiences the most growth is installation labor.

Professional Services:

For Professional Services, a flat percentage of 10% was used. This percentage is based on WorleyParsons experience in designing, procuring and managing the construction of power plants.

Overall Average

The overall average contingency equates to 7.9%. The table below shows the range of contingency percentages applied to the various cost categories.

Project General Contingency				
Item	**Range (%)**	**Cycle 1**	**Cycle 1A**	**Cycle 2**
Equipment	3 – 6	3.1	4.2	3.2
Bulk Material	10 – 18	13.4	14.7	13.7
Installation Labor	20 - 24	20.0	21.8	20
Professional Services	10	10.0	10	10
Total		**9.5%**	**10.9%**	**10.3%**

7.6 Project Specific Contingency

Specific contingency addresses specific cost items likely to be incurred but having unknown value. As indicated above, vendor quotes were solicited for key CAES equipment. The solicitation packages included specific commercial terms & conditions (T's & C's). The vendor quotes received did not take into account the requirements of the T's & C's. In order to account for this disparity and, not knowing the exact amount needed by the vendors to conform to the T's & C's, a specific contingency was included. This applies to Cycles 1, 1A & 2. The value of the specific contingency was established by taking 6% of the value of the key CAES equipment.

Additionally, Cycle 2 vendors require a License Fee. Although the value of the License Fee was provided by the vendor, it was decided to include this value as a specific contingency.

7.7 Other Exclusions

A list of items excluded from the estimate includes, but is not necessarily limited to, the following:

- Owner's Costs (see below)
- Premiums beyond 5-10's required to attract craft labor
- Premiums associated with an EPC contracting approach
- Allowance for Funds Used During Construction
- All taxes with the exception of payroll taxes
- Cavern Development Costs

7.8 Typical Owner's Costs

Owner's costs are excluded from the estimate. Typical Owner's costs include, but are not limited to, the following:

- Permits & Licensing
- Land Acquisition / Rights of Way Costs
- Project Development Costs
- Legal Fees
- Owner's Engineering / Project & Construction Management Staff
- Plant Operators during startup
- Electricity consumed during startup
- Fuel and Reagent consumed during startup
- Initial Fuel & Reagent Inventory
- Transmission Interconnections & Upgrades
- Operating Spare Parts
- Furnishings for new Office, Warehouse and Laboratory
- Financing Costs

8.0 Engineering, Procurement & Construction Management Approach

The estimates are based on an Engineer – Procure – Construction Manage (EPCM) multiple contract approach. This approach basically has one main contractor, typically an A/E firm to produce the design, assist in the procurement of goods and services and provide construction management services during construction. The EPCM contractor generally acts as an agent for the owner when purchasing said goods and services, meaning contracts and purchase orders are written on the owner's letterhead.

There may be several purchase orders to purchase the necessary engineered equipment and engineered bulks for the project. These items would be handed to the installation contractors to install. The estimate is based on no markups by the EPCM contractor on any of the purchase orders or construction contracts.

Installation is achieved through the use of multiple subcontractors. Contractors are responsible for purchasing non-engineered bulks such as concrete and small bore

piping. As discussed in Section 7.2, Contractors will generally apply a markup on the value of non-engineered bulks for overhead and profit.

The estimate is based on warranties being provided by the equipment manufacturers. Additionally, the EPCM contract does not include plant performance guarantees, pricing guarantees, schedule guarantees or guarantees associated with consumables during plant operation (fuel, aux power, etc).

8.1 Procurement Approach

As discussed above, the execution of the EPCM contracting approach will involve multiple purchase orders. Below is a sample listing of Furnish-only Purchase Orders. Because of the flexible nature of the EPCM contracting approach, this list can vary significantly.

Furnish & Deliver Purchase Orders	
Air Turbine Generator	Fuel Gas Compressor
Combustion Turbine Generator	Fuel Gas Conditioning
Emergency Generator	Fuel Gas Chromatograph
Large Circuit Breakers	Bridge Crane
Isophase Bus Duct	Circulating Water Pumps
Non-Segregated Phase Bus Duct	Sump Pumps
Raw Water Pumphouse MCC	Fire Water Pumps
Step-Up Transformers	Misc Horizontal Pumps
Aux Transformers	Misc Vertical Pumps
Miscellaneous Transformers	Recuperator
Distributed Control System	Process Air Compressors
Continuous Emissions Monitoring	Air Receiver & Dryer
Ammonia Handling System	Air Stack
Water Treatment System	Circulating Water Piping
Oil / Water Separator	Power Distribution Centers
Packaged Sanitary System	

8.2 Contracting Approach

As discussed above, the execution of the EPCM contracting approach will involve multiple construction contract packages. Below is a sample listing of Furnish, Deliver & Erect Contracts. Similar to the procurement packages, the flexible nature of the EPCM contracting approach allows for this list to vary significantly.

Furnish, Deliver & Erect Contracts	
Cooling Tower	Mechanical Erection
Field Fabricated Tanks	Piping
Initial Sitework	Fire Protection
Final Sitework	Insulation
Offsite Pipeline	Plant Switchyard
Foundations & Underground Utilities	Interconnect Switchyard
Generation Building Erection	115kV Transmission Line
Admin / Maintenance Building Erection	34.5kV Distribution Line
Pre-Engineered Buildings	Electrical and I&C
Raw Water Pumphouse	Start-Up Subcontracts

9.0 Estimate Results

Below are the results of the capital cost estimates for the three CAES cycles.

Plant Capital Costs			
	$ x 1,000		
Item	**Cycle 1**	**Cycle 1A**	**Cycle 2**
Procurement Packages	$ 146,296	$ 152,972	$ 141,863
Construction Packages	112,082	123,688	137,988
Subtotal	258,378	276,660	279,851
MTO & Design Allowances	3,992	4,312	4,796
Contractor Markup on Material	2,595	2,771	3,229
Subtotal – Construction	$ 264,965	$ 283,743	$ 287,876
Engineering, CM & Startup Services	24,018	24,018	25,078
Escalation	12,371	13,654	20,561
Subtotal	$ 301,354	$ 321,415	$333,515
Contingency - General	28,613	35,064	34,298
Contingency - Specific	7,833	8,133	12,191
Total - Plant Capital Costs	**$ 337,799**	**$ 364,612**	**$ 380,004**
	$/kW	**$/kW**	**$/kW**
	$2,502	**$1,736**	**$1,810**

10.0 Comparison Estimates

The CAES technology is somewhat unique. As a means of comparing the CAES plants to the costs of more mainstream technology, two high-level estimates were developed; one for natural gas-fired simple cycle and one for natural gas-fired combined cycle. The configurations and associated output are below:

Comparison Estimate Configurations		
	Configuration	Output (MW)
Simple Cycle	4 x 0 LM6000PG	210
Combined Cycle	3 x 1 LM6000PG	209

The estimates were developed using WorleyParsons in-house parametric estimating model. The model uses high-level project parameters to generate conceptual-level cost estimates. The model has the capability to incorporate vendor information for major equipment. WorleyParsons has a significant amount of recent vendor information for the equipment required for the comparison estimates. This information was incorporated into the estimates.

The comparison estimates have an accuracy of +/-30%. The overall scope of the comparison estimates is similar to that of the CAES estimates and includes:

- All scope inside the plant boundary limits
- Offsite water intake structure and pipeline to plant
- Plant switchyard
- 115kV transmission line to interconnect point
- Interconnect switchyard
- 34.5kV distribution line to raw water intake.

Results of the comparison estimates are below:

Comparison Estimates		
Item	**Simple Cycle**	**Combined Cycle**
Procurement Packages	$ 115,768	$ 136,619
Construction Packages	59,045	78,545
Subtotal	174,812	215,164
MTO & Design Allowances	incl above	incl above
Contractor Markup on Material	Incl above	Incl above
Subtotal – Construction	$ 174,812	$ 215,164
Engineering, CM & Startup Services	15,733	19,365
Escalation	12,237	15,061
Subtotal	$ 202,782	$249,589
Contingency - General	30,417	37,438
Contingency - Specific	0	0
Total - Plant Capital Costs	**$ 233,200**	**$ 287,028**
	$/kW	**$/kW**
	$1,110	**$1,373**

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Appendix A

Journeyman Wage Rates and Fringe Benefits

Valid to May, 2012

	$/hr		
Craft	Base Rate	Fringes	Total
Asbestos Workers / Insulators	$ 28.99	$ 14.97	$ 43.96
Boilermakers	31.57	19.78	51.35
Bricklayer	27.81	16.02	43.83
Carpenters	26.87	15.53	42.40
Cement Masons	29.99	17.56	47.55
Laborers	25.66	15.60	41.26
Electricians	32.45	22.76	55.21
Operating Engineer - Heavy	35.75	20.45	56.20
Operating Engineer – Light	32.96	20.45	53.41
Operating Engineer – Medium	34.99	20.45	55.44
Operating Engineer – Oiler	30.01	20.45	50.46
Millwright	26.87	15.53	42.40
Piledriver	26.87	15.53	42.40
Plasterer	27.81	16.02	43.83
Plumber	30.76	20.72	51.48
Painter	22.52	14.52	37.04
Roofers	21.84	10.65	32.49
Sheetmetal Worker	23.74	10.23	33.97
Sprinkler Fitter	31.05	19.47	50.52
Ironworker	27.81	20.24	48.05
Pipefitter	30.76	20.72	51.48
Tile Layer	28.56	12.05	40.61
Teamster	20.34	10.70	31.04
Weighted Average	29.64	18.85	48.49

Appendix B

Composite Labor Rate Breakdown

	$/hr (Average)
Base Rate	$ 29.64
Fringe Benefits	18.85
Subtotal	48.49
Worker's Compensation Insurance	3.93
Contractor's General Liability Insurance	0.81
FICA	2.27
FUI	0.24
SUI	1.82
Subtotal	57.55
Supervision	11.51
Indirect Craft	5.76
Scaffold Erection	2.72
Temporary Facilities	1.25
Field Office	1.25
Small Tools / Expendables	2.58
Material Handling	2.88
Safety / Incentives	2.00
Mob / Demob	1.08
Subsistence / Travel	4.00
Premium Time / General Foreman	8.84
Construction Equipment incl Fuel, Oil & Maint	12.14
Subtotal	113.55
Overhead & Profit	20.44
Total	$ 133.99

Appendix C

Escalation Percentages – CERA Global Redesign

Component	2011	2012	2013	2014	2015	2016
Fabricated Steel	9.03	-2.93	-4.97	22.17	-2.84	-16.95
Power Transformers	1.29	1.73	4.53	-0.44	5.82	0.04
Gas Turbines	-0.96	-0.24	10.73	2.44	13.71	1.87
Compressors	2.27	2.24	-0.20	7.92	0.88	-1.25
Expanders	4.24	5.59	1.38	5.89	2.1	1.01
Stack (Steel)	5.45	3.48	-0.68	8.69	0.60	-1.85
Heat Exchangers	5.50	3.48	-1.72	10.39	-0.02	-3.19
Cooling Towers	-3.73	0.00	2.04	-1.06	5.26	-0.33
Carbon Steel Pipe	14.69	9.24	-7.36	20.59	-2.76	-10.00
Electrical Bulks	6.20	-4.47	-7.36	-6.67	-4.60	-3.60
Pumps	2.27	5.56	-0.26	7.97	0.85	-1.31
Labor & Construction Wages		1.28	2.11	1.13	0.6	0.78

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Seneca CAES Project
- Cost Estimating

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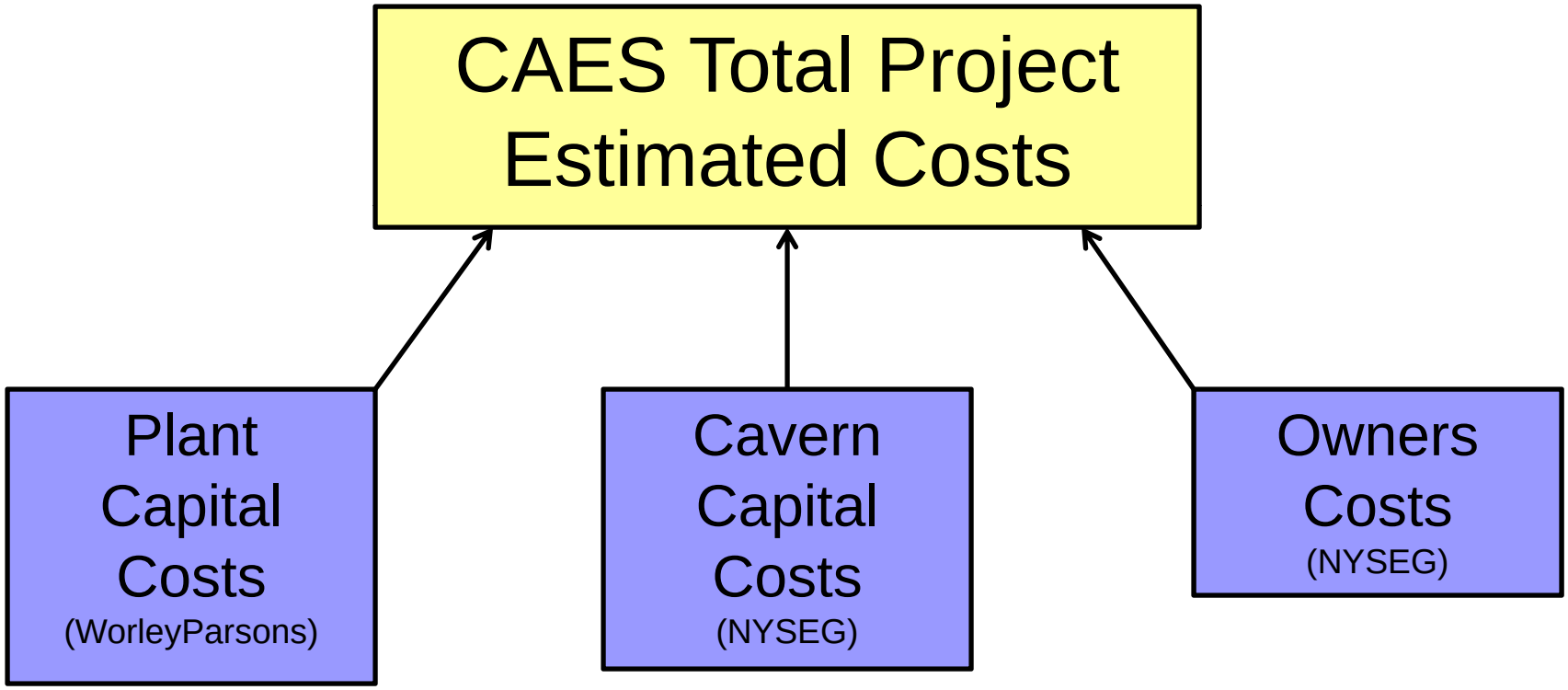
Cost Estimate
Total Project Estimate Overview



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Plant Capital Cost Estimate Overview

- Plant Capital Cost Estimates were developed for the following cases:
  - Cycle 1 (170MW / 135MW Compression/Generation)
  - Cycle 1A (170MW / 210MW)
  - Cycle 2 (170MW / 210MW)

- Estimate Approach & Accuracy:
  - Cycle 1: Detailed, Bottom-Up, +/-10%
  - Cycle 1A: Factored from Cycle 1, +/- 20% (see separate slide for explanation)
  - Cycle 2: Detailed, Bottom-Up, +/- 10%

- Estimate Scope includes:
  - All scope within the plant boundary
  - Switchyard, transmission line and interconnect substation
  - Raw water pump house and pipeline to plant

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Plant Capital Cost Estimate
Scope Development

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Cycle 1 & Cycle 2

- Scope of project defined through the engineering process:
  - Layouts, P&ID's Equipment Lists, Single Line Diagrams, etc.

- Material Take-Offs developed for bulk materials including: (but not limited to)
  - Excavation
  - Concrete
  - Reinforcing Steel
  - Structural Steel
  - Siding
  - Roofing
  - Pipe
  - Valves
  - Cable
  - Conduit
  - Cable Tray

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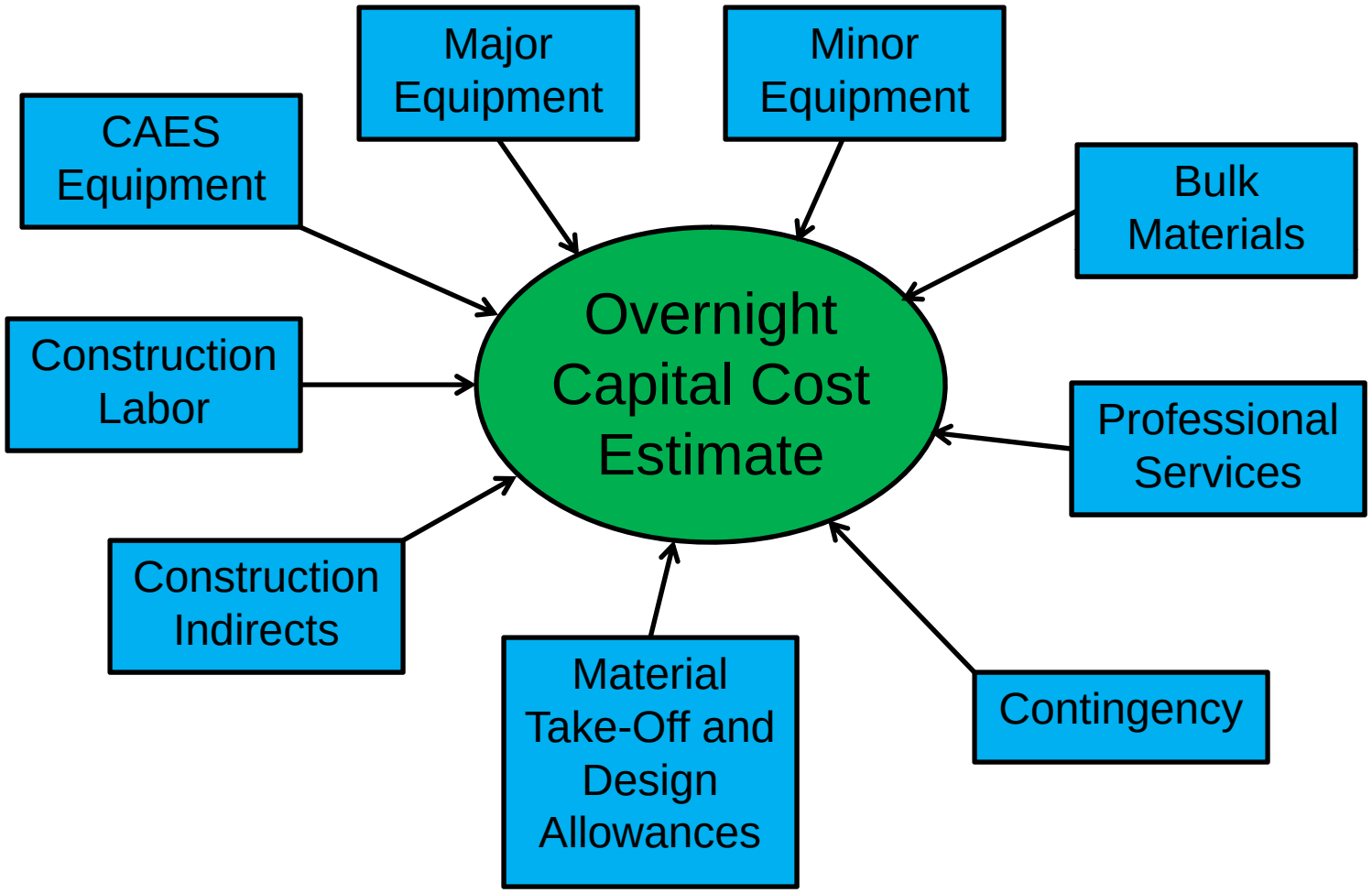
Plant Capital Cost Estimate Components



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Plant Capital Cost Estimate
Equipment Pricing

CAES Equipment — Vendor pricing received for the following CAES Equipment:

Air Compressors	Air Expanders
Combustion Turbine	Recuperator

Major Equipment — Vendor pricing received for the following Major equipment:

Bridge Crane	Cooling Tower
Field Erected Tanks	Circ Water Pumps
Vertical Pumps	Fire Protection Skid
GSU Transformer	Emergency Generator
CEMS	Fuel Gas Compressor

Minor Equipment — Includes minor, Balance-of-Plant equipment such as sump pumps and small transformers. Pricing developed based on WorleyParsons in-house cost data.

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Plant Capital Cost Estimate
Bulk Material Pricing

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Bulk Materials

Vendor pricing received for the following bulk materials:

- Aggregate
- Reinforcing Steel
- Roofing
- ARC Valves
- FRP Piping
- Control Valves
- Ready-Mix Concrete
- Siding (Insulated & Uninsulated)
- Noise Enclosures
- U/G Valves
- Ductile Iron Piping

The balance of bulk material pricing is based on WorleyParsons – in-house cost data.

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Plant Capital Cost Estimate
Construction Labor

Wage Rate	Davis Bacon rates for Schuyler County, NY
Crew Rates	WorleyParsons standard crew configurations used. Crews consist of a blend of crafts required for a specific task as well as the construction supervision and construction indirects needed to perform the task.
Installation Hours	Hours to install permanent plant equipment developed based on equipment type, weight, size and fabrication completeness upon delivery. Hours to install bulk materials based on WorleyParsons in-house installation data.
Labor Productivity	Labor Productivity based on published information for the Watkins Glen, NY area.
Work Week	Estimate based on working 5 days per week, 10 hours per day. An allowance for casual overtime is included.
Travel	The estimate is based on 50% of the craft receiving $80/day per diem allowance.

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Plant Capital Cost Estimate
Construction Indirects

Construction Indirects include the following:

- Payroll Taxes & Insurance
- Contractor's General Liability Insurance
- Construction Supervision
- Indirect Craft Labor
- Scaffold Erection
- Temporary Facilities
- Field Office
- Small Tools & Consumables
- Material Handling
- Safety / Incentives
- Mobilization / Demobilization
- Construction Equipment
- Fuel Oil & Maintenance
- Contractor's Overhead & Profit

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Plant Capital Cost Estimate
Procurement Packages

The estimates are based on the following Procurement Packages:

- Air Turbine Generator
- Combustion Turbine
- Emergency Generator
- Large Circuit Breakers
- Iso-phase Bus Duct
- Non-Seg Bus Duct
- Raw Water Pumphouse MCC
- Step-Up Transformer
- Aux Transformers
- Miscellaneous Transformers
- DCS
- CEMS
- Ammonia Unloading & Forwarding
- Water Treatment
- Oil / Water Separator
- Packaged Sanitary System
- Fuel Gas Compressor
- Fuel Gas Conditioning
- Fuel Gas Chromatograph
- Bridge Crane
- Circ. Water Pumps
- Sump Pumps
- Fire Water Pumps
- Misc .Horizontal Pumps
- Misc. Vertical Pumps
- Recuperator
- Process Air Compressor
- Air Receiver & Dryer
- Air Stack
- Circ. Water Pipe
- Power Distribution Centers

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Plant Capital Cost Estimate
Construction Packages

The estimates are separated into the following Construction Packages:

- Cooling Tower
- Field Fabricated Tanks
- Initial Sitework
- Final Sitework
- Offsite Pipeline
- Foundations & U/G Utilities
- Generation Building Erection
- Admin/Maint. & Mech Eq. Bldg.
- Pre-Engineered Buildings
- Raw Water Pumphouse
- Mechanical Erection
- Piping
- Fire Protection
- Insulation
- Plant Switchyard
- Interconnect Switchyard
- 115kV Transmission Line
- 34.5kV Distribution Line
- Electrical and I&C
- Start-up Subcontracts

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Plant Capital Cost Estimate
Cycle 1A Approach

Cycle 1A Estimate approach is different from that of Cycle 1 and Cycle 2.

Late in the process, Dresser-Rand provided pricing for Air Expanders capable of generating 210MW (Cycle 1 is 135MW). WorleyParsons had insufficient time to develop a detailed design and associated estimate for this case, labeled Cycle 1A.

Rather, WorleyParsons developed a 'factored" estimate as follows.

- Starting point is Cycle 1
- Each Procurement Package and Construction Package was broken down into logical buckets. For instance, The Foundations and U/G Utilities contract was broken down by foundation. Mechanical Erection was broken into equipment type.
- Factors were applied where appropriate. For instance, the GSU transformer foundation was multiplied by a factor based on plant output.
- Revised Dresser-Rand Pricing was used directly

Plant Capital Cost Estimate
MTO & Design Allowances

Material Take-Off and Design Allowances

- Considered a “known unknown”, which differentiates this allowance from contingency
- Intended to compensate for the degree of engineering that is incomplete at the time of estimate preparation.
- Calculated by applying percentages to the estimated costs for major bulk commodities
- Percentages based on a number of factors including:
  - Historic percentage changes
  - Degree of certainty in design features
  - Overall confidence in developing quantities for respective systems.

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Plant Capital Cost Estimate
Professional Services

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Professional Services includes:

- Engineering
- Design
- Procurement Services
- Project Management
- Site Construction Management
- Plant Startup Services

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Plant Capital Cost Estimate Escalation

- Escalation is intended to capture predicted changes in costs between Estimate Development and Project Execution
- Escalation development involves two major steps:
  - Development of Annual Escalation percentages
  - Application of Annual Escalation percentages
- Forecasted percentages provided by CERA
- Project schedule used to determine the length of time between overnight cost estimate data date and mid-point of scheduled expenditure.
- Escalated values determined by multiplying overnight costs against annual escalation percentages for the required duration as determined above, compounded annually.
- Escalation averaged slightly over 2% per annum.

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Plant Capital Cost Estimate
General Contingency

- Addresses unforeseen elements of cost within the defined scope
- Calculated by applying a range of factors to individual systems or components
- Major Categories and the respective range of percentages for contingency are as follows.:
  - Permanent Plant Equipment 3.0 – 6.0%
  - Bulk Material Purchase 10.0 – 18.0%
  - Installation Labor 20.0 – 24.0%
  - Professional Services 10.0%
- Overall average contingency percentage ranges from 9.5 – 10.4%

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Plant Capital Cost Estimate
Specific Contingency

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- Addresses foreseen elements of cost that have undefined value.
- Specific Contingencies included for the following:
  - Commercial Terms & Conditions on CAES Equipment
  - Licensing Fee (Cycle 2 only)

NOTE: MUD MATS ARE NOT INCLUDED.
Ref. GA Drawing: CAES-1-DW-111-002-101 Rev B

						Main dimensions (ft)								Structural Steel						Base Plate & Anchor Bolts								Grating			Handrail		Waterstop	
Old GA Item No.	New GA Item No.	Location	Description	Type of Material	Quantity	L	W	H	Crushed Stone (CY)	Des.Vol Conc. (CY)	Des. Excav. Volume (CY)	Backfill Volume (CY)	Design Formwork (SF)	Design Rebar (Tons)	Heavy[1] Steel (lbs/ft)	Medium[1] Steel (lbs/ft)	Light[1] Steel (lbs/ft)	Length (ft)	Design Steel-Heavy (Tons)	Design Steel-Medium (Tons)	Design Steel-Light (Tons)	No. of Base Pl	No. of AB per Base Pl	Anchor Bolt Dia (in)	Anchor Bolt Length (in)	Base Pl Length (in)	Base Pl Width (in)	Base Pl Thickness (in)	Design Base Pl (Tons)	Design Anchor Bolts (Tons)	Length of Grating (ft)	Width of Grating (ft)	Area of Grating (SF)	Length of Guardrail (ft)	Total Length of Guardrail (ft)	Length of Waterstop (ft)	Total Length of Waterstop (ft)
1,2, 3, 6, 33, 38	1, 2, 3, 6, 33, 38	Turbine/Compressor Bldg (394'X120'X59.75' high)	Beams & Columns	Steel	1														794.00	400.00	133.00															
			Purlins	Steel	1																133.00															
			Girts	Steel	1																145.00															
			Grating	Steel	6																									20.00	6.00	720.00				
			Handrail	Steel	6																												32.00	192.00		
			Base Plate & Anchor Bolts	Steel	1																	28	4	2	36	21.00	18.00	1.50	2.25	1.80						
			Base Plate & Anchor Bolts	Steel	1																	28	8	3	48	24.00	24.00	2.50	5.72	7.48						
			Exterior Columns	Concrete	28	8.00	8.00	2.50	33.2	165.9	311.1	112.0	2240.0	10.79																							
			Interior Columns	Concrete	28	12.00	12.00	3.00	74.7	448.0	711.4	188.7	4032.0	29.12																							
			Intercooler Fdns	Concrete	6	30.00	12.50	2.00	41.7	166.7				10.83																							
			Aftercooler Fdns	Concrete	2	17.50	5.00	2.00	3.2	13.0				0.84																							
			Expander & Generator Fdn	Concrete	1	72.00	18.00	6.50	24.0	312.0	523.7	187.7	1170.0	20.28																							
			Expander & Generator Fdn	Concrete	1	27.00	18.00	2.67	9.0	48.1			240.3	3.12																							
			Compressor & Motor Fdns	Concrete	2	28.75	16.00	7.60	17.0	259.0	1,003.2	727.2	1360.4	16.83																							
			Compressor & Motor Fdns	Concrete	2	52.25	20.00	6.00	38.7	464.4			1734.0	30.19																							
			Compressor & Motor Fdns	Concrete	2	31.00	20.00	10.67	23.0	490.0			2176.7	31.85																							
			Interior Mat (1.5' thick)	Concrete	1	394.00	120.00	1.50	627.7	2156.8				140.19																							
			Total (yd^3)						**892.1**	**4523.9**	**2549.4**	**1215.6**	**12953.4**	**294.1**					**794.0**	**400.0**	**393.0**									**8.0**	**9**							
															Optional Steel Total (tons)							*Base PL + Anchorage (tons)*															
4, 7	4,7	Recuperator Fdn (72'X35'X4.5' thick)	Base Plate	Steel																		24				30.00	24.00	2.00	4.90							
			Anchor Bolts	Steel																		6	6	2.50	54.00				0.00	1.35						
			Anchor Bolts	Steel																		18	4	1.50	30				0.00	0.54						
			Mat Foundation (4.5' thick)	Concrete	1	72.00	35.00	4.50	46.7	420.0	507.0	40.4	963.0	27.30																							
			Total (yd^3)						**46.7**	**420.0**	**507.0**	**40.4**	**963.0**	**27.3**					**0.0**	**0.0**	**0.0**									**4.9**	**2**							
															Steel Total (tons)							*Base PL + Anchorage (tons)*															
5	5	Air Inlet Filter Fdn (Assumed)	Column Foundation	Concrete	8	8.00	8.00	2.50	9.5	47.4	266.7	202.4		3.08																							
			Column Piers	Concrete	8	2.50	2.50	4.00	0.9	7.4			320.0	0.48																							
			Total (yd^3)						**10.4**	**54.8**	**266.7**	**202.4**	**320.0**	**3.6**					**0.0**	**0.0**	**0.0**									**0.0**	**0**							
															Steel Total (tons)							*Base PL + Anchorage (tons)*															
8	8	Mechanical Equip Bldg (90'X90'X25' high)	Beams & Column																83.00	42.00	14.00															
			Purlins																		21.00															
			Girts																		23.00															
			Base Plate & Anchor Bolts																			12	4	2	24	21.00	21.00	1.50	1.13	0.29						
			Exterior Columns	Concrete	8	8.00	8.00	2.50	9.5	47.4	88.9	32.0	640.0	3.08																							
			Interior Columns	Concrete	4	10.00	10.00	2.50	7.4	37.0	64.0	19.6	400.0	2.41																							
			Interior Mat (1.5' thick)	Concrete	1	90.00	90.00	1.50	137.9	450.0				29.25																							
			Total (yd^3)						**154.7**	**534.4**	**152.9**	**51.6**	**1040.0**	**34.7**					**83.0**	**42.0**	**58.0**									**1.1**	**0**							
															Steel Total (tons)							*Base PL + Anchorage (tons)*															
9	9	Fire Water Pump House Fdn (21'X7'X1.5' Thick)	Perimeter Beam (1.5' wide X 4' deep)	Concrete	1	50.00	1.50	4.00	1.4	11.1	30.3	17.8	412.0	0.72																							
			Mat Foundation (1.5' thick)	Concrete	1	18.00	4.00	1.50	1.3	4.0	8.9			0.26																							
			Total (yd^3)						**2.7**	**15.1**	**39.2**	**17.8**	**412.0**	**1.0**					**0.0**	**0.0**	**0.0**									**0.0**	**0**							
															Steel Total (tons)							*Base PL + Anchorage (tons)*															
10	10	Service/Fire Water Tank (62'-0" Dia)	Perimeter Beam (2' wide X 4' deep)	Concrete	1	195.00	2.00	4.00	7.2	57.8	131.3	66.3	1576.0	3.76																							
			Total (yd^3)						**7.2**	**57.8**	**131.3**	**66.3**	**1576.0**	**3.8**					**0.0**	**0.0**	**0.0**									**0.0**	**0**							
															Steel Total (tons)							*Base PL + Anchorage (tons)*															
11	11	Demin Water Tank (18'-0" Dia)	Perimeter Beam (2' wide X 4' deep)	Concrete	1	57.00	2.00	4.00	2.1	16.9	39.3	20.3	472.0	1.10																							
			Total (yd^3)						**2.1**	**16.9**	**39.3**	**20.3**	**472.0**	**1.1**					**0.0**	**0.0**	**0.0**									**0.0**	**0**							
															Steel Total (tons)							*Base PL + Anchorage (tons)*															
12, 14	12, 14	Cooling Tower Basin & Pump chamber (79.5'X244'X4.0' High & 25'X50'X18' Deep)	Guardrail	Steel	1																												40.00	40.00		
			Platform	Steel	1											26.0		75.0		0.98																
			Grating	Steel	1																									25.00	7.50	187.50				
			Waterstop for Cooling Tower Basin	PVC	1																														1300.00	1300.00
			Waterstop for Pump Chamber	PVC	1																														150.00	150.00
			Cooling Tower Basin Mat	Concrete	1	244.00	79.50	1.50	359.2	1077.7	1,485.1	48.2	0.0	70.05																							
			Cooling Tower Basin Wall	Concrete	1	639.00	1.25	4.00		116.3			5122.0	7.69																							
			Pump Chamber Mat	Concrete	1	50.00	25.00	2.00	23.1	92.6	1,875.0	518.5	0.0	6.02																							
			Pump Chamber Wall	Concrete	1	150.00	2.00	18.00		200.0			5472.0	13.00																							
			Pump Chamber Roof	Concrete	1	40.00	25.00	2.00		74.1			260.0	4.81																							
			Total (yd^3)						**382.4**	**1562.7**	**2860.1**	**566.7**	**10854.0**	**101.6**					**0.0**	**1.0**	**0.0**									**0.0**	**0**							
															Steel Total (tons)							*Base PL + Anchorage (tons)*															
13	13	Cooling Tower Chem Feed Bldg Fdn (32.5'X32.5'X1.5' Thick)	Perimeter Beam (1.5' wide X 4' deep)	Concrete	1	124.00	1.50	4.00	3.4	27.6	73.5	42.5	372.0	1.8																							
			Mat Foundation (1.5' thick)	Concrete	1	29.50	29.50	1.50	16.1	48.3	73.5			3.1																							
			Total (yd^3)						**19.6**	**75.9**	**147.0**	**42.5**	**372.0**	**4.9**					**0.0**	**0.0**	**0.0**									**0.0**	**0**							
															Steel Total (tons)							*Base PL + Anchorage (tons)*															
16	16	Cooling Tower PDC (30'X15'X1.5' Thick)	Perimeter Beam (1.5' X 4' deep)	Concrete	1	84.00	1.50	4.00	2.3	18.7	48.2	29.2	513.0	1.91																							
			Mat Foundation (1.5' thick)	Concrete	1	27.00	12.00	1.50	6.0	18.0				0.47																							
			Total (yd^3)						**8.3**	**36.7**	**50.2**	**29.2**	**513.0**	**2.4**					**0.0**	**0.0**	**0.0**									**0.0**	**0**							
															Steel Total (tons)							*Base PL + Anchorage (tons)*															
17	17	(3) Aux Transformer (50' X 37' X 5.5' deep)	Guardrail	Steel	3																												85.00	255.00		
			Platform	Steel	3											26.0		200.0		7.80		24.0	0.0		12.0	12.0	0.75	1.10	0.00							
			Platform	Steel	3												7.2	60.0			0.65															
			Grating	Steel	3																									38.00	38.00	4332.00				
			Waterstop	PVC	3																														170.00	510.00
			Mat Foundation (1.5' thick)	Concrete	3	51.00	38.00	1.50	107.7	323.0	1,540.0	858.1		21.00																							
			Pedestal (15'X12'X3' high)	Concrete	3	15.00	12.00	3.00		60.0			486.0	3.90																							
			Pit Wall (4' high X 1.25' thick)	Concrete	3	170.00	1.25	4.00		94.4			2550.0	6.14																							
			Fire Wall (25' high X 1.25' thick)	Concrete	3	86.00	1.25	25.00		298.6			12900.0	19.41																							
			Total (yd^3)						**107.7**	**776.1**	**1540.0**	**858.1**	**15936.0**	**50.4**					**0.0**	**7.8**	**0.6**									**1.1**	**0.0**							
															Steel Total (tons)							*Base PL + Anchorage (tons)*															

NOTE: MUD MATS ARE NOT INCLUDED.
Ref. GA Drawing: CAES-1-DW-111-002-101 Rev B

Old GA Item No.	New GA Item No.	Location	Description	Type of Material	Quantity	Main dimensions (ft) L	W	H	Crushed Stone (CY)	Des.Vol Conc. (CY)	Des. Excav. Volume (CY)	Backfill Volume (CY)	Design Formwork (SF)	Design Rebar (Tons)	Structural Steel: Heavy[2] Steel (lbs/ft)	Medium[1] Steel (lbs/ft)	Light[1] Steel (lbs/ft)	Length (ft)	Design Steel-Heavy (Tons)	Design Steel-Medium (Tons)	Design Steel-Light (Tons)	Base Plate & Anchor Bolts: No. of Base Pl	No. of AB per Base Pl	Anchor Bolt Dia (in)	Anchor Bolt Length (in)	Base Pl Length (in)	Base Pl Width (in)	Base Pl Thickness (in)	Design Base Pl (Tons)	Design Anchor Bolts (Tons)	Grating: Length of Grating (ft)	Width of Grating (ft)	Area of Grating (SF)	Handrail: Length of Guardrail (ft)	Total Length of Guardrail (ft)	Waterstop: Length of Waterstop (ft)	Total Length of Waterstop (ft)
18	18	Ammonia Unloading Area (44' X 15')	Perimeter Beam (1.5'X2.5')	Concrete	1	112.00	1.50	2.50	3.1	15.6	43.6	24.9	567.5	1.01																								
			Mat Foundation (1.5' thick)	Concrete	1	41.00	12.00	1.50	9.1	27.3				1.78																								
			Total (yd³)						12.2	42.9	43.6	24.9	567.5	2.8	*Steel Total (tons)*				0.0	0.0	0.0	*Base PL + Anchorage (tons)*							0.0	0.0	*Grating (SF)*			0.0	*Handrail (FT)*	0.0	*Waterstop (FT)*	0.0
19	19	Ammonia Storage Tank (55' X 20' X 5.5' deep)	Guardrail	Steel	1																													144.00	144.00		
			Platform	Steel	1											26.0		80.0		1.04																	
			Platform	Steel	1												7.2	35.0			0.13	12.0	0.0			12.0	12.0	0.8	0.18	0.00							
			Grating	Steel	1																										17.00	15.00	255.00				
			Waterstop	PVC	1																															150.00	150.00
			Mat Foundation (1.5' thick)	Concrete	1	55.00	20.00	1.50	20.4	61.1	314.7	90.6		3.97																							
			Pedestal (9'X5'X3' high)	Concrete	2	10.00	1.50	3.00		3.3			138.0	0.22																							
			Pit Wall (4' high X 1' thick)	Concrete	1	144.00	1.00	4.00		21.3			720.0	1.39																							
			Total (yd³)						20.4	85.8	314.7	90.6	858.0	5.6	*Steel Total (tons)*				0.0	1.0	0.1	*Base PL + Anchorage (tons)*							0.2	0.0	*Grating (SF)*			255.0	*Handrail (FT)*	144.0	*Waterstop (FT)*	150.0
20	20	Electrical PDC (80' X 25')	Perimeter Beam (1.5'X4.0')	Concrete	1	204.00	1.50	4.00	5.7	45.3	119.0	68.0	1644.0	2.95																								
			Mat Foundation (1.5' thick)	Concrete	1	77.00	22.00	1.50	31.4	94.1				6.12																								
			Total (yd³)						37.0	139.4	119.0	68.0	1644.0	9.1	*Steel Total (tons)*				0.0	0.0	0.0	*Base PL + Anchorage (tons)*							0.0	0.0	*Grating (SF)*			0.0	*Handrail (FT)*	0.0	*Waterstop (FT)*	0.0
21	21	Oil Water Separator Fdn (15' X 7.5')	Mat Foundation (1.5' thick)	Concrete	1	15.00	7.50	1.50	2.1	6.3				0.41																								
			Total (yd³)						2.1	6.3	0.0	0.0	0.0	0.4	*Steel Total (tons)*				0.0	0.0	0.0	*Base PL + Anchorage (tons)*							0.0	0.0	*Grating (SF)*			0.0	*Handrail (FT)*	0.0	*Waterstop (FT)*	0.0
22, 23, 25	22, 23, 25	Admin/Maint/Storage Bldg (120' X 115' X 25' high)	Beams & Column																154.0	77.0	25.0																
			Purlins																		35.0																
			Girts																		39.0																
			Base Plate & Anchor Bolts																			25.0	4.0			21.0	16.0	1.5	1.79	0.00							
			Guardrail		1																													150.00	150.00	150.00	150.00
			Grating		2																										20.00	20.00	800.00				
			Exterior Column Fdn	Concrete	16	8.00	8.00	2.50	19.0	94.8	142.2	28.4	1280.0	6.16																								
			Interior Column Fdn	Concrete	9	10.00	10.00	2.50	16.7	83.3	120.0	20.0	900.0	5.42																								
			Mat Foundation (1.5' thick)	Concrete	1	120.00	115.00	1.50	229.4	766.7				49.83																								
			Total (yd³)						265.0	944.8	262.2	48.4	2180.0	61.4	*Steel Total (tons)*				154.0	77.0	99.0	*Base PL + Anchorage (tons)*							1.8	0.0	*Grating (SF)*			800.0	*Handrail (FT)*	150.0	*Waterstop (FT)*	150.0
24	24	Potable Water Tank (14'-4" Dia)	Perimeter Beam (2' wide X 4' deep)	Concrete	1	45.00	2.00	4.00	1.7	13.3	31.3	16.3	376.0	0.87																								
			Total (yd³)						1.7	13.3	31.3	16.3	376.0	0.9	*Steel Total (tons)*				0.0	0.0	0.0	*Base PL + Anchorage (tons)*							0.0	0	*Grating (SF)*			0	*Handrail (FT)*	0	*Waterstop (FT)*	0
28	28	Step-up Transformer (60' X 46' X 5.5' deep)	Guardrail	Steel	1																													60.00	60.00		
			Platform	Steel	1											26.0		220.0		2.86																	
			Platform	Steel	1												7.2	100.0			0.36	20.0	0.0			12.0	12.0	0.8	0.31	0.00							
			Grating	Steel	1																										44.00	44.00	1936.00				
			Waterstop	PVC	1																															213.00	213.00
			Mat Foundation (2' thick)	Concrete	1	60.00	28.00	2.00	31.1	124.4	493.0	119.7		8.09																								
			Pedestal (30'X28'X3' high)	Concrete	1	30.00	28.00	3.00		93.3			348.0	6.07																								
			Pit Wall (4' high X 1.25' thick)	Concrete	1	204.00	1.25	4.00		37.8			1020.0	2.46																								
			Fire Wall (32' high X 1.25' thick)	Concrete	1	106.00	1.25	32.00		157.0			6466.0	10.21																								
			Total (yd³)						31.1	412.6	493.0	119.7	7834.0	26.8	*Steel Total (tons)*				0.0	2.9	0.4	*Base PL + Anchorage (tons)*							0.3	0.0	*Grating (SF)*			1936.0	*Handrail (FT)*	60.0	*Waterstop (FT)*	213.0
29	29	Guard House (10' X 7.5')	Mat Foundation (1' thick)		1	10.00	7.50	1.00	1.4	2.8	6.3	2.2	35.0	0.18																								
			Total (yd³)						1.4	2.8	6.3	2.2	35.0	0.2	*Steel Total (tons)*				0.0	0.0	0.0	*Base PL + Anchorage (tons)*							0.0	0	*Grating (SF)*			0	*Handrail (FT)*	0	*Waterstop (FT)*	0
34	34	Switchyard Control Bldg (55' X 16')	Perimeter Beam (1.5'X4.0')	Concrete	1	136.00	1.50	4.00	3.8	30.2	79.3	45.3	1100.0	1.96																								
			Mat Foundation (1.5' thick)	Concrete	1	52.00	13.00	1.50	12.5	37.6				2.44																								
			Total (yd³)						16.3	67.8	79.3	45.3	1100.0	4.4	*Steel Total (tons)*				0.0	0.0	0.0	*Base PL + Anchorage (tons)*							0.0	0.0	*Grating (SF)*			0.0	*Handrail (FT)*	0.0	*Waterstop (FT)*	0.0
35	35	Gas Compressor Fdn (72.5' X 55')	Perimeter Beam (1.5'X4.0')	Concrete	1	249.00	1.50	4.00	6.9	55.3	145.3	83.0	2004.0	3.60																								
			Mat Foundation (1.5' thick)	Concrete	1	69.50	52.00	1.50	66.9	200.8				13.05																								
			Total (yd³)						73.8	256.1	145.3	83.0	2004.0	16.6	*Steel Total (tons)*				0.0	0.0	0.0	*Base PL + Anchorage (tons)*							0.0	0.0	*Grating (SF)*			0.0	*Handrail (FT)*	0.0	*Waterstop (FT)*	0.0
36	36	Gas Metering Stn Fdn (55' X 20')	Mat Foundation (1.5' thick)	Concrete	1	55.00	20.00	1.50	20.4	61.1				3.97																								
			Total (yd³)						20.4	61.1	0.0	0.0	0.0	4.0	*Steel Total (tons)*				0.0	0.0	0.0	*Base PL + Anchorage (tons)*							0.0	0.0	*Grating (SF)*			0.0	*Handrail (FT)*	0.0	*Waterstop (FT)*	0.0
37	37	Storm Water Transfer Pump Fdn (20' X 20')	Perimeter Beam (1.5'X4.0')	Concrete	1	74.00	1.50	4.00	2.1	16.4	43.2	24.7	604.0	1.07																								
			Mat Foundation (1.5' thick)	Concrete	1	17.00	17.00	1.50	5.4	16.1				1.04																								

NOTE: MUD MATS ARE NOT INCLUDED.

Ref. GA Drawing: CAES-1-DW-111-002-101 Rev B

													Structural Steel						Base Plate & Anchor Bolts								Grating			Handrail		Waterstop	
Old GA Item No.	New GA Item No.	Location	Description	Type of Material	Quantity	Main dimensions (ft) L	W	H	Crushed Stone (CY)	Des.Vol Conc. (CY)	Des. Excav. Volume (CY)	Backfill Volume (CY)	Design Formwork (SF)	Design Rebar (Tons)	Heavy[1] Steel (lbs/ft)	Medium[1] Steel (lbs/ft)	Light[1] Steel (lbs/ft)	Length (ft)	Design Steel-Heavy (Tons)	Design Steel-Medium (Tons)	Design Steel-Light (Tons)	No. of Base Pl	No. of AB per Base Pl	Anchor Bolt Dia (in)	Anchor Bolt Length (in)	Base Pl Length (in)	Base Pl Width (in)	Base Pl Thickness (in)	Design Base Pl (Tons)	Design Anchor Bolts (Tons)	Length of Grating (ft)	Width of Grating (ft)	Area of Grating (SF)	Length of Guardrail (ft)	Total Length of Guardrail (ft)	Length of Waterstop (ft)	Total Length of Waterstop (ft)
			Total (yd^3)						7.4	32.5	43.2	24.7	604.0	2.1	*Steel Total (tons)*				0.0	0.0	0.0	*Base PL + Anchorage (tons)*							0.0	0.0	*Grating (SF)*		0.0	*Handrail (FT)*	0.0	*Waterstop (FT)*	0.0

NOTE: MUD MATS ARE NOT INCLUDED.
Ref. GA Drawing: CAES-1-DW-111-002-101 Rev B

Old GA Item No.	New GA Item No.	Location	Description	Type of Material	Quantity	Main dimensions (ft) L	W	H	Crushed Stone (CY)	Des.Vol Conc. (CY)	Des. Excav. Volume (CY)	Backfill Volume (CY)	Design Formwork (SF)	Design Rebar (Tons)	Structural Steel: Heavy[1] Steel (lbs/ft)	Medium[1] Steel (lbs/ft)	Light[1] Steel (lbs/ft	Length (ft)	Design Steel-Heavy (Tons)	Design Steel-Medium (Tons)	Design Steel-Light (Tons)	Base Plate & Anchor Bolts: No. of Base Pl	No. of AB per Base Pl	Anchor Bolt Dia (in)	Anchor Bolt Length (in)	Base Pl Length (in)	Base Pl Width (in)	Base Pl Thickness (in)	Design Base Pl (Tons)	Design Anchor Bolts (Tons)	Grating: Length of Grating (ft)	Width of Grating (ft)	Area of Grating (SF)	Handrail: Length of Guardrail (ft)	Total Length of Guardrail (ft)	Waterstop: Length of Waterstop (ft)	Total Length of Waterstop (ft)
39	39	Gas Fired Generator Fdn (40' X 22.5')	Perimeter Beam (1.5'X4.0')	Concrete	1	119.00	1.50	4.00	3.3	26.4	69.4	39.7	964.0	1.72																								
			Mat Foundation (1.5' thick)	Concrete	1	37.00	19.50	1.50	13.4	40.1				2.61																								
			Total (yd^3)						16.7	66.5	69.4	39.7	964.0	4.3	*Steel Total (tons)*				0.0	0.0	0.0	*Base PL + Anchorage (tons)*							0.0	0.0	*Grading (SF)*			0.0	*Handrail (FT)*	0.0	*Waterstop (FT)*	0.0
40	40	(2) Variable Frequency Drive Fdn (20' X 16')	Perimeter Beam (1.5'X4.0')	Concrete	2	66.00	1.50	4.00	3.7	29.3	79.3	46.3	1080.0	1.91																								
			Mat Foundation (1.5' thick)	Concrete	2	17.00	13.00	1.50		24.6			0.0	1.60																								
			Total (yd^3)						3.7	53.9	79.3	46.3	1080.0	3.5	*Steel Total (tons)*				0.0	0.0	0.0	*Base PL + Anchorage (tons)*							0.0	0.0	*Grading (SF)*			0.0	*Handrail (FT)*	0.0	*Waterstop (FT)*	0.0
XX	XX	Misc Pipe Supports, Bus Duct Supports etc	Misc Support steel	Steel	1												19.0	500.0			4.75																
			Base Plate & Anchor Bolts	Steel																		50.0	4.0			15.0	15.0	0.75	1.20	0.00							
			2.5' X 2.5' X 4.0' Cubes	Concrete	50	2.50	2.50	4.00	5.8	46.3	93.8	41.7	2000.0	3.01																								
			30" dia sonotubes	Concrete	100	2.25	2.25	4.00	9.4	75.0				4.88																								
			Total (yd^3)						15.2	121.3	93.8	41.7	2000.0	7.9	*Steel Total (tons)*				0.0	0.0	4.8	*Base PL + Anchorage (tons)*							1.2	0.0	*Grading (SF)*			0.0	*Handrail (FT)*	0.0	*Waterstop (FT)*	0.0
	YY	(5) Generator Breakers (15' X 10')	Misc Support steel	Steel	5											26.0	19.0	100.0		6.50	4.75																
			Base Plate & Anchor Bolts	Steel	5																	4.0	4.0	1.0	18.0	18.0	18.0	0.75	0.69	0.16							
			Mat Foundation (2' thick)	Concrete	5	15.00	10.00	2.00	13.9	55.6	83.3	13.9	500.0	3.61																								
			Total (yd^3)						13.9	55.6	83.3	13.9	500.0	3.6	*Steel Total (tons)*				0.0	6.5	4.8	*Base PL + Anchorage (tons)*							0.7	0.2	*Grading (SF)*			0.0	*Handrail (FT)*	0.0	*Waterstop (FT)*	0.0

	Crushed Stone (CY)	Design Concrete Volume (CY)	Design Excavation Volume (CY)	Backfill Volume (CY)	Design Formwork (SF)	Design Rebar (ton)
FOUNDATION GRAND TOTALS	2172	10437	10147	3776	67158	678

	Design Heavy Steel (ton)	Design Medium Steel (ton)	Design Light Steel (ton)
STEEL TOTALS (tons)	1031	538	561

	Design Base PL (ton)	Design Anchor Bolts (ton)
BASE PL + ANCHORAGE (tons)	19	12

	Grating (SF)
GRATING TOTALS (SF)	8231

	Handrail (ft)
HANDRAIL TOTALS (FT)	841

	Waterstop (ft)
WATERSTOP TOTALS (FT)	2473

[1] Heavy Steel - >80 lbs/ft, Medium Steel - >20 lbs/ft but <80 lbs/ft, Light Steel <20 lbs/ft

NOTE: MUD MATS ARE NOT INCLUDED.

Ref. GA Drawing: CAES-1-DW-111-002-201 Rev C

Old GA Item No	New GA Item No	Location	Description	Type of Material	Quantity	Main dimensions (ft) L	W	H	Crushed Stone (CY)	Des.Vol Conc. (CY)	Des. Excav. Volume (CY)	Backfill Volume (CY)	Design Formwork (SF)	Design Rebar (Tons)	Structural Steel: Heavy[1] Steel (lbs/ft)	Medium[1] Steel (lbs/ft)	Light[1] Steel (lbs/ft)	Length (ft)	Design Steel-Heavy (Tons)	Design Steel-Medium (Tons)	Design Steel-Light (Tons)	Base Plate & Anchor Bolts: No. of Base Pl	No. of AB per Base Pl	Anchor Bolt Dia (in)	Anchor Bolt Length (in)	Base Pl Length (in)	Base Pl Width (in)	Base Pl Thickness (in)	Design Base Pl (Tons)	Design Anchor Bolts (Tons)	Grating: Length of Grating (ft)	Width of Grating (ft)	Area of Grating (SF)	Handrail: Length of Guardrail (ft)	Total Length of Guardrail (ft)	Waterstop: Length of Waterstop (ft)	Total Length of Waterstop (ft)
1,2, 3, 5, 6, 33, 38, 39	1, 2, 3, 5, 6, 33, 38, 42, 43	Turbine/Compressor Bldg (415'X110'X76' high + 415'X49'X31' high + 25'X80'X31' high)	Beams & Columns	Steel	1														1432.00	716.00	236.00																
			Purlins	Steel	1																167.00																
			Girts	Steel	1																212.00																
			Grating	Steel	8																									20.00	6.00	960.00					
			Handrail	Steel	8																												32.00	256.00		
			Base Plates & Anchor Bolts	Steel																		48	4	2.00	36.00	21.00	18.00	1.50	3.86	3.08							
			Base Plates & Anchor Bolts	Steel																		32	8	2.50	48.00	24.00	24.00	2.50	6.53	8.55							
			Anchor Bolts (CTG)	Steel																		32	1	2.00	36.00				0.00	0.51							
			Exterior Columns	Concrete	28	8.00	8.00	2.50	33.2	165.9	311.1	112.0	2240.0	10.79																							
			Interior Columns	Concrete	28	12.00	12.00	3.00	74.7	448.0	711.4	188.7	4032.0	29.12																							
			Intercooler Fdns	Concrete	6	30.00	12.50	2.00	41.7	166.7				10.83																							
			Aftercooler Fdns	Concrete	2	17.50	5.00	2.00	3.2	13.0				0.84																							
			Expander & Generator Fdn	Concrete	2	72.00	25.00	6.50	66.7	866.7	1,414.0	480.7	2522.0	56.33																							
			Expander & Generator Fdn	Concrete	2	27.00	25.00	2.67	25.0	133.5			555.4	8.68																							
			Compressor & Motor Fdns	Concrete	2	28.75	16.00	7.60	17.0	259.0	1,003.2	727.2	1360.4	16.83																							
			Compressor & Motor Fdns	Concrete	2	52.25	20.00	6.00	38.7	464.4			1734.0	30.19																							
			Compressor & Motor Fdns	Concrete	2	31.00	20.00	10.67	23.0	490.0			2176.7	31.85																							
			Lube Oil Skids	Concrete	4	15.00	13.00	2.00	14.4	57.8				3.76																							
			CTG Foundation	Concrete	1	28.67	31.00	6.00	16.5	197.5	227.8	13.8	530.0	12.84																							
			CTG Foundation	Concrete	1	24.07	25.33	6.00	11.3	135.5	158.4	11.6	288.8	8.81																							
			CTG Foundation	Concrete	1	13.88	14.00	6.00	3.6	43.2	53.4	6.7	166.5	2.81																							
			CTG Foundation	Concrete	1	30.38	14.00	7.67	7.9	120.8	147.1	18.4	573.3	7.85																							
			Interior Mat (1.5' thick)	Concrete	0	135.00	55.00	1.50	0.0	0.0				0.00																							
			Interior Mat (1.5' thick)	Concrete	1	80.00	25.00	1.50	37.0	111.1				7.22																							
			Interior Mat (1.5' thick)	Concrete	1	415.00	159.00	1.50	861.7	2859.0				185.84																							
						Total (yd³)			1275.6	6532.0	4026.4	1559.1	16179.2	424.6	*Steel Total (tons)*				1432.0	716.0	618.0	*Base PL + Anchorage (tons)*							10.4	12.1	*Grating (SF)*			960	*Handrail (FT)*	256	*Waterstop (FT)*	0
4, 7	4, 7	Recuperator Fdn (41.25'X25'X5.0' thick)	Base Plate	Steel																		24				30.00	24.00	2.00	4.90								
			Anchor Bolts	Steel																		6	6	2.50	54.00				0.00	1.35							
			Anchor Bolts	Steel																		18	4	1.50	30				0.00	0.54							
			Mat Foundation (5' thick)	Concrete	1	96.00	46.00	5.00	81.8	817.8	958.2	58.7	1420.0	53.16																							
						Total (yd³)			81.8	817.8	958.2	58.7	1420.0	53.2	*Steel Total (tons)*				0.0	0.0	0.0	*Base PL + Anchorage (tons)*							4.9	1.9	*Grating (SF)*			0	*Handrail (FT)*	0	*Waterstop (FT)*	0
5	5	Air Inlet Filter Fdn (Assumed)	Base Plates & Anchor Bolts																			8	4	2	36	30.00	30.00	1.50	1.53	0.51							
			Base Plates & Anchor Bolts																			8	4	2	36	30.00	30.00	1.50	1.53	0.51							
			Column Foundation	Concrete	8	8.00	8.00	2.50	9.5	47.4	266.7	202.4		3.08																							
			Column Piers	Concrete	8	2.50	2.50	4.00	0.9	7.4			320.0	0.48																							
						Total (yd³)			10.4	54.8	266.7	202.4	320.0	3.6	*Steel Total (tons)*				0.0	0.0	0.0	*Base PL + Anchorage (tons)*							3.1	1.0	*Grating (SF)*			0	*Handrail (FT)*	0	*Waterstop (FT)*	0
8	8	Mechanical Equip Bldg (90'X90'X25' high)	Beams & Column																83.00	42.00	14.00																
			Purlins																		44.00																
			Girts																		44.00																
			Base Plate & Anchor Bolts																			12	4	1.50	24.00	21.00	21.00	1.50	1.13	0.29							
			Exterior Columns	Concrete	8	8.00	8.00	2.50	9.5	47.4	88.9	32.0	640.0	3.08																							
			Interior Columns	Concrete	4	10.00	10.00	2.50	7.4	37.0	64.0	19.6	400.0	2.41																							
			Interior Mat (1.5' thick)	Concrete	1	90.00	90.00	1.50	137.9	450.0				29.25																							
						Total (yd³)			154.7	534.4	152.9	51.6	1040.0	34.7	*Steel Total (tons)*				83.0	42.0	58.0	*Base PL + Anchorage (tons)*							1.1	0.3	*Grating (SF)*			0	*Handrail (FT)*	0	*Waterstop (FT)*	0
9	9	Fire Water Pump House Fdn (21'X7'X1.5' Thick)																																			
			Perimeter Beam (1.5' wide X 4' deep)	Concrete	1	50.00	1.50	4.00	1.4	11.1	30.3	17.8	412.0	0.72																							
			Mat Foundation (1.5' thick)	Concrete	1	18.00	4.00	1.50	1.3	4.0	8.9			0.26																							
						Total (yd³)			2.7	15.1	39.2	17.8	412.0	1.0	*Steel Total (tons)*				0.0	0.0	0.0	*Base PL + Anchorage (tons)*							0.0	0.0	*Grating (SF)*			0	*Handrail (FT)*	0	*Waterstop (FT)*	0
10	10	Service/Fire Water Tank (62'-0" Dia)																																			
			Perimeter Beam (2' wide X 4' deep)	Concrete	1	195.00	2.00	4.00	7.2	57.8	131.3	66.3	1576.0	3.76																							
						Total (yd³)			7.2	57.8	131.3	66.3	1576.0	3.8	*Steel Total (tons)*				0.0	0.0	0.0	*Base PL + Anchorage (tons)*							0.0	0.0	*Grating (SF)*			0	*Handrail (FT)*	0	*Waterstop (FT)*	0
11	11	Not Used																																			
			Perimeter Beam (2' wide X 4' deep)	Concrete	0	57.00	2.00	4.00	0.0	0.0	0.0	0.0	0.0	0.00																							
						Total (yd³)			0.0	0.0	0.0	0.0	0.0	0.0	*Steel Total (tons)*				0.0	0.0	0.0	*Base PL + Anchorage (tons)*							0.0	0.0	*Grating (SF)*			0	*Handrail (FT)*	0	*Waterstop (FT)*	0
12, 14	12, 14	Cooling Tower Basin & Pump chamber (79.5'X244'X4.0' High & 25'X50'X18' Deep)	Guardrail	Steel	1											26.0		75.0																40.00	40.00		
			Platform	Steel	1															0.98																	
			Grating	Steel	1																									25.00	7.50	187.50					
			Waterstop for Cooling Tower Basin	PVC	1																														1300.00	1300.00	
			Waterstop for Pump Chamber	PVC	1																														150.00	150.00	
			Cooling Tower Basin Mat	Concrete	1	244.00	79.50	1.50	359.2	1077.7	1,485.1	48.2	0.0	70.05																							
			Cooling Tower Basin Wall	Concrete	1	639.00	1.25	4.00		118.3			5122.0	7.69																							
			Pump Chamber Mat	Concrete	1	50.00	25.00	2.00	23.1	92.6	1,375.0	518.5	0.0	6.02																							
			Pump Chamber Wall	Concrete	1	150.00	2.00	18.00		200.0			5472.0	13.00																							
			Pump Chamber Roof	Concrete	1	40.00	25.00	2.00		74.1			260.0	4.81																							
						Total (yd³)			382.4	1562.7	2860.1	566.7	10854.0	101.6	*Steel Total (tons)*				0.0	1.0	0.0	*Base PL + Anchorage (tons)*							0.0	0.0	*Grating (SF)*			188	*Handrail (FT)*	40	*Waterstop (FT)*	1450
13	13	Cooling Tower Chem Feed Bldg Fdn (32.5'X32.5'X1.5' Thick)																																			
			Perimeter Beam (1.5' wide X 4' deep)	Concrete	1	124.00	1.50	4.00	3.4	27.6	73.5	42.5	372.0	1.8																							
			Mat Foundation (1.5' thick)	Concrete	1	29.50	29.50	1.50	16.1	48.3	73.5			3.1																							
						Total (yd³)			19.6	75.9	147.0	42.5	372.0	4.9	*Steel Total (tons)*				0.0	0.0	0.0	*Base PL + Anchorage (tons)*							0.0	0.0	*Grating (SF)*			0	*Handrail (FT)*	0	*Waterstop (FT)*	0
16	16	Cooling Tower PDC Fdn (30'X15'X1.5' Thick)																																			
			Perimeter Beam (1.5' X 4' deep)	Concrete	1	84.00	1.50	4.00	2.3	18.7	50.2	29.2	513.0	1.21																							
			Mat Foundation (1.5' thick)	Concrete	1	27.00	12.00	1.50	6.0	18.0				1.17																							
						Total (yd³)			8.3	36.7	50.2	29.2	513.0	2.4	*Steel Total (tons)*				0.0	0.0	0.0	*Base PL + Anchorage (tons)*							0.0	0.0	*Grating (SF)*			0	*Handrail (FT)*	0	*Waterstop (FT)*	0
17	17	(3) Aux Transformer (50' X 37' X 5.5' deep)	Guardrail	Steel	3																												85.00	255.00		
			Platform	Steel	3											26.0		200.0		7.80		24.0	0.0			12.0	12.0	0.75	1.10	0.00							
			Platform	Steel	3												7.2	60.0			0.65																
			Grating	Steel	3																											38.00	38.00	4332.00				
			Waterstop	PVC	3																														170.00	510.00	
			Mat Foundation (1.5' thick)	Concrete	3	51.00	38.00	1.50	107.7	323.0	1,540.0	858.1		21.00																							
			Pedestal (15'X12'X3' high)	Concrete	3	15.00	12.00	3.00		60.0			486.0	3.90																							
			Pit Wall (4' high X 1.25' thick)	Concrete	3	170.00	1.25	4.00		94.4			2550.0	6.14																							
			Fire Wall (25' high X 1.25' thick)	Concrete	3	86.00	1.25	25.00		298.6			12900.0	19.41																							
						Total (yd³)			107.7	776.1	1540.0	858.1	15936.0	50.4	*Steel Total (tons)*				0.0	7.8	0.6	*Base PL + Anchorage (tons)*							1.1	0.0	*Grating (SF)*			4332.0	*Handrail (FT)*	255.0	*Waterstop (FT)*	510.0

NYSEG - CAES Project
Material Quantities Estimate(Cycle 2)

Ref. GA Drawing: CAES-1-DW-111-002-201 Rev C

Old GA Item No	New GA Item No	Location	Description	Type of Material	Quantity	Main dimensions (ft) L	W	H	Crushed Stone (CY)	Des.Vol Conc. (CY)	Des. Excav. Volume (CY)	Backfill Volume (CY)	Design Formwork (SF)	Design Rebar (Tons)	Structural Steel: Heavy[1] Steel (lbs/ft)	Medium[1] Steel (lbs/ft)	Light[1] Steel (lbs/ft)	Length (ft)	Design Steel-Heavy (Tons)	Design Steel-Medium (Tons)	Design Steel-Light (Tons)	Base Plate & Anchor Bolts: No. of Base Pl	No. of AB per Base Pl	Anchor Bolt Dia (in)	Anchor Bolt Length (in)	Base Pl Length (in)	Base Pl Width (in)	Base Pl Thickness (in)	Design Base Pl (Tons)	Design Anchor Bolts (Tons)	Grating: Length of Grating (ft)	Width of Grating (ft)	Area of Grating (SF)	Handrail: Length of Guardrail (ft)	Total Length of Guardrail (ft)	Waterstop: Length of Waterstop (ft)	Total Length of Waterstop (ft)
18	18	Ammonia Unloading Area (44' X 15')	Perimeter Beam (1.5'X2.5')	Concrete	1	112.00	1.50	2.50	3.1	15.6	43.6	24.9	567.5	1.01																							
			Mat Foundation (1.5' thick)	Concrete	1	41.00	12.00	1.50	9.1	27.3				1.78																							
			Total (yd^3)						**12.2**	**42.9**	**43.6**	**24.9**	**567.5**	**2.8**	***Steel Total (tons)***				**0.0**	**0.0**	**0.0**	***Base PL + Anchorage (tons)***								**0.0**	**0.0**	***Grating (SF)***		**0.0**	***Handrail (FT)***	**0.0**	***Waterstop (FT)***	**0.0**
19	19	Ammonia Storage Tank (55' X 20' X 5.5' deep)	Guardrail	Steel	1											26.0		80.0		1.04														144.00	144.00		
			Platform	Steel	1												7.2	35.0			0.13	12.0	0.0			12.0	12.0	0.8	0.18	0.00							
			Platform	Steel	1																										17.00	15.00	255.00				
			Grating	Steel	1																																
			Waterstop	PVC	1																														150.00	150.00
			Mat Foundation (1.5' thick)	Concrete	1	55.00	20.00	1.50	20.4	61.1	314.7	90.6		3.97																							
			Pedestal (9'X5'X3' high)	Concrete	2	10.00	1.50	3.00		3.3			138.0	0.22																							
			Pit Wall (4' high X 1' thick)	Concrete	1	144.00	1.00	4.00		21.3			720.0	1.39																							
			Total (yd^3)						**20.4**	**85.8**	**314.7**	**90.6**	**858.0**	**5.6**	***Steel Total (tons)***				**0.0**	**1.0**	**0.1**	***Base PL + Anchorage (tons)***								**0.2**	**0.0**	***Grating (SF)***		**255.0**	***Handrail (FT)***	**144.0**	***Waterstop (FT)***	**150.0**
20	20	Electrical PDC (80' X 25')	Perimeter Beam (1.5'X4.0')	Concrete	1	204.00	1.50	4.00	5.7	45.3	119.0	68.0	1644.0	2.95																							
			Mat Foundation (1.5' thick)	Concrete	1	77.00	22.00	1.50	31.4	94.1				6.12																							
			Total (yd^3)						**37.0**	**139.4**	**119.0**	**68.0**	**1644.0**	**9.1**	***Steel Total (tons)***				**0.0**	**0.0**	**0.0**	***Base PL + Anchorage (tons)***								**0.0**	**0.0**	***Grating (SF)***		**0.0**	***Handrail (FT)***	**0.0**	***Waterstop (FT)***	**0.0**
21	21	Oil Water Separator Fdn (15' X 7.5')	Mat Foundation (1.5' thick)	Concrete	1	15.00	7.50	1.50	2.1	6.3				0.41																							
			Total (yd^3)						**2.1**	**6.3**	**0.0**	**0.0**	**0.0**	**0.4**	***Steel Total (tons)***				**0.0**	**0.0**	**0.0**	***Base PL + Anchorage (tons)***								**0.0**	**0.0**	***Grating (SF)***		**0.0**	***Handrail (FT)***	**0.0**	***Waterstop (FT)***	**0.0**
22, 23, 25	22, 23, 25	Admin/Maint/Storage Bldg (120' X 115' X 25' high)	Beams & Column																**154.0**	**77.0**	**25.0**															
			Purlins																		**35.0**															
			Girts																		**39.0**															
			Base Plate & Anchor Bolts																			25.0	4.0	1.5	24.0	21.0	16.0	1.5	1.79	0.60							
			Guardrail		1																													150.00	150.00	150.00	150.00
			Grating		2																										20.00	20.00	800.00				
			Exterior Column Fdn	Concrete	16	8.00	8.00	2.50	19.0	94.8	142.2	28.4	1280.0	6.16																							
			Interior Column Fdn	Concrete	9	10.00	10.00	2.50	16.7	83.3	120.0	20.0	900.0	5.42																							
			Mat Foundation (1.5' thick)	Concrete	1	120.00	115.00	1.50	229.4	766.7				49.83																							
			Total (yd^3)						**265.0**	**944.8**	**262.2**	**48.4**	**2180.0**	**61.4**	***Steel Total (tons)***				**154.0**	**77.0**	**99.0**	***Base PL + Anchorage (tons)***								**1.8**	**0.6**	***Grating (SF)***		**800.0**	***Handrail (FT)***	**150.0**	***Waterstop (FT)***	**150.0**
24	24	Potable Water Tank (14'-4" Dia)	Perimeter Beam (2' wide X 4' deep)	Concrete	1	45.00	2.00	4.00	1.7	13.3	31.3	16.3	376.0	0.87																							
			Total (yd^3)						**1.7**	**13.3**	**31.3**	**16.3**	**376.0**	**0.9**	***Steel Total (tons)***				**0.0**	**0.0**	**0.0**	***Base PL + Anchorage (tons)***								**0.0**	**0.0**	***Grating (SF)***		**0.0**	***Handrail (FT)***	**0.0**	***Waterstop (FT)***	**0.0**
28	28	Step-up Transformer (60' X 46' X 5.5' deep)	Guardrail	Steel	1											26.0		220.0		2.86		20.0	0.0			12.0	12.0	0.8	0.31	0.00				60.00	60.00		
			Platform	Steel	1												7.2	100.0			0.36															
			Platform	Steel	1																										44.00	44.00	1936.00				
			Grating	Steel	1																																
			Waterstop	PVC	1																														213.00	213.00
			Mat Foundation (2' thick)	Concrete	1	60.00	28.00	2.00	31.1	124.4	493.0	119.7		8.09																							
			Pedestal (30'X28'X3' high)	Concrete	1	30.00	28.00	3.00		93.3			348.0	6.07																							
			Pit Wall (4' high X 1.25' thick)	Concrete	1	204.00	1.25	4.00		37.8			1020.0	2.46																							
			Fire Wall (32' high X 1.25' thick)	Concrete	1	62.00	1.25	32.00		91.9			3782.0	5.97																							
			Total (yd^3)						**31.1**	**347.4**	**493.0**	**119.7**	**5150.0**	**22.6**	***Steel Total (tons)***				**0.0**	**2.9**	**0.4**	***Base PL + Anchorage (tons)***								**0.3**	**0.0**	***Grating (SF)***		**1936.0**	***Handrail (FT)***	**60.0**	***Waterstop (FT)***	**213.0**
29	29	Guard House (10' X 7.5')	Mat Foundation (1' thick)		1	10.00	7.50	1.00	1.4	2.8	6.3	2.2	35.0	0.18																							
			Total (yd^3)						**1.4**	**2.8**	**6.3**	**2.2**	**35.0**	**0.2**	***Steel Total (tons)***				**0.0**	**0.0**	**0.0**	***Base PL + Anchorage (tons)***								**0.0**	**0.0**	***Grating (SF)***		**0.0**	***Handrail (FT)***	**0.0**	***Waterstop (FT)***	**0.0**
34	34	Switchyard Control Bldg (55' X 16')	Perimeter Beam (1.5'X4.0')	Concrete	1	136.00	1.50	4.00	3.8	30.2	79.3	45.3	1100.0	1.96																							
			Mat Foundation (1.5' thick)	Concrete	1	52.00	13.00	1.50	12.5	37.6				2.44																							
			Total (yd^3)						**16.3**	**67.8**	**79.3**	**45.3**	**1100.0**	**4.4**	***Steel Total (tons)***				**0.0**	**0.0**	**0.0**	***Base PL + Anchorage (tons)***								**0.0**	**0.0**	***Grating (SF)***		**0.0**	***Handrail (FT)***	**0.0**	***Waterstop (FT)***	**0.0**
35	35	Not Used	Perimeter Beam (1.5'X4.0')	Concrete	0	249.00	1.50	4.00	0.0	0.0	0.0	0.0	0.0	0.00																							
			Mat Foundation (1.5' thick)	Concrete	0	69.50	52.00	1.50	0.0	0.0				0.00																							
			Total (yd^3)						**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	***Steel Total (tons)***				**0.0**	**0.0**	**0.0**	***Base PL + Anchorage (tons)***								**0.0**	**0.0**	***Grating (SF)***		**0.0**	***Handrail (FT)***	**0.0**	***Waterstop (FT)***	**0.0**
36	36	Gas Metering Stn Fdn (55' X 20')	Mat Foundation (1.5' thick)	Concrete	1	55.00	20.00	1.50	20.4	61.1				3.97																							
			Total (yd^3)						**20.4**	**61.1**	**0.0**	**0.0**	**0.0**	**4.0**	***Steel Total (tons)***				**0.0**	**0.0**	**0.0**	***Base PL + Anchorage (tons)***								**0.0**	**0.0**	***Grating (SF)***		**0.0**	***Handrail (FT)***	**0.0**	***Waterstop (FT)***	**0.0**
37	37	Storm Water Transfer Pump Fdn (20' X 20')	Perimeter Beam (1.5'X4.0')	Concrete	1	74.00	1.50	4.00	2.1	16.4	43.2	24.7	604.0	1.07																							
			Mat Foundation (1.5' thick)	Concrete	1	17.00	17.00	1.50	5.4	16.1				1.04																							
			Total (yd^3)						**7.4**	**32.5**	**43.2**	**24.7**	**604.0**	**2.1**	***Steel Total (tons)***				**0.0**	**0.0**	**0.0**	***Base PL + Anchorage (tons)***								**0.0**	**0.0**	***Grating (SF)***		**0.0**	***Handrail (FT)***	**0.0**	***Waterstop (FT)***	**0.0**
40	39	Gas Fired Generator Fdn (40' X 22.5')	Perimeter Beam (1.5'X4.0')	Concrete	1	119.00	1.50	4.00	3.3	26.4	69.4	39.7	964.0	1.72																							
			Mat Foundation (1.5' thick)	Concrete	1	37.00	19.50	1.50	13.4	40.1				2.61																							

Ref. GA Drawing: CAES-1-DW-111-002-201 Rev C

													Structural Steel							Base Plate & Anchor Bolts									Grating			Handrail		Waterstop	
Old GA Item No	New GA Item No	Location	Description	Type of Material	Quantity	Main dimensions (ft) L	W	H	Crushed Stone (CY)	Des.Vol Conc. (CY)	Des. Excav. Volume (CY)	Backfill Volume (CY)	Design Formwork (SF)	Design Rebar (Tons)	Heavy[1] Steel (lbs/ft)	Medium[1] Steel (lbs/ft)	Light[1] Steel (lbs/ft)	Length (ft)	Design Steel-Heavy (Tons)	Design Steel-Medium (Tons)	Design Steel-Light (Tons)	No. of Base Pl	No. of AB per Base Pl	Anchor Bolt Dia (in)	Anchor Bolt Length (in)	Base Pl Length (in)	Base Pl Width (in)	Base Pl Thickness (in)	Design Base Pl (Tons)	Design Anchor Bolts (Tons)	Length of Grating (ft)	Width of Grating (ft)	Area of Grating (SF)	Length of Guardrail (ft)	Total Length of Guardrail (ft)	Length of Waterstop (ft)	Total Length of Waterstop (ft)
				Total (yd^3)					16.7	66.5	69.4	39.7	964.0	4.3	*Steel Total (tons)*				0.0	0.0	0.0	*Base PL + Anchorage (tons)*							0.0	0.0	*Grating (SF)*		0.0	*Handrail (FT)*	0.0	*Waterstop (FT)*	0.0

Ref. GA Drawing: CAES-1-DW-111-002-201 Rev C

Old GA Item No	New GA Item No	Location	Description	Type of Material	Quantity	Main dimensions (ft) L	W	H	Crushed Stone (CY)	Des.Vol Conc. (CY)	Des. Excav. Volume (CY)	Backfill Volume (CY)	Design Formwork (SF)	Design Rebar (Tons)	**Structural Steel** Heavy[1] Steel (lbs/ft)	Medium[1] Steel (lbs/ft	Light[1] Steel (lbs/ft	Length (ft)	Design Steel-Heavy (Tons)	Design Steel-Medium (Tons)	Design Steel-Light (Tons)	**Base Plate & Anchor Bolts** No. of Base Pl	No. of AB per Base Pl	Anchor Bolt Dia (in)	Anchor Bolt Length (in)	Base Pl Length (in)	Base Pl Width (in)	Base Pl Thickness (in)	Design Base Pl (Tons)	Design Anchor Bolts (Tons)	**Grating** Length of Grating (ft)	Width of Grating (ft)	Area of Grating (SF)	**Handrail** Length of Guardrail (ft)	Total Length of Guardrail (ft)	**Waterstop** Length of Waterstop (ft)	Total Length of Waterstop (ft)
41	41	(2) Variable Frequency Drive Fdn (40' X 16')																																			
			Perimeter Beam (1.5'X4.0')	Concrete	2	106.00	1.50	4.00	5.9	47.1	126.0	73.0	1720.0	3.06																							
			Mat Foundation (1.5' thick)	Concrete	2	37.00	13.00	1.50		53.4			0.0	3.47																							
						Total (yd³)			5.9	100.6	126.0	73.0	1720.0	6.5	*Steel Total (tons)*				0.0	0.0	0.0	*Base PL + Anchorage (tons)*							0.0	0.0	*Grating (SF)*			0.0	*Handrail (FT)*	0.0	*Waterstop (FT)*	0.0
42	40	Air Stack (7.5' diameter assumed)	Beams & Columns	Steel	1																															
			Purlins	Steel	1																															
			Girts	Steel	1																															
			Grating	Steel	1																															
			Handrail	Steel	1																															
			Base Plate & Anchor Bolts	Steel	1																	1	10	1.50	30	188.00	6.00	1.50	0.24	0.08							
			Mat Foundation (3' thick)	Concrete	1	7.50	7.50	3.00	1.0	6.3	11.7	4.4	90.0	0.41																							
						Total (yd³)			1.0	6.3	11.7	4.4	90.0	0.4	*Optional Steel Total (tons)*				0.0	0.0	0.0	*Base PL + Anchorage (tons)*							0.2	0	*Grating (SF)*			0	*Handrail (FT)*	0	*Waterstop (FT)*	0
XX	XX	Misc Pipe Supports, Bus Duct Supports etc	Misc Support steel	Steel	1												19.0	500.0			4.75															
			Base Plate & Anchor Bolts	Steel																		50.0	4.0	1.0	18.0	15.0	15.0	0.8	1.20	0.40							
			2.5' X 2.5' X 4.0' Cubes	Concrete	50	2.50	2.50	4.00	5.8	46.3	93.8	41.7	2000.0	3.01																							
			30" dia sonotubes	Concrete	100	2.25	2.25	4.00	9.4	75.0				4.88																							
						Total (yd³)			15.2	121.3	93.8	41.7	2000.0	7.9	*Steel Total (tons)*				0.0	0.0	4.8	*Base PL + Anchorage (tons)*							1.2	0.4	*Grating (SF)*			0.0	*Handrail (FT)*	0.0	*Waterstop (FT)*	0.0
	YY	(13) Generator Breakers (15' X 10')	Misc Support steel	Steel	13											26.0	19.0	100.0		16.90	12.35															
			Base Plate & Anchor Bolts	Steel	13																	4.0	4.0	1.0	18.0	18.0	18.0	0.75	1.79	0.42							
			Mat Foundation (2' thick)	Concrete	13	15.00	10.00	2.00	36.1	144.4	216.7	36.1	1300.0	9.39																							
						Total (yd³)			36.1	144.4	216.7	36.1	1300.0	9.4	*Steel Total (tons)*				0.0	16.9	12.4	*Base PL + Anchorage (tons)*							1.8	0.4	*Grating (SF)*			0.0	*Handrail (FT)*	0.0	*Waterstop (FT)*	0.0

	Crushed Stone (CY)	Design Concrete Volume (CY)	Design Excavation Volume (CY)	Backfill Volume (CY)	Design Formwork (SF)	Design Rebar (ton)
FOUNDATION GRAND TOTALS	2540	12646	12082	4087	67211	822

	Design Heavy Steel (ton)	Design Medium Steel (ton)	Design Light Steel (ton)
STEEL TOTALS (tons)	1669	865	793

	Design Base PL (ton)	Design Anchor Bolts (ton)
BASE PL + ANCHORAGE (tons)	26	17

	Grating (SF)
GRATING TOTALS (SF)	8471

	Handrail (ft)
HANDRAIL TOTALS (FT)	905

	Waterstop (ft)
WATERSTOP TOTALS (FT)	2473

[1] Heavy Steel - >80 lbs/ft, Medium Steel - >20 lbs/ft but <80 lbs/ft, Light Steel <20 lbs/ft

NYSEG - CAES: Cycle-1 Civil Quantities,

811 SITE DEVELOPEMNT

11100 SITE PREPARATION

811	11100	Clear & Grub - medium	17	AC	
		Strip, haul, & Stockpile Topsoil, assume 6" thick	13713	CY	
		Cut / fill - balance on site	77924	CY	
		Excavate / load / haul topsoil	10164	CY	
		Place topsoil, and compact - 12" thick	10648	SY	2.2 ac
		Seed and Mulch	2.20	AC	
		Subgrade prep / shape, yard areas	40910	SY	gravel areas decrease due to CT areas increase
		Aggregate, 6" ABC stone, yard areas	6818	CY	
		Geotextile fabric, 8 oz, nonwoven, yard areas	40910	SY	

E&S CONTROL

		Inlet protection	20	EA	
		Seed and Mulch - topsoil piles	2.00	AC	
		Super Silt fence, install / remove, perimeter	2550	LF	
		Temporary erosion control maintenance, 60 weeks at 8 hr/wk	1	LS	

11105 CONSTRUCTION LAYDOWN

	11105	Clear & Grub - medium, laydown & construction parking	4.00	AC	total 5 ac
		Remove aggregate and stockpile, laydown & construction parking	807	CY	assume 1 ac ex. Gravel area
		Strip, haul, & Stockpile Topsoil, assume 6" thick, laydown & construction parking	3227	CY	
		Cut / fill - balance, laydown & construction parking	13890	CY	
		Subgrade prep / shape, laydown & construction parking	24200	SY	add ex gravel area, 1ac
		Aggregate, 6" ABC, furnish and install, laydown & construction parking	448	CY	
		Seed and Mulch - topsoil piles, laydown & construction parking	0.5	AC	
		Silt fence, install / remove, laydown & construction parking	1000	LF	

	Geotextile fabric, 8 oz, nonwoven, laydown & construction parking	24200	SY	
	Demolish the existing Waste Transfer Building	1	LS	
	Temporary erosion control maintenance, 60 weeks at 8 hr/wk	1	LS	
11202 STOMWATER RUNOFF POND				
	Excavation/fill berm, balance on site	4291	CY	2.66ac-ft
	Finish grade, storm water detention pond	5808	SY	
	Manhole riser, 4' x 10'd, stormwater detention pond	1	EA	
	Rip-rap, furnish & place, stormwater detention pond	93	CY	
	Geotextile fabric, 8 oz/sy nonwoven, for rip-rap, stormwater detention pond	236	SY	
	24" RCP FES, stormwater detention pond	1	EA	
	Pipe, 24" RCP, stormwater detention pond	100	LF	
11601 STORMWATER DISCHARGE SYSTEM				
	Excavate/stockpile drainage ditch, 2.5'w bot x3'd (2:1 slope), diversion ditch	1450	LF	finished ditch 2'wx2'depth, extra excavation for 12" lined ditch
	Haul / place drainage ditch, 2.5'w bot x3'd (2:1 slope), diversion ditch	1369	CY	
	Rip-rap, furnish & place, 12" thick, lined ditch	854	CY	
	Geotextile fabric, 4 oz/yd nonwoven, drainage ditch	2562	SY	
	Culvert, 24"RCP	40	LF	
	24' RCP FES	2		
812 SITE IMPROVEMENTS				
11301 ROADS AND PARKING LOTS				
	Subgrade prep / shape roads - asphalt roads	11890	SY	
	Surface wear course + binder, 4' thick, furnish and install - asphalt roads	11890	SY	
	Aggregate base course, 6" thick, furnish and install - asphalt roads	11890	SY	
	Aggregate subbase, 12" ABC, furnish and install - asphalt roads	11890	SY	
	Geotextile fabric, road stabilization fabric - asphalt roads	11890	SY	

11304 FENCING & ENTRY CONTROL

Fence, chain link, 10' high	600	LF
Fence, chain link, 10' high with barbed wire	3350	LF
Gate, 24' wide, slider, automatic	1	EA
Gate, 24' wide, double gate, emergency exit	1	EA
Gate, 12' wide, double gate, maintenance access	2	EA
Gate 4' wide, single swing gate, personnel access	1	EA

11600 STROMWATER DISCHARGE PIPES

Haul spoils, storm sewer	1590	CY
Backfill trench, random fill, storm sewer	1404	CY
Trench, storm sewer	2994	CY
Sand bedding - stormsewer	1156	CY
Catch Basin, 4' dia x 6' deep - storm sewer	14	EA
Catch Basin, 4' dia x 10' deep - storm sewer	6	EA
Pipe,15" RCP - storm sewer	1160	LF
Pipe, 24" RCP - storm sewer	1720	LF
Pipe, 36" RCP - storm sewer	690	LF
24" RCP FES, storm sewer	1	EA
36" RCP FES, storm sewer	1	EA

TRENCHING FOR ME PIPES

CWS (PBS 461)

Spoils, CWS	2301	CY
Backfill - CWS	2407	CY
Trench - CWS	4708	CY
Sand Bedding - CWS	1366	CY

Process Air to Well head (PBS 411)

Spoils, CWS	1067	CY
Backfill - CWS	1778	CY
Trench - CWS	2844	CY
Sand Bedding - CWS	788	CY

RAW WATER (PBS 511)

Spoils	926	CY

Backfill	3114	CY
Trench	4040	CY
Sand Bedding	878	CY
Jack and bore for 6" dia raw water pipe, under highway	200	LF

WASTEWATER TREATMENT (PBS 526)

Spoils	211	CY
Backfill	734	CY
Trench	945	CY
Sand Bedding	202	CY

COMPRESSED AIR (PBS 543)

Spoils, CWS	87	CY
Backfill - CWS	160	CY
Trench - CWS	247	CY
Sand Bedding - CWS	87	CY

FUEL GAS (PBS 561)

Spoils	58	CY
Backfill	157	CY
Trench	215	CY
Sand Bedding	52	CY

FIRE PROTECTION (PBS 572)

Spoils	567	CY
Backfill	1465	CY
Trench	2032	CY
Sand Bedding	498	CY

Raw Water Intake at Seneca Lake

Clear & Grub - medium	0.13	AC
Strip, haul, & Stockpile Topsoil, assume 6" thick	105	CY
Subgrade prep / shape, yard areas	390	SY
Aggregate, 6" ABC stone, road & yard areas	65	CY
Geotextile fabric, 8 oz, nonwoven, yard areas	390	SY
Install/remove Silt fence, disturbed area	200	LF

Protective Steel Piles, 40' long, 15' underground	3	EA	
Install/remove silt curtain	400	LF	
Jack and bore or horizontal directional drilling, 24" intake pipe	240	LF	
24" dia, Polyethylene intake pipe, with 6 pipe supports	316	LF	
Intake wedge wire screen, StaticORB S26, special copper-bearing alloys for Zebra & Quagga mussel control.	1	EA	see website http://www.screenservices.com/StaticOrb.htm
Install Intake screen, underwater	1	LS	
Riprap protection, waterfront	67	CY	45Lx20Wx2D

Notes:

1. The quantities for civil engineering listed above is a site specific estimate, topographic is based on USGS 10-ft contours.
2. The quantities listed is based on General Arrangement WorleyParsons drawing CAES-1-DW-111-002-101, Rev. B
3. Cut and fill quantities are based on 3 levels, i.e.. Plant-El 995, switch yard-El 985 and laydown-El 980, the bottom of the stormwater pond is at El 970.
4. The Fence length is based on the entire site as shown in General Arrangement listed above.
5. The frost depth is 54", therefore, all mechanical pipes are considered have 5.5 ft cover.
6. The lengths and sizes of mechanical pipes are provided by mechanical department. And they are revised per latest revisions on 9/21/11.

NYSEG - CAES: Cycle-2 Civil Quantities,						
811 SITE DEVELOPEMNT						
	11100 SITE PREPARATION					
811	11100		Clear & Grub - medium	18	AC	
			Strip, haul, & Stockpile Topsoil, assume 6" thick	14520	CY	
			Cut / fill - balance on site	82199	CY	plant 44.65+ switch yard 6.3 acft
			Excavate / load / haul topsoil	10164	CY	
			Place topsoil, and compact - 12" thick	13068	SY	2.7 ac
			Seed and Mulch	2.70	AC	
			Subgrade prep / shape, yard areas	46000	SY	
			Aggregate, 6" ABC stone, yard areas	7667	CY	
			Geotextile fabric, 8 oz, nonwoven, yard areas	46000	SY	
	E&S CONTROL					
			Inlet protection	20	EA	
			Seed and Mulch - topsoil piles	2.00	AC	
			Super Silt fence, install / remove, perimeter	2650	LF	
			Temporary erosion control maintenance, 60 weeks at 8 hr/wk	1	LS	
	11105 CONSTRUCTION LAYDOWN					
	11105		Clear & Grub - medium, laydown & construction parking	4.00	AC	total 5 ac
			Remove aggregate and stockpile, laydown & construction parking	807	CY	assume 1 ac ex. Gravel area
			Strip, haul, & Stockpile Topsoil, assume 6" thick, laydown & construction parking	3227	CY	
			Cut / fill - balance, laydown & construction parking	13890	CY	
			Subgrade prep / shape, laydown & construction parking	24200	SY	add ex gravel area, 1ac
			Aggregate, 6" ABC, furnish and install, laydown & construction parking	448	CY	
			Seed and Mulch - topsoil piles, laydown & construction parking	0.5	AC	

			Silt fence, install / remove, laydown & construction parking	1000	LF	
			Geotextile fabric, 8 oz, nonwoven, laydown & construction parking	24200	SY	
			Demolish the existing Waste Transfer Building	1	LS	
			Temporary erosion control maintenance, 60 weeks at 8 hr/wk	1	LS	
	11202 STOMWATER RUNOFF POND					
			Excavation/fill berm, balance on site	4291	CY	2.66ac-ft
			Finish grade, storm water detention pond	5808	SY	
			Manhole riser, 4' x 10'd, stormwater detention pond	1	EA	
			Rip-rap, furnish & place, stormwater detention pond	93	CY	
			Geotextile fabric, 8 oz/sy nonwoven, for rip-rap, stormwater detention pond	236	SY	
			24" RCP FES, stormwater detention pond	1	EA	
			Pipe, 24" RCP, stormwater detention pond	100	LF	
	11601 STORMWATER DISCHARGE SYSTEM					
			Excavate/stockpile drainage ditch, 2.5'w bot x3'd (2:1 slope), diversion ditch	1450	LF	finished ditch 2'wx2'depth, extra excavation for 12" lined ditch
			Haul / place drainage ditch, 2.5'w bot x3'd (2:1 slope), diversion ditch	1369	CY	
			Rip-rap, furnish & place, 12" thick, lined ditch	854	CY	
			Geotextile fabric, 4 oz/yd nonwoven, drainage ditch	2562	SY	
			Culvert, 24"RCP	40	LF	
			24" RCP FES	2		
812 SITE IMPROVEMENTS						
	11301 ROADS AND PARKING LOTS					
			Subgrade prep / shape roads - asphalt roads	12865	SY	
			Surface wear course + binder, 4' thick, furnish and install - asphalt roads	12865	SY	
			Aggregate base course, 6" thick, furnish and install - asphalt roads	12865	SY	
			Aggregate subbase, 12" ABC, furnish and install - asphalt roads	12865	SY	

			Geotextile fabric, road stabilization fabric - asphalt roads	12865	SY	
	11304 FENCING & ENTRY CONTROL					
			Fence, chain link, 10' high	600	LF	
			Fence, chain link, 10' high with barbed wire	3513	LF	
			Gate, 24' wide, slider, automatic	1	EA	
			Gate, 24' wide, double gate, emergency exit	1	EA	
			Gate, 12' wide, double gate, maintenance access	2	EA	
			Gate 4' wide, single swing gate, personnel access	1	EA	
	11600 STROMWATER DISCHARGE PIPES					
			Haul spoils, storm sewer	1688	CY	
			Backfill trench, random fill, storm sewer	1498	CY	
			Trench, storm sewer	3185	CY	
			Sand bedding - stormsewer	1228	CY	
			Catch Basin, 4' dia x 6' deep - storm sewer	14	EA	
			Catch Basin, 4' dia x 10' deep - storm sewer	6	EA	
			Pipe,15" RCP - storm sewer	1160	LF	
			Pipe, 24" RCP - storm sewer	1930	LF	
			Pipe, 36" RCP - storm sewer	700	LF	
			24" RCP FES, storm sewer	1	EA	
			36" RCP FES, storm sewer	1	EA	
TRENCHING FOR ME PIPES						
CWS (PBS 461)						
			Spoils, CWS	2301	CY	
			Backfill - CWS	2407	CY	
			Trench - CWS	4708	CY	
			Sand Bedding - CWS	1366	CY	
Process Air to Well head (PBS 411)						
			Spoils, CWS	1067	CY	
			Backfill - CWS	1778	CY	
			Trench - CWS	2844	CY	
			Sand Bedding - CWS	788	CY	
RAW WATER (PBS 511)						

			Spoils	923	CY	
			Backfill	3111	CY	
			Trench	4035	CY	
			Sand Bedding	876	CY	
			Jack and bore for 6" dia raw water pipe, under highway	200	LF	
WASTEWATER TREATMENT (PBS 526)						
			Spoils	234	CY	
			Backfill	807	CY	
			Trench	1041	CY	
			Sand Bedding	223	CY	
COMPRESSED AIR (PBS 543)						
			Spoils, CWS	132	CY	
			Backfill - CWS	244	CY	
			Trench - CWS	376	CY	
			Sand Bedding - CWS	132	CY	
FUEL GAS (PBS 561)						
			Spoils	48	CY	
			Backfill	131	CY	
			Trench	179	CY	
			Sand Bedding	43	CY	
FIRE PROTECTION (PBS 572)						
			Spoils	567	CY	
			Backfill	1465	CY	
			Trench	2032	CY	
			Sand Bedding	498	CY	
Raw Water Intake at Seneca Lake						
			Clear & Grub - medium	0.13	AC	
			Strip, haul, & Stockpile Topsoil, assume 6" thick	105	CY	
			Subgrade prep / shape, yard areas	390	SY	
			Aggregate, 6" ABC stone, road & yard areas	65	CY	
			Geotextile fabric, 8 oz, nonwoven, yard areas	390	SY	

			Install/remove Silt fence, disturbed area	200	LF	
			Protective Steel Piles, 40' long, 15' underground	3	EA	
			Install/remove silt curtain	400	LF	
			Jack and bore or horizontal directional drilling, 24" intake pipe	240	LF	
			24" dia, Polyethylene intake pipe, with 6 pipe supports	316	LF	
			Intake wedge wire screen, StaticORB S26, special copper-bearing alloys for Zebra & Quagga mussel control.	1	EA	see website http://www.screenservices.com/StaticOrb.htm
			Install Intake screen, underwater	1	LS	
			Riprap protection, waterfront	67	CY	45Lx20Wx2D
Notes:						
1. The quantities for civil engineering listed above is a site specific estimate, topographic is based on USGS 10-ft contours.						
2. The quantities listed is based on General Arrangement WorleyParsons drawing CAES-1-DW-111-002-101. Rev. C						
3. Cut and fill quantities are based on 3 levels, i.e.. Plant-El 995, switch yard-El 985 and laydown-El 980,						
the bottom of the stormwater pond is at El 970.						
4. The Fence length is based on the entire site as shown in General Arrangement listed above.						
5. The frost depth is 54", therefore, all mechanical pipes are considered have 5.5 ft cover.						
6. The lengths and sizes of mechanical pipes are provided by mechanical department. And they are revised per latest revisions on 9/21/11.						

Item	Desc	Qty	Unit	Notes
1	Main Iso Phase Bus Duct - 3 ph@		LF	
	Iso Phase Bus Duct Tap - 3 ph@		LF	
2	Non Seg Bus Duct - (1a)	130	LF	GSU-1 Transformer to Generator: 13.8KV, 8000A
	Non Seg Bus Duct - (2a)	38	LF	Transformer T-1 to 4000A Bus: 13.8KV, 4000A
	Non Seg Bus Duct - (2b)	80	LF	VFD-1 to 4000A Bus: 13.8KV, 4000A
	Non Seg Bus Duct - (2c)	95	LF	4000A Bus to 4000 Compressor: 13.8KV, 4000A
	Non Seg Bus Duct - (3a)	38	LF	Transformer T-19 to "T" @ (3a/b/c): 13.8KV, 6000A
	Non Seg Bus Duct - (3b)	80	LF	"T" @ (3a/b/c) to 5000A Bus: 13.8KV, 6000A
	Non Seg Bus Duct - (3c)	55	LF	"T" @ (3a/b/c) to VFD-1: 13.8KV, 6000A
	Non Seg Bus Duct - (3d)	85	LF	VFD-1 to 5000A Bus: 13.8KV, 6000A
	Non Seg Bus Duct - (3e)	60	LF	5000A Bus to 5000 Compressor: 13.8KV, 6000A

3	**Medium Voltage Cable**			
BOM #	Cable Description	Cable Length		
M11	1-1000 KCMIL SH		LF	Insulation Voltage Class: 15KV-133%
M12	1-750 KCMIL SH		LF	Insulation Voltage Class: 15KV-133%
M13	1-500 KCMIL SH		LF	Insulation Voltage Class: 15KV-133%
M14	1-350 KCMIL SH	2,000	LF	Insulation Voltage Class: 15KV-133%
M15	1-250 KCMIL SH		LF	Insulation Voltage Class: 15KV-133%
M16	1-4/0 KCMIL SH	10,900	LF	Insulation Voltage Class: 15KV-133%
M17	1-2/0 KCMIL SH		LF	Insulation Voltage Class: 15KV-133%
M18	1-1/0 KCMIL SH		LF	Insulation Voltage Class: 15KV-133%

4	Medium Voltage Power Cable Terminations			
BOM #	Cable Description	Termination Count		
M11	1-1000 KCMIL SH		EA	
M12	1-750 KCMIL SH		EA	
M13	1-500 KCMIL SH		EA	
M14	1-350 KCMIL SH	6	EA	
M15	1-250 KCMIL SH		EA	
M16	1-4/0 KCMIL SH	24	EA	
M17	1-2/0 KCMIL SH		EA	
M18	1-1/0 KCMIL SH		EA	

5	**Low Voltage Power Cable**			
BOM #	Cable Description	Cable Length		
P 1	600V - 1/C - 750KCMIL		LF	Insulation Voltage Class: 600V, single lay power
P 2	600V - 1/C - 500KCMIL	8,300	LF	Insulation Voltage Class: 600V, single lay power
P 3	600V - 1/C - 350KCMIL	3,100	LF	
P 5	600V - 1/C - #4/0	7,900	LF	Insulation Voltage Class: 600V, single lay power
P 6	600V - 1/C - #2/0	6,500	LF	Insulation Voltage Class: 600V, single lay power
P11	600V - 3/c - #1/0 (+GND)		LF	Insulation Voltage Class: 600V, Random lay power

Item	Desc	Qty	Unit	Notes
P12	600V - 3/c - #2 (+GND)		LF	Insulation Voltage Class: 600V, Random lay power
P13	600V - 3/c - #4 (+GND)	200	LF	Insulation Voltage Class: 600V, Random lay power
P14	600V - 3/c - #6 (+GND)	2,550	LF	Insulation Voltage Class: 600V, Random lay power
P15	600V - 3/c - #8 (+GND)	1,800	LF	Insulation Voltage Class: 600V, Random lay power
P16	600V - 3/c - #10 (+GND)	20,000	LF	Insulation Voltage Class: 600V, Random lay power

Item	Desc	Qty	Unit	Notes
P17	600V - 3/c - #12 (+GND)	9,200	LF	Insulation Voltage Class: 600V, Random lay power
P22	600V - 3/c - #10		LF	Insulation Voltage Class: 600V, Random lay power
P23	600V - 4/c - #10		LF	Insulation Voltage Class: 600V, Random lay power
P24	600V - 3/c - #12		LF	Insulation Voltage Class: 600V, Random lay power
P31	1/C- 500KCMIL BARE CU GND		LF	ground cable for single conductor circuits
P32	1/C- 250KCMIL BARE CU GND		LF	ground cable for single conductor circuits
P33	1/C- #4/0 BARE CU GND		LF	ground cable for single conductor circuits
P34	1/C- #2/0 BARE CU GND		LF	ground cable for single conductor circuits
P36	1/C- #2 BARE CU GND	2,050	LF	ground cable for single conductor circuits
P37	1/C- #4 BARE CU GND		LF	ground cable for single conductor circuits
P38	1/C- #6 BARE CU GND		LF	ground cable for single conductor circuits
			LF	

6	**Low Voltage Power Cable Terminations**			
BOM #	Cable Description	Termination Count		
P 1	600V - 1/C - 750KCMIL		EA	
P 2	600V - 1/C - 500KCMIL	24	EA	
P 3	600V - 1/C - 350KCMIL	30	EA	
P 5	600V - 1/C - #4/0	36	EA	
P 6	600V - 1/C - #2/0	12	EA	
P11	600V - 3/c - #1/0 (+GND)		EA	
P12	600V - 3/c - #2 (+GND)		EA	
P13	600V - 3/c - #4 (+GND)		EA	
P14	600V - 3/c - #6 (+GND)	40	EA	
P15	600V - 3/c - #8 (+GND)	64	EA	
P16	600V - 3/c - #10 (+GND)	232	EA	
P17	600V - 3/c - #12 (+GND)	128	EA	
P22	600V - 3/c - #10		EA	
P23	600V - 4/c - #10		EA	
P24	600V - 3/c - #12		EA	
P31	1/C- 500KCMIL BARE CU GND		EA	
P32	1/C- 250KCMIL BARE CU GND		EA	
P33	1/C- #4/0 BARE CU GND		EA	
P34	1/C- #2/0 BARE CU GND		EA	
P36	1/C- #2 BARE CU GND	10	EA	
P37	1/C- #4 BARE CU GND		EA	
P38	1/C- #6 BARE CU GND		EA	
			EA	

7	**Control Cable**			
BOM #	Cable Description	Cable Length		
C 1	600V - 2/C - #12	600	LF	Insulation Voltage Class: 600V,
C 3	600V - 5/C - #12		LF	Insulation Voltage Class: 600V,
C11	600V - 2/C - #14		LF	Insulation Voltage Class: 600V,
C12	600V - 3/C - #14		LF	Insulation Voltage Class: 600V,

Item	Desc	Qty	Unit	Notes
C13	600V - 5/C - #14	25,000	LF	Insulation Voltage Class: 600V,
C14	600V - 7/C - #14		LF	Insulation Voltage Class: 600V,

Item	Desc	Qty	Unit	Notes
C15	600V - 9/C - #14		LF	Insulation Voltage Class: 600V,
C16	600V - 12/C - #14	3,600	LF	Insulation Voltage Class: 600V,
C52	600V - 4/C - #10 SH		LF	Insulation Voltage Class: 600V, switchyard CT circuits
C53	600V - 2/C - #6 SH		LF	Insulation Voltage Class: 600V, switchyard CT circuits

8	**Control Cable Terminations**			
BOM #	Cable Description	Termination Count		
C 1	600V - 2/C - #12	8	EA	
C 3	600V - 5/C - #12		EA	
C11	600V - 2/C - #14		EA	
C12	600V - 3/C - #14		EA	
C13	600V - 5/C - #14	390	EA	
C14	600V - 7/C - #14		EA	
C15	600V - 9/C - #14		EA	
C16	600V - 12/C - #14	192	EA	
			EA	
C52	600V - 4/C - #10 SH		EA	
C53	600V - 2/C - #6 SH		EA	
			EA	

9	**Instrument Cable**			
BOM #	Cable Description	Cable Length		
L 1	600V - 2/c- #16 SH		LF	
L 2	600V - 3/c- #16 SH		LF	
L 3	600V - 5/c- #16 SH		LF	
L 4	600V - 7/c- #16 SH		LF	
L 5	600V - 9/c- #16 SH		LF	
L11	600V - 1P- #16 SH	24,000	LF	
L12	600V - 2P- #16 SH,OA SH		LF	
L21	600V - 1TRI- #16 SH		LF	
L41	600V - 1P- #16 SH,TC-K	1,100	LF	
L42	600V - 2P- #16 SH,OA SH,TC-K		LF	
			LF	

10	**Instrument Cable Terminations**			
BOM #	Cable Description	Termination Count		
L 1	600V - 2/c- #16 SH		LF	
L 2	600V - 3/c- #16 SH		LF	
L 3	600V - 5/c- #16 SH		LF	
L 4	600V - 7/c- #16 SH		LF	
L 5	600V - 9/c- #16 SH		LF	
L11	600V - 1P- #16 SH	198	LF	

Item	Desc	Qty	Unit	Notes
L12	600V - 2P- #16 SH,OA SH		LF	
L21	600V - 1TRI- #16 SH		LF	
L41	600V - 1P- #16 SH,TC-K	30	LF	
L42	600V - 2P- #16 SH,OA SH,TC-K		LF	
			LF	

11	**Grounding**			
	Ground Cable	28,000	LF	4/0 bare copper Ground Cable
	Ground Cable	150	LF	4/0 insulated copper Ground Cable
	Ground Rods	110	EA	3/4" x 10' Copper clad steel
	Exothermic welds	602	EA	Exothermic type Cadweld connections - cable/cable
	Exothermic welds	110	EA	Exothermic type Cadweld connections - cable/rod
	Exothermic welds	22	EA	Exothermic type Cadweld connections - cable/steel
	Exothermic welds	31	EA	Exothermic type Cadweld connections - cable/rebar
	Bolted Connections	78	EA	cable/lug/equipment
	Equipment Stingers	100	LF	4/0 bare copper Ground Cable with 10' coil for later connection to equipment
	Equipment Stingers	2	LF	4/0 insulated copper Ground Cable with 10' coil for later connection to equipment
	Static Ground Reel	1	EA	
	Ground Test Well	2	EA	
	Ground Step Mat		EA	

12	**Cable Tray**			
	24" x 6" Straight section	1,210	LF	Aluminum Ladder Tray
	18" x 6" Straight section	1,210	LF	Aluminum Ladder Tray
			LF	Aluminum Ladder Tray
			LF	Aluminum Ladder Tray
			LF	Aluminum Ladder Tray
			LF	Aluminum Ladder Tray
			LF	Aluminum Ladder Tray
	18" x 4" Straight section	1,210	LF	Galvanized Steel Solid Bottom Tray
			LF	Galvanized Steel Solid Bottom Tray
			LF	Galvanized Steel Solid Bottom Tray

13	**Above Grade Conduit**			
	3/4"	40,700	LF	Rigid Galvanized metallic conduit
	3/4"	4,070	LF	Flexible (liquid-tite) conduit
	1"	10,800	LF	Rigid Galvanized metallic conduit
	1"	1,080	LF	Flexible (liquid-tite) conduit
	1 1/2"	2,700	LF	Rigid Galvanized metallic conduit
	1 1/2"	270	LF	Flexible (liquid-tite) conduit
	2"	20,000	LF	Rigid Galvanized metallic conduit
	2"	2,000	LF	Flexible (liquid-tite) conduit
	2 1/2"	10,000	LF	Rigid Galvanized metallic conduit
	2 1/2"	1,000	LF	Flexible (liquid-tite) conduit
	3"	10,000	LF	Rigid Galvanized metallic conduit
	3"	1,000	LF	Flexible (liquid-tite) conduit

Item	Desc	Qty	Unit	Notes
	4"	3,600	LF	Rigid Galvanized metallic conduit
	4"	360	LF	Flexible (liquid-tite) conduit
	5"	1,000	LF	Rigid Galvanized metallic conduit
	5"	100	LF	Flexible (liquid-tite) conduit
14	**Underground Ductbank\Embedded conduits CTG Embedded Conduits**			
	2"		LF	Rigid Galvanized metallic conduit
	2"	1,000	LF	Schedule 40 PVC Conduit
	3"		LF	Rigid Galvanized metallic conduit
	3"		LF	Schedule 40 PVC Conduit
	4"	2,900	LF	Rigid Galvanized metallic conduit
	4"	26,105	LF	Schedule 40 PVC Conduit
	5"		LF	Rigid Galvanized metallic conduit
	5"	3,553	LF	Schedule 40 PVC Conduit
15	**Pre-Cast Electrical Manholes**			
	10x10x10	4	EA	
16	**Lighting Fixtures**			
	Light Fixture, A1 HPS, 250W, w/30' pole, (Roadway Lighting) includes excavation and conduit	24	EA	
	Light Fixture, A6 HPS, 100W, outdoor stanchion mount		EA	
	Light Fixture, B3 HPS, 70W, Outdoor Stanchion Mount		EA	
	Light Fixture, B4 HPS, 150W, Wall Mount with photo Control		EA	
	Light Fixture, B5 HPS, 70W, Wall Mount with Photo Control		EA	
	Light Fixture, B6 HPS, 400W, High bay		EA	
	Light Fixture, B7 HPS, 400W, High Bay with 250W Tungsten Halogen Lamp for Standby Lighting		EA	
	Light Fixture, C1 HPS, 1000W, High bay		EA	
	Light Fixture, C2 HPS, 1000W, High Bay with 250W Tungsten Halogen Lamp for Standby Lighting		EA	
	E1 Halogen, Emergency Lighting Unit 12VDC (2) 8W, with sealed battery pack.		EA	
	E2 Halogen, Emergency Lighting remote Heads(2) 12V DC, 8W		EA	
	E3 Exit Sign - 20Yr Life		EA	
	E4 Halogen, Emergency Lighting Remote head (1) 12V DC, 8W		EA	

Item	Desc	Qty	Unit	Notes

Item	Desc	Qty	Unit	Notes
17	**Communications**			
	Indoor Wall Station	8	EA	
	Indoor Speaker Amplifier		EA	
	Outdoor Wall Station	7	EA	
	Outdoor Speaker Amplifier		EA	
	Desktop Station	8	EA	
	Horn Speaker - with driver	20	EA	
	Horn Speaker		EA	
	Ceiling Cone Speaker	27	EA	
	Telephone Interface	1	EA	
	Line Balance Assembly	1	EA	

Item	Desc	Qty	Unit	Notes
1	Main Iso Phase Bus Duct - 3 ph@		LF	
	Iso Phase Bus Duct Tap - 3 ph@		LF	
2	Non Seg Bus Duct - (1a)	130	LF	GSU-1 Transformer to Generator: 13.8KV, 8000A
	Non Seg Bus Duct - (2a)	38	LF	Transformer T-1 to 4000A Bus: 13.8KV, 4000A
	Non Seg Bus Duct - (2b)	80	LF	VFD-1 to 4000A Bus: 13.8KV, 4000A
	Non Seg Bus Duct - (2c)	95	LF	4000A Bus to 4000 Compressor: 13.8KV, 4000A
	Non Seg Bus Duct - (3a)	38	LF	Transformer T-19 to "T" @ (3a/b/c): 13.8KV, 6000A
	Non Seg Bus Duct - (3b)	80	LF	"T" @ (3a/b/c) to 5000A Bus: 13.8KV, 6000A
	Non Seg Bus Duct - (3c)	55	LF	"T" @ (3a/b/c) to VFD-1: 13.8KV, 6000A
	Non Seg Bus Duct - (3d)	85	LF	VFD-1 to 5000A Bus: 13.8KV, 6000A
	Non Seg Bus Duct - (3e)	60	LF	5000A Bus to 5000 Compressor: 13.8KV, 6000A

3	**Medium Voltage Cable**			
BOM #	Cable Description	Cable Length		
M11	1-1000 KCMIL SH		LF	Insulation Voltage Class: 15KV-133%
M12	1-750 KCMIL SH		LF	Insulation Voltage Class: 15KV-133%
M13	1-500 KCMIL SH		LF	Insulation Voltage Class: 15KV-133%
M14	1-350 KCMIL SH	2,000	LF	Insulation Voltage Class: 15KV-133%
M15	1-250 KCMIL SH		LF	Insulation Voltage Class: 15KV-133%
M16	1-4/0 KCMIL SH	10,900	LF	Insulation Voltage Class: 15KV-133%
M17	1-2/0 KCMIL SH		LF	Insulation Voltage Class: 15KV-133%
M18	1-1/0 KCMIL SH		LF	Insulation Voltage Class: 15KV-133%

4	Medium Voltage Power Cable Terminations			
BOM #	Cable Description	Termination Count		
M11	1-1000 KCMIL SH		EA	
M12	1-750 KCMIL SH		EA	
M13	1-500 KCMIL SH		EA	
M14	1-350 KCMIL SH	6	EA	
M15	1-250 KCMIL SH		EA	
M16	1-4/0 KCMIL SH	24	EA	
M17	1-2/0 KCMIL SH		EA	
M18	1-1/0 KCMIL SH		EA	

5	**Low Voltage Power Cable**			
BOM #	Cable Description	Cable Length		
P 1	600V - 1/C - 750KCMIL		LF	Insulation Voltage Class: 600V, single lay power
P 2	600V - 1/C - 500KCMIL	8,300	LF	Insulation Voltage Class: 600V, single lay power
P 3	600V - 1/C - 350KCMIL	3,100	LF	
P 5	600V - 1/C - #4/0	7,900	LF	Insulation Voltage Class: 600V, single lay power
P 6	600V - 1/C - #2/0	6,500	LF	Insulation Voltage Class: 600V, single lay power
P11	600V - 3/c - #1/0 (+GND)		LF	Insulation Voltage Class: 600V, Random lay power

Item	Desc	Qty	Unit	Notes
P12	600V - 3/c - #2 (+GND)		LF	Insulation Voltage Class: 600V, Random lay power
P13	600V - 3/c - #4 (+GND)	200	LF	Insulation Voltage Class: 600V, Random lay power
P14	600V - 3/c - #6 (+GND)	2,550	LF	Insulation Voltage Class: 600V, Random lay power
P15	600V - 3/c - #8 (+GND)	1,800	LF	Insulation Voltage Class: 600V, Random lay power
P16	600V - 3/c - #10 (+GND)	20,000	LF	Insulation Voltage Class: 600V, Random lay power

Item	Desc	Qty	Unit	Notes
P17	600V - 3/c - #12 (+GND)	9,200	LF	Insulation Voltage Class: 600V, Random lay power
P22	600V - 3/c - #10		LF	Insulation Voltage Class: 600V, Random lay power
P23	600V - 4/c - #10		LF	Insulation Voltage Class: 600V, Random lay power
P24	600V - 3/c - #12		LF	Insulation Voltage Class: 600V, Random lay power
P31	1/C- 500KCMIL BARE CU GND		LF	ground cable for single conductor circuits
P32	1/C- 250KCMIL BARE CU GND		LF	ground cable for single conductor circuits
P33	1/C- #4/0 BARE CU GND		LF	ground cable for single conductor circuits
P34	1/C- #2/0 BARE CU GND		LF	ground cable for single conductor circuits
P36	1/C- #2 BARE CU GND	2,050	LF	ground cable for single conductor circuits
P37	1/C- #4 BARE CU GND		LF	ground cable for single conductor circuits
P38	1/C- #6 BARE CU GND		LF	ground cable for single conductor circuits
			LF	

6	**Low Voltage Power Cable Terminations**			
BOM #	Cable Description	Termination Count		
P 1	600V - 1/C - 750KCMIL		EA	
P 2	600V - 1/C - 500KCMIL	24	EA	
P 3	600V - 1/C - 350KCMIL	30	EA	
P 5	600V - 1/C - #4/0	36	EA	
P 6	600V - 1/C - #2/0	12	EA	
P11	600V - 3/c - #1/0 (+GND)		EA	
P12	600V - 3/c - #2 (+GND)		EA	
P13	600V - 3/c - #4 (+GND)		EA	
P14	600V - 3/c - #6 (+GND)	40	EA	
P15	600V - 3/c - #8 (+GND)	64	EA	
P16	600V - 3/c - #10 (+GND)	232	EA	
P17	600V - 3/c - #12 (+GND)	128	EA	
P22	600V - 3/c - #10		EA	
P23	600V - 4/c - #10		EA	
P24	600V - 3/c - #12		EA	
P31	1/C- 500KCMIL BARE CU GND		EA	
P32	1/C- 250KCMIL BARE CU GND		EA	
P33	1/C- #4/0 BARE CU GND		EA	
P34	1/C- #2/0 BARE CU GND		EA	
P36	1/C- #2 BARE CU GND	10	EA	
P37	1/C- #4 BARE CU GND		EA	
P38	1/C- #6 BARE CU GND		EA	
			EA	

7	**Control Cable**			
BOM #	Cable Description	Cable Length		
C 1	600V - 2/C - #12	600	LF	Insulation Voltage Class: 600V,
C 3	600V - 5/C - #12		LF	Insulation Voltage Class: 600V,
C11	600V - 2/C - #14		LF	Insulation Voltage Class: 600V,
C12	600V - 3/C - #14		LF	Insulation Voltage Class: 600V,

Item	Desc	Qty	Unit	Notes
C13	600V - 5/C - #14	25,000	LF	Insulation Voltage Class: 600V,
C14	600V - 7/C - #14		LF	Insulation Voltage Class: 600V,

Item	Desc	Qty	Unit	Notes
C15	600V - 9/C - #14		LF	Insulation Voltage Class: 600V,
C16	600V - 12/C - #14	3,600	LF	Insulation Voltage Class: 600V,
C52	600V - 4/C - #10 SH		LF	Insulation Voltage Class: 600V, switchyard CT circuits
C53	600V - 2/C - #6 SH		LF	Insulation Voltage Class: 600V, switchyard CT circuits

8	**Control Cable Terminations**			
BOM #	Cable Description	Termination Count		
C 1	600V - 2/C - #12	8	EA	
C 3	600V - 5/C - #12		EA	
C11	600V - 2/C - #14		EA	
C12	600V - 3/C - #14		EA	
C13	600V - 5/C - #14	390	EA	
C14	600V - 7/C - #14		EA	
C15	600V - 9/C - #14		EA	
C16	600V - 12/C - #14	192	EA	
			EA	
C52	600V - 4/C - #10 SH		EA	
C53	600V - 2/C - #6 SH		EA	
			EA	

9	**Instrument Cable**			
BOM #	Cable Description	Cable Length		
L 1	600V - 2/c- #16 SH		LF	
L 2	600V - 3/c- #16 SH		LF	
L 3	600V - 5/c- #16 SH		LF	
L 4	600V - 7/c- #16 SH		LF	
L 5	600V - 9/c- #16 SH		LF	
L11	600V - 1P- #16 SH	24,000	LF	
L12	600V - 2P- #16 SH,OA SH		LF	
L21	600V - 1TRI- #16 SH		LF	
L41	600V - 1P- #16 SH,TC-K	1,100	LF	
L42	600V - 2P- #16 SH,OA SH,TC-K		LF	
			LF	

10	**Instrument Cable Terminations**			
BOM #	Cable Description	Termination Count		
L 1	600V - 2/c- #16 SH		LF	
L 2	600V - 3/c- #16 SH		LF	
L 3	600V - 5/c- #16 SH		LF	
L 4	600V - 7/c- #16 SH		LF	
L 5	600V - 9/c- #16 SH		LF	
L11	600V - 1P- #16 SH	198	LF	

Item	Desc	Qty	Unit	Notes
L12	600V - 2P- #16 SH,OA SH		LF	
L21	600V - 1TRI- #16 SH		LF	
L41	600V - 1P- #16 SH,TC-K	30	LF	
L42	600V - 2P- #16 SH,OA SH,TC-K		LF	
			LF	

11	**Grounding**			
	Ground Cable	28,000	LF	4/0 bare copper Ground Cable
	Ground Cable	150	LF	4/0 insulated copper Ground Cable
	Ground Rods	110	EA	3/4" x 10' Copper clad steel
	Exothermic welds	602	EA	Exothermic type Cadweld connections - cable/cable
	Exothermic welds	110	EA	Exothermic type Cadweld connections - cable/rod
	Exothermic welds	22	EA	Exothermic type Cadweld connections - cable/steel
	Exothermic welds	31	EA	Exothermic type Cadweld connections - cable/rebar
	Bolted Connections	78	EA	cable/lug/equipment
	Equipment Stingers	100	LF	4/0 bare copper Ground Cable with 10' coil for later connection to equipment
	Equipment Stingers	2	LF	4/0 insulated copper Ground Cable with 10' coil for later connection to equipment
	Static Ground Reel	1	EA	
	Ground Test Well	2	EA	
	Ground Step Mat		EA	

12	**Cable Tray**			
	24" x 6" Straight section	1,210	LF	Aluminum Ladder Tray
	18" x 6" Straight section	1,210	LF	Aluminum Ladder Tray
			LF	Aluminum Ladder Tray
			LF	Aluminum Ladder Tray
			LF	Aluminum Ladder Tray
			LF	Aluminum Ladder Tray
			LF	Aluminum Ladder Tray
	18" x 4" Straight section	1,210	LF	Galvanized Steel Solid Bottom Tray
			LF	Galvanized Steel Solid Bottom Tray
			LF	Galvanized Steel Solid Bottom Tray

13	**Above Grade Conduit**			
	3/4"	40,700	LF	Rigid Galvanized metallic conduit
	3/4"	4,070	LF	Flexible (liquid-tite) conduit
	1"	10,800	LF	Rigid Galvanized metallic conduit
	1"	1,080	LF	Flexible (liquid-tite) conduit
	1 1/2"	2,700	LF	Rigid Galvanized metallic conduit
	1 1/2"	270	LF	Flexible (liquid-tite) conduit
	2"	20,000	LF	Rigid Galvanized metallic conduit
	2"	2,000	LF	Flexible (liquid-tite) conduit
	2 1/2"	10,000	LF	Rigid Galvanized metallic conduit
	2 1/2"	1,000	LF	Flexible (liquid-tite) conduit
	3"	10,000	LF	Rigid Galvanized metallic conduit
	3"	1,000	LF	Flexible (liquid-tite) conduit

Item	Desc	Qty	Unit	Notes
	4"	3,600	LF	Rigid Galvanized metallic conduit
	4"	360	LF	Flexible (liquid-tite) conduit
	5"	1,000	LF	Rigid Galvanized metallic conduit
	5"	100	LF	Flexible (liquid-tite) conduit
14	**Underground Ductbank\Embedded conduits CTG Embedded Conduits**			
	2"		LF	Rigid Galvanized metallic conduit
	2"	1,000	LF	Schedule 40 PVC Conduit
	3"		LF	Rigid Galvanized metallic conduit
	3"		LF	Schedule 40 PVC Conduit
	4"	2,900	LF	Rigid Galvanized metallic conduit
	4"	26,105	LF	Schedule 40 PVC Conduit
	5"		LF	Rigid Galvanized metallic conduit
	5"	3,553	LF	Schedule 40 PVC Conduit
15	**Pre-Cast Electrical Manholes**			
	10x10x10	4	EA	
16	**Lighting Fixtures**			
	Light Fixture, A1 HPS, 250W, w/30' pole, (Roadway Lighting) includes excavation and conduit	24	EA	
	Light Fixture, A6 HPS, 100W, outdoor stanchion mount		EA	
	Light Fixture, B3 HPS, 70W, Outdoor Stanchion Mount		EA	
	Light Fixture, B4 HPS, 150W, Wall Mount with photo Control		EA	
	Light Fixture, B5 HPS, 70W, Wall Mount with Photo Control		EA	
	Light Fixture, B6 HPS, 400W, High bay		EA	
	Light Fixture, B7 HPS, 400W, High Bay with 250W Tungsten Halogen Lamp for Standby Lighting		EA	
	Light Fixture, C1 HPS, 1000W, High bay		EA	
	Light Fixture, C2 HPS, 1000W, High Bay with 250W Tungsten Halogen Lamp for Standby Lighting		EA	
	E1 Halogen, Emergency Lighting Unit 12VDC (2) 8W, with sealed battery pack.		EA	
	E2 Halogen, Emergency Lighting remote Heads(2) 12V DC, 8W		EA	
	E3 Exit Sign - 20Yr Life		EA	
	E4 Halogen, Emergency Lighting Remote head (1) 12V DC, 8W		EA	

Item	Desc	Qty	Unit	Notes

Item	Desc	Qty	Unit	Notes
17	**Communications**			
	Indoor Wall Station	8	EA	
	Indoor Speaker Amplifier		EA	
	Outdoor Wall Station	7	EA	
	Outdoor Speaker Amplifier		EA	
	Desktop Station	8	EA	
	Horn Speaker - with driver	20	EA	
	Horn Speaker		EA	
	Ceiling Cone Speaker	27	EA	
	Telephone Interface	1	EA	
	Line Balance Assembly	1	EA	

NOTE: MUD MATS ARE NOT INCLUDED.

Ref. GA Drawing: CAES-1-DW-177-002-101 & 111-002-103 Rev A

													Structural Steel							Base Plate & Anchor Bolts								Grating			Handrail		Waterstop	
GA Item No.	Location	Description	Type of Material	Quantity	Main dimensions (ft)			Crushed Stone (CY)	Des.Vol Conc. (CY)	Des. Excav. Volume (CY)	Backfill Volume (CY)	Design Formwork (SF)	Design Rebar (Tons)	Heavy[1] Steel (lbs/ft)	Medium[1] Steel (lbs/ft)	Light[1] Steel (lbs/ft)	Length (ft)	Design Steel-Heavy (Tons)	Design Steel-Medium (Tons)	Design Steel-Light (Tons)	No. of Base Pl	No. of AB per Base Pl	Anchor Bolt Dia (in)	Anchor Bolt Length (in)	Base Pl Length (in)	Base Pl Width (in)	Base Pl Thickness (in)	Design Base Pl (Tons)	Design Anchor Bolts (Tons)	Length of Grating (ft)	Width of Grating (ft)	Area of Grating (SF)	Length of Guardrail (ft)	Total Length of Guardrail (ft)	Length of Waterstop (ft)	Total Length of Waterstop (ft)
					L	W	H																												
??	Intake Pump House Bldg (26'X18'X14' high + 10'-0" diameter X 24'-0" long pump chamber)	Beams & Columns	Steel	1														2.40	1.20	0.50															
		Purlins	Steel	1																1.00															
		Girts	Steel	1																4.00															
		Grating	Steel	1																										10.00	10.00	100.00	35.00	35.00	35.00	35.00
		Handrail	Steel	1																															
		Base Plate & Anchor Bolts	Steel	1																	6	4	2	36	21.00	21.00	1.50	0.56	0.38							
		Pump Chamber Base (2' thick)	Concrete	1	13.00	13.00	2.00	3.1	12.5	519.2	385.6		0.81																						
		Pump Chamber Wall (1.5' thick)	Concrete	1	36.13	1.50	24.00		48.2			1734.2	3.13																						
		Bldg Perimeter Beam (3' X 4')	Concrete	1	76.00	3.00	4.00	4.2	33.8			608.0	2.20																						
		Bldg Slab (1.5' thick)	Concrete	1	20.00	12.00	1.50	4.4	13.3				0.87																						
		Bldg Slab (1.5' thick)	Concrete	-1	10.00	3.14	1.50	-0.6	-1.7				-0.11																						
		Pump Chamber Base (2' thick)	Concrete	-1	6.00	6.00	2.00	-0.7	-2.7				-0.17																						
					Total (yd^3)			**10.5**	**103.4**	**519.2**	**385.6**	**2342.2**	**6.7**	***Optional Steel Total (tons)***				**2.4**	**1.2**	**5.5**	***Base PL + Anchorage (tons)***							**0.6**	**0**	***Grating (SF)***		**100**	***Handrail (FT)***	**35**	***Waterstop (FT)***	**35**

	Crushed Stone (CY)	Design Concrete Volume (CY)	Design Excavation Volume (CY)	Backfill Volume (CY)	Design Formwork (SF)	Design Rebar (ton)
FOUNDATION GRAND TOTALS	11	103	519	386	2342	7

	Design Heavy Steel (ton)	Design Medium Steel (ton)	Design Light Steel (ton)
STEEL TOTALS (tons)	2	1	6

	Design Base PL (ton)	Design Anchor Bolts (ton)
BASE PL + ANCHORAGE (tons)	1	0

	Grating (SF)
GRATING TOTALS (SF)	100

	Handrail (ft)
HANDRAIL TOTALS (FT)	35

	Waterstop (ft)
WATERSTOP TOTALS (FT)	35

[1] Heavy Steel - >80 lbs/ft, Medium Steel - >20 lbs/ft but <80 lbs/ft, Light Steel <20 lbs/ft

Total Project Owner's Costs through June 2016

Total Phase 1 Costs	Month → Total↓	2010 Total↓	2011 Total↓	2012 Total↓	2013 Total↓	2014 Total↓	2015 Total↓	2016 Total↓
Actuals	$2,709,907	$40,203	$2,680,571	-$10,867	$0	$0	$0	$0
Forecast	$0	$0	$0	$0	$0	$0	$0	$0
Actuals & Forecast	$2,709,907	$40,203	$2,680,571	-$10,867	$0	$0	$0	$0
Total Project Management Costs								
Actuals	$0	$0	$0	$0	$0	$0	$0	$0
Forecast	$2,903,686	$0	$0	$440,604	$547,780	$809,873	$751,270	$354,159
Actuals & Forecast	$2,903,686	$0	$0	$440,604	$547,780	$809,873	$751,270	$354,159
Total Corporate Support Costs								
Actuals	$0	$0	$0	$0	$0	$0	$0	$0
Forecast	$1,157,514	$0	$0	$121,563	$125,209	$710,004	$132,834	$67,904
Actuals & Forecast	$1,157,514	$0	$0	$121,563	$125,209	$710,004	$132,834	$67,904
Total Article X Costs								
Actuals	$0	$0	$0	$0	$0	$0	$0	$0
Forecast	$889,190	$0	$0	$583,235	$305,956	$0	$0	$0
Actuals & Forecast	$889,190	$0	$0	$583,235	$305,956	$0	$0	$0
Total PSC Rate Proceeding Costs								
Actuals	$0	$0	$0	$0	$0	$0	$0	$0
Forecast	$1,010,845	$0	$0	$705,972	$304,873	$0	$0	$0
Actuals & Forecast	$1,010,845	$0	$0	$705,972	$304,873	$0	$0	$0
Total Interconnection Process Costs								
Actuals	$0	$0	$0	$0	$0	$0	$0	$0
Forecast	$707,000	$0	$0	$616,667	$90,333	$0	$0	$0
Actuals & Forecast	$707,000	$0	$0	$616,667	$90,333	$0	$0	$0
Total Inergy/US Salt Costs								
Actuals	$0	$0	$0	$0	$0	$0	$0	$0
Forecast	$599,024	$0	$0	$0	$0	$77,890	$79,057	$442,078
Actuals & Forecast	$599,024	$0	$0	$0	$0	$77,890	$79,057	$442,078
Total Plant Staffing Costs								
Actuals	$0	$0	$0	$0	$0	$0	$0	$0
Forecast	$1,638,422	$0	$0	$0	$0	$536,959	$822,603	$278,860
Actuals & Forecast	$1,638,422	$0	$0	$0	$0	$536,959	$822,603	$278,860
Total Phase 3 Costs								
Actuals	$0	$0	$0	$0	$0	$0	$0	$0
Forecast	$2,066,545	$0	$0	$0	$0	$0	$0	$2,066,545
Actuals & Forecast	$2,066,545	$0	$0	$0	$0	$0	$0	$2,066,545
Total of all Project Owner Cost Tabs								
Actuals	$2,709,907	$40,203	$2,680,571	-$10,867	$0	$0	$0	$0
Forecast	$10,972,225	$0	$0	$2,468,040	$1,374,151	$2,134,726	$1,785,763	$3,209,545
Actuals & Forecast	$13,682,132	$40,203	$2,680,571	$2,457,173	$1,374,151	$2,134,726	$1,785,763	$3,209,545

ESTIMATE SUMMARY

NYSEG
NYSEG CAES Cycle One

ACCOUNT	ITEM	QTY	UNIT	MATERIAL	LABOR	TOTAL	COMMENTS
	Procurement Packages						
11201	CAES Equipment			$ 130,544,500	$ -	$ 130,544,500	
14001	Black Start Generator			$ 781,000	$ -	$ 781,000	
21401	Generator & Compressor Circuit Breakers			$ 2,362,670	$ -	$ 2,362,670	
22101	Isolated Phase Bus Duct			$ -	$ -	$ -	
22201	Non-Seg Bus Duct			$ 651,000	$ -	$ 651,000	
23101	Raw Water Pumphouse MCC			$ 24,000	$ -	$ 24,000	
25101	Step-Up Transformer			$ 1,500,000	$ -	$ 1,500,000	
25201	Aux Transformer			$ 2,666,300	$ -	$ 2,666,300	
25301	Miscellaneous Transformers			$ 200,600	$ -	$ 200,600	
51001	DCS			$ -	$ -	$ -	
53201	CEMS			$ 230,500	$ -	$ 230,500	
93301	Ammonia Unloading, Storage & Forwarding			$ 78,000	$ -	$ 78,000	
95001	Water Treatment System			$ 1,111,000	$ -	$ 1,111,000	
95101	Oil / Water Separator			$ 49,000	$ -	$ 49,000	
95801	Packaged Sanitary System			$ 75,000	$ -	$ 75,000	
96101	Fuel Gas Compressor			$ 408,000	$ -	$ 408,000	
96301	Fuel Gas Conditioning			$ 508,000	$ -	$ 508,000	
96501	Fuel Gas Chromatograph			$ 60,000	$ -	$ 60,000	
102001	Bridge Crane			$ 427,486	$ -	$ 427,486	
154101	Circulating Water & Aux Cooling Water Pumps			$ 545,400	$ -	$ 545,400	
154301	Sump Pumps			$ 90,000	$ -	$ 90,000	
157101	Fire Water Pumps			$ 298,000	$ -	$ 298,000	
157501	Miscellaneous Horizontal Pumps			$ 47,600	$ -	$ 47,600	
157601	Miscellaneous Vertical Pumps			$ 92,222	$ -	$ 92,222	
182001	Air Receiver & Dryer			$ 98,000	$ -	$ 98,000	
293101	Air Stack			$ -	$ -	$ -	
420201	Circ Water Pipe			$ 1,235,943	$ -	$ 1,235,943	
491001	Power Distribution Center			$ 2,211,960	$ -	$ 2,211,960	
	Procurement Package Subtotal			$ 146,296,181	$ -	$ 146,296,181	
						$ -	
	Construction Packages					$ -	
171001	Cooling Tower			$ 2,665,940	$ -	$ 2,665,940	
191101	Field Fabricated Tanks			$ 1,214,334	$ -	$ 1,214,334	
591101	Initial Sitework			$ 692,586	$ 2,149,486	$ 2,842,072	
591102	Final Sitework			$ 378,663	$ 200,579	$ 579,242	
591201	Offsite Pipeline			$ 110,107	$ 619,513	$ 729,620	
591401	Foundations & U/G Utilities			$ 5,841,603	$ 14,238,772	$ 20,080,375	
592101	Generation Building Erection			$ 9,715,442	$ 4,012,079	$ 13,727,521	
592102	Admin / Maintenance and Mech Equipment Buildings			$ 6,126,210	$ 2,181,401	$ 8,307,611	
592201	Pre-Engineered Buildings			$ 3,401,519	$ 9,657	$ 3,411,176	
592301	Raw Water Pumphouse			$ 380,383	$ 279,149	$ 659,532	
593301	Mechanical Erection			$ 366,740	$ 16,940,053	$ 17,306,793	
593401	Piping			$ 5,114,419	$ 2,828,131	$ 7,942,550	
593601	Fire Protection			$ 97,619	$ 95,603	$ 193,222	
593701	Insulation			$ 173,474	$ 681,150	$ 854,624	
594101	Plant Switchyard			$ 3,224,196	$ 1,364,784	$ 4,588,980	
594102	Interconnect Switchyard			$ 5,895,149	$ 3,778,984	$ 9,674,133	
594201	115kV Transmission Line			$ 468,000	$ -	$ 468,000	
594202	34.5kV Distribution Line			$ 119,500	$ -	$ 119,500	
594401	Electrical and I&C			$ 2,783,256	$ 9,975,803	$ 12,759,059	
651001	Start-up Subcontracts			$ 1,072,000	$ 2,885,740	$ 3,957,740	
	Construction Package Subtotal			$ 49,841,140	$ 62,240,884	$ 112,082,024	
	Purchase Order & Subcontract Package Subtotal			$ 196,137,321	$ 62,240,884	$ 258,378,205	
	Material & Design Development Allowance	1	LS	$ 1,908,053	$ 2,083,597	$ 3,991,650	
	Subcontractor's Mark-up on Material	1	LS	$ 2,595,100	$ -	$ 2,595,100	
	Additional Premium Time Cost (5-10's)	1	LS			$ -	Included in crew rate
	Overtime Productivity Cost	1	LS			$ -	None
	Construction Subtotal			$ 200,640,474	$ 64,324,481	$ 264,964,955	
	PROFESSIONAL SERVICES:						
	Engineering, Construction Management, & Start-up Services	1	LS			$ 24,018,000	Includes Escalation
	Engineering Subtotal					$ 24,018,000	
	OTHER COSTS:						
	Builder's All Risk Insurance	1	LS			$ -	Excluded
	Worker's Compensation & Employers' Liability	1	LS			$ -	Included in crew rate
	Commercial General Liability	1	LS			$ -	Included in crew rate
	Comprehensive Automobile Liability	1	LS			$ -	Included in crew rate
	Contractor's Equipment & Automobile Physical Damage Insurance	1	LS			$ -	Included in crew rate
	Transportation Insurance	1	LS			$ -	Included in crew rate
	Payment & Performance Bond	1	LS			$ -	Excluded
	Escalation	1	LS			$ 12,370,976	
	Sales & Use Tax	1	LS			$ -	
	Warranty	1	LS			$ -	Excluded
	Permits & Fees	1	LS			$ -	Excluded
	Other Costs Subtotal					$ 12,370,976	
	SUBTOTAL COST					**$ 301,353,931**	
	Contingency - General	1	LS			$ 28,612,574	
	Contingency - Major Purchase Order Terms & Conditions	1	LS			$ 7,832,670	
	Contingency Subtotal					$ 36,445,244	
	TOTAL COST					**$ 337,799,175**	
	Fees					$ -	
	Cavern & Well Sytem Deveopment					$ 38,920,122	
	AFUDC					$ 54,161,656	
	Owner's Costs					$ 13,682,133	
	Licensing Support					$ 710,000	
	TOTAL					**$ 445,273,086**	

ESTIMATE SUMMARY

NYSEG
NYSEG CAES Cycle One A (Indicative)

ACCOUNT	ITEM	QTY	UNIT	MATERIAL	LABOR	TOTAL	COMMENTS
	Procurement Packages						
11201	CAES Equipment			$ 155,144,500	$ -	$ 155,144,500	
14001	Black Start Generator			$ 781,000	$ -	$ 781,000	
21401	Generator & Compressor Circuit Breakers			$ 2,362,670	$ -	$ 2,362,670	
22101	Isolated Phase Bus Duct			$ -	$ -	$ -	
22201	Non-Seg Bus Duct			$ 707,542	$ -	$ 707,542	
23101	Raw Water Pumphouse MCC			$ 24,000	$ -	$ 24,000	
25101	Step-Up Transformer			$ 2,043,672	$ -	$ 2,043,672	
25201	Aux Transformer			$ 2,666,300	$ -	$ 2,666,300	
25301	Miscellaneous Transformers			$ 200,600	$ -	$ 200,600	
51001	DCS			$ -	$ -	$ -	
53201	CEMS			$ 253,550	$ -	$ 253,550	
93301	Ammonia Unloading, Storage & Forwarding			$ 106,271	$ -	$ 106,271	
95001	Water Treatment System			$ 1,222,100	$ -	$ 1,222,100	
95101	Oil / Water Separator			$ 49,000	$ -	$ 49,000	
95801	Packaged Sanitary System			$ 75,000	$ -	$ 75,000	
96101	Fuel Gas Compressor			$ 555,879	$ -	$ 555,879	
96301	Fuel Gas Conditioning			$ 584,200	$ -	$ 584,200	
96501	Fuel Gas Chromatograph			$ 60,000	$ -	$ 60,000	
102001	Bridge Crane			$ 641,229	$ -	$ 641,229	
154101	Circulating Water & Aux Cooling Water Pumps			$ 545,400	$ -	$ 545,400	
154301	Sump Pumps			$ 90,000	$ -	$ 90,000	
157101	Fire Water Pumps			$ 298,000	$ -	$ 298,000	
157501	Miscellaneous Horizontal Pumps			$ 54,124	$ -	$ 54,124	
157601	Miscellaneous Vertical Pumps			$ 92,222	$ -	$ 92,222	
182001	Air Receiver & Dryer			$ 98,000	$ -	$ 98,000	
293101	Air Stack			$ -	$ -	$ -	
420201	Circ Water Pipe			$ 1,483,132	$ -	$ 1,483,132	
491001	Power Distribution Center			$ 2,433,156	$ -	$ 2,433,156	
	Procurement Package Subtotal			$ 172,571,546	$ -	$ 172,571,546	
						$ -	
	Construction Packages					$ -	
171001	Cooling Tower			$ 2,665,940	$ -	$ 2,665,940	
191101	Field Fabricated Tanks			$ 1,326,781	$ -	$ 1,326,781	
591101	Initial Sitework			$ 692,587	$ 2,149,486	$ 2,842,073	
591102	Final Sitework			$ 378,663	$ 200,579	$ 579,242	
591201	Offsite Pipeline			$ 110,107	$ 619,513	$ 729,620	
591401	Foundations & U/G Utilities			$ 6,244,432	$ 15,414,206	$ 21,658,639	
592101	Generation Building Erection			$ 10,201,214	$ 4,212,683	$ 14,413,897	
592102	Admin / Maintenance and Mech Equipment Buildings			$ 6,126,210	$ 2,181,402	$ 8,307,612	
592201	Pre-Engineered Buildings			$ 3,613,395	$ 10,531	$ 3,623,926	
592301	Raw Water Pumphouse			$ 380,384	$ 279,149	$ 659,533	
593301	Mechanical Erection			$ 415,580	$ 21,265,835	$ 21,681,415	
593401	Piping			$ 5,412,602	$ 3,022,682	$ 8,435,283	
593601	Fire Protection			$ 107,381	$ 105,163	$ 212,544	
593701	Insulation			$ 192,179	$ 750,099	$ 942,278	
594101	Plant Switchyard			$ 3,224,196	$ 1,364,784	$ 4,588,980	
594102	Interconnect Switchyard			$ 5,895,148	$ 3,778,983	$ 9,674,131	Assumes no Cap Bank Req'd
594201	115kV Transmission Line			$ 468,000	$ -	$ 468,000	
594202	34.5kV Distribution Line			$ 119,500	$ -	$ 119,500	
594401	Electrical and I&C			$ 3,012,753	$ 11,228,831	$ 14,241,584	
651001	Start-up Subcontracts			$ 1,072,000	$ 2,885,740	$ 3,957,740	
	Construction Package Subtotal			$ 51,659,052	$ 69,469,665	$ 121,128,717	
	Purchase Order & Subcontract Package Subtotal			$ 224,230,598	$ 69,469,665	$ 293,700,263	
	Material & Design Development Allowance	1	LS	$ 2,007,496	$ 2,220,272	$ 4,227,768	
	Subcontractor's Mark-up on Material	1	LS	$ 2,689,375	$ -	$ 2,689,375	
	Additional Premium Time Cost (5-10's)	1	LS			$ -	Included in crew rate
	Overtime Productivity Cost	1	LS			$ -	None
	Construction Subtotal			$ 228,927,468	$ 71,689,938	$ 300,617,406	
	PROFESSIONAL SERVICES:						
	Engineering, Construction Management, & Start-up Services	1	LS			$ 24,018,000	Includes Escalation
	Engineering Subtotal					$ 24,018,000	
	OTHER COSTS:						
	Builder's All Risk Insurance	1	LS			$ -	Excluded
	Worker's Compensation & Employers' Liability	1	LS			$ -	Included in crew rate
	Commercial General Liability	1	LS			$ -	Included in crew rate
	Comprehensive Automobile Liability	1	LS			$ -	Included in crew rate
	Contractor's Equipment & Automobile Physical Damage Insurance	1	LS			$ -	Included in crew rate
	Transportation Insurance	1	LS			$ -	Included in crew rate
	Payment & Performance Bond	1	LS			$ -	Excluded
	Escalation	1	LS			$ 13,735,425	
	Sales & Use Tax	1	LS			$ -	
	Warranty	1	LS			$ -	Excluded
	Permits & Fees	1	LS			$ -	Excluded
	Other Costs Subtotal					$ 13,735,425	
	SUBTOTAL COST					**$ 338,370,831**	
	Contingency - General	1	LS			$ 35,327,966	
	Contingency - Major Purchase Order Terms & Conditions	1	LS			$ 9,308,670	
	Contingency Subtotal					$ 44,636,636	
	TOTAL COST					**$ 383,007,468**	
	Fees					$ -	
	Cavern & Well Sytem Deveopment					$ 38,920,122	
	AFUDC					$ 60,857,797	
	Owner's Costs					$ 13,682,133	
	Licensing Support					$ 710,000	
	TOTAL					**$ 497,177,520**	

ESTIMATE SUMMARY

NYSEG
NYSEG CAES Cycle Two

ACCOUNT	ITEM	QTY	UNIT	MATERIAL	LABOR	TOTAL	COMMENTS
	Procurement Packages						
11201	CAES Equipment			$ 121,497,400	$ -	$ 121,497,400	
14001	Black Start Generator			$ 781,000	$ -	$ 781,000	
21401	Generator & Compressor Circuit Breakers			$ 4,740,550	$ -	$ 4,740,550	
22101	Isolated Phase Bus Duct			$ 637,000	$ -	$ 637,000	
22201	Non-Seg Bus Duct			$ 938,050	$ -	$ 938,050	
23101	Raw Water Pumphouse MCC			$ 24,000	$ -	$ 24,000	
25101	Step-Up Transformer			$ 2,085,000	$ -	$ 2,085,000	
25201	Aux Transformer			$ 3,029,300	$ -	$ 3,029,300	
25301	Miscellaneous Transformers			$ 200,600	$ -	$ 200,600	
51001	DCS			$ 1,039,549	$ -	$ 1,039,549	
53201	CEMS			$ 230,500	$ -	$ 230,500	
93301	Ammonia Unloading, Storage & Forwarding			$ 78,000	$ -	$ 78,000	
95001	Water Treatment System			$ 555,100	$ -	$ 555,100	
95101	Oil / Water Separator			$ 49,000	$ -	$ 49,000	
95801	Packaged Sanitary System			$ 75,000	$ -	$ 75,000	
96101	Fuel Gas Compressor			$ -	$ -	$ -	
96301	Fuel Gas Conditioning			$ 674,000	$ -	$ 674,000	
96501	Fuel Gas Chromatograph			$ 60,000	$ -	$ 60,000	
102001	Bridge Crane			$ 534,586	$ -	$ 534,586	
154101	Circulating Water & Aux Cooling Water Pumps			$ 545,400	$ -	$ 545,400	
154301	Sump Pumps			$ 90,000	$ -	$ 90,000	
157101	Fire Water Pumps			$ 298,000	$ -	$ 298,000	
157501	Miscellaneous Horizontal Pumps			$ 29,600	$ -	$ 29,600	
157601	Miscellaneous Vertical Pumps			$ 92,222	$ -	$ 92,222	
182001	Air Receiver & Dryer			$ 98,000	$ -	$ 98,000	
420201	Circ Water Pipe			$ 1,235,943	$ -	$ 1,235,943	
491001	Power Distribution Center			$ 2,244,960	$ -	$ 2,244,960	
	Procurement Package Subtotal			$ 141,862,760	$ -	$ 141,862,760	
						$ -	
	Construction Packages					$ -	
171001	Cooling Tower			$ 2,665,940	$ -	$ 2,665,940	
191101	Field Fabricated Tanks			$ 904,091	$ -	$ 904,091	
591101	Initial Sitework			$ 733,353	$ 2,255,741	$ 2,989,094	
591102	Final Sitework			$ 406,593	$ 217,152	$ 623,745	
591201	Offsite Pipeline			$ 110,061	$ 618,568	$ 728,629	
591401	Foundations & U/G Utilities			$ 6,327,293	$ 15,086,184	$ 21,413,477	
592101	Generation Building Erection			$ 16,228,656	$ 6,701,905	$ 22,930,561	
592102	Admin / Maintenance and Mech Equipment Buildings			$ 6,170,210	$ 2,461,344	$ 8,631,554	
592201	Pre-Engineered Buildings			$ 2,816,950	$ 7,234	$ 2,824,184	
592301	Raw Water Pumphouse			$ 380,383	$ 278,825	$ 659,208	
593301	Mechanical Erection			$ 2,105,638	$ 25,635,614	$ 27,741,252	
593401	Piping			$ 5,686,800	$ 3,379,319	$ 9,066,119	
593601	Fire Protection			$ 142,270	$ 179,456	$ 321,726	
593701	Insulation			$ 167,667	$ 662,239	$ 829,906	
594101	Plant Switchyard			$ 3,224,196	$ 1,363,261	$ 4,587,457	
594102	Interconnect Switchyard			$ 5,895,149	$ 3,774,888	$ 9,670,037	
594201	115kV Transmission Line			$ 468,000	$ -	$ 468,000	
594202	34.5kV Distribution Line			$ 119,500	$ -	$ 119,500	
594401	Electrical and I&C			$ 3,437,362	$ 12,735,828	$ 16,173,190	
651001	Start-up Subcontracts			$ 1,182,000	$ 3,458,136	$ 4,640,136	
	Construction Package Subtotal			$ 59,172,112	$ 78,815,694	$ 137,987,806	
	Purchase Order & Subcontract Package Subtotal			$ 201,034,872	$ 78,815,694	$ 279,850,566	
	Material & Design Development Allowance	1	LS	$ 2,363,728	$ 2,432,015	$ 4,795,743	
	Subcontractor's Mark-up on Material	1	LS	$ 3,229,388	$ -	$ 3,229,388	
	Additional Premium Time Cost (5-10's)	1	LS			$ -	Included in crew rate
	Overtime Productivity Cost	1	LS			$ -	None
	Construction Subtotal			$ 206,627,988	$ 81,247,709	$ 287,875,697	
	PROFESSIONAL SERVICES:						
	Engineering, Construction Management, & Start-up Services	1	LS			$ 25,078,000	Includes Escalation
	Engineering Subtotal					$ 25,078,000	
	OTHER COSTS:						
	Builder's All Risk Insurance	1	LS			$ -	Excluded
	Worker's Compensation & Employers' Liability	1	LS			$ -	Included in crew rate
	Commercial General Liability	1	LS			$ -	Included in crew rate
	Comprehensive Automobile Liability	1	LS			$ -	Included in crew rate
	Contractor's Equipment & Automobile Physical Damage Insurance	1	LS			$ -	Included in crew rate
	Transportation Insurance	1	LS			$ -	Included in crew rate
	Payment & Performance Bond	1	LS			$ -	Excluded
	Escalation	1	LS			$ 20,561,225	
	Sales & Use Tax	1	LS			$ -	
	Warranty	1	LS			$ -	Excluded
	Permits & Fees	1	LS			$ -	Excluded
	Other Costs Subtotal					$ 20,561,225	
	SUBTOTAL COST					**$ 333,514,922**	
	Contingency - General	1	LS			$ 34,298,196	
	Contingency -Major Purchase Order Terms & Conditions	1	LS			$ 4,841,064	
	Contingency Subtotal					$ 39,139,260	
	TOTAL COST					**$ 372,654,182**	
	Fees					$ 7,350,000	
	Cavern & Well Sytem Deveopment					$ 38,920,122	
	AFUDC					$ 60,831,375	
	Owner's Costs					$ 13,682,133	
	Licensing Support					$ 710,000	
	TOTAL					**$ 494,147,812**	