12 Appendix C – Technical Memoranda

12.7 Schedule, Manpower, and Equipment Utilization During Construction

Eagle Mountain Pumped Storage Project – Schedule, Manpower and Equipment Utilization During Construction

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April 9, 2009

Preparation of an environmental evaluation of the Eagle Mountain Pumped Storage Project under the National Environmental Policy Act (NEPA) and the California Environmental Quality Act (CEQA) includes an assessment of construction-related impacts associated with the project. These impacts typically include: air quality (fugitive dust and carbon emissions from construction equipment operation); noise generated during construction; night-time light "pollution"; water quality concerns (erosion and sedimentation entering surface water bodies, as well as hazardous spills that might affect surface and ground water supplies); and socio-economic impacts on the region. Assessment of these construction-related impacts requires an evaluation of the probable construction schedule and the estimated quantities of work (excavation, fill placement, concrete production and placement, tunneling by boring machine and conventional methods, etc.) to identify the types and numbers of equipment pieces that are likely to be used over time, as well as the required labor force.

At this early stage in project design and given the complexity of the Eagle Mountain Project, it is difficult to develop an overall schedule of equipment and man-power that will closely follow what actually will occur during construction. However, the estimates provided in Attachment 1 represent a reasonable estimate of the type, schedule and monthly use of construction equipment, as well as the monthly man-power utilization during construction of the project. These estimates are based on an overall construction period of about 4 years and engineering judgment and experience relative to construction methods and procedures.

The estimated construction schedule is provided on Figure 1. Key features of the estimated schedule are summarized below:

First Year of Construction

General:

- Mobilize and construct temporary office, storage, maintenance and staging facilities.
- Construct and improve permanent and construction access roads.

Water Conduits:

- Proceed and erect Tunnel Boring Machine and start excavation of tailrace tunnel.

Power Plant:

- Construct access tunnel portal and start excavation of access tunnel.

Upper Reservoir:

- Excavation of approach channel to inlet/outlet works.

Production Wells:

- Begin Construction

Lower Reservoir:

- Start moving unstable tailings pile.
- Start to line lower reservoir.

Monitoring Wells:

- Begin Construction

Switchyard:

- Start switchyard construction.

Transmission Line:

- Start construction of transmission line foundations.

Second Year of Construction

Upper Reservoir:

- Complete excavation of approach tunnel.
- Complete construction of the south and west dams.
- Start Construction of inlet/outlet structures.
- Start lining of Reservoir.

Production Wells:

- Complete Construction

Lower Reservoir:

- Complete moving unstable tailings pile.
- Seepage control liner blanketing.
- Construct inlet/outlet works.

- Install water pipeline from wells, pumping plant, and reverse osmosis system.
- Begin to fill lower reservoir.

Monitoring Wells:
- Complete Construction

Water Conduits:
- Complete tailrace tunnel, manifold and draft tube tunnels.
- Move and erect Tunnel Boring Machine and excavate upper pressure tunnel.
- Excavate lower pressure tunnel, manifold and penstock tunnels.
- Start to excavate pressure shaft.
- Start Installation of steel tunnel linings.

Power Plant:
- Complete majority of underground power plant access.
- Finish excavation of access tunnel.
- Excavate powerhouse cavern.
- Excavate transformer gallery caverns.
- Embed spiral cases and draft tube liners.
- Start to install pump/turbines and generators.
- Start first stage and second stage concrete.
- Start to install electrical and mechanical equipment.

Transmission Line:
- Build foundations and towers.
- String high voltage transmission wires.

Switchyard:
- Complete switchyard and install equipment.

Third Year of Construction

Upper Reservoir:
- Seepage Control by blanketing with fines and grouting.
- Complete inlet/outlet works.

Lower Reservoir:
- Continue filling lower reservoir.

Water Conduits:
- Finish excavation of pressure shaft.
- Construct downstream surge chambers.
- Concrete line penstock and draft tube manifolds.
- Install steel linings in penstocks and concrete linings in draft tube tunnels.

Power Plant:
- Complete excavation of transformer gallery caverns.
- Construct cable tunnel and shaft.
- Complete first stage concrete.
- Start and complete superstructure concrete.
- Continue installation of pump/turbines.

- Continue installation of motor/generators.
- Continue installation of other mechanical and electrical equipment.
- Install water delivery pipeline, pump, and reverse osmosis system.
- Installation of mechanical and electrical equipment.

Fourth Year of Construction

Power Plant:

- Finish installation of pump/turbines.
- Finish installation of motor/generators.
- Continue and Finish installation of other mechanical and electrical equipment.
- Start architectural construction.
- Start startup and testing of units.
- Commission unit 1.
- Commission units 2, 3 and 4 at three month intervals ending the beginning of April.
- Complete architectural work.

Transmission Line:

- Test and energize high voltage transmission line.

Commercial Operation:

- June 2016.

Attachment 1 is organized as follows:

- Bar chart showing the major features of the project construction and the estimated duration in months for construction.

- The schedule bar chart with an overlay graph showing the total number of persons working on the project per month. The peak work force is estimated to be 209 laborers. The total work force is estimated to be 4,674 person months over the duration of construction.

- The schedule bar chart with an overlay graph showing the total number of on-site equipment items, daily concrete trucks (on-site), and daily heavy trucks (on-site) required for the project per month. The peak monthly on-site equipment items are estimated to be 150 items. The peak daily concrete trucks (on-site) are estimated to be 210 trucks. This estimate assumes the trucks are traveling to and from an on-site batch plant. The peak daily heavy trucks (on-site) are estimated to be 258 trucks. This estimate assumes the trucks are hauling materials to and from locations on-site.

- The schedule bar chart with an overlay graph showing the total number of off-site trucks working on the project per month. The peak monthly off-site truck volume is estimated to be 75 trucks. The total off-site truck volume is estimated to be 925 trucks for the duration of construction. This estimate assumes the off-site trucks are importing the necessary construction materials to the site such as steel linings, steel reinforcement, electrical components, etc.

- The schedule bar chart with an overlay graph showing the total labor cost for staff working on the project per month. The peak monthly labor cost is estimated to be $2.51 million.

- The schedule bar chart with an overlay graph showing the cumulative total labor cost for staff working on the project. The cumulative labor cost for the project is estimated to be $58 million.

- A summary table showing the average crew size for each major feature of the project construction, the associated average duration in months, and the total number of person months for each item and for the complete project.

- A summary table showing the type and total number of equipment required for each major feature of the project construction.

- A summary table showing estimates of construction crew member's basic hourly wages and hourly wages including the contractor's overhead and profit.

- A summary table showing a typical pumped-storage project operations crew, and their associated annual salaries. Also shown is a table presenting the annual operations and maintenance costs expected to occur over the project duration.

- A table showing the typical equipment and task production rates used in calculations for the duration and quantity of equipment required for each major feature of the project construction.

- A list of major construction activities and items required for the pumped-storage project.

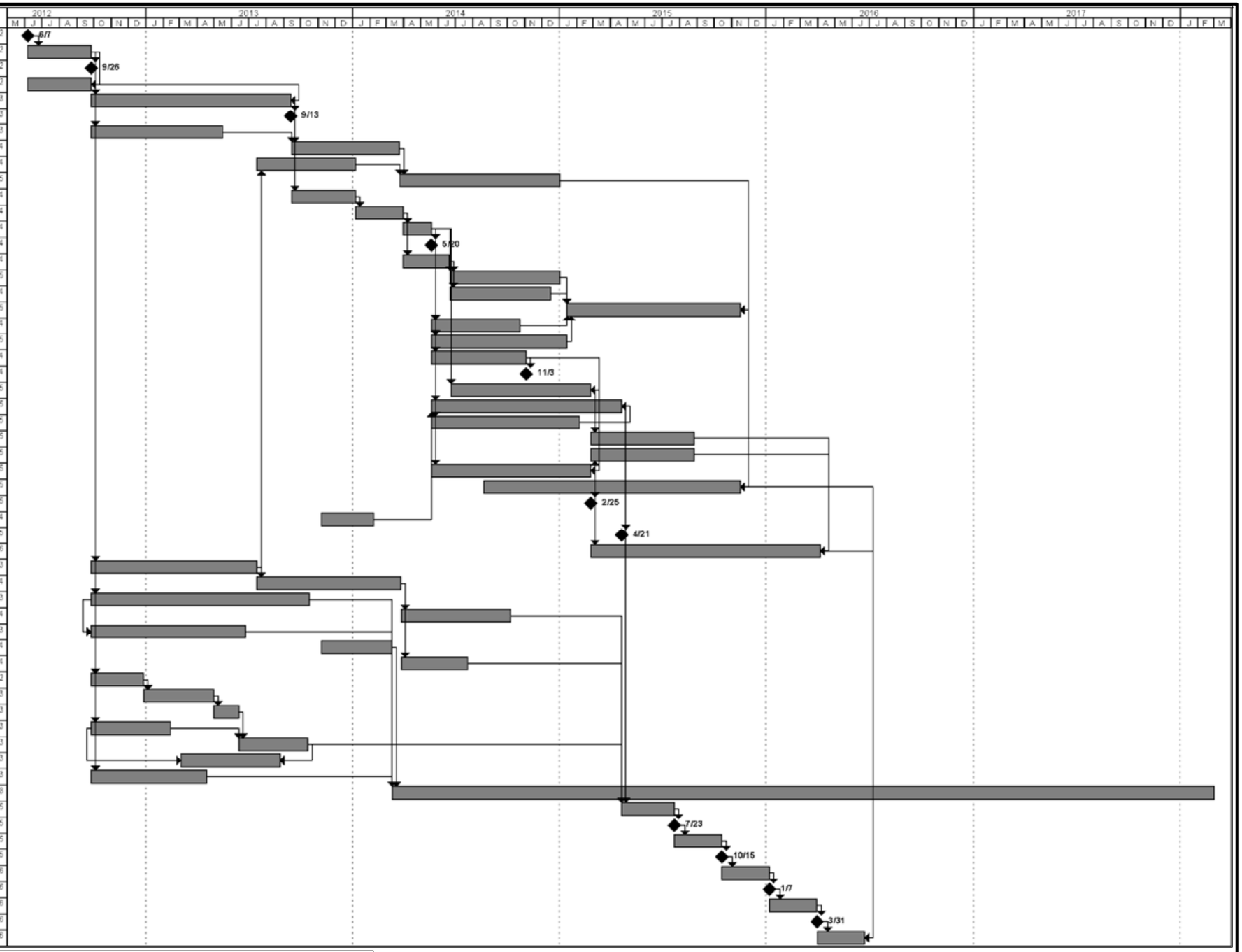
- Equipment and crew size calculation spreadsheets for each major feature of the project construction. Only project features with construction durations are presented.

- Tunnel excavation advancement rate calculation spreadsheet. The spreadsheet includes advancement rates for Tunnel Boring Machine (TBM) and Drill and Blast (D&B) excavation methods.

- Project features and cost estimate spreadsheet. Includes quantities and unit prices for major project features.

- Project reservoir filling calculations and associated charts.

ID	Task Name	Duration	Start	Finish
1	Notice to Proceed	0 days	Thu 6/7/12	Thu 6/7/12
2	Civil Contractor Mobilization	16 wks	Thu 6/7/12	Wed 9/26/12
3	Civil Contractor Mobilized	0 days	Wed 9/26/12	Wed 9/26/12
4	Construct Access Roads	16 wks	Thu 6/7/12	Wed 9/26/12
5	Excavate Power House Access Tunnel	50.4 wks	Thu 9/27/12	Fri 9/13/13
6	Complete Access Tunnel Excavation	0 days	Fri 9/13/13	Fri 9/13/13
7	Excavate Tailrace Tunnel	33.2 wks	Thu 9/27/12	Thu 5/16/13
8	Excavate Lower Pressure Tunnel	27.3 wks	Mon 9/16/13	Tue 3/25/14
9	Excavate Upper Pressure Tunnel	24.7 wks	Wed 7/17/13	Mon 1/6/14
10	Excavate Pressure Shaft	40.6 wks	Tue 3/25/14	Fri 1/2/15
11	Excavate Top Heading	16.1 wks	Mon 9/16/13	Mon 1/6/14
12	Roof Anchorage and Lining	12.1 wks	Mon 1/6/14	Mon 3/31/14
13	Excavate Remainder of Cavern	7.1 wks	Tue 4/1/14	Tue 5/20/14
14	Complete Power House Excavation	0 days	Tue 5/20/14	Tue 5/20/14
15	Excavate Transformer Gallery	11.8 wks	Tue 4/1/14	Fri 6/20/14
16	Excavate Tailrace Surge Chamber	27.8 wks	Mon 6/23/14	Thu 1/1/15
17	Excavate Cable Tunnel Shaft	25.4 wks	Mon 6/23/14	Tue 12/16/14
18	Line and Pave Cable Tunnel	43.6 wks	Thu 1/15/15	Mon 11/16/15
19	Line Penstocks and Draft Tube Manifolds	22.5 wks	Tue 5/20/14	Thu 10/23/14
20	Install Steel Tunnel Linings	34.3 wks	Tue 5/20/14	Wed 1/14/15
21	First Stage Concrete	23.9 wks	Tue 5/20/14	Mon 11/3/14
22	Complete Power House 1st Stage Concrete	0 days	Mon 11/3/14	Mon 11/3/14
23	Install Spiral Cases and Draft Tube Liners	35.3 wks	Tue 6/24/14	Wed 2/25/15
24	Install Pump-Turbines and Generators	48 wks	Tue 5/20/14	Tue 4/21/15
25	Embed Spiral Cases and Draft Liners	37.5 wks	Tue 5/20/14	Thu 2/5/15
26	Install Mechanical Equipment	26 wks	Thu 2/26/15	Wed 8/26/15
27	Install Electrical Equipment	26 wks	Thu 2/26/15	Wed 8/26/15
28	Complete Concrete Work (2nd StelConc)	40.3 wks	Tue 5/20/14	Wed 2/25/15
29	Structural and Architectural Construction	64.5 wks	Thu 8/21/14	Mon 11/16/15
30	Complete Draft Tube, Spiral Case and Powerhous	0 days	Wed 2/25/15	Wed 2/25/15
31	Electrical and Mechanical Mobilization	13.4 wks	Thu 11/7/13	Fri 2/7/14
32	Complete Installation of Pump-Turbines, Generato	0 days	Tue 4/21/15	Tue 4/21/15
33	Complete Electrical Construction	57.9 wks	Thu 2/26/15	Wed 4/6/16
34	Excavate Approach Channel - Upper Reservoir	41.8 wks	Thu 9/27/12	Tue 7/16/13
35	Construct Upper Reservoir Dam	36.4 wks	Wed 7/17/13	Thu 3/27/14
36	Move Unstable Soil - Lower Reservoir	55.1 wks	Thu 9/27/12	Thu 10/17/13
37	Line Upper Reservoir	27.4 wks	Fri 3/28/14	Mon 10/6/14
38	Line Lower Reservoir	38.9 wks	Thu 9/27/12	Wed 6/26/13
39	Construct I/O Structure - Lower Reservoir	17.8 wks	Thu 11/7/13	Tue 3/11/14
40	Construct I/O Structure - Upper Reservoir	16.8 wks	Fri 3/28/14	Wed 7/23/14
41	Switchyard Excavation	13.3 wks	Thu 9/27/12	Fri 12/28/12
42	Switchyard Foundations	17.6 wks	Fri 12/28/12	Wed 5/1/13
43	Switchyard Structures	6.4 wks	Wed 5/1/13	Fri 6/14/13
44	Transmission Line Foundations	20 wks	Thu 9/27/12	Wed 2/13/13
45	Transmission Line Stringing	17.2 wks	Fri 6/14/13	Mon 10/14/13
46	Transmission Line Structures	25 wks	Mon 3/4/13	Mon 8/26/13
47	Install Water Supply Pipeline and RO System	29.2 wks	Thu 9/27/12	Thu 4/18/13
48	Reservoir Filling	207.6 wks	Wed 3/12/14	Fri 3/2/18
49	Unit 1 Startup	13.4 wks	Tue 4/21/15	Thu 7/23/15
50	U-1 Start-up	0 days	Thu 7/23/15	Thu 7/23/15
51	Unit 2 Startup	12 wks	Thu 7/23/15	Thu 10/15/15
52	U-2 Start-up	0 days	Thu 10/15/15	Thu 10/15/15
53	Unit 3 Startup	12 wks	Thu 10/15/15	Thu 1/7/16
54	U-3 Start-up	0 days	Thu 1/7/16	Thu 1/7/16
55	Unit 4 Startup	12 wks	Thu 1/7/16	Thu 3/31/16
56	U-4 Start-up	0 days	Thu 3/31/16	Thu 3/31/16
57	Finish Project	12 wks	Thu 3/31/16	Thu 6/23/16



Task — Progress — Summary — External Tasks — Deadline

Split — Milestone — Project Summary — External Milestone

Eagle Crest Energy Company

Eagle Mountain Pumped Storage Project
Eagle Mountain, California

Project 080472

ESTIMATED PROJECT CONSTRUCTION SCHEDULE

Eagle Crest Energy

GEI Consultants

February 2009 Figure 1

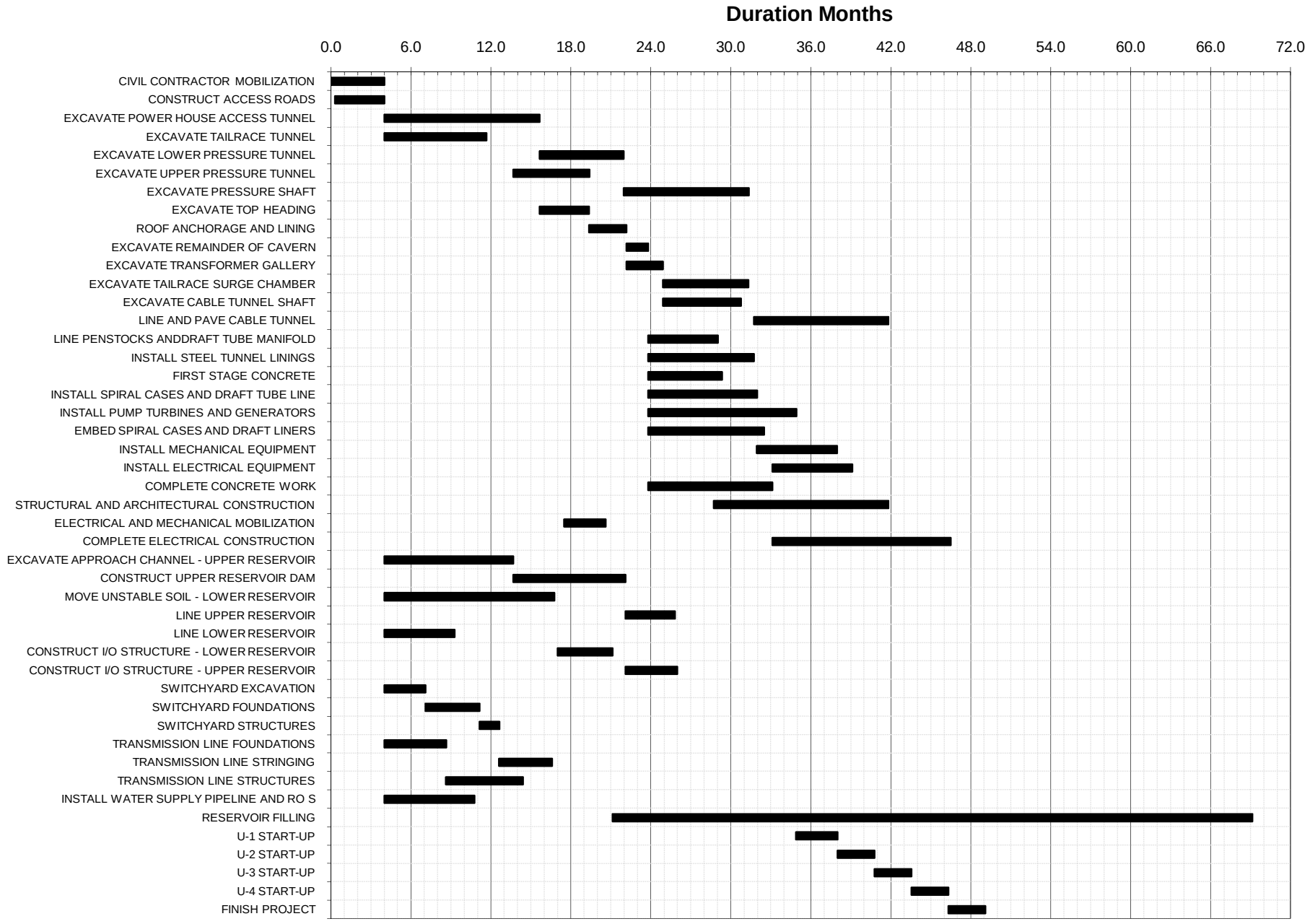
I:\NMiller\PROJECTS\080470 Eagle Mountain\Equipment\ Schedule.dwg Apr 2009

ATTACHMENT 1

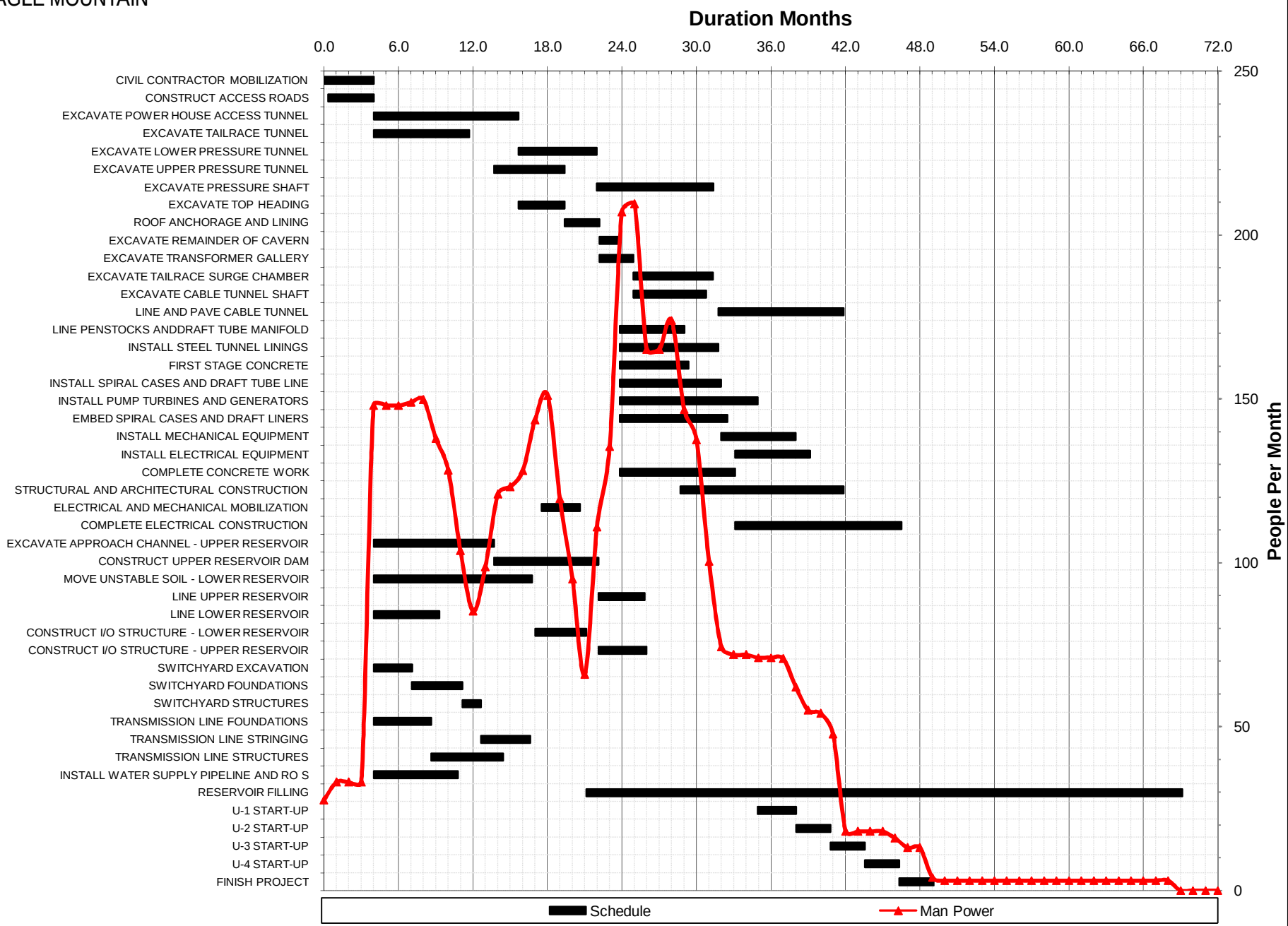
EAGLE MOUNTAIN
PUMPED STORAGE PROJECT

SCHEDULE, EQUIPMENT, AND MAN POWER ESTIMATES

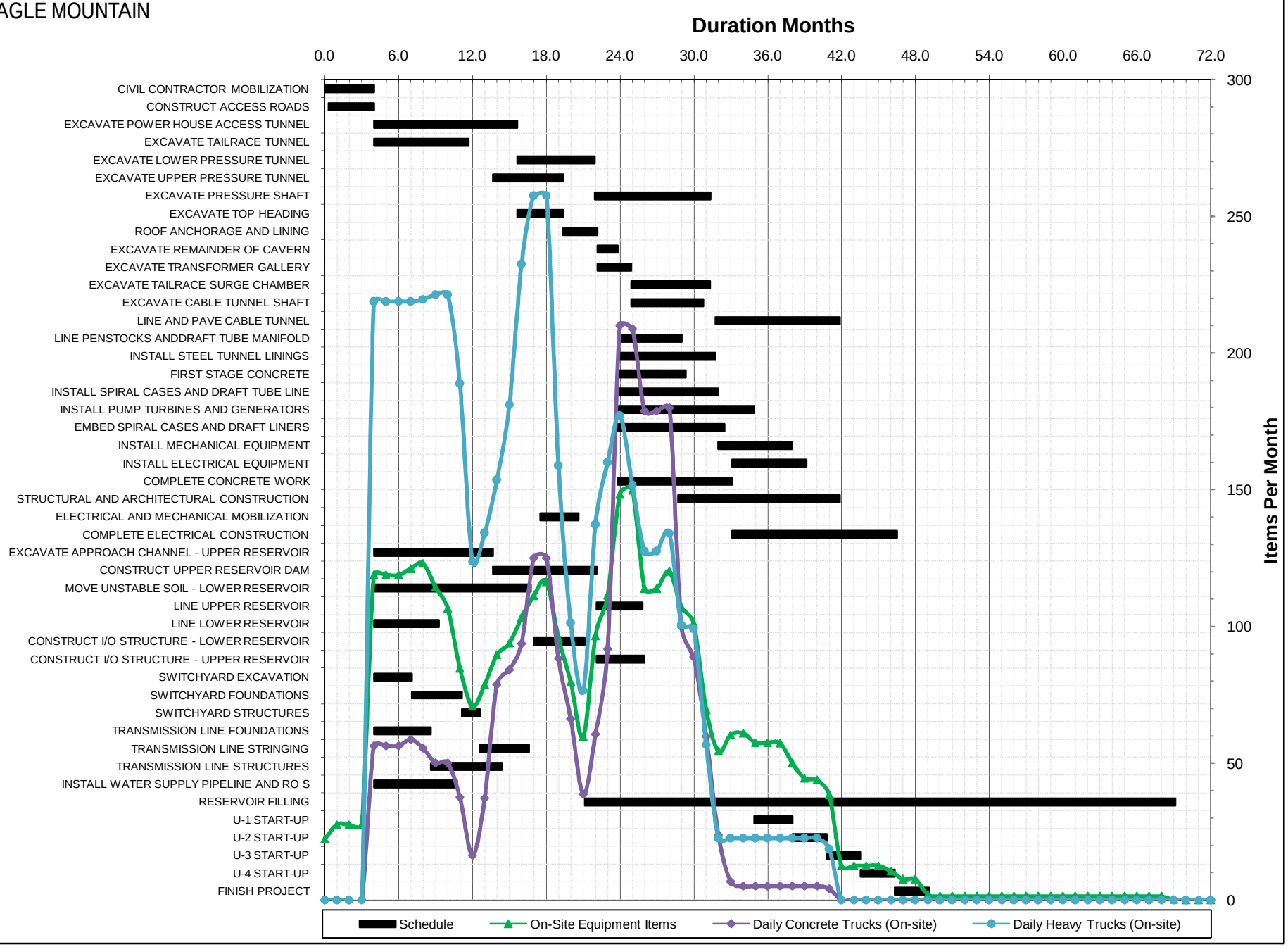
ESTIMATED CONSTRUCTION SCHEDULE
EAGLE MOUNTAIN



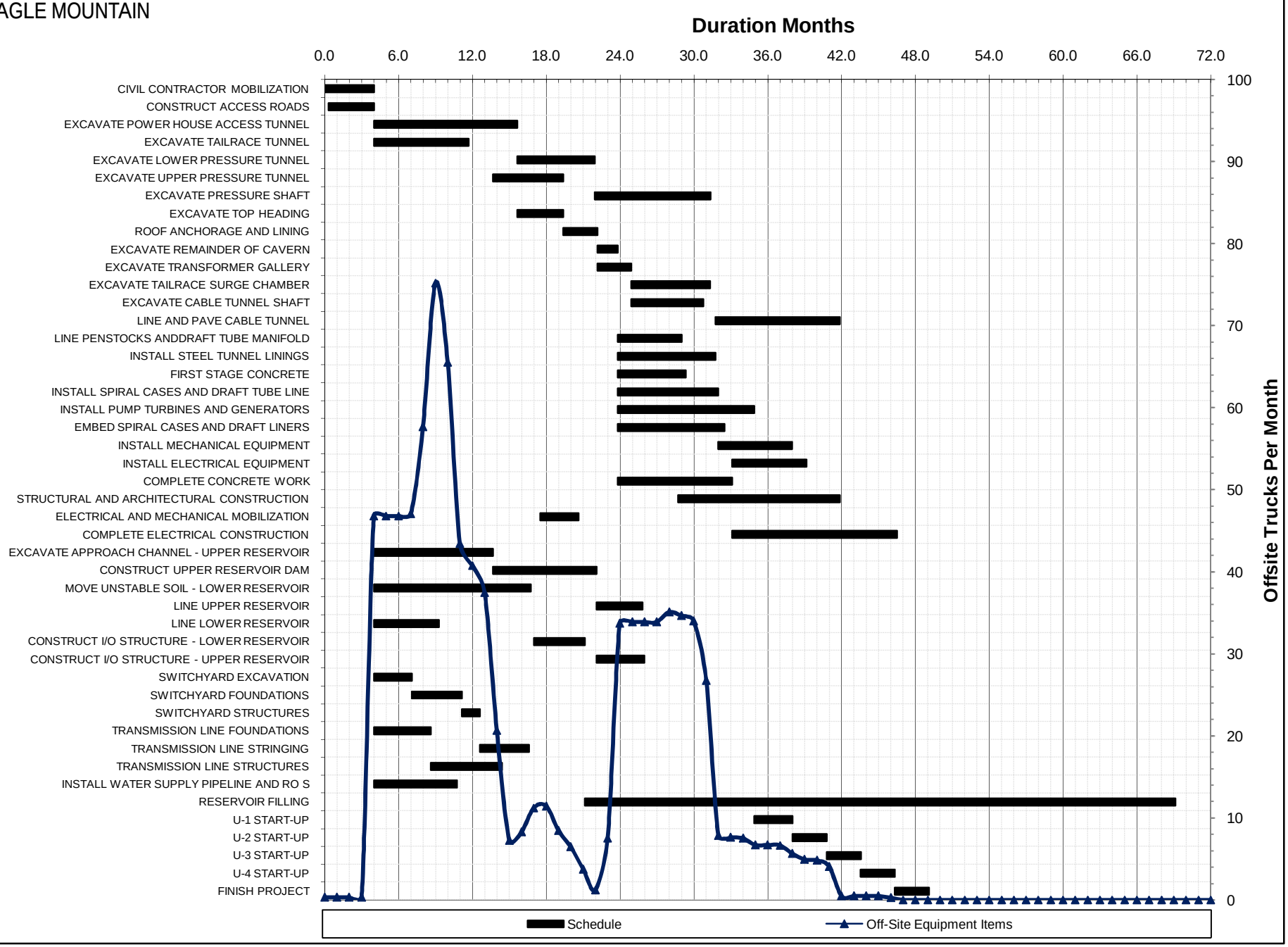
ESTIMATED CONSTRUCTION SCHEDULE & MAN POWER
EAGLE MOUNTAIN



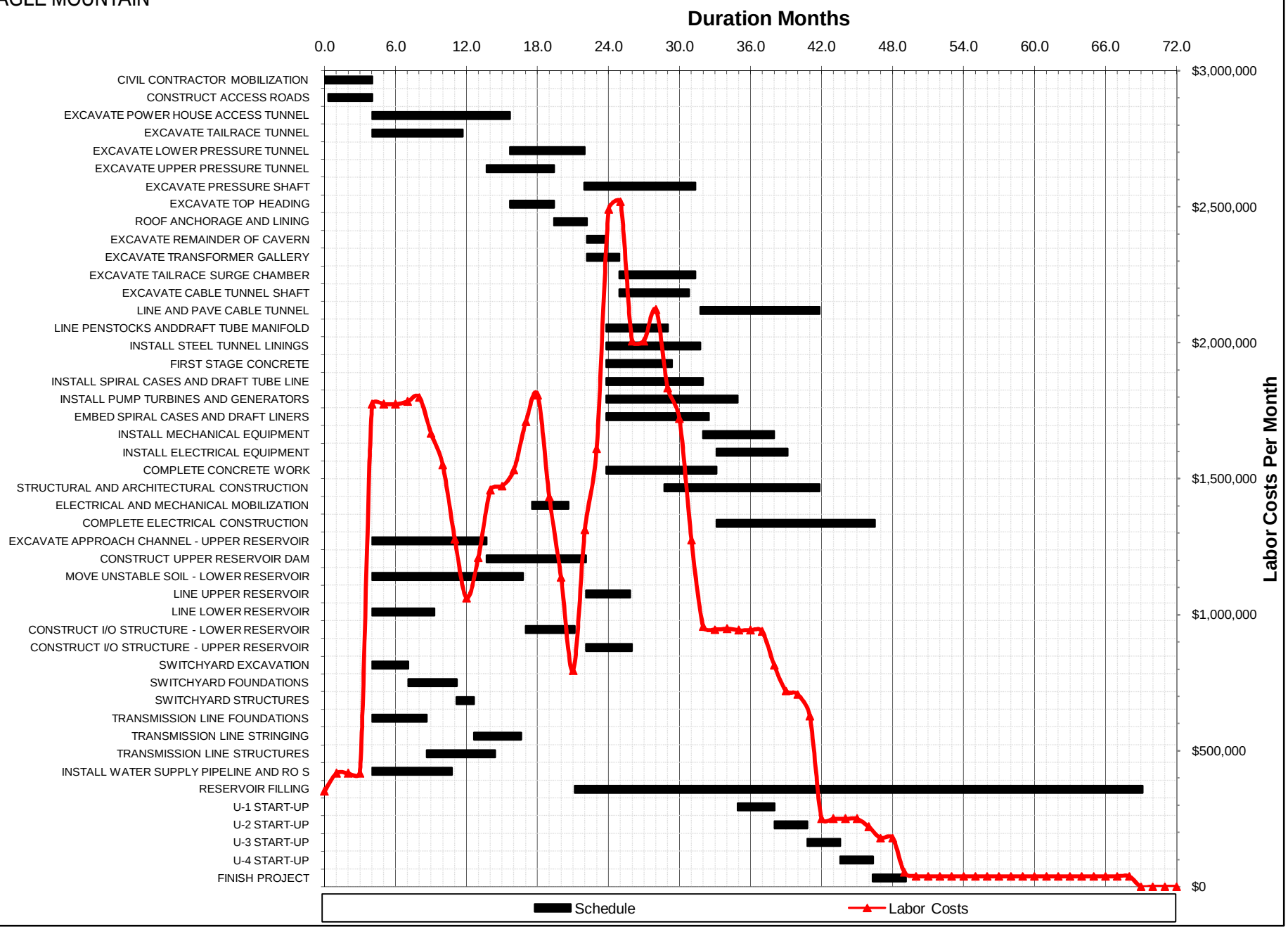
ESTIMATED CONSTRUCTION SCHEDULE & EQUIPMENT
EAGLE MOUNTAIN



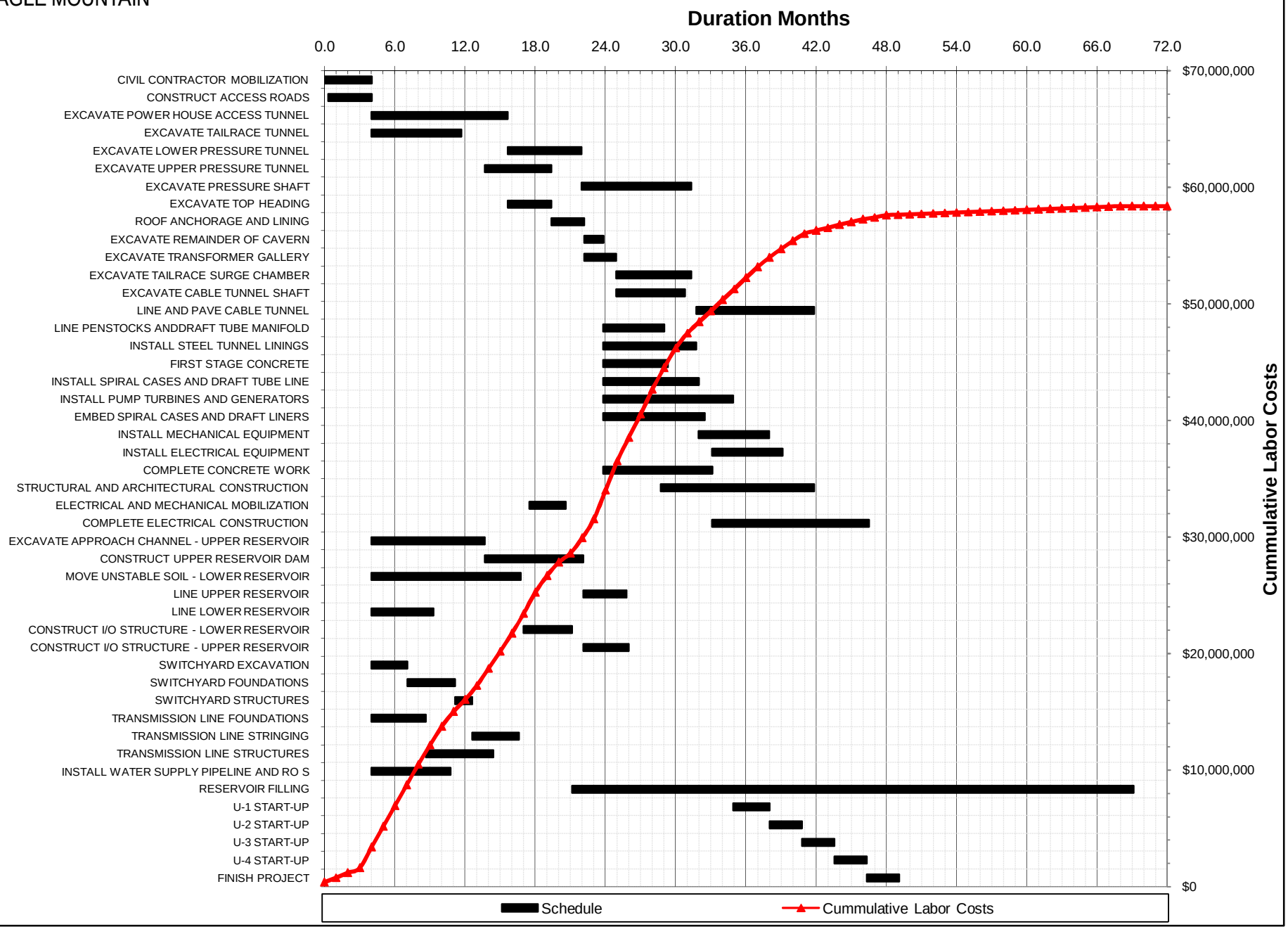
ESTIMATED CONSTRUCTION SCHEDULE & OFFSITE TRUCKS PER MONTH
EAGLE MOUNTAIN



ESTIMATED CONSTRUCTION SCHEDULE & MONTHLY LABOR COSTS
EAGLE MOUNTAIN



ESTIMATED CONSTRUCTION SCHEDULE & CUMMULATIVE LABOR COSTS
EAGLE MOUNTAIN



ESTIMATED CONSTRUCTION WORK FORCE
EAGLE MOUNTAIN PUMPED-STORAGE PROJECT

CONSTRUCTION SEGMENT	AVERAGE CREW SIZE (1)	AVERAGE DURATION (MONTHS) (2)	SHIFTS (3)		PERSON MONTHS (4)
			NUMBER	LENGTH (HRS)	
CIVIL CONTRACTOR MOBILIZATION	15	4	1	8	60
CONSTRUCT ACCESS ROADS	18	4	1	8	67
EXCAVATE POWER HOUSE ACCESS TUNNEL	23	12	1	8	268
EXCAVATE TAILRACE TUNNEL	26	8	1	8	199
EXCAVATE LOWER PRESSURE TUNNEL	16	6	1	8	101
EXCAVATE UPPER PRESSURE TUNNEL	29	6	1	8	166
EXCAVATE PRESSURE SHAFT	20	9	1	8	188
EXCAVATE TOP HEADING	27	4	1	8	100
ROOF ANCHORAGE AND LINING	6	3	1	8	17
EXCAVATE REMAINDER OF CAVERN	27	2	1	8	44
EXCAVATE TRANSFORMER GALLERY	18	3	1	8	49
EXCAVATE TAILRACE SURGE CHAMBER	16	6	1	8	103
EXCAVATE CABLE TUNNEL SHAFT	11	6	1	8	65
LINE AND PAVE CABLE TUNNEL	6	10	1	8	61
LINE PENSTOCKS ANDDRAFT TUBE MANIFOLD	36	5	1	8	187
INSTALL STEEL TUNNEL LININGS	22	8	1	8	175
FIRST STAGE CONCRETE	19	6	1	8	105
INSTALL SPIRAL CASES AND DRAFT TUBE LINE	8	8	1	8	65
INSTALL PUMP TURBINES AND GENERATORS	8	11	1	8	89
EMBED SPIRAL CASES AND DRAFT LINERS	7	9	1	8	61
INSTALL MECHANICAL EQUIPMENT	9	6	1	8	54
INSTALL ELECTRICAL EQUIPMENT	8	6	1	8	48
COMPLETE CONCRETE WORK	15	9	1	8	140
STRUCTURAL AND ARCHITECTURAL CONSTRUCTION	30	13	1	8	394
ELECTRICAL AND MECHANICAL MOBILIZATION	15	3	1	8	46
COMPLETE ELECTRICAL CONSTRUCTION	8	13	1	8	107
EXCAVATE APPROACH CHANNEL - UPPER RESERVOIR	23	10	1	8	222
CONSTRUCT UPPER RESERVOIR DAM	38	8	1	8	320
MOVE UNSTABLE SOIL - LOWER RESERVOIR	19	13	1	8	242
LINE UPPER RESERVOIR	23	4	1	8	85
LINE LOWER RESERVOIR	18	5	1	8	95
CONSTRUCT I/O STRUCTURE - LOWER RESERVOIR	26	4	1	8	107
CONSTRUCT I/O STRUCTURE - UPPER RESERVOIR	27	4	1	8	105
SWITCHYARD EXCAVATION	10	3	1	8	31
SWITCHYARD FOUNDATIONS	11	4	1	8	45
SWITCHYARD STRUCTURES	9	1	1	8	13
TRANSMISSION LINE FOUNDATIONS	10	5	1	8	46
TRANSMISSION LINE STRINGING	7	4	1	8	28
TRANSMISSION LINE STRUCTURES	12	6	1	8	69
INSTALL WATER SUPPLY PIPELINE AND RO S	19	7	1	8	128
RESERVOIR FILLING	3	24	1	8	72
U-1 START-UP	7	3	1	8	22
U-2 START-UP	7	3	1	8	19
U-3 START-UP	7	3	1	8	19
U-4 START-UP	7	3	1	8	19
FINISH PROJECT	10	3	1	8	28
				TOTAL	4674

(1) Average number of people on site during a construction activity, rounded to the nearest person.
(2) Estimated time to complete a construction activity if completed independent of other construction activities and without consideration of other construction and schedule constraints, rounded to the nearest month.
(3) Number and length of daily shifts.
(4) Rounded to nearest person month. One person month is equal to 173 hours. Calculated prior to rounding crew sizes and durations.

ESTIMATED CONSTRUCTION EQUIPMENT
EAGLE MOUNTAIN

TYPE OF EQUIPMENT	CIVIL CONTRACTOR MOBILIZATION	ACCESS ROADS	POWER HOUSE ACCESS TUNNEL	EXCAVATE TAILRACE TUNNEL	EXCAVATE LOWER PRESSURE TUNNEL	EXCAVATE UPPER PRESSURE TUNNEL	EXCAVATE PRESSURE SHAFT	EXCAVATE TOP HEADING	ROOF ANCHORAGE AND LINING	EXCAVATE REMAINDER OF CABIN
DURATION [5]	**4**	**4**	**12**	**8**	**6**	**6**	**9**	**4**	**3**	**2**
On-site										
Air Compressor	0.0	1.3	0.0	0.0	0.0	0.0	1.3	3.8	1.3	1.3
Backhoe / Front End Loader, Wheeled	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Backhoe, Tracked	0.0	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Compactor, Sheepsfoot, Self-Propelled	0.0	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Compactor, Vibratory, Self-Propelled	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Concrete Pump	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Crane - 40 Ton	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Crane - 70 Ton	0.0	0.0	0.0	0.0	0.0	0.0	1.3	0.0	0.0	0.0
Dozer, D5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Dozer, D6	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Dozer, D8	0.0	1.3	0.0	0.0	0.0	0.0	1.3	2.5	0.0	2.5
Drill, Tracked	0.0	1.3	2.5	1.3	1.3	0.0	1.3	3.8	1.3	3.8
Dump Truck, End Dump, 15 Ton	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Dump Truck, Off-Highway, 34 Ton	0.0	3.8	5.0	6.3	2.5	6.3	2.5	5.0	0.0	5.0
Excavator, 325	0.0	1.3	1.3	1.3	1.3	0.0	1.3	2.5	0.0	2.5
Forklift, Rough Terrain	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Front End Loader, Wheeled	0.0	1.3	2.5	2.5	2.5	1.3	2.5	5.0	0.0	5.0
Fuel Truck / Support Truck	1.3	1.3	0.0	0.0	0.0	1.3	1.3	1.3	1.3	1.3
Generator - Diesel	1.3	1.3	1.3	1.3	1.3	1.3	1.3	2.5	1.3	2.5
Grout Pump	0.0	0.0	1.3	1.3	1.3	0.0	1.3	0.0	1.3	0.0
Motor Grader	1.3	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pump truck - Concrete	0.0	0.0	1.3	2.5	2.5	0.0	2.5	0.0	0.0	0.0
Truck, Flatbed	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3	0.0
Tunnel Rig	0.0	0.0	1.3	1.3	1.3	1.3	0.0	0.0	0.0	0.0
Water Pump, Diesel	1.3	0.0	1.3	1.3	1.3	1.3	1.3	0.0	0.0	0.0
Water Truck	0.0	1.3	0.0	0.0	0.0	0.0	0.0	1.3	0.0	1.3
Welder and Generator Set	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL	**10.0**	**17.5**	**17.5**	**18.8**	**15.0**	**12.5**	**18.8**	**27.5**	**7.5**	**25.0**
Daily Vehicles [3]										
Daily Concrete Mixer Truck - 8 CY	0.0	0.0	16.3	31.3	31.3	62.5	31.3	0.0	3.8	0.0
Daily Semi Trailer Truck	0.0	0.0	71.3	97.5	76.3	81.3	30.0	75.0	0.0	50.0
Off-Site Vehicles										
Total Offsite Flatbed/Semi Trucks	1.3	0.0	11.3	6.3	16.3	32.5	8.8	0.0	2.5	0.0

(1) Rounded to nearest unit of equipment.
(2) Sum of estimated pieces of equipment times duration of construction activity. Calculated prior to rounding duration and equipment quantities. One equipment month is equal to 173 hours of operation.

(3) Number of daily vehicles on site.
(4) Pieces of equipment not equal to a whole number represent equipment not being utilized for entire duration of the activity.

(5) Rounded to the nearest month.

ESTIMATED CONSTRUCTION EQUIPMENT
EAGLE MOUNTAIN

TYPE OF EQUIPMENT / DURATION [5]	EXCAVATE TRANSFORMER GALLERY	EXCAVATE TAILRACE SURGE CHANBER	EXCAVATE CABLE TUNNEL SHAFT	LINE AND PAVE CABLE TUNNEL	LINE PENSTKS DRAFT TUBE MAN.	INSTALL STEEL TUNNEL LINES	FIRST STAGE CONCRETE	INSTALL CASES DRAFT TUBE LINE.	INSTALL PUMP TURBIN. AND GEN.	EMBED CASES AND DRAFT LINERS
	3	6	6	10	5	8	6	8	11	9
On-site										
Air Compressor	1.3	1.3	1.3	1.3	2.5	1.3	0.0	0.0	1.3	0.0
Backhoe / Front End Loader, Wheeled	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Backhoe, Tracked	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Compactor, Sheepsfoot, Self-Propelled	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Compactor, Vibratory, Self-Propelled	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Concrete Pump	0.0	0.0	0.0	1.3	0.0	0.0	0.0	1.3	0.0	0.0
Crane - 40 Ton	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3	0.0	0.0
Crane - 70 Ton	0.0	0.0	0.0	1.3	0.0	0.0	1.3	0.0	1.3	0.0
Dozer, D5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Dozer, D6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Dozer, D8	1.3	0.0	0.0	0.0	1.3	0.0	0.0	0.0	0.0	0.0
Drill, Tracked	2.5	1.3	1.3	1.3	0.0	1.3	0.0	0.0	0.0	0.0
Dump Truck, End Dump, 15 Ton	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Dump Truck, Off-Highway, 34 Ton	3.8	1.3	1.3	0.0	3.8	2.5	0.0	0.0	0.0	0.0
Excavator, 325	1.3	1.3	1.3	0.0	1.3	1.3	0.0	0.0	0.0	0.0
Forklift, Rough Terrain	0.0	0.0	0.0	0.0	0.0	1.3	0.0	0.0	0.0	0.0
Front End Loader, Wheeled	2.5	2.5	2.5	0.0	3.8	2.5	0.0	0.0	0.0	0.0
Fuel Truck / Support Truck	1.3	1.3	1.3	1.3	1.3	1.3	1.3	0.0	1.3	1.3
Generator - Diesel	1.3	1.3	1.3	1.3	2.5	1.3	1.3	1.3	1.3	0.0
Grout Pump	0.0	0.0	0.0	1.3	0.0	0.0	1.3	0.0	0.0	0.0
Motor Grader	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pump truck - Concrete	0.0	1.3	0.0	0.0	5.0	2.5	2.5	0.0	0.0	1.3
Truck, Flatbed	0.0	0.0	0.0	1.3	0.0	0.0	0.0	0.0	0.0	0.0
Tunnel Rig	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Water Pump, Diesel	0.0	0.0	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Water Truck	1.3	1.3	0.0	0.0	1.3	1.3	1.3	0.0	0.0	1.3
Welder and Generator Set	0.0	0.0	0.0	0.0	0.0	1.3	0.0	1.3	1.3	0.0
TOTAL	**16.3**	**12.5**	**11.3**	**10.0**	**22.5**	**17.5**	**8.8**	**5.0**	**6.3**	**3.8**
Daily Vehicles [3]										
Daily Concrete Mixer Truck - 8 CY	0.0	0.0	0.0	1.3	62.5	31.3	31.3	1.3	0.0	5.0
Daily Semi Trailer Truck	50.0	18.8	3.8	0.0	50.0	25.0	0.0	0.0	0.0	0.0
Off-Site Vehicles										
Total Offsite Flatbed/Semi Trucks	0.0	1.3	0.0	2.5	11.3	192.5	10.0	13.8	10.0	3.8

(1) Rounded to nearest unit of equipment.
(2) Sum of estimated pieces of equipment times duration of construction activity. Calculated prior to rounding duration and equipment quantities. One equipment month is equal to 173 hours of operation.

(3) Number of daily vehicles on site.
(4) Pieces of equipment not equal to a whole number represent equipment not being utilized for entire duration of the activity.

(5) Rounded to the nearest month.

ESTIMATED CONSTRUCTION EQUIPMENT
EAGLE MOUNTAIN

TYPE OF EQUIPMENT	ESTIMATED AVERAGE PIECES OF EQUIPMENT FOR CONSTRUCTION ACTIVITIES[1]									
	INSTALL MECH. EQUIPMENT	INSTALL ELECT. EQUIPMENT	COMPLETE CONCRETE WK.	STRUCTURAL AND ARCHIT. CONST.	ELECTRICAL AND MECH. MOBE.	COMPLETE ELEC. CONSTRUCTION	EXCAVATE APPR. CHANNEL - UPPER	CONSTRUCT UPPER DAM	MOVE UNSTABLE SOIL - LOWER	LINE UPPER RESERVOIR
DURATION [5]	**6**	**6**	**9**	**13**	**3**	**13**	**10**	**8**	**13**	**4**
On-site										
Air Compressor	1.3	1.3	0.0	1.3	0.0	1.3	1.3	2.5	0.0	0.0
Backhoe / Front End Loader, Wheeled	0.0	0.0	0.0	0.0	1.3	0.0	0.0	0.0	0.0	0.0
Backhoe, Tracked	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Compactor, Sheepsfoot, Self-Propelled	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Compactor, Vibratory, Self-Propelled	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.0	0.0	1.3
Concrete Pump	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Crane - 40 Ton	0.0	0.0	1.3	1.3	0.0	0.0	0.0	0.0	0.0	0.0
Crane - 70 Ton	1.3	0.0	0.0	1.3	0.0	0.0	0.0	0.0	0.0	0.0
Dozer, D5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.0	0.0	0.0
Dozer, D6	0.0	0.0	0.0	0.0	1.3	0.0	0.0	0.0	0.0	0.0
Dozer, D8	0.0	0.0	0.0	0.0	0.0	0.0	2.5	0.0	2.5	1.3
Drill, Tracked	0.0	0.0	0.0	1.3	0.0	0.0	2.5	0.0	0.0	0.0
Dump Truck, End Dump, 15 Ton	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.3	0.0	0.0
Dump Truck, Off-Highway, 34 Ton	0.0	0.0	0.0	1.3	0.0	0.0	7.5	5.0	6.3	12.5
Excavator, 325	0.0	0.0	0.0	1.3	0.0	0.0	1.3	0.0	1.3	2.5
Forklift, Rough Terrain	0.0	1.3	0.0	2.5	1.3	1.3	0.0	0.0	0.0	0.0
Front End Loader, Wheeled	0.0	0.0	0.0	2.5	0.0	0.0	2.5	2.5	0.0	2.5
Fuel Truck / Support Truck	1.3	1.3	1.3	2.5	1.3	1.3	1.3	2.5	1.3	1.3
Generator - Diesel	1.3	1.3	1.3	2.5	1.3	2.5	0.0	0.0	0.0	0.0
Grout Pump	0.0	0.0	0.0	1.3	0.0	0.0	0.0	0.0	0.0	0.0
Motor Grader	0.0	0.0	0.0	0.0	1.3	0.0	0.0	2.5	1.3	0.0
Pump truck - Concrete	0.0	0.0	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Truck, Flatbed	0.0	0.0	0.0	0.0	1.3	2.5	0.0	0.0	0.0	0.0
Tunnel Rig	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Water Pump, Diesel	0.0	0.0	0.0	1.3	1.3	0.0	0.0	0.0	0.0	0.0
Water Truck	0.0	0.0	1.3	0.0	0.0	0.0	1.3	2.5	1.3	1.3
Welder and Generator Set	2.5	1.3	0.0	1.3	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL	**7.5**	**6.3**	**6.3**	**21.3**	**10.0**	**8.8**	**20.0**	**33.8**	**13.8**	**22.5**
Daily Vehicles[3]										
Daily Concrete Mixer Truck - 8 CY	0.0	0.0	16.3	3.8	0.0	0.0	0.0	0.0	0.0	0.0
Daily Semi Trailer Truck	0.0	0.0	0.0	22.5	0.0	0.0	50.0	0.0	0.0	0.0
Off-Site Vehicles										
Total Offsite Flatbed/Semi Trucks	6.3	5.0	12.5	53.8	1.3	6.3	0.0	0.0	0.0	0.0

(1) Rounded to nearest unit of equipment.
(2) Sum of estimated pieces of equipment times duration of construction activity. Calculated prior to rounding duration and equipment quantities. One equipment month is equal to 173 hours of operation.

(3) Number of daily vehicles on site.
(4) Pieces of equipment not equal to a whole number represent equipment not being utilized for entire duration of the activity.

(5) Rounded to the nearest month.

ESTIMATED CONSTRUCTION EQUIPMENT
EAGLE MOUNTAIN

TYPE OF EQUIPMENT	LINE LOWER RESERVOIR	CONSTRUCT I/O STRUC. - LOWER	CONSTRUCT I/O STRUC. - UPPER	SWITCHYARD EXCAVATION	SWITCHYARD FOUNDATIONS	SWITCHYARD STRUCTURES	TRANS. LINE FOUNDATIONS	TRANS. LINE STRINGING	TRANS. LINE STRUCTURES	INSTALL H20 SUPPLY AND RO S	RESERVOIR FILLING
DURATION [5]	5	4	4	3	4	1	5	4	6	7	24
On-site											
Air Compressor	0.0	1.3	1.3	0.0	0.0	0.0	0.0	0.0	1.3	0.0	0.0
Backhoe / Front End Loader, Wheeled	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Backhoe, Tracked	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Compactor, Sheepsfoot, Self-Propelled	0.0	0.0	0.0	0.0	1.3	0.0	0.0	0.0	0.0	1.3	0.0
Compactor, Vibratory, Self-Propelled	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Concrete Pump	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Crane - 40 Ton	0.0	0.0	0.0	0.0	0.0	0.0	1.3	2.5	2.5	0.0	0.0
Crane - 70 Ton	0.0	1.3	1.3	0.0	0.0	1.3	0.0	0.0	0.0	0.0	0.0
Dozer, D5	0.0	0.0	0.0	1.3	1.3	0.0	0.0	0.0	0.0	0.0	0.0
Dozer, D6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Dozer, D8	1.3	1.3	1.3	0.0	0.0	0.0	0.0	0.0	0.0	1.3	0.0
Drill, Tracked	0.0	1.3	1.3	0.0	1.3	0.0	1.3	0.0	0.0	0.0	0.0
Dump Truck, End Dump, 15 Ton	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.3	0.0
Dump Truck, Off-Highway, 34 Ton	6.3	5.0	6.3	6.3	6.3	0.0	0.0	0.0	0.0	0.0	0.0
Excavator, 325	2.5	1.3	1.3	1.3	0.0	0.0	0.0	0.0	0.0	1.3	0.0
Forklift, Rough Terrain	0.0	0.0	0.0	0.0	0.0	1.3	0.0	1.3	1.3	0.0	0.0
Front End Loader, Wheeled	2.5	1.3	1.3	1.3	0.0	0.0	1.3	0.0	0.0	1.3	0.0
Fuel Truck / Support Truck	1.3	1.3	1.3	1.3	1.3	2.5	1.3	2.5	2.5	1.3	1.3
Generator - Diesel	0.0	0.0	0.0	0.0	0.0	1.3	0.0	0.0	0.0	0.0	0.0
Grout Pump	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Motor Grader	0.0	0.0	0.0	0.0	1.3	0.0	0.0	0.0	0.0	0.0	0.0
Pump truck - Concrete	0.0	2.5	2.5	0.0	1.3	0.0	1.3	0.0	0.0	0.0	0.0
Truck, Flatbed	0.0	0.0	0.0	0.0	0.0	1.3	0.0	1.3	1.3	0.0	0.0
Tunnel Rig	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Water Pump, Diesel	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Water Truck	1.3	1.3	1.3	1.3	1.3	0.0	0.0	0.0	0.0	0.0	0.0
Welder and Generator Set	0.0	0.0	0.0	0.0	0.0	1.3	0.0	0.0	2.5	1.3	0.0
TOTAL	**16.3**	**17.5**	**18.8**	**12.5**	**15.0**	**8.8**	**6.3**	**7.5**	**11.3**	**13.8**	**1.3**
Daily Vehicles[3]											
Daily Concrete Mixer Truck - 8 CY	0.0	31.3	31.3	0.0	2.5	0.0	8.8	0.0	0.0	0.0	0.0
Daily Semi Trailer Truck	0.0	25.0	25.0	0.0	0.0	0.0	0.0	0.0	2.5	0.0	0.0
Off-Site Vehicles											
Total Offsite Flatbed/Semi Trucks	0.0	11.3	0.0	0.0	1.3	12.5	30.0	0.0	200.0	260.0	0.0

(1) Rounded to nearest unit of equipment.
(2) Sum of estimated pieces of equipment times duration of construction activity. Calculated prior to rounding duration and equipment quantities. One equipment month is equal to 173 hours of operation.

(3) Number of daily vehicles on site.
(4) Pieces of equipment not equal to a whole number represent equipment not being utilized for entire duration of the activity.

(5) Rounded to the nearest month.

ESTIMATED CONSTRUCTION EQUIPMENT
EAGLE MOUNTAIN

TYPE OF EQUIPMENT	U-1 START-UP	U-2 START-UP	U-3 START-UP	U-4 START-UP	FINISH PROJECT		ESTIMATED EQUIPMENT MONTHS[2]
DURATION [5]	3	3	3	3	3		
On-site							
Air Compressor	1.3	1.3	1.3	1.3	1.3		220
Backhoe / Front End Loader, Wheeled	0.0	0.0	0.0	0.0	0.0		9
Backhoe, Tracked	0.0	0.0	0.0	0.0	0.0		5
Compactor, Sheepsfoot, Self-Propelled	0.0	0.0	0.0	0.0	0.0		13
Compactor, Vibratory, Self-Propelled	0.0	0.0	0.0	0.0	0.0		53
Concrete Pump	0.0	0.0	0.0	0.0	0.0		23
Crane - 40 Ton	0.0	0.0	0.0	0.0	0.0		57
Crane - 70 Ton	0.0	0.0	0.0	0.0	0.0		81
Dozer, D5	0.0	0.0	0.0	0.0	0.0		42
Dozer, D6	0.0	0.0	0.0	0.0	0.0		9
Dozer, D8	0.0	0.0	0.0	0.0	0.0		125
Drill, Tracked	0.0	0.0	0.0	0.0	0.0		188
Dump Truck, End Dump, 15 Ton	0.0	0.0	0.0	0.0	0.0		95
Dump Truck, Off-Highway, 34 Ton	0.0	0.0	0.0	0.0	0.0		629
Excavator, 325	0.0	0.0	0.0	0.0	0.0		190
Forklift, Rough Terrain	0.0	0.0	0.0	0.0	0.0		90
Front End Loader, Wheeled	0.0	0.0	0.0	0.0	0.0		328
Fuel Truck / Support Truck	0.0	0.0	0.0	0.0	3.8		340
Generator - Diesel	1.3	1.3	1.3	1.3	1.3		264
Grout Pump	0.0	0.0	0.0	0.0	0.0		83
Motor Grader	0.0	0.0	0.0	0.0	0.0		50
Pump truck - Concrete	0.0	0.0	0.0	0.0	0.0		179
Truck, Flatbed	0.0	0.0	0.0	0.0	0.0		72
Tunnel Rig	0.0	0.0	0.0	0.0	0.0		39
Water Pump, Diesel	0.0	0.0	0.0	0.0	0.0		83
Water Truck	0.0	0.0	0.0	0.0	0.0		127
Welder and Generator Set	0.0	0.0	0.0	0.0	0.0		98
TOTAL	**2.5**	**2.5**	**2.5**	**2.5**	**6.3**	**TOTAL**	**3492**
Daily Vehicles[3]							
Daily Concrete Mixer Truck - 8 CY	0.0	0.0	0.0	0.0	0.0		-
Daily Semi Trailer Truck	0.0	0.0	0.0	0.0	0.0		-
Off-Site Vehicles							
Total Offsite Flatbed/Semi Trucks	0.0	0.0	0.0	0.0	0.0		924

(1) Rounded to nearest unit of equipment.
(2) Sum of estimated pieces of equipment times duration of construction activity. Calculated prior to rounding duration and equipment quantities. One equipment month is equal to 173 hours of operation.

(3) Number of daily vehicles on site.
(4) Pieces of equipment not equal to a whole number represent equipment not being utilized for entire duration of the activity.

(5) Rounded to the nearest month.

Labor Costs

Client:	Eagle Crest Energy	Project	080473	Page	1
Subject:	Eagle Mountain Construction Schedule and Equipment	Date	3/19/2009	By	NDM
		Checked		By	
		Approved		By	

LABOR COSTS

Crew	Hourly Wages ($/hr)	Hourly Wages (including O &P) ($/hr)	Source
Blaster	$33.60	$52.10	R.S. Means 2009, Crew B-47, Blast Foreman
Carpenters	$39.95	$61.95	R.S. Means 2009, Carpenters
Cement Finisher	$38.30	$56.05	R.S. Means 2009, Cement Finishers
Driller	$31.60	$49.00	R.S. Means 2009, Crew B-47, Driller
Electricians	$47.00	$69.95	R.S. Means 2009, Electricians
Equipment Operators	$41.35	$62.15	R.S. Means 2009, Equipment Operator (Medium)
Grade Setter	$41.35	$62.15	R.S. Means 2009, Equipment Operator (Medium)
Foreman	$42.85	$66.35	R.S. Means 2009, Foreman Average (Outside)
Labor Foreman	$33.60	$52.10	R.S. Means 2009, Labor Foreman (Outside)
Laborers	$31.60	$49.00	R.S. Means 2009, Common Building Laborers
Mechanics	$42.70	$64.20	R.S. Means 2009, Equipment Operator, Master Mechanics
Painter	$35.20	$52.75	R.S. Means 2009, Painters, Ordinary
Pile Driver	$38.50	$62.50	R.S. Means 2009, Pile Drivers
Pipe Foreman	$49.35	$74.05	R.S. Means 2009, Pipe Fitter
Pipe Layer	$40.85	$63.25	R.S. Means 2009, Skilled Worker
Plumber	$48.75	$73.15	R.S. Means 2009, Plumber
Rigger	$40.85	$63.25	R.S. Means 2009, Skilled Worker
Survey/Rodmen	$39.75	$60.80	R.S. Means 2009, Average of: Instrument Man, Rodmen/Chainmen
Steel Worker	$44.70	$79.65	R.S. Means 2009, Structural Steel Workers
Steel Worker Foreman	$46.70	$83.20	R.S. Means 2009, Structural Steel Foremen
Truck Drivers	$31.95	$49.15	R.S. Means 2009, Truck Drivers (Heavy)
Welder	$44.70	$79.65	R.S. Means 2009, Welders

Operations Labor Costs

Client:	Eagle Crest Energy	Project	080473	Page	1
Subject:	Eagle Mountain Operations	Date	1/21/2009	By	NDM
		Checked		By	
		Approved		By	

OPERATIONS

Crew	Shift Quantity	Number of Daily Shifts	Total Operations Crew	Annual Salaries[1] ($/year)	Annual Labor Costs ($)
Mechanical Engineer	2	2	4	$63,000	$252,000
Electrical Engineer	2	2	4	$63,000	$252,000
Project Engineer	1	2	2	$62,000	$124,000
Project Manager	1	2	2	$75,000	$150,000
Construction Manager	1	2	2	$70,000	$140,000
Manager	1	2	2	$54,000	$108,000
Power Plant Operator	2	2	4	$58,000	$232,000
Plant Engineer	1	2	2	$63,000	$126,000
Mechanical Maintenance Technician	1	2	2	$37,000	$74,000
Scheduler	1	2	2	$57,000	$114,000
Field Service Engineer	1	2	2	$53,000	$106,000
Administration Staff	1	2	2	$57,000	$114,000
TOTAL =	**15**		**30**		**$1,792,000**

1) Source: http://www.simplyhired.com/a/salary/search/q-Hydro+Power (3/19/2009)

OPERATIONS AND MAINTENANCE COSTS

The operation and maintenance costs are those associated with Project operation and upkeep. They include the cost of the direct salaries and administrative support of plant administration, operating and maintenance personnel, and of maintenance equipment and materials and repairs and spare parts.

Eagle Mountain Pumped Storage Estimated Annual Project Costs

Operating Costs Elements	Amount ($/year)
Property Tax	$8,390,000
Land Leases	$2,000,000
Makeup Water and Pumping	$2,400,000
Water Treatment	$720,000
Property Insurance	$4,200,000
Salaries	$1,800,000
Home Office Administration	$900,000
Supplies and Parts	$2,500,000
FERC Fees	$1,500,000
Total Annual Operating Cost	**$24,410,000**

Note:
Table from Draft License Application - Exhibit D

Client:	Eagle Crest Energy	Project	080473	Page	1
Subject:	Eagle Mountain Construction Schedule and Equipment	Date	1/21/2009	By	NDM
		Checked		By	
		Approved		By	

EAGLE MOUNTAIN PUMPED-STORAGE PROJECT --- TYPICAL EQUIPMENT AND TASK PRODUCTION RATES

TASK/EQUIPMENT	TYPICAL PRODUCTION RATES (SINGLE CREW ONLY)	
Tunnel Boring Machine	45 - 120	ft/day
Drill and Blast Excavation	200 - 400	cy/day
Benching Excavation	500	cy/day
Trench Excavation	200	lcy/hr
Prelining Shotcrete	200 - 300	sy/day
Concrete	100 - 200	cy/day
Grouting	450	cf/day
Roof & Wall Support	2000 - 2500	sf/day
Rock Anchors	400	lf/day
Misc. Steel	20	tons/day
Steel Liner	50	lf/day
Elevator Shaft	50	lf/day
Excavator	200 - 300	cy/hr
Compactor (large)	850	cy/hr
Compactor (small)	120	cy/hr
Grading	1200	cy/day
Gravel Placement	1500	cy/day
RCC Dams	1500	cy/day
Trashrack Installation	200	sf/day
Peir Foundations	4 - 10	peirs/day
Fencing Installation	300	lf/day
Transmission Line Stringing	8000	ft/day
Pipeline Installation	1000	ft/day

GEI Consultants, Inc.
080473 Eagle Mountain Pumped Storage Project
Construction Schedule Item List
1/20/2009
NDM

1 **NOTICE TO PROCEED**
2 **CIVIL CONTRACTOR MOBILIZATION**
3 **CIVIL CONTRACTOR MOBILIZED**
4 **CONSTRUCT ACCESS ROADS**
5 **EXCAVATE POWER HOUSE ACCESS TUNNEL**
6 **COMPLETE ACCESS TUNNEL EXCAVATION**
7 **EXCAVATE TAILRACE TUNNEL**
8 **EXCAVATE LOWER PRESSURE TUNNEL**
9 **EXCAVATE UPPER PRESSURE TUNNEL**
10 **EXCAVATE PRESSURE SHAFT**
11 **EXCAVATE TOP HEADING**
12 **ROOF ANCHORAGE AND LINING**
13 **EXCAVATE REMAINDER OF CAVERN**
14 **COMPLETE POWER HOUSE EXCAVATION**
15 **EXCAVATE TRANSFORMER GALLERY**
16 **EXCAVATE TAILRACE SURGE CHAMBER**
17 **EXCAVATE CABLE TUNNEL SHAFT**
18 **LINE AND PAVE CABLE TUNNEL**
19 **LINE PENSTOCKS ANDDRAFT TUBE MANIFOLD**
20 **INSTALL STEEL TUNNEL LININGS**
21 **FIRST STAGE CONCRETE**
22 **COMPLETE POWER HOUSE 1ST STAGE CONCRETE**
23 **INSTALL SPIRAL CASES AND DRAFT TUBE LINE**
24 **INSTALL PUMP TURBINES AND GENERATORS**
25 **EMBED SPIRAL CASES AND DRAFT LINERS**
26 **INSTALL MECHANICAL EQUIPMENT**
27 **INSTALL ELECTRICAL EQUIPMENT**
28 **COMPLETE CONCRETE WORK**
29 **STRUCTURAL AND ARCHITECTURAL CONSTRUCTION**
30 **COMPLETE DRAFT TUBE, SPIRAL CASE AND POWERHOUSE, 2ND STAGE CONCRETE**
31 **ELECTRICAL AND MECHANICAL MOBILIZATION**
32 **COMPLETE INSTALLATION OF PUMP-TURBINES, GENERATOR**
33 **COMPLETE ELECTRICAL CONSTRUCTION**
34 **EXCAVATE APPROACH CHANNEL - UPPER RESERVOIR**
35 **CONSTRUCT UPPER RESERVOIR DAM**
36 **MOVE UNSTABLE SOIL - LOWER RESERVOIR**
37 **LINE UPPER RESERVOIR**
38 **LINE LOWER RESERVOIR**
39 **CONSTRUCT I/O STRUCTURE - LOWER RESERVOIR**
40 **CONSTRUCT I/O STRUCTURE - UPPER RESERVOIR**
41 **SWITCHYARD EXCAVATION**
42 **SWITCHYARD FOUNDATIONS**
43 **SWITCHYARD STRUCTURES**
44 **TRANSMISSION LINE FOUNDATIONS**
45 **TRANSMISSION LINE STRINGING**
46 **TRANSMISSION LINE STRUCTURES**
47 **INSTALL WATER SUPPLY PIPELINE AND RO S**
48 **RESERVOIR FILLING**
49 **UNIT-1 START-UP**
50 **U-1 START-UP**
51 **UNIT-2 START-UP**
52 **U-2 START-UP**
53 **UNIT-3 START-UP**
54 **U-3 START-UP**
55 **UNIT-4 START-UP**
56 **U-4 START-UP**
57 **FINISH PROJECT**

2 Civil Contractor Mobe

Client:	Eagle Crest Energy	Project	080473	Page	1
Subject:	Eagle Mountain Construction Schedule and Equipment	Date	1/21/2009	By	NDM
		Checked		By	
		Approved		By	

EQUIPMENT	Quantity
On Site	
Air Compressor	
Backhoe / Front End Loader, Wheeled	1
Backhoe, Tracked	
Chipper, Wood	
Compactor, Sheepsfoot, Self-Propelled	
Compactor, Vibratory, Self-Propelled	
Concrete Pump	
Crane - 40 Ton	
Crane - 70 Ton	
Dozer, D5	
Dozer, D6	1
Dozer, D8	
Dozer, D10	
Drill, Tracked	
Dump Truck, End Dump, 15 Ton	
Dump Truck, Off-Highway, 34 Ton	
Dump Truck, Semi-Trailer	
Excavator, 325	
Forklift, Rough Terrain	1
Front End Loader, Tracked	
Front End Loader, Wheeled	
Fuel Truck / Support Truck	1
Generator - Diesel	1
Grout Pump	
Hydroseed Sprayer, Truck Mounted	
Motor Grader	1
Pile Driver	
Pump Truck - Concrete	
Powder Truck	
Scraper, Self-propelled, 21 CY	
Truck, Flatbed	1
Tunnel Rig	
Water Pump, Diesel	1
Water Truck	
Welder and Generator Set	
Total Offsite Flatbed/Semi Trucks	1
Daily Concrete Mixer Truck - 8 CY	
Daily Semi Trailer Truck	

Crew	Quantity
Blaster	
Carpenters	2
Cement Finisher	
Driller	
Electricians	2
Equipment Operators	5
Grade Setter	
Foreman	1
Labor Foreman	
Laborers	3
Mechanics	1
Painter	
Pile Driver	
Pipe Foreman	
Pipe Layer	
Plumber	
Rigger	
Survey/Rodmen	
Steel Worker	
Steel Worker Foreman	
Truck Drivers	1
Welder	

Total Crew Size	15
Monthly Labor Cost	$195,100

Duration: **4.0** Months **16.0** Weeks

NOTES:

Mobilization to include installing field offices, preparing staging area, minor road grading, temporary utility connections, security fencing, bringing equipment to site, prepartion of equipment, and lighting

4 Accesss Roads

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EQUIPMENT	Quantity	
On Site		
Air Compressor	1	
Backhoe / Front End Loader, Wheeled		
Backhoe, Tracked	1	
Chipper, Wood		
Compactor, Sheepsfoot, Self-Propelled	1	
Compactor, Vibratory, Self-Propelled		
Concrete Pump		
Crane - 40 Ton		
Crane - 70 Ton		
Dozer, D5		
Dozer, D6		
Dozer, D8	1	
Dozer, D10		
Drill, Tracked	1	
Dump Truck, End Dump, 15 Ton		
Dump Truck, Off-Highway, 34 Ton	3	hauling onsite
Dump Truck, Semi-Trailer		
Excavator, 325	1	
Forklift, Rough Terrain		
Front End Loader, Tracked		
Front End Loader, Wheeled	1	
Fuel Truck / Support Truck	1	
Generator - Diesel	1	
Grout Pump/Plant		
Hydroseed Sprayer, Truck Mounted		
Grader, H14	1	
Pile Driver		
Pump Truck - Concrete		
Powder Truck		
Scraper, Self-propelled, 21 CY		
Truck, Flatbed		
Tunnel Rig (TBM) **(3)**		
Water Pump, Diesel		
Water Truck	1	Dust Control
Welder and Generator Set		
Total Offsite Flatbed/Semi Trucks		
Daily Concrete Mixer Truck - 8 CY		
Daily Semi Trailer Truck		

Crew	Quantity
Blaster	2
Carpenters	
Cement Finisher	
Driller	1
Electricians	
Equipment Operators	6
Grade Setter	1
Foreman	1
Labor Foreman	
Laborers	
Mechanics	
Painter	
Pile Driver	
Pipe Foreman	
Pipe Layer	
Plumber	
Rigger	
Survey/Rodmen	2
Steel Worker	
Steel Worker Foreman	
Truck Drivers	5
Welder	

Total Crew Size	18
Monthly Labor Cost	$221,300

Duration: **3.7** Months **16.0** Weeks

1.0 - CONSTRUCTION AND ACCESS ROADS SCHEDULE				
Existing Unpaved Mining Roads				
1.1 Construction Road to Saddle Dams			13,800	LF
1.2 Road from South Dam to Intake Platform			1,800	LF
Total Existing			15,600	LF
Width			30	FT
Depth			2	FT
Volume			34,667	CY
Production Rate	900	FT/DAY	2000	CY/DAY
			10	HR/DAY
			216.25	HRS/MONTH
Initial Duration			0.8	MONTHS
Contingency			15	%
Final Duration			0.9	MONTHS
Final Duration			4.0	WEEKS
New Dirt Roads				
1.3 Road from intake platform down to Channel			2,000	LF
1.4 Road from South Dam to Power Tunnel Portal Const.			10,100	LF
1.5 Extension to Cable, Elevator Shafts & Surge Tank			4,400	LF
1.5 Access road to Lower Inlet Platform			4,000	LF
1.6 Inlet Platform Down to Channel			3,000	LF
Total Existing			23,500	LF
Width			30	FT
Depth			2	FT
Volume			52,222	CY
Production Rate	450	FT/DAY	1000	CY/DAY
			10	HR/DAY
			216.25	HRS/MONTH
Initial Duration			2.4	MONTHS
Contingency			15	%
Final Duration			2.8	MONTHS
Final Duration			12.0	WEEKS

Assumptions:

New road construction will require rock blasting and excavtion.
Hauling of material (onsite)
Survey control
Dust control
Grading
Compacting

Access Roads:

Equipment: Air Compressor, Backhoe, Sheepsfoot Compactor, Dozer, Tracked Drill, Dump Trucks, Excavator, FE Loader, Support Truck, Generator, Grader, Water Truck.
Crew: 1 Driller, 2 Blasters, 6 Equip Opr., 2 survey, 3 DT Driver, 1 Foreman, 1 Grade Setter, 2 Survey.
Schedule: Additive activities, Existing + New.

5 Power House Access Tunnel

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EQUIPMENT	Quantity	
On Site		
Air Compressor		
Backhoe / Front End Loader, Wheeled		
Backhoe, Tracked		
Chipper, Wood		
Compactor, Sheepsfoot, Self-Propelled		
Compactor, Vibratory, Self-Propelled		
Concrete Pump		
Crane - 40 Ton		
Crane - 70 Ton		
Dozer, D5		
Dozer, D6		
Dozer, D8		
Dozer, D10		
Drill, Tracked	2	
Dump Truck, End Dump, 15 Ton		
Dump Truck, Off-Highway, 34 Ton	4	Haul Cuttings
Dump Truck, Semi-Trailer		
Excavator, 325	1	
Forklift, Rough Terrain		
Front End Loader, Tracked		
Front End Loader, Wheeled	2	Load cuttings
Fuel Truck / Support Truck		
Generator - Diesel	1	
Grout Pump/Plant	1	
Hydroseed Sprayer, Truck Mounted		
Grader, H14		
Pile Driver		
Pump Truck - Concrete	1	
Powder Truck		
Scraper, Self-propelled, 21 CY		
Truck, Flatbed		
Tunnel Rig (TBM)	1	
Water Pump, Diesel	1	
Water Truck		
Welder and Generator Set		
Total Offsite Flatbed/Semi Trucks	9	
Daily Concrete Mixer Truck - 8 CY	13	
Daily Semi Trailer Truck	57	

Crew	Quantity
Blaster	2
Carpenters	
Cement Finisher	
Driller	2
Electricians	
Equipment Operators	5
Grade Setter	
Foreman	2
Labor Foreman	
Laborers	4
Mechanics	1
Painter	
Pile Driver	
Pipe Foreman	
Pipe Layer	
Plumber	
Rigger	
Survey/Rodmen	2
Steel Worker	
Steel Worker Foreman	
Truck Drivers	5
Welder	

Total Crew Size	23
Monthly Labor Cost	$275,600

Duration: **11.6** Months **50.4** Weeks

CONSTANTS: 10 HR/DAY 216.25 HRS/MONTH

2.0 - CONSTRUCTION TUNNELS SCHEDULE				
2.1 To Machine Hall Roof			2,900	CY
2.2 To Transformer Hall Roof			1,700	CY
2.3 To Power Shaft Construction			8,500	CY
2.4 To Tailrace Surge Tank Construction Access			1,900	CY
Total Volume			15,000	CY
D&B Production Rate	38	FT/DAY	250	CY/DAY
Initial Duration			2.8	MONTHS
Contingency			25	%
Final Duration			3.5	MONTHS
Final Duration			15.0	WEEKS
EQUIPMENT/TRUCKING				
DUMP TRUCKS			30	CY/TRUCK
			500	# OF TRUCKS FOR TASK
			9	LOADS/DAY
			1.0	CYCLE TIME (HRS)
			1	REQUIRED # OF TRUCKS
SEMIS			20	CY/TRUCK
			750	# OF TRUCKS FOR TASK
			13	TRUCKS/DAY

3.0 - ACCESS TUNNEL SCHEDULE				
3.1 Main Access Tunnel (6628') to Power House				
3.1.1 Excavation (TBM)			192,500	CY
Duration (from Tunnel Exc. Spreadsheet)			27.1	WEEKS
Average Production Rate			1,136	CY/DAY
Contingency			25	%
Final Duration			7.8	MONTHS
Final Duration			33.9	WEEKS
3.1.2 Prelining Shotcrete(w/wire-mesh)			20,600	SY
Production Rate			200	SY/DAY
Duration			4.8	MONTHS
Contingency			25	%
Final Duration			6.0	MONTHS
Final Duration			25.8	WEEKS
Lag			2.0	WEEKS
Maximum Duration			27.8	WEEKS
3.1.3 Invert concrete			6,900	CY
Production Rate			100	CY/DAY
Duration			3.2	MONTHS
Contingency			25	%
Final Duration			4.0	MONTHS
Final Duration			17.3	WEEKS
Lag			2.0	WEEKS
Maximum Duration			19.3	WEEKS
3.1.4 Rock anchors (15' long)			5,000	EA
Total Bolt Length			75,000	FT
Production Rate		(2 crews)	800	FT/DAY
Duration			4.3	MONTHS
Contingency			25	%
Final Duration			5.4	MONTHS
Final Duration			23.4	WEEKS
Lag			2.0	WEEKS
Maximum Duration			25.4	WEEKS
3.2 Drainage Gallery Access Tunnel (L=80')				
3.2.1 Excavation			800	CY
D&B Production Rate	38	FT/DAY	250	CY/DAY
Initial Duration			0.1	MONTHS
Contingency			25	%
Final Duration			0.2	MONTHS
Final Duration			0.8	WEEKS
3.2.2 Invert Concrete			10	CY
Production Rate			100	CY/DAY
Duration			0.005	MONTHS
Contingency			25	%
Final Duration			0.006	MONTHS
Final Duration			0.025	WEEKS
Lag			0.5	WEEKS
Maximum Duration			0.5	WEEKS
3.2.3 Prelining			200	SY
Production Rate			200	SY/DAY
Duration			0.0	MONTHS
Contingency			25	%
Final Duration			0.1	MONTHS
Final Duration			0.3	WEEKS
Lag			0.5	WEEKS
Maximum Duration			0.8	WEEKS

5 Power House Access Tunnel

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3.3 Tailrace Rock Trap Access Tunnel (L = 100')		100	LF
D&B Production Rate		37	FT/DAY
Initial Duration		0.1	MONTHS
Contingency		25	%
Final Duration		0.2	MONTHS
Final Duration		0.7	WEEKS
EQUIPMENT/TRUCKING			
DUMP TRUCKS		193954	TOTAL VOLUME, CY
		30	CY/TRUCK
		6,417	# OF TRUCKS FOR TASK
		38	LOADS/DAY
		1.0	CYCLE TIME (HRS)
		4	REQUIRED # OF TRUCKS
OFFSITE TRUCKS		168	TOTAL WEIGHT, TONS
Assume 2lbs/ft of rebar/rockbolts; 12ft of rebar/c.y. of conc;		20	TONS/TRUCK
1lbs of reinforcment/s.y. of shotcrete		9	# OF TRUCKS
CONCRETE TRUCKS		8643	TOTAL VOLUME, CY
		8	CY/TRUCK
		1,080	# OF TRUCKS FOR TASK
		13	TRUCKS/DAY
CONCRETE PUMP TRUCKS	(15 TRUCKS)-->	120	CY/DAY
		1	# OF TRUCKS
SEMIS		20	CY/TRUCK
		9,698	# OF TRUCKS FOR TASK
		57	TRUCKS/DAY

Assumptions:
Const. Tunnel Diameter = 15', = 177sf
D&B advancement rate = 37 ft/day, = 250cy/day
Excavation Then Haul Offsite
Survey Control
Shotcrete/Prelining = 3" thick

Construction Tunnels:
Process: Drill, Blast, Excavate, Load, Haul, Dump, Load, Haul offsite.
Equipment: Track Drill, Excavator, FE Loader, Dump Trucks, FE Loader, Semis.
Crew: 1 Driller, 2 Blasters, 4 Equip Opr., 2 survey, 1 DT Driver

Access Tunnels:
Process: TBM bore, Excavate, Load, Haul, Dump, Load, Haul offsite; Rock Anchors; Shotcrete; Invert Concrete.
Equipment: TBM, Excavator, FE Loader, Dump Trucks, FE Loader, 2 Track Drill, Semis; Grout Pump; Concrete

7 Excavate Tailrace Tunnel

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EQUIPMENT	Quantity	
On Site		
Air Compressor		
Backhoe / Front End Loader, Wheeled		
Backhoe, Tracked		
Chipper, Wood		
Compactor, Sheepsfoot, Self-Propelled		
Compactor, Vibratory, Self-Propelled		
Concrete Pump		
Crane - 40 Ton		
Crane - 70 Ton		
Dozer, D5		
Dozer, D6		
Dozer, D8		
Dozer, D10		
Drill, Tracked	1	
Dump Truck, End Dump, 15 Ton		
Dump Truck, Off-Highway, 34 Ton	5	Haul Cuttings
Dump Truck, Semi-Trailer		
Excavator, 325	1	
Forklift, Rough Terrain		
Front End Loader, Tracked		
Front End Loader, Wheeled	2	Load cuttings
Fuel Truck / Support Truck		
Generator - Diesel	1	
Grout Pump/Plant	1	
Hydroseed Sprayer, Truck Mounted		
Grader, H14		
Pile Driver		
Pump Truck - Concrete	2	
Powder Truck		
Scraper, Self-propelled, 21 CY		
Truck, Flatbed		
Tunnel Rig (TBM)	1	
Water Pump, Diesel	1	
Water Truck		
Welder and Generator Set		
Total Flatbed/Semi Trucks	5	
Daily Concrete Mixer Truck - 8 CY	25	
Daily Semi Trailer Truck	78	

Crew	Quantity
Blaster	2
Carpenters	
Cement Finisher	
Driller	1
Electricians	
Equipment Operators	3
Grade Setter	
Foreman	1
Labor Foreman	1
Laborers	8
Mechanics	1
Painter	
Pile Driver	
Pipe Foreman	
Pipe Layer	
Plumber	
Rigger	
Survey/Rodmen	2
Steel Worker	
Steel Worker Foreman	
Truck Drivers	7
Welder	

Total Crew Size	26
Monthly Labor Cost	$298,700

Duration: **7.7** Months **33.2** Weeks

CONSTANTS: 10 HR/DAY 216.25 HRS/MONTH

12.0 - TAILRACE TUNNEL SCHEDULE				
12.1 Tailrace Tunnel Excavation (TBM)			223,100	CY
Duration (from Tunnel Exc. Spreadsheet)			23.1	WEEKS
Average Production Rate			1,544	CY/DAY
Contingency			25	%
Final Duration			6.7	MONTHS
Final Duration			28.9	WEEKS
12.2 Prelining Shotcrete & Support			78,700	SY
Production Rate		(3-4 crews)	800	SY/DAY
Duration			4.5	MONTHS
Contingency			25	%
Final Duration			5.7	MONTHS
Final Duration			24.6	WEEKS
Lag			2.0	WEEKS
Maximum Duration			26.6	WEEKS
12.3 Plug Concrete Construction			3,400	CY
Production Rate			200	CY/DAY
Duration			0.8	MONTHS
Contingency			25	%
Final Duration			1.0	MONTHS
Final Duration			4.3	WEEKS
12.4 Plug Grout Injection			4,273	SY
Production Rate		(1.5 crews)	300	SY/DAY
Duration			0.7	MONTHS
Contingency			25	%
Final Duration			0.8	MONTHS
Final Duration			3.6	WEEKS
Lag			0.5	WEEKS
Maximum Duration			4.1	WEEKS
12.5 Tailrace Rock Trap Construction			1,133	CY
D&B Production Rate			250	CY/DAY
Duration			0.21	MONTHS
Contingency			25	%
Final Duration			0.26	MONTHS
Final Duration			1.1	WEEKS
12.6 Excavate Tailrace Surge Tank (shown on different schedule task)				
EQUIPMENT/TRUCKING				
DUMP TRUCKS			224,233	TOTAL VOLUME, CY
			30	CY/TRUCK
			7,474	# OF TRUCKS FOR TASK
			46	LOADS/DAY
			1.0	CYCLE TIME (HRS)
			5	REQUIRED # OF TRUCKS
OFFSITE TRUCKS			80	TOTAL WEIGHT, TONS
Assume 2lbs/ft of rebar/rockbolts; 12ft of rebar/c.y. of conc;			20	TONS/TRUCK
1lbs of reinforcment/s.y. of shotcrete			5	# OF TRUCKS
CONCRETE TRUCKS			9958	TOTAL VOLUME, CY
			8	CY/TRUCK
			1,245	# OF TRUCKS FOR TASK
			25	TRUCKS/DAY
CONCRETE PUMP TRUCKS		(15 TRUCKS)-->	120	CY/DAY
			2	# OF TRUCKS
SEMIS			20	CY/TRUCK
			11,212	# OF TRUCKS FOR TASK
			78	TRUCKS/DAY

Assumptions:
Excavation Then Haul Offsite
Survey Control
Shotcrete/Prelining = 3" thick
Tailrace Tunnel:
Process: TBM bore, Excavate, Load, Haul, Dump, Load, Haul offsite; Shotcrete; Plug Concrete.
Equipment: TBM, Excavator, FE Loader, Dump Trucks, FE Loader, Semis; Grout Pump; Concrete Pump Truck.
Crew: 1 TBM Operator, 2 TBM Laborers, 3 Equip Opr., 2 survey, 5 DT Drivers;
(Activities do not overlap, therefore use maximum of activities to find equimpent and crew estimates)
Tailrace Rock Trap:
Process: Drill, Blast, Excavate, Load, Haul, Dump, Load, Haul offsite.
Equipment: Track Drill, Excavator, FE Loader, Dump Trucks, FE Loader, Semis.
Crew: 1 Driller, 2 Blasters, 3 Equip Opr., 2 survey, 1 DT Driver
Schedule: Excavation and Plug construction = duration, other activies + lag are less, Rock trap constructed concurrently.

8 Excavate Lower Pres. Tunnel

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EQUIPMENT	Quantity	
On Site		
Air Compressor		
Backhoe / Front End Loader, Wheeled		
Backhoe, Tracked		
Chipper, Wood		
Compactor, Sheepsfoot, Self-Propelled		
Compactor, Vibratory, Self-Propelled		
Concrete Pump		
Crane - 40 Ton		
Crane - 70 Ton		
Dozer, D5		
Dozer, D6		
Dozer, D8		
Dozer, D10		
Drill, Tracked	1	
Dump Truck, End Dump, 15 Ton		
Dump Truck, Off-Highway, 34 Ton	2	haul cuttings
Dump Truck, Semi-Trailer		
Excavator, 325	1	
Forklift, Rough Terrain		
Front End Loader, Tracked		
Front End Loader, Wheeled	2	Load cuttings
Fuel Truck / Support Truck		
Generator - Diesel	1	
Grout Pump/Plant	1	
Hydroseed Sprayer, Truck Mounted		
Grader, H14		
Pile Driver		
Pump Truck - Concrete	2	
Powder Truck		
Scraper, Self-propelled, 21 CY		
Truck, Flatbed		
Tunnel Rig (TBM)	1	
Water Pump, Diesel	1	
Water Truck		
Welder and Generator Set		
Total Offsite Flatbed/Semi Trucks	13	
Daily Concrete Mixer Truck - 8 CY	25	
Daily Semi Trailer Truck	61	

Crew	Quantity
Blaster	
Carpenters	
Cement Finisher	
Driller	1
Electricians	
Equipment Operators	3
Grade Setter	
Foreman	1
Labor Foreman	
Laborers	4
Mechanics	1
Painter	
Pile Driver	
Pipe Foreman	
Pipe Layer	
Plumber	
Rigger	
Survey/Rodmen	2
Steel Worker	
Steel Worker Foreman	
Truck Drivers	4
Welder	

Total Crew Size	16
Monthly Labor Cost	$190,600

Duration: **6.3** Months **27.3** Weeks

CONSTANTS: 10 HR/DAY 216.25 HRS/MONTH

8.0 - LOWER PRESSURE TUNNEL SCHEDULE			
8.1 Lower Pressure Tunnel Excavation (TBM)		52,600	CY
Duration (from Tunnel Exc. Spreadsheet)		6.9	WEEKS
Average Production Rate		1,214	CY/DAY
Contingency		25	%
Final Duration		2.0	MONTHS
Final Duration		8.7	WEEKS
8.2 Prelining Shotcrete & Support (6")		13,900	SY
Production Rate	(2 crews)	500	SY/DAY
Duration		1.3	MONTHS
Contingency		25	%
Final Duration		1.6	MONTHS
Final Duration		7.0	WEEKS
Lag		2.0	WEEKS
Maximum Duration		9.0	WEEKS
8.3 Tunnel Lining		14,300	CY
Production Rate		200	CY/DAY
Duration		3.3	MONTHS
Contingency		25	%
Final Duration		4.1	MONTHS
Final Duration		17.9	WEEKS
Lag		2.0	WEEKS
Maximum Duration		19.9	WEEKS
8.4 Miscellaneous Concrete (bends, plug, etc.)		5,900	CY
Production Rate		200	CY/DAY
Duration		1.4	MONTHS
Contingency		25	%
Final Duration		1.7	MONTHS
Final Duration		7.4	WEEKS
8.5 Contact Grouting		10,700	CF
Production Rate		450	CF/DAY
Duration		1.10	MONTHS
Contingency		25	%
Final Duration		1.37	MONTHS
Final Duration		5.9	WEEKS
Lag		1.0	WEEKS
Maximum Duration		6.9	WEEKS
8.6 Curtain Grouting		5,800	CF
Production Rate		450	CF/DAY
Duration		0.60	MONTHS
Contingency		25	%
Final Duration		0.75	MONTHS
Final Duration		3.2	WEEKS
Lag		1.0	WEEKS
Maximum Duration		4.2	WEEKS
EQUIPMENT/TRUCKING			
DUMP TRUCKS		52,600	TOTAL VOLUME, CY
		30	CY/TRUCK
		1,753	# OF TRUCKS FOR TASK
		13	LOADS/DAY
		1.0	CYCLE TIME (HRS)
		2	REQUIRED # OF TRUCKS
OFFSITE TRUCKS		249	TOTAL WEIGHT, TONS
Assume 2lbs/ft of rebar/rockbolts; 12ft of rebar/c.y. of conc;		20	TONS/TRUCK
1lbs of reinforcment/s.y. of shotcrete		13	# OF TRUCKS
CONCRETE TRUCKS		23,128	TOTAL VOLUME, CY
		8	CY/TRUCK
		2,891	# OF TRUCKS FOR TASK
		25	TRUCKS/DAY
CONCRETE PUMP TRUCKS	(15 TRUCKS)-->	120	CY/DAY
		2	# OF TRUCKS
SEMIS		20	CY/TRUCK
		2,630	# OF TRUCKS FOR TASK
		61	TRUCKS/DAY

Assumptions:

Excavation Then Haul Offsite
Survey Control
Shotcrete/Prelining = 3" thick

Lower Pressure Tunnel:

Process: TBM bore, Excavate, Load, Haul, Dump, Load, Haul offsite; Shotcrete; Concrete Lining, Grouting.
Equipment: TBM, Excavator, FE Loader, Dump Trucks, FE Loader, Semis; Concrete Pump Truck; Drill, Grout
Crew: 1 TBM Operator, 2 TBM Laborers, 3 Equip Opr., 2 survey, 2 DT Drivers;
Schedule: Tunnel lining + Misc. Concrete = duration, other activies + lag are less, other activies constructed concurrently.

9 Excavate Upper Pres. Tunnel

Client:	Eagle Crest Energy	Project	080473	Page	1
Subject:	Eagle Mountain Construction Schedule and Equipment	Date	1/21/2009	By	NDM
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EQUIPMENT	Quantity	
On Site		
Air Compressor		
Backhoe / Front End Loader, Wheeled		
Backhoe, Tracked		
Chipper, Wood		
Compactor, Sheepsfoot, Self-Propelled		
Compactor, Vibratory, Self-Propelled		
Concrete Pump		
Crane - 40 Ton		
Crane - 70 Ton		
Dozer, D5		
Dozer, D6		
Dozer, D8		
Dozer, D10		
Drill, Tracked		
Dump Truck, End Dump, 15 Ton		
Dump Truck, Off-Highway, 34 Ton	5	haul cuttings
Dump Truck, Semi-Trailer		
Excavator, 325		
Forklift, Rough Terrain		
Front End Loader, Tracked		
Front End Loader, Wheeled	1	Load cuttings
Fuel Truck / Support Truck	1	
Generator - Diesel	1	
Grout Pump/Plant		
Hydroseed Sprayer, Truck Mounted		
Grader, H14		
Pile Driver		
Pump Truck - Concrete		
Powder Truck		
Scraper, Self-propelled, 21 CY		
Truck, Flatbed		
Tunnel Rig (TBM)	1	
Water Pump, Diesel	1	
Water Truck		
Welder and Generator Set		
Total Offsite Flatbed/Semi Trucks	26	
Daily Concrete Mixer Truck - 8 CY	50	
Daily Semi Trailer Truck	65	

Crew	Quantity
Blaster	
Carpenters	
Cement Finisher	
Driller	
Electricians	
Equipment Operators	4
Grade Setter	
Foreman	1
Labor Foreman	1
Laborers	10
Mechanics	1
Painter	
Pile Driver	
Pipe Foreman	
Pipe Layer	
Plumber	
Rigger	
Survey/Rodmen	2
Steel Worker	
Steel Worker Foreman	
Truck Drivers	10
Welder	

Total Crew Size	29
Monthly Labor Cost	$332,200

Duration: **5.7** Months **24.7** Weeks

CONSTANTS: 10 HR/DAY 216.25 HRS/MONTH

5.0 - UPPER PRESSURE TUNNEL SCHEDULE			
5.1 Upper Pressure Tunnel Excavation (TBM)		133,300	CY
Duration (from Tunnel Exc. Spreadsheet)		16.6	WEEKS
Average Production Rate		1,284	CY/DAY
Contingency		25	%
Final Duration		4.8	MONTHS
Final Duration		20.8	WEEKS
5.2 Prelining Shotcrete & Support (6")		35,300	SY
Production Rate	(2 crews)	500	SY/DAY
Duration		3.3	MONTHS
Contingency		25	%
Final Duration		4.1	MONTHS
Final Duration		17.7	WEEKS
Lag		2.0	WEEKS
Maximum Duration		19.7	WEEKS
5.3 Tunnel Lining		36,300	CY
Production Rate	(2 crews)	400	CY/DAY
Duration		4.2	MONTHS
Contingency		25	%
Final Duration		5.2	MONTHS
Final Duration		22.7	WEEKS
Lag		2.0	WEEKS
Maximum Duration		24.7	WEEKS
5.4 Miscellaneous Concrete (bends, plug, etc.)		5,400	CY
Production Rate		200	CY/DAY
Duration		1.2	MONTHS
Contingency		25	%
Final Duration		1.6	MONTHS
Final Duration		6.8	WEEKS
5.5 Contact Grouting		27,200	CF
Production Rate		450	CF/DAY
Duration		2.80	MONTHS
Contingency		25	%
Final Duration		3.5	MONTHS
Final Duration		15.1	WEEKS
Lag		1.0	WEEKS
Maximum Duration		16.1	WEEKS
EQUIPMENT/TRUCKING			
DUMP TRUCKS		133,300	TOTAL VOLUME, CY
		30	CY/TRUCK
		4,443	# OF TRUCKS FOR TASK
		43	LOADS/DAY
		1.0	CYCLE TIME (HRS)
		5	REQUIRED # OF TRUCKS
OFFSITE TRUCKS		518	TOTAL WEIGHT, TONS
Assume 2lbs/ft of rebar/rockbolts; 12ft of rebar/c.y. of conc;		20	TONS/TRUCK
1lbs of reinforcment/s.y. of shotcrete		26	# OF TRUCKS
CONCRETE TRUCKS		45,649	TOTAL VOLUME, CY
		8	CY/TRUCK
		5,706	# OF TRUCKS FOR TASK
		50	TRUCKS/DAY
CONCRETE PUMP TRUCKS	(15 TRUCKS)-->	120	CY/DAY
		4	# OF TRUCKS
SEMIS		20	CY/TRUCK
		6,665	# OF TRUCKS FOR TASK
		65	TRUCKS/DAY

Assumptions:

Excavation Then Haul Offsite
Survey Control
Shotcrete/Prelining = 3" thick

Lower Pressure Tunnel:

Process: TBM bore, Excavate, Load, Haul, Dump, Load, Haul offsite; Shotcrete; Concrete Lining, Grouting.
Equipment: TBM, Excavator, FE Loader, Dump Trucks, FE Loader, Semis; Concrete Pump Truck; Grout Pump,
Crew: 1 TBM Operator, 2 TBM Laborers, 3 Equip Opr., 2 survey, 5 DT Drivers;
Schedule: Maximum of All Activities = duration, other activies + lag are less, other activies constructed concurrently.

10 Excavate Pressure Shaft

Client:	Eagle Crest Energy	Project	080473	Page	1 of 2
Subject:	Eagle Mountain Construction Schedule and Equipment	Date	1/21/2009	By	NDM
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EQUIPMENT	Quantity	
On Site		
Air Compressor	1	
Backhoe / Front End Loader, Wheeled		
Backhoe, Tracked		
Chipper, Wood		
Compactor, Sheepsfoot, Self-Propelled		
Compactor, Vibratory, Self-Propelled		
Concrete Pump		
Crane - 40 Ton		
Crane - 70 Ton	1	shaft work
Dozer, D5		
Dozer, D6		
Dozer, D8	1	Benching
Dozer, D10		
Drill, Tracked	1	
Dump Truck, End Dump, 15 Ton		
Dump Truck, Off-Highway, 34 Ton	2	
Dump Truck, Semi-Trailer		
Excavator, 325	1	Larger Model
Forklift, Rough Terrain		
Front End Loader, Tracked		
Front End Loader, Wheeled	2	
Fuel Truck / Support Truck	1	
Generator - Diesel	1	
Grout Pump/Plant	1	
Hydroseed Sprayer, Truck Mounted		
Grader, H14		
Pile Driver		
Pump Truck - Concrete	2	
Powder Truck		
Scraper, Self-propelled, 21 CY		
Truck, Flatbed		
Tunnel Rig (TBM)		
Water Pump, Diesel	1	
Water Truck		
Welder and Generator Set		
Total Offsite Flatbed/Semi Trucks (3)	8	
Daily Concrete Mixer Truck - 10 CY	25	
Daily Semi Trailer Truck	24	

Crew	Quantity
Blaster	2
Carpenters	
Cement Finisher	
Driller	1
Electricians	
Equipment Operators	4
Grade Setter	
Foreman	1
Labor Foreman	
Laborers	4
Mechanics	1
Painter	
Pile Driver	
Pipe Foreman	
Pipe Layer	
Plumber	
Rigger	
Survey/Rodmen	2
Steel Worker	
Steel Worker Foreman	
Truck Drivers	5
Welder	

Total Crew Size	20
Monthly Labor Cost	$237,200

Duration: **9.4** Months **40.6** Weeks

CONSTANTS: 10 HR/DAY 216.25 HRS/MONTH

7.0 - POWER SHAFT SCHEDULE		
7.1 Power Shaft Excavation (D&B)	40,600	CY
Duration (from Tunnel Exc. Spreadsheet)	11.6	WEEKS
Average Production Rate	467	CY/DAY
Contingency	50	%
Final Duration	4.0	MONTHS
Final Duration	17.4	WEEKS
7.2 Shaft Prelining & Support	2,200	SF
Production Rate	100	SF/DAY
Duration	1.0	MONTHS
Contingency	25	%
Final Duration	1.3	MONTHS
Final Duration	5.5	WEEKS
Lag	2.0	WEEKS
Maximum Duration	7.5	WEEKS
7.3 Concrete Lining	11,100	CY
Production Rate	200	CY/DAY
Duration	2.6	MONTHS
Contingency	25	%
Final Duration	3.2	MONTHS
Final Duration	13.9	WEEKS
Lag	2.0	WEEKS
Maximum Duration	15.9	WEEKS
7.4 Contact Grouting	9,300	CF
Production Rate	450	CF/DAY
Duration	1.0	MONTHS
Contingency	25	%
Final Duration	1.2	MONTHS
Final Duration	5.2	WEEKS
Lag	2.0	WEEKS
Maximum Duration	7.2	WEEKS

EQUIPMENT/TRUCKING			
DUMP TRUCKS		40,600	TOTAL VOLUME, CY
		30	CY/TRUCK
		1,353	# OF TRUCKS FOR TASK
		16	LOADS/DAY
		1.0	CYCLE TIME (HRS)
		2	REQUIRED # OF TRUCKS
OFFSITE TRUCKS		133	TOTAL WEIGHT, TONS
Assume 2lbs/ft of rebar/rockbolts; 12ft of rebar/c.y. of conc;		20	TONS/TRUCK
1lbs of reinforcment/s.y. of shotcrete		7	# OF TRUCKS
CONCRETE TRUCKS		11,628	TOTAL VOLUME, CY
		8	CY/TRUCK
		1,453	# OF TRUCKS FOR TASK
		25	TRUCKS/DAY
CONCRETE PUMP TRUCKS	(15 TRUCKS)-->	120	CY/DAY
		2	# OF TRUCKS
SEMIS		20	CY/TRUCK
		2,030	# OF TRUCKS FOR TASK
		24	TRUCKS/DAY

6.0 - SURGE TANK SCHEDULE		
6.1 Shaft Excavation (D&B)	8,900	CY
Production Rate	400	CY/DAY
Duration	1.0	MONTHS
Contingency	25	%
Final Duration	1.3	MONTHS
Final Duration	5.6	WEEKS
6.2 Benching Excavation	35,300	CY
Production Rate	500	CY/DAY
Duration	3.3	MONTHS
Contingency	25	%
Final Duration	4.1	MONTHS
Final Duration	17.7	WEEKS

10 Excavate Pressure Shaft

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6.3 Concrete Works	700	CY
Production Rate	100	CY/DAY
Duration	0.3	MONTHS
Contingency	25	%
Final Duration	0.4	MONTHS
Final Duration	1.8	WEEKS
Lag	2.0	WEEKS
Maximum Duration	3.8	WEEKS

EQUIPMENT/TRUCKING			
OFFSITE TRUCKS		8	TOTAL WEIGHT, TONS
Assume 2lbs/ft of rebar/rockbolts; 12ft of rebar/c.y. of conc;		20	TONS/TRUCK
1lbs of reinforcment/s.y. of shotcrete		1	# OF TRUCKS
CONCRETE TRUCKS		700	TOTAL VOLUME, CY
		8	CY/TRUCK
		88	# OF TRUCKS FOR TASK
		13	TRUCKS/DAY
CONCRETE PUMP TRUCKS	(15 TRUCKS)-->	120	CY/DAY
		1	# OF TRUCKS
SEMIS		20	CY/TRUCK
		2,210	# OF TRUCKS FOR TASK
		20	TRUCKS/DAY

Assumptions:

Excavation Then Haul Offsite
Survey Control
Shotcrete/Prelining = 3" thick

Power Shaft:

Process: Drill, Blast, Excavate, Crane Hoist, Load, Haul, Dump, Load, Haul offsite.
Equipment: Track Drill, Excavator, Crane, FE Loader, Dump Trucks, FE Loader, Semis; Grout Pump, Concrete
Crew: 1 Driller, 2 Blasters, 4 Equip Opr., 2 survey, 2 DT Driver;

Surge Tank:

Process: D&B: Drill, Blast, Excavate, Crane Hoist, Load, Haul offsite.
Equipment: D&B: Track Drill, Excavator, Crane, FE Loader, Dump Trucks, FE Loader, Semis; Grout Pump,
Crew: 1 Driller, 2 Blasters, 4 Equip Opr., 2 survey;
Schedule: Shaft Exc. + Surge Exc. + Bench Exc. = duration, other activies + lag are less, other activies constructed concurrently.

11 Excavate Top Heading

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Subject:	Eagle Mountain Construction Schedule and Equipment	Date	1/21/2009	By	NDM
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EQUIPMENT	Quantity	
On Site		
Air Compressor	3	
Backhoe / Front End Loader, Wheeled		
Backhoe, Tracked		
Chipper, Wood		
Compactor, Sheepsfoot, Self-Propelled		
Compactor, Vibratory, Self-Propelled		
Concrete Pump		
Crane - 40 Ton		
Crane - 70 Ton		
Dozer, D5		
Dozer, D6		
Dozer, D8	2	
Dozer, D10		
Drill, Tracked	3	
Dump Truck, End Dump, 15 Ton		
Dump Truck, Off-Highway, 34 Ton	4	
Dump Truck, Semi-Trailer		
Excavator, 325	2	Larger Model
Forklift, Rough Terrain		
Front End Loader, Tracked		
Front End Loader, Wheeled	4	
Fuel Truck / Support Truck	1	
Generator - Diesel	2	
Grout Pump/Plant		
Hydroseed Sprayer, Truck Mounted		
Grader, H14		
Pile Driver		
Pump Truck - Concrete		
Powder Truck		
Scraper, Self-propelled, 21 CY		
Truck, Flatbed		
Tunnel Rig (TBM) **(3)**		
Water Pump, Diesel		
Water Truck	1	
Welder and Generator Set		
Total Offsite Flatbed/Semi Trucks		
Daily Concrete Mixer Truck - 8 CY		
Daily Semi Trailer Truck	60	

Crew	Quantity
Blaster	6
Carpenters	
Cement Finisher	
Driller	3
Electricians	
Equipment Operators	8
Grade Setter	
Foreman	2
Labor Foreman	
Laborers	1
Mechanics	
Painter	
Pile Driver	
Pipe Foreman	
Pipe Layer	
Plumber	
Rigger	
Survey/Rodmen	2
Steel Worker	
Steel Worker Foreman	
Truck Drivers	5
Welder	

Total Crew Size	27
Monthly Labor Cost	$326,000

Duration: **3.7** Months **16.1** Weeks

CONSTANTS: 10 HR/DAY 216.25 HRS/MONTH

13.0 MACHINE HALL SCHEDULE			
13.1-C Hall Benching Excavation (El. 18, El. 85)		64,000	CY
Production Rate	(3 crews)	1,200	CY/DAY
Duration		2.5	MONTHS
Contingency		25	%
Final Duration		3.1	MONTHS
Final Duration		13.3	WEEKS
13.1-D Roof Excavation (El. 85, El. 100)		9,900	CY
Production Rate	(2-3 crews)	900	CY/DAY
Duration		0.5	MONTHS
Contingency		25	%
Final Duration		0.6	MONTHS
Final Duration		2.8	WEEKS
EQUIPMENT/TRUCKING			
DUMP TRUCKS		73,900	TOTAL VOLUME, CY
		30	CY/TRUCK
		2,463	# OF TRUCKS FOR TASK
		40	LOADS/DAY (MAX.)
		1.0	CYCLE TIME (HRS)
		4	REQUIRED # OF TRUCKS
SEMIS		20	CY/TRUCK
		3,695	# OF TRUCKS FOR TASK
		60	TRUCKS/DAY

Assumptions:

Excavation Then Haul Offsite

Survey Control

Excavate Top Heading

Process: Drill, Blast, Excavate, Load, Haul, Dump, Load, Haul offsite.

Equipment: Track Drills, 2 Excavators, 2 Dozers, 4 FE Loaders, Dump Trucks, Semis, Water Truck, Support Truck.

Crew: 3 Drillers, 6 Blasters, 8 Equip Opr., 2 survey, 4 DT Drivers, 2 Foreman, 1 Water Truck Driver, 1 Support Driver.

Schedule: Activities are additive.

12 Roof Anchorage and Lining

Client:	Eagle Crest Energy	Project	080473	Page	1
Subject:	Eagle Mountain Construction Schedule and Equipment	Date	1/21/2009	By	NDM
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EQUIPMENT	Quantity	
On Site		
Air Compressor	1	
Backhoe / Front End Loader, Wheeled		
Backhoe, Tracked		
Chipper, Wood		
Compactor, Sheepsfoot, Self-Propelled		
Compactor, Vibratory, Self-Propelled		
Concrete Pump		
Crane - 40 Ton		
Crane - 70 Ton		
Dozer, D5		
Dozer, D6		
Dozer, D8		
Dozer, D10		
Drill, Tracked	1	drill anchor holes
Dump Truck, End Dump, 15 Ton		
Dump Truck, Off-Highway, 34 Ton		
Dump Truck, Semi-Trailer		
Excavator, 325		
Forklift, Rough Terrain		
Front End Loader, Tracked		
Front End Loader, Wheeled		
Fuel Truck / Support Truck	1	
Generator - Diesel	1	
Grout Pump/Plant	1	shotcrete
Hydroseed Sprayer, Truck Mounted		
Grader, H14		
Pile Driver		
Pump Truck - Concrete		
Powder Truck		
Scraper, Self-propelled, 21 CY		
Truck, Flatbed	1	
Tunnel Rig (TBM)		
Water Pump, Diesel		
Water Truck		
Welder and Generator Set		
Total Offsite Flatbed/Semi Trucks	2	
Daily Concrete Mixer Truck - 8 CY	3	
Daily Semi Trailer Truck		

Crew	Quantity
Blaster	
Carpenters	
Cement Finisher	
Driller	1
Electricians	
Equipment Operators	
Grade Setter	
Foreman	1
Labor Foreman	
Laborers	3
Mechanics	
Painter	
Pile Driver	
Pipe Foreman	
Pipe Layer	
Plumber	
Rigger	
Survey/Rodmen	
Steel Worker	
Steel Worker Foreman	
Truck Drivers	1
Welder	

Total Crew Size	6
Monthly Labor Cost	$67,500

Duration: **2.8** Months **12.1** Weeks

CONSTANTS: 10 HR/DAY 216.25 HRS/MONTH

13.0 MACHINE HALL SCHEDULE				
13.2	Roof & Walls Support (3")		96,700	SF
	Production Rate	(1 crew)	2,200	SF/DAY
	Duration		2.0	MONTHS
	Contingency		25	%
	Final Duration		2.5	MONTHS
	Final Duration		11.0	WEEKS
NA	Rock Bolts			
	Assume Bolts Lengths are:		20.0	LF
	Assume 1 bolt per:		100.0	SF
	Total Length		19340.0	LF
	Production Rate		400	LF/DAY
	Duration		2.2	MONTHS
	Contingency		25	%
	Final Duration		2.8	MONTHS
	Final Duration		12.1	WEEKS
EQUIPMENT/TRUCKING				
OFFSITE TRUCKS			25	TOTAL WEIGHT, TONS
Assume 2lbs/ft of rebar/rockbolts; 12ft of rebar/c.y. of conc;			20	TONS/TRUCK
1lbs of reinforcment/s.y. of shotcrete			2	# OF TRUCKS
CONCRETE TRUCKS			895	TOTAL VOLUME, CY
			8	CY/TRUCK
			112	# OF TRUCKS FOR TASK
			3	TRUCKS/DAY

Assumptions:
Roof and Walls Support is 3" thick shotcrete
Grout for rockbolts is included in shotcrete volume
Roof and Walls Support:
Process: Drill, Install Rock Bolts, Grout Bolts, Shotcrete Surface.
Equipment: Track Drill, Support Truck, Flatbed Truck for rock bolts.
Crew: 1 Driller, 3 Laborers, 1 Foreman, 1 Truck Driver.

Schedule: Activities are additive.

13 Excavate Remainder of Cavern

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EQUIPMENT	Quantity
On Site	
Air Compressor	1
Backhoe / Front End Loader, Wheeled	
Backhoe, Tracked	
Chipper, Wood	
Compactor, Sheepsfoot, Self-Propelled	
Compactor, Vibratory, Self-Propelled	
Concrete Pump	
Crane - 40 Ton	
Crane - 70 Ton	
Dozer, D5	
Dozer, D6	
Dozer, D8	2
Dozer, D10	
Drill, Tracked	3
Dump Truck, End Dump, 15 Ton	
Dump Truck, Off-Highway, 34 Ton	4
Dump Truck, Semi-Trailer	
Excavator, 325	2
Forklift, Rough Terrain	
Front End Loader, Tracked	
Front End Loader, Wheeled	4
Fuel Truck / Support Truck	1
Generator - Diesel	2
Grout Pump/Plant	
Hydroseed Sprayer, Truck Mounted	
Grader, H14	
Pile Driver	
Pump Truck - Concrete	
Powder Truck	
Scraper, Self-propelled, 21 CY	
Truck, Flatbed	
Tunnel Rig (TBM)	
Water Pump, Diesel	
Water Truck	1
Welder and Generator Set	
Total Offsite Flatbed/Semi Trucks	
Daily Concrete Mixer Truck - 8 CY	
Daily Semi Trailer Truck	40

Crew	Quantity
Blaster	6
Carpenters	
Cement Finisher	
Driller	3
Electricians	
Equipment Operators	8
Grade Setter	
Foreman	1
Labor Foreman	1
Laborers	1
Mechanics	
Painter	
Pile Driver	
Pipe Foreman	
Pipe Layer	
Plumber	
Rigger	
Survey/Rodmen	2
Steel Worker	
Steel Worker Foreman	
Truck Drivers	5
Welder	

Total Crew Size	27
Monthly Labor Cost	$322,900

Duration: **1.6** Months **7.1** Weeks

CONSTANTS: 10 HR/DAY 216.25 HRS/MONTH

13.0 MACHINE HALL SCHEDULE			
13.1-A Excavation Draft Tubes (El. -16,El. -36)		4,600	CY
Production Rate	(2 crews)	800	CY/DAY
Duration		0.3	MONTHS
Contingency		25	%
Final Duration		0.3	MONTHS
Final Duration		1.4	WEEKS
13.1-B Benching Excavation (El. -16, El. 18)		22,700	CY
Production Rate	(2-3 crews)	1,000	CY/DAY
Duration		1.0	MONTHS
Contingency		25	%
Final Duration		1.3	MONTHS
Final Duration		5.7	WEEKS
EQUIPMENT/TRUCKING			
DUMP TRUCKS		27,300	TOTAL VOLUME, CY
		30	CY/TRUCK
		910	# OF TRUCKS FOR TASK
		33	LOADS/DAY (MAX.)
		1.0	CYCLE TIME (HRS)
		4	REQUIRED # OF TRUCKS
SEMIS		20	CY/TRUCK
		1,365	# OF TRUCKS FOR TASK
		40	TRUCKS/DAY

Assumptions:

Excavation Then Haul Offsite

Survey Control

Excavate Remainder of Cavern

Process: Drill, Blast, Excavate, Load, Haul, Dump, Load, Haul offsite.

Equipment: Track Drills, 2 Excavators, 2 Dozers, 4 FE Loaders, Dump Trucks, Semis, Water Truck, Support Truck.

Crew: 3 Drillers, 6 Blasters, 8 Equip Opr., 2 survey, 4 DT Drivers, 2 Foreman, 1 Water Truck Driver, 1 Support Driver.

Schedule: Activities are additive.

15 Excavate Transformer Gallery

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Subject:	Eagle Mountain Construction Schedule and Equipment	Date	1/21/2009	By	NDM
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		Approved		By	

EQUIPMENT	Quantity
On Site	
Air Compressor	1
Backhoe / Front End Loader, Wheeled	
Backhoe, Tracked	
Chipper, Wood	
Compactor, Sheepsfoot, Self-Propelled	
Compactor, Vibratory, Self-Propelled	
Concrete Pump	
Crane - 40 Ton	
Crane - 70 Ton	
Dozer, D5	
Dozer, D6	
Dozer, D8	1
Dozer, D10	
Drill, Tracked	2
Dump Truck, End Dump, 15 Ton	
Dump Truck, Off-Highway, 34 Ton	3
Dump Truck, Semi-Trailer	
Excavator, 325	1
Forklift, Rough Terrain	
Front End Loader, Tracked	
Front End Loader, Wheeled	2
Fuel Truck / Support Truck	1
Generator - Diesel	1
Grout Pump/Plant	
Hydroseed Sprayer, Truck Mounted	
Grader, H14	
Pile Driver	
Pump Truck - Concrete	
Powder Truck	
Scraper, Self-propelled, 21 CY	
Truck, Flatbed	
Tunnel Rig (TBM)	
Water Pump, Diesel	
Water Truck	1
Welder and Generator Set	
Total Offsite Flatbed/Semi Trucks	
Daily Concrete Mixer Truck - 8 CY	
Daily Semi Trailer Truck	40

Crew	Quantity
Blaster	2
Carpenters	
Cement Finisher	
Driller	2
Electricians	
Equipment Operators	5
Grade Setter	
Foreman	1
Labor Foreman	
Laborers	1
Mechanics	1
Painter	
Pile Driver	
Pipe Foreman	
Pipe Layer	
Plumber	
Rigger	
Survey/Rodmen	2
Steel Worker	
Steel Worker Foreman	
Truck Drivers	4
Welder	

Total Crew Size	18
Monthly Labor Cost	$218,800

Duration: **2.7** **Months** **11.8** **Weeks**

CONSTANTS: 10 HR/DAY 216.25 HRS/MONTH

15.1 TRANSFORMER HALL EXCAVATION (D&B)			
SCHEDULE			
15.1-A Transformer Hall Excavation		30,900	CY
Production Rate	(2 crews)	800	CY/DAY
Duration		1.8	MONTHS
Contingency		25	%
Final Duration		2.2	MONTHS
Final Duration		9.7	WEEKS
15.1-B Nishe Excavation		2,700	CY
Production Rate	(1crew)	400	CY/DAY
Duration		0.3	MONTHS
Contingency		25	%
Final Duration		0.4	MONTHS
Final Duration		1.7	WEEKS
15.1-C Cable Gallery Excavation		700	CY
Production Rate	(1crew)	400	CY/DAY
Duration		0.1	MONTHS
Contingency		25	%
Final Duration		0.1	MONTHS
Final Duration		0.4	WEEKS
15.1-D A/C Gallery Excavation		100	CY
Production Rate	(1crew)	400	CY/DAY
Duration		0.0	MONTHS
Contingency		25	%
Final Duration		0.0	MONTHS
Final Duration		0.1	WEEKS
EQUIPMENT/TRUCKING			
DUMP TRUCKS		34,400	TOTAL VOLUME, CY
		30	CY/TRUCK
		1,147	# OF TRUCKS FOR TASK
		27	LOADS/DAY (MAX.)
		1.0	CYCLE TIME (HRS)
		3	REQUIRED # OF TRUCKS
SEMIS		20	CY/TRUCK
		1,720	# OF TRUCKS FOR TASK
		40	TRUCKS/DAY

Assumptions:

Excavation Then Haul Offsite

Survey Control

Excavate Transformer Gallery:

Process: Drill, Blast, Excavate, Load, Haul, Dump, Load, Haul offsite.

Equipment: Track Drills, 1 Excavators, 1 Dozer, 3 FE Loaders, Dump Trucks, Semis, Water Truck, Support Truck.

Crew: 2 Drillers, 4 Blasters, 5 Equip Opr., 2 survey, 3 DT Drivers, 1 Foreman, 1 Water Truck Driver, 1 Support Driver.

Schedule: Activities are additive.

16 Exc. Tailrace Surge Chamber

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Subject:	Eagle Mountain Construction Schedule and Equipment	Date	1/21/2009	By	NDM
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EQUIPMENT	Quantity
On Site	
Air Compressor	1
Backhoe / Front End Loader, Wheeled	
Backhoe, Tracked	
Chipper, Wood	
Compactor, Sheepsfoot, Self-Propelled	
Compactor, Vibratory, Self-Propelled	
Concrete Pump	
Crane - 40 Ton	
Crane - 70 Ton	
Dozer, D5	
Dozer, D6	
Dozer, D8	
Dozer, D10	
Drill, Tracked	1
Dump Truck, End Dump, 15 Ton	
Dump Truck, Off-Highway, 34 Ton	1
Dump Truck, Semi-Trailer	
Excavator, 325	1
Forklift, Rough Terrain	
Front End Loader, Tracked	
Front End Loader, Wheeled	2
Fuel Truck / Support Truck	1
Generator - Diesel	1
Grout Pump/Plant	
Hydroseed Sprayer, Truck Mounted	
Grader, H14	
Pile Driver	
Pump Truck - Concrete	1
Powder Truck	
Scraper, Self-propelled, 21 CY	
Truck, Flatbed	
Tunnel Rig (TBM)	
Water Pump, Diesel	
Water Truck	1
Welder and Generator Set	
Total Offsite Flatbed/Semi Trucks	1
Daily Concrete Mixer Truck - 8 CY	
Daily Semi Trailer Truck	15

Crew	Quantity
Blaster	2
Carpenters	
Cement Finisher	
Driller	1
Electricians	
Equipment Operators	3
Grade Setter	
Foreman	1
Labor Foreman	
Laborers	4
Mechanics	
Painter	
Pile Driver	
Pipe Foreman	
Pipe Layer	
Plumber	
Rigger	
Survey/Rodmen	2
Steel Worker	
Steel Worker Foreman	
Truck Drivers	3
Welder	

Total Crew Size	16
Monthly Labor Cost	$188,600

Duration: **6.4** **Months** **27.8** **Weeks**

CONSTANTS: 10 HR/DAY 216.25 HRS/MONTH

12.6 D/S Surge Tank Construction (D&B)			
SCHEDULE			
NA Surge Tank Excavation (D&B)		19,000	CY
Production Rate	(1 crew)	300	CY/DAY
Duration	(Reduced Production - Limited Access)	2.9	MONTHS
Contingency		25	%
Final Duration		3.7	MONTHS
Final Duration		15.8	WEEKS
NA Roof & Walls Support (3")		105,000	SF
Production Rate	(1 crew)	2,200	SF/DAY
Duration		2.2	MONTHS
Contingency		25	%
Final Duration		2.8	MONTHS
Final Duration		11.9	WEEKS
EQUIPMENT/TRUCKING			
DUMP TRUCKS		19,000	TOTAL VOLUME, CY
		30	CY/TRUCK
		633	# OF TRUCKS FOR TASK
		10	LOADS/DAY (MAX.)
		1.0	CYCLE TIME (HRS)
		1	REQUIRED # OF TRUCKS
OFFSITE TRUCKS		6	TOTAL WEIGHT, TONS
Assume 2lbs/ft of rebar/rockbolts; 12ft of rebar/c.y. of conc;		20	TONS/TRUCK
1lbs of reinforcment/s.y. of shotcrete		1	# OF TRUCKS
SEMIS		20	CY/TRUCK
		950	# OF TRUCKS FOR TASK
		15	TRUCKS/DAY

Assumptions:

Excavation Then Haul Offsite

Survey Control

Excavate Transformer Gallery:

Process: Drill, Blast, Excavate, Load, Haul, Dump, Load, Haul offsite.

Equipment: Track Drill, 1 Excavators, 2 FE Loaders, Dump Truck, Semis, Water Truck, Support Truck.

Crew: 1 Driller, 2 Blasters, 3 Equip Opr., 2 survey, 1 DT Driver, 1 Water Truck Driver, 1 Support Driver.

Shotcrete Crew: 1 Forman, 2 Laborers, 1 CPT Driver.

Schedule: Activities are additive.

17 Excavate Cable Tunnel Shaft

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Subject:	Eagle Mountain Construction Schedule and Equipment	Date	1/21/2009	By	NDM
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EQUIPMENT	Quantity	
On Site		
Air Compressor	1	
Backhoe / Front End Loader, Wheeled		
Backhoe, Tracked		
Chipper, Wood		
Compactor, Sheepsfoot, Self-Propelled		
Compactor, Vibratory, Self-Propelled		
Concrete Pump		
Crane - 40 Ton		
Crane - 70 Ton		
Dozer, D5		
Dozer, D6		
Dozer, D8		
Dozer, D10		
Drill, Tracked	1	
Dump Truck, End Dump, 15 Ton		
Dump Truck, Off-Highway, 34 Ton	1	
Dump Truck, Semi-Trailer		
Excavator, 325	1	Larger Model
Forklift, Rough Terrain		
Front End Loader, Tracked		
Front End Loader, Wheeled	2	
Fuel Truck / Support Truck	1	
Generator - Diesel	1	
Grout Pump/Plant		
Hydroseed Sprayer, Truck Mounted		
Grader, H14		
Pile Driver		
Pump Truck - Concrete		
Powder Truck		
Scraper, Self-propelled, 21 CY		
Truck, Flatbed		
Tunnel Rig (TBM)		
Water Pump, Diesel	1	
Water Truck		
Welder and Generator Set		
Total Offsite Flatbed/Semi Trucks		
Daily Concrete Mixer Truck - 8 CY		
Daily Semi Trailer Truck	3	

Crew	Quantity
Blaster	2
Carpenters	
Cement Finisher	
Driller	1
Electricians	
Equipment Operators	4
Grade Setter	
Foreman	
Labor Foreman	
Laborers	1
Mechanics	
Painter	
Pile Driver	
Pipe Foreman	
Pipe Layer	
Plumber	
Rigger	
Survey/Rodmen	2
Steel Worker	
Steel Worker Foreman	
Truck Drivers	1
Welder	

Total Crew Size	11
Monthly Labor Cost	$134,600

Duration:	**5.9**	**Months**	**25.4**	**Weeks**

CONSTANTS:	10	HR/DAY	216.25	HRS/MONTH

15.1-E CABLE SHAFT EXCAVATION SCHEDULE				
NA Cable Shaft Excavation (D&B)			4,700	CY
	Production Rate	(1 crew)	50	CY/DAY
	Duration	(Low production - restricted work area)	4.3	MONTHS
	Contingency		35	%
Final Duration			5.9	MONTHS
Final Duration			25.4	WEEKS
EQUIPMENT/TRUCKING				
DUMP TRUCKS			4,700	TOTAL VOLUME, CY
			30	CY/TRUCK
			157	# OF TRUCKS FOR TASK
			2	LOADS/DAY (MAX.)
			1.0	CYCLE TIME (HRS)
			1	REQUIRED # OF TRUCKS
SEMIS			20	CY/TRUCK
			235	# OF TRUCKS FOR TASK
			3	TRUCKS/DAY

Assumptions:

Excavation Then Haul Offsite

Survey Control

Excavate Transformer Gallery:

Process: Drill, Blast, Excavate, Crane Hoist, Load, Haul, Dump, Load, Haul offsite.

Equipment: Track Drill, Excavator, Crane, FE Loader, Dump Truck, FE Loader, Semis, Support Truck.

Crew: 1 Driller, 2 Blasters, 4 Equip Opr., 2 survey, 1 DT Driver, 1 Support Driver.

18 Line and Pave Cable Tunnel

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Subject:	Eagle Mountain Construction Schedule and Equipment	Date	1/21/2009	By	NDM
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EQUIPMENT	Quantity
On Site	
Air Compressor	1
Backhoe / Front End Loader, Wheeled	
Backhoe, Tracked	
Chipper, Wood	
Compactor, Sheepsfoot, Self-Propelled	
Compactor, Vibratory, Self-Propelled	
Concrete Pump	1
Crane - 40 Ton	
Crane - 70 Ton	1
Dozer, D5	
Dozer, D6	
Dozer, D8	
Dozer, D10	
Drill, Tracked	1
Dump Truck, End Dump, 15 Ton	
Dump Truck, Off-Highway, 34 Ton	
Dump Truck, Semi-Trailer	
Excavator, 325	
Forklift, Rough Terrain	
Front End Loader, Tracked	
Front End Loader, Wheeled	
Fuel Truck / Support Truck	1
Generator - Diesel	1
Grout Pump/Plant	1
Hydroseed Sprayer, Truck Mounted	
Grader, H14	
Pile Driver	
Pump Truck - Concrete	
Powder Truck	
Scraper, Self-propelled, 21 CY	
Truck, Flatbed	1
Tunnel Rig (TBM)	
Water Pump, Diesel	
Water Truck	
Welder and Generator Set	
Total Offsite Flatbed/Semi Trucks	2
Daily Concrete Mixer Truck - 8 CY	1
Daily Semi Trailer Truck	

Crew	Quantity
Blaster	
Carpenters	
Cement Finisher	
Driller	1
Electricians	
Equipment Operators	
Grade Setter	
Foreman	1
Labor Foreman	
Laborers	3
Mechanics	
Painter	
Pile Driver	
Pipe Foreman	
Pipe Layer	
Plumber	
Rigger	
Survey/Rodmen	
Steel Worker	
Steel Worker Foreman	
Truck Drivers	1
Welder	

Total Crew Size	6
Monthly Labor Cost	$67,500

Duration: **10.1** Months **43.6** Weeks

CONSTANTS: 10 HR/DAY 216.25 HRS/MONTH

15.0 TRANSFORMER HALL SCHEDULE			
15.2-E	Roof & Walls Support - Cable Shaft	56,900	SF
	Production Rate (1 crew)	500	SF/DAY
	Duration (Low production - restricted work area)	5.3	MONTHS
	Contingency	25	%
	Final Duration	6.6	MONTHS
	Final Duration	28.5	WEEKS
NA	Rock Bolts		
	Assume Bolts Lengths are:	5.5	LF
	Assume 1 bolt per:	45.0	SF
	Total Length	6954	LF
	Production Rate	200	LF/DAY
	Duration (Low production - restricted work area)	1.6	MONTHS
	Contingency	25	%
	Final Duration	2.0	MONTHS
	Final Duration	8.7	WEEKS
NA	Ladders, Platforms, Cable Installation		
	Total Length	1300	LF
	Production Rate	50	LF/DAY
	Duration	1.2	MONTHS
	Contingency	25	%
	Final Duration	1.5	MONTHS
	Final Duration	6.5	WEEKS

EQUIPMENT/TRUCKING		
OFFSITE TRUCKS	36	TOTAL WEIGHT, TONS
Assume 2lbs/ft of rebar/rockbolts; 12ft of rebar/c.y. of conc;	20	TONS/TRUCK
1lbs of reinforcment/s.y. of shotcrete	2	# OF TRUCKS
CONCRETE TRUCKS	527	TOTAL VOLUME, CY
	8	CY/TRUCK
	66	# OF TRUCKS FOR TASK
	1	TRUCKS/DAY

Assumtions:

Roof and Walls Support is 3" thick shotcrete

Grout for rockbolts is included in shotcrete volume

Roof and Walls Support:

Process: Drill, Install Rock Bolts, Grout Bolts, Shotcrete Surface, Install Equipment.

Equipment: Track Drill, Hoist, Support Truck, Flatbed Truck for rock bolts, Pump.

Crew: 1 Driller, 3 Laborers, 1 Foreman, 1 Truck Driver.

Schedule: Activities are additive.

19 Penstock & Draft Tube Man.

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EQUIPMENT	Quantity
On Site	
Air Compressor	2
Backhoe / Front End Loader, Wheeled	
Backhoe, Tracked	
Chipper, Wood	
Compactor, Sheepsfoot, Self-Propelled	
Compactor, Vibratory, Self-Propelled	
Concrete Pump	
Crane - 40 Ton	
Crane - 70 Ton	
Dozer, D5	
Dozer, D6	
Dozer, D8	1
Dozer, D10	
Drill, Tracked	
Dump Truck, End Dump, 15 Ton	
Dump Truck, Off-Highway, 34 Ton	3
Dump Truck, Semi-Trailer	
Excavator, 325	1
Forklift, Rough Terrain	
Front End Loader, Tracked	
Front End Loader, Wheeled	3
Fuel Truck / Support Truck	1
Generator - Diesel	2
Grout Pump/Plant	
Hydroseed Sprayer, Truck Mounted	
Grader, H14	
Pile Driver	
Pump Truck - Concrete	4
Powder Truck	
Scraper, Self-propelled, 21 CY	
Truck, Flatbed	
Tunnel Rig (TBM)	
Water Pump, Diesel	
Water Truck	1
Welder and Generator Set	
Total Offsite Flatbed/Semi Trucks	9
Daily Concrete Mixer Truck - 8 CY	50
Daily Semi Trailer Truck	40

Crew	Quantity
Blaster	4
Carpenters	
Cement Finisher	
Driller	2
Electricians	
Equipment Operators	5
Grade Setter	
Foreman	3
Labor Foreman	3
Laborers	9
Mechanics	
Painter	
Pile Driver	
Pipe Foreman	
Pipe Layer	
Plumber	
Rigger	
Survey/Rodmen	2
Steel Worker	
Steel Worker Foreman	
Truck Drivers	8
Welder	

Total Crew Size	36
Monthly Labor Cost	$417,400

Duration: 5.2 **Months** 22.5 **Weeks**

CONSTANTS: 10 HR/DAY 216.25 HRS/MONTH

9.0 PENSTOCK MANIFOLD SCHEDULE				
9.1 Manifold Tunnel Excavation (D&B)			7,400	CY
	Production Rate	(2 crews)	800	CY/DAY
	Duration		0.4	MONTHS
	Contingency		25	%
Final Duration			0.5	MONTHS
Final Duration			2.3	WEEKS
9.2 Manifold Tunnel Prelining & Support (3", 75%)			2,400	SY
	Production Rate	(2 crews)	500	SY/DAY
	Duration		0.2	MONTHS
	Contingency		25	%
Final Duration			0.3	MONTHS
Final Duration			1.2	WEEKS
9.3 Concrete Lining			1,800	CY
	Production Rate	(2 crews)	400	CY/DAY
	Duration		0.2	MONTHS
	Contingency		25	%
Final Duration			0.3	MONTHS
Final Duration			1.1	WEEKS
9.4 Concrete Plug			10,700	CY
	Production Rate	(1crew)	200	CY/DAY
	Duration		2.5	MONTHS
	Contingency		25	%
Final Duration			3.1	MONTHS
Final Duration			13.4	WEEKS
EQUIPMENT/TRUCKING				
DUMP TRUCKS			7,400	TOTAL VOLUME, CY
			30	CY/TRUCK
			247	# OF TRUCKS FOR TASK
			27	LOADS/DAY (MAX.)
			1.0	CYCLE TIME (HRS)
			3	REQUIRED # OF TRUCKS
OFFSITE TRUCKS			151	TOTAL WEIGHT, TONS
Assume 2lbs/ft of rebar/rockbolts; 12ft of rebar/c.y. of conc;			20	TONS/TRUCK
1lbs of reinforcment/s.y. of shotcrete			8	# OF TRUCKS
CONCRETE TRUCKS			12700	TOTAL VOLUME, CY
			8	CY/TRUCK
			1,588	# OF TRUCKS FOR TASK
			50	TRUCKS/DAY
CONCRETE PUMP TRUCKS		(15 TRUCKS)-->	120	CY/DAY
			4	# OF TRUCKS
SEMIS			20	CY/TRUCK
			370	# OF TRUCKS FOR TASK
			40	TRUCKS/DAY

11.0 DRAFT TUBE MANIFOLD SCHEDULE				
11.1 Manifold Tunnel Excavation (D&B)			7,400	CY
	Production Rate	(2 crews)	800	CY/DAY
	Duration		0.4	MONTHS
	Contingency		25	%
Final Duration			0.5	MONTHS
Final Duration			2.3	WEEKS
11.2 Manifold Tunnel Prelining & Support (3", 75%)			2,400	SY
	Production Rate	(2 crews)	500	SY/DAY
	Duration		0.2	MONTHS
	Contingency		25	%
Final Duration			0.3	MONTHS
Final Duration			1.2	WEEKS
11.3 Concrete Lining			1,600	CY
	Production Rate	(2 crews)	400	CY/DAY
	Duration		0.2	MONTHS
	Contingency		25	%
Final Duration			0.2	MONTHS
Final Duration			1.0	WEEKS
EQUIPMENT/TRUCKING				
DUMP TRUCKS			7,400	TOTAL VOLUME, CY
			30	CY/TRUCK
			247	# OF TRUCKS FOR TASK
			27	LOADS/DAY (MAX.)
			1.0	CYCLE TIME (HRS)
			3	REQUIRED # OF TRUCKS
OFFSITE TRUCKS			20	TOTAL WEIGHT, TONS
Assume 2lbs/ft of rebar/rockbolts; 12ft of rebar/c.y. of conc;			20	TONS/TRUCK
1lbs of reinforcment/s.y. of shotcrete			1	# OF TRUCKS
CONCRETE TRUCKS			1800	TOTAL VOLUME, CY
			8	CY/TRUCK
			225	# OF TRUCKS FOR TASK
			50	TRUCKS/DAY
CONCRETE PUMP TRUCKS		(15 TRUCKS)-->	120	CY/DAY
			4	# OF TRUCKS
SEMIS			20	CY/TRUCK
			370	# OF TRUCKS FOR TASK
			40	TRUCKS/DAY

Assumptions:
Excavation Then Haul Offsite
Survey Control
(Activities do not overlap, therefore use maximum of activities to find equimpent and crew estimates)

20 Install Steel Tunnel Linings

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		Approved		By	

EQUIPMENT	Quantity
On Site	
Air Compressor	1
Backhoe / Front End Loader, Wheeled	
Backhoe, Tracked	
Chipper, Wood	
Compactor, Sheepsfoot, Self-Propelled	
Compactor, Vibratory, Self-Propelled	
Concrete Pump	
Crane - 40 Ton	
Crane - 70 Ton	
Dozer, D5	
Dozer, D6	
Dozer, D8	
Dozer, D10	
Drill, Tracked	1
Dump Truck, End Dump, 15 Ton	
Dump Truck, Off-Highway, 34 Ton	2
Dump Truck, Semi-Trailer	
Excavator, 325	1
Forklift, Rough Terrain	1
Front End Loader, Tracked	
Front End Loader, Wheeled	2
Fuel Truck / Support Truck	1
Generator - Diesel	1
Grout Pump/Plant	
Hydroseed Sprayer, Truck Mounted	
Grader, H14	
Pile Driver	
Pump Truck - Concrete	2
Powder Truck	
Scraper, Self-propelled, 21 CY	
Truck, Flatbed	
Tunnel Rig (TBM)	
Water Pump, Diesel	
Water Truck	1
Welder and Generator Set	1
Total Offsite Flatbed/Semi Trucks	154
Daily Concrete Mixer Truck - 8 CY	25
Daily Semi Trailer Truck	20

Crew	Quantity
Blaster	2
Carpenters	
Cement Finisher	
Driller	1
Electricians	
Equipment Operators	3
Grade Setter	
Foreman	1
Labor Foreman	
Laborers	4
Mechanics	
Painter	
Pile Driver	
Pipe Foreman	
Pipe Layer	
Plumber	
Rigger	
Survey/Rodmen	2
Steel Worker	2
Steel Worker Foreman	
Truck Drivers	5
Welder	2

Total Crew Size	22
Monthly Labor Cost	$278,800

Duration: **7.9** **Months** **34.3** **Weeks**

CONSTANTS: 10 HR/DAY 216.25 HRS/MONTH

10.0 PENSTOCKS SCHEDULE			
10.1 Penstock Tunnel Excavation - D&B		18,900	CY
Production Rate	(1 crew)	400	CY/DAY
Duration		2.2	MONTHS
Contingency		25	%
Final Duration		2.7	MONTHS
Final Duration		11.8	WEEKS
10.2 Penstock Tunnel Prelining & Support (3", 30%)		3,800	SY
Production Rate	(1 crew)	200	SY/DAY
Duration		0.9	MONTHS
Contingency		25	%
Final Duration		1.1	MONTHS
Final Duration		4.8	WEEKS
10.3 Steel Liner Installation		3,000	TONS
Assumed Unit Weight of Steel Liner		475	LBS/CF
Tunnel Diameter		15	FT
Thickness		1.625	INCHES
Unit Weight		1.5	TONS/FT
Length		2,000	FT
Production Rate		50	LF/DAY
Duration		1.8	MONTHS
Contingency		25	%
Final Duration		2.3	MONTHS
Final Duration		10.0	WEEKS
10.4 Concrete Filling Around Liner		5,200	CY
Production Rate	(2 crews)	400	CY/DAY
Duration		0.6	MONTHS
Contingency		25	%
Final Duration		0.8	MONTHS
Final Duration		3.3	WEEKS
10.5 Contact Grouting		2,000	LF
Diameter		15	FT
Contact Grouting Area Percent		25	%
Grout Volume		5,890	CF
Production Rate	(1 crew)	450	CF/DAY
Duration		0.6	MONTHS
Contingency		25	%
Final Duration		0.8	MONTHS
Final Duration		3.3	WEEKS
10.6 Curtain Grouting			
Assumed Grout Curtain Diameter		30	FT
Grout Curtain Thickness		1	FT
Penstock Diameter		15	FT
Number of Penstocks		4	
Volume of Grout		2,200	CF
Production Rate		450	CF/DAY
Duration		0.23	MONTHS
Contingency		25	%
Final Duration		0.28	MONTHS
Final Duration		1.2	WEEKS
EQUIPMENT/TRUCKING			
DUMP TRUCKS		18,900	TOTAL VOLUME, CY
		30	CY/TRUCK
		630	# OF TRUCKS FOR TASK
		13	LOADS/DAY (MAX.)
		1.0	CYCLE TIME (HRS)
		2	REQUIRED # OF TRUCKS
CONCRETE TRUCKS		5816	TOTAL VOLUME, CY
		8	CY/TRUCK
		727	# OF TRUCKS FOR TASK
		25	TRUCKS/DAY
CONCRETE PUMP TRUCKS	(15 TRUCKS)-->	120	CY/DAY
		2	# OF TRUCKS
OFFSITE TRUCKS		3064	TOTAL WEIGHT, TONS
Assume 2lbs/ft of rebar/rockbolts; 12ft of rebar/c.y. of conc;		20	TONS/TRUCK
1lbs of reinforcment/s.y. of shotcrete		154	# OF TRUCKS
SEMIS		20	CY/TRUCK
		945	# OF TRUCKS FOR TASK
		20	TRUCKS/DAY

Assumptions:

Excavation Then Haul Offsite

Survey Control

Penstock & Draft Tube Manifolds:

Process: Drill, Blast, Excavate, Load, Haul, Dump, Load, Haul offsite; Shotcrete; Steel Lining, Concrete Lining, Contact Grouting, Curtain Grouting.

Equipment: Track Drill, 1 Excavator, 2 FE Loaders, Dump Trucks, Semis, Water Truck, Support Truck.

Crew: 1 Driller, 2 Blasters, 3 Equip Opr., 2 survey, 2 DT Drivers, 1 Foreman, 1 Water Truck Driver, 1 Support Driver.

Steel Lining Crew: 2 Welders, 2 Steel Workers, 1 Equip Opr.

Shotcrete/Concrete/Grouting Crew: 1 Foreman, 4 Laborers, 2 CPT Drivers.

Schedule: Activities are additive.

21 First Stage Concrete

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EQUIPMENT	Quantity
On Site	
Air Compressor	
Backhoe / Front End Loader, Wheeled	
Backhoe, Tracked	
Chipper, Wood	
Compactor, Sheepsfoot, Self-Propelled	
Compactor, Vibratory, Self-Propelled	
Concrete Pump	
Crane - 40 Ton	
Crane - 70 Ton	1
Dozer, D5	
Dozer, D6	
Dozer, D8	
Dozer, D10	
Drill, Tracked	
Dump Truck, End Dump, 15 Ton	
Dump Truck, Off-Highway, 34 Ton	
Dump Truck, Semi-Trailer	
Excavator, 325	
Forklift, Rough Terrain	
Front End Loader, Tracked	
Front End Loader, Wheeled	
Fuel Truck / Support Truck	1
Generator - Diesel	1
Grout Pump/Plant	1
Hydroseed Sprayer, Truck Mounted	
Grader, H14	
Pile Driver	
Pump Truck - Concrete	2
Powder Truck	
Scraper, Self-propelled, 21 CY	
Truck, Flatbed	
Tunnel Rig (TBM)	
Water Pump, Diesel	
Water Truck	1
Welder and Generator Set	
Total Offsite Flatbed/Semi Trucks	8
Daily Concrete Mixer Truck - 8 CY	25
Daily Semi Trailer Truck	

Crew	Quantity	
Blaster		
Carpenters		
Cement Finisher	2	
Driller		
Electricians		
Equipment Operators	1	
Grade Setter		
Foreman	1	
Labor Foreman	1	
Laborers	9	form work
Mechanics		
Painter		
Pile Driver		
Pipe Foreman		
Pipe Layer		
Plumber		
Rigger		
Survey/Rodmen		
Steel Worker	2	rebar
Steel Worker Foreman		
Truck Drivers	3	
Welder		

Total Crew Size	19
Monthly Labor Cost	$225,300

Duration: **5.5** **Months** **23.9** **Weeks**

CONSTANTS: 10 HR/DAY 216.25 HRS/MONTH

FIRST STAGE CONCRETE - MULTIPLE ITEMS SCHEDULE				
13.3-B	Machine Hall (El.-16,El.-12)		2,700	CY
	Production Rate	(1 crew)	200	CY/DAY
	Duration		0.6	MONTHS
	Contingency		25	%
	Final Duration		0.8	MONTHS
	Final Duration		3.4	WEEKS
13.3-C	Machine Hall (El.-12,El.+9)		10,100	CY
	Production Rate	(1 crew)	200	CY/DAY
	Duration		2.3	MONTHS
	Contingency		25	%
	Final Duration		2.9	MONTHS
	Final Duration		12.6	WEEKS
15.2-A	Roof & Wall Support Transformer Hall		44,300	SF
	Production Rate	(1 crew)	2,200	SF/DAY
	Duration		0.9	MONTHS
	Contingency		25	%
	Final Duration		1.2	MONTHS
	Final Duration		5.0	WEEKS
15.2-B	Roof & Wall Support Nishe Excavation		2,500	SF
	Production Rate	(1 crew)	500	SF/DAY
	Duration	(Low production - restricted work area)	0.2	MONTHS
	Contingency		25	%
	Final Duration		0.3	MONTHS
	Final Duration		1.3	WEEKS
15.2-C	Roof & Wall Support Cable Gallery		3,200	SF
	Production Rate	(1 crew)	500	SF/DAY
	Duration	(Low production - restricted work area)	0.30	MONTHS
	Contingency		25	%
	Final Duration		0.37	MONTHS
	Final Duration		1.6	WEEKS
15.2-D	Roof & Wall Support A/C Gallery		100	SF
	Production Rate	(1 crew)	500	SF/DAY
	Duration	(Low production - restricted work area)	0.01	MONTHS
	Contingency		25	%
	Final Duration		0.01	MONTHS
	Final Duration		0.1	WEEKS
EQUIPMENT/TRUCKING				
OFFSITE TRUCKS			156	TOTAL WEIGHT, TONS
Assume 2lbs/ft of rebar/rockbolts; 12ft of rebar/c.y. of conc;			20	TONS/TRUCK
1lbs of reinforcment/s.y. of shotcrete			8	# OF TRUCKS
CONCRETE TRUCKS			13,264	TOTAL VOLUME, CY
			8	CY/TRUCK
			1,658	# OF TRUCKS FOR TASK
			25	TRUCKS/DAY
CONCRETE PUMP TRUCKS		(15 TRUCKS)-->	120	CY/DAY
			2	# OF TRUCKS

Assumptions:

Process: Form, Pump, Finish.
Equipment: Concrete Trucks, Concrete Pump Trucks, 1 Water Truck, 1 Support Truck, Hoist Crane.
Crew: 1 Foreman, 1 Laborer Foreman, 8 Laborers, 2 Cement Finishers, 2 Steel Workers, 1 Water Truck Driver, 1 Support Driver, 2 CPT Drivers, 1 Crane Oper.
Schedule: Activities are additive.

23 Spiral Cases & Draft Tube

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EQUIPMENT	Quantity
On Site	
Air Compressor	
Backhoe / Front End Loader, Wheeled	
Backhoe, Tracked	
Chipper, Wood	
Compactor, Sheepsfoot, Self-Propelled	
Compactor, Vibratory, Self-Propelled	
Concrete Pump	1
Crane - 40 Ton	1
Crane - 70 Ton	
Dozer, D5	
Dozer, D6	
Dozer, D8	
Dozer, D10	
Drill, Tracked	
Dump Truck, End Dump, 15 Ton	
Dump Truck, Off-Highway, 34 Ton	
Dump Truck, Semi-Trailer	
Excavator, 325	
Forklift, Rough Terrain	
Front End Loader, Tracked	
Front End Loader, Wheeled	
Fuel Truck / Support Truck	
Generator - Diesel	1
Grout Pump/Plant	
Hydroseed Sprayer, Truck Mounted	
Grader, H14	
Pile Driver	
Pump Truck - Concrete	
Powder Truck	
Scraper, Self-propelled, 21 CY	
Truck, Flatbed	
Tunnel Rig (TBM)	
Water Pump, Diesel	
Water Truck	
Welder and Generator Set	1
Total Offsite Flatbed/Semi Trucks	11
Daily Concrete Mixer Truck - 8 CY	1
Daily Semi Trailer Truck	

Crew	Quantity
Blaster	
Carpenters	
Cement Finisher	
Driller (3)	
Electricians	
Equipment Operators	1
Grade Setter	
Foreman	1
Labor Foreman	
Laborers	2
Mechanics	
Painter	
Pile Driver	
Pipe Foreman	
Pipe Layer	
Plumber	
Rigger	
Survey/Rodmen	
Steel Worker	2
Steel Worker Foreman	
Truck Drivers	1
Welder	1

Total Crew Size	8
Monthly Labor Cost	$111,400

Duration: **8.2** **Months** **35.3** **Weeks**

CONSTANTS: 10 HR/DAY 216.25 HRS/MONTH

13.4 Spiral Cases & Draft Tube Liners			
SCHEDULE			
13.4-A Draft Tube Steel Liner		220	TONS
Assumed Unit Weight of Steel Liner		475	LBS/CF
Average Draft Tube Diameter		10	FT
Thickness		1.625	INCHES
Unit Weight		1.0	TONS/FT
Length		300	FT
Production Rate	(1 crew)	5	LF/DAY
Duration	(Very low production - very restricted work area)	2.8	MONTHS
Contingency		25	%
Final Duration		3.5	MONTHS
Final Duration		15.0	WEEKS
10.5 Contact Grouting		8,100	CF
Production Rate	(1 crew)	100	CF/DAY
Duration	(Very low production - very restricted work area)	3.7	MONTHS
Contingency		25	%
Final Duration		4.7	MONTHS
Final Duration		20.3	WEEKS
EQUIPMENT/TRUCKING			
CONCRETE TRUCKS		300	TOTAL VOLUME, CY
		8	CY/TRUCK
		38	# OF TRUCKS FOR TASK
		1	TRUCKS/DAY
OFFSITE TRUCKS		220	TOTAL WEIGHT, TONS
		20	TONS/TRUCK
		11	# OF TRUCKS

Assumptions:
Process: Steel Lining, Contact Grouting.
Equipment: Crane, Concrete Pump, Welder.
Steel Lining Crew: 1 Welders, 2 Steel Workers, 1 Equip Opr.
Grouting Crew: 1 Foreman, 2 Laborers, 1 CPT Drivers.
Schedule: Activities are additive.

24 Pump Turbines and Generators

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EQUIPMENT	Quantity
On Site	
Air Compressor	1
Backhoe / Front End Loader, Wheeled	
Backhoe, Tracked	
Chipper, Wood	
Compactor, Sheepsfoot, Self-Propelled	
Compactor, Vibratory, Self-Propelled	
Concrete Pump	
Crane - 40 Ton	
Crane - 70 Ton	1
Dozer, D5	
Dozer, D6	
Dozer, D8	
Dozer, D10	
Drill, Tracked	
Dump Truck, End Dump, 15 Ton	
Dump Truck, Off-Highway, 34 Ton	
Dump Truck, Semi-Trailer	
Excavator, 325	
Forklift, Rough Terrain	
Front End Loader, Tracked	
Front End Loader, Wheeled	
Fuel Truck / Support Truck	1
Generator - Diesel	1
Grout Pump/Plant	
Hydroseed Sprayer, Truck Mounted	
Grader, H14	
Pile Driver	
Pump Truck - Concrete	
Powder Truck	
Scraper, Self-propelled, 21 CY	
Truck, Flatbed	
Tunnel Rig (TBM)	
Water Pump, Diesel	
Water Truck	
Welder and Generator Set	1
Total Offsite Flatbed/Semi Trucks	8
Daily Concrete Mixer Truck - 8 CY	
Daily Semi Trailer Truck	

Crew	Quantity
Blaster	
Carpenters	
Cement Finisher	
Driller	
Electricians	2
Equipment Operators	1
Grade Setter	
Foreman	1
Labor Foreman	
Laborers	3
Mechanics	
Painter	
Pile Driver	
Pipe Foreman	
Pipe Layer	
Plumber	
Rigger	
Survey/Rodmen	
Steel Worker	
Steel Worker Foreman	
Truck Drivers	
Welder	1

Total Crew Size	8
Monthly Labor Cost	$107,200

Duration: **11.1** **Months** **48.0** **Weeks**

CONSTANTS: 10 HR/DAY 216.25 HRS/MONTH

14.0 TURBINES & GENERATORS SCHEDULE		
14.1 & .2 Install Water to Wire Package	4	EA
Production Rate	50	DAYS/EA
Duration	9.2	MONTHS
Contingency	20	%
Final Duration	11.1	MONTHS
Final Duration	48.0	WEEKS
EQUIPMENT/TRUCKING		
OFF SITE FLATBED SEMIS	0.5	UNITS/TRUCK
	8	# OF TRUCKS FOR TASK
	1	TRUCKS/DAY

Assumptions:

Equipment: Crane, Welder, Air Compressor (tools), Support Truck, Generator, Semis.
Installation Crew: 1 Welder, 2 Electricians, 1 Equip Opr., 1 Foreman, 2 Laborers, 1 Support Truck Driver.

25 Embed Spiral Case&Draft Tube

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EQUIPMENT	Quantity
On Site	
Air Compressor	
Backhoe / Front End Loader, Wheeled	
Backhoe, Tracked	
Chipper, Wood	
Compactor, Sheepsfoot, Self-Propelled	
Compactor, Vibratory, Self-Propelled	
Concrete Pump	
Crane - 40 Ton	
Crane - 70 Ton	
Dozer, D5	
Dozer, D6	
Dozer, D8	
Dozer, D10	
Drill, Tracked	
Dump Truck, End Dump, 15 Ton	
Dump Truck, Off-Highway, 34 Ton	
Dump Truck, Semi-Trailer	
Excavator, 325	
Forklift, Rough Terrain	
Front End Loader, Tracked	
Front End Loader, Wheeled	
Fuel Truck / Support Truck	1
Generator - Diesel	
Grout Pump/Plant	
Hydroseed Sprayer, Truck Mounted	
Grader, H14	
Pile Driver	
Pump Truck - Concrete	1
Powder Truck	
Scraper, Self-propelled, 21 CY	
Truck, Flatbed	
Tunnel Rig (TBM)	
Water Pump, Diesel	
Water Truck	1
Welder and Generator Set	
Total Offsite Flatbed/Semi Trucks	3
Daily Concrete Mixer Truck - 8 CY	4
Daily Semi Trailer Truck	

Crew	Quantity
Blaster	
Carpenters	
Cement Finisher	1
Driller	
Electricians	
Equipment Operators	
Grade Setter	
Foreman	1
Labor Foreman	
Laborers	3
Mechanics	
Painter	
Pile Driver	
Pipe Foreman	
Pipe Layer	
Plumber	
Rigger	
Survey/Rodmen	
Steel Worker	
Steel Worker Foreman	
Truck Drivers	2
Welder	

Total Crew Size	7
Monthly Labor Cost	$79,600

Duration: **8.7** **Months** **37.5** **Weeks**

CONSTANTS: 10 HR/DAY 216.25 HRS/MONTH

13.0 MACHINE HALL SCHEDULE			
13.3-A Concrete Draft Tubes (El. -41,El. -16)		4,500	CY
Production Rate	(1 crew)	30	CY/DAY
Duration	(Very low production - very restricted work area)	6.9	MONTHS
Contingency		25	%
Final Duration		8.7	MONTHS
Final Duration		37.5	WEEKS
EQUIPMENT/TRUCKING			
OFFSITE TRUCKS		54	TOTAL WEIGHT, TONS
Assume 2lbs/ft of rebar/rockbolts; 12ft of rebar/c.y. of conc;		20	TONS/TRUCK
1lbs of reinforcment/s.y. of shotcrete		3	# OF TRUCKS
CONCRETE TRUCKS		4,500	TOTAL VOLUME, CY
		8	CY/TRUCK
		563	# OF TRUCKS FOR TASK
		4	TRUCKS/DAY
CONCRETE PUMP TRUCKS	(15 TRUCKS)-->	120	CY/DAY
		1	# OF TRUCKS

Assumptions:

Process: Form, Pump, Finish.
Equipment: Concrete Trucks, Concrete Pump Truck, 1 Water Truck, 1 Support Truck.
Crew: 1 Foreman, 2 Laborers, 1 Cement Finisher, 1 Water Truck Driver, 1 Support Driver, 1 CPT Driver.

26 Install Mech. Equip.

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EQUIPMENT	Quantity
On Site	
Air Compressor	1
Backhoe / Front End Loader, Wheeled	
Backhoe, Tracked	
Chipper, Wood	
Compactor, Sheepsfoot, Self-Propelled	
Compactor, Vibratory, Self-Propelled	
Concrete Pump	
Crane - 40 Ton	
Crane - 70 Ton	1
Dozer, D5	
Dozer, D6	
Dozer, D8	
Dozer, D10	
Drill, Tracked	
Dump Truck, End Dump, 15 Ton	
Dump Truck, Off-Highway, 34 Ton	
Dump Truck, Semi-Trailer	
Excavator, 325	
Forklift, Rough Terrain	
Front End Loader, Tracked	
Front End Loader, Wheeled	
Fuel Truck / Support Truck	1
Generator - Diesel	1
Grout Pump/Plant	
Hydroseed Sprayer, Truck Mounted	
Grader, H14	
Pile Driver	
Pump Truck - Concrete	
Powder Truck	
Scraper, Self-propelled, 21 CY	
Truck, Flatbed	
Tunnel Rig (TBM)	
Water Pump, Diesel	
Water Truck	
Welder and Generator Set	2
Total Offsite Flatbed/Semi Trucks	5
Daily Concrete Mixer Truck - 8 CY	
Daily Semi Trailer Truck	

Crew	Quantity
Blaster	
Carpenters	
Cement Finisher	
Driller	
Electricians	
Equipment Operators	1
Grade Setter	
Foreman	1
Labor Foreman	
Laborers	3
Mechanics	
Painter	
Pile Driver	
Pipe Foreman	
Pipe Layer	
Plumber	
Rigger	
Survey/Rodmen	
Steel Worker	2
Steel Worker Foreman	
Truck Drivers	
Welder	2

Total Crew Size	9
Monthly Labor Cost	$128,600

Duration: **6.0** **Months** **26.0** **Weeks**

CONSTANTS: 10 HR/DAY 216.25 HRS/MONTH

INSTALL MECHANICAL EQUIPMENT SCHEDULE		
13.8 96" Dia. Spherical Valve	4	EA
Production Rate	20	DAYS/EA
Duration	3.7	MONTHS
Contingency	25	%
Final Duration	4.6	MONTHS
Final Duration	20.0	WEEKS
NA 350 Ton Bridge Crane	1.0	EA
Production Rate	24	DAYS/EA
Duration	1.1	MONTHS
Contingency	25	%
Final Duration	1.4	MONTHS
Final Duration	6.0	WEEKS
EQUIPMENT/TRUCKING		
OFFSITE FLATBED SEMIS	1.0	UNITS/TRUCK
	5	# OF TRUCKS FOR TASK
	1	TRUCKS/DAY

Assumptions:

Equipment: Crane, Welder, Air Compressor (tools), Support Truck, Generator, Semis.

Installation Crew: 2 Welders, 2 Steel Workers, 1 Equip Opr., 1 Foreman, 2 Laborers, 1 Support Truck Driver.
Schedule: Activities are additive.

27 Install Elec. Equip.

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EQUIPMENT	Quantity
On Site	
Air Compressor	1
Backhoe / Front End Loader, Wheeled	
Backhoe, Tracked	
Chipper, Wood	
Compactor, Sheepsfoot, Self-Propelled	
Compactor, Vibratory, Self-Propelled	
Concrete Pump	
Crane - 40 Ton	
Crane - 70 Ton	
Dozer, D5	
Dozer, D6	
Dozer, D8	
Dozer, D10	
Drill, Tracked	
Dump Truck, End Dump, 15 Ton	
Dump Truck, Off-Highway, 34 Ton	
Dump Truck, Semi-Trailer	
Excavator, 325	
Forklift, Rough Terrain	1
Front End Loader, Tracked	
Front End Loader, Wheeled	
Fuel Truck / Support Truck	1
Generator - Diesel	1
Grout Pump/Plant	
Hydroseed Sprayer, Truck Mounted	
Grader, H14	
Pile Driver	
Pump Truck - Concrete	
Powder Truck	
Scraper, Self-propelled, 21 CY	
Truck, Flatbed	
Tunnel Rig (TBM)	
Water Pump, Diesel	
Water Truck	
Welder and Generator Set	1
Total Offsite Flatbed/Semi Trucks	4
Daily Concrete Mixer Truck - 8 CY	
Daily Semi Trailer Truck	

Crew	Quantity
Blaster	
Carpenters	
Cement Finisher	
Driller	
Electricians	2
Equipment Operators	1
Grade Setter	
Foreman	1
Labor Foreman	
Laborers	3
Mechanics	
Painter	
Pile Driver	
Pipe Foreman	
Pipe Layer	
Plumber	
Rigger	
Survey/Rodmen	
Steel Worker	
Steel Worker Foreman	
Truck Drivers	
Welder	1

Total Crew Size	8
Monthly Labor Cost	$107,200

Duration: **6.0** **Months** **26.0** **Weeks**

CONSTANTS: 10 HR/DAY 216.25 HRS/MONTH

INSTALL ELECTRICAL EQUIPMENT SCHEDULE			
NA	Install Electrical Equipment (1300 MW)	1,300	MW
	Production Rate	60	MW/WEEK
	Duration	5.0	MONTHS
	Contingency	20	%
	Final Duration	6.0	MONTHS
	Final Duration	26.0	WEEKS

Assumptions:

Equipment: Forklift, Welder, Air Compressor (tools), Support Truck, Generator.
Installation Crew: 1 Welder, 2 Electricians, 1 Equip Opr., 1 Foreman, 2 Laborers, 1 Support Truck Driver.

28 Complete Concrete Work

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EQUIPMENT	Quantity
On Site	
Air Compressor	
Backhoe / Front End Loader, Wheeled	
Backhoe, Tracked	
Chipper, Wood	
Compactor, Sheepsfoot, Self-Propelled	
Compactor, Vibratory, Self-Propelled	
Concrete Pump	
Crane - 40 Ton	1
Crane - 70 Ton	
Dozer, D5	
Dozer, D6	
Dozer, D8	
Dozer, D10	
Drill, Tracked	
Dump Truck, End Dump, 15 Ton	
Dump Truck, Off-Highway, 34 Ton	
Dump Truck, Semi-Trailer	
Excavator, 325	
Forklift, Rough Terrain	
Front End Loader, Tracked	
Front End Loader, Wheeled	
Fuel Truck / Support Truck	1
Generator - Diesel	1
Grout Pump/Plant	
Hydroseed Sprayer, Truck Mounted	
Grader, H14	
Pile Driver	
Pump Truck - Concrete	1
Powder Truck	
Scraper, Self-propelled, 21 CY	
Truck, Flatbed	
Tunnel Rig (TBM)	
Water Pump, Diesel	
Water Truck	1
Welder and Generator Set	
Total Offsite Flatbed/Semi Trucks	10
Daily Concrete Mixer Truck - 8 CY	13
Daily Semi Trailer Truck	

Crew	Quantity	
Blaster		
Carpenters		
Cement Finisher	2	
Driller		
Electricians		
Equipment Operators	1	
Grade Setter		
Foreman	1	
Labor Foreman		
Laborers	5	
Mechanics		
Painter		
Pile Driver		
Pipe Foreman		
Pipe Layer		
Plumber		
Rigger		
Survey/Rodmen	2	
Steel Worker	2	rebar
Steel Worker Foreman		
Truck Drivers	2	
Welder		

Total Crew Size	15
Monthly Labor Cost	$187,200

Duration: **9.3** **Months** **40.3** **Weeks**

CONSTANTS: 10 HR/DAY 216.25 HRS/MONTH

COMPLETE CONCRETE WORK (2ND STAGE) - MULTIPLE ITEMS SCHEDULE				
13.3-D	Machine Hall (El.9,El.19)		1,100	CY
	Production Rate	(1 crew)	100	CY/DAY
	Duration	(Half Production - Detailed Finishing)	0.5	MONTHS
	Contingency		25	%
	Final Duration		0.6	MONTHS
	Final Duration		2.8	WEEKS
13.3-E	Machine Hall (El.19,El.21)		1,900	CY
	Production Rate	(1 crew)	100	CY/DAY
	Duration	(Half Production - Detailed Finishing)	0.9	MONTHS
	Contingency		25	%
	Final Duration		1.1	MONTHS
	Final Duration		4.8	WEEKS
13.3-F	Machine Hall Slab (El.38)		1,000	CY
	Production Rate	(1 crew)	100	CY/DAY
	Duration	(Half Production - Detailed Finishing)	0.5	MONTHS
	Contingency		25	%
	Final Duration		0.6	MONTHS
	Final Duration		2.5	WEEKS
13.3-G	Machine Hall Walls (El.9,El.18)		500	CY
	Production Rate	(1 crew)	100	CY/DAY
	Duration	(Half Production - Detailed Finishing)	0.2	MONTHS
	Contingency		25	%
	Final Duration		0.3	MONTHS
	Final Duration		1.3	WEEKS
13.3-H	Machine Hall Walls (El.18,El.85)		5,100	CY
	Production Rate	(1 crew)	100	CY/DAY
	Duration	(Half Production - Detailed Finishing)	2.4	MONTHS
	Contingency		25	%
	Final Duration		2.9	MONTHS
	Final Duration		12.8	WEEKS
13.3-I	Machine Hall Roof		2,600	CY
	Production Rate	(1 crew)	100	CY/DAY
	Duration	(Half Production - Detailed Finishing)	1.2	MONTHS
	Contingency		25	%
	Final Duration		1.5	MONTHS
	Final Duration		6.5	WEEKS
15.3	Transformer Hall Concrete Works		3,900	CY
	Production Rate	(1 crew)	100	CY/DAY
	Duration	(Half Production - Detailed Finishing)	1.8	MONTHS
	Contingency		25	%
	Final Duration		2.3	MONTHS
	Final Duration		9.8	WEEKS
EQUIPMENT/TRUCKING				
OFFSITE TRUCKS			193	TOTAL WEIGHT, TONS
Assume 2lbs/ft of rebar/rockbolts; 12ft of rebar/c.y. of conc;			20	TONS/TRUCK
1lbs of reinforcment/s.y. of shotcrete			10	# OF TRUCKS
CONCRETE TRUCKS			16,100	TOTAL VOLUME, CY
			8	CY/TRUCK
			2,013	# OF TRUCKS FOR TASK
			13	TRUCKS/DAY
CONCRETE PUMP TRUCKS		(15 TRUCKS)-->	120	CY/DAY
			1	# OF TRUCKS

Assumptions:

Process: Form, Pump, Finish.

Equipment: Concrete Trucks, Concrete Pump Truck, 1 Water Truck, 1 Support Truck, Hoist Crane.

Crew: 1 Foreman, 4 Laborers, 2 Cement Finishers, 2 Steel Workers, 1 Water Truck Driver, 1 Support Driver, 1 CPT Driver, 1 Crane Oper., 2 Survey

Schedule: Activities are additive.

29 Struc. & Archit. Construct.

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Subject:	Eagle Mountain Construction Schedule and Equipment	Date	1/21/2009	By	NDM
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EQUIPMENT	Quantity
On Site	
Air Compressor	1
Backhoe / Front End Loader, Wheeled	
Backhoe, Tracked	
Chipper, Wood	
Compactor, Sheepsfoot, Self-Propelled	
Compactor, Vibratory, Self-Propelled	
Concrete Pump	
Crane - 40 Ton	1
Crane - 70 Ton	1
Dozer, D5	
Dozer, D6	
Dozer, D8	
Dozer, D10	
Drill, Tracked	1
Dump Truck, End Dump, 15 Ton	
Dump Truck, Off-Highway, 34 Ton	1
Dump Truck, Semi-Trailer	
Excavator, 325	1
Forklift, Rough Terrain	2
Front End Loader, Tracked	
Front End Loader, Wheeled	2
Fuel Truck / Support Truck	2
Generator - Diesel	2
Grout Pump/Plant	1
Hydroseed Sprayer, Truck Mounted	
Grader, H14	
Pile Driver	
Pump Truck - Concrete	
Powder Truck	
Scraper, Self-propelled, 21 CY	
Truck, Flatbed	
Tunnel Rig (TBM)	
Water Pump, Diesel	1
Water Truck	
Welder and Generator Set	1
Total Offsite Flatbed/Semi Trucks	43
Daily Concrete Mixer Truck - 8 CY	3
Daily Semi Trailer Truck	18

Crew	Quantity
Blaster	2
Carpenters	4
Cement Finisher	
Driller	1
Electricians	
Equipment Operators	4
Grade Setter	
Foreman	2
Labor Foreman	
Laborers	5
Mechanics	1
Painter	2
Pile Driver	
Pipe Foreman	
Pipe Layer	
Plumber	2
Rigger	
Survey/Rodmen	2
Steel Worker	2
Steel Worker Foreman	
Truck Drivers	2
Welder	1

Total Crew Size	30
Monthly Labor Cost	$390,100

Duration: **13.1** **Months** **64.5** **Weeks**

CONSTANTS: 10 HR/DAY 216.25 HRS/MONTH

STRUCTURAL & ARCHITECTURAL CONSTRUCTION SCHEDULE			
NA	Structural & Architectural Construction		
	Machine Hall Volume	144,000	CY
	Transformer Hall Volume	27,300	CY
	Total Struc. & Arch. Const. Volume	171,300	CY
	Production Rate	1,000	CY/DAY
	Duration	7.9	MONTHS
	Contingency	25	%
	Final Duration	9.9	MONTHS
	Final Duration	42.8	WEEKS
13.5	Elevator Shaft Construction	1,250	LF
	Production Rate	50	LF/DAY
	Duration	1.2	MONTHS
	Contingency	25	%
	Final Duration	1.4	MONTHS
	Final Duration	6.3	WEEKS
13.6	Miscellaneous Metal Works - Machine Hall		
	Assumed Steel Weight	250	TONS
	Production Rate	20	TONS/DAY
	Duration	0.6	MONTHS
	Contingency	25	%
	Final Duration	0.7	MONTHS
	Final Duration	3.1	WEEKS
NA	Drainage Gallery Excavation - D&B	6,200	CY
	D&B Production Rate	200	CY/DAY
	Duration	1.4	MONTHS
	Contingency	25	%
	Final Duration	1.8	MONTHS
	Final Duration	7.8	WEEKS
13.7	Drainage Gallery S&A Construction Volume	6,200	CY
	Production Rate	1,000	CY/DAY
	Duration	0.3	MONTHS
	Contingency	25	%
	Final Duration	0.4	MONTHS
	Final Duration	1.6	WEEKS
13.6	Miscellaneous Steel - Transformer Hall		
	Assumed Steel Weight	240	TONS
	Production Rate	20	TONS/DAY
	Duration	0.6	MONTHS
	Contingency	25	%
	Final Duration	0.7	MONTHS
	Final Duration	3.0	WEEKS
EQUIPMENT/TRUCKING			
DUMP TRUCKS		6,200	TOTAL VOLUME, CY
		30	CY/TRUCK
		207	# OF TRUCKS FOR TASK
		7	LOADS/DAY (MAX.)
		1.0	CYCLE TIME (HRS)
		1	REQUIRED # OF TRUCKS
CONCRETE TRUCKS (Elevator Construction)		463	TOTAL VOLUME, CY
		8	CY/TRUCK
		58	# OF TRUCKS FOR TASK
		3	TRUCKS/DAY
OFFSITE FLATBED SEMIS (MISC. METAL)		490	TOTAL WEIGHT, TONS
		20	TONS/TRUCK
		25	# OF TRUCKS FOR TASK
		7	TRUCKS/DAY
OFFSITE FLATBED SEMIS (STRUCT. & ARCH. WORK)		355	TOTAL WEIGHT, TONS
(assume 1 ton of materials per 500 CY of Volume)		20	TONS/TRUCK
		18	# OF TRUCKS FOR TASK
		1	TRUCKS/DAY
SEMIS - DUMP		20	CY/TRUCK
		310	# OF TRUCKS FOR TASK
		10	TRUCKS/DAY

Assumptions:

Structural & Architectural work consists of interior walls (i.e. wood, alum., drywall, offices, restrooms, etc.)
Excavation Then Haul Offsite
Survey Control

Structural, Architectural, & Misc. Metal Work:

Equipment: Crane Hoist, Air Compressor, Generator, Flatbed Semis, Fork Lifts, Support Truck.
Crew: 1 Equip. Oper., 2 Foremans, 4 Carpenters, 4 Laborers, 2 Painters, 2 Plumbers, 1 Welder, 2 Steel Workers.

Elevator & Drainage Gallery Construction:

Process: Drill, Blast, Excavate, Crane Hoist, Load, Haul, Dump, Load, Haul offsite; Shotcrete.
Equipment: Track Drill, Excavator, Crane, FE Loader, Dump Truck, FE Loader, Semis; Grout Pump, Support Truck, Water Pump.
Crew: 1 Driller, 2 Blasters, 4 Equip Opr., 2 survey, 1 DT Driver; Shotecrete/Concrete: 2 Laborers, 1 Forman, 1 Support Driver.
Schedule: Activities are additive.

31 Elec. and Mech. Mobe

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EQUIPMENT	Quantity
On Site	
Air Compressor	
Backhoe / Front End Loader, Wheeled	1
Backhoe, Tracked	
Chipper, Wood	
Compactor, Sheepsfoot, Self-Propelled	
Compactor, Vibratory, Self-Propelled	
Concrete Pump	
Crane - 40 Ton	
Crane - 70 Ton	
Dozer, D5	
Dozer, D6	1
Dozer, D8	
Dozer, D10	
Drill, Tracked	
Dump Truck, End Dump, 15 Ton	
Dump Truck, Off-Highway, 34 Ton	
Dump Truck, Semi-Trailer	
Excavator, 325	
Forklift, Rough Terrain	1
Front End Loader, Tracked	
Front End Loader, Wheeled	
Fuel Truck / Support Truck	1
Generator - Diesel	1
Grout Pump/Plant	
Hydroseed Sprayer, Truck Mounted	
Grader, H14	1
Pile Driver	
Pump Truck - Concrete	
Powder Truck	
Scraper, Self-propelled, 21 CY	
Truck, Flatbed	1
Tunnel Rig (TBM)	
Water Pump, Diesel	1
Water Truck	
Welder and Generator Set	
Total Offsite Flatbed/Semi Trucks	1
Daily Concrete Mixer Truck - 8 CY	
Daily Semi Trailer Truck	

Crew	Quantity
Blaster	
Carpenters	2
Cement Finisher	
Driller	
Electricians	2
Equipment Operators	5
Grade Setter	
Foreman	1
Labor Foreman	
Laborers	3
Mechanics	1
Painter	
Pile Driver	
Pipe Foreman	
Pipe Layer	
Plumber	
Rigger	
Survey/Rodmen	
Steel Worker	
Steel Worker Foreman	
Truck Drivers	1
Welder	

Total Crew Size	15
Monthly Labor Cost	$195,100

Duration: **3.1** Months **13.4** Weeks

NOTES:

Mobilization to include installing field offices, preparing staging area, minor road grading, temporary utility connections, security fencing, bringing equipment to site, prepartion of equipment, and lighting

33 Complete Elec. Const.

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EQUIPMENT	Quantity
On Site	
Air Compressor	1
Backhoe / Front End Loader, Wheeled	
Backhoe, Tracked	
Chipper, Wood	
Compactor, Sheepsfoot, Self-Propelled	
Compactor, Vibratory, Self-Propelled	
Concrete Pump	
Crane - 40 Ton	
Crane - 70 Ton	
Dozer, D5	
Dozer, D6	
Dozer, D8	
Dozer, D10	
Drill, Tracked	
Dump Truck, End Dump, 15 Ton	
Dump Truck, Off-Highway, 34 Ton	
Dump Truck, Semi-Trailer	
Excavator, 325	
Forklift, Rough Terrain	1
Front End Loader, Tracked	
Front End Loader, Wheeled	
Fuel Truck / Support Truck	1
Generator - Diesel	2
Grout Pump/Plant	
Hydroseed Sprayer, Truck Mounted	
Grader, H14	
Pile Driver	
Pump Truck - Concrete	
Powder Truck	
Scraper, Self-propelled, 21 CY	
Truck, Flatbed	2
Tunnel Rig (TBM)	
Water Pump, Diesel	
Water Truck	
Welder and Generator Set	
Total Offsite Flatbed/Semi Trucks	5
Daily Concrete Mixer Truck - 8 CY	
Daily Semi Trailer Truck	

Crew	Quantity
Blaster	
Carpenters	
Cement Finisher	
Driller	
Electricians	4
Equipment Operators	1
Grade Setter	
Foreman	1
Labor Foreman	
Laborers	2
Mechanics	
Painter	
Pile Driver	
Pipe Foreman	
Pipe Layer	
Plumber	
Rigger	
Survey/Rodmen	
Steel Worker	
Steel Worker Foreman	
Truck Drivers	
Welder	

Total Crew Size	8
Monthly Labor Cost	$109,600

Duration: **13.4** **Months** **57.9** **Weeks**

CONSTANTS: 10 HR/DAY 216.25 HRS/MONTH

COMPLETE ELECTRICAL CONSTRUCTION SCHEDULE			
NA	Complete Electrical Construction		
	Machine Hall Volume	144,000	CY
	Transformer Hall Volume	27,300	CY
	Total Electircal Const. Volume	171,300	CY
	Production Rate	800	CY/DAY
	Duration	9.9	MONTHS
	Contingency	25	%
	Final Duration	12.4	MONTHS
	Final Duration	53.5	WEEKS
13.5	Cable Shaft Electrical Construction	1,300	LF
	Production Rate	75	LF/DAY
	Duration	0.8	MONTHS
	Contingency	25	%
	Final Duration	1.0	MONTHS
	Final Duration	4.3	WEEKS

Assumptions:

Completing electrical work consists of wiring lighting, power outlets, controls systems, IT requirments, etc.
Equipment: Fork Lift, Air Compressor, Generator, Flatbed Trucks, Semis, Support Truck.
Crew: 1 Equip. Oper., 4 Electricians, 1 Foreman, 2 Laborers.

Schedule: Activities are additive.

34 Exc. Approach Channel Upper

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EQUIPMENT	Quantity	
On Site		
Air Compressor	1	
Backhoe / Front End Loader, Wheeled		
Backhoe, Tracked		
Chipper, Wood		
Compactor, Sheepsfoot, Self-Propelled		
Compactor, Vibratory, Self-Propelled		
Concrete Pump		
Crane - 40 Ton		
Crane - 70 Ton		
Dozer, D5		
Dozer, D6		
Dozer, D8	2	
Dozer, D10		
Drill, Tracked	2	
Dump Truck, End Dump, 15 Ton		
Dump Truck, Off-Highway, 34 Ton	6	
Dump Truck, Semi-Trailer		
Excavator, 325	1	
Forklift, Rough Terrain		
Front End Loader, Tracked		
Front End Loader, Wheeled	2	
Fuel Truck / Support Truck	1	
Generator - Diesel		
Grout Pump/Plant		
Hydroseed Sprayer, Truck Mounted		
Grader, H14		
Pile Driver		
Pump Truck - Concrete		
Powder Truck		
Scraper, Self-propelled, 21 CY		
Truck, Flatbed		
Tunnel Rig (TBM)		
Water Pump, Diesel		
Water Truck	1	dust control
Welder and Generator Set		
Total Offsite Flatbed/Semi Trucks		
Daily Concrete Mixer Truck - 8 CY		
Daily Semi Trailer Truck	40	

Crew	Quantity
Blaster	4
Carpenters	
Cement Finisher	
Driller	2
Electricians	
Equipment Operators	5
Grade Setter	
Foreman	1
Labor Foreman	
Laborers	2
Mechanics	
Painter	
Pile Driver	
Pipe Foreman	
Pipe Layer	
Plumber	
Rigger	
Survey/Rodmen	2
Steel Worker	
Steel Worker Foreman	
Truck Drivers	7
Welder	

Total Crew Size	23
Monthly Labor Cost	$270,000

Duration: **9.7** Months **41.8** Weeks

CONSTANTS: 10 HR/DAY 216.25 HRS/MONTH

UPPER RESERVOIR INTAKE APPROACH CHANNEL EXCAVATION SCHEDULE			
NA	Excavate Approach Channel	376,250	CY
	Excavator Hourly Production Rate	225	CY/HR
	Assume: cycle time = 40 sec, 3.0 cy bucket, 83% eff.		
	# of Excavators	1	
	Production Rate	2,250	CY/DAY
	Duration	7.7	MONTHS
	Contingency	25	%
	Final Duration	9.7	MONTHS
	Final Duration	41.8	WEEKS
NA	Approach Channel Rock Excavation (D&B) (20%)	75,250	CY
	Production Rate (2 crew)	800	CY/DAY
	Duration	4.3	MONTHS
	Contingency	25	%
	Final Duration	5.4	MONTHS
	Final Duration	23.5	WEEKS

EQUIPMENT/TRUCKING		
DUMP TRUCKS	376,250	TOTAL VOLUME, CY
	30	CY/TRUCK
	12,542	# OF TRUCKS FOR TASK
	75	LOADS/DAY (MAX.)
	0.75	CYCLE TIME (HRS)
	6	REQUIRED # OF TRUCKS
SEMIS	20	CY/TRUCK
	3,763	# OF TRUCKS FOR TASK
	40	TRUCKS/DAY

Assumptions:

Standard Excavation Haul & Dump Onsite

Rock Excavation Haul Offsite

Survey Control

Drilling and blast rock sections (~20%) while excavator works concurrently, therefore use maximum.

Upper Reservoir Approach Channel Excavation:

Process: Excavate, Load, Haul, Dump; Drill, Blast, Excavate, Load, Haul offsite.

Equipment: Track Drills, 1 Excavator, 2 Dozers, 2 FE Loaders, Dump Trucks, Semis, Water Truck, Support Truck.

Crew: 2 Drillers, 4 Blasters, 5 Equip Opr., 1 Laborer, 2 survey, 6 DT Drivers, 1 Foreman, 1 Water Truck Driver, 1 Support Driver.

Schedule: Activities are additive.

35 Construct Upper Res Dams

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EQUIPMENT	Quantity	
On Site		
Air Compressor	2	Tools
Backhoe / Front End Loader, Wheeled		
Backhoe, Tracked		
Chipper, Wood		
Compactor, Sheepsfoot, Self-Propelled		
Compactor, Vibratory, Self-Propelled	4	
Concrete Pump		
Crane - 40 Ton		
Crane - 70 Ton		
Dozer, D5	4	
Dozer, D6		
Dozer, D8		
Dozer, D10		
Drill, Tracked		
Dump Truck, End Dump, 15 Ton	5	
Dump Truck, Off-Highway, 34 Ton	4	
Dump Truck, Semi-Trailer		
Excavator, 325		
Forklift, Rough Terrain		
Front End Loader, Tracked		
Front End Loader, Wheeled	2	
Fuel Truck / Support Truck	2	
Generator - Diesel		
Grout Pump/Plant		
Hydroseed Sprayer, Truck Mounted		
Grader, H14	2	
Pile Driver		
Pump Truck - Concrete		
Powder Truck		
Scraper, Self-propelled, 21 CY		
Truck, Flatbed		
Tunnel Rig (TBM)		
Water Pump, Diesel		
Water Truck	2	
Welder and Generator Set		
Total Offsite Flatbed/Semi Trucks		
Daily Concrete Mixer Truck - 8 CY		
Daily Semi Trailer Truck		

Crew	Quantity	
Blaster		
Carpenters	4	form work
Cement Finisher		
Driller		
Electricians		
Equipment Operators	12	
Grade Setter		
Foreman	2	
Labor Foreman		
Laborers	6	
Mechanics	1	
Painter		
Pile Driver		
Pipe Foreman		
Pipe Layer		
Plumber		
Rigger		
Survey/Rodmen	2	
Steel Worker		
Steel Worker Foreman		
Truck Drivers	11	
Welder		

Total Crew Size	38
Monthly Labor Cost	$464,700

Duration: **8.4** Months **36.4** Weeks

CONSTANTS: 10 HR/DAY 216.25 HRS/MONTH

4.0 UPPER RESERVOIR SADDLE DAMS SCHEDULE		
4.1 South Saddle Dam	218,400	CY
Production Rate	1,500	CY/DAY
Duration	6.7	MONTHS
Contingency	25	%
Final Duration	8.4	MONTHS
Final Duration	36.4	WEEKS
4.2 West Saddle Dam	72,100	CY
Production Rate	1,500	CY/DAY
Duration	2.2	MONTHS
Contingency	25	%
Final Duration	2.8	MONTHS
Final Duration	12.0	WEEKS
EQUIPMENT/TRUCKING		
DUMP TRUCKS (for aggregate material, 90%)	261,450	TOTAL VOLUME, CY
(End Dump 15 Ton)	15	CY/TRUCK
	17,430	# OF TRUCKS FOR TASK
	100	LOADS/DAY (MAX.)
(From processed material stockpile onsite, to batch plant)	0.50	CYCLE TIME (HRS)
	5	REQUIRED # OF TRUCKS
CONCRETE TRUCKS (assume 10% of material)	29,050	TOTAL VOLUME, CY
	8	CY/TRUCK
	3,631	# OF TRUCKS FOR TASK
	38	TRUCKS/DAY
DUMP TRUCKS RCC MATERIAL	290,500	TOTAL VOLUME, CY
(End Dump 34 Ton)	30	CY/TRUCK
	9,683	# OF TRUCKS FOR TASK
	100	LOADS/DAY (MAX.)
(From batch plant to dam site)	0.33	CYCLE TIME (HRS)
	4	REQUIRED # OF TRUCKS

Assumptions:

South and West dams will be constructed concurrently, therefore, equipment and labor is additive for this task.
Survey Control

Upper Reservoir Dams:

Process: Haul Materials, Mix Batch, Haul to Dam Site, Place, Spread, Vibrotory Compaction.
Equipment: Dump Trucks (15,34 ton), 2 FE Loaders, 4 Dozers, 2 Graders, 4 Compactors, Water Trucks, Support Trucks.
Crew: 12 Equip Opr., 4 Laborers, 4 Carpenters, 2 survey, 9 DT Drivers, 2 Foreman, 2 Water Truck Driver, 2 Support Driver, 1 Mechanics.
Schedule: Activities are additive.

36 Move Unstable Soil LR

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EQUIPMENT	Quantity
On Site	
Air Compressor	
Backhoe / Front End Loader, Wheeled	
Backhoe, Tracked	
Chipper, Wood	
Compactor, Sheepsfoot, Self-Propelled	
Compactor, Vibratory, Self-Propelled	
Concrete Pump	
Crane - 40 Ton	
Crane - 70 Ton	
Dozer, D5	
Dozer, D6	
Dozer, D8	2
Dozer, D10	
Drill, Tracked	
Dump Truck, End Dump, 15 Ton	
Dump Truck, Off-Highway, 34 Ton	5
Dump Truck, Semi-Trailer	
Excavator, 325	1
Forklift, Rough Terrain	
Front End Loader, Tracked	
Front End Loader, Wheeled	
Fuel Truck / Support Truck	1
Generator - Diesel	
Grout Pump/Plant	
Hydroseed Sprayer, Truck Mounted	
Grader, H14	1
Pile Driver	
Pump Truck - Concrete	
Powder Truck	
Scraper, Self-propelled, 21 CY	
Truck, Flatbed	
Tunnel Rig (TBM)	
Water Pump, Diesel	
Water Truck	1
Welder and Generator Set	
Total Offsite Flatbed/Semi Trucks	
Daily Concrete Mixer Truck - 8 CY	
Daily Semi Trailer Truck	

Crew	Quantity
Blaster	
Carpenters	
Cement Finisher	
Driller	
Electricians	
Equipment Operators	6
Grade Setter	
Foreman	1
Labor Foreman	
Laborers	4
Mechanics	
Painter	
Pile Driver	
Pipe Foreman	
Pipe Layer	
Plumber	
Rigger	
Survey/Rodmen	2
Steel Worker	
Steel Worker Foreman	
Truck Drivers	6
Welder	

Total Crew Size	19
Monthly Labor Cost	$227,700

Duration: **12.7** Months **55.1** Weeks

CONSTANTS: 10 HR/DAY 216.25 HRS/MONTH

MOVE UNSTABLE SOIL - LOWER RESERVOIR		
SCHEDULE		
16.1 Platform Excavation	661,000	CY
Excavator Hourly Production Rate	300	CY/HR
Assume: cycle time = 30 sec, 3.0 cy bucket, 83% eff.		
# of Excavators	1	
Production Rate	3,000	CY/DAY
Duration	10.2	MONTHS
Contingency	25	%
Final Duration	12.7	MONTHS
Final Duration	55.1	WEEKS
EQUIPMENT/TRUCKING		
DUMP TRUCKS	330,500	TOTAL VOLUME, CY
(assume 50% moved by trucks, 50% moved by equipment)	30	CY/TRUCK
	11,017	# OF TRUCKS FOR TASK
	100	LOADS/DAY (MAX.)
	0.50	CYCLE TIME (HRS)
	5	REQUIRED # OF TRUCKS

Assumptions:

Standard Excavation Haul & Dump Onsite

Survey Control

50% of material moved by Dozers & Loaders, other 50% loaded onto dump trucks and hauled to onsite location.

Move Unstable Soil Lower Reservoir:

Process: Excavate, Load, Haul, Dump.

Equipment: 1 Excavator, 1 Grader, 2 Dozers, 2 FE Loaders, Dump Trucks, Water Truck, Support Truck.

Crew: 6 Equip Opr., 3 Laborers, 2 survey, 5 DT Drivers, 1 Foreman, 1 Water Truck Driver, 1 Support Driver.

37 Line Upper Res.

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EQUIPMENT	Quantity
On Site	
Air Compressor	
Backhoe / Front End Loader, Wheeled	
Backhoe, Tracked	
Chipper, Wood	
Compactor, Sheepsfoot, Self-Propelled	
Compactor, Vibratory, Self-Propelled	1
Concrete Pump	
Crane - 40 Ton	
Crane - 70 Ton	
Dozer, D5	
Dozer, D6	
Dozer, D8	1
Dozer, D10	
Drill, Tracked	
Dump Truck, End Dump, 15 Ton	
Dump Truck, Off-Highway, 34 Ton	10
Dump Truck, Semi-Trailer	
Excavator, 325	2
Forklift, Rough Terrain	
Front End Loader, Tracked	
Front End Loader, Wheeled	2
Fuel Truck / Support Truck	1
Generator - Diesel	
Grout Pump/Plant	
Hydroseed Sprayer, Truck Mounted	
Grader, H14	
Pile Driver	
Pump Truck - Concrete	
Powder Truck	
Scraper, Self-propelled, 21 CY	
Truck, Flatbed	
Tunnel Rig (TBM)	
Water Pump, Diesel	
Water Truck	1
Welder and Generator Set	
Total Offsite Flatbed/Semi Trucks	
Daily Concrete Mixer Truck - 8 CY	
Daily Semi Trailer Truck	

Crew	Quantity
Blaster	
Carpenters	
Cement Finisher	
Driller	
Electricians	
Equipment Operators	6
Grade Setter	
Foreman	1
Labor Foreman	
Laborers	3
Mechanics	
Painter	
Pile Driver	
Pipe Foreman	
Pipe Layer	
Plumber	
Rigger	
Survey/Rodmen	2
Steel Worker	
Steel Worker Foreman	
Truck Drivers	11
Welder	

Total Crew Size	23
Monthly Labor Cost	$270,300

Duration: **3.7** Months **27.4** Weeks

CONSTANTS: 10 HR/DAY 216.25 HRS/MONTH

LINE UPPER RESERVOIR SCHEDULE			
NA	Upper Reservoir Lining (Bottom 3rd of reservoir)	385,587	SY
	Lining Depth	3	FT
	Total Lining Volume	385,587	CY
	Excavator Hourly Production Rate	300	CY/HR
	Assume: cycle time = 30 sec, 3.0 cy bucket, 83% eff.		
	# of Excavators	2	
	Production Rate	6,000	CY/DAY
	Duration	3.0	MONTHS
	Contingency	25	%
	Final Duration	3.7	MONTHS
	Final Duration	16.1	WEEKS
NA	Compaction of Upper Reservoir Lining	385,587	SY
	Compactor Hourly Production Rate	847	CY/HR
	Assume: Drum Width = 84", Lift = 12", Passes = 6, V = 4mph		
	# of Compactors	1	
	Production Rate	8,470	CY/DAY
	Duration	2.1	MONTHS
	Contingency	25	%
	Final Duration	2.6	MONTHS
	Final Duration	11.4	WEEKS
EQUIPMENT/TRUCKING			
DUMP TRUCKS		385,587	TOTAL VOLUME, CY
		30	CY/TRUCK
		12,853	# OF TRUCKS FOR TASK
		200	LOADS/DAY (MAX.)
		0.50	CYCLE TIME (HRS)
		10	REQUIRED # OF TRUCKS

Assumptions:

Standard Excavation Haul & Dump Onsite

Survey Control

Line Upper Reservoir:

Process: Excavate, Load, Haul, Dump, Compact.

Equipment: 2 Excavators, 1 Dozer, 1 Compactor, 2 FE Loaders, Dump Trucks, Water Truck, Support Truck.

Crew: 6 Equip Opr., 2 Laborers, 10 DT Drivers, 1 Foreman, 1 Water Truck Driver, 1 Support Driver, 2 survey.

Schedule: Activities are additive.

38 Line Lower Res.

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Subject:	Eagle Mountain Construction Schedule and Equipment	Date	1/21/2009	By	NDM
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		Approved		By	

EQUIPMENT	Quantity
On Site	
Air Compressor	
Backhoe / Front End Loader, Wheeled	
Backhoe, Tracked	
Chipper, Wood	
Compactor, Sheepsfoot, Self-Propelled	
Compactor, Vibratory, Self-Propelled	1
Concrete Pump	
Crane - 40 Ton	
Crane - 70 Ton	
Dozer, D5	
Dozer, D6	
Dozer, D8	1
Dozer, D10	
Drill, Tracked	
Dump Truck, End Dump, 15 Ton	
Dump Truck, Off-Highway, 34 Ton	5
Dump Truck, Semi-Trailer	
Excavator, 325	2
Forklift, Rough Terrain	
Front End Loader, Tracked	
Front End Loader, Wheeled	2
Fuel Truck / Support Truck	1
Generator - Diesel	
Grout Pump/Plant	
Hydroseed Sprayer, Truck Mounted	
Grader, H14	
Pile Driver	
Pump Truck - Concrete	
Powder Truck	
Scraper, Self-propelled, 21 CY	
Truck, Flatbed	
Tunnel Rig (TBM)	
Water Pump, Diesel	
Water Truck	1
Welder and Generator Set	
Total Offsite Flatbed/Semi Trucks	
Daily Concrete Mixer Truck - 8 CY	
Daily Semi Trailer Truck	

Crew	Quantity
Blaster	
Carpenters	
Cement Finisher	
Driller	
Electricians	
Equipment Operators	6
Grade Setter	
Foreman	1
Labor Foreman	
Laborers	3
Mechanics	
Painter	
Pile Driver	
Pipe Foreman	
Pipe Layer	
Plumber	
Rigger	
Survey/Rodmen	2
Steel Worker	
Steel Worker Foreman	
Truck Drivers	6
Welder	

Total Crew Size	18
Monthly Labor Cost	$217,100

Duration: **5.3** Months **38.9** Weeks

CONSTANTS: 10 HR/DAY 216.25 HRS/MONTH

LINE LOWER RESERVOIR SCHEDULE		
NA Lower Reservoir Lining (Bottom half of reservoir)	546,920	SY
Lining Depth	3	FT
Total Lining Volume	546,920	CY
Excavator Hourly Production Rate	300	CY/HR
Assume: cycle time = 30 sec, 3.0 cy bucket, 83% eff.		
# of Excavators	2	
Production Rate	6,000	CY/DAY
Duration	4.2	MONTHS
Contingency	25	%
Final Duration	5.3	MONTHS
Final Duration	22.8	WEEKS
NA Compaction of Upper Reservoir Lining	546,920	SY
Compactor Hourly Production Rate	847	CY/HR
Assume: Drum Width = 84", Lift = 12", Passes = 6, V = 4mph		
# of Compactors	1	
Production Rate	8,470	CY/DAY
Duration	3.0	MONTHS
Contingency	25	%
Final Duration	3.7	MONTHS
Final Duration	16.1	WEEKS
EQUIPMENT/TRUCKING		
DUMP TRUCKS	546,920	TOTAL VOLUME, CY
	30	CY/TRUCK
	18,231	# OF TRUCKS FOR TASK
	200	LOADS/DAY (MAX.)
	0.25	CYCLE TIME (HRS)
	5	REQUIRED # OF TRUCKS

Assumptions:

Standard Excavation Haul & Dump Onsite

Survey Control

Line Lower Reservoir:

Process: Excavate, Load, Haul, Dump, Compact.

Equipment: 2 Excavators, 1 Dozer, 1 Compactor, 2 FE Loaders, Dump Trucks, Water Truck, Support Truck.

Crew: 6 Equip Opr., 2 Laborers, 5 DT Drivers, 1 Foreman, 1 Water Truck Driver, 1 Support Driver, 2 survey.

Schedule: Activities are additive.

39 Construct IO Struc. Lower

Client:	Eagle Crest Energy	Project	080473	Page	1
Subject:	Eagle Mountain Construction Schedule and Equipment	Date	1/21/2009	By	NDM
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EQUIPMENT	Quantity
On Site	
Air Compressor	1
Backhoe / Front End Loader, Wheeled	
Backhoe, Tracked	
Chipper, Wood	
Compactor, Sheepsfoot, Self-Propelled	
Compactor, Vibratory, Self-Propelled	
Concrete Pump	
Crane - 40 Ton	
Crane - 70 Ton	1
Dozer, D5	
Dozer, D6	
Dozer, D8	1
Dozer, D10	
Drill, Tracked	1
Dump Truck, End Dump, 15 Ton	
Dump Truck, Off-Highway, 34 Ton	4
Dump Truck, Semi-Trailer	
Excavator, 325	1
Forklift, Rough Terrain	
Front End Loader, Tracked	
Front End Loader, Wheeled	1
Fuel Truck / Support Truck	1
Generator - Diesel	
Grout Pump/Plant	
Hydroseed Sprayer, Truck Mounted	
Grader, H14	
Pile Driver	
Pump Truck - Concrete	2
Powder Truck	
Scraper, Self-propelled, 21 CY	
Truck, Flatbed	
Tunnel Rig (TBM)	
Water Pump, Diesel	
Water Truck	1
Welder and Generator Set	
Total Offsite Flatbed/Semi Trucks	9
Daily Concrete Mixer Truck - 8 CY	25
Daily Semi Trailer Truck	20

Crew	Quantity
Blaster	2
Carpenters	
Cement Finisher	
Driller	1
Electricians	
Equipment Operators	4
Grade Setter	
Foreman	1
Labor Foreman	
Laborers	9
Mechanics	
Painter	
Pile Driver	
Pipe Foreman	
Pipe Layer	
Plumber	
Rigger	
Survey/Rodmen	2
Steel Worker	
Steel Worker Foreman	
Truck Drivers	7
Welder	

Total Crew Size	26
Monthly Labor Cost	$297,600

Duration: **4.1** Months **17.8** Weeks

CONSTANTS: 10 HR/DAY 216.25 HRS/MONTH

CONSTRUCT LOWER I/O STRUCTURE SCHEDULE			
16.3 Intake Structure Excavation		13,900	CY
Excavator Hourly Production Rate		225	CY/HR
Assume: cycle time = 40 sec, 3.0 cy bucket, 83% eff.			
# of Excavators		1	
Production Rate		2,250	CY/DAY
Duration		0.3	MONTHS
Contingency		25	%
Final Duration		0.4	MONTHS
Final Duration		1.5	WEEKS
NA Intake Structure Rock Excavation (D&B) (20%)		2,780	CY
Production Rate	(1 crew)	400	CY/DAY
Duration		0.3	MONTHS
Contingency		25	%
Final Duration		0.4	MONTHS
Final Duration		1.7	WEEKS
16.2 Access Tunnel Portal Concrete		180	CY
Production Rate	(1 crew)	200	CY/DAY
Duration		0.0	MONTHS
Contingency		25	%
Final Duration		0.1	MONTHS
Final Duration		0.2	WEEKS
16.4 Intake Structure Concrete		6,400	CY
Production Rate	(1 crew)	200	CY/DAY
Duration		1.5	MONTHS
Contingency		25	%
Final Duration		1.8	MONTHS
Final Duration		8.0	WEEKS
16.5 Trashracks, Misc. Metals		100	TONS
Assumed Unit Weight of Steel		475	LBS/CF
Area		5,040	SQ FT
Thickness		6	INCHES
Percent Openings		85	%
Unit Weight		35.6	LBS/SQ FT
Production Rate		200	SQ FT/DAY
Duration		1.2	MONTHS
Contingency		25	%
Final Duration		1.5	MONTHS
Final Duration		6.3	WEEKS
EQUIPMENT/TRUCKING			
DUMP TRUCKS		13,900	TOTAL VOLUME, CY
		30	CY/TRUCK
		463	# OF TRUCKS FOR TASK
		75	LOADS/DAY (MAX.)
		0.50	CYCLE TIME (HRS)
		4	REQUIRED # OF TRUCKS
OFFSITE TRUCKS		179	TOTAL WEIGHT, TONS
Assume 2lbs/ft of rebar/rockbolts; 12ft of rebar/c.y. of conc;		20	TONS/TRUCK
1lbs of reinforcment/s.y. of shotcrete		9	# OF TRUCKS
SEMIS		20	CY/TRUCK
		139	# OF TRUCKS FOR TASK
		20	TRUCKS/DAY
CONCRETE TRUCKS		6,580	TOTAL VOLUME, CY
		8	CY/TRUCK
		823	# OF TRUCKS FOR TASK
		25	TRUCKS/DAY
CONCRETE PUMP TRUCKS	(15 TRUCKS)-->	120	CY/DAY
		2	# OF TRUCKS

Assumptions:

Standard Excavation Haul & Dump Onsite
Rock Excavation Haul Offsite
Survey Control

Lower Reservoir I/O Structure:

Process: Excavate, Load, Haul, Dump; Drill, Blast, Excavate, Load, Haul offsite.
Equipment: Track Drill, 1 Excavator, 1 Dozers, 1 FE Loader, Dump Trucks, Semis, CP Trucks, Water Truck, Support Truck, Crane.
Crew: 1 Driller, 2 Blasters, 4 Equip Opr., 8 Laborers, 2 survey, 4 DT Drivers, 1 Foreman, 1 Water Truck Driver, 2 CPT Drivers, 1 Support Driver.
Schedule: Activities are additive.

40 Construct IO Struc. Upper

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Subject:	Eagle Mountain Construction Schedule and Equipment	Date	1/21/2009	By	NDM
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EQUIPMENT	Quantity
On Site	
Air Compressor	1
Backhoe / Front End Loader, Wheeled	
Backhoe, Tracked	
Chipper, Wood	
Compactor, Sheepsfoot, Self-Propelled	
Compactor, Vibratory, Self-Propelled	
Concrete Pump	
Crane - 40 Ton	
Crane - 70 Ton	1
Dozer, D5	
Dozer, D6	
Dozer, D8	1
Dozer, D10	
Drill, Tracked	1
Dump Truck, End Dump, 15 Ton	
Dump Truck, Off-Highway, 34 Ton	5
Dump Truck, Semi-Trailer	
Excavator, 325	1
Forklift, Rough Terrain	
Front End Loader, Tracked	
Front End Loader, Wheeled	1
Fuel Truck / Support Truck	1
Generator - Diesel	
Grout Pump/Plant	
Hydroseed Sprayer, Truck Mounted	
Grader, H14	
Pile Driver	
Pump Truck - Concrete	2
Powder Truck	
Scraper, Self-propelled, 21 CY	
Truck, Flatbed	
Tunnel Rig (TBM)	
Water Pump, Diesel	
Water Truck	1
Welder and Generator Set	
Total Offsite Flatbed/Semi Trucks	
Daily Concrete Mixer Truck - 8 CY	25
Daily Semi Trailer Truck	20

Crew	Quantity
Blaster	2
Carpenters	
Cement Finisher	
Driller	1
Electricians	
Equipment Operators	4
Grade Setter	
Foreman	1
Labor Foreman	
Laborers	9
Mechanics	
Painter	
Pile Driver	
Pipe Foreman	
Pipe Layer	
Plumber	
Rigger	
Survey/Rodmen	2
Steel Worker	
Steel Worker Foreman	
Truck Drivers	8
Welder	

Total Crew Size	27
Monthly Labor Cost	$308,300

Duration: **3.9** Months **16.8** Weeks

CONSTANTS: 10 HR/DAY 216.25 HRS/MONTH

CONSTRUCT UPPER I/O STRUCTURE SCHEDULE			
4.3.1 Intake Structure Excavation		12,000	CY
Excavator Hourly Production Rate		299	CY/HR
Assume: cycle time = 30 sec, 3.0 cy bucket, 83% eff.			
# of Excavators		1	
Production Rate		2,990	CY/DAY
Duration		0.2	MONTHS
Contingency		25	%
Final Duration		0.2	MONTHS
Final Duration		1.0	WEEKS
NA Intake Structure Rock Excavation (D&B) (20%)		2,400	CY
Production Rate	(1 crew)	400	CY/DAY
Duration		0.3	MONTHS
Contingency		25	%
Final Duration		0.3	MONTHS
Final Duration		1.5	WEEKS
4.3.2 Intake Structure Concrete		6,400	CY
Production Rate	(1 crew)	200	CY/DAY
Duration		1.5	MONTHS
Contingency		25	%
Final Duration		1.8	MONTHS
Final Duration		8.0	WEEKS
16.5 Trashracks, Misc. Metals		100	TONS
Assumed Unit Weight of Steel		475	LBS/CF
Area		5,040	SQ FT
Thickness		6	INCHES
Percent Openings		85	%
Unit Weight		35.6	LBS/SQ FT
Production Rate		200	SQ FT/DAY
Duration		1.2	MONTHS
Contingency		25	%
Final Duration		1.5	MONTHS
Final Duration		6.3	WEEKS
EQUIPMENT/TRUCKING			
DUMP TRUCKS		12,000	TOTAL VOLUME, CY
		30	CY/TRUCK
		400	# OF TRUCKS FOR TASK
		100	LOADS/DAY (MAX.)
		0.50	CYCLE TIME (HRS)
		5	REQUIRED # OF TRUCKS
OFFSITE TRUCKS		177	TOTAL WEIGHT, TONS
Assume 2lbs/ft of rebar/rockbolts; 12ft of rebar/c.y. of conc;		20	TONS/TRUCK
1lbs of reinforcment/s.y. of shotcrete		9	# OF TRUCKS
SEMIS		20	CY/TRUCK
		120	# OF TRUCKS FOR TASK
		20	TRUCKS/DAY
CONCRETE TRUCKS		6,400	TOTAL VOLUME, CY
		8	CY/TRUCK
		800	# OF TRUCKS FOR TASK
		25	TRUCKS/DAY
CONCRETE PUMP TRUCKS	(15 TRUCKS)-->	120	CY/DAY
		2	# OF TRUCKS

Assumptions:

Standard Excavation Haul & Dump Onsite
Rock Excavation Haul Offsite
Survey Control

Upper Reservoir I/O Structure:

Process: Excavate, Load, Haul, Dump; Drill, Blast, Excavate, Load, Haul offsite.
Equipment: Track Drill, 1 Excavator, 1 Dozers, 1 FE Loader, Dump Trucks, Semis, CP Trucks, Water Truck, Support Truck, Crane.
Crew: 1 Driller, 2 Blasters, 4 Equip Opr., 8 Laborers, 2 survey, 5 DT Drivers, 1 Foreman, 1 Water Truck Driver, 2 CPT Drivers, 1 Support Driver.
Schedule: Activities are additive.

41 Switchyard Exc.

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Subject:	Eagle Mountain Construction Schedule and Equipment	Date	1/21/2009	By	NDM
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EQUIPMENT	Quantity
On Site	
Air Compressor	
Backhoe / Front End Loader, Wheeled	
Backhoe, Tracked	
Chipper, Wood	
Compactor, Sheepsfoot, Self-Propelled	
Compactor, Vibratory, Self-Propelled	
Concrete Pump	
Crane - 40 Ton	
Crane - 70 Ton	
Dozer, D5	1
Dozer, D6	
Dozer, D8	
Dozer, D10	
Drill, Tracked	
Dump Truck, End Dump, 15 Ton	
Dump Truck, Off-Highway, 34 Ton	5
Dump Truck, Semi-Trailer	
Excavator, 325	1
Forklift, Rough Terrain	
Front End Loader, Tracked	
Front End Loader, Wheeled	1
Fuel Truck / Support Truck	1
Generator - Diesel	
Grout Pump/Plant	
Hydroseed Sprayer, Truck Mounted	
Grader, H14	
Pile Driver	
Pump Truck - Concrete	
Powder Truck	
Scraper, Self-propelled, 21 CY	
Truck, Flatbed	
Tunnel Rig (TBM)	
Water Pump, Diesel	
Water Truck	1
Welder and Generator Set	
Total Offsite Flatbed/Semi Trucks	
Daily Concrete Mixer Truck - 8 CY	
Daily Semi Trailer Truck	

Crew	Quantity
Blaster	
Carpenters	
Cement Finisher	
Driller	
Electricians	
Equipment Operators	3
Grade Setter	
Foreman	1
Labor Foreman	
Laborers	3
Mechanics	
Painter	
Pile Driver	
Pipe Foreman	
Pipe Layer	
Plumber	
Rigger	
Survey/Rodmen	
Steel Worker	
Steel Worker Foreman	
Truck Drivers	3
Welder	

Total Crew Size	10
Monthly Labor Cost	$118,500

Duration: **3.1** Months **13.3** Weeks

CONSTANTS: 10 HR/DAY 216.25 HRS/MONTH

SWITCHYARD EXCAVATION SCHEDULE			
NA	Switchyard Excavation	107,860	CY
	Excavation Depth	5	FT
	Excavator Hourly Production Rate	299	CY/HR
	Assume: cycle time = 30 sec, 3.0 cy bucket, 83% eff.		
	# of Excavators	1	
	Production Rate	2,988	CY/DAY
	Duration	1.7	MONTHS
	Contingency	25	%
	Final Duration	2.1	MONTHS
	Final Duration	9.0	WEEKS
NA	Transfer Station Grading	20,370	CY
	Production Rate	1,200	CY/DAY
	Duration	0.8	MONTHS
	Contingency	25	%
	Final Duration	1.0	MONTHS
	Final Duration	4.2	WEEKS
EQUIPMENT/TRUCKING			
DUMP TRUCKS		107,860	TOTAL VOLUME, CY
(Assume haul and dump onsite)		30	CY/TRUCK
		3,595	# OF TRUCKS FOR TASK
		100	LOADS/DAY (MAX.)
		0.50	CYCLE TIME (HRS)
		5	REQUIRED # OF TRUCKS

Assumptions:

Standard Excavation Haul & Dump Onsite

Upper Reservoir I/O Structure:

Process: Excavate, Load, Haul, Dump, Grading.

Equipment: 1 Excavator, 1 Dozers, 1 FE Loader, Dump Trucks, Water Truck, Support Truck.

Crew: 3 Equip Opr., 2 Laborers, 5 DT Drivers, 1 Foreman, 1 Water Truck Driver, 1 Support Driver.

Schedule: Activities are additive.

42 Switchyard Foundations

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Subject:	Eagle Mountain Construction Schedule and Equipment	Date	1/21/2009	By	NDM
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EQUIPMENT	Quantity
On Site	
Air Compressor	
Backhoe / Front End Loader, Wheeled	
Backhoe, Tracked	
Chipper, Wood	
Compactor, Sheepsfoot, Self-Propelled	1
Compactor, Vibratory, Self-Propelled	
Concrete Pump	
Crane - 40 Ton	
Crane - 70 Ton	
Dozer, D5	1
Dozer, D6	
Dozer, D8	
Dozer, D10	
Drill, Tracked	1
Dump Truck, End Dump, 15 Ton	
Dump Truck, Off-Highway, 34 Ton	5
Dump Truck, Semi-Trailer	
Excavator, 325	
Forklift, Rough Terrain	
Front End Loader, Tracked	
Front End Loader, Wheeled	
Fuel Truck / Support Truck	1
Generator - Diesel	
Grout Pump/Plant	
Hydroseed Sprayer, Truck Mounted	
Grader, H14	1
Pile Driver	
Pump Truck - Concrete	1
Powder Truck	
Scraper, Self-propelled, 21 CY	
Truck, Flatbed	
Tunnel Rig (TBM)	
Water Pump, Diesel	
Water Truck	1
Welder and Generator Set	
Total Offsite Flatbed/Semi Trucks	1
Daily Concrete Mixer Truck - 8 CY	2
Daily Semi Trailer Truck	

Crew	Quantity
Blaster	
Carpenters	
Cement Finisher	
Driller	1
Electricians	
Equipment Operators	3
Grade Setter	
Foreman	1
Labor Foreman	
Laborers	3
Mechanics	
Painter	
Pile Driver	
Pipe Foreman	
Pipe Layer	
Plumber	
Rigger	
Survey/Rodmen	
Steel Worker	
Steel Worker Foreman	
Truck Drivers	3
Welder	

Total Crew Size	11
Monthly Labor Cost	$129,100

Duration: **4.1** Months **17.6** Weeks

CONSTANTS: 10 HR/DAY 216.25 HRS/MONTH

SWITCHYARD FOUNDATIONS SCHEDULE			
NA	Switchyard Foundations (assume peirs)		
	Foundations Area (assume 5% of area)	27,500	SQ FT
	Area per peir	50	SQ FT
	Peir Depth	30	FT
	Peir Diameter	1	FT
	Number of Peirs	552	#
	Production Rate	10	PEIRS/DAY
	Duration	2.6	MONTHS
	Contingency	25	%
	Final Duration	3.2	MONTHS
	Final Duration	13.8	WEEKS
NA	Gravel Base Placement	10,185	CY
	Production Rate	1,500	CY/DAY
	Duration	0.3	MONTHS
	Contingency	25	%
	Final Duration	0.4	MONTHS
	Final Duration	1.7	WEEKS
NA	Compaction of Gravel Base (assume 3' thick)	10,185	CY
	Compactor Hourly Production Rate	120	CY/HR
	Assume: Drum Width = 50", Lift = 4", Passes = 6, V = 4mph		
	# of Compactors	1	
	Production Rate	1,204	CY/DAY
	Duration	0.4	MONTHS
	Contingency	25	%
	Final Duration	0.5	MONTHS
	Final Duration	2.1	WEEKS
EQUIPMENT/TRUCKING			
DUMP TRUCKS (gravel base)		10,185	TOTAL VOLUME, CY
		30	CY/TRUCK
		340	# OF TRUCKS FOR TASK
		50	LOADS/DAY (MAX.)
		1.0	CYCLE TIME (HRS)
		5	REQUIRED # OF TRUCKS
OFFSITE TRUCKS		6	TOTAL WEIGHT, TONS
Assume 2lbs/ft of rebar/rockbolts; 12ft of rebar/c.y. of conc;		20	TONS/TRUCK
1lbs of reinforcment/s.y. of shotcrete		1	# OF TRUCKS
CONCRETE TRUCKS		482	TOTAL VOLUME, CY
		8	CY/TRUCK
		60	# OF TRUCKS FOR TASK
		2	TRUCKS/DAY
CONCRETE PUMP TRUCKS	(15 TRUCKS)-->	120	CY/DAY
		1	# OF TRUCKS

Assumptions:

Process: Drill and Pour Peirs, Place Gravel Base, Compact Gravel Base.
Equipment: 1 Track Drill, 1 Dozer, 1 Grader, 1 Vibro. Compactor, Dump Trucks, Conc. Pump Truck, Water Truck, Support Truck.
Crew: 1 Driller, 3 Equip Opr., 2 Laborers, 5 DT Driver, 1 Foreman, 1 Water Truck Driver, 2 CPT Driver, 1 Support Driver.

Schedule: Activities are additive.

43 Switchyard Structures

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Subject:	Eagle Mountain Construction Schedule and Equipment	Date	1/21/2009	By	NDM
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EQUIPMENT	Quantity
On Site	
Air Compressor	
Backhoe / Front End Loader, Wheeled	
Backhoe, Tracked	
Chipper, Wood	
Compactor, Sheepsfoot, Self-Propelled	
Compactor, Vibratory, Self-Propelled	
Concrete Pump	
Crane - 40 Ton	
Crane - 70 Ton	1
Dozer, D5	
Dozer, D6	
Dozer, D8	
Dozer, D10	
Drill, Tracked	
Dump Truck, End Dump, 15 Ton	
Dump Truck, Off-Highway, 34 Ton	
Dump Truck, Semi-Trailer	
Excavator, 325	
Forklift, Rough Terrain	1
Front End Loader, Tracked	
Front End Loader, Wheeled	
Fuel Truck / Support Truck	2
Generator - Diesel	1
Grout Pump/Plant	
Hydroseed Sprayer, Truck Mounted	
Grader, H14	
Pile Driver	
Pump Truck - Concrete	
Powder Truck	
Scraper, Self-propelled, 21 CY	
Truck, Flatbed	1
Tunnel Rig (TBM)	
Water Pump, Diesel	
Water Truck	
Welder and Generator Set	1
Total Offsite Flatbed/Semi Trucks	10
Daily Concrete Mixer Truck - 8 CY	
Daily Semi Trailer Truck	

Crew	Quantity
Blaster	
Carpenters	
Cement Finisher	
Driller	
Electricians	
Equipment Operators	2
Grade Setter	
Foreman	1
Labor Foreman	
Laborers	2
Mechanics	
Painter	
Pile Driver	
Pipe Foreman	
Pipe Layer	
Plumber	
Rigger	
Survey/Rodmen	
Steel Worker	2
Steel Worker Foreman	
Truck Drivers	
Welder	2

Total Crew Size	9
Monthly Labor Cost	$131,500

Duration: **1.5** Months **6.4** Weeks

CONSTANTS: 10 HR/DAY 216.25 HRS/MONTH

SWITCHYARD STRUCTURES SCHEDULE			
NA	Switchyard Large Structures		
	Number of Structures	6	#
	Assumed Structure Height	100	FT
	Production Rate	50	FT/DAY
	Duration	0.6	MONTHS
	Contingency	25	%
	Final Duration	0.7	MONTHS
	Final Duration	3.0	WEEKS
NA	Switchyard Small Structures		
	Number of Structures	6	#
	Assumed Structure Height	30	FT
	Production Rate	50	FT/DAY
	Duration	0.2	MONTHS
	Contingency	25	%
	Final Duration	0.2	MONTHS
	Final Duration	0.9	WEEKS
15.5-C	Switchyard Fencing	3,200	LF
	Production Rate	300	LF/DAY
	Duration	0.5	MONTHS
	Contingency	15	%
	Final Duration	0.6	MONTHS
	Final Duration	2.5	WEEKS

Assumptions:

Equipment: 1 Crane, 1 Flatbed Truck, 2 Support Trucks, 1 Forklift, Generator, Welder.
Crew: 1 Crane Opr., 1 Equip. Opr., 2 Laborers, 2 Steel Workers, 1 Foreman, 2 Welders.
Schedule: Activities are additive.

44 Trans. Line Foundations

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Subject:	Eagle Mountain Construction Schedule and Equipment	Date	1/21/2009	By	NDM
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		Approved		By	

EQUIPMENT	Quantity
On Site	
Air Compressor	
Backhoe / Front End Loader, Wheeled	
Backhoe, Tracked	
Chipper, Wood	
Compactor, Sheepsfoot, Self-Propelled	
Compactor, Vibratory, Self-Propelled	
Concrete Pump	
Crane - 40 Ton	1
Crane - 70 Ton	
Dozer, D5	
Dozer, D6	
Dozer, D8	
Dozer, D10	
Drill, Tracked	1
Dump Truck, End Dump, 15 Ton	
Dump Truck, Off-Highway, 34 Ton	
Dump Truck, Semi-Trailer	
Excavator, 325	
Forklift, Rough Terrain	
Front End Loader, Tracked	
Front End Loader, Wheeled	1
Fuel Truck / Support Truck	1
Generator - Diesel	
Grout Pump/Plant	
Hydroseed Sprayer, Truck Mounted	
Grader, H14	
Pile Driver	
Pump Truck - Concrete	1
Powder Truck	
Scraper, Self-propelled, 21 CY	
Truck, Flatbed	
Tunnel Rig (TBM)	
Water Pump, Diesel	
Water Truck	
Welder and Generator Set	
Total Offsite Flatbed/Semi Trucks	24
Daily Concrete Mixer Truck - 8 CY	7
Daily Semi Trailer Truck	

Crew	Quantity
Blaster	
Carpenters	
Cement Finisher	
Driller	1
Electricians	
Equipment Operators	3
Grade Setter	
Foreman	1
Labor Foreman	
Laborers	2
Mechanics	
Painter	
Pile Driver	
Pipe Foreman	
Pipe Layer	
Plumber	
Rigger	
Survey/Rodmen	
Steel Worker	2
Steel Worker Foreman	
Truck Drivers	1
Welder	

Total Crew Size	10
Monthly Labor Cost	$131,700

Duration: **4.6** Months **20.0** Weeks

CONSTANTS: 10 HR/DAY 216.25 HRS/MONTH

TRANSMISSION LINE FOUNDATIONS SCHEDULE			
NA	Transmission Line Foundations - Concrete		
	Line Length	10	MILES
	Assumed Structures/Mile	8	#/MILE
	Peirs Per Structure	4	#/STRUCTURE
	Total # of Peirs	320	#
	Estimated Length of Peirs	50	FT
	Peir Diameter	3	FT
	Total Volume	4,189	CY
	Production Rate	4	PEIRS/DAY
	Duration	3.7	MONTHS
	Contingency	25	%
	Final Duration	4.6	MONTHS
	Final Duration	20.0	WEEKS
NA	Transmission Line Foundations - Steel		
	Total # of Peirs	320	#
	Estimated Length of Peirs	50	FT
	Peir Diameter	3	FT
	# of Bars/Sq. ft	5	#/SQ FT
	Bar Size	6	#
	Bar Weight Per Foot	1.5	LBS/FT
	Shear Reinforcement Bar Size	4	#
	Shear Reinforcement Weight Per Foot	0.67	LBS/FT
	Total Weight	475	TONS

EQUIPMENT/TRUCKING			
CONCRETE TRUCKS		4,189	TOTAL VOLUME, CY
		8	CY/TRUCK
		524	# OF TRUCKS FOR TASK
		7	TRUCKS/DAY
CONCRETE PUMP TRUCKS	(15 TRUCKS)-->	120	CY/DAY
		1	# OF TRUCKS
OFFSITE FLATBED SEMIS (reinforcement)		20	TONS/TRUCK
		24	# OF TRUCKS FOR TASK
		1	TRUCKS/DAY

Assumptions:

Process: Drill Peirs, Place Steel, Pour Concrete, Finish Work.
Equipment: 1 Tracked Drill, 1 Front End Loader, 1 Crane, 1 Flatbed Truck, 1 Support Truck, 1 Conc. Pump Truck.
Crew: 3 Equip. Opr., 2 Laborers, 2 Steel Workers, 1 Foreman, 1 CPT Driver.

45 Trans. line stringing

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EQUIPMENT	Quantity
On Site	
Air Compressor	
Backhoe / Front End Loader, Wheeled	
Backhoe, Tracked	
Chipper, Wood	
Compactor, Sheepsfoot, Self-Propelled	
Compactor, Vibratory, Self-Propelled	
Concrete Pump	
Crane - 40 Ton	2
Crane - 70 Ton	
Dozer, D5	
Dozer, D6	
Dozer, D8	
Dozer, D10	
Drill, Tracked	
Dump Truck, End Dump, 15 Ton	
Dump Truck, Off-Highway, 34 Ton	
Dump Truck, Semi-Trailer	
Excavator, 325	
Forklift, Rough Terrain	1
Front End Loader, Tracked	
Front End Loader, Wheeled	
Fuel Truck / Support Truck	2
Generator - Diesel	
Grout Pump/Plant	
Hydroseed Sprayer, Truck Mounted	
Grader, H14	
Pile Driver	
Pump Truck - Concrete	
Powder Truck	
Scraper, Self-propelled, 21 CY	
Truck, Flatbed	1
Tunnel Rig (TBM)	
Water Pump, Diesel	
Water Truck	
Welder and Generator Set	
Total Offsite Flatbed/Semi Trucks	
Daily Concrete Mixer Truck - 8 CY	
Daily Semi Trailer Truck	

Crew	Quantity
Blaster	
Carpenters	
Cement Finisher	
Driller	
Electricians	
Equipment Operators	3
Grade Setter	
Foreman	1
Labor Foreman	
Laborers	3
Mechanics	
Painter	
Pile Driver	
Pipe Foreman	
Pipe Layer	
Plumber	
Rigger	
Survey/Rodmen	
Steel Worker	
Steel Worker Foreman	
Truck Drivers	
Welder	

Total Crew Size	7
Monthly Labor Cost	$86,600

Duration: **4.0** Months **17.2** Weeks

CONSTANTS: 10 HR/DAY 216.25 HRS/MONTH

TRANSMISSION LINE STRINGING SCHEDULE			
NA	Transmission Line Stringing		
	Transmission Line Length	10	MILES
	# of Lines	8	#
	Sag Factor	1.30	
	Total Line Length	549,200	FT
	Production Rate	8,000	FT/DAY
	Duration	3.2	MONTHS
	Contingency	25	%
	Final Duration	4.0	MONTHS
	Final Duration	17.2	WEEKS

Assumptions:

Equipment: 2 Cranes, 1 Flatbed Truck, 2 Support Truck, 1 Forklift.
Crew: 3 Equip. Opr., 3 Laborers, 1 Foreman.

46 Trans. line structures

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EQUIPMENT	Quantity
On Site	
Air Compressor	1
Backhoe / Front End Loader, Wheeled	
Backhoe, Tracked	
Chipper, Wood	
Compactor, Sheepsfoot, Self-Propelled	
Compactor, Vibratory, Self-Propelled	
Concrete Pump	
Crane - 40 Ton	2
Crane - 70 Ton	
Dozer, D5	
Dozer, D6	
Dozer, D8	
Dozer, D10	
Drill, Tracked	
Dump Truck, End Dump, 15 Ton	
Dump Truck, Off-Highway, 34 Ton	
Dump Truck, Semi-Trailer	
Excavator, 325	
Forklift, Rough Terrain	1
Front End Loader, Tracked	
Front End Loader, Wheeled	
Fuel Truck / Support Truck	2
Generator - Diesel	
Grout Pump/Plant	
Hydroseed Sprayer, Truck Mounted	
Grader, H14	
Pile Driver	
Pump Truck - Concrete	
Powder Truck	
Scraper, Self-propelled, 21 CY	
Truck, Flatbed	1
Tunnel Rig (TBM)	
Water Pump, Diesel	
Water Truck	
Welder and Generator Set	2
Total Offsite Flatbed/Semi Trucks	160
Daily Concrete Mixer Truck - 8 CY	
Daily Semi Trailer Truck	2

Crew	Quantity
Blaster	
Carpenters	
Cement Finisher	
Driller	
Electricians	
Equipment Operators	3
Grade Setter	
Foreman	1
Labor Foreman	
Laborers	3
Mechanics	
Painter	
Pile Driver	
Pipe Foreman	
Pipe Layer	
Plumber	
Rigger	
Survey/Rodmen	
Steel Worker	2
Steel Worker Foreman	1
Truck Drivers	
Welder	2

Total Crew Size	12
Monthly Labor Cost	$173,600

Duration: **5.8** Months **25.0** Weeks

CONSTANTS: 10 HR/DAY 216.25 HRS/MONTH

TRANSMISSION LINE STRUCTURES SCHEDULE		
NA Transmission Line Structures		
Line Length	10	MILES
Assumed Structures/Mile	8	#/MILE
Total # of Structures	80	#
Assumed Structure Weight	40	TONS
Total Steel Weight	3,200	TONS
Production Rate	0.8	STRUCTURES/DAY
Duration	4.6	MONTHS
Contingency	25	%
Final Duration	5.8	MONTHS
Final Duration	25.0	WEEKS
EQUIPMENT/TRUCKING		
OFFSITE FLATBED SEMIS	20	TONS/TRUCK
	160	# OF TRUCKS FOR TASK
	2	TRUCKS/DAY

Assumptions:

Process: Deliver Steel, Cut, Bolt, and Erect Steel Structure.
Equipment: 2 Cranes, 1 Flatbed Truck, 2 Support Truck, 1 Forklift, 1 Air compressor, 2 Generator/Welder Set.

Crew: 3 Equip. Opr., 3 Laborers, 2 Steel Workers, 2 Welders, 1 Steel Foreman, 1 Foreman.

47 Inst. H2O Supply Pipe & RO S

Client:	Eagle Crest Energy	Project	080473	Page	1
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EQUIPMENT	Quantity
On Site	
Air Compressor	
Backhoe / Front End Loader, Wheeled	
Backhoe, Tracked	
Chipper, Wood	
Compactor, Sheepsfoot, Self-Propelled	1
Compactor, Vibratory, Self-Propelled	
Concrete Pump	
Crane - 40 Ton	
Crane - 70 Ton	
Dozer, D5	
Dozer, D6	
Dozer, D8	1
Dozer, D10	
Drill, Tracked	
Dump Truck, End Dump, 15 Ton	5
Dump Truck, Off-Highway, 34 Ton	
Dump Truck, Semi-Trailer	
Excavator, 325	1
Forklift, Rough Terrain	
Front End Loader, Tracked	
Front End Loader, Wheeled	1
Fuel Truck / Support Truck	1
Generator - Diesel	
Grout Pump/Plant	
Hydroseed Sprayer, Truck Mounted	
Grader, H14	
Pile Driver	
Pump Truck - Concrete	
Powder Truck	
Scraper, Self-propelled, 21 CY	
Truck, Flatbed	
Tunnel Rig (TBM)	
Water Pump, Diesel	
Water Truck	
Welder and Generator Set	1
Total Offsite Flatbed/Semi Trucks	208
Daily Concrete Mixer Truck - 8 CY	
Daily Semi Trailer Truck	

Crew	Quantity
Blaster	
Carpenters	
Cement Finisher	
Driller	
Electricians	
Equipment Operators	4
Grade Setter	
Foreman	1
Labor Foreman	
Laborers	3
Mechanics	
Painter	
Pile Driver	
Pipe Foreman	1
Pipe Layer	2
Plumber	
Rigger	
Survey/Rodmen	2
Steel Worker	
Steel Worker Foreman	
Truck Drivers	6
Welder	

Total Crew Size	19
Monthly Labor Cost	$233,600

Duration: **6.7** Months **29.2** Weeks

CONSTANTS: 10 HR/DAY 216.25 HRS/MONTH

INSTALL WATER SUPPLY LINE SCHEDULE			
NA	Pipeline Excavation		
	Excavation Length	75,000	FT
	Excavation Unit Volume	1.6	CY/FT
	(assume 30 Steel pipe, 10,000 gpm, 3' Backfill)		
	Excavation Total Volume	120,000	CY
	Excavator Hourly Production Rate	200	LCY/HR
	# of Excavators	1	
	Production Rate	2,000	CY/DAY
	Duration	2.8	MONTHS
	Contingency	25	%
	Final Duration	3.5	MONTHS
	Final Duration	15.0	WEEKS
NA	Pipeline Bedding Material (25% of Backfill)	25,500	CY
	Production Rate	1,000	CY/DAY
	Duration	1.2	MONTHS
	Contingency	25	%
	Final Duration	1.5	MONTHS
	Final Duration	6.4	WEEKS
	Lag from Excavation	2.0	WEEKS
	Maximum Duration	8.4	WEEKS
NA	Pipeline Installation	75,000	FT
	Production Rate	1,000	FT/DAY
	Duration	3.5	MONTHS
	Contingency	25	%
	Final Duration	4.3	MONTHS
	Final Duration	18.8	WEEKS
	Lag from Excavation	4.0	WEEKS
	Maximum Duration	22.8	WEEKS
NA	Compaction Pipeline (85% of Exc.)	102,000	CY
	Compactor Hourly Production Rate	120	CY/HR
	Assume: Drum Width = 50", Lift = 4", Passes = 6, V = 4mph		
	# of Compactors	1	
	Production Rate	1,204	CY/DAY
	Duration	3.9	MONTHS
	Contingency	25	%
	Final Duration	4.9	MONTHS
	Final Duration	21.2	WEEKS
	Lag from Installation	4.0	WEEKS
	Maximum Duration (incl. this lag + install lag)	29.2	WEEKS

EQUIPMENT/TRUCKING		
DUMP TRUCKS (bedding material onsite)	25,500	TOTAL VOLUME, CY
(Assume bedding material is 25% of backfill)	15	CY/TRUCK
	1,700	# OF TRUCKS FOR TASK
	80	LOADS/DAY (MAX.)
	0.50	CYCLE TIME (HRS)
	5	REQUIRED # OF TRUCKS
OFFSITE SEMIS (pipe material)	360	LF/TRUCK
(Assume 40' sticks, 9 per truck)	208	# OF TRUCKS FOR TASK
	3	TRUCKS/DAY

Assumptions:

Upper Reservoir I/O Structure:

Process: Excavate, Place Bedding, Install Pipe, Backfill, Compact.

Equipment: 1 Excavator, 1 Dozers, 1 FE Loader, 1 Sheepsfoot Compactor, Dump Trucks, Water Truck, Support Truck, Welder.

Crew: 4 Equip Opr., 2 Laborers, 5 DT Drivers, 1 Foreman, 1 Water Truck Driver, 1 Support Driver, 1 Pipe Forman, 2 Pipe Layers, 2 Survey.

Schedule: Activities are additive.

48 Reservoir Filling

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EQUIPMENT	Quantity
On Site	
Air Compressor	
Backhoe / Front End Loader, Wheeled	
Backhoe, Tracked	
Chipper, Wood	
Compactor, Sheepsfoot, Self-Propelled	
Compactor, Vibratory, Self-Propelled	
Concrete Pump	
Crane - 40 Ton	
Crane - 70 Ton	
Dozer, D5	
Dozer, D6	
Dozer, D8	
Dozer, D10	
Drill, Tracked	
Dump Truck, End Dump, 15 Ton	
Dump Truck, Off-Highway, 34 Ton	
Dump Truck, Semi-Trailer	
Excavator, 325	
Forklift, Rough Terrain	
Front End Loader, Tracked	
Front End Loader, Wheeled	
Fuel Truck / Support Truck	1
Generator - Diesel	
Grout Pump/Plant	
Hydroseed Sprayer, Truck Mounted	
Grader, H14	
Pile Driver	
Pump Truck - Concrete	
Powder Truck	
Scraper, Self-propelled, 21 CY	
Truck, Flatbed	
Tunnel Rig (TBM)	
Water Pump, Diesel	
Water Truck	
Welder and Generator Set	
Total Offsite Flatbed/Semi Trucks	
Daily Concrete Mixer Truck - 8 CY	
Daily Semi Trailer Truck	

Crew	Quantity
Blaster	
Carpenters	
Cement Finisher	
Driller	
Electricians	
Equipment Operators	1
Grade Setter	
Foreman	
Labor Foreman	
Laborers	1
Mechanics	1
Painter	
Pile Driver	
Pipe Foreman	
Pipe Layer	
Plumber	
Rigger	
Survey/Rodmen	
Steel Worker	
Steel Worker Foreman	
Truck Drivers	
Welder	

Total Crew Size	3
Monthly Labor Cost	$38,000

Duration: **48.0** Months **207.6** Weeks

CONSTANTS: 20 HR/DAY 216.25 HRS/MONTH

RESERVOIR FILLING SCHEDULE			
NA	Reservoir Filling		
	Reservoirs Active Storage	17,700	AC-FT
	Upper Reservoir Inactive Storage	2,300	AC-FT
	Lower Reservoir Inactive Storage	4,200	AC-FT
	Total Storage	24,200	AC-FT
	Annual Seepage	1,628	AC-FT
	Annual Evaporation	1,763	AC-FT
	Pumping Rate	6,000	GPM
	Final Duration **(From Reservoir Filling Calculations, attached)**	48.0	MONTHS
	Final Duration	207.6	WEEKS

Assumptions:
Equipment: Support Truck.
Crew: 1 Equip Opr., 1 Laborer, 1 Mechanic.

49 U 1 START

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EQUIPMENT	Quantity
On Site	
Air Compressor	1
Backhoe / Front End Loader, Wheeled	
Backhoe, Tracked	
Chipper, Wood	
Compactor, Sheepsfoot, Self-Propelled	
Compactor, Vibratory, Self-Propelled	
Concrete Pump	
Crane - 40 Ton	
Crane - 70 Ton	
Dozer, D5	
Dozer, D6	
Dozer, D8	
Dozer, D10	
Drill, Tracked	
Dump Truck, End Dump, 15 Ton	
Dump Truck, Off-Highway, 34 Ton	
Dump Truck, Semi-Trailer	
Excavator, 325	
Forklift, Rough Terrain	
Front End Loader, Tracked	
Front End Loader, Wheeled	
Fuel Truck / Support Truck	
Generator - Diesel	1
Grout Pump/Plant	
Hydroseed Sprayer, Truck Mounted	
Grader, H14	
Pile Driver	
Pump Truck - Concrete	
Powder Truck	
Scraper, Self-propelled, 21 CY	
Truck, Flatbed	
Tunnel Rig (TBM)	
Water Pump, Diesel	
Water Truck	
Welder and Generator Set	
Total Offsite Flatbed/Semi Trucks	
Daily Concrete Mixer Truck - 8 CY	
Daily Semi Trailer Truck	

Crew	Quantity
Blaster	
Carpenters	
Cement Finisher	
Driller	
Electricians	3
Equipment Operators	
Grade Setter	
Foreman	1
Labor Foreman	
Laborers	
Mechanics	3
Painter	
Pile Driver	
Pipe Foreman	
Pipe Layer	
Plumber	
Rigger	
Survey/Rodmen	
Steel Worker	
Steel Worker Foreman	
Truck Drivers	
Welder	

Total Crew Size	7
Monthly Labor Cost	$101,500

Duration: **3.1** Months **13.4** Weeks

CONSTANTS: 10 HR/DAY 216.25 HRS/MONTH

UNIT 1 START-UP

Assumptions:

Process: Start-up involves inspections and testing of all electrical and mechanical equipment prior to unit initiation.
Equipment: Air Compressor, Generator.
Crew: 3 Electricians, 3 Mechanics, 1 Foreman.

51 U 2 START

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EQUIPMENT	Quantity
On Site	
Air Compressor	1
Backhoe / Front End Loader, Wheeled	
Backhoe, Tracked	
Chipper, Wood	
Compactor, Sheepsfoot, Self-Propelled	
Compactor, Vibratory, Self-Propelled	
Concrete Pump	
Crane - 40 Ton	
Crane - 70 Ton	
Dozer, D5	
Dozer, D6	
Dozer, D8	
Dozer, D10	
Drill, Tracked	
Dump Truck, End Dump, 15 Ton	
Dump Truck, Off-Highway, 34 Ton	
Dump Truck, Semi-Trailer	
Excavator, 325	
Forklift, Rough Terrain	
Front End Loader, Tracked	
Front End Loader, Wheeled	
Fuel Truck / Support Truck	
Generator - Diesel	1
Grout Pump/Plant	
Hydroseed Sprayer, Truck Mounted	
Grader, H14	
Pile Driver	
Pump Truck - Concrete	
Powder Truck	
Scraper, Self-propelled, 21 CY	
Truck, Flatbed	
Tunnel Rig (TBM)	
Water Pump, Diesel	
Water Truck	
Welder and Generator Set	
Total Offsite Flatbed/Semi Trucks	
Daily Concrete Mixer Truck - 8 CY	
Daily Semi Trailer Truck	

Crew	Quantity
Blaster	
Carpenters	
Cement Finisher	
Driller	
Electricians	3
Equipment Operators	
Grade Setter	
Foreman	1
Labor Foreman	
Laborers	
Mechanics	3
Painter	
Pile Driver	
Pipe Foreman	
Pipe Layer	
Plumber	
Rigger	
Survey/Rodmen	
Steel Worker	
Steel Worker Foreman	
Truck Drivers	
Welder	

Total Crew Size	7
Monthly Labor Cost	$101,500

Duration: **2.8** Months **12.0** Weeks

CONSTANTS: 10 HR/DAY 216.25 HRS/MONTH

UNIT 2 START-UP

Assumptions:

Process: Start-up involves inspections and testing of all electrical and mechanical equipment prior to unit initiation.
Equipment: Air Compressor, Generator.
Crew: 3 Electricians, 3 Mechanics, 1 Foreman.

53 U 3 START

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EQUIPMENT	Quantity
On Site	
Air Compressor	1
Backhoe / Front End Loader, Wheeled	
Backhoe, Tracked	
Chipper, Wood	
Compactor, Sheepsfoot, Self-Propelled	
Compactor, Vibratory, Self-Propelled	
Concrete Pump	
Crane - 40 Ton	
Crane - 70 Ton	
Dozer, D5	
Dozer, D6	
Dozer, D8	
Dozer, D10	
Drill, Tracked	
Dump Truck, End Dump, 15 Ton	
Dump Truck, Off-Highway, 34 Ton	
Dump Truck, Semi-Trailer	
Excavator, 325	
Forklift, Rough Terrain	
Front End Loader, Tracked	
Front End Loader, Wheeled	
Fuel Truck / Support Truck	
Generator - Diesel	1
Grout Pump/Plant	
Hydroseed Sprayer, Truck Mounted	
Grader, H14	
Pile Driver	
Pump Truck - Concrete	
Powder Truck	
Scraper, Self-propelled, 21 CY	
Truck, Flatbed	
Tunnel Rig (TBM)	
Water Pump, Diesel	
Water Truck	
Welder and Generator Set	
Total Offsite Flatbed/Semi Trucks	
Daily Concrete Mixer Truck - 8 CY	
Daily Semi Trailer Truck	

Crew	Quantity
Blaster	
Carpenters	
Cement Finisher	
Driller	
Electricians	3
Equipment Operators	
Grade Setter	
Foreman	1
Labor Foreman	
Laborers	
Mechanics	3
Painter	
Pile Driver	
Pipe Foreman	
Pipe Layer	
Plumber	
Rigger	
Survey/Rodmen	
Steel Worker	
Steel Worker Foreman	
Truck Drivers	
Welder	

Total Crew Size	7
Monthly Labor Cost	$101,500

Duration: **2.8** Months **12.0** Weeks

CONSTANTS: 10 HR/DAY 216.25 HRS/MONTH

UNIT 3 START-UP

Assumptions:

Process: Start-up involves inspections and testing of all electrical and mechanical equipment prior to unit initiation.
Equipment: Air Compressor, Generator.
Crew: 3 Electricians, 3 Mechanics, 1 Foreman.

55 U 4 START

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EQUIPMENT	Quantity
On Site	
Air Compressor	1
Backhoe / Front End Loader, Wheeled	
Backhoe, Tracked	
Chipper, Wood	
Compactor, Sheepsfoot, Self-Propelled	
Compactor, Vibratory, Self-Propelled	
Concrete Pump	
Crane - 40 Ton	
Crane - 70 Ton	
Dozer, D5	
Dozer, D6	
Dozer, D8	
Dozer, D10	
Drill, Tracked	
Dump Truck, End Dump, 15 Ton	
Dump Truck, Off-Highway, 34 Ton	
Dump Truck, Semi-Trailer	
Excavator, 325	
Forklift, Rough Terrain	
Front End Loader, Tracked	
Front End Loader, Wheeled	
Fuel Truck / Support Truck	
Generator - Diesel	1
Grout Pump/Plant	
Hydroseed Sprayer, Truck Mounted	
Grader, H14	
Pile Driver	
Pump Truck - Concrete	
Powder Truck	
Scraper, Self-propelled, 21 CY	
Truck, Flatbed	
Tunnel Rig (TBM)	
Water Pump, Diesel	
Water Truck	
Welder and Generator Set	
Total Offsite Flatbed/Semi Trucks	
Daily Concrete Mixer Truck - 8 CY	
Daily Semi Trailer Truck	

Crew	Quantity
Blaster	
Carpenters	
Cement Finisher	
Driller	
Electricians	3
Equipment Operators	
Grade Setter	
Foreman	1
Labor Foreman	
Laborers	
Mechanics	3
Painter	
Pile Driver	
Pipe Foreman	
Pipe Layer	
Plumber	
Rigger	
Survey/Rodmen	
Steel Worker	
Steel Worker Foreman	
Truck Drivers	
Welder	

Total Crew Size	7
Monthly Labor Cost	$101,500

Duration: **2.8** Months **12.0** Weeks

CONSTANTS: 10 HR/DAY 216.25 HRS/MONTH

UNIT 4 START-UP

Assumptions:

Process: Start-up involves inspections and testing of all electrical and mechanical equipment prior to unit initiation.
Equipment: Air Compressor, Generator.
Crew: 3 Electricians, 3 Mechanics, 1 Foreman.

57 FINSIH PROJECT

Client:	Eagle Crest Energy	Project	080473	Page	1
Subject:	Eagle Mountain Construction Schedule and Equipment	Date	1/21/2009	By	NDM
		Checked		By	
		Approved		By	

EQUIPMENT	Quantity
On Site	
Air Compressor	1
Backhoe / Front End Loader, Wheeled	
Backhoe, Tracked	
Chipper, Wood	
Compactor, Sheepsfoot, Self-Propelled	
Compactor, Vibratory, Self-Propelled	
Concrete Pump	
Crane - 40 Ton	
Crane - 70 Ton	
Dozer, D5	
Dozer, D6	
Dozer, D8	
Dozer, D10	
Drill, Tracked	
Dump Truck, End Dump, 15 Ton	
Dump Truck, Off-Highway, 34 Ton	
Dump Truck, Semi-Trailer	
Excavator, 325	
Forklift, Rough Terrain	
Front End Loader, Tracked	
Front End Loader, Wheeled	
Fuel Truck / Support Truck	3
Generator - Diesel	1
Grout Pump/Plant	
Hydroseed Sprayer, Truck Mounted	
Grader, H14	
Pile Driver	
Pump Truck - Concrete	
Powder Truck	
Scraper, Self-propelled, 21 CY	
Truck, Flatbed	
Tunnel Rig (TBM)	
Water Pump, Diesel	
Water Truck	
Welder and Generator Set	
Total Offsite Flatbed/Semi Trucks	
Daily Concrete Mixer Truck - 8 CY	
Daily Semi Trailer Truck	

Crew	Quantity
Blaster	
Carpenters	
Cement Finisher	
Driller	
Electricians	3
Equipment Operators	
Grade Setter	
Foreman	1
Labor Foreman	
Laborers	2
Mechanics	3
Painter	
Pile Driver	
Pipe Foreman	
Pipe Layer	
Plumber	
Rigger	
Survey/Rodmen	
Steel Worker	
Steel Worker Foreman	1
Truck Drivers	
Welder	

Total Crew Size	10
Monthly Labor Cost	$140,700

Duration: **2.8** Months **12.0** Weeks

CONSTANTS: 10 HR/DAY 216.25 HRS/MONTH

FINISH PROJECT

Assumptions:

Finish Project involves final inspections and testing of all major electrical and mechanical equipment, final tunnel and I/O structures inspections, and all other ancillary structures and equipment inspections and testing.
Equipment: 3 Support Trucks, Air Compressor, Generator.
Crew: 3 Electricians, 3 Mechanics, 1 Steel Worker Foreman, 2 Laborers, 1 Foreman.

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080473 Eagle Mountain Pumped Storage Project
Construction Schedule & Excavation Advancement Rates
1/20/2009
NDM

TBM Advancement Rates - Lookup Table

Type A	120	ft/day
Type B	95	ft/day
Type C	45	ft/day

D&B Advancement Rates - Lookup Table

D&B Rate Reduction Factor (%) =		**25**
Type A	37	ft/day
Type B	32	ft/day
Type C	17	ft/day

Upper Pressure Tunnel

Begin Sta. (ft)	End Sta. (ft)	Length (ft)	Rock Type (A, B, C)	Geologic Rock Description	Excavation Method (TBM, D&B)	Advancement Rate (ft/day)	Duration (days)	Cummulative Duration (days)
0	500	500	B	Granite	TBM	95	5	5
500	1500	1000	C	Quartzite	TBM	45	22	27
1500	2500	1000	C	Schistose meta-arkose	TBM	45	22	50
2500	3000	500	C	Quartzite	TBM	45	11	61
3000	4000	1000	C	Schistose meta-arkose	TBM	45	22	83
	Total =	4000 ft				**Total =**	83	16.7 weeks
						Contingency (%) =	25	
						Estimated Total Construction Duration =	104	20.8 weeks

Original Construction Schedule Estimate

Duration =	22.2	weeks
Length =	4000	ft
Advancement Rate =	36	ft/day
Calc. Advancement Rate =	39	ft/day

Vertical Shaft

Begin Sta. (ft)	End Sta. (ft)	Length (ft)	Rock Type (A, B, C)	Geologic Rock Description	Excavation Method (TBM, D&B)	Advancement Rate (ft/day)	Duration (days)	Cummulative Duration (days)
0	300	300	B	Granite	D&B	32	9	9
300	600	300	B	Granite	D&B	32	9	19
600	900	300	B	Granite	D&B	32	9	28
900	1200	300	C	Schistose meta-arkose	D&B	17	18	46
1200	1398	198	C	Schistose meta-arkose	D&B	17	12	58
	Total =	1398 ft				**Total =**	58	11.6 weeks
						Contingency (%) =	50	
						Estimated Total Construction Duration =	87	17.4 weeks

Original Construction Schedule Estimate

Duration =	39.8	weeks
Length =	1398	ft
Advancement Rate =	7	ft/day
Calc. Advancement Rate =	16	ft/day

Lower Pressure Tunnel

Begin Sta. (ft)	End Sta. (ft)	Length (ft)	Rock Type (A, B, C)	Geologic Rock Description	Excavation Method (TBM, D&B)	Advancement Rate (ft/day)	Duration (days)	Cummulative Duration (days)
0	200	200	C	Granite	TBM	45	4	4
200	500	300	C	Quartz Monzonite	TBM	45	7	11
500	1000	500	C	Granite	TBM	45	11	22
1000	1200	200	C	Schistose meta-arkose	TBM	45	4	27
1200	1560	360	C	Schistose meta-arkose	TBM	45	8	35
	Total =	1560 ft				**Total =**	35	7 weeks
						Contingency (%) =	25	
						Estimated Total Construction Duration =	43	8.7 weeks

Original Construction Schedule Estimate

Duration =	32.6	weeks
Length =	1560	ft
Advancement Rate =	10	ft/day
Calc. Advancement Rate =	36	ft/day

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Construction Schedule & Excavation Advancement Rates
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Penstocks & Draft Tubes

Begin Sta. (ft)	End Sta. (ft)	Length (ft)	Rock Type (A, B, C)	Geologic Rock Description	Excavation Method (TBM, D&B)	Advancement Rate (ft/day)	Duration (days)	Cummulative Duration (days)
0	350	350	C	Granite	D&B	17	21	21
350	850	500	C	Granite	D&B	17	30	51
850	1200	350	C	Granite	D&B	17	21	72
1200	1200	0	C	-	D&B	17	0	72
1200	1200	0	C	-	D&B	17	0	72
	Total =	1200 ft				**Total =**	72	14.4 weeks
						Contingency (%) =	50	
						Estimated Total Construction Duration =	108	21.6 weeks

Original Construction Schedule Estimate
Duration = 22.6 weeks
Length = 1200 ft
Advancement Rate = 11 ft/day

Calc. Advancement Rate = 11 ft/day

Tailrace Tunnel

Begin Sta. (ft)	End Sta. (ft)	Length (ft)	Rock Type (A, B, C)	Geologic Rock Description	Excavation Method (TBM, D&B)	Advancement Rate (ft/day)	Duration (days)	Cummulative Duration (days)
0	600	600	B	Granite	TBM	95	6	6
600	2500	1900	C	Quartz Monzonite	TBM	45	42	49
2500	4000	1500	B	Granite	TBM	95	16	64
4000	5000	1000	B	Schistose meta-arkose	TBM	95	11	75
5000	6835	1835	C	Schistose meta-arkose	TBM	45	41	116
	Total =	6835 ft				**Total =**	116	23.2 weeks
						Contingency (%) =	25	
						Estimated Total Construction Duration =	145	29 weeks

Original Construction Schedule Estimate
Duration = 31.2 weeks
Length = 6835 ft
Advancement Rate = 44 ft/day

Calc. Advancement Rate = 47 ft/day

Access Tunnel

Begin Sta. (ft)	End Sta. (ft)	Length (ft)	Rock Type (A, B, C)	Geologic Rock Description	Excavation Method (TBM, D&B)	Advancement Rate (ft/day)	Duration (days)	Cummulative Duration (days)
0	500	500	B	Granite	TBM	95	5	5
500	2000	1500	C	Quartz Monzonite	TBM	45	33	39
2000	4000	2000	C	Granite	TBM	45	44	83
4000	4500	500	B	Schistose meta-arkose	TBM	95	5	88
4500	6625	2125	C	Schistose meta-arkose	TBM	45	47	136
	Total =	6625 ft				**Total =**	136	27.2 weeks
						Contingency (%) =	25	
						Estimated Total Construction Duration =	169	33.9 weeks

Original Construction Schedule Estimate
Duration = 48.6 weeks
Length = 6625 ft
Advancement Rate = 27 ft/day

Calc. Advancement Rate = 39 ft/day

Cable Shaft

Begin Sta. (ft)	End Sta. (ft)	Length (ft)	Rock Type (A, B, C)	Geologic Rock Description	Excavation Method (TBM, D&B)	Advancement Rate (ft/day)	Duration (days)	Cummulative Duration (days)
0	500	500	B	Granite	D&B	32	16	16
500	1000	500	B	Quartz Monzonite	D&B	32	16	31
1000	1500	500	B	Granite	D&B	32	16	47
1500	2010	510	C	Schistose meta-arkose	D&B	17	30	77
2010	2010	0	C	-	D&B	17	0	77
	Total =	2010 ft				**Total =**	77	15.5 weeks
						Contingency (%) =	50	
						Estimated Total Construction Duration =	116	23.3 weeks

Original Construction Schedule Estimate
Duration = 26 weeks
Length = 2010 ft
Advancement Rate = 15 ft/day

Calc. Advancement Rate = 17 ft/day

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080473 Eagle Mountain Pumped Storage Project
Tunnel Boring Maching Advancement Rates
1/20/2009
NDM

Average Advancment Rate	**120**	**ft/day**	**Equation**	
Std. Dev. (rounded) =	**50**	**ft/day**		
Type A (std. TBM Exc.) =	120	ft/day	Average Value	
Type B (CIP Liner Req'd) =	95	ft/day	Average Value - (1/2) Std. Dev.	
Type C (Diff. Exc w/ Conc. Liner) =	45	ft/day	Average Value - (1.5) Std. Dev.	

Assumptions:

Work days/week: 5

Work Hours/Day: 20

Diameter (ft)	Rock Type	Advancement Rate	Units	Advancement Rate (ft/day)	Source
16	A - Std. TBM Exc.	225	m/week	148	Hatch Mott MacDonald Tunnel Estimating Database spreadsheet,
16	B - CIP Liner	195	m/week	128	Appendix D of VLHC in Northern Illinios, Fermi National Accelerator Labs.
16	C - Difficult Exc. Conc Liner	102	m/week	67	
NA	NA	16	m/day	52	http://www-project.slac.stanford.edu/lc/local/documentation/pdf/TBM-
NA	Limestone	8.8	ft/hr	176	Peter J. Tarkoy, Predicting TBM Penetration Rates in Selected Rock
	Shale & Siltstone	9.5	ft/hr	190	Types, Figure 3, Plot of group averages, 1973.
	Sandstone	11.2	ft/hr	224	
	Orthoquartzite	5.2	ft/hr	104	
	Quartzite	3.6	ft/hr	72	
NA	Schist	3.5	ft/hr	70	
					Projects Involving Robbins Equipment reported by TunnelBuilder.com,
11.5	Sandstone	55.0	m/day	180	Bolivia, Misicuni
16.2	Hardrock	28.8	m/day	94	China, Shanxi
13.3	NA	39.1	m/day	128	Ecuador, Manabi
32.8	Hardrock	30.0	m/day	98	New Zealand, Manapouri
18.7	NA	38.0	m/day	125	Peru, Chinango
18.2	Limestone	57.2	m/day	188	United States, Illinios
10.4	Sandstone, shale	58.1	m/day	191	United States, Colorado, Plateau Creek
11	Sandstones	50	ft/day	50	Jacobs Associates. Beatriz Reservoir Intake Tunnel, Tunnel Feasibility
NA	Quartzite	20	m/day	66	EM 1110-2-2901, May 30, 1997, Low values used of Drilling Rate Index
NA	Basalt	30	m/day	98	range given in Table C-10.
NA	Gneiss	30	m/day	98	
NA	Mica Gneiss/Coarse Granite	30	m/day	98	
NA	Schist/Phyllite	35	m/day	115	
NA	Med/Fine Granite	30	m/day	98	
NA	Limestone	50	m/day	164	
NA	Shale	55	m/day	180	
NA	Sandstone	45	m/day	148	
NA	Siltstone	60	m/day	197	

PROJECT FEATURES
& COSTS

Item	Description	Unit	Quantity	Unit Cost	Cost	
1	**CONSTRUCTION AND ACCESS ROADS**					
	1.1 Construction Road to Saddle Dams*	LF	13,800	$95	1,306,900	
	1.2 Road from South Dam to Intake Platform*	LF	1,800	$95	170,500	
	1.3 Road from intake platform down to Channel	LF	2,000	$95	189,400	
	1.4 Road from South Dam to Power Tunnel Portal Const.	LF	10,100	$95	956,400	
	1.5 Extension to Cable, Elevator Shafts & Surge Tank	LF	4,400	$95	416,700	
	1.5 Access road to Lower Inlet Platform	LF	4,000	$95	378,800	
	1.6 Inlet Platform Down to Channel	LF	3,000	$95	284,100	
	* Existing unpaved mining road					**3,702,700**
2	**CONSTRUCTION TUNNELS**					
	2.1 To Machine Hall Roof	CY	2,900	$208	603,200	
	2.2 To Transformer Hall Roof	CY	1,700	$208	353,600	
	2.3 To Power Shaft Construction	CY	8,500	$208	1,768,000	
	2.4 To Tailrace Surge Tank Construction Access	CY	1,900	$208	395,200	
						3,120,000
3	**ACCESS TUNNELS**					
	3.1 Main Access Tunnel (6628')					
	3.1.1 Excavation	CY	192,500	$208	40,040,000	
	3.1.2 Prelining Shotcrete(w/wire-mesh)	SY	20,600	$109	2,245,400	
	3.1.3 Invert concrete	CY	6,900	$500	3,450,000	
	3.1.4 Rock anchors (15' long)	EA	5,000	$300	1,500,000	
	3.2 Drainage Gallery Access Tunnel (L=80')					
	3.2.1 Excavation	CY	800	$208	166,400	
	3.2.2 Invert Concrete	CY	10	$500	5,000	
	3.2.3 Prelining	SY	200	$72	14,400	
	3.3 Tailrace Rock Trap Access Tunnel (L = 100')	LF	100	$780	78,000	
						47,499,200
4	**UPPER RESERVOIR**					
	4.1 South Saddle Dam	CY	218,400	$100	21,840,000	
	4.2 West Saddle dam	CY	72,100	$100	7,210,000	
	4.3 Upper Reservoir Intake Structure					
	4.3.1 Excavation	CY	12,000	$25	300,000	
	4.3.2 Concrete	CY	6,400	$878	5,616,000	
	4.3.3 Trashracks, Gares, miscl. Metals	Tons	100	$10,000	1,000,000	
						35,966,000
5	**UPPER PRESSURE TUNNEL (3963')**					
	5.1 Tunnel Excavation - TBM	CY	133,300	$156	20,794,800	
	5.2 Tunnel Prelining & Support (3")	SY	35,300	$72	2,541,600	
	5.3 Tunnel Lining	CY	36,300	$1,080	39,204,000	
	5.4 Miscellaneous Concrete (bent, plug etc)	CY	5,400	$1,080	5,832,000	
	5.5 Contact Grouting	CF	27,200	$42	1,142,400	
						69,514,800
6	**SURGE TANK**					
	6.1 Shaft Excavation - D/B	CY	8,900	$208	1,851,200	
	6.2 Benching Excavation	CY	35,300	$150	5,295,000	
	6.3 Concrete Works	CY	700	$878	614,300	
						7,760,500
7	**POWER SHAFT (1348')**					
	7.1 Power Shaft Excavation (1208') - D/B	CY	40,600	$208	8,444,800	
	7.2 Shaft Prelining & support	SF	2,200	$72	158,400	
	7.3 Concrete Lining	CY	11,100	$1,080	11,988,000	
	7.4 Contact Grouting	CF	9,300	$42	390,600	
						20,981,800
8	**LOWER PRESSURE TUNNEL (1563')**					
	8.1 Tunnel Excavation - TBM	CY	52,600	$156	8,205,600	
	8.2 Tunnel Prelining & Support (6")	SY	13,900	$109	1,515,100	
	8.3 Tunnel Lining	CY	14,300	$1,080	15,444,000	
	8.4 Miscellaneous Concrete (bent, plug etc)	CY	5,900	$1,080	6,372,000	
	8.5 Contact Grouting	CF	10,700	$42	449,400	
	8.6 Curtain Grouting	CF	5,800	$42	243,600	
						32,229,700
9	**PENSTOCK MANIFOLD (350')**					
	9.1 Manifold Tunnel Excavation - D/B	CY	7,400	$208	1,539,200	
	9.2 Manifold Tunnel Prelining & Support (3", 75%)	SY	2,400	$72	172,800	
	9.3 Concrete Lining	CY	1,800	$1,080	1,944,000	
	9.4 Concrete Plug	CY	10,700	$1,080	11,556,000	
						15,212,000
10	**PENSTOCKS (500')**					
	10.1 Penstock Tunnel Excavation - D/B	CY	18,900	$208	3,931,200	
	10.2 Penstock Tunnel Prelining & Support (3", 30%)	SY	3,800	$72	273,600	
	10.3 Steel liner installation	Tons	3,000	$12,000	36,000,000	
	10.4 Concrete Filling around Liner	CY	5,200	$1,080	5,616,000	
	10.5 Contact Grouting	LF	2,000	$59	118,000	
	10.6 Curtain Grouting	LS	1	$92,000	92,000	
						46,030,800
11	**DRAFT TUBE MANIFOLD (350')**					
	11.1 Manifold Tunnel Excavation - D/B	CY	7,400	$208	1,539,200	
	11.2 Manifold Tunnel Prelining & Support (3", 75%)	SY	2,400	$72	172,800	
	11.3 Concrete Lining	CY	1,600	$1,080	1,728,000	
	11.4 Tube Fingers Excavation (Total L=620')	CY	6,500	$208	1,352,000	
	11.5 Tube Fingers Prelining	SY	4,100	$72	295,200	
	11.6 Tube Fingers Concrete	CY	1,200	$1,080	1,296,000	
						6,383,200
12	**TAILRACE TUNNEL (6635')**					
	12.1 Tailrace Tunnel Excavation - TBM	CY	223,100	$156	34,803,600	
	12.2 Tailrace Tunnel Prelining & Support (3", 100%)	SY	79,700	$109	8,578,300	
	12.3 Plug Concrete Construction	CY	3,400	$1,080	3,672,000	
	12.4 Plug -Radial Grout injection	LS	1	$92,000	92,000	
	12.5 Rock Trap Construction	LS	1	$950,000	950,000	
	12.6 D/S Surge Tank Construction	LS	1	$6,000,000	6,000,000	
						54,095,900

PROJECT FEATURES
& COSTS

Item	Description	Unit	Quantity	Unit Cost	Cost	
13	**MACHINE HALL**					
	13.1 Excavation Draft Tubes(El.-16,El.-36)	CY	4,600	$208	956,800	
	Benching excavation (El.-16,18)	CY	22,700	$156	3,541,200	
	Hall Benching excavation (El.18,El.85)	CY	64,000	$156	9,984,000	
	Roof excavation (El.85 , 100)	CY	9,900	$208	2,059,200	
	13.2 Roof &Walls Support (W/3" shotcrete)	SF	96,700	$42	4,082,700	
	13.3 Concrete					
	Draft Tubes El.-41, EL.-16	CY	4,500	$1,000	4,500,000	
	Machine Hall El.-16, El.-12	CY	2,700	$800	2,160,000	
	Machine Hall El.-12, El.+9	CY	10,100	$1,000	10,100,000	
	Machine Hall El.9, El. 19	CY	1,100	$1,000	1,100,000	
	Machine Hall El.19, El.21	CY	1,900	$800	1,520,000	
	Machine Hall slab El. 38	CY	1,000	$1,000	1,000,000	
	Machine Hall Walls El. 9, El.18	CY	500	$1,000	500,000	
	Machine Hall Walls El.18, El.85	CY	5,100	$1,000	5,100,000	
	Machine Hall Roof	CY	2,600	$1,000	2,600,000	
	13.4 Draft Tube Liner	Tons	220	$12,000	2,640,000	
	Draft Tube Contact Grouting	LS	1	$340,000	340,000	
	13.5 Elevator Shaft Construction	LS	1	$1,194,647	1,194,600	
	13.6 Miscellaneous Metal works	LS	1	$500,000	500,000	
	13.7 Drainage Gallery Construction	LS	1	$852,013	852,000	
	13.8 96" Dia. Spherical Valve	EA	4	$360,000	1,440,000	
						56,170,500
14	**TURBINES/GENERATORS**					
	14.1 Water to Wire Package	EA	4	$60,000,000	240,000,000	
	14.2 Installation	EA	4	$15,000,000	60,000,000	
						300,000,000
15	**TRANSFORMER HALL**					
	15.1 Excavation					
	Transformer Hall Excavation	CY	30,900	$156	4,820,400	
	Nishe Excavation	CY	2,700	$208	561,600	
	Cable Gallery Excavation	CY	700	$208	145,600	
	A/C Gallery Excavation	CY	100	$208	20,800	
	Cable Shaft Excavation	CY	4,700	$156	733,200	
	15.2 Roof & Wall Support					
	Transformer Hall	SF	44,300	$35	1,566,500	
	Nishe	SF	2,500	$12	30,400	
	Cable Gallery	SF	3,200	$12	38,900	
	A/C Gallery	SF	100	$12	1,200	
	Cable Shaft	SF	56,900	$12	691,200	
	15.3 Concrete works	CY	3,900	$1,000	3,900,000	
	15.4 Miscellaneous Steel	LS	1	$472,764	472,800	
	15.5 Transfer Station					
	Grading	CY	820	$10	8,200	
	Gravel Base	CY	410	$40	16,400	
	Fence	LS	1	$20,000	20,000	
	Towers	Tons	7	$15,000	105,000	
	Footings	LS	1	$18,000	18,000	
	O/H Transmission Lines, (Two pll. each 0.9 mile long)	Mile	1.8	$300,000	540,000	
						13,690,200
16	**LOWER RESERVOIR**	CY				
	16.1 Platform Excavation	CY	661,000	$25	16,525,000	
	16.2 Access tunnel portal concrete	CY	180	$500	90,000	
	16.3 Intake structure excavation	CY	13,900	$40	556,000	
	16.4 Intake structure concrete	CY	6,400	$800	5,120,000	
	16.5 Trashracks, Gares, misc. Metals	Tons	100	$10,000	1,000,000	
						23,291,000
17	**Unlisted Items (10% of all other items)**	LS	1	$73,564,800	73,564,800	**73,564,800**
				Total	809,213,100	
	Base Construction Subtotal (BCS)				**$809,213,100**	
	Mobilization @ 5% of BSC				$40,460,700	
	Construction Contingencies (15% of BCS+Mob.)				$127,451,100	
	Direct Construction Subtotal (DCS)				**$977,124,900**	
	Design Engineering (4% of DCS)				$39,085,000	
	Permitting (.5% of DCS)				$4,885,600	
	Legal and Administrative Costs (.3% of DCS)				$2,931,400	
	Construction Administration and Engineering (5% of DCS)				$48,856,200	
	Opinion of Probable Construction Costs (OPCC) 2008				**$1,072,880,000**	

GEI Consultants, Inc.
080473 Eagle Mountain Pumped Storage Project
Reservoir Filling Calculations
4/7/2009
NDM

RESERVOIR FILLING CALCULATIONS

Purpose: Estimate the time required to fill the Eagle Mountain Pumped Storage Project Reservoirs to full operating capacity.

Procedure: Calculate inflow, losses, and final reservoir levels based on a monthly time step.

Calculation Steps:

1. Determine volume of groundwater pumped from wells to Lower Reservoir (varies by month).
2. Determine Lower Reservoir storage and water surface elevation after inflow from groundwater wells.
3. Subtract seepage and evaporation losses from Lower Reservoir.
4. If Lower Reservoir level is above 25% active capacity, pump available water up to the Upper Reservoir.
5. Determine the Upper Reservoir storage and water surface elevation after inflow from Lower Reservoir.
6. Subtract seepage and evaporation losses from Upper Reservoir.
7. Repeat steps 1 through 6 until Upper Reservoir is at full capacity.

See attached calculation table and required inputs.

Attached Charts:

1. Eagle Mountain Pumped Storage Project Lower Reservoir Filling:
   This graph shows the Lower Reservoir storage and water surface elevation just before pumping to the Upper Reservoir and the storage and water surface elevation after pumping to the Upper Reservoir, for each monthly time step.

2. Eagle Mountain Pumped Storage Project Upper Reservoir Filling:
   This graph shows the Upper Reservoir storage and water surface elevation just before pumping from the Lower Reservoir and the storage and water surface elevation after pumping From the Lower Reservoir, for each monthly time step.

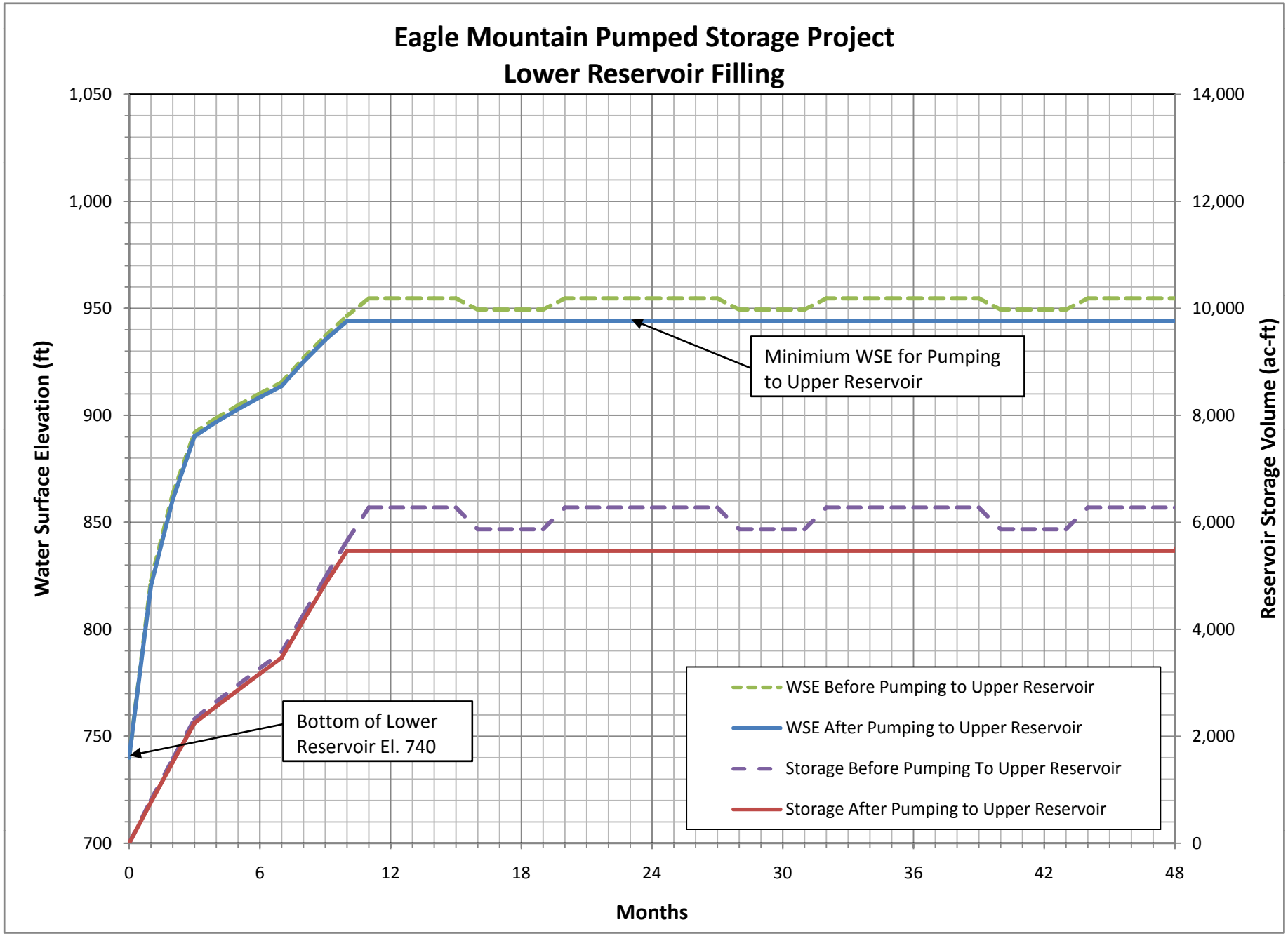
3. Eagle Mountain Pumped Storage Project Groundwater Supply and Lower Reservoir Pumping:
   This graph shows the volume of water pumped from the groundwater supply wells to Lower Reservoir, and the water pumped from the Lower Reservoir to the Upper Reservoir, for each monthly time step.

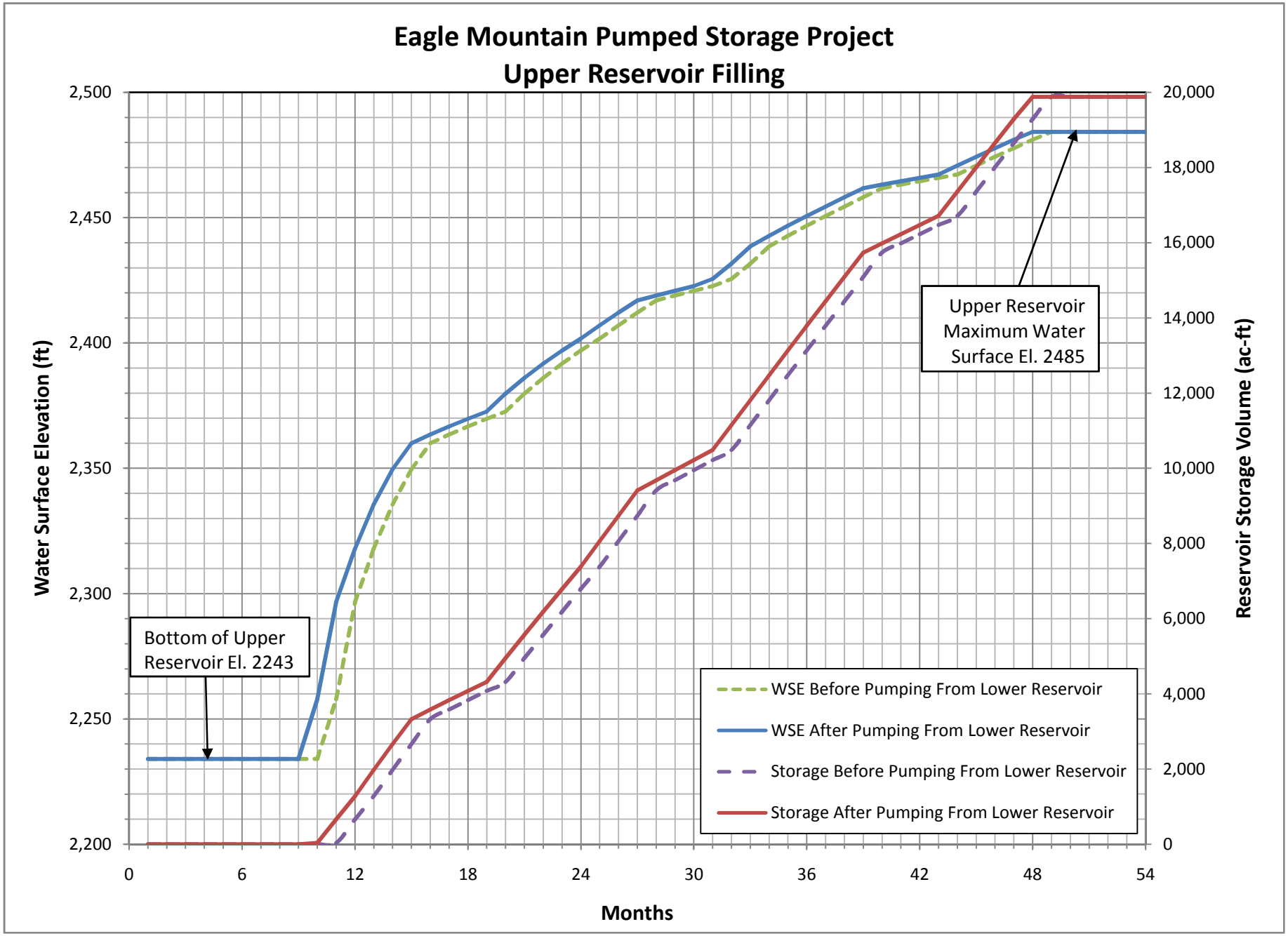
GEI Consultants, Inc.
080473 Eagle Mountain Pumped Storage Project
Reservoir Filling
4/7/2009
NDM

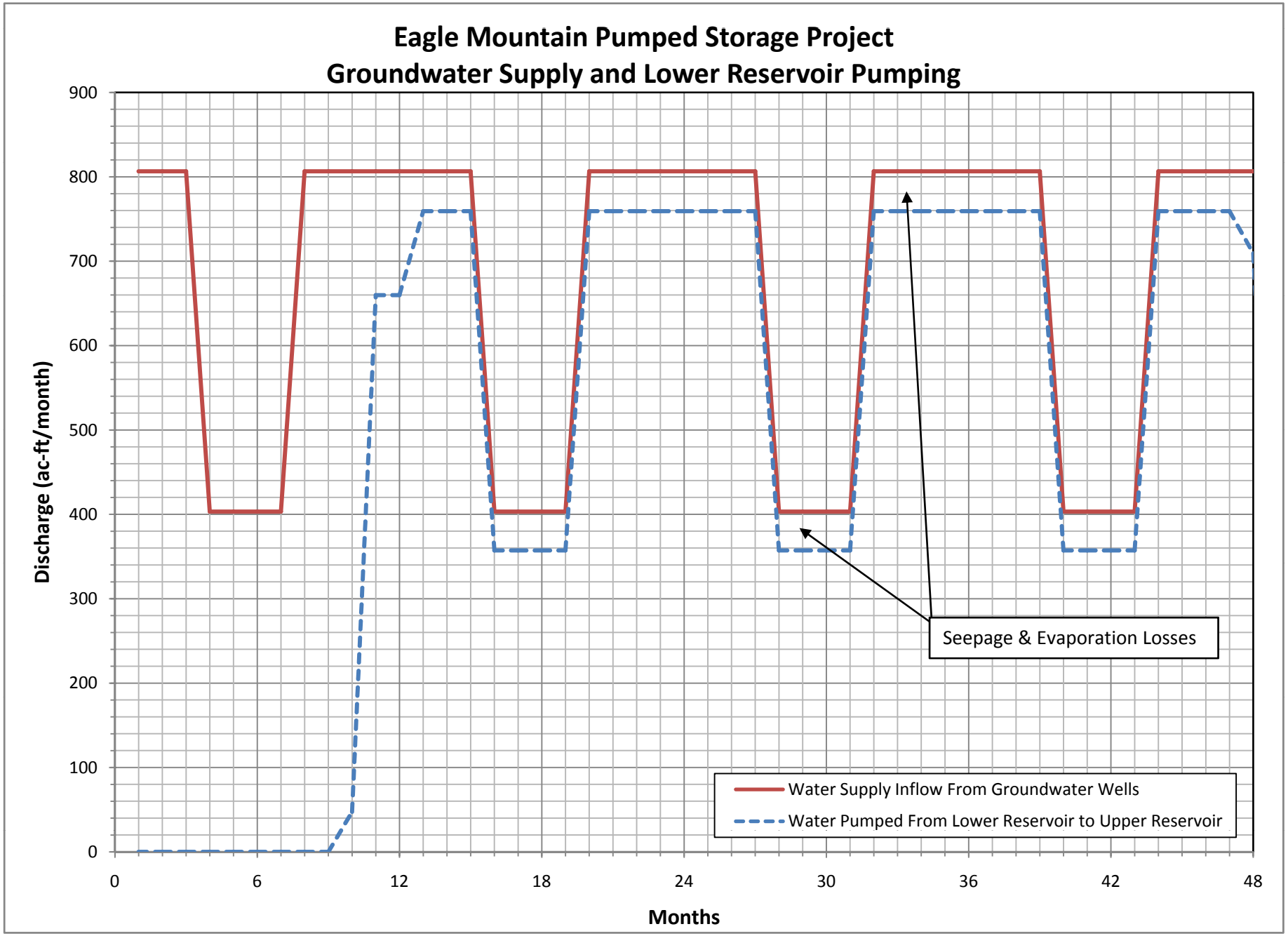
INPUT DATA		
First Filling Month	March	
Pumping Duration Oct-May, t1:	24	hrs
Pumping Duration Jun-Sept, t2:	12	hrs
Pumping Rate, Q:	6,000	gpm
Pumping Rate, Q:	13.37	cfs
Pumping Rate, Q1:	9679	AF/yr
Pumping Rate, Q2:	4839	AF/yr
Evaporation Rate:	7.5	ft/yr

SEEPAGE DATA		
LR Seepage at Max. El.:	2765	AF/yr
LR Seepage at Min. El.:	863	AF/yr
Begin LR Seepage Pumpback Month:	12	
UR Seepage at Max. El.:	1913	AF/yr
UR Seepage at Min. El.:	456	AF/yr
Begin UR Seepage Pumpback Month:	24	

			Lower Reservoir											Upper Reservoir										
Month Count	Month	Water Supply Pipeline Discharge (ac-ft)	Starting Elevation (ft)	Starting Storage (ac-ft)	After Filling Storage (ac-ft)	After Filling Elevation (ft)	Evaporation (ac-ft)	Seepage (ac-ft)	Intermediate Storage Volume (ac-ft)	Intermediate Water Surface Elevation (ft)	Percent of Total Capacity (%)	Final Storage Volume (ac-ft)	Final Water Surface Elevation (ft)	Available Pumping Volume to UR (ac-ft)	UR Starting Elevation (ft)	Starting Storage (ac-ft)	Ending Storage (ac-ft)	Volume Pumped (ac-ft)	Ending Elevation (ft)	Evaporation (ac-ft)	Seepage (ac-ft)	Final Storage Volume (ac-ft)	Final Water Surface Elevation (ft)	Percent of Total Capacity (%)
1	March	807	740.0	0	807	822.6	7	32	768	820.2	3.5%	768	820.2	0	2234	0	0.0	0.0	2234.0	0.0	0.0	0.0	2234.0	0.0%
2	April	807	820.2	768	1575	863.3	12	48	1515	860.6	6.9%	1515	860.6	0	2234	0	0.0	0.0	2234.0	0.0	0.0	0.0	2234.0	0.0%
3	May	807	860.6	1515	2322	892.0	15	59	2247	890.2	10.3%	2247	890.2	0	2234	0	0.0	0.0	2234.0	0.0	0.0	0.0	2234.0	0.0%
4	June	403	890.2	2247	2651	898.7	30	62	2559	896.9	11.7%	2559	896.9	0	2234	0	0.0	0.0	2234.0	0.0	0.0	0.0	2234.0	0.0%
5	July	403	896.9	2559	2963	904.7	32	64	2867	902.9	13.1%	2867	902.9	0	2234	0	0.0	0.0	2234.0	0.0	0.0	0.0	2234.0	0.0%
6	August	403	902.9	2867	3270	910.2	34	66	3170	908.4	14.5%	3170	908.4	0	2234	0	0.0	0.0	2234.0	0.0	0.0	0.0	2234.0	0.0%
7	September	403	908.4	3170	3573	915.4	36	68	3469	913.7	15.8%	3469	913.7	0	2234	0	0.0	0.0	2234.0	0.0	0.0	0.0	2234.0	0.0%
8	October	807	913.7	3469	4276	926.7	38	74	4164	925.0	19.0%	4164	925.0	0	2234	0	0.0	0.0	2234.0	0.0	0.0	0.0	2234.0	0.0%
9	November	807	925.0	4164	4971	937.0	42	83	4846	935.2	22.1%	4846	935.2	0	2234	0	0.0	0.0	2234.0	0.0	0.0	0.0	2234.0	0.0%
10	December	807	935.2	4846	5652	946.5	44	92	5516	944.6	25.2%	5469	944.0	47	2234	0	47.4	47.4	2259.0	0.6	8.7	38.1	2257.9	0.2%
11	January	807	944.0	5469	6275	954.7	47	100	6128	952.8	28.0%	5469	944.0	660	2258	38	697.8	659.8	2297.9	10.0	22.3	665.5	2296.6	3.3%
12	February	807	944.0	5469	6275	954.7	47	100	6128	952.8	28.0%	5469	944.0	660	2297	666	1325.3	659.8	2319.2	17.5	29.7	1278.0	2317.9	6.4%
13	March	807	944.0	5469	6275	954.7	47	0	6228	954.0	28.4%	5469	944.0	759	2318	1278	2037.4	759.3	2336.9	24.6	35.9	1976.9	2335.5	9.9%
14	April	807	944.0	5469	6275	954.7	47	0	6228	954.0	28.4%	5469	944.0	759	2336	1977	2736.2	759.3	2350.9	30.0	44.7	2661.6	2349.6	13.3%
15	May	807	944.0	5469	6275	954.7	47	0	6228	954.0	28.4%	5469	944.0	759	2350	2662	3420.9	759.3	2361.3	39.5	53.6	3327.8	2360.0	16.6%
16	June	403	944.0	5469	5872	949.4	46	0	5826	948.8	26.6%	5469	944.0	357	2360	3328	3685.0	357.2	2364.8	45.8	56.6	3582.6	2363.5	17.9%
17	July	403	944.0	5469	5872	949.4	46	0	5826	948.8	26.6%	5469	944.0	357	2363	3583	3939.8	357.2	2368.1	47.2	59.4	3833.2	2366.7	19.2%
18	August	403	944.0	5469	5872	949.4	46	0	5826	948.8	26.6%	5469	944.0	357	2367	3833	4190.4	357.2	2371.1	50.1	62.0	4078.3	2369.8	20.4%
19	September	403	944.0	5469	5872	949.4	46	0	5826	948.8	26.6%	5469	944.0	357	2370	4078	4435.5	357.2	2374.0	51.5	64.5	4319.5	2372.6	21.6%
20	October	807	944.0	5469	6275	954.7	47	0	6228	954.0	28.4%	5469	944.0	759	2373	4319	5078.8	759.3	2381.1	55.7	70.6	4952.6	2379.7	24.8%
21	November	807	944.0	5469	6275	954.7	47	0	6228	954.0	28.4%	5469	944.0	759	2380	4953	5711.9	759.3	2387.4	61.4	75.9	5574.5	2386.1	27.9%
22	December	807	944.0	5469	6275	954.7	47	0	6228	954.0	28.4%	5469	944.0	759	2386	5575	6333.8	759.3	2393.1	65.3	80.8	6187.7	2391.8	30.9%
23	January	807	944.0	5469	6275	954.7	47	0	6228	954.0	28.4%	5469	944.0	759	2392	6188	6947.0	759.3	2398.3	72.9	85.2	6788.8	2397.0	33.9%
24	February	807	944.0	5469	6275	954.7	47	0	6228	954.0	28.4%	5469	944.0	759	2397	6789	7548.2	759.3	2403.0	76.5	89.3	7382.3	2401.7	36.9%
25	March	807	944.0	5469	6275	954.7	47	0	6228	954.0	28.4%	5469	944.0	759	2402	7382	8141.6	759.3	2407.6	80.3	0.0	8061.3	2407.0	40.3%
26	April	807	944.0	5469	6275	954.7	47	0	6228	954.0	28.4%	5469	944.0	759	2407	8061	8820.6	759.3	2412.7	82.5	0.0	8738.1	2412.1	43.7%
27	May	807	944.0	5469	6275	954.7	47	0	6228	954.0	28.4%	5469	944.0	759	2412	8738	9497.4	759.3	2417.6	85.6	0.0	9411.8	2417.0	47.1%
28	June	403	944.0	5469	5872	949.4	46	0	5826	948.8	26.6%	5469	944.0	357	2417	9412	9769.1	357.2	2419.5	87.5	0.0	9681.5	2418.9	48.4%
29	July	403	944.0	5469	5872	949.4	46	0	5826	948.8	26.6%	5469	944.0	357	2419	9682	10038.8	357.2	2421.4	88.5	0.0	9950.3	2420.8	49.8%
30	August	403	944.0	5469	5872	949.4	46	0	5826	948.8	26.6%	5469	944.0	357	2421	9950	10307.5	357.2	2423.3	89.7	0.0	10217.8	2422.7	51.1%
31	September	403	944.0	5469	5872	949.4	46	0	5826	948.8	26.6%	5469	944.0	357	2423	10218	10575.1	357.2	2427.4	90.8	0.0	10484.3	2425.6	52.4%
32	October	807	944.0	5469	6275	954.7	47	0	6228	954.0	28.4%	5469	944.0	759	2426	10484	11243.6	759.3	2432.2	92.9	0.0	11150.7	2431.6	55.8%
33	November	807	944.0	5469	6275	954.7	47	0	6228	954.0	28.4%	5469	944.0	759	2432	11151	11910.0	759.3	2439.2	96.1	0.0	11814.0	2438.6	59.1%
34	December	807	944.0	5469	6275	954.7	47	0	6228	954.0	28.4%	5469	944.0	759	2439	11814	12573.3	759.3	2443.3	99.3	0.0	12474.0	2442.7	62.4%
35	January	807	944.0	5469	6275	954.7	47	0	6228	954.0	28.4%	5469	944.0	759	2443	12474	13233.3	759.3	2447.4	101.6	0.0	13131.7	2446.7	65.7%
36	February	807	944.0	5469	6275	954.7	47	0	6228	954.0	28.4%	5469	944.0	759	2447	13132	13891.0	759.3	2451.3	104.7	0.0	13786.4	2450.6	68.9%
37	March	807	944.0	5469	6275	954.7	47	0	6228	954.0	28.4%	5469	944.0	759	2451	13786	14545.7	759.3	2455.0	107.7	0.0	14438.0	2454.4	72.2%
38	April	807	944.0	5469	6275	954.7	47	0	6228	954.0	28.4%	5469	944.0	759	2454	14438	15197.3	759.3	2458.8	109.4	0.0	15087.9	2458.1	75.4%
39	May	807	944.0	5469	6275	954.7	47	0	6228	954.0	28.4%	5469	944.0	759	2458	15088	15847.2	759.3	2462.4	110.9	0.0	15736.4	2461.8	78.7%
40	June	403	944.0	5469	5872	949.4	46	0	5826	948.8	26.6%	5469	944.0	357	2462	15736	16093.6	357.2	2463.8	111.7	0.0	15981.9	2463.2	79.9%
41	July	403	944.0	5469	5872	949.4	46	0	5826	948.8	26.6%	5469	944.0	357	2463	15982	16339.2	357.2	2465.1	112.4	0.0	16226.8	2464.5	81.1%
42	August	403	944.0	5469	5872	949.4	46	0	5826	948.8	26.6%	5469	944.0	357	2465	16227	16584.0	357.2	2466.5	112.4	0.0	16471.7	2465.9	82.4%
43	September	403	944.0	5469	5872	949.4	46	0	5826	948.8	26.6%	5469	944.0	357	2466	16472	16828.9	357.2	2467.9	113.0	0.0	16715.9	2467.2	83.6%
44	October	807	944.0	5469	6275	954.7	47	0	6228	954.0	28.4%	5469	944.0	759	2467	16716	17475.2	759.3	2471.4	113.7	0.0	17361.5	2470.8	86.8%
45	November	807	944.0	5469	6275	954.7	47	0	6228	954.0	28.4%	5469	944.0	759	2471	17361	18120.8	759.3	2474.9	115.1	0.0	18005.7	2474.3	90.0%
46	December	807	944.0	5469	6275	954.7	47	0	6228	954.0	28.4%	5469	944.0	759	2474	18006	18765.0	759.3	2478.3	116.5	0.0	18648.6	2477.7	93.2%
47	January	807	944.0	5469	6275	954.7	47	0	6228	954.0	28.4%	5469	944.0	759	2478	18649	19407.9	759.3	2481.7	117.1	0.0	19290.8	2481.1	96.5%
48	February	807	944.0	5469	6275	954.7	47	0	6228	954.0	28.4%	5469	944.0	759	2481	19291	20000.0	709.2	2484.9	118.5	0.0	19881.5	2484.2	99.4%
49	March	807	944.0	5469	6275	954.7	47	0	6228	954.0	28.4%	6228	954.0	759	2484	19881	20000.0	118.5	2484.9	119.2	0.0	19880.8	2484.2	99.4%
50	April	807	954.0	6228	7035	964.1	50	0	6985	963.5	31.9%	6985	963.5	1516	2484	19881	20000.0	119.2	2484.9	119.2	0.0	19880.8	2484.2	99.4%
51	May	807	963.5	6985	7791	973.1	52	0	7739	972.5	35.3%	7739	972.5	2270	2484	19881	20000.0	119.2	2484.9	119.2	0.0	19880.8	2484.2	99.4%
52	June	403	972.5	7739	8142	977.1	54	0	8088	976.5	36.9%	8088	976.5	2620	2484	19881	20000.0	119.2	2484.9	119.2	0.0	19880.8	2484.2	99.4%
53	July	403	976.5	8088	8492	981.1	55	0	8437	980.4	38.5%	8437	980.4	2968	2484	19881	20000.0	119.2	2484.9	119.2	0.0	19880.8	2484.2	99.4%
54	August	403	980.4	8437	8840	984.9	56	0	8784	984.3	40.1%	8784	984.3	3315	2484	19881	20000.0	119.2	2484.9	119.2	0.0	19880.8	2484.2	99.4%
55	September	403	984.3	8784	9187	988.7	57	0	9130	988.0	41.7%	9130	988.0	3661	2484	19881	20000.0	119.2	2484.9	119.2	0.0	19880.8	2484.2	99.4%
56	October	807	988.0	9130	9936	996.5	59	0	9877	995.9	45.1%	9877	995.9	4409	2484	19881	20000.0	119.2	2484.9	119.2	0.0	19880.8	2484.2	99.4%
57	November	807	995.9	9877	10684	1004.1	61	0	10623	1003.5	48.5%	10623	1003.5	5154	2484	19881	20000.0	119.2	2484.9	119.2	0.0	19880.8	2484.2	99.4%
58	December	807	1003.5	10623	11429	1011.5	63	0	11366	1010.8	51.9%	11366	1010.8	5897	2484	19881	20000.0	119.2	2484.9	119.2	0.0	19880.8	2484.2	99.4%
59	January	807	1010.8	11366	12172	1018.6	65	0	12108	1018.0	55.3%	12108	1018.0	6639	2484	19881	20000.0	119.2	2484.9	119.2	0.0	19880.8	2484.2	99.4%
60	February	807	1018.0	12108	12914	1025.5	67	0	12847	1024.8	58.7%	12847	1024.8	7379	2484	19881	20000.0	119.2	2484.9	119.2	0.0	19880.8	2484.2	99.4%


Eagle Mountain Pumped Storage Project
Lower Reservoir Filling
Water Surface Elevation (ft)
Reservoir Storage Volume (ac-ft)
Months
1,050
1,000
950
900
850
800
750
700
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
0
6
12
18
24
30
36
42
48
Minimium WSE for Pumping to Upper Reservoir
Bottom of Lower Reservoir El. 740
WSE Before Pumping to Upper Reservoir
WSE After Pumping to Upper Reservoir
Storage Before Pumping To Upper Reservoir
Storage After Pumping to Upper Reservoir


Eagle Mountain Pumped Storage Project
Upper Reservoir Filling
Water Surface Elevation (ft)
Reservoir Storage Volume (ac-ft)
Months
2,500
2,450
2,400
2,350
2,300
2,250
2,200
20,000
18,000
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
0
6
12
18
24
30
36
42
48
54
Bottom of Upper Reservoir El. 2243
Upper Reservoir Maximum Water Surface El. 2485
WSE Before Pumping From Lower Reservoir
WSE After Pumping From Lower Reservoir
Storage Before Pumping From Lower Reservoir
Storage After Pumping From Lower Reservoir


Eagle Mountain Pumped Storage Project
Groundwater Supply and Lower Reservoir Pumping
Discharge (ac-ft/month)
900
800
700
600
500
400
300
200
100
0
0
6
12
18
24
30
36
42
48
Months
Seepage & Evaporation Losses
Water Supply Inflow From Groundwater Wells
Water Pumped From Lower Reservoir to Upper Reservoir