April 8, 2015

NEOMED RESEARCH AND GRADUATE EDUCATION + COMPARATIVE MEDICAL UNIT APPENDICES

PSUAE

MECHANICAL OPTION Advisor: Dr. James D. Freihaut

Appendices

Appendix A: Trane TRACE 700 Reports

SYSTEM SUMMARY

DESIGN AIRFLOW QUANTITIES
By ACADEMIC

System Description	System Type	MAIN SYSTEM Outside Airflow cfm	Cooling Airflow cfm	Heating Airflow cfm	Return Airflow cfm	Exhaust Airflow cfm	Auxiliary System Supply Airflow cfm	Room Exhaust Airflow cfm
Alternative 1								
RGE AHU-1	Variable Volume Reheat (30% Min Flow Default)	68,749	98,914	29,914	98,914	68,749	0	96,704
RGE AHU-2	Variable Volume Reheat (30% Min Flow Default)	297,689	299,921	91,650	299,921	297,689	0	311,391
RGE AHU-3	Variable Volume Reheat (30% Min Flow Default)	3,245	26,354	8,001	26,354	3,245	0	10,572
RGE AHU-4	Bypass Multizone	450	18,956	18,956	18,956	450	0	18,753
Totals		370,133	444,145	148,521	444,145	370,133	0	437,420

Note: Airflows on this report are not additive because they are each taken at the time of their respective peaks. To view the balanced system design airflows, see the appropriate Checksums report (Airflows section).

Project Name: Neomed Research and Graduate Education
Dataset Name: TECH 2.trc

TRACE® 700 v6.3 calculated at 03:46 AM on 10/05/2014
Design Airflow Quantities Report Page 1 of 1

SYSTEM SUMMARY

DESIGN COOLING CAPACITIES

By ACADEMIC

Alternative 1

Building Airside Systems and Plant Capacities

		Peak Plant Loads								Block Plant Loads								
Plant	System	Main Coil ton	Aux Coil ton	Opt Vent Coil ton	Misc Load ton	Stg 1 Desic Cond ton	Stg 2 Desic Cond ton	Base Utility ton	Peak Total ton	Time Of Peak mo/hr	Main Coil ton	Aux Coil ton	Opt Vent Coil ton	Misc Load ton	Stg 1 Desic Cond ton	Stg 2 Desic Cond ton	Base Utility ton	Block Total ton
Cooling plant - 001		1,958.9	0.0	0.0	0.0	0.0	0.0	0.0	1,958.9	7/16	1,749.0	0.0	0.0	0.0	0.0	0.0	0.0	1,749.0
	RGE AHU-1	386.6	0.0	0.0	0.0	0.0	0.0	0.0	386.6	7/16	353.8	0.0	0.0	0.0	0.0	0.0	0.0	353.8
	RGE AHU-2	1,486.9	0.0	0.0	0.0	0.0	0.0	0.0	1,486.9	7/16	1,312.4	0.0	0.0	0.0	0.0	0.0	0.0	1,312.4
	RGE AHU-3	54.5	0.0	0.0	0.0	0.0	0.0	0.0	54.5	7/16	53.1	0.0	0.0	0.0	0.0	0.0	0.0	53.1
	RGE AHU-4	30.9	0.0	0.0	0.0	0.0	0.0	0.0	30.9	7/16	29.7	0.0	0.0	0.0	0.0	0.0	0.0	29.7
Building totals		1,958.9	0.0	0.0	0.0	0.0	0.0	0.0	1,958.9		1,749.0	0.0	0.0	0.0	0.0	0.0	0.0	1,749.0

Building peak load is 1,958.9 tons.

Building maximum block load of 1,749.0 tons occurs in July at hour 16 based on system simulation.

Project Name: Neomed Research and Graduate Education
Dataset Name: TECH 2.trc

TRACE® 700 v6.3 calculated at 03:46 AM on 10/06/2014
Design Capacity Quantities report Page 1 of 1

SYSTEM SUMMARY
DESIGN HEATING CAPACITIES
By ACADEMIC

Alternative 1

System Coil Capacities

System Description	System Type	Main System Btu/h	Aux System Btu/h	Preheat Btu/h	Reheat Btu/h	Humid. Btu/h	Optional Vent Btu/h	Stg 1 Desic Regen Btu/h	Stg 2 Desic Regen Btu/h	Stg 1 Frost Prevention Btu/h	Stg 2 Frost Prevention Btu/h	Heating Totals Btu/h
RGE AHU-1	Variable Volume Reheat (30% Min Flow Default)	-3,279,402	0	-3,504,387	-576,530	0	0	0	0	0	0	-6,783,789
RGE AHU-2	Variable Volume Reheat (30% Min Flow Default)	-4,792,309	0	-14,572,320	-1,951,715	0	0	0	0	0	0	-19,364,628
RGE AHU-3	Variable Volume Reheat (30% Min Flow Default)	-1,271,535	0	-170,008	-141,833	0	0	0	0	0	0	-1,441,542
RGE AHU-4	Bypass Multizone	-66,281	0	0	0	0	0	0	0	0	0	-66,281
Totals		-9,409,526	0	-18,246,715	-2,670,078	0	0	0	0	0	0	-27,656,240

Building Plant Capacities

Plant	System	Peak Loads												
		Main Coil MBh	Preheat Coil MBh	Reheat Coil MBh	Humid. Coil MBh	Aux Coil MBh	Opt Vent Coil MBh	Misc Load MBh	Stg 1 Desic. Regen. MBh	Stg 2 Desic. Regen. MBh	Stg 1 Frost Prev. MBh	Stg 2 Frost Prev. MBh	Base Utility MBh	Absorption Load MBh
Heating plant - 002		9,410	18,247	0	0	0	0	0	0	0	0	0	0	0
	RGE AHU-1	3,279	3,504	0	0	0	0	0	0	0	0	0	0	0
	RGE AHU-2	4,792	14,572	0	0	0	0	0	0	0	0	0	0	0
	RGE AHU-3	1,272	170	0	0	0	0	0	0	0	0	0	0	0
	RGE AHU-4	66	0	0	0	0	0	0	0	0	0	0	0	0

Building peak load is 27,656.2 MBh.

Project Name: Neomed Research and Graduate Education
Dataset Name: TECH 2.trc

TRACE® 700 v6.3 calculated at 03:46 AM on 10/06/2014
Design Capacity Quantities report Page 1 of 1

Economic Summary

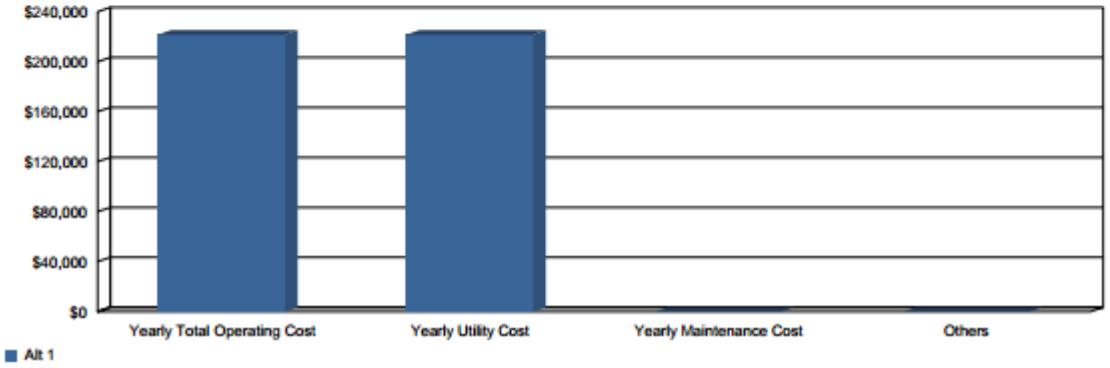
Project Information

Location	Rootstown, Ohio	Study Life:	20 years
Project Name	Neomed Research and Graduate Education	Cost of Capital:	10 %
User	Samuel T Bridwell	Alternative 1:	
Company	The Pennsylvania State University		
Comments			

Economic Comparison of Alternatives

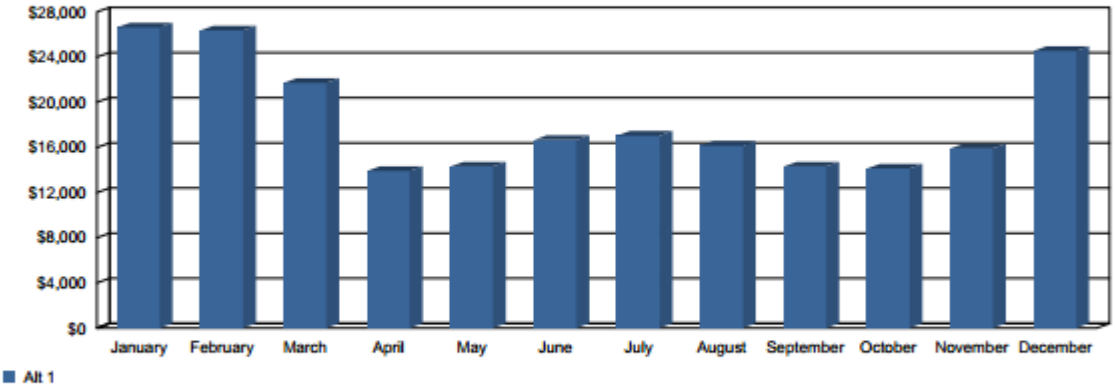
Yearly Savings ($)	First Cost Difference ($)	Cumulative Cash Flow Difference ($)	Simple Payback (yrs.)	Net Present Value ($)	Life Cycle Payback (yrs.)	Internal Rate of Return (%)	Life Cycle Cost

Annual Operating Costs



Yearly Total Operating Cost ($)	Yearly Utility Cost ($)	Yearly Maintenance Cost ($)	Plant kWh/ton-hr

Monthly Utility Costs



Project Name: Neomed Research and Graduate Education
Dataset Name: TECH 2.trc

TRACE 700 6.3
calculated at 03:46 AM on 10/06/2014

ENERGY CONSUMPTION SUMMARY

By ACADEMIC

	Elect Cons. (kWh)	Gas Cons. (kBtu)	Water Cons. (1000 gals)	% of Total Building Energy	Total Building Energy (kBtu/yr)	Total Source Energy* (kBtu/yr)
Alternative 1						
Primary heating						
Primary heating		19,913,922		57.9 %	19,913,922	20,962,024
Other Htg Accessories	43,022			0.4 %	146,834	440,546
Heating Subtotal	**43,022**	**19,913,922**		**58.3 %**	**20,060,756**	**21,402,570**
Primary cooling						
Cooling Compressor	950,519			9.4 %	3,244,121	9,733,337
Tower/Cond Fans	272,359		7,413	2.7 %	929,562	2,788,966
Condenser Pump				0.0 %	0	0
Other Clg Accessories	10,814			0.1 %	36,908	110,736
Cooling Subtotal....	**1,233,692**		**7,413**	**12.2 %**	**4,210,592**	**12,633,038**
Auxiliary						
Supply Fans	1,512,810			15.0 %	5,163,221	15,491,213
Pumps	90,001			0.9 %	307,174	921,613
Stand-alone Base Utilities				0.0 %	0	0
Aux Subtotal....	1,602,811			15.9 %	5,470,395	16,412,826
Lighting						
Lighting	1,355,949			13.5 %	4,627,855	13,884,954
Receptacle						
Receptacles	6,078			0.1 %	20,743	62,235
Cogeneration						
Cogeneration				0.0 %	0	0
Totals						
Totals**	**4,241,553**	**19,913,922**	**7,413**	**100.0 %**	**34,390,341**	**64,395,620**

* Note: Resource Utilization factors are included in the Total Source Energy value.
** Note: This report can display a maximum of 7 utilities. If additional utilities are used, they will be included in the total.

Project Name: Neomed Research and Graduate Education
Dataset Name: TECH 2.trc

TRACE® 700 v6.3 calculated at 03:46 AM on 10/06/2014
Alternative - 1 Energy Consumption Summary report page 1

Energy Cost Budget / PRM Summary

By ACADEMIC

Project Name: Neomed Research and Graduate Education	Date: October 06, 2014
City: Rootstown, Ohio	Weather Data: Akron, Ohio

Note: The percentage displayed for the "Proposed/ Base %" column of the base case is actually the percentage of the total energy consumption.

* Denotes the base alternative for the ECB study.

		* Alt-1		
		Energy 10^6 Btu/yr	Proposed / Base %	Peak kBtuh
Lighting - Conditioned	Electricity	4,627.9	13	528
Space Heating	Electricity	146.8	0	36
	Gas	19,913.9	58	6,994
Space Cooling	Electricity	3,281.0	10	1,666
Pumps	Electricity	307.2	1	111
Heat Rejection	Electricity	929.6	3	224
Fans - Conditioned	Electricity	5,163.2	15	1,620
Receptacles - Conditioned	Electricity	20.7	0	2
Total Building Consumption		34,390.3		

		* Alt-1
Total	Number of hours heating load not met	0
	Number of hours cooling load not met	0

	* Alt-1	
	Energy 10^6 Btu/yr	Cost/yr $/yr
Electricity	14,476.4	122,229
Gas	19,913.9	99,570
Total	34,390	221,799

Project Name: Neomed Research and Graduate Education
Dataset Name: TECH 2.trc

TRACE® 700 v6.3 calculated at 03:46 AM on 10/06/2014
Energy Cost Budget Report Page 1 of 1

MONTHLY ENERGY CONSUMPTION

By ACADEMIC

------ Monthly Energy Consumption ------

Utility	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Total
Alternative: 1													
Electric													
On-Pk Cons. (kWh)	232,362	209,454	241,360	266,940	382,432	542,511	673,198	562,125	391,157	263,034	241,512	235,466	4,241,551
On-Pk Demand (kW)	394	392	411	558	968	1,134	1,148	1,094	958	510	452	398	1,148
Off-Pk Demand (kW)	390	392	412	474	735	1,018	1,103	988	818	466	423	395	1,103
Mid-Pk Demand (kW)	404	405	424	475	777	1,122	1,174	1,072	818	455	427	409	1,174
Gas													
On-Pk Cons. (therms)	41,507	40,987	31,096	11,945	1,924	486	118	581	1,294	13,422	18,570	37,209	199,139
On-Pk Demand (therms/hr)	65	70	57	37	9	3	1	3	5	40	45	60	70
Water													
Cons. (1000gal)	57	51	59	179	741	1,525	2,043	1,640	802	190	67	58	7,413

Energy Consumption		
Building	349,705	Btu/(ft2-year)
Source	654,819	Btu/(ft2-year)
Floor Area	98,341	ft2

Environmental Impact Analysis	
CO2	7,666,942 lbm/year
SO2	53,207 gm/year
NOX	13,296 gm/year

Project Name: Neomed Research and Graduate Education
Dataset Name: TECH 2.trc

TRACE® 700 v6.3 calculated at 03:46 AM on 10/05/2014
Alternative - 1 Monthly Energy Consumption report Page 1 of 1

Appendix B: Designer Elite CHVAC 7 Reports

Building Summary Loads

Building peaks in August at 1pm.

Bldg Load Descriptions	Area Quan	Sen Loss	%Tot Loss	Lat Gain	Sen Gain	Net Gain	%Net Gain
Roof	5,638	23,257	9.69	0	11,900	11,900	2.29
Wall	8,148	67,219	28.00	0	11,747	11,747	2.26
Glass	6,252	149,585	62.31	0	166,211	166,211	31.97
Floor Slab	0	0	0.00	0	0	0	0.00
Skin Loads		240,061	100.00	0	189,858	189,858	36.52
Lighting	20,043	0	0.00	0	75,229	75,229	14.47
Equipment	30,283	0	0.00	0	113,661	113,661	21.86
People	246	0	0.00	67,650	67,650	135,300	26.03
Partition	0	0	0.00	0	0	0	0.00
Cool. Pret.	0	0	0.00	0	0	0	0.00
Heat. Pret.	0	0	0.00	0	0	0	0.00
Cool. Vent.	0	0	0.00	0	0	0	0.00
Heat. Vent.	0	0	0.00	0	0	0	0.00
Cool. Infil.	0	0	0.00	0	0	0	0.00
Heat. Infil.	0	0	0.00	0	0	0	0.00
Draw-Thru Fan	0	0	0.00	0	5,793	5,793	1.11
Blow-Thru Fan	0	0	0.00	0	0	0	0.00
Reserve Cap.	0	0	0.00	0	0	0	0.00
Reheat Cap.	0	0	0.00	0	0	0	0.00
Supply Duct	0	0	0.00	0	0	0	0.00
Return Duct	0	0	0.00	0	0	0	0.00
Misc. Supply	0	0	0.00	0	0	0	0.00
Misc. Return	0	0	0.00	0	0	0	0.00
Building Totals		240,061	100.00	67,650	452,191	519,841	100.00

Building Summary	Sen Loss	%Tot Loss	Lat Gain	Sen Gain	Net Gain	%Net Gain
Ventilation	0	0.00	0	0	0	0.00
Infiltration	0	0.00	0	0	0	0.00
Pretreated Air	0	0.00	0	0	0	0.00
Zone Loads	240,061	100.00	67,650	446,398	514,048	98.89
Plenum Loads	0	0.00	0	0	0	0.00
Fan & Duct Loads	0	0.00	0	5,793	5,793	1.11
Building Totals	240,061	100.00	67,650	452,191	519,841	100.00

Check Figures

Total Building Supply Air (based on a 17* TD):	25,265	CFM
Total Building Vent. Air (0.00% of Supply):	0	CFM
Total Conditioned Air Space:	20,043	Sq.ft
Supply Air Per Unit Area:	1.2605	CFM/Sq.ft
Area Per Cooling Capacity:	462.7	Sq.ft/Ton
Cooling Capacity Per Area:	0.0022	Tons/Sq.ft
Heating Capacity Per Area:	11.98	Btuh/Sq.ft
Total Heating Required With Outside Air:	240,061	Btuh
Total Cooling Required With Outside Air:	43.32	Tons

Chvac - Full Commercial HVAC Loads Calculation Program
SBM, Inc.
Uniontown, OH 44685-8797

Elite Software Development, Inc.
Neoucom RGE Labs
Page 3

Building Summary Loads

Building peaks in August at 3pm.

Bldg Load Descriptions	Area Quan	Sen Loss	%Tot Loss	Lat Gain	Sen Gain	Net Gain	%Net Gain
Roof	0	0	0.00	0	0	0	0.00
Wall	9,558	75,269	36.29	0	14,191	14,191	1.06
Glass	5,787	132,161	63.71	0	121,290	121,290	9.05
Floor Slab	0	0	0.00	0	0	0	0.00
Skin Loads		207,430	100.00	0	135,480	135,480	10.11
Lighting	59,835	0	0.00	0	214,374	214,374	16.00
Equipment	212,480	0	0.00	0	761,262	761,262	56.80
People	411	0	0.00	107,888	107,888	215,775	16.10
Partition	0	0	0.00	0	0	0	0.00
Cool. Pret.	0	0	0.00	0	0	0	0.00
Heat. Pret.	0	0	0.00	0	0	0	0.00
Cool. Vent.	0	0	0.00	0	0	0	0.00
Heat. Vent.	0	0	0.00	0	0	0	0.00
Cool. Infil.	0	0	0.00	0	0	0	0.00
Heat. Infil.	0	0	0.00	0	0	0	0.00
Draw-Thru Fan	0	0	0.00	0	0	0	0.00
Blow-Thru Fan	0	0	0.00	0	13,275	13,275	0.99
Reserve Cap.	0	0	0.00	0	0	0	0.00
Reheat Cap.	0	0	0.00	0	0	0	0.00
Supply Duct	0	0	0.00	0	0	0	0.00
Return Duct	0	0	0.00	0	0	0	0.00
Misc. Supply	0	0	0.00	0	0	0	0.00
Misc. Return	0	0	0.00	0	0	0	0.00
Building Totals		207,430	100.00	107,888	1,232,279	1,340,167	100.00

Building Summary	Sen Loss	%Tot Loss	Lat Gain	Sen Gain	Net Gain	%Net Gain
Ventilation	0	0.00	0	0	0	0.00
Infiltration	0	0.00	0	0	0	0.00
Pretreated Air	0	0.00	0	0	0	0.00
Zone Loads	207,430	100.00	107,888	1,219,004	1,326,891	99.01
Plenum Loads	0	0.00	0	0	0	0.00
Fan & Duct Loads	0	0.00	0	13,275	13,275	0.99
Building Totals	207,430	100.00	107,888	1,232,279	1,340,166	100.00

Check Figures

Total Building Supply Air (based on a 20° TD):	57,892	CFM
Total Building Vent. Air (0.00% of Supply):	0	CFM
Total Conditioned Air Space:	33,050	Sq.ft
Supply Air Per Unit Area:	1.7516	CFM/Sq.ft
Area Per Cooling Capacity:	295.9	Sq.ft/Ton
Cooling Capacity Per Area:	0.0034	Tons/Sq.ft
Heating Capacity Per Area:	6.28	Btuh/Sq.ft
Total Heating Required With Outside Air:	207,430	Btuh
Total Cooling Required With Outside Air:	111.68	Tons

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Monday, February 06, 2012, 11:29 AM

Chvac - Full Commercial HVAC Loads Calculation Program
SBM, Inc.
Uniontown, OH 44685-8797

Elite Software Development, Inc.
NEOMED CMU
Page 3

Building Summary Loads

Building peaks in June at 4pm.

Bldg Load Descriptions	Area Quan	Sen Loss	%Tot Loss	Lat Gain	Sen Gain	Net Gain	%Net Gain
Roof	14,704	68,146	7.83	0	52,478	52,478	5.63
Wall	8,414	34,199	3.93	0	8,255	8,255	0.89
Glass	280	8,487	0.98	0	15,496	15,496	1.66
Floor Slab	0	0	0.00	0	0	0	0.00
Skin Loads		110,832	12.73	0	76,229	76,229	8.17
Lighting	22,056	0	0.00	0	82,784	82,784	8.88
Equipment	21,584	0	0.00	9,680	81,011	90,691	9.73
People	78	0	0.00	21,513	21,513	43,027	4.61
Partition	0	0	0.00	0	0	0	0.00
Cool. Pret.	0	0	0.00	0	0	0	0.00
Heat. Pret.	0	0	0.00	0	0	0	0.00
Cool. Vent.	14,781	0	0.00	372,252	264,166	636,418	68.25
Heat. Vent.	9,948	759,475	87.27	0	0	0	0.00
Cool. Infil.	0	0	0.00	0	0	0	0.00
Heat. Infil.	0	0	0.00	0	0	0	0.00
Draw-Thru Fan	0	0	0.00	0	3,389	3,389	0.36
Blow-Thru Fan	0	0	0.00	0	0	0	0.00
Reserve Cap.	0	0	0.00	0	0	0	0.00
Reheat Cap.	0	0	0.00	0	0	0	0.00
Supply Duct	0	0	0.00	0	0	0	0.00
Return Duct	0	0	0.00	0	0	0	0.00
Misc. Supply	0	0	0.00	0	0	0	0.00
Misc. Return	0	0	0.00	0	0	0	0.00
Building Totals		870,307	100.00	403,445	529,093	932,538	100.00

Building Summary	Sen Loss	%Tot Loss	Lat Gain	Sen Gain	Net Gain	%Net Gain
Ventilation	759,475	87.27	372,252	264,166	636,418	68.25
Infiltration	0	0.00	0	0	0	0.00
Pretreated Air	0	0.00	0	0	0	0.00
Zone Loads	110,832	12.73	31,193	261,537	292,730	31.39
Plenum Loads	0	0.00	0	0	0	0.00
Fan & Duct Loads	0	0.00	0	3,389	3,389	0.36
Building Totals	870,307	100.00	403,445	529,093	932,538	100.00

Check Figures

Total Building Supply Air (based on a 17° TD):	14,781	CFM
Total Building Vent. Air (100.00% of Supply):	14,781	CFM
Total Conditioned Air Space:	14,704	Sq.ft
Supply Air Per Unit Area:	1.0052	CFM/Sq.ft
Area Per Cooling Capacity:	189.2	Sq.ft/Ton
Cooling Capacity Per Area:	0.0053	Tons/Sq.ft
Heating Capacity Per Area:	59.19	Btuh/Sq.ft
Total Heating Required With Outside Air:	870,307	Btuh
Total Cooling Required With Outside Air:	77.71	Tons

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Monday, February 06, 2012, 11:28 AM

Electrical Usage and Cost Yearly Comparison

		FY 03	FY 04	FY 05	FY 06	FY 07	FY 08	FY 09	FY 10	FY 11	FY 12	FY 13	FY 14	Monthly Average
July	Kilowatt Hrs	1,090,800	894,451	964,648	823,121	549,168	803,831	801,182	802,301	873,802	742,648	849,188	1,216,025	867,597
	Dollars	$76,356.00	$67,205.77	$68,984.20	$62,575.46	$57,427.03	$63,667.81	$68,700.57	$72,389.56	$66,113.17	$55,893.68	$62,790.24	$89,539.28	$67,636.90
	$/kwh	**$0.070**	**$0.075**	**$0.072**	**$0.076**	**$0.105**	**$0.079**	**$0.086**	**$0.090**	**$0.076**	**$0.075**	**$0.074**	**$0.074**	$0.079
	Temperature				74°	74°	69°	69°	68°	73°	70°	75°	72°	
August	Kilowatt Hrs	1,039,200	970,422	928,187	918,745	620,852	886,110	808,037	790,258	881,642	869,299	932,194	1,171,771	901,393
	Dollars	$73,246.12	$67,155.69	$68,692.77	$67,713.83	$59,254.89	$70,286.08	$72,088.86	$72,350.75	$65,413.83	$67,165.08	$70,420.68	$86,584.41	$70,031.08
	$/kwh	**$0.070**	**$0.069**	**$0.074**	**$0.074**	**$0.095**	**$0.079**	**$0.089**	**$0.092**	**$0.074**	**$0.077**	**$0.076**	**$0.074**	$0.079
	Temperature				73°	72°	73°	71°	71°	72°	77°	76°	71°	
September	Kilowatt Hrs	975,600	1,045,788	923,692	793,210	597,370	848,130	763,456	826,345	821,581	776,852	864,756	1,221,542	871,527
	Dollars	$68,278.54	$73,666.56	$66,987.11	$59,813.76	$52,618.74	$68,888.25	$65,895.67	$64,755.35	$61,569.34	$60,432.26	$65,455.19	$91,314.41	$66,639.60
	$/kwh	**$0.070**	**$0.070**	**$0.073**	**$0.075**	**$0.088**	**$0.081**	**$0.086**	**$0.078**	**$0.075**	**$0.078**	**$0.076**	**$0.075**	$0.077
	Temperature				68°	62°	67°	68°	64°	63°	70°	70°	70°	
October	Kilowatt Hrs	942,000	867,898	830,910	758,171	522,133	895,846	793,020	749,675	707,548	733,208	775,208	1,070,569	803,849
	Dollars	$64,867.04	$65,309.91	$62,178.27	$56,046.41	$49,896.64	$68,339.73	$64,477.73	$59,299.41	$54,968.49	$55,617.58	$59,044.17	$73,620.25	$61,138.80
	$/kwh	**$0.069**	**$0.075**	**$0.075**	**$0.074**	**$0.096**	**$0.076**	**$0.081**	**$0.079**	**$0.078**	**$0.076**	**$0.076**	**$0.069**	$0.077
	Temperature				54°	50°	59°	60°	58°	52°	60°	56°	61°	
November	Kilowatt Hrs	801,600	814,199	792,234	746,735	565,003	783,910	718,951	821,495	709,884	769,813	753,095	1,106,962	781,990
	Dollars	$55,129.20	$59,074.02	$54,933.03	$53,574.35	$54,788.41	$58,782.86	$59,540.80	$63,119.86	$53,737.50	$56,624.77	$57,188.91	$73,920.47	$58,367.85
	$/kwh	**$0.069**	**$0.073**	**$0.069**	**$0.072**	**$0.097**	**$0.075**	**$0.083**	**$0.077**	**$0.076**	**$0.074**	**$0.076**	**$0.067**	$0.075
	Temperature			44°	44°	45°	41°	46°	45°	41°	51°	48°	49°	
December	Kilowatt Hrs	789,600	792,906	822,665	753,764	764,435	771,334	694,931	737,906	732,248	755,099	754,084	1,032,840	783,484
	Dollars	$52,255.12	$54,452.99	$54,942.47	$60,201.89	$54,248.00	$56,852.25	$54,703.88	$56,977.70	$55,440.83	$55,424.54	$57,593.06	$68,031.99	$56,760.39
	$/kwh	**$0.066**	**$0.069**	**$0.067**	**$0.080**	**$0.071**	**$0.074**	**$0.079**	**$0.077**	**$0.076**	**$0.073**	**$0.076**	**$0.066**	$0.073
	Temperature			31°	28°	38°	32°	31°	29°	24°	39°	40°	34°	
January	Kilowatt Hrs	841,200	815,210	759,144	473,077	681,397	703,052	731,026	708,704	657,776	650,462	835,841	1,123,259	748,346
	Dollars	$52,835.99	$54,003.48	$52,765.28	$52,868.36	$50,664.29	$53,047.76	$55,953.68	$54,766.11	$49,798.95	$48,452.78	$61,077.50	$73,990.73	$55,018.74
	$/kwh	**$0.063**	**$0.066**	**$0.070**	**$0.112**	**$0.074**	**$0.075**	**$0.077**	**$0.077**	**$0.076**	**$0.074**	**$0.073**	**$0.066**	$0.075
	Temperature			27°	37°	32°	30°	28°	24°	22°	34°	33°	28°	
February	Kilowatt Hrs	790,800	810,055	754,786	678,228	777,793	734,842	731,884	680,824	675,017	700,753	763,616	1,064,702	763,608
	Dollars	$53,627.92	$53,763.63	$52,550.45	$60,749.17	$53,126.01	$54,161.90	$55,201.99	$52,770.13	$50,632.89	$50,760.05	$55,800.98	$71,054.58	$55,349.98
	$/kwh	**$0.068**	**$0.066**	**$0.070**	**$0.090**	**$0.068**	**$0.074**	**$0.075**	**$0.078**	**$0.075**	**$0.072**	**$0.073**	**$0.067**	$0.073
	Temperature			31°	30°	20°	26°	20°	25°	23°	33°	27°	19°	
March	Kilowatt Hrs	794,400	777,011	785,594	669,115	705,942	716,921	720,252	683,767	648,097	704,306	748,176	1,148,868	758,537
	Dollars	$54,355.16	$53,372.08	$53,474.80	$62,252.72	$51,468.49	$53,999.39	$56,455.53	$53,025.49	$49,196.09	$50,887.48	$54,129.49	$77,028.99	$55,803.81
	$/kwh	**$0.068**	**$0.069**	**$0.068**	**$0.093**	**$0.073**	**$0.075**	**$0.078**	**$0.078**	**$0.076**	**$0.072**	**$0.072**	**$0.067**	$0.074
	Temperature			34°	36°	42°	34°	32°	41°	34°	35°	31°	26°	
April	Kilowatt Hrs	896,400	837,648	757,345	677,027	702,451	752,149	801,712	779,435	682,739	828,228	824,821	1,108,614	804,047
	Dollars	$63,962.46	$54,934.24	$56,255.17	$62,286.25	$51,362.71	$56,402.35	$60,491.36	$60,456.99	$51,574.41	$60,125.30	$60,277.34	$73,339.86	$59,289.04
	$/kwh	**$0.071**	**$0.066**	**$0.074**	**$0.092**	**$0.073**	**$0.075**	**$0.075**	**$0.078**	**$0.076**	**$0.073**	**$0.073**	**$0.066**	$0.074
	Temperature			52°	53°	47°	53°	42°	53°	42°	53°	39°	42°	
May	Kilowatt Hrs	831,600	769,220	783,602	642,935	751,537	730,711	740,803	721,657	772,074	742,967	821,612		755,338
	Dollars	$58,456.38	$62,713.62	$56,140.70	$59,918.55	$54,977.62	$59,716.57	$61,966.41	$56,398.65	$58,508.47	$57,030.38	$59,918.87		$58,704.20
	$/kwh	**$0.070**	**$0.082**	**$0.072**	**$0.093**	**$0.073**	**$0.082**	**$0.084**	**$0.078**	**$0.076**	**$0.077**	**$0.073**		$0.078
	Temperature			57°	59°	64°	56°	55°	60°	55°	55°	56°		
June	Kilowatt Hrs	963,396	928,351	838,655	625,872	769,400	785,500	779,017	762,090	740,270	873,359	946,424		819,303
	Dollars	$65,435.81	$67,224.67	$65,200.60	$57,891.83	$62,101.49	$67,697.80	$66,399.81	$59,368.47	$53,985.30	$61,788.08	$70,750.68		$63,440.41
	$/kwh	**$0.068**	**$0.072**	**$0.078**	**$0.092**	**$0.081**	**$0.086**	**$0.085**	**$0.078**	**$0.073**	**$0.071**	**$0.075**		$0.078
	Temperature			73°	67°	70°	69°	63°	69°	68°	66°	65°		
Totals	Kilowatt Hrs	**10,756,596**	**10,323,159**	**9,941,462**	**8,560,000**	**8,007,481**	**9,412,336**	**9,084,271**	**9,064,457**	**8,902,678**	**9,146,994**	**9,869,015**		9,369,859
	Dollars	**$738,805.74**	**$732,876.66**	**$713,104.85**	**$715,892.58**	**$651,934.32**	**$731,842.75**	**$741,876.29**	**$725,678.47**	**$670,939.27**	**$680,201.98**	**$734,447.11**		$712,509.093
	$/kwh	**$0.069**	**$0.071**	**$0.072**	**$0.084**	**$0.081**	**$0.078**	**$0.082**	**$0.080**	**$0.075**	**$0.074**	**$0.074**		$0.076
					52°	**51°**	**51°**	**49°**	**50°**	**47°**	**54°**	**51°**		

Gas Usage and Cost Yearly Comparison

		FY 03	FY 04	FY 05	FY 06	FY 07	FY 08	FY 09	FY 10	FY 11	FY 12	FY 13	FY 14	Average per month:
July	MCF's	2,505.30	2,657.61	2,647.05	2,139.01	2,002.50	1,957.90	2,013.40	2,339.90	2,207.60	1,964.50	2,373.90	4,102.00	2,409
	Dollars	$13,929.47	$18,895.61	$18,820.53	$16,962.35	$17,101.35	$15,584.88	$28,811.75	$20,331.39	$18,005.19	$13,008.92	$13,664.17	$19,468.10	$17,881.98
	$/MMBTU	**$5.56**	**$7.11**	**$7.11**	**$7.93**	**$8.54**	**$7.96**	**$14.31**	**$8.69**	**$8.16**	**$6.62**	**$5.76**	**$4.75**	$7.71
	Temperature				74°	74°	69°	69°	68°	73°	70°	75	72	
August	MCF's	3,333.58	2,649.95	3,057.88	1,854.00	2,314.00	1,812.60	2,202.60	2,339.70	2,522.00	1,677.10	2,075.30	3,791.50	2,469
	Dollars	$17,634.65	$18,841.14	$21,741.53	$13,293.18	$19,692.14	$13,458.56	$23,435.66	$19,534.16	$20,980.52	$12,393.77	$13,292.30	$16,481.66	$17,564.94
	$/MMBTU	**$5.29**	**$7.11**	**$7.11**	**$7.17**	**$8.51**	**$7.43**	**$10.64**	**$8.35**	**$8.32**	**$7.39**	**$6.41**	**$4.35**	$7.34
	Temperature				73°	72°	73°	71°	71°	72°	77°	76	71	
September	MCF's	2,568.12	2,910.18	2,984.29	2,075.10	2,079.60	2,251.80	2,471.40	2,894.50	2,819.00	1,983.20	2,251.40	3,466.80	2,563
	Dollars	$13,585.34	$20,691.38	$21,218.30	$20,460.49	$17,562.22	$16,348.07	$26,023.84	$24,730.61	$23,093.25	$15,355.92	$15,185.69	$16,363.29	$19,218.20
	$/MMBTU	**$5.29**	**$7.11**	**$7.11**	**$9.86**	**$8.44**	**$7.26**	**$10.53**	**$8.54**	**$8.19**	**$7.74**	**$6.74**	**$4.72**	$7.63
	Temperature				68°	62°	67°	68°	64°	63°	70°	70	70	
October	MCF's	2,959.20	4,231.89	3,735.98	2,862.80	3,334.90	2,054.20	3,481.60	4,143.20	3,251.10	2,506.60	3,452.70	3,862.20	3,323
	Dollars	$15,654.17	$30,088.74	$26,562.82	$26,967.58	$24,881.69	$15,433.20	$36,696.06	$33,133.17	$28,687.71	$20,183.14	$23,837.44	$18,893.88	$25,084.97
	$/MMBTU	**$5.29**	**$7.11**	**$7.11**	**$9.42**	**$7.46**	**$7.51**	**$10.54**	**$8.00**	**$8.82**	**$8.05**	**$6.90**	**$4.89**	$7.59
	Temperature				54°	50°	59°	60°	49°	52°	60°	56	61	
November	MCF's	6,267.30	4,959.15	4,450.92	3,935.50	4,861.00	4,598.70	6,067.60	4,418.80	4,453.50	4,234.80	4,007.90	5,754.50	4,834
	Dollars	$33,154.02	$35,259.56	$31,646.04	$44,538.11	$45,780.90	$38,822.23	$68,624.56	$39,716.17	$39,230.88	$34,293.41	$31,013.13	$26,539.76	$39,051.56
	$/MMBTU	**$5.29**	**$7.11**	**$7.11**	**$11.32**	**$9.42**	**$8.44**	**$11.31**	**$8.99**	**$8.81**	**$8.10**	**$7.74**	**$4.61**	$8.19
	Temperature			44°	44°	45°	41°	46°	45°	41°	51°	48	49	
December	MCF's	6,834.50	5,873.66	6,253.44	7,094.50	4,928.40	6,196.80	6,537.20	6,503.90	7,764.80	5,282.60	5,051.20	8,572.00	6,408
	Dollars	$36,154.51	$41,761.72	$44,461.96	$80,948.25	$51,546.14	$42,671.16	$75,439.29	$49,858.90	$51,402.98	$39,397.63	$37,111.17	$34,348.00	$48,758.48
	$/MMBTU	**$5.29**	**$7.11**	**$7.11**	**$11.41**	**$10.46**	**$6.89**	**$11.54**	**$7.67**	**$6.62**	**$7.46**	**$7.35**	**$4.01**	$7.74
	Temperature			31°	28°	38°	32°	31°	29°	24°	39°	40	34	
January	MCF's	6,945.90	8,047.26	1,559.48	4,777.80	5,106.30	5,754.20	8,909.10	7,521.10	7,956.30	6,293.50	6,452.60	9,545.50	6,572
	Dollars	$36,743.81	$57,216.02	$11,087.90	$38,365.73	$35,943.25	$44,433.93	$100,940.10	$55,204.87	$52,511.58	$42,745.45	$43,851.87	$37,332.45	$46,364.75
	$/MMBTU	**$5.29**	**$7.11**	**$7.11**	**$8.03**	**$7.04**	**$7.72**	**$11.33**	**$7.34**	**$6.60**	**$6.79**	**$6.80**	**$3.91**	$7.09
	Temperature			27°	37°	32°	30°	28°	24°	22°	34°	33	28	
February	MCF's	9,194.60	8,696.89	6,791.38	6,731.50	8,629.70	9,120.30	7,686.50	8,181.20	6,711.60	5,673.20	9,070.60	9,392.70	7,990
	Dollars	$52,448.23	$61,834.89	$48,286.71	$44,851.98	$61,857.69	$73,692.02	$79,716.69	$60,393.62	$45,826.80	$39,326.62	$60,909.08	$45,592.17	$56,228.04
	$/MMBTU	**$5.70**	**$7.11**	**$7.11**	**$6.66**	**$7.17**	**$8.08**	**$10.37**	**$7.38**	**$6.83**	**$6.93**	**$6.72**	**$4.85**	$7.08
	Temperature			31°	30°	20°	26°	20°	25°	23°	33°	27	19	
March	MCF's	6,042.80	5,915.89	6,144.96	5,604.00	1,723.60	6,958.10	6,201.00	6,120.40	4,994.70	4,501.10	7,630.70		5,622
	Dollars	$31,966.41	$42,061.98	$43,690.67	$54,599.77	$14,492.03	$68,759.94	$66,747.56	$47,310.69	$37,135.59	$32,353.91	$61,900.24		$45,547.16
	$/MMBTU	**$5.29**	**$7.11**	**$7.11**	**$9.74**	**$8.41**	**$9.88**	**$10.76**	**$7.73**	**$7.43**	**$7.19**	**$8.11**		$8.07
	Temperature			34°	36°	42°	34°	32°	41°	34°	35°	31	26	
April	MCF's	4,865.21	5,000.45	4,192.98	4,334.00	8,560.10	4,264.30	4,710.20	3,865.80	3,582.40	3,815.30	5,735.80		4,812
	Dollars	$25,736.96	$35,553.20	$29,812.09	$40,977.97	$76,253.37	$41,005.51	$43,776.60	$30,636.47	$26,137.19	$28,977.20	$42,106.50		$38,270.28
	$/MMBTU	**$5.29**	**$7.11**	**$7.11**	**$9.46**	**$8.91**	**$9.62**	**$9.29**	**$7.93**	**$7.30**	**$7.59**	**$7.34**		$7.90
	Temperature			52°	53°	47°	53°	42°	53°	42°	53°	39	42	
May	MCF's	2,988.90	3,490.04	4,115.48	2,896.00	2,420.20	3,712.60	3,101.30	3,581.80	2,127.50	3,059.20	3,524.60		3,183
	Dollars	$15,811.28	$24,814.18	$29,261.07	$26,139.30	$22,144.83	$38,462.54	$28,789.37	$28,382.18	$15,637.13	$21,334.86	$25,190.32		$25,087.91
	$/MMBTU	**$5.29**	**$7.11**	**$7.11**	**$9.03**	**$9.15**	**$10.36**	**$9.28**	**$7.92**	**$7.35**	**$6.97**	**$7.15**		$7.88
	Temperature			57°	59°	64°	56°	55°	60°	55°	55°	56		
June	MCF's	3,253.69	3,163.57	2,535.81	2,575.30	2,669.50	2,863.60	2,645.50	2,546.10	2,398.10	2,504.60	3,868.50		2,820
	Dollars	$17,212.02	$22,492.98	$18,029.61	$21,233.35	$24,583.43	$32,364.41	$25,481.46	$20,088.73	$16,949.77	$14,431.51	$25,829.97		$21,699.75
	$/MMBTU	**$5.29**	**$7.11**	**$7.11**	**$8.25**	**$9.21**	**$11.30**	**$9.63**	**$7.89**	**$7.07**	**$5.76**	**$6.68**		$7.75
	Temperature			73°	67°	70°	69°	63°	69°	68°	66°	65		
Totals	MCF's	**57,759.10**	**57,596.54**	**48,469.65**	**46,879.51**	**48,629.80**	**51,545.10**	**56,027.40**	**54,456.40**	**50,788.60**	**43,495.70**	**55,495.20**		51,922
	Dollars	**$310,030.87**	**$409,511.40**	**$344,619.23**	**$429,338.06**	**$411,839.04**	**$441,036.45**	**$604,482.94**	**$429,320.96**	**$375,598.59**	**$313,802.34**	**$393,891.88**		$405,770.16
	$/MMBTU	**$5.37**	**$7.11**	**$7.11**	**$9.16**	**$8.47**	**$8.56**	**$10.79**	**$7.88**	**$7.40**	**$7.21**	**$7.10**		$7.83
	Ave. Temp.				**52**	**51**	**51**	**49**	**50**	**47**	**54**	**51**		

CHP Analysis

		FY 03	FY 04	FY 05	FY 06	FY 07	FY 08	FY 09
July	$/kwh	$0.070	$0.075	$0.072	$0.076	$0.105	$0.079	$0.086
	$/MMBTU	$5.56	$7.11	$7.11	$7.93	$8.54	$7.96	$14.31
	Spark Gap	**$14.95**	**$14.90**	**$13.84**	**$14.34**	**$22.10**	**$15.25**	**$10.81**
	kW	1515	1242	1340	1143	763	1116	1113
	MBH	3480	3691	3676	2971	2781	2719	2796
	λD	**0.67**	**0.87**	**0.80**	**0.76**	**1.07**	**0.71**	**0.74**
	Temperature	0	0	0	74°	74°	69°	69°
August	$/kwh	$0.070	$0.069	$0.074	$0.074	$0.095	$0.079	$0.089
	$/MMBTU	$5.29	$7.11	$7.11	$7.17	$8.51	$7.43	$10.64
	Spark Gap	**$15.36**	**$13.17**	**$14.57**	**$14.42**	**$19.45**	**$15.82**	**$15.50**
	kW	1443	1348	1289	1276	862	1231	1122
	MBH	4630	3680	4247	2575	3214	2518	3059
	λD	**0.94**	**0.80**	**0.97**	**0.59**	**1.09**	**0.60**	**0.80**
	Temperature	0	0	0	73°	72°	73°	71°
September	$/kwh	$0.070	$0.070	$0.073	$0.075	$0.088	$0.081	$0.086
	$/MMBTU	$5.29	$7.11	$7.11	$9.86	$8.44	$7.26	$10.53
	Spark Gap	**$15.22**	**$13.53**	**$14.14**	**$12.23**	**$17.36**	**$16.54**	**$14.76**
	kW	1355	1452	1283	1102	830	1178	1060
	MBH	3567	4042	4145	2882	2888	3128	3433
	λD	**0.77**	**0.82**	**0.95**	**0.77**	**1.02**	**0.78**	**0.95**
	Temperature	0	0	0	68°	62°	67°	68°
October	$/kwh	$0.069	$0.075	$0.075	$0.074	$0.096	$0.076	$0.081
	$/MMBTU	$5.29	$7.11	$7.11	$9.42	$7.46	$7.51	$10.54
	Spark Gap	**$14.89**	**$14.94**	**$14.82**	**$12.24**	**$20.54**	**$14.84**	**$13.28**
	kW	1308	1205	1154	1053	725	1244	1101
	MBH	4110	5878	5189	3976	4632	2853	4836
	λD	**0.92**	**1.43**	**1.32**	**1.11**	**1.87**	**0.67**	**1.29**
	Temperature	0	0	0	54°	50°	59°	60°
November	$/kwh	$0.069	$0.073	$0.069	$0.072	$0.097	$0.075	$0.083
	$/MMBTU	$5.29	$7.11	$7.11	$11.32	$9.42	$8.44	$11.31
	Spark Gap	**$14.86**	**$14.15**	**$13.21**	**$9.70**	**$18.99**	**$13.53**	**$12.96**
	kW	1113	1131	1100	1037	785	1089	999
	MBH	8705	6888	6182	5466	6751	6387	8427
	λD	**2.29**	**1.78**	**1.65**	**1.54**	**2.52**	**1.72**	**2.47**
	Temperature	0	0	44°	44°	45°	41°	46°

CHP Analysis

		FY 03	FY 04	FY 05	FY 06	FY 07	FY 08	FY 09
December	$/kwh	$0.066	$0.069	$0.067	$0.080	$0.071	$0.074	$0.079
	$/MMBTU	$5.29	$7.11	$7.11	$11.41	$10.46	$6.89	$11.54
	Spark Gap	**$14.10**	**$13.01**	**$12.46**	**$11.99**	**$10.33**	**$14.71**	**$11.52**
	kW	1097	1101	1143	1047	1062	1071	965
	MBH	9492	8158	8685	9853	6845	8607	9079
	λD	**2.54**	**2.17**	**2.23**	**2.76**	**1.89**	**2.35**	**2.76**
	Temperature	0	0	31°	28°	38°	32°	31°
January	$/kwh	$0.063	$0.066	$0.070	$0.112	$0.074	$0.075	$0.077
	$/MMBTU	$5.29	$7.11	$7.11	$8.03	$7.04	$7.72	$11.33
	Spark Gap	**$13.11**	**$12.30**	**$13.26**	**$24.71**	**$14.75**	**$14.39**	**$11.10**
	kW	1168	1132	1054	657	946	976	1015
	MBH	9647	11177	2166	6636	7092	7992	12374
	λD	**2.42**	**2.89**	**0.60**	**2.96**	**2.20**	**2.40**	**3.57**
	Temperature	0	0	27°	37°	32°	30°	28°
February	$/kwh	$0.068	$0.066	$0.070	$0.090	$0.068	$0.074	$0.075
	$/MMBTU	$5.70	$7.11	$7.11	$6.66	$7.17	$8.08	$10.37
	Spark Gap	**$14.17**	**$12.34**	**$13.29**	**$19.58**	**$12.84**	**$13.52**	**$11.73**
	kW	1098	1125	1048	942	1080	1021	1017
	MBH	12770	12079	9432	9349	11986	12667	10676
	λD	**3.41**	**3.15**	**2.64**	**2.91**	**3.25**	**3.64**	**3.08**
	Temperature	0	0	31°	30°	20°	26°	20°
March	$/kwh	$0.068	$0.069	$0.068	$0.093	$0.073	$0.075	$0.078
	$/MMBTU	$5.29	$7.11	$7.11	$9.74	$8.41	$9.88	$10.76
	Spark Gap	**$14.76**	**$13.02**	**$12.83**	**$17.52**	**$12.95**	**$12.19**	**$12.20**
	kW	1103	1079	1091	929	980	996	1000
	MBH	8393	8217	8535	7783	2394	9664	8613
	λD	**2.23**	**2.23**	**2.29**	**2.45**	**0.72**	**2.84**	**2.52**
	Temperature	0	0	34°	36°	42°	34°	32°
April	$/kwh	$0.071	$0.066	$0.074	$0.092	$0.073	$0.075	$0.075
	$/MMBTU	$5.29	$7.11	$7.11	$9.46	$8.91	$9.62	$9.29
	Spark Gap	**$15.62**	**$12.11**	**$14.65**	**$17.50**	**$12.52**	**$12.36**	**$12.81**
	kW	1245	1163	1052	940	976	1045	1113
	MBH	6757	6945	5824	6019	11889	5923	6542
	λD	**1.59**	**1.75**	**1.62**	**1.88**	**3.57**	**1.66**	**1.72**
	Temperature	0	0	52°	53°	47°	53°	42°

CHP Analysis

		FY 03	FY 04	FY 05	FY 06	FY 07	FY 08	FY 09
May	$/kwh	$0.070	$0.082	$0.072	$0.093	$0.073	$0.082	$0.084
	$/MMBTU	$5.29	$7.11	$7.11	$9.03	$9.15	$10.36	$9.28
	Spark Gap	**$15.31**	**$16.78**	**$13.88**	**$18.28**	**$12.28**	**$13.59**	**$15.23**
	kW	1155	1068	1088	893	1044	1015	1029
	MBH	4151	4847	5716	4022	3361	5156	4307
	λD	**1.05**	**1.33**	**1.54**	**1.32**	**0.94**	**1.49**	**1.23**
	Temperature	0	0	57°	59°	64°	56°	55°
June	$/kwh	$0.068	$0.072	$0.078	$0.092	$0.081	$0.086	$0.085
	$/MMBTU	$5.29	$7.11	$7.11	$8.25	$9.21	$11.30	$9.63
	Spark Gap	**$14.61**	**$14.11**	**$15.67**	**$18.86**	**$14.44**	**$13.95**	**$15.34**
	kW	1338	1289	1165	869	1069	1091	1082
	MBH	4519	4394	3522	3577	3708	3977	3674
	λD	**0.99**	**1.00**	**0.89**	**1.21**	**1.02**	**1.07**	**1.00**
	Temperature	0	0	73°	67°	70°	69°	63°

Yearly Average	$/kwh	$0.069	$0.071	$0.072	$0.085	$0.083	$0.078	$0.082
	$/MMBTU	$5.35	$7.11	$7.11	$9.02	$8.56	$8.54	$10.80
	Spark Gap	**$14.75**	**$13.70**	**$13.89**	**$15.95**	**$15.71**	**$14.22**	**$13.10**
	kW	1245	1195	1151	991	927	1089	1051
	MBH	6685	6666	5610	5426	5628	5966	6485
	λD	**1.57**	**1.63**	**1.43**	**1.60**	**1.78**	**1.60**	**1.81**
	Temperature	0	0	0	52	51	51	49

CHP Analysis

		FY 10	FY 11	FY 12	FY 13	FY 14	Monthly Average
July	$/kwh	$0.090	$0.076	$0.075	$0.074	$0.074	$0.080
	$/MMBTU	$8.69	$8.16	$6.62	$5.76	$4.75	$7.98
	Spark Gap	**$17.75**	**$14.01**	**$15.43**	**$15.91**	**$16.83**	**$15.39**
	kW	1114	1214	1031	1179	1689	1161
	MBH	3250	3066	2728	3297	5697	3132
	λD	**0.85**	**0.74**	**0.78**	**0.82**	**0.99**	**0.80**
	Temperature	68°	73°	70°	75	72	
August	$/kwh	$0.092	$0.074	$0.077	$0.076	$0.074	$0.079
	$/MMBTU	$8.35	$8.32	$7.39	$6.41	$4.35	$7.61
	Spark Gap	**$18.48**	**$13.42**	**$15.25**	**$15.73**	**$17.30**	**$15.56**
	kW	1098	1225	1207	1295	1627	1218
	MBH	3250	3503	2329	2882	5266	3262
	λD	**0.87**	**0.84**	**0.57**	**0.65**	**0.95**	**0.79**
	Temperature	71°	72°	77°	76	71	
September	$/kwh	$0.078	$0.075	$0.078	$0.076	$0.075	$0.077
	$/MMBTU	$8.54	$8.19	$7.74	$6.74	$4.72	$7.89
	Spark Gap	**$14.42**	**$13.77**	**$15.05**	**$15.43**	**$17.18**	**$14.77**
	kW	1148	1141	1079	1201	1697	1166
	MBH	4020	3915	2754	3127	4815	3446
	λD	**1.03**	**1.01**	**0.75**	**0.76**	**0.83**	**0.87**
	Temperature	64°	63°	70°	70	70	
October	$/kwh	$0.079	$0.078	$0.076	$0.076	$0.069	$0.078
	$/MMBTU	$8.00	$8.82	$8.05	$6.90	$4.89	$7.84
	Spark Gap	**$15.18**	**$13.94**	**$14.17**	**$15.41**	**$15.26**	**$14.93**
	kW	1041	983	1018	1077	1487	1083
	MBH	5754	4515	3481	4795	5364	4547
	λD	**1.62**	**1.35**	**1.00**	**1.30**	**1.06**	**1.26**
	Temperature	49°	52°	60°	56	61	
November	$/kwh	$0.077	$0.076	$0.074	$0.076	$0.067	$0.076
	$/MMBTU	$8.99	$8.81	$8.10	$7.74	$4.61	$8.51
	Spark Gap	**$13.52**	**$13.37**	**$13.45**	**$14.51**	**$14.95**	**$13.84**
	kW	1141	986	1069	1046	1537	1045
	MBH	6137	6185	5882	5567	7992	6598
	λD	**1.58**	**1.84**	**1.61**	**1.56**	**1.52**	**1.87**
	Temperature	45°	41°	51°	48	49	

CHP Analysis

		FY 10	FY 11	FY 12	FY 13	FY 14	Monthly Average
December	$/kwh	$0.077	$0.076	$0.073	$0.076	$0.066	$0.073
	$/MMBTU	$7.67	$6.62	$7.46	$7.35	$4.01	$8.08
	Spark Gap	**$14.96**	**$15.56**	**$14.05**	**$15.03**	**$15.29**	**$13.43**
	kW	1025	1017	1049	1047	1435	1057
	MBH	9033	10784	7337	7016	11906	8626
	λD	**2.58**	**3.11**	**2.05**	**1.96**	**2.43**	**2.40**
	Temperature	29°	24°	39°	40	34	
January	$/kwh	$0.077	$0.076	$0.074	$0.073	$0.066	$0.076
	$/MMBTU	$7.34	$6.60	$6.79	$6.80	$3.91	$7.38
	Spark Gap	**$15.30**	**$15.58**	**$15.03**	**$14.61**	**$15.39**	**$14.92**
	kW	984	914	903	1161	1560	992
	MBH	10446	11050	8741	8962	13258	8753
	λD	**3.11**	**3.54**	**2.83**	**2.26**	**2.49**	**2.62**
	Temperature	24°	22°	34°	33	28	
February	$/kwh	$0.078	$0.075	$0.072	$0.073	$0.067	$0.074
	$/MMBTU	$7.38	$6.83	$6.93	$6.72	$4.85	$7.28
	Spark Gap	**$15.33**	**$15.15**	**$14.29**	**$14.70**	**$14.70**	**$14.27**
	kW	946	938	973	1061	1479	1023
	MBH	11363	9322	7879	12598	13045	10920
	λD	**3.52**	**2.91**	**2.37**	**3.48**	**2.58**	**3.12**
	Temperature	25°	23°	33°	27	19	
March	$/kwh	$0.078	$0.076	$0.072	$0.072	$0.067	$0.075
	$/MMBTU	$7.73	$7.43	$7.19	$8.11		$8.07
	Spark Gap	**$14.99**	**$14.81**	**$13.98**	**$13.09**		**$13.85**
	kW	950	900	978	1039	1596	1004
	MBH	8501	6937	6252	10598		7808
	λD	**2.62**	**2.26**	**1.87**	**2.99**		**2.28**
	Temperature	41°	34°	35°	31	26	
April	$/kwh	$0.078	$0.076	$0.073	$0.073	$0.066	$0.075
	$/MMBTU	$7.93	$7.30	$7.59	$7.34		$7.90
	Spark Gap	**$14.80**	**$14.84**	**$13.68**	**$14.07**		**$14.09**
	kW	1083	948	1150	1146	1540	1078
	MBH	5369	4976	5299	7966		6683
	λD	**1.45**	**1.54**	**1.35**	**2.04**		**1.83**
	Temperature	53°	42°	53°	39	42	

CHP Analysis

		FY 10	FY 11	FY 12	FY 13	FY 14	Monthly Average
May	$/kwh	$0.078	$0.076	$0.077	$0.073		$0.078
	$/MMBTU	$7.92	$7.35	$6.97	$7.15		$7.88
	Spark Gap	**$14.97**	**$14.85**	**$15.52**	**$14.22**		**$14.99**
	kW	1002	1072	1032	1141		1049
	MBH	4975	2955	4249	4895		4421
	λD	**1.45**	**0.81**	**1.21**	**1.26**		**1.24**
	Temperature	60°	55°	55°	56		
June	$/kwh	$0.078	$0.073	$0.071	$0.075		$0.078
	$/MMBTU	$7.89	$7.07	$5.76	$6.68		$7.75
	Spark Gap	**$14.94**	**$14.30**	**$14.97**	**$15.23**		**$15.13**
	kW	1058	1028	1213	1314		1138
	MBH	3536	3331	3479	5373		3917
	λD	**0.98**	**0.95**	**0.84**	**1.20**		**1.01**
	Temperature	69°	68°	66°	65		
Yearly Average	$/kwh	$0.080	$0.075	$0.074	$0.074	$0.069	$0.077
	$/MMBTU	$8.04	$7.62	$7.22	$6.97	$4.51	$7.85
	Spark Gap	**$15.39**	**$14.47**	**$14.57**	**$14.83**	**$15.69**	**$14.60**
	kW	1049	1030	1059	1142	1565	1084
	MBH	6303	5878	5034	6423	8418	6010
	λD	**1.76**	**1.67**	**1.39**	**1.65**	**1.58**	**1.63**
	Temperature	50	47	54	51	0	

Appendix D: Initial DOE CHP Screening

Note: used 10-year average utility data for screening

DOE TAP CHP Qualification Screen				
Gas Fueled CHP - Recip Engine, Microturbine, Fuel Cell or Gas Turbine Systems / natural gas, LFG, biogas				
Note: The results of this screening analysis use average values and assumptions and should not be utilized as an investment g				
Facility Information				
Facility Name	NEOMED Campus			
Location (City, State)	Rootstown, Ohio			
Application	Laboratory/Higher Ed.			
Loads				
Annual Hours of Operation	8,760	Annual operating hours with loads conducive to CHP		
Average Power Demand, kW	1,084	Average power demand during operating hours		
Annual Electricity Consumption, kWh	9,495,840			
Average Thermal Demand, MMBtu/hr	6.01			
Annual Thermal Demand, MMBtu	52,648			
Energy Costs	**Base Case**	**CHP Case**		
Boiler/Thermal Fuel Costs, $/MMBtu	$7.85	$7.85		
CHP Fuel Costs, $MM/Btu		$7.85		
Average Electricity Costs, $/kWh	$0.077		Annual electricity costs (demand	
Percent Average per kWh Electric Cost Avoided		0%	Option 1 - Percent of average elec	
Standby Rate, $/kW		$0.05	Option 2 - Monthly $/kW standby	
Existing System				
Displaced Thermal Efficiency, %	90.0%	Displaced onsite thermal (boiler, heater, etc) efficiency		
CHP System				
Net CHP Power, kW		1,084	CHP System Specs	C
CHP Electric Efficiency, % (HHV)		36.8%	CHP system specs	C
CHP Thermal Output, Btu/kWh		3,854	CHP system specs	C
CHP Thermal Output, MMBtu/hr		4.2	CHP system specs	C
CHP Power to Heat Ratio		0.89	Calculated based on CHP power o	
CHP Availability, %		98%	90 to 98%	
Incremental O&M Costs, $/kWh		$0.019	CHP system specs	C
Thermal Utilization, %		90%	Amount of available thermal capt	
Total Installed Costs, $/kW		$2,335	CHP system specs	C

DOE TAP CHP Qualification Screen		
Gas Fueled CHP - Recip Engine, Microturbine, Fuel Cell or Gas Turbine Systems / natural gas, LFG, biogas		
Note: The results of this screening analysis use average values and assumptions and should not be utilized as an investment grade anal		
Facility Information		
Facility Name	NEOMED Campus	
Location (City, State)	Rootstown, Ohio	
Application	Laboratory/Higher Ed.	
Annual Energy Consumption	**Base Case**	**CHP Case**
Purchased Electricity, kWh	9,495,840	189,917
Generated Electricity, kWh	0	9,305,923
On-site Boiler/Heater Thermal, MMBtu	52,648	20,372
CHP Thermal, MMBtu	0	32,276
Boiler/Heater Fuel, MMBtu	58,497	22,635
CHP Fuel, MMBtu	0	86,210
Total Fuel, MMBtu	*58,497*	*108,845*
Annual Operating Costs		
Purchased Electricity, $	$731,180	$14,624
Standby Charges (Option 2), $	$0	$650
On-site Boiler/Heater Fuel, $	$459,204	$177,685
CHP Fuel, $	$0	$676,749
Incremental O&M, $	$0	$176,813
Total Operating Costs, $	*$1,190,384*	*$1,046,521*
Simple Payback		
Annual Operating Savings		$143,863
Total Installed Costs		$2,531,140
Incentives		$200,000
Simple Payback, Years		**16.2**
Operating Costs to Generate		
Fuel Costs, $/kWh		$0.073
Thermal Credit, $/kWh		($0.030)
Incremental O&M, $/kWh		$0.019
Total Operating Costs to Generate, $/kWh		**$0.061**

Appendix E: CHP Configurations Screening

Option A: 1 GE Jenbacher J420 with process steam load

DOE TAP CHP Qualification Screen			
Gas Fueled CHP - Recip Engine, Microturbine, Fuel Cell or Gas Turbine Systems / natural gas, LFG, biogas			
Note: The results of this screening analysis use average values and assumptions and should not be utilized as an			
Facility Information			
Facility Name	NEOMED Campus		
Location (City, State)	Rootstown, Ohio		
Application	Laboratory/Higher Ed.		
Loads			
Annual Hours of Operation	8,760		Annual operating hours wi
Average Power Demand, kW	1,565		Average power demand du
Annual Electricity Consumption, kWh	13,709,400		
Average Thermal Demand, MMBtu/hr	4.82		
Annual Thermal Demand, MMBtu	42,179		
Energy Costs	**Base Case**		**CHP Case**
Boiler/Thermal Fuel Costs, $/MMBtu	$4.51		$4.51
CHP Fuel Costs, $MM/Btu			$4.51
Average Electricity Costs, $/kWh	$0.069		
Percent Average per kWh Electric Cost Avoided			0%
Standby Rate, $/kW			$0.05
Existing System			
Displaced Thermal Efficiency, %	85.0%		Displaced onsite thermal (E
CHP System			
Net CHP Power, kW			1,426
CHP Electric Efficiency, % (HHV)			40.8%
CHP Thermal Output, Btu/kWh			3,852
CHP Thermal Output, MMBtu/hr			5.5
CHP Power to Heat Ratio			0.89
CHP Availability, %			98%
Incremental O&M Costs, $/kWh			$0.019
Thermal Utilization, %			90%
Total Installed Costs, $/kW			$2,335

DOE TAP CHP Qualification Screen		
Gas Fueled CHP - Recip Engine, Microturbine, Fuel Cell or Gas Turbine Systems / natural gas, LFG, biogas		
Note: The results of this screening analysis use average values and assumptions and should not be utilized as an		
Facility Information		
Facility Name	NEOMED Campus	
Location (City, State)	Rootstown, Ohio	
Application	Laboratory/Higher Ed.	
Annual Energy Consumption	**Base Case**	**CHP Case**
Purchased Electricity, kWh	13,709,400	1,467,475
Generated Electricity, kWh	0	12,241,925
On-site Boiler/Heater Thermal, MMBtu	42,179	0
CHP Thermal, MMBtu	0	42,441
Boiler/Heater Fuel, MMBtu	49,623	0
CHP Fuel, MMBtu	0	102,326
Total Fuel, MMBtu	*49,623*	*102,326*
Annual Operating Costs		
Purchased Electricity, $	$945,949	$101,256
Standby Charges (Option 2), $	$0	$856
On-site Boiler/Heater Fuel, $	$223,799	$0
CHP Fuel, $	$0	$461,490
Incremental O&M, $	$0	$232,597
Total Operating Costs, $	*$1,169,748*	*$796,198*
Simple Payback		
Annual Operating Savings		$373,550
Total Installed Costs		$3,329,710
Incentives		$200,000
Simple Payback, Years		**8.4**
Operating Costs to Generate		
Fuel Costs, $/kWh		$0.038
Thermal Credit, $/kWh		($0.018)
Incremental O&M, $/kWh		$0.019
Total Operating Costs to Generate, $/kWh		**$0.038**

Option B: 2 GE Jenbacher J316 with process steam load

DOE TAP CHP Qualification Screen			
Gas Fueled CHP - Recip Engine, Microturbine, Fuel Cell or Gas Turbine Systems / natural gas, LFG, biogas			
Note: The results of this screening analysis use average values and assumptions and should not be utilized as an			
Facility Information			
Facility Name	NEOMED Campus		
Location (City, State)	Rootstown, Ohio		
Application	Laboratory/Higher Ed.		
Loads			
Annual Hours of Operation	8,760		Annual operating hours wit
Average Power Demand, kW	1,565		Average power demand du
Annual Electricity Consumption, kWh	13,709,400		
Average Thermal Demand, MMBtu/hr	4.82		
Annual Thermal Demand, MMBtu	42,179		
Energy Costs	**Base Case**		**CHP Case**
Boiler/Thermal Fuel Costs, $/MMBtu	$4.51		$4.51
CHP Fuel Costs, $MM/Btu			$4.51
Average Electricity Costs, $/kWh	$0.069		
Percent Average per kWh Electric Cost Avoided			0%
Standby Rate, $/kW			$0.05
Existing System			
Displaced Thermal Efficiency, %	85.0%		Displaced onsite thermal (E
CHP System			
Net CHP Power, kW			1,696
CHP Electric Efficiency, % (HHV)			38.3%
CHP Thermal Output, Btu/kWh			4,382
CHP Thermal Output, MMBtu/hr			7.4
CHP Power to Heat Ratio			0.78
CHP Availability, %			98%
Incremental O&M Costs, $/kWh			$0.019
Thermal Utilization, %			90%
Total Installed Costs, $/kW			$2,335

DOE TAP CHP Qualification Screen			
Gas Fueled CHP - Recip Engine, Microturbine, Fuel Cell or Gas Turbine Systems / natural gas, LFG, biogas			
Note: The results of this screening analysis use average values and assumptions and should not be utilized as an			
Annual Energy Consumption	**Base Case**		**CHP Case**
Purchased Electricity, kWh	13,709,400		0
Generated Electricity, kWh	0		13,709,400
On-site Boiler/Heater Thermal, MMBtu	42,179		0
CHP Thermal, MMBtu	0		54,068
Boiler/Heater Fuel, MMBtu	49,623		0
CHP Fuel, MMBtu	0		122,228
Total Fuel, MMBtu	*49,623*		*122,228*
Annual Operating Costs			
Purchased Electricity, $	$945,949		$0
Standby Charges (Option 2), $	$0		$1,018
On-site Boiler/Heater Fuel, $	$223,799		$0
CHP Fuel, $	$0		$551,246
Incremental O&M, $	$0		$260,479
Total Operating Costs, $	*$1,169,748*		*$812,742*
Simple Payback			
Annual Operating Savings			$357,005
Total Installed Costs			$3,960,160
Incentives			$200,000
Simple Payback, Years			**10.5**
Operating Costs to Generate			
Fuel Costs, $/kWh			$0.040
Thermal Credit, $/kWh			($0.016)
Incremental O&M, $/kWh			$0.019
Total Operating Costs to Generate, $/kWh			**$0.043**

Option C: 3 GE Jenbacher J312 with process steam load

DOE TAP CHP Qualification Screen			
Gas Fueled CHP - Recip Engine, Microturbine, Fuel Cell or Gas Turbine Systems / natural gas, LFG, biogas			
Note: The results of this screening analysis use average values and assumptions and should not be utilized as an			
Facility Information			
Facility Name	NEOMED Campus		
Location (City, State)	Rootstown, Ohio		
Application	Laboratory/Higher Ed.		
Loads			
Annual Hours of Operation	8,760		Annual operating hours wit
Average Power Demand, kW	1,565		Average power demand du
Annual Electricity Consumption, kWh	13,709,400		
Average Thermal Demand, MMBtu/hr	4.82		
Annual Thermal Demand, MMBtu	42,179		
Energy Costs	**Base Case**		**CHP Case**
Boiler/Thermal Fuel Costs, $/MMBtu	$4.51		$4.51
CHP Fuel Costs, $MM/Btu			$4.51
Average Electricity Costs, $/kWh	$0.069		
Percent Average per kWh Electric Cost Avoided			0%
Standby Rate, $/kW			$0.05
Existing System			
Displaced Thermal Efficiency, %	85.0%		Displaced onsite thermal (E
CHP System			
Net CHP Power, kW			1,899
CHP Electric Efficiency, % (HHV)			38.1%
CHP Thermal Output, Btu/kWh			4,387
CHP Thermal Output, MMBtu/hr			8.3
CHP Power to Heat Ratio			0.78
CHP Availability, %			98%
Incremental O&M Costs, $/kWh			$0.021
Thermal Utilization, %			90%
Total Installed Costs, $/kW			$2,737

DOE TAP CHP Qualification Screen			
Gas Fueled CHP - Recip Engine, Microturbine, Fuel Cell or Gas Turbine Systems / natural gas, LFG, biogas			
Note: The results of this screening analysis use average values and assumptions and should not be utilized as an			
Annual Energy Consumption	**Base Case**		**CHP Case**
Purchased Electricity, kWh	13,709,400		-2,593,135
Generated Electricity, kWh	0		16,302,535
On-site Boiler/Heater Thermal, MMBtu	42,179		0
CHP Thermal, MMBtu	0		64,368
Boiler/Heater Fuel, MMBtu	49,623		0
CHP Fuel, MMBtu	0		145,957
Total Fuel, MMBtu	*49,623*		*145,957*
Annual Operating Costs			
Purchased Electricity, $	$945,949		-$178,926
Standby Charges (Option 2), $	$0		$1,139
On-site Boiler/Heater Fuel, $	$223,799		$0
CHP Fuel, $	$0		$658,267
Incremental O&M, $	$0		$342,353
Total Operating Costs, $	*$1,169,748*		*$822,833*
Simple Payback			
Annual Operating Savings			$346,915
Total Installed Costs			$5,197,563
Incentives			$200,000
Simple Payback, Years			**14.4**
Operating Costs to Generate			
Fuel Costs, $/kWh			$0.040
Thermal Credit, $/kWh			($0.014)
Incremental O&M, $/kWh			$0.021
Total Operating Costs to Generate, $/kWh			**$0.048**

Option B: 1 GE Jenbacher J420 with trigeneration, absorption cooling sized to thermal output

DOE TAP CHP Qualification Screen			
Gas Fueled CHP - Recip Engine, Microturbine, Fuel Cell or Gas Turbine Systems / natural gas, LFG, biogas with Heatin			
Note: The results of this screening analysis use average values and assumptions and should not be utilized as an inve			
Facility Information			
Facility Name	NEOMED Campus		
Location (City, State)	Rootstown, Ohio		
Application	Laboratory/Higher Ed.		
Loads			
Annual Hours of Operation	8,760		
Average Power Demand, kW	1,565		Average power demand
Annual Hours of Cooling Demand	2,520		input
Annual Hours of Heating Demand	6,240		determined by annual
Annual Electricity Consumption, kWh	13,709,400		
Average Heating Demand, MMBtu/hr	8.42		CHP sytem sized to heat
Annual Heating Demand, MMBtu	52,541		
Average Cooling Demand, Tons	394		2014 cooling
Average Power Demand without Cooling, kW	1,329		CHP system sized not to
Average Thermal Requirements for Cooling, MMBtu/hr	6.75		Thermal requirements f
Average Thermal Requirements for Cooling, MMBtu/hr	#REF!		Thermal requirements f
Annual Cooling Demand, Tons	992,880		
Energy Costs	**Base Case**		**CHP Case**
Boiler/Thermal Fuel Costs, $/MMBtu	$4.51		$4.51
CHP Fuel Costs, $MM/Btu			$4.51
Average Electricity Costs, $/kWh	0.069		
Cooling Electricity Costs, $/kWh	$0.069		
Percent Average per kWh Electric Cost Avoided			0%
Standby Rate, $/kW			$0.05
Existing System			
Displaced Thermal Efficiency, %	90.0%		
Existing Chiller Power Requirements, kWh/Ton	0.60		

DOE TAP CHP Qualification Screen		
Gas Fueled CHP - Recip Engine, Microturbine, Fuel Cell or Gas Turbine Systems / natural gas, LFG, biogas with Heatin		
Note: The results of this screening analysis use average values and assumptions and should not be utilized as an inv		
Facility Information		
Facility Name	NEOMED Campus	
Location (City, State)	Rootstown, Ohio	
Application	Laboratory/Higher Ed.	
CHP System		**CHP Cooling Single Effect**
Net CHP Power, kW		1,426
CHP Electric Efficiency, % (HHV)		40.8%
CHP Thermal Output, Btu/kWh (Available Heating)		3,852
CHP Thermal Output, MMBtu/hr (Available Heating)		5.49
CHP Thermal Output, Btu/kWh (Available Cooling)		3,274
CHP Thermal Output, MMBtu/hr (Available Cooling)		4.67
CHP Power to Heat Ratio		0.89
CHP Availability, %		98%
Incremental O&M Costs for CHP, $/kWh		$0.019
Incremental O&M Costs for chiller, $/Ton-Year		$30.00
CHP Installed Costs, $/kW (without chillers)		$2,335
Thermal Utilization, %		90%
CHP Cooling		
Absorption Chiller COP		0.7
Absorption Chiller Capacity, Tons		245
Absorption Installed Costs, $/Ton		$1,720

DOE TAP CHP Qualification Screen			
Gas Fueled CHP - Recip Engine, Microturbine, Fuel Cell or Gas Turbine Systems / natural gas, LFG, biogas with Heatin			
Note: The results of this screening analysis use average values and assumptions and should not be utilized as an inve			
Annual Energy Consumption			**CHP Cooling**
	Base Case		**Single Effect**
Purchased Electricity, kWh	*13,709,400*		*1,104,259*
Generated Electricity, kWh	0		12,241,925
Annual Cooling Demand, Tons	992,880		992,880
Electric Cooling, Tons	992,880		387,519
Cooling Electricity, kWh	595,728		232,511
CHP Cooling, Tons	0		605,361
On-site Boiler/Heater Thermal Demand, MMBtu	52,541		22,309
Boiler/Heater Fuel, MMBtu	58,379		24,788
CHP Heating, MMBtu	0		30,232
CHP Fuel, MMBtu	0		102,326
Total Fuel, MMBtu	*58,379*		*127,114*
Annual Operating Costs			
Purchased Electricity, $	$945,949		$76,194
Standby Charges (Option 2), $	$0		$856
On-site Boiler/Heater Fuel, $	$263,288		$111,793
CHP Fuel, $	$0		$461,490
Incremental O&M, $	$0		$239,950
Total Operating Costs, $	*$1,209,236*		*$890,283*
Simple Payback			
Annual Operating Savings, $			$318,953
Chiller Installed Costs, $/kW			$296
Total CHP System Costs, $/kW (including chiller)			$2,631
Total Installed Costs			$3,751,325
Incentives			$200,000
Simple Payback, Years			**11.1**
Operating Costs to Generate, $/kWh			
Fuel Costs, $/kWh			$0.038
Cooling Credit, $/kWh			$0.000
Heating Credit, $/kWh			($0.012)
Incremental O&M, $/kWh			$0.020
Total Operating Costs to Generate, $/kWh			**$0.045**

Option E: 2 GE Jenbacher J316 with trigeneration, absorption cooling sized to thermal output

DOE TAP CHP Qualification Screen			
Gas Fueled CHP - Recip Engine, Microturbine, Fuel Cell or Gas Turbine Systems / natural gas, LFG, biogas with Heatin			
Note: The results of this screening analysis use average values and assumptions and should not be utilized as an inve			
Facility Information			
Facility Name	NEOMED Campus		
Location (City, State)	Rootstown, Ohio		
Application	Laboratory/Higher Ed.		
Loads			
Annual Hours of Operation	8,760		
Average Power Demand, kW	1,565		Average power demand
Annual Hours of Cooling Demand	2,520		input
Annual Hours of Heating Demand	6,240		determined by annual
Annual Electricity Consumption, kWh	13,709,400		
Average Heating Demand, MMBtu/hr	8.42		CHP sytem sized to heat
Annual Heating Demand, MMBtu	52,541		
Average Cooling Demand, Tons	394		
Average Power Demand without Cooling, kW	1,329		CHP system sized not to
Average Thermal Requirements for Cooling, MMBtu/hr	6.75		Thermal requirements f
Average Thermal Requirements for Cooling, MMBtu/hr	#REF!		Thermal requirements f
Annual Cooling Demand, Tons	992,880		
Energy Costs	**Base Case**		**CHP Case**
Boiler/Thermal Fuel Costs, $/MMBtu	$4.51		$4.51
CHP Fuel Costs, $MM/Btu			$4.51
Average Electricity Costs, $/kWh	0.069		
Cooling Electricity Costs, $/kWh	$0.069		
Percent Average per kWh Electric Cost Avoided			0%
Standby Rate, $/kW			$0.05
Existing System			
Displaced Thermal Efficiency, %	90.0%		
Existing Chiller Power Requirements, kWh/Ton	0.60		

DOE TAP CHP Qualification Screen		
Gas Fueled CHP - Recip Engine, Microturbine, Fuel Cell or Gas Turbine Systems / natural gas, LFG, biogas with Heatin		
Note: The results of this screening analysis use average values and assumptions and should not be utilized as an inv		
Facility Information		
Facility Name	NEOMED Campus	
Location (City, State)	Rootstown, Ohio	
Application	Laboratory/Higher Ed.	
CHP System		**CHP Cooling**
		Single Effect
Net CHP Power, kW		1,696
CHP Electric Efficiency, % (HHV)		38.3%
CHP Thermal Output, Btu/kWh (Available Heating)		4,382
CHP Thermal Output, MMBtu/hr (Available Heating)		7.43
CHP Thermal Output, Btu/kWh (Available Cooling)		3,725
CHP Thermal Output, MMBtu/hr (Available Cooling)		6.32
CHP Power to Heat Ratio		0.78
CHP Availability, %		98%
Incremental O&M Costs for CHP, $/kWh		$0.019
Incremental O&M Costs for chiller, $/Ton-Year		$30.00
CHP Installed Costs, $/kW (without chillers)		$2,335
Thermal Utilization, %		90%
CHP Cooling		
Absorption Chiller COP		0.7
Absorption Chiller Capacity, Tons		332
Absorption Installed Costs, $/Ton		$1,350

DOE TAP CHP Qualification Screen			
Gas Fueled CHP - Recip Engine, Microturbine, Fuel Cell or Gas Turbine Systems / natural gas, LFG, biogas with Heatin			
Note: The results of this screening analysis use average values and assumptions and should not be utilized as an inve			
Annual Energy Consumption			**CHP Cooling**
	Base Case		**Single Effect**
Purchased Electricity, kWh	*13,709,400*		*-1,341,851*
Generated Electricity, kWh	0		14,559,821
Annual Cooling Demand, Tons	992,880		992,880
Electric Cooling, Tons	992,880		173,830
Cooling Electricity, kWh	595,728		104,298
CHP Cooling, Tons	0		819,050
On-site Boiler/Heater Thermal Demand, MMBtu	52,541		11,637
Boiler/Heater Fuel, MMBtu	58,379		12,931
CHP Heating, MMBtu	0		40,903
CHP Fuel, MMBtu	0		129,810
Total Fuel, MMBtu	*58,379*		*142,740*
Annual Operating Costs			
Purchased Electricity, $	$945,949		-$92,588
Standby Charges (Option 2), $	$0		$1,018
On-site Boiler/Heater Fuel, $	$263,288		$58,317
CHP Fuel, $	$0		$585,441
Incremental O&M, $	$0		$286,586
Total Operating Costs, $	*$1,209,236*		*$838,774*
Simple Payback			
Annual Operating Savings, $			$370,463
Chiller Installed Costs, $/kW			$264
Total CHP System Costs, $/kW (including chiller)			$2,599
Total Installed Costs			$4,407,892
Incentives			$200,000
Simple Payback, Years			**11.4**
Operating Costs to Generate, $/kWh			
Fuel Costs, $/kWh			$0.040
Cooling Credit, $/kWh			$0.000
Heating Credit, $/kWh			($0.014)
Incremental O&M, $/kWh			$0.020
Total Operating Costs to Generate, $/kWh			**$0.046**

Option F: 3 GE Jenbacher J312 with trigeneration, absorption cooling sized to thermal output

DOE TAP CHP Qualification Screen			
Gas Fueled CHP - Recip Engine, Microturbine, Fuel Cell or Gas Turbine Systems / natural gas, LFG, biogas with Heatin			
Note: The results of this screening analysis use average values and assumptions and should not be utilized as an inve			
Facility Information			
Facility Name	NEOMED Campus		
Location (City, State)	Rootstown, Ohio		
Application	Laboratory/Higher Ed.		
Loads			
Annual Hours of Operation	8,760		
Average Power Demand, kW	1,565		Average power demand
Annual Hours of Cooling Demand	2,520		input
Annual Hours of Heating Demand	6,240		determined by annual
Annual Electricity Consumption, kWh	13,709,400		
Average Heating Demand, MMBtu/hr	8.42		CHP sytem sized to heat
Annual Heating Demand, MMBtu	52,541		
Average Cooling Demand, Tons	394		
Average Power Demand without Cooling, kW	1,329		CHP system sized not to
Average Thermal Requirements for Cooling, MMBtu/hr	6.75		Thermal requirements f
Average Thermal Requirements for Cooling, MMBtu/hr	#REF!		Thermal requirements f
Annual Cooling Demand, Tons	992,880		
Energy Costs	**Base Case**		**CHP Case**
Boiler/Thermal Fuel Costs, $/MMBtu	$4.51		$4.51
CHP Fuel Costs, $MM/Btu			$4.51
Average Electricity Costs, $/kWh	0.069		
Cooling Electricity Costs, $/kWh	$0.069		
Percent Average per kWh Electric Cost Avoided			0%
Standby Rate, $/kW			$0.05
Existing System			
Displaced Thermal Efficiency, %	90.0%		
Existing Chiller Power Requirements, kWh/Ton	0.60		

DOE TAP CHP Qualification Screen		
Gas Fueled CHP - Recip Engine, Microturbine, Fuel Cell or Gas Turbine Systems / natural gas, LFG, biogas with Heatin		
Note: The results of this screening analysis use average values and assumptions and should not be utilized as an inv		
Facility Information		
Facility Name	NEOMED Campus	
Location (City, State)	Rootstown, Ohio	
Application	Laboratory/Higher Ed.	
CHP System		**CHP Cooling Single Effect**
Net CHP Power, kW		1,899
CHP Electric Efficiency, % (HHV)		38.1%
CHP Thermal Output, Btu/kWh (Available Heating)		4,387
CHP Thermal Output, MMBtu/hr (Available Heating)		8.33
CHP Thermal Output, Btu/kWh (Available Cooling)		3,729
CHP Thermal Output, MMBtu/hr (Available Cooling)		7.08
CHP Power to Heat Ratio		0.78
CHP Availability, %		98%
Incremental O&M Costs for CHP, $/kWh		$0.021
Incremental O&M Costs for chiller, $/Ton-Year		$30.00
CHP Installed Costs, $/kW (without chillers)		$2,737
Thermal Utilization, %		90%
CHP Cooling		
Absorption Chiller COP		0.7
Absorption Chiller Capacity, Tons		372
Absorption Installed Costs, $/Ton		$1,350

DOE TAP CHP Qualification Screen		
Gas Fueled CHP - Recip Engine, Microturbine, Fuel Cell or Gas Turbine Systems / natural gas, LFG, biogas with Heatin		
Note: The results of this screening analysis use average values and assumptions and should not be utilized as an inve		
Annual Energy Consumption		**CHP Cooling**
	Base Case	**Single Effect**
Purchased Electricity, kWh	*13,709,400*	*-3,144,010*
Generated Electricity, kWh	0	16,302,535
Annual Cooling Demand, Tons	992,880	992,880
Electric Cooling, Tons	992,880	74,755
Cooling Electricity, kWh	595,728	44,853
CHP Cooling, Tons	0	918,125
On-site Boiler/Heater Thermal Demand, MMBtu	52,541	6,690
Boiler/Heater Fuel, MMBtu	58,379	7,433
CHP Heating, MMBtu	0	45,851
CHP Fuel, MMBtu	0	145,957
Total Fuel, MMBtu	*58,379*	*153,390*
Annual Operating Costs		
Purchased Electricity, $	$945,949	-$216,937
Standby Charges (Option 2), $	$0	$1,139
On-site Boiler/Heater Fuel, $	$263,288	$33,523
CHP Fuel, $	$0	$658,267
Incremental O&M, $	$0	$353,506
Total Operating Costs, $	*$1,209,236*	*$829,498*
Simple Payback		
Annual Operating Savings, $		$379,738
Chiller Installed Costs, $/kW		$264
Total CHP System Costs, $/kW (including chiller)		$3,001
Total Installed Costs		$5,699,454
Incentives		$200,000
Simple Payback, Years		**14.5**
Operating Costs to Generate, $/kWh		
Fuel Costs, $/kWh		$0.040
Cooling Credit, $/kWh		$0.000
Heating Credit, $/kWh		($0.014)
Incremental O&M, $/kWh		$0.022
Total Operating Costs to Generate, $/kWh		**$0.048**

Option G: 1 GE Jenbacher J420 with trigeneration, full load absorption cooling with boiler makeup

DOE TAP CHP Qualification Screen			
Gas Fueled CHP - Recip Engine, Microturbine, Fuel Cell or Gas Turbine Systems / natural gas, LFG, biogas with Heatin			
Note: The results of this screening analysis use average values and assumptions and should not be utilized as an inve			
Facility Information			
Facility Name	NEOMED Campus		
Location (City, State)	Rootstown, Ohio		
Application	Laboratory/Higher Ed.		
Loads			
Annual Hours of Operation	8,760		
Average Power Demand, kW	1,565		Average power demand
Annual Hours of Cooling Demand	2,520		input
Annual Hours of Heating Demand	6,240		determined by annual
Annual Electricity Consumption, kWh	13,709,400		
Average Heating Demand, MMBtu/hr	8.42		CHP sytem sized to heat
Annual Heating Demand, MMBtu	52,541		
Average Cooling Demand, Tons	394		2014 cooling
Average Power Demand without Cooling, kW	1,329		CHP system sized not to
Average Thermal Requirements for Cooling, MMBtu/hr	6.75		Thermal requirements f
Average Thermal Requirements for Cooling, MMBtu/hr	#REF!		Thermal requirements f
Annual Cooling Demand, Tons	992,880		
Energy Costs	**Base Case**		**CHP Case**
Boiler/Thermal Fuel Costs, $/MMBtu	$4.51		$4.51
CHP Fuel Costs, $MM/Btu			$4.51
Average Electricity Costs, $/kWh	0.069		
Cooling Electricity Costs, $/kWh	$0.069		
Percent Average per kWh Electric Cost Avoided			0%
Standby Rate, $/kW			$0.05
Existing System			
Displaced Thermal Efficiency, %	90.0%		
Existing Chiller Power Requirements, kWh/Ton	0.60		

DOE TAP CHP Qualification Screen		
Gas Fueled CHP - Recip Engine, Microturbine, Fuel Cell or Gas Turbine Systems / natural gas, LFG, biogas with Heatin		
Note: The results of this screening analysis use average values and assumptions and should not be utilized as an inv		
Facility Information		
Facility Name	NEOMED Campus	
Location (City, State)	Rootstown, Ohio	
Application	Laboratory/Higher Ed.	
CHP System		**CHP Cooling Single Effect**
Net CHP Power, kW		1,426
CHP Electric Efficiency, % (HHV)		40.8%
CHP Thermal Output, Btu/kWh (Available Heating)		3,852
CHP Thermal Output, MMBtu/hr (Available Heating)		5.49
CHP Thermal Output, Btu/kWh (Available Cooling)		3,274
CHP Thermal Output, MMBtu/hr (Available Cooling)		4.67
CHP Power to Heat Ratio		0.89
CHP Availability, %		98%
Incremental O&M Costs for CHP, $/kWh		$0.019
Incremental O&M Costs for chiller, $/Ton-Year		$30.00
CHP Installed Costs, $/kW (without chillers)		$2,335
Thermal Utilization, %		90%
CHP Cooling		
Absorption Chiller COP		0.7
Absorption Chiller Capacity, Tons		245
Absorption Installed Costs, $/Ton		$1,720
tons made up by boiler		154
MMBTU/hr		1.85

DOE TAP CHP Qualification Screen			
Gas Fueled CHP - Recip Engine, Microturbine, Fuel Cell or Gas Turbine Systems / natural gas, LFG, biogas with Heatin			
Note: The results of this screening analysis use average values and assumptions and should not be utilized as an inve			
Annual Energy Consumption			**CHP Cooling**
	Base Case		**Single Effect**
Purchased Electricity, kWh	*13,709,400*		*871,747*
Generated Electricity, kWh	0		12,241,925
Annual Cooling Demand, Tons	992,880		992,880
Electric Cooling, Tons	992,880		0
Cooling Electricity, kWh	595,728		0
CHP Cooling, Tons	0		992,880
On-site Boiler/Heater Thermal Demand, MMBtu	52,541		26,959
Boiler/Heater Fuel, MMBtu	58,379		29,955
CHP Heating, MMBtu	0		30,232
CHP Fuel, MMBtu	0		102,326
Total Fuel, MMBtu	*58,379*		*132,281*
Annual Operating Costs			
Purchased Electricity, $	$945,949		$60,151
Standby Charges (Option 2), $	$0		$856
On-site Boiler/Heater Fuel, $	$263,288		$135,096
CHP Fuel, $	$0		$461,490
Incremental O&M, $	$0		$239,950
Total Operating Costs, $	*$1,209,236*		*$897,543*
Simple Payback			
Annual Operating Savings, $			$311,694
Chiller Installed Costs, $/kW			$296
Total CHP System Costs, $/kW (including chiller)			$2,631
Total Installed Costs			$3,751,325
Incentives			$200,000
Simple Payback, Years			**11.4**
Operating Costs to Generate, $/kWh			
Fuel Costs, $/kWh			$0.038
Cooling Credit, $/kWh			$0.000
Heating Credit, $/kWh			($0.010)
Incremental O&M, $/kWh			$0.020
Total Operating Costs to Generate, $/kWh			**$0.047**

Option H: 2 GE Jenbacher J316 with trigeneration, full load absorption cooling with boiler makeup

DOE TAP CHP Qualification Screen			
Gas Fueled CHP - Recip Engine, Microturbine, Fuel Cell or Gas Turbine Systems / natural gas, LFG, biogas with Heatin			
Note: The results of this screening analysis use average values and assumptions and should not be utilized as an inve			
Facility Information			
Facility Name	NEOMED Campus		
Location (City, State)	Rootstown, Ohio		
Application	Laboratory/Higher Ed.		
Loads			
Annual Hours of Operation	8,760		
Average Power Demand, kW	1,565		Average power demand
Annual Hours of Cooling Demand	2,520		input
Annual Hours of Heating Demand	6,240		determined by annual
Annual Electricity Consumption, kWh	13,709,400		
Average Heating Demand, MMBtu/hr	8.42		CHP sytem sized to heat
Annual Heating Demand, MMBtu	52,541		
Average Cooling Demand, Tons	394		
Average Power Demand without Cooling, kW	1,329		CHP system sized not to
Average Thermal Requirements for Cooling, MMBtu/hr	6.75		Thermal requirements f
Average Thermal Requirements for Cooling, MMBtu/hr	#REF!		Thermal requirements f
Annual Cooling Demand, Tons	992,880		
Energy Costs	**Base Case**		**CHP Case**
Boiler/Thermal Fuel Costs, $/MMBtu	$4.51		$4.51
CHP Fuel Costs, $MM/Btu			$4.51
Average Electricity Costs, $/kWh	0.069		
Cooling Electricity Costs, $/kWh	$0.069		
Percent Average per kWh Electric Cost Avoided			0%
Standby Rate, $/kW			$0.05
Existing System			
Displaced Thermal Efficiency, %	90.0%		
Existing Chiller Power Requirements, kWh/Ton	0.60		

DOE TAP CHP Qualification Screen		
Gas Fueled CHP - Recip Engine, Microturbine, Fuel Cell or Gas Turbine Systems / natural gas, LFG, biogas with Heatin		
Note: The results of this screening analysis use average values and assumptions and should not be utilized as an inv		
Facility Information		
Facility Name	NEOMED Campus	
Location (City, State)	Rootstown, Ohio	
Application	Laboratory/Higher Ed.	
CHP System		**CHP Cooling Single Effect**
Net CHP Power, kW		1,696
CHP Electric Efficiency, % (HHV)		38.3%
CHP Thermal Output, Btu/kWh (Available Heating)		4,382
CHP Thermal Output, MMBtu/hr (Available Heating)		7.43
CHP Thermal Output, Btu/kWh (Available Cooling)		3,725
CHP Thermal Output, MMBtu/hr (Available Cooling)		6.32
CHP Power to Heat Ratio		0.78
CHP Availability, %		98%
Incremental O&M Costs for CHP, $/kWh		$0.019
Incremental O&M Costs for chiller, $/Ton-Year		$30.00
CHP Installed Costs, $/kW (without chillers)		$2,335
Thermal Utilization, %		90%
CHP Cooling		
Absorption Chiller COP		0.7
Absorption Chiller Capacity, Tons		332
Absorption Installed Costs, $/Ton		$1,350
tons made up by boiler		69
MMBTU/hr		0.83

DOE TAP CHP Qualification Screen			
Gas Fueled CHP - Recip Engine, Microturbine, Fuel Cell or Gas Turbine Systems / natural gas, LFG, biogas with Heatin			
Note: The results of this screening analysis use average values and assumptions and should not be utilized as an inve			
Annual Energy Consumption			**CHP Cooling**
	Base Case		**Single Effect**
Purchased Electricity, kWh	*13,709,400*		*-1,446,149*
Generated Electricity, kWh	0		14,559,821
Annual Cooling Demand, Tons	992,880		992,880
Electric Cooling, Tons	992,880		0
Cooling Electricity, kWh	595,728		0
CHP Cooling, Tons	0		992,880
On-site Boiler/Heater Thermal Demand, MMBtu	52,541		13,723
Boiler/Heater Fuel, MMBtu	58,379		15,248
CHP Heating, MMBtu	0		40,903
CHP Fuel, MMBtu	0		129,810
Total Fuel, MMBtu	*58,379*		*145,058*
Annual Operating Costs			
Purchased Electricity, $	$945,949		-$99,784
Standby Charges (Option 2), $	$0		$1,018
On-site Boiler/Heater Fuel, $	$263,288		$68,770
CHP Fuel, $	$0		$585,441
Incremental O&M, $	$0		$286,586
Total Operating Costs, $	*$1,209,236*		*$842,030*
Simple Payback			
Annual Operating Savings, $			$367,206
Chiller Installed Costs, $/kW			$264
Total CHP System Costs, $/kW (including chiller)			$2,599
Total Installed Costs			$4,407,892
Incentives			$200,000
Simple Payback, Years			**11.5**
Operating Costs to Generate, $/kWh			
Fuel Costs, $/kWh			$0.040
Cooling Credit, $/kWh			$0.000
Heating Credit, $/kWh			($0.013)
Incremental O&M, $/kWh			$0.020
Total Operating Costs to Generate, $/kWh			**$0.047**

Option I: 3 GE Jenbacher J312 with trigeneration, full load absorption cooling with boiler makeup

DOE TAP CHP Qualification Screen			
Gas Fueled CHP - Recip Engine, Microturbine, Fuel Cell or Gas Turbine Systems / natural gas, LFG, biogas with Heatin			
Note: The results of this screening analysis use average values and assumptions and should not be utilized as an inve			
Facility Information			
Facility Name	NEOMED Campus		
Location (City, State)	Rootstown, Ohio		
Application	Laboratory/Higher Ed.		
Loads			
Annual Hours of Operation	8,760		
Average Power Demand, kW	1,565		Average power demand
Annual Hours of Cooling Demand	2,520		input
Annual Hours of Heating Demand	6,240		determined by annual
Annual Electricity Consumption, kWh	13,709,400		
Average Heating Demand, MMBtu/hr	8.42		CHP sytem sized to heat
Annual Heating Demand, MMBtu	52,541		
Average Cooling Demand, Tons	394		
Average Power Demand without Cooling, kW	1,329		CHP system sized not to
Average Thermal Requirements for Cooling, MMBtu/hr	6.75		Thermal requirements f
Average Thermal Requirements for Cooling, MMBtu/hr	#REF!		Thermal requirements f
Annual Cooling Demand, Tons	992,880		
Energy Costs	**Base Case**		**CHP Case**
Boiler/Thermal Fuel Costs, $/MMBtu	$4.51		$4.51
CHP Fuel Costs, $MM/Btu			$4.51
Average Electricity Costs, $/kWh	0.069		
Cooling Electricity Costs, $/kWh	$0.069		
Percent Average per kWh Electric Cost Avoided			0%
Standby Rate, $/kW			$0.05
Existing System			
Displaced Thermal Efficiency, %	90.0%		
Existing Chiller Power Requirements, kWh/Ton	0.60		

DOE TAP CHP Qualification Screen		
Gas Fueled CHP - Recip Engine, Microturbine, Fuel Cell or Gas Turbine Systems / natural gas, LFG, biogas with Heatin		
Note: The results of this screening analysis use average values and assumptions and should not be utilized as an inv		
Facility Information		
Facility Name	NEOMED Campus	
Location (City, State)	Rootstown, Ohio	
Application	Laboratory/Higher Ed.	
CHP System		**CHP Cooling Single Effect**
Net CHP Power, kW		1,899
CHP Electric Efficiency, % (HHV)		38.1%
CHP Thermal Output, Btu/kWh (Available Heating)		4,387
CHP Thermal Output, MMBtu/hr (Available Heating)		8.33
CHP Thermal Output, Btu/kWh (Available Cooling)		3,729
CHP Thermal Output, MMBtu/hr (Available Cooling)		7.08
CHP Power to Heat Ratio		0.78
CHP Availability, %		98%
Incremental O&M Costs for CHP, $/kWh		$0.021
Incremental O&M Costs for chiller, $/Ton-Year		$30.00
CHP Installed Costs, $/kW (without chillers)		$2,737
Thermal Utilization, %		90%
CHP Cooling		
Absorption Chiller COP		0.7
Absorption Chiller Capacity, Tons		372
Absorption Installed Costs, $/Ton		$1,350
tons made up by boiler		30
MMBTU/hr		0.36

DOE TAP CHP Qualification Screen			
Gas Fueled CHP - Recip Engine, Microturbine, Fuel Cell or Gas Turbine Systems / natural gas, LFG, biogas with Heatin			
Note: The results of this screening analysis use average values and assumptions and should not be utilized as an inve			
Annual Energy Consumption			**CHP Cooling**
	Base Case		**Single Effect**
Purchased Electricity, kWh	*13,709,400*		*-3,188,863*
Generated Electricity, kWh	0		16,302,535
Annual Cooling Demand, Tons	992,880		992,880
Electric Cooling, Tons	992,880		0
Cooling Electricity, kWh	595,728		0
CHP Cooling, Tons	0		992,880
On-site Boiler/Heater Thermal Demand, MMBtu	52,541		7,587
Boiler/Heater Fuel, MMBtu	58,379		8,430
CHP Heating, MMBtu	0		45,851
CHP Fuel, MMBtu	0		145,957
Total Fuel, MMBtu	*58,379*		*154,387*
Annual Operating Costs			
Purchased Electricity, $	$945,949		-$220,032
Standby Charges (Option 2), $	$0		$1,139
On-site Boiler/Heater Fuel, $	$263,288		$38,018
CHP Fuel, $	$0		$658,267
Incremental O&M, $	$0		$353,506
Total Operating Costs, $	*$1,209,236*		*$830,899*
Simple Payback			
Annual Operating Savings, $			$378,338
Chiller Installed Costs, $/kW			$264
Total CHP System Costs, $/kW (including chiller)			$3,001
Total Installed Costs			$5,699,454
Incentives			$200,000
Simple Payback, Years			**14.5**
Operating Costs to Generate, $/kWh			
Fuel Costs, $/kWh			$0.040
Cooling Credit, $/kWh			$0.000
Heating Credit, $/kWh			($0.014)
Incremental O&M, $/kWh			$0.022
Total Operating Costs to Generate, $/kWh			**$0.048**

Cooling Load Calculation

							Cooling Months								
		January	February	March	April	May	June	July	August	Septembe	October	November	December		
10 Year Avg.	total kW	992	1,023	1,004	1,078	1,049	1,138	1,161	1,218	1,166	1,083	1,045	1,057	avg. (non-cooling) kW	992
	cooling power (kW)						146	169	226	174				avg. (cooling) kW	179
	cooling load (MBH)						2917	3378	4514	3484				Avg. Cooling MBH	3,573
	cooling load (Ton)						243	282	376	290				**Avg. Cooling Tons**	**298**

							Cooling Months								
		January	February	March	April	May	June	July	August	Septembe	October	November	December		
2013	total kW	1,161	1,061	1,039	1,146	1,141	1,314	1,179	1,295	1,201	1,077	1,046	1,047	avg. (non-cooling) kW	1,039
	cooling power (kW)						275	140	256	162				avg. (cooling) kW	208
	cooling load (MBH)						5505	2805	5110	3237				Avg. Cooling MBH	4,164
	cooling load (Ton)						459	234	426	270				**Avg. Cooling Tons**	**347**

							Cooling Months								
		January	February	March	April	May	June	July	August	Septembe	October	November	December		
2014	total kW	1,560	1,479	1,596	1,540			1,689	1,627	1,697	1,487	1,537	1,435	avg. (non-cooling) kW	1,435
	cooling power (kW)							254	193	262				avg. (cooling) kW	236
	cooling load (MBH)							5087	3858	5240				Avg. Cooling MBH	4,728
	cooling load (Ton)							424	322	437				**Avg. Cooling Tons**	**394**

Appendix F: Sensitivity Study

Option A		Electric Price	Payback Period
		Current .069$/kWH	8.4
		$0.074	7.3
		$0.077	6.6
		$0.081	6.1
		$0.084	5.6
		$0.088	5.2
		$0.091	4.9
		$0.095	4.6
		$0.098	4.3
		Gas Price	**Payback Period**
		Current $4.51/MMBtu	8.4
		$4.28	8.1
		$4.05	7.9
		$3.83	7.6
		$3.60	7.4
		$3.38	7.2
		$3.15	7.0
		$2.93	6.9
		$2.70	6.7

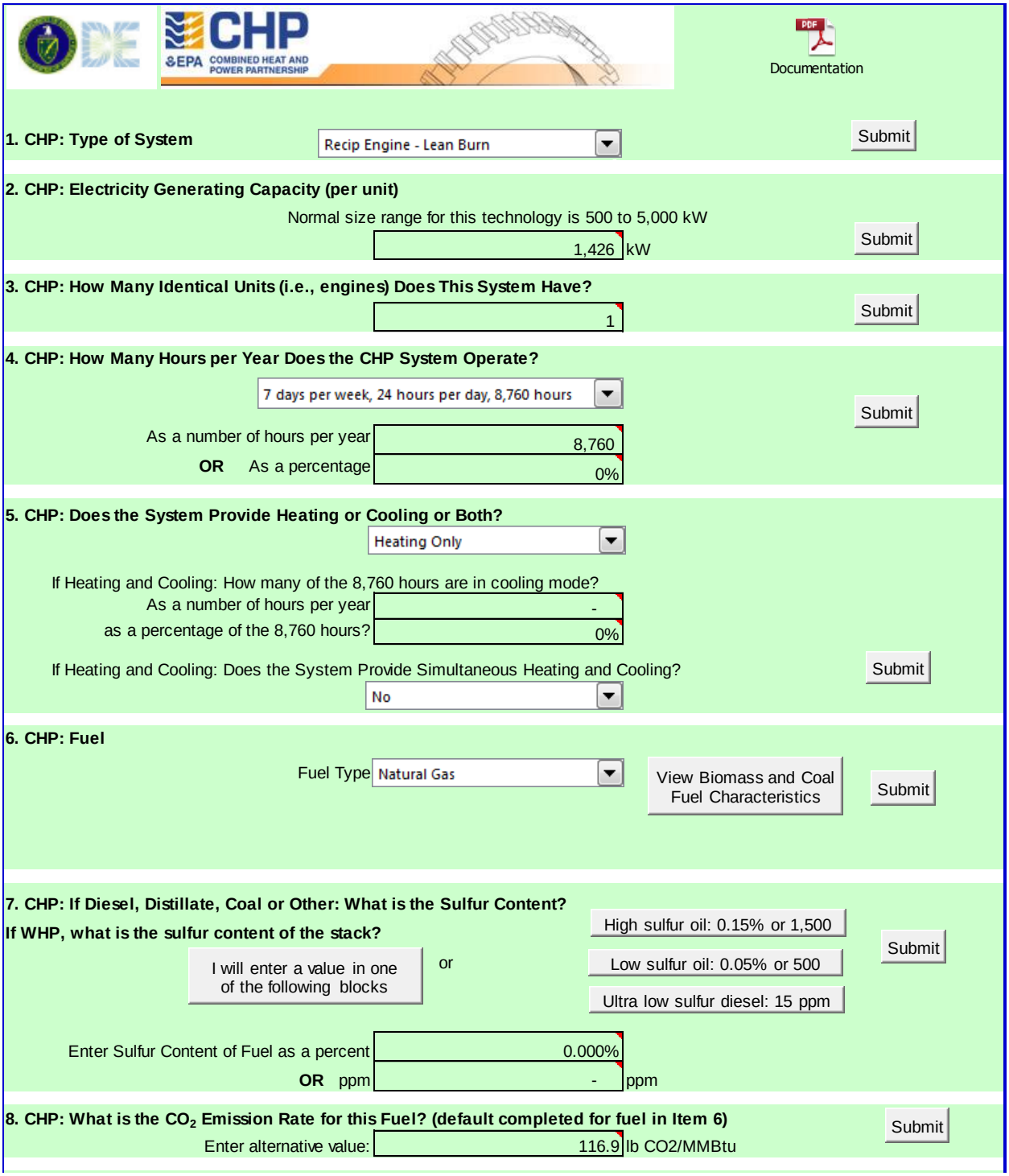
electric increase/gas decrease	Electric Price	Gas Price	Payback Period
0	Current .069$/kWH	Current $4.51/MMBtu	8.4
5%	$0.074	$4.28	7.0
10%	$0.077	$4.05	6.3
15%	$0.081	$3.83	5.6
20%	$0.084	$3.60	5.2
25%	$0.088	$3.38	4.7
30%	$0.091	$3.15	4.4
35%	$0.095	$2.93	4.0
40%	$0.098	$2.70	3.8

Option B		Electric Price	Payback Period
		Current .069$/kWH	10.5
		$0.074	8.6
		$0.077	7.8
		$0.081	7.0
		$0.084	6.4
		$0.088	5.9
		$0.091	5.5
		$0.095	5.1
		$0.098	4.8
		Gas Price	Payback Period
		Current $4.51/MMBtu	10.5
		$4.28	9.8
		$4.05	9.3
		$3.83	9.0
		$3.60	8.6
		$3.38	8.2
		$3.15	7.9
		$2.93	7.6
		$2.70	7.4

electric increase/gas decrease	Electric Price	Gas Price	Payback Period
0	Current .069$/kWH	Current $4.51/MMBtu	10.5
5%	$0.074	$4.28	8.2
10%	$0.077	$4.05	7.2
15%	$0.081	$3.83	6.3
20%	$0.084	$3.60	5.7
25%	$0.088	$3.38	5.1
30%	$0.091	$3.15	4.7
35%	$0.095	$2.93	4.3
40%	$0.098	$2.70	4.0

Appendix G: Emissions Calculations

Option A



9. CHP: What is the Heat Content of this Fuel? (Enter a value in only ONE of the boxes)

	1,028	Btu/cubic foot (HHV)
OR	-	Btu/gallon (HHV)
OR	-	Btu/lb (HHV)

Submit

10. CHP: Boiler Steam To Process (Steam Turbine CHP Only)

Boiler Steam to Process as lb Steam/hr	0
Boiler Steam to Process as MMBtu Steam/hr	0

Submit

11. CHP: Steam Turbine System Boiler Efficiency (Steam Turbine CHP Only)

I will enter an efficiency | Use default for this technology

Enter Boiler Efficiency as %	0%

Submit

12. CHP: Electric Efficiency

I will enter an efficiency in **one** of the following blocks | Use default for this technology

Enter Generating Efficiency as %	41%	(HHV)
OR Enter Generating Efficiency as Btu/kWh HHV	-	Btu/kWh (HHV)
OR Enter Generating Efficiency as Btu/kWh LHV	-	Btu/kWh (LHV)

Submit

13. CHP: Base Power to Heat Ratio

The Power to Heat Ratio should reflect ONLY the thermal production of the generating unit (i.e., combustion turbine). Thermal Output of the duct burners (if equipped) should not be included.

I will enter a Power to Heat | Use default for this technology

Power to Heat Ratio	0.89
If WHP: Useful Thermal Output (MMBtu/hr)	0

Submit

14. CHP: NOx Emission Rate

I will enter a NOx rate in **one** of the following blocks

Use default emissions for this technology.
Note: Default emissions are without aftertreatment. Some areas may require add-on controls and you will need to enter an emission rate based on your local requirements. SCR can reduce emissions by up to 90%

Enter a NOx Rate as ppm (15% O_2)	-	ppm
OR Enter a NOx Rate as gm/hp-hr	1.100	gm/hp-hr
OR Enter a NOx Rate as lb/MMBtu	-	lb NOx/MMBtu
OR Enter a NOx Rate as lb/MWh	-	lb NOx/MWh

Submit

15. Duct Burners: Does the System Incorporate Duct Burners?

No — Submit

16. Duct Burners: What is the Total Fuel Input Capacity of the Burners for Each CHP Unit?

For reference, the Recip Engine - Lean Burn has a heat input of 11.9 MMBtu/hr

- MMBtu/hr — Submit

17. Duct Burners: The CHP system operates 8,760 hours per year. How much do the duct burners operate?

As a number of hours per year: -

As a percentage of the 8,760 hours?: 0% — Submit

18. Duct Burners: NOx Emission Rate for the Duct Burners

I will enter a NOx rate in **one** of the following blocks | Use default for this technology — Submit

- lb/MMBtu

OR

- ppm NOx at 15% O2

19. Cooling: Does the CHP Provide Cooling? **No** — Submit

You indicated No Cooling in Item 5

20. Cooling: Type of Absorption Chiller Used? — Submit

Coefficient of Performance (COP): -

21. Cooling: What is the Cooling Capacity of the System?

Based on your other entries, the maximum cooling capacity is . tons or . MMBtu/hr of cooling — Submit

(Enter a value in only ONE of the boxes)

- Cooling Tons

OR

- MMBtu per Hour of Cooling

22. Displaced Cooling: What is the Efficiency of the Cooling System that is Being Displaced? — Submit

(Enter a value in only ONE of the boxes)

Electricity Demand (kW per ton): -

OR Coefficient of Performance (COP): -

23. Displaced Thermal: Type of System:

Existing Gas Boiler

Submit

24. Displaced Thermal: If not a Natural Gas System: What is the Sulfur Content?

I will enter a | or | Commercial coal: 1% sulfur | High sulfur oil: 0.15% or 1,500 | Low sulfur oil: 0.05% or 500 ppm

Submit

Enter Sulfur Content as a percent: 0.00%

OR ppm: - ppm

25. Displaced Thermal: What is the CO2 Emission Rate for this Fuel? (default completed for fuel in Item 23)

Enter alternative value: 116.9 lb CO2/MMBtu

Submit

26. Displaced Thermal: What is the Heat Content of this Fuel? (Enter a value in only ONE of the boxes)

1,028 Btu/cubic foot (HHV)

OR - Btu/gallon (HHV)

OR - Btu/lb (HHV)

Submit

27. Displaced Thermal: Efficiency (usually a boiler)

I will enter an efficiency | Use default for this thermal technology

Submit

Enter Generating Efficiency as %: 85%

28. Displaced Thermal Production: NOx Emission Rate

I will enter the NOx rate | Use default for NOx rate

Submit

NOx Rate: 0.100 lb NOx/MMBtu

29. Displaced Electricity: Generation Profile

eGRID Fossil Fuel (2010 data)

Modify one of the Three User-Defined Generating Sources

Submit

Link to EPA's Fuel and CO2 Emissions Savings Calculation Methodology for CHP

30. Displaced Electricity: Select U.S. Average, eGRID Subregion, NERC region, or State

RFCW West

Submit

Link to eGRID Subregion Map

31. Displaced Electricity: Select Electric Grid Region for Transmission and Distribution (T&D) Losses

Eastern Interconnect

5.82%

Submit

Link to NERC Interconnections Map

CHP Results

The results generated by the CHP Emissions Calculator are intended for eductional and outreach purposes only; it is not designed for use in developing emission inventories or preparing air permit applications.

The results of this analysis have not been reviewed or endorsed by the EPA CHP Partnership.

Table 1

Annual Emissions Analysis					
	CHP System	Displaced Electricity Production	Displaced Thermal Production	Emissions/Fuel Reduction	Percent Reduction
NO_x (tons/year)	20.30	10.82	2.82	(6.66)	-49%
SO_2 (tons/year)	0.03	30.93	0.02	30.92	100%
CO_2 (tons/year)	6,105	14,337	3,293	11,525	65%
CH_4 (tons/year)	0.12	0.163	0.06	0.110	49%
N_2O (tons/year)	0.01	0.231	0.01	0.225	95%
Total GHGs (CO_2e tons/year)	6,111	14,412	3,296	11,597	65%
Fuel Consumption (MMBtu/year)	104,445	139,368	56,341	91,264	47%
Equal to the annual GHG emissions from this many passenger vehicles:				2,201	
Equal to the annual GHG emissions from the generation of electricity for this many homes:				1,439	

This CHP project will avoid yearly emissions of greenhouse gases by 11,597 tons of carbon dioxide equivalent.

Equal to the annual greenhouse gas emissions from 2,201 passenger vehicles.

Equal to the annual greenhouse gas emissions from the generation of electricity used by 1,439 homes.

Option B

Documentation

1. CHP: Type of System — Recip Engine - Lean Burn — Submit

2. CHP: Electricity Generating Capacity (per unit)

Normal size range for this technology is 500 to 5,000 kW

848 kW — Submit

3. CHP: How Many Identical Units (i.e., engines) Does This System Have?

2 — Submit

4. CHP: How Many Hours per Year Does the CHP System Operate?

7 days per week, 24 hours per day, 8,760 hours — Submit

As a number of hours per year: 8,760

OR As a percentage: 0%

5. CHP: Does the System Provide Heating or Cooling or Both?

Heating Only

If Heating and Cooling: How many of the 8,760 hours are in cooling mode?

As a number of hours per year: -

as a percentage of the 8,760 hours?: 0%

If Heating and Cooling: Does the System Provide Simultaneous Heating and Cooling? — Submit

No

6. CHP: Fuel

Fuel Type: Natural Gas — View Biomass and Coal Fuel Characteristics — Submit

7. CHP: If Diesel, Distillate, Coal or Other: What is the Sulfur Content?

If WHP, what is the sulfur content of the stack?

I will enter a value in one of the following blocks

or

High sulfur oil: 0.15% or 1,500

Low sulfur oil: 0.05% or 500

Ultra low sulfur diesel: 15 ppm

Submit

Enter Sulfur Content of Fuel as a percent: 0.000%

OR ppm: - ppm

8. CHP: What is the CO_2 Emission Rate for this Fuel? (default completed for fuel in Item 6) — Submit

Enter alternative value: 116.9 lb CO2/MMBtu

9. CHP: What is the Heat Content of this Fuel? (Enter a value in only ONE of the boxes)

	1,028	Btu/cubic foot (HHV)
OR	-	Btu/gallon (HHV)
OR	-	Btu/lb (HHV)

Submit

10. CHP: Boiler Steam To Process (Steam Turbine CHP Only)

Boiler Steam to Process as lb Steam/hr	0
Boiler Steam to Process as MMBtu Steam/hr	0

Submit

11. CHP: Steam Turbine System Boiler Efficiency (Steam Turbine CHP Only)

I will enter an efficiency | Use default for this technology

Enter Boiler Efficiency as %	0%

Submit

12. CHP: Electric Efficiency

I will enter an efficiency in **one** of the following blocks | Use default for this technology

Submit

Enter Generating Efficiency as %	38%	(HHV)
OR Enter Generating Efficiency as Btu/kWh HHV	-	Btu/kWh (HHV)
OR Enter Generating Efficiency as Btu/kWh LHV	-	Btu/kWh (LHV)

13. CHP: Base Power to Heat Ratio

The Power to Heat Ratio should reflect ONLY the thermal production of the generating unit (i.e., combustion turbine). Thermal Output of the duct burners (if equipped) should not be included.

I will enter a Power to Heat | Use default for this technology

Submit

Power to Heat Ratio	0.78
If WHP: Useful Thermal Output (MMBtu/hr)	0

14. CHP: NOx Emission Rate

I will enter a NOx rate in **one** of the following blocks

Use default emissions for this technology.
Note: Default emissions are without aftertreatment. Some areas may require add-on controls and you will need to enter an emission rate based on your local requirements. SCR can reduce emissions by up to 90%

Enter a NOx Rate as ppm (15% O_2)	-	ppm
OR Enter a NOx Rate as gm/hp-hr	1.100	gm/hp-hr
OR Enter a NOx Rate as lb/MMBtu	-	lb NOx/MMBtu
OR Enter a NOx Rate as lb/MWh	-	lb NOx/MWh

Submit

15. Duct Burners: Does the System Incorporate Duct Burners?

No

Submit

16. Duct Burners: What is the Total Fuel Input Capacity of the Burners for Each CHP Unit?

For reference, the Recip Engine - Lean Burn has a heat input of 7.6 MMBtu/hr

\- MMBtu/hr

Submit

17. Duct Burners: The CHP system operates 8,760 hours per year. How much do the duct burners operate?

As a number of hours per year -

As a percentage of the 8,760 hours? 0%

Submit

18. Duct Burners: NOx Emission Rate for the Duct Burners

I will enter a NOx rate in **one** of the following blocks

Use default for this technology

Submit

\- lb/MMBtu

OR - ppm NOx at 15% O2

19. Cooling: Does the CHP Provide Cooling? **No**

You indicated No Cooling in Item 5

Submit

20. Cooling: Type of Absorption Chiller Used?

Coefficient of Performance (COP) -

Submit

21. Cooling: What is the Cooling Capacity of the System?

Based on your other entries, the maximum cooling capacity is . tons or . MMBtu/hr of cooling

(Enter a value in only ONE of the boxes)

\- Cooling Tons

\- **OR** MMBtu per Hour of Cooling

Submit

22. Displaced Cooling: What is the Efficiency of the Cooling System that is Being Displaced?

Submit

(Enter a value in only ONE of the boxes)

Electricity Demand (kW per ton) -

OR Coefficient of Performance (COP) -

23. Displaced Thermal: Type of System:

Existing Gas Boiler

Submit

24. Displaced Thermal: If not a Natural Gas System: What is the Sulfur Content?

I will enter a | or | Commercial coal: 1% sulfur | High sulfur oil: 0.15% or 1,500 | Low sulfur oil: 0.05% or 500 ppm

Submit

Enter Sulfur Content as a percent: 0.00%

OR ppm: - ppm

25. Displaced Thermal: What is the CO2 Emission Rate for this Fuel? (default completed for fuel in Item 23)

Enter alternative value: 116.9 lb CO2/MMBtu

Submit

26. Displaced Thermal: What is the Heat Content of this Fuel? (Enter a value in only ONE of the boxes)

1,028 Btu/cubic foot (HHV)

OR - Btu/gallon (HHV)

OR - Btu/lb (HHV)

Submit

27. Displaced Thermal: Efficiency (usually a boiler)

I will enter an efficiency | Use default for this thermal technology

Submit

Enter Generating Efficiency as %: 85%

28. Displaced Thermal Production: NOx Emission Rate

I will enter the NOx rate | Use default for NOx rate

Submit

NOx Rate: 0.100 lb NOx/MMBtu

29. Displaced Electricity: Generation Profile

eGRID Fossil Fuel (2010 data)

Modify one of the Three User-Defined Generating Sources

Submit

Link to EPA's Fuel and CO2 Emissions Savings Calculation Methodology for CHP

30. Displaced Electricity: Select U.S. Average, eGRID Subregion, NERC region, or State

RFCW West

Submit

Link to eGRID Subregion Map

31. Displaced Electricity: Select Electric Grid Region for Transmission and Distribution (T&D) Losses

Eastern Interconnect

5.82%

Submit

Link to NERC Interconnections Map

CHP Results

The results generated by the CHP Emissions Calculator are intended for eductional and outreach purposes only; it is not designed for use in developing emission inventories or preparing air permit applications.

The results of this analysis have not been reviewed or endorsed by the EPA CHP Partnership.

Table 1

Annual Emissions Analysis					
	CHP System	Displaced Electricity Production	Displaced Thermal Production	Emissions/Fuel Reduction	Percent Reduction
NO_x (tons/year)	24.14	12.87	3.82	(7.45)	-45%
SO_2 (tons/year)	0.04	36.79	0.02	36.77	100%
CO_2 (tons/year)	7,744	17,051	4,469	13,776	64%
CH_4 (tons/year)	0.15	0.194	0.08	0.132	48%
N_2O (tons/year)	0.01	0.274	0.01	0.268	95%
Total GHGs (CO_2e tons/year)	7,752	17,141	4,473	13,862	64%
Fuel Consumption (MMBtu/year)	132,498	165,756	76,458	109,717	45%
Equal to the annual GHG emissions from this many passenger vehicles:				2,630	
Equal to the annual GHG emissions from the generation of electricity for this many homes:				1,720	

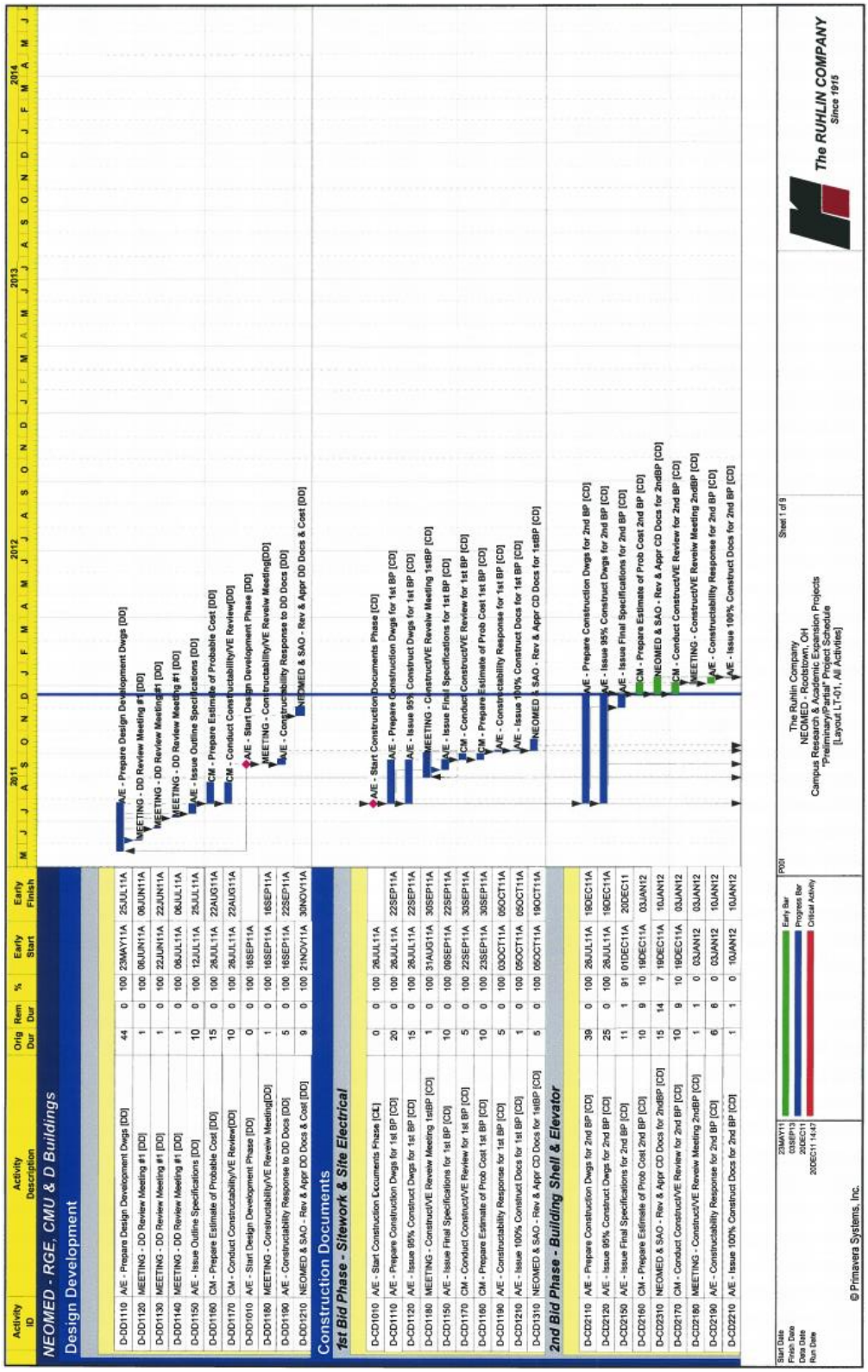
This CHP project will avoid yearly emissions of greenhouse gases by 13,862 tons of carbon dioxide equivalent.

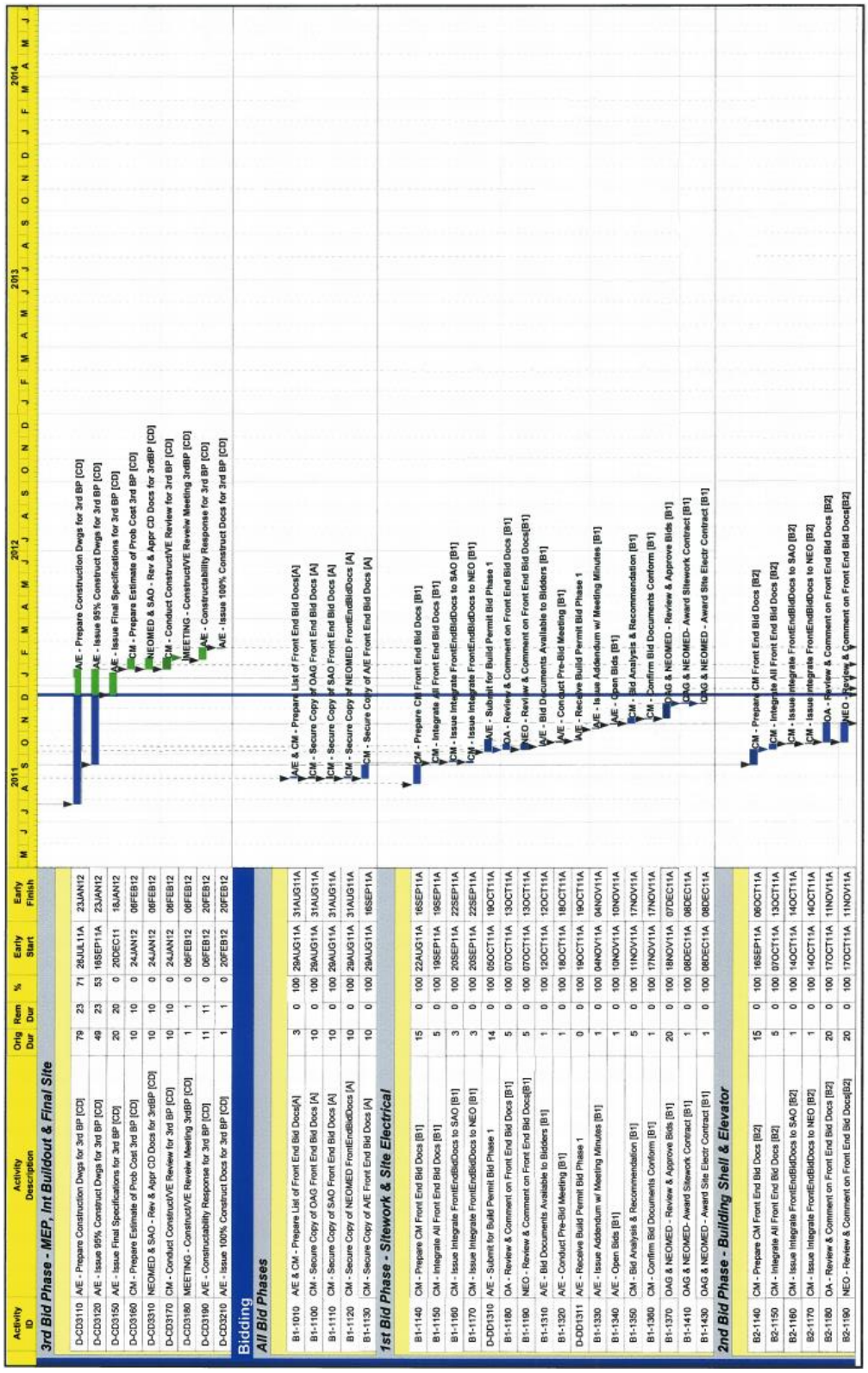
Equal to the annual greenhouse gas emissions from 2,630 passenger vehicles.

Equal to the annual greenhouse gas emissions from the generation of electricity used by 1,720 homes.

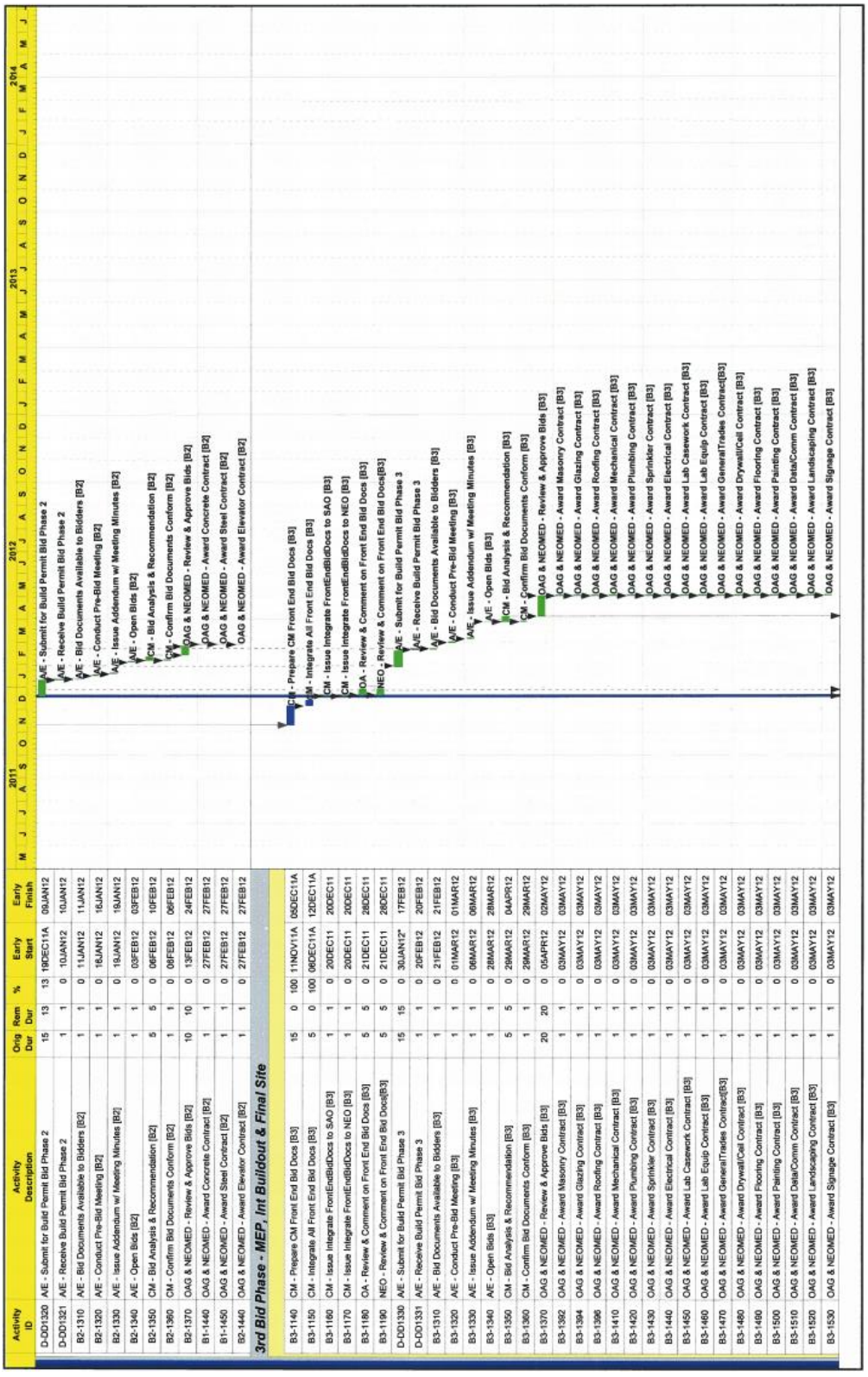
Appendix H: Project Schedules

Original Schedule

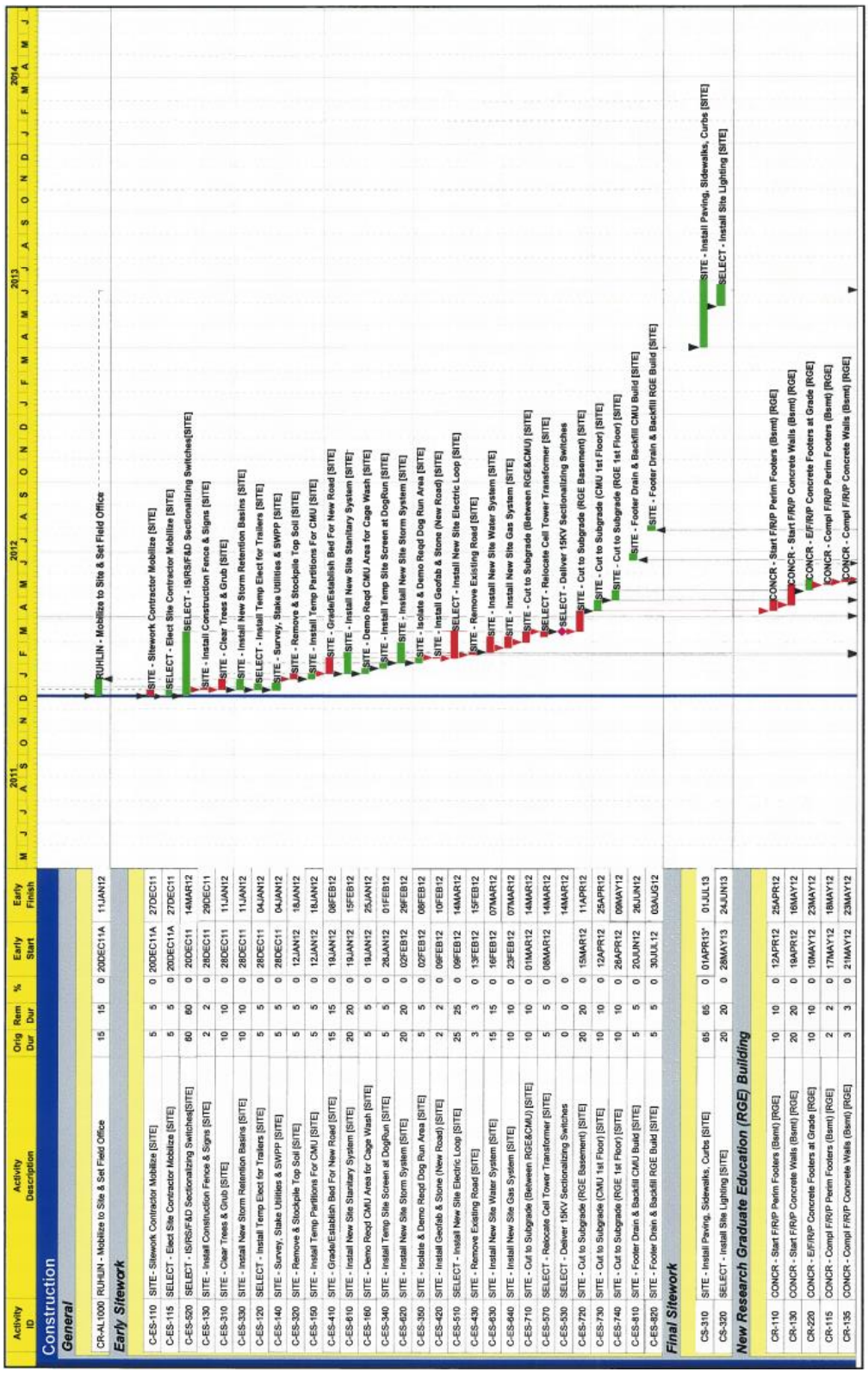




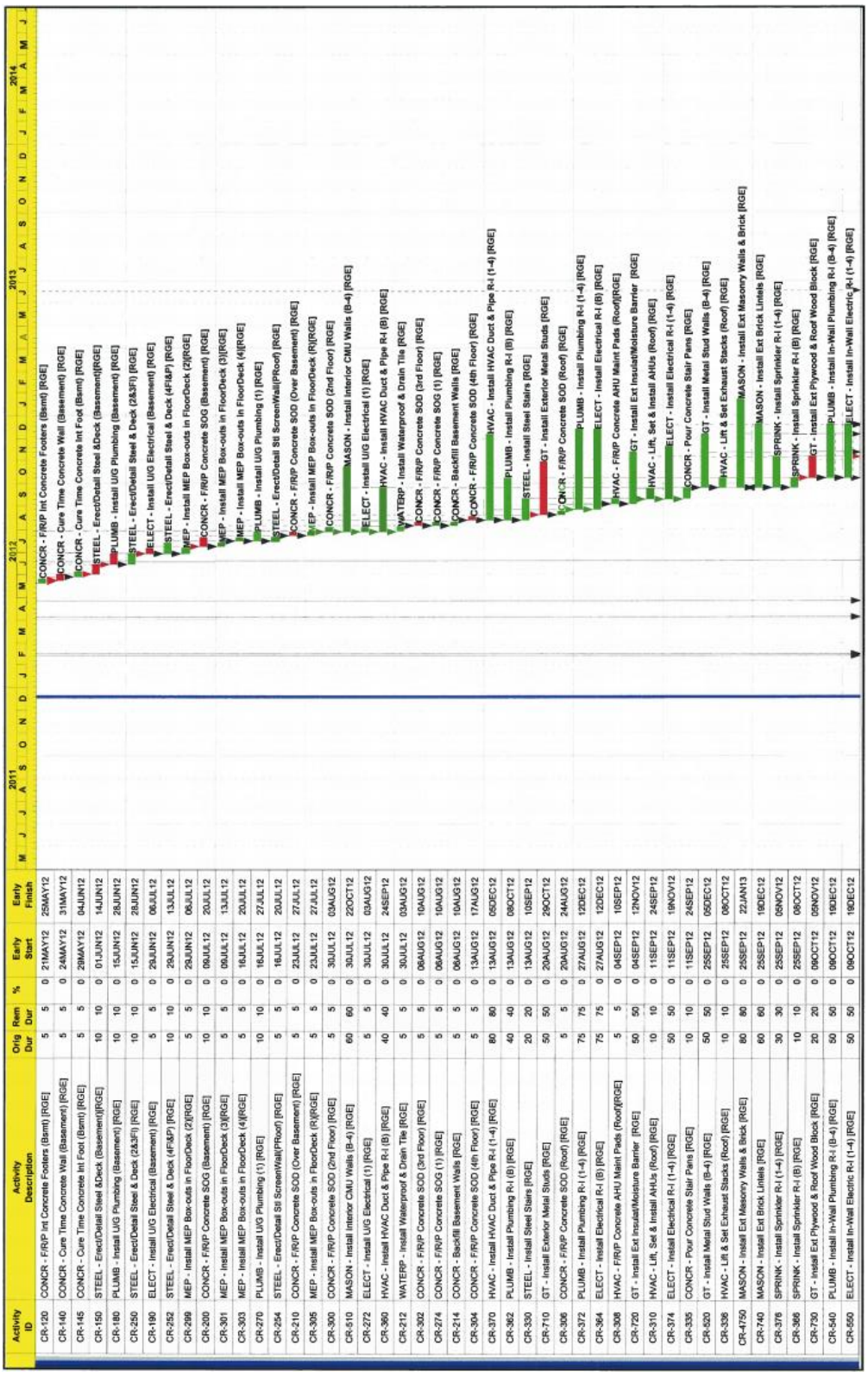
Activity ID	Activity Description	Orig Dur	Rem Dur	%	Early Start	Early Finish
3rd Bid Phase - MEP, Int Buildout & Final Site						
D-CD3110	A/E - Prepare Construction Dwgs for 3rd BP [CD]	79	23	71	26JUL11A	23JAN12
D-CD3120	A/E - Issue 95% Construct Dwgs for 3rd BP [CD]	49	23	53	16SEP11A	23JAN12
D-CD3150	A/E - Issue Final Specifications for 3rd BP [CD]	20	20	0	20DEC11	18JAN12
D-CD3160	CM - Prepare Estimate of Prob Cost 3rd BP [CD]	10	10	0	24JAN12	06FEB12
D-CD3310	NEOMED & SAO - Rev & Appr CD Docs for 3rdBP [CD]	10	10	0	24JAN12	06FEB12
D-CD3170	CM - Conduct Construct/VE Review for 3rd BP [CD]	10	10	0	24JAN12	06FEB12
D-CD3180	MEETING - Construct/VE Reveiw Meeting 3rdBP [CD]	1	1	0	06FEB12	06FEB12
D-CD3190	A/E - Constructability Response for 3rd BP [CD]	11	11	0	06FEB12	20FEB12
D-CD3210	A/E - Issue 100% Construct Docs for 3rd BP [CD]	1	1	0	20FEB12	20FEB12
Bidding						
All Bid Phases						
B1-1010	A/E & CM - Prepare List of Front End Bid Docs[A]	3	0	100	29AUG11A	31AUG11A
B1-1100	CM - Secure Copy of OAG Front End Bid Docs [A]	10	0	100	29AUG11A	31AUG11A
B1-1110	CM - Secure Copy of SAO Front End Bid Docs [A]	10	0	100	29AUG11A	31AUG11A
B1-1120	CM - Secure Copy of NEOMED FrontEndBidDocs [A]	10	0	100	29AUG11A	31AUG11A
B1-1130	CM - Secure Copy of A/E Front End Bid Docs [A]	10	0	100	29AUG11A	16SEP11A
1st Bid Phase - Sitework & Site Electrical						
B1-1140	CM - Prepare CM Front End Bid Docs [B1]	15	0	100	22AUG11A	16SEP11A
B1-1150	CM - Integrate All Front End Bid Docs [B1]	5	0	100	19SEP11A	19SEP11A
B1-1160	CM - Issue Integrate FrontEndBidDocs to SAO [B1]	3	0	100	20SEP11A	22SEP11A
B1-1170	CM - Issue Integrate FrontEndBidDocs to NEO [B1]	3	0	100	20SEP11A	22SEP11A
D-DD1310	A/E - Submit for Build Permit Bid Phase 1	14	0	100	05OCT11A	19OCT11A
B1-1180	OA - Review & Comment on Front End Bid Docs [B1]	5	0	100	07OCT11A	13OCT11A
B1-1190	NEO - Review & Comment on Front End Bid Docs[B1]	5	0	100	07OCT11A	13OCT11A
B1-1310	A/E - Bid Documents Available to Bidders [B1]	1	0	100	12OCT11A	12OCT11A
B1-1320	A/E - Conduct Pre-Bid Meeting [B1]	1	0	100	18OCT11A	18OCT11A
D-DD1311	A/E - Receive Build Permit Bid Phase 1	0	0	100	19OCT11A	19OCT11A
B1-1330	A/E - Issue Addendum w/ Meeting Minutes [B1]	1	0	100	04NOV11A	04NOV11A
B1-1340	A/E - Open Bids [B1]	1	0	100	10NOV11A	10NOV11A
B1-1350	CM - Bid Analysis & Recommendation [B1]	5	0	100	11NOV11A	17NOV11A
B1-1360	CM - Confirm Bid Documents Conform [B1]	1	0	100	17NOV11A	17NOV11A
B1-1370	OAG & NEOMED - Review & Approve Bids [B1]	20	0	100	18NOV11A	07DEC11A
B1-1410	OAG & NEOMED- Award Sitework Contract [B1]	1	0	100	08DEC11A	08DEC11A
B1-1430	OAG & NEOMED - Award Site Electr Contract [B1]	1	0	100	08DEC11A	08DEC11A
2nd Bid Phase - Building Shell & Elevator						
B2-1140	CM - Prepare CM Front End Bid Docs [B2]	15	0	100	16SEP11A	06OCT11A
B2-1150	CM - Integrate All Front End Bid Docs [B2]	5	0	100	07OCT11A	13OCT11A
B2-1160	CM - Issue Integrate FrontEndBidDocs to SAO [B2]	1	0	100	14OCT11A	14OCT11A
B2-1170	CM - Issue Integrate FrontEndBidDocs to NEO [B2]	1	0	100	14OCT11A	14OCT11A
B2-1180	OA - Review & Comment on Front End Bid Docs [B2]	20	0	100	17OCT11A	11NOV11A
B2-1190	NEO - Review & Comment on Front End Bid Docs[B2]	20	0	100	17OCT11A	11NOV11A



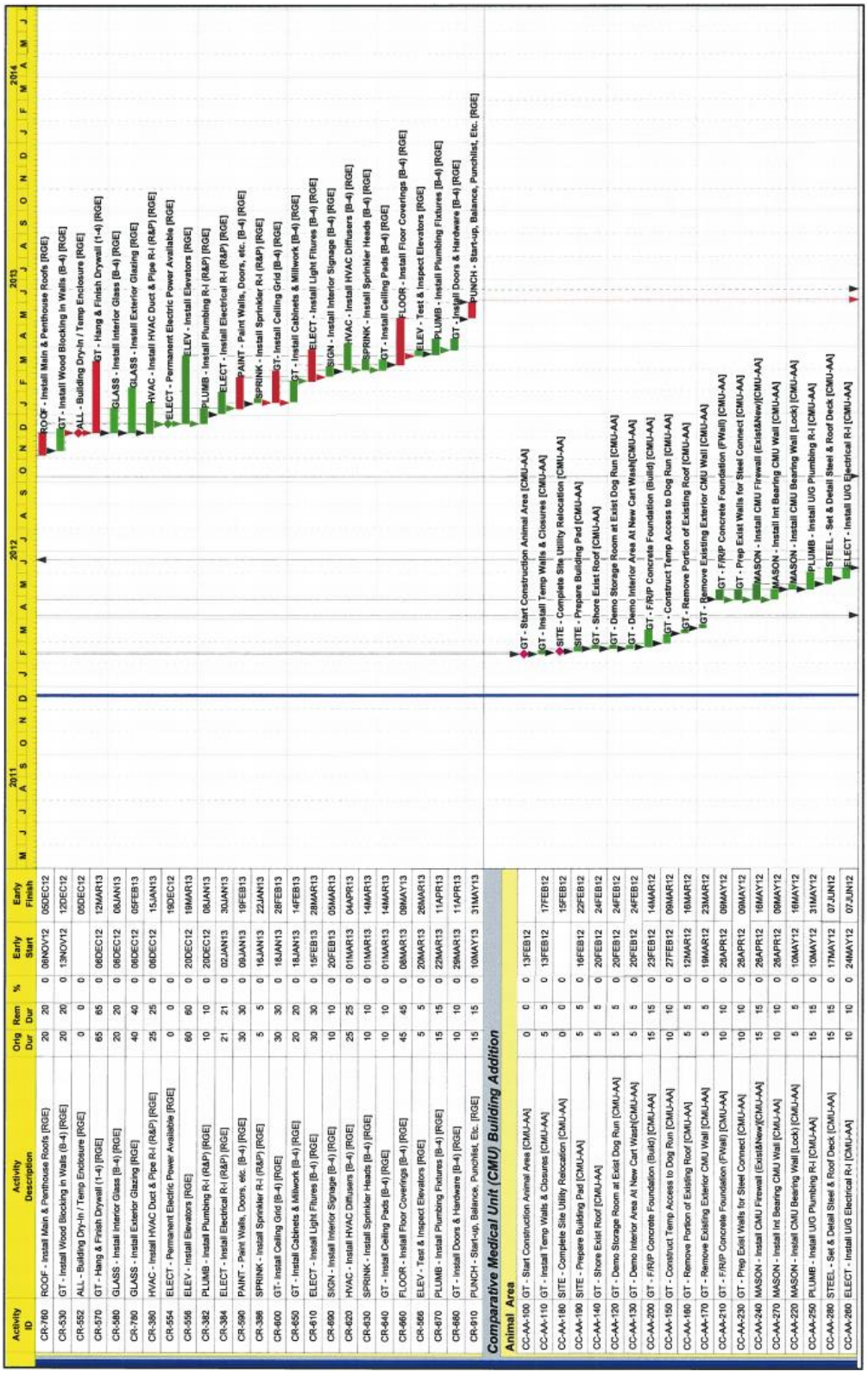
Activity ID	Activity Description	Orig Dur	Rem Dur	%	Early Start	Early Finish
D-DD1320	A/E - Submit for Build Permit Bid Phase 2	15	13	13	19DEC11A	09JAN12
D-DD1321	A/E - Receive Build Permit Bid Phase 2	1	1	0	10JAN12	10JAN12
B2-1310	A/E - Bid Documents Available to Bidders [B2]	1	1	0	11JAN12	11JAN12
B2-1320	A/E - Conduct Pre-Bid Meeting [B2]	1	1	0	16JAN12	16JAN12
B2-1330	A/E - Issue Addendum w/ Meeting Minutes [B2]	1	1	0	18JAN12	18JAN12
B2-1340	A/E - Open Bids [B2]	1	1	0	03FEB12	03FEB12
B2-1350	CM - Bid Analysis & Recommendation [B2]	5	5	0	06FEB12	10FEB12
B2-1360	CM - Confirm Bid Documents Conform [B2]	1	1	0	06FEB12	06FEB12
B2-1370	OAG & NEOMED - Review & Approve Bids [B2]	10	10	0	13FEB12	24FEB12
B1-1440	OAG & NEOMED - Award Concrete Contract [B2]	1	1	0	27FEB12	27FEB12
B1-1450	OAG & NEOMED - Award Steel Contract [B2]	1	1	0	27FEB12	27FEB12
B2-1440	OAG & NEOMED - Award Elevator Contract [B2]	1	1	0	27FEB12	27FEB12
	3rd Bid Phase - MEP, Int Buildout & Final Site					
B3-1140	CM - Prepare CM Front End Bid Docs [B3]	15	0	100	11NOV11A	05DEC11A
B3-1150	CM - Integrate All Front End Bid Docs [B3]	5	0	100	06DEC11A	12DEC11A
B3-1160	CM - Issue Integrate FrontEndBidDocs to SAO [B3]	1	1	0	20DEC11	20DEC11
B3-1170	CM - Issue Integrate FrontEndBidDocs to NEO [B3]	1	1	0	20DEC11	20DEC11
B3-1180	OA - Review & Comment on Front End Bid Docs [B3]	5	5	0	21DEC11	28DEC11
B3-1190	NEO - Review & Comment on Front End Bid Docs[B3]	5	5	0	21DEC11	28DEC11
D-DD1330	A/E - Submit for Build Permit Bid Phase 3	15	15	0	30JAN12*	17FEB12
D-DD1331	A/E - Receive Build Permit Bid Phase 3	1	1	0	20FEB12	20FEB12
B3-1310	A/E - Bid Documents Available to Bidders [B3]	1	1	0	21FEB12	21FEB12
B3-1320	A/E - Conduct Pre-Bid Meeting [B3]	1	1	0	01MAR12	01MAR12
B3-1330	A/E - Issue Addendum w/ Meeting Minutes [B3]	1	1	0	06MAR12	06MAR12
B3-1340	A/E - Open Bids [B3]	1	1	0	28MAR12	28MAR12
B3-1350	CM - Bid Analysis & Recommendation [B3]	5	5	0	29MAR12	04APR12
B3-1360	CM - Confirm Bid Documents Conform [B3]	1	1	0	29MAR12	29MAR12
B3-1370	OAG & NEOMED - Review & Approve Bids [B3]	20	20	0	05APR12	02MAY12
B3-1382	OAG & NEOMED - Award Masonry Contract [B3]	1	1	0	03MAY12	03MAY12
B3-1394	OAG & NEOMED - Award Glazing Contract [B3]	1	1	0	03MAY12	03MAY12
B3-1396	OAG & NEOMED - Award Roofing Contract [B3]	1	1	0	03MAY12	03MAY12
B3-1410	OAG & NEOMED - Award Mechanical Contract [B3]	1	1	0	03MAY12	03MAY12
B3-1420	OAG & NEOMED - Award Plumbing Contract [B3]	1	1	0	03MAY12	03MAY12
B3-1430	OAG & NEOMED - Award Sprinkler Contract [B3]	1	1	0	03MAY12	03MAY12
B3-1440	OAG & NEOMED - Award Electrical Contract [B3]	1	1	0	03MAY12	03MAY12
B3-1450	OAG & NEOMED - Award Lab Casework Contract [B3]	1	1	0	03MAY12	03MAY12
B3-1460	OAG & NEOMED - Award Lab Equip Contract [B3]	1	1	0	03MAY12	03MAY12
B3-1470	OAG & NEOMED - Award GeneralTrades Contract[B3]	1	1	0	03MAY12	03MAY12
B3-1480	OAG & NEOMED - Award Drywall/Ceil Contract [B3]	1	1	0	03MAY12	03MAY12
B3-1490	OAG & NEOMED - Award Flooring Contract [B3]	1	1	0	03MAY12	03MAY12
B3-1500	OAG & NEOMED - Award Painting Contract [B3]	1	1	0	03MAY12	03MAY12
B3-1510	OAG & NEOMED - Award Data/Comm Contract [B3]	1	1	0	03MAY12	03MAY12
B3-1520	OAG & NEOMED - Award Landscaping Contract [B3]	1	1	0	03MAY12	03MAY12
B3-1530	OAG & NEOMED - Award Signage Contract [B3]	1	1	0	03MAY12	03MAY12



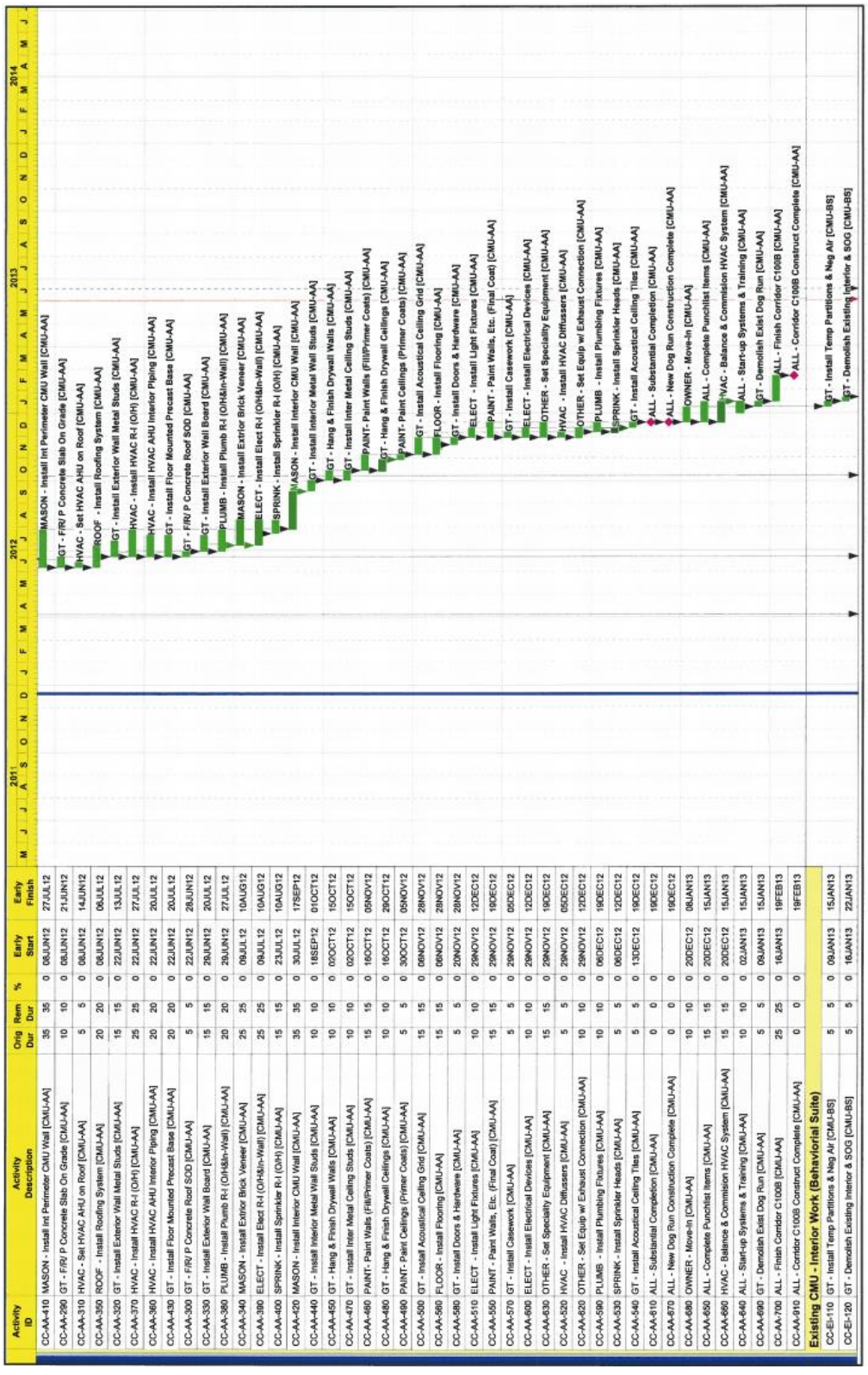
Activity ID	Activity Description	Orig Dur	Rem Dur	%	Early Start	Early Finish
Construction						
General						
CR-AL1000	RUHLIN - Mobilize to Site & Set Field Office	15	15	0	20DEC11A	11JAN12
Early Sitework						
C-ES-110	SITE - Sitework Contractor Mobilize [SITE]	5	5	0	20DEC11A	27DEC11
C-ES-115	SELECT - Elect Site Contractor Mobilize [SITE]	5	5	0	20DEC11A	27DEC11
C-ES-520	SELECT - IS/RS/F&D Sectionalizing Switches[SITE]	60	60	0	20DEC11	14MAR12
C-ES-130	SITE - Install Construction Fence & Signs [SITE]	2	2	0	28DEC11	29DEC11
C-ES-310	SITE - Clear Trees & Grub [SITE]	10	10	0	28DEC11	11JAN12
C-ES-330	SITE - Install New Storm Retention Basins [SITE]	10	10	0	28DEC11	11JAN12
C-ES-120	SELECT - Install Temp Elect for Trailers [SITE]	5	5	0	28DEC11	04JAN12
C-ES-140	SITE - Survey, Stake Utilities & SWPP [SITE]	5	5	0	28DEC11	04JAN12
C-ES-320	SITE - Remove & Stockpile Top Soil [SITE]	5	5	0	12JAN12	18JAN12
C-ES-150	SITE - Install Temp Partitions For CMU [SITE]	5	5	0	12JAN12	18JAN12
C-ES-410	SITE - Grade/Establish Bed For New Road [SITE]	15	15	0	19JAN12	08FEB12
C-ES-610	SITE - Install New Site Stanitary System [SITE]	20	20	0	19JAN12	15FEB12
C-ES-160	SITE - Demo Reqd CMU Area for Cage Wash [SITE]	5	5	0	19JAN12	25JAN12
C-ES-340	SITE - Install Temp Site Screen at DogRun [SITE]	5	5	0	29JAN12	01FEB12
C-ES-620	SITE - Install New Site Storm System [SITE]	20	20	0	02FEB12	29FEB12
C-ES-350	SITE - Isolate & Demo Reqd Dog Run Area [SITE]	5	5	0	02FEB12	08FEB12
C-ES-420	SITE - Install Geofab & Stone (New Road) [SITE]	2	2	0	06FEB12	10FEB12
C-ES-510	SELECT - Install New Site Electric Loop [SITE]	25	25	0	09FEB12	14MAR12
C-ES-430	SITE - Remove Existing Road [SITE]	3	3	0	13FEB12	15FEB12
C-ES-630	SITE - Install New Site Water System [SITE]	15	15	0	16FEB12	07MAR12
C-ES-640	SITE - Install New Site Gas System [SITE]	10	10	0	23FEB12	07MAR12
C-ES-710	SITE - Cut to Subgrade (Between RGE&CMU) [SITE]	10	10	0	01MAR12	14MAR12
C-ES-570	SELECT - Relocate Cell Tower Transformer [SITE]	5	5	0	08MAR12	14MAR12
C-ES-530	SELECT - Deliver 15KV Sectionalizing Switches	0	0	0		14MAR12
C-ES-720	SITE - Cut to Subgrade (RGE Basement) [SITE]	20	20	0	15MAR12	11APR12
C-ES-730	SITE - Cut to Subgrade (CMU 1st Floor) [SITE]	10	10	0	12APR12	25APR12
C-ES-740	SITE - Cut to Subgrade (RGE 1st Floor) [SITE]	10	10	0	26APR12	09MAY12
C-ES-810	SITE - Footer Drain & Backfill CMU Build [SITE]	5	5	0	20JUN12	26JUN12
C-ES-820	SITE - Footer Drain & Backfill RGE Build [SITE]	5	5	0	30JUL12	03AUG12
Final Sitework						
CS-310	SITE - Install Paving, Sidewalks, Curbs [SITE]	65	65	0	01APR13*	01JUL13
CS-320	SELECT - Install Site Lighting [SITE]	20	20	0	28MAY13	24JUN13
New Research Graduate Education (RGE) Building						
CR-110	CONCR - Start F/R/P Perim Footers (Bsmt) [RGE]	10	10	0	12APR12	25APR12
CR-130	CONCR - Start F/R/P Concrete Walls (Bsmt) [RGE]	20	20	0	19APR12	16MAY12
CR-220	CONCR - E/F/R/P Concrete Footers at Grade [RGE]	10	10	0	10MAY12	23MAY12
CR-115	CONCR - Compl F/R/P Perim Footers (Bsmt) [RGE]	2	2	0	17MAY12	18MAY12
CR-135	CONCR - Compl F/R/P Concrete Walls (Bsmt) [RGE]	3	3	0	21MAY12	23MAY12



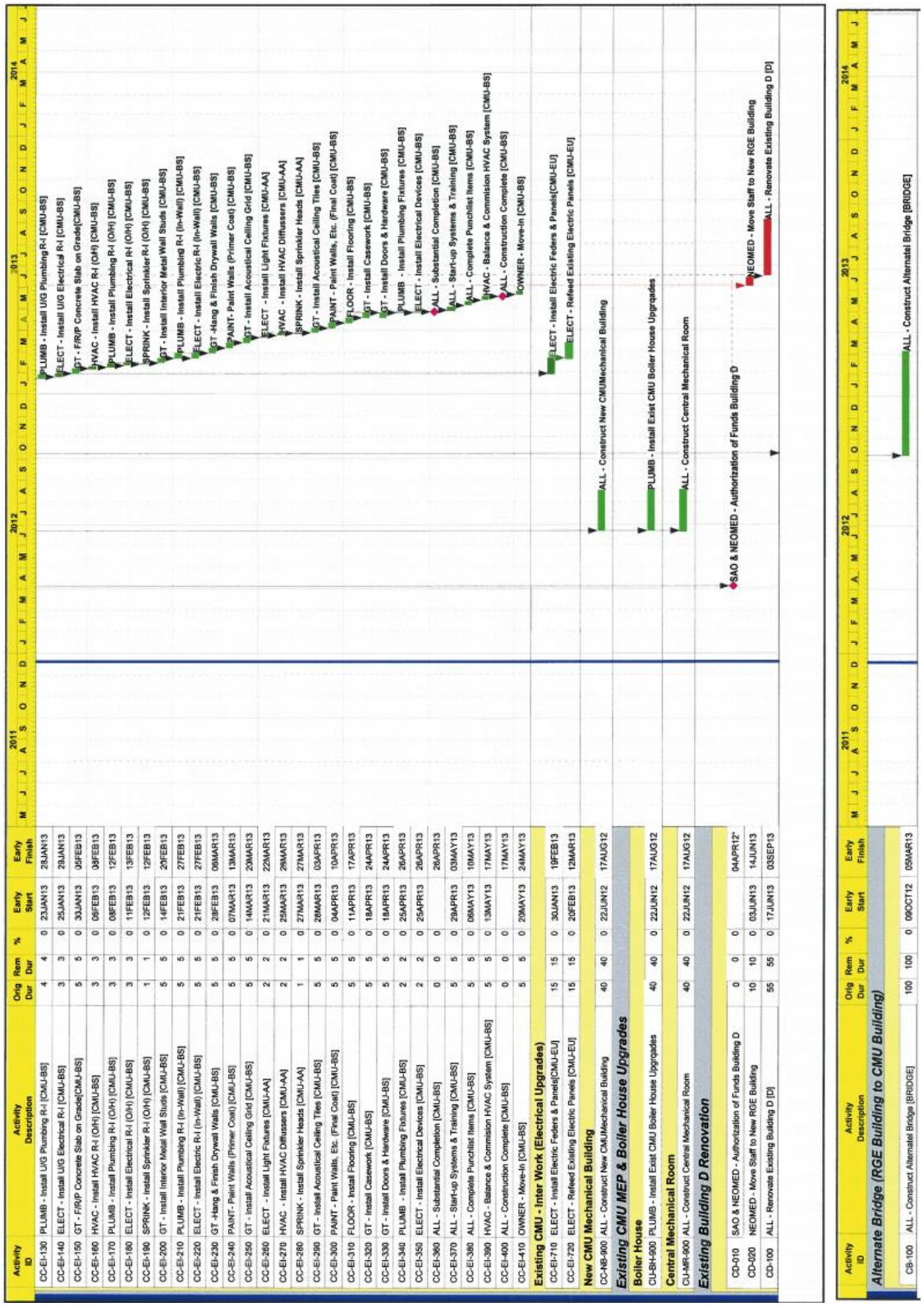
Activity ID	Activity Description	Orig Dur	Rem Dur	%	Early Start	Early Finish
CR-120	CONCR - F/RP Int Concrete Footers (Bsmt) [RGE]	5	5	0	21MAY12	25MAY12
CR-140	CONCR - Cure Time Concrete Wall (Basement) [RGE]	5	5	0	24MAY12	31MAY12
CR-145	CONCR - Cure Time Concrete Int Foot (Bsmt) [RGE]	5	5	0	29MAY12	04JUN12
CR-150	STEEL - Erect/Detail Steel &Deck (Basement)[RGE]	10	10	0	01JUN12	14JUN12
CR-180	PLUMB - Install U/G Plumbing (Basement) [RGE]	10	10	0	15JUN12	28JUN12
CR-250	STEEL - Erect/Detail Steel & Deck (2&3Fl) [RGE]	10	10	0	15JUN12	28JUN12
CR-190	ELECT - Install U/G Electrical (Basement) [RGE]	5	5	0	29JUN12	06JUL12
CR-252	STEEL - Erect/Detail Steel & Deck (4Fl&P) [RGE]	10	10	0	29JUN12	13JUL12
CR-299	MEP - Install MEP Box-outs in FloorDeck (2)[RGE]	5	5	0	29JUN12	06JUL12
CR-200	CONCR - F/RP Concrete SOG (Basement) [RGE]	10	10	0	09JUL12	20JUL12
CR-301	MEP - Install MEP Box-outs in FloorDeck (3)[RGE]	5	5	0	09JUL12	13JUL12
CR-303	MEP - Install MEP Box-outs in FloorDeck (4)[RGE]	5	5	0	16JUL12	20JUL12
CR-270	PLUMB - Install U/G Plumbing (1) [RGE]	10	10	0	16JUL12	27JUL12
CR-254	STEEL - Erect/Detail Stl ScreenWall(PRoof) [RGE]	5	5	0	16JUL12	20JUL12
CR-210	CONCR - F/RP Concrete SOD (Over Basement) [RGE]	5	5	0	23JUL12	27JUL12
CR-305	MEP - Install MEP Box-outs in FloorDeck (R)[RGE]	5	5	0	23JUL12	27JUL12
CR-300	CONCR - F/RP Concrete SOD (2nd Floor) [RGE]	5	5	0	30JUL12	03AUG12
CR-510	MASON - Install Interior CMU Walls (B-4) [RGE]	60	60	0	30JUL12	22OCT12
CR-272	ELECT - Install U/G Electrical (1) [RGE]	5	5	0	30JUL12	03AUG12
CR-360	HVAC - Install HVAC Duct & Pipe R-I (B) [RGE]	40	40	0	30JUL12	24SEP12
CR-212	WATERP - Install Waterproof & Drain Tile [RGE]	5	5	0	30JUL12	03AUG12
CR-302	CONCR - F/RP Concrete SOD (3rd Floor) [RGE]	5	5	0	06AUG12	10AUG12
CR-274	CONCR - F/RP Concrete SOG (1) [RGE]	5	5	0	06AUG12	10AUG12
CR-214	CONCR - Backfill Basement Walls [RGE]	5	5	0	06AUG12	10AUG12
CR-304	CONCR - F/RP Concrete SOD (4th Floor) [RGE]	5	5	0	13AUG12	17AUG12
CR-370	HVAC - Install HVAC Duct & Pipe R-I (1-4) [RGE]	80	80	0	13AUG12	05DEC12
CR-362	PLUMB - Install Plumbing R-I (B) [RGE]	40	40	0	13AUG12	08OCT12
CR-330	STEEL - Install Steel Stairs [RGE]	20	20	0	13AUG12	10SEP12
CR-710	GT - Install Exterior Metal Studs [RGE]	50	50	0	20AUG12	29OCT12
CR-306	CONCR - F/RP Concrete SOD (Roof) [RGE]	5	5	0	20AUG12	24AUG12
CR-372	PLUMB - Install Plumbing R-I (1-4) [RGE]	75	75	0	27AUG12	12DEC12
CR-364	ELECT - Install Electrical R-I (B) [RGE]	75	75	0	27AUG12	12DEC12
CR-308	HVAC - F/RP Concrete AHU Maint Pads (Roof)[RGE]	5	5	0	04SEP12	10SEP12
CR-720	GT - Install Ext Insulat/Moisture Barrier [RGE]	50	50	0	04SEP12	12NOV12
CR-310	HVAC - Lift, Set & Install AHUs (Roof) [RGE]	10	10	0	11SEP12	24SEP12
CR-374	ELECT - Install Electrical R-I (1-4) [RGE]	50	50	0	11SEP12	19NOV12
CR-335	CONCR - Pour Concrete Stair Pans [RGE]	10	10	0	11SEP12	24SEP12
CR-820	GT - Install Metal Stud Walls (B-4) [RGE]	50	50	0	25SEP12	05DEC12
CR-336	HVAC - Lift & Set Exhaust Stacks (Roof) [RGE]	10	10	0	25SEP12	08OCT12
CR-4750	MASON - Install Ext Masonry Walls & Brick [RGE]	80	80	0	25SEP12	22JAN13
CR-740	MASON - Install Ext Brick Lintels [RGE]	60	60	0	25SEP12	19DEC12
CR-376	SPRINK - Install Sprinkler R-I (1-4) [RGE]	30	30	0	25SEP12	05NOV12
CR-366	SPRINK - Install Sprinkler R-I (B) [RGE]	10	10	0	25SEP12	08OCT12
CR-730	GT - Install Ext Plywood & Roof Wood Block [RGE]	20	20	0	09OCT12	05NOV12
CR-540	PLUMB - Install In-Wall Plumbing R-I (B-4) [RGE]	50	50	0	09OCT12	19DEC12
CR-650	ELECT - Install In-Wall Electric R-I (1-4) [RGE]	50	50	0	09OCT12	19DEC12



Activity ID	Activity Description	Orig Dur	Rem Dur	%	Early Start	Early Finish
	Comparative Medical Unit (CMU) Building Addition					
	Animal Area					
CR-760	RO/F - Install Main & Penthouse Roofs [RGE]	20	20	0	08NOV12	05DEC12
CR-530	GT - Install Wood Blocking in Walls (B-4) [RGE]	20	20	0	13NOV12	12DEC12
CR-652	ALL - Building Dry-In / Temp Enclosure [RGE]	0	0	0		05DEC12
CR-570	GT - Hang & Finish Drywall (1-4) [RGE]	65	65	0	06DEC12	12MAR13
CR-580	GLASS - Install Interior Glass [B-4] [RGE]	20	20	0	06DEC12	08JAN13
CR-760	GLASS - Install Exterior Glazing [RGE]	40	40	0	06DEC12	05FEB13
CR-380	HVAC - Install HVAC Duct & Pipe R-I (R&P) [RGE]	25	25	0	06DEC12	15JAN13
CR-554	ELECT - Permanent Electric Power Available [RGE]	0	0	0		19DEC12
CR-556	ELEV - Install Elevators [RGE]	60	60	0	20DEC12	19MAR13
CR-382	PLUMB - Install Plumbing R-I (R&P) [RGE]	10	10	0	20DEC12	08JAN13
CR-384	ELECT - Install Electrical R-I (R&P) [RGE]	21	21	0	02JAN13	30JAN13
CR-590	PAINT - Paint Walls, Doors, etc. [B-4] [RGE]	30	30	0	09JAN13	19FEB13
CR-386	SPRINK - Install Sprinkler R-I (R&P) [RGE]	5	5	0	16JAN13	22JAN13
CR-600	GT- Install Ceiling Grid [B-4] [RGE]	30	30	0	18JAN13	28FEB13
CR-650	GT - Install Cabinets & Millwork [B-4] [RGE]	20	20	0	18JAN13	14FEB13
CR-610	ELECT - Install Light Fitures [B-4] [RGE]	30	30	0	15FEB13	28MAR13
CR-690	SIGN - Install Interior Signage [B-4] [RGE]	10	10	0	20FEB13	05MAR13
CR-620	HVAC - Install HVAC Diffusers [B-4] [RGE]	25	25	0	01MAR13	04APR13
CR-630	SPRINK - Install Sprinkler Heads [B-4] [RGE]	10	10	0	01MAR13	14MAR13
CR-640	GT - Install Ceiling Pads [B-4] [RGE]	10	10	0	01MAR13	14MAR13
CR-660	FLOOR - Install Floor Coverings [B-4] [RGE]	45	45	0	08MAR13	09MAY13
CR-566	ELEV - Test & Inspect Elevators [RGE]	5	5	0	20MAR13	26MAR13
CR-670	PLUMB - Install Plumbing Fixtures [B-4] [RGE]	15	15	0	22MAR13	11APR13
CR-680	GT - Install Doors & Hardware [B-4] [RGE]	10	10	0	29MAR13	11APR13
CR-810	PUNCH - Start-up, Balance, Punchlist, Etc. [RGE]	15	15	0	10MAY13	31MAY13
CC-AA-100	GT - Start Construction Animal Area [CMU-AA]	0	0	0	13FEB12	
CC-AA-110	GT - Install Temp Walls & Closures [CMU-AA]	5	5	0	13FEB12	17FEB12
CC-AA-180	SITE - Complete Site Utility Relocation [CMU-AA]	0	0	0		15FEB12
CC-AA-190	SITE - Prepare Building Pad [CMU-AA]	5	5	0	16FEB12	22FEB12
CC-AA-140	GT - Shore Exist Roof [CMU-AA]	5	5	0	20FEB12	24FEB12
CC-AA-120	GT - Demo Storage Room at Exist Dog Run [CMU-AA]	5	5	0	20FEB12	24FEB12
CC-AA-130	GT - Demo Interior Area At New Cart Wash[CMU-AA]	5	5	0	20FEB12	24FEB12
CC-AA-200	GT - F/RUP Concrete Foundation (Build) [CMU-AA]	15	15	0	23FEB12	14MAR12
CC-AA-150	GT - Construct Temp Access to Dog Run [CMU-AA]	10	10	0	27FEB12	09MAR12
CC-AA-160	GT - Remove Portion of Existing Roof [CMU-AA]	5	5	0	12MAR12	16MAR12
CC-AA-170	GT - Remove Existing Exterior CMU Wall [CMU-AA]	5	5	0	19MAR12	23MAR12
CC-AA-210	GT - F/RUP Concrete Foundation (FWall) [CMU-AA]	10	10	0	26APR12	09MAY12
CC-AA-230	GT - Prep Exist Walls for Steel Connect [CMU-AA]	10	10	0	26APR12	09MAY12
CC-AA-240	MASON - Install CMU Firewall (Exist&New)[CMU-AA]	15	15	0	26APR12	16MAY12
CC-AA-270	MASON - Install Int Bearing CMU Wall [CMU-AA]	10	10	0	26APR12	09MAY12
CC-AA-220	MASON - Install CMU Bearing Wall [Lock] [CMU-AA]	5	5	0	10MAY12	16MAY12
CC-AA-250	PLUMB - Install U/G Plumbing R-I [CMU-AA]	15	15	0	10MAY12	31MAY12
CC-AA-280	STEEL - Set & Detail Steel & Roof Deck [CMU-AA]	15	15	0	17MAY12	07JUN12
CC-AA-260	ELECT - Install U/G Electrical R-I [CMU-AA]	10	10	0	24MAY12	07JUN12



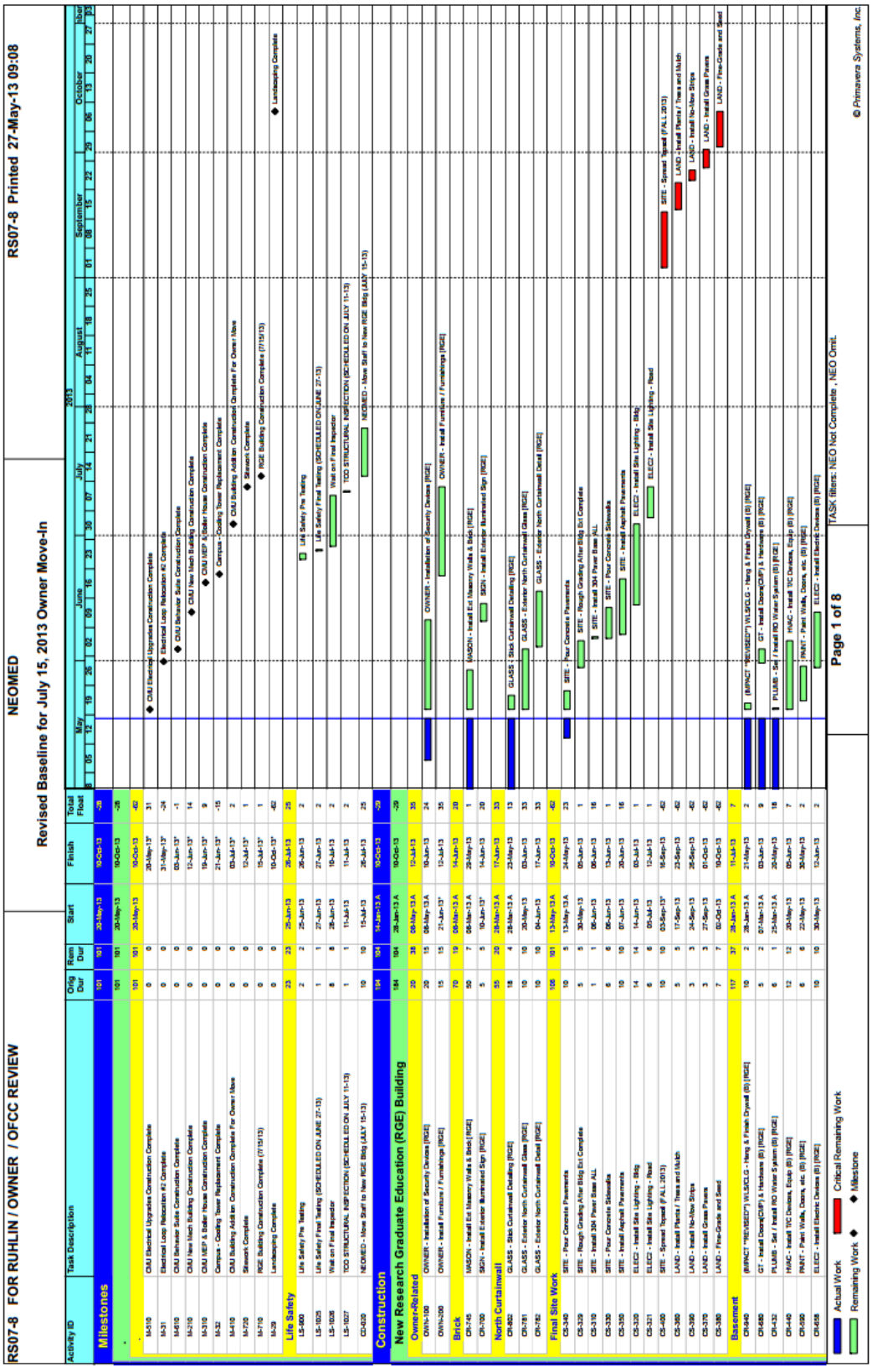
Activity ID	Activity Description	Orig Dur	Rem Dur	%	Early Start	Early Finish
CC-AA-410	MASON - Install Int Perimeter CMU Wall [CMU-AA]	35	35	0	06JUN12	27JUL12
CC-AA-290	GT - F/R/ P Concrete Slab On Grade [CMU-AA]	10	10	0	08JUN12	21JUN12
CC-AA-310	HVAC - Set HVAC AHU on Roof [CMU-AA]	5	5	0	08JUN12	14JUN12
CC-AA-350	ROOF - Install Roofing System [CMU-AA]	20	20	0	08JUN12	06JUL12
CC-AA-320	GT - Install Exterior Wall Metal Studs [CMU-AA]	15	15	0	22JUN12	13JUL12
CC-AA-370	HVAC - Install HVAC R-I (O/H) [CMU-AA]	25	25	0	22JUN12	27JUL12
CC-AA-360	HVAC - Install HVAC AHU Interior Piping [CMU-AA]	20	20	0	22JUN12	20JUL12
CC-AA-430	GT - Install Floor Mounted Precast Base [CMU-AA]	20	20	0	22JUN12	20JUL12
CC-AA-300	GT - F/R/ P Concrete Roof SOD [CMU-AA]	5	5	0	22JUN12	28JUN12
CC-AA-330	GT - Install Exterior Wall Board [CMU-AA]	15	15	0	29JUN12	20JUL12
CC-AA-380	PLUMB - Install Plumb R-I (O/H&In-Wall) [CMU-AA]	20	20	0	29JUN12	27JUL12
CC-AA-340	MASON - Install Exterior Brick Veneer [CMU-AA]	25	25	0	09JUL12	10AUG12
CC-AA-390	ELECT - Install Elect R-I (O/H&In-Wall) [CMU-AA]	25	25	0	09JUL12	10AUG12
CC-AA-400	SPRINK - Install Sprinkler R-I (O/H) [CMU-AA]	15	15	0	23JUL12	10AUG12
CC-AA-420	MASON - Install Interior CMU Wall [CMU-AA]	35	35	0	30JUL12	17SEP12
CC-AA-440	GT - Install Interior Metal Wall Studs [CMU-AA]	10	10	0	18SEP12	01OCT12
CC-AA-450	GT - Hang & Finish Drywall Walls [CMU-AA]	10	10	0	02OCT12	15OCT12
CC-AA-470	GT - Install Inter Metal Ceiling Studs [CMU-AA]	10	10	0	02OCT12	15OCT12
CC-AA-460	PAINT- Paint Walls (Fill/Primer Coats) [CMU-AA]	15	15	0	16OCT12	05NOV12
CC-AA-480	GT - Hang & Finish Drywall Ceilings [CMU-AA]	10	10	0	16OCT12	29OCT12
CC-AA-490	PAINT- Paint Ceilings (Primer Coats) [CMU-AA]	5	5	0	30OCT12	05NOV12
CC-AA-500	GT - Install Acoustical Ceiling Grid [CMU-AA]	15	15	0	06NOV12	28NOV12
CC-AA-560	FLOOR - Install Flooring [CMU-AA]	15	15	0	06NOV12	28NOV12
CC-AA-580	GT - Install Doors & Hardware [CMU-AA]	5	5	0	20NOV12	28NOV12
CC-AA-510	ELECT - Install Light Fixtures [CMU-AA]	10	10	0	29NOV12	12DEC12
CC-AA-550	PAINT - Paint Walls, Etc. (Final Coat) [CMU-AA]	15	15	0	29NOV12	19DEC12
CC-AA-570	GT - Install Casework [CMU-AA]	5	5	0	29NOV12	05DEC12
CC-AA-600	ELECT - Install Electrical Devices [CMU-AA]	10	10	0	29NOV12	12DEC12
CC-AA-630	OTHER - Set Specialty Equipment [CMU-AA]	15	15	0	29NOV12	19DEC12
CC-AA-520	HVAC - Install HVAC Diffusers [CMU-AA]	5	5	0	29NOV12	05DEC12
CC-AA-620	OTHER - Set Equip w/ Exhaust Connection [CMU-AA]	10	10	0	29NOV12	12DEC12
CC-AA-590	PLUMB - Install Plumbing Fixtures [CMU-AA]	10	10	0	06DEC12	19DEC12
CC-AA-530	SPRINK - Install Sprinkler Heads [CMU-AA]	5	5	0	06DEC12	12DEC12
CC-AA-540	GT - Install Acoustical Ceiling Tiles [CMU-AA]	5	5	0	13DEC12	19DEC12
CC-AA-810	ALL - Substantial Completion [CMU-AA]	0	0	0		19DEC12
CC-AA-870	ALL - New Dog Run Construction Complete [CMU-AA]	0	0	0		19DEC12
CC-AA-680	OWNER - Move-In [CMU-AA]	10	10	0	20DEC12	08JAN13
CC-AA-650	ALL - Complete Punchlist Items [CMU-AA]	15	15	0	20DEC12	15JAN13
CC-AA-660	HVAC - Balance & Commision HVAC System [CMU-AA]	15	15	0	20DEC12	15JAN13
CC-AA-640	ALL - Start-up Systems & Training [CMU-AA]	10	10	0	02JAN13	15JAN13
CC-AA-690	GT - Demolish Exist Dog Run [CMU-AA]	5	5	0	09JAN13	15JAN13
CC-AA-700	ALL - Finish Corridor C100B [CMU-AA]	25	25	0	16JAN13	19FEB13
CC-AA-910	ALL - Corridor C100B Construct Complete [CMU-AA]	0	0	0		19FEB13
Existing CMU - Interior Work (Behavioral Suite)						
CC-Ei-110	GT - Install Temp Partitions & Neg Air [CMU-BS]	5	5	0	09JAN13	15JAN13
CC-Ei-120	GT - Demolish Existing Interior & SOG [CMU-BS]	5	5	0	16JAN13	22JAN13

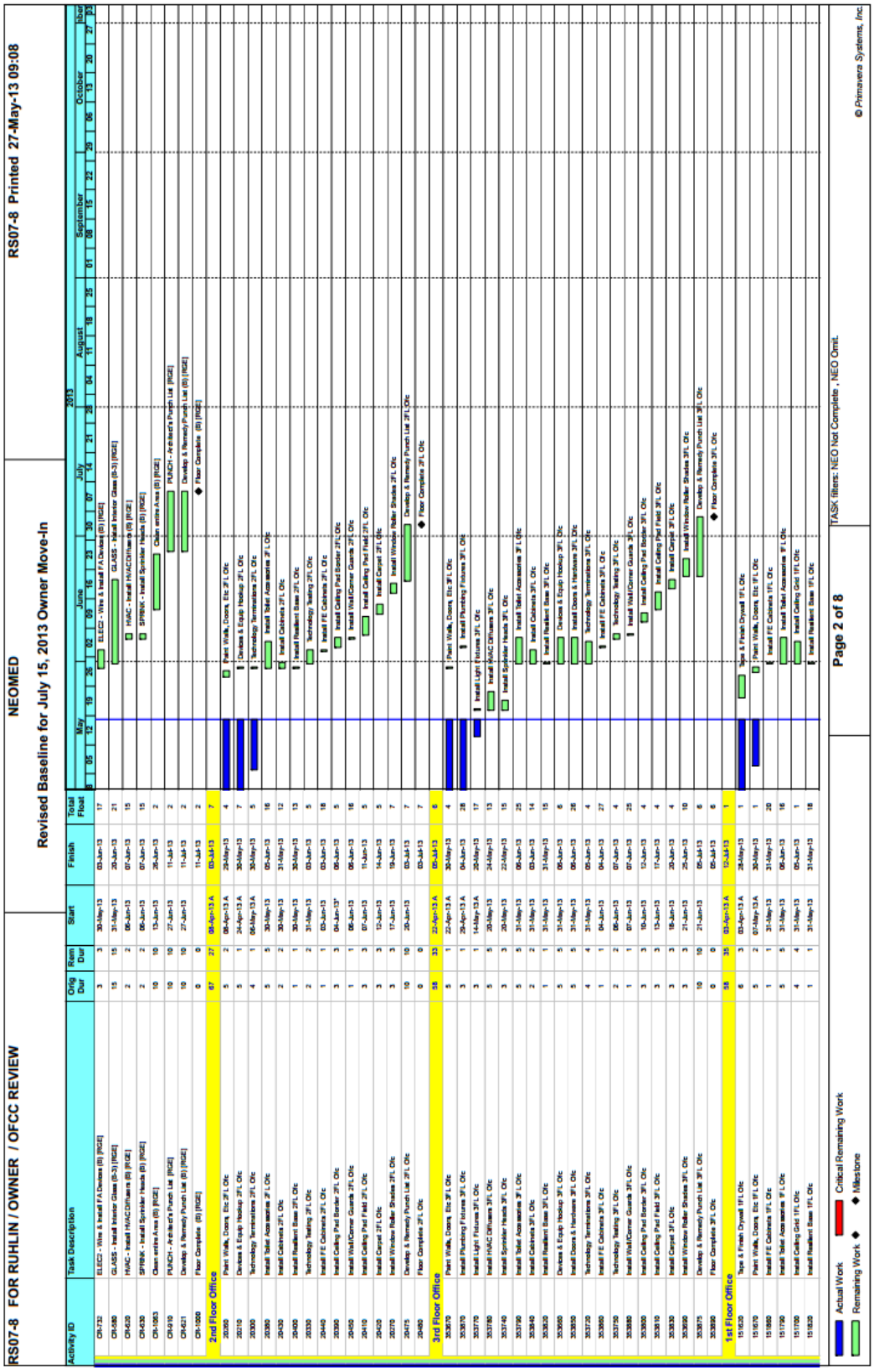


Activity ID	Activity Description	Orig Dur	Rem Dur	%	Early Start	Early Finish
CC-EI-130	PLUMB - Install U/G Plumbing R-I [CMU-BS]	4	4	0	23JAN13	28JAN13
CC-EI-140	ELECT - Install U/G Electrical R-I [CMU-BS]	3	3	0	25JAN13	29JAN13
CC-EI-150	GT - F/R/P Concrete Slab on Grade[CMU-BS]	5	5	0	30JAN13	05FEB13
CC-EI-160	HVAC - Install HVAC R-I (O/H) [CMU-BS]	3	3	0	06FEB13	08FEB13
CC-EI-170	PLUMB - Install Plumbing R-I (O/H) [CMU-BS]	3	3	0	08FEB13	12FEB13
CC-EI-180	ELECT - Install Electrical R-I (O/H) [CMU-BS]	3	3	0	11FEB13	13FEB13
CC-EI-190	SPRINK - Install Sprinkler R-I (O/H) [CMU-BS]	1	1	0	12FEB13	12FEB13
CC-EI-200	GT - Install Interior Metal Wall Studs [CMU-BS]	5	5	0	14FEB13	20FEB13
CC-EI-210	PLUMB - Install Plumbing R-I (In-Wall) [CMU-BS]	5	5	0	21FEB13	27FEB13
CC-EI-220	ELECT - Install Electric R-I (In-Wall) [CMU-BS]	5	5	0	21FEB13	27FEB13
CC-EI-230	GT -Hang & Finish Drywall Walls [CMU-BS]	5	5	0	28FEB13	06MAR13
CC-EI-240	PAINT- Paint Walls (Primer Coat) [CMU-BS]	5	5	0	07MAR13	13MAR13
CC-EI-250	GT - Install Acoustical Ceiling Grid [CMU-BS]	5	5	0	14MAR13	20MAR13
CC-EI-260	ELECT - Install Light Fixtures [CMU-AA]	2	2	0	21MAR13	22MAR13
CC-EI-270	HVAC - Install HVAC Diffusers [CMU-AA]	2	2	0	25MAR13	26MAR13
CC-EI-280	SPRINK - Install Sprinkler Heads [CMU-AA]	1	1	0	27MAR13	27MAR13
CC-EI-290	GT - Install Acoustical Ceiling Tiles [CMU-BS]	5	5	0	28MAR13	03APR13
CC-EI-300	PAINT - Paint Walls, Etc. (Final Coat) [CMU-BS]	5	5	0	04APR13	10APR13
CC-EI-310	FLOOR - Install Flooring [CMU-BS]	5	5	0	11APR13	17APR13
CC-EI-320	GT - Install Casework [CMU-BS]	5	5	0	18APR13	24APR13
CC-EI-330	GT - Install Doors & Hardware [CMU-BS]	5	5	0	18APR13	24APR13
CC-EI-340	PLUMB - Install Plumbing Fixtures [CMU-BS]	2	2	0	25APR13	26APR13
CC-EI-350	ELECT - Install Electrical Devices [CMU-BS]	2	2	0	25APR13	26APR13
CC-EI-360	ALL - Substantial Completion [CMU-BS]	0	0	0		26APR13
CC-EI-370	ALL - Start-up Systems & Training [CMU-BS]	5	5	0	29APR13	03MAY13
CC-EI-380	ALL - Complete Punchlist Items [CMU-BS]	5	5	0	06MAY13	10MAY13
CC-EI-390	HVAC - Balance & Commision HVAC System [CMU-BS]	5	5	0	13MAY13	17MAY13
CC-EI-400	ALL - Construction Complete [CMU-BS]	0	0	0		17MAY13
CC-EI-410	OWNER - Move-In [CMU-BS]	5	5	0	20MAY13	24MAY13
Existing CMU - Inter Work (Electrical Upgrades)						
CC-EI-710	ELECT - Install Electric Feders & Panels[CMU-EU]	15	15	0	30JAN13	19FEB13
CC-EI-720	ELECT - Refeed Existing Electric Panels [CMU-EU]	15	15	0	20FEB13	12MAR13
New CMU Mechanical Building						
CC-NB-900	ALL - Construct New CMUMechanical Building	40	40	0	22JUN12	17AUG12
Existing CMU MEP & Boiler House Upgrades						
Boiler House						
CU-BH-900	PLUMB - Install Exist CMU Boiler House Upgrades	40	40	0	22JUN12	17AUG12
Central Mechanical Room						
CU-MR-900	ALL - Construct Central Mechanical Room	40	40	0	22JUN12	17AUG12
Existing Building D Renovation						
CD-010	SAO & NEOMED - Authorization of Funds Building D	0	0	0		04APR12*
CD-020	NEOMED - Move Staff to New RGE Building	10	10	0	03JUN13	14JUN13
CD-100	ALL - Renovate Existing Building D [D]	55	55	0	17JUN13	03SEP13

Activity ID	Activity Description	Orig Dur	Rem Dur	%	Early Start	Early Finish
Alternate Bridge (RGE Building to CMU Building)						
CB-100	ALL - Construct Alternatel Bridge [BRIDGE]	100	100	0	09OCT12	05MAR13

Revised Baseline Schedule

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Revised Baseline for July 15, 2013 Owner Move-In
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Actual Work
Remaining Work
Critical Remaining Work
Milestone
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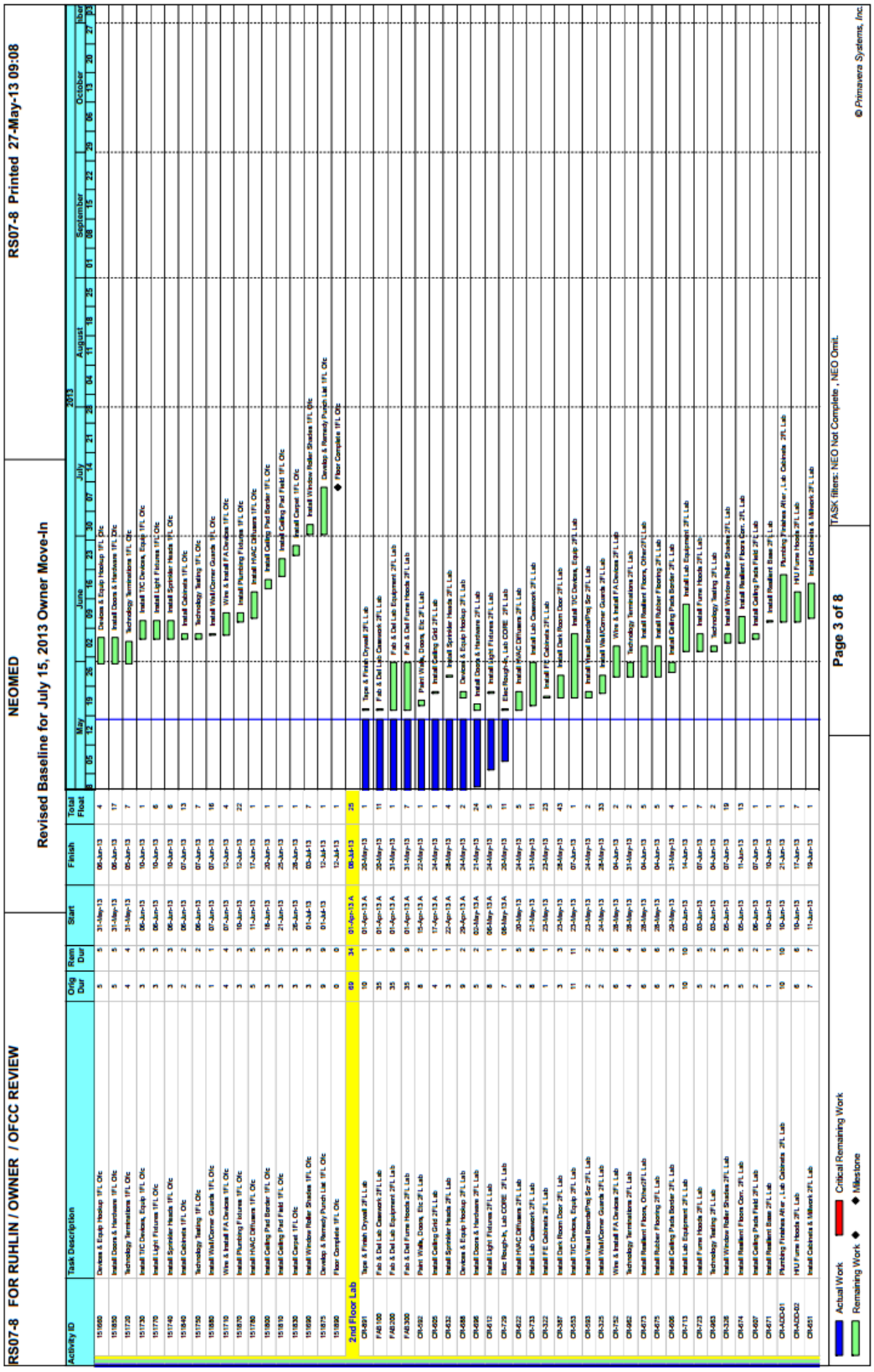
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Remaining Work
Critical Remaining Work
Milestone
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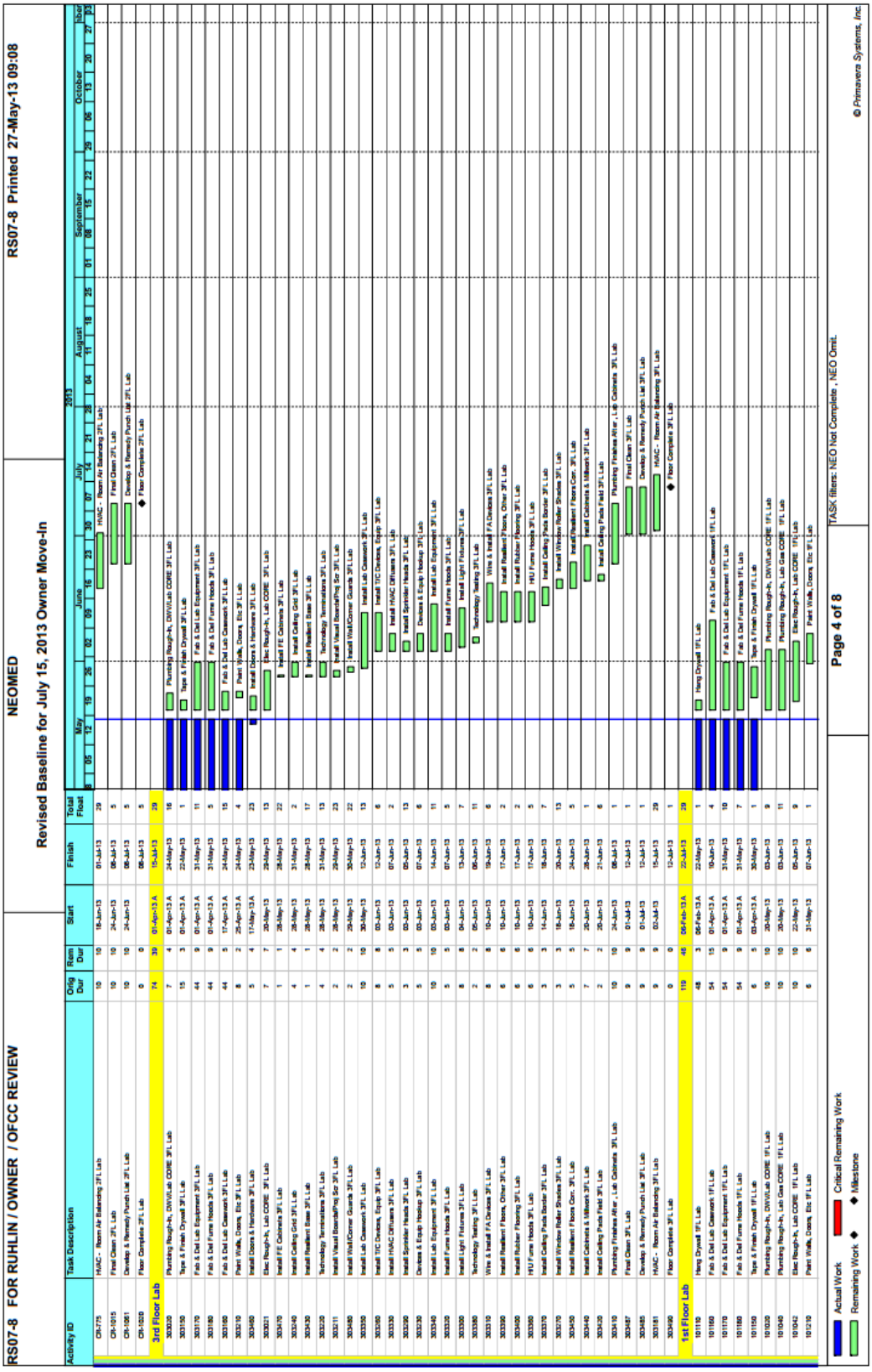
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Actual Work
Remaining Work
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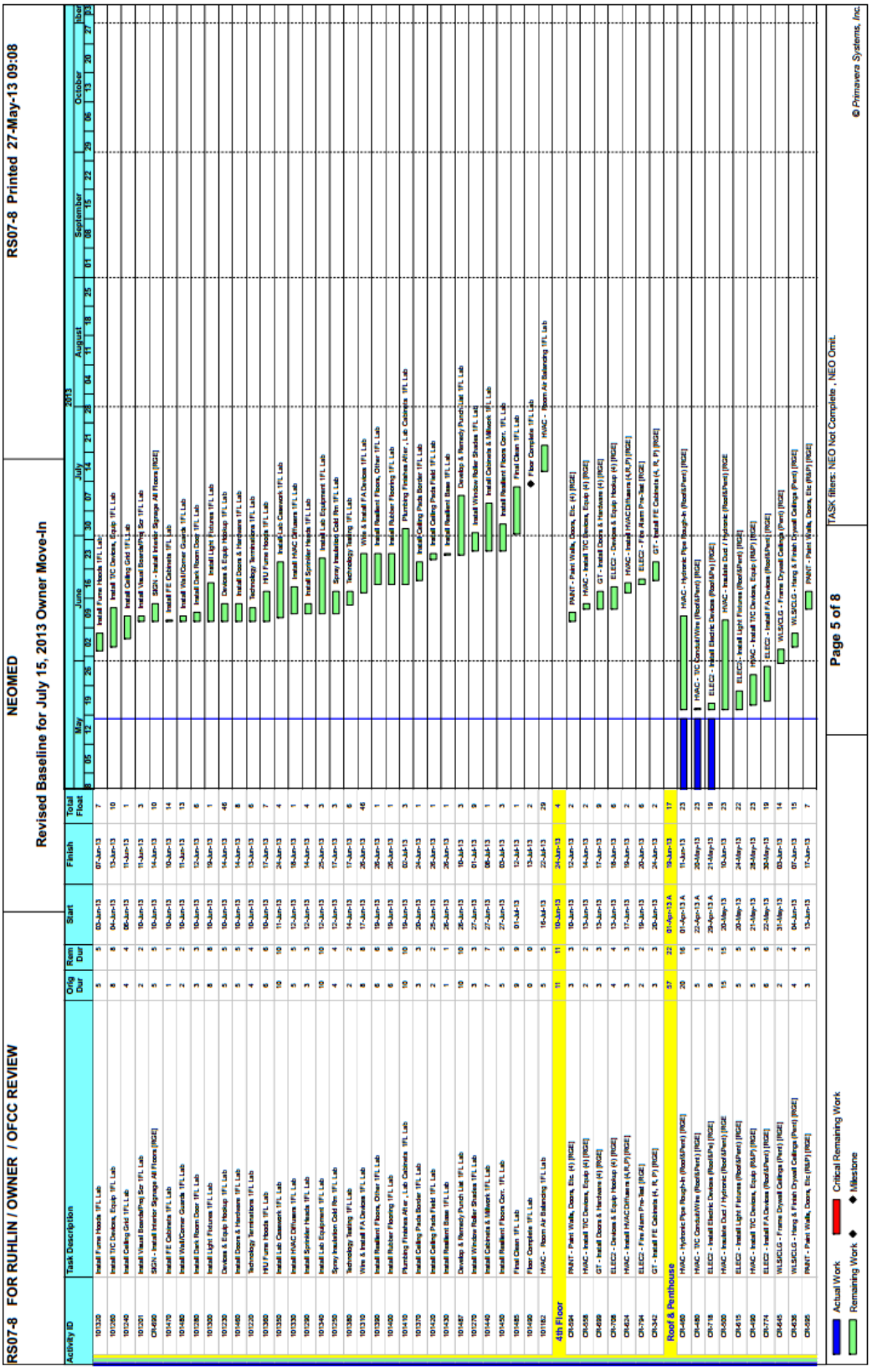
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Remaining Work
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Milestone
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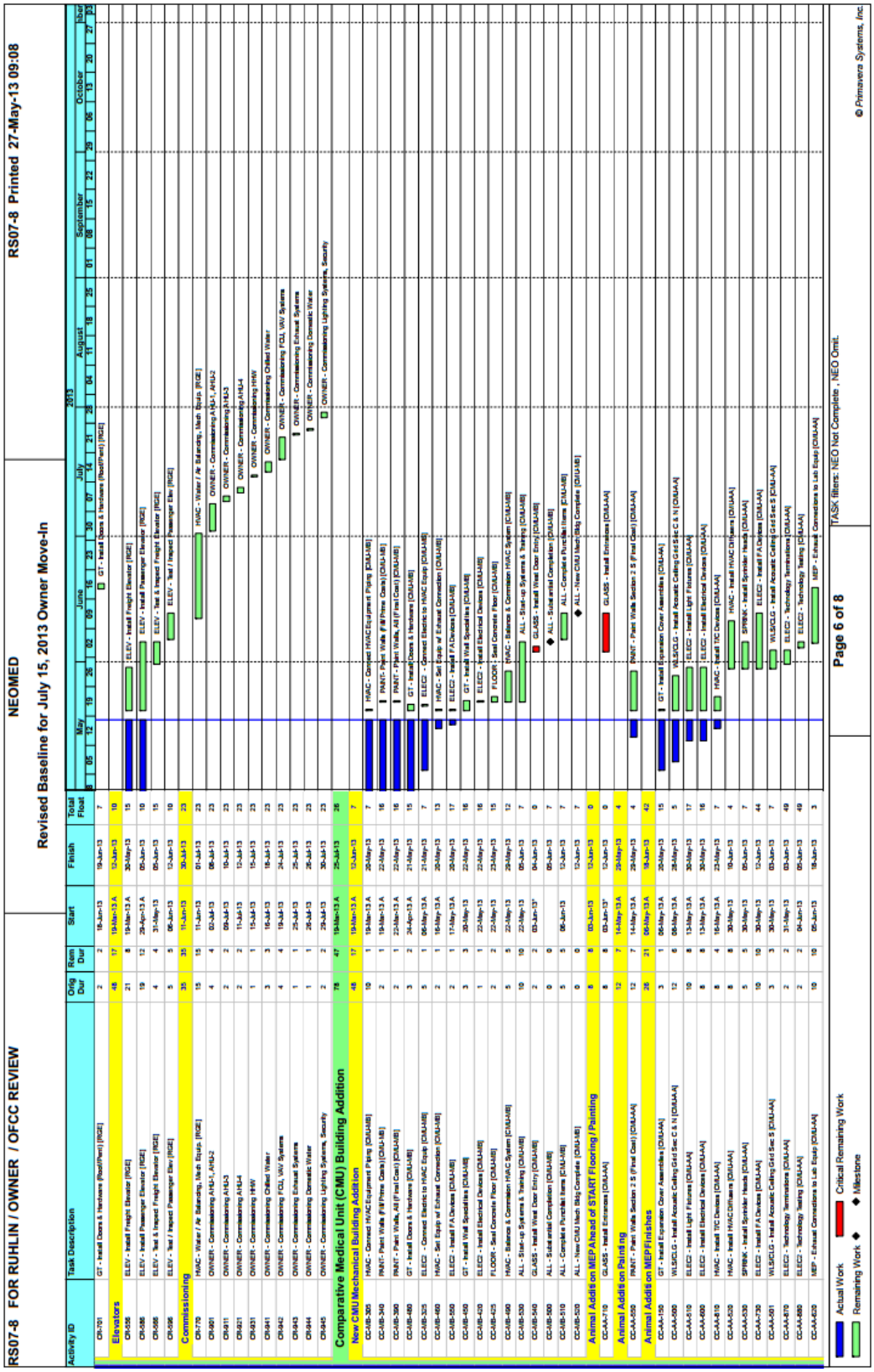
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Actual Work
Remaining Work
Critical Remaining Work
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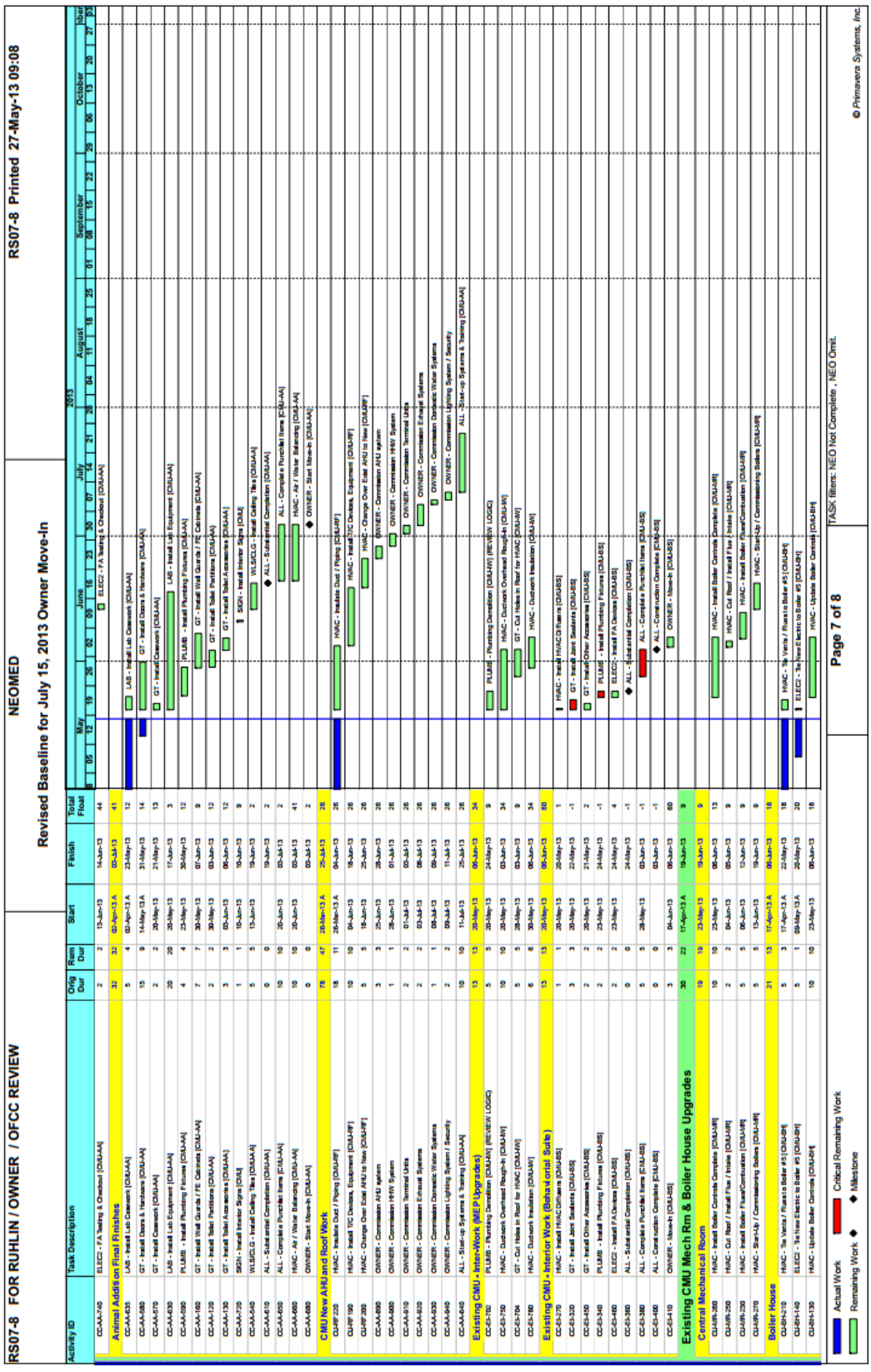
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Remaining Work
Critical Remaining Work
Milestone
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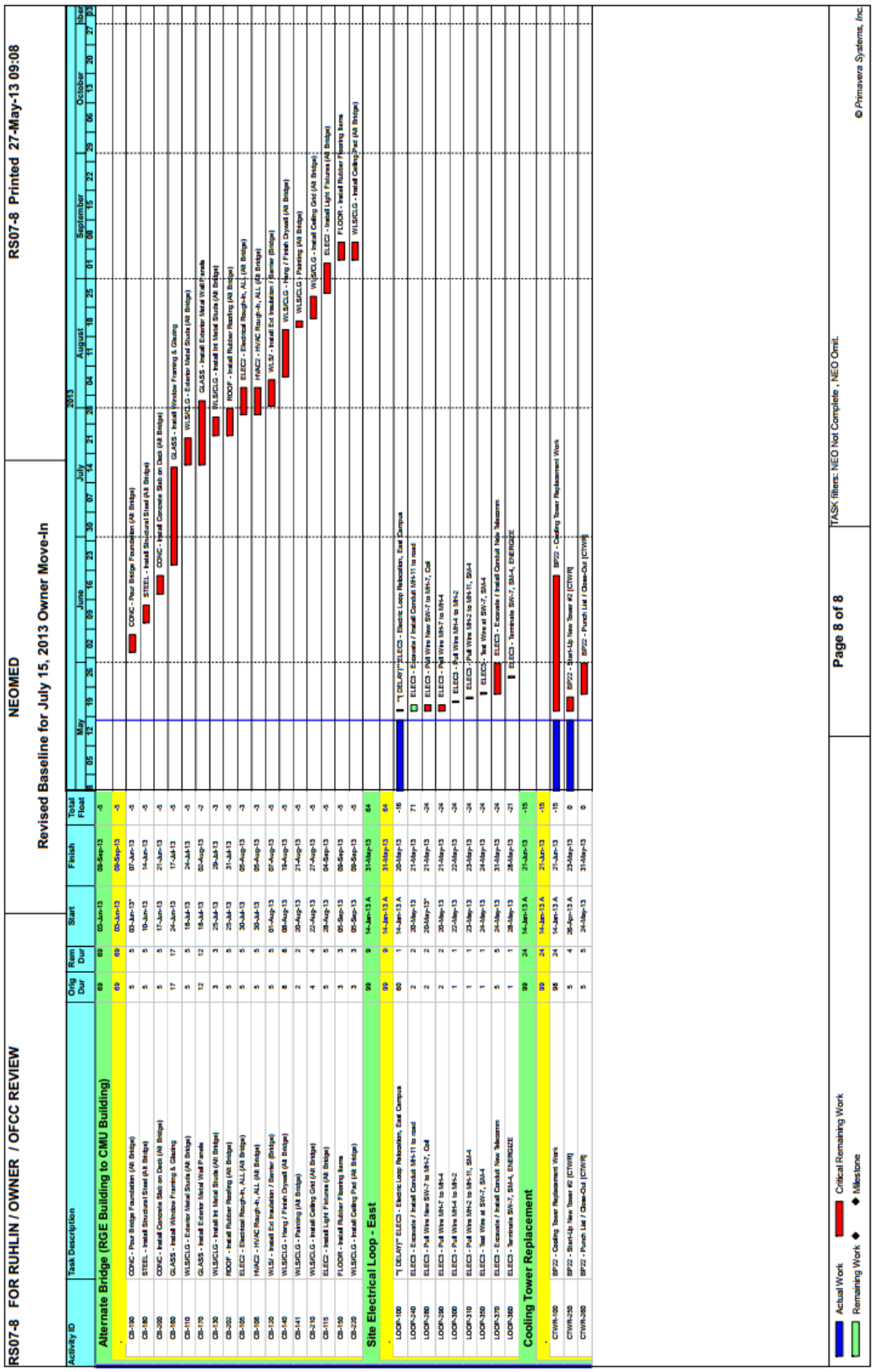
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Task Description
Orig Dur
Rem Dur
Start
Finish
Total Float
2013
May
June
July
August
September
October
Actual Work
Remaining Work
Critical Remaining Work
Milestone
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TASK filters: NEO Not Complete , NEO Omit.
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