

## APPENDIX B

### Cost Estimates:

First Cost  
Energy Consumption  
Operating Cost  
Life Cycle Cost

PROJECT: BRONX HIGH SCHOOL FOR LAW, GOVERNMENT & JUSTICE  
CONVENTIONAL SYSTEM

DESCRIPTION OF WORK	UNIT		MATERIAL		LABOR		TOTAL COST
	QNTY	UNIT MEAS	UNIT COST	TOTAL	UNIT COST	TOTAL	
<b>CHILLERS - AIR COOLED</b>							
320 T.R., CHILLED WATER, REFRIG. 134A	2	EA	148,500.00	297,000	11,300.00	22,600	319,600
DX PIPING W/ INSULATION - LIQ & GAS	800	LF	21.25	17,000	14.35	11,480	28,480
<b>Total:</b>				<b>314,000</b>		<b>34,080</b>	<b>348,080</b>
<b>PUMPS - W/ LOCAL PIPING/VALVING</b>							
CHILLED WATER PUMPS	3	EA	3,175.00	9,525	565.00	1,695	11,220
<b>Total:</b>				<b>9,525</b>		<b>1,695</b>	<b>11,220</b>
<b>AIR HANDLING UNITS: W/ FILTERS, MOTOR &amp; DRIVE</b>							
AHU-1: 48,000 CFM	1	EA	58,500.00	58,500	4,825.00	4,825	63,325
AHU-2: 19,000 CFM	1	EA	26,600.00	26,600	1,375.00	1,375	27,975
AHU-3: 17,500 CFM	1	EA	25,400.00	25,400	1,290.00	1,290	26,690
AHU-4: 3,200 CFM	1	EA	4,850.00	4,850	635.00	635	5,485
AHU-5: 14,500 CFM	1	EA	21,200.00	21,200	1,200.00	1,200	22,400
AHU-6: 5,200 CFM	1	EA	7,975.00	7,975	710.00	710	8,685
AHU-7: 12,000 CFM	1	EA	16,100.00	16,100	985.00	985	17,085
AHU-8: 6,000 CFM	1	EA	10,100.00	10,100	740.00	740	10,840
AHU-9: 7,200 CFM	1	EA	11,600.00	11,600	805.00	805	12,405
AHU-10: 3,100 CFM	1	EA	4,725.00	4,725	620.00	620	5,345
<b>Total:</b>				<b>187,050</b>		<b>13,185</b>	<b>200,235</b>
<b>COOLING COILS</b>							
AHU-1	1	EA	8,496.00	8,496	4,470.00	4,470	12,966
AHU-2	1	EA	3,365.00	3,365	1,769.00	1,769	5,134
AHU-3	1	EA	3,099.00	3,099	1,630.00	1,630	4,729
AHU-4	1	EA	567.00	567	298.00	298	865
AHU-5	1	EA	2,368.00	2,368	1,350.00	1,350	3,718
AHU-6	1	EA	921.00	921	484.00	484	1,405
AHU-7	1	EA	2,125.00	2,125	1,118.00	1,118	3,243
AHU-8	1	EA	1,063.00	1,063	559.00	559	1,622
AHU-9	1	EA	1,275.00	1,275	671.00	671	1,946
AHU-10	1	EA	549.00	549	289.00	289	838
<b>Total:</b>				<b>23,828</b>		<b>12,638</b>	<b>36,466</b>
<b>FANS</b>							
RF-1: 38,400 CFM	1	EA	12,750.00	12,750	3,250.00	3,250	16,000
RF-2: 15,200 CFM	1	EA	7,100.00	7,100	1,750.00	1,750	8,850
RF-3: 14,000 CFM	1	EA	7,100.00	7,100	1,750.00	1,750	8,850
RF-4: 2,560 CFM	1	EA	1,950.00	1,950	1,040.00	1,040	2,990
RF-5: 14,500 CFM	1	EA	7,100.00	7,100	1,750.00	1,750	8,850
RF-6: 4160 CFM	1	EA	3,985.00	3,985	1,350.00	1,350	5,335
RF-7: 9,600 CFM	1	EA	5,100.00	5,100	1,500.00	1,500	6,600
RF-8: 4,800 CFM	1	EA	4,400.00	4,400	1,500.00	1,500	5,900
RF-9: 5,750 CFM	1	EA	2,750.00	2,750	1,500.00	1,500	4,250
RF-10: 2,480 CFM	1	EA	1,750.00	1,750	750.00	750	2,500
<b>Total:</b>				<b>53,985</b>		<b>16,140</b>	<b>70,125</b>
<b>AIR DISTRIBUTION</b>							
GALVANIZED IRON DUCTWORK	155,000	LBS	1.06	164,300	4.02	623,100	787,400
DUCT INSULATION	80,000	SF	1.76	140,800	2.40	192,000	332,800
DIFFUSERS	575	EA	159.00	91,425	37.50	21,563	112,988
<b>Total:</b>				<b>396,525</b>		<b>836,663</b>	<b>1,233,188</b>

PROJECT: BRONX HIGH SCHOOL FOR LAW, GOVERNMENT & JUSTICE  
 CONVETIONAL SYSTEM

DESCRIPTION OF WORK	UNIT		MATERIAL		LABOR		TOTAL COST
	QNTY	UNIT MEAS	UNIT COST	TOTAL	UNIT COST	TOTAL	
<b>PIPE</b>							
8" PIPE/ FITTINGS/ SUPPORTS	500	LF	30.00	15,000	60.00	30,000	45,000
6" PIPE/ FITTINGS/ SUPPORTS	550	LF	29.00	15,950	39.50	21,725	37,675
5" PIPE/ FITTINGS/ SUPPORTS	650	LF	26.50	17,225	34.25	22,263	39,488
4" PIPE/ FITTINGS/ SUPPORTS	750	LF	19.50	14,625	21.50	16,125	30,750
3" PIPE/ FITTINGS/ SUPPORTS	900	LF	17.50	15,750	17.50	15,750	31,500
2 1/2" PIPE/ FITTINGS/ SUPPORTS	800	LF	13.25	10,600	13.25	10,600	21,200
2" PIPE/ FITTINGS/ SUPPORTS	700	LF	11.25	7,875	9.50	6,650	14,525
1 1/2" PIPE/ FITTINGS/ SUPPORTS	1,000	LF	9.20	9,200	9.25	9,250	18,450
1 1/4" PIPE/ FITTINGS/ SUPPORTS	1,200	LF	8.20	9,840	8.75	10,500	20,340
1" PIPE/ FITTINGS/ SUPPORTS	900	LF	7.10	6,390	8.25	7,425	13,815
3/4" PIPE/ FITTINGS/ SUPPORTS	500	LF	7.10	3,550	8.25	4,125	7,675
1/2" PIPE/ FITTINGS/ SUPPORTS	400	LF	6.90	2,760	8.00	3,200	5,960
<b>Total:</b>				<b>128,765</b>		<b>157,613</b>	<b>286,378</b>
<b>PIPE INSULATION</b>							
8" PIPE SIZE	500	LF	10.40	5,200	7.90	3,950	9,150
6" PIPE SIZE	550	LF	9.50	5,225	7.40	4,070	9,295
5" PIPE SIZE	650	LF	9.50	6,175	7.40	4,810	10,985
4" PIPE SIZE	750	LF	4.20	3,150	3.30	2,475	5,625
3" PIPE SIZE	900	LF	4.10	3,690	3.20	2,880	6,570
2 1/2" PIPE SIZE	800	LF	4.10	3,280	3.20	2,560	5,840
2" PIPE SIZE	700	LF	4.00	2,800	3.10	2,170	4,970
1 1/2" PIPE SIZE	1,000	LF	2.30	2,300	1.80	1,800	4,100
1 1/4" PIPE SIZE	1,200	LF	2.30	2,760	1.80	2,160	4,920
1" PIPE SIZE	900	LF	2.30	2,070	1.80	1,620	3,690
3/4" PIPE SIZE	500	LF	2.15	1,075	1.65	825	1,900
1/2" PIPE SIZE	400	LF	2.15	860	1.65	660	1,520
<b>Total:</b>				<b>38,585</b>		<b>29,980</b>	<b>68,565</b>
<b>GRAND TOTAL</b>				<b>1,152,263</b>		<b>1,101,993</b>	<b>\$ 2,254,256</b>

PROJECT: BRONX HIGH SCHOOL FOR LAW, GOVERNMENT & JUSTICE  
 FULL STORAGE WITH LOW TEMPERATURE AIR DISTRIBUTION

DESCRIPTION OF WORK	UNIT		MATERIAL		LABOR		TOTAL COST
	QNTY	UNIT MEAS	UNIT COST	TOTAL	UNIT COST	TOTAL	
<b>CHILLERS</b>							
410 T.R., CHILLED WATER, REFRIG. 407C	2	EA	135,500.00	271,000	11,600.00	23,200	294,200
600 TON COOLING TOWER	2	EA	46,400.00	92,800	4,425.00	8,850	101,650
PROPYLENE GLYCOL	220	GAL	8.65	1,903	12.65	2,783	4,686
DX PIPING W/ INSULATION - LIQ & GAS	1,200	LF	21.25	25,500	14.35	17,220	42,720
TEMPERATURE SENSOR	3	EA	305.00	915	34.45	103	1,018
GLOBE VALVES	3	EA	2,175.00	6,525	80.00	240	6,765
ICE THERMAL STORAGE TANKS	3,078	TON-HR	70.00	215,460	0.00	-	215,460
<b>Total:</b>				<b>614,103</b>		<b>52,396</b>	<b>666,499</b>
<b>PUMPS - W/ LOCAL PIPING/VALVING</b>							
CHILLED WATER PUMPS	3	EA	2,775.00	8,325	455.00	1,365	9,690
CONDENSOR PUMP	2	EA	3,175.00	6,350	685.00	1,370	7,720
SECONDARY VARIABLE SPEED PUMP	1	EA	7,425.00	7,425	2,300.00	2,300	9,725
<b>Total:</b>				<b>22,100</b>		<b>1,365</b>	<b>27,135</b>
<b>AIR HANDLING UNITS: W/ FILTERS, MOTOR &amp; DRIVE</b>							
AHU-1: 37,500 CFM	1	EA	57,800.00	57,800	4,725.00	4,725	62,525
AHU-2: 14,500 CFM	1	EA	20,100.00	20,100	1,100.00	1,100	21,200
AHU-3: 13,500 CFM	1	EA	18,100.00	18,100	1,075.00	1,075	19,175
AHU-4: 2,400 CFM	1	EA	4,125.00	4,125	580.00	580	4,705
AHU-5: 11,200 CFM	1	EA	15,800.00	15,800	965.00	965	16,765
AHU-6: 4,200 CFM	1	EA	6,250.00	6,250	655.00	655	6,905
AHU-7: 8,000 CFM	1	EA	12,900.00	12,900	925.00	925	13,825
AHU-8: 4,800 CFM	1	EA	7,775.00	7,775	690.00	690	8,465
AHU-9: 4,800 CFM	1	EA	7,775.00	7,775	690.00	690	8,465
AHU-10: 2,400 CFM	1	EA	4,125.00	4,125	580.00	580	4,705
<b>Total:</b>				<b>154,750</b>		<b>11,985</b>	<b>166,735</b>
<b>COOLING COILS</b>							
AHU-1	1	EA	9,770.00	9,770	5,140.00	5,140	14,910
AHU-2	1	EA	3,870.00	3,870	2,035.00	2,035	5,905
AHU-3	1	EA	3,560.00	3,560	1,875.00	1,875	5,435
AHU-4	1	EA	350.00	350	345.00	345	695
AHU-5	1	EA	2,950.00	2,950	1,550.00	1,550	4,500
AHU-6	1	EA	1,060.00	1,060	560.00	560	1,620
AHU-7	1	EA	2,445.00	2,445	1,285.00	1,285	3,730
AHU-8	1	EA	1,220.00	1,220	645.00	645	1,865
AHU-9	1	EA	1,460.00	1,460	770.00	770	2,230
AHU-10	1	EA	630.00	630	332.00	332	962
<b>Total:</b>				<b>27,315</b>		<b>14,537</b>	<b>41,852</b>
<b>FANS</b>							
RF-1: 30000 CFM	1	EA	9,960.00	9,960	2,540.00	2,540	12,500
RF-2: 11600 CFM	1	EA	5,420.00	5,420	1,335.00	1,335	6,755
RF-3: 10800 CFM	1	EA	5,480.00	5,480	1,350.00	1,350	6,830
RF-4: 1920 CFM	1	EA	1,460.00	1,460	780.00	780	2,240
RF-5: 8960 CFM	1	EA	5,485.00	5,485	1,350.00	1,350	6,835
RF-6: 3360 CFM	1	EA	3,220.00	3,220	1,090.00	1,090	4,310
RF-7: 6400 CFM	1	EA	3,400.00	3,400	1,000.00	1,000	4,400
RF-8: 3840 CFM	1	EA	3,520.00	3,520	1,200.00	1,200	4,720
RF-9: 3840 CFM	1	EA	1,835.00	1,835	1,000.00	1,000	2,835
RF-10: 1920 CFM	1	EA	1,355.00	1,355	580.00	580	1,935
<b>Total:</b>				<b>41,135</b>		<b>12,225</b>	<b>53,360</b>
<b>AIR DISTRIBUTION</b>							
GALVANIZED IRON DUCTWORK	135,000	LBS	1.06	143,100	4.02	542,700	685,800
DUCT INSULATION	65,000	SF	1.98	128,700	2.67	173,550	302,250
DIFFUSERS	575	EA	181.00	104,075	42.25	24,294	128,369
<b>Total:</b>				<b>375,875</b>		<b>740,544</b>	<b>1,116,419</b>

PROJECT: BRONX HIGH SCHOOL FOR LAW, GOVERNMENT & JUSTICE  
 FULL STORAGE WITH LOW TEMPERATURE AIR DISTRIBUTION

DESCRIPTION OF WORK	UNIT		MATERIAL		LABOR		TOTAL COST
	QNTY	UNIT MEAS	UNIT COST	TOTAL	UNIT COST	TOTAL	
<u>PIPE</u>							
8" PIPE/ FITTINGS/ SUPPORTS	400	LF	30.00	12,000	60.00	24,000	36,000
6" PIPE/ FITTINGS/ SUPPORTS	440	LF	29.00	12,760	39.50	17,380	30,140
5" PIPE/ FITTINGS/ SUPPORTS	520	LF	26.50	13,780	34.25	17,810	31,590
4" PIPE/ FITTINGS/ SUPPORTS	600	LF	19.50	11,700	21.50	12,900	24,600
3" PIPE/ FITTINGS/ SUPPORTS	720	LF	17.50	12,600	17.50	12,600	25,200
2 1/2" PIPE/ FITTINGS/ SUPPORTS	640	LF	13.25	8,480	13.25	8,480	16,960
2" PIPE/ FITTINGS/ SUPPORTS	560	LF	11.25	6,300	9.50	5,320	11,620
1 1/2" PIPE/ FITTINGS/ SUPPORTS	800	LF	9.20	7,360	9.25	7,400	14,760
1 1/4" PIPE/ FITTINGS/ SUPPORTS	960	LF	8.20	7,872	8.75	8,400	16,272
1" PIPE/ FITTINGS/ SUPPORTS	720	LF	7.10	5,112	8.25	5,940	11,052
3/4" PIPE/ FITTINGS/ SUPPORTS	400	LF	7.10	2,840	8.25	3,300	6,140
1/2" PIPE/ FITTINGS/ SUPPORTS	320	LF	6.90	2,208	8.00	2,560	4,768
<b>Total:</b>				<b>103,012</b>		<b>126,090</b>	<b>229,102</b>
<u>PIPE INSULATION</u>							
8" PIPE SIZE	400	LF	10.40	4,160	7.90	3,160	7,320
6" PIPE SIZE	440	LF	9.50	4,180	7.40	3,256	7,436
5" PIPE SIZE	520	LF	9.50	4,940	7.40	3,848	8,788
4" PIPE SIZE	600	LF	4.20	2,520	3.30	1,980	4,500
3" PIPE SIZE	720	LF	4.10	2,952	3.20	2,304	5,256
2 1/2" PIPE SIZE	640	LF	4.10	2,624	3.20	2,048	4,672
2" PIPE SIZE	560	LF	4.00	2,240	3.10	1,736	3,976
1 1/2" PIPE SIZE	800	LF	2.30	1,840	1.80	1,440	3,280
1 1/4" PIPE SIZE	960	LF	2.30	2,208	1.80	1,728	3,936
1" PIPE SIZE	720	LF	2.30	1,656	1.80	1,296	2,952
3/4" PIPE SIZE	400	LF	2.15	860	1.65	660	1,520
1/2" PIPE SIZE	320	LF	2.15	688	1.65	528	1,216
<b>Total:</b>				<b>30,868</b>		<b>23,984</b>	<b>54,852</b>
<b>GRAND TOTAL</b>				<b>1,369,158</b>		<b>983,126</b>	<b>\$ 2,355,954</b>

PROJECT: BRONX HIGH SCHOOL FOR LAW, GOVERNMENT & JUSTICE  
PARTIAL STORAGE WITH LOW TEMPERATURE AIR DISTRIBUTION

DESCRIPTION OF WORK	UNIT		MATERIAL		LABOR		TOTAL COST
	QNTY	UNIT MEAS	UNIT COST	TOTAL	UNIT COST	TOTAL	
<b>CHILLERS</b>							
240 T.R., CHILLED WATER, REFRIG. 407C	2	EA	77,000.00	154,000	10,700.00	21,400	175,400
350 TON COOLING TOWER	2	EA	32,300.00	64,600	2,800.00	5,600	70,200
PROPYLENE GLYCOL	220	GAL	8.65	1,903	12.65	2,783	4,686
DX PIPING W/ INSULATION	1,200	LF	21.25	25,500	14.35	17,220	42,720
TEMPERATURE SENSOR	3	EA	305.00	915	34.45	103	1,018
GLOBE VALVES	3	EA	2,175.00	6,525	80.00	240	6,765
ICE THERMAL STORAGE TANKS	1,782	TON-HR	70.00	124,740	0.00	-	124,740
<b>Total:</b>				<b>378,183</b>		<b>47,003</b>	<b>425,529</b>
<b>PUMPS - W/ LOCAL PIPING/VALVING</b>							
CHILLED WATER PUMPS	3	EA	2,775.00	8,325	455.00	1,365	9,690
CONDENSOR PUMP	2	EA	3,175.00	6,350	685.00	1,370	7,720
SECONDARY VARIABLE SPEED PUMP	1	EA	7,425.00	7,425	2,300.00	2,300	9,725
<b>Total:</b>				<b>22,100</b>		<b>1,365</b>	<b>27,135</b>
<b>AIR HANDLING UNITS: W/ FILTERS, MOTOR &amp; DRIVE</b>							
AHU-1: 37,500 CFM	1	EA	57,800.00	57,800	4,725.00	4,725	62,525
AHU-2: 14,500 CFM	1	EA	20,100.00	20,100	1,100.00	1,100	21,200
AHU-3: 13,500 CFM	1	EA	18,100.00	18,100	1,075.00	1,075	19,175
AHU-4: 2,400 CFM	1	EA	4,125.00	4,125	580.00	580	4,705
AHU-5: 11,200 CFM	1	EA	15,800.00	15,800	965.00	965	16,765
AHU-6: 4,200 CFM	1	EA	6,250.00	6,250	655.00	655	6,905
AHU-7: 8,000 CFM	1	EA	12,900.00	12,900	925.00	925	13,825
AHU-8: 4,800 CFM	1	EA	7,775.00	7,775	690.00	690	8,465
AHU-9: 4,800 CFM	1	EA	7,775.00	7,775	690.00	690	8,465
AHU-10: 2,400 CFM	1	EA	4,125.00	4,125	580.00	580	4,705
<b>Total:</b>				<b>154,750</b>		<b>11,985</b>	<b>166,735</b>
<b>COOLING COILS</b>							
AHU-1	1	EA	9,770.00	9,770	5,140.00	5,140	14,910
AHU-2	1	EA	3,870.00	3,870	2,035.00	2,035	5,905
AHU-3	1	EA	3,560.00	3,560	1,875.00	1,875	5,435
AHU-4	1	EA	350.00	350	345.00	345	695
AHU-5	1	EA	2,950.00	2,950	1,550.00	1,550	4,500
AHU-6	1	EA	1,060.00	1,060	560.00	560	1,620
AHU-7	1	EA	2,445.00	2,445	1,285.00	1,285	3,730
AHU-8	1	EA	1,220.00	1,220	645.00	645	1,865
AHU-9	1	EA	1,460.00	1,460	770.00	770	2,230
AHU-10	1	EA	630.00	630	332.00	332	962
<b>Total:</b>				<b>27,315</b>		<b>14,537</b>	<b>41,852</b>
<b>FANS</b>							
RF-1: 30000 CFM	1	EA	9,960.00	9,960	2,540.00	2,540	12,500
RF-2: 11600 CFM	1	EA	5,420.00	5,420	1,335.00	1,335	6,755
RF-3: 10800 CFM	1	EA	5,480.00	5,480	1,350.00	1,350	6,830
RF-4: 1920 CFM	1	EA	1,460.00	1,460	780.00	780	2,240
RF-5: 8960 CFM	1	EA	5,485.00	5,485	1,350.00	1,350	6,835
RF-6: 3360 CFM	1	EA	3,220.00	3,220	1,090.00	1,090	4,310
RF-7: 6400 CFM	1	EA	3,400.00	3,400	1,000.00	1,000	4,400
RF-8: 3840 CFM	1	EA	3,520.00	3,520	1,200.00	1,200	4,720
RF-9: 3840 CFM	1	EA	1,835.00	1,835	1,000.00	1,000	2,835
RF-10: 1920 CFM	1	EA	1,355.00	1,355	580.00	580	1,935
<b>Total:</b>				<b>41,135</b>		<b>12,225</b>	<b>53,360</b>
<b>AIR DISTRIBUTION</b>							
GALVANIZED IRON DUCTWORK	135,000	LBS	1.06	143,100	4.02	542,700	685,800
DUCT INSULATION	65,000	SF	1.98	128,700	2.67	173,550	302,250
DIFFUSERS	575	EA	181.00	104,075	42.25	24,294	128,369
<b>Total:</b>				<b>375,875</b>		<b>740,544</b>	<b>1,116,419</b>

PROJECT: BRONX HIGH SCHOOL FOR LAW, GOVERNMENT & JUSTICE  
 PARTIAL STORAGE WITH LOW TEMPERATURE AIR DISTRIBUTION

DESCRIPTION OF WORK	UNIT		MATERIAL		LABOR		TOTAL COST
	QNTY	UNIT MEAS	UNIT COST	TOTAL	UNIT COST	TOTAL	
<u>PIPE</u>							
8" PIPE/ FITTINGS/ SUPPORTS	400	LF	30.00	12,000	60.00	24,000	36,000
6" PIPE/ FITTINGS/ SUPPORTS	440	LF	29.00	12,760	39.50	17,380	30,140
5" PIPE/ FITTINGS/ SUPPORTS	520	LF	26.50	13,780	34.25	17,810	31,590
4" PIPE/ FITTINGS/ SUPPORTS	600	LF	19.50	11,700	21.50	12,900	24,600
3" PIPE/ FITTINGS/ SUPPORTS	720	LF	17.50	12,600	17.50	12,600	25,200
2 1/2" PIPE/ FITTINGS/ SUPPORTS	640	LF	13.25	8,480	13.25	8,480	16,960
2" PIPE/ FITTINGS/ SUPPORTS	560	LF	11.25	6,300	9.50	5,320	11,620
1 1/2" PIPE/ FITTINGS/ SUPPORTS	800	LF	9.20	7,360	9.25	7,400	14,760
1 1/4" PIPE/ FITTINGS/ SUPPORTS	960	LF	8.20	7,872	8.75	8,400	16,272
1" PIPE/ FITTINGS/ SUPPORTS	720	LF	7.10	5,112	8.25	5,940	11,052
3/4" PIPE/ FITTINGS/ SUPPORTS	400	LF	7.10	2,840	8.25	3,300	6,140
1/2" PIPE/ FITTINGS/ SUPPORTS	320	LF	6.90	2,208	8.00	2,560	4,768
<b>Total:</b>				<b>103,012</b>		<b>126,090</b>	<b>229,102</b>
<u>PIPE INSULATION</u>							
8" PIPE SIZE	400	LF	10.40	4,160	7.90	3,160	7,320
6" PIPE SIZE	440	LF	9.50	4,180	7.40	3,256	7,436
5" PIPE SIZE	520	LF	9.50	4,940	7.40	3,848	8,788
4" PIPE SIZE	600	LF	4.20	2,520	3.30	1,980	4,500
3" PIPE SIZE	720	LF	4.10	2,952	3.20	2,304	5,256
2 1/2" PIPE SIZE	640	LF	4.10	2,624	3.20	2,048	4,672
2" PIPE SIZE	560	LF	4.00	2,240	3.10	1,736	3,976
1 1/2" PIPE SIZE	800	LF	2.30	1,840	1.80	1,440	3,280
1 1/4" PIPE SIZE	960	LF	2.30	2,208	1.80	1,728	3,936
1" PIPE SIZE	720	LF	2.30	1,656	1.80	1,296	2,952
3/4" PIPE SIZE	400	LF	2.15	860	1.65	660	1,520
1/2" PIPE SIZE	320	LF	2.15	688	1.65	528	1,216
<b>Total:</b>				<b>30,868</b>		<b>23,984</b>	<b>54,852</b>
<b>GRAND TOTAL</b>				<b>1,133,238</b>		<b>977,733</b>	<b>\$ 2,114,984</b>

Energy Consumption for Conventional System

HOUR	January		February		March		April	
	MBH	TONS	MBH	TONS	MBH	TONS	MBH	TONS
0.0	2036	170	1764	147	1334	111	619	52
1.0	2095	175	1820	152	1416	118	578	48
2.0	2162	180	1886	157	1479	123	548	46
3.0	2240	187	1951	163	1544	129	529	44
4.0	2327	194	2036	170	1613	134	514	43
5.0	2413	201	2112	176	1676	140	506	42
6.0	7435	620	6243	520	8190	682	14973	1248
7.0	9527	794	8015	668	10843	904	19949	1662
8.0	9809	817	8426	702	11561	963	20797	1733
9.0	10288	857	8970	747	12388	1032	22056	1838
10.0	10874	906	9568	797	13395	1116	23483	1957
11.0	11432	953	10229	852	14418	1202	24823	2069
12.0	11995	1000	10846	904	15252	1271	25899	2158
13.0	12507	1042	11241	937	15850	1321	27149	2262
14.0	12842	1070	11614	968	16246	1354	27770	2314
15.0	12853	1071	11702	975	16293	1358	27631	2303
16.0	12651	1054	11511	959	15748	1312	27297	2275
17.0	12417	1035	11138	928	14867	1239	26522	2210
18.0	1769	147	1427	119	897	75	838	70
19.0	1838	153	1476	123	970	81	829	69
20.0	1888	157	1518	127	1027	86	774	65
21.0	1914	159	1577	131	1093	91	735	61
22.0	1948	162	1620	135	1165	97	685	57
23.0	1987	166	1700	142	1238	103	660	55
	159246	13271	140391	11699	180502	15042	296163	24680

HOUR	May		June		July		August	
	MBH	TONS	MBH	TONS	MBH	TONS	MBH	TONS
0.0	929	77	1070.6	89	2118.6	177	2004.4	167
1.0	853	71	939.6	78	1929.3	161	1835.5	153
2.0	798	66	875	73	1727.6	144	1664.2	139
3.0	721	60	797.4	66	1519.7	127	1509.3	126
4.0	672	56	756.3	63	1329.2	111	1373.8	114
5.0	660	55	815.2	68	1416.5	118	1292.4	108
6.0	23607	1967	34631.2	2886	46056.8	3838	45959.3	3830
7.0	30303	2525	44042.7	3670	56899.9	4742	55929.8	4661
8.0	31176	2598	45632.5	3803	58215.7	4851	57238.4	4770
9.0	32075	2673	47699.5	3975	59584.2	4965	58408.7	4867
10.0	33216	2768	49783.9	4149	61015.9	5085	59614.1	4968
11.0	34437	2870	51050.9	4254	62266.9	5189	60964.7	5080
12.0	35555	2963	52162.3	4347	63518.8	5293	62459.4	5205
13.0	36786	3065	53902.5	4492	64589.3	5382	63748.4	5312
14.0	37252	3104	54738	4562	65221	5435	64022.4	5335
15.0	36854	3071	54193.6	4516	65407.5	5451	63382.8	5282
16.0	36219	3018	52790.7	4399	64905.1	5409	62019.6	5168
17.0	35114	2926	50930.1	4244	63473.4	5289	59823.5	4985
18.0	1413	118	2053.8	171	3130.1	261	3076.6	256
19.0	1345	112	1925.4	160	3027.3	252	3010.6	251
20.0	1256	105	1753.6	146	2856.9	238	2808.7	234
21.0	1174	98	1578.3	132	2678	223	2613.8	218
22.0	1082	90	1417.1	118	2500.4	208	2420.6	202
23.0	998	83	1291.3	108	2332	194	2251.4	188
	414495	34541	606831.5	50569	757720.1	63143	739432.4	61619



HOUR	September		October		November		December	
	MBH	TONS	MBH	TONS	MBH	TONS	MBH	TONS
0.0	1244.9	104	734	61	823.2	69	1367.6	114
1.0	1125	94	668	56	865	72	1445.1	120
2.0	1040.5	87	591	49	906.9	76	1491	124
3.0	974.2	81	566	47	934.3	78	1554.1	130
4.0	891.8	74	535	45	956.8	80	1645	137
5.0	800	67	513	43	990.8	83	1743.6	145
6.0	30234.8	2520	19978	1665	11180.6	932	7573.7	631
7.0	38337.5	3195	26715	2226	14244	1187	9815.7	818
8.0	39511.5	3293	28066	2339	14387.5	1199	10107.8	842
9.0	40658.8	3388	29763	2480	14794.8	1233	10696.8	891
10.0	42248.5	3521	31597	2633	15423.4	1285	11403.3	950
11.0	44214.1	3685	33099	2758	16135.4	1345	12083.9	1007
12.0	46200.2	3850	34606	2884	16835.3	1403	12655.3	1055
13.0	47613.3	3968	35987	2999	17503.4	1459	13237	1103
14.0	48675.7	4056	36722	3060	17747.7	1479	13724.5	1144
15.0	48775	4065	36842	3070	17472.5	1456	13785.5	1149
16.0	47515	3960	36175	3015	17269.3	1439	13639.3	1137
17.0	45907.8	3826	34656	2888	17050.1	1421	13420.3	1118
18.0	1632.1	136	1003	84	718.9	60	1105.6	92
19.0	1605.2	134	997	83	751.6	63	1135.2	95
20.0	1501.9	125	949	79	773.8	64	1158.1	97
21.0	1406	117	882	73	793.9	66	1191.4	99
22.0	1304.9	109	829	69	825.4	69	1217.5	101
23.0	1206.8	101	784	65	865.1	72	1240.1	103
	534625.5	44552	393257	32771	200249.7	16687	158437.4	13203

Energy Consumption for Ice Thermal Storage

HOUR	January		February		March		April	
	MBH	TONS	MBH	TONS	MBH	TONS	MBH	TONS
0.0	1833	153	1587	132	1201	100	557	46
1.0	1886	157	1638	137	1274	106	520	43
2.0	1946	162	1697	141	1331	111	493	41
3.0	2016	168	1756	146	1390	116	476	40
4.0	2095	175	1833	153	1451	121	463	39
5.0	2172	181	1901	158	1508	126	456	38
6.0	6692	558	5619	468	7371	614	13476	1123
7.0	8574	714	7214	601	9759	813	17954	1496
8.0	8828	736	7583	632	10405	867	18717	1560
9.0	9260	772	8073	673	11149	929	19850	1654
10.0	9787	816	8611	718	12055	1005	21134	1761
11.0	10289	857	9206	767	12976	1081	22340	1862
12.0	10796	900	9761	813	13727	1144	23309	1942
13.0	11256	938	10117	843	14265	1189	24434	2036
14.0	11557	963	10452	871	14621	1218	24993	2083
15.0	11567	964	10532	878	14664	1222	24868	2072
16.0	11386	949	10360	863	14173	1181	24567	2047
17.0	11175	931	10024	835	13380	1115	23870	1989
18.0	1592	133	1285	107	807	67	754	63
19.0	1654	138	1328	111	873	73	746	62
20.0	1699	142	1367	114	924	77	697	58
21.0	1722	144	1420	118	984	82	662	55
22.0	1753	146	1458	121	1049	87	616	51
23.0	1788	149	1530	127	1114	93	594	50
	143321	11943	126352	10529	162452	13538	266547	22212

HOUR	May		June		July		August	
	MBH	TONS	MBH	TONS	MBH	TONS	MBH	TONS
0.0	836	70	963.54	80	1906.74	159	1803.96	150
1.0	767	64	845.64	70	1736.37	145	1651.95	138
2.0	718	60	787.5	66	1554.84	130	1497.78	125
3.0	649	54	717.66	60	1367.73	114	1358.37	113
4.0	605	50	680.67	57	1196.28	100	1236.42	103
5.0	594	49	733.68	61	1274.85	106	1163.16	97
6.0	21247	1771	31168.08	2597	41451.12	3454	41363.37	3447
7.0	27273	2273	39638.43	3303	51209.91	4267	50336.82	4195
8.0	28058	2338	41069.25	3422	52394.13	4366	51514.56	4293
9.0	28868	2406	42929.55	3577	53625.78	4469	52567.83	4381
10.0	29894	2491	44805.51	3734	54914.31	4576	53652.69	4471
11.0	30993	2583	45945.81	3829	56040.21	4670	54868.23	4572
12.0	32000	2667	46946.07	3912	57166.92	4764	56213.46	4684
13.0	33107	2759	48512.25	4043	58130.37	4844	57373.56	4781
14.0	33527	2794	49264.2	4105	58698.9	4892	57620.16	4802
15.0	33169	2764	48774.24	4065	58866.75	4906	57044.52	4754
16.0	32597	2716	47511.63	3959	58414.59	4868	55817.64	4651
17.0	31602	2634	45837.09	3820	57126.06	4761	53841.15	4487
18.0	1272	106	1848.42	154	2817.09	235	2768.94	231
19.0	1210	101	1732.86	144	2724.57	227	2709.54	226
20.0	1130	94	1578.24	132	2571.21	214	2527.83	211
21.0	1057	88	1420.47	118	2410.2	201	2352.42	196
22.0	974	81	1275.39	106	2250.36	188	2178.54	182
23.0	898	75	1162.17	97	2098.8	175	2026.26	169
	373045	31087	546148.4	45512	681948.1	56829	665489.2	55457

HOUR	September		October		November		December	
	MBH	TONS	MBH	TONS	MBH	TONS	MBH	TONS
0.0	1120.41	93	661	55	740.88	62	1230.84	103
1.0	1012.5	84	601	50	778.5	65	1300.59	108
2.0	936.45	78	532	44	816.21	68	1341.9	112
3.0	876.78	73	510	42	840.87	70	1398.69	117
4.0	802.62	67	482	40	861.12	72	1480.5	123
5.0	720	60	461	38	891.72	74	1569.24	131
6.0	27211.32	2268	17980	1498	10062.54	839	6816.33	568
7.0	34503.75	2875	24044	2004	12819.6	1068	8834.13	736
8.0	35560.35	2963	25260	2105	12948.75	1079	9097.02	758
9.0	36592.92	3049	26786	2232	13315.32	1110	9627.12	802
10.0	38023.65	3169	28437	2370	13881.06	1157	10262.97	855
11.0	39792.69	3316	29789	2482	14521.86	1210	10875.51	906
12.0	41580.18	3465	31145	2595	15151.77	1263	11389.77	949
13.0	42851.97	3571	32388	2699	15753.06	1313	11913.3	993
14.0	43808.13	3651	33050	2754	15972.93	1331	12352.05	1029
15.0	43897.5	3658	33158	2763	15725.25	1310	12406.95	1034
16.0	42763.5	3564	32558	2713	15542.37	1295	12275.37	1023
17.0	41317.02	3443	31191	2599	15345.09	1279	12078.27	1007
18.0	1468.89	122	902	75	647.01	54	995.04	83
19.0	1444.68	120	897	75	676.44	56	1021.68	85
20.0	1351.71	113	854	71	696.42	58	1042.29	87
21.0	1265.4	105	794	66	714.51	60	1072.26	89
22.0	1174.41	98	746	62	742.86	62	1095.75	91
23.0	1086.12	91	705	59	778.59	65	1116.09	93
	481163	40097	353931	29494	180224.7	15019	142593.7	11883

Detail Operating Cost

	Peak kW			Demand Cost (kW)		
	Conventional	Full	Partial	Conventional	Full	Partial
JAN	88.6	0	0	1077.78	0.00	0.00
FEB	107.8	0	0	1311.44	0.00	0.00
MAR	150.8	0	0	1835.24	0.00	0.00
APR	181.8	0	250	2212.02	0.00	3041.53
MAY	222.0	0	264	2701.74	0.00	3212.88
JUN	241.4	0	264	2938.32	0.00	3212.88
JUL	255.6	0	264	3110.65	0.00	3212.88
AUG	254.0	0	264	3091.18	0.00	3212.88
SEP	231.9	0	264	2822.47	0.00	3212.88
OCT	196.2	0	264	2388.24	0.00	3212.88
NOV	152.1	0	0	1850.81	0.00	0.00
DEC	105.7	0	0	1286.13	0.00	0.00
<b>Total</b>	<b>2188</b>	<b>0</b>	<b>1833.92</b>	<b>26626.01</b>	<b>0.00</b>	<b>22318.81</b>

	Operating Cost (kWh)			Total Operating Cost		
	Conventional	Full	Partial	Conventional	Full	Partial
JAN	1701.84	2294.94	1999.94	2779.62	2294.94	1999.94
FEB	1504.67	1902.79	1602.79	2816.11	1902.79	1602.79
MAR	1965.35	2060.73	2060.73	3800.59	2060.73	2060.73
APR	3264.50	3781.20	2709.54	5476.52	3781.20	5751.07
MAY	4551.58	4951.58	3413.69	7253.32	4951.58	6626.57
JUN	6670.54	7227.99	4802.79	9608.86	7227.99	8015.67
JUL	8294.05	8850.64	6884.06	11404.70	8850.64	10096.94
AUG	8089.98	8741.85	5662.99	11181.16	8741.85	8875.87
SEP	5161.97	6803.64	3768.24	7984.44	6803.64	6981.12
OCT	4337.61	4489.68	3079.70	6725.85	4489.68	6292.58
NOV	1882.83	2886.18	2286.18	3733.64	2886.18	2286.18
DEC	1715.29	1808.83	1808.83	3001.42	1808.83	1808.83
<b>Total</b>	<b>49140.21</b>	<b>55800.05</b>	<b>40079.48</b>	<b>75766.22</b>	<b>55800.05</b>	<b>62398.29</b>

Life Cycle Cost

Date	Electricity Escalation 4% Inflation	Conventional	Partial Storage	Full Storage
2003	0.95	71977.91	59278.37	53010.05
2004	0.95	71977.91	59278.37	53010.05
2005	0.95	71977.91	59278.37	53010.05
2006	0.95	71977.91	59278.37	53010.05
2007	0.95	71977.91	59278.37	53010.05
2008	0.92	69704.92	57406.42	51336.05
2009	0.92	69704.92	57406.42	51336.05
2010	0.92	69704.92	57406.42	51336.05
2011	0.93	70462.59	58030.41	51894.05
2012	0.96	72735.57	59902.35	53568.05
2013	1.02	77281.55	63646.25	56916.05
2014	1.06	80312.20	66142.18	59148.05
2015	1.09	82585.18	68014.13	60822.05
2016	1.14	86373.49	71134.05	63612.06
2017	1.2	90919.47	74877.94	66960.06
2018	1.26	95465.44	78621.84	70308.06
2019	1.33	100769.08	82989.72	74214.07
2020	1.37	103799.73	85485.65	76446.07
2021	1.44	109103.36	89853.53	80352.07
2022	1.51	114407.00	94221.41	84258.08
2023	1.58	119710.63	98589.29	88164.08
2024	1.65	125014.27	102957.17	92070.08
2025	1.73	131075.57	107949.04	96534.09
2026	1.81	137136.86	112940.90	100998.09
2027	1.89	143198.16	117932.76	105462.09
2028	1.96	148501.80	122300.64	109368.10
		2533622.49	2086598.70	1865953.67