

TRACE® 700 Economic Summary

By mkk

Project Information

Weather file Billings, Montana
 Project Name Greybull Elementary
 Location Greybull, Wyoming
 Building Owner BHCSD #1
 User KJE
 Company MKK Consulting Engineers
 Comments

Alternative 1 - - Base Assumption ashrae 90-1
 Alternative 2 - - Envelope Upgrade & Lighting Control
 Alternative 3 - - Heat Pump System Base Envelope
 Alternative 4 - - Heat Pump / Upgrade Envelope / Lighting

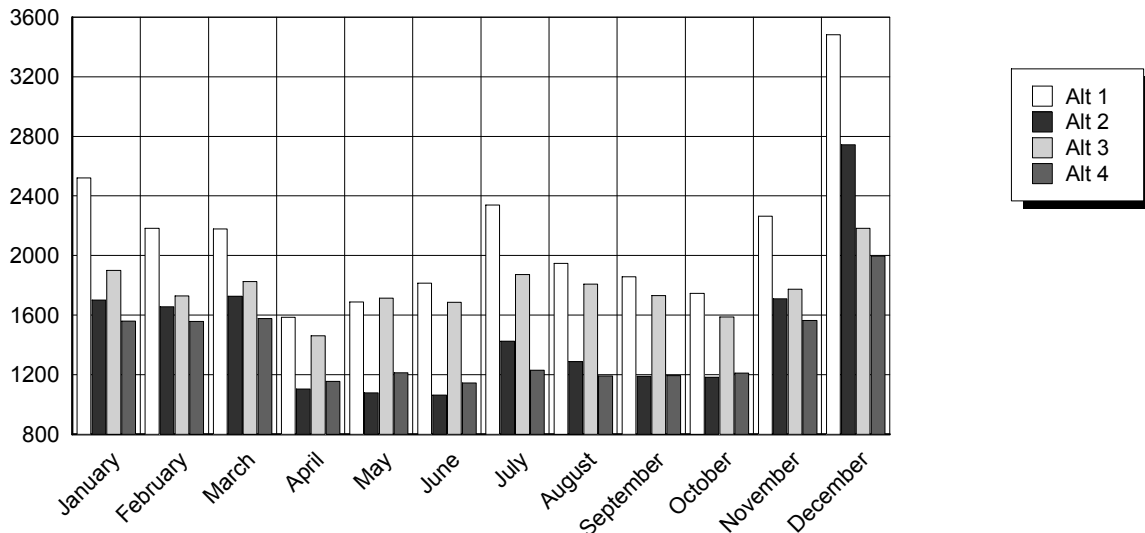
Economic Summary

Alternative Number	Installed Cost	First Year Util. Cost	Final Year Util. Cost	First Year Maint. Cost	Final Year Maint. Cost	Life Cycle Cost
1	2,000,000.00	25,606.41	25,606.41	35,000.00	50,988.39	2,763,293.79
2	2,020,000.00	17,866.71	17,866.71	35,000.00	50,988.39	2,694,520.06
3	2,065,000.00	21,270.56	21,270.56	35,000.00	50,988.39	2,778,561.94
4	2,085,000.00	16,596.21	16,596.21	35,000.00	50,988.39	2,744,947.43

Economic Comparison of the Alternatives

Alt. - Alt.	First Cost Difference	Simple Payback	Net Present Value	Life Cycle Payback	Internal Rate of Return
2 - 1	20,000.00	2.6 yrs	68,773.73	2.9 yrs	38.6 %
3 - 1	65,000.00	15.0 yrs	-15,268.15	Does not pay back	2.9 %
4 - 1	85,000.00	9.4 yrs	18,346.36	14.3 yrs	8.5 %
3 - 2	45,000.00	Does not pay back	-84,041.88	Does not pay back	Does not pay back
4 - 2	65,000.00	51.2 yrs	-50,427.37	Does not pay back	Does not pay back
4 - 3	20,000.00	4.3 yrs	33,614.51	5.1 yrs	23.0 %

Monthly Utility Costs



Equipment Energy Consumption by Alternative

	Elect Cons. (kWh)	Gas Cons. (kBtu)	Percent of Total Energy	Total Building Energy (kBtu/yr)	Total Source Energy* (kBtu/yr)
Alternative: 1 - Base Assumption ashrae 90-1					
Primary heating		924,594	55.4%	924,594	973,256
Cooling Compressor	23,561		4.8%	80,413	241,264
Tower/Cond Fans	3,644		0.8%	12,437	37,314
Other Clg Accessories	274		0.1%	935	2,806
Supply Fans	72,126		14.8%	246,167	738,575
Lighting	91,656		18.8%	312,822	938,559
Receptacles	18,963	25,853	5.4%	90,574	221,395
Totals**	210,224	950,447	100.0%	1,667,942	3,153,170
Alternative: 2 - Envelope Upgrade & Lighting Control					
Primary heating		736,747	57.1%	736,747	775,523
Cooling Compressor	14,984		4.0%	51,141	153,438
Tower/Cond Fans	2,160		0.6%	7,372	22,120
Other Clg Accessories	247		0.1%	842	2,525
Supply Fans	59,775		15.8%	204,013	612,100
Lighting	58,893		15.6%	201,003	603,068
Receptacles	18,846	25,853	7.0%	90,174	220,197
Totals**	154,905	762,600	100.0%	1,291,292	2,388,970
Alternative: 3 - Heat Pump System Base Envelope					
Primary heating		402,945	40.5%	402,945	424,152
Cooling Compressor	13,000		4.5%	44,370	133,125
Other Clg Accessories	36		0.0%	124	373
Supply Fans	39,893		13.7%	136,153	408,501
Lighting	91,656		31.5%	312,822	938,559
Receptacles	21,186	25,853	9.9%	98,161	244,157
Totals**	165,771	428,798	100.0%	994,575	2,148,868
Alternative: 4 - Heat Pump / Upgrade Envelope / Lighting					
Primary heating		500,131	53.2%	500,131	526,454
Cooling Compressor	10,095		3.7%	34,454	103,372
Other Clg Accessories	50		0.0%	171	514
Supply Fans	35,012		12.7%	119,495	358,521
Lighting	57,043		20.7%	194,686	584,118
Receptacles	18,963	25,853	9.6%	90,574	221,395
Totals**	121,162	525,985	100.0%	939,512	1,794,374

* Note: Resource Utilization factors are included in the Total Source Energy value.