

## LIFE CYCLE COST ANALYSIS, CRITERIA AND DATA SHEETS

**DOCUMENT NUMBER:** 15000

**APPLICATION:** ELEMENTARY, MIDDLE AND HIGH SCHOOL

### DATE OF ISSUE:

**10-26-11** - **Minor revisions to Data Sheets**  
**04-08-10** - **Allowed use of screw chillers; revised Annual Fuel Cost Table**  
05-01-08 - Standardized systems and performance data.  
06-10-04 - Revised Life Cycle Cost Data Sheet 4  
05-16-03 - revised  
11-26-02 - first issued

### NOTES:

The architect/engineer's selection of schemes to evaluate shall be determined with the prior approval of the General Manager of Construction, the General Manager of Maintenance, and the Project Coordinator.

The architect/engineer is required to submit the Life Cycle Cost Analysis (LCCA) in accordance with SDHC standard document 00200 Submittal Summary. The attached criteria and data sheets are to be used in compiling the LCCA.

### ATTACHMENTS:

Life Cycle Criteria (04-08-10)  
Data Sheets (10-26-11)

**LIFE CYCLE CRITERIA**  
**04-08-10**

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- A. Refer to page 7 for system illustrations. [Unit costs per square foot to be announced at a later date.](#)
- B. Acceptable HVAC systems for new and existing High Schools, Middle Schools and Elementary Schools for consideration are as follows:
1. Water cooled system (cooling tower) with central station Air Handlers with VAV boxes containing electric heat.
  2. Water cooled system (cooling tower) with dedicated outside air Air Handlers with individual classroom floor mounted Fan Coil Units with electric heat.
  3. Air cooled system (outside chiller) with central station Air Handlers with VAV boxes containing electric heat.
  4. Air cooled system (outside chiller) with dedicated outside air Air Handlers with individual classroom floor mounted Fan Coil Units with electric heat.
  5. Air cooled split systems with dedicated outside air Air Handlers and with central station Air Handlers with VAV boxes containing electric heat.
  6. Air cooled split systems with individual classroom floor mounted Fan Coil Units with electric heat.
  7. Thermal Storage with an air cooled system (outside chiller) and central station Air Handlers with VAV boxes containing electric heat.
  8. Thermal Storage with an air cooled system (outside chiller) and dedicated outside air Air Handlers with individual classroom floor mounted Fan Coil Units with electric heat.

**C. Criteria**

1. The equipment energy consumption values (kw/ ton, EER or COP) used in the LCCA, are to be the same kw/ ton, EER or COP written in the Florida Energy code.
2. Use the following factors for estimated service life of equipment:

Equipment Item	Years:	Inside	Outside
Reciprocating Chillers		22	20
<a href="#">Screw Chillers</a>		<a href="#">25</a>	<a href="#">23</a>
Centrifugal Chillers		25	23
Scroll Chillers		25	23
Rooftop ac units		n/a	10
Air Cooled Split Systems		n/a	10
Pumps		20	15
Cooling Towers		n/a	20
Controls (BAS)		15	n/a
VAV Boxes		20	n/a
Chilled Water Fan Coil Units		20	n/a
Chilled Water Air Handler		20	n/a

**SCHOOL NAME:** \_\_\_\_\_

**SYSTEM DESCRIPTION**

SCHEME A	
SCHEME B	
SCHEME C	
SCHEME D	
SCHEME E	

**ASSUMED ENERGY UNIT COSTS**

FUEL TYPE	UNITS	BTU/UNIT	UNIT COST
Electric	KWH	3,413	\$ 0.069
Electric Demand	KW	3,413	\$11.310
Gas	Therm	100,000	\$ 1.150
Water	1,000 Gal.	n/a	\$ 3.060

**ANNUAL OPERATING COSTS**

SCHEME	MAINTENANCE SUPPLIES	MAINTENANCE LABOR	OPERATING LABOR	WATER USAGE (COOLING TOWERS)	ELECTRICAL CONSUMPTION
SCHEME A					
SCHEME B					
SCHEME C					
SCHEME D					
SCHEME E					

**HVAC SYSTEM INSTALLED COST**

(GROSS FROM DATA SHEET 4)

SCHEME A	
SCHEME B	
SCHEME C	
SCHEME D	
SCHEME E	

ENGINEER: \_\_\_\_\_

DATE: \_\_\_\_\_



SUMMARY

PRESENT WORTH IN TODAY'S DOLLARS

INITIAL COST	= HVAC SYSTEM INSTALLED, GROSS COST	
SUPPLIES	= ANNUAL MAINTENANCE SUPPLIES X 11.65,	(i = 7%)
LABOR	= ANNUAL TOTAL LABOR X 11.65,	(i = 7%)
MAJOR REPAIR	= TOTAL MAJOR REPAIR COSTS	
DOMESTIC WATER	= ANNUAL WATER COST X 11.65,	(i = 7%)
ENERGY COST	= ANNUAL ENERGY COST X 12.78,	(i = 6%)

FINANCIAL SUMMARY (Total owning and operating cost over the 25 year life of the school)

	SCHEME A	SCHEME B	SCHEME C	SCHEME D	SCHEME E
INITIAL, GROSS COST					
SUPPLIES					
LABOR					
MAJOR REPAIRS					
DOMESTIC WTR COST					
ENERGY COST					
SHIFTED TON REBATE					
TOTAL O&O COST					
RANKING OF ALL SCHEMES					

ENGINEER

\_\_\_\_\_

DATE:

\_\_\_\_\_

School's AC floor area, \_\_\_\_\_ square feet

Block load tonnage, \_\_\_\_\_ tons

SUPPORT DATA

Scheme A                      Scheme B                      Scheme C                      Scheme D                      Scheme E

**1. Estimated, total installed mechanical cost of the HVAC system**

Sch A \$\_\_\_\_\_, Sch B \$\_\_\_\_\_, Sch C \$\_\_\_\_\_, Sch D \$\_\_\_\_\_, Sch E \$\_\_\_\_\_

**2. Associated, estimated construction costs**

**2.1 Electrical service**

Sch A \$\_\_\_\_\_, Sch B \$\_\_\_\_\_, Sch C \$\_\_\_\_\_, Sch D \$\_\_\_\_\_, Sch E \$\_\_\_\_\_

**2.2 Building floor area**

Sch A \$\_\_\_\_\_, Sch B \$\_\_\_\_\_, Sch C \$\_\_\_\_\_, Sch D \$\_\_\_\_\_, Sch E \$\_\_\_\_\_

**2.3 Fenced area outside including property costs**

Sch A \$\_\_\_\_\_, Sch B \$\_\_\_\_\_, Sch C \$\_\_\_\_\_, Sch D \$\_\_\_\_\_, Sch E \$\_\_\_\_\_

**2.4 Structural support costs**

Sch A \$\_\_\_\_\_, Sch B \$\_\_\_\_\_, Sch C \$\_\_\_\_\_, Sch D \$\_\_\_\_\_, Sch E \$\_\_\_\_\_

**2.5 Enhanced Hurricane Protection Area (EHPA) costs**

Sch A \$\_\_\_\_\_, Sch B \$\_\_\_\_\_, Sch C \$\_\_\_\_\_, Sch D \$\_\_\_\_\_, Sch E \$\_\_\_\_\_

**2.6 Plumbing/ Domestic water service**

Sch A \$\_\_\_\_\_, Sch B \$\_\_\_\_\_, Sch C \$\_\_\_\_\_, Sch D \$\_\_\_\_\_, Sch E \$\_\_\_\_\_

**2.7 Test and Balance Services**

Sch A \$\_\_\_\_\_, Sch B \$\_\_\_\_\_, Sch C \$\_\_\_\_\_, Sch D \$\_\_\_\_\_, Sch E \$\_\_\_\_\_

**2.8 Reduced building height and cost based on number of block courses not needed.**

Sch A \$\_\_\_\_\_, Sch B \$\_\_\_\_\_, Sch C \$\_\_\_\_\_, Sch D \$\_\_\_\_\_, Sch E \$\_\_\_\_\_

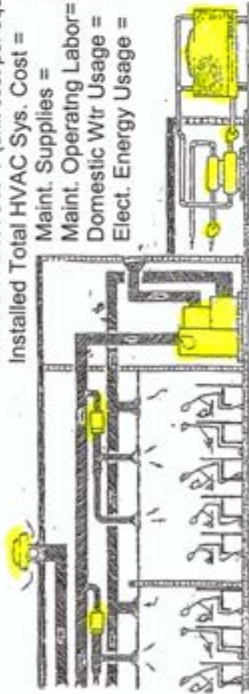
**2.9 Other related unique costs:**

Sch A \$\_\_\_\_\_, Sch B \$\_\_\_\_\_, Sch C \$\_\_\_\_\_, Sch D \$\_\_\_\_\_, Sch E \$\_\_\_\_\_

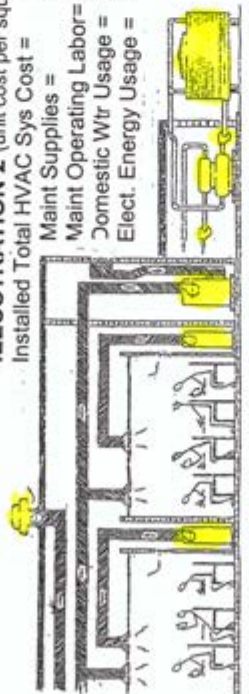
**3. Total, estimated gross, installed cost to install the HVAC system. (These numbers are to be entered into the table titled HVAC SYSTEM INSTALLED COSTS on Sheet 1 of the LCCA form.)**

Sch A \$\_\_\_\_\_, Sch B \$\_\_\_\_\_, Sch C \$\_\_\_\_\_, Sch D \$\_\_\_\_\_, Sch E \$\_\_\_\_\_

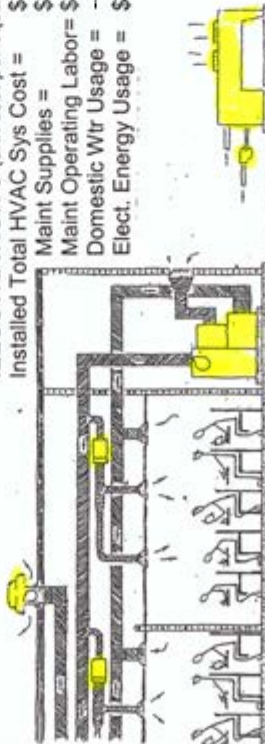
**ILLUSTRATION 1** (unit cost per square foot)  
Installed Total HVAC Sys. Cost = \$ **TBA**  
Maint. Supplies = \$ ..  
Maint. Operating Labor = \$ ..  
Domestic Wtr Usage = \$ ..  
Elect. Energy Usage = \$ ..



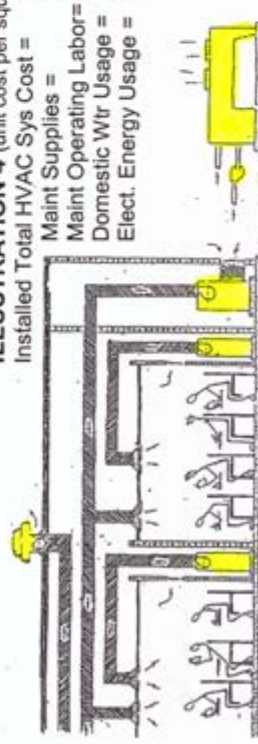
**ILLUSTRATION 2** (unit cost per square foot)  
Installed Total HVAC Sys Cost = \$ **TBA**  
Maint Supplies = \$ ..  
Maint Operating Labor = \$ ..  
Domestic Wtr Usage = \$ ..  
Elect. Energy Usage = \$ ..



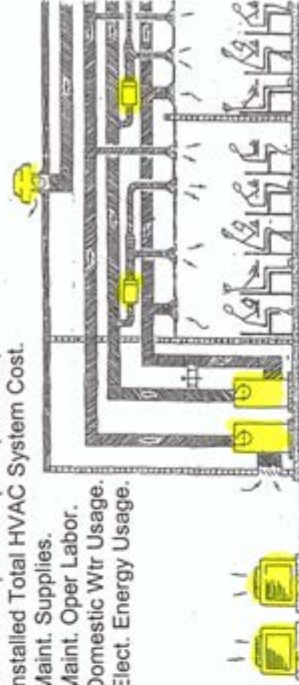
**ILLUSTRATION 3** (unit cost per square foot)  
Installed Total HVAC Sys Cost = \$ **TBA**  
Maint Supplies = \$ ..  
Maint Operating Labor = \$ ..  
Domestic Wtr Usage = \$ -- n/a --  
Elect. Energy Usage = \$ ..



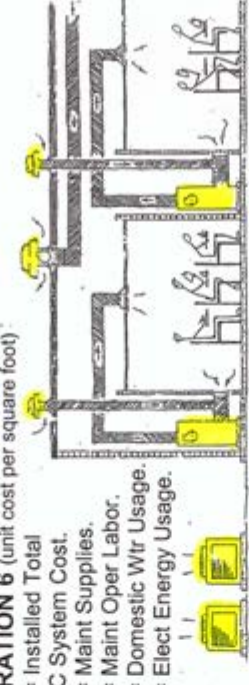
**ILLUSTRATION 4** (unit cost per square foot)  
Installed Total HVAC Sys Cost = \$ **TBA**  
Maint Supplies = \$ ..  
Maint Operating Labor = \$ ..  
Domestic Wtr Usage = \$ -- n/a --  
Elect. Energy Usage = \$ ..



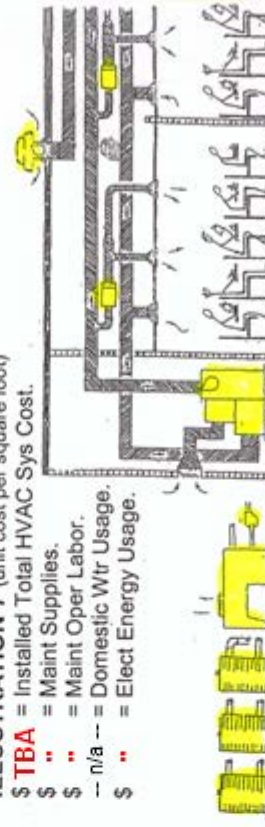
**ILLUSTRATION 5** (unit cost per square foot)  
Installed Total HVAC System Cost. = \$ **TBA**  
= Maint. Supplies. = \$ ..  
= Maint. Oper Labor. = \$ ..  
= Domestic Wtr Usage. = \$ -- n/a --  
= Elect. Energy Usage. = \$ ..



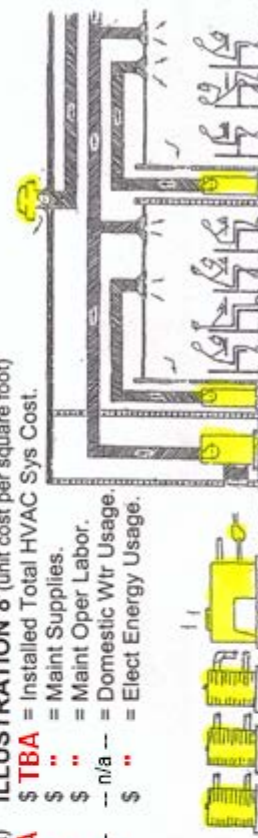
**ILLUSTRATION 6** (unit cost per square foot):  
Installed Total HVAC System Cost. = \$ **TBA**  
= Maint Supplies. = \$ ..  
= Maint Oper Labor. = \$ ..  
= Domestic Wtr Usage. = \$ -- n/a --  
= Elect Energy Usage. = \$ ..



**ILLUSTRATION 7** (unit cost per square foot)  
Installed Total HVAC Sys Cost. = \$ **TBA**  
= Maint Supplies. = \$ ..  
= Maint Oper Labor. = \$ ..  
= Domestic Wtr Usage. = \$ -- n/a --  
= Elect Energy Usage. = \$ ..



**ILLUSTRATION 8** (unit cost per square foot)  
Installed Total HVAC Sys Cost. = \$ **TBA**  
= Maint Supplies. = \$ ..  
= Maint Oper Labor. = \$ ..  
= Domestic Wtr Usage. = \$ -- n/a --  
= Elect Energy Usage. = \$ ..



ENGINEERING ECONOMIC ANALYSIS

I = 7.00 %

N	(P/F)	(P/A)	(P/G)	(F/P)	(F/A)	(A/P)	(A/F)	(A/G)	N
1	.9346	0.9346	-0.0000	1.0700	1.0000	1.0700	1.0000	-0.0000	1
2	.8734	1.8080	0.8734	1.1449	2.0700	0.5531	0.4831	0.4831	2
3	.8163	2.6243	2.5060	1.2250	3.2149	0.3811	0.3111	0.9549	3
4	.7629	3.3872	4.7947	1.3108	4.4399	0.2952	0.2252	1.4155	4
5	.7130	4.1002	7.6467	1.4026	5.7507	0.2439	0.1739	1.8650	5
6	.6663	4.7665	10.9784	1.5007	7.1533	0.2098	0.1398	2.3032	6
7	.6227	5.3893	14.7149	1.6058	8.6540	0.1856	0.1156	2.7304	7
8	.5820	5.9713	18.7889	1.7182	10.2598	0.1675	0.0975	3.1465	8
9	.5439	6.5152	23.1404	1.8385	11.9780	0.1535	0.0835	3.5517	9
10	.5083	7.0236	27.7156	1.9672	13.8164	0.1424	0.0724	3.9461	10
11	.4751	7.4987	32.4665	2.1049	15.7836	0.1334	0.0634	4.3296	11
12	.4440	7.9427	37.3506	2.2522	17.8885	0.1259	0.0559	4.7025	12
13	.4150	8.3577	42.3302	2.4098	20.1406	0.1197	0.0497	5.0648	13
14	.3878	8.7455	47.3718	2.5785	22.5505	0.1143	0.0443	5.4167	14
15	.3624	9.1079	52.4461	2.7590	25.1290	0.1098	0.0398	5.7583	15
16	.3387	9.4466	57.5271	2.9522	27.8881	0.1059	0.0359	6.0897	16
17	.3166	9.7632	62.5923	3.1588	30.8402	0.1024	0.0324	6.4110	17
18	.2959	10.0591	67.6219	3.3799	33.9990	0.0994	0.0294	6.7225	18
19	.2765	10.3356	72.5991	3.6165	37.3790	0.0968	0.0268	7.0242	19
20	.2584	10.5940	77.5091	3.8697	40.9955	0.0944	0.0244	7.3163	20
21	.2415	10.8355	82.3393	4.1406	44.8652	0.0923	0.0223	7.5990	21
22	.2257	11.0612	87.0793	4.4304	49.0057	0.0904	0.0204	7.8725	22
23	.2109	11.2722	91.7201	4.7405	53.4361	0.0887	0.0187	8.1369	23
24	.1971	11.4693	96.2545	5.0724	58.1767	0.0872	0.0172	8.3923	24
25	.1842	11.6536	100.6765	5.4274	63.2490	0.0858	0.0158	8.6391	25

I = 4.00 %

N	(P/F)	(P/A)	(P/G)	(F/P)	(F/A)	(A/P)	(A/F)	(A/G)	N
1	.9615	0.9615	-0.0000	1.0400	1.0000	1.0400	1.0000	-0.0000	1
2	.9246	1.8861	0.9246	1.0816	2.0400	0.5302	0.4902	0.4902	2
3	.8890	2.7751	2.7025	1.1249	3.1216	0.3603	0.3203	0.9739	3
4	.8548	3.6299	5.2670	1.1699	4.2465	0.2755	0.2355	1.4510	4
5	.8219	4.4518	8.5547	1.2167	5.4163	0.2246	0.1846	1.9216	5
6	.7903	5.2421	12.5062	1.2653	6.6330	0.1908	0.1508	2.3857	6
7	.7599	6.0021	17.0657	1.3159	7.8983	0.1666	0.1266	2.8433	7
8	.7307	6.7327	22.1806	1.3686	9.2142	0.1485	0.1085	3.2944	8
9	.7026	7.4353	27.8013	1.4233	10.5828	0.1345	0.0945	3.7391	9
10	.6756	8.1109	33.8814	1.4802	12.0061	0.1233	0.0833	4.1773	10
11	.6496	8.7605	40.3772	1.5395	13.4864	0.1141	0.0741	4.6090	11
12	.6246	9.3851	47.2477	1.6010	15.0258	0.1066	0.0666	5.0343	12
13	.6006	9.9856	54.4546	1.6651	16.6288	0.1001	0.0601	5.4533	13
14	.5775	10.5631	61.9618	1.7317	18.2919	0.0947	0.0547	5.8659	14
15	.5553	11.1184	69.7355	1.8009	20.0236	0.0899	0.0499	6.2721	15
16	.5339	11.6523	77.7441	1.8730	21.8245	0.0858	0.0458	6.6720	16
17	.5134	12.1657	85.9581	1.9479	23.6975	0.0822	0.0422	7.0656	17
18	.4936	12.6593	94.3498	2.0258	25.6454	0.0790	0.0390	7.4530	18
19	.4746	13.1339	102.8933	2.1068	27.6712	0.0761	0.0361	7.8342	19
20	.4564	13.5903	111.5647	2.1911	29.7781	0.0736	0.0336	8.2091	20
21	.4388	14.0292	120.3414	2.2788	31.9692	0.0713	0.0313	8.5779	21
22	.4220	14.4511	129.2024	2.3699	34.2480	0.0692	0.0292	8.9407	22
23	.4057	14.8568	138.1284	2.4647	36.6179	0.0673	0.0273	9.2973	23
24	.3901	15.2470	147.1012	2.5633	39.0826	0.0656	0.0256	9.6479	24
25	.3751	15.6221	156.1040	2.6658	41.6459	0.0640	0.0240	9.9925	25