

12.0 CONCLUSIONS AND RECOMMENDATIONS

The redesign of the Milton Hershey School New Supply Center's mechanical system met all of its design criteria. The redesign, from a mechanical systems standpoint, has a higher initial cost than the existing system, however, the annual operating cost for the redesign is lower. When looked at over 20 years, the redesign saves over \$376,000 and pays itself back in less than 2 years.

Most importantly, the redesign kept to the design goal of building system integration. Mechanically, the redesign takes the hot water, chilled water, and walk-in-freezer condenser water, and domestic hot water systems and integrates them through energy recovery techniques and direct fired absorption chiller-heaters. The DOAS with water source heat pumps configuration also aids in building system integration scheme. Using this method of space conditioning integrates the new water source loop with the condenser water heat recovery system.

The redesigned mechanical system also affects other buildings systems, and further integrates them in the overall project. Replacing the VAV air handling units with dedicated outdoor air units saves on first cost, but also paves the way for structural and construction work. Relocating the remaining 6 air handling units from the steel and concrete elevated mezzanine room to the roof requires structural system adjustments, but also saves in first cost. Not having to construct the 11,000 square foot mezzanine floor saves on first cost, and that completely covers the additional cost of upgrading the roof structural system. When analyzed, the relocation of the air handling units saves approximately \$150,000 of initial cost.

The redesigned mechanical system included replacing 10 electric driven VAV supply fans with 2 dedicated outdoor air system fans. Also, the electric driven vapor compression chillers are replaced with natural gas fired absorption chillers. This affects the power requirements at the supply center and the electrical breadth analyzes the effected distribution panels. Small cost savings are found in the electrical wiring work as well.

Table 12-1 indicates the overall project initial cost and 20 year life cycle cost when the structural and construction breadth topics are merged with the mechanical work. The electrical breadth's cost savings are very small relative to the other topics and therefore ignored in this comparison.

Table 12-1 Total Project Cost Analysis

	EXISTING SYSTEM	REDESIGN SYSTEM
Mechanical	\$622,840	\$682,885
Structural/Construction	\$154,458	\$288
Total First Cost	\$777,298	\$683,173
20 Year Life Cycle Cost	\$3,043,808	\$2,512,748
20 Year LCC Difference	+\$531,060	

Table 12-1 illustrates that the overall project redesign saves approximately \$530,000 over a 20 year life cycle. Since the overall project redesign is also less expensive than the existing system, no payback period is required for analysis. Therefore, since savings are found in energy, initial cost, operating cost, and the lowest 20 year life cycle cost is calculated, the total redesign is beneficial for the Milton Hershey School New Supply Center.