

Executive Summary:

The 2009 PACE Roundtable event discussed many issues involving the current construction industry. Two important topics discussed during the event were sustainable construction and efficient project management. Today's owners are looking for a building design that incorporates sustainable features to benefit their building throughout its lifespan and efficient construction methods to deliver projects on-time and on-budget. The following analyses intend to offer ideas on reducing building operating costs through energy savings and efficient construction through prefabricated materials.

The first analysis looks at the implementation of a Solyndra PV system on the existing white TPO roof of both buildings. Solyndra claims that the implementation of their product with a reflective roof will optimize energy production. The study shows that the proposed system will provide a savings of \$38,650 during the first year after installation. When using a 5% cost of energy increase per year it was determined that the system will pay for itself within 22 years of operation. This is within the 25-year warranty period, in fact, by the end of the warranty the owner will save \$402,622.63 in energy costs.

The second analysis involves implementing a unitized curtain wall system in place of the existing architectural precast and punched window façade. This was proposed to shorten the schedule and provide more natural daylight to the interior space. This study showed that the total project schedule would be shortened by 23 days and reduces the general conditions by 1.75%. This translates into a savings of \$106,701.30 for the project. However, it was determined that the curtain wall system would cost 31% higher than the existing system and would more than double the cooling load on the building by solar heat gain through the increased glazing. This would dramatically increase the energy cost placed upon this building because the glazing is one of the largest factors in the cooling load of an office building.

The third analysis incorporated replacing the current all air mechanical system with a more energy efficient chilled beam mechanical system. This analysis only involved the comparison between the distribution equipment and supply material. This analysis showed used the decreased ceiling plenum height to translate into savings for the building. From this analysis it was determined that by implementing this system the owner would save 52.7 CY of concrete, which translates to a \$67,390.13 cost savings on CIP concrete for the structural columns. The owner would also save 5.22% of conditioned air volume in the building to allow for a higher percentage of ventilated air in the building. However, when comparing the duration of installation and initial cost the new system cost approximately 45% more to install and take 54% longer time to complete. Although the proposed system is projected to cost more and take longer to install than the current system typically, chilled beam mechanical systems have around a 23% yearly energy savings compared to an all air system. From these annual savings the average chilled beam system pays for itself within 7-10 years of installation.