2.0 Executive Summary

The purpose of this report is to explore redesign options for the Miller Children's Hospital Pediatric Inpatient Addition, located in Long Beach, CA. The facility has been estimated to have high energy consumption and operation costs due to its function as a hospital facility in a warm climate. The two redesign options explored in this report are combined heat and power and photovoltaic electricity production. The main goals of the redesign are to reduce energy consumption, decrease operation costs, and cut back on emissions while exercising good design practices.

The proposed combined heat and power system proposed uses a 1,075 kW reciprocating engine generator to produce electricity for the building. The engine will operate along the building demand curve and recover exhaust heat that will be used for hot water reheat coils and domestic water throughout the building. The initial cost of the system is approximately $1,840,000 with an overall building operation savings of approximately $320,000 per year. The payback period for the proposed system is less than 6 years. An acoustics analysis was also done to measure the noise levels caused by the engine of various spaces in the Miller Children's Hospital, the Pediatric Inpatient Addition, and outdoors. All noise levels fall within the recommended limits due to the layout of the new cogeneration plant spaces.

Finally, two photovoltaic panel arrays totaling 900 panels were installed on the roof of the Miller Children's Hospital and the Pediatric Inpatient Addition generating 245,631 kWh of electricity and a maximum power output of 140 kW AC. The initial cost of the system is estimated to be $1,482,250. The incentives package, including performance based incentives and state and federal tax breaks, totals $1,192,200. This reduces the initial cost of the photovoltaic system down to $290,000. With an annual electric savings of approximately $46,000 per year, the proposed system will have a payback period of just over 6 years.