

Design of a Dome Utilizing Sustainable Energy Sources

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Abstract: *In recent times, there has been a notable upsurge in the utilization of dome structures, recognized as highly efficient architectural forms. These structures offer optimal space coverage with minimal larger volumes, devoid of obstructive columns, resulting in enhanced efficiency and cost-effectiveness. Domes, particularly for circular spaces, provide lightweight roofing solutions. This study endeavors to present a design for a steel dome that adheres to the principles of the green building code. The Municipality of Sison, driven by the necessity for a versatile facility to accommodate a spectrum of events and activities, past and future, is the focal point of this proposal. The researcher intends to develop a dome design that aptly caters to these multifarious needs. Employing diverse theories within structural engineering, the structural analysis and design were manually computed, employing methods such as the slope deflection technique. The envisioned dome encompasses various facilities, including a basketball court and seating for up to 4,000 attendees. To meet energy requirements, solar power is harnessed, necessitating 138 units of 60-amp solar charge controllers to charge a 12 V 279,600 Wh battery, paired with a 69,900 W solar array. The dome's design underwent evaluation in collaboration with LGU-Sison and other key stakeholders. The estimated budget for the entire project approximates 102.6 million pesos. The structural design aligns with the guidelines stipulated by the National Building Code of the Philippines (NBCP) and the National Structural Code of the Philippines (NSCP). With earthquake-resistant attributes and adherence to energy efficiency standards specified by green building criteria, the design attains a comprehensive blend of safety and sustainability.*

Keywords: cost effective, dome, energy efficiency, sustainable

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