

**PROPOSED DESIGN OF A SIX-STOREY PHYSICAL SCIENCE BUILDING
AT CAVITE STATE UNIVERSITY-MAIN CAMPUS**

Undergraduate Design Project
Submitted to the Faculty of the
College of Engineering and Information Technology
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DEARLIE L. BARSOLASCO
RACHELLE P. DIGON
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ABSTRACT

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The study entitled “Design of a Six- Storey Physical Science Building at Cavite State University, Indang, Cavite.” was conducted at Cavite State University – Main Campus from Januray 2017 to May 2018.

The study aimed to prepare an architectural plan, structural design and electrical and plumbing layouts of a six-storey Physical Science building located at Cavite State University- Main Campus, Indang, Cavite. The study included the design and structural analysis of members such as beams, columns, footings, slabs and stairs. The study also provided a detailed construction cost estimate of the building.

Structural Aided Analysis and Design (STAAD) software and Computer Aided Drafting Device (CADD) were used in analyzing the structural members of the building and accomplishing the architectural and structural details of the building as well as the site development.

After the comprehensive studies and computations, it is concluded that all sections and materials used in the project are safe, efficient and economical. In truss 1, PIPX30 was used at top chord, PIPX40 at bottom chord, and PIPS20 at web members, while in truss 2, PIPS20 was used at top chord, PIPS25 at bottom chord, and PIPS15 at web members. Beam 52 (B1) adopted a section of 300mm x 450mm reinforced with 3-25 mm diameter top bars and 2-25 mm diameter bottom bars at support, and 2-25 mm diameter top bars and 2-25

mm bottom bars at midspan. Beam 36 (B2) obtained a section of 350mm x 500mm with 8-25 mm diameter top bars and 3-25 mm diameter bottom bars at support, and 2-25 mm diameter top bars and 4-20 mm bottom bars at midspan. Beam 118 (B3) adopted a section of 350mm x 500mm reinforced with 5-25 mm diameter top bars and 2-25 mm diameter bottom bars at support, and 2-25 mm diameter top bars and 3-25 mm bottom bars at midspan. Beam 130 (B4) obtained a section of 350 mm x 500 mm with 5-25 mm diameter top bars and 2-25 mm diameter bottom bars at support, and 2-25 mm diameter top bars and 3-25 mm bottom bars at midspan. For interior and exterior column, a 450 mm x 450 mm section was adopted and reinforced by 12-25 mm diameter vertical bars. Slab on Grade was designed using 125 mm thickness, while suspended slab obtained 100 mm thickness, both with 12 mm Ø main bars. Isolated footing was designed with base dimension of 3.50m x 3.50m and 0.475m thickness reinforced with 14-25 mm diameter bars. Cantilever footing was designed with base dimension of 3.0 m x 3.0 m and 0.60m thickness reinforced with 25-25 mm diameter top and bottom bars. Combined footing with base dimension of 5.5 m x 4.1 m and 0.45 m thickness reinforced with 16-25 mm diameter bars at for longitudinal and overhang portion, 6-25 mm diameter bars for transverse section at column 1, and 5-25 mm diameter bars for transverse section at column 2. The estimated total project cost of the six-storey Physical Science building was P 59,463,063.29.

It is recommended to use a structural engineering software integrated with Building Information Modeling (BIM) for a more reliable and faster analysis of structure. Utilization of a high-strength concrete capable of handling stress higher than 3000 psi can be taken into consideration, in line with the usage of a dual resisting frame designed to resist total lateral force.

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