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MARA

ECS358
CIVIL ENGINEERING DESIGN PROJECT
TECHNICAL REPORT

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BUILDING SITE

A layer of hill earth, hardcore, clinker, or ash that has been rammed solid to a thickness of at least 0.305 meters must cover the entire ground surface or building site before any building can be constructed there. This includes filling it with material that has been impregnated with animal or vegetable matter. Any building site needs to be completely cleared of turf and other plant debris before any construction can begin.

VEHICULAR ACCESS TO SITE

Restricted to specific hours to avoid obstructing flow of traffic if found to be necessary.

BUILDING MATERIAL

(1) Any materials used-

(a) in the erection of a building;

(b) in the structural alteration or extension of a building;

(c) in the execution of works or the installation of fittings, being works or fittings to which any provision of these By-laws applies; or

(d) for the backfilling of any excavations on a site in connection with any building or works or fittings to which any provision of these By-laws applies, shall be -

(aa) of a suitable nature and quality in relation to the purposes for and conditions in which they are used;

(bb) adequately mixed or prepared; and

(cc) applied, used or fixed so as to adequately perform the functions for which they are designed.

(2) The use of any material or any method of mixing or preparing materials or of applying, using or fixing materials, which conforms with a Standard Specification or Code of Practice prescribing the quality of material or standards of workmanship shall be deemed to be sufficient compliance with the requirements of paragraph (1) of by-law 53 if the use of the material or method is appropriate for the purpose and conditions in which it is used.

In conclusion, all of the structure's manually calculated designs were completed. The slab's thickness has been set at 150 mm, and it is a two-way slab with one short edge discontinuous. This thickness value was initially assumed to be able to withstand the amount of load that would be applied to it without being affected by shear, deflection, or cracking. This is because all of the checking calculations passed, and the value obtained was higher than expected. The total load is calculated by taking into account the slab's self-weight and the design value of the action. The slab chosen is the critical slab at E-D/7-6. Because the slab was designed for the first floor, the characteristic permanent action, Gk, was limited to the tiles ceramic floor, services, and suspended ceiling, which is 1.45 kN/m2. For characteristic variable action, Qk was determined based on the use of the space that the slab will cover. Because the slab was designed for use as a bedroom, the Qk is in category A, with a value of 1.5 kN/m2. All reinforcement, including the main and secondary bars, has the same diameter and spacing in both directions, which is H10-300 c/c. This slab also has a one-hour fire resistance and is designed to last 50 years.

Next, the beam's load was calculated by taking into account the total load distributed by each slab that was connected to it. The beam was designed to be 7/E-A, with continuous connections in both directions. The beam is a point load with three spans because it is supported by only four columns. The point load is located at 7/B. The point load was calculated using the loads from the secondary beams on the left and right sides of the designed beam. To determine the value, the slabs must be analyzed. The total value of the point load is 38.97 kN, so the span is considered critical. Both square beams at support and T-flange beams at mid span must be designed. The maximum moment and shear are used to determine whether the beam is passed or not, as if the maximum value is passed, the other values will undoubtedly be unaffected. The support beam and the T-flange beam have dimensions of 250 x 300 mm each. After checking, all of the calculated values passed in terms of deflection and cracking.

Aside from that, the column was specifically designed for this project. Columns are structures designed to transfer loads from the building to the foundation before they are released into the ground. The load that the column must carry, including from the roof to the first and ground floors. However, only one column at ground level was designed for this project because it carries the greatest amount of load. The column is designed as 7/E. Because there is no truss landing on the roof beam attached to the column, the distributed load from the roof is limited to the beam's own weight. Meanwhile, for the first and ground floors, the total distribution load is made up of the load from the slab, the self-weight of the beam, and the