MARCHÉ ADONIS,
Dollard des Ormeaux

Structural Framing:

The new Marché Adonis supermarket is a new building incorporating an existing structure. *Th**e structural framing*** is composed partly with a basement and approximately 50% with a slab-on-grade. The existing building is a one storey steel structure, built in the 1970's, using SIPOREX prefabricated feather-light panels.

Receiving & Retail Areas:

The new structure is composed of two sections, one being the receiving and refrigeration area (19m x 25m) and the other the retail section (58m x 40m). The ***receiving area*** is a two storey steel structure with a basement, a structural concrete ground floor and a structural steel roof, with mechanical area penthouse. The open roof is an area spanning 12.5 m over the refrigeration section. It houses roof top units, surrounded by a full floor height screen. In this receiving area there is a freight elevator servicing for the two floors.

The ***retail area*** is composed of two sections, the old stone area with a SIPOREX roof (58m x 18m) and the new retail area (58m x 22m). There is an exposed structural steel framing, having a roof with a 5% slope and cantilever canopies spanning 4m and supported by 5 spans, totalling 52 m. in roof trusses. The interior 52 m span suspended from the roof system, which is supported by the exterior trusses, totals 10m in roof height. A canopy, which is free standing, awning over the existing structure, is partially supported by this roof structure. Both the interior and exterior trusses are fully exposed structures. Part of this structure supports a mezzanine built for offices and the other is partly suspended from the roof structure. At the other end of the 52 m long trusses there is a small cafeteria formed between the two trusses, served by stairs which are suspended by cables from the roof structure. The extension of the 52 m trusses is an exterior two truss free standing structural system. The cantilever part supports a section of the retail area roof, with a continuation of the main roof slope. The sloped roof has a vertical rise of 5 m on one side and 0.5 at the end, overreaching the loading dock area, which spans 38m in length.

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SAFI 3D Steel Analysis:

SAFI *3D Steel* was used to simulate the existing building, the new receiving and loading area and the new retail area. Given the uneven sloped geometry and truss configuration, the roof of the existing building was reinforced to withstand wind and earthquake loading and support lateral loads, emanating from the new structure, with limited locations of cross bracing. In addition, the mezzanine floor and rest area were both integrated in the simulation, including the use of suspended members and cross bracing. The new and existing structures are both on pile supported foundations, thus for the simulation spring supports were used. For the Earthquake analysis, the number of elements used in the program totalled some 10,000 elements in members, Plate elements & surface loads and The Corresponding nodes per loading pattern, using a total of 43 loading patterns in the program. Surface loads were used to provide the various loading cases. The elements were grouped and the steel calculations were used to design the members, meeting the necessary deflection requirements. For the elements that showed over stress, this was done manually, using coloured graphic displays, until the final sizing was achieved. In addition to the above, the deflection requirements of the entire building were also verified by SAFI and results of the total deflection were compared to Code provisions. Calculations considering torsion were verified and compared to Code requirements. The steel roof deck was introduced in the program as a simulated rigid plate with an equivalent thickness for the simulated analysis. An equivalent thickness was used as a means to obtain deflection requirements.

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MARCHÉ ADONIS PROJECT

Category:	Commercial
Client:	Adonis
Project Location:	Dollard des Ormeaux, Montréal, Québec
Description:	Existing & Addition with New Sloped Roof & Canopy Cost of Structure: 1.5M
Engineers in Charge:	Elie Chakieh Hellen Christodoulou
Company:	Le Groupe Geni-E-Tude Inc.
Software:	SAFI 3D STEEL Buildings & calculator
Comments:	Earthquake & Wind analysis. Suspended mezzanines & cafeteria from 80 ft., completely exposed trusses integrated with exterior columns on piles, simulating spring action of supports.

SAFI is graphically illustrative technical software, used for structural analysis, for any type of structure. It is integrative and interchangeable between a finite element analysis and a sophisticated structural analysis. It also has the capability to integrate all types of material of unique construction. The graphic and technical information available is unparalleled.

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