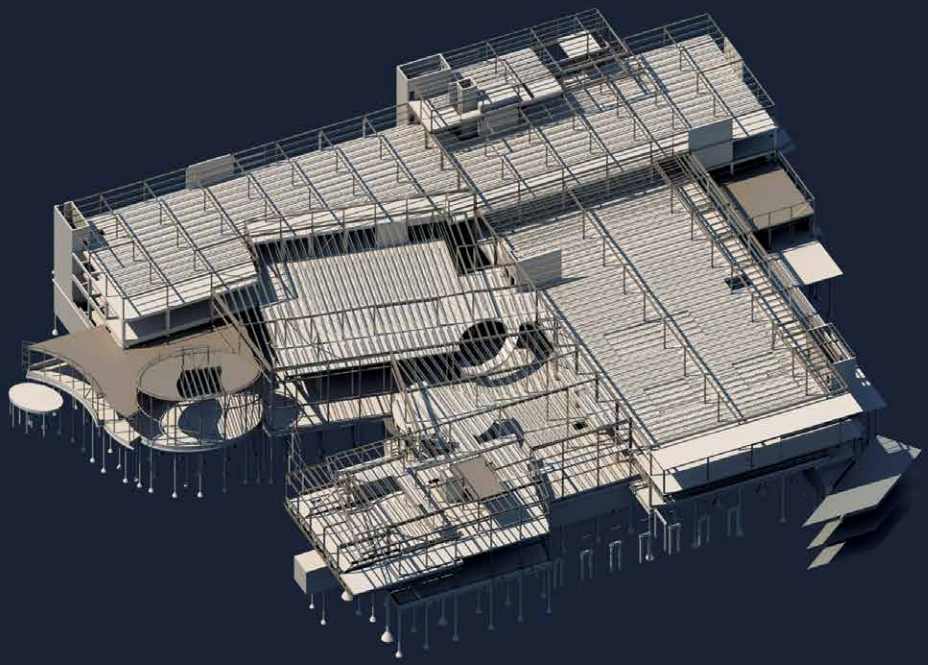


TOM THURSTON, DIRECTOR, CAPITAL DEVELOPMENT

STRUCTURAL ENGINEERING

New Royal Alberta Museum Project

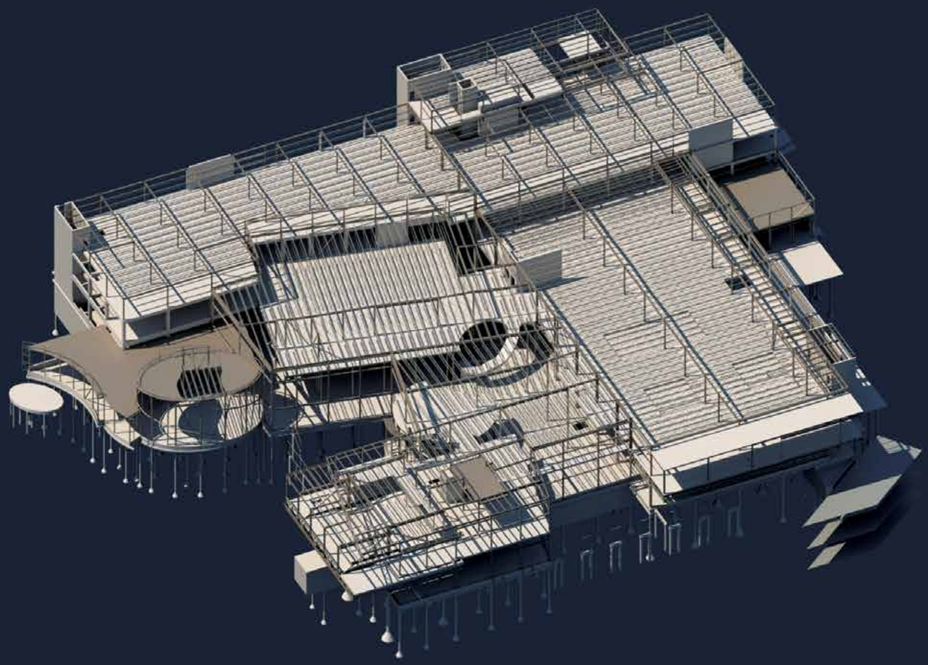
Our new Museum is being created by a process called Integrated Design. It's a collaborative approach that involves all key stakeholders in the building design process from concept to completion. Although it is time-consuming in the design phases, this multidisciplinary collaboration pays large dividends through the development of a more holistic design. It also greatly reduces the number of expensive change orders during construction. Dialog, our talent-laden integrated design team, includes experts in the key engineering disciplines needed to design a successful and sustainable building. These include structural, mechanical and electrical engineering, or, as I affectionately call this trio, *"Earth, Wind and Fire"*. In the next three blog posts, I will be showcasing each of these disciplines, starting with structural engineering, or "Earth".

Structural engineers are experts in using engineering principles to analyze forces and evaluate the strength of structural elements. Their key challenge is to design and detail structures that will resist all super-imposed weights and forces while keeping material use and labour costs to a minimum. Examples and benefits of some of the structural systems include:

Foundations: Many regularly spaced cylindrical holes are drilled into the soil using a special drill or auger that forms a large diameter "bell" shape at the base. Once they are filled with steel framing and concrete these underground columns, or piles, will hold the building firmly in place.

Typical Floor Framing: The principal structural floor system at the new Royal Alberta Museum is of cast-in-place reinforced concrete supported by concrete columns. Steel reinforcement is carefully positioned within the flat concrete plate. It is designed to resist the bending and shearing forces imposed by its own weight as well as by equipment, collections and people. This system was selected based on cost, performance, durability, its ability to limit sound transmission, and response to vibrations. Because a flat plate floor requires no interior beams or thickenings, it provides a consistent clear zone for mechanical and electrical services below. This is an example of integrated design decision making.

Roof Framing: The top story of the Museum switches systems from concrete to steel. Open web steel joists and metal decking support snow, wind and rain. The joists are custom-engineered for each span and loading condition, providing a very cost-effective and lightweight solution. →



CONTINUED

STRUCTURAL ENGINEERING

New Royal Alberta Museum Project

Feature Gallery Trusses: The Feature Gallery requires a large open room, free from columns, that will provide our exhibit team complete flexibility when setting up changing displays. This long span requires the use of deep steel trusses formed with square box-section members. The open spaces in the truss are sized to support the extensive mechanical and electrical systems needed to service this gallery.

Steel Columns in Lobby: Circular steel columns have been selected to satisfy aesthetic requirements. Although the diameter of each column is the same, the thickness of the column's interior steel core varies depending on the structural load that it must support. This allows for a uniform and consistent aesthetic.

If you walk past our downtown construction site or visit it, virtually on our website, you will see real progress being made as this integrated design moves from plan to reality. The site is an anthill of activity with two overhead cranes supplying concrete and steel to the workers below that are setting the formwork for the foundations of your new Museum. Above this, a framework will arise that provides the overall shape for the Museum building.

PHOTOS

FIGURE 1 This computer-generated model of the new building's structural elements provides the integrated design team with a valuable tool with which to detect areas of conflict between systems and identify opportunities for integration. The series of bell pile foundations our building sits on are visible in the model.