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## MECHANICAL ENGINEERING

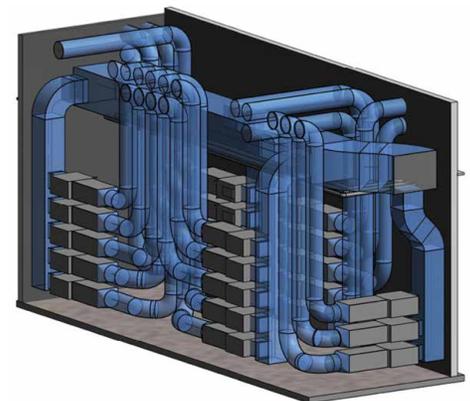
### *Building Your Museum*

This is the second in a three part series that showcases the efforts of the structural, mechanical and electrical engineering disciplines, which I have affectionately nicknamed “Earth, wind and fire”. The focus of this article is on mechanical engineering or “wind”.

The mechanical team’s first task is designing a delivery system to supply indoor air of a high quality at precise temperature and relative humidity. This system needs to be both flexible and sustainable. To make the task more challenging, the Museum has different requirements for temperature and relative humidity in different collection storage areas. Moreover, the Feature Gallery will need to meet different environmental settings to accommodate the most stringent criteria of the travelling exhibitions the Museum may wish to showcase. This difficult task is made more challenging by our harsh Alberta climate, with its marked differences between winter and summer weather conditions.

Sustainability is another overriding design principle applied to the entire system. The system is oversized or has “redundancy” so that in the event of an equipment failure part of the system will continue to operate to make certain the needed environment inside the building can be maintained. Green technology is employed to ensure that waste heat is captured and recycled. The Museum’s main air intake needs to move more than 300,000 cubic feet of air per minute at peak. No wonder it is so large that you could park your Audi R8 sports car in it... sideways!

In addition to the ventilation system we have plumbing—lots of plumbing. A fully pressurized sprinkler system keeps us safe from fire. Washrooms are conveniently located through the building and sinks are found in all the activity rooms and meeting rooms. In fact, we have a grand total of 608 plumbing fixtures. The most complex plumbing service requirements are found in our various laboratories where in addition to hot and cold water we have plumbed purified water as well as compressed air. Extra care has been taken in the design phase to ensure that plumbing does not cross through or overhead the collection storage areas—a “fail-safe” in case of a leak.



### PHOTOS

**FIGURE 1** Overall piping diagram showing just some of the 15,000 separate pipe runs that total 31.9 km of plumbing for the new building.

**FIGURE 2** Computer-aided design or CAD technology is used to design complex duct feeds for the permanent galleries. These drawings are also used by the builder to develop fabrication sequences. Tight schematics are a necessity considering that there is 16.8 km of duct work in the new Museum!