Profiles of Open Shop Construction Projects INTRO

Open Shop contractors have come to dominate the construction market in Western Canada. They are active in every sector, offering a wide range of construction services to a variety of clients. What kinds of projects do these include? A few recent jobs will illustrate not only the range and quality of services available through open shop contractors but also how the demands of the marketplace are changing.

With construction booming in Alberta there is a very long list of fascinating projects. We've chosen three because they demonstrate the varied capabilities of the open shop sector as well as how construction is changing and the emergence of market sectors that scarcely existed until recently.

One is a downtown office tower. Certainly not a new market sector, but rather one of the traditional cores to the construction market. The next is an agri-food processing plant. An interesting project, it involves new processing technology and is an example of the emerging agri-business market sector which is becoming an important client group for construction. The last is a cogeneration power plant. Here, again, is a project that is interesting just from the construction aspect, but is also a case study in how construction markets can be influenced by factors such as government deregulation, environmental issues, energy markets and commodity prices.

Cogeneration (cogen) power facilities are not a brand new idea. Linking a thermal-powered electrical generating plant with another facility which may supply the fuel and share the power, waste heat and steam output has been done before in many countries. Recently however, changing market forces have come together to produce a flurry of cogeneration projects in western Canada.

The most important driver of the cogen market has been the deregulation of electrical markets. This is a wave of change affecting, on varying timetables, most industrial economies. In Canada, the days of massive government-owned or controlled electrical monopolies are fading, and we are seeing an intense shake-up in the electrical market. Also influential have been the economics of fuel sources, environmental concerns and technological advances in power generation.

Bring these ingredients together, stir well and, voila! - we have an important new market niche for the construction industry that is generating hundreds of millions of dollars in construction contracts. Constructing cogen plants is now an active market, but the future may hold even more potential. There are new initiatives that exploit the many different ways to link a range of fuel sources with varying end uses for the electricity, heat and steam that these plants produce.

Focus Industrial Contractors is an Edmonton-based firm which has recently completed a cogen project near Westlock, Alberta that is a good case study of the cogen market and its potential.

The project involved installing a 19MW power plant that is unique in that it will use peat as its fuel source. Focus President John Cousins explains that although our country has huge peat resources he believes this is the first time it has been used on a commercial scale in Canada to generate power.

Another interesting aspect to the project was that the equipment for the plant came from a facility in California where it was dismantled, loaded on trucks and shipped to the Alberta site. If that wasn't enough of a twist on a normal procurement scenario, the equipment had also been through a flood following a levee break near the original plant site.

Not surprisingly, Russ Timmons, Focus' project manager, says this was a tough but very interesting project. "The challenges were to take an existing facility and make sure everything complied with Canadian codes and specifications. We worked closely with engineering staff to make all the changes needed to get compliance."

Focus staff with expertise in several disciplines monitored disassembly in the U.S. so parts could be catalogued for re-assembly. They report that proper sequencing of the shipments of components gave them more concern than any problems they experienced with shipping across an international boundary.

Because this was such an unusual job it required a very wide range of skills and expertise. Also, because it was not a huge project (\$25 million) and at a relatively remote site, it required a flexible and adaptable crew. With the exception of the metal building cladding, Focus's own forces completed all the work. Timmons says the crew peaked at about 70 people and that, "We

did everything from civil work to calibration and start-up." He says that they experienced no difficulty in assembling a crew but did go through some manpower stresses during some short periods of peak demand.

When asked about the toughest part of the project, Timmons says that the plant had undergone some renovations and upgrades that were not well documented with as-built drawings. He comments, "We had our work cut our for us and it's good that we had an experienced crew. There was a good atmosphere on the job and a good working attitude. There were no borders or barriers and everybody pitched in. Our core crew was excellent and we relied on those experienced, field-trained guys."

The work included concrete foundations, erection of structural steel, equipment setting including the turbine generator, stack, precipitator and fuel-handling system. Adapting an existing facility to a new use probably affected the electrical and instrumentation scope more than any other aspect. A new 138 KV substation was required as well as new motor control equipment, new switchgear and control rooms. The existing conduit was replaced with new Teck cable and tray systems. New programmable logic control systems completed the upgrade to the electrical/instrumentation package.

Boiler work was a critical component of the project, and, as Focus has ASME accreditation in this field, they were able to complete the work in this scope without having to rely on subtrades.

The plant is now up and running and is delivering power directly to the provincial grid. Initial operations used wood waste as fuel stock but peat, harvested locally and trucked to the site, is now the main fuel source.

Focus has completed another cogen plant at a different Alberta site. That one is fuelled by wood waste from a forestry plant. John Cousins expresses his satisfaction with these projects and optimism for continued activity in this market niche. The company has an alliance which gives them access to European burner and boiler technology which is ideally suited to this new generation of power plants.

The deregulation of electricity markets coupled with this new technology opens up many new possibilities. Selling electricity is becoming similar to any other commodity. It is feasible for anyone that can produce it profitably. The viability of these plants can be further increased thanks to factors related to fuel sources and the fact that heat, steam and off-peak power can also be an important part of the overall financial equation. As an example, John Cousins describes a proposal for a plant that would burn forestry waste and have steam, waste heat and electricity to deliver back to the forestry plant as well as a greenhouse operation.

Whatever combination of factors come together to make cogeneration plants viable, it appears that the market will continue to expand and generate the type of construction projects that are ideally suited to open shop contractors and their multi-skilled workforces.

TransCanada Pipelines Tower

Tower cranes silhouetted atop a high-rise office tower stand as a virtual trademark for the construction industry. That highly visible and commonplace scene is an ever-present reminder of how important the commercial office market is to the construction industry. Office building has created billions of dollars in work for construction contractors, and although it can be a very cyclical market, it continues to be one of the core sectors for the industry.

As it rises to take its place on Calgary's skyline, the TransCanada Pipelines Tower (TCPL) is one of the most recent examples of this kind of project. Scheduled for completion in the summer of 2000, the TCPL Tower will be a 36-floor, cast-in-place concrete structure with 1,000,000 square feet of rentable space. After starting in an excavation 45 feet below street level, a crew of 225 will, in the span of 30 months, transform 62,000 cubic yards of concrete into five floors of underground parking, a six-floor base pedestal and 30 typical office floors. The ultimate end product will be a 584 foot tower sheathed in a blue tinted glass curtain wall that will be a new workplace for about two and a half thousand office workers and a number of new retail businesses.

PCL/Maxam is co-ordinating the work of their own forces as well as 35 subcontractors on this design-build project. Bruce White is PCL's construction manager for the job and a veteran of at least eight multi-story commercial buildings over the past fifteen years. One would expect a building of this magnitude, on a difficult and congested downtown site, would present many construction and engineering challenges, but in talking to White it soon becomes clear that one issue supersedes all others in importance - the schedule. In his words, "The schedule is paramount."

Adherence to schedule is important in all types of construction, but few sectors are as unforgiving in this aspect as the office market. Leasing decisions are made far in advance and firm move-in dates for tenants simply cannot be altered, no matter what difficulties might arise in the construction process. Bruce White explains that soon after they top out the concrete structure in April of 2000, they must begin to turn over sections of space called tranches. This term translates as slices - and the sections of building that are turned over are literally horizontal slices through the tower. Typically, a three-floor slice will be turned over for tenant fit-out every three weeks. With hundreds of tenant employees scheduled to leave their existing workspaces and move into their new premises on firm dates, there can be no options or contingencies that will change these handovers.

Speaking as construction reached the 16th floor, White expresses satisfaction with their progress. As the project enters its second winter season, he explains that they have had good luck with weather. The only schedule-impacting weather delay they have experienced was a span over Christmas 1998, when a cold snap caused them to miss a very narrow time window for the 3,600 yard foundation raft pour. Constraints imposed by downtown traffic limited the pour dates to weekends, and although the crew had formwork and rebar ready well in advance, a brief spell of bad weather coincided with the target weekend.

Anyone familiar with high-rise construction will acknowledge that "in the hole" is the most difficult phase, and the one with the most opportunities for bad things to happen. White reports

that their excavation, shoring and foundation work went well. Geotechnical reports indicated that some rock might be encountered that could not be conventionally excavated. PCL had some insight into conditions having recently completed a structure immediately adjacent to the TCPL site, and they believed that a backhoe would be able to handle all of the excavation. That turned out to be the case, and Bruce White was relieved not to have had to become involved in blasting on a downtown site. Groundwater, which can be hit and miss in downtown Calgary, was also not a big factor.

On typical floors, the project is on a pour cycle that completes a floor every five days, utilising core and fly form systems that are PCL in-house designs. Most concrete is pumped from street level to placing booms, freeing the two tower cranes from concrete pouring duties. "That", White says, "gains us 18 to 20 hours of hook time in a five day cycle," referring to the critical importance of crane time on his project.

The structure is a fairly standard concrete frame, but White points out that the 28,000 square foot typical office floor plate includes long (50 foot) clear spans. Although not structurally essential, to assure flatness in the floor slabs for those long spans, underslab beams are post tensioned. As is commonplace today with high-rise structures, high strength concrete is employed with up to 80 mpa in columns and 55mpa in beams. The design also includes some quite complex geometry on the glass curtainwall.

An unusual aspect of the project is that drawings are in imperial measure. Some specific interior design requirements dictated this unusual situation, and some twenty years after our changeover to metric, PCL and subtrade forces were challenged to adapt to working with the old system.

When questioned about the effect of building in the midst of a hot construction market, White reports that they have not experienced significant manpower problems and have been able to assemble a "good group of trades" despite the market. After a prolonged slump in office construction in the city, PCL has recently been involved with four new downtown towers. White thinks that his project, the latest of the bunch, benefited by inheriting some personnel, both his own forces and subtrade crews, who had gained some recent high-rise experience on those other jobs.

High-rise construction, despite encompassing some huge and complex structures, is often described as a race against time. Bruce White's capsule job description of his own role reflects that. When asked what his challenge is, he says, "Our job is to be innovative in coming up with ways to mitigate schedule concerns without affecting the quality of the finished project."

The TCPL tower is an excellent illustration of the most recent incarnation of one of the most important sectors of the construction economy. At first glance, it is similar to some of its neighbours built twenty years ago, but on closer examination, is more complex, incorporating new technology and high-class finishes and, as always, erected at the highest possible speed. The office market continues to evolve, but there are no signs that its importance to the construction industry is diminishing. That image of tower cranes rising above a downtown

skyline will continue to be a symbol of the construction business.

Lamb-Weston Potato Processing Plant

An Old Market Sector Revitalised

The agricultural market is certainly not a new client group for the construction industry. Some of the very foundations of the construction market in Western Canada evolved out of building the infrastructure that served prairie agriculture - barns, grain elevators, packing plants and rail facilities. Times have changed however; agriculture's portion of total construction volume has long been eclipsed by the demands of our growing cities and the variety of other industries that are now more prominent in our economy.

While this may be one of construction's oldest market sectors, there have been some new developments recently. Farming is changing, and agribusiness is increasingly the term used to describe it. This transformation is bringing new products to new customers and a reorganisation of long-established activities like grain-handling and meat-packing. Agribusiness has demanded the construction of a variety of new facilities - some of them involving very substantial capital investments.

The Lamb-Weston Plant

The Lamb-Weston Potato Processing plant outside Taber, Alberta is an example of the new construction opportunities presented by the expanding agribusiness sector in western Canada. The recently completed plant processes locally grown potatoes into frozen french fries that are shipped to markets world wide.

Calgary-based, Stuart Olson Constructors Inc. was the lead contractor for the project in a joint venture with Fisher & Sons of Burlington, Washington. An interview with Blair Grier, Stuart Olson's project manager, reveals his enthusiasm and satisfaction with this job, even several months after completion. Grier says, "It was easily the high-point of my construction career."

Fast Track Plus

Construction of the plant was a design-build project that called for an extremely fast-track schedule. As Blair Grier puts it, "We went from a bare field to the first potato down the line in eight and a half months. The start-up date was set the year before, and on April 15th, 1999 we were running potatoes."

Grier says that meeting the schedule was the biggest challenge. Any construction project of this magnitude presents many challenges, but the Lamb Weston facility had some unique features to go along with the very compressed schedule. The main processing plant is a 250,000 square foot structure with a precast concrete frame. It required over 1,000 pieces of precast which were all

supplied out of Spokane, Washington. The adjacent cold storage facility for finished product is a 200,000 square foot conventionally framed structural steel building clad with insulated panels.

Processing requires large quantities of water, and one of the most interesting components of the project is the inclusion of a water and waste treatment plant to handle the 1.5 million gallons of water that the plant uses every day. The facilities put in place are equivalent to those of a sizeable town and include an intake in a nearby lake linked to the plant by a mile-long pipeline. A state-of- the-art treatment plant brings the water up to the required standard. Treatment of wastewater is equally complex and involves primary treatment in clarifiers before the waste water is piped to giant lined lagoons. Wastewater is recycled as irrigation water and the capacity of the lagoons allows for up to a year's storage time so that water can be held over between irrigating seasons.

Water was just one part of the infrastructure the plant required. Grier says, "We put this plant in the middle of a bare field, and everything had to be put in new - power supply, water, natural gas, rail spur line - there was nothing on site when we started."

The process building has a standard slab on grade but includes, as Grier says, "countless foundations for processing equipment, some literally the size of houses." Grier adds that the schedule was very much tailored to the delivery of "lots of proprietary equipment" that came from suppliers all over North America.

The plant is located about three quarters of an hour by road from the nearest large centre, Lethbridge. That's not a remote site by western Canadian standards, but Grier relates that they had some initial concerns about labour supply. These proved to be unfounded, as he reports that they had little difficulty in attracting a good workforce which peaked at about 500 employees working for a total of about 25 contractors. He was especially pleased that ninety percent of the work was done by local contractors and local tradespeople.

Even the simplest construction project holds potential for conflict among the participants. A project of this complexity with such a compressed schedule further increases that risk. Despite this, Blair Grier reports that the level of co-operation was one of the most satisfying aspects of the job. He says, "The owner was the best client I ever worked for."

The owner is pleased to report that, along with meeting the very difficult schedule, the project came in on budget.

This 108 million dollar investment in an agricultural processing facility is just one example of construction activity being generated by the agribusiness sector. Another plant of similar size is currently under construction in the same area for a different owner. The meat-packing industry has also been the source of some major projects as that industry reorganises and seeks to service new export markets. Similar examples can be found in other agriculture-related niches such as grain-handling and forage-processing. This often overlooked sector of our economy will continue to provide opportunities for the construction industry.