

# KIN CENTRE COMPLEX

Prince George, British Columbia



## **75-Word Summary**

This project comprises the expansion and renovation of the existing Kin Centre Complex in preparation for the 2015 Canada Winter Games. Great care was taken in the overall form and detailing of the structure, which ultimately became the dominant architectural expression for the Complex. The gently curving steel beams serve as a natural counterpoint to the expressive wood roof sweeping over the ice rink below.

## **Project Highlights**

### **Innovation**

The existing Kin Centre Complex was originally constructed in the early 1970's and comprises 3 ice rinks interconnected by a common 2-storey spectator lounge/change room area. A 6,000 seat ice rink (CN Centre) was added at a later date to form part of the overall facility. The City of Prince George needed to upgrade the Complex to accommodate the 2015 Canada Winter Games which includes various ice sports including Men and Women's Hockey. In addition, it was required that the Complex be converted from an Olympic size ice surface to an NHL size ice surface after the Games, while maintaining flexibility to host small concerts, tradeshow, community shows and other sporting events. Some examples of innovative engineering include the following:

- In order to resolve major structural deficiencies in the existing spectator roof, double tees were demolished in order to extend the Kin 1 roof over this space. This reduced the overall seismic demand of the building and also allowed the new Kin 1 structure to provide lateral support to the existing spectator area.
- The curved geometry of the Kin 1 roof beams imposes a natural horizontal thrust into the steel frame due to dead, live, wind and seismic loads. This thrust is cleverly resisted by raking steel columns at the top of the spectator seating. The sculpted angular columns not only provide efficient "frame action" to the structure but also provide a visually dynamic form.
- Kin 2 received partial upgrades which included extending the north end of the building by 30 feet to accommodate new temporary seating for the Games, and the addition new change rooms adjacent to the west side of the building. Both additions were designed to enhance the overall lateral stability of the existing structure by effectively "buttressing" the building.
- The gently curving roof consists of prefabricated SPF glue-laminated panels, each 2 feet wide by 5 inches deep spanning 25 feet between the curved steel beams. The mass timber panels in conjunction with a plywood skin provide a natural roof support system and diaphragm without the need for any additional in-plane horizontal bracing. The overall thickness of the timber complied with the heavy timber requirements of the BC Building Code thereby provided an inherent 45 minute fire resistance rating to what is effectively a combustible material. Finally, intentional gaps were provided between occasional timber panels to allow for concealment of piping and conduits.

### **Complexity**

Fast + Epp was presented with a number of structural challenges in translating the Owner's requirements and the architectural vision. The solutions that emerged from this process include the following:

- Flexibility was built into the detailing to allow for phasing of the project to minimize disruption to Kin 2 and Kin 3 ice rinks during construction.
- Work to the existing Kin 1 demolition was further phased to the spring to minimize disruption to the hockey season.
- The Kin 2 arena was actually extended in length by 30 feet to accommodate new temporary seating for the Games all while staying open to the public.

One of the most structurally deficient areas of the complex was the 2-storey spectator lounge/change rooms interconnecting the three ice rinks. Existing construction in this area consisted of 2 levels of precast concrete double tees with insufficient connectivity and no identifiable lateral support system. In addition to this, the weight of the existing floor and roof was imposing a significant inertial seismic demand into the roof structure that would be very difficult and expensive to address in its current state. These deficiencies were successfully addressed by utilizing the reconfigured change room concrete block walls at the lower level to stabilize the second floor precast double tees. At the roof level, the precast double tees were totally removed, making way for the new, much lighter Kin 1 roof to extend over the spectator lounge area, thereby creating a single unified open space.

### **Social and/or Economic Benefits**

Kin Centre Complex was constructed with maximum flexibility in mind. The Kin 1 ice rink was not only designed to accommodate both Olympic and NHL size ice surfaces, but also to host future non-hockey related functions such as trade shows and concerts. This flexibility will provide the City of Prince George with many future revenue generating options, all within a single facility.

Hockey rinks are often the focal point of a community where people gather to play the game or simply meet their friends. The Kin Centre Complex is exactly that to the City of Prince George. With this in mind, all efforts were taken to preserve and enhance the existing facility as well as keeping the facility open to the public as much as possible during the refurbishment works. The result is a facility that remains familiar to the residents, but with an extended life to serve the needs of the community for years to come.

### **Environmental Benefits**

Prince George is located in the epicentre of the BC wood industry, with many of the local mills processing common local species such as Spruce, Pine and Fir (SPF). Very early in the design process the design team opted to utilize the locally produced SPF as the primary material for the Kin 1 roof which also directly responded to the mandate of the Wood First Policy. The Kin Centre Complex stands as a beacon of environmental sustainability: the roof contains 40,000 square feet of SPF timber, and serves as a testament to the local species grown within the Prince George area.

### **Meeting Client's Needs**

In responding directly to the Owners and Architects desires, a unique and expressive structural system was created which combined the strength of steel and the elegance of wood. From the beginning of the project, the Owner was clear that the new Kin 1 ice rink was to serve as the showpiece for the 2015 Canada Winter Games. Great care was taken in the overall form and detailing of the structure, which ultimately became the dominant architectural expression for the Complex. The gently curving steel beams serve as a natural counterpoint to the expressive wood roof sweeping over the ice rink below.



Photo 1: Existing Kin 1 Arena prior to demolition



Photo 2: Existing spectator lounge prior to demolition



Photo 3: Kin 1 reconstruction



Photo 4: Kin 1 reconstruction complete



Photo 5: Curved steel beam and solid wood roof



Photo 6: Sloped/sculpted steel columns



Photo 7: View from new spectator lounge



Photo 8: New Kin 1 exterior elevation