

NEW ENGLAND CONSTRUCTION



PC Construction Builds \$58M Stowe Mountain Resort Addition

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Maine Drilling and Blasting operator adjusts Atlas Copco ROC D3 Drill Rig at one of numerous holes bored for the removal of 3,000 cubic yards of rock.



PC Construction

Braces for Strong Weather During Creation of Stowe Mountain Resort Addition

By Paul Fournier



This rendering shows the Spruce Peak Adventure Center and Alpine Club designed by Bull Stockwell Allen Architects for the \$58 million expansion of Stowe Mountain Resort in Vermont.

Strong winds and constant snowfall are among the challenges facing construction crews as they build a \$58 million addition to the Stowe Mountain Resort in north-central Vermont this winter.

In preparation for steel erection for the 125,000 square foot Spruce Peak Adventure Center and Alpine Club, construction manager PC Construction of South Burlington, Vermont, is going full bore to finish putting in concrete foundations and walls before the onset of winter. Designed by Bull Stockwell Allen Architects, the project significantly expands family amenities and services at the year-round destination, and will include a ski school, daycare facilities and children's activity center, retail shops, restaurants, food markets and luxury condominium residences. In addition, it includes an 85,000 square foot below-grade parking structure, an outdoor ice skating rink, a community pavilion and an outdoor plaza.

PC Construction began work at the project in May, with crews setting up fences to isolate the construction area from the guests at the busy facility.

"This is a very active resort, so safety has to be our number one concern," said Matthew Cooke, Senior Project Manager for PC Construction.

With the work area set off from the public, Cooke said, site contractor S.D. Ireland of Williston, Vermont, began relocating existing underground utilities and installing new ones, as well as excavating for buildings, the underground garage and other areas. Ireland is moving an estimated 80,000 cubic yards of earth, including some 3,000 cubic yards of ledge drilled and blasted by crews from the Albany, New York, office of Maine Drilling and Blasting.

Concurrent Design and Construction

Cooke said fast-track design and construction plus value-added engineering are speeding progress of the project. In order to meet various deadlines of the owner, Spruce Peak Realty LLC, the project team is designing and constructing phases of work under a rigorous sequential schedule. For instance, while site excavation and utility relocation were underway, the project team was developing drawings and other construction documents for the next phase of work. Cooke pointed out that PC Construction was part of this process, contributing ideas from a contractor's perspective that could expedite construction in efficient, economical ways.

In spring, as major site work was being

completed, the contractor received a set of drawings labeled "25 percent documents," as guidelines for constructing the next phase of work – the forming and placement of concrete for footings and walls.

By August, "75 percent documents" were being used as guidelines for steel framing details and other structural work. Walter P. Moore and Associates Inc., are the structural engineers for the project. Other engineer members of the team are Civil Engineering Associates, SE Group (landscape architects), and L+N Consulting Inc. (mechanical, electrical and plumbing).

This regimen of phased construction, design and issuance of documents has been used successfully by the project

team and is expected to keep the work on schedule throughout the approaching winter season.

Master Plan Expansion

PC Construction's work is outlined in the Spruce Peak Resort Master Plan which was prepared to accommodate projected growth of the facility. The Master Plan includes phased construction of a series of moderate size multi-use and residential buildings and development of public outdoor areas. Specifically, PC Construction's contract covers the construction of The Adventure Center (Building A1) and Alpine Club (Building A2), plus a new below-grade parking



One of S.D. Ireland's several CAT excavators at the Stowe site loads material into a haul truck.

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Vermont Project is First in Region to Use New Connections

Canatal Industries Inc., the supplier of some 1,500 tons of steel for the Spruce Peak resort project, is also fabricating more than 200 of the patented SidePlate bolted connections that join beams and columns of building moment frames.

Moment frames are rigid constructions designed to limit the tendency of a building to lean or “drift” from the effect of wind and seismic forces. For many years, typical moment connections relied on welded beam-flange-to-column-flange joints. But after a catastrophic earthquake in 1994 in Northridge, California, it was determined that the extent of devastation was exacerbated by brittle fracture of welds of some moment connections.

Since then, engineers have been working on designing moment connections to eliminate this type of failure. Among them are engineers at SidePlate Systems Inc., who over the past 20 years have de-

veloped a number of patented moment connections to resist large seismic forces. Most recently they designed a new type of bolted connection suitable for areas such as the East Coast where wind forces are as important as forces expected from seismic activity.

Introduced in September 2013, the patented SidePlate bolted connections

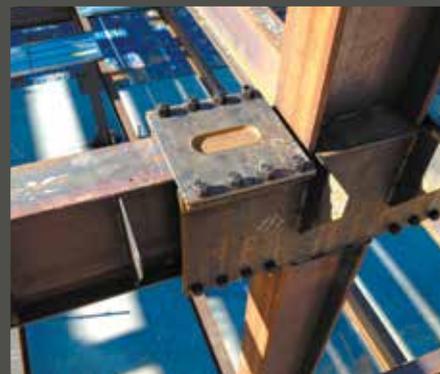


Photo shows patented SidePlate Bolted connection for a moment frame, with beam bolted in place between side plates.

are for projects governed by wind or low-seismic forces. The bolted connection consists of a “column tree” formed in the steel fabricator’s shop by welding two steel side plates to a column’s flanges – one plate on each side – with predrilled angles welded to the outside faces of the side plates flush with the top. A corresponding beam marked for that connection’s location is configured with a predrilled cover plate welded to the top flange and two predrilled angles welded to the bottom flange.

At the jobsite, a crane lowers the beam into place between the side plates of the column, the predrilled holes of the beam angles and column angles are lined up, then high strength bolts are inserted and tightened with torque wrenches. No field welding is needed.

According to Matt Mester, P.E., a Structural Engineer and expert in seismic forces, SidePlate does not actually manufacture connections, but permits



Closeup shows cover plate of moment-connection beam before bolts have been inserted through pre-drilled holes.

fabricators to use the system for a fee. SidePlate performs the engineering calculations and supplies stamped shop drawings to fabricators who make the connections in their own shops.

Mester said the new bolted connections have been installed at projects in North Carolina, Kentucky and Minnesota, but this is the first time they are being used in New England.

“We want to get the foundations in by November, so we can start erecting steel.”

Matthew Cooke, Senior Project Manager for PC Construction

garage. The single-level garage is located underneath the two buildings and a new central plaza which is to be used for a number of activities. Among the uses for the plaza will be an ice skating rink in winter, setting for musical performances all year, a splash zone in summer, and a farmer’s market in summer and fall.

As described by the architect, the Adventure Center is primarily a ski school on two levels, replacing and expanding an existing ski school. It will also have indoor activities, including rock climbing areas, a media and lounge activities area, and a casual food service area. The adjoining Alpine Club will provide a central club facility on two levels, including a locker lounge and dining facilities.

The third, fourth and fifth levels of both buildings will be occupied by residential units, both single level and two level units.

Different Deadlines for Different Parts

PC Construction has several different deadlines for portions of each building.

“We have to turn over to the owner the completed first two levels of the Alpine Center in November 2015, the first two levels of the Adventure Center in January 2016, and the completed three upper floors of both buildings in September 2016,” Cooke said.

By August, S.D. Ireland workers were beginning to pour the first of what eventually would amount to 8,500 cubic yards of ready mix into concrete forms for floor slabs, footings and walls. S.D. Ireland is also supplying an estimated 800 cubic yards of precast walls for the underground garage. The garage beneath the buildings will be completed in stages.

The precast walls will be set in place first, then CCS Constructors will set up two lattice-boom crawler cranes on the

bottom of the garage to erect the steel building frames, said Cooke.

“As they back up along the garage floor, setting building steel, we’ll pour the bottom slab, and the top slab (the lid) will be constructed on the precast walls,” Cooke explained.

The approaching mountain winter is adding urgency to the task of completing foundation walls and piers for the buildings.

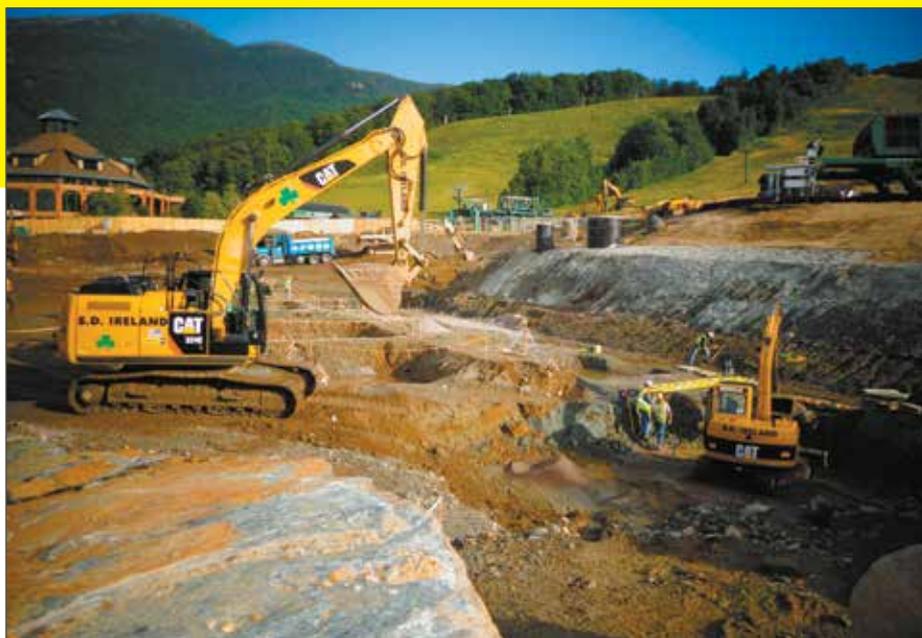
“We want to get the foundations in by November, so we can start erecting steel,” said Cooke. “Doing this in winter will be our biggest challenge because of winds and snow. When the wind is too strong, then ironworkers can’t erect steel that day. Also, since it snows frequently here we’ll probably have to clear snow almost every day before we can work.”

Connections May Ease Winter Framing

With winter posing a formidable challenge, anything that can shorten the time needed to erect some 1,500 tons of steel provided by Canatal Industries Inc., for the five story buildings is helpful, said Cooke. One promising development is the decision of the project team to use a new type of connection for the numerous steel moment frames of the structures.

Cooke hopes that the new column-to-beam connection will speed up steel erection.

“The specifications call for the use of a SidePlate Bolted connection for the steel moment frames of the buildings,” he said. “They’re bolted together during erection – and there’s no field welding. All welding is done in Canatal’s fabricating shop. That means the connections can be made quicker in the field, and anything that can save us time especially in mountain winter conditions is welcome.”



About 80,000 cubic yards of earth is being removed at Stowe Mountain Resort site for two main buildings and an underground parking garage.



Mid-summer photo shows just-completed footing wall as crews push to get all foundations in the ground before the onset of mountain winter.