Case**Study**

Virtual Design & Construction: Effective Communication Ensures Project Success

Tulalip Casino, Hotel and Conference Center
Tulalip, Washington

The casino's 440,000-sq-ft size makes it the largest and most distinctive meeting, gaming, entertainment and shopping destination in Washington State. It includes a 12-story hotel (with 370 guestrooms and numerous specialty suites), a renovated and expanded casino which added 15,000-sq-ft of additional space, a 30,000-sq-ft conference center and meeting area, and a 14,000-sq-ft full –service spa and six restaurants.

CHALLENGES AND SOLUTIONS

Challenge: There were many different BIM models being developed over the course of design and construction – creating the possibility of miscommunication with the field.

Solution: A dedicated Integrated Construction Coordinator (reporting and coordinating with the architect and assistant project manager – and then acting as the information liaison with the field) was used. The coordinator managed model input and produced documents to be used in the field. These ensured constructability of the project during design and protected the integrity of design during construction.

Challenge: The project had a fast-track schedule of 22 months, making it imperative that all participants have timely and completely accurate information (especially the field).

Solution: A community computer setup in the plan room was used by both the office and field as a live and interactive means to communicate in 3D (the computer effectively became the primary source of information on the project). The computer held a version of the model, which included all MEP models, architectural models and structural models. Every team member was trained in using the software to navigate, dimension and manipulate objects. Instead of a select few looking for conflicts, every team member could (and did) catch coordination issues. Any crafts person, at any time, could walk into the job site trailer and access model information.

Challenge: Having a 3D/4D model is a great tool, but it only goes so far. Translating the model into real, actionable information for the field is a challenge. Solution: Extracting the pertinent information from the model and delivering it to the field was critical. The vehicle developed was an Integrated Work Plan (IWP), a layout drawing that simplified and consolidated all coordinated

Project Type:
Hotel - Mixed Use

Delivery Method:
General Contracting

Key Participants:
General Contractor:
Mortenson Construction
Architect:
Ruhl Parr & Associates

information into one delivery source – creating a task specific document containing all information necessary to perform a specific task of a defined scope of work. The IWP was also used by engineers to perform quality checks in the field. The IWPs contained the following scopes of work: pile cap and footing layout (allowing all panels to be pre-fabricated); slab on grade (slab edge, depressions, curbs and housekeeping pads, and bolt pattern for steel columns); post-tensioned decks in the hotel tower (slab edge with block outs, curbs, depressions and housekeeping pads; sleeve layout; PT head layout; embed layout; and stud rail layout and fabrication drawings); shear wall layout (including elevations with coordinated block outs and embeds).

Challenge: In order to meet the 22-month schedule, construction had to start with design documents only 60 percent complete. Additionally, the project was the architect's first practical introduction to BIM. Both could have created issues.

Solution: All members of the design and construction team (including subcontractors) committed early to a culture of collaboration and innovation – which ultimately empowered each member of the team. Examples include: the architect was directly involved with BIM during the coordination process; engineers used IWPs for quality control and the superintendent was involved in the IWP approval process; the MEP engineer ran clash detection during the MEP meetings; the assistant project manager in charge of enclosure used software to build a model of the typical glazing and metal panel mock up for enclosure review; and subcontractors were involved either with modeling their own scopes of work such as the MEP trades, or simply through their involvement with the IWP process and use of the plan room computer.

Results:

- By using color-coded drawings, the iron workers were able to prefabricate all of the stud rails at the same time and distribute them with the exact quantity and types, decreasing installation time by 20 percent.
- IWPs containing plan and elevation were used in the forming and pouring of shear walls, increasing production by 26 percent. Not one embed, block out, or sleeve was misplaced.
- Through the use of IWPs, man hours were reduced by 22 percent to complete the concrete structure. The schedule for this scope of work was reduced by 10 percent, shaving 6 weeks off a tight schedule.
- The use of identically coordinated layout drawings by the MEP trades, carpenters and struc-

tural subcontractors meant no field conflicts, eliminating one day from the typical PT deck pour cycle. This resulted in over 70 percent more work in place per RFI written when compared to previous projects where BIM was not used.

- By using the model, the team was able to coordinate and pour the first deck two days after the release of CDs versus the average of two to three months.
- During the course of interior wall coordination between the contractor and architect, three serious structural issues and 234 dimensional conflicts were resolved.
- By using the model, the team resolved over 2500 MEP conflicts.
- The plan room computer concept was so successful that Mortenson is now using it as a standard practice on every project.
- The owner was able to have a soft opening three months before the grand opening (bringing in additional revenue) and the project was finished on budget.