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CELEBRATING 55 YEARS

By Rick Jensen: Renovations/restorations - Expecting the unexpected - part 1

November 17, 2011 - Construction Design & Engineering

When performing a renovation or restoration - especially in an old or historic structure - you have to prepare yourself for surprises along the way. Despite meticulous preplanning, you will inevitably stumble upon some unexpected challenges once walls and ceilings are opened up. Most older buildings do not have up-to-date records or as-builts to identify building systems because many have been patched here and there throughout the years without documentation. The best strategy a construction manager can implement to combat these foreseeable surprises is to plan ahead by anticipating that they will occur and developing a proactive, project-specific plan to deal with them effectively.

Necessary Components of the Project-Specific Plan

Most construction managers have developed and will enforce policies and procedures that outline the baseline standards for quality and safety on every job. To achieve optimum success, these policies should be examined and modified to create a project-specific plan that addresses the unique difficulties each project faces.

Comprehensive Quality Program

At Erland, we have developed a Risk Assessment Matrix - a document filled out by the project executive during preconstruction and shared with the team - that identifies potential hazards before a project begins. Uncovering these risks allows the project team to start crafting potential solutions early in the process. That way, when a problem arises, the project team is prepared and can work quickly to fix it because they are tuned into a troubleshooting mind set.

Technology

Technology such as Building Information Modeling (BIM) can be a very useful solution. BIM is a layered, 3-dimensional, electronic model that represents exactly how the real building will be built in the field - with structural, plumbing, electrical, and HVAC components laid out in precise detail. For older and historic structures that don't have as-built records, you must perform field dimensioning - an analysis of the building to verify existing conditions like ceiling heights and wall placement. This information is then used to create the base of your BIM model.

Once the BIM model is complete, a Coordinator can run a clash detection query to identify trouble spots and verify that the drawings for the renovation are accurate. For example, if the plumbing subcontractor has laid out piping in the same space as the electrician's wiring, the clash detection will catch that interference and allow for a fix to the plans before the clash becomes a problem in the field.

Accurate Schedules

Your project-specific plan should also include a detailed project schedule. It's important to be realistic about the time it will take to perform a complex renovation, making sure to build in extra

time to resolve issues as they arise. The difficulty is knowing how much extra time is needed - a few days? Weeks? Months? It would be a huge waste of resources and money if your construction manager was too conservative, inaccurately projecting that the job would take months longer than necessary. While it is impossible to predict exactly how a project will unfold - none of us has a crystal ball, after all - practice does make perfect. Construction managers with a strong portfolio of restoration projects will draw from previous experience to determine the appropriate amount of time and will update schedules throughout the project to reflect current conditions.

Experienced Team

This leads us to the final, and perhaps most crucial, component of successfully managing a complex renovation - staffing your project with experienced and knowledgeable field and management personnel. You'll want to trust that the individuals performing your renovation have managed similar projects and know how to handle both simple and complex obstructions as the project progresses. Policies and procedures are important, but it's even more critical to have the right individuals in place to put those plans into action.

Implementing the Plan - Project Examples

The following two case studies exemplify how a comprehensive project-specific plan can play a significant role in the success of an intricate renewal/restoration project.

Andover Inn at Phillips Academy - Andover, Mass.

In 2008, Erland's design/build team (with architect, Arrowstreet) was hired to renovate the historic 30-room Andover Inn. After more than a year of intense preconstruction, work began in earnest during the fall of 2009. The inn, originally built in 1930, was in desperate need of a complete overhaul, but Phillips Academy - the inn's owner - was concerned that construction would destroy the historic value of the building. One of the major challenges for Erland was to update the hotel while maintaining its historic look and feel. In preconstruction, working with the school and architect, it was decided that the building should be completely gutted and rehabilitatedâ€”with the exception of the main lobby and dining areas, which were preserved because of the richness of their architectural detailing. Finished in late summer 2010, Andover Inn now features new mechanical and electrical systems, as well as a modernized look that blends contemporary style with the historical flavor of the inn.

Andover Inn remained in operation up until the day Erland started construction, severely limiting our access to the building to analyze the existing conditions. In addition, like many historic structures, there were no records or as-builts available for review. Our team had to make many design assumptions about the framework and layout of the structure - like what might exist behind the walls and how much space there was above the ceilings - in order to move forward with developing and finalizing the design. Unfortunately, once construction began, we discovered many unforeseen impediments.

At the start of the project, we had not intended to create a BIM model but, as we began to open up walls and discover more about the conditions of the building, we realized that our initial design assumptions would not hold. The space inside the walls and ceilings was much narrower than we had anticipated. There were several structural columns that occupied space we had intended to use for mechanical systems. Luckily, our team had completed a Risk Assessment Matrix during preconstruction that identified the unknown layout of the building as a potential problem, so we had built extra time into the schedule to account for time to solve this issue.

Despite our preplanning, there wasn't an inordinate amount of time to problem solve. In order to maintain the construction schedule and expedite the necessary modifications to the design, we built a partial BIM model to determine how to move forward. One of the new features to be included in the building was a four-pipe HVAC system, which, as the name implies, uses four pipes in two self-contained systems - two pipes (one for supply and one for return) for hot water and two more for cold water.

Fitting all the piping into Andover Inn's tight space was a huge challenge because, at first glance, it seemed as though the system was entirely too big for the amount of space available. The BIM model, built using the exact dimensions of the existing building, allowed us to evaluate different options and ultimately find a way to fit this spatially challenging HVAC system into the small building. Some modifications had to be made to accommodate the four-pipe system. We were forced to lower ceiling heights in certain areas of the inn to allow for the additional pipes. Erland's BIM Coordinator, John Cormier, said of the project, "I don't think we could have found a way to fit that four-pipe system into that building without the BIM model. We had to rework the layout so many times to ensure a perfect fit and I don't see how we could have done that in the field and still maintained the project schedule. It would have taken too long and it still wouldn't have been as precise as the plan we derived from the model."

Technology played a huge part in achieving success at Andover Inn. However, without a skilled and knowledgeable team working together to overcome the obstacles we encountered, and the know how to utilize the right technology, it's very likely the project would not have ended as well.

Stitzer YMCA Center/Judd Gymnasia at Springfield College - Springfield, Mass.

Originally built in 1894 and expanded in 1910, Judd Gymnasia is the oldest building on the Springfield College campus. Given the facility's age and increasing lack of functionality, the school was interested in exploring options to better make use of the space. One course of action could have been to tear it down and build a new structure. Destroying such an important piece of the College's history, however, was not a welcome prospect; so, the school made the decision to renovate Judd Gymnasia and give the facility new purpose. In 2009, Erland Construction began this important restoration project - our third consecutive project for Springfield College.

Before the start of construction, Erland hired a third party firm to assess the building envelope and structural integrity of the building. Because of its age, there was concern that it might not stand up to the rigor of the planned renovations. The assessment found that the building was sound, but once the team began opening up walls and removing ceilings, parts of the building began to fail.

Judd had undergone several small "band aid" repairs prior to this major renewal project. Because it was originally built in the late 1800s, it was not insulated, so the school had covered ceilings in the East and West Gyms and the former Natatorium (which was then transformed into the school's bookstore) lowering the heights to help with astronomical heating bills. The shortened ceilings covered many of the building's beautiful features, including arched windows in the East Gym. As part of this project, Erland was tasked with restoring many of the original components of the building to recreate the initial design.

Uncovering the arched windows in the East Gym was particularly problematic for our team. After removing the ceiling and walls to expose the windows, the arches of the windows began to fall apart. Erland's team had to reinforce all the trusses and outside walls to ensure the window arches would stay in place. Adding insulation to this building while restoring ceiling heights also meant that we were adding weight to the roof; we had to reinforce the entire structure to ensure it would be able

to support snow loads.

Despite our best efforts to plan ahead by hiring a firm to assess the building's structural integrity, our team had to think quickly to manage the unexpected. As with most school projects, we had a firm deadline to finish before the start of the 2011 school year, so we did not have the luxury of stopping work to brainstorm potential solutions - despite our efforts to build in some extra time after completing the Risk Assessment Matrix in preconstruction. Our site superintendent and field laborers were forced to think on their feet to resolve small issues in the field; our project management staff had to work diligently to develop solutions to the larger scale challenges while always upholding the agreed-upon budget and schedule. Without prior experience to rely on, meeting the schedule would have been next to impossible.

A Good Defense

In construction, like sports, sometime the best offense is a good defense. Planning ahead and anticipating setbacks based on previous experience and the building's observable condition will help to avoid huge problems during construction. There is no "right way" to renovate a space, but the top Construction Managers have plenty of resources to draw on and policies to enforce to increase the chance for success.

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