

Executive Summary

The Penn State Ice Arena is the focus of the Integrated Project Delivery/ Building Information Modeling (IPD/BIM) Senior Thesis. This report will serve as a proposal for HPR Integrated Design's alternative design strategies to achieve more efficient building systems within each discipline. The goals of these strategies are to deliver a facility that will have the highest quality for the budget allotted, reduce building's energy usage and cost, create a fast tracked schedule, and develop a LEED Gold certified hockey arena.

HPR Integrated Design has developed three packages that first saved costs, and then enhanced the building features. These packages will give the owner options to enhance the quality of their ice hockey arena. HPR has studied the feasibility study up through the preliminary design, as well case other case studies, while using value engineering to develop these packages. Listed here are the design packages created.

- Savings Package – Raising of the Event Level
- Prominence Package – Main Arena Roof System Design
- Function Package – Façade Redesign

HPR has utilized the following method for developing each of the design packages.

1. Find an Opportunity
2. Identify our Goals
3. Create a Strategy
4. Define our Process
5. Finalize the Results

Savings Package:

The current design shows a floor-to-floor height between the event level and main concourse level of 20 foot 9 inches. With this height level, there is 10-foot plenum space. The driving force behind raising the event level is to reduce the amount of bedrock needing to be excavated from the site. In doing so, the plenum space will be reduced. HPR believes that by raising the event level approximately three feet, excavation costs will be reduced, and the plenum space that is otherwise wasted will be optimized. Savings from the reduction of excavation will then be reallocated to the main arena roof system design to give the Penn State University a facility of greater value for the same construction cost.

Prominence Package:

When HPR received the drawings for the Penn State Ice Arena, the main arena roof system's design had not been completed. HPR's designers will coordinate and design a roof for the main arena that is iconic and that will support the overhead lighting and duct systems.

Function Package:

With the design of the new roof system, the façade will have to be redesigned in order to coordinate in the efforts to design an iconic facility. As the façade is redesigned, materials will be

selected and configured to maximize daylighting, reduce energy loads, and reduce construction and energy costs.

The raising of the event level and the main arena roof systems are closely connected. As the volume of the main arena is increased by a new roof profile, it is then reduced with the raising of the event level up. On a financial side, money saved in excavation by raising the event level can then be reallocated to the more prominent arena roof structural and MEP systems. This will provide the University with a higher quality product for a competitive cost to the current design.