

How Effective Teamwork Saved WSU Millions

Owner + Constructor + Designer

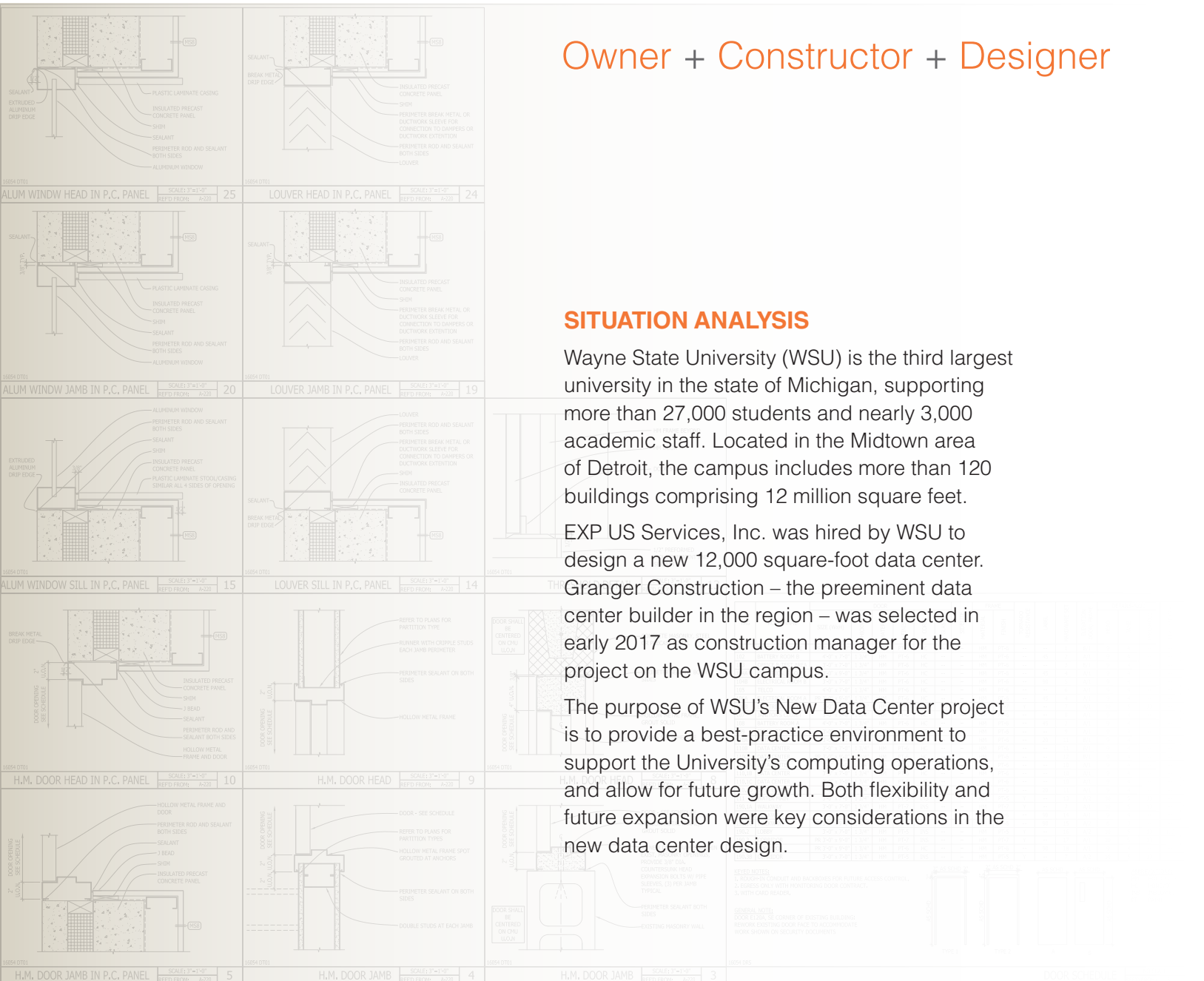
SITUATION ANALYSIS

Wayne State University (WSU) is the third largest university in the state of Michigan, supporting more than 27,000 students and nearly 3,000 academic staff. Located in the Midtown area of Detroit, the campus includes more than 120 buildings comprising 12 million square feet.

EXP US Services, Inc. was hired by WSU to design a new 12,000 square-foot data center.

Granger Construction – the preeminent data center builder in the region – was selected in early 2017 as construction manager for the project on the WSU campus.

The purpose of WSU's New Data Center project is to provide a best-practice environment to support the University's computing operations, and allow for future growth. Both flexibility and future expansion were key considerations in the new data center design.



GETTING STARTED

Data center projects are complicated undertakings. As with most projects of this complexity, it was imperative that the WSU Data Center project start with a foundation for success.

From the beginning, the commitment of all parties to do what was in the best interest of the project was apparent. Rather than operate within traditional silos, the team, including the owner, architect, constructor, and end users, worked collaboratively throughout the pre-construction process.

The team held an initial “Right Start” meeting to uncover elements critical to the overall plan as well as define the “conditions of satisfaction” for the project. Beginning the process with an open dialogue and agreed-upon goals ensured that the entire team was aligned from day one.

OPTIMIZING DESIGN, SAVING MILLIONS

EXP and Granger worked together throughout pre-construction to thoughtfully modify designs and plans, as well as identify areas where value engineering could be utilized. Both Granger and EXP showed commitment and willingness to dedicate organizational resources and talent during pre-construction for the overall benefit of the project. By doing so, opportunities for optimization were identified and discussed as plans were being finalized.

According to Dennis Carignan, vice president of Granger Construction, this collaborative approach resulted in unique value engineering outcomes.

“Oftentimes, value engineering means reducing scope,” said Carignan. “Because of our true understanding of project goals, and the decision to dedicate resources upfront, we didn’t have to reduce scope. Instead, we found win-win ways to optimize details that both improved reliability and reduced costs.”

Together, Granger and EXP identified more than \$3.7 million in project optimizations.

STARTING STRONG

- Key decision makers all in the same room before the project began
- Conditions of satisfaction set upfront
- Teamwork and trust built through thoughtful communication
- Cohesive information between architect and CM
- Committing energy and resources at the beginning saved money and time
- Project goals clearly posted throughout construction

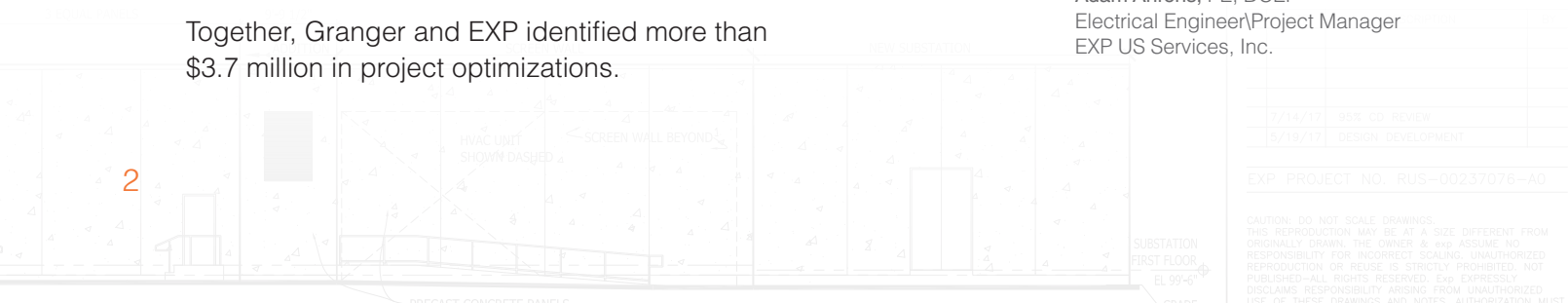


Presented with this list of proposed value engineering items, WSU was able to thoughtfully consider each prospective change and evaluate its effect on the project. Many specific value engineering elements – such as

design changes to the roof, the incorporation of the substation building into the data center project, and the elimination of a perimeter corridor – were approved for implementation by the owner. In all, these changes resulted in overall cost savings of \$2.2 million to the project.

“Bringing Granger onboard early in the design process provided invaluable assistance with regards to constructibility and coordination, utilizing their expertise in building systems and construction methods. Resolving conflicts and coordinating design across all trades throughout the process eliminated costly redesign efforts at the end of the project, as well as change orders during construction.”

Adam Ahrens, PE, DCEP
Electrical Engineer/Project Manager
EXP US Services, Inc.



THE SPECIFICS

Precast Envelope

Reliability of operation is key in a data center. Two critical elements of this are the prevention of water intrusion and security. Like most owners, WSU was significantly concerned about both. Initial plans specified a perimeter corridor designed to prevent collision impact to the facility and mitigate potential water damage by placing the computer room on an inside wall.

Working together, Granger and EXP addressed these concerns by reviewing original plans and recommending a solution utilizing a precast envelope in conjunction with robust landscaping. This suggestion eliminated the need for the perimeter corridor and satisfied both the barrier and water concerns while saving time and money.

FIG. 1

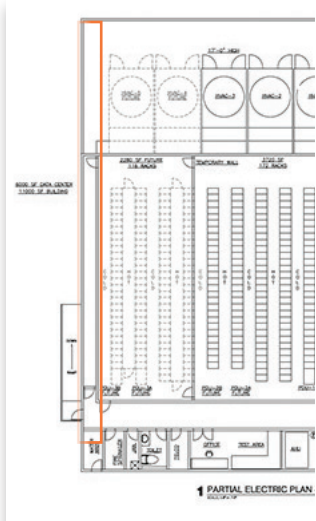
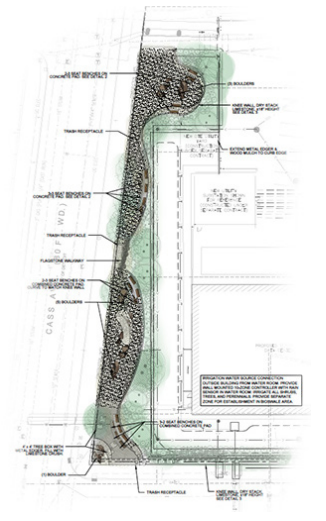


FIG. 2



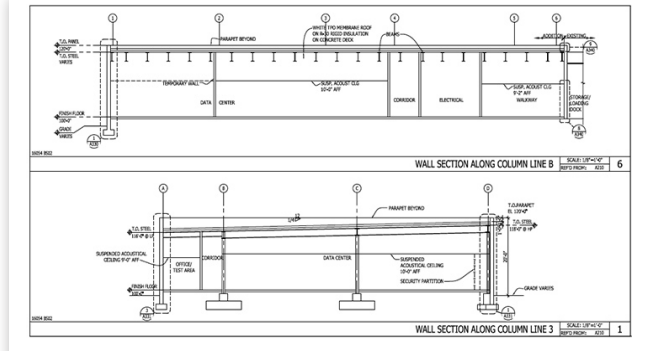
Planned perimeter corridor was eliminated (FIG. 1) and robust hard landscaping was used to mitigate water concerns (FIG. 2).

Contributing factors to recommending this solution included the ability of a precast envelope to act as a barrier to impact. In addition to added durability, this approach minimized security concerns. It also improved scheduling by enclosing the building faster, limiting the impact of winter on construction. Finally, robust, hardened landscaping helped reduce security and water damage concerns.

The Insurance of a Double Roof at Half the Cost

Like all data centers, WSU's directive for the server room specified a watertight envelope. The original design solution included a second roof with supports from above to prevent potential leakage. This double-roof solution required roof penetration to secure the two together.

FIG. 3



The slab on deck concrete option provides the required watertight envelope at a significant savings (FIG. 3).

The project team conducted a roof/structure analysis based on the original plans and future goals. After thorough analysis, Granger and the engineering team determined several viable – and cost saving – solutions. One of which was to utilize a slab on deck concrete solution and eliminate the second roof altogether – a cost savings of approximately \$225,000.

Granger and EXP communicated the viability and cost savings of the slab on deck concrete option to the WSU team. The result not only satisfied the initial directive of a watertight envelope, but provided significant cost, schedule and resource savings.

Incorporating the Substation Building to Maximize Efficiency

Initially a separate project, a substation building to provide power to the data center was an ancillary part of the WSU New Data Center plans. Due to physical barrier and security concerns, original designs called for a structural screen wall to shield external functional elements of the cooling system. Upon evaluation, the team proposed significant cost savings and increased efficiency by incorporating

The substation's previous location (FIG. 4) and the substation incorporated into the data center project (FIG. 5). Relocating the substation to serve as an equipment screen wall created significant savings, improved site operations and reduced project risks.

FIG. 4 Mechanical Screenwall.

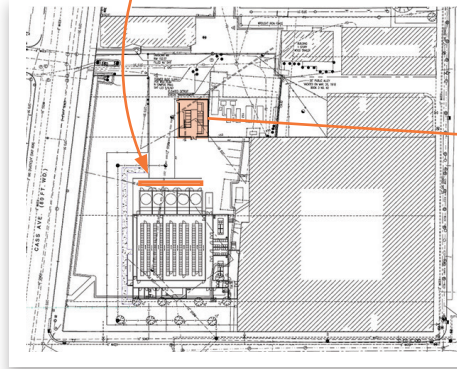
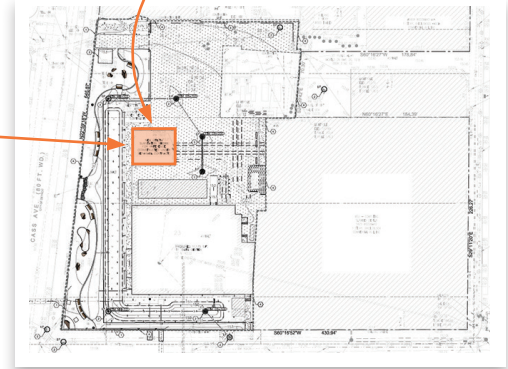


FIG. 5 Screenwall eliminated by relocating the substation.



the accompanying substation building into the overall data center project. Including the substation building allowed it to be relocated closer to the structure to provide a more secure barrier for the building's external elements. It also eliminated the need for the screen wall altogether.

This design saved significant resources in several ways. It reduced underground duct length, improved site logistics and overall operational effectiveness (including the convenience of housing the hub with the data center) and it improved economies of scale because it became easier to procure work without increasing general conditions.

Consistent teamwork and constant communication between Granger, EXP and WSU allowed the team to reevaluate the original substation building plan and agree on a more efficient alternative solution.

CONCLUSION

The trust built through open communication between Granger, EXP and Wayne State University was critical to the decision-making process.

The commitment to team collaboration has ensured that WSU's New Data Center project will effectively support the University's needs for years to come. By beginning with the end in mind, and through a commitment to clear communication, thoughtful design, and a willingness to invest appropriate resources, the project saved more than \$2.2 million before construction began.

VALUE ENGINEERING

Three value-engineering solutions that helped save WSU millions:

Precast Envelope

- Eliminated perimeter corridor
- Satisfied water damage and barrier concerns
- Minimized cold weather installation premiums

Single Slope Concrete Roof Slab with Xypex Admixture

- Satisfied watertight envelope
- Eliminated interstitial space associated with the double-roof structure
- Increased durability of the facility

Incorporating Substation Into Single Project

- Eliminated need for separate screen wall
- Increased operational efficiencies for WSU team
- Reduced cost of the electrical duct bank

"Working with Granger and EXP on the new data center project has been a successful collaboration. Due to the importance of this facility to Wayne State University it was critical for us to work with experienced partners, and Granger has exceeded our expectations. The creativity and innovation they brought to the project has been impressive. We fully expect that Granger's careful and thoughtful planning will keep us on budget during construction and continue to provide value once the new facility is online."

Daren Hubbard, PMP
CIO and Associate Vice President
Computing & Information Technology
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