SUCCESS STORY | LHB

PREVIEWING THE FUTURE OF URBAN RENEWAL

Virtual reality powered by NVIDIA® Quadro® GPUs delivers a realistic, immersive preview of the Superior Street Reconstruction Project by LHB.

NVIDIA

NVIDIA Quadro GPUs provide the compatibility and performance needed to boost stakeholder buy-in while reducing design time and costs.

AT A GLANCE

CUSTOMER PROFILE

Company: LHB

Industry: Architecture/Engineering (AE)

Location: based in Duluth, Minnesota

Size: 260 employees

SUMMARY

- AE firm based in Duluth, Minnesota.
- Designed a reconstruction project for a major thoroughfare.
- Modeled a segment of the project for VR previews.
- NVIDIA Quadro VR-Ready GPUs provide compatibility with design and modeling applications while delivering immersive VR experiences.
- Increased stakeholder buy-in reduces costs and speeds project design and approvals.

SOFTWARE

Modeling: Autodesk Building Design Suite Premium 2017, AutoCAD Civil 3D, Raster Design, Bentley Microstation

VR: Revizto, Fuzor

HARDWARE

NVIDIA boards: Quadro P5000

Workstations: Dell Precision 5810

VR: Oculus Rift and HTC Vive

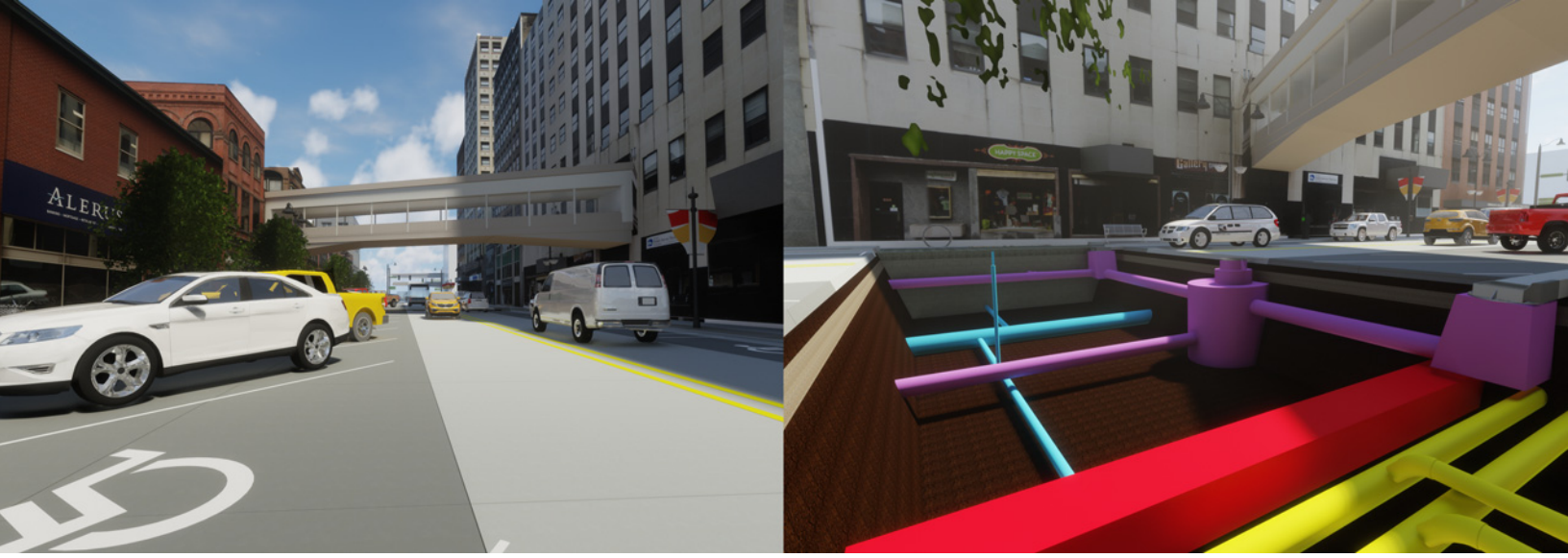
Respect among a diverse group of specialists, an entrepreneurial spirit, and a desire to create vibrant communities have been the guiding principles at LHB since its founding in Duluth, Minnesota, in 1966. The firm initially began as a structural engineering firm, but quickly expanded to include architects and other engineering disciplines. Today, LHB is a full-service firm that delivers complete projects from high-performing buildings to sites and infrastructure.

LHB's civil engineering services include large corridor studies, community redevelopment plans, design frameworks, streetscape design, and pedestrian amenities. For example, the City of Duluth hired LHB to design the Superior Street Reconstruction Project. This project aims to revitalize just over a mile of one of the city's oldest, most iconic streets by improving the street, streetscape, traffic control, transit, below-ground utilities, and operations for greater functionality, sustainability, and user experience.

CHALLENGE

Civil engineering projects include many components such as plants, benches, public art, crosswalks, signals, lighting, and utilities that require discussion, review, and approval. Project stakeholders can include executive and legislative bodies, planning and public works departments, transit and emergency services, business and property owners, residents, and other impacted parties. Construction methods and phasing to minimize construction impacts also require consideration, as does ongoing maintenance.

"Everyone from the lieutenant governor to the general public is involved with the Superior Street project," said Dan Stine, BIM Administrator at LHB. "We had to demonstrate our ability to handle projects beyond individual buildings and deliver a design worthy of our hometown. It was imperative for stakeholders to see our proposals in a meaningful and impactful way. It's hard enough to mentally transform the static 2D drawings used by most firms into complete 3D streetscapes, let alone understand the experience of using those spaces. This is especially true



Managing graphics and VR drivers and applications to make sure everything worked was a tedious, time-consuming process. We had to use different machines for design and rendering. We also needed to verify that all of the software and drivers worked before every client meeting or demonstration.

Dan Stine
BIM Administrator
LHB, Inc.

REASONS FOR QUADRO

1. Seamless tested and certified support for design, rendering, and VR applications.
2. Performance boost compared to previous VR solution that used consumer GPUs.
3. Improved realism and interactivity using NVIDIA-specific VR features.
4. Increased buy-in saves time and lowers project cost.

when comparing multiple options under varying weather and time conditions.

"We quickly realized that virtual reality (VR) was the way to go, because it creates a realistic, interactive environment that accurately mimics the final product. This level of immersion increases support for the project while also helping viewers spot potential issues before construction begins. Aesthetics, lighting, ambiance, sight lines, security, cost control—the case for VR is compelling."

LHB uses high-end design and modeling applications such as AutoCAD Civil 3D and Revit, which require enterprise-grade GPUs such as NVIDIA Quadro. VR applications such as Revizto render this data in real time for viewing on a headset such as Oculus or HTC Vive. These headsets are supported by both gaming/consumer GPUs, such as NVIDIA® GeForce®, and professional GPUs, such as NVIDIA Quadro.

"Our workstations rely on the tested, certified Quadro cards and drivers for optimum performance and uptime," continued Stine. "Managing graphics and VR drivers and applications to make sure everything worked was a tedious, time-consuming process with the consumer gaming cards. We had to use different machines for design and rendering. We also needed to verify that all of the software and drivers worked before every client meeting or demonstration."

Traditional fixed-angle renderings still have their place, but having VR allows our clients to freely explore projects in progress. For example, one store owner could see and experience how a street lamp would look in front of his window display. Another resident could survey the street from the elevated pedestrian walkway.

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SOLUTION

Oculus Rift Commercial and HTC Vive resolve compatibility issues and streamline the pipeline from modeling to viewing by allowing LHB to use tested and certified NVIDIA Quadro P5000 GPUs and drivers. This also eliminates the need to maintain separate workstations for design/modeling and VR viewing. Architects and engineers can also take advantage of VR to preview and fine-tune their designs at any time.

LHB uses more than one VR application. Revizto is available to anyone who works on buildings and can be used for issue tracking. Fuzor leverages NVIDIA® PhysX® and NVIDIA® SLI® multi-GPU performance scaling to provide a realistic interactive experience that includes avatar walkthroughs and vehicle driving. Fuzor also offers more natural controller functions and contextual information than the other applications, making it ideal for use by clients and stakeholders.

"We created a VR experience for a one-block area of Superior Street based on our Revit model," said Stine. "We placed photographs of existing buildings on flat surfaces and then modeled details such as curbs, utilities, and a pedestrian bridge. Topography information from AutoCAD Civil 3D increased realism by allowing users to stick to the ground without falling though. Street lamps and other light sources are photometrically accurate for the lamp and bulb type for realistic nighttime views. The NVIDIA Quadro GPUs deliver the performance we need to provide this level of realism in a truly interactive virtual environment."

RESULTS

LHB is increasingly using VR powered by NVIDIA Quadro P5000 GPUs for client presentations and design reviews. For example, engineers can explore a petroleum pumping station, including walking up and down movable stairs, verifying that shutoff valves are within reach, and reviewing the locations and routing of pipes, conduits, actuators, and other components. Some designers bring headsets to client meetings on a regular basis or provide VR samples for experiences that don't require a headset. This facilitates sharing design concepts with a broader audience, such as legislators, prospective tenants, the general public,

and other stakeholders before and during a project. For example, the Superior Street VR model was updated to demonstrate how requested changes to streetlight poles would look once implemented.

Running Fuzor with NVIDIA Quadro GPUs offers several unique benefits. Depending on the workstation and need, a single GPU can render both eyes; alternatively, dual GPUs can each render one eye. NVIDIA® OptiX™ ray tracing provides fast and accurate light analysis, while multi-threaded rendering using DirectX 11 Driver Command Lists boosts performance.

"Traditional fixed-angle renderings still have their place, but having VR allows our clients to freely explore projects in progress," Stine concluded. "For example, one store owner could see and experience how a street lamp would look in front of his window display. Another resident could survey the street from the elevated pedestrian walkway. Examples like these force us to consider materials and other design elements earlier on to create a more compelling experience, but the payoff in client buy-in and spotting potential issues before starting construction is invaluable. The NVIDIA Quadro P5000 GPUs are certified by Autodesk and work seamlessly with our design, modeling, and VR applications while delivering significant, noticeable performance boosts over the consumer cards we used before Quadro support was available. This technology is so successful that we have constructed VR lounges in our offices to increase collaboration between staff and clients."

Going forward, LHB plans to continue using VR and finding new ways to deliver even more immersive and interactive experiences. For example, Fuzor supports multiple concurrent users in the same model. Each user can see the other users' avatars in the model. This feature is currently unique to Fuzor and the professional VR market.

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Dan Stine
BIM Administrator
LHB, Inc.

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