

2016 AGC ACE Awards

Category 5: Best Building Project – Subcontractor (over \$10 Million)

Specialty Contractor: Sturgeon Electric Company, Inc.

Project Name: US Highway 36 Express Lanes

Like two jewels nestled in Colorado’s rocky mountain crown, the cities of Denver and Boulder shine brightly as two of America’s most desirable places to live. Denver was recently ranked #1 by U.S. News and World Report’s “Best Places to Live”, while Boulder earned top-ten distinction in the same category at livability.com. However, if you’ve ever driven around these two cities, you’d know that such honors could not possibly have included “easy traffic” as part of the evaluation criteria. And if you live here, it’s likely you share the same frustration with locals who feel like every roadway upgrade on the Front Range seems obsolete by the time they’re finished. And you’d be correct to assume as much - until now.

The US Highway 36 Managed Lanes project was the largest construction project in Colorado last year, spanning 18 miles and eight lanes of traffic between Denver and Boulder, with an overall cost approaching \$550 million. However, this was much more than a roadway expansion project. It comprised bold, innovative, intelligent features which held the attention of many civic leaders and engineers across America:

“This project represents the future of transportation in Colorado. US-36 is a model of how a multimodal highway in a public-private partnership will help this state’s critical corridors meet growing demands.” – Colorado Gov. John Hickenlooper

A peek into the future: Mirroring Europe’s roadway innovations, US Highway-36 has become Colorado’s first “Smart Highway”. It’s a looking glass into the future of *the Internet of Things* (IOT); the forthcoming flood of intelligent devices intertwined with nearly every market of human affairs. From the way we commute by land, air and sea, to the way we exist on nearly every platform - the IOT is coming. Intelligent devices are expected to outnumber humans 3-to-1 within a decade. It sounds like a Sci-Fi narrative scripted for Hollywood, but the IOT is already in its infancy, poised to revolutionize traffic as we know it, and Coloradans have a front-row seat to the show.

The owner's goal for the 18-mile corridor was to create a project the taxpayers would be proud of, and that other departments of transportation could study and implement in their own states. To achieve this, the Colorado Department of Transportation (CDOT) partnered with a concessionaire who contributed equity to help fund the project and operate the highway for the next 50 years. The concessionaire hired a construction team that included Sturgeon Electric in the first large infrastructure Public Private Partnership (P3) project in Colorado.

Sturgeon Electric's scope of work included reallocation of existing traffic signalization to accommodate lane and shoulder expansion, as well as new roadway overhead and underground infrastructure. This included intelligent signage, controls, power, communications, lighting, structure installation and programming. Working together with CDOT, Ames/Granite Joint Venture and other trade partners, Sturgeon Electric safely and successfully delivered a much-needed intelligent highway system with numerous innovations:

- **Managed High-Occupancy Vehicle (HOV) lanes** – vehicles with two or more passengers (HOV-2) can travel in the express lanes without incurring a toll, until speeds consistently drop below 50MPH or when public transit is repeatedly delayed, at which point the lanes will change to HOV-3, requiring three or more passengers in order to ride toll-free.
- **Variable tolling** – Toll rates for managed lanes adjust based on traffic flow to aid with congestion.
- **Active Traffic Management** – signage above each lane directs traffic to improve flow, adjusting speeds or providing other instruction.
- **Travel Time Indication** – gantry signage displays expected travel times to exits or towns based on feedback of traffic movement.
- **Bus Rapid Transit (BRT)** – several features accommodate a dedicated local bus system which runs a circuit between Boulder and Denver.
- **Bus-On-Shoulders** – shoulders are 12 feet wide and engineered to accommodate heavy vehicles; the intelligent highway system automatically activates the shoulder when traffic thickens.

- **Diverging Diamond Interchange (DDI)** – the first of its kind on the Front Range, the DDI is an innovative intersection system which significantly reduces congestion while reducing serious accidents. This is accomplished by eliminating designated left turns onto the highway by funneling left-turning traffic through a two-phased signaled interchange. Uses of DDI interchanges in other parts of the country have drastically reduced “t-bone” accidents while improving traffic flow.

US-36 is the only project to date that incorporates all of these elements on the same project. Sturgeon Electric is honored to have been awarded the opportunity to be one of the first electrical contractors in America to build such a project.

Solutions of Special Projects

The enormous scale of the project and schedule expectations were difficulties which were exacerbated by not being able to fully close the existing roadway. In addition, the motoring public was constantly present in and around the work zone, which required extensive precautions to keep the roadways safe for the workers and for the motorists. To overcome these challenges, a very detailed plan was developed that would allow the road to be built in way that minimized impact to motorists’ commute, yet still created the safest possible work zone. Sturgeon implemented some of the latest work zone safety concepts such as “Hot Spot Trailers”, which were portable message signs that included a camera and vehicle detectors that allowed us to notify the public of troublesome spots early, as well as survey and measure the effect of the hot spot on the traffic.

Excellence in Project Execution and Management/Team Approach

While US-36 was a bold new frontier for Colorado, it was also the first time that responsibility of device integration was placed upon the contractor. Having never faced such an undertaking, Sturgeon recognized the challenge ahead:

- Immediate need for construction craftsman who could also fill a second role as highly capable and knowledgeable IT technicians.
- Uncertainty regarding physical connections, hardware, software, and across-the-board implementation of an unfamiliar system.

Sturgeon Electric was able to overcome these challenges by channeling resources and focusing on development:

- Recruited and developed returning military veterans who had gained IT experience while serving the country.
- Provided in-house training and development strategies for existing craftsmen to bring their IT capabilities up to par.
- Sturgeon Electric faced a large amount of uncertainty and ventured into new territory which required constant innovation, validation and modification.

Construction Innovations/State-of-the-Art Advancement

Prefabrication has traditionally been very limited in the heavy civil industry, however Sturgeon Electric's US-36 team gleaned concepts mastered by its Commercial & Industrial group. This process included building assemblies and installing components into cabinets within the company's warehouse, which reduced overhead work significantly. By creating cribs to support the large overhead sign structures on the ground, the signage could be installed rapidly, maximizing efficiency and reducing impact to the public.

Intelligent devices installed included:

- 90 Ethernet switches
- 193 Lane Use Signals (4'x4' signs over each lane)
- 29 Variable Message Signs
- 70 RFID readers
- 50 Microwave Vehicle Radar Detectors

Environmental/Safety

Highway work zones are burdened with many of the typical hazards associated with vertical construction projects. However, they have the added hazards of the travelling public and their vehicles constantly zooming by at 60mph. Therefore, the approach to safety must emphasize concern for craftsmen as well as the public. Safe work plans and protocols were engineered with

great care and planning for every single task, including a requirement for communication on an hourly basis.

The construction team planned out every closure, detailing on the drawings and working with CDOT to ensure that every closure, including bike paths, met the requirements of the USDOT's Manual on Uniform Traffic Control Devices. Because of this, much of the work was required to occur at night. Sturgeon Electric's crews were trained on how to properly identify road closure setups to prevent mistakes which could lead to injury or worse. In addition, crews were outfitted with the latest in personal protective equipment, including a lighting system worn on the hard hats that made the employees stand out from 360 degrees.

Excellence in Client Service and/or Contribution to Community

Sturgeon Electric is proud to have successfully delivered the \$27M electrical package on the US Highway 36 Managed Lanes project. In doing so, we've taken part in the story of how Colorado's roadways are leaping into innovation, re-shaping the way America commutes. The significance of this project to Colorado and the future roadway construction of other large cities makes US-36 a worthy contender for *Best Building Project – Subcontractor (over \$10 Million)*.









