

Stormwater improvements connects community

Angus W. Stocking, Licensed Land Surveyor

The massive Antelope Valley project represents a decades-long collaboration between the city of Lincoln, University of Nebraska-Lincoln, and the Lower Platte South Natural Resources District. Prompted by the need to safeguard against the Antelope Creek designated 100-year flood event, the project raised the question, "What do you want Lincoln and particularly the 600-square-block historical core to look like in 20 years?"

The Joint Antelope Valley Authority, a governmental entity created to administer the project, engaged the community, consultants, economists, planners, engineers, and facilitators to develop a 20-year plan and begin implementation of Phase 1 projects. Olsson Associates teamed with Parsons Brinckerhoff to win the initial feasibility study contracts in the late 1990s, and the two firms have been working together ever since.

use of a long, linear stretch of land running north and south through the heart of Lincoln.

Had a 100-year flood actually happened, studies suggested that water three to six feet deep would have inundated over 1,000 structures and caused millions of dollars worth of damage. To prevent this disaster and revitalize the area, 52 alternatives were studied before designers settled on a plan that left the existing conduit in place and created a new landscaped waterway with a trail system and park features. In association with that work, six miles of new roadway, 11 vehicle bridges, three pedestrian bridges, and a three-track railroad bridge were built, along with a diversion weir at the mouth of the conduit, and extensive channel improvements upstream and downstream of the conduit.

Considered as a whole, this was the city of Lincoln's largest-ever public works project. "This was a controversial plan



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said. "The obvious advantage was the interoperability, data sharing, and workflow efficiency among the clients, the design team, and other stakeholders." Another benefit of standardization was the ability to incorporate the city and county in GIS files for easy addition of utility information, right-of-way corridors, and aerial imagery.

conversion alone represented potentially huge savings, he said.

Antelope Valley today

The new waterway now serves as a linear park through the city, providing recreation and spurring development. In conjunction with the work needed for the new waterway, designers also addressed chronic transportation issues and made changes that improve safety and efficiency of daily commutes. "We designed the new waterway to be a linear park that helps to connect the city, rather than divide it," Jueneman explained. "For example, there is now a bike trail running the entire length of the channel, connecting to the existing bike trail network."

The new north/south trail replaces an existing trail that was not as friendly. "It was broken up into segments, and a lot of it was adjacent to major arterials or in narrow right-of-

flow moving through the park, which maintains fresh water," Jueneman said. "In an average storm—which are two- to five-year flood events—flow will first be increased through the conduit until it reaches capacity. In bigger events there is the potential for flow into the park, which has been designed to manage stormwater as needed."

The combination of the new waterway, rain gardens, and permeable surfaces greatly reduced the need for detention basins so that, in addition to the park itself, there is only one small new detention area. Another benefit of this massive stormwater project is the opportunity it provided to address chronic transportation challenges.

For example, about 60 trains per day passed through the area, stopping vehicular traffic at at-grade crossings. Designers worked with Burlington Northern Santa Fe officials to design and construct a new elevated intersection without any significant disruption to train schedules. The final grade separation design is comprised of MSE retaining walls, two concrete girder bridges, and a complex reverse curvature steel girder bridge. Two at-grade crossings were eliminated, all arterial roadway traffic was eliminated from the university campus, and the overall transportation infrastructure was upgraded to handle increased traffic projections through 2025.

"The creation of the roadway/channel/trail corridor creates a quality of life that never existed in this area," said Jueneman. "The trails improved access in the city core, contributing to a sustainable environment, and the landscaped areas and park facilities create destination spaces in what had been an underutilized edge of downtown. And the north and south areas of the University of Nebraska are now far better connected."

At \$246 million, Antelope Valley was an expensive project. But the value of present benefits is estimated to be \$745 million, and projections suggest that the private sector will invest three dollars for every public dollar spent. The improvements to quality of life are hard to estimate, but new development is already occurring, and several housing projects have already been completed.

The Antelope Valley project shows that a massive public investment in vital infrastructure pays off. The years of planning, innovative design, and a continuous commitment from all the stakeholders have delivered a revitalized, more sustainable community.

About the Author

Angus W. Stocking, is a licensed land surveyor who writes about infrastructure projects around the world as a frequent contributor to *Be Current* magazine, a Bentley Systems publication.



"This project was needed primarily to remove about 50 acres of the University of Nebraska and several Lincoln neighborhoods out of the floodplain," said Olsson Associates Senior Designer Brian Jueneman. "When that much area is in a floodplain, developers don't want to invest and it becomes blighted."

Jueneman has been associated with the project from its earliest phases. "Before this work was done, Antelope Creek ran through a 3,900-foot-long box culvert known as 'the conduit'—and this conduit was severely undersized with respect to 100-year flood events," he explained. This meant that major storms had a high potential to cause flooding, and, as a result, prevented constructive

because numerous properties had to be acquired before excavation could begin, and the property owners weren't necessarily happy about it," Jueneman related. In fact, the project has required about 1,000 public meetings and 75 citizen advisory committee meetings. The level of public input and amount of effort that went into keeping the public informed and educated was unparalleled. Hundreds of displays and descriptive documents were created for the sole purpose of engaging the public and educating them on the project.

"At an early stage, the decision was made that all CADD files, management, and electronic design would be standardized on the MicroStation and GEOPAK platforms," Jueneman

Project drafting and design standards were created and controlled using MicroStation's customizable workspace environments, then shared via an FTP site. "Design teams were headquartered in Lincoln, and support teams were spread from Minneapolis to Wichita," Jueneman noted. "Having project standards in an accessible format made enforcement effortless and fostered an efficient means for updates and changes as the process went along."

Regarding the return on investment of standardization, time savings were realized immediately with the elimination of other file formats which, in turn, reduced lost effort due to file conversion. The reduction in errors associated with

ways. The new trail is a great link to the overall trails network and is much better for bicycle commuting." In addition, most of the waterway is lined with grass and native plants, pervious paving, and rain gardens, which has a natural appearance that can be maintained. All of this combines to create an area that encourages walking and biking.

At the upstream side of the conduit, a three-block main park was established with features such as water fountains, plaza space, an amphitheater for festivals, and a pedestrian overlook. This area also serves a practical purpose in the overall stormwater management plan. "The weir structure is built upstream of the park and is designed to keep normal water