



**KANSAS  
INTERSTATE  
HIGHWAY 35  
SLOPE  
CASE STUDY**



**UNI-GROUP U.S.A.**  
MANUFACTURERS OF UNI PAVING STONES

**PROJECT:**

Interstate Highway I-35  
State of Kansas

**OWNER:**

Kansas Department of Transportation (KDOT)

**PROJECT DESIGNER:**

HNTB Corporation  
Overland Park, Kansas

**GENERAL CONTRACTOR:**

Bratton Bros. Contracting, Inc.  
Shawnee, Kansas

**PAVER INSTALLER:**

Quality Concrete Construction Co.  
Mission, Kansas

**CONCRETE PAVER MANUFACTURER:**

Barbour Pavers, Inc.  
Independence, Missouri

**PAVERS:**

2<sup>3</sup>/<sub>8</sub>" (60mm) and 3<sup>1</sup>/<sub>8</sub>" (80mm) UNI-Decor®  
Red/Charcoal Blend - 62,600 square feet  
Slope: 1 foot rise in 1.8 feet

**T**he slope improvements for the reconstructed interchanges at Johnson Drive and 67th Street in the city of Merriam in Johnson County, Kansas were completed in July 1991 as part of the Interstate Highway 35 Corridor improvements project. These side embankment slopes are characterized by steep fill slopes which are difficult to maintain and are subject to significant erosion. The Kansas Department of Transportation (KDOT) selected the design firm HNTB of Overland Park, Kansas, one of the nation's leading transportation design firms, to develop landscaping plans for the corridor and to design slope improvements at the interchanges.

HNTB was asked to consider cast-in-place concrete, dry-laid stone and turf as design alternatives for the slopes. When installation and long-term maintenance costs were studied for all three methods, a flexible pavement design using segmental interlocking concrete pavers was selected. Although this paving system has slightly higher installation costs, the life cycle costs are lower. The interlocking pavers met all the project criteria – preservation of slope integrity, weed control, and elimination of mowing. In addition, this flexible paving system would withstand freeze-thaw cycles.

**T**he 62,600 square feet of UNI-Decor® interlocking concrete pavers that were specified for the project were manufactured by Barbour Pavers, Inc. of Independence, Missouri, a member of UNI-GROUP U.S.A., the nation's leading concrete paver producer organization. UNI® Paving Stones have earned a worldwide reputation for



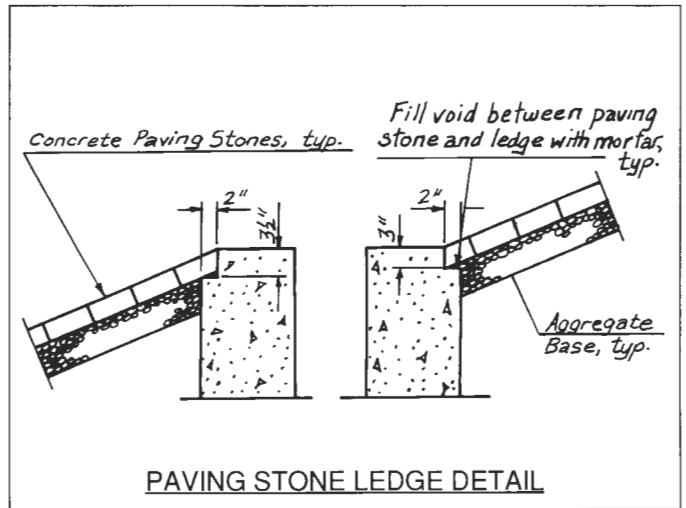
unsurpassed quality, durability and proven performance. UNI-GROUP U.S.A. manufacturers' pavers have been specified for major paving projects nationwide, including the Pier IX Terminal in Virginia, the Dallas/Ft. Worth International Airport in Texas, the Port of New Orleans in Louisiana, and Disney World in Florida. They offer designers, engineers, developers, and architects superior professional service and technical expertise unmatched in the concrete paver industry. All UNI® Paving Stones are manufactured to the highest quality standards to meet or exceed ASTM C-936 specifications of minimum 8000 psi, maximum 5% absorption and freeze-thaw testing per section 8 of ASTM C-67. The red and charcoal blend UNI-Decor® pavers that were selected for the project provided a unique combination of attractive pattern design, color, and texture, with an economical, long-wearing surface.

**B**ase and drainage design were critical elements of the slope project. Reinforced concrete toe walls were installed at the bottom of the slopes, with a drainage system at their base. This drainage system carries the runoff to the existing storm drainage system on I-35, where a connection was made. The Johnson Drive interchange required jacking an encasement pipe under the existing ramp pavement at two locations to facilitate the connection between the new and existing drainage systems.



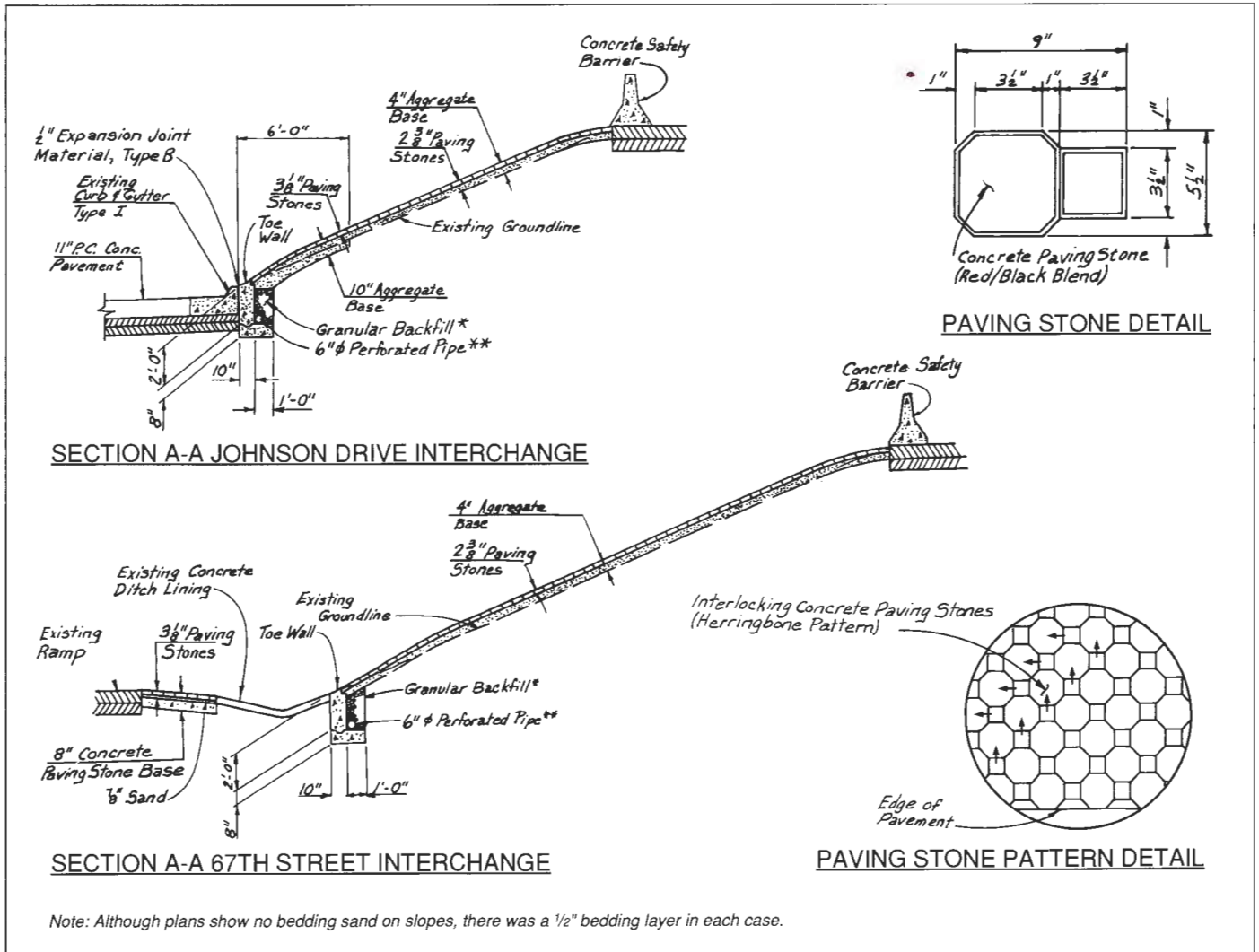
**T**wo thicknesses of UNI-Decor® concrete pavers were used on the Interstate 35 slope project. A 2<sup>3</sup>/<sub>8</sub>" (60mm) thick unit was utilized for the slope areas, while 3<sup>1</sup>/<sub>8</sub>" (80mm) thick pavers were used for areas where occasional vehicular traffic was expected. Before the pavers could be installed, the topsoil on the slopes had to be removed down to the existing soil reinforcement grid which stabilized the steep slopes and could not be disturbed. A 4" crushed rock aggregate base was then placed on the slopes and compacted to 95% density with a specially designed plate compactor with two vibratory plate tampers. The steep grade necessitated maneuvering the tamper into place on the slopes by use of a wench mounted on a fabricated stabilizing arm. Then a sand bedding layer conforming to the grading requirements of ASTM C-33 was screeded to 1/2" to seat the 2<sup>3</sup>/<sub>8</sub>" (60mm) UNI-Decor® pavers. In the vehicular traffic areas, the 3<sup>1</sup>/<sub>8</sub>" (80mm) units were placed over an 8" concrete base with a 7/8" sand bedding layer. The total installation, including excavation, drainage, base construction and manual placement of the pavers was completed in approximately 6 weeks.

Specially designed and shaped cast-in-place planters were placed in areas which would not compromise the structural integrity of the soil reinforcement grid already in

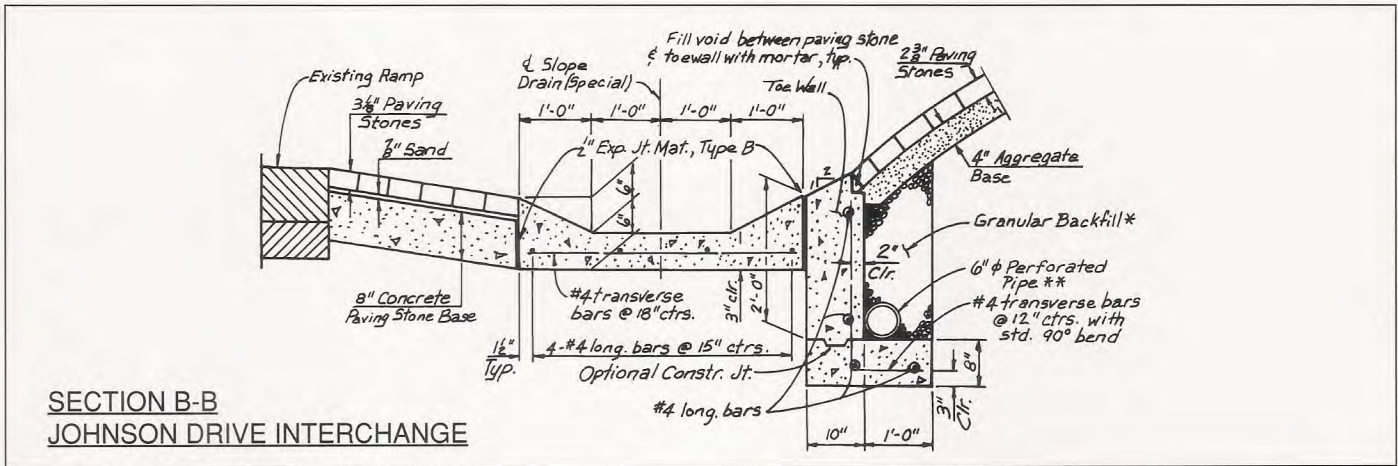


place. The reinforced concrete planters were designed to withstand earth pressures from the steep embankment slopes. Ledges were formed and cast into the planter walls at all locations where the pavers abutted the planters.

Although the steep grade made installation more difficult for the general contractor, Bratton Bros. Contracting, Inc., and the paver installer, Quality Concrete Construction Co., all work was completed without interruption to



Note: Although plans show no bedding sand on slopes, there was a 1/2" bedding layer in each case.



the I-35 interchange traffic. This was an important factor as the KDOT demanded that all designs in the reconstruction of I-35 be developed so that traffic flow was maintained. Interstate 35 is the main commuter route linking Kansas City, Missouri, and the Kansas suburbs. Public information and design coordination were key elements of the traffic maintenance program. A Corridor Advisory Team, consisting of representatives of KDOT, the Kansas Highway Patrol, FHWA, and a metropolitan planning group, was created to keep the public informed and to coordinate the project management program.

**T**he UNI-Decor® interlocking concrete pavers not only provided a durable, stabilizing surface for the slopes, but also added beauty to the surrounding area. At a time when funding for public works projects is in short supply, there was some concern about public reaction to the "expensive-looking" pavers. In a report about the project, Channel 5 KCTV reporter, Reed Black, spoke with Dennis Weinrich of the KDOT about why they used the concrete pavers. Mr. Weinrich commented that they had previously experienced problems with erosion and maintenance of the traditional reinforced concrete and grass-surfaced slopes and felt that the higher initial cost of the pavers would be offset by their low life-cycle costs. Mr. Black also questioned patrons at a nearby gas station about the project and whether the pavers were a good use of the taxpayers' dollars. One businessman who lived in the vicinity felt that it gave the whole area an economic boost and liked how the UNI-Decor® pavers looked, while another customer commented that the pavers would cut down on maintenance and replacement costs in the long run.

**M**ore than two years after installation (and after being subjected to winter weather and record rainfall), Terry Flanagan, P.E., of HNTB, project manager of the I-35 slope project, notes that the UNI-Decor® pavers have held up well. He comments that the KDOT has been quite pleased with the selection of the UNI-Decor® interlocking pavers for the slope embankments and were confident the higher initial installation cost would be justified in lower maintenance expenditures. Mr. Flanagan added that the pavers also are helpful in delineating the ramp pavement area from the slope access and drainage areas. HNTB also specified UNI-Decor® pavers for various bridge abutment slopes for the 1993 Kellogg (U.S. Highway 54) expansion project in Wichita, Kansas.

*Please Note: Pavement design varies with climate, available construction materials, design methods, soil conditions, and traffic load. A qualified engineer, architect, and/or landscape architect should be consulted in concrete paver applications to ensure desired results.*

For additional information on UNI® Pavers, consult the following publications also available from your UNI-GROUP U.S.A. manufacturer:

"Applications For Concrete Paving Block In The United States Market", R.S. Rollings and M.P. Rollings, 1992

"Design Considerations For The UNI Eco-Stone® Concrete Paver", R.S. Rollings and M.P. Rollings, 1993



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