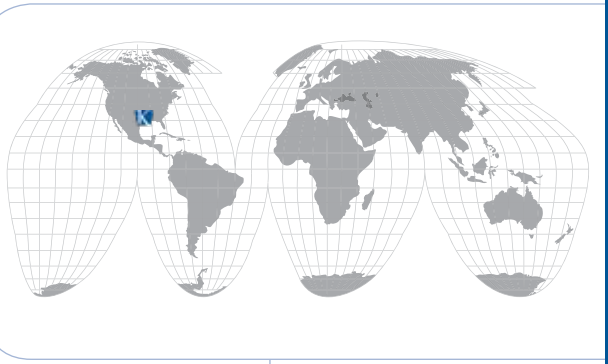
KEYSTONE® RETAINING WALL SYSTEMS
A CONTECH COMPANY

Cove Lane Interchange

Lake Charles, Louisiana



CASE STUDY

Louisiana's Highway Interchange Challenges Overcome with Piles and Keystone Walls

In July of 2015, the Louisiana Department of Transportation and Development and other state and local officials held a ribbon-cutting ceremony celebrating the completion of the Cove Lane Interchange project in Calcasieu Parish. This was a large-scope, complex overpass and road improvements project of 1.8 miles that marked the first of three phases of remedies to congestion along a major interstate artery in the area, I-210. It provides relief of traffic congestion near two large resort and casino attractions, and in the larger scheme, furnishes economic benefits for the Lake Charles and New Orleans region with better connections between residential, commercial, and industrial hubs.

Photo provided by GeoEngineers, Inc.

Project:	*Cove Lane Interchange*
Location:	*Lake Charles, LA*
Owner:	*Louisiana D.O.T. & Dev.*
Keystone Product:	*KeySystem™ I - KeySteel® SQ.FT.* *KeySystem™ II - KeyGrid™*
Licensed Manufacturer:	*Premier Concrete Products* *Baton Rouge, LA*
Total Wall Sq.Ft.:	*5,000 s.f. - KeySteel® SQ.FT.* *127,000 s.f. - KeyGrid™*
Wall Contractor:	*Johnson Bros. Construction* *www.johnson-bros.com*
Civil Engineer:	*Stantec* *www.stantec.com*
Geotechnical Engineer:	*GeoEngineers* *www.geoengineers.com*

The completed Cove Lane interchange is the first of a three-phase, $80 million project that the Louisiana Department of Transportation and Development has undertaken. "The completion of this (phase) not only allows for improved transportation for motorists, but it will enhance development along the corridor," said State Senator Dan Morrish.

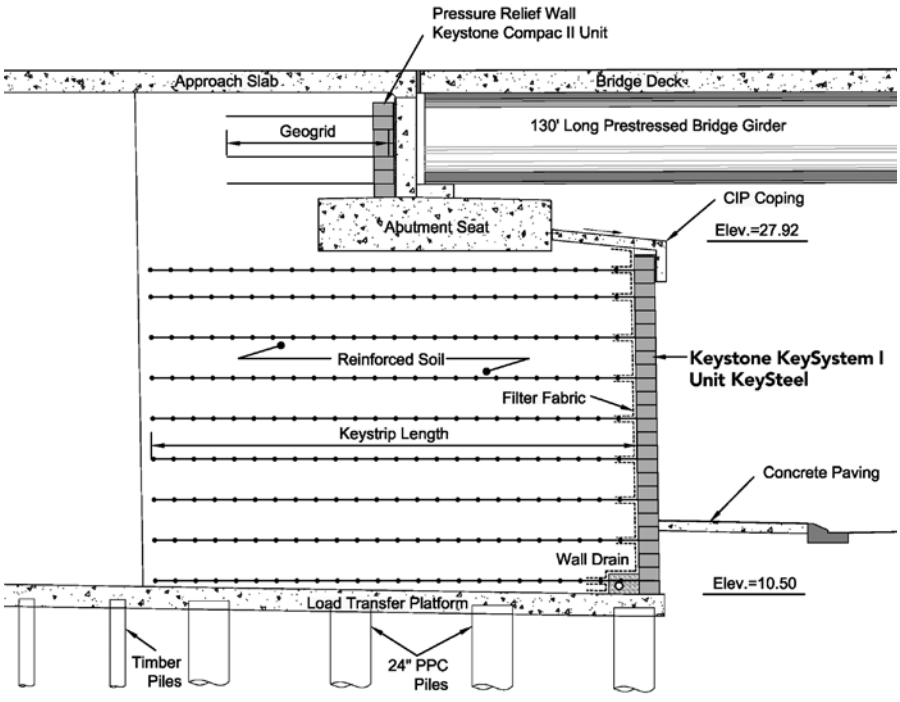
CASE STUDY

Traffic Flow Phase I
Construct Walls 1, 2, and 3, which support the westbound ramp using KeySystem II. Includes support of a smaller bridge abutment using KeySystem II for the northbound Cove Lane bridge to the Golden Nugget Casino and the golf course.

Traffic Flow Phase II
Construct Approach and Bridge Abutment Walls 4, 5, and temporary walls that support the eastbound lanes of I-210. Construct Walls 6 and 7, which support the eastbound ramp.

Traffic Flow Phase III
Construct Approach and Bridge Abutment Walls 8 and 9. Increase the height of portions of Walls 1, 2 & 3 to final finished grade vertical alignment.

I-210 Bridge Abutment Over Cove Lane



Pressure Relief Walls
Keystone also used KeySystem II for pressure relief walls behind the approximately 5-foot-high I-210 abutment seat stem walls.

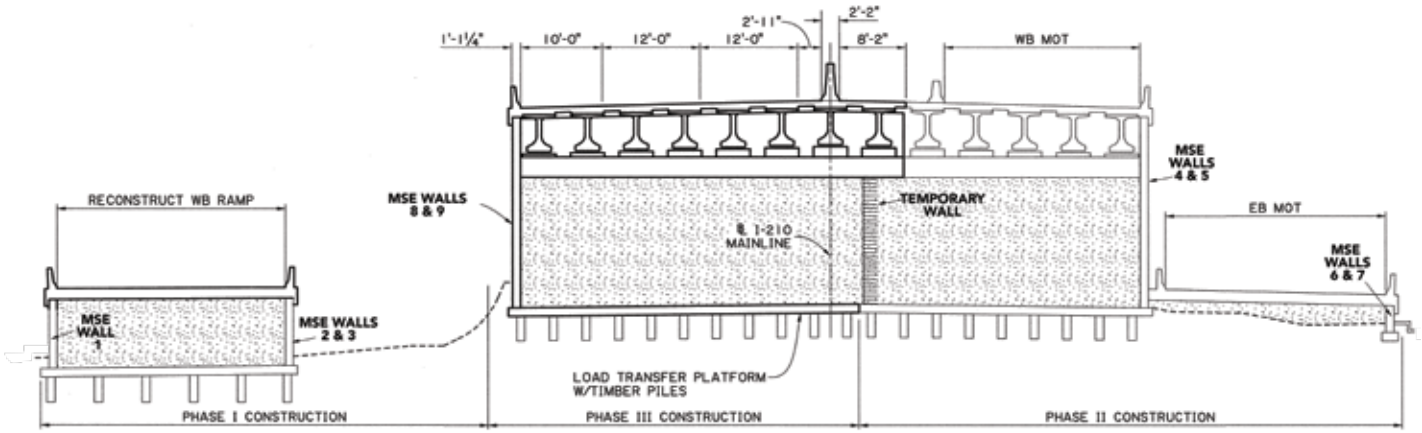
Slip Joint
A vertical slip joint was installed at the transition of the KeySteel and KeySystem II systems, to accommodate any differential settlement.

Pile-Supported Load Transfer Slab
Timber piles were used to support the approach sections below the load transfer slab. Larger 24-inch pre-stressed precast concrete piles were used to support the I-210 bridge abutments. KeySystem II walls less than 8 feet tall did not require a pile-supported slab below and rested on 6-inch-thick, 24-inch wide concrete leveling pads.

Construction began in late 2013

At $38.6 million, the project constructed a full interchange at Cove Lane and I-210 plus a roundabout on Cove Lane and an extension of Cove Lane north to connect with a new public roadway.

The interchange is primarily comprised of a new highway bridge. Several aspects of the site conditions and project requirements prompted a design that was both intricate and unique: first, the extremely poor foundation soils necessitated a pile-supported slab under the walls; second, to manage the traffic during phased construction, large temporary walls were employed; third, in a unique design strategy, two retaining wall systems, the KeySteel System (KeySystem I) and KeyGrid (KeySystem II) systems, were used in combination on the bridge and approaches.



Phase III: Construction | Typical Section at I-210 Bridge

KeySteel, with its inextensible steel reinforcement, was utilized for loadbearing wall sections of the bridge, while KeyGrid, with its extensible geogrid reinforcement, was used for all other approach walls. KeyGrid utilizes Keystone Compac II units and TenCate Miragrid® geogrids by TenCate Geosynthetics. The combination of the two wall systems was an integral part of designing for the structural loads at the abutment versus roadway support walls.

In addition, their use allowed uniformity in support systems throughout the project phases and addressed a compressed schedule and cost considerations. The KeySteel System and KeyGrid system provided a valuable solution, combining the cost-effectiveness of segmental retaining walls with the strength and reliability of mechanically stabilized earth walls.

8,000 concrete piles were driven to support the bridge structure.

Phased Construction Temporary Wall

CASE STUDY

KeyGrid to KeySteel Transition Joint

Project Material Summary

- 5,000 sf of KeySteel (KeySystem I) was installed on the bridge structure
- 127,000 sf of KeyGrid (KeySystem II) was installed on the ramp and temporary walls
- 8,000 driven piles, or 88,000 lineal pile feet, were driven to support the bridge structure

Craig Moritz, PE, principal engineer at Keystone, says the project was singular in several respects: "Walls were required to support ramps, roadways and abutment sections in three construction phases, requiring large temporary walls. The roadway and temporary walls were both constructed with Keystone's KeyGrid geogrid-reinforced system to provide consistent construction and support the concrete roadway directly over the top of the temporary wall system during the Phase II construction. Because the abutment walls supported the large bridge loads, Keystone's inextensible KeySteel system was used to minimize deflection for the 100-year design life.

KeySteel® Bridge Abutment

For more information on Keystone KeySystem I - KeySteel or KeySystem II - KeyGrid or other Keystone products, please visit www.keystonewalls.com or call 800-747-8971.

While the fast-track project involved almost two miles of highway, this half-mile stretch of bridge overpass was the focus. Construction was staged in three phases to maintain traffic flow, with large temporary walls alternately diverting east and westbound traffic to build each lane's walls and bridge sections. This photo shows a completed Phase II.

Photo provided by GeoEngineers, Inc.

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