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# Editorial

## New Highway Bill – Autonomy for DOT Designers and Specifiers



**Matt Childs, P.E., President**  
American Concrete Pipe Association

The U.S. House and Senate approved [\*Moving Ahead for Progress in the 21st Century \(MAP-21\)\*](#)<sup>1</sup> on June 29, 2012 and signed into law by the President on July 2. The Bill reauthorizes the Federal-aid highway program at the Congressional Budget Office's baseline level—equal to current funding levels plus inflation—for two fiscal years.

The new legislation passed by Congress directly addresses the role of

states in choosing pipe materials for culverts and storm sewers. Section 1525 of the MAP-21 bill clearly states that

***“States shall have the autonomy to determine culvert and storm sewer material types to be included in the construction of a project on a Federal-aid highway.”***

MAP 21 does not change the basic role of the highway design engineer. Their role in any design project is to design a project that meets the desired purpose, is constructible, and protects the health, safety and welfare of the user. In the case of all projects, the engineer should provide the best value and longevity to the owner. Before making a final determination to allow a pipe material, the engineer has a responsibility to analyze the structural integrity, durability and hydraulic efficiency of installed pipe materials. In addition, the engineer has a responsibility to determine the ability of materials and products to withstand unexpected events such as wild fires, tanker spills and any other risks that may be identified during the selection process.

Section 1525 of MAP-21 allows the states and their engineers to act as engineers when determining pipe materials. No longer are there artificial means of entry into highway specifications through forced “competition.”

This is good for the public and industry.

### LINKS

1. [http://epw.senate.gov/public/index.cfm?FuseAction=Files.View&FileStore\\_id=6d1e2690-6bc7-4e13-9169-0e7bc2ca0098](http://epw.senate.gov/public/index.cfm?FuseAction=Files.View&FileStore_id=6d1e2690-6bc7-4e13-9169-0e7bc2ca0098)

# 2012 Project Achievement Award Winner

## Pipe Jacking Saves Time Eases Traffic Congestion

By Randy Wahlen, P.E., Marketing Engineer  
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Utah is making an important investment to restore and expand I-15 to support economic development and improve transportation throughout the state. [I-15 Utah County CORE project](#)<sup>1</sup> will renovate I-15 in Utah County to meet transportation demands through the year 2030. The project will add two lanes in both directions along the 21-mile corridor; extend the express lane in both directions on the south end of the project; rebuild and reconfigure 10 freeway interchanges and replace 63 aging bridges; use 40-year concrete pavement along the entire corridor.

[Minger Construction](#)<sup>2</sup> of Chanhasen, Minnesota was selected for the drainage portion of the project to jack concrete pipe under I-15 to avoid open cut construction. Nearly 2.5 miles of precast reinforced concrete jacking pipe in the following sizes were required:

- 1,280 feet of 18-inch diameter
- 1,192 feet of 30-inch diameter
- 2,264 feet of 48-inch diameter
- 201 feet of 60-inch diameter
- 2,880 feet of 24-inch diameter
- 4,872 feet of 36-inch diameter
- 276 feet of 54-inch diameter
- 276 feet of 72-inch diameter

In the Intermountain Area, [concrete jacking pipe](#)<sup>3</sup> have been typically larger than 48-inches in diameter to accommodate a man-driven microtunneling technique. Minger Construction wanted to use 12-inch to 36-inch [microtunneling](#)<sup>4</sup> pipe in some locations. To facilitate these sizes without a casing pipe, [Oldcastle](#)<sup>5</sup> produced concrete pipe with spigot joints at each end with a steel band to keep the gasket in compression. By using pilot holes with augers, the small diameter concrete pipe could be jacked without an internal operator.

The most critical part of jacking small diameter concrete pipe is having extremely tight tolerances, so that the joints have maximum concrete surface areas for jacking forces. Since 18-inch diameter concrete pipes have thinner walls, jacking forces along the joint are more critical. To produce pipes with a very small end-to-end tolerance, longitudinal rebar was added to ensure that the pallets and headers fit the same on every pipe.

The major benefit of using jacking pipe was maintaining the uninterrupted flow of traffic. In addition, jacking pipe under the freeway saved time for commuters when compared to lane interruptions with the open cut method, and provided flexibility for design-build contractors on a project where construction scheduling and temporary traffic control are critical considerations.

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2. [www.mingerconstruction.com/](http://www.mingerconstruction.com/)
3. [www.concrete-pipe.org/pdfdd/DD\\_4.pdf](http://www.concrete-pipe.org/pdfdd/DD_4.pdf)
4. [www.concrete-pipe.org/pdfcpn/CP-News-Spring-2001.pdf](http://www.concrete-pipe.org/pdfcpn/CP-News-Spring-2001.pdf) (Page 8)
5. [www.oldcastleprecast.com/Plants/ogden/Pages/default.aspx](http://www.oldcastleprecast.com/Plants/ogden/Pages/default.aspx)

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- **Keyword Search on American Concrete Pipe Association Website** (jacking, reinforced concrete pipe, microtunnel, joints, trenchless)  
[www.concrete-pipe.org](http://www.concrete-pipe.org)
- **Concrete Pipe Design Manual**  
[www.concrete-pipe.org/pages/design-manual.html](http://www.concrete-pipe.org/pages/design-manual.html)
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Handling of RCP for placement in trench.



Small diameter reinforced concrete jacking pipe being lowered into position for jacking.



Series of photos showing installation of precast concrete box section.

## A One-Time Case for Open Cut Box Culvert Construction over Jacking on I-15, Utah

By Randy Wahlen, P.E., Marketing Engineer  
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As a matter of policy, the [Utah Department of Transportation \(UDOT\)](#)<sup>1</sup> does not allow open cut construction of utilities under major roadways. It did make a one-time-only exception in 2011, however, when construction of a concrete culvert under I-15 was required as part of a major storm drain master plan in Davis County. Existing facilities needed to be upgraded to handle storm events more effectively. The freeway can act as a barrier to stormwater flow from development on the higher elevations east of I-15. Once the stormwater is conveyed under I-15, it is discharged into the Great Salt Lake, only a short distance from the freeway.

Multiple round reinforced concrete pipes, [jacked and bored](#)<sup>2</sup> under I-15 were first considered for the culvert. Due to project conflicts with other utilities, railroad crossings, and cover requirements, pipe jacking was not feasible. Open cut method for construction of a [precast concrete box culvert](#)<sup>3</sup> was presented to UDOT as an alternative, which was not readily supported by the department before it was approved with strict scheduling and special construction considerations. The greatest issue for opposing the open cut method was traffic volume comprised of approximately 65,000 vehicles per day travelling south. UDOT takes any disruption of traffic very seriously.

[The Davis County, Barton Creek Project](#)<sup>4</sup> had included 110 feet of 10-foot x 5-foot precast concrete boxes, 3,065 feet of 9-foot x 4-foot boxes (165 feet across I-15 and 520 feet through the I-15 500 West off ramp), and several junction/outlet structures along the I-15 and UTA Frontrunner corridors. Construction of the box culvert would require restriction of southbound traffic to two lanes on Friday evenings starting at 10:00 p.m. All southbound lanes would be reopened by 7:00 a.m. on Saturday morning. It took two weekends to complete construction of the culvert. Only the southbound lanes were affected by the lane closures, because alignment of the northbound lanes did not require a culvert.

Excavation for the box culvert could not start until midnight. Since the box sections had to be backfilled and the surface asphalted (and cooled), to accommodate full southbound traffic by 7:00 a.m., installing the box sections quickly was critical. [Whitaker Construction](#)<sup>5</sup> used multiple trackhoes so that backfilling the set boxes would take place while subsequent box sections were set. Achieving the required backfill and compaction was a challenge, because there was up to eight feet of cover required over the boxes. In addition to the trackhoes, more equipment was needed on site to place backfill material, mitigate dust, and compact the backfill. The schedule was so restrictive that flowable fill was not an option, due to the curing times. The project was completed on schedule, and the road replaced to the satisfaction of UDOT.

UDOT's Region One permits office coordinated all communications with the public, using overhead message signs; alerts on their website and smart phone apps; news stories on all local major media; and temporary message signs. Well organized communications between representatives of Davis County, Hansen, Allen and Luce Engineering, A-Trans, Whitaker Construction, and UDOT occurred over nearly 18 months before construction. The result was an upgraded stormwater conveyance across I-15 with a new road surface over the culvert. Most of the traveling public were unaware that a precast concrete box culvert had been installed, as they travelled south on I-15.

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3. [www.concrete-pipe.org/pdf/installation\\_guide.pdf](http://www.concrete-pipe.org/pdf/installation_guide.pdf)
4. [www.standard.net/topics/construction/2010/06/29/bids-taken-flood-control-project](http://www.standard.net/topics/construction/2010/06/29/bids-taken-flood-control-project)
5. [www.whitcon.com/](http://www.whitcon.com/)

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- **Keyword Search on American Concrete Pipe Association Website**  
(box, section, installation, trench, storm, stormwater, culvert)  
[www.concrete-pipe.org](http://www.concrete-pipe.org)
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[www.concrete-pipe.org/pages/design-manual.html](http://www.concrete-pipe.org/pages/design-manual.html)
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[www.concrete-pipe.org/pages/cpnews.html](http://www.concrete-pipe.org/pages/cpnews.html)

## Many Types of RCP Installed in Bypass of Historic Town Center

By Nick P. Domenico

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Mullica Hill, the only village in Gloucester County, New Jersey is recognized for its downtown historic buildings, car shows, festivals, and Civil War enactments. Problems with Interstate and local traffic through the village began to arise as early as the 1960s when congestion and bottlenecks began to impede flow and disrupt business. Merchants did not want motorists and customers to avoid the downtown core, but something had to be done to improve the economy of the historic village, while eliminating the bottleneck in a major highway.

The solution was improvements to the downtown thoroughfare and a bypass. The realignment and separation of the [NJDOT](#)<sup>1</sup> US Route 322 through traffic by means of a bypass would eliminate the turning movements for the Route 322 traffic and relieve much of the bottleneck. Construction of a multi-phase, four-year project that included the "[Route 322 Bypass](#)"<sup>2</sup> was eventually approved. Construction of concrete pipe culverts under the existing Route 322, and construction of drainage basins, along with the use of decorative stone walls near the intersection of Route 322 and Clems Run Road, began in November 2008. Phase II Route 322 construction widened Route 322 to a five lane roadway (two in each direction with a center turn lane), and in December 2011, construction began on the bypass.

[Maser Consulting](#)<sup>3</sup> of Logan, NJ designed many of the bypass structures used for storm-water management. Pipelines and culverts were designed with [reinforced concrete pipe](#)<sup>4</sup>, reinforced concrete elliptical pipe where shallow depths of backfill were required, and perforated concrete pipe for slow release of runoff into the soil. Maser's design showcased the flexibility in use of reinforced concrete pipe by utilizing elliptical pipe up to 58-inch x 91-inch diameter with a 30 degree mitered bend.

The first phase of the construction was completed by DeFalco & Bisconti, based out of Atco, New Jersey, and the second by The [JPC Group](#)<sup>5</sup>. The JPC Group is an engineering, construction and demolition firm with offices and yards in Philadelphia, PA and Blackwood, NJ. More than 4,500 feet of storm RCP were installed by JPC during Phase II - with one section discharging into a Contech Stormfilter System and eventually a tributary under a cast in place concrete arch culvert that was designed and built by the JPC Group.

Maser Consulting Engineers maintained the character of Mullica Hill after conducting a feasibility study, developing the bypass concept, and providing preliminary engineering information. The alignment of the bypass traversed environmentally-sensitive land, which required extensive wetland and community impact reviews. The final design included two major bridge structures and three signalized intersections. Maser was responsible for the surveys and traffic analysis, storm-water management, ecological studies, environmental assessment, geotechnical engineering, and cultural resource studies. They also were involved in the regional transportation planning.

Construction crews and the engineering company, [CME Associates](#)<sup>6</sup> of Parlin NJ completed the \$16-million project on time and on budget.

### LINKS

1. [www.state.nj.us/transportation/](http://www.state.nj.us/transportation/) (search Mullica)
2. [www.co.gloucester.nj.us/news/displaynews.asp?NewsID=1046&TargetID=1,2,3,4,5,6,7,8,8,9,9,0,0](http://www.co.gloucester.nj.us/news/displaynews.asp?NewsID=1046&TargetID=1,2,3,4,5,6,7,8,8,9,9,0,0)
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6. [www.cmeengineering.com/](http://www.cmeengineering.com/)

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58-inch x 91-inch precast reinforced concrete elliptical pipe.



Elliptical pipe installed under shallow depths of backfill.

## The Big Push

By René DeRouen, Senior Account Manager  
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Rinker Materials Concrete Pipe Division<sup>1</sup> (Roanoke and Sealy plants) was selected by Trinity Infrastructure<sup>2</sup> to supply reinforced concrete pipe, precast concrete boxes, and various other precast concrete products on the LBJ Express Project<sup>3</sup> in Dallas. This project will accommodate population growth for next three decades by nearly doubling the capacity on the LBJ Freeway, through the addition of up to six new express toll lanes on I-635 and four on IH-35.

Rinker Materials was selected because it is a leading producer of precast concrete pipe and boxes in the USA, and a supplier that could meet Trinity's aggressive timeline. The average daily traffic where IH-35E intersects with IH-635 is approximately 270,000 vehicles, so open cut installations for culverts was not an option. Installation by jacking was required.

One of the project highlights was the jacking<sup>4</sup> of boxes underneath IH-35E (Segment 1B of the Project). Precast box jacking is the process of installing a continuous string of box sections by jacking against a reaction block in the launch pit. A.R. Daniel Construction, Inc.<sup>5</sup> was selected for the jacking operation because they specialize in trenchless construction. Art Daniel assisted Rinker with the design of the boxes in accordance with ASTM C1577-11a<sup>6</sup> and HL93 Live Load<sup>7</sup>. Rinker supplied box sections for three triple-barrel culverts.

Culvert #707-1 is a 9-foot x 5-foot structure that required one push for 276 feet, a second push for 270 feet and a third for 264 feet for a total of 810 feet under earth cover that ranged from 2 to 20 feet. Culvert #707-2 is a 9-foot x 5-foot structure that required one push for 102 feet and a second for 108 feet for a total of 318 feet under 3 to 10 feet of earth. Culvert #707-3 is a 10-foot x 5-foot structure that required three pushes of 150 feet each over a distance of 450 feet under 2 to 15 feet of earth. All of these boxes had a lay length of 6.04 feet. The maximum allowable jacking force for the 9-foot x 5-foot run was 1,400 tons, and 2,000 tons for the 10-foot x 5-foot run. The boxes were produced with an additional outer bell and spigot shoulder reinforcement cage that was 12 inches wide. Additional joint cushion material was applied to the bell end of the box to minimize damage due to the jacking force. Two-inch threaded grout/lube ports were fabricated into the boxes. During jacking, bentonite slurry was pumped through the sidewall ports to fill the annulus between the box and the soil that is created by pushing the slightly oversized shield or cutting ring at the leading edge of the culvert. Slurry fills the annulus and further reduces frictional resistance between the box sections and soil.

The big push was completed without disrupting traffic. Construction began in spring of 2011 and is scheduled to conclude by late 2015.

### LINKS

1. [www.rinkerpipe.com/default.shtml](http://www.rinkerpipe.com/default.shtml)
2. <http://lbjexpress.com/partners.asp>
3. <http://lbjexpress.com/>
4. [www.concrete-pipe.org/pdfdd/DD\\_4.pdf](http://www.concrete-pipe.org/pdfdd/DD_4.pdf)
5. [www.danielcs.com/](http://www.danielcs.com/)
6. [www.astm.org/Standards/C1577.htm](http://www.astm.org/Standards/C1577.htm)
7. [www.inti.gob.ar/cirsoc/pdf/puentes\\_hormigon/1-bridgedesign\\_manual\\_LRFD2009\\_TEXAS.pdf](http://www.inti.gob.ar/cirsoc/pdf/puentes_hormigon/1-bridgedesign_manual_LRFD2009_TEXAS.pdf)

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Photos: A.R. Daniel Construction, Inc.



The maximum allowable jacking force for the 9-foot x 5-foot run was 1,400 tons.



Joint cushion material was applied to the bell end of the box to minimize damage due to the jacking force.



Jacking against a reaction block in the launch pit.



Pipeline Utilities developed a handheld device to compact haunches of large diameter and elliptical pipes.



A Pipe Tugger assists with homing 96-inch diameter O-ring gasketed joints.



Only rigid, concrete pipe allows close spacing (3 feet) between dual runs.

## 96 Under 95

By Douglas J. Holdener, P.E.  
Florida Region Engineer  
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Pipeline Utilities, of Riviera Beach, Florida, is installing 96-inch diameter reinforced concrete pipe (RCP) culvert at the interchange of I-95 and State Road (SR) 68. [Pipeline Utilities is a subcontractor to Ranger Construction Industries \(Vecellio Group, Inc.\) on the \\$78.3M project to widen I-95 for an 8.7-mile section from SR 70 to SR 614<sup>1</sup>](#). Ranger is the prime contractor for the design-build project, which includes team members Wantman Group, Atkins Global, and Cone & Graham.

RCP is being supplied by [Rinker Materials Concrete Pipe Division<sup>2</sup>](#). Project plans specified a 374-foot dual run of 96-inch diameter pipe with an ASTM C 76 Class IV strength classification.<sup>3</sup> Rinker conducted an in-plant hydrostatic test to demonstrate the joint performance to the [Florida Department of Transportation \(FDOT\)<sup>4</sup>](#). The in-plant joint test involved externally pressurizing the joint to 13 psi for 10 minutes to ensure no infiltration through the joint per ASTM C 443.

Pipeline Utilities is using four Komatsu hydraulic excavators to install the pipe, which weighs 13.5 tons per joint. A Komatsu PC400LC excavates the trench, a PC600LC installs the pipe, and a PC220LC and a PC200LC backfill along both sides of the trench. A pipe tugger winches the pipe joints together. Superintendent [Matthew Craddock<sup>5</sup>](#) manages an efficient crew of six men in the trench and two excavator operators.

Pipeline Utilities developed a handheld compaction device to tamp soil into the haunches of the 96-inch diameter pipe. Soil compaction is the most laborious part of the installation, especially since FDOT specifications require 100 percent standard proctor density up to the roadway subgrade, and 6-inch lifts until one foot above the pipe crown. From one foot above the crown, 12-inch lifts are allowed, but the approximate 30 feet of fill will be 100 percent SPD compacted.

In addition to the 96-inch diameter ASTM C 76 Class IV pipe, Rinker Materials is supplying 15, 18, 24, 36, 48, 60, and 72-inch diameter round ASTM C 76 Class III pipe and 12-inch x 18-inch and 38-inch x 60-inch elliptical ASTM C 507 Class III pipe.

The I-95 interstate freeway from SR 70 to SR 614 widening project started in June 2011 and is expected to be completed in early 2015.

## REFERENCES

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2. Rinker Materials Concrete Pipe Division website [www.rinkerpipe.com/default.shtml](http://www.rinkerpipe.com/default.shtml)
3. 90% Construction Plan Submittal, Wantman Group Inc., Financial Project ID 413046-1-52-01, October 7, 2011.
4. Florida Department of Transportation web site, [www.dot.state.fl.us/publicinformationoffice/construct/district4pio/stlucie.shtml](http://www.dot.state.fl.us/publicinformationoffice/construct/district4pio/stlucie.shtml)
5. Matthew Craddock, of Pipeline Utilities, Inc., contributed to this article.

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The American Concrete Pipe Association hosts post installation inspection demonstrations that highlight robotic inspection equipment and specific issues that evaluation teams must understand about the accuracy of recorded data. Discussions include the proper technique for crack measurement and joint gap measurement accuracy for concrete pipe, along with deformation and inclinometer measurements for thermoplastic conduits. Demonstrations generally



take place in states that have added PII in specifications for newly installed pipe, or in states that are considering revisions to their pipe inspection requirements. Join the growing number of DOT regional offices, municipal engineers, contractors, and consulting engineers who have experienced the ACPA's demonstrations. Call this number, or your local concrete pipe producer, and lead the way to a future where culverts and pipelines last for generations.

**Call 972-506-7216 for more info.**

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