

LARGEST

Precast Concrete Storm Sewer Pipe

Serves Dual Purpose

By Rick Phillips, Rinker Materials, Hydro Conduit Division
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The Cornhusker state is known for the massive football linemen at the University of Nebraska and crop yields from cornfields that stretch beyond the horizon. Now they can lay claim to some mighty big reinforced concrete pipe. It's the largest precast concrete storm sewer in Omaha, constructed to drain the area surrounding the site of the city's new \$281 million Convention Center and Arena. It also serves to reduce the city's combined sewers through its overall sewer separation master plan.

Located on the old Union Pacific Railroad yard at 10th & Abbott Drive, the site includes all of the elements of a major urban renewal project such as master planning, platting, coordination with many involved parties, demolition, grading, sewers, paving and landscaping—all on a grand scale. Rinker Materials, Hydro Conduit Division, a

long-time member of the American Concrete Pipe Association, supplied the reinforced concrete pipe (RCP) for the storm sewer system from their plants in LaPlatte and Valley, Nebraska.

The storm sewer system consists of 1,125 feet of 144-inch diameter pipe in open cut, and an additional 250 feet of jacked pipe. The system includes 270 feet of 120-inch diameter pipe, 930 feet of 108-inch diameter pipe, and 2,400 feet of 30-inch diameter sanitary sewer with 425 feet installed inside a 48-inch steel casing.

Unstable soil conditions and high ground water required excavation to bedrock and placement of riprap for bedding to support the pipe. Backfill included recycled concrete to the spring line of the pipe. Because the work was done in the winter, off-site soil was mixed with the material that was removed to control the water content of the backfill. Despite the poor soil conditions and winter weather, the contractor Roloff Construction Co., completed the \$6.5 million contract ahead of schedule.

Installation of the 144-inch diameter 1350 D RCP included a railroad crossing, a levee cross-

A 7-foot section of 144-inch diameter 1350 D RCP (with gasket on and spigot/gasket soaped with lubricant) is lowered into the trench for installation.



ing and crossing under a bridge. According to Terry Atkins, P.E., the project manager of the consulting engineering firm, Lamp, Rynearson & Associates of Omaha, the most challenging part of the project involved tunneling and jacking 250 feet of the 144-inch diameter pipe under all three obstructions. With an outside diameter of 14 feet 2 inches, each 7-foot long section of 3000 D RCP jacking pipe weighed approximately 48,000

jacks pushed with a force of 200 tons, together delivering 1.6 million pounds of force. Another 2.5 million pounds was added at intermediate jacking locations. With each push, the big pipes were moved six to eight inches, or about 28 feet per day. The entire operation, done non-stop around the clock, took nine days to complete. The final location of the pipe was only 1 3/8 inches lower than planned and two inches off horizontally.



Contractor employees seized the opportunity to promote their employer's name with a unique painted billboard at the job site.

pounds. This is one of the largest jacked pipes to be installed in the Midwest. The 144-inch diameter pipe had to be trucked to the site one piece at a time on specialized multi-axle trailers. Horizontal Boring of Exeter, Nebraska was subcontracted to bore the tunnel for the jacking pipe.

The pipe was jacked with an Akkerman 170-inch outside diameter excavator tunnel boring machine under the Union Pacific Railroad, Abbott Drive, and the Corps of Engineers Levee (that protects the city from flooding by the Missouri River) to a cofferdam where the pipe outlet ends at the Burt-Izard Ditch. The Burt-Izard Ditch then empties directly into the Missouri River. The tunnel and jack clearance was just three inches over a 48-inch diameter pipe, one foot from the Abbott Drive Bridge pier on one side and one foot from an existing box culvert on the other side.

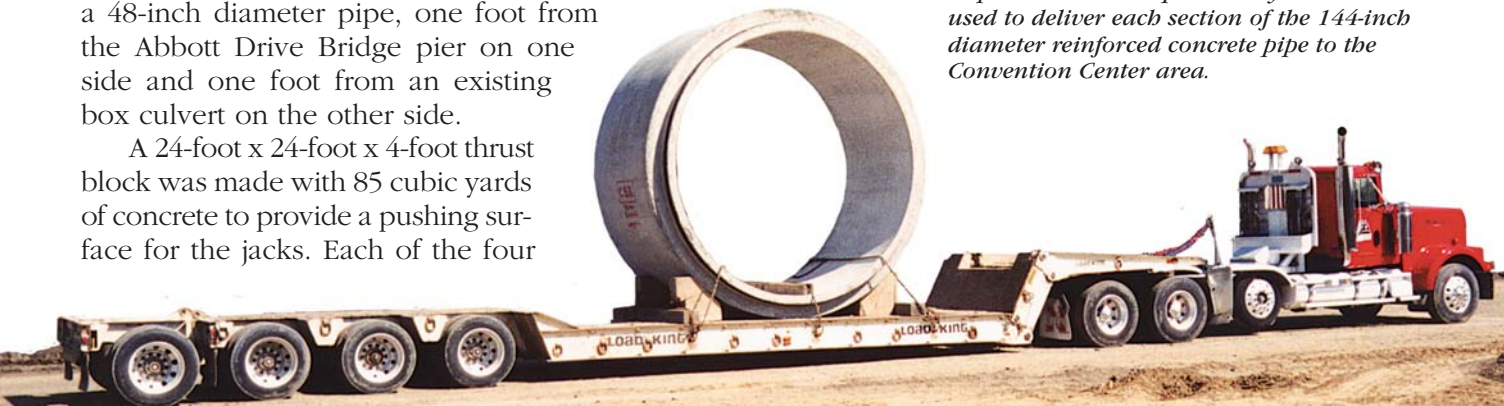
A 24-foot x 24-foot x 4-foot thrust block was made with 85 cubic yards of concrete to provide a pushing surface for the jacks. Each of the four

A parallel 30-inch Class IV RCP sanitary sewer was also constructed and installed at depths up to 30 feet. This sewer also included a 410-foot bore and jack. The 60-inch pipe to be tapped at the end of the bore could not be located in advance, so the new casing was bored until the existing pipe was hit. After verifying it was the 60-inch pipe, surveyors went into the casing, located the pipe, then went above ground and staked its location. Because of the proximity to an existing building, the 96-inch diameter manhole servicing the 30-inch and 60-inch lines was mined down from inside the manhole. As soils were removed from inside the manhole, the unit was lower into position.

Rinker has just commenced shipment of 6,400 feet of 108-inch 1350 D RCP to second and third contracts servicing the site. The entire project includes construction of a 194,000 square-foot exhibition hall and a 17,000-seat arena. Visitors to the convention center and sports fans will enjoy generations of entertainment on a site built over reinforced concrete pipelines designed to last a hundred years or more. ☺

Sources: Grandia, Curt; "Rolloff Construction Co. installs the largest storm-sewer pipe in Omaha", in Midwest Contractor, May 28, 2001; Web site of Lamp, Rynearson & Associates, Company News; Reprint of "Omaha's Convention Center "Underground" in APWA Newsletter, Fall 2001)

A special double-drop "Low Boy" trailer was used to deliver each section of the 144-inch diameter reinforced concrete pipe to the Convention Center area.



Project: Omaha Convention Center/Arena
Owner: City of Omaha
 City Engineer: Hank Vieregger
 City Planning Department: Greg Peterson

Designer: Lamp, Rynearson & Associates
 Omaha, Nebraska
 Mike McMeekin, P.E., President
 Terry Atkins, P.E., Senior Project
 Manager

Contractor: Roloff Construction Co.
 Omaha, Nebraska
 Larry Roloff, President
 Bob Norris, Vice President, Project
 Superintendent
 Dick Noble, Estimating Manager
 Dwain Warriner, Pipe Laying Supervisor

Quantities: 1,125 feet – 144-inch diameter
 1350 D RCP
 250 feet – 144-inch diameter
 3000 D RCP jacking pipe
 270 feet – 120-inch diameter
 1350 D RCP
 930 feet – 108-inch diameter
 1350 D RCP
 2,400 feet – 30-inch diameter
 Class IV RCP

Producer: Rinker Materials, Hydro Conduit Division
 LaPlatte and Valley, Nebraska Plants
 Jeff Arnold, General Manager

Rinker Materials, Hydro Conduit Division has been manufacturing and supplying reinforced concrete pipe for the Omaha area since 1965. The Omaha plants manufacture round RCP and manholes up to 144-inch inside diameter, box culverts, flared-end sections along with reinforced concrete elliptical and arch pipe. Florida-based Rinker Materials is a major supplier of construction materials, aggregates, and ready-mixed concrete throughout the United States. For information on Rinker Materials, Hydro Conduit Division, visit www.rinker.com.

The design, production and installation of the Omaha Convention Center/Arena precast concrete storm sewer system was a team effort. Shown here are (left to right) Rick Phillips, Jim McDill and Larry Mauck, Rinker Materials, Hydro Conduit Division; Brett Wawers, Lamp, Rynearson and Associates, Inc.; Greg Peterson, City of Omaha; Terry Atkins, Lamp, Rynearson and Associates, Inc.; Bob Norris, Roloff Construction Co.; and Jeff Arnold, Rinker Materials, Hydro Conduit Division.

