T R A C T I O N

Tried and true promotion methods help Prairie Material Sales bring roller compacted concrete pavement to the Land of Lincoln.

As the price of bitumen binder remains exposed to petroleum market volatility, prospects brighten for the portland cement concrete cousin of asphalt pavement. Few markets where roller compacted concrete pavement has surfaced have the scale of Chicago and northern Illinois, where public agencies and private developers are seeing a new alternative to full-depth or base course asphalt in roads, parking areas and heavy-duty vehicle yards.

ACI Committee 327 on Roller-Compacted Concrete Pavements recommends a minimum temperature of 40°F for RCC placement. Prairie Material customers have worked at lower temperatures, heeding the ACI-recommended use of insulating plastic tarps after the finishing roller passes.

ILLINOIS TRANSPORT PHOTO: Concrete Products
A three-year, RCC pavement market development campaign of public and private demonstration projects, state and local agency calls, and outreach to contractors, land developers, engineering firms, practitioners and academia is paying off for Prairie Material Sales. The longtime Chicago leader in ready mixed aggregate has seen a sharp inflection point on its RCC pavement chart activity: 2012 volume will exceed 18,000 cu. yd., nearly eight-fold what the producer logged in each of the prior three years. The volume reflects greater demand from a charter customer, CSX Corp., and inaugural RCC projects with a strong cross section of asphalt-only or combined concrete/asphalt paving contractors serving Chicago and suburbs.

“We started in 2009 when CSX put out a project to bid for crane runways, placing 1,800 cu. yd. in two 8-in. lifts. The railroad had used RCC pavement in other states and sought to test it in Chicago,” says Prairie Material Marketing/Product Specialist Theron Tobolski. “That was our first RCC job, and it gave energy to the RCC movement in Illinois. We have now supplied roller compacted concrete for 11 different projects and worked with six different asphalt contractors.

“We have talked to the Chicago Department of Transportation, along with municipal and county agencies throughout the market. Some RCC projects are in design, although local agencies are restricted to the type of work where they can pave with roller compacted concrete. They can specify it for capital improvement-funded projects, but jobs using motor fuel tax funds are limited to materials with Illinois Department of Transportation approval. We have approached IDOT about approving RCC as a pavement option, and department officials are open to the concept. We are hoping to find a project in early 2013 for them to explore the benefits of RCC pavements. If the pavement meets their goals and performs to their specifications, then it will be an approved pavement option.”

TURNING POINTS
Summer 2011 and 2012 construction season peaks have enabled Prairie Material to stage two pivotal RCC pavement demonstrations. The producer’s breakout event took place in August 2011, when it enlisted a key Chicago asphalt contractor, Orange Crush LLC, to place 280 cu. yd. of RCC mix for a pavement at Toyota Park in Bridgeview, IL, home to the Major League Soccer’s Chicago Fire and near Prairie Material’s head office. Arranging donated material and labor for a conveniently located site near two Interstates’ junction, Tobolski targeted project decision makers over contractors, drawing representatives from Illinois Department of Transportation, Illinois Department of Aviation, Chicago DOT, and a host of municipal engineers and city or village board members.

The pavement placement and finishing were accompanied by a technical program featuring American Concrete Pavement Association’s Randy Riley, whose group has put RCC market support on the fast track (note Editorial, page 4), and two RCC pavement promotion veterans: Indiana Ready Mixed Concrete Association’s Jerry Larson and Portland Cement Association’s Wayne Adaska. Both have assisted ready mixed operations across Indiana in bringing the RCC pavement value proposition to state, county, municipal engineers and private construction prospects. Perhaps most persuasive at the Toyota Park gathering was Village of Streamwood (Ill.) Public Works Director Matt Mann, who relayed the RCC placement and finishing successes his department’s crews have realized on their own.

On the strength of the Bridgeview presentations and first-hand pavement practice observation, Chicag DOT representatives pinpointed a fall 2011 Pilot Program site: A residential street for which Bigane Paving crews placed 5 inches of RCC on a 4-in. stone base, and a 1-in. asphalt wear course. Tobolski has since assisted department engineers with writing an RCC spec so they can include the material as an option on appropriate projects out to bid.

Earlier this year, Tobolski became the first concrete industry representative to address the Illinois Conference on Asphalt and Transportation, tag-teaming with Bigane Paving’s Jim Dillon on an RCC presentation. The two also carried the RCC message to Illinois Association of Highway Engineers conference earlier this fall.

“I have presented RCC pavement background and performance data to 16 engineering firms this year, and have had 10 projects where engineers either specified RCC outright or proposed RCC alternates to their clients,” Tobolski affirmed. "Anybody can sit back and wait for RCC projects to develop and then bid on them, but it takes an industry leader to walk into an office and convince someone who has never heard of RCC or knows little about it to design it on their project knowing they have to take full responsibility for the end result. Being an industry leader is the approach Prairie Material has taken.”

RCC MIX WORKHORSE
In three years of trial RCC pavement work, Prairie Material used central mixed plants in Chicago (Yard 32/downtown) and the suburbs of Bridgeview (Yard 1/headquarters) and Addison (Yard 14). Conventional tilt drum equipment shouldered the relatively low volume 2009–2011 projects. Moving into 2012, the producer landed CSX contracts totaling 6,200 cu. yd.; municipal parking lot (Orange Crush LLC) and Coméd (Rabine Paving Group) projects; plus two southwest suburban jobs combining for nearly 11,000 cu. yd.

The latter would command upwards of 1,000 cu. yd., or more per day. That demand drove Prairie Material’s purchase of Vince Hagan Co. trailer-mounted horizontal shaft spiral blade mixer and wet belt equipment, with which two of the producer’s existing Haynie/All Travel-All plants—each configured for transit mixed production—could tackle high-volume RCC output. The spiral blade model can yield 8 cu. yd. of ultra-dry RCC mixes in as little as 30 seconds, or 10 cu. yd. of conventional concrete at a comparable pace.

Continued on page 30
CSX CRANE RUNWAYS

To eliminate asphalt rutting from giant cranes trafficking its Chicago intermodal terminal, CSX Corp. opted to have new runways built with a deep roller compacted concrete base plus asphalt wear course. Prairie Material Sales deployed a new ribbon mixer-equipped Vince Hagan portable plant yielding consistent 8-cu.-yd. loads. The CSX crane runways saw two 4.5-cu.-yd. batches mixed separately in 30s, then discharged into dump or mixer trucks to supply 9-cu.-yd. loads for the CSX project.

Contractor Central Blacktop began the project by cutting and removing the existing asphalt to accommodate the new crane lanes. The RCC was paved in two 6-in. lifts using road wideners, each lift finished with two vibratory and two static roller passes. A tack coat topping was applied to the RCC pavement to make way for a 2-in. asphalt wear course. The crane runways are part of a CSX 2012 RCC pavement schedule for which Prairie Material has delivered 6,200 cu. yd.—nearly triple the annual average the rail operator’s Chicago sites consumed from 2009–2011.
The mixer and wet belt were deployed in August at Bridgeview for the main CSX placement, the material handling unit charging both dump and mixer trucks for RCC mix delivery to the CSX yard. The trailerized mixer was then dispatched to a Joliet, Ill., site about 40 miles to the southwest. There, it was set up with another relocated Haganator model on cube blocks, enabling direct charging of dump trucks serving two truck terminal projects: One in Joliet, the other in Wilmington, about 20 miles away.

Completed in October and November, the terminal pavements incorporated a standard RCC mix spec. “So far, we have worked with a single mix design and feel it has been critical to the success of the RCC pavements we have supplied along with contractors’ paving techniques,” says Prairie Technical Support Manager Lea Burkart, who developed the mix design. “RCC pavement mixes are extremely moisture sensitive. Our mix design typically ranges between 6.4 to 6.8 percent moisture for optimal placement.”

The best gauge for monitoring RCC mixes, he adds, is AASHTO 7318 Water Content of Freshly Mixed Concrete Using Microwave Oven Drying, with samples taken systematically from dry truck loads.

RCC mix moisture is directly linked to the labor savings or added costs in the same manner a contractor experiences with a slab crew finishing a workable or stubborn conventional concrete mix. RCC moisture level is key to contractors attaining a freeze-thaw durable pavement that achieves its density threshold of 98 percent or higher of the modified proctor test, measured by a nuclear gauge.

“If the RCC arrives at the site with optimum moisture, crews can typically attain 98 percent or greater density with two vibratory roller passes,” explains Theron Tobolski. “A mix with less than optimal moisture content might require two vibratory and two static roller passes to achieve the 98 percent density of the modified proctor test.” The RCC mix will not perform without compaction, he adds: “If you don’t compact it, there is no strength gain. Once dried, uncompacted material can be swept off or dug up with ease.”

**CONTRACTOR BUY IN**

Prairie Material's RCC pavement team has brought the mix quality control experience from CSX and smaller 2012 jobs to two season-capping contracts. The Illinois Transport

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**ILLINOIS TRANSPORT**

After finishing the 2012 CSX RCC schedule from its headquarters plant, borerering Chicago, Prairie Material prepared to deliver more than 10,000 cu. yd. of RCC mix for two pavement jobs in the far southwest suburbs. The RCC workhorse, a Vince Hagan horizontal shaft spiral blade mixer, was relocated to a Joliet, Ill., yard and staged with a second Haganator Travel-All plant Prairie Material had used for transit mixed production at another site.

The Joliet plant commenced production in mid-October for Illinois Transport, a 2,000-cu.-yd. contract netting RCC pavement along a main truck terminal entrance and eight-lane truck dispatch island. The job was a RCC first for asphalt/concrete pavement contractor “D” Construction Inc. Crews placed 6 in. of RCC (finished surfaced) on a 6-in. base, Prairie Material capped RCC pavement activity for the season just before Thanksgiving, delivering 7,000 yd. of material from the Joliet site to the local Central States Trucking terminal.

**PHOTOS: Concrete Products**
job in Wilmington, one hour southwest of Chicago, called for 2,000 cu. yd. of RCC pavement mix on a portion of the main entry plus dispatch and staging area accommodating up to 500 trucks per day. The project comprises 6 inches of RCC pavement on an asphalt grinding base of the same thickness. It is the first RCC job for Coal City, Ill., concrete and asphalt contractor “D” Construction Co. “With roller compacted concrete,” notes “D” Asphalt Superintendent Dave Manfred, “we can be competitive on more jobs and go after new markets.”

“I believe roller compacted concrete is as cost effective as asphalt and more durable under high truck traffic,” adds Ray Norkiewicz, senior project superintendent for Illinois Transport lead contractor, FCL Builders of Itasca, Ill. On Illinois Transport and other projects, conventional asphalt crews have seamlessly transitioned to RCC mix placement and pavement finishing, he observes, noting, “The biggest issue with RCC pavement compared to asphalt is sensitivity to wind. Heavy wind can dry out the RCC mix too quickly for crews to effectively finish a pavement.”

Days after the Illinois Transport pavement was finished, Prairie Material prepared for a second, larger project where value engineering carried the day for an RCC proposal. “Once you start looking at the price differential between roller-compact concrete, conventional concrete and heavy-duty asphalt, and the pros and cons of each, RCC is a more attractive option for certain projects,” explains Christian Evangelista, who as project manager for Arco Murray National Construction Co. has overseen placement of 7,000 yd. of RCC mix for the Central States Trucking Co. terminal in Joliet. “RCC can bear comparable loads to conventional concrete, but is more cost competitive against it and heavy-duty asphalt pavement.”

Central States is the tenant at a build-to-suit trailer facility within Centerpoint Properties’ CIC-Joliet Development. An inaugural RCC job for Arco Murray subcontractor R-Flow Construction, the Central States plan included a specification simplifying the facility’s pavement design. A monolithic, conventional concrete slab was ruled out for cost considerations, while an asphalt alternative would have required placement of 7- to 8-in.-thick, 12-ft.-wide concrete dolly strips to support trailers and their pavement-puncture prone legs. In addition to upfront costs, the strips limit the owner’s flexibility in yard space allocation and utilization as new trucking clients join the terminal.

“The RCC bears truck traffic and trailer leg loads like regular concrete, but a yard owner or operator needs to understand the material’s differences from alternate pavements,” Evangelista affirms. “RCC presents a different appearance that might turn off some owners—a rough finish that tends to dust somewhat and possibly exhibit some roller marks. In a trailer facility adjacent to an intermodal yard, appearance doesn’t matter. Dusting and minor gravel spalling are confined to the top 1/16-in. of a 7-in. or thicker RCC pavement, but the structure is set to deliver a long service life, just as it is engineered.”

QUALITY CONTROL

During an Illinois Transport project (opposite page) placement, Joliet yard staff retrieves RCC mix sample. Prairie Material finds the AASHTO T31B method best suited to gauging moisture content, RCC mixes weighed before and after microwave oven drying. Throughout RCC placement, technicians use a nuclear gauge to determine pavement density and direct vibratory and static roller equipment patterns to achieve a 98 percent density of the modified proctor test.

The producer has also turned to the 6-in. Humboldt Marshal heavy-duty compactor hammer—a 22-lb. drop weight used for asphalt specimens—for testing RCC in 6 x 12 plastic molds. A first cylinder lift is compacted with 25 hammer drops, a second lift with five drops. The molds then tapped off with RCC mix and 15 hammer drops; following excess-mix strike off, the specimen is capped and subjected to five final hammer drops.

The method was proposed by S.F.A.T.E. Testing and adopted by Chicago DOT during the city’s RCC residential street project in 2011. A more established method, ASTM C 1435 Standard Practice for Molding Roller-Compacted Concrete in Cylinder Molds Using a Vibrating Hammer, requires the dry mixes to be placed in heavier and much costlier stainless steel molds, then compacted by a power hammer.