C

ost-effective and durable, roll-

er-compacted concrete (RCC) pavements are laying a solid foun-
dation for a number of significant projects for the Port of Houston Authority (August 2016). For perspective, a similar amount of RCC would fill a 6-inch-thick single lane roadway stretching more than 800 miles across Texas from Orange to El Paso.

Since 2007, RCC has filled a key role in the Port Authority’s Bayport Container Terminal expansion—an integral part of the PHA’s capital improvement program that totals a proposed $314 million in 2016. High-performing, low-maintenance RCC pavements are strong and dense so they can handle the weight of heavy container-handling equipment and can be used as the first lift of load-bearing concrete.

“The Port Authority has fully embraced RCC as a cost-effective solution and the concrete pavement of choice at Bayport Terminal,” noted Matt Singel, Program Manager at the Cement Council of Texas and an authority on RCC. “Concrete and cement-stabilized pavement options including RCC are solving many of the difficult challenges—poor soils, high-water tables, heavy loading requirements and a need for fast construction—faced by the Port of Houston and other U.S. ports and intermodal facilities.”

The Port Authority’s decision to use RCC on its Bayport Terminal expansion was in its final design stage in 2007. The Port Authority encouraged RCC bids for the first of six new container terminal expansions to be built over the next 10 years. “The goal was to reduce cost and ensure long-term durability, and port leadership at that time believed RCC offered a sound solution,” said PHA Chief Construction Manager Brock Lewis.

Reducing Construction Time

By placing RCC, the Port estimated that it reduced the project construction schedule by four months while keeping maintenance to a minimum. “We were able to return to business sooner than expected while also maximizing down time,” this reinforced the Port Authority’s decision to continue using RCC as a pavement,” Lewis added.

A complex of shipping and cargo-handling facilities, the Port of Houston spans 26 miles along the Houston Ship Channel. In 2015, the Port ranked first in the U.S. in import tonnage and second in export tonnage. Once primarily a bulk carrier facility, the Port Authority has significantly expanded its container-handling capacity over the past five years, in part to prepare for the 2016 completion of the Panama Canal expansion.

“The Port Authority believes this strategy will increase our business since the Panama Canal is doubling its capacity by increasing the number of cargo ships and the size of ships that pass through it, and the Port of Houston is closest port on the canal,” Leonti pointed out. RCC is an economical, fast-construct-

applicability. This has been one catalyst for increased use in commercial areas such as local streets and highways.

“RCC production/placement rates are very high, making it an ideal concrete paving material for large, thick industrial pavements,” Singel noted. “Additionally, no formwork, finishing or steel (dowels or reinforcing) is needed, which further expedites placement and reduces labor costs.”

Other Uses

Other popular RCC applications include industrial plant access roads and parking lots, truck/freight terminals, bulk commodity storage and distribution centers, military facilities, airport parking areas, roadways in public parks and temporary travel lanes that must be constructed quickly to divert traffic. RCC was first used as a pavement option in the late 1970s and early 1980s at a Cana-
dlian logging yard. In 1994, RCC came to Texas when Port Hood military base in Killeen—the U.S. Army’s largest port—used the concrete to pave a tank storage stand.

RCC’s major thrust has occurred over the past 15 years as more and more busi-

nesses and state, county and city govern-

ments have recognized it as a viable, low-cost, long-term pavement,” Singel noted. “Its pop-

ularity will only continue.” RCC gets its name from the heavy vibra-
tory steel drum and rubber-tired rollers used to compact the concrete to its spe-
cified density before it begins to set up. This high density provides support while the cement is hydrating and building strength. RCC has the same basic ingre-
dients—well-graded aggregates (gravel and crushed stone), cementitious materials and water—of conventional concrete but also different mixture proportions.

What is the biggest difference in the two concretes? “RCC has a higher percentage of fine aggregates, which allows for tight packing and consolidation,” Singel said. “Due to the relatively lower water and cement contents of its mixture, RCC pavements have reduced shrinkage compared to conventional concrete pavements.”

The cost of materials used in RCC is gen-

erally comparable to the cost of materials used in conventional mixes of similar strength. RCC typically has slightly lower cement contents than conventional concretes, which can lead to savings in material costs.

Other current and future RCC projects at the PHA include Container Yard 6 of South Container Yard, West Container Yard, Barbours Cut Container Yard, and Phases 1, 2, 3 and 7 of South Container Yard. Besides noting the positive RCC impact, Leonti said he generally has been pleased with the performance of the PHA’s capital improvements program.

“It’s a huge responsibility to get these major expansion projects such as the Bayport Con-

ainer Terminal expanded on time and on budget. As a city of Houston entity, we have to work through many challenges such as taking care of the environment, working with surrounding jurisdictions and meeting numerous business requirements. The environ-

mental factor in the Houston area this past spring has also been a major issue for our construction schedule,” Leonti said.

“We are starting to see improvement in our overall performance, and we need to continue down that road with sound busi-

ness strategies such as RCC utilization. An-

other challenge is to find numerous bidders on our projects even when the economy is on downturn. It’s important to work with these larger construction companies to get their business, which means we need to do a better job of con-

struction management.”

By Mark McFarlane

RCC Pavement Lays Foundation for Port of Houston Authority Projects

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