ROADWAYS

ABOUT

Roadways, including US Highways, city and neighborhood streets, access roads and intersections are the lifeblood of our transportation network.

Optimally designed roads must have the capacity to carry the required daily traffic yet still be economical enough on initial cost basis and durable enough to limit long-term maintenance cost.

Roller-Compacted Concrete (RCC) pavements are ideally suited to meet this challenge, providing a lower initial cost to concrete pavement while eliminating many of the common and costly problems traditionally associated with flexible pavements.

ATTRIBUTES

- Fast construction
- Cost-effective
- Open to traffic shortly after placement
- Resistance to shoving and pushing
- Long life pavement
- Minimal maintenance required
- No rutting
- No pot holes
- Resistance to hydraulic fluid and fuel spills
- Will not soften under high temperatures
CITY OF COLUMBUS, LOCKBOURNE ROAD

PROJECT DETAILS: A industrialized section of roadway on the South side of Columbus Ohio needed replacement. The City of Columbus chose RCC for long term durability, speed of construction, and ease of maintaining access to businesses. The project included 20,486 square yards of 8” of RCC placed on a single lift, over 6” of aggregate base, and capped with 3” thick surface layer of asphalt.

BIG HORN, ALLIANCE, NE

PROJECT DETAILS: In 1994 one mile of RCC was placed in one day on Big Horn Avenue, with saw cuts joints constructed every 27”. This was one of the first RCC roadways built as a final riding surface in the United States. Although showing signs of age, per the Public Works Director at the City of Alliance, "...for 25 plus years, it has needed fewer repairs than typical concrete.”

I-285 GDOT, ATLANTA, GA

PROJECT DETAILS: This project won the 2006 National Partnership for Highway Quality Silver Award and SCAN Innovation Award. Over 35 lane miles of shoulder replacement with 6” and 8” RCC. I-285 sees extremely heavy traffic, with up to 24,000 trucks per day in addition to 116,000 other vehicles.

Nichols Consulting Engineers (NCE) conducted a performance review and life cycle analysis, after 12 years of service. NCE concluded that the RCC was still in “excellent condition with no signs of distress and has required no maintenance.”
MCASHAN RD, MCCA ALA, AL

PROJECT DETAILS: 9,727 square yards for ALDOT on McAshan Road in McCalla, AL. This project was the inaugural RCC project for ALDOT on a travel lane. The existing HMA roadway was experiencing significant distress from repeated heavy truck loads. Both the Jefferson County Industrial Park and Norfolk Southern McCalla Intermodal Facility utilize this route for access to Interstate 20/59. ALDOT was looking for a high structural value pavement which could withstand heavy loads and still allow interrupted access. Placing a single lift 10” RCC in one lift was the solution ALDOT needed.

ROSEVILLE, CA

PROJECT DETAILS: These roadways are classified as collector, industrial arterial and residential. The RCC pavements were placed on compacted subgrade, cement stabilized base, and reclaimed base. The RCC received a traditional finish, diamond ground, and troweled finish. Early traffic opening was crucial to a successful project on each of these streets with some intersections opening within 12 hours of paving. This project won multiple awards from ASCE Local chapter, California League of Cities, and ACPA.

45TH ST, KS

PROJECT DETAILS: The existing asphalt failed and was severely rutted, cracked, and potholed. The solution was cement stabilized base and 7” of RCC. The roadway was milled 3” in order to accommodate elevations of adjacent roadways and driveways. The remaining asphalt and base were reclaimed and treated with cement to form a new 12” durable base layer. After 3 days of curing, 14,000 square yards of 7” RCC were placed and opened to traffic within 48 hours. Initial and life cycle costs overall, proved lower than traditional methods.
RCC is comprised of the same constituents as conventional concrete: cement, aggregates, and water. However, unlike conventional concrete, RCC mixes are generally comprised of well graded aggregate blends in lieu of traditional two size aggregate mixes. In addition, as RCC is a stiffer mix (5-7\% water) achieving density (98\% modified proctor) is paramount to meeting design strength targets. Typical RCC compressive strengths range from 4,000 to 6,000 psi while flexural strength targets are usually in the 550-750 psi range.

RCC does not require finishing, nor does it contain dowels or steel reinforcing. RCC is placed with high density asphalt paving machines and compacted with dual steel drum rollers. Pavers can now be equipped with electronic sensors, automated steering, and string line (similar to HMA pavers) to assist with grade and thickness control. RCC is typically cured with a white pigmented curing compound or, if capped, with HMA asphalt emulsion. While RCC has not been historically constructed with joints, the current best practice recommendation is to saw cut and seal joints at no more than 15’ grid pattern depending on the placement width.

From a testing standpoint, RCC compressive strengths are measured utilizing field cast cylinders (ASTM C1435) or extracted cores. Although there is not an ASTM method currently approved, beams can be fabricated using a similar practice as (ASTM C1435) with a square head in 2” lifts, or alternatively, beams may also be extracted from the pavement and tested for flexural strength if necessary. Densities (wet) are measured using a standard nuclear density gauge. It is strongly recommended to perform a test section to verify strength, density, and thickness targets are achievable during live production. Furthermore, this test section enables all parties (owner, engineer, and contractor) to have consistent expectations with regards to surface texture, joint treatment, and placement methods.

From a structural design standpoint, RCC is like jointed plain concrete pavement. The pavement design process follows the same modeling as conventional concrete. There are several design programs which can be utilized however, the RCC Pavement Council recommends: Pavementdesigner.org, AASHTO PavementME, or PCASE.