2019 FDR Symposium
Greensboro, NC
Full Depth Reclamation and Cement Stabilization in Durham, NC
FDR and Cement Stabilization are used for many types of projects in Durham

Tasha Johnson
Public Works Department
City of Durham

Nia Rodgers
General Services Department
City of Durham
• Farm to Market Road prior to 2006
• Length = 4,776 LF
• Area saw a surge in development beginning in 2007
• Last paved in 2003
• More than 20 calls for pavement repair over 3 years prior to FDR in 2016
• FDR done in 2016
• FDR Cost = $320,000
• Patch & Pave Estimate = $429,000
• Near Duke University
• Length = approx. 1,500 LF
• Rerouted campus buses destroyed pavement
• Last paved in 2003
• Multiple calls for repair in the year prior to FDR
• FDR done in 2017
• Cost to the department approx. $100K
Ravenstone Subdivision

Durham, NC
• Failed Development
• Tied up in litigation for years
• Multiple streets in multiples phases of residential subdivision
• Missing the final 1” of surface for over five years

• Costs for patch and pave = $1,255,751
• Est for FDR = $1,172,000
Cement Stabilization

- Page Park
- Sherron Farms multiple phases
- Magnolia Creek – Phase 2
- Vermillion road widening
- Brightleaf Tract 12
- Lakeshore
- Fendol Farms phase 1C
- Copley Farms
- Andrews Chapel
- And several others
Cement Stabilization Requirements

A geotechnical engineer’s report is required that provides the following information.

- Provide detail of **mix design**
  - Specify pounds of cement per square yard
  - Specify optimum moisture content
  - Depth of stabilization
- Specify **method for mixing** cement into subgrade
  - Mixing by hand or mini excavator is not acceptable.
- Confirm **geotech will be onsite** to inspect treatment operations
  - Verify treatment rate
  - Verify moisture content
  - Provide field report to City of Durham Inspector at end of day
Cement Stabilization Requirements

- **Provide a map** showing where treatment is to take place.
  - Treatment is to be applied over a complete facility
  - (full width of street from intersection to intersection).
  - Partial areas will not be allowed.

- **Please Note**
  - Adding material to the road will cause it to fluff (or get higher). Be sure that road is graded appropriately to receive extra material. From past experience when this is not done and the contractor needs to scrape off an inch or two of stabilized material to get back on grade they can no longer pass a proofroll.
  - Do not construct the soil-cement base when the air temperature is below 40°F nor when conditions indicate that the temperature may fall below 40°F within 24 hours. Do not place or mix materials with frozen subgrade. Protect the base from freezing for 7 days after completion.
Recreation and Parking

FDR Highlights since 2014

16 parking and service areas on 13 sites

Tennis Facilities
- 18 courts on 3 sites
- 1 facility in construction
- 1 in planning

1 Basketball facility (2 courts)

1 Futsal court
Considerations

- Hauling Costs
- Costs compared to heavy-duty concrete pavement section
- Efficiencies by combining paving projects
- Seasonal Conditions
- Construction Duration
- Grading and ADA
- Combine with other solutions
- Experience of FDR contractor and Geotech
Garrett Road Park Tennis Courts

- 6 courts (~4,000 SY)
- Base Spec: FDR 50# at 10” ; 3” Asphalt
- FDR and Paving Cost: $131,335
Garrett Road Park Tennis Courts

Cracking and poor repairs

Ponding

Geotechnical Testing: Sandy clay and fill moisture content

Recommendation: 65# at 12” depth +$10,600 (not accepted)

Actual: 55# at 10” depth, field adjusted + $3,100
Garrett Road Park Tennis Courts

Pavement Reclamation

Cement Mixing

Proof Roll
Garrett Road Park Tennis Courts

Equipment got stuck in soft areas
185 SY (4.6% of site) failed proof roll

Remediation:
2’ undercut removal
13” CABC
11” on-site material
+$7,112

+ ~4 weeks including change order processing, FDR, remediation, fine grading and paving
Garrett Road Park Tennis Courts

GC: CourtOne
Paving and FDR: Raleigh Paving
Geotech: Terra Tech
Sign and Signal Shop

Renovated facility

Mill and overlay existing pavement

Compact existing gravel
Sign and Signal Shop

Proof roll FAIL at parking lot
- Debris, Organic matter
- Wet soils to 5’

Options:
Undercut, CABC and geogrid
+ 4-5 weeks
+ delay to building inspection

FDR 40#/SY at 12”, existing lot
Increase Asphalt to 3” depth
Undercut and ABC selected areas
+$78,992 (slightly more than CABC option)
+24 days, building inspection ON TIME
Concerns and Lessons Learned

- Pick the Right Location
- Communication
- Dust Control
- More Communication
- Utilities
- Old Brick gutters
- Brittle water lines
- Trolley Tracks
- Costs
- You cannot over communicate
Questions?

Tasha Johnson
Public Works Department
City of Durham
Tasha.Johnson@DurhamNC.gov
(919) 560-4326

Nia Rodgers
General Services Department
City of Durham
Nia.Rodgers@DurhamNC.gov
(919) 560-4197