

Jacksonville, FL – April 22-24, 2014





# SMOOTH PAVEMENTS?



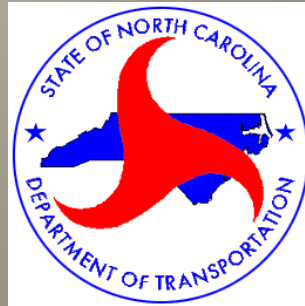
**Diamond Grind**



# Diamond Grinding Slurry



**What do we do with it NOW???**





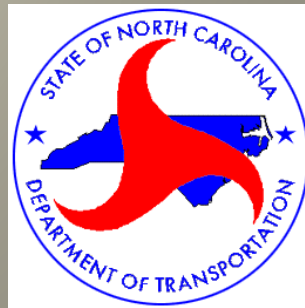
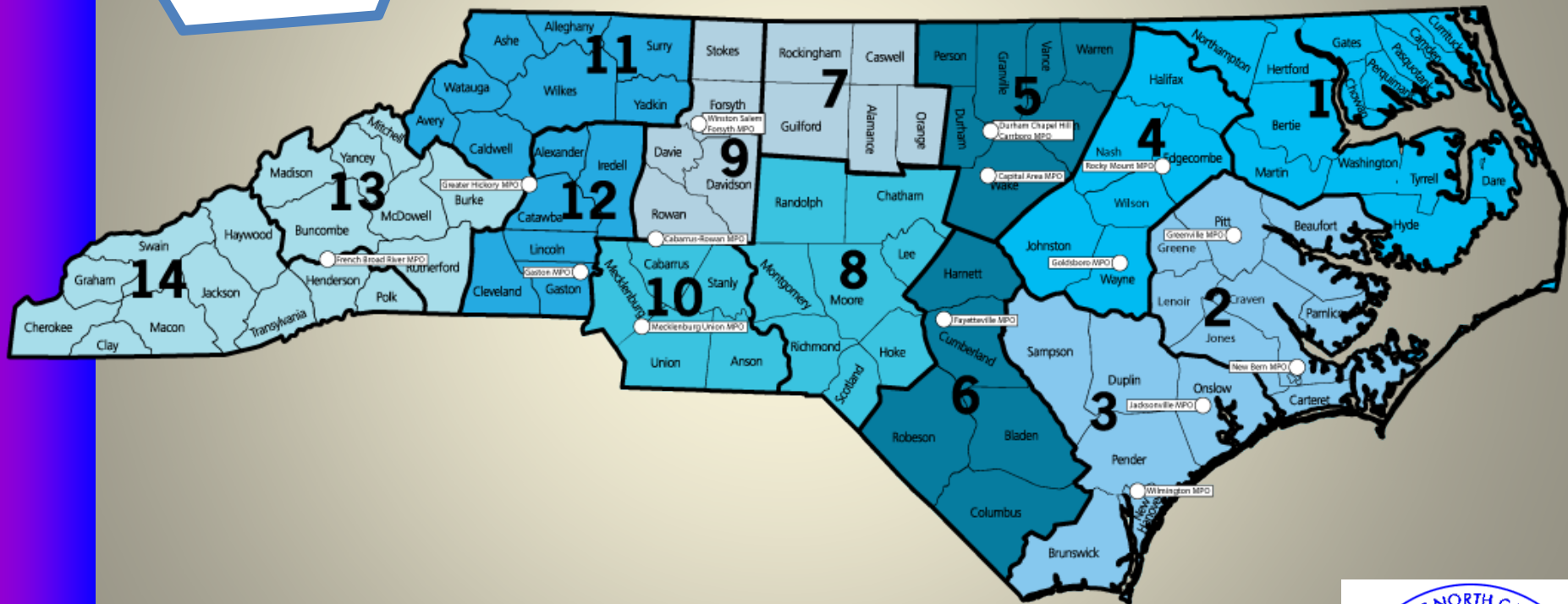
# Davis C. Diggs, PE

## District Engineer





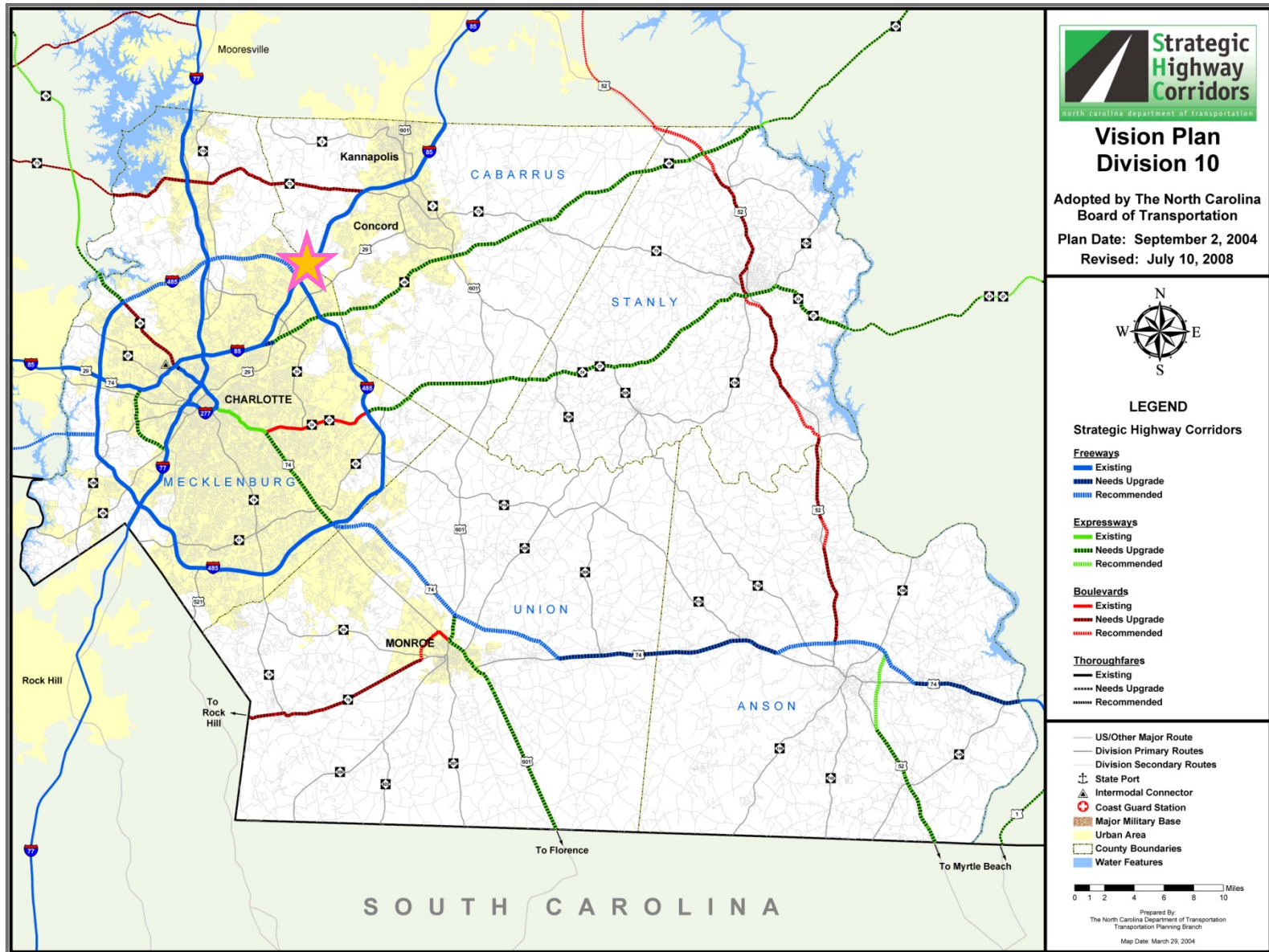
# regions & divisions





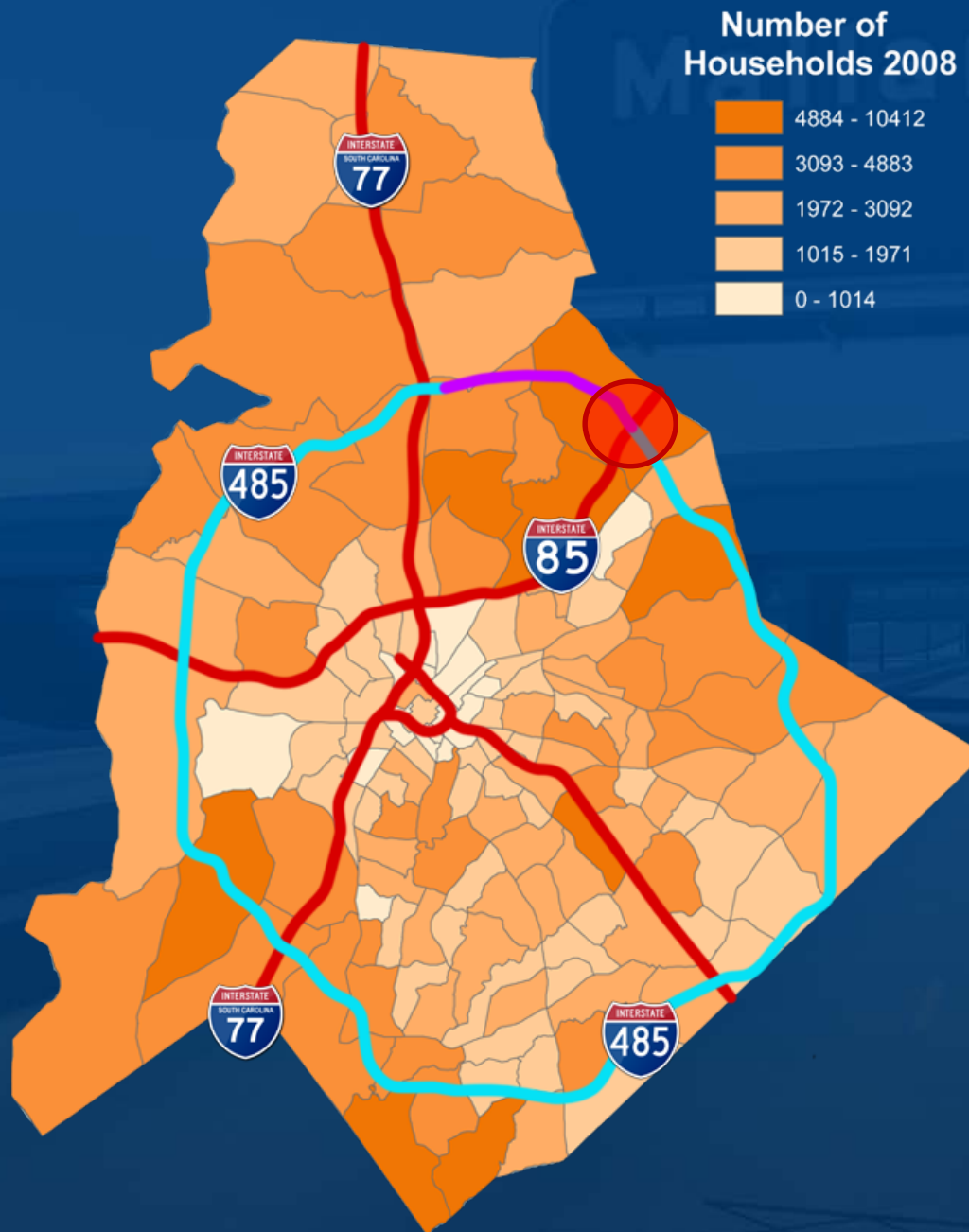


## STRATEGIC HIGHWAY CORRIDORS



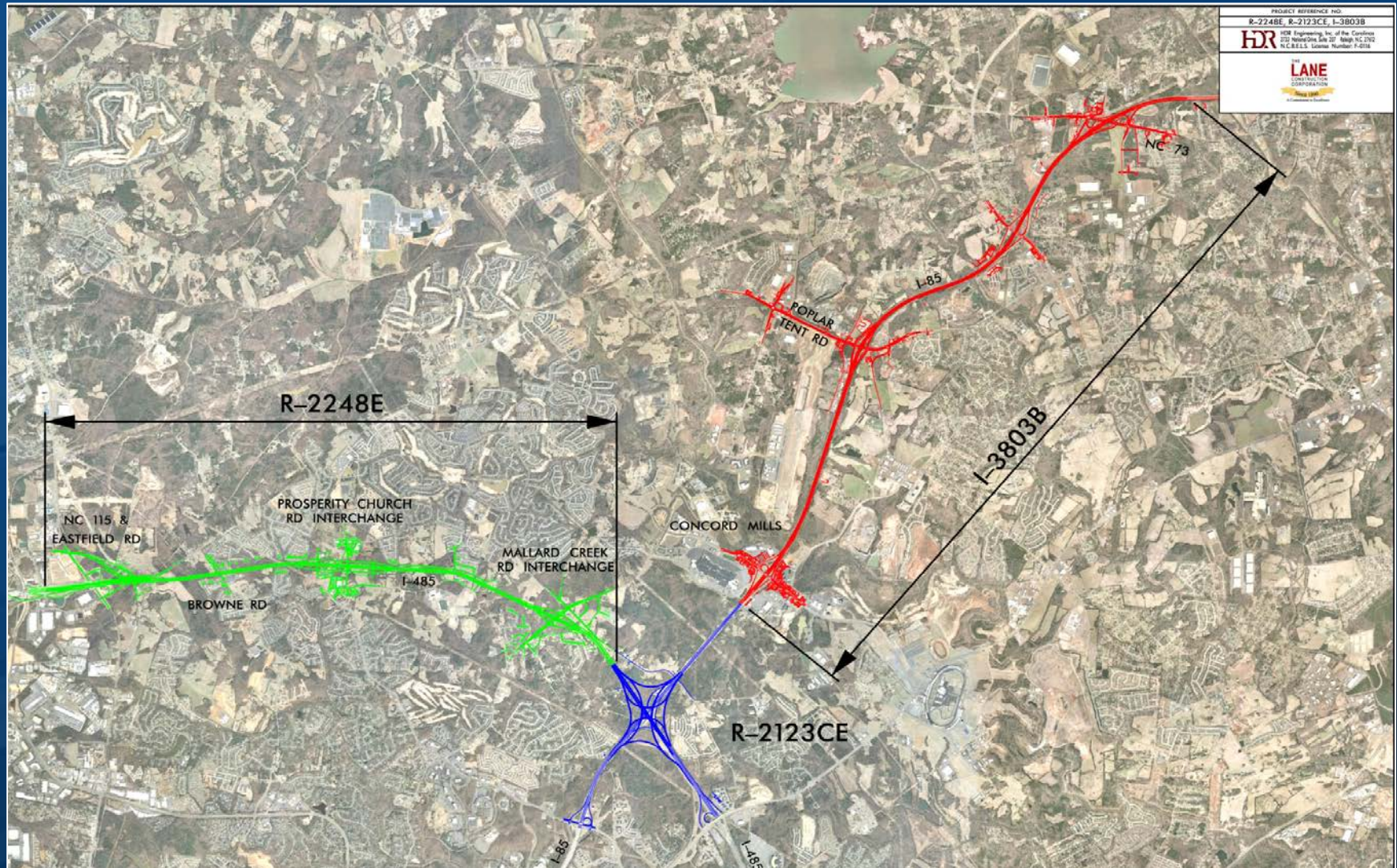


# I-485 / I-85 Interchange R-2123CE Mecklenburg/Cabarrus Counties





# ALL CONCRETE PAVEMENT!!! (Almost 1 Million SY)



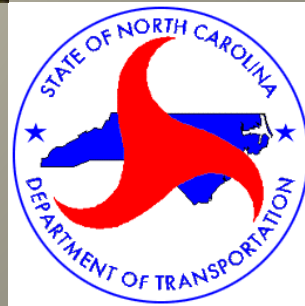
## The Big Three! - \$400m Contract Value



Charlotte's turbine interchange was named the top road project in the October 2012 issue of "Roads and Bridges" magazine. Rather than build the proposed four-level stack interchange, the turbine uses the existing right-of-way, features smaller bridges, and will be easier to maintain. Savings estimate \$50 million.



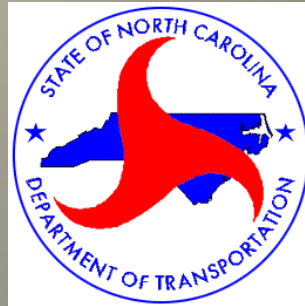
**R-2123 CE**





# I485 to I85 Interchange

- R-2123CE: I-85/I-485 Interchange Reconstruction
- Design Build Project
  - Initial Estimated Cost \$155 Million
- Lane/STV-Ralph Whitehead Associates awarded contract @ \$92,162,250
- Completion scheduled for December, 2014
- Design Build team modified 4-Level Stack to Turbine Interchange





# I-485 / I-85 Interchange R-2123CE Mecklenburg/Cabarrus Counties



January 2014



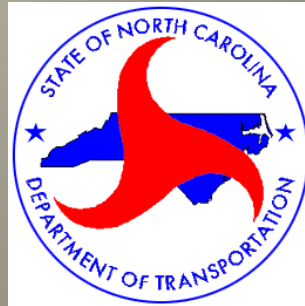
# I-3803B



727.520.8181  
www.aerophoto.com

I-85 Widening / I-485 Interchange

Image # 130821 0291  
Date 08.21.13

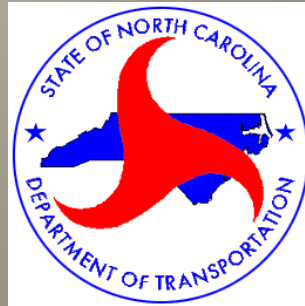




# I-85 Cabarrus County

## **I-3803B:** I-85 from Bruton Smith Blvd. to NC 73

- ❖ Widens 7 mi. of I-85 from 4-lane divided to 8-lane divided and reconstructs interchanges at Poplar Tent Road and NC 73.
- ❖ Lane Construction/HDR submitted winning price proposal @ \$125,159,110
- ❖ Innovative Design Features at Poplar Tent Rd & NC 73
- ❖ Construction began August 2011
- ❖ Completion scheduled for September, 2014





# Innovative Design Features

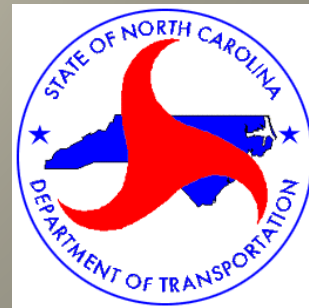
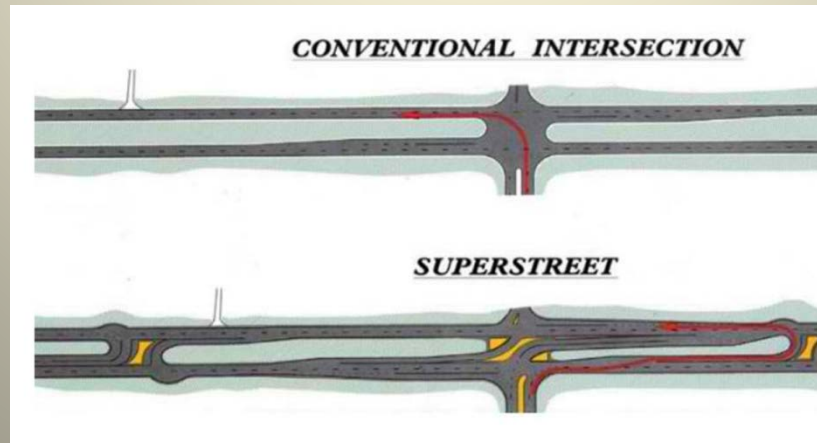
## Diverging Diamond Interchanges



## Roundabouts



## Superstreets





# Strategic Location / Safety Innovation



**National Asphalt Paving Association's (NAPA)  
2012 Asphalt Operations Safety Innovations Award**





Concrete Plant Setup





Concrete Paving



## Challenges

- All-Grind Not part of these contracts.
- Our contract required smoothness testing by Rainhart Profilograph but NCDOT wanted to use IRI (Upgrade to 2012 Specs.) This required a change order (SA).
- Lane knew this would require some diamond grinding, but initial results indicated about 40% required corrective action – much more than anticipated.
- Lane proposed to all-grind both projects with a 60/40 split of the cost.



## Challenges (Continued)

- Assumptions made at that time about slurry disposal methods were incorrect.

### Language from Supplemental Agreement:

The method and location of disposal for the concrete slurry produced by the grinding will be submitted for approval prior to beginning work and **must abide by the NC Department of Environment and Natural Resources permit requirements for slurry disposal.**



# THE PERMIT!!!



## North Carolina Department of Environment and Natural Resources

Pat McCrory  
Governor

Division of Water Quality  
Charles Wakild, P.E.  
Director

John E. Skvarla, III  
Secretary

April 24, 2013

Terry Gibson, PE – State Highway Administrator  
NC Department of Transportation  
1536 Mail Service Center  
Raleigh, NC 27601-1536



Subject: Permit No. WQ0035749  
Diamond Grinding/Hydrodemolition  
Land Application of Diamond  
Grinding and Hydrodemolition  
Operation Slurry (503 exempt)  
Statewide

Dear Mr. Gibson:

In accordance with your permit modification request received March 19, 2013, we are forwarding herewith Permit No. WQ0035749, dated April 24, 2013, to the NC Department of Transportation for the operation of the subject residuals management program.

Modifications to the subject permit are as follows:

- ♦ Update the permit to allow both Diamond Grinding Slurry (DGS) and Hydrodemolition Operation Slurry (HOS) to be land applied or distributed statewide in accordance with 15A NCAC 02T .1100.

**Please note that DGS or HOS shall not be land applied if its pH is greater than or equal to 12.5 and the pH shall be sampled for each truckload in accordance with Condition IV.3 and IV.4.**

This permit shall be effective from the date of issuance until May 31, 2017, and shall be subject to the conditions and limitations as specified therein. Please pay particular attention to the monitoring requirements listed in Section IV. Failure to establish an adequate system for collecting and maintaining the required operational information shall result in future compliance problems.

If any parts, requirements or limitations contained in this permit are unacceptable, the Permittee has the right to request an adjudicatory hearing upon written request within 30 days following receipt of this permit. This request shall be in the form of a written petition, conforming to Chapter 150B of the North Carolina General Statutes, and filed with the Office of Administrative Hearings at 6714 Mail Service Center, Raleigh, NC 27699-6714. Unless such demands are made, this permit shall be final and binding.

AQUIFER PROTECTION SECTION  
1636 Mail Service Center, Raleigh, North Carolina 27699-1636  
Location: 512 N. Salisbury St., Raleigh, North Carolina 27604  
Phone: 919-807-6484 \ FAX: 919-807-6496  
Internet: <http://portal.ncdenr.org/web/wc/dgs>

An Equal Opportunity/Affirmative Action Employer

One  
North Carolina  
*Naturally*



4. Pollutant concentrations in DGS or HOS applied to any land application site shall not exceed the following **Ceiling Concentrations** or **Monthly Average Concentrations** (i.e., dry weight basis):

<b>Parameter</b>	<b>Ceiling Concentration (milligrams per kilogram)</b>	<b>Monthly Average Concentration (milligrams per kilogram)</b>
Arsenic	75	41
Cadmium	85	39
Copper	4,300	1,500
Lead	840	300
Mercury	57	17
Molybdenum	75	n/a
Nickel	420	420
Selenium	100	100
Zinc	7,500	2,800



# Contacts

NCDOT - Robin Maycock  
Environmental Operations Engineer II  
919-861-3780 [rmaycock@ncdot.gov](mailto:rmaycock@ncdot.gov)

NCDENR - Michael E. Scott  
Chief Solid Waste Section  
919-707-8246 [michael.scott@ncdenr.gov](mailto:michael.scott@ncdenr.gov)



# DATA SUMMARY & CALCULATION SHEET

Date Prepared = 10/11/2013

NCDOT Project No. 1588-10-027, Phase 02



Comparison of laboratory reported metal concentrations in the diamond grinding slurry dewatered cake product vs IHSB preliminary remedial goals  
Sample ID = NCDOT 1-85/485. Sample Collected on September 23, 2013. Sample Collected By = Rob Willcox with S&ME, Inc.

Constituent	Basis	Lab Results (Total Metals) (mg/kg)	Lab Method	Preliminary Residential - Health Based Soil Remediation Goal (PSRG) (mg/kg)	PSRG Health Based Adjusted Values <sup>1</sup> (mg/kg)	Protection of Groundwater PSRG (mg/kg)	Lab Results (SPLP Method) (ug/L)	NCAC 2L Groundwater Quality Standards (ug/L)
Arsenic	C	1.3	6020	0.61	30.5	5.8	< 1.0	10
Barium	N	180	6010B	3000	5000	580	360	580
Cadmium	N	< 0.45	6010B	14	23.3	3.0	< 5.0	2.0
Hexavalent Chromium*	C/M	3.1	7199	0.29	14.5	3.8	< 10	10
Lead <sup>II</sup>		4.7	6010B	400	400 <sup>II</sup>	270	< 5.0	15
Mercury	N	< 0.036	7471	2.0	3.3	1.0	< 0.20	1.0
Selenium	N	4.0	6010B	78	130.0	2.1	< 20	20
Silver	N	< 0.90	6010B	78	130.0	3.4	< 10	20

Yellow background = concentration reported in the sample is greater than the non-adjusted PSRG

Blue background = concentration reported in the sample is greater than the Protection of Groundwater Remedial Goal

Hexavalent Chromium\* = Hexavalent chromium has the most restrictive goal for the different forms of chromium. Total chromium and trivalent chromium have also been reported and are below PSRG Goals

Lead<sup>II</sup> = The SRG is based on USEPA guidance on lead cleanup levels. The value cannot be adjusted

Preliminary PSRG Health Based Goal, Adjusted Values<sup>1</sup> (methodology taken from reference 2 above):

For carcinogens = PSRG Health Goal x 100/n, where n = number of carcinogens present (for the above example n = 2)

For non-carcinogens = PSRG Health Goal x 5/n, where n = the number of non-carcinogens present (for the above example n = 3)

## Basis

C = The PSRG is based on the carcinogenic endpoint and corresponds to an excess lifetime cancer risk of 1 in 1,000,000

N = The PSRG is based on the non-carcinogen endpoint and corresponds to a hazard quotient of 0.2.

M = Contaminant is a mutagen

## References:

- 1) Inactive Hazardous Site Branch, Preliminary Soil Remediation Goals (PSRG) Table, July 2013
- 2) Registered Environmental Consultant Program, Implementation Guidance, November 2012 (Edited 12/12/12)



# OPTIONS???

(Approximately 2.6M Gallons of Slurry)

- Haul to Waste Water Treatment Plant (Local Plant Would Not Accept.)
- Land Apply on Agricultural Fields Flatter than 6:1
- Land Apply on Project Where Flatter than 6:1  
(Both Require no Rainfall within 48 Hours.)
- Haul to a Permitted Landfill. (Closest was 19 miles & Tipping Fee was \$75/ton.)
- Dewater and mix with soil. Cap with 5' compacted soil. All must be above ground water elevation.



# Lane Construction Enlisted the Help of...



**BIO-NOMIC SERVICES, INC.**  
A CARYLON COMPANY

800-782-6798

[HOME](#)

[ABOUT US](#)

[SERVICES](#)

[JOB OPPORTUNITIES](#)

[CONTACT](#)

## CONTACT US



### Bio-Nomic Services, Inc.

516 Rountree Road  
Charlotte, NC 28217-2133

Toll Free: 1.800.782.6798  
Phone: 704.529.0000  
Fax: 704.529.1648

Email: [office@bio-nomic.com](mailto:office@bio-nomic.com)

For more information, please visit the [Carylon Corporation](#) website.

## ➤ RELATED INFORMATION

As an experienced service provider, we are geared to perform 24 hours a day, 365 days a year. You can call our 24 hour dispatch service at **800.782.6798**



## **Equipment and Processing**

The Lane Construction Corporation intends to sub-contract with Bio-Nomic Services, Inc. (Bio-Nomic) to perform Concrete Grinding Slurry processing. Bio-Nomic will furnish slurry mixing tanks, water holding tanks with transfer pumps and generator as necessary to introduce slurry to a Trailer Mounted 110 CF Plate & Frame Filter Press. Slurry produced by the grinding operation will be transported to a receiving tank with mixers necessary to homogenize the material brought to the dewatering operation. The Plate & Frame Press operation is a batch process where each discharge from the unit will be 4 cubic yards. It is expected that the cycle time for each discharge will be approximately 1 to 1 ½ hours. The effluent water from the dewatering system will be transferred to a holding tank for re-use in the grinding operation or other disposal. A schematic of the “Slurry Processing Center” is attached in Figure 1-A.

Initial receiving tanks for the slurry will be open topped 30 yard roll off containers. These containers, which will be water-tight, have been chosen to handle the large volume of slurry anticipated during peak grinding operations. Roll Off #1 will be used to receive and will be connected to Roll Off #2 via an 8” pipe. Roll Off #1 is the first holding location for slurry to accommodate the early settlement of solids. The 8” pipe will allow flow of slurry into Roll Off #2. Bio-Nomic will draw slurry from Roll Off #2 into the slurry mixing tanks to create “homogenized” slurry for processing thru the Plate & Frame Filter Press.



# Process Layout





## Step 1: Grind and Collect Slurry in Tanker.





## Step 2: Dump into Holding Tanks.







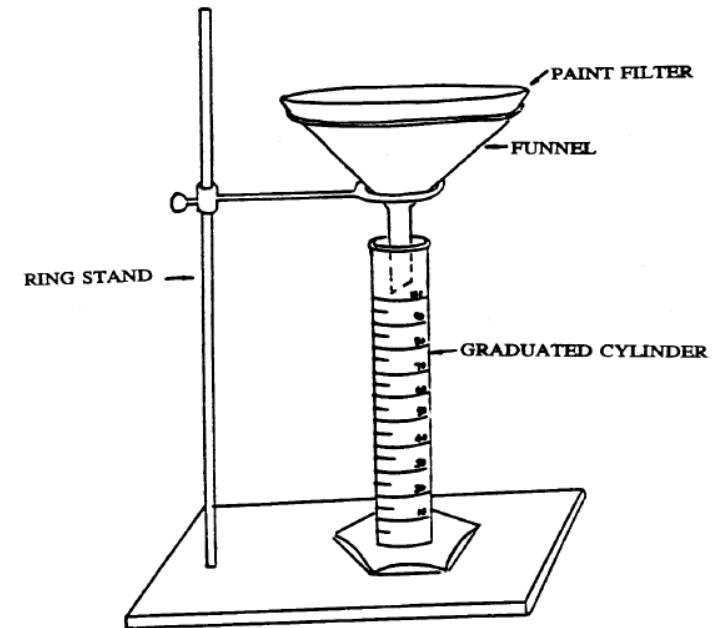


# PH Testing



# Paint Filter Test

FIGURE 1  
PAINT FILTER TEST APPARATUS





### Step 3: Separate Liquids from Solids





## Step 4: Dump Solids and Mix with Soil.













Added 30 Mil Geomembrane Lined Pit to Keep up with Production. Pit Dimensions are 120'x120'x4'





Procedure Continues to Function Adequately.





# Total Cost for Diamond Grinding Including Slurry Disposal.

2 Design Build Projects with approx. 650,000 SY  
Concrete. (Added as a Supplemental Agreement)

NCDOT \$1,000,000

Lane      \$ 666,000

Total = \$1,666,000



Robin Maycock

NCDOT Environmental Operations Engineer II

November 15, 2013.

“I was pleased with the processing operation, the pH of the material received by the grinding operation and method of incorporating waste material into the pit. Modifications from the original permit application (ie shaker table, extra dumpster) appear to be operating fine. ”

“This method of slurry disposal is likely to be more prevalent in the future as EPA is restricting more conventional means of disposal, and we may be asked about it in the future. ”



# Questions?

