

*Review of
Erosion and Sedimentation Program
Delegation to the North Carolina Department
of Transportation, Division of Highways*

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The Land Quality Section reviewed the program delegation to the Department of Transportation, Division of Highways (DOT) on September 29 through October 1, 2009. The projects selected for review were a mix of contract construction, design-build, maintenance and borrow sites. The review and the results reported here are in accordance with requirements of the Sedimentation Control Commission (SCC) delegation to the DOT.

PROJECT REVIEWS

Eight contract construction projects, a design-build project, five maintenance/force account projects and two borrow areas operated by maintenance forces were chosen based on the stage of construction and the significance of the projects. Projects were generally 20 to 70 percent complete, one of which has since been completed. The projects selected were:

CONTRACT PROJECTS

| Division | County | TIP # | Route | Contract Amount | Length | Completion Date | % Complete |
|-----------------|---------------|--------------|--------------------------------|------------------------|---------------|------------------------|-------------------|
| 4 | Nash | R-2823 | Rocky Mount Northern Connector | \$31,895,000.00 | 4.6 mi | 8/1/2011 | 34 |
| 2 | Lenoir | U-2928AB | Spirit Way, Global Transpark | | 1.3 mi | | |
| 5 | Durham | B-3450 | SR 1116/1126, Bridges | \$18,810,912.36 | 1.8 mi | 8/3/2010 | 65 |
| 6 | Cumberland | U-2519 E | I-295, Fayetteville Outer Loop | \$52,553,157.52 | 2.5 mi | 7/1/2012 | 20 |
| 7 | Rockingham | B-4252 | US 311, Bridges | \$5,073,677.38 | 0.5 mi | 12/31/2010 | 44 |
| 8 | Richmond | R-2502B | US 1 | \$26,633,346.18 | 4 mi | 11/15/2011 | 26 |
| 12 | Iredell | R-3833A | SR 1100, Brawley School Road | \$25,266,297.21 | 3.8 mi | 7/15/2011 | 28 |
| 13 | Mitchell | B-4202 | SR 1002, Bridges | \$1,664,746.06 | 0.2 mi | 1/15/2010 | 100 |
| 13 | Madison | R-2518A | US 19 | \$107,876,544.83 | 10 mi | 10/15/2012 | 37 |

MAINTENANCE/FORCE ACCOUNT PROJECTS

| Division | County | Route | Length |
|-----------------|---------------|------------------------------|---------------|
| 2 | Craven | SR 1275, Cobbtown Road | 2.9 mi |
| 6 | Columbus | SR 1460, Ward Road | 0.75 mi |
| 9 | Stokes | SR 1739, Bill Blackwell Road | 0.4 mi |
| 11 | Ashe | SR 1300, B.H. Duncan Road | 0.3 mi |
| 13 | Buncombe | SR 2850, Garrison Road | 1.0 mi |
| 3 | Sampson | Old 421 Borrow Area | NA |
| 4 | Johnston | Worsley Borrow Area | NA |

OVERALL REVIEW CRITERIA

The Roadside Environmental Unit (REU) notified project construction management personnel of the review on the day preceding each day of review. Each project review consisted of reviewing the erosion control plan for adequacy, inspecting the project for compliance, and examining the project files. LQS regional office personnel participated in the project inspections. Plans were available for review at all sites.

Contract Construction Projects Summary

| Division | Route | Plan | Measures | | Ground Cover | | Overall Effectiveness | |
|----------|--------------------------------|----------|----------------------|------------------|------------------|------------|-----------------------|----------|
| | | adequacy | Implement- tation | Install- tion | Mainte- nance | timeliness | | adequacy |
| 4 | Rocky Mount Northern Connector | Yes | No | Yes | Yes | Yes | Yes | Good - |
| 2 | Spirit Way, Global Transpark | Yes | Yes | Yes | No | Yes | No | Good |
| 5 | SR 1116/1126, Bridges | Yes | Yes | Yes | Yes | Yes | Yes | Good |
| 6 | I-295, Fayetteville Outer Loop | Yes | Yes | Yes | Yes | Yes | Yes | Good |
| 7 | US 311, Bridges | Yes | Yes | Yes | Yes | Yes | Yes | Good |
| 8 | US 1 | Yes | Yes | Yes | Yes | Yes | Yes | Good + |
| 12 | SR 1100, Brawley School Road | Bad topo | Yes | Yes | Yes | Yes | Yes | Fair + |
| 13 | SR 1002, Bridges | Yes | Yes | Yes | Yes | Yes | Yes | Good |
| 13 | US 19 | Yes | No | No | Yes | No | No | Fair |

Rocky Mount Northern Connector---The plan for the project was adequate and had been revised to reflect field changes. Measures were needed to control sedimentation during the transition between phases. Most of the site had effective measures and good ground cover, however, construction entrances were not properly installed to prevent tracking of mud off the project. Sediment had been tracked onto paved roads.

Spirit Way, Global Transpark ---The plan was adequate and measures were generally effective. Check dams and silt fence needed minor maintenance. A ditch needed matting, and some bare areas needed seeding. No sedimentation damage was observed.

Bridges on SR 1116 and 1126 ---The plan for the project was adequate and had been revised to reflect field changes. The only problem noted was with the installation of riprap on the stream bank below a bridge, resulting in bank erosion.

I-295, Fayetteville Outer Loop ---The plan was adequate. The weekly self-monitoring reports were very thorough. Measures were effective and no sedimentation damage was observed. Recommendations were made to add a sediment trap and provide additional ground cover.

Bridges on US 311—The plan for the project was adequate, and measures were effective. Some of

the ditches had straw wattles with PAM. Water in sediment traps that had been treated with PAM was clear, while other traps were turbid. No sedimentation damage was observed.

US 1—The plan was adequate, the measures were effective, and ground cover was good. No sedimentation damage was observed. The project was in excellent condition.

SR 1100, Brawley School Road—Inaccurate topographic information on the plan had led to field revisions in the plan. Measures had to be relocated to actual points of discharge. Stormwater discharging from a new pipe was not adequately treated, resulting in sedimentation damage.

Bridges on SR 1002—The plan was adequate and measures were effective. Diversions and seeding of slopes had been improved in response to self-monitoring reports. No sedimentation damage was observed.

US 19—The plan had been extensively reviewed by Land Quality prior to issuance of trout waiver for project. There were issues of measures not fitting the topography in the field. Some clearing and grubbing measures were filled during grading, leaving areas unprotected at the transition from cut to fill. Despite the planning and research emphasis on reducing turbidity on the project, few PAM treatments were observed in the field. This project was to limit the disturbed area to less than 20 acres at time because it is in a HQW zone. Land disturbance significantly exceeded 20 acres. Many cut areas were being graded simultaneously. Overall project condition was fair.

Maintenance Projects Summary

| Division | Route | Plan | | Measures | | Ground Cover | | Overall Effectiveness |
|----------|------------------------------|----------|----------------------|------------------|------------------|--------------|----------|-----------------------|
| | | adequacy | Implement- tation | Install- tion | Mainte- nance | timeliness | adequacy | |
| 2 | SR 1275, Cobbtown Road | Yes | Yes | Yes | Yes | Yes | Yes | Good |
| 3 | SR 1460, Ward Road | Yes | Yes | Yes | Yes | Yes | No | Fair + |
| 9 | SR 1739, Bill Blackwell Road | Yes | Yes | Yes | Yes | Yes | Yes | Good + |
| 11 | SR 1300, B.H. Duncan Road | Yes | No | No | Yes | Yes | No | Fair |
| 13 | SR 2850, Garrison Road | No | No | No | Yes | Yes | No | Poor |
| 3 | Old 421 Borrow Area | Yes | Yes | Yes | Yes | Yes | Yes | Good |
| 4 | Worsley Borrow Area | No | N/A | No | No | Yes | Yes | Poor |

SR 1275, Cobbtown Road—The plan had an adequate plan, but the copy with field revisions was not on the job site. Measures were effective and no sedimentation damage was observed. There were

areas needing ground cover.

SR 1460, Ward Road---Field revisions had to be made to locate measures at points of discharge, because the plan did not reflect the actual topography. The right-of-way was not adequate, resulting in steep slopes. Ground cover needed improvement in spots. Some sedimentation damage was observed.

SR 1739, Bill Blackwell Road---This was an excellent project. The plan was done over an aerial photo, so measures could be easily located. The project was completed in 14 days, and ground cover was established.

SR 1300, B.H. Duncan Road---The plan was not adequate. Gabion baskets were installed in the edge of the stream to form the toe of a fill slope. This was neither shown on the plan, nor in the request for a trout waiver. The request for the trout waiver described the realignment as moving the center-line of the road away from the stream. However, the removal of the trees between the road and the stream was not described. The plan did not include a reforestation plan, as required for NC DOT secondary road projects that seek a trout waiver. Back slopes along the road were not prepared before seeding. Sediment control measures were too small, and slopes too steep. Straw wattles had just been laid out on the project, but were not staked.

SR 2850, Garrison Road—The waste area for the project did not have an adequate plan. Measures had not been installed correctly, and were ineffective in areas. A fill slope on the project was about 1 ½ : 1 and was uncompacted. It had not been prepared for seeding and any mulch had washed or blown off. Cut slopes were near vertical, and the ditches were so small and steep sided that there was not room for straw wattles. Small ineffective check dams were installed. Matting in the ditch was poorly secured. Sediment had washed into a drainage below the waste area.

Old 421 (Harrells) Borrow Area—This small borrow area had an adequate plan, with effective measures and good ground cover. No sedimentation damage was observed.

Worsley Borrow Area—This site is a soil stockpile area. It is larger than one acre and does not have a plan. A vegetated buffer had prevented sedimentation damage. The project needs a plan, installed measures and self-monitoring.

ADMINISTRATIVE REVIEW

An issue arose this year concerning the method the Hydraulics Unit is using to determine peak discharge in watersheds of less than one square mile. Hand drawn maps and nomographs developed in 1973 are still being used for sizing culverts and determining outlet velocities. Land Quality has agreed to let NC DOT submit data to validate the use of this method to the SCC Technical Advisory Committee. Adoption of current methods published by the Federal Highway Administration, the U.S. D.A. Natural Resources Conservation Service and the U. S. Geological Survey are encouraged.

DOT Internal Inspection Process

REU Field Operations staff inspects all DOT projects. Projects are inspected monthly. Each project is evaluated on a scale of 1-10 for installation of measures, maintenance of measures, effectiveness of measures, plan implementation and overall project evaluation. A score of 6 or less results in the issuance of an “Immediate Corrective Action” report (ICA). Land Quality records indicate ten ICA’s were issued in 2009.

Education Efforts

NC DOT has contracted with N. C. State University to train and certify contractors and staff in the design, management and installation of sedimentation and erosion control practices. Levels I, II and III have been implemented. The Level III course for design of erosion and sedimentation control plans would be better if it was two days instead of one. The limited time allowed for the training results in instructors “teaching the test,” rather than allowing time for discussion and the development of understanding. NC DOT is funding research on turbidity in the streams on the US 19 project, and the effectiveness of hydromulches.

ISSUES NOTED IN THE REVIEW

Secondary Roads

The two projects for the widening and paving of secondary roads in the mountains had significant deficiencies. The plans were not adequate, and did not take into account existing topography. The projects were built without proper drainage or slope stabilization. Maintenance grading crews need to be trained and equipped to compact fill slopes and prepare graded slopes for seeding.

Trout Buffer Impacts

The SCC issued a declaratory ruling in December 2006 concerning the issuance of trout waivers for NC DOT secondary road projects. The ruling states:

“That the temporary and minimal standard for a trout buffer waiver encompasses the paving and improvement of secondary roads when NC DOT ultimately removes erosion and sedimentation impacts from the area by stabilizing an unstable, eroding road surface, avoids and minimizes impacts; restores the area to native vegetation characteristic of an undisturbed buffer to the extent practical upon completion of construction, uses best management practices during and after construction, and limits disturbance to the amount necessary within the trout buffer in order to meet safety, right of way, and topographical constraints.”

There are important conditions in this ruling, including avoidance and minimization, restoration of native vegetation, use of best management practices and limitation of disturbance within the buffer.

NC DOT Division 11 personnel seem to be completely unaware of these conditions. The only trees along the stream on the B. H. Duncan Road project were cut down, and no plans were made to restore native vegetation along the stream. Indeed, gabion baskets were installed in the water that were not on the plan. It is recommended that DOT establish a training program to familiarize personnel on the requirements for trout buffers and how to design plans for disturbance in the buffer.

Maintenance Borrow and Waste Areas

Another issue of concern is small waste and borrow areas. There are a number of areas used by Division Maintenance forces, with at least one in each county. It is strongly recommended that NC DOT audit the inventory of these sites, and develop erosion and sedimentation control plans as necessary, and reclaim sites in a timely manner.

High Quality Water Zones

The US 19 project is in a High Quality Water Zone. The plan for the project requires careful phasing to limit the disturbed area. The contractor was allowed to disturb more than 20 acres at a time, in violation of Design Standards for Sensitive Watersheds.

Technology Transfer

Maintenance forces in Stokes County developed erosion control plans for secondary roads using GIS software. The plans were overlaid on aerial photography, showing the plans to scale with accurate location of measures. The NC DOT GIS Unit has excellent resources for aerial photography and topographic contours for the entire state, as well as primary and secondary roads. NCDOT would benefit greatly by having personnel proficient in using this technology train District and County Maintenance personnel how to use GIS data to prepare plans. The quality of erosion control plans on Maintenance projects is very uneven across the state.

NC DOT regularly funds research projects on innovative stormwater, erosion and sedimentation control. New technology is developed from this research. The Roadside Environmental Unit develops specifications and standard drawings for the new measures. However, the acceptance and utilization of new measures is inconsistent throughout the state. PAM treatments should be used in HQW and Trout waters starting with initial land clearing. (Expectations are that an effluent limit for turbidity will be implemented in North Carolina in 18 months, making the use of PAM or similar treatment a Federal requirement.)

The Recommendations from the 2008 Annual Review are listed below. Only recommendation No. 3 has been satisfactory and effectively addressed. The other four recommendations remain as areas that need improvement.

1. Enhanced sediment settling with flocculants should be integrated with traditional practices when adequate surface area cannot be provided for measures. This should be implemented immediately on all maintenance projects as well as contract construction projects.

2. County maintenance forces and landscaping crews need to coordinate which unit will prepare steep back slopes or cut banks for seeding.
3. Failures of skimmer sediment basins should be evaluated to determine if construction or design flaws can be identified and eliminated.
4. Sediment controls should be kept in place until ground cover sufficient to restrain erosion is established rather than being removed for the convenience of the seeding contractor.
5. The Land Quality Section and NC DOT need to continue to evaluate the need for environmental review of projects in High Quality Waters and Trout Waters, and achieve a consistent level of environmental protection.