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

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Performed by:

Francis M. Nevils, Jr., P.E., C.P.E.S.C.
Section Chief

T. Gray Hauser, Jr., P.E.
State Sedimentation Specialist

Matthew Poling, P.E.
Assistant State Sedimentation Specialist

NCDENR
North Carolina Department of Environment and Natural Resources
Division of Energy, Mineral, and Land Resources
Land Quality Section

INTRODUCTION

§ 113A-54. POWERS AND DUTIES OF THE COMMISSION
(d) In implementing the erosion and sedimentation control program, the [Sedimentation Control] Commission shall:… (2) Assist and encourage other State agencies in developing erosion and sedimentation control programs to be administered in their jurisdictions. The Commission shall approve, approve as modified, or disapprove programs submitted pursuant to G.S. 113A-56 and from time to time shall review these programs for compliance with rules adopted by the Commission and for adequate enforcement.

§ 113A-56. JURISDICTION OF THE COMMISSION
(b) The [Sedimentation Control] Commission may delegate the jurisdiction conferred by G.S. 113A-56(a), in whole or in part, to any other State agency that has submitted an erosion and sedimentation control program to be administered by it, if the program has been approved by the Commission as being in conformity with the general State program.

The Land Quality Section reviewed the program delegation to the North Carolina Department of Transportation, (NC DOT) on September 24-26, 2012. The projects selected for review were a mix of contract construction, design-build and maintenance. The review and the results reported here are in accordance with requirements of the Sedimentation Control Commission (SCC) delegation to the NC DOT and § 113A-54(d)(2) and § 113A-56(b).

PROJECT REVIEWS

Twelve contract construction or design-build projects, and four maintenance/force account projects were chosen based on the stage of construction and the significance of the projects. Projects were generally between 30 and 70 percent complete.

Land Quality personnel from the regional offices and central office accompanied NC DOT personnel to the 16 projects, which were inspected during a 3-day period. Each project review consisted of reviewing the erosion control plan for adequacy, inspecting the project for compliance, and examining the project files. Plans were available for review at all sites.

NC DOT is responsible for two types of inspections on each project. NPDES Self-Monitoring and SPCA Self-Inspections are conducted at least weekly by a project inspector from the office of the resident engineer for design-build or contract construction, or from the office of the county or district engineer for maintenance projects. There are 7 Roadside Environmental Unit Field Operations engineers, each covering 2 of the 14 divisions in the state. The engineers each have generally one technician, who inspects secondary road projects and some contract construction. 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). The weekly project inspections and monthly REU inspections were reviewed for each project.

Field data was collected on erosion and sediment control measure installation, maintenance and effectiveness. Timely provision of ground cover, adequacy of right-of-way, phasing of grading, field revisions and sedimentation damage were also evaluated. Each project was then given an overall rating of "Poor, Fair or Good." A summary of the sixteen projects follows.

CONTRACT OR DESIGN-BUILD PROJECTS

Division	County	TIP #	Route	Contract Amount	Length	Overall Rating
1	Craven	R-2583	US 158, Murfreesboro	$32,818,830	7.2	Good
2	Onslow	U-4700B	Western Parkway	$28,853,605	2	Fair
4	Nash	B-4588	Bridge over Stoney Ck, SR1670	$1,207,702	0.16	Good
5	Wake	R-2814B	US 401, Rolesville	$24,956,387	5.8	Good
6	Harnett	R-5185	US 401, Lillington	$5,904,802	1	Good
7	Guilford	R-2611	West Market Street, SR 1008	$17,475,472	3.8	Good
8	Lee	R-2417AA	US 421, Sanford	$30,181,608	4.4	Good
10	Mecklenburg	R-2248E	I-485, Charlotte Outer Loop	$139,457,129	5.1	Fair
11	Ashe	U-3812	NC 88, Jefferson	$3,599,585	1.5	Fair
13	Rutherford	R-2233AB	US 221, South of US 74 Bypass	$30,438,069	6	Fair +
14	Macon	R-4748	New Route from Siler Rd.	$6,785,291	0.86	Good
14	Macon	B-4286	NC 28, Franklin	$9,665,922	2.5	Good

MAINTENANCE/FORCE ACCOUNT PROJECTS

Division	County	Route	Length	Overall Rating
2	Jones	SR 1157, Guinea Town Road	0.1	Fair
6	Cumberland	SR 1420, Barefoot Road	1.7	Good
11	Watauga	SR 1123, Laurel Creek Road	1.4	Fair
12	Cleveland	SR 1644, Willis Road	0.7	Good

PROJECT EVALUATIONS

US 158, Murfreesboro Bypass, TIP R-2583

NC DOT Division 1, Hertford County

This is a 7.2 mile project with a design-build contract for $32,818,830. The project has consistently scored 9's on monthly REU inspections. The plan was adequate and properly implemented. Ground cover, runoff conveyance and sediment controls were all adequate and effective. Overall rating was Good.

Box culvert being formed on US 158, Murfreesboro Bypass

Guinea Town Road, SR 1157 Pipe Replacement, 2B.205211

NC DOT Division 2, Jones County

This is a NC DOT Bridge Maintenance project 0.1 miles in length. An existing pipe is to be excavated and replaced with a new corrugated metal pipe and headwall. The ACOE 404 Permit and DWQ 401 Certification approved removal of the pipe without dewatering of the work area. Turbidity curtains were installed above and below the project. It is difficult to evaluate if bed load sediment was being transported from the work area, but the stream was extremely turbid on both sides of the turbidity curtain. NC DOT REU provided the following explanation of the site: "[The] turbidity curtain was doing a good job of keeping turbid water in the work zone until the approach fill gave way that the curtain was secured to. When this happened the curtain no longer spanned the width of the water course which allowed turbid water to get past it. …This particular stream was in a 'no flow' situation and that the water present was essentially trapped in a low lying area (bowl) at the project site. … the stream bed was dry some short distance up and downstream of the project." The well installed upland measures do seem pointless considering the impact of the work in the stream. Based on conditions during the review, the overall rating was Fair.

Guinea Town Road, SR 1157

Western Parkway, TIP U-4700B

NC DOT Division 3, Onslow County

This is a 2 mile project with a contract for $28,853,605. REU Monthly Inspections had generally scored the project 8-9, with detailed lists of corrective actions. The September 5, 2012 report dropped the score to 7 because of a failure to maintain measures and establish ground cover in a timely manner. The lack of ground cover around the bridge on September 26, 2012 gave the project a Fair rating.

Bridge construction on Western Parkway

Bridge over Stoney Creek, SR 1670, TIP B-4588

NC DOT Division 4, Nash County

This is a 0.16 mile project with a contract for $1,207,702. Detailed REU monthly inspections have consistently scored the project as a 9. The project had effective and maintained measures, and good permanent ground cover on finished areas. The project was rated Good.

Bridge over Stoney Creek, SR 1670

US 401, Rolesville Bypass, TIP R-2814B

NC DOT Division 5, Wake County

This is a 5.825 mile project with a contract for $24,956,387. Recent REU Monthly inspection reports scored the project as 8 or 9, with comments concerning maintenance and protection around a culvert headwall. The measures were maintained on the day of the review. The project was rated Good.

US 401, Rolesville Bypass

Barefoot Road, SR 1420, 6C.026078

NC DOT Division 6, Cumberland County

This is a 1.7 mile secondary road widening and paving project conducted by NC DOT Maintenance forces. The REU monthly inspections have scored this project at 9. Ground cover was being provided in accordance with the new NPDES Permit requirements of 7 and 14 days. No sedimentation damage had occurred and the project was rated Good.

Barefoot Road, SR 1420

US 401 Lillington, TIP R-5185

NC DOT Division 6, Harnett County

This is a 1 mile project with a contract for $5,904,802. REU Monthly inspection reports scored project as 8 or 9. The disturbed area is minimized by providing ground cover as grading progresses. The one mile long project had about one acre of disturbed area in September. The project was rated as Good.

Fill slope on US 401, Lillington

West Market Street, SR 1008, TIP R-2611

Division 7, Guilford County

This is a 3.8 mile widening project with a contract for $17,475,472. Recent REU Monthly inspection reports scored the project at 9. The project had an adequate plan which had been effectively implemented. The only recommendation to improve the project was to apply PAM to wrapped rock silt checks. The project was rated Good.

Temporary Rock Sediment Dam-Type B on West Market Street, SR 1008

US 421, Sanford Bypass, TIP R-2417AA

NC DOT Division 8, Lee County

This is a 4.4 mile project with a contract for $30,181,608. Recent REU monthly inspections have scored the project 7 to 8. Immediate Corrective Action inspection reports were issued in June and November 2011 when scores dropped to 6. Providing ground cover on slopes and maintenance of measures at the toe of slopes are issues. The disturbed area was estimated at 50 acres in September. The overall project rating at the review was Good.

US 421, Sanford Bypass

I-485, Charlotte Outer Loop, TIP-R-2248E

NC DOT Division 10, Mecklenburg County

This is a 5.1 mile new highway project with a design-build contract for $139,457,129. REU monthly inspection reports have generally graded the overall project at 8, with maintenance or effectiveness of BMP's sometimes scored at 6 or 7. Sediment damage reported in June and July 2012 had been cleaned up. An ICA (overall evaluation of 6) was issued two days before the review because the contractor cleared and grubbed 200 feet of stream and stream buffer that was supposed to remain undisturbed prior to bridge construction. The area had been promptly seeded and matted.
During the review it was noted that slopes need to be graded in a manner that will allow for temporary seeding. Some exposed slopes had not been stabilized in a timely manner. A large basin receiving runoff from at least 9 acres was dewatering through a stone spillway and did not have porous baffles. The project rating was Fair.

I-485 basin for 9 acre drainage area without surface dewatering or porous baffles

Laurel Creek Road, SR 1123, 11C.095093

NC DOT Division 11, Watauga County

This is a 1.4 mile project to widen and pave a gravel secondary road. The work was being done by a private contractor under the administration of the District (Maintenance) Engineer. REU monthly inspection reports have generally graded the overall project at 7 or 8. The plan was designed assuming that disturbed areas would not be open for more than 30 days. Too much area had been opened to allow stabilization within 30 days. The waste area had a high potential for erosion. New disturbance in the stream buffer needed to be graded and stabilized in one operation. The overall rating was Fair.

Laurel Creek Road, SR 1123

NC 88, Jefferson, TIP U-3812

Division 11, Ashe County

This is a 1.5 mile project with a contract for $3,599,585. REU monthly inspection reports have consistently graded the overall project at 8. There were four spots that needed improved or additional measures. Slight sediment loss had occurred at the wetland in the upper end of a small pond that was within a Temporary Drainage Easement for the construction of the project. A skimmer sediment basin discharged through land clearing debris and down a vertical cut slope to the pond. The overall project rating was Fair.

NC 88, Jefferson—Skimmer Sediment Basin discharges through land clearing debris down unstable excavated slope and into pond.

Willis Road, SR 1644

NC DOT Division 12, Cleveland County

This is a 0.7 mile widening and paving of a secondary gravel road by NC DOT Maintenance Forces. REU monthly inspections improved from 7 in August, 8 in September to 9 in October. The site had adequate measures and ground cover had been provided in a timely manner. Two issues were discussed at the site. The plans were designed based on a 30 day period of land disturbance. This resulted in the use of a Type B Silt Basin for an 8.5 acre drainage area of primarily off-site agricultural land. The basin discharged onto an upland area with dense vegetation, and no sedimentation damage was observed. The surface area of this measure was far smaller than the design standard for surface area of basins. The other issue was record keeping. The project inspector was not updating his set of erosion control plans with the installation dates of measures or plan revisions. Weekly project inspections did not list corrective actions that should have been taken in response to Land Quality Sedimentation Inspection Reports or REU Monthly Inspections. A second inspection of the project was not made after the second day of significant rainfall (greater than ½ inch) in the week. The measures on the project were effective and well maintained. The overall project rating was Good.

Willis Road, SR 1644 Silt Basin Type B with 8.5 acre drainage area.

US 221, South of US 74 Bypass, TIP R-2233 AB

NC DOT Division 13, Rutherford County

This is a 6 mile project to widen US 221 from 2 to 4 lanes, with a contract for $30,438,069. REU monthly inspection reports have consistently graded the overall project at 9. The plan was not adequate at Floyd's Creek, where storm drainage discharged directly into the creek without going through a sediment basin. Some measures had been removed before the slopes above the measures were stabilized. Matting fill slopes was recommended rather than just straw mulch, especially where basins were being removed to riprap line channels at the toe of the slopes. Some of the skimmers on the project lacked the proper orifice to control dewatering. Inlet protection of the project was excellent. The overall rating was Fair +.

US 221

New Route from Siler Rd to Wiley Brown Rd, TIP R-4748

NC DOT Division 14, Macon County

This is a 0.86 mile project to build a new road near a shopping center, with a contract for $6,785,129. REU monthly inspection reports have graded the overall project at 8, with the permitted area at 9. The plan was adequate and the measures were effective and adequately maintained. The only deficiency was that exposed slopes at the waste area had not been stabilized in a timely manner. The overall project rating was Good.

New Route from Siler Road to Wiley Brown Road

NC 28, Franklin, TIP R-2408B

NC DOT Division 14, Macon County

This is a 2.5 mile project with a contract for $9,665,922. REU monthly inspection reports have usually graded the overall project at 8. The plan was generally adequate, but had silt fence located in a swale where rock silt checks were needed. The measures were properly installed, maintained and effective. This project included a high bridge over the Little Tennessee River. Land Quality agrees with the Division Environmental Officer's recommendation that temporary sediment basins be converted to permanent storm water measures to control the runoff discharging to the river. The project rating was Good.

NC 28 at Little Tennessee River

ISSUES NOTED AND RECOMMENDATIONS

Skimmer Dewatering Time

Some of the skimmers used by NC DOT contractors appeared to dewater at a rapid rate. This was noted last year. Older skimmers manufactured by Erosion Supply Company are often installed without an orifice plate. These skimmers may dewater the basin so rapidly that the skimmer never floats, defeating their function as a surface dewatering device. An ECS skimmer with a union joint and an orifice plate was observed during the review. ESC skimmers should be retrofitted with an orifice plate of the proper size or not used.

Orifice plate within union joint on ECS skimmer

Ground Cover on Steep Slopes

Slopes had been hydroseeded on a design-build project this summer when the plan called for matting. This was not an adequate substitution. Graded slopes on maintenance projects are rarely matted, even though they may be steeper than 2:1 in the mountains. As noted last year, matting, bonded fiber matrix or flexible growth media (at recommended application rates) should be used on slopes steeper than 2:1.

Fill slope above culvert inlet on Laurel Creek Road, SR 1123, Watauga County

Design-Build Projects

Two distinct problems have been noted over the summer of 2012 on Design-Build projects. The first is the inadequacy of erosion and sedimentation control plans prepared by the private design firms. Basic design criteria for sedimentation control measures are not being followed. One design engineer for a project argued to Land Quality and REU staff that two rows of silt fence were adequate below a vertical cut slope that was well over 30 feet tall. Design-build firms are not installing basins that dewater from the surface or have porous baffles. This has been observed on four different projects across the state. In some cases, these measures are being installed in the field without proper design during transitions in grading. In other cases, the plans were submitted to REU and approved even though they were inadequate.

Fill slope with two rows of silt fence on creek bank on I-485 Design Build project.

The second issue is installation of measures. Design-build firms have been slow to install measures beyond those on the plans when additional measures are necessary to prevent sedimentation damage and address transitional phases of grading. The SPCA requires measures sufficient to restrain sediment—

> § 113A-57. MANDATORY STANDARDS FOR LAND-DISTURBING ACTIVITY
> (3) Whenever land-disturbing activity that will disturb more than one acre is undertaken on a tract, the person conducting the land-disturbing activity shall install erosion and sedimentation control devices and practices that are sufficient to retain the sediment generated by the land-disturbing activity within the boundaries of the tract during construction.
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> § 113A-54.1. APPROVAL OF EROSION CONTROL PLANS
> (b) If, following commencement of a land-disturbing activity pursuant to an approved erosion and sedimentation control plan, the [Sedimentation Control] Commission determines that the plan is inadequate to meet the requirements of this Article, the Commission may require any revision of the plan that is necessary to comply with [the SPCA].

The rules of the Sedimentation Control Commission speak directly to the requirement of additional measures beyond those in the plan—

> 15A NCAC 04B .0115 ADDITIONAL MEASURES
> Whenever the Commission or a local government determines that significant erosion and sedimentation continues despite the installation of protective practices, the person conducting the land disturbing activity will be required to and shall take additional protective action.

The NC DOT must be able to direct design-build contractors to revise erosion control plans, take corrective actions and provide additional measures as required by the SPCA and the rules promulgated by the Sedimentation Control Commission. Maintaining operational control of the land-disturbing activity, and operating in conformity with the SPCA and SCC rules are requirements for continued delegation of plan approval authority.

NC DOT should revise the plan approval process for design-build projects. REU should have sufficient time to thoroughly review initial and revised design-build erosion and sedimentation control plans, to verify conformity with design criteria. Design-build contracts should provide for field inspection and plan revision by the engineering design firm on at least a monthly basis for the duration of the project. REU Field Operations staff should have authority to require additional measures or a revised plan in conformity with the SPCA. Revised policies and procedures should be submitted to the Sedimentation Control Commission for review and approval.