PANEL: EROSION AND SEDIMENT CONTROL

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Panel of Speakers:

Michaelyn Rozar/David Bennett, Georgia Soil and Water Conservation Commission, Athens:
HB 285 & Mandatory Education Program For Erosion and Sediment Control in Georgia

Terry Sturm, School of Civil Engineering, Georgia Institute of Technology, Atlanta
In-stream Sediment Sources in Peachtree Creek

Ray Wilke:
Effective Erosion and Sediment Control

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Research Lab, Athens, GA:
Application of BMPs and Technologies

HB 285 & Mandatory Education Program for Erosion and Sediment Control in Georgia

In 2003 the General Permit (NPDES-Storm water) and the Georgia Erosion and Sediment Control Act (GESA) (HB 285) were updated primarily to mirror each other and to create a system of laws that would, in the end, help clean up our streams and waterways in Georgia. There were three objectives in revising these laws: 1) Create Achievable Laws, 2)Provide for increased Enforcement, and 3)Have a better Education Program for all the participants.

A Stakeholder Advisory Board was created to advise the GASWCC in the creation of a better education program for persons involved with land disturbing activity. The law says
"..After December 31,2006, all persons involved in land development, design, review, permitting, construction, monitoring or inspection shall meet the education and training certification requirements dependant upon their level of involvement with the process as developed by the Commission in consultation with EPD and the Stakeholder Advisory Board." We estimate that 20,000 people will need to certify by the deadline.

The Stakeholder Advisory Board is now in our eighth month of a detailed evaluation and advisement of what will be taught, by whom, when, and how the tests will be given and certifications rendered. It is anticipated that all courses will be offered by June of this year in order to achieve the deadline set by the revised Act.

In-stream Sediment Sources in Peachtree Creek

Urbanization of stream watersheds in a major metropolitan area changes not only the hydrology of the stream but also the sedimentary response to increased runoff peaks and volumes, and to increased sediment input from construction sites during the period of rapid urban development. The stream response can include major geomorphic changes that continue to occur over a long time period due to stream instability caused by an imbalance of sediment supply and sediment transport capacity. Quantitatively assessing the contribution of streambed degradation and bank erosion to the total sediment budget becomes an essential step in developing sediment TMDLs, identifying stream restoration strategies, evaluating changes in floodplain and channel storage in flood analyses, and determining the consequences of external forcing functions such as channel dredging. A study of changes in the sediment budget over a time period of three decades from the 1970s through the 1990s in the Peachtree Creek drainage basin located in the Atlanta metropolitan area has shown a significant in-stream contribution to the total sediment discharge that continues to change over time even though urbanization of the watershed has reached a mature state.

The two main sources of sediment discharge in Peachtree Creek include erosion of the watershed and erosion of the channel and floodplain. The average annual total sediment discharge from the watershed was calculated using the flow-duration, sediment-rating curve method based on data from the USGS gauging station at Northside Drive. In addition, an event-based watershed model (SEDCAD) was applied to the watershed to estimate the sediment yield due to erosion from the watershed. Measured cross-sections of Peachtree Creek from the 1980s and 1990s were used to calculate net changes in sediment volume due to erosion and deposition in the channel and on the floodplain. These results compared favorably with the difference between total average annual sediment load at Northside Dr. and simulation model results for watershed sediment yield, indicating that net changes in channel and floodplain storage due to erosion contribute a significant portion of the total sediment load. The results showed a significant increase in total sediment discharge from the 1970s to the 1980s with a reduction back to 1970s levels in the 1990s due to rapid urbanization during the 1980s. The contribution of watershed sediment yield was greater than that due to channel and floodplain erosion in the 1970s and 1980s, while the opposite was true in the 1990s. The urbanization of the basin continues to contribute to the sediment discharge in the creek through in-stream sources of sediment.

Effective Erosion and Sediment Control

The key to effective erosion and sediment control is realizing that erosion control and sediment control are two separate processes. Erosion control involves keeping soil particles from being dislodged in the first place. Sediment control involves separating dislodged soil particles from the water which is transporting them. Good erosion control requires protecting disturbed soil from the forces of falling droplets of rain and from flowing water. This is best accomplished through the application of mulch, polymers and erosion control matting. Inevitably, some soil will be dislodged during a rainfall event and, therefore, sediment control is also essential. In order to control sediment, one must consider drainage patterns, not just in the final configuration of the site, but at the various stages of construction. Devices intended to stop the transport of sediment are most effective when placed close to the origin of the sediment. Once drainage converges to form a raging torrent of sediment laden water, effectively separating the sediment becomes almost impossible. Silt fence, inlet sediment traps and sediment ponds are the most common forms of sediment control. To function properly, each of these measures must be designed and placed to accommodate the flows coming to them. Good design must consider these flows.

To avoid erosion and sediment control violations, erosion and sediment control measures must not only be properly designed, they must also be properly implemented. The most important aspect of proper implementation, other than proper installation in the first place, is maintenance. Maintenance should be performed before it becomes a crisis and must consider the lead time required by the subcontractor performing the work. Prompt implementation of recommendations from inspectors is also essential. In addition, the operator of a site should notify the designer whenever it becomes obvious that erosion and sediment control measures as designed are not performing adequately. Another practice that can significantly reduce the possibility of a violation is to limit traffic on disturbed areas of the site during wet conditions. This can be accomplished by placing a stone pad adjacent to the construction exit large enough to accommodate the vehicles of the workers at the site. Practicing these simple measures will significantly reduce the amount of soil that leaves the site and, therefore, limit the opportunities for violations to occur.

Application of BMPs and Technologies

For any given construction site, at least 4 different parties are involved in the management of erosion and sediment control and selection of BMPs. These are the Owner, the Design Engineer, the Contractor, and the Site Inspector. BMPs are chosen from a palette of different control options and competing vendors by the designer in order to minimize erosion and capture sediment prior to discharge offsite. BMPs are installed by the contractor, who is held to a performance standard by the Site Inspector. Meeting this performance standard may require adjustments, including additional BMPs to the original design in order to meet what is occurring in the field. Performance standards for erosion control are specified in NPDES General Permit #GAR 100001 through 100003, these require additional actions of the owner and contractor if these standards are not met at the discharge point. However in order to be more proactive instead of reactive, many local jurisdictions feel that some onsite inspection prior to a discharge is needed. This has sometimes been a contentious issue due to the possible misapplication of BMPs. In practice, a BMP has a range of applicability and design guideline such as those found in the Georgia Stormwater Manual (2001) or Manual for Erosion and Sediment Control in Georgia (2000). These only address the general applicability of the method itself. For example, unreinforced silt fences are intended only to be used to trap sediments for sheet flow. In addition to the set of design guidelines, various agencies such as the American Society of Testing Materials (ASTM) provide minimum standards of performance; these can be found at: http://www.ieca.org/Resources/ASTMsinESC2.pdf. A criticism of these standards is that they are based upon laboratory-based testing, rather than field testing. Field performance measurements of BMPs are becoming more available, but standardization of these measurements, which is necessary for comparison, is still a long way off.

REFERENCES

Georgia Soil and Water Conservation Commission (2000) Manual for Erosion and Sediment Control in Georgia, Fifth Edition, Atlanta, Georgia.

Atlanta Regional Commission (2001) Georgia Stormwater Manual, Atlanta, Georgia. Available for download at www.georgiastormwater.org