

The Five Pillars of Construction Stormwater Management

For a bit of a different perspective and approach on our favorite subject, check out the article below. The article was accepted by IECA as an abstract for a workshop for presentation at EC11.

Background

The construction stormwater industry seems to be in flux. On one hand, the industry's progress and renewed commitment to environmental protection over the last few years has been refreshing and admirable. On the other, the industry still lags behind the expectations and requirements of regulators and a portion of the general public. In other words, the good news (and bad) is that the industry has *almost* kept up with the expectations and priorities of regulators and the general public.

When Congress passed the Clean Water Act in 1972 its stated objective was to "restore and maintain the chemical, physical and biological integrity of the Nation's waters." With the legislation, Congress also set goals of eliminating pollutants to our nation's waters by 1985 and restoring waters to a level supporting wildlife and recreation by 1983. The goals of the Clean Water Act have hardly been met. By 2004, of those waters assessed, only 56% of rivers, 36% of lakes and 70% of bays and estuaries were fully supporting all designated uses. Today, annual spending in the U.S. for mitigation of erosion and sedimentation is estimated at \$13 billion.

EPA and many American citizens have not forgotten the major stated objective of the CWA – to restore the integrity of our nation's waters. As a matter of fact, federal legislation has recently been introduced to strengthen the Clean Water Act and reinforce America's commitment to clean water. EPA and state environmental regulators are not only tasked with environmental protection. They are also mandated to improve and enhance the environment. This causes an expectation that the construction industry also improve. A better understanding of this fact certainly has the potential to change how one approaches the laws used to regulate construction. Recent EPA guidance regarding construction stormwater regulations has caused many to evaluate lessons learned and how best to apply them to meet the ever improving standards. Those companies and individuals who are willing to innovate and to integrate new solutions into their processes will be allowed to continue building and constructing. Those choosing to hold on "the way that we have always done it" will simply be left behind.

The industry seems to have forgotten what the letters, BMP stand for. It appears that the acronym has morphed into Best Manufactured Product rather than Best Management Practice. Like many areas of American society, the promise of a fast easy fix has been allowed to replace actual thinking and application management. Unfortunately, the amount of money spent on "erosion control" is no indicator of success. The construction industry spends millions of dollars each year on construction stormwater management. Yet sediment remains the number one pollutant of our nation's waters with the construction industry being blamed for a good portion of it.

Some of the lessons learned and observations experienced are simple yet sometimes difficult to recognize. Especially as the industry tries to balance the findings of relatively newer areas of experience against the hundreds of years of its having constructing things in and of dirt. One such observation is that sediment control alone is ineffective. Resources in terms of space, time and funding required to treat construction stormwater using sediment control alone are simply not available. The volume and types of runoff and soils that construction sites experience and the quality level required to meet regulatory standards is near impossible without employing other management tools. Another observation is that existing natural vegetation is the most effective erosion control BMP available. It also happens to be one of the most economical.

Much has also been learned about the role water handling plays in the management of construction stormwater runoff. While sediment cannot be effectively removed from flowing water, one can remove flowing water from sediment. By diverting and conveying flowing water around, under and over the work area, we reduce the amount of sediment carrying water that must be managed. Water velocity also affects erosion and sediment control efforts. By increasing the velocity of water, its erosive energy, the mass of soil being transported and the size of the particle being carried are also increased.

The construction industry cannot escape communication. The continual messages that are sent intentionally and unintentionally may be positive or negative. The fact is that the public and environmental regulators are watching and listening and expect open communication. The expectation not only requires the relay of what is happening on the jobsite and why, it also requires that the industry listen and address every concern.

Leadership author Dr. John C. Maxwell teaches that one of an organization's greatest challenges is to train its employees to think and to do things in order of importance. This coupled with the public and regulatory expectation of continued improvement is where the Five Pillars of Construction Stormwater Management originates. The construction industry must learn to manage five specific areas in order to have a chance at success. These areas are Communication, Work, Water, Erosion and Sediment... in that order.

The Five Pillars

Managing COMMUNICATION is *the* best management practice. Effectively managing communication involves intentionally sending directed messages while listening and addressing every known concern. The intended recipients include internal stakeholders as the priorities and expectations of leaders are conveyed to employees and contractors. Equally important is communication with the external stakeholder in the form of listening and intentionally conveying information about priorities, efforts and a willingness to partner.

Managing WORK, or how contractors, employees and operations are directed can have a significant effect on how we the environment may be impacted by construction. Finding a balance between desires for quality and the promotion of contractor innovation is not easy. However, standards should be set for those areas that have proven to give the most value for the investment and for those requirements that help to ensure environmental regulation compliance.

Managing WATER is made easier if the mantra "clean water in, clean water out" is repeated as projects are planned, designed and constructed. The goal should be to not allow one particle of sediment to enter waters coming to and flowing through the site. Protection of these waters comes in the form of diversion and by enclosed conveyance. By taking this approach, efforts may be focused toward those raindrops that fall within the work area. This is a much more manageable proposition.

Managing EROSION begins with managing the raindrop impact. Raindrops impact the earth at about 19 mph, they immediately cause the detachment of soil particles and mixing with runoff. The clean water in – clean water out approach can be maintained while receiving this water by minimizing both the energy of the impact and the energy of the runoff. This reduces the effects of the first stage of the erosion process. Without first communicating how the work will be managed to ensure that this water is managed, success may be difficult. As the contractor is clearly directed to limit and delay disturbance of then directed to achieve permanent stabilization as soon as possible, erosion is reduced through the management of communication, work and water.

Managing SEDIMENT is required simply because, sediment happens. Even most detractors of the construction industry will reluctantly admit that the job of protecting water quality in a world of dirt and rainfall is not an easy one. The fact is that when disturbed soil mixes with rainfall, soil particle detachment and the transport of the loosened soil is inevitable. For the stages of construction or situations where absolute construction stormwater management through communication, work, water and erosion is simply not possible, there must be a backup plan. Once the runoff begins to carry dislodged soil particles, it must be treated. Ideally, every raindrop is captured and complete evaporation or infiltration takes place to separate the dirt from the water. This ideal goal is usually unattainable due to site limitations, the volume of sediment laden water or other factors which may be geographical, topographical, geological and meteorological in nature. While the goal may be lofty, it should not be discounted altogether. This is one area where almost reaching the goal does provide a benefit.

Taking advantage of the effects of water velocity on erosion and sedimentation rates, one can actually trigger some helpful occurrences as total water capture is attempted. If velocity of the water is slowed rather than allowed to speed up, the erosive energy and the sediment carrying capacity of the runoff can be significantly reduced.

The Real Challenge

There is a real expectation that the construction industry get better every day. Putting off doing right things eventually leads to forced action by regulation. One can choose to sit and complain about the inevitable change caused by the latest EPA regulation upgrade. Or, if one wishes to continue working to facilitate progress through construction, they must stand up and begin to think and to do things in order of importance. If communication, work, water, erosion and sediment are not managed in that order, success in water quality in construction may never be fully reached.

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