CONTINUOUS IMPROVEMENT PROJECT DATABASE

ENERGY AND ENVIRONMENT PROJECTS

Project Name	Project Description	Division	Project Year	Contact Name	Contact Number
Spills are no Thrill	The herbicide crew needed a place to park their application equipment and store inventory in a manner that would contain any type of spills. This would prevent stormwater contamination and protect the environment. The solution was to design and build a structure with an integral collection system in the floor. This allowed collection for reuse of any product that may spill from inventory or the application vehicles. A storage facility for product inventory and a four bay building with integral floor drains was constructed. These floor drains accumulate in a sump where it is pumped to a collections tank for reuse. The structure was also designed with radiant heaters to prevent freezing of the application vehicle plumbing. This was a secondary benefit from having an enclosed collection pad.	Div 4	2009	J.C. Duckworth	(252) 237-6164
Sustainable Rest Area Design U.S. 421 Wilkes County	Problem: In the U.S., buildings account for: 39 percent of the total energy use 68 percent of the total electricity consumption 12 percent of the total water consumption NC's rest areas need to serve the traveling public in a much more sustainable way to help preserve our state's natural resources.Solution: Built a more environmentally sustainable facility. It conserves natural resources and teaches the importance of sustainable building practices and the benefits that can be achieved by using them.	Roadside Environmental Unit	2009	Connie Morgan	(919)733-2920
Asphalt Solvent Testing Program	The Department was purchasing a variety of asphalt solvents at $8.75 to $16.29 per gallon from various vendors at different prices with little knowledge of the products, or their impact on field personnel time & resources. These products used were not evaluated for environmental, safety or performance criteria. State Road Maintenance sought the help of NCSU, Roadside Environmental, NCDENR and EPA. Sampling & testing protocol were established and test procedures were developed for evaluating asphalt solvent effectiveness. Roadside Environmental developed protocols to eliminate harmful constituents by coordinating with NCDENR to meet existing EPA regulations and consulted safety/environmental regulations to establish safe handling criteria for field personnel. A Qualified Products List (QPL) was developed and submitted to Purchasing for proper procurement of asphalt solvents. Changes are made in the testing program as deemed necessary by the implementation team. As a result of implementing this program, the Department now has a QPL resulting in an annual contract with one vendor providing asphalt solvent that meets established environmental, safety and performance criteria. At $8.17 per gallon in 2006, the Department realizes a cost saving of approximately $250,000 per year.	Division of Highways	2009	Kelly Croft	(919)329-4090
Electronic File Storage & Paper Consumption Reduction	Problem: The problem centers around the amount of paperwork that is submitted for driveway permit and encroachment applications. Currently the Department requires 4 sets of drawings and plans for driveway permits and 5 sets for standard encroachments (additional copies are necessary for Raleigh review). Because of the numerous copies, large amounts of paper products are being utilized The number of copies also require adequate storage space for the documentation. Solution: The apparent solution is to reduce the number of paper submittal copies. The Department could reduce the amount of submitted paperwork by converting the internal circulation to electronic files This would require relatively inexpensive hard drive storage areas. District Offices could scan the smaller documentation, using the local scanners. Large plan copies could be scanned at the Division Office. All approvals and comments could be handled through electronic approvals, thus reducing the need to transport files. Electronic approvals would also allow a clear file history. The encroachment and driveway packets could be scanned into a hard drive system. Copies for the Division, District, and County Maintenance Office would be completely electronic and allow instant access as necessary.	Boone District	2008	Brandon Greer	(828) 265-5380

Electronic Programmable Thermostats	Problem: Energy was wasted because manual thermostats were being used to control roughly 3,000 sf of office space. Unless someone physically changed the settings every morning and evening, the climate control system was running all night and weekend as if the building was occupied. Solution: Install electronic thermostats that can be programmed for time of day and day of week to minimize energy use. Results: Energy is saved by controlling the climate in an appropriate fashion. Time is also saved because this solution requires little daily intervention from our staff.	Division 10 Office	2008	Tim Boland	(704)-982-0101
Erosion Control on R-2231	Problem: Due to default of contract obligations on TIP Project R-2231, the prime contractor was removed and the project sat idle for several weeks. The Division Engineer requested that maintenance, operations, and construction units mobilize personnel and equipment to perform erosion control maintenance and repair. The project was 16.2 miles in length with approximately 5 miles on 4 lane highway unpaved. Several meetings were held with division staff to determine the personnel and equipment needed to perform erosion work. Three maintenance crews from Montgomery, Richmond, and Randolph Counties along with others were mobilized to begin erosion work on the project. Solution: The three maintenance crews performed erosion control maintenance throughout the project. The Randolph County maintenance crew worked on the northern section which was mostly complete. The Montgomery and Richmond County crews worked on the southern part of the project which had 5 miles of unpaved roadway and various erosion problems. These crews not only repaired erosion devices, but repaired eroded cut and fill slopes, graded shoulders and ditches, and built some median bridge protection.	Division 8	2008	Kevin Hedrick	(910) 582-7075
HVAC Run Time Adjustment	Problem: The Materials and Tests Unit main laboratory building in Raleigh is a 33,515 square foot facility with a volume of 526,882 cubic feet that was constructed in 1963. The heating and ventilation system is essentially the same as when it was installed with no design or operational changes and only replacement of components as they have worn out. The building is a complex one with sections of the building requiring having specific temperature and humidity requirements for sample curing and testing and where the users in one section may be requiring air conditioning due to the generation of heat through the use of laboratory equipment such as ovens, burners, and electronic equipment whereas the users in another section may be requiring heating due to outside air exchange for ventilation (dust and fume removal) and from operation of large roll up doors located on the loading dock. As a result, both the heating (boiler) and air conditioning (chillers) run all day, all year, at an enormous energy cost. Solution: Upgrade the system controls so that the building HVAC system could be regulated up/down with adjustment of airflow to sections of the building in order that the boiler, chiller, air handler units, and other motors, do not run at full capacity all day every day but run only ten hours per day on workdays.	Facilities Management /Materials and Tests Unit	2008	Mike Cottle	(919)329-4299
Mulching ROW	Problem: Excess growth on DOT right of way needed to be removed in an environmentally friendly way. Solution: Contacted a local tree mulching company for removal of trees and vegetation by mulching on site.	Operations- Division 3	2007	L.E. Reynolds	(910) 592-1434
Low Volume Bridge Approach Investigations	Problem: The FHWA identified significant cost and scope issues with the re-construction of very low volume bridges under North Carolina's TIP and Bridge Replacement/Upgrade programs. Most significantly many of these structures on lower tier facilities were utilizing the same basic design and permitting criteria as those major structures on new TIP and new Bridge projects on high speed higher tier Strategic Corridors. The costs environmental- financial- project delivery time - were significant and the cumulative impact was that fewer bridges were able to be replaced resulting in longer than optimal operational lives for structures with low sufficiency rating. Solution: A process improvement team was activated with an ambitious goal of identifying issues and outlining a plan to improve our bridge project scoping process and associated recommendations. The inter-agency team produced and implemented recommendations for bridge projects	Preconstruction - Highway Design & Traffic Engin	2006	Anthony Wyatt	(919) 733-1593
Silt Fence Recycling	Problem: Need to recycle silt fencing to save landfill space. Approximately 5000 LF of silt fencing is used annually in secondary road construction and typical section improvements. Solution: Sampson Maintenance began recycling the silt fence and storing it in the maintenance yard.	Operations - Division 3	2006	L.E Reynolds	(910) 592-1434

Embankment Repair on I-40	Failure of the fill slope occurred on I-40 between the roadway and the Pigeon River beneath a retain wall containing a cross pipe outlet. The foundation of the retaining wall was exposed and was undercut near the midpoint just below the pipe outlet. The foundation and retaining wall did not appear to have moved. The decision was made to repair the slope with obsolete portable concrete barriers and back fill underneath the retaining wall foundation. The length of the proposed fill was 60-90 feet and the height was approximately 53 feet. The pipe invert near the bottom of the retaining wall was approximately 16 feet below the top of the wall. The only access to the work site was from above. An access road was cut into the fill slope from above. All access to the site was from I-40 itself, which necessitated a lane closure while construction was underway.	Operations Division 14	2005	Jamie Wilson	(828) 586-2141
A Good Tomorrow	New hires at NCDOT are given a mandatory two-day employee orientation session which includes an overview of NCDOT benefits and policies and safety training. Since environmental awareness is also very important to NCDOT, and training is expensive, the concept of an environmental stewardship video for new hires was developed. The video is less than ten minutes long and showcases NCDOT environmental stewardship programs and emphasizes environmental excellence. The concept was developed in collaboration between the NCDOT Media Unit and the Environmental Operations Section of the Roadside Environmental Unit. The video, titled A Good Tomorrow, highlights NCDOT environmental stewardship actions and environmental programs across the Department and strives to instill team-based environmental pride, responsibility and ethics in the new employee.	Operations Asset Management	2005	Robin Little	(919) 861-3781
NCDOT Swap Shop	NCDOT's 14,000 employees state-wide had no formal process in place to view and obtain NCDOT item(s)/material(s) that were in the process of being surplused. The NCDOT Swap Shop Program established a formal process where employees and view and obtain these items/materials. This program not only improves communication and information sharing among all employees, but also demonstrates our commitment to preserve natural and financial resources and in being good stewards of the environment	Administration General Services	2005	John Sharp	(919) 715-6054x230.
Salt Building Drapery	This CPI team was formed to resolve problems with our salt storage facility. The specific problem with our storage unit was shrinkage and polluting the nearby environment. During heavy rain events, rainwater would blow into the open front of our salt storage units and erode our salt piles. In addition, evidence of storm water runoff pollution was apparent because the surrounding grassy areas were dead and brown. The CPI team attempted several different ideas; however, their most innovative idea was the addition of drapery to the front of each salt building structure to prevent rainwater blowing into the storage units. The Salt building curtains consisted of fence posts, fence couplings, and tarps which were all available from the Central Depot in Raleigh. After installation there was no loss of salt and grassy areas recovered with the elimination of storm water runoff.	Operations-Div 7	2004	Michal Venable	(336) 315-7080
Mitigation Process Improvement Initiative	The Mitigation Process Improvement Initiative was initiated through a mutual agreement with the NC Department of Transportation (DOT), the NC Department of Environment and Natural Resources (DENR), and the US Army Corps of Engineers Wilmington District (USACE). The process mission was to develop a structured mitigation process that supports the timely delivery of NC's Transportation Program while appropriately compensating for unavoidable and minimized wetland, stream, and buffer impacts. The initiative was undertaken with the overall purpose to improve the effectiveness and efficiency of the DOT/DENR/USACE compensatory mitigation process. This process improvement initiative is highly complex and has involved numerous representatives of various state and federal resource agencies. The Ecosystem Enhancement Program (EEP) was the result of recommendations developed by the process owners.	Environment & Planning-Project Development	2004	Bill Gilmore	(336) 903-9184
Yes! Yes! We Can Stop Littering	The citizens of N. C. expect the department to provide a high standard of motoring safety and environmental soundness, as well as beauty along our roadsides. The North Carolina school system provides an ideal opportunity to educate the state's youth and by extension their parents and their communities about the harmful effects of litter and how we can stop littering and improve our quality of life. With this view in mind the Union County Rotary Club and the schools system in Union Count developed a classroom course entitled YES! YES! WE CAN STOP LITTERING. The department was a partner in implementing the program successfully in the Union County school system and is working with the Rotary Clubs of N. C. to implement the program in the school systems of all 100 counties.	OPERATIONS - ROADSIDE ENVIRONMENTAL	2003	Anne Walker	(919) 715-2550.

Road Oil Database	There continues to be difficulty in record keeping on paving history within the division and providing access to this information for all departments. A division database was created in ACCESS to record all aspects of road paving. As a result county engineers and otherdepartment heads now have access to the database that allows them to identify roads that Road Oil has paved and those that havereceived markings. This information reduces the need to send out a person to identify whether a road that has been paved needs remarking.	OPERATIONS - DIVISION 9	2003	Noel Chilton	(336) 896-7019.
Secondary Road Paving Standards, Context Sensitive Solutions	Div. 14 received much scrutiny of their secondary roads paving standards from property owners and environmental agencies. Safe and effective uniform standards were needed. Div. 14 developed a document entitled Secondary Road Paving Standards" which gives guidence to engineers on selecting the least disruptive, but adequate section for a project.	Operations Div 14	2003	Joel Setzer	(828) 586-2141
Recycled Appliances & Cross Line Pipes	Div. 7 was faced with serious budget problems which caused a 63% reduction of litter patrol crews. A deal was worked out to allow the crews to dispose of large appliances and metal cross pipes at the local recycling plant which they passed on the way to the landfill. As a result, 199,370 pounds of scrap appliances were recycled. In addition, they improved cycle time, created revenue and reduced the amount of trash and fees at the landfill	Div 7 Maintenance	2003	Michael Venable	(336)570-6833
Median Guardrail Turf Conversion	Guardrail in median creates challenges for maintenance of turf there. Previous methods of changing turf vegetation involved sodding and overseeding over a period of 2 to 3 years. Div. 14 selected a more desirable mix of hard fescue and bluegrass more suitable to cooler areas west of Raleigh. New mixture has year round growth, low fertilizer requirements, better drought tolerance and less mowing. Also, the active year round grass provides better pollution absorption, is suitable for poor soils and less runoff to harm environment.	Operations Div 14	2003	Reuben Moore	(828)586-2141
Truck Kitty Litter Box	According to our Stormwater Pollution Prevention Plan (SPPP), to avoid fluid leaks from exposure to rainfall and possibly causing the polluted rainwater from entering the storm drainage system, we should provide drip pans for all vehicles and equipment that leak.Some equipment such as asphalt distributors with spray bars, have many places where potential leaks originate and it becomes impossible and/or impractical to provide a drip pan. In reviewing this problem, the SPPP team originally built three drip pans for the Road Oil Unit to use. The SPPP team discovered several problems with the pans ranging from the number, the size, the weight of the pans, employee frustration with emptying them and disposing of the collected material.	OPERATIONS - DIVISION 7	2002	Michael Venable	(336) 570-6833.
Bridgesharks	Drift and debris constantly build up against bridge columns during heavy rains causing scouring of the river banks and silt sedimentation build-up against the debris. The Bridgeshark is installed on the face of bridge columns and is designed to eliminate drift accumulation on the columns. It consists of a molded polyethylene turbine attached to a stainless steel track. The rotating turbine will slide up and down on the track relative to the water surface elevation and is designed to intercept and turn floating trees, logs, and debris before they impact the column face.The Bridgesharks were installed on Bridge #50 in Chatham County that spans Deep River.	OPERATIONS - DIVISION 8	2002	Richard Hancock	(910) 944-2344.
Roadside Quail Habitat Area	The Roadside Environmental Unit is working with the Division of Wildlife Resources to develop and enhance habitat suitable for quail on NCDOT rights-of-way in Division 12. The REU was approached by Wildlife Resources biologist Terry Sharpe, who needed our cooperation to maximize quail habitat areas adjacent to I-77 north of Statesville. Several of the landowners along this corridor had agreed with the Division of Wildlife to develop quail habitat on their land. The effectiveness of this project was limited, however, in that the habitat areas lacked continuity. Our right-of-way provides a link between the roperties. Through selective mowing and tree removal and replacing fescue with native grasses, we hope to develop a stretch of 3.5 miles of right-of-way into a corridor for quail movement and habitation. This area incorporates two existing wildflower beds and includes a median meadow area.	OPERATIONS - ROADSIDE ENVIRONMENTAL	2002	Derek Smith	(919) 733-2920.
Bituminous Treatment/Retreatments Field Record Form	The process of keeping records of the bituminous treatment of roads was cumbersome due to the forms involved. The forms had to be clipped together with paperclips, with carbon paper in between. This was difficult to do, and not very reliable. The forms were hard to keep properly lined up so that the carbon was in the proper position to make the copy. The carbon paper was very messy, and also difficult to keep in the correct position	OPERATIONS - DIVISION 13	2002	Ken Putnam	(828) 251-6171

Hydrostripper	Aluminum sign recycling is conducted through arrangements between the NCDOT and Department of Corrections. In the past, DOC used old archaic abrasive dry sanding machines to remove the reflective material from signs. It frequently took 10 passes through the sanding machine to get the old reflective material from signs. In addition to eventually grinding down the thickness of the aluminum, this process also remove the chromate conversion coating necessary to retard corrosion. The cleaned sign was then shipped to Pennsylvania, where the chromate coating was reapplied. In addition to the added cost, the chromate conversion treatment is an environmentally unfriendly operation due to the chromium in the coating. The desire was to establish an efficient, environmentally friendly, state-of-the-art highway sign reclaiming operation. After further research, DOC purchased a Hydrostripper. The Hydrostripper utilizes a high-pressure water system to remove old reflective material from the signs. Because it uses water, the signs are not ground away which allows the aluminum to be used over and over. The most outstanding feature of this method is that the aluminum is not affected during the cleaning process, thereby eliminating the need to reapply the chromate coating.	PRECONSTRUCTION	2001	John Grant	(919) 715-0951
Monarch Butterfly Program	The annual migration of monarch butterflies is one of the marvels of nature. Monarchs stay over winter in parts of Mexico and southern California. Each spring they begin a round trip journey of several thousand miles that takes four or five generations to complete. They fly north as far as southern Canada, then return each fall to the same spot where their ancestors spent the previous winter. Monarch larvae feed exclusively on species of milkweed. Without milkweed along their migration routes, monarchs would be unable to reproduce. Due to development, farming practices and changes in land use, milkweed is becoming increasingly less common throughout the United States, including North Carolina. There has been a corresponding noticeable decline in the number of monarchs that visit North Carolina during their migration. In late 1999, Dr. Voit Gilmore, Chairman of the Governor's Clean NC 2000 Board, approached the NCDOT with concerns about the downward trend in the monarch butterfly population. The Roadside Environmental Unit agreed to research the issue, and as a result, the "Monarch Butterfly Program" was implemented.	OPERATIONS ROADSIDE ENVIRONMENTAL	2001	David L. King	(919) 733-2920
CRS-2 Loading Hose Overflow Collector	After reviewing the former practice of loading CRS-2 into the asphalt distributor, the team discovered a considerable amount of CRS-2 was dripping onto the ground after loading had occurred. In order to prevent excess CRS-2 from being spilled onto the ground, the maintenance mechanic on the yard developed a sealed containment system for connecting the dripping CRS-2 hose after the loading is completed. The solution involves placing a quick connect system on the end of the loading hose and also on top of a 55 gallon barrel. This sealed barrel prevents the CRS-2 from dripping onto the ground and adversely effecting the environment, as well as preventing rainwater from entering the storage container	OPERATIONS DIVISION 9	2001	John Rhyne	(336) 631-1360
Chipping to Reduce Brush Volume	Orange County Maintenance is responsible for the grading and construction of an annual secondary road program. One of the steps of this process is the clearing and grubbing of roadway rights of way prior to grading. The brush that was generated was trucked to local landfills using contracted and DOT operated dump trucks. The CPI team decided to utilize a contracted brush chipper to reduce the brush volume and to dispose of as many ships as possible by spreading them along the right of way limits or to provide to nearby property owners at no cost to the department. Hauling brush to a landfill would be done only when no other means available.	OPERATIONS DIVISION 7	2001	Chuck Edwards	(919) 732-4330
Recycle Power Poles	The Williamston Bypass construction project of US 64 crossed a baseball field previously owned by the Town of Williamston. The right of way acquisition made the Department the owner of the field and all appurtenances. This included 13 power poles. While arranging for disposal of the transformers, a representative of NC Power indicated the Williamston Fire Department was in need of poles for a training facility. We contacted Jim Peele, Captain of the Fire Department, who confirmed they were interested. Captain Peele has agreed to remove the poles at no cost to the Department. An estimate for removal and disposal was requested from Barnhill Contracting Co., prime contractor on the above project. The quote received was as follows: 4 small poles @ $450/ea. = $1800 9 tall poles @ $1000/ea. = $9000 Therefore, the total cost to the Department would have been $10,800.	OPERATIONS DIVISION 1	2001	C. W. Bridgers	(252) 792-0347

Maintenance Yard Improvement	In 1998 the State of North Carolina implemented a Stormwater Pollution Prevention Plan (SPPP) for Maintenance yards. Each year at different times the SPPP leader has to observe different Stormwater Discharge Outfall (SDO) locations for pollutants such as salt runoff, metallic debris, oils, gases, etc. In the past we have had problems getting all metal objects subject to rust under a shelter where it would not be exposed to rainfall. There were several buildings on the site that were old and were not being fully utilized. We recently remodeled and improved the structural stability of several buildings that have not been fully used. By improving these v, such as new roofs, cleaning, painting, and adding some structural stability, we increased the space to provide shelter for salt spreaders, tailgates, and other various pieces of equipment. By doing this, the run off of hazardous salt material and rust has been reduced to streams.	OPERATIONS DIVISION 11	2001	Travis Spicer	(336) 835-4241
Environmental Program Coordination	Division Four is faced with increased need for environmental compliance, coordination and notification for maintenance activities in the Division. This need was made even greater with the introduction of Buffer requirements for the Neuse and Tar River and the maintenance activities stemming from hurricane-related flooding. The Division Engineer, and the new Division Environmental Officer (DEO), formed a team comprised of the DEO, Assistant District Engineers from the three districts and the Bridge Maintenance Supervisor. The Assistant District Engineers and Bridge Maintenance Supervisor were designated as District Environmental Coordinators (DECs) and were assigned to help environmental coordination efforts underway by the DEO.	OPERATIONS DIVISION 4	2001	Robin Little	(252) 237-6164