T3S Quarterly

Award Winning Stormwater Project in Hilton Head

Editor's Note: Information in this article was supplied by Scott Liggett of the Town of Hilton Head. It is an excellent example of an innovative solution to a difficult problem.

In 1995 the Town of Hilton Head Island conducted an Island–Wide Drainage Study to identify existing stormwater improvement needs. The study recommended upgrading the stormwater outfall under US 278 and enlarging the natural freshwater creek upstream of tidal Jarvis Creek, thus reducing problematic flooding in the Main Street area during large storm events. Work on the conceptual design for this project began in FY 1996. Because significant wetlands and trees were found within the proposed project location, the Town began to pursue an option that minimized the wetland impact by rerouting the ditch. Rerouting also meant lengthening the ditch, which in turn increased the amount of excavation and loss of trees and wildlife habitat. Estimated construction costs increased from $1.6 million to $3.0 million. The original drainage plan included widening the natural freshwater creek adjacent to the Jarvis Creek Tract (at that time privately owned) to a bottom width of 35 feet and a depth of approximately 6 feet. The sloping bank would create a 100–foot wide canal. Enlarging the freshwater creek would destroy a large and unique area of upland habitat and over 4 acres of freshwater wetlands. A different approach would be needed to minimize the projected disturbance.

An Innovative Solution

During the summer of 1996 the Town purchased the 50-acre Jarvis Creek tract and staff began to explore additional design options to solve the drainage problem. A 13–acre lake, capable of storing and conveying the necessary stormwater was envisioned. A pump station was needed to move the water from the ditch to the lagoon. From the lake, water would flow through a vegetated spillway that discharges into the headwaters of Jarvis Creek. This alternative plan was adopted, and the site was ideal for the creation of the lake because a majority of the site had been previously cleared and used for cattle grazing. The selection of the Jarvis Creek Tract resulted in the protection of 3.5 acres of valuable freshwater wetlands, and a reduction in upland habitat and tree loss.

The Plan for the Project

The Jarvis Creek Project has been designed to be a combined drainage improvement project and community park. The tract is approximately 50 acres, of which roughly half are wooded. The remainder was cleared for pasture as part of the antebellum Honey Horn Plantation. The drainage project involved the construction of a borrow pit on the cleared portion of the tract into which pumps deliver stormwater

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from upstream the drainage area. The borrow pit forms the central feature of a passive park that will be constructed following the drainage project. Final design elements of the park include interpretive trails, observation piers, and picnic areas. As a result of the construction of the pump station, 0.468 acres of wetlands were filled. To compensate, the Town constructed a one acre transitional wetland at the outfall of the borrow pit, and a wetland littoral shelf in the borrow pit itself. As a further example of the innovative nature of this project, the dirt removed from the borrow pit has been sold for over $500,000 to help finance the park element.

Additional Benefits and Innovations

The Town needed to construct a pump station near Hwy 278 that would pump the stormwater through four 48″ pipes to the lake. The layout of the pipes was a particularly critical decision, given the abundance of specimen–size live oaks and pine trees. The pipes were laid out in such a way that the entrance road to the park would eventually be paved on top of the pipes, requiring that only one swath be cleared through the parcel. Only plants native to Hilton Head Island were used for the project. This selection improved the quality of the parcel for native wildlife by providing indigenous food and cover sources. The selection of native plants also reduces the need for pest management, irrigation, and long–term maintenance.

The change from a 100–foot wide canal to a stormwater retention lake with wetland filter will have profound impacts on water quality. The stormwater is designed to flow into the lake, through the vegetated wetland mitigation site, into an existing bottomland hardwood wetland, and then into the freshwater creek. The detention time in the lake, and the filtering effect of the wetlands is designed to improve the quality of water flowing into Jarvis Creek.

The wetland mitigation area is perhaps the most exciting aspect of the project. In designing the wetland, Town staff visited existing reference wetlands in the watershed to determine appropriate plant species.

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Because the mitigation area is a transitional wetland moving from the saturated lake edge to a higher site, plant species change from aquatic species such as pickerel weed to red maples and cypress on the spillway.

The park is designed as a passive recreation area, with trails and picnic areas. Walking trails have been designed around trees, and little vegetation is being removed for park infrastructure. A boardwalk will guide visitors through the constructed wetland to teach them about wetland mitigation. The majority of the site will be left in its natural state as a haven for wildlife. Local groups have expressed interest in stocking the lake with native fish species. The remaining undisturbed wetlands on the site, as well as the wetland mitigation areas, are permanently protected through restrictive covenants.

Building For the Future While Recognizing the Past

Effort was made to include the historical roots of the site into the design of the park element of the project. Before construction of the Cross Island Parkway, the Jarvis Creek Tract was part of a larger parcel called Honey Horn Plantation. This antebellum plantation, which is now also owned by the Town, has several historic buildings and a very interesting cultural history. The design of the park buildings was fashioned after the buildings at Honey Horn. Our design consultants were directed to Honey Horn for inspiration, and the details in the park plan reflect this cultural heritage well. The use of a barn–type construction for the picnic pavilions and a split–rail fence through the site reflect the old island character.

Learning More From Our Successes

This project has generated much excitement and study here at the Town. We have several plans in place to continue the study of the project after completion. Because the water quality aspect of the project is innovative, we have been monitoring the progress since the beginning. We have bi–weekly water quality monitoring conducted at the pump station site near Hwy 278, and at the freshwater creek behind the outfall. This monitoring checks for 10 different water quality parameters. The intention was to get a good baseline of data before the pump station became operational to use as a comparison for when the stormwater is actively pumped

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through the system. This monitoring has been going on since September 1999, and will continue indefinitely. We hope to use the data collected and the lessons learned on other stormwater improvement projects in the Town. In addition to water quality, we are actively monitoring the progression of the created wetland. We have established three permanent vegetation plots to monitor plant growth. We also take quarterly soil samples to determine if hydric characteristics are present and to measure levels of nutrients in the soil. In addition, we are logging all wildlife species encountered and are watching the lake evolve from a barren pit into a diverse wildlife habitat.

Involving the Public — Educating the Public

This project has been very much a community effort. The need for a community park was identified in the Town's 1991 Comprehensive Plan and the 1995 Recreation and Open Space Plan. Prior to design of the park, questionnaires were distributed to Island residents asking them what types of amenities they would prefer. The park's final design was a combination of citizen input and site constraints. The Jarvis Creek project presents a great opportunity for public education about our natural resources. Town staff have already conducted several field trips with school children to teach them about wetlands and wetland mitigation. The park design includes interpretive trails that will allow us to educate the public about the native species in the park, and about our unique wetlands. It is hoped that a cooperative partnership will be arranged with Hilton Head Middle School to design the signage for the trail. This park fits nicely into our on-going public education program here at the Town.

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Recognition for Innovation

This project is one of the most innovative in the Town's Capital Improvements Program. In fact, its unique design has been recognized as outstanding by the Association of State Floodplain Managers, who invited Town staff to present the project at their 1998 national conference. In addition, because of its ability to mitigate upstream flooding, the project was awarded the DNR Flood Mitigation Assistant Grant two years in a row. These grants, worth over $500,000, represented all the money available in South Carolina for this program during those two years. Finally, the project was the only recipient of the 2000 South Carolina Department of Natural Resource's Stewardship Development Award.

The Town of Hilton Head Island has created an exciting project that makes the best of our natural resources, while providing an innovative solution to a complicated problem.

How Americans Travel — and How Far

Travel statistics gathered for the U.S. Department of Transportation show that 30 percent of all trips taken by Americans are vacations. The most popular time to travel is from July through September. Here's a rundown of the favorite modes of travel and the average distances from home:

- 75% of families take their cars. Average distance is 368 miles.
- 19% take planes — 1,732 miles.
- 2% take charter or tour buses — 438 miles.
- Less than 1% take trains or ships — 440 miles.

APWA to Offer Internet Training on the New MUTCD

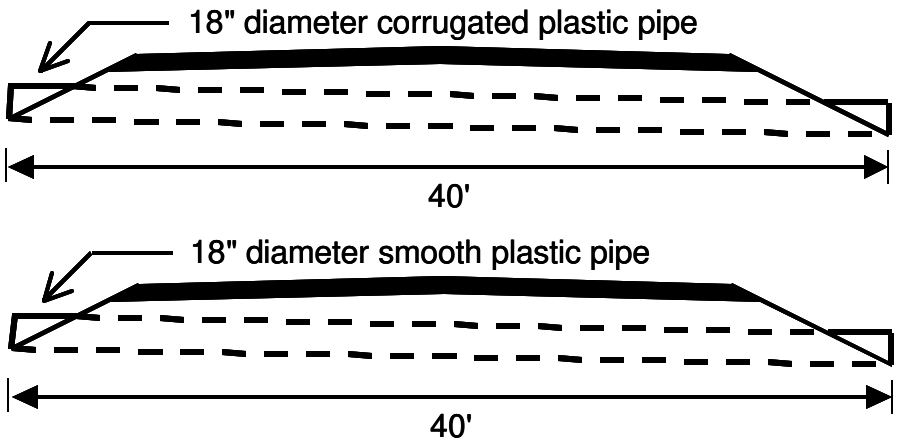
Take advantage of a 90-minute Click, Listen, and Learn training session, August 8, 2001, titled "MUTCD: Setting You Straight on the Changes." Take advantage of this timely, interactive training delivered right to your own site for only $140. What a value—a key professional topic, top national instructors, no travel or per diem expenses, and your crews can be back on task within 2 hours! All you need is an office computer with Internet access and a speakerphone! Attendee's submit questions via email, or live during the Q&A sections of the program. Instructors are, Cherie Kittle and Linda Brown from FHWA, and Dan Centa, P.E., City of Pueblo, CO. To register or obtain more information including presentation time in your area, visit the 'Education' section on the APWA website (www.apwa.net), click on the "Click, Listen, and Learn" on the left side of the page, or call Ashley Gann at 816/472-6100 ext. 3511.

Test your culvert design knowledge

by David Orr, P.E., Cornell Local Roads Program

Editor's Note: Reprinted from Nuggets & Nibbles, Spring 2001

Q — Which culvert has a greater capacity to carry water?



Details of both pipes:

18" diameter	40' long	Projecting Inlet
Maximum Allowable Headwater		2.5' deep
Slope: 2.5%	(1' fall over the 40' length)	

A — Neither pipe carries a greater amount of water!!!

At the maximum allowable headwater, both pipes carry about 10 cubic feet per second (4,000 gallons per minute). The only difference is the outlet velocity. In the corrugated pipe the outlet velocity is 6 feet per second (f/sec), while in the smooth pipe the outlet velocity is over 9 f/sec!

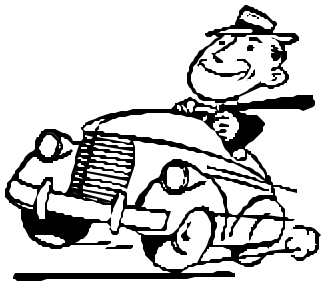
Grass will provide all the outlet protection needed in the corrugated pipe, however, some rip–rap is needed to provide erosion protection for the smooth pipe.

Why?

Because both pipes are flowing under INLET control. In other words, the critical factor in the capacity of the pipe is how the water gets in the inlet. Although the second pipe is smooth on the inside, the only effect is to increase velocity.

Which is better?

It all depends on the cost. The smooth pipe may need rip–rap, but may be less likely to plug with debris. The corrugated pipe does not need extra erosion control but may be harder to install due to its increased flexibility.



Murphy's Laws of Summer Driving

- No matter where you park your car, the sun will be shining on the driver's seat when you return.
- There is always room to merge behind a diesel bus.
- Your car horn will get stuck when you drive behind a group of Hell's Angels.
- If all the cars are coming your way, you're on a one-way street (driving the wrong way).
- If you try to change lanes to get off the ramp, the car in the lane to your right will speed up.
- Trucks that overturn on the highway are always filled with something sticky.
- When you move to the next lane because it's going faster, it becomes the slowest lane.
- The guy with a bumper sticker that says "If you can read this, you're too close" always tailgates.
- The first bug to land on your windshield will spatter right in front of your eyes.
- When you leave the proper distance between you and the car ahead, someone will try to move into it.
- Your car will not malfunction in the presence of a mechanic.

How to Drive in the Rain

It's a panic. The wet roadway turns slick, and if it's raining very hard, you can't see. What then? The Network of Employers for Traffic Safety says:

- Reduce speed to 10 mph below the speed limit.
- Create space. Keep an 8- to 10-second distance between you and the car in front of you.
- If your tires are losing contact with the road (hydroplaning), grip the steering wheel firmly and apply the brakes slowly until you regain control.
- Avoid hard acceleration, braking, or any sudden movements.
- If you skid, take your foot off the brake, ease off the accelerator, and steer in the opposite direction of the skid.

Always keep your tires and brakes in good condition. Make sure the defroster works so the windshield doesn't get foggy, and change your windshield wiper blades twice a year.

Ready for a fight? Put on the gloves and get tough about hand safety.

When a boxer "puts on the gloves," you know he's ready for a fight, but he's also fighting to keep his hands in good shape. His livelihood depends on keeping his hands safe. So does yours.

Many of us take our hands for granted. Whether we use them to operate or move machinery, to lift heavy and sharp-cornered material, or to work with chemicals, our hands are often in danger. Make sure the gloves are the right kind.

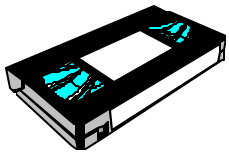
Do you need cut, puncture, or abrasion resistance, protection from heat and cold, or chemical permeation protection? How about protection from shock or radiation? Always check with your supervisor to determine whether the glove you use is best for your job.

Hand protection goes beyond the gloves, however. The National Safety Council says most hand injuries fall into three categories: lacerations and abrasions, pinched points which are being caught between fast-moving objects, and cumulative trauma due to vibration or repetitive motion.

Machine guarding and "lock-out tag-out" procedures are always important. According to the Council, lack of attention is a significant factor in hand injury. Robert Pater of Strategic Safety Associates in Portland, Ore., says the need to know where your hands are at all times is vital. Toward the end of a work day, for example, you might tend to slump and put your hands in a dangerous spot for support.

It's important for each of us to be in control of our own safety. A safety director can't do it. A supervisor can't do it. All they can do is set the rules. Each of us must be the safety director of our own lives. And when it comes to our hands, we should fight to protect them.
So put on the gloves, know where your hands are, and know what's going on with your hands and your job.

Videotapes Available



The Transportation Technology Transfer Service maintains a videotape library of approximately 300 tapes covering transportation and other related topics. These videos are available free for loan to individuals employed by any city, county, or state government agency in South Carolina.

You can view the catalog of tapes on–line at our web site, www.ce.clemson.edu/t3s, or you can order a copy of the catalog by calling our office. To order videotapes, or any of our other publications, you can either complete the form on page 7 of this newsletter, and fax it to us, or you can call our office toll–free at 888–414–3069.

Upcoming T³S Workshops

Hands–On Computer Training:

GIS: Aug. 14 – Columbia
Synchro: Aug. 15 – Columbia

Crack Sealing, with Demonstrations

Sept. 12 – Charleston
Sept. 13 – Columbia

Design, Construction and Recycling of Pavement Base

Oct. 16 – Charleston
Oct. 17 – Columbia

Asphalt Construction Fundamentals

Nov. – 7 Charleston
Nov. – 8 Columbia

Preventing Auto Theft

The Pennsylvania Auto Theft Prevention Authority offers these common-sense suggestions for foiling would-be auto thieves:

- Make a habit of locking your car doors and taking your keys with you. Don't make exceptions.
- Don't hide a second set of keys anywhere on the car.
- Park in well-lit areas.
- Don't keep the motor running while you dash to the ATM or convenience store.
- Don't leave money or valuables in plain view.
- Apply the emergency brake when you park.
- Park in your garage if you have one.
- Don't leave the registration or title in the car.

How does your training stack up?

Tricon, the $22–billion–a–year PepsiCo spin-off that runs Pizza Hut, Taco Bell, and KFC, is launching a new employee–training program.

It stresses "listening, empathy, exceeding expectations, and recovering from a mistake," says their human resources director, Gregg Dedrick.

Taxi Cab Facts and Figures

According to the Nationwide Personal Travel Survey conducted for the U.S. Department of Transportation, the United States taxi cab industry generates $2.6 billion in revenue each year from 717 million passenger trips. Though New York City represents only 3 percent of the nation's population, it accounts for a third of those trips because half of New Yorkers do not own a car.

Nationwide, the average trip length is five miles and "home" is the most frequent destination. Women take cabs slightly more than men. Lower and higher income households use taxis more than those in the middle brackets.

Information Request and Address Change Form

To order any of the publications, videos, or other materials listed on our web site or in any issue of *T³S Quarterly*, complete this form and mail it or fax it to **Sandra Priddy** at the address or phone number shown below.

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Phone: **888.414.3069 (toll free)**
864.656.1456
Fax: **864.656.2670**

Publication or Video

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Phone _____ Fax _____

- ❑ ***This is a new address***
- ❑ ***Please add my name to your mailing list***

Suggested Topics for Future Workshops

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Native Plants Protect the Environment

Editor's Note: Reprinted from Nevada Milepost, Spring 2001

The Federal Highway Administration (FHWA) published a handbook entitled *Roadside Use of Native Plants.* It provides state–by–state references related to native plants and how they can be used to benefit highway projects by saving time and money.

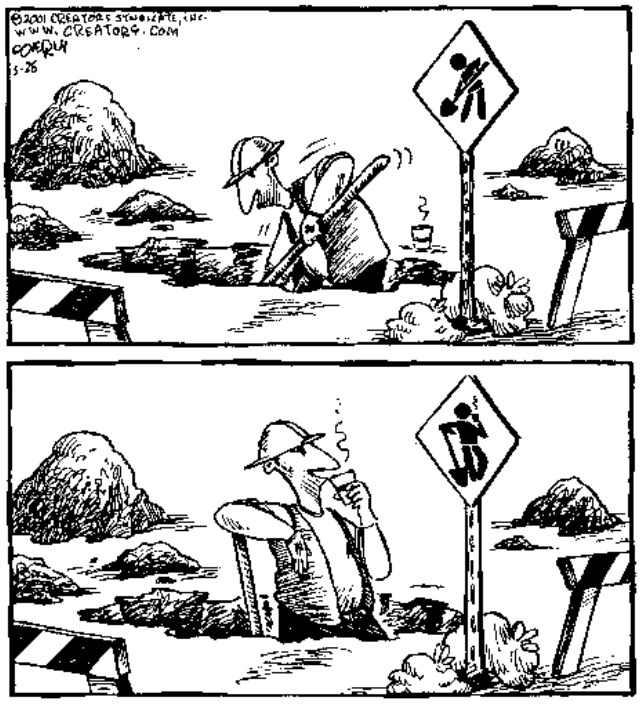
Native plants can be used for erosion control, landscaping, and maintenance of highway rights–of–way. Native plants have adapted over time to the varied climates and geology that highways cross. They can prosper without fertilizers and can ward off invasion of weeds. They reduce the need for herbicide use.

According to the FHWA, invasive non–native plants can cause significant changes to ecosystems, upset the ecological balance, and cause serious economic harm to America's agricultural sectors.

The handbook includes vegetation maps as well as lists of native trees, shrubs, grasses, and other plants particular to each state. In addition, the handbook lists environmental, academic, scientific, and other organizations that could provide help in each state.

To request a copy of the handbook, write to FHWA, 400 7th Street, SW, HEPN–30, Room 3240, Washington, DC 20590 or e–mail Bonnie.Harper-Lore@FHWA.dot.gov.

SPEED BUMP **Dave Coverly**



T³S Quarterly is published by the South Carolina Transportation Technology Transfer Service (T³S) for the benefit of county and municipal government agency personnel in SC. T³S, administered by the Clemson University Civil Engineering Department, is the Local Technical Assistance Program (LTAP) center for SC. T³S is part of a nation–wide network of LTAP centers established by the Federal Highway Administration (FHWA) in cooperation with state transportation agencies. T³S is jointly funded by FHWA and the SCDOT. The views, opinions, and recommendations contained in the newsletter do not necessarily reflect the views of the FHWA or the SCDOT.

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