

MAINE DEPARTMENT OF TRANSPORTATION

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Integrating Transportation and Ecological Infrastructure For Community-Based Solutions
Wendi Goldsmith, Marshal Robert, Gary Toth

Introduction: We have a team that we'd really like you all to listen to. I'm going to introduce Mr. Scott Duncanson. I've known Scott for years, believe it or not. Scott's from Gannett Fleming, and he's going to be this afternoon's moderator. Scott? You'll hear a lot of bio when he speaks tomorrow.

Scott Duncanson: Thank you, Judy. Every conference seems to have a tough slot to fill and a tough slot to present that. This afternoon, right after lunch, we're presenting. It seems like they've turned up the heat; it seems like it's a little warm in here. We're following a great presentation by the entourage from Florida DOT earlier this morning. Above all, we're coming before one of the biggest events of the conference -- the lobster bake.

For those of you not from New England, you should enjoy yourselves. It should be a good time here at the lobster bake. We spell lobster L O B S T E R -- lobster.

The session that we're going to present today deals with integrating transportation and ecological infrastructure for community-based solutions. I know some of you guys are looking at yourselves saying, "This is community-impact assessment. This is about people. Why do we want to hear about the environment?"

We can't overlook the ecological context and role that the natural environment plays to people within communities. There may be special relationships that exist between the community and the natural environment that contribute to a sense of place. That needs to be identified when you're performing your projects. This relationship can be related to recognized natural resources, landscapes, habitats or ecological qualities important to a community. We're also increasingly in an era of environmental stewardship, where we need to be stewards of the environment -- looking for ecological solutions that are context-sensitive, to work within the communities in which we're performing our transportation projects and community-impact assessments.

We have three distinguished speakers, today. I'm going to introduce all three at once, so that we have a seamless presentation flow in the presentation this afternoon. First, we have **Gary Toth:** of NJDOT. Gary has 30 years of experience with the department, and is currently director of project planning and development. His division is charged with generating half a billion dollars of new starts for NJDOT on an annual basis. Project planning involves creating a partnership with the host communities and regulatory agencies, and systematically ratcheting down project expectations, to create a good fit between engineering, environmental and political considerations.

Gary has worked for NJDOT since graduating from Stevens Institute of Technology, with a Bachelors in engineering. He's also a graduate of the Environmental Management Institute of the University of Southern California. Gary is one of the originators of the NJDOT Taskforce on Context-Sensitive Design, which has been working to impellent CSD thinking-beyond-the-pavement principles, within NJDOT since 1999.

He has participated in workshops on peer reviews of context-sensitive design and CIA in Maryland, Connecticut, Washington DC, Indiana and Oregon. Gary has been a member of the National Community-Impact Design Team since 1998. He helped evolve that team into the TRD subcommittee, and remains a member, today. In October 2001, he organized the TRB Northeast US Workshop on Community-Impact

Assessment, and will do so again in 2005. Gary is 52 years old, single with three children. He enjoys reading, coaching, soccer, cooking and wine. All those together -- I don't know.

Presenting second will be Wendi Goldsmith of the Bioengineering Group. Ms. Goldsmith is president and founder of the Bioengineering Group. She has extensive experience in all phases of project design and implementation for lakes, rivers and title areas.

As project manager, consulting bioengineer or horticultural advisor, she has often led interdisciplinary, collaborative design teams to adopt ecologically-rich strategies. She has played a key role in promoting local familiarity and acceptance of bioengineering methods, and has aided in the logistical planning for innovative projects.

Evaluating change in land use and its effect on geomorphic stability, non-point source pollution and habitat degradation has been an integral part of Ms. Goldsmith's waterways assessment and restoration projects. She also has a thorough understanding of federal, state and local environmental and regulatory policy.

Ms. Goldsmith earned her Master of Science in plant and soil science from the University of Massachusetts. She has a Master of Arts degree in landscape architecture and landscape design from the Conway School. A Bachelor of Arts in geology and geophysics from Yale University, and a Bachelor of Arts in the environment from Yale.

Sample projects -- she's been a project manager for the largest bioengineering project to date in the United States, addressing erosion and habitat degradation and loss along a 20-mile reach of the Cumberland River in Cross Creek's National Wildlife Refuge in Tennessee -- the Nashville District of the US Army Corps of Engineers.

Speaking third will be Marshal Robert, also of the Bioengineering Group. Mr. Robert has been with the Bioengineering Group for one year, and brings with him over 20 years of experience. He has developed a broad range of technical and managerial experience in complex, multidisciplined transportation planning, design construction, environmental restoration and permitting for bicycle, pedestrian, highway and other transportation projects.

He's an enthusiastic practitioner of the public involvement process and context-sensitive design. His experience as a manager for the Route 21 viaduct replacement project in Routes 1 and 9 Haynes Avenue project as well as environmental screening for the replacement of the I280 Stickle Bridge has familiarized him with the Newark, New Jersey area and many of its key stakeholders.

He is a graduate of the Seton Hall University Law School. He also earned a BS in civil engineering from the University of Delaware.

With our speakers all being introduced now, Gary will lead us off.

Gary Toth: You know I hate these bios. They tell you what you did, but they don't tell you who you really are and where you learned it. I can tell you what my mentor as a soccer coach once told me. "All good soccer coaches are great thieves." I'll tell you, I got to where I am by being a great thief. I'm looking around the room and I see Leroy, Leigh Anne Jacobs, Brenda, Eileen and Don back there. My buddy [Elkin]'s back in the corner. There's Jerry, too. Most of what I've learned, I've basically stolen from you guys. So today and on Thursday when I talk, I'll be sort of parroting back your ideas.

I'm going to talk a little bit about culture change. A lot of people have been talking about culture change, here. John Metille kicked off the whole thing with the keynote. He talked about the culture change that was needed to think about more-flexible designs and environmental leadership.

Leroy was talking about culture change this morning. He's always been talking about culture change, over the years. He was talking about the culture change that FDOT went through on the project in Tampa, in terms of thinking about diversity.

Even the commissioner of Maine, DOT talked about the culture change. It was interesting when he was introduced, because he was not an engineer. He came from an economic development background. I sense that he's helping to bring a culture change to Maine DOT in terms of looking at transportation as part of the economy, economic development and the social structure.

We're going to talk about another culture change. That culture change is the one that Scott outlined, which is to think about the ecology and the environment -- although a little different -- a little more rolled into CIA. In order to talk about culture change, I thought maybe I'd tell a little story. This story begins somewhere in the world -- some corner of the world, time unknown. Some people say that these are the first four NJDOT traffic engineers. I think that's me, my first day up there in the tree.

One day a prize appears. The boldest of the group goes for it while the other three watch. What happens? The bold gets punched -- so everybody goes back to their desks and remembers the reward/punishment cycle.

The next day, the prize appears again. The bold go for it, but the rest of the organization restrain themselves. They kind of sit around and hang around. One day, somebody retires. Everybody retires -- right, Leroy? A new guy comes along, and he doesn't know the rules. So guess what? He goes for it, gets restrained by the organization and gets indoctrinated into the culture. So he now sits there like the rest of them and doesn't go for the prize and doesn't even know why.

Another new guy comes along. The same thing happens. As you notice, the punishment's not even occurring, any more. The guy's just standing there with the hose. Sooner or later, you have a whole new organization of people -- none of which ever really were punished for their boldness. Yet they all sit around and just follow the status quo. They just take it easy and don't take any chances.

That's sort of how beliefs get engrained into a culture. I know that's how it's happened at NJDOT -- and there are many dimensions of that. With respect to the ecosystem, these are a lot of the beliefs that we came to hold. The ecosystem is something that we need to do only to get permits. We made up our minds. We got up to the bean counting mentality. We can't pay for more than we take. More importantly, we don't even want to get involved in planning and designing for more than we're going to be forced to build. You guys helped us, Brenda -- particularly in the division office -- to believe that the federal process is going to require us to do this project-by-project, because of the accounting system. The federal aid system is very project-oriented.

We were trained to mitigate at the end. And we all believe this -- environmental stewardship was not our job. It was people like Leroy and Gene Kleckley and Brenda that helped break that mould. Today as much as anything, we want to speak on this -- how we were trained to believe that the natural and human environment are separate entities.

This is the way that most of us look at things. Worse yet, this is the way some of us look at things. "Is this transportation?" We need a paradigm shift. We need to go for that banana. The new paradigm is starting for environmental sustainability from the beginning of project planning. We've got to think of ourselves as stewards of the environment -- not just something that we have to mitigate to get our jobs built.

We need to start thinking of the natural environment as part of the community profile. This is something that both Wendi and Marshal taught me -- which is why they're here today -- to do most of the talking about the project-specific examples. Environmental restoration enhancement can be intrinsic to helping a community. It was something that I never thought about 'til I saw their presentation. They've done a lot of work in terms of viewing some of the stuff -- some of the mitigation that we would have looked at simply as a way of getting our permits -- as something that actually helps enhance the community. What we're really looking to do is this -- to merger the thing into one big picture. Thanks.

Now let me turn it over to Wendi.

Wendi Goldsmith: Thanks, Gary. I come from a background that apparently has nothing at all to do with the transportation field. Except maybe for the fact that rivers and highways are both linear. I started out as a scientist and designer and manager of river systems. I've noticed, driving around, that rivers and highways often parallel one another, for various reasons, and I've found myself being called into an increasing number of projects that were transportation-related. Either because the rivers were jeopardizing transportation infrastructure -- or, in some cases, transportation storm water management needs were necessitating a more thoughtful approach than had previously been occurring. In some cases, the transportation world was the only source of funding for correcting various serious problems.

There are a whole bunch of recognized environmental impacts due to transportation infrastructure. Water quality has received increasing regulation. Air quality -- especially in some regions around the Northeast. It's a very serious issue that's starting to impair progress on projects. Habitat degradation isn't very widely regulated. I don't think our policies and activities currently do a lot to address the habitat degradation impact. In general, this is all caused by the contamination of streams and wetlands, by hydrocarbons, heavy metals and other pollutants carried in storm water runoff -- and the airborne pollutants, as well.

If you look at the world from the point of view of a raindrop, you'll realize that in an undeveloped environment, of the total annual precipitation that falls on the landscape -- about half of it in this part of the word -- leaves the site effortlessly, through evaporation and transpiration. Most of the rest of it -- about 45 percent of the total annual precipitation in this part of the word -- enters the groundwater -- both shallow and deep groundwater reserves. A mere 5 percent -- maybe as much as 8 percent -- leaves the site as runoff.

In the built environment, we've engineered buildings, roadways, parking lots and all the types of development that sprout up around transportation infrastructure to specifically shed water and convey it very directly and quickly to the nearest receiving water. We've actually engineered impervious surfaces into the system, and engineered out the residents' time -- time and space for evapotranspiration and groundwater recharge. This leads to a lot of problems. It also means we're handling a much larger volume of water through our conveyance infrastructure than we necessarily have to.

If you're looking at the environmental health and specifically viewing the world in terms of its ecological infrastructure, the only way that you're going to achieve a sustainable set of conditions is to follow a natural model for hydrology. To practice the recreation, in many cases, of a sustainable water budget on a site-by-site basis.

To do this, you have to focus on daily and weekly hydrologic performance -- not just focus on the high-recurring centrifugal storm events, such as a hundred-year event. You need to focus on replicating the natural water budget, in terms of evapotranspiration, infiltration and runoff. By doing that here and there on the site scale, in our highway corridors themselves, then also hopefully others will be tending to the management of all this in the surrounding lands -- and we ultimately actually achieve benefits on the watershed scale. In fact, this is simply the only way I know of to practice actual watershed management, where there's any improvement that occurs.

Site-scale sustainable hydrology gives us healthy soils and productive vegetation, and provides for the residents' time for these vegetated soil systems to process pollutant loads, and give us suitable quality and quantity of water in streams. From a science point of view, that's what's happening on these sites. By integrating the greenspace needed to accomplish these goals, we have the opportunity to satisfy a bunch of other social needs.

One of the first projects I worked on that ended up being involved with not one but two highway agencies -- the Massachusetts Turnpike Authority and Mass Highways -- was related to the restoration of a seriously impaired brook in Chicopee, Massachusetts. Overall, this project involved restoring a mile and a half of urban stream. To do so, it was necessary to add some storm water detention facilities. To actually physically repair the stream by boosting it up in its channel and then cutting its way down severely. And to provide for enhanced energy dissipation in various habitat features in the stream, itself.

We did as much of this work as possible, using some various soft-engineering techniques with different forms of bank vegetation. The steep -- up to 20-foot high failing slopes along the size of this creek -- had created ongoing nuisance problems. At one point, they became quite a serious, tragic political issue in the community. Back in the early 80s, in fact, a couple of kids were playing in one of these steep sandy-banked gullies. The slope collapsed and soil covered several kids. A few of the kids got away, but one child died as a result of this pretty humble and basic problem.

This put it on the mayor's top agenda. There was a tremendous study done to assess the severity of this issue, and to identify how to correct it. For this one hearthstone-quarry-brook-corridor alone, the 1983 price tag for engineering a solution to that problem was over \$2m.

For a transportation project, that might not be a hefty price tag, but for a down-and-out post-industrial community in the Connecticut River Valley, like Chicopee, with a seriously-declining tax base, they didn't have any way to deal with that problem. As a matter of fact, it sat as a back-burner item for another 10 years, until the widening of State Highway through their community necessitated a solution for handling storm water.

At that point, they looked again at what the causes of the stream erosion had been. It turned out it was runoff from both the Mass Pike and the existing state highway, as well as its proposed widening. Due to the terrain of Chicopee, here we had the Connecticut Valley. This is a highly non-cohesive glacial outwashed terrain alongside the Connecticut Valley. If you don't handle your storm water impeccably, it's carving deep gullies through that landscape and creating very precipitous slope failures. Most of this community was pretty fully built out. So they weren't facing a sprawl problem. But they also didn't have a lot of land to turn to to deal with the issues.

The solution on this site **involved finding ye olde plot of land under the power lines, and creating a detention basin to intercept flow from the Mass Turnpike and from Mass Highway properties. There was the need to actually place a very steep reach of this gully in a pipe, to control grade change and get the water safely under the highway, using some structural methods for the headwall, as well as some vegetated methods.**

This whole system was constructed using the stream, itself, as the access corridor. We put the whole stream together using a variety of soft-armoring techniques, all of which were designed to enhance vegetation and put a diverse set of water quality and habitat-enhancing species directly in contact with the stream environment -- which has developed wonderfully. In addition to solving a bunch of community needs, and helping to get the permits for the highway-widening project, this project has gotten a lot of attention from the State Department of Environmental Protection, as well as EPA Region 1, and the Physical Stability and Vegetation Performance and Wildlife Habitat Monitor and Protocol that we developed for this project has become the standard for other projects of its type throughout New

England. The good news is that this is one of those few projects that's had a detailed monitoring schedule -- and it shows excellent results.

Another project on a slightly larger scale that we've been involved with, at Gary's decision-making, is Portway. One of the largest projects currently on the planning boards for the State of New Jersey's DOT. This project is a bold and very large project. Very encompassing, in terms of its geographic scope as well as its purpose -- which is basically to provide a different series of roadway and bridge infrastructure improvements. To improve access to and between the Newark, Elizabeth, Ayer and Seaport Complex

. And what's widely believed to be the largest intermodal rail and trucking warehouse facility anywhere in the world. There are more railheads here and more travel lanes than you can find anywhere else. The problem is the connections aren't smooth. They aren't being used efficiently. In order to prevent some sprawling warehousing activities elsewhere in the state, a project like this needed to shore things up within the Portway district.

Driving around this area, you will see lots and lots of bridges of different styles and ages and conditions. Container yard after container yard serving the ship, rail and air transport industries. This is located in a part of the world that has actually gotten pretty well known. If you've ever seen the whole entry series from the Sopranos, you're driving through the Portway area.

In fact, how many people have driven around that part of New Jersey? How many people think of that part of New Jersey whenever you think of New Jersey at all? [inaudible audience reactions] There's a tremendous opportunity to re-emphasize the rather amazing collection of natural resources -- albeit in an impaired... There are how many super fun sites within the Portway region? There's a tremendous opportunity to actually make some positive impacts to those resource areas, and to make those part of the more memorable experience that people using this transportation corridor may encounter.

The strategy for a New Jersey Portway, which is still in the planning process, involved identifying opportunities for ecologically-based storm water management, remediation of contaminated soils, using low-impact roadway and building site construction practices, and the establishment of repairing greenways that are sited and designed to add habitat as well as recreational value to this primarily industrial landscape that disconnects many neighborhoods from the resource areas that might otherwise be enjoyed, appreciated and better stewarded.

The first site that we have tackled for concept-level design is a 100-plus acre US Postal Service facility, right in Jersey City. Of this approximately 120-acre site, 114 acres is impervious. There are over 25 acres for the rooftops, alone. The reason NJDOT is looking at this site is they need to encroach on some of the postal service property in order to accomplish some of the lane widening that they need to handle.

We looked at how we could make some relatively significant improvements into the management of storm water on that site, while accommodating the extra travel lanes that NJDOT needed to accomplish. In order to do that, we looked for outside. Here's an existing highway corridor -- here's the intended alignment of the new travel lanes -- here are the 25 acres of rooftop area and all the surrounding parking lot areas. And some rail heads and so forth.

We had to look out in the surrounding landscape, at the existing intact and impaired stream corridor areas and wetland areas -- to look at what was there that could be restored, modified, enhanced and incorporated. To provide some functional service to this project, in terms of storm water management. In fact, part of this involved sitting a greenway corridor that was going to be used for surface conveyance of storm water, as well as a mixed-use trail -- bikeway -- pedestrian walkway.

Looking at how you do this for the postal service area involved handling storm water in a vegetated surface channel, incorporating vegetated infiltration zones into the parking lot, and swapping out. There were some existing surface channels there, but they were fenced off and paved over this grouted rip-rap through most of the areas. Even so, there was still a little modest token of habitat use onsite. We talked about handling storm water onsite in a different pattern, and focusing on enhancing the ecological values in the stream corridor -- providing examples of where this has been accomplished on other projects with similar soil and similar slopes -- similar parking and truck traffic demands.

Also, on a number of projects, we have proven the ability to handle storm water quality and storm water quantity detention -- even in sites with very serious flood plan encroachment limitations. If you plan these things out early, you can accomplish a lot of these multipurpose solutions, even despite many constraints.

Additional things that have been identified for this and other sites that are part of the Portway project are porous pavements, use of median areas for storm water mitigation and habitat mitigation of other forms. The use of vegetated swale systems for conveying storm water. This is especially important in the Portway environment, where so much of the site is closely at the high-tide line. There are some drainage issues. Keeping the water high in the landscape often allows it to flow more reliably.

Identifying the stream wetland salt marsh restoration opportunities. Very often in a lot of these old industrial sites, impacts aren't always going to be negative. You're dealing with sites that've been seriously damaged and impaired. You can solve some of your drainage problems while improving habitat problems by actually identifying where you need to go in. To meddle with a stream in a good way.

Along the way, there are many opportunities to use these interventions to create greenway corridors for people. All in all, you start getting community members onboard in many ways -- if you plan in this manner.

People tend to be curious, at least, and ultimately very positively won over to some of the more unusual techniques, such as porous pavements. Looking at the visual appeal of a median used to handle drainage, instead of an invisible hard infrastructure that's just buried out of sight. We looked for this project at all of the right-of-way, sizing constraints. It's quite feasible to fit in all of the engineering requirements for storm water handling. To address the volumes and the water quality. We've helped by illustrating other similar project sites we've worked on, that are not related to the transportation field, to help create some support for storm water management, wetlands and salt marsh restoration.

One of the most exciting parts of this project involves the creation... There's a faint purple line here that shows the alignment of a greenway corridor that follows the alignment of portways, new travel lanes, in many cases. But it also follows the Hackensack River, in many cases. Linking some previously-unconnected parkland and other habitat open space. Again, providing plenty of opportunity for people. A buffer of vegetation and storm water management lands, together with the travel lanes.

Here's how we bring some of these experience and techniques into the transportation-related world, at the small-scale and at the very large-scale. I think there are lots of opportunities to do more, and Marshal Robert will explain some of his involvement in the Route 52 Causeway Project.

Marshal Robert: We're here to support Gary. This is another New Jersey project. The project here is a 2-mile long bridge over the inter-estuary -- the Great Egg Harbor, just south of Atlantic City, New Jersey. Basically, this bridge is in really bad shape and needed to be repaired. They'd been putting off the repairs because of the costs. The bridge is just slightly off the waterway. Its columns are falling

apart. [The drawbridge is operating the environment]. There's a great deal of traffic congestion and problems in the area.

Obviously the situation is, "Let's replace it. It's a big bridge. We could do environmental impact statements spending 6-10 years trying to come up with how to permit the project." The record of decision -- there was an issue -- "Well, okay. We'll deal with that in design. We'll build something. We'll do a mitigation element. We'll put it all together." At the end of the record of decision, there was basically a whole bunch of stuff we were going to do as a commitment, but really not plan for implementing those particular elements.

The first thing we did right after the record of decision was to do the audacious thing. We relooked at each mitigation commitment and [believed] that whether it was a contributing element to environmental stewardship, or not. We looked at it as, "Does it give value? Can it improve the community, itself, and the environment?" Equally important is, "Would it be endorsed by the public?" You can imagine that this particular site where the recreation aspects of the economy are driven by the environment -- it was very hard not to include the environmental and ecological infrastructure from the community impacts, themselves. From the Federal Highway Administration, "Can we save money or streamline the process, to get this project done more effectively?"

This slide just basically shows us the basic difference in size and scale that this particular project would have, to what was there before. We're talking about twice as wide, two to three times as high, out where everybody could see it. It's a massive facility. It was going to affect two major communities. You can see it from everywhere. It's going to affect their tidal areas. It's going to affect their bay areas and a lot of things. It's very difficult to distinguish between the community impact assessment and the ecological impact assessment on this particular project.

Some of the design goals would be, obviously, to enhance mobility. That was the object of the job. "Let's get some problem that we have in the transportation industry and get it fixed." At the same time, we wanted to preserve the environmental, scenic and aesthetic resources, and do it in a way that integrates it into a single way of adding value to the project.

In this particular case, coming into the town, the prior project had a very large detention base. Just outside this little rendering was a whole bunch of individual homes. The detention base had a big six-foot high chain-link fence around it. One of those areas that Wendi had mentioned before of using a median [inaudible] retention facility, we converted -- changed the slopes away from the side and moved water into the center. We treated it in the center and then converted a detention base -- an eyesore -- into basically a landscaped burr. That was basically part of it. That was what the community was interested in -- that particular location.

We integrated an ecological solution into an aesthetic and absolutely a community impact process. We converted a number of residents who were vocal opponents of the project into advocates.

One of the things that's absolutely necessary from an ecological perspective and from a community-impact assessment is truly to find the local context. There's no substitute for developing the context and then having a very robust environmental process with community involvement, from beginning to end.

Make sure that folks recognize a bridge can be seen from everywhere -- both night and day. The aesthetic impacts of the community are also relative to the environmental impacts. There are historic facilities on the site. How is this going to be perceived by the regulated community of such a large facility over such an ecologically-sensitive ecosystem?

You do it by demonstration. Some good graphics, involving some architects on the project, and recognizing that it is part of an amazing ecology. Looking at it in the day and at night, so that we can tell people what it looked like during the day -- and the impacts at night, as well.

Going ahead just to the point where you're looking at the very mundane. What would it look like using various alignments? Can we smooth it out? Can we make it look more efficient, affective and elegant in the landscape, itself? Understanding that these are two very heavily-used recreational communities, the existing bridge had no pedestrian interconnections. This particular project, we expanded as part of the project from just a regular sidewalk on a bridge to a multiuse pathway separated from the passing lanes. We also put in open rail systems, to recognize that the pathway on the bridge was high enough to see the ocean from, and to great distance -- as you could imagine -- from something of this respect in the air, it was a destination in and of itself.

We did interconnection between communities, provided for pedestrian mobility and for the passive recreation of bird-watching. That's a big issue down on the southern tip of New Jersey. There's a great deal of industry and tourism on bird-watching, as a matter of fact. This slide represents some of that little rendering you saw earlier of how we integrated both bioretention and aesthetic treatments as a community-impact bonus. This particular facility right here, just offsite the major intersection was causing many of the problems. It's a historic landmark. It's one of the earliest houses built in New Jersey, known for Captain Summers, who was very active in a lot of the Revolution War era naval battles.

There's an existing circle that had to be removed. But by involving the State Historic Preservation Office and local communities, we provided for a new and expanded front yard for the facility. It was being hidden behind a restaurant and their dumpsters. Providing for parking for access to the front. Converting a fishing pier into a boat ramp, with part of the community involvement process. Then re-integrating the "feel" of a circle -- a traffic circle -- into the landscape itself, as part of the pedestrian mobility. Now there's still a good recognition of the transportation and the environment.

Again, a community-impact driven, multiuse facility that helps with the permitting. There will be bioretention facilities in here to help handle the storm water, which could be handled in no other way. Having good graphics and understanding what the impact is of your project -- especially one of this magnitude -- went well, involving those folks in that process. And using plants in an effective way -- to do both bioretention and aesthetic treatments for the project.

One of the bigger issues in this particular project is maintaining access to the waterfront. All of those islands had access in the existing conditions. You build a single bridge up in the air -- how do you manage that? So part of the process was to integrate parking lots and fishing piers and the like to all the community. That's what was driving a lot of the community's decision-making -- access to that ecology. Access to the fishing, access to the waterfront, access to the bird watching was an important aspect. Same time, by moving the road over, we could integrate some wetland mitigation and marshland restoration projects. Then under the bridge where nothing else was going to grow, we put in infiltration basins. Within that particular area, each and every one of these environmental commitments that we're committed to at the EIS process were revisited and turned into multiuse and integrated approaches -- all of which gained community support and regulatory support for a very large project with significant impacts.

One of the real keys to getting community support was how to provide access to one of those particular islands in the area, which already had a visitor's center. That was one of their key recreation elements, and an economic driver for Ocean City, New Jersey. The visitors would attend this existing small center and get a lot of beach badges and reservations for restaurants and a lot of things. This was going to be

isolated from the facility and the Department of Transportation said, "Well, we'll build you something someplace else in town." They had nothing to develop in town, and it became a big bone of controversy between the two -- the Department of Transportation and the Community -- How to handle the visitor's center.

In researching some of the work, and dealing with the Federal Highway Administration, we recognized there was a funding for scenic byways and visitors' centers and scenic overlooks. You could actually build a building as part of a transportation project. The new project would have a building placed at this location, up at the bridge elevation, with a parking lot, so you could provide for a scenic overlook. Lo and behold, right there in the middle of the project, after the EIS was found, some state-protected herons decided to take up roosting -- right in the middle of the project area -- causing a little redesign.

So you had this very interesting shape. The idea was to keep this facility at least 50 feet away from these new state-protected species. That also required us to shift the entire project away from those particular upland. These are all in uplands, because the herons needed trees to roost in that were immediately adjacent to marshland. These were former dredge-disposal facilities, and dredge-islands are classic for that.

For the same reason, the DOT originally had the road coming through in this pattern, because it would maximize the upland. Then we had attention between resources which caused a bit of a decision-making problem with the resource agencies. "Which resource do we affect most?"

To try to solve those integrated community solutions, recreation solutions, environmental solutions, we decided to say, "Let's put a visitor's center back out there. Put it at the deck level and rebuild it. Not only are we going to do that -- we're going to build something very, very nice. We'll model it after a historic preservation facility that had been lost in Ocean City." The original bridge that's on here, we didn't mention. It also was deemed a historic resource, and we had to get into mitigation.

In this particular case, we had recreation, community impact, ecological tourism...

[tape turn]

...one facility, which gained a lot of public and regulatory support. Once we touched down on the other side, how do you provide access to this? To truly have access on both sides of the bridge? Then the bridge itself would become a tourist destination, itself.

Another issue occurred in that you had the islands out there that were being protected. The waterways between the islands were starting to erode because of a lot of boat traffic. By raising the bridge to get it out of the flood areas, we'd allow for a lot more boat traffic underneath. There would be a huge increase in wake action, which was already causing severe erosion and loss of anywhere from 3 to 15 feet per year of existing bay islands, and damaging the ecosystem. There was an anticipation that that impact would increase over time.

In order to preserve those islands and preserve the ecosystem itself that was, in fact, driving much of the revenues in the area for fishing and bird watching and just visiting the nature of the area, we needed to involve a series of bioprotection measures to slow down or stop that erosion practice, as part of the project.

There wasn't enough with a long, slender highway. It's very difficult to come up. Here's the highway, itself. Where in the world are we going to look to get mitigation? You're generally going to have to go offsite. Fortunately, we had a circumstance with this particular project which the DOT was dealing with,

and the Department of Environmental Protection was dealing with -- a [Takens] Case -- the place over here that's associated with a wildlife management area and an EPA priority wetland. The DEP kept denying permits to build on this particular property, along the ocean front. They were losing in court.

The DEP got together with the DOT and said, "What can we do? How can we work together to solve this problem?" Understanding that a project of this magnitude -- a two-mile long bridge -- is going to have to have a mitigation budget. It would have to provide for offsite protection. "Why can't we combine some of the offsite mitigation elements required for this particular project by having the DOT with their federal funds buy this beachfront property, provide the owner with the economic value he needed to solve that particular problem, drop the lawsuit, and create a very valuable piece of public infrastructure that is basically the link for making this one of the most effective feeding areas for migratory songbirds and birds that are coming from the tip of Cape May County. It's one of the few areas on the Jersey shore that basically has no development or a significant area. The birds kind of channel through Ocean City, away from Atlantic City. This is a great flyway into the New Jersey Estuary Program. This was a very critical element for the DEP to get into public preserve. It was all done through the cooperation and stewardship approach that was used on this particular project.

You may want to again look at some of the basic comparisons of how things changed during the process from a parking lot in the heron rookery, itself to a scenic overlook providing for educational opportunities -- actually inside that particular premises.

There we go. We're done. We have another particular project that Wendi would like to continue with.

Wendi Goldsmith: I'm going to show a project that I actually had nothing to do with, except for the fact that I worked closely with the late Gary Mason over the last several years. This was one of his most-widely esteemed projects, going back to the early 1980s. That was when the city of Berkeley, California hired his firm, Wolf Mason Associates, to come up with something good to do with this four-acre, linear, abandoned railroad freight yard. This project's received a lot of national attention, although at the time it never had anything at all to do, transportation-related. The fact is that there are many scrappy little long, skinny parcels of land in and around many transportation corridors that are serving to disconnect neighborhoods and fragment migration patterns for wildlife. There are many, many cases where there were transportation projects, themselves that put significant stream and river areas into culverts.

This project had a stream criss-crossing. You're dividing it in half -- buried in a culvert. This shows the actual process of breaking apart the culvert to daylight the stream.

Back in the early days, the thrifty approach to handling that concrete was to stack it up and use it to armor the bank. For a number of reasons, that's not a favored approach, nowadays. Here, you can see some of that stacked concrete armor. This little asphalt pad. A lot of excavation work was done to bring the grade of the park space down to meet the actual elevation of the stream. We see this natural amphitheatre type area that's been created.

This project was finished in 1984. It's developed. You can see the paved pad, and here's the highly-vegetated stream corridor which has many excellent fish, bird and small-mammal habitat values. But more importantly, this grubby little place that really wasn't on anybody's agenda, and hadn't gotten anybody's attention as a resource area, has become a very much beloved neighborhood amenity. I would encourage everybody here to look out at your projects and think about the opportunities to go back and turn back -- to undo -- some of the past damage, even on a project as extreme as this, where we're breaking open an old culvert and daylighting a stream.

We are currently involved with several stream-daylighting projects that are connected to transportation projects. Two for the NJDOT and one interestingly enough that the Corps of Engineers is undertaking in cooperation with the NYDOT.

Basically, become stewards of the ecological infrastructure -- recognizing the deep interrelationship between the built and natural environment. Work together on an interdisciplinary basis. Plan early to strive for solutions that improve both the transportation and ecological infrastructure. It doesn't happen if you scrape something together at the end of the process. You need to embark early in the discussions, to identify problems that need to be solved, and get some buy-in for how to go about doing that. And then to work out the technical details, of course.

What's perhaps most hopeful, if you follow this approach, there's a strong possibility that local community opinion will actually help influence the regulatory process in a broader sense.

The regulatory process is there to serve and balance a bunch of needs. But when you get people excited about engaging in environmental impacts that can help create open space and connectivity and fishable rivers and swimmable estuaries -- these are the kinds of things that help regulators work as part of the team, to find a way to carry out some of these projects. Rather than just saying, "No. Keep our life simple. Stay away from the resource area."

A lot of these projects involve getting right into the midst of work in areas that we've all frankly been told are a big banana -- just stay away from them. So let's work together and get some of these things accomplished. We're all here, ready to answer some questions. We hope you have some interesting ones to put to us. Thanks.

Audience: [applause]

Speaker: Let me just share a couple more ideas with you. We presented the details because that's a way to sort of help understand things. But the general principle that we're trying to put forth here is to use the ecology and the mitigation as an opportunity to improve communities -- whether they're communities that have been impacted heavily already by industry or development, or whether they're communities like the stork communities -- which, right here is one of them. Route 52 is another one. Shore communities have learned to capitalize on our ecosystem. Our community's in-between. We think that there are great opportunities to change our mindset and culture and our way of thinking about things, in order to do that.

Also, I guess I wanted to make a point about doing this on small jobs as well as big jobs. I was talking to Rob, back there in the corner in the lunch line today. When you come to these conferences, there's a tendency to talk all the time about big projects. But this stuff transfers to little projects, too. Some of the ones that Wendi showed on her slides there at the end are smaller projects. Even on a \$2m intersection project, there's an opportunity. We have one, in fact, in Morton County, New Jersey, to upgrade the ecology and do something again to help the community.

I guess the last idea was the one that I started with, in terms of the idea of stealing ideas. We didn't start with this on the Portway, and I guess Mass Turnpike Authority and Mass Transportation Department in Maine may have started out with the idea of helping the communities with what they were doing. But they adopted the idea. I don't know what Massachusetts is going, but in New Jersey, we may have been forced into it a couple times. Now we're sort of using it to change our culture -- just like Leroy used the Tampa - Ybor City example... As an opportunity to help change the culture of FDOT.

Scott, do you have any closing remarks? Or do we want to go right into questions?

Scott Duncanson: We probably have time for one or two questions. Then I think we have to get ready for [inaudible]

Speaker: That's George?

Speaker: Yes. I just had one suggestion. There are about 14 areas [inaudible] effects on that. This is just a curiosity one for me. Are you going to do anything with [inaudible] as you use it here to? I know you're improving the psychological health with recreation and everything else. But do you do anything that actually removes pollutants or removes harmful bacteria? Or any of this type of thing? To improve the health of the people, per se?

Wendi Goldsmith: Absolutely. The vegetated swaths of land used to buffer the greenway areas and provide storm water conveyance are certainly very effective measures for taking airborne particulates out of the birdside area. Also, the storm water management, in particular. You've got plants harnessing the sun's rays to drive a whole series of beneficial, biological and geochemical reactions in the soil environment that degrade hydrocarbons, take toxic heavy metals out of solution -- and they're actually the only way known to provide effective pathogen control for diffused pollutants. There are lots of other widgets you can stick on the end of a pipe that'll take out some oil and grit... But there's nothing else besides these systems that will actually deal with pathogen loads.

We've worked in some seriously-impaired watersheds, where we [have out] solutions like this -- being retrofitted into the existing infrastructure. You have some demonstrated EJ problems. These can be very effective to address those needs.

Speaker: George, [I'm a layman] to this. But Wendi and Marshal have taught me, plus our [inaudible] storm water rules. You can use your storm water management -- [sometimes it's in pipes and treating them at the end]. But the vortex chamber is something that your maintenance folks have to come out every six months and clean out. If you do it in a way that these guys showed, where you can actually use nature to help clean it out.

Speaker: That's exactly [inaudible]

Speaker: Another issue is that we need the bioretention facilities not only to intercept surface water. Those that are along streams in the bioretention swells also intercept the shallow groundwater, as well. So you get additional benefits for treating the shallow groundwater, as it goes into many of these facilities. It takes care of the seeps and those kinds of problems. You get multiple modes of treatment with these facilities.

Speaker: I guess I've been hearing -- how much is this practiced?

Speaker: How much is it practiced?

Speaker: Yes. In other words, you know more now from state-to-state, I think. How much do we see this actually being done?

Speaker: I can only really speak for New Jersey. Over the last year or so, we're now trying to make it part of our culture, to do this all the time. A couple years ago, this was sporadic. We were doing it only when forced to by permit.

Leroy Irwin: [Jerry], I understand what you're trying to do, here. I'd like to make a parallelism of what we're trying to do in Florida. One question is how well are you incorporating into the planning aspects of transportation and the planning aspects of local community needs and ecological needs together, in the very beginning? I see you've done this in the project-level development. But one of the things that we're trying to do with what we showed you this morning is through this screening process that we're doing. You didn't talk about the review process that takes place between agencies. The agencies have a responsibility to come back to DOT with a long-range transportation plan, with the MPOs, and identify for us these opportunities that you've been talking about here. So it becomes part of the transportation and community planning process. Are you moving in that direction, or not?

Speaker: Truthfully? No. I think that's a good suggestion. Right now, so far, we've been doing it through our project-development process. Have you had much success in Florida with the MPOs? Are they...?

Speaker: Oh, yes.

Speaker: Yes.

Leroy Irwin: That's the long-range goal of the plan we're trying to do. To get this ecological planning, if you want to call it that way, and transportation planning. It's that collaborative effort we're talking about, an the integration of both planning together. The ecological part of it. That's why we're trying to move our permitting back up way far into the process.

Communities need to be planning their ecological resources, as well as planning their sociological and cultural resources. We have to put those two together. That's one of the efforts we're trying to do, here. One of the cultural changes we're trying to do in transportation is we have to think about those things in transportation, as well as get the ecological people thinking about the transportation and mobility needs. They're not independent of each other. They have to work together.

Speaker: Yes. Leroy, it strikes me that in places like Chicopee, Massachusetts and a lot of places in New Jersey like that, the people don't recognize the value that the ecosystem has. Therefore, they're not asking us for it. Whereas in places like the project that Marshal talked about, which is along the shore -- or, I'm sure in Portland and other places where the community lives off the ecosystem, then they probably are more sensitive. But New Jersey's got too many places that look like Chicopee. So maybe we have to be the leaders. We'll get Eileen back there once, too...

Leroy Irwin: Just one more question. Looking at that aspect, I [don't know that in] Florida we have a lot of opportunities to do things, but our DEP is developing a statewide greenway system. It gets into some of the things you're talking about. We have our rails-to-trails conversion type thing, which is also part of the greenway system. We're trying to integrate that and those opportunities for greenways into our local comprehensive planning efforts. Unfortunately or fortunately, transportation impacts those facilities, tremendously. We need to be developing those things, concurrently, and not get to the point where they become conflicts in the transportation planning process -- but joint-development efforts. I just wanted to add that I love what you're doing here. I just think it needs to go to that...

Speaker: Sure. That's a really good point. Eileen had something to say.

Eileen Hughes: First of all, I was just kind of hearing Don, saying we need to boast about Maryland. They're doing a lot of this as we go along -- and integrating it into our projects. I just wanted to thank you, Gary, for bringing this to this forum. If we're going to have a sustainable environment for future generations, we need to recognize that we need to integrate all this together, and nurture that deep appreciation that people have for the

natural environment. We've sort of removed ourselves from it, and we need in some ways, I think, to step back and look at a little child. They see a puddle with a little bit of water, and they want to go to it and stomp it and play in it. I think it's that sort of seed that we need to cultivate in our communities. That's my speech!

Gary Toth: That's a good point. In fact, I know we've learned a lot from Maryland, too. I didn't mean to create the impression that... Like I said before, we try to steal ideas from other people. Maryland and Florida were two of our inspirations for a lot of what we're doing.

Speaker: I wanted to mention that Federal Highways relatively recently as well as TRB has become more and more interested in the health effects of transportation and how we can improve the health of our communities via our projects, as well. It certainly runs true with the ecology of the water systems, as well as the recreational facilities that we all go to.

Gary Toth: Federal Highway's been very supportive of us. Like on the Portway project. That's really a program -- it consists of five separate projects. It's going to require five separate permits. I started out by saying in the beginning that there was an initial problem in terms of understanding how we were going to calculate this. When you develop a plan like that at the watershed level, it's very difficult to say what portion of it goes to the Fish House Road project, and what portion of it goes to the [inaudible] bridge. In the division office, initially, they scratched their heads. They walked away. They were a little frustrated at first. But they came back a couple of days later and said, "We'll figure it out."

They allowed us to do the design for something that's going to be much larger than we know that we'll ever need to mitigate, from two to one. The theory would be that the plan would be there. Maybe we would build half of it, but at least the plan would be there, so that other agencies could have opportunities to come along and get grants and other things and contribute.

Speaker: Wendi, I'm sure that you are really concerned about using native vegetation. The types of plants that are going to be both good for the soils and for the area. The circle just keeps getting bigger and bigger. But there's a big concern that the highway rights-of-way are just perfect pathways for weeds and bad vegetation to move through. For bad trees, shrubs, vines -- all kinds of things -- to move right across the country on our rights-of-way.

We're having pretty good luck getting DOTs to be sensitive about the types of vegetation they plant, so they're not creating problems. But you go back and ask that same department, "What are your mowing policies, to keep your vegetation at a productive level?" They'll say, "Oh, as fast as we plant it, they mow it down." It's got to be the maintenance department. You've got to be very holistic about this whole situation of creating a good biodiversity on the right-of-way. Are you working with any of those kinds of problems with the DOTs anywhere?

Wendi Goldsmith: Certainly, you're absolutely right that things may look great on a plan, but first of all they have to be correctly implemented in the ground -- and then maintained over time, as you point out. The big question is, though, what you choose as a solution has to be something that fits in to the reality of the maintenance schemes. So that rules out some interesting ideas until we change the maintenance schemes.

In addition to that, I would say I'm very interested in vegetation. It's one of my passions. But I don't make it a priority in my designs, because I've selected a different priority. That is, focusing on hydrology. I don't believe you can have a healthy, safe-maintaining native plant community unless you have healthy, robust soils, with proper conditions being maintained by themselves, over time. You can't have that if you don't have proper hydrologic management. I think looking at construction projects along a highway right-of-way, we see the standard garden variety approach leads to significant hydrologic impacts. Not only of the right-of-way itself, but these tend to spread offsite. That's how the Hearthstone Quarry Brook dug its way 6 feet down into its

stream valley, on average. That's how the water quality around the Newark, New Jersey area became very degraded. You see physical problems and plant community responses largely due to the initial hydrologic scenario.

Until the 1960s, there had been no regulation of storm water, at all. The first thing that got on peoples' radar screen was, "Oh, my goodness! All of our large-scale earth-moving activities and the creation of new development patterns has apparently been having an impact on flooding in certain watersheds." So we instituted flood management requirements. There were engineering standards and different regulations, community-by-community -- but largely, dealing with the flooding issue. The Clean Water Act -- NPDES Phase 2, which just kicked in over a year ago, is the first really broad-scale concern about water quality impacts.

Still, nobody's actually looking at water "quantity" itself, on this total annual water budget. What's going on with the average raindrop? What's the fate of the average raindrop? These are the issues that matter, and these are the issues that we look to as the priority on any site-planning or design project.

Speaker: [Jerry], I promise to go back to my office and make sure that we don't plant any weeds on the I95 corridor. [inaudible] Baltimore.

Speaker: Let's take one last question, and then we'll finish up.

Speaker: We're from Iowa. A person that works for our Department of Natural Resources is teaching about what they call, "Rain Gardens." You're nodding your head, so you're familiar with that? They plant native vegetation as a part of and toward the improvement of hydrology. He'd told us that they did this thing in Minneapolis, where they got 60 percent of residents to plant these little rain gardens in their yards. They provided the plant material and prepared the land for the planting. All the residents had to do was maintain it. They got a 60 percent response.

They've even done things on roofs of buildings. They've put these gardens in to help mitigate the storm water and the rainwater and that kind of thing. I was just curious if you'd been involved in anything like that, or if where you see that going. I'm sure that someone in Iowa stole it from somebody else. It seems like people kind of share their ideas. I was just curious. Obviously, you're familiar with it, because you're nodding your head -- but just what your thoughts were about that kind of thing.

Wendi Goldsmith: Sure. Actually, several years ago, the University of Iowa brought our firm onboard to help them with the hydrologic management planning of some of their campus improvements -- and for their pretty extensive athletic facility, which recently completed construction. We came up with a plan that involves some large-scale rain gardens for handling building and parking lot runoff, and a series of treatment wetlands onsite that not only kept the whole site to the performance standard of maintaining sustainable site-scale hydrology. It actually used the site to buffer both the quality and quantity of runoff from the surrounding typical suburban neighborhood. It wasn't retrofitted with these kinds of measures you talk about. They can be very effective, and we endorse them a lot.

In fact, I spent the year of 1991 working with a very innovative German engineering firm that specialized in watershed management and river restoration. I came back from that work experience just blown away and impressed by these lightweight engineered vegetative roofing systems that help make the building footprint hydrologically invisible. I immediately came back eagerly encouraging my clients to consider some of these solutions. Much to Gary's credit, one of these initial presentations he heard me give -- I was talking about green roof systems. I give him tremendous credit for being enthusiastic about the idea, and believing that this might just play a role in transportation projects.

But the first major project using a green roof in New England is just under construction, now. Actually, the building of the New Haven, Connecticut Regional Water Authority drinking water filtration plant has been under construction for 3.5 years. The roof structure's going on as we speak. Next month, the lightweight engineered vegetative system will be going into place. It'll be open to the public and conspicuous. The agency that owns the facility is very eager to have it there as a demonstration and learning center for state-of-the-art watershed best management practices. I encourage you to visit it. It's right there were 91 meets 95. Well, it's a couple exits north, but very close to that intersection.

Speaker: Let's finish up. I think we've had a good informative session with some lively discussion. I'd like to thank Gary, Wendi and Marshal for speaking, today. Let's give them a round of applause.

Audience: [applause]

Speaker: We will meet at the front door at 3.30. Don't forget your name tag -- or remember...

[session ends]