US ARMY CORPS OF ENGINEERS

Moderator: Courtney Chambers
November 6, 2013
12:26 pm CT

(Courtney Chambers): Okay at this time I'll give you today's speaker on Engineering With Nature, by Dr. Todd Bridges. Dr. Bridges is the U.S. Army's senior research scientist for environmental science. Sediment assessment and management has been a major focus of his research at the Engineer Research and Development Center for the last 20 years. He's the program manager for the Dredging Operations Environmental Research Program known as DOER, and the director of the center for contaminated sediment, and is the U.S. Army Corps of Engineers lead for its Engineering With Nature initiative, which he's going to discuss with us today. More information about Dr. Bridges' distinguished background can be found in his biography posted on the DOTs Web page along with a copy of the PowerPoint he'll be sharing with us today. Dr. Bridges we're very happy to have you with us today. At this time I'm going to give you the presenter rights and we can begin. Also, participants will now be entering...

Operator: All participants are now in listen-only mode.

Dr. Todd Bridges: Well, (Courtney) I think we just need my slides to come up on the screen.

(Courtney Chambers): Yes sir, okay. I've got a slight delay on my end, just one minute. Well, hold on. I'm sorry. All right. We're getting there. I'm sorry. Here we go, okay. I apologize for the delay. You should be good to go Todd.

Dr. Todd Bridges: Okay. Thank you very much (Courtney). I certainly appreciate the opportunity to participate in the DOTs Webinar series, and to talk about our engineering with nature initiative, and how we're using the initiative to shape our work in

water resources infrastructure, specifically, today maybe illustrating even more so the connection to our navigation program and our dredging activities overall.

Most of us I think would recognize, I believe that there are lots of reasons why we need to be attentive to updating and improving our processes. It's been 40 years since the passage of The Clean Water Act, and the Marine Protection and Research Sanctuary's Act and related legislation that govern, for example, managed sediment. We have other challenges related to budgetary processes within the federal government than elsewhere, as well as the fact that our environment in general has changed substantially, due to benefits that have been derived from the passage of such legislation. So we're not dealing with the same world that we once did. We need to be particularly tuned to the fact that we need to be continually improving ourselves, so that we can be efficient and cost-effective in the way that we apply our engineering and conduct our operation.

Connected with that also is the need for us to find ways to work together collaboratively, cooperatively. We have a large assemblage of authorized legislation and regulations that touch upon our work within the water, and it necessitates that we work together across agencies and organizations to achieve our multiple objectives.

Then lastly here and maybe more current with thinking is an emphasis on our need to make our projects sustainable, as seeking out these triple-win outcomes that move toward optimally achieving social and environmental and economic objectives that are associated with our various activities.

This need is perhaps illustrated well in the Corps of Engineer's Civil Works strategic vision or plan that's illustrated on this slide, called Sustainable Solutions to America's Water Resources Needs.

I've used this picture many, many times to illustrate the point that, you know, 25 years ago when the decision was made to place the San Francisco deep ocean disposal site for dredge material 50 miles from the Golden Gate Bridge, there were many reasons why that seemed to be an appropriate and suitable decision. Given such things as the increases in the price for diesel fuel, as well as the interest for using dredge material for beneficial purposes within the bay, there are ways in which I think we can improve our practices, and should be seeking to improve our practices to make them more sustainable in the long run.

So this is our operational definition of engineering with nature. I'll just read it. We're seeking to intentionally align our natural and our engineering processes to efficiently and sustainably deliver economic, environmental and social benefits through collaborative processes to achieve more sustainability overall.

As we've been working with the initiative over the last few years, we've been emphasizing four key elements of engineering with nature as a practice, as a means for pursuing projects and activities. First, we want to use signs and engineering that produces operational efficiencies. Again, seeking ways to extend the amount of productivity we can achieve through dollars expended, or level of effort, or the time that's expended in achieving our project goals.

Secondly, we want to use natural processes to maximum benefit. If we can make use of, as I've said several times in making presentations on this topic, if we can use hydrodynamics to achieve what maybe in the past we would have

spent diesel fuel and pumps to achieve, it makes sense for us to find ways in which we might harness those natural processes to get those outcomes. Of course we would need to manage the uncertainties that would be intended to doing that, but how can we more creatively make use of natural processes to achieve our long-term objectives?

Thirdly, we want to broaden and extend the benefits that we provide by our projects. It's certainly the case that for the Corps of Engineers, and for navigation projects for example, certainly the primary, the central motivation motivating the authorization of those projects is the achievement of economic benefits through commercial navigation. We also recognize at the same time that there are many opportunities for us to achieve a broader set of objectives through those projects, including environmental and social benefits. So how is it we can work efficiently and effectively to achieve a broader base of benefits associated with our project even our infrastructure project?

Then finally here, how can we make use of modern, if you will and science-based collaborative processes to organize and focus the wide variety of interest and stakeholders, and partners that are germane and important to our projects? We have a broad set of interests, perspectives, points of view that are relevant to our project. So how do we organize efficiently the collaborations that are necessary to move forward on our projects? In perspective the status of the Engineering With Nature activity that we have underway, it's been really over four years now that we've had this initiative underway and moving forward within the Corps of Engineers Civil Works program. Over that period we've had a large number of engagements with between 200 and 300 hundred individuals across the Corps of Engineers that are at a variety of levels, as well as with other agencies. I notice from the people signing on in the Webinar that many of you have participated in some of these activities from a broad set of perspectives.

We've had workshops and dialogue sessions and have developed project development teams to advance our goals with Engineering With Nature. We've developed a strategic plan. We've developed some specific research projects to advance practices related to Engineering With Nature. We've initiated some field demonstration projects, which I'll list for you in this presentation. We've begun implementing kind of a wide range actually, a communication plan to spread the word about this and to enlist the help and the contributions of others in this effort.

I can illustrate some of these ideas beginning with a focus on dredging maybe with this slide here presenting sediment management as a progression. I realize to some degree this is a bit of a cartoon. We have facilities all around the country that - maybe not as big as (Craney Island) in Virginia, because it's over a square mile in size confine disposal facility. We have many sites that function primarily, principally or exclusively as a disposal area.

It's relatively cost-efficient to use the site for this purpose, but admittedly there are relatively few environmental, if any environmental or social benefits that are derived from sediment at that site, even though we can manage the sediment very inexpensively at that site.

Times Beach New York, that's the site that's pictured there on the slide is another case in point. Times Beach was in fact a confined disposal facility that was used rather extensively in the 1970s. It transitioned in its use. There was a rather circuitous past that it took in reaching its use, now is in fact a local nature preserve. That's its current use, for bird watching and trails that exists within the facility itself. It's quite popular with many locals who are engaged in those kinds of activities. So that represents a broader set of benefits that are achieved from that site, that weren't necessarily thought of or planned in

advance of its designation as a confined disposal facility, but they just happened to emerge.

A popular island in Chesapeake Bay in Maryland is the site of an historic island within the Bay which had shrunk over time. There's a large restoration activity underway there that's making use of dredge material from the region to restore this island to its historic footprint in excess of 1500 acres. It's taking a lot of dredge material to do that.

It's a large project. It's about $670 million I think overall. It works at this site, but admittedly there's only so much room in a budget around the country to have $670 million projects to make use of dredge material. How can we make more progress, you know, in respect to this? Another example is the use of dredge pumps and pipelines for example, in the Gulf Coast in Louisiana to create wetlands. This has been done and has been practiced, and is being done right now in Louisiana, but there's a need for being able to use more material for purposes of creating wetlands and other habitats in locations like this around the country. If we have to rely upon traditional practices, engineering practices, using pipelines and pumps to move material, in some cases long distances, there's only going to be a limited amount of money available to do that.

How can we make use of, for example natural processes to extend the value that we can get from the dollar to take advantage of these opportunities? One of the techniques that's useful for us in getting a broader view about what it is that we're doing in managing sediment is lifecycle assessment.

(Matthew Bates) and (Igor Linkov) had been applying lifecycle assessment methods/lifecycle analysis methods with colleagues in the New England

district, looking at total environmental footprint, if you will, that are associated with different alternative practices for managing dredge material.

What you see here in a bar presentation is basically the kind of added footprint that's associated with a large number of different kinds of end points, environmental end points related to managing sediment in this way including the production of cariogenic compounds, and the toxicology of the materials, the liberation of greenhouse gases, et cetera, et cetera. You can see these end points listed her. So the taller the bar, the larger the footprint associated with that particular practice.

You can see here that in this particular example that they worked through that the distance to the disposal site from the dredging site has held as a constant. That's ten miles to the disposal site, so ten miles to an open water, a placement site, or ten miles to the development of a containment island. You can see in this particular example that the utilization of an open water site represents a much smaller footprint than the other two.

Also, I'll point out to you that in the case of the island that the bar graph goes below zero. That's because you actually have in this particular case the generation of benefits, and the development of habitat. It's a vegetated habitat associated with the construction of that site. This particular technique is just one of several that can be used to get a broader perspective on impacts or effects and benefits that are related to a particular operational practice.

Some other kinds of solution sets, I've already mentioned this one, so I probably won't go into more detail. In the state of Louisiana it's estimated, you know, that they need 30 to 40 million cubic yards of sediment a year applied to the creation of wetlands in order to kind of stabilize their coastal environment. Well, that's a lot of dredge material. If we have to rely, you

know, principally upon historical engineering practices, there's little way I think to get to those kinds of totals. So how can we make use of natural processes, maybe to extend the way in which we pursue those kinds of opportunities? These are two examples of modifications in practices that are under consideration or have been thought about.

First, in North Tybee Island in Savannah, Georgia; North Tybee has erosion that's part of the island now, and currently sand is mined offshore and is placed upon this beach here to address that problem, but there's also an opportunity to make use of sediment that comes from a navigation channel, and to take this sediment of mixed grains, this muddier material and to create offshore berms with that material using pipelines, and to allow natural winnowing and transport process that are operating off of North Tybee Island to move the core grain material, the sand onshore while the fine grain material is winnowed from that.

That's an example of strategic sediment placement, not just applicable in this particular case. It's being considered, in fact is being utilized around the country. Mobile District has made great progress in its demonstration and consideration of in bay thin layer replacement with grain material. The ocean disposal site for Mobile Bay is as much as a 30-mile trip with a hopper dredge from the bay out to that site, which is a long distance, and it costs a lot of money.

Dredging costs have increased substantially with increasing fuel costs. So what are the opportunities for thin layer placement or beneficial application of sediments within the bay itself? Retaining the sediments within the bay, and reducing the cost to the dredging program, but also generating environmental benefits related to that. Mobile district with its partners in collaboration with

the agencies have made great progress in demonstrating some of the ways in which these practices can be updated over time to reflect these opportunities.

An inland example that I've shown in the past that's not so much a dredging example, but maybe a restoration example. In the upper Missouri River, back in the 2009 timeframe, we spent about $25 million to construct 650 acres of sandbar habitat. Principally for the benefit of the Interior Least Tern, but in 2011 during the high-water event we call the flood, Mother Nature of its own constructed 16,000 acres of sandbar habitat. In effect buried the 650 acres that we constructed.

Now, we know that floods happened, that high-water events happen, the question here is how can we, in a strategic sense, make use of what we understand is going to happen as a part of just natural cycles and processes in nature to achieve outcomes that we find desirable, making use of natural processes that minimize our need to spend precious dollars on that activity.

This is another example of the (Luccihatchi) bar that's right across from the City of Memphis River, and here's this secondary channel where we see dikes have been constructed in order to maintain flow within the primary channel. You know, for purposes of navigation traffic.

The issue has been that these dikes as they were originally constructed have disrupted the habitat thats represented by this secondary channel and the bar itself, and its utilization by animals and aquatic habitat such as sturgeon and a pocket book muscle that are a threatened and endangered species.

So a conservation group within the area including fish and wildlife service and others work to develop an approach for notching these dikes. Basically creating low areas within these dikes which will allow for a flow to be

maintained within this secondary channel in such a way to preserve not only the habitat within the secondary channel itself, but also on the bar. In this way, they've actually kind of restored considerable habitat value to not just a few acres, but in fact 11 miles of habitat at a cost of about $150,000 in total.

This example from Wilmington district, the Wilmington offshore fishing enhancement structure, which you see pictured right here, this L-shaped structure with a little tail on it was constructed in the late 1990s as a part of a deepening project in the Cape Fear river, where the Corps was blasting limestone rock out of the river bed to deepen the channel.

It was recognized by folks at Wilmington district and their partners and collaborators and other agencies that this represented opportunity to create a rare form of habitat in the southeast Atlantic hard bottom reef. So rather than disposing the rock from that elaborate project if there would have been a disposal site, and as part of routine practice, they intentionally got together with biologists and engineers and designed a reef structure and its specific orientation to flow to create a reef that would benefit local fisheries.

This project was quite successful and data subsequent to its construction documented its use by fisheries, and it's a site which hosts fishing tournaments every year. So the collaboration of its value locally, both in a social sense, recreational sense, as well as an environmental sense. This project was constructed for very little additional costs on top of this deepening project. I think the total additional cost that was calculated was $12,000. This is a large site. I believe the dimension for the longest wing of the reef is over a nautical mile.

Also, with our fine grain material, (Doug Clark) and his colleague here and districts have been able to document the use of our dredge material disposal

sites offshore to fisheries. Using hydro-acoustics they've been able to document the use of these sites like off of Mobile Bay. A whole range of different water fowl and species then have been able to substantiate these hydro-acoustic data with sprawling survey data to document environmental benefits related to creating topography, making mounds where we didn't have mounds before due to the reef effect and the turbulence that's created by these features in the environment.

This is not a dredging example, but it just shows that these principals extend to other kinds of projects including those that have been pursued by St. Louis district and other districts around the country that make use of river training structures to accomplish specific engineering function, but these folks have been able to go back and look at these features and have documented the development of very diverse fish communities in association with these features that wouldn't exist in their absence.

(Burton Seudel) and (Tom Burdette) and his colleague here at ERDC working with their colleagues at Buffalo district have been able to add some additional features in the form of surface texture to some toe blocks for break waters on the Great Lakes to be able to accelerate the development of aquatic communities within those environments. They're in the process of collecting data now to substantiate the development of those kinds of communities and the value and the benefit that can be achieved from making these adjustments in the toe block designs themselves.

Extending these kinds of concepts to a particularly challenging issue for us in the dredging program is the management of contaminated sediments. While we have as a percentage of our program, you know, much less than - somewhere between 5 and 10% of the sediment that we dredge in the United States every year is contaminated to such a degree that it requires some

special form management or handling. Even though it's a small percentage, it requires an inert amount of time and effort to address these kinds of problems. So we're interested in finding ways in which we can utilize less expensive management practices; again, to extend the value and the productivity of the dollar that we devote to these efforts. One of the techniques or overall approaches that's consistent with this interest within Engineering With Nature is called monitored natural recovery. This is a methodology thats pursuant in the context of an environmental clean up or remediation, and back in 2009 some folks here at ERDC including myself and the U.S. Navy and some people in the private sector developed an actual technical guide for use in monitored natural recovery, which relies upon focusing natural processes to achieve risk reduction related to contaminated sediment.

Including this idea of so-called enhanced monitored natural recovery, which I've characterized here as, you know, applying light-touch engineering, if you will to achieve risk reduction. There are a number of benefits associated with this kind of approach that I don't have time to get into here, but there are many ways in which using these kinds of techniques in combination with a more traditional, if you will engineering practice will allow us to create additional value from our efforts to control risk related to contaminated sediments.

This slide has a listing of the current, what we call our Engineering With Nature action projects that we've gotten underway over the last few months. I can let you read through the list while I maybe give a little bit additional information about them. We have a project that (Elizabeth Murray) is leading in San Francisco Bay that is examining different berm structures that can be utilized within a restoration feature to accelerate sediment retention, to accelerate the development of habitat within those features, making use again

of natural tidal and wave processes to help us progress the development of habitat.

(Kelly Burkes-Copes) and her colleagues out in New Mexico out in the Albuquerque district are examining the range of ecosystem goods and services that have been produced from a restoration project in the Rio Grande, which made use of these engineering with nature principles and practices.

(Burton Seudel), (Jeff Corbino) in New Orleans district are actively pursuing here documenting the benefits that have been achieved from a practice that New Orleans district has been employing for more than ten years on the Atchafalaya river using sediment placement to help develop and build an island wetland complex within the river.

(Christy Foran) and colleagues in the New Orleans district including (Jeff Corbino) and in New England district developing a portfolio framework methodology for quantifying beneficial use benefits that can be achieved through the application of dredge material.

(Tom Fordet) and his colleagues in the Buffalo district are looking at and employing, in fact construction techniques to add turn habitat into break water in Ashtabula, OH.

(Joe Kridinger) and his colleagues up in the Great Lakes are finding ways in which they can apply dredge material within the Duluth interior harbor, not within a CDF but to apply dredge material in a shallow water environment within that harbor system to create wetlands habitat. While at the same time addressing a need to find alternatives to the practice of disposing of material in a CDF, which has basically reached its capacity.

Then finally, (Pam Bailey) is working on developing a sustainable design manual for Engineering With Nature using the plant community. Making use of principles and practices from landscape architecture to make use of the engineering benefits that can be achieved through the use of natural community.

I'm excited about those projects, we've had a research project underway for a couple of years now that's exploring the use of ways in which we can advance our engineering tools and our practices to enable us to make more use of dredge material that is produced from our navigation projects and coastal system, to reduce our vulnerabilities related to climate change, specifically sea level rise, through the construction of natural habitat. To be able to do this efficiently and to reduce the costs related to say more traditional or historical engineering practices, we need a little bit more information about how sediment behaves in these kinds of systems, for example, the hydrodynamics of wetland networks and how sedimentation occurs within wetland complexes. So it's combination of laboratory studies using flumes, which you see pictured here on the slide, in combination with some field investigations where we're actually measuring things like turbulence within the wetland systems to be able to improve our modeling tools for those kinds of projects.

Part of our communication strategy for Engineering With Nature has involved basically dialogue sessions that we've undertaken, both within the Corps of Engineers, and you see a description of people that we've had discussions with, a structured dialogue with within the Corps, as well as outside the Corps, those with whom we engage within our program. So we're in a position to compare the perspectives of these populations of people as they think about opportunities and constraints that may exist in respect to Engineering With Nature.

This shows just one set of the kinds of results that we've gotten from these dialogue sessions. So what you see here are the kind of issues that were raised in these dialogue sessions that were considered to be barriers toward the adoption or the progress of Engineering With Nature, within the Corps and within our mission space.

The dark bars show the number of respondents outside the Corps of Engineers that viewed this particular issue to be a barrier. Then the light green bars show the number of respondents within the Corps of Engineers, whether or not they consider that to be a barrier to adoption. You see actually a number of broad range of issues being identified here including the Corps culture, funding limitations, mandates and policies that we have.

There's actually quite a bit of correspondence between the responses of the two groups. Of course there are a few cases where one is noted and the other is not. We also ask what was considered to be important to overcoming these barriers, to be able to make progress.

We see a little bit, perhaps more interesting differences here between the two groups, for example those external to the Corps, working for other organizations viewed stakeholder communication being very important to overcome these barriers, and within the Corps we didn't think that was nearly as important.

That's probably a response that could be expected from us, and opens another issue around it addressing policy and process kinds of issues that's something that within the Corps of Engineers we feel and think about quite a bit, and it wasn't viewed nearly as important an issue when viewed from outside our organization.

So in general this is kind of summary slide. One way to view Engineering With Nature is really more of a systems approach to project implementation. There are a number of good examples; I'll just speak specifically to the Corps of Engineers using this kind of approach within our practice. I mean it could easily be argued, and should be argued that the Corps has been doing Engineering With Nature for a long time.

It hasn't been characterized as such perhaps, but there are many good examples of this practice around the Corps of Engineers. Our intention here, what we're doing here is trying to draw more focused attention to these kinds of practices, so that we can advance this way of doing business within our program.

One of the tools that we have developed and launched within the program we call Engineering With Nature project map. This is an online GIS database of projects that we have collected information on that we believe illustrates some of the glimpses and principles that are associated with a way of doing things with nature. This database is accessible from our Web site, which I'll show you in just a moment that you can access just from your own laptop. You don't have to download anything, it's searchable online by you where you can look at where these projects are, get some basic information about the project itself. We have hyperlinks where you can collect and access more detailed information about the project.

Currently, we have about 120 projects in the database itself, and our desire is to add additional projects to it over time. So if you have any projects you'd like to nominate to that, the database itself provides some instructions on how you can nominate projects to be included in the database.

Here's just a screen capture of the first page of our engineering with nature Web site, and as (Courtney) was mentioning in the very beginning, we've had some server issues recently that hopefully have been clarified, so you should be able to access this Web site now.

It's basically going to be and is our main hub for distributing resources and information about our program over time. I certainly invite you to take a look at that, and offer us any recommendations you might have in regard to it.

Just in wrapping up, you know, again to emphasize that one of the things we're trying to achieve here is finding ways to expand the range of benefits that can be produced from all water-based infrastructure including our navigation program, that is to create more value from our activities within the water. Also, to balance consideration of the environmental risks that are associated with our activities, which has probably dominated our thinking and dominated our practices for the last four years since the inception of the Clean Water Act and related legislation.

We need to balance those considerations with the benefits that we can achieve through our programs even for the environment, as we all work toward more sustainable projects into the future. With that I'll conclude, and I'd be happy to answer any questions anybody has.

(Courtney Chambers): Great. Thank you very much Todd. Okay our plan for taking questions this afternoon is that we're going to take them in the order that they're submitted in the chat feature, and as we get to your question please feel free to take your phone off of mute, and add to or further discuss your questions. So at this time I'm going to return to interactive mode.

Operator: All participants are now in interactive talk mode.

(Courtney Chambers): Todd if you'd like to go return to the meeting interface right there at the top of your screen, we'll have the chat feature visible to everyone. Great. Thank you. Just a reminder, although we're in interactive mode you'll still have to individually take your phones off of mute as you normally would.

Dr. Todd Bridges: If you'd rather just vocalize your question or your comment, I'd be happy to do that now as opposed to you typing them first, to eliminate dead air if there are any questions or comments.

(Mary Richardson): This is (Mary Richardson) in Savannah. I'm sorry did I miss the Web site?

(Courtney Chambers): Todd if you want to you can back it up to that slide, and then window, yeah.

(Mary Richardson): Thank you.

Dr. Todd Bridges: (Courtney) mentioned previously the slides from this presentation are going to be posted from the DOTs Web page. I don't know how long it takes you to do that, so you'll be able...

(Courtney Chambers): Well, actually the PDF of the presentation is already up there, along with Dr. Bridges bio right now. This recorded meeting, as well as the transcript for it will be posted within the next week. Yes, you have access to these slides right now on that Web site - well on the DOTs Web site, excuse me. All right. Are there any other questions this afternoon?

(Bill): Yeah. Hi. This is (Bill). Hi Todd. I have a question on Slide 17, you mentioned something called cohesive sediment settling, and I wonder what you mean by that?

Dr. Todd Bridges: Oh, right here.

(Bill): Yeah. That's the one.

Dr. Todd Bridges: Right. So for example not just in the Gulf of Mexico habitats, but in other places we typically find, you know, wetland habitats that are built upon mixed grain sediments. We have sedimentation occurring in those when I think we have a more sustainable situation, but we obviously want to construct, if you will. If we're constructing wetland, we want to construct these projects in a way in which we make them sustainable into the long run. That is they can accrete sediment. They're in a context and the processes in that context are supportive in both sustaining that feature over time. So what (Joe Galani) and his colleagues have been doing is looking at this graphic here on the bottom, the turbulence profile within these sediment beds, this is data that came out of this flume study here. As you might expect, you know, the velocity profiles, or for example the orbital velocities of waves, as waves move across wetland beds declines as you would expect, right with the frictional forces that are involved there.

What (Joe) and his colleagues have found is that if you look close to the bed, you actually see an increase in turbulence in the presence of vegetation. Well, turbulence tends to keep particles in suspension rather than to encourage their deposition. So that kind of data is important for us to be able to incorporate into models of these processes so we're better able to design these projects to be sustainable over the long run. That's part of where this project is focused here so we can become more efficient at our design, and then consequently in our operational implementation of those designs.

(Bill): Okay. Thanks Todd.

Dr. Todd Bridges: Yeah. Thanks (Bill).

(Tony Niles): Hey Todd this is (Tony Niles). I've got a question for you. Also, first off my compliments on the Webinar process here. This is the first time I've been on one where I can actually go and select whatever slide I want to see and go back to it and look at it. That was a good way for me to get that Web site address.

You also mentioned that project sites I guess on the Web site there can be nominated. Is there a criteria for the nomination of sites that could go into that?

Dr. Todd Bridges: All right. Well, that's a good question (Tony). We have a feature within the database itself, which can be accessed by any user to nominate and to provide us with information about projects that they believe are suitable for inclusion in the database. The kinds of projects that we're looking for, which are illustrated within the database itself, and within the Engineering With Nature Web site are those that hit upon those four main, you know, elements or key factors or attributes that I mentioned at the very beginning of this presentation. You know, operational efficiencies and making use of natural processes and producing a broad range of benefits in an intentional way and using collaborative processes. So if there are projects that illustrate strongly one of those or hopefully a combination of those attributes together, then those are the kinds of projects that we believe would be valuable to include within the database. So folks are asked to provide information about the projects and give us contact information so we can follow up with them, and reach determinations as to whether and how the project meets those kinds of criteria for inclusion.

(Tony Niles): Great. Thanks.

(Courtney Chambers): All right. We've still got time for some more questions if any of you have them. I'd also like to just send a quick reminder that if you are calling in as a group, just to help us keep track of our participation, let me know the number in your group if you don't mind via the chat feature.

Dr. Todd Bridges: I guess I could've started this seminar by offering a prize for the best question. Maybe I would have stimulated some additional questions if I'd done that. That's something to add to the suggestion box for the DOTs Webinar.

(Courtney Chambers): Okay. In our presenter instructions I'll put in there, prize consideration. Well Todd do you have any - thank you to those that are sending me your group number. I appreciate that. Todd do you have any closing comments?

Dr. Todd Bridges: Well, yeah I mean I appreciate people taking the time to listen in on the Webinar, particularly for those who have heard me talk about this multiple times, but participate anyway, probably with the expectation that I'm going to have something different to say each time. I hope I don't disappoint.

We are very interested in getting feedback from people about what we're doing through this initiative and are very interested in people expressing their interest in participating in some fashion, or in them identifying opportunities around the country where they believe this approach to project development and execution would be useful and productive.

If anybody on the call or your colleagues that maybe didn't participate today have ideas and thoughts about how you could engage with us on this initiative, please, please do so. You know, you can email myself or email (Cynthia

Banks), and we would love to have your thoughts about this and your participation.

(Courtney Chambers): Great. Thank you very much Todd. It's been a very informative presentation today and we appreciate you taking the time to share it. Participants we also wanted to thank you for joining us and for contributing through questions. We would like you to continue watching for notices on upcoming DOTs Webinars from (Cynthia Banks) here at ERDC. With that we're going to close it out this afternoon. So we hope you all have a great day.

END