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Good afternoon. My name is James and I'll be your conference operator today. I like to welcome everyone to the implemented work zone IGS applications call. All lines have been placed on mute to prevent background noise. After the speaker's remarks there will be a question-and-answer session and if you would like to ask a question, press star Emma number 1 on your telephone keypad if you would like to withdraw your question, press the pound. Thank you. Nicole Coene, you may begin your conference.

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Good afternoon or good morning. Welcome to the 13th webinar in the smarter work zone webinar series. Implementing work zone I guess applications procurement my name is Nicole Coene and I will moderate the webinar. Before I go further, want to mention that we have been experiencing conductivity issues with Adobe Connect. DOT is working to resolve the issues. But a permanent fix is not in place. If you experience poor audio quality while listening to the audio, call the teleconference line. Please bear with us if we need to pause to address audio issues. We will try to fix them as quickly as possible. If you do call the teleconference line for the audio, you will need to mute your computer speakers or you will hear it over the computer and the telephone simultaneously. We have three presenters. Todd Peterson, Federal Highway Administration office of operations, Jerry Ullman, Texas A&M Transportation Institute, and Matthew -- and Matthew Daeda of the Illinois Department of transportation. As member of the information team for FHWA every day counts initiative, Todd Peterson promotes adoption of work zone intelligent transportation system solutions and actions to better coordinate highway construction projects to accelerate project delivery, reduce costs and reduce public exposure to work zone congestion he is a licensed PE and certified PT OE, and received his Masters degree in civil engineering from Virginia Tech. Dr. Jerry Ullman is a siege -- senior research engineer and regions fellow at the Texas A&M Transportation Institute and leave the work zone and dynamic message research program at DTI since joining TTI in 1984 he has been the principal investigator for numerous studies pertaining to work zone safety and mobility. Traffic control, device effectiveness, freeway operations and travel information systems. He was the primary author of the FHWA publication work zone ITDS implementation guide and is a member of the FHWA every day counts smarter work zone's implementation team Matthew Daeda has been with the Illinois Department of Transportation for 14 years. His duties have included a resident engineer, traffic control supervisor, and he is currently the express -- Expressway traffic operations engineer for region one were he is responsible for improving safety and efficiency of on the expressway system. He holds a bachelor degree in civil engineer for Michigan technology University and is a registered professional engineer in Illinois. Today's seminar will last 90 minutes with 60 minutes allocated for the speakers and the final 30 minutes for questions and answers. If it during the presentation you think of a question you can type it into the chat area. Make sure that you send your question to everyone and indicate which presenter your question is 4% is will be unable to answer questions during the presentations but we will pause halfway through the presentations to answer questions typed into the chatbox and to participate in polling activities. We will answer questions again at the end of all of the presentations. In addition if

time allows we will open the telephone lines for questions and comments. If we run out of time and are unable to address the question, will attempt to get written responses. The PowerPoint presentation your list during the webinar is available for download from the file download in the lower right-hand corner. It will be available online within the next few weeks along with a recording of the transcript that I will notify icon is once the materials are posted online. The every day counts three smarter work zone webinar series program does not offer PDH. To confirm the presentation of the webinar please submit it individual participation confirmation request to Rachel Klein. -- You will see that power. -- Participation email and 5 or 7 days. It will be said for consideration for the determination of smarter work zone webinar eligibility is the province of the licensing agent, not the smarter work zone series program. I'm going to turn it over to Todd Peterson of FHWA to get us started.

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Great. Thank you, Nicole. So as Nicole mentioned, this is number 13 in our smarter work zone's webinar series this is a webinar series focused on our everyday accounts initiative a smarter work zone's and we have attempted to go through a number of topics that cover both angles of smarter work zone's and we will talk a little bit more about that today. In case you are interested in what has been presented already, the list is on this page, and it shows what has been presented already. If you would like to review some of those materials, the prior webinars and all of the training materials are archived on the other work zone safety information clearinghouse at the link below. After today's webinar, the 14th webinar, it will focus on leveraging traffic management center resources on June 16 so keep an eye out for registration on that. The purpose of today's webinar will focus on -- an overview of what the smarter work zone technology application initiative is an we will turn our attention to the main topic, which is step 4 of the work zone ITDS implementation guide which focuses on the procurement of work zone IGS systems. Following a little overview, we will turn to some real-world examples and show how various approaches to procurement have been used in getting these systems for smarter work zone's applications. All right. There we go. Really briefly, what are smarter work zone's? In general? Smarter work zone's, really is an initiative that we started with of the third round of every day counts, focusing on strategies to optimize work zone safety and mobility using policies and practices and looking at better use in data and better use of coordination, both within agencies and between agencies and their stakeholders to reduce works zone crashes and delays and mitigate the impact of work zones through a proactive collaboration and understanding of the cumulative impacts of multiple work zones so it is a lot of information that falls under two categories. One is project coordination which is really a proactive side of the more planning focused side of coordinating multiple projects to reduce of the cumulative impact of multiple work zones on traffic operations. Today's webinar, we are focusing on the technology application side which is the utilization of better data management practices and ITDS hardware through the deployment of intelligent transportation systems for actually dynamically managing traffic operations during construction. So the technology application side is really that construction stays -- stage activity which involves the use of higher technology, ITDS hardware, and better dated management practices to understand what is actually happening in the work sounds and to convey information both the two drivers so that they understand what is coming up as they approach a work zone but also the traffic managers so they can actively manage what is going on and they can enhance the information by managing what is going up on variable message signs. Or make other changes to the traffic control or operational strategies in response to what is actually happening out in the field. So really, it is an attempt to strengthen by a link between what is happening in a field, the

agency's understanding of it, and the agency's ability to convey that information to get actionable information to drive so they can change their behavior before they get into a situation, heavy congestion, or a safety issue that they could have benefited from some advance information. Technology application, as an initiative, we have two key goals for technology application. Subset a of this goal is for the agencies to have adopted business processes to facilitate the implementation of technology applications into work zone management practices. By business processes, we mean development of standards, policies, and other things that institutionalize the consideration of work zone ITS as an option, so there is some guidance on how -- what the criteria of the agency uses to actually get the it implemented in their work zones. And strategies, basically following what we have laid out in the work zone ITS implementation guide. The second part of this goal is actually doing the ITS implementation, actually putting some hardware out in the field, running the system, seeing how they work, and judging how they work and using that to improve the future implementation of ITS on projects so between those two goals, we are in pretty good shape. I think we have 38 states out of the 35 that we were shooting for that were either adopting the business processes or they have actually implemented a work zone ITS out in the field. So that is really good. So as I mentioned before, the focus of today's presentation is step 4 of the work zone ITS implementation guide and it was published back in 2014. It lays out a six step systems engineering approach to work zone ITS implementation beginning from the earliest stages of considering the needs for the system, working through the design of the system, procurement, and finally evaluation of the system, leading to continuous improvement of the agency processes. This guide is available at this link here. If you have a copy of the presentation, it should be a hot link that you can send to it. If you go to federal highways work zone management program webpage, you should be able to get a search for ITS guide and it will come up in the search there. So in the context of that guide, today's focus is on procurement, and as you can see here, that comes in the second half of the overall process of implementing work zone ITS applications. It follows where the agency has assessed their needs for transportation operations, for the project, or for their program. They have determined that the ITS is a component that they want to include. They have come up with a concept, con ops for how the ITS will actually function within their workflow. They have put some thought into detailing the design of the system. They know how it is going to function, what information they want to be communicated by the system. They know what to expect once of the system is live in the field. And now they are at the stage of actually buying it and searching for how they are going to get to the -- get the system purchased and put out in the field. So even though the con ops and the system design are in place, there are still a lot of decisions to be made in regard meant to their. Human, of how that ITS system will function. They are not visible to the traveling public but they have a big effect on how the agency -- the agency's relationship with the system. How it interacts with the hardware, the level of interaction of the hardware, the level of responsibility for maintaining the system, those sorts of things. So what do we consider? What are the options? Does the agency have -- I materially lost my screen of there. What are the options for procurement? Does the agency have the knowledge capital to build and maintain the system themselves? Is it something they want to contract? Do they want to pick her that ITS system directly from a vendor specializing in ITS systems or are they comfortable on their contractor pool that they will be able to subcontract a system that the -- meets the performance requirements? What will be procurement look like? Is it specific to a project? Is it an areawide on-call type contract? How would be advertised? Will it be lump sum on a construction contract? Will provide performance specifications? What qualities ultimately will drive the agency

selection? These are questions that are asked during procurement and we will cover these in the coming slides. This slide gives a rough flowchart of what the process is for procurement at the agency level. The first being considered as, what is the basic structure for the work zone ITS implementation? Is it -- can the agency get a commercial off-the-shelf project? Products? Is -- and off-the-shelf product is probably best suited to a simpler type of application, kind of a generic type of application, maybe a key warning system or something like that, where there is not a lot of complexity associated with it and there is a lot of off-the-shelf systems that already exists, vendors have established good a business models built around providing the installations to agencies. Quickly, efficiently, and they get the job done. They have proven pretty effective at what they do. Customized solution might be more appropriate for if the agency is dealing with a more complex project or possibly where there is a desire to maintain components of the system, post-construction, and finally the agency may already have eight CMC and have some hardware and they are looking for a more robust data source to fill in the gaps. In that case, maybe it is not related to hardware at all but maybe just a data sharing agreement or Pro data subscription may be. Maybe that is what is being procured. Beyond the actual type of the work zone ITS system, the method -- there are considerations with regards to method. It can be direct procurement or indirect procurement. It could be a purchase or a lease. And then, depending on how the system is actually awarded, that will guide a lot of -- those decisions about how they want to sell this system or how they want to advertise the system and have it bid, depending on what the agency objectives are. So for direct procurement, the agency is directly entering into an agreement with that ITS provider to obtain the hardware or a system that they -- they can either purchase or lease it. In an indirect procurement, the agency is not directly buying the system. They are really buying the capability, provided by the ITS system. They are putting the onus on their contractor to make sure that whatever they provide is meeting the performance specifications established by the agency. So the definition of the system from the standpoint of procurement falls into the specifications as opposed to a direct agreement with a vendor or hardware provider. In the direct procurement scenario, if the agency is looking at maybe a longer duration project or it has a number of similar projects that they want to do the same thing on, and they have the assets, the knowledge capital, the staff that can actually manage and install and maintain these systems, then purchase becomes an option for them. But if they are -- maybe they do not have the staff or they do not want to commit the resources to long-term maintenance or they do not want to be in a position where they have to worry about upgrading their hardware in a couple of years. Then leasing can be a better option for them. So all of those considerations are agency specific and it is something that you have to weigh internally as far as what your priorities are and if a purchase or at least is the right way to go for you. In a direct procurement scenario, the contractor hired by the agency is directly focused on providing the ITS system. That is their agreement with the agency. They are responsible for providing the hardware, depending on the extent of the agreement. They may be responsible for maintaining the system. Providing a conduit for information, being generated by the hardware in the field. Back to the agency, maintaining that conductivity with TMC. They have responsibility for providing response to the incidence. At all of these different provisions of what the level of the contractor's responsibility are become part of that agreement that are established and actually purchasing the system. If it is a matter purchasing the hardware or purchasing the overall ITS implementation as a top to bottom service, so there are a number of different ways to get the best value out of that. There is a lot of specifics you can get into, into the specifications, as far as time to respond, the length of time it takes to replace a piece of hardware that has failed in the field and that kind of thing. There is a

number of ways to make sure that the agency is getting the best value for the buck if they go the procurement route. On the indirect procurement side of things, again, the agency is not buying the hardware outbreaks. They are really buying the capability and they are relying on their contractor to just make it happen, based on the performance specifications that are built into the contract. With an indirect procurement method, that is a distinct change from the direct, and that there is not a hardware deliverable as part of -- at least not a long-term legacy hardware installation as part of the deliverable. Typically, this is, in a situation like this, but ITS becomes advertised and bid pretty much like any other work item on the project. It can either be a lump sum item, providing work zone ITS traffic control. It could be part -- parted out so that it is being a la carte so that the agency is actually bidding out the specific components of the ITS installation. Or it could be putting it on the contractor to make sure that they are putting on -- that they meet the agency specifications. Typically it is a lump sum arrangement because of the agency has put the thought into -- what specifically they want to buy in order to fit it out on a per item basis, they have already -- been to the level of considering what they need and they put themselves in a position where direct procurement button might be much -- more of what they are looking for. With indirect deployment, the one risk that the agency has is that, if the ITS is a small component of a larger construction projects, the agency can be put in a position where the contractor is no longer has that laser focus on the performance of the ITS as a part of the larger project. With direct procurement, you have -- you are dealing with a vendor, a contractor, that -- that is their sole responsibility is making sure that the ITS system is running at top notch. With an indirect project, a contractor may be able -- if they can make their money on earth work or creating or pavement and the ITS is \$50,000 component of a \$2 million project, they do not exactly have the incentive to make sure that the ITS system is top of the line. So it becomes an issue that the agency has to deal with and writing the specifications for that. There can be some - - there is not a lot of accountability for making sure -- at least to the agency does not have the control over who is actually providing the ITS system. To an extent, they are at the mercy of the contractor for picking somebody that is going to get the job done and then, the agency goes through the contractor to hold whoever is providing the ITS system, the subcontractor, responsible so there is a level of separation between the agency and the ITS provider that may or may not be acceptable depending upon the goals of the project. Some of these we talked about already. Considerations for indirect procurement. What might or might not be better for an agency really depends on the extent of the project, what the agency goals are for procuring ITS systems, -- is it for a specific project? Is the agency looking for a longer-term, maybe areawide on-call type of agreement? All of these things need to be weighed individually to determine what is going to provide the best value to the agency. Some -- takeaways for step firm -- four is in procuring ITS, a few things need to be considered. The perspective of the agency that is actually wanting to do the ITS. They have their own goals for what they want to accomplish. They want - - they are looking at from the standpoint of making the project function effectively and having a ITS system that is going to complement their traffic operations plan for the project. Or for their program. Then you have the perspective of the contractor, who is just responsible for getting the project done. And again, they are focused on getting in, getting out, getting paid, and making as much money in the process as they can, and if ITS is not -- if that can be a loss leader on the project, that is going to happen. So the agency wants -- if ITS and having that capability is of importance to them, you want to make sure that the way that you procure the ITS is not sacrificing the quality -- the potential quality of the ITS. Again, finally the vendor who supplies the work zone ITS, this is their bread and butter. They are in a position where the technology is

advancing rapidly. They need to have -- they need to stay abreast of what the latest technology is. Their world is making sure that the hardware is upgraded. That it is functional. That it is doing the job that it is supposed to do. And it is very focused on that and there is almost an IT element to it as well since they are dealing with computer systems. They are doing a lot of data communications and providing that link between of the data that is happening out in the field and what the agency wants to manage the project. With all of these, there are a lot of issues to consider here. It is really tough to cover all of the bases. In a brief introduction. Hopefully, we have gotten some of the ideas out on the table and we can let some of the rest explained for example. With that, I will hand it off to Matthew Daeda to discuss a little but about -- a little bit about that -- Massachusetts DOT procurement process. Matthew.

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Actually, I think it is me.

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Yeah. It is Jerry. Go ahead.

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Sorry. I am seeing Massachusetts on the slide.

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Anyway.

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I am going to talk about three examples. I think you did a great job of presenting the big picture issues and what step forward for German means. What I am going to do in the next few minutes is go through three state examples that I think illustrate and -- in practical terms, things that you talked about. What we have done is borrowed actually from a couple of webinar presentations that have been done by others. So I want to acknowledge those and we will have -- actually, there individuals contact information will be up after each state so if you are interested in having more discussions with them, you will have that information. So Massachusetts is the first one that I want to brief you on. Neil Boudreau with the Massachusetts DOT is the one who had initially presented on their approach. With respect to procurement, a couple of things that I think are important to share with you all today. About what they do. They follow a very much a traditional, I will call it, indirect contract bid item approach to procuring work zone ITS. They have used it on multiple projects to date as you can see. They generally rely on a fairly standard traveler information, real-time type of a system, either on the work zone, approached the work zone, or in some cases, they are putting out information on where it's -- routes leading to and from the worksite in a way to get to the diversion. A wide range of activities so that approach is, I think, something that a lot of agencies have experimented with. And it may be the most common way that work zone ITS is procured across the country. What they do is in their bid item, they do it as a lump sum but very specific with respect to equipment. They have got the expertise in-house or their consulting that design these for them. About what they want. So they have a range of equipment that they can specify and they do specified for each of the systems that they want on a project. As you can see, I think it will illustrate that they typically go with a lump sum approach or maybe a per month reimbursement approach. But it is the data itself that defines what the systems going to contain, it include and what is going to be able to do with respect to operating -- providing these kinds of messages. That kind of a thing. Very important thing that they do, as you can tell, is that they also spell out exactly where the equipment goes, how it needs to be calibrated, what tests need to be done to their five and get basically paid for getting it out there and getting it run -- ready to run and operate. Also the performance, expect

deliverables and all of those kinds of things. A very traditional model, the projects that they see coming up the road that need it. They specified into the project themselves. They also specify, as part of the bidding requirements, the personnel that they want to see involved or the bidder demonstrate that they have got people in a project manager role, a systems person, some field repair folks that are going to be able to get out there and keep the device is maintained and that kind of thing and then software. So they are very prescribed. Exact. Definitions of what they want and then they ask for the bid items in that regard. Again, traditional, I think, more common approaches. The contact information if you would like to contact him directly for some more information. Again, there is also -- on one of the webinars, in that EDC 3 series, where he talks about the entire process that you may want to go in and listen to or look over if you have not already. The next example I want to go through is down here in Texas. I think most people are well aware of the eye 35 construction travel information system deployment that we have talked about on numerous occasions in these webinar series. Highly successful in our opinion. I think that Texas agrees with that. The point today is that a component that had some interesting procurement approach to it that we want to chat with you about today and that is -- end of queue warning system, the component. If you happened to pay attention to what we have said in the past webinars, we had the quarter itself, a situation of multiple projects over a 96 miles of I 35 in central Texas being whited out, concurrently, multiple projects at the same time. Most of the work is occurring in the median, separation between freeway and frontage or outside the frontage roads so there is really no permanent capacity reductions that would be expected to create congestion on a regular basis. During the nighttime lane closures which were a lot of the project depending on the location, day, week, expectations for queues to develop did occur so there was a big concern about rear end collisions. The approach taken was that, rather than try to put out a lot of equipment that would be in the contractor's way and be used at any one location fairly infrequently to go with an on-call kind of approach that would be deployed, easily, on nights when the lane closures, wherever they were going to occur, and you can see the system how simple it really was -- for sensors, some logic, the single message sign, detect congestion, indicate how far it was an the next morning when the lane closures picked up, there is no equipment in the contractor's way to get work done and that kind of thing. Very simple. Either a forest system or if we thought that the queues would be longer than a couple of miles, you go to a more extensive system. Very logically -- a logic system and deployment wise, simple to do and, again, picked up at the end of the day or the end of the night shift and out of the way of the contracting folks themselves. It works. Based on some data that we have collected and analyzed. We see the significant reductions over what would have happened if the systems had not been deployed. All around, a very successful -- the interesting part for this webinar is that the approach taken, obviously, there is going to be a significant deployment cost associated with this approach, putting it out and picking it up. So the idea of, do we lump sum, bid it on the contracts themselves? It seemed like that might be a little challenging to bid so the idea of eventually that going out to the contractors as part of a change order for those that were active. Give us a bid on a system with the plans that you just sobbed and give us a per deployment cost, a per night deployment, thinking that it would be something that would be easier to bid. We were wrong. Hard to believe. I have been told more often than not but the idea was a good one. But we kind of missed the boat on it. It created uncertainty for the contractors trying to respond to the change order bid and depending on how many lane closures they thought they would get versus how many they thought that TxDOT would request to have them do. The uncertainty was -- basically the bid came in all over the place and was hard for TxDOT to say which ones were reasonable or

not so we subsequently modified that or TxDOT did to a mobilization plus deployment. Procurement approach. Initially the thought was that the contractors would bid equipment as the mobilization and then maybe the per night deployment would include the labor and any maintenance and that kind of thing. In actuality, the maintenance, replacement, types of communication costs and all of those types of things were actually bid as part of the mobilization and it was just of the labor for putting the systems out and picking them up that were bid on the deployment approach. Interesting thing from that approach, we did have several contractors who had bid that initial way that did not work really well and then came back and bid on this approach. So we were able to directly compare what went into the approach -- and when you did lifecycle cost of the system over the expected number of nights that they would be using them on the projects under both models, this approach came in significantly lower, 20% lower average bid prices for the life cycle. So obviously it was a good decision to go to this approach. It works very well. I do need to mention, also, it included in the bid, specifications for this approach. It was that we are going to have change orders for the mobilization of getting equipment into each of these selected contracts. Change orders. But we expect the contractors to play nice and share the systems if the contractor is going to have multiple enclosures. Under their mobilization cost, give them enough equipment to cover all of them. That project or a contractor next to them would be able to loan them their system for whatever reason. For that night and that kind of thing. In actuality, most of the contractors used the same control subcontractor which subsequently was not an issue and it actually works very well and very smoothly for that approach. A little bit about usage. Just to wrap this up. Here is what ended of being used over about a two year period through last December. About 319 nights -- 300 deployments of those two types of plans, levels of cubic -- queues system deployments that you can see. Concern over if there was enough equipment procured went a little bit conservative and had a little more equipment that needed to be procured when you look at how many nights of multiple deployments have actually occurred in the court or. Most of the times, there has only been one of the contractors that on a given night needed a Lane closure. I think it highlights the issue that we sought really on that putting a lot of equivalent out there and deleting it constantly is going to be a lot of equipment that in any one location does not get a lot of utilization. I think you see this. Most of the nights -- one small location under that 96 mile corridor had a Lane closure. Us -- several nights with a couple of contractors doing things at the most we have ever seen today through 2015 what the night where we had four contractors deployed -- deploying systems on the same time. A little bit about what cost came in for this procurement approach. The system that included the equipment itself, communication cost, insurance, repair, maintenance kinds of things, averaged a little over \$200,000 for the system, the eight sensors and two portable changing message signs. The per night deployment came in a very inexpensively in this approach. As you can see, over that 319 nights of deployment so far, the cost for the system, again, across 96 miles -- multiple projects in the corridor and a little bit under \$2 million. All right. A third one -- Welcome -- you are welcome to contact myself and if I do not have the answer, I can put you in touch with the folks that do about this for German approach. The last one before I turn it over to Matt is talking about what they are doing in Illinois. The Iowa DOT approach that John Jackals with the consulting firm in Minneapolis as well as Tim Simmons with Iowa a DOT presented on aspects of this but they have gone from the indirect project-based procurement approach that both Texas and the Massachusetts models have talked with you about to one of the direct procurement approaches that I think is working very well for them. A little bit about Iowa. They have got very specified goals for dealing with work zone mobility and

safety issues. They want to be able, with the work zone equipment, and they refer to it as their intelligent work zone systems, but monitoring is a big issue. There are some very rural areas of the state that do not have good coverage -- they do not have good coverage and being able to see what is going on sometimes is very important as it is to keep drivers informed as they traverse the state or move around in urban areas of the state. I think most agencies deal with issues with respect to worrying about queues if they form and being able to warn drivers about that as well as mitigate those when they occur. In trucks entering -- workspace -- travel spaces from the workspaces. That kind of thing. They have got a number of slated goals to try to address and they also have a big goal, which is to do this on an integrated -- at a statewide level so that they have a one-stop -- knowing what is going on across the state approach. They do have -- the reason for that is that they do have a statewide TMC north of Des Moines. They run pretty extensive transportation management system operation out of that. Quite a number of permanent devices, mostly in the urban areas, but some distributed at various world parts of the state. More importantly, they have got the software itself that has been developed to help them deal with a number of traffic -- transportation management issues. They desire to be able to just -- have an intelligent work zone system. Bring it in and have it integrated so that they have got people available to watch it. They focus on it and that it all works seamlessly together so that is what their goal and what they want to do. It is to make sure that it all works through the center. So they have taken an interesting approach and have, the last couple -- certainly last year and I think they are doing the same this year, a statewide direct procurement approach with a work zone ITS vendor. They have gone and issued an RFP for vendors to provide equipment that is compatible with their central TMC, that can communicate with it, and that the summit -- the center can communicate with it, and it is a pay per performance type of a contract. So give me a price per device per day, month, week, that kind of thing. Then they go through the process of specifying, we need this equipment out on this job for these months, and they pay for that on that month. Like I said, it is that basis as opposed to allocating the entire cost of the equipment to a given project. It is distributed by the vendor, subcontractor who is providing that service to them. On the project across the state. I think some of this is -- I might have jumped the gun a little bit but they have got a nice business process set up where they get -- SRF provides information and gets the contracts and manages the projects for them. They have got a vendor that provides the devices themselves. -- The software vendor at the TMC is making sure that there is integration and communication possible and the algorithms such as acute detection is operated through their TMC software itself. They have had quite a bit of success. My understanding from talking with those guys is that they have actually got the funding by picking small amounts of funding from the various did -- districts for the construction and putting it into the central contract with a little bit of hesitancy. The district engineers, initially, about this -- it did seem like they saw it as an initial loss of some funds but after the first year of going through this and finding how easy it was for them to get these systems on their jobs and then seeing that they were put on the right jobs and that they were highly successful in mitigating and managing the impacts on those jobs, much more agreeable to this approach and continuing that in future years. Again, very successful but a different approach to the procurement approach. There is John and Tim's contact information if you want to get with them specifically about the Iowa DOT model and with that, I think I turn it over to Nicole.

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Thank you, Jerry. Yes. We are now going to pause for a quick polling question. To take advantage of time to do question and answer. If you have a question, please feel free to type it

into the chat pod and we will answer them now. In addition our polling question, which type of procurement does your agency most commonly utilized? Please choose all that apply. While people are answering that, Charles Martin had a comment. I find that the most complicated issue to determining how to fund adding smarter work zones often -- often it is not one project to driving the need, but rather several. One may have federal aid and the others may not. I am assuming this is some of the projects they have funding to add ITS. Todd or Jerry or even Matt, would you like to provide comments to Charles statement?

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I guess one thing that we can say in regards to the finding is that several states have taken advantage of grants which are Ed -- and that is an acronym for accelerated -- accelerated innovation deployment. I think I got that right but that provides -- a fairly large grant. I think it is up to \$1 million to fund the implementation of a new or innovative technology for a single project or for other projects. I think, in that case, it would be not necessarily have to be a federal aid project, but the implementation of the ITS would be a measure of federal funding that could be leveraged to deploy in this kind of an innovation in a project. Beyond that, I'm not sure if that is -- there are other options for finding these things but Jerry, or Matt, I don't know if you have any other thoughts in this area.

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This is Jerry. I agree. I think that is something that we have heard for a number of years, and I think it is important why we are -- the EDC 3 program is emphasizing smarter work zones. The issues about funding and how you find it is usually -- it is the most challenging. If you go back to the implementation guide, the approach, and in general, the TMP development approach, waiting until the last minute to think about work zone safety mobility impacts after contract funds have been allocated -- programmed and allocated and those kinds of things, really does tie your hands. The traffic people that are left with -- make the best you can do but you cannot have any money. The first thing is to truly get consideration of this done and thought about and figure out how to put on it, potential funding need, earlier in the project scoping process. Other states have gone through and established business processes to do just that. You look at certain characteristics of projects. You have a checklist of this might need a work zone ITS, and, if it does, then that triggers, we might need to allocate a little bit more to the project for that. The other thing is with some of the direct leasing the project -- the Iowa DOT except when I think Matt is going to talk about similar things that they are doing in Illinois. Another way where you do not have to basically pay for or get the benefits of a system entirely within the project that may need it but it does not last long enough to justify paying for all of the equipment and a system on a given project. And having it on call, you prioritize the equipment across multiple projects because the vendors get the money on a per day, per month, that kind of basis. Those are similar things that are moving forward and it is still not easy, but suggestions of ways to make it less painful and a little more successful in that regard.

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This is Matt. I kind of understand where you are coming from. We have had similar problems in Illinois where there are multiple jobs going on and only one contract has the smart work zone ITS in it. We have not had issue with the funding sources so that is not something that we have had to approach. To emphasize what Jerry was saying, it is important to identify the cost and the need for the smart work zones early on in the planning and development process. That is the best way to get them out there and needed and included in the contract plans when you need them.

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Thank you, gentlemen. We have one other question. Tracy -- are there examples of HSIP funds being used for work zone ITS deployments?

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Tracy, I am not completely sure -- there are a couple of states that I think are using it. I do not want to speak the actual use of the HSIP funds because I'm not completely sure that that is what they are doing. I think you talk might be using -- Utah might be using the HSIP for their various speed limit implementation but don't quote me on that. In response to Mr. Martin's question, that certainly another avenue where -- a funding source to fund something like smarter work zones for a project.

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This is Matt again. I know that IDOT has explored trying to use HSIP funds to deploy the projects but I'm not sure what the final answer on that was.

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Thank you, gentlemen. We are going to go ahead and move back to the presentation. And Matt, if you would like to go ahead and take over.

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Yes. I am Matthew Daeda here with IDOT. I have been asked to talk about procurement experience in Illinois and talk about about the on call smart work zone contracts we have right now. For procurement, we generally follow the trend and implementation guide process that Todd was talking about. IDOT has use the direct procurement on a very limited basis, purchasing some IT devices and using them on the work zones to kind of monitor what is going on out there. When we are looking to get really robust work zone ITS systems out there, we tend to go with indirect method more often. The way that we try to do this for the most part is to get the ITS requirements and the documents for the contract. We try to identify these as early in the plan development stage as possible. If an impact is identified, the first thing we try to do is eliminate or reduce it. We look at revise construction, agent, Lane closure, temporary payments, and basically throw everything against the wall and see if there's a way to keep the lanes open and still complete the improvement safely. If unavoidable, we develop a contract specific requirements for a work zone ITS through mitigation strategy. We typically use the performance-based the specification. Our standard document is to provide real-time traffic monitoring, queue detection and morning within half-mile accuracy and then leave it to the vendors and the contractors to present a system that will meet the specifications. When developing this, but -- to determine how far it is, we use traffic modeling, queue prediction programs but we lean on experience or technical staff in our field to predict what that expected queue is going to be an design a system around those parameters. Primarily we use these for queue warning style systems in Illinois but we have use them to display travel time delay information and recommend predetermined alternate route. The other common way that we have got me systems are there is a contract change order. The project is causing a delay that we were not anticipating and true engineering and just changing the job, we cannot get that traffic impact eliminated or otherwise mitigated these situations, we issue a change order to the existing contract at the work zone ITS system and the same as when we included in the transit documents, we develop project specific requirements and transmit them over to the contractor. We try and get that warning system in place. We do require our contractors to get multiple bid from multiple vendors and suppliers and supply the back to IDOT and we look at it and evaluate it and select which one to use. Typically we will go with the lowest cost system but it needs to meet the requirements that we want out there. The last way that we get smart work zones out on the street is through our on-call work

zone -- smart work zone contracts. In 2015 we learned three standalone contracts. They were established to allow IDOT basically to deploy the work zone ITS system to address activities that are expected to cause a delay or are causing traffic impacts at the time. Very generic contracts that include general guidance on a number of devices, expected performance and that includes payment details and typical deployment plans. How do these projects come about? In 2014, IDOT decided we need to quickly deploy these systems to address traffic impacts out on the street. These are targeted for low-cost contracts that have high traffic impacts. Just would not be cost-effective for either IDOT to procure the equipment or to include the ITS provisions in their separate contract. IDOT up your of safety and engineering funded three separate contracts. They were developed to provide systems the District 1 which is the Chicago Metropolitan area, District 8, the St. Louis area and East St. Louis and the district 9 in far southern Illinois. The contracts were in 2013, three year duration contracts but they are set up to be work order style contract that can supplement the traffic control and pretty much we can call a contractor and say we need you out there, when can you be there? Get the system in place and operating. The three contracts are 62835 in District 1, 76867 in District 8 and 78450 in District 9. Again, the intent of these contracts is to deploy on a short duration activities. We figure about two weeks or less. Where we are closing, and causing significant cueing or significant queuing has been experienced in the past. The on-call contract, again, in District 1 is mostly used to support internal operations. Maintenance, jobs, bridge inspections and things like that although we have used it on a contract work side to support the Bureau of construction when we need it. An example for a typical deployment for us, our brute -- bridge crew conducts annual inspections that require lanes to be close. Typically we can complete this inspections during daylight hours. We can complete this inspections off-peak hours around the weekends but we do have a couple of bridges out there that it takes up to one week to complete the inspection. At this location, it is just -- they have been doing this in the past every year. Traffic has been getting worse every year. We have been doing more and more mitigation strategies, restricting the work hours down to a point where our bridge crews are coming back to us saying that they cannot complete the project efficiently anymore. So at that point, we brought out the smart work zone and we're supplementing it to get that done. How these contracts are broken up. They are kind of similar but each one is a little bit different to suit the district need for District 1 and District 8, each deployment consists of callout and that accounts for the initial installation, mobilization of the system and the removal of it. And it includes the setup of the logic and control software. We have said -- separate pay items for the signs and the smart traffic monitoring system. Each portable changeable message sign is pay for separately for the smart traffic monitoring system includes four traffic center -- sensors and control software. Typical detail was provided in the transit documents that shows a contractor what a typical deployment would be. The district 9 contract is a little bit different. Their typical deployment consists of one changeable message sign and four sensors. For our basis of payment, our callouts are basically set up on each basis so one lump sum payment pays for that installation, setup, and removal of the system. The smart traffic monitoring system and changeable message sign up in District 1 are paid for on a calendar day basis of that allows the flexibility if we write the work order, we anticipate the project to last one week but if it stretches into the second week or if it gets done early, it allows us the flexibility to extend or reduce the length of that work order to be more efficient. The district 9 contract was set up to allow for a longer deployment so they have pay items that allow for the changeable message sign and the monitoring system to be out there by the calendar day of the week or monthly as needed. The advantages of this is it allows us to deploy the system only

when needed. We do not have to bear the cost of having the system internally. We work directly with the vendors and it sounds more like the direct procurement method but we do this on the transit system and I think it is more indirect. Communication is faster and seamless and the vendors provide training with their systems. Staff is granted the system to monitor the traffic conditions and change the messaging if needed directly. It has given us a lot better results and at the thing I like about it the most is the traffic monitoring. We can pull up the system in the office and see what is going on in the field and work with the resident engineers and make adjustments as needed. Here's an example of one of our work orders. This is for one of the bridge inspection projects that I mentioned earlier. We deployed at the on-call smart work zone contract for the 2016 inspection. We utilize state police controls out there to help monitor traffic and enforce the work zone speed limit. The inspection was plan for four consecutive days. The inspectors are permitted to close the way from nine at -- 9 AM until 2 PM to complete the work. The feedback from police and inspectors was positive. State police above the systems. They think that they are the best thing aside from having more troopers out there to enforce the speed limit. This is good and helping slow people down and let them know what the traffic conditions are. On the work order, you can see the different pay items, changeable message sign, 16, four signs out there for four days, four days for the smart traffic monitoring system and the one in each column was to get the system in place. To get the control software set up and then remove it when we were done. What you are missing is that it data that was needed -- this is planned work that we had to schedule an advance and you can see the date of issuance March 7 it was to be in place by May 2 so quite a few -- quite a bit of time to get the system lined up and out there. Here you can see what the typical callout is. This is included right in the bid documents. You have got the four changeable message signs. They are set up the message. Traffic conditions, 5 miles to 6 miles in advance of the work zone and then you've got that traffic monitoring system set up to miles to 3 miles to monitor the traffic conditions. This shows us alternating sides of the roadway for the changeable message signs, something we like to do because of the truck traffic that we have out there, figuring that we can catch the cars in the left lane in case the message sign is being blocked by a large tract. This is not mandatory. We do put them all on the right side sometimes because of limited space. So massive that we learned so far on these contracts but one of the problems that we have had is that the vendors programs do not always work on the IDOT computers. From what I'm told, there is conflict between the software communicating with the vendor servers and network security. We have been trying to resolve this problem but it continues to be an issue for us. Fortunately our vendor this year has a website based software. It does not have all of the functionality of the main program but it allows us to get the screen capture shots of the traffic conditions. To see what the speeds are off of the speed sensors, traffic counts and change the messages when needed for -- a response or anything else is going on. One thing that we would like to add to the contract for next time this comes around is it would require the vendor to install and test software on IDOT computers within one month so we know that the program is going to work well before the system is needed on the site. Another thing we would like to do is provide greater flexibility by adding a pay items for individual sensors if needed, similar to what the district 9 contract does. Right now the smart work zone pay item and provisions allow for sensors in the control system. We have had situations out there where the queue buildup to such an extent that four sensors cannot accurately monitor the traffic conditions and provide a queue accuracy within 1/2 mile. I would like to see pay item for supplemental devices out there. We are looking forward to specify a required timeline for each work order. For the example that work order, issued months before the scheduled work was due to be out there.

That is not always possible in case you have an emergency repair. It could take up to a week so a failure or something along those lines. We would like something that says the contractor can be notified, has to respond within one week. If we say that you did the system out there commented one week, one day, some timeline what it would be a realistic time to be expected to have the system in place and operating. Just an example of this, we notified the contractor two months ahead of time that the system needed to be operational and he headed operating in about three hours before the lane closure went up we were sweating, thinking about not letting them start that they pulled through for us. We need to provide clarification on pavement -- payment methods for more than one week but less than one month. This one would apply to the district 9 contract. The intent would be not to pay for one month plus X weeks and X days but instead of one month plus a portion of the second month. Looking at maybe providing better examples on the various durations of deployments of how they be paid for. Specific concern that was brought up by the contractor in that district was the cellular plans for the devices. Typical cellular plan is a monthly based plan so how does that payment work out on one week deployment? Five-week deployment? If he has already got the cellular plan for the full month or the full two months. We would like to see a clause added for cooperation between contractors from when the system is deployed in support of our construction. Activities. For example, traffic sensors, changeable message signs located within the work zone could be a conflict of where the contractors working for these guys have got to coordinate for access to the site and use of the equipment and make sure that the equipment is at a location where it can monitor traffic and not be obstructed by construction activities and things like that. Another concern would be resistance between the prime contractor, objecting to have an on call ITS deployed within his contract limits. Another thing we would like to see added a specific quantity of closed-circuit TV cameras. We have cameras on the contract specific work zone ITS but not included as part of the on call contracts. These are very useful. You get a lot of information off of the sensors and the speeds. Traffic counts and things like that but sometimes a picture is worth 1000 words and if you can actually load up a closed-circuit television camera, and see what the traffic operations are, it would be immensely beneficial on these types of contracts. We do have our own surveillance cameras on site. At some of these locations. This would not be something that I would include it may be a typical deployment but maybe have a stars optional on 1, 2, closed-circuit television cameras as determined by the engineer per deployment. Lastly, I think we need to address how the system adjustments are handled. The message board needs to be moved or sensory located because it is not at an optimal place where we want to adjust how things are working. How is the contractor compensated? Is that incidental to the deployment? Can he be expected to adjust the equipment two or three times before payment? Would he be paid for every time he is out there adjusting it? IDOT so far it's very happy with his on-call systems, the three districts that have it, feedback from of the public, feedback from state police, the contractors and the internal IDOT RE/MAX working out there love the system and they think it is really communicating to what the motorists are doing and they are slowing down. We are seeing a reduction in precious out there and IDOT is looking to did -- to deploy this. District 3 which is kind of the North Central District did have a contract earlier this spring in April, and 2 and 5 are looking to add contracts. And district format, 6 and 7 are looking to get contracts as well. This is something that we are going to continue doing in Illinois for the foreseeable future but we really do like these contracts. If you have got any questions, there is my information and also there is Paul Lorton, working with the Bureau of safety programs Unit Chief. He with a lot of help with us getting these contracts together, getting them funded and out on the street for us to use. That is all I have. The call? Nicole?

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Thank you, Matt. We're going to start off the second question and answer session. Before I get into the questions in the chat pod, we would like to post the audience in general, if you have used HSIP funds for ITS in work zones, we would like to hear from you. If you could take a moment to type into the chat pod some details about you have used the funds or feel free to press star 1 on your telephone keypad to comment over the telephone. We would appreciate the information. I can, please comment if you have used HSIP funds for ITS and work zones. We have one other question in the chat pod. This is for you, Matt. In the work order that you share, the callout was for \$20,000. Any idea why it was so high?

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That is -- the price our contractor got for us. You have got to figure they have got to have this equipment around. It is kind of labor-intensive to get it out there. They have to go out, have got to deploy the four changeable message signs and the four sensors. It is not as labor intensive as pavement workers but for contracts, four guys to get the equivalent out there. If you look further down in the work order, you can see how the monthly, the daily rental rates are lower in my mind. Again, that would be a question for a contractor I am afraid.

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Thank you, Matt. This time we do not have any other questions in the chat and I want to give people a moment to type it in. If you would like to ask a question over the telephone, press star 1 on your telephone keypad to be placed in the queue to have your telephone line unmuted and we will pause for one minute. Then we can move on to the closing remarks from Todd.

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Nicole, this is Matthew Daeda again and Paul Lorton is actually listening in on the webinar and he sent me an email. He says are on call contracts are being funded with HSIP funds and that they have utilized HSIP to get ITS out on a few selected construction contracts. Most recently they used it to get ITS out on the 74 project in our District 5.

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Thank you, Matt.

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[ Pause ]

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Okay. There are not any more questions coming in right now so I am going to go ahead and turn it over to Todd to wrap about please if you have a question, while he is wrapping up, press star 1 on your telephone keypad or go ahead and type it into the chat pod and we can address it after the closing remarks.

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Thank you. Just to wrap up, I want to cover some of the resources that federal highway has produced and can bring to bear for your uses on implementing smarter work zones and technology applications specifically on your projects. We mentioned this earlier. The smarter work zone interactive toolkit is available through the national work zone safety information clearinghouse at the link at the top of the page. This website includes not just archives of all of the webinars that we have produced to date on the smarter work zone webinar series. It also -- it is a clearinghouse for the documents including the implementation guide, and other related documents pertaining to technology applications and project coordination that are available for use by agencies. There is some guidance in there, some good case studies, some good materials that if you have not seen it already, it is a good place to check out and it is sort of the one-stop

shop for all of the information related to the smarter work zones initiative. Some other resources, again, most of the stuff should be on the clearinghouse but if not, if you are more familiar with the federal highway works and management webpage, these resources are available. The ITS technology page, we have a page dedicated to that on error team webpage. At the link shown here. Our peer to peer program also is something that we are increasingly leveraging to provide some technology transfer between states that are looking to implement technology applications in particular that are looking to draw on the experience of other states. I believe that we will be looking to set up some site visits with Utah to look at their variable speed limit systems. I think that we are close to getting that arranged. Something to look forward to. We have the guide, ITS implementation guide is available at the link shown here. There is a companion document to that with case studies documenting . There are other examples of states that have used the ITS in accordance with the guidance, the steps and the implementation guide on their projects. Just a general overview of the guidance in general. It is at the link at the bottom of the page and that kind of covers all six steps. With that, we have also mentioned the upcoming webinar number 14 which will address leveraging TMC resources for work zone management on June 16. So keep an eye out for registration on that. And then, we will leave you with a link of the clearinghouse which, again, it has all of the information that we should before and if there are any comments, you want to contact us directly and if you reach out at the email below, you can direct your comments or questions to the appropriate team member and we will get you taken care of. I think that wraps it up for me. I don't see any additional questions coming in. I do not see any other examples of states using the HSIP funds pertaining to Tracy's earlier question. If anybody wants to share information on that, again, feel free to share your experiences. Any one of us on the team.

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Thank you. Thank you to the rest of our presenters and for everyone attending today, please enjoy the rest of your day.

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This concludes today's conference call. You may now disconnect.