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CULTURAL RESOURCES COMMISSION
SPECIAL MEETING
JANUARY 4, 2005

A quorum of the Cultural Resources Commission (Commission) was not present; therefore, the meeting was opened by Chair Lori Sablas as a public presentation, Tuesday, January 4, 2005, at 6:05 p.m., Planning Conference Room, Kalana Pakui Building, 1st Floor, 250 South High Street, Wailuku, Maui, Hawai`i.

A quorum of the Commission was established at 6:30 p.m. (See Record of Attendance.)

Ms. Lori Sablas: Aloha ahiahi. Thank you, everyone, for coming to this gathering tonight, and for everyone who's here, we say thank you. I'm going to have Dawn Duensing introduce our special guest speaker.

Ms. Dawn Duensing: Good evening, everybody. Aloha. We have with us tonight, we're very lucky to have with us Mr. Frank Nelson who is the Preservation Managing Engineer for the Bridge Rehabilitation Program for the Oregon Department of Transportation. I have been very fortunate to know Mr. Nelson for five years now. I've been going to Historic America Road Conferences where I met him and have been able to see the wonderful work that the State of Oregon is doing to preserve their historic coast bridges and other historic bridges. And, at the last presentation, he showed how they were preserving arch bridges and how they were fixing walls, two problems we have here on Maui, and I thought we have Certified Local Government funding, thanks to the National Park Service, for the County of Maui this year and this program is a part of that Federal funding, so we are very grateful of the Park Service for funding this program. And Mr. Nelson has 12 years experience with the Oregon Department of Transportation and, prior to that, he was working with the United States Navy. So, with that, I would like to hand over the presentation to him and let him share what they are doing in Oregon.

B. PRESENTATION AND DISCUSSION WITH MR. FRAMK NELSON, OREGON DEPARTMENT OF TRANSPORTATION, RELATING TO THE PRESERVATION OF HISTORIC BRIDGES. Mr. Nelson will present an overview of Oregon's bridge rehabilitation program, comments on his site visits to Hana Belt Road bridges, and recommendations regarding preservation of Hana's historic concrete arch bridges.

Mr. Frank Nelson: Thank you very much, Dawn. Again, thank you very much for coming. It's a pleasure to be here. It's always a pleasure to be able to share work that you've been doing with folks that perhaps could take advantage of it as well. So what we're looking at

is some of the things that we've been doing that will parallel what the Hana Road District perhaps could use, and so I had the pleasure of, Monday, getting a guided tour, taking Dawn underneath the bridges with some test instruments, including a steel rock pick to test the concrete, and so we'll talk about what we found there as well as some of the things that are going on, so I think you'll find this interesting and, hopefully, valuable.

Things that Oregon and Maui have in common: rugged coastlines; strong preservation communities; spectacular bridges, and corrosion problems, plus we often find that there are standards that conflict with our desires to preserve historic assets.

This is Central Oregon Coast. It carries U.S. 101. It's a two-lane highway from the State of Washington down to California, and this also has a little stretch of road which was the old highway, and you can see, center right, an arch bridge, one that we just restored. This bridge is little bit larger than the ones on the Hana Road, but it is 22 feet wide, so it's kind of on the order of the widths that we're talking about. Your coastline is also, obviously, very rugged.

We've got 13 very large significant bridges that were designed by noted Bridge Engineer, Conde B. McCullough, the State Bridge Engineer from 1919 to 1936; 11 of them remain. We have preserved 6, we have one in progress, and we have funds approved for 2 more. With McCullough's bridges, we'll send the photographs, those of us in bridge, we often say that the devil is in the detail, there's rich ornamental art deco detailing that requires significant effort in order to bring it back to as original condition. Also, the thin cover of concrete makes it a little bit difficult in order to preserve the bridges.

This is the largest of the existing McCullough bridges, the Coos Bay Bridge, it's 3,559 feet long. We have an approved project to do one-half of the concrete arch bridges on it, that's about a 24 million dollar project; we'll do that in 2007. I just painted the steel batwing truss band in the center; that was about 8 million dollars just as a paint job. So we're putting serious money into these bridges. This is some of the detailing going underneath where usually only us bridge trolls go but there are number of people that enjoy seeing the uncommon views, it's very much like a cathedral. McCullough has very intricate work at the ends of his bridges in order to accommodate pedestrians and we want to preserve these. These are very uncommon within our state.

Another one of the bridges that we are working on. Right now, I have contract out for bid to replace the deck of the Siuslaw River Florence Bridge. The center span is a movable bridge, it's bascule span, and we're replacing steel grid with something that's more like the original; we're using plastic in place of wood; it has tied arches; spectacular detailing on the four, basically, obelisk operator buildings, only one of them operates the bridge. Reeds Port Bridge is a center swing span and it has concrete tied arches that flank it.

Your bridges, the ones that interest me: you've got two masonry arch bridges; three solid spandrel, which some of us call barrel arch bridges; two open spandrel or ribbed arch bridges, which are very similar to some of what we're seeing here in Oregon; plus 52 additional bridges. Your bridge rails are solid or square baluster. They just fit. One thing that really impressed me is there is no extra room. Also, it's very rural. Just going from Wailuku out to Hana, just for me as, and I can't call myself an outsider, I have lived in Hawaii twice, this is my third trip to Maui, it's the first on business, but it's very different from Wailuku to Hana. The mountainside and the ocean are significant factors.

My favorite bridge, Waikani, and that's partly because the detailing is very reminiscent of the McCullough bridges that I work on. Something that I don't have to deal with that you all do are things like right turns at the -- right at the ends of the bridges and some serious problems with rails. Underneath Waikani, very unusual design. Again, this struck me as being very similar to looking at the underside of McCullough's bridges; a lot of effort in coming up with a very pleasing geometric plan as opposed to just standard vertical columns with plane rectangular horizontal beams. This is unusual workmanship.

Koukouai, very interesting little bridge. Very strong. The steep rocks. The right choice of structure was an arch, but the roadway had to be way high. A large number of vertical columns to support it. Very unusual design for an arch bridge, and to have been designed and constructed by Maui folks at a time when most of us on the Mainland wouldn't have known Hawaii existed, is spectacular. One thing that did strike me was the rails on this. I think that's only about half of the rail that we're looking at; the other half is buried in the asphalt road.

Oheo is another spectacular bridge. It's in excellent condition. It very well matches the site. It has a very nicely detailed open rail that's reminiscent of some of what we see. And I'll talk to this a little longer but the way the bridge rails flare out and are protected by lava rock walls along the side is one of the best transitions from guardrail to bridge rail that I have ever seen.

Some of the work we finished. The first bridge was the Cape Creek Bridge, a fairly large structure. We completed this in 1992. The cathodic protection work actually started in 1990 and so it has been protected pretty much since 1990. We have done no maintenance on the bridge whatsoever in that approximately 14 years. There is no roadway exactly at the end of the bridge on the right side of the picture; it goes right straight into a tunnel.

Yaquina Bay, this beautiful bridge has three steel spans, seven concrete arch spans; this was the second bridge that we did. The concrete work, I'm in the middle of painting the steel span and you can a little bit of the work platform in the upper part of the arch. This has become one of the three symbols of tourism in the State of Oregon. This community of Newport here just really loves their bridge and that's a defining element for the city of

Newport and their bay. Art deco detailing on it; takes a fair amount of effort to, when we did the repairs, to make sure that it was correct or we could do that; it's not difficult.

Depoe Bay, third bridge, actually it's two bridges underneath. On the left of the picture, you can see a narrow pair of arch ribs and, on the right side, there's a wider pair of arch ribs; the first was done in 1927 and the second in 1939, it's the only McCullough bridge that has been widen to four lanes. Again, when this first bridge was built, there was nothing here, and now there's a fairly sizable town there and, again, they define themselves as the bridge.

Next bridge, Big Creek, a smaller bridge. This is a little bit closer in size to yours. It's a 120-foot through arch. We did protection on the bottom side. We changed the cross bracing in order to get it out of the way of trucks which kept hitting the cross bracing, so we changed the x-bracing to what we call a lazy-k, you can see the horizontal bars going across, but we detailed it in exactly the same manner that the original design was done so that most people cannot tell that we altered the bridge.

Cummins Creek, this one was designed, we think, by Federal Lands, Bureau of Public Roads perhaps, and it has McCullough's signature on it but it doesn't look like his bridges. Again, it's a 150-foot bridge, so it's somewhere on the order of magnitude of the Hana bridges, so something I thought you might like to see.

This one is the one that we just finished, the Rocky Creek Bridge, it's named after Ben Jones, the father of our coast highway, very much like A.P. Low, the county engineer, could be called the father of the Hana Road. This bridge we're very proud of. It looks like brand new 1927 to the point that Porche Motor Company of America selected this bridge to use in their boxter roadster advertising. They liked the fact that it had excellence in engineering and beauty in design, so we were very pleased. It's a narrow bridge. It's 22 feet wide, so this is starting to get down to Hana Road standards. Rails on this are totally new. I'll talk a little bit later about why they're significant.

Current bridge we're working on is 1900 feet long, the Rogue River Bridge, named after Governor Patterson who was a strong supporter of the Coast Highway and of this bridge in particular, built in 1931. This is what one of the center sections look like that we have finished. It shows some of the electrical connections for the protection system that we use. What you're looking at is not concrete. It's a reinforced concrete bridge but you cannot see a single piece of concrete in the photograph. Everything you see that is that gray color is actually zinc metal. We have completely covered the concrete with zinc metal to protect it.

How did we get started? Well, we had a hard start and this is something that perhaps you can associate with. We lost one of our big bridges and it was very, very bloody. No one

was happy with the results and so, as a result, we were told just don't do this again. The new bridge is a beautiful bridge, it won awards, but as you look at this, it doesn't have the same look and feel of the other bridges on the coast. So we lost something in the process. We created a team with specialists in order to make sure that we could do the kind of protection system that we needed. Corrosion damage of the reinforcing steel because of the coast was a primary driving factor for the problems with our bridges and so we made sure we had material specialists, corrosion specialists, as well as the structural engineers in order to do it, and we tasked ourselves to inspect and evaluate the condition of the bridges, prioritize stuff, and to keep looking for new things that we could use. We looked through petro chemical, through military, NASA, other states, Federal Highway Administration for things that we could use in terms of new materials and new techniques. One of the things that we found was that originally, with reinforced concrete, people expected that the concrete would protect the steel, and it does to an extent, but when you have saltwater particularly in the vicinity, the saltwater infiltrates and it causes corrosion to accelerate and what happens is that the steel, when it rust, if you've ever looked at rust on fences or your vehicles, the rust that's produced from the corrosion, oxidation of iron, is six to eight times the volume of the original steel and so if it's outside, that's not a problem, you just see additional build up of material, but if it's inside concrete, it acts just like a hydraulic jack and pushes the concrete off, so you have cracking and breaking off of concrete. Saltwater and concrete just flat don't mix.

Now corrosion damage, looking at our bridges versus yours, this is what the Rocky Creek Ben Jones Bridge looked like before we got started. It doesn't look all that bad from a distance. Koukouai, sure looks good from the outside. Rocky Creek underneath, however, let me point your attention here, this particular beam, the reinforcing steel which has been exposed and severely corroded, some of the bars just stop right here, they've completely rusted through. So that means that we were not able to carry as much traffic on this as we would like to. The deck was in such bad shape. You can literally see in many places all of the reinforcing steel. We determined that we could not save the deck although we could save columns, arches, cross beams, everything else but that. This is what a typical beam look like and this is not that difficult to repair. It looks pretty ugly, but you can remove the concrete, clean up the steel, and if necessary, provide some additional steel, replace the concrete, and make it work just like original.

This is what Koukouai looks underneath. Much, much better. I wish my bridges looked like Koukouai. There are some problems with the deck, but they're very minor, they're very localized. Again if you look at the big concrete members that are going crosswise, those are the primary elements that are taking the weight of vehicles and passing them to the columns; no damage whatsoever. We took the hammer underneath there to pound on many of the places where we did find corrosion to see if the concrete was breaking off easily, and it did not. Good solid concrete. We did find a couple places where there is some flexing of the columns. Three out of that whole forest of columns very, very minor

damage. We found that sway bracing, the horizontal members here, these are not carrying load, but they're meant to keep the crossbeams from wiggling, and we saw that there is corrosion damage, some significant corrosion damage on them that would have to be repaired. The bars that are at the bottom corners and the bars at the top corners, you can see the bottom bars here, but when you go climb under the bridge, you can see horizontal cracking where the top bars are at so you know that in time, they will look like these if you do not do something. You can see some of the bars on the arch rib, particularly down towards the bottom, all of the problems on the arch rib are on one single rib which is the makai end and so that's where probably most of the salt that would be coming up from the valley and ocean below would be deposited upon the bridge, so it was the first arch rib and sway bracing that connected to the second rib are where the majority of damage is; this is all very, very minor in comparison to the bridges that we normally work on and is easily repairable.

Waikani looks almost like brand new. Some minor patching. The State has invested time and money in repairing this bridge. Again, these were very inexpensive patches and they've been in place, according to the district engineer, at least ten years.

Down at our Rogue River Bridge, the big one, this is what our rail looked like. There are pieces of the rail you could just walk up to it and just take off. There are portions of it that you could literally kick out, not something that you would like with over a 30-foot drop to the water below.

This is what Waikani Bridge rail looks like. Interesting thing, corrosion damage is not a problem. These bars, although they're exposed, are just about as good as new. Very, very little corrosion. It appears it's impact damage, which has just shattered the concrete and knocked it off, but those bars are much larger than we have in any of our bridge rails other than two new bridges, and so they basically stop the vehicle. Something to keep in mind as you consider working on your bridges is that with some additional steel in your bridge rails, you prevent vehicles from going through the rail although you may still have to come back and do some repairs to the concrete.

On Rocky Creek, in order to do the level of work that we do, in Oregon, to meet our environmental requirements, we use a full enclosure so all of the contractors work in terms of removing the damaged concrete, of doing repairs to the steel, of placing the new concrete is all done within an enclosure so nothing escapes to the air and water.

In this picture, which is the underside, there are two what we call fascia walls or kind of like the fascia beams that you have on your house by the roof, one of these to the left you can see is a nice R shape; the one that we're looking at, you don't see an arch do you? The gentleman in the picture has been removing damaged concrete and much of the concrete was damaged and you can see pieces of reinforcing steel that are discontinuous, there's

also quite a few pieces I can tell you are just plain missing, they've corroded and are gone. What we have do is remove a lot of the work. And on the arches, with this picture, we had a little bit of damage on the base of the column; this is very similar to what we saw on Koukouai; very easy to repair. We hammered almost literally every inch of concrete to make sure that we know where the delaminations are at, we removed the bad concrete, we put in nice concrete saw cuts so that we have a half-inch vertical surface. If any of you have ever done work with concrete where you've tried to feather it up onto a surface, it has a tendency to break off, we don't want that to happen, we want it to be solid, so we have vertical surfaces. But this is all set to receive new concrete. Work that we did on the underside, remember the underside of the bars at Koukouai, no way near as -- well, approximately the same level of damage. But in order to put the new concrete back, particularly in places like where the fascia arch was missing, required our Oregon carpenters to kinda learn a new trade as to how to do the form work for this kind of detail work. As they put the form work in place, everything has to be made sure that it's correct in dimensions, then we use a pumped grout to replace the missing concrete, we do a brush blast in order just to make sure the surface is clean and ready, and then we use an arc sprayed zinc material over the top of it.

This is where I'll stop for just a second and explain a little bit of the technique that we use. We call it cathodic protection and cathodic protection is where in order to protect steel, you use a second metal, a sacrificial metal, usually magnesium, aluminum, or zinc, that is connected to the steel so that it will corrode in place of the steel. And we also go a little bit farther, we use a current, electric current, that operates in reverse to what the normal current would be in concrete with corrosion going on so that we actually force the zinc to corrode at an even faster rate; this gives additional protection. In order to have the electric current flow, there has to be two electrodes. We make the inside steel the cathode, the protected one, and we make the zinc on the outside the anode or the sacrificial one. So, as a result, we end up with the ability to prevent the reinforcing steel within the concrete from ever corroding by continually forcing the zinc to corrode. We place twenty thousandths of an inch thick layer of zinc on the outside of the bridge that will last about 30 years; then we'll have to go do it again. We apply it with a machine that's a cross between a very large arc welder that has two feeds of zinc wire, and a very large air compressor and sprayer that forces a jet of air that pushes the molten zinc out onto the concrete.

Because the bridge deck was in bad shape, we sliced it off, but we sliced it right at the top of these little cubicle concrete features that are called dentils. If any of you have seen very old Mainland furniture, like Ethan Allen, you'll see along the top where they'll have these little wood pieces that are called dentils. It was a very old technique and Conde B. McCollough liked it and so he had it on his bridges, we made sure that we didn't damage these, and any ones that were already broken, we cast new ones.

The rail, this is where we made a significant departure and I think that, as you guys look at things that you could do with Waikani, this one will be a great a value to you. In the -- originally, the bridge rail consisted of a concrete curb that was poured in place, then precast T's were set in it and so in this photograph you can see some vertical scoring that makes it looks like there are individual letter T's but they're somehow attached to the top and the bottom. Well this is a precast element, from the break over towards the left to the right-hand edge, this was all precast as one element and it has, instead of reinforcing steel in it, some very large metal. The top portion has an eight-inch across steel channel. There's another eight-inch steel channel down here, and there's about a three-inch wide flange member that goes up, it's welded to the top and welded to the bottom, and we bend the bars over to come up from the deck, and we will place a concrete curb across it. This is what it looks like after the concrete has all been placed and we've shot zinc over it. It looks like brand new 1927, it meets the Department of the Interior's Visual Standards, but it is actually a stronger rail than some of the crash tested rails that are used on newer bridges. We made sure that this bridge rail could not be penetrated. But on historic bridges, one thing that you should know is that the law does not require, Federal law, does not require using Federal funds, that you have crash tested rails if it's a historic bridge. There is great latitude, but you must be able to meet a certain impact loading, and this rail far more then exceeds that, and something very similar could be done in the case of say Waikani.

We put a scenic turnout. This is part of the National Scenic Byway and so we included the turnout and, in that process, we took the best piece of the original rail that we very carefully sliced off and placed in there. We also have interpretive panels to explain to the public the designer of these bridges, to explain Ben Jones, the father of the highway who argued loud and long to get the legislature in 1919 to approve a highway from Astoria at the north, down to, hopefully, the California border, and the process that we use to protect these structures.

This is the scenic turnout at Waikani Bridge. I don't know where you would put something appropriate and I'm sure that you probably would not want to put one that would accommodate buses any larger than these. But it was very instructive to me going through and looking at these bridges, while I was more interested at looking at the underside, people of Maui and visitors were very interested in seeing the bridge, the top side, as well as getting their pictures taken on the bridge, so they are very popular attractions as well as a means for the people of Hana to get to and from here.

Big bridge we're working on presently has some similar things. Again, 1900 feet. Big jetty that was built by the Corps. of Engineers to protect the marina at the left. The Pacific Ocean is right at the top of the slide. This is brackish water. Sea lions are up there all the time. We built work bridges virtually all across the river. You see an enclosure on the left where the contractor was starting at one end. We included in this process, at the request of the Mayor of Gold Beach, to relocate a waterline that was hanging, I mean, literally, hanging on the historic bridge rail is to replace it with a waterline tucked up underneath the

bridge, and so the contractor, in this picture, was putting that in. This took some very intricate work with our congressman, working to find some special one hundred percent Federal funds, in other words, no local match were required, so that that could pay for this portion of the work to relocate the city waterline without causing any cost to the city.

When we do our work and hammer the bridge, we ask -- we have the contractor, as he's doing this, is to mark up all of the areas partly so that we can agree with the contractor on how many square feet are being covered and this is what it looks like. This is, you can see towards the bottom of the picture, some exposed rebar; towards the top, you can see a crack. Well the delaminations are significant enough that virtually all that concrete has to be replaced, so you have to do more than just visually look at it to see what kind of work you have to accomplish. Similarly, with light duty air hammers, 15 pound hammers, you remove concrete that you found that was delaminated, arc spray zinc on it. This is finished work.

Something that I invite you to come to Oregon and view is some of the detailing on this bridge is phenomenal as if these were individual blocks. This bridge used a very special technique in order to have very slender arch ribs and so the designer made very slender columns. He made this look like a barrel arch but, if you look in the back, you can see that this is actually a thin concrete cast plate. It's a very light weight bridge which presented some problems to us because there's not a lot of concrete for us to work with. But when the problem is how do you save the bridge; how do you restore the bridge; all good engineers can figure out how to do that. If the problem is defined as how do you replace the bridge, they do something different. In this case, we were looking to find all of the things that we had to do to save this bridge. One of the things was that jetty that we saw earlier was directing the force of the river at this particular pier which cut the river bottom about three feet deeper than it was and was exposing the underside of the foundation and we were at risk of losing it, and if we lost this pier, we would lose the bridge. So what we did was a design build that we incorporated into this. There's a cofferdam around it. Cofferdam is sheet pile driven into the water 32 feet on a side which can be pumped out so that you can work in the dry. The contractor placed a seal concrete at the bottom and he sunk six drill shafts in there, a drill shaft is a six-foot diameter hole that is, basically, dug with a circular drill while he's pushing down steel casing, it's reinforced with steel and filled with concrete, and then we placed a concrete box around this, we drilled through it, pulled it all together with high-strength strands so that the new foundation, which goes down about a hundred feet below this photograph, supports the old foundation like you would hold a book in your hand, and the old foundation does nothing. We did all this work under traffic.

These are the forms, steel forms, that were used for bridge rail on this project. Again, we used the technique of pre-casting, we used structural steel so that the bridge rail is actually a structural steel rail that will stop anything, but it's incased in concrete that accurately reflects the original dimensions; these are pieces that are all together. At the bottom of the

picture you can see the steel plate, which is part of it, that's how we attach it to the bridge with a large number of anchor bolts which are sunk down into the bridge deck with leveling nuts, pretty much like you see people install traffic lights, at the top are large bolts and there is a pre-cast concrete cap that goes over the top, it's tied together, and then there are solid sections where we have the reinforcing steel, and you can see the plates there with all of the bolts. And when it's done, it looks like original, but it's far stronger than what the original was.

To give you an idea, you can just kinda look through here and you can see the kind of money that we've been putting into these bridges plus there's about another 50 million dollars worth of other historic bridge work that we've done in the past 15 years. One of interest to you all, Cummins Creek, at 1.7 million dollars where the cathodic protection cost was about $9.00 per square foot, that's what it would take to do several of your bridges, so if you were to do a restoration project on Koukouai and Waikani, it would -- the sum of that would be less then 1.7 million dollars.

Our procedures. We do survey work. We remove the delaminate concrete. Pretty much all of the items that we've talked about here: lightweight chipping hammers; replace with pressure grout; hand tool it; we need to maintain a minimum coverage; we do weight curing of the concrete cause we don't want it to crack when it shrinks; mentioned cathodic protection; we have to find and locate the reinforcing, connect it, make sure that there's no metal which might short-circuit the reinforcing to the top, put the anode in; reference cells are things that we bury into the concrete at the most corrosive areas and we have our monitoring system pay attention to the voltage at that point because if we are providing sufficient current to protect any steel in that vicinity, we're confident that we've got it covered everywhere in there; we have to do the equipment installation and check out, and they don't have a bullet on this but just for you all to understand is that once you've built something like this, it's like your car, you have to do periodic maintenance on the electrical system on this or else it'll quit working and you won't know it.

We do some unusual things that I'm not sure that you do. We use pre-qualification techniques with our contractors and because there's always the possibility that we get a contractor who has not done a historic bridge like this, we have a training program specified within the contract that we and the contractor jointly provide so that the designers, the constructors, and the inspectors all go through the training and understand the repair procedures and the cathodic protection procedures and that they -- if they do something that is not correct, one of the things that we do is in addition to having them remove the nonconforming work, before they can redo it, they have to go through retraining on that particular work item. All of their procedures must be approved by us and they must provide a full enclosure to ensure that we don't have anything escape to the atmosphere.

For more information, Curt Cryer is my Senior Corrosion Engineer. And what I'm going to do here is to make it a bit simpler for you, the next slide is -- I'm going to give you a single email address at bridge, you send it to bridge@odot.state.or.us and if you ask anything about cathodic protection or historic bridges, it'll come to us, and so that completes the presentation I have. If we can have some lights, if there are any questions, I'll be very pleased to answer them.

Mr. Lon Whelchel: I know from talking to you a little earlier that you have a list of priorities and that includes small or large bridges. There are bridges ...(inaudible)... I realize that are not on your list of priorities, I wonder how you can get them on. One particular, it's a very small bridge, it's a beautiful thing over there in Lower Waiehu Beach Road, it's falling apart. Do you know if that's on your list of priorities or not?

Mr. Nelson: I don't make the priorities for your bridges, I'm going to give you some recommendations here, but I've been asked to focus on the Hana Road bridges, and so the two that were of the biggest interest were the arch bridges. I would offer to you that it would be appropriate, for those two bridges, to do a repair project, which included cathodic protection, either with or without a power supply, that would ensure those to last a fair time. The closed spandrel arch bridges, from what I could see, looked like they are in no danger in the immediate future for significant structural problems. What I did see, and we've talked with the engineers here about, is that your bridge rails, some of them are not much higher then ankle height and it appears that they're at ankle height because of asphalt that's been placed on it, and I made a strong suggestion to the engineers that they remove the asphalt, so that's something that I would suggest that you could do in terms of applying gentle pressure to preserve your historic bridges is -- the asphalt on top of there is just dead weight and that reduces the amount of weight of trucks that could go over it without affecting the bridge. Since most of the bridges on the Hana Road are in the small category, I would suggest that one of the most significant things that you're going to want to have the State and County do is to give you a plan of this is what we intend to do to preserve the Hana Road bridges. I can provide them with a lot of technical help but it is their responsibility to come up with such a plan and from what I've seen is it appears that the engineers are now working with the historians and working with you all. I don't think that would have been a fair statement to have said some number of years ago, but I would say, at present, it's fair enough. They seem to be extremely receptive to doing techniques like this at least on the two bridges that we specifically talked about and it seemed that we got some interest with the discussion of asphalt.

We also talked about bridge rails and guardrails coming up to bridges, and so one of the recommendations is that you all cause them and probably help them to develop some guidelines for what you want to see within the Hana Road historic district. Now what I saw going out there was an awful lot of lava rock. Make sense. That's natural building material in Hawaii. There was also a fair amount of the more conventional steel w-rail guardrails

and a few transitions to bridges that looked absolutely ugly, and when you have these beautiful little bridges and you put an absolutely ugly connection to it, that's a terrible thing to do. So there are ways that you can do it. We discussed with them is that you end up with putting a solid structure at the end of the bridge and you attach the guardrail to it and you leave the historic bridge alone. One of the other things that you can do, as we saw with Oheo, is that bridge rail has a nice flare to it and there is lava rock and natural rock coming to it so that there's no way that you could hit the abutment head on. This is what the engineers are worried about is that when you have a solid parapet wall, and you can hit it head on, that means that someone who's had too much to drink is traveling way to fast and is not in control, you've just killed them, and I'm aware that in Hawaii there is significant concern about litigation so, okay, how do you avoid that? Well, one of things is is that the objective, and this is Federal Highway's concept of safety, is that you wanna have a smooth clean line going through there so that no matter where you hit it, you will slide along and you will be unable to hit something head on. Well you can do more than just have a steel guardrail that transitions into that thick ugly thing they call a tri-beam and slap that onto the bridge rail; that is the standard approach, but there's more that you can do and Federal Highway Standards allow a lot of latitude on historic bridges. Take advantage of that latitude. Yes, ma'am?

Ms. Lisa Rotunno-Hazuka: Let's talk about funding. So I think in one of our meetings we talked about restoration versus replacement and that the funding that you get is equivalent to what it -- what a proposal would be to demolish the bridge and rebuild it. Is that correct?

Mr. Nelson: That's incorrect.

Ms. Rotunno-Hazuka: That's incorrect. Okay, what is the equation of Federal funding or --

Mr. Nelson: I'm going to presume that, since we're talking with bridges, the most likely funds that would be used are Highway Bridge Rehabilitation and Replacement Funds. Please note, again, the title of the funds if rehabilitation and replacement. They can be used for either. There are rules on sufficiency rating that if the sufficiency rating is above 50, you have to have special circumstances to replace the bridge. Now with the Hana bridges have sufficiency ratings down in single digits, that's not an issue. You could use the funds to replace the bridges legally, but the factor that you were talking about is that if you were to replace a bridge and as mitigation you wanted to move the bridge, make it a park resource or something of that nature, but it would be out of the transportation system, the maximum amount of HBRR Funds or Highway Bridge Rehabilitation and Replacement Funds that you could use to that mitigation purpose is equal to the amount of money it would take to demolish the bridge; that's where that number comes from. The bridges that we saw here tonight where we were using 20 million dollars, that's HBRR Funds, which are being used to preserve that bridge and to use an unusual rail system without end rail treatments, so we were able to make the case with Federal Highway that even though

there's a long drop to the river, the speed on that bridge is 45 miles per hour. Because of the low accident history, the high curb, the fact that it's a long straight bridge, and that we used an unusual virtually impenetrable design, is that Federal Highway did not require us to put any kind of additional barriers or tubes or something else in order to meet what some people have heard are mandated requirements by Federal Highway.

Ms. Rotunno-Hazuka: Okay, I've got ...(inaudible)... didn't we have a list of bridges that are proposed to be replaced and did you look at those bridges? No? This is strictly for just these two?

Ms. Duensing: Yeah. The reason why we focused on the arch bridges is because when I heard Frank's presentation in April when I was in Portland --

Ms. Rotunno-Hazuka: Okay.

Ms. Duensing: It was an obvious connection to Maui because it's concrete arch bridge here, it's concrete arch bridge there, and we have that railing problem with Waikani, so I was looking at it as a way to get a program started.

Ms. Rotunno-Hazuka: Okay.

Ms. Duensing: You know you start with these two and can we make this work, will the State DOT and FHWA allow us to make this work, and then we can proceed with the rest and find out can they be fixed rather than replaced cause, at present, we've already got four bridges scheduled to be replaced.

Ms. Rotunno-Hazuka: Okay, so what do we do with what we've learned today and how do we fund and how do we make this happen?

Mr. Nelson: Okay, the first thing is you're going to want to make sure that you get a plan with both the State and County --

Ms. Rotunno-Hazuka: Okay.

Mr. Nelson: That says for the Hana Road district. You're going to want a plan from the County and from the State that says for the Hana Road District, this is how we intend to preserve these bridges. Now --

Ms. Rotunno-Hazuka: What if they don't have that vision?

Mr. Nelson: Well, one of the purposes of your Commission is to help them attain that vision.

Ms. Rotunno-Hazuka: Get that vision. Okay.

Mr. Nelson: I've been asked to help them see the techniques that they can use to fulfill that vision and perhaps as we go through the techniques, we will see in Kapolei, as we saw today with State district engineers and with County engineers, is that, you know, they are in fact on board and working in that direction. One of the things that you can do is ask for reconsideration of any bridges that are currently proposed to be replaced and the way that you can do that is, in light of what we have just learned and the fact that there may be some things that we could do with bridge rails, with guardrails, with some of these treatments, perhaps we can consider relooking at some of these. Again, from what we thought would be probably the worst example of condition, easy to repair, and some of the other bridges that are much more protected from the ocean, you know, I'm thinking that, you know, if Dawn had in her request that, Frank, we want you to come over here for a month and climb around under every bridge, we would probably find that there was little damage and that what we found would be easily repairable. You all and the State have made quite a change in that you now have replacement bridges that are 16-foot in width, so you've -- however you've done it, you all have figured out how to work together; that's quite a change that I take from maybe six or seven years ago. So you wanna keep doing is what you're doing.

But you talked about funding and, generally, bridges are placed in a State Transportation Improvement Plan or STIP and, depending on the state, it's from two to six years in duration, and so these bridges are planned to be done in certain years, and they put them in those years with the intent of doing preliminary engineering in years before that and so when they're in the design phase, they then start applying for permits, hold public hearings, and often that's when you find out that a bridge is going to be replaced. I would suggest that, from your viewpoint, you would want to know, before the bridge is placed into the STIP, what is going to be done and so that's why you want a plan from them that says, and you can do this for all historic structures on Maui, but again right now I'm focusing on the Hana Road Historic District, because you have the opportunity of pushing the system and saying this is on the National Register, it is different from the rest of Maui, this is not Wailuku. We need to do something different here. What is it that you're going to do and how do we help you come up with some good decisions on what that will be. I think from what we saw today is that there are people that are willing to listen. Dawn has contracted with me to basically do the same workshop in Kapolei. I think that the engineers there are open, we will find out, and I think that it would be appropriate to ask Dawn to give you feedback at a later meeting on what we learned at that workshop. But what you wanna do with this plan is what are you gonna do, when are you proposing to do it, what do you think the rough estimates are for repairs. I'm expecting that probably the County will say we don't have a lot of money, but if you can make the case for having a bridge repaired that goes into the STIP, the State can probably find the Federal funds to take care of 80 percent of the cost.

Now, in Oregon, we have the local agencies all propose their projects centrally into the bridge section, there's a ranking system that the local agencies have come up with, we help them administer it, but we make no decisions on whether this bridge gets done or that one; they all get ranked according to the number system, they go into the STIP, they get executed, and they get 80 percent Federal funds. So you have the ability to get Federal funding, it's just a matter of you have to make the case that your bridge or bridges need to be done as oppose to some on the Big Island, Oahu, Kauai, or that you think that even though an expansion near Lahaina is important for business, taking care of these historic assets is perhaps more important to the people of Maui.

Ms. Rotunno-Hazuka: Okay, looking at what projects are going to get funded and -- and then the technology that you were talking about where you use the zinc in that spray --

Mr. Nelson: Yes.

Ms. Rotunno-Hazuka: Is that a technology that is even used over here? Probably not?

Mr. Nelson: I would say that the zinc spraying is probably not. There are quite a few places in the U.S. that use that to spray it on metal bridges in lieu of paint, but one of the things that would be done, there are three subcontractors that I'm aware of that would be very willing to work for one of your prime contractors and to do the work. You know, we're not talking about heavy machinery that has to be moved around, it's people that would have to be flown here. I know on the airplane that I came out on there were construction people coming back after the holidays to continue on projects in Hawaii, on Maui, so it wouldn't be that different. Again, I don't know what your contracting laws are but I'm real picky when it comes to the historic bridges. If we're putting that kind of money into something that the public has told us that we're subject to lynching if we don't do it right, I'm a little bit picky about who the contractor is going to be, and we have worked out with our Associated General Contractors, AGC, on procedures that they accept that when we ask the contractors to submit this information, they do so. If they fill it out correctly, they're determined pre-qualified, and then we notify them, and we accept bids from them and the low bid, from that group, is who we award to. And part of the pre-qualification process is that if you have not done cathodic protection, then you must provide a subcontractor who has and give us the name of the project and owner contacts and other stuff so that we can verify that this is in fact truth and then they're really to go. It's not a very onerous process; it's something that if you were going to have work done on your car, you would kinda want to know something about who you're going to have it done by. So why would we use less with public funds?

Ms. Sablas: Frank, I wanna just say thank you. I've gone to the Oregon Coast and appreciate the bridges that you have and it's nice to meet the guy who's responsible for maintaining all of that. Some of the challenges we have here and of recent is that it seems

like that engineers wanna change the -- our bridges and you mentioned something earlier about our bridges were made that suited the environment, you know, to give a sense of place, and I must agree with you, but the proposals that we've had that we've kinda fought against is that because of safety reasons, the argument was that it can't be done and so what we've been hearing from you is very encouraging today and, hopefully, your message will get to the right people because our bridges in Hana are unique, I don't think there's any other highway anywhere that is, you know, like the Hana bridges, so I really thank you and thank Dawn, actually, for initiating you to come here because we need help and it's nice to be able to know that we can turn to somebody who have proven experience in preserving the historic bridges so that we don't have to go the way of doing -- making decisions uninformed. And so what I had asked Dawn earlier is that are you going to be able to make presentation to the engineers that we have been working with. And I like the fact that you talked about training and the pre-qualification and if that's something that we're not having, then that's -- it's not been done, I think that's something that we need to look at because it is very vital that we have people working on this of preserving the bridges who know what they're doing and not getting the lowest bid or contract, again, I'm just talking maybe out of context, but I -- I'm very glad that we have someone like Dawn who's very passionate about our bridges and her dedication in our department and I think, you know, I look to her to really kinda carry the lead for us here and hope that we can get this message to the people who are -- who we are doing business with now and in the future because this is something that's in the works, so I hope we're not too late at this point to be able to take advantage of some of the -- some of the points that you have made that makes a lot of sense. The most encouraging you told me is that our bridges are, you know, I mean their salvageable, I've never heard that before.

Ms. Rotunno-Hazuka: Yeah, we never have.

Ms. Sablas: And coming from an, you know, an expert is really encouraging so thank you.

Mr. Nelson: One of the things that I could offer is that, from having lived in Hawaii I know the value of food, and so when we had the meeting with the County and district engineers today at nine, we went until three non-stop, so these folks thought it was important enough to stay or at least sneak out and grab something and come back as opposed to saying, hey, I'm sorry, you know, it's chow time, I'm gone. We also had very animated discussions and so one of the things that they asked me to ensure that, as I talk with people, is that they recognize that they are trying very hard to do what you would like them to do, and it's a see change for them to go from doing things according to standards because everything is okay if you do it according to standards, to taking some risk and doing something that is out of the ordinary, and they were very open to the fact that, well, Hana Road is out of the ordinary, it is absolutely, as you say, unique and so, therefore, it deserves unique techniques and so I -- they're realizing that. It's taking them some time. It is quite a change for them. But, again, engineers are natural problems solvers. If the problem is

framed as how do we keep this bridge in service, they figure out how to do that. If the problem is framed as how do we replace the bridge, they do that.

Ms. Rotunno-Hazuka: That's a good point.

Mr. Nelson: So we had very good and, I think, very productive discussion with County and State district engineers here today. We're going to attempt to do the same thing at Kapolei and we understand that we will have, in addition to the State bridge engineer staff, possibly some consultants who might tasked to do some of the design work potentially. We've also got Federal Highway engineers. In fact, the bridge engineer for the Federal Highway Administration came today to hear the presentation and to go through the discussion with us and agreed with all of the references to the fact that, as I have told you here, there are tremendous latitude that the Federal Highway Administration has to allow you to use Federal funds and to essentially leave your historic bridges as is. So that's one thing I want you to leave with is that Federal Highway is not the enemy; your State bridge engineers are not the enemy, but there is a way of doing business that has been in place for many years and that is the enemy, and so that's what we need to do is to break that process and to rebuild a new process. The two bridges, Koukouai and Waikani, I think are the possibility of creating a new process through all of this with on how you get a plan on how you're going to do it and you can tell them that why aren't those two bridges at the top of the list; oh, oops, okay, we'll put those at the top of the list, and say, okay, now how are you going to get those into the current STIP? Oh, well we're going to propose taking these bridges out and move them back later. How are you going to do this? And so, generally, if the question is how are you going to do it, as oppose to are you going to do it, the answers are often different, and so that's what you want to do is you want to challenge the other players in the process to explain to you how they're going to accomplish your objectives. Now, in this, they will still always feel a compelling need to ensure that the road is as safe as they can make it and part of that is, that I make in presentations, is that engineers are in a different position than historians in that when we put our stamp on the drawings, we are personally liable and so, by God, when we do that, we want to ensure that we've provided adequate engineering in order to ensure that it's going to work as expected and it will be safe as expected, but it is always far easier to just say, oh, do it according to standards, stamp that, but it takes a little bit more effort to do a unique solution. So you have an opportunity here to do this whether cathodic protection is selected or not, you can repair these bridges and keep them in service, but I think the biggest issue that you will face won't be so much whether cathodic protection is used on these bridges is how you work with getting the players to come up with guardrails, transitions, and other stuff so that your parapet walls on the bridges are adequate for safety, in other words, they're higher than ankle height, that they still retain the look and feel of the original.

Ms. Rotunno-Hazuka: Yeah.

Mr. Nelson: And there are things that can be done, like I say, with additional steel, perhaps a little bit of additional thickness, you can't do much when you have a 16-foot road, every inch counts, but there's a little bit that you can do and --

Ms. Sablas: What could you do, you know, like that layer upon layer of asphalt that kinda like, you know, now make the railing shorter? Is there a method to grate it down and reinforce it instead of just putting --

Ms. Rotunno-Hazuka: Take the asphalt off?

Ms. Sablas: Yeah.

Mr. Nelson: The -- I think there's two questions in what I'm hearing. The first with regard to the asphalt. There is equipment, two types, you can use something as simple as a heavy-duty front-end loader and just go buck up the asphalt. The second is that they make milling equipment, I don't know if there any here on Maui, but you run it over there and it just grinds it up and makes it available for recycling, and so you could go literally remove all of the asphalt off the bridge but we do --

Ms. Sablas: Is that something that would be recommended over just paving over?

Mr. Nelson: Yes. I strongly recommend, as I have already recommended to the engineers, is that they do that and there's two reasons: first, it's dead weight, and the second is asphalt is a big black sponge. It holds water which means that you are making your bridge deck as well as the lower portion of your rail at greater risk for corrosion damage. You know, Hawaii, every place where it stays wet, moss grows, and steel rusts, but places where it's drier, it doesn't happen.

Ms. Sablas: So having said that, why have we been doing it? I mean maybe that's not a question to you but it's just --

Mr. Nelson: Oh, I can answer that. It's the same as ...(inaudible)... in Oregon, we have some of these arguments, just I've never seen anywhere near that thickness of asphalt, you hold the record, but because it's easy if you have a paving train. So the contractor gets started and he doesn't stop; that cost him less time which cost the owner less money.

Ms. Sablas: But it's good for the short-term, not the long-term.

Mr. Nelson: You're absolutely correct. And so that's why I say that you really need some long-range plans and if -- oftentimes, public works county engineers are dealing with so many urgent issues that come up, planning is one of the things that's most difficult for them to do, they don't have the time or staff, so you're going to be pushing them when you're

asking for long-range plans, but if you narrow your focus to something like the Hana Road District, now it's not such a horrible task is to what is your plan for doing all of the bridges on Maui and how are you going to get rid of the excess asphalt and how are you going to do -- you're not going to get an answer to that question; it's just too big; it's overwhelming. So narrow your focus down to something that you can push them hard on and push frequently, but please push gently because these people are trying to do a good job and if all you do is damage the relationship you've already built, that may be a short-term victory but it's a long-term loss.

Ms. Sablas: Good advice.

Mr. Nelson: Well, we've been there; we've done it, and so it -- there's no point in not sharing with you, you know, our experiences on this. On our Coast Highway, we did not have a cultural resources commission to work with, really, we had to deal with a couple of individuals that were very helpful. We have cultural resource specialists right on staff. In fact, now due to a reorganization, they're just down the hall from me, which is very convenient. I have almost my own private historians so as things come up, I can find out very quickly is this valuable or not, and then they discover that it works the other way, they can come down the hall and get an engineer, so I started to become, over the past eight years or so, used to working with historians, and I guess the historians are now starting to become used to working with engineers, and that's been a very valuable process for us because as we prioritize our bridges, partly it's on condition, but then part of it is which ones are the truly historic bridges and what should we do. And perhaps by the next time that you come to the Oregon Coast, the National Register will have agreed with my proposal and will have listed all of those bridges in the National Register as a collection.

Ms. Rotunno-Hazuka: Like we have.

Mr. Nelson: Like you have, right.

Ms. Sablas: She can help you.

Mr. Nelson: Well I wasn't wise enough to realize that I could have maybe talked to Dawn on leaving Maui and come to Oregon and work for me. So you gotta be careful, I now know that she might be interested in doing that, so you better treat her well because it's not above me to hijack people.

Ms. Sablas: We don't want you to, but work together.

Mr. Nelson: Oh, okay. We can do that. And, again, if the State or the County wishes help with engineering, we're prepared to do that since we do this on a daily basis, so to do another couple of small bridges would be fairly easy to do.

Ms. Sablas: I have non-engineering questions. It's more an environmental type of thing. One of my pet peeves, and I had brought this up earlier when the consultants were here with proposal of the bridges, is the -- it seems like the numerous signs that they have all over, you know, that mars the beauty of the, the natural beauty of the whole area and I was told that it was necessary for safety reasons, and I don't buy that, you know, I just think that you don't need to have those, you know, no passing signs every so -- you know, those yellow -- I know it's a State thing, but I said it's a non-engineering thing, but I don't know how we can get around to that. It's just a personal peeve of mine to see so many of those --

Ms. Rotunno-Hazuka: Signs ...(inaudible)...

Ms. Sablas: Yeah, I mean no passing, of course, how can you pass, there's no passing zone so why do you have a sign that says --

Ms. Rotunno-Hazuka: It's the liability again.

Ms. Sablas: Well, I think, but I just think it's an overdone type of thing and, you know, if we're going to do the job, might as well do it right, and make a nice bridge but not have the -- you know you spoke earlier, and that really touched me, about this sensitivity of the bridge to the environment and I think the ancients had that and we're kinda losing it of when we build things, build it to blend with the environment as oppose to having it stand out and not match the environment, and if you went further down in the -- to the Kahiko area, I think you could have an example of a bridge that was built that is definitely out of context, that total steel bridge, I don't know what the name is, but it seems like we could learn from people back then with less resources then we have now, but it seems like if they were able to do the job that they were doing then with the limited resources, why can't we do a better job now with the advanced technology and resources that we have instead of doing it worse. Okay, I'm just speaking out of context.

Mr. Samuel Kalalau: I just wanted to know, you know, when you start on the repair of the bridges, you know, like the little Big Creek Bridge and the Cummins Bridge, do you close the bridge off to the traffic?

Mr. Nelson: Absolutely not. There are businesses up and down the coast that, once again, would lynch us for doing that. What we do do because in order to completely protect the bridges, let me draw on the air, I realize it would be difficult, but we protect the underside and up to the side with zinc, but we don't put zinc on the driving surface, so there's the possibility for salt to come in from the top, and we've got some very good concrete in the bridge decks but we chiseled down a little bit and we put a high-density concrete called microsilica or silica fume concrete for the deck, we have to do it one lane at a time, and so we close one lane, we make the bridge a one-lane bridge for a short period, we put that in,

we take care of the bridge rail on that side at the same time, and then we move traffic over, we take care of the other side, and the bridge rail on that side, and then we open it back up. None of these bridges are we allowed to close.

Ms. Sablas: But our bridges are all one lane.

Mr. Nelson: I understand and what I think you will find is as you grind asphalt off is that you schedule it so that for, you know, from two to five in the afternoon, you can't get from here to there, and you go grind a couple layers off, you get the equipment out of the way, you open it back up to traffic; then the next day, two to five, you grind off some more, you open it back up to traffic. What I'm expecting is that, from what I can see from the underside, is that you're not likely to see serious problems with the topside of the deck, but I doubt that there's anyone who knows because it's been so many years since the bare concrete was seen is they just don't know, but I would doubt it. The problem is, as I think you're driving at, is in order to do the bridge rail on one side, how do you do it? Normally you have to have some kind of a platform scaffold set just to the outside so the contractor can work from and then you have to put some kind of a barrier just almost immediately on the inside. Now, instead of a 16-foot bridge, now you're down to a 12-foot or 13-foot bridge, but you can now remove the bridge rail outward, take it off, you can come back, put the new bridge rail on, get it all set and ready to go; then you move that work platform to the other side of the bridge, you slide the temporary barriers over to that side, and you do that side of the bridge, and so with that, you keep the bridge open.

Mr. Kalalau: You mentioned about one of the bridges that you guys added an extra lane on them.

Mr. Nelson: Oh, no. No, we have not added extra lanes -- oh, okay, on one bridge, sorry, this was back in history, but, yes, we had a narrow two-lane bridge and then we added a still narrow two-lane bridge, but not as narrow next to it, and ended up with a four-lane bridge and that was just right in the downtown area, so the highway comes in, it's two lanes, it goes to four lanes for a short distance, about a city block, and then it goes back to two lanes, and it's gone. We had the room to build a bridge next to it. Even if you had, like at Waikani, if you were to build a second arch bridge right next to it, you're still stuck with right-angled turns at each end of the bridge, so now how in the world are you going to deal with traffic going from a very narrow lane onto this wide bridge and then coming back onto the narrow lane? I mean you could go put cones on the bridge so that you've got a nice curved route on it, but I don't think that you would end up with anything safer or more useful, and now you have the risk of having an ugly bridge obscuring a beautiful bridge, or you've got a new version of the old bridge and the original version of the old bridge, and you get people confused which is which. As it is now, if you keep the Hana Road essentially as it is, you have got, what seems to me, what Maui was like 50, 60, 70

years ago; that's still present. And as you go past Hana city, where the power line stop, it's a lot like it was, right?

Mr. Kalalau: No, we got million dollar homes coming up all over the place out there, you know, it's not becoming a sense of place anymore, you know, we preserve these bridges for the people to come in there and change the whole sense of place.

Ms. Sablas: See that was what was mentioned to us by the prior consultants that it -- Hana has changed and the road was built maybe back then for just maybe, you know, the residential and now it's changed and you have huge trucks going over and the weight factor and that's -- it's a danger factor because --

Mr. Nelson: Well you can't have huge trucks going over, the bridges won't, physically, the dimensions aren't --

Mr. Kalalau: I work for the highways and I've spent a lot of times under those bridges and watched semi-trailers haul bulldozers over those bridges and I've seen chunks of cement fall off and, you know --

Mr. Nelson: Okay.

Ms. Rotunno-Hazuka: So they're doing it.

Mr. Kalalau: I, you know, I look at those bridges and stuff but the key thing is here is we need to identify what is historical, what is -- what bridges that we need to preserve. There's a lot of bridges that's been wiped out in other storms and it's been replaced totally. There's bridges right now that has to be replaced totally because our heavy rain weathers are going over the entire bridge and we can't use the bridge, traffic get stuck between two bridges. You know, we cannot go in there and preserve a bridge that we cannot use because every time it floods, it goes, you know, the water goes over the bridge. We need bridges that is going to work; that is going to, you know, that the people can travel and get home and get to school and get from school back to home. It's really nice to preserve these bridges, I mean, you know, the architectural designs and stuff, it's worth preserving but the key issue here is not all the bridges are there to be preserved, and right now the bridges that the County get planned for replacement, those are the bridges that needs to be replaced, and I think some of the designs that their engineers have, I mean with the rock wall and, you know, just about -- it's just like a replica of the original bridge, which is even better. Why I talked about expanding the bridge a little wider is for bicycle traffic and for people walking across the bridge. It's very dangerous now with all the tourist on the bridges. You know we drive those roads everyday and it's very, very dangerous with all tourist on the bridges. They don't have no walking paths on the bridge; bicyclists, they don't have room for them crossing over the bridge if you get a car or a truck going over it.

The population is not the same anymore. We're having more people moving into there. That is why I said it's real important what you're sharing here but I think people should look at it more in-depth when they think about preservation and reconstruction of the old bridges and stuff. You know, like you said, the people would hang you guys if you guys close the bridge and stuff, I mean we had some -- we had some -- some of the cliffs over there that blocked the road for many days and the construction people that had the job there tried to close the road and stuff and I mean they almost had third world war. This is the same kinda incident I see with the bridges and stuff and because we have just one way in and one way out. Yeah, I've been to Oregon too and I've drove down that highway. Your guys bridges are very beautiful too.

But my other concern was, you know, if you -- if you preserve this bridge for say 20 million dollars and then 30 years we gotta throw another 20 million dollars in, it's like it's more than just a group of people trying to sit down and plan this whole thing for long-term because long-term we know what's the whole factor is, it's money, you know, I mean 50, 60 years from now if we don't have the -- if we don't have the money to preserve that bridge anymore, you know, a lot of us won't be here then and whoever stay sitting on the Cultural Resources Commission might say put a brand new one in.

This is all the kinda things that I think should be looked at in the planning of preserving, you know, the bridges there, and I don't think they should use the bridges as a sense of place because the place is totally changing now, you know, it's not -- it's not like when the old people who planned those bridges and they designed those road, you know, they -- they didn't see this coming, you know, so we're not going to see what's coming in the next 30 years and, you know, some of the bridges that we could, you know, like Waikani is like one of your bridges is you have informational turn off site where you have part of the original rail there and you have the story of the bridge. I think that some of the bridges there, when we do remove them and replace them, I think we should have an informational plaque there, you know, so the people know that the bridge they're on now was or used to look like this. A lot of time a lot of our old things are, our historical stuffs and artifacts goes into museums, but, you know, we cannot take the bridge and put them in a museum, so it's -- I think whatever we can and if we can afford it, we should do it. If it's not possible, then we should have some kinda like the bridge that you have there with all the information on them of who built it, how it looked.

Ms. Sablas: Are there any comments from the general public to -- sure.

Unidentified Speaker: ...(inaudible)...

Mr. Nelson: It really depends on the length of the bridge and what it's crossing. The Yaquina Bay Bridge, for instance, where we did a detail analysis to find out what the replacement cost would be for that bridge was 52 million dollars as oppose to 13.5 million

dollars to do restoration and cathodic protection, and as you plan the net present value of what every 30 years of going and replacing the zinc on it, you do not increase that 13.5 million dollars very much, so the net present value of the decision to keep the bridge is still on the order of 20 million dollars as oppose to a 52 million dollar replacement. The one bridge, Alsea Bay, that we replaced, they had planned a 20 million dollar simple straight bridge, it was 44 million dollars to build a bridge that the public would accept. When we get down to one that was as damaged as the Rocky Creek Bridge, which was 3.8 million dollars, we could have built a replacement bridge for about 3.8 million dollars that would have looked like that bridge, but the decision was made is that if the price is the same for a duplicate or the original, let's keep the original, and so that was kind of a decision. When you get down to bridges that are on the size of 20 to 50 feet, the repair cost, particularly looking at the quality of bridge that you have, is very small. You're talking something that's a fraction, once again, of the replacement cost because you don't have to bring in the heavy equipment to go demolish and get it out of there, you don't have to bring in the heavy equipment to set the new bridge in place, and you don't have to deal with how do we close the bridge so the people of Hana can get to town. Most of the work is done by the bridge trolls underneath.

The other thing is that cathodic protection is, if you don't have to do much repairs and the surfaces are very simple, you could basically figure out what the cost would be to spray paint that bridge, and now you replace the difference in price for zinc metal over paint, and the people who are doing it are essentially the same trade, same people, the equipment rental or bringing it to Hawaii, this is equipment that's smaller than this desk so it's not something that's expensive to bring in, the cost for doing it is relatively small. I'm guessing that for most of the high quality paints that are used that you wouldn't be allowed to spray paint in open air so you would have to have some kind of an enclosure. It wouldn't have to be anywhere near as tough as the enclosures that we have because we have to be able to deal with 90 mile per hour winds, you don't have that problem, so you could deal with something that would be more tarps.

So, essentially, what I would have to have, you know, some numbers from the State and County, but I would expect that the cost to rehabilitate and to preserve say Koukouai would be probably a fourth of what it would cost to replace the bridge plus you don't end up with having to disrupt traffic. I'd still argue that you want to replace -- take the asphalt off of it. The biggest expense that you will have, I believe, in all of this is coming up with something like lava rock guardrails coming into it and then working on the bridge parapets in order to make sure that they are strong enough and high enough, I'm not going to propose a dimensional height here, there are standards for heights, whether they apply on the Hana Road or not, is a very good question, I mean people have gotten used to ankle height bridge rails for a long time. I think you deserve something better than that. I'm built pretty close to the earth but, you know, I'm looking down over there saying, "You know what, if I stub my toe here, I'm over the -- and down the river and to the ocean." So I think that

there is a lot that can be done for small amounts of money. But I think that's it so, basically, the kind of bridges you're talking about is about one-fourth the cost. Now that remains to be seen, but that's my best engineering estimate without having all the numbers available.

Ms. Rotunno-Hazuka: Thank you.

Ms. Sablas: Thank you very much.

Mr. Nelson: Thank you very much. I appreciate the opportunity.

Ms. Rotunno-Hazuka: Yeah, we really appreciate it.

The meeting adjourned at 7:40 p.m.

Respectfully submitted by,

SUZETTE L. ESMERALDA
Secretary to Boards and Commission I

RECORD OF ATTENDANCE

Present
Lori Sablas, Chairperson
Samuel Kalalau, III
Lon Whelchel
Lisa Rotunno-Hazuka
Solomon Kaopuiki (arrived at 6:30 p.m.)

Excused
Barbara Long
Keeaumoku Kapu, Vice-Chairperson
Perry Artates

Others
Dawn Duensing, Planning Staff