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STATE of CALIFORNIA

STATE ENERGY RESOURCES CONSERVATION and

DEVELOPMENT COMMISSION

In the matter of:	)	Docket No. 19-BSTD-03
	)	
2022 Energy Code	)	STAFF WORKSHOP
Pre-Rulemaking	)	
	)	
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Proposed 2022 Energy Code Nonresidential High-Performance Envelope

Remotely held via Zoom

California Energy Commission
Warren-Alquist State Energy Building
1516 Ninth Street
Sacramento, California 95814

Tuesday, October 20, 2020

In accordance with Executive Order N-29-20 and Executive Order N-33-20, the physical location was canceled and the meeting was held via the Zoom video/audio internet and via teleconference platforms.

Reported by:
S. Palmer, CERT 00124

APPEARANCES

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Haile Bucaneg, Co-Host
Michael Shewmaker, Co-Host
Peter Strait, Co-Host

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Kiri Coakley
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I N D E X

P R O C E E D I N G S

OCTOBER 20, 2020 9:05 o'clock a.m.

MR. BOZORGCHAMI: Hello, everyone. My name is Payam Bozorgchami. I'm the Project Manager for the 2022 Building Energy Efficiency Standards. I want to welcome you to the Energy Commission's Virtual Pre-Rulemaking Workshop being held virtually here at the Energy Commission.

Let me provide you with some housekeeping rules. We will be muting everyone. And after each proposed measure is presented, we will stop it and allow people to raise their hand and we'll unmute you. And you can ask your question or express your concerns. And you can also submit your questions in the Question and Answer box with the program. We will answer questions as they come in.

Also, if you are participating by phone, you can use the star 9 to raise your hand and star 9 to lower your hand, and star 6 to mute and unmute yourself. One important thing to remember is that when you do -- when we do unmute you, please state your name and your affiliation.

This Workshop is being recorded, and for us to BE ABLE TO communicate back with you at a later time, we need to know exactly who we were talking with or who we're having a discussion with.

And, again one more time, this presentation is being recorded. And the transcript and the recordings will

be provided at a later time.

Also I wanted to let you know that the PowerPoint presentation that you're seeing today will also be posted on our docket for your viewing by tomorrow at lunch time.

So with that, let's get started.

Some of the areas that we're going to be discussing today will be raising the formal background on what the Energy Commission is and how we do the analysis. And Mike Shewmaker, a specialist with our office, will be talking about steep-sloped cool roofs, roof alterations, fenestration requirements, opaque envelope, and the simplification of the hotel/motel envelope requirements.

We're trying to provide some alignment with the nonresidential and we will explain that a little bit later.

With that, so how did we start. To reduce wasteful, uneconomic, and inefficient or unnecessary consumption of energy, two California politicians, Charles Warren and Al Alquist, the co-authors, developed what's known as the Warren Alquist Act. This law was signed in 1974 under Governor Ronald Reagan and was funded by Jerry Brown in 1975. And the development of the Energy Commission was made at that time.

This Act actually gives authority to the Energy Commission to develop the Energy Code on a triennial basis and the local jurisdictions to enforce the Energy Codes

through the building permit process.

These days we're not just talking about energy efficiency. We're looking at global warming potentials, we're looking at a government -- urban heat island, we're looking at decarbonization, and providing a pathway for an all-electric building to be implemented here in California.

How are the Codes developed. Currently, with the help of our utility partners, being Pacific Gas & Electric, Southern California Edison, San Diego Gas & Electric, the Sacramento Municipal Utility District, and the Los Angeles Department of Water and Power, who with their consultants help and support our efforts in moving forward and through the 2022 Code cycle. These organizations with consultants develop what we call the Codes and Standards Enhancement Document, the CASE Reports. The utilities have had multiple stakeholder meetings within their own program, where they invited the public to provide feedback and provide information for the proposals that they will be making to the Energy Commission.

So for each measure that you will be hearing today, there were two workshops done at the utility level, and now when they submitted the CASE Report to the Energy Commission, now that becomes the responsibility of the Energy Commission to move forward with it. And, to get more information from you folks and others, we have what we call

the pre-rulemaking workshops, today being one of those.

There are other entities involved in Code development. We also have the California Energy Alliance. They have submitted a few proposals to the Energy Commission also for evaluation.

But in doing so, all measures have to go through a lifecycle cost methodology based on the most current, up-to-date time-dependent value format in the creations. So what is proposed has to be cost-effective to the building owner. And it's all based on the 16 climatic zones in California and what may be cost-effective in one climate zone may not be cost-effective in another climate zone.

Our tentative schedule currently as we move forward. We are to complete our workshops by -- and supposedly we're supposed to have them all completed by the end of October. There are two workshops that will be lingering, and I will explain those a little bit later, after this slide. But our hope is to have the 45-day language, write-ups, and hearings in February. Before doing that, we have to write the Code language, the Standard language, and it has to be done at least a month before our workshops -- actually I lied, it has to be done two months before our workshop because it takes about a month to have it routed within the Energy Commission and to be evaluated. And then it takes about a month or so to get it posted for

your public review.

And we will most likely have two workshops some time in February. Those workshops will be commissioner-held workshops, so Commissioner McAllister will oversee those workshops. It will most likely be three or maybe four. At this time I'm not a hundred percent sure how we're going to do that.

And then we're trying to get the language ready for adoption by July of 2021. Folks, there's not much time left. So if we can get your comments and concerns earlier rather than later, we're in better shape. And I really don't want to rush things, but we'll do our best to get everything implemented properly, but that also requires your assistance.

We will, after the adoption, we will have to develop the Compliance Manuals, electronic documents for compliance documents, and provide training to the public of the new Code language and what that means.

Then we will be going to the Building Standards Commission for approval of our standards some time -- excuse me -- in December of 2021. That -- at the Building Standards Commission, it's mostly to receive an approval, because we have already done the adoption process here at the Energy Commission, and they just want to make sure that we follow all procedures and protocols that are required,

that we have public hearings, that we take people's/folks' comments in consideration. Per se, we don't have to agree with those arguments, but we have to have taken those into consideration and prove that we have done so.

We're trying to do all this one year in advance, again to get everybody ready and educated and have a smooth transition into 2023 on this current Code cycle.

Our current tentative rulemaking schedule so far, we've had quite few, as you can see. Right now, October 20th, we're talking about the nonresidential high-performance envelope. We will have another one next week on control environmental horticulture and steam traps for newly-constructed buildings and newly-constructed systems.

Also we were to have a workshop on October 29th on the indoor air quality. We are pushing that back to November 3rd and we will tie that up with the nonresidential reduced infiltration requirement. So the indoor air quality proposal and the nonresidential reduced infiltration will both be held on November 3rd. And on November 19th, we will have -- oops, sorry -- we will have one more workshop to propose the all-electric pathway as we move forward, PV requirements, and also present the multifamily all electric as we move forward.

We may or may not between November 3rd and November 19th have another workshop. That will be for

anything we may have missed or anything that comes up that needs to be considered. And we will have another workshop, I'm not sure at this time when that would happen or if that would happen, but I just wanted to get that out to you. But if we do have one, we will definitely have a notice going out and enough time for you folks to be ready to participate.

Key websites for you to consider. The first one is the Utility-Sponsored Stakeholder website. That has all the information that was used to develop the final CASE Reports. The Building Energy Efficiency Program, our websites here at the Energy Commission. That's all the information we have based on 2016, 2019, and the new 2022 Standards. These are all the documents, all the instructions, all the training material, and the compliance and computer programs.

The last link is probably the most important link today and this is for your comments. Please submit your comments to this website here. For this workshop, please submit them by November 3rd. We would love to hear from you. And the reason we do is we want to make sure that we have a very solid program as we move forward. But the sooner you do so, the better we are.

You will probably see this website more and more throughout this presentation today. I just wanted to make

sure that you guys are informed and be able to submit your comments on time.

Some key staff members here at the Energy Commission. Mazi Shirakh, he's our Senior Mechanical Engineer within the Building Standards Office and he's overseeing the Electrification Pathway and the Decarbonization Pathway as we move forward into 2022 and beyond. Myself. Peter Strait, he's a Supervisor here at the Building Standards Office. He oversees all of our staffing and support as we develop the Codes. Haile Bucaneg is our Senior Mechanical Engineer. He's new to the office for this Code cycle. And he's been of very great benefit and he's provided a lot of great input on our Codes and Standards work that we've been doing. Will Vicent, he is our new Office Manager. At this time I don't have a phone number for him as he started about three weeks ago and we have not been back in the office so we don't know what phone number is going to be assigned to him at this time. So to get ahold of him, because you're upset with me or anybody else, you could email him at this time.

Again like I said earlier on, for your comments for today's workshop, please have them submitted to our docket by November 3rd to be considered and at the link below. And I would appreciate it if you guys could submit your comments or communicate with us sooner than later

because then it gives us enough time to really understand the concern and have the proper Code language developed.

Thank you. And if there are any questions, I will pause right now and take any questions that you may have.

And if not, I will transfer to Mikey Shewmaker -- oh, excuse me -- everybody that knows him calls him Mikey -- Michael Shewmaker, and he can start his PowerPoint presentation.

Mikey.

We have one raised hand. And one second, I apologize.

Siva, I'm going to unmute you. Please state your name and affiliation. But before you do, you need to unmute yourself too from your side. Thank you.

MR. SETHURAMAN: How about now? Are you able to hear me?

MR. BOZORGCHAMI: Perfect. Thank you.

MR. SETHURAMAN: Okay. Siva Sethuraman with Cascade Energy. I think there were two slides that showed like a calendar schedule for different measures or focus area. I think --

MR. BOZORGCHAMI: Yes.

MR. SETHURAMAN: -- I don't think we talked about the first one. Would you be able to share that slide one more time?

MR. BOZORGCHAMI: This one, right here?

MR. SETHURAMAN: For right now.

MR. SHEWMAKER: I take it from control by sharing this hearing.

MR. BOZORGCHAMI: Oh, oh, I'm sorry.

This one?

MR. SETHURAMAN: Yes. Thank you so much. Yeah, I just wanted to get an idea of what --

MR. BOZORGCHAMI: Sure. See, we will have this posted on our website. And if you look in our previous workshops too, this is a standard template that we've been using, so that's also on there. The only thing that may not be on the previous slides are the information on the November 3rd. It used to say October 29th, but we moved it to November 3rd at this time.

MR. SETHURAMAN: Got it. Okay. All right.

MR. BOZORGCHAMI: Okay.

MR. SETHURAMAN: Thank you so much.

MR. BOZORGCHAMI: You're welcome very much.

Mikey, go ahead.

* MR. SHEWMAKER: Okay. Share my screen.

All right. Thank you for having me. Good morning, everyone. My name is Michael Shewmaker and I'm an Energy Specialist with the Building Standards Office. Today I am here to present the Nonresidential High-Performance

Envelope Proposals for 2022.

Before I dive in, I'd like to take a second to give a special thanks to the Nonresidential Envelope CASE Team, led by Energy Solutions who served as a primary author for this CASE initiative.

In today's presentation I will be covering five topics, as Payam mentioned earlier: The steep-sloped cool roofs; roof alterations; fenestration, which includes an update to the U-factor and SHGC requirements for fixed window and curtain wall storefront windows, as well as a compliance path option for an update to FAR SHGC equation to provide credit for horizontal slats; additionally, I will be covering opaque envelope, specifically I will be focusing on a proposal for walls; and a simplification for one the hotel/motel envelope requirements.

Starting first with cool roof. For those of you who would like to follow along in the CASE Report, this proposal will correspond to Chapter 2.

So under the current 2019 Code, nonresidential buildings are required to have an aged solar reflectance of 0.20 and a thermal emittance of 0.75 in all climate zones.

First off, I want to reiterate that we are not pursuing the low-sloped cool roof proposal for inclusion in Part 6 for 2022. So for the remainder of this presentation, I will be focused solely on the steep-sloped cool roof

proposal.

This proposed Code change would impact new construction as well as additions and alterations. However, alterations to healthcare facilities would be exempted.

So for 2022, we are looking at requiring an aged solar reflectance of 0.25 and a thermal emittance of 0.80 in Climate Zones 2 and 4 through 16. This measure would apply to all nonresidential building types including relocatable public school buildings and healthcare facilities with the exception of alterations.

Since this measure is being proposed for new construction as well as additions and alterations, Section 140.3(b) and 141.0(a)2B would be affected as the section would be updated to reflect the proposed steep-sloped and cool roof requirement proposed. And there are no proposed changes to the reference appendices for this measure.

For this measure there would continue to be an exception for roof areas covered by building-integrated solar PV panels or building-integrated solar thermal panels.

And although we are not pursuing the low-sloped cool roof proposal at this time, the low-sloped cool roof insulation trade-off table would be updated to align with the new TDV values as well as the roof alterations proposal which I will discuss in the next section of this presentation.

The one concern from stakeholders that was brought up at the utility-sponsored stakeholder meetings that I'd like to address was regarding potential product availability. Through the CASE Team's research, they found that 86 percent of products that currently meet the 2019 steep-sloped requirement would meet the proposed 2022 requirement. However, I want to be clear, the proposed Code change does not prohibit the use of any roof product. Through either the prescriptive low-sloped cool roof insulation trade-off table or the performance compliance approach, any product can be installed.

Another concern that was brought up the utility-sponsored stakeholder meeting was regarding moisture. Numerous online articles and simulations have shown that appropriate amounts of above deck insulation can be added to ensure that the roof deck stays above the dew point, mitigating any potential moisture concerns. For new construction, the stakeholders that we spoke to indicated that moisture buildup is not really a concern as designers can design the roof assembly to account for the more reflective roof surface.

For alterations, multiple stakeholders agreed that adding R-10 above deck insulation would keep a roof deck warm enough to mitigate most moisture accumulation problems in the vast majority of existing buildings. However, the

specific conditions of each building would not to be considered and additional insulation may be required in certain climate zones and scenarios.

Now before we dive into the results of the computer modeling, I wanted to touch on a few key assumptions. For modeling purposes, we assumed that the standard design or baseline was minimally compliant with the 2019 Part 6 requirements with one exception. For hotel/motel guestrooms, it was assumed that the entire room area complies with the nonresidential requirements in Table 140.3-B.

To perform the necessary computer simulations, the 2022 research version of CBECC-Com was used along with EnergyPlus. A few key assumptions of other prototypes that were not used or were modified:

Hotels, warehouses, large retail buildings, and grocery store buildings were not modeled and are not included in the scope of this measure;

The retail mixed use building prototype does not include a roof, subject to it is not evaluated; and,

Finally, OfficeSmall, restaurant, standalone retail, and retail strip mall building prototypes were modified to include examples with steep-sloped roofs.

I threw this slide in to provide a little information on where the building prototypes used in this

analysis came from. The majority of the building prototypes used come directly from the CBECC-Com software. However, the grocery and assembly models were sourced from CPUC's DEER and the hospital prototype was modeled -- hospital prototype model was sourced from DOE and ASHRAE.

Now digging into the results of the energy modeling, in the following slides I will present the first-year energy impact results. Here you have the TDV energy savings for new construction. And, as you can see, the results are generally positive with a few exceptions here and there.

And here you have the TDV energy savings for alterations. Again, the results are generally positive with a few exceptions.

Now in the next set of slides I will present the 30-year energy cost savings results for newly-constructed buildings and alterations in 2023 dollars. As noted on the slide, the TDV methodology allows for peak electricity savings to be valued more than electricity savings during non-peak periods.

To give some perspective, here you have the 30-year TDV energy cost savings results for the OfficeSmall building prototype. And, as you can see, the large electricity savings seen from this measure far outweigh the slight increase in natural gas usage, resulting in positive

TDV energy cost savings in almost all climate zones except for Climate Zone 1.

Pulling back a little, here you have the total TDV energy cost savings per square foot for new construction broken down by building prototype and climate zone. And here you have the total TDV energy cost savings for alterations. Again, this is per square foot and broken down by building prototype and climate zone.

The incremental cost for both new construction and roof alterations consists of the difference in material costs of roofing products that meet the current 2019 requirements to those that meet the proposed 2022 requirements. There were no incremental cost for product installation and no incremental cost for maintenance.

On this slide you have the incremental cost information that was gathered and used for the benefit cost analysis. Incremental costs were determined from online searches, previous research reports, and phone conversations with roofing suppliers and retailers.

Using the incremental cost information from the previous slide as well as the percent market share that those roofing products represent, a blended incremental cost was estimated at two cents a square foot. Additionally, the lifetime of these products was assumed to be 15 years, so the incremental cost used for the cost-effective analysis

includes the cost to replace the roofing membrane once during the 30-year period of analysis.

And now for the cost-effectiveness results. Since this measure proposes a prescriptive requirement, a cost analysis was required to demonstrate that this measure is cost-effective over a the 30-year period of analysis. Included in this are the incremental first cost and the maintenance and replacement costs; and the TDV energy cost savings from electricity and natural gas were included in the evaluation as well.

Here to give some perspective again, you have the cost-effective summary the OfficeSmall building prototype. If you focus your attention to the column on the right side of the table, there you have the benefit-to-cost ratios. Just as a reminder, to be considered cost-effective, the calculated benefit-to-cost ratio must be greater than or equal to 1.0. As you can see, this measure has shown to be cost-effective in almost all climate zones with the exception of Climate Zones 1 and 3.

Here you have the cost-effectiveness summary for new construction broken down by climate zone and building prototype. At the bottom of the table you have the benefit-to-cost ratio for each climate zone weighted across the various construction types by the construction forecasts.

And here you have the cost-effectiveness for

alterations, again broken down by climate zone and building prototype with the construction-weighted benefit-to-cost ratio at the bottom.

So with that we'll pause here a moment, open it up for questions. For those of you who would like to speak, please use the raise your hand function, once called on you will be able to unmute yourself. For those of you on the phone, you raise your hand by using star 9 and when called on you use star 6 to unmute yourself. And please before stating your comment or question state your name and affiliation for the record.

MR. BOZORGCHAMI: So, Mikey, we have Paul.

Paul, I'm going to unmute you. Go ahead, sir.

And, folks, when I unmute you, you unmute yourselves too. It's a two-step process.

So, Paul, you're muted right now I think.

MR. LAVALLEE: Okay. Can you hear me?

MR. BOZORGCHAMI: Yes, perfect.

MR. LAVALLEE: Good. Hello. Good morning. My name is Paul Lavallee. I work for Arkema as a Global Market Manager for Kynar Coatings. I want to start by thanking the California Energy Commission for the opportunity to share these comments. I also want to thank the CASE and Codes and Standards Enhancement Team for the great work and doing all the analysis on the nonresidential high-performance building

envelope.

I'd like to request that the Commission include the low-slope cool roof requirements within the Title 24, Part 6, in the nonresidential high-performance building envelope and not in Title 24, Part 11, the CalGreen. And I'd like to share five reasons why I think it's in California's best interest to include the low-slope cool roof requirements in Title 24, Part 6.

First is low-slope cool roofs will actually provide a 32-percent higher payback to California than the proposed steep-sloped roofs. This is evidenced on the CASE Reports, if you look at their Tables 49, 50, and 51, the overall payback or net present value, as it's called, over the roof's lifespan. And, in fact, this payback time would even be higher with some of the longer-lasting roof technologies that are presently available in the market.

Second, the low-slope roofs will provide 13-percent higher greenhouse gas savings or reductions versus the proposed steep-sloped roofs. The low-sloped roofs will provide a net 955 metric tons of CO2 equivalent reductions. And this is supported by the CASE calculations that have been publicly shared. And I'm told those will be included in the forthcoming updated CASE Report.

Third, the concerns about roof condensation can be easily addressed, as mentioned by Mikey in his slides just

now. They can be addressed with vapor barriers or roof insulation. In fact, the CASE Report clearly outlines performance standards to address this. That's in Section 2.2.2.6.

Fourth, there's a wide variety of currently-available roofing toppings that meet the low-sloped roof standards. In fact, there are several asphaltic base products that meet the proposed standards. Overall, all together there's 480 unique roofing products on the market that meet the proposed low-sloped cool roof standards. And those are listed in Table 172 and 173 of the CASE Report.

And, fifth and finally, the energy goals set by the California Legislature are, frankly, challenging and their imminent. And meeting these mandate targets is going to require a "all of the above" approach utilizing many proven technologies to collectively reduce our carbon footprint. The CASE Report's final calculation and conclusions support that the proposed low-sloped cool roof requirements are a proven value-add.

So taken together, we feel these five points paint a picture of economic and achievable improvement, and that meets the California Energy Commission's goals as mentioned by Payam at the start, energy efficiency, greenhouse gas reduction, and reducing the environmental impact and heat effect on buildings. So taken together we propose the

addition of the low-slope roof proposal, the high-performance building envelope for the 2022 Code cycle year.

Again, thank you for the opportunity to share these comments.

MR. BOZORGCHAMI: Thank you, Paul. I will be reaching out to you. Thank you.

MR. LAVALLEE: Great.

MR. BOZORGCHAMI: Joe, I'm going to unmute you, sir.

MR. CAIN: Hello. Joe Cain, Solar Energy Industries Association. I heard that for steep-slope, the mention that BIPV roofs are exempt from the cool roof requirement. The question is about a BIPV roof system in which the esthetic is consistent across the roof, but some of the portion of the roof is the power-producing portion of the roof and the rest of it is just in the same family of product, is that entire roof exempt from cool roof requirements for steep slope? Otherwise that product -- you know, I'm not sure how that product would meet the cool roof requirements. That's the question. Thank you.

MR. BOZORGCHAMI: So, Joe, are you talking more similar to -- I'll be out there and just say it -- Tesla cool -- or is it access the solar roof?

MR. CAIN: Yes. I was not going to mention a trade name, but --

MR. BOZORGCHAMI: Yeah, that's okay. No, it's only areas that provide power generation. The value of cool roof oversees the other part, so if you do have a cool roof, that should reduce your energy consumption, so the rest of the wall -- roof most likely would need to meet that cool roof requirement.

MR. CAIN: Okay. That could be problematic.

MR. BOZORGCHAMI: Yeah.

MR. CAIN: So that may be something that needs further study, I guess is my suggestion.

MR. BOZORGCHAMI: Sure. Let's talk about that.

MR. CAIN: Thank you.

MR. BOZORGCHAMI: Sorry, I'm just taking notes. Any other raised hands? Any questions and answers?

Okay, with that, Mikey, go on to the next proposal, please.

* MR. SHEWMAKER: All right. So the next topic I will be covering is roof alterations, which corresponds to Chapter 3 in the CASE Report.

Roofing insulation requirements for alterations were first introduce in 2008 and have remained unchanged since. For roof replacements, R-8 continuous insulation is required in Climate Zones 1 and 3 through 9 and R-14 continuous insulation is required in Climate Zones 2 and 10 through 16. Roof recovers, on the other hand, have been

exempted from any insulation requirements during this time.

For 2022 it was proposed that roof replacement would be required to have R-23 continuous insulation and Climate Zones 1 through 5 and 9 through 16, and R-17 continuous insulation in Climate Zones 6 through 8. Additionally, roof recovers would be required to have either a minimum of R-10 continuous insulation above deck or meet the requirements for roof replacements, whichever is less.

Because this measure would only apply to alterations, only Section 141.0 of part 6 would be affected. Additionally, JA4, Table 4.2.2 for the Reference Appendices would be updated to include U-factors for R-17, R-20, and R-23 continuous insulation.

The exception for mechanical equipment located on the roof and that is not being disconnected or lifted would continue to exist, however, it would be limited to certain climate zones for both roof replacements and recovers. And I will explain more on this in a moment. Additionally, the exception for tapered insulation would remain available.

For 2022 it was proposed that we remove the exceptions for existing roofs with R-7 continuous insulation. The reason for this modification is to accommodate the R-10 continuous insulation requirement for recovers. Additionally, the exception states that insulation is not required to be added if doing so would

reduce the base flashing height to less than 8 inches at penthouse and parapet walls, as stakeholders have indicated that raising base flashing heights at penthouse and parapet walls does not add significant complexity or cost to projects. Furthermore, this change would reduce the complexity of the Code and remove an exception that stakeholders is unnecessary. Furthermore, the exception for limited base flashing height of mechanical equipment was modified to limit it to certain climate zones as it was found to be cost-effective to lift the equipment in certain scenarios.

Again just to reiterate, the standard design was minimally compliant with the 2019 Part 6 requirements with the one exception for hotel/motel guestrooms.

For computer analysis we again used the CBECC-Com 2022 Research Version as well as EnergyPlus. As a quick note, for this measure the hospital and retail mixed-use building prototypes were not evaluated and the public assembly building prototype is continuing to be evaluated, but the results were not prepared in time to present today.

This is not something we need to go into in depth, but it reiterates what I stated earlier about the origins of these building prototypes and were used in the analysis.

Digging into the results of the energy modeling, starting first with the first year energy impacts. Here you

have the TDV energy savings for roof replacements. As you can see, the results are positive in almost every scenario, with the exception of retail standalone in Climate Zone 15, which came as a bit of a surprise to us.

And here you have the TDV energy savings for roof recovers, which shows fairly significant savings in nearly all scenarios, a little less so for the OfficeLarge and Medium, but still positive.

Now moving to the results of the 30-year energy cost savings. Here you have that 30-year TDV energy cost savings for roof replacements. Again we have just that one anomaly for retail standalone in Climate Zone 15. And here you have the 30-year TDV energy cost savings for roof recovers with positive savings across the board.

The incremental first cost estimate for this measure included the material cost of insulation, the labor to install it, and the cost of lifting mechanical equipment to maintain the necessary base flashing height. Additionally, it was assumed the lifetime of the roofing membrane is 15 years, so that over the 30-year period of analysis there would be at least one roof recover.

For roof replacements it was assumed that there would not be any incremental cost for replacement or maintenance. However, for roof recovers, we assumed a replacement cost of 55 cents a square foot in Climate Zones

1 and 3 through 9 and 51 cents a square foot in Climate Zones 2 and 10 through 16.

Just as a quick note, we assumed incremental replacement cost was the same used for the incremental first cost for roof recovers, but with a three-percent discount rate applied over 15 years.

Here you can see how the incremental cost was calculated for the various levels of insulation for roof replacements versus recovers. Just as a quick note, it was originally proposed that we included a means for third-party verification for the existing insulation to be counted towards the roof alteration requirement. But since there is no means or entity to do this at this time, we decided not to pursue this for 2022. So that is why you see the cost of verification there crossed out.

And, finally, we'll dig into the cost-effectiveness analysis results before we open the floor again for questions.

Here, you have the cost-effectiveness summary for roof replacements. Again, values that fall below a benefit-to-cost ratio below one are highlighted in red. And here you have the cost-effectiveness summary for roof recovers. To sort of bring this all together, here you have the benefit-to-cost ratio for each climate zone with the cost of various construction types and construction forecasts. As

you can see, the roof replacements measure was shown to be cost-effective for all climate zones. And for roof recovers, it showed them as cost-effective in almost all climate zones, just barely missing the mark in Climate Zone 10. However, this might change with the removal of the verification cost.

And although this information was not included in the overall cost-effective analysis due to the small number of recovers covering the membrane, a question came up at one of the stakeholder meetings about cover boards that I thought I would address. The statewide CASE Team formed a cost-effective analysis for adding a cover board during a roof recover with an additional first cost of 40 cents a square foot and an additional maintenance cost of 26 cents a square foot for the cover board.

And with that we'll take a moment here and open things up for questions.

MR. STRAIT: Thank you. There is one question that we have by chat, and I'm happy to read that now. Are you able to hear me, Mikey?

MR. SHEWMAKER: Yes.

MR. STRAIT: Okay, just confirming.

Sid Dinwiddle -- Dinwidde -- I'm sorry -- asks: Recognizing higher reflectance may result in moisture problems, the use of R-10 insulation above the deck is

suggested to prevent the issue. Why was that insulation not included in the cost-effectiveness evaluation.

MR. SHEWMAKER: Is this a question related to the -- specifically to the cool roof proposal? Because the measure here, the R-10 insulation was taken into consideration.

MR. STRAIT: Um-hum. We have -- Sid, if you're still listening, you can type a response in or a new question to clarify or you can raise your hand and we can unmute your line.

MR. SHEWMAKER: And you could always email me as well and we can --

MR. STRAIT: Oh, he is saying prior proposal specifically. And Heidi has typed a response, and I don't know if you want to read that off.

MR. SHEWMAKER: I don't have access to the Q&A.

MR. STRAIT: All right. I will read the response that I'm seeing from Heidi: So the roof insulation requirement was considered for alterations within the roof proposal. Both roof insulation and cooler roofs for steep slope are cost-effective independently. They have not let the combined energy impacts and benefit costs of R-10 along with the cool roof but because each is cost-effective independently, we would not expect them to be not cost-effective together.

So that's --

(Brief simultaneous talking.)

MR. SHEWMAKER: -- party.

MR. BOZORGCHAMI: Joe, I'm going to unmute you.

MR. CAIN: Joe Cain, Solar Energy Industries Association. I heard mention of cover boards, and just a comment that as you stand on a requirement for rooftop PV systems to some commercial occupancies, to meet the fire classification requirements in the Building Codes you will likely see increased use of cover boards, and those would be helpful if -- in more widespread use with original construction to provide better opportunities for meeting fire classification requirements for PV systems and mounting systems in the presence of that roof assembly. So cover boards is a good thing.

MR. STRAIT: Thank you, Joe.

I do not have any additional open questions in the Q&A box.

MR. BOZORGCHAMI: I don't have any more raised hands, so, Mikey, go ahead.

* MR. SHEWMAKER: Okay. All right, so moving onto windows. So for this topic there are two proposals that I will talk about. The first is a prescriptive update to the U-factor and SHGC requirements for fixed windows and curtain wall storefront windows. And the second is a compliance

option update to the RSHGC equation to provide credit for horizontal slats.

So first I'll start with the proposal for fixed and curtain wall storefront window factors and SGHCs. Here you have the window requirements from Tables 140.3-B and -C to help focus your attention on both of the two categories that we'll be discussing for this measure which are, again, fixed windows and curtain wall storefront windows.

For 2022, this measure would apply to new construction only and would reflect a more stringent U-factor in SHGC values, while visible transmittance would remain the same. In a departure from this past, this measure would also update the reference table to include bearing values for each climate zone to account for climate-specific ease.

So for 2022 the prescriptive window requirements would look something like this. For fixed windows, a U-factor and SHGC requirements would be revised to meet .34, .22 in Climate Zones 9 and 11 through 15. For all other climate zones would remain at the current 1.36, 1.25.

For curtain wall storefront windows, the U-factor and SHGC requirements would be revised to .38, .25 in Climate Zones 1 and 7, while all other climate zones would remain in the current .41, .26.

Most of the changes you see here for Part 6 and

the Reference Appendices are related to the updated RSHGC equation, which I will talk about in a minute. But for the U-factor and SHGC updates, because this proposal would only affect new construction, only Section 140.3 would be affected.

For 2022, it was proposed to do away with the exception for site-building fenestration. I should note that this has been a gradual phasing-out process. This exception would reduce the last Code cycle from 1,000 square feet to 200 square feet, but we feel that this will give builders enough time to acquaint themselves with the NFRC certification process.

In order to achieve these more stringent U-factor and SHGC requirements, there are many technologies that are currently available that would allow the designer to meet the proposed requirement. Excuse me. These include argon and krypton gas fill, low-e coatings, thermally broken frames, warm edge spaces, and triple-pane glazing. However, achieving the proposed overall U-factors may require more than one of these strategies to be employed. For the purposes of this measure, the CASE Team determined that including the fourth surface low-e coating on a baseline technology was sufficient to meet the updated requirements.

Before we dive into the results of the modeling, I should mention that for fixed windows, for any building type

that was expected to contain curtain wall and storefront window products, it was assumed that 809 percent of the fenestration was fixed and 20 percent was curtain wall or storefront windows.

For this measure we again used CBECC-Com and EnergyPlus, but for this measure all of the building prototypes were evaluated.

Again this was information that you saw earlier, so I'm going to skip over it.

But so now we'll dive into the results of the energy modeling. Here you have the TDV energy savings for fixed windows. And here you have the TDV energy savings for curtain wall storefront windows.

Switching now to the 30-year cost-effectiveness -- or cost savings results, here you have the 30-year energy cost savings for fixed windows. And here you have the 30-year energy cost savings for curtain wall and storefront windows.

The incremental costs for this measure are relative to a window that is minimally compliant with the 2019 Standards and includes labor and material cost but no incremental maintenance or replacement costs.

In this table you have the incremental costs for fixed windows broken down for each building prototype. And here you have incremental costs for curtain wall storefront

windows broken down for each building prototype.

Just like with the other two measures, the cost-effectiveness measure proposes a prescriptive requirement. A cost analysis was required to demonstrate that this measure was cost-effective over the 30-year period of analysis.

First, to give a little perspective. Here, you have the fixed window cost-effectiveness summary for the OfficeLarge building prototype. And, similarly, here you have the curtain wall storefront window cost-effectiveness summary for the OfficeLarge building prototype.

And on this slide you have benefit-to-cost ratios for fixed windows broken down by climate zone and building prototype. Again at the bottom of the table you have the benefit-to-cost ratio for each climate zone weighted across the various construction types by the construction forecasts. And, finally, here are the benefit-to-cost ratios for curtain wall storefront windows.

But before I move on to the RSHGC equation update, I will pause here for a moment and see if there are any questions.

MR. BOZORGCHAMI: Mikey, this is Payam. We have one question on your previous proposal. It came in a little bit late. It's from -- I don't know Paul's last name, but it's from Paul. And he states: The key problem requiring

upgrades on existing buildings during recover work is enforced and has any thought been given to how this will be enforced.

We're going to be working with folks at D- -- county -- building members trying to figure that out, but right now, as you know, there is certain city and county enforcement requirements. Examples, City of L.A., County of L.A., the Cities of Davis and San Mateo and Santa Monica, and so forth, that have a permit requirement for recover work to be done. So -- but that's a further discussion that we're going to be having with the local building officials and see what we can do.

But for your current proposal, I don't see any questions or raised hands.

MR. STRAIT: I'm unmuting myself there, Payam. But, no, I don't see any other questions either.

MR. BOZORGCHAMI: So I think we can move on.

MR. SHEWMAKER: There is a raised hand that just came up.

MR. BOZORGCHAMI: Oh, Joe has just raised his hand.

Go ahead, Joe.

MR. CAIN: Joe Cain with SEIA. This may be a little bit sidebar at this point in time, but there is the new U.S. standard that is developed for BIPV. And I am

aware that there are a couple of products that are -- have been listed that are fenestration or other facade products. So -- and move to -- again, if we move the PV requirement for high-rise buildings and there is insufficient roof area, we will begin to look at the facade systems. So --

MR. BOZORGCHAMI: Sure.

MR. CAIN: -- a question or suggestion is whether there is anything on parallel to the cool roof exception for, say for instance, if you had a BIPV fenestration product, would it be appropriate to exempt that from some or of the other requirements. That's the question, something to look into.

MR. BOZORGCHAMI: Sure, Joe. And I've heard that too, I've heard it at NFRC also, that comment. This is something that we're going to have to talk with you and be able to provide some sort of clarity within the Standards. I sure do want to see BIPVs out there, but we're going to have to figure out how to get them implemented into the --

MR. CAIN: Right.

MR. BOZORGCHAMI: So I --

MR. CAIN: That's a little more tricky because of --

MR. BOZORGCHAMI: Yeah.

MR. CAIN: -- the thermal and the -- yeah, anyway.

MR. BOZORGCHAMI: Yeah, because that system works

a little bit better with heat and the reduced solar heat gain, so we're going to have to figure that out.

MR. CAIN: Okay. Thank you.

MR. BOZORGCHAMI: Mikey, I suggest you go on to your next.

* MR. SHEWMAKER: All right. Okay. So the proposed updates to the RSHGC equation are to provide credit for horizontal slats in addition to overhangs. Now this was a fairly complex endeavor, so I will do my best to break it down in a manner that is hopefully understandable. But I would implore you to review this information in the CASE Report for yourselves if you were interested.

Quickly, I should also note that the RSHGC equation update is alternative compliance path, so no cost-effectiveness calculation was necessary.

Some key assumptions:

The energy savings from exterior shading is only a function of the solar heat gain that passes through the shading onto the window it shades; it is only affected by the geometry and solar reflectances of the shading materials; it is not affected by the choice of the prototype building;

Additionally, the interior characteristics of the building do not affect the amount of solar radiation passing through an exterior shading device;

And since the size of the exterior shade would be required to cover the entire window, the size of the window does not affect the relative energy savings; for these reasons, only the OfficeSmall prototype was evaluated.

So the prototype was modeled as a baseline with no horizontal slats and then was compared to one with exterior horizontal slats. Various cutoff angles, tilt angles, and reflectances were modeled in the proposed cases. for more, all models were rotated to cover a range of orientations.

And so people can know what the hell I'm talking about, here is an illustration to help explain. The tilt of the horizontal slat determines how much indirect sunlight reaches the interior. An analogy with visible light is that the greater the tilt, the more the glowing surface of the slat can be seen from the interior.

The tilt and spacing together determine a solar elevation angle above which direct sunlight is blocked. This is known as the cutoff angle. The cutoff angle of a horizontal slat determines how much direct sunlight reaches the interior.

And before we get into the proposed equation, first we discuss the shading factor. The shading factor is a factor multiplied by a window's SHGC to produce the RSHGC when shading is present. Then using the equation you see on the screen for each climate zone the TDV weighted the solar

gains through the window for all hours in the proposed model was divided by that of the baseline unshaded model. This was then weighted by the climate zone fraction of all forecasted nonresidential construction and then all climate zones were assumed.

In order to create an equation that would work for both overhangs and horizontal fins, we first need to determine the savings from an overhang. To do this, the zero tilt, zero reflectance shading factor results were used. Since overhangs don't have interreflection between slats, they do not transmit solar gains and so therefore their reflectance is considered virtually zero.

For horizontal slats, the physics is a little more complex due to the reflectance of light between the slats, resulting in more interior gains. For a given cutoff angle, there is a tilt angle of maximum solar gains.

At low tilt angles, the slats mostly interreflect between themselves and not into the interior. At high tilt angles, the slats mostly bounce sunlight back out to the exterior. Somewhere between these two points there is a maximum solar gain point. And, to be conservative, this maximum point was used for determining the shading factor formula.

This figure helps to illustrate what I have just described on a previous slide. So in this figure you have

the shading factor graphed as a function of the horizontal slats' tilt angle. And, as you can see, the shading factor increases with increased tilt angle to a point. And then once you go beyond a certain tilt angle, the shading factor begins to drop.

Finally, here you have the revised bar SHGC equation being proposed. So this equation represents the progression curve of the shading factor that was derived for the final RSHGC. The format of the equation results in a shading factor that is 1.0, one projection factor at the length or projection of the fin over the spacing between the slats equals zero and reaches a minimum near a 180 degree azimuth.

In this factor the regression curve represented by the solid lines are plotted with the simulated values represented by the dots for various cutoff angles and azimuths.

And then in this figure the correlation between simulated and calculated savings along with a line of perfect correlation is shown. As you can see from both figures, the overhang regression is conservative and slightly over estimates the shading factors, while the horizontal slat regression matches the simulated results closely.

So with that we'll pause here again for a moment

and see if there are any questions.

MR. BOZORGCHAMI: Any questions, any concerns, any raised hands?

MR. STRAIT: I'm not seeing anything in the Q&A box.

MR. BOZORGCHAMI: Sure. Folks, you still have time, so if you can't think of anything now you could always submit your comments through our docket and we'll reach out to you folks that way too.

But for now, Mikey, I say we can move forward.

* MR. SHEWMAKER: Okay. Now switching gears to opaque envelope, which corresponds to Chapter 5 of the CASE Report.

Here you have an excerpt from Table 140.3-B of the 2019 Standards, showing opaque envelope U-factor requirements for walls. To help focus your attention, I have both of the values that we will be discussing in this section, and I will frame it.

First off, we are not looking to pursue the roof proposal outlined in this section of the CASE Report. So from this point forward, I will be focusing solely on the walls proposal. This is proposal will apply to new construction as well as additions and alterations. And for 2022, the CASE Team proposed to add R-4 continuous insulation to the current wall requirements.

So for 2022, the revised U-factor requirements for walls are broken down by climate zone would look something like this.

Despite this change applying to additions and alterations as well as new construction, the only section of the Standards that would be affected by this proposal would be Section 140.3, specifically Tables 140.3-B and Table 140.3-C. There are no proposed changes to the Reference Appendices for this measure.

Like all the other measures presented today, we assume the standard design was going to be compliant with the 2019 Standards, with the one exception for hotel/motel guestrooms.

Again we used the same software and the same building prototypes as we had done for all the other measures. Here is a breakdown of all the building prototypes that were evaluated. And now that we've set the stage, we will dive into all the energy modeling.

Here you have the TDV energy savings for walls. Now this information was not included in the final CASE Report that was docketed, so this table is from the draft final CASE Report that was reviewed by the Energy Commission and it will be included in a safe supplement to this CASE Report. Just to know, between the draft final CASE Report and the docketed final CASE Report, there were some last-

minute updates made to the incremental cost information for roofs, which ultimately led them to not be cost-effective on their own. In light of this, the Energy Commission chose to move forward with only the walls proposal. But as you can see here, the savings for walls are positive in nearly all scenarios, with the exception of assembly building prototype.

Moving into the results of the 30-year energy cost savings, here you can see that the projected savings are positive across the board despite the slight increase in electricity usage in Climate Zones 1, 3, 5, and 16. Again, I know this table was not included in the final CASE Report that was docketed. But like I mentioned earlier for the first-year energy impact, this table is from the draft final CASE Report and will be included in the staff supplement.

For this measure, the incremental first costs included incremental material cost of additional insulation. It was also assumed that there would be no additional labor costs or any anticipated incremental maintenance or replacement costs.

Here you have a breakdown of how the incremental cost was calculated for each of the various building prototypes that were evaluated. And, finally, for cost-effectiveness, here you have the benefit-to-cost ratios for the wall proposal. Again, this table was not included in

the final CASE Report that was docketed, but will be included in a staff supplement. As you can see, the wall proposal has shown to be cost-effective in the vast majority of scenarios. With a few exceptions, when weighted across the various construction types, it is shown to be cost-effective in all climate zones.

And with that, we'll pause here and see if there are any questions.

MR. STRAIT: I'm not seeing any new questions in the Question and Answer box.

MR. BOZORGCHAMI: Yeah, Mikey. Go ahead and go to the next topic, please.

MR. SHEWMAKER: Well, let's give folks a second while I grab a sip of water.

* Since we are still not seeing anything, I will continue on. All right. This will be the last topic I'll be covering today, is a proposal by the statewide CASE Team to simplify the hotel/motel envelope requirements. For more information, please consult Appendix M of the CASE Report.

Current hotel/motel buildings are subject to two different sets of envelope requirements. The nonresidential space types much comply with the requirement in Table 140.3-B that apply to all nonresidential buildings, and guestrooms in these spaces must comply with the requirements in Table 140.3-C.

This proposal would simplify the requirements for hotel/motel. The entire hotel/motel room would need to adhere to one requirement as opposed to different requirements, depending on the space type located under the room. Essentially, it was proposed that the envelope requirements for hotel/motel be aligned with the requirements for nonresidential buildings. The envelope requirements that apply to high-rise residential would be moved to the new multifamily section. And what would remain in Table 140.3-C would apply to guestroom spaces within hotel/motel buildings.

On the next couple of slides I'm going to show a table that represents the requirements of both Table 140.3-B, which applies to nonresidential buildings, and Table 140.3-C, which applies to guestrooms, and then shows what is being proposed below in red. Please note that where it was showing to be cost-effective, the recommended envelope requirements are consistent with the proposed envelope requirements presented within the CASE Report.

So, again, just to reiterate, the recommendation is to align the proposed requirements as presented in this report where it was shown to be cost-effective. If a measure was shown to not be effective, then the more stringent of the two current requirements was proposed. So here you have the proposed recommendation for roofs, walls,

and low-sloped cool roof products. Please note that the values you see highlighted were aligned with the opaque envelope proposal that we are no longer pursuing. So these values will be either updated to align with the more stringent of the two values or left as-is.

And here you have the proposed recommendation for steep-sloped cool roof products and roof replacements.

A couple of key assumptions before we dive into the results of the energy modeling. The steep-sloped cool roof and roof recover proposed requirements were not modeled for a HotelSmall prototype. And it was assumed that the hotel/motels would also not be affected by the curtain wall storefront window requirement.

For evaluation, the CBECC-Com 2022 Research Version was used along with EnergyPlus. And, for this measure, only the HotelSmall building prototype was evaluated.

Moving into the results from the computer modeling, the following slides show energy savings and peak demand reductions per unit. Here you have the energy savings for new construction. As you can see, the electricity and natural gas savings are almost all positive. And here you have the energy savings for alterations. As you can see, in this scenario the electricity and natural gas savings are positive across the board.

To estimate the incremental costs of the proposed changes, the statewide CASE Team determined the incremental cost for the following on a per square foot basis. The incremental cost of current requirements that apply to guestroom spaces relative to the proposed requirements as well as the incremental costs of the current requirements that apply to nonresidential spaces in the hotel/motel relative to the proposed environment. The CASE Team then used the building geometry in the prototypical buildings to develop a weighted average incremental cost per square foot of impacted envelope element.

So here you have incremental cost information for new construction. I know this table looks a little overwhelming, and I apologize for it being so small, but there was a lot of information for the slides. So to hopefully make things a little clearer, you have the incremental cost information for your baseline assumption on the left and then the proposed on the right. And then the total incremental cost that was then used as part of the analysis can be found in the far right column of the table.

So here you can see the incremental cost for cool roofs. Here you have incremental cost information for wall and insulation. And here you have the incremental cost information for windows. Then at the bottom of the table you have the total incremental cost for all of the measures

being proposed or evaluated. This value is the sum of the total incremental costs for each of the submeasures found in this table.

Similarly, here you have the incremental cost information for alterations. So here you can see the incremental cost associated with a cool roof alteration, for a roof recover. And here you can see the incremental cost associated with a replacement. There at the bottom you can see the total incremental cost for all of the measures being proposed and evaluated.

And because this proposal would modify the stringency of the proposed requirements for hotel/motels, a cost analysis was required to demonstrate that this measure is cost-effective over the 30-year period of analysis. So here you have the cost-effectiveness summary for new construction. As you can see, the cost-effectiveness didn't quite pencil out as we had hoped, with this proposal only showing cost-effectiveness for Climate Zones 10 through 16.

And here you have the cost-effectiveness summary for alterations. Again, it wasn't quite what we had hoped, but it did prove cost-effective in more climate zones than construction, with this measure penciling out Climate Zones 2, 4, and 8 through 16.

Now while we do not have any specific questions at this time, we are highly, highly interested in your feedback

on this proposal. So, please, I encourage you to review Appendix M and provide us with your questions and comments in the docket.

And with that, I will stop yammering and open things up for questions.

MR. STRAIT: I do not have any questions in the Q&A box at the moment and I'm not seeing any hands raised.

MR. BOZORGCHAMI: Mikey, let's take another glass of water, so maybe hopefully something comes up. If not, then people, folks can submit their comments in our docket and we can answer them that way.

MR. SHEWMAKER: Okay.

MR. BOZORGCHAMI: Okay. I think we should move on to the next proposal.

MR. SHEWMAKER: Okay. Well, that is pretty much it for me.

MR. BOZORGCHAMI: Okay.

MR. SHEWMAKER: Thank you all for your time and attention this morning. You can find a copy of the CASE Report using the following link. For those of you with a copy of the presentation, you can simply click where it says "CASE Report," and it will take you directly to the actual CASE Report. I've also provided a link to our online commenting system. Again, for those of you with a copy of the presentation, you can simply click where it says,

"Submit Comment," and it will take you right to it.

And, finally, as Payam mentioned earlier, we ask that comments be submitted to the docket by no later than 5:00 p.m. on November 3rd.

You can submit your comments to us in one of three ways: Through our electronic commenting system, which I had just mentioned on a previous slide; by emailing your comments to the docket unit at docket@energy.ca.gov. Please be sure to include the Docket Number 19-BSTD-03 and "2022 Building Energy Efficiency Standards" in the subject line.

And, finally, as a last resort, you can submit your comments by mail and to the following address. However, during this time electronic submittal is highly, highly encouraged as we are out of the office during this pandemic.

If you have any questions, please don't hesitate to reach out to us. Questions regarding these specific proposals can be directed to me. My contact information is provided there at the top. And for questions related to the 2022 Standards more in general, you can reach out to Payam Bozorgchami.

And with that, that concludes my presentation. Thank you, all, again. And as much as time will allow, I'd like to open things back up for any final comments or questions.

MR. BOZORGCHAMI: Mikey, can you go back to that one slide that had all the three -- there you go. Yeah, right there.

Any comments, any questions? On anything you heard today?

Well, if not, please submit your docket and the information is right there. And I will adjourn the Pre-Ruling Workshop for today. Thank you, everyone, for participating. Thank you.

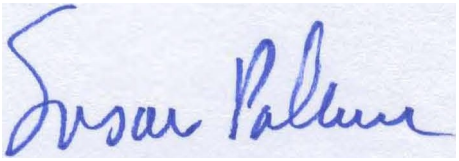
(Whereupon, the workshop was concluded at 10:27 o'clock a.m.)

REPORTER'S CERTIFICATE

I DO HEREBY CERTIFY THAT THE TESTIMONY IN THE FOREGOING HEARING WAS TAKEN AT THE TIME AND PLACE THEREIN STATED; THAT THE TESTIMONY OF SAID WITNESSES WERE REPORTED BY ME, A CERTIFIED ELECTRONIC COURT REPORTER AND A DISINTERESTED PERSON, AND WAS UNDER MY SUPERVISION THEREAFTER TRANSCRIBED INTO TYPEWRITING.

AND I FURTHER CERTIFY THAT I AM NOT OF COUNSEL OR ATTORNEY FOR EITHER OR ANY OF THE PARTIES TO SAID HEARING NOR IN ANY WAY INTERESTED IN THE OUTCOME OF THE CAUSE NAMED IN SAID CAPTION.

IN WITNESS WHEREOF, I HAVE HEREUNTO SET MY HAND THIS 30TH DAY OF OCTOBER, 2020.



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CERT 00124

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I do hereby certify that the testimony in the foregoing hearing was taken at the time and place therein stated; that the testimony of said witnesses were transcribed by me, a certified transcriber.

And I further certify that I am not of counsel or attorney for either or any of the parties to said hearing nor in any way interested in the outcome of the cause named in said caption.

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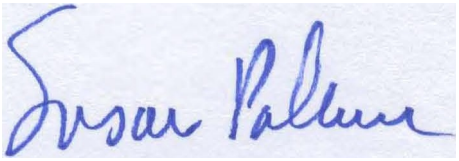

Susan Palmer
Certified Reporter
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