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Transcript of Joshua W. Phinney, Ph.D.

Date: September 13, 2024

Case: Affordable Wire Management, LLC -v- CCABH, Inc. (PTAB)

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WORLDWIDE COURT REPORTING & LITIGATION TECHNOLOGY

Affordable Wire Management, Exhibit No. EX1041

Case No.: IPR2024-00139

Page 1 of 177

1 UNITED STATES PATENT AND TRADEMARK OFFICE
2
3 BEFORE THE PATENT TRIAL AND APPEAL BOARD

4 AFFORDABLE WIRE MANAGEMENT, LLC,
5
6 Petitioner,

7 v.

8 CAMBRIA COUNTY ASSOCIATION FOR THE BLIND AND
9 HANDICAPPED, INC.,
10 Patent Owner.

11 Case No. IPR2024-00139

12 U.S. Patent No. 10,177,551 B1

13
14 * CONFIDENTIAL UNDER PROTECTIVE ORDER *
15 DEPOSITION OF JOSHUA W. PHINNEY, PH.D.

16 New York, New York

17 Friday, September 13, 2024

18 9:21 a.m. EDT

19
20 Job No.: 552312

21 Pages: 1 - 137

22 Reported by: Monique Vouthouris, CCR, RPR, CRR

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3
4 Deposition of JOSHUA W. PHINNEY, PH.D., held at
5 the offices of:

6
7 MINTZ, LEVIN, COHN, FERRIS, GLOVSKY AND POPEO, P.C.
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12 Pursuant to notice, before Monique Vouthouris,
13 Certified Court Reporter, Registered Professional
14 Reporter, Certified Realtime Reporter, and Notary
15 Public in and for the States of New York and
16 New Jersey.
17
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A P P E A R A N C E S

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A P P E A R A N C E S C O N T I N U E D

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P R O C E E D I N G S

JOSHUA W. PHINNEY, PH.D.,

being first duly sworn or affirmed by the Notary,
testifies as follows:

EXAMINATION

BY MR. SWEENEY:

Q Good morning, Dr. Phinney.

A Good morning.

Q My name is Robert Sweeney. I am counsel
for petitioner in this matter, Affordable Wire
Management, LLC.

You're here today for your deposition in
IPR2024-00139 relating to U.S. Patent Number
10,177,551. I'll be asking you questions today
regarding your knowledge of this IPR and
particularly the declaration you submitted in this
IPR on behalf of patent owner, Cambria County
Association for the Blind and Handicapped.

If you don't understand any of my
questions, please ask me to repeat or rephrase it so
we can make sure you understand the question I'm

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1 asking and make sure we're on the same page. Sound
2 good?

3 A Understood.

4 Q And please let me know if you need a
5 break. I would just ask if we're in the middle of a
6 question or a line of questioning, you let me wrap
7 that up. Does that sound good?

8 A Yes.

9 Q Have you ever been deposed before?

10 A Yes.

11 Q Approximately how many times have you been
12 deposed before?

13 A I think maybe in the high forties, maybe
14 almost fifty.

15 Q Great. So you understand I'll be asking
16 you questions and you'll be answering those
17 questions truthfully, correct?

18 A Yes.

19 Q And have you ever served as a technical
20 expert in a litigation before?

21 A Yes.

22 Q Approximately how many times?

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1 A Almost all of those times that I mentioned
2 were. I would decrease the count somewhat because
3 sometimes I was deposed twice in one matter.

4 Q Were those all patent disputes?

5 A Almost all, and some were trade secrets.

6 Q And in each of those matters, were you
7 opining on the validity of a patent?

8 A Almost exclusively, yes, that was the
9 case, in addition to other things related to the
10 patent.

11 Q So you're familiar with the relevant legal
12 standards regarding patent validity?

13 A Yes, I was informed regarding them.

14 Q And you're not under the influence of any
15 medications or substances that would inhibit your
16 ability to provide truthful answers today, correct?

17 A Correct.

18 Q Is there any reason that you're unable to
19 provide full, truthful and accurate testimony today?

20 A No.

21 Q Have you ever been to a solar plant?

22 A Yes.

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1 Q How many times?

2 A I would say maybe I think three, and some
3 others through -- through conference calls, you
4 know, looking at -- looking at something sort of
5 live.

6 Q And what was the purpose of each of those
7 visits to a solar plant?

8 A Failure analysis.

9 Q Where were each of those solar plants
10 located?

11 A So Webberville, Texas. There's the
12 Rosendin one in Kern County. And when I say Kern
13 County, you sort of fly into Bakersfield to go to a
14 lot of these in the Antelope Valley, some of them
15 are technically I think in Los Angeles County and
16 others are in San Luis Obispo County. But there's a
17 whole lot of solar development there.

18 Q And what years were you visiting these
19 solar plants?

20 A I think in 2013 to 2019 approximately,
21 scattered over that range.

22 Q Was that for the same client?

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1 A No.

2 Q Different matters?

3 A Yes.

4 Q And was that -- were those related to --
5 was your failure analysis related to a litigation or
6 other consulting work?

7 A Failure analysis can be I'm going to say
8 sort of pre-litigation, or where parties, like the
9 owner and the owner's engineer and their
10 subcontractors, have agreed to mediation by their
11 contracts, and maybe they're all trying to figure
12 out what it is that's happened, because some of
13 these failures were catastrophic. So it's an
14 unstructured problem of trying to figure out just
15 what happened to even get to the point of
16 adjudicating liability. So it's typically that type
17 of thing and sometimes more focused.

18 Q Have you ever designed a solar plant?

19 A I would say no. I worked with people who
20 have designed solar plants to look at their design
21 and improve their design.

22 Q What type of improvements were you making?

1 A Well, one that was really biting people
2 early on had to do with aggregation of inverters.
3 And so when you would have a grade scale solar
4 plant, you would have a small inverter, you know,
5 they were maybe about two and a half megawatts, and
6 they would be compensated a certain way, they would
7 have a closed loop feedback system. And when you
8 actually aggregate hundreds of these on a site,
9 imagine they all do the same thing at once.

10 So there's sort of a pipe for a current
11 that's sent to the grid through a generator step-up
12 transformer, a main step-up transformer. And
13 that -- those transformers have a certain impedance,
14 but if all of them sort of do something at once, it
15 effectively multiplies the impedance. You see sort
16 of more back voltage when you try to apply a
17 current.

18 And so this actually caused complete
19 haywire operation, unstable operation and
20 oscillation in some of the -- the plants that I
21 worked on in 2013. I mean, they just went
22 completely nuts; transformers caught on fire, entire

1 e-houses were complete losses, just complete fire
2 loss.

3 So -- I'm sorry -- the kinds of things I
4 worked on were understanding that and then changing
5 how the compensation was occurred and installing a
6 compacitor, for instance, was one thing, a
7 three-phase compacitor was installed in some of
8 these e-houses, and looking at that as a way to
9 mitigate this instability. So that's sort of a
10 plant-wide example.

11 Q Was that prior to your work at Exponent or
12 was that while you were working at Exponent?

13 A That's part of my work at Exponent. You
14 know, we would be called in in a situation where,
15 you know, there's a lot of open questions and an
16 unstructured problem.

17 I mean, you know, I mentioned like
18 compensation, but that wasn't clear starting off,
19 you know. Starting off there was also like gophers
20 chewing wires, and people wondered could there have
21 been events like that, or choppy irradiance of
22 clouds. So when you get clouds, you get these

1 certain types of call it cloud effects, people were
2 wondering could that have prompted this.

3 So, you know, it's like exploring
4 different avenues. It's sort of an unstructured way
5 using a team. That's sort of what Exponent is good
6 at doing.

7 Q So were those all photovoltaic, or PV,
8 solar farms that you were working on?

9 A Yeah, those ones that I mentioned earlier,
10 and when I mentioned Kern County and so forth, those
11 were photovoltaic insulation solar.

12 Q Did you ever work on any concentrated
13 solar power plants?

14 A I don't believe so.

15 Q What is concentrated solar power?

16 A That's not a term that people use to refer
17 to the ones I worked on. We called them like grid
18 scale, we would refer to the number of step-up
19 transformers they had as distinguishing them, and
20 the number of electrical blocks and inverter
21 configuration, so where the inverter was, and I
22 don't -- I don't recall one of those being called

1 concentrated.

2 Q So you've never heard that term before,
3 "concentrated solar power"?

4 A I may have. I don't think that was what
5 we called those -- those plants I worked on.

6 Q Besides PV solar power, are there other
7 types of solar power that you're aware of?

8 A Well, there's thermophotovoltaics.

9 Q And could you describe your understanding
10 of that?

11 A So sometimes abbreviated TPV, you can use
12 a very hot body to use, I believe, a conventional
13 junction device to capture photons off of a very hot
14 object. But I don't think they are photovoltaics,
15 you know, it hasn't been commercialized for
16 out-of-door applications in any way I've heard of.

17 Q Is TPV -- strike that.
18 What portion of the solar market would you
19 say is TPV and which is PV?

20 A Oh, I think it's zero percent, yes. It
21 was, when I've encountered it, it's always been a
22 research issue.

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1 Q What is utility scale solar?

2 A So, in my thinking, I distinguish
3 residential and grid scale, and grid scale will be a
4 PV generation facility that is not really there to
5 power load on the site as much as export power, and
6 they have an agreement, like a large generation
7 agreement with a connecting utility as to how to do
8 that.

9 You know, 10 years ago that would be a 30
10 megawatt scale, but now it's, you know, a 300
11 megawatt scale. So that's -- I think of that as
12 grid scale. Residential is just much, much tinier,
13 it's rooftop installations typically, and they have
14 different sorts of safety features and connection to
15 the serving utility in a totally different way.

16 Q So is commercial and industrial solar
17 power different than utility scale?

18 A I would say it can be. So, for instance,
19 a PV installation that's rooftop in a commercial
20 environment can be larger than a residential, you
21 know, 10 kilowatt installation or something. But
22 it's -- it's not at the grid scale, you know, it's

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1 not this part that's sometimes many square miles now
2 in one facility.

3 Q So utility scale doesn't necessarily refer
4 to the size of the plant. It refers more to the
5 purpose of the power generation. Is that fair to
6 say?

7 MR. FLYNN: Object to the form.

8 A In my thinking, what I was telling you
9 about particular installations, I mean, these are
10 things with just -- I think there are millions of
11 panels in some of these, and those I've always
12 called grid scale. They were there as generators
13 and there wasn't like an associated plant. You
14 know, frequently you can find an industrial plant
15 with an associated PV installation and its sole
16 purpose is not generation. So I think maybe that
17 could be the way to distinguish that, like you say,
18 is purpose could be part of it.

19 Q Do you know if CAB sells products in each
20 of those sectors?

21 A I don't really know that. I would just --
22 I would be speculating. I may have seen things that

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1 could give me a sense of that, but I don't have a
2 specific recollection. I didn't -- I didn't address
3 that in my declaration.

4 Q When was PV solar introduced in the United
5 States?

6 MR. FLYNN: Object to form.

7 A So when I'm thinking of early grid scale
8 solar where people were really talking about it
9 being commercially viable as a bigger generator,
10 that would be I'm thinking around 2010, you know,
11 pretty recently. And it had existed before, but I
12 think sort of the economics had, you know, brought
13 it all together where people were talking about it.
14 And then some of my clients, who were in the
15 utilities, began investing in it.

16 Q What do you mean by the economics?

17 A Well, like, for instance, if you're
18 dealing with just, you know, something that's 10
19 megawatts or less, that can be so small that a
20 utility that -- you know, utilities have since
21 invested heavily, they can be like a Sempra or
22 ConEd, they have 10 megawatts is sort of not even

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1 worth their time, you know, when they have
2 traditional generators that are up at, you know, 500
3 megawatts to a gigawatt.

4 So when you started to see utility
5 investment, I recall seeing that first when it hit
6 around the tens of megawatts mark and people started
7 to have a good fraction of a square mile start to be
8 panels, and those panels would be cheap enough that
9 people said, well, we can perhaps make money on
10 this. And so, you know, it was the business of --
11 of generating electricity in those -- in those
12 markets is really I think what ultimately drove
13 adoption in larger projects.

14 Q So one of the key factors, it sounds like,
15 was the reduction in price of the panels themselves
16 made an economic case for the industry growth?

17 A That's what I recall at the time. I
18 recall being -- you know, wondering how the life
19 cycle cost of the PV panels would make this a good
20 bet. That's the type of thing that engineers would
21 talk about, saying, you know, bah humbug, this is
22 not really viable in a life cycle cost sense. So

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1 that's -- that's the kind of thing I remember
2 talking about in early 2010s.

3 Q So when you were working at Exponent, it
4 says that one of the things you worked on was
5 overhead lines and calculation profiles preceded by
6 sag calculations. Do you recall that?

7 A Yes.

8 Q What is a sag calculation?

9 A So you're just trying to find out a
10 mid-span ground clearance for a conductor that's
11 supported at structures, and so that would be an
12 initial step that I would do before calculating
13 electric and magnetic field profiles along a
14 transect of those transmission lights because I want
15 to find the largest magnetic field or electric field
16 for siting purposes. So that's the type of work I
17 have been doing since about 2005.

18 Q For those overhead lines that you were
19 doing sag calculations on, were those at -- were
20 those solar lines or another -- strike that.

21 Were those overhead line sag calculations
22 for solar power?

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1 A No, they were not specifically for solar
2 power. But some of them were simply transmission
3 and distribution lines. So they could have carried
4 current from a solar generation facility. I would
5 be -- at that point be working for a utility or the
6 owner's engineer in -- as part of their siting
7 process, you know, they want to build, you know, a
8 220 kilovolt line and it's going to go this far and
9 they have to go through an entire siting process.

10 Some of that must have been related to the
11 anticipation of there being large blocks of power
12 that need to be moved south from Kern County to LA,
13 for instance. But, you know, that's -- I just was
14 focused on the line.

15 Q Right. What was the first year you did
16 that type of work?

17 A 2005.

18 Q I think you mentioned this, but the
19 overhead lines were -- so those were messenger lines
20 supporting conductor cables?

21 A Those included -- very frequently included
22 EHS, so high-strength steel lines that are

1 essentially messenger or guy wire, they included
2 those.

3 They included also conductors, you know,
4 aluminum clad steel reinforced conductors very
5 typical, some copper conductors. So, you know, I've
6 worked on hundreds of different transmission and
7 distribution lines, all types of conductors.

8 Q So is the sag calculation on the support
9 wire or on the conducting wires?

10 A So most of the spans I would work on would
11 be self-supporting, like the conductor would be
12 supported only by the structures. And between the
13 structures, like the most typical case would be an
14 aluminum clad steel reinforced or so-called ACSR
15 wire, and this would have a known diameter and
16 tensioning when it was installed. So I would know
17 the design tension of the wire, and then I would
18 work with its load and ambient to come up with a
19 temperature rise and the sag, like how far it
20 droops.

21 Q What was the diameter of those support
22 wires?

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1 A So I had mentioned EHS wire and other
2 types of shield and static wires, very typical
3 number for those would be three-eighths inch
4 diameter. There could be larger if they included --
5 like, there's different kinds of shield wires that
6 you can have that surmount transmission lines
7 especially.

8 Q So is the shield wire supplying a support
9 function and you're calculating how much that will
10 sag based on the load and the properties of that
11 wire? Is that right?

12 A No, that's not right the way you said
13 that.

14 Q Okay. What's the purpose of the shield
15 wire?

16 A So in a transmission line, that type of
17 shield wire that surmounts the transmission line is
18 for lightning protection.

19 Q So is there a separate line that supports
20 the transmission line?

21 A No. As I was saying, those phase
22 conductors, as I call them, the ones that are

1 actually carrying the power in a transmission line
2 would most typically be self-supporting between
3 structures. And what I mean by that is the
4 structures provide an attachment point through --
5 maybe you've seen these insulators that can be --
6 they can be a good 4 feet long sometimes, and that
7 holds or fixes the conductor and supports it at the
8 structure, and then in between the structures it
9 forms like a catenary, it's like a -- it just has a
10 sag, and that's called the span.

11 Q So what are those phase conductors, what
12 material are they made out of typically?

13 A So in a transmission line, which is the
14 one I was talking about, the typical one is called
15 ACSR, and that's aluminum clad steel reinforced, and
16 those will typically have a code name. So in this
17 field there's something called the bird code, and
18 the bird names tell you what exact type of
19 commercial wire you're using, you know, its
20 stranding and so forth.

21 Q And the ACSR wires actually carry current
22 and are -- strike that.

1 The ACR wires carry current -- ACSR,
2 excuse me.

3 A Yes, they -- they would carry the load
4 current.

5 Q So when you're doing a sag calculation,
6 what characteristics of the lines are you factoring
7 into that calculation?

8 A The installed tension, the identification
9 of the wires itself. So like that specific bird
10 code thing I was mentioning, you would know from
11 that the characteristics of the wire, like its
12 material composition and stranding and its modulus
13 and other things.

14 And then you also need to consider, if
15 you're not concerned about lateral movement, you can
16 just look at the load, which means sort of how much
17 current it's carrying and predict the temperature
18 rise of the conductor, and along with the ambient
19 you could figure out a degree of temperature rise
20 given the use case, and that would ultimately tell
21 you how far -- take all of those together, you can
22 figure out how much the conductor would sag.

1 Q So the ambient temperature is the
2 temperature it is outside. Is that right?

3 A Yeah.

4 Q Certain climates will have a great
5 variance between the ultimate low temperature and
6 the ultimate high temperature that that territory
7 can experience, correct?

8 MR. FLYNN: Object to form.

9 A There can be a great variation in outdoor
10 temperatures, really striking, when you think about
11 it, and often in summer is often when the load is
12 highest. You know, in New England it's like that's,
13 you know, over 20 gigawatts are used when it's
14 hottest outside because it's just air conditioning
15 is a big factor there.

16 Q So as the temperature of the load and the
17 ambient temperature increase, those wires will sag
18 more?

19 A Yes, they'll sag more. And so a siting
20 council is often interested in hearing what is the
21 worst case electric and magnetic field that can be
22 encountered on the right of way and they want to see

1 is this -- does this meet NESC requirements,
2 National Electric Safety Code requirements. For
3 instance, for an electrical worker who is on the
4 right of way there's a certain limit. And then, you
5 know, they consider with siting like what kind of
6 magnetic fields are going to be off, you know, from
7 the edge of the right of way and outward in people's
8 residences, and that's -- that's a lot of the
9 fighting that goes on about where transmission lines
10 are located, it has to do with those types of
11 numbers.

12 Q What's siting council?

13 A So a public utility commission.
14 Connecticut is a great example because the entire
15 State of Connecticut is one council, which is
16 unusual, and it's called the Connecticut Siting
17 Council, CSC. And if you want to build and get a
18 certificate of public necessity for a transmission
19 line, you have to consult with all the
20 municipalities you want to run through and to get
21 your easement.

22 You also have to go to the Connecticut

1 Siting Council and make a case, and part of that is
2 essentially like an environmental impact kind of
3 report that you're providing to them, and they're
4 concerned are you getting too close to a school,
5 what's the current state of research on the, you
6 know, epidemiology related to exposure to electric
7 magnetic fields.

8 Q So as temperatures drop, will the sag
9 decrease?

10 A That's typical.

11 Q Are certain materials more prone to sag at
12 high temperatures than others?

13 A Yes.

14 Q Is steel more prone to sag at high
15 temperatures than, say, aluminum?

16 A I think the answer is yes. I tend to work
17 with them in composite, and I'm thinking of steel
18 reinforced conductors I know that can have less sag
19 compared to all aluminum conductors. I said ACSR.
20 There's another class called AAC, it's all aluminum
21 conductor. I don't know if I could say a hundred
22 percent, but I think the steel reinforced helps --

1 helps with that mechanical strength.

2 Q When you say steel reinforced, does that
3 mean that there are multiple strands that are
4 interwoven with each other, or is it referring to a
5 copper -- is it referring to a cladding that goes
6 over steel?

7 A I've seen both. So with the C, I would
8 expect aluminum clad to refer to cladding, so
9 connection of sort of coating with aluminum of a
10 steel core. But I have definitely seen stranding of
11 conductors that has aluminum separated from steel,
12 so I know those exist, too, so.

13 Q Is one of the reasons that those lines are
14 a composite of different materials to avoid too much
15 sag?

16 A I've -- I've understood it related to
17 design tension, and ease of installation was really
18 what drove the adoption of ACSR and which became
19 quite common. But I guess that would translate to
20 some degree into sag.

21 Sag is not the only thing you worry about.
22 You know, cost and other -- there's a myriad of

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1 things that a lineman, or a line engineer is going
2 to consider, because the choice of the conductor and
3 how it's installed really can affect the structures,
4 which are the really big ticket item, you know, they
5 can cost a lot of money to get into place and erect,
6 and then how you, you know, tension the wire on.

7 Q So when you say structure, you're talking
8 about the pile and the brackets that are affixed to
9 the transmission lines?

10 A Not really.

11 Q So what do you mean by structures?

12 A Structures like if you -- if you go look
13 at a transmission line structure, there's often a
14 very large lattice steel structure that can be 80
15 foot tall, it can be 100 feet tall. It can be
16 tubular steel, massive. And some of them are
17 located in remote places and, I mean, it costs a ton
18 of money to put up one. So line engineers are
19 trying to come up with a reliable installation and
20 while being sensitive to the cost of all those.

21 Q So those tubular steel structures are what
22 is used to keep the transmission lines aboveground?

1 MR. FLYNN: Object to form.

2 A In part, that's what holds those
3 conductors up and separated from one another.
4 Usually offset from a tubular steel support there
5 will be an arm and it will support it off there,
6 yeah, that's part of its function.

7 Q Is it fair to say that those transmission
8 lines are more bendable under high temperatures than
9 they are under cold temperatures?

10 MR. FLYNN: Object to form.

11 A That could be. But in practice, as far as
12 swaying of the conductor, I haven't really
13 encountered that. So I'm often worried under
14 different conditions and temperatures, like the
15 lateral movement of those conductors, have they been
16 implicated in, for instance, some forest fires that
17 started, or there's a suggestion that that was the
18 case and they are causing arcs. And the temperature
19 really didn't -- didn't really factor into that, so
20 I don't know that I could -- I'm just trying to
21 think of instances where I've studied real bending
22 or galloping of the conductor where it's actually

1 flexing, because what I'm talking about is sort of
2 just swaying where it's pretty much rigid in its --
3 in its shape between structures.

4 Q So the same conductor will sway the same
5 amount under high winds and low winds?

6 A No. That's -- that's the difference that
7 -- in looking at the literature that really seem to
8 be the most important in determining swaying,
9 lateral, was the wind. And, you know, didn't seem
10 to be so much a temperature thing, but the conductor
11 is not really bending or flexing so much. It's
12 really sort of it's like rocking a cradle a little
13 bit. It's like it's still sort of rigidly in its
14 shape and not flexing or bending.

15 So I'm just trying to really clarify if
16 that's the type of thing you're talking about when
17 you're asking about bending.

18 Q So the temperature has no effect on how
19 much or how little that conductor will sway?

20 A I don't know that I agree with that. But
21 what I was -- when I was studying this, it had
22 mostly to do -- that lateral motion had mostly to do

1 with the wind conditions and other mechanical --
2 mechanical considerations of support, not
3 temperature.

4 Q What does "galloping" mean?

5 A So there's higher modes and motions, like
6 wave-like motions between -- between structures.
7 And so if you can imagine like if you were to flick
8 a rope and see a wave travel along it, in high wind
9 conditions you can get these aeolian vibrations and
10 there can actually be dampers that you install on
11 some long spans to mitigate galloping of the
12 conductor, which can be very destructive.

13 Q I think we might need a spelling on
14 "aeolian."

15 A A-e-o-l-i-a-n. Did I say a-e-i? I said
16 a-e-o. Okay. Good.

17 Q Does temperature have an effect on how
18 much that line will gallop?

19 A I think it could. I think that's likely.
20 I'm not sure I could answer for certain, though.

21 Q Would a line gallop more under a higher
22 temperature or a lower temperature?

1 A I think there's -- I don't think I can
2 answer that given just that. I think when I've
3 studied galloping, it's been some semi-empirical
4 equations that's been studied over the years, and
5 there's many considerations that go into those
6 equations and terms, and I just couldn't tell you.

7 I think it depends so much on things like
8 the length and what the excitation is like. I don't
9 think I can give you a general answer.

10 Q Would the length you're referring to be --
11 between structures, that the length between those
12 two structures is what -- strike that.

13 Would the length between two structures
14 allow for more or less galloping of the line?

15 MR. FLYNN: Object to form.

16 A Again, I don't think I could give you an
17 answer generally like that because it's just sort of
18 a multifactor problem, and it really has to do with
19 the modes and how excitable the modes are between
20 the two. Like, if there's a standing wave that can
21 develop in that span and it's not just a length
22 issue, it has to do with whether or not the standing

1 waves are related to the excitation, you know, in a
2 way that causes a problem. Like if you hit a sweet
3 spot, the thing may move in a certain -- have a
4 certain mode shape that could just be excited and
5 create a standing wave that will get worse and worse
6 and worse through the excitation.

7 So it's a -- it's a complicated enough
8 thing that I don't think I could just give you that
9 sort of answer about monotonicity of one variable.

10 Q Is temperature one variable in how much a
11 conductor will gallop?

12 A I think it is. I can't really recall. I
13 mean, these are -- these are quite empirical
14 equations. This is something that's been studied
15 for some time, and sitting here I couldn't tell you
16 a hundred percent.

17 Q Do metals become more malleable at higher
18 temperatures?

19 A Generally, that's how I understand --
20 understand it, to become more ductile, they'll
21 become more grain boundaries will move in a way that
22 allows you, yeah, to change the shape more.

1 Q Do metals become more flexible at higher
2 temperatures?

3 A I would expect that it's not something
4 I -- yeah, I've studied just in and of itself to run
5 to ground, but I expect that based on what I said to
6 you about malleability. And that's not for
7 necessarily every material. I'm just saying that
8 for, you know, for metals that we talked about, like
9 aluminum and copper, things like that, and some
10 steels.

11 Q Are there steels that become less flexible
12 as temperature increases?

13 A So I dealt with some magnetic steels where
14 very little would surprise me about their
15 properties. In other words, they were -- they were
16 formed under certain types of stress, they were --
17 with an application of magnetic fields, and so they
18 were aligned a certain way. And they had all kinds
19 of properties related to their flexing, because
20 their flexing actually created magnetic fields, and
21 so they were intentionally magnetostrictive steels.

22 And the properties of these things, I

1 can't say that I studied them specifically under
2 temperature and how they behave, but they were
3 complicated because it was not just the thermal
4 part, but the mechanical part, the shaping part, the
5 magnetic part, and, you know, I hadn't -- I hadn't
6 prepared to talk about all this stuff that we've
7 been discussing the last, you know, half hour or so
8 at this deposition. So I haven't -- I haven't
9 prepared on a lot of that.

10 Q Are those types of steels used in cable
11 management in solar at all?

12 MR. FLYNN: Object to form.

13 A I guess I don't know specifically. Where
14 I've encountered them is not in cables, but in
15 magnetic structures, things like transformers.

16 Q You reviewed the CAB installation guide,
17 Exhibit 2041, in preparation of your declaration,
18 correct?

19 A Yes.

20 Q We'll get our first exhibit out here.
21 Have you reviewed this document?

22 A Yes.

1 Q Go to page 4.

2 A Okay. I'm there.

3 Q In Section 3.5 it says [as read], [REDACTED]

4 [REDACTED]

5 [REDACTED]

6 [REDACTED]"

7 Do you see that?

8 A Yes.

9 Q And then it says [as read], [REDACTED]

10 [REDACTED]

11 [REDACTED]

12 [REDACTED]

13 [REDACTED]

14 Do you see that?

15 A Yes.

16 Q Do you agree with that?

17 A That I think goes back to what we were
18 talking about with transmission lines, that's the
19 type of behavior I expect to see in transmission
20 lines, so that makes sense.

21 Q Why is the [REDACTED]

22 [REDACTED]?

1 A So that's not -- that's not something I
2 considered for my declaration.

3 But, you know, [REDACTED]
4 [REDACTED]
5 [REDACTED]
6 [REDACTED]
7 [REDACTED].

8 Q Okay. But you agree with the statement
9 that [REDACTED]
10 [REDACTED], correct?

11 MR. FLYNN: You know, at this point I'm
12 going to have to object. I've been letting it go
13 for a while now. But I'm going to have to object
14 because it's getting to the point it's well beyond
15 the scope of Dr. Phinney's testimony in his
16 declaration, and I also object to the relevance of
17 it.

18 MR. SWEENEY: Well, you're limited to form
19 objections. So I'd appreciate if you keep your
20 objections to form objections. If you want to paper
21 something else down the road, you are free to do
22 that. But you are limited to form objections, so I

1 urge you to please stick to that.

2 MR. FLYNN: That's actually not true. In
3 the IPR depositions we have to make substantive
4 objections to preserve.

5 BY MR. SWEENEY:

6 Q We'll keep going here.

7 So you don't know why [REDACTED]

8 [REDACTED]?

9 A So when you're asking why, do you mean
10 like -- are you asking like physically in the
11 material, like why it's different? Or because my
12 answer was -- is that could the loose be another way
13 of -- [REDACTED].

14 Q Let's start with physical. Do you know
15 why [REDACTED]

16 [REDACTED] in regards to -- strike that.

17 [REDACTED]
18 [REDACTED]?

19 MR. FLYNN: I will object to form. I will
20 reiterate the same objection. If you continue on
21 this line of questioning, I can either continue to
22 object to each question or you can agree to give me

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1 a running objection to this line of questions so I
2 don't have to keep interrupting.

3 A I didn't -- I didn't consider this at all
4 in preparing my declaration.

5 In my experience with transmission lines,
6 I would say that the things I would consider to

7 [REDACTED]
8 [REDACTED]
9 [REDACTED]
10 [REDACTED].

11 Q Is there a [REDACTED]
12 [REDACTED]?

13 A I don't know that I could give you a good
14 answer for that, because I'm aware that [REDACTED]

15 [REDACTED]
16 [REDACTED]
17 [REDACTED]
18 [REDACTED]
19 [REDACTED], sorry.

20 Q So is that to say if it was [REDACTED]
21 [REDACTED]
22 [REDACTED]?

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1 A That one or vice versa. I'm just trying
2 to -- I'm just trying to think through it. But I
3 think those are the types of operational variables
4 that a lineman can use to have a good installation
5 that's performing the way it's expected at the end.

6 Q In your declaration at paragraph 21, you
7 mention having taught electricians and
8 engineers-in-training to prepare students for NEC
9 questions on the professional engineering exam. Is
10 that right?

11 A Yes, I wrote that. I don't have my
12 declaration, but I remember writing that.

13 Q Sure. Yeah, we can actually give you a
14 copy of that.

15 So this is Exhibit 2064 and this is your
16 declaration that you submitted on behalf of the
17 patent owner in this matter, correct?

18 A Correct.

19 Q We'll go to paragraph 21.

20 A Okay. I'm there.

21 Q And you see there that you said that you
22 taught electricians and engineers-in-training to

1 prepare students for NEC questions on the
2 professional engineering exam, correct?

3 A Correct.

4 Q How many years did you teach that class?

5 A I can think of two, and it could have been
6 three, and they were scattered at different times.

7 Q What years did you teach that class?

8 A So I'm thinking one of them was probably
9 2010 and then later maybe in 2014 or '13, because
10 I'm thinking of the code books that I had to buy,
11 and there really could have been another one where I
12 did just like one session, the NEC session, and
13 someone else sort of did all the other, all the
14 other ones.

15 Q Was that class part of an undergraduate
16 program?

17 A No. It was -- it was, I believe, just
18 called the Professional Engineering Review Course.
19 It was open for students and undergrads, but also
20 people who didn't have an undergraduate degree, and
21 those were about half the class, were people who
22 were preparing for their PE, their professional

1 engineering exam, and so most of them were
2 electricians or worked for TA or PA Transit
3 Authority or Port Authority here in the City.

4 Q What is the professional engineering exam?

5 A So it's -- it's this test that you can
6 take to become a registered or recognized
7 professional engineer in a state. And so to become
8 an engineer of record on a project, for instance,
9 you need to have a PE, and you need to have your
10 stamp.

11 And there's a lot of laws that, depending
12 on the state you're in, about how engineering work
13 is done and under whose supervision and how drawings
14 are stamped and designs are completed. So it's
15 related to that professional capacity of doing
16 engineering, sort of officially putting your stamp
17 on designs.

18 Q So passing that exam certifies
19 electricians or engineers to do certain things?

20 A Yes. They can sign off on drawings. They
21 can sign off on designs. They can become an
22 engineer of record. In some states that's required

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1 to testify regarding engineering at all, and you can
2 be served with a fine for not having the PE exam in
3 a particular state. That does happen.

4 Q What topics from the NEC did you cover in
5 that class?

6 A So I was focused on the types of questions
7 that people would get in their tests. So not all of
8 the people, but most of the people were going to
9 take the electrical -- the electrical engineering
10 type of PE.

11 So what you can do, you could specialize
12 in computer science, and very few people did that.
13 And there is some people you could actually
14 specialize in controls, and very few people did
15 that. Almost all of them did the electrical
16 engineering and power systems type of focus.

17 So there's like three versions of the PE
18 or electrical that you can take, and I focused on
19 the power systems one, and I just -- about --
20 surprisingly, about half the questions on there have
21 some NEC component, it's really quite astronomical.
22 And so I was just going over all those different

1 ones that are known, we have encountered, and...

2 Q So in the class you covered specific NEC
3 code sections or general principles?

4 A Specific sections and using specific
5 tables and provisions of the NEC.

6 Q Does the class cover NEC code sections
7 related to messenger-based support systems?

8 A We didn't need to focus on that, that I
9 recall. We were concerned more with like designing
10 feeder cables, designing -- selecting conductors for
11 their ampacity, some of the disconnect and
12 protection requirements, so sizing of fuses,
13 disconnects in a motor starter, for instance, that

14 would be quite a typical one. And then how do you
15 size all the conductors for the rating of the motor
16 and size the disconnect.

17 Q Was grounding one of the topics that your
18 curriculum included?

19 A Yes.

20 Q Why is that?

21 A Well, one thing we would talk about the
22 just residential -- residential power systems and

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1 split phase 240 volt service that can come to a
2 home. We would talk about the basics of what's in a
3 panel board in someone's house, where the breakers
4 are, where the grounding electrical conductor is and
5 how that's affixed to the panel, or the service
6 conductors are, what the equipment grounding
7 conductors are, how those travel to different branch
8 circuits and go to loads.

9 Q When did you first learn about the NEC?

10 A I think in the '80s. I think that's about
11 right, in the '80s.

12 Q And why did you have to learn about the
13 NEC?

14 A I was just interested in electrical
15 engineering.

16 Q Do you need to consult NEC requirements
17 when you advise on matters regarding electrical
18 power systems?

19 A No, not really. Electrical power systems,
20 to me, means things on the other side of the demarc
21 from the customer's equipment. So I worry about the
22 NESC, the National Electric Safety Code,

1 so that's utility world, that's a world of
2 multi-grounded neutrals. It's a different
3 situation, and different especially with respect to
4 grounding compared to the National Electrical Code,
5 which is more on the customer side of the demarc.
6 So the stabs of the revenue meter, if you're on the
7 customer side of those, that's customer equipment,
8 that's NEC. And on the distribution line side, the
9 transmission line side, that's utility, NESC.

10 Q So when you're working on a failure
11 analysis at a PV plant, is the NEC relevant to your
12 analysis?

13 A Yes.

14 Q When you're advising on matters relating
15 to PV plants, do you need to consult the NEC's
16 requirements?

17 A I think you asked the NEC's requirements?
18 Yes.

19 Q Does the term "messenger" imply the
20 physical characteristics of a component or the
21 function of a component?

22 A I'm looking at paragraph 54 of my

1 declaration. And so, first of all, I would ask you
2 -- this is from the 2020 NEC, and what I'm pointing
3 out here is that that's one of the first times that
4 the messenger wire was sort of defined where people
5 wrote down a definition for the term.

6 Before that it had been used, but there
7 wasn't a definition around that people had sort of
8 agreed on, at least to write like this. And so are
9 you talking about a particular time frame or --

10 Q Yes. Prior to the 2020 NEC, did the term
11 "messenger" imply the physical characteristics of a
12 component or the function of a component?

13 A I'm going to have to give kind of a
14 complicated answer. I think in a way it's sort of
15 both because -- I'll stop there. It's sort of --
16 it's sort of both. I can explain more.

17 Q What were the physical characteristics
18 that the term "messenger" implied?

19 A So messenger wire would almost always be a
20 stranded galvanized wire. You know, it would be
21 this cable that would be, you know, before I had
22 mentioned that three-eighths inch EHS, you know,

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1 that's the type of wire that could be used for guys,
2 guying applications, static. It could be used for a
3 messenger.

4 And so sometimes there's names for things
5 that are what they are used for that are at the top
6 of like a catalog sheet. And then when you look
7 down in the actual wire you're buying, you'll see,
8 well, gosh, I'm buying -- I'm buying, like, 7 AWG
9 stranded EHS wire, which is also called guy wire,
10 which is also called messenger wire, and which could
11 be the same thing I use for shield wire.

12 And so that -- so that sort of underlying
13 physical characteristics of the cable is something
14 that the engineers who use that cable would have
15 known about. They would have recognized that. You
16 don't need to buy separate guy wire. You could use
17 your messenger wire as guy wire because it's really
18 the same wire.

19 So there's sort of a layer of marketing
20 names or use names on top of physical
21 characteristics that distinguish wires.

22 Q So the use of messenger wire is really

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1 more branding than speaking to the physical
2 characteristics of the cable?

3 MR. FLYNN: Object to the form.

4 A I wouldn't agree with that the way you
5 said it, not -- it's not branding.

6 Q But the same cable, the same properties
7 could be sold as a guy wire or a messenger wire. Is
8 that right?

9 A Yeah, that's -- that's the kind of thing
10 I'm saying. Like if you looked under the hood, you
11 could say, oh, well, the reel of guy wire that I
12 bought is three-eighths inch 7 strand EHS wire,
13 maybe even from the same manufacturer, but this one
14 was from a catalog sheet called guy and this one was
15 from a catalog sheet called messenger.

16 Q You mentioned one of the physical
17 characteristics of a messenger is that it's
18 galvanized. Galvanized means a coating on the
19 particular wire, correct?

20 A That's the way I've understood it. You
21 know, it's often a zinc coating or something, yeah,
22 it gives it some sort of corrosion resistance

1 properties.

2 Q And the underlying strands would be made
3 of what materials?

4 A Steels I think is quite typical.

5 Q Could it be aluminum?

6 A For messenger I would expect steel.

7 Q You wouldn't expect steel?

8 A I would.

9 Q Would. What's the function of a messenger
10 wire?

11 A So going to that paragraph 54, you know,
12 when the 2020 NEC says that a messenger is defined
13 as a wire that is run along with or integral with
14 the cable or conductor to provide mechanical support
15 for the cable or conductor, you know, that seems to
16 express a function there.

17 Q Prior to this definition in 2020, what was
18 the generally understood function of a messenger
19 wire?

20 A I would say people would have agreed to
21 this. This wasn't like a new thing. It just was
22 something that hadn't been written down and

1 discussed perhaps in committee. But I think people
2 would have agreed with this kind of -- this kind of
3 language in 2020 had they bothered to address the
4 issue in an earlier code cycle.

5 Q Do messenger wires always have to be
6 stranded?

7 A I can't think of one that has not been
8 that I've encountered. But I don't see why it would
9 be necessarily precluded. They're often at a
10 diameter where a solid conductor at that diameter is
11 usually not even called a wire anymore, it's called
12 a rod. And so I think if you go -- I think if
13 you're less than 4 AWGs it's called -- definitely
14 called rod, if you're less than 4 AWGs, but that's
15 almost half an inch, so diameter.

16 Q Have you ever heard the term "aircraft
17 cable"?

18 A I have.

19 Q What is aircraft cable?

20 A Sitting here, I don't -- I don't really
21 know. I didn't address that in my -- my
22 declaration. I would really just have to go refresh

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1 my recollection. But, yeah, I've seen it.

2 Q In what context have you seen the term
3 "aircraft cable"?

4 A Well, I've worked on hangars and I've
5 worked on aircraft, so I think it's a very vague
6 recollection, but it could have been then. And I
7 really just have to go refresh my recollection. But
8 I distinctly remember the word -- the phrase.

9 Q So you have no understanding of the
10 physical properties of aircraft cable?

11 MR. FLYNN: Object to form.

12 A Sitting here, sitting here I don't. I
13 haven't -- I didn't prepare about that or include in
14 my declaration.

15 Q You reviewed the declaration of Mr. Allen
16 Smith, Exhibit 2061, correct?

17 A Yes.

18 Q Let me introduce this. I've just handed
19 you Exhibit 2061, it's the declaration of Allen
20 Smith. Are you familiar with this document?

21 A Yes, I reviewed it.

22 Q Did you review the documents that

1 Mr. Smith cites to in his declaration?

2 A Yes.

3 Q In paragraph 50 of your declaration you
4 cite to Mr. Smith's declaration that aboveground
5 cable management -- strike that.

6 Paragraph 50 of your declaration you say
7 [as read], "To organize a myriad of high-ampacity
8 conductors in commercial PV installations before the
9 time of the invention claimed in the '551 patent,
10 CAB sold an aboveground cable management system that
11 used cable hangars suspended from a steel messenger
12 wire," correct?

13 A Yes.

14 Q And you cite to Mr. Smith's declaration,
15 in particular paragraphs 21 through 32. Is that
16 correct?

17 A Yes.

18 Q In paragraph 26 of Mr. Smith's declaration
19 he discusses a company called SunPower. Is that
20 correct?

21 A Yes.

22 Q What is SunPower?

1 A I think there were engineers that were
2 associated with a solar power plant located in
3 Davis, California, just looking at that previous
4 paragraph.

5 Q Did you review Exhibit 2008 that Mr. Smith
6 cites to, the "Field Process Change Review 1
7 Development Review Messenger Cable"?

8 A Yes.

9 Q What do you recall about Exhibit 2008?

10 A Without having the document, I recall that
11 it had some Excel-like things, it was tabulations
12 toward the end, and I recall it looking more like a
13 PowerPoint at the beginning. That's just my -- my
14 memory now.

15 Q I'm handing you Exhibit 2008. This is the
16 document you're referring to, correct?

17 A Yes, this looks like how I remember it.

18 Q Go to page 7 of this presentation, it says

19 [as read], "[REDACTED]
20 [REDACTED]
21 [REDACTED]
22 [REDACTED]."

1 Do you see that?

2 A Yes.

3 Q Is it fair to say that this presentation
4 was put together by SunPower analyzing [REDACTED]
5 [REDACTED]?

6 A That was my understanding, yes.

7 Q Go to the next page, page 8 of Exhibit
8 2008, you see a summary description with some line
9 items. Is that correct?

10 A Yes.

11 Q Do you see under the line "[REDACTED]
12 [REDACTED]

13 Do you see that?

14 A Yes.

15 Q What do you take that to mean?

16 A I take this as like, going back a little
17 bit to what I said about, like, names for type of
18 cable that you could find in a catalog as describing
19 the actual rows in a table that are your options to
20 buy, and that sometimes things can have a label, but
21 be the same underlying cable.

22 Q So here is it fair to say that SunPower

1 was using [REDACTED] ?

2 MR. FLYNN: Object to form.

3 A That looks to be what they're
4 contemplating, is [REDACTED]

5 [REDACTED]
6 [REDACTED].

7 Q Based on that, would you agree that

8 [REDACTED]
9 [REDACTED] ?

10 A The types of things that a person of
11 ordinary skill would look to to make that
12 determination would be is it really strong enough.
13 You need to look at sort of underlying is it able to
14 handle this tensioning and this load.

15 Since it's here and they're contemplating
16 it, they probably thought it was suitable, probably
17 overrated for the job. But, you know, that's the
18 kind of thing you need to check. You need to figure
19 out is it actually going to be strong enough and,
20 hopefully, weather resistant and, you know, can
21 stand up to the environment.

22 Q Is it your opinion that the '551 patent

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1 claims a messenger wire as a grounding conductor?

2 MR. FLYNN: Object to form.

3 A No, it is not. I don't agree with that,
4 that characterization. I think it's just an
5 oversimplification of the patent to put it that way.

6 Q Is it your opinion that the '551 patent
7 claims a multi-function line?

8 A Yeah, the claims include a multi-function
9 line, yes.

10 MR. SWEENEY: We have been going for a
11 bit. Let's do 10 minutes.

12 (Recess 10:48 a.m. - 11:06 a.m.)

13 BY MR. SWEENEY:

14 Q Is it your opinion that the '551 patent
15 claims using a messenger wire as a grounding
16 conductor?

17 Actually, sorry, before we get started,
18 did you talk to your counsel during the break?

19 A Not anything of substance. About the
20 building and the adjacent buildings.

21 Q Okay. All right. Is it your opinion that
22 the '551 patent claims using a messenger wire as a

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1 grounding conductor?

2 A So in my paragraph 82 I talk about the
3 construction for multi-function line, I think it
4 describes how a POSITA would understand that term.
5 And so I don't know if I could agree that -- that
6 like a messenger wire is used as a ground wire.
7 Because you see the way I'm phrasing it is that the
8 multi-function line is serving both a mechanical
9 function as a messenger wire and this electrical
10 function as a grounding conductor.

11 Q And that's permitted by the NEC, correct?

12 MR. FLYNN: Object to form.

13 A I'm not sure what you're asking.

14 Q Sure. Messenger wire can be used as a
15 grounding conductor, correct?

16 A So in the context of the '551 patent, a
17 POSITA would understand the multi-function line can
18 be used as a grounding conductor. So that's why in
19 paragraph 82 I offer this construction that a
20 multi-function line is a tension member that
21 supports -- supports current wires and/or cable
22 hangars as a messenger wire and which provides a

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1 current path as a grounding conductor.

2 Q Does the NEC permit using a messenger as a
3 grounding conductor?

4 A I think you're referring to Article
5 360 -- 30.30 and you're perhaps referring to this --
6 you're asking about I think a messenger wire used as
7 an equipment grounding conductor? Is that right?

8 Q Are you referring to Section 396.30?

9 A Correct, 396.30.

10 Q I am passing you excerpted pages from
11 Exhibit 1007. If you could flip to page -- the last
12 page in the excerpt, 241, it's the last page of --
13 it's on the back. Do you see Section 396.30
14 "Messenger"?

15 A Yes.

16 Q Do you see subsection C where it says [as
17 read], "Equipment Grounding Conductor. Where the
18 messenger is used as an equipment grounding
19 conductor, it shall comply with the requirements of
20 250.32(B), 250.118, 250.184(B)(8), and 250.186(D)."

21 Do you see that?

22 A Yes.

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1 Q Do you agree with the NEC that a messenger
2 can be used as an equipment grounding conductor?

3 MR. FLYNN: Object to form.

4 A I disagree with the way you characterize
5 that, because particularly there with that article
6 250.118, messenger wire is not among the types of
7 permissible equipment grounding conductor. So
8 this -- this is listing in one place the
9 requirements that an EGC would have to -- or a
10 messenger wire would have to satisfy to serve as an
11 EGC. But it's not something that a person of
12 ordinary skill recognizes as being a permissible
13 equipment grounding conductor like if we were to
14 look at 250.118.

15 Q So you're saying that the -- strike that.

16 Why would the NEC say this if a messenger
17 could not be used as an equipment grounding
18 conductor?

19 A To alert people what requirements would
20 have to be satisfied by -- if they were to consider
21 using a messenger wire for that purpose, it would
22 have to satisfy all the requirements. It's -- it's

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1 not among the types of conductor approved for this
2 purpose that are in 250.118.

3 So at this point there was a -- there is a
4 desire to actually exclude and prevent people from
5 using a messenger wire as an EGC in the code
6 discussions at this time, as I understand from
7 Mr. Brooks.

8 Q Do you take this section subsection C to
9 mean if a messenger complies with these provisions,
10 that it may serve as an equipment grounding
11 conductor?

12 A It must comply with all of those -- all of
13 those requirements in order to -- for that to
14 even -- for that to even be considered. Like, a
15 person of ordinary skill would understand off the
16 bat that a galvanized steel messenger wire isn't an
17 equipment grounding conductor.

18 Q Sure. But just to get an answer to the
19 question I asked, do you take this subsection C to
20 mean if a messenger complies with these provisions
21 enumerated in subsection C, that that messenger may
22 serve as an equipment grounding conductor?

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1 A It must comply with these to -- to be used
2 as an equipment grounding conductor.

3 Q As long as a messenger wire complies with
4 the sections in 396.30(C), a messenger wire can
5 serve as an equipment grounding conductor, correct?

6 A I think it just goes a little further than
7 the articles listed themselves because it would have
8 to bear a listing.

9 So, for instance, 250.118 says that other
10 listed means can be used as an equipment grounding
11 conductor. That requires an engineering evaluation
12 of what the current rating, you know, kilo ampere
13 current rating, the fusing current to withstand 30
14 cycles would be.

15 So the articles themselves subsume an
16 entire engineering investigation. So adding that
17 in, I think I could agree that these are the
18 requirements, these articles, for being used as a --
19 for a messenger wire or, you know, for a wire to be
20 used as an equipment grounding conductor.

21 Q So if these requirements were satisfied, a
22 messenger wire can be used as an equipment grounding

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1 conductor under NEC Section 396.30 (C) ?

2 A I would just add yes, but that includes an
3 engineering investigation in order to have the
4 listing to be used as such.

5 Q So prior to '17, it was known that a
6 messenger wire could be used as an equipment
7 grounding conductor, correct?

8 A I don't think so, as far as there being a
9 commercially useful product or that being recognized
10 as a use for messenger wire.

11 Q So despite the 2008 NEC permitting it in
12 Section 396.30 (C), you don't think that was a known
13 use of a messenger wire?

14 A The way you ask your question I think
15 is -- I think you're begging the question the way
16 you're asking it, because it's not really permitted.
17 It's saying you need to conduct an investigation in
18 order to use messenger wire for that purpose; that
19 contemplating the idea in some abstract way without
20 any type of actual engineering investigation doesn't
21 mean that it is -- messenger wire is permitted to be
22 used as an EGC.

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1 Q This section doesn't say engineering
2 investigation, does it?

3 MR. FLYNN: Object to form.

4 A It does in a way because it's referring to
5 the separate articles. So when you look at 250.118,
6 a person of ordinary skill knows that messenger wire
7 is not used, you don't look at galvanized steel
8 stranded wire and use that as EGC. You can use
9 copper, aluminum clad copper or aluminum. You can
10 use other listed assemblies that have been studied
11 and approved by listing agencies over time. Rigid
12 metal conduit is one.

13 That's -- that's been decades in the
14 making to create a list of permissible EGCs,
15 equipment grounding conductors when I say "EGC." So
16 a mere recitation of the parameters for an
17 engineering study is not permitting something.

18 In fact, people at this time would have
19 and they were skeptical about the possibility of
20 using messenger wire as an equipment grounding
21 conductor.

22 Q I'm handing you Exhibit 2066. Have you

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1 seen this document before?

2 A Yes.

3 Q You cite to this document in your
4 declaration, correct?

5 A Yes.

6 Q This document is titled [REDACTED]

7 [REDACTED]

8 [REDACTED]

9 [REDACTED] " correct?

10 A Yes.

11 Q What is [REDACTED]?

12 A [REDACTED]

13 [REDACTED]

14 [REDACTED].

15 MR. FLYNN: Excuse me, Mr. Sweeney, I
16 should have noted this before with Exhibit 2061,
17 these exhibits are marked "Confidential Protective
18 Order Material," so just so I don't forget, since we
19 are covering this kind of information in this
20 deposition, we should mark the deposition transcript
21 as "Confidential Under Protective Order" material
22 and then we can figure out which portions of it we

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1 can de-designate at the appropriate time.

2 MR. SWEENEY: Yeah, that sounds fine.

3 Thanks.

4 BY MR. SWEENEY:

5 Q [REDACTED]

6 [REDACTED] ?

7 MR. FLYNN: Object to form.

8 A I would say that they are routinely
9 applying certain portions of the NEC and can
10 actually even inform some of the -- some of the
11 recommendations for ampacity and other -- other
12 numbers. So at least for portions, I think I would
13 agree with that.

14 Q This report addresses [REDACTED]

15 [REDACTED], correct?

16 A Yes.

17 Q And if you go to page 6 of the [REDACTED]

18 [REDACTED]
19 [REDACTED]
20 [REDACTED].

21 Do you see that?

22 A Yes.

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1 Q Do you agree with that statement?

2 A I think that it needs to be considered in
3 light of the previous statement of the parameters.

4 So what it says in the previous paragraph
5 is that a [REDACTED]

6 [REDACTED]
7 [REDACTED] So that's what I was talking about
8 is like a recitation of the parameters, and you
9 actually have to do that work to know, you know, can
10 we make it, can it satisfy those requirements.

11 Q So in this context, do you agree with the
12 sentence in the [REDACTED] [as read],
13 "[REDACTED]
14 [REDACTED]"?

15 A In that context, subject to it actually
16 satisfying the requirements for -- that are set
17 forth, yeah, I would agree with it.

18 Q I'll go back to the excerpted NEC Exhibit
19 1007. Turn to page 31, please.

20 A Okay. I'm there.

21 Q What does the NEC define ground as, first
22 definition at the top there?

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1 A The earth.

2 Q Do you agree with that definition?

3 A I offer in my -- in my declaration I take
4 it a little bit further and I did say or another
5 body that serves in place of the earth, because that
6 comes up sometimes. But that's -- yeah, that's more
7 or less right, that -- this is, I think, 2008,
8 though.

9 Q That's right.

10 A Yeah.

11 Q So do you agree with the NEC's definition
12 of ground as the earth?

13 A Well, in the 2008 that's how it was
14 written. But it was -- it was -- I believe that
15 because it's in that highlighting, that was changed,
16 and I'm thinking about later code revisions. That's
17 at least part of the story.

18 Q What can be used as a grounding electrode
19 in a PV installation?

20 A So a person of ordinary skill would --
21 would look to permissible grounding electrodes as
22 cited in 250.52. I don't know if we have that here.

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1 Q Yeah, we do. That is page 108.

2 A Yeah, there it is. That's -- this is a
3 pretty good recitation of the types of materials
4 that are regarded as being permissible for a
5 grounding electrode.

6 Q Can a structural member made of metal
7 inserted 10 feet into the earth serve as a grounding
8 electrode?

9 A It can. There's numerous, you know,
10 caveats about how it's encased, you know, and
11 there's some detail about -- there can be some
12 engineering detail that sometimes comes up with what
13 the nature of that soil is, or if it's drain rock,
14 or if it's very desiccated soil. You know, this
15 does come up. It can be a little bit more
16 complicated than just embedded into soil. You can't
17 assume that everything is going to be performing
18 equally. But absolutely, that type of thing can
19 serve as a grounding electrode.

20 Q Why does the NEC prescribe 10 feet in
21 Section 250.52(A)(2)(1)?

22 A This -- this is something of quite

1 long-standing that relates to how grounding
2 electrodes are embedded in the earth. Eight feet is
3 another number that's used for dedicated grounding
4 electrodes that don't serve a structural function.
5 And this is through experience over time and doing
6 ground resistance tests by impressing currents into
7 these and studying this over time as it relates to
8 the efficacy of the grounding system for, you know,
9 for all the functions it would serve.

10 So it's -- there's a lot of history that
11 goes into this, and, you know, 10 feet is -- you
12 might say is a number that's arrived at through a
13 scientific study of this, especially in the context
14 of fire protection over many years, and people come
15 to this through committee and through their best way
16 to rattle with the science.

17 Q The '551 patent teaches that conductive
18 piles can be grounded by disposing those piles in
19 the earth, correct?

20 MR. FLYNN: Object to form.

21 A They can serve as a grounding electrode.
22 Like in figure 5 of the '551 patent, you know,

1 provided that's sufficient embedding depth. And,
2 you know, there's some caveats, like I said, you
3 know, drain rock isn't necessarily soil. And so,
4 you know, you have to be careful about some of the
5 details.

6 But assuming those are all correct, yes,
7 you can drive a structural member, like a pile, that
8 deep, and it can serve as a grounding electrode.

9 Q I'm handing you Exhibit 1001, the '551
10 patent. If you go to column 8, line 36, it says [as
11 read], "In one exemplary embodiment not shown, the
12 conductive piles 32 included generally
13 non-conductive body, e.g., wood or composite bodies,
14 with a highly conductive element, e.g., copper wire
15 or partially conductive element, i.e., steel cable
16 coupled, directly coupled, temporarily coupled or
17 fixed thereto."

18 Do you see that?

19 A Yes.

20 Q What do you take that disclosure to mean?

21 A That there can be a highly conductive
22 element that is affixed to a generally

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1 non-conductive pile.

2 Q So would that include a wooden pile with a
3 steel cable running the length of that wooden pile?

4 MR. FLYNN: Object to form.

5 A I think in that sentence it could include
6 that combination because we can take the wood from
7 the first e.g., that list, and we can take steel
8 cable from the second recitation of the, you know,
9 the type of partially conductive element that is
10 coupled to the pile.

11 Q So would that partially conductive element
12 serve as a grounding conductor on the wooden pile in
13 combination with a grounding electrode at the end?

14 A And you're referring specifically to a
15 steel -- a steel one?

16 Q I'm referring to the disclosure that we
17 just read.

18 A So the way you asked your question, I
19 think you've described it as a grounding electrode
20 conductor, and I think you're asking me --

21 Q I can rephrase.

22 What's the purpose of the partially

1 conductive element that is coupled to the wooden
2 pile?

3 A I think it's to -- you think of it as
4 compensating for the non-conductive nature of the
5 pile. So rather than being a conductive pile, it's
6 a non-conductive pile with a conductor affixed to it
7 including a partially conductive element.

8 Q It says here in line 34 to 35 [as read],
9 "In one exemplary embodiment not shown, the
10 conductive piles include," and then it goes on to
11 say "wood." And then it says that it has a
12 "partially conductive element, i.e., steel coupled
13 thereto."

14 So does this mean that the patent's use of
15 the term "conductive pile" includes wooden piles?

16 MR. FLYNN: Object to the form.

17 A With other things as a composite element I
18 think is what it's saying. You could swap a
19 conductive pile for this composite with conductive
20 and non-conductive parts.

21 Q So a wooden pile in combination with a
22 partially conductive component is a conductive pile

1 according to the '551 patent, correct?

2 A Like an alternative way to realize the
3 conductive pile. The whole thing doesn't have to be
4 conductive.

5 Q Was it fairly common practice in utility
6 electrical to use wooden piles?

7 A I would say that's -- that's -- it's
8 common. They are called poles, and like a 55-foot
9 pine pole is almost industry standard. There's
10 many, many of them in the United States.

11 Q And using that separate grounding
12 conductor on that wooden pole, is that common
13 practice?

14 A So the way you're asking this question, I
15 just -- you're using a term that I included in
16 construction so you're using as grounding conductor.
17 And so I really got to take us back to what a person
18 of ordinary skill would understand a grounding
19 conductor to be in the context of the '551 patent,
20 which is really a wire cable that's there to serve
21 two purposes; it's there to provide an effective
22 ground pole current path that's going to, you know,

1 facilitate the operation of a protection device, in
2 addition to a second function, which is to connect
3 to, you know, to the earth through a grounding
4 electrode and a grounding electrode conductor.

5 So, you know, the grounding conductor, I'm
6 using it, and as a person of ordinary skill would
7 understand it in the '551 patent, is, you know,
8 installed and intentionally -- is intended for those
9 two purposes.

10 Q Just on the street when you see a wooden
11 pile like you alluded to, a very popular wooden pile
12 pole, is it common to see a metal wire running down
13 the side of that wooden pole?

14 A It is, it is common. There are risers,
15 and risers are like the actual phase conductors that
16 can go down to underground, but then there are down
17 wires that can connect to a static.

18 Q In your declaration starting at paragraph
19 38, you give a tutorial on grounding systems and you
20 note that bonding practices are important for
21 protecting personnel from electrical shock hazards,
22 correct?

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1 A Yes.

2 Q What is an AHJ?

3 A The authority having jurisdiction, more or
4 less the face of that person will be your inspector.

5 Q Is proper bonding one of the things that
6 an AHJ will inspect?

7 A Very much so, yes.

8 Q Why do they inspect for proper bonding?

9 A Well, the hazards of an unbonded system,
10 it's a hazard for property and life.

11 Q What does an inspection for proper bonding
12 entail?

13 A So there are many pieces of electrical
14 equipment that have non-current carrying parts, and
15 that's things like their enclosures and supports.
16 Some of those non-current carrying parts are likely
17 to be energized if they're in close proximity to
18 energized conductors. So those parts are often in
19 an assembly. There's many parts.

20 And so proper bonding is making sure, for
21 instance, that those parts are all bonded to one
22 another electrically, so that no matter where a

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1 ground fault occurs within the assembly, there is
2 established an effective ground fault current path
3 that can facilitate the operation of a protection
4 device, and that's -- you know, it doesn't do any
5 good to ground if you don't also have a way to
6 detect that there has been a ground fault and do
7 something about it.

8 It's not just about connection to the
9 earth through the grounding electrode and the
10 grounding electrode conductor. It's also about that
11 effective ground fault current path.

12 Q So when these AHJs are inspecting for that
13 proper bonding, what do they do to see if it's
14 properly bonded?

15 A Yeah, so they'll be like the ultimate
16 stickler. If you walk around a generation facility,
17 you'll notice many things that are different from
18 your house, many things are made of metal, and
19 there's all kinds of bonding jumpers in different
20 places that you're not used to seeing in your house
21 because they're not decorative.

22 So you'll be going down stairs in, like, a

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1 substation or something and there will be bond
2 jumpers between like the rail to the rail to other
3 metal structural elements, and the idea is that all
4 of it is bonded together. So, you know, if things
5 really go south and there's a fire and there's bad
6 electrical faults somewhere in the building, there's
7 a way that that limits the potential on the exposed
8 metal parts, especially those likely to become
9 energized.

10 Q While I appreciate that background, I'm
11 not sure if you answered my question of what the
12 inspection for bonding actually entails.

13 A Right. So it's that kind of stickler idea
14 that I was talking about, about making sure and
15 looking at metal parts, especially of assemblies,
16 and trying to identify parts of equipment and
17 non-current-carrying metal objects and ensuring that
18 they are bonded, and if they're not bonded, that
19 they're, for instance, in the case of hangars are in
20 full contact with something that is like a grounded
21 messenger wire.

22 Q So how does AHJ ensure the component is

1 bonded?

2 A So it has to do with the use of, like,
3 listed types of bonding methods and assemblies to
4 create the bonds, and that's through irreversible
5 crimp-type fittings, exothermic welding.

6 This is not merely going to Home Depot and
7 getting -- you know, making something up. It's
8 often through listed assemblies that are used to
9 bond one thing to another.

10 So when we -- in some of the photos that
11 we've seen, we've seen stranded copper wire with
12 irreversible crimp-type fittings on either side, and
13 that's electrical work done by an electrician to
14 create it's, like, you know, it's a jumper to, and
15 you can put those across different types of sliding
16 connections to ensure that both sides of that bonded
17 connection are at the same potential.

18 Q Let's go back to the CAB installation
19 guide, Exhibit 2041. On page 2 you see [REDACTED]

20 [REDACTED]

21 [REDACTED]

22 Do you see that?

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1 A Yes.

2 Q [REDACTED]

3 [REDACTED]

4 A [REDACTED]

5 [REDACTED]

6 [REDACTED]

7 [REDACTED]

8 [REDACTED]

9 [REDACTED]

10 [REDACTED]

11 [REDACTED]

12 [REDACTED]

13 [REDACTED]

14 [REDACTED]

15 [REDACTED]

16 [REDACTED]

17 [REDACTED]

18 [REDACTED]

19 [REDACTED]

20 [REDACTED]

21 [REDACTED]

22 [REDACTED]

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Affordable Wire Management, Exhibit No. EX1041

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1

[REDACTED]

2

[REDACTED]

3

[REDACTED]

4

[REDACTED]

5

[REDACTED]

6

Q

[REDACTED]

7

[REDACTED]

8

[REDACTED]

9

A

[REDACTED]

10

[REDACTED]

11

[REDACTED]

12

[REDACTED]

13

[REDACTED]

14

[REDACTED]

15

[REDACTED]

16

[REDACTED]

17

[REDACTED]

18

[REDACTED]

19

[REDACTED]

20

[REDACTED]

21

Q

So a POSITA would look at this

[REDACTED]

22

[REDACTED]

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1 [REDACTED] Is that fair?

2 MR. FLYNN: I'm just going to object to
3 form.

4 A [REDACTED]

5 [REDACTED]

6 [REDACTED]

7 [REDACTED]

8 [REDACTED]

9 [REDACTED]

10 Q Let's go back to your declaration.

11 Paragraph 113.

12 A Okay. I'm there.

13 Q In paragraph 113 you mention that [as
14 read] "Mr. Brooks concluded that even if the
15 conductor insulation were to be damaged, the hangars
16 would remain at or near ground potential because
17 they are in contact with the grounded messenger,"
18 correct?

19 A And the words are "full contact." But
20 yes.

21 Q What is ground potential?

22 A Ground potential would be, for instance,

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1 the voltage, that's another way, potential is
2 another way of saying voltage, so the same voltage
3 as the grounding system in the earth at that point.

4 Q So to remain at ground potential means
5 that the voltage in that messenger wire would be the
6 same as the voltage of the earth. Is that correct?

7 A They would be really close because there
8 would be a connection through equipment grounding
9 conductor to a grounding electrode conductor to the
10 ground electrode. So through that path, that would
11 establish pretty much the same potential on that
12 messenger wire and, hence, the hangar, which is in
13 full-time contact with the messenger wire.

14 Q So the hangars that Mr. Brooks was talking
15 about, are those bonded?

16 A They are not bonded, and the purpose of
17 his report was to indicate and put people's mind at
18 ease about that issue. He said no, they don't need
19 to bear a listing for bonding because they are
20 fixtures in the sense of the NEC, that like NM
21 staple, so NM is like Romex or non-metallic, a lot
22 of our houses have this sort of flat cable that's NM

1 cable and it's affixed with staples. So the same
2 way that there can be a metal part,
3 non-current-carrying part of the system, you don't
4 need to go bond the staple, it's regarded as
5 fixturing.

6 So there's you like to bond most parts,
7 big parts of an assembly. But if there's a part
8 that doesn't bear a listing for bonding and it's not
9 really connected through a bonding jumper, if it's
10 in full contact, you know, it's good enough if it's
11 a fixture, and the NEC has antecedents for that.

12 Q When lightning strikes a tree, does the
13 energy from that lightning pass through the tree
14 into the earth?

15 A We could have a whole discussion about the
16 direction of current and everything. But that's
17 fine to think that way, that a lot goes into the
18 tree, burns up the tree, a lot is dissipated into
19 the earth, it will be like a shell current that will
20 go out from the earth, and it's all to dissipate a
21 very large static charge that's around us all the
22 time. I mean, it's like a hundred volts per meter

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1 up to the clouds. There's a fantastic reservoir of
2 charge in the atmosphere.

3 Q What's your understanding of the phrase
4 "partially conductive" as used in the '551 patent?

5 A So here, if we can go to there's these
6 definition columns, and quite thorough, and so I'm
7 just going to look through the "as used herein
8 sections" until I find it.

9 Q I can save you some time. Column 8 line
10 23.

11 A All right. Thank you. Yeah, it would
12 have taken me a while to find this.

13 Yeah, so that I think is a great guide, as
14 used herein, partially conductive used to describe
15 as an element or a sub-element is one that conducts
16 electricity but with some resistance or where an
17 electricity does not pass through all portions of
18 the element.

19 Q Does aluminum conduct electricity but with
20 some resistance?

21 A The answer is basically yes, for our
22 temperature -- and all the metals that we're talking

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1 about here in normal life, all the metals, including
2 aluminum, will have some resistance.

3 Q Some electricity will pass through all of
4 those metals?

5 A You can put it that way. You know, at
6 some point in the world of, like, power systems,
7 things eventually become like dielectrics and -- but
8 for metals, yeah, they're going to conduct some
9 electricity, you could quantify their resistance,
10 their impedance.

11 Q Back to your declaration at paragraph 108.

12 A Okay. I'm there.

13 Q And there you acknowledge that messenger
14 systems competed with trenching and cable trays,
15 correct?

16 MR. FLYNN: Object to form.

17 A Maybe a way I would rephrase it is just to
18 say sort of aboveground, sort of suspended
19 hangar-based way of organizing cables competed with
20 the trenching.

21 Q In paragraph 108 you say [as read], "These
22 topics reflect the marketing challenge for CAB rings

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1 saddles circa 2015, namely whether an exposed cable
2 management solution using an aboveground messenger
3 suspended cable management system would be
4 competitive with buried cables or cables placed in
5 cable trays," right?

6 A Yes.

7 Q So besides messengers and cable trays,
8 what other components were used at the time to
9 support conductors?

10 A Okay. I just got to make sure I'm
11 understanding. If you could just ask that again.
12 I'm not sure I understood.

13 Q Of course. So apart from messenger and
14 cable tray, what other components -- actually, I'll
15 restart that.

16 Apart from messenger and cable tray, were
17 there any other components used for aboveground
18 cable management?

19 MR. FLYNN: Object to form.

20 A In solar plants I saw trench conduit and
21 direct buried cable. So I think that would -- that
22 would be the -- that would fall under the trenching.

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1 Other applications aboveground I've seen lots of
2 conduit.

3 Q Conduit referring to a pipe that the
4 conductors were put into?

5 A More or less, yes, that's right.

6 Q So aboveground cable management solar
7 there were only messengers, cable trays and conduit?

8 A In PV systems, I don't recall seeing
9 conduit really. You know, there were conduit risers
10 where the conduit was buried and sort of the end of
11 it would come up and, you know, that's still a
12 trench system.

13 I don't recall seeing, at least for the DC
14 wiring, anything other than a trenched. You know,
15 for the big cables on the other side of a main
16 step-up or a generator step-up transformer, I think
17 there were other essentially distribution and
18 transmission line style structures.

19 Q In your experience, were chains ever used
20 as an alternative to messenger wire?

21 A I have not seen chains used.

22 Q What's your understanding of the term

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1 "deflection"?

2 A So just without context now, because I
3 can't think of a place where I talked about
4 deflection in my -- in my declaration.

5 Q Sure.

6 A Unless you're asking about the
7 declaration.

8 Q What's your general understanding of the
9 word "deflect"?

10 A You know, it deviates from some place.
11 And what's occurring in my mind right now, I'm
12 thinking of a cantilevered beam and there's a
13 mechanical load at the end and we say it deflects
14 because it bends and the tip moves under the
15 influence of the load.

16 Q I just placed Exhibit 1003 in front of
17 you. This is Grushkowitz U.S. Patent Number
18 10,003,298. Have you seen this document before?

19 A Yes.

20 Q Have you reviewed this document?

21 A Yes.

22 Q Grushkowitz is concerned with deflection

1 of mounting brackets in response to thermal
2 expansion or contraction of the cable trays,
3 correct?

4 MR. FLYNN: Object to form.

5 A That's -- that's part of what it has is
6 that cantilever sort of bracket that's flexing in
7 response to change in the dimensions of the cable
8 tray.

9 Q When a cable tray expands or contracts --
10 strike that.

11 Grushkowitz discloses a cable tray that
12 may expand up to 6 millimeters and contract up to 6
13 millimeters, correct?

14 A If you could point me to a particular part
15 of the specification, I could --

16 Q Yeah, that's column 10 starting at line
17 4 -- 24. It says there [as read], "Depending on the
18 length of the cable tray and the temperature, each
19 cable tray may expand by up to about 6 millimeters
20 in length or contract by up to about 6 millimeters
21 in length." Do you see that?

22 A Yes.

1 Q So what's happening when a cable tray
2 expands or contracts because of temperature?

3 A I think it would -- it would depend on the
4 -- for the nominal length we would have to first
5 establish the -- any bias forces or offset in the
6 deflection of the brackets, so assuming it's held by
7 two brackets on either end using a bolted
8 connection. And once we establish that kind of like
9 setpoint, then we can talk about the forces and
10 reaction forces and deflections with that change in
11 length of the cable tray.

12 Q Would a cable tray made from aluminum
13 expand more than a cable tray made from steel at a
14 high temperature?

15 A I really need to refer to something. I'm
16 not sure I can answer you right now. If there's --
17 if there's a place talking about this, I probably
18 read it, but I don't think I can give you an answer
19 without finding that.

20 Q Okay. We'll move on. We'll pull back up
21 the CAB Installation Guide, Exhibit 2041. Let's go
22 to page 3 Section 2.4.

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1 A Okay. I'm there.

2 Q 2.4 says [as read], [REDACTED]

3 [REDACTED]

4 [REDACTED] " Do you see that?

5 A Yes.

6 Q [REDACTED]

7 [REDACTED]

8 [REDACTED] ?

9 A [REDACTED]

10 [REDACTED]

11 [REDACTED]

12 [REDACTED]

13 [REDACTED]

14 [REDACTED]

15 [REDACTED]

16 [REDACTED] .

17 Q [REDACTED]

18 [REDACTED] ?

19 A [REDACTED]

20 [REDACTED]

21 [REDACTED]

22 [REDACTED]

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Affordable Wire Management, Exhibit No. EX1041

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1

2

3

4

5

6

7

Q

8

?

9

MR. FLYNN: Object to form.

10

A

11

12

Q

13

?

14

A

15

16

17

18

Q

Is "clam shell clamp" a term commonly used
in the solar field?

20

A

I don't think I really encountered it.
I've encountered lots of specialized names in solar
for bonding hardware, and I don't recall "clam

22

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1 shell" being one of them. One I do recall is Weeb
2 and that's a big deal in solar, but not -- I don't
3 recall "clam shell."

4 Q Okay. Is it fair to say that ground
5 clamps generally are used to connect a grounding
6 electrode to a grounding electrode conductor?

7 MR. FLYNN: Object to form.

8 A I don't know that that's fair. When you
9 go buy a listed connection to a grounding -- for a
10 grounding electrode, there's often like these
11 bronze-style fittings for connections to grounding
12 electrodes, I believe they are often called ground
13 clamps, and they bear a listing for bonding and
14 grounding, and they are for that purpose, and they
15 cost like extra.

16 You know, it's not just a clamp that you
17 would use on a downrod, because people do all kinds
18 of tricks with downrods and they hold things on
19 rods, but those aren't intended for that electrical
20 purpose.

21 So, you know, these special outdoor-rated
22 bonding-rated, those I do believe are called ground

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1 clamps when you buy them, ground rods, ground
2 clamps. They are right next to one another on a
3 shelf. But it's not -- I would just -- the converse
4 isn't necessarily true. In other words, there can
5 be other things called ground clamps.

6 Q I understand. Let's go back to that
7 excerpted version of the NEC, Exhibit 1007, on page
8 113.

9 A Okay. I'm there.

10 Q Section 250.70, "Methods of grounding and
11 bonding conductor connection to electrodes." Do you
12 see that?

13 MR. FLYNN: Give me one second.

14 MR. SWEENEY: Yeah, sure.

15 MR. FLYNN: 113, is that what you said?

16 MR. SWEENEY: Yeah.

17 MR. FLYNN: Okay. Thanks.

18 A And you were pointing at 250.70?

19 Q Yes.

20 A Yes, I see that.

21 Q The third sentence there says [as read],
22 "Ground clamps shall be listed for the materials

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1 with the grounding electrode and the grounding
2 electrode conductor." Do you see that?

3 A Yes.

4 Q And so is that what you were talking to
5 earlier about ground clamps being listed?

6 A So that's just part of it. So that's [as
7 read] "Ground clamps shall be listed for the
8 materials of the grounding electrode and the
9 grounding electrode conductor."

10 So the only materials you're allowed for
11 grounding electrode conductor are -- they are
12 actually pretty restrictive. Like, you have to have
13 I think aluminum, aluminum -- anyway, you maybe have
14 to have an aluminum or copper there, and then -- but
15 that's just part of it, because it says above you're
16 allowed listed clamps, in that first sentence. So
17 the clamp itself has to be listed in the first
18 place, and then it says it also needs to be listed
19 for the material.

20 So the way I kind of see this is, like,
21 don't get the wrong one, like, if your grounding
22 electrode conductor is a particular material, don't

1 buy the aluminum one when you need the copper one,
2 because it has to do with all these details of,
3 like, clamping and biting and is it gas-tight and
4 will it weather, because people ignore these things
5 for 50 years, 60 years, and, you know, it can
6 matter.

7 Q And so in 250.70, this provision is giving
8 guidance on how to properly use a ground clamp,
9 correct?

10 A As far as the listing, you know, as being
11 careful about the permissible types of clamp. And
12 also, I just would add I'm noting like the multiple
13 conductors, you know, you can -- you can't -- like,
14 you know, it's so specific, you know, there's one
15 that has like, oh, this will take two conductors,
16 this will take one conductor, and they're different,
17 so don't get the wrong one. There could be subtypes
18 with a listing particular for their use.

19 Q So moving on a little bit, I understand
20 one of your contentions on the CAB website, that's
21 one of our pieces of prior art depicts a mock-up
22 support assembly, and you cite to the declaration of

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1 Mr. Smith to that effect. Is that correct?

2 A Among other things, yeah. And I have my
3 own opinions about that website. But, yeah, I do
4 cite to his description of the mock-up.

5 Q I'll pull that up. This is Exhibit 1005.

6 MR. FLYNN: Just before you go to this,
7 since -- do you want to take a break now? Is it a
8 reasonable time to go through this and then take a
9 break?

10 MR. SWEENEY: Can we go off the record for
11 a second.

12 (Recess 12:26 p.m. - 1:08 p.m.)

13 BY MR. SWEENEY:

14 Q Welcome back, Dr. Phinney.

15 A Good to be here.

16 Q Let's go to Exhibit 2061, the declaration
17 of Mr. Allen Smith. Go to paragraph 14 of his
18 declaration.

19 A Okay. I'm there.

20 Q The second sentence of Mr. Smith's
21 declaration says [as read], "In 2013, CAB installed
22 a 50-foot mock-up installation in a power plant

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1 located in Carlisle, Pennsylvania, for purposes of
2 having the mock-up photographed for use in a
3 marketing brochure? Do you see that?

4 A I do. It's just it said "solar power
5 plant." But yes.

6 Q Thank you. Yes.

7 Is it your understanding that the
8 marketing brochure photos used or taken at that
9 mock-up installation were later used for the CAB
10 website?

11 A Yes, that's my understanding.

12 Q And so would you agree that the
13 photograph -- the photographs in the CAB website
14 were taken at an actual solar power plant?

15 A What I -- what I relied on is just what's
16 stated here. Seems consistent with that. It says
17 in a solar power plant located in Carlisle,
18 Pennsylvania.

19 Q If we can go back to Exhibit 1005, CAB
20 website.

21 A All right. I'm there.

22 Q So would you agree that the piles and

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1 panels that you can see on page 3 of Exhibit 1005
2 are part of an actual solar power plant?

3 A I would answer the same way that I did
4 previously, I think that's referring to this power
5 plant located in Carlisle, Pennsylvania, from what I
6 could tell from Mr. Smith's declaration.

7 And just to clarify, the piles, not the --
8 anything clamped to the piles. I just want to make
9 sure that that distinction is clear. So like the --
10 not what I'd call the bracket with this U-bolt
11 around it, I'm distinguishing that from the pile in
12 my answer.

13 Q Understood. How deep would you expect the
14 piles in this photo to be driven into the earth?

15 A You know, I don't -- I don't really know.
16 They appear to be embedded in some drain rock. You
17 know, without investigating further, I don't think I
18 could tell you.

19 I would just note that 10 feet for a pile,
20 it would be quite deep, to my understanding. You
21 can get a lot of mechanical support out of the earth
22 without having to be 10 feet into the ground.

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1 Q What would you say is the average depth
2 that a pile supporting a solar panel is embedded in
3 the earth?

4 MR. FLYNN: Object to form.

5 A I think it would just depend. And average
6 wouldn't necessarily make sense given the different
7 environments, soils and loads. So the size of solar
8 panels, you know, some are about half the size that
9 these appear to be. So just averaging over those I
10 don't think is necessarily the right approach and
11 not a good substitute for investigating what -- what
12 this embedding depth would be if it mattered.

13 Q How deep would you estimate the piles
14 supporting these large solar panels would be
15 embedded in the earth?

16 A I think I would have to give the same
17 answer I gave before.

18 You know, first of all, it appears to be
19 drain rock. And so if you're referring to soil
20 that's perhaps underneath that, you know, I don't
21 know. I think we would need to investigate that to
22 find out.

1 Q What are grounding jumpers?

2 A So if we're looking at Exhibit 2041, and

3 we looked at that [REDACTED]

4 [REDACTED]

5 [REDACTED]

6 [REDACTED]

7 [REDACTED]

8 [REDACTED]

9 [REDACTED]

10 [REDACTED].

11 Q Sorry. So are grounding jumpers the same
12 as grounding splices?

13 A Are you asking about a particular place I
14 used the term?

15 Q Generally in the industry.

16 A There, I think -- I can't think of a
17 difference right now that would be important for us.
18 You could call that jumper a grounding jumper or a
19 grounding splice and I think we would be talking
20 about that same thing. I don't think that would
21 cause an important distinction.

22 Q Does the grounding system of claim 1

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1 require a grounding splice?

2 A I would say no, that's not one of the
3 elements.

4 Q Is it your opinion that prior to CAB,
5 messenger-based cable management had never been used
6 in the solar industry?

7 MR. FLYNN: Object to the form.

8 A I think on that point I would have to rely
9 on the declarations of Mr. Smith and Mr. Bowman.
10 The systems that I encountered were trenched.

11 Q So you never encountered a messenger-based
12 cable management system prior to 2017?

13 MR. FLYNN: Object to the form.

14 A I maybe did. But I'm saying prior to
15 CAB's introduction of that commercially, I wasn't
16 aware of that aboveground type of system, and I knew
17 of trenched systems and conduit, they were direct
18 buried cable. But I may have -- I may have seen a
19 cable tray or an aboveground system prior to 2017.

20 Q So it's your testimony that prior to CAB,
21 you were not aware of an aboveground system using a
22 messenger wire in solar. Is that correct?

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1 MR. FLYNN: Object to form.

2 A When you say prior to CAB, you just mean
3 prior to -- you mean prior to CAB's introduction of
4 any type of product I think is what you're asking
5 me?

6 Q No. I'll rephrase.

7 Is it your testimony that prior to CAB's
8 introduction of the standard system, you were not
9 aware of an aboveground system using a messenger
10 wire in solar?

11 A Yeah, I think that's right. I knew of --
12 I recall trenched systems and I know that there were
13 at least short portions of those systems that
14 included some sort of cable tray where cables exited
15 and entered e-houses. I can think of those. But I
16 don't recall seeing one with a messenger wire.

17 Q Is it possible that prior to CAB's
18 introduction of the standard system, people were
19 using messenger cable management in solar?

20 MR. FLYNN: Object to form.

21 A I'm just -- I'm just talking from my
22 experience. So there I would just have to rely

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1 on -- on Mr. Smith and Mr. Bowman's description of,
2 you know, as they introduced their product, what
3 kind of skepticism they were met with by industry
4 buyers, that's all I could base that on. My own
5 personal experience is I didn't see it.

6 Q But it's possible?

7 MR. FLYNN: Object to form.

8 A I don't know. It seems like -- it seems
9 like a factual question. And, you know, all I have
10 to go on is sort of my experience and what their
11 testimony is. I don't really -- I didn't do an
12 inquiry like that.

13 Q Paragraph 293 of your declaration you say
14 that [as read] "CAB's integrated grounding system
15 satisfied a long-felt need in the industry,
16 including in solar power plants to avoid the need
17 and expense of separate grounding conductors and
18 grounding splices." Is that correct?

19 A Yes.

20 Q CAB's standard system was first sold in
21 2015, correct?

22 A I just don't have the date in my memory.

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1 Q Sure. In Mr. Smith's declaration,
2 paragraph 43, he says [as read] "In July 2015 CAB
3 learned that SunEdison intended to use CAB's
4 aboveground cable management system for all of
5 SunEdison's projects involving its NT tracker system
6 going forward."

7 Do you remember reading that?

8 A Yes.

9 Q And then Mr. Smith says in paragraph 76,
10 that CAB first sold its integrated grounding system
11 in 2017.

12 A Yes.

13 Q Is it your opinion that a need that is
14 felt for a year and a half is a long-felt need?

15 A I suppose so if -- if there was sort of a
16 need without a resolution until the integrated
17 grounding was offered.

18 Q In your opinion, can a grounded messenger
19 wire that is not an equipment grounding conductor be
20 a multi-function line?

21 A I don't -- I don't think so, because
22 it's -- this goes to the definition I offer, the

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1 construction I offer for a multi-function line is
2 that it needs to --

3 Q Is it your opinion that --

4 A -- needs to -- sorry.

5 Q No, I'm sorry.

6 A -- needs to provide a current path as a
7 grounding conductor.

8 Q Is it your opinion that CAB's integrated
9 grounding system messenger wire is a multi-function
10 line?

11 A Can you just ask that again, please? I'm
12 sorry.

13 Q Sure. Is it your opinion that CAB's
14 integrated grounding system messenger wire is a
15 multi-function line?

16 A So the way you've asked that question is
17 not really -- I think is sort of at war with the way
18 I understand the multi-function line, what I
19 understand it to be.

20 So in my opinion, this is paragraph 82 of
21 my declaration, [as read] "A multi-function line is
22 a tension member that supports current wires and/or

1 cable hangars as a messenger wire and which provides
2 a current path as a grounding conductor."

3 And as we know from the composition of
4 the -- you know, the engineering that went into
5 creating a copper clad conductor, that
6 multi-function line is not, you know, merely or only
7 a messenger wire.

8 Q Right. So it's your opinion that CAB's
9 messenger wire does satisfy your construction of the
10 term "multi-function line"?

11 MR. FLYNN: Object to form.

12 A So where I'm -- where your question
13 doesn't really express things the way I understand
14 them is because you're saying CAB's messenger wire.
15 And what I'm saying is CAB developed something that
16 was more than a messenger wire, it was this
17 multi-function line, because it was, you know,
18 suitable for use as an equipment grounding
19 conductor. So it provided a current path as a
20 grounding conductor, but also was a tension member
21 that supported current wires and cable hangars as
22 messenger wire, but you had to build something new.

1 Q So if we can go to Appendix A of your
2 declaration on page A1.

3 A Okay. I'm there.

4 Q On the right-hand side of that image
5 there's an annotation that says "Conductive
6 messenger support wire and EGC." Do you see that?

7 A Yes.

8 Q And it's pointing to the messenger wire in
9 that image. Is that right?

10 MR. FLYNN: Object to form.

11 A Again, I'm going to give the same type of
12 answer. What I'm trying to get at, you're using the
13 term "messenger wire" that I find reductive and
14 potentially confusing because of this prior art
15 messenger wire, which is bought as such and doesn't
16 include the engineering, isn't for use as a
17 grounding conductor. And so that that development
18 of this new wire, which is not a messenger wire,
19 it's more, is why I give this larger label.

20 So you're building that terminology into
21 your question, so that's why I keep giving these
22 answers.

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1 Q CAB calls this component a messenger wire.

2 Do you know that?

3 A I could have seen that.

4 Q So when I'm referring to it as a messenger
5 wire in this image, I'm referring to what CAB calls
6 it. Does that make sense?

7 A If you want to call it that, that's fine.
8 I just do find it reductive and potentially
9 confusing because of the engineering changes, the
10 engineering that was made to make this new wire.

11 Q Is it your opinion that this is not a
12 messenger wire?

13 MR. FLYNN: Object to form.

14 A Well, one of the best ways I know how to
15 put it is what I was referring to on paragraph 82 of
16 my declaration. It's something that [as read] "a
17 tension member that supports current wires and/or
18 cable hangars as a messenger wire and provides a
19 current path as a grounding conductor."

20 Q So with your knowledge of the engineering
21 work that you've referred to, and your knowledge
22 that the cable in this image is sold by CAB, is it

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1 your opinion that this is a multi-function line?

2 A Yes, that's -- that's right. That's why I
3 label it as a conductive messenger support wire and
4 an EGC.

5 Q If the grounding system in this image was
6 modified so that there was a separate EGC in
7 combination with the cable that's already there,
8 would you still consider that cable a multi-function
9 line?

10 MR. FLYNN: I'm going to object to the
11 form.

12 Could I just ask you to repeat that? I'm
13 not sure that it didn't get lost in translation.

14 Q If there is a separate equipment grounding
15 conductor in this image, would that same component
16 that you've designated conductive messenger support
17 wire and EGC still be a multi-function line?

18 A I guess I'm not sure what you're asking
19 me. I mean, what do you mean a separate EGC?

20 Q You're familiar with CAB's integrated
21 grounding system, correct?

22 A Yes.

1 Q If CAB's integrated grounding system were
2 modified such that the messenger wire was grounded,
3 but there was a separate EGC, would the system
4 practice claim 1?

5 A So at this point I guess I'm not sure what
6 you're asking me, because, so, first of all, you
7 used the word "messenger wire," and so I want to
8 know -- there's that ambiguity I mentioned about are
9 you talking about what's here? Because I think -- I
10 think -- I think you need to rephrase, if I can
11 understand the question.

12 Q Let's go to paragraph 304 of your
13 declaration.

14 A Okay. I'm there.

15 Q So here you say [as read], "Exemplary CAB
16 product part numbers that constitute its integrated
17 grounding system include [REDACTED]

18 [REDACTED]

19 Do you see that?

20 A Yes.

21 Q Is that the component in Appendix A?

22 A Oh, excuse me, sorry. I thought you were

1 asking more to your question.

2 That I understand to be, that [REDACTED] I
3 understand to be that [REDACTED] that we were
4 looking at that had the label in Appendix A

5 [REDACTED]"

6 Q So in paragraph 304 you call that
7 component [REDACTED],
8 correct?

9 A That's what I write there. I think that
10 that terminology "[REDACTED]" is maybe
11 from, you know, like quoting a document essentially.
12 I maybe could have put quotes around it.

13 Q Perhaps a document where CAB is calling
14 its component a messenger wire?

15 MR. FLYNN: Object to form.

16 A What I will say is I recall a document
17 that I believe used the phrase "[REDACTED]
18 [REDACTED]" and -- but, in any event, this [REDACTED] is
19 that item that I've labeled in Appendix A
20 "[REDACTED]."

21 Q Is it your opinion that CAB's integrated
22 grounding system practices claim 1 of the '551

1 patent?

2 A I think it's co-extensive with the claim.

3 Q What's the difference between being
4 co-extensive with the claim and practicing the
5 claim?

6 A As I understand it, the co-extensive means
7 that there could be other -- other aspects of the
8 commercial system, but those are not critical for
9 the grounding aspect of the claim.

10 Q Does CAB's integrated grounding system
11 practice claim 1 of the '551 patent?

12 A Yeah, I think so. I mean, I can make a
13 claim chart where I can show here's the element and
14 here's the aspect of the system that -- that
15 practices it. And I think your question was about
16 the CAB system that CAB sells is I think what you
17 said.

18 Q Yeah. How do you determine that CAB's
19 integrated grounding system is structured to, as
20 that phrase is defined in the '551 patent, practice
21 claim 1?

22 A So this -- there is two sort of

1 engineering pieces that went into that inquiry, and
2 one really was about the multi-function line aspect
3 and the other was about the clamp.

4 So that's something where there was
5 underlying calculations or testing that made it
6 clear, as an example, that the Burndy clamp was
7 suitable to provide a bonding connection.

8 Q So without that background information
9 that you're relying on, would an identically
10 structured system as CAB's integrated grounding
11 system practice claim 1?

12 A I think so, because I think what you're
13 asking me is like an atom-for-atom replica
14 essentially of the system that I'm talking about.
15 Yeah, I think that's right.

16 When I'm talking about other material,
17 that's like proof kind of issues, it's like how a
18 person of ordinary skill would understand that some
19 of these claimed elements are present.

20 Q So looking at that system, you would be
21 able to determine that it was structured to practice
22 claim 1?

1 A Well, if you look at the kind of thing a
2 POSITA relies on, the reason I relied on certain
3 types of testing documentation is that that -- or a
4 listing summarizing that that has occurred, is the
5 type of material a POSITA would rely on.

6 So to answer your question, yeah, you
7 could determine it from the -- the physical
8 hardware. But that's exactly what the testing, the
9 listing, the certification does for you, it's sort
10 of a shortcut, so you're saying, oh, it was tested.

11 Q So you would look at the physical hardware
12 and then follow up with the testing for listing and
13 the listing information. Is that fair?

14 A I think that is pretty fair. You would
15 need to -- without that listing, you would have to
16 do the testing, and every customer wouldn't want to
17 be burdened with a science project of figuring it
18 out.

19 Q Understood. Okay. Let's go to claim 1 of
20 the '551 patent. Can you review claim 1 and tell
21 me -- well, strike that.

22 Do you agree that claim 1 of the '551

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Transcript of Joshua W. Phinney, Ph.D.

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1 patent describes a grounding system structured to
2 ground a number of cables supported by a support
3 assembly and the support assembly includes space
4 conductive piles?

5 MR. FLYNN: Object to form.

6 A You seem to be paraphrasing the preamble
7 in your question, and, you know, the preamble
8 phrases it slightly differently. But basically,
9 yes.

10 Q Do you agree that claim 1 of the '551
11 patent does not mention cable hangars?

12 A As far as a word, it's not there. It does
13 include in the preamble a support assembly.

14 Q But you'll agree that it does not --
15 you'll agree that it does not mention cable hangars?

16 A I think that's -- that's right. It has
17 the words that we see here. Cable hangars isn't
18 there.

19 Q Throughout your declaration you refer to
20 CAB's integrated grounding system. Is that the same
21 as CAB's integrated system?

22 A Yes. I can't think of any reason I would

1 have had to somehow distinguish those two. I
2 intended to be consistent, so I must have omitted a
3 word.

4 Q You reviewed CAB's standard system as well
5 as the integrated grounding system, correct?

6 A Yes.

7 Q Is it your opinion that CAB's standard
8 system does not practice the '551? Let me rephrase.

9 Does CAB's standard system practice claim
10 1?

11 A Well, I didn't really -- I didn't really
12 undertake to analyze it. I used it really for the
13 purpose of those photos to illustrate the
14 grounding -- the grounding splice. And, you know, I
15 just haven't done the analysis.

16 Q But you're aware that the standard system
17 has a standard system grounding conductor, correct?

18 A That's right, it has equipment grounding
19 conductor and a messenger wire, that's right.

20 Q So with that in mind, you're unable to
21 determine whether or not the standard system
22 practices claim 1?

1 MR. FLYNN: I'm going to object to
2 relevance. Beyond the scope.

3 A I definitely used it to contrast, you
4 know, what sort of the value proposition of the
5 integrated grounding system was. You know, like
6 Mr. Bowman says, it's like a no-brainer to do
7 because you can have one conductor instead of two.

8 And I really didn't do the analysis. I
9 mean, I looked at the grounding splice, at the
10 grounding splices as illustrative of what's
11 described in the background of the invention of '551
12 to set up what's different about integrated
13 grounding. But I didn't do an element-by-element
14 analysis.

15 Q If a multi-function line needs grounding
16 splices, would it practice claim 1 of the '551
17 patent?

18 MR. FLYNN: Object to the form.

19 A I think it could depend. I mean, if
20 there's a particular instance, I think we would have
21 to analyze it to check. It could depend.

22 Q So you did analyze CAB's integrated

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1 grounding system, correct?

2 A Yes.

3 Q In your opinion, does CAB's integrated
4 grounding system include mid-pier kits that are
5 rated for bonding and grounding?

6 A Yes, I think that's fair.

7 Q As well as end-pier kits?

8 A I don't have the ability to search. I
9 just hope maybe you could -- I know I mention
10 end-pier kits, and I'm trying to find that place to
11 see if that's sold along with the integrated
12 grounding system.

13 Q Sure. It's paragraph 304 of your
14 declaration.

15 A Yes, I'm trying to remember if the
16 grounding end-pier attachment kit -- and maybe, I'm
17 sorry, if you could just remind me of your question.

18 Q Sure. Is it your opinion that CAB's
19 integrated grounding system includes end-pier kits
20 that are rated for bonding and grounding?

21 A Everything I recall related to a rating
22 for bonding was regarding essentially a mid-pier

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1 attachment on the L bracket. I don't -- I don't
2 recall citing something showing that end-pier kit
3 included a rating for bonding.

4 For instance, I believe I've seen at least
5 drawings that are showing grounding splices that are
6 made at those points perhaps by an electrician, like
7 there's non-conductive and support hardware for an
8 end-pier and then a jump. But I -- I don't think I
9 recorded whether or not the end-pier kit has a
10 rating for bonding.

11 Q In Mr. Smith's declaration, paragraphs 70
12 through 72, Mr. Smith recounts efforts that CAB
13 undertook to develop its customized copper composite
14 messenger wire L-shaped bracket clamps. Is that
15 correct?

16 A Yes.

17 Q Why couldn't CAB use its existing clamps
18 and brackets for its integrated grounding system?

19 A Well, I think for me that would be
20 speculation. You know, when I read this story of
21 having to develop something new, I could speculate
22 why that was the case. But the kind of things I've

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1 seen are just a few photos, and I wasn't privy to,
2 you know, communications that knew about, like,
3 problems that those types of assemblies would have
4 had to even pass -- pass certification tests.

5 Q Do you know if the clamps and L brackets
6 that CAB developed for its integrated grounding
7 system, do you know if those clamps and L brackets
8 are in all mid-pier kits sold by CAB?

9 A So the clamps developed for integrated
10 grounding, are they in all of the sold units? I'm
11 just making sure I heard your question.

12 Q Yeah, I'll try to read it not like a
13 robot. Do you know if the clamps and L brackets CAB
14 developed for its integrated grounding system are
15 included with all mid-pier kits CAB sells?

16 A I don't think I know that type of
17 information. I do recall seeing at least I believe
18 isolated purchase orders that did default down to
19 part numbers. But I don't recall seeing like
20 comprehensive lists of what went in the kits.

21 Q If we go to -- back to the first page of
22 Appendix A, A1, excuse me, there you cite to the CAB

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1 website, correct?

2 A Yes.

3 Q I'll use a new exhibit here. This will be
4 EX1042.

5 (Exhibit 1042 marked for identification.)

6 Q I'll represent to you that this is a
7 printout of the website URL that you cite on page
8 129 of your declaration in Appendix A.

9 Does this look familiar?

10 A It certainly has some photos and parts,
11 like the torque 2 hangars, you know, I've seen
12 pictures of them in the 2020 Bill Brooks white
13 paper. So there's maybe a little interference going
14 on because I've seen some parts of this in other
15 documents.

16 Q On the second page of this document, on
17 the right-hand side do you see where it says [as
18 read], "The patented design includes a custom
19 engineered messenger wire, clamps and mid-pier
20 brackets"? Do you see that?

21 A Yes.

22 Q Do you agree that CAB's integrated

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1 grounding system includes a custom engineered
2 messenger wire, clamps and mid-pier brackets?

3 A I think so. That seems to be the type of
4 things we were looking at in Mr. Smith's declaration
5 at paragraph 70 to 72.

6 Q You agree this statement does not include
7 hangars, correct?

8 A That statement does not include hangars.

9 Q And that statement does not include
10 end-pier kits, correct?

11 A That statement does not, I'm focusing on
12 the -- that first sentence in -- after the bold
13 blue, "The patented design."

14 MR. SWEENEY: I think we may be done here.
15 If we could just take five minutes to collect my
16 mess and --

17 MR. FLYNN: Sure.

18 MR. SWEENEY: So let's take a five-minute
19 break.

20 (Recess 2:03 p.m. - 2:23 p.m.)

21 BY MR. SWEENEY:

22 Q If a cable is fixed between two points, is

1 there tension on that cable?

2 MR. FLYNN: Object to the form.

3 A I think it could depend.

4 Q What would it depend on?

5 A If you mentioned it's fixed between two
6 points and you gesture with your hand like, you
7 know, maybe being not supported by anything else or
8 not so slack that it's resting on anything else, and
9 things of that nature, so as long as it's maybe
10 suspended between those two points and simply
11 supported on either side so there's not a bending
12 moment, you know, in those circumstances, yeah, you
13 could say there's tension on the -- on the cable or
14 wire.

15 Q Is there a change in length of that cable
16 based on a change in temperature?

17 A That could happen.

18 Q Would a decrease in temperature cause the
19 cable to be drawn taut?

20 A It could.

21 Q Would a decrease in temperature cause the
22 cable -- strike that.

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1 Would a decrease in temperature cause an
2 increase in tension of that cable?

3 A I think it could.

4 MR. SWEENEY: All right. We pass the
5 witness.

6 EXAMINATION

7 BY MR. FLYNN:

8 Q Dr. Phinney, I just have a few questions
9 for you.

10 Mr. Sweeney was asking you whether or not
11 CAB's integrated grounding system includes cable
12 hangars. Do you recall that?

13 A Yes.

14 Q And you had -- either you or Mr. Sweeney
15 had directed you to paragraph 304 of your
16 declaration.

17 A Okay. I'm there.

18 Q And you do include cable hangars as one of
19 the component parts of CAB's integrated grounding
20 system, correct?

21 A Yes, there I list it in paragraph 304.

22 Q Dr. Phinney, in your opinion, are the

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1 cable hangars that are listed there in paragraph
2 304, and presumably included as part of the
3 integrated grounding systems that CAB sells, are
4 those cable hangars critical to the integrated
5 grounding system itself?

6 MR. SWEENEY: Objection. Form.

7 A I would answer no, the cable hangars are
8 not critical to the grounding aspect of the
9 invention.

10 Q Do the cable hangars that you identify in
11 paragraph 304 of your declaration, do they have any
12 impact on the operation of CAB's integrated
13 grounding system?

14 A I guess a short answer would be no,
15 certainly as far as the grounding aspects.

16 Q Similarly, with respect to the end-pier
17 attachment kits that you also identify in paragraph
18 304 of your declaration and Mr. Sweeney was asking
19 you about, are those end-pier attachment kits,
20 assume that they are not rated for grounding, would
21 those end-pier attachment kits have any impact on
22 the operation of CAB's integrated grounding system?

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1 MR. SWEENEY: Objection. Form.

2 A No, they wouldn't be critical to the
3 grounding aspects of the claimed invention.

4 Q Dr. Phinney, if you could put Exhibit 1005
5 in front of you.

6 A Okay. I have it.

7 Q And I would ask you to page through the
8 various pages of Exhibit 1005, particularly those
9 pages that purport to show a messenger wire from
10 which these saddle rings and hangars are suspended.

11 A Okay. I've looked at those photos.

12 Q And on those various pages that include
13 those various photos, is it your opinion that a
14 person of ordinary skill in the art at the time of
15 the invention would be able to look at the messenger
16 wire depicted and conclude without more that the
17 messenger wire would be acting as a grounding
18 conductor as well as a support structure?

19 MR. SWEENEY: Objection. Form. Scope.

20 A A person of ordinary skill would not
21 conclude that this -- this messenger wire is acting
22 as a grounding conductor. I'm looking at page 3,

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1 and there you can see the messenger wire on the left
2 side is sort of frayed and all coming apart, and you
3 can see that actually in some of the other drawings
4 as well, or photographs as well, and that's, I mean,
5 that's not even electrical work.

6 Furthermore, a POSITA would look at this
7 and see this galvanized steel type of wire for a
8 support function and know from that it can't serve
9 as a grounding conductor because of code provisions,
10 like NEC article 250.118 that don't list messenger
11 wire among permitted equipment grounding conductors.

12 Q When you say the 250.118 does not list
13 messenger wire among equipment grounding conductors,
14 do you mean galvanized steel messenger wires?

15 A Yes, that's what I mean. Messenger wires
16 are conductive in this type of, you know, this type
17 of color, I mean, this is -- this appears to be a
18 galvanized steel messenger wire.

19 Q Is it your opinion whether the photos
20 included in Exhibit 1005 would reasonably suggest to
21 a person of ordinary skill in the art that the
22 depicted messenger wire is acting as a grounding

1 conductor?

2 MR. SWEENEY: Objection. Form. Scope.

3 A No, they wouldn't really suggest that to a
4 person of ordinary skill. I lay out a lot of
5 reasons for this in my declaration. It has to do
6 with, you know, the orientation of this -- of this
7 messenger wire and the supported current wires, the
8 lack of connection to anything else to the panels,
9 for instance.

10 And moreover, just the fact that equipment
11 grounding conductors are not required to run with
12 current conductors in the vicinity of the array. I
13 mean, just not seeing something there and then
14 concluding, well, something that is there must be
15 serving that function as a grounding conductor is
16 just not a leap that a person of ordinary skill
17 would make.

18 Q Do I understand your testimony or your
19 answer to mean that a person of ordinary skill would
20 not conclude or it would not be reasonably suggested
21 to that person of ordinary skill that the messenger
22 wires act as a grounding conductor simply because a

1 separate grounding conductor is not depicted?

2 MR. SWEENEY: Objection. Form. Scope.

3 A Yeah, that's -- that's correct.

4 Q Dr. Phinney, based upon what's depicted in
5 these photos in the CAB website Exhibit 1005, would
6 a person of ordinary skill in the art expect to see
7 a separate grounding conductor in that area shown in
8 the photos?

9 MR. SWEENEY: Same objections.

10 A No, and that has to do with what I
11 mentioned about the orientation. So being along the
12 direction of a string you would expect -- and I have
13 this in my declaration -- is that this type of --
14 you expect, rather, to see an equipment grounding
15 conductor in areas at a home run that are not in the
16 vicinity of the array, that are leaving the array.
17 You can see depictions like this actually in -- I'm
18 thinking in particular of Exhibit 2021 which
19 actually shows the integrated grounding where
20 there's, you know, there's cables running
21 perpendicular to trackers.

22 So it's rather in those locations that you

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1 expect to see an equipment grounding conductor. So
2 you wouldn't -- you wouldn't expect to see one at
3 all in this type of location.

4 MR. FLYNN: That's all I have.

5 FURTHER EXAMINATION

6 BY MR. SWEENEY:

7 Q Dr. Phinney, does the NEC prohibit
8 orienting an EGC in parallel to a solar array?

9 A No, it does not prohibit that.

10 Q Have you ever seen an equipment grounding
11 conductor run in parallel to a solar array?

12 A I'm not sure what you're asking the way
13 you phrased it. And I really should have said that
14 same thing I think with your previous question
15 because I think you used "solar array" there, too.

16 Q Going back to page 3 of Exhibit 1005, do
17 you see the direction of the messenger in this
18 photo, have you ever seen an equipment grounding
19 conductor follow that same path?

20 A Not a separate conductor. I've seen it in
21 home runs, but I've seen it rather bonding through
22 the racking, so where the racking is suitable to

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1 provide all the connection and serve as -- serve the
2 equipment grounding function.

3 So, in other words, you only need to
4 provide an equipment grounding conductor to the end
5 of a string because of -- because of it being bonded
6 together through its racking.

7 Q What does racking refer to?

8 A So I can show you in -- in Exhibit 2064,
9 that's my declaration, in paragraph 40, so this is
10 on page 17, there's bonding hardware for mounting PV
11 modules, and they can be connected one to another in
12 a string in a way that provides so that they are all
13 bonded together, so the equipment grounding
14 conductor need only terminate at the end of a
15 string.

16 Q So if a stray current were imposed on that
17 string, would it flow from that string to the
18 equipment grounding conductor?

19 MR. FLYNN: Object to the form.

20 A I'm not exactly sure what you're asking.

21 Q What's the purpose of bonding the string
22 you referred to to the equipment grounding

1 conductor?

2 A So the PV modules can be all bonded
3 together by design, because it's known that they are
4 to be installed in a string. And then should a
5 ground fault occur anywhere within the string,
6 because it's a bonded system, a specialized bonding
7 hardware, that that current would -- would travel to
8 the equipment grounding conductor that would provide
9 an effective ground fault current path, for
10 instance, to assist in clearing the fault by
11 facilitating the operation of a protection device.

12 Q So that stray current would flow in
13 parallel to the solar panels, correct?

14 A That current, that would be a fault
15 current we would often think of it as, yes, would
16 flow you think of it in parallel to the string.

17 MR. SWEENEY: I pass back the witness.

18 MR. FLYNN: I have nothing further.

19 MR. SWEENEY: We're done.

20 (Time noted: 2:40 p.m.)

21

22 *****

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1 CERTIFICATE OF CERTIFIED SHORTHAND REPORTER

2 NOTARY PUBLIC

3 I, MONIQUE VOUTHOURIS, Certified Court Reporter
4 and Notary Public within and for the State of New
5 York, do hereby certify:

6 That JOSHUA W. PHINNEY, PH.D., the witness
7 whose deposition is hereinbefore set forth, was duly
8 sworn by me before the commencement of such
9 deposition, and that such deposition was taken
10 before me and is a true record of the testimony
11 given by such witness.

12 I further certify that the adverse party,
13 CAMBRIA COUNTY ASSOCIATION FOR THE BLIND AND
14 HANDICAPPED, INC., was represented by counsel at the
15 deposition.

16 I further certify that the deposition of JOSHUA
17 W. PHINNEY, PH.D. occurred at 919 Third Avenue, New
18 York, New York, on Friday, September 13, 2024,
19 commencing at 9:21 a.m. to 2:40 p.m. EDT.

20 I further certify that I am not related to any
21 of the parties to this action by blood or marriage,
22 I am not employed by or an attorney to any of the

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Affordable Wire Management, Exhibit No. EX1041

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1 parties to this action, and that I am in no way
2 interested, financially or otherwise, in the outcome
3 of this matter.

4 IN WITNESS WHEREOF, I have hereunto set my hand
5 this 20th day of September 2024.

6
7
8 
9

10 Monique Vouthouris, CCR, RPR, CRR

11 Notary Public of the State of New York

12 My commission expires: December 1, 2027
13
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