

EVALUATION OF
DETECTABLE WARNINGS/DIRECTIONAL SURFACES
ADVISORY COMMITTEE (EDWAC)

**Division of the State Architect
Underwriters Laboratories Inc.**

**Minutes of a Public Meeting held on:
Wednesday, August 17, 2005**

**1102 Q Street, 5th Floor Conference Rooms
Sacramento, California**

MEETING ATTENDANCE ON WEDNESDAY, AUGUST 17, 2005

Committee Members Present

David Cordova
Jeff Holm
Arfaraz Khambatta
Eugene (Gene) Lozano, Jr.
Michael Paravagna
Paula Anne Reyes-Garcia
Richard Skaff
Jane R. Vogel
Tom Whisler

Committee Members Absent

Doug Hensel
Minh Nguyen

DSA Staff Present

Derek Shaw
Louise Redeen

UL Staff Present

Jeff Barnes
Esther Espinoza
Andre Miron

Others Present

Joni Bauer, California Association of
Orientation & Mobility Specialists
Francis Hamele, Wausau Tile
Paul Hantz, Wausau Tile
Mark Heimlich, Armor-Tile
Jon Julnes, Vanguard ADA Systems
Of America
Russ Klug, ADA Concrete Domes/Cast In Tact
Jeff Koenig, Detectable Warning Systems Inc.
Kel Kristiansen, Interlock San Diego
Pat Merriman, CastinTact
Ed Vodegel, Flint Trading, Inc.
Lex Zuber, Norsestar Construction

AUGUST 17, 2005

General – A meeting of the Evaluation of the Detectable Warnings/Directional Surfaces Advisory Committee (EDWAC) was held on August 17, 2005 at the California Community Colleges Building in Sacramento, California. The purpose of the meeting was to discuss known technologies, review testing programs provided in a draft of proposed requirements, and to discuss other issues related to the evaluation of detectable warnings and directional surfaces.

The following minutes/meeting report is not intended to be a verbatim transcript of the discussions at the meeting, but is intended to record the significant features of those discussions.

1 **1. Call to Order** [Jeff Barnes/UL]

2 Jeff Barnes called the fourth meeting of the advisory committee for detectable warnings and
3 directional surfaces to order at 10:00 a.m.

4

5 **2. Review of Meeting Protocol** [Jeff Barnes/UL]

6 Jeff Barnes noted that the meeting protocol follows Roberts Rule of Order, and emphasized
7 the need to continue to focus on the scope and goals of the committee. Essentially the
8 scope and goals are to establish performance criteria for detectable warnings, to establish
9 the longevity of the product in the field and verify that the products complies with State of
10 California building codes, so that after 5 years, the product does not degrade in its
11 performance characteristics by greater than 10 percent.

12

13 **3. EDWAC Member Introductions/Roll Call** [Jeff Barnes/UL]

14 EDWAC members, UL and DSA staff members, manufacturers, and general public, each
15 took a turn introducing themselves. Three EDWAC members were not in attendance.

16

17 **4. Review/Adopt Minutes of April 28 – 29, 2005 Meeting** [Jeff Barnes/UL]

1 Jeff asked if any committee members had questions or comments concerning the April 28
2 and 29, 2005 meeting minutes. The comments or recommendations were as follows:

3 a) Gene Lozano two proposed editorial changes:

4 1. The term "article," should be used instead of the word "section" in the code
5 reference described on Page 34, Line 17, of the April 28, 2005 (Day One)
6 meeting report.

7 2. Recommends revising the term "yellow/orange" to "yellowish orange,
8 number 33538", on Page 34, Line 8 of the April 29, 2005 (Day Two)
9 meeting report.

10 b) Richard Skaff – Notes that his handout distributed at the end of the meeting, was
11 not provided as an attachment to the meeting minutes. The handout consists of
12 several written concerns prepared by Richard Skaff, provided to introduce topics of
13 concern for discussions at upcoming EDWAC meetings. Although some of the
14 concerns were discussed as part of the meeting topics during the August 17, 2005
15 meeting, Richard proposes that the committee specifically discuss the listed issues
16 as a separate document at a future meeting.

17 b) Paul Hantz proposed three revisions.

18 1. Revise the terms on Day Two, Page 18, and line 6, from "adhesive on
19 screw" to "adhesive on screw covers"

20 2. Clarify Day One, Page 18, and lines 16-21 paragraph. This overly
21 condensed paragraph addresses resiliency values for pre-cast ADA
22 truncated domes and concrete pavers. Paul Hantz will provide his input for
23 this paragraph to Esther Espinoza, so that the paragraph can be clarified
24 further.

25 3. Add comments about Paul's proposal to conduct a sweeping test with a
26 tapping test, or instead of a tapping test, or conduct a sound transmission

1 for sound-on-cane test. Andre Miron agreed at the meeting to consider or
2 prepare these test methods for detectable warnings. Paul Hantz will
3 provide his input for this paragraph, and submit the information to Esther
4 Espinoza so that the April meeting minutes can be updated.

5
6 Richard Skaff made a motion to adopt the April 28 and 29, 2005 meeting minutes. Gene
7 Lozano seconds the motion. There were no objections, so the meeting minutes were
8 adopted.

9 Vote Results: 8 yes votes, 0 no votes

10
11 **5/6. Research Design – Detectable Warnings/Directional Surfaces and**
12 **Manufacturer/Comments** [Jeffrey Barnes/UL]

13 *Topics:*

- 14 *a) Goals of Research Design*
- 15 *b) Research Design Exercise Schedule*
- 16 *c) Installation Overview*
- 17 *d) Detectable Warning Sample Specifications*
- 18 *e) Test Site*
- 19 *f) Research Design Expenses*

20
21 a) Goals of Research Design – Jeff Barnes reported that the goals of the research design is
22 to prove the proposed resiliency test method and the measurement that have been defined
23 in the draft standard. Secondly, establish a level of resiliency that an individual can reliably
24 detect for those installations and detectable warning systems that rely on resiliency for the
25 primary means of detection. The research design will provide some guidance of what the
26 minimum detection level should be in terms of the measure of coefficient of restitution

concept that is being proposed, and how it correlates to the actual perception difference from the person using the product.

b) Research Design Exercise Schedule – Jeff Barnes announced that the research exercise, designed to assist the committee in developing performance criterion on resilience, is schedule for the next meeting in October 2005.

c) Installation Overview –The research design exercise is intended to evaluate the proposed test measurement technique developed by UL on resiliency. Part of the research is to identify or put a number indicating a level of resiliency on a particular product, so that this information is available to interested parties prior to product installation. Another part of the research goal is to determine if a product retains its resiliency when surrounded by another or similar material. Therefore it's important to have the test site provide various samples of products some of which rely on resilience, for its method of detection, and some of which do not rely on resilience. Data will be collected and analyzed by Linda Myers and Billie Bentzen, reviewed by the committee, and if possible a number or level identified which notes at what level a detectable warning product becomes detectable by its resiliency.

Representatives of the public attending the next meeting will be invited to participate in the research design exercise. Manufacturers will be encouraged to participate by contributing test samples, and by sharing the financial expenses of creating a research test site and for analyzing the data from the test site.

Linda Myers will oversee the exercise in Sacramento, California, and provide brief training on research procedures for all test participants. In addition, Linda Myers will outline basic

safely guidelines for all test participants guiding a person in this exercise who have been provided with blindfolds.

d) Detectable Warning Sample Specifications – Jeff Barnes circulated a draft handout that provides sample specifications for the upcoming research design exercise. Discussions concluded with the following additional comments to be added to the handout.

1. Height – Use standard 4 feet height samples for ease of installation.
2. Lifting Hardware – Four inserts or bolts should be installed onto the opposite sides of samples (two on each side), not on the top or bottom of a test sample. Paul Hantz and Pat Merriman will send recommendations of standard hardware information, to Jeff Barnes.
3. Surface – Handout will note that surfaces and products placed over an existing surface, should be recessed, or constructed at an even level with surrounding surfaces/pavers.
4. Dome to Dome Spacings – Specifications will request submitted test samples with 2.35 inch dome to dome spacings in an inline pattern, although alternate spacings and staggered patterns are acceptable if in compliance with the building code or with IR11B-4 (1.67 inch spacing). The pattern type and dome spacings will be recorded and added to the test data for analysis.
5. Footwear – Any footwear type is acceptable, and will be noted as part of the test data.
6. Samples – Manufacturers will need to indicate type of detectable warning samples to be submitted for testing. Jeff Barnes will review sample construction data, to verify that a variety of samples types will be tested, and to permit as many manufacturers as possible have the option of submitting at least one test sample.

1 7. Updating Manufacturer's List – David Cordova from CALTRANS, will send a list of
2 additional producers to Esther Espinoza that will be incorporated into the current
3 invitation list of manufacturers prepared by UL from the EDWAC General Contact
4 List.

5
6 e) Test Site – Jeff Barnes notes that CALTRANS has offered a 60-foot area that will hold
7 approximately 20 test samples. This test site is currently available only for a limited time (60
8 – 90 days), however Jeff will contact CALTRANS after the meeting, to determine if the test
9 site can be retained for a longer period of time, in order to conduct other research projects.
10 Although Jeff had contacted several contractors for consideration in installing all test
11 samples, he was still interested collecting additional suggestions. David Cordova and
12 Paula Reyes-Garcia volunteered to research this and contact Jeff if they can locate
13 additional contractors.

14
15 Gene Lozano notes that a longer time period would be needed, since he is recommending
16 that additional research, acoustical sound testing and other tests be conducted at the test
17 site. Gene recommends that the guidelines specify that a sound difference method be
18 included in test samples, in case the samples are later subjected to acoustical testing.

19
20 Jeff Barnes agreed, and notes that further negotiations are planned with CALTRANS in
21 order to pursue an extension of the approval for the test site.

22
23 f) Research Design Expenses – The approximate cost for installation/removal of detectable
24 warnings, analyze data, and for Linda Myers and Beezy Bentzen would be between \$12,000
25 and \$15,000 total. This amount would be divided up among the manufacturers submitting

1 samples for installation, and those manufacturers installing multiple samples would pay a
2 proportionally larger amount, based on the number of samples submitted.

4 **Floor Discussions**

5 Jon Julnes asked if there was an equitable method of handling the financial expenses of
6 conducting the research, when all manufacturers would benefit however the cost of the
7 research design would be divided among a smaller group of manufacturers. Are there any
8 advantages for the manufacturers participating in the resiliency design research?

9
10 Jeff Barnes explained that there are several advantages, which include their participation in
11 the development of new requirements for detectable warnings, and the manufacturers have
12 the opportunity of introducing their products to the EDWAC and the general public involved
13 with the testing. In addition, it may be possible to waive the test fees and samples in a
14 future certification project for the resiliency test for the tested model only, if the manufacturer
15 has had their product subjected to the resilience design test, and if the designated
16 certification organization are in agreement with this proposal. Jeff Barnes will provide an
17 approximate cost limit for the resilience testing at the next meeting.

18 19 **7/8. Environmental Conditioning – UV Aging (Exhibit A, Section 8); and** 20 **Manufacturer/Public Comments** [Andre Miron/UL and Jeff Barnes/UL]

21 *Topic: UV Aging – Update*

22 Andre Miron announced that he continues to work in the lab testing numerous samples;
23 reviewing and verifying proposed test methods, and has been making steady progress. The
24 following is a list of significant comments made based on discussions or in response to
25 questions, all related to the test program or test samples.

- 1 a) Test Chambers – After review of available conditioning test chambers, Andre has
2 determined that the environmental conditions can be reproduced. Tests could be
3 duplicated in the laboratory in specified test chambers.
- 4 b) UV Test Chamber – The UV test chamber has a weight limit that permits testing only
5 four 2 by 2 ft sample tiles at a time. To address this issue, UL will needs to locate a
6 larger test chamber, or utilize smaller samples sizes for testing. Andre is presently
7 conducting research for a larger chamber and has contacted manufacturers of UL's
8 test chambers. In addition, Andre has requested suggestions or information from
9 anyone aware of facilities with a large UV exposure xenon arc or similar chamber
10 available.
- 11 c) Conditioning Tests – Other conditioning tests such as the salt spray exposure test,
12 and the freeze- thaw, and chemical resistance test have been tested with no reported
13 problems.
- 14 d) Chemical Resistance Test – Andre is still working on testing various types of
15 chemicals for the chemical resistance test. With respect to chemical resistance,
16 Andre has conducted additional research on different chemicals including chemicals
17 that will be used to test for staining. As part of the research on several chemicals
18 currently under review, standard dirt has been found to be an effective chemical to
19 use in plumbing products and other categories. Soil consists of many different
20 components, which incorporate many of the staining concerns discussed by the
21 committee, such as carbon black, motor oil, iron oxide, calcium products, and other
22 chemicals, with water added. This makes a slushy mud that easily stains products.
23 This would be a good chemical mixture to use in testing so that chemicals such as
24 tree sap, gum, coffee, are no longer needed. Andre notes that some testing
25 programs use standard urine instead of urea, as a test material for testing, and this
26 provides an authentic material for exposure. Andre notes that David Cordova

provided information on de-icing agents and it was determined that sodium chloride was the most common de-icing agent material used in the State of California.

e) Time frame – Andre plans to run all the proposed tests before the next meeting.

Andre intends to run every test at least once, in each condition, and on all the samples submitted for testing. Some test equipment is on hand, some are on order, and other equipment (such as jigs), have been fabricated. Andre plans to develop some baseline ideas, and note which tests will or will not work consistently.

f) Impact Test – Andre Miron reported on the status of the acoustical sound test, like the nylon dropped ball, and another test replicating the cane tap test.

1. Andre has not completed evaluating these tests yet since he only recently received new test software to use on these tests.

2. Looking for an objective rather than subjective method to determine compliance.

3. Looking to conduct side-by-side testing using the nylon ball or a cane tap for comparison of test data. Andre is reviewing the data to relate between ball dropping, cane dropping, cane dragging, and how to relate the whole acoustic quality issue.

g) MSDS – A Materials Safety Data Sheet (MSDS) is generally not needed for non-liquid samples, only for liquid materials. Andre reminded manufactures to send MSDS documents on hazardous materials, and for all liquid materials such as glue, epoxy, adhesive, coating, etc. Andre notes that UL has a lab policy to prevent chemical inhalation by laboratory technicians when testing burnt materials.

h) Attachment Materials -- Richard- we spoke before about attachment materials, and are tests available for this aspect? Andre notes that the bond strength test is intended to test the attachment materials, by testing the bond strength between the interface and the concrete and the detectable warning. In addition, the proposed

sample requirements will indicate that in those cases where it will be an issue, that the material should be attached to the concrete, using the preferred method of attachments. Pre-attached samples will be requested these samples will not require MSDS documents. However, Andre is currently reviewing how to best use the space in test chambers for aging tests. There may be some cases where it makes sense to attach the materials after exposure testing, although obviously not for the bond strength test or not anywhere where there might be failure in the interface. In some cases, for instance where the material will be attached on the top, then testing an entire sample would not be needed. For now, the samples should be sent to the test agency, already attached to the concrete.

i) Bonding Strength Tests for Asphalt Materials – There is a concern among committee members that materials attached to surface materials attached to asphalt, are subject to potential problems when asphalt heats up and deflects heat back to the surface connected to the material. UL is considering two options to address this issue.

1. Option 1 – Standard tests on detectable warnings would be conducted on concrete only, unless manufacturers request testing on asphalt material.
2. Option 2 – Recommend that installations on asphalt be considered temporary installation only since using concrete materials is generally considered a permanent installation, and use of asphalt is considered temporary. Therefore no testing program and no certification program would be available for detectable warnings installed on asphalt material. Several members supported this option, since asphalt can vary in construction from manufacturer to manufacturer, and state to state, and at times asphalt samples are too flexible to test properly.

1 j) Asphalt – The following comments were provided during the meeting and will be
2 considered for the updated draft standard, or researched further and discussed at the
3 next scheduled meeting.

4 1. Asphalt material – Some members reported that asphalt varies quite a bit in
5 quality, density, and may be filled with a wide range of materials such as
6 rubber, and cork.

7 2. Several manufacturers stated that many asphalt installations are very high
8 quality, and is at least as good as the material that it is attached too. In
9 numerous cases, the material attached to the asphalt failed in bonding first,
10 before any failure of the asphalt. A manufacturer suggested not designating
11 asphalt as a temporary installation, and instead should accept asphalt material
12 during testing if designed to fall away only when the material it's attached too
13 falls away first. Andre Miron agreed with the comment and notes that this is
14 similar to the requirement already noted in the proposed bond strength test for
15 concrete material.

16 3. Andre Miron notes that the certification type can vary, and it would be
17 possible to have certification provided for products tested and rated for snow
18 and ice, and have other products not rated for snow and ice. Some materials
19 in the field are perfectly suitable for a particular area, if it complies with the
20 testing, and others not suitable for the area. This is common practice for UL
21 Listed and Recognized products.

22 4. Richard Skaff notes that it would be important for the committee to make a
23 recommendation by identifying asphalt as a temporary method. This would
24 make sense especially because many public entities are using asphalt
25 because its less expensive than concrete. Asphalt could be used as

1 permanent installation, if a section of concrete is used within the asphalt field
2 to install the detectable warning.

- 3 5. A manufacturer suggested the possibility of collecting valuable data by
4 examining installation materials that are over five years old. It would be
5 worthwhile to examine samples that are at least 5 years old, to check how the
6 sample has weathered and worn over time, and to collect data on color
7 fastness, domes wear ability, resiliency, etc. Jeff Barnes agreed that this type
8 of information would be very valuable, to verify the wear of a product out in the
9 field. Although UL has already collected lots of research on this, UL would be
10 interested in any other information available. Jeff noted that as the committee
11 goes forward, part of the requirement cannot be that we must look or test a the
12 performance of a product for 5 years before it can be approved for use in the
13 State of California. There needs to be some method for evaluating new
14 products, which are introduced all the time in the market, and the standard
15 should not need to test products after 5 years. The test products needs to
16 meet baseline requirements, so that new products, new adhesives, new
17 designs, new materials, etc. when introduced in a products life cycle, can be
18 evaluated, and if in compliance, receive certification. The evaluation of
19 detectable warnings should not be based on what was approved 5 years ago.
- 20 6. Paul Hantz notes that although the several committee members described
21 asphalt settings as not standard, it is a standard installation in some areas for
22 pavers. It's a standard installation accepted nationally for pavers, concrete
23 pavers, and sidewalks, especially in a climate that is open to more free style
24 installations. It has the stability of concrete if properly installed, the flexibility of
25 sand set installation, and yet it's considered stable.

- 1 7. Richard Skaft notes that all asphalt installations, if considered permanent,
2 should be tested for certification when the public are using these types of
3 surfaces, both for concrete paver installation, and surface applied material
4 glued down on asphalt installation. Plastics and other materials may also be
5 glued to the surfaces. Richard notes that in many cities this construction is
6 considered temporary, because the construction is not considered to have
7 longevity.
- 8 8. Richard Skaft doesn't feel that all tests conducted on concrete, should be
9 considered representative of all tests conducted on asphalt, which can be
10 softer, less dense and more flexible than concrete. There are several tests
11 such as bonding strength, resiliency, sound on cane and other tests that
12 should be conducted separately.
- 13 9. Richard- it would not be prudent for DSA to provide certification information,
14 and not also provide information on the differences of the substrate material.
15 This is very important.
- 16 10. Jeff Barnes notes that some of the suggestions above can be done as part of
17 the instructions or recommendations for the proposals. Part of the theory
18 behind the resiliency test, is that the criterion is in the code, and that it be
19 resiliency detectable, and differentiates between the surrounding materials. UL
20 could develop a delta of coefficient of restitution, that delta restitution is
21 needed between the detectable warning and the surrounding materials. UL
22 could thereafter provide a common coefficient of restitution for common
23 building materials, such as stone, concrete, asphalt, etc. Jeff Barnes notes
24 that a discussion of asphalt should be conducted at the next meeting.
- 25

1 **9. Confirmation (Exhibit A, Section 5)** [Andre Miron/UL]

2 Jeff Barnes reported that Confirmation would consist in the standard as a simple statement.
3 For confirmation, the section will basically note that the product construction should be in
4 conformance to the building code. Additional feedback or suggestions for this section would
5 be appreciated.

6
7 Andre Miron adds that there will be a reference back to the confirmation section, after
8 certain tests such as the abrasion and environment tests which might result in changes to
9 the shape of the sample. This reference would be needed to verify that the basic
10 construction still meets the building code requirements in the confirmation test.

11
12 Richard Skaff asked if Title 24 and DSA specifications which is slightly different, also meet
13 ADAAG specifications? Does Title 24 meet those requirements?

14
15 Derek Shaw responded by noting that as of now, Title 24 meets ADAAG specifications.

16
17 David Cordova notes that IR 11B-4 is in harmony with the Public Rights of Way Guidelines,
18 because in that they give a range of dimensions. The geometry in IR 11B-4 is at one end of
19 the range, so it's in harmony with those measurements. In addition, CALTRANS has a letter
20 from the Federal Highway Administration, which provides a nationwide directive that states
21 that you can use the new design for detectable warning surfaces, as cited in the May 2002
22 memorandum from FHWA.

23
24 **10. Slip Resistance (Exhibit A, Section 19)** [Andre Miron/UL]

25 Andre Miron reported that UL already had a standard for slip resistance titled the Slip
26 Resistance of Floor Surface Materials, UL 410. This standard uses the James machine and

1 is an industry mainstay for slip resistance on flooring and walkway materials. UL is
2 considering the possibility of using the test methods specified in UL 410. However, it should
3 be noted that all slip resistance test methods evaluated by Andre have several drawbacks.
4 One of the drawbacks is that most slip resistance tests were designed to measure slip
5 resistance on a flat non-textured surface. Andre is conducting various tests to determine if
6 the James machine, Brungraber Mark I, and other measuring devices that measure the
7 coefficient of static friction will work reliably on a textured surface with truncated domes.
8 Several test methods reference testing on a flat surface, and we are unsure how UL can
9 modify the test methods to address the textured surfaces with domes. UL will consider
10 various foot sizes, noting that a larger foot that sits on top of the domes might work however
11 it may discount the slip resistance of the material between the domes, or possibly a smaller
12 foot should be used to fit between domes.

13
14 Andre notes that generally slip resistance testing can be problematic because you can
15 never compare one machine's results against another machine's results, and try to
16 determine what the minimum value required is for the machines. At this time UL's minimum
17 requirement is 0.5 co-efficient of friction using the James Machine. There are other
18 documents out in industry that have requirement values of 0.6 for flat surfaces and 0.8 co-
19 efficient values for sloped surfaces. These specifications were determined by using the
20 Brungraber apparatus. There is also a Brungraber Mark II measuring device with it's own
21 ASTM standard that might work as another possibility, as well as horizontal pole meters,
22 and other test apparatuses. Definitely the entire test program requires more effort and
23 research. UL will continue to research and evaluate various test methods to determine
24 which method is best suited for detectable warning products.

1 David Cordova reported that CALTRANS has a test method for measuring friction, which is
2 used for pavements. California Test Method 342 is a test apparatus with a tire that uses
3 glycerin as a lubricant. The tire is turned for a certain number of revolutions, and then
4 dropped. This method is used to measure friction. The slip resistance has a COF of 0.35,
5 which is used on pavement at intersections near crosswalks. This test method information
6 is available on the CALTRANS Internet site. This is an alternative test method that Andre
7 might want to review. It should be noted that there are different coefficient of friction values
8 for whatever test method used, and the ADAAG appendix for example, will provide 4 or 5
9 test methods, each with different values.

10
11 Richard Skaff made note of two items. First, that FHWA is working now on a research
12 project similar to our project, which is to develop requirements for color fastness, and slip
13 resistance, etc. The committee may need to examine what they are working on in the
14 project. Second, should consider adding the use of King tips to the slip resistance test.
15 King tips is a Canadian crutch/walker with rubber tips, that is not applied the same way as a
16 walking shoe would be applied to a surface, and uses different parts of the surface other
17 than just the dome, and gets in-between domes. This in-between surface is very important
18 for slip resistance. The motion is a downward forward force, which is applied differently
19 then the downward motion of a walking shoe and how it is applied to the surface. It should
20 be noted that there are many types of walkers, but some walkers have only four points with
21 a rubber tip that applies a downward force, and slip resistance is a big issue with this type of
22 construction.

23
24 Gene Lozano asked if testing of raised bar tiles would require different tests, because the
25 raised bars are more solid then the domes?

1 Andre Miron replied that it might or might not require different tests. UL will need to
2 examine domes and fields for many tests, because they have different properties. If
3 possible, UL would prefer to have one test represent several products, however this is not
4 always possible. Slip resistance in UL 410, which has an ASTM that goes with the
5 standard, uses COF 0.5, which also notes that it shouldn't be used in a wet conditions and
6 should not be tested on non-flat surfaces. However, detectable warnings will have wet and
7 dry conditions, using non-flat textured surfaces.

8
9 Paul Hantz asked if samples that provide extra texture, or a spray on texture, would be
10 testing for slip resistance of these products once it wears off?

11
12 Andre Miron replied that UL is considering conducting slip resistance testing before and
13 after the abrasion test. This would be done to determine if the abrasion test has affected
14 the slip resistance of the sample. Some products with surface coatings may be affected by
15 the abrasion test.

16
17 Gene asked if DSA had provided an interpretation of the word "integral" which is used as
18 part of color requirements, as mentioned in relation with color and slip resistance, and so
19 forth. Does this term interpret color as all the way through the material or just through the
20 coating? This was mentioned at the previous meeting. This might clarify the test method
21 for slip resistance

22
23 Derek Shaw replied that DSA had no interpretation for "integral" as part of the color
24 requirements.

1 Jane Vogel asked if the committee could experience a wet surface during operation of the
2 research tile demonstration at CALTRANS?

3
4 Jeff Barnes replied that this would be possible although not as a regular part of the test
5 demonstration. It would be a good idea to hose off an area for the committee to experience
6 a quick feel of the surface when wet and blindfolded.

7
8 Andre Miron plans to bring the Brungraber Mark I machine to the test site and conduct
9 preliminary tests, since the device is portable. The equipment uses a foot sized piece, to
10 sense slippage. However, it may not be able to test the area between the domes, since the
11 foot tester is preset in size. The size of the tester is a rectangle, 3 inches by 3 inches,
12 attached by clips and magnets to an iron level, and when it slips it causes a sensor to go
13 activate, which measures resistance. Can this device slip though, and with an accurate
14 process? Not sure if this will work because of the rubber material on the piece. Andre
15 notes that slip resistance is difficult to duplicate.

16
17 Jeff Barnes added that the goal is to standardize one of the two test methods identified so
18 far. Since we do have coefficient of friction established using the James machine, which
19 has been widely accepted by industry for a long time with a COF value of 0.45, which is part
20 of a consensus based standard already. The second method uses the Brungraber test
21 apparatus, which the ACCESS board has proposed, with COF values of 0.6 for flat surfaces
22 and 0.8 for slope surfaces. Starting with these pre-established values is a good beginning
23 for considering the new tests methods, otherwise we would need to begin to work on a
24 number from scratch.

1 Richard Skaff was concerned that the test methods doesn't deal with real life situations by
2 taking into account only normal walking surfaces, however these surfaces will be subject to
3 factors other than the bottom of feet, such as canes, walkers, wheel chairs, etc. The feet
4 motions are not applied the same as the downward forward motion of the other devices.

5
6 Andre Miron notes that although the directions of movement, and the distribution of weight
7 are different, the coefficient of friction as defined experimentally does not change.

8 Therefore, when you talk about friction, you talk about the resistance to motion of one body
9 when against another body, and how much force it takes in order to create a lateral
10 movement per unit of weight which is being placed down upon it.

11
12 Richard Skaff asked if the weight changed with the method of applying the weight?

13
14 Andre Miron replied that there is a change of weight with the method of applying the weight,
15 however there is a curve the goes along with the change. However, the coefficient of
16 friction is a standard scientific device that provides a relative measure of when a body is
17 placed against the device, it will have a certain amount of resistance to lateral motion on it.
18 No matter the type of shoe or cane or walker tip used, which is most likely made of rubber,
19 each will have it's own friction level. The real issue is not so much the method of measuring,
20 but measuring the right part of the sample in question. Parts of the foot for example,
21 depending on feet size, may be conducted mostly on the domes, or over fields.

22
23 Richard Skaff and Gene Lozano recommend that the sides of the domes be measured.

24 Gene notes that the importance of measuring the side of the domes will depend on how

25 Title 24, if the new range of 2.35 inch spacings are adopted. This will be an issue,

1 especially if using larger spaces because if the column of dots are spaced further apart, the
2 foot is less likely to make contact with other domes.

3
4 Andre Miron notes that the sides of the domes are another question to consider. Is a slight
5 sliding off a dome permitted? And if yes, how far a distance should the committee accept?
6 For example, will certain sliding distances cause an ankle in high heels to turn?

7
8 Gene Lozano reports that DSA has a proposal out for a 45-day comment period, which is
9 proposing a wider range size of 1.67 to 2.35 inches. Gene noted that based on personal
10 experience, Gene's foot will walk on a row of columns and may not make contact with
11 another row of domes, if the domes are spaced 2.35 inches apart, which leads to a slight
12 rocking motion.

13
14 Andre Miron noted that research is continuing and UL plans to conduct additional tests, and
15 that he plans to look to bring out the Brungraber to the next meeting for testing at
16 CALTRANS. However, he cannot bring the James machine, because it is not a portable
17 device. Andre will conduct some tests at the test site and in the lab using available
18 materials from manufacturers. It may be possible to that the test apparatus may be
19 applicable with minor adjustments, and possibly find a method to measure the space in
20 between by designing a specially shaped foot, or make another type of modification. Andre
21 emphasized that additional research and experimentation will be needed to fine-tune this
22 test.

23
24 Jeff Holm notes that he received input from Hawaii, about UL conducting testing, finding
25 measurements at certain points of time, and comparing the difference. The input involved a
26 discussion about using the James machine vs. other test methods. Why not use either

1 one, since the committee is looking only for a coefficient of friction number, and are not
2 setting a level? Why not use either the James or Brungraber equipment or other measuring
3 equipment?

4
5 Andre Miron replied that strictly speaking the committee would need to determine if the
6 product degrades or not. On the other hand, if we have a very slippery material to begin
7 with and it is determined that it doesn't become more slippery, well it is still a slippery
8 material and could be a hazard. We would make a recommendation that when doing this
9 test, using whatever test apparatus we specify, that a minimum recommended slip
10 resistance value should be used when conducting the slip resistance test. Although not
11 part of the scope, it would seem advisable to do this in order to minimize hazards.

12
13 Jeff Holm asked if recommending a minimum slip resistance value doesn't put the
14 committee in the position of determining the slip resistance for the state of California?

15
16 Jeff Barnes replied that this is the reason that UL is looking to draw upon existing
17 precedents for floor materials, such as UL 410. Jeff had received at least one suggestion
18 that recommended using UL 410 which has a coefficient of friction value when tested with
19 the James machine, based on the standard, which has a long history of use accepted
20 industry wide, nationally. The Brungraber machine has a history and a recommendation of
21 values, but does not have a long history of use available. The committee has basically two
22 paths to consider. Does the committee want to try to align with the recommended federal
23 specifications, or with the established value and test method for flooring materials. The
24 committee may consider just providing a baseline recommendation, since setting a limit
25 goes beyond the scope of the EDWAC project. DSA could choose to consider this option,
26 and continue or not continue with this recommendation. Same type of process will be done

1 with resiliency after the test method has been verified, and determined how to measure
2 resiliency. The logical next step would be to give the resiliency data to DSA, who can
3 determine if the materials are acceptable for a particular application so that they can use the
4 information as needed.

5
6 Jeff Holm asked if there would be a limit set for resiliency?

7
8 Jeff Barnes replied that would be a limit specified since the State Code states that it must be
9 discernable between itself and the surroundings. So the committee can provide some
10 guidelines by specifying the coefficient of friction for common surrounding materials vs. the
11 product that is installed. So possibly a product that is suitable for resiliency in a concrete
12 application, may not be suitable in an asphalt application for the resiliency feature.

13
14 David Cordova suggested that following the same line of reasoning of going outside of the
15 scope of the committee, the committee should consider designating a baseline value for
16 sound on cane characteristics in addition to those values already planned for resiliency and
17 slip resistance. The research could be easily done if the testing was conducted on the
18 samples provided in the test area at CALTRANS.

19
20 Jeff Barnes responded by noting that providing baseline values for resiliency and slip
21 resistance would be relatively simple to do, since the data is already available and just
22 needs to be related and the test methods developed. However, sound on cane is a
23 significant research project in itself, would be complicated, and would require extensive
24 research and take several months or longer to test. The committee would be starting from
25 ground zero, and would need to start with new research and test methods. However, the
26 committee could make a recommendation in the standard, that more research be conducted

1 on this issue. Jeff notes that it's a lot more complicated than just testing at the test site. Too
2 many issues to address, and the entire process would require much more work. Sound on
3 cane, and the whole sound spectrum becomes very convoluted. A lot more research is
4 needed on this topic.

5
6 Richard Skaff disagreed with the entire slip resistance test method, since there hasn't been
7 a slip resistance test method prepared for all the many types of detectable warnings with
8 domes, only for flat ground surface material. The side of the domes is a different surface
9 from the valley or top of the domes. If there is a change or variation allowed for spacing,
10 then it could change how the surface is applied on a detectable warning surface.

11
12 Jeff Barnes disagreed that it is certain that there is there is a difference. This cannot be
13 determined without additional testing and research, and this research is already planned
14 and underway before the next meeting. Testing will be conducted on various surfaces to
15 confirm if the Brungraber or James Machine test apparatus will work best with the proposed
16 test.

17
18 Richard Skaff asked Andre if he planned to try the application of a crutch tip applied
19 differently than a swinging foot surface to compare the relationship, with a force applied with
20 downward force instead of a sliding force.

21
22 Andre Miron responded by noting that theoretically the coefficient of friction is just that and
23 gives a value, first of a foot that doesn't just swing. The foot comes down and then has
24 wayward pressure as it lifts up and comes down again. A crutch comes down with forward
25 pressure then goes off and comes up again. Anything coming straight down will not result
26 with any movement. So the real question is the lateral issue. Forward or backward

1 movement is the same interaction between the two surfaces. So forward or backward
2 friction is really not going to change the numbers on that merit.

3
4 Richard Skaff notes that it's the location that is a factor. The committee should look at the
5 valley, dome top, and dome sides. The sides might be more slippery and may have a
6 different coefficient than other places, because there is no expectation that this area will be
7 walked on.

8
9 Andre Miron states that friction is based on the number of contact area in contact with the
10 various surfaces areas. There is very little surface area on the side of the dome. So high
11 heels, cane tips or any other small thin item placed on the side of dome, will likely still slip
12 down into the valley. The location is for different types of force applied that lateral
13 movement for example. Forward backward motion is being looked at and the committee
14 needs to consider if the Coefficient of Friction value is too low.

15
16 Richard Skaff notes that the force of the cane or crutch will be directed into the valley, or
17 elsewhere such as in a forward or upward movement, thereby causing the user to slip.
18 Users don't always use a downward force movement, and may instead use a lateral
19 movement. The movement from a shoe would be directly differently.

20
21 Andre Miron notes that if there is some slippage upward, that the users own weight would
22 bring it down again. The geometry of the detectable warnings has been constructed to
23 prevent falling.

Gene Lozano pointed out that if you look at all the different products, you would find that the slopes and profiles are different and so the sides of domes should be looked at carefully. Some slopes could be more gradual, or sharper and may affect overall slippage.

Jeff Barnes announced that as part of the slip resistance proposal for the next meeting, UL would draft a proposal for discussion, which may address this issue.

11. Manufacturer/Public Comments on Slip Resistance [Jeffrey Barnes/UL]

Mark Heimlich notes that it would be advisable for the committee to establish minimum levels of performance in order for the EDWAC to develop an effective standard.

12. Test Samples (Exhibit A) [Andre Miron/UL]

Andre Miron is reviewing all testing methods and the total number at tests. Based on the number of tests, a standard product evaluation would require a large number of samples.

Arfaraz, and others have recommended combining the some of the environmental tests, without influencing the integrity of the tests. This may be an option in some cases, but not all testing can be combined. There are no easy answers. UL is considering decreasing the size samples, and combining tests, to improve this situation.

David Cordova recommended considering a third option, which would consist of adopting the manufacturer's submitted test data if conducted by another test agencies. Routinely CALTRAN views test data submitted by the manufacturers when testing have been conducted by other test agencies.

Jeff Barnes notes that this issue will be covered by the certification discussion, and a recommendation to be made by the committee and how this will be set up.

1
2 Andre Miron notes that the testing on samples still needs to be done by a separate agency.
3 DSA would determine if this would be acceptable for their certification process, if they will
4 accept factory testing, and/or third party testing. UL in the meantime is proposing to
5 combine tests, or reduce sizes wherever possible. Non-destructive tests such as the
6 abrasion test can have the sample be reused for other tests. Other tests such as impact
7 test, bond test, shear test, ball pressure test, and various other tests could not be combined.
8 Andre is currently conducting the impact tests in different sizes, to determine if results are
9 the same, so that UL can request smaller samples whenever possible.

10
11 Jeff Holm asked if multiple samples are needed for impact test to get an average value?
12

13 Andre Miron replied that three samples are needed per condition, to make certain that they
14 are getting similar values. UL needs 26 samples to establish a baseline, for the as-received
15 vs. the conditioned samples. The committee may eventually want to set a minimum impact
16 value for the impact test. However, this issue will need lots more data, before considering it
17 further. Andre invited manufacturers to provide test data related to specific sizes, for the
18 impact test, if available. A 4 by 4 inch or a 6 by 6 inch sample may be too small. A sample
19 that is too small may introduce edge stresses. Andre is concerned that if samples become
20 too small, they may no longer provide representative data. All tests will be looked at
21 carefully to determine if smaller sample sizes can be utilized. For now, the evaluation
22 requires a large sample for a large number of tests. But this is being revised and trimmed
23 down as much as possible.

24
25 **13. Manufacturer/Public Comments on Test Samples** [Jeffrey Barnes/UL]

26 There were no comments on the test samples from manufacturers or public representatives.

1
2 **14. Certification of Detectable Warnings – Open Discussion** [Jeff Barnes/UL]

3 Jeff Barnes is requesting suggestions be provided in order to craft up some options and
4 submit them as recommendations to DSA. Various methods of certification are available.

5 The following are a few items to consider.

- 6 1. Use independent third party to conduct tests, using an approved lab.
- 7 2. Self-declaration – where manufacturer specifies that they meet the specifications of
8 the standard. This has multiple phases, where you can have it specify, or require
9 that they use a test agency from a list of approved labs. Could range from a
10 manufacturer conducting the tests themselves, or use the test program from specific
11 test organizations.
- 12 3. DSA will be maintaining a list of certified products that can be used with different
13 applications within the state.
- 14 4. Manufacturers or third party organization will need to provide this information directly
15 to DSA.

16

17 Gene Lozano notes that his organization recommended the proposal. His organization
18 wanted a third party laboratory, that could handle the testing, that mfrs would use, and get a
19 certification stamp or label noting that it is in compliance with the requirements. Might need
20 two types of certification, based on Title 24. There are the boarding platforms and the
21 housing community development curb ramps, and color, resiliency, and sound difference
22 have different requirements. So rather than have the manufacturers provide the test data,
23 the third party test agency would provide the information to DSA directly. DSA would
24 accredit qualified test labs.

25

1 David Cordova notes that the committee should be careful not to encourage potential
2 monopolizing. CALTRANS requires only that the lab be certified or accredited. It is against
3 their policy to specify only a few specific companies.

4
5 Jeff Barnes notes that an agency should certify if the company has the appropriate
6 equipment and experience in conducting similar tests to those required for detectable
7 warnings. OSHA accreditations are available for agency approvals. This program for
8 detectable warning is different in that we aren't looking for applying marks or stamps, but
9 only a test program package.

10
11 Gene Lozano and Richard Skaff disagreed, and recommend that a marking or labeling
12 system be used on detectable warning systems. Many inspectors, building officials, building
13 owners, and transit officials, are requesting some kind of marking.

14
15 David Cordova notes that the building code does not require a mark. The independent 3rd
16 party agencies would be approving these. It's up to DSA to manage this program, and
17 maintain a list of approved products, on their website that's a living document. So that at
18 any given time a contractor can obtain access to the information. This might be how it
19 would be best managed.

20
21 Richard Skaff makes a recommendation that DSA concludes that it needs to provides a list
22 of independent approved labs that can do these tests being developed, and may change
23 eventually to any independent lab that can prove that it can conduct the tests. He also
24 recommends that markings or labels be provided on the products, because public entities
25 and private businesses will want the markings, and are more comfortable with this system.

1 Jeff Barnes notes that if the manufacturer, for a product that has been evaluated to a
2 particular, applies a marking set a requirement, no issue to it. However, references to a 3rd
3 party test agency, UL for example, will require that the test house provide follow-up reviews
4 at the factories, with the test process and product subject to quarterly reviews.

5
6 Richard asked if DSA could provide a stamp with a date of expiration.

7
8 David Cordova notes that there are hundreds of approved products for the State of
9 California, that don't require a stamp, mark or mold. The mfr specifies model or type that
10 goes on the specification. What happens if after two years, if the product molds still have
11 the markings, but they are no longer approved? This is potentially a problem, to have a
12 manufacturer ship unauthorized products.

13
14 Jeff Holm notes that it is not completely true in that CALTRANS does not require labeling.
15 Labels are required for steel products, such as chain link fences, asphalt, concrete, and
16 other products. The products are provided with tags on them that are signed by the
17 manufacturer and meet a certain requirements. They have dates on them, and the tags are
18 removed and filed so that material is identified in the product.

19
20 David Cordova said that there are some labels for certain products, however another level
21 of review is created when persons are sent to the manufacturing site to tag products. It
22 would be simple to merely have the product name and model number provided, that are
23 specified on the approval list, that can be posted on the website.

24
25 Gene Lozano replies that this is a life safety material and can make a difference. A person
26 could get killed if all the proper precautions are not taken.

1
2 Jeff Barnes notes that there is a recommendation that a marking or label, be provided on
3 each piece, or a tag on batches of products. DSA will review the entire document, and may
4 not approve the entire document, including this recommendation for labels.

5
6 Richard Skaff replied that batch products could be dated on DSA stamps. It should be a
7 simple issue to propose.

8
9 Paula Reyes Garcia recommended using an id number as cross-reference to the link on the
10 website. Paula also recommends batch tagging.

11
12 Jeff Barnes notes that the manufacturer would be providing a label that provides the date
13 code, and a reference ID to the certification ID on the DSA website for documentation,
14 which would provide tracing ability for the product.

15
16 David mentions that DSA calls this Certification of Compliance. In addition, CALTRANS
17 requests that the resident engineer obtains a copy of the certification letter for their files.

18
19 Paula Reyes-Garcia recommended that a similar system could be adopted by having these
20 letters collected by IOR, the Inspector Of Record for DSA projects, and having the letters
21 placed into a project file.

22
23 Gene Lozano suggests that DSA or a test agency provide random periodic field checks on
24 the manufactured products to verify that the product still meets the requirements. One visit
25 a year would be advisable.

1 David Cordova replied that the responsibility of inspections could be handled by
2 independent testing agencies, especially since legislation requires that the product be re-
3 certified every two years. The independent entity would be taking in data from other private
4 labs that are certified, that do the testing, to make certain that it meets the various testing
5 results. This extra duty of the independent company would include verifying with the mfrs
6 that products are still meeting the requirements and that they are certified out in the field as
7 well. An inspection every two years would be suitable.

8
9 Paula Reyes-Garcia suggests that independent entities make recommendations if they see
10 repeated problems or failures in the field. A recommended course of action could be made
11 and dealt with by DSA on a regular basis.

12
13 Jeff Barnes agreed that a feedback mechanism right to the website connection to DSA,
14 would be advisable. Maybe the standard needs to be revised to address a need, or maybe
15 there is a particular problem with the product or manufacturer that needs to be addressed.

16
17 Tom Whisler asked how does UL certify any product off the assembly line with a UL sticker
18 provided on it?

19
20 Jeff Barnes replied that most certified products are initially evaluated, and as long as the
21 product does not change, there is no additional certification. Also, there are follow-up
22 inspections at the factory. This program is for detectable warning is different, because state
23 law requires the product to be re-certified every two years.

1 Gene Lozano notes that originally his committee wanted to address a lot of new
2 developments in products every two years, so they didn't want products issued from
3 different generations that did not comply with the requirements.

4
5 Jeff Barnes notes that this is usually handled by requiring that new model numbers be
6 provided with new revised products, and products with new models would require additional
7 testing, based on the number of changes added to the revised product.

8
9 **15. Manufacturer/Public Comments on Certification of Detectable Warnings** [Jeff
10 Barnes/UL]

11 Jon Julnes notes that most companies cannot afford the testing expenses, shipping costs,
12 and other expenses, for certifying their products every two years. If there are some
13 changes, should run only those tests based on the changes. Most products that meet
14 California requirements would also meet the requirements of all other states. However,
15 could end up with only a few basic products in California if the large expenses drive some
16 companies out of state, and in addition, drive the prices up in California.

17
18 David Cordova agreed with Jon's comments, and notes that this proposal is consistent with
19 other programs in DSA. The intent was not to drive anyone out of business. And should
20 be flexible as possible within the letter of the law.

21
22 Paul Hantz agreed with Jon about the cost of testing products can be very expensive. If
23 possible, would like to minimize the test program done every two years, although new
24 models should require additional testing. The labeling process comments are acceptable.

1 Pat Merriman adds that new emerging products would likely not be introduced in California
2 because of the high cost of product recertification.

3
4 Gene Lozano feels that the language in the building code is vague enough that UL and DSA
5 could work could use the input from mfrs, to make modifications by rewriting the language,
6 and not eliminate the companies. It is important to have trust extended towards the
7 manufacturers, although there is a history of a few problems.

8
9 Richard Skaff asked if a model number guarantees that the material is assembled the same
10 at all times?

11
12 Andre Miron notes that some tests will provide that data but not all. A follow up program
13 could be set up, that would not require all the testing.

14
15 David Cordova mentions that this is consistent with CALTRANS who handles approved
16 proprietary products. It includes random checks. The independent entity could handle this.

17
18 Gene Lozano understands the hardships for manufacturers certifying their products. Gene
19 would like to see some checks and balances. If the independent party did some random
20 unannounced visits, new processed evaluations, etc. would be very helpful. Maybe the
21 manufacturers could provide some recommendations. Gene would like to see a reduction
22 of politics and outside influences affecting product certifications.

23
24 Jeff Holm requests that UL come up with some ideas for abbreviation of the 2-year re-
25 certification program. Could UL bring this proposal to the next meeting for discussion?

1 Jeff Barnes agrees to add this to the meeting agenda for the next meeting. This in fact was
2 the intent of the committee discussion for this topic.

3
4 Richard Skaff requested that UL provide a rough cost list for evaluating the products.

5
6 Andre Miron agreed to provide an approximate cost limit of what UL would charge, however
7 this would be only applicable to UL and not other test agencies.

8
9 Tom Whisler notes that as products change, standards and codes can change. You don't
10 want to certify products too far out, because the requirements may change.

11
12 **16. Shear Impact Test – Discussion** [Andre Miron/UL]

13 Andre Miron reported on several test issues, which were as follows:

- 14 a) As discussed at the last meeting, Andre is looking into developing an impact test that
15 would look at conducting the impact testing from the side rather from the top. Andre
16 will experiment with this as he begins to work with the pendulum style of impact
17 testing, and consider if it correlates well with the regular impact data that Andre is
18 collecting. If it correlates, it may not be necessary to conduct the shear impact test.
19 If the data shows that the domes are more susceptible to that sort of force, and if not
20 included by in 60-degree incline test, then may need to consider adding as a new
21 test, or replace another test if the new test offers a worst case situation, and covers
22 the same type of requirement.
- 23 b) With regard to impact in general, the cold impact test, consisted of a 1.18 lb ball
24 dropped on sample, from a height of 4 ¼ feet. Based on test results, some samples
25 in the as-received condition did not perform as well in this test, when compared to the
26 test results of other products. Andre will consider adding this test to the regular

1 impact test, using the 90 percent of the value observed in the Garner impact test, as
2 the value following the cold exposure test. Generally, the 1.18 lb ball impact drop
3 test did not do well when dropped on concrete domes. However, the domes
4 constructed of polymeric materials had very good test results. There is probably no
5 reason to have two impact tests, although this may have done originally because of a
6 preexisting standard. The cold impact test should be it's own condition, rather than
7 it's own test.

8 c) Andre examined the compressive strength test used for underground utilities
9 structures, and although the test apparatus may be overkill for our products, probably
10 a smaller test apparatus would be more appropriate.

11
12 Gene Lozano mentioned that the compression test is very important for some of the
13 applications. Early detectable warnings could not bear the weight of trolley cars, and the
14 domes would crack.

15
16 Jeff Holm asked Andre if the cold impact test would be folded into the impact resistance
17 test?

18
19 Andre Miron replied that yes, another would be added to the impact resistance test. Which
20 requires that the sample be cold conditioned and subjected to the 90 percent impact value.
21 Andre notes that three sample specimens are in one set.

22
23 Jeff Barnes asked committee members if the draft standard should indicate a minimum
24 impact value? In addition, is the use of a steel ball dropped on test specimens too rigorous
25 for testing of these types of products?

1 Gene Lozano replied that he would recommend a minimum impact value, to help address
2 the common use of wheelchairs, carts, and other likely hazards on detectable warnings.

3
4 Andre Miron notes that those types of equipment are more of a compressive strength issue.

5 Andre is asking about two different forces here. There is the impact force of a dropped
6 object, versus the impact force of a rolled device. What is the worst-case force for a high-
7 speed device? Andre asked for more suggestions of possible impact sources, which
8 include the following suggestions from committee members and public representatives.

9 a) Movement of a large person running, and of a skate boarder moving over domed
10 surfaces. (Andre Miron notes that the running person has rubber soles, which
11 absorbs force and is not a very severe impact.)

12 b) Snow shovels, or people moving freight over the domes using pallets.

13 c) Handcarts with hard wheels moving large amounts of weight should be considered.

14 Most of these equipments are providing side impact force. Should also consider
15 equipment ramps that are dropped hard on these domes on a regular basis.

16 Frequently construction workers will use these ramps as they construct new
17 buildings.

18 d) CHP horses used in cities, stepping over surfaces with domes.

19 e) Light rails with a steel plate, a bridging device that is manually lowered by the driver
20 onto the platforms, over many domes.

21
22 Jeff Barnes notes that this information may be useful to determine different impact levels,
23 and to develop suitable ratings, depending on where the product would be used.

24
25 Andre Miron agreed that developing impact levels wouldn't be difficult to do. Especially
26 since some areas may require high impact resistant materials. Andre will consider

developing high, low and medium impact levels, and a rating that can be used by installers.
It will still be necessary to evaluate the product to determine if degrades over time.

Mark Heimlich is concerned since contractors may not look at impact levels. They generally won't be making this decision. In addition, Mark asked if other conditions should be added to the rating list, such as for UV testing, etc?

Jeff Barnes notes that cities are accustomed to seeking approvals of suitable materials for use in designated areas. The committee may want to consider making a recommendation that the Inspector of Record be given guidance on how to select and approve appropriate impact levels.

Andre Miron replies that adding specific conditions to the certification list is a possibility. Why use domes rated for snow resistant if won't be used in areas with snow? The final decision on this issue will be determined by DSA. There should be no problem with providing ratings.

David Cordova state that this will depend on how the owning entity writes the specifications. Categories or conditions of approval may be noted in the specifications. CALTRANS for example, would note this information on their documents. David notes there that the list is likely to be formatted with categories or groupings.

Derek Shaw replied that using tiered categories, is not a new idea and will consider this suggestion if the EDWAC submits this proposal.

1 Jeff Barnes notes that are many categories that could be tracked, such as impact, UV
2 exposure, indoors and/or outdoors use, The definition would be defined for the users to use,
3 so that they can read the table.

4
5 Gene Lozano agreed with the proposal. Gene asked if there should be categories for indoor
6 use, such as flame test, toxicity, etc?

7
8 Jeff Barnes adds that consideration of several categories is possible. Tracking different
9 ratings, would allow detectable warnings to be used in areas in which it is suitable. The list
10 would provide full information for users to choose from.

11
12 Lex Zuber asked if this might require that the contractors determine the suitable materials
13 for each site? What if competitors choose only those categories that are inexpensive, and
14 not the most suitable for a particular application? This would be unfair if some companies
15 make a sincere effort to comply with the code by using properly rated materials, and other
16 manufacturers used unacceptable materials for the designated location for installation.

17
18 David Cordova adds that once the certification list is approved, it's possible that
19 CALTRANS may want to decide which options are suitable and have the specification writer
20 choose the appropriate ratings, rather than have the contractor continue to select the
21 products.

22
23 Jeff Barnes notes that all contractors would have to compete on the same level. Everyone
24 has to choose an approved material that meets the correct requirements written by the
25 specification writer. If a couple of private industries make this mistake, they will learn their

1 lesson when they are required to remove the products, and this would lose money for the
2 company if they used inappropriate products.

3
4 Gene Lozano asked about privately owned projects. What if the contractor uses an
5 inexpensive material, indoors only products on the outdoors, in order to save money,
6 because of confusion? Will building inspectors catch this, or somehow be involved.

7
8 Tom Whisler responded by stating that he is a building official, and usually architects would
9 be responsible for specifying the product or its use, or the conditions of its use. It is the
10 responsibility of the architect, and up to them to select the correct ratings for the product
11 (indoor/outdoor, UV ratings, etc). It's up to the contractor to install the product, and up to
12 the inspector to make sure that it's put in properly. However, the architects may need to be
13 specially trained so that they can properly specify the correct detectable warnings to be
14 used in specific areas.

15
16 Gene Lozano expressed his concerns because it appears that architects aren't aware of all
17 possible hazards, so additional training is necessary.

18
19 Andre Miron replies that the alternative is that all detectable warnings, no matter where they
20 are installed and no matter how they are used, must meet all building codes requirements
21 for all conditions. The committee could choose to make this recommendation. However, it
22 may not be a good idea to require that detectable warnings be usable for all conditions, all
23 situations, etc., Such a product would be too expensive to use. Andre is working to find a
24 happy medium. The committee wants to exclude as few products as possible from the
25 certification process, while still meeting the requirements of a given location.

1 Gene- Agrees with Andre, but there should be some information that is conveyed somehow,
2 trickles down so that the building officials make certain that the product is suitable for its
3 use.

4
5 Tom Whisler states that the property owner is required to maintain the installed product, and
6 if it deteriorates, it should be replaced with the correct materials or a new product as
7 needed.

8
9 A manufacturer notes that inspectors are not very consistent. In the same city, you can
10 have a building and the next building constructed to comply with a completely different
11 standard. The inspectors are not being given the information, and there is a lot of
12 confusion.

13
14 Tom Whisler replies that it is generally not the inspector that checks the plan; it's the plan
15 checker, who checks the plan to verify that they are in compliance with the code. The
16 inspector just follows the plan.

17
18 Kel Kristiansen reports what's happening is that most of the teeth of the domes are being
19 forced into many areas because of tenant-improvements type of permits. Many
20 manufacturers are told to obtain permits for these improvements, and in addition
21 manufacturers are told that must install domes. Each inspector provides various different
22 input for installation locations, which is inconsistently applied. The inspector at times insists
23 on specific domes being installed in a short period of time, or they won't get final approval.
24 Every inspector is making their own decisions on where the detectable warnings should be
25 installed, color used, and how are they to be installed.

1 Tom Whisler states that regardless of whether tiles endure for 6 months or 6 years, the
2 product still need to be in their designated location, and should be functional.

3
4 Arfaraz Khambatta points out that most entities will request some kind of warranty. If a list
5 or chart states that the product is rated for 5 years, or something like that, the contractors
6 will feel confident that they can install this product, and it will endure for at least five years.

7 Arfaraz suggested using more realistic values on the list, rather than numbers that represent
8 other values. The information from the test should be reflected in the ratings.

9
10 Jeff Barnes notes that a draft of the list will be prepared and submitted to the committee for
11 review. The information will be more easily evaluated, once the draft has been circulated to
12 the committee members. The draft will provide a good definition of how the list will work,
13 and can be tweaked or go in another direction if necessary. The purpose of the discussion
14 at the meeting was to provide UL with a good understanding of the direction the committee
15 wants to move towards, in terms of the recommendation that the EDWAC wants to propose
16 for certification. The information will be reflected in the proposal being developed by UL,
17 which will be shown and discussed at the next meeting.

18
19 David Cordova notes that establishing a rating system shouldn't be a problem, because the
20 state building code puts the burden on the enforcing agency. So the enforcing agency, or
21 local agency, or for example CALTRANS, are going to have a standard plan or a special
22 provision. Once they give it attention, the burden is on them to keep track of what is going
23 on in the building code, and they will need to get it set up and standardized. It may take
24 time before it's standardized between agencies, but it can work.

1 Derek Shaw notes that the committee may want to consider a simple classification system.
2 The committee may want to select a system with a limited number of choices, and maybe
3 this will result in a more successful installation, and make everyone's life easier.

4
5 Jeff Holm recommends that the entity that conducts the testing, provide this ratings
6 information based on their testing, rather than have DSA provide this information. This
7 should be done so that DSA doesn't cross into other boundaries. In addition, it should be
8 noted that the information is not binding and it's not law, and therefore until it is, it should not
9 be necessary to provide information recommending locations. Or, maybe consider placing a
10 big disclaimer on the list. Another possibility is to consider having the manufacturers
11 promote their products based on test results, and use the information to determine if
12 suitable in a particular area. So when they market this, they can show results, and refer to
13 test agency for verification, that it's good for specified locations.

14
15 Michael Paravagna notes that architects should have some of the responsibility with
16 evaluating the data, determining the needs of the project, and specifying what material
17 needs to be used, and when it is in place, the building owner should have the responsibility
18 for maintaining accessible features. It's not possible to develop a safety net that will ensure
19 that all this will happen. All responsible parties still need to come to meet their
20 responsibilities. The committee can provide information that will help them meet those
21 obligations, and this is as far as we can go.

22
23 Derek Shaw adds that if a manufacturer placed a visible marking of their rating onto their
24 product, this would make it easier to replace their product when repair was needed.

1 A manufacturer asked if the list would limit the number of manufacturers, model numbers,
2 and their classification levels?

3
4 Andre Miron replied that there were no limits. All tested products would be on the list, if they
5 passed the test program.

6
7 Arfaraz Khambatta asked Andre Miron to confirm previous comments on confirmation.
8 Before an approved lab actually processes a product through the test program, will the
9 product itself be required to comply with the dimension requirements as stated in the code?

10
11 Andre Miron notes that there are going to be baseline requirements in the standard that
12 have to be met before the test specimens can be tested. Geometry will be done first, before
13 the conditioning tests start. When needed we may return products that are not in
14 compliance. This exam of the dimensions of the product is part of the confirmation process.
15 A product not retaining color, bonding, etc. are showstoppers. It is important not to make
16 any snap decision on the final test program yet. UL is also considering tiering tests.
17 However, UL is still gathering data, research on conditioning, etc.

18
19 **17. Manufacturer/Public Comments on Testing for Shear Impact Test** [Jeff Barnes/UL]

20 **Mark Heimlich Comments:**

21 Mark notes that it's difficult for manufacturers of stamped tiles to consistently manufacture
22 quality products for testing purposes. These manufacturers are required to produce
23 numerous samples, before they have samples suitable for submitting to a testing agency.
24 These samples do not represent typical production samples. How will test agencies deal
25 with these types of situations?

1 David Cordova reported the method that CALTRANS has used to handle these types of
2 production problems. David notes that it requires a lot of expertise to provide quality
3 samples acceptable for field installation. Initially CALTRANS considered disallowing
4 products manufactured using the stamp process. It should be up to the governing agency if
5 they want to make changes to the program, like CALTRANS almost decided on when
6 considering excluding this method from their evaluation program. David notes that this is
7 also a performance specification, and the contractor should be responsible for the material
8 for 5 years after contract acceptance. CALTRANS only places 5-year warranties on
9 prefabricated options.

10
11 Jeff Barnes volunteered a respond from a certification viewpoint. UL has is concerned with
12 several issues all products under evaluation. In many cases, these concerns include
13 evaluating materials used for construction, and the manufacturing process used on the
14 product. So we would need to look at these two aspects for detectable warning products.
15 UL as a testing agency would examine specific concrete mixes as part of the test program.
16 We would need to look at installation, and quality control mechanism needs to be examined.
17 UL would need to consider how to address this in a field-controlled product. We will
18 consider this further at another meeting. However, one method could be to require use of a
19 certified installer, who has been specially trained, and has follow-up training to make sure
20 that the quality of installation, is consistent. Although this is not an easy situation, these
21 issues would need to be addressed.

22
23 Gene Lozano notes that having a certified installer would still require a level of trust. Gene
24 emphasizes that stamped concrete is not consistent, even if the same person is installing
25 the concrete. These types of products need more consistency in manufacturing, and in

1 addition to using a certified installer, should also require random follow-up inspections of the
2 products on a periodic basis.

3
4 Jeff Barnes replied that this could be addressed by looking at the installation practice. The
5 committee could request that as part of the certification process, that certifiers witness
6 installations and the installation process used, for a minimum distance to show consistency.
7 So there are several ways to address potential quality control issues. In addition, the
8 committee could require that an actual installation out in the field be witnessed by a test
9 agency, to demonstrate repeatability and consistency.

10
11 Paul Hantz Comments:

12 Paul made a request to bring up two items for the record.

13 1) Sound-on-Cane Testing Procedure – As noted in the previous meeting, Paul is proposing
14 gathering information or including a drag test (or similar test) in the testing procedures for
15 the sound on cane category.

16
17 Andre Miron replied that he is presently researching assorted tests, including the drag test
18 as a potential test for detectable warnings.

19
20 2) Strength Testing – Secondly, the idea that the basis for the material that's going to be on
21 the ADA is no better than the surrounding materials that we talked about two meetings ago.
22 For example, the salt test should not be so severe that the sidewalk crumbles due to testing.
23 Therefore the level of test should not exceed the strength of the material so that it does not
24 deteriorate before deterioration of the ADA materials.

1 **18. Meeting Evaluation** [Jeff Barnes/UL]

2 There were no comments on the meeting format from manufacturers or public
3 representatives.

4
5 Jeff Barnes announced that there would be additional two (2-day) meetings scheduled for
6 October and December 2005. The next EDWAC meeting will take place on Oct. 11, 2005
7 and Oct. 12, 2005 in Sacramento California.

8
9 **19. Adjourn**

10 Jeff Barnes adjourns meeting at 4:00 pm.