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

Meeting Attendance on Friday, February 18, 2005

Committee Members Present
H. David Cordova
Doug Hensel
Jeff Holm
Arfaraz Khambatta
Eugene (Gene) Lozano, Jr.
Minh Nguyen
Michael Paravagna
Paula Anne Reyes-Garcia
Richard Skaff
Jane R. Vogel

Committee Members Absent
Victoria Burns
Tom Whisler

DSA Staff Present
Derek M. Shaw

UL Staff Present
Jeffrey Barnes
Billie Louise Bentzen via Teleconference (UL Consultant – from Accessible Design for the Blind)
Michelle Courier
Esther Espinoza
Andre Miron

Others Present
Lisa Berry, Wausau Tile
Robert Branning, HUB Has It
William Coe, Naviplate, Inc.
Greg R. Francis, GRF Comm Provisions, Inc.
Craig Gerber, Cold Spring Granite
Francis, G. Hamele, Wausau Tile
Paul Hantz, Wausau Tile
Mark Heimlich, Armor-Tile
Jon Julnes, Vanguard ADA Systems Of America
Russ Klug, ADA Concrete Domes
Jeff Koenig, Detectable Warning Systems, Inc.
Duane Sippola, MetaDome, LLC
Michael Stenko, Transpo Industries, Inc.
Dustin Upgren, Cold Spring Granite
Chip Van Abel, Naviplate
Ed Vodegel, Flint Trading, Inc.
Lex Zuber, HUB Has It

General *– A meeting of the Evaluation of the Detectable Warnings/Directional Surfaces Advisory Committee (EDWAC) was held on February 17 and 18, 2005 at the California Community Colleges Building in Sacramento, California. The purpose of the meeting was to introduce and discuss known technologies, testing programs, 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.

Minutes of Second Day of Meeting held on

Friday, February 18, 2005

1. Call to Order (Jeffrey Barnes/UL)

Jeffrey Barnes called the meeting to order at 10:00 a.m.

2. Resilience and Detectable Warnings/Directional Surfaces (Billie Louise Bentzen, PHD/Accessible Design for the Blind) – Teleconference

Billie Louise Bentzen provided a Power-Point presentation of detailed information on previous and current research on resilience and sound on cane-contact in relation to detectable warning and directional surface products. Topics presented in the presentation were as follows:

"DETECTABLE WARNINGS: RESEARCH ON RESILIENCE AND SOUND ON CANE-CONTACT"

– ***Presented by Billie Louise Bentzen, Accessible Design for the Blind***

A) ***The Problem of Research on Both Resilience and Sound on Cane-Contact:***

1) A material that differs from an adjoining material in resiliency will also differ in sound on cane-contact.

2) **In research in which participants who are blind approach surfaces using a long cane, it is not usually possible to determine whether it is the difference in resiliency or sound on cane-contact that has resulted in detection of the warning surface.**

Presentation (Billie Louise Bentzen):

Billie stated that generally when addressing the topic of resiliency, the topic of sound on cane-contact must also be addressed since both concepts are interrelated. A material that differs from an adjoining material in resiliency is going to differ in sound on cane-contact. It was noted that there are some materials that don't differ in resiliency that also differ in sound. However, if they differ in resiliency, they will differ in sound. Both these concepts were interwoven in the presentation. Previous research on this topic has shown that in studies where participants who are blind approached surfaces using a long cane, it was not usually possible to determine whether it was the difference in resiliency or sound on cane-contact that had resulted in detection of the warning surface.

B) ***Problems with Objective Data:***

If a surface is simultaneously experienced both under foot and with the long cane, as has been the case in most research on warning surfaces, objective data cannot be used to determine the relative contributions of differences in texture, resilience and sound on cane-contact to detectability.

Presentation (Billie Louise Bentzen):

Billie noted that there was quite a bit of research on detectable warnings that was based on measures of detection and typically on stopping distances on surfaces. This was based either on travel detectable under foot in which the person was guided or used a guide dog or guide group or used another method of guidance, or traveled independently using a long cane. Most of the research had participants traveling with their own cane or guide dog. This permitted a simultaneous experience of detection of the surfaces by underfoot or with a long cane. No objective data could be used to determine the relative contributions of the difference between texture and resilience and sound. Texture is included now because there are extremes in texture under foot and with the cane as well.

C) ***Strategies to Determine Whether Detection is Based on Resiliency or Sound on Cane-Contact:***

Researchers have often asked participants to report whether they detected a surface under foot, or by hearing the difference as it was contacted by their long cane. This is a very difficult distinction for participants to make; hence the data are somewhat unreliable.

Presentation (Billie Louise Bentzen):

In previous research, researchers have often requested that test participants report on whether they detected a surface under foot, or by hearing the difference as their long cane contacted it. It was difficult for the participants to provide a self-report of a detection process that is simultaneously experienced in multiple ways. This type of report was found to be somewhat unreliable, since participants had difficulties providing information, and at times based their reports on comments from other research participants.

Floor Discussion:

Richard Skaff asked if there hasn't always been a premise that we haven't found the perfect orientation mobility system for individuals who are blind, or who have low vision. As a result of this premise, many alternatives have been developed so that there are multiple methods and systems for persons who are blind or have low vision to use for detection, whether by using truncated domes or other systems, or a combination of several systems.

Billie Bentzen confirmed that Richard's observation was correct, that basic psychological research has shown that the more ways that a concept was communicated, particularly when detecting the difference in two different things, then the more likely it was to be detected as different. Combinations of systems can be good for persons using these detection systems.

Richard noted that in essence whether one of the combinations was found to be better for detection than another was not the primary issue. What mattered was whether the combination of one or the other or both would get the attention of the person needing the information so that they could proceed.

D) ***A Strategy for Looking At Detection Based on Difference in Resiliency:***

1) **If participants approach a warning surface without a long cane, either because they are using a dog guide or because some other type of guidance is provided, they only have under-foot information available.**

2) **If all surfaces tested under floor had exactly the same surface texture, we could be fairly sure that differences in detectability were due to differences in resilience. However, in most research to date, there have been small differences in texture as well as resilience.**
3) **Therefore, research using this strategy is only suggestive of whether differences in detectability are due to differences in resilience or surface texture.**

Presentation (Billie Louise Bentzen):

Billie stated that when participants approached a warning surface without a long cane, either because they used a guide dog, or because they were being guided, they would only have under-foot information available. This was a method used to obtain information on detection based on resiliency, but it was generally found to be confusing since the research participants were moving on to a textured surface as well as a warning surface.

If all surfaces tested under floor had exactly the same surface texture, we could be certain that differences in detectability were in fact due to differences in resilience. However, in most research, there have been small differences in texture as well as resilience. Therefore, even the objective research using this strategy has been only suggestive of whether differences in detectability were due to differences in resilience or surface texture.

E) A Strategy for Looking At Detection Based on Difference in Sound:

1) If participants approach a warning surface using a long cane, and stop because they detect a surface change before stepping on it, we can be sure detection is based on information from the cane-tip.

2) However, the cane tip perceives differences in sound simultaneously with differences in texture. In addition, differences in resiliency can also be experienced as differences in rebound of the cane after it contacts the surface.

3) Therefore, research using this strategy leaves us still uncertain about the relative contributions to detectability, of differences in sound, resilience and surface texture.

<u>Presentation (Billie Louise Bentzen)</u>:

Billie Bentzen made the observation that if differences were viewed based on sound, if participants approached a warning surface using a long cane, and stopped because they could detect a surface change before stepping on it, then it could be concluded that detection was based on information from the cane-tip.

However, the cane tip perceived differences in sound simultaneously with differences in texture. In addition differences in resiliency could also be experienced as differences in the rebound of the cane after it had contacted the surface. So it can’t be said that sound has definitely been detected based on the use of a long cane. That’s only one kind of information provided by the cane, which includes rebounding on the surface a little differently; depending on the use of the cane, that could be an indicator of the differences in resiliency. In addition, surface texture could also be considered.

The results of research using this strategy implies uncertainty about the relative contributions to detectability, of differences in sound, resilience and surface texture. A number of researchers have asked research participants to record after they detected a surface, what they detected on the basis of. The information provided was not clearly conclusive.

<u>Floor Discussion:</u>

Gene Lozano made the observation that along with the style and type of long cane used, the type of cane tip used also made a difference on the ability to detect surfaces adequately.

Richard Skaff added that detection was also conducted by using a tapping motion or a side-to-side dragging technique, commonly used by the blind community. .

Billie Bentzen affirmed that this was all correct. The differences of cane tips, and cane type, and the method of using the cane, could all affect detectability to some degree.

F) ***<u>All of the Research on Detectability of Warning Surfaces has had One or More of These Confounds</u>:***

1) **Nonetheless, it is a basic principle of psychophysics that when stimuli differ from each other in more than one way, they will be more readily perceived as being different from each other.**
2) **There is some evidence, albeit somewhat confounded, that difference in resilience facilitates detection of warning surfaces.**

<u>Presentation (Billie Louise Bentzen)</u>:

Billie Bentzen made note that it was a basic principle of psychophysics that when stimuli differ from each other in more than one way, that they would be more readily perceived as being different from each other. This is the basic principle of the way the perceptual system worked. So there was some evidence that detection of resilience does facilitate detection of warning surfaces. Based on the perception of differences having more than one mention of how they differ will enhance detection, although it's difficult to demonstrate this conclusively when referring to detectable warnings. It's difficult, because the differences cannot be disentangled.

G) <u>The Earliest Research to Identify a Warning Surface</u>:

1) **The first research to identify a warning surface was conducted in 1980 by Aiello and Steinfeld who tested the detectability of two surfaces used in association with brushed concrete, a ribbed rubber mat, and various heights and spacings of a hard abrasive surface. The rubber mat was significantly more detectable that any other configuration of abrasive surfaces, and was preferred by all participants.**
2) **So, this is one resilient surface that was more detectable than hard surfaces with which it was compared.**
3) **But, the textures were different, and the ribs of the rubber mat also caused a slight lateral displacement of the foot as they were stepped on – so the results suggest that resilience may have resulted in the greater detectability of the rubber mat, but this is not definitively demonstrated.**

<u>Presentation (Billie Louise Bentzen)</u>:

Billie Bentzen made note that there were a number of different research studies that had been conducted on detectable warnings, and that Billie would emphasize the resilience and sound on cane-contact information for each reported research study described in the presentation.

The first research to identify a warning surface was conducted in 1980 by Aiello and Steinfeld who tested the detectability of two surfaces used in association with brushed concrete, a ribbed rubber mat, and various heights and spacings of a hard abrasive surface. The rubber mat was found to be significantly more detectable that any other configuration of abrasive surfaces, and was preferred by all test participants. Research participants were not required to make a report of detection for this research study.

The ribbed rubber mat had a resilient surface that was more detectable than hard surfaces with which it was compared. However, the textures were different, and the ribs of the rubber mat also caused a slight lateral displacement of the foot as they were stepped on, so the results suggested that although resilience may have resulted in the greater detectability of the rubber mat, this was not definitively demonstrated.

H) <u>Next Steps</u>:

1) **Templer and Wineman (1980) compared detectability of 11 materials next to brushed concrete.**
2) **A resilient tennis court surface (Kushionkote), and strips of thermoplastic were more detectable than other non-resilient paving surfaces having various textures.**

<u>Presentation (Billie Louise Bentzen)</u>:

Billie Bentzen reported that Templer and Wineman (1980) compared the detectability of 11 materials adjacent to brushed concrete. Among the 11 materials tested, a resilient tennis court surface (Kushionkote), and strips of thermoplastic were found to be more detectable than other non-resilient paving surfaces having various textures. Both of these were to some extent different in resiliency from the brushed concrete.

I) Research to Determine Relative Contributions of Texture, Sound and Rebound:

1) **Templer, Wineman & Zimring (1982) tested detectability of 32 surfaces compared with brushed concrete. Surface texture, sound, and rebound were systematically varied. Materials included combinations of concrete, thermoplastic, neoprene, wood and steel, each of which was sometimes installed over a cavity.**
2) **Loud sound on cane-contact was subjectively judged to be the most important factor in detection. Loudness was increased by installation over a cavity.**

Presentation (Billie Louise Bentzen):

Billie Bentzen noted that researchers Templer, Wineman & Zimring (1982) tested detectability of 32 surfaces, which were compared with brushed concrete. Surface texture, sound, and rebound were systematically varied, using materials which included combinations of concrete, thermoplastic, neoprene, wood and steel, each of which were sometimes installed over a hollow cavity. This was done in order to develop a formula against which they could compare to non-tested materials, to determine if they had adequate differences in texture, sound and rebound to be considered detectable. The materials included combinations of concrete, thermoplastic, neoprene, wood and steel, each of which was occasionally installed over a cavity. And so the texture of this material was varied too. In most cases truncated domes textures were not used, instead various widths of ribs were used, that were spaced differently on the surfaces. There may have been ribs of different heights too.

The result of this research was that in part this was subjective data. Loud sound on cane-contact was subjectively judged to be the most important factor in detection. It was definitely true that installing the material over a cavity increased loudness. Mounting them on plywood also appeared to work well.

J) <u>Research to Determine Detectability of Detectable Warning Products Made of Different Materials:</u>

1) **In research by Bentzen and colleagues (1994) two resilient detectable warning products were compared with seven non-resilient products.**
2) **In terms of under foot detection and mean stopping distance, there was no significant difference between these two groups of warning products.**

<u>Presentation (Billie Louise Bentzen)</u>:
Billie Bentzen reported that in 1994 research conducted by Bentzen and colleagues, compared two resilient detectable warning products with seven non-resilient products. There was particular interest in detectable warning products, and finding the best surface that could be used on various kinds of platforms. The study compared seven non-resilient surfaces, which all consisted of truncated dome products available at that time, differing slightly in details of truncated domes. They were approached from various types of materials, which included brushed concrete, Peralli tile, coarse aggregate

concrete, and heavy wooden plywood. In some ways this was a more difficult test than had been previously conducted when researchers usually approached by brushed concrete.

In terms of under foot detection and the mean stopping distances, there was no significant difference between the resilient and non-resilient product. Although people can normally detect the edge of a transit platform using a long cane, if they are distracted they may not realize that they're near the edge, or if the platform area is very crowded, they may not detect the edge and respond in time. So use of detectable warnings provides advance warning of hazards. This is also true for curb ramp applications, in which the use of detectable warnings provides the users with advance warning of hazards, before they step on to the street. In addition, once a person steps on to the street, they can usually detect some differences in float because of the gutter and may detect some differences in surface texture, although detecting differences between concrete and asphalt is not something that people are normally able to do.

It is essential to note that detectable warnings are needed as sort of a back-up system in case of a missing cane, or guide dog, or if exposed to possibly dangerous distractions and crowded areas. The research group were particularly interested in under foot detection. A subset of subjects participated in long cane detection, and researchers found that if a surface was highly detectable under foot, it would be highly detectable with a long cane. However, some surfaces were detectable with a long cane that were not detectable under foot, and that is not the type of surface that should be used.

<u>Floor Discussion:</u>

Richard Skaff asked if there had been any analysis done on users who are blind or had low vision that also had other types of disabling conditions? For example, there has been a high population increase in diabetes among both the younger and older populations. Individuals afflicted with diabetes, are often subject to a lost of sensitivity in the extremities. Does this go back to needing multiple detection systems meaning, detectable sound on cane-contact as well as under foot, because a person may not be capable of detecting the detectable warning under foot but may possibly hear sound on cane-contact?

Billie Bentzen agreed with Richard's comments, and noted that there has been no systematic collection of data comparing the groups mentioned. However, persons with diabetes have been included within some of the sample groups tested.

Gene asked if in any of the research studies performed earlier, when they tested for under foot detection did the researchers also consider the variable of the type of footwear that a person was wearing? A leather soled shoe vs. a crepe shoe, and how wearing these type of shoes impacted detection.

Billie Bentzen replied that some of the researchers had attempted to manipulate this variable systematically. Shoe soles vary so much that it has never it could not be tightly controlled. It is certainly true that a harder surface or a thinner surface sole is likely to enhance detection.

K) ***Research to Compare Detectability of Surfaces that Differed in Sound and Resilience:***

Research conducted for Sacramento Regional Transit Authority in 1997 compared four detectable warning products, one of which differed somewhat from the adjoining surface in resilience and somewhat in sound, and one of which did not differ markedly in resilience but which was very different in sound, largely because there was a cavity between the product and the substrate.

Presentation (Billie Louise Bentzen):

Confirming the slide information, Billie Bentzen reported that research conducted for Sacramento Regional Transit Authority in 1997, compared four detectable warning products, one of which differed somewhat from the adjoining surface in resilience and somewhat in sound, and one of which didn't differ markedly in resilience but which was very different in sound, largely because there was a cavity between the product and the substrate.

L) *Results:*

1) **For under-foot detectability, the product that differed in resilience was one of the two that performed best. However, when approached using a long cane, there were no differences between products.**
2) **When the measure was stopping distance instead of detection, the resilient product performed among the two best when encountered under foot, or with the long cane or dog guide.**
3) **The resilient product and the product that had a markedly different sound, but not resilience, were judged easiest to detect.**

Presentation (Billie Louise Bentzen):

For under-foot detectability, the product that differed in resilience was one of the two that performed best. However, when approached using a long cane, there were no differences between the two best products, so in detection they were equal.

When the measure was stopping distance instead of detection, the resilient product performed among the two best when encountered under foot, or with the long cane or dog guide. Stopping distance in this line of research is usually measured in terms of how much of the material has been progressed on to before coming to a stop. Previous research had indicated that if the surface was highly detectable then test participants would stop within 24 inches of that material, and that is the basis on which 24 inches was established as the minimum depth of travel on the material. In Sacramento where the measure was stopping distances rather than detection, the resilient product was considered among the two best when encountered under foot, or with a long cane, or with a guide.

The resilient product and the product that had a markedly different sound, but not resilience, were judged easiest to detect. But this was a subjective judgment. The first two were objective measures. When test participants were asked what surface they thought would be easiest to detect in the context of a transit environment, their opinion was that the product that had the really different sound, and not resilience was judged easiest to detect. A problem with conducting this type of research was that a surface could either be made so that it differs enough in sound to be highly detectable or the surface can be made that it is highly detectable on the basis of resiliency. In fact, one study reported that resiliency was in fact the most reliable means of detecting, but the two surfaces found to be the most detectable against concrete were carpet and Astroturf. That was the difficulty with that type of research, and with reaching real firm conclusions about it. In Sacramento, research illustrated that both resiliency and sound were contributing importantly to the detection

M) *Conclusion:*

1) **Differences in both resilience and sound on cane-contact appear to increase the likelihood of detecting truncated dome detectable warning surfaces, although there have been confounds in the research.**
2) **However, there is no guidance in the research literature on how much difference in resilience or sound on cane-contact is required to enhance detection.**

Presentation (Billie Louise Bentzen):

Billie Bentzen reported that it would be reasonable to conclude that differences in both resilience and sound on cane-contact appeared to increase the likelihood of detecting truncated dome detectable warning surfaces, although there have been confounds in the research, because it was not possible to eliminate them. However, there was no guidance in the research literature on how much difference in resilience or sound on cane-contact would be required to enhance detection.

N) Need for Research on Resilience:

1) **There is a need for research to determine the difference in resilience that can be detected. This should be a measure of under-foot detection, as most people who are legally blind will detect differences under foot.**

2) Most persons who are legally blind do not use a long cane. A small minority of persons who are blind use dog guides. Neither of these groups uses a long cane, which is required to generate differences in sound on cane-contact.

Presentation (Billie Louise Bentzen):

Billie Bentzen reported that there was a need for research on resilience, to determine the difference in resilience that can be detected. It was important that this should be a measure of under-foot detection, as most people who are legally blind are going to be detecting differences under foot. This is because most people who are legally blind are not traveling with either a long cane or a guide dog. They may also have the ability to detect a difference by visual contrast. In many situations people with low vision, if looking in one direction may have adequate vision, but when looking toward a light source their ability to detect differences in contrast drops considerably. Individuals with low vision, often as a result of blood sugar levels or fatigue find that their vision abilities have increased or decreased. These persons are going to rely heavily on under foot detection as their backup detection system. They don't have a long cane that's going to tell them where the street drops off. In those situations when their vision is not useful, they would need that under foot detectability. It should be noted that only a small minority of persons who are blind use dog guides.

O) Need for Research on Sound on Cane-Contact:

There is a need for research to determine the difference in sound on cane-contact that can be detected. This should be conducted using participants who are blind who typically travel using a long cane.

Measures should be made both when using the cane in a side-to-side tapping technique, and a sliding technique.

Presentation (Billie Louise Bentzen):

Billie Bentzen affirmed that there is a need for research to determine the difference in sound on cane-contact that can be detected. This should be conducted using participants who are blind who typically travel using a long cane. Measures should be made both when using the cane in a side-to-side tapping technique, and a sliding technique. Ideally using different cane tips as well. It was important to note that the research should be conducted using persons who are blind, and who typically travel using a long cane. In some of the research, developing a standard measure was sought by conducting a test that used a long cane that pivoted on its support and then was artificially dropped onto a warning surface. This test was used to measure rebounds, however it did not provide useful information.

Floor Discussion:

Jane Vogel asked if any research has been done with individuals who were deaf and blind?

Billie Bentzen replied that these surfaces were not tested with people who are deaf and blind, because they were recognized as presented on the basis of under foot detection. In a study conducted using nine available detectable warning materials, all were found to be highly detectable under foot, and that was important since this would be the sense that people who are deaf and blind would have remaining for detection. In many cases they would receive information from use of a long cane or a guide dog. In terms of the most reliable information they're going to have, it would be by detecting surface texture, and having differences enhanced by different means.

Richard Skaff asked if a person who is deaf and blind is trained to use a cane differently? For example, would this be done to get more information because they may not be able to hear the tip of the cane on the ground surface? Could they better feel the textural change between the hard surface concrete and the truncated domes, if they dragged the cane instead of tapping the cane? Are they given a different type of training to use the cane? Is there that kind of consideration?

Billie Bentzen responded that as far as she knew and based on many years of professional classes, she had not heard of systematic training to use one technique in preference over another. Many years ago, instructors were encouraged to teach everyone the tapping technique, and the sliding technique was not much in use at that time. This continued until it was found that people get much more accurate information about exactly where boundaries are if a sliding technique is used, as well as receive better information for surface texture. However, it was also possible to travel faster when using the tapping technique than when using the sliding technique. The sliding technique in many cases was difficult, depending on the type of cane tip used, because it was more likely to get hung up than if using the tapping method. People vary on when and how they want to use those techniques. Some individuals have used almost exclusively a sliding technique, and others used primarily a tapping technique.

Jane Vogel added that that many people who use a cane have other multiple disabilities. And teaching the tapping technique is more difficult than other methods, because there is a rhythm that needs to be developed. The sliding technique although it may not be as precise as tapping, has been used more often because the person using this technique was better able use this method because of other disabilities, such as hearing loss, or cerebral palsy, or types of disabilities. Jane, although not a mobility instructor, has worked with the deaf and blind individuals, who used their canes around truncated domes and elsewhere. It has been noted how sometimes the cane tips especially some of the larger cane tips, will actually cause a deaf and blind person to stop in their tracks, because they don't know where they're going and they become stuck. Use of the side-to-side method does certainly allow a more freedom from hazards than tapping where they might miss detection all together, because they're not very good at it. Although using any kind of cane technique, was better than none.

Richard asked Billie Bentzen a question related to age and newness of a disability, or disabling condition. Were there obvious differences in function with either tapping or dragging cane use with individuals in the later years of aging, who have become newly disabled? They might have lost their vision or had limited vision for some medical reason, at a later age and haven't had years of experience with the disability or use of a cane. Do they react to detectable warnings and use it as effectively, as a person for example who was born with blindness?

Billie Bentzen replied that there has been no research in this country that used a large enough subject group or multi group to shed very much information on this. The British researchers have done a fair amount of study using older blind people as well as using the younger population, and determined that the surfaces they used are highly detectable to older people who likely have become blind later in life.

Gene Lozano reported that he has used a cane for over thirty years. Depending on the situation, Gene might use a folding metal cane with an aluminum metal tip, which is useful for travel and other times when crossing a major intersection. Originally Gene started with a solid fiberglass cane with a metal tip, that telegraphs more information with tapping, and so he felt more confident using the solid fiberglass cane. Gene noticed that he tends to use tapping with the folding metal cane. However, if uncertain, Gene is more likely if using the metal folding cane start a sliding technique to collect more information. So use of the type of cane and slide or tap technique depends on the situation. Gene noticed that many older users around the age 55 don't get enough training for using long canes properly. They appear to use a sliding method, which is more comfortable for new cane users.

Jane Vogel mentioned that the older population generally did not receive cane training; instead they use a human guide. The guides are not always well trained, and frequently do not lead the user properly. When they guide someone, they should walk slightly ahead so that they're in the lead, otherwise they place the older person in danger. The vast majority of persons, who are blind and older, will rely primarily on under foot detection.

Arfaraz Khambatta asked that in researching the differences in sound, how many types or kinds of platform types were used, which platform would be considered the best?

Billie Bentzen responded that the study used four types of platforms. The platforms consisted of brushed concrete, Pirelli tile installed over concrete, coarse aggregate, and heavy wooden planking. There was a minor affect of decrease of detection by coarse aggregate.

Manufacturers/Public Comments:

Jon Julnes Comments:

Jon Julnes asked what kind of research was done on surfaces that had been built over a hollow or cavity? Were there any tests conducted over an extended period of time to deal with the inherent issues of moisture collecting underneath surfaces and causing degradation of the concrete or freeze-thaw issues?

Billie Bentzen had not conducted any long-term studies to detect this, so did not have any information on this issue.

Dustin Upgren Comments:

a) Would be interested to know if there had been research done on differences in detection, based on the location of the application of the detectable warning? For example, a detectable warning placed on a curb ramp on a busy intersection vs. an interior application. Was there a difference of detectability in those different locations?

Billie Bentzen replied that she was not aware of any difference of detectability at these different locations. However, there might be a difference in the stopping distance at each location. Users travel with more caution on a platform, than at a curb, or around a corner, which they expect to be safer, and so they walk faster and with more confidence.

Dustin Upgren Comments Continued:

b) Does traffic noise effect detection and is hearing sound on cane differences more difficult? “Has traffic interference played a big part on hearing sound on cane difference?”

Billie Bentzen replied that based on previous research, traffic noise makes a big difference. In terms of detecting the difference between the pedestrian and vehicular way, it is known that traffic plays a big difference. Billie provided a synopsis of some research done on the effect of traffic noise on curb ramps, and how it related people’s ability to stop before they step onto the street. Approximately 80 subjects were tested. Ten curb ramps in ten cities were tested around the country. When the streets were approached by way of the curb ramps on 39 percent of the trials, they stepped onto the street within some distance or another, without stopping. Test subjects were asked to report what information were they using to let them know that they had reached the street. And vehicular sound was the major tool that they used, although other cues available too. Half of the 39 percent reported that there were cars in the street either moving or idling. Traffic noise was found to be primary source of information indicating the boundaries between pedestrian and vehicular way. .

Jane Vogel asked about the study, and whether all were experienced cane traveler?

Billie Bentzen replied that yes, all test subjects were experienced cane travelers.

Gene Lozano stated that Sacramento was one of the ten locations chosen for testing, and the testing was done on a blended curb in the downtown area. This was a difficult busy area to work with, and the tested curbs did not have detectable warning surfaces. The research by Billie Bentzen and Janet Barlow demonstrated a real need for detectable warning products on curb ramps regardless of where they were located, including parking lots and other areas. Gene concurred with Beezy that in city streets sudden drop offs are unexpected, unlike transit platform areas. A person tends to travel faster on curb ramps, whether or not they are familiar with the area.

<u>Mark Heimlich Comments</u>:

Yesterday the definition of resilience was defined as, “Resilience, the ability of the material to absorb energy when deformed elastically without creating a permanent deformation.” What is the relationship between this definition and sound?

Jeff Barnes noted that the committee had not actually talked about the definition for resilience yet. This topic discussion was tabled until Friday, along with the definition of acoustic quality. Discussion of the definition for resilience would be the next discussion, and the committee will seek Billie Bentzen’s input on this topic.

Richard asked Billie Bentzen if based on research studies, how important was color to people with limited vision in addition to the textural value of the detectable warning.

Billie Bentzen was not aware of any research done that would answer this question exactly. Although it is true that persons with low vision will detect a change from further away than a cane’s reach, which is the farthest you can get away if using only touch.

Gene Lozano asked if in previous research about different colors and also based on the work by Virginia Tech, was there a value or percentage found that should be used as a minimum value for color contrast or color hue, that indicates one color would be better than others?

Billie Bentzen replied that her research was conducted on color contrast on different products, 16 or so existing detectable warning products on the same platform, that was examined for detection underfoot and with a long cane. The Federal Transit Administration asked Billie to also look at visual contrast and color and so with limited samples of limited products, this was done on the same platform. And all from an objective measured point of view, and the test subjects could only get a certain distance away from the products. It wasn’t all that good a measure since it could only use the platform provided, although all colors were reported to be fairly visible. However subjectively, when you asked the subjects which product performed the best, the responses were unexpected. Billie expected that the researchers were going to use the results to create a contrast ratio that worked, and this wasn’t going to be related to hue or color. This did not happen. The results were very clear, that there was a preference for yellow, over other colors. Most of the colors selected were of some variation of yellow; two were safety yellow, and one red. There was an emphatic preference for safety yellow. The approach was from new concrete, a fairly white surface, with a difference in reflection of 40 percent. In the others it was higher. The 40 percent surface had the minimum difference, and some surfaces were as high as 80 percent or more, that were not safety yellow. Those were not subjectively judged by participants to be as easy to see and use as a warning of safety yellow tiles.

Minh Nguyen asked about the Billie’s research on stopping distances. The research studies reported stopping distance of 24 – 30 inches. What were the materials used for detecting stops?

Billie Bentzen reported that 95 percent of people stopped within these distances, using all the tested surfaces used in Billie's research studies. There was very little difference between materials.

3. Resilience Definition – Committee Open Discussion (Jeffrey Barnes/UL)

Jeff Barnes announced that at the last meeting, a discussion was held for the definition of "resiliency". At that time UL had developed a proposed definition. The definition, without input from the committee or public was at described below: **Resilience is the ability of the material to absorb energy when deformed elastically without creating a permanent deformation."** This definition is submitted for review and discussion, and will be modified based on input from committee, and comments from Billie Bentzen, manufacturers, and the public.

There were many concerns about defining the word "resilience" properly. Some of those issues discussed in great detail included the following:

a) The importance of using building code requirements for curb ramps, as referenced in Chapters 11B and 11A, which have no requirements for sound difference or resiliency. Where you find the requirements is on boarding platforms and hazardous vehicular ways. So it's a contrast in resiliency between the adjoining surface and the detectable warning. It's either resiliency or sound on cane-contact.

b) Resilience is a matter of durability and detectability, which is important to blind persons. Both are relevant.

c) The purpose of the definition was to determine that if a product has a particular resiliency from its original installation, that characteristic is still at 90 percent of its original design characteristics after five years. This information was needed in order to identify exactly what is resiliency, so that a test program could be developed, tested and measured.

d) It was important not to overlap the definition of “resilience” with the definition of shape, because shape is already written to assure that the “shape” of a product is not to degrade after 5 years, more than 10 percent. Should consider absorptive qualities and deformation, bouncing back abilities.

e) Need to consider how well a material retains whatever the characteristics resiliency comes out to be defined as. It should be measurable, and putting it in layman’s terms does it have enough springiness, so that step on and off of a concrete surface, can a person detect the difference, not based on domes but based on the feel of the material, how spongy it is it, or is it harder.

f) Should you caution because an improper definition could result in a material that is too spongy, and not be effective, although it may bounce back to its original shape. Possibly a way to address this would be to establish a test criteria, with a certain range so that only a certain amount of deformation is permitted.

g) The committee wants to avoid ending up with a sponge with the appropriate design, truncated domes; however, it can’t be felt when stopped on. Therefore, a minimum and maximum range of the resilience.

h) Should define resiliency not to the test, but to the user. The test will later be defined to test resilience. The committee does not want to omit a possibly useful test, because it didn't fit a definition based on the tests.

i) The committee needs not to set a value or range of values. What the definition needs to specify is a relationship in the definition. Even if envisioning the comparison or application of the surfaces to both concrete and asphalt, they differ. A material could have slightly less resilience material yet would be detectable in association with concrete, but not detectable in association with asphalt.

j) 99 percent of the time poured cement concrete (PPC) will be the surrounding surface of detectable warning products. On occasion asphalt concrete (AC), is used, but not very frequently. Those two surfaces should be considered as the assumed surrounding material.

k) If a resiliency factor or degree of restitution is created, it should not limit the manufacturer's selection of materials. Such as concrete, metal plates, etc.

l) Should consider whether resiliency is to be a detection under foot, or bounce back on using the cane.

m) The definition should be about its ability to bounce back. This definition is only about physical force compressed. We need to go back to "detectability", not the springiness of the product and whether it deflects or not, detectability is key.

n) A definition that would be highly effective would be one that specifies the product’s ability to maintain the original shape or as preordained by some design standard after impact with some level of force.

o) Resilience is the ability of the material to absorb and translate energy when exposed to physical force.

p) Resilience is the capacity of a material to absorb energy when it is deformed elastically, and then upon unloading, to have this energy to recover.

After a detailed discussion among committee members, and considering comments from the public, and manufacturers, the following definition was proposed for a vote to the EDWAC.

Definition:

Resilience is the capacity of a material to absorb energy when it is deformed elastically (subjected to physical force) and then upon unloading to have this energy recovered.

Minh made a motion to accept, Richard seconds the motion.

Vote Results: 9 yes votes, and 0 no votes.

4. Proposed Requirements for Detectable Warnings and Directional Surfaces – Resilience, Sections 12 – 14, Exhibit B (Andre Miron, Michelle Courier/UL)

Andre noted that in the current draft standard there is space there for flexural strength and tensile strength. Just to save on time, Andre and Michelle reviewed these tests in advance and found that they were good tests to use for this particular application. Flexural strength tests provides a generic material property that is not going to reflect the performance of the material as it's being installed on top of concrete or asphalt. Flexural strength of substrates would probably exceed the strength of the overlay and so is not a good indicator for testing. These tests were examined, and it wad decided that the tests should only be done if previous research have promoted the tests as good indicators of resiliency. Based on the different products that Andre looked at, both the flexural strength and the tensile strength tests do not look like good tests candidates to conduct on products across the board. The tensile test isn't appropriate for the failure modes being developed, and not appropriate for the samples being prepared to specific specifications.

A possible test to look at would be the coefficient of restitution, which consists of dropping a steel ball, measuring ¾ " diameter, dropped on material that is installed in standard concrete, from the height of a meter. The height of the bounce is measured, by recording the amount of time between the first and second impact. The height of bounce can be determined by using the gravitational constant and some standard physics. Basically this formula measures the percentage of energy that is re-imparted by the steel ball. This method would serve as a good indicator of how a cane dropped on a surface is going react. When the committee conducts the exercise at the next meeting, we are likely to see a correlation between the resilience exercise and the values of the coefficient of restitution if used in the exercise.

Gene Lozano asked if it would be a better idea to use an actual cane tip, instead of the steel ball?

Andre responded that this could be done, however the ball is a representative device, and the test was designed to use a steel ball. In addition, decisions would need to be made on the type and variety of canes tips that should be used in the standardized tests.

Arfaraz Khambatta asked for the size of the ball, and how do we ensure that the ball falls on the flat surface.

Andre explained that the size of the ball is ¾”, small so as to not damage the tiles, and that the ball falls straight on the flat surface because of a tube like guide that is provided for testing.

Richard Skaff asked why not test the dome?

Andre Miron replied that testing the dome might be tricky because if you hit the sides of a dome, the test is changed. Currently researching to determine if hitting the valley is representative of the material.

Richard suggested a comparative analysis be done where both the valley and the dome are tested.

David Cordova recommends testing both the domes and the valleys, since this is what a cane can detect.   In addition, he expects that between the domes and the valley are different areas, which might or might not include paint, padding or similar differences.

Andre Miron noted that adding the dome area to testing, could be done, however not sure if useful data would be available since the domes are going to cause sideway bounces. It might be difficult to target hitting just the top of the dome. There are some other tests being considered, and those proposals may be available at the next meeting. It is important to look at this and any other test methods that are made available to see if there is any correlation between these tests, and the resiliency exercise to occur at the next meeting.

Michelle Courier notes that manufacturers sell products with or without coating, and both need to be tested to cover all bases

Derek Shaw asked if each would require a full set of tests? Any representative testing permitted?

Jeff Barnes replied that possibly some of the tests might be waived, if the products were identical except for the coating.

Richard asked if the manufacturer redesigned their tiles to have wider spaced domes, would this require all new testing?

Jeff Barnes replied that materials characteristics would not be impacted. Once a product is evaluated, and modified, then a test evaluation would be done to determine which tests should be done, or waived.

Jeff Barnes asked if there was some element that should be looked at to determine resiliency.

Derek Shaw asked if we should consider the different types of testing resilience such as immediate unloading, and foot pressure with slower unloading.

Andre Miron agreed that we might want to look at these tests. Andre believes that there is a correlation between the two, where the value would be a different value, however there would be a correlation between both values. Andre feels that the coefficient of restitution represents both test, but this is all based on instinct, and more data would be needed to verify this theory.

<u>Manufacturer/Public Comments</u>

<u>Paul Hantz Comments:</u>

Shouldn't we drop the pertinent material, such as a cane tip, rather than a steel ball? Isn't dropping a steel ball, another regular impact test. Maybe using a porcelain, or ceramic might be better, more accurate that using a steel ball.

Michelle Courier replied that it doesn't matter what material is used to drop on products, you will still the same result, as long as the same material is being dropped.

Minh Nguyen believed that Paul's point is if you drop a steel ball and it breaks the tile on impact, then there will be less energy and the resilience will be lower.

Andre Miron noted that the test method was designed for ceramic tile, and can be used on all product materials, to level the playing field. Any type of products can be used, and the same results would occur. However, Andre will consider using other materials other than steel balls if the steel ball is found not to be ideal.

5. Resilience Exercise – Request for Manufacturers' Assistance/Committee Open Discussion (Billie Louise Bentzen, PHD/Accessible Design for the Blind)

After the previous EDWAC meeting, Jeff Barnes and Billie Louise Bentzen discussed possible approaches towards addressing a system of measurement for resilience. During these discussions, a plan was formed to propose conducting a resilience exercise for committee members at the next EDWAC meeting.

Billie suggests all members participate in an exercise at the next meeting, and there shouldn't be much difference of detectability between members with or without vision. The EDWAC can use this resilience exercise to attempt to create a measurement test. At the next meeting, members will work in pairs, if possible, wearing soft-sole and hard-soled shoes. Members will use a layout of one foot by one foot, with samples provided with California rated texture with an equal number of concrete pavers, plus two. Equal heights should be used, if possible. Samples should be arranged on a hard floor, placed next to a concrete paver, and two plain pavers should be provided as a control. Each member will be guided to the tiles, and blindfolded if not visually impaired. Information will be recorded after each trial. Level of acceptability, should be determined by the committee. However, it might be difficult to decide on acceptability, until the data has been analyzed.

Jeff Barnes noted that Beezy had suggested collecting data also by using a cane. Possibly this would permit the committee to provide some guidance to cities, related to measurement information with resiliency. This can be considered as a positive educational tool for members, and Beezy plans to send the data to the university for analyses.

Gene Lozano asked if the test was limited only to material that is currently available? If not, Gene would like to bring samples of tiles used in the past. In addition, Gene notes that one foot by one foot test areas may not be adequate, since with two shoes, there is not enough space to permit both feet. Also Gene suggests blocking sound, so as not to get clues. This would be useful to establish a comprehensive range.

Billie Bentzen accepted the suggestions for both of these modifications, but not convinced that both of these are necessary.

Jeff Barnes noted that it was very important to establish detectability. Do products out there really provide resilience? This might be determined by conducting the resilience exercise. The group can also consider how a product that is very rigid compares to polymeric with some spring.

Gene Lozano asked what if none of the materials are marginally detectable? The committee still needs to develop a measure of some sort, possibly a minimum and a maximum range.

David Cordova commented that the committee needs to make a good faith effort to try to develop a range. It would be fine to conduct testing, however we will need to review and accept our own data.

Jeff Holm noted that if this committee develops standards, would this look unfair if the committee is establishing requirements, can they show that they are not biased?

Jeff Barnes noted that the most important issue is to educate the committee with the purpose to center the committee and provide general direction.

Jon Julnes agreed that this exercise is an excellent idea, and may open members up to new ideas. Jon is concerned about including test material that is not currently available for use.

Mark Heimlich asked if imbedded and stamped concrete would need to be tested?

Billie Bentzen replied that the concrete tiles did not need to be tested.

Richard Skaff disagreed, noting that unless you test all products available, how can a range be determined?

Jeff Barnes recommended no limitations, that all manufacturers would be invited to send samples.

Billie Bentzen recommended deciding if asphalt surfaces should be tested. It would be best, if each material could be tested against itself. While considering all materials, we should all keep in mind that we are measuring resiliency and sound on cane-contact.

Richard Skaff suggested using the test site at CALTRANS. We might want to consider visiting that site for the testing, and for the first day of the meeting.

David Cordova agreed to look into the possibility of using the laboratory setup, and reserving a conference room at the Sacramento CALTRANS location.

Jeff Holm noted that if the CALTRANS location is not available, the committee should consider using a garage that is located nearby.

Derek Shaw suggested posting a notice on the website addressed to interested parties, and asking for manufacturers to send in samples for testing.

Jeff Holms made a motion to hold the resilience exercise at next meeting. Gene seconded the motion.

Richard Skaff agreed with Gene that a one-foot square is not a reasonable space. Concrete and at a yard, more realistically tests these products. Need 4 feet by 3 feet, which is more similar to real life. CALTRANS would be best system.

David Cordova suggested using an unpaved area, excavate, and place samples in this location.

Minh Nguyen agreed that a larger test site was needed. If CALTRANS, was not available, would suggest building a wooden platform that has a recessed form, and apply specimens to make it flush.

Jeff Barnes reminded everyone that cost might be factor since we should control the expenses for such an informal exercise.

Jon Julnes would prefer that the committee install the test site at CALTRANS, because it represents a more real world environment.

Mike Stenko noted that from the east coast, it would be costly to send staff to install these test sites. Mike recommended using a bed of sand, which would provide a quick and easy method for setting up testing. It would show that the current resilience range is quite narrow.

Jeff Barnes volunteered to set up the resilience exercise with David Cordova, and develop a proposed plan and recommendations for samples.

6. Proposed Requirements for Detectable Warnings and Directional Surfaces – Attachment, Sections 15, 16, Exhibit B (Andre Miron, Michelle Courier/UL)

Andre Miron reported that there are two attachment tests under consideration:

1) Bond strength evaluation intended for materials to be placed on top of the substrate and under the overlay material. The tests consist of drilling a core of material through the top of the overlay into the core of the material about ¾ in deep, and attach a steel disk to the top of the core, and measure how much force was required to pull that disk off. The idea is that you will be measuring the bond strength of the adhesive layer/attachment layer so that you apply a tensile load until the core breaks free. In case of non-adhesive attachments, we would test the interface layer where the intersection is where the material is attached to the concrete.

2) 45-degree pressure test consists of a steel blade supported at a 45-degree angle, with a load applied to make sure that the dome or directional bars are not

easily detached. This will check the lateral attachment and the strength of the domes and directional bars.

Arfaraz Khambatta asked if the adhesive property was being measured to connect the steel disk and truncated domes.

Andre Miron pointed out that Figure 2 was the test being discussed, which illustrated the test set-up.

Jeff Barnes requested that the manufacturers provide information on the adhesives used on products, for testing purposes. Please provide your knowledge of the bond strength, so that we can develop the bond strength test appropriately.

<u>David Hantz Comments:</u>

Will need to put on the Agenda, the need to reconcile wording between government code and building code.

<u>7. Proposed Requirements for Detectable Warnings and Directional Surfaces – Color Fastness, Section 17, Exhibit B (Andre Miron, Michelle Courier/UL)</u>

Andre Miron reported that for color fastness, we are looking at how much color changes over time. Before and after aging, we will be looking at the difference. We are looking at ASTM D2244. The standard contains a test method, as well as a number of calculations. We are suggesting that the standard Delta E color value can be used to determine if the color has faded substantially. Looks like 10 units of the color difference would be a good value to start with. We have ANSI requirements for what is defined as safety yellow, and these can be used to determine if a color meets the requirements for safety yellow. But that may fall outside of the responsibility of the committee.

Jeff Barnes asked that since the code only requires color in specific situations, should we test for color when it is not required?

Gene Lozano recommended testing with color since if it is black or some other color that you see that in 5 years it has only faded 10 percent maximum.

8. Proposed Requirements for Detectable Warnings and Directional Surfaces – Acoustic Quality, Section 18, Exhibit B (Andre Miron, Michelle Courier/UL)

Jeff Barnes noted that feedback is needed on acoustic quality in preparation for the next meeting. The definition of acoustic quality will also be addressed at the next meeting. There is a general consensus of what we're looking for as defined in our scope. Does the change of the acoustics, the sound that detectable warnings generate when first installed, change after five years? Has there been significant degradation, and has there been a change in that sound?

The change of acoustics is a very difficult result to quantify from a test perspective. Unlike resiliency, where we have may have an easy way of quantifying resiliency, with difficulties in defining the definition, acoustic quality will probably be difficult to define and to quantify a change of sound will be difficult. This has been a bit of a challenge, however Andre and Michelle have a few ideas to discuss. Michelle and Andre will be soliciting some feedback or guidance from everyone, to help provide some direction.

Andre Miron notes that basically, acoustic quality is the sound of a cane, with tapping on the detectable warning discernable from the tapping on another surface such as concrete, and can the difference be detected? Most likely measuring and recording these values would be done by using a sound spectrograph, and comparing it to itself for reference. Several things can be looked at to quantify sound such as volume (in decibels), pitch (frequency, or timber) and the duration of the sound. It's possible to measure these values and come up with some rudimentary method of comparing sound to itself, before and after aging, but Andre was definitely open to suggestions on this issue.

Jeff Barnes made note that after a strike there would be a very noisy waveform, with several peaks shown on the graph. Testing before and after aging would result in two graphs. We need to consider what to do with these two graphs, and the information provided?

Gene Lozano suggested that the tested product should be installed onto a solid surface, to get a true value. Some products such as ceramic tile can have a dramatic change in sound depending on the material surrounding the tile. Samples should be imbedded and fully surrounded.

Andre Miron reported that in the proposed standard that this test and several other tests would require a concrete backing for testing.

Jeff Barnes noted that the main objective in the testing is to conduct tests to measure the differences between unaged and aged samples. We need to determine if there has been a difference in the product. In order to do this, the samples should be of sufficient sizes for testing. All the tests will be a comparison test back to itself. Currently we need ideas on how to provide guidance on the selection of suitable acoustical sound, and we still need to figure out how to measure a difference in sound.

Minh Nguyen suggested creating at least five graphs of the same materials, which might print with slightly different values, and creating an average from this information in order to determine a standard baseline, allowing for variation factor. The standard baseline would be used to determine if the 90 percent minimum criteria has been met. Should consider looking at acoustic measurement machines.

Doug Hensel suggested evaluating standards ASTM E1007 or ASTM E 492, which might be useful in providing sound information.

David Cordova offered information about a field measurement standard used by CALTRANS for measuring noise that might be useful. If needed, David can provide the standard information, if needed.

Michelle Courier expressed interest in a machine called a spectrograph that measures sound and records sound. Michelle is interested in obtaining information on this test equipment, which will allow a fingerprint of the sound.

David Cordova asked if the testing wasn't to be based on a comparison to the surrounding area? That there should be an identifiable difference of sound, which would be measured and identified.

Jeff Barnes explained that there are two parts to the testing being considered. Within our scope we must establish a durability test to determine that there is no significant degradation over a period of time. In addition, there is some value in providing recommendations on how to rate a product to a particular level, and providing a number so that a person purchasing this product would know what types of surrounding materials could be used. Although not part of the scope of the committee, we may later use the information, if available, to make recommendations.

Gene Lozano asked if CALTRANS hosts the committee's resilience exercise, would it be possible to also test for sound differences.

Jeff Barnes agreed that this might be acceptable, however we need to consider how to detect the difference between sounds, scientifically.

Gene Lozano responded that if we could agree on the definition, then that would help us to determine the test.

Jeff Barnes recommended that everyone consider defining acoustic quality, and if possible, provide suggestions at the next meeting.

Derek Shaw noted that early synthesizers and electronic keyboards studied the manipulation of sound such as, sound, pitch, frequency, and volume. The information was broken down pretty specifically, and might be useful for Andre in developing some of the tests for sound.

Manufacturers/Public Comments:

Mark Heimlich Comments:

It's important to look at real world conditions and what's important. The committee should think about creating a sled that slides across domes as well as the background field and somehow measure a continuous sustained sound difference, a sound level average, and uses the value to compare to concrete.

Jon Julnes Comments:

Prefers the sound measurement method use the side-to-side method, which is more accurate, than the tapping method for canes.

Jeff Barnes notes that this information will be considered as Andre and Michelle develop tests.

David Cordova asked if the text in the attachment was based on the Government code, or on Title 24 regulation building code. The information does not match. May need to confirm and make a recommendation to change this wording definition.

Derek Shaw reported that the law requires us to look at specific facets, but some are not covered in the government code. The committee may wish to provide recommendations to correct the discrepancy between codes.

9. Future EDWAC Meetings (Jeffrey Barnes/UL)

Proposed Meeting Dates:

a) First Option: April 28 and 29, 2005 (2-day meeting)

b) Second Option: May 12 and 13, 2005 (2-day meeting)

c) Third Option: April 14 and 15, 2005 (2-day meeting)

April 28 and 29 were selected as the best dates for the next meeting. All EDWAC meetings will be scheduled using the timelines below unless noted otherwise:

On Thursdays: Start at 10:00 am, end meeting at 5:00 pm

On Fridays: Start at 9:00 am, and end meeting at 3:00 pm

10. General Information (Jeffrey Barnes/UL)

Handouts and Pamphlets: Handouts and Pamphlets may be provided to all committee members at the end of the EDWAC meetings. However a standard-sized audiocassette of the recorded text from the handouts/pamphlets should also be made available for Mr. Gene Lozano.

11. Pending Discussion Items (Jeffrey Barnes/UL)

a) Definition of Acoustic Quality – Reserved for discussion at the next meeting.

b) Integral Color Issues (DSA) – Reserved for discussion at a future EDWAC meeting.

c) Conformation/Confirmation – Reserved for discussion at the next meeting.

d) Flammability – Reserved for discussion at a future EDWAC meeting.

e) Slip Resistance (DSA) – Reserved for discussion at a future EDWAC meeting.

12. Adjournment (Jeffrey Barnes/UL)

The meeting was adjourned at 3:00 p.m.