



ICC A117.1 STANDARD
FOURTH PUBLIC REVIEW DRAFT
BACKGROUND REPORT

August 25, 2016

ICC/ANSI A117.1 STANDARD
DEVELOPMENT - 2015 EDITION

A117.1 Standard Committee
2012 Cycle Changes to review for
2015 Edition of the A117.1 Standard
Copyright ©2016 International Code Council, Inc.

**ICC A117.1 Standard – Accessible and Usable Buildings and Facilities
Fourth Public Review Draft – Background Report
August 25, 2016**

This document is an informational companion to the Fourth Public Review Draft of the 2015 edition of the ICC A117.1 Standard. The Fourth Public Review Draft only shows the changes to the text of the standard which are changes to the Third Public Review Draft. These changes were approved based on:

- Background information provided by the proponents;
- Information supplied by those submitting comments to the First Public Review Draft as supplemented through the Committee's consideration;
- Public comments received on the Second and Third Public Review drafts as supplemented through the committee's consideration of those public comments.

This Background Report contains the information supporting each change included in the Fourth Public Review Draft. The information is presented in chronological order from initial committee action on each change proposal in 2012 through to the current A117.1 Committee action which approved the most recent version of each change.

Change identification

The history of each proposed change is numbered based on the initial identification of each proposal. Subsequent actions related to that initial change proposal are numbered with additional information. Examples:

Change identification

9-7-12.	Initial change proposal number.
9-7-12 PC2.	Public comment received regarding Committee's initial action.
9-7-12 PC2.1.	Public comment on changes resulting from a PC related action – 2 nd Public Review Draft.
9-7-12 PC2.1.	Public comment on changes resulting from a PC related action – 3 rd Public Review Draft

(For the ease of the Committee's consideration at its February 2015 meeting – each public comment was also given an Agenda Item number between #1 and #53). At the November meeting, those changes which were subject to additional comments we assigned Agenda Item numbers such as #33.1 and #33.2. These numbers are used in this report for each corresponding change.

For further information please see the following documents. The documents are found the A117.1 Standard page of the ICC website. <http://www.iccsafe.org/icc-asc-a117/>

1. Fourth Public Review Draft
2. Fourth Public Review Draft – Supplement
3. First Public Review Draft Background Report.
4. Second Public Review Draft Background Report.
5. Third Public Review Draft Background Report.

Providing Public Comment on the Fourth Public Review Draft

Comments can be made to the Fourth Public Review Draft. Comments will only be accepted on the changes which have been approved by the Committee and are included Fourth Public Review Draft. Comments on changes in the first three Public Review Drafts or other comments unrelated to the changes in the Fourth Public Review Draft will be set aside for consideration after the 2015 edition is published.

If you have questions, please direct them to Kermit Robinson, krobinson@iccsafe.org

Closing Date for Public Comments – Tuesday, October 11, 2016.

Chronology ICC A117.1 Standard – Accessible and Usable Buildings and Facilities 2012 to 2015* Development Cycle.

	Date	Event.	
1.	2012	Notice	Call for proposal to amend the 2009 edition of the ASC/ICC A117.1 Standard.
2.	July 2012	Publish	New Proposals to amend standard published.
3.	August 27-31, 2012 January 14-18, 2013	Meetings	Committee consideration of new proposals.
4.	March 12, 2013	Publish	Committee Action Report (CAR) actions on proposed changes
5	April 19, 2013	Notice	Proponents of new proposals notified of Committee's action and their opportunity to comment.
6	March-May 2013	Ballot	Committee confirms actions of CAR or provides negative ballot comment
7	June 14, 2013	Publish	Ballot Comment and Proponent Comment Agenda
8	July 15-19, 2013	Meeting	Committee consideration of Ballot and Proponent Comments.
9	August 7, 2013	Publish	Committee Action Report (CAR) on Ballot and Proponent Comments
10	September 20, 2013	Notice	Proponents asked if their issue has been resolved by the committee's action

Fourth Public Review Draft – Background Report
August 25, 2016

11	August-October, 2013	Ballot	Committee confirms actions of CAR (actions published 8/7/13)
12	October 25, 2013	Publish	First Public Review Draft – Open draft for public comments
13	December 23, 2013	Publish	Public Comment Report – Comments on First Public Review Draft
14	January 3, 2014	Publish	Unresolved Issues Report
15	January 21-24, 2014 July 14-16, 2014	Meetings	Committee consideration of Public Comment Report and Unresolved Issues Report
16	August 21, 2014**	Publish	Committee Action Reports (CAR) on Public Comments and Unresolved Issues Reports
17	November 7, 2014	Publish	Second Public Review Draft – Draft available for public comments
18	December 22, 2014	Deadline	Close of public comment period on Second Public Review Draft.
19	January, 2015	Publish	Public Comment Report – Comments on Second Public Review Draft
20	February 2-6, 2015	Meeting	Committee consideration of Public Comment report – Second Public Review Draft
21	March 20, 2015	Publish	Committee Action Reports (CAR) on Public Comments on Second Public Review Draft
22	July 2, 2015	Publish	Third Public Review Draft – Draft available for public comments
23	August 17, 2015	Deadline	Close of public comment period on Third Public Review Draft.
24	October 1, 2015	Publish	Public Comment Report – Comments on Third Public Review Draft and Unresolved Issues Report (Proposal 6-37-12)
25	November 16-18	Meeting	Committee consideration of Public Comment report – Third Public Review Draft
26	November 23, 2015	Publish	Committee Action Reports (CAR) on Public Comments (November 16-18)
27	March 10, 2016	Publish	Final Ballot Results – Ballot 15.03 – regarding CAR of November 23, 2015
28	June 6, 2016	Publish	Unresolved Issues Report (Proposal 7-1-12)
29	July 5-6, 2016	Meeting	Committee reconsideration of Unresolved Issue 7-1-12.
30	July 7, 2016	Publish	Committee Action Report – Unresolved Issue 7-1-12
31	August 24, 2016	Publish	Final Ballot Results – Ballot 16.4 – regarding CAR on unresolved issue 7-1-12
32	August 25, 2016	Publish	Fourth Public Review Draft – Draft available for public comments
33	October 11, 2016	Deadline	Close of public comment period on Third Public Review Draft.

* Earlier documents identified the next edition as the 2014 edition.

Chapter 1

See the following item for a change to the list of referenced standards.

7-1-12/3.1-PC 3.3 – Page 38

Otherwise there are no changes to Chapter 1 in this public review draft.

Chapter 2

There are no changes proposed for Chapter 2.

Chapter 3

See the following item for changes to Chapter 3:

6-46-12/2.1 – PC2.1 – Page 30.

Otherwise there are no changes to Chapter 3 in this public review draft.

Chapter 4

4-34-12

(This represents the language approved by the committee for the First Public Review Draft)

Revise as follows:

404.3.4 Two Doors in Series. Doors in series shall comply with Section 404.2.5.

EXCEPTION: Full power automatic doors in a series are not required to provide a turning space complying with Section 304.

404.3.5 Control Switches. Manually operated control switches shall comply with Section 309. The clear floor space adjacent to the control switch shall be located beyond the arc of ~~the~~ door swings.

404.3.6 Door Hardware. Handles, pulls, latches, locks, and other operable parts shall comply with Section 404.2.6.

4-34-12 PC1

Kim Paarlberg, representing International Code Council

Further revise as follows:

404.3.4 Two Doors in Series. Doors in series shall comply with Section 404.2.5.

~~**EXCEPTION:** Full power automatic doors in a series are not required to provide a turning space complying with Section 304.~~

404.3.5 Control Switches. Manually operated control switches shall comply with Section 309. The clear floor space adjacent to the control switch shall be located beyond the arc of ~~the~~ door swings.

404.3.6 Door Hardware. Handles, pulls, latches, locks, and other operable parts shall comply with Section 404.2.6.

Reason: The exception is already covered in 4-31-12. This change will coordinate 4-11, 4-30, 4-31 and 4-34.

Committee action on 4-34-12 PC1

Approve Public Comment 4-34-12 PC1.

Reason: This change will coordinate 4-11, 4-30, 4-31 and 4-34.

Public Comment on Second Public Review Draft

Agenda Item #13

Comment No. 4-34-12 PC1.1	Submitted by: Kim Paarlberg – ICC

	<p>Revise as follows:</p> <p>404.3.4 Two Doors or Gates in Series. Doors or gates in series shall comply with Section 404.2.5.</p> <p><u>EXCEPTION:</u> Full power automatic doors or gates in a series are not required to provide a turning space complying with Section 304.</p>
<p>Comment Reason by Kim Paarlberg: I was the original proponent of the code change that added the turning space in a vestibule. The concern was possible entrapment when a person was not strong enough to open an exterior door. Providing an automatic door to address that concern is a preferred option. They should not lose the allowance for a smaller vestibule when they are offering a higher level of accessibility.</p>	
<p>Committee Action of February 2015 regarding Agenda Item #13 – comment number 4-34-12 PC1.1</p> <p>Approved as modified:</p> <p>Modification:</p> <p>404.3.4 Two Doors or Gates in Series. Doors or gates in series shall comply with Section 404.2.5.</p> <p><u>EXCEPTION:</u> Where both doors or gates in series are power assist doors, low energy automatic doors or full power automatic doors, the two doors and gates in a series shall not be required to provide a turning space between the doors.</p> <p>Reason: The committee agreed with Ms. Paarlberg that the exception which provides a higher level of accessibility through the provision of automatic or power assist doors makes waiver of the turning space reasonable. In conjunction with the action on Agenda #11, requiring the two doors of a vestibule to be the same technology, the turning space waiver is appropriate.</p>	

Public Comment on Third Public Review Draft	
4-34-12	
Agenda Item #13.1	
<p>Committee Action on Agenda Item #13.1 – comment number 4-34-12 PC1.1</p> <p>Approved as Modified.</p> <p>Modification (instead of deleting exception, the action revises the exception as follows):</p> <p>Revise as follows:</p> <p>404.3.4 Two Doors or Gates in Series. Doors or gates in series shall comply with Section</p>	

404.2.5.	
<p>EXCEPTION: Where both doors or gates in series are power assist doors, low energy automatic doors or full power automatic doors, the two doors and gates in a series shall not be required to provide a turning space between the doors.</p>	
<p>Reason: The Committee strongly supported maintaining the concept of this exception. It is seen as one of the few incentives encouraging the installation of power operated doors. There remains space between the doors allowing activation of the second door. The exception had been in the 2003 edition, but was lost in the 2009, the committee's first action in this cycle was to restore the exception. However the Committee realized its original inclusion of the power-assist category of doors was not appropriate because this category of doors does not have battery back-up power source. In the event of a power failure with power assist doors, the committee felt that retaining the turning space to be needed.</p>	
<p>Comment No: 4-34-12/1.1 – PC 1.1</p>	<p>Submitted by: Gigi Scovel Paralyzed Veterans of America</p>
	<p>Further revise as follows:</p> <p>404.3.4 Two Doors or Gates in Series. Doors or gates in series shall comply with Section 404.2.5.</p> <p>EXCEPTION: Where both doors or gates in series are power assist doors, low energy automatic doors or full power automatic doors, the two doors and gates in a series shall not be required to provide a turning space between the doors.</p>
<p>Comment Reason: This is a reduction in accessibility and a potential life safety issue. If one of the doors in the series malfunctions, if the power is out, or if the doors are not maintained, a person may not be able to turn around to exit the doorway, use the doors, or could potentially become stuck.</p>	

Chapter 5

There are no changes to Chapter 5 in this public review draft.

Chapter 6

6-37– 12

(This represents the language approved by the committee for the First Public Review Draft)

Add new text as follows:

606.5 Basin Location. The interior edge of the rim of the lavatory basin shall be located 3 inches (75 mm) maximum from the front edge of the fixture or countertop.

6-37-12 PC1

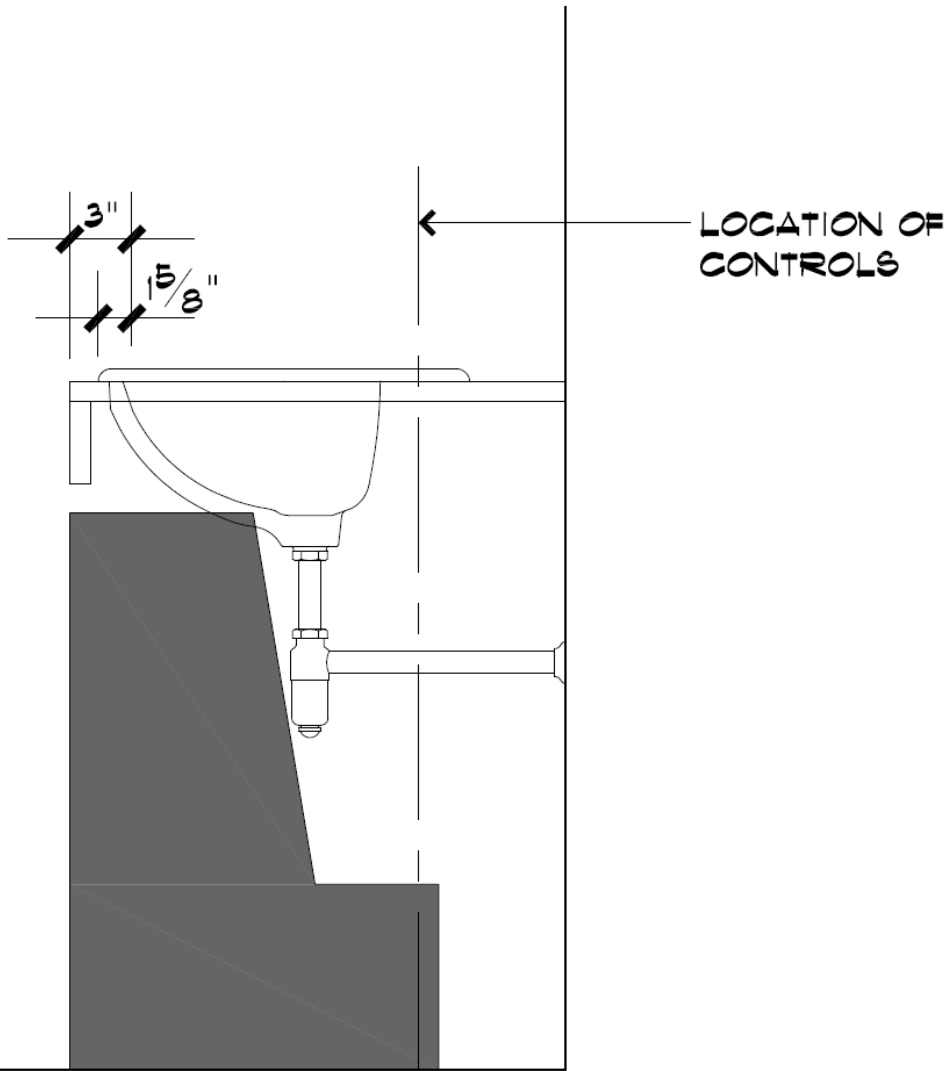
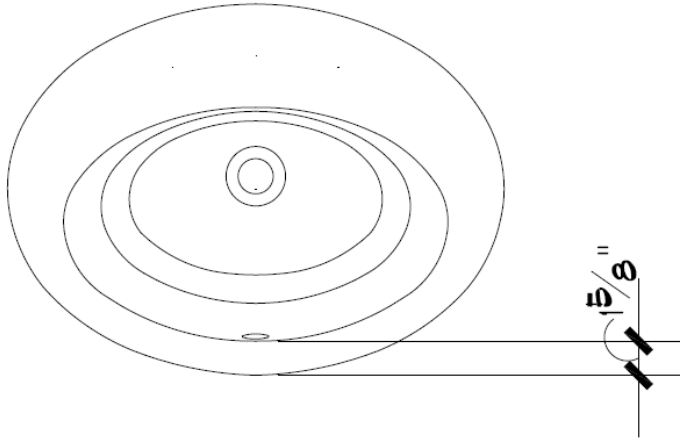
Brad Gaskins, representing self

Further revise as follows:

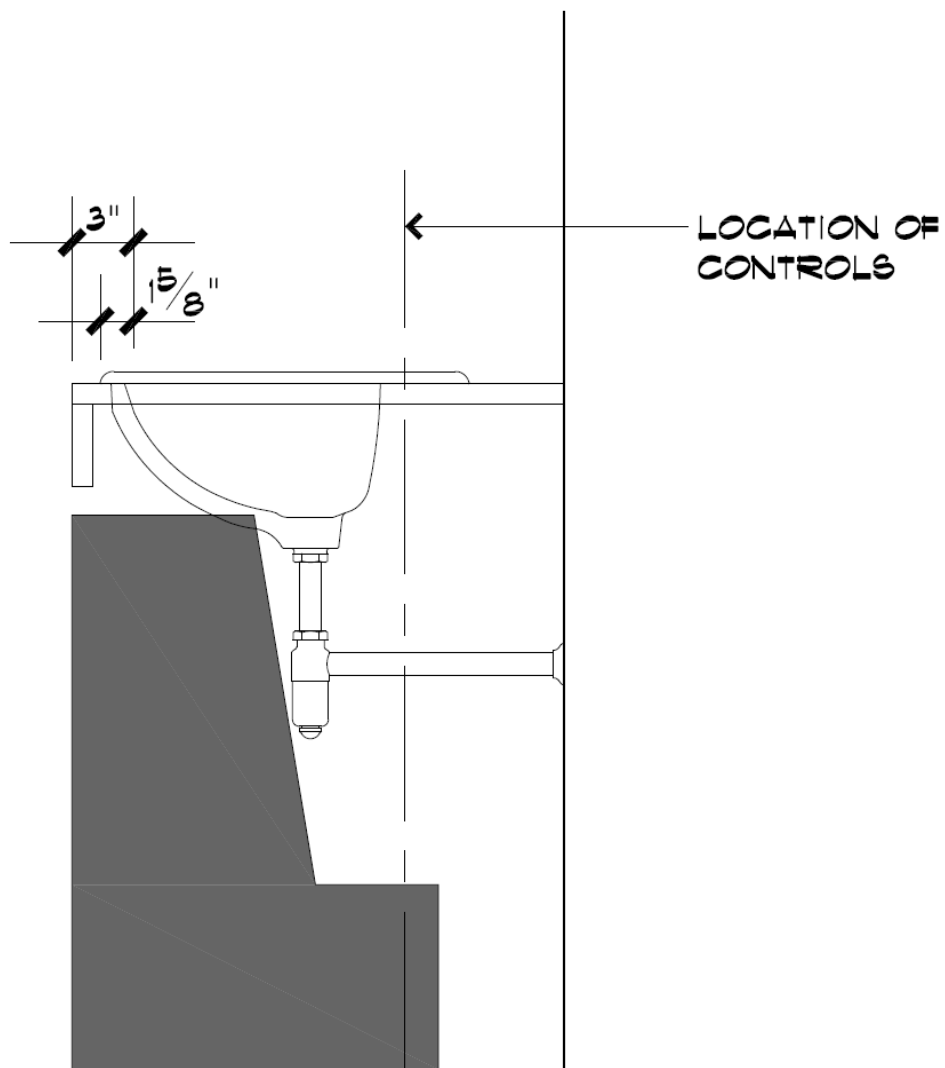
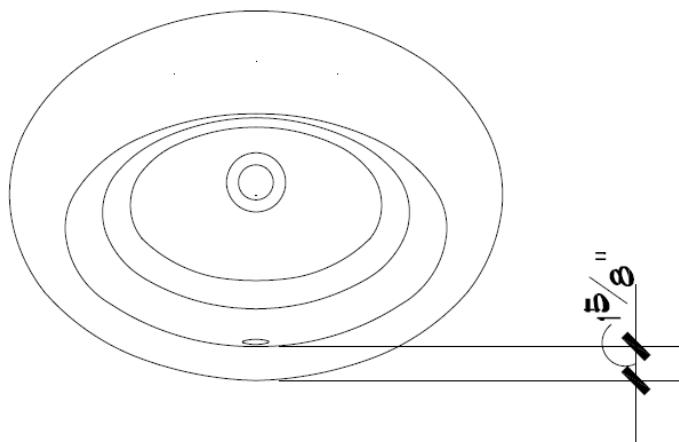
606.5 Basin Location. The interior edge of the rim of the lavatory basin shall be located 3 $\frac{1}{2}$ inches (~~75~~ 90 mm) maximum from the front edge of the fixture or countertop.

Reason: At the current 3" from the front edge most sinks would not be able to comply with the required knee clearance. It would be impossible to meet the 8" deep requirement.

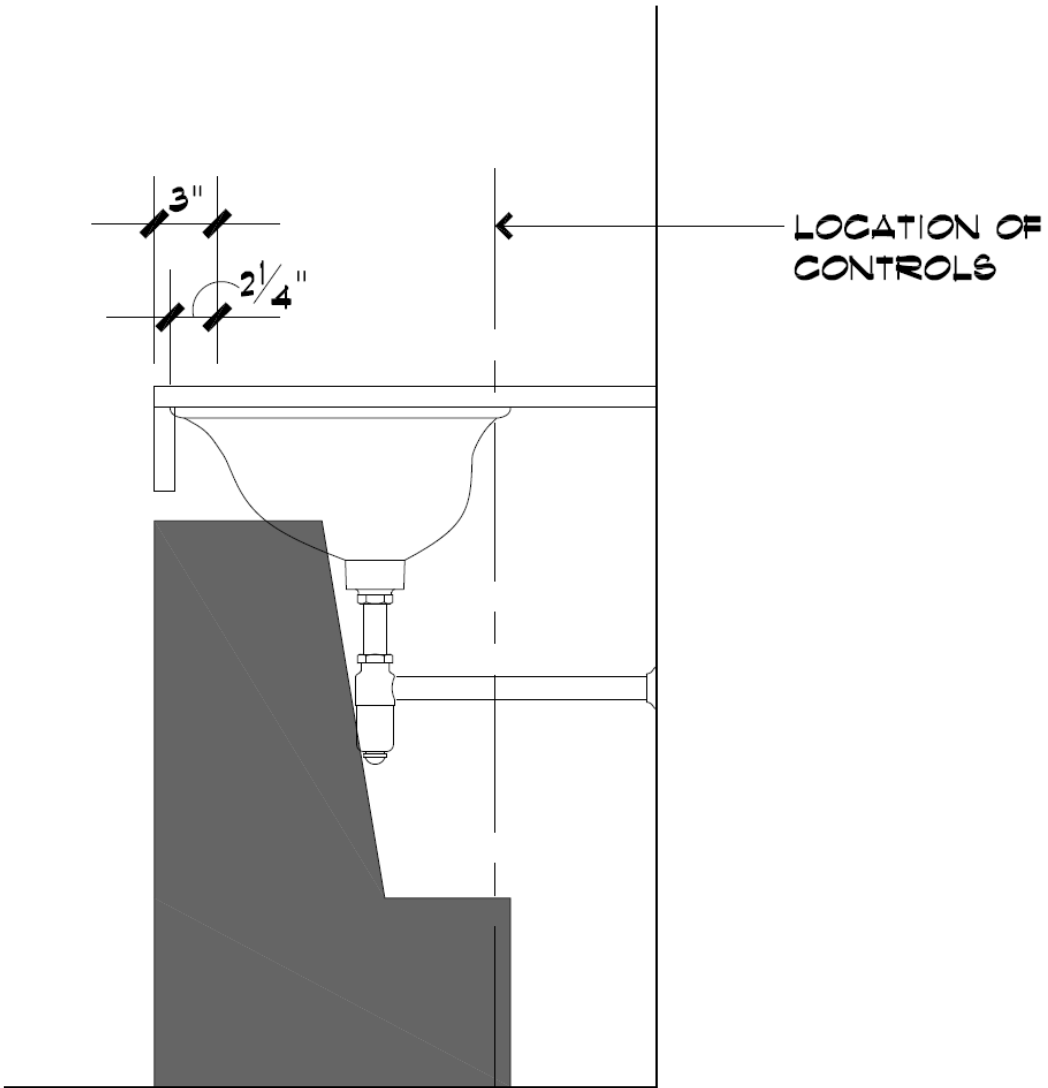
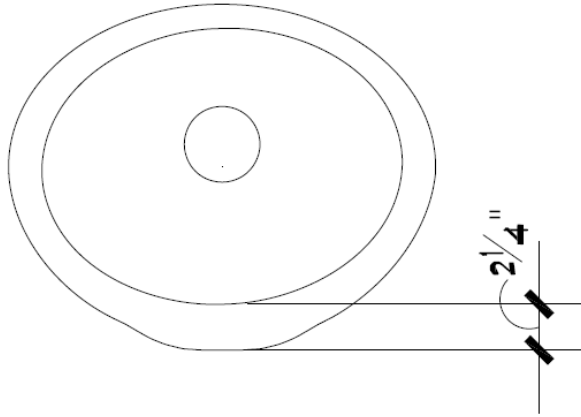
The following figures were submitted as part of Mr. Gaskins comment.



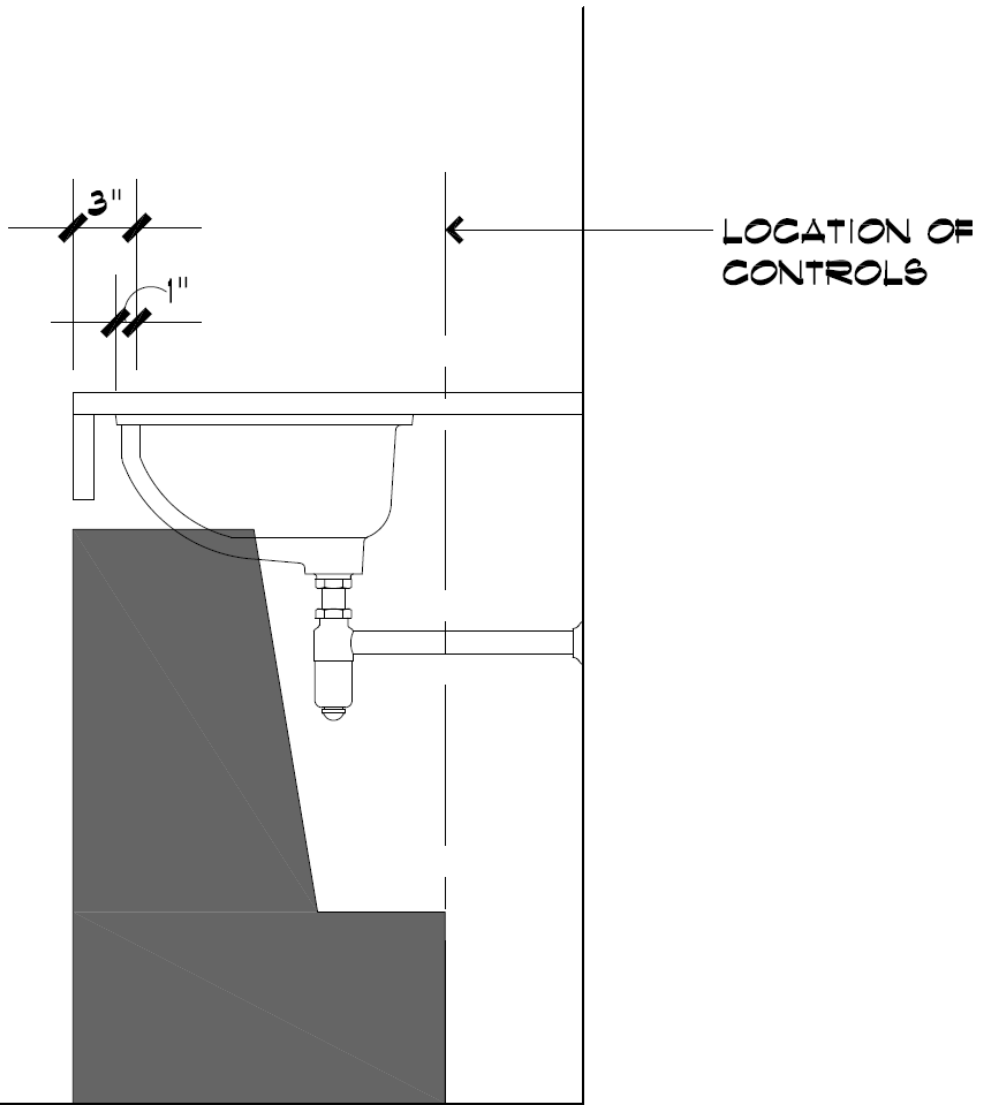
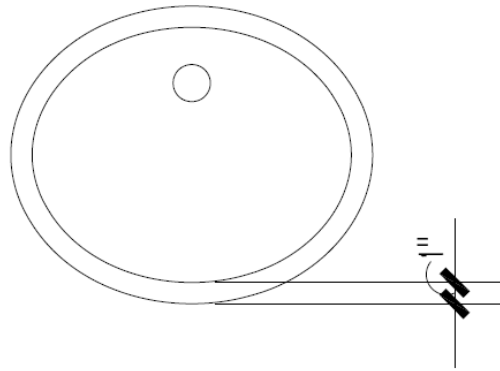
K-2907-1



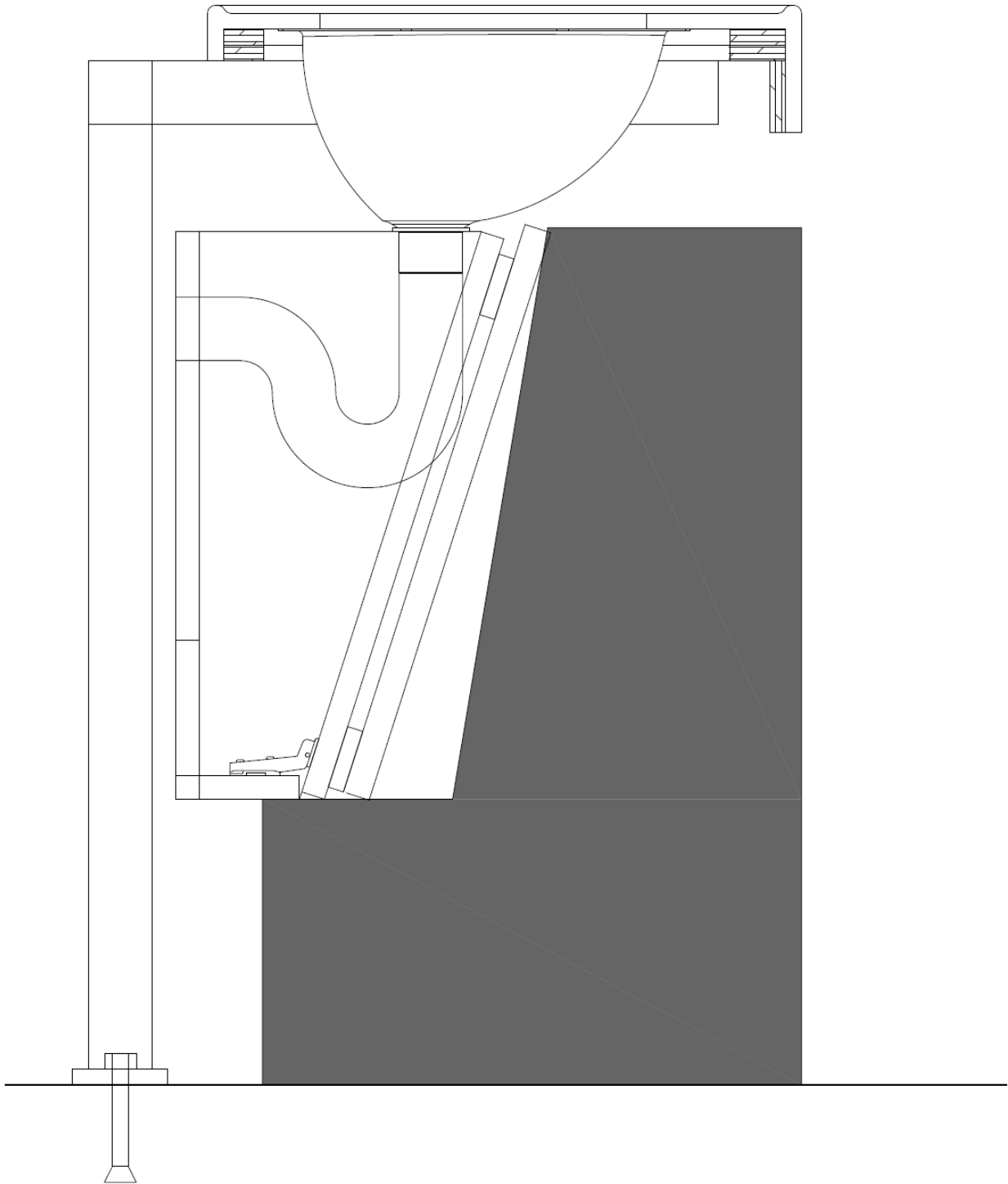
K-2907-4



K-2336



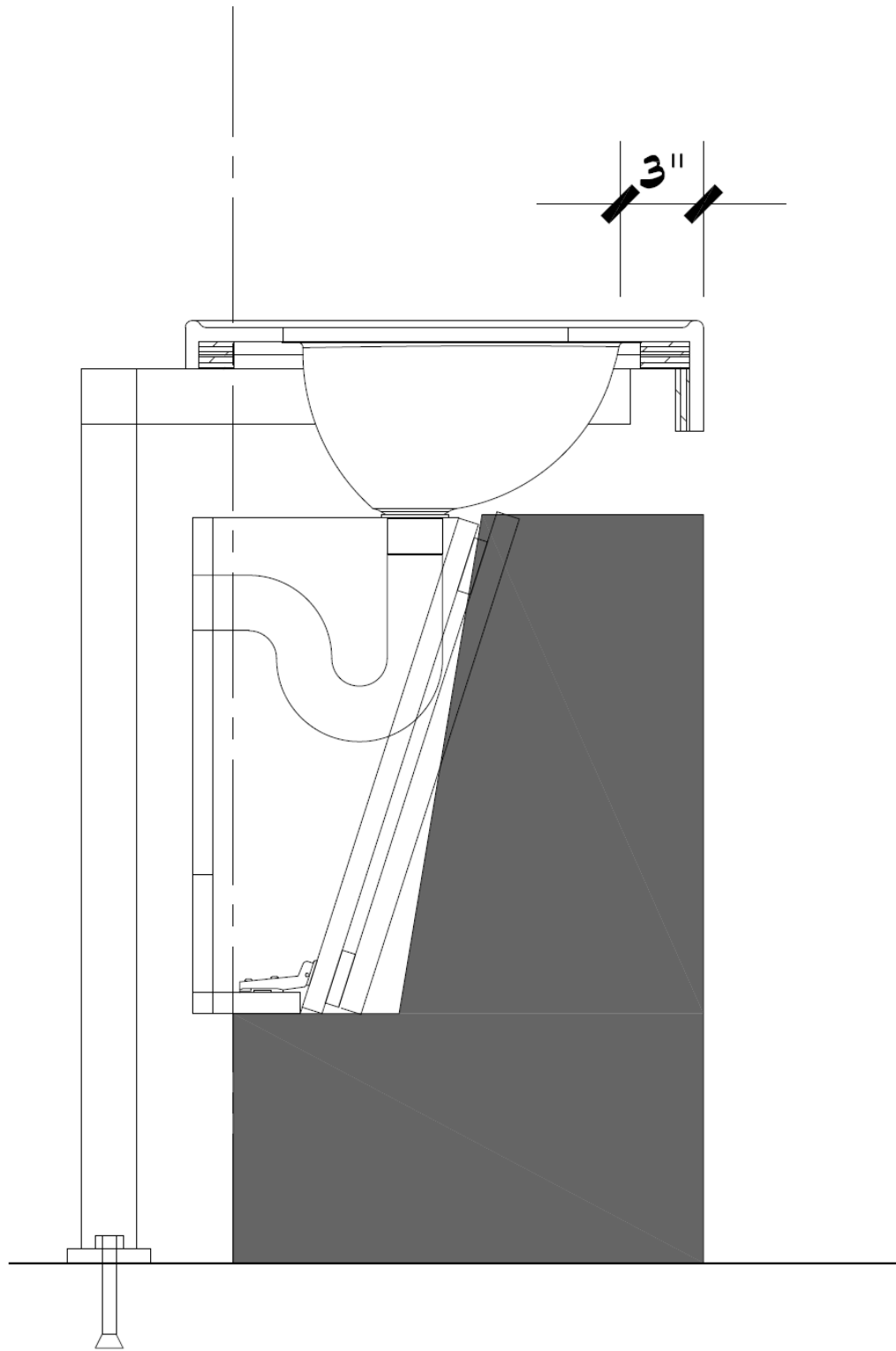
K-221Ø



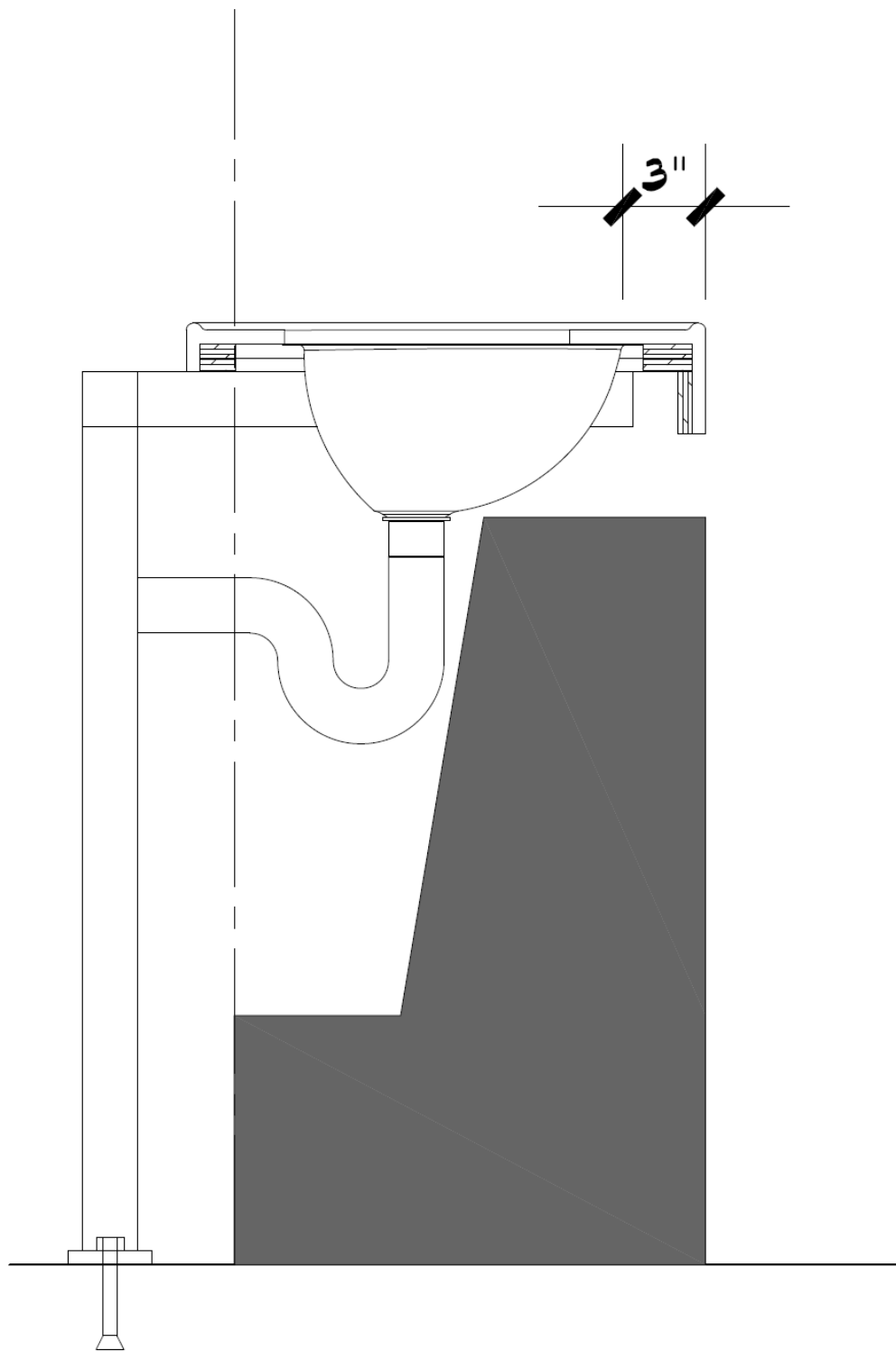
EXISTING DESIGN

Fourth Public Review Draft - Background Report

August 25, 2016



**DESIGN W/ NEW PROPOSED
STANDARD**



**DESIGN W/ NEW PROPOSED STANDARD
(PROTECTIVE SHROUD REMOVED)**

~~Public Review Draft - Background Report~~

August 25, 2016

Committee action on 6-37-12 PC1

Approve Public Comment 6-37-12 PC1.

Reason: Mr. Gaskins demonstrated that the 3 inch measurement would not allow other provisions to be in compliance. The 3.5 depth still addresses the need raised by this original proposal and allows overall compliance.

Second Public Review DRAFT

6-37-12 PC1

Agenda Item #24

Comment No:
6-37-12 PC1.1

Submitted by:
Matt Sigler - PMI

Further revise as follows:

606.5 Basin Location. The interior edge of the rim of the lavatory basin shall be located ~~3~~ $\frac{1}{2}$ 6 inches (~~90~~ 150 mm) maximum from the front edge of the fixture or countertop.

Reason:

PMI is very much against the original proposal of 3 inches, and this public comment that revises the dimension to 3-1/2 inches for the following reasons:

1. There are many lavatories in the market that have been acceptable for years with setbacks of up to 5 or more inches to gain the required knee clearance as stated in Section 306.3.
2. According to studies conducted by Kohler, lavatories can be very uncomfortable even painful to use when the rims are moved so far forward on the counter as would be the case with the proposed language. People would be resting their forearms or wrists on the rims of the lavatories that can cause a pinching sensation of the wrists and soreness of the underside of the forearms.
3. The further forward a lavatory is set there is greater propensity for splashing because of the angle of discharge from the faucet.
4. There is no known study that supports the proposed setbacks. Therefore, a task group should be formed to review this proposal before being considered by the committee for inclusion into the standard.

As it is too late in the process to eliminate this new requirement, we are offering a dimension that should be appropriate for the fixtures that are available on the market and provides that the original issue is still addressed. We are still researching with our member manufacturers as to what would be the best distance. We will bring out findings to the February 2015 meeting and may suggest a distance different than 6 inches.

6-37-12 PC1 - AS PUBLISHED 2ND PUBLIC REVIEW DRAFT

Revise as follows:

606.5 Basin Location. The interior edge of the rim of the lavatory basin shall be located 3 $\frac{1}{2}$ inches (~~75~~ 90 mm) maximum from the front edge of the fixture or countertop.

6-37-12 PC1**Agenda Item #24B****Committee Action on Agenda Item #24B – comment number 6-37-12 PC 1.1****Disapproved:****Reason:**

The committee considered considerable information provided by the proponent, but found that it was based on older information which did not reflect even the current A117.1 (and ADA) standards nor typical wheeled mobility equipment in use today. There are sinks currently on the market that will allow the 3-1/2 setback installation. The Committee remained committed to adding this provision – at this setback distance into the Standard.

Initial Ballot resolves sustained the committee’s action. Final ballot results did not sustain the committee, therefore the issue because unresolved and needed to return for further consideration. The following are the negative ballots submitted.

AH&LA – Doug Anderson**Negative Ballot**

Comment: The requirement for a maximum dimension from the countertop edge to the inside of the basin is a new provision and the dimension is arbitrary and not based on any type of research. The impact of this requirement on the installation of different types of sinks (under-mount/self-rimming/integrated basins in countertops, wall mounted, etc.) is not known, the benefit of this requirement is not known, and the impact on provision of accessible knee space with different types of sinks is not known.

Based on the extent of the unknowns and potential expense and conflict with accessible knee space requirements, it seems unreasonable to adopt any basin setback requirements until more research is conducted.

APSP – John Caden**Negative Ballot**

Comment: I agree with the Kohler research.

NAHB– Dan Buuck**Negative Ballot**

Comment: When the committee approved the 3 1/2 inch dimension, it did so with the intent that the number was a starting point to encourage feedback from industry. The industry responded with more technical data than is usually required by the committee for proposed changes, and yet it stuck with the original dimension for which no data was given. Some member comments criticized the age of the research, but why would there be newer data if the issue had not come to the forefront recently? The industry’s research is much preferable to the complete lack of data presented by others on the committee.

PMI– Matt Sigler**Negative Ballot**

Comment: PMI **does not** agree with the Committee’s actions for 6-37-12 PC1.1 (Agenda Item #24B) for the following reasons:

1. What is shown in the committee action report, dated March 20, 2015, for Agenda Item #24B (6-37-12 PC1) **is incorrect**, and should be replaced with the following that was discussed during the February meeting:

606.5 Basin Location. The interior edge of the rim of the lavatory basin shall be located 5 3-1/2 inches (127 90 mm) maximum from the front edge of the fixture or countertop. Where a lavatory is required to comply with Section 606.6, the interior edge of the lavatory basin shall be located 3 1/2 (90 mm) maximum from the front edge of the fixture or countertop.

Substantiation:

- The proponents for the 3-1/2 inch maximum lavatory basin setback requirement have failed to provide sufficient evidence to show that setbacks greater than 3-1/2 inches have been an issue in all circumstances. The facts are that a 5 inch setback is necessary to allow the use of various styles of lavatories such as counter-mounted. Additionally, based on the underside contour and style of the lavatory, in conjunction with the countertop thickness, a 5 inch setback is necessary to achieve the required knee and toe clearances.
 - As far as providing sufficient evidence for the proposed 5 inch maximum setback, Kohler conducted in-house research that demonstrated that as much as 5 inches was necessary based on some users comfortably stabilizing themselves upon the front edge of the fixture. Additionally, a 5 inch dimension is necessary depending on the style of sink being used as previously indicated. Furthermore, Kohler discovered that a 3-1/2 inch setback was more appropriate for persons with limited reach, and therefore the recommendation by PMI to add the second sentence to Section 606.5.
 - The committee should be reminded that for years 5 inches or greater was necessary to accommodate lavatory overflow channels as they were not permitted to infringe into the required knee and toe clearances that were mandated by the standard. It was not until the standard was changed (1992 version of the standard) to allow the overflow channel to infringe into the knee and toe clearance space that manufacturers were able to move the basin forward to accommodate a 3-1/2 inch setback.
 - A mandate for a 3-1/2 inch maximum lavatory basin setback for all circumstances would significantly limit choice in the marketplace. In fact, it would literally eliminate 50% or more of the accessible product that is currently available.
 - In conclusion, a 3-1/2 inch maximum lavatory basin setback is not appropriate for all circumstances, and therefore PMI recommends a 5 inch maximum setback for all lavatories except those that are required to comply with Section 606.6 (Lavatories with Enhanced Reach Range).
2. PMI provided the Technical Committee with field studies conducted by Kohler that demonstrated:
 - a. A 3-1/2 inch basin setback does not work for all disabilities.
 - b. Some wheel chair users prefer more surface area contact for forearms, this gives them greater control and stability. A setback of 5 inches provided the necessary surface area for such users.
 3. Those in opposition to PMI's comment indicated that Kohler's field studies were dated, and not based on current practices. However, it was also acknowledged by those who opposed PMI's comment that **no technical data or evidence was ever provided to prove that a 3-1/2 inch maximum basin setback was a valid dimension.** Even the Chair acknowledged such when casting his negative vote to break the tie during the February Meeting.
 4. Those in opposition to PMI's comment further indicated that they were opposed to PMI's comment because they believed that a 3-1/2 inch lavatory basin setback was necessary for those with limited reach, and because the A117.1 does not mandate that a certain percentage of public lavatories meet the requirements of Section 606.6 (Lavatories with Enhanced Reach Range) that all ADA lavatories

should have a 3-1/2 inch maximum basin setback. PMI agrees that those with limited reach should have a maximum basin setback of 3-1/2 inches and indicated such within the **above comment** that was discussed during the February Meeting. However, PMI does not agree that all ADA lavatories should be required to have a maximum 3-1/2 inch basin setback just because a certain percentage of those with disabilities require it, but instead would encourage the committee to consider mandating that a certain percentage of ADA required lavatories meet the requirements of Section 606.6.

5. PMI is very concerned that an ICC Committee such as A117.1 would knowingly allow a technical requirement into one of their standards/codes that was based on **absolutely no technical data**.

PMI believes that the attached public comment should be **accepted as submitted**. However, if PMI's comment does not receive the necessary votes for reconsideration by the Technical Committee, than at least the item in question should be tabled until next code cycle and a task group formed to properly vet this item.

Alan Gettelman

Comment: I want to change my original ballot on Item 6-37-12. I now submit a Negative Ballot supporting PMI-Matt Sigler for reconsideration.

John Salmen

Comment: I am voting for item c.ii. – against the committee action and for PMI's proposed change to Section 606.5 that calls for a 5 inch setback and 3.5 inches in specific locations.

AH&LA – Doug Anderson

Comment: The requirement for a maximum dimension from the countertop edge to the inside of the basin is a new provision and the dimension is arbitrary and not based on any type of research. The impact of this requirement on the installation of different types of sinks (under-mount/self-rimming/integrated basins in countertops, wall mounted, etc.) is not known, the benefit of this requirement is not known, and the impact on provision of accessible knee space with different types of sinks is not known.

Based on the extent of the unknowns and potential expense and conflict with accessible knee space requirements, it seems unreasonable to adopt any basin setback requirements until more research is conducted.

AHLA is choosing option 1.c.ii for #24B. Against the committee action and for PMI's Proposed Change to Section 606.5 (attached – a 5 inch setback and 3.5 inches in specified locations).

AIA – David Collins

Comment: I am voting against the committee action and for PMI's Proposed Change to Sec. 606.5 (attached – a 5 inch setback and 3.5 inches in specified locations)

I believe that the information provided in the changes to Section 606.5 is as relevant today as it was when originally developed. I believe that the committee was wrong in its decision to not provide some means for flexible design solutions for a broader user base.

APSP – John Caden

Comment: I agree with the Kohler research.

AOTA – Shoshana Shamberg/Brian Dudgeon

Comment: We would like to vote in and be in favor of the 5 inch setback with 3.5 inches in specified locations.

ASPE – Dan O’Gorman

Comment: ASPE is choosing option 1.c.ii for #24B. Against the committee action and for PMI’s Proposed Change to Section 606.5 (attached – a 5 inch setback and 3.5 inches in specified locations).

BOMA – Steve Orłowski

Comment: Based on the persuasive arguments from Mr. Anderson and Mr. Sigler, BOMA is voting against the committee action and in support of PMI’s proposed change to Section 606.5.

CSI – Dennis Hall

Comment: CSI is choosing option 1.c.ii for #24B. Against the committee action and for PMI’s Proposed Change to Section 606.5 (attached – a 5 inch setback and 3.5 inches in specified locations).

HLAA – Sharon Toji

Comment: I would like to see choices if possible.

ICC – Kimberly Paarlberg

Comment: I want this back on the agenda for discussion and consideration. I do not like the current proposed fix. At this point I support the proposal for 6 inches.

NAHB – Dan Buuck

Comment: When the committee approved the 3 1/2 inch dimension, it did so with the intent that the number was a starting point to encourage feedback from industry. The industry responded with more technical data than is usually required by the committee for proposed changes, and yet it stuck with the original dimension for which no data was given. Some member comments criticized the age of the research, but why would there be newer data if the issue had not come to the forefront recently? The industry’s research is much preferable to the complete lack of data presented by others on the committee.

NAHB is choosing option 1.c.ii for #24B. Against the committee action and for PMI’s Proposed Change to Section 606.5 (attached – a 5 inch setback and 3.5 inches in specified locations).

NATO – Gene Boecker

Comment: I support the position taken by PMI and their proposed modification. Although the original proponent made an effective argument that people use sinks in airports and offices for oral hygiene, such is not the case in shopping centers, bars and movie theaters. The scope needs to be limited in some fashion to allow other sinks basins to be used. I agree with PMI that without a limit the basin could be placed too far from the counter edge (and I have seen these awkward things). The 5 inch dimension seems adequate for that need. The 3-1/2 inches in limited conditions seems appropriate for constructability. The next step would be to modify the scoping for these enhanced reach range sinks in the proper installations.

PMI – Matt Sigler

Comment: Voting against the committee action and for PMI’s Proposed Change to Section 606.5 (attached – a 5 inch setback and 3.5 inches in specified locations.)

There are extensive comments from Matt Sigler throughout this document.

RESNA – Edward Steinfeld

Comment: This is a two-fold problem caused by lack of an evidence based approach to standards development and lack of current research on PMI’s side. On one hand, there is no research to support the 3.5 in. max and the plumbing industry is probably right about the impact. The rule we approved would probably throw us back to surgical sinks as the only code compliant option. On the other hand, the current knee space is not good either so the illustrations showing the impact should be looked at in light of that. Only 50% of the 500 people we measured in our anthropometry study fit under the current knee space clearance. But our recommendations for changing that were not accepted by the Committee. I

reviewed our data. You can find it at <http://udeworld.com/documents/designresources/pdfs/KneeToeClearance.pdf> See Fig. 1. Given the actual sizes of WMD users, the 3.5 in. rule would probably be an improvement because, with the current distance, the individuals requiring the deeper knee space have to position themselves back further from the counter. The enhanced lavatory would allow them to be closer to the sink edge. So, I am voting against the committee's action and for PMI's proposal. As I understand it, this would require the 3.5 in max. in the enhanced lav only, perhaps spurring some innovation in the plumbing industry.

SMA – David Cooper

Comment: Based upon review of all the comments I am voting against the committee action and for PMI's Proposed Change to Sec. 606.5 describing – a 5 inch setback and 3.5 inches in specified locations.

WABO – Rick Lupton.

Comment: Based on the public comments submitted.

PMI Rationale included with Unresolved Issue distribution – 5/26/15

PMI **does not** believe that the Committee's actions provided an appropriate resolution to our comment for 6-37-12 PC1 (Agenda Item #24B) for the following reasons:

1. What is shown in the committee action report for Agenda Item #24B (6-37-12 PC1) **is incorrect**, and should be replaced with the attached that was discussed during the February Meeting.
2. PMI provided the Technical Committee with the attached field studies conducted by Kohler that demonstrated:
 - a. A 3-1/2 inch basin setback does not work for all disabilities.
 - b. Some wheel chair users prefer more surface area contact for forearms, this gives them greater control and stability. A setback of 5 inches provided the necessary surface area for such users.
3. Those in opposition to PMI's comment indicated that Kohler's field studies were dated, and not based on current practices. However, it was also acknowledged by those who opposed PMI's comment that **no technical data or evidence was ever provided to prove that a 3-1/2 inch maximum basin setback was a valid dimension**. Even the Chair acknowledged such when casting his negative vote to break the tie during the February Meeting.
4. Those in opposition to PMI's comment further indicated that they were opposed to PMI's comment because they believed that a 3-1/2 inch lavatory basin setback was necessary for those with limited reach, and because the A117.1 does not mandate that a certain percentage of public lavatories meet the requirements of Section 606.6 (Lavatories with Enhanced Reach Range) that all ADA lavatories should have a 3-1/2 inch maximum basin setback. PMI agrees that those with limited reach should have a maximum basin setback of 3-1/2 inches and indicated such within the **attached comment** that was discussed during the February Meeting. However, PMI does not agree that all ADA lavatories should be required to have a maximum 3-1/2 inch basin setback just because a certain percentage of those with disabilities require it, but instead would encourage the committee to consider mandating that a certain percentage of ADA required lavatories meet the requirements of Section 606.6.
5. PMI is very concerned that an ICC Committee such as A117.1 would knowingly allow a technical requirement into one of their standards/codes that was based on **absolutely no technical data**.

PMI Proposal included with Unresolved Issue distribution – 5/26/15

606.5 Basin Location. The interior edge of the rim of the lavatory basin shall be located 5 3-1/2 inches (127 99 mm) maximum from the front edge of the fixture or countertop. Where a lavatory is required to comply with Section 606.6, the interior edge of the lavatory basin shall be located 3 1/2 (90 mm) maximum from the front edge of the fixture or countertop.

Substantiation:

- The proponents for the 3-1/2 inch maximum lavatory basin setback requirement have failed to provide sufficient evidence to show that setbacks greater than 3-1/2 inches have been an issue in all circumstances. The facts are that a 5 inch setback is necessary to allow the use of various styles of lavatories such as counter-mounted. Additionally, based on the underside contour and style of the lavatory, in conjunction with the countertop thickness, a 5 inch setback is necessary to achieve the required knee and toe clearances.
- As far as providing sufficient evidence for the proposed 5 inch maximum setback, Kohler conducted in-house research that demonstrated that as much as 5 inches was necessary based on some users comfortably stabilizing themselves upon the front edge of the fixture. Additionally, a 5 inch dimension is necessary depending on the style of sink being used as previously indicated. Furthermore, Kohler discovered that a 3-1/2 inch setback was more appropriate for persons with limited reach, and therefore the recommendation by PMI to add the second sentence to Section 606.5.
- The committee should be reminded that for years 5 inches or greater was necessary to accommodate lavatory overflow channels as they were not permitted to infringe into the required knee and toe clearances that were mandated by the standard. It was not until the standard was changed (1992 version of the standard) to allow the overflow channel to infringe into the knee and toe clearance space that manufacturers were able to move the basin forward to accommodate a 3-1/2 inch setback.
- A mandate for a 3-1/2 inch maximum lavatory basin setback for all circumstances would significantly limit choice in the marketplace. In fact, it would literally eliminate 50% or more of the accessible product that is currently available.
- In conclusion, a 3-1/2 inch maximum lavatory basin setback is not appropriate for all circumstances, and therefore PMI recommends a 5 inch maximum setback for all lavatories except those that are required to comply with Section 606.6 (Lavatories with Enhanced Reach Range).

Additional comments received after July 1, 2015

24B.2015-01

Comment Submitted by: Dan Bartz, Representing Kohler

#24B (6-37-12 PC1) Lavatory Basin Setback

The following proposed language should be considered:

606.6 Lavatories With Enhanced Reach Range At least one lavatory shall be provided with enhanced reach range and shall comply with section 606.6. The interior edge of the lavatory basin shall be located 3 1/2 (90 mm) maximum from the front edge of the fixture or countertop. Where enhanced reach range is required at lavatories, f Faucets and soap dispenser controls shall have a reach depth of 11 inches (280 mm) maximum, or if automatic shall be activated within a reach depth of 11 inches (280 mm) maximum. Water and soap flow shall be provided with a reach depth of 11 inches (280 mm).

Reason:” Leave the current standards as is and simply add language to the Enhanced Reach Range section. By doing so would then require installations in public bathrooms that would ensure the presence of accessible bathroom sinks for the little people. The current standard as is states “where enhanced reach range is required ...” this language leaves the issue wide open for inconsistent application of the

requirements and poor judgement as to whether or not these type of installation are needed. We have heard testimony that are few if any public bathrooms that presently have such installations that meet this need.

24B.2015.02

Comment Submitted by: Jean Tessmer, Representing herself

#24B (6-37-12 PC1) Lavatory Basin Setback

Further revise as follows:

606.5 Basin Location. The interior edge of the rim of the lavatory basin shall be located ~~3-1/2~~ 2 inches (~~90~~ 75 mm) maximum from the front edge of the fixture or countertop.

Background and documentation supporting the 2 inch setback for Basins.

The later proposal from PMI which I am commenting on all started with the original proposed change from Judith K. Pipher, Independence First – 6-37-12 606.5 (new). See below in red.

PMI without providing any disability usability studies submitted that the sink should move back away from the front edge of the counter by 5". Then Kim Paarlberg said 6". Since I did not see any disability ergonomics study that would satisfy the usability of the movement of the bowl further from the leading edge of a counter, the suggestion does not make sense based on the original ANSI A117.1 1961 and 1986.

The ANSI A117.1 is a disability design and construction criterion. The primary focus of this particular committee is to lean toward providing usable design and products. This is the stated goal of this body of members. It is not a plumbing or marketing business membership. The outcomes from this committee should not impede but allow better access to goods and services equal to the same access to goods and services for ambulatory individuals. The ANSI A117.1 is the American version of disability rights which is to augment independence not obstruct and create by dependence. We are not supposed to make the lame look lamer. We are supposed to make the way straight.

Here is I hope a simple analogy that we can all relate to. When we are all in a seated position at a dining table the placement of the large place is to be 1 to 2 inches from the edge of the table (see references below). The reason why is obvious, it is easier to eat off a plate if the plate is closer to the edge. Can you imagine what it would be like to make the required stated position of a plate 5 to 6 inches back from the edge of the table?

Now imagine that you're sitting in a chair to use a lavatory that is 5 or 6 inches away from the edge of a counter or a drinking fountain with the spout 5 or 6 inches away from the leading edge of the rim of the fountain. You would be hard pressed to get some water to your face to rinse if off since you cannot get your face over the bowl. Should we put signs up that state you cannot shave, rinse your face, and brush your teeth or do any other activity that would allow you to place your face over the bowl of a sink.

Another example is drinking fountains now allowed per the newer code to have the spout 5 inches from the front rim of the bowl how do you get your lips to touch the water when you are seated, especially when you have to use your fist against your chest (adding 2 or 3 more inches to the 5 to 6 inch distance). We have already created problems with drinking fountains by moving the fountain spout so it can be 5 inches from the front rim. See Photos below.

The 1990 ADA and UFAS had drinking fountains with the spout at the front edge of the drinking fountain with the trajectory of water parallel to the front edge.

Now we have set precedence with allowing the spout to be 5 inches max., from the leading edge of the drinking fountain. There is no research that bears out this distance to be usable. The original drinking fountain spout location was based on the research and conversation with the University of Illinois.

Pushing the essential access to water back far away from the face of the individual with a disability means we are telling them to go back to carrying around a cup for attaining access to water because the drinking fountain will only give them clear approach but no access to the water. Who is the ANSI A117.1 committee supposed to represent? Who is pressuring the committee to follow market trends? I am grateful for manufacturers who still provide usable drinking fountains and other components for individuals with disabilities. I only spec components and fixtures that are usable based on the research and studies produced over a 40 year period by the University of Illinois and I still converse with the original researchers who have said this requirement does not make sense. How will an individual rinse their face if on an outing if they get hot? How will they reach the handle sets which will only be pushed back further? Will PMI require the industry to drastically narrow down the faucet to be sold with the pushed back bowls to be a type that is a single lever with an extra-long handle? How does pushing back the leading edge of a bowl that needs to be access, facilitate the usability of that lavatory of someone with a disability? I say if the market wants to do something different let the burden of proof come from them and not from the individuals who make recommendations to help. That is the David and Goliath technique.

The distance should be set at 2 inches any component that needs to allow a person in a wheelchair to be able to get their face over the fixture such as lavatories, and drinking fountains. We need to look at the whole picture not just a part of it. That is the dynamic approach originally used to create the ANSI A117.1 Standard.

Before PMI this was the recommendation.

602.4 Spout Height. Spout outlets shall be 36 inches (915 mm) maximum above the finish floor or ground.

602.5 Spout Location. The spout shall be located 15 inches (380 mm) minimum from the vertical support and 5 inches (125 mm) maximum from the front edge of the unit, including bumpers.

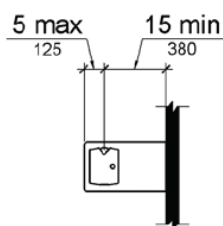


Figure 602.5
Drinking Fountain Spout Location

Original Proposal

6-37-12

606.5 (New)

Proposed Change as Submitted

Proponent: Judith K. Pipher, Independence First

Add new text as follows:

606.5 Basin Location. The interior edge of the rim of the lavatory basin shall be located 3 inches (75 mm) maximum from the front edge of the fixture or countertop.

Reason: Lavatory basins need to be accessible not only regarding reach ranges for faucets but for persons performing hygiene activities such as brushing their teeth or using mouthwash. Quite simply, basins need to be located to allow a person in a wheelchair to move his or her head and mouth over the basin to spit out toothpaste, mouthwash or other waste materials. Particularly where lavatories are dropped into countertops (but also where pedestal lavatories have especially deep horizontal ledges between their leading edges and the bowl) the location of the basin should be within a range that makes it usable to persons in a seated position.

A dimension of ± 3 inches (75 mm) is typical of kitchen sink locations and should be sufficient to providing this level of access to wheelchair users and persons of short stature at bathroom and toilet room lavatories.

While this issue is greatest in dwelling units, many persons perform hygiene activities in commercial facilities such as office or airport toilet rooms. Because of this, the change in Section 606 is appropriate.

Ms. Pipher was seeking better access (ergonomically) for individuals with disabilities to have usable sinks.





References for the placement of Dining plates distance from the edge of the table:

<http://www.dummies.com/how-to/content/how-to-set-your-holiday-table.html>

Illustration of plate placement with measurement.

<http://www.bing.com/images/search?q=proper+plate+placement&view=detailv2&&id=DAB54D0FCC44BC457E8A5D28587DCE4AFA3FB6D2&selectedIndex=0&ccid=tSiumZgA&simid=608021461157151499&thid=JN.xARudqP88DQCmtlbpGlyKA&ajaxhist=0>

Illustration by Kohlscorporation.com of dinnerware placement at 2" from the edge of the table.

http://etiquettescholar.com/dining_etiquette/table_setting/place_setting/dinnerware/placing_dinnerware.htm

Large plates, such as the dinner plate and luncheon plate, are laid about 1 inch in from the edge of the table. The exception is the service plate, a capacious plate aligned flush with the edge of the table.

<https://www.lifetimebrands.com/How-Do-I-Set-a-Table%3F/How-To-Set-A-Table,default,pg.html>

Place settings should sit one inch from the edge of the table.

<http://allrecipes.com/howto/table-setting-101/?mxt=t06dda>

Plates and Bowls

- Dinner plates should be placed approximately 2 inches from the table's edge, centered on the placemat (if using placemats) or squarely in front of each chair.

Codes Regulation Document Center - Claudia's Notes:

When it comes to making buildings accessible to all people, no matter what their mobility issues, **we have ICC/ANSI A117.1 to thank for setting the standards used throughout the United States.** It's hard to believe, but the standard has been around since 1961 and covers both new and existing facilities. Let's keep us being thankful to the ICC/ANSI A117.1 for **promoting accessibility**.

Jean Tessmer, RME, ASID

24B.2015.03

Comment Submitted by: Laurel Wright, Representing North Carolina

#24B (6-37-12 PC1) Lavatory Basin Setback

Laurel joined with others who previously provided support for the PMI concept of a mixture of a 5 inch

6-37-12
Agenda Item #24B – Unresolved Issue
Committee Action on Agenda Item #24B – comment number 6-37-12 PC 1.1 – Unresolved Issue:
Approved as Modified.
Modification (instead of modifying the lavatory setback distance, the deleting exception, the action

revises the exception as follows):

Delete without substitution as follows:

606.5 Basin Location. The interior edge of the rim of the lavatory basin shall be located 3 ½ inches (90 mm) maximum from the front edge of the fixture or countertop.

Reason: The Committee's action was based on a concern that insufficient information and research is available on this topic to feel comfortable with selecting any specific setback requirement for lavatories. The origins of the proposal was an desire to have lavatory basins close to the counter edge so people using mobility devices or simply those with lower stature could lean over the lavatory to use it for various activities such as tooth brushing and other toilet/hygiene needs. The debate got entwined with the issue of reach range of the lavatory controls. The consensus was that this topic needed further research which could be accomplished prior to or during the next cycle, but that it was premature to add this into the next edition of the Standard.

Comment No:
6-37-12 PC1.1

Submitted by:
Matt Sigler – PMI

Further revise as follows:

606.5 Basin Location. The interior edge of the rim of the lavatory basin shall be located 3 ½ 6 inches (90 150 mm) maximum from the front edge of the fixture or countertop.

Rationale included with Unresolved Issue distribution – 5/26/15

PMI **does not** believe that the Committee's actions provided an appropriate resolution to our comment for 6-37-12 PC1 (Agenda Item #24B) for the following reasons:

1. What is shown in the committee action report for Agenda Item #24B (6-37-12 PC1) **is incorrect**, and should be replaced with the attached that was discussed during the February Meeting.
2. PMI provided the Technical Committee with the attached field studies conducted by Kohler that demonstrated:
 - a. A 3-1/2 inch basin setback does not work for all disabilities.
 - b. Some wheel chair users prefer more surface area contact for forearms, this gives them greater control and stability. A setback of 5 inches provided the necessary surface area for such users.
3. Those in opposition to PMI's comment indicated that Kohler's field studies were dated, and not based on current practices. However, it was also acknowledged by those who opposed PMI's comment that **no technical data or evidence was ever provided to prove that a 3-1/2 inch maximum basin setback was a valid dimension**. Even the Chair acknowledged such when casting his negative vote to break the tie during the February Meeting.
4. Those in opposition to PMI's comment further indicated that they were opposed to PMI's comment because they believed that a 3-1/2 inch lavatory basin setback was necessary for those with limited reach, and because the A117.1 does not mandate that a certain percentage of public lavatories meet the requirements of Section 606.6 (Lavatories with Enhanced Reach Range) that all ADA lavatories should have a 3-1/2 inch maximum basin setback. PMI agrees that those with limited reach should have a maximum basin setback of 3-1/2 inches and indicated such within the **attached comment** that was discussed during the February Meeting. However, PMI does not agree that all ADA lavatories should be required to have a maximum 3-1/2 inch basin setback just because a certain percentage of those with disabilities require it, but instead would encourage the committee to consider mandating that a certain percentage of ADA required lavatories meet the requirements of Section 606.6.
5. PMI is very concerned that an ICC Committee such as A117.1 would knowingly allow a technical requirement into one of their standards/codes that was based on **absolutely no technical data**.

6-46– 12

(This represents the language approved by the committee for the First Public Review Draft)

Revise as follows:

608.2.1.2 Clearance. A clearance of ~~48~~ 52 inches (~~1220~~ 1360 mm) minimum in length measured perpendicular from 12 inches (305 mm) beyond the control seat wall, and 36 inches (915 mm) minimum in depth shall be provided adjacent to the open face of the compartment.

6-46-12 PC2

Kimberly Paarlberg, representing ICC

Further revise as follows:

608.2.1.2 Clearance. A clearance of 52 inches (1360 mm) minimum in length measured perpendicular from ~~42 inches (305 mm) beyond the control seat~~ wall, and 36 inches (915 mm) minimum in depth shall be provided adjacent to the open face of the compartment.

Reason: The increased clear floor space, combined with the change to measure from the seat wall instead of the control wall now prohibits the transfer shower from ever being located in the corner. The shower has to have at least 4" offset (see figure). The study information provided for the increase in clear floor space did not include information on acceptable transfers. The plumbing industry has done these studies. They should be investigated before revising this measurement.

In addition, the transfer location in an alternate roll-in shower does not include the same offset. Therefore, the standard is inconsistent in application.

608.2.3 Alternate Roll-in-Type Shower Compartments. Alternate roll-in-type shower compartments shall comply with Section 608.2.3.

608.2.3.1 Size. Alternate roll-in shower compartments shall have a clear inside dimension of 60 inches (1525 mm) minimum in width, and 36 inches (915 mm) in depth, measured at the center point of opposing sides. An entry 36 inches (915 mm) minimum in width shall be provided at one end of the 60-inch (1525 mm) width of the compartment. A seat wall, 24 inches (610 mm) minimum and 36 inches (915 mm) maximum in length, shall be provided on the entry side of the compartment.

Committee action on 6-46-12 PC2

Approve Public Comment 6-46-12 PC2.

Reason: The public comment changes how the length of the clearance next to the transfer shower is to be measured. The comment shifts focus from the seat wall to the control wall.

Public Comment on Second Public Review Draft	
Agenda Item #25	
Comment No: 6-46-12 PC2.1	Submitted by: Edward Steinfeld - RESNA
	<p>Revise as follows:</p> <p>608.2.1.2 Clearance. A clearance of 52 inches (1320 mm) minimum in length measured perpendicular from 12 inches (305 mm) beyond the seat wall, and 36 inches (915 mm) minimum in depth shall be provided adjacent to the open face of the compartment. The seat</p>

	<p>wall shall align with the wheelchair seat back as per Section 305.8 Seat Back Location, or be 4 inches (100 mm) maximum behind the seat wall.</p> <p>305.8 Seat Back Location. For the purposes of this standard, the seat back of a wheelchair within the clear floor space shall be considered 40 inches (1015 mm) from the front or 12 inches (305mm) from the rear of the wheelchair space.</p>
<p>Comment Reason by Edward Steinfeld: We support the PC3 option over PC2 since it better aligns the seat back of wheelchairs with the back of the shower seat. However, consistent with my comments on 3-13E-12 PC3, the seat back should be part of the clear floor space section because it can be used for many purposes. Designers should learn about seat back location because it plays a role in reachability. The IDeA Center can prepare an illustration that will be useful for many purposes. The current alignment in the standard is 12 inches and there is insufficient evidence to increase this to 16 inches. Thus, the general rule should remain 12 inches from the rear; and exceptions provided to address specific concerns where they arise. In this case, there is disagreement as to whether 12 or 16 should be allowable. While I support leaving the 12 and believe this would provide better access, I do understand the concerns of those opposed. The solution I am proposing reaffirms 12 as the rule (as it is currently), but gives designers the flexibility to choose 16 if they wish, thereby addressing the concerns of those who wish to provide more flexibility.</p>	
<p>Committee Action of February 2015 regarding Agenda Item #25 – comment number 6-46-12 PC 2.1</p> <p>Approved:</p> <p>Reason: See Comment Reason provided by Mr. Steinfeld. The committee found this revision to provide a long term improvement to the standard. It provides a new building block specifying where the seat back of the mobility device should be assumed to be located in the clear floor space. This allows consistent application in various code provisions by allowing reference back to the new building block.</p>	

Third Public Review Draft	
6-46-12	
Agenda Item #25.1	
<p>Committee Action on Agenda Item #25.1 – comment number 6-46-12/2.1 – PC2.1</p> <p>Approve as Modified</p> <p>Modification (the modification replaces the original comment. It places the revised text in proper context with the previously approved ‘new building’ vs ‘existing building’ format of Section 608.2.1.2.)</p> <p>Revise as follows:</p> <p>305.8 Seat Back Location. For purposes of this standard, the seat back of a wheelchair within the clear floor space shall be considered 40 inches (1015 mm) from the front or 12 inches (305 mm) from the rear of the wheelchair space.</p>	

608.2.1.2 Clearance

608.2.1.2.1 New buildings. In new buildings, a clearance of 52 inches (1320 mm) minimum in length, and 36 inches (915 mm) minimum in depth shall be provided adjacent to the open face of the compartment. The length of the clear floor space shall be measured perpendicular from either 1) the control wall or 2) from 4 inches behind the control wall. The seat wall shall align with the wheelchair seat back in accordance with Section 305.8 or be 4 inches (100 mm) maximum behind the seat wall.

608.2.1.2.2 Existing buildings and within new Type B units. In existing buildings and within new Type B units, a clearance of 48 inches (1220 mm) minimum in length measured perpendicular from the control wall, and 36 inches (915 mm) minimum in depth shall be provided adjacent to the open face of the compartment.

Reason: The committee concurred with the commenter's reason that the proposed section 305.8 should not be instituted as a building block requirement in this edition because only one provision refers to it. Further, it will be confusing when viewed in context of the assembly seating provisions. While it isn't reference in the assembly seating section, the shoulder align of assembly seating vs seat back location may be confusing in application. This does not preclude creating such building block in future editions. The next text provides options for placement of the clearance next to a transfer shower.

Comment No:
6-46-12/2.1 – PC2.1

Submitted by:
Kim Paarlberg
International Code Council

Further revise as follows:

608.2.1.2 Clearance. A clearance of 52 inches (1320 mm) minimum in length measured perpendicular between 12 inches (305 mm) and 16 inches (? mm) beyond the seat wall, and 36 inches (915 mm) minimum in depth shall be provided adjacent to the open face of the compartment. ~~The seat wall shall align with the wheelchair seat back as per Section 305.8 Seat Back Location, or be 4 inches (100 mm) maximum behind the seat wall.~~

~~**305.8 Seat Back Location.** For the purposes of this standard, the seat back of a wheelchair within the clear floor space shall be considered 40 inches (1015 mm) from the front or 12 inches (305 mm) from the rear of the wheelchair space~~

Comment Reason: There is no reason to send someone to a separate building block section for seat back alignment. We do not do this for shoulder alignment in Chapter 8, but instead provide a specific measurement for the clear floor space in the section dealing with alignment. Putting the requirement into the transfer shower section would be consistent.

This is not intended to be a technical change. It will allow the same alternatives provided for in the current text approved by the committee. This would address the concern that the increased clear floor space of 52", with leaving the dimension at 12", would force a wall offset. The range of alignment would allow for flexibility in design and is within the range that Dr. Steinfeld said was adequate for alignment for transfer. There will not be walls on both sides, because this location still has to meet the alcove provisions that require 60" for sideways movement. See the attached drawing for an example of the configuration options.

6-55-12

Please Note: The version of 6-55-12 included in the public review draft was not the final version of 6-55-12 as approved by the committee. The version approved by the committee is shown in 6-55-12 PC1

6-55-12 PC1

Kim Paarlberg, representing ICC

Please note: The following reflects the version of 6-55-12 that was approved by the Committee.

608.3.2 Standard Roll-in-Type Showers. Grab bars in standard roll-in showers shall comply with Section 608.3.2.

608.3.2.1 Back wall grab bar. In standard roll-in type showers, a grab bar shall be provided on the back wall beginning at the edge of the seat. The grab bars shall not be provided above the seat. The back wall grab bar shall extend the length of the wall and extend within 6 inches (150 mm) maximum from the adjacent side wall opposite the seat.

Exceptions:

1. The back wall grab bar but shall not be required to exceed 48 inches (1220 mm) in length.
2. The back wall grab bar is not required to extend within 6 inches (150 mm) of the adjacent side wall opposite the seat if it would require the grab bar length to exceed 48 inches (1220 mm) in length.

608.3.2.2 Side wall grab bars. Where a side wall is provided opposite the seat within 72 inches (1830 mm) of the seat wall, a grab bar shall be provided on the side wall opposite the seat. The side wall grab bar shall extend the length of the wall and extend within 6 inches (150 mm) maximum from the adjacent back wall.

Exception: The side wall grab bar but shall not be required to exceed 30 inches (760 mm) in length. Grab bars shall be 6 inches (150 mm) maximum from the adjacent wall.

Committee action on 6-55-12 PC1

Approve Public Comment 6-55-12 PC1.

Reason: The committee approved the public comment; reaffirming its earlier approved version of 6-55-12.

6-55-12 PC3

Curt Wiehle, Minnesota Construction Codes and Licensing, representing self

Further revise as follows:

608.3.2.1 Back wall grab bar. In standard roll-in type showers, a grab bar shall be provided on the back wall beginning at the edge of the seat. The grab bars shall not be provided above the seat. The back wall grab bar shall extend the length of the wall and extend within 6 inches (150 mm) maximum from the adjacent side wall opposite the seat.

Exceptions:

1. The back wall grab bar ~~but~~ shall not be required to exceed 48 inches (1220 mm) in length.
2. ~~The back wall grab bar is not required to extend within 6 inches (150 mm) of the adjacent side wall opposite the seat if it would require the grab bar length to exceed 48 inches (1220 mm) in length.~~

Reason: The first exception already limits the length of the bar to 48 inches. Exception 2 is redundant.

Committee action on 6-55-12 PC3

Approve Public Comment 6-55-12 PC3.

Reason: The Committee agreed with Mr. Wiehle's observation that the 2nd exception is redundant.

Public Comment on Second Public Review Draft	
Agenda Item #28	
Comment No: 6-55-12 PC3.1	Submitted by: Edward Steinfeld – RESNA
	<p>Revise as follows:</p> <p>608.3.2.1 Back wall grab bar. In standard roll-in type showers, a grab bar shall be provided on the back wall beginning at the edge of the seat. The grab bars shall not be provided above the seat. The back wall grab bar shall extend the length of the wall and extend within 6 inches (150 mm) maximum from the adjacent side wall opposite the seat.</p> <p style="padding-left: 40px;">Exceptions:</p> <ol style="list-style-type: none"> 1. The back wall grab bar but shall not be required to exceed 48 inches (1220 mm) in length. 2. The back wall grab bar is not required to extend within 6 inches (150 mm) of the adjacent side wall opposite the seat if it would require the grab bar length to exceed 48 inches (1220 mm) in length. <p>Option # 1- Proposed Change</p> <p><u>608.3.2.1. Back Wall Grab Bar. In standard roll-in shower stalls, a grab bar shall be provided along the entire length of the back wall from 6 inches (150 mm) maximum of one corner to within 6 inches (150 mm) maximum of the opposite corner.</u></p> <p style="padding-left: 40px;"><u>Exception: If a permanent seat is provided, the grab bar shall terminate at the leading edge of the seat.</u></p> <p>... OR ...</p>

	<p>Option #2</p> <p><u>608.3.2.1. Back Wall Grab Bar.</u> In standard roll-in shower stalls, a grab bar shall be provided along the entire length of the back wall from 6 inches (150 mm) maximum of one corner to within 6 inches (150 mm) maximum of the opposite corner.</p> <p><u>Exceptions:</u></p> <ol style="list-style-type: none"> 1. <u>If a permanent seat is provided, the grab bar shall terminate at the leading edge of the seat.</u> 2. <u>If the shower stall is longer than 60 inches (1525 mm), and a 48 inches (1220 mm) long grab bar is provided at minimum, then the distance from the end of the grab bar to either corner can exceed 6 inches (150 mm).</u>
<p>Comment Reason by Edward Steinfeld:</p> <p>We are offering two alternatives to the existing proposed change depending on whether the Committee decides that mandating a 48 in. max. bar is necessary: Version 1 (preferred) requires the bar to be long enough to reduce “unprotected” wall length to only 6 in. at either end. Version 2 allows the grab bar to be only 48 in. long if the stall is greater than 60 in.</p> <p>A roll in shower stall should also be safe for people who are standing while taking a shower. In the 1980 standard, where the roll in shower stall was first introduced, the bar was required along the entire length of the stall, with the exception of 6 in. at each end in recognition that a bar that did not wrap around was not necessary because it was unlikely anyone would grab the bar right in the corner. This ensured that someone standing would always have a bar within reach and that a movable seat could be located at any location within the stall. At that time, a permanent seat was not required in a roll in shower. In the 2009 revisions, the Committee required a folding seat and allowed the bar to max out at 48 in. The length of 48 in. is arbitrary, with no basis in research. It is a legacy of the original illustration showing a 60 in. long shower stall area minus the 6 in. allowances at both corners. The maximum length not only introduces too much complexity in the wording but it also allows very large shower stalls to have back walls that do not have bars along their entire length. Further it specifies a specific location of the bar when that is not always where it might be best, depending on other features of the stall. The language is exceedingly complex and difficult to understand which has been demonstrated by the numerous attempts to adjust it during this cycle. The proposed revision in Alternate #1 above significantly simplifies the text by stating the basic rule in the main paragraph and corrects the oversight related to the 48 in. maximum at the same time, bringing back the original intent. If the Committee still desires to limit the length of the back bar to 48 in. The paragraph could be altered as in Alternate #2 which states the basic rule and allows the designer to put the 48 in. grab bar at the most appropriate location. Moreover, it clearly conveys the intent that it is better to have a longer grab bar for safety.</p>	
<p>Committee Action of February 2015 regarding Agenda Item #28 – comment number 6-55-12 PC 3.1</p> <p>Approved as modified:</p> <p>Modification:</p> <p>Option #1 was approved.</p> <p><u>608.3.2.1. Back Wall Grab Bar.</u> In standard roll-in shower stalls, a grab bar shall be provided along the entire length of the back wall from 6 inches (150 mm) maximum of one corner to within 6 inches (150 mm) maximum of the opposite corner.</p> <p><u>Exception:</u> If a permanent seat is provided, the grab bar shall terminate at the leading edge of</p>	

the seat.

Reason:

Please see Comment Reason provided by Mr. Steinfeld (above). The revised text of the comment provides clear language for the length and placement of the back wall grab bar.

Third Public Review Draft

6-55-12

Agenda Item #28.2

Committee Action on Agenda Item #28.2 – comment number 6-55-12/3.1 – PC 3.2

Approved

Reason: The Committee agreed with the reason provided by this Commenter. This comment restores the text that existed prior to the 2009 edition of the standard.

**Comment No:
6-55-12/3.1 – PC 3.2**

**Submitted by:
Kim Paarlberg
International Code Council**

Further revise as follows:

608.3.2.1 Back wall grab bar. In standard roll-in type showers, a grab bar shall be provided on the back wall beginning at the edge of the seat. The grab bars shall not be provided above the seat. The back wall grab bar shall extend the length of the wall and extend within 6 inches (150 mm) maximum from the adjacent side wall opposite the seat.

Exceptions:

1. The back wall grab bar but shall not be required to exceed 48 inches (1220 mm) in length.
2. The back wall grab bar is not required to extend within 6 inches (150 mm) of the adjacent side wall opposite the seat if it would require the grab bar length to exceed 48 inches (1220 mm) in length.

~~**608.3.2.1. Back Wall Grab Bar.** In standard roll-in shower stalls, a grab bar shall be provided along the entire length of the back wall from 6 inches (150 mm) maximum of one corner to within 6 inches (150 mm) maximum of the opposite corner.~~

~~**Exception:** If a permanent seat is provided, the grab bar shall terminate at the leading edge of the seat.~~

Comment Reason: This proposal is to restore the language from the 2009 A117.1 for the rear grab bar in a roll-in shower. The 2009 language addressed the concern of what to do with a roll in shower that is provided in a space larger than the minimum size. Issues with the approved language are as follows:

The language currently approved would require grab bars the full length of the rear wall, even if the roll-in shower location is part of a larger group shower room. With the 48" length requirement in the 2009 A117.1, the shower stall would have to be at least 76 inches ($22" + 48" + 6" = 76"$) with an L-shaped seat and 69 inches ($15" + 48" + 6" = 69"$) with a rectangular seat before this exception could be used.

The opposite wall grab bar and new vertical grab bar are not required when the shower stall is greater than 72" deep (Section 608.3.2.2 & 608.3.2.3 shown below), so what is the logic of making the rear grab bar go on forever?

There is also the point where additional supports for the extra long rear grab bar would be required. How would you do that and not block access to the grab bar? That is not addressed in the new language.

In addition, the 2009 ICC A117.1 added a requirement for a folding or fixed seat in a roll-in shower (Section 608.2.2.3 shown below). Therefore, the grab bar should always stop at the seat. An exception in the current language that says "if...provided" could be read to say a seat is not required.

The 2009 ICC A117.1 language allowed more freedom in design. One example is the new style of bathroom being used in nursing homes and hospitals that allows for assistance in bathing when needed.

Seat requirements for roll-in showers are as follows:

608.2.2.3 Seat. A folding seat complying with Section 610 shall be provided on an end wall.

EXCEPTIONS:

1. A seat is not required to be installed in a shower for a single occupant accessed only through a private office and not for common use or public use, provided reinforcement has been installed in walls and located so as to permit the installation of a shower seat.
2. A fixed seat shall be permitted where the seat does not overlap the minimum clear inside dimension required by Section 608.2.2.1.

The grab bar requirements for roll-in showers as currently approved are as follows:

608.3.2 Standard Roll-in-Type Showers. Grab bars in standard roll-in showers shall comply with Sections 608.3.2.1 through 608.3.2.3. (6-55-12 PC1)

608.3.2.1 Back Wall Grab Bar. In standard roll-in type showers, a grab bar shall be provided along the entire length of the wall from 6 inches (150 mm) maximum of one corner to within 6 inches (150 mm) maximum of the opposite corner. (6-55-12 PC3.1) (6-61-12)

Exception: If a permanent seat is provided, the grab bar shall terminate at the leading edge of the seat. (6-55-12PC3.1)

608.3.2.2 Side wall grab bars. Where a side wall is provided opposite the seat within 72 inches (1830 mm) of the seat wall, a grab bar shall be provided on the side wall opposite the seat. The side wall grab bar shall extend the length of the wall and extend within 6 inches (150 mm) maximum from the adjacent back wall. (6-55-12 PC1)

Exception: The side wall grab bar shall not be required to exceed 30 inches (760 mm) in length. (6-55-12 PC1)

608.3.2.3 Vertical Grab Bar. Where a side wall is provided opposite the seat within 72 inches (1830) of the seat wall a vertical grab bar shall be provided. A vertical grab bar 18 inches (45 mm) minimum in length shall be provided on the end wall 3 inches (75 mm) minimum and 6 inches (150 mm) maximum above the horizontal grab bar, and 4 inches (100 mm) maximum inward from the front edge of the shower. (6-61-12 PC1.2)

Chapter 7

PLEASE NOTE: As part of the Third Public Review Draft, 7-1-12 received 4 public comments. Initially one was approved and the others were disapproved or withdrawn.

Public Comment 7-1-12/3.1- PC3.1 was approved and is shown on Page 51 (aka Agenda Item #35.1). This approval was sustained by the committee and remains a distinct action. Part of Public Comment PC3.3 also covers this section. The committee's action on PC3.1 is distinct and not superseded by later action on 7-1-12/3.1 – PC3.3.

Public Comment 7-1-12/3.1-PC3.3 (aka Agenda Item #35.3) was initially disapproved by the committee, but the disapproval was not sustained during the Ballot. As a result PC3.3 became an unresolved issue. The unresolved issue was returned to the committee in July 2016 for further action. Such action to approve PC3.3 is indicated below commencing on Page 58. Such action was sustained by committee ballot.

7-1– 12

(This represents the language approved by the committee for the First Public Review Draft)

Add new text as follows:

105.2.13 Light reflectance value (LRV) of a surface. Method of Test. BS 8493:2008 + A1: 2010 (British Standards Institution, 389 Chiswick High Road, London W4 4AL, United Kingdom).

701.1.2 Light Reflectance Value. The light reflectance value (LRV) of surfaces shall be determined in accordance with BS 8493 for the following surface types:

1. Opaque paint coatings and paint systems, including those that cause extreme angular dependences of reflected light and those that have a surface texture of less than 2 mm;
2. Opaque coverings including those that cause extreme angular dependences of reflected light, and those that have an unyielding texture of less than 2 mm;
3. Opaque coverings with a yielding pile, e.g. carpet;
4. Opaque materials, including those that cause extreme angular dependences of reflected light, and those that have a texture of less than 2 mm, e.g. finished metals;
5. Opaque materials coated with non-opaque coatings or coverings, e.g. timber door coated with a woodstain, including those that cause extreme angular dependences of reflected light, and those that have a texture of less than 2 mm;
6. Multi-colored surfaces;

701.1.2.1 Other Surfaces. Other surfaces shall comply with Section 703.1.3.1.

701.1.3 Contrast Value. The contrast between the LRVs of adjacent surfaces required by Sections 703.2.1.2, 703.5.3.2, 703.6.3.2, 705.3, and 504.5.1 shall be determined by Equation 7-1,

Contrast = [(B1-B2)/B1] x 100 percent

Equation 7-1

Where

B1 = light reflectance value (LRV) of the lighter surface,

B2 = light reflectance value (LRV) of the darker surface.

701.1.3.1 Other Surfaces. Surfaces not within the scope of BS 8493 shall provide contrast between adjacent surfaces that are either light on dark or dark on light.

Revise as follows

703.2.1 General. Visual characters shall comply with the following:

(Balance of section is not changed)

703.2.1.1 Nonglare Finish. The glare from coverings, the finish of characters and their background shall not exceed 19 as measured on a 60-degree gloss meter.

703.2.1.2 Contrast. The Light Reflectance Value (LRV) of characters and their background shall contrast 70 percent minimum as determined in accordance with Equation 7-1. The lighter surface shall have a LRV of not less than 45.

703.5.3 Finish and Contrast. Pictograms and their fields shall have a nonglare finish. Pictograms shall contrast with their fields, with either light pictograms on a dark field, or dark pictograms on a light field.

703.5.3.1 Nonglare Finish. The glare from coverings and the finish of pictograms and their fields shall not exceed 19 as measured on a 60-degree gloss meter.

703.5.3.2 Contrast. The Light Reflectance Value (LRV) of pictograms and their fields shall contrast 70 percent minimum as determined in accordance with Equation 7-1. The lighter surface shall have a LRV of not less than 45.

703.6.2 Finish and Contrast. Symbols of accessibility and their backgrounds shall have non-glare finish. Symbols of accessibility shall contrast with their backgrounds with either a light symbol on a dark background or a dark symbol on a light background.

703.6.3.1 Nonglare Finish. The glare from coverings and the finish of symbols of accessibility and their backgrounds shall not exceed 19 as measured on a 60-degree gloss meter.

703.6.3.2 Contrast. The Light Reflectance Value (LRV) of symbols of accessibility and their backgrounds shall contrast 70 percent minimum, as determined in accordance with Equation 7-1. The lighter surface shall have a LRV of not less than 45.

705.3 Contrast. Detectable warning surfaces shall contrast visually with adjacent surfaces, either light-on-dark or dark-on-light.

The Light Reflectance Value (LRV) of the surfaces shall contrast 70 percent minimum, as determined in accordance with Equation 7-1. The lighter surface shall have a LRV of not less than 45.

504.5.1 Visual Contrast. The leading 2 inches (51 mm) of the tread shall have visual contrast of dark-on-light or light-on-dark from the remainder of the tread.

The Light Reflectance Value (LRV) of the 2-inch (51 mm) stripe and tread shall contrast 70 percent minimum, as determined in accordance with Equation 7-1. The lighter surface shall have a LRV of not less than 45.

7-1-12 PC3

Teresa E. Cox, representing International Sign Association

Delete and substitute as follows:

~~105.2.13 Light reflectance value (LRV) of a surface. Method of Test. BS 8493:2008 + A1: 2010 (British Standards Institution, 389 Chiswick High Road, London W4 4AL, United Kingdom).~~

~~701.1.2 Light Reflectance Value. The light reflectance value (LRV) of surfaces shall be determined in accordance with BS 8493 for the following surface types:~~

- ~~1. Opaque paint coatings and paint systems, including those that cause extreme angular dependences of reflected light and those that have a surface texture of less than 2 mm;~~
- ~~2. Opaque coverings including those that cause extreme angular dependences of reflected light, and those that have an unyielding texture of less than 2 mm;~~
- ~~3. Opaque coverings with a yielding pile, e.g. carpet;~~
- ~~4. Opaque materials, including those that cause extreme angular dependences of reflected light, and those that have a texture of less than 2 mm, e.g. finished metals;~~
- ~~5. Opaque materials coated with non-opaque coatings or coverings, e.g. timber door coated with a woodstain, including those that cause extreme angular dependences of reflected light, and those that have a texture of less than 2 mm;~~
- ~~6. Multi-colored surfaces;~~

~~701.1.2.1 Other Surfaces. Other surfaces shall comply with Section 703.1.3.1.~~

~~701.1.3 Contrast Value. The contrast between the LRVs of adjacent surfaces required by Sections 703.2.1.2, 703.5.3.2, 703.6.3.2, 705.3, and 504.5.1 shall be determined by Equation 7-1,~~

~~Contrast = $\frac{B1-B2}{B1} \times 100$ percent~~ ~~Equation 7-1~~

~~Where~~

~~B1 = light reflectance value (LRV) of the lighter surface,
B2 = light reflectance value (LRV) of the darker surface.~~

~~701.1.3.1 Other Surfaces. Surfaces not within the scope of BS 8493 shall provide contrast between adjacent surfaces that are either light on dark or dark on light.~~

Revise as follows

~~703.2.1 General. Visual characters shall comply with the following:~~

~~————(Balance of section is not changed)~~

~~**703.2.1.1 Nonglare Finish.** The glare from coverings, the finish of characters and their background shall not exceed 19 as measured on a 60-degree gloss meter.~~

~~**703.2.1.2 Contrast.** The Light Reflectance Value (LRV) of characters and their background shall contrast 70 percent minimum as determined in accordance with Equation 7-1. The lighter surface shall have a LRV of not less than 45.~~

~~**703.5.3 Finish and Contrast.** Pictograms and their fields shall have a nonglare finish. Pictograms shall contrast with their fields, with either light pictograms on a dark field, or dark pictograms on a light field.~~

~~**703.5.3.1 Nonglare Finish.** The glare from coverings and the finish of pictograms and their fields shall not exceed 19 as measured on a 60-degree gloss meter.~~

~~**703.5.3.2 Contrast.** The Light Reflectance Value (LRV) of pictograms and their fields shall contrast 70 percent minimum as determined in accordance with Equation 7-1. The lighter surface shall have a LRV of not less than 45.~~

~~**703.6.2 Finish and Contrast.** Symbols of accessibility and their backgrounds shall have non-glare finish. Symbols of accessibility shall contrast with their backgrounds with either a light symbol on a dark background or a dark symbol on a light background.~~

~~**703.6.3.1 Nonglare Finish.** The glare from coverings and the finish of symbols of accessibility and their backgrounds shall not exceed 19 as measured on a 60-degree gloss meter.~~

~~**703.6.3.2 Contrast.** The Light Reflectance Value (LRV) of symbols of accessibility and their backgrounds shall contrast 70 percent minimum, as determined in accordance with Equation 7-1. The lighter surface shall have a LRV of not less than 45.~~

~~**705.3 Contrast.** Detectable warning surfaces shall contrast visually with adjacent surfaces, either light-on-dark or dark-on-light.~~

~~The Light Reflectance Value (LRV) of the surfaces shall contrast 70 percent minimum, as determined in accordance with Equation 7-1. The lighter surface shall have a LRV of not less than 45.~~

~~**504.5.1 Visual Contrast.** The leading 2 inches (51 mm) of the tread shall have visual contrast of dark-on-light or light-on-dark from the remainder of the tread.~~

~~The Light Reflectance Value (LRV) of the 2-inch (51 mm) stripe and tread shall contrast 70 percent minimum, as determined in accordance with Equation 7-1. The lighter surface shall have a LRV of not less than 45.~~

703.2.1 General. Visual characters shall comply with the following:

(Balance of section is not changed)

703.2.1.1 Nonglare Finish. The glare from coverings, the finish of characters and their background shall not exceed 19 as measured on a 60-degree gloss meter.

703.2.10 Contrast. Characters shall contrast with their background, with either light characters on a dark background or dark characters on a light background.

703.5.3.1 Nonglare Finish. The glare from coverings and the finish of pictograms and their fields shall not exceed 19 as measured on a 60-degree gloss meter.

703.5.3.2 Contrast. Characters shall contrast with their background, with either light characters on a dark background or dark characters on a light background.

703.6.2 Finish and Contrast. Symbols of accessibility and their backgrounds shall have non-glare finish. Symbols of accessibility shall contrast with their backgrounds with either a light symbol on a dark background or a dark symbol on a light background.

703.6.3.1 Nonglare Finish. The glare from coverings and the finish of symbols of accessibility and their backgrounds shall not exceed 19 as measured on a 60-degree gloss meter.

705.3 Contrast. Detectable warning surfaces shall contrast visually with adjacent surfaces, either light-on-dark or dark-on-light.

504.5.1 Visual Contrast. The leading 2 inches (51 mm) of the tread shall have visual contrast of dark-on-light or light-on-dark from the remainder of the tread.

Reason: 1. The LRV's of many standard sign materials cannot be measured using the British Standard Method of Test.

2. Site conditions, particularly the type and intensity of lighting, have great impact on perceived contrast. Following the formula without considering site conditions, would allow combinations that do not have enough contrast, and prohibit others that are perfectly legible when appropriate lighting is provided.

3. The British Standard states in part "The method described in this standard is not appropriate for making on-site measurements. Therefore it is recommended that published LRV data, determined in accordance with this standard, are used for the determination of visual contrast." Relying on the British Standard (BS) establishes a design standard that lacks a corresponding field method to accurately calculate conforming color contrast of signs installed on-site.

4. The BS is referenced by a British government accessibility standard, Approved Document M (ADM 2010, with 2013 amendments), in association with measuring the difference in LRV's of adjacent building elements. Consistent with this application, the BS specifies sample sizes ranging from 450 mm x 450 mm (appx. 17.7 inches x 17.7 inches) to 25 mm x 25 mm (appx. 1 inch x 1 inch). But there appears to be no supporting evidence that the BS's LRV difference measurements are predictive of legibility for any population with special visual needs (e.g. elders, those with mild low vision), and the BS does not provide a means to measure for conformance, under actual field conditions, the LRV's of small graphic elements, especially text or visual symbols.

5. This proposal is really no different than proposals that have been defeated numerous times for multiple reasons, except for the addition of a new standard of questionable utility. The mere addition of any new standard, though, does not in any way support the adoption of 70% as a threshold value. In fact, the 70% figure is not mentioned in the BS.

6. Research is sorely needed to provide a rational basis for a signage contrast standard that can be applied simply, and prior to final site installation, whose conformance is predictive of legibility under typical if not actual field conditions.

Committee action on 7-1-12 PC3

Approve Public Comment 7-1-12 PC3.

Reason: The Committee concluded that there was insufficient information for the standard to use the contrast analysis methods and testing included in 7-1-12. They wish for the discussions and research to continue, and by making this amendment, the issue appears in the next public review draft and is available for comment. The glare provisions are appropriate to maintain going into the next edition of the standard.

Public Comment on Second Public Review Draft	
Agenda Item #35	
Comment No: 7-1-12 PC3.1	Submitted by: Sharon Toji – HLAA Eugene Lozano, Jr. – California Council of the Blind Billie Lousie (Beezy) Bentzen – Accessible Design for the Blind on behalf of AERBVI
	<p>Revise as follows:</p> <p>106.2.XX Light reflectance value (LRV) of a surface. Method of Test. BS 8493:2008 + A1: 2010 (British Standards Institution, 389 Chiswick High Road, London W4 4AL, United Kingdom).</p> <p>504.5.1 Visual Contrast. The leading 2 inches (51 mm) of the tread shall have visual contrast of dark-on-light or light-on-dark from the remainder of the tread. <u>The Light Reflectance Value (LRV) of the 2-inch (51 mm) stripe and tread shall contrast 70 percent minimum, as determined in accordance with Equation 7-1. The lighter surface shall have a LRV of not less than 45.</u></p> <p>701.1.2 Light Reflectance Value. <u>The light reflectance value (LRV) of surfaces shall be determined in accordance with BS 8493 for the following surface types:</u></p> <ol style="list-style-type: none"> <u>1. Opaque paint coatings and paint systems, including those that cause extreme angular dependences of reflected light and those that have a surface texture of less than 2 mm;</u> <u>2. Opaque coverings including those that cause extreme angular dependences of reflected light, and those that have an unyielding texture of less than 2 mm;</u> 3. Opaque coverings with a yielding pile, e.g. carpet; <u>4. Opaque materials, including those that cause extreme angular dependences of reflected light, and those that have a texture of less than 2 mm, e.g. finished metals;</u> <u>5. Opaque materials coated with non-opaque coatings or coverings, e.g. timber door coated with a woodstain, including those that cause extreme angular dependences of reflected light, and those that have a texture of less than 2 mm;</u> <u>6. Multi-colored surfaces;</u> <u>7. Ordinary materials as defined in 3. Terms and Definitions, 3.3, by BS 8493:2008 + A1: 2010;</u> <p>701.1.2.1 Other Surfaces. Other surfaces shall comply with Section 703.1.3.1.</p> <p>701.1.3 Contrast Value. <u>The contrast between the LRVs of adjacent surfaces required by Sections 703.2.1.2, 703.5.3.2, 703.6.3.2, 705.3, and 504.5.1 shall be determined by Equation 7-1,</u></p> <p><u>Contrast = [(B1-B2)/B1] x 100 percent</u> <u>Equation 7-1</u></p> <p><u>Where</u> <u>B1 = light reflectance value (LRV) of the lighter surface,</u> <u>B2 = light reflectance value (LRV) of the darker surface.</u></p>

	<p>701.1.3.1 Other Surfaces. Surfaces not within the scope of BS 8493 shall provide contrast between adjacent surfaces that are either light on dark or dark on light.</p> <p>703.2.1 General. Visual characters shall comply with the following: (Balance of section is not changed)</p> <p>703.2.1.1 Nonglare Finish. The glare from coverings, the finish of characters and their background shall not exceed 19 as measured on a 60-degree gloss meter.</p> <p>703.2.1.2 Contrast. The Light Reflectance Value (LRV) of characters and their background shall contrast 70 percent minimum as determined in accordance with Equation 7-1. The lighter surface shall have a LRV of not less than 45.</p> <p>703.2.10 Contrast. Characters and their background shall have a non-glare finish. Characters shall contrast with their background, with either light characters on a dark background or dark characters on a light background.</p> <p>703.5.3 Finish and Contrast. Pictograms and their fields shall have a nonglare finish. Pictograms shall contrast with their fields, with either light pictograms on a dark field, or dark pictograms on a light field.</p> <p>703.5.3.1 Nonglare Finish. The glare from coverings and the finish of pictograms and their fields shall not exceed 19 as measured on a 60-degree gloss meter.</p> <p>703.5.3.2 Contrast. The Light Reflectance Value (LRV) of pictograms and their fields shall contrast 70 percent minimum as determined in accordance with Equation 7-1. The lighter surface shall have a LRV of not less than 45. Characters shall contrast with their background, with either light characters on a dark background or dark characters on a light background.</p> <p>703.6.2 Finish and Contrast. Symbols of accessibility and their backgrounds shall have non-glare finish. Symbols of accessibility shall contrast with their backgrounds with either a light symbol on a dark background or a dark symbol on a light background.</p> <p>703.6.3.1 Nonglare Finish. The glare from coverings and the finish of symbols of accessibility and their backgrounds shall not exceed 19 as measured on a 60-degree gloss meter.</p> <p>703.6.3.2 Contrast. The Light Reflectance Value (LRV) of symbols of accessibility and their backgrounds shall contrast 70 percent minimum, as determined in accordance with Equation 7-1. The lighter surface shall have a LRV of not less than 45.</p> <p>705.3 Contrast. Detectable warning surfaces shall contrast visually with adjacent surfaces, either light-on-dark or dark-on-light.</p> <p><u>The Light Reflectance Value (LRV) of the surfaces shall contrast 70 percent minimum, as determined in accordance with Equation 7-1. The lighter surface shall have a LRV of not less than 45.</u></p>
<p>Reasons:</p> <p>Reasons and documentation supplied by Sharon Toji:</p> <p>Reasons why we need a measurable standard for contrast in the ANSI A117.1 Standard I can cite many anecdotal incidents where contrast for signs covered by the ANSI standards and the ADA SAD have insufficient contrast. These are signs that are sometimes very consequential in safely and efficiently gaining access to public buildings. In one such anecdote, a building inspector wrote in my LinkedIn group that he was in a high rise hotel during a fire. He went down the corridor to what he thought was an appropriate exit, only to find that the sign adjacent to</p>	

the door stated that the stair did not actually lead to the public way, so he had to travel back a distance to a different stair. He blamed a non-contrasting sign, and said "I would have liked to get my hands on the inspector who passed that sign as having adequate contrast.

Hospitals often have non-contrasting signs on walls because the colors are left to designers, and pale silver on off-white walls are particularly popular. Elevator floor indicators and informational signs in transit venues such as airports and rail stations often use red characters on black backgrounds, virtually invisible to a large number of people with common "color blindness."

I believe that if we had a standard, it would serve as a guide for designers and sign companies, and we would get much better understanding of the requirement for light/dark contrast that is part of the ANSI standard as well as the Americans with Disabilities Act Design Standards.

Such a standard would, I believe, prompt manufacturers of measurement devices to come out with many more useful devices that could be used in the field. Already, there is one such device out, and it costs less than \$250 for a device that can measure a color stroke as small as 3 MM in width. There is no doubt that more companies would enter the field with such devices if a standard were in place. Already, there are many devices that do measure color on computer screens as well as colors on walls and furniture, but other than the above device, I don't know of any that have such a small aperture, so they don't work for small sign character strokes. The fact that the devices exist, however, shows that the ability is there to adapt them for sign use.

We also have, thanks to the British Standards Institute, a "Standard of Test" for LRVs that applies to the great majority of the materials used for the kinds of signs that are covered by the ADA design standards, as well as materials used for stair striping and detectable warning surfaces. Because of the availability of this standard, LRV measurements are being adopted internationally as a standard for measuring contrast in the built environment. If you read the British Standard carefully, you will see that about the only surfaces that cannot be measured are those that change color when exposed to light (such as photo luminescent materials) and materials that would have to be measured on curved surfaces. That appears to be a minor consideration in light of the number of signs that could be tested, even on site. Also, just as with braille, once you have determined that one sign fabricated of particular materials is compliant, there is no need to measure all the remainder of the signs made of identical materials, even if some of those are displayed on curved surfaces.

In my opinion, we are holding up a much higher standard of research for this one item than we usually do for many other issues that come before the committee. Virtually all the measurements that we deal with are compromise measurements. They all strive to affect the majority of persons with various types of disabilities, but can never be considered the one and only perfect measurement for all. Vision is especially difficult to calibrate in this way, because it is so complex, and one person can have a combination of vision issues, all of which are subject to change. Finding the perfect "sample population" would be virtually impossible. The purpose of the figure we chose (i.e. 45 LRV) as the minimum lighter color merely gets us to a point where we are forcing the designer to choose at least one of the colors from the lighter end of the spectrum. Otherwise, they are free to choose two colors from the darker end, and the formula flaw then becomes obvious.

There are instances going back many years, during the history of the 70 percent contrast ratio, where reports suggested that the way to correct the flaw in the formula, which tends to give contrast preference to dark colors, due to the mathematical curve created because of the uneven intervals between LRV points, would be to require a minimum light color. That is why the work group on Contrast took that direction.

Establishing this dividing line where light colors are divided from dark colors is important for two reasons: First, many people still think we are talking about color (or hue) when we talk about contrast. Without the LRV standard, that belief persists and color choices are made accordingly. Second, there is a tendency to interpret the code as "darker colors versus lighter colors," or vice versa. When I ask architects or inspectors why certain choices were made, or two obviously non-contrasting colors were passed, I'm told "this color is darker than this color, so it complies." In one case some years ago, which some Committee members might remember, the two colors were white and ivory. I just saw another new college building with a complete system of signs with white characters on very light beige backgrounds, barely better than the white on ivory example.

How did we choose 45? After a lot of study of various reports and charts, and viewing of different combinations, we saw this was the area that was the rational point to divide light from dark. We obviously could have chosen 46 or 44. Numbers in the standard are almost always somewhat arbitrary. Why is a reach range 48 and not 47 or 49? We chose 45 instead because we often count or measure by fives, just as 48 was chosen because it represents 4 feet.

The British approach contrast in a slightly different manner, by dictating the difference between LRV figures. For some elements, such as doors and hardware, they chose 30 points. However, unless they choose a very high number, they end up with a flaw as well. Thirty points of difference between darker colors is much different than it is between lighter colors. For signs, they solved the problem by stating that the two LRV numbers for sign

characters and background must be 70 points apart. This restricts the number of hues for signs to relatively few, only the very darkest and lightest colors. Our method, requiring that the lighter color have a number of 45 or higher, allows designers much more latitude, so we think it is a better way to correct the flaw, and one that allows for more creativity and will encourage much more compliance.

In other words, we are not trying to find a "perfect" number at which everyone with a vision impairment, but with usable vision, will be able to detect the difference between the characters and background of a sign. This is a minimum, and it is a compromise that will not serve every person, although it will be fine for many as well. We are merely giving the designer a boundary, and saying, we are going to call colors with an LRV of 45 or higher "light colors," and those below that numbers "dark colors." Then we are going to require that the contrast be 70 percent, by applying a formula to those two numbers. And, we are referring to the British standard of test in case there is a question about the correctness of the LRV number assigned to a material. That means that the LRV can be determined in a laboratory environment using an instrument that conforms to certain specifications, following a specific procedure.

Since most colored materials are already tested using similar procedures for consistency reasons, or for architects who want to use the latest "green" design standards, only custom materials will need special testing. An architectural materials company in the UK has reported that they set up the material and trained their personnel to do the testing, and have added this to their services with great success. I have been told by employees of UL that they would be willing to add the service as well, although I think some large design and sign firms and architects might invest in it for in-house use.

There are literally hundreds of combinations of colors that will be available to designers, and a great variety of materials, including wood, painted surfaces, plastics, metals, and even carpet if they care to use them for signs, by using this standard and method of test. And, there are many different brands of scientific instruments that can correctly measure the LRV, as well as at least one device currently available for a modest price that an inspector could use for a site measurement. There is even an "ap" available for many phones and tablets that will instantly calculate the 70 percent formula. Measurement only takes seconds using this device and application, and does not depend on ambient light.

Another argument of opponents was that contrast does not affect many people. I think those people are forgetting that, in addition to the significant number of people who have a variety of vision impairments, but still use their vision, color deficiencies are a serious problem for many people with otherwise normal vision. About 8 percent of the male population has the most common form of "color blindness" and for those people, some signs might as well be invisible if they do not have sufficient light/dark contrast. I have read statements that, if we also include women, and those with vision conditions that also include certain color deficiencies, the percentage of the population could be as high as 12 percent. Aging affects the color vision of most people, and there are increasing number of elderly people who are living longer and who remain active to a more advanced age so they are also accessing public buildings.

Color deficient vision is of such importance to science and industry, that there are entire firms, including firms for both research and testing, devoted to it. NASA has also done significant research on the topic, and has reports on their site. I have received letters in support of the need for contrast from some of their staff, as well as from others in the defense department. Most people are not aware of the number of crucial professions that rely on adequate color vision, These institutions are concerned about the numbers of people who do not have normal color vision, and are trying to solve those problems. One possible solution for some problems is obviously determining contrast standards, and being able to substitute materials of varied darkness and lightness. In one study, NIST was investigating the colors of electrical wires in aircraft to determine contrast.

Another issue is lighting. Of course adequate lighting influences vision. However, at this time we have few lighting standards, and even if we did, it would be difficult to control, on a day to day basis, whether or not a specific sign is lighted sufficiently. What we can control, is that the sign comes from the manufacturer with enough contrast that it can be read under normal lighting conditions in most public buildings.

Another point to consider is that the National Institute of Building Sciences has been dealing with many of the same questions under the auspices of a committee studying the needs of the low vision community. This is a topic that is getting increasing attention, as we think beyond the needs of those with the most significant life-long disabilities, and the discrimination they have lived with, to the needs of others in the population as they access the built environment, and particularly older people, who will represent a major part of the population. Here is the link to the most recent draft version of their report: http://www.nibs.org/?page=lvdc_guidelines

It is long past time for us to have a measurable standard since this is a very far reaching problem, affecting not only those who are classified as blind, but anyone who is deaf or hard of hearing, those with mobility impairments, or those who cannot speak or be understood by others when they ask directions. Being able to read the signs that direct us around facilities, give us important safety information, travel information, rules and

regulations for using buildings, or even inform us during disasters, is crucial.

We need to put this proposed standard in perspective: Like many of our standards, there is more to be learned on the condition that prompts the standard. New technology will emerge that will make all or some parts of our standards obsolete. Because of digital advances, new wayfinding possibilities, including for those with vision impairments, are emerging monthly. This is a simple attempt to provide a reasonable divide between light and dark colors, so that a contrast ratio long in existence can be used in a reasonably consistent manner. The use of light reflectance values to establish contrast is based on solid research on contrast by respected individuals in the UK, most of it already in use in Europe and other countries as they establish international standards. Why are we resisting such a step forward for people who need to be able to read signs in order to get around and use public services in a safe and efficient manner?

Areas of Particular Interest from the NIBS Report

These are some excerpts from the National Institute of Building Sciences report, which states that lighting and contrast are the two biggest influences on use of buildings by people with low vision.

2.8 Wayfinding (pages 21-22)

Tactile wayfinding aids (braille) are generally not familiar to older adults and persons with low vision, but all wayfinding aids should comply with the following:

Information displays, lettering styles, spacing and other features should comply with ADA Standards 703.2 (30), and as follows:

- ♣ Signs are more legible for people with low vision when characters contrast with their background with a Light Reflectance Value (LRV) as recommended in Table 4C-2.
- ♣ Lettering and other graphics should be monochromatic white information on black field because many persons with low vision have some degree of color blindness and difficulty with low contrast. See also Table 4C-2.
- ♣ Raised or incised lettering not contrasting in color or value with the surrounding field is not recommended for use by persons with low vision. Shadows may confuse rather than enhance visibility.

Wayfinding surface illumination should be uniform and as recommended in Table 5C-1, Ref. 4, in daylight and after dark and the sign surfaces should be shielded from the light source to avoid reflected glare.

Internally illuminated or backlit signs may be difficult for persons with low vision due to glare.

Variable message signs may be suitable with the following recommendations (28):

- ♣ Use left-justified text a minimum of 22 mm (7/8 in.) high but not less than 1 percent of the distance at which the sign is to be read.
- ♣ Use sans-serif fonts with upper and lower-case in simple sentences without abbreviations.
- ♣ Space characters about ¼ of the font width, and space words more than characters.
- ♣ Space lines apart 50 percent of text height where multiple lines are needed, but avoid fewer than 3 lines.
- ♣ Do not use multiple colors or flashing messages.

Liquid crystal displays may be difficult for persons with low vision, especially where they may be subject to direct sunlight or strong shadows. LED and other internally illuminated displays are preferable.

3.3.2 Wayfinding Aids (page 31)

Directional and wayfinding graphic aids are important for all buildings used by the public, especially for people visiting for the first time. In addition to the guidance provided for signs in ADA Standards 703 (30), the following is recommended to accommodate persons with low vision:

- Persons with low vision may not be proficient in interpreting braille. Therefore, visual aids are more appropriate, and should be placed as close to the main entrance doors as possible to be readable before entering the lobby without having to search for the reception desk, security facilities, etc.
- All graphics must be adequately illuminated at all hours, and should have high-contrasts between figures or text and background field. See introductory discussion to this chapter and Table 4C-2 for additional guidance.

3.5.9 Wayfinding Aids (page 34)

Wherever possible, wayfinding aids should be placed facing the direction of travel rather than on walls and doors along the corridor sides. Signage placed across corridors at the ceilings may be difficult to see for some people with low vision to see and may be difficult to illuminate properly.

- All wayfinding aids must be in high contrast with the surrounding fields in color and value. See Table 4C-2.
- All wayfinding aids require electric lighting illumination that does not result in glare from reflections off the signage or adjacent surfaces (34).

3.6 Stairways

3.6.1 Surface Finishes (page 35)

- Stair risers should contrast with treads to aid in visibility to persons ascending the stairs.
- Stair tread nosings should be in high contrast colors and values from stair treads and should be 50 mm (2 in.) wide so that the edge of each tread is highly visible to the user descending.
- Stringers or skirting should be darker and have a strong value contrast with treads and risers to enhance their visibility.
- Highly figured or patterned materials should be avoided, as they may be confusing to those with low vision. Continuous carpeted stair runners with such designs may camouflage the edge of the tread and create a fall hazard.
- The sloping undersides of stairs and escalators could become a head-bumping hazard, so spaces under the stairs or escalators must be enclosed or otherwise protected to prevent access below a height of 2030 mm (80 in) See also ADA Standards 307.4 (30).
 - See Table 4C-2 for further guidance.

3.10.6 Other Design Considerations (pages 40-41)

Menus may be a reading challenge for many people with low vision due to small font size. Menu boards mounted on the wall behind preparation areas of cafeteria stations and short order counters may be difficult for many people to read, especially when the menu selection is large and restrictive space dictates using small font size. At tables in dining areas with wait staff, printed menus may be hard to read due to low lighting. Some options to be considered to address this issue follow (28):

- If space is available at the beginning of the cafeteria line or short order counters, task-lit menu boards and other information may be located there. Labels of food and beverage selections located at the place of display or point of sale such as at the steam table or dessert case may also be helpful.
- Hand-out paper menus in large font size, with contrasting print on a matte finish, at the beginning of the cafeteria line or short-order counter may be a simple way to accommodate low-vision customers.
- Task lighting luminaires at tables can help diners read traditional menus and see their food and dishes in otherwise low ambient light.
- Video and touchscreens may also be useful tools for presenting menus and other information.

Note: the Chart referenced shows the familiar 70 percent contrast ratio as required for signs, and gives the formula, but does not mention the need for a minimum lighter color or the flaw in the formula. For

other types of surfaces, such as stair striping, they recommend a minimum number of points. For stair striping, a minimum difference of 50 points is recommended. Depending on what colors were used, a 50 point difference could mean anything from a high of 89 percent to a low of 54 percent. It would depend on whether you were comparing a black stripe with a medium color step, or a white stripe with a medium-light color step.

Dr Geoff Cook's research was used prominently by the committee, according to two of the members with whom I met to discuss the report.

Material in Support of Contrast Standard

The following two page document is an excerpt from the British Standard of Test for Light Reflectance Values.

I maintain that the adopted amendment to my original proposal has omitted a very significant category of material types, which I believe has the result of greatly reducing the effectiveness of the proposed standard.

The implication of comments made by some committee members was that the list of materials that could be tested according to the British Standard of Test is very restrictive. I have included two pages that refer to these comments, and I believe show the fallacy of that conclusion.

As a matter of fact, I maintain that a careful and correct reading of the standard details shows that the method of test can be used for a very broad array of materials that are commonly used for signs, in addition to their use for other architectural elements, such as stair striping, that are also covered by this proposal.

I have highlighted the sections that I believe demonstrate this, so they are easy to locate.

First, under Section 1 Scope, there is a list of materials that the method of test applies to. The text emphasizes, with the use of the word "including" in the descriptions of the materials, that not only is the test applicable, for example, to "opaque paint coatings and paint systems," but it also includes what might be considered an unusual material, "those that cause extreme angular dependences of reflected light and those that have a surface texture of less than 2 mm." So, it isn't confined to such materials, but includes them in addition to all the more usual opaque paint coatings and paint systems.

The proponents of the amended text also left out a very important item on the list, the term "ordinary materials."

Perhaps they thought the term was too general to include, but as a matter of fact, it is a fairly carefully defined term in the standard, and should be included in the list.

Skipping to 3 Terms and Definitions, 3.3 ordinary materials, we see all materials that are not considered "ordinary materials." That would mean that most of the plastics, for instance, that are used for signs could be tested. We already have a very inclusive list of other materials that can be tested.

Then, to give us even more specificity, the scope goes on to list the surfaces that cannot be tested: thermochromic, photochromic, retroreflecting, fluorescent, phosphorescent, those involving electrical power, and self-luminous, or composed of free-standing, curved non-opaque materials such as curved glass or clear plastic.

Those who actually design and fabricate the types of architectural signs that must comply with accessibility standards will ascertain, I believe, that very few of these materials are used for such signs. Photoluminescent material used for exit signs, for instance, would be one exception. Many of these materials cannot be tested because they actually change color with temperature or light change. I have also been informed by Geoff Cook, who was the lead for this standard, that a material that is fabricated in its flat state, such as a piece of plastic that has the graphics applied to it while flat, can be accurately tested, even though later it may be forced into a extrusion that will cause it to be curved. You cannot, however, test a curved surface.

The question of opaque materials coated or covered with non-opaque coatings or coverings are covered in the highlighted area on the second page. Dr Cook has ascertained that if each material is tested individually with its coating or covering, the LRV will be valid. For instance, even though both materials would be otherwise identical, if they are different colors, and each is coated or covered, each would have to be tested. You cannot assume that the difference in the LRV caused by deflection will be identical.

I propose, therefore, that the materials called "ordinary materials" be included on the list that can be tested. This will greatly reduce the materials that will revert to the vague "light on dark or dark on light" standard.

Reason provided by Eugene Lozano, Jr.:

The California Council of the Blind, Inc. (CCB) is a statewide membership organization. Its members are blind, visually impaired and fully sighted individuals who are concerned about the dignity and well-being of blind and

visually impaired people throughout the state. Formed in 1934, the Council has become the largest organization of people who are blind or visually impaired in the state of California, with over 40 chapters and special interest affiliates and a membership of over 2,000.

Through a variety of programs and services, CCB enables people who are blind and visually impaired to live and work independently and to participate in their own communities. The Council has influenced change in such areas and issues as civil rights, employment, rehabilitation, transportation, environmental access, travel, recreation, Social Security, and other benefits. To strengthen advocacy efforts, the Council often works in coalition with other state disability groups.

The CCB is in support of reinstating Proposal 7-1-12, which cover Sections 105.2, 504.5.1, 701.1.2, 701.1.3, 701.2.1, 701.2.1.2, 703.2.10, 703.5.3, 703.5.3.2, 703.6.3.2, and 705.3. The reinstatement of the Proposal and the adoption of these sections will make the difference in having effective and useable visual cues for detectable warning surfaces, stair-stripping for the edge of stair trends, signage, and other applications which will increase the safety and access for persons with low vision.

We are in full agreement with the supporting documentation which has been submitted by Sharon Toji, Access Communications, on behalf of Hearing Loss Association of America. Her comments are based on independent and scientifically-based research from the Reading University in the UK, which eventually became an officially recognized standard.

The CCB feels additional research is unnecessary at this time and that the ANSI A117.1 committee should adopt the British standard to establish a method for measuring contrast between foreground and background. Also it is important there be at least a 70% contrast between adjoining surfaces.

Reason provided by Billie Louise (Beezy) Bentzen:

The perfect has been the enemy of the good for far too long regarding standards for visual contrast and glare. Numerous other countries as well as the ISO have measureable, enforceable standards for visual contrast. The US standard of light-on-dark or dark-on-light is an embarrassment that serves no one well. It is totally subjective, not measureable, and serves no sign readers well. It is high time that ANSI A117 remedied this situation by adopting a standard that includes a well-researched formula and for which there are modestly priced and reasonably accurate measurement instruments that can be used in the field.

Establishing this standard can reasonably be expected to improve legibility of signs not only for people with impaired visual acuity or color vision, but for all people who sometimes need to read signs in low illumination. Failure to establish this measurable, enforceable, research-based standard tells the world once again, that legibility of signs is not really important to US standards bodies. Perceived beauty, ease and expense of manufacturing trump the fundamental purpose of signs—to provide information that people can read and understand.

**Committee Action of February 2015 regarding Agenda Item #35
– comment number 7-1-12 PC 3.1**

Approved as modified:

Modification:

The full comment was approved with the exception of the change to Section 504.5.1. The existing text of 504.5.1 would be retained. The following shows as a revision to the comment which therefore retains existing text of the standard.

504.5.1 Visual Contrast–~~The leading 2 inches (51 mm) of the tread shall have visual contrast of dark-on-light or light-on-dark from the remainder of the tread. The Light Reflectance Value (LRV) of the 2-inch (51 mm) stripe and tread shall contrast 70 percent minimum, as determined in accordance with Equation 7-1. The lighter surface shall have a LRV of not less than 45.~~

Reason:

The Committee is not unanimous in its support of these provisions for measuring contrast. The topic is strongly debated each time it comes to the Committee's agenda. The conclusion at this time is that this referenced standard and the measurement of contrast is a good start for addressing the variety of factors affecting the readability of signs, pictograms and symbols of accessibility. While not all aspects are addressed, adding this specificity for this element improves accessibility. Concern was raised that this restricts the options of designers to provide other solutions. The other factors going into signs and other displays remain available for full flexibility. The final conclusion was that on balance these provisions need to be added to the A117.1 standard.

The provisions for of Section 504.5.1 were not included because other proposals have adequately addressed by other approved changes.

Third Public Review Draft

7-1-12

Agenda Item #35.1

Committee Action on Agenda Item #35.1 – comment number 7-1-12/3.1 – **PC3.1**

Approved

Reason: There was considerable debate whether the LRV was appropriate for detectable warnings. These features are generally outside where they are subject to weather extremes as well as dirt which will obscure the warnings. The measurement tool for the LRV received praise from committee members who already have to device and have used it in real world situations. But the ability to achieve and maintain a 70% contrast was not realistic. While 'Federal yellow' is often used for these features, there was concern that even Federal Yellow would achieve the 70%. Many on the committee spoke in favor of maintaining the LRV measurement for detectable warnings and in the standard overall. At the conclusion the committee voted to remove the LRV measurement from applying to detectable warnings for this edition of the standard.

Comment No:
7-1-12/3.1 – **PC4.1**
Misnumbered –
should have been
PC3.1

Submitted by:
Kim Paarlberg
International Code Council

Further revise as follows:

705 Detectable Warnings

705.3 Contrast. Detectable warning surfaces shall contrast visually with adjacent surfaces. ~~The Light Reflectance Value (LRV) of the surfaces shall contrast 70 percent minimum, as determined in accordance with Equation 7-1. The lighter surface shall have a LRV of not less than 45 either light-on-dark or dark-on-light.~~

Comment Reason: The committee decided in 7-1-2 PC3 to take the visual contrast requirements off of stairways. There is even more of a concern with detectable warnings on curb cuts. What happens when

there is snow, mud or rain? The language should be restored to the 2009 ICC A117.1 requirements.

Third Public Review Draft	
7-1-12	
Agenda Item #35.3 – First Action November 2015.	
Committee Action on Agenda Item #35.3 – comment number 7-1-12/3.1 – PC 3.3	
Disapproved	
<p>Reason: Once again the committee heard from experts on both sides of this issue. While there are concerns that the LRV is an inadequate measure of contrast, there is a reasonable cost device which is available for the measurement. Supporters again acknowledged that contrast isn't the only measure of a sign's clarity and readability, it is appropriate to consider and include in the standard. This provision would only be in the A117.1 standard and therefore only apply to the limited number of signs addressed in Section 1111 of the International Building Code. The concern that it would have wider application to other signs regulated under ADA was dismissed because this isn't being adopted into the ADAAG. The Committee has felt for years that the 'light on dark or dark on light' provisions found in the current standard are inadequate, therefore the Committee once again confirmed is approval of the LRV measurement and reference to the BS8493 standard.</p>	
<p>Comment No: 7-1-12/3.1 – PC4.1 Misnumbered – should have been PC3.3</p>	<p>Submitted by: Teresa Cox International Sign Association</p>
	<p>Delete standard as follows:</p> <p>106.2.3 Light reflectance value (LRV) of a surface. Method of Test. BS 8493:2008 + A1: 2010 (British Standards Institution, 389 Chiswick High Road, London W4 4AL, United Kingdom).</p> <p>Further revise as follows</p> <p>701.1.2 Light Reflectance Value. The light reflectance value (LRV) of surfaces shall be determined in accordance with BS 8493 for the following surface types:</p> <ol style="list-style-type: none"> 1. Opaque paint coatings and paint systems, including those that cause extreme angular dependences of reflected light and those that have a surface texture of less than 2 mm. 2. Opaque coverings including those that cause extreme angular dependences of reflected light, and those that have an unyielding texture of less than 2 mm. 3. Opaque coverings with a yielding pile, e.g. carpet.

	<p>4. Opaque materials, including those that cause extreme angular dependences of reflected light, and those that have a texture of less than 2 mm, e.g. finished metals.</p> <p>5. Opaque materials coated with non-opaque coatings or coverings, e.g. timber door coated with a woodstain, including those that cause extreme angular dependences of reflected light, and those that have a texture of less than 2 mm.</p> <p>6. Multi-colored surfaces.</p> <p>7. Ordinary materials as defined in Section 3. Terms and Definitions, subsection 3.3 in BS 8493 listed in Section 106.2.3.</p> <p>701.1.2.1 Other Surfaces. Other surfaces shall comply with Section 703.1.3.1.</p> <p>701.1.3 Contrast Value. The contrast between the LRVs of adjacent surfaces required by Sections 703.2.1.2, 703.5.3.2, 703.6.3.2 and 705.3 shall be determined by Equation 7-1,</p> <p>Contrast = $[(B1 - B2)/B1] \times 100$ percent ————— Equation 7-1</p> <p>Where</p> <p>B1 = light reflectance value (LRV) of the lighter surface,</p> <p>B2 = light reflectance value (LRV) of the darker surface.</p> <p>701.1.3.1 Other Surfaces. Surfaces not within the scope of BS 8493 shall provide contrast between adjacent surfaces that are either light on dark or dark on light.</p> <p>703.2 Visual Characters.</p> <p>703.2.1 General. Visual characters shall comply with the following: (Balance of section is not changed)</p> <p>703.2.1.1 Nonglare Finish. The glare from coverings, the finish of characters and their background shall not exceed 19 as measured on a 60-degree gloss meter.</p> <p>703.2.1.2 Contrast. The Light Reflectance Value (LRV) of characters and their background shall contrast 70 percent minimum as determined in accordance with Equation 7-1. The lighter surface shall have a LRV of not less than 45.</p> <p>703.2.10 Contrast. Characters and their background shall have a non-glare finish. Characters shall contrast with their background, with either light characters on a dark background or dark characters on a light background.</p> <p>703.5.3 Finish and Contrast. Pictograms and their fields shall comply with Sections 703.5.3.1 and 703.5.3.2 have a nonglare finish. Pictograms shall contrast with their fields, with either light pictograms on a dark field, or dark pictograms on a light field.</p> <p>703.5.3.1 Nonglare Finish. The glare from coverings and the finish of pictograms and their fields shall not exceed 19 as measured on a 60-degree gloss meter.</p>
--	---

703.5.3.2 Contrast. ~~The Light Reflectance Value (LRV) of pictograms and their fields shall contrast 70 percent minimum as determined in accordance with Equation 7-1. The lighter surface shall have a LRV of not less than 45. Characters shall contrast with their background, with either light characters on a dark background or dark characters on a light background.~~

703.6.2 Finish and Contrast. Symbols of accessibility and their backgrounds shall comply with Sections 703.6.2.1 and ~~703.6.2.2~~ have a non-glare finish. Symbols of accessibility shall contrast with their backgrounds with either a light symbol on a dark background or a dark symbol on a light background.

703.6.2.1 Nonglare Finish. The glare from coverings and the finish of symbols of accessibility and their backgrounds shall not exceed 19 as measured on a 60-degree gloss meter.

703.6.2.2 Contrast. ~~The Light Reflectance Value (LRV) of symbols of accessibility and their backgrounds shall contrast 70 percent minimum, as determined in accordance with Equation 7-1. The lighter surface shall have a LRV of not less than 45.~~

Please note that in a separate action the Committee agreed that detectable warning contrast would be determine via light-on-dark or dark-on-light methodology. That action would supersede this action to maintain the LRV contrast measurement in Sec. 705.3

705.3 Contrast. ~~Detectable warning surfaces shall contrast visually with adjacent surfaces, either light-on-dark or dark-on-light. The Light Reflectance Value (LRV) of the surfaces shall contrast 70 percent minimum, as determined in accordance with Equation 7-4-7-5. The lighter surface shall have a LRV of not less than 45.~~

705.3.1 Contrast Value. ~~The contrast between the LRVs of adjacent surfaces required by Section 705.3 shall be determined by Equation 7-5.~~

~~Contrast = $[(B1-B2)/B1] \times 100$ percent Equation 7-5~~

~~Where~~

~~B1 = light reflectance value (LRV) of the lighter surface.~~

~~B2 = light reflectance value (LRV) of the darker surface~~

Comment Reason: ISA supports changes to the standard when those proposed changes are backed by empirical evidence and research. Very little research has been done on what makes signs legible and accessible.

We disagree with the committee action on this proposal for many reasons. The British Standard cited by the proponent pertains to contrast with other architectural elements (stairway striping, doors, carpets, and walls), not to contrast on signs.

Independent, empirical research is needed. ISA is working to identify potential funding sources for a scientific study to provide the Committee with a firm basis to change the standard.

Ballot 15.03 – Final Ballot results (March 10, 2016)

Comments regarding 7-12-1

HCAA – Sharon Toji **Affirmative Ballot with Comment**

Comment:

1. The LRV is the virtually universal acceptable standard of measurement for lightness and darkness.
2. There has been significant research done on contrast, including research in the UK that included signs in transportation venues. We heard from two experts that contrast was the most important element in the ability of persons with a variety of vision impairments to discern sign characters from their backgrounds.
3. The British Standard of Test can be used to test many materials that are used to fabricate signs, including plastics and woods, with various finishes.
4. The major consideration, according to the research that we heard about, is the amount of difference between the LRV of the characters to the background, and our choice of 45 as the lowest LRV allowable for the lighter color, provides for a difference of at least 40 from the darkest color, which is considered minimum contrast for persons with a range of vision impairments
5. The standard we are approving “does no harm” and provides a benchmark that will aid many persons. It is a building block for further research and refinement, and more stringent regulation, if desired.

John Salmen – individual member

Negative Ballot

Comment: There is not yet sufficiently clear and convincing information supporting a change from the text we have used for years. Therefore the text from previous versions should continue to be used until such information is available.

AEMA – Scott Cleary

Negative Ballot

Comment: More work needs to be done.

AIA – David Collins

Negative Ballot

Comment: Research in this area can help us install appropriate standards that will serve those in need of appropriate devices to use them. Until we are clear on what and how to identify them and use them it is inappropriate to require this be applied.

APSP– John Caden

Negative Ballot

Comment: I agree with the argument presented by Dr. Arditi.

BOMA- Steve Orlowski

Negative Ballot

Comment: Having listened to both sides of the debate and having had an opportunity to reflect on those discussions, BOMA will be voting against the committee’s action on this item. Based on discussions during the meeting, it is clear that the debate of using the 70% contrast value has not reached consensus amongst the experts in this field and there is still a great deal of additional research needed to justify the proposed values. It is our opinion that the inclusion of the British Standard should not be moved forward

at this time and that the Signage Task Group should work on finding a compromise between now and the next cycle of the standard.

CSI – Dennis Hall

Negative Ballot

Comment: Not persuaded that this is the right solution.

ICC – Kim Paarlberg

Negative Ballot

Comment: The ICC A117.1 committee discussed Item 35.2 after this proposal. If the same issues had been discussed first, I feel the committee might have voted to disapprove the original proposal in favor of a more investigation.

- Several concerns were brought up about terms used, such as ordinary material and multi-colored surfaces. “Ordinary materials” is not a definition, but rather a definition of what is not ordinary material. The term “multi-colored surface” is too interpretive. The terms are defined in the standard, but were not in the code, so interpretation of what this meant would be too broad.
- The scope of the standard is repeated in the text, so this is a copy write issue.
- When looking at the scope, the committee was not sure if “including those” was intended to be limiting or examples. How items 1 through 5 addresses this question is inconsistent, so it is unclear and confusing. Items 6 and 7 use the defined terms – but only Item 7 refers you to the standard for what this means.
- There is also the question about how this could be uniformly enforced in the field, or should rather be a listing required for a sign.

ISA – Teresa Cox

Negative Ballot

Comment: ISA is in favor of making changes to the standard when they are supported by empirical evidence and research. Independent, empirical research on signs is needed.

During our meeting last month, Dr. Aries Arditi presented the beginnings of a paper that will be peer reviewed and published in the public domain. We are very close to a more consistent, more rational, and clearer solution to address signage and low vision accessibility. We have identified potential funding sources, independent of the sign industry, for a research project to test some of the ideas in his paper. If we can hold off just a bit longer, we will have a proposal based on science that can achieve a broad consensus on the committee.

We disagree with the committee action on this proposal for many reasons. The British Standard cited by the proponent pertains to contrast with other architectural elements (stairway striping, doors, carpets, and walls), not to contrast between characters and their background on signs. This proposal includes a minimum LRV of 45 for the lighter of the two colors; however each of the three LRV measuring devices shown at our meeting last month (for measuring LRVs in the field) had different readings for the same color. What would happen if the sign manufacturer’s measuring device registered an LRV of 45 and the inspector’s device measured 44.8? Clearly, more work needs to be done on this proposal before we change the standard.

Several of us, on both sides of this issue, are interested in serving on a **Signage Task Group to develop proposals for consideration during the next cycle**. We are very concerned about the precedent that will be set if a requirement for 70% contrast on signs -- without an empirical basis to support this as the threshold value nor consideration of factors that affect legibility of signs such as illumination levels -- is published in our standard.

NACS – M. Bradley Gaskins**Negative Ballot**

Comment: I believe the committee made an ill-advised decision at this time and further research is necessary before placing something in the standards that is possibly not attainable or necessary.

NAHB– Dan Buuck**Negative Ballot**

Comment: I believe the committee made an ill-advised decision at this time and further research is necessary before placing something in the standards that is possibly not attainable or necessary.

NATO – Gene Boecker**Negative Ballot**

Comment: The information is not quite ready to be included into the standard as the ‘proper’ methodology. Yes, it is necessary to have something included that is more definitive than the subjective language that is provided currently. But the comments by the committee and Dr. Arditti clearly indicates that the matter is not resolved yet and that broad consensus can be achieved if we wait.

NCOSFM– Laurel Wright**Negative Ballot**

Comment: This is an issue that requires continued discussion prior to making a final decision. The printing date of this standard, potentially delayed, is coupled with the fact that it may not even be referenced by a model code for another cycle or so. This means that if we do not make a better effort to address the issue in a more substantive way, it may be entirely too long before the next standard would be in place to resolve the issue.

RESNA – Edward Steinfeld**Negative Ballot**

Comment: RESNA believes that this issue is still not well resolved by the proposed change. We were moved by Dr. Arditi’s testimony because we know he is a well-respected scientist with deep knowledge of low vision. We would not only like to continue the discussion on LRV but also expand it to other related issues related to low vision and involve other experts, especially from the building science community in which there is great knowledge of illumination in buildings. We think this discussion is most appropriate to hold in the next cycle, unless this cycle is extended for some other reason..

SEGD – Dave Miller**Negative Ballot**

Comment: I believe that the additional research that was proposed will allow for a more comprehensive solution and will facilitate a more broad consensus within our group in a way that will allow for improved access to the built environment.

TARGET – Tom Phillips**Negative Ballot**

Comment: Critical that we create good criteria. Passing this just to have something makes no sense and is a slippery slope.

Ballots revised during recirculation period:**Alan Gettelman – Individual Member****Negative Ballot**

Comment: I feel more research and discussion is needed to develop an effective standard that is based on more than the LRV factor.

NEII – Kevin Brinkman**Negative Ballot**

Comment: After reading through the comments from the original ballot and reflecting on the discussion at the meeting, I am sympathetic to the need, but I am also concerned that we do not have consensus and may be putting something into the standard just to show progress. Both sides provided many arguments for their position, but even the experts we heard from are not in agreement on what requirements are needed. Contrast appears to be one component to improve readability of signs, but there were also other mentioned. I would be in favor of creating a Signage Task group as one person recommended and having both sides work together to recommend requirements that both sides can agree on for the next cycle.

NMHC – Ron Nickson**Negative Ballot**

Comment: Based on previously submitted negative ballots and specifically the reason supplied by BOMA.

PMI – Matt Sigler**Negative Ballot**

Comment: After reviewing all of the comments that were submitted, it is apparent that consensus has not been reached amongst industry experts. Therefore, I believe it is premature to include this item in the standard until such time when consensus can be achieved.

SMA – David Cooper**Negative Ballot**

Comment: Having been unable to attend the recent meeting, with further review of the issue and the ballot comments It is now clear that the issues related to this change are yet unresolved and it would be of most benefit to deter changing the standard.

Third Public Review Draft
7-1-12
Agenda Item #35.3 – Committee Action July 5, 2016
<p>Committee Action on Agenda Item #35.3 – comment number 7-1-12/3.1 – PC 3.3 July 5, 2016</p> <p>Approve the public comment**</p> <p>Reason: The committee conducted a lengthy discussion regarding whether to keep the LRV based methodology of determining sufficient contrast in the next edition of the standard. There is one point of consensus and that is that the light on dark or dark on light criteria currently in the standard is inadequate and antiquated.</p> <p>Those in support of maintaining the previously approved change (and speaking against this public comment) and maintaining a reference to BS 8493 encouraged the committee to move to a modern scientific based criteria and methodology. They point to the fact that the standard is used in Britain. There was testimony that the measuring devices are inexpensive, easy to use and highly consistent in their measurement. They agreed that further study is happening and new information may be available in</p>

the future, but questioned whether any new research, properly peer reviewed, was going to be available in the near future. They felt this public comment was just another delaying action. They felt another study task group could certainly be convened, but that the next standard needs this contrast requirement and measurement methodology now. If new information is forthcoming, the A117.1 is a living document and new proposals could be considered. Finally it was felt that we can move off of the light on dark/dark on light criteria because this methodology is available.

Those speaking in favor of this public comment encouraged the committee to wait until further study and research is completed. They spoke that such research will be available 'soon' and will help the committee move toward a better criteria and standard than offered via BS 8493. Those against keeping the BS 8493 noted that it is not a consensus approach to the determination of contrast; that other countries are using a different methodology and a different requirement than the 70 percent which would be required if A117.1 isn't changed before publication. Some have found the BS 8493 to be unclear and that the text references the standard in inconsistent ways. There is concern that it would be a difficult standard to understand and use in field enforcement. Some speakers encouraged the full committee to step back on this issue and consider a task group to study the issue for the next cycle. Concern was expressed that this would impact negatively the adoption potential of the standard.

There was conflicting testimony regarding how many signs would be impacted by this requirement.

**** Approval** in this case means approval of public comment which results in the changes indicated below. It removes from inclusion in the next edition of the standard determination of LRV as part of determining adequate contrast.

Original of public comment found on Page 52.

New Documents submitted for July 5, 2016 meeting:

Communication from Sharon Toji on July 4, 2016

I do apologize if anyone thought that, in quoting Aries, I was implying that he agreed with my direction on the standard. I thought I made that clear in my bolded sentence right after the quote. Although I don't know specifically what he does have in mind, and am interested to learn more, I do remember, however, that he ended his last discussion before the committee by saying that we certainly needed something more specific, and that the current wording is so vague as to be meaningless. I couldn't remember his exact words, so chose to use the ones he wrote to me.

I still stand by my position that we are dealing with some factors that are firmly fixed throughout the world: The LRV is the measurement used for darkness and lightness of material surfaces, and the 70 percent minimum, and its accompanying formula is already in various codes, and anyone who gets signage specifications will see it in a certain percentage of those specifications. Therefore, it seems that we would be well advised to try to correct it with the rather simple and straightforward method suggested from time to time by respected scientists: Set a level and say that is the lowest LRV acceptable as a "light" color. It becomes merely a sort of definition for the word "light" as it appears in our current standard. By extension, we can assume that LRVs less than that define "dark."

Therefore, I ask that we affirm the standard, which we have done more than once in the past, give Aries' concept of a standard our careful consideration in the next cycle, and in the meantime, merely extend the life of a formula that has been established for many years, but does have a well-acknowledged flaw.

And again, my apologies to Aries and to the Committee if they did not understand what I thought was clear, that our only absolute point of agreement is that the current wording is not adequate for a standard, and certainly needs to be replaced. I thought his opinion on that was already public, and so I wasn't revealing anything confidential by quoting it. The only opinion I was bolstering by quoting Aries was indeed what he has repeated, that the current standard is "virtually meaningless." My own opinion, clearly not shared by him, is that we have waited much too long to do something about it, even if it is just the tiny step of adding a base LRV for the lighter color. And, regardless of the length of the proposed standard, that is really what it does. All the rest was added at the request of certain committee members to verify LRVs and have nothing to do with the actual standard itself.

Sharon Toji

Communication from Dr. Aries Arditi on July 4, 2014

Dear Sharon,

I do think the committee members need to be informed that while I stand by my opinion that "light on dark or dark on light" is virtually meaningless, there was a much more in my email to you in the way of context than the quote that you cherry-picked to bolster your position. You did not ask me in advance whether it would be okay to quote me, but instead selected one small part of what I had (then) hoped to be the beginning of a productive and private communication. I feel you misused my words, and I will unfortunately have to be more guarded when communicating with you in the future.

The committee should know that a couple of sentences after what you quoted, I also wrote "I don't believe that any quantitative contrast minimum will make things better for the population we're trying to serve, without a comprehensive and evidence-based, or at least strongly defensible approach to the problem." Therein lies the crux of the problem:

You wish to provide credibility and authority to the contrast standard by adopting a number (70%) or two (min LRV of 45), that even though you usually concede has no evidence backing it, provides a "starting point." Lately as we see, you've been summoning for support the testimony of Hilary Dalke and by association Gary Rubin, whose work, according to Gary, to whom I've spoken about this, and according to the papers you provide, focuses on the conspicuity of signs against their backgrounds (usually walls), and not on the contrast of letters against the sign background. Sign conspicuity is an important issue, but it's not really relevant to the issue that is now up for discussion by the A1171 committee, and should not sway anyone's opinion.

My position, on the other hand, is that given complexities including those of instrumentation, of measuring LRV on textured and patterned surfaces, and the multidimensional nature of visual accessibility in which contrast is but one component, a quantitative contrast requirement will not be effective. I provided the committee with details about this in my testimony and won't repeat it here, since I believe they all have it.

I also have devised a simple way to formulate a requirement that is based on human visual function, whose compliance can be measured and ascertained simply and without the use of specialized instruments, and which will more effectively address visual accessibility than what is in the standard now. I am now editing a paper I have written that details this, and which I will submit for publication by the end of this month. I am not sharing it with the committee in advance of publication because I do not want the proposal within it to be politicized. To me, such a proposal provides a better "starting point" than selecting the nearly arbitrary numbers of 70 and 45. Other than the potential for providing a satisfying and novel solution to this thorny and long-lived problem and ultimately enhancing

accessibility for those with low vision, I have no interest in the outcome of the committee's vote. As I told you in my private email, I have received no and expect no remuneration or financial benefit from producing this work (which is one reason it has taken me so many months to write it).

I understand your committee has to wrap things up for this edition of the standard, and my ideas, even if enthusiastically received by all, will have arrived too late for this round. But the foundation on which your proposal to build this contrast standard is in my opinion essentially flawed, and the addition of these two required numbers will do little more than "light on dark or dark on light" to make things more accessible to those with impaired vision -- it will simply add a veneer of authority, one supported most strongly by the chorus of others who are adopting similar requirements. Obviously your committee has mixed views on this issue -- I know from personal memories this 70% figure has been up for discussion for some 20 years without resolution. Why resolve it now, when there is so little agreement within the committee? Would it really be wise for A117.1 to adopt a contrast requirement today and then need to amend or retract it for the next edition?

Yours truly,
Aries

Aries Arditi, Ph.D.
Founder & Principal Scientist
Visibility Metrics, LLC
49 Valley View Road
Chappaqua, NY 10514
Voice: 914 500 8863 | Fax: 914 239 3557
<http://www.visibilitymetrics.com>

Communication from Sharon Toji – July 2, 2016

Hello, everyone!

I am asking your indulgence to read one more long post from me. I know it's dirty pool to ask this, but give a break to an old lady, now 80, who has hung in there since 1992, very much appreciates her long association with this committee and with all of you, and is much too addicted to long emails and speeches on her favorite topic — physical access for those who don't see, hear, speak, communicate or comprehend in the ways the world chooses to categorize as "normal."

Short message for those who don't want to do that:

Please reconsider, and let's vote for the contrast standard that at least puts us where most of the international codes are: with something measurable. Quote from a letter I just received from my one-time colleague on the original ANSI Sign Task Force, Dr Aries Arditti: **"I think I understand where you're coming from proposing a "start" to a contrast standard. And I certainly agree that "light on dark or dark on light" is just meaningless and just plain dumb to have in a standard."**

I am not trying to imply that Aries agrees with what I have proposed, but the fact that he thinks what we have now doesn't even qualify as worthy of a standard at all, should speak to all of us. (By the way, "dumb" is his term, not mine!) What we have now before us as a proposed standard DOES NO HARM. At the very least it is a standard, although, like almost every other standard we have, it needs work, development, etc. But is a standard, it makes sense. If nothing else, it would help people who are color blind or just don't see very well!

And if you want to see what, at least, anything colored on your computer looks like to someone who can't distinguish colors, get the free app "Color Oracle" and install it. It is, not to be punny, an eye opener! <http://colororacle.org/>

For those who did not keep the material on Professor Hilary Dalke, here is an excellent brief summary to paste into your browser: http://g11.cgpublisher.com/proposals/121/index_html

Now to the long version:

I have been getting last minute correspondence on that never-ending topic, contrast in signs! I know this is right before our meeting, and you are probably all on holiday, but I would like to sum up a few things that I have been receiving. I have had correspondence from Aries Arditti, from items that have been sent out by Ed Steinfeld, and forwarded by Glenn Dea, from Hilary Dalke, and from Jean Tessmer, to note the most recent.

1. Our proposed contrast is not perfect, nor should it be the final thought on the topic. None of our other standards fit that description either, so this proposed standard is no different, nor is it any "worse" than many of our standards were when they were first introduced.
2. We have been moving increasingly toward measurable standards. We know that they almost all represent compromises, in that they are posited on the abilities of just a portion of the group of people they are designed to accommodate. Ramp slope, for instance, is still too steep for some, and overkill for others, but we still come up with figures for minimums and maximums and ranges that we think will serve many people.
3. Is contrast in signs even a problem? Even NASA thinks it is, and scientists from NASA have corresponded with me on the topic, and on the work they are doing. Color blindness is their major concern, and how to work with it. Color blindness is seen increasingly as a disability in many forms of employment, as well as in test taking, textbook and map reading, etc.

We have the statements of respected experts in the field, such as Dr August Colenbrander, currently of the Smith-Kettlewell Eye Institute, that contrast is the single most important factor in the visibility of signs, or for that matter, any object that must be distinguished from its background or an adjacent object. I also have many anecdotal accounts from people who have corresponded with me, including the statement of an inspector who happened to be in a hotel during a fire and told me (and posted the story on LinkedIn) of his disgust with the inspector who passed the signs as having adequate dark/light contrast! It was due to one of the signs that he could have been trapped during the fire.

We also have testimony from Professor Hilary Dalke, whose work was done in cooperation with Moorsfield Eye Hospital, the largest and most prestigious eye institute in Europe, that she and Dr Gary Rubin (of Moorsfield and University College London) found that a large percentage of the subjects they used with a variety of vision impairments also have impaired color discrimination, and of course this figure must be added to the approximately 8 percent of individuals who have one of the forms of color blindness.

Indeed, we are speaking of a significant portion of people who have some kind of difficulty distinguishing certain hues, or colors, and to whom the darkness and lightness contrast is the main way they can distinguish one object from another, including characters on sign backgrounds.

4. It is also obvious that other countries that are moving forward on accessibility find contrast to be worthy of their attention. Via Glenn Dea, and sent to him by Ed Steinfeld, I received a copy of a paper

published by Norwegian researchers on contrast for stairs. I'm not sure when they first started their study, because it's obvious that instruments that would have assisted their measurements are now available, are reasonable in cost, and don't measure ambient light, so would have eliminated many of their problems. The pointed out that a definite measurement should be used for the standard.

The major useful takeaway I got from their paper is that contrast is indeed a problem in the built environment, and worthy of attention, that measurements of contrast are considered important, specific levels of contrast are considered important, that the LRV is indeed a useful and accepted unit of measurement and that the "Weber Formula" (the 70 percent formula) is indeed known and used in countries around the world when contrast is the topic.

I was surprised that Glenn Dea mentioned the Sapolinski paper and sent it around as a new discovery in the literature. I included that paper as part of my material on contrast quite some time ago, and I know that ISA and SEGD were aware of it, because I think it was mentioned in a rather dismissive light during one meeting. However, even though the study was done by an obviously very talented student and not by a known research scientist in the field, it has been taken seriously. It is now the standard that is used in New Zealand, and designers there are ordering both of the small devices I showed the committee to use. We (those of us on the Task Force working on contrast) found that the conclusions actually comported quite well with our own suggested standard, that we peg an LRV of 45 as the "border" point where we divide lighter colors from darker colors along the LRV spectrum.

5. So let me now attempt to sum up my case, and ask that we adopt this standard and move it forward to the next cycle, where I very much hope that Aries Arditti, perhaps working in conjunction with Dr Gary Rubin, will further refine it, and give us much more detail about useful contrast measurements for sign characters and their backgrounds.

A. Contrast for signs and their characters and symbols, (as well as for stair stripes, detectable waring surfaces, and even other architectural elements) is indeed an important subject for our standard dealing with accessibility in the built environment, especially for those with communications related and vision related disabilities.

B. Contrast as we understand it is not to be expressed in terms of color, or hue, because we are dealing with persons who have impaired ability to "see" or understand color as the majority do. Therefore, we must deal with contrast as contrast of darker objects to lighter objects. However, there is no specific boundary to define which LRVs are for "light" colors, which for "dark," and which for "medium."

C. The scientifically accepted expression of darkness and lightness of surfaces is the "Light Reflectance Value," or LRV. This is used widely throughout the world, and scientific instruments are available that measure it. Virtually all manufacturers of colored materials test the LRV of their products as a means of retaining consistency over multiple batches. Paint swatches available to consumers now usually list the LRV of each swatch.

D. We now are aware of at least two reasonably priced portable instruments that appear to give consistent measurements of the LRV of colored surfaces. An increasing number of people who want to give advice on contrast, or do field inspections, are using these devices. A reasonable assumption would be that if a measurable contrast standard is adopted, more makers of scientific instruments will develop small, affordable devices, and that the quality and ease of use of these devices will continue to improve.

E. Several studies over the years have suggested that the "Weber Formula," since it is in such

widespread use, and since the 70 percent contrast ratio is so widely accepted as a minimum be corrected, so that two very dark colors do not achieve an unreasonably high percentage of contrast. The suggestion has usually been that a reasonable LRV merely be chosen as the lowest color to be designated as the lighter of two colors that are being compared. Dr Colenbrander explained that there is no procedure that would pick a “perfect” LRV, any more than we can choose a perfect number of inches for the width of a door, or a figure for the slope of a ramp. As a long-recognized expert on contrast, he stated that an LRV of 45 was indeed a “reasonable” figure to use.

Since the Weber formula is well known in the United States, and was a reference in the original ADAAG Appendix, and the 70 percent contrast minimum is also well known, the Task Force on Contrast decided to build on something already well known and accepted rather than move to the UK Standard, which merely dictates a difference between two LRV figures. If you follow the progress of the British standard, you see that this figure now is different for various elements, with the latest document dealing with signage now listing a standard of 70 points of difference between the two LRVs, whereas the original standard of 30 points was based on the difference between various large architectural elements such as walls and doors. The Dalke-Rubin research showed that an increase for signs from 30 to 40 points made a significant improvement in the number of people who could discern differences in adjacent swatches, and when the difference increases to 70 (which is really only necessary when one of the colors is white or a very pale variation of white), 93 percent of those with significant vision impairments can discern the adjoining swatches.

F. One concern of the Committee was whether there is a standard to test LRVs. This question is answered, I believe, by citing the British Standard of Test. This testing protocol is stated as being effective for virtually every possible sign material except for self-illuminating or illuminated materials and other than for photo-luminescent materials that are used for safety signs during power outages, these are rarely used for common architectural signage. The British Standard has become the accepted standard throughout Europe, as far as I can discover. (As an aside, Geoffrey Cook, who spoke in support of the proposed standard, has been on the Standards Committee for the British Standard, and Hilary Dalke, whose interview I played, is currently on the Committee.)

G. Another concern of our Committee is whether we have any evidence about the levels of contrast and whether the proposed standard, if followed, will reach a reasonably large number of individuals with vision impairments. We certainly know that it will positively affect a large number of persons with color blindness, and that alone is about 8 percent of the population. Although most people with color blindness do not consider themselves as disabled, the fact is, however, that the condition can be disabling under specific circumstances, and reading safety and transportation venue signs may be one of those. If a person who is deaf or hard of hearing, or has some sort of speech related disability is also color blind, we can see how the one factor relates to the major disability. We cannot discount, as well, the increasing numbers of elderly persons whose ability to discern colors is affected.

I hesitate to try to pull out specific percentages from the Dalke-Rubin studies and relate them precisely to our proposed standard, but we do know that they find a difference of 40 points appears to positively affect 65 percent of persons with significant vision impairment. We know that by making the lowest level of light color one with an LRV of 45, that difference is achieved any time a dark color (0-5 LRV) is used together with a minimum light color (45 LRV). Our application of the Weber Formula as a second “test” of contrast requires a point difference of more than 40 points when two lighter colors are being compared. Of course, we do hope that many designers will choose to go beyond the minimum difference of 70 percent.

H. Is there anyone out there that would use this Standard? I am finding an increasing number of signage specifications that come to me in connection with requests for bids that have already adopted this standard! Evidently they are picking it up from ANSI proposals, and incorporating it. Architects are

actually looking for standards on which to hang their hats. Anyone who understands standards and codes at all expects something more than our vague “light on dark” statement, when no definition is given for either of those terms. Even the SEG D in the last White Paper I read, as well as many of the most prominent sign companies and designers cite the 70 percent formula. So people are seeking a measurable standard. Let’s quit quibbling and give them something usable, something with a familiar form of measurement, and then strive to refine it further in the next cycle.

Thank you for reading!
Sharon Toji

Email from Glenn Dea – July 1, 2016

Dear A117.1 Committee Members,

Dr. Ed Steinfeld has alerted us to research recently conducted in Norway on the topic of planning and measuring luminance contrast in staircases, and he has kindly forwarded a draft of this paper by Leif D. Houck, Kristoffer Gundersen, and Ola Strengen of the Norwegian University of Life Sciences, Department of Mathematical Sciences and Technology, Ås Norway. Although the article is not about signs, many of the same issues discussed by our committee come into play. The paper discusses Norway’s adoption of a fixed luminance contrast threshold in association with specific building elements such as handrails and steps.

Of interest to the committee is the research team’s use of Weber’s formula for purposes of calculating luminance contrast, as has been proposed for consideration by the committee, and limitations the researchers experienced in measuring contrast on-site. Of interest also is the paper’s reporting and discussion of how Norwegian standards express contrast requirements differently than what is prescribed in *ISO 21542:2011 (E) - Building construction - Accessibility and usability of the built environment*, the model accessibility standard in Europe.

Separately, in the ISA document dated June 23, 2016, and distributed by our Committee Secretary, reference was made in footnote 2 to research conducted in Australia: *An Improved Metric for Visual Differentiation using Colour-modified Clinical Eye Charts*, Redeemer Baptist School North Parramatta Australia, Sapolski, J., August 2009. We have attached a copy of this paper for the Committee’s reference. The Australian researchers discuss three of the four luminance contrast standards then in use by jurisdictions throughout the world -- those used in the UK, the US, and Australia --and the state of research on the topics of luminance contrast and basic visual function.

Kind regards,

Glenn Dea, AIA (CA Architect C-26299)
Certified Access Specialist, California (CASp-023)
ICC Accessibility Inspector/ Plans Examiner, 1063102
Vice President
Creative Design Associates
17528 E. Rowland Street, 2nd Floor
City of Industry, CA 91748

Please note that the articles referenced are not reproduced as we ICC does not hold copyright for them.

Communication from Kenneth Peskin, ISA – June 23, 2016

Kermit Robinson, Senior Technical Staff
ASC A117 Committee Secretary
3060 Saturn Street, Suite 100
Brea, CA 92821

23 June 2016

Kermit,

On behalf of Teresa Cox and the representatives of the International Sign Association, I am submitting these comments as supplementary materials for the July 5 ICC/A117.1 Committee Meeting. The statement for distribution to the committee begins on the following 5 pages.

Thank You,

Kenneth Peskin
Director, Industry Programs



ISA is in favor of making changes to the standard when they are supported by empirical evidence and research. Independent, empirical research on signs is needed.

During our meeting last November, Dr. Aries Arditi presented the beginnings of a paper that will be peer reviewed and published in the public domain. We are very close to a more consistent, more rational, and clearer solution to address signage and low vision accessibility. We have identified potential funding sources, independent of the sign industry, for a research project to test some of the ideas in his paper. If we can hold off just a bit longer, we will have a proposal based on science that can achieve a broad consensus on the committee.

We disagree with the committee action on this proposal for many reasons. The British Standard cited by the proponent pertains to contrast with other architectural elements (stairway striping, doors, carpets, and walls), not to contrast between characters and their background on signs. This proposal includes a minimum LRV of 45 for the lighter of the two colors; however each of the three LRV measuring devices shown at our meeting last month (for measuring LRVs in the field) had different readings for the same color. What would happen if the sign manufacturer's measuring device registered an LRV of 45 and the inspector's device measured 44.8? Clearly, more work needs to be done on this proposal before we change the standard.

Jurisdictions and standards organizations outside of the US, as listed in the table included with this comment, have adopted or are considering approaches to address contrast between characters and their background on signs that differ in significant ways from the proposal. For example, in Australia, wayfinding signs are subject to a minimum luminance contrast of 30%. In Canada, the CSA B651-12 accessibility standard (Revised October 2015) includes a requirement for visual [termed by CSA as *colour*] contrast of at least 70% but does so in conjunction with requiring the level of illumination on signs

to be at least 200 lux. Hong Kong and Singapore building standards specify separate criteria for colour contrast and luminance contrast.

Several of us, on both sides of this issue, are interested in serving on a **Signage Task Group to develop proposals for consideration during the next cycle**. We are very concerned about the precedent that will be set if a requirement for 70% contrast on signs -- without an empirical basis to support this as the threshold value nor consideration of factors that affect legibility of signs such as illumination levels -- is published in our standard.

Table – Comparison of Standards related to Contrast on Signs
(Australia, Canada, Hong Kong SAR-China, Singapore)

Country or State	Code or Standard	Is a fixed percent contrast difference between characters and their background specified?	Specified percent contrast (if one is specified)	Are minimum illumination levels specified for subject signs?	Does the standard specify a protocol to calculate visual contrast?	Remarks
Australia	<i>Disability (Access to Premises – Buildings) Standards 2010</i>	Yes	30% luminance contrast	Yes, element-specific levels ranging from 150 lux – 300 lux per Clause 19.1 of AS 1428.2	No	*fn1
	<i>AS 1428.1-2009 Design for access and mobility - General requirements for access - New building work, Standards Australia</i>	No	N/A	No	Yes, the Bowman-Sapolski equation found in Appendix B.	*fn2
	<i>DR [DRAFT] AS 1428.4.2:2015 - Design for access and mobility Part 4.2: Wayfinding, Standards Australia</i>	Yes	30% luminance contrast	No, Annex E (Informative) ORIENTATION AND MOBILITY refers to sufficient illumination, but a min. level is not specified.	Yes, reference is made to AS 1428.1, Paragraph B4.	*fn3 *fn4
Canada	<i>CSA B651-12 Accessible design for the built environment (Revised October 2015), CSA Group</i>	Yes	70% visual [termed by CSA as <i>colour</i>] contrast	Yes, at least 200 lux	Yes, the Michelson Contrast formula found in 4.3.5.3.4.	*fn5
Hong Kong SAR, China	<i>Design Manual - Barrier Free Access 2008, Hong Kong SAR Buildings Department</i>	No	N/A	Yes, at least 120 lux *fn6	Yes, based on [1991] ADAAG A4.30.5 formula *fn7	*fn8 *fn9

Singapore	Code on Accessibility in the Built Environment 2013, Singapore Building and Construction Authority	No	N/A	Yes, at least 200 lux	No	*fn10
-----------	--	----	-----	--------------------------	----	-------

*fn1 From Australia Disability (Access to Premises — Buildings) Standards 2010
<https://www.legislation.gov.au/Details/F2010L00668> :

“D4.4 Luminance contrast

The following apply to *luminance contrast*:

- (a) the background, negative space, fill of a sign or border with a minimum width of 5 mm must have a *luminance contrast* with the surface on which it is mounted of not less than 30%;
- (b) tactile characters, icons and symbols must have a minimum *luminance contrast* of 30% to the surface on which the characters are mounted;
- (c) *luminance contrasts* must be met under the lighting conditions in which the sign is to be located.

.....

H2.12 Lighting

Any lighting provided must comply with minimum levels of maintenance illumination for various situations shown in the notes to clause 19.1 of AS 1428.2.”

*fn2 From AS 1428.1-2009 Design for access and mobility - General
 APPENDIX B THE MEASUREMENT OF LUMINANCE CONTRAST BETWEEN BUILDING ELEMENTS
 (Informative):

“B3.3 Procedure

.....

The luminance contrast (C) of two surfaces has to be calculated using the following equation:

$$C = 125 (Y_2 - Y_1) / (Y_1 + Y_2 + 25) \text{ Bowman-Sapolinski equation}^*$$

where

C = luminance contrast

Y1 and Y2 = luminous reflectance values of the two surfaces

* An Improved Metric for Visual Differentiation using Colour-modified Clinical Eye Charts, Redeemer Baptist School North Parramatta Australia, Sapolinski, J., August 2009.”

*fn3 From DR [DRAFT] AS 1428.4.2:2015 - Design for access and mobility Part 4.2: Wayfinding
<http://infostore.saiglobal.com/store/Details.aspx?ProductID=1826853> :

“3.6 DESIGN REQUIREMENTS FOR NON-RAISED TACTILE WAYFINDING SIGNS FOR PEDESTRIANS WITH LOW VISION

3.6.1 General

The following are minimum requirements to be incorporated into the design, manufacture and installation of non-tactile wayfinding signs provided for pedestrians who do not read by touch:

- (e) All text and graphics shall have a minimum luminance contrast of 30% between the character and the background colour.

NOTE A formula for calculating luminance contrast for wayfinding signage is provided in AS 1428.1, Paragraph B4.”

*fn4 Per Standards Australia, this draft standard will be subject to a second round of public comment in 2017.

*fn5 From CSA B651-12 Accessible design for the built environment (Revised October 2015)
<http://shop.csa.ca/en/canada/accessibility/b651-12/inv/27021232012> :

“4.3.5.3.4 Calculation of the luminance contrast value

The luminance contrast value (%) shall be calculated using the following formula, known as Michelson Contrast, CM:

$$CM = (L1 - L2) / (L1 + L2) \times 100$$

where

L1 = the value of luminance on a lighter surface, expressed in cd/m²;

L2 = the value of luminance on a darker surface, expressed in cd/m²

When luminance values are not available, but CIE Y values are available, the values Y1 and Y2 may be substituted for L1 and L2. Note that the CIE Y value is identical to the LRV.

4.5 Signage

.....

4.5.3 Characters

On signs, letters and numerals shall

.....

- (e) be colour-contrasted by at least 70% with its background (see Figure 9);

.....

Commentary:

.....

(5) Illuminated signs with letters such as red, green, or blue should not be used on a black background.

(6) Examples of colours that contrast more than 70% are navy blue with matte white (95%), apple green with white (72%), and silver with saddle brown (70%).

(7) Colour combinations that should be avoided include yellow/grey, yellow/white, blue/green, red/green, black/violet, and red/black.

.....

4.5.5 Illumination

The level of illumination on signs shall be at least 200 lx.

.....

Annex E (normative)

Elevator requirements for persons with physical disabilities

Notes:

- (1) This Annex is a mandatory part of this Standard.

.....

E.20 Signs

E.20.1

Accessible signs shall comply with Clause E.20.2.

.....

E.20.2.9 Finish and contrast

Characters and their background shall have a non-glare finish. Characters shall contrast with their background, with either light characters on a dark background, or dark characters on a light background.

.....

E.20.3.11.1

Characters and their background shall have a non-glare finish. Characters shall contrast with their background with either light characters on a dark background or dark characters on a light background.”

*fn6 From Chapter 4 – Design Requirements, Division 16 - Illumination
<http://www.bd.gov.hk/english/documents/code/bfa2008/Division16.pdf> :

“73. Illumination Level for Signs

Signs provided under Division 13 shall have illumination level on the sign surface of not less than 120 lux.”

*fn7 See contrast formula in Design Manual - Barrier Free Access 2008 Appendix D – Luminous Contrast, page D/3 http://www.bd.gov.hk/english/documents/code/bfa2008/AppendicesA_D.pdf .

*fn8 Under Best Practice Section of Chapter 4 – Design Requirements, Division 13 –Signs, 70% luminance contrast is referenced in association with the ISA. From Design Manual - Barrier Free Access 2008 Chapter 4 – Design Requirements, Division 13 -Signs
http://www.bd.gov.hk/english/documents/code/e_bfa2008.htm :

“BEST PRACTICE SECTION

A. Design Considerations

- (a) Signs should be clear and easy to read and understand in order to assist persons with intellectual, cognitive and sensory disabilities.
- (b) International symbols are to be used for purpose of standardization and apprehension by all persons with a disability residing in Hong Kong or visiting from overseas. Examples of standard public information symbols are shown in Figure 37.
- (c) Prominent signs with high color and luminous contrasts as well as special shapes are recommended to be used for the elderly.”

.....

“B. Recommended Design Requirements

Location

- (a) Sign should be erected to indicate clearly the locations of accessible routes through the building.

Luminous Contrast

- (b) Luminous contrast of not less than 70% should be provided to differentiate the international symbol of accessibility from the background, either light-on-dark or dark-on-light. The commonly employed colours are white for the wheelchair figure and blue for the background.”

*fn9 From Design Manual - Barrier Free Access 2008 Appendix D – Luminous Contrast, page D/2
http://www.bd.gov.hk/english/documents/code/bfa2008/AppendicesA_D.pdf :

“A 30% difference in luminous is generally the minimum discernible by a person with partial sight. Black and white have a 100% luminous contrast. Grey and black or grey and white have a 50% luminous contrast.”

*fn10 From https://www.bca.gov.sg/BarrierFree/others/ACCESSIBILITY_CODE_2013.pdf :

“Sec. 8.5.3.1 All characters and graphical symbols shall:

.....

(b) have colours and tones that contrast with the following background:

(i) within the sign; and

(ii) with the surround or substrate.

.....

Sec. 8.5.6.1: “The minimum level of illumination on signs shall be 200 lux.

.....

Appendix D (recommendations): “A 30% difference in luminous is generally the minimum discernible by a person with partial sight. Black and white have a 100% luminous contrast. Grey and black or grey and white have a 50% luminous contrast..”

Ballot 16.4 – Comments submitted on #35.3

ISA – Teresa Cox

Affirmative Ballot with Comment

ISA would like to take this opportunity to comment and expand on the Reason Statement that was written after the July 5th action.

The Committee has considered many previous proposals to add an LRV based methodology of determining sufficient contrast to the standard. Although “light on dark” or “dark on light” may be imperfect, it represents the best solution at this juncture.

The inexpensive, easy to use LRV measuring devices brought before the committee are **NOT** highly consistent in their measurement, which would be a particular problem should the committee establish a minimum LRV for the lighter of two colors.

A minimum difference in LRV between visual characters and their background is a recommendation in Britain's accessibility standard/code of practice, BS 8300:2009+A1:2010, not a requirement.

In recent communications, the ISA has discussed how other codes and standards address visual contrast and signs. Some standards do not mandate a fixed numerical threshold and instead provide advisory information covering this topic. In this way, Singapore and Hong Kong are similar to what the UK does. In other countries, a fixed threshold is mandated or a draft code is in development to do that—this is true for codes in Europe and also in Canada. Whether or not a fixed threshold is mandated, we found that codes will mandate minimum illumination levels for signs.

Regarding formulas, we've generally focused on using Weber's formula which expresses luminance contrast as a ratio. Canada, in its model access code, instead uses Michaelson's formula and Australia specifies the Sapolinski equation. This represents an attempt to use a better formula more representative of how the human eye differentiates between surfaces.

Each of these three are similar in that they express contrast as a ratio or percentage. This is discussed in the ISO's model access standard, together with a fourth formula, the ISO or UK equation, which instead expresses contrast as the algebraic difference of readings between two surfaces.

The closest parallels we have to the proposal are in Canada and Australia—Canada's CSA standard specifies 70% for contrast and Australia's standard specifies 30%, on the basis of empirical research there.

So, among other standards organizations, there has been an effort to do something better than what we have in the US—light on dark/dark on light-- it's just that at this time there isn't consensus of specifically what threshold to mandate if one is mandated or what formula to use—those are issues we ask be addressed by a task group with the aim that a better standard, backed up by empirical research, be developed to address visual accessibility.

Access Board – Marsha Mazz**Affirmative Ballot with Comment**

Comment: It is time to move on, but we remain hopeful that the committee will address this important issue in a signage task group that will begin its work long before balloting begins for the next cycle.

Todd Andersen – individual member**Negative Ballot**

Comment: Enough already. We have abused this matter enough that it won't get a 2/3 vote – either up or down. I am saddened we didn't affirm as the proposed idea does far less than it's proponent claims and far less than it's opponent fear.

Alan Gettelman – individual member**Negative Ballot**

Comment: Retaining LRV in accord with the BS8493 Standard is a better definition than current Light/Dark-Dark/Light. Approval of the LRV measurement and reference to the BS8493 improves the next edition of the A117.1 Standard; waiting for results of further study and research does not.

Jake Pauls – individual member**Negative Ballot**

Comment: As much as I would like this matter to be deferred for the next cycle, I am more persuaded by the understanding of, and interpretation of, the existing research held by the advocates for action now to increase specificity on this issue.

AERBVI – Billie Louise Bentzen**Negative Ballot**

Comment: The Committee is in agreement that a more specific standard is needed. The Committee previously approved language based on the best scientific evidence and international practice available. No new scientific evidence has been presented that suggests that the draft that was previously approved is incorrect or inadvisable. There is now evidence presented by testimony of Gina Hilberry that the standard in the draft has and is being successfully used in major construction in St. Louis and is improving accessibility of the environment for people with and without impaired vision. A vote in the affirmative is simply a vote to delay improvement in the standard and to continue to approve the use of contrast which is based solely on subjective judgements of dark and light, and which impairs safety and independent wayfinding for people with impaired vision, including nearly all people over the age of 65 whose contrast sensitivity is decreasing, while their need for illumination is increasing. If there is new research or practice-based evidence that the standard needs to be changed in the next cycle, it can be changed.

DREDF – Marilyn Golden**Negative Ballot**

Comment: 70% is measurable, it's a clear improvement to the standard, and will ensure far better accessibility at required signage. The application is limited to required signs – not anything else, and waiting for future research will result in confusion and bad signage in many buildings.

HLAA – Sharon Toji**Negative Ballot**

Comment: We have increasing evidence from well-supported studies carried out by reputable researchers on the influence of contrast on access to architectural elements, including signage, that a difference of 40 points between the Light Reflectance Values (LRV) of two adjacent surfaces greatly increases the number of individuals who can discern those elements. Therefore, the proposed standard, which uses the familiar 70 percent formula in conjunction with a requirement for the lighter color to have a minimum LRV of 45, will meet that requirement when

one of the colors is very dark. By using a familiar formula, along with a very simple and easily understandable requirement, the Committee will be following the suggestion of several scientists who have worked on this problem in the past, and we will finally have a measurable standard for contrast rather than a vague and meaningless one. The fact that we now have reports of at least two small and affordable devices that can be used in the field to check LRV measurements and that do get repeatable results, is encouraging and should provide us with the confirmation we need that it is time to move this standard forward.

Sharon Toji requested that the following be included in her comment:

Email From Sharon Toji on August 3:

I was browsing through materials produced by the Pocklington Trust, and organization in the UK that funds research on vision, and found this wonderful booklet. Both Geoff Cook and Hilary Dalke were involved in providing the material for it. I don't know if we have a similar organization here in the U.S., although of course both the Braille Institute and the Lighthouse do produce a number of useful materials.

Our ANSI Standards for the interiors of living spaces do not deal at all with sensory based disabilities, but perhaps they should. I especially like the illustrations on stairs and steps, as well as doors. It's interesting to note where LRV is mentioned, along with differences in LRV that are recommended for specific elements.

If for some reason you can't get this to open either by clicking on it or pasting it into your browser, you can go to pocklington-trust.org.uk and then search for the booklet by name. Actually, this is just one of several booklets the Trust has published dealing with housing for persons with sight loss.

<http://pocklington-trust.org.uk/wp-content/uploads/2015/05/Housing-for-People-with-Sight-Loss.pdf>

Email of August 1 from Hilary Allday.

This email contains for attachments – As I was unable to attach them to this document, I will be forwarding Ms. Allday's email to you.

Hi everyone - and thank you all for sharing your valuable work on this important subject - CONTRAST. It is very heartening to see so much involvement from a wide range of people with passion coming together to make sense on this subject, and hopefully making it easier for everyone to get this right and help visually impaired people in the end.

One thing comes across clearly in some correspondence, is that many people do not realise that CONTRAST RATIO was primarily examined in relation to visual displays which was vital for aircraft etc and of course is really critical for all web screen accessibility today. This is not relevant for contrast in design for signage, products and environments.

However we know that **CONTRAST OF LIGHT REFLECTANCE VALUES**, which is the difference between **two adjacent material surfaces** - whether a text letter and background, or step edge, or column on a concourse - is critical for perception and independent living for visually impaired people.

You measure the **LIGHT REFLECTANCE VALUE** of a surface of a material (nothing to do with screen illuminance) by using a colorimeter to give you an LRV %. In the UK we use the difference between two LRVs % to achieve the important **CONTRAST DIFFERENCE** number (currently and advised 30). A spectrophotometer measures colour and is important for quality control in industry; but it is not the most useful tool to ensure widespread checking and specification of contrast in

environments (see Jean Meyer's report) . A colorimeter is an industry standard instrument and it is all that is needed for measuring Y values.

LRV% has to be measured with **all ambient light excluded**.

This provides empirical data on materials and products which is why we developed our meter now used all around the world.

Any measurement of Light (LUX LEVEL) is critical for visibility prediction in the environment but only in terms of being able to calculate one of the five factors that determine visibility. (Please see attached Springer Verlag publications and (www.cromocon.com/Cromocon/Cromocon_app.html)).

This is the work we have been doing for over 18 years testing to date around 500 people (see next email with attached PROJECTOR 2002 viewable on PC only). The most recent work you can see in the attached document (confidential not for publication) which is currently being prepared for final publication in 2016. You will see that research just completed looks at making the contrast advice to be 40 minimum for general visibility and 70 CD minimum for text etc on signage or hazardous objects. This research was extensive so I have shown only measurements and tests at 3 meters - stated by our 105 visually impaired participants as the critical distance for seeing anything that might be dangerous. I believe this is very important and unique work which Professor Rubin and I will be publishing this paper this year.

Thank you for your time! Hope some of it useful.....do let us know please.

Best wishes,

Hilary
Hilary Dalke

Director
CROMOCON Ltd
No 3
40 Carlton Drive
London
SW15 2DG
UK
www.cromocon.com
hilaryallday@btinternet.com
cromocon@gmail.com
+44 (0) 7710169734

Professor of Design (Emeritus)

THOMAS POCKLINGTON TRUST REPORT - <http://www.pocklington-trust.org.uk/Resources/Thomas%20Pocklington/Documents/PDF/Research%20Publications/RF39%20Making%20an%20Entrance.pdf>

<http://www.kingston.ac.uk/news/findanexpert/profile/23/hilary-dalke/>
http://fada.kingston.ac.uk/staff/view_staff.php?id=100

Commendation by HEFCE/UNLTD as a Business of Outstanding Social Impact

NAD – Hansel Bauman**Negative Ballot**

Comment: While the proposed means of measuring LRV that has been stricken, may not be ideal for use in the U.S. (British Standard), it does provide a level of measurability that make the standard more useful and makes a good step toward a new – more enforceable – standard which could be updated after the experience of using the new “British Standard” for one cycle of the standard. I propose leaving the LRV measures that is to retract the last committee vote.

UCP – Gina Hilberry**Negative Ballot**

Comment: The proposal as it stands in the draft should not be deleted. It makes sense to require a level of contrast that is measurable rather than stay with “light on dark or dark on light” language which can frequently result in signage that is functionally invisible to many with low vision. We have the technology available to improve signage accessibility and it should be in place immediately. Without adoption of our previous work, signage will remain undefined and frequently inaccessible. The proposal previously approved provided guidance and clarity to an area of the standards that is currently of little use.

While additional research is needed (it is our understanding that the work will be “available soon”) the deadline for this has been known for a long time and the research has not been forthcoming. I will welcome new work for the next cycle, but to continue to allow signs like this (see below) for another five years of building history is contrary to our charge to develop standards for accessibility:



Chapter 8

8-6– 12

(This represents the language approved by the committee for the First Public Review Draft)

Add new text as follows:

802.11 Stage Lighting for Sign Language Interpreters. Lighting shall be provided at each side of a stage for the purposes of illuminating a Sign Language Interpreter. The illuminated presentation area shall be 25 square feet (2.3 m²) minimum measured in a vertical plane with the bottom edge at 48 inches (1220 mm) above the finished floor and a minimum of 36 inches (915 mm) measured from the presentation wall. The illumination shall be provided by directional light fixtures controlled independently from the general room lighting. The fixtures shall be located as necessary to provide a diagonal cast of light for facial illumination at no less than 15 degrees from the vertical plane. The illumination shall be 10 foot candles (108 lux) minimum greater than the least light level.

8-6-12 PC1

Hansel Bauman representing National Association of the Deaf

Further revise as follows:

~~**802.11 Stage Lighting for Sign Language Interpreters.** Lighting shall be provided at each side of a stage for the purposes of illuminating a Sign Language Interpreter. The illuminated presentation area shall be 25 square foot (2.3 m²) minimum measured in a vertical plane with the bottom edge at 48 inches (1220 mm) above the finished floor and a minimum of 36 inches (915 mm) measured from the presentation wall. The illumination shall be provided by directional light fixtures controlled independently from the general room lighting. The fixtures shall be located as necessary to provide a diagonal cast of light for facial illumination at no less than 15 degrees from the vertical plane. The illumination shall be 10 foot candles (108 lux) minimum greater than the least light level.~~

802.11 General. Sign language interpreter stations shall comply with 802.11.

802.11.1 Area. A sign language interpreter station shall provide a level and clear floor of sufficient floor area necessary to enable a sign language interpreter to produce sign language legible from the seating area identified in 802.11.2 and allow periodic interpreter shift changes to take place.

802.11.2 Location. Sign language interpreter stations shall be located so that seating within an arc centered on the station and subtending 120 degrees maximum and not more than 65 feet from the station is provided with sightlines providing unobstructed view of the signers from top of their heads to their waists and to an arm's length to both sides of the signer, all as measured to the center of the station. The vertical viewing angle to the interpreter station shall not exceed 30 degrees.

802.11.4 Illumination: The sign language interpreter station shall be illuminated in compliance with 802.11.2 while signing is underway. Illumination of the sign language interpreter station shall comply with the Recommended Maintained Illuminance Targets established for a "Transitional Sermon" by IES Handbook 10th Edition, Table 37.2.

802.11.5 Backdrop. When a sign language interpreter station is located no greater than 10 feet in front of a permanent wall as measured tangent to the centerline of the arc described in 802.11.2 a portion of the wall measuring 69 inches wide centered on the sign language interpreter station and 96 inches high from the finish floor shall be considered as a backdrop. The surface treatment of the backdrop shall comply with 802.11.5 while sign language interpretation is being provided. The backdrop shall provide a flat, smooth surface with a monochromatic, low-luster finish treatment.

Reason: The proposed revision to **802.11 Stage Lighting for Sign Language Interpreters** is a complete replacement of the text provided in the Public Review Draft dated October 25, 2013. The revised proposal provides a performance standard for **Sign Language Interpreter Stations** to accommodate a reasonable range of possible performance venues where sign language interpreting would likely be provided rather than providing targeted guidance for a specific location. The revision provides measurable lighting conditions, spatial relationships and adds guidance for the surface treatment for a backdrop which could greatly enhance ones acuity of reading sign language from a prescribed area within audience seating.

In the revised text the sign language interpreter station (the station) is defined in terms of its performance as an area that enables an interpreter to perform visual communication. The station is located in relation to a seating area within the audience that would have reasonable visual access to the station. The dimensions and geometry used to describe the Location / seating area derived from information on acceptable theater viewing angles published in Time Saver Standards for Building Types by De Chiara and Callender.

Measures for lighting are provided by way of reference to the Illuminating Engineering Society (IES) Handbook. The proposed lighting levels and methods for measuring the lighting levels at the station are consistent with lighting levels determined as beneficial for viewing sign language in similar conditions observed over time at public forums held at Gallaudet University where sign-language interpreting is used in public forums on a daily basis. The IES standard substantiates the lighting levels for viewing gestures in sermons that are video recorded. Until further detailed research is provided this the IES standard provides a reasonable measure of light levels in both the vertical and horizontal directions in which sign language is viewed.

Finally the proposal provides guidance for surface treatment for a permanent wall that, because of its proximity to the area identified as the station would serve as a backdrop to the sign language produced by the interpreter. The proposed language seeks to provide a reasonable requirement for an architectural backdrop that would not interfere or be a part of the stage set of the performance being interpreted. Furthermore, the standard for the backdrop intends to allow reasonable flexibility to the wall surface treatment while controlling glare and visual vibrations caused by shadows produced by heavy wall texture and or surface patterns. Controlling these adverse conditions greatly reduces eye strain and enhances acuity.

Committee action on 8-6-12 PC1

Approve Public Comment 8-6-12 PC1

Reason: The public comment is a significant improvement over that previously approved, providing clear design parameters for sign language interpreter stations. The committee hopes including this in the next public review draft will promote comments to improve it further..

Public Comment on Second Public Review Draft

Agenda Item #42

**Comment No:
8-6-12 PC1.1**

**Submitted by:
Kim Paarlberg - ICC**

Revise as follows:

~~405.2.XX IES Handbook 10th Edition, (Illuminating Engineering Society, 120 Wall Street, Floor 17, New York, NY 10005-4001).~~

802.11 General. Sign language interpreter stations shall comply with Section 802.11.

802.11.1 Area. A sign language interpreter station shall provide a level and clear floor of sufficient floor area necessary to enable a sign language interpreter with a minimum size of 24 inches (? mm) deep and 36 inches (? mm) wide that is located to providing a direct line of sight from to produce sign language legible from the seating area identified in

	<p>Section 802.11.2 and allow periodic interpreter shift changes to take place.</p> <p>802.11.2 Location. Sign language interpreter stations shall be located so that seating within an arc centered on from the station and subtending 120 <u>measured to the left and right a minimum of 60 degrees maximum and not more than within 65 feet (19.8 m) horizontal distance</u> from the station is provided with sightlines providing unobstructed <u>a view of the signers from top of their heads to their waists and to an arm's length to both sides of the signer</u> sign language station from a height 36 inches (?? mm) to 72 inches (?? mm) above the floor of the station , all as measured to the center of the station. The vertical viewing angle from the person in the seat to the interpreter station shall not exceed 30 degrees <u>measures to the front and center of the floor of the sign language station</u>.</p> <p>802.11.3 Illumination: The sign language interpreter station shall have lighting facilities capable of providing 10 foot-candles (108 lux) of illuminance while signing is underway be illuminated in compliance with 802.11.2 measured at the center of the floor of the sign language station at a height of 48 inches (? mm) above the floor <u>Illumination of the sign language interpreter station shall comply with the Recommended Maintained Illuminance Targets established for a "Transitional Sermon" by IES Handbook 10th Edition, Table 37.2.</u></p> <p>802.11.4 Backdrop. When a sign language interpreter station is located no greater <u>less</u> than 10 feet (3050 mm) in front of a permanent wall as measured tangent to the centerline of the arc described in Section 802.11.2 a portion of the wall measuring 69 inches (1755 mm) wide centered on behind the sign language interpreter station and to a height of 96 inches (2440 mm) high from the finish floor shall be considered as a backdrop. The surface treatment of the backdrop shall comply with Section 802.11.5 while sign language interpretation is being provided. The backdrop shall provide a flat, smooth surface with a monochromatic, low-luster finish treatment.</p> <p>Exception: <u>The wall is not required to comply with Section 802.11.4 where a backdrop with a monochromatic, low-luster finish treatment is provided.</u></p>
<p>Comment Reason by Kim Paarlberg:</p>	<p>105.2.xx, and 802.11.3 - A handbook that includes recommendations should never be references in a standard that relies on mandatory requirements. This goes against all policies followed by the A117.1 for all other referenced standards.</p> <p>802.11.1 – The phrase “to produce sign language legible from the seating area identified” is replaces by “providing a direct line of sight from”. Whether or not sing language is legible is dependent on the eyesight of the viewer. This language is not clear or uniformly enforceable. The proposed language is consistent with language used in the assembly seating criteria and is more clearly understood.</p> <p>The phrase “and allow periodic interpreter shift changes to take place” is proposed to be struck because this is an operational issue and not clear. Does this mean that there has to be space for two people to exchange, or that there needs to be a place for the 2nd person to stand or sit out of the way? I have seen the 2nd interpreter sit next to the 1st interpreter or come from somewhere else – both options should be permissible.</p> <p>802.11.2 - The word subtend is defined in the dictionary as follows: In geometry, an angle subtended by an arc, line, or other curve is one whose two rays pass through the endpoints of the arc. The precise meaning varies with the context. For example, one may speak of the angle subtended by an arc of a circumference when the angle's vertex is a point on the circumference. A simple theorem of plane geometry states that arcs of equal lengths subtend equal angles in such a situation.</p> <p>Assuming this is the range for where the seats that have a good view of the interpreter are required, if an interpreter</p>

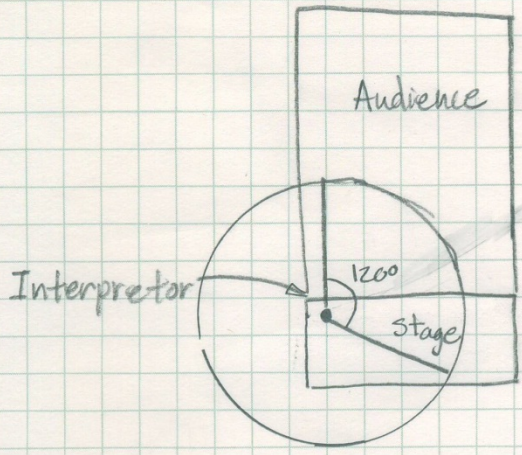
was standing in the middle of the stage, this might be doable. However, the most common place for an interpreter is at the side of the stage. This literally would require the viewing area to be behind them. See Figures. The maximum” could be read to indicate that the angle could be anything up to that range in width – including 0 degrees – which I don’t think was the intent. ‘Unobstructed’ to 65 feet could be interpreted to not allow any columns in the room in that area. Thus the room we have our A117.1 meetings in would be in violation. Since an interpreter could be of any height, using the size of the interpreter for the viewing range is not consistent.

The intent of the revisions to the last sentence is intended to provide more precise information of measurement. However, this requirement should probably be deleted because it could prohibit seating immediately in front of the interpreter when the interpreter is on any type of raised platform or stage.

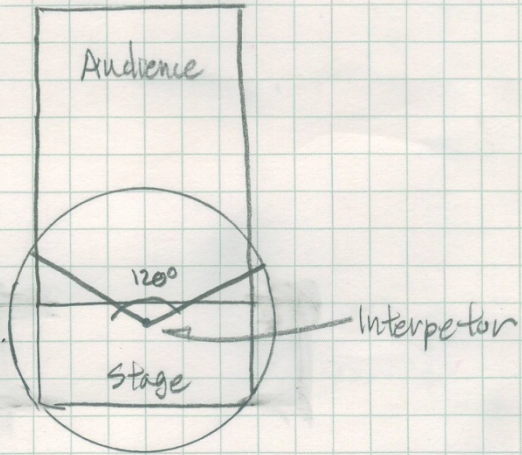
802.11.3 – 10 footcandles is the lighting required for work. The measurement it take at the approximate height of the signers between their hands and face.

802.11.4 – The phrase “as measured tangent to the centerline of the arc described in Section 802.11.2” does not seem to have any purpose and is confusing. Why set a width of 69” if the station is wider? The backdrop is the full width of the station. The sentence “The surface treatment of the backdrop shall comply with Section 802.11.5 while sign language interpretation is being provided.” Is struck because you do not change the surface of a permanent wall. An exception that would allow for good contrast is a better solution. “Smooth” is left out of the exception because the temporary backdrop may be a curtain.

If the committee agrees with the problems raised, but do not think that these corrections go far enough, the alternative would be to vote to delete the original proposal.



Interpreter at side of stage



Interpreter at center of stage



BARTON CREEK
CONFERENCE RESORT

8212 Barton Club Drive • Austin, Texas 78735 • 512/329-4000 • 800/527-3220

**Committee Action of February 2015 regarding Agenda Item #42
– comment number 8-6-12 PC 1.1**

Approved:

Reason:

Please see Comment Reason provided by Ms. Paarlberg. The committee approved this public comment as a welcome improvement and refinement of these provisions which will be new to the A117.1 standard.

Third Public Review Draft

8-6-12

Agenda Item #42.1

Committee Action on Agenda Item #42.1 – comment number 8-6-12/1.1 – PC1.1

Approved

Reason: The committee agreed with the proponent that the final sentence of Section 802.11.2 what going to potential affect placement of seats in an auditorium design. Such was not the intent of the original proposal. The original intent was to provide criteria for staging of sign language interpreters and not force restrictions on seating arrangement.

**Comment No:
8.6.12/1.1 – PC 1.1**

**Submitted by:
Kim Paarlberg
International Code Council**

Further revise as follows:

802.11 Stage Lighting for Sign Language Interpreters (8-6-12 PC1)

802.11 General. (no change)

802.11.1 Area. (no change)

802.11.2 Location. Sign language interpreter stations shall be located so that seating within an arc from the station and measured to the left and to the right 60 degrees within 65 feet (19.8 m) horizontal distance from the station is provided with sightlines providing a view of sign language station from a height of 36 inches (915 mm) to 72 (1830 mm) inches above the floor of the station. ~~The vertical viewing angle from the person in the seat to the interpreter station shall not exceed 30 degrees measured to the front and center of the floor and center of the floor of the sign language station.~~

802.11.3 Illumination: (no change)

	<p>802.11.4 Backdrop. When a sign language interpreter station is located <u>with a permanent wall</u> less than 10 feet (3050 mm) in front of a permanent wall behind the sign language interpreter station, <u>the permanent wall</u> and to a height of 96 inches (2440 mm) from the finish floor shall be considered as a backdrop. The backdrop shall provide a flat, smooth surface with a monochromatic, low-luster finish treatment.</p> <p>Exception: The wall is not required to comply with Section 802.11.4 where a backdrop with a monochromatic, low luster finish treatment is provided.</p>
<p>Comment Reason: The changes to Section 802.11.1 and 802.11.4 are for cleaner English, and perhaps can be considered editorial.</p> <p>The last sentence for 802.11.2 has a technical issue. The cone described for the seat from the interpreter can pick up a huge range of seats. Which seat is the vertical viewing angle required in the last sentence to be taken from? If this is interpreted as all of the seats, for the front rows, where a person with vision impairments may choose to sit, the viewing angle of 30 degrees may be too small. In a venue with tiered seating, a 65' horizontal distance from the stage may have the seats located substantially above the interpreter station. The language does not indicate if this viewing angle is up or down. I did find the attached image while attempting to do some research on this, but with the lack of technical justification and study, it seems better to not include this criteria at this time and come back with something next cycle if this becomes an issue.</p>	

