Coefficient of Friction Test for Sound Stage 33, Project "Strongarm"

March 10 – 12, 2008
Equipment Used: Trusty-Step Slip Meter, Model TSI-9010 & TSI TH-Calc, Model 8727
EHS Representative: Rob Roberts
Location: Sound Stage 33

General:

EHS was contacted to conduct follow-up slip tests during a snow mock-up, which took place in SS 33 for project "Strongarm", in order to help determine the type of pre-show flooring to be used. The static coefficient of friction (S.C.O.F.) was measured before and after the snow had fallen. The coefficient of friction is an indicator of the potential for fall due to slippery floor conditions. The Americans with Disabilities Act (ADA) (Section A 4.5.1) recommends a static coefficient of friction of 0.6 for accessible routes and 0.8 for ramps.

Methodology:

A Trusty-Step Slip Meter was used to obtain the SCOF readings. The meter was operationally calibrated prior to the readings taken on the date of testing. The meter was fitted with neolite and leather pads and was pulled across the surface being tested by a motorized controller. The feet were sanded prior to testing and after every four (4) pulls to relieve contaminants from the surface of the feet. The sample area was marked by the directions of the compass and subsequently broken into quadrants. The south-west and north-east quadrants were tested to provide comparative data. The readings were recorded after each test. Results of >1 will be calculated as 1 for averaging purposes. See photos of testing areas.

Observations:

The flooring material provided for testing was textured concrete that has been sealed with SCOFIELD® Cureseal-S ™. Of note was the texture of the mock wood-grain; some areas were finished to varying degrees of roughness. Areas that were rough produced a higher SCOF.

Two (2) machines were used to produce the snow effect. Each was placed approximately 20 feet above the flooring sample with the outputs facing inward toward each other. This configuration was explained to simulate the proposed show scene layout. The cycling of the snow followed a pattern of 20 seconds "on", 2 minutes 40 seconds "off." Each snow machine oscillated on a turntable providing a coverage area of about 45 degrees based on observation without instrumentation.

Cleaning between snow cycles was accomplished via a wet mopping with a solution of 50% water and 50% denatured alcohol.

Upon conclusion of the test on 3/12/2008 at 1600, a measurement of temperature and humidity was taken inside the soundstage via a TSI TH-Calc. Temp: 75 degrees F. Relative humidity: 41%

Results:

The flooring material provided for the snow mock-up met the ADA requirement of 0.6. See table for data.

Recommendations:

Based on the mock up results, the concrete textured flooring sealed with SCOFILED® Cureseal-S™ makes a suitable walking surface. All areas predicted to be employee and guest walk ways should remain as rough as possible and efforts to eliminate a glossy surface should be taken during construction and thereafter. Pictures were taken of the sample floor areas that were glossy and gave the lowest of results of the SCOF testing; see attached photos.

SCOF Readings Sound Stage 33, Project “Strong Arm”

DATE: 3/10/2008

Time	Location	Condition	Rotation*					
			1	2	3	4	Avg	Comments
1645	South-west corner	Dry – Neolite	>1	.9	.9	.9	.925	Initial testing of surface. Surface is textured concrete and treated/sealed with Scofield Cureseal-S
1645	North-east corner	Dry – Neolite	.85	.95	.925	.85	.89	Initial testing of surface. Surface is textured concrete and treated/sealed with Scofield Cureseal-S

Date/Time	Location	Condition	Rotation*					
			1	2	3	4	Avg	Comments
1645	South-west corner	Dry – Leather Feet	.875	.825	.75	.725	.79	Initial testing of surface. Surface is textured concrete and treated/sealed with Scofield Cureseal-S
1645	North-east corner	Dry – Leather Feet	.825	.9	.775	.7	.8	Initial testing of surface. Surface is textured concrete and treated/sealed with Scofield Cureseal-S

DATE: 3/11/2008

Time	Location	Condition	Rotation*					
			1	2	3	4	Avg	Comments
0915	South-west corner	"Wet" - Neolite	>1	.9	.95	.95	.95	Test "snow" has been running for 16-hours. Surface has not been cleaned prior to test.
0915	North-east corner	"Wet" - Neolite	.8	.95	.85	.7	.825	Test "snow" has been running for 16-hours. Surface has not been cleaned prior to test.

Time	Location	Condition	Rotation*					
			1	2	3	4	Avg	Comments
0915	South-west corner	"Wet" – Leather Feet	.85	.7	>1	.825	.84	Test "snow" has been running for 16-hours. Surface has not been cleaned prior to test.
0915	South-west corner	"Wet" – Leather Feet	.775	.7	.775	.725	.74	Test "snow" has been running for 16-hours. Surface has not been cleaned prior to test. Mopping began at 0945.

Time	Location	Condition	Rotation*					
			1	2	3	4	Avg	Comments
1645	South-west corner	Dry - Neolite	.975	>1	.975	.8	.93	50/50 Denatured Alcohol and water solution was used to mop clean surface and left to dry for 8-hours
1645	North-east corner	Dry - Neolite	>1	.925	.95	.975	.96	50/50 Denatured Alcohol and water solution was used to mop clean surface and left to dry for 8-hours

Time	Location	Condition	Rotation*					
			1	2	3	4	Avg	Comments
1645	South-west corner	Dry – Leather	.8	.65	.675	.75	.72	50/50 Denatured Alcohol and water solution was used to mop clean surface and left to dry for 8-hours.

3/11/2008 Cont'd

1645	North-east corner	Dry – Leather	.775	.75	.75	.65	.73	50/50 Denatured Alcohol and water solution was used to mop clean surface and left to dry for 8-hours.

DATE: 3/12/2008

Time	Location	Condition	Rotation*					
			1	2	3	4	Avg	Comments
0910	South-west corner	"Wet" – Neolite	>1	1	1	.95	.975	2nd test of wet test after another16-hour cycle. Surface has not been cleaned prior to testing.
0910	North-east corner	"Wet" – Neolite	.925	.9	.875	.825	.88	2nd test of wet test after another16-hour cycle. Surface has not been cleaned prior to testing.

Time	Location	Condition	Rotation*					
			1	2	3	4	Avg	Comments
0910	South-west corner	"Wet" – Leather	.75	.9	.825	.75	.81	2nd test of wet test after another16-hour cycle. Surface has not been cleaned prior to testing.
0910	North-east corner	"Wet" – Leather	.675	.775	.675	.75	.72	2nd test of wet test after another16-hour cycle. Surface has not been cleaned prior to testing.

Time	Location	Condition	Rotation*					
			1	2	3	4	Avg	
								Comments
1000	South-west corner	Wet – Neolite	.9	1	.9	.975	.94	Worst-Case Scenario #1. Test was conducted with a subject wearing a poncho with sunscreen applied to exposed skin. Subject was then doused with 3 (approx 20oz) containers of water. Subject then walked across concrete test area and removed poncho. This was to simulate the actions a guest may take in line.
1000	North-east corner	Wet – Neolite	>1	1	.85	.75	.9	Worst-Case Scenario #1. Test was conducted with a subject wearing a poncho with sunscreen applied to exposed skin. Subject was then doused with 3 (approx 20oz) containers of water. Subject then walked across concrete test area and removed poncho. This was to simulate the actions a guest may take in line.

3/12/2008 Cont'd

Time	Location	Condition	Rotation*					
			1	2	3	4	Avg	Comments
1000	South-west corner	Wet – Leather	.7	.875	.825	.8	.8	Worst-case Scenario #1. Test was conducted with a subject wearing a poncho with sunscreen applied to exposed skin. Subject was then doused with 3 (approx 20oz) containers of water. Subject then walked across concrete test area and removed poncho. This was to simulate the actions a guest may take in line.
1000	North-east corner	Wet – Leather	.7	.875	.8	.8	.79	Worst-case Scenario #1. Test was conducted with a subject wearing a poncho with sunscreen applied to exposed skin. Subject was then doused with 3 (approx 20oz) containers of water. Subject then walked across concrete test area and removed poncho. This was to simulate the actions a guest may take in line.

Time	Location	Condition	Rotation*					
			1	2	3	4	Avg	Comments
1015	South-west corner	Wet – Neolite	.975	>1	.75	.875	.9	Worst-case Scenario #2. Test was conducted with one cup (approx 20oz) of water with Orange wedge dropped to floor. Subject walked through spilled water.
1015	North-east corner	Wet – Neolite	.975	.85	.875	.925	.91	Worst-case Scenario #2. Test was conducted with one cup (approx 20oz) of water with Orange wedge dropped to floor. Subject walked through spilled water.

3/12/2008 Cont'd

Time	Location	Condition	Rotation*					
			1	2	3	4	Avg	Comments
1015	North-east corner	Wet – Leather	.95	.95	1	.95	.96	Worst-case Scenario #2. Test was conducted with one cup (approx 20oz) of water with Orange wedge dropped to floor. Subject walked through spilled water. Only one set of test was conducted due to saturation of leather feet on testing equipment. **Mopping began at approx 1030.**

Time	Location	Condition	Rotation*					
			1	2	3	4	Avg	Comments
1530	South-west corner	Dry - Neolite	1	>1	>1	.925		50/50 Denatured Alcohol and water solution was used to mop clean surface and left to dry for 5-hours.
1530	North-east corner	Dry - Neolite	.85	.95	>1	.925		50/50 Denatured Alcohol and water solution was used to mop clean surface and left to dry for 5-hours.

Time	Location	Condition	Rotation*					
			1	2	3	4	Avg	Comments
1530	South-west corner	Dry – Leather	.9	.9	>1	.8		50/50 Denatured Alcohol and water solution was used to mop clean surface and left to dry for 5-hours.
1530	North-east corner	Dry – Leather	.7	.9	.775	.75		50/50 Denatured Alcohol and water solution was used to mop clean surface and left to dry for 5-hours.

*Rotation is the orientation of the slip meter when the reading is taken. Four readings are taken:

1- Towards the North
2- Towards the South
3- Towards the East
4- Towards the West

Photo Attachments:

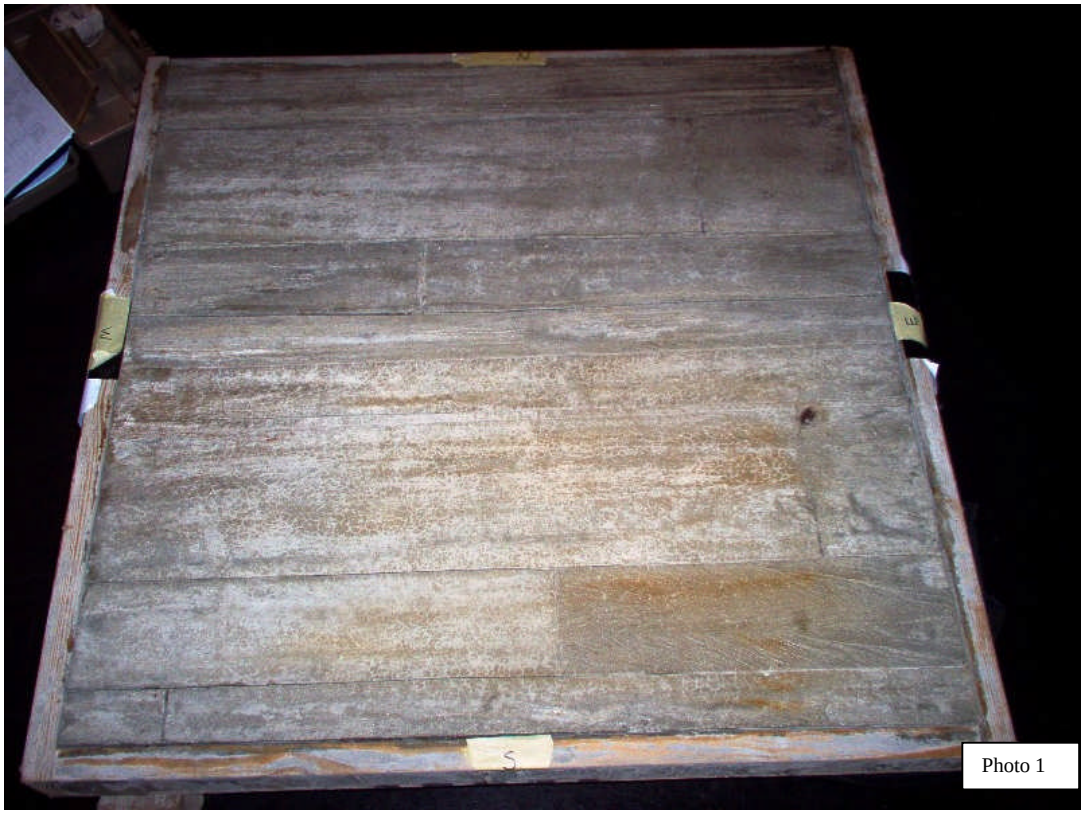

Photo 1

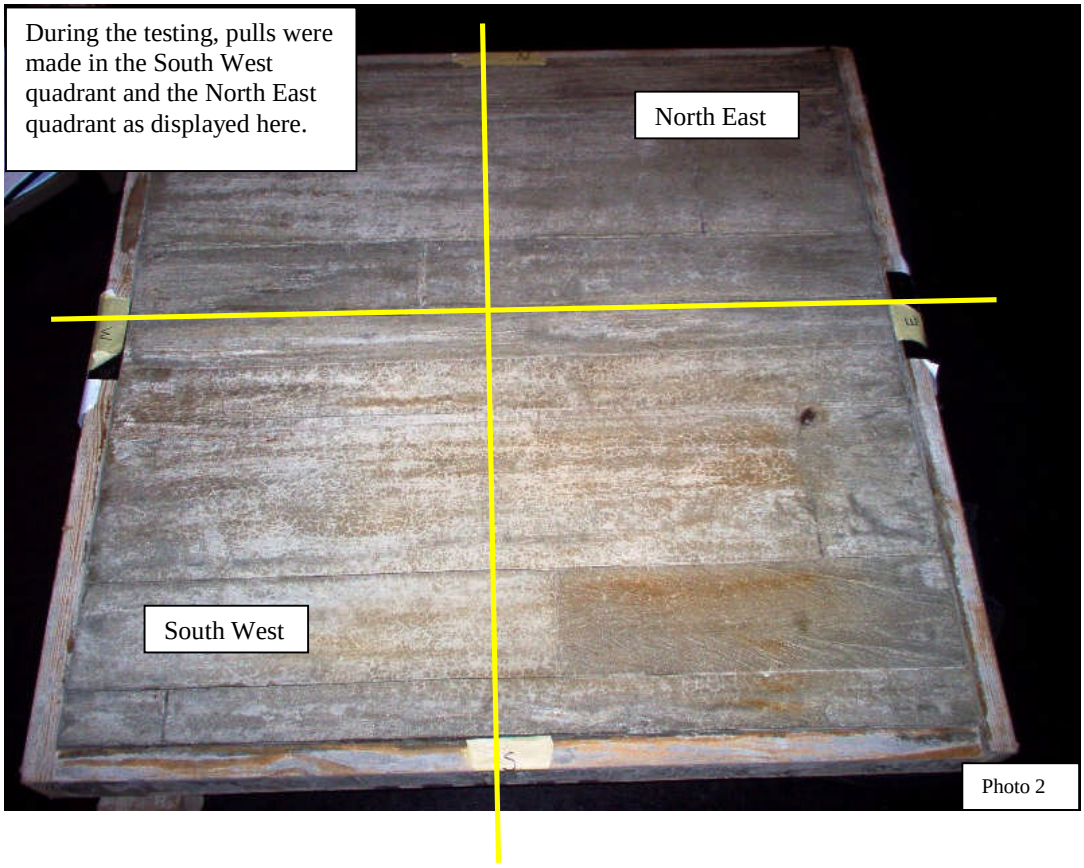

Photo 2

Photo’s cont’d

Photo’s cont’d