FWD-RU6701

# Falling Weight Deflectometer vs Laboratory Determined Resilient Modulus (Slab Curling Study)

**FINAL REPORT**
**December 2005**

Submitted by


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Federal Highway Administration

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16. Abstract

Stantec Consulting completed Falling Weight Deflectometer (FWD) testing on three PCC Slabs built at East Brunswick location. Two sets of FWD testing were performed, one on August 5, 2005 and the second on October 28, 2005.

Dynatest Model 8002-231 series Falling Weight Deflectometer (FWD) was used for deflection testing. Deflection tests were performed on three constructed slabs along three paths (right wheel path, edge and slab center line) using three load levels, 9000, 12000 and 14000 lbs. The pavement deflections measured with the FWD were used to determine the structural properties of the pavement layer and subgrade soil through the backcalculation. The backcalculation analysis was performed according to 1993 AASHTO Design Guide to calculate the in-situ pavement structural capacity and subgrade modulus.

The pavement PCC thickness varied slightly from 11 inches to 11.5 inches; therefore a thickness of 11.5 inches was used in the backcalculation analysis. A 4 inches base and 4 inches subbase thickness were assumed for the backcalculation analysis.

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# Slab Curling Study

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## Summary

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# 1.0 Introduction

Stantec Consulting was contracted by Rutgers University to conduct the FWD testing and corresponding analysis on three PCC slabs that were built in East Brunswick. Constructed slabs had an average thickness of 11.5 inches and width of 12 ft. Each of the slabs has different length. “Slab 1” is 16.7 ft long, “Slab 2” is 15 ft long while “Slab 3” is 78.5 ft long.

As a part of the pavement evaluation, this report was prepared to summarize the FWD testing and data analysis and to quantify the strength of the pavement structure.

FWD tests were performed by Stantec on August 5$^{th}$ and October 28$^{th}$ 2005. Deflection measurements were taken along Right Wheel Path, Edge and Centerline. Tests were performed at slab center and joint approach and joint leave (along the longer slab, “Slab 3”, two additional tests were added) along each tested path.

# 2.0 Testing Plan

The FWD testing was performed using an LTPP-SHRP calibrated FWD to determine the structural capacity of newly constructed pavement. Test locations included three PCC slabs, one 78.5 ft long slab, one 15 ft long slab and the one 16.7 ft long slab. Deflection testing was performed along three paths: RWP (3 ft from slab right end), Edge (1ft from slab right end) and Centerline (6 ft from the slab right end) for the 12 ft wide slabs.

Each slab was tested with nine test points per slab (center of the path, joint approach and joint leave). In addition, the long slab (78.5 ft) had two additional test points in each wheel path, as shown in Figure 1. All testing points were paint marked before the start of the testing.

The slabs were retested 3 times on each testing day. At each test location a series of four load applications were applied to the pavement surface. The first application is a “seating” drop of 9000 lbs to ensure that the FWD loading plate is firmly resting on the pavement surface. The next three load levels are approximately 9000, 12000 and 14000 lbs. At each test location pavement deflections under load were measured by nine sensors (geophones) placed at the following fixed spacing (see Table 1) from the center of the 12 inches diameter load plate. Both pavement and air temperatures were automatically and continuously recorded during the FWD testing.

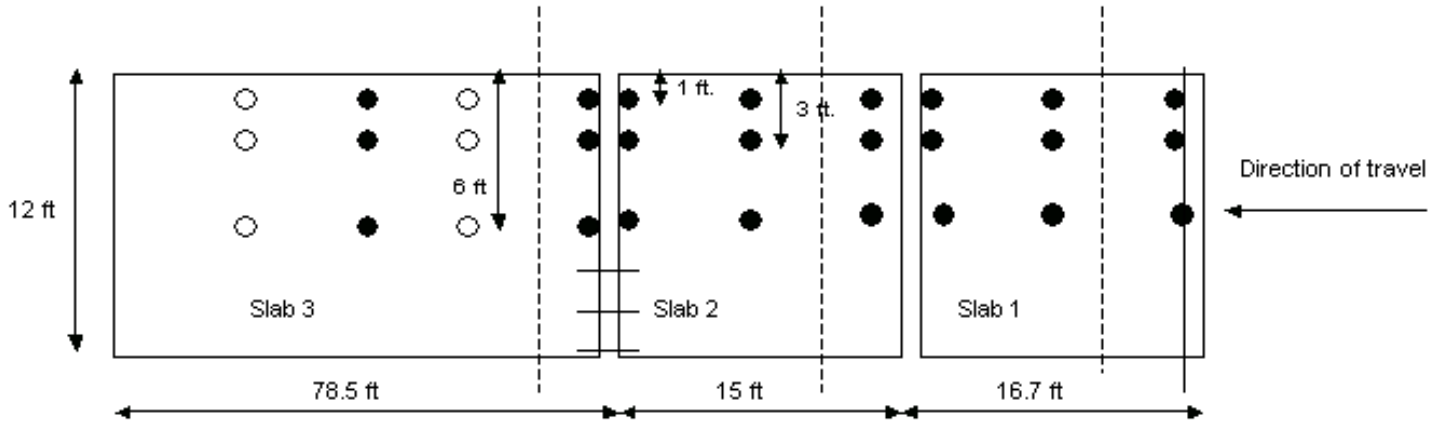
**Table 1. FWD Sensor Configuration**

| Sensor Number | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|
| **Offset from Load Center (in.)** | 0 | 12 | 18 | 24 | 36 | 48 | 60 | 72 | -12 |

## 2.1 TEST LOCATIONS

Figure 1 shows the test locations.

**TEST LOCATIONS**




● Test point

**Not to Scale**

# 3.0 Analysis Methodology and Results

The AASHTO 1993 Design Guide backcalculation analysis was used to determine the structural properties of the pavement layers and subgrade soils.

## 3.1 MAXIMUM NORMALIZED DEFLECTION

The maximum normalized deflection ($D_o$), measured at the center of the load plate, is a good indicator of overall pavement strength. The deflection at this location is a function of the pavement layer stiffness, as well as the support capacity of the subgrade. As deflection depends on load and due to slight variations in measured load at each test point, the deflections are adjusted or normalized to a "standard" load level of 9000 lbs. Figures 2 and 3 represent the variation of maximum normalized deflection ($D_o$) data along the tested slabs. The first test location (leave joint) is represented as Station 0 and the remaining test locations are referenced from it in feet. For more details see Figure 1. Figures 4 and 5 show the change in the surface temperature during the testing.

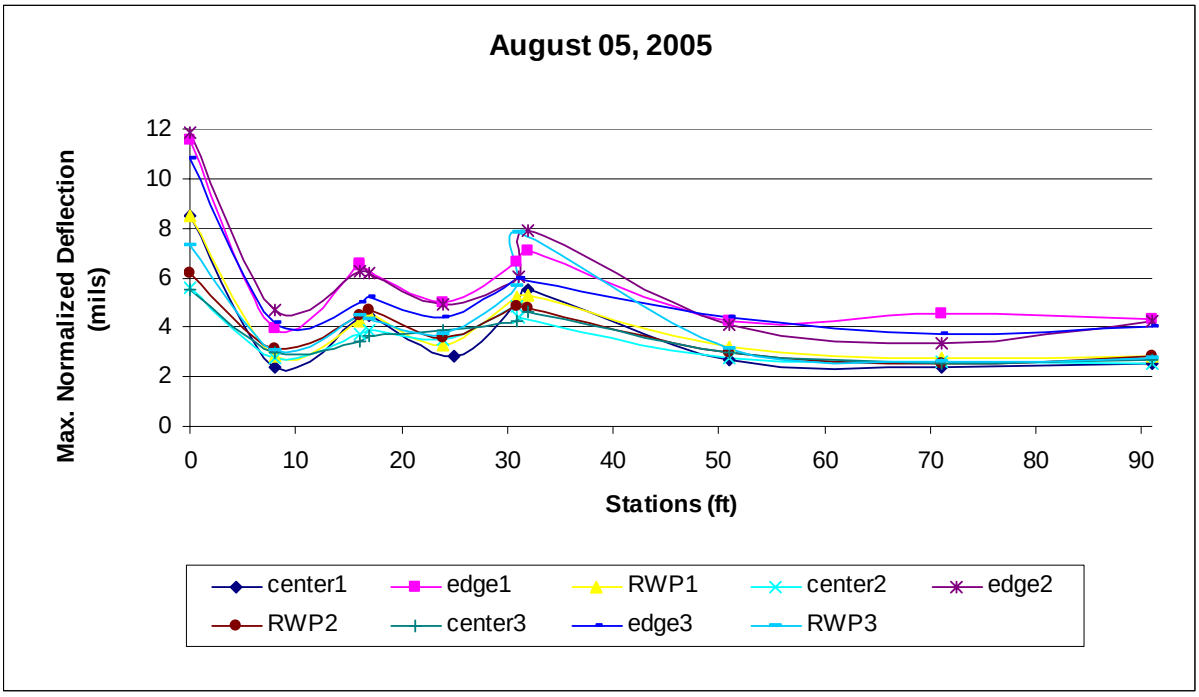



**Figure 2. Maximum Normalized Deflections along the Slabs for August Testing**

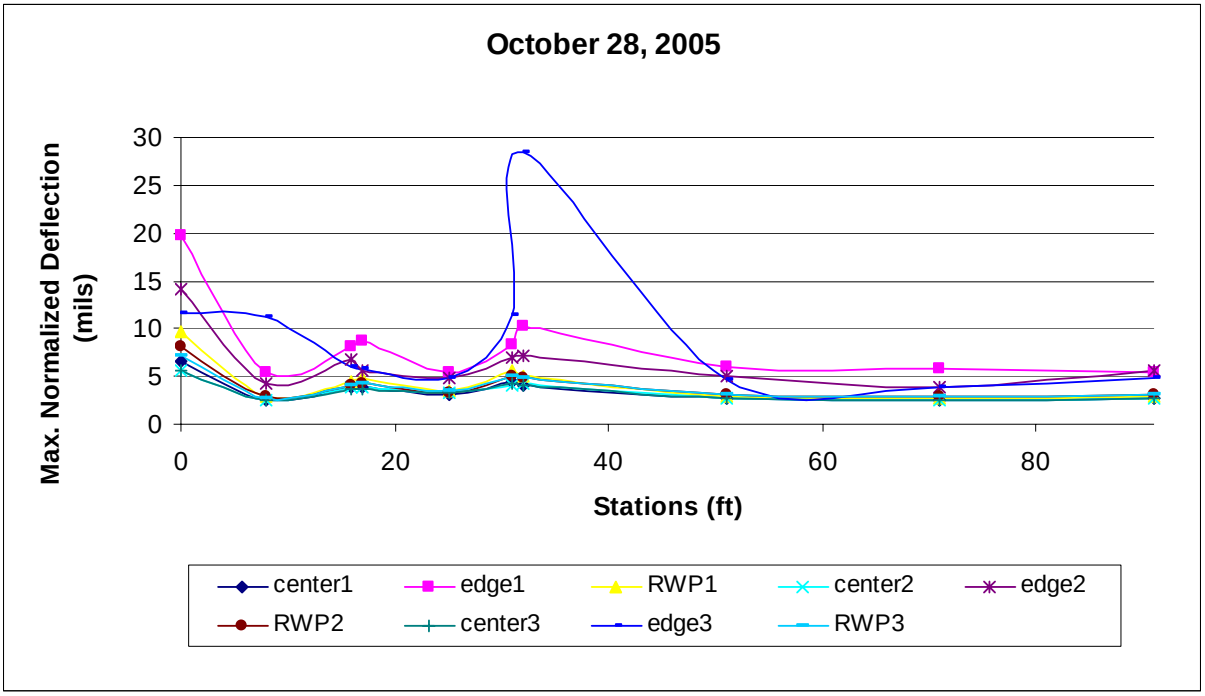



**Figure 3. Maximum Normalized Deflections along the Slabs for October Testing**

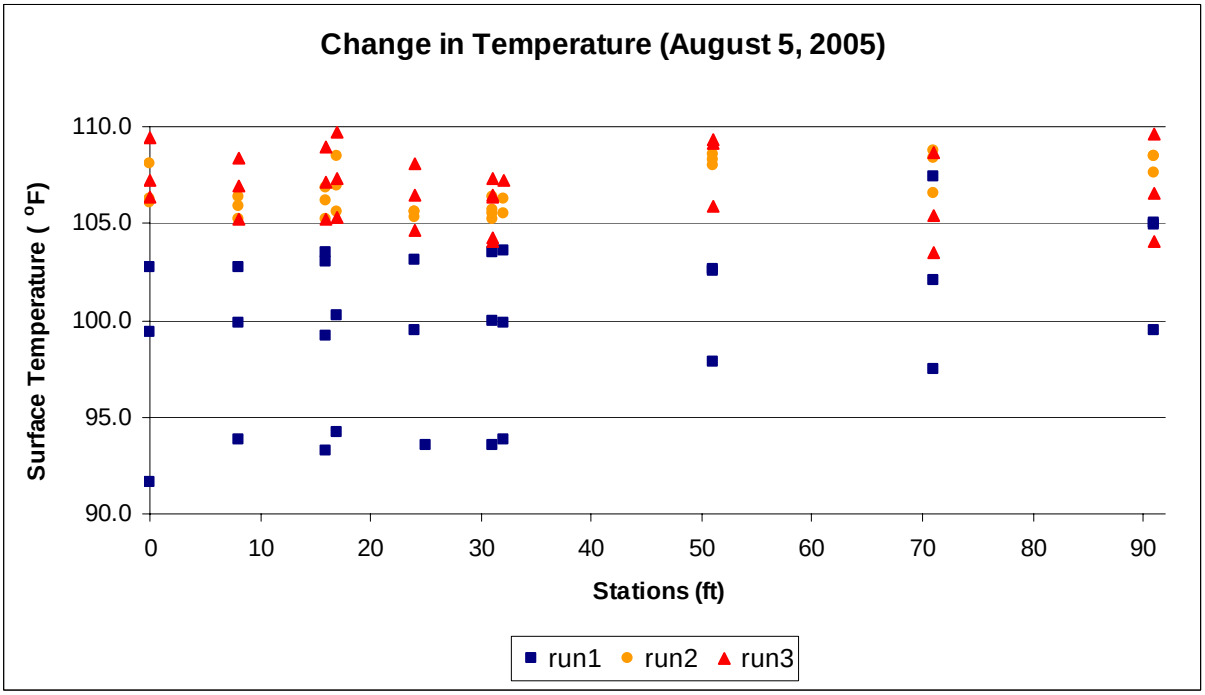



**Figure 4. Change in Surface Temperature for August Testing Cycle**

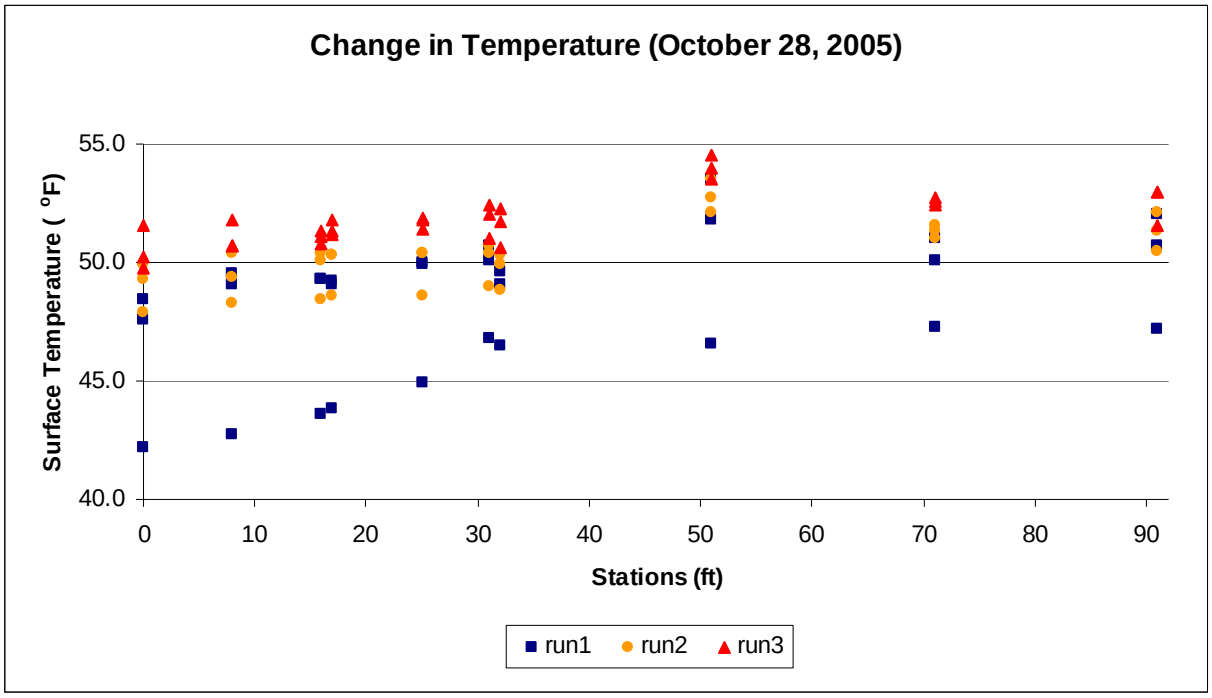



**Figure 5. Change in Surface Temperature for October testing cycle**

## 3.2 BACKCALCULATION OF MATERIAL PROPERTIES

The pavement deflections measured with the FWD are used to determine the structural properties of the pavement layers and subgrade soils in terms of Concrete elastic moduli (Epcc) and Modulus of subgrade reaction (Ks), through the “backcalculation” process.

The normalized deflections and backcalculated results for August and October testing are presented in the Table 2 and Table 3 included in the Appendix A.

# 4.0 Closure

This report is based on FWD testing conducted by Stantec on August 5, 2005 and October 28, 2005 and it summarizes the backcalculation results for three PCC slabs in East Brunswick location. Results reported here are considered to be complete within the scope of services agreed upon.

# Appendix A

## Table 2: Normalized Deflections and Backcalculated Results August 2005

| Run | SlabId | Station (ft) | TestType* | Def_1 (0") | Def_2 (12") | Def_4 (24") | Def_5 (36") | Def_9 (-12") | Surface Temp. | AirTemp | Lte1 | KStatic | EPcc |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| run1 | slab 0 | 0 | LAvg | 8.48 | 6.02 | 4.77 | 3.45 | 1.97 | 91.6 | 86.9 | 79.34 | 0.00 | 0 |
| run1 | slab 1 | 8 | MAvg | 2.39 | 2.02 | 1.96 | 1.66 | 2.14 | 93.8 | 87.8 | | 199.84 | 4,133,601 |
| run1 | slab 1 | 16 | AAvg | 4.37 | 3.63 | 3.06 | 2.34 | 3.54 | 93.3 | 87.7 | 90.54 | 0.00 | 0 |
| run1 | slab 1 | 17 | LAvg | 4.48 | 3.28 | 2.80 | 2.17 | 3.82 | 94.2 | 87.7 | 81.78 | 0.00 | 0 |
| run1 | slab 2 | 25 | MAvg | 2.86 | 2.39 | 2.19 | 1.85 | 2.56 | 93.5 | 87.0 | | 209.44 | 2,755,754 |
| run1 | slab 2 | 31 | AAvg | 5.03 | 3.74 | 3.27 | 2.57 | 3.95 | 93.5 | 88.6 | 87.82 | 0.00 | 0 |
| run1 | slab 2 | 32 | LAvg | 5.55 | 4.05 | 3.42 | 2.62 | 4.16 | 93.8 | 88.3 | 81.56 | 0.00 | 0 |
| run1 | Slab 3 BC | 51 | MAvg | 2.69 | 2.26 | 2.15 | 1.83 | 2.40 | 97.8 | 88.8 | | 191.34 | 3,419,505 |
| run1 | Slab 3 | 71 | MAvg | 2.42 | 2.03 | 1.95 | 1.66 | 2.17 | 97.5 | 89.9 | | 207.30 | 3,893,942 |
| run1 | Slab 3 AC | 91 | MAvg | 2.51 | 2.16 | 2.08 | 1.74 | 2.29 | 99.5 | 90.8 | | 173.10 | 4,355,647 |
| run1 | Slab 0 | 0 | LAvg | 11.53 | 8.54 | 7.02 | 5.32 | 11.57 | 102.7 | 96.0 | 80.12 | 0.00 | 0 |
| run1 | Slab 1 | 8 | MAvg | 3.92 | 3.40 | 3.42 | 2.92 | 3.63 | 102.7 | 95.2 | | 85.41 | 3,630,164 |
| run1 | Slab 1 | 16 | AAvg | 6.56 | 5.44 | 4.73 | 3.71 | 5.47 | 103.0 | 94.0 | 90.33 | 0.00 | 0 |
| run1 | Slab 1 | 16 | LAvg | 6.48 | 4.91 | 4.35 | 3.48 | 5.80 | 103.5 | 94.2 | 82.00 | 0.00 | 0 |
| run1 | Slab 2 | 24 | MAvg | 5.00 | 4.26 | 4.05 | 3.39 | 4.70 | 103.1 | 94.0 | | 96.41 | 1,967,543 |
| run1 | Slab 2 | 31 | AAvg | 6.60 | 5.01 | 4.33 | 3.42 | 5.38 | 103.5 | 95.3 | 88.29 | 0.00 | 0 |
| run1 | Slab 2 | 32 | LAvg | 7.07 | 5.42 | 4.68 | 3.75 | 5.48 | 103.6 | 95.9 | 82.95 | 0.00 | 0 |
| run1 | Slab 3 BC | 51 | MAvg | 4.24 | 3.74 | 3.64 | 3.12 | 3.99 | 102.6 | 96.9 | | 79.20 | 3,356,156 |
| run1 | Slab 3 | 71 | MAvg | 4.52 | 3.90 | 3.81 | 3.17 | 4.22 | 107.4 | 96.8 | | 89.77 | 2,592,290 |
| run1 | Slab 3 AC | 91 | MAvg | 4.35 | 3.71 | 3.55 | 2.99 | 3.99 | 104.9 | 96.0 | | 108.09 | 2,312,191 |
| run1 | Slab 0 | 0 | LAvg | 8.47 | 6.03 | 4.92 | 3.63 | 2.27 | 99.4 | 93.0 | 83.67 | 0.00 | 0 |
| run1 | Slab 1 | 8 | MAvg | 2.85 | 2.31 | 2.24 | 1.98 | 2.42 | 99.9 | 93.0 | | 199.07 | 2,925,181 |
| run1 | Slab 1 | 16 | AAvg | 4.26 | 3.56 | 3.13 | 2.44 | 3.52 | 99.2 | 92.0 | 97.02 | 0.00 | 0 |
| run1 | Slab 1 | 17 | LAvg | 4.51 | 3.39 | 2.91 | 2.36 | 3.96 | 100.2 | 91.7 | 88.31 | 0.00 | 0 |
| run1 | Slab 2 | 24 | MAvg | 3.25 | 2.70 | 2.58 | 2.14 | 2.87 | 99.5 | 92.5 | | 170.63 | 2,618,341 |
| run1 | Slab 2 | 31 | AAvg | 5.19 | 3.66 | 3.21 | 2.56 | 4.11 | 100.0 | 92.7 | 92.87 | 0.00 | 0 |
| run1 | Slab 2 | 32 | LAvg | 5.30 | 3.97 | 3.41 | 2.70 | 4.23 | 99.9 | 92.4 | 87.91 | 0.00 | 0 |
| run1 | Slab 3 BC | 51 | MAvg | 3.24 | 2.80 | 2.71 | 2.35 | 2.96 | 102.5 | 93.5 | | 121.96 | 3,711,713 |
| run1 | Slab 3 | 71 | MAvg | 2.79 | 2.35 | 2.26 | 1.91 | 2.55 | 102.1 | 93.6 | | 174.31 | 3,497,655 |
| run1 | Slab 3 AC | 91 | MAvg | 2.83 | 2.41 | 2.32 | 1.95 | 2.56 | 105.0 | 93.7 | | 162.82 | 3,633,316 |

| Run | SlabId | Station (ft) | TestType* | Def_1 (0") | Def_2 (12") | Def_4 (24") | Def_5 (36") | Def_9 (-12") | Surface Temp. | AirTemp | Lte1 | KStatic | EPcc |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| run2 | Slab 0 | 0 | LAvg | 5.62 | 4.01 | 3.31 | 2.44 | 4.45 | 106.3 | 96.1 | 78.88 | 0.00 | 0 |
| run2 | Slab 1 | 8 | MAvg | 2.74 | 2.31 | 2.28 | 1.94 | 2.48 | 106.4 | 96.7 | | 161.36 | 3,929,691 |
| run2 | Slab 1 | 16 | AAvg | 3.72 | 3.01 | 2.62 | 2.05 | 3.00 | 106.8 | 97.1 | 88.98 | 0.00 | 0 |
| run2 | Slab 1 | 17 | LAvg | 3.85 | 2.83 | 2.45 | 2.01 | 3.16 | 108.5 | 97.3 | 81.28 | 0.00 | 0 |
| run2 | Slab 2 | 24 | MAvg | 3.49 | 2.84 | 2.69 | 2.19 | 3.05 | 105.6 | 96.1 | | 184.36 | 2,095,011 |
| run2 | Slab 2 | 31 | AAvg | 4.82 | 3.07 | 2.65 | 2.18 | 3.75 | 105.2 | 96.4 | 85.93 | 0.00 | 0 |
| run2 | Slab 2 | 31 | LAvg | 4.38 | 3.29 | 2.86 | 2.22 | 3.40 | 105.5 | 97.2 | 82.98 | 0.00 | 0 |
| run2 | Slab 3 BC | 51 | MAvg | 2.75 | 2.33 | 2.22 | 1.86 | 2.51 | 108.3 | 97.1 | | 179.86 | 3,482,429 |
| run2 | Slab 3 | 71 | MAvg | 2.62 | 2.11 | 2.02 | 1.72 | 2.24 | 106.6 | 97.1 | | 245.56 | 2,774,721 |
| run2 | Slab 3 AC | 91 | MAvg | 2.55 | 2.23 | 2.10 | 1.80 | 2.36 | 108.5 | 96.7 | | 162.95 | 4,476,080 |
| run2 | Slab 0 | 0 | LAvg | 11.85 | 8.77 | 7.32 | 5.68 | 4.89 | 108.1 | 99.6 | 82.67 | 0.00 | 0 |
| run2 | Slab 1 | 8 | MAvg | 4.72 | 3.99 | 3.85 | 3.35 | 4.23 | 105.9 | 98.4 | | 98.32 | 2,160,460 |
| run2 | Slab 1 | 16 | AAvg | 6.26 | 5.12 | 4.44 | 3.56 | 5.19 | 105.2 | 100.3 | 92.96 | 0.00 | 0 |
| run2 | Slab 1 | 17 | LAvg | 6.17 | 4.79 | 4.26 | 3.45 | 5.41 | 105.6 | 99.5 | 83.71 | 0.00 | 0 |
| run2 | Slab 2 | 24 | MAvg | 4.93 | 4.19 | 4.00 | 3.30 | 4.56 | 105.6 | 100.7 | | 99.57 | 1,958,538 |
| run2 | Slab 2 | 31 | AAvg | 6.01 | 4.32 | 3.70 | 3.01 | 4.80 | 106.4 | 98.9 | 86.19 | 0.00 | 0 |
| run2 | Slab 2 | 32 | LAvg | 7.93 | 4.82 | 4.20 | 3.40 | 4.96 | 106.3 | 98.6 | 65.64 | 0.00 | 0 |
| run2 | Slab 3 BC | 51 | MAvg | 4.08 | 3.44 | 3.33 | 2.85 | 3.68 | 108.0 | 99.1 | | 115.15 | 2,476,896 |
| run2 | Slab 3 | 71 | MAvg | 3.35 | 2.87 | 2.77 | 2.36 | 3.13 | 108.8 | 99.1 | | 128.88 | 3,282,736 |
| run2 | Slab 3 AC | 91 | MAvg | 4.26 | 3.71 | 3.56 | 3.06 | 3.93 | 107.6 | 98.9 | | 93.01 | 2,812,384 |
| run2 | Slab 0 | 0 | LAvg | 6.18 | 4.44 | 3.67 | 2.78 | 2.71 | 106.1 | 98.7 | 80.87 | 0.00 | 0 |
| run2 | Slab 1 | 8 | MAvg | 3.10 | 2.63 | 2.62 | 2.24 | 2.75 | 105.2 | 97.5 | | 132.06 | 3,746,683 |
| run2 | Slab 1 | 16 | AAvg | 4.48 | 3.67 | 3.24 | 2.60 | 3.61 | 106.2 | 96.1 | 90.62 | 0.00 | 0 |
| run2 | Slab 1 | 17 | LAvg | 4.70 | 3.53 | 3.16 | 2.55 | 4.11 | 106.9 | 97.8 | 84.67 | 0.00 | 0 |
| run2 | Slab 2 | 24 | MAvg | 3.58 | 3.10 | 2.94 | 2.43 | 3.32 | 105.3 | 96.3 | | 125.09 | 2,957,733 |
| run2 | Slab 2 | 31 | AAvg | 4.81 | 3.32 | 2.92 | 2.32 | 3.86 | 105.7 | 97.2 | 90.26 | 0.00 | 0 |
| run2 | Slab 2 | 32 | LAvg | 4.79 | 3.58 | 3.13 | 2.46 | 3.85 | 105.5 | 97.7 | 84.11 | 0.00 | 0 |
| run2 | Slab 3 BC | 51 | MAvg | 2.95 | 2.52 | 2.38 | 2.08 | 2.70 | 108.6 | 97.2 | | 158.80 | 3,425,638 |
| run2 | Slab 3 | 71 | MAvg | 2.56 | 2.20 | 2.07 | 1.80 | 2.35 | 108.4 | 97.7 | | 180.43 | 4,000,291 |
| run2 | Slab 3 AC | 91 | MAvg | 2.82 | 2.38 | 2.28 | 1.93 | 2.54 | 108.5 | 97.7 | | 175.00 | 3,393,523 |
| run3 | Slab 0 | 0 | LAvg | 5.51 | 3.92 | 3.19 | 2.42 | 2.08 | 109.4 | 99.8 | 79.21 | 0.00 | 0 |
| run3 | Slab 1 | 8 | MAvg | 3.01 | 2.50 | 2.43 | 2.08 | 2.70 | 108.4 | 99.3 | | 167.52 | 3,123,743 |

| Run | SlabId | Station (ft) | TestType* | Def_1 (0") | Def_2 (12") | Def_4 (24") | Def_5 (36") | Def_9 (-12") | Surface Temp. | AirTemp | Lte1 | KStatic | EPcc |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| run3 | Slab 1 | 16 | AAvg | 3.44 | 2.88 | 2.56 | 2.02 | 2.92 | 108.9 | 97.8 | 94.36 | 0.00 | 0 |
| run3 | Slab 1 | 17 | LAvg | 3.69 | 2.77 | 2.48 | 2.03 | 3.13 | 109.7 | 98.3 | 83.60 | 0.00 | 0 |
| run3 | Slab 2 | 24 | MAvg | 3.88 | 3.16 | 2.94 | 2.40 | 3.43 | 108.1 | 99.9 | | 174.21 | 1,785,103 |
| run3 | Slab 2 | 31 | AAvg | 4.23 | 3.16 | 2.76 | 2.19 | 3.43 | 107.3 | 98.9 | 90.29 | 0.00 | 0 |
| run3 | Slab 2 | 32 | LAvg | 4.59 | 3.34 | 2.89 | 2.25 | 3.40 | 107.2 | 97.8 | 80.97 | 0.00 | 0 |
| run3 | Slab 3 BC | 51 | MAvg | 2.95 | 2.40 | 2.28 | 1.92 | 2.57 | 109.3 | 99.6 | | 213.57 | 2,523,208 |
| run3 | Slab 3 | 71 | MAvg | 2.50 | 2.12 | 1.98 | 1.71 | 2.26 | 108.7 | 100.7 | | 207.78 | 3,625,990 |
| run3 | Slab 3 AC | 91 | MAvg | 2.69 | 2.28 | 2.17 | 1.82 | 2.41 | 109.6 | 98.7 | | 183.90 | 3,560,294 |
| run3 | Slab 0 | 0 | LAvg | 10.78 | 7.74 | 6.40 | 4.83 | 3.21 | 106.4 | 98.2 | 78.31 | 0.00 | 0 |
| run3 | Slab 1 | 8 | MAvg | 4.18 | 3.56 | 3.52 | 2.97 | 3.83 | 105.2 | 99.1 | | 99.59 | 2,730,621 |
| run3 | Slab 1 | 16 | AAvg | 5.02 | 4.40 | 3.79 | 3.05 | 4.19 | 105.2 | 99.8 | 91.00 | 0.00 | 0 |
| run3 | Slab 1 | 17 | LAvg | 5.22 | 4.05 | 3.69 | 2.99 | 4.84 | 105.3 | 98.4 | 84.74 | 0.00 | 0 |
| run3 | Slab 2 | 24 | MAvg | 4.37 | 3.69 | 3.47 | 2.91 | 3.98 | 104.6 | 98.6 | | 120.92 | 2,042,925 |
| run3 | Slab 2 | 31 | AAvg | 5.94 | 4.43 | 3.80 | 2.97 | 4.58 | 104.3 | 98.0 | 84.08 | 0.00 | 0 |
| run3 | Slab 2 | 31 | LAvg | 5.96 | 4.64 | 3.99 | 3.24 | 4.88 | 104.1 | 97.7 | 85.03 | 0.00 | 0 |
| run3 | Slab 3 BC | 51 | MAvg | 4.38 | 3.80 | 3.71 | 3.16 | 4.08 | 105.9 | 97.7 | | 86.66 | 2,867,174 |
| run3 | Slab 3 | 71 | MAvg | 3.73 | 3.19 | 3.05 | 2.59 | 3.49 | 103.5 | 97.7 | | 122.69 | 2,771,635 |
| run3 | Slab 3 AC | 91 | MAvg | 4.06 | 3.51 | 3.36 | 2.84 | 3.73 | 104.1 | 96.9 | | 104.80 | 2,747,123 |
| run3 | Slab 0 | 0 | LAvg | 7.31 | 5.19 | 4.31 | 3.19 | 7.92 | 107.2 | 99.5 | 77.22 | 0.00 | 0 |
| run3 | Slab 1 | 8 | MAvg | 3.09 | 2.66 | 2.67 | 2.24 | 2.84 | 106.9 | 99.8 | | 117.38 | 4,250,309 |
| run3 | Slab 1 | 16 | AAvg | 4.47 | 3.73 | 3.22 | 2.59 | 3.63 | 107.1 | 99.7 | 88.29 | 0.00 | 0 |
| run3 | Slab 1 | 17 | LAvg | 4.32 | 3.25 | 2.90 | 2.38 | 3.82 | 107.3 | 98.9 | 81.89 | 0.00 | 0 |
| run3 | Slab 2 | 24 | MAvg | 3.69 | 3.19 | 2.98 | 2.50 | 3.43 | 106.5 | 99.3 | | 126.85 | 2,741,820 |
| run3 | Slab 2 | 31 | AAvg | 5.69 | 3.54 | 3.04 | 2.34 | 3.62 | 106.5 | 98.7 | 69.25 | 0.00 | 0 |
| run3 | Slab 2 | 31 | LAvg | 7.86 | 3.85 | 3.32 | 2.69 | 4.18 | 106.4 | 98.6 | 53.20 | 0.00 | 0 |
| run3 | Slab 3 BC | 51 | MAvg | 3.14 | 2.69 | 2.54 | 2.20 | 2.91 | 109.1 | 100.3 | | 147.50 | 3,256,103 |
| run3 | Slab 3 | 71 | MAvg | 2.63 | 2.16 | 2.04 | 1.76 | 2.33 | 105.4 | 99.8 | | 223.76 | 3,044,371 |
| run3 | Slab 3 AC | 91 | MAvg | 2.79 | 2.38 | 2.30 | 1.92 | 2.54 | 106.6 | 98.5 | | 163.79 | 3,709,120 |

* LAvg = Joint Testing – Leave Slab
MAvg = Mid-Slab Testing
AAvg = Joint Testing – Approach Slab

## Table 2: Normalized Deflections and Backcalculated Results October 2005

| Run | SlabId | Station (ft) | TestType* | Def_1 (0") | Def_2 (12") | Def_4 (24") | Def_5 (36") | Def_9 (-12") | Surface Temp. | AirTemp | Lte1 | KStatic | EPcc |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| run1 | Slab 1 | 0 | LAvg | 6.59 | 4.78 | 3.85 | 2.88 | 5.41 | 48.4 | 48.4 | 81.30 | 0.00 | 0 |
| run1 | Slab 1 | 8 | MAvg | 2.51 | 2.13 | 1.98 | 1.79 | 2.24 | 49.1 | 47.6 | | 200.60 | 3,729,180 |
| run1 | Slab 1 | 16 | AAvg | 3.95 | 3.20 | 2.72 | 2.14 | 3.16 | 49.3 | 47.7 | 89.66 | 0.00 | 0 |
| run1 | Slab 1 | 17 | LAvg | 3.92 | 2.94 | 2.43 | 2.01 | 3.45 | 49.1 | 47.3 | 84.18 | 0.00 | 0 |
| run1 | Slab 2 | 25 | MAvg | 3.08 | 2.54 | 2.23 | 1.93 | 2.75 | 49.9 | 47.1 | | 230.03 | 2,146,148 |
| run1 | Slab 2 | 31 | AAvg | 4.39 | 3.42 | 2.82 | 2.30 | 3.52 | 50.1 | 47.7 | 89.95 | 0.00 | 0 |
| run1 | Slab 2 | 32 | LAvg | 4.13 | 3.14 | 2.58 | 2.13 | 3.53 | 49.1 | 48.6 | 85.19 | 0.00 | 0 |
| run1 | Slab 3 | 51 | MAvg | 2.64 | 2.27 | 2.05 | 1.84 | 2.42 | 53.5 | 48.5 | | 192.47 | 3,521,492 |
| run1 | Slab 3 | 71 | MAvg | 2.45 | 2.13 | 1.94 | 1.74 | 2.25 | 51.0 | 48.6 | | 188.71 | 4,178,650 |
| run1 | Slab 3 | 91 | MAvg | 2.73 | 2.34 | 2.18 | 1.91 | 2.46 | 52.0 | 47.8 | | 175.82 | 3,604,902 |
| run1 | Slab 1 | 0 | LAvg | 19.66 | 15.10 | 12.94 | 9.67 | 9.00 | 42.2 | 41.3 | 80.53 | 0.00 | 0 |
| run1 | Slab 1 | 8 | MAvg | 5.47 | 4.78 | 4.74 | 4.18 | 5.22 | 42.7 | 42.7 | | 58.60 | 2,727,440 |
| run1 | Slab 1 | 16 | AAvg | 8.15 | 7.04 | 6.08 | 4.79 | 6.98 | 43.6 | 42.7 | 89.84 | 0.00 | 0 |
| run1 | Slab 1 | 17 | LAvg | 8.80 | 6.94 | 5.96 | 4.78 | 7.77 | 43.8 | 42.5 | 82.65 | 0.00 | 0 |
| run1 | Slab 2 | 25 | MAvg | 5.46 | 4.76 | 4.60 | 3.88 | 5.14 | 44.9 | 43.5 | | 71.29 | 2,240,285 |
| run1 | Slab 2 | 31 | AAvg | 8.24 | 6.54 | 5.69 | 4.45 | 6.74 | 46.8 | 43.1 | 85.79 | 0.00 | 0 |
| run1 | Slab 2 | 32 | LAvg | 10.33 | 5.48 | 4.82 | 3.78 | 5.99 | 46.5 | 44.0 | 55.66 | 0.00 | 0 |
| run1 | Slab 3 | 51 | MAvg | 5.94 | 5.21 | 4.91 | 4.48 | 5.44 | 46.6 | 44.2 | | 63.13 | 2,138,021 |
| run1 | Slab 3 | 71 | MAvg | 5.81 | 5.00 | 4.40 | 4.10 | 5.52 | 47.3 | 44.3 | | 90.78 | 1,542,961 |
| run1 | Slab 3 | 91 | MAvg | 5.34 | 4.78 | 4.51 | 4.04 | 5.06 | 47.2 | 45.5 | | 60.80 | 2,756,115 |
| run1 | Slab 1 | 0 | LAvg | 9.63 | 7.12 | 5.82 | 4.16 | 2.29 | 47.6 | 45.5 | 81.47 | 0.00 | 0 |
| run1 | Slab 1 | 8 | MAvg | 2.89 | 2.49 | 2.30 | 2.15 | 2.62 | 49.5 | 45.1 | | 153.77 | 3,694,847 |
| run1 | Slab 1 | 16 | AAvg | 4.51 | 3.92 | 3.37 | 2.69 | 3.66 | 49.3 | 44.4 | 89.56 | 0.00 | 0 |
| run1 | Slab 1 | 17 | LAvg | 4.78 | 3.59 | 2.94 | 2.51 | 4.32 | 49.2 | 46.5 | 82.72 | 0.00 | 0 |
| run1 | Slab 2 | 25 | MAvg | 3.51 | 3.06 | 2.88 | 2.47 | 3.25 | 50.0 | 45.6 | | 120.63 | 3,192,736 |
| run1 | Slab 2 | 31 | AAvg | 5.57 | 4.37 | 3.74 | 2.94 | 4.49 | 50.7 | 46.0 | 88.91 | 0.00 | 0 |
| run1 | Slab 2 | 32 | LAvg | 5.01 | 3.89 | 3.39 | 2.69 | 4.68 | 49.6 | 46.7 | 85.65 | 0.00 | 0 |
| run1 | Slab 3 | 51 | MAvg | 2.91 | 2.52 | 2.23 | 2.07 | 2.68 | 51.8 | 46.8 | | 173.97 | 3,202,633 |
| run1 | Slab 3 | 71 | MAvg | 2.77 | 2.31 | 2.06 | 1.92 | 2.45 | 50.1 | 46.9 | | 216.50 | 2,832,749 |
| run1 | Slab 3 | 91 | MAvg | 2.94 | 2.59 | 2.31 | 2.12 | 2.71 | 50.7 | 46.6 | | 153.12 | 3,581,368 |

| Run | SlabId | Station (ft) | TestType* | Def_1 (0") | Def_2 (12") | Def_4 (24") | Def_5 (36") | Def_9 (-12") | Surface Temp. | AirTemp | Lte1 | KStatic | EPcc |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| run2 | Slab 1 | 0 | LAvg | 5.59 | 4.00 | 3.15 | 2.43 | 4.22 | 49.9 | 47.9 | 79.85 | 0.00 | 0 |
| run2 | Slab 1 | 8 | MAvg | 2.54 | 2.17 | 1.95 | 1.82 | 2.27 | 50.4 | 48.2 | | 203.33 | 3,600,637 |
| run2 | Slab 1 | 16 | AAvg | 3.82 | 3.11 | 2.62 | 2.11 | 3.13 | 50.4 | 47.5 | 91.54 | 0.00 | 0 |
| run2 | Slab 1 | 17 | LAvg | 3.94 | 2.96 | 2.60 | 2.05 | 3.39 | 50.3 | 47.8 | 83.79 | 0.00 | 0 |
| run2 | Slab 2 | 25 | MAvg | 3.26 | 2.65 | 2.35 | 2.02 | 2.88 | 50.4 | 49.1 | | 227.04 | 1,930,750 |
| run2 | Slab 2 | 31 | AAvg | 4.09 | 3.20 | 2.68 | 2.13 | 3.29 | 50.4 | 48.2 | 89.81 | 0.00 | 0 |
| run2 | Slab 2 | 32 | LAvg | 4.33 | 3.20 | 2.56 | 2.15 | 3.48 | 50.3 | 48.3 | 82.61 | 0.00 | 0 |
| run2 | Slab 3 | 51 | MAvg | 2.71 | 2.32 | 2.07 | 1.87 | 2.48 | 52.7 | 49.7 | | 197.76 | 3,257,675 |
| run2 | Slab 3 | 71 | MAvg | 2.46 | 2.10 | 1.94 | 1.71 | 2.21 | 51.6 | 50.0 | | 202.77 | 3,863,295 |
| run2 | Slab 3 | 91 | MAvg | 2.75 | 2.32 | 2.18 | 1.91 | 2.44 | 51.3 | 49.3 | | 186.06 | 3,354,206 |
| run2 | Slab 1 | 0 | LAvg | 14.04 | 10.46 | 8.54 | 6.25 | 8.08 | 47.9 | 47.3 | 80.25 | 0.00 | 0 |
| run2 | Slab 1 | 8 | MAvg | 4.32 | 3.75 | 3.68 | 3.20 | 4.02 | 48.3 | 47.3 | | 84.07 | 3,033,937 |
| run2 | Slab 1 | 16 | AAvg | 6.71 | 5.34 | 4.43 | 3.51 | 5.49 | 48.4 | 47.4 | 88.16 | 0.00 | 0 |
| run2 | Slab 1 | 17 | LAvg | 5.63 | 4.58 | 4.00 | 3.29 | 5.57 | 48.6 | 48.3 | 87.60 | 0.00 | 0 |
| run2 | Slab 2 | 25 | MAvg | 4.93 | 4.25 | 4.19 | 3.43 | 4.54 | 48.6 | 48.6 | | 81.28 | 2,408,746 |
| run2 | Slab 2 | 31 | AAvg | 7.02 | 5.57 | 4.71 | 3.72 | 5.77 | 49.0 | 48.5 | 88.62 | 0.00 | 0 |
| run2 | Slab 2 | 32 | LAvg | 7.23 | 4.88 | 4.35 | 3.43 | 5.50 | 48.8 | 48.4 | 72.76 | 0.00 | 0 |
| run2 | Slab 3 | 51 | MAvg | 5.11 | 4.46 | 4.33 | 3.73 | 4.74 | 52.1 | 47.7 | | 71.94 | 2,534,137 |
| run2 | Slab 3 | 71 | MAvg | 3.94 | 3.36 | 3.02 | 2.76 | 3.66 | 51.0 | 49.3 | | 135.10 | 2,248,573 |
| run2 | Slab 3 | 91 | MAvg | 5.60 | 4.96 | 4.72 | 4.08 | 5.24 | 50.5 | 48.5 | | 63.69 | 2,385,659 |
| run2 | Slab 1 | 0 | LAvg | 8.11 | 5.86 | 4.68 | 3.51 | 8.62 | 49.3 | 48.0 | 78.75 | 0.00 | 0 |
| run2 | Slab 1 | 8 | MAvg | 2.81 | 2.45 | 2.33 | 2.12 | 2.58 | 49.4 | 48.5 | | 135.65 | 4,433,427 |
| run2 | Slab 1 | 16 | AAvg | 4.08 | 3.47 | 3.00 | 2.41 | 3.34 | 50.1 | 47.9 | 89.35 | 0.00 | 0 |
| run2 | Slab 1 | 17 | LAvg | 4.27 | 3.21 | 2.66 | 2.28 | 3.80 | 50.3 | 48.9 | 81.82 | 0.00 | 0 |
| run2 | Slab 2 | 25 | MAvg | 3.36 | 2.88 | 2.53 | 2.30 | 3.07 | 50.4 | 48.8 | | 166.38 | 2,511,107 |
| run2 | Slab 2 | 31 | AAvg | 5.12 | 3.88 | 3.21 | 2.60 | 4.09 | 50.7 | 49.7 | 87.03 | 0.00 | 0 |
| run2 | Slab 2 | 32 | LAvg | 4.76 | 3.60 | 2.93 | 2.45 | 4.09 | 49.9 | 48.9 | 82.36 | 0.00 | 0 |
| run2 | Slab 3 | 51 | MAvg | 3.17 | 2.72 | 2.50 | 2.28 | 2.88 | 53.5 | 49.3 | | 151.36 | 3,104,057 |
| run2 | Slab 3 | 71 | MAvg | 2.98 | 2.59 | 2.37 | 2.13 | 2.78 | 51.3 | 48.3 | | 153.96 | 3,461,662 |
| run2 | Slab 3 | 91 | MAvg | 3.11 | 2.69 | 2.37 | 2.20 | 2.85 | 52.1 | 49.0 | | 165.74 | 2,944,381 |
| run3 | Slab 1 | 0 | LAvg | 5.71 | 4.14 | 3.24 | 2.50 | 4.75 | 49.8 | 48.8 | 81.18 | 0.00 | 0 |
| run3 | Slab 1 | 8 | MAvg | 2.54 | 2.16 | 2.00 | 1.83 | 2.27 | 50.7 | 49.0 | | 193.25 | 3,788,757 |

| Run | SlabId | Station (ft) | TestType* | Def_1 (0") | Def_2 (12") | Def_4 (24") | Def_5 (36") | Def_9 (-12") | Surface Temp. | AirTemp | Lte1 | KStatic | EPcc |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| run3 | Slab 1 | 16 | AAvg | 3.76 | 3.16 | 2.60 | 2.12 | 3.14 | 50.8 | 48.5 | 93.33 | 0.00 | 0 |
| run3 | Slab 1 | 17 | LAvg | 3.69 | 2.75 | 2.42 | 1.96 | 3.25 | 51.2 | 48.9 | 83.49 | 0.00 | 0 |
| run3 | Slab 2 | 25 | MAvg | 3.32 | 2.69 | 2.46 | 2.04 | 2.90 | 51.4 | 49.9 | | 214.64 | 1,976,176 |
| run3 | Slab 2 | 31 | AAvg | 4.28 | 3.29 | 2.75 | 2.21 | 3.35 | 51.0 | 50.0 | 87.49 | 0.00 | 0 |
| run3 | Slab 2 | 32 | LAvg | 4.12 | 3.14 | 2.67 | 2.14 | 3.49 | 50.6 | 49.1 | 85.18 | 0.00 | 0 |
| run3 | Slab 3 | 51 | MAvg | 2.74 | 2.34 | 2.23 | 1.88 | 2.50 | 53.5 | 49.2 | | 171.61 | 3,667,659 |
| run3 | Slab 3 | 71 | MAvg | 2.50 | 2.12 | 1.94 | 1.71 | 2.22 | 52.7 | 49.2 | | 215.55 | 3,501,866 |
| run3 | Slab 3 | 91 | MAvg | 2.81 | 2.36 | 2.29 | 1.93 | 2.47 | 53.0 | 49.3 | | 172.63 | 3,485,036 |
| run3 | Slab 1 | 0 | LAvg | 11.57 | 8.65 | 7.09 | 5.20 | 3.32 | 51.6 | 49.3 | 232.01 | 0.00 | 0 |
| run3 | Slab 1 | 8 | MAvg | 11.30 | 3.53 | 3.38 | 2.88 | 3.64 | 51.8 | 49.0 | | 353.40 | 90,195 |
| run3 | Slab 1 | 16 | AAvg | 6.05 | 5.20 | 4.44 | 3.50 | 5.19 | 51.3 | 48.2 | 266.44 | 0.00 | 0 |
| run3 | Slab 1 | 17 | LAvg | 5.82 | 4.66 | 4.19 | 3.37 | 5.57 | 51.8 | 49.4 | 248.67 | 0.00 | 0 |
| run3 | Slab 2 | 25 | MAvg | 4.83 | 4.14 | 4.07 | 3.27 | 4.35 | 51.8 | 48.2 | | 89.23 | 2,279,255 |
| run3 | Slab 2 | 31 | AAvg | 11.37 | 5.18 | 4.44 | 3.41 | 5.58 | 52.0 | 48.8 | 152.22 | 0.00 | 0 |
| run3 | Slab 2 | 32 | LAvg | 28.46 | 4.65 | 4.16 | 3.16 | 5.06 | 51.7 | 49.4 | 50.76 | 0.00 | 0 |
| run3 | Slab 3 | 51 | MAvg | 4.62 | 3.99 | 3.88 | 3.34 | 4.23 | 54.5 | 49.8 | | 85.33 | 2,612,171 |
| run3 | Slab 3 | 71 | MAvg | 3.96 | 3.35 | 3.18 | 2.79 | 3.60 | 52.4 | 49.4 | | 122.05 | 2,470,539 |
| run3 | Slab 3 | 91 | MAvg | 4.79 | 4.22 | 3.85 | 3.48 | 4.51 | 51.6 | 48.5 | | 87.46 | 2,369,879 |
| run3 | Slab 1 | 0 | LAvg | 7.24 | 5.22 | 4.20 | 3.14 | 2.35 | 50.2 | 49.6 | 80.71 | 0.00 | 0 |
| run3 | Slab 1 | 8 | MAvg | 2.73 | 2.32 | 2.21 | 2.02 | 2.44 | 50.7 | 49.5 | | 163.31 | 3,891,166 |
| run3 | Slab 1 | 16 | AAvg | 4.12 | 3.44 | 2.97 | 2.40 | 3.43 | 51.1 | 49.1 | 93.11 | 0.00 | 0 |
| run3 | Slab 1 | 17 | LAvg | 4.19 | 3.16 | 2.69 | 2.29 | 3.79 | 51.3 | 50.1 | 84.55 | 0.00 | 0 |
| run3 | Slab 2 | 25 | MAvg | 3.41 | 2.89 | 2.68 | 2.31 | 3.08 | 51.9 | 48.8 | | 154.87 | 2,627,609 |
| run3 | Slab 2 | 31 | AAvg | 5.12 | 3.86 | 3.25 | 2.56 | 4.16 | 52.4 | 48.7 | 90.92 | 0.00 | 0 |
| run3 | Slab 2 | 32 | LAvg | 4.90 | 3.72 | 3.12 | 2.57 | 4.30 | 52.3 | 50.4 | 85.02 | 0.00 | 0 |
| run3 | Slab 3 | 51 | MAvg | 3.08 | 2.67 | 2.45 | 2.22 | 2.84 | 54.0 | 49.4 | | 146.86 | 3,408,241 |
| run3 | Slab 3 | 71 | MAvg | 2.82 | 2.29 | 2.08 | 1.89 | 2.44 | 52.6 | 49.1 | | 238.58 | 2,474,621 |
| run3 | Slab 3 | 91 | MAvg | 3.09 | 2.66 | 2.40 | 2.19 | 2.81 | 53.0 | 49.6 | | 160.16 | 3,102,433 |

* LAvg = Joint Testing – Leave Slab
MAvg = Mid-Slab Testing
AAvg = Joint Testing – Approach Slab