DEVELOPMENT OF TESTING PROTOCOLS AND PERFORMANCE CRITERIA FOR PEDESTAL-SET CONCRETE PAVING SLABS

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NATIONAL CONCRETE MASONRY ASSOCIATION
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August 1, 2023

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Development of Testing Protocols and Performance Criteria for Pedestal-Set Concrete Paving Slabs

1.0 PROJECT OVERVIEW

Pedestal-set concrete paving slabs have become a popular decking system for pedestrian plaza and rooftop applications as facility owners look to expand usable space and create functional outdoor places. While testing protocols currently exist in ASTM C140/C140M, *Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units* (Ref. 1), for evaluating the flexural strength of concrete paving slabs, these established protocols test slabs under conditions that do not replicate the in-situ loading and support conditions of pedestal-set slabs. This project was initiated to investigate alternative support and loading conditions to simulate those seen in the field for pedestal-set applications. In turn, the results and observations from this program were used to develop testing protocols for consideration as a future ASTM standard test method when assessing the performance characteristics of pedestal-set slabs.

1.1 Scope of Investigation

ASTM C140/C140M Annex A8, *Test Procedures for Segmental Concrete Paving Slabs*, was originally developed with the assumption that concrete paving slabs would meet the requirements of ASTM C1782/C1782M, *Standard Specification for Segmental Concrete Paving Slabs* (Ref. 2), and predominately be installed over a base that provides continuous support similar to conventional pavements. As such, given the size, configuration, and conventional installation practices of paving slabs at the time, qualification testing was predicated on modulus of rupture (flexural strength) testing. Using the ASTM C140/C140M testing protocols, the modulus of rupture of a paving slab was determined by applying a line load to the mid-span of a simply-supported slab as illustrated in Figure 1. These testing protocols are functionally the same as those for concrete paving slabs produced to comply with, and tested under, CSA A231.1, *Precast Concrete Paving Slabs* (Ref. 3).

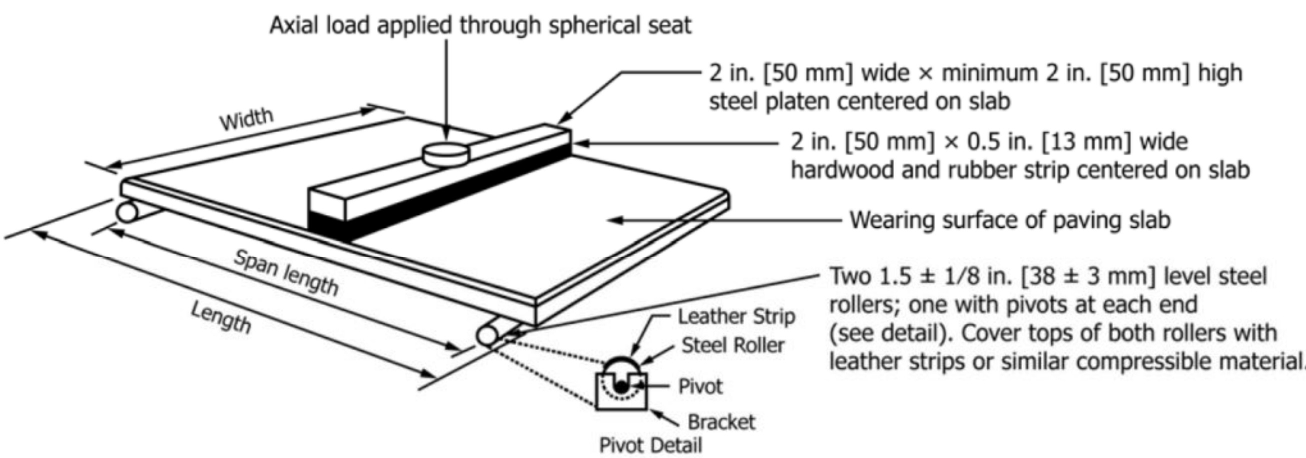


FIG. A8.3 Modulus of Rupture Test

Figure 1 – ASTM C140/C140M Modulus of Rupture Test Setup (Ref. 1)

To better replicate the support, loading conditions, and potential failure mechanisms of pedestal-set paving slabs illustrated in Figure 2, this investigation explored alternative testing protocols using ASTM C140/C140M Annex A8 as a baseline with the following modifications:

- The wood and rubber loading strip was replaced with a nominal 2 in. (50 mm) diameter vulcanized rubber loading pad positioned at the center of the slab. While no standardized loading condition can replicate all possible loading conditions that may be encountered in the field, a concentrated load at the center of the slab would represent a more conservative loading scenario. (Early pilot testing reviewed in Section 1.2 used a 2.8 in. (71 mm) steel loading disk, which was replaced with the rubber pad as this was felt to provide a more uniform loading area, particularly in cases were a surface texture on the face of the slab was present.)

- The steel support rollers on opposite edges of the slab were replaced with vulcanized rubber pads placed at each corner of the slab to simulate pedestal supports, as illustrated in Figure 3.

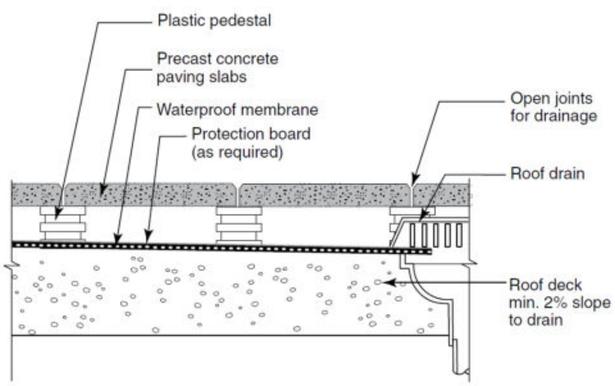


Figure 2 – Pedestal-Set Concrete Paving Slabs (Ref. 4)

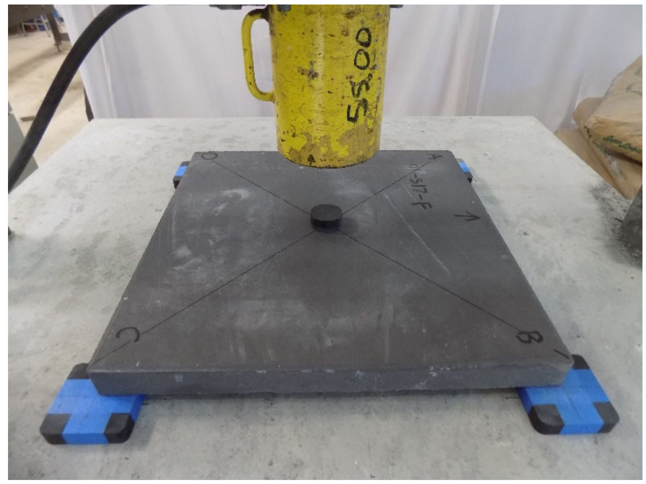


Figure 3 – Corner Supported, Center Point Loading Testing Conditions

While the testing configuration shown in Figure 3 mimics the support and potential loading conditions a paving slab may see in service, this test setup would present challenges to most testing laboratories that may not have the space or equipment necessary to test full-size slab specimens. As such, a secondary objective to this investigation was to determine if a correlation could be established between the strength of full-size slabs and the strength of slabs reduced in size to facilitate routine quality control testing. Finally, a tertiary objective of this research project was to compare the flexural strengths measured through the corner-supported specimens of this study to the flexural strengths that would be obtained through conventional flexural testing in accordance with ASTM C140/C140M, Annex A8. This last goal is intended to provide a degree of benchmarking between previously established and vetted testing procedures and those used as part of this research investigation.

This project was structured such that testing was completed in multiple phases, thus allowing for the potential refinement and ongoing verification of the testing protocols as data is collected and knowledge is generated and analyzed. The end objectives of the testing reported here include:

- Develop accurate, repeatable, and representative testing protocols for corner supported, center point loaded slabs.
- Establish and validate a minimum loading criteria for testing full-size slabs intended for pedestal set applications.
- Establish and validate a scaling factor for reduced-size slabs when full-size testing cannot be performed.
- Correlate test results to existing modulus of rupture testing procedures defined by ASTM C140/C140M.
- Determine if there is a difference in the performance of pedestal-set paving slabs with different thicknesses when tested under center point loading and corner support conditions.

- Determine if there is a difference in the performance of paving slabs produced by the three most common manufacturing methods: dry-cast, hydraulically-pressed, and hermetically-pressed.
- Applying the results of the testing and analyses, develop a new standardized test method specific to pedestal-set paving slabs.

1.2 Pilot Investigation

1.2.1 Pilot Investigation – Scope

Prior to the initiation of the testing associated with this project, a small-scale preliminary investigation was conducted to vet the proposed testing protocols. This pilot testing was conducted on a limited number of paving slabs to compare the novel approaches to testing employed in this investigation to existing standardized testing procedures and engineering mechanics. Variables assess in the pilot investigation include:

- Four sets of two slabs each were tested. Each slab set was produced by a different manufacturer or using a different mix design.
- Each slab measured nominally 24x24 in. (610x610 mm) in plan dimensions and either 50 mm or 60 mm in thickness.
- One slab from each set was tested full-size using corner supports and center point loading. The second slab from each set was quartered into approximately 12x12 in. (305x305 mm) reduced-size slabs and tested using corner supports and center point loading.
- Each corner was supported by a nominal 1 in. (25 mm) thick vulcanized rubber pad shown in Figure 4. The support pads had a reported hardness range of 65-70 on the Shore A durometer scale.
- To preclude premature failure due to inadequate support, the orthogonal width and length of the support pad bearing dimensions were equal to the thickness of the slab being tested. This assumes that shear-induced corner cracking would follow a failure line approximately 45 degrees from the horizontal as illustrated in Figure 5.
- The center point load was applied through a steel disk with a diameter of approximately 2.8 in. (71 mm) located at the geometric center of the slab per Figure 6.
- Load was applied to each specimen at a rate consistent with ASTM C140/C140M, Annex A8 and the failure load and mechanism was recorded.

Figure 4 – Vulcanized Rubber Support Pads

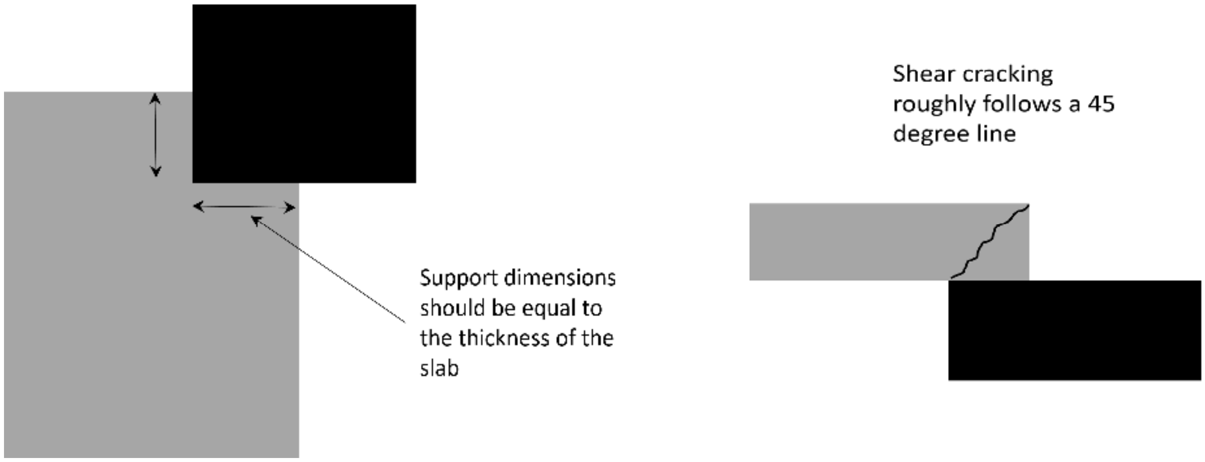


Figure 5 – Corner Support Layout and Dimensioning

Figure 6 – Center Point Steel Loading Disk (Pilot Testing)

1.2.2 Pilot Investigation – Test Results

The results of the pilot study are summarized in Table 1, which includes:

- The slab compressive strength, absorption, and density as determined in accordance with ASTM C140/C140M.
- The full-size slab flexural strength as determined in accordance with Annex A8 of ASTM C140/C140M, with the exception that the span length was set to 90% of the slab length similar to the protocols of ASTM C1491, *Standard Specification for Concrete Roof Pavers* (Ref. 5).
- The full-size slab flexural strength with corner supports and center point loading.
- The average of the four quartered slab flexural strength with corner supports and center point loading.

1.2.3 Pilot Investigation – Findings and Recommendations

Given the limited scope and number of specimens tested in the pilot investigation, the results presented in Table 1 are by no means considered definitive. These early results do however, support the following theories predicted by engineering and material mechanics:

- The quartered specimens exhibited the largest failing load, a result primarily driven by the reduced span length of these reduced-size slabs.

- The simply-supported slabs tested per the modified procedures of Annex A8 of ASTM C140/C140M would have a higher flexural strength than corresponding full-size slabs tested with corner supports and center point loading given the differences in support and loading conditions.
- Whereas the simply-supported slabs exhibited classic flexural failures associated with simple span elements, the corner-supported slabs exhibited more complex 'yield line' failures as well as classic flexural failure as depicted in Figure 7.

Table 1 – Summary of Pilot Investigation Findings

Specimen Set and Nominal Thickness	Compressive Strength, lb/in.^{2} (MPa)	Absorption, %	Density, lb/ft^3, (kg/m^3)	Full-Size, Simple Supported (FSS), lb (N)[A]	Full-Size Center Loaded, lb (N)[B]	Quartered Center Loaded, lb (N)[B]	Ratio Quartered/ Full-Size
A – 60 mm	12,070 (83.2)	4.0	139.2 (2,229)	4,335 (19,275)	3,780 (16,825)	5,470 (24,325)	1.45
B – 50 mm	12,750 (87.9)	2.3	149.2 (2,390)	3,065 (13,625)	2,800 (12,450)	3,480 (15,475)	1.24
C – 50 mm	12,320 (84.9)	2.5	148.3 (2,376)	2,950 (13,125)	2,710 (12,050)	3,190 (14,200)	1.18
D – 50 mm	13,530 (93.3)	3.1	147.1 (2,356)	2,785 (12,400.4)	2,230 (9,925)	3,020 (13,425)	1.35

[A] Slab specimens tested full-size using the procedures of ASTM C140/C140M, Annex A8 except the span length was set at 90% of the slab length.
[B] Testing configuration used corner supports and a concentrated load applied at the center of the slab.

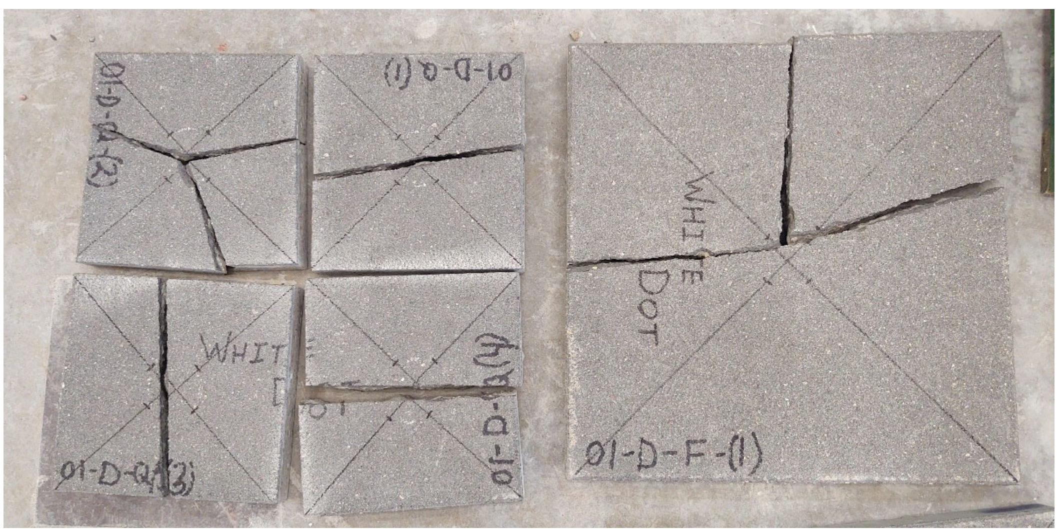


Figure 7 – Corner-Supported Failure Modes Seen in Pilot Study

The testing protocols used in the pilot study were adopted for the remainder of this investigation, with the exception that the steel loading disk was replaced with a 2 in. (50 mm) diameter loading pad made with the same vulcanized rubber as the support pads. The rubber loading pad is shown in Figure 8. Based on some of the failure modes seen in the initial testing, the rubber loading disk was felt to provide a more uniform loading area, particularly in cases were a surface texture on the face of the slab was present.


Figure 8 – Vulcanized Rubber Loading Pad

2.0 RESEARCH TEST MATRIX

Twelve different sets of concrete paving slabs were solicited and received from nine different production facilities across the U.S. and Canada. To minimize the influence of production-related variables, each set was manufactured on the same machine during the same run. As detailed in subsequent sections of this report, more robust testing was conducted on Sets 1, 2, and 3 to quantify with higher precision intra-production variables that may influence test results. As such, more slab specimens were tested for these three sets than for the remaining sets of slabs. All slabs had nominal widths and lengths equal to 24x24 in. (610x610 mm) with other test variables associated with each set of slabs summarized in Table 2.

Table 2 – Test Matrix Summary

Slab Set No.	Nominal Slab Thickness	Production Method	Number of Slabs Tested per Set
1	50 mm	Dry-cast, through-mix	40
2	60 mm	Dry-cast, through-mix	40
3	50 mm	Hermetically-pressed	40
4	50 mm	Hermetically-pressed	15
5	50 mm	Dry-cast, face-mix	15
6	50 mm	Hydraulically-pressed	15
7	45 mm	Hydraulically-pressed	15
8	55 mm	Dry-cast, through-mix	15
9	60 mm	Dry-cast, through-mix	15
10	60 mm	Dry-cast, face-mix	15
11	50 mm	Hermetically-pressed	15
12	50 mm	Dry-cast, face-mix	15

2.1 Specimen Designations and Nomenclature

Three different flexural testing protocols were investigated as part of this project using the information gleaned from the pilot testing. The three testing designations used in reporting these results are as follows:

- F-Slabs – These specimens included all corner-supported, full-size slabs with center point loading as illustrated in Figure 9. The purpose of these tests was to establish performance criteria of full-size slabs under pedestal-set conditions.

- Q-Slabs – These specimens included all corner-supported, quartered slabs with center point loading saw-cut from full-size specimens a typical example of which is shown in Figure 10. The purpose of these tests was to develop a correlation between the full-size slab strength and the reduced-size slab strength recognizing not all laboratories have the means to test full-size slabs.
- FSS-Slabs – These specimens include simply-supported, full-size slabs with mid-span line loading using a span length equal to 90% of the slab length as shown in Figure 11. The purpose of these tests was to establish a correlation between the corner support, center loading testing configuration and conventional modulus of rupture testing similar to ASTM C1491 and ASTM C1782/C1782M.

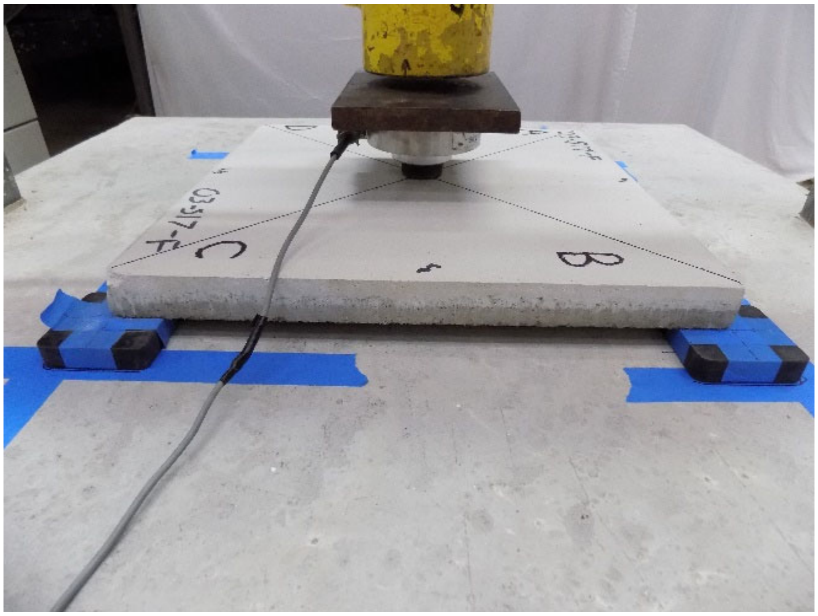


Figure 9 – F-Slab Testing Set-Up

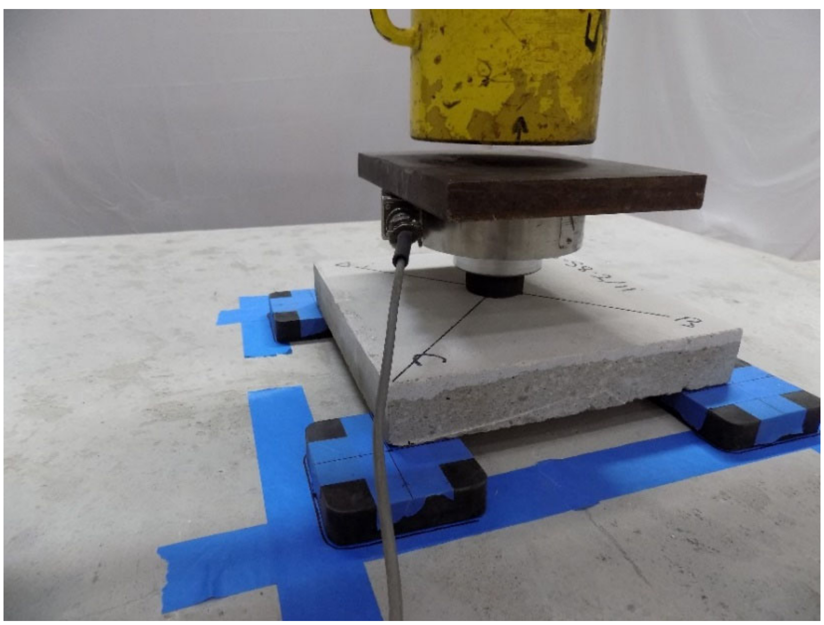


Figure 10 – Q-Slab Testing Set-Up

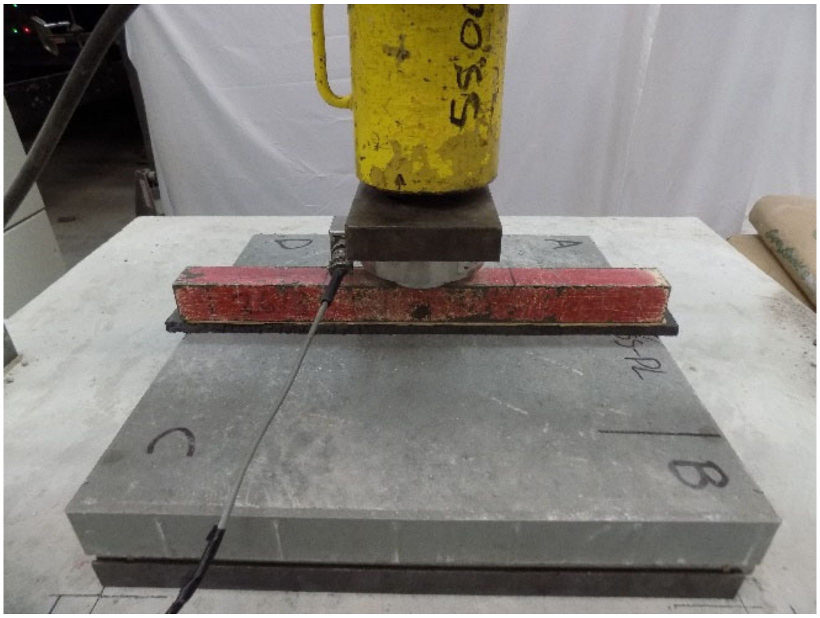


Figure 11 – FSS-Slab Testing Set-Up

For the dry-cast slabs, the direction the slabs were manufactured was tracked to isolate potential non-homogeneous material properties resulting from inconsistent feed, fill, or compaction across the slabs. These markings, as shown in Figure 12, indicate the position of the slabs relative to the front of the machine during production. Hydraulically-pressed and hermetically-pressed slabs were not marked and tracked in this manner as these production methods were considered to have no bias for production orientation.

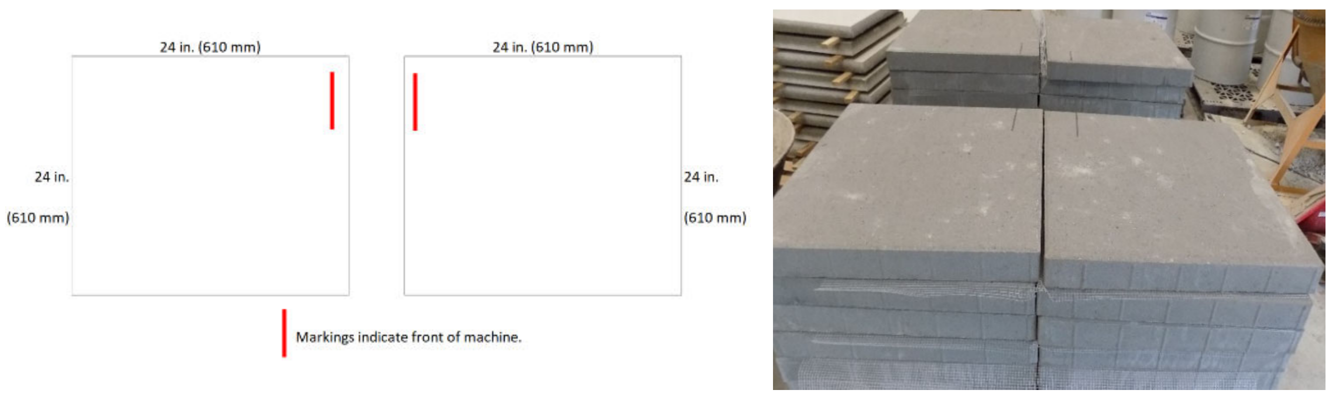


Figure 12 – Marking for Direction of Front of the Machine

To identify potential failure mechanisms associated with each slab's manufacturing orientation, the corners of each full-size and quartered slab specimen was marked "A", "B", "C", or "D" starting from the top left of each slab and working clockwise around the perimeter as shown in Figure 13. This same corner labeling was applied to the quartered slabs as well with the added descriptor identifying the row (1 or 2) and column (1, 2, 11, or 12) each quartered specimen was obtained as illustrated in Figure 14. Within each set, all slabs from the left side of production (marking on the upper right) were assigned an odd specimen number whereas all slabs from the right side of production (marking on the upper left) were assigned an even specimen number.

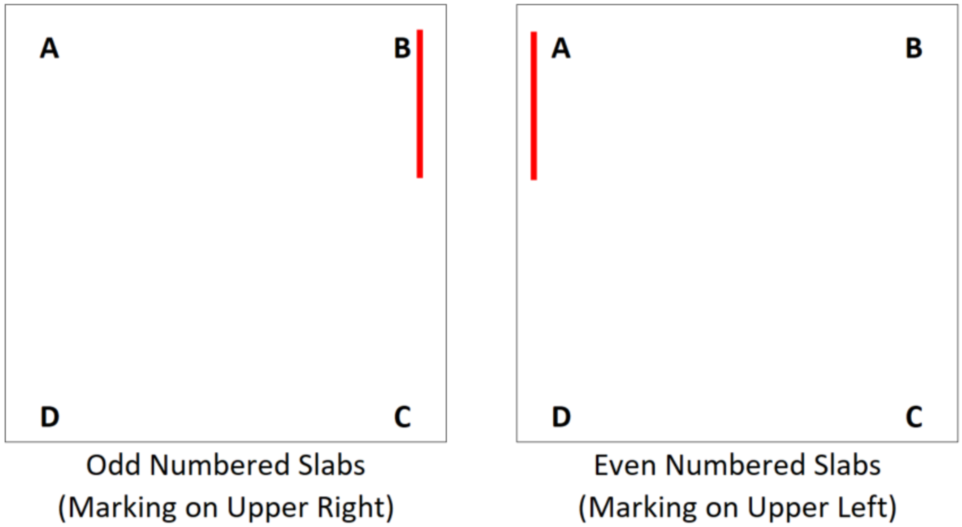


Figure 13 – Full-Size Slab Corner Markings

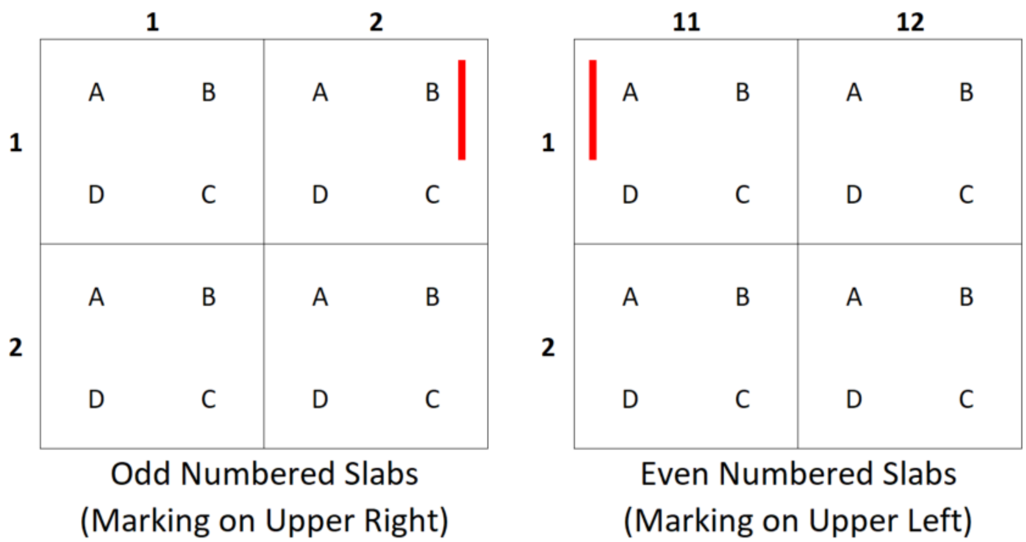


Figure 14 – Quartered Slab Corner Markings and Row/Column Designations

Using these description protocols, the full-size, corner-supported, center point loaded slab specimens (F-Slabs) were each identified using the designation XX-SY-F, where XX refers to the Set Number and Y is the slab number within the set (even for production marking on the upper left and odd for production marking on the upper right). For example, 02-S5-F is the full-size F-Slab (corner-supported, center point loaded) from Set 2 consisting of a slab with the marking on the upper right (odd numbered slab).

The quartered slabs (Q-Slabs) used a similar specimen designation protocol with the exception that each specimen was future identified by the row and column number (Figure 14) from which it was obtained from the full size slabs: XX-SY-Q-R/C. For example, 03-S2-Q-1/12 is the quartered Q-Slab (corner-supported, center point loaded) from Set 3 taken from the upper right side of an even numbered slab (production marking on the upper left).

Likewise, the simple-supported, mid-span loaded (FSS-Slabs) used a designation similar to the F-Slabs with the exception of introducing 'PL' (the direction of span is parallel to the direction of production) or

‘PR’ (the direction of span is perpendicular to the direction of production) as illustrated in Figure 15. The solid blue line in Figure 15 represents the loading strip and the dashed green lines are the roller supports. For example, 02-S1-FSS-PL is the full-size, simply supported F-Slab from Set 2 consisting of a slab with the marking on the upper right (odd numbered slab) having span length parallel to the direction of production. Approximately half of the FSS slabs were tested in the ‘PL’ orientation with the other haft tested in the ‘PR’ orientation to capture any potential influence the direction of manufacturing may have on the measured flexural strength.

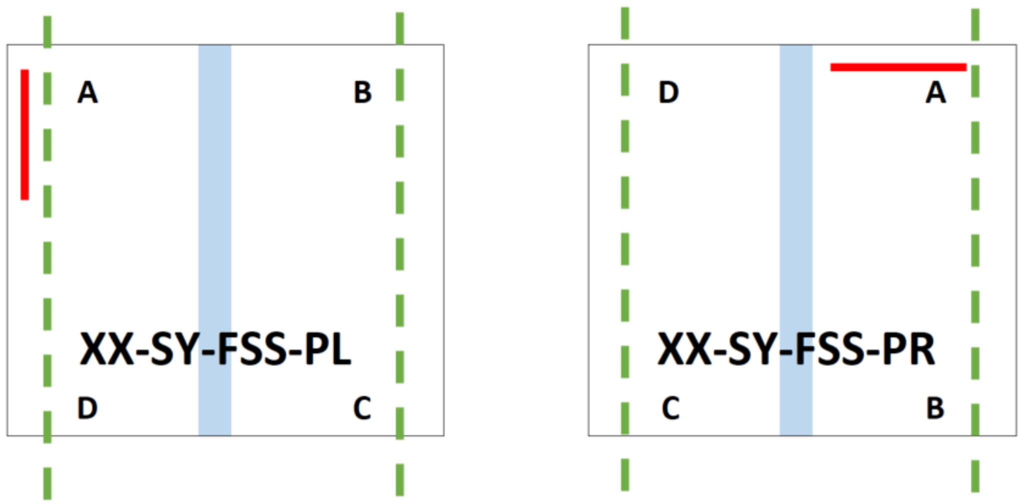


Figure 15 – FSS-Slab Support and Loading Orientation Designations

Although the hydraulically-pressed and hermetically-pressed slabs were not considered to have a production orientation bias, this designation system was applied to all slab specimens in this study for consistency.

2.1.1 Sets 1, 2, and 3 Compression and Absorption Testing

To capture the profile of the possible variations in compressive strength, density, and absorption across the surface of the slabs, which in turn can potentially influence the flexural strength of the slabs, two slabs from Sets 1, 2, and 3 set were cut into 70 coupons as illustrated in Figure 16. Each coupon was alternatively designated “D” or “C”, where “D” refers to coupons tested for density/absorption and “C” refers to coupons tested for compressive strength. Eighteen density coupons and 17 compression coupons were harvested from each slab resulting in a total of 36 density coupons and 34 compression coupons from each of the three sets of slabs. The size of each coupon was approximately 4.6x3.2 in. (117x81 mm) to comply with the compression coupon testing criteria of ASTM C140/C140M, Annex A4 as well as to afford the ability to obtain as many coupons as possible from each slab.

The coupons are identified with the XX-C/D-R/C nomenclature where:

- XX represents the Set number, which varies from 01 to 03;
- C/D stands for compression coupon or density coupon; and
- R/C refers to the row number (R) and the column number (C) from where the coupon was obtained. Row numbers vary from 1 to 7 whereas column numbers vary from 1 to 5 for Slab 1 (the slab produced with directional production marking on the upper right) and 11 to 15 for Slab 2 (the slab produced with the directional production marking on the upper left).

For example, specimen 01-C-3/12 is a coupon from Slab Set 1, tested in compression, and obtained from Row 3/Column 12.

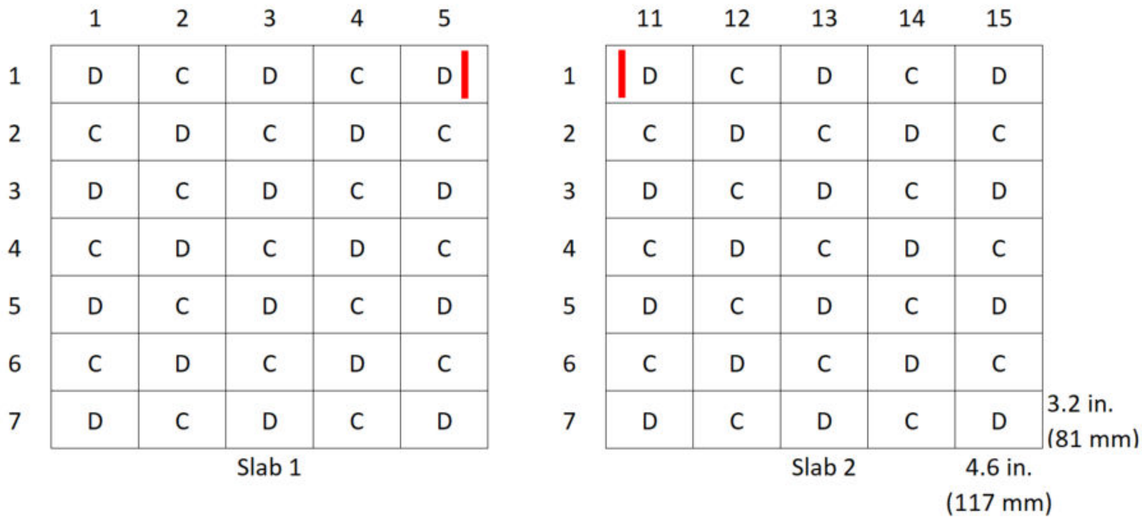


Figure 16 – Compression and Density Coupon Profiling: Sets 1-3

2.1.2 Sets 4 Through 12 Compression and Absorption Testing

Compression and density testing was conducted on slab Sets 4-12 in addition to Set 1-3, however, far fewer coupons were harvested from Sets 4-12 as the property profiling obtained from Sets 1, 2, and 3 were felt to provide a representative example of the range of physical characteristics across a typical concrete paving slab.

Compression and absorption coupons were obtained from the slabs tested as full-size, simply-supported (FSS-Slabs) as the flexural testing of these specimens would reliably result in a single crack located at approximately mid-span of the slab following testing. The coupon harvesting schematic for Sets 4-12 is illustrated in Figure 17.

As the FSS-Slabs were rotated 90 degrees relative to their production orientation (FSS-PL and FSS-PR) this allowed compression coupon sampling from each of the four edges of the slabs. Individual compression and absorption samples were designated using the A-B-C-D corner markings on each slab. Absorption specimen A was taken from the upper left of each slab in its production orientation, absorption specimen B was taken from the upper right, and so on. As each absorption specimen had a cracked surface along the flexural failure plane, this edge was squared-up by saw-cutting prior to absorption testing being completed.

Compression coupons were obtained along the edges (away from the flexure crack failure plane) and again designated based on the corner A-B-C-D markings. Compression coupon A-D was sampled from the middle of the edge of the slab between the A and D corners, compression coupon B-C from the edge between the B and C corners, and so on. Each compression coupon was cut to produce a length-to-width ratio of approximately 2 and a thickness-to-width of approximately 0.62. Even with these targeted dimensions, aspect ratio correction factors were applied to the measured compressive strength.

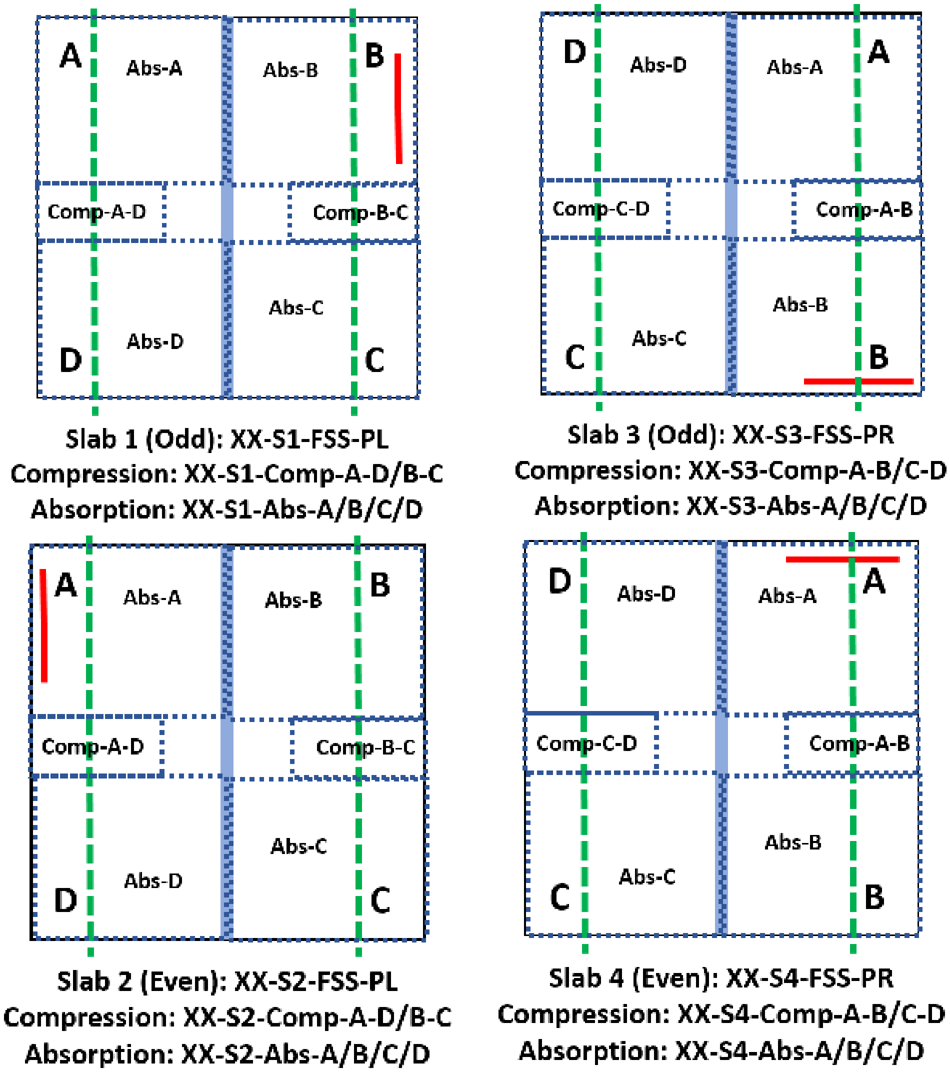


Figure 17 – Compression and Density Coupon Profiling: Sets 4-12

2.2 Failure Mechanism Designations

During flexural testing, three types of failure modes were observed:

- Compound: Failure mechanism characterized by multiple lines of cracking emanating from approximately the center of the slab, an example of which is shown in Figure 18.
- Flexure 1: Failure mechanism characterized by simple flexure with a single crack running perpendicular to the direction of slab production through approximately the center of the slab, an example of which is shown in Figure 19.
- Flexure 2: Failure mechanism characterized by simple flexure with a single crack running parallel to the direction of slab production through approximately the center of the slab, an example of which is shown in Figure 20.

Using the A, B, C, and D corner labeling also facilitated capturing the failure cracking observed with each specimen. Examples of failure line cracks are illustrated in Figure 21 where the blue lines indicate crack locations within the slab following testing.

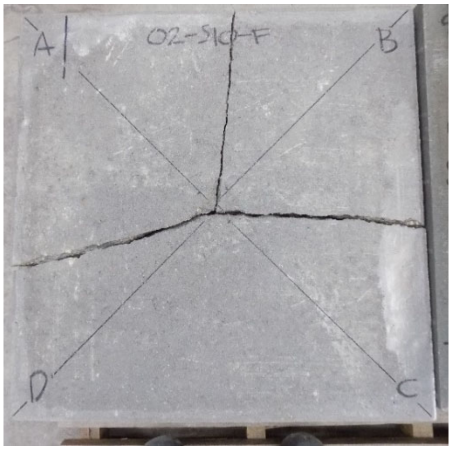


Figure 18 – Typical ‘Compound’ Failure Mechanism

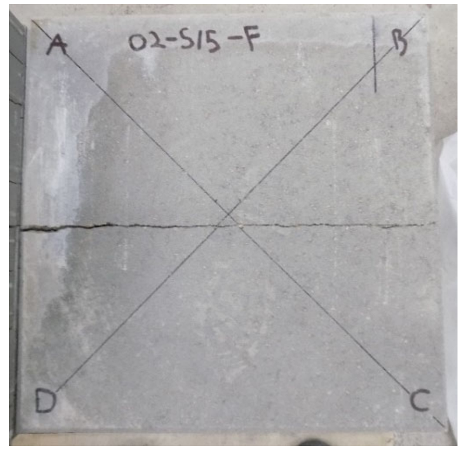


Figure 19 – Typical ‘Flexure 1’ Failure Mechanism

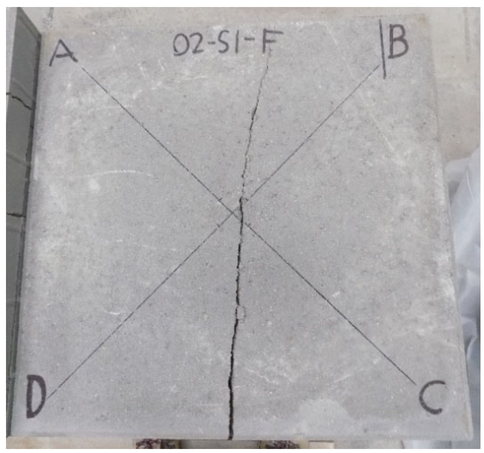


Figure 20 – Typical ‘Flexure 2’ Failure Mechanism

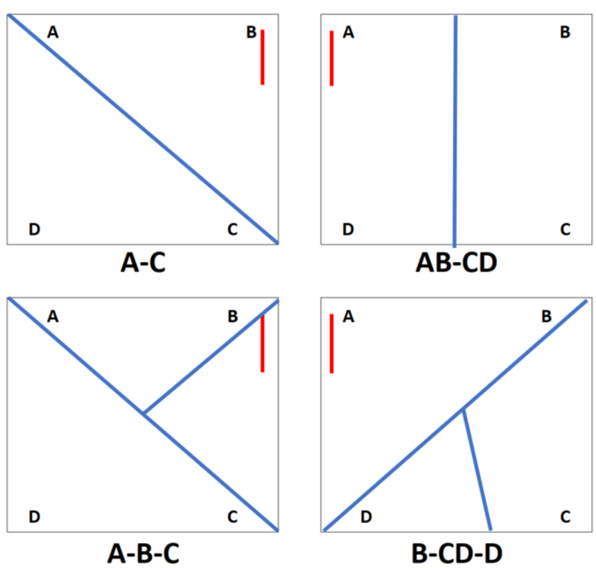


Figure 21 – Failure Line Designations

3.0 TEST RESULTS

To inform and refine the testing variables investigated and the subsequent analyses associated with this project, physical testing of the twelve sets of paving slabs was conducted in two phases. Testing on Slab Sets 1, 2, and 3 conducted first, and based on those results, revisions to the testing protocols were introduced and applied to Slab Sets 4-12 as discussed here. Detailed discussion of Sets 1-3 is provided in Section 3.1 with Section 3.2 summarizing the results from Sets 4-12. The analyses and discussions presented in Section 4.0 combines the results and observations from all twelve sets of slabs.

3.1 Slab Sets 1, 2, and 3

The 40 slabs from each of the first three sets of slabs were subdivided and the following tests conducted on each set:

- Material Properties: Two slabs from each set were cut into compression and absorption coupons as shown in Figure 16. The large number of coupons was intended to capture the profile of the possible variations in compressive strength and density across the surface of the slabs, which in turn can potentially influence the flexural strength of the samples.
- F-Slabs: Eighteen full-size slabs (F-Slabs) from each set were tested under corner support and center point loading as illustrated in Figure 9. The purpose of these tests was to establish performance criteria of full-size slabs in service under pedestal-set conditions.
- Q-Slabs: Forty quartered slabs (Q-Slabs) saw cut from ten full size slabs were tested under corner support and center point loading as illustrated in Figure 10. The purpose of these tests was to develop a correlation between the full-size slab strength and the reduced-size slab strength recognizing not all laboratories have the means to test full-size slabs.
- FSS-Slabs: Ten full size slabs (FSS-Slabs) were tested using simple support conditions and a span length equal to 90% of the slab length as shown in Figure 11. Half of these slabs were tested with the span length parallel to the direction of production with the other half tested setting the span length perpendicular to the direction of production. The purpose of these tests was to establish a potential correlation between the corner support, center loading testing configuration and conventional modulus of rupture testing similar to ASTM C1491, *Standard Specification for Concrete Roof Pavers*, and ASTM C1782/C1782M, *Standard Specification for Segmental Concrete Paving Slabs*.

3.1.1 Compression, Density, and Absorption

Testing for the compressive strength, density, and absorption of each harvested coupon was conducted in accordance with Annex A4 of ASTM C140/C140M, *Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Unit* (Ref. 1). The results of these tests are summarized in Table 3 with detailed results of the individual coupons for each set of slabs included in Appendix A.

Precision, bias, and uncertainties associated with any testing notwithstanding, some variation in material properties was anticipated at different locations across each slab's surface. To gain a better understanding of how the physical properties change within a single slab for each slab set, the individual coupon properties are mapped to their respective location within the full-size slabs as shown in Figures 22 through 27. The potential impact(s) of these property variations are discussed further in the analyses of the flexural strength data.

Table 3 – Average Physical Properties: Sets 1, 2, and 3

	Compressive Strength, lb/in.^{2} (MPa)			Absorption			Density, lb/ft^3 (kg/m^3)		
	Set 1[A]	Set 2[B]	Set 3[C]	Set 1[A]	Set 2[B]	Set 3[C]	Set 1[A]	Set 2[B]	Set 3[C]
Average	7,570 (52.2)	11,290 (77.8)	11,430 (78.8)	4.1%	3.5%	4.1%	131.1 (2,100)	137.9 (2,210)	143.8 (2,300)
Standard Deviation	856 (5.9)	923 (6.4)	745 (5.1)	0.3%	0.1%	0.1%	2.1 (34)	1.5 (24)	1.7 (27)
Coefficient of Variation	11.3%	8.2%	6.5%	6.4%	3.9%	3.6%	1.6%	1.1%	1.2%

[A]Set 1: 50 mm dry-cast slabs.
[B]Set 2: 60 mm dry-cast slabs.
[C]Set 3: 50 mm hydraulically-pressed slabs.

	1	2	3	4	5
1		7,990		6,540	
2	8,080		8,060		5,710
3		9,310		7,780	
4	8,140		8,270		6,030
5		7,730		7,090	
6	7,880		7,370		6,480
7		8,090		8,410	

Slab 1

	11	12	13	14	15
1		7,250		7,440	
2	6,840		7,250		7,920
3		7,100		7,560	
4	6,440		8,120		8,550
5		7,230		9,340	
6	9,450		8,460		8,390
7		6,920		7,180	

Slab 2

Figure 22 – Set 1: Slab Compressive Strength Profiles (lb/in.^{2})
(100 lb/in.^{2} = 0.69 MPa)

	1	2	3	4	5
1	134.4		132.3		126.7
2		133.4		130.2	
3	133.5		133.5		128.4
4		132.6		130.5	
5	133.0		130.6		130.2
6		132.1		132.1	
7	134.0		133.6		132.0

Slab 1

	11	12	13	14	15
1	132.1		131.1		132.7
2		130.9		130.6	
3	130.8		129.5		132.2
4		127.9		130.3	
5	127.0		130.9		131.9
6		128.3		130.4	
7	126.4		130.9		131.1

Slab 2

Figure 23 – Set 1: Slab Density Profiles (lb/ft^3)
(1 lb/ft^3 = 16 kg/m^3)

	1	2	3	4	5
1		11,080		11,320	
2	10,420		9,890		8,880
3		10,870		10,690	
4	12,340		11,040		12,500
5		11,140		11,070	
6	12,190		11,340		11,790
7		11,610		11,980	

Slab 1

	11	12	13	14	15
1		12,380		12,340	
2	11,940		10,620		11,420
3		11,330		10,670	
4	13,030		8,800		12,360
5		10,910		10,890	
6	11,220		11,030		11,690
7		11,570		11,640	

Slab 2

Figure 24 – Set 2: Slab Compressive Strength Profiles (lb/in.^{2})
(100 lb/in.^{2} = 0.69 MPa)

	1	2	3	4	5
1	139.6		139.8		139.1
2		138.1		137.2	
3	139.0		136.6		138.7
4		137.2		136.5	
5	132.9		136.9		139.1
6		137.5		137.1	
7	139.3		138.0		139.4

Slab 1

	11	12	13	14	15
1	140.3		139.5		139.1
2		137.9		136.9	
3	139.5		134.8		138.7
4		136.8		137.0	
5	138.8		135.9		137.7
6		136.8		137.5	
7	138.8		139.1		139.0

Slab 2

Figure 25 – Set 2: Slab Density Profiles (lb/ft^3)
(1 lb/ft^3 = 16 kg/m^3)

	1	2	3	4	5
1		13,070		10,250	
2	11,580		11,520		10,660
3		11,550		10,980	
4	11,140		10,870		12,140
5		11,920		12,330	
6	11,730		12,520		11,010
7		12,120		11,500	

Slab 1

	11	12	13	14	15
1		10,470		10,760	
2	11,220		11,990		10,880
3		10,830		10,970	
4	11,720		11,700		12,980
5		11,090		9,770	
6	10,840		10,860		11,610
7		11,820		12,200	

Slab 2

Figure 26 – Set 3: Slab Compressive Strength Profiles (lb/in.^{2})
(100 lb/in.^{2} = 0.69 MPa)

	1	2	3	4	5
1	144.5		145.1		145.0
2		144.0		144.2	
3	141.7		142.3		144.0
4		141.8		142.4	
5	141.2		142.4		145.8
6		144.8		142.9	
7	143.8		145.9		147.1

Slab 1

	11	12	13	14	15
1	144.9		144.6		145.2
2		143.8		144.3	
3	142.0		142.4		143.7
4		142.0		143.5	
5	141.6		142.0		147.0
6		141.6		145.3	
7	143.8		146.1		146.2

Slab 2

Figure 27 – Set 3: Slab Density Profiles (lb/ft^3)
(1 lb/ft^3 = 16 kg/m^3)

3.1.2 F-Slabs (Full-Size, Center Loaded, Corner Supported Slabs)

Table 4 summarizes the peak flexure load of the F-Slabs under corner support and center point loading conditions. Detailed results of the individual slabs including slab dimensions and warpage, slab weight, peak load, and failure mechanisms for each of the three sets of slabs are included in Appendix B. Each set of F-Slabs consisted of 18 full-size slabs with the exception of Set 1, which exhibited a premature corner failure of Specimen 01-S5-F and therefore only included 17 individual test results. While one of the goals of this investigation is to develop testing protocols that can identify the potential failure mechanisms seen in Slab 01-S5-F (e.g., corner failure), for the purposes of this study, which includes establishing correlations between full-size and reduced-size slabs, this data point was excluded from subsequent analyses.

Table 4 – Summary of F-Slabs Test Results: Sets 1, 2, and 3

	Set 1 (50 mm Dry-Cast)[A]	**Set 2 (60 mm Dry-Cast)**	**Set 3 (50 mm Hydraulically-Pressed)**
Flexural Load Summaries			
Average	2,245 lb (10,000 N)	2,525 lb (11,225 N)	3,285 lb (14,625 N)
Standard Deviation	136 lb (605 N)	349 lb (1,550 N)	118 lb (525 N)
Coefficient of Variation	6.1%	13.8%	3.6%
Summary of Failure Modes			
Compound	3	1	5
Flexure 1	5	16	2
Flexure 2	10	1	11

[A]Flexural load summary data does not include the measured load from Specimen 01-S5-F, which exhibited a premature corner failure resulting in a peak load of 1,397 lb (6,214 N). See Appendix B.1.

The failure mode of the Set 2 slabs was dominated by cracking perpendicular to the direction of production (Flexure 1). This observation is explored further in Section 3.1.5.

3.1.3 Q-Slabs (Quartered, Center Loaded, Corner Supported Slabs)

With the understanding that testing full-size slabs having nominal dimensions of 24 in. (610 mm) or greater is not always practical or feasible, 10 full-size slabs from each set were saw-cut into quarters measuring nominally 12x12 in. (305x305 mm) to determine if a correlation could be established between the failing loads of full-size slabs and their reduced-size counterparts. Table 5 summarizes the applied peak flexure load results of the Q-Slabs under corner support and center point loading conditions. Detailed results of the individual slabs for each of the three sets of slabs are included in Appendix C along with photographs of example failure mechanisms.

Each set of Q-Slabs consisted of 40 full-size slabs with the exception of Set 1, which exhibited a premature failure of Specimen 01-S9-Q-2/1. Therefore, Set 1 only included 39 individual test results. While one of the goals of this investigation is to develop testing protocols that can identify these potential failure mechanisms, for the purposes of this study, which includes establishing correlations between full-size and reduced-size slabs, the 01-S9-Q-2/1 data point was excluded from subsequent analyses.

As with the F-Slabs, Set 2 of the Q-Slabs showed a propensity to exhibit a ‘Flexure 1’ failure mode, whereby the direction of cracking ran perpendicular to the direction the slabs were manufactured. Potential reasons for this are explored in Section 3.1.5.

Table 5 – Summary of Q-Slabs Test Results: Sets 1, 2, and 3

	Set 1 (50 mm Dry-Cast)[A]	Set 2 (60 mm Dry-Cast)	Set 3 (50 mm Hydraulically-Pressed)
Flexural Load Summaries			
Average	2,725 lb (12,125 N)	4,230 lb (18,825 N)	4,305 lb (19,150 N)
Standard Deviation	256 lb (1,140 N)	322 lb (1,430 N)	344 lb (1,530 N)
Coefficient of Variation	9.4%	7.6%	8.0%
Summary of Failure Modes			
Compound	2	0	0
Flexure 1	30	39	21
Flexure 2	8	1	19

[A]Flexural load summary data does not include the measured load from Specimen 01-S9-Q-2/1, which exhibited a premature failure resulting in a peak load of 625 lb (2,780 N). See Appendix C.1.

3.1.4 FSS-Slabs (Full-Size, Simply-Supported Slabs)

To provide a baseline comparison between conventional simply-supported flexural testing and corner-supported flexural testing, 10 slabs from each set were tested using the procedures of ASTM C140/C140M, Annex A8, with the exception that the span length was set to 90% of the slab length/width. For this investigation, the test span length was approximately 21.6 in. (548 mm) for each of the three sets. Table 6 summarizes the test results of the FSS-Slabs. Appendix D contains detailed information on each FSS-Slab test specimen.

Table 6 – Summary of FSS-Slabs Test Results: Sets 1, 2, and 3

	Set 1 (50 mm Dry-Cast)	Set 2 (60 mm Dry-Cast)	Set 3 (50 mm Hydraulically-Pressed)
Flexural Load Summaries			
Average	2,3953 lb (10,650 N)	2,9053 lb (12,925 N)	3,470 lb (15,425 N)
Standard Deviation	243 lb (1,080 N)	555 lb (2,470 N)	320 lb (1,425 N)
Coefficient of Variation	10.1%	19.1%	9.2%
Summary of Failure Modes			
Compound	0	0	3
Flexure 1	6	6	3
Flexure 2	4	4	4

Observing the compound failure mechanisms in the Set 3 slabs was unexpected for the FSS support and loading conditions. It is likely that these multiple failure planes were not a result of the applied load, but instead occurring in the moments immediately after failure when these slabs cracked and fell to the base of the supporting equipment.

3.1.5 Analysis Set 2 – Centered-Quartered Slab Flexure Results

Considering the failure modes of the F-Slabs and Q-Slabs (Tables 4 and 5), Set 2 does appear to show bias for failing in 'Flexure 1' mechanisms. Given that this trend does not extend to the F- and Q-Slabs of Sets 1 and 3, it is unlikely this a result of the testing protocols, but more likely an inherent manufacturing characteristic of Slab Set 2. If this was a manufacturing defect that was located in the middle of the slab and ran perpendicular to the direction of production, it would not manifest in the test results of the Q-Slabs of Set 2 as this was essentially the saw-cut location for the quartering of the slab.

To explore this concept further, the flexure results of each of the FSS-Slabs were compared considering the direction of span running perpendicular and parallel separately as summarized in Table 7. While the direction of loading did not have a significant impact on the measured flexural strength of Sets 1 and 3, the Set 2 slabs that were tested with the loading strip perpendicular to the direction of production exhibited a significantly lower (approximately 25%) flexural failure load, particularly considering the compressive strength and larger thickness of the Set 2 slabs relative to the other sets.

Table 7 – Summary of FSS-Slabs Test Results by Direction of Span: Sets 1, 2, and 3

	Set 1 (50 mm Dry-Cast)	**Set 2 (60 mm Dry-Cast)**	**Set 3 (50 mm Hydraulically-Pressed)**
Orientation of Loading Strip Parallel to Direction of Production			
Average	2,235 lb (9,950 N)	3,420 lb (15,225 N)	3,350 lb (14,900 N)
Standard Deviation	87 lb (385 N)	500 lb (2,225 N)	164 lb (730 N)
Orientation of Loading Strip Perpendicular to Direction of Production			
Average	2,500 lb (11,100 N)	2,555 lb (11,375 N)	3,550 lb (15,800 N)
Standard Deviation	261 lb (1,160 N)	215 lb (955 N)	386 lb (1,715 N)
Ratio FSS-PR/FSS-PL	1.12	0.75	1.06

This gave rise to the theory that the Set 2 slabs may have had a defect or other preexisting distress that was oriented perpendicular to their direction of production, which was not captured in the testing of these slabs parallel to the direction of production. To test this theory, four of the untested Set 2 slabs were saw-cut, this time obtaining a 12x12 in. (305x305 mm) reduced-size specimens from the center of the full-size slab as illustrated in Figure 28 and tested using the Q-Slab testing protocol (corner-supported, center loaded). Two of these slabs were from the left side of production cycle and two from the right. Each of the centered-quartered slabs failed in 'Flexure 1' (crack perpendicular to the direction of production) and had a failing load less than half of Q-Slabs of Set 2 (Table 5) as summarized in Table 8. It should be noted that prior to cutting the reduced-size specimens from the center of the full-size slabs, the slabs were closely examined and a micro-crack oriented perpendicular to the direction of production was observed in the middle of the bottom side of each slab. While the cause of these micro-cracks could not be determined, it supports the theory that this preexisting condition contributed to the lower flexural failure loads for the slabs loaded in the perpendicular direction and the lower failing loads for the center-quartered slabs compared to the corner-quartered slabs.

These observations coupled with the testing results of the centered-quartered flexure specimens sampled from the Set 2 slabs spurred revisions to the second phase of testing associated with this project. While the general testing protocols from Phase I were carried into Phase II, centered-quartered samples (CQ-Slabs) were obtained from Slab Sets 4-12 in addition to the quartered corner samples (Q-Slabs) in an effort to identify and isolate potential flexural failure mechanisms that would not otherwise be captured with the Q-Slabs.

Table 8 – Set 2 Centered-Quartered Flexure Results

	Slab 1	Slab 2	Slab 3	Slab 4
Load, lb (N)	1,845 lb (8,200 N)	2,020 lb (9.000 N)	1,905 lb (8,475 N)	2,150 lb (9,575 N)
Failure Mode	Flexure 1	Flexure 1	Flexure 1	Flexure 1

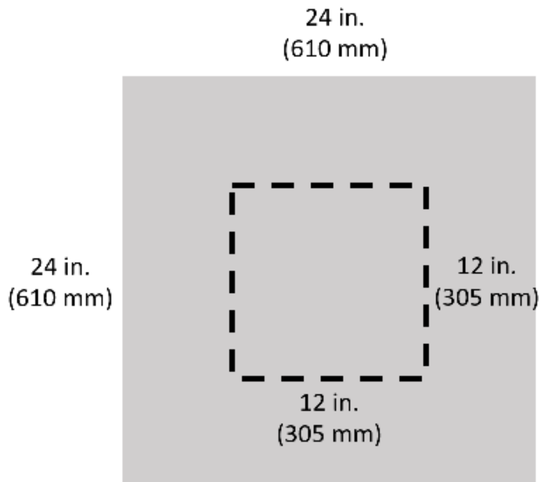


Figure 28 – Location of Centered-Quartered Reduced-Size Specimen

3.2 Slab Sets 4 through 12

Mirroring the testing program for Sets 1-3 to characterize the absorption, compressive strength, flexural strength under simple-support conditions, and flexural strength under corner-supported, center loaded of both full-size and reduced-size slab, nine additional sets of slabs were sourced from various producers and tested. Each set consisted of fifteen individual full-size slabs tested as follows:

- 4 full-size slabs tested with corner supports and center point loading (F-Slabs);
- 4 full-size slabs tested with simple supports and mid-span loading (FSS-Slabs);
- 4 full-size slabs with samples saw-cut from the center of each slab and tested with corner supports and center point loading (CQ-Slabs); and
- 3 full-size slabs quartered into 12 samples and tested with corner supports and center point loading (Q-Slabs).

Production methods employed for Slab Set 4-12 included dry-cast (with and without a face-mix), hermetically-pressed, and hydraulically-pressed. All slabs had nominal lengths and width of 24 in. (610 mm) with varying nominal thicknesses.

3.2.1 Compression, Density, and Absorption

Testing for the compressive strength, density, and absorption of each harvested coupon was conducted in accordance with Annex A4 of ASTM C140/C140M, *Standard Test Methods for Sampling and Testing*

Concrete Masonry Units and Related Unit (Ref. 1). The results of these tests are summarized in Table 9 with detailed results of the individual coupons for each set of slabs included in Appendix A.

Table 9 – Average Physical Properties: Sets 4 through 12

Set	Production Method	Property	Average	Standard Deviation	COV
4	Hermetically-Pressed	Nominal Thickness, mm	50	0.68	1.3
		Compressive Strength, lb/in.^{2} (MPa)	12,250 (84.5)	590	4.8
		Absorption, %	4.50	0.11	2.4
		Density, lb/ft^3 (kg/m^3)	141.0 (2,259)	0.68	0.5
5	Dry-Cast Face-Mix	Nominal Thickness, mm	50	0.20	0.4
		Compressive Strength, lb/in.^{2} (MPa)	14,800 (102.0)	263	1.8
		Absorption, %	3.09	0.20	6.3
		Density, lb/ft^3 (kg/m^3)	146.6 (2,348)	0.72	0.5
6	Hydraulically-Pressed	Nominal Thickness, mm	50	0.94	1.9
		Compressive Strength, lb/in.^{2} (MPa)	16,810 (115.9)	968	5.8
		Absorption, %	4.69	0.13	2.9
		Density, lb/ft^3 (kg/m^3)	149.3 (2,392)	1.09	0.7
7	Hydraulically-Pressed	Nominal Thickness, mm	45	0.71	0.102
		Compressive Strength, lb/in.^{2} (MPa)	15,180 (104.7)	531	3.5
		Absorption, %	4.06	0.13	3.1
		Density, lb/ft^3 (kg/m^3)	148.8 (2,384)	0.76	0.5
8	Dry-Cast Through-Mix	Nominal Thickness, mm	55	0.66	1.2
		Compressive Strength, lb/in.^{2} (MPa)	6,580 (45.4)	305	4.6
		Absorption, %	7.62	0.47	6.2
		Density, lb/ft^3 (kg/m^3)	134.2 (2,150)	1.45	1.1
9	Dry-Cast Through-Mix	Nominal Thickness, mm	60	0.84	1.4
		Compressive Strength, lb/in.^{2} (MPa)	10,580 (72.9)	704	6.7
		Absorption, %	4.56	0.21	4.6
		Density, lb/ft^3 (kg/m^3)	139.1 (2,228)	1.52	1.1
10	Dry-Cast Face-Mix	Nominal Thickness, mm	60	0.86	1.4
		Compressive Strength, lb/in.^{2} (MPa)	9,460 (65.2)	1551	16.4
		Absorption, %	5.98	0.97	16.2
		Density, lb/ft^3 (kg/m^3)	134.9 (2,161)	2.46	1.8
11	Hermetically-Pressed	Nominal Thickness, mm	50	0.64	1.2
		Compressive Strength, lb/in.^{2} (MPa)	14,280 (98.5)	873	6.1
		Absorption, %	3.69	0.18	4.7
		Density, lb/ft^3 (kg/m^3)	145.5 (2,331)	1.15	0.8
12	Dry-Cast Face-Mix	Nominal Thickness, mm	50	0.48	0.9
		Compressive Strength, lb/in.^{2} (MPa)	14,030 (96.7)	1986	14.2
		Absorption, %	3.95	0.56	14.1
		Density, lb/ft^3 (kg/m^3)	142.2 (2,278)	2.33	1.6

3.2.2 F-Slabs (Full-Size, Center Loaded, Corner Supported Slabs)

Table 10 summarizes the peak flexure load of the F-Slabs under corner support and center point loading conditions for Sets 4 through 12 as an average of the four slabs tested per set. Detailed results of the individual slabs including slab dimensions and warpage, slab weight, peak load, and failure mechanisms for each slab set are included in Appendix B.

Table 10 – Summary of F-Slabs Test Results: Sets 4 through 12

Slab Set	Average, lb (N)	Standard Deviation, lb (N)	COV, %
4	2,175 (9,675)	91 (405)	4.2
5	2,700 (12,000)	97 (430)	3.6
6	3,110 (13,850)	107 (475)	3.4
7	1,790 (7,950)	34 (150)	1.9
8	2,270 (10,100)	143 (635)	6.3
9	3,040 (13,525)	161 (715)	5.3
10	2,180 (9,700)	295 (1,310)	13.5
11	2,570 (11,450)	50 (220)	2.0
12	2,930 (13,025)	136 (605)	4.7

3.2.3 Q-Slabs and CQ-Slabs (Quartered, Center Loaded, Corner Supported Slabs)

As with the Phase I testing, four specimens from each set where saw-cut by quartering about the plan centroid of each slab and tested with corner-support, center loaded conditions. In addition, three other reduced-size specimens were saw-cut from the center of full-size slabs as shown in Figure 28. The test results of these reduced-size specimens (Q-Slabs and CQ-Slabs) are provided in Table 11 with detailed results provided in Appendix C.

Table 11 – Summary of Reduced-Size Slab Test Results: Sets 4 through 12

Slab Set	Specimen Set	Average, lb (N)	Standard Deviation, lb (N)	COV, %
4	Quartered Corner Specimens (Q-Slabs)	2,665 (11,850)	146 (650)	5.5
	Center-Quartered Specimens (CQ-Slabs)	2,810 (12,500)	46 (205)	1.6
	All Reduced Specimens	2,695 (11,975)	144 (640)	5.3
5	Quartered Corner Specimens (Q-Slabs)	3,450 (15,325)	181 (805)	5.2
	Center-Quartered Specimens (CQ-Slabs)	3,690 (16,425)	66 (295)	1.8
	All Reduced Specimens	3,495 (15,550)	191 (850)	5.5
6	Quartered Corner Specimens (Q-Slabs)	3,995 (17,775)	156 (695)	3.9
	Center-Quartered Specimens (CQ-Slabs)	3,875 (17,225)	119 (530)	3.1
	All Reduced Specimens	3,970 (17,650)	154 (685)	3.9
7	Quartered Corner Specimens (Q-Slabs)	2,190 (9,725)	146 (650)	6.7

	Center-Quartered Specimens (CQ-Slabs)	2,460 (10,950)	51 (225)	2.1
	All Reduced Specimens	2,240 (9,975)	172 (775)	7.7
8	Quartered Corner Specimens (Q-Slabs)	2,770 (12,325)	194 (875)	7.0
	Center-Quartered Specimens (CQ-Slabs)	3,005 (13,375)	108 (480)	3.6
	All Reduced Specimens	2,830 (12,525)	202 (900)	7.1
9	Quartered Corner Specimens (Q-Slabs)	4,465 (19,850)	312 (1,390)	7.0
	Center-Quartered Specimens (CQ-Slabs)	4,150 (18,475)	374 (1,665)	9.0
	All Reduced Specimens	4,400 (19,575)	340 (1,510)	7.7
10	Quartered Corner Specimens (Q-Slabs)	4,400 (19,575)	349 (1,550)	7.9
	Center-Quartered Specimens (CQ-Slabs)	3,425 (15,250)	243 (1,080)	7.1
	All Reduced Specimens	4,205 (18,725)	515 (2,290)	12.2
11	Quartered Corner Specimens (Q-Slabs)	3,505 (15,600)	215 (955)	6.1
	Center-Quartered Specimens (CQ-Slabs)	3,430 (15,250)	112 (500)	3.3
	All Reduced Specimens	3,490 (15,525)	199 (885)	5.7
12	Quartered Corner Specimens (Q-Slabs)	3,960 (17,600)	319 (1,420)	8.1
	Center-Quartered Specimens (CQ-Slabs)	4,035 (17,950)	210 (935)	5.2
	All Reduced Specimens	3,975 (17,675)	298 (1,325)	7.5

Comparing each set of reduced-size specimens, there was generally good correlation in measured strength between the quartered (Q-Slabs) and center-quartered (CQ-Slabs) with the exception of Set 10 where the centered-quartered specimens were significantly lower in strength compared to the quartered specimens. As reviewed in Section 3.1.5, it is likely this set had an unidentified inherent weakness in the slabs that only manifested in the testing of the centered-quartered specimens.

3.2.4 FSS-Slabs (Full-Size, Simply-Supported Slabs)

To round out the testing matrix, four full-size slabs were tested under simple support, strip loading conditions to assess the modulus of rupture and provide a baseline for comparison to historical slab quality control testing. The results of these tests are summarized in Table 12 with detailed results provided in Appendix D.

Table 12 – Summary of FSS-Slabs Test Results: Sets 4 through 12

Slab Set	Average, lb/in.^{2} (MPa)	Standard Deviation, lb/in.^{2} (MPa)	COV, %
4	830 (5.70)	80 (0.55)	9.6
5	1,035 (7.15)	47 (0.32)	4.5
6	1,330 (9.15)	43 (0.30)	3.2
7	735 (5.05)	25 (0.17)	3.4
8	710 (4.90)	45 (0.31)	6.3
9	900 (6.20)	43 (0.30)	4.8
10	530 (3.65)	75 (0.52)	14.2
11	925 (6.40)	8 (0.06)	0.9
12	1,100 (7.60)	263 (1.81)	23.9

The observations from Set 10 noted from Table 11 carry over to the FSS-Slab testing for this set as well with a notable drop in flexural strength indicating a preexisting weakness. This measured modulus of rupture is lower than would have been predicted for the corresponding compressive strength of 9,460 lb/in.^{2} (65.2 MPa) associated with Set 10.

4.0 ANALYSES

4.1 Determination of Minimum Concentrated Load Performance Criteria

In addition to developing a testing protocol for assessing the strength and performance of pedestal set slabs, this project set out to determine an appropriate minimum load paving slabs installed in pedestal set applications should be capable of carrying. As discussed, applying a concentrated load to slabs during testing may not replicate all loading conditions such slabs will see in service, but it is a possible loading scenario and conservatively captures more extreme loading events. It is also relatively easy to apply in a laboratory setting compared to other loading types, such as uniformly distributed loads, and therefore affords better intra-laboratory repeatability.

For benchmarking purposes, ASCE/SEI 7, *Minimum Design Loads and Associated Criteria for Buildings and Other Structures* (Ref. 6), defines minimum live load design criteria for a number of applications. While these minimum design loads vary considerably based on the intended use of a system or structure, for applications where pedestal set slabs would commonly be used, including office buildings, lobbies, and similar areas not subject to vehicular traffic, ASCE/SEI 7 requires a minimum concentrated load of 2,000 lb (8,900 N) to be accounted for in design.

While directly comparing the slab strengths under concentrated center loading (F-Slabs) to simply supported strip loading (FSS-Slabs) is not possible due to the differences in loading and support conditions, it does provide a means of comparing relative performance against an established minimum strength criterion. In accordance with ASTM C1782/C1782M, the minimum average modulus of rupture for paving slabs is 725 lb/in.^{2} (5.0 MPa), which if used as a benchmark, only Sets 2, 8, and 10 exhibited modulus of rupture values below this threshold. Accounting for the previously noted discrepancies of Sets 2 and 10, the slabs tested as part of this project would have for the most part met the minimum requirements under ASTM C1782/C1782M. As summarized in Table 13, comparing the concentrated failure loads to the modulus of rupture values, only Set 7 had an average concentrated failing load less than 2,000 lb (8,896 N), but it's modulus of rupture was only slightly above the minimum ASTM C1782/C1782M value.

While such comparisons should be taken with caution given that flexural strength is dependent on not only compressive strength, but also method of manufacturing (wet-cast vs. dry-cast), aggregate size and shape, and specimen moisture content at the time of testing, it does provide a secondary means of indirectly supporting an average minimum concentrated loading criteria of 2,000 lb (8,896 N).

In addition to a minimum average modulus of rupture, ASTM C1782/C1782M also stipulates that no unit exhibit a modulus of rupture less than 650 lb/in.^{2} (4.5 MPa). This allowance for an individual unit to have a strength up to 10% less than the average tested strength is relatively common throughout ASTM standards addressing performance criteria for manufactured concrete products. If applied here, then the average concentrated failing load would be a minimum of 2,000 lb (8,896 N) with no individual unit failing at less than 1,800 lb (8,007 N). Finally, rather than exact metric conversions, it is recommended that a dual unit ASTM standard require the following strength criteria:

> *At the time of delivery to the job site, the average concentrated failing load of the test specimens shall be a minimum of 2,000 lb [8,900 N] with no individual unit less than 1,800 lb [8,000 N] when tested using the protocols as outlined in Appendix E of this report.*

Table 13 – Comparison of F-Slab and FSS-Slab Strengths

Set No.	Average Concentrated Failure Load, F-Slabs, lb (N)	Average Modulus of Rupture, FSS-Slabs, lb/in.^{2} (MPa)
Set 1 (Dry-Cast Through-Mix)	2,245 (10,000)	745 (5.15)
Set 2 (Dry-Cast Through-Mix)	2,525 (11,225)	700 (4.85)
Set 3 (Hydraulically-Pressed)	3,285 (14,625)	1,215 (8.40)
Set 4 (Hermetically-Pressed)	2,175 (9,675)	830 (5.70)
Set 5 (Dry-Cast Face-Mix)	2,700 (12,000)	1,035 (7.15)
Set 6 (Hydraulically-Pressed)	3,110 (13,850)	1,330 (9.15)
Set 7 (Hydraulically-Pressed)	1,790 (7,975)	735 (5.05)
Set 8 (Dry-Cast Through-Mix)	2,270 (10,100)	710 (4.90)
Set 9 (Dry-Cast Through-Mix)	3,040 (13,525)	900 (6.20)
Set 10 (Dry-Cast Face-Mix)	2,180 (9,700)	530 (3.65)
Set 11 (Hermetically-Pressed)	2,570 (11,450)	925 (6.40)
Set 12 (Dry-Cast Face-Mix)	2,930 (13,025)	1,100 (7.55)

4.2 Determination of Reduced-Size Specimen Correction Factor

Given that it is not always practical to test full-size slabs, another aspect of this investigation was to develop testing protocols, and if possible, a relationship between the strength of slabs tested full-size and the same slabs tested in a reduced-size configuration. As previously noted in the review of the test data, testing reduced-size slabs presents its own challenges as harvesting smaller specimens can artificially increase the tested strength by inadvertently removing planes of weakness present in full-size specimens. While this can be addressed by testing both the corners and centers of full-size slabs, it does result in a large number of tests required to be conducted.

Table 14 summarizes the strengths of each slab set under concentrated loading conditions for both full-size and reduced-size specimens. The average ratio of the reduced-size to full-size strength for all sets is 1.37 with a standard deviation of 0.20. If, however, Sets 2 and 10 are removed from the data set, the average ratio is 1.29 with a standard deviation of 0.07. (See Sections 3.15, 3.2.3 and 3.2.4 for further discussion on Sets 2 and 10.)

Table 14 – Comparison of F-Slab and Q-/CQ-Slab Strengths					
Set No.	F-Slabs, lb (N)	Q-Slabs, lb (N)	CQ-Slabs, lb (N)	All Q-Slabs*, lb (N)	Ratio Reduce/Full-Size
Set 1 (Dry-Cast Through-Mix)	2,245 (10,000)	2,725 (12,125)	NA	2,725 (12,125)	1.21
Set 2 (Dry-Cast Through-Mix)	2,525 (11,225)	4,230 (18,825)	1,980 (8,800)	3,780 (16,825)	1.50
Set 3 (Hydraulically-Pressed)	3,285 (14,625)	4,305 (19,150)	NA	4,305 (19,150)	1.31
Set 4 (Hermetically-Pressed)	2,175 (9,675)	2,665 (11,850)	2,810 (12,500)	2,695 (11,975)	1.24
Set 5 (Dry-Cast Face-Mix)	2,700 (12,000)	3,450 (15,325)	3,690 (16,425)	3,500 (15,575)	1.30
Set 6 (Hydraulically-Pressed)	3,110 (13,850)	3,995 (17,775)	3,875 (17,225)	3,970 (17,650)	1.28
Set 7 (Hydraulically-Pressed)	1,790 (7,975)	2,190 (9,725)	2,460 (10,950)	2,245 (9,975)	1.25
Set 8 (Dry-Cast Through-Mix)	2,270 (10,100)	2,770 (12,325)	3,005 (13,375)	2,815 (12,525)	1.24
Set 9 (Dry-Cast Through-Mix)	3,040 (13,525)	4,465 (19,850)	4,150 (18,475)	4,400 (19,575)	1.45
Set 10 (Dry-Cast Face-Mix)	2,180 (9,700)	4,400 (19,575)	3,425 (15,250)	4,205 (18,700)	1.93
Set 11 (Hermetically-Pressed)	2,570 (11,450)	3,505 (15,600)	3,430 (15,250)	3,490 (15,525)	1.36
Set 12 (Dry-Cast Face-Mix)	2,930 (13,025)	3,960 (17,600)	4,035 (17,950)	3,975 (17,675)	1.36

* ‘All Q-Slabs’ is the average value for all of the reduced size specimens within each set and is equal to (4[Q-Slabs] + [CQ-Slabs])/5 which reflects the number of specimens tested in each set.

Accounting for the standard deviation of 0.07, applying a correction factor of 1.35 between the full-size and reduced-size specimen strength is reasonably conservative. Applying this correction factor to the minimum load of 2,000 lb (8,896 N) reviewed in Section 4.1 results in a minimum average reduced-size strength of 2,700 (12,010 N). Similarly, applying a 10% reduction to address a lower bound minimum strength would require no reduced-size specimen testing less than 2,450 lb (10,898 N). Like the full-size slab criteria, rather than exact metric conversions, it is recommended that a dual unit ASTM standard require the following strength criteria:

> *At the time of delivery to the job site, the average concentrated failing load of the test specimens if tested as reduced-size specimens shall be a minimum of 2,700 lb [12,000 N] with no individual unit less than 2,450 lb [10,900 N] when tested using the protocols as outlined in Appendix E of this report.*

5.0 CONCLUSIONS AND RECOMMENDATIONS

Appendix E converts the testing protocols developed in this investigation into mandatory language testing criteria through proposed modifications to Annex A8 of ASTM C140/C140M. While testing of full-size specimens is encouraged, there are options to test reduced-size samples saw-cut from full-size slabs. Given the theoretically infinite number of slab geometries that could conceivably be manufactured, however, there are constraints on reduced-size specimen geometry. Further, given that these testing protocols only accommodate slab sizes up to 24 in. (610 mm), a prescriptive limit on the spacing of support pedestals of 24 in. (610 mm) should also be considered. These constraints should not be construed to preclude unique slab geometries or support configurations, but acknowledge that such conditions would require additional design analysis.

For minimum slab strength under concentrated loads, the following is recommended for pedestal-set slabs. Rather than exact metric conversions, it is recommended that a dual unit ASTM standard require the following strength criteria for ease of application:

> *At the time of delivery to the job site, the average concentrated failing load of the test specimens shall be a minimum of 2,000 lb [8,900 N] with no individual unit less than 1,800 lb [8,000 N] when tested using the protocols as outlined in Appendix E of this report.*
>
> *If the specimens are tested as reduced-size specimens the average concentrated failing load shall be a minimum of 2,700 lb [12,000 N] with no individual unit less than 2,450 lb [10,900 N].*

Specimen Configuration	Minimum Strength, lb (N)	
	Average of 3 Slabs	Individual Slab
Full-Size	2,000 (8,900)	1,800 (8,000)
Quartered Corners	2,700 (12,000)	2,450 (10,900)
Quartered Centers	2,700 (12,000)	2,450 (10,900)

6.0 REFERENCES

1. ASTM C140/C140M-22b, *Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units*, ASTM International, West Conshohocken, PA, www.astm.org.
2. ASTM C1782/C1782M-21, *Standard Specification for Segmental Concrete Paving Slabs*, ASTM International, ASTM International, West Conshohocken, PA, www.astm.org.
3. CSA A231.1-19, *Precast Concrete Paving Slabs*, CSA Group, Toronto, ON, www.csagroup.org.
4. Tech Spec 14, *Segmental Concrete Paving Units for Roof Decks*, Interlocking Concrete Pavement Institute, Chantilly, VA, www.icpi.org.
5. ASTM C1491-19, *Standard Specification for Concrete Roof Pavers*, ASTM International, West Conshohocken, PA, www.astm.org.
6. ASCE/SEI-7-16, *Minimum Design Loads and Associated Criteria for Buildings and Other Structures*, American Society of Civil Engineers, Reston, VA, www.asce.org.

APPENDIX: DETAILED TEST RESULTS AND RECOMMENDED TESTING PROTOCOLS

Appendix A: Compression, Density, and Absorption Test Results

Appendix A.1: Set 1 – 50 mm Dry-Cast Slab Specimens

Coupon ID:	Average Width (in.)	Average Height (in.)	Average Length (in.)	Coupon Weight (lb)	Average Cap Thickness (in.)	Aspect Ratio R_a	Aspect Ratio Factor F_a	Total Load (lb)	Net Area (in.^{2})	Net Area Compressive Strength (lb/in.^{2})	Slab Averages
01-C-1/2	3.237	2.079	4.593	2.42	0.043	0.64	1.03	115,530	14.9	7,990	
01-C-1/4	3.262	2.066	4.581	2.37	0.037	0.63	1.02	95,740	14.9	6,540	
01-C-2/1	3.187	2.102	4.643	2.46	0.035	0.66	1.04	114,510	14.8	8,080	
01-C-2/3	3.189	2.101	4.615	2.39	0.031	0.66	1.04	113,650	14.7	8,060	
01-C-2/5	3.231	2.061	4.670	2.30	0.039	0.64	1.02	84,000	15.1	5,710	**Set 1 - Slab 1:**
01-C-3/2	3.266	2.098	4.560	2.48	0.039	0.64	1.03	134,750	14.9	9,310	Strength:
01-C-3/4	3.288	2.076	4.524	2.39	0.045	0.63	1.02	113,640	14.9	7,780	Avg. = 7,590 psi
01-C-4/1	3.286	2.099	4.536	2.50	0.044	0.64	1.03	118,220	14.9	8,140	SD = 936 psi
01-C-4/3	3.189	2.091	4.640	2.41	0.036	0.66	1.04	117,610	14.8	8,270	COV = 12.3%
01-C-4/5	3.255	2.059	4.649	2.37	0.038	0.63	1.02	89,440	15.1	6,030	
01-C-5/2	3.249	2.107	4.510	2.41	0.039	0.65	1.03	109,430	14.7	7,730	
01-C-5/4	3.214	2.082	4.590	2.36	0.039	0.65	1.03	101,180	14.7	7,090	
01-C-6/1	3.237	2.116	4.565	2.43	0.033	0.65	1.04	112,030	14.8	7,880	
01-C-6/3	3.268	2.079	4.675	2.48	0.046	0.64	1.02	110,010	15.3	7,370	
01-C-6/5	3.251	2.062	4.679	2.40	0.043	0.63	1.02	96,510	15.2	6,480	
01-C-7/2	3.245	2.073	4.623	2.38	0.054	0.64	1.03	118,380	15.0	8,090	
01-C-7/4	3.254	2.079	4.665	2.50	0.039	0.64	1.03	124,490	15.2	8,410	
02-C-1/12	3.178	2.085	4.671	2.40	0.043	0.66	1.04	103,300	14.8	7,250	
02-C-1/14	3.289	2.106	4.546	2.46	0.040	0.64	1.03	108,360	15.0	7,440	
02-C-2/11	3.161	2.078	4.618	2.34	0.038	0.66	1.04	95,810	14.6	6,840	
02-C-2/13	3.117	2.106	4.577	2.32	0.041	0.68	1.06	97,760	14.3	7,250	
02-C-2/15	3.204	2.119	4.587	2.42	0.026	0.66	1.05	111,290	14.7	7,920	**Set 1 - Slab 2:**
02-C-3/12	3.301	2.093	4.647	2.46	0.042	0.63	1.02	106,660	15.3	7,100	Strength:
02-C-3/14	3.260	2.118	4.558	2.44	0.042	0.65	1.04	108,480	14.9	7,560	Avg. = 7,560 psi
02-C-4/11	3.250	2.074	4.628	2.37	0.043	0.64	1.02	94,440	15.0	6,440	SD = 798 psi
02-C-4/13	3.253	2.106	4.602	2.47	0.030	0.65	1.03	117,620	15.0	8,120	COV = 10.6%
02-C-4/15	3.188	2.117	4.641	2.46	0.039	0.66	1.05	120,690	14.8	8,550	
02-C-5/12	3.241	2.088	4.595	2.41	0.038	0.64	1.03	104,470	14.9	7,230	
02-C-5/14	3.171	2.114	4.610	2.46	0.035	0.67	1.05	130,020	14.6	9,340	
02-C-6/11	3.243	2.078	4.578	2.33	0.032	0.64	1.03	93,250	14.8	6,450	
02-C-6/13	3.277	2.109	4.545	2.48	0.032	0.64	1.03	122,410	14.9	8,460	
02-C-6/15	3.212	2.122	4.669	2.49	0.018	0.66	1.04	120,440	15.0	8,390	
02-C-7/12	3.235	2.087	4.618	2.39	0.037	0.65	1.03	100,260	14.9	6,920	
02-C-7/14	3.221	2.113	4.599	2.43	0.026	0.66	1.04	102,120	14.8	7,180	

Coupon ID:	Received Weight (lb)	Immersed Weight (lb)	Saturated Weight (lb)	Oven-Dry Weight (lb)	Absorption (%)	Density (lb/ft^3)	Net Volume (ft^3)	Slab Averages
01-D-1/1	2.429	1.372	2.476	2.377	4.1	134.4	0.018	
01-D-1/3	2.485	1.384	2.526	2.422	4.3	132.3	0.018	
01-D-1/5	2.323	1.270	2.388	2.272	5.1	126.7	0.018	
01-D-2/2	2.399	1.337	2.428	2.333	4.1	133.4	0.017	
01-D-2/4	2.304	1.260	2.334	2.242	4.1	130.2	0.017	**Set 1 - Slab 1:**
01-D-3/1	2.457	1.375	2.496	2.398	4.1	133.5	0.018	Absorption:
01-D-3/3	2.549	1.420	2.578	2.478	4.0	133.5	0.019	Avg. = 4.2%
01-D-3/5	2.371	1.300	2.426	2.317	4.7	128.4	0.018	SD = 0.3%
01-D-4/2	2.436	1.346	2.461	2.369	3.9	132.6	0.018	COV = 7.5%
01-D-4/4	2.374	1.302	2.407	2.310	4.2	130.5	0.018	Density:
01-D-5/1	2.449	1.362	2.485	2.393	3.8	133.0	0.018	Avg. = 131.8 pcf
01-D-5/3	2.484	1.365	2.519	2.416	4.3	130.6	0.018	SD = 2.0 pcf
01-D-5/5	2.375	1.308	2.421	2.324	4.2	130.2	0.018	COV = 1.5%
01-D-6/2	2.384	1.318	2.415	2.322	4.0	132.1	0.018	
01-D-6/4	2.428	1.344	2.462	2.368	4.0	132.1	0.018	
01-D-7/1	2.449	1.376	2.494	2.400	3.9	134.0	0.018	
01-D-7/3	2.483	1.388	2.520	2.425	3.9	133.6	0.018	
01-D-7/5	2.365	1.324	2.422	2.324	4.2	132.0	0.018	
01-D-1/11	2.334	1.316	2.399	2.293	4.6	132.1	0.017	
01-D-1/13	2.379	1.313	2.421	2.327	4.0	131.1	0.018	
01-D-1/15	2.466	1.381	2.519	2.420	4.1	132.7	0.018	
01-D-2/12	2.419	1.326	2.449	2.357	3.9	130.9	0.018	
01-D-2/14	2.329	1.273	2.356	2.267	3.9	130.6	0.017	**Set 1 - Slab 2:**
01-D-3/11	2.487	1.375	2.536	2.433	4.2	130.8	0.019	Absorption:
01-D-3/13	2.440	1.322	2.467	2.376	3.9	129.5	0.018	Avg. = 4.1%
01-D-3/15	2.488	1.379	2.524	2.428	4.0	132.2	0.018	SD = 0.2%
01-D-4/12	2.434	1.313	2.468	2.368	4.2	127.9	0.019	COV = 5.2%
01-D-4/14	2.433	1.325	2.458	2.367	3.9	130.3	0.018	Density:
01-D-5/11	2.373	1.282	2.422	2.319	4.4	127.0	0.018	Avg. = 130.3 pcf
01-D-5/13	2.462	1.350	2.491	2.394	4.1	130.9	0.018	SD = 1.8 pcf
01-D-5/15	2.529	1.403	2.570	2.468	4.2	131.9	0.019	COV = 1.4%
01-D-6/12	2.453	1.327	2.487	2.386	4.2	128.3	0.019	
01-D-6/14	2.464	1.343	2.489	2.395	3.9	130.4	0.018	
01-D-7/11	2.306	1.244	2.358	2.257	4.5	126.4	0.018	
01-D-7/13	2.411	1.326	2.446	2.349	4.1	130.9	0.018	
01-D-7/15	2.485	1.377	2.535	2.433	4.2	131.1	0.019	

SI Conversions:
1 in. = 25.4 mm
1 lb = 0.454 kg
1 lbf = 4.44 N
100 lb/in.^{2} = 0.69 MPa
1 lb/ft^3 = 16 kg/m^3

Slab Set 1 Averages

Property	Average	Standard Deviation	Coefficient of Variation
Compressive Strength	7,570 lb/in.^{2}	856 lb/in.^{2}	11.3%
Absorption	4.1%	0.3%	6.4%
Density	131.1 lb/ft^3	2.1 lb/ft^3	1.6%

Appendix A.2: Set 2 – 60 mm Dry-Cast Slab Specimens

Coupon ID:	Average Width (in.)	Average Height (in.)	Average Length (in.)	Coupon Weight (lb)	Average Cap Thickness (in.)	Aspect Ratio R_a	Aspect Ratio Factor F_a	Total Load (lb)	Net Area (in.^{2})	Net Area Compressive Strength (lb/in.^{2})	Slab Averages
02-C-1/2	3.174	2.358	4.620	2.85	0.015	0.74	1.11	146,660	14.7	11,080	
02-C-1/4	3.145	2.350	4.589	2.78	0.020	0.75	1.11	147,070	14.4	11,320	
02-C-2/1	3.146	2.350	4.608	2.81	0.024	0.75	1.11	136,020	14.5	10,420	
02-C-2/3	3.147	2.346	4.576	2.76	0.018	0.75	1.11	128,440	14.4	9,890	
02-C-2/5	3.232	2.344	4.511	2.79	0.028	0.73	1.10	118,260	14.6	8,880	**Set 2 - Slab 1:**
02-C-3/2	3.272	2.340	4.611	2.87	0.028	0.72	1.09	150,770	15.1	10,870	Strength:
02-C-3/4	3.260	2.337	4.581	2.82	0.017	0.72	1.09	146,510	14.9	10,690	Avg. = 11,190 psi
02-C-4/1	3.264	2.334	4.595	2.87	0.016	0.72	1.09	170,090	15.0	12,340	SD = 910 psi
02-C-4/3	3.241	2.333	4.549	2.79	0.014	0.72	1.09	149,070	14.7	11,040	COV = 8.1%
02-C-4/5	3.257	2.329	4.563	2.84	0.015	0.71	1.09	170,780	14.9	12,500	
02-C-5/2	3.248	2.333	4.622	2.85	0.020	0.72	1.09	153,380	15.0	11,140	
02-C-5/4	3.225	2.330	4.583	2.80	0.021	0.72	1.09	149,680	14.8	11,070	
02-C-6/1	3.251	2.314	4.597	2.82	0.025	0.71	1.09	167,780	14.9	12,190	
02-C-6/3	3.233	2.333	4.520	2.77	0.013	0.72	1.09	151,590	14.6	11,340	
02-C-6/5	3.230	2.324	4.589	2.78	0.018	0.72	1.09	160,140	14.8	11,790	
02-C-7/2	3.193	2.318	4.597	2.76	0.020	0.73	1.10	155,480	14.7	11,610	
02-C-7/4	3.199	2.319	4.562	2.74	0.014	0.72	1.09	159,640	14.6	11,980	
02-C-1/12	3.215	2.352	4.570	2.84	0.016	0.73	1.10	165,330	14.7	12,380	
02-C-1/14	3.183	2.344	4.577	2.79	0.024	0.74	1.10	162,960	14.6	12,340	
02-C-2/11	3.203	2.345	4.506	2.79	0.020	0.73	1.10	156,630	14.4	11,940	
02-C-2/13	3.247	2.339	4.567	2.81	0.020	0.72	1.09	144,220	14.8	10,620	
02-C-2/15	3.298	2.364	4.619	2.90	0.015	0.72	1.09	159,670	15.2	11,420	**Set 2 - Slab 2:**
02-C-3/12	3.203	2.338	4.601	2.83	0.017	0.73	1.10	152,000	14.7	11,330	Strength:
02-C-3/14	3.197	2.339	4.604	2.80	0.017	0.73	1.10	142,800	14.7	10,670	Avg. = 11,400 psi
02-C-4/11	3.234	2.338	4.533	2.83	0.020	0.72	1.09	174,620	14.7	13,030	SD = 951 psi
02-C-4/13	3.234	2.312	4.568	2.72	0.036	0.71	1.09	119,550	14.8	8,800	COV = 8.3%
02-C-4/15	3.198	2.369	4.619	2.86	0.015	0.74	1.11	165,000	14.8	12,360	
02-C-5/12	3.254	2.331	4.596	2.82	0.024	0.72	1.09	149,870	15.0	10,910	
02-C-5/14	3.180	2.344	4.583	2.76	0.014	0.74	1.10	143,810	14.6	10,890	
02-C-6/11	3.226	2.335	4.537	2.76	0.021	0.72	1.09	150,120	14.6	11,220	
02-C-6/13	3.246	2.334	4.601	2.82	0.020	0.72	1.09	150,910	14.9	11,030	
02-C-6/15	3.206	2.369	4.605	2.82	0.014	0.74	1.10	156,200	14.8	11,690	
02-C-7/12	3.259	2.324	4.624	2.82	0.022	0.71	1.09	160,410	15.1	11,570	
02-C-7/14	3.222	2.340	4.580	2.83	0.018	0.73	1.10	156,800	14.8	11,640	

Coupon ID:	Received Weight (lb)	Immersed Weight (lb)	Saturated Weight (lb)	Oven-Dry Weight (lb)	Absorption (%)	Density (lb/ft^3)	Net Volume (ft^3)	Slab Averages
02-D-1/1	2.807	1.609	2.837	2.747	3.3	139.6	0.020	
02-D-1/3	2.844	1.633	2.873	2.779	3.4	139.8	0.020	
02-D-1/5	2.717	1.557	2.750	2.658	3.5	139.1	0.019	
02-D-2/2	2.806	1.595	2.830	2.735	3.5	138.1	0.020	
02-D-2/4	2.800	1.585	2.827	2.730	3.5	137.2	0.020	**Set 2 - Slab 1:**
02-D-3/1	2.906	1.661	2.936	2.839	3.4	139.0	0.020	Absorption:
02-D-3/3	2.800	1.581	2.827	2.729	3.6	136.6	0.020	Avg. = 3.5%
02-D-3/5	2.845	1.623	2.873	2.779	3.4	138.7	0.020	SD = 0.1%
02-D-4/2	2.854	1.615	2.880	2.781	3.6	137.2	0.020	COV = 2.7%
02-D-4/4	2.784	1.570	2.810	2.713	3.6	136.5	0.020	Density:
02-D-5/1	2.818	1.557	2.850	2.754	3.5	132.9	0.021	Avg. = 137.9 pcf
02-D-5/3	2.782	1.573	2.809	2.711	3.6	136.9	0.020	SD = 1.7 pcf
02-D-5/5	2.808	1.604	2.834	2.741	3.4	139.1	0.020	COV = 1.2%
02-D-6/2	2.788	1.580	2.813	2.718	3.5	137.5	0.020	
02-D-6/4	2.775	1.569	2.800	2.705	3.5	137.1	0.020	
02-D-7/1	2.814	1.617	2.853	2.759	3.4	139.3	0.020	
02-D-7/3	2.746	1.566	2.779	2.685	3.5	138.0	0.019	
02-D-7/5	2.774	1.595	2.813	2.721	3.4	139.4	0.020	
02-D-1/11	2.776	1.600	2.810	2.721	3.3	140.3	0.019	
02-D-1/13	2.829	1.622	2.860	2.767	3.3	139.5	0.020	
02-D-1/15	2.840	1.630	2.879	2.783	3.4	139.1	0.020	
02-D-2/12	2.818	1.599	2.842	2.747	3.5	137.9	0.020	
02-D-2/14	2.873	1.626	2.902	2.799	3.7	136.9	0.020	**Set 2 - Slab 2:**
02-D-3/11	2.814	1.609	2.836	2.744	3.4	139.5	0.020	Absorption:
02-D-3/13	2.728	1.531	2.761	2.657	3.9	134.8	0.020	Avg. = 3.5%
02-D-3/15	2.865	1.635	2.894	2.799	3.4	138.7	0.020	SD = 0.2%
02-D-4/12	2.719	1.539	2.747	2.649	3.7	136.8	0.019	COV = 4.8%
02-D-4/14	2.800	1.582	2.824	2.726	3.6	137.0	0.020	Density:
02-D-5/11	2.807	1.600	2.831	2.738	3.4	138.8	0.020	Avg. = 138.0 pcf
02-D-5/13	2.723	1.532	2.750	2.653	3.7	135.9	0.020	SD = 1.4 pcf
02-D-5/15	2.855	1.621	2.884	2.788	3.5	137.7	0.020	COV = 1.0%
02-D-6/12	2.766	1.563	2.793	2.697	3.6	136.8	0.020	
02-D-6/14	2.827	1.601	2.851	2.755	3.5	137.5	0.020	
02-D-7/11	2.778	1.590	2.813	2.721	3.4	138.8	0.020	
02-D-7/13	2.812	1.610	2.845	2.753	3.3	139.1	0.020	
02-D-7/15	2.833	1.624	2.870	2.777	3.3	139.0	0.020	

SI Conversions:
1 in. = 25.4 mm
1 lb = 0.454 kg
1 lbf = 4.44 N
100 lb/in.^{2} = 0.69 MPa
1 lb/ft^3 = 16 kg/m^3

Slab Set 2 Averages

Property	Average	Standard Deviation	Coefficient of Variation
Compressive Strength	11,290 lb/in.^{2}	923 lb/in.^{2}	8.2%
Absorption	3.5%	0.1%	3.9%
Density	137.9 lb/ft^3	1.5 lb/ft^3	1.1%

Appendix A.3: Set 3 – 50 mm Hydraulically-Pressed Slab Specimens

Coupon ID:	Average Width (in.)	Average Height (in.)	Average Length (in.)	Coupon Weight (lb)	Average Cap Thickness (in.)	Aspect Ratio R_a	Aspect Ratio Factor F_a	Total Load (lb)	Net Area (in.^{2})	Net Area Compressive Strength (lb/in.^{2})	Slab Averages
03-C-1/2	3.224	1.941	4.635	2.49	0.019	0.60	0.99	197,330	14.9	13,070	
03-C-1/4	3.151	1.950	4.624	2.43	0.041	0.62	1.01	148,410	14.6	10,250	
03-C-2/1	3.226	1.929	4.620	2.47	0.031	0.60	0.99	175,100	14.9	11,580	
03-C-2/3	3.150	1.959	4.544	2.39	0.038	0.62	1.01	163,350	14.3	11,520	
03-C-2/5	3.188	1.966	4.593	2.47	0.053	0.62	1.00	155,370	14.6	10,660	**Set 3 - Slab 1:**
03-C-3/2	3.240	1.946	4.631	2.50	0.042	0.60	0.99	175,350	15.0	11,550	Strength:
03-C-3/4	3.165	1.967	4.599	2.46	0.045	0.62	1.01	158,330	14.6	10,980	Avg. = 11,580 psi
03-C-4/1	3.238	1.930	4.622	2.44	0.025	0.60	0.98	169,450	15.0	11,140	SD = 725 psi
03-C-4/3	3.154	1.968	4.552	2.40	0.040	0.62	1.01	154,310	14.4	10,870	COV = 6.3%
03-C-4/5	3.150	1.923	4.636	2.46	0.052	0.61	1.00	177,520	14.6	12,140	
03-C-5/2	3.249	1.946	4.592	2.49	0.027	0.60	0.99	180,290	14.9	11,920	
03-C-5/4	3.154	1.974	4.580	2.45	0.045	0.63	1.01	175,680	14.4	12,330	
03-C-6/1	3.228	1.929	4.632	2.43	0.037	0.60	0.99	178,000	14.9	11,730	
03-C-6/3	3.188	1.965	4.583	2.45	0.031	0.62	1.00	182,080	14.6	12,520	
03-C-6/5	3.165	1.980	4.578	2.46	0.023	0.63	1.01	157,330	14.5	11,010	
03-C-7/2	3.230	1.948	4.648	2.49	0.029	0.60	0.99	183,540	15.0	12,120	
03-C-7/4	3.163	1.965	4.602	2.45	0.035	0.62	1.01	165,880	14.6	11,500	
03-C-1/12	3.224	1.935	4.621	2.46	0.031	0.60	0.99	157,940	14.9	10,470	
03-C-1/14	3.256	1.959	4.488	2.46	0.036	0.60	0.99	158,870	14.6	10,760	
03-C-2/11	3.250	1.926	4.621	2.45	0.027	0.59	0.98	171,920	15.0	11,220	
03-C-2/13	3.224	1.966	4.589	2.50	0.026	0.61	1.00	177,800	14.8	11,990	
03-C-2/15	3.248	1.988	4.651	2.59	0.029	0.61	1.00	164,380	15.1	10,880	**Set 3 - Slab 2:**
03-C-3/12	3.252	1.942	4.630	2.50	0.030	0.60	0.98	165,580	15.1	10,830	Strength:
03-C-3/14	3.252	1.990	4.562	2.52	0.022	0.61	1.00	162,820	14.8	10,970	Avg. = 11,280 psi
03-C-4/11	3.129	1.934	4.645	2.34	0.017	0.62	1.01	169,360	14.5	11,720	SD = 754 psi
03-C-4/13	3.225	1.972	4.506	2.42	0.038	0.61	1.00	170,160	14.5	11,700	COV = 6.7%
03-C-4/15	3.091	2.002	4.635	2.46	0.018	0.65	1.03	179,930	14.3	12,980	
03-C-5/12	3.266	1.994	4.615	2.51	0.005	0.61	1.00	167,430	15.1	11,090	
03-C-5/14	3.252	1.953	4.670	2.57	0.041	0.60	0.99	150,220	15.2	9,770	
03-C-6/11	3.244	1.935	4.519	2.45	0.022	0.60	0.98	161,550	14.7	10,840	
03-C-6/13	3.288	1.919	4.604	2.46	0.049	0.58	0.97	169,480	15.1	10,860	
03-C-6/15	3.249	2.004	4.651	2.59	0.025	0.62	1.00	174,590	15.1	11,610	
03-C-7/12	3.243	1.940	4.614	2.48	0.030	0.60	0.99	179,360	15.0	11,820	
03-C-7/14	3.261	1.986	4.638	2.57	0.025	0.61	1.00	185,100	15.1	12,200	

Coupon ID:	Received Weight (lb)	Immersed Weight (lb)	Saturated Weight (lb)	Oven-Dry Weight (lb)	Absorption (%)	Density (lb/ft^3)	Net Volume (ft^3)	Slab Averages
03-D-1/1	2.455	1.454	2.487	2.392	4.0	144.5	0.017	
03-D-1/3	2.369	1.409	2.402	2.310	4.0	145.1	0.016	
03-D-1/5	2.442	1.453	2.478	2.383	4.0	145.0	0.016	
03-D-2/2	2.482	1.458	2.499	2.403	4.0	144.0	0.017	
03-D-2/4	2.454	1.443	2.473	2.379	3.9	144.2	0.016	**Set 3 - Slab 1:**
03-D-3/1	2.459	1.434	2.480	2.377	4.3	141.7	0.017	Absorption:
03-D-3/3	2.423	1.413	2.440	2.343	4.2	142.3	0.016	Avg. = 4.1%
03-D-3/5	2.458	1.448	2.482	2.386	4.0	144.0	0.017	SD = 0.2%
03-D-4/2	2.498	1.453	2.515	2.413	4.2	141.8	0.017	COV = 3.7%
03-D-4/4	2.453	1.431	2.470	2.371	4.2	142.4	0.017	Density:
03-D-5/1	2.444	1.423	2.468	2.363	4.4	141.2	0.017	Avg. = 143.8 pcf
03-D-5/3	2.439	1.426	2.459	2.357	4.3	142.4	0.017	SD = 1.7 pcf
03-D-5/5	2.444	1.457	2.472	2.372	4.2	145.8	0.016	COV = 1.1%
03-D-6/2	2.479	1.464	2.497	2.398	4.2	144.8	0.017	
03-D-6/4	2.463	1.441	2.483	2.385	4.1	142.9	0.017	
03-D-7/1	2.425	1.437	2.460	2.357	4.3	143.8	0.016	
03-D-7/3	2.406	1.437	2.436	2.337	4.2	145.9	0.016	
03-D-7/5	2.397	1.437	2.427	2.334	4.0	147.1	0.016	
03-D-1/11	2.440	1.442	2.465	2.375	3.8	144.9	0.016	
03-D-1/13	2.486	1.471	2.515	2.420	3.9	144.6	0.017	
03-D-1/15	2.576	1.533	2.612	2.511	4.0	145.2	0.017	
03-D-2/12	2.487	1.460	2.505	2.408	4.0	143.8	0.017	
03-D-2/14	2.499	1.472	2.519	2.423	4.0	144.3	0.017	**Set 3 - Slab 2:**
03-D-3/11	2.453	1.431	2.473	2.372	4.3	142.0	0.017	Absorption:
03-D-3/13	2.501	1.457	2.516	2.416	4.1	142.4	0.017	Avg. = 4.1%
03-D-3/15	2.594	1.524	2.617	2.517	4.0	143.7	0.018	SD = 0.1%
03-D-4/12	2.440	1.422	2.458	2.358	4.2	142.0	0.017	COV = 3.4%
03-D-4/14	2.440	1.431	2.458	2.361	4.1	143.5	0.016	Density:
03-D-5/11	2.452	1.429	2.475	2.373	4.3	141.6	0.017	Avg. = 143.9 pcf
03-D-5/13	2.459	1.433	2.479	2.380	4.1	142.0	0.017	SD = 1.7 pcf
03-D-5/15	2.629	1.573	2.657	2.553	4.1	147.0	0.017	COV = 1.2%
03-D-6/12	2.486	1.443	2.504	2.409	4.0	141.6	0.017	
03-D-6/14	2.554	1.515	2.579	2.478	4.1	145.3	0.017	
03-D-7/11	2.418	1.434	2.455	2.353	4.3	143.8	0.016	
03-D-7/13	2.416	1.445	2.450	2.354	4.1	146.1	0.016	
03-D-7/15	2.548	1.528	2.588	2.484	4.2	146.2	0.017	

SI Conversions:
1 in. = 25.4 mm
1 lb = 0.454 kg
1 lbf = 4.44 N
100 lb/in.^{2} = 0.69 MPa
1 lb/ft^3 = 16 kg/m^3

Slab Set 3 Averages

Property	Average	Standard Deviation	Coefficient of Variation
Compressive Strength	11,430 lb/in.^{2}	745 lb/in.^{2}	6.5%
Absorption	4.1%	0.1%	3.6%
Density	143.8 lb/ft^3	1.7 lb/ft^3	1.2%

Appendix A.4: Set 4 – 50 mm Hermetically-Pressed Slab Specimens

Compression Test Results — Date of Testing = June 22, 2022

	04-S1-Comp-A-D	04-S2-Comp-A-D	04-S3-Comp-A-B	04-S4-Comp-A-B	04-S1-Comp-B-C	04-S2-Comp-B-C	04-S3-Comp-C-D	04-S4-Comp-C-D
Coupon Weight (lb) =	3.509	3.555	3.567	3.570	3.582	3.501	3.492	3.467
Width 1 (in.) =	3.266	3.320	3.279	3.296	3.291	3.261	3.280	3.231
Width 2 (in.) =	3.270	3.318	3.292	3.302	3.288	3.273	3.281	3.234
Height 1 (in.) =	2.017	2.040	2.028	2.025	2.011	2.011	2.028	2.033
Height 2 (in.) =	2.030	2.024	2.053	2.021	2.012	2.021	2.012	2.018
Length 1 (in.) =	6.564	6.536	6.620	6.561	6.567	6.605	6.562	6.566
Length 2 (in.) =	6.528	6.555	6.645	6.568	6.622	6.511	6.552	6.555
Post-Capping Height 1 (in.) =	2.093	2.093	2.110	2.101	2.098	2.081	2.002	2.099
Post-Capping Height 2 (in.) =	2.112	2.101	2.122	2.099	2.105	2.093	2.002	2.119
Compression Load (lb) =	246,930	255,340	262,270	281,590	275,020	273,720	268,030	240,100
Coupon Weight (lb) =	3.509	3.555	3.567	3.570	3.582	3.501	3.492	3.467
Average Width (in.) =	3.268	3.319	3.286	3.299	3.290	3.267	3.281	3.233
Average Height (in.) =	2.024	2.032	2.041	2.023	2.012	2.016	2.020	2.026
Average Length (in.) =	6.546	6.546	6.633	6.565	6.595	6.558	6.557	6.561
Aspect Ratio =	0.619	0.612	0.621	0.613	0.611	0.617	0.616	0.627
Compressive Strength (psi) =	11,620	11,750	12,140	13,020	12,670	12,840	12,510	11,480
Average Strength (psi) =	12,250							

Absorption Test Results — Date of Start of Testing = June 20, 2022

	04-S1-Abs-A	04-S1-Abs-B	04-S1-Abs-C	04-S1-Abs-D	04-S2-Abs-A	04-S2-Abs-B	04-S2-Abs-C	04-S2-Abs-D
Received Weight (lb) =	19.68	19.80	20.70	19.02	19.40	20.32	20.86	18.58
Immersed Weight (lb) =	11.53	11.60	12.18	11.16	11.33	11.94	12.32	10.94
Saturated Weight (lb) =	20.04	20.14	21.14	19.40	19.76	20.70	21.32	18.98
Oven-Dry Weight (lb) =	19.18	19.32	20.24	18.56	18.90	19.82	20.40	18.16
Absorption (%) =	4.48%	4.24%	4.45%	4.53%	4.55%	4.44%	4.51%	4.52%
Density (pcf) =	140.6	141.2	141.0	140.6	139.9	141.2	141.4	140.9

	04-S3-Abs-A	04-S3-Abs-B	04-S3-Abs-C	04-S3-Abs-D	04-S4-Abs-A	04-S4-Abs-B	04-S4-Abs-C	04-S4-Abs-D
Received Weight (lb) =	18.60	21.08	19.60	20.68	20.42	19.84	20.28	19.00
Immersed Weight (lb) =	11.00	12.36	11.16	12.20	12.08	11.73	11.90	11.14
Saturated Weight (lb) =	19.00	21.50	19.44	21.08	20.86	20.26	20.70	19.36
Oven-Dry Weight (lb) =	18.18	20.56	18.56	20.20	19.94	19.40	19.80	18.52
Absorption (%) =	4.51%	4.57%	4.74%	4.36%	4.61%	4.43%	4.55%	4.54%
Density (pcf) =	141.8	140.4	139.9	141.9	141.7	141.9	140.4	140.6

SI Conversions:
1 in. = 25.4 mm
1 lb = 0.454 kg
1 lbf = 4.44 N
100 lb/in.^{2} = 0.69 MPa
1 lb/ft^3 = 16 kg/m^3

Slab Set 4 Averages

Property	Average	Standard Deviation	Coefficient of Variation
Compressive Strength	12,250 lb/in.^{2}	590 lb/in.^{2}	4.8%
Absorption	4.5%	0.11%	2.4%
Density	141.0 lb/ft^3	0.68 lb/ft^3	0.5%

Appendix A.5: Set 5 – 50 mm Dry-Cast Face-Mix Slab Specimens

Compression Test Results Date of Testing = July 15, 2022

	05-S1-Comp-A-D	05-S2-Comp-A-D	05-S3-Comp-A-B	05-S4-Comp-A-B	05-S1-Comp-B-C	05-S2-Comp-B-C	05-S3-Comp-C-D	05-S4-Comp-C-D
Coupon Weight (lb) =	3.497	3.643	3.743	3.619	3.578	3.620	3.732	3.696
Width 1 (in.) =	3.146	3.242	3.280	3.203	3.141	3.155	3.346	3.299
Width 2 (in.) =	3.195	3.243	3.281	3.201	3.148	3.151	3.350	3.315
Height 1 (in.) =	1.982	2.033	2.048	2.037	2.000	2.021	2.037	2.024
Height 2 (in.) =	1.974	2.038	2.047	2.033	2.002	2.026	2.036	2.026
Length 1 (in.) =	6.450	6.581	6.448	6.460	6.529	6.496	6.547	6.450
Length 2 (in.) =	6.466	6.535	6.476	6.468	6.577	6.559	6.527	6.466
Post-Capping Height 1 (in.) =	2.042	2.113	2.107	2.113	2.067	2.095	2.092	2.108
Post-Capping Height 2 (in.) =	2.017	2.120	2.152	2.106	2.058	2.095	2.085	2.078
Compression Load (lb) =	293,550	302,660	307,720	301,270	304,800	293,480	327,710	322,850
Coupon Weight (lb) =	3.497	3.643	3.743	3.619	3.578	3.620	3.732	3.696
Average Width (in.) =	3.171	3.243	3.281	3.202	3.145	3.153	3.348	3.307
Average Height (in.) =	1.978	2.036	2.048	2.035	2.001	2.024	2.037	2.025
Average Length (in.) =	6.458	6.558	6.462	6.464	6.553	6.528	6.537	6.458
Aspect Ratio =	0.624	0.628	0.624	0.636	0.636	0.642	0.608	0.612
Compressive Strength (psi) =	14,500	14,450	14,690	14,880	15,140	14,660	14,920	15,120
Average Strength (psi) =	14,800							

Absorption Test Results Date of Start of Testing = July 11, 2022

	05-S1-Abs-A	05-S1-Abs-B	05-S1-Abs-C	05-S1-Abs-D	05-S2-Abs-A	05-S2-Abs-B	05-S2-Abs-C	05-S2-Abs-D
Received Weight (lb) =	19.54	21.72	19.36	21.82	21.32	20.42	20.62	21.64
Immersed Weight (lb) =	11.63	12.95	11.52	12.96	12.74	12.13	12.28	12.88
Saturated Weight (lb) =	19.76	22.02	19.70	22.14	21.64	20.68	20.88	21.88
Oven-Dry Weight (lb) =	19.18	21.36	19.06	21.46	20.94	20.06	20.26	21.28
Absorption (%) =	3.02%	3.09%	3.36%	3.17%	3.34%	3.10%	3.06%	2.82%
Density (pcf) =	147.2	147.0	145.4	145.9	146.8	146.4	147.0	147.5

	05-S3-Abs-A	05-S3-Abs-B	05-S3-Abs-C	05-S3-Abs-D	05-S4-Abs-A	05-S4-Abs-B	05-S4-Abs-C	05-S4-Abs-D
Received Weight (lb) =	21.64	20.70	21.12	20.06	22.08	19.42	22.42	19.36
Immersed Weight (lb) =	12.88	12.27	12.59	11.94	13.10	11.61	13.33	11.47
Saturated Weight (lb) =	21.90	20.96	21.46	20.30	22.42	19.74	22.66	19.62
Oven-Dry Weight (lb) =	21.30	20.38	20.78	19.74	21.72	19.10	22.02	19.02
Absorption (%) =	2.82%	2.85%	3.27%	2.84%	3.22%	3.35%	2.91%	3.15%
Density (pcf) =	147.4	146.3	146.2	147.3	145.4	146.6	147.3	145.6

SI Conversions:
1 in. = 25.4 mm
1 lb = 0.454 kg
1 lbf = 4.44 N
100 lb/in.^{2} = 0.69 MPa
1 lb/ft^3 = 16 kg/m^3

Slab Set 4 Averages

Property	Average	Standard Deviation	Coefficient of Variation
Compressive Strength	14,800 lb/in.^{2}	263 lb/in.^{2}	1.8%
Absorption	3.09%	0.20%	6.3%
Density	146.6 lb/ft^3	0.72 lb/ft^3	0.5%

Appendix A.6: Set 6 – 50 mm Hydraulically-Pressed Slab Specimens

Compression Test Results — Date of Testing = June 16, 2022

	06-S1-Comp-A-D	06-S2-Comp-A-D	06-S3-Comp-A-B	06-S4-Comp-A-B	06-S1-Comp-B-C	06-S2-Comp-B-C	06-S3-Comp-C-D	06-S4-Comp-C-D
Coupon Weight (lb) =	3.803	3.696	3.659	3.618	3.622	3.603	3.761	3.842
Width 1 (in.) =	3.303	3.255	3.301	3.281	3.273	3.280	3.287	3.341
Width 2 (in.) =	3.316	3.256	3.313	3.288	3.294	3.314	3.312	3.341
Height 1 (in.) =	2.012	1.999	1.945	1.944	1.954	1.950	2.016	2.002
Height 2 (in.) =	2.021	2.019	1.951	1.940	1.944	1.953	2.020	2.013
Length 1 (in.) =	6.532	6.506	6.524	6.518	6.528	6.513	6.536	6.581
Length 2 (in.) =	6.542	6.513	6.520	6.523	6.525	6.513	6.527	6.588
Post-Capping Height 1 (in.) =	2.049	2.039	1.975	1.977	2.016	1.975	2.063	2.039
Post-Capping Height 2 (in.) =	2.091	2.070	2.023	2.045	1.976	2.028	2.077	2.049
Compression Load (lb) =	358,920	362,090	393,760	389,080	324,120	369,560	350,090	383,940
Coupon Weight (lb) =	3.803	3.696	3.659	3.618	3.622	3.603	3.761	3.842
Average Width (in.) =	3.310	3.256	3.307	3.285	3.284	3.297	3.300	3.341
Average Height (in.) =	2.017	2.009	1.948	1.942	1.949	1.952	2.018	2.008
Average Length (in.) =	6.537	6.510	6.522	6.521	6.527	6.513	6.532	6.585
Aspect Ratio =	0.609	0.617	0.589	0.591	0.594	0.592	0.612	0.601
Compressive Strength (psi) =	16,540	17,170	17,820	17,780	14,840	16,850	16,240	17,250
Average Strength (psi) =	16,810							

Absorption Test Results — Date of Start of Testing = June 15, 2022

	06-S1-Abs-A	06-S1-Abs-B	06-S1-Abs-C	06-S1-Abs-D	06-S2-Abs-A	06-S2-Abs-B	06-S2-Abs-C	06-S2-Abs-D
Received Weight (lb) =	19.86	22.58	20.56	22.16	22.28	20.04	21.26	21.64
Immersed Weight (lb) =	12.10	13.72	12.60	13.47	13.72	12.32	13.09	13.31
Saturated Weight (lb) =	20.24	22.98	20.94	22.56	22.72	20.40	21.66	22.04
Oven-Dry Weight (lb) =	19.36	21.96	20.02	21.60	21.68	19.48	20.68	21.04
Absorption (%) =	4.55%	4.64%	4.60%	4.44%	4.80%	4.72%	4.74%	4.75%
Density (pcf) =	148.4	148.0	149.8	148.3	150.3	150.4	150.6	150.4

	06-S3-Abs-A	06-S3-Abs-B	06-S3-Abs-C	06-S3-Abs-D	06-S4-Abs-A	06-S4-Abs-B	06-S4-Abs-C	06-S4-Abs-D
Received Weight (lb) =	20.12	20.04	22.90	22.14	20.24	20.08	14.32	26.34
Immersed Weight (lb) =	12.38	12.31	14.05	13.63	12.29	12.21	8.70	16.08
Saturated Weight (lb) =	20.48	20.38	23.34	22.58	20.58	20.44	14.60	26.84
Oven-Dry Weight (lb) =	19.54	19.44	22.26	21.52	19.68	19.54	13.96	25.66
Absorption (%) =	4.81%	4.84%	4.85%	4.93%	4.57%	4.61%	4.58%	4.60%
Density (pcf) =	150.5	150.3	149.5	150.0	148.1	148.2	147.6	148.8

SI Conversions:
1 in. = 25.4 mm
1 lb = 0.454 kg
1 lbf = 4.44 N
100 lb/in.^{2} = 0.69 MPa
1 lb/ft^3 = 16 kg/m^3

Slab Set 4 Averages

Property	Average	Standard Deviation	Coefficient of Variation
Compressive Strength	16,810 lb/in.^{2}	968 lb/in.^{2}	5.8%
Absorption	4.69%	0.13%	2.9%
Density	149.3 lb/ft^3	1.09 lb/ft^3	0.7%

Appendix A.7: Set 7 – 45 mm Hydraulically-Pressed Slab Specimens

Compression Test Results Date of Testing = May 10, 2022

	07-S1-Comp-A-D	07-S2-Comp-A-D	07-S3-Comp-A-B	07-S4-Comp-A-B	07-S1-Comp-B-C	07-S2-Comp-B-C	07-S3-Comp-C-D	07-S4-Comp-C-D
Coupon Weight (lb) =	1.808	1.697	1.761	1.733	1.711	1.709	1.726	1.652
Width 1 (in.) =	2.468	2.452	2.487	2.495	2.454	2.459	2.457	2.476
Width 2 (in.) =	2.426	2.457	2.455	2.497	2.434	2.455	2.424	2.453
Height 1 (in.) =	1.675	1.652	1.648	1.623	1.638	1.589	1.520	1.552
Height 2 (in.) =	1.678	1.624	1.672	1.620	1.655	1.614	1.653	1.516
Length 1 (in.) =	5.045	4.982	5.027	5.011	5.024	5.036	5.048	5.058
Length 2 (in.) =	5.032	4.976	5.002	5.004	5.019	5.008	5.017	5.033
Post-Capping Height 1 (in.) =	1.766	1.711	1.729	1.752	1.726	1.693	1.662	1.639
Post-Capping Height 2 (in.) =	1.778	1.742	1.738	1.727	1.746	1.722	1.657	1.619
Compression Load (lb) =	177,000	180,170	190,190	183,180	176,760	178,650	170,510	181,280
Coupon Weight (lb) =	1.808	1.697	1.761	1.733	1.711	1.709	1.726	1.652
Average Width (in.) =	2.447	2.455	2.471	2.496	2.444	2.457	2.441	2.465
Average Height (in.) =	1.677	1.638	1.660	1.622	1.647	1.602	1.587	1.534
Average Length (in.) =	5.039	4.979	5.015	5.008	5.022	5.022	5.033	5.046
Aspect Ratio =	0.685	0.667	0.672	0.650	0.674	0.652	0.650	0.622
Compressive Strength (psi) =	15,290	15,490	16,180	15,170	15,210	15,020	14,380	14,730
Average Strength (psi) =	15,180							

Absorption Test Results Date of Start of Testing = April 27, 2022

	07-S1-Abs-A	07-S1-Abs-B	07-S1-Abs-C	07-S1-Abs-D	07-S2-Abs-A	07-S2-Abs-B	07-S2-Abs-C	07-S2-Abs-D
Received Weight (lb) =	19.46	17.50	17.92	19.46	16.06	21.34	20.00	16.82
Immersed Weight (lb) =	11.74	10.64	10.73	11.75	9.70	12.88	12.03	10.13
Saturated Weight (lb) =	19.66	17.70	18.10	19.66	16.20	21.54	20.20	17.02
Oven-Dry Weight (lb) =	18.90	17.00	17.38	18.88	15.58	20.74	19.44	16.34
Absorption (%) =	4.02%	4.12%	4.14%	4.13%	3.98%	3.86%	3.91%	4.16%
Density (pcf) =	148.9	150.3	147.2	148.9	149.6	149.4	148.5	148.0

	07-S3-Abs-A	07-S3-Abs-B	07-S3-Abs-C	07-S3-Abs-D	07-S4-Abs-A	07-S4-Abs-B	07-S4-Abs-C	07-S4-Abs-D
Received Weight (lb) =	18.88	18.72	18.78	17.58	14.70	17.46	20.26	22.80
Immersed Weight (lb) =	11.39	11.29	11.33	10.59	8.86	10.51	12.23	13.71
Saturated Weight (lb) =	19.06	18.88	18.98	17.76	14.86	17.56	20.44	23.02
Oven-Dry Weight (lb) =	18.32	18.18	18.24	17.06	14.24	16.88	19.64	22.10
Absorption (%) =	4.04%	3.85%	4.06%	4.10%	4.35%	4.03%	4.07%	4.16%
Density (pcf) =	149.0	149.5	148.8	148.5	148.1	149.4	149.3	148.1

SI Conversions:
1 in. = 25.4 mm
1 lb = 0.454 kg
1 lbf = 4.44 N
100 lb/in.^{2} = 0.69 MPa
1 lb/ft^3 = 16 kg/m^3

Slab Set 4 Averages

Property	Average	Standard Deviation	Coefficient of Variation
Compressive Strength	15,180 lb/in.^{2}	531 lb/in.^{2}	3.5%
Absorption	4.06%	0.13%	3.1%
Density	148.8 lb/ft^3	0.76 lb/ft^3	0.5%

Appendix A.8: Set 8 – 55 mm Dry-Cast Through-Mix Slab Specimens

Compression Test Results Date of Testing = July 21, 2022

	08-S1-Comp-A-D	08-S2-Comp-A-D	08-S3-Comp-A-B	08-S4-Comp-A-B	08-S1-Comp-B-C	08-S2-Comp-B-C	08-S3-Comp-C-D	08-S4-Comp-C-D
Coupon Weight (lb) =	4.070	3.933	4.048	3.834	3.678	4.041	3.844	3.781
Width 1 (in.) =	3.326	3.328	3.347	3.210	3.254	3.215	3.263	3.244
Width 2 (in.) =	3.332	3.331	3.339	3.223	3.268	3.214	3.265	3.238
Height 1 (in.) =	2.230	2.218	2.225	2.205	2.223	2.224	2.208	2.205
Height 2 (in.) =	2.217	2.232	2.220	2.222	2.219	2.223	2.195	2.204
Length 1 (in.) =	6.945	6.836	6.893	6.905	6.856	6.998	6.836	7.006
Length 2 (in.) =	6.934	6.833	6.898	6.904	6.862	6.887	6.818	6.978
Post-Capping Height 1 (in.) =	2.335	2.333	2.338	2.301	2.335	2.338	2.305	2.286
Post-Capping Height 2 (in.) =	2.319	2.317	2.319	2.332	2.314	2.323	2.292	2.288
Compression Load (lb) =	140,470	152,530	143,400	138,590	133,710	128,160	137,860	148,550
Coupon Weight (lb) =	4.070	3.933	4.048	3.834	3.678	4.041	3.844	3.781
Average Width (in.) =	3.329	3.330	3.343	3.217	3.261	3.215	3.264	3.241
Average Height (in.) =	2.224	2.225	2.223	2.214	2.221	2.224	2.202	2.205
Average Length (in.) =	6.940	6.835	6.896	6.905	6.859	6.943	6.827	6.992
Aspect Ratio =	0.668	0.668	0.665	0.688	0.681	0.692	0.674	0.680
Compressive Strength (psi) =	6,390	7,050	6,520	6,660	6,350	6,150	6,540	6,960
Average Strength (psi) =	6,580							

Absorption Test Results Date of Start of Testing = July 20, 2022

	08-S1-Abs-A	08-S1-Abs-B	08-S1-Abs-C	08-S1-Abs-D	08-S2-Abs-A	08-S2-Abs-B	08-S2-Abs-C	08-S2-Abs-D
Received Weight (lb) =	21.00	21.48	23.08	19.34	21.04	21.54	21.64	20.38
Immersed Weight (lb) =	12.55	12.80	13.73	11.52	12.61	12.90	12.86	12.07
Saturated Weight (lb) =	22.16	22.66	24.24	20.28	22.26	22.62	22.72	21.46
Oven-Dry Weight (lb) =	20.54	20.98	22.52	18.90	20.56	21.06	21.14	19.88
Absorption (%) =	7.89%	8.01%	7.64%	7.30%	8.27%	7.41%	7.47%	7.95%
Density (pcf) =	133.4	132.8	133.7	134.6	132.9	135.2	133.8	132.1

	08-S3-Abs-A	08-S3-Abs-B	08-S3-Abs-C	08-S3-Abs-D	08-S4-Abs-A	08-S4-Abs-B	08-S4-Abs-C	08-S4-Abs-D
Received Weight (lb) =	22.28	20.84	20.92	21.24	22.10	20.26	22.54	20.28
Immersed Weight (lb) =	13.34	12.37	12.48	12.63	13.25	12.16	13.45	12.15
Saturated Weight (lb) =	23.30	21.90	22.04	22.14	23.32	21.20	23.52	21.40
Oven-Dry Weight (lb) =	21.74	20.32	20.40	20.72	21.58	19.80	22.02	19.78
Absorption (%) =	7.18%	7.78%	8.04%	6.85%	8.06%	7.07%	6.81%	8.19%
Density (pcf) =	136.2	133.1	133.2	136.0	133.7	136.7	136.4	133.4

SI Conversions:
1 in. = 25.4 mm
1 lb = 0.454 kg
1 lbf = 4.44 N
100 lb/in.^{2} = 0.69 MPa
1 lb/ft^3 = 16 kg/m^3

Slab Set 4 Averages

Property	Average	Standard Deviation	Coefficient of Variation
Compressive Strength	6,580 lb/in.^{2}	305 lb/in.^{2}	4.6%
Absorption	7.62%	0.47%	6.2%
Density	134.2 lb/ft^3	1.45 lb/ft^3	1.1%

Appendix A.9: Set 9 – 60 mm Dry-Cast Through-Mix Slab Specimens

Compression Test Results Date of Testing = May 13, 2022

	09-S1-Comp-A-D	09-S2-Comp-A-D	09-S3-Comp-A-B	09-S4-Comp-A-B	09-S1-Comp-B-C	09-S2-Comp-B-C	09-S3-Comp-C-D	09-S4-Comp-C-D
Coupon Weight (lb) =	5.278	5.128	5.166	5.131	5.071	5.275	5.325	5.355
Width 1 (in.) =	3.649	3.614	3.615	3.590	3.572	3.673	3.717	3.702
Width 2 (in.) =	3.640	3.603	3.620	3.601	3.564	3.682	3.715	3.693
Height 1 (in.) =	2.399	2.335	2.347	2.346	2.350	2.328	2.345	2.350
Height 2 (in.) =	2.399	2.329	2.345	2.351	2.347	2.326	2.350	2.352
Length 1 (in.) =	7.349	7.395	7.470	7.468	7.403	7.460	7.407	7.498
Length 2 (in.) =	7.400	7.424	7.490	7.488	7.404	7.482	7.439	7.518
Post-Capping Height 1 (in.) =	2.449	2.409	2.431	2.429	2.423	2.390	2.412	2.399
Post-Capping Height 2 (in.) =	2.448	2.392	2.450	2.453	2.410	2.386	2.410	2.413
Compression Load (lb) =	252,560	279,410	254,610	266,500	287,760	288,150	277,570	317,790
Coupon Weight (lb) =	5.278	5.128	5.166	5.131	5.071	5.275	5.325	5.355
Average Width (in.) =	3.645	3.609	3.618	3.596	3.568	3.678	3.716	3.698
Average Height (in.) =	2.399	2.332	2.346	2.349	2.349	2.327	2.348	2.351
Average Length (in.) =	7.375	7.410	7.480	7.478	7.404	7.471	7.423	7.508
Aspect Ratio =	0.658	0.646	0.649	0.653	0.658	0.633	0.632	0.636
Compressive Strength (psi) =	9,800	10,790	9,730	10,290	11,360	10,700	10,250	11,710
Average Strength (psi) =	10,580							

Absorption Test Results Date of Start of Testing = May 12, 2022

	09-S1-Abs-A	09-S1-Abs-B	09-S1-Abs-C	09-S1-Abs-D	09-S2-Abs-A	09-S2-Abs-B	09-S2-Abs-C	09-S2-Abs-D
Received Weight (lb) =	23.90	20.70	21.82	24.36	23.80	21.06	21.76	23.44
Immersed Weight (lb) =	13.76	11.96	12.72	14.20	13.31	12.17	12.69	13.64
Saturated Weight (lb) =	24.24	21.02	22.10	24.66	23.36	21.32	22.02	23.68
Oven-Dry Weight (lb) =	23.14	20.04	21.14	23.60	22.30	20.36	21.08	22.68
Absorption (%) =	4.75%	4.89%	4.54%	4.49%	4.75%	4.72%	4.46%	4.41%
Density (pcf) =	137.8	138.0	140.6	140.8	138.5	138.8	141.0	141.0

	09-S3-Abs-A	09-S3-Abs-B	09-S3-Abs-C	09-S3-Abs-D	09-S4-Abs-A	09-S4-Abs-B	09-S4-Abs-C	09-S4-Abs-D
Received Weight (lb) =	21.86	21.74	22.54	22.52	23.34	22.86	21.68	21.34
Immersed Weight (lb) =	12.46	12.46	13.04	12.99	13.40	13.15	12.58	12.35
Saturated Weight (lb) =	22.16	22.06	22.76	22.76	23.60	23.12	21.92	21.58
Oven-Dry Weight (lb) =	21.14	21.04	21.82	21.78	22.60	22.16	21.02	20.68
Absorption (%) =	4.82%	4.85%	4.31%	4.50%	4.42%	4.33%	4.28%	4.35%
Density (pcf) =	136.0	136.8	140.1	139.1	138.3	138.7	140.4	139.8

SI Conversions:
1 in. = 25.4 mm
1 lb = 0.454 kg
1 lbf = 4.44 N
100 lb/in.^{2} = 0.69 MPa
1 lb/ft^3 = 16 kg/m^3

Slab Set 4 Averages

Property	Average	Standard Deviation	Coefficient of Variation
Compressive Strength	10,580 lb/in.^{2}	704 lb/in.^{2}	6.7%
Absorption	4.56%	0.21%	4.6%
Density	139.1 lb/ft^3	1.52 lb/ft^3	1.1%

Appendix A.10: Set 10 – 60 mm Dry-Cast Face-Mix Slab Specimens

Compression Test Results Date of Testing = January 14, 2023

	10-S1-Comp-A-D	10-S2-Comp-A-D	10-S3-Comp-A-B	10-S4-Comp-A-B	10-S1-Comp-B-C	10-S2-Comp-B-C	10-S3-Comp-C-D	10-S4-Comp-C-D
Coupon Weight (lb) =	6.327	6.060	5.980	6.242	5.977	6.087	6.087	6.257
Width 1 (in.) =	3.966	3.927	3.938	3.962	3.931	3.919	3.919	3.930
Width 2 (in.) =	3.961	3.935	3.943	3.954	3.941	3.924	3.924	3.935
Height 1 (in.) =	2.535	2.392	2.385	2.370	2.392	2.432	2.432	2.430
Height 2 (in.) =	2.420	2.378	2.460	2.405	2.375	2.440	2.440	2.455
Length 1 (in.) =	7.949	7.944	7.943	7.932	7.960	7.953	7.953	7.969
Length 2 (in.) =	7.955	7.945	7.964	7.940	7.943	7.987	7.987	7.974
Post-Capping Height 1 (in.) =	2.636	2.474	2.530	2.540	2.510	2.552	2.552	2.552
Post-Capping Height 2 (in.) =	2.532	2.495	2.538	2.480	2.506	2.551	2.510	2.542
Compression Load (lb) =	295,620	293,180	229,170	332,530	248,380	362,740	260,010	343,390
Coupon Weight (lb) =	6.327	6.060	5.980	6.242	5.977	6.087	6.087	6.257
Average Width (in.) =	3.964	3.931	3.941	3.958	3.936	3.922	3.922	3.933
Average Height (in.) =	2.478	2.385	2.423	2.388	2.384	2.436	2.436	2.443
Average Length (in.) =	7.952	7.945	7.954	7.936	7.952	7.970	7.970	7.972
Aspect Ratio =	0.625	0.607	0.615	0.603	0.606	0.621	0.621	0.621
Compressive Strength (psi) =	9,500	9,340	7,330	10,490	7,880	11,710	8,390	11,050
Average Strength (psi) =	9,460							

Absorption Test Results Date of Start of Testing = January 3, 2023

	10-S1-Abs-A	10-S1-Abs-B	10-S1-Abs-C	10-S1-Abs-D	10-S2-Abs-A	10-S2-Abs-B	10-S2-Abs-C	10-S2-Abs-D
Received Weight (lb) =	21.13	22.71	21.15	23.93	22.04	23.03	23.96	20.51
Immersed Weight (lb) =	12.28	13.17	12.26	13.91	12.74	13.30	13.86	11.88
Saturated Weight (lb) =	21.94	23.58	21.98	24.70	22.56	23.38	24.42	21.06
Oven-Dry Weight (lb) =	20.52	22.04	20.52	23.22	21.36	22.36	23.26	19.92
Absorption (%) =	6.92%	6.99%	7.12%	6.37%	5.62%	4.56%	4.99%	5.72%
Density (pcf) =	132.6	132.1	131.7	134.3	135.7	138.4	137.4	135.4

	10-S3-Abs-A	10-S3-Abs-B	10-S3-Abs-C	10-S3-Abs-D	10-S4-Abs-A	10-S4-Abs-B	10-S4-Abs-C	10-S4-Abs-D
Received Weight (lb) =	22.00	20.63	23.51	23.30	22.17	22.36	23.21	22.77
Immersed Weight (lb) =	12.79	11.97	13.62	13.51	12.82	12.91	13.41	13.16
Saturated Weight (lb) =	22.80	21.42	24.34	23.86	22.68	22.66	23.58	23.34
Oven-Dry Weight (lb) =	21.32	19.98	22.76	22.56	21.46	21.70	22.52	22.06
Absorption (%) =	6.94%	7.21%	6.94%	5.76%	5.68%	4.42%	4.71%	5.80%
Density (pcf) =	132.9	131.9	132.5	136.0	135.8	138.9	138.2	135.2

SI Conversions:
1 in. = 25.4 mm
1 lb = 0.454 kg
1 lbf = 4.44 N
100 lb/in.^{2} = 0.69 MPa
1 lb/ft^3 = 16 kg/m^3

Slab Set 4 Averages

Property	Average	Standard Deviation	Coefficient of Variation
Compressive Strength	9,460 lb/in.^{2}	1,551 lb/in.^{2}	16.4%
Absorption	5.98%	0.97%	16.2%
Density	134.9 lb/ft^3	2.46 lb/ft^3	1.8%

Appendix A.11: Set 11 – 50 mm Hermetically-Pressed Slab Specimens

Compression Test Results — Date of Testing = June 30, 2022

	11-S1-Comp-A-D	11-S2-Comp-A-D	11-S3-Comp-A-B	11-S4-Comp-A-B	11-S1-Comp-B-C	11-S2-Comp-B-C	11-S3-Comp-C-D	11-S4-Comp-C-D
Coupon Weight (lb) =	3.767	3.340	3.416	3.653	3.521	3.760	3.479	3.518
Width 1 (in.) =	3.296	3.061	3.295	3.274	3.251	3.291	3.126	3.155
Width 2 (in.) =	3.310	3.066	3.186	3.267	3.260	3.307	3.124	3.157
Height 1 (in.) =	2.047	1.988	1.988	2.001	2.079	2.060	2.044	2.041
Height 2 (in.) =	2.044	1.996	1.983	1.996	2.078	2.059	2.045	2.042
Length 1 (in.) =	6.531	6.430	6.384	6.580	6.510	6.465	6.374	6.399
Length 2 (in.) =	6.506	6.429	6.382	6.568	6.514	6.471	6.389	6.377
Post-Capping Height 1 (in.) =	2.092	2.051	2.031	2.050	2.086	2.102	2.105	2.089
Post-Capping Height 2 (in.) =	2.097	2.053	2.029	2.038	2.093	2.097	2.091	2.195
Compression Load (lb) =	314,550	272,700	268,560	316,600	265,290	315,960	288,390	286,250
Coupon Weight (lb) =	3.767	3.340	3.416	3.653	3.521	3.760	3.479	3.518
Average Width (in.) =	3.303	3.064	3.241	3.271	3.256	3.299	3.125	3.156
Average Height (in.) =	2.046	1.992	1.986	1.999	2.079	2.060	2.045	2.042
Average Length (in.) =	6.519	6.430	6.383	6.574	6.512	6.468	6.382	6.388
Aspect Ratio =	0.619	0.650	0.613	0.611	0.638	0.624	0.654	0.647
Compressive Strength (psi) =	14,710	14,340	12,990	14,710	12,830	14,980	15,030	14,660
Average Strength (psi) =	14,280							

Absorption Test Results — Date of Start of Testing = June 27, 2022

	11-S1-Abs-A	11-S1-Abs-B	11-S1-Abs-C	11-S1-Abs-D	11-S2-Abs-A	11-S2-Abs-B	11-S2-Abs-C	11-S2-Abs-D
Received Weight (lb) =	20.98	20.84	22.10	19.42	21.60	20.62	20.70	21.86
Immersed Weight (lb) =	12.41	12.27	13.04	11.46	12.74	12.22	12.18	12.92
Saturated Weight (lb) =	21.22	21.14	22.46	19.62	21.84	20.82	20.92	22.06
Oven-Dry Weight (lb) =	20.50	20.38	21.62	18.98	21.04	20.14	20.22	21.28
Absorption (%) =	3.51%	3.73%	3.89%	3.37%	3.80%	3.38%	3.46%	3.67%
Density (pcf) =	145.2	143.4	143.2	145.1	144.3	146.1	144.4	145.3

	11-S3-Abs-A	11-S3-Abs-B	11-S3-Abs-C	11-S3-Abs-D	11-S4-Abs-A	11-S4-Abs-B	11-S4-Abs-C	11-S4-Abs-D
Received Weight (lb) =	20.90	20.34	21.86	21.16	22.18	18.90	23.42	19.80
Immersed Weight (lb) =	12.45	12.11	13.02	12.60	13.17	11.24	13.94	11.81
Saturated Weight (lb) =	21.16	20.60	22.08	21.36	22.40	19.10	23.68	19.98
Oven-Dry Weight (lb) =	20.38	19.84	21.30	20.60	21.56	18.40	22.80	19.26
Absorption (%) =	3.83%	3.83%	3.66%	3.69%	3.90%	3.80%	3.86%	3.74%
Density (pcf) =	146.0	145.8	146.7	146.7	145.8	146.1	146.1	147.1

SI Conversions:
1 in. = 25.4 mm
1 lb = 0.454 kg
1 lbf = 4.44 N
100 lb/in.^{2} = 0.69 MPa
1 lb/ft^3 = 16 kg/m^3

Slab Set 4 Averages

Property	Average	Standard Deviation	Coefficient of Variation
Compressive Strength	14,280 lb/in.^{2}	873 lb/in.^{2}	6.1%
Absorption	3.69%	0.18%	4.7%
Density	145.5 lb/ft^3	1.15 lb/ft^3	0.8%

Appendix A.12: Set 12 – 50 mm Dry-Cast Face-Mix Slab Specimens

Compression Test Results Date of Testing = January 25, 2023

	12-S1-Comp-A-D	12-S2-Comp-A-D	12-S3-Comp-A-B	12-S4-Comp-A-B	12-S1-Comp-B-C	12-S2-Comp-B-C	12-S3-Comp-C-D	12-S4-Comp-C-D
Coupon Weight (lb) =	3.469	3.496	3.473	3.428	3.529	3.533	3.542	3.640
Width 1 (in.) =	3.230	3.220	3.212	3.214	3.223	3.211	3.225	3.221
Width 2 (in.) =	3.245	3.223	3.216	3.224	3.230	3.213	3.230	3.235
Height 1 (in.) =	2.024	2.023	2.012	2.020	2.028	2.007	1.987	2.025
Height 2 (in.) =	2.035	2.016	2.005	2.015	2.032	2.006	1.985	2.020
Length 1 (in.) =	6.516	6.504	6.486	6.490	6.500	6.496	6.510	6.506
Length 2 (in.) =	6.491	6.508	6.488	6.493	6.503	6.494	6.494	6.488
Post-Capping Height 1 (in.) =	2.132	2.082	2.114	2.080	2.112	2.077	2.050	2.082
Post-Capping Height 2 (in.) =	2.160	2.084	2.099	2.110	2.125	2.079	2.070	2.087
Compression Load (lb) =	233,460	283,790	273,030	250,040	279,280	305,810	344,540	351,270
Coupon Weight (lb) =	3.469	3.496	3.473	3.428	3.529	3.533	3.542	3.640
Average Width (in.) =	3.238	3.222	3.214	3.219	3.227	3.212	3.228	3.228
Average Height (in.) =	2.030	2.020	2.009	2.018	2.030	2.007	1.986	2.023
Average Length (in.) =	6.504	6.506	6.487	6.492	6.502	6.495	6.502	6.497
Aspect Ratio =	0.627	0.627	0.625	0.627	0.629	0.625	0.615	0.627
Compressive Strength (psi) =	11,250	13,740	13,260	12,140	13,530	14,840	16,470	16,990
Average Strength (psi) =	14,030							

Absorption Test Results Date of Start of Testing = January 23, 2023

	12-S1-Abs-A	12-S1-Abs-B	12-S1-Abs-C	12-S1-Abs-D	12-S2-Abs-A	12-S2-Abs-B	12-S2-Abs-C	12-S2-Abs-D
Received Weight (lb) =	17.92	21.58	20.70	19.56	20.82	18.50	20.08	20.04
Immersed Weight (lb) =	10.49	12.70	12.20	11.49	12.21	10.87	11.80	11.75
Saturated Weight (lb) =	18.22	22.04	20.96	19.76	21.24	18.84	20.24	20.22
Oven-Dry Weight (lb) =	17.50	21.08	20.22	19.10	20.34	18.08	19.62	19.58
Absorption (%) =	4.11%	4.55%	3.66%	3.46%	4.42%	4.20%	3.16%	3.27%
Density (pcf) =	141.3	140.8	144.0	144.1	140.6	141.6	145.1	144.2

	12-S3-Abs-A	12-S3-Abs-B	12-S3-Abs-C	12-S3-Abs-D	12-S4-Abs-A	12-S4-Abs-B	12-S4-Abs-C	12-S4-Abs-D
Received Weight (lb) =	16.84	18.88	19.52	22.48	19.74	19.26	20.60	20.12
Immersed Weight (lb) =	9.86	10.93	11.44	13.17	11.59	11.34	12.17	11.88
Saturated Weight (lb) =	17.14	19.32	19.88	22.74	20.22	19.74	20.82	20.38
Oven-Dry Weight (lb) =	16.44	18.44	19.08	21.96	19.36	18.88	20.18	19.72
Absorption (%) =	4.26%	4.77%	4.19%	3.55%	4.44%	4.56%	3.17%	3.35%
Density (pcf) =	140.9	137.1	141.1	143.2	140.0	140.3	145.6	144.8

SI Conversions:
1 in. = 25.4 mm
1 lb = 0.454 kg
1 lbf = 4.44 N
100 lb/in.^{2} = 0.69 MPa
1 lb/ft^3 = 16 kg/m^3

Slab Set 4 Averages

Property	Average	Standard Deviation	Coefficient of Variation
Compressive Strength	14,030 lb/in.^{2}	1,986 lb/in.^{2}	14.2%
Absorption	3.95%	0.56%	14.1%
Density	142.2 lb/ft^3	2.33 lb/ft^3	1.6%

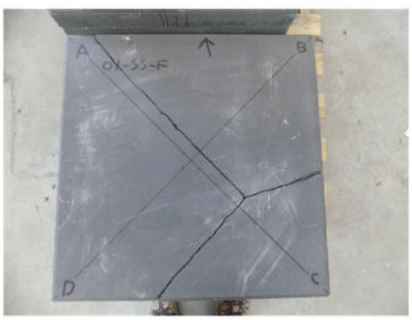
Appendix B: F-Slabs (Full-Size, Center Loaded, Corner Supported) Test Results

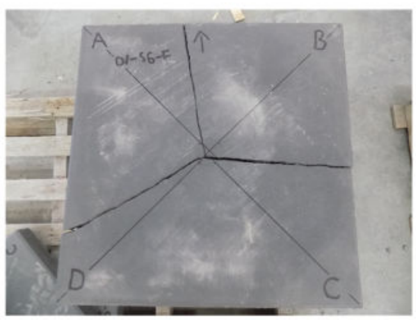
Appendix B.1: Set 1 – 50 mm Dry-Cast Slab Specimens

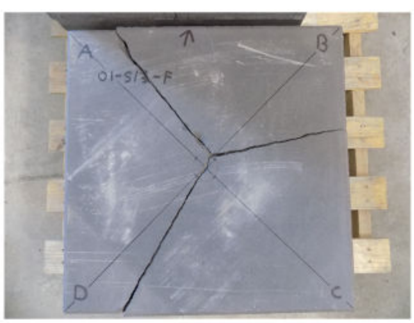
Slab ID	Average Width (in.)	Average Thickness (in.)	Average Length (in.)	Top Surface Warpage Concave (in.)	Top Surface Warpage Convex (in.)	Bottom Surface Warpage Concave (in.)	Bottom Surface Warpage Convex (in.)	Slab Weight (lb)	Failure Path	Failure Mode	Failing Load (lb)
01-S1-F	23.70	2.04	23.64	0.000	0.060	0.000	0.000	90.92	AD-BC	Flexure 1	2,433
01-S2-F	23.69	2.03	23.71	0.013	0.000	0.000	0.007	89.40	AD-BC	Flexure 1	2,265
01-S3-F	23.70	2.01	23.65	0.000	0.010	0.000	0.040	89.24	AB-CD	Flexure 2	2,208
01-S4-F	23.66	2.02	23.72	0.016	0.000	0.000	0.000	90.18	AB-CD	Flexure 2	2,383
01-S5-F	23.72	2.02	23.67	0.000	0.060	0.000	0.000	89.40	A-CD-BC	Compound	1,397
01-S6-F	23.64	2.03	23.70	0.000	0.060	0.000	0.000	90.43	AB-BC-D	Compound	2,401
01-S7-F	23.65	2.02	23.71	0.000	0.030	0.016	0.000	90.49	AD-BC	Flexure 1	2,436
01-S8-F	23.68	2.01	23.69	0.000	0.000	0.000	0.008	89.60	AB-CD	Flexure 2	2,343
01-S9-F	23.68	2.03	23.67	0.000	0.000	0.000	0.060	89.72	AD-BC	Flexure 1	2,382
01-S10-F	23.67	2.00	23.69	0.014	0.000	0.000	0.004	89.01	AB-CD	Flexure 2	2,160
01-S11-F	23.69	2.05	23.69	0.000	0.000	0.000	0.000	90.59	AB-CD	Flexure 2	2,099
01-S12-F	23.66	2.03	23.67	0.000	0.006	0.000	0.000	89.78	AB-CD	Flexure 2	2,175
01-S13-F	23.69	1.99	23.67	0.000	0.020	0.000	0.000	90.27	BC-D-A	Compound	2,307
01-S14-F	23.68	2.04	23.67	0.000	0.010	0.000	0.000	90.15	AB-CD	Flexure 2	2,132
01-S15-F	23.71	2.02	23.74	0.013	0.000	0.000	0.010	89.69	AB-CD	Flexure 2	2,143
01-S16-F	23.69	2.01	23.68	0.000	0.000	0.000	0.000	89.35	AB-CD	Flexure 2	2,238
01-S17-F	23.68	2.06	23.69	0.012	0.000	0.000	0.020	90.01	AD-BC	Flexure 1	1,978
01-S18-F	23.68	2.02	23.67	0.000	0.002	0.000	0.000	89.21	AB-CD	Flexure 2	2,113
										Average (lb)* =	**2,247**
										Standard Deviation (lb)* =	**136**
										Coefficient of Variation (%)* =	**6.0**

*Summary excludes 01-S5-F as an outlier.

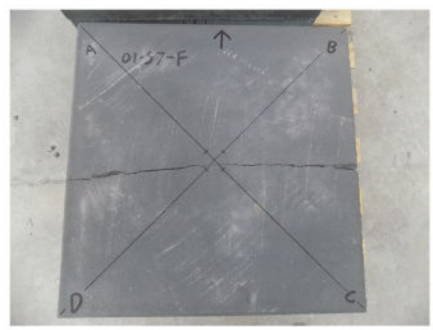
Compound Failure Mode Count = 3



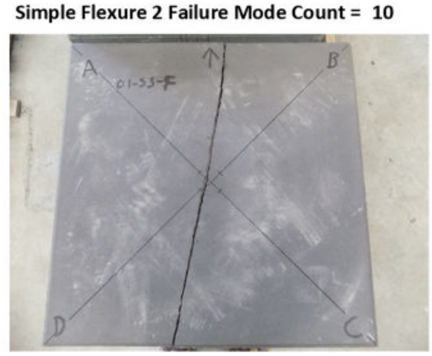




Simple Flexure 1 Failure Mode Count = 5



Simple Flexure 2 Failure Mode Count = 10

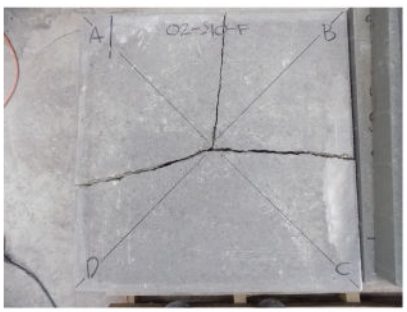


SI Conversions:
1 in. = 25.4 mm
1 lb = 0.454 kg
1 lbf = 4.44 N

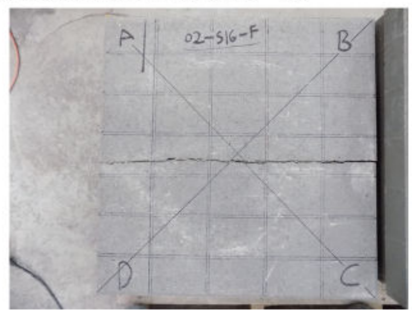
Appendix B.2: Set 2 –60 mm Dry-Cast Slab Specimens

Slab ID	Average Width (in.)	Average Thickness (in.)	Average Length (in.)	Top Surface Warpage Concave (in.)	Top Surface Warpage Convex (in.)	Bottom Surface Warpage Concave (in.)	Bottom Surface Warpage Convex (in.)	Slab Weight (lb)	Failure Path	Failure Mode	Failing Load (lb)
02-S1-F	23.55	2.33	23.53	0.030	0.000	0.000	0.030	105.56	AB-DC	Flexure 2	2,567
02-S2-F	23.54	2.39	23.52	0.040	0.000	0.000	0.000	108.22	AD-BC	Flexure 1	2,358
02-S3-F	23.60	2.30	23.60	0.014	0.000	0.000	0.000	105.57	AD-BC	Flexure 1	2,321
02-S4-F	23.55	2.32	23.59	0.030	0.000	0.010	0.000	105.30	AD-BC	Flexure 1	2,407
02-S5-F	23.54	2.32	23.59	0.014	0.000	0.000	0.050	108.68	AD-BC	Flexure 1	2,468
02-S6-F	23.54	2.30	23.51	0.010	0.000	0.150	0.000	105.64	AD-BC	Flexure 1	2,545
02-S7-F	23.59	2.31	23.59	0.017	0.000	0.022	0.000	105.15	AD-BC	Flexure 1	2,834
02-S8-F	23.57	2.36	23.55	0.030	0.000	0.000	0.000	105.99	AD-BC	Flexure 1	2,336
02-S9-F	23.53	2.30	23.54	0.000	0.000	0.010	0.000	105.55	AD-BC	Flexure 1	3,626
02-S10-F	23.52	2.31	23.51	0.000	0.000	0.000	0.000	105.63	AD-BC-AB	Compound	2,994
02-S11-F	23.56	2.32	23.57	0.000	0.000	0.025	0.000	105.99	AD-BC	Flexure 1	2,643
02-S12-F	23.55	2.33	23.57	0.000	0.000	0.000	0.000	106.74	AD-BC	Flexure 1	2,574
02-S13-F	23.53	2.33	23.55	0.030	0.000	0.000	0.000	105.92	AD-BC	Flexure 1	2,388
02-S14-F	23.53	2.36	23.50	0.040	0.000	0.000	0.014	106.43	AD-BC	Flexure 1	2,174
02-S15-F	23.60	2.37	23.55	0.040	0.000	0.016	0.000	106.11	AD-BC	Flexure 1	2,228
02-S16-F	23.53	2.34	23.54	0.000	0.000	0.000	0.010	105.77	AD-BC	Flexure 1	2,170
02-S17-F	23.54	2.37	23.53	0.015	0.000	0.000	0.000	106.88	AD-BC	Flexure 1	2,524
02-S18-F	23.56	2.33	23.55	0.000	0.000	0.000	0.022	106.97	AD-BC	Flexure 1	2,310
										Average (lb) =	**2,526**
										Standard Deviation (lb) =	**349**
										Coefficient of Variation (%) =	**13.8**

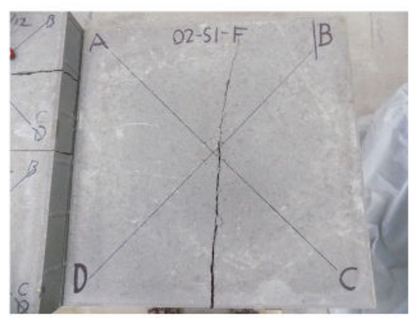
Compound Failure Mode Count = 1



Simple Flexure 1 Failure Mode Count = 16



Simple Flexure 2 Failure Mode Count = 1

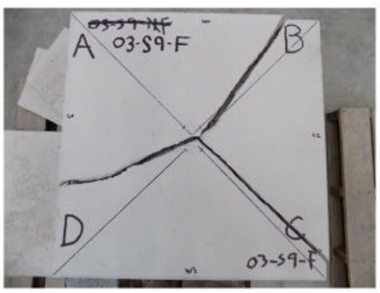


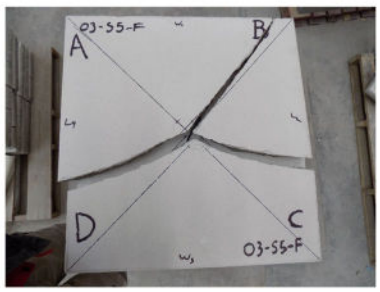
SI Conversions:
1 in. = 25.4 mm
1 lb = 0.454 kg
1 lbf = 4.44 N

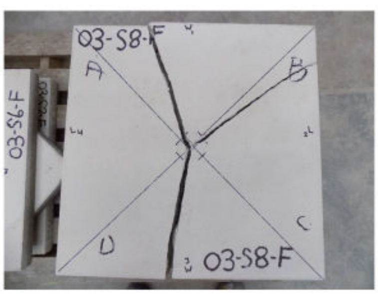
Appendix B.3: Set 3 – 50 mm Hydraulically-Pressed Slab Specimens

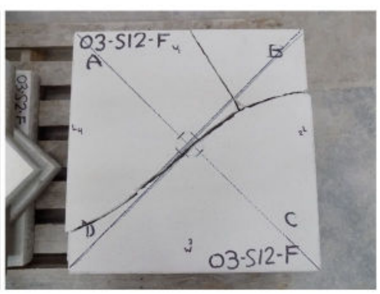
Slab ID	Average Width (in.)	Average Thickness (in.)	Average Length (in.)	Top Surface Warpage Concave (in.)	Top Surface Warpage Convex (in.)	Bottom Surface Warpage Concave (in.)	Bottom Surface Warpage Convex (in.)	Slab Weight (lb)	Failure Path	Failure Mode	Failing Load (lb)
03-S1-F	23.65	1.98	23.65	0.000	0.000	0.000	0.000	93.58	AB-CD	Flexure 2	3,127
03-S2-F	23.66	1.97	23.66	0.000	0.130	0.090	0.000	93.85	AD-BC	Flexure 1	3,041
03-S3-F	23.64	1.96	23.63	0.000	0.110	0.013	0.000	93.00	AB-CD	Flexure 2	3,428
03-S4-F	23.66	2.00	23.64	0.000	0.030	0.020	0.000	95.30	AB-CD	Flexure 2	3,471
03-S5-F	23.64	1.96	23.65	0.000	0.016	0.000	0.000	93.34	B-AD-BC	Compound	3,211
03-S6-F	23.64	1.98	23.67	0.000	0.060	0.010	0.000	94.28	AD-BC	Flexure 1	3,404
03-S7-F	23.64	1.96	23.63	0.000	0.100	0.020	0.000	93.08	AB-CD	Flexure 2	3,324
03-S8-F	23.66	1.96	23.65	0.000	0.110	0.010	0.000	93.14	AB-B-CD	Compound	3,168
03-S9-F	23.63	1.98	23.64	0.000	0.030	0.018	0.000	93.96	B-C-D	Compound	3,318
03-S10-F	23.64	1.96	23.65	0.000	0.070	0.020	0.000	93.48	AB-CD	Flexure 2	3,345
03-S11-F	23.65	2.00	23.67	0.000	0.070	0.000	0.000	94.58	AB-CD	Flexure 2	3,404
03-S12-F	23.65	1.97	23.64	0.000	0.030	0.030	0.000	93.80	D-AB-BC	Compound	3,143
03-S13-F	23.67	1.98	23.65	0.000	0.020	0.024	0.000	94.22	AB-CD	Flexure 2	3,293
03-S14-F	23.64	1.99	23.66	0.000	0.190	0.000	0.010	94.50	AB-CD	Flexure 2	3,305
03-S15-F	23.63	1.96	23.64	0.018	0.000	0.000	0.000	94.06	AB-CD	Flexure 2	3,232
03-S16-F	23.66	1.97	23.64	0.000	0.070	0.010	0.000	93.90	D-BC-AB	Compound	3,357
03-S17-F	23.63	1.95	23.64	0.000	0.030	0.022	0.000	93.18	AB-CD	Flexure 2	3,211
03-S18-F	23.64	1.98	23.66	0.000	0.080	0.050	0.000	94.12	AB-CD	Flexure 2	3,377
										Average (lb) =	**3,287**
										Standard Deviation (lb) =	**118**
										Coefficient of Variation (%) =	**3.6**

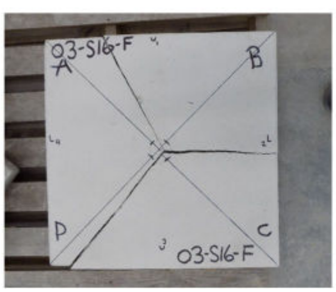
Compound Failure Mode Count = 5



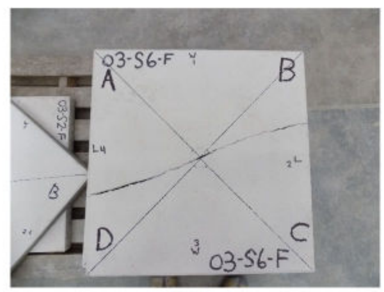




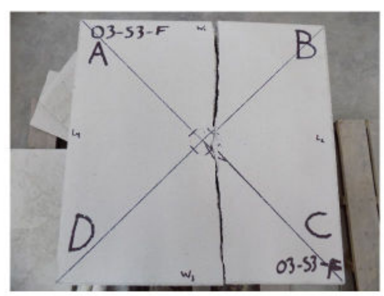




Simple Flexure 1 Failure Mode Count = 2



Simple Flexure 2 Failure Mode Count = 11

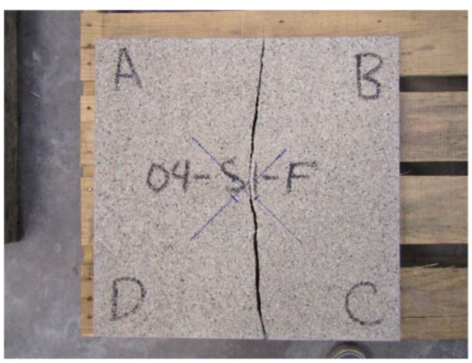


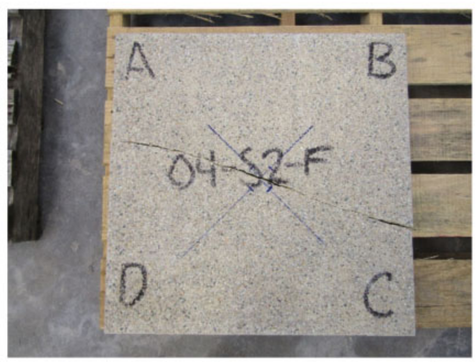
SI Conversions:
1 in. = 25.4 mm
1 lb = 0.454 kg
1 lbf = 4.44 N

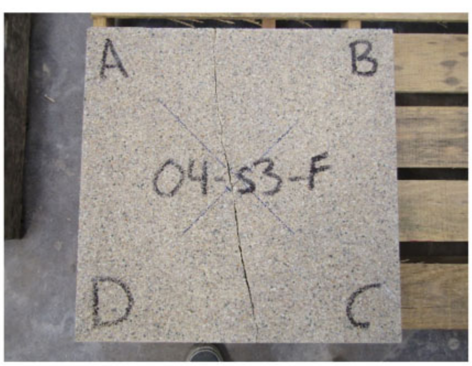
Appendix B.4: Set 4 – 50 mm Hermetically-Pressed Slab Specimens

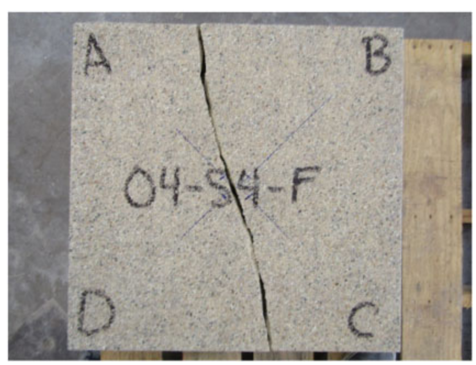
	04-S1-F	04-S2-F	04-S3-F	04-S4-F
Width 1 (in.) =	23.75	23.71	23.70	23.73
Width 2 (in.) =	23.75	23.72	23.70	23.74
Height 1 (in.) =	1.917	1.979	1.984	1.983
Height 2 (in.) =	2.015	1.992	1.979	1.981
Height 3 (in.) =	2.019	1.995	1.978	1.995
Height 4 (in.) =	2.020	2.010	1.998	1.996
Length 1 (in.) =	23.74	23.72	23.72	23.75
Length 2 (in.) =	23.74	23.73	23.71	23.74
Full-Size Slab Weight (lb) =	94.27	93.36	92.66	92.52
Top Concave (in.) =	0.010	0.010	0.010	0.010
Top Convex (in.) =	0.000	0.000	0.000	0.000
Bottom Concave (in.) =	0.010	0.010	0.010	0.010
Bottom Convex (in.) =	0.000	0.000	0.000	0.000
Failing Load (lb) =	2218	2064	2272	2137
Failure Mechanism =	AB-CD	AD-BC	AB-CD	AB-CD
Failure Mode =	NA	NA	NA	NA
Average Width (in.) =	23.75	23.72	23.70	23.74
Average Height (in.) =	1.993	1.994	1.985	1.989
Average Length (in.) =	23.74	23.73	23.72	23.75
Average Failing Load (lb) =	2173			

SI Conversions:
1 in. = 25.4 mm
1 lb = 0.454 kg
1 lbf = 4.44 N





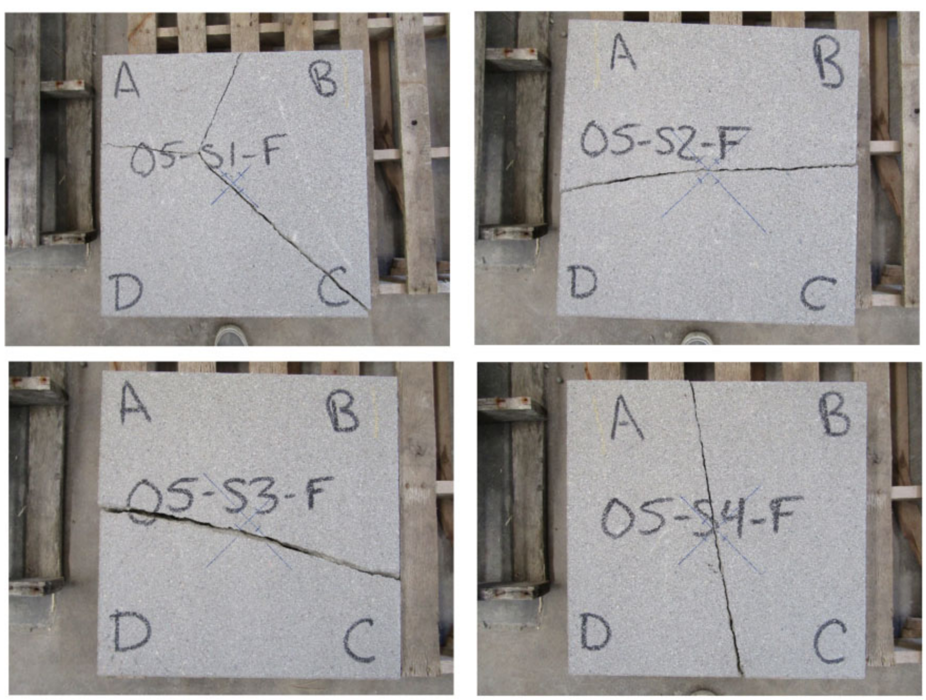




Appendix B.5: Set 5 – 50 mm Dry-Cast Face-Mix Slab Specimens

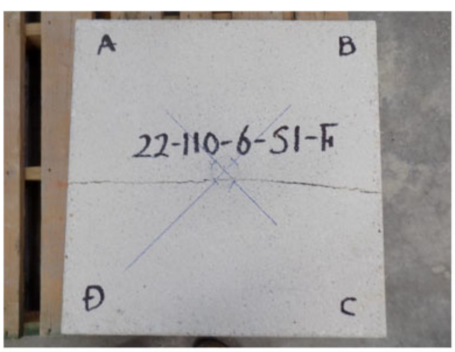
	05-S1-F	05-S2-F	05-S3-F	05-S4-F
Width 1 (in.) =	23.71	23.70	23.72	23.71
Width 2 (in.) =	23.72	23.70	23.70	23.70
Height 1 (in.) =	1.983	1.984	1.980	1.977
Height 2 (in.) =	1.974	1.998	1.992	1.991
Height 3 (in.) =	1.994	1.979	1.996	1.986
Height 4 (in.) =	1.981	1.987	1.989	1.974
Length 1 (in.) =	23.73	23.72	23.70	23.71
Length 2 (in.) =	23.72	23.70	23.70	23.72
Full-Size Slab Weight (lb) =	96.91	97.65	98.05	98.09
Top Concave (in.) =	0.010	0.010	0.010	0.010
Top Convex (in.) =	0.000	0.000	0.000	0.000
Bottom Concave (in.) =	0.010	0.010	0.010	0.010
Bottom Convex (in.) =	0.000	0.000	0.000	0.000
Failing Load (lb) =	2625	2805	2755	2609
Failure Mechanism =	AD-C-AB	AD-BC	AD-BC	AB-CD
Failure Mode =	Compound	Flexure 1	Flexure 1	Flexure 2
Average Width (in.) =	23.72	23.70	23.71	23.71
Average Height (in.) =	1.983	1.987	1.989	1.982
Average Length (in.) =	23.73	23.71	23.70	23.72
Average Failing Load (lb) =	2699			

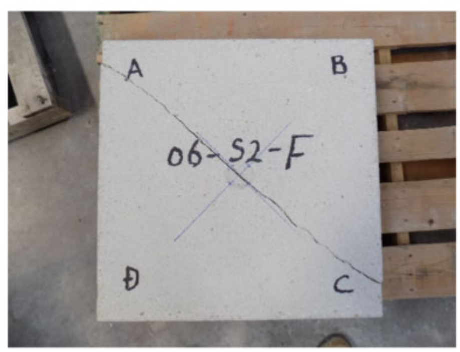
SI Conversions:
1 in. = 25.4 mm
1 lb = 0.454 kg
1 lbf = 4.44 N

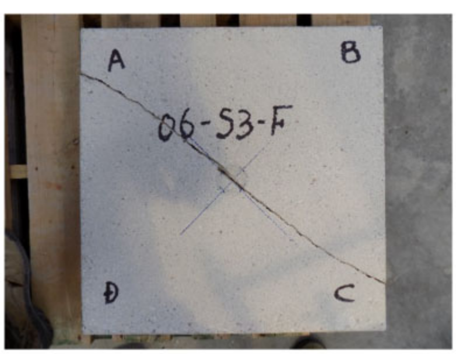


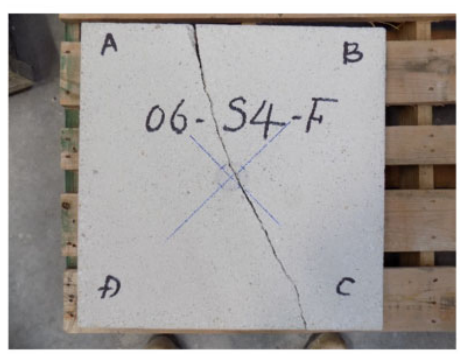
	06-S1-F	06-S2-F	06-S3-F	06-S4-F
Width 1 (in.) =	24.00	24.00	24.00	24.00
Width 2 (in.) =	24.00	24.00	24.00	24.00
Height 1 (in.) =	2.001	1.976	2.031	2.028
Height 2 (in.) =	2.019	1.998	1.941	2.011
Height 3 (in.) =	2.009	1.924	2.002	1.979
Height 4 (in.) =	1.937	2.009	2.021	1.989
Length 1 (in.) =	24.00	24.00	24.00	24.00
Length 2 (in.) =	24.00	24.00	24.00	24.00
Full-Size Slab Weight (lb) =	101.00	100.37	101.31	100.48
Top Concave (in.) =	0.011	0.010	0.011	0.011
Top Convex (in.) =	0.000	0.000	0.000	0.000
Bottom Concave (in.) =	0.011	0.011	0.010	0.010
Bottom Convex (in.) =	0.000	0.000	0.000	0.000
Failing Load (lb) =	2952	3166	3175	3156
Failure Mechanism =	AD-BC	AD-BC	AD-BC	AB-CD
Failure Mode =	NA	NA	NA	NA
Average Width (in.) =	24.00	24.00	24.00	24.00
Average Height (in.) =	1.992	1.977	1.999	2.002
Average Length (in.) =	24.00	24.00	24.00	24.00
Average Failing Load (lb) =	3112			

SI Conversions:
1 in. = 25.4 mm
1 lb = 0.454 kg
1 lbf = 4.44 N





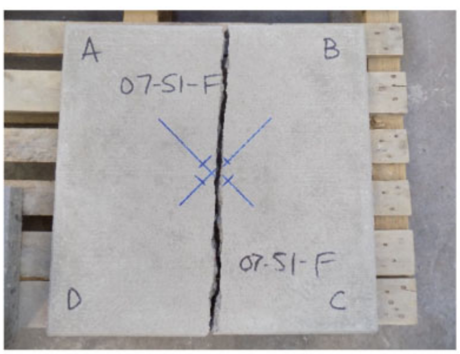


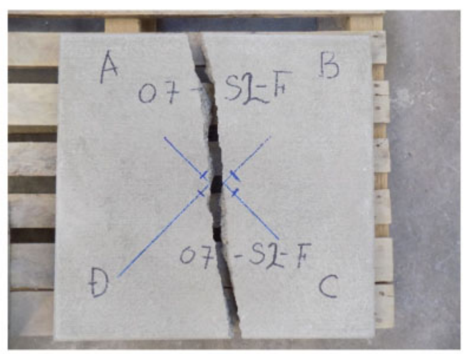


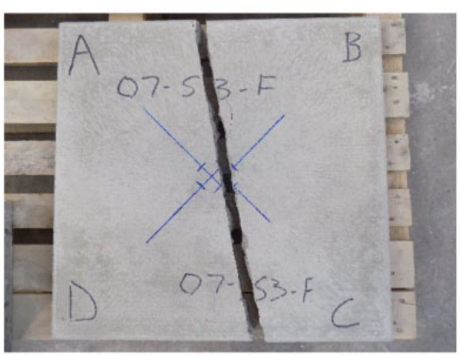
Appendix B.7: Set 7 – 45 mm Hydraulically-Pressed Slab Specimens

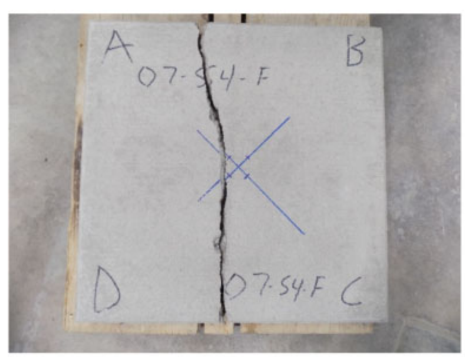
	07-S1-F	07-S2-F	07-S3-F	07-S4-F
Width 1 (in.) =	24.00	24.00	24.00	24.00
Width 2 (in.) =	24.00	24.00	24.00	24.00
Height 1 (in.) =	1.842	1.835	1.867	1.846
Height 2 (in.) =	1.893	1.891	1.899	1.894
Height 3 (in.) =	1.880	1.882	1.879	1.880
Height 4 (in.) =	1.915	1.920	1.915	1.919
Length 1 (in.) =	23.93	23.94	23.95	23.94
Length 2 (in.) =	23.97	23.96	23.96	23.96
Full-Size Slab Weight (lb) =	87.03	87.18	87.58	87.05
Top Concave (in.) =	0.030	0.020	0.020	0.020
Top Convex (in.) =	0.000	0.000	0.000	0.000
Bottom Concave (in.) =	0.000	0.000	0.000	0.000
Bottom Convex (in.) =	0.000	0.000	0.000	0.000
Failing Load (lb) =	1775	1841	1770	1776
Failure Mechanism =	AB-CD	AB-CD	AB-CD	AB-CD
Failure Mode =	NA	NA	NA	NA
Average Width (in.) =	24.00	24.00	24.00	24.00
Average Height (in.) =	1.883	1.882	1.890	1.885
Average Length (in.) =	23.95	23.95	23.96	23.95
Average Failing Load (lb) =	1791			

SI Conversions:
1 in. = 25.4 mm
1 lb = 0.454 kg
1 lbf = 4.44 N





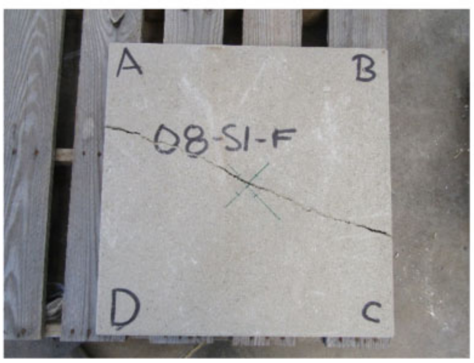


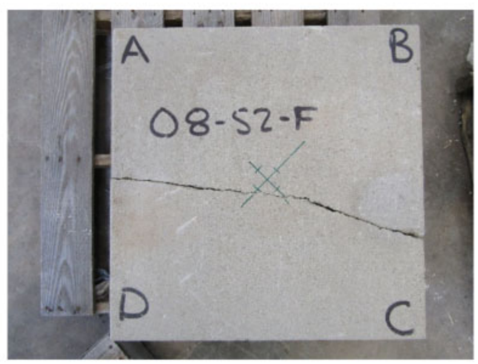


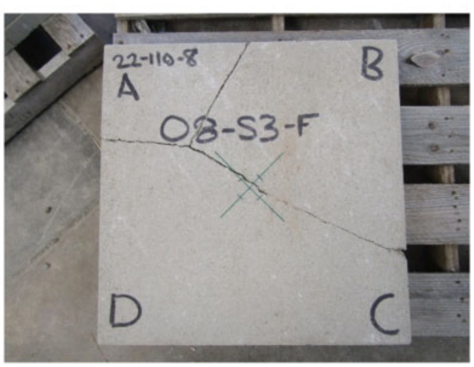
Appendix B.8: Set 8 – 55 mm Dry-Cast Through-Mix Slab Specimens

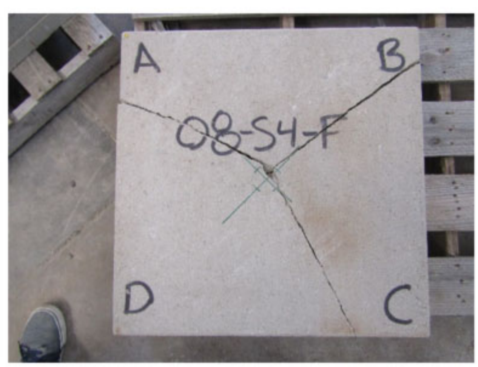
	08-S1-F	08-S2-F	08-S3-F	08-S4-F
Width 1 (in.) =	23.87	23.86	23.90	23.86
Width 2 (in.) =	23.89	23.90	23.90	23.84
Height 1 (in.) =	2.208	2.198	2.209	2.199
Height 2 (in.) =	2.218	2.241	2.238	2.233
Height 3 (in.) =	2.221	2.236	2.274	2.255
Height 4 (in.) =	2.178	2.208	2.285	2.229
Length 1 (in.) =	23.89	23.88	23.85	23.86
Length 2 (in.) =	23.85	23.92	23.86	23.90
Full-Size Slab Weight (lb) =	100.70	100.66	101.18	99.74
Top Concave (in.) =	0.020	0.000	0.020	0.020
Top Convex (in.) =	0.000	0.080	0.000	0.000
Bottom Concave (in.) =	0.000	0.010	0.000	0.000
Bottom Convex (in.) =	0.060	0.000	0.050	0.060
Failing Load (lb) =	2444	2261	2287	2095
Failure Mechanism =	AD-BC	AD-BC	AD-BC-AB	AD-BC-DC
Failure Mode =	Flexure 1	Flexure 1	Compound	Compound
Average Width (in.) =	23.88	23.88	23.90	23.85
Average Height (in.) =	2.206	2.221	2.252	2.229
Average Length (in.) =	23.87	23.90	23.86	23.88
Average Failing Load (lb) =	2272			

SI Conversions:
1 in. = 25.4 mm
1 lb = 0.454 kg
1 lbf = 4.44 N





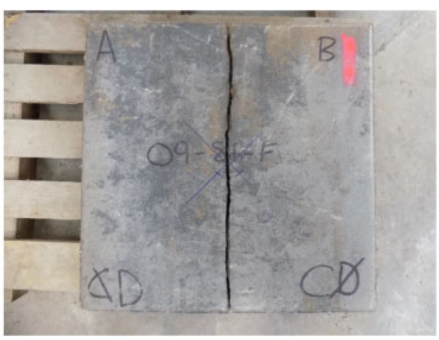


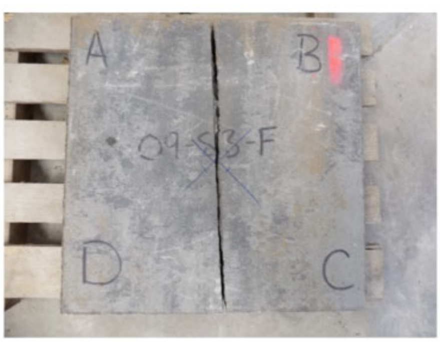


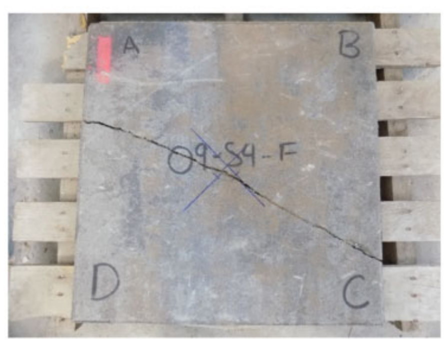
Appendix B.9: Set 9 – 60 mm Dry-Cast Through-Mix Slab Specimens

	09-S1-F	09-S2-F	09-S3-F	09-S4-F
Width 1 (in.) =	23.52	23.57	23.48	23.46
Width 2 (in.) =	23.50	23.57	23.51	23.53
Height 1 (in.) =	2.400	2.343	2.340	2.315
Height 2 (in.) =	2.414	2.335	2.370	2.314
Height 3 (in.) =	2.386	2.343	2.393	2.332
Height 4 (in.) =	2.361	2.311	2.366	2.297
Length 1 (in.) =	23.54	23.56	23.50	23.51
Length 2 (in.) =	23.54	23.54	23.51	23.54
Full-Size Slab Weight (lb) =	109.59	107.40	108.74	107.06
Top Concave (in.) =	0.012	0.012	0.012	0.012
Top Convex (in.) =	0.000	0.000	0.000	0.000
Bottom Concave (in.) =	0.012	0.012	0.012	0.012
Bottom Convex (in.) =	0.000	0.000	0.000	0.000
Failing Load (lb) =	2879	2925	3160	3196
Failure Mechanism =	AB-CD	AD-BC	AB-CD	AD-BC
Failure Mode =	Flexure 2	Flexure 1	Flexure 2	Flexure 1
Average Width (in.) =	23.51	23.57	23.50	23.50
Average Height (in.) =	2.390	2.333	2.367	2.315
Average Length (in.) =	23.54	23.55	23.51	23.53
Average Failing Load (lb) =	3040			

SI Conversions:
1 in. = 25.4 mm
1 lb = 0.454 kg
1 lbf = 4.44 N



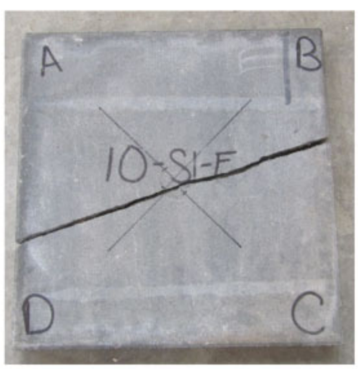


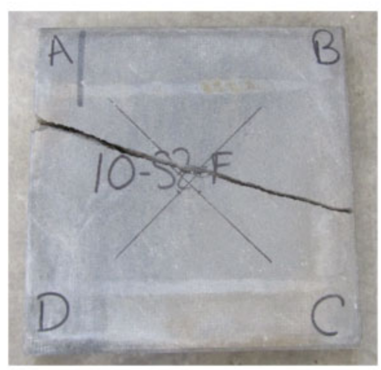


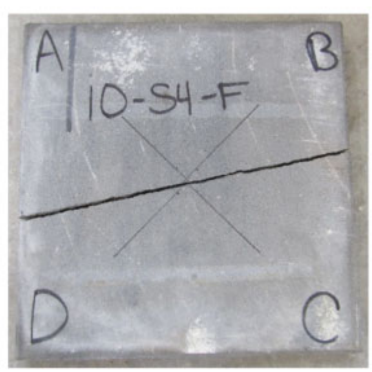
Appendix B.10: Set 10 – 60 mm Dry-Cast Face-Mix Slab Specimens

	10-S1-F	10-S2-F	10-S3-F	10-S4-F
Width 1 (in.) =	23.56	23.57	23.56	23.55
Width 2 (in.) =	23.60	23.55	23.61	23.64
Height 1 (in.) =	2.515	2.489	2.482	2.461
Height 2 (in.) =	2.558	2.472	2.543	2.519
Height 3 (in.) =	2.528	2.488	2.548	2.468
Height 4 (in.) =	2.474	2.470	2.472	2.445
Length 1 (in.) =	23.53	23.53	23.54	23.53
Length 2 (in.) =	23.57	23.62	23.59	23.56
Full-Size Slab Weight (lb) =	110.84	111.51	110.57	111.25
Top Concave (in.) =	0.016	0.014	0.014	0.016
Top Convex (in.) =	0.000	0.000	0.000	0.000
Bottom Concave (in.) =	0.000	0.000	0.010	0.011
Bottom Convex (in.) =	0.040	0.040	0.000	0.000
Failing Load (lb) =	1980	2410	1872	2450
Failure Mechanism =	AD-BC	AD-BC	AB-CD	AD-BC
Failure Mode =	Flexure 1	Flexure 1	Flexure 2	Flexure 1
Average Width (in.) =	23.58	23.56	23.59	23.60
Average Height (in.) =	2.519	2.480	2.511	2.473
Average Length (in.) =	23.55	23.58	23.57	23.55
Average Failing Load (lb) =	2178			

SI Conversions:
1 in. = 25.4 mm
1 lb = 0.454 kg
1 lbf = 4.44 N

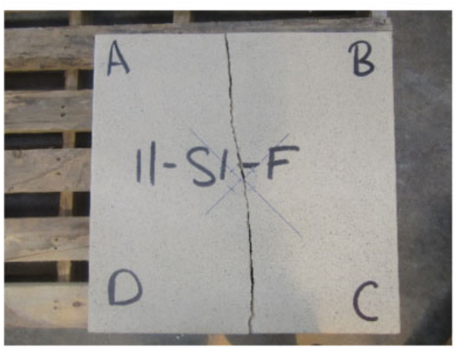


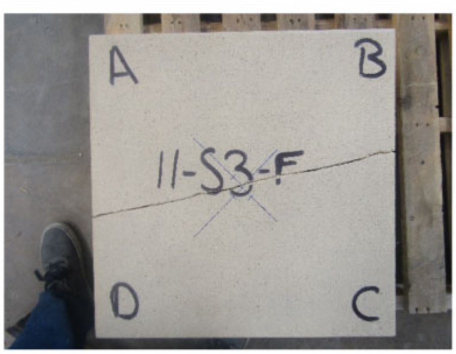


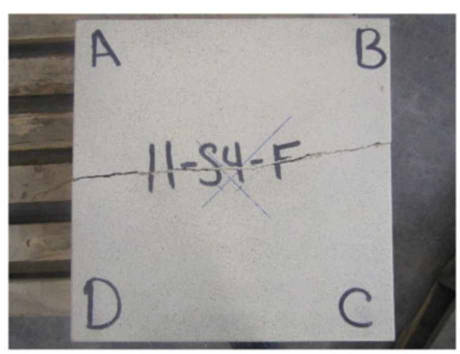


	11-S1-F	11-S2-F	11-S3-F	11-S4-F
Width 1 (in.) =	24.00	24.00	24.00	24.00
Width 2 (in.) =	24.00	24.00	24.00	24.00
Height 1 (in.) =	1.995	2.038	1.984	1.987
Height 2 (in.) =	2.040	2.066	2.009	2.007
Height 3 (in.) =	2.042	2.049	2.016	2.019
Height 4 (in.) =	2.032	2.010	1.994	2.023
Length 1 (in.) =	24.00	24.00	24.00	24.00
Length 2 (in.) =	24.00	24.00	24.00	24.00
Full-Size Slab Weight (lb) =	99.08	99.73	98.30	99.05
Top Concave (in.) =	0.010	0.010	0.010	0.010
Top Convex (in.) =	0.000	0.000	0.000	0.000
Bottom Concave (in.) =	0.010	0.010	0.010	0.010
Bottom Convex (in.) =	0.000	0.000	0.000	0.000
Failing Load (lb) =	2557	2567	2521	2641
Failure Mechanism =	AB-CD	AD-BC	AD-BC	AD-BC
Failure Mode =	NA	NA	NA	NA
Average Width (in.) =	24.00	24.00	24.00	24.00
Average Height (in.) =	2.027	2.041	2.001	2.009
Average Length (in.) =	24.00	24.00	24.00	24.00
Average Failing Load (lb) =	2572			

SI Conversions:
1 in. = 25.4 mm
1 lb = 0.454 kg
1 lbf = 4.44 N

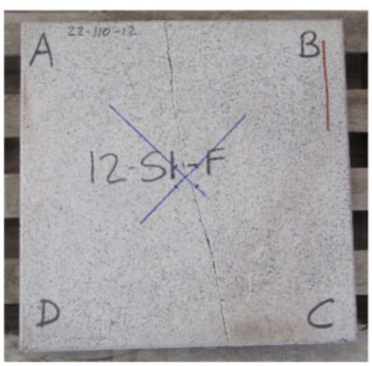


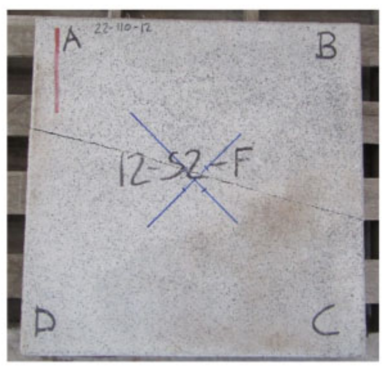


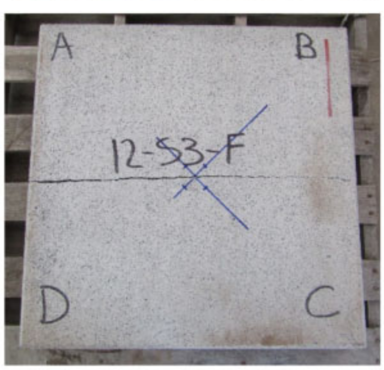


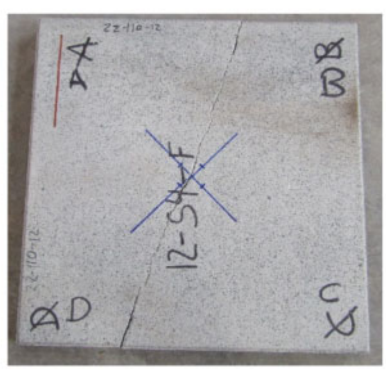
	12-S1-F	12-S2-F	12-S3-F	12-S4-F
Width 1 (in.) =	23.52	23.52	23.51	23.55
Width 2 (in.) =	23.51	23.51	23.50	23.56
Height 1 (in.) =	2.027	2.027	2.063	2.055
Height 2 (in.) =	2.071	2.048	2.048	2.024
Height 3 (in.) =	2.040	2.020	2.035	2.043
Height 4 (in.) =	2.030	2.030	2.030	2.049
Length 1 (in.) =	23.55	23.54	23.55	23.54
Length 2 (in.) =	23.54	23.54	23.53	23.52
Full-Size Slab Weight (lb) =	94.25	94.31	91.83	94.06
Top Concave (in.) =	0.020	0.020	0.040	0.020
Top Convex (in.) =	0.000	0.000	0.000	0.000
Bottom Concave (in.) =	0.000	0.000	0.000	0.000
Bottom Convex (in.) =	0.020	0.040	0.020	0.020
Failing Load (lb) =	3130	2895	2873	2824
Failure Mechanism =	AB-CD	AD-BC	AD-BC	AB-CD
Failure Mode =	Flexure 2	Flexure 1	Flexure 1	Flexure 2
Average Width (in.) =	23.52	23.52	23.51	23.56
Average Height (in.) =	2.042	2.031	2.044	2.043
Average Length (in.) =	23.55	23.54	23.54	23.53
Average Failing Load (lb) =	2931			

SI Conversions:
1 in. = 25.4 mm
1 lb = 0.454 kg
1 lbf = 4.44 N









Appendix C: Q-Slabs (Reduced-Size, Center Loaded, Corner Supported) Test Results

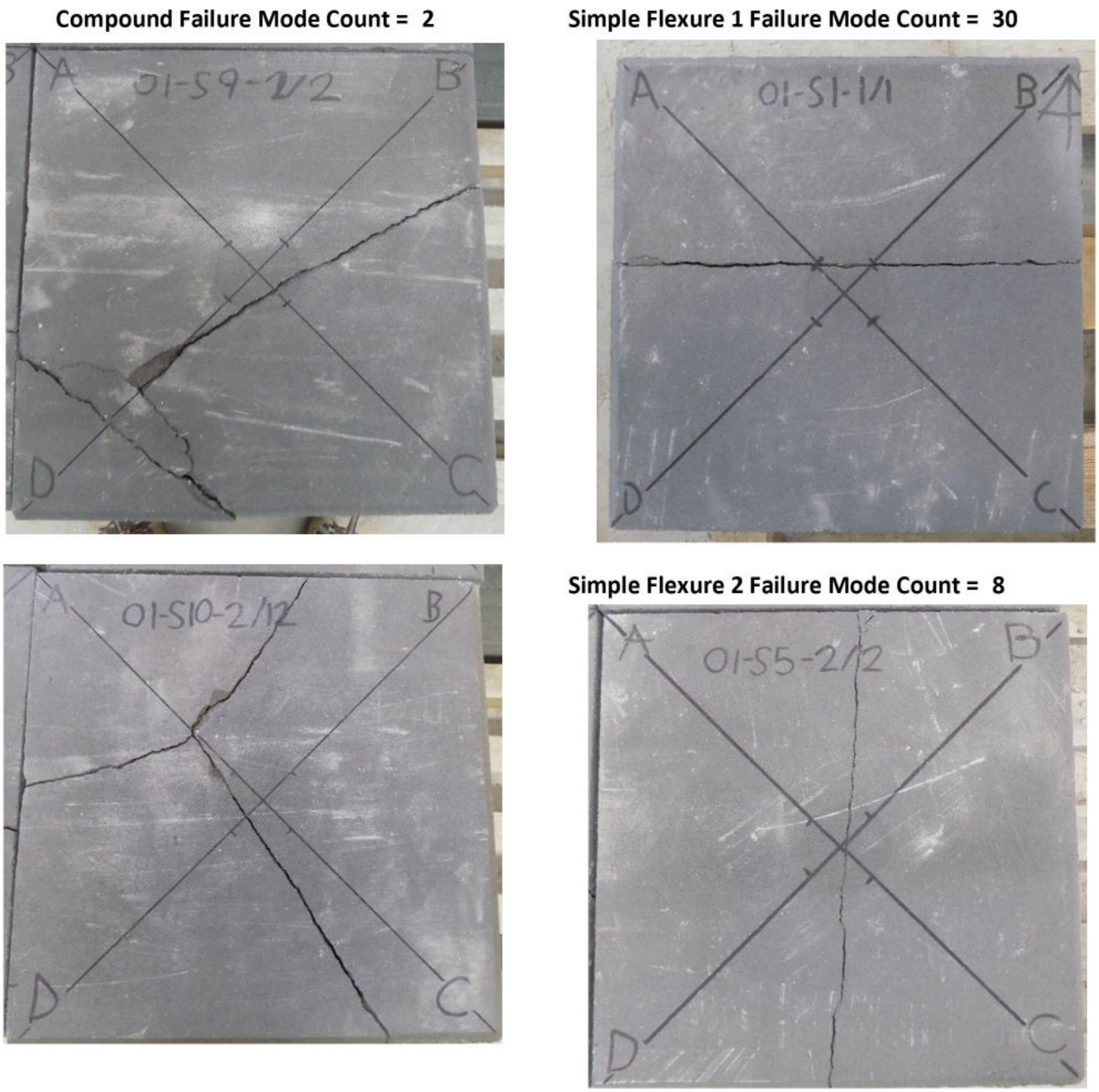
Appendix C.1: Set 1 – Q-Slabs (Quartered) 50 mm Dry-Cast Flexure Results

Slab ID	Average Width (in.)	Average Thickness (in.)	Average Length (in.)	Slab Weight (lb)	Failure Path	Failure Mode	Failing Load (lb)
01-S1-Q-1/1	11.71	2.05	11.80	21.77	AD-BC	Flexure 1	2,376
01-S1-Q-1/2	11.70	2.05	11.74	21.67	AD-BC	Flexure 1	2,414
01-S1-Q-2/1	11.71	2.08	11.82	22.76	AB-CD	Flexure 2	2,687
01-S1-Q-2/2	11.82	2.08	11.83	22.88	AB-CD	Flexure 2	2,527
						Slab Average (lb) =	**2,501**
						Slab Standard Deviation (lb) =	**140**
01-S2-Q-1/11	11.79	2.06	11.72	22.02	AB-CD	Flexure 2	2,829
01-S2-Q-1/12	11.77	2.07	11.78	22.22	AB-CD	Flexure 2	2,657
01-S2-Q-2/11	11.75	2.08	11.73	22.72	AD-BC	Flexure 1	2,976
01-S2-Q-2/12	11.77	2.09	11.83	22.82	AB-DC	Flexure 2	2,822
						Slab Average =	**2,821**
						Slab Standard Deviation (lb) =	**130**
01-S3-Q-1/1	11.86	2.06	11.68	22.2	AD-BC	Flexure 1	2,895
01-S3-Q-1/2	11.86	2.07	11.82	22.6	AD-BC	Flexure 1	2,846
01-S3-Q-2/1	11.70	2.06	11.67	22.55	AD-BC	Flexure 1	2,999
01-S3-Q-2/2	11.70	2.09	11.88	22.88	AD-BC	Flexure 1	2,847
						Slab Average =	**2,897**
						Slab Standard Deviation (lb) =	**72**
01-S4-Q-1/11	11.71	2.06	11.80	21.88	AB-DC	Flexure 2	2,760
01-S4-Q-1/12	11.70	2.05	11.75	21.61	AD-BC	Flexure 1	2,937
01-S4-Q-2/11	11.82	2.08	11.83	23.08	AD-BC	Flexure 1	2,099
01-S4-Q-2/12	11.84	2.08	11.82	22.61	AD-BC	Flexure 1	2,520
						Slab Average =	**2,579**
						Slab Standard Deviation (lb) =	**363**
01-S5-Q-1/1	11.81	2.07	11.80	21.86	AD-BC	Flexure 1	2,494
01-S5-Q-1/2	11.79	2.05	11.74	21.66	AD-BC	Flexure 1	2,701
01-S5-Q-2/1	11.73	2.08	11.76	22.48	AD-BC	Flexure 1	2,626
01-S5-Q-2/2	11.81	2.07	11.80	21.86	AB-CD	Flexure 2	3,134
						Slab Average =	**2,739**
						Slab Standard Deviation (lb) =	**277**
01-S6-Q-1/11	11.74	2.07	11.71	22.1	AD-BC	Flexure 1	3,190
01-S6-Q-1/12	11.74	2.07	11.81	22.38	AB-CD	Flexure 2	2,990
01-S6-Q-2/11	11.81	2.08	11.73	22.62	AD-BC	Flexure 1	2,897
01-S6-Q-2/12	11.82	2.08	11.79	22.76	AD-BC	Flexure 1	2,796
						Slab Average =	**2,968**
						Slab Standard Deviation (lb) =	**168**

Slab ID	Average Width (in.)	Average Thickness (in.)	Average Length (in.)	Slab Weight (lb)	Failure Path	Failure Mode	Failing Load (lb)
01-S7-Q-1/1	11.79	2.06	11.77	21.91	AD-BC	Flexure 1	2,808
01-S7-Q-1/2	11.79	2.07	11.73	22.01	AD-BC	Flexure 1	2,745
01-S7-Q-2/1	11.75	2.09	11.77	22.45	AD-BC	Flexure 1	2,764
01-S7-Q-2/2	11.75	2.09	11.75	22.56	AD-BC	Flexure 1	2,882
						Slab Average =	**2,800**
						Slab Standard Deviation (lb) =	**61**
01-S8-Q-1/11	11.79	2.06	11.77	21.86	AD-BC	Flexure 1	2,637
01-S8-Q-1/12	11.74	2.06	11.77	21.87	AD-BC	Flexure 1	2,991
01-S8-Q-2/11	11.72	2.09	11.76	22.47	AD-BC	Flexure 1	2,845
01-S8-Q-2/12	11.77	2.09	11.76	22.55	AD-BC	Flexure 1	2,721
						Slab Average =	**2,799**
						Slab Standard Deviation (lb) =	**154**
01-S9-Q-1/1	11.74	2.00	11.72	21.52	AD-BC	Flexure 1	2,682
01-S9-Q-1/2	11.73	1.99	11.80	21.31	AD-BC	Flexure 1	2,541
01-S9-Q-2/1	11.79	2.03	11.77	22.26	AD-BC	Flexure 1	625
01-S9-Q-2/2	11.81	2.02	11.75	22.06	AD-BC-CD	Compound	2,608
						Slab Average* =	**2,610**
						Slab Standard Deviation (lb)* =	**71**
01-S10-Q-1/11	11.77	2.00	11.73	21.19	AD-BC	Flexure 1	2,551
01-S10-Q-1/12	11.76	1.99	11.78	21.2	AD-BC	Flexure 1	2,011
01-S10-Q-2/11	11.77	2.02	11.74	22.05	AD-BC	Flexure 1	3,093
01-S10-Q-2/12	11.77	2.02	11.77	21.92	AB-AD-C	Compound	2,373
						Slab Average =	**2,507**
						Slab Standard Deviation (lb) =	**451**
			Slab Set Average (lb)* =	**2,725**			
			Slab Set Standard Deviation (lb)* =	**256**			
			Slab Set Coefficient of Variation (%)* =	**9.4**			

*Summary excludes 01-S9-Q-2/1 as an outlier.

SI Conversions:
1 in. = 25.4 mm
1 lb = 0.454 kg
1 lbf = 4.44 N



Set 1 – Typical Failure Mechanisms

Appendix C.2: Set 2 – Q-Slabs (Quartered) 60 mm Dry-Cast Flexure Results

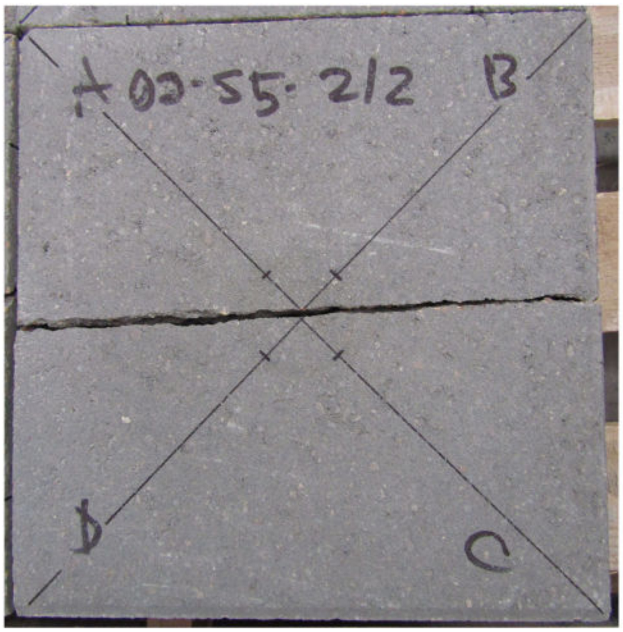
Slab ID	Average Width (in.)	Average Thickness (in.)	Average Length (in.)	Slab Weight (lb)	Failure Path	Failure Mode	Failing Load (lb)
02-S1-Q-1/1	11.75	2.38	11.65	26.64	AD-BC	Flexure 1	4,942
02-S1-Q-1/2	11.72	2.38	11.72	26.46	AD-BC	Flexure 1	4,242
02-S1-Q-2/1	11.62	2.39	11.71	26.62	AD-BC	Flexure 1	4,837
02-S1-Q-2/2	11.67	2.39	11.66	26.40	AD-BC	Flexure 1	4,781
						Slab Average (lb) =	**4,701**
						Slab Standard Deviation (lb) =	**313**
02-S2-Q-1/11	11.75	2.39	11.70	26.76	AD-BC	Flexure 1	4,498
02-S2-Q-1/12	11.75	2.37	11.68	26.42	AD-BC	Flexure 1	4,340
02-S2-Q-2/11	11.64	2.38	11.66	26.40	AD-BC	Flexure 1	4,704
02-S2-Q-2/12	11.64	2.36	11.70	26.14	AD-BC	Flexure 1	4,551
						Slab Average =	**4,523**
						Slab Standard Deviation (lb) =	**150**
02-S3-Q-1/1	11.71	2.40	11.72	26.72	AD-BC	Flexure 1	4,497
02-S3-Q-1/2	11.67	2.38	11.63	26.24	AD-BC	Flexure 1	4,163
02-S3-Q-2/1	11.67	2.40	11.67	26.58	AD-BC	Flexure 1	4,103
02-S3-Q-2/2	11.73	2.39	11.69	26.82	AD-BC	Flexure 1	4,317
						Slab Average =	**4,270**
						Slab Standard Deviation (lb) =	**176**
02-S4-Q-1/11	11.83	2.39	11.68	26.96	AD-BC	Flexure 1	3,940
02-S4-Q-1/12	11.76	2.37	11.69	26.64	AD-BC	Flexure 1	4,299
02-S4-Q-2/11	11.56	2.40	11.68	26.40	AD-BC	Flexure 1	4,403
02-S4-Q-2/12	11.62	2.38	11.70	26.48	AD-BC	Flexure 1	4,000
						Slab Average =	**4,161**
						Slab Standard Deviation (lb) =	**225**
02-S5-Q-1/1	11.61	2.35	11.68	26.08	AD-BC	Flexure 1	3,648
02-S5-Q-1/2	11.58	2.39	11.69	26.34	AD-BC	Flexure 1	4,147
02-S5-Q-2/1	11.76	2.35	11.66	26.38	AD-BC	Flexure 1	3,690
02-S5-Q-2/2	11.82	2.38	11.70	26.72	AD-BC	Flexure 1	4,164
						Slab Average =	**3,912**
						Slab Standard Deviation (lb) =	**281**
02-S6-Q-1/11	11.67	2.38	11.69	26.58	AD-BC	Flexure 1	4,245
02-S6-Q-1/12	11.72	2.39	11.68	26.76	AD-BC	Flexure 1	4,688
02-S6-Q-2/11	11.72	2.37	11.77	26.50	AD-BC	Flexure 1	4,271
02-S6-Q-2/12	11.67	2.39	11.61	26.34	AB-CD	Flexure 2	4,537
						Slab Average =	**4,435**
						Slab Standard Deviation (lb) =	**214**

Slab ID	Average Width (in.)	Average Thickness (in.)	Average Length (in.)	Slab Weight (lb)	Failure Path	Failure Mode	Failing Load (lb)
02-S7-Q-1/1	11.72	2.32	11.54	25.54	AD-BC	Flexure 1	3,643
02-S7-Q-1/2	11.83	2.33	11.68	26.40	AD-BC	Flexure 1	3,894
02-S7-Q-2/1	11.69	2.31	11.69	25.72	AD-BC	Flexure 1	4,049
02-S7-Q-2/2	11.72	2.32	11.69	25.94	AD-BC	Flexure 1	4,141
						Slab Average =	**3,932**
						Slab Standard Deviation (lb) =	**218**
02-S8-Q-1/11	11.73	2.33	11.73	26.24	AD-BC	Flexure 1	4,312
02-S8-Q-1/12	11.68	2.34	11.66	26.12	AD-BC	Flexure 1	3,927
02-S8-Q-2/11	11.66	2.30	11.74	25.56	AD-BC	Flexure 1	4,080
02-S8-Q-2/12	11.70	2.32	11.63	25.54	AD-BC	Flexure 1	3,693
						Slab Average =	**4,003**
						Slab Standard Deviation (lb) =	**260**
02-S9-Q-1/1	11.74	2.33	11.66	26.04	AD-BC	Flexure 1	4,295
02-S9-Q-1/2	11.76	2.34	11.71	25.82	AD-BC	Flexure 1	3,968
02-S9-Q-2/1	11.74	2.31	11.65	26.34	AD-BC	Flexure 1	4,501
02-S9-Q-2/2	11.61	2.34	11.65	25.98	AD-BC	Flexure 1	4,357
						Slab Average* =	**4,207**
						Slab Standard Deviation (lb)* =	**209**
02-S10-Q-1/11	11.72	2.33	11.61	25.80	AD-BC	Flexure 1	3,952
02-S10-Q-1/12	11.73	2.32	11.76	26.18	AD-BC	Flexure 1	4,204
02-S10-Q-2/11	11.67	2.34	11.68	26.10	AD-BC	Flexure 1	4,309
02-S10-Q-2/12	11.66	2.32	11.70	25.90	AD-BC	Flexure 1	3,954
						Slab Average =	**4,105**
						Slab Standard Deviation (lb) =	**180**
			Slab Set Average (lb) =	**4,232**			
			Slab Set Standard Deviation (lb) =	**322**			
			Slab Set Coefficient of Variation (%) =	**7.6**			

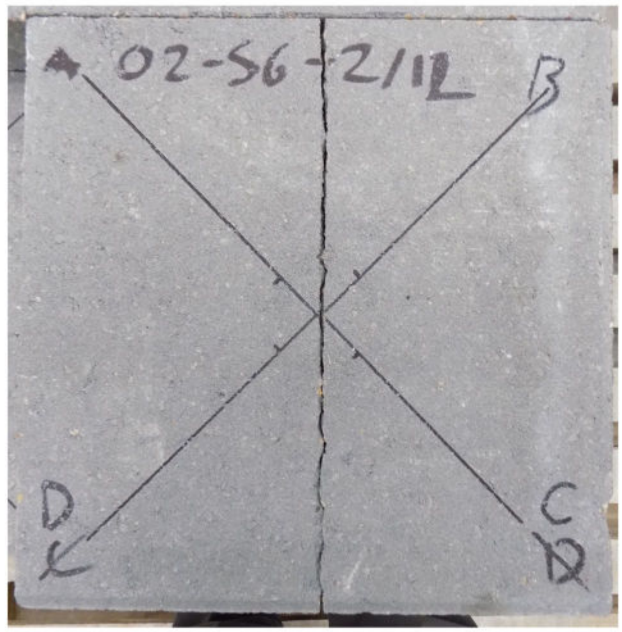
SI Conversions:
1 in. = 25.4 mm
1 lb = 0.454 kg
1 lbf = 4.44 N

Compound Failure Mode Count = 0

Simple Flexure 1 Failure Mode Count = 39



Simple Flexure 2 Failure Mode Count = 1



Set 2 – Typical Failure Mechanisms

Appendix C.3: Set 3 – Q-Slabs (Quartered) 50 mm Hydraulically-Pressed Flexure Results

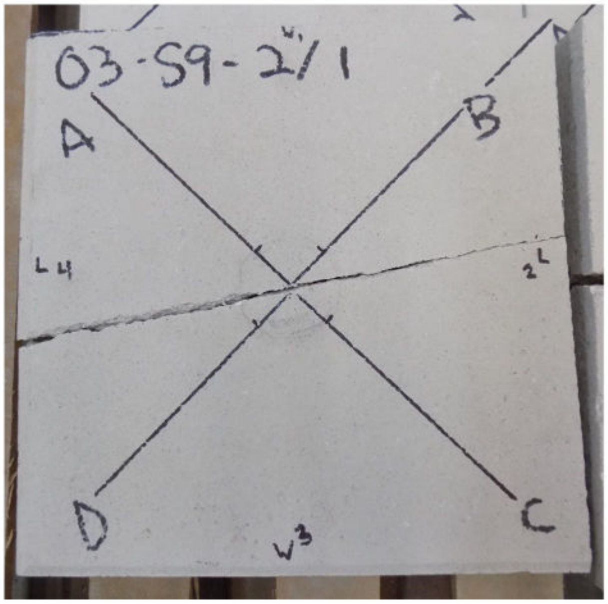
Slab ID	Average Width (in.)	Average Thickness (in.)	Average Length (in.)	Slab Weight (lb)	Failure Path	Failure Mode	Failing Load (lb)
03-S1-Q-1/1	11.75	2.00	11.73	23.50	AD-BC	Flexure 1	4,308
03-S1-Q-1/2	11.72	2.00	11.72	23.50	AB-CD	Flexure 2	3,927
03-S1-Q-2/1	11.76	1.96	11.79	23.14	AB-CD	Flexure 2	4,473
03-S1-Q-2/2	11.69	1.95	11.76	22.64	AB-CD	Flexure 2	4,081
					Slab Average (lb) =		**4,197**
					Slab Standard Deviation (lb) =		**241**
03-S2-Q-1/11	11.66	1.92	11.71	22.52	AB-CD	Flexure 2	4,393
03-S2-Q-1/12	11.62	1.96	11.81	23.16	AB-CD	Flexure 2	4,784
03-S2-Q-2/11	11.75	1.93	11.80	22.88	AB-CD	Flexure 2	4,148
03-S2-Q-2/12	11.66	1.98	11.84	23.56	AD-BC	Flexure 1	4,563
					Slab Average =		**4,472**
					Slab Standard Deviation (lb) =		**269**
03-S3-Q-1/1	11.71	1.98	11.82	23.50	AD-BC	Flexure 1	4,484
03-S3-Q-1/2	11.67	1.95	11.67	22.48	AD-BC	Flexure 1	3,820
03-S3-Q-2/1	11.80	1.97	11.73	23.36	AB-CD	Flexure 2	4,432
03-S3-Q-2/2	11.73	1.95	11.75	22.82	AD-BC	Flexure 1	4,109
					Slab Average =		**4,211**
					Slab Standard Deviation (lb) =		**309**
03-S4-Q-1/11	11.75	1.95	11.83	23.08	AB-CD	Flexure 2	4,240
03-S4-Q-1/12	11.86	1.96	11.66	22.94	AB-CD	Flexure 2	3,959
03-S4-Q-2/11	11.62	2.00	11.78	23.38	AB-CD	Flexure 2	4,463
03-S4-Q-2/12	11.73	2.00	11.67	23.36	AB-CD	Flexure 2	4,329
					Slab Average =		**4,248**
					Slab Standard Deviation (lb) =		**213**
03-S5-Q-1/1	11.59	1.99	11.76	23.16	AD-BC	Flexure 1	4,227
03-S5-Q-1/2	11.61	1.96	11.86	22.64	AD-BC	Flexure 1	3,203
03-S5-Q-2/1	11.71	1.96	11.51	22.84	AD-BC	Flexure 1	4,535
03-S5-Q-2/2	11.94	1.94	11.84	23.34	AD-BC	Flexure 1	4,205
					Slab Average =		**4,043**
					Slab Standard Deviation (lb) =		**580**
03-S6-Q-1/11	11.78	1.95	11.73	22.80	AB-CD	Flexure 2	3,299
03-S6-Q-1/12	11.73	1.93	11.73	22.86	AB-CD	Flexure 2	4,086
03-S6-Q-2/11	11.69	1.97	11.79	23.36	AB-CD	Flexure 2	4,117
03-S6-Q-2/12	11.70	1.96	11.75	23.16	AD-BC	Flexure 1	4,652
					Slab Average =		**4,039**
					Slab Standard Deviation (lb) =		**557**

Slab ID	Average Width (in.)	Average Thickness (in.)	Average Length (in.)	Slab Weight (lb)	Failure Path	Failure Mode	Failing Load (lb)
03-S7-Q-1/1	11.80	1.99	11.85	23.27	AD-BC	Flexure 1	4,140
03-S7-Q-1/2	11.68	1.96	11.63	22.61	AD-BC	Flexure 1	4,353
03-S7-Q-2/1	11.69	2.03	11.90	24.16	AB-CD	Flexure 2	4,635
03-S7-Q-2/2	11.81	2.01	11.57	23.61	AD-BC	Flexure 1	4,606
						Slab Average =	**4,434**
						Slab Standard Deviation (lb) =	**233**
03-S8-Q-1/11	11.74	1.97	11.74	23.44	AD-BC	Flexure 1	4,353
03-S8-Q-1/12	11.80	1.96	11.74	23.02	AB-CD	Flexure 2	4,517
03-S8-Q-2/11	11.78	1.94	11.69	22.88	AB-CD	Flexure 2	4,512
03-S8-Q-2/12	11.72	1.96	11.69	23.32	AD-BC	Flexure 1	4,218
						Slab Average =	**4,400**
						Slab Standard Deviation (lb) =	**143**
03-S9-Q-1/1	11.80	1.99	11.79	23.75	AD-BC	Flexure 1	4,857
03-S9-Q-1/2	11.78	1.95	11.71	22.79	AB-CD	Flexure 2	4,292
03-S9-Q-2/1	11.68	1.99	11.79	23.53	AD-BC	Flexure 1	4,653
03-S9-Q-2/2	11.69	1.95	11.71	22.72	AD-BC	Flexure 1	4,389
						Slab Average* =	**4,513**
						Slab Standard Deviation (lb)* =	**302**
03-S10-Q-1/11	11.71	1.99	11.78	23.45	AD-BC	Flexure 1	4,568
03-S10-Q-1/12	11.78	1.99	11.71	23.53	AD-BC	Flexure 1	4,760
03-S10-Q-2/11	11.78	1.94	11.84	23.01	AB-CD	Flexure 2	4,047
03-S10-Q-2/12	11.71	1.94	11.65	22.44	AD-BC	Flexure 1	4,371
						Slab Average =	**4,437**
						Slab Standard Deviation (lb) =	**304**
			Slab Set Average (lb) =	**4,303**			
			Slab Set Standard Deviation (lb) =	**344**			
			Slab Set Coefficient of Variation (%) =	**8.0**			

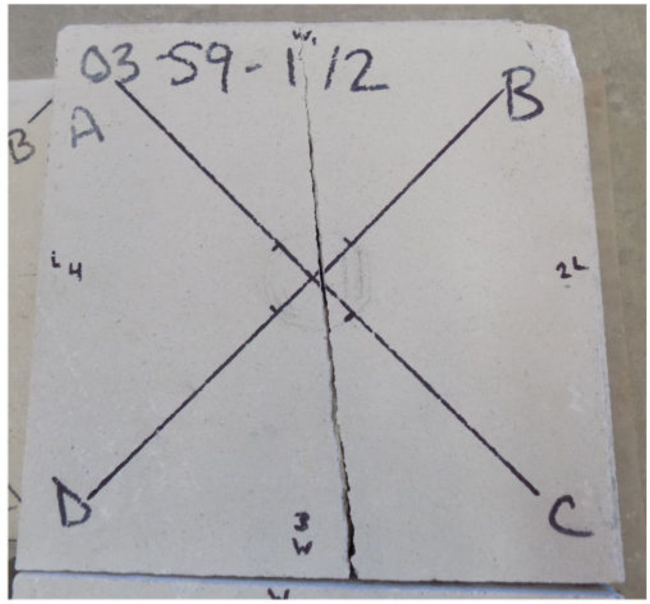
SI Conversions:
1 in. = 25.4 mm
1 lb = 0.454 kg
1 lbf = 4.44 N

Compound Failure Mode Count = 0

Simple Flexure 1 Failure Mode Count = 21



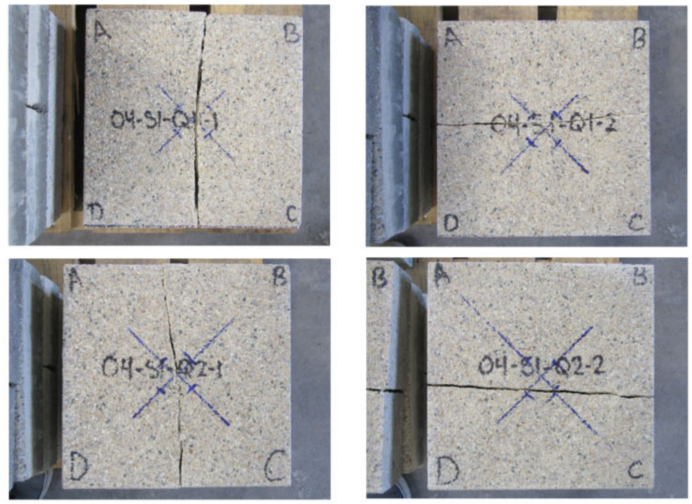
Simple Flexure 2 Failure Mode Count = 19



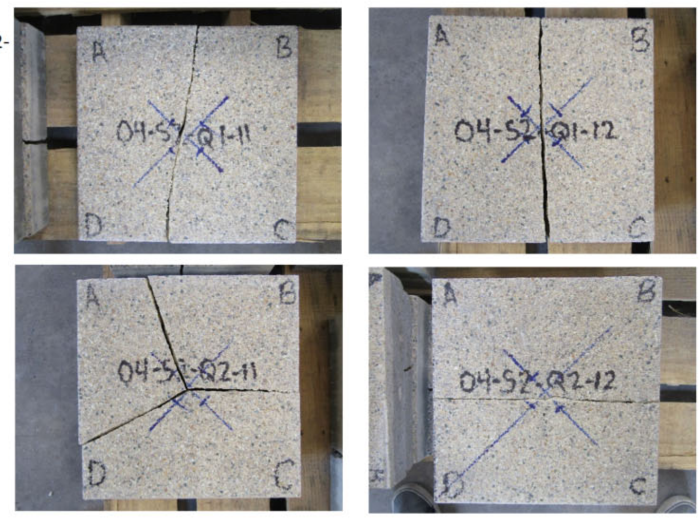
Set 3 – Typical Failure Mechanisms

Appendix C.4: Set 4 – Q-Slabs (Quartered) 50 mm Hermetically-Pressed Flexure Results

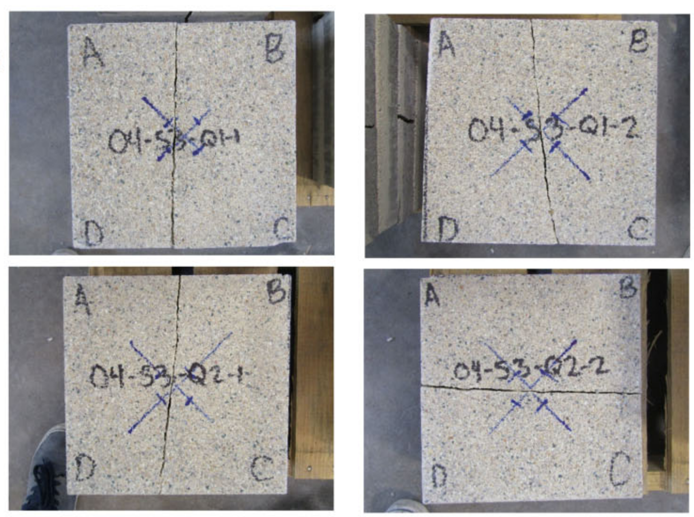
	04-S1-Q1-1	04-S1-Q1-2	04-S1-Q2-1	04-S1-Q2-2
Width 1 (in.) =	11.92	11.88	11.67	11.69
Width 2 (in.) =	11.94	11.92	11.68	11.71
Height 1 (in.) =	2.007	2.003	1.988	1.994
Height 2 (in.) =	1.993	2.010	2.001	1.999
Length 1 (in.) =	11.76	11.82	11.76	11.83
Length 2 (in.) =	11.78	11.85	11.78	11.84
Reduced Slab Weight (lb) =	23.02	23.12	22.38	22.59
Failing Load (lb) =	2623	2749	2452	2346
Failure Mechanism =	AB-CD	AD-BC	AB-CD	AD-BC
Failure Mode =	NA	NA	NA	NA
Average Width (in.) =	11.93	11.90	11.68	11.70
Average Height (in.) =	2.000	2.007	1.995	1.997
Average Length (in.) =	11.77	11.84	11.77	11.84
Average Failing Load (lb) =	2543			



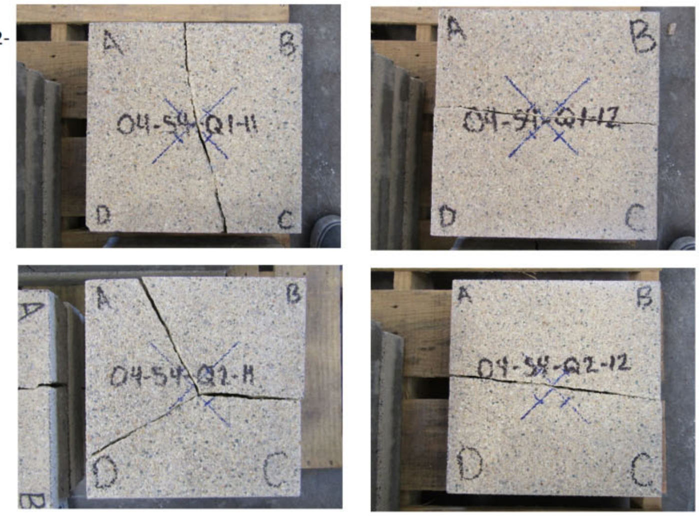
	04-S2-Q1-11	04-S2-Q1-12	04-S2-Q2-11	04-S2-Q2-12
Width 1 (in.) =	11.83	11.77	11.75	11.77
Width 2 (in.) =	11.84	11.83	11.78	11.83
Height 1 (in.) =	2.015	2.015	2.000	2.019
Height 2 (in.) =	2.006	2.016	2.008	2.020
Length 1 (in.) =	11.82	11.77	11.71	11.88
Length 2 (in.) =	11.82	11.77	11.72	11.90
Reduced Slab Weight (lb) =	22.72	22.76	22.58	23.18
Failing Load (lb) =	2819	2540	2638	2750
Failure Mechanism =	AB-CD	AB-CD	AD-BC-AB	AD-BC
Failure Mode =	NA	NA	NA	NA
Average Width (in.) =	11.84	11.80	11.77	11.80
Average Height (in.) =	2.011	2.016	2.004	2.020
Average Length (in.) =	11.82	11.77	11.72	11.89
Average Failing Load (lb) =	2687			



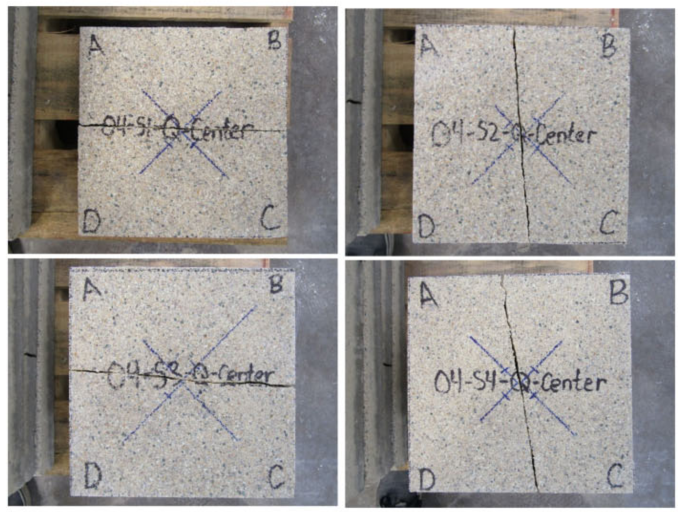
	04-S3-Q1-1	04-S3-Q1-2	04-S3-Q2-1	04-S3-Q2-2
Width 1 (in.) =	11.80	11.68	11.78	11.89
Width 2 (in.) =	11.81	11.75	11.82	11.93
Height 1 (in.) =	2.006	2.019	2.019	2.026
Height 2 (in.) =	1.994	2.003	2.014	2.013
Length 1 (in.) =	11.67	11.90	11.91	11.67
Length 2 (in.) =	11.68	11.92	11.93	11.69
Reduced Slab Weight (lb) =	22.40	22.82	23.02	22.92
Failing Load (lb) =	2848	2804	2765	2741
Failure Mechanism =	AB-CD	AB-CD	AB-CD	AD-BC
Failure Mode =	NA	NA	NA	NA
Average Width (in.) =	11.81	11.72	11.80	11.91
Average Height (in.) =	2.000	2.011	2.017	2.020
Average Length (in.) =	11.68	11.91	11.92	11.68
Average Failing Load (lb) =	2790			



	04-S4-Q1-11	04-S4-Q1-12	04-S4-Q2-11	04-S4-Q2-12
Width 1 (in.) =	11.80	11.80	11.76	11.78
Width 2 (in.) =	11.84	11.83	11.77	11.81
Height 1 (in.) =	2.009	2.018	2.004	2.020
Height 2 (in.) =	1.999	2.011	2.014	2.013
Length 1 (in.) =	11.89	11.70	11.80	11.81
Length 2 (in.) =	11.89	11.72	11.81	11.82
Reduced Slab Weight (lb) =	22.76	22.62	22.68	22.90
Failing Load (lb) =	2502	2600	2790	2656
Failure Mechanism =	AB-CD	AD-BC	AD-BC-AB	AD-BC
Failure Mode =	NA	NA	NA	NA
Average Width (in.) =	11.82	11.82	11.77	11.80
Average Height (in.) =	2.004	2.015	2.009	2.017
Average Length (in.) =	11.89	11.71	11.81	11.82
Average Failing Load (lb) =	2637			



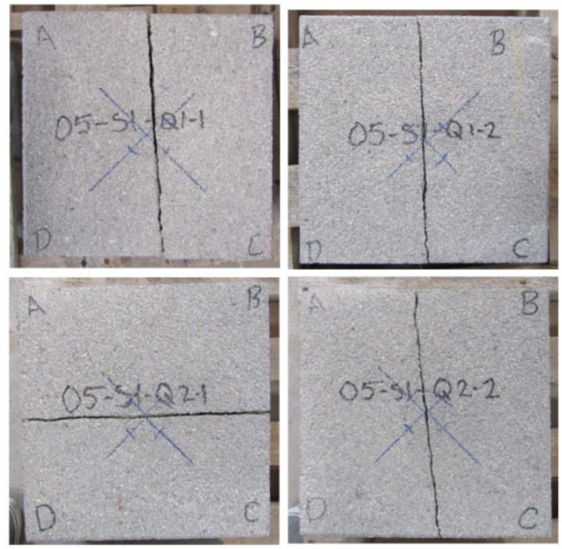
	04-S1-Q-Center	04-S2-Q-Center	04-S3-Q-Center	04-S4-Q-Center
Width 1 (in.) =	11.93	12.05	12.03	11.94
Width 2 (in.) =	11.94	12.10	12.05	11.90
Height 1 (in.) =	1.994	1.999	1.992	2.035
Height 2 (in.) =	2.000	1.989	1.976	2.013
Length 1 (in.) =	11.91	11.83	12.00	12.05
Length 2 (in.) =	11.97	11.83	12.02	12.05
Reduced Slab Weight (lb) =	23.42	23.42	23.68	24.00
Failing Load (lb) =	2775	2871	2775	2822
Failure Mechanism =	AD-BC	AB-CD	AD-BC	AB-CD
Failure Mode =	NA	NA	NA	NA
Average Width (in.) =	11.94	12.08	12.04	11.92
Average Height (in.) =	1.997	1.994	1.984	2.024
Average Length (in.) =	11.94	11.83	12.01	12.05
Average Failing Load (lb) =	2811			



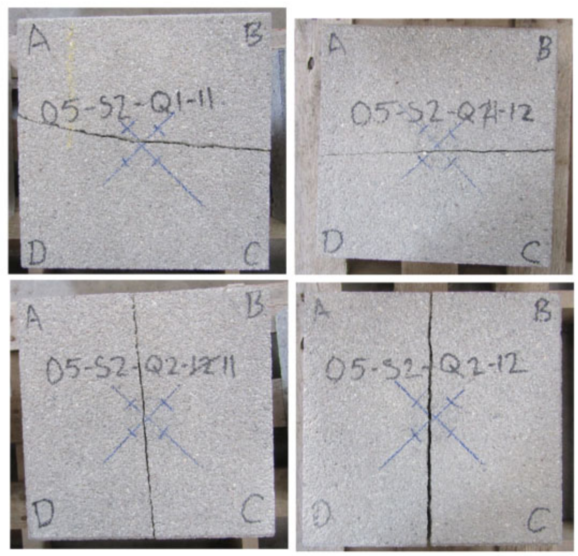
SI Conversions:
1 in. = 25.4 mm
1 lb = 0.454 kg
1 lbf = 4.44 N

Appendix C.5: Set 5 – Q-Slabs (Quartered) 50 mm Dry-Cast Face-Mix Flexure Results

	05-S1-Q1-1	05-S1-Q1-2	05-S1-Q2-1	05-S1-Q2-2
Width 1 (in.) =	11.75	11.78	11.85	11.80
Width 2 (in.) =	11.75	11.78	11.85	11.85
Height 1 (in.) =	2.017	2.056	1.980	1.998
Height 2 (in.) =	2.019	2.045	2.023	2.027
Length 1 (in.) =	11.78	11.80	11.77	11.80
Length 2 (in.) =	11.80	11.85	11.78	11.85
Reduced Slab Weight (lb) =	23.96	24.32	23.86	24.22
Failing Load (lb) =	3384	3281	3290	3207
Failure Mechanism =	AB-CD	AB-CD	AD-BC	AB-CD
Failure Mode =	Flexure 2	Flexure 2	Flexure 1	Flexure 2
Average Width (in.) =	11.75	11.78	11.85	11.83
Average Height (in.) =	2.018	2.051	2.002	2.013
Average Length (in.) =	11.79	11.83	11.78	11.83
Average Failing Load (lb) =	3291			

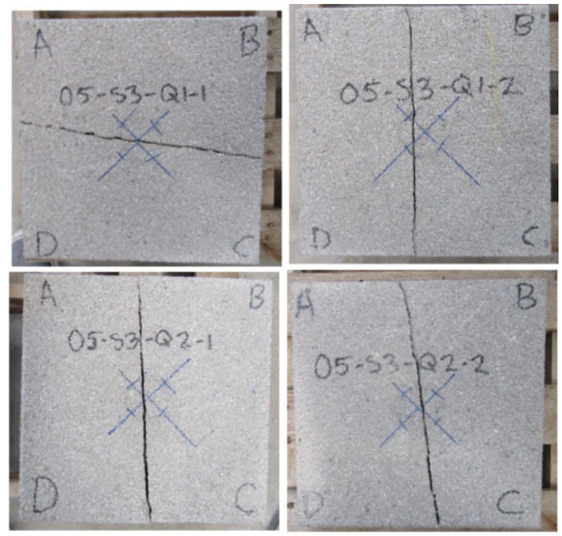


	05-S2-Q1-11	05-S2-Q1-12	05-S2-Q2-11	05-S2-Q2-12
Width 1 (in.) =	11.78	11.78	11.75	11.80
Width 2 (in.) =	11.80	11.80	11.80	11.85
Height 1 (in.) =	2.036	2.042	2.000	1.997
Height 2 (in.) =	2.030	2.021	2.030	2.003
Length 1 (in.) =	11.80	11.80	11.78	11.80
Length 2 (in.) =	11.85	11.80	11.80	11.85
Reduced Slab Weight (lb) =	24.30	24.12	23.66	24.10
Failing Load (lb) =	3213	3368	3235	3524
Failure Mechanism =	AD-BC	AD-BC	AB-CD	AB-CD
Failure Mode =	Flexure 1	Flexure 1	Flexure 2	Flexure 2
Average Width (in.) =	11.79	11.79	11.78	11.83
Average Height (in.) =	2.033	2.032	2.015	2.000
Average Length (in.) =	11.83	11.80	11.79	11.83
Average Failing Load (lb) =	3335			

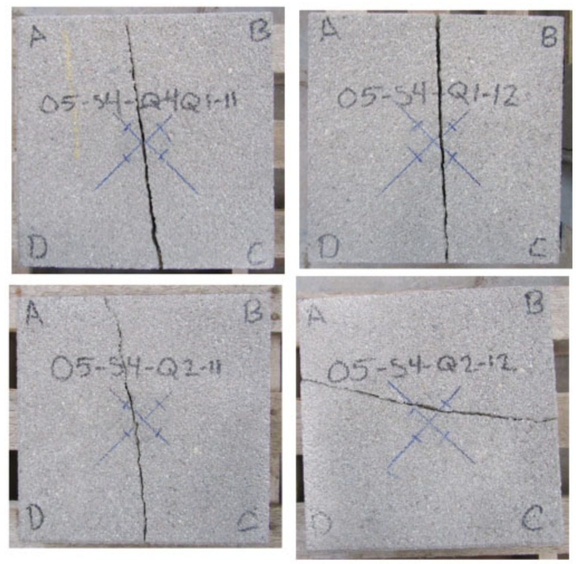


SI Conversions:
1 in. = 25.4 mm
1 lb = 0.454 kg
1 lbf = 4.44 N

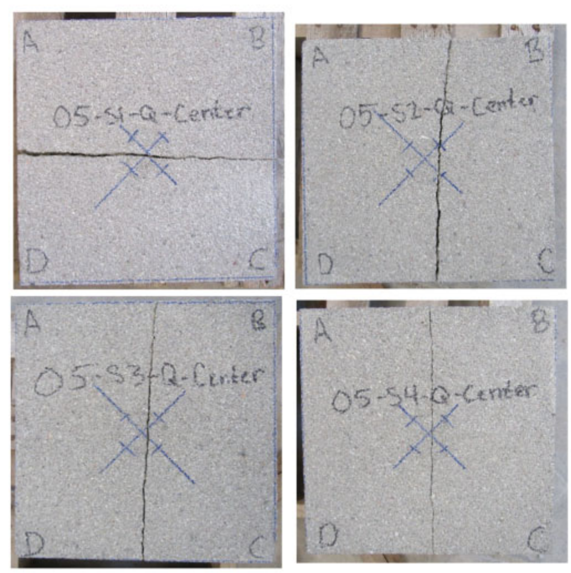
	05-S3-Q1-1	05-S3-Q1-2	05-S3-Q2-1	05-S3-Q2-2
Width 1 (in.) =	11.70	11.73	11.82	11.78
Width 2 (in.) =	11.70	11.85	11.87	11.78
Height 1 (in.) =	2.034	2.021	2.020	2.033
Height 2 (in.) =	2.023	2.039	2.027	2.056
Length 1 (in.) =	11.80	11.78	11.80	11.78
Length 2 (in.) =	11.82	11.80	11.80	11.80
Reduced Slab Weight (lb) =	24.36	24.42	24.42	24.30
Failing Load (lb) =	3512	3702	3406	3484
Failure Mechanism =	AD-BC	AB-CD	AB-CD	AB-CD
Failure Mode =	Flexure 1	Flexure 2	Flexure 2	Flexure 2
Average Width (in.) =	11.70	11.79	11.85	11.78
Average Height (in.) =	2.029	2.030	2.024	2.045
Average Length (in.) =	11.81	11.79	11.80	11.79
Average Failing Load (lb) =	3526			



	05-S4-Q1-11	05-S4-Q1-12	05-S4-Q2-11	05-S4-Q2-12
Width 1 (in.) =	11.80	11.80	11.80	11.80
Width 2 (in.) =	11.80	11.80	11.82	11.78
Height 1 (in.) =	2.052	2.056	2.025	2.034
Height 2 (in.) =	2.040	2.029	2.030	2.035
Length 1 (in.) =	11.77	11.80	11.82	11.80
Length 2 (in.) =	11.80	11.82	11.80	11.83
Reduced Slab Weight (lb) =	24.26	24.46	24.32	24.60
Failing Load (lb) =	3571	3545	3612	3826
Failure Mechanism =	AB-CD	AB-CD	AB-CD	AD-BC
Failure Mode =	Flexure 2	Flexure 2	Flexure 2	Flexure 1
Average Width (in.) =	11.80	11.80	11.81	11.79
Average Height (in.) =	2.046	2.043	2.028	2.035
Average Length (in.) =	11.79	11.81	11.81	11.82
Average Failing Load (lb) =	3639			

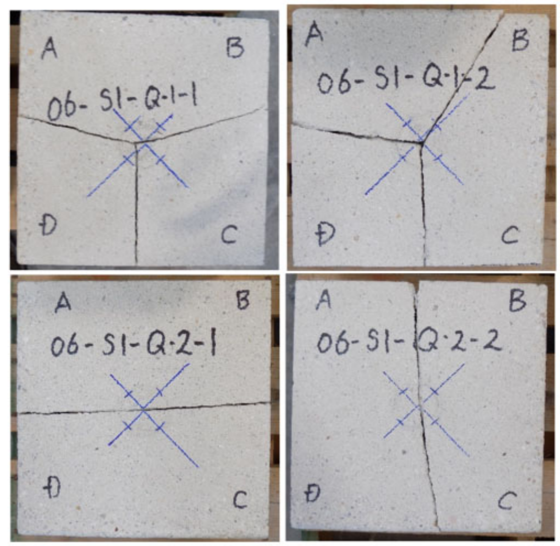


	05-S1-Q-Center	05-S2-Q-Center	05-S3-Q-Center	05-S4-Q-Center
Width 1 (in.) =	12.14	12.00	12.16	11.90
Width 2 (in.) =	12.26	11.93	12.18	11.90
Height 1 (in.) =	2.046	2.046	2.044	2.057
Height 2 (in.) =	2.025	2.056	2.048	2.041
Length 1 (in.) =	12.15	12.07	12.17	12.04
Length 2 (in.) =	12.25	12.19	12.19	12.05
Reduced Slab Weight (lb) =	25.96	25.69	25.93	25.13
Failing Load (lb) =	3598	3710	3700	3754
Failure Mechanism =	AD-BC	AB-CD	AB-CD	AB-CD
Failure Mode =	Flexure 1	Flexure 2	Flexure 2	Flexure 2
Average Width (in.) =	12.20	11.97	12.17	11.90
Average Height (in.) =	2.036	2.051	2.046	2.049
Average Length (in.) =	12.20	12.13	12.18	12.05
Average Failing Load (lb) =	3691			

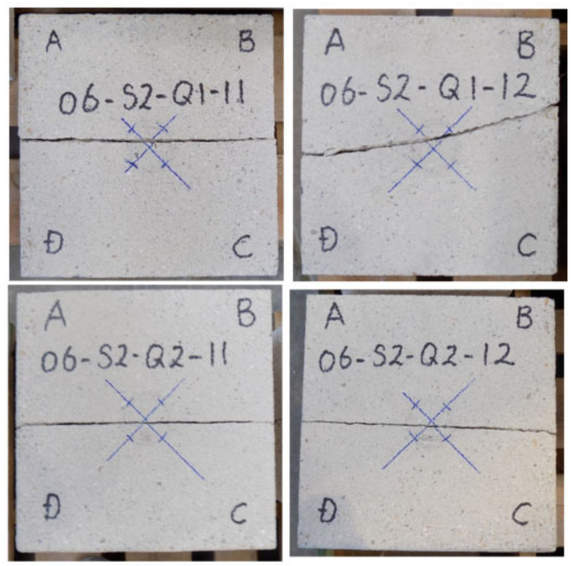


Appendix C.6: Set 6 – Q-Slabs (Quartered) 50 mm Hydraulically-Pressed Flexure Results

	06-S1-Q1-1	06-S1-Q1-2	06-S1-Q2-1	06-S1-Q2-2
Width 1 (in.) =	11.96	11.90	11.87	11.94
Width 2 (in.) =	11.95	11.89	11.86	11.96
Height 1 (in.) =	1.998	1.949	2.007	1.999
Height 2 (in.) =	1.986	1.963	2.006	1.999
Length 1 (in.) =	11.94	11.89	11.87	12.00
Length 2 (in.) =	11.95	11.91	11.90	12.00
Reduced Slab Weight (lb) =	25.10	24.29	24.74	24.74
Failing Load (lb) =	4392	3798	3907	3946
Failure Mechanism =	AD-BC-CD	AB-CD-AD	AD-BC	AB-CD
Failure Mode =	NA	NA	NA	NA
Average Width (in.) =	11.96	11.90	11.87	11.95
Average Height (in.) =	1.992	1.956	2.007	1.999
Average Length (in.) =	11.95	11.90	11.89	12.00
Average Failing Load (lb) =	4011			

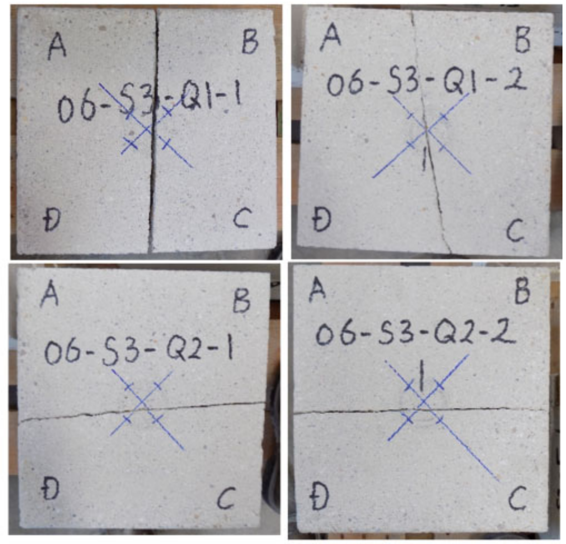


	06-S2-Q1-11	06-S2-Q1-12	06-S2-Q2-11	06-S2-Q2-12
Width 1 (in.) =	11.94	11.91	11.87	11.90
Width 2 (in.) =	11.96	11.93	11.89	11.91
Height 1 (in.) =	2.015	1.972	2.037	2.002
Height 2 (in.) =	2.006	1.966	2.039	2.000
Length 1 (in.) =	11.80	12.05	11.88	11.98
Length 2 (in.) =	11.79	12.07	11.87	11.98
Reduced Slab Weight (lb) =	24.82	24.78	25.00	24.73
Failing Load (lb) =	4129	4091	4109	3900
Failure Mechanism =	AD-BC	AD-BC	AD-BC	AD-BC
Failure Mode =	NA	NA	NA	NA
Average Width (in.) =	11.95	11.92	11.88	11.91
Average Height (in.) =	2.011	1.969	2.038	2.001
Average Length (in.) =	11.80	12.06	11.88	11.98
Average Failing Load (lb) =	4057			

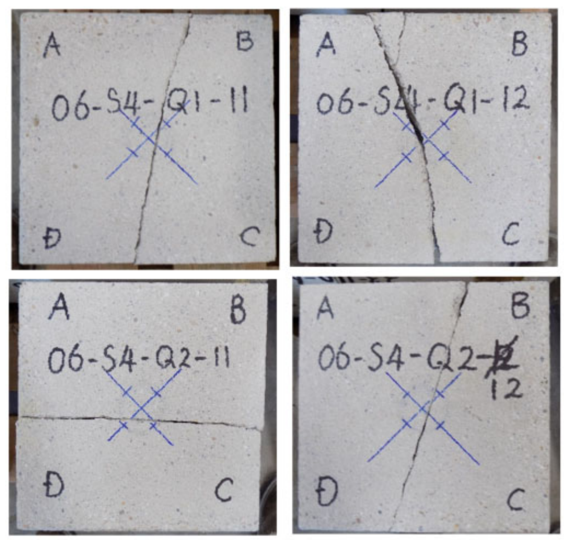


SI Conversions:
1 in. = 25.4 mm
1 lb = 0.454 kg
1 lbf = 4.44 N

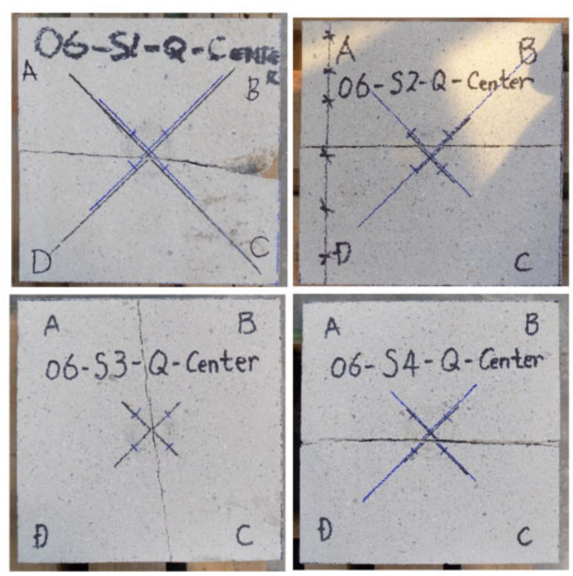
	06-S3-Q1-1	06-S3-Q1-2	06-S3-Q2-1	06-S3-Q2-2
Width 1 (in.) =	11.42	11.56	12.43	12.28
Width 2 (in.) =	11.40	11.55	12.46	12.29
Height 1 (in.) =	1.968	1.981	2.009	2.011
Height 2 (in.) =	1.980	1.980	2.006	2.019
Length 1 (in.) =	11.94	11.89	11.98	11.86
Length 2 (in.) =	11.96	11.86	11.95	11.89
Reduced Slab Weight (lb) =	23.37	23.74	26.09	25.75
Failing Load (lb) =	3787	3869	3990	4124
Failure Mechanism =	AB-CD	AB-CD	AD-BC	AD-BC
Failure Mode =	NA	NA	NA	NA
Average Width (in.) =	11.41	11.56	12.45	12.29
Average Height (in.) =	1.974	1.981	2.008	2.015
Average Length (in.) =	11.95	11.88	11.97	11.88
Average Failing Load (lb) =	3943			



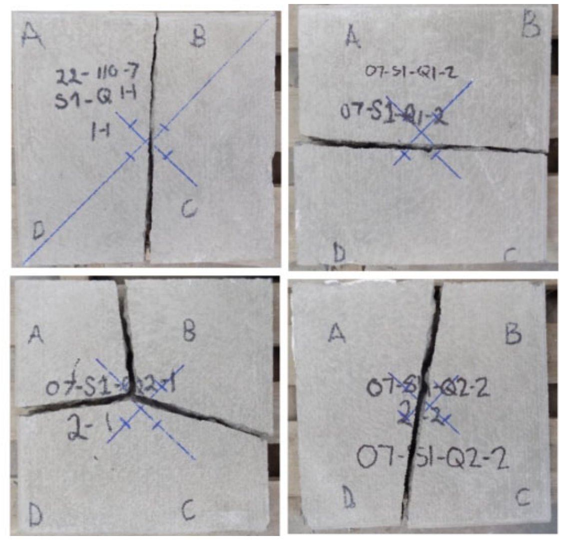
	06-S4-Q1-11	06-S4-Q1-12	06-S4-Q2-11	06-S4-Q2-12
Width 1 (in.) =	11.97	11.95	11.93	11.90
Width 2 (in.) =	11.95	11.96	11.97	11.90
Height 1 (in.) =	1.974	1.990	2.024	2.010
Height 2 (in.) =	1.928	1.950	2.028	1.989
Length 1 (in.) =	11.97	11.79	11.95	11.89
Length 2 (in.) =	11.99	11.81	11.96	11.91
Reduced Slab Weight (lb) =	24.49	24.49	25.18	24.92
Failing Load (lb) =	3894	4024	4078	3877
Failure Mechanism =	AB-CD	AB-CD	AD-BC	AB-CD
Failure Mode =	NA	NA	NA	NA
Average Width (in.) =	11.96	11.96	11.95	11.90
Average Height (in.) =	1.951	1.970	2.026	2.000
Average Length (in.) =	11.98	11.80	11.96	11.90
Average Failing Load (lb) =	3968			



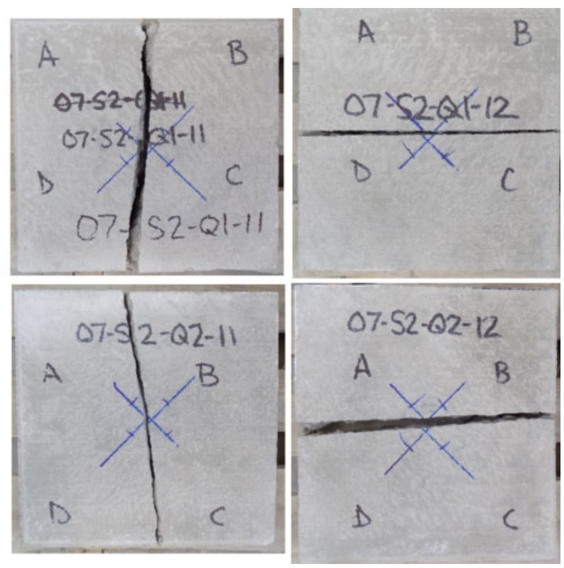
	06-S1-Q-Center	06-S2-Q-Center	06-S3-Q-Center	06-S4-Q-Center
Width 1 (in.) =	12.02	12.01	12.02	12.03
Width 2 (in.) =	12.01	12.01	12.05	12.05
Height 1 (in.) =	1.966	1.971	1.982	1.975
Height 2 (in.) =	1.965	1.972	1.996	1.982
Length 1 (in.) =	12.01	12.01	12.03	12.01
Length 2 (in.) =	12.01	12.01	12.03	12.02
Reduced Slab Weight (lb) =	25.31	25.03	25.25	25.09
Failing Load (lb) =	3755	3788	3987	3963
Failure Mechanism =	AD-BC	AD-BC	AB-CD	AD-BC
Failure Mode =	NA	NA	NA	NA
Average Width (in.) =	12.02	12.01	12.04	12.04
Average Height (in.) =	1.966	1.972	1.989	1.979
Average Length (in.) =	12.01	12.01	12.03	12.02
Average Failing Load (lb) =	3873			



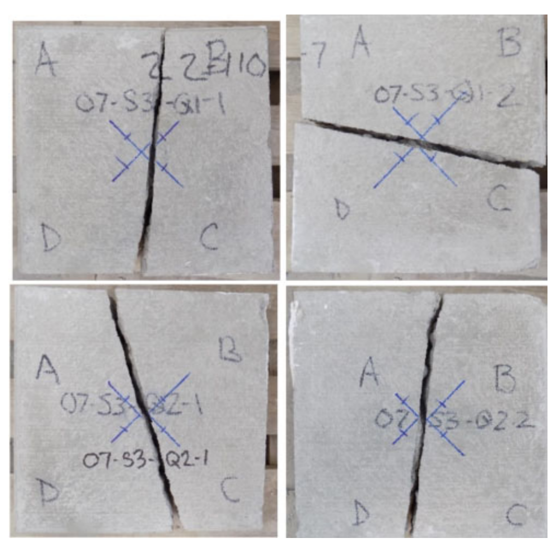
	07-S1-Q1-1	07-S1-Q1-2	07-S1-Q2-1	07-S1-Q2-2
Width 1 (in.) =	11.94	11.83	11.86	11.95
Width 2 (in.) =	11.95	11.84	11.85	12.00
Height 1 (in.) =	1.927	1.924	1.670	1.647
Height 2 (in.) =	1.663	1.645	1.911	1.901
Length 1 (in.) =	12.10	11.80	11.93	11.87
Length 2 (in.) =	12.10	11.82	11.98	11.88
Reduced Slab Weight (lb) =	21.82	20.92	21.54	21.38
Failing Load (lb) =	2143	2034	2128	2201
Failure Mechanism =	AB-CD	AD-BC	AD-BC-AB	AB-CD
Failure Mode =	NA	NA	NA	NA
Average Width (in.) =	11.95	11.84	11.86	11.98
Average Height (in.) =	1.795	1.785	1.791	1.774
Average Length (in.) =	12.10	11.81	11.96	11.88
Average Failing Load (lb) =	2127			



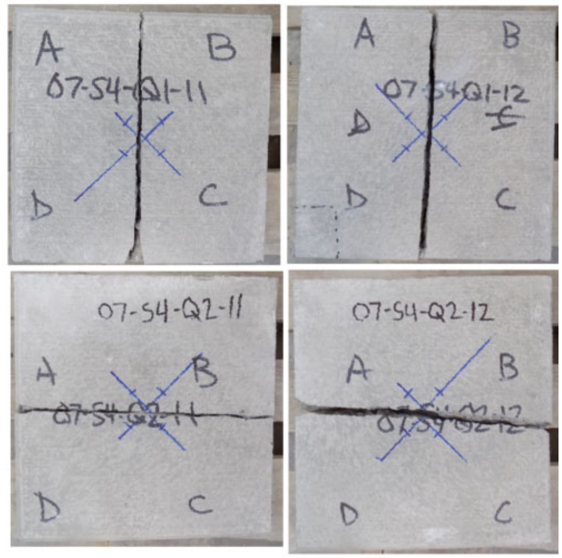
	07-S2-Q1-11	07-S2-Q1-12	07-S2-Q2-11	07-S2-Q2-12
Width 1 (in.) =	11.92	11.90	11.93	11.96
Width 2 (in.) =	11.93	11.90	11.97	11.98
Height 1 (in.) =	1.918	1.909	1.705	1.705
Height 2 (in.) =	1.703	1.703	1.948	1.927
Length 1 (in.) =	11.94	11.88	11.93	11.83
Length 2 (in.) =	11.95	11.90	11.95	11.85
Reduced Slab Weight (lb) =	21.46	21.52	21.68	21.66
Failing Load (lb) =	2151	2296	2292	2245
Failure Mechanism =	AB-CD	AD-BC	AB-CD	AD-BC
Failure Mode =	NA	NA	NA	NA
Average Width (in.) =	11.93	11.90	11.95	11.97
Average Height (in.) =	1.811	1.806	1.827	1.816
Average Length (in.) =	11.95	11.89	11.94	11.84
Average Failing Load (lb) =	2246			



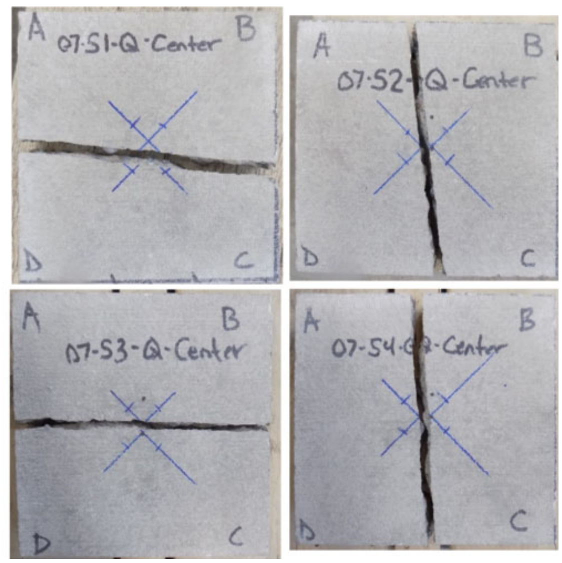
	07-S3-Q1-1	07-S3-Q1-2	07-S3-Q2-1	07-S3-Q2-2
Width 1 (in.) =	11.98	11.80	11.90	11.82
Width 2 (in.) =	11.98	12.08	11.90	11.80
Height 1 (in.) =	1.920	1.936	1.712	1.694
Height 2 (in.) =	1.704	1.705	1.915	1.901
Length 1 (in.) =	12.00	11.80	12.03	11.78
Length 2 (in.) =	12.02	12.08	12.03	11.80
Reduced Slab Weight (lb) =	22.08	21.74	21.78	21.04
Failing Load (lb) =	1916	2409	2307	2381
Failure Mechanism =	AB-CD	AD-BC	AB-CD	AB-CD
Failure Mode =	NA	NA	NA	NA
Average Width (in.) =	11.98	11.94	11.90	11.81
Average Height (in.) =	1.812	1.821	1.814	1.798
Average Length (in.) =	12.01	11.94	12.03	11.79
Average Failing Load (lb) =	2253			



	07-S4-Q1-11	07-S4-Q1-12	07-S4-Q2-11	07-S4-Q2-12
Width 1 (in.) =	11.88	11.88	12.00	11.98
Width 2 (in.) =	11.90	11.90	12.00	12.00
Height 1 (in.) =	1.889	1.887	1.694	1.682
Height 2 (in.) =	1.676	1.681	1.918	1.947
Length 1 (in.) =	11.90	11.90	12.00	11.80
Length 2 (in.) =	11.90	11.95	12.03	11.82
Reduced Slab Weight (lb) =	21.24	21.34	21.90	21.54
Failing Load (lb) =	2246	2253	2072	1931
Failure Mechanism =	AB-CD	AB-CD	AD-BC	AD-BC
Failure Mode =	NA	NA	NA	NA
Average Width (in.) =	11.89	11.89	12.00	11.99
Average Height (in.) =	1.783	1.784	1.806	1.815
Average Length (in.) =	11.90	11.93	12.02	11.81
Average Failing Load (lb) =	2126			



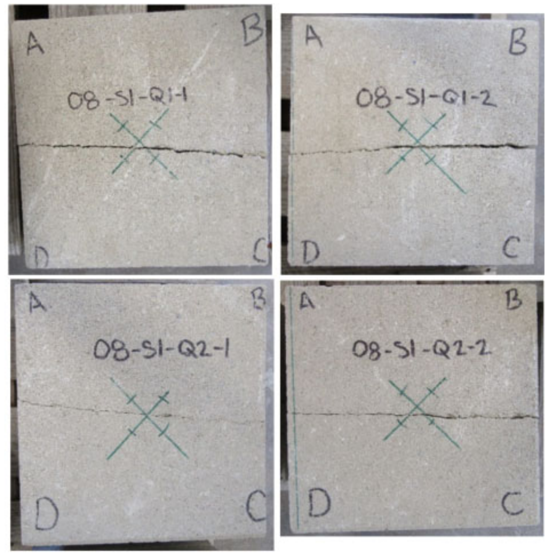
	07-S1-Q-Center	07-S2-Q-Center	07-S3-Q-Center	07-S4-Q-Center
Width 1 (in.) =	11.97	11.98	12.00	12.00
Width 2 (in.) =	12.00	12.00	12.00	12.00
Height 1 (in.) =	1.655	1.661	1.648	1.653
Height 2 (in.) =	1.653	1.670	1.660	1.669
Length 1 (in.) =	11.97	12.00	12.02	12.00
Length 2 (in.) =	12.00	12.00	12.03	12.00
Reduced Slab Weight (lb) =	21.02	21.02	20.80	20.88
Failing Load (lb) =	2521	2467	2398	2452
Failure Mechanism =	AD-BC	AB-CD	AD-BC	AB-CD
Failure Mode =	NA	NA	NA	NA
Average Width (in.) =	11.99	11.99	12.00	12.00
Average Height (in.) =	1.654	1.666	1.654	1.661
Average Length (in.) =	11.99	12.00	12.03	12.00
Average Failing Load (lb) =	2460			



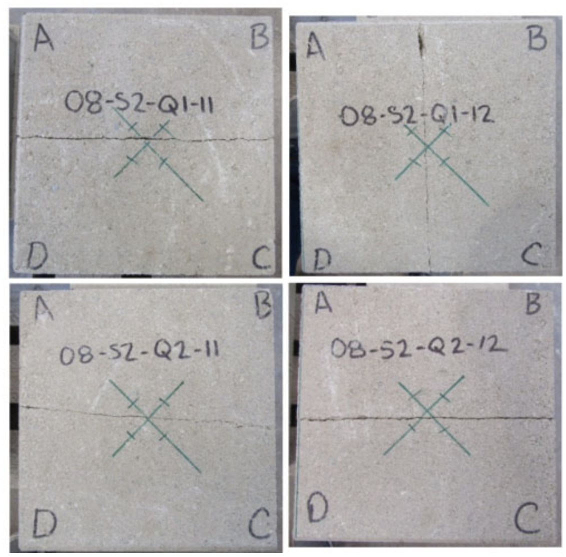
SI Conversions:
1 in. = 25.4 mm
1 lb = 0.454 kg
1 lbf = 4.44 N

Appendix C.8: Set 8 – Q-Slabs (Quartered) 55 mm Dry-Cast Through-Mix Flexure Results

	08-S1-Q1-1	08-S1-Q1-2	08-S1-Q2-1	08-S1-Q2-2
Width 1 (in.) =	11.85	11.84	11.87	11.86
Width 2 (in.) =	11.86	11.90	11.88	11.86
Height 1 (in.) =	2.245	2.218	2.265	2.279
Height 2 (in.) =	2.268	2.247	2.287	2.258
Length 1 (in.) =	11.66	12.06	11.44	12.25
Length 2 (in.) =	11.65	12.07	11.45	12.25
Reduced Slab Weight (lb) =	24.22	24.74	24.26	25.64
Failing Load (lb) =	2739	2696	2601	2700
Failure Mechanism =	AD-BC	AD-BC	AD-BC	AD-BC
Failure Mode =	Flexure 1	Flexure 1	Flexure 1	Flexure 1
Average Width (in.) =	11.85	11.87	11.88	11.86
Average Height (in.) =	2.257	2.233	2.276	2.269
Average Length (in.) =	11.65	12.06	11.44	12.25
Average Failing Load (lb) =	2684			



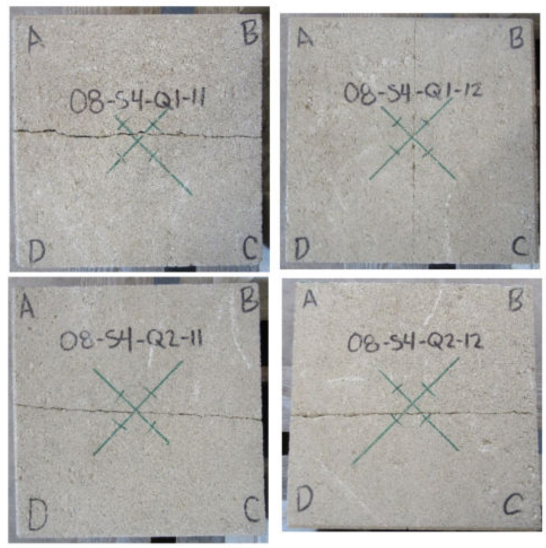
	08-S2-Q1-11	08-S2-Q1-12	08-S2-Q2-11	08-S2-Q2-12
Width 1 (in.) =	11.86	11.82	11.89	11.90
Width 2 (in.) =	11.87	11.83	11.88	11.93
Height 1 (in.) =	2.212	2.233	2.257	2.269
Height 2 (in.) =	2.243	2.247	2.259	2.274
Length 1 (in.) =	11.73	12.01	11.64	12.07
Length 2 (in.) =	11.73	12.04	11.65	12.07
Reduced Slab Weight (lb) =	24.30	25.04	24.28	25.48
Failing Load (lb) =	2904	3061	2363	2656
Failure Mechanism =	AD-BC	AB-CD	AD-BC	AD-BC
Failure Mode =	Flexure 1	Flexure 2	Flexure 1	Flexure 1
Average Width (in.) =	11.87	11.83	11.88	11.91
Average Height (in.) =	2.228	2.240	2.258	2.272
Average Length (in.) =	11.73	12.02	11.65	12.07
Average Failing Load (lb) =	2746			



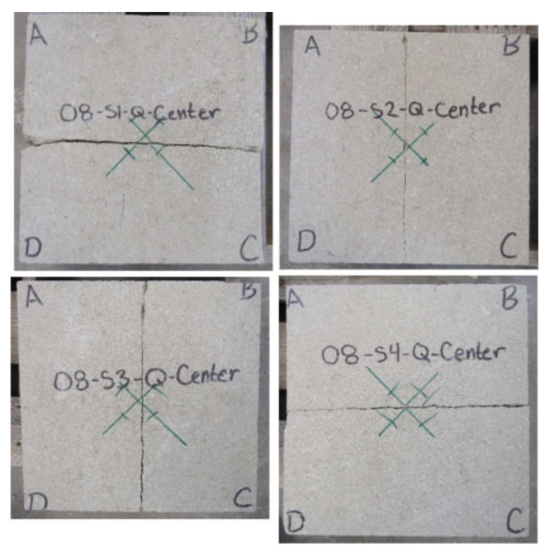
SI Conversions:
1 in. = 25.4 mm
1 lb = 0.454 kg
1 lbf = 4.44 N

	08-S3-Q1-1	08-S3-Q1-2	08-S3-Q2-1	08-S3-Q2-2
Width 1 (in.) =	11.87	12.00	11.85	11.71
Width 2 (in.) =	11.85	12.00	11.85	11.72
Height 1 (in.) =	2.260	2.273	2.299	2.278
Height 2 (in.) =	2.269	2.251	2.296	2.298
Length 1 (in.) =	11.87	11.86	11.76	11.97
Length 2 (in.) =	11.88	11.86	11.76	11.97
Reduced Slab Weight (lb) =	25.10	24.92	25.22	24.92
Failing Load (lb) =	2884	3040	2955	2711
Failure Mechanism =	AD-BC	AB-CD	AD-BC	AD-BC
Failure Mode =	Flexure 1	Flexure 2	Flexure 1	Flexure 1
Average Width (in.) =	11.86	12.00	11.85	11.72
Average Height (in.) =	2.265	2.262	2.298	2.288
Average Length (in.) =	11.88	11.86	11.76	11.97
Average Failing Load (lb) =	2898			

	08-S4-Q1-11	08-S4-Q1-12	08-S4-Q2-11	08-S4-Q2-12
Width 1 (in.) =	11.87	11.80	11.86	11.96
Width 2 (in.) =	11.88	11.80	11.87	11.98
Height 1 (in.) =	2.240	2.237	2.269	2.260
Height 2 (in.) =	2.251	2.250	2.273	2.266
Length 1 (in.) =	11.78	11.95	11.77	11.94
Length 2 (in.) =	11.79	11.97	11.78	11.98
Reduced Slab Weight (lb) =	24.46	24.78	24.66	25.22
Failing Load (lb) =	2868	2929	2482	2739
Failure Mechanism =	AD-BC	AB-CD	AD-BC	AD-BC
Failure Mode =	Flexure 1	Flexure 2	Flexure 1	Flexure 1
Average Width (in.) =	11.88	11.80	11.87	11.97
Average Height (in.) =	2.246	2.244	2.271	2.263
Average Length (in.) =	11.79	11.96	11.77	11.96
Average Failing Load (lb) =	2755			

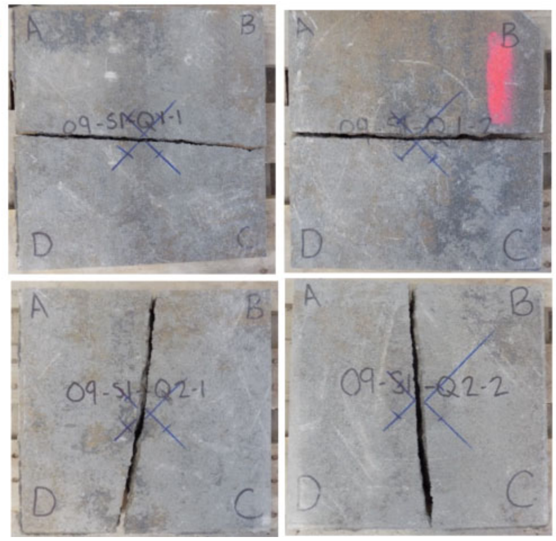


	08-S1-Q-Center	08-S2-Q-Center	08-S3-Q-Center	08-S4-Q-Center
Width 1 (in.) =	11.86	11.66	11.46	11.84
Width 2 (in.) =	11.91	11.72	11.47	11.84
Height 1 (in.) =	2.194	2.173	2.191	2.189
Height 2 (in.) =	2.200	2.169	2.211	2.208
Length 1 (in.) =	11.53	11.98	11.75	11.42
Length 2 (in.) =	11.60	11.96	11.76	11.57
Reduced Slab Weight (lb) =	23.96	23.92	23.38	23.74
Failing Load (lb) =	3123	2861	3028	3010
Failure Mechanism =	AD-BC	AB-CD	AB-CD	AD-BC
Failure Mode =	Flexure 1	Flexure 2	Flexure 2	Flexure 1
Average Width (in.) =	11.89	11.69	11.47	11.84
Average Height (in.) =	2.197	2.171	2.201	2.199
Average Length (in.) =	11.57	11.97	11.76	11.50
Average Failing Load (lb) =	3006			

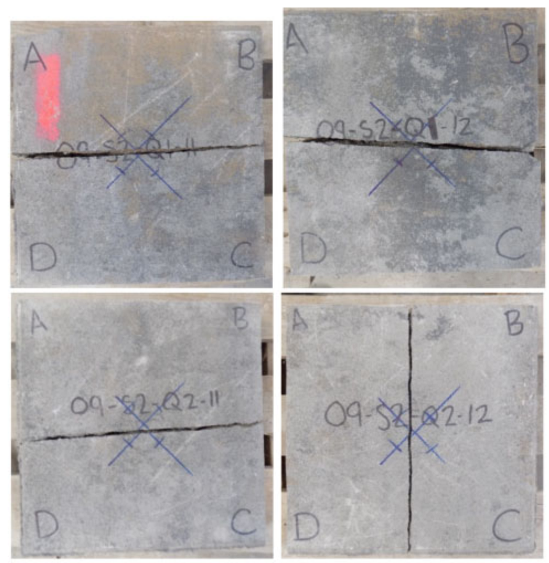


Appendix C.9: Set 9 – Q-Slabs (Quartered) 60 mm Dry-Cast Through-Mix Flexure Results

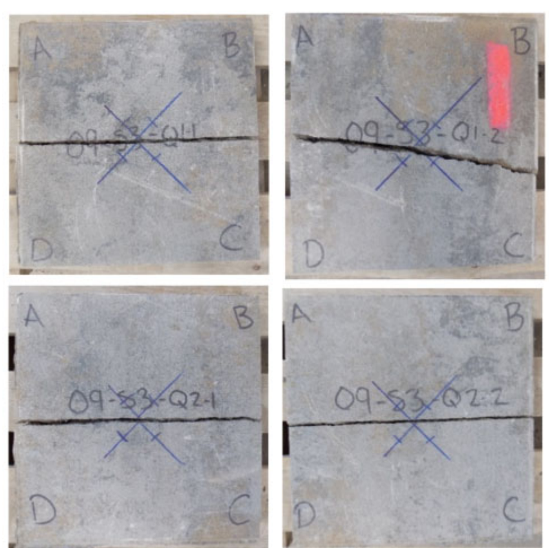
	09-S1-Q1-1	09-S1-Q1-2	09-S1-Q2-1	09-S1-Q2-2
Width 1 (in.) =	11.67	11.79	11.73	11.62
Width 2 (in.) =	11.68	11.81	11.77	11.63
Height 1 (in.) =	2.379	2.333	2.389	2.349
Height 2 (in.) =	2.381	2.350	2.392	2.345
Length 1 (in.) =	11.66	11.73	11.71	11.71
Length 2 (in.) =	11.69	11.75	11.75	11.71
Reduced Slab Weight (lb) =	26.64	26.70	27.38	26.80
Failing Load (lb) =	4535	4296	4986	4127
Failure Mechanism =	AD-BC	AD-BC	AB-CD	AB-CD
Failure Mode =	Flexure 1	Flexure 1	Flexure 2	Flexure 2
Average Width (in.) =	11.67	11.80	11.75	11.63
Average Height (in.) =	2.380	2.342	2.391	2.347
Average Length (in.) =	11.68	11.74	11.73	11.71
Average Failing Load (lb) =	4486			



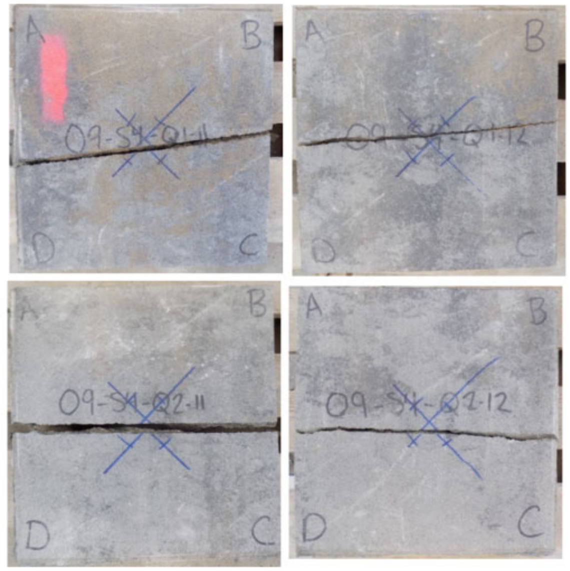
	09-S2-Q1-11	09-S2-Q1-12	09-S2-Q2-11	09-S2-Q2-12
Width 1 (in.) =	11.66	11.67	11.74	11.75
Width 2 (in.) =	11.68	11.66	11.74	11.75
Height 1 (in.) =	2.344	2.341	2.342	2.350
Height 2 (in.) =	2.345	2.348	2.355	2.366
Length 1 (in.) =	11.70	11.71	11.70	11.73
Length 2 (in.) =	11.69	11.73	11.71	11.73
Reduced Slab Weight (lb) =	26.40	26.50	27.06	27.16
Failing Load (lb) =	4336	4207	4705	4736
Failure Mechanism =	AD-BC	AD-BC	AD-BC	AB-CD
Failure Mode =	Flexure 1	Flexure 1	Flexure 1	Flexure 2
Average Width (in.) =	11.67	11.66	11.74	11.75
Average Height (in.) =	2.345	2.345	2.349	2.358
Average Length (in.) =	11.70	11.72	11.71	11.73
Average Failing Load (lb) =	4496			



	09-S3-Q1-1	09-S3-Q1-2	09-S3-Q2-1	09-S3-Q2-2
Width 1 (in.) =	11.65	11.64	11.74	11.76
Width 2 (in.) =	11.65	11.65	11.77	11.77
Height 1 (in.) =	2.344	2.306	2.350	2.311
Height 2 (in.) =	2.349	2.317	2.368	2.330
Length 1 (in.) =	11.70	11.70	11.68	11.74
Length 2 (in.) =	11.72	11.71	11.74	11.75
Reduced Slab Weight (lb) =	26.44	26.18	27.10	27.08
Failing Load (lb) =	4315	4074	4925	4503
Failure Mechanism =	AD-BC	AD-BC	AD-BC	AD-BC
Failure Mode =	Flexure 1	Flexure 1	Flexure 1	Flexure 1
Average Width (in.) =	11.65	11.64	11.76	11.76
Average Height (in.) =	2.347	2.312	2.359	2.321
Average Length (in.) =	11.71	11.70	11.71	11.74
Average Failing Load (lb) =	4454			



	09-S4-Q1-11	09-S4-Q1-12	09-S4-Q2-11	09-S4-Q2-12
Width 1 (in.) =	11.65	11.63	11.74	11.78
Width 2 (in.) =	11.66	11.64	11.75	11.78
Height 1 (in.) =	2.302	2.300	2.311	2.310
Height 2 (in.) =	2.310	2.307	2.342	2.337
Length 1 (in.) =	11.69	11.69	11.74	11.70
Length 2 (in.) =	11.70	11.73	11.75	11.70
Reduced Slab Weight (lb) =	26.08	26.06	26.84	26.88
Failing Load (lb) =	3929	4360	4578	4822
Failure Mechanism =	AD-BC	AD-BC	AD-BC	AD-BC
Failure Mode =	Flexure 1	Flexure 1	Flexure 1	Flexure 1
Average Width (in.) =	11.66	11.63	11.74	11.78
Average Height (in.) =	2.306	2.304	2.327	2.324
Average Length (in.) =	11.69	11.71	11.74	11.70
Average Failing Load (lb) =	4422			

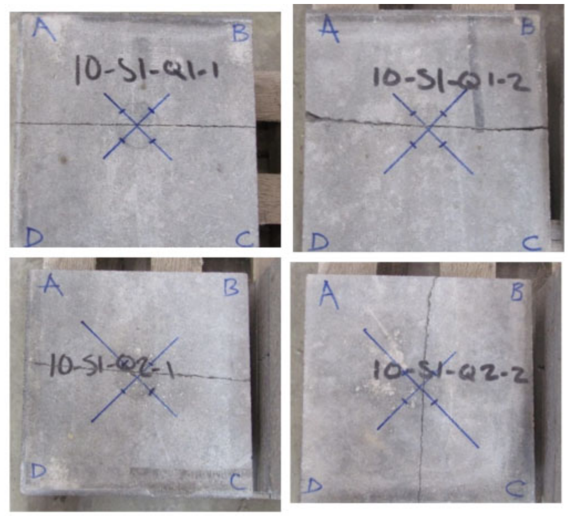


	09-S1-Q-Center	09-S2-Q-Center	09-S3-Q-Center	09-S4-Q-Center
Width 1 (in.) =	12.01	12.03	12.06	12.07
Width 2 (in.) =	12.02	12.03	12.07	12.06
Height 1 (in.) =	2.380	2.338	2.382	2.339
Height 2 (in.) =	2.386	2.333	2.384	2.337
Length 1 (in.) =	12.05	12.05	12.05	12.06
Length 2 (in.) =	12.04	12.05	12.06	12.05
Reduced Slab Weight (lb) =	28.32	27.94	28.26	27.64
Failing Load (lb) =	3951	4496	3724	4431
Failure Mechanism =	AB-CD	AB-CD	AB-CD	AB-CD
Failure Mode =	Flexure 2	Flexure 2	Flexure 2	Flexure 2
Average Width (in.) =	12.01	12.03	12.06	12.07
Average Height (in.) =	2.383	2.336	2.383	2.338
Average Length (in.) =	12.05	12.05	12.05	12.05
Average Failing Load (lb) =	4151			

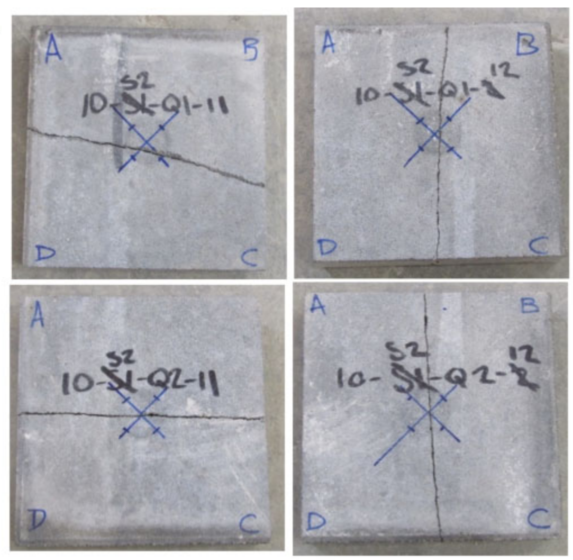
SI Conversions:
1 in. = 25.4 mm
1 lb = 0.454 kg
1 lbf = 4.44 N

Appendix C.10: Set 10 – Q-Slabs (Quartered) 60 mm Dry-Cast Face-Mix Flexure Results

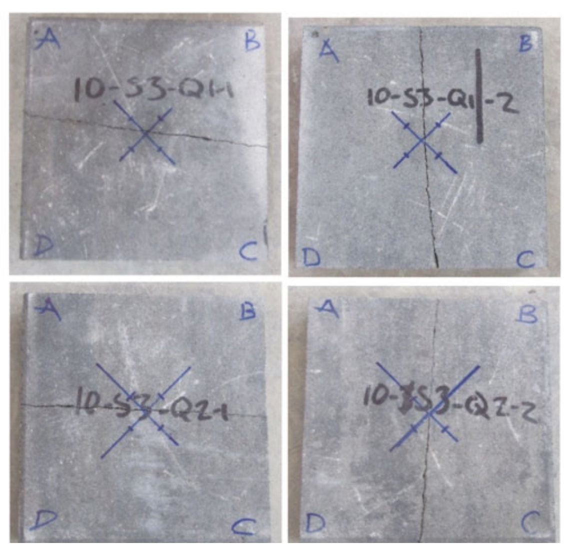
	10-S1-Q1-1	10-S1-Q1-2	10-S1-Q2-1	10-S1-Q2-2
Width 1 (in.) =	11.61	11.63	11.78	11.57
Width 2 (in.) =	11.60	11.60	11.79	11.56
Height 1 (in.) =	2.510	2.370	2.540	2.490
Height 2 (in.) =	2.540	2.460	2.560	2.490
Length 1 (in.) =	11.78	11.56	11.76	11.77
Length 2 (in.) =	11.78	11.54	11.77	11.76
Reduced Slab Weight (lb) =	27.35	26.58	28.30	26.98
Failing Load (lb) =	4143	3791	4264	3763
Failure Mechanism =	AD-BC	AD-BC	AD-BC	AB-CD
Failure Mode =	Flexure 1	Flexure 1	Flexure 1	Flexure 2
Average Width (in.) =	11.61	11.62	11.79	11.57
Average Height (in.) =	2.525	2.415	2.550	2.490
Average Length (in.) =	11.78	11.55	11.77	11.77
Average Failing Load (lb) =	3990			



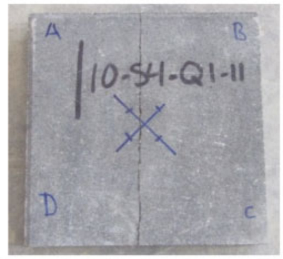
	10-S2-Q1-11	10-S2-Q1-12	10-S2-Q2-11	10-S2-Q2-12
Width 1 (in.) =	11.74	11.73	11.56	11.74
Width 2 (in.) =	11.75	11.77	11.55	11.84
Height 1 (in.) =	2.470	2.460	2.450	2.460
Height 2 (in.) =	2.460	2.470	2.500	2.500
Length 1 (in.) =	11.60	11.75	11.63	11.62
Length 2 (in.) =	11.55	11.80	11.62	11.67
Reduced Slab Weight (lb) =	27.33	28.14	27.01	28.02
Failing Load (lb) =	4338	4661	4345	4329
Failure Mechanism =	AD-BC	AB-CD	AD-BC	AB-CD
Failure Mode =	Flexure 1	Flexure 2	Flexure 1	Flexure 2
Average Width (in.) =	11.75	11.75	11.56	11.79
Average Height (in.) =	2.465	2.465	2.475	2.480
Average Length (in.) =	11.58	11.78	11.63	11.65
Average Failing Load (lb) =	4418			

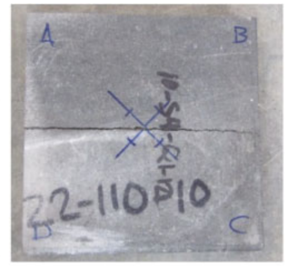


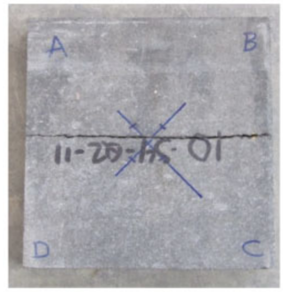
	10-S3-Q1-1	10-S3-Q1-2	10-S3-Q2-1	10-S3-Q2-2
Width 1 (in.) =	11.63	11.65	11.59	11.71
Width 2 (in.) =	11.63	11.65	11.65	11.72
Height 1 (in.) =	2.480	2.470	2.500	2.490
Height 2 (in.) =	2.500	2.450	2.570	2.450
Length 1 (in.) =	11.65	11.69	11.74	11.73
Length 2 (in.) =	11.64	11.71	11.77	11.75
Reduced Slab Weight (lb) =	26.80	26.53	27.60	26.89
Failing Load (lb) =	4716	4259	4326	4313
Failure Mechanism =	AD-BC	AB-CD	AD-BC	AB-CD
Failure Mode =	Flexure 1	Flexure 2	Flexure 1	Flexure 2
Average Width (in.) =	11.63	11.65	11.62	11.72
Average Height (in.) =	2.490	2.460	2.535	2.470
Average Length (in.) =	11.65	11.70	11.76	11.74
Average Failing Load (lb) =	4404			

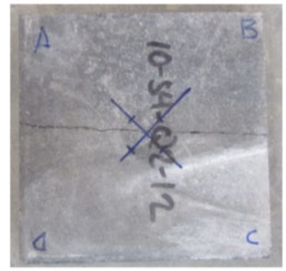


	10-S4-Q1-11	10-S4-Q1-12	10-S4-Q2-11	10-S4-Q2-12
Width 1 (in.) =	11.56	11.66	11.78	11.68
Width 2 (in.) =	11.57	11.69	11.79	11.75
Height 1 (in.) =	2.460	2.490	2.440	2.430
Height 2 (in.) =	2.470	2.460	2.450	2.450
Length 1 (in.) =	11.60	11.75	11.65	11.65
Length 2 (in.) =	11.52	11.74	11.65	11.70
Reduced Slab Weight (lb) =	26.69	27.77	27.15	27.82
Failing Load (lb) =	5010	4858	4508	4803
Failure Mechanism =	AB-CD	AD-BC	AD-BC	AD-BC
Failure Mode =	Flexure 2	Flexure 1	Flexure 1	Flexure 1
Average Width (in.) =	11.57	11.68	11.79	11.72
Average Height (in.) =	2.465	2.475	2.445	2.440
Average Length (in.) =	11.56	11.75	11.65	11.68
Average Failing Load (lb) =	4795			

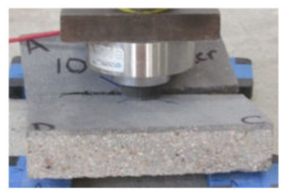


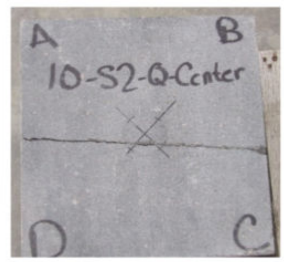


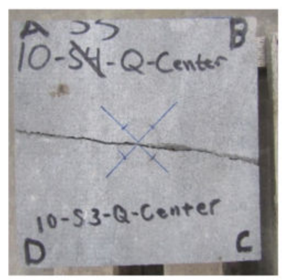


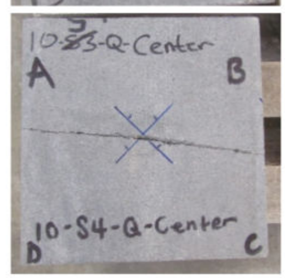


	10-S1-Q-Center	10-S2-Q-Center	10-S3-Q-Center	10-S4-Q-Center
Width 1 (in.) =	11.97	11.99	12.01	12.08
Width 2 (in.) =	11.98	11.96	12.00	12.03
Height 1 (in.) =	2.490	2.515	2.480	2.380
Height 2 (in.) =	2.500	2.520	2.460	2.370
Length 1 (in.) =	11.96	11.96	12.06	12.05
Length 2 (in.) =	11.97	11.92	12.02	12.05
Reduced Slab Weight (lb) =	28.74	28.07	28.24	28.80
Failing Load (lb) =	3729	3133	3415	3432
Failure Mechanism =	AD-BC	AD-BC	AD-BC	AD-BC
Failure Mode =	Flexure 1	Flexure 1	Flexure 1	Flexure 1
Average Width (in.) =	11.98	11.98	12.01	12.06
Average Height (in.) =	2.495	2.518	2.470	2.375
Average Length (in.) =	11.97	11.94	12.04	12.05
Average Failing Load (lb) =	3427			





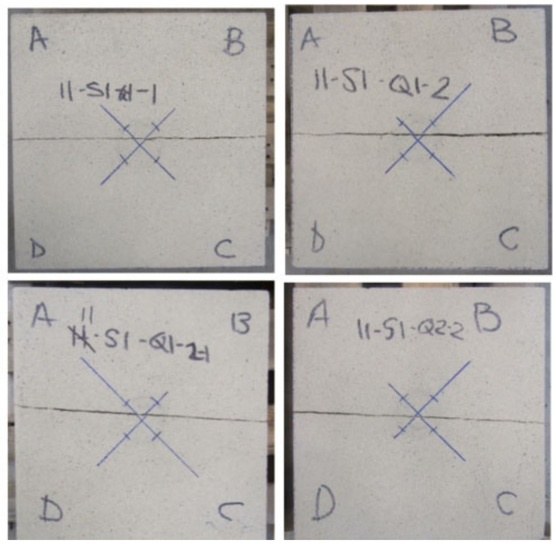




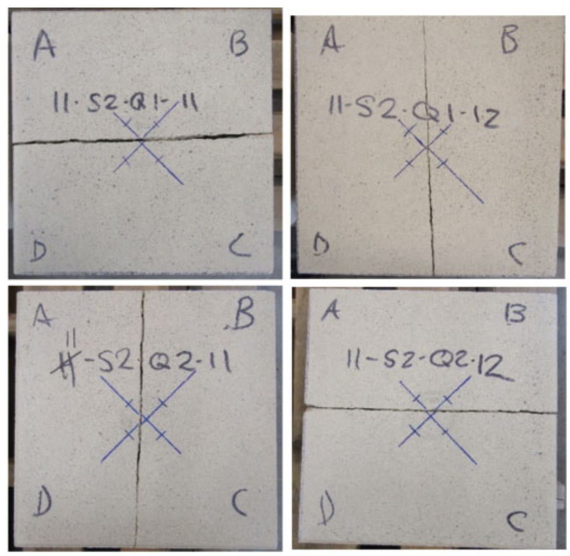
SI Conversions:
1 in. = 25.4 mm
1 lb = 0.454 kg
1 lbf = 4.44 N

Appendix C.11: Set 11 – Q-Slabs (Quartered) 50 mm Hermetically-Pressed Flexure Results

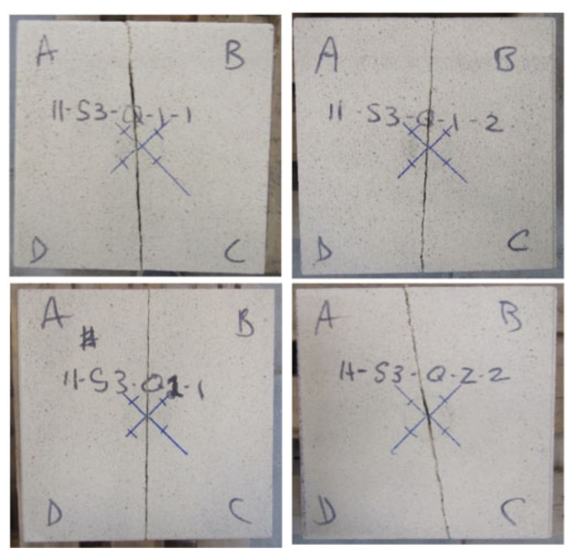
	11-S1-Q1-1	11-S1-Q1-2	11-S1-Q2-1	11-S1-Q2-2
Width 1 (in.) =	11.85	11.87	11.90	11.88
Width 2 (in.) =	11.83	11.86	11.91	11.88
Height 1 (in.) =	2.033	2.035	2.012	2.025
Height 2 (in.) =	2.038	2.037	2.032	2.038
Length 1 (in.) =	11.85	11.85	11.83	11.85
Length 2 (in.) =	11.84	11.85	11.83	11.84
Reduced Slab Weight (lb) =	24.60	24.78	24.40	24.52
Failing Load (lb) =	3696	3495	3388	3329
Failure Mechanism =	AD-BC	AD-BC	AD-BC	AD-BC
Failure Mode =	NA	NA	NA	NA
Average Width (in.) =	11.84	11.87	11.91	11.88
Average Height (in.) =	2.036	2.036	2.022	2.032
Average Length (in.) =	11.85	11.85	11.83	11.85
Average Failing Load (lb) =	3477			



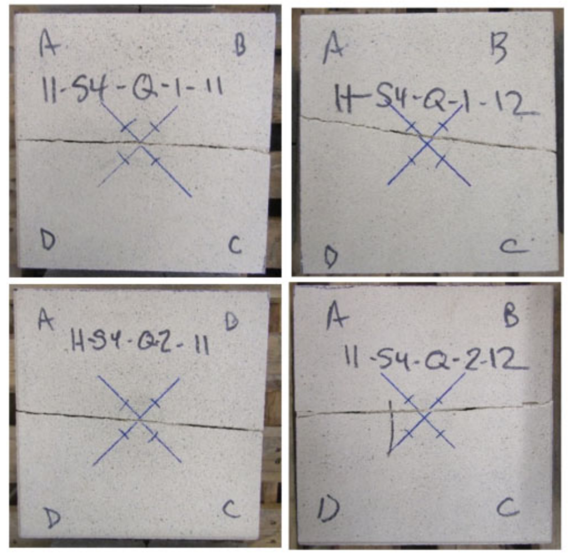
	11-S2-Q1-11	11-S2-Q1-12	11-S2-Q2-11	11-S2-Q2-12
Width 1 (in.) =	11.87	11.84	11.83	11.85
Width 2 (in.) =	11.88	11.84	11.82	11.88
Height 1 (in.) =	1.982	2.024	2.022	2.049
Height 2 (in.) =	1.991	2.022	1.983	2.022
Length 1 (in.) =	11.88	11.83	11.85	11.87
Length 2 (in.) =	11.88	11.83	11.86	11.84
Reduced Slab Weight (lb) =	24.16	24.26	24.16	24.56
Failing Load (lb) =	3206	3323	3422	3876
Failure Mechanism =	AD-BC	AB-CD	AB-CD	AD-BC
Failure Mode =	NA	NA	NA	NA
Average Width (in.) =	11.88	11.84	11.83	11.87
Average Height (in.) =	1.987	2.023	2.003	2.036
Average Length (in.) =	11.88	11.83	11.86	11.86
Average Failing Load (lb) =	3457			



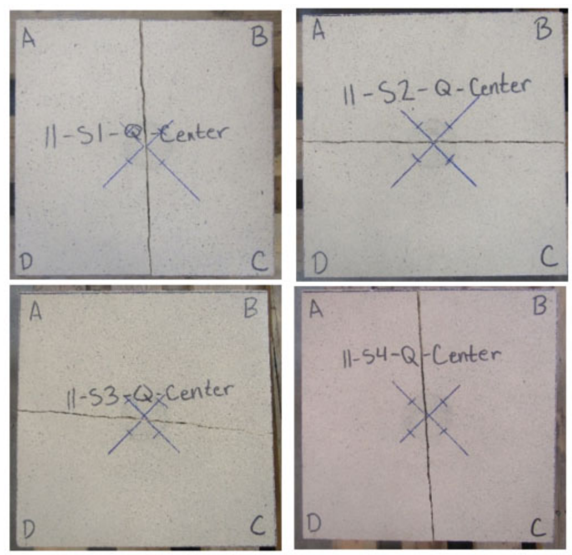
	11-S3-Q1-1	11-S3-Q1-2	11-S3-Q2-1	11-S3-Q2-2
Width 1 (in.) =	11.82	11.81	11.86	11.90
Width 2 (in.) =	11.83	11.82	11.89	11.91
Height 1 (in.) =	2.005	2.056	2.026	2.064
Height 2 (in.) =	2.009	2.060	2.000	2.064
Length 1 (in.) =	11.84	11.89	11.83	11.90
Length 2 (in.) =	11.84	11.89	11.84	11.89
Reduced Slab Weight (lb) =	24.10	24.92	24.16	25.16
Failing Load (lb) =	3108	3552	3597	3767
Failure Mechanism =	AB-CD	AB-CD	AB-CD	AB-CD
Failure Mode =	NA	NA	NA	NA
Average Width (in.) =	11.83	11.82	11.88	11.91
Average Height (in.) =	2.007	2.058	2.013	2.064
Average Length (in.) =	11.84	11.89	11.84	11.90
Average Failing Load (lb) =	3506			



	11-S4-Q1-11	11-S4-Q1-12	11-S4-Q2-11	11-S4-Q2-12
Width 1 (in.) =	11.91	11.92	11.84	11.84
Width 2 (in.) =	11.90	11.90	11.83	11.84
Height 1 (in.) =	2.031	2.032	1.998	2.009
Height 2 (in.) =	2.052	2.065	2.030	2.033
Length 1 (in.) =	11.85	11.83	11.84	11.87
Length 2 (in.) =	11.85	11.87	11.85	11.84
Reduced Slab Weight (lb) =	24.66	24.86	24.16	24.24
Failing Load (lb) =	3682	3715	3348	3608
Failure Mechanism =	AD-BC	AD-BC	AD-BC	AD-BC
Failure Mode =	NA	NA	NA	NA
Average Width (in.) =	11.91	11.91	11.84	11.84
Average Height (in.) =	2.042	2.049	2.014	2.021
Average Length (in.) =	11.85	11.85	11.85	11.86
Average Failing Load (lb) =	3588			

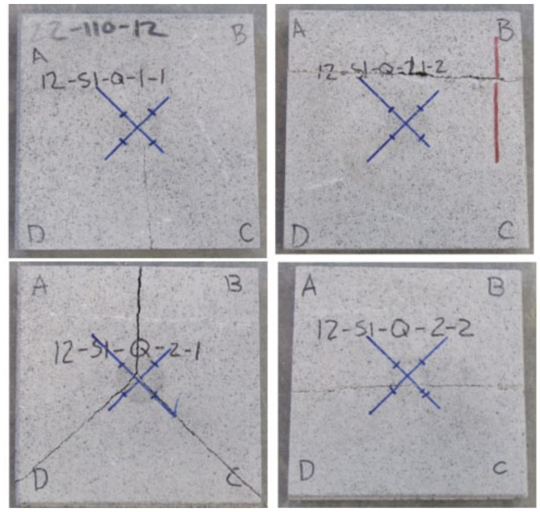


	11-S1-Q-Center	11-S2-Q-Center	11-S3-Q-Center	11-S4-Q-Center
Width 1 (in.) =	12.02	12.00	12.03	12.00
Width 2 (in.) =	12.02	12.00	12.03	12.02
Height 1 (in.) =	2.026	1.953	1.963	2.007
Height 2 (in.) =	2.018	1.999	2.007	2.009
Length 1 (in.) =	12.00	12.03	12.02	12.00
Length 2 (in.) =	12.00	12.02	12.04	12.00
Reduced Slab Weight (lb) =	24.92	24.60	24.92	24.86
Failing Load (lb) =	3408	3284	3494	3539
Failure Mechanism =	AB-CD	AD-BC	AD-BC	AB-CD
Failure Mode =	NA	NA	NA	NA
Average Width (in.) =	12.02	12.00	12.03	12.01
Average Height (in.) =	2.022	1.976	1.985	2.008
Average Length (in.) =	12.00	12.03	12.03	12.00
Average Failing Load (lb) =	3431			

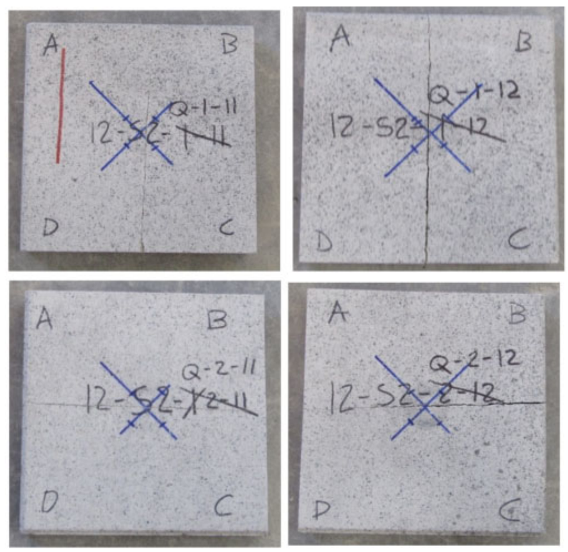


SI Conversions:
1 in. = 25.4 mm
1 lb = 0.454 kg
1 lbf = 4.44 N

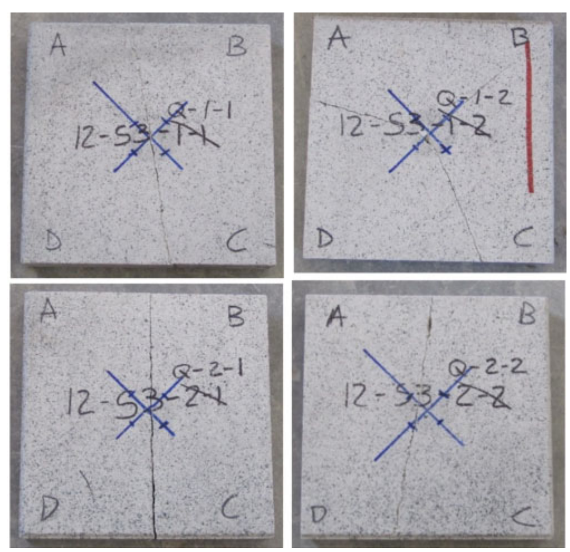
	12-S1-Q1-1	12-S1-Q1-2	12-S1-Q2-1	12-S1-Q2-2
Width 1 (in.) =	11.63	11.68	11.67	11.69
Width 2 (in.) =	11.62	11.65	11.68	11.65
Height 1 (in.) =	2.010	1.980	2.000	2.000
Height 2 (in.) =	2.030	1.970	2.010	1.980
Length 1 (in.) =	11.74	11.64	11.72	11.64
Length 2 (in.) =	11.73	11.60	11.71	11.68
Reduced Slab Weight (lb) =	22.70	21.65	23.49	22.68
Failing Load (lb) =	4421	3151	4354	3613
Failure Mechanism =	AB-CD	AD-BC	AB-D-C	AD-BC
Failure Mode =	Flexure 2	Flexure 1	Compound	Flexure 1
Average Width (in.) =	11.63	11.67	11.68	11.67
Average Height (in.) =	2.020	1.975	2.005	1.990
Average Length (in.) =	11.74	11.62	11.72	11.66
Average Failing Load (lb) =	3885			



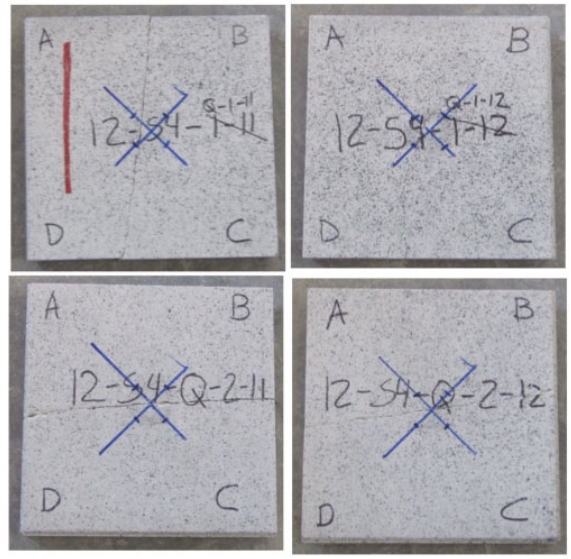
	12-S2-Q1-11	12-S2-Q1-12	12-S2-Q2-11	12-S2-Q2-12
Width 1 (in.) =	11.65	11.63	11.68	11.70
Width 2 (in.) =	11.66	11.65	11.67	11.69
Height 1 (in.) =	1.980	1.980	2.020	2.010
Height 2 (in.) =	2.010	2.020	2.030	2.030
Length 1 (in.) =	11.68	11.68	11.66	11.71
Length 2 (in.) =	11.66	11.70	11.68	11.72
Reduced Slab Weight (lb) =	22.59	22.85	23.18	23.52
Failing Load (lb) =	4140	3771	3787	3863
Failure Mechanism =	AB-CD	AB-CD	AD-BC	AD-BC
Failure Mode =	Flexure 2	Flexure 2	Flexure 1	Flexure 1
Average Width (in.) =	11.66	11.64	11.68	11.70
Average Height (in.) =	1.995	2.000	2.025	2.020
Average Length (in.) =	11.67	11.69	11.67	11.72
Average Failing Load (lb) =	3890			



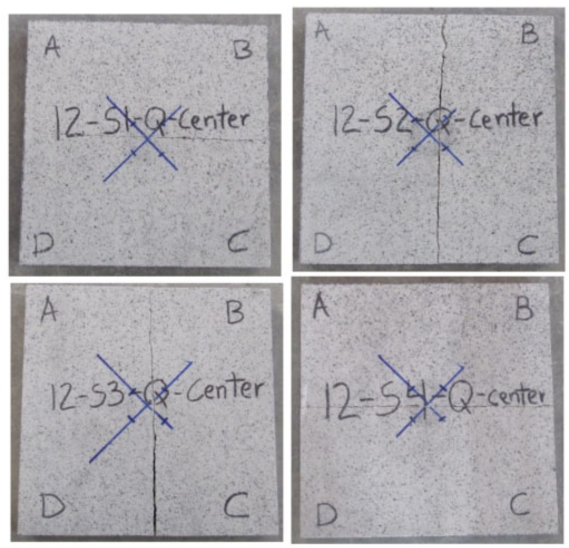
	12-S3-Q1-1	12-S3-Q1-2	12-S3-Q2-1	12-S3-Q2-2
Width 1 (in.) =	11.67	11.65	11.74	11.68
Width 2 (in.) =	11.65	11.65	11.72	11.68
Height 1 (in.) =	2.020	1.980	2.010	1.990
Height 2 (in.) =	2.020	1.990	2.000	2.000
Length 1 (in.) =	11.63	11.68	11.64	11.71
Length 2 (in.) =	11.64	11.70	11.66	11.73
Reduced Slab Weight (lb) =	22.72	22.33	23.07	22.64
Failing Load (lb) =	4279	3964	4227	3836
Failure Mechanism =	AB-CD	AD-B-CD	AB-CD	AB-CD
Failure Mode =	Flexure 2	Compound	Flexure 2	Flexure 2
Average Width (in.) =	11.66	11.65	11.73	11.68
Average Height (in.) =	2.020	1.985	2.005	1.995
Average Length (in.) =	11.64	11.69	11.65	11.72
Average Failing Load (lb) =	4077			



	12-S4-Q1-11	12-S4-Q1-12	12-S4-Q2-11	12-S4-Q2-12
Width 1 (in.) =	11.64	11.64	11.73	11.71
Width 2 (in.) =	11.65	11.63	11.70	11.73
Height 1 (in.) =	2.000	1.980	2.030	2.030
Height 2 (in.) =	2.020	2.010	2.010	2.000
Length 1 (in.) =	11.67	11.64	11.69	11.66
Length 2 (in.) =	11.70	11.65	11.68	11.70
Reduced Slab Weight (lb) =	22.46	22.64	23.65	23.60
Failing Load (lb) =	3890	4120	4129	3781
Failure Mechanism =	AB-CD	AB-CD	AD-BC	AD-BC
Failure Mode =	Flexure 2	Flexure 2	Flexure 1	Flexure 1
Average Width (in.) =	11.65	11.64	11.72	11.72
Average Height (in.) =	2.010	1.995	2.020	2.015
Average Length (in.) =	11.69	11.65	11.69	11.68
Average Failing Load (lb) =	3980			



	12-S1-Q-Center	12-S2-Q-Center	12-S3-Q-Center	12-S4-Q-Center
Width 1 (in.) =	11.97	11.97	11.99	12.00
Width 2 (in.) =	11.95	11.95	12.00	11.98
Height 1 (in.) =	2.020	2.040	2.010	2.010
Height 2 (in.) =	2.000	1.990	2.000	2.020
Length 1 (in.) =	11.98	11.96	12.00	11.99
Length 2 (in.) =	11.97	11.94	11.95	11.95
Reduced Slab Weight (lb) =	23.53	24.10	23.82	24.20
Failing Load (lb) =	3781	4038	4296	4030
Failure Mechanism =	AD-BC	AB-CD	AB-CD	AD-BC
Failure Mode =	Flexure 1	Flexure 2	Flexure 2	Flexure 1
Average Width (in.) =	11.96	11.96	12.00	11.99
Average Height (in.) =	2.010	2.015	2.005	2.015
Average Length (in.) =	11.98	11.95	11.98	11.97
Average Failing Load (lb) =	4036			



SI Conversions:
1 in. = 25.4 mm
1 lb = 0.454 kg
1 lbf = 4.44 N

Appendix D: FSS-Slabs (Full-Size, Simply-Supported) Test Results

Appendix D.1: Set 1 – FSS-Slabs 50 mm Dry-Cast Through-Mix Flexure Results

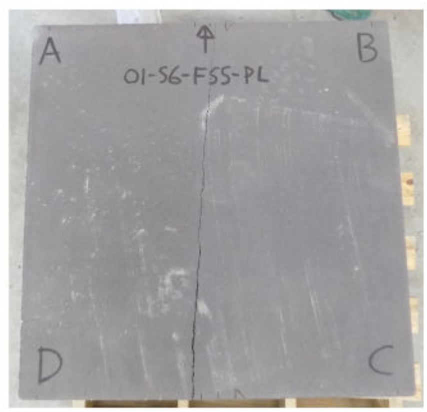
Slab ID	Average Width (in.)	Average Thickness (in.)	Average Length (in.)	Top Surface Warpage Concave (in.)	Top Surface Warpage Convex (in.)	Bottom Surface Warpage Concave (in.)	Bottom Surface Warpage Convex (in.)	Slab Weight (lb)	Failure Path	Failure Mode	Failing Load (lb)
01-S1-FSS-PL	23.69	2.08	23.69	0.010	0.000	0.000	0.010	90.76	AB-CD	Flexure 2	2,341
01-S2-FSS-PL	23.71	2.07	23.66	0.010	0.000	0.000	0.020	90.94	AB-CD	Flexure 2	2,210
01-S5-FSS-PL	23.70	2.08	23.68	0.010	0.000	0.000	0.030	90.81	AB-CD	Flexure 2	2,255
01-S6-FSS-PL	23.69	2.10	23.69	0.010	0.000	0.000	0.000	91.07	AB-CD	Flexure 2	2,133
Average Strength with Load Parallel to Direction of Production (lb) =											**2,235**
Standard Deviation with Load Parallel to Direction of Production (lb) =											**87**
01-S3-FSS-PR	23.68	2.07	23.71	0.010	0.000	0.000	0.030	91.73	AD-BC	Flexure 1	2,422
01-S4-FSS-PR	23.68	2.07	23.70	0.020	0.000	0.000	0.040	90.49	AD-BC	Flexure 1	2,304
01-S7-FSS-PR	23.68	2.09	23.69	0.010	0.000	0.000	0.010	90.70	AD-BC	Flexure 1	2,322
01-S8-FSS-PR	23.68	2.08	23.70	0.000	0.000	0.000	0.000	90.74	AD-BC	Flexure 1	2,360
01-S9-FSS-PR	23.68	2.08	23.69	0.010	0.000	0.010	0.000	90.41	AD-BC	Flexure 1	2,596
01-S10-FSS-PR	23.68	2.09	23.72	0.000	0.000	0.000	0.000	91.94	AD-BC	Flexure 1	2,986
Average Strength with Load Perpendicular to Direction of Production (lb) =											**2,498**
Standard Deviation with Load Perpendicular to Direction of Production (lb) =											**261**

Slab Set Average (lb) = 2,393
Slab Set Standard Deviation (lb) = 243
Slab Set Coefficient of Variation (%) = 10.1

Compound Failure Mode Count = 0

Simple Flexure 1 Failure Mode Count = 6

Simple Flexure 2 Failure Mode Count = 4



SI Conversions:
1 in. = 25.4 mm
1 lb = 0.454 kg
1 lbf = 4.44 N

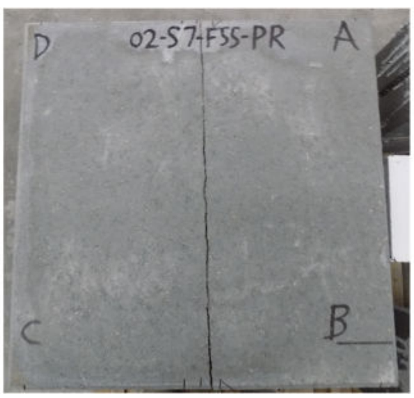
Appendix D.2: Set 2 – FSS-Slabs 60 mm Dry-Cast Through-Mix Flexure Results

Slab ID	Average Width (in.)	Average Thickness (in.)	Average Length (in.)	Top Surface Warpage Concave (in.)	Top Surface Warpage Convex (in.)	Bottom Surface Warpage Concave (in.)	Bottom Surface Warpage Convex (in.)	Slab Weight (lb)	Failure Path	Failure Mode	Failing Load (lb)
02-S1-FSS-PL	23.55	2.36	23.55	0.020	0.000	0.000	0.000	107.81	AB-CD	Flexure 2	3,083
02-S2-FSS-PL	23.52	2.37	23.54	0.030	0.000	0.000	0.000	108.01	AB-CD	Flexure 2	4,162
02-S5-FSS-PL	23.55	2.39	23.58	0.024	0.000	0.000	0.000	108.12	AB-CD	Flexure 2	3,278
02-S6-FSS-PL	23.54	2.40	23.52	0.013	0.000	0.017	0.000	108.31	AB-CD	Flexure 2	3,161
										Average Strength with Load Parallel to Direction of Production (lb) =	**3,421**
										Standard Deviation with Load Parallel to Direction of Production (lb) =	**500**
02-S3-FSS-PR	23.54	2.39	23.56	0.040	0.000	0.000	0.050	108.09	AD-BC	Flexure 1	2,640
02-S4-FSS-PR	23.53	2.39	23.56	0.010	0.000	0.000	0.030	107.80	AD-BC	Flexure 1	2,656
02-S7-FSS-PR	23.54	2.32	23.55	0.020	0.000	0.000	0.030	105.11	AD-BC	Flexure 1	2,537
02-S8-FSS-PR	23.55	2.36	23.55	0.020	0.000	0.000	0.040	106.76	AD-BC	Flexure 1	2,872
02-S9-FSS-PR	23.54	2.35	23.55	0.030	0.000	0.000	0.020	106.30	AD-BC	Flexure 1	2,346
02-S10-FSS-PR	23.54	2.31	23.56	0.020	0.000	0.000	0.010	105.22	AD-BC	Flexure 1	2,291
										Average Strength with Load Perpendicular to Direction of Production (lb) =	**2,557**
										Standard Deviation with Load Perpendicular to Direction of Production (lb) =	**215**

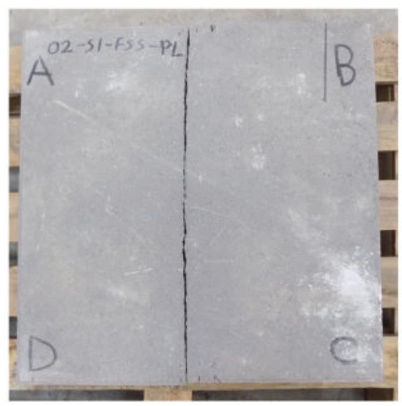
Slab Set Average (lb) =	**2,903**
Slab Set Standard Deviation (lb) =	**555**
Slab Set Coefficient of Variation (%) =	**19.1**

Compound Failure Mode Count = 0

Simple Flexure 1 Failure Mode Count = 6



Simple Flexure 2 Failure Mode Count = 4



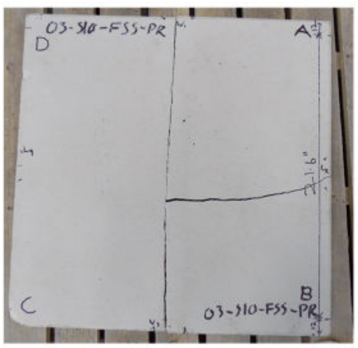
SI Conversions:
1 in. = 25.4 mm
1 lb = 0.454 kg
1 lbf = 4.44 N

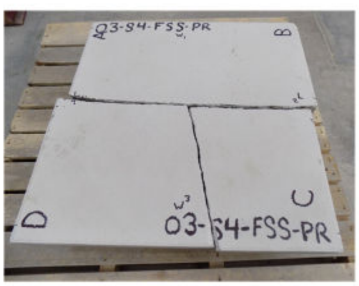
Appendix D.3: Set 1 – FSS-Slabs 50 mm Hermetically-Pressed Flexure Results

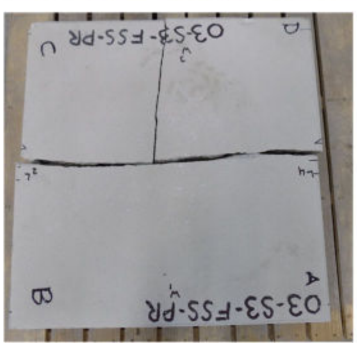
Slab ID	Average Width (in.)	Average Thickness (in.)	Average Length (in.)	Top Surface Warpage Concave (in.)	Top Surface Warpage Convex (in.)	Bottom Surface Warpage Concave (in.)	Bottom Surface Warpage Convex (in.)	Slab Weight (lb)	Failure Path	Failure Mode	Failing Load (lb)
03-S1-FSS-PL	23.65	1.97	23.64	0.000	0.010	0.024	0.000	94.00	AB-CD	Flexure 2	3,260
03-S2-FSS-PL	23.65	1.95	23.66	0.000	0.000	0.000	0.000	93.16	AB-CD	Flexure 2	3,596
03-S5-FSS-PL	23.65	1.95	23.65	0.000	0.040	0.024	0.000	93.36	AB-CD	Flexure 2	3,257
03-S6-FSS-PL	23.64	1.93	23.65	0.000	0.010	0.017	0.000	93.69	AB-CD	Flexure 2	3,290
					Average Strength with Load Parallel to Direction of Production (lb) =						**3,351**
					Standard Deviation with Load Parallel to Direction of Production (lb) =						**164**
03-S3-FSS-PR	23.66	1.99	23.64	0.000	0.010	0.000	0.000	94.66	AD-BC-CD	Compound	3,901
03-S4-FSS-PR	23.67	1.98	23.64	0.000	0.050	0.020	0.000	94.01	AD-BC-CD	Compound	3,289
03-S7-FSS-PR	23.65	1.97	23.63	0.000	0.040	0.000	0.000	94.05	AD-BC	Flexure 1	3,412
03-S8-FSS-PR	23.65	1.97	23.65	0.000	0.040	0.000	0.000	93.80	AD-BC	Flexure 1	2,996
03-S9-FSS-PR	23.65	2.00	23.67	0.000	0.070	0.024	0.000	94.30	AD-BC	Flexure 1	4,006
03-S10-FSS-PR	23.65	1.94	23.66	0.000	0.030	0.014	0.000	93.69	AD-BC-AB	Compound	3,697
					Average Strength with Load Perpendicular to Direction of Production (lb) =						**3,550**
					Standard Deviation with Load Perpendicular to Direction of Production (lb) =						**386**

Slab Set Average (lb) =	**3,470**
Slab Set Standard Deviation (lb) =	**320**
Slab Set Coefficient of Variation (%) =	**9.2**

Compound Failure Mode Count = 3

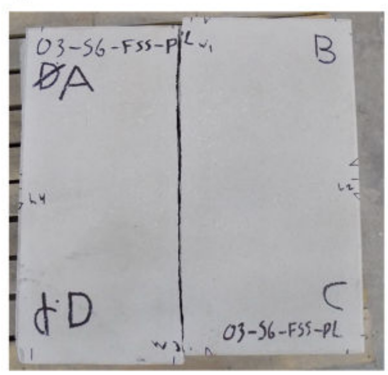






Simple Flexure 1 Failure Mode Count = 3

Simple Flexure 2 Failure Mode Count = 4

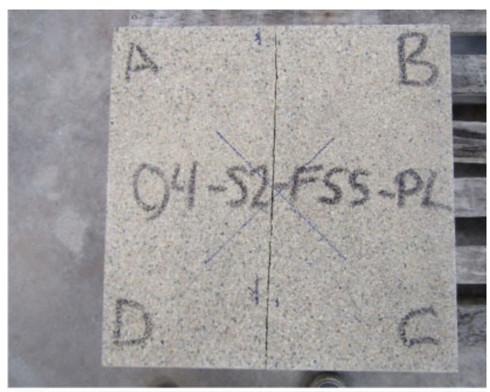


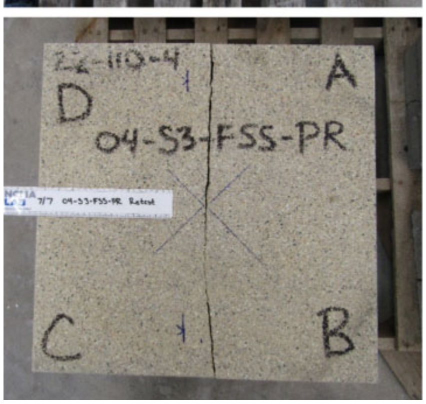
SI Conversions:
1 in. = 25.4 mm
1 lb = 0.454 kg
1 lbf = 4.44 N

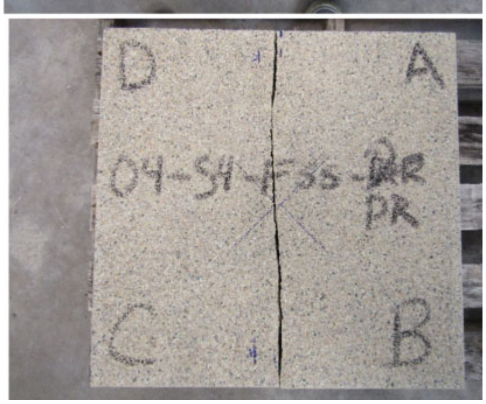
Appendix D.4: Set 4 – FSS-Slabs 50 mm Hermetically-Pressed Flexure Results

	04-S1-FSS-PL	04-S2-FSS-PL	04-S3-FSS-PR	04-S4-FSS-PR
Width 1 (in.) =	23.74	23.74	23.75	23.75
Width 2 (in.) =	23.74	23.76	23.78	23.76
Height 1 (in.) =	2.037	2.006	1.983	2.019
Height 2 (in.) =	2.014	2.025	1.980	2.037
Height 3 (in.) =	2.013	2.026	1.975	2.050
Height 4 (in.) =	2.030	2.039	1.974	2.006
Length 1 (in.) =	23.75	23.72	23.74	23.79
Length 2 (in.) =	23.74	23.73	23.83	23.78
Full-Size Slab Weight (lb) =	94.07	93.87	91.44	94.20
Top Concave (in.) =	0.010	0.010	0.000	0.010
Top Convex (in.) =	0.000	0.000	0.020	0.000
Bottom Concave (in.) =	0.010	0.010	0.010	0.010
Bottom Convex (in.) =	0.000	0.000	0.000	0.000
Span Length (in.) =	21.6	21.6	21.6	21.6
Failing Load (lb) =	2621	2547	2044	2675
Failure Mechanism =	AB-CD	AB-CD	AD-BC	AD-BC
Failure Mode =	NA	NA	NA	NA
Average Width (in.) =	23.74	23.75	23.77	23.76
Average Height (in.) =	2.024	2.024	1.978	2.028
Average Length (in.) =	23.75	23.73	23.79	23.79
Flexural Strength (psi) =	874	848	712	887
Average Strength (psi) =	830			

SI Conversions:
1 in. = 25.4 mm
1 lb = 0.454 kg
1 lbf = 4.44 N



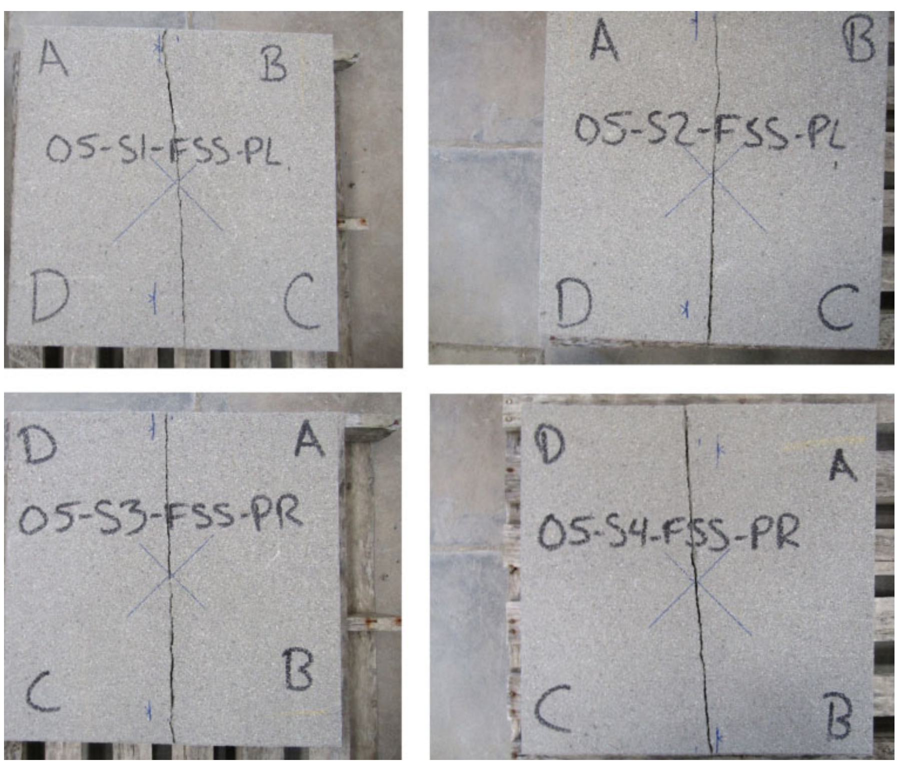




Appendix D.5: Set 5 – FSS-Slabs 50 mm Dry-Cast Face-Mix Flexure Results

	05-S1-FSS-PL	05-S2-FSS-PL	05-S3-FSS-PR	05-S4-FSS-PR
Width 1 (in.) =	23.74	23.73	23.72	23.73
Width 2 (in.) =	23.73	23.73	23.75	23.72
Height 1 (in.) =	1.978	1.985	1.981	1.983
Height 2 (in.) =	1.983	1.982	1.984	1.986
Height 3 (in.) =	1.987	1.969	1.996	1.998
Height 4 (in.) =	1.976	1.966	1.989	1.989
Length 1 (in.) =	23.73	23.71	23.72	23.72
Length 2 (in.) =	23.73	23.71	23.71	23.73
Full-Size Slab Weight (lb) =	96.99	98.83	98.83	98.34
Top Concave (in.) =	0.010	0.010	0.010	0.010
Top Convex (in.) =	0.000	0.000	0.000	0.000
Bottom Concave (in.) =	0.010	0.010	0.010	0.010
Bottom Convex (in.) =	0.000	0.000	0.000	0.000
Span Length (in.) =	21.6	21.6	21.6	21.6
Failing Load (lb) =	2842	3121	2915	3063
Failure Mechanism =	AB-CD	AB-CD	AD-BC	AD-BC
Failure Mode =	Flexure 2	Flexure 2	Flexure 1	Flexure 1
Average Width (in.) =	23.74	23.73	23.74	23.73
Average Height (in.) =	1.981	1.976	1.988	1.989
Average Length (in.) =	23.73	23.71	23.72	23.73
Flexural Strength (psi) =	989	1092	1007	1057
Average Strength (psi) =	1036			

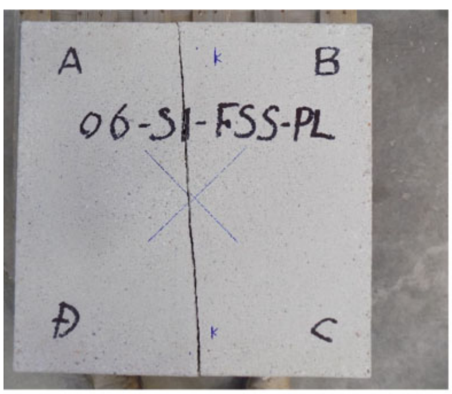
SI Conversions:
1 in. = 25.4 mm
1 lb = 0.454 kg
1 lbf = 4.44 N

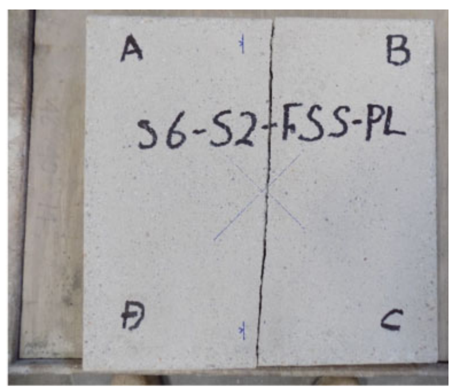


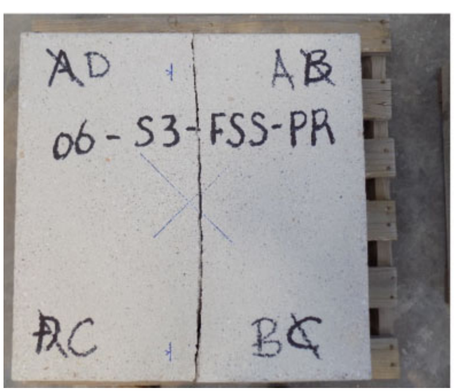
Appendix D.6: Set 6 – FSS-Slabs 50 mm Hermetically-Pressed Flexure Results

	06-S1-FSS-PL	06-S2-FSS-PL	06-S3-FSS-PR	06-S4-FSS-PR
Width 1 (in.) =	24.00	24.00	24.00	24.00
Width 2 (in.) =	24.00	24.00	24.00	24.00
Height 1 (in.) =	2.011	2.002	2.009	2.025
Height 2 (in.) =	2.025	2.042	2.010	2.051
Height 3 (in.) =	2.005	1.968	1.983	1.971
Height 4 (in.) =	1.924	1.927	1.934	1.929
Length 1 (in.) =	24.00	24.00	24.00	24.00
Length 2 (in.) =	24.00	24.00	24.00	24.00
Full-Size Slab Weight (lb) =	100.57	100.52	100.63	100.53
Top Concave (in.) =	0.010	0.010	0.010	0.010
Top Convex (in.) =	0.000	0.000	0.000	0.000
Bottom Concave (in.) =	0.010	0.010	0.009	0.010
Bottom Convex (in.) =	0.000	0.000	0.000	0.000
Span Length (in.) =	21.6	21.6	21.6	21.6
Failing Load (lb) =	3800	4001	3976	3805
Failure Mechanism =	AB-CD	AB-CD	AD-BC	AD-BC-CD
Failure Mode =	NA	NA	NA	NA
Average Width (in.) =	24.00	24.00	24.00	24.00
Average Height (in.) =	1.991	1.985	1.984	1.994
Average Length (in.) =	24.00	24.00	24.00	24.00
Flexural Strength (psi) =	1294	1371	1364	1292
Average Strength (psi) =	1330			

SI Conversions:
1 in. = 25.4 mm
1 lb = 0.454 kg
1 lbf = 4.44 N



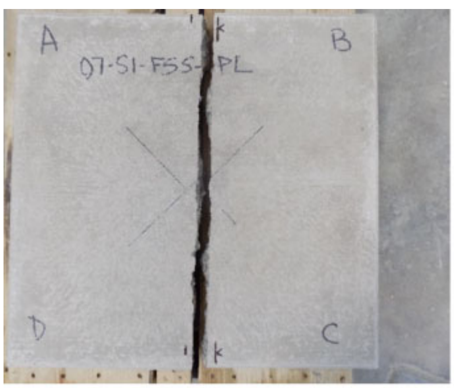


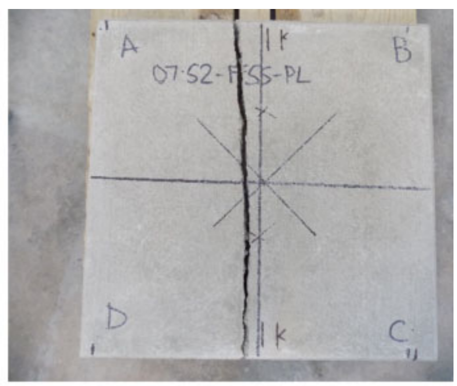


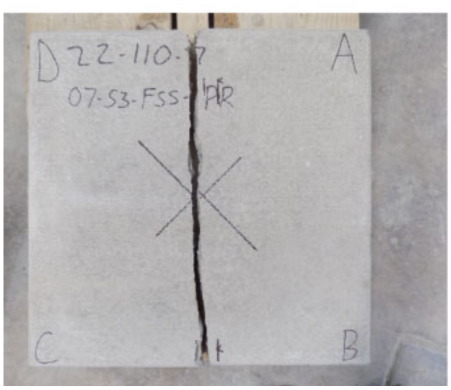
Appendix D.7: Set 7 – FSS-Slabs 45 mm Hydraulically-Pressed Flexure Results

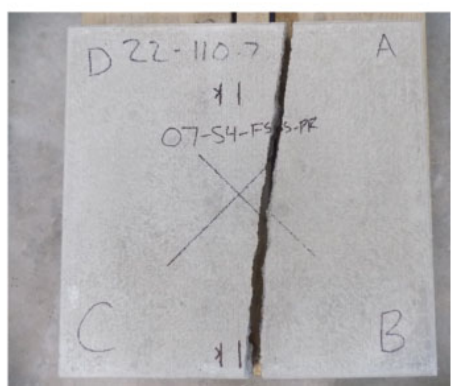
	07-S1-FSS-PL	07-S2-FSS-PL	07-S3-FSS-PR	07-S4-FSS-PR
Width 1 (in.) =	23.93	24.00	23.89	23.96
Width 2 (in.) =	24.00	24.00	24.00	23.98
Height 1 (in.) =	1.864	1.873	1.881	1.922
Height 2 (in.) =	1.905	1.853	1.885	1.936
Height 3 (in.) =	1.854	1.917	1.926	1.885
Height 4 (in.) =	1.884	1.834	1.845	1.870
Length 1 (in.) =	24.00	24.00	24.00	24.00
Length 2 (in.) =	24.00	24.00	23.95	24.00
Full-Size Slab Weight (lb) =	87.17	86.71	87.38	87.71
Top Concave (in.) =	0.015	0.015	0.015	0.018
Top Convex (in.) =	0.000	0.000	0.000	0.000
Bottom Concave (in.) =	0.000	0.000	0.000	0.000
Bottom Convex (in.) =	0.000	0.000	0.000	0.000
Span Length (in.) =	21.6	21.6	21.6	21.6
Failing Load (lb) =	1918	1858	1869	2055
Failure Mechanism =	AB-CD	AB-CD	AD-BC	AD-BC
Failure Mode =	NA	NA	NA	NA
Average Width (in.) =	23.97	24.00	23.95	23.97
Average Height (in.) =	1.877	1.869	1.884	1.903
Average Length (in.) =	24.00	24.00	23.98	24.00
Flexural Strength (psi) =	736	718	712	767
Average Strength (psi) =	733			

SI Conversions:
1 in. = 25.4 mm
1 lb = 0.454 kg
1 lbf = 4.44 N





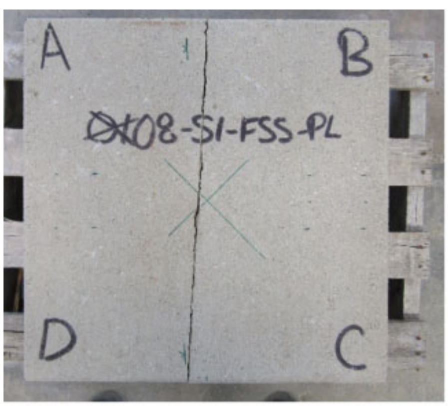


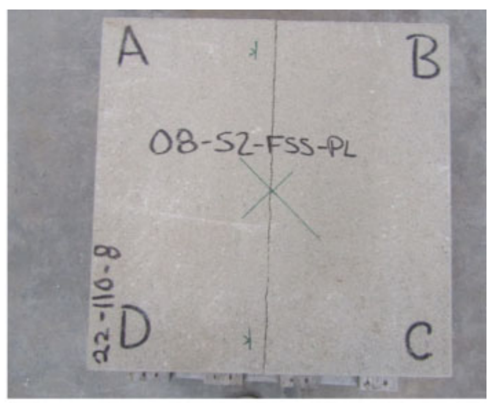


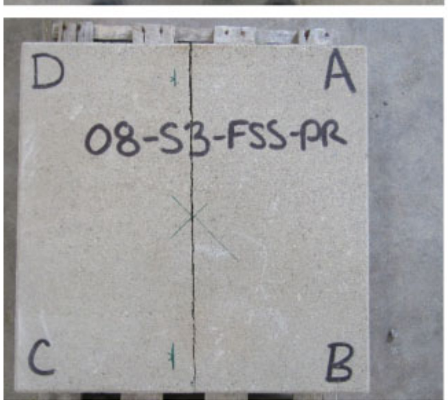
Appendix D.8: Set 8 – FSS-Slabs 55 mm Dry-Cast Through-Mix Flexure Results

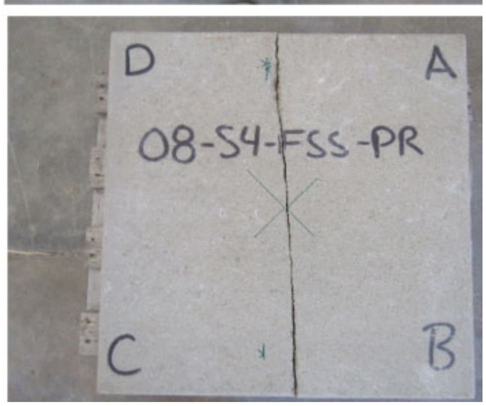
	08-S1-FSS-PL	08-S2-FSS-PL	08-S3-FSS-PR	08-S4-FSS-PR
Width 1 (in.) =	23.87	23.87	23.87	23.86
Width 2 (in.) =	23.89	23.90	23.90	23.85
Height 1 (in.) =	2.241	2.236	2.238	2.205
Height 2 (in.) =	2.228	2.243	2.233	2.212
Height 3 (in.) =	2.198	2.184	2.204	2.214
Height 4 (in.) =	2.190	2.217	2.186	2.172
Length 1 (in.) =	23.86	23.86	23.86	23.89
Length 2 (in.) =	23.89	23.86	23.89	23.91
Full-Size Slab Weight (lb) =	99.95	99.87	100.44	100.00
Top Concave (in.) =	0.000	0.010	0.010	0.000
Top Convex (in.) =	0.040	0.000	0.000	0.040
Bottom Concave (in.) =	0.010	0.000	0.010	0.020
Bottom Convex (in.) =	0.000	0.030	0.000	0.000
Span Length (in.) =	21.6	21.6	21.6	21.6
Failing Load (lb) =	2505	2461	2816	2496
Failure Mechanism =	AB-CD	AB-CD	AD-BC	AD-BC
Failure Mode =	Flexure 2	Flexure 2	Flexure 1	Flexure 1
Average Width (in.) =	23.88	23.89	23.89	23.86
Average Height (in.) =	2.214	2.220	2.215	2.201
Average Length (in.) =	23.88	23.86	23.88	23.90
Flexural Strength (psi) =	693	677	778	700
Average Strength (psi) =	712			

SI Conversions:
1 in. = 25.4 mm
1 lb = 0.454 kg
1 lbf = 4.44 N





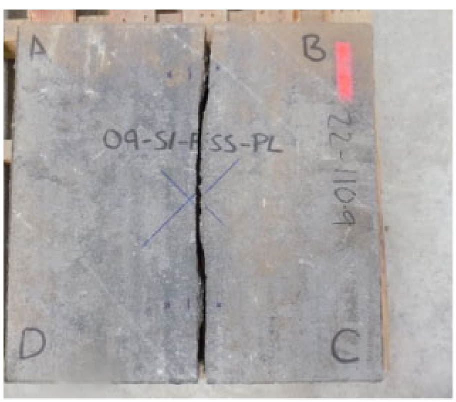


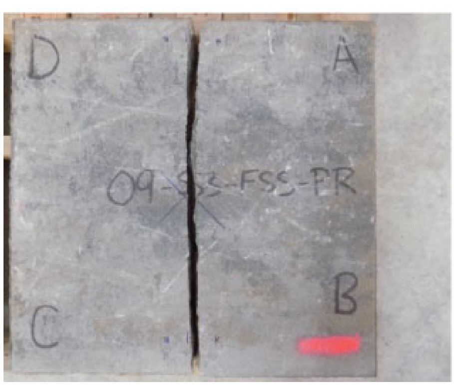


Appendix D.9: Set 9 – FSS-Slabs 60 mm Dry-Cast Through-Mix Flexure Results

	09-S1-FSS-PL	09-S2-FSS-PL	09-S3-FSS-PR	09-S4-FSS-PR
Width 1 (in.) =	23.50	23.54	23.51	23.53
Width 2 (in.) =	23.53	23.52	23.52	23.51
Height 1 (in.) =	2.351	2.330	2.375	2.341
Height 2 (in.) =	2.422	2.314	2.356	2.382
Height 3 (in.) =	2.425	2.328	2.339	2.339
Height 4 (in.) =	2.343	2.383	2.371	2.374
Length 1 (in.) =	23.52	23.59	23.54	23.60
Length 2 (in.) =	23.55	23.57	23.55	23.61
Full-Size Slab Weight (lb) =	109.21	107.71	107.19	107.45
Top Concave (in.) =	0.012	0.000	0.000	0.000
Top Convex (in.) =	0.000	0.012	0.012	0.012
Bottom Concave (in.) =	0.012	0.000	0.000	0.000
Bottom Convex (in.) =	0.000	0.012	0.012	0.012
Span Length (in.) =	21.6	21.6	21.6	21.6
Failing Load (lb) =	3778	3335	3772	3732
Failure Mechanism =	AB-CD	AB-CD	AD-BC	AD-BC
Failure Mode =	Flexure 2	Flexure 2	Flexure 1	Flexure 1
Average Width (in.) =	23.52	23.53	23.52	23.52
Average Height (in.) =	2.385	2.339	2.360	2.359
Average Length (in.) =	23.54	23.58	23.55	23.61
Flexural Strength (psi) =	915	840	933	924
Average Strength (psi) =	903			

SI Conversions:
1 in. = 25.4 mm
1 lb = 0.454 kg
1 lbf = 4.44 N

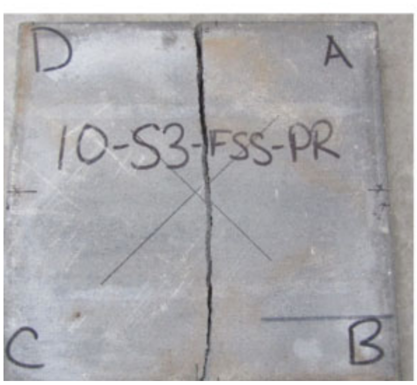


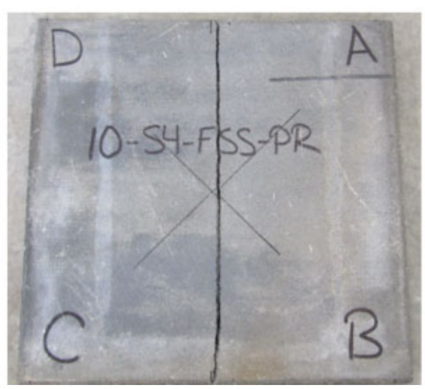


Appendix D.10: Set 10 – FSS-Slabs 60 mm Dry-Cast Face-Mix Flexure Results

	10-S1-FSS-PL	10-S2-FSS-PL	10-S3-FSS-PR	10-S4-FSS-PR
Width 1 (in.) =	23.56	23.59	23.55	23.54
Width 2 (in.) =	23.64	23.57	23.58	23.56
Height 1 (in.) =	2.545	2.459	2.531	2.485
Height 2 (in.) =	2.535	2.436	2.479	2.459
Height 3 (in.) =	2.471	2.466	2.489	2.474
Height 4 (in.) =	2.505	2.453	2.546	2.468
Length 1 (in.) =	23.53	23.53	23.56	23.56
Length 2 (in.) =	23.59	23.64	23.62	23.61
Full-Size Slab Weight (lb) =	109.41	110.07	107.93	111.23
Top Concave (in.) =	0.014	0.020	0.010	0.014
Top Convex (in.) =	0.000	0.000	0.000	0.000
Bottom Concave (in.) =	0.000	0.000	0.000	0.010
Bottom Convex (in.) =	0.050	0.040	0.050	0.000
Span Length (in.) =	21.6	21.6	21.6	21.6
Failing Load (lb) =	2012	2539	2298	2665
Failure Mechanism =	AB-CD	AB-CD	AD-BC	AD-BC
Failure Mode =	Flexure 2	Flexure 2	Flexure 1	Flexure 1
Average Width (in.) =	23.60	23.58	23.57	23.55
Average Height (in.) =	2.514	2.454	2.511	2.472
Average Length (in.) =	23.56	23.59	23.59	23.59
Flexural Strength (psi) =	437	580	501	600
Average Strength (psi) =	529			

SI Conversions:
1 in. = 25.4 mm
1 lb = 0.454 kg
1 lbf = 4.44 N

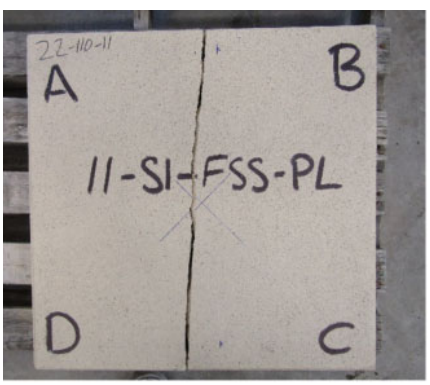


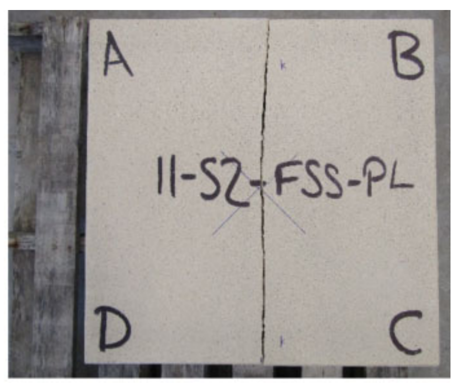


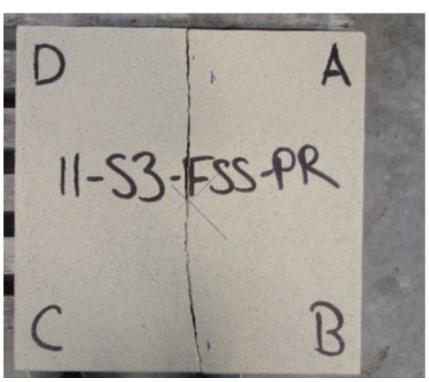
Appendix D.11: Set 11 – FSS-Slabs 50 mm Hermetically-Pressed Flexure Results

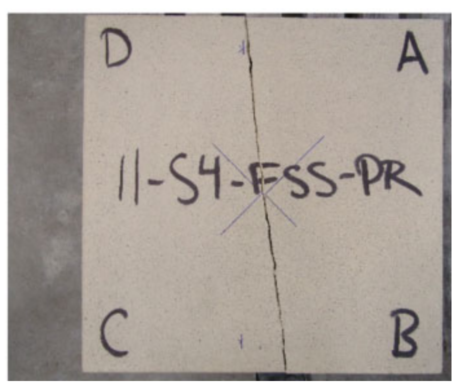
	11-S1-FSS-PL	11-S2-FSS-PL	11-S3-FSS-PR	11-S4-FSS-PR
Width 1 (in.) =	24.00	24.00	24.00	24.00
Width 2 (in.) =	24.00	24.00	24.00	24.00
Height 1 (in.) =	2.057	2.010	2.045	2.024
Height 2 (in.) =	2.030	2.068	1.998	2.054
Height 3 (in.) =	1.992	2.072	2.040	2.000
Height 4 (in.) =	2.046	2.045	2.053	2.033
Length 1 (in.) =	24.00	24.00	24.00	24.00
Length 2 (in.) =	24.00	24.00	24.00	24.00
Full-Size Slab Weight (lb) =	98.60	100.00	99.15	99.41
Top Concave (in.) =	0.010	0.010	0.010	0.010
Top Convex (in.) =	0.000	0.000	0.000	0.000
Bottom Concave (in.) =	0.010	0.010	0.010	0.010
Bottom Convex (in.) =	0.000	0.000	0.000	0.000
Span Length (in.) =	21.6	21.6	21.6	21.6
Failing Load (lb) =	2858	2880	2856	2791
Failure Mechanism =	AB-CD	AB-CD	AD-BC	AD-BC
Failure Mode =	NA	NA	NA	NA
Average Width (in.) =	24.00	24.00	24.00	24.00
Average Height (in.) =	2.031	2.049	2.034	2.028
Average Length (in.) =	24.00	24.00	24.00	24.00
Flexural Strength (psi) =	935	926	932	916
Average Strength (psi) =	927			

SI Conversions:
1 in. = 25.4 mm
1 lb = 0.454 kg
1 lbf = 4.44 N









	12-S1-FSS-PL	12-S2-FSS-PL	12-S3-FSS-PR	12-S4-FSS-PR
Width 1 (in.) =	23.53	23.53	23.55	23.54
Width 2 (in.) =	23.52	23.49	23.55	23.54
Height 1 (in.) =	2.078	1.995	2.024	2.048
Height 2 (in.) =	2.035	2.023	2.000	2.021
Height 3 (in.) =	2.010	2.011	2.015	2.030
Height 4 (in.) =	2.028	2.006	2.025	2.023
Length 1 (in.) =	23.54	23.53	23.54	23.50
Length 2 (in.) =	23.55	23.54	23.52	23.49
Full-Size Slab Weight (lb) =	93.71	93.47	91.54	93.85
Top Concave (in.) =	0.020	0.040	0.060	0.000
Top Convex (in.) =	0.000	0.000	0.000	0.000
Bottom Concave (in.) =	0.000	0.000	0.000	0.000
Bottom Convex (in.) =	0.030	0.020	0.020	0.040
Span Length (in.) =	21.6	21.6	21.6	21.6
Failing Load (lb) =	2407	3562	2891	4184
Failure Mechanism =	AB-CD	AB-CD	AD-BC	AD-BC
Failure Mode =	Flexure 2	Flexure 2	Flexure 1	Flexure 1
Average Width (in.) =	23.53	23.51	23.55	23.54
Average Height (in.) =	2.038	2.009	2.016	2.031
Average Length (in.) =	23.55	23.54	23.53	23.50
Flexural Strength (psi) =	798	1217	979	1397
Average Strength (psi) =	1098			

SI Conversions:
1 in. = 25.4 mm
1 lb = 0.454 kg
1 lbf = 4.44 N