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16. Abstract This project evaluated the structural performance of Sileto for retrofit and precast applications through proof-of-concept laboratory testing. The program included 4-point flexural tests on composite beams, 3-point flexural tests on slabs and a railroad tie, and axial compression tests on concrete columns jacketed with Sileto. Variables included Sileto type, placement (tension or compression zone), and reinforcement. Results showed that placing Sileto on the tension side significantly increased flexural capacity, while placement in compression had limited effect. Jacketed columns exhibited strong bond and increased axial capacity, especially with longitudinal reinforcement. Slab tests confirmed high bending resistance.			
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Comprehending the Structural Performance and Examining Potential Field Applications of Sileto, as a New Material

Final Report

February 2026

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CHAPTER 1. INTRODUCTION

1.1. Background

Sileto is a new polymer-based concrete that according to developers, its properties does not change by temperature. It is a proprietary material developed by a company named Sileto.

FIU has carried out two separate projects, hereafter called Phase I and Phase II, to comprehend the performance of the material and develop a set of recommendations for future work, that could lead to field application of Sileto in U.S. market. This report provides findings of both Phase I and Phase II.

In Phase I of the Investigation of the project, a series of activities were undertaken to develop preliminary assessment of Sileto and identify the feasible areas of application for Sileto in U.S.

Following the conclusion of the Phase I research the final report summarizing the activities within Phase I was submitted to Sileto.

In addition to FIU research, Sileto was also evaluated by Construction Technology Laboratories (CTL) in Skokie Illinois. The CTL report is available through Sileto.

1.2. Major Findings from Phase I study

Limited work was carried out under Phase I of the study to mainly comprehend the durability and some of the mechanical properties of Sileto as a construction material.

Preliminary work under Phase I indicated that Sileto is a very durable material.

According to project sponsor, Sileto® is composed of two types of materials:

- 1- Solid aggregates; (~75%). Two types of aggregates (Canopus and Phenix) with differences in organic phases. It was mentioned that material with Phenix has higher compressive strength than material with Canopus
- 2- Polymeric matrix – Liquid (~25%)

FIU used, newly developed non-destructive testing method to assess the durability of the Sileto, as described below. The durability assessment was achieved, through application FIU's non-destructive method to both Sileto and Ultra High-Performance Concrete (UHPC) with compressive strength exceeding 18,000 psi. UHPC is extremely durable material and provided an excellent reference point to assess the durability of Sileto.

Figure 1 and Figure 2 show results of these tests for sileto materials. These results are in terms of applied pressure versus time. In this test the test cylinder made of Silto, on one end is subjected to water at a high pressure and pressure versus time is monitored. Ingress of water into test cylinder causes drop in the water pressure. Retaining the water pressure is an indication that material is durable, as water does not ingress into the test cylinder. In the tests, pressure was increased to about 250 psi and drop in pressure versus time is observed, as indicated in Figure 1 and Figure 2. More durable the material, the more steady the pressure versus time response is, after pressure reach its pick value. Figure 3 shows results of same tests on normal strength concrete and UHPC.

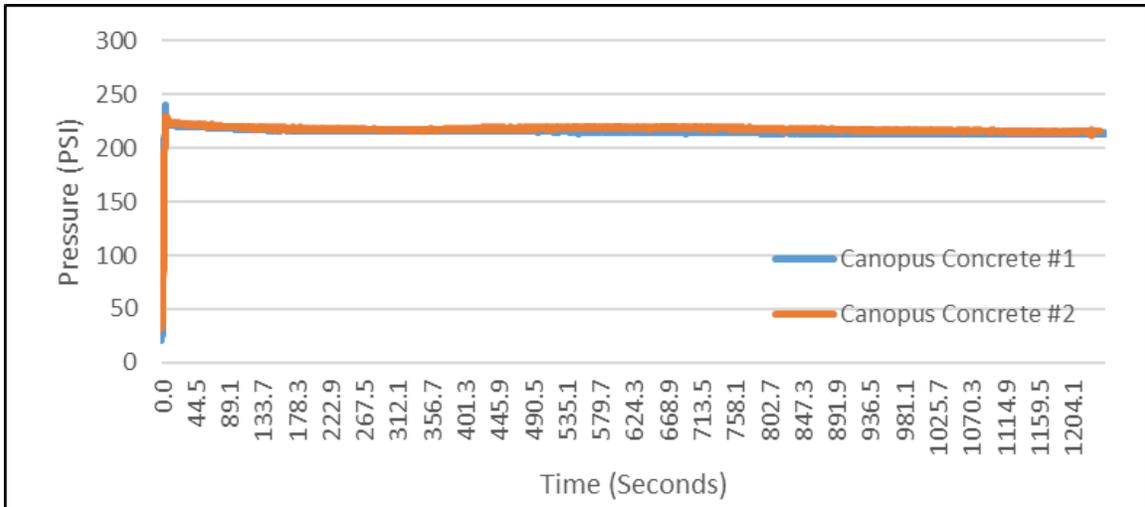


Figure 1. Durability test results for Sileto material (Canopus)

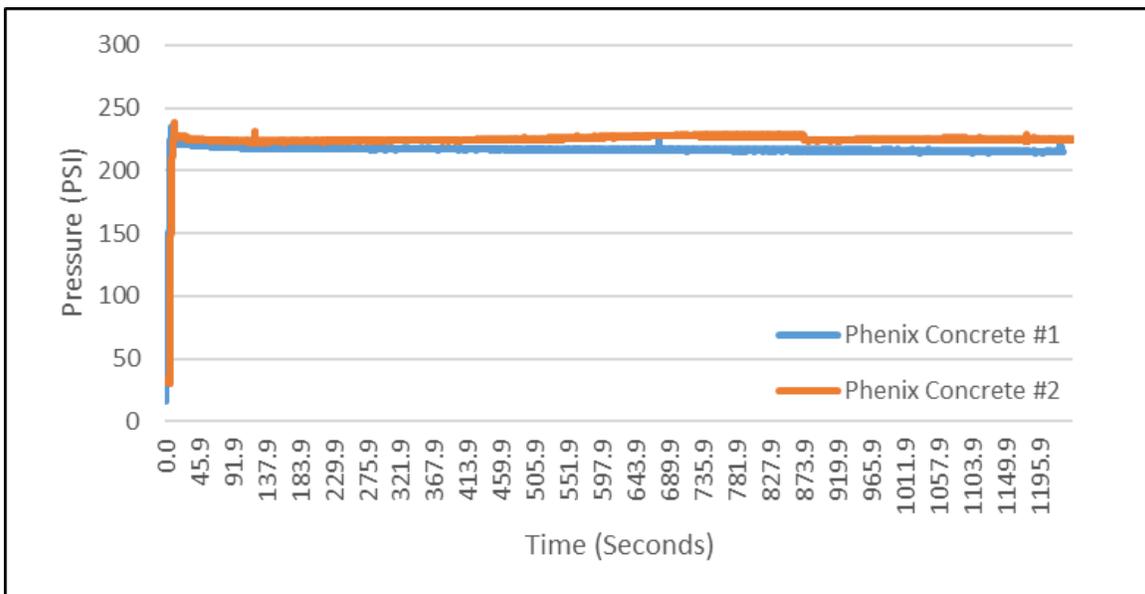


Figure 2. Durability test results for Sileto material (Phenix)

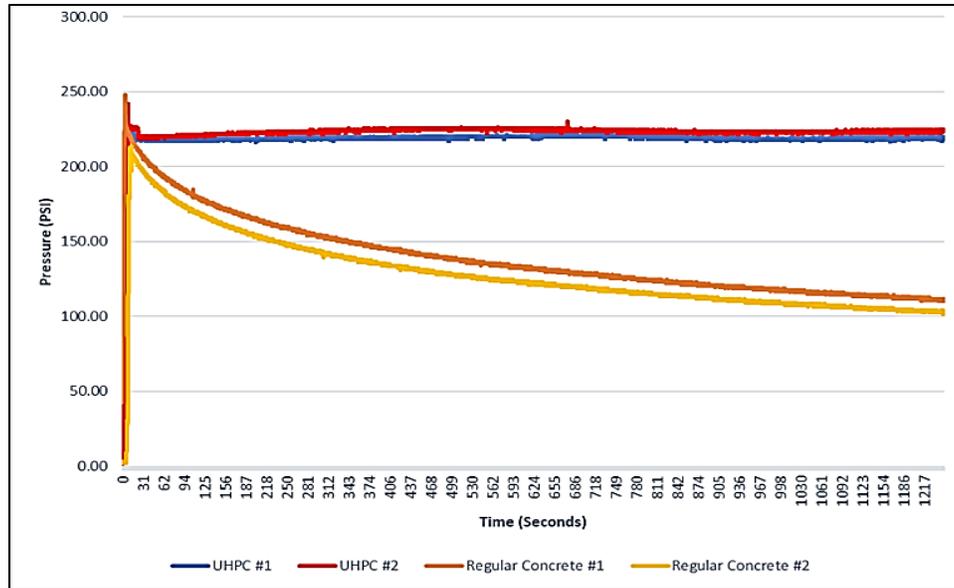


Figure 3. Durability test results for normal strength concrete and UHPC

As observed from Figure 1 through Figure 3, Results of tests conducted on Sileto test cylinders are close to results obtained on UHPC and better than what is observed with normal strength concrete. As a result, it can be concluded that the preliminary work indicates that Sileto is a very durable material.

1.3. Phase II Project

1.3.1. Objectives

The main objective of the Phase II project was to carry out tests on various test specimen types and develop a set of conclusion and recommendations on areas of applicability of Sileto as construction materials in U.S. market.

Existing constructed facilities in U.S. are in need to either replacement or retrofit/upgrade. Resources to replace all deficient constructed facilities such as bridges are not available and need for retrofit/upgrade of existing constructed facilities are a priority. In addition, a new priority is added to all construction activities- The carbon footprint and sustainability of construction materials used. Sileto does not use cement, which is a major source of producing CO₂. The durability aspect of Sileto combined with not using Cement, makes it an attractive construction material. It should however, be noted that a separate study needs to be carried out to quantitatively assess the carbon footprint of Sileto and compare it to conventional concrete, as Sileto uses other Chemical ingredients. The researchers under this study, because of proprietary nature of Sileto does not have knowledge to independently assess the carbon footprint of Sileto.

The objectives of Phase II study could be viewed, as conducting proof-of-concept test and further tests could be needed, for complete investigation and better assessment of Sileto for specific application.

1.3.2. Scope of work

The scope of work consisted of conducting tests to mainly evaluate the use of Sileto as retrofit/Upgrade construction material. Sections to follow provides summary of the tests conducted and major conclusions drawn from there and set of recommendations for future work. All test specimens were fabricated by Sileto in Brazil and was shipped to FIU for testing. Sections to follow provides description of each test specimen types, as well as results and conclusions that could be made from tests carried out on each test specimen type.

CHAPTER 2. 4-POINT FLEXURAL TESTING OF SILETO PRISMATIC SPECIMENS

These specimens were in the form of short beams retrofitted with a thin layer of Silto. These specimens were used to gain preliminary understanding of using Silto as construction material for retrofitting/upgrading structural elements and subjected to mainly flexural type loadings.

4-Point Flexural Strength tests were conducted on prismatic specimens. Each specimen had an overall dimension of 15cm x 15cm x 50 cm and was comprised of a 12cm x 15cm x 50cm layer of concrete with a 3cm x 15cm x 50cm Silto layer. The prismatic specimens were fabricated with the Silto layer either on the top or below the concrete layer. The Silto layer was either Fenix, Canopus, or Atria Silto type with or without glass fiberglass reinforcement. Tests were conducted in accordance with the ASTM C78/C78M – 22 Standard Test Method. All tests were conducted on a Qualitest QT-HW2-2000 Double Space Servo Hydraulic UTM (Figure 4). Load cells were utilized to measure the applied load on each specimen. Potentiometers were used to measure the deflection of each specimen. The objective of this testing was to determine the effect of different types of Silto concrete, with or without fiber glass, applied as a layer on the top or bottom of concrete beams, on their flexural strength.



Figure 4. Qualitest QT-HW2-2000 Double Space Servo Hydraulic UTM

2.1. Results

Sileto also provided test cylinders made of different Sileto types used in the 4-point beam specimens, as well as regular concrete used in these specimens. Results of cylinder tests conducted on these test cylinders are described next.

A total of five 10cm x 20cm cylinders made from Fenix, Canopus, and Atria Sileto as well as the material used to manufacture the railroad tie and concrete respectively were compression tested in accordance with the ASTM C-39 standard. Testing was done on a Forney compression testing machine (Figure 5).



Figure 5. Forney Compression Testing Machine

As can be seen from Table 1, the Fenix Sileto withstood the largest load at 625,033 newtons. That is almost 626% larger than the load withstood by basic concrete.

Table 1. Compression Testing Results

	TIE	ATRIA	FENIX	CANOPUS	CONCRETE
STRESS(MPa)	62.68	59.43	77.13	66.83	12.31
LOAD (N)	508,051	481,807	625,033	541,766	99,858

Also as noted from table above, the conventional concrete used had a very low compressive strength. Detail description of each 4-point test conducted are provided next.

2.1.1. 4-Point Flexural Strength Canopus Sileto on Top

Specimen Number: #2

Reinforcement: Fiberglass

Max Load: 9,470 N

Failure Mode: Flexural Failure

Max Bending Moment Capacity: 719.7 N.M



Figure 6. Specimen #2 Failure

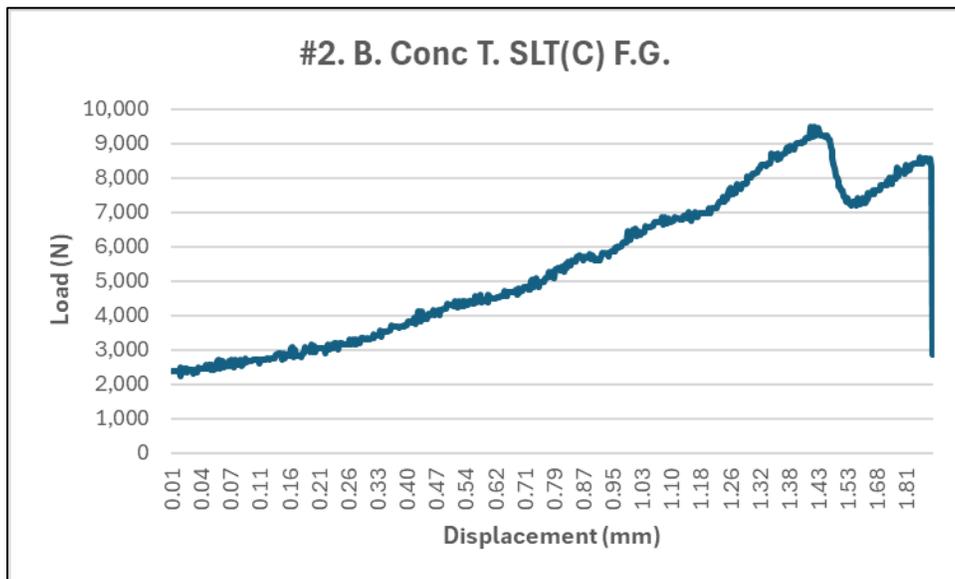


Figure 7. Specimen #2 Results

Specimen Number: #21

Reinforcement: None

Max Load: 17,300 N

Failure Mode: Flexural Failure

Max Bending Moment Capacity: 1314.8 N.M



Figure 8. Specimen #21 Failure

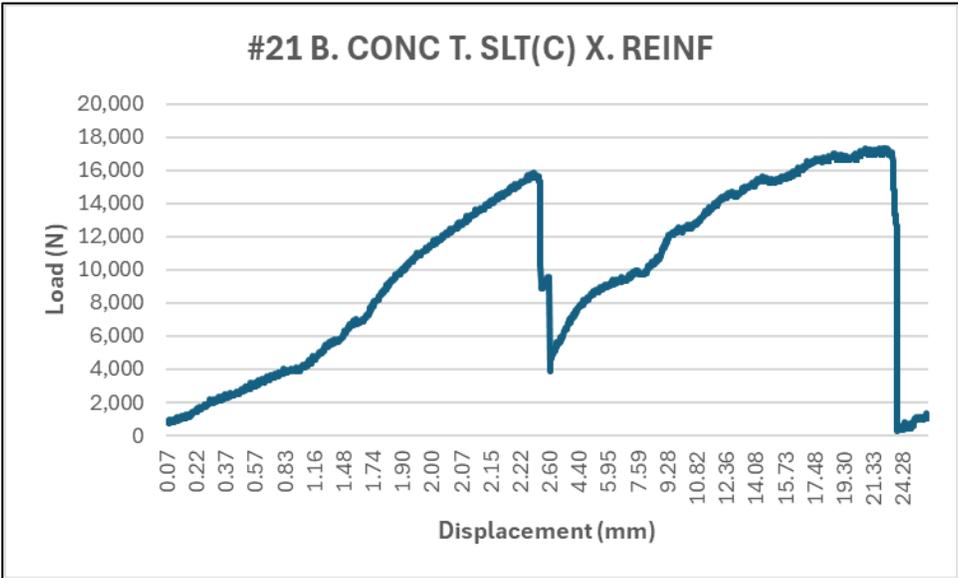


Figure 9. Specimen #21 Results

Specimen Number: #25

Reinforcement: None

Max Load: 12,647 N

Failure Mode: Flexural Failure

Max Bending Moment Capacity: 961.2 N.M



Figure 10. Specimen #25 Failure

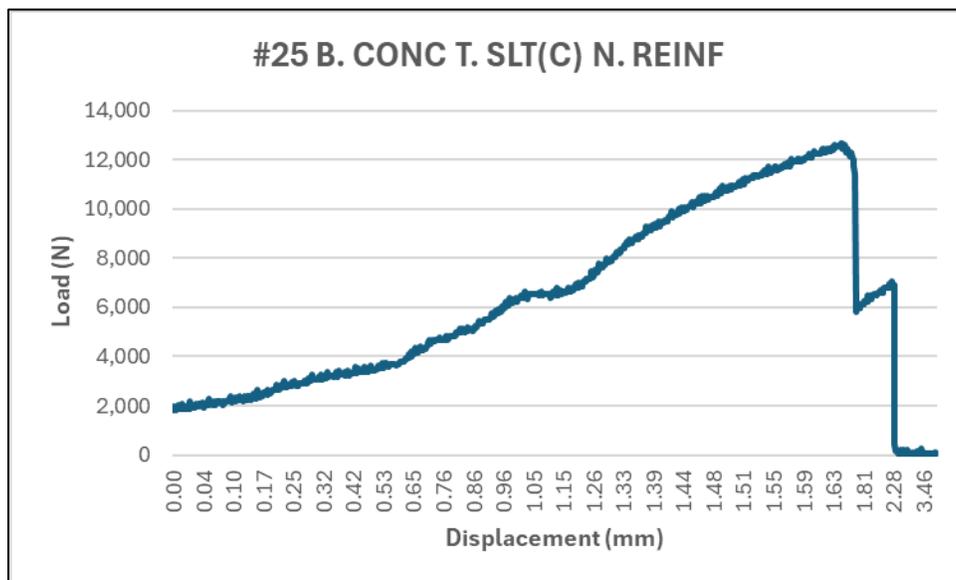


Figure 11. Specimen #25 Results

2.1.2. 4-Point Flexural Strength Canopus Sileto on Bottom

Specimen Number: #3

Reinforcement: Fiberglass

Max Load: 53,863 N

Failure Mode: Flexural Failure

Max Bending Moment Capacity: 4093.6 N.M



Figure 12. Specimen #3 Failure

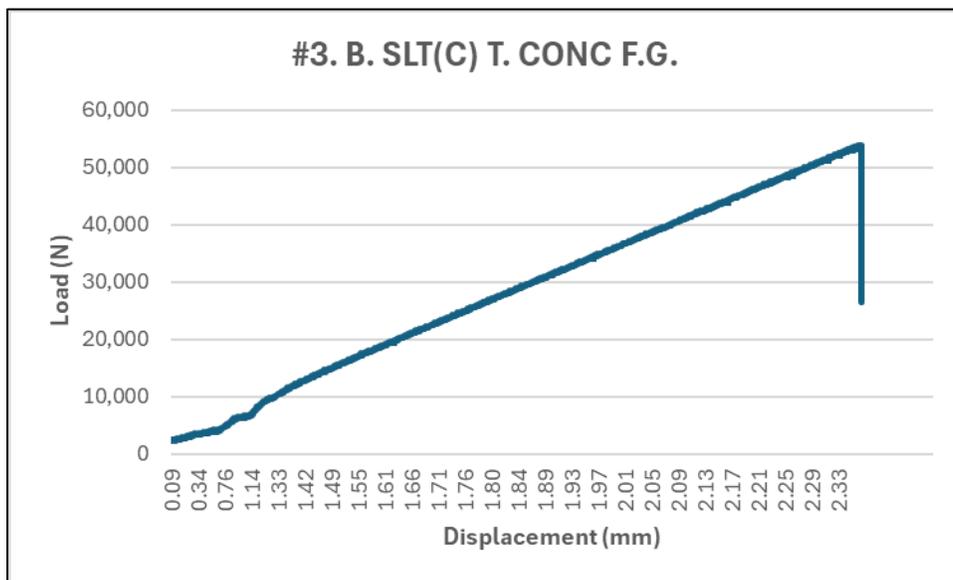


Figure 13. Specimen #3 Results

Specimen Number: #11

Reinforcement: None

Max Load: 62,937 N

Failure Mode: Moment-Shear Failure

Max Shear Capacity: 31468.5 N



Figure 14. Specimen #11 Failure

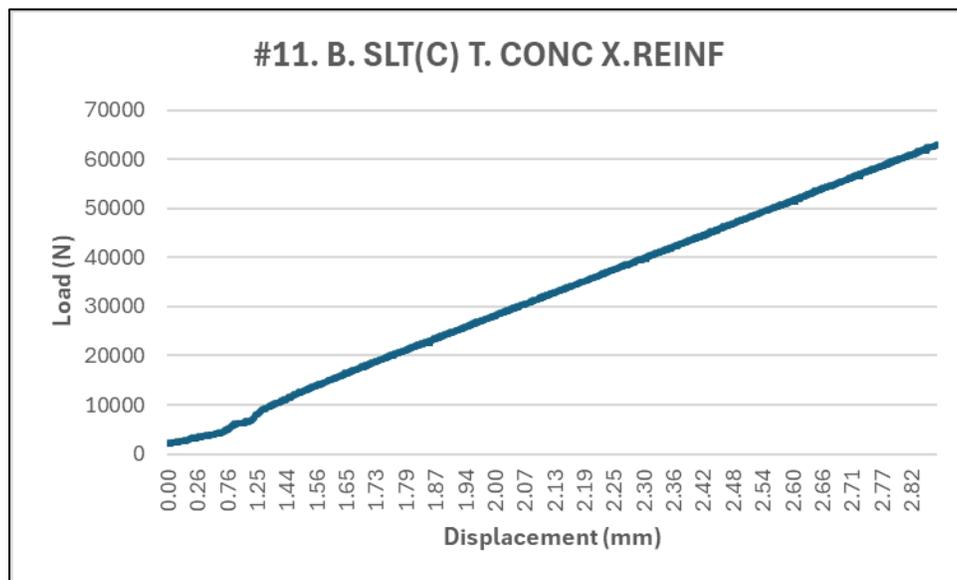


Figure 15. Specimen #11 Results

Specimen Number: #12

Reinforcement: Fiberglass

Max Load: 64,603 N

Failure Mode: Flexural Failure

Max Bending Moment Capacity: 4909.8 N.M



Figure 16. Specimen #12 Failure

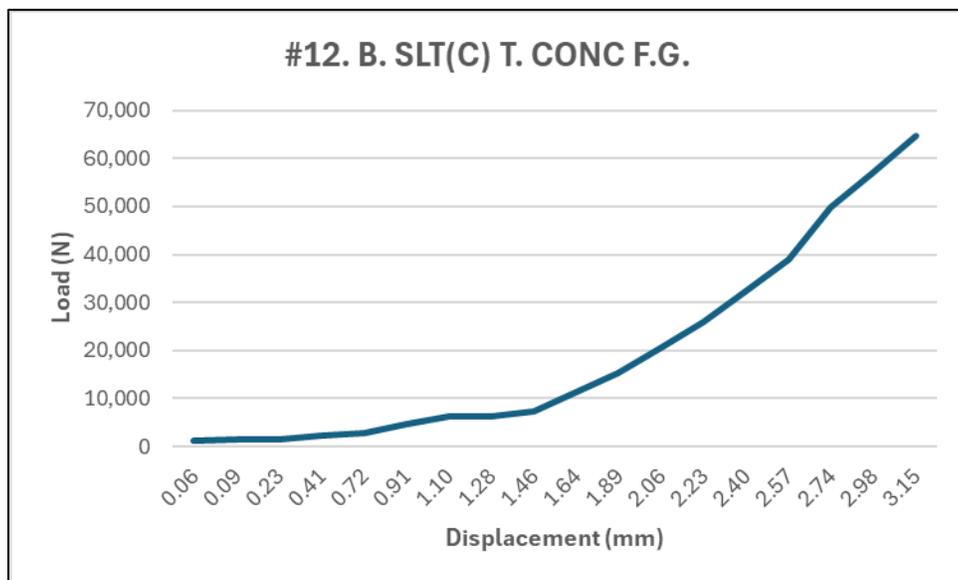


Figure 17. Specimen #12 Results

Specimen Number: #22

Reinforcement: None

Max Load: 49,393 N

Failure Mode: Flexural Failure

Max Bending Moment Capacity: 3753.9 N.M



Figure 18. Specimen #22 Failure

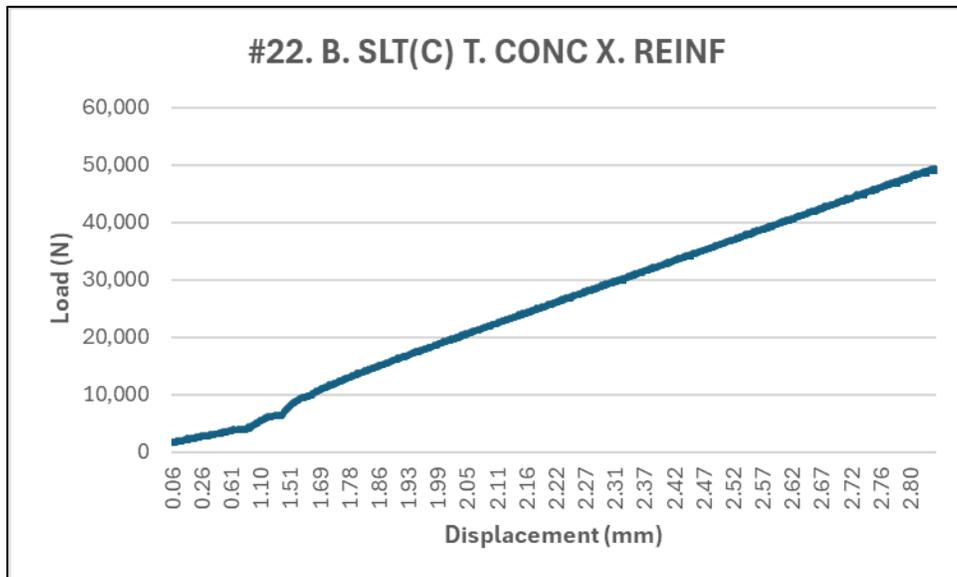


Figure 19. Specimen #22 Results

Specimen Number: #24

Reinforcement: Fiberglass

Max Load: 47,800 N

Failure Mode: Shear Moment Failure

Max Shear Capacity: 23900 N.M



Figure 20. Specimen #24 Failure

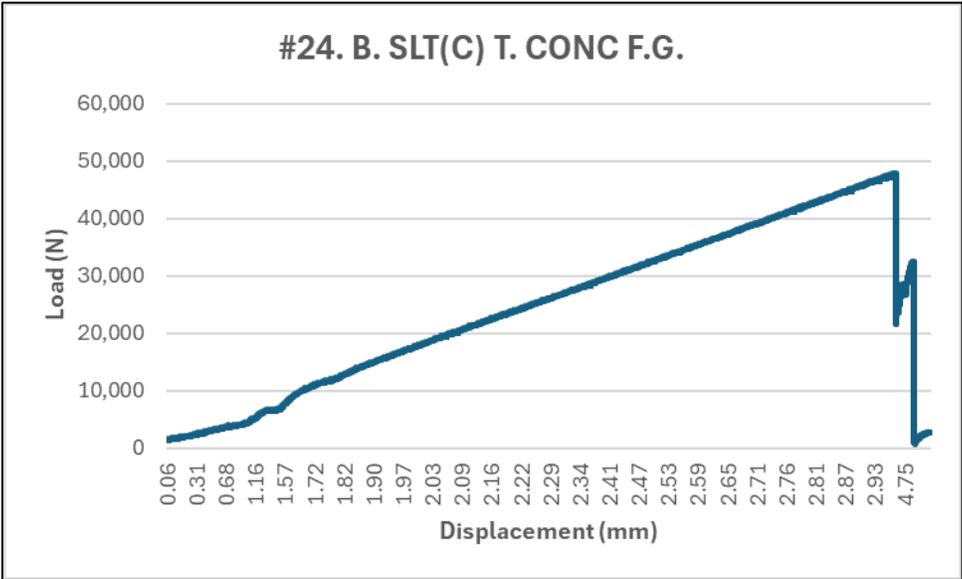


Figure 21. Specimen #24 Results

Specimen Number: #27

Reinforcement: Fiberglass

Max Load: 33,833 N

Failure Mode: Shear Moment Failure

Max Shear Capacity: 16916.5 N



Figure 22. Specimen #27 Failure

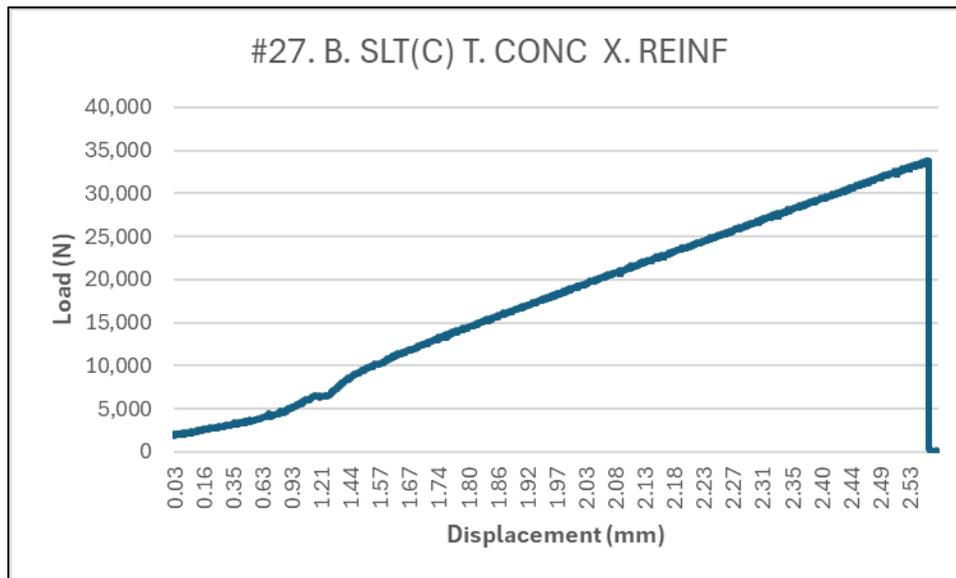


Figure 23. Specimen #27 Results

Specimen Number: #28

Reinforcement: None

Max Load: 30,363 N

Failure Mode: Shear Moment Failure

Max Shear Capacity: 15181.5 N



Figure 24. Specimen #28 Failure

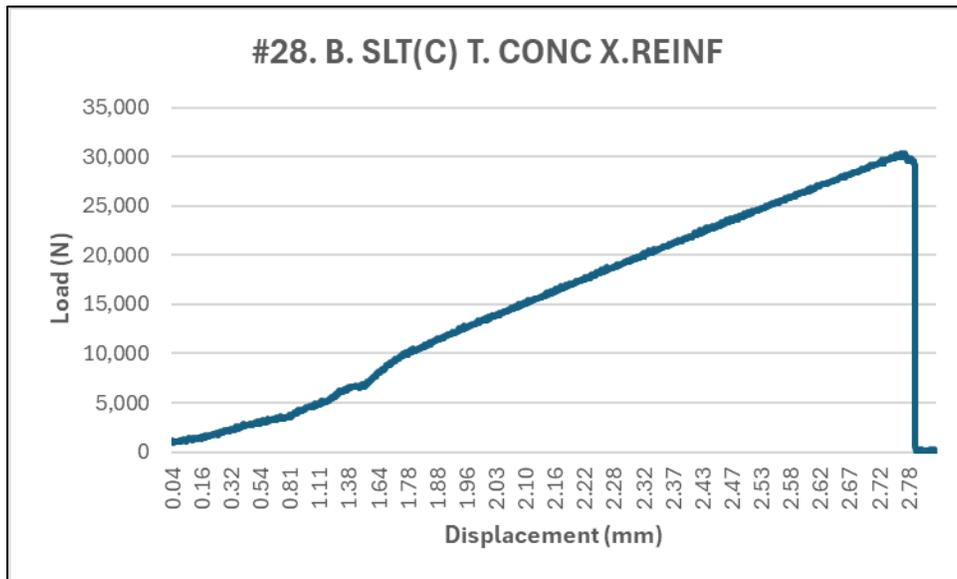


Figure 25. Specimen #28 Results

2.1.3. 4-Point Flexural Strength Atria Sileto on Top

Specimen Number: #13

Reinforcement: Fiberglass

Max Load: 13,343 N

Failure Mode: Flexure Failure

Max Bending Moment Capacity: 1014.1 N.M



Figure 26. Specimen #13 Failure

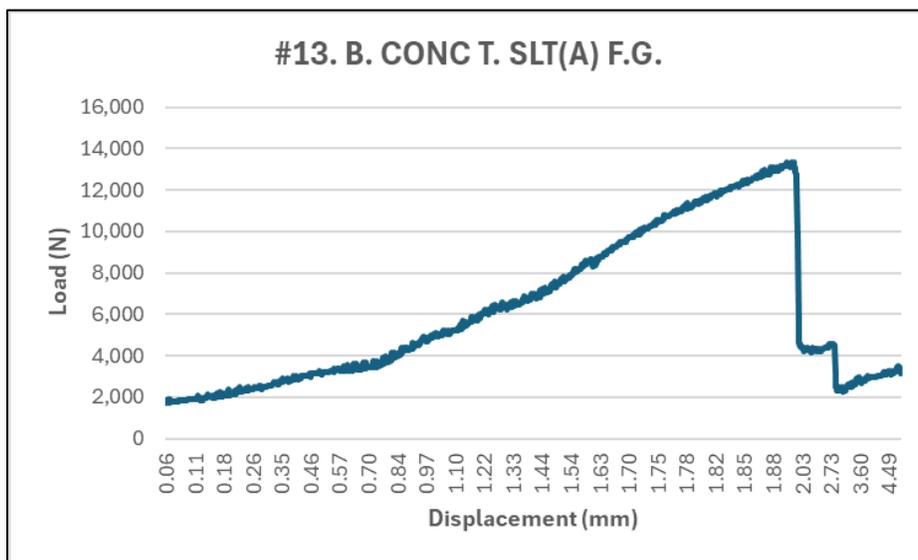


Figure 27. Specimen #13 Results

Specimen Number: #15

Reinforcement: None

Max Load: 7,853 N

Failure Mode: Flexure Failure

Max Bending Moment Capacity: 596.8 N.M



Figure 28. Specimen #15 Failure

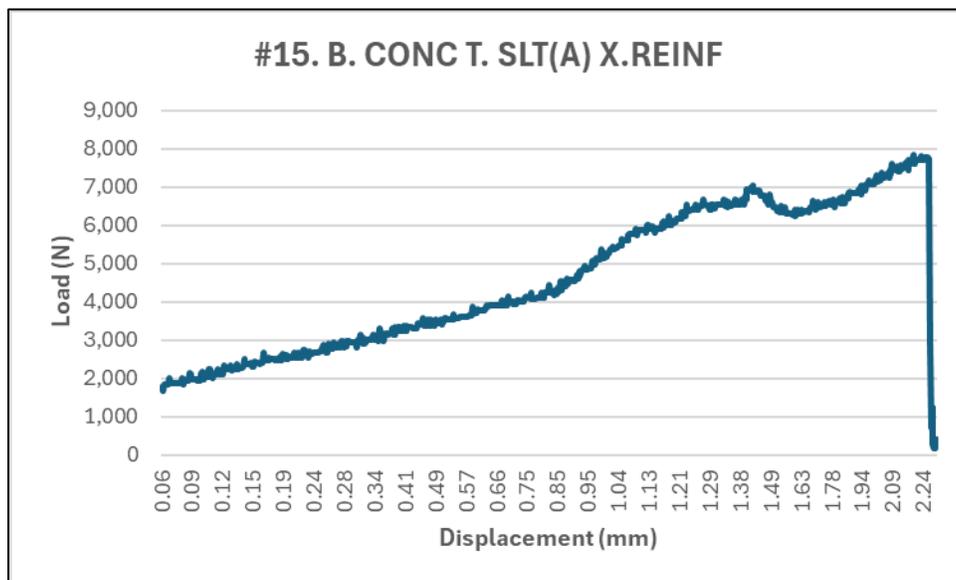


Figure 29. Specimen #15 Results

Specimen Number: #17

Reinforcement: None

Max Load: 14,203 N

Failure Mode: Flexure Failure

Max Bending Moment Capacity: 1079.4 N.M



Figure 30. Specimen #17 Failure

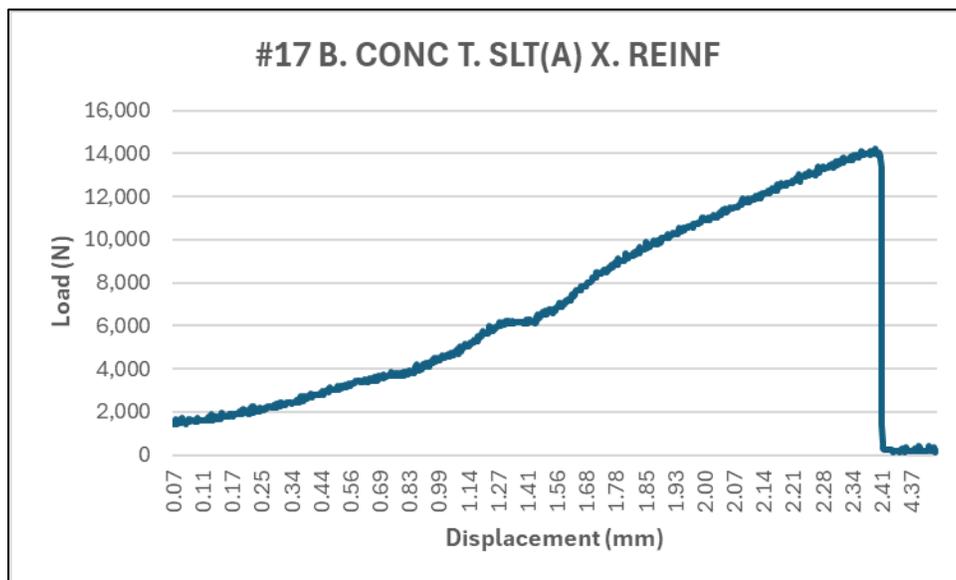


Figure 31. Specimen #17 Results

2.1.4. 4-Point Flexural Strength Atria Sileto on Bottom

Specimen Number: #5

Reinforcement: Fiberglass

Max Load: 66,327 N

Failure Mode: Flexure Failure

Max Bending Moment Capacity: 5040.9 N.M



Figure 32. Specimen #5 Failure

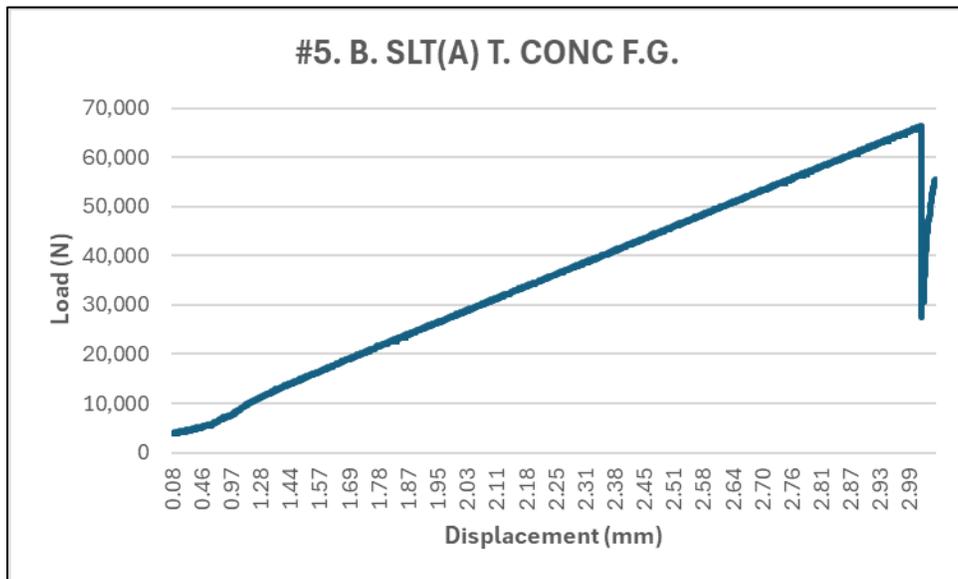


Figure 33. Specimen #5 Results

Specimen Number: #16

Reinforcement: Fiberglass

Max Load: 57,297 N

Failure Mode: Flexure Failure

Max Bending Moment Capacity: 4354.6 N.M



Figure 34. Specimen #16 Failure

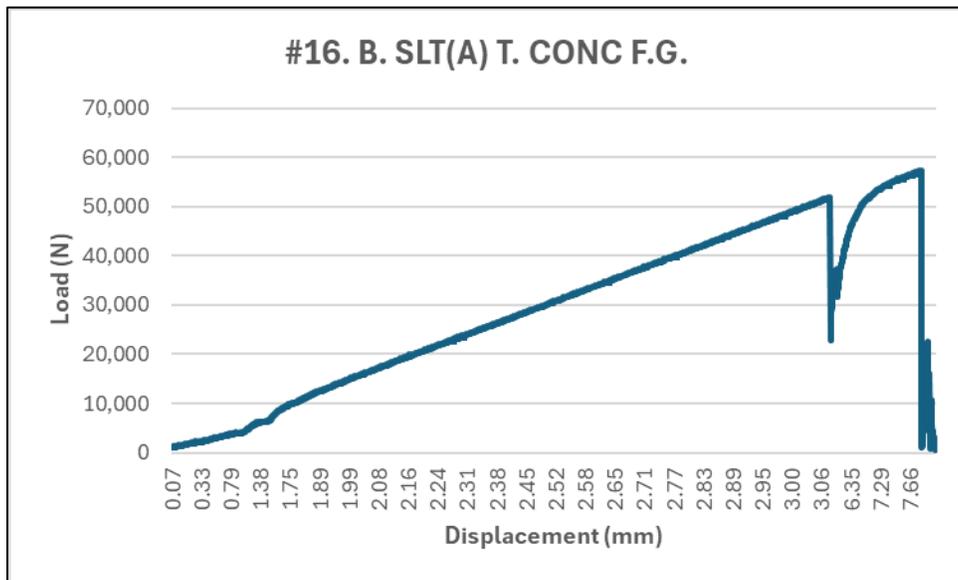


Figure 35. Specimen #16 Results

Specimen Number: #19

Reinforcement: None

Max Load: 44,283 N

Failure Mode: Flexure Failure

Max Bending Moment Capacity: 3365.5 N.M



Figure 36. Specimen #19 Failure

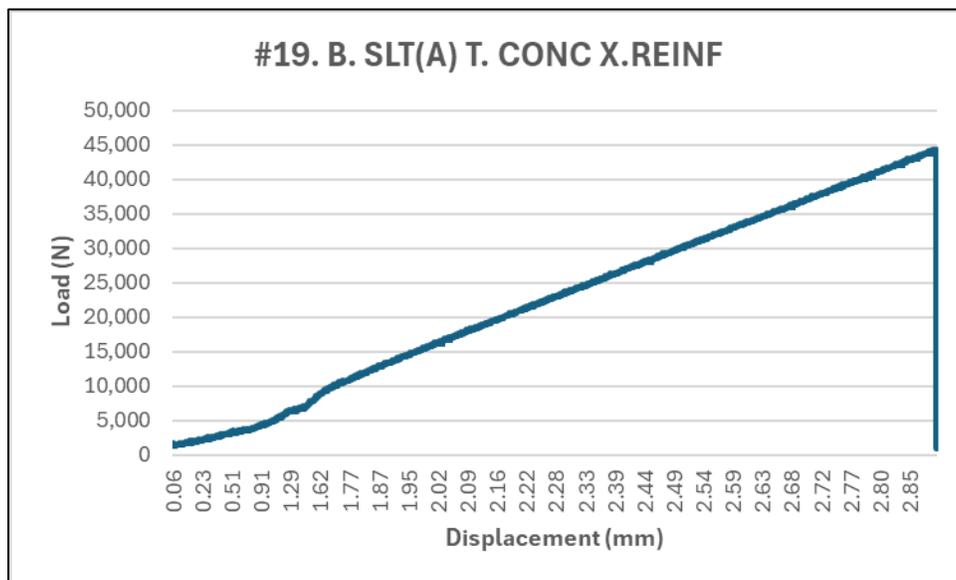


Figure 37. Specimen #19 Results

2.1.5. 4-Point Flexural Strength Fenix Sileto on Top

Specimen Number: #7

Reinforcement: None

Max Load: 20,640 N

Failure Mode: Flexure Failure

Max Bending Moment Capacity: 1568.6 N.M



Figure 38. Specimen #7 Failure

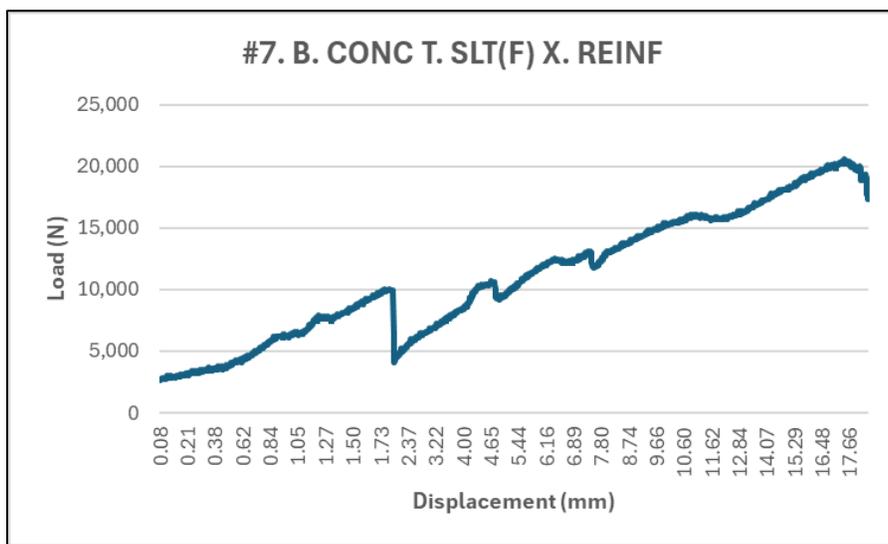


Figure 39. Specimen #7 Results

Specimen Number: #10

Reinforcement: None

Max Load: 19,993 N

Failure Mode: Flexure Failure

Max Bending Moment Capacity: 1519.5 N.M



Figure 40. Specimen #10 Failure

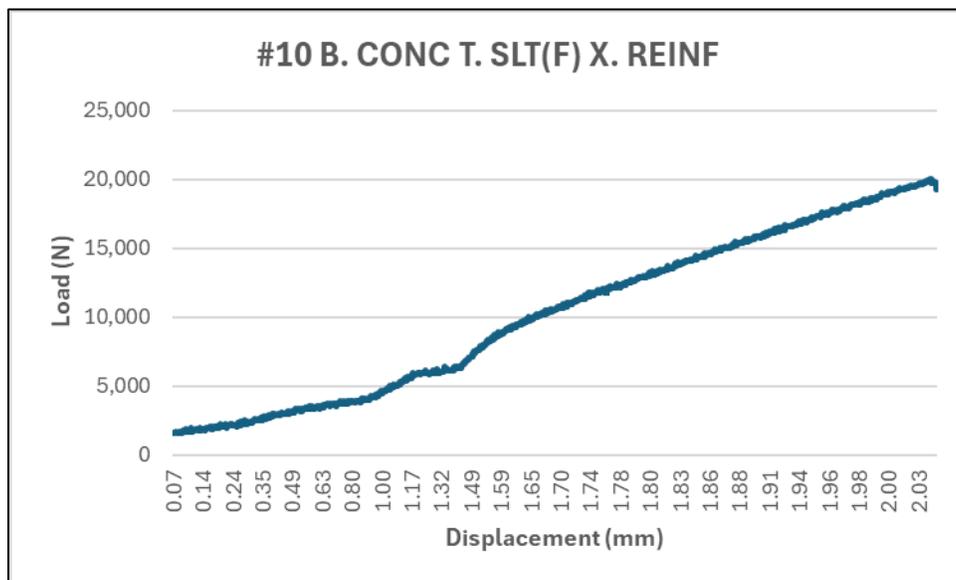


Figure 41. Specimen #10 Results

Specimen Number: #20

Reinforcement: None

Max Load: 10,553 N

Failure Mode: Flexure Failure

Max Bending Moment Capacity: 802 N.M



Figure 42. Specimen #20 Failure

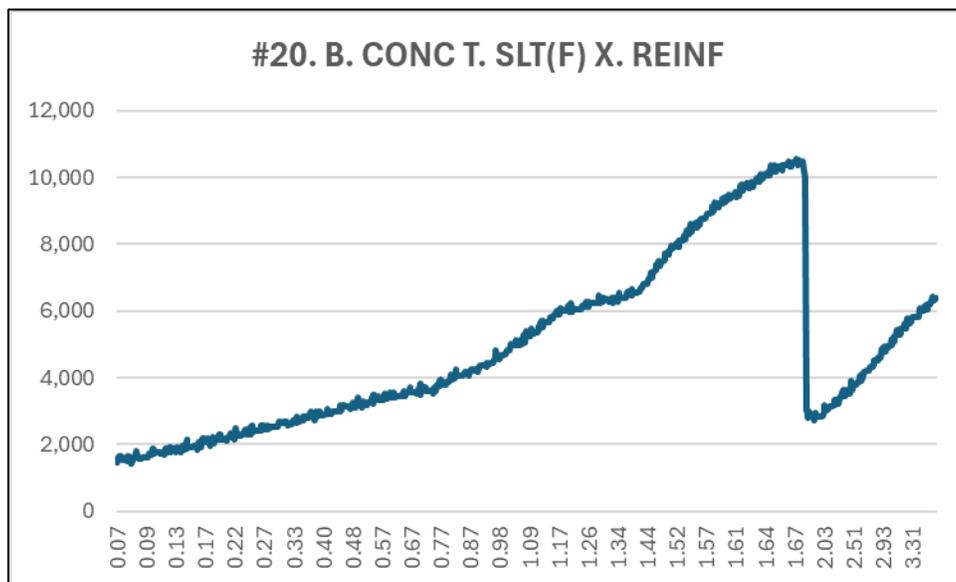


Figure 43. Specimen #20 Results

2.1.6. 4-Point Flexural Strength Fenix Sileto on Bottom

Specimen Number: #9

Reinforcement: Fiberglass

Max Load: 67,310 N

Failure Mode: Flexure Failure

Max Bending Moment Capacity: 5115.6 N.M



Figure 44. Specimen #9 Failure

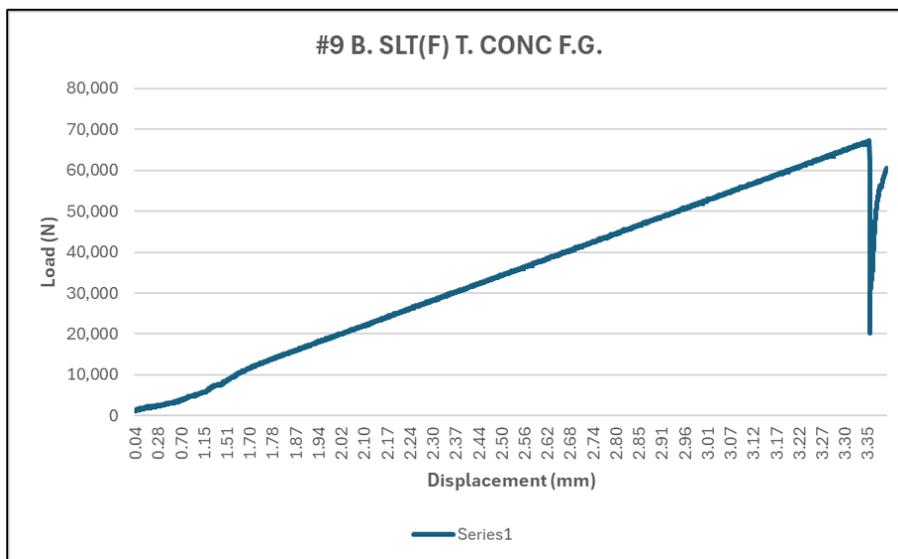


Figure 45. Specimen #9 Results

Specimen Number: #14

Reinforcement: Fiberglass

Max Load: 68,073 N

Failure Mode: Flexure Failure

Max Bending Moment Capacity: 5173.5 N.M



Figure 46. Specimen #14 Failure

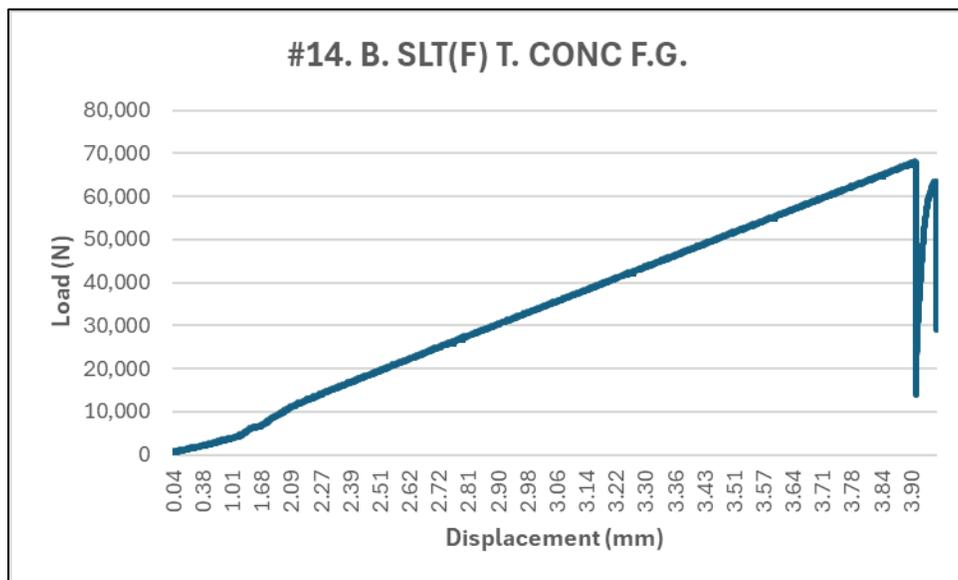


Figure 47. Specimen #14 Results

Specimen Number: #18

Reinforcement: None

Max Load: 33,483 N

Failure Mode: Flexure Failure

Max Bending Moment Capacity: 2544.7 N.M



Figure 48. Specimen #18 Failure

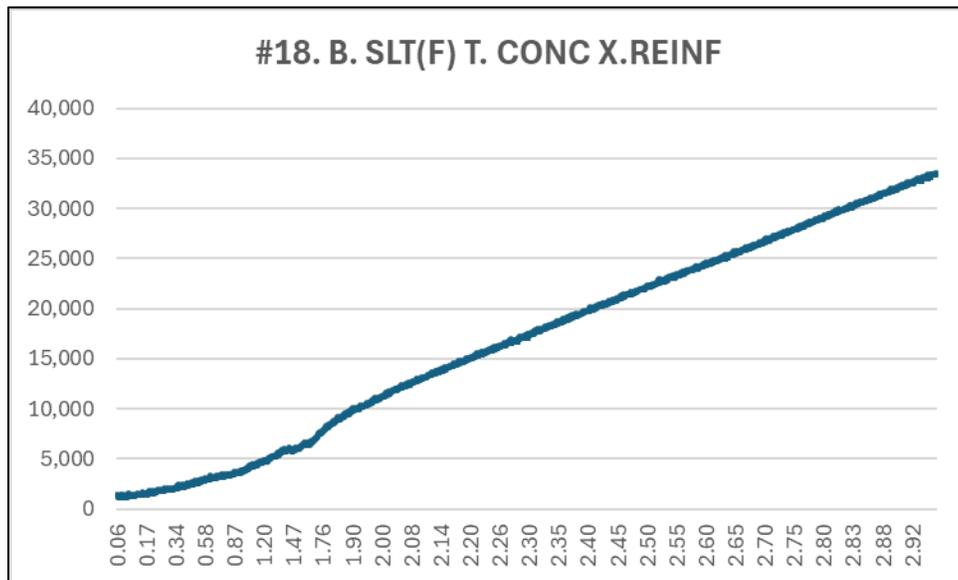


Figure 49. Specimen #18 Results

Specimen Number: #23

Reinforcement: None

Max Load: 52,090 N

Failure Mode: Shear Moment Failure

Max Shear Capacity: 26045 N



Figure 50. Specimen #23 Failure

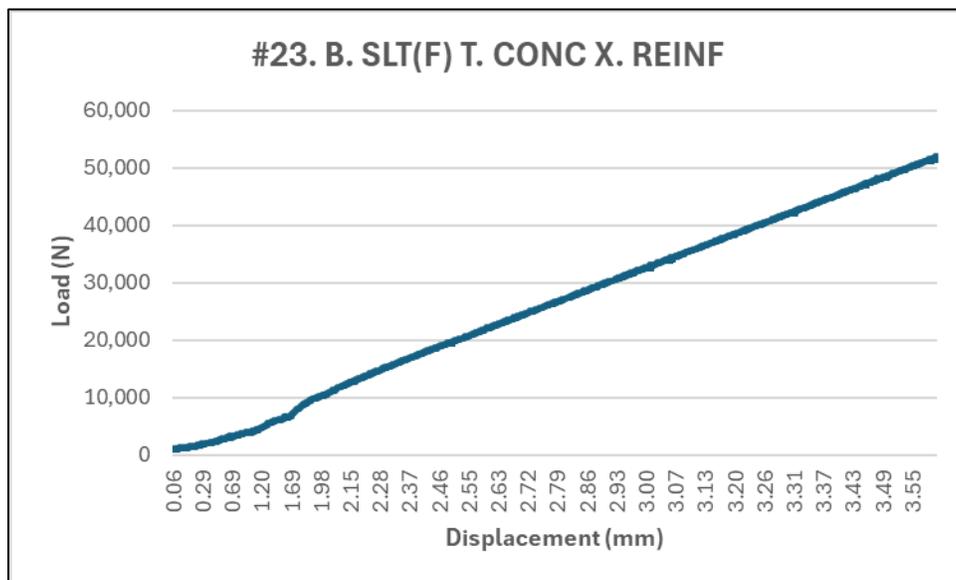


Figure 51. Specimen #23 Results

Specimen Number: #26

Reinforcement: Fiberglass

Max Load: 21,770 N

Failure Mode: Flexure Failure

Max Bending Moment Capacity: 1654.5 N.M



Figure 52. Specimen #26 Failure

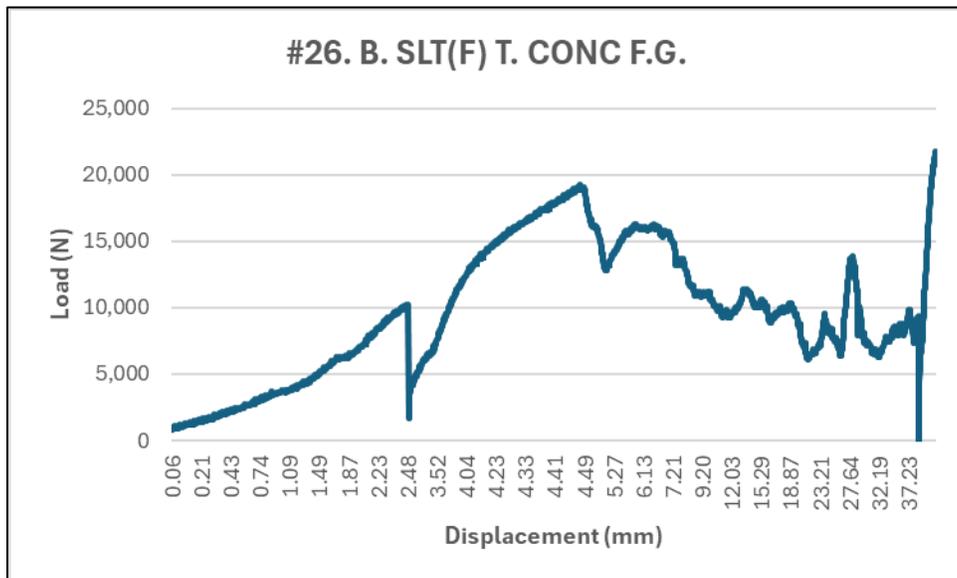


Figure 53. Specimen #26 Results

Specimen Number: #29

Reinforcement: None

Max Load: 14,813 N

Failure Mode: Flexure Failure

Max Bending Moment Capacity: 1125.8 N.M



Figure 54. Specimen #29 Failure

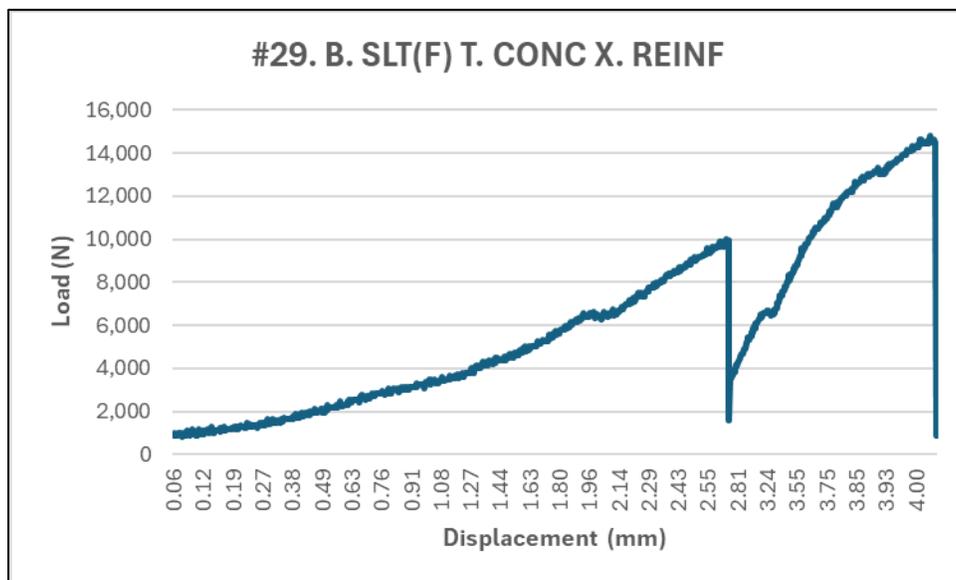


Figure 55. Specimen #29 Results

2.1.7. 4-Point Flexural Strength Specimens That Delaminated During Shipping

Specimen Number: #30 (concrete only)

Reinforcement: None

Max Load: 12,477 N

Failure Mode: Flexure Failure

Max Bending Moment Capacity: 948.3 N.M



Figure 56. Specimen #30 Failure

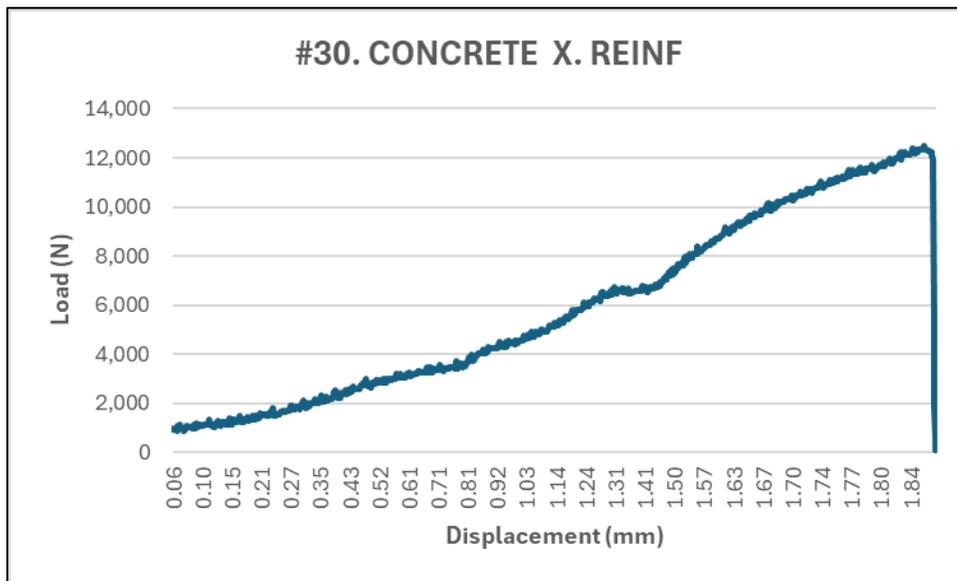


Figure 57. Specimen #30 Results

Specimen Number: #31 (Fenix Sileto with fiberglass)

Reinforcement: Fiberglass

Max Load: 4,757 N

Failure Mode: Flexure Failure

Max Bending Moment Capacity: 361.5 N.M



Figure 58. Specimen #31 Failure

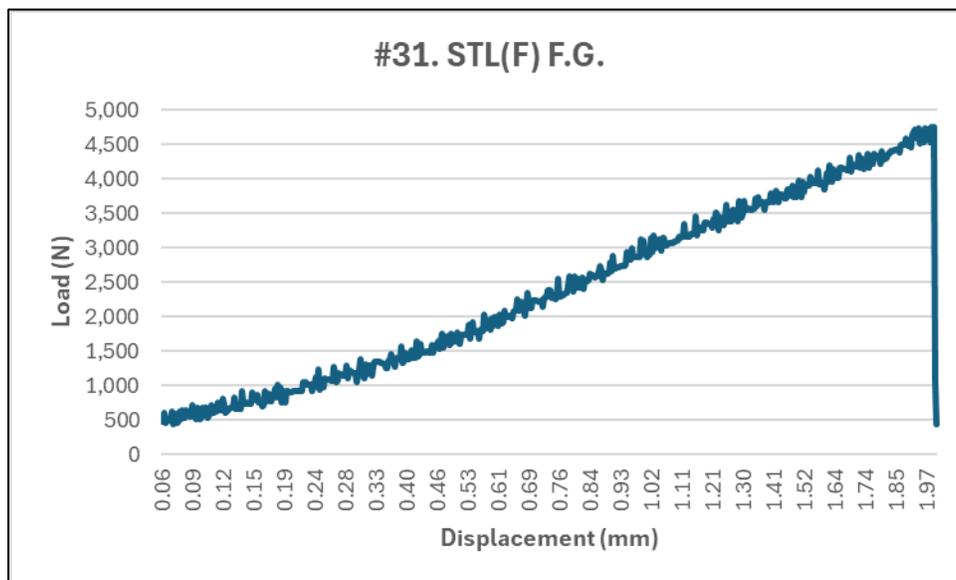


Figure 59. Specimen #31 Results

Specimen Number: #32 (concrete only)

Reinforcement: None

Max Load: 10,890 N

Failure Mode: Flexure Failure

Max Bending Moment Capacity: 827.6 N.M

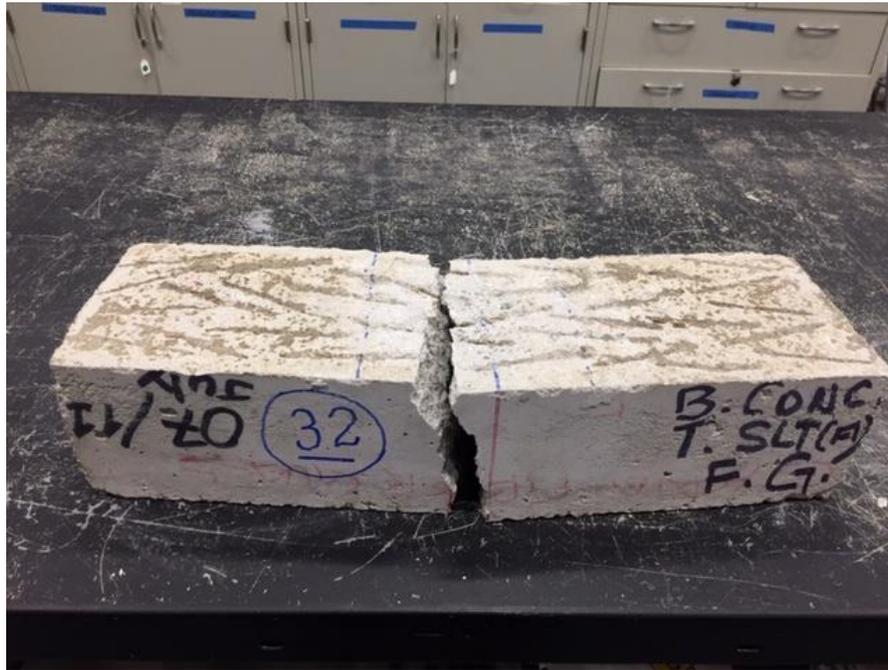


Figure 60. Specimen #32 Failure

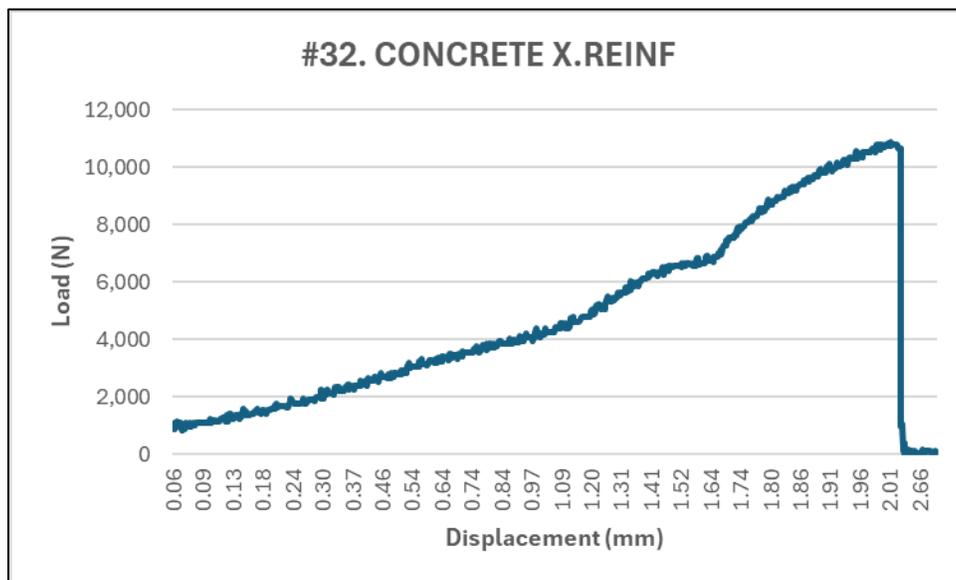


Figure 61. Specimen #32 Results

Specimen Number: #33 (concrete only)

Reinforcement: None

Max Load: 8,340 N

Failure Mode: Flexure Failure

Max Bending Moment Capacity: 633.8 N.M



Figure 62. Specimen #33 Failure

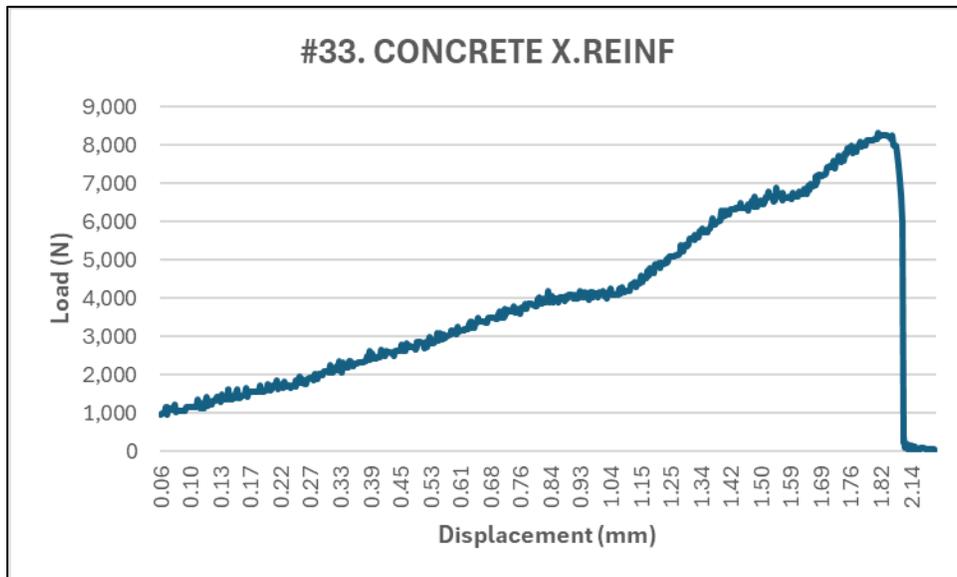


Figure 63. Specimen #33 Results

Specimen Number: #34 (Fenix Sileto without reinforcement)

Reinforcement: None

Max Load: 5,480 N

Failure Mode: Flexure Failure

Max Bending Moment Capacity: 416.5 N.M



Figure 64. Specimen #34 Failure

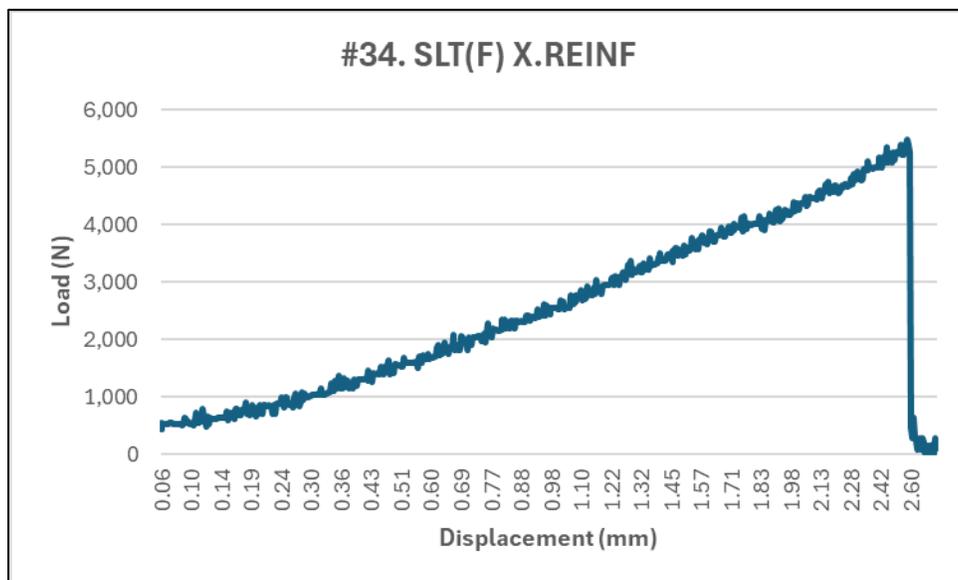


Figure 65. Specimen #34 Results

Specimen Number: #35 (Fenix Sileto with fiberglass)

Reinforcement: Fiberglass

Max Load: 7,403 N

Failure Mode: Flexure Failure

Max Bending Moment Capacity: 562.6 N.M



Figure 66. Specimen #35 Failure

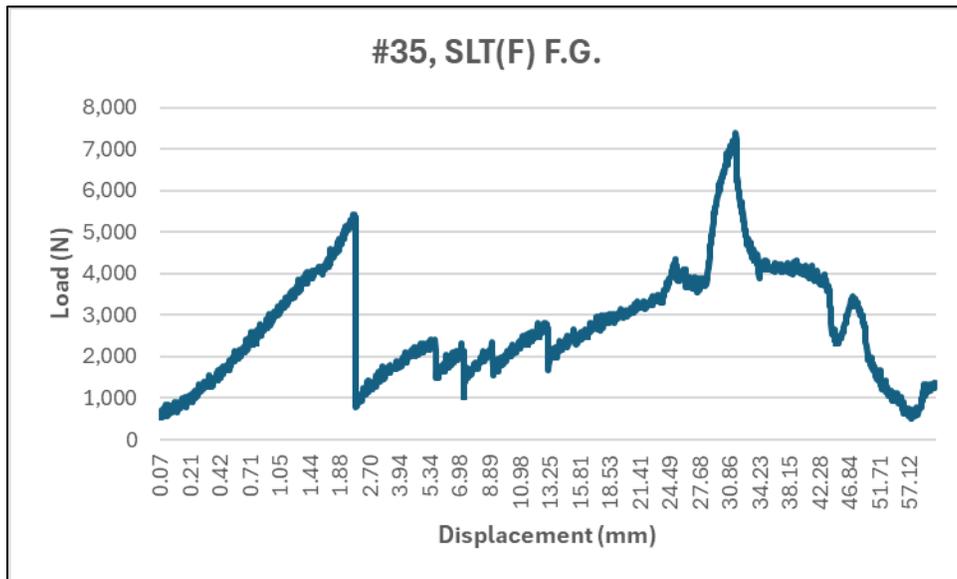


Figure 67. Specimen #35 Results

Figure 68 shows the average 4-point flexural strength results for the specimens that did not delaminate during shipping.

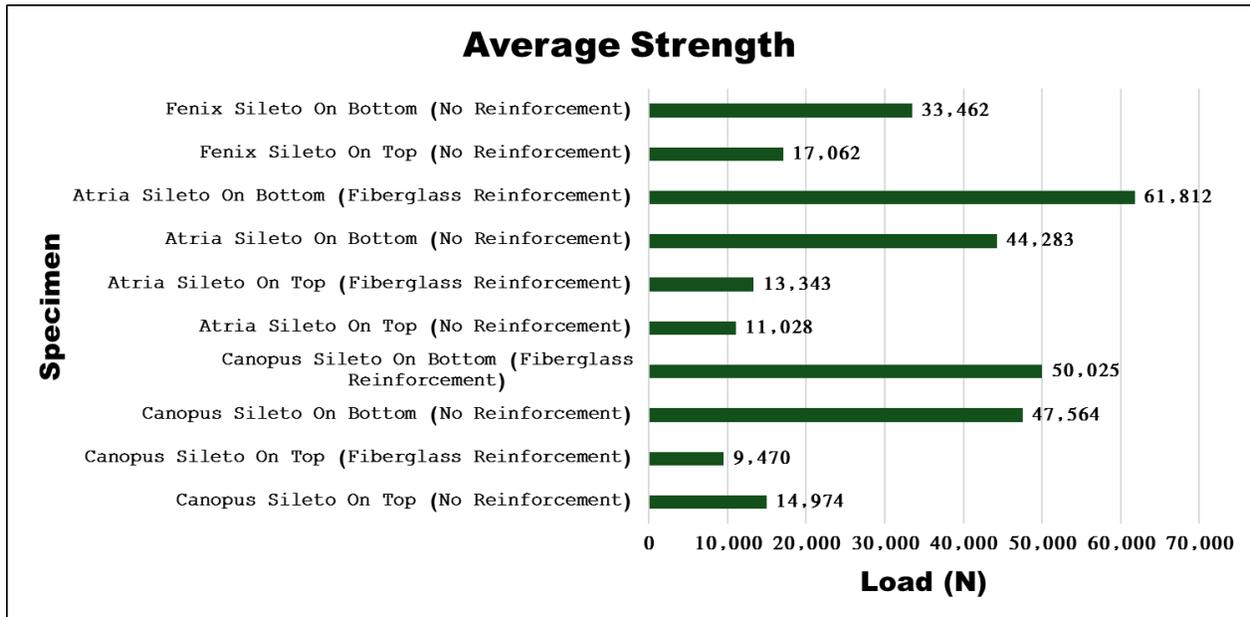


Figure 68. Average results from specimens that did not delaminate during shipping

2.2. Conclusions and Recommendations

Tests observations and results summarized in Figure 68 above, provides basis to make following conclusions, and recommendations:

- Addition of a layer of Sileto on tension side of test specimens was effective in increasing the flexural capacity of the beam specimens.
- Addition of fiber glass as tension reinforcement did result in increase in flexural capacity. This behavior also indicates that the bond between normal strength concrete and Sileo was good enough to utilize some level of tension capacity provided by Fiber Glass.
- Addition of Sileto is not effective when added in compression side.

Test specimens were prepared by Sileto and FIU team was not involved in preparation of these test specimens. Therefore FIU team does not have knowledge of how Sileto layer was placed over normal strength concrete and its curing procedure. However, the test results indicates that the method of placing layer of Sileto on normal strength concrete to increase the flexural capacity of the beams was effective.

There were significant differences between compressive capacity of normal strength concrete used in the test specimens and compressive capacity of Sileto. This can influence the conclusions, as effectiveness of Sileto as retrofit/upgrade material for enhancing flexural capacity of structural elements. In practice the compressive capacity of conventional type concrete used in practice is higher than those used in the test specimen. It is recommended that in future normal strength concrete with compressive strength of at least 5000 psi to be used in test specimens.

It is recommended that in future, comprehensive study be carried out to better understand, bond between Sileto layer and hardened concrete over which Sileto is applied. Both short- and long-term bond behavior needs to be investigated. This is especially important, as Sileto's best application is believed to be to retrofit/upgrade the capacity of existing deficient structures. Sileto could be an excellent material for retrofit/upgrade if it can be delivered to site and used similar to conventional concrete.

CHAPTER 3. 3-POINT FLEXURAL STRENGTH OF RAILROAD TIE

Sileto provided a railroad tie to be tested. In this section only results of tests are provided, without any conclusions or recommendations.

The 3-point flexural strength testing of the railroad tie shown in Figure 69. The railroad tie had dimensions of 280cm x 30cm x 30cm with a clear span between the two rigid supports of 225 cm. Each end of the tie was resting on a Teflon sheet during the test. The tie was also reinforced with fiberglass fibers. The specimen was loaded using a hydraulic ram. Load cells as well as pressure transducers were utilized to measure the applied load on the specimen. Deflection gages were used to measure the deflection of the specimen.



Figure 69. 3-Point Flexural Strength Testing of The Railroad Tie

3.1. Results



Figure 70. Railroad Tie Failure

Max Load: 86,108 N

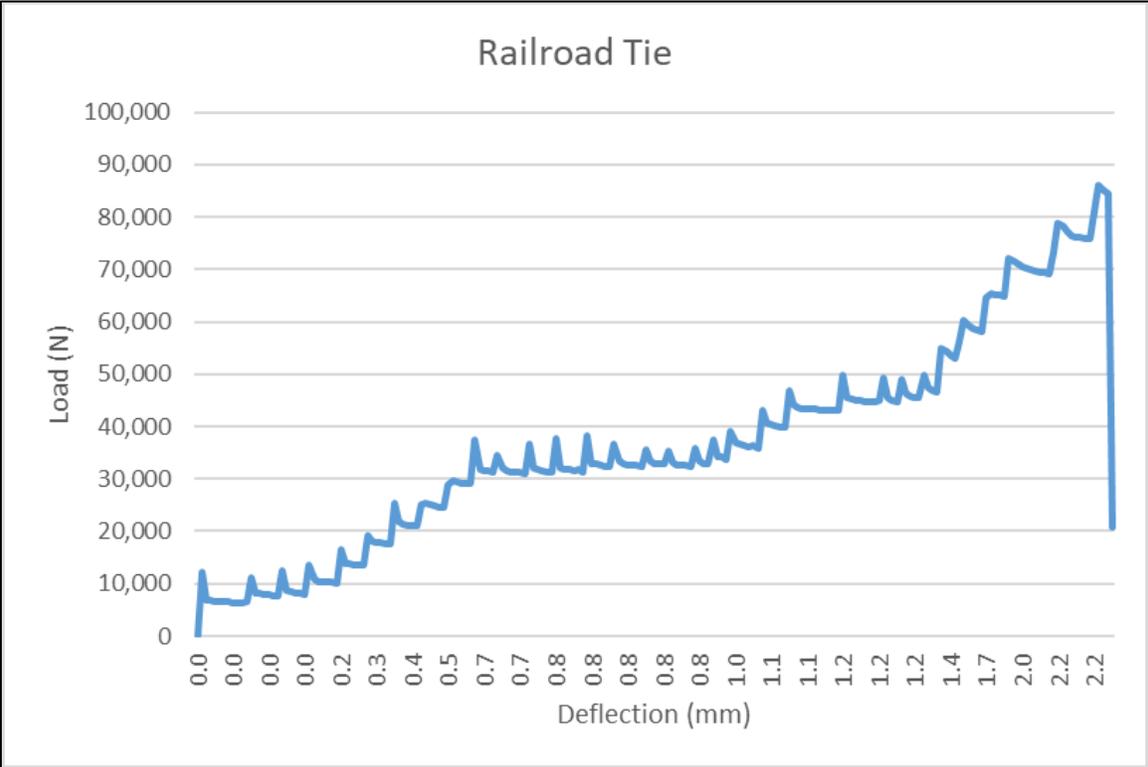


Figure 71. Railroad Tie Results

CHAPTER 4. COMPRESSIVE STRENGTH OF CYLINDRICAL COLUMNS

One of the best applications of Sileto, could be increasing the axial load carrying capacity of the concrete or timber columns, in existing structures, needing retrofit/upgrade. Excellent durability characteristics of Sileto also makes the Sileto a very good construction material for being proactive and protecting existing columns in buildings and bridges against corrosion, especially in coastal areas, where constructed facilities are prone to chloride and/or carbon induced corrosion.

To develop preliminary information on effectiveness of Sileto as a construction material to retrofit/upgrade capacity of existing deficient columns, series of tests were conducted on small scale concrete columns wrapped by Sileto. Test specimens were prepared by Sileto in Brazil and were shipped to FIU for testing. Total of five (5) columns were fabricated from either Canopus, Fenix, or Atria material. Each cylindrical column had an average length of approximately 100 cm with diameters of either 15 or 20 cm. These columns were tested under pure axial load. To ensure stability and uniform load distribution over the column ends, blocks made of UHPC were cast on both ends of each specimen. Each specimen was subjected to axial load using a hydraulic ram. Load cells as well as pressure transducers were utilized to measure the applied load on the columns. Potentiometers were used to measure the deflection of the specimens. The objective of this testing is to determine the effect of different types of Sileto concrete jackets, either reinforced with four #5 longitudinal rebars or unreinforced, on the axial compressive capacity of column specimens. The core of each specimen consisted of plain concrete with a 10 cm diameter, without any reinforcement.

Results of individual tests, as well as the details of each column test specimen tested are provided next, followed by conclusions and recommendations.

4.1. Results

4.1.1. Column #1

Material: Retrofit Canopus

Reinforcement: Steel Rebar

Diameter: 20 CM

Initial length of the specimen without UHPC blocks: 99 cm

Length between the UHPC blocks: 85 cm

Length between backs of the UHPC blocks: 103 cm

Maximum Load: 1,284 kN

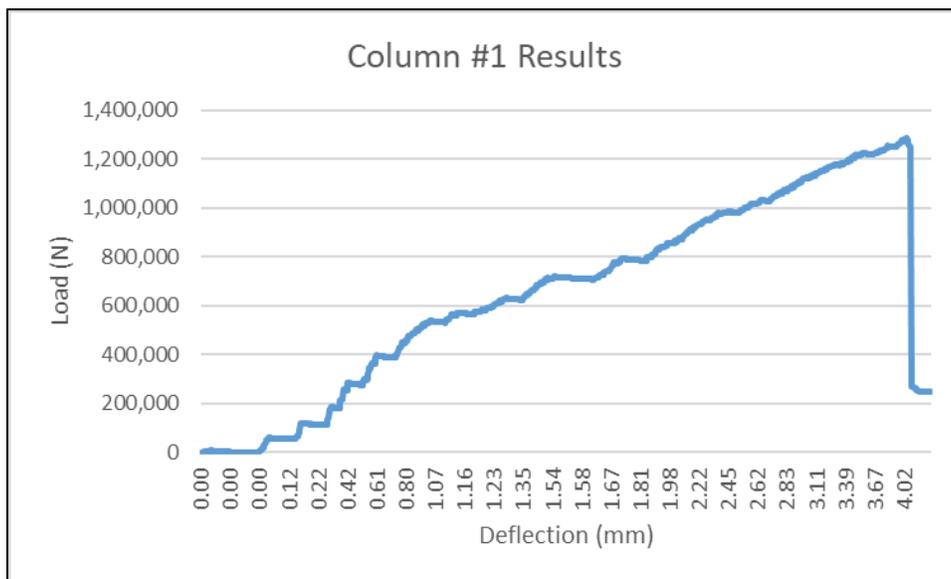


Figure 72. Column #1 Results



Figure 73. Column #1 Testing

4.1.2. *Column #2*

Material: Retrofit Canopus

Reinforcement: None

Diameter: 20 CM

Initial length of the specimen without UHPC blocks: 110 cm

Length between the UHPC blocks: 85 cm

Length between backs of the UHPC blocks: 103 cm

Maximum Load: 1,210 kN

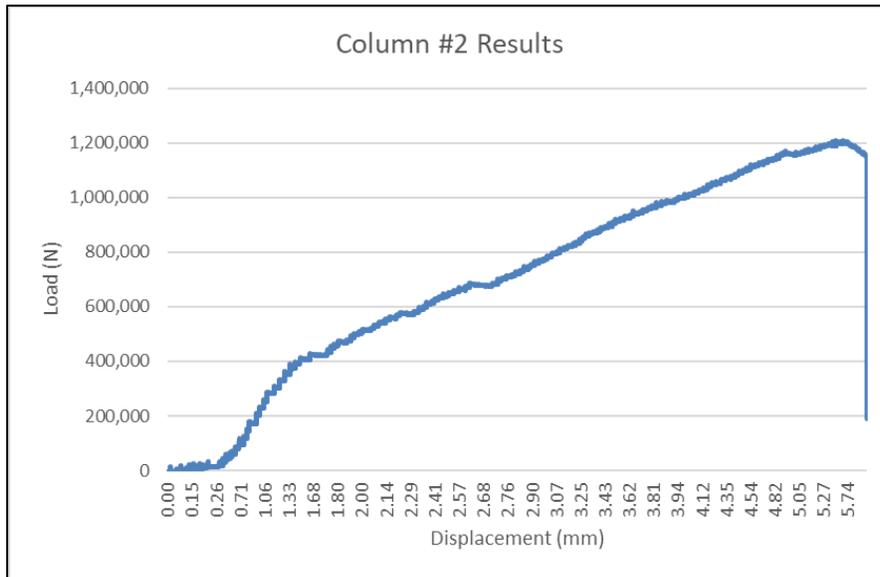


Figure 74. Column #2 Results

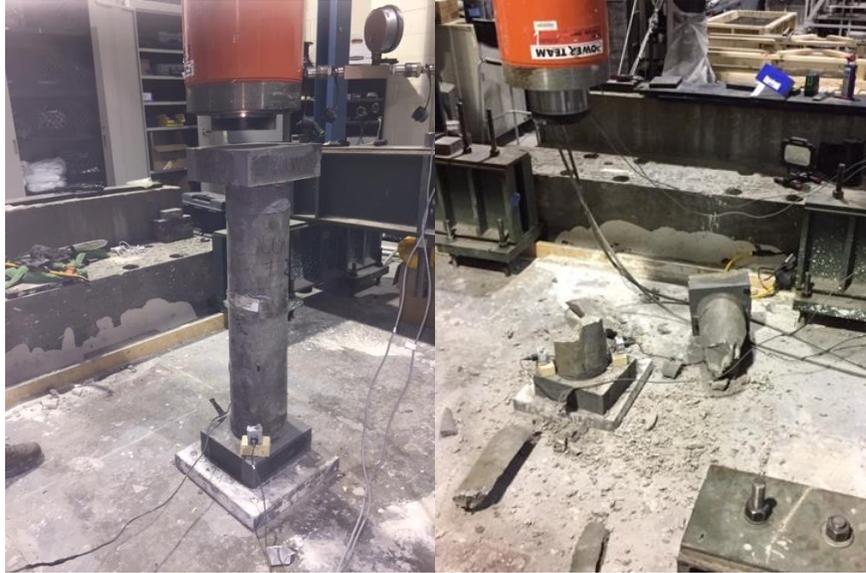


Figure 75. Column #2 Testing

4.1.3. Column #3

Material: Retrofit Fenix

Reinforcement: Steel Rebar

Diameter: 15 CM

Initial length of the specimen without UHPC blocks: 100 cm

Length between the UHPC blocks: 87 cm

Length between backs of the UHPC blocks: 105 cm

Maximum Load: 521,726 N

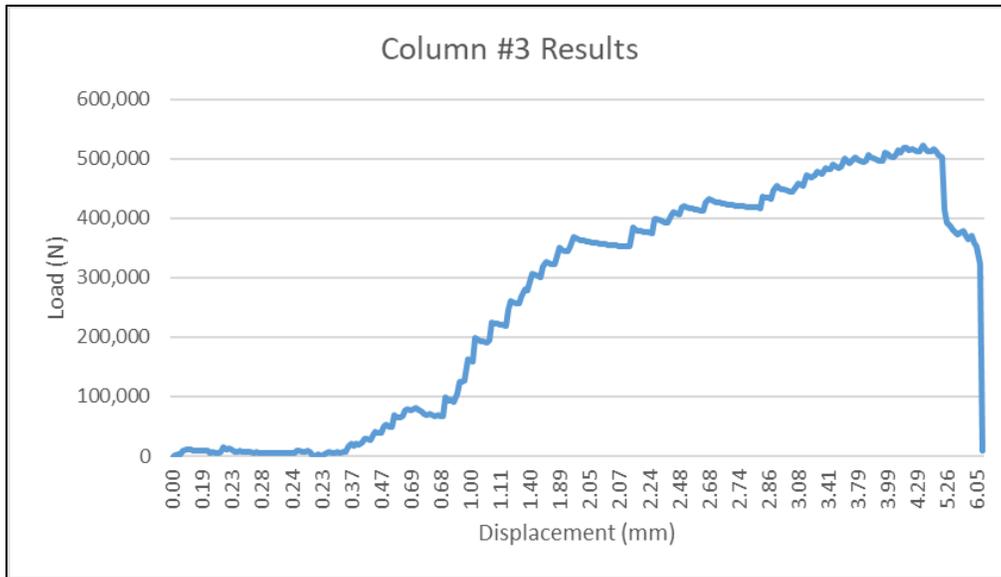


Figure 76. Column #3 Results



Figure 77. Column #3 Testing

4.1.4. Column #4

Material: Retrofit Fenix

Reinforcement: Steel Rebar

Diameter: 20 CM

Initial length of the specimen without UHPC blocks: 100 cm

Length between the UHPC blocks: 87 cm

Length between backs of the UHPC blocks: 105 cm

Maximum Load: 1,569 kN

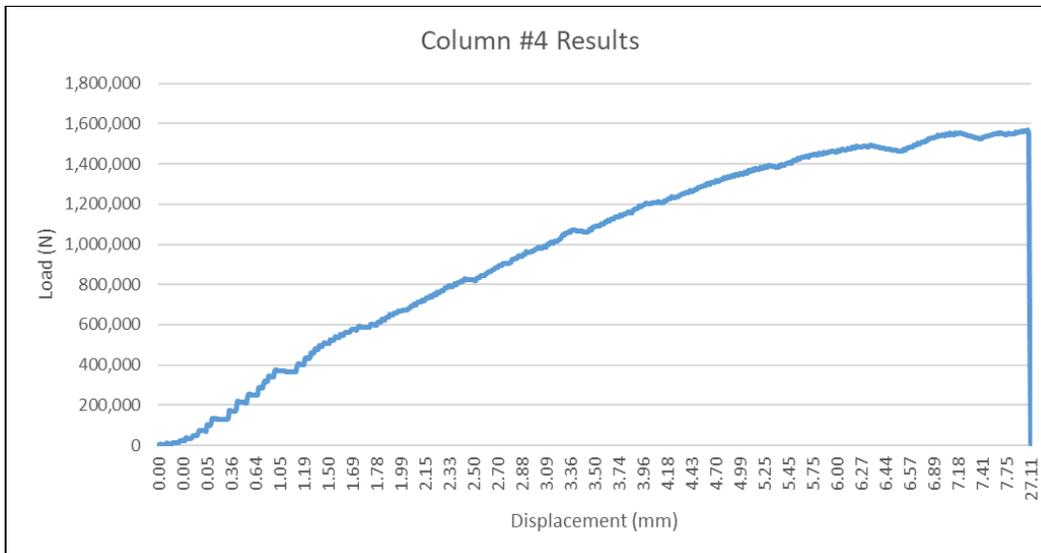


Figure 78. Column #4 Results



Figure 79. Column #4 Testing

4.1.5. *Column #5*

Material: Retrofit Atria

Reinforcement: Steel Rebar

Diameter: 20 CM

Initial length of the specimen without UHPC blocks: 100 cm

Length between the UHPC blocks: 86 cm

Length between backs of the UHPC blocks: 104 cm

Maximum Load: 1,632 kN

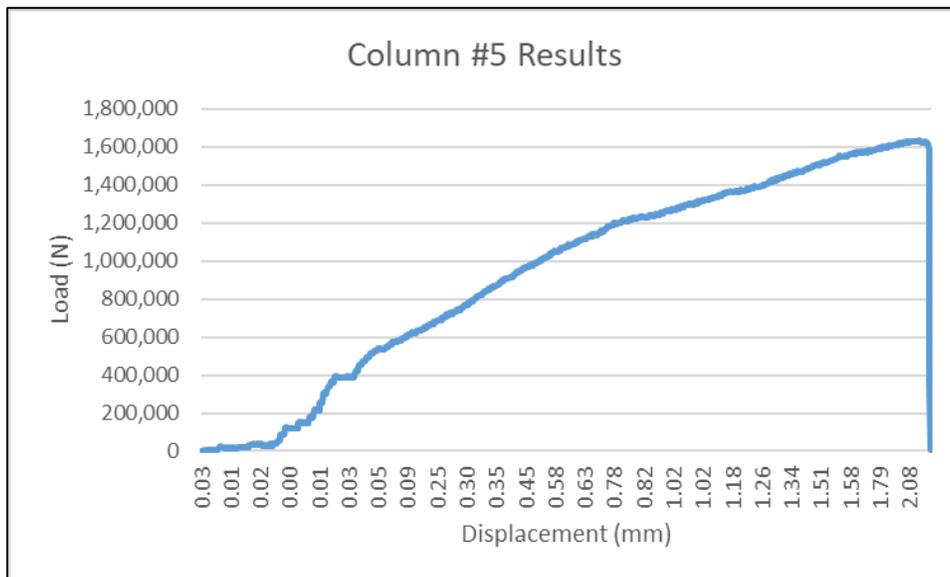


Figure 80. Column #5 Results



Figure 81. Column #5 Testing

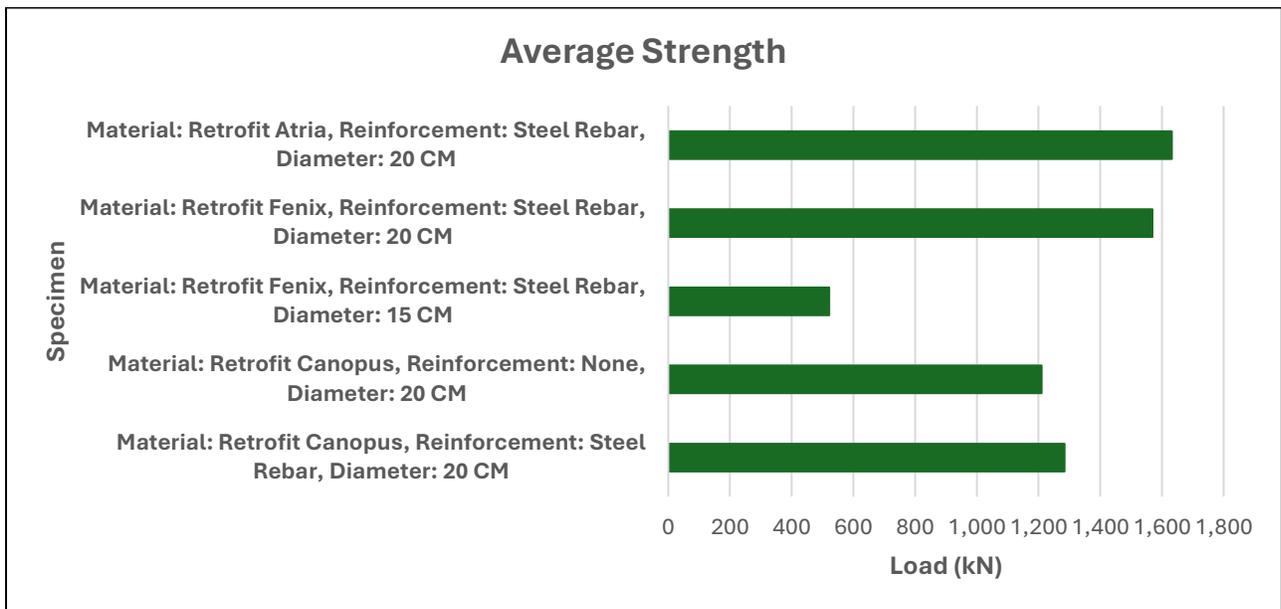


Figure 82. Average Compressive Strength of Cylindrical Columns

4.2. Summary, Conclusions and Recommendations

Concrete columns subjected to pure axial load, in general exhibit a very brittle failure mode. Same observation was observed during testing of the five test specimens described above. Based on the test observations, following tentative conclusions could be made:

- 1) Bond between Sileto and normal strength concrete columns, appeared to be very good.
- 2) Addition of longitudinal reinforcement resulted in relatively ductile mode of failure.

3) None of the test columns included transverse reinforcement. Addition of transverse reinforcement in field application is recommended, as it is also required by governing specifications.

4) tests conducted provided preliminary information that indicates Sileto could be a very good construction materials for retrofitting/upgrading existing deficient columns. Columns in buildings and bridges are subjected to combined axial load and moment. It is recommended that in future, performance of Sileto for increasing capacity of existing deficient columns includes effects of combined axial load and moment.

5) To use Sileto as construction material for retrofit/Upgrade of capacity of existing deficient concrete or timber columns, or for protection against corrosion, it is recommended more organized investigation that aim at comprehending different factors, capable of affecting behavior of columns be designed and conducted.

CHAPTER 5. 3-POINT FLEXURAL STRENGTH OF CONCRETE SLABS

Sileto provided two unmarked slabs believed to be fabricated from Sileto Fenix material for testing. These two slabs, were tested under 3-point flexural loading, as described below. Each slab had an average length of 244 cm with a width of 122 cm and a thickness of 19 cm. Each slab was reinforced with 12 fiberglass fibers that were spaced 10 cm apart with a 5.0 cm cover. Each slab was centered in the testing apparatus which had an open space between the two supports of 225 cm. This allowed for 8.5 cm of each end of the slab to be resting on each support. A rubber sheet was placed between each end of the slab and the support. Each specimen was loaded using a hydraulic ram. Load cells as well as pressure transducers were utilized to measure the applied load on the specimen. Potentiometers were used to measure the deflection of each specimen. The objective of these tests was to determine the maximum bending capacity of the slabs.

Description of each slab test is provided below.

5.1. Slab #1

Material: Fenix

Reinforcement: Fiberglass

Maximum Load: 156,740 N

Maximum Bending Capacity: 81896.7 N.M

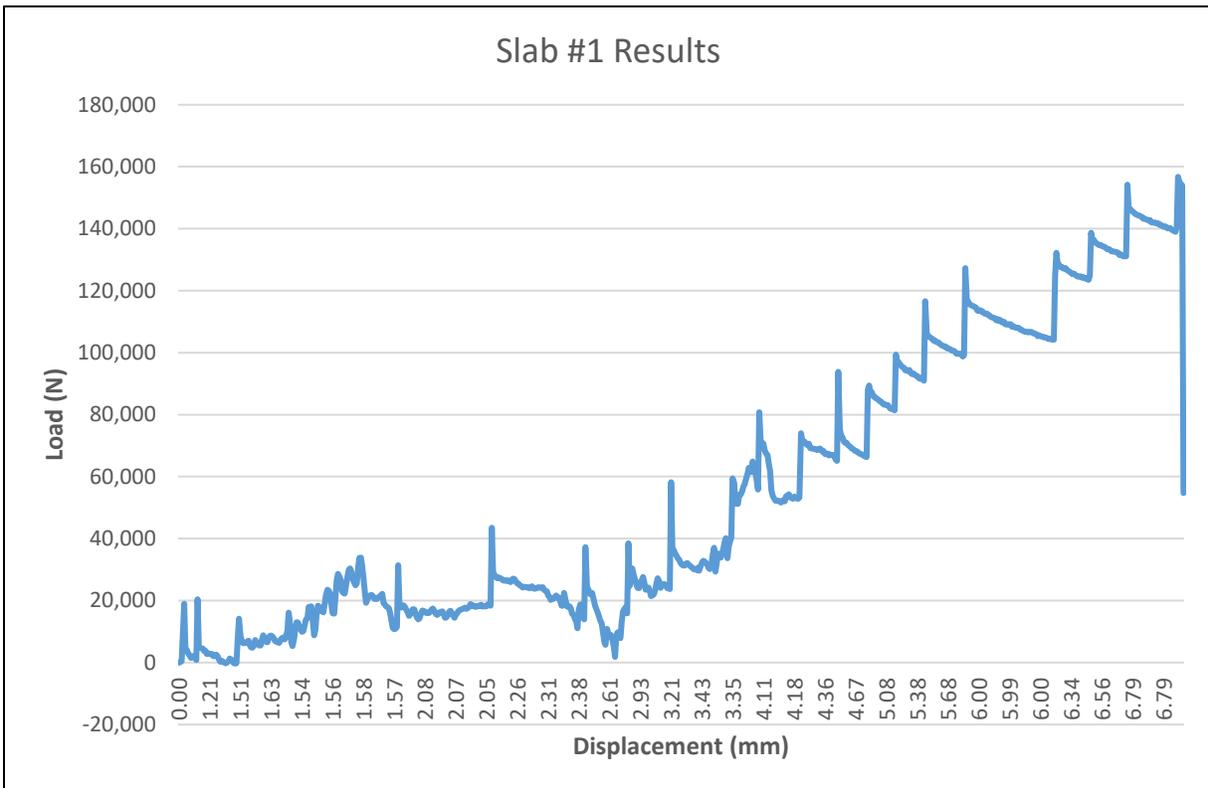


Figure 83. Slab #1 Results



Figure 84. Slab #1 Testing

5.2. Slab #2

Material: Fenix

Reinforcement: Fiberglass

Maximum Load: 170,052 N

Maximum Bending Capacity: 95654.3 N.M

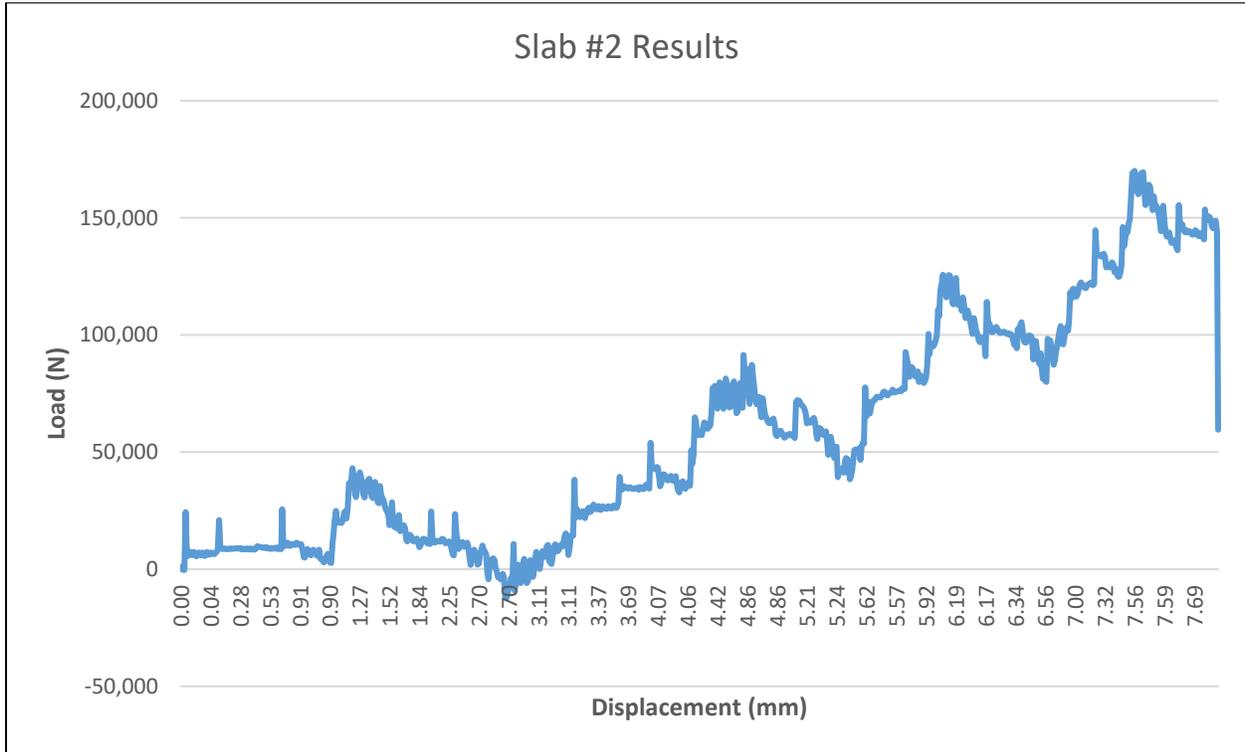


Figure 85. Slab #2 Results



Figure 86. Slab #2 Testing

After test conclusion, it was observed that in slab #2 the fiberglass reinforcement were located exactly in the center of the slab (9.5 cm from the top edge of the slab as tested). However, in slab #1 the fibers were located 7.0 cm from the top edge of the slab as tested.

The procedure used in testing the slabs, placed the fiberglass in slab 1 mainly in compression. In slab 2 test, the fiberglass was closer to tension face. As a result maximum load achieved in slab 2 was higher.

5.3. Conclusion and Recommendations

Based on the limited number of slab tests conducted following conclusions and recommendations are made:

- 1) Sileto could be used as a construction material in precast deck panels, for bridge application. It is recommended that reinforcement, either fiberglass or mild steel be used to increase ductility.
- 2) In typical bridge application, precast panels are fabricated off site and delivered to construction site. In the construction site, precast panels are made composite with steel or concrete girders using shear studs. Further, precast panels are joint using closure joints. These two operations could be achieved in the field using such material as non-shrinkage grout or UHPC. In such scenario there is a need to comprehend interaction between Sileto and other construction materials.
- 3) Sileto could also be used as overlay material in bridge deck.
- 4) Use of Sileto as precast panel or bridge deck overlay is believed to be an excellent application area, since Sileto is a very durable material with high comprehensive strength. To this end a comprehensive investigation needs to be conducted.