Appendix H–Support Data

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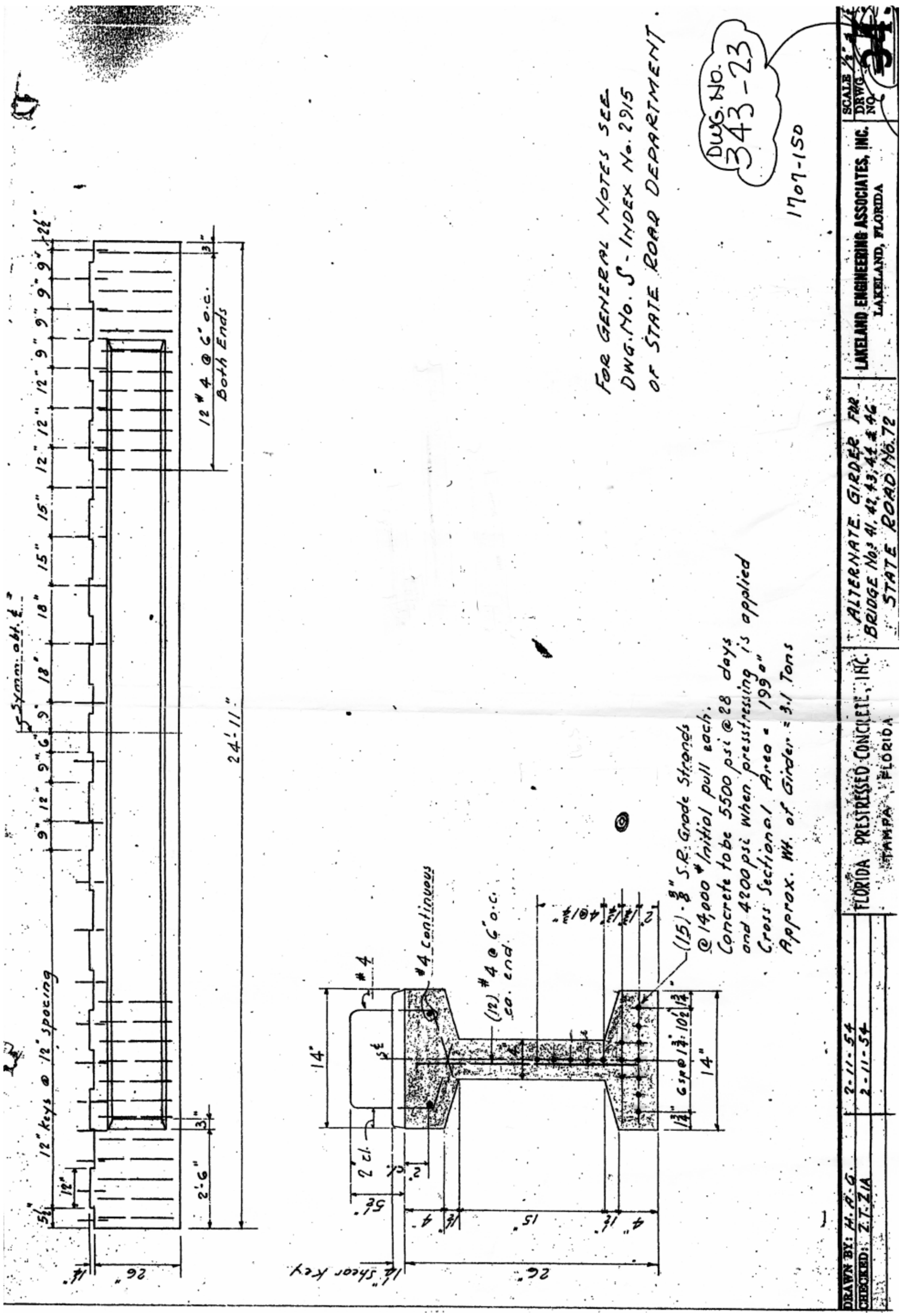
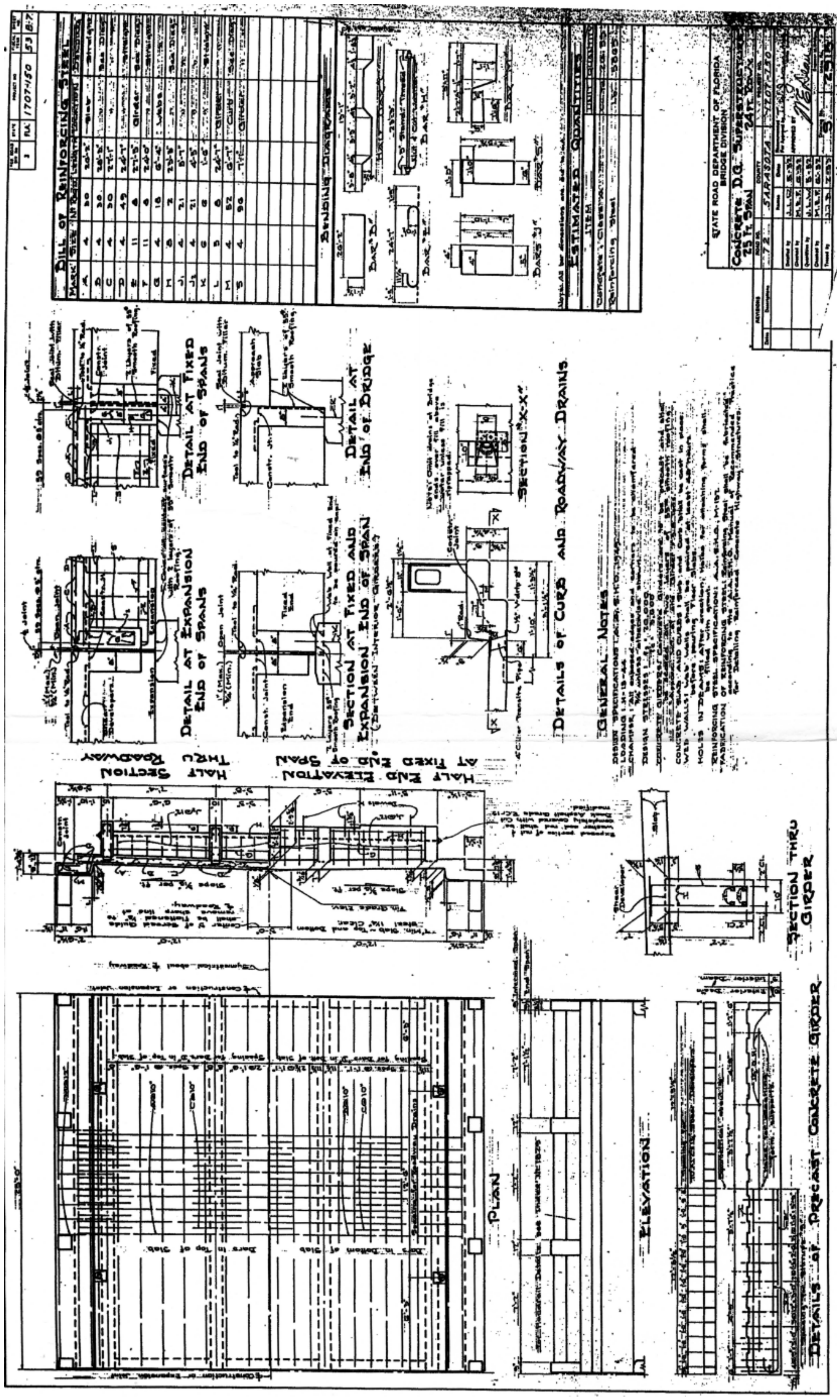
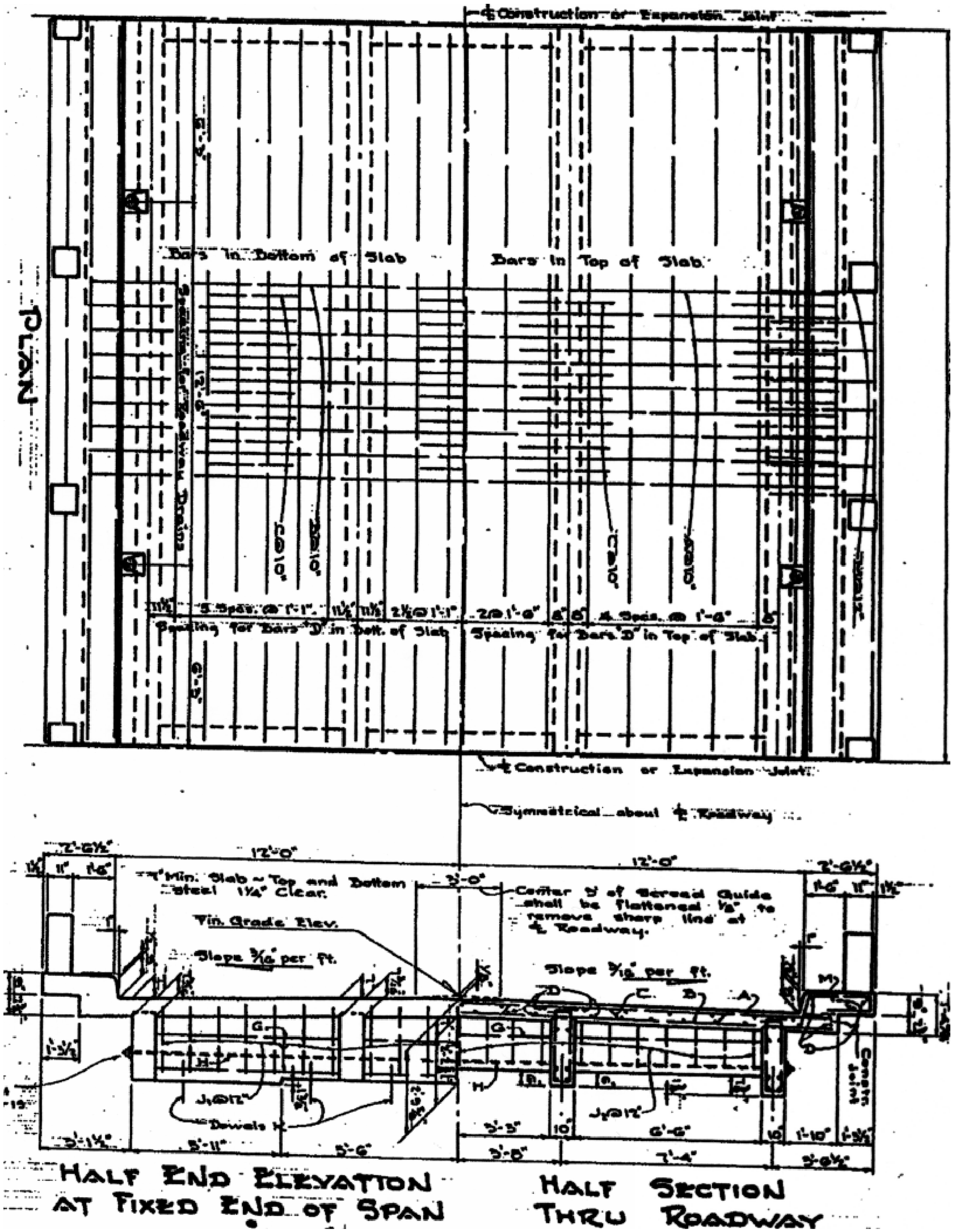
H.1 SR-72 Support Data

H.1.1 Original Plans




BILL OF REINFORCING STEEL
BENDING DIAGRAMS
ESTIMATED QUANTITIES
DETAIL AT FIXED END OF SPANS
DETAIL AT EXPANSION END OF SPANS
DETAIL AT END OF BRIDGE
SECTION AT FIXED AND EXPANSION END OF SPAN
SECTION "X-X"
DETAILS OF CURB AND ROADWAY DRAINS
GENERAL NOTES
HALF SECTION THRU ROADWAY
HALF END ELEVATION AT FIXED END OF SPAN
PLAN
ELEVATION
SECTION THRU GIRDER
DETAILS OF PRECAST CONCRETE GIRDER
STATE ROAD DEPARTMENT OF FLORIDA
BRIDGE DIVISION
SARASOTA



PLAN
℄ Construction or Expansion Joint
Bars in Bottom of Slab
Bars in Top of Slab
Spacing for Bars "D" in Bott. of Slab
Spacing for Bars "D" in Top of Slab
℄ Construction or Expansion Joint
Symmetrical about ℄ Roadway
Min. Slab ~ Top and Bottom Steel 1¼" Clear.
Fin. Grade Elev.
Slope 3/16" per ft.
Center 3' of Screed Guide shall be flattened ½" to remove sharp line at ℄ Roadway.
Slope 3/16" per ft.
Dowels K
HALF END ELEVATION AT FIXED END OF SPAN
HALF SECTION THRU ROADWAY

H.1.2 Core Testing

WILLIAMS
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September 19, 2006

Timothy J. Farrell, P.E.
EC Driver & Associates, Inc.
500 N. Westshore Boulevard, Suite 500
Tampa, Florida 33609

Subject: Bridge Concrete Core Testing
SR 72 Bridge Nos. 170042, 170043, 170044, 170046, 170941
District-Wide Bridge Engineering Services
Financial Project ID 412550-1-32-02
Contract No. C-8C41
Williams Project No. 1305-000-05

Dear Mr. Farrell,

Williams Earth Sciences, Inc. (Williams) has completed the field and laboratory work for the above referenced project. This work was accomplished under the District-Wide Bridge Engineering Services contract C-8C41.

The field work consisted of taking concrete cores through the deck beams of five bridges along SR 72. The concrete cores were 2-inch nominal diameter and approximately 4 to 4.5 inches in length. Four cores were taken at predetermined span and core locations for each bridge. Sketches illustrating the core locations are attached. The cores were retrieved using a hand-held coring machine. This resulted in shape imperfections, as seen in the attached photographs. It is our opinion that these shape imperfections had insignificant affects on the compression and split tension break results. The coring was performed in August and September, 2006.

The concrete core samples were transported to our laboratory facility for compressive and tensile strength testing. The compressive strength cores were capped using a neoprene pad prior to testing. The specimen height, diameter and load at failure have been input into a spreadsheet and the corrected unconfined compressive strength or the splitting tensile strength has been calculated. The tests were performed in general accordance with ASTM Designation C 39/C 39M-05 and C 496/C 496M-04 for the compressive strength and splitting tensile strength, respectively. The spreadsheets illustrating the core measurements and test results are attached. Photographs were taken of each core sample before and after breaking. The photographs are attached.

Tables 1A through 4A contain a summary with the span number, beam number, core number, concrete test performed, resulting strength, and fracture pattern. Tables 1B through 4B contain the statistics of the breaks. The Designations for the cores represent the span, beam and core number. For example, core designation 3-4-1 represents Span 3, Beam 4, and core 1 for a particular bridge.

On Bridge 170044 Myakka River, core specimen 1-4-1, a 2-inch long crack about 1/8 inch wide was observed along one side. Additional photographs were taken to illustrate this characteristic. Williams did not observe any other fractures or other detrimental characteristics on the remaining concrete cores with the naked eye.

Table 1: Summary of Test Results.

Specimen ID	Span Number	Beam Number	Core Number	Test Type (UC or ST)	Test Result (psi)	Failure Mode
Bridge No. 170042						
1-1-1	1	1	1	UC	4,068	3
3-4-1	3	4	1	UC	2,331	3
1-4-1	1	4	1	ST	362	3
3-1-1	3	1	1	ST	507	3
Bridge No. 170043						
1-1-1	1	1	1	UC	5,139	4
3-4-1	3	4	1	UC	2,928	3
1-4-1	1	4	1	ST	827	3
3-1-1	3	1	1	ST	517	3
Bridge No. 170044						
1-1-1	1	1	1	UC	2,333	3
10-4-1	10	4	1	UC	4,192	3
1-4-1	1	4	1	ST	561	3
10-1-1	10	1	1	ST	522	3
Bridge No. 170046						
1-1-1	1	1	1	UC	4,088	3
3-4-1	3	4	1	UC	2,400	3
1-4-1	1	4	1	ST	641	3
3-1-1	3	1	1	ST	726	3
Bridge No. 170941						
1-1-1	1	1	1	UC	2,035	3
6-4-1	6	4	1	UC	2,683	3
1-4-1	1	4	1	ST	549	3
6-1-1	6	1	1	ST	536	3

Table 2A: Statistics of Concrete Core Breaks; Bridge No. 1370042 Myakka River Overflow.

Statistic	Compression Tests	Split Tension Tests
Number of Specimens	2	2
Average Result	3,200 psi	435 psi
Standard Deviation	1,228 psi	103 psi
High Result	4,068 psi	507 psi
Low Result	2,331 psi	362 psi

Table 2B: Statistics of Concrete Core Breaks; Bridge No. 170043 Myakka River Relief.

Statistic	Compression Tests	Split Tension Tests
Number of Specimens	2	2
Average Result	4,034psi	672 psi
Standard Deviation	1,563 psi	219 psi
High Result	5,139 psi	827 psi
Low Result	2,928 psi	517 psi

Table 2C: Statistics of Concrete Core Breaks; Bridge No. 170044 Myakka River.

Statistic	Compression Tests	Split Tension Tests
Number of Specimens	2	2
Average Result	3,263 psi	542 psi
Standard Deviation	1,315 psi	28 psi
High Result	4,192 psi	561 psi
Low Result	2,333 psi	522 psi

Table 3D: Statistics of Concrete Core Breaks; Bridge No. 170046 Deer Prairie Slough.

Statistic	Compression Tests	Split Tension Tests
Number of Specimens	2	2
Average Result	3,244 psi	684 psi
Standard Deviation	1,194 psi	60 psi
High Result	4,088 psi	726 psi
Low Result	2,400 psi	641 psi

Table 3E: Statistics of Concrete Core Breaks; Bridge No. 170941 Cow Pen Slough.

Statistic	Compression Tests	Split Tension Tests
Number of Specimens	2	2
Average Result	2,359 psi	543 psi
Standard Deviation	458 psi	9 psi
High Result	2,683 psi	549 psi
Low Result	2,035 psi	536 psi

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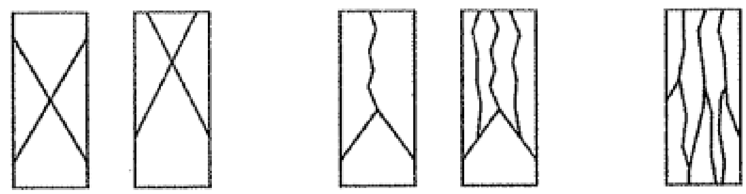
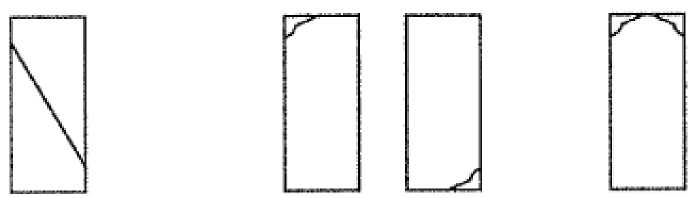
Typical Failure Patterns:



Type 1
Reasonably well-formed cones on both ends, less than 1 in (25 mm) of cracking through caps

Type 2
Well-formed cone on one end, vertical cracks running through caps, no well-defined cone on other end

Type 3
Columnar vertical cracking through both ends, no well-formed cones



Type 4
Diagonal fracture with no cracking through ends; tap with hammer to distinguish from Type 1

Type 5
Side fractures at top or bottom (occur commonly with unbonded caps)

Type 6
Similar to Type 5 but end of cylinder is pointed

Williams appreciates the opportunity to work with you on this project and we look forward to the next opportunity. If you have any questions regarding the results of this work, please contact the undersigned.

Sincerely,

WILLIAMS EARTH SCIENCES, INC.

Larry D. Spears, P.E.
Senior Geotechnical Engineer
Florida Registration No. 52105

Submittals: (3) Addressee

Attachments: Concrete Core Locations
Spreadsheet Results of Concrete Laboratory Testing
Photographs of Core Samples

I:\Projects\LARGO\13\1305\1305-000-00 Dist Wide Bridge EC Driver\1305-000-05 SR 72 Bridges_Concrete Core Samples_5 Bridges\Report\Bridge Concrete Core Report SR 72 9-19-06.doc

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H.1.3 X7 Instrumentation

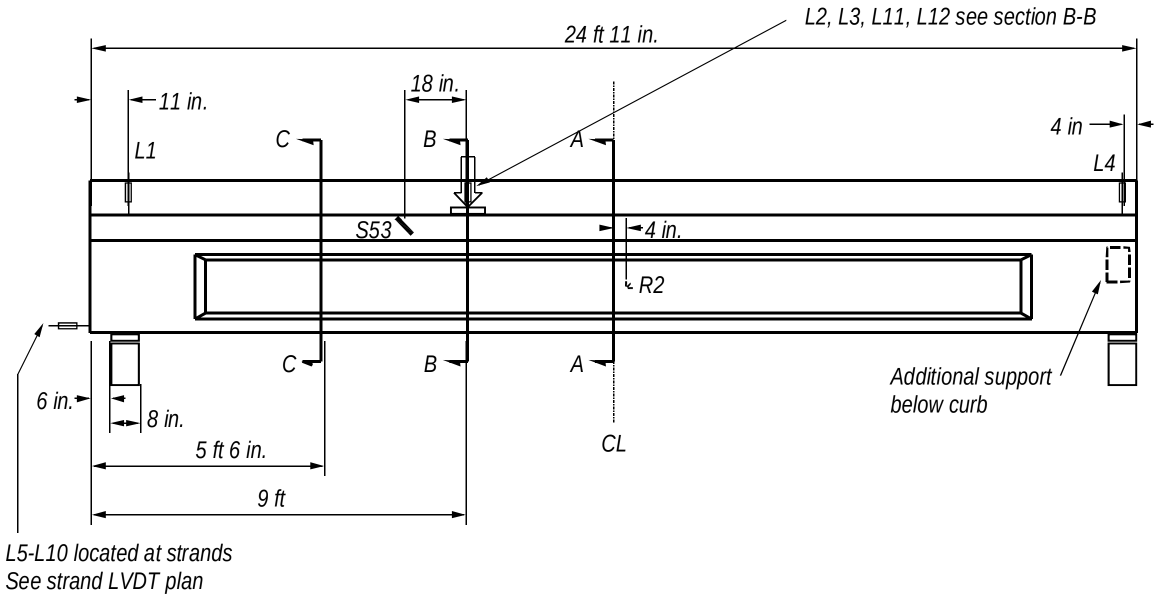

Figure 1–X7 instrumentation

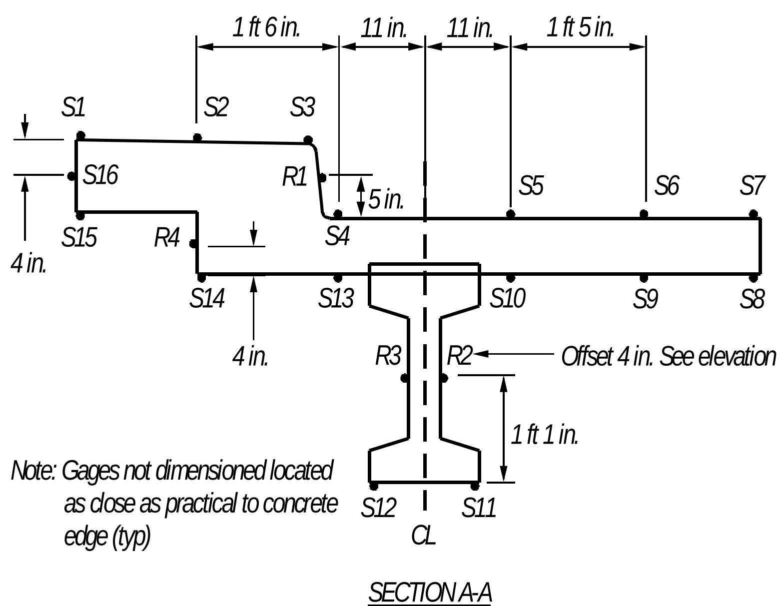

Figure 2–X7 instrumentation at plane A-A (5’-6” from near end)

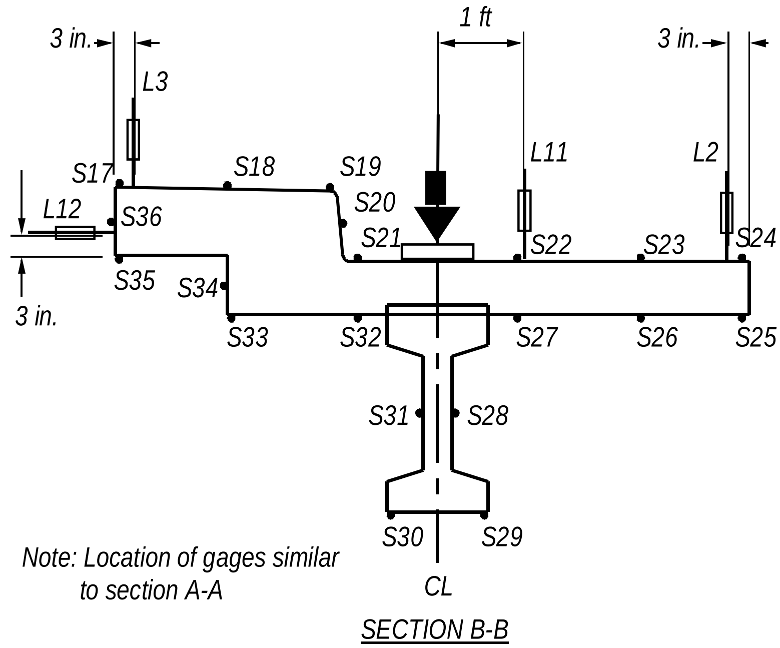

Figure 3–X7 instrumentation at plane B-B (load point)

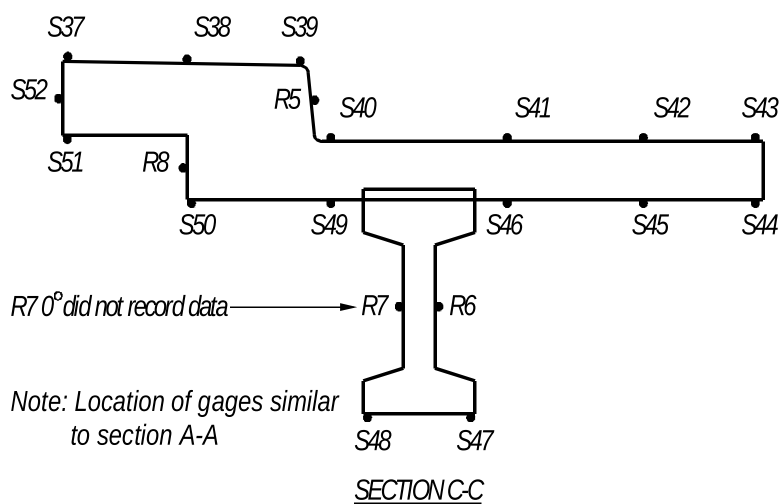

Figure 4–X7 instrumentation at plane C-C (centerline of span)

H.1.4 X4 Instrumentation

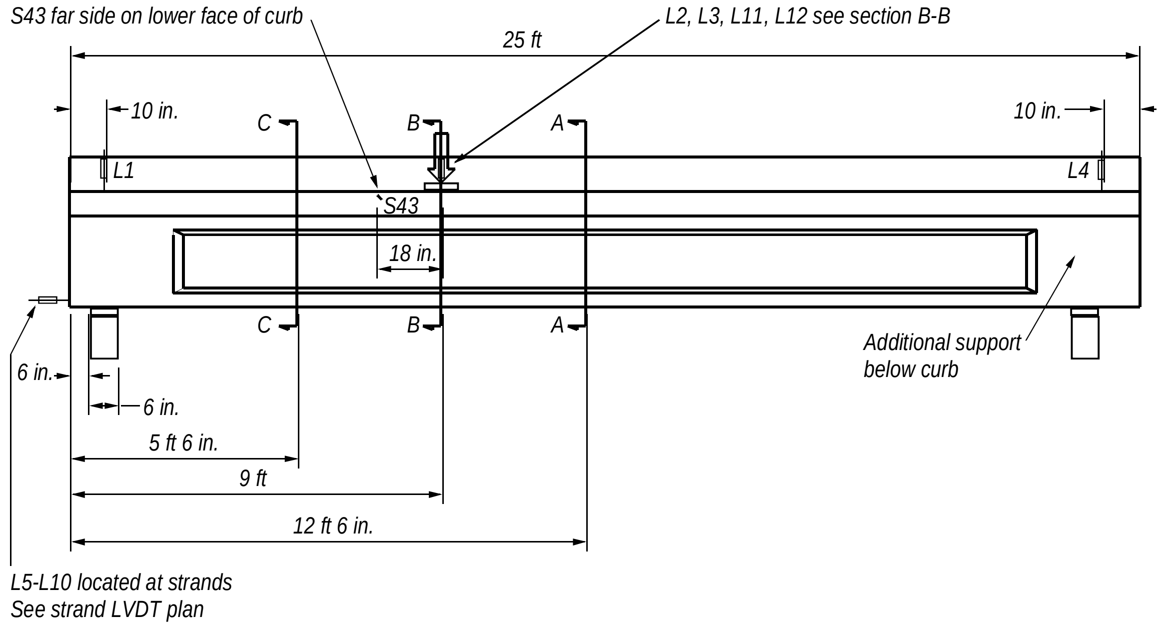

Figure 5–X4 instrumentation

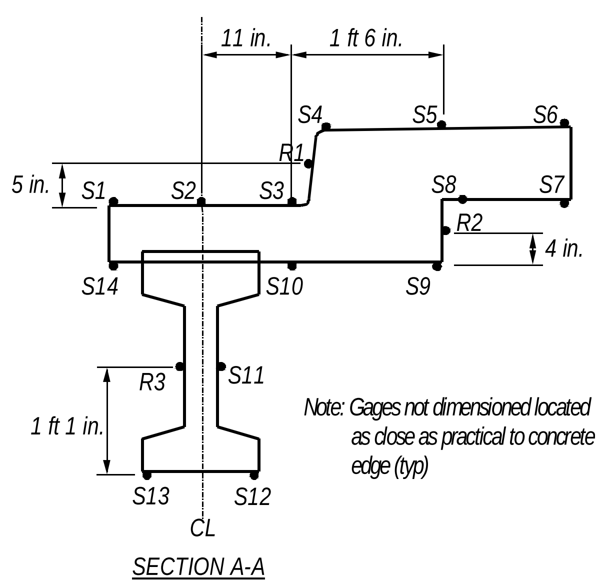

Figure 6–X4 instrumentation at plane A-A (12'-6" from near end)

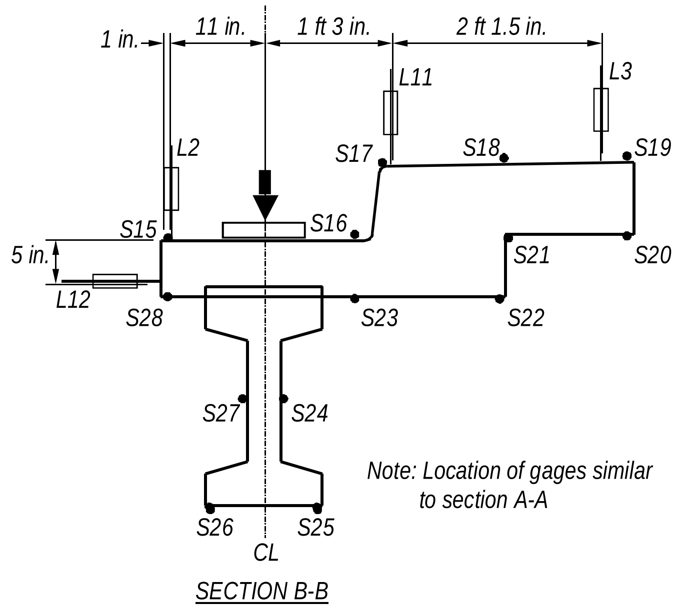

Figure 7–X4 instrumentation at plane B-B (load point)

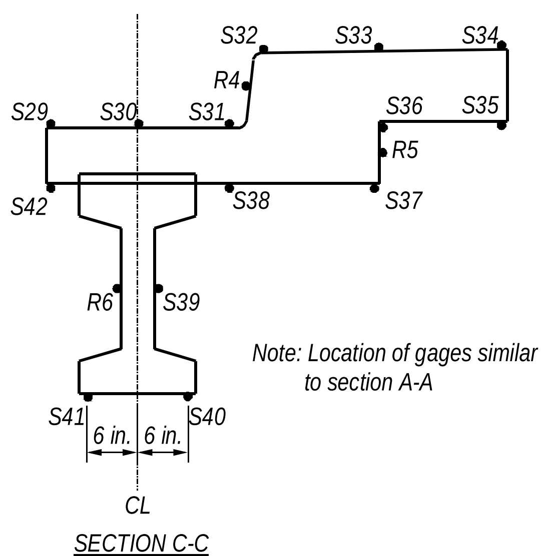

Figure 8–X4 instrumentation at plane C-C (5'-6" from near end)

H.1.5 I2A Instrumentation

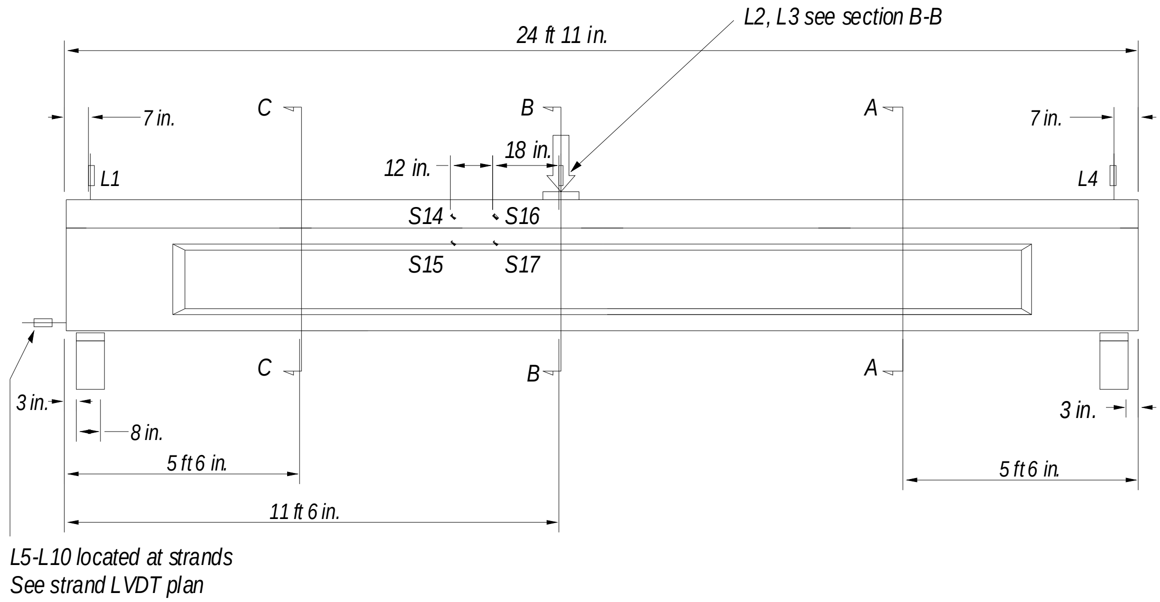

Figure 9–I2A instrumentation

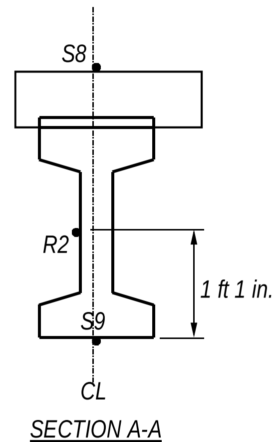

Figure 10–I2A instrumentation at plane A-A (5 ft-6 in. from far end)

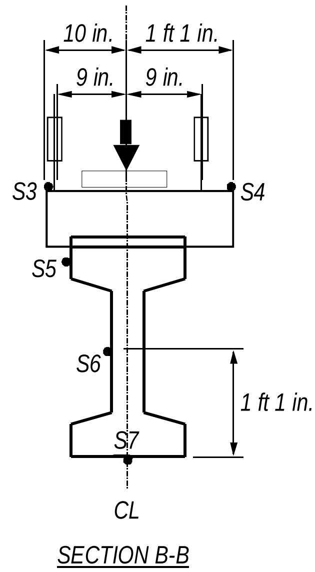

Figure 11–I2A instrumentation at plane B-B (load point)

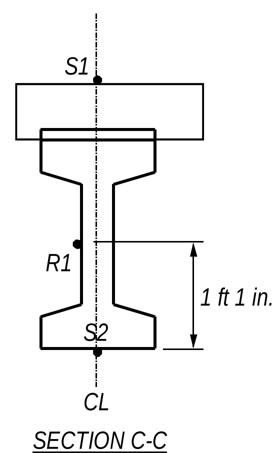

Figure 12–I2A instrumentation at plane C-C (5 ft-6 in. from near end)

H.1.6 I2B Instrumentation

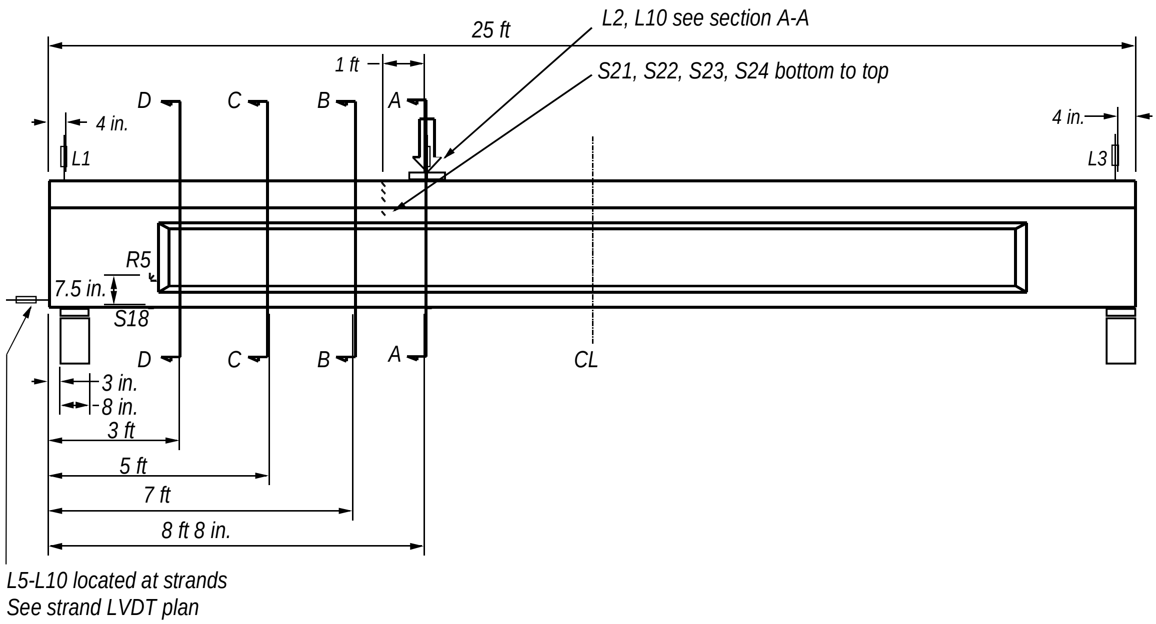

Figure 13–I2B instrumentation

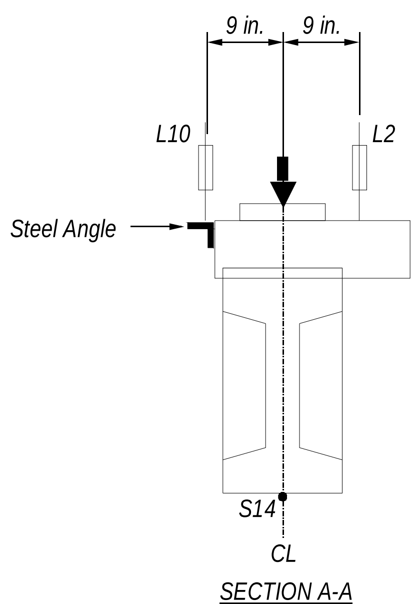

Figure 14–I2B instrumentation at plane A-A (load point)

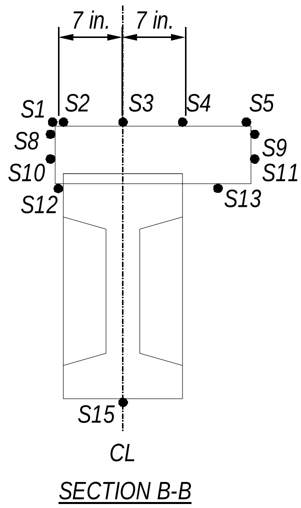

Figure 15–I2B instrumentation at plane B-B (7 ft from near end)

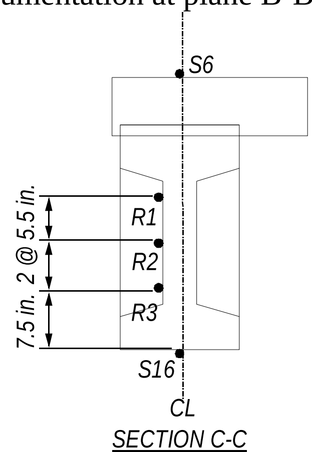

Figure 16–I2B instrumentation at plane C-C (5 ft from near end)

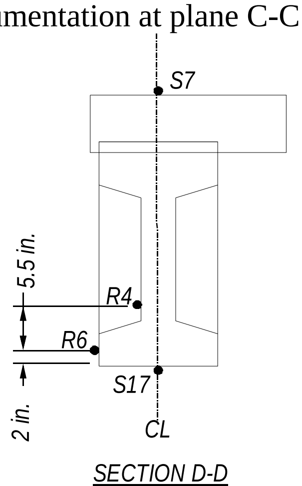

Figure 17–I2B instrumentation at plane D-D (5 ft from near end)

H.1.7 I4 Instrumentation

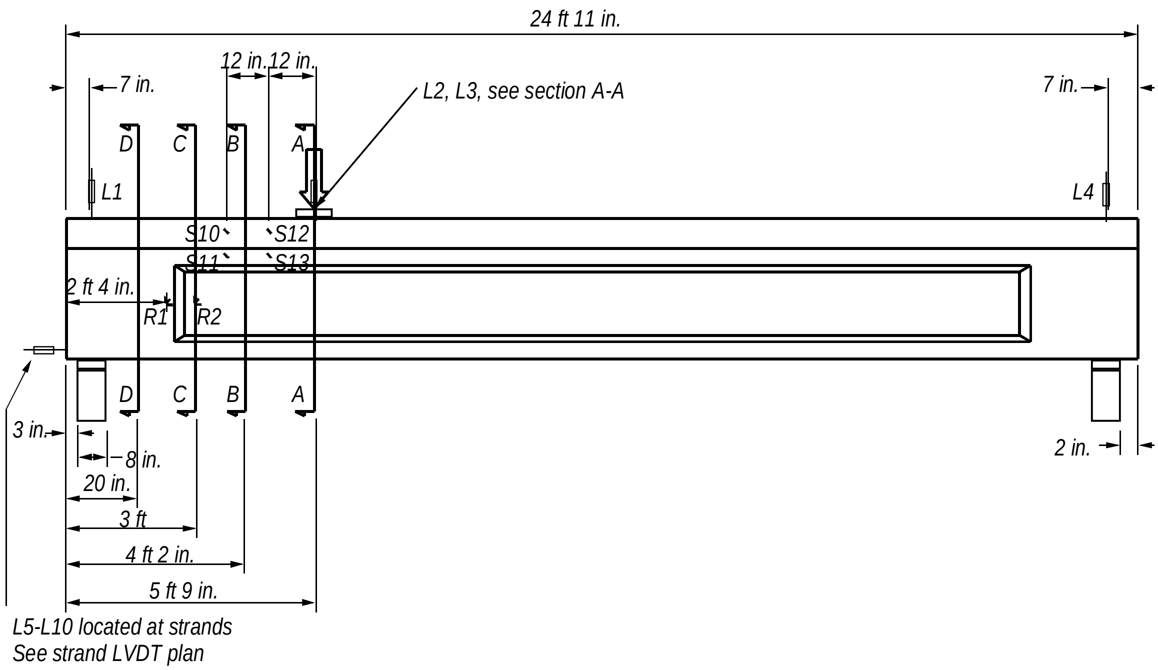

Figure 18–I4 instrumentation

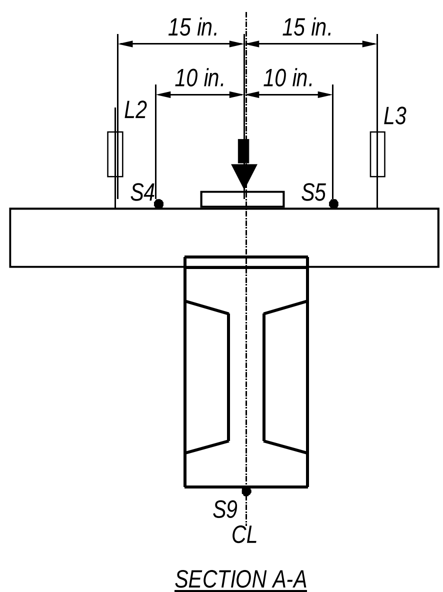

Figure 19–I4 instrumentation at plane A-A (load point)

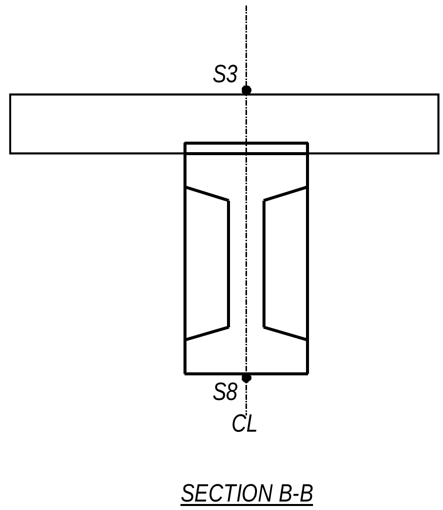

Figure 20–I4 instrumentation at plane B-B (4 ft-2 in. from near end)

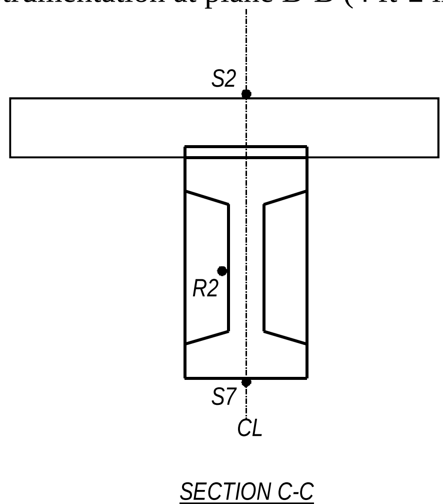

Figure 21–I4 instrumentation at plane C-C (3 ft-0 in. from near end)

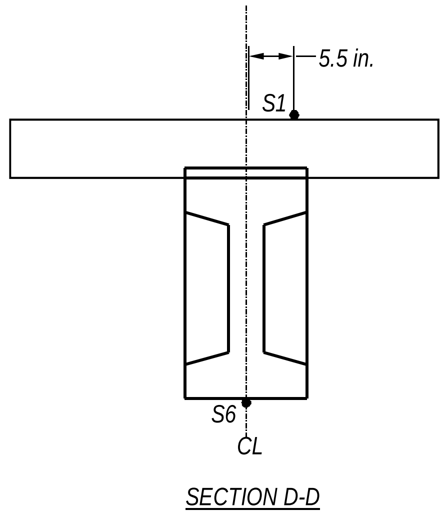

Figure 22–I4 instrumentation at plane D-D (1 ft-8 in. from near end)

H.1.8 I6 Instrumentation

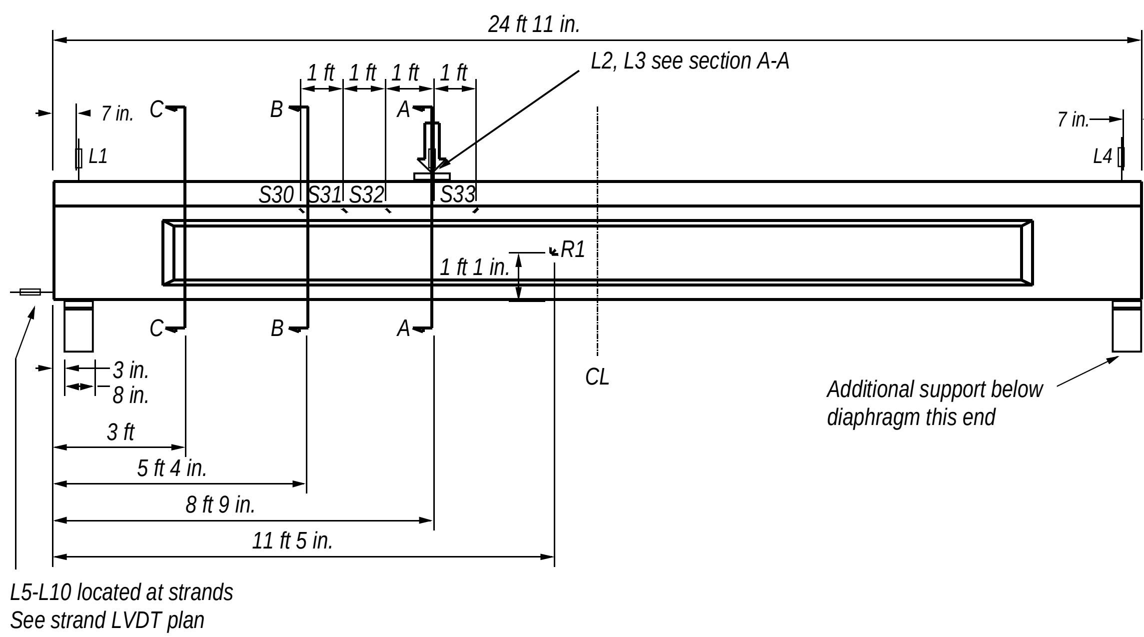

Figure 23–I6 instrumentation

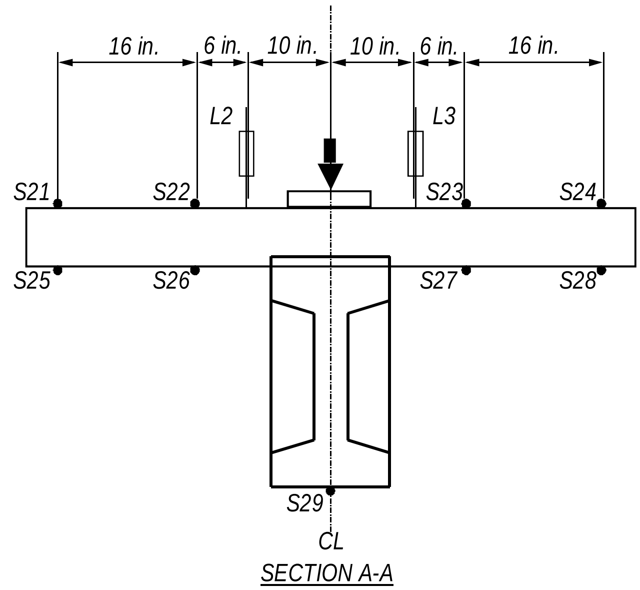

Figure 24–I6 instrumentation at plane A-A (load point)

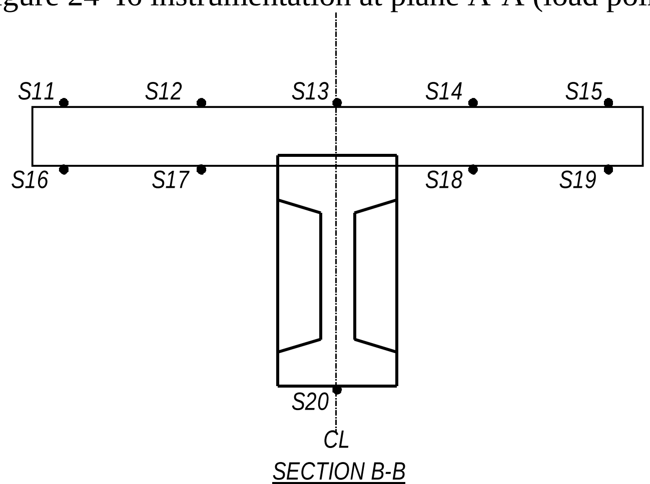

Figure 25–I6 instrumentation at plane B-B (5 ft-4 in. from near end)

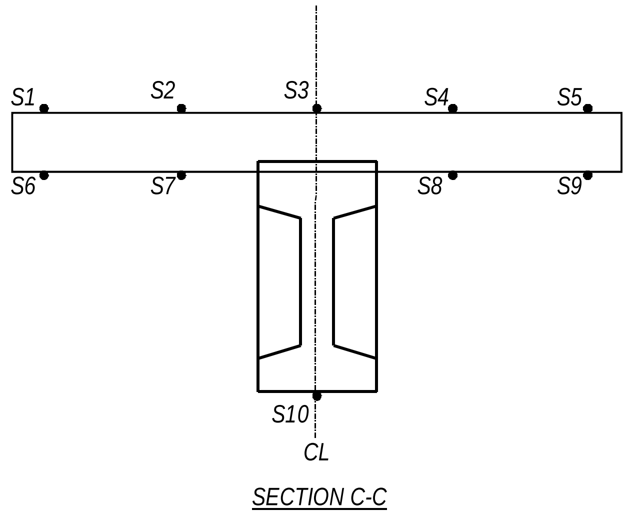

Figure 26–I6 instrumentation at plane C-C (3 ft-0 in. from near end)

H.2 FIB-54 Support Data

H.2.1 Vertical Reinforcement Strain

Strain data from select vertical reinforcement were collected from FIB-54 specimens during load testing. Locations of the strain gages on vertical reinforcement are provided in Table 1. Strain data from the gages are provided in Table 2.

Strain in the vertical reinforcement was not measured during prestress transfer but was estimated using the FE models from appendix F. By assuming strain compatibility between concrete and vertical reinforcement at prestress transfer, the strain in the reinforcement was assumed to equal the concrete strain taken from the FE models. Results are listed in Table 2.

Based on the strain data, stress in the vertical bars was estimated by multiply by the modulus of elasticity. Estimate stresses are listed in Table 2. Estimated stresses were limited to the test yield stress of the reinforcing bars. Stress data may be useful in developing strut-and-tie models of the end region at peak load.

Table 1–Gage location on vertical reinforcement

Specimen	Gage	X (in.)	Y (in.)	Z (in.)
WN	MS1	0	88.5	43.5
	MS2	0	52.5	25.3
WB	MS1	0	88.0	43.0
	MS2	0	52.5	25.5
FN	MS1	0	89.0	43.2
	MS2	0	53.0	25.5
FB	MS1	0	88.3	43.5
	MS2	0	52.5	25.5
DC	MS1	0	88.5	43.3
	MS2	0	52.5	25.5
DM	MS1	0	88.0	43.5
	MS2	0	44.5	25.5

Table 2–Strain in vertical reinforcement

Specimen	Gage	*Strain due to prestress transfer (microstrain)	Strain due to service load test (microstrain)	Strain due to ultimate load test (microstrain)	Total Strain at peak load (microstrain)	Stress at peak load (ksi)
WN	MS1	-8	184	1431	1607	46.6
	MS2	42	157	1170	1369	39.7
WB	MS1	-8	76	3867	3935	63.0
	MS2	42	38	1100	1180	34.2
FN	MS1	-8	74	545	611	17.7
	MS2	42	78	948	1068	31.1
FB	MS1	-8	241	2062	2295	63.0
	MS2	42	76	941	1059	30.7
DC	MS1	-13	130	7682	7799	63.0
	MS2	72	44	1973	2089	60.6
DM	MS1	-13	41	3188	3216	63.0
	MS2	72	79	1574	1725	50.0
*Based on FE model						

H.2.2 Standard Test for Strand Bond

Strain data Strand bonding capacity was tested according to the method proposed by the North American Strand Producers (NASP, 2009). This Appendix contains supplemental information on the materials, methods, and procedures used to carry out the tests.

In preparation for the NASP tests, numerous small and full size grout mixes were tested. Table 3 lists the proportions, flows, and strengths for each test mix. Small batches had a total mix weight of approximately 7 lb. Full batches had a total mix weight of approximately 225 lb. Prior to mixing the full batches, the mixer was “buttered” using a batch having a total weight of approximately 35 lb. The butter was discarded prior to mixing the grout batch. Mixers for the small and full batches are shown in Figure 27. All grout mixing and testing was conducted at the FDOT State Materials Office in Gainesville, FL.

Table 3–NASP test trial grout batches

Mix ID	Batch Size	Sand Proportion	Cement Proportion	Water Proportion	w/c ratio	s/c ratio	Flow	Strength at 24 hours
1	Small	0.645	0.239	0.116	0.485	2.703	124	NA

2	Small	0.695	0.206	0.100	0.485	3.378	65	NA
3	Small	0.656	0.231	0.112	0.485	2.838	112	4160 psi
4	Small	0.660	0.229	0.111	0.485	2.885	105	4310 psi
5	Small	0.659	0.230	0.111	0.485	2.872	111	4180 psi
6	Small	0.646	0.243	0.110	0.454	2.658	111	4640 psi
7	Small	0.646	0.243	0.110	0.454	2.658	104	4740 psi
8	Full*	0.645	0.244	0.110	0.452	2.639	96	4075 psi
9	Full	0.646	0.243	0.111	0.459	2.658	101.5	4310 psi
10	Full	0.644	0.246	0.110	0.449	2.618	105	4700 psi
11	Full	0.644	0.246	0.110	0.446	2.614	88.5	NA
12	Full	0.637	0.243	0.120	0.493	2.614	107.5	4250 psi
* The mixer for batch 8 was not “buttered” prior to batching.								

Figure 27–Mixer for small batches (left), large batches (right)

Test samples were placed in a wood support frame to secure the strands and tubes during grout pouring and curing (Figure 28). Grout was placed in (3) lifts as specified by the test method. Grout was consolidated after each lift using a mechanical vibrator. Strands were supported vertically and laterally at the base of the wood frame. Additional lateral support was provided at the base and top (Figure 29) of the tube structure. Prior to placement in the tubes, the outer wires were cut shorter than the center wire (Figure 29). This was done to facilitate measurement of slip of the center wire, as required by the test method. Care was taken to maintain the surface condition of the strands from the time of collection in the prestressing yard, until they were embedded in grout.

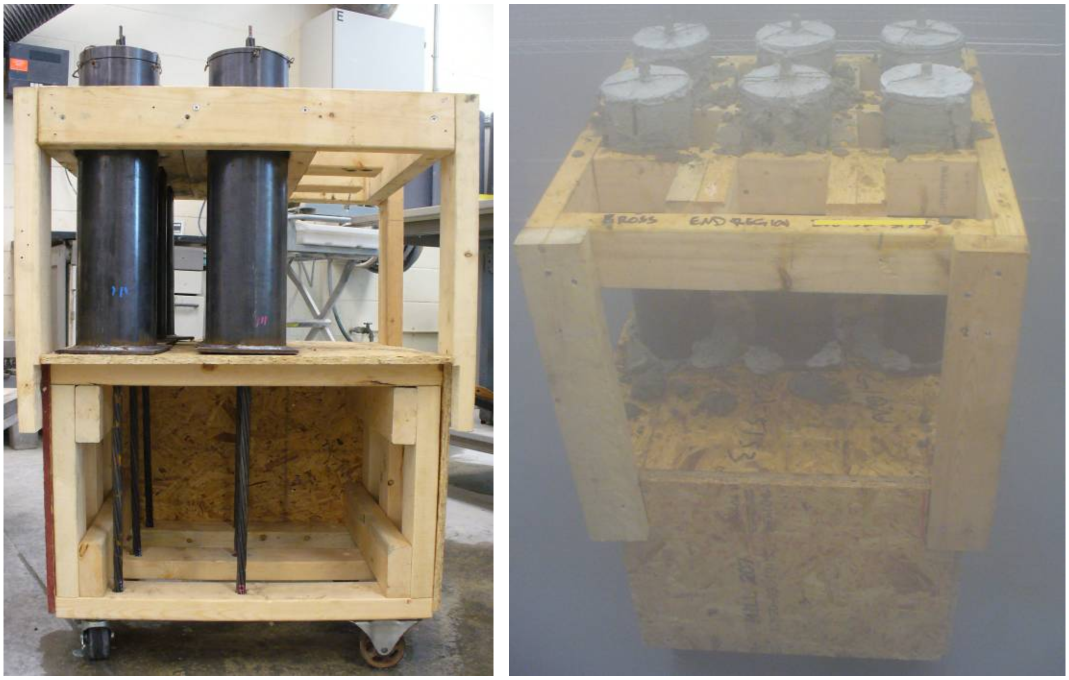

Figure 28–Wood frame and NASP samples (left), in cure room (right)

Figure 29–Stand lateral support at top of tube

The NASP pull-out tests were conducted the State Materials Office of the FDOT. The test setup is shown in Figure 30. The thrust bearing shown in the figure allows rotation of the strand (along its length) during loading, as required by the test method. No rotation of the strands was visually observed during testing.

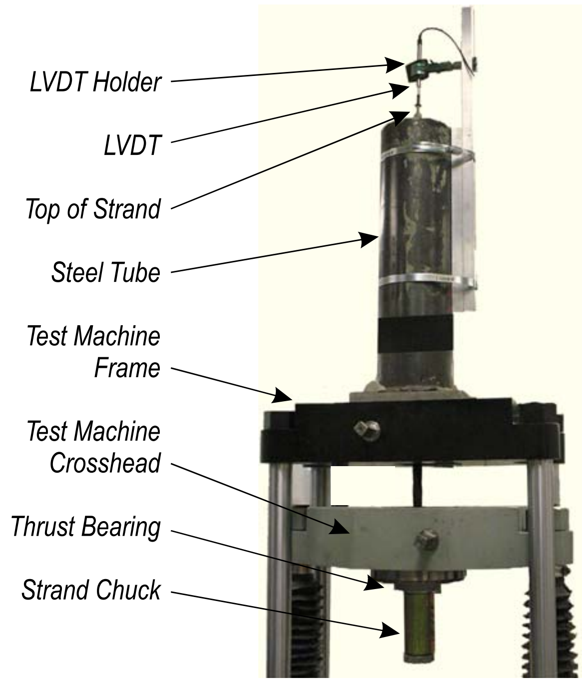

Figure 30–NASP test setup

Sand for NASP testing was donated by Florida Rock of Gainesville, FL. The particle size distribution for the sand was at edge of, but still within, the requirements of ASTM C33:

Vulcan
Materials Company
Florida Rock Division

Statistical Analysis 09/17/2010 - 10/15/2010 Production
1530-Grandin Sand Plant 76-349 301T-CONCRETE SAND

Sample Id	Date	Status	#4 (4.75mm)	#8 (2.36mm)	#16 (1.18mm)	#30 (0.6mm)	#50 (0.3mm)	#100 (0.15mm)	#200 (75um)	PAN (0um)	FM
1482582055	10/14/2010 13:26	Pass	99.8	97.9	86.5	57.1	25.4	5.0	0.33	0.00	2.28
1491898021	10/15/2010 13:30	Pass	99.8	98.0	86.4	55.8	24.5	4.2	0.30	0.00	2.32
1492884821	10/15/2010 13:32	Pass	99.7	97.9	86.0	55.1	24.6	3.1	0.27	0.00	2.33

	#4 (4.75mm)	#8 (2.36mm)	#16 (1.18mm)	#30 (0.6mm)	#50 (0.3mm)	#100 (0.15mm)	#200 (75um)	PAN (0um)	FM
Count	30	30	30	30	30	30	30	29	30
Min	99.6	96.6	84.0	52.5	23.1	2.2	0.22	0.00	2.22
Max	100.0	98.3	89.4	60.1	27.1	5.2	0.57	0.00	2.40
Range	0.4	1.7	5.4	7.6	4.0	3.0	0.35	0.00	0.18
Mean	99.8	97.6	85.8	56.0	25.1	4.0	0.30	0.00	2.32
Median	99.8	97.6	85.7	55.7	25.0	4.1	0.30	0.00	2.32
St Dev	0.1	0.5	1.3	1.9	1.2	0.8	0.08	0.00	0.05
CV	0.0	0.0	0.0	0.0	0.0	0.2	0.3		0.0
Skewness	0.8	-0.6	1.1	0.3	0.0	-0.4	2.3	0.0	-0.2
Kurtosis	1.4	-0.6	0.9	-0.8	-1.3	-0.7	5.5	0.0	-0.7
Pay Factor									
Lower Target									
Upper Target									
Lower Spec (LSL)	95	85	65	25	5	0	0		2.05
Upper Spec (USL)	100	100	97	70	35	7	4		2.45
PWS	100.0	100.0	100.0	100.0	100.0	100.0	100.0		99.8
Lower Limit (LCL)	99.6	96.6	83.2	52.2	22.7	2.4	0.14	0.00	2.23
Upper Limit (UCL)	100.0	98.6	88.4	59.8	27.5	5.6	0.46	0.00	2.41
PWL	99.8	96.7	95.8	95.2	95.6	96.0	96.0	100.0	95.4

Query

Query Selections:
Plant: 1530-Grandin Sand Plant 76-349
Product: 301T-CONCRETE SAND
Date Range: 09/17/2010 - 10/17/2010
Sample Type: Production
Sample Method: Production Cone
Agency: Florida DOT
Number of Tests: 30

Passing: 30
Failures: 0

aggQC **Vulcan Materials Company**

Cement for strand testing was donated by CEMEX of Brooksville, FL. As required by the NASP test method, the cement was high-early strength, Type III cement:

CEMEX

Brooksville South Plant
10311 CEMENT PLANT ROAD
Brooksville, Fl 34601
Phone (352) 799-7881 / FAX (352) 799-6088

CEMENT MILL TEST REPORT

Cement Identified as: TYPE III Portland Cement
Plant: Cemex Brooksville Cement
Location: Brooksville, FL
Production Date: 9/1/10 - 9/30/10

Date of Report: 10/4/10

Silo 14

STANDARD CHEMICAL REQUIRMENTS (ASTM C114)	TEST RESULTS	SPECIFICATIONS	ASTM C-150 / AASHTO M-85	ASTM C-150	AASHTO M-85	ASTM C-150 / AASHTO M-85	ASTM C-1157
			TYPE I Low alkali	TYPE II Low alkali	TYPE II Low alkali	TYPE III	GU
Silicon Dioxide (SiO_2) %	20.5	Minimum	----	----	20	---	----
Aluminum Oxide (Al_2O_3) %	4.8	Maximum	----	6	6	---	----
Ferric Oxide (Fe_2O_3) %	3.7	Maximum	----	6	6	---	----
Calcium Oxide (CaO) %	63.6		----	----	----	---	----
Magnesium Oxide (MgO) %	0.7	Maximum	6.0	6.0	6.0	6.0	----
Sulfur Trioxide (SO_3) % **	3.2	Maximum	3.0	3.0	3.0	3.5 ***	----
Loss on Ignition (LOI) %	2.0	Maximum	3	3	3	3	----
Insoluble Residue (IR) %	0.56	Maximum	0.75	0.75	0.75	0.75	----
Alkalies (Na_2O equivalent) %	0.38	Maximum	0.60	0.60	0.60	0.60	----
Carbon Dioxide in cement (CO_2) %							
Limestone % in cement (ASTM C150 A1)		Maximum	5	5	5	---	
$CaCO_3$ in limestone % (2.274 x % CO_2 LS)		Minimum	70	70	70	---	
Tricalcium Silicate (C_3S) %	55	Maximum	----	----	----	---	----
Dicalcium Silicate (C_2S) %	18		----	----	----	---	----
Tricalcium Aluminate (C_3A) %	7	Maximum	----	8	8	15	----
Tetracalcium Aluminoferrite (C_4AF) %	11		----	----	----	---	
(C_3S + 4.75 C_3A)	86	Maximum		100	100		
(C_4AF + 2C_3A) or (C_4AF + C_2F) %	24	Maximum	----	----	----		----
PHYSICAL REQUIRMENTS							
(ASTM C204) Blaine Fineness, cm2/g	5812	*Minimum*	2800	2800	2800	---	----
(ASTM C204) Blaine Fineness, cm2/g	5812	Maximum		4200 (i)	4200 (i)	---	
(ASTM C430) -325 Mesh %			----	----	----		----
(ASTM C191) Time of Setting (Vicat)							
Initial Set, minutes	48	*Minimum*	45	45	45	45	45
Final Set, minutes	120	Maximum	375	375	375	375	420
(ASTM C185) Air Content of Mortar %	5.5	Maximum	12	12	12	12	----
(ASTM C151) Autoclave Expansion %	-0.020	Maximum	0.80	0.80	0.80	0.80	0.80
(ASTM C187) Normal Consistency %	26.0		----	----	----		----
(ASTM C1038) Expansion in Water %		Maximum	0.02	0.02	0.02		0.02
(ASTM C186) 7 day Heat of Hydration cal/g		Max. if specified					
(ASTM C109) Compressive Strength, psi (Mpa)							
1 Day	3050 (21.0)		----	----	----	1740 (12.0)	----
3 Days	4255 (29.3)	*Minimum*	1740 (12.0)	1450 (10.0)	1450 (10.0)	3480 (24.0)	1450 (10.0)
7 Days	5510 (38.0)	*Minimum*	2760 (19.0)	2470 (17.0)	2470 (17.0)		2465 (15.0)
28 Days	7590 (52.4)	*Minimum*	----	----	----		----

** The performance of Cemex Type I/II has proven to be improved with sulfur trioxide levels in excess of the 3.0% limit for Type II.
As per footnote D (Table One ASTM C150) our Optimum SO3 is 3.51 % (ASTM C563-04). Cement tested according to C1038-4 showed 0.011 exp at 3.75% SO3

*** Limit is 4.5 max. when C3A is more than 8 ** FDOT Sec. 921
(i) Does not apply if C3S + 4.75C3A is less than or equal to 90

The data shown above is typical of the cement produced at Brooksville, Fl. and currently being shipped from this silo.
This Cement contains Limestone, except type III

Cemex hereby certifies that this cement meets or exceeds the chemical and physical Specifications of :

x ASTM C-150 for Type I and Type I low alkali
x ASTM C-150 for Type II and Type II low alkali
x ASTM C-150 and AASHTO M-85 for Type III
x ASTM C-1157 GU
x AASHTO M-85 for Type I and Type I low alkali
x AASHTO M-85 for Type II and Type II low alkali

Oliver H Sohn
Oliver H Sohn
Quality Control Manager

Cemex is not responsible for the improper use or workmanship that may be associated with the use of this cement.

H.3 FIB-63 Support Data

H.3.1 Gage Coordinates

The gage coordinates used within this section listed by specimen in Tables

Table 4–Gage coordinates for specimen CT

Gage	X (in.)	Y (in.)	Z (in.)
ES1	0	3.5	18
ES2	0	3.5	36
SG1	-21	120	63
SG2	21	120	63
SG3	0	120	0
SG4	3.5	72	36
SG5	0	0	6
SG6	0	0.5	0.5

Table 5–Gage coordinates for specimen SL

Gage	X (in.)	Y (in.)	Z (in.)
ES1	0	3.75	16.75
ES2	0	3.75	34.5
SG1	-21	120	63
SG2	21	120	63
SG3	0	120	0
SG4	3.5	72	36
SG5	0	0	6
SG6	0	0.5	0.5

Table 6–Gage coordinates for specimen PT

Gage	X (in.)	Y (in.)	Z (in.)
ES1	0	2.25	17.5
ES2	0	2.25	36
SG1	-21	120	63
SG2	21	120	63
SG3	0	120	0
SG4	3.5	72	36
SG5	0	0	6
SG6	0	0.5	0.5
XS1	0	0	62.5

XS2	3.5	1.5	24
XS3	3.5	4	24
XS4	3.5	12	24
VG1	0	1.5	17

Table 7–Gage coordinates for specimen LB

Gage	X (in.)	Y (in.)	Z (in.)
ES1	0	18	2.5
ES2	0	36	3.5
SG1	-21	120	63
SG2	21	120	63
SG3	0	120	0
SG4	3.5	72	36
SG5	0	0	6
SG6	0	0.5	0.5

H.3.2 Strain during Post-Tensioning

Table 8–Stress due to post-tensioning during tensioning process in specimen PT

Tensioned Rods	VG1	ES1	ES2	XS1	XS2	XS3	XS4
Rods 1-3	-56.18	4.25	7.90	29.37	-69.81	-70.34	-61.76
All Rods	-163.76	65.67	23.59	134.11	-207.71	-195.63	-133.47
Axis	Y	Z	Z	Z	Y	Y	Y

H.3.3 Strain during Prestress Release

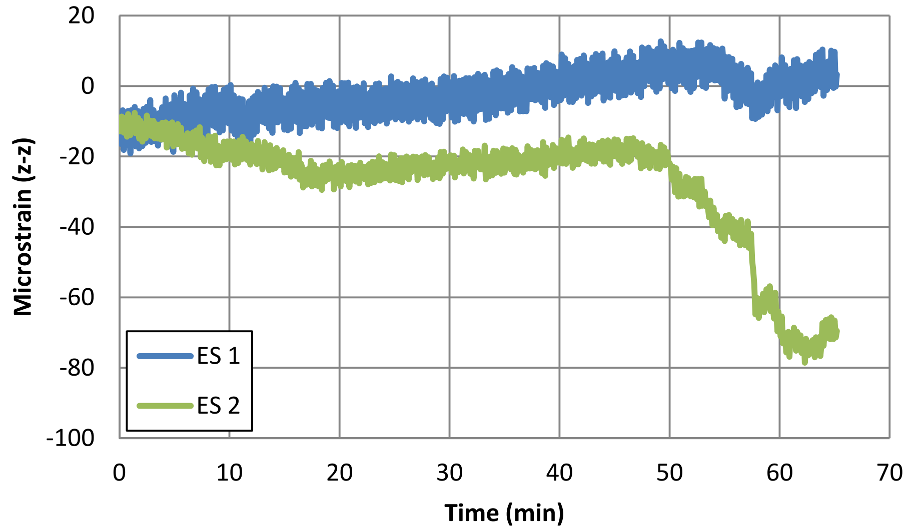

Figure 31–Strain due to prestress release in ES gages in specimen CT

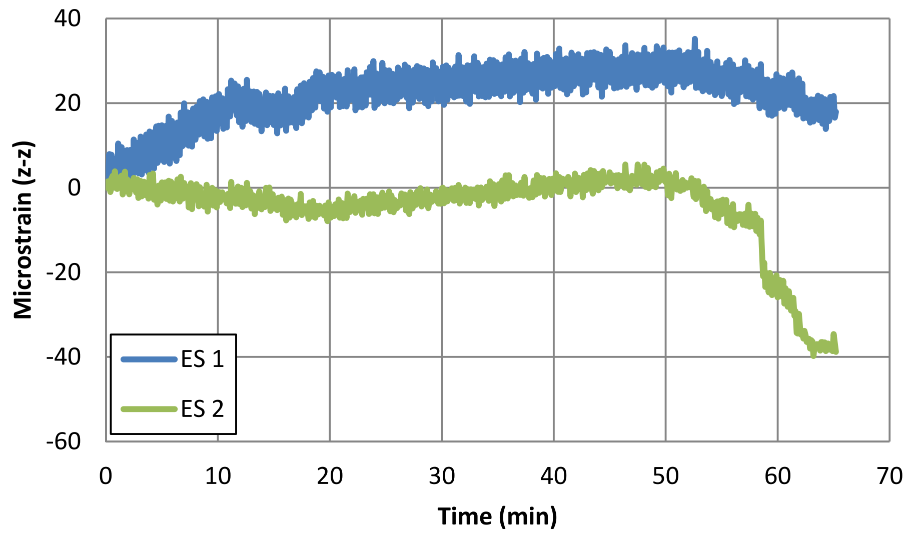

Figure 32–Strain due to prestress release in ES gages in specimen SL

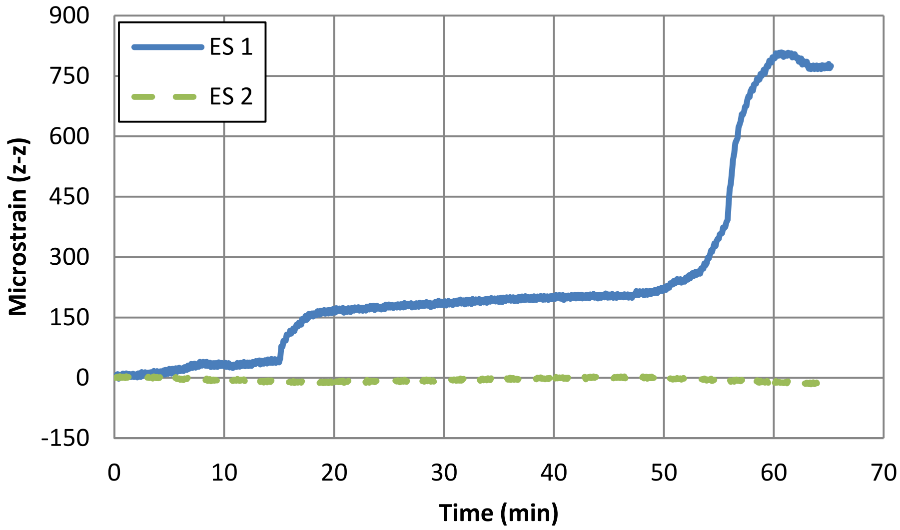

Figure 33–Strain due to prestress release in ES gages in specimen PT

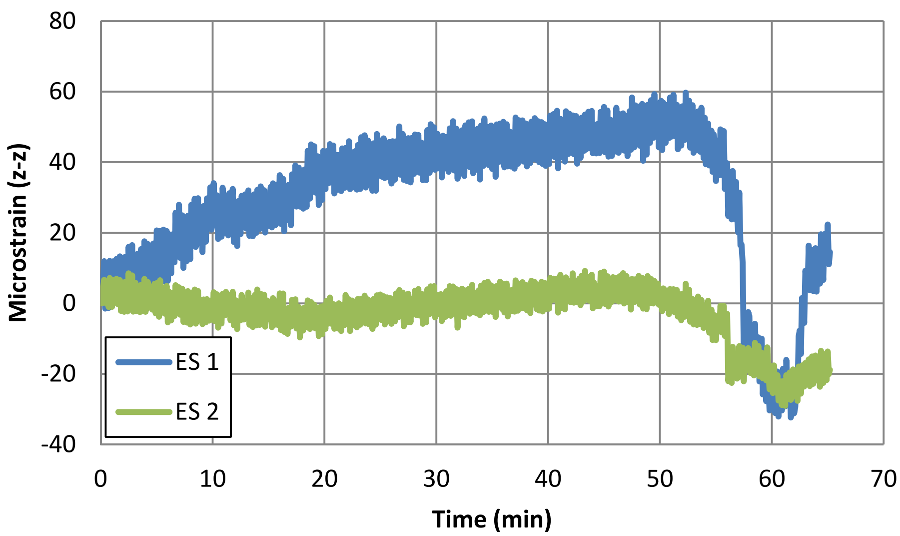

Figure 34–Strain due to prestress release in ES gages in specimen LB

H.3.4 Web Cracks

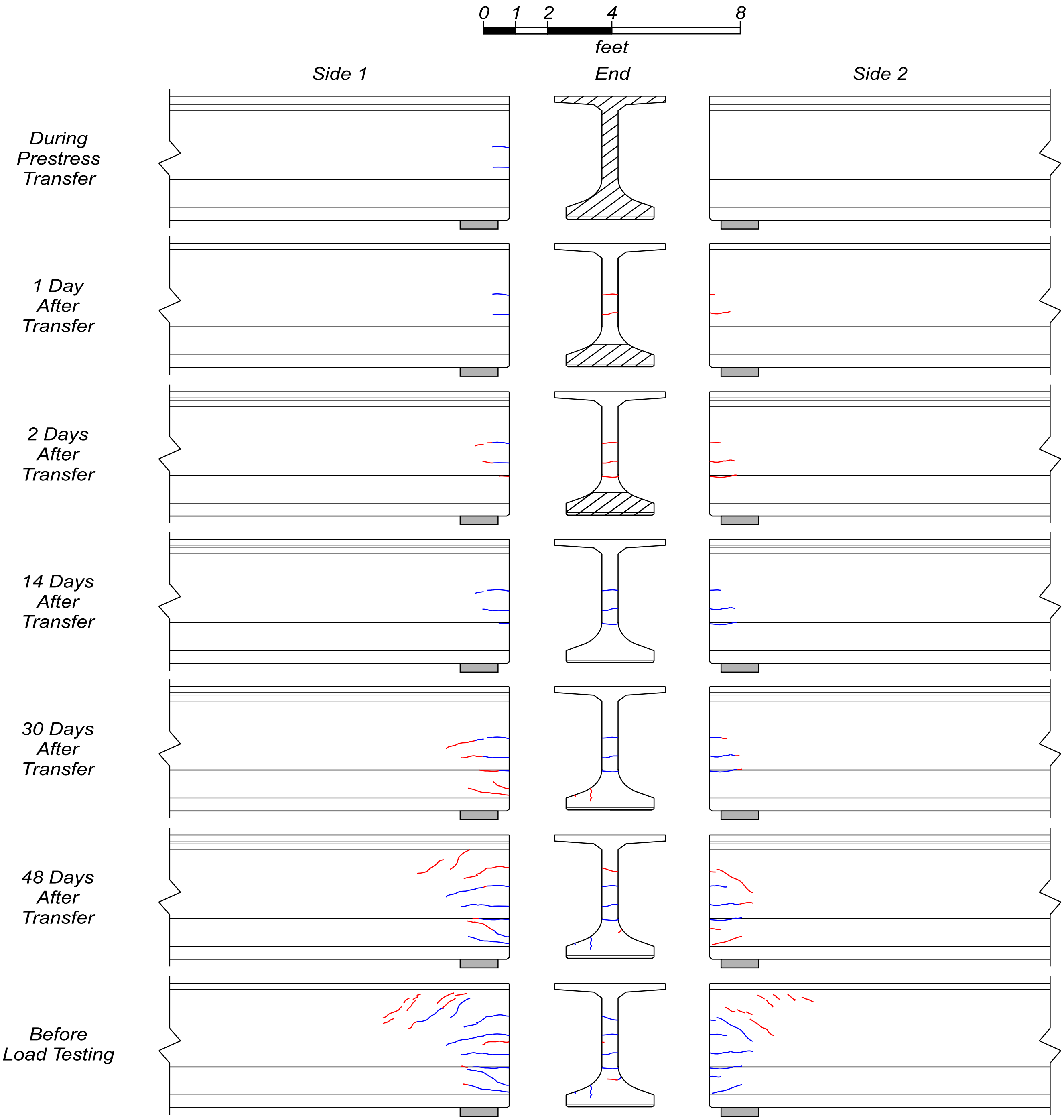

Figure 35–Crack growth in specimen SL (flexural cracks in top flange not shown)

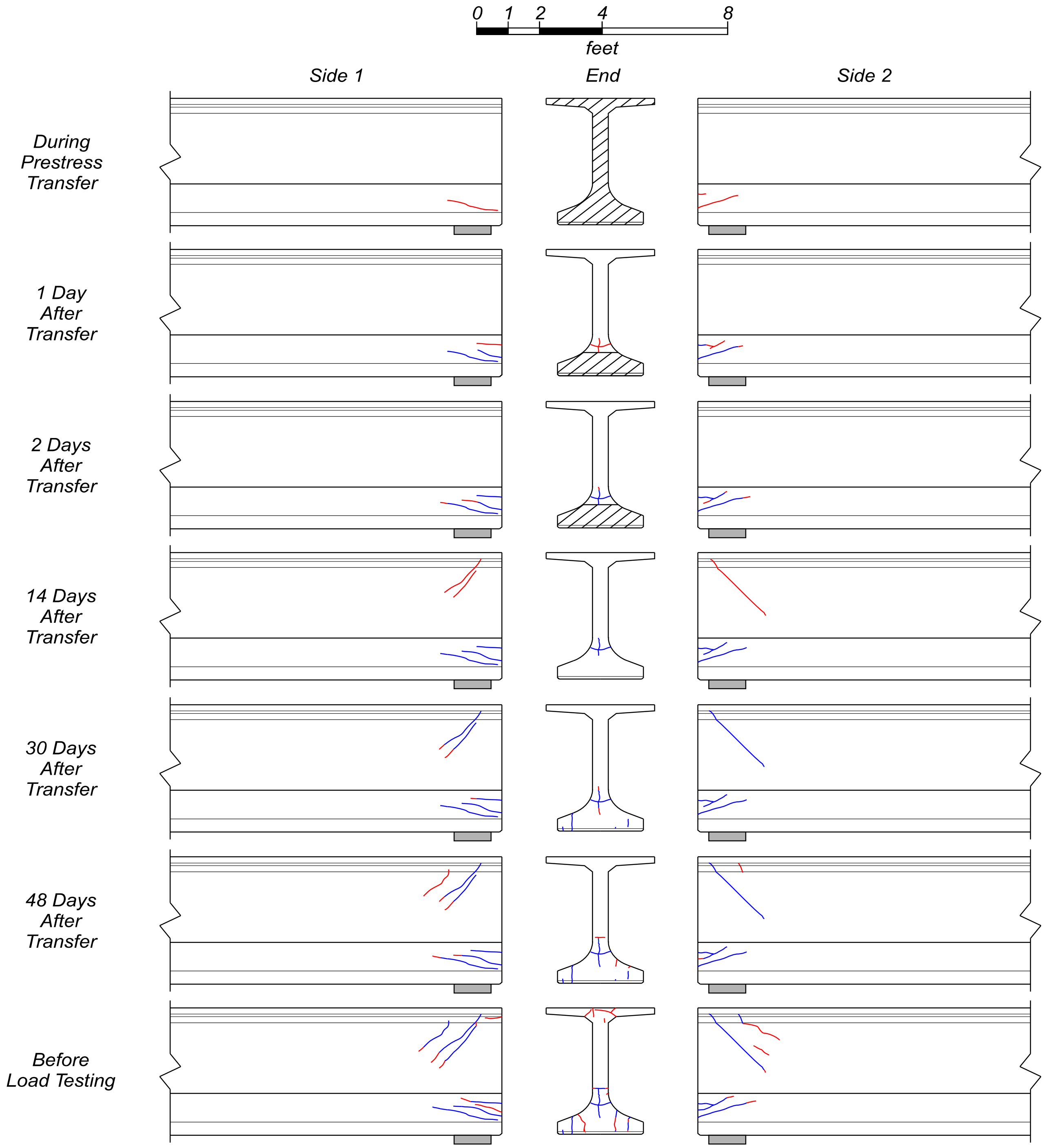

Figure 36–Crack growth in specimen PT (flexural cracks in top flange not shown)

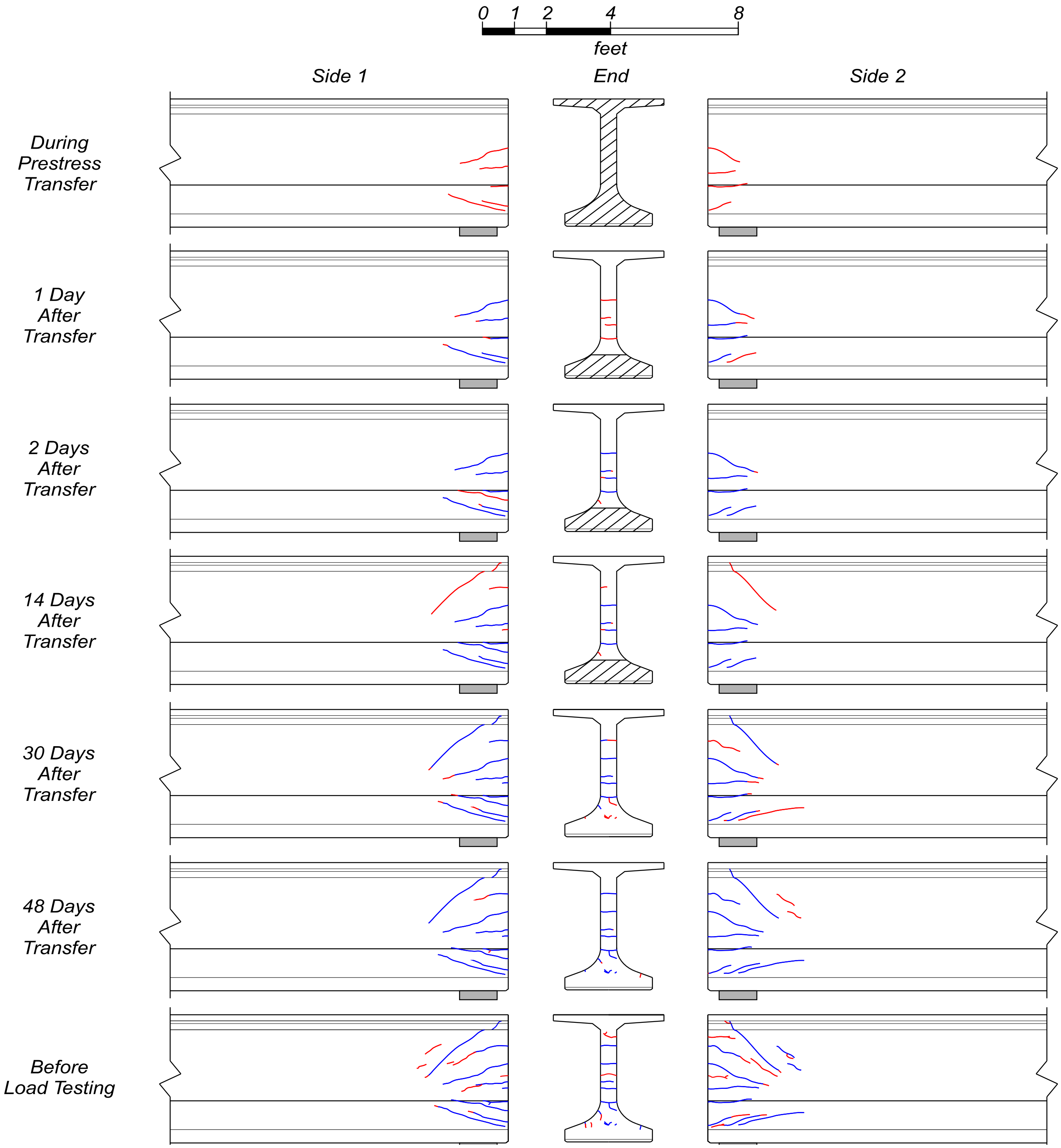

Figure 37–Crack growth in specimen LB (flexural cracks in top flange not shown)

H.3.5 Load Tests

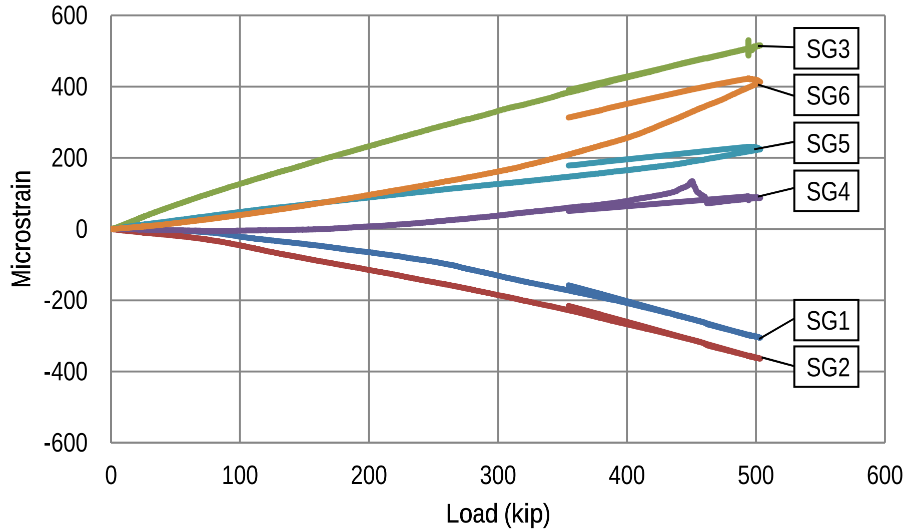

Figure 38–Service load test strain data for specimen CT

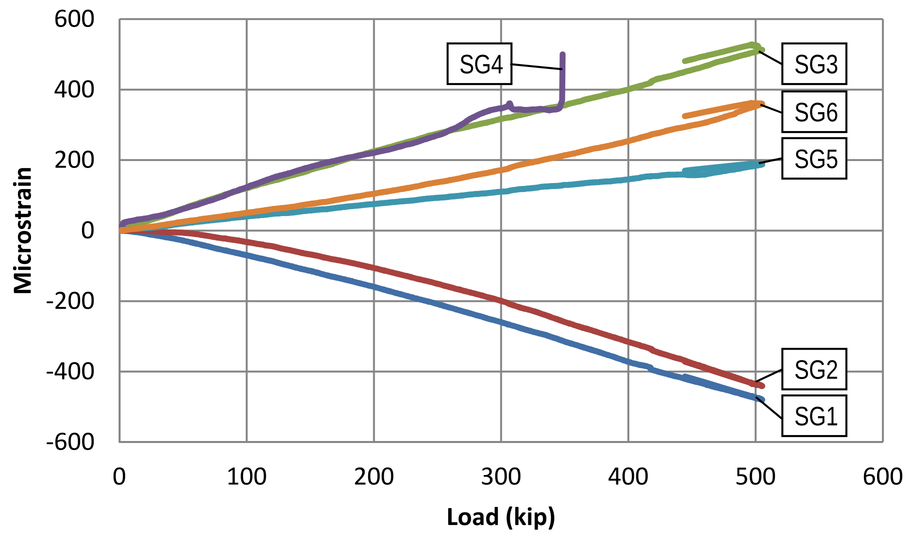

Figure 39–Service load test strain data for specimen SL

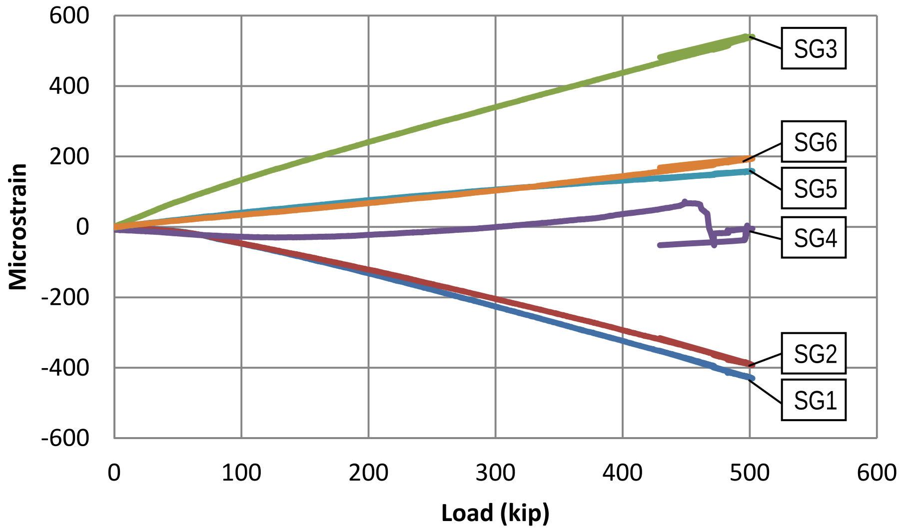

Figure 40–Service load test strain data for specimen PT

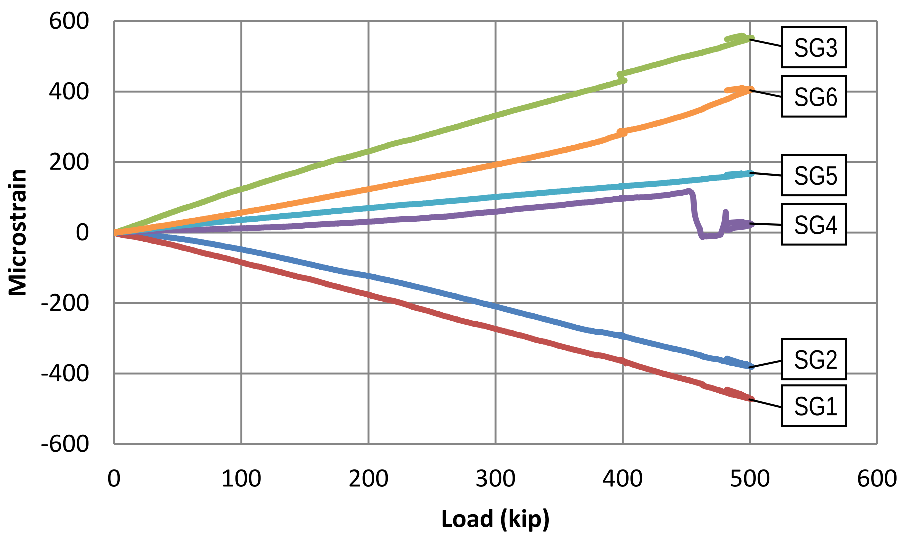

Figure 41–Service load test strain data for specimen LB