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PERFORMANCE EVALUATION OF TYPE II AND TYPE IIA BOX BEAM END TERMINALS

VOLUME II: APPENDICES

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16. Abstract (Limit: 200 words) Two types of guide rail end terminals were constructed and evaluated according to the American Association of State Highway and Transportation Officials' (AASHTO's) *Manual for Assessing Safety Hardware* (MASH). The guide rail end terminals are used with weak-post, box beam guide rail systems by the New York State Department of Transportation (NYSDOT). Nine full-scale vehicle crash tests were performed in accordance with either Test Level 3 (TL-3) or Test Level 2 (TL-2) requirements using both standard and modified impact locations and test conditions for the 1100C [1,100-kg (2,425-lb)] passenger car and the 2270P [2,268-kg (5,000-lb)] pickup truck. One test was run on the Type II box beam end terminal, six tests were performed on the Type IIA end terminal on flat ground, and two tests were performed on the Type IIA end terminal installed in a ditch. The Volume I report contains the research results and discussion. The Volume II report contains the appendices.			
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DISCLAIMER STATEMENT

The contents of this report reflect the views and opinions of the authors who are responsible for the facts and the accuracy of the data presented herein. The contents do not necessarily reflect the official views or policies of the New York State Department of Transportation, the United States Department of Transportation, nor the Federal Highway Administration. This report does not constitute a standard, specification, regulation, product endorsement, nor an endorsement of manufacturers.

UNCERTAINTY OF MEASUREMENT STATEMENT

The Midwest Roadside Safety Facility (MwRSF) has determined the uncertainty of measurements for several parameters involved in standard full-scale crash testing and non-standard testing of roadside safety features. Information regarding the uncertainty of measurements for critical parameters is available upon request by the sponsor and the Federal Highway Administration.

The Independent Approving Authority (IAA) for the data contained herein was Mr. Scott K. Rosenbaugh.

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INTRODUCTION

Two weak-post, box beam guide rail end terminals were evaluated to standards set by the Manual for Assessing Safety Hardware (MASH). New York State Department of Transportation (NYSDOT) requested that the first full-scale test, test no. NYBBT-1, be conducted on the Type II box beam end terminal. The Type II box beam end terminal CAD details are provided in Appendix B. NYSDOT requested eight full-scale tests, test nos. NYBBT-2 through NYBBT-9, on a modified version of the Type I terminal, now referred to as the Type IIA. The Type IIA end terminal design was modified during the study, which is outlined in Table 24 of Volume I. The Type IIA box beam end terminal CAD details are provided in Appendices F, G, J, M, O, P, S, and T.

The contents of Volume II are meant to be supplementary data for Volume I. Volume I contains the research equipment, methods, full-scale test documentation, and a discussion of the results of the research conducted for full-scale test nos. NYBBT-1 through NYBBT-9. Volume II contains the appendices of the report. The appendices include calculations to determine the longitudinal center of gravity of each vehicle, full sets of system drawings for each of the full-scale tests, English-unit full-scale test summary pages, vehicle deformation data, accelerometer and angular data presented graphically, material specifications, and mill certifications.

APPENDIX A Vehicle Center of Gravity Determination

NYBBT-1 Vehicle: 2002 Kia Rio

Vehicle CG Determination

VEHICLE	Equipment	Weight	Long CG	HOR M
+	Unbalasted Car	2429	37.71058	91598.99
+	Brake receivers/wires	5	134	670
+	Brake Frame	10	26	260
+	Brake Cylinder	29	63	1827
+	Strobe Battery	6	57	342
+	Hub	17	0	0
+	CG Plate (EDRs)	8	35	280
-	Battery	-24	-9	216
-	Oil	-6	8	-48
-	Interior	-51	44	-2244
-	Fuel	-68	88	-5984
-	Coolant	-8	-18	144
-	Washer fluid	0	0	0
BALLAST	Water	72	78	5616
	Misc.		0	0
	Misc.		0	0
				92677.99
	TOTAL WEIGHT	2419		38.31252

wheel base 95.25

NCHRP 350 Targets			CURRENT	Difference
Test Inertial Weight	2420	(+/-)55	2419	-1.0
Long CG	39	(+/-)4	38.31	-0.68748

Note, Long. CG is measured from front axle of test vehicle

Curb Weight		
	Left	Right
Front	763	733
Rear	458	475
FRONT	1496	
REAR	933	
TOTAL	2429	

Dummy = 166lbs.

Actual test inertial weight		
	Left	Right
Front	724	724
Rear	475	474
FRONT	1448	
REAR	949	
TOTAL	2397	

Figure A-1. Vehicle Mass Distribution, Test No. NYBBT-1

NYBBT-2 Vehicle: 2003 Kia Rio

Vehicle CG Determination

VEHICLE	Equipment	Weight	Long CG	HOR M
+	Unbalasted Car	2343	35.85595	84010.5
+	Brake receivers/wires	5	130.5	652.5
+	Brake Frame	13	29.5	383.5
+	Brake Cylinder	22	65	1430
+	Strobe Battery	6	65.5	393
+	Hub	17	0	0
+	CG Plate (EDRs)	8	35	280
-	Battery	-34	-9	306
-	Oil	-6	8	-48
-	Interior	-43	44	-1892
-	Fuel	-17	78	-1326
-	Coolant	-9	-18	162
-	Washer fluid	-5	0	0
BALLAST	Water	88	78	6864
	Misc.		0	0
	Misc.		0	0
				91215.5
	TOTAL WEIGHT	2388		38.19745

wheel base 95.25

NCHRP 350 Targets		CURRENT	Difference
Test Inertial Weight	2420 (+/-)55	2388	-32.0
Long CG	39 (+/-)4	38.20	-0.80255

Note, Long. CG is measured from front axle of test vehicle

Curb Weight

	Left	Right
Front	719	742
Rear	463	419
FRONT	1461	
REAR	882	
TOTAL	2343	

Dummy = 166lbs.

Actual test inertial weight

	Left	Right
Front	696	726
Rear	480	493
FRONT	1422	
REAR	973	
TOTAL	2395	

Figure A-2. Vehicle Mass Distribution, Test No. NYBBT-2

NYBBT-3 Vehicle: 2003 Kia Rio

Vehicle CG Determination

VEHICLE	Equipment	Weight	Long CG	HOR M
+	Unbalasted Car	2358	35.50668	83724.75
+	Brake receivers/wires	5	130.5	652.5
+	Brake Frame	10	29.5	295
+	Brake Cylinder	22	65	1430
+	Strobe Battery	6	65.5	393
+	Hub	17	0	0
+	CG Plate (EDRs)	8	35	280
-	Battery	-37	-9	333
-	Oil	-8	8	-64
-	Interior	-41	44	-1804
-	Fuel	-10	78	-780
-	Coolant	-9	-18	162
-	Washer fluid	-8	0	0
BALLAST	Water	97	78	7566
	Misc.		0	0
	Misc.		0	0
				92188.25
	TOTAL WEIGHT	2410		38.25239

wheel base 95.25

NCHRP 350 Targets		CURRENT	Difference
Test Inertial Weight	2420 (+/-)55	2410	-10.0
Long CG	39 (+/-)4	38.25	-0.74761

Note, Long. CG is measured from front axle of test vehicle

Curb Weight

	Left	Right
Front	734	745
Rear	444	435
FRONT	1479	
REAR	879	
TOTAL	2358	

Dummy = 166lbs.

Actual test inertial weight

	Left	Right
Front	758	767
Rear	503	565
FRONT	1525	
REAR	1068	
TOTAL	2593	

Figure A-3. Vehicle Mass Distribution, Test No. NYBBT-3

NYBBT-4 Vehicle: 2002 Dodge Ram 1500QC

Vehicle CG Determination

VEHICLE	Equipment	Weight	Long CG	Vert CG	HOR M	Vert M
+	Unbalasted Truck	5097	60.75	28.95	309642.8	147558.2
+	Brake receivers/wires	5	116	51	580	255
+	Brake Frame	5	34	31	170	155
+	Brake Cylinder	22	74	29	1628	638
+	Strobe Battery	6	74	30	444	180
+	Hub	27	0	15	0	405
+	CG Plate (EDRs)	8	54	32	432	256
-	Battery	-43	-7	45	301	-1935
-	Oil	-12	8	19	-96	-228
-	Interior	-54	44	24	-2376	-1296
-	Fuel	-165	111	20	-18315	-3300
-	Coolant	-21	-18	35	378	-735
-	Washer fluid	-9	-15	35	135	-315
BALLAST	Water	115	111	20	12765	2300
	Misc. (DTS equip)	20	74	27	1480	540
	Misc.		0	0	0	0
					307168.8	144478.2
	TOTAL WEIGHT	5001			61.42147	28.88985

wheel base 140.25

NCHRP 350 Targets		CURRENT	Difference
Test Inertial Weight	5000	5001	1.0
Long CG	62	61.42	-0.57853
Vert CG	28	28.89	0.88985

Note, Long. CG is measured from front axle of test vehicle

Curb Weight

	Left	Right
Front	1469	1377
Rear	1127	1124
FRONT	2846	
REAR	2251	
TOTAL	5097	

Actual test inertial weight

	Left	Right
Front	1415	1360
Rear	1146	1083
FRONT	2775	
REAR	2229	
TOTAL	5004	

Figure A-4. Vehicle Mass Distribution, Test No. NYBBT-4

NYBBT-5 Vehicle: 2002 Dodge Ram 1500QC

Vehicle CG Determination

VEHICLE	Equipment	Weight	Long CG	Vert CG	HOR M	Vert M
+	Unbalasted Truck	5072	59.75	28.02	303052	142117.4
+	Brake receivers/wires	5	116	51	580	255
+	Brake Frame	5	34	31	170	155
+	Brake Cylinder	22	74	29	1628	638
+	Strobe Battery	6	74	30	444	180
+	Hub	27	0	15	0	405
+	CG Plate (EDRs)	8	54	32	432	256
-	Battery	-51	-7	45	357	-2295
-	Oil	-8	8	19	-64	-152
-	Interior	-55	44	24	-2420	-1320
-	Fuel	-158	111	20	-17538	-3160
-	Coolant	-18	-18	35	324	-630
-	Washer fluid	-7	-15	35	105	-245
BALLAST	Steel Plates	132	109	33.5	14388	4422
	Misc. (DTS equip)	20	74	27	1480	540
	Misc.		0	0	0	0
					302938	141166.4
	TOTAL WEIGHT	5000			60.5876	28.23329

wheel base 140.25

NCHRP 350 Targets		CURRENT	Difference
Test Inertial Weight	5000	5000	0.0
Long CG	62	60.59	-1.41240
Vert CG	28	28.23	0.23329

Note, Long. CG is measured from front axle of test vehicle

Curb Weight

	Left	Right
Front	1465	1444
Rear	1078	1085
FRONT	2909	
REAR	2163	
TOTAL	5072	

Actual test inertial weight

	Left	Right
Front	1386	1442
Rear	1095	1095
FRONT	2828	
REAR	2190	
TOTAL	5018	

Figure A-5. Vehicle Mass Distribution, Test No. NYBBT-5

NYBBT-6 Vehicle: 2002 Kia Rio

Vehicle CG Determination

VEHICLE	Equipment	Weight	Long CG	HOR M
+	Unbalasted Car	2386	35.05	83629.5
+	Brake receivers/wires	5	130.5	652.5
+	Brake Frame	10	29.5	295
+	Brake Cylinder	22	65	1430
+	Strobe Battery	6	65.5	393
+	Hub	17	0	0
+	CG Plate (EDRs)	8	35	280
-	Battery	-36	-9	324
-	Oil	-6	8	-48
-	Interior	-40	44	-1760
-	Fuel	-18	78	-1404
-	Coolant	-9	-18	162
-	Washer fluid	-5	0	0
BALLAST	Water	60	78	4680
	Misc.		0	0
	DTS	20	65	1300
				89934
	TOTAL WEIGHT	2420		37.16281

wheel base 95.25

NCHRP 350 Targets			CURRENT	Difference
Test Inertial Weight	2420	(+/-)55	2420	0.0
Long CG	39	(+/-)4	37.16	-1.83719

Note, Long. CG is measured from front axle of test vehicle

Curb Weight

	Left	Right
Front	817	691
Rear	391	487
FRONT	1508	
REAR	878	
TOTAL	2386	

Dummy = 166lbs.

Actual test inertial weight

	Left	Right
Front	740	723
Rear	493	468
FRONT	1463	
REAR	961	
TOTAL	2424	

Figure A-6. Vehicle Mass Distribution, Test No. NYBBT-6

NYBBT-7 Vehicle: 2002 Dodge Ram 1500QC

Vehicle CG Determination

VEHICLE	Equipment	Weight	Long CG	Vert CG	HOR M	Vert M
+	Unbalasted Truck	5069	61.45	28.14	311490.1	142641.7
+	Brake receivers/wires	5	116	51	580	255
+	Brake Frame	5	34	31	170	155
+	Brake Cylinder	22	74	29	1628	638
+	Strobe Battery	6	76	32	456	192
+	Hub	27	0	15	0	405
+	CG Plate (EDRs)	8	54	32	432	256
-	Battery	-43	-7	45	301	-1935
-	Oil	-12	8	19	-96	-228
-	Interior	-72	44	24	-3168	-1728
-	Fuel	-154	111	20	-17094	-3080
-	Coolant	-13	-18	35	234	-455
-	Washer fluid	0	-15	35	0	0
BALLAST	Water	137	111	20	15207	2740
	Misc. (DTS equip)	15	74	27	1110	405
	Misc.		0	0	0	0
					311250.1	140261.7
	TOTAL WEIGHT	5000			62.25001	28.05233

wheel base 140.25

NCHRP 350 Targets		CURRENT	Difference
Test Inertial Weight	5000	5000	0.0
Long CG	62	62.25	0.25001
Vert CG	28	28.05	0.05233

Note, Long. CG is measured from front axle of test vehicle

Curb Weight

	Left	Right
Front	1441	1407
Rear	1107	1114
FRONT	2848	
REAR	2221	
TOTAL	5069	

Actual test inertial weight

	Left	Right
Front	1424	1366
Rear	1096	1126
FRONT	2790	
REAR	2222	
TOTAL	5012	

Figure A-7. Vehicle Mass Distribution, Test No. NYBBT-7

Test: **NYBBT-8** Vehicle: **Rio Sedan (1100C)**

Vehicle CG Determination

VEHICLE	Equipment	Weight	Long CG	HOR M
+	Unbalasted Car	2434	34.87	84867.75
+	Brake receivers/wires	6	129.5	777
+	Brake Frame	7	27	189
+	Brake Cylinder	22	63	1386
+	Strobe Battery	6	63	378
+	Hub	17	0	0
+	CG Plate (EDRs)	9	39.5	355.5
+	DTS	23	62	1426
-	Battery	-29	-8.5	246.5
-	Oil	-6	-3	18
-	Interior	-49	49	-2401
-	Fuel	-38	84.5	-3211
-	Coolant	-9	-16.5	148.5
-	Washer fluid	-8	-16	128
BALLAST	Water	38	84.5	3211
	Misc.			0
	Misc.			0
				87519.25
	TOTAL WEIGHT	2423		36.1202

wheel base 95.25

MASH targets		CURRENT	Difference
Test Inertial Weight	2420 (+/-)55	2423	3.0
Long CG	39 (+/-)4	36.12	-2.87980

Note, Long. CG is measured from front axle of test vehicle

Curb Weight

	Left	Right
Front	780	763
Rear	460	431
FRONT	1543	
REAR	891	
TOTAL	2434	

Dummy = 166lbs.

Actual test inertial weight (from scales)

	Left	Right
Front	748	755
Rear	463	472
FRONT	1503	
REAR	935	
TOTAL	2438	

Figure A-8. Vehicle Mass Distribution, Test No. NYBBT-8

NYBBT-9 Vehicle: Ram 1500 (2270P)

Vehicle CG Determination

VEHICLE	Equipment	Weight	Long CG	Vert CG	HOR M	Vert M
+	Unbalasted Truck(Curb)	5033	61.89627	28.7766	311523.9	144832.6
+	Brake receivers/wires	9	108	52.5	972	472.5
+	Brake Frame	5	36	24.5	180	122.5
+	Brake Cylinder (Nitrogen)	28	75	28	2100	784
+	Strobe/Brake Battery	5	71	29	355	145
+	Hub	20	0	15	0	300
+	CG Plate (EDRs)	8	72	29.5	576	236
-	Battery	-46	-8	40	368	-1840
-	Oil	-8	5.5	17	-44	-136
-	Interior	-68	49	23	-3332	-1564
-	Fuel	-160	114.5	19.5	-18320	-3120
-	Coolant	-18	-17.25	32.5	310.5	-585
	DTS	22	71	29	1562	638
-	Washer fluid	-6	-18	32.5	108	-195
BALLAST	Water	169	114.5	19.5	19350.5	3295.5
	Misc.		71	30	0	0
	Misc.				0	0
					315709.9	143386.1
	TOTAL WEIGHT	4993			63.23051	28.71743

wheel base 140.25

Calculated Test Inertial Weight

MASH Targets	Targets	CURRENT	Difference
Test Inertial Weight	5000	4993	-7.0
Long CG	62	63.23	1.23051
Vert CG	28	28.72	0.71743

Note, Long. CG is measured from front axle of test vehicle

Curb Weight

	Left	Right
Front	1430	1382
Rear	1109	1112
FRONT	2812	
REAR	2221	
TOTAL	5033	

Actual test inertial weight (from scales)

	Left	Right
Front	1374	1379
Rear	1101	1135
FRONT	2753	
REAR	2236	
TOTAL	4989	

Figure A-9. Vehicle Mass Distribution, Test No. NYBBT-9

APPENDIX B Type II Box Beam Terminal System Details - English Units, Test No. NYBBT-1

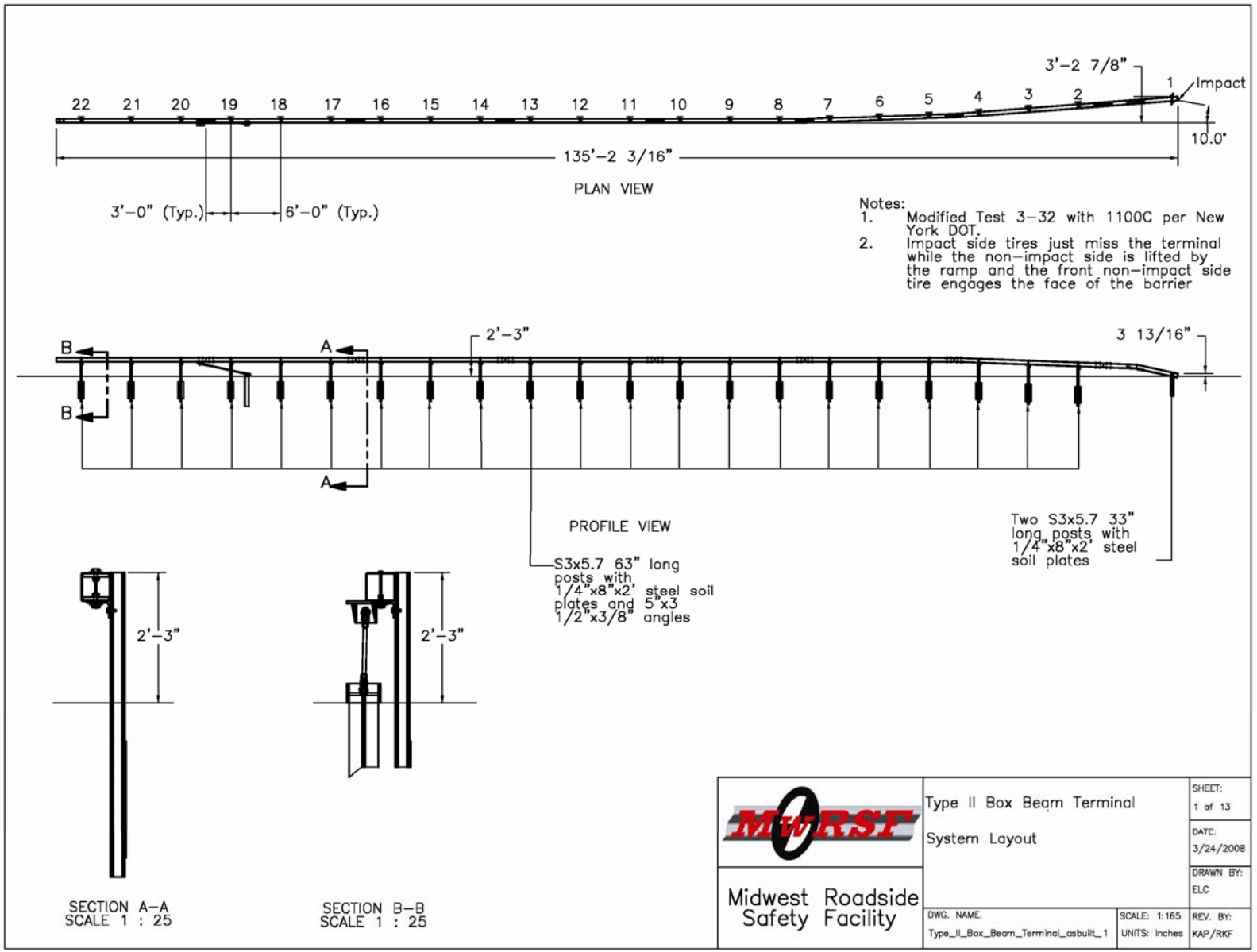


Figure B-1. Type II Box Beam Terminal System Details (English), Test No. NYBBT-1

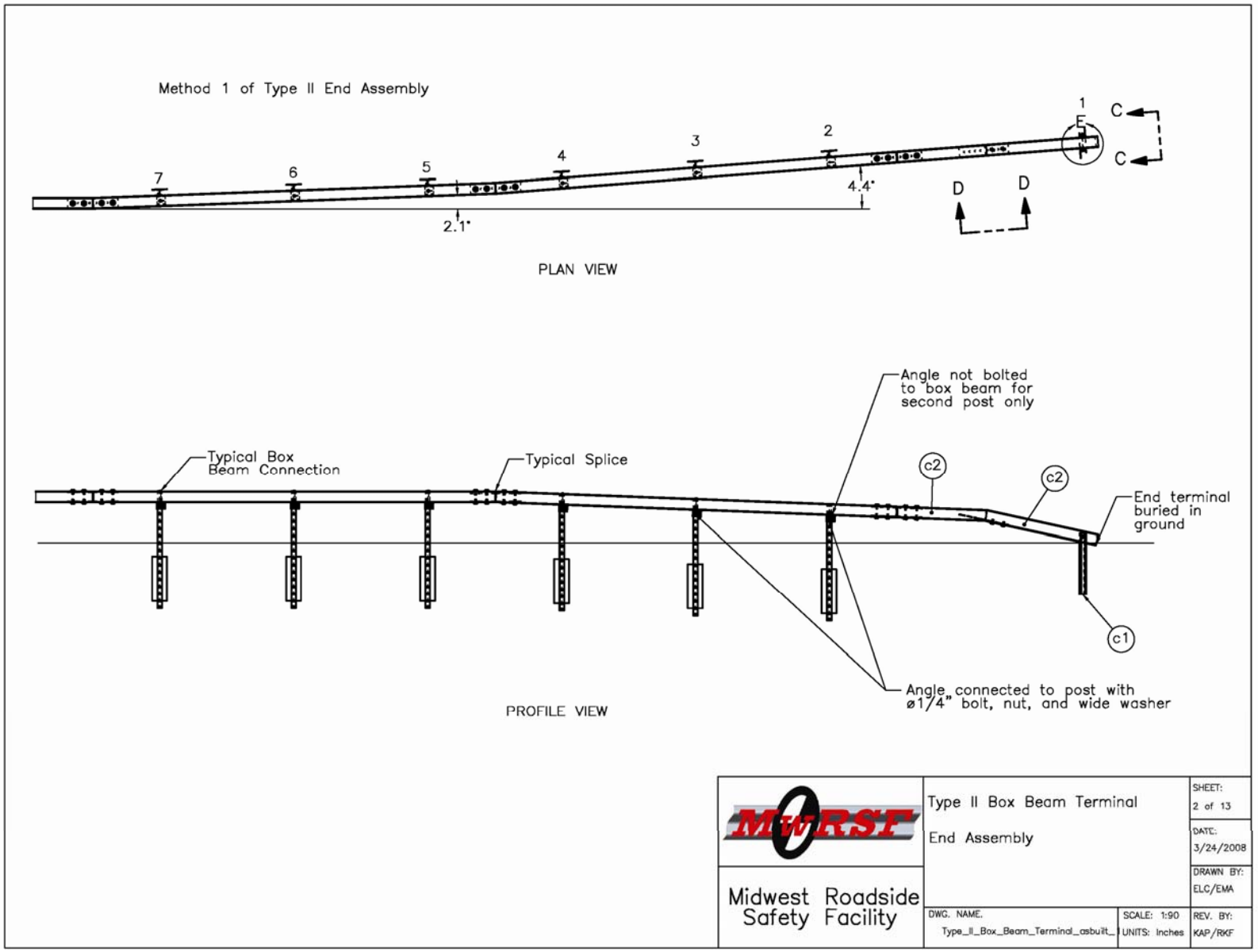


Figure B-2. Type II Box Beam Terminal System Details (English), Test No. NYBBT-1

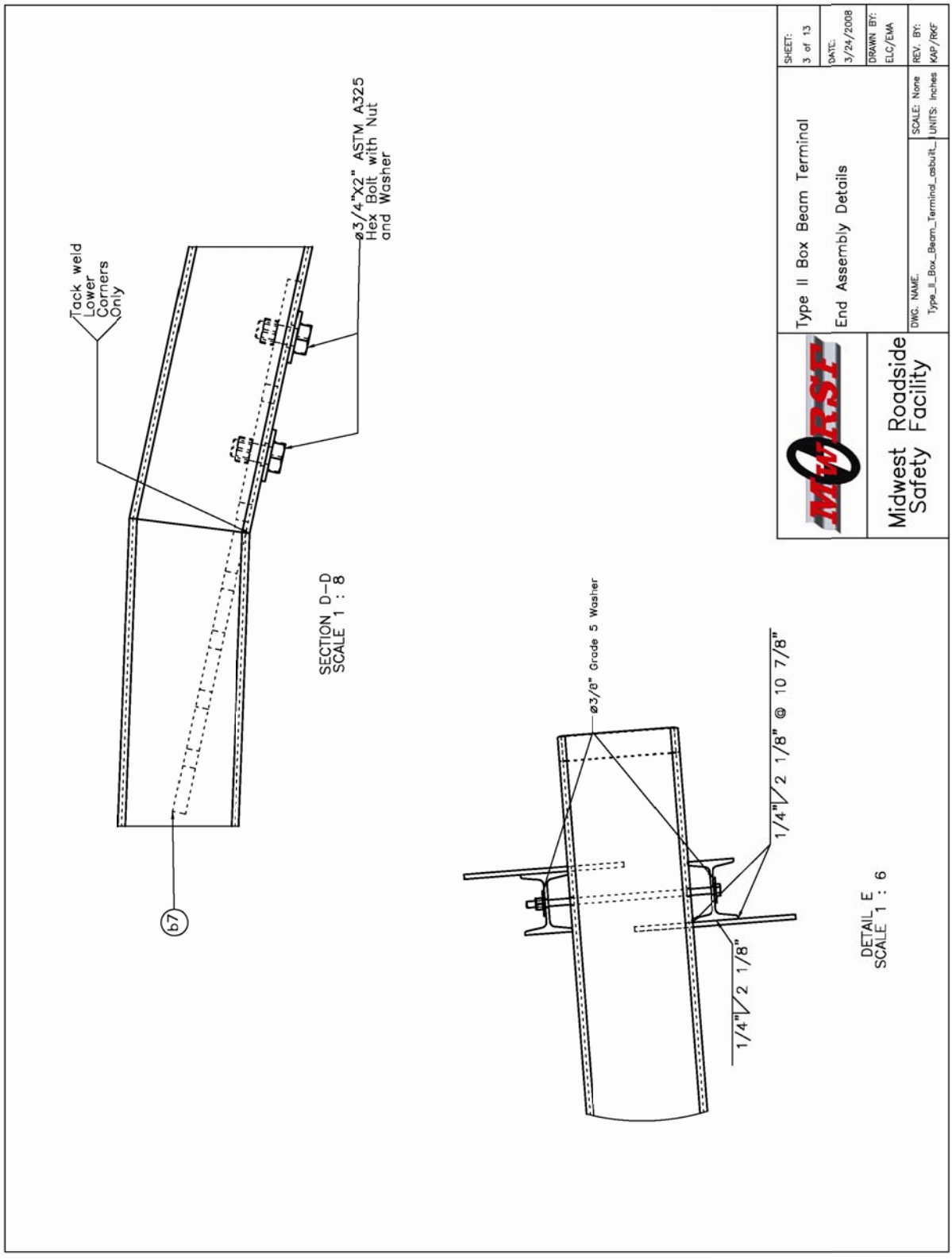


Figure B-3. Type II Box Beam Terminal System Details (English), Test No. NYBBT-1

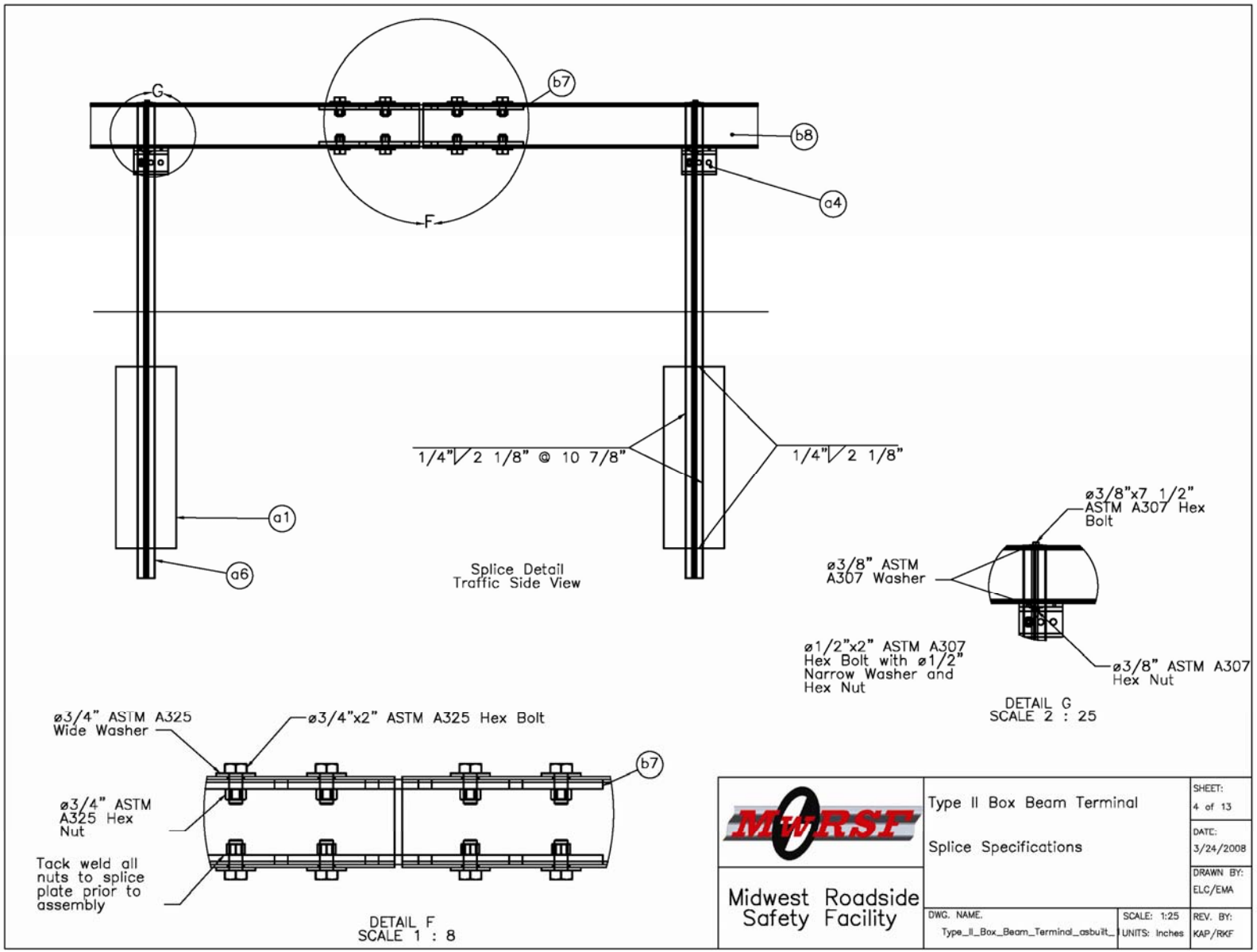


Figure B-4. Type II Box Beam Terminal System Details (English), Test No. NYBBT-1

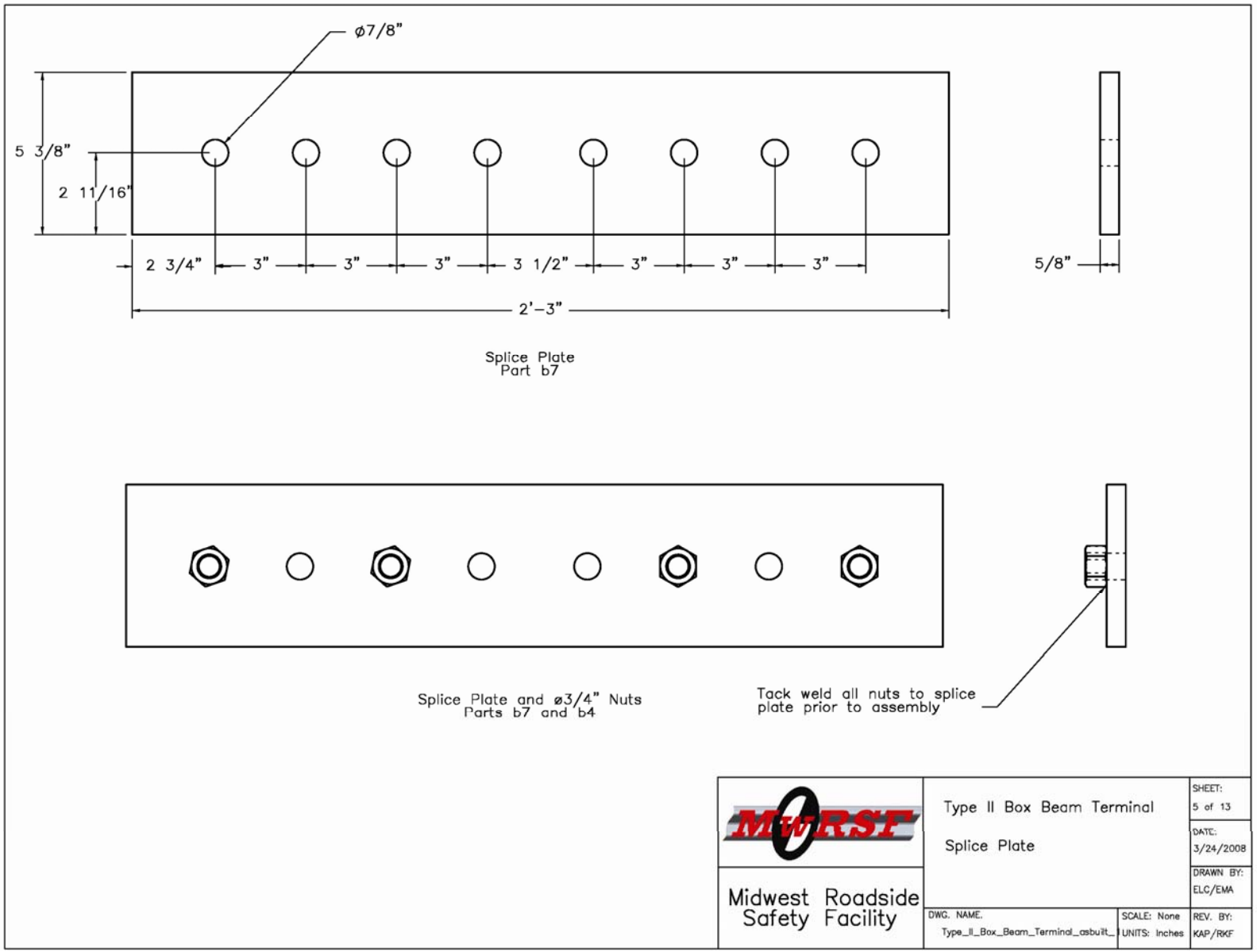


Figure B-5. Type II Box Beam Terminal System Details (English), Test No. NYBBT-1

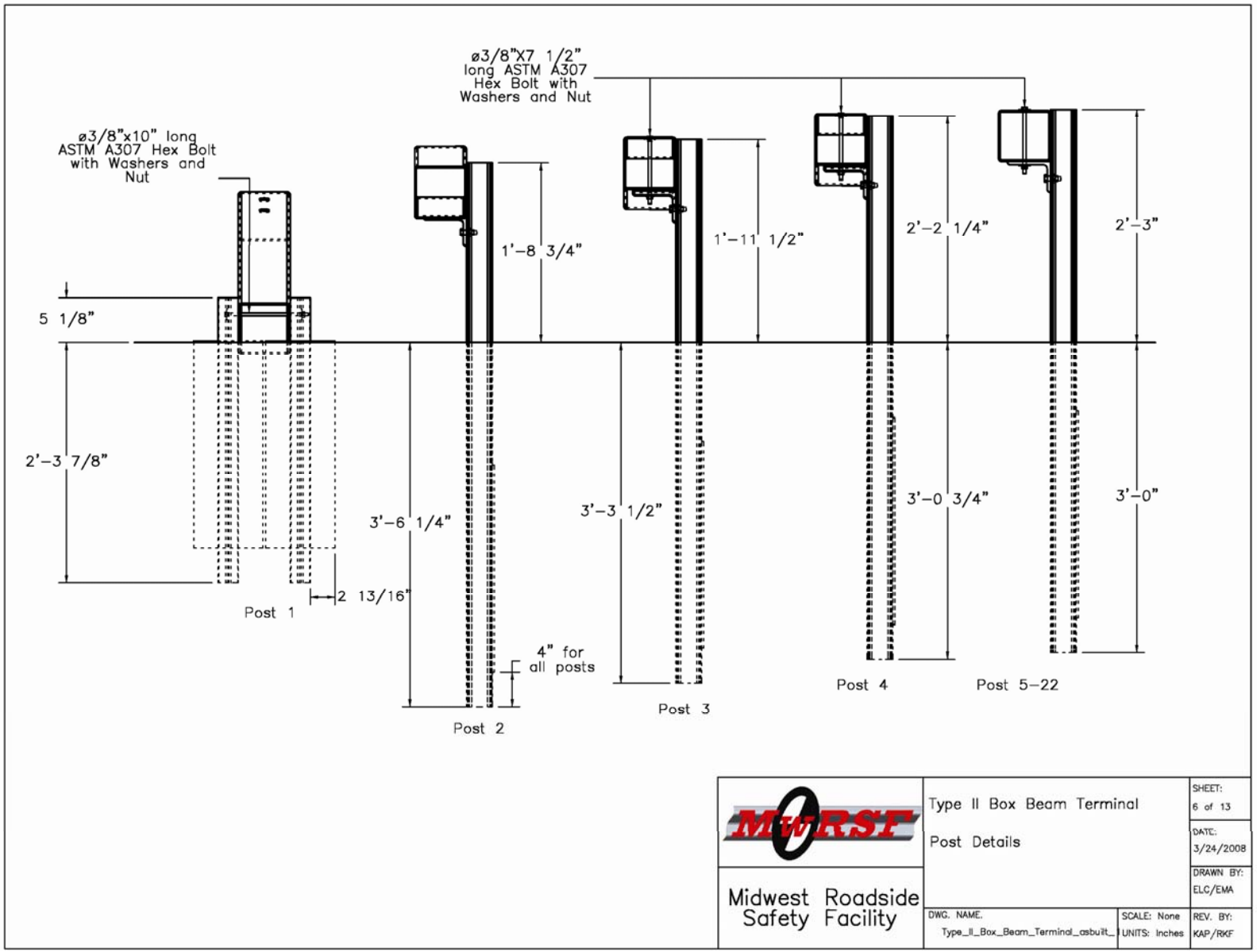


Figure B-6. Type II Box Beam Terminal System Details (English), Test No. NYBBT-1

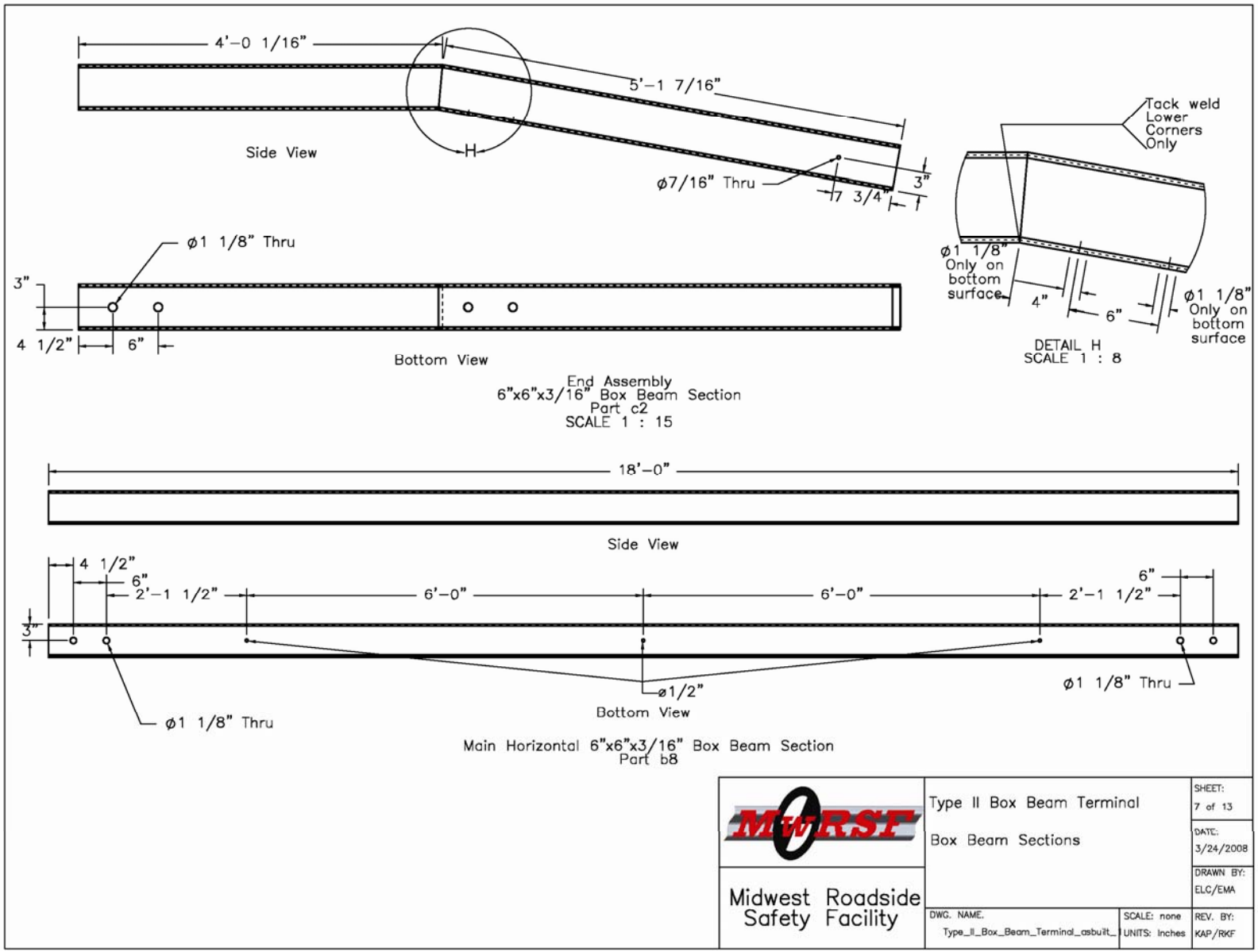


Figure B-7. Type II Box Beam Terminal System Details (English), Test No. NYBBT-1

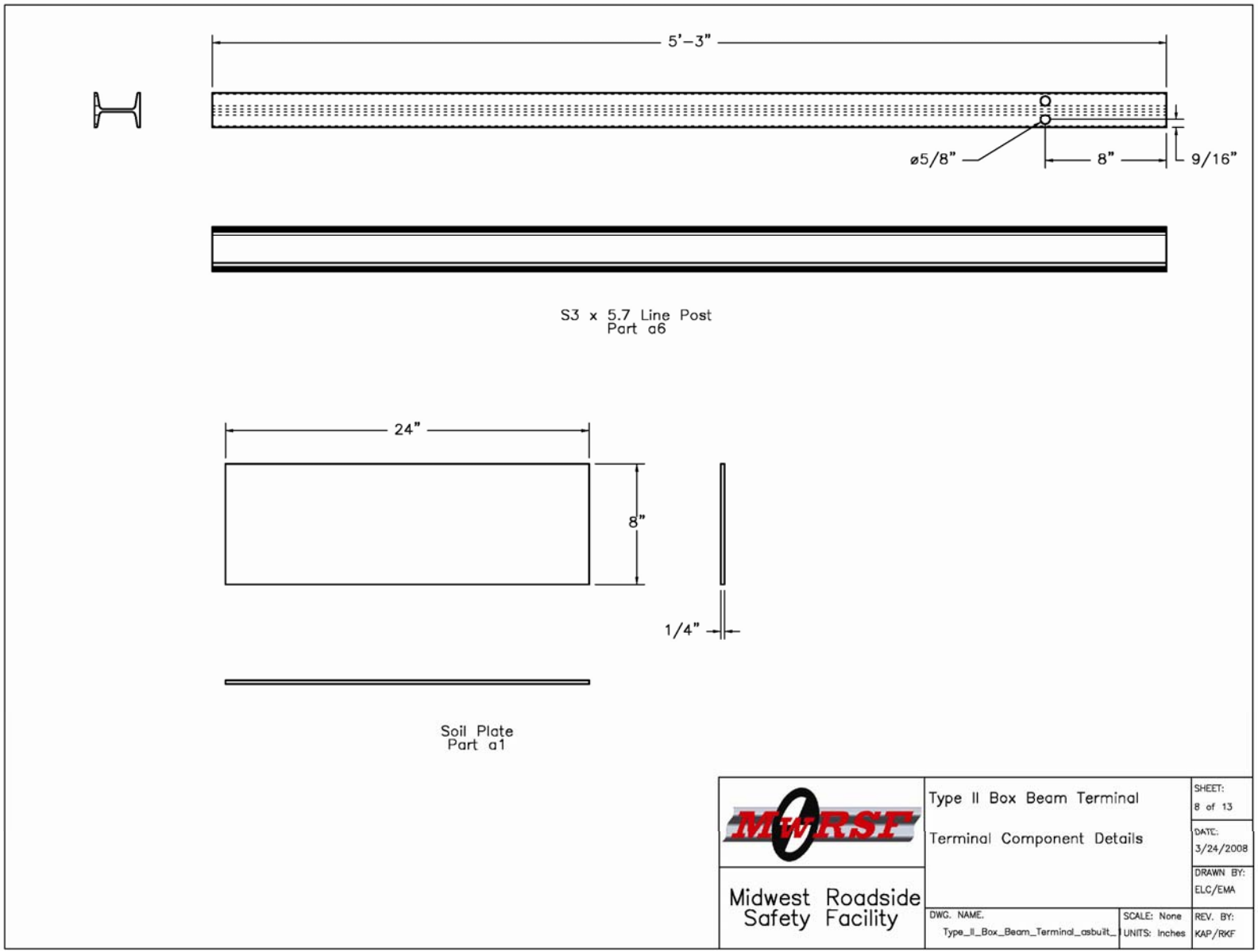


Figure B-8. Type II Box Beam Terminal System Details (English), Test No. NYBBT-1

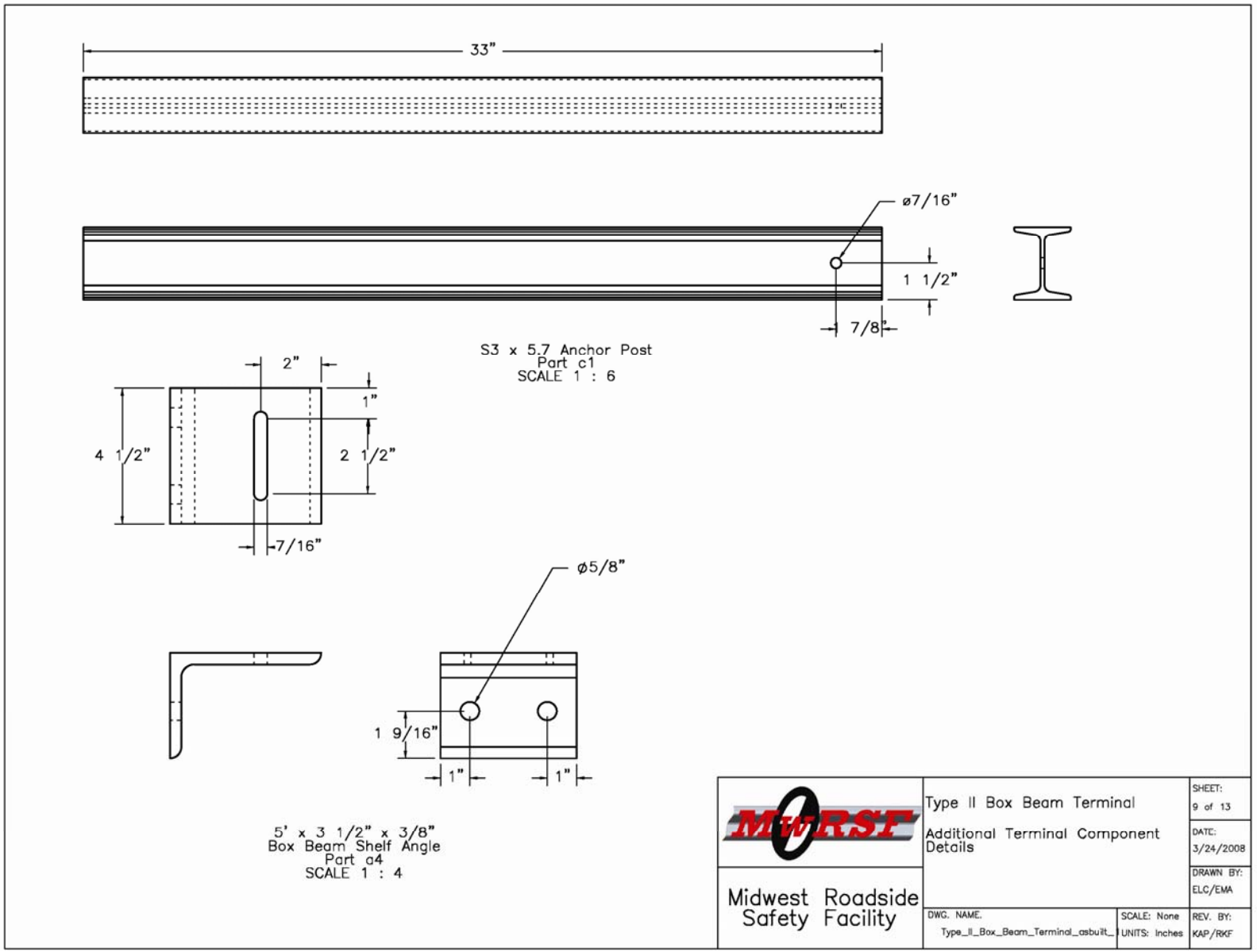


Figure B-9. Type II Box Beam Terminal System Details (English), Test No. NYBBT-1

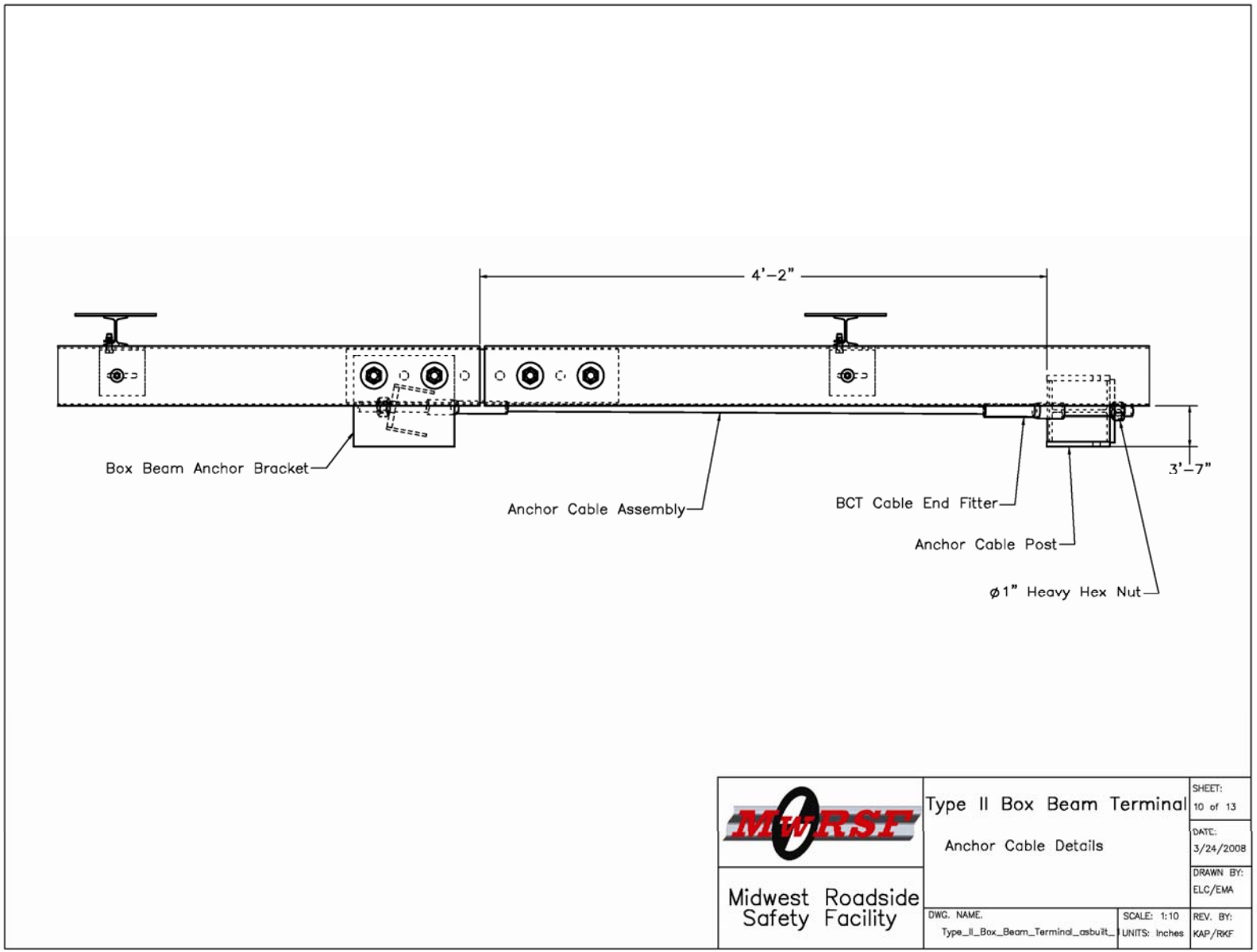


Figure B-10. Type II Box Beam Terminal System Details (English), Test No. NYBBT-1

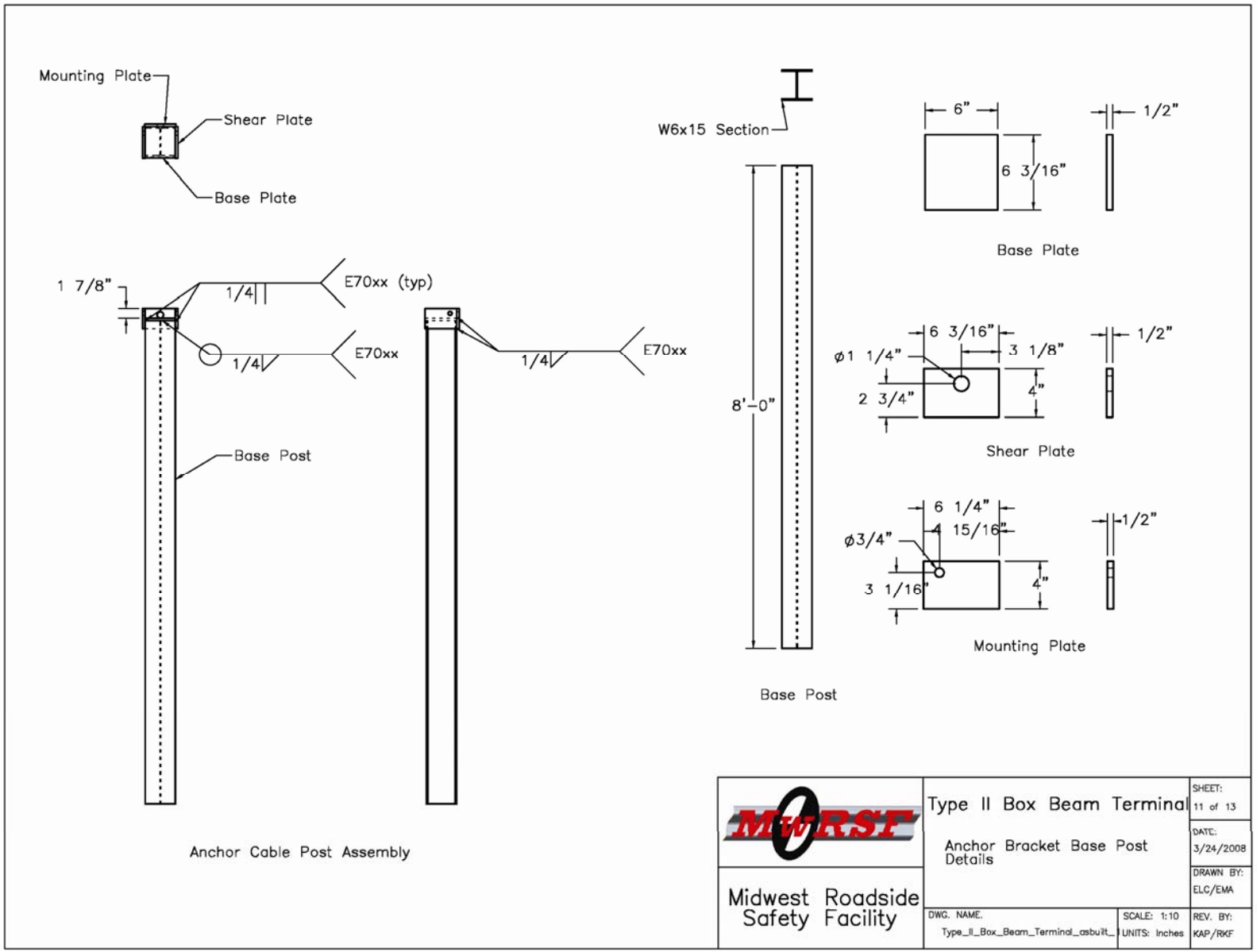


Figure B-11. Type II Box Beam Terminal System Details (English), Test No. NYBBT-1

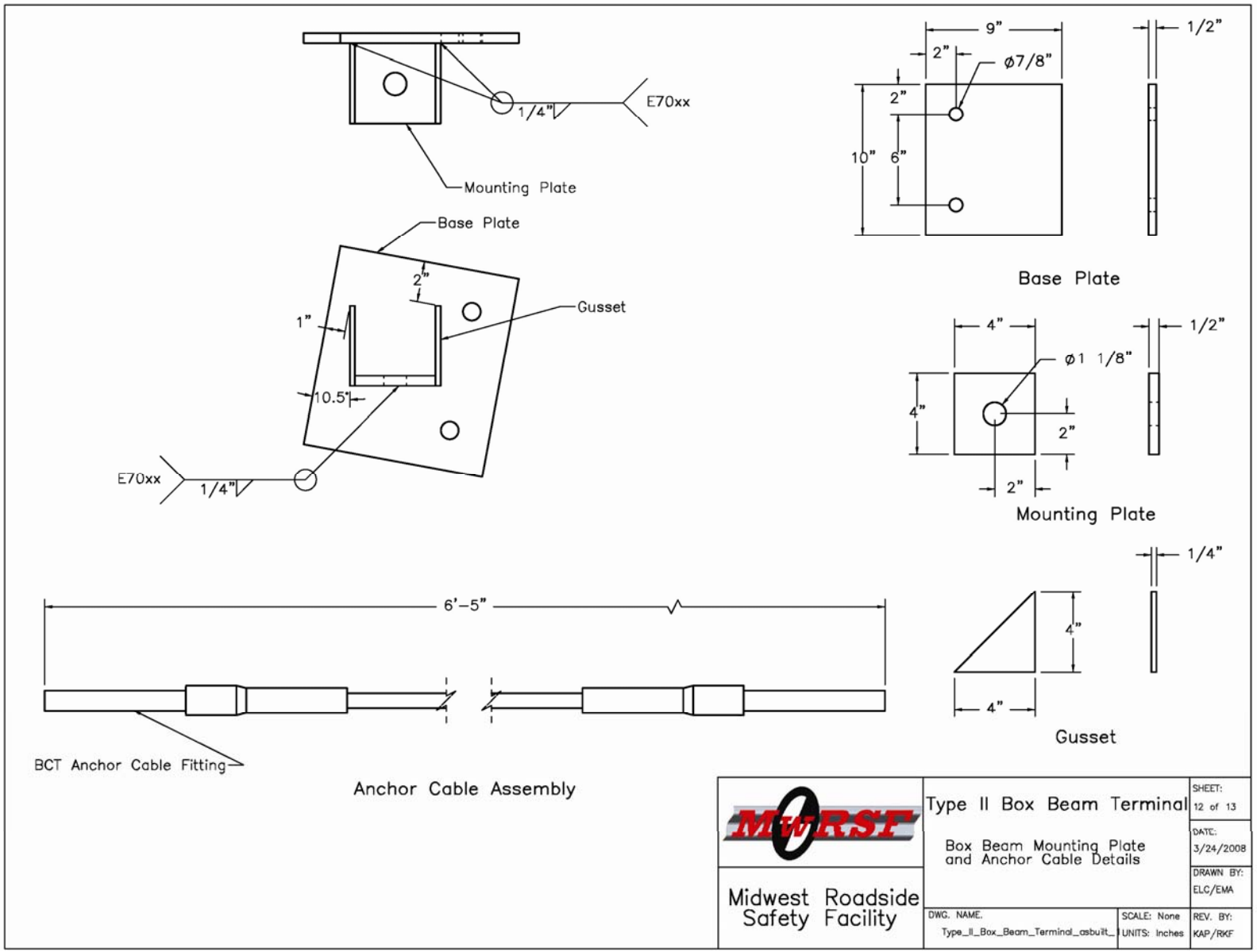


Figure B-12. Type II Box Beam Terminal System Details (English), Test No. NYBBT-1

Type II Box Beam Terminal			
Item No.	Quantity	Description	Material Specification
a1	23	1/4" x 8" x 2' steel soil plate	A36 Steel
a2	19	ø 1/2" coarse thread 2" long hex bolt	ASTM A307
a3	7	ø 1/2" hex nut	ASTM A307
a4	21	5" x 3 1/2" x 3/8" box beam shelf angle	A36 Steel
a5	19	ø 1/2" narrow washer	ASTM A307
a6	21	S3 x 5.7 63" long post	A36 Steel
b1	20	ø 3/8" coarse thread 7 1/2" long hex bolt	ASTM A307
b2	33	ø 3/8" hex nut	ASTM A307
b3	42	ø 3/8" wide washer	ASTM A307
b4	50	ø 3/4" hex nut	ASTM A325
b5	58	ø 3/4" wide washer	ASTM A325
b6	58	ø 3/4" coarse thread 2" long hex bolt	ASTM A325
b7	15	26 3/4" x 5 5/16" x 5/8" splice plate	A36 Steel
b8	7	6" x 6" x 3/16" 18' long box beam	ASTM A500 Grade B
c1	2	S3 x 5.7 33" long post	A36 Steel
c2	1	6" x 6" x 3/16" box beam end assembly	ASTM A500 Grade B
c4	1	ø 5/16" coarse thread 9 3/8" long hex bolt	ASTM A307
c5	2	ø 1/4" hex nut	ASTM A307
c6	2	ø 1/4" x 1 1/2" long hex bolt	ASTM A307
c7	4	ø 1/4" wide washer	ASTM A307
d1	1	Box beam cable anchor	A36 steel, galvanized
d2	1	Lower end post	A36 steel, galvanized
d3	2	BCT Anchor Cable End	A36 steel, galvanized
d4	1	Anchor cable	3 x 7 galvanized cable
d5	2	7/8" diameter hex nut	ASTM A307

MwRSF

Midwest Roadside Safety Facility

Type II Box Beam Terminal

Bill of Materials

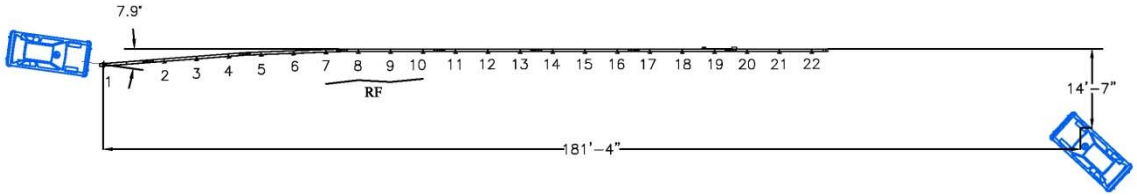
SHEET: 13 of 13
DATE: 3/24/2008
DRAWN BY: ELC/EMA
REV. BY: KAP/RKF

DWG. NAME. Type_II_Box_Beam_Terminal_asbuilt_
SCALE: None
UNITS: Inches

Figure B-13. Type II Box Beam Terminal System Details (English), Test No. NYBBT-1

APPENDIX C Test Summary Sheets in English Units

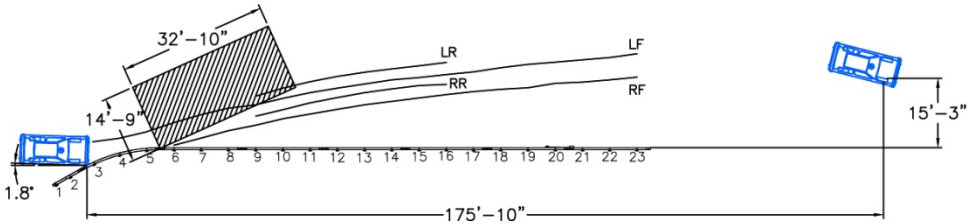
0.000 sec 0.118 sec 0.234 sec 0.306 sec 0.550 sec



- Test Agency ..... MwRSF
- Test Number NYBBT-1
- Date 8/14/07
- MASH Test Designation ..... Modified 3-32
- Appurtenance ..... Type II End Terminal
- Total Length ..... 135 ft
- Key Element - Steel Box Beam
  - Size ..... 6 in. x 6 in. x 3/16 in.
  - Length ..... 18 ft
  - Top Mounting Height ..... 27 in.
- Key Elements - Steel Post
  - Post No. 1 ..... S3x5.7 by 33 in. long
  - Post Nos. 2-22 ..... S3x5.7 by 63 in. long
- Type of Soil ..... Grading B - AASHTO M 147-65 (1990)
- Test Vehicle
  - Type/Designation 1100C
  - Make and Model ..... 2002 Kia Rio
  - Curb ..... 2,428 lb
  - Test Inertial ..... 2,396 lb
  - Gross Static ..... 2,586 lb
- Impact Conditions
  - Speed ..... 61.9 mph
  - Angle (trajectory) ..... 7.9 degrees
  - Target Impact Location ..... on upstream end of terminal
  - Actual Impact Location ..... 2 1/2 in. downstream from end of terminal
- Exit Conditions
  - Speed ..... 61.5 mph
  - Angle ..... 10.6 degrees
  - Exit Box Criterion ..... NA
- Post-Impact Trajectory
  - Vehicle Stability ..... Unsatisfactory
  - Stopping Distance ..... 181 ft - 4 in. downstream
    14 ft - 7 in. laterally behind traffic-side face
- Occupant Impact Velocity (EDR-3)
  - Longitudinal ..... -8.46 ft/s < 40 ft/s
  - Lateral ..... -7.02 ft/s < 40 ft/s
- Occupant Ridedown Acceleration (EDR-3)
  - Longitudinal ..... 11.19 g's < 20.49 g's
  - Lateral ..... 11.91 g's < 20.49 g's
- Occupant Impact Velocity (EDR-4)
  - Longitudinal ..... -4.17 ft/s < 40 ft/s
  - Lateral ..... -7.60 ft/s < 40 ft/s
- Occupant Ridedown Acceleration (EDR-4)
  - Longitudinal ..... 10.47 g's < 20.49 g's
  - Lateral ..... 12.49 g's < 20.49 g's
- THIV (EDR-4 - not required) ..... NA
- PHD (EDR-4 - not required) ..... NA
- ASI (EDR-3 - not required) ..... NA
- ASI (EDR-4 - not required) ..... NA
- Test Article Damage ..... Moderate
- Test Article Deflections
  - Permanent Set ..... 1 3/16 in.
  - Dynamic ..... 2 11/16 in.
  - Working Width ..... NA
- Vehicle Damage ..... Extensive
  - VDS[12] ..... 01-L&T-5
  - CDC[13] 01-FDA09
  - Maximum Deformation ..... NA
- Angular Displacement
  - Roll ..... NA
  - Pitch ..... NA
  - Yaw ..... 188 degrees

Figure C-1. Summary of Test Results and Sequential Photographs (English), Test No. NYBBT-1

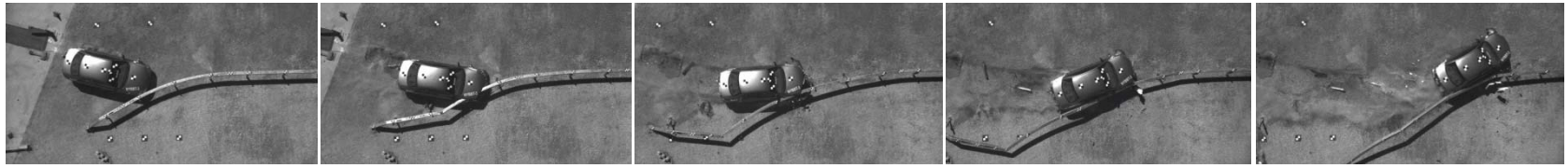
0.000 sec | 0.06 sec | 0.158 sec | 0.224 sec | 0.476 sec



- Test Agency ..... MwRSF
- Test Number NYBBT-2
- Date 8/15/07
- MASH Test Designation ..... Modified 3-30
- Appurtenance ..... Type IIA End Terminal
- Total Length ..... 132 ft
- Key Element - Steel Box Beam
  - Size ..... 6 in. x 6 in. x 3/16 in.
  - Length ..... 18 ft
  - Top Mounting Height ..... 27 in.
- Key Elements - Steel Post
  - Post No. 1 ..... S3x5.7 by 33 in. long
  - Post Nos. 2-22 ..... S3x5.7 by 63 in. long
- Type of Soil ..... Grading B - AASHTO M 147-65 (1990)
- Test Vehicle
  - Type/Designation 1100C
  - Make and Model ..... 2002 Kia Rio
  - Curb ..... 2,343 lb
  - Test Inertial ..... 2,395 lb
  - Gross Static ..... 2,553 lb
- Impact Conditions
  - Speed ..... 63.2 mph
  - Angle (trajectory) ..... 1.6 degrees
  - Target Impact Location ..... left ¼-point aligned w/ centerline tangent box beam
  - Actual Impact Location ..... 16 1/2 in. upstream of post no. 3
- Exit Conditions
  - Speed ..... 48.7 mph
  - Angle ..... 15.7 degrees
  - Exit Box Criterion ..... Passed
- Post-Impact Trajectory
  - Vehicle Stability ..... Satisfactory
  - Stopping Distance ..... 175 ft - 10 in. downstream
    15 ft - 3 in. laterally away traffic-side face
- Occupant Impact Velocity (EDR-3)
  - Longitudinal ..... -14.38 ft/s < 40 ft/s
  - Lateral ..... -14.75 ft/s < 40 ft/s
- Occupant Ridedown Acceleration (EDR-3)
  - Longitudinal ..... -8.54 g's < 20.49 g's
  - Lateral ..... -4.78 g's < 20.49 g's
- Occupant Impact Velocity (EDR-4)
  - Longitudinal ..... -12.47 ft/s < 40 ft/s
  - Lateral ..... -14.73 ft/s < 40 ft/s
- Occupant Ridedown Acceleration (EDR-4)
  - Longitudinal ..... -7.26 g's < 20.49 g's
  - Lateral ..... -3.91 g's < 20.49 g's
- THIV (DTS - not required)* ..... 20.67 ft/s
- PHD (DTS - not required)* ..... 8.99 g's
- ASI (EDR-3 - not required) ..... NA
- ASI (EDR-4 - not required) ..... NA
- Test Article Damage ..... Moderate
- Test Article Deflections
  - Permanent Set ..... 7 1/2 in.
  - Dynamic ..... 24 1/8 in.
  - Working Width ..... 109 13/16 in.
- Vehicle Damage ..... Moderate
  - VDS[12] 01-RFQ-3
  - CDC[13] 01-FZEW3
  - Maximum Deformation ..... NA
- Angular Displacement
  - Roll ..... NA
  - Pitch ..... NA
  - Yaw ..... -15 degrees

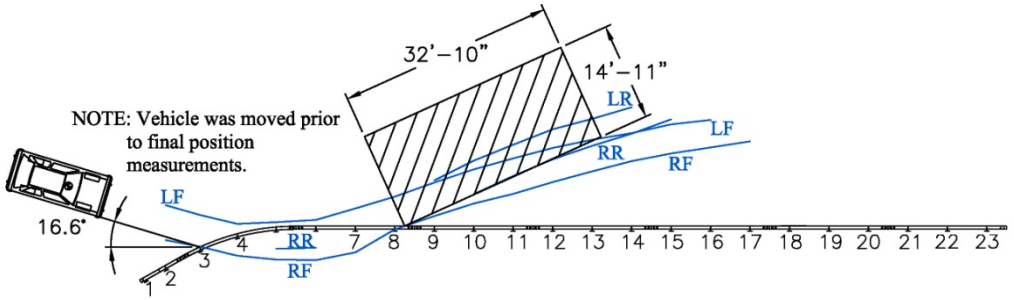
Figure C-2. Summary of Test Results and Sequential Photographs (English), Test No. NYBBT-2

* THIV and PHD values are calculated using angular data from the DTS and accelerometer traces from the EDR-3.



0.000 sec 0.090 sec 0.186 sec 0.306 sec 0.494 sec

- Test Agency ..... MwRSF
- Test Number NYBBT-3
- Date 9/7/07
- MASH Test Designation 3-34
- Appurtenance ..... Type IIA End Terminal
- Total Length ..... 132 ft
- Key Element - Steel Box Beam
  - Size ..... 6 in. x 6 in. x 3/16 in.
  - Length ..... 18 ft
  - Top Mounting Height ..... 27 in.
- Key Elements - Steel Post
  - Post No. 1 ..... S3x5.7 by 33 in. long
  - Post Nos. 2-23 ..... S3x5.7 by 63 in. long
- Type of Soil ..... Grading B - AASHTO M 147-65 (1990)
- Test Vehicle
  - Type/Designation 1100C
  - Make and Model ..... 2002 Kia Rio
  - Curb ..... 2,358 lb
  - Test Inertial ..... 2,428 lb
  - Gross Static ..... 2,593 lb
- Impact Conditions
  - Speed ..... 63.7 mph
  - Angle (trajectory) ..... 16.6 degrees
  - Target Impact Location ..... Centerline of post no. 3
  - Actual Impact Location ..... 3/4 in. upstream of post no. 3
- Exit Conditions
  - Speed ..... 35.9 mph
  - Angle ..... 19.5 degrees
  - Exit Box Criterion ..... Passed
- Post-Impact Trajectory
  - Vehicle Stability ..... Satisfactory
  - Stopping Distance ..... NA
- Occupant Impact Velocity (EDR-3)
  - Longitudinal ..... -17.16 ft/s < 40 ft/s
  - Lateral ..... 14.57 ft/s < 40 ft/s

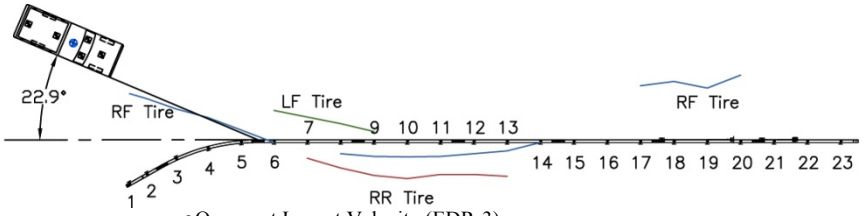


- Occupant Ridedown Acceleration (EDR-3)
  - Longitudinal ..... -9.02 g's < 20.49 g's
  - Lateral ..... 6.53 g's < 20. 49 g's
- THIV (EDR-3 - not required)* ..... 20.96 ft/s
- PHD (EDR-3 - not required)* ..... 10.95 g's
- ASI (EDR-3 - not required) ..... NA
- Test Article Damage ..... Moderate
- Test Article Deflections
  - Permanent Set ..... 246 in.
  - Dynamic ..... NA
  - Working Width ..... 287 7/8 in.
- Vehicle Damage ..... Moderate
  - VDS[12] 01-RFQ-6
  - CDC[13] 01-RYEW2
  - Maximum Deformation ..... NA
- Angular Displacement
  - Roll ..... 3 degrees
  - Pitch ..... NA
  - Yaw ..... -46 degrees

Figure C-3. Summary of Test Results and Sequential Photographs (English), Test No. NYBBT-3

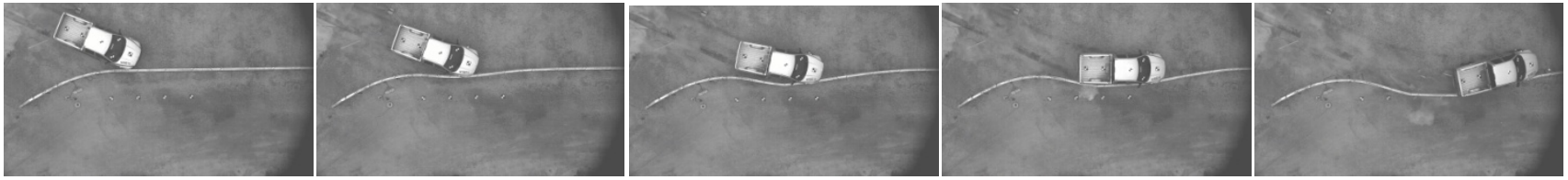
* The THIV and PHD values were calculated using high-speed video analysis and EDR-3 accelerometer data.

0.000 sec | 0.058 sec | 0.180 sec | 0.268 sec | 0.360 sec

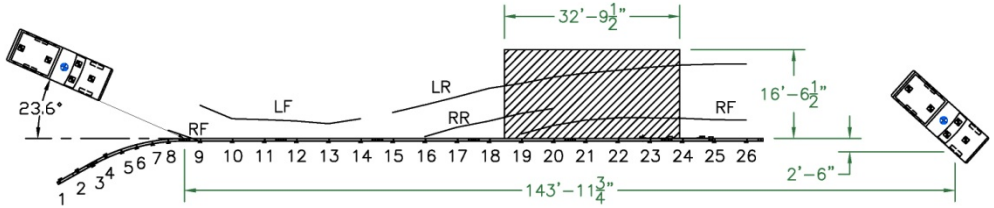


- Test Agency ..... MwRSF
- Test Number NYBBT-4
- Date 7/11/08
- MASH Test Designation 3-35
- Appurtenance ..... Modified Type IIA End Terminal
- Total Length ..... 132 ft
- Key Element - Steel Box Beam
  - Size ..... 6 in. x 6 in. x 3/16 in.
  - Length ..... 18 ft
  - Top Mounting Height ..... 27 in.
- Key Elements - Steel Post
  - Post Nos. 1-3 ..... S3x5.7 by 84 in. long
  - Post Nos. 4-23 ..... S3x5.7 by 63 in. long
- Type of Soil ..... Grading B - AASHTO M 147-65 (1990)
- Test Vehicle
  - Type/Designation 2270P
  - Make and Model ..... 2002 Dodge Ram 1500 Quad Cab Pickup
  - Curb ..... 5,097 lb
  - Test Inertial ..... 5,004 lb
  - Gross Static ..... 5,176 lb
- Impact Conditions
  - Speed ..... 62.1 mph
  - Angle (trajectory) ..... 22.9 degrees
  - Target Impact Location ..... Midspan between post nos. 5 and 6
  - Actual Impact Location ..... 33 1/2 in. upstream of post no. 6
- Exit Conditions
  - Speed ..... NA
  - Angle ..... NA
  - Exit Box Criterion ..... NA
- Post-Impact Trajectory
  - Vehicle Stability ..... Unsatisfactory
  - Stopping Distance ..... NA
- Occupant Impact Velocity (EDR-3)
  - Longitudinal ..... -10.32 ft/s < 40 ft/s
  - Lateral ..... 13.32 ft/s < 40 ft/s
- Occupant Ridedown Acceleration (EDR-3)
  - Longitudinal ..... -7.12 g's < 20.49 g's
  - Lateral ..... 11.90 g's < 20.49 g's
- Occupant Impact Velocity (DTS)
  - Longitudinal ..... -9.23 ft/s < 40 ft/s
  - Lateral ..... 13.53 ft/s < 40 ft/s
- Occupant Ridedown Acceleration (DTS)
  - Longitudinal ..... -6.38 g's < 20.49 g's
  - Lateral ..... 11.32 g's < 20.49 g's
- THIV (DTS - not required) ..... 17.52 ft/s
- PHD (DTS - not required) ..... 11.42 g's
- ASI (EDR-3 - not required) 0.84
- ASI (DTS - not required) 0.79
- Test Article Damage ..... Extensive
- Test Article Deflections
  - Permanent Set ..... 282 1/4 in.
  - Dynamic ..... NA
  - Working Width ..... NA
- Vehicle Damage ..... Extensive
  - VDS[12] ..... 01-R&T-4
  - CDC[13] 01-RDAO9
- Maximum Deformation ..... 1 1/4 in. at right-center floorboard
- Angular Displacement (Note: Angular data was not available after 3.8 seconds)
  - Roll ..... 193 degrees
  - Pitch ..... 90 degrees
  - Yaw ..... 132 degrees

Figure C-4. Summary of Test Results and Sequential Photographs (English), Test No. NYBBT-4



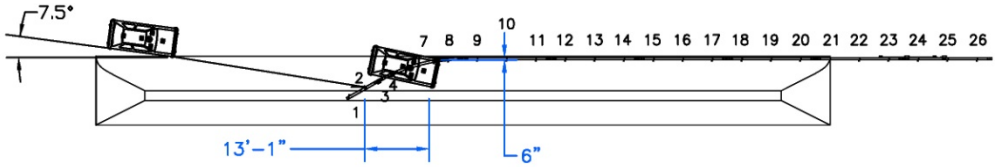
0.000 sec 0.058 sec 0.180 sec 0.268 sec 0.360 sec



- Test Agency ..... MwRSF
- Test Number NYBBT-5
- Date 7/31/08
- MASH Test Designation 3-35
- Appurtenance ..... Modified Type IIA End Terminal
- Total Length ..... 132 ft
- Key Element - Steel Box Beam
  - Size ..... 6 in. x 6 in. x 3/16 in.
  - Length ..... 18 ft
  - Top Mounting Height ..... 27 in.
- Key Elements - Steel Post
  - Post Nos. 1, 2, 4 ..... S3x5.7 by 84 in. long
  - Post Nos. 3, 5-26 ..... S3x5.7 by 63 in. long
- Type of Soil ..... Grading B - AASHTO M 147-65 (1990)
- Test Vehicle
  - Type/Designation 2270P
  - Make and Model ..... 2002 Dodge Ram 1500 Quad Cab Pickup
  - Curb ..... 5,128 lb
  - Test Inertial ..... 5,018 lb
  - Gross Static ..... 5,190 lb
- Impact Conditions
  - Speed ..... 62.1 mph
  - Angle (trajectory) ..... 23.6 degrees
  - Target Impact Location ..... Midspan between post nos. 8 and 9
  - Actual Impact Location ..... 34 in. upstream of post no. 9
- Exit Conditions
  - Speed ..... 50.4 mph
  - Angle ..... 4 degrees
  - Exit Box Criterion ..... Pass
- Post-Impact Trajectory
  - Vehicle Stability ..... Satisfactory
  - Stopping Distance ..... 143 ft - 11 3/4 in. downstream
2 ft - 6 in. laterally behind traffic-side face
- Occupant Impact Velocity (EDR-3)
  - Longitudinal ..... -9.21 ft/s < 40 ft/s
  - Lateral ..... 13.52 ft/s < 40 ft/s
- Occupant Ridedown Acceleration (EDR-3)
  - Longitudinal ..... -4.85 g's < 20.49 g's
  - Lateral ..... 5.49 g's < 20.49 g's
- Occupant Impact Velocity (DTS)
  - Longitudinal ..... -9.12 ft/s < 40 ft/s
  - Lateral ..... 13.68 ft/s < 40 ft/s
- Occupant Ridedown Acceleration (DTS)
  - Longitudinal ..... -4.56 g's < 20.49 g's
  - Lateral ..... 6.51 g's < 20.49 g's
- THIV (DTS - not required) ..... 15.42 ft/s
- PHD (DTS - not required) ..... 6.57 g's
- ASI (EDR-3 - not required) 0.50
- ASI (DTS - not required) 0.51
- Test Article Damage ..... Moderate
- Test Article Deflections
  - Permanent Set ..... 43 in.
  - Dynamic ..... 68 1/2 in.
  - Working Width ..... 98 5/8 in.
- Vehicle Damage ..... Moderate
  - VDS[12] 01-RFQ-3
  - CDC[13] 01-RDEN2
- Maximum Deformation ..... 1/2 in. at right-front floorboard
- Angular Displacement
  - Roll ..... -19 degrees
  - Pitch ..... -10 degrees
  - Yaw ..... 50 degrees

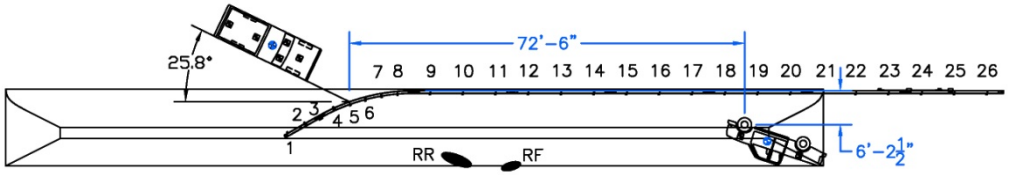
Figure C-5. Summary of Test Results and Sequential Photographs (English), Test No. NYBBT-5

-0.404 sec | 0.000 sec | 0.042 sec | 0.126 sec | 0.286 sec



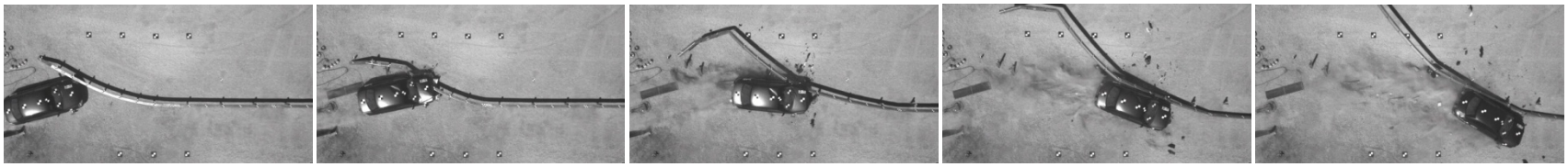
- Test Agency ..... MwRSF
- Test Number NYBBT-6
- Date 10/3/08
- MASH Test Designation ..... Modified 2-34
- Appurtenance ..... Modified Type IIA End Terminal in Ditch
- Total Length ..... 132 ft
- Key Element - Steel Box Beam
  - Size ..... 6 in. x 6 in. x 3/16 in.
  - Length ..... 18 ft
  - Top Mounting Height ..... 27 in.
- Key Elements - Steel Post
  - Post Nos. 1, 2, 4 ..... S3x5.7 by 84 in. long
  - Post Nos. 3, 5-26 ..... S3x5.7 by 63 in. long
- Type of Soil ..... Grading B - AASHTO M 147-65 (1990)
- Test Vehicle
  - Type/Designation 1100C
  - Make and Model ..... 2002 Kia Rio
  - Curb ..... 2,385 lb
  - Test Inertial ..... 2,425 lb
  - Gross Static ..... 2,593 lb
- Impact Conditions
  - Speed ..... 45.7 mph
  - Angle (trajectory) ..... 7.5 degrees
  - Target Impact Location ..... Centerline of post no. 2
  - Actual Impact Location ..... 10 3/4 in. downstream of post no. 2
- Exit Conditions
  - Speed ..... NA
  - Angle ..... NA
  - Exit Box Criterion ..... NA
- Post-Impact Trajectory
  - Vehicle Stability ..... Satisfactory
  - Stopping Distance ..... 13 ft - 1 in. downstream 6 in. laterally behind traffic-side face
- Occupant Impact Velocity (EDR-3)
  - Longitudinal ..... -28.23 ft/s < 40 ft/s
  - Lateral ..... 9.94 ft/s < 40 ft/s
- Occupant Ridedown Acceleration (EDR-3)
  - Longitudinal ..... -12.50 g's < 20.49 g's
  - Lateral ..... 5.32 g's < 20.49 g's
- Occupant Impact Velocity (DTS)
  - Longitudinal ..... -26.49 ft/s < 40 ft/s
  - Lateral ..... 10.52 ft/s < 40 ft/s
- Occupant Ridedown Acceleration (DTS)
  - Longitudinal ..... -10.91 g's < 20.49 g's
  - Lateral ..... 6.96 g's < 20.49 g's
- THIV (DTS - not required) ..... 26.05 ft/s
- PHD (DTS - not required) ..... 12.58 g's
- ASI (EDR-3 - not required) 0.78
- ASI (DTS - not required) 0.76
- Test Article Damage ..... Moderate
- Test Article Deflections
  - Permanent Set ..... 23 in.
  - Dynamic ..... 26 3/8 in.
  - Working Width ..... NA
- Vehicle Damage ..... Moderate
  - VDS[12] 01-RFQ-6
  - CDC[13] 01-RYAW9
- Maximum Deformation ..... 1/2 in. at right-front floorboard
- Angular Displacement
  - Roll ..... 10 degrees
  - Pitch ..... 4 degrees
  - Yaw ..... 8 degrees

Figure C-6. Summary of Test Results and Sequential Photographs (English), Test No. NYBBT-6



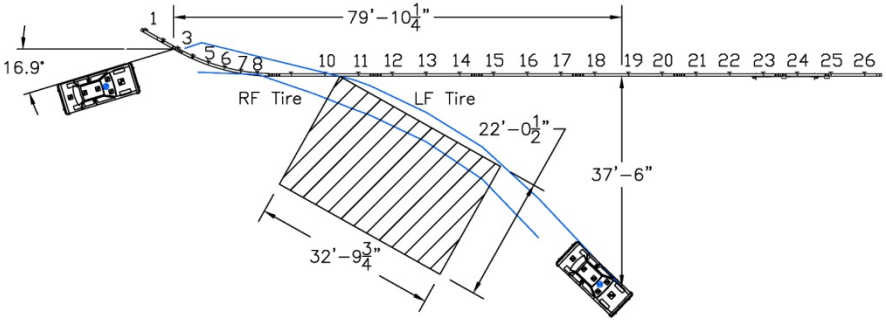
- Test Agency ..... MwRSF
- Test Number NYBBT-7
- Date 11/03/08
- MASH Test Designation ..... Modified 3-35
- Appurtenance ..... Modified Type IIA End Terminal in Ditch
- Total Length ..... 132 ft
- Key Element - Steel Box Beam
  - Size ..... 6 in. x 6 in. x 3/16 in.
  - Length ..... 18 ft
  - Top Mounting Height ..... 27 in.
- Key Elements - Steel Post
  - Post Nos. 1, 2, 4 ..... S3x5.7 by 84 in. long
  - Post Nos. 3, 5-26 ..... S3x5.7 by 63 in. long
- Type of Soil ..... Grading B - AASHTO M 147-65 (1990)
- Test Vehicle
  - Type/Designation 2270P
  - Make and Model ..... 2002 Dodge Ram 1500 Quad Cab Pickup
  - Curb ..... 5,069 lb
  - Test Inertial ..... 5,012 lb
  - Gross Static ..... 5,184 lb
- Impact Conditions
  - Speed ..... 62.6 mph
  - Angle ..... 25.8 degrees
  - Target Impact Location ..... Centerline of post no. 5
  - Actual Impact Location ..... Centerline of post no. 5
- Exit Conditions
  - Speed ..... NA
  - Angle ..... NA
  - Exit Box Criterion ..... NA
- Post-Impact Trajectory
  - Vehicle Stability ..... Satisfactory
  - Stopping Distance ..... 72 ft - 6 in. downstream
    6 ft - 2 1/2 in. laterally behind traffic-side face
- Occupant Impact Velocity (EDR-3)
  - Longitudinal ..... -14.82 ft/s < 40 ft/s
  - Lateral ..... 9.39 ft/s < 40 ft/s
- Occupant Ridedown Acceleration (EDR-3)
  - Longitudinal ..... -15.39 g's < 20.49 g's
  - Lateral ..... 12.12 g's < 20.49 g's
- Occupant Impact Velocity (EDR-4)
  - Longitudinal ..... -12.64 ft/s< 40 ft/s
  - Lateral ..... 8.54 ft/s < 40 ft/s
- Occupant Ridedown Acceleration (EDR-4)
  - Longitudinal ..... -13.57 g's < 20.49 g's
  - Lateral ..... 12.80 g's < 20.49 g's
- Occupant Impact Velocity (DTS)
  - Longitudinal ..... -13.44 ft/s < 40 ft/s
  - Lateral ..... 8.96 ft/s < 40 ft/s
- Occupant Ridedown Acceleration (DTS)
  - Longitudinal ..... -14.28 g's < 20.49 g's
  - Lateral ..... 14.45 g's < 20.49 g's
- THIV (EDR-4 - not required) ..... 15.00 ft/s
- PHD (EDR-4 - not required) ..... 13.73 g's
- THIV (DTS - not required) ..... 16.34 ft/s
- PHD (DTS - not required) ..... 14.48 g's
- ASI (EDR-3 - not required) 0.98
- ASI (EDR-4 - not required) 0.97
- ASI (DTS - not required) 1.08
- Test Article Damage ..... Extensive
- Test Article Deflections
  - Permanent Set ..... 190 3/4 in.
  - Dynamic ..... NA
  - Working Width ..... NA
- Vehicle Damage ..... Extensive
  - VDS[12] ..... 01-R&T-5
  - CDC[13] 01-RDAO9
- Maximum Deformation ..... 3/4 in. at right-center floorboard
- Angular Displacement
  - Roll ..... 612 degrees
  - Pitch ..... -58 degrees
  - Yaw ..... -170 degrees

Figure C-7. Summary of Test Results and Sequential Photographs (English), Test No. NYBBT-7



0.000 sec 0.090 sec 0.278 sec 0.468 sec 0.660 sec

- Test Agency ..... MwRSF
- Test Number NYBBT-8
- Date 7/15/09
- MASH Test Designation 3-34
- Appurtenance ..... Modified Type IIA End Terminal
- Total Length ..... 132 ft
- Key Element - Steel Box Beam
  - Size ..... 6 in. x 6 in. x 3/16 in.
  - Length ..... 18 ft
  - Top Mounting Height ..... 27 in.
- Key Elements - Steel Post
  - Post Nos. 1, 2, 4 ..... S3x5.7 by 84 in. long
  - Post Nos. 3, 5-26 ..... S3x5.7 by 63 in. long
- Type of Soil ..... Grading B - AASHTO M 147-65 (1990)
- Test Vehicle
  - Type/Designation 1100C
  - Make and Model ..... 2003 Kia Rio
  - Curb ..... 2,434 lb
  - Test Inertial ..... 2,438 lb
  - Gross Static ..... 2,608 lb
- Impact Conditions
  - Speed ..... 63.1 mph
  - Angle ..... 16.9 degrees
  - Target Impact Location ..... Centerline of post no. 3
  - Actual Impact Location ..... 1 in. upstream of centerline of post no. 3
- Exit Conditions
  - Speed ..... 25.5 mph
  - Angle ..... 25.7 degrees
  - Exit Box Criterion ..... Pass
- Post-Impact Trajectory
  - Vehicle Stability ..... Satisfactory
  - Stopping Distance ..... 79 ft - 10 1/4 in. downstream
    37 ft - 6 in. laterally away traffic-side face
- Occupant Impact Velocity (EDR-3)
  - Longitudinal ..... -31.96 ft/s < 40 ft/s
  - Lateral ..... 14.32 ft/s < 40 ft/s

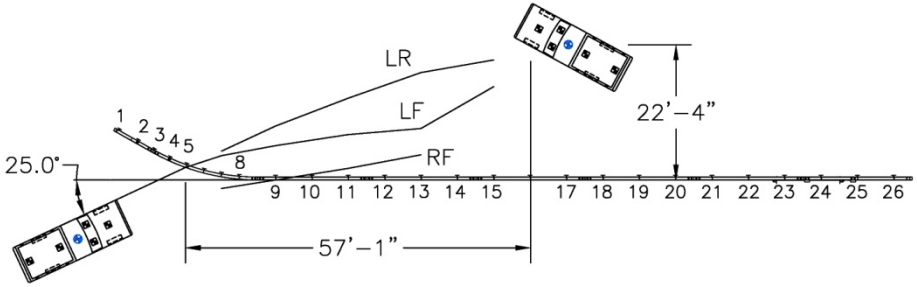


- Occupant Ridedown Acceleration (EDR-3)
  - Longitudinal ..... -11.15 g's < 20.49 g's
  - Lateral ..... 7.08 g's < 20.49 g's
- Occupant Impact Velocity (EDR-4)
  - Longitudinal ..... -30.63 ft/s < 40 ft/s
  - Lateral ..... 14.54 ft/s < 40 ft/s
- Occupant Ridedown Acceleration (EDR-4)
  - Longitudinal ..... -10.31 g's < 20.49 g's
  - Lateral ..... 5.62 g's < 20.49 g's
- THIV (EDR-4 - not required) ..... 31.20 ft/s
- PHD (EDR-4 - not required) ..... 10.41 g's
- ASI (EDR-3 - not required) 1.24
- ASI (EDR-4 - not required) 1.16
- Test Article Damage ..... Moderate
- Test Article Deflections
  - Permanent Set ..... 9 ft - 3 7/8 in.
  - Dynamic ..... NA
  - Working Width ..... 21.5 ft (estimate)
- Vehicle Damage ..... Moderate
  - VDS[12] 11-LFQ-6
  - CDC[13] 11-LYAW9
- Maximum Deformation ..... 4 in. at the front of the side panel
- Angular Displacement
  - Roll ..... 7 degrees
  - Pitch ..... -7 degrees
  - Yaw ..... 55 degrees

Figure C-8. Summary of Test Results and Sequential Photographs (English), Test No. NYBBT-8

0.000 sec 0.094 sec 0.268 sec 0.446 sec 0.636 sec

- Test Agency ..... MwRSF
- Test Number NYBBT-9
- Date 8/6/09
- MASH Test Designation ..... Modified 3-35
- Appurtenance ..... Modified Type IIA End Terminal
- Total Length ..... 132 ft
- Key Element - Steel Box Beam
  - Size ..... 6 in. x 6 in. x 3/16 in.
  - Length ..... 18 ft
  - Top Mounting Height ..... 27 in.
- Key Elements - Steel Post
  - Post Nos. 1, 2, 4 ..... S3x5.7 by 84 in. long
  - Post Nos. 3, 5-26 ..... S3x5.7 by 63 in. long
- Type of Soil ..... Grading B - AASHTO M 147-65 (1990)
- Test Vehicle
  - Type/Designation 2270P
  - Make and Model ..... 2003 Dodge Ram 1500 Quad Cab Pickup
  - Curb ..... 5,033 lb
  - Test Inertial ..... 4,989 lb
  - Gross Static ..... 5,159 lb
- Impact Conditions
  - Speed ..... 63.3 mph
  - Angle ..... 25.0 degrees
  - Target Impact Location ..... Centerline of post no. 5
  - Actual Impact Location ..... 2 in. upstream of centerline of post no. 5
- Exit Conditions
  - Speed ..... 52.1 mph
  - Angle ..... 31.0 degrees
  - Exit Box Criterion ..... NA
- Post-Impact Trajectory
  - Vehicle Stability ..... Satisfactory
  - Stopping Distance ..... 57 ft - 1 in. downstream
    22 ft - 4 in. laterally behind traffic-side face
- Occupant Impact Velocity (EDR-3)
  - Longitudinal ..... -14.34 ft/s < 40 ft/s
  - Lateral ..... 9.94 ft/s < 40 ft/s



- Occupant Ridedown Acceleration (EDR-3)
  - Longitudinal ..... -7.77 g's < 20.49 g's
  - Lateral ..... 4.38 g's < 20.49 g's
- Occupant Impact Velocity (DTS)
  - Longitudinal ..... -14.47 ft/s < 40 ft/s
  - Lateral ..... 9.23 ft/s < 40 ft/s
- Occupant Ridedown Acceleration (DTS)
  - Longitudinal ..... -7.37 g's < 20.49 g's
  - Lateral ..... 4.84 g's < 20.49 g's
- THIV (DTS - not required) ..... 15.89 ft/s
- PHD (DTS - not required) ..... 7.67 g's
- ASI (EDR-3 - not required) 0.82
- ASI (DTS - not required) 0.73
- Test Article Damage ..... Extensive due to gating
- Test Article Deflections
  - Permanent Set ..... 42 1/2 in.
  - Dynamic ..... NA
  - Working Width ..... 58 ft - 5 9/16 in.
- Vehicle Damage ..... Moderate
  - VDS[12] 11-LFQ-3
  - CDC[13] 11-LFEW8
- Maximum Deformation ..... 3/4 in. at the left side of the dashboard
- Angular Displacement
  - Roll ..... -22 degrees
  - Pitch ..... -5 degrees
  - Yaw ..... 236 degrees

Figure C-9. Summary of Test Results and Sequential Photographs (English), Test No. NYBBT-9

APPENDIX D Occupant Compartment Deformation Data

Occupant Compartment Deformation Index (OCDI)

Test No. NYBBT-1
Vehicle Type: 2002 Kia Rio Sedan

OCDI = XXABCDEFGHI

XX = location of occupant compartment deformation

A = distance between the dashboard and a reference point at the rear of the occupant compartment, such as the top of the rear seat or the rear of the cab on a pickup

B = distance between the roof and the floor panel

C = distance between a reference point at the rear of the occupant compartment and the motor panel

D = distance between the lower dashboard and the floor panel

E = interior width

F = distance between the lower edge of right window and the upper edge of left window

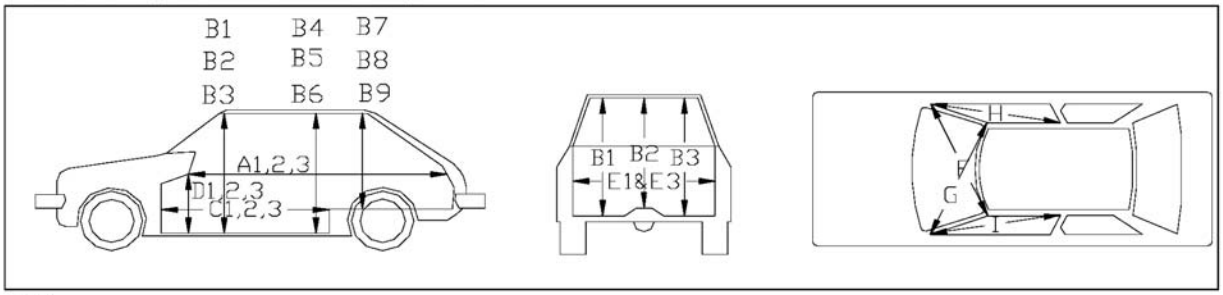
G = distance between the lower edge of left window and the upper edge of right window

H= distance between bottom front corner and top rear corner of the passenger side window

I= distance between bottom front corner and top rear corner of the driver side window

Severity Indices

0 - if the reduction is less than 3%
1 - if the reduction is greater than 3% and less than or equal to 10 %
2 - if the reduction is greater than 10% and less than or equal to 20 %
3 - if the reduction is greater than 20% and less than or equal to 30 %
4 - if the reduction is greater than 30% and less than or equal to 40 %



where,
1 = Passenger Side
2 = Middle
3 = Driver Side

Location:

Measurement	Pre-Test (in.)	Post-Test (in.)	Change (in.)	% Difference	Severity Index
A1	50.00	49.75	-0.25	-0.50	0
A2	48.75	48.50	-0.25	-0.51	0
A3	50.00	50.00	0.00	0.00	0
B1	42.25	39.00	-3.25	-7.69	1
B2	37.75	39.00	1.25	3.31	1
B3	42.25	43.25	1.00	2.37	0
C1	55.25	55.00	-0.25	-0.45	0
C2	43.50	43.50	0.00	0.00	0
C3	58.50	58.00	-0.50	-0.85	0
D1	20.25	20.00	-0.25	-1.23	0
D2	20.00	20.00	0.00	0.00	0
D3	19.50	19.50	0.00	0.00	0
E1	52.75	52.75	0.00	0.00	0
E3	53.00	53.00	0.00	0.00	0
F	45.00	44.00	-1.00	-2.22	0
G	46.25	47.00	0.75	1.62	0
H	39.00	39.25	0.25	0.64	0
I	38.25	38.75	0.50	1.31	0

Note: Maximum sevrity index for each variable (A-I) is used for determination of final OCDI value

	XX	A	B	C	D	E	F	G	H	I
Final OCDI:	F	0	1	0	0	0	0	0	0	0

Figure D-1. Occupant Compartment Deformation Index (OCDI), Test No. NYBBT-1

Occupant Compartment Deformation Index (OCDI)

Test No. NYBBT-2
Vehicle Type: 2003 Kia Rio Sedan

OCDI = XXABCDEFGHI

XX = location of occupant compartment deformation

A = distance between the dashboard and a reference point at the rear of the occupant compartment, such as the top of the rear seat or the rear of the cab on a pickup

B = distance between the roof and the floor panel

C = distance between a reference point at the rear of the occupant compartment and the motor panel

D = distance between the lower dashboard and the floor panel

E = interior width

F = distance between the lower edge of right window and the upper edge of left window

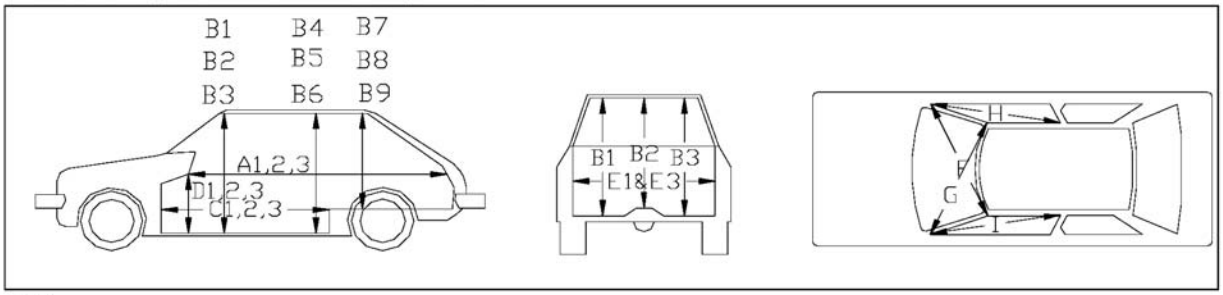
G = distance between the lower edge of left window and the upper edge of right window

H= distance between bottom front corner and top rear corner of the passenger side window

I= distance between bottom front corner and top rear corner of the driver side window

Severity Indices

0 - if the reduction is less than 3%
1 - if the reduction is greater than 3% and less than or equal to 10 %
2 - if the reduction is greater than 10% and less than or equal to 20 %
3 - if the reduction is greater than 20% and less than or equal to 30 %
4 - if the reduction is greater than 30% and less than or equal to 40 %



where,
1 = Passenger Side
2 = Middle
3 = Driver Side

Location:

Measurement	Pre-Test (in.)	Post-Test (in.)	Change (in.)	% Difference	Severity Index
A1	48.75	48.75	0.00	0.00	0
A2	47.50	47.50	0.00	0.00	0
A3	50.25	50.25	0.00	0.00	0
B1	42.00	41.50	-0.50	-1.19	0
B2	37.25	37.50	0.25	0.67	0
B3	41.75	41.75	0.00	0.00	0
C1	54.75	54.75	0.00	0.00	0
C2	56.00	56.25	0.25	0.45	0
C3	55.25	55.00	-0.25	-0.45	0
D1	20.00	19.75	-0.25	-1.25	0
D2	18.25	18.25	0.00	0.00	0
D3	22.25	22.25	0.00	0.00	0
E1	51.75	52.00	0.25	0.48	0
E3	54.00	53.50	-0.50	-0.93	0
F	46.50	46.75	0.25	0.54	0
G	46.25	46.50	0.25	0.54	0
H	39.00	39.25	0.25	0.64	0
I	39.00	39.25	0.25	0.64	0

Note: Maximum sevrity index for each variable (A-I) is used for determination of final OCDI value

Final OCDI: XX A B C D E F G H I
F 0 0 0 0 0 0 0 0 0

Figure D-2. Occupant Compartment Deformation Index (OCDI), Test No. NYBBT-2

Occupant Compartment Deformation Index (OCDI)

Test No. NYBBT-3
Vehicle Type: 2003 Kia Rio Sedan

OCDI = XXABCDEFGHI

XX = location of occupant compartment deformation

A = distance between the dashboard and a reference point at the rear of the occupant compartment, such as the top of the rear seat or the rear of the cab on a pickup

B = distance between the roof and the floor panel

C = distance between a reference point at the rear of the occupant compartment and the motor panel

D = distance between the lower dashboard and the floor panel

E = interior width

F = distance between the lower edge of right window and the upper edge of left window

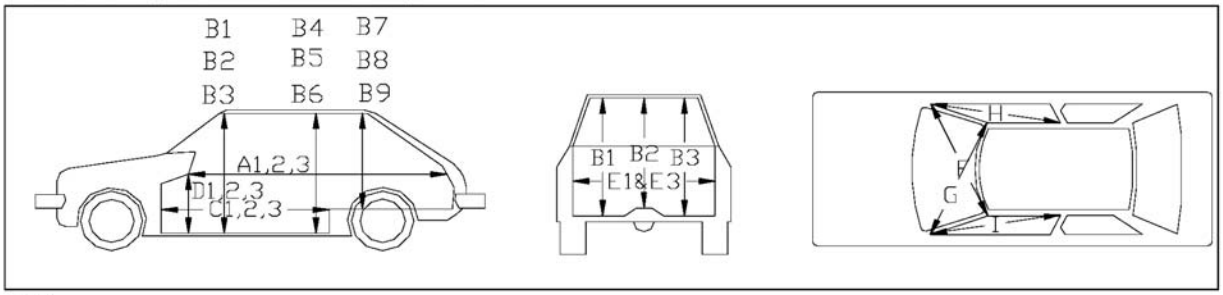
G = distance between the lower edge of left window and the upper edge of right window

H= distance between bottom front corner and top rear corner of the passenger side window

I= distance between bottom front corner and top rear corner of the driver side window

Severity Indices

0 - if the reduction is less than 3%
1 - if the reduction is greater than 3% and less than or equal to 10 %
2 - if the reduction is greater than 10% and less than or equal to 20 %
3 - if the reduction is greater than 20% and less than or equal to 30 %
4 - if the reduction is greater than 30% and less than or equal to 40 %



where,
1 = Passenger Side
2 = Middle
3 = Driver Side

Location:

Measurement	Pre-Test (in.)	Post-Test (in.)	Change (in.)	% Difference	Severity Index
A1	49.50	49.50	0.00	0.00	0
A2	48.00	48.25	0.25	0.52	0
A3	51.00	51.00	0.00	0.00	0
B1	41.25	39.00	-2.25	-5.45	1
B2	37.50	27.00	-10.50	-28.00	3
B3	41.50	38.50	-3.00	-7.23	1
C1	59.00	59.00	0.00	0.00	0
C2	42.00	42.00	0.00	0.00	0
C3	57.00	56.75	-0.25	-0.44	0
D1	20.00	20.00	0.00	0.00	0
D2	13.50	13.25	-0.25	-1.85	0
D3	22.25	22.25	0.00	0.00	0
E1	54.00	53.50	-0.50	-0.93	0
E3	53.50	53.50	0.00	0.00	0
F	45.50	47.00	1.50	3.30	1
G	44.00	42.00	-2.00	-4.55	1
H	38.75	39.25	0.50	1.29	0
I	38.50	38.50	0.00	0.00	0

Note: Maximum sevrity index for each variable (A-I) is used for determination of final OCDI value

	XX	A	B	C	D	E	F	G	H	I
Final OCDI:	RF	0	3	0	0	0	1	1	0	0

Figure D-3. Occupant Compartment Deformation Index (OCDI), Test No. NYBBT-3

VEHICLE PRE/POST CRUSH INFO
Set-1

TEST: NYBBT-4
VEHICLE: 2002 Dodge Ram

POINT	X	Y	Z	X'	Y'	Z'	DEL X	DEL Y	DEL Z
1	27	11.5	-0.25	27	11.5	-0.25	0	0	0
2	29.75	16.75	-2	29.75	16.75	-1.5	0	0	0.5
3	31	24.75	-2	31	24.75	-2	0	0	0
4	28.5	29	-1.5	28.5	29.25	-1.75	0	0.25	-0.25
5	21	8.5	-1.25	21	8.5	-1	0	0	0.25
6	22	14	-4	22	14	-4	0	0	0
7	23.25	19.25	-8.25	23.5	19	-8.25	0.25	-0.25	0
8	23.5	30	-7.5	23.5	29.75	-7.75	0	-0.25	-0.25
9	15.25	1	-2.5	15.25	1	-2.25	0	0	0.25
10	17	7.5	-3	17	7.5	-2.5	0	0	0.5
11	19	13.5	-6.5	19	13.5	-6.5	0	0	0
12	20.25	22	-9.5	20.25	22	-9.25	0	0	0.25
13	20.5	30	-9.5	20.5	29.5	-9.75	0	-0.5	-0.25
14	9.25	1	-3.25	9.25	1	-3	0	0	0.25
15	9.75	7.5	-3.5	9.75	7.5	-3.25	0	0	0.25
16	12.75	13	-9.75	13.75	12.75	-9.75	1	-0.25	0
17	14	21.5	-9.5	14	21.25	-9.25	0	-0.25	0.25
18	13.5	30	-9.25	13.5	29.5	-9	0	-0.5	0.25
19	5.75	0	-3.25	5.75	0	-3	0	0	0.25
20	5.5	7.25	-3.75	5.5	7.5	-3.5	0	0.25	0.25
21	7.5	14	-9.5	7.5	13.75	-9.5	0	-0.25	0
22	7	21.5	-9.25	7	21	-9	0	-0.5	0.25
23	7.25	29.75	-9	7	29.75	-7.75	-0.25	0	1.25
24	1	0.75	-2.75	1	1	-2.5	0	0.25	0.25
25	0.25	6.75	-2.75	0.25	6.75	-2.5	0	0	0.25
26	0.75	12.25	-5.25	1	12	-5.25	0.25	-0.25	0
27	0.75	21	-4.75	0.75	20.75	-4.5	0	-0.25	0.25
28	0.75	27.25	-4.5	0.75	26.5	-4	0	-0.75	0.5
29							0	0	0

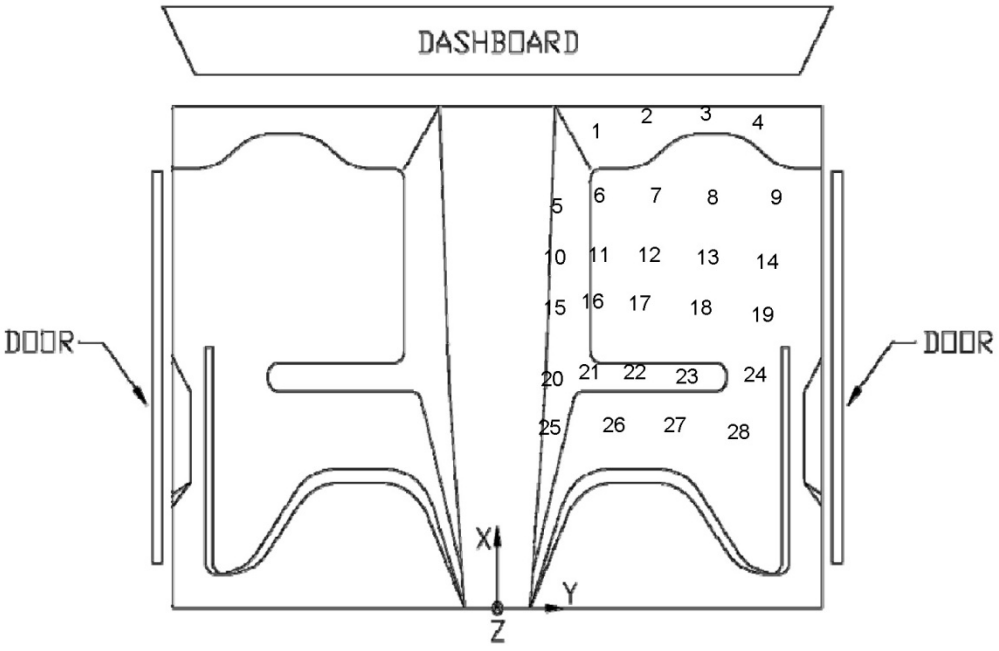


Figure D-4. Occupant Compartment Deformation Data - Set 1, Test No. NYBBT-4

VEHICLE PRE/POST CRUSH INFO
Set-2

TEST: NYBBT-4
VEHICLE: 2002 Dodge Ram

POINT	X	Y	Z	X'	Y'	Z'	DEL X	DEL Y	DEL Z
1	50	13.75	0	50	13.75	-0.25	0	0	-0.25
2	52.75	19	-1.25	52.75	19	-1.25	0	0	0
3	54	27	-0.75	54	27	-0.75	0	0	0
4	51.5	31.25	0	51.5	31.5	0	0	0.25	0
5	44	10.75	-1.25	44	10.75	-1.25	0	0	0
6	45	16.25	-3.5	45	16.25	-3.75	0	0	-0.25
7	46.25	21.5	-7.25	46.5	21.25	-7.5	0.25	-0.25	-0.25
8	46.5	32.25	-6	46.5	32	-6.25	0	-0.25	-0.25
9	38.25	3.25	-3	38.25	3.25	-3	0	0	0
10	40	9.75	-3	40	9.75	-2.75	0	0	0.25
11	42	15.75	-6	42	15.75	-6.25	0	0	-0.25
12	43.25	24.25	-8.5	43.25	24.25	-8.5	0	0	0
13	43.5	32.25	-8.25	43.5	31.75	-8.25	0	-0.5	0
14	32.25	3.25	-3.75	32.25	3.25	-3.5	0	0	0.25
15	32.75	9.75	-3.5	32.75	9.75	-3.5	0	0	0
16	35.75	15.25	-9.5	36.75	15	-9.5	1	-0.25	0
17	37	23.75	-8.75	37	23.5	-8.5	0	-0.25	0.25
18	36.5	32.25	-8	36.5	31.75	-7.75	0	-0.5	0.25
19	28.75	2.25	-3.75	28.75	2.25	-3.5	0	0	0.25
20	28.5	9.5	-3.75	28.5	9.75	-3.75	0	0.25	0
21	30.5	16.25	-9.25	30.5	16	-9.25	0	-0.25	0
22	30	23.75	-8.5	30	23.25	-8.25	0	-0.5	0.25
23	30.25	32	-7.5	30	32	-6.5	-0.25	0	1
24	24	3	-3.25	24	3.25	-3.25	0	0.25	0
25	23.25	9	-3	23.25	9	-2.75	0	0	0.25
26	23.75	14.5	-5	24	14.25	-5.25	0.25	-0.25	-0.25
27	23.75	23.25	-4.25	23.75	23	-4.25	0	-0.25	0
28	23.75	29.5	-3.5	23.75	28.75	-3.25	0	-0.75	0.25
29							0	0	0
30							0	0	0
31							0	0	0
32							0	0	0
33							0	0	0
34							0	0	0
35							0	0	0

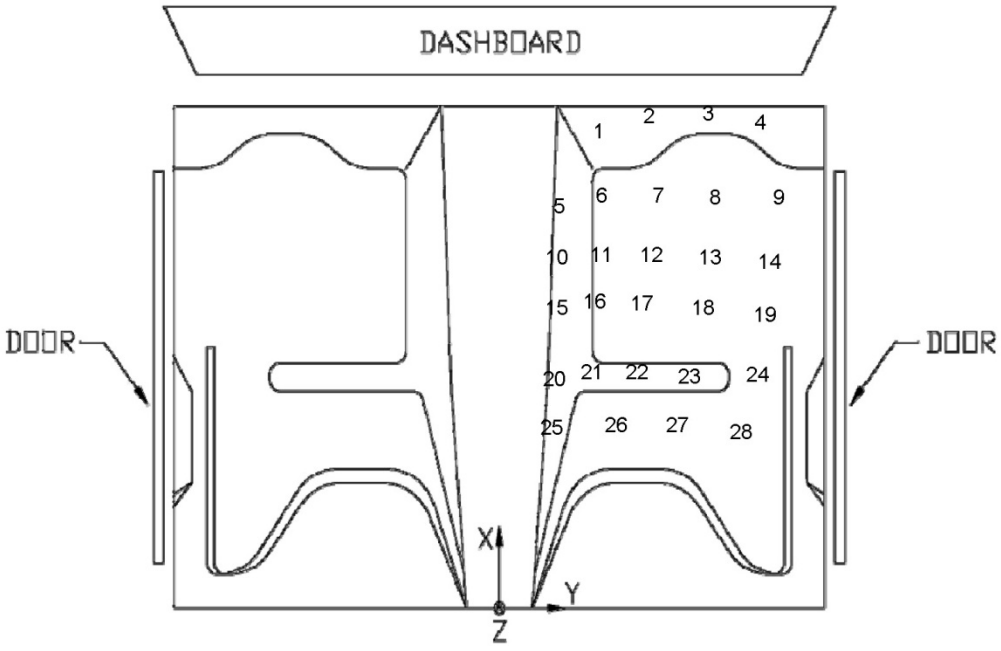


Figure D-5. Occupant Compartment Deformation Data - Set 2, Test No. NYBBT-4

Occupant Compartment Deformation Index (OCDI)

Test No. NYBBT-4
Vehicle Type: 2002 Dodge Ram

OCDI = XXABCDEFGHI

XX = location of occupant compartment deformation

A = distance between the dashboard and a reference point at the rear of the occupant compartment, such as the top of the rear seat or the rear of the cab on a pickup

B = distance between the roof and the floor panel

C = distance between a reference point at the rear of the occupant compartment and the motor panel

D = distance between the lower dashboard and the floor panel

E = interior width

F = distance between the lower edge of right window and the upper edge of left window

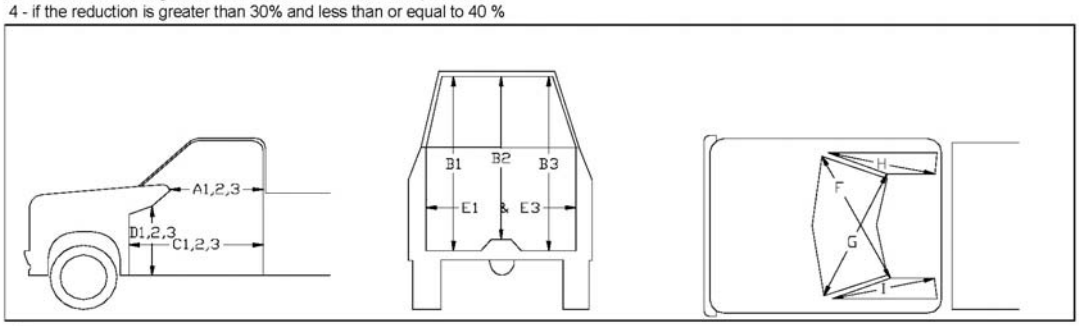
G = distance between the lower edge of left window and the upper edge of right window

H= distance between bottom front corner and top rear corner of the passenger side window

I= distance between bottom front corner and top rear corner of the driver side window

Severity Indices

0 - if the reduction is less than 3%
1 - if the reduction is greater than 3% and less than or equal to 10 %
2 - if the reduction is greater than 10% and less than or equal to 20 %
3 - if the reduction is greater than 20% and less than or equal to 30 %
4 - if the reduction is greater than 30% and less than or equal to 40 %



where,
1 = Passenger Side
2 = Middle
3 = Driver Side

Location:

Measurement	Pre-Test (in.)	Post-Test (in.)	Change (in.)	% Difference	Severity Index
A1	57.50	58.50	1.00	1.74	0
A2	50.50	50.50	0.00	0.00	0
A3	58.00	58.00	0.00	0.00	0
B1	47.75	47.75	0.00	0.00	0
B2	42.00	42.25	0.25	0.60	0
B3	47.75	47.50	-0.25	-0.52	0
C1	69.00	69.50	0.50	0.72	0
C2	47.25	47.00	-0.25	-0.53	0
C3	67.25	68.00	0.75	1.12	0
D1	23.00	23.00	0.00	0.00	0
D2	13.00	13.00	0.00	0.00	0
D3	23.25	23.00	-0.25	-1.08	0
E1	65.75	64.50	-1.25	-1.90	0
E3	65.00	64.25	-0.75	-1.15	0
F	58.00	58.50	0.50	0.86	0
G	57.00	57.75	0.75	1.32	0
H	41.00	41.25	0.25	0.61	0
I	39.25	39.50	0.25	0.64	0

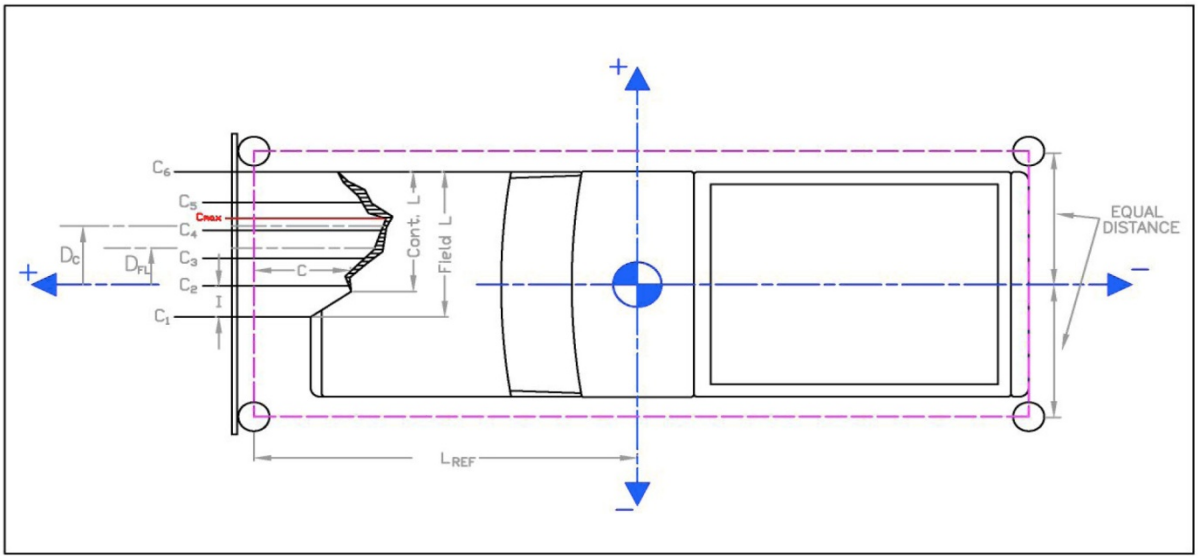
Note: Maximum sevrity index for each variable (A-I) is used for determination of final OCDI value

	XX	A	B	C	D	E	F	G	H	I
Final OCDI:	RF	0	0	0	0	0	0	0	0	0

Figure D-6. Occupant Compartment Deformation Index (OCDI), Test No. NYBBT-4

Date: 7/11/2008 Test Number: NYBBT-4

Make: Dodge Model: Ram 1500 Q.C. Year: 2002



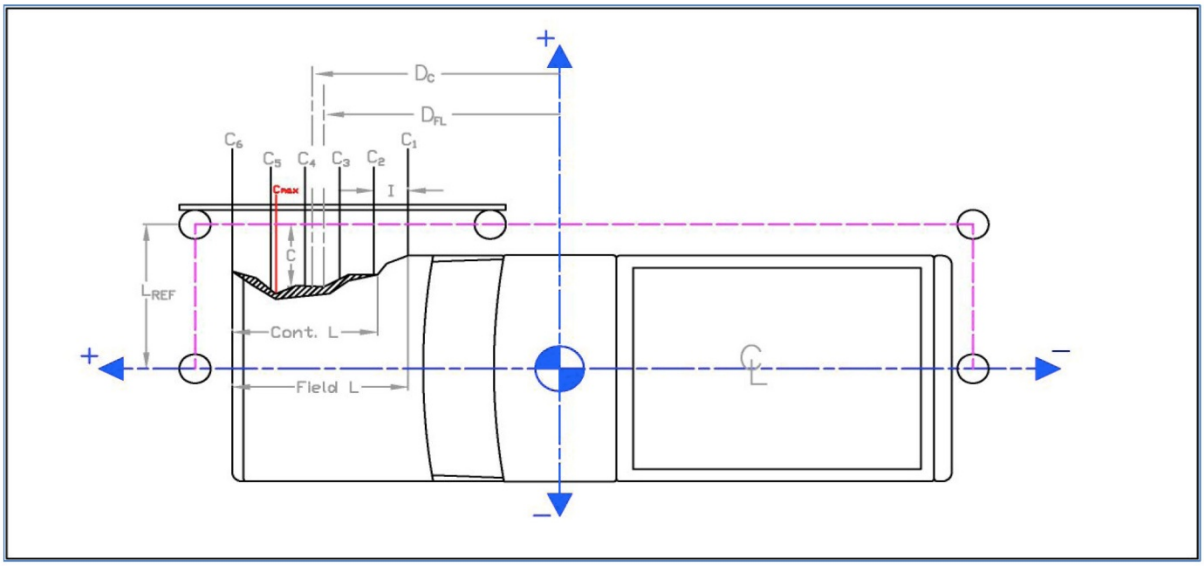
	in.	(mm)
Distance from C.G. to reference line - L_{REF}:	107.75	(2737)
Width of contact and induced crush - Field L:	18.75	(476)
Crush measurement spacing interval (L/5) - I:	3.75	(95)
Distance from center of vehicle to center of Field L - D_{FL}:	28.375	(721)
Width of Contact Damage:	13.75	(349)
Distance from center of vehicle to center of contect damage - D_C:	30.875	(784)

	Crush Measurement		Lateral Location		Original Profile Measurement		Dist. Between Ref. Lines		Actual	Crush
	in.	(mm)	in.	(mm)	in.	(mm)	in.	(mm)	in.	(mm)
C_1	8.25	(210)	19	(483)	12.3125	(313)	-4	-(102)	-0.0625	-(2)
C_2	11.25	(286)	22.75	(578)	13.2344	(336)			2.01563	(51)
C_3	23	(584)	26.5	(673)	14.6875	(373)			12.3125	(313)
C_4	28	(711)	30.25	(768)	16.2969	(414)			15.7031	(399)
C_5	NA	NA	34	(864)	19.25	(489)			NA	NA
C_6	NA	NA	37.75	(959)	28.125	(714)			NA	NA
C_{MAX}	28	(711)	30.25	(768)	16.2969	(414)			15.7031	(399)

Figure D-7. Exterior Vehicle Crush (NASS) - Front, Test No. NYBBT-4

Date: 7/11/2008 Test Number: NYBBT-4

Make: Dodge Model: Ram 1500 Q.C. Year: 2002



	in.	(mm)
Distance from centerline to reference line - L_{REF}:	44.5	(1130)
Width of contact and induced crush - Field L:	117.5	(2985)
Crush measurement spacing interval (L/5) - I:	23.5	(597)
Distance from vehicle c.g. to center of Field L - D_{FL}:	45.75	(1162)
Width of Contact Damage:	117.5	(2985)
Distance from vehicle c.g. to center of contect damage - D_C:	58.5	(1486)

	Crush Measurement		Longitudinal Location		Original Profile Measurement		Dist. Between Ref. Lines		Actual	Crush
	in.	(mm)	in.	(mm)	in.	(mm)	in.	(mm)	in.	(mm)
C_1	8	(203)	-13	-(330)	11.25	(286)	-5.5	-(140)	2.25	(57)
C_2	9.5	(241)	10.5	(267)	11.25	(286)			3.75	(95)
C_3	8.5	(216)	34	(864)	11.25	(286)			2.75	(70)
C_4	na	na	57.5	(1461)	10.5	(267)			na	na
C_5	14	(356)	81	(2057)	11.25	(286)			8.25	(210)
C_6	na	na	104.5	(2654)	37	(940)			na	na
C_{MAX}	18	(457)	81	(2057)	11.25	(286)			12.25	(311)

Figure D-8. Exterior Vehicle Crush (NASS) - Side, Test No. NYBBT-4

VEHICLE PRE/POST CRUSH INFO
Set-1

TEST: NYBBT-5
VEHICLE: 2002 Dodge Ram

POINT	X	Y	Z	X'	Y'	Z'	DEL X	DEL Y	DEL Z
1	24	9.75	0	24	9.75	0	0	0	0
2	26.5	14	-1	26.5	14.25	-1	0	0.25	0
3	29.5	18	-4	29.75	18.25	-4	0.25	0.25	0
4	30.25	24.5	-3	30.25	24.5	-3	0	0	0
5	29	29.5	-1	29	29.5	-1	0	0	0
6	20	8	-1.5	20	8	-1.5	0	0	0
7	21	13.25	-3.75	21	13.25	-3.75	0	0	0
8	22.75	18.5	-7.75	22.75	18.75	-7.75	0	0.25	0
9	23	25.25	-7.5	23	25.5	-7.5	0	0.25	0
10	22.75	30.75	-7.25	22.75	30.5	-7.25	0	-0.25	0
11	15.75	2.75	-2.5	15.5	2.75	-2.5	-0.25	0	0
12	16	8.25	-3	16	8.25	-3	0	0	0
13	17.75	13	-6.5	17.75	12.75	-6.5	0	-0.25	0
14	19	18.75	-9.25	19	18.5	-9.25	0	-0.25	0
15	19	25.25	-8.75	19	25	-8.75	0	-0.25	0
16	18.5	30.25	-8.5	18.5	30.25	-8.5	0	0	0
17	11.5	2.75	-2.75	11.5	2.75	-2.75	0	0	0
18	11.75	8.25	-3.25	11.75	8.25	-3.25	0	0	0
19	14	13.25	-9.25	14	13.25	-9.25	0	0	0
20	14.25	19	-8.75	14.25	19	-8.75	0	0	0
21	14.5	25	-8.5	14.25	24.75	-8.5	-0.25	-0.25	0
22	14	30	-8.25	14	30	-8.25	0	0	0
23	6.5	2.75	-3	6.5	2.75	-3	0	0	0
24	6	8.5	-3.75	6	8.5	-3.75	0	0	0
25	8.5	13.25	-9	8.5	13.25	-9	0	0	0
26	9.25	22	-8.25	9	21.75	-8.25	-0.25	-0.25	0
27	8.5	29.5	-7.75	8.5	29.5	-7.75	0	0	0
28	0.75	14.5	-4.5	0.75	14.5	-4.5	0	0	0
29	0.75	24	-3.5	0.75	24	-3.75	0	0	-0.25

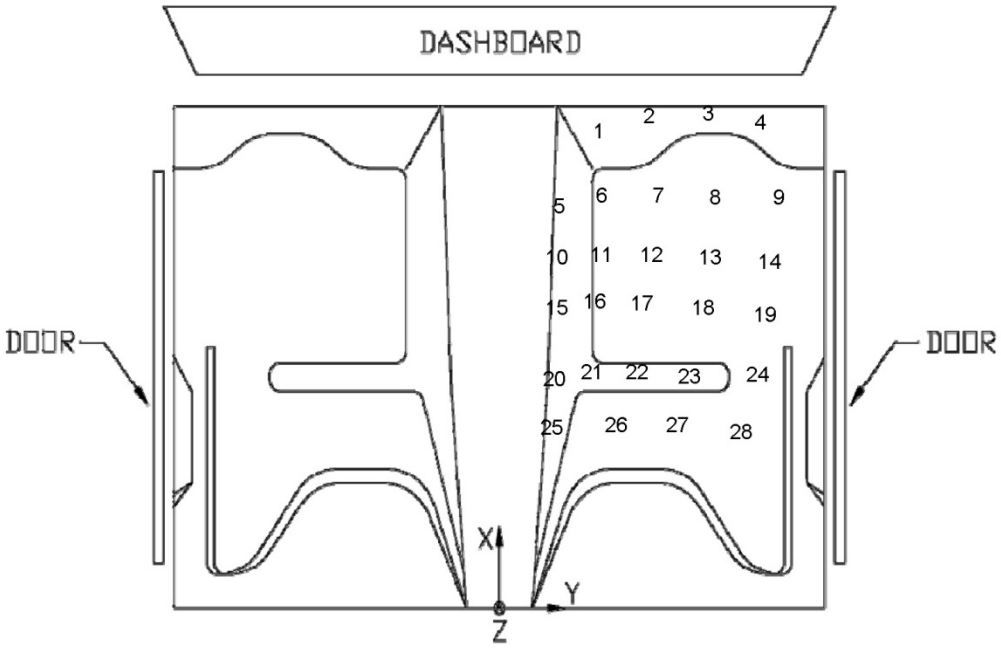


Figure D-9. Occupant Compartment Deformation Data - Set 1, Test No. NYBBT-5

VEHICLE PRE/POST CRUSH INFO
Set-2

TEST: NYBBT-5
VEHICLE: 2002 Dodge Ram

				22.75	2.5				
POINT	X	Y	Z	X'	Y'	Z'	DEL X	DEL Y	DEL Z
1	46.75	12.25	0	46.75	12.25	0	0	0	0
2	49.25	16.5	-1	49.25	16.75	-1	0	0.25	0
3	52.25	20.5	-4	52.5	20.75	-4	0.25	0.25	0
4	53	27	-3.5	53	27	-3	0	0	0.5
5	51.75	32	-1	51.75	32	-1	0	0	0
6	42.75	10.5	-1.5	42.75	10.5	-1.5	0	0	0
7	43.75	15.75	-3.75	43.75	15.75	-3.75	0	0	0
8	45.5	21	-7.75	45.5	21.25	-7.75	0	0.25	0
9	45.75	27.75	-7.75	45.75	28	-7.5	0	0.25	0.25
10	45.5	33.25	-7.5	45.5	33	-7.25	0	-0.25	0.25
11	38.5	5.25	-2.25	38.25	5.25	-2.5	-0.25	0	-0.25
12	38.75	10.75	-3	38.75	10.75	-3	0	0	0
13	40.5	15.5	-6.5	40.5	15.25	-6.5	0	-0.25	0
14	41.75	21.25	-9.25	41.75	21	-9.25	0	-0.25	0
15	41.75	27.75	-9	41.75	27.5	-8.75	0	-0.25	0.25
16	41.25	32.75	-8.75	41.25	32.75	-8.5	0	0	0.25
17	34.25	5.25	-2.5	34.25	5.25	-2.75	0	0	-0.25
18	34.5	10.75	-3.25	34.5	10.75	-3.25	0	0	0
19	36.75	15.75	-9.25	36.75	15.75	-9.25	0	0	0
20	37	21.5	-9	37	21.5	-8.75	0	0	0.25
21	37.25	27.5	-8.75	37	27.25	-8.5	-0.25	-0.25	0.25
22	36.75	32.5	-8.5	36.75	32.5	-8.25	0	0	0.25
23	29.25	5.25	-2.75	29.25	5.25	-3	0	0	-0.25
24	28.75	11	-3.5	28.75	11	-3.75	0	0	-0.25
25	31.25	15.75	-9	31.25	15.75	-9	0	0	0
26	32	24.5	-8.5	31.75	24.25	-8.25	-0.25	-0.25	0.25
27	31.25	32	-8	31.25	32	-7.75	0	0	0.25
28	23.5	17	-4.5	23.5	17	-4.5	0	0	0
29	23.5	26.5	-4	23.5	26.5	-3.75	0	0	0.25
30							0	0	0
31							0	0	0
32							0	0	0
33							0	0	0
34							0	0	0
35							0	0	0

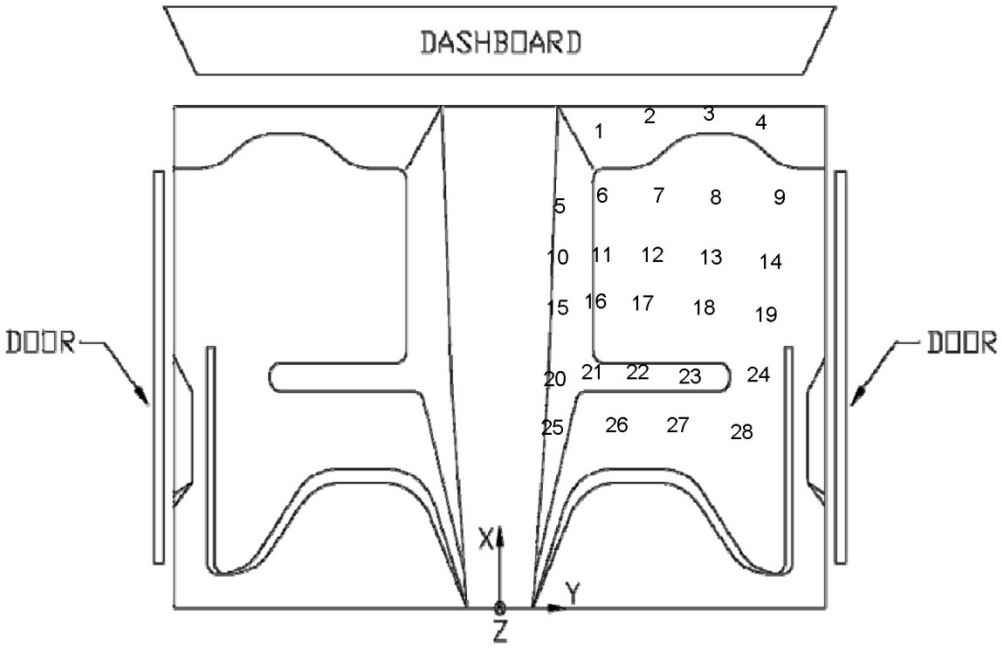


Figure D-10. Occupant Compartment Deformation Data - Set 2, Test No. NYBBT-5

Occupant Compartment Deformation Index (OCDI)

Test No. NYBBT-5
Vehicle Type: 2002 Dodge Ram

OCDI = XXABCDEFGHI

XX = location of occupant compartment deformation

A = distance between the dashboard and a reference point at the rear of the occupant compartment, such as the top of the rear seat or the rear of the cab on a pickup

B = distance between the roof and the floor panel

C = distance between a reference point at the rear of the occupant compartment and the motor panel

D = distance between the lower dashboard and the floor panel

E = interior width

F = distance between the lower edge of right window and the upper edge of left window

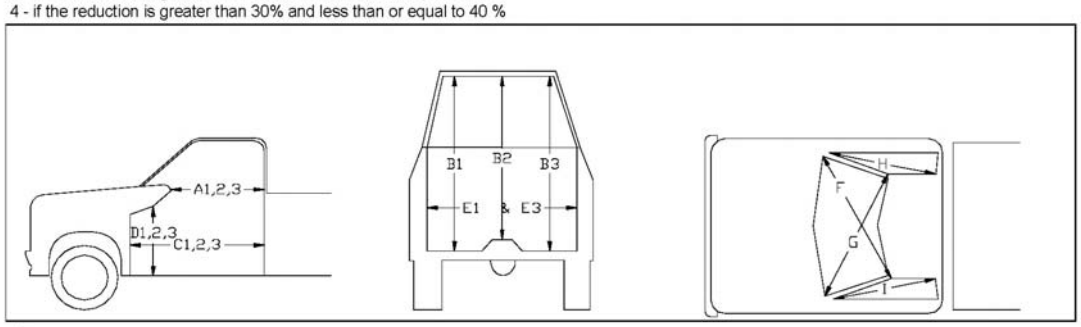
G = distance between the lower edge of left window and the upper edge of right window

H= distance between bottom front corner and top rear corner of the passenger side window

I= distance between bottom front corner and top rear corner of the driver side window

Severity Indices

0 - if the reduction is less than 3%
1 - if the reduction is greater than 3% and less than or equal to 10 %
2 - if the reduction is greater than 10% and less than or equal to 20 %
3 - if the reduction is greater than 20% and less than or equal to 30 %
4 - if the reduction is greater than 30% and less than or equal to 40 %



where,
1 = Passenger Side
2 = Middle
3 = Driver Side

Location:

Measurement	Pre-Test (in.)	Post-Test (in.)	Change (in.)	% Difference	Severity Index
A1	56.00	55.75	-0.25	-0.45	0
A2	50.50	50.50	0.00	0.00	0
A3	56.75	56.50	-0.25	-0.44	0
B1	48.50	48.50	0.00	0.00	0
B2	42.00	42.00	0.00	0.00	0
B3	47.75	47.75	0.00	0.00	0
C1	69.50	70.00	0.50	0.72	0
C2	47.00	47.00	0.00	0.00	0
C3	66.25	66.00	-0.25	-0.38	0
D1	23.00	23.00	0.00	0.00	0
D2	13.25	13.25	0.00	0.00	0
D3	22.50	22.50	0.00	0.00	0
E1	65.00	65.00	0.00	0.00	0
E3	65.00	65.00	0.00	0.00	0
F	57.50	57.25	-0.25	-0.43	0
G	58.50	58.50	0.00	0.00	0
H	36.50	36.50	0.00	0.00	0
I	36.75	36.75	0.00	0.00	0

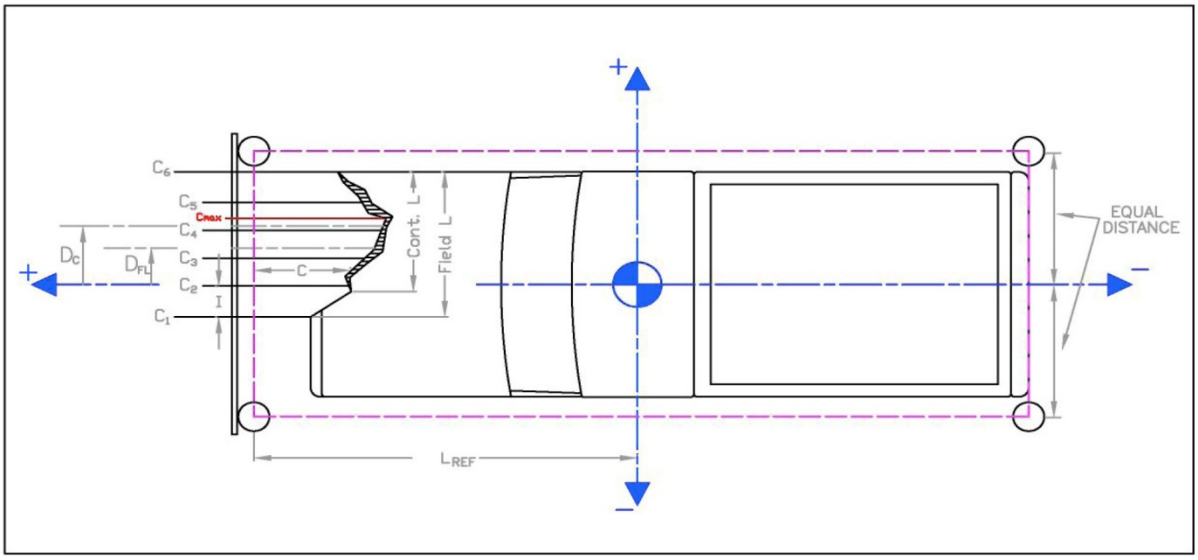
Note: Maximum sevrity index for each variable (A-I) is used for determination of final OCDI value

	XX A B C D E F G H I
Final OCDI:	RF 0 0 0 0 0 0 0 0 0 0

Figure D-11. Occupant Compartment Deformation Index (OCDI), Test No. NYBBT-5

Date: 7/31/2008 Test Number: NYBBT-5

Make: Dodge Model: Ram 1500 Q.C. Year: 2002



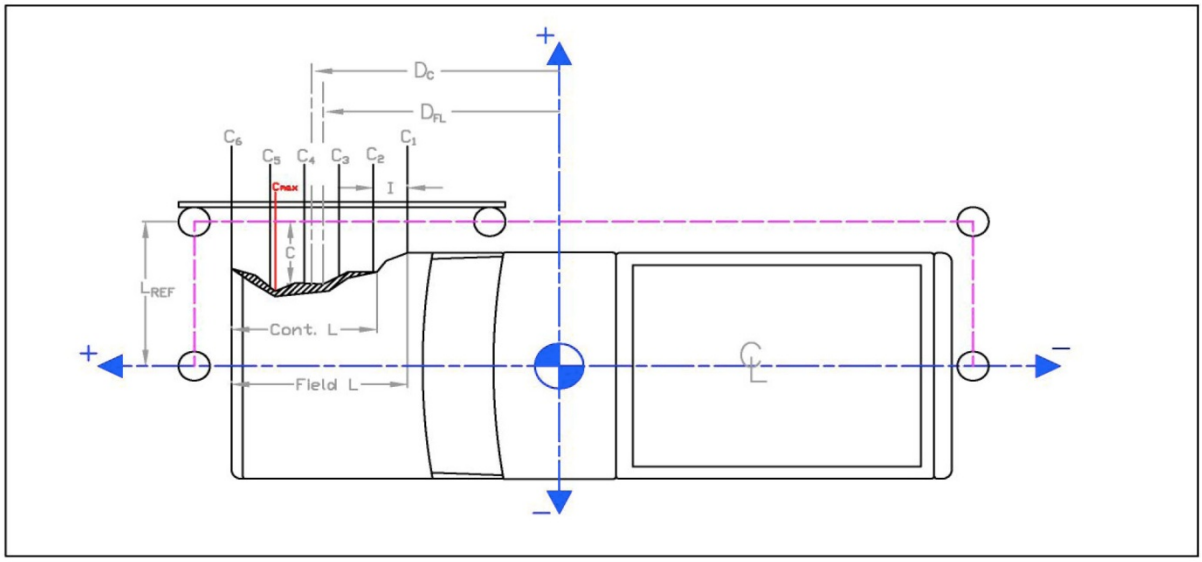
	in.	(mm)
Distance from C.G. to reference line - L_{REF}:	107	(2718)
Width of contact and induced crush - Field L:	21	(533)
Crush measurement spacing interval (L/5) - I:	4.2	(107)
Distance from center of vehicle to center of Field L - D_{FL}:	27.5	(699)
Width of Contact Damage:	20.25	(514)
Distance from center of vehicle to center of contect damage - D_C:	27.5	(699)

	Crush Measurement		Lateral Location		Original Profile Measurement		Dist. Between Ref. Lines		Actual	Crush
	in.	(mm)	in.	(mm)	in.	(mm)	in.	(mm)	in.	(mm)
C_1	9	(229)	17	(432)	11.9375	(303)	-3.375	-(86)	0.4375	(11)
C_2	11	(279)	21.2	(538)	12.75	(324)			1.625	(41)
C_3	14	(356)	25.4	(645)	14.1719	(360)			3.20313	(81)
C_4	29.5	(749)	29.6	(752)	15.9063	(404)			16.9688	(431)
C_5	30.75	(781)	33.8	(859)	19.0313	(483)			15.0938	(383)
C_6	31.75	(806)	38	(965)	29	(737)			6.125	(156)
C_{MAX}	29.5	(749)	29.6	(752)	15.9063	(404)			16.9688	(431)

Figure D-12. Exterior Vehicle Crush (NASS) - Front, Test No. NYBBT-5

Date: 7/31/2008 Test Number: NYBBT-5

Make: Dodge Model: Ram 1500 Q.C. Year: 2002



	in.	(mm)
Distance from centerline to reference line - L_{REF}:	53	(1346)
Width of contact and induced crush - Field L:	105	(2667)
Crush measurement spacing interval (L/5) - I:	21	(533)
Distance from vehicle c.g. to center of Field L - D_{FL}:	47.5	(1207)
Width of Contact Damage:	71	(1803)
Distance from vehicle c.g. to center of contect damage - D_C:	54.5	(1384)

	Crush Measurement		Longitudinal Location		Original Profile Measurement		Dist. Between Ref. Lines		Actual	Crush
	in.	(mm)	in.	(mm)	in.	(mm)	in.	(mm)	in.	(mm)
C_1	13.75	(349)	-5	-(127)	11.25	(286)	3	(76)	-0.5	-(13)
C_2	14.25	(362)	16	(406)	11.25	(286)			0	()
C_3	14.75	(375)	37	(940)	11.25	(286)			0.5	(13)
C_4	10.75	(273)	58	(1473)	10.5	(267)			-2.75	-(70)
C_5	24.5	(622)	79	(2007)	11.25	(286)			10.25	(260)
C_6	42	(1067)	100	(2540)	36.125	(918)			2.875	(73)
C_{MAX}	25	(635)	78	(1981)	11.25	(286)			10.75	(273)

Figure D-13. Exterior Vehicle Crush (NASS) - Side, Test No. NYBBT-5

VEHICLE PRE/POST CRUSH INFO

TEST: NYBBT-6
VEHICLE: 2002 Kia Rio Sedan

POINT	X	Y	Z	X'	Y'	Z'	DEL X	DEL Y	DEL Z
1	29	5.75	-2.5	29	6.25	-1.5	0	0.5	1
2	30.25	10.5	-2.5	29.75	11.5	-2.5	-0.5	1	0
3	30.25	16	-2.5	30	15	-1.5	-0.25	-1	1
4	25.5	24.5	0	25.25	24	1	-0.25	-0.5	1
5	24.5	5.25	-5.5	24.25	5.5	-5.25	-0.25	0.25	0.25
6	26.5	10.75	-5.75	26.5	11	-5.5	0	0.25	0.25
7	26.75	17.75	-5.25	26.75	17.25	-4.75	0	-0.5	0.5
8	23.75	24.75	-4	23.75	24.25	-3.5	0	-0.5	0.5
9	19.75	5.25	-8	19.5	5.5	-7.25	-0.25	0.25	0.75
10	20.25	10.5	-8.25	20	10.75	-5.75	0	0.25	2.5
11	20.25	16.5	-7.25	20	16.25	-6.25	-0.25	-0.25	1
12	20.5	21.75	-7	20.5	22	-6.25	0	0.25	0.75
13	18.5	25.75	-2.75	18.5	25.75	-2.25	0	0	0.5
14	11.75	1.75	-3.75	11.25	1.75	-3.25	-0.5	0	0.5
15	14.75	5.75	-8	14.25	5	-6	-0.5	-0.75	2
16	15.75	12	-8	15.5	12.25	-5	-0.25	0.25	3
17	16.25	16.75	-7	16.25	16.5	-6.25	0	-0.25	0.75
18	16	24.75	-6.5	16	24.75	-6	0	0	0.5
19	8.25	1.75	-3.5	8.25	1.75	-3.25	0	0	0.25
20	9.5	7.5	-8	8.75	7.25	-5.5	-0.75	-0.25	2.5
21	9.25	12	-7.75	8.5	12	-5.5	-0.75	0	2.25
22	10	17.25	-7	10.25	17	-6.5	0.25	-0.25	0.5
23	11.5	21.25	-6.75	11.5	21.25	-6.25	0	0	0.5
24	11.25	26.5	-2.25	11.25	26.25	-2	0	-0.25	0.25
25	2.25	2.5	-3.25	2.25	2.5	-3	0	0	0.25
26	1.75	6.5	-4.25	1.75	6.5	-4	0	0	0.25
27	1.25	13	-4.5	1.25	13	-4.25	0	0	0.25
28	1.75	21.75	-3	1.75	22	-3	0	0.25	0
29							0	0	0

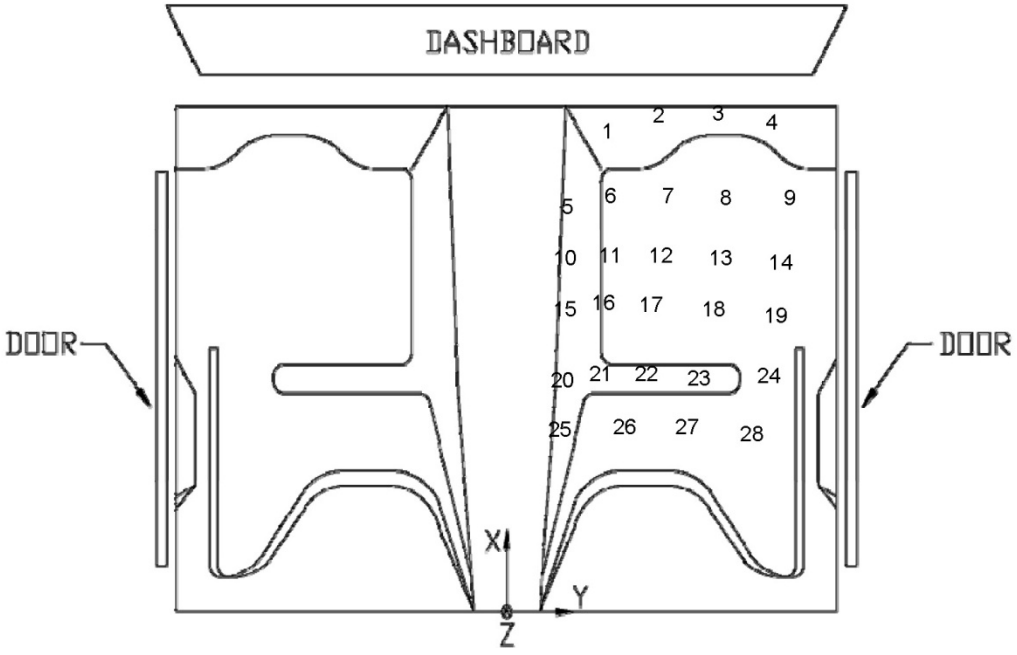


Figure D-14. Occupant Compartment Deformation Data - Set 1, Test No. NYBBT-6

Occupant Compartment Deformation Index (OCDI)

Test No. NYBBT-6
Vehicle Type: 2002 Kia Rio Sedan

OCDI = XXABCDEFGHI

XX = location of occupant compartment deformation

A = distance between the dashboard and a reference point at the rear of the occupant compartment, such as the top of the rear seat or the rear of the cab on a pickup

B = distance between the roof and the floor panel

C = distance between a reference point at the rear of the occupant compartment and the motor panel

D = distance between the lower dashboard and the floor panel

E = interior width

F = distance between the lower edge of right window and the upper edge of left window

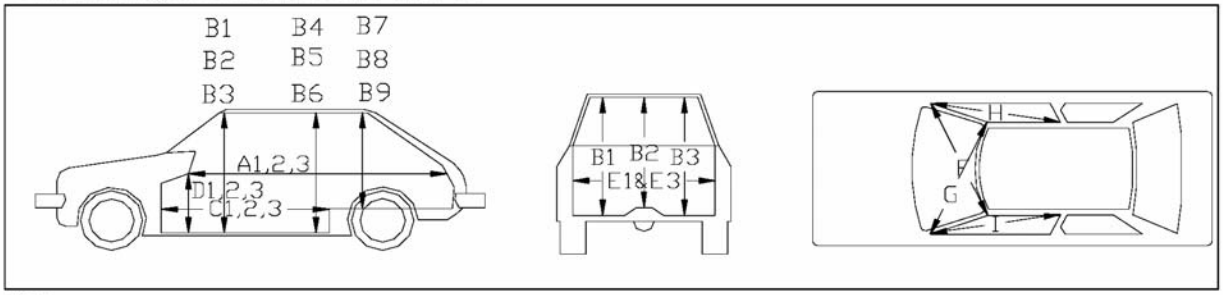
G = distance between the lower edge of left window and the upper edge of right window

H= distance between bottom front corner and top rear corner of the passenger side window

I= distance between bottom front corner and top rear corner of the driver side window

Severity Indices

0 - if the reduction is less than 3%
1 - if the reduction is greater than 3% and less than or equal to 10 %
2 - if the reduction is greater than 10% and less than or equal to 20 %
3 - if the reduction is greater than 20% and less than or equal to 30 %
4 - if the reduction is greater than 30% and less than or equal to 40 %



where,
1 = Passenger Side
2 = Middle
3 = Driver Side

Location:

Measurement	Pre-Test (in.)	Post-Test (in.)	Change (in.)	% Difference	Severity Index
A1	48.25	48.00	-0.25	-0.52	0
A2	45.50	43.50	-2.00	-4.40	1
A3	50.25	46.75	-3.50	-6.97	1
B1	41.25	41.50	0.25	0.61	0
B2	37.50	34.00	-3.50	-9.33	1
B3	42.00	34.00	-8.00	-19.05	0
C1	60.75	60.25	-0.50	-0.82	0
C2	43.75	43.50	-0.25	-0.57	0
C3	61.25	60.50	-0.75	-1.22	0
D1	20.00	19.25	-0.75	-3.75	1
D2	11.50	10.50	-1.00	-8.70	1
D3	20.00	18.50	-1.50	-7.50	1
E1	52.75	52.75	0.00	0.00	0
E3	53.75	53.75	0.00	0.00	0
F	47.50	NA	#VALUE!	#VALUE!	0
G	48.00	NA	#VALUE!	#VALUE!	0
H	39.75	37.50	-2.25	-5.66	1
I	39.50	39.50	0.00	0.00	0

Note: Maximum sevrity index for each variable (A-I) is used for determination of final OCDI value

Final OCDI: XX A B C D E F G H I
RF 1 1 0 1 0 0 0 1 0

Figure D-15. Occupant Compartment Deformation Index (OCDI), Test No. NYBBT-6

VEHICLE PRE/POST CRUSH INFO
Set-1

TEST: NYBBT-7
VEHICLE: 2002 Dodge Ram

POINT	X	Y	Z	X'	Y'	Z'	DEL X	DEL Y	DEL Z
1	26.25	10	-0.5	26	10.25	-0.25	-0.25	0.25	0.25
2	29.25	15.25	-1.5	29.25	15	-1	0	-0.25	0.5
3	31.5	20.75	-2.5	31.5	21	-2.5	0	0.25	0
4	29.25	29.5	0	29.25	29.25	0.25	0	-0.25	0.25
5	21	8.5	-2	20.75	8	-1.5	-0.25	-0.5	0.5
6	23.25	13.5	-4	23.25	13.25	-3.5	0	-0.25	0.5
7	28.25	20	-6	28.25	20	-5.75	0	0	0.25
8	27.25	29.25	-3.25	27	28.5	-3	-0.25	-0.75	0.25
9	18.25	6.5	-3	18.25	6.75	-3.25	0	0.25	-0.25
10	19.75	13	-5.25	19.75	12.75	-5	0	-0.25	0.25
11	22	18.5	-9	22	18	-9	0	-0.5	0
12	22	29	-7.75	22	28.5	-7.5	0	-0.5	0.25
13	14.5	3.5	-3.5	14.75	3.5	-3.25	0.25	0	0.25
14	15.75	10.25	-6.25	16	10	-6.25	0.25	-0.25	0
15	18.25	18	-9.75	18.75	18	-9.75	0.5	0	0
16	18.5	24.25	-9.25	18.25	23.75	-9	-0.25	-0.5	0.25
17	18	29.75	-8.5	18	30	-8	0	0.25	0.5
18	9.75	4	-4	9.75	3.75	-3.75	0	-0.25	0.25
19	12.25	11.25	-10	12.5	10.75	-9.75	0.25	-0.5	0.25
20	13.25	18.5	-9	13.25	18	-9	0	-0.5	0
21	14	25.5	-8.5	13.75	25.5	-8	-0.25	0	0.5
22	13.5	30	-8.25	13.25	29.25	-7.75	-0.25	-0.75	0.5
23	5.75	4.5	-4	5.5	4.5	-4	-0.25	0	0
24	7.5	12.25	-9.25	7.5	12	-9.5	0	-0.25	-0.25
25	8.5	21	-8.5	8.25	21	-8.5	-0.25	0	0
26	9	29.75	-7.75	8.5	29.5	-7.5	-0.5	-0.25	0.25
27	1.25	3.5	-3.25	1.25	3.75	-3	0	0.25	0.25
28	0.75	12	-5	0.75	12	-4.75	0	0	0.25
29	0.75	25.5	-3.5	0.75	25.5	-3.25	0	0	0.25

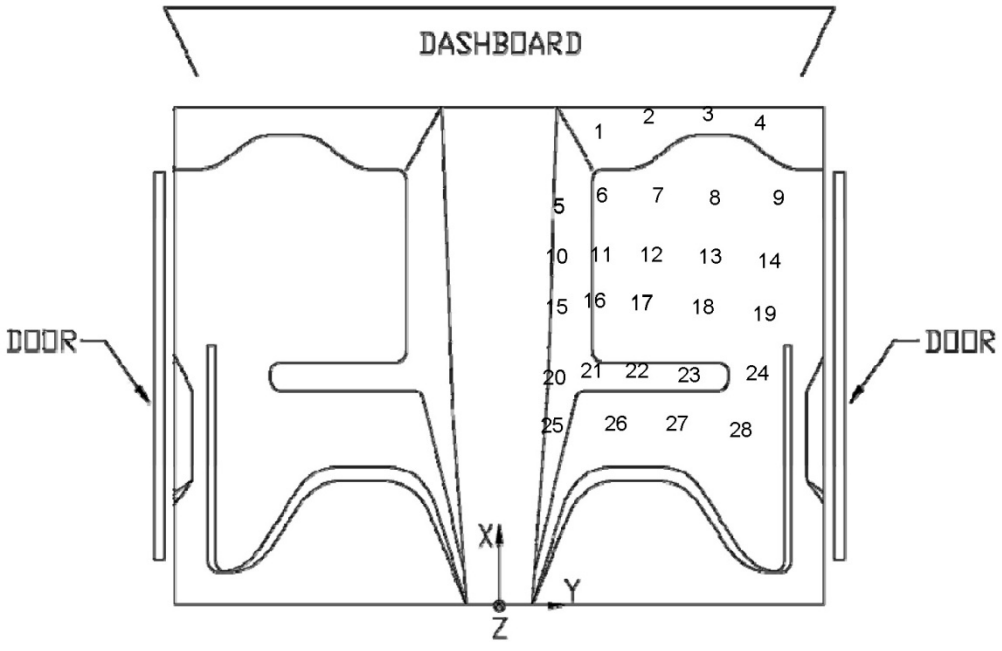


Figure D-16. Occupant Compartment Deformation Data - Set 1, Test No. NYBBT-7

VEHICLE PRE/POST CRUSH INFO
Set-2

TEST: NYBBT-7
VEHICLE: 2002 Dodge Ram

POINT	X	Y	Z	X'	Y'	Z'	DEL X	DEL Y	DEL Z
1	49.25	13	-0.5	49	13.25	-0.25	-0.25	0.25	0.25
2	52.25	18.25	-1.5	52.25	18	-1	0	-0.25	0.5
3	54.5	23.75	-2.5	54.5	24	-2.5	0	0.25	0
4	52.25	32.5	0	52.25	32.25	0.25	0	-0.25	0.25
5	44	11.5	-2	43.75	11	-1.75	-0.25	-0.5	0.25
6	46.25	16.5	-4	46.25	16.25	-3.75	0	-0.25	0.25
7	51.25	23	-5.75	51.25	23	-5.75	0	0	0
8	50.25	32.25	-3.25	50	31.5	-3	-0.25	-0.75	0.25
9	41.25	9.5	-3	41.25	9.75	-3	0	0.25	0
10	42.75	16	-5.25	42.75	15.75	-5	0	-0.25	0.25
11	45	21.5	-9	45	21	-9.25	0	-0.5	-0.25
12	45	32	-7.75	45	31.5	-7.5	0	-0.5	0.25
13	37.5	6.5	-3.5	37.75	6.5	-3.25	0.25	0	0.25
14	38.75	13.25	-6.25	39	13	-6	0.25	-0.25	0.25
15	41.25	21	-9.75	41.75	21	-9.75	0.5	0	0
16	41.5	27.25	-9.25	41.25	26.75	-9	-0.25	-0.5	0.25
17	41	32.75	-8.5	41	33	-8.5	0	0.25	0
18	32.75	7	-4	32.75	6.75	-3.5	0	-0.25	0.5
19	35.25	14.25	-10	35.5	13.75	-9.75	0.25	-0.5	0.25
20	36.25	21.5	-9.25	36.25	21	-9.25	0	-0.5	0
21	37	28.5	-8.75	36.75	28.5	-8.25	-0.25	0	0.5
22	36.5	33	-8.25	36.25	32.25	-8	-0.25	-0.75	0.25
23	28.75	7.5	-4	28.5	7.5	-3.75	-0.25	0	0.25
24	30.5	15.25	-9.5	30.5	15	-9.25	0	-0.25	0.25
25	31.5	24	-8.5	31.25	24	-8.5	-0.25	0	0
26	32	32.75	-7.75	31.5	32.5	-7.5	-0.5	-0.25	0.25
27	24.25	6.5	-3.25	24.25	6.75	-3	0	0.25	0.25
28	23.75	15	-5	23.75	15	-4.75	0	0	0.25
29	23.75	28.5	-3.75	23.75	28.5	-3.5	0	0	0.25
30							0	0	0
31							0	0	0
32							0	0	0
33							0	0	0
34							0	0	0
35							0	0	0

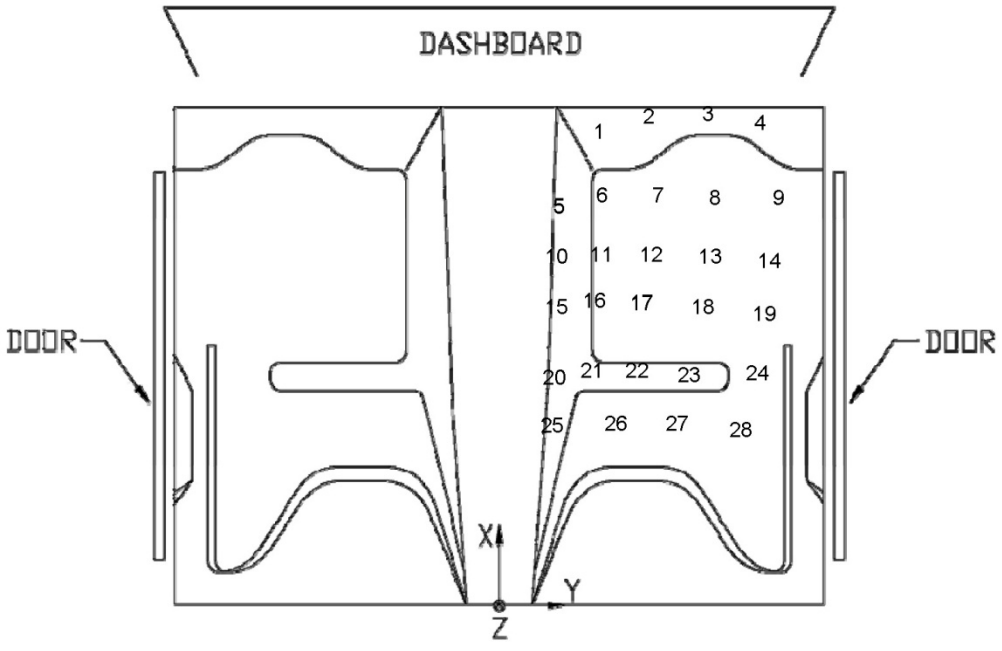


Figure D-17. Occupant Compartment Deformation Data - Set 2, Test No. NYBBT-7

Occupant Compartment Deformation Index (OCDI)

Test No. NYBBT-7
Vehicle Type: 2002 Dodge Ram

OCDI = XXABCDEFGHI

XX = location of occupant compartment deformation

A = distance between the dashboard and a reference point at the rear of the occupant compartment, such as the top of the rear seat or the rear of the cab on a picku

B = distance between the roof and the floor panel

C = distance between a reference point at the rear of the occupant compartment and the motor panel

D = distance between the lower dashboard and the floor panel

E = interior width

F = distance between the lower edge of right window and the upper edge of left window

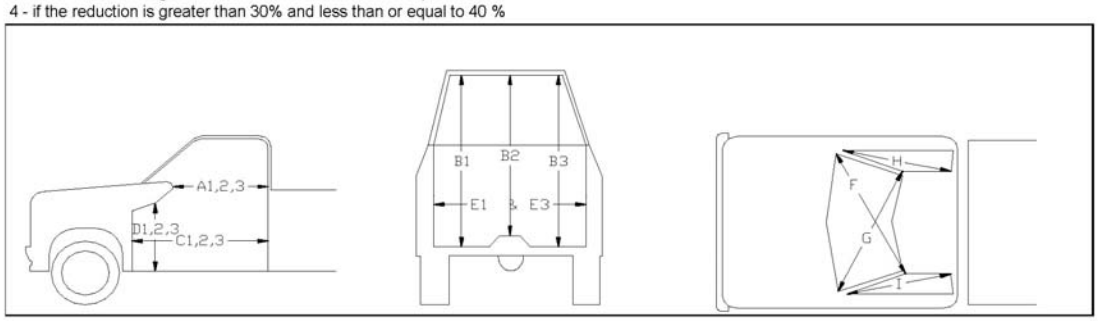
G = distance between the lower edge of left window and the upper edge of right window

H= distance between bottom front corner and top rear corner of the passenger side window

I= distance between bottom front corner and top rear corner of the driver side window

Severity Indices

0 - if the reduction is less than 3%
1 - if the reduction is greater than 3% and less than or equal to 10 %
2 - if the reduction is greater than 10% and less than or equal to 20 %
3 - if the reduction is greater than 20% and less than or equal to 30 %
4 - if the reduction is greater than 30% and less than or equal to 40 %



where,
1 = Passenger Side
2 = Middle
3 = Driver Side

Location:

Measurement	Pre-Test (in.)	Post-Test (in.)	Change (in.)	% Difference	Severity Index
A1	58.00	58.00	0.00	0.00	0
A2	53.00	53.00	0.00	0.00	0
A3	58.50	58.50	0.00	0.00	0
B1	47.50	47.00	-0.50	-1.05	0
B2	42.00	42.00	0.00	0.00	0
B3	48.00	47.75	-0.25	-0.52	0
C1	70.50	70.50	0.00	0.00	0
C2	48.00	48.00	0.00	0.00	0
C3	69.00	69.00	0.00	0.00	0
D1	23.00	23.25	0.25	1.09	0
D2	13.25	13.25	0.00	0.00	0
D3	23.00	22.75	-0.25	-1.09	0
E1	65.50	64.50	-1.00	-1.53	0
E3	65.00	64.50	-0.50	-0.77	0
F	59.50	59.50	0.00	0.00	0
G	59.00	59.00	0.00	0.00	0
H	41.50	40.00	-1.50	-3.61	1
I	41.25	41.25	0.00	0.00	0

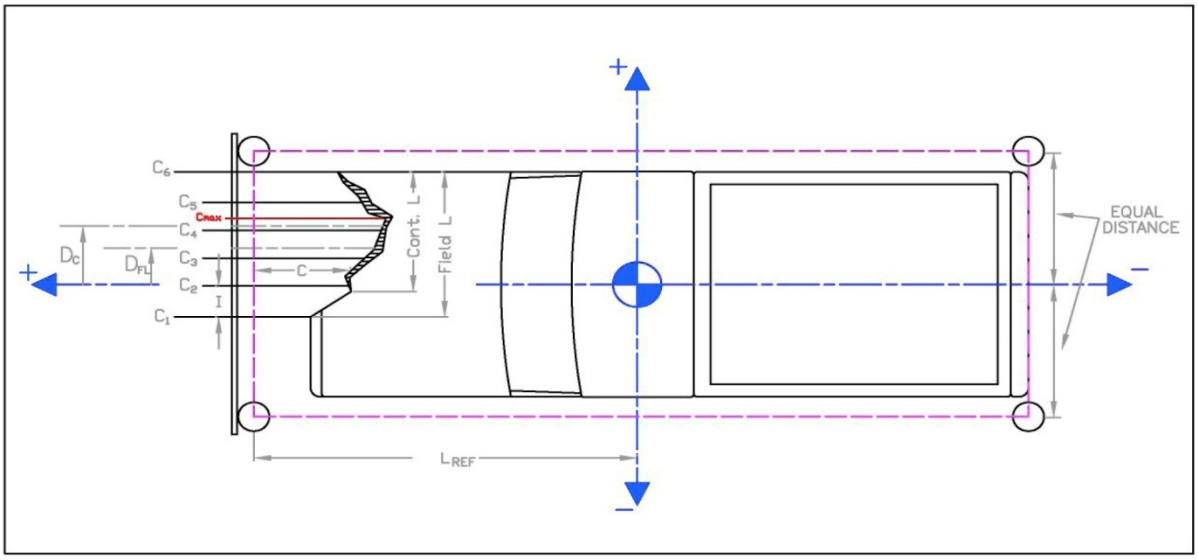
Note: Maximum sevrity index for each variable (A-I) is used for determination of final OCDI value

	XX	A	B	C	D	E	F	G	H	I
Final OCDI:	RF	0	0	0	0	0	0	0	1	0

Figure D-18. Occupant Compartment Deformation Index (OCDI), Test No. NYBBT-7

Date: 11/3/2008 Test Number: NYBBT-7

Make: Dodge Model: Ram 1500 Quad Cab Year: 2002



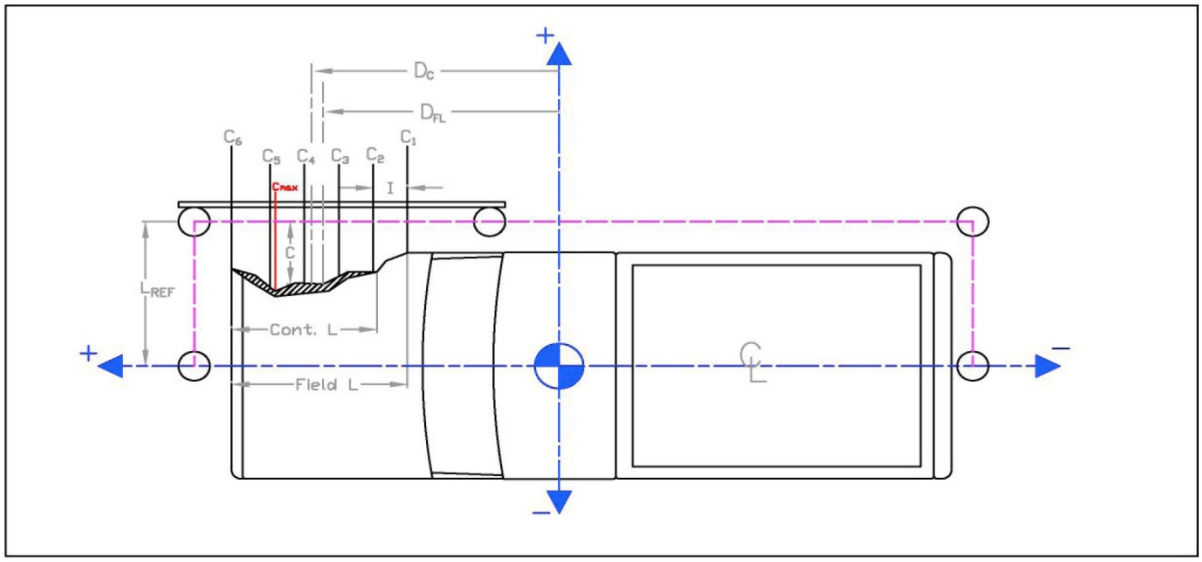
	in.	(mm)
Distance from C.G. to reference line - L_{REF}:	122	(3099)
Width of contact and induced crush - Field L:	38	(965)
Crush measurement spacing interval (L/5) - I:	7.6	(193)
Distance from center of vehicle to center of Field L - D_{FL}:	15	(381)
Width of Contact Damage:	34	(864)
Distance from center of vehicle to center of contect damage - D_C:	17	(432)

	Crush Measurement		Lateral Location		Original Profile Measurement		Dist. Between Ref. Lines		Actual	Crush
	in.	(mm)	in.	(mm)	in.	(mm)	in.	(mm)	in.	(mm)
C_1	19.5	(495)	-4	-(102)	10.25	(260)	10	(254)	-0.75	-(19)
C_2	21.5	(546)	3.6	(91)	10.25	(260)			1.25	(32)
C_3	24.5	(622)	11.2	(284)	10.875	(276)			3.625	(92)
C_4	28	(711)	18.8	(478)	12.2656	(312)			5.73438	(146)
C_5	29	(737)	26.4	(671)	14.5938	(371)			4.40625	(112)
C_6	32	(813)	34	(864)	19.25	(489)			2.75	(70)
C_{MAX}	32	(813)	34	(864)	19.25	(489)			2.75	(70)

Figure D-19. Exterior Vehicle Crush (NASS) - Front, Test No. NYBBT-7

Date: 11/3/2008 Test Number: NYBBT-7

Make: Dodge Model: Ram 1500 Quad Cab Year: 2002



	in.	(mm)
Distance from centerline to reference line - L_{REF}:	45	(1143)
Width of contact and induced crush - Field L:	227	(5766)
Crush measurement spacing interval (L/5) - I:	45.4	(1153)
Distance from vehicle c.g. to center of Field L - D_{FL}:	-14.5	-(368)
Width of Contact Damage:	227	(5766)
Distance from vehicle c.g. to center of contect damage - D_C:	-14.5	-(368)

	Crush Measurement		Longitudinal Location		Original Profile Measurement		Dist. Between Ref. Lines		Actual	Crush
	in.	(mm)	in.	(mm)	in.	(mm)	in.	(mm)	in.	(mm)
C_1	24	(610)	-128	-(3251)	16	(406)	-5	-(127)	13	(330)
C_2	10	(254)	-82.6	-(2098)	10.5	(267)			4.5	(114)
C_3	7	(178)	-37.2	-(945)	11.6458	(296)			0.35417	(9)
C_4	7.5	(191)	8.2	(208)	11.25	(286)			1.25	(32)
C_5	13	(330)	53.6	(1361)	10.5	(267)			7.5	(191)
C_6	47	(1194)	99	(2515)	27.5625	(700)			24.4375	(621)
C_{MAX}	16.5	(419)	80	(2032)	11.25	(286)			10.25	(260)

Figure D-20. Exterior Vehicle Crush (NASS) - Side, Test No. NYBBT-7

VEHICLE PRE/POST CRUSH
FLOORPAN - SET 1

TEST: NYBBT-8
VEHICLE: Rio Sedan (1100C)

POINT	X	Y	Z	X'	Y'	Z'	DEL X	DEL Y	DEL Z
1	25.75	-23.75	-0.5	25.25	-23.5	-0.5	-0.5	0.25	0
2	28.5	-19	-0.75	27.5	-18.75	-0.5	-1	0.25	0.25
3	31	-16	0	29.5	-15.75	0.25	-1.5	0.25	0.25
4	30.75	-10.5	-1	30.75	-10.5	-1	0	0	0
5	24.5	-24.75	-2.75	24.5	-25	-2.75	0	-0.25	0
6	27.75	-18.75	-3.25	27	-19	-3.25	-0.75	-0.25	0
7	29	-9.75	-4.5	29	-10	-4.25	0	-0.25	0.25
8	24.5	-22.25	-5.25	24.5	-21.5	-5.25	0	0.75	0
9	26	-17.25	-6.5	26	-16.75	-6.5	0	0.5	0
10	26	-11.5	-7	26	-11.25	-6.75	0	0.25	0.25
11	25.5	-6.75	-7.5	25.5	-7	-7.5	0	-0.25	0
12	19.75	-23	-8	19.5	-23	-8	-0.25	0	0
13	20	-15.25	-8	20	-15.25	-8	0	0	0
14	20.5	-7.5	-8.5	20.5	-7.5	-8.25	0	0	0.25
15	16	-21	-8	15.75	-21.25	-7.25	-0.25	-0.25	0.75
16	15.5	-15	-7.75	15.5	-15	-7.75	0	0	0
17	15.5	-10	-8.25	15.5	-10	-8	0	0	0.25
18	10.5	-22.75	-7.75	10.25	-22.5	-7.5	-0.25	0.25	0.25
19	10.5	-17.25	-7.5	10.75	-17.5	-7.5	0.25	-0.25	0
20	10.25	-13	-7.5	10.25	-13	-7.5	0	0	0
21	8.25	-3.5	-3.75	8.25	-3.5	-3.5	0	0	0.25
22	5	-22	-7.75	5	-21.75	-7.25	0	0.25	0.5
23	6.25	-15	-7.25	6.5	-14.75	-7.25	0.25	0.25	0
24	6.5	-7.75	-7.75	6.5	-7.5	-7.75	0	0.25	0
25	5	-3.5	-3.5	5	-3.5	-3.25	0	0	0.25
26	0.5	-24	-3.75	0.5	-24	-3.75	0	0	0
27	0.25	-20.25	-4.5	0.25	-20.5	-4.5	0	-0.25	0
28	0.25	-15	-4.75	0.25	-15	-4.5	0	0	0.25
29	0.25	-6	-3.75	0.25	-6	-3.75	0	0	0
30							0	0	0
31							0	0	0

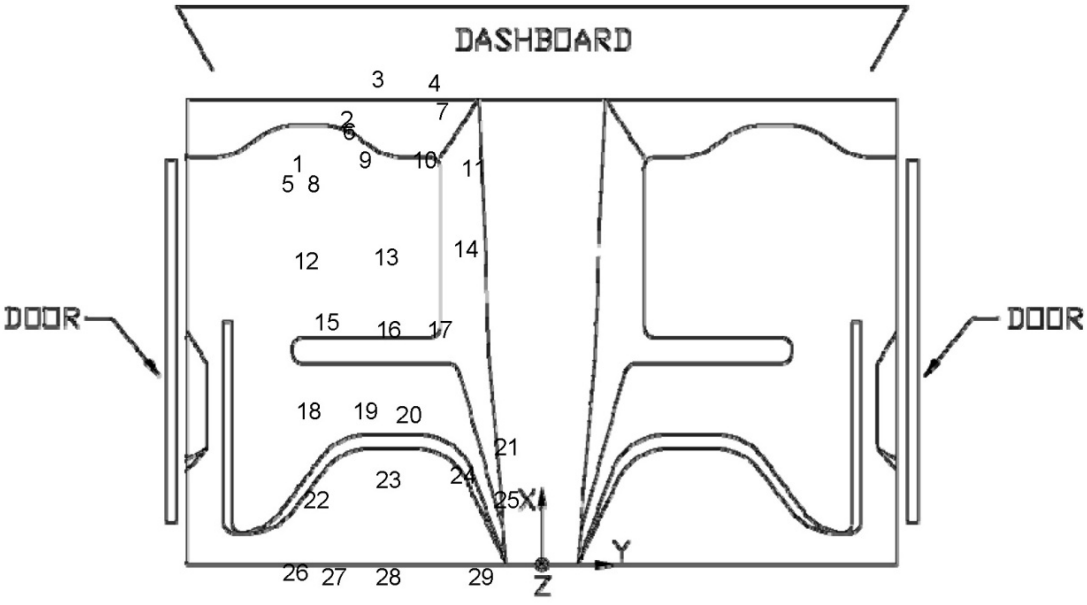


Figure D-21. Floorpan Deformation Data - Set 1, Test No. NYBBT-8

VEHICLE PRE/POST CRUSH
FLOORPAN - SET 2

TEST: NYBBT-8
VEHICLE: Rio Sedan (1100C)

POINT	X	Y	Z	X'	Y'	Z'	DEL X	DEL Y	DEL Z
1	48.75	-25.75	-1.5	48	-25.5	-1.5	-0.75	0.25	0
2	51	-21.5	-1.5	50	-21	-1.75	-1	0.5	-0.25
3	53.75	-17.5	-1	52.25	-17.75	-0.75	-1.5	-0.25	0.25
4	53.75	-12.5	-1.75	53.5	-13	-1.75	-0.25	-0.5	0
5	47.75	-26.25	-3.75	47.5	-26.25	-4	-0.25	0	-0.25
6	50.5	-21	-4.25	50.25	-21	-4.25	-0.25	0	0
7	52.25	-12.5	-5	52.25	-13	-5.25	0	-0.5	-0.25
8	47.5	-24	-6.25	47.5	-23.25	-6.5	0	0.75	-0.25
9	49.25	-17.75	-7.5	49.25	-17.75	-7.5	0	0	0
10	49.25	-12.75	-7.75	49.25	-12.75	-7.75	0	0	0
11	48.5	-8.75	-8.25	48.5	-8.75	-8.5	0	0	-0.25
12	42.75	-25.75	-9	42.75	-25.75	-9	0	0	0
13	43.25	-17	-8.75	43.25	-17.25	-9	0	-0.25	-0.25
14	43.75	-9	-9	43.75	-9.75	-9.25	0	-0.75	-0.25
15	39	-22.5	-9	39	-23.25	-8.5	0	-0.75	0.5
16	38.75	-16.5	-8.5	38.75	-17	-8.75	0	-0.5	-0.25
17	38.75	-11.5	-8.75	38.75	-12.25	-9	0	-0.75	-0.25
18	33.25	-24	-8.75	33.5	-24.5	-8.5	0.25	-0.5	0.25
19	33.75	-19.25	-8.25	34	-19.75	-8.5	0.25	-0.5	-0.25
20	33.75	-14.5	-8.25	33.75	-14.75	-8.25	0	-0.25	0
21	31.5	-5.5	-4.25	31.25	-5.5	-4.25	-0.25	0	0
22	28.25	-23	-8.5	28.25	-23.5	-8.25	0	-0.5	0.25
23	29.5	-16.5	-8	29.5	-16.5	-8.25	0	0	-0.25
24	29.75	-9.25	-8.25	29.75	-9.25	-8.25	0	0	0
25	28	-5.5	-3.75	28	-5.5	-4	0	0	-0.25
26	23.5	-26	-4.75	23.5	-26	-4.75	0	0	0
27	23.5	-22.5	-5.5	23.5	-22.5	-5.5	0	0	0
28	23.75	-17.5	-5.5	23.75	-17.5	-5.5	0	0	0
29	23.25	-8.5	-4.25	23.5	-8.5	-4.25	0.25	0	0
30							0	0	0
31							0	0	0

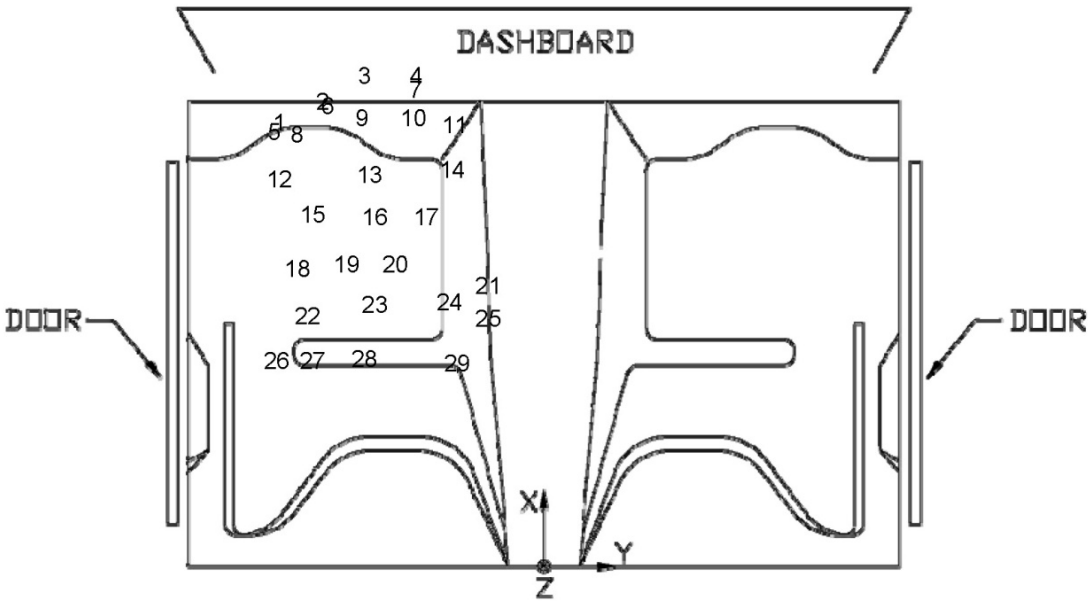


Figure D-22. Floorpan Deformation Data - Set 2, Test No. NYBBT-8

VEHICLE PRE/POST CRUSH
INTERIOR CRUSH - SET 1

TEST: NYBBT-8
VEHICLE: Rio Sedan (1100C)

	POINT	X	Y	Z	X'	Y'	Z'	DEL X	DEL Y	DEL Z
DASH	A1	68.5	-19	21.5	68	-19	21.5	-0.5	0	0
	A2	71.5	2.25	22	71.25	2.25	22	-0.25	0	0
	A3	70.75	15	21.25	70.5	15	21	-0.25	0	-0.25
	A4	63	-14.5	22.75	63	-14.5	22.75	0	0	0
	A5	66	-1.5	21.75	66	-1.5	21.25	0	0	-0.5
	A6	64.25	15.25	20.25	64.25	15.25	20.5	0	0	0.25
SIDE PANEL	B1	20	-29	2.75	19.5	-29.25	3	-0.5	-0.25	0.25
	B2	23.5	-30.75	0	23.25	-30.75	0	-0.25	0	0
	B3	19.5	-29	-1.5	19.25	-29	-1.5	-0.25	0	0
IMPACT SIDE DOOR	C1	-11	-36.25	19.5	11.25	-36.75	19.25	22.25	-0.5	-0.25
	C2	7	-35.25	17.25	6.75	-35.5	17.5	-0.25	-0.25	0.25
	C3	-2.25	-33.75	13	-2.75	-34	13	-0.5	-0.25	0
	C4	8.75	-31.5	9.75	8.5	-32	9.5	-0.25	-0.5	-0.25
	C5	-11	-30	5.75	-11.25	-30	5.75	-0.25	0	0
	C6	15.5	-30	3.75	15.5	-29.5	4	0	0.5	0.25
ROOF	D1	44.5	-12.75	21.75	44.25	-12.75	22.25	-0.25	0	0.5
	D2	44.25	-6.75	21.75	44.25	-6.25	22.5	0	0.5	0.75
	D3	44.5	0	21.25	44.75	0	21.75	0.25	0	0.5
	D4	44.5	8	21	44.75	8	21	0.25	0	0
	D5	43.5	14.5	20.25	43.75	14.5	20.5	0.25	0	0.25
	D6	32.5	-10	25.5	32.5	-10	25.5	0	0	0
	D7	32	10.5	24.75	32	10.5	24.5	0	0	-0.25
	D8	23.75	-15	25.25	23.75	-15	25.25	0	0	0
	D9	23.25	-4.25	25.25	23.5	-4.25	25.75	0.25	0	0.5
	D10	23	2.75	25	23	2.75	25	0	0	0
	D11	23.5	14	23.75	23.5	14	23.75	0	0	0
	D12	13	-13.5	26.25	12.75	-13.5	26.75	-0.25	0	0.5
	D13	12.25	7	25.75	12.25	7.25	25.75	0	0.25	0
	D14	8.25	-7	26.25	8.25	-7	26.25	0	0	0
	D15	8	6.25	25.5	8	6.25	25.5	0	0	0

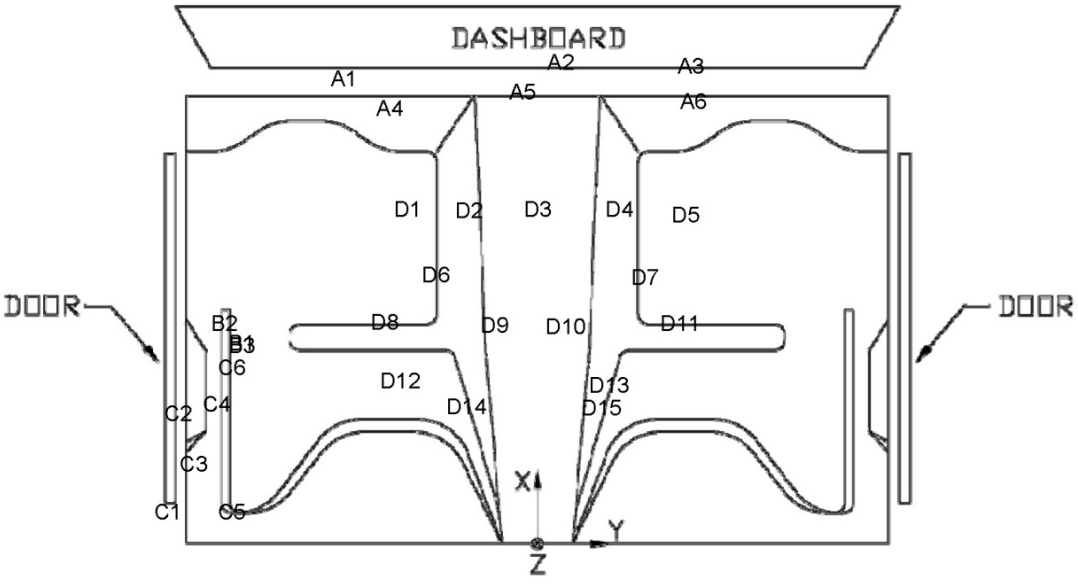


Figure D-23. Occupant Compartment Deformation Data - Set 1, Test No. NYBBT-8

VEHICLE PRE/POST CRUSH
INTERIOR CRUSH - SET 2

TEST: NYBBT-8
VEHICLE: Rio Sedan (1100C)

	POINT	X	Y	Z	X'	Y'	Z'	DEL X	DEL Y	DEL Z
DASH	A1	38	-42	20.25	37.75	-42	20.5	-0.25	0	0.25
	A2	40.75	-21.25	21	40.5	-21.25	21	-0.25	0	0
	A3	40.25	-8.5	20.75	40	-8.5	21.25	-0.25	0	0.5
	A4	33	-37.75	21.75	32.75	-37.75	22	-0.25	0	0.25
	A5	35	-24.5	20.75	34.75	-24.5	21	-0.25	0	0.25
	A6	33.25	-8	20	33.25	-8.25	20	0	-0.25	0
SIDE PANEL	B1	33.5	-31.25	1.5	33.25	-31.25	1.5	-0.25	0	0
	B2	33.25	-33.5	2.5	37	-33	2.5	3.75	0.5	0
	B3	37.25	-31	-1.25	33.25	-31	-1.5	-4	0	-0.25
IMPACT SIDE DOOR	C1	2	-35.5	18	2	-36.25	18.25	0	-0.75	0.25
	C2	19.5	-35.75	16.25	19.5	-36.5	16.25	0	-0.75	0
	C3	11	-34.25	11.75	11	-34.75	12	0	-0.5	0.25
	C4	22	-33	8.5	22.25	-33.25	8.75	0.25	-0.25	0.25
	C5	2.5	-30.75	4.5	2.5	-31	4.75	0	-0.25	0.25
	C6	29.5	-31	2.75	29.25	-31	2.75	-0.25	0	0
ROOF	D1	48.5	-33.25	18.25	48.5	-33.25	18.5	0	0	0.25
	D2	48.75	-26.75	19	48.5	-27	19.25	-0.25	-0.25	0.25
	D3	49	-20.5	19.25	49	-20.75	19.5	0	-0.25	0.25
	D4	48.75	-12.75	19.5	49	-13	19.75	0.25	-0.25	0.25
	D5	48	-6.25	19.75	48	-6.25	19.75	0	0	0
	D6	37.25	-30.25	23	37.25	-30.75	23.25	0	-0.5	0.25
	D7	36.5	-10.75	24	36.75	-11.25	24.25	0.25	-0.5	0.25
	D8	28.5	-35.5	23.25	28.5	-35.75	23	0	-0.25	-0.25
	D9	28.25	-25	24.5	28.25	-25.25	24.5	0	-0.25	0
	D10	28	-18	25	28	-18.25	25	0	-0.25	0
	D11	28.5	-8	24.5	28.5	-7.75	24.75	0	0.25	0.25
	D12	17.75	-34.25	25.25	18	-34.25	25.5	0.25	0	0.25
	D13	17.5	-14	26.75	17.75	-14.25	26.75	0.25	-0.25	0
	D14	13.5	-27.75	26.25	13.75	-27.75	26.5	0.25	0	0.25
	D15	13.5	-14.5	27	13.5	-15	27	0	-0.5	0

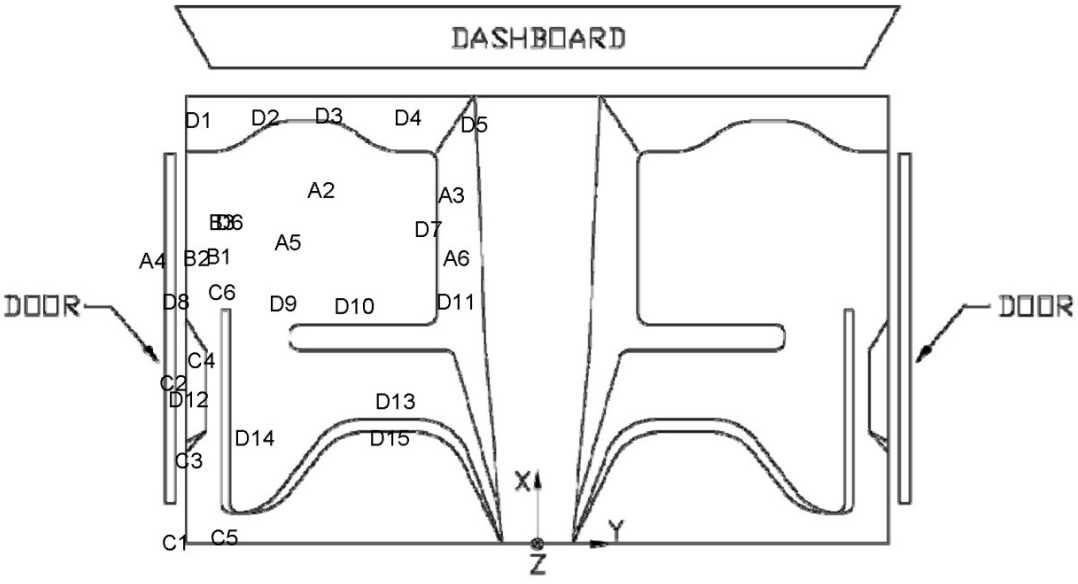
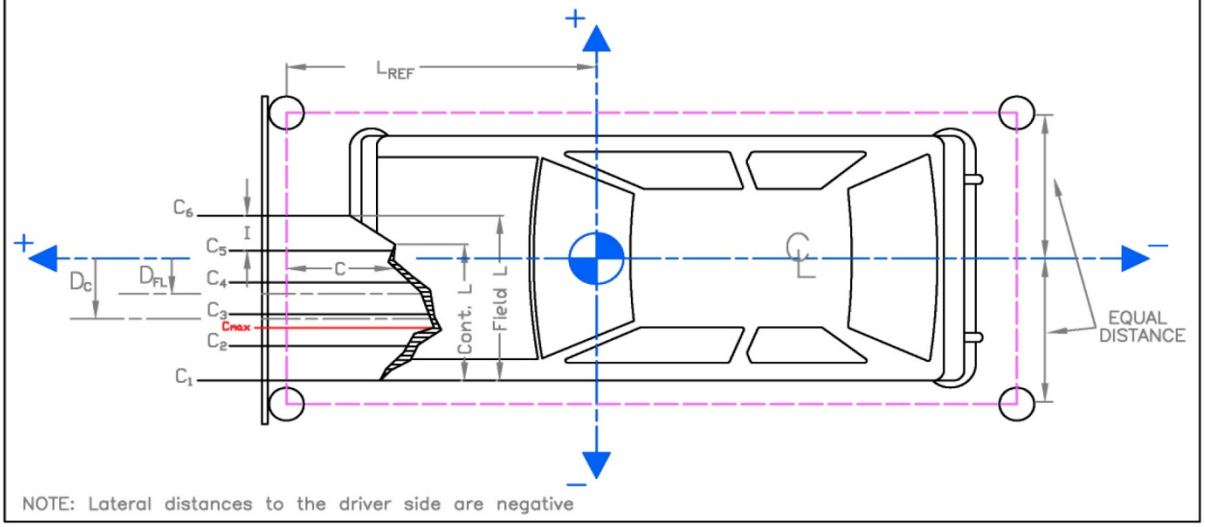


Figure D-24. Occupant Compartment Deformation Data - Set 2, Test No. NYBBT-8

Date: 7/29/2009 Test Number: NYBBT-8

Make: Kia Model: Rio Sedan (1100C) Year: 2003



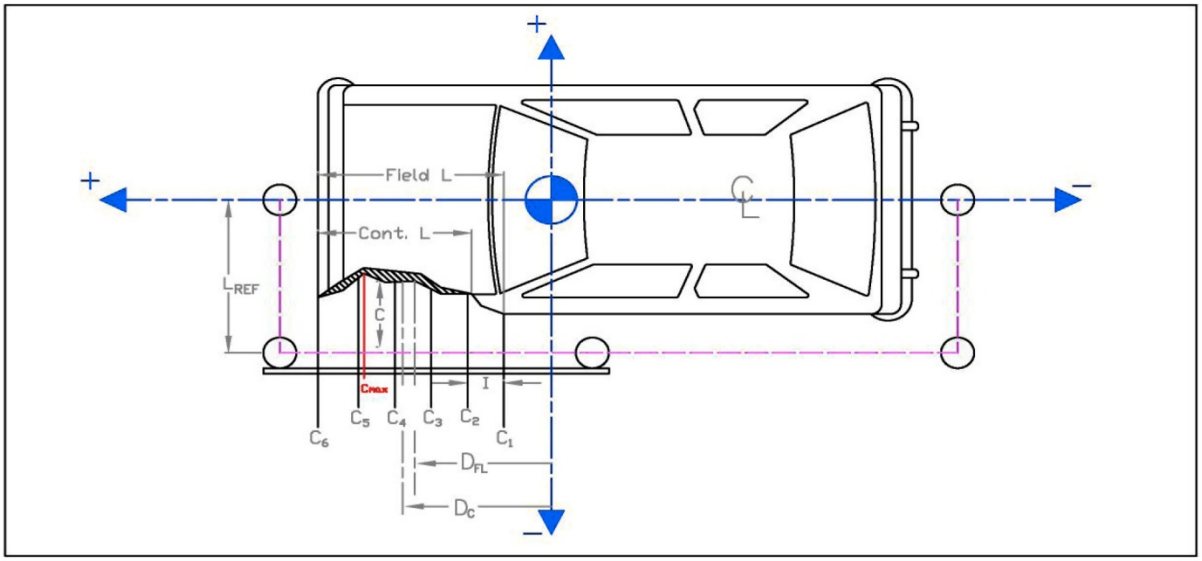
	in.	(mm)
Distance from C.G. to reference line - L_{REF}:	66.5	(1689)
Width of contact and induced crush - Field L:	65	(1651)
Crush measurement spacing interval (L/5) - I:	13	(330)
Distance from center of vehicle to center of Field L - D_{FL}:	0	()
Width of Contact Damage:	65	(1651)
Distance from center of vehicle to center of contect damage - D_C:	0	()

	Crush Measurement		Lateral Location		Original Profile Measurement		Dist. Between Ref. Lines		Actual	Crush
	in.	(mm)	in.	(mm)	in.	(mm)	in.	(mm)	in.	(mm)
C_1	NA	NA	-32.5	-(826)	30.625	(778)	-12.37	-(314)	NA	NA
C_2	10.5	(267)	-19.5	-(495)	10.0938	(256)			12.7765	(325)
C_3	12.25	(311)	-6.5	-(165)	7.75	(197)			16.8702	(429)
C_4	12.5	(318)	6.5	(165)	7.75	(197)			17.1202	(435)
C_5	12.5	(318)	19.5	(495)	10.0938	(256)			14.7765	(375)
C_6	NA	NA	32.5	(826)	30.625	(778)			NA	NA
C_{MAX}	12.5	(318)	6.5	(165)	7.75	(197)			17.1202	(435)

Figure D-25. Exterior Vehicle Crush (NASS) - Front, Test No. NYBBT-8

Date: 40023 Test Number: NYBBT-8

Make: Kia Model: Rio Sedan (1100C) Year: 2003



	in.	(mm)
Distance from centerline to reference line - L_{REF}:	43	(1092)
Width of contact and induced crush - Field L:	68.125	(1730)
Crush measurement spacing interval (L/5) - I:	13.625	(346)
Distance from vehicle c.g. to center of Field L - D_{FL}:	34.0625	(865)
Width of Contact Damage:	68.125	(1730)
Distance from vehicle c.g. to center of contect damage - D_C:	49.125	(1248)

	Crush Measurement		Longitudinal Location		Original Profile Measurement		Dist. Between Ref. Lines		Actual	Crush
	in.	(mm)	in.	(mm)	in.	(mm)	in.	(mm)	in.	(mm)
C_1	10.5	(267)	0	()	3.25	(83)	7	(178)	0.25	(6)
C_2	11.5	(292)	13.625	(346)	3.25	(83)			1.25	(32)
C_3	16.5	(419)	27.25	(692)	4.5	(114)			5	(127)
C_4	25.5	(648)	40.875	(1038)	4.5	(114)			14	(356)
C_5	19.5	(495)	54.5	(1384)	5.25	(133)			7.25	(184)
C_6	NA	NA	68.125	(1730)	25.5	(648)			NA	NA
C_{MAX}	25.5	(648)	40.88	(1038)	4.5	(114)			14	(356)

Figure D-26. Exterior Vehicle Crush (NASS) - Side, Test No. NYBBT-8

VEHICLE PRE/POST CRUSH
FLOORPAN - SET 1

TEST: NYBBT-9
VEHICLE: Ram 1500 (2270P)

POINT	X	Y	Z	X'	Y'	Z'	DEL X	DEL Y	DEL Z
1	29.25	-27.75	-2.75	29.25	-27.5	-2.75	0	0.25	0
2	33.75	-23.75	-0.25	33	-24.5	-0.25	-0.75	-0.75	0
3	33.5	-15.75	-1.75	33.5	-16.25	-2	0	-0.5	-0.25
4	28.75	-10.5	-2.25	29	-10	-2.25	0.25	0.5	0
5	26.25	-29	-7	26	-29	-7	-0.25	0	0
6	28.5	-23	-5.75	28.5	-22.5	-6	0	0.5	-0.25
7	29	-18.75	-5.25	29	-18	-5.5	0	0.75	-0.25
8	27.25	-10.25	-5	27.25	-10.5	-5	0	-0.25	0
9	21.75	-27.25	-9	21.75	-27	-9.25	0	0.25	-0.25
10	22.25	-22.25	-8.75	22.25	-21.5	-9	0	0.75	-0.25
11	22	-14	-8.75	22	-13.75	-9	0	0.25	-0.25
12	16.5	-28	-9.75	16.5	-28.5	-9.75	0	-0.5	0
13	16.5	-20.25	-9.5	16.5	-20	-9.5	0	0.25	0
14	16.5	-16	-9.5	16.5	-15.75	-9.5	0	0.25	0
15	14	-8	-2.5	14	-8	-2.75	0	0	-0.25
16	10.25	-26.25	-9.5	10.25	-25.5	-9.5	0	0.75	0
17	10.5	-17.5	-9.25	10.25	-17	-9.25	-0.25	0.5	0
18	10.5	-11.5	-9	10.5	-11.25	-9	0	0.25	0
19	8.5	-8	-3	8.5	-8	-3	0	0	0
20	5.75	-27.5	-9.5	5.75	-28	-9.5	0	-0.5	0
21	5.25	-21	-9.5	6.25	-21	-9.5	1	0	0
22	6.5	-15.5	-9.25	6.5	-15.5	-9.25	0	0	0
23	4.75	-8	-3.25	4.75	-8	-3.5	0	0	-0.25
24	0	-28.25	-5.5	0.25	-28.25	-5.5	0.25	0	0
25	0.25	-21.75	-5.25	0.25	-21.75	-5.25	0	0	0
26	0	-17	-5.25	0	-17.5	-5.25	0	-0.5	0
27	0.25	-12	-5	0.25	-12	-5	0	0	0
28	0.5	-4.5	-2.25	0.5	-4.5	-2.25	0	0	0
29							0	0	0
30							0	0	0
31							0	0	0

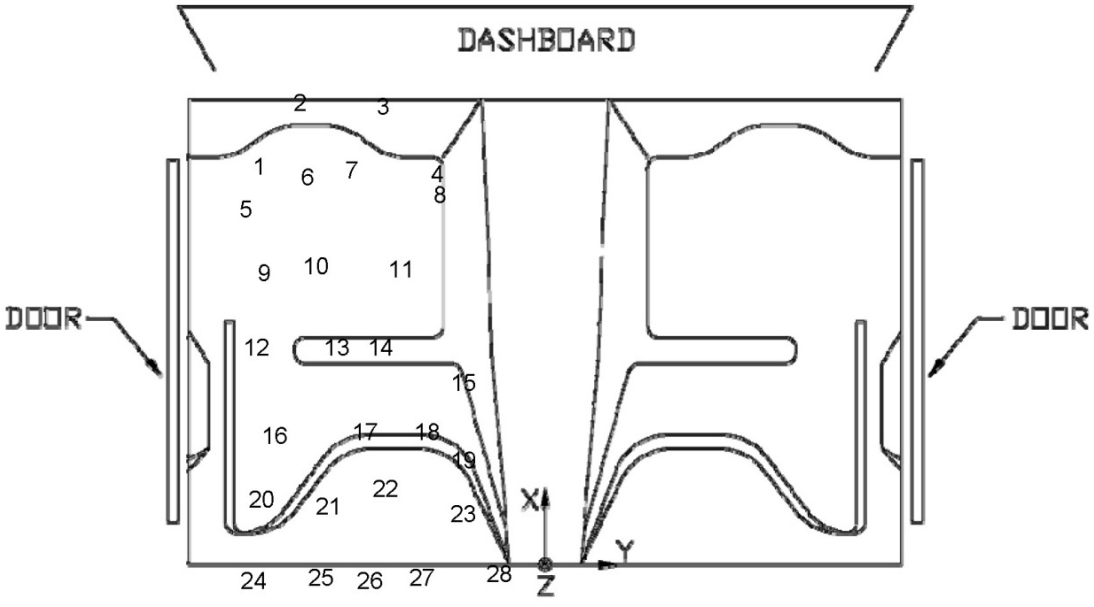


Figure D-27. Floorpan Deformation Data - Set 1, Test No. NYBBT-9

VEHICLE PRE/POST CRUSH
FLOORPAN - SET 2

TEST: NYBBT-9
VEHICLE: Ram 1500 (2270P)

POINT	X	Y	Z	X'	Y'	Z'	DEL X	DEL Y	DEL Z
1	52.25	-32	-2.25	52	-32.75	-2.5	-0.25	-0.75	-0.25
2	56.25	-28.75	0	56.25	-29.5	0	0	-0.75	0
3	56.25	-21	-2	56.25	-21.5	-1.75	0	-0.5	0.25
4	51.75	-15	-2.25	51.5	-15.25	-2.25	-0.25	-0.25	0
5	49.25	-33	-6.5	49	-33.25	-6.5	-0.25	-0.25	0
6	51.5	-26.25	-5.5	51.5	-26.5	-5.75	0	-0.25	-0.25
7	51.75	-22.25	-5.25	52	-22.75	-5.25	0.25	-0.5	0
8	50	-14.25	-5	50	-14.5	-5.25	0	-0.25	-0.25
9	44.75	-32	-8.75	44.75	-32	-8.75	0	0	0
10	45.25	-27	-8.5	45.25	-26.75	-8.75	0	0.25	-0.25
11	45	-18.5	-8.5	45	-17.75	-8.75	0	0.75	-0.25
12	39.5	-33.75	-9.5	39.5	-33.5	-9.5	0	0.25	0
13	39.5	-25.25	-9.25	39.5	-24.5	-9.25	0	0.75	0
14	39.5	-21.25	-9.25	39.5	-20.5	-9.25	0	0.75	0
15	37	-13	-2.5	36.75	-12.75	-2.5	-0.25	0.25	0
16	33.5	-31.25	-9.25	33.5	-30.75	-9.25	0	0.5	0
17	33.5	-22.5	-9	33.5	-21.75	-9	0	0.75	0
18	33.5	-16.25	-9	33.5	-16	-9	0	0.25	0
19	31.25	-13	-3	31.25	-12.75	-3	0	0.25	0
20	29	-32.75	-9	29	-32.5	-9.25	0	0.25	-0.25
21	29.75	-26.25	-9.25	29.5	-25.5	-9.25	-0.25	0.75	0
22	29.5	-20.25	-9.25	29.5	-19.75	-9.25	0	0.5	0
23	27.5	-13	-3.5	27.5	-12.75	-3.5	0	0.25	0
24	23.25	-33	-5	23.25	-33	-5	0	0	0
25	23.25	-26.5	-5	23.25	-26.25	-5	0	0.25	0
26	23	-22	-5	23.25	-22	-5	0.25	0	0
27	23.25	-17	-5	23	-16.5	-5	-0.25	0.5	0
28	23.25	-9.75	-2.5	23.5	-9.25	-2.5	0.25	0.5	0
29							0	0	0
30							0	0	0
31							0	0	0

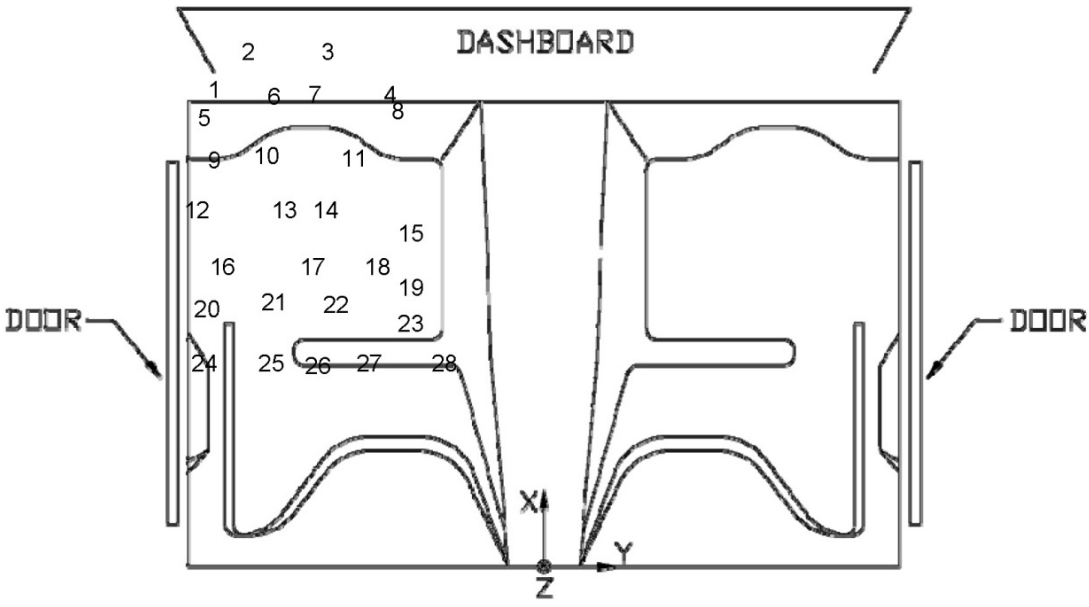


Figure D-28. Floorpan Deformation Data - Set 2, Test No. NYBBT-9

VEHICLE PRE/POST CRUSH
INTERIOR CRUSH - SET 1

TEST: NYBBT-9
VEHICLE: Ram 1500 (2270P)

	POINT	X	Y	Z	X'	Y'	Z'	DEL X	DEL Y	DEL Z
DASH	A1	70.25	-26.75	24.25	69.5	-26.5	24	-0.75	0.25	-0.25
	A2	70	-8.75	25.75	70	-8.75	25.25	0	0	-0.5
	A3	70.75	0	25.25	70.75	0	24.75	0	0	-0.5
	A4	69.5	-28.25	13.25	69	-28.25	13.25	-0.5	0	0
	A5	70.5	-19.25	12	70	-19	12	-0.5	0.25	0
	A6	70.5	-11.25	13.25	69.75	-11	13.25	-0.75	0.25	0
SIDE PANEL	B1	20	-36	1.25	20.25	-36	1.5	0.25	0	0.25
	B2	24.5	-38	-3.5	24.5	-38	-3.25	0	0	0.25
	B3	20.25	-36.25	-4	20.25	-36.25	-4	0	0	0
IMPACT SIDE DOOR	C1	-10.25	-38	17.25	-10.25	-38	17.25	0	0	0
	C2	7.5	-35.25	16	7.75	-35	16.25	0.25	0.25	0.25
	C3	-13.5	-39.25	4.25	-13.25	-39	4.25	0.25	0.25	0
	C4	1	-34.75	4.75	1	-34.75	4.75	0	0	0
	C5	-0.75	-35.5	-6	-0.75	-35.25	-5.75	0	0.25	0.25
	C6	15.25	-36.5	-2.5	15.5	-36.25	-2.5	0.25	0.25	0
ROOF	D1							0	0	0
	D2							0	0	0
	D3							0	0	0
	D4							0	0	0
	D5							0	0	0
	D6							0	0	0
	D7							0	0	0
	D8							0	0	0
	D9							0	0	0
	D10							0	0	0
	D11							0	0	0
	D12							0	0	0
	D13							0	0	0
	D14							0	0	0
	D15							0	0	0

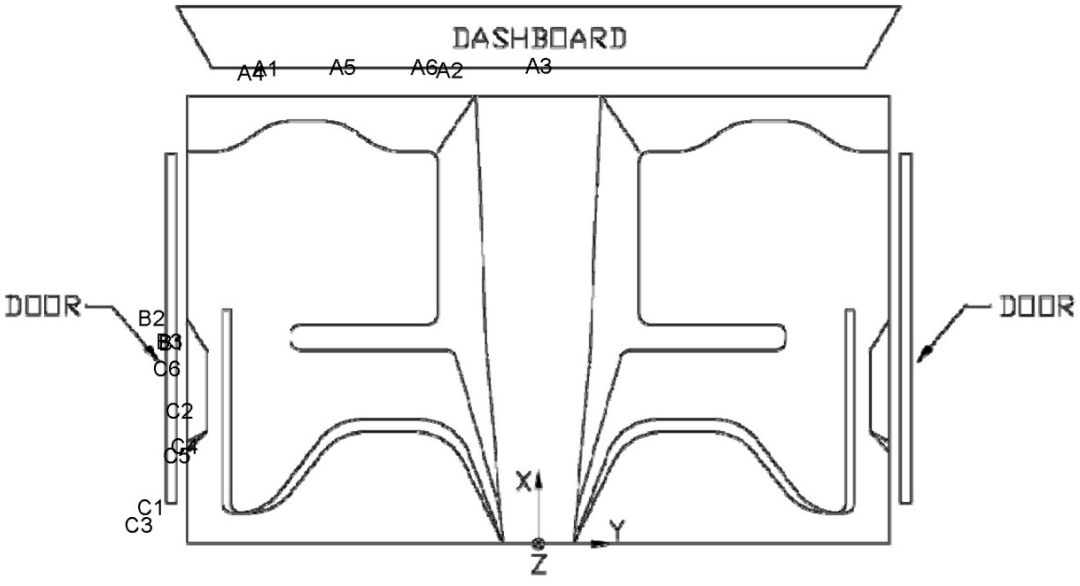


Figure D-29. Occupant Compartment Deformation Data - Set 1, Test No. NYBBT-9

VEHICLE PRE/POST CRUSH
INTERIOR CRUSH - SET 2

TEST: NYBBT-9
VEHICLE: Ram 1500 (2270P)

Cells marked "NA" indicate that the measurement was not taken due to procedural difficulties or reference compromise.

	POINT	X	Y	Z	X'	Y'	Z'	DEL X	DEL Y	DEL Z
DASH	A1	64.25	-55.75	24.5	64.25	-55.75	24.5	0	0	0
	A2	63.5	-38	25.75	63.5	-38.25	25.25	0	-0.25	-0.5
	A3	64.5	-29.25	25	64.25	-29.25	24.25	-0.25	0	-0.75
	A4	67.5	-58	13.75	67.25	-58	13.75	-0.25	0	0
	A5	68	-48.75	12	68.25	-48.5	12.25	0.25	0.25	0.25
	A6	67.25	-40.25	13.25	67	-40.25	13.5	-0.25	0	0.25
SIDE PANEL	B1	35.25	-53.5	-2	35.25	NA	-2	0	#VALUE!	0
	B2	39.75	-54.5	3	40	NA	2.75	0.25	#VALUE!	-0.25
	B3	35.5	-63.5	3.5	35.5	NA	3.25	0	#VALUE!	-0.25
IMPACT SIDE DOOR	C1	4.25	-67.75	18	4.25	-67.75	17.5	0	0	-0.5
	C2	22.75	-64.75	16.75	22.5	-64.75	16.75	-0.25	0	0
	C3	1.5	-68.5	4.75	1.5	-68.5	4.75	0	0	0
	C4	16.25	-65.25	5.25	16.25	-65	5.25	0	0.25	0
	C5	14.5	-65.75	-5.5	14.25	-65.5	-5.75	-0.25	0.25	-0.25
	C6	31	-65	-1.75	31	-65	-2	0	0	-0.25
ROOF	D1							0	0	0
	D2							0	0	0
	D3							0	0	0
	D4							0	0	0
	D5							0	0	0
	D6							0	0	0
	D7							0	0	0
	D8							0	0	0
	D9							0	0	0
	D10							0	0	0
	D11							0	0	0
	D12							0	0	0
	D13							0	0	0
	D14							0	0	0
	D15							0	0	0

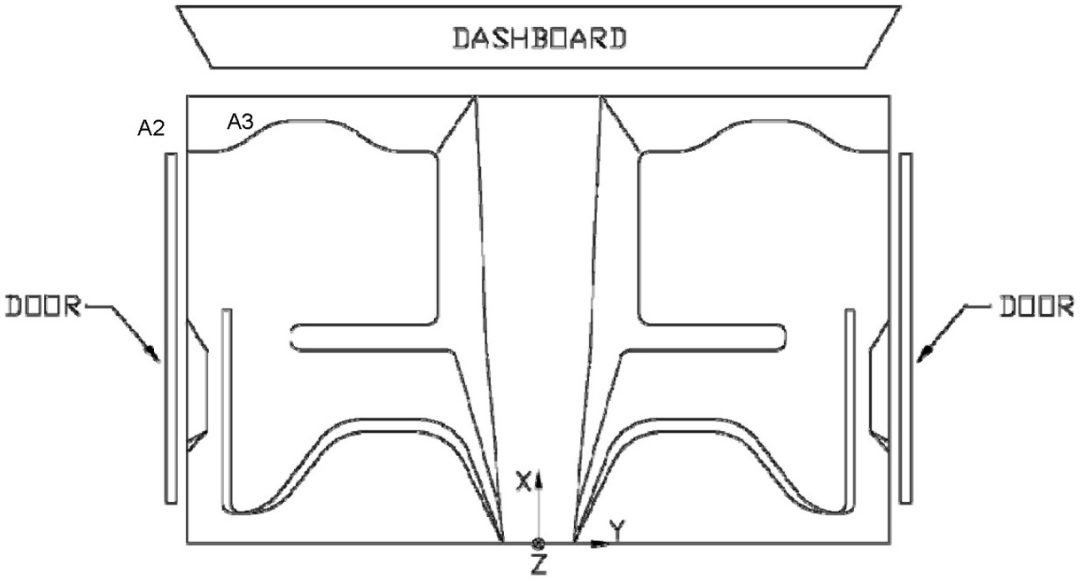
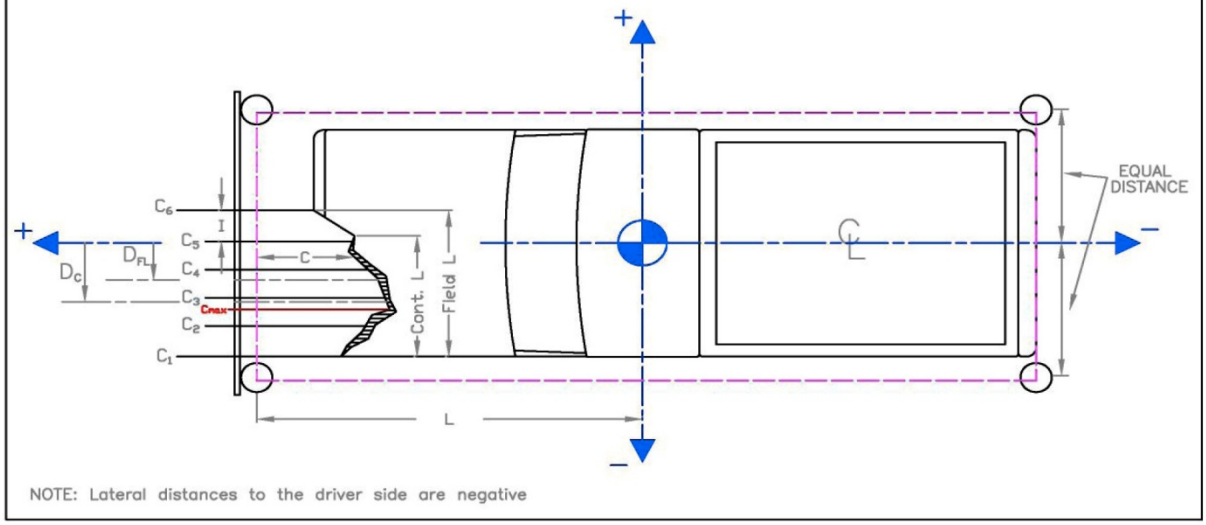


Figure D-30. Occupant Compartment Deformation Data - Set 2, Test No. NYBBT-9

Date: 8/6/2009 Test Number: NYBBT-9

Make: Dodge Model: Ram 1500 (2270P) Year: 2003



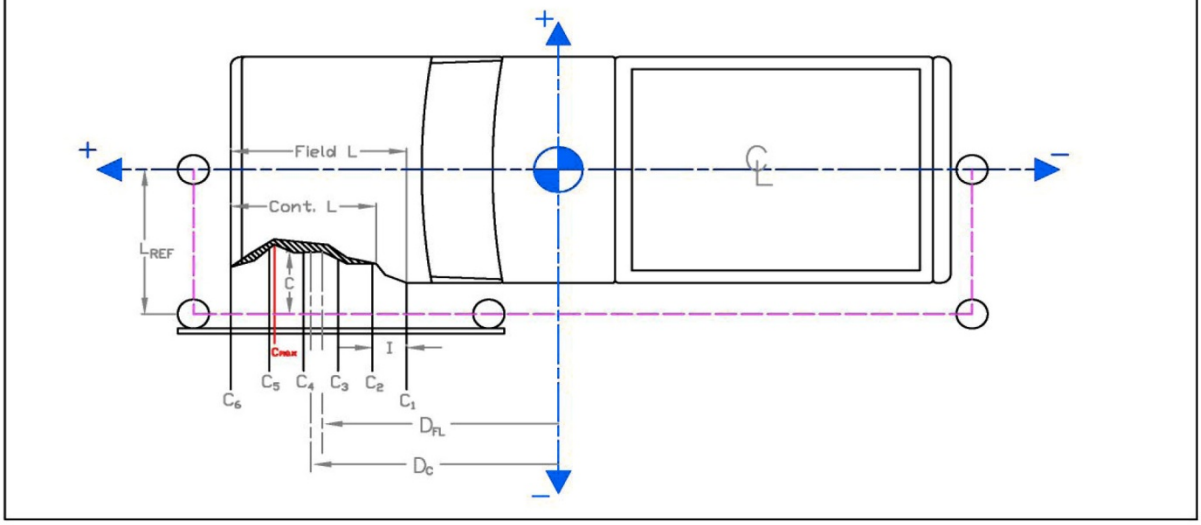
	in.	(mm)
Distance from C.G. to reference line - L_{REF}:	115.25	(2927)
Width of contact and induced crush - Field L:	77.5	(1969)
Crush measurement spacing interval (L/5) - I:	15.5	(394)
Distance from center of vehicle to center of Field L - D_{FL}:	0	()
Width of Contact Damage:	77.5	(1969)
Distance from center of vehicle to center of contect damage - D_C:	0	()

	Crush Measurement		Lateral Location		Original Profile Measurement		Dist. Between Ref. Lines		Actual	Crush
	in.	(mm)	in.	(mm)	in.	(mm)	in.	(mm)	in.	(mm)
C_1	NA	NA	-38.75	-(984)	29	(737)	2.51949	(64)	NA	NA
C_2	26.25	(667)	-23.25	-(591)	13.3906	(340)			10.3399	(263)
C_3	21	(533)	-7.75	-(197)	10.4844	(266)			7.99613	(203)
C_4	22.25	(565)	7.75	(197)	10.4844	(266)			9.24613	(235)
C_5	17.5	(445)	23.25	(591)	13.3906	(340)			1.58988	(40)
C_6	35.25	(895)	38.75	(984)	29	(737)			3.73051	(95)
C_{MAX}	38	(965)	32	(813)	17.5	(445)			17.9805	(457)

Figure D-31. Exterior Vehicle Crush (NASS) - Front, Test No. NYBBT-9

Date: 8/6/2009 Test Number: NYBBT-9

Make: Dodge Model: Ram 1500 (2270P) Year: 2003



	in.	(mm)
Distance from centerline to reference line - L_{REF}:	57.5	(1461)
Width of contact and induced crush - Field L:	30	(762)
Crush measurement spacing interval (L/5) - I:	6	(152)
Distance from vehicle c.g. to center of Field L - D_{FL}:	86.75	(2203)
Width of Contact Damage:	30	(762)
Distance from vehicle c.g. to center of contect damage - D_C:	76.75	(1949)

	Crush Measurement		Longitudinal Location		Original Profile Measurement		Dist. Between Ref. Lines		Actual	Crush
	in.	(mm)	in.	(mm)	in.	(mm)	in.	(mm)	in.	(mm)
C_1	21	(533)	71.75	(1822)	10.5	(267)	7.5	(191)	3	(76)
C_2	22	(559)	77.75	(1975)	11.25	(286)			3.25	(83)
C_3	34.5	(876)	83.75	(2127)	11.75	(298)			15.25	(387)
C_4	37	(940)	89.75	(2280)	13.5	(343)			16	(406)
C_5	46.5	(1181)	95.75	(2432)	20	(508)			19	(483)
C_6	NA	NA	101.75	(2584)	37	(940)			NA	NA
C_{MAX}	46.5	(1181)	95.75	(2432)	20	(508)			19	(483)

Figure D-32. Exterior Vehicle Crush (NASS) - Side, Test No. NYBBT-9

APPENDIX E Accelerometer and Rate Transducer Data Analysis, Test No. NYBBT-1

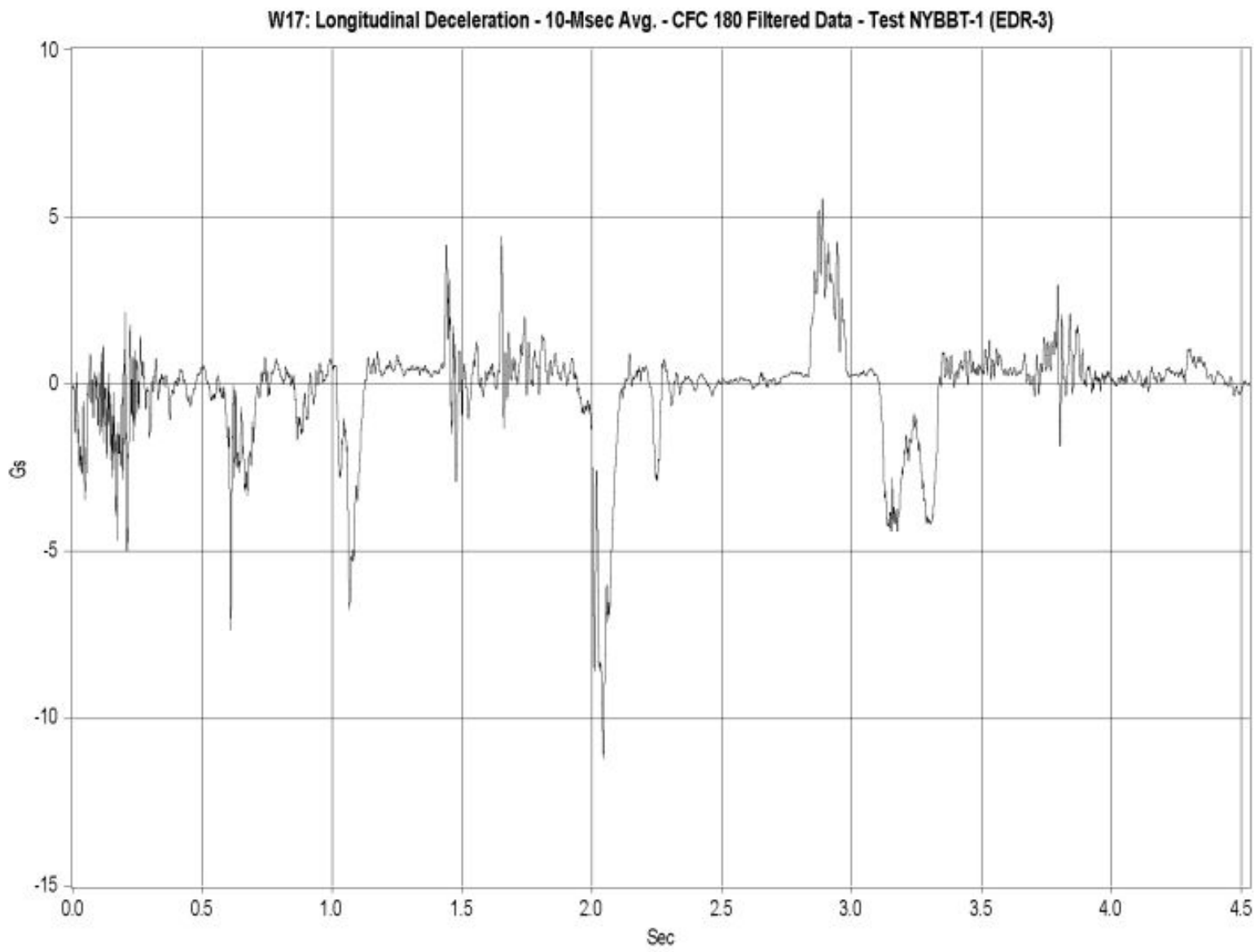


Figure E-1. Graph of Longitudinal Deceleration (EDR-3), Test No. NYBBT-1

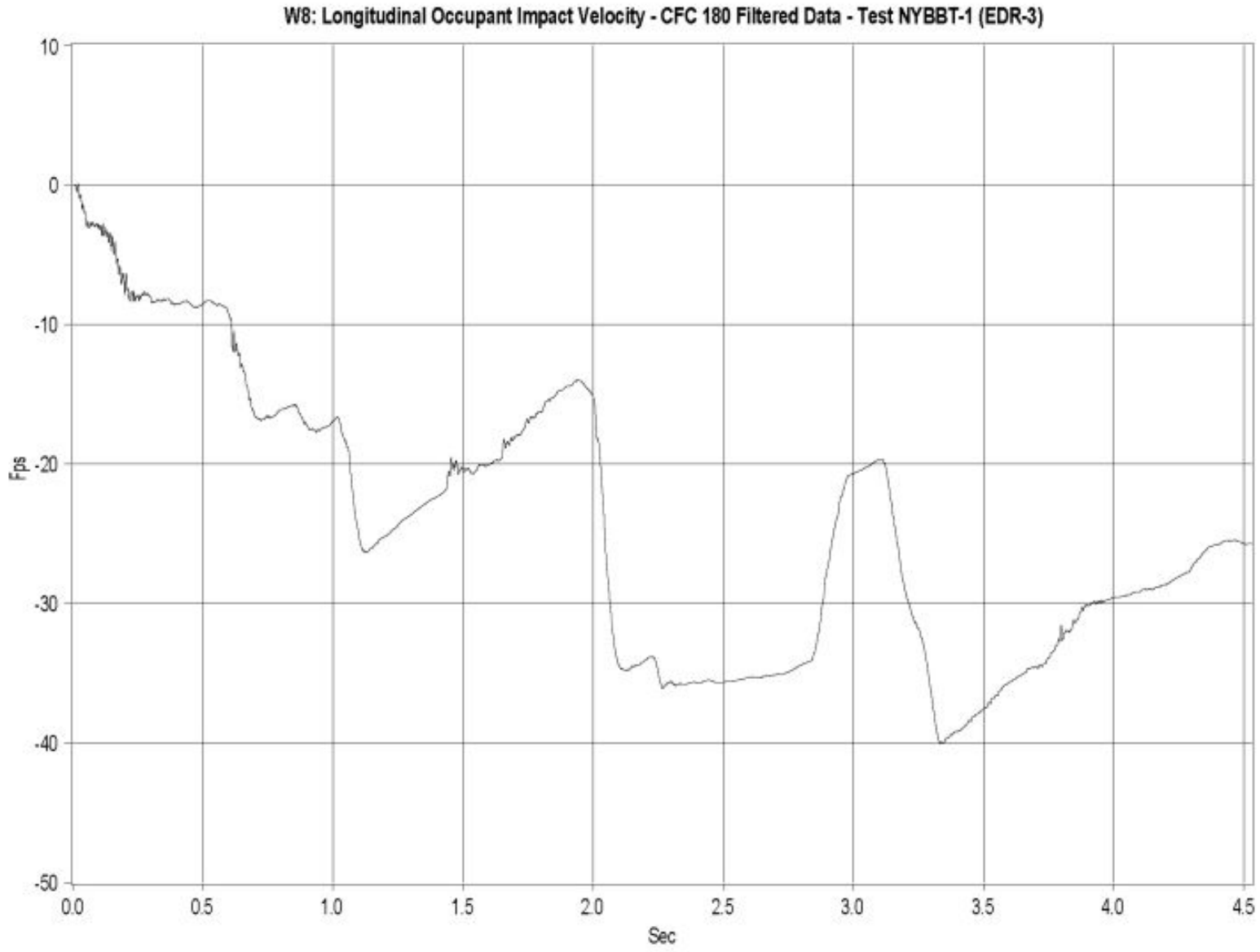


Figure E-2. Graph of Longitudinal Occupant Impact Velocity (EDR-3), Test No. NYBBT-1

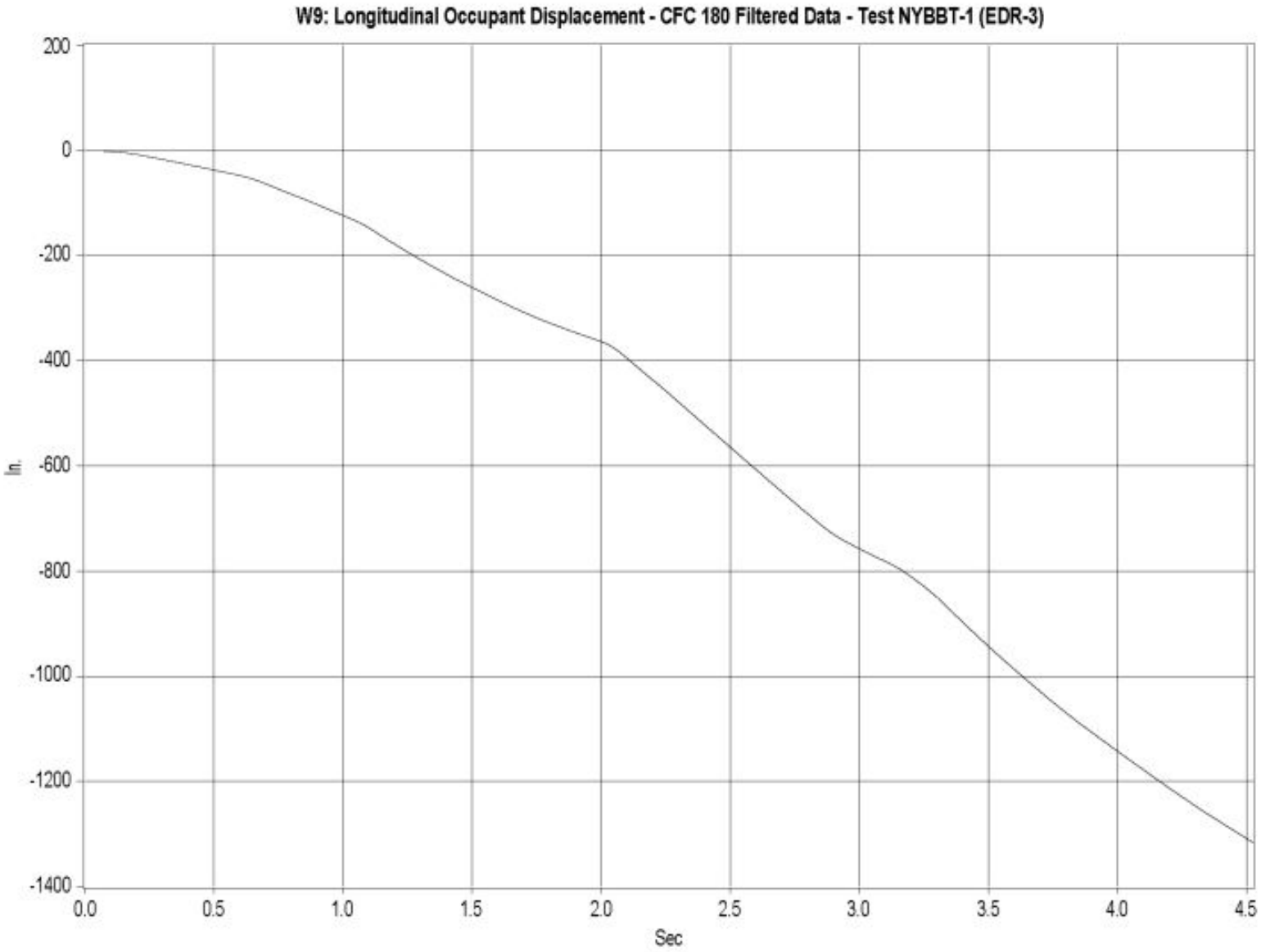


Figure E-3. Graph of Longitudinal Occupant Displacement (EDR-3), Test No. NYBBT-1

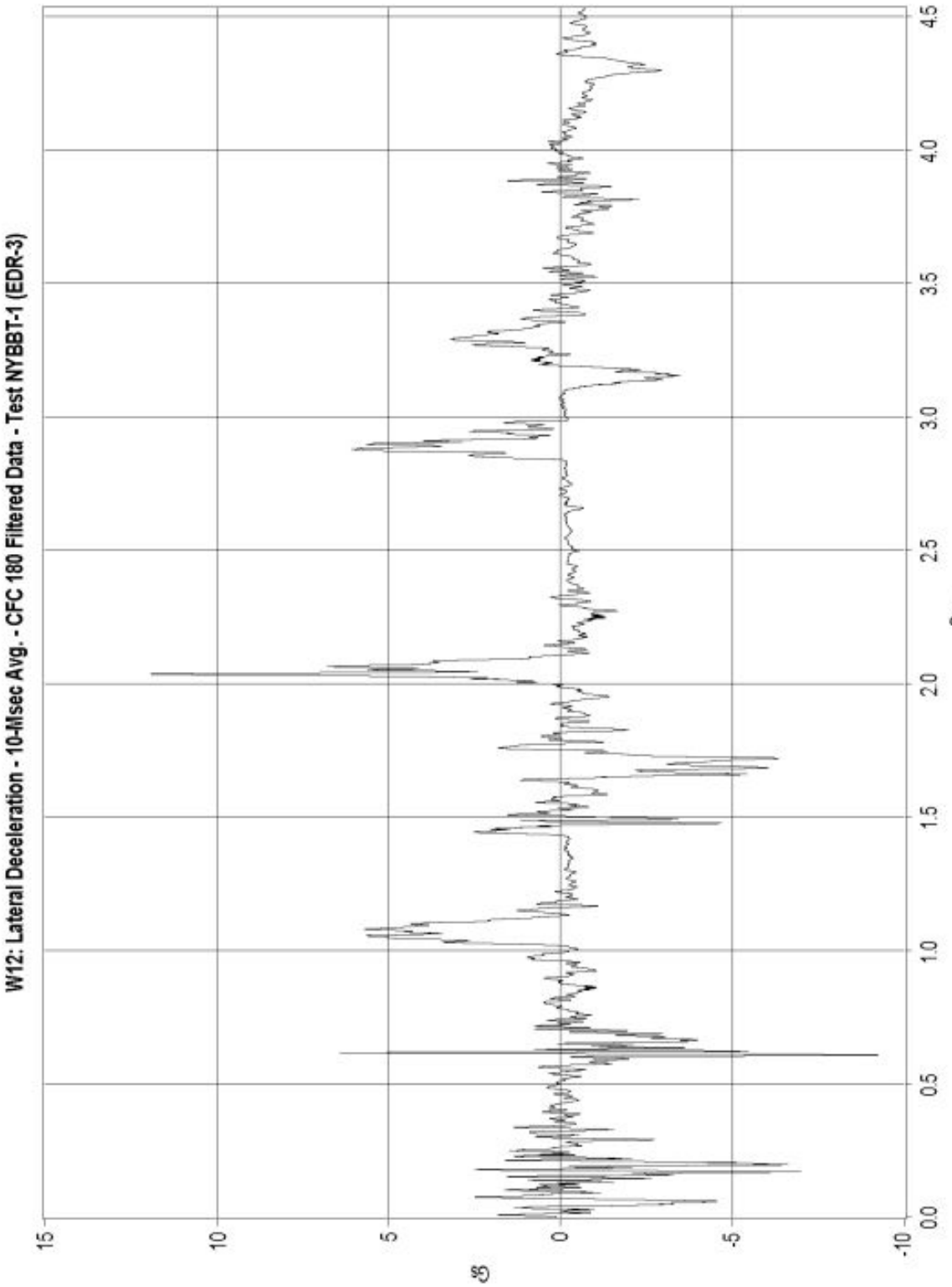


Figure E-4. Graph of Lateral Deceleration (EDR-3), Test No. NYBBT-1

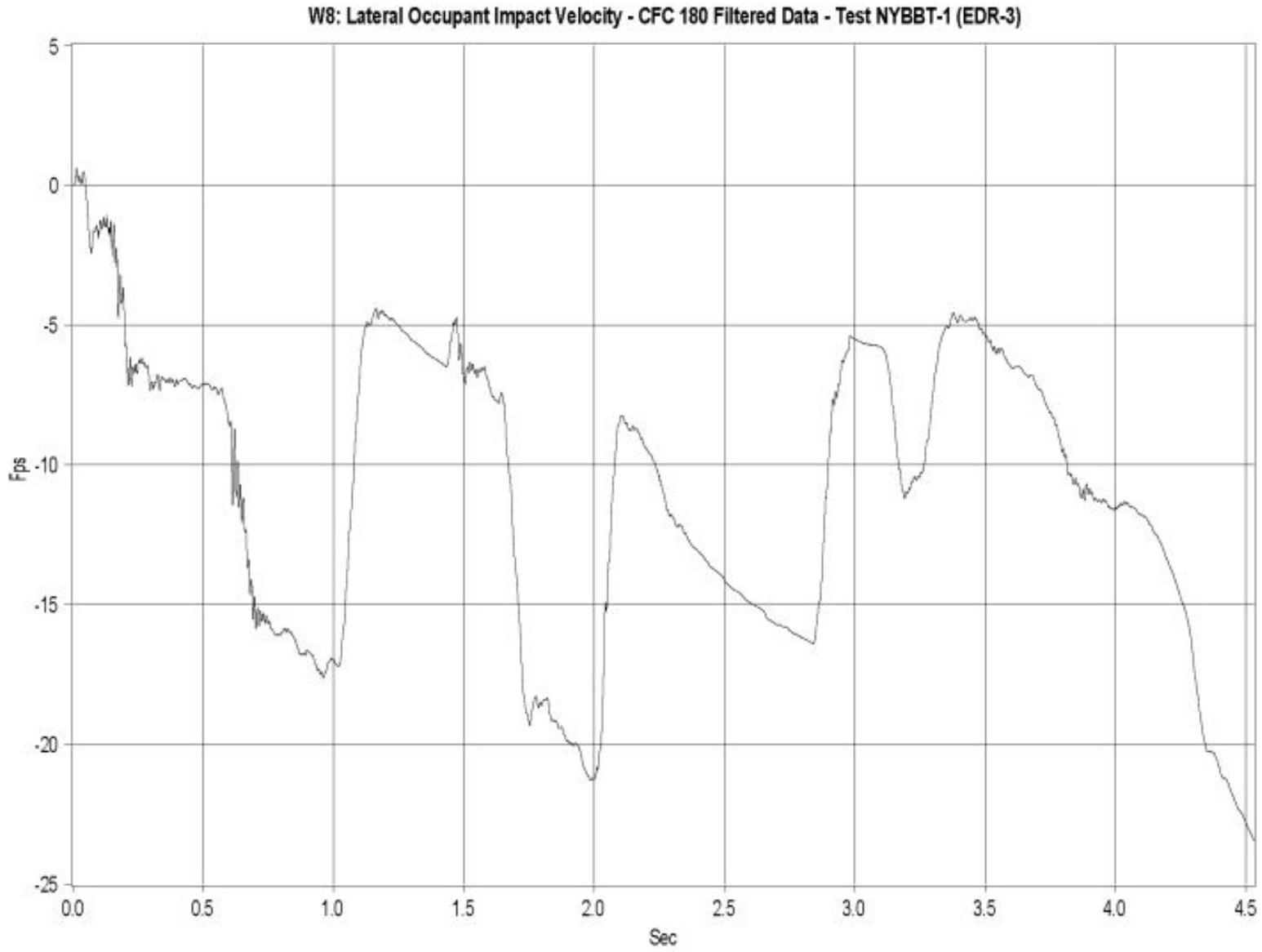


Figure E-5. Graph of Lateral Occupant Impact Velocity (EDR-3), Test No. NYBBT-1

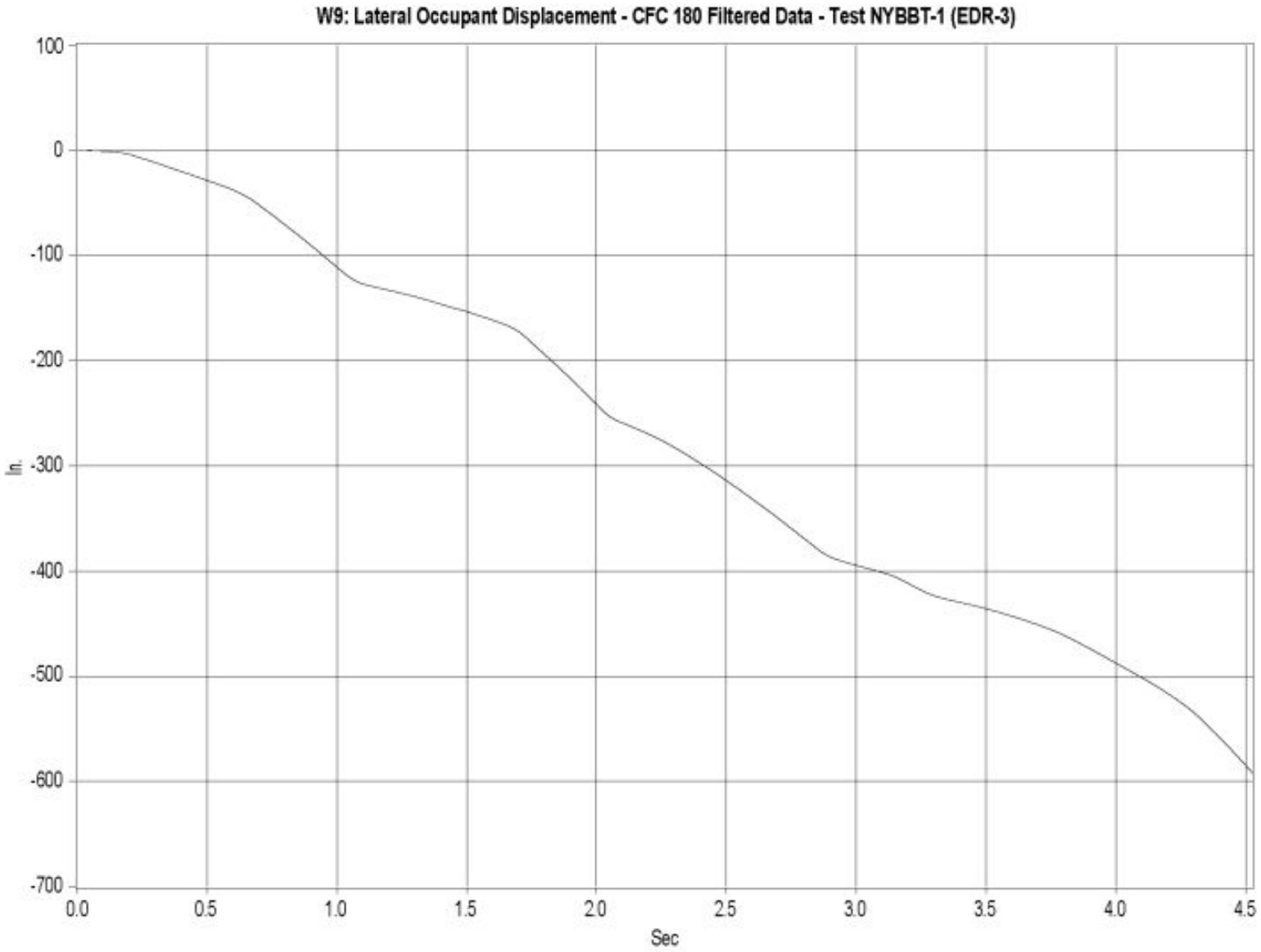


Figure E-6. Graph of Lateral Occupant Displacement (EDR-3), Test No. NYBBT-1

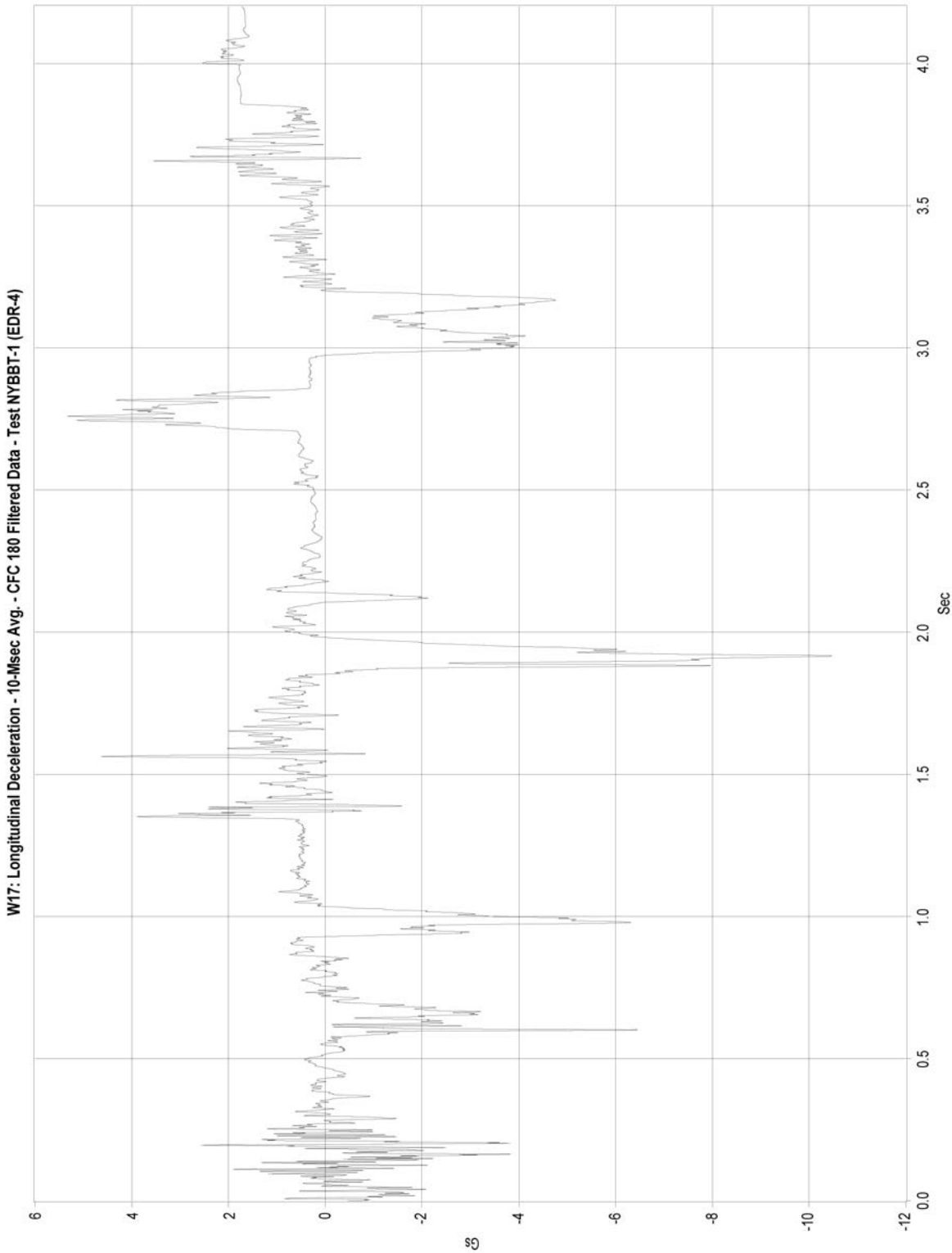


Figure E-7. Graph of Longitudinal Deceleration (EDR-4), Test No. NYBBT-1

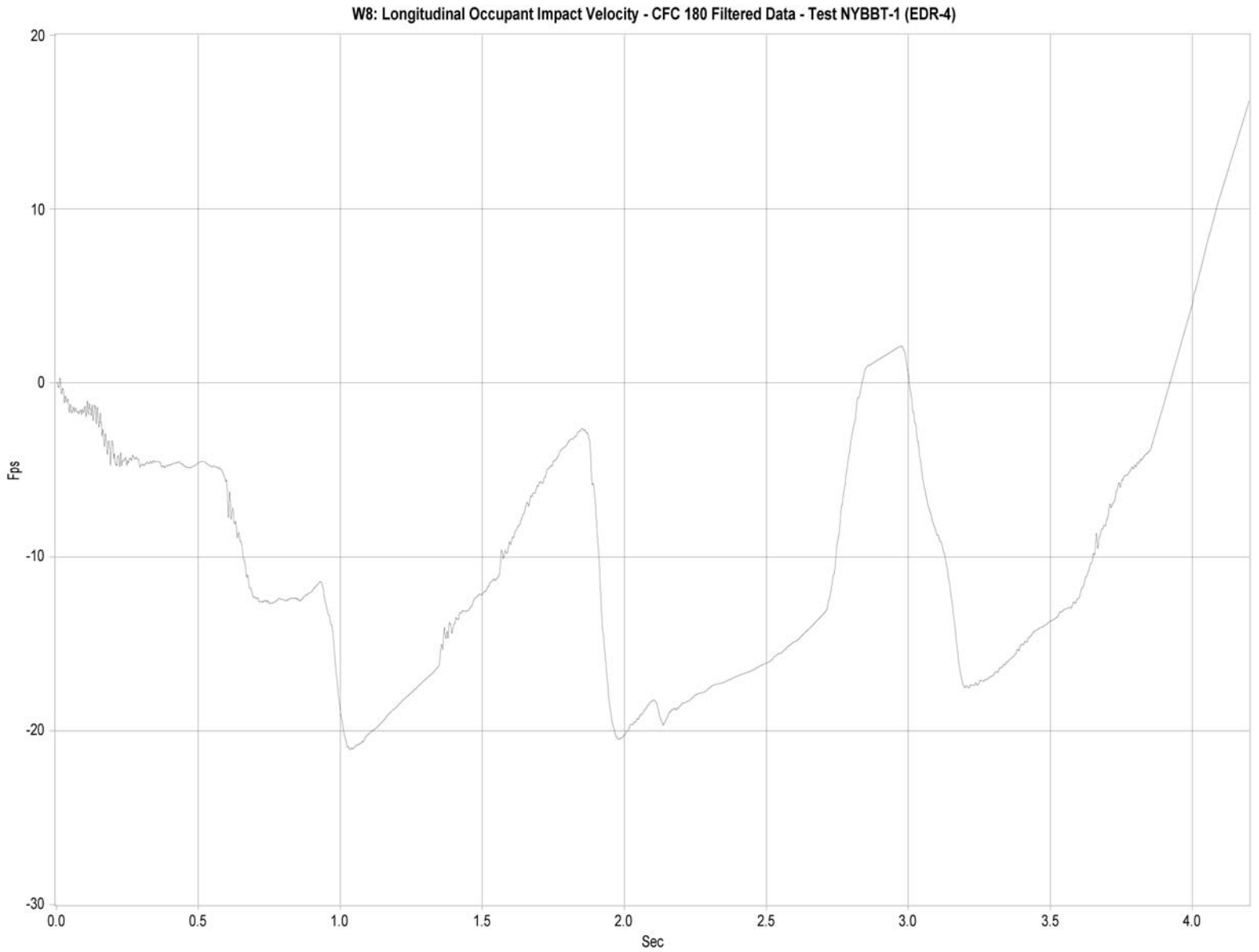


Figure E-8. Graph of Longitudinal Occupant Impact Velocity (EDR-4), Test No. NYBBT-1

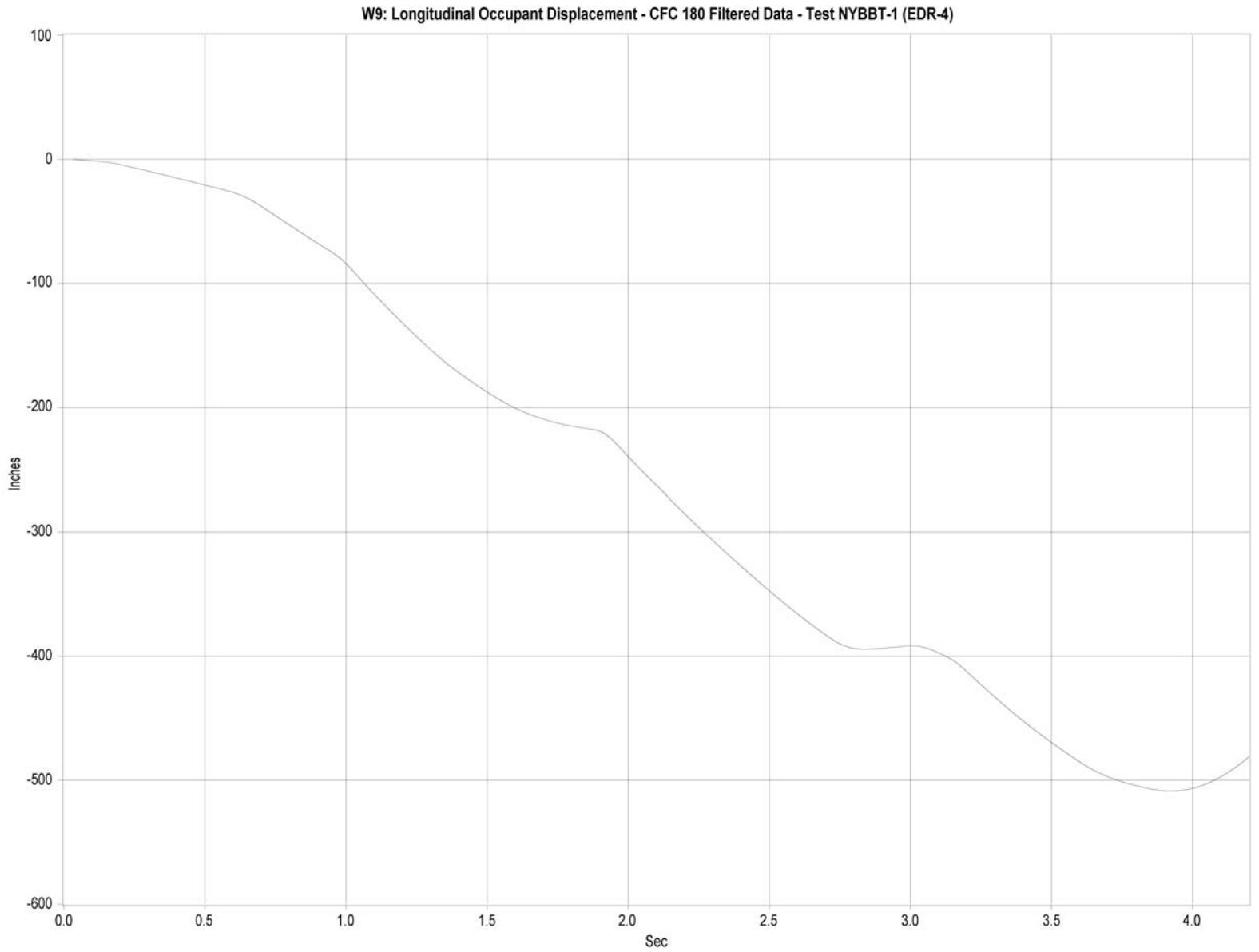


Figure E-9. Graph of Longitudinal Occupant Displacement (EDR-4), Test No. NYBBT-1

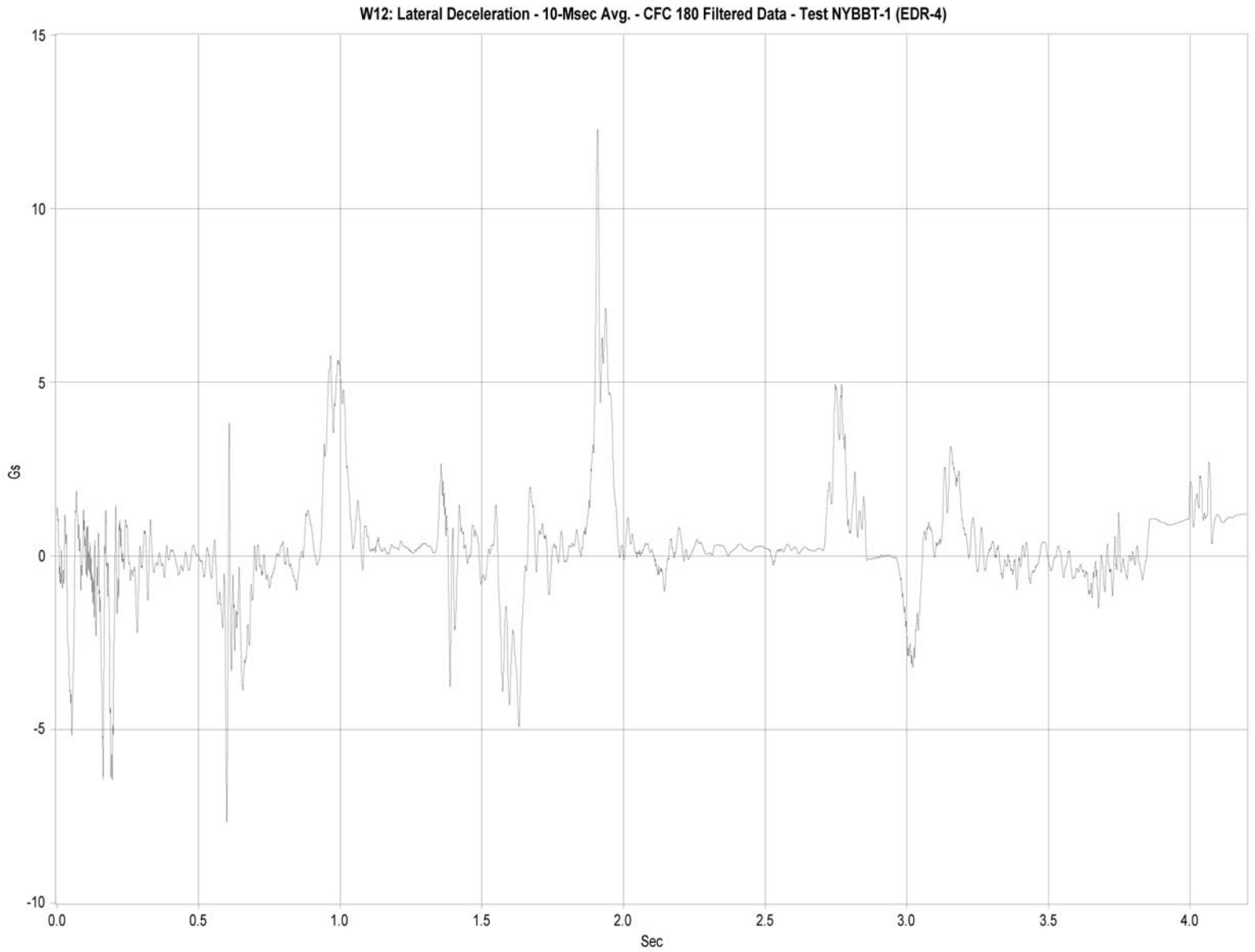


Figure E-10. Graph of Lateral Deceleration (EDR-4), Test No. NYBBT-1

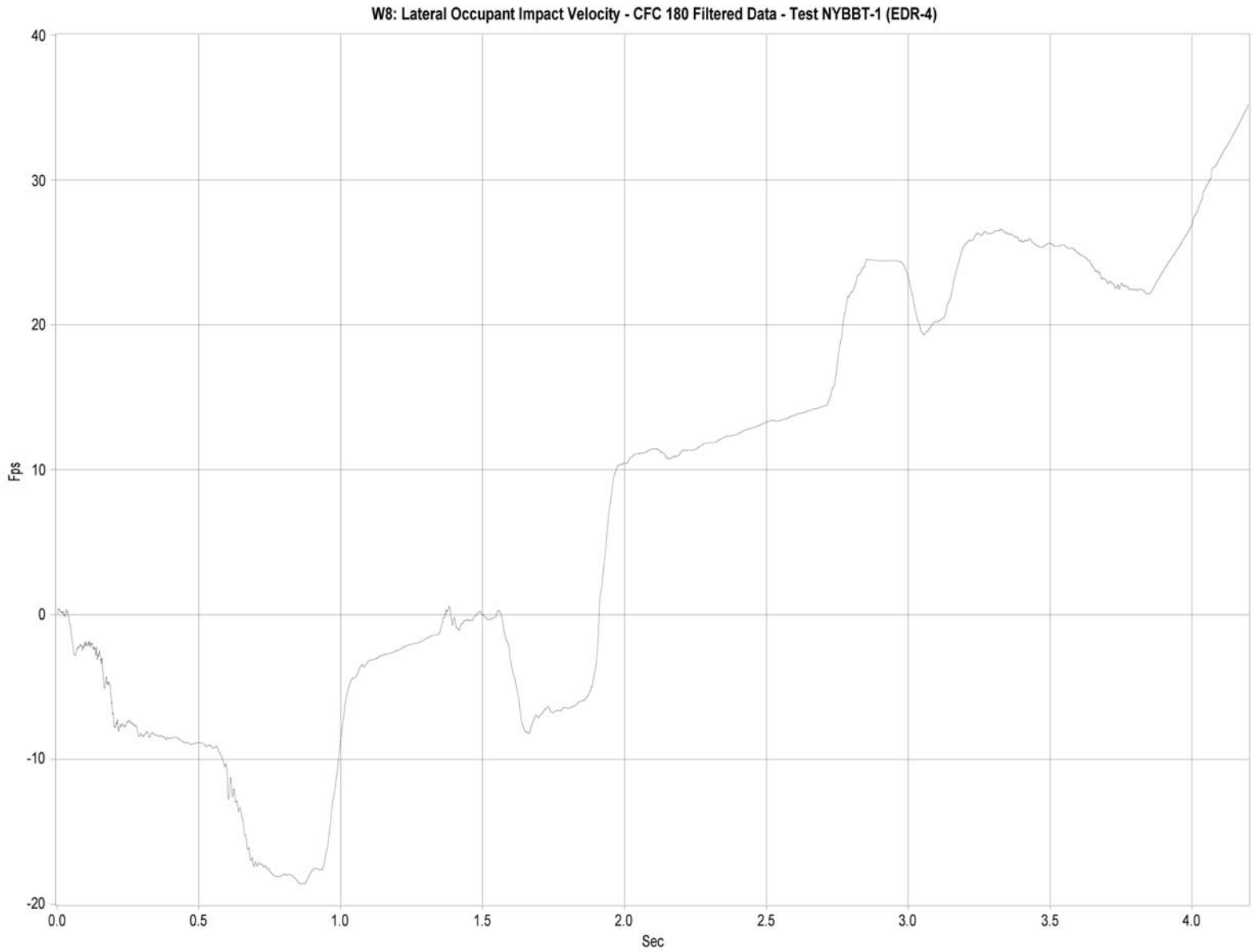


Figure E-11. Graph of Lateral Occupant Impact Velocity (EDR-4), Test No. NYBBT-1

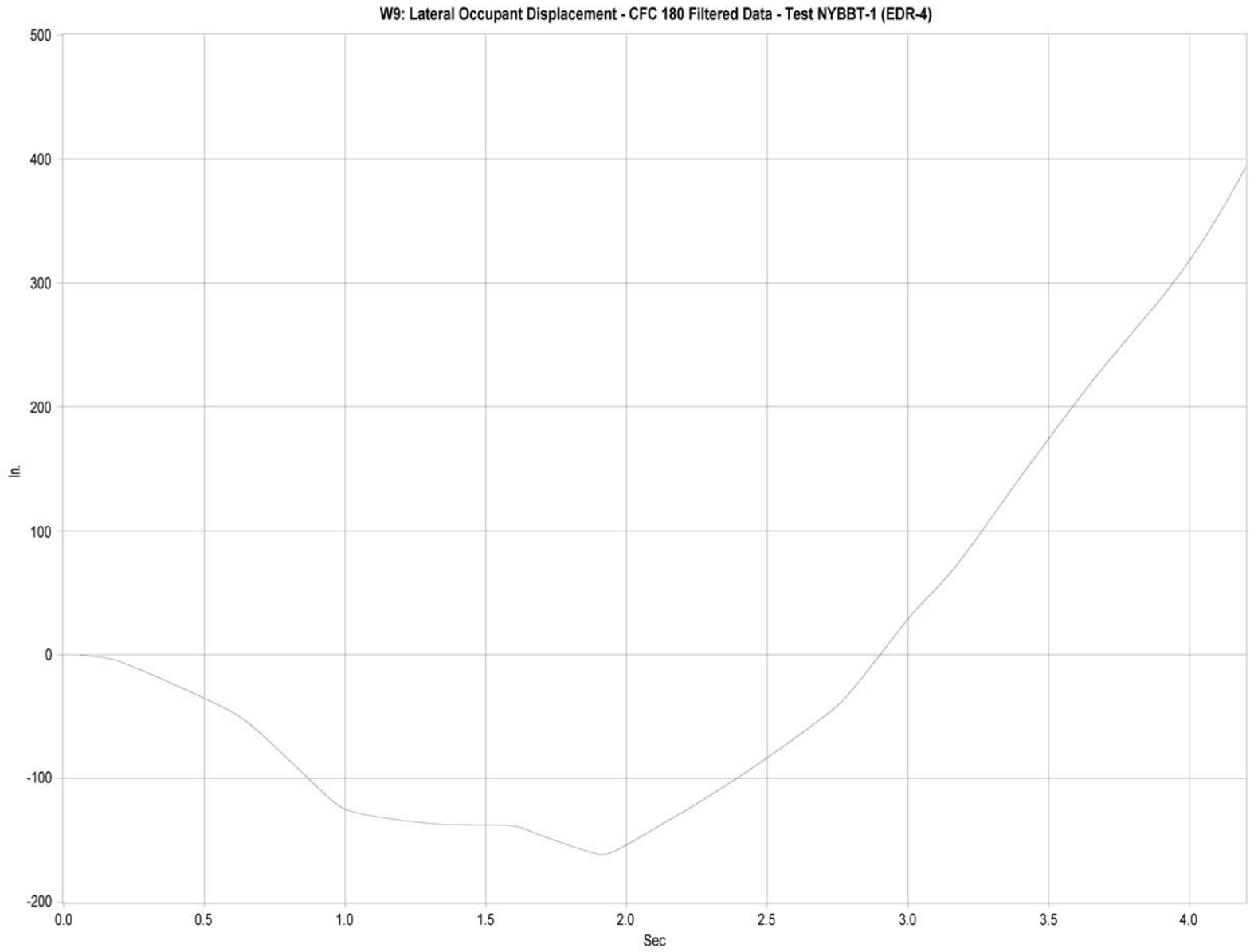


Figure E-12. Graph of Lateral Occupant Displacement (EDR-4), Test No. NYBBT-1

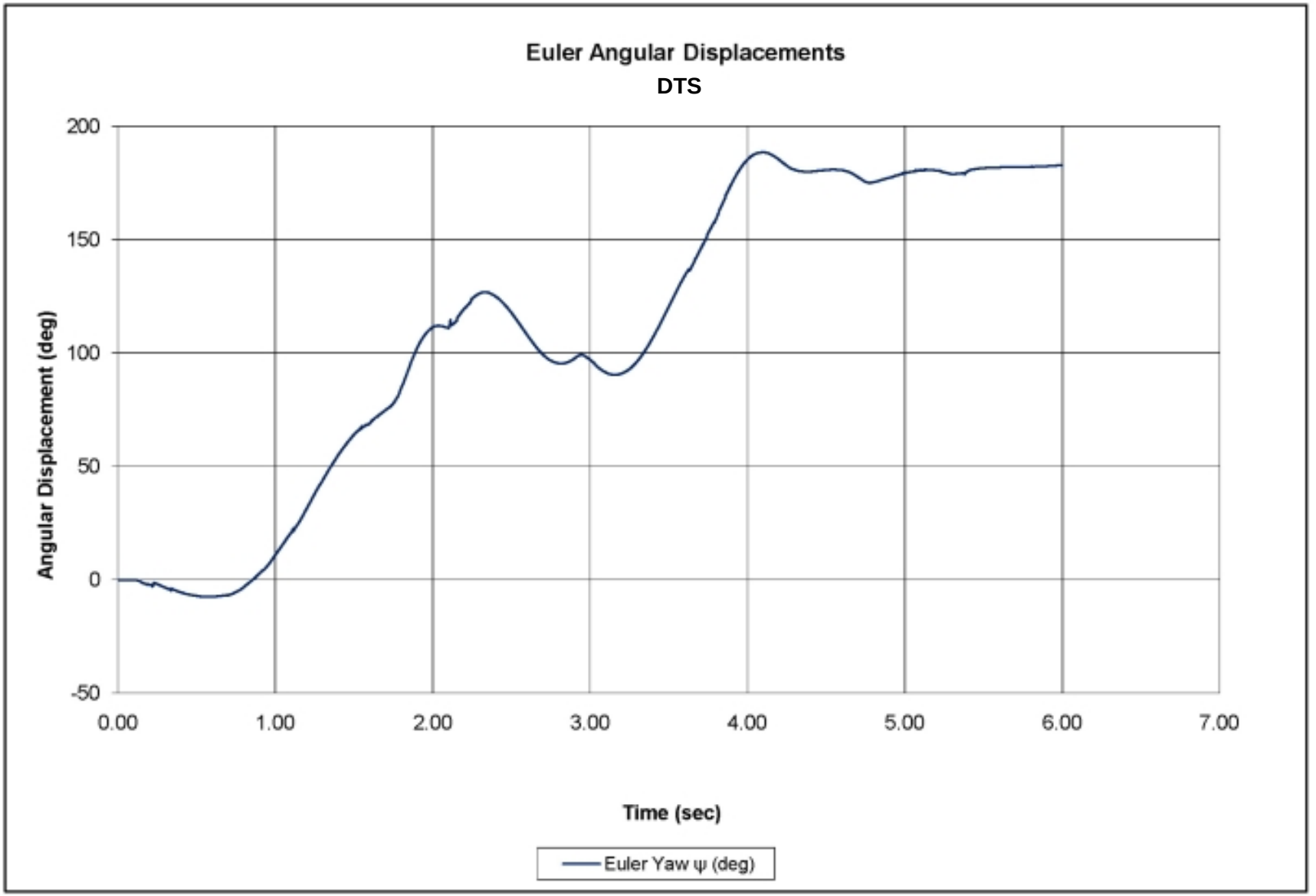


Figure E-13. Graph of Yaw Angular Displacement (DTS), Test No. NYBBT-1

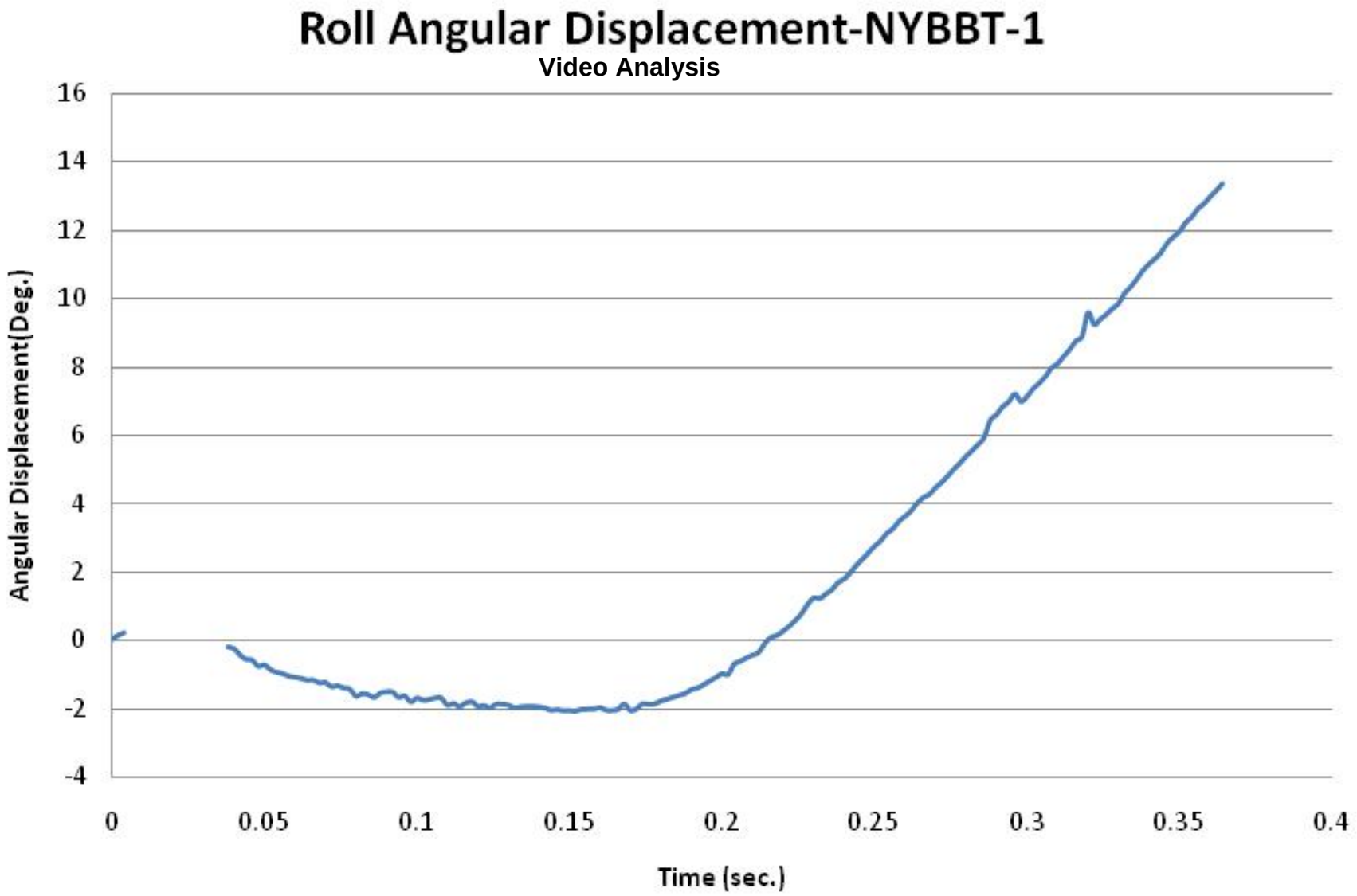


Figure E-14. Graph of Roll Angular Displacement (Video Analysis), Test No. NYBBT-1

APPENDIX F Type IIA Box Beam Terminal System Details - English Units, Test No. NYBBT-2

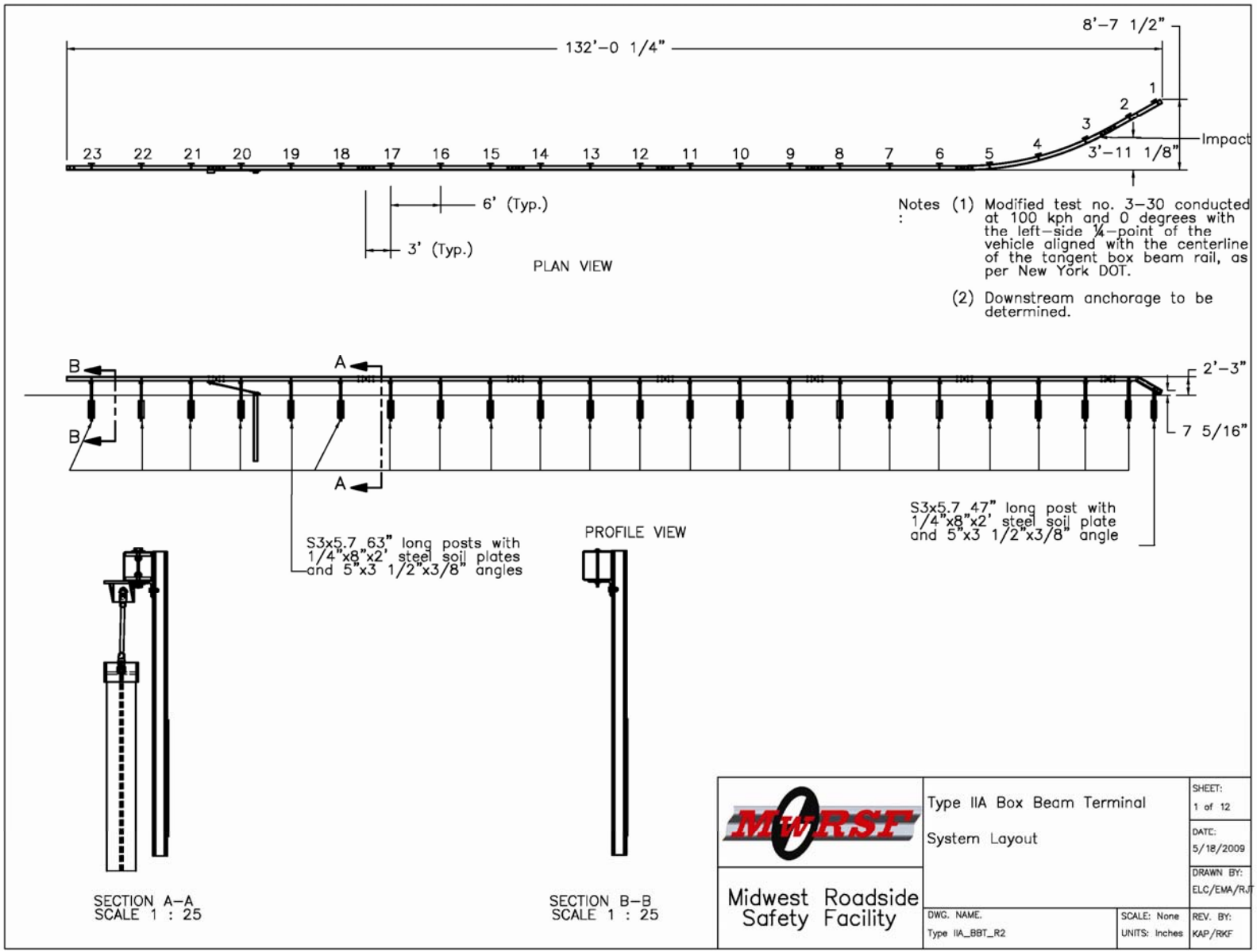


Figure F-1. Type IIA Box Beam Terminal System Details (English), Test No. NYBBT-2

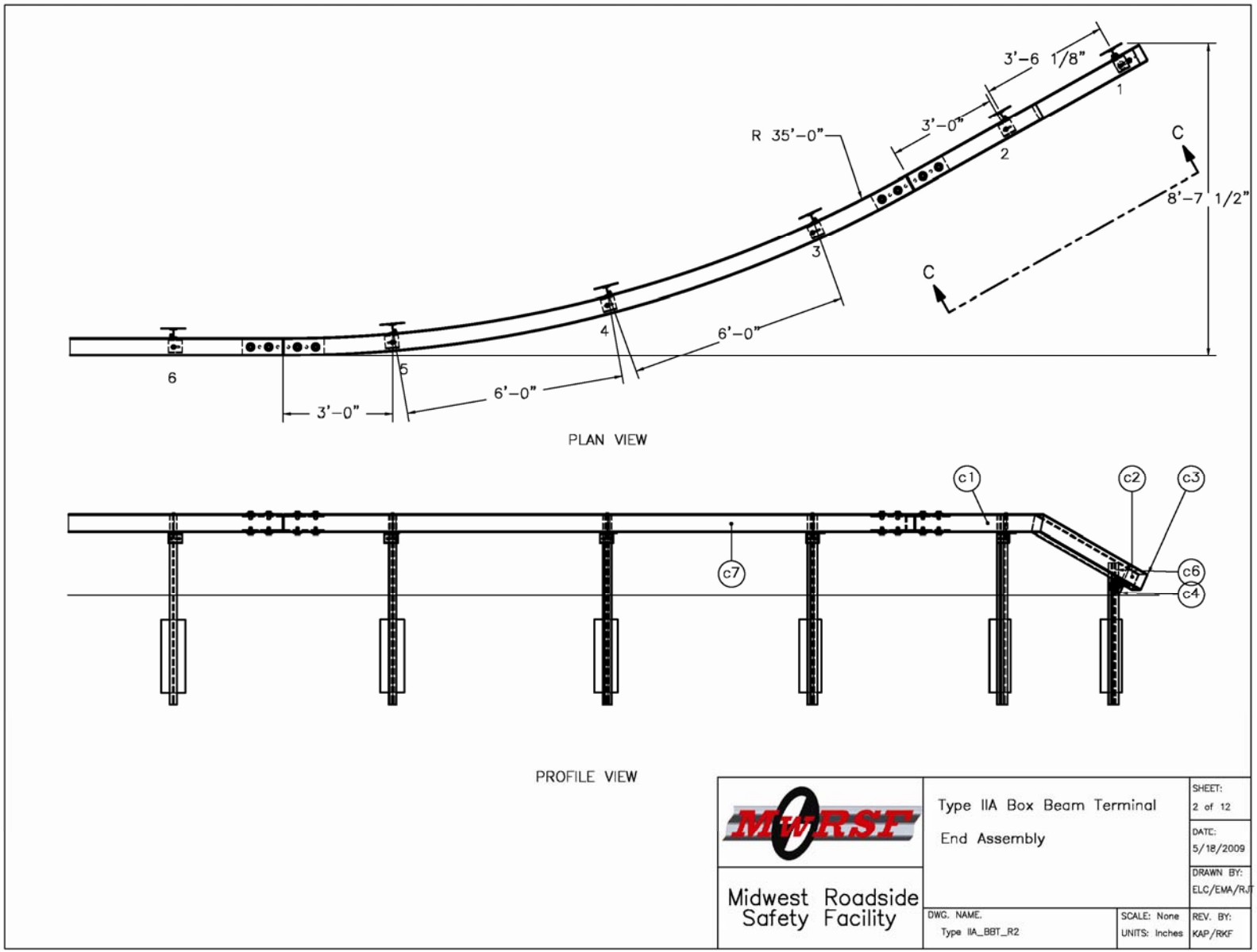


Figure F-2. Type IIA Box Beam Terminal System Details (English), Test No. NYBBT-2

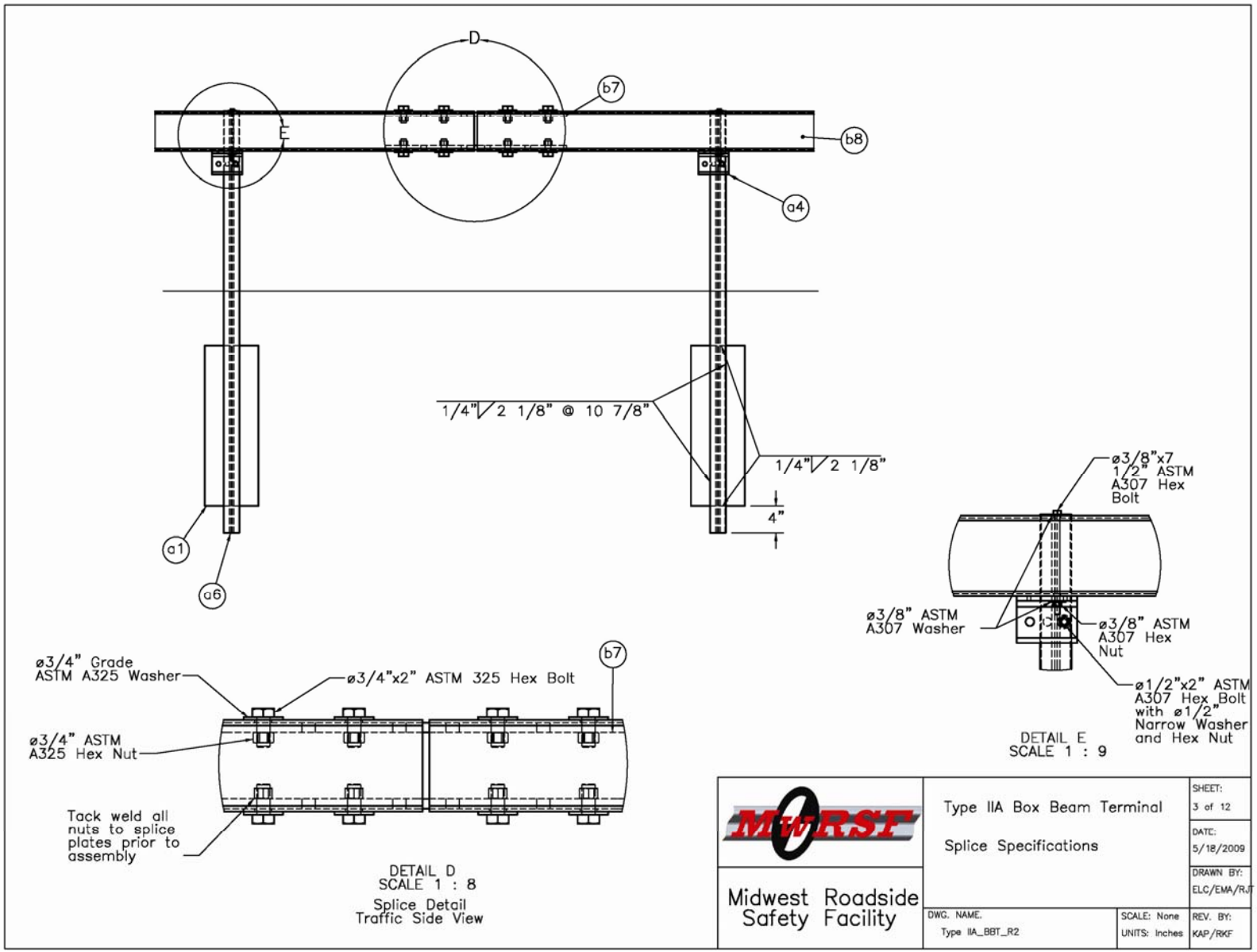


Figure F-3. Type IIA Box Beam Terminal System Details (English), Test No. NYBBT-2

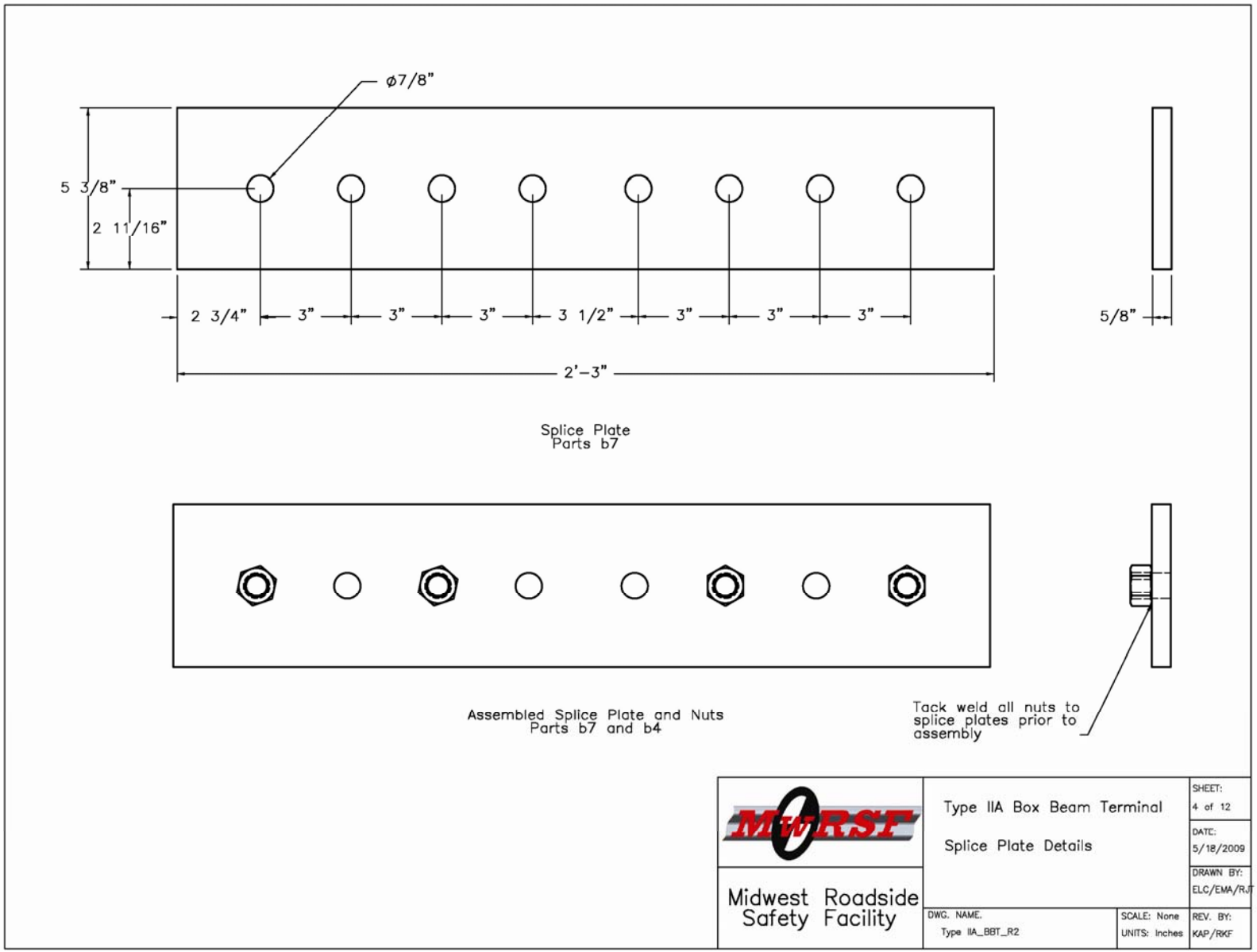


Figure F-4. Type IIA Box Beam Terminal System Details (English), Test No. NYBBT-2

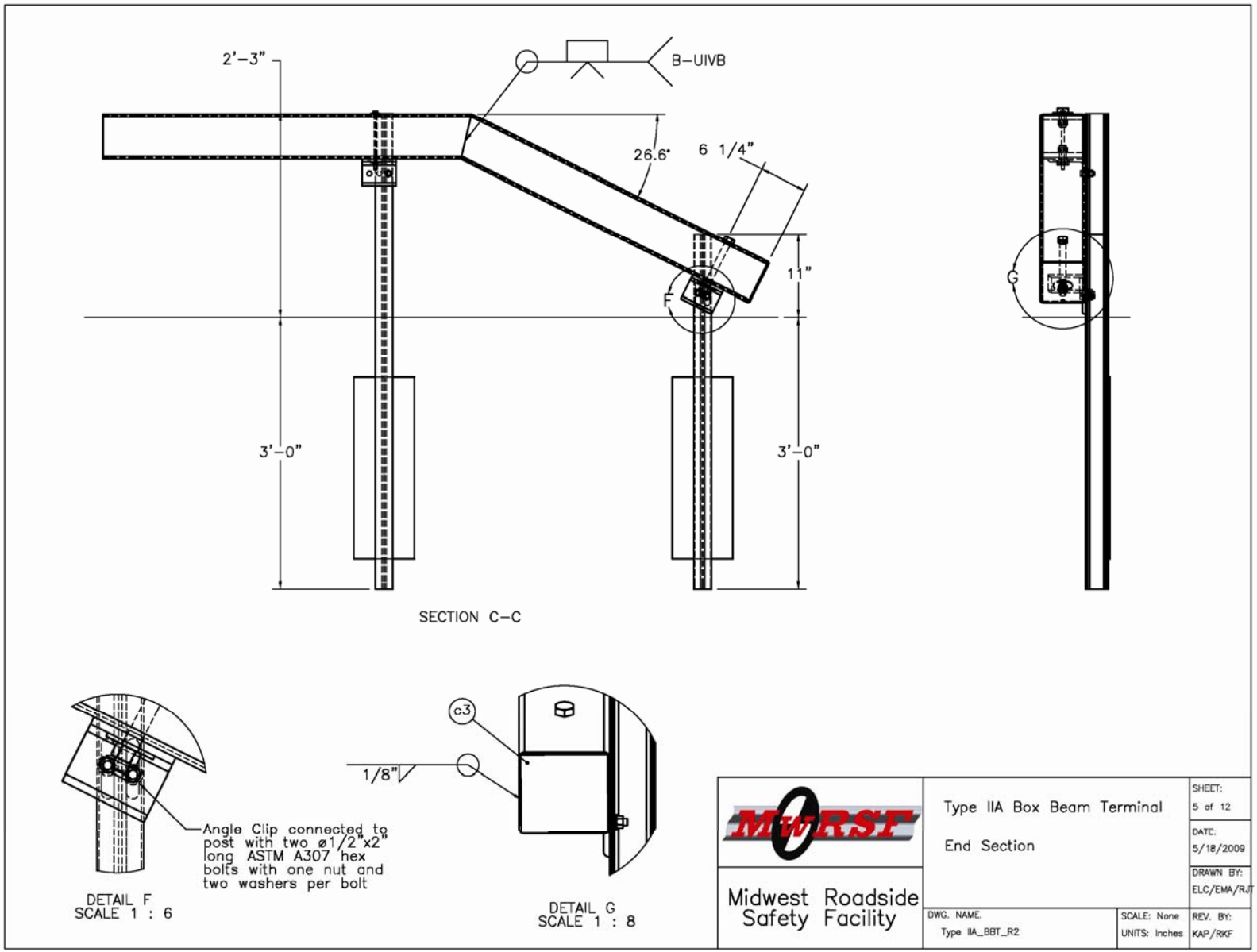


Figure F-5. Type IIA Box Beam Terminal System Details (English), Test No. NYBBT-2

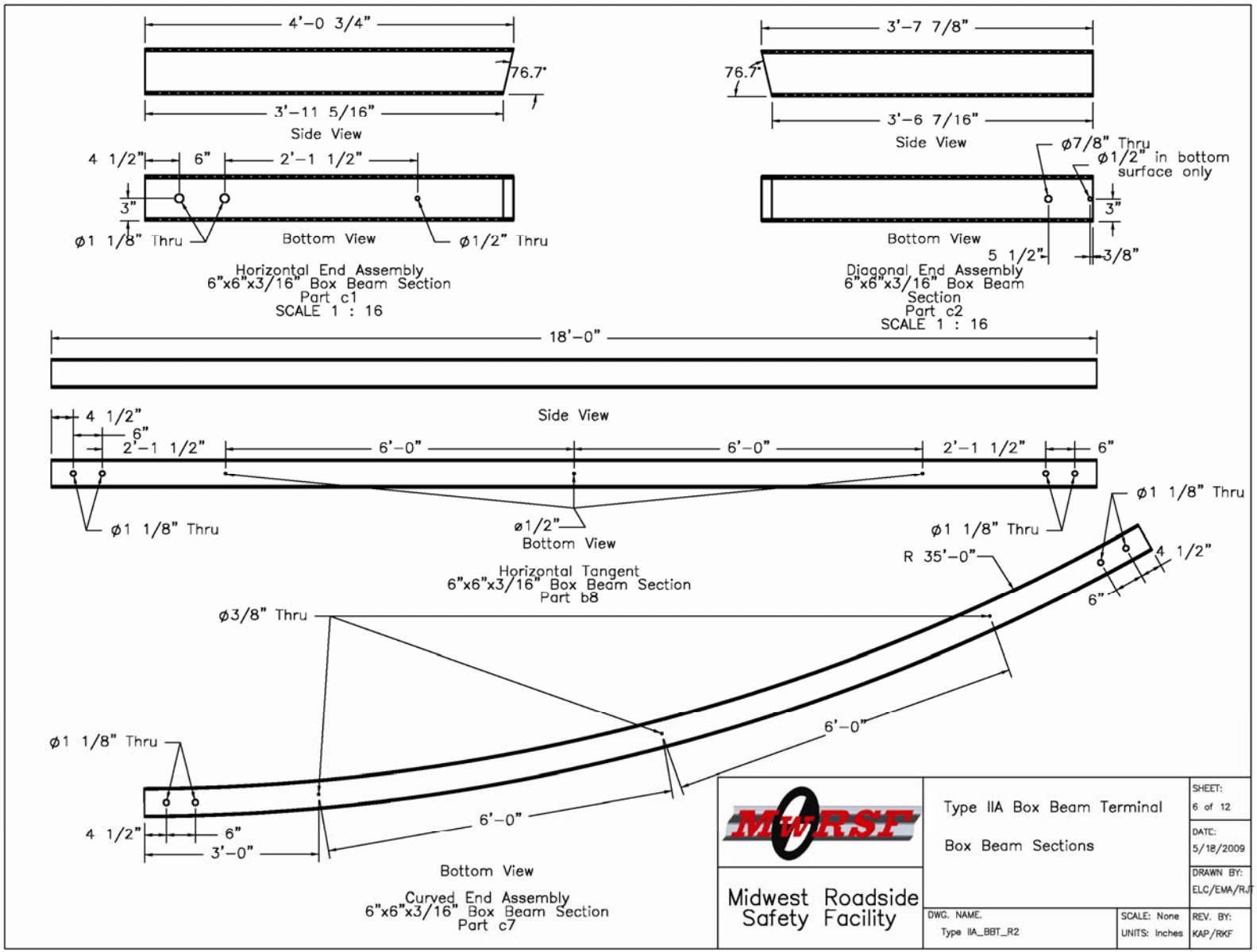


Figure F-6. Type IIA Box Beam Terminal System Details (English), Test No. NYBBT-2

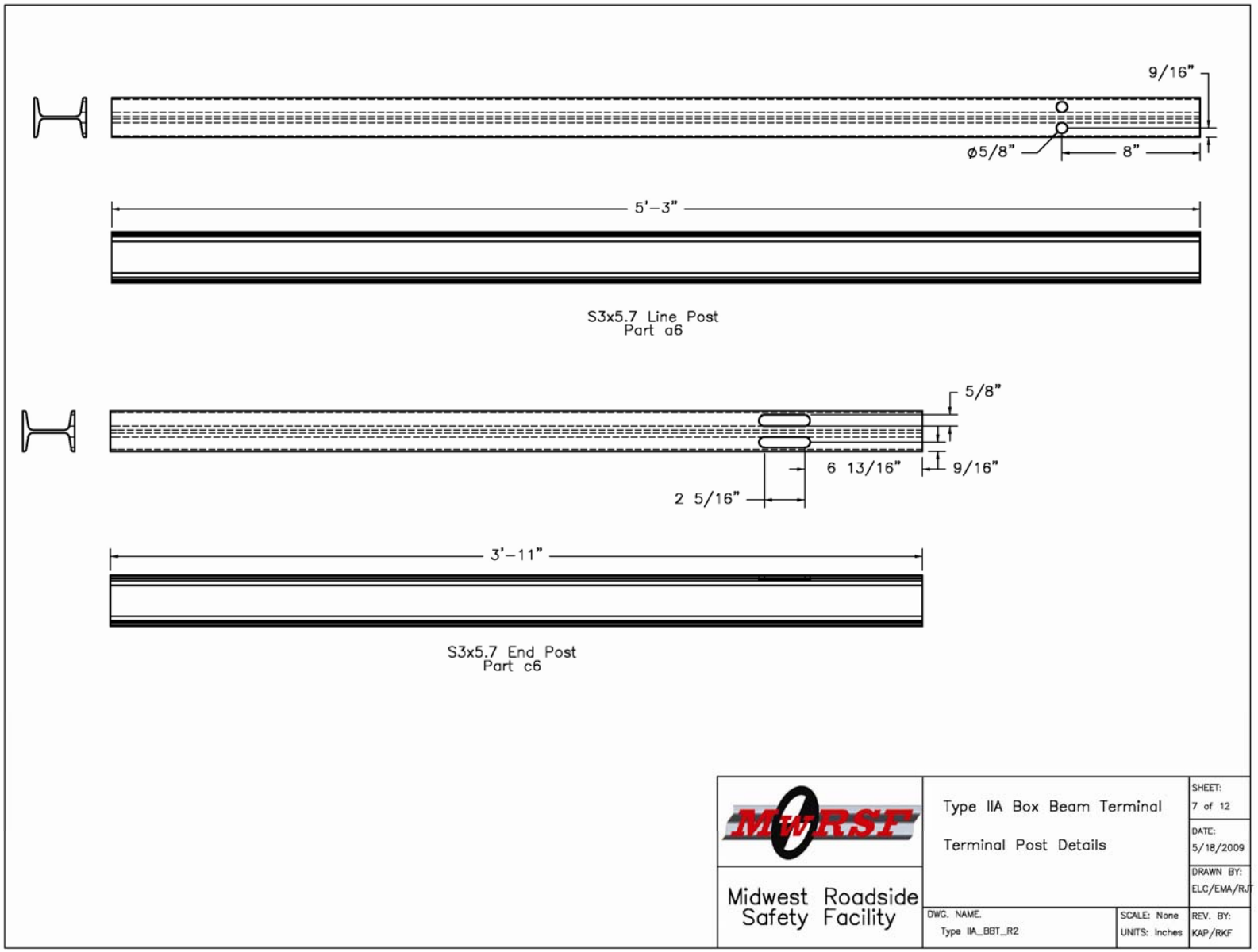


Figure F-7. Type IIA Box Beam Terminal System Details (English), Test No. NYBBT-2

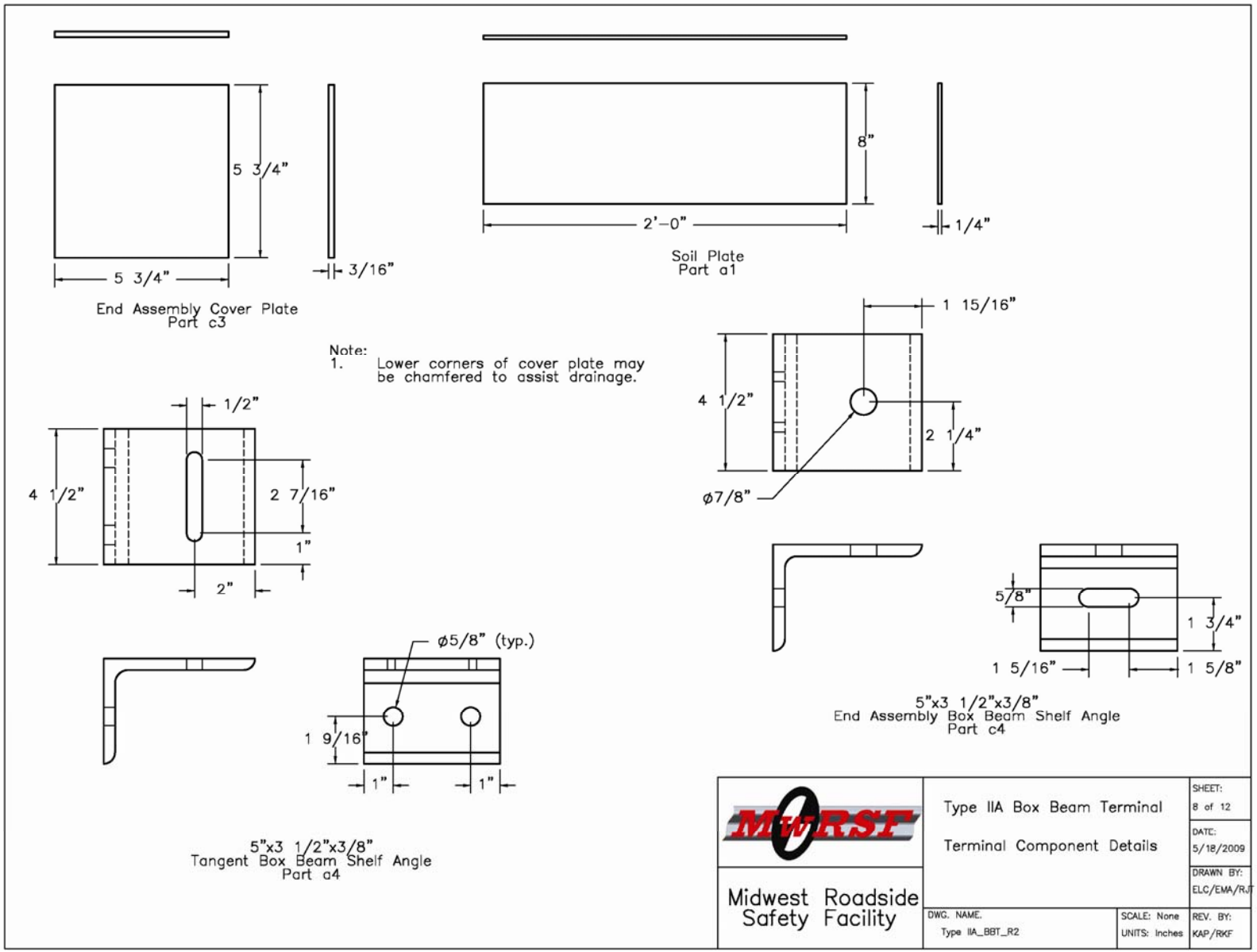


Figure F-8. Type IIA Box Beam Terminal System Details (English), Test No. NYBBT-2

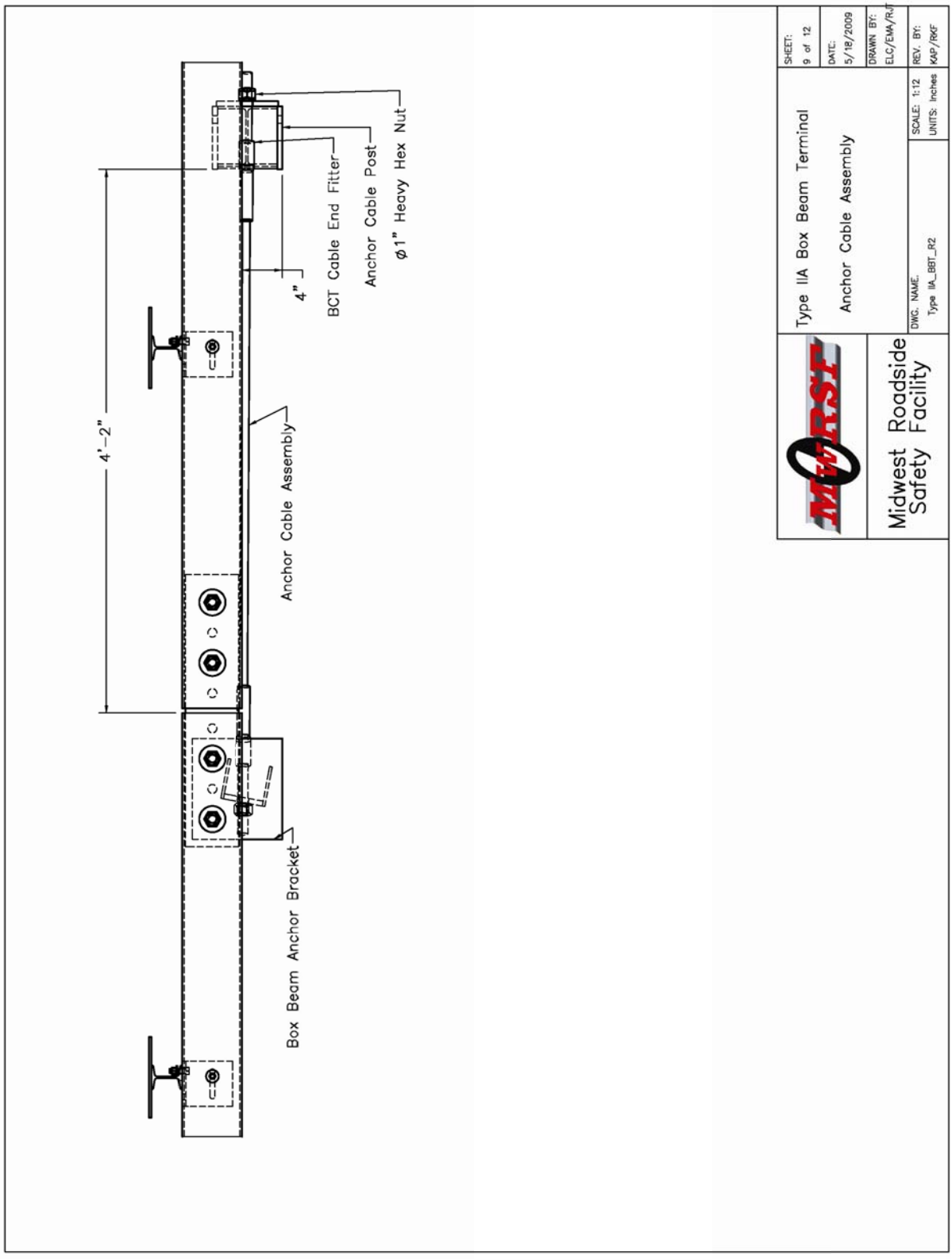


Figure F-9. Type IIA Box Beam Terminal System Details (English), Test No. NYBBT-2

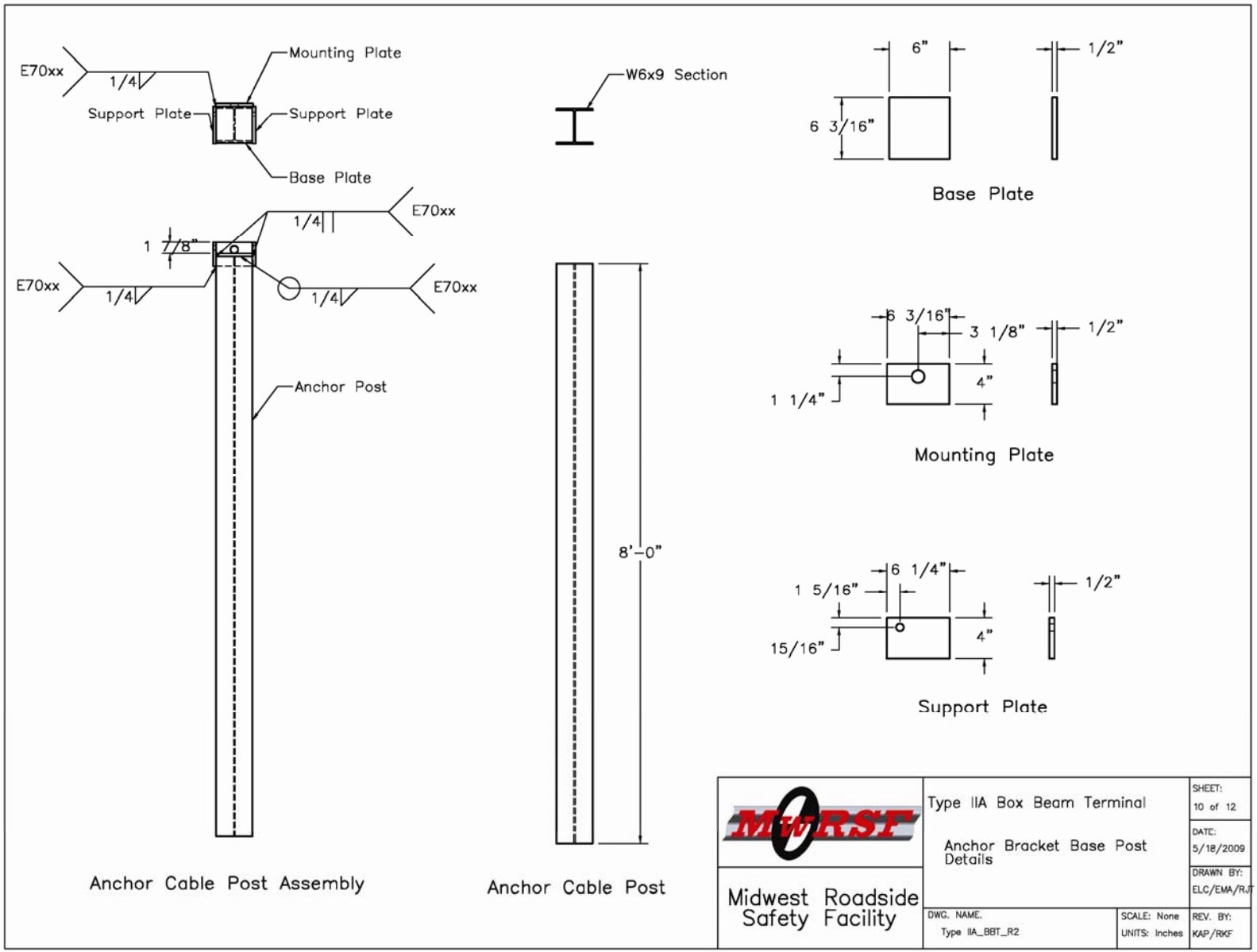


Figure F-10. Type IIA Box Beam Terminal System Details (English), Test No. NYBBT-2

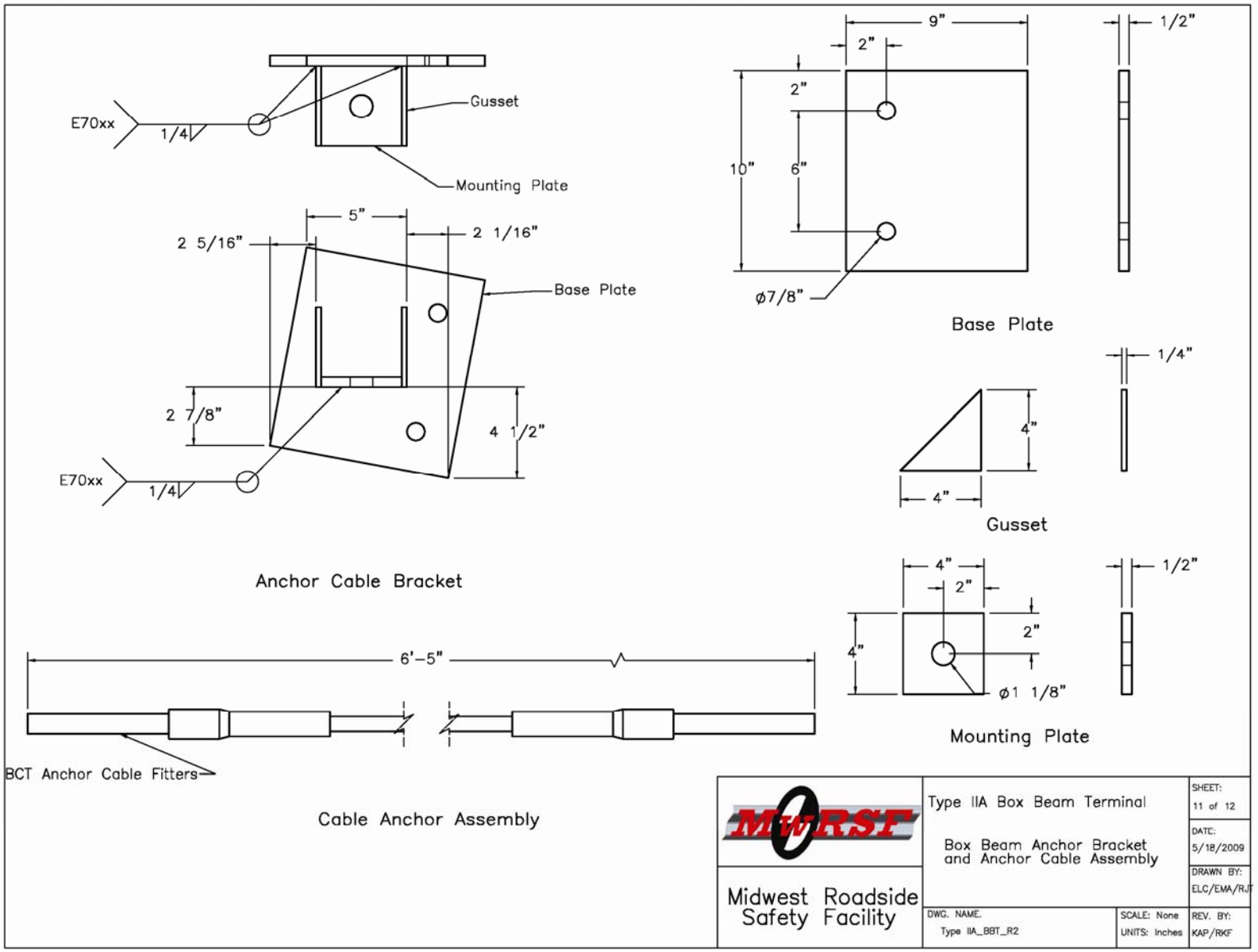


Figure F-11. Type IIA Box Beam Terminal System Details (English), Test No. NYBBT-2

Type IIA Box Beam Terminal			
Item No.	QTY.	Description	Material Specification
a1	23	1/4" x 8" x 2' steel soil plate	A36 Steel
a2	24	ø 1/2" coarse thread 2" long hex bolt	ASTM A307
a3	24	ø 1/2" hex nut	ASTM A307
a4	22	5" x 3 1/2" x 3/8" box beam shelf angle	A36 Steel
a5	24	ø 1/2" narrow washer	ASTM A307
a6	22	S3 x 5.7 63" long post	A36 Steel
b1	22	ø 3/8" coarse thread 7 1/2" long hex bolt	ASTM A307
b2	22	ø 3/8" hex nut	ASTM A307
b3	44	ø 3/8" wide washer	ASTM A307
b4	56	ø 3/4" hex nut	ASTM A325
b5	56	ø 3/4" wide washer	ASTM A325
b6	56	ø 3/4" coarse thread 2" long hex bolt	ASTM A307
b7	14	27" x 5 3/8" x 5/8" splice plate	A36 Steel
b8	6	6" x 6" x 3/16" 18' long box beam	ASTM A500 Grade B
c1	1	End assembly horizontal 6" x 6" x 3/16" box beam	ASTM A500 Grade B
c2	1	End assembly diagonal 6" x 6" x 3/16" box beam	ASTM A500 Grade B
c3	1	End assembly 3/16" thick cover plate	A36 Steel
c4	1	5" x 3 1/2" x 3/8" box beam shelf angle	A36 Steel
c5	1	ø 3/4" coarse thread 7 1/2" long hex bolt	ASTM A307
c6	1	S3 x 5.7 47" long post	A36 Steel
c7	1	6" x 6" x 3/16" R35' Curved Box Beam	ASTM A500 Grade B
–	1	Box Beam Cable Anchor Mounting Plate	A36 steel, galvanized
–	2	Box Beam Cable Anchor Gusset	A36 steel, galvanized
–	1	Box Beam Cable Anchor Base Plate	A36 steel, galvanized
–	1	Lower End Post	A36 Steel
–	1	Lower End Post Base Plate	A36, galvanized
–	1	Lower End Post Front Collar Plate	A36 steel, galvanized
–	2	Lower End Post Side Plate	A36 steel, galvanized
–	2	BCT Anchor Cable End	–

Midwest Roadside Safety Facility

Type IIA Box Beam Terminal

Bill of Materials

SHEET: 12 of 12

DATE: 5/18/2009

DRAWN BY: ELC/EMA/RJT

DWG. NAME: Type IIA_BBT_R2

SCALE: None

UNITS: Inches

REV. BY: KAP/RKF

Figure F-12. Type IIA Box Beam Terminal System Details (English), Test No. NYBBT-2

APPENDIX G Type IIA Box Beam Terminal System Details - Metric and English Units, Test No. NYBBT-3

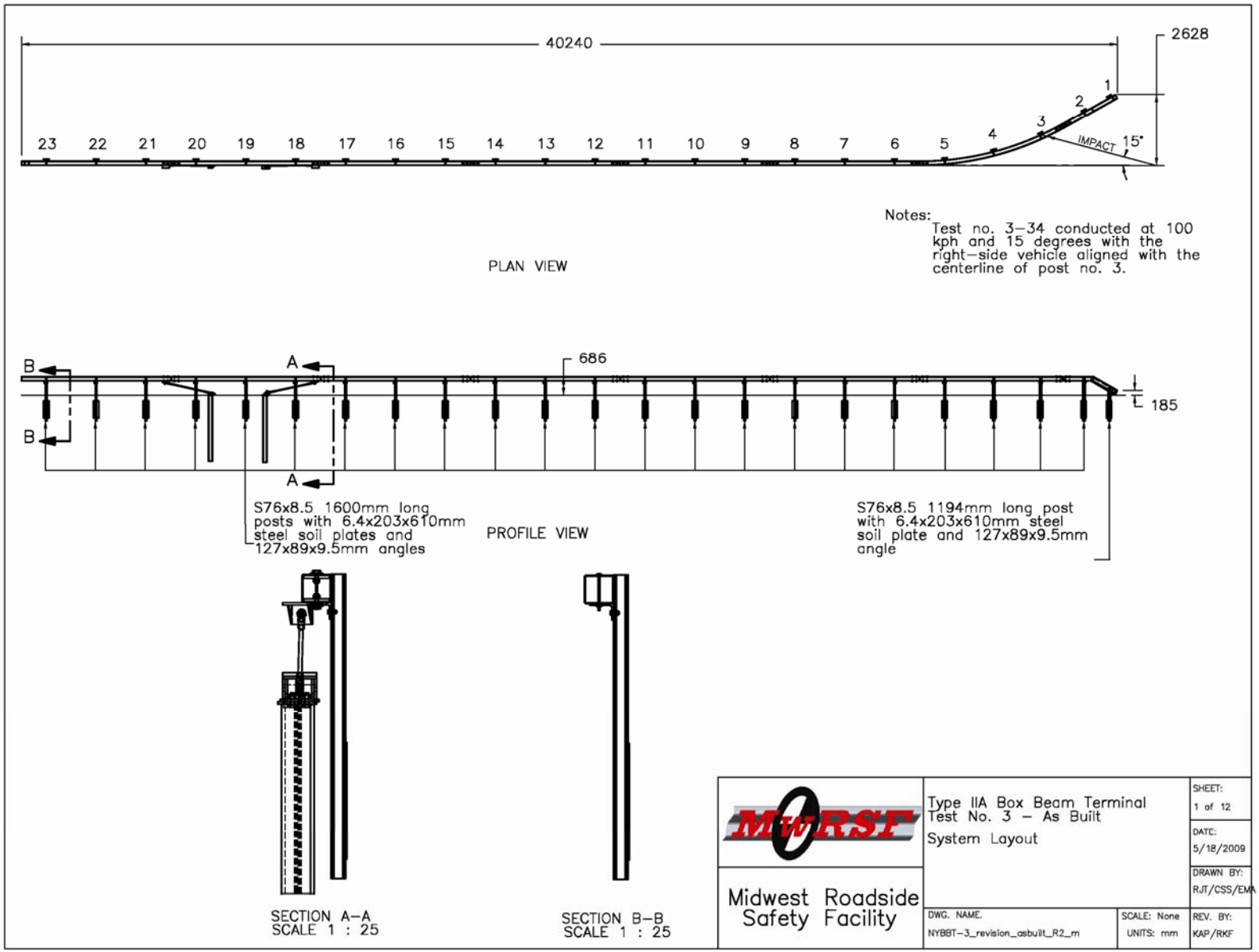


Figure G-1. Type IIA Box Beam Terminal System Details (Metric), Test No. NYBBT-3

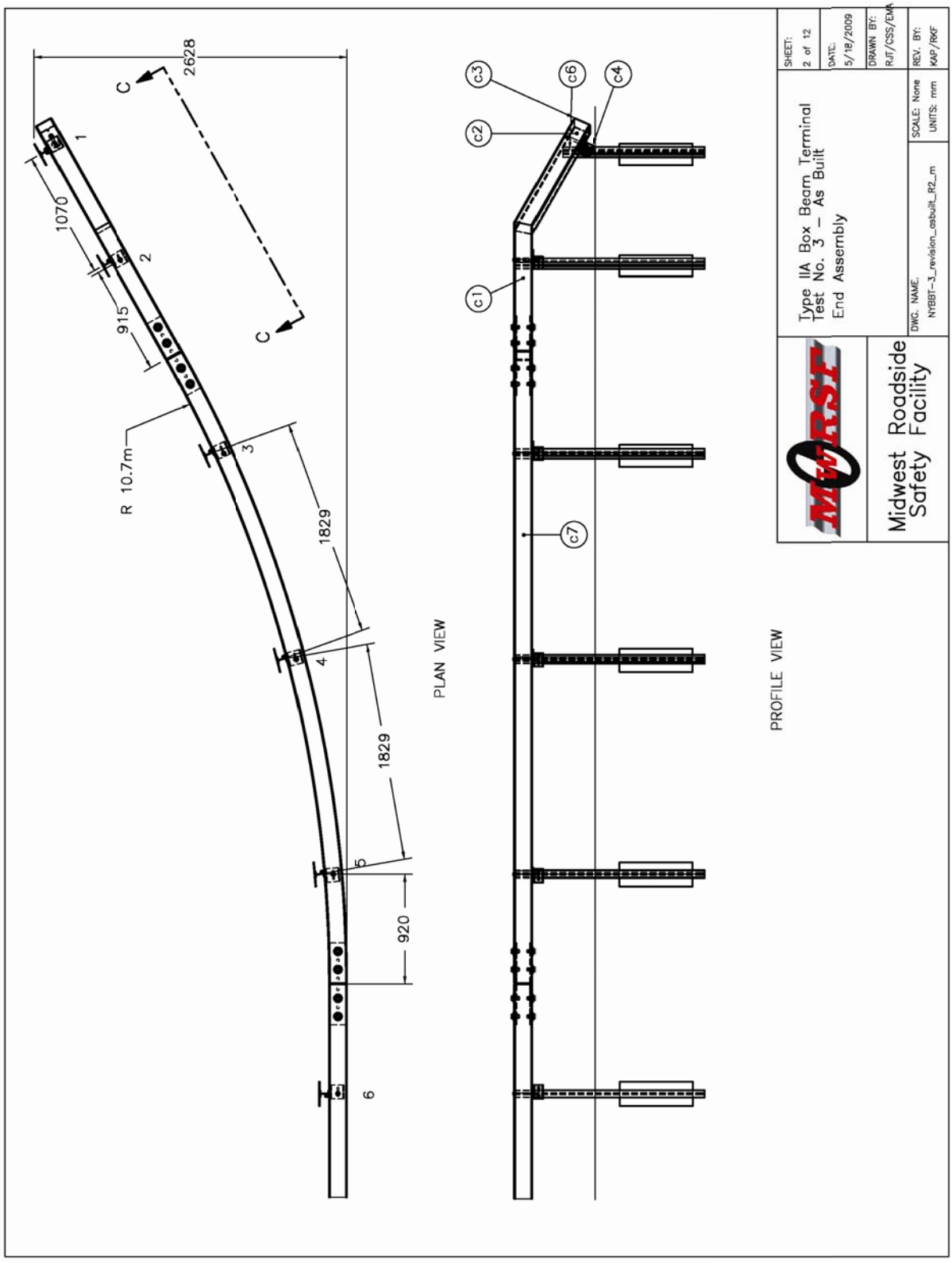


Figure G-2. Type IIA Box Beam Terminal System Details (Metric), Test No. NYBBT-3

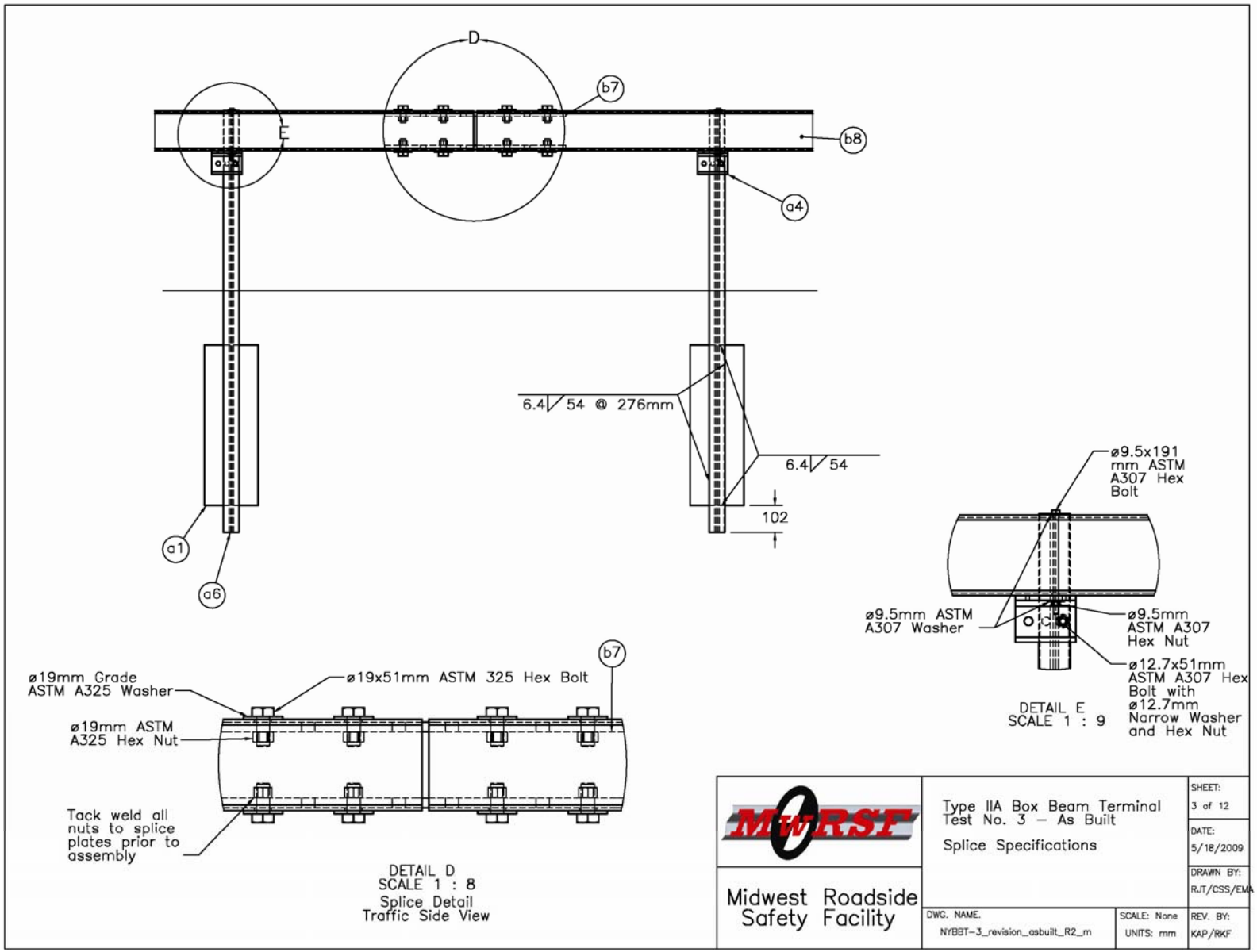


Figure G-3. Type IIA Box Beam Terminal System Details (Metric), Test No. NYBBT-3

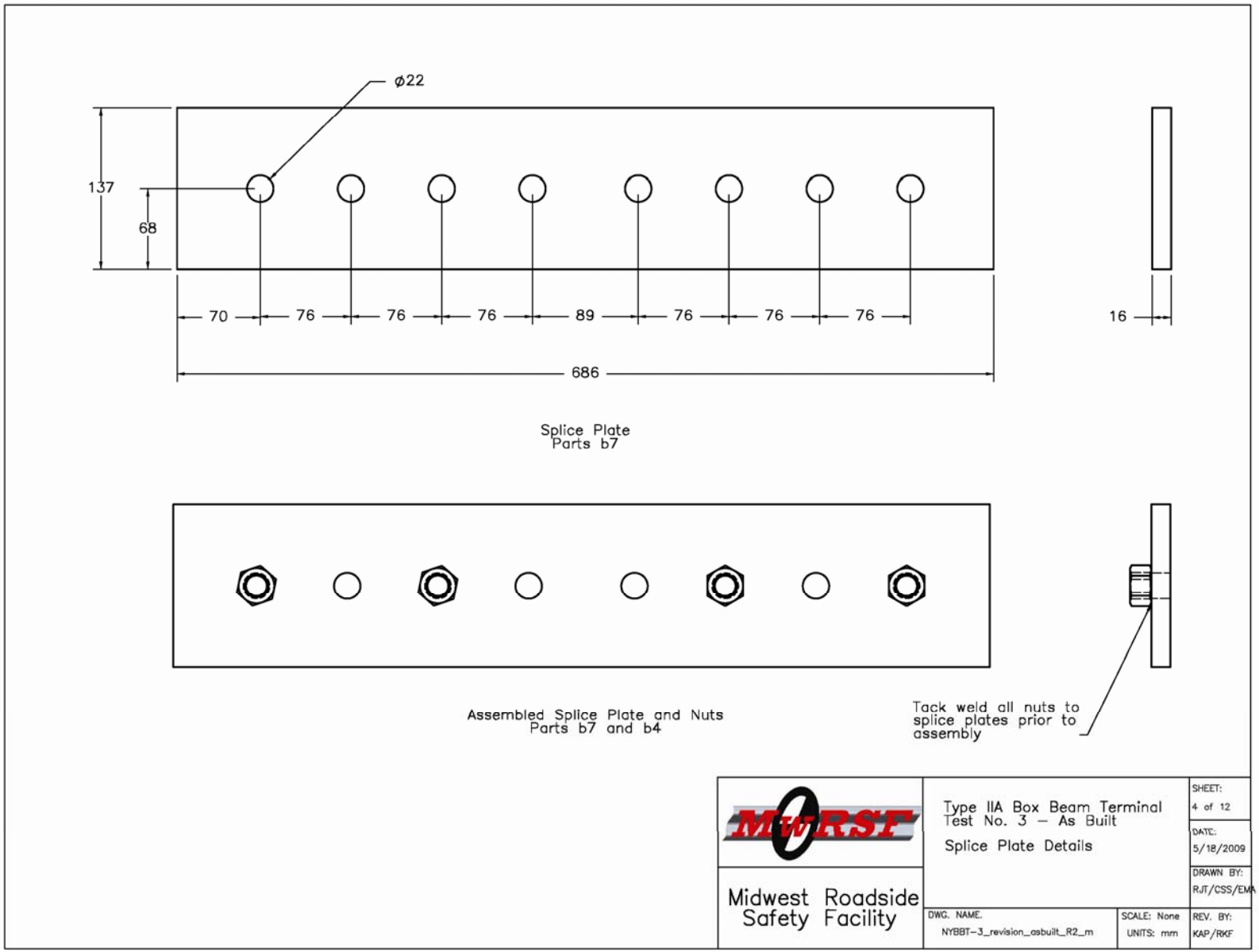


Figure G-4. Type IIA Box Beam Terminal System Details (Metric), Test No. NYBBT-3

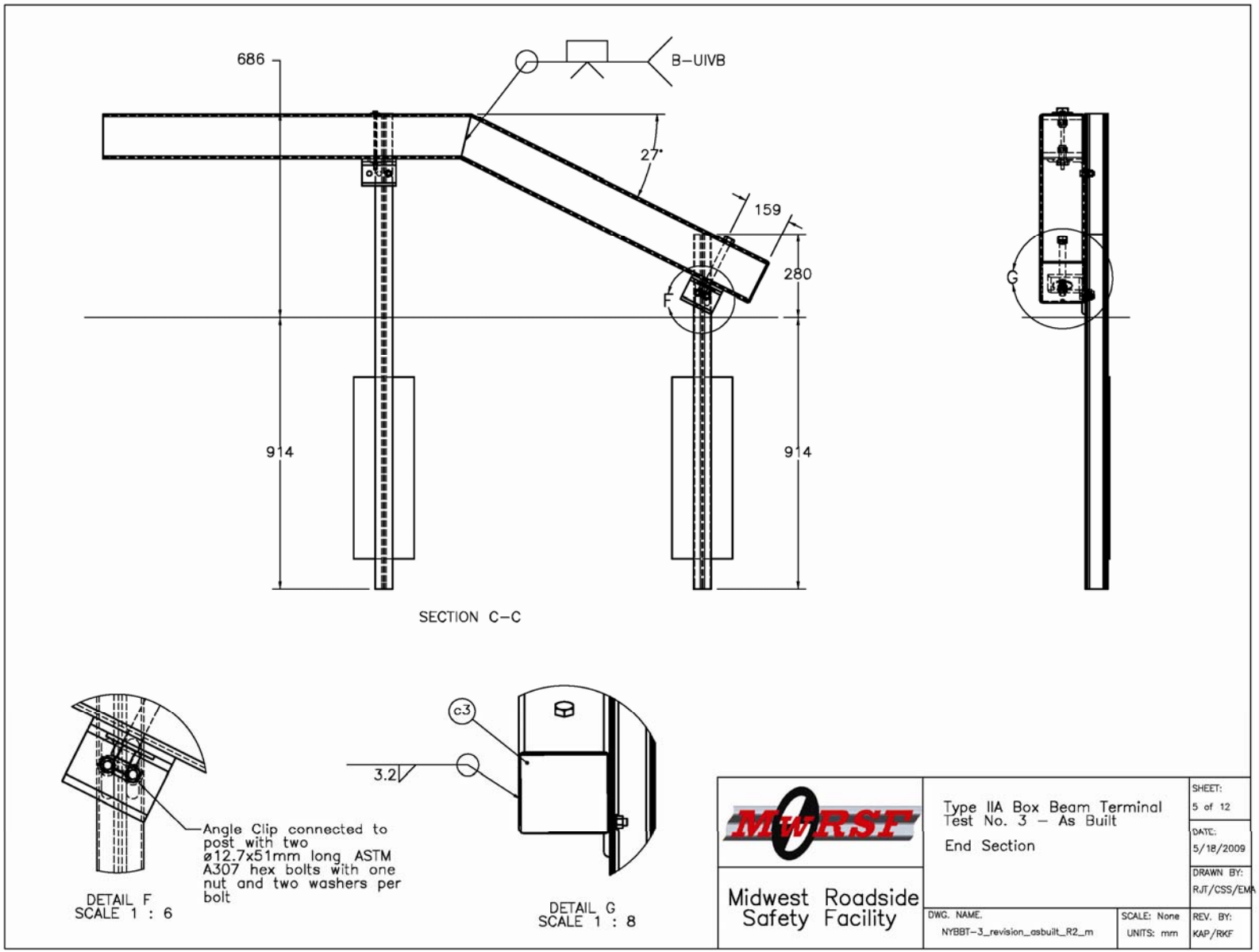


Figure G-5. Type IIA Box Beam Terminal System Details (Metric), Test No. NYBBT-3

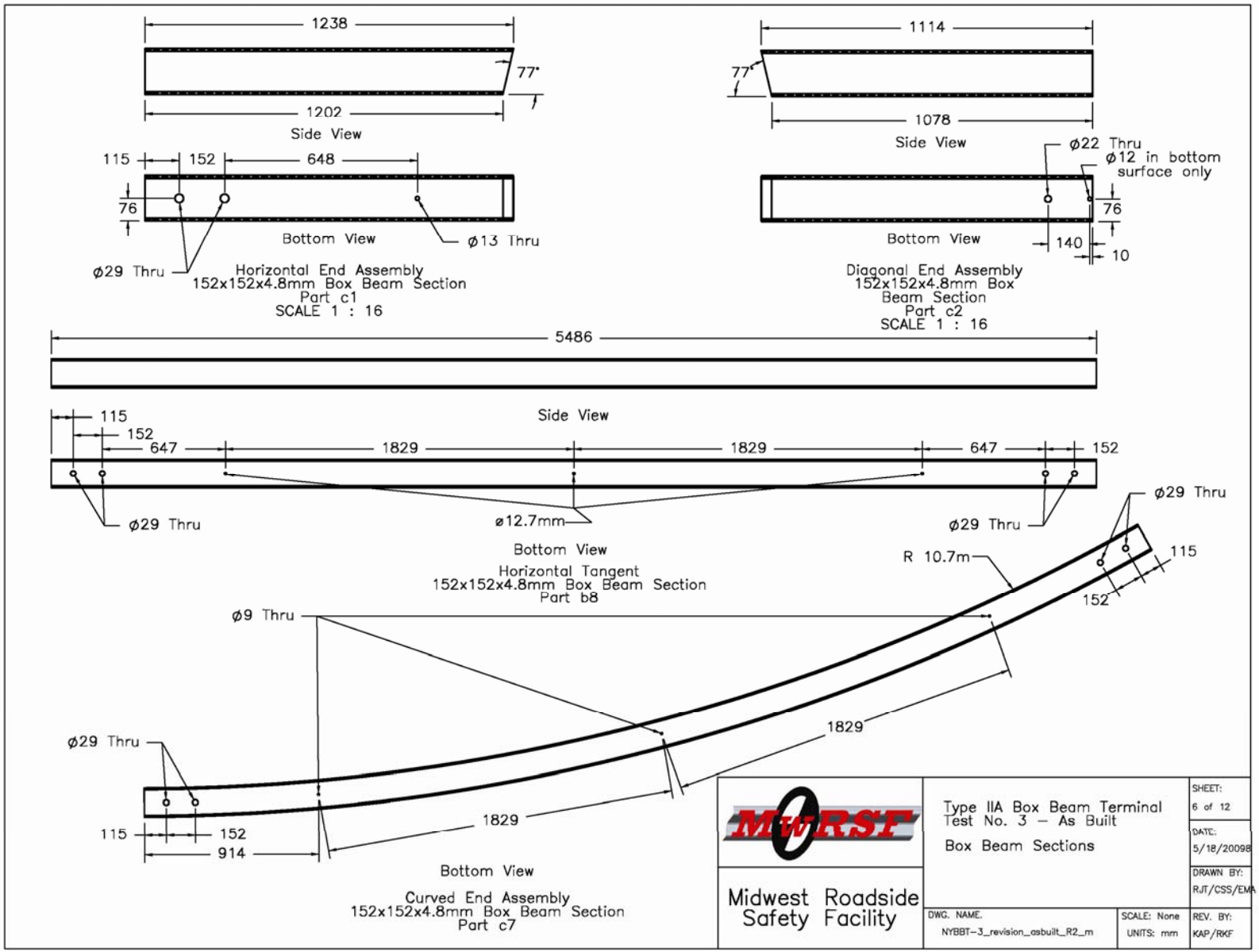


Figure G-6. Type IIA Box Beam Terminal System Details (Metric), Test No. NYBBT-3

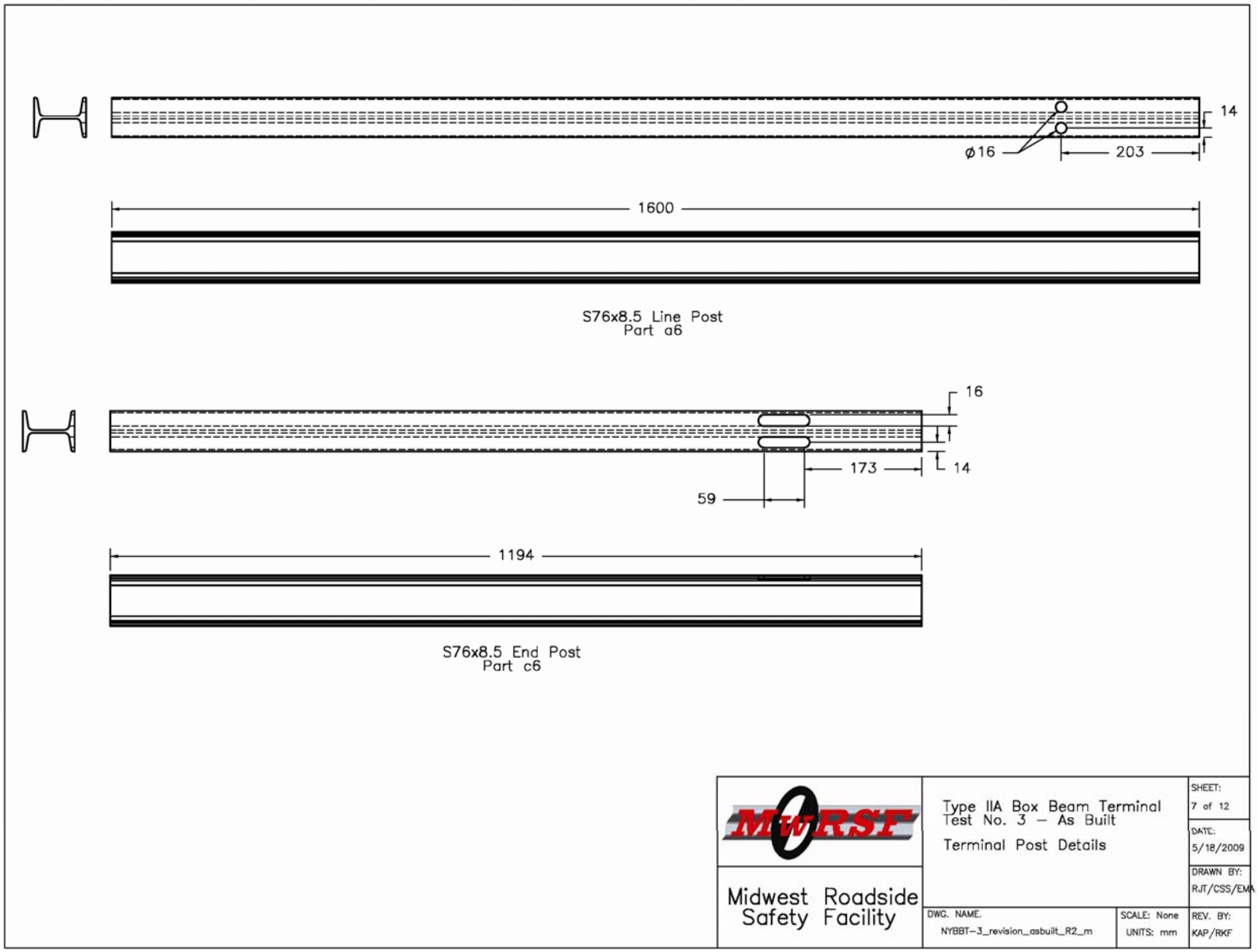


Figure G-7. Type IIA Box Beam Terminal System Details (Metric), Test No. NYBBT-3

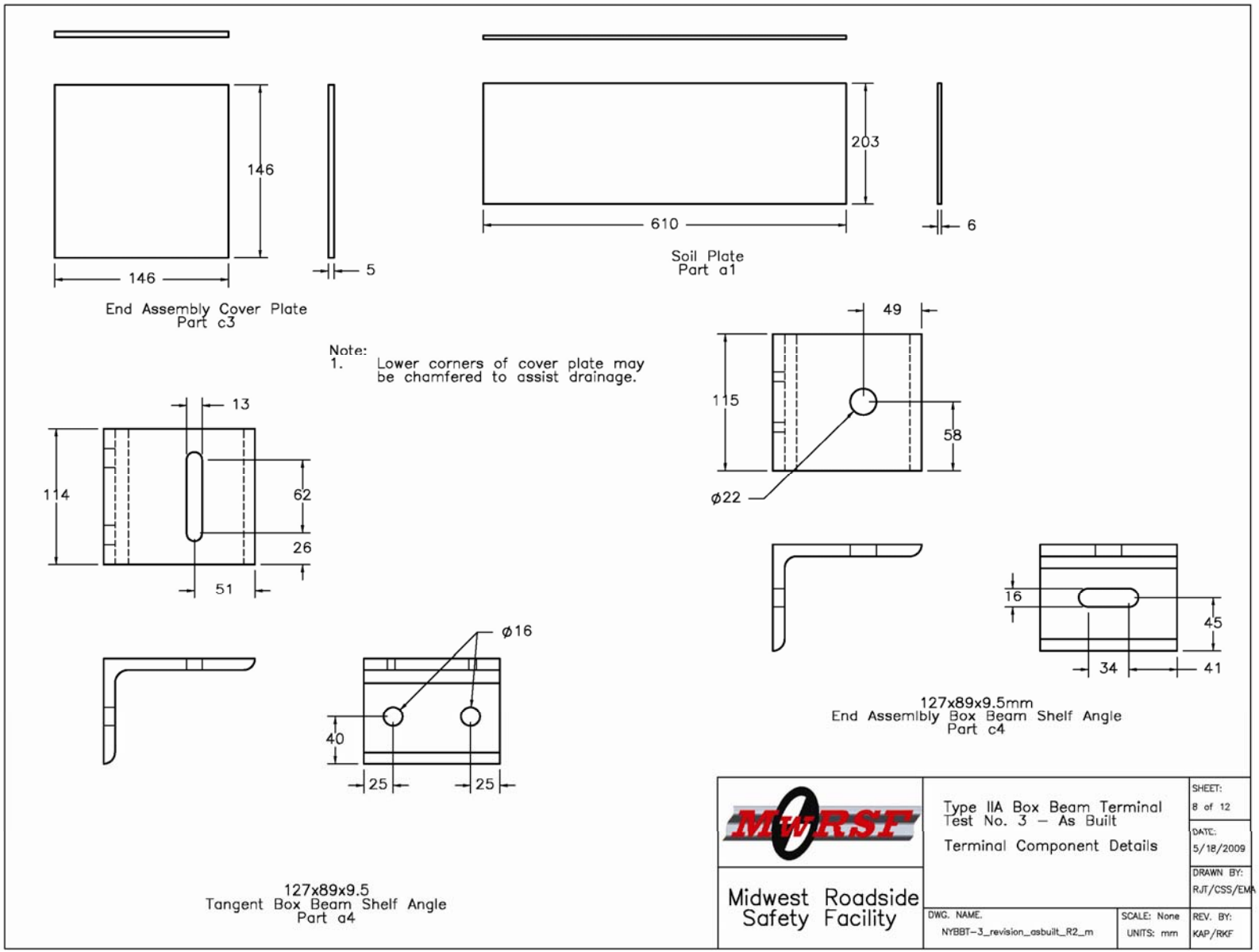


Figure G-8. Type IIA Box Beam Terminal System Details (Metric), Test No. NYBBT-3

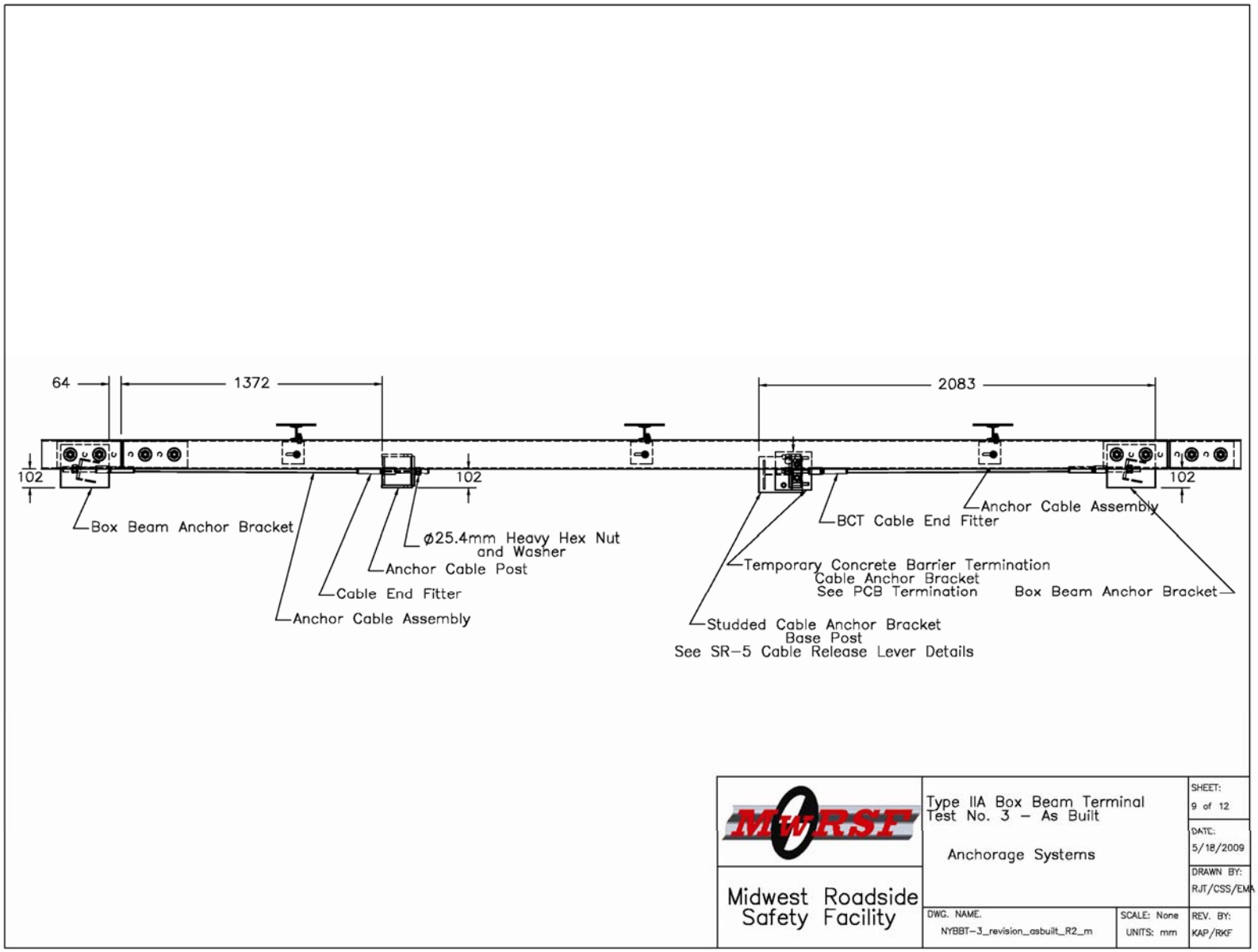


Figure G-9. Type IIA Box Beam Terminal System Details (Metric), Test No. NYBBT-3

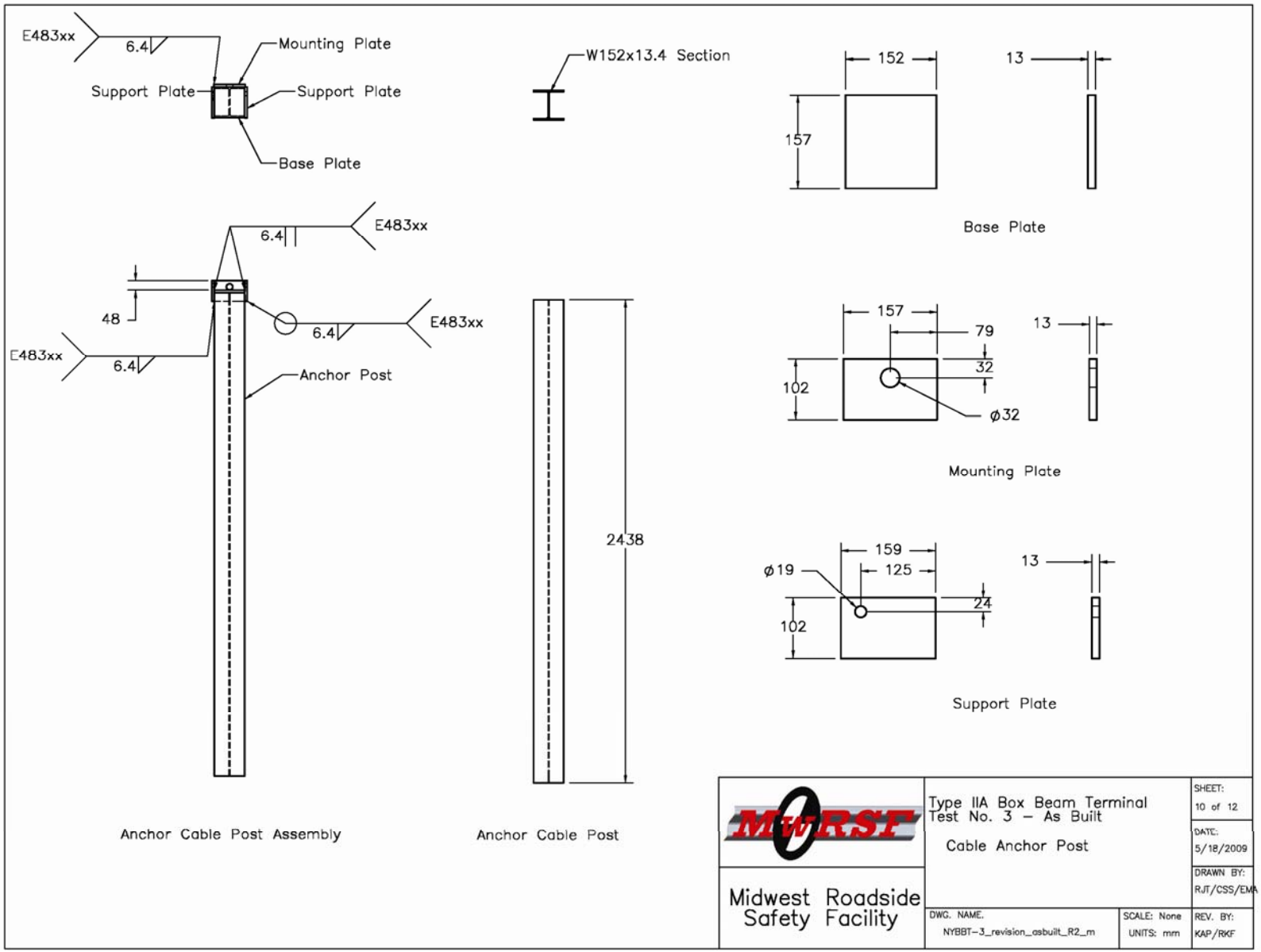


Figure G-10. Type IIA Box Beam Terminal System Details (Metric), Test No. NYBBT-3

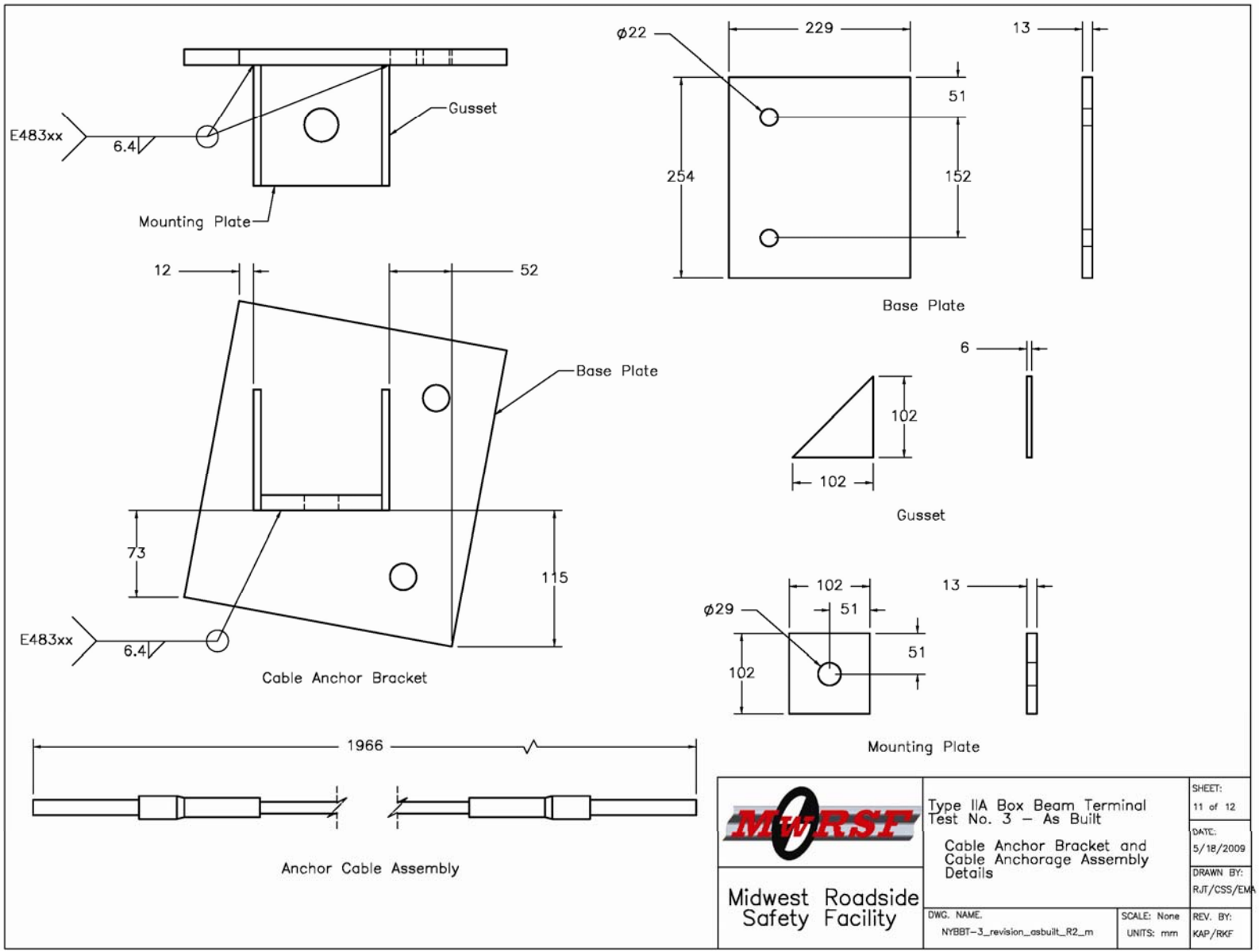


Figure G-11. Type IIA Box Beam Terminal System Details (Metric), Test No. NYBBT-3

New York Type IIA Box Beam Terminal			
Item No.	QTY.	Description	Material Spec
a1	23	6.4 x 203 x 610mm steel soil plate	A36 Steel
a2	24	ø 12.7mm coarse thread 51mm long hex bolt	ASTM A307
a3	24	ø 12.7mm hex nut	ASTM A307
a4	22	127 x 89 x 9.5mm box beam shelf angle	A36 Steel
a5	24	ø 12.7mm narrow washer	ASTM A307
a6	22	S76 x 8.5 1600mm long post	A36 Steel
b1	22	ø 9.5mm coarse thread 191mm long hex bolt	ASTM A307
b2	22	ø 9.5mm hex nut	ASTM A307
b3	44	ø 9.5mm wide washer	ASTM A307
b4	56	ø 19mm hex nut	ASTM A325
b5	56	ø 19mm wide washer	ASTM A325
b6	56	ø 19mm coarse thread 51mm long hex bolt	ASTM A307
b7	14	686 x 137 x 16mm splice plate	A36 Steel
b8	6	152 x 152 x 4.8mm 5486mm long box beam	ASTM A500 Grade B
c1	1	End assembly horizontal 152 x 152 x 4.8mm box beam	ASTM A500 Grade B
c2	1	End assembly diagonal 152 x 152 x 4.8mm box beam	ASTM A500 Grade B
c3	1	End assembly 4.8mm thick cover plate	A36 Steel
c4	1	127 x 89 x 9.5mm box beam shelf angle	A36 Steel
c5	1	ø 19 coarse thread 191mm long hex bolt	ASTM A307
c6	1	S76 x 8.5 1194mm long post	A36 Steel
c7	1	152 x 152 x 4.8mm R10.7m Curved Box Beam	ASTM A500 Grade B

Midwest Roadside Safety Facility

Type IIA Box Beam Terminal
Test No. 3 – As Built
Bill of Materials

SHEET: 12 of 12
DATE: 5/18/2009
DRAWN BY: RJT/CSS/EMA
REV. BY: KAP/RKF
DWG. NAME: NYBBT-3_revision_asbuilt_R2_m
SCALE: None
UNITS: mm

Figure G-12. Type IIA Box Beam Terminal System Details (Metric), Test No. NYBBT-3

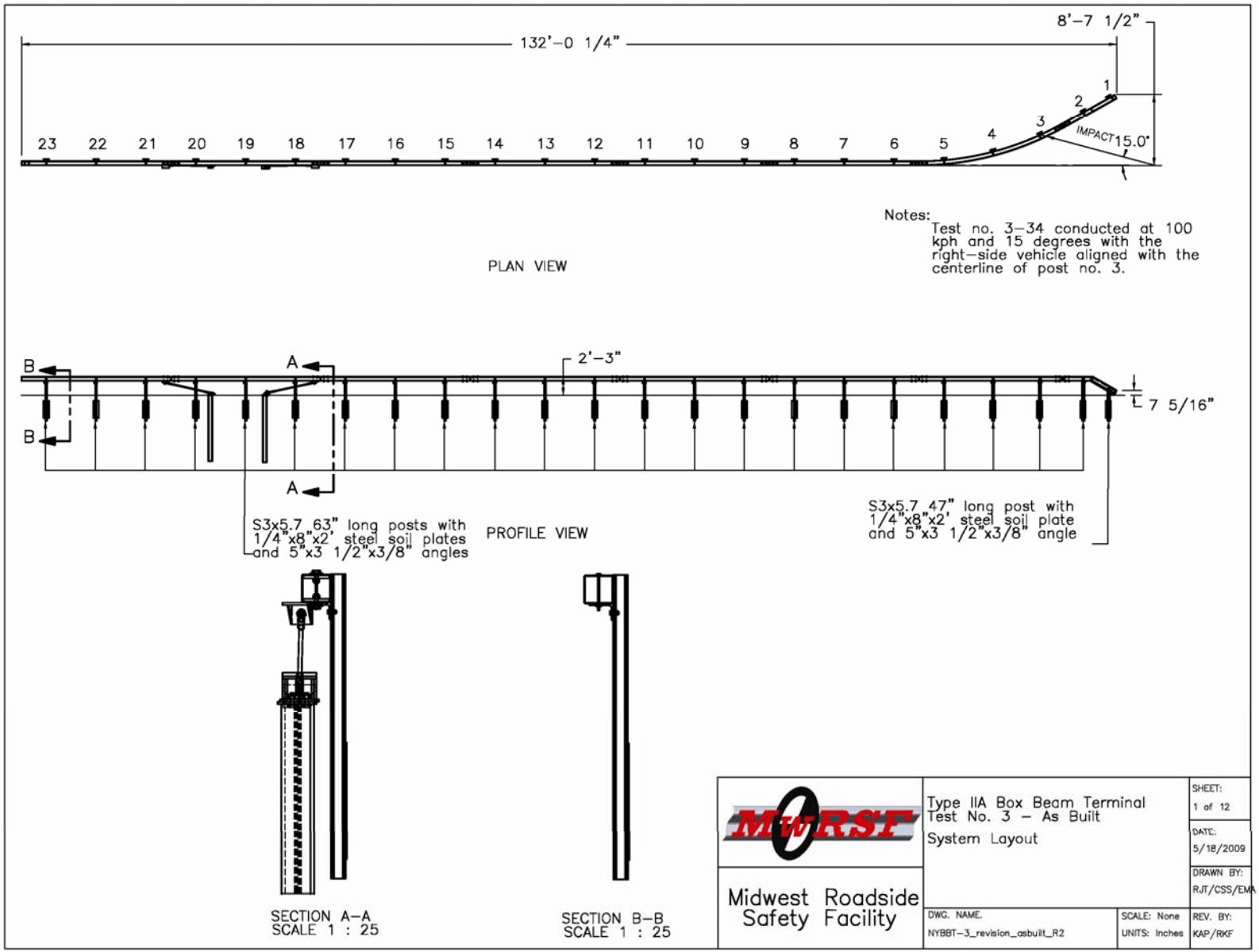


Figure G-13. Type IIA Box Beam Terminal System Details (English), Test No. NYBBT-3

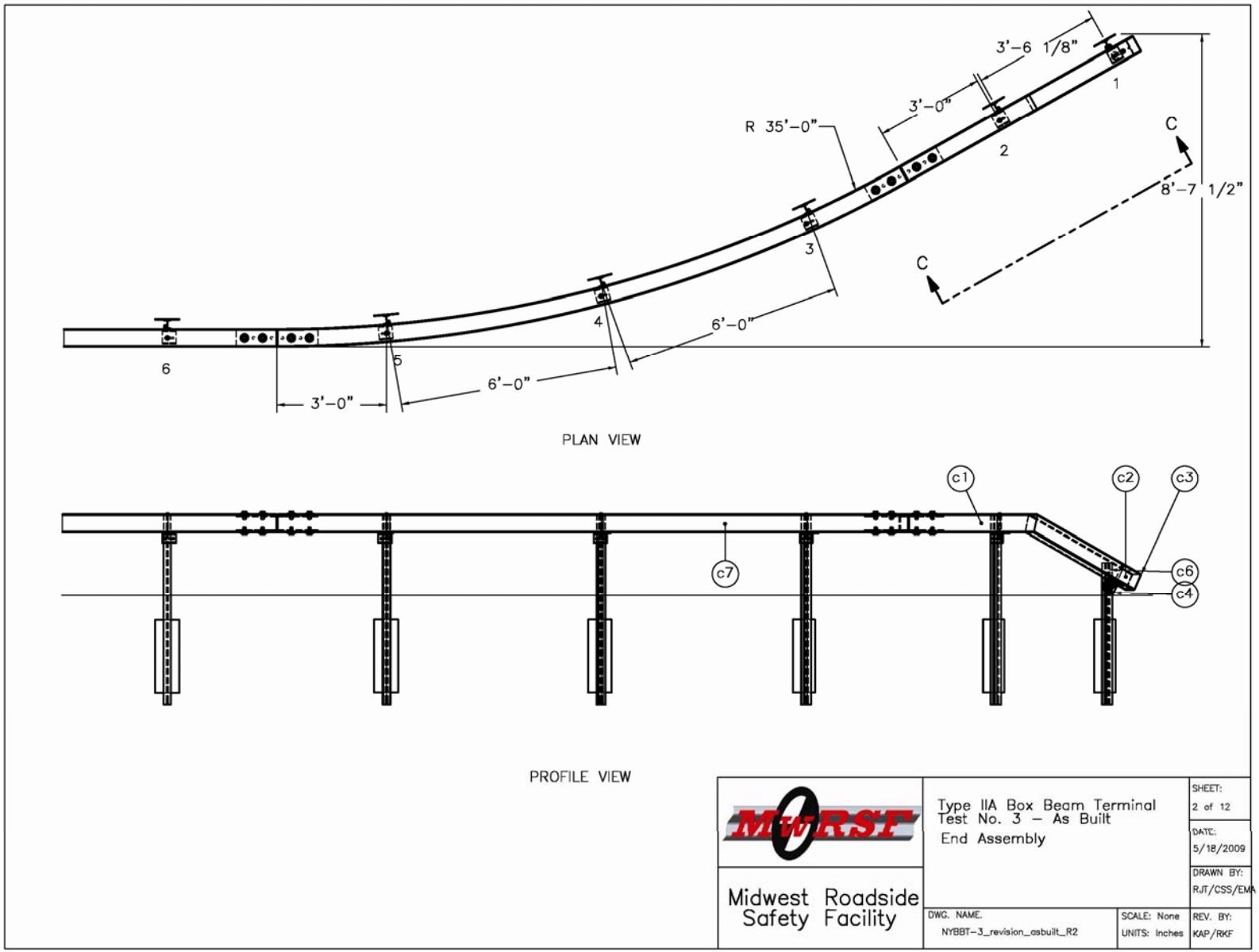


Figure G-14. Type IIA Box Beam Terminal System Details (English), Test No. NYBBT-3

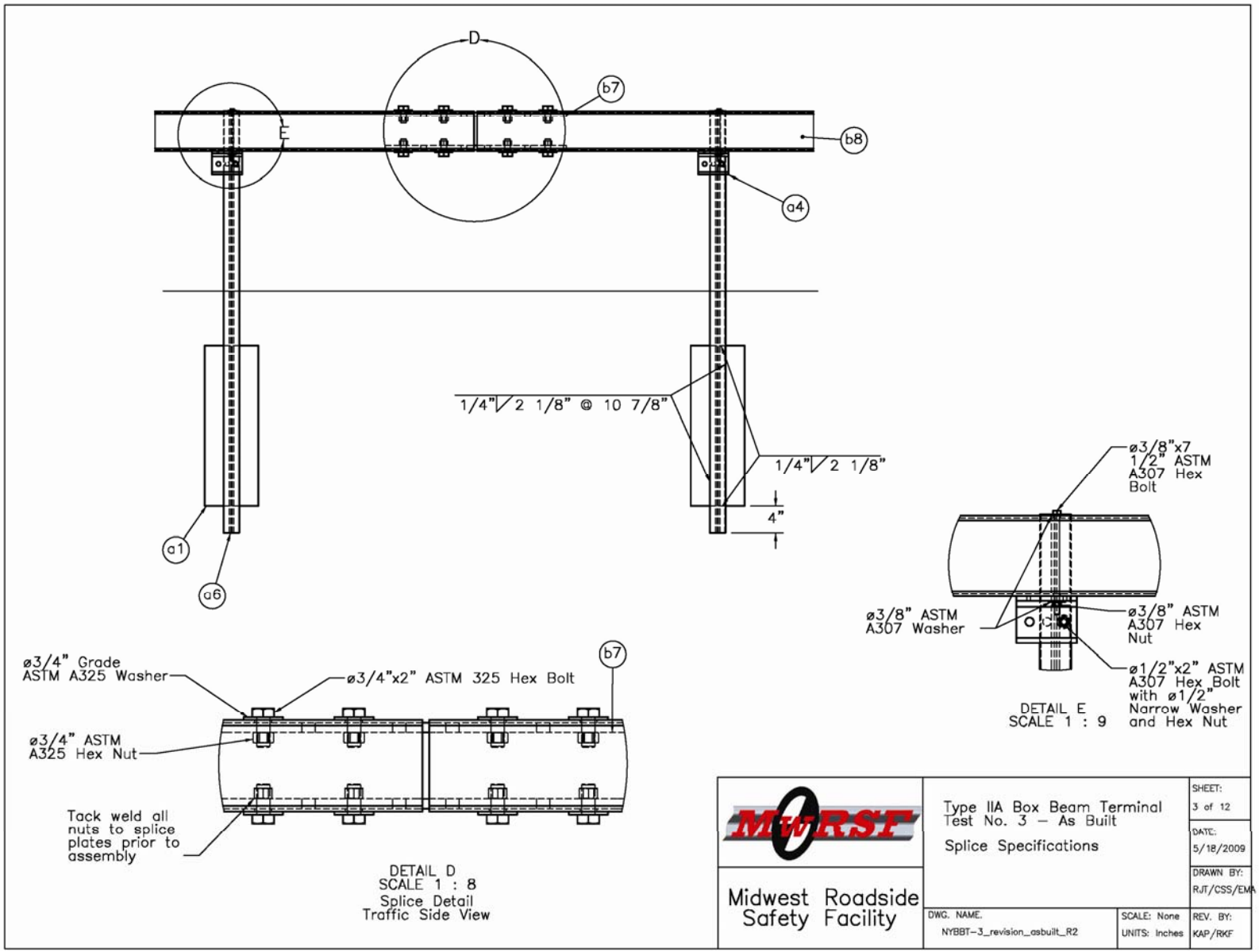


Figure G-15. Type IIA Box Beam Terminal System Details (English), Test No. NYBBT-3

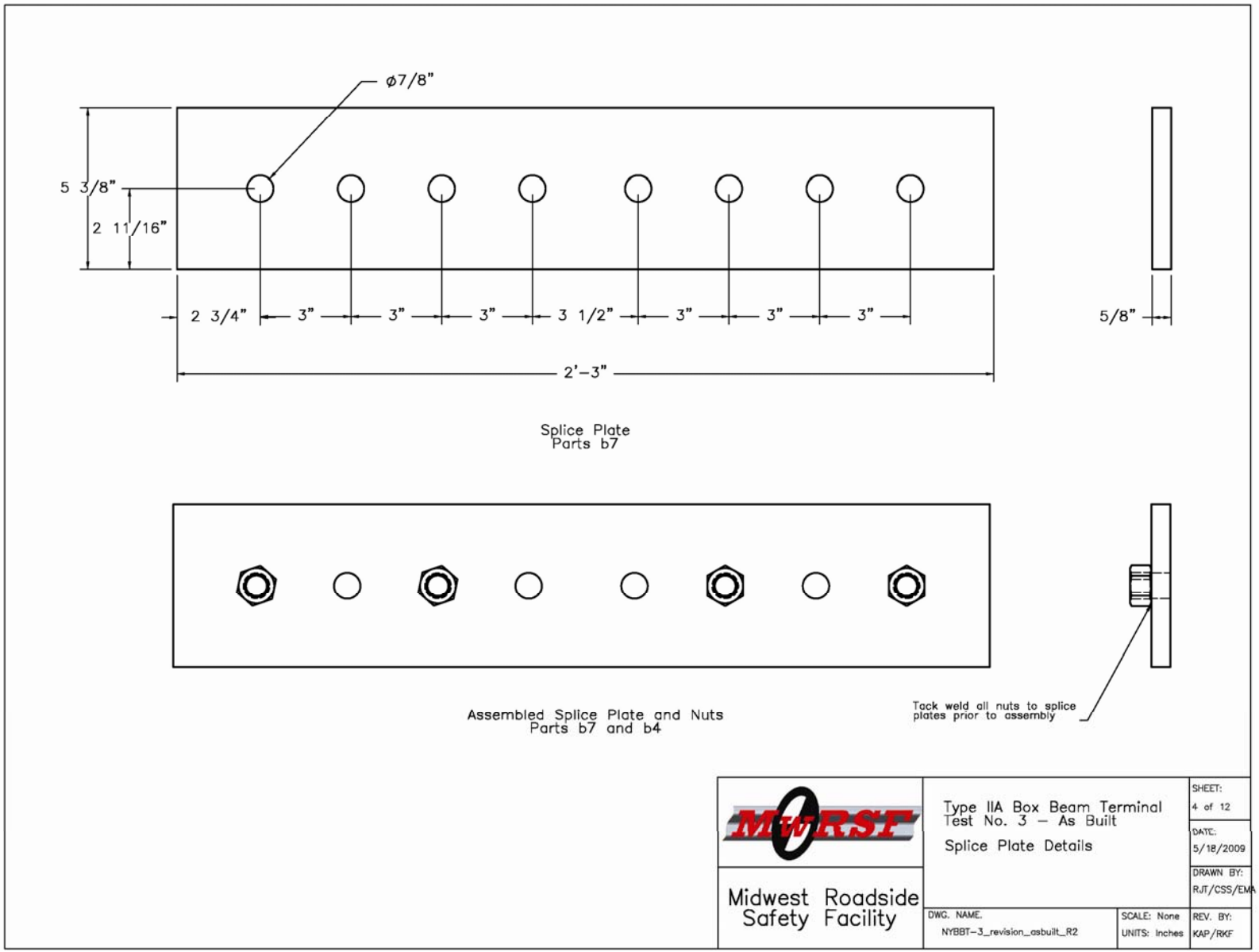


Figure G-16. Type IIA Box Beam Terminal System Details (English), Test No. NYBBT-3

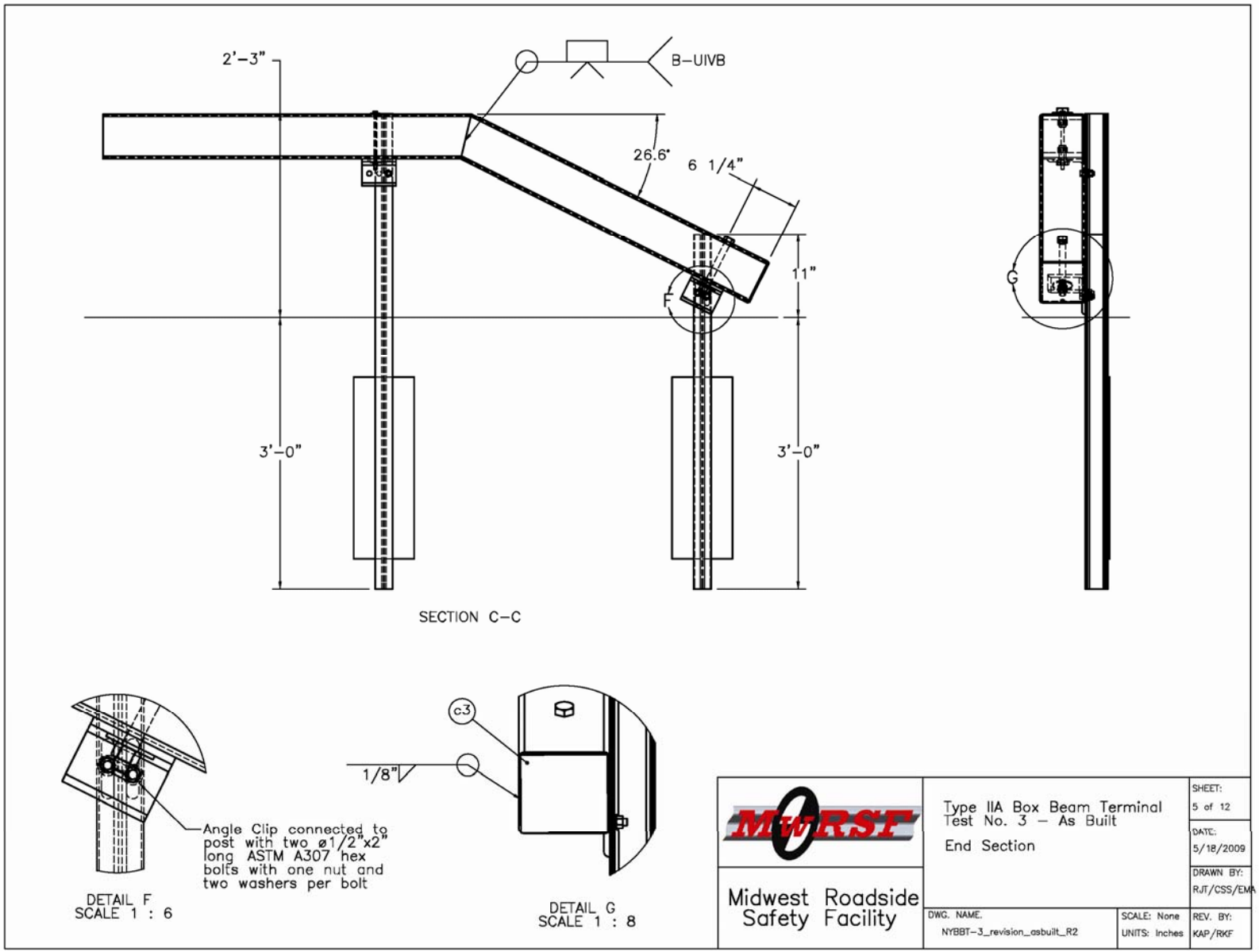


Figure G-17. Type IIA Box Beam Terminal System Details (English), Test No. NYBBT-3

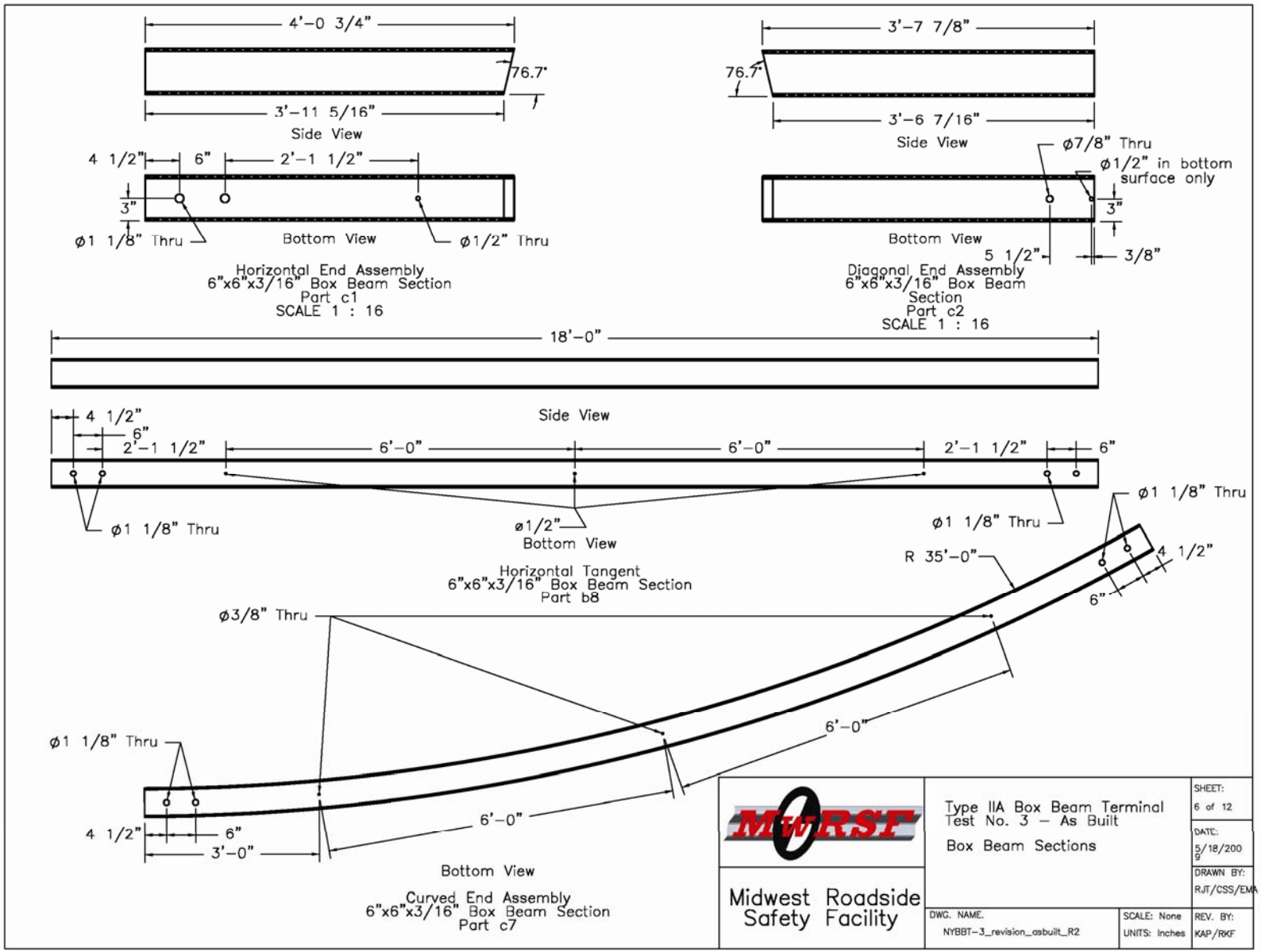


Figure G-18. Type IIA Box Beam Terminal System Details (English), Test No. NYBBT-3

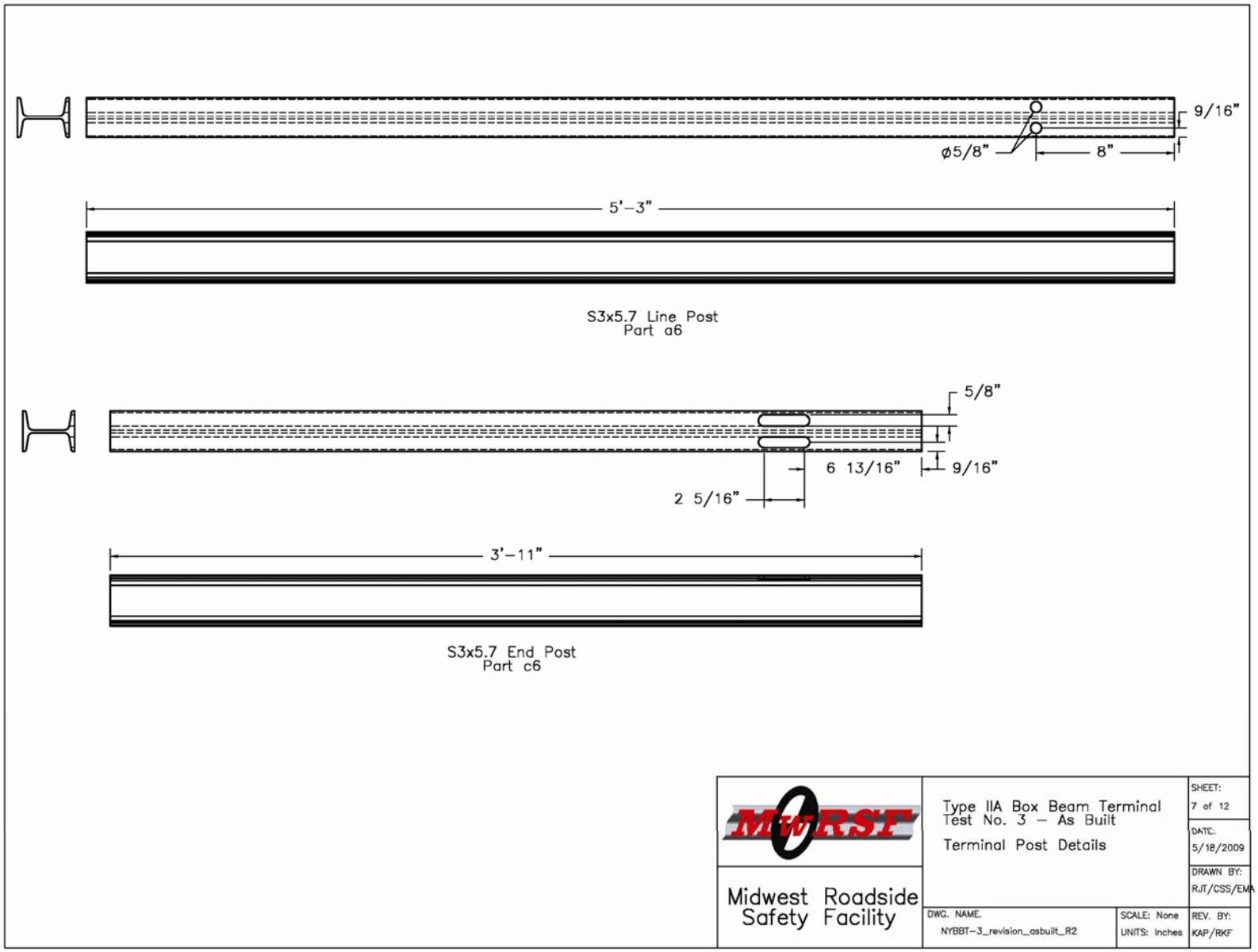


Figure G-19. Type IIA Box Beam Terminal System Details (English), Test No. NYBBT-3

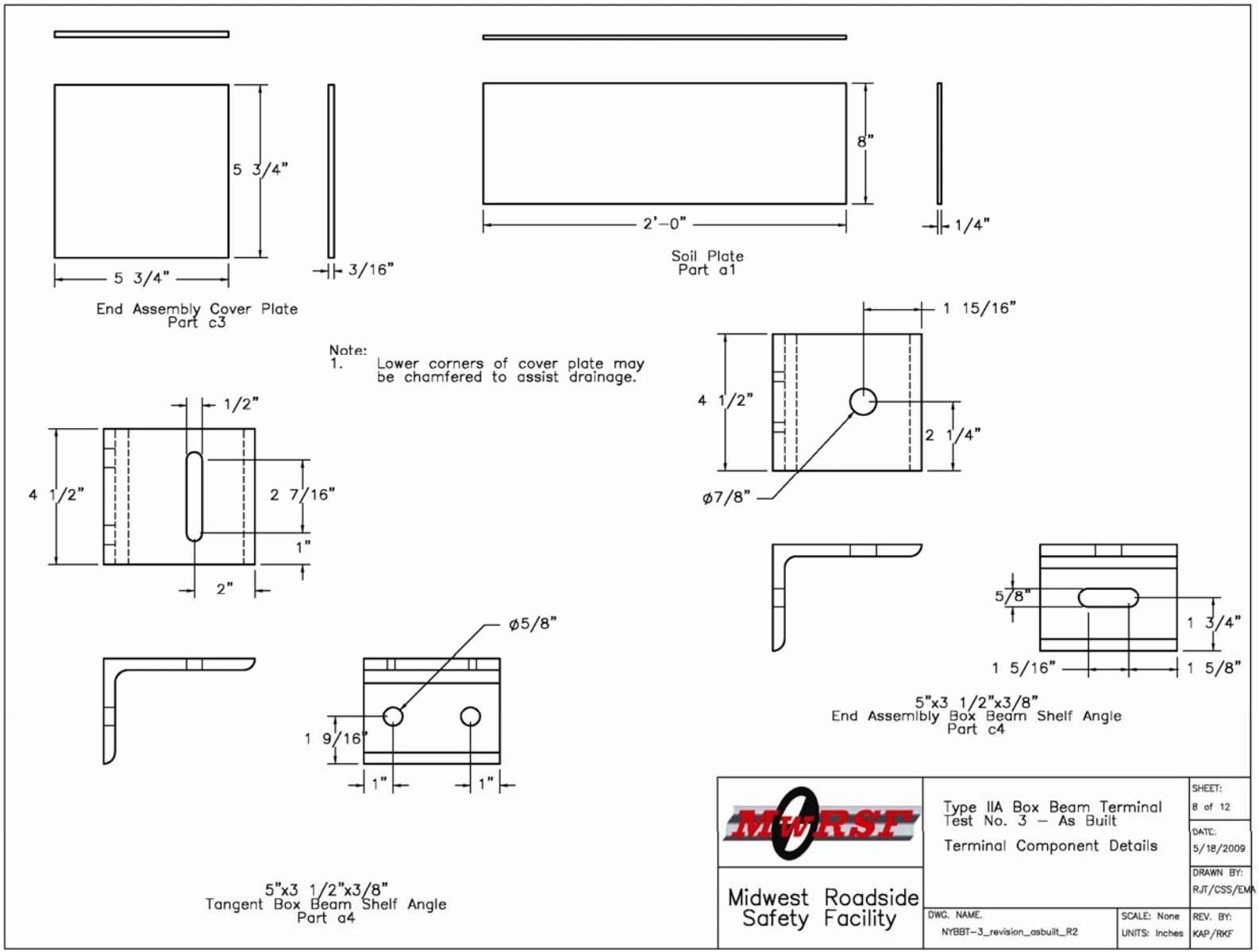


Figure G-20. Type IIA Box Beam Terminal System Details (English), Test No. NYBBT-3

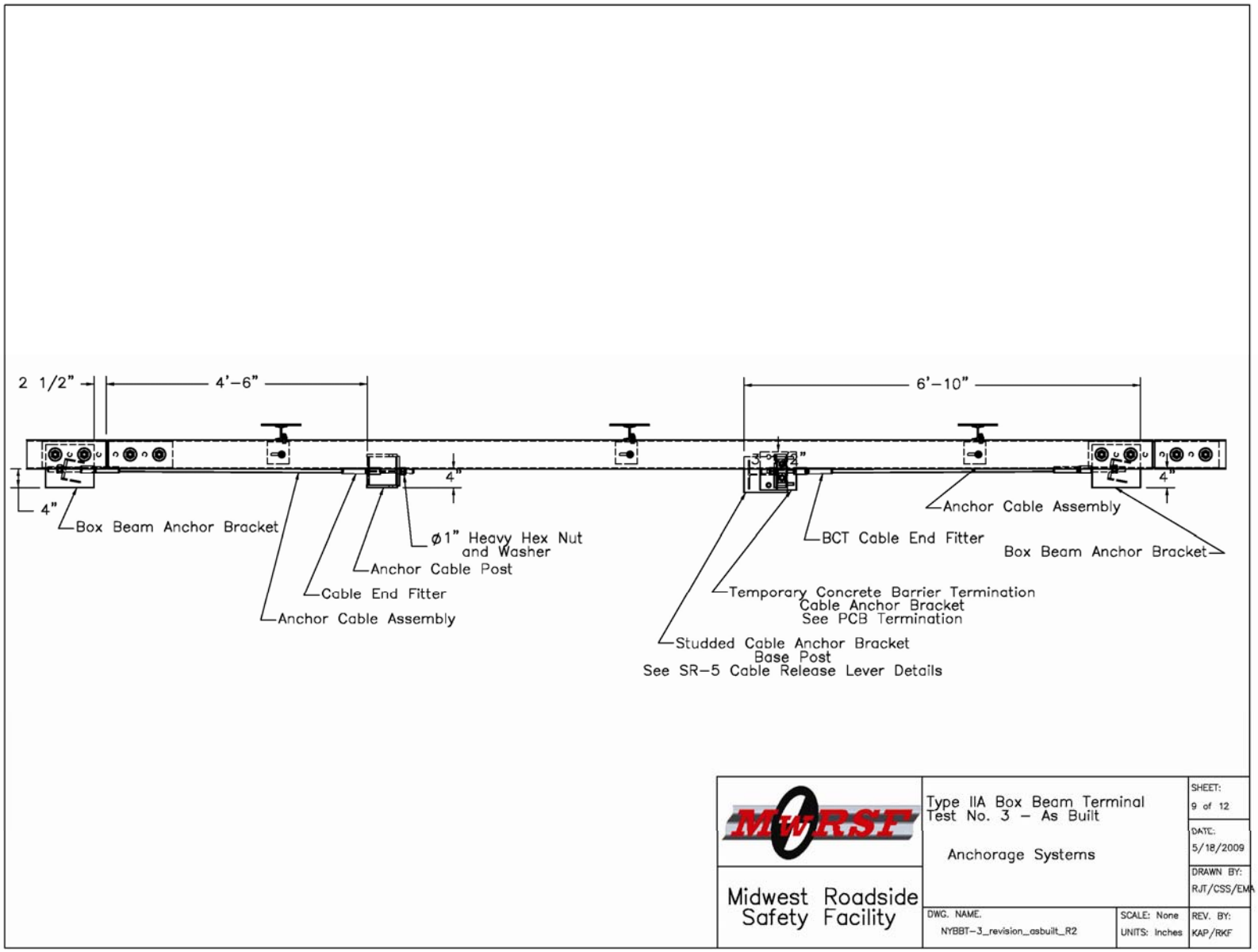


Figure G-21. Type IIA Box Beam Terminal System Details (English), Test No. NYBBT-3

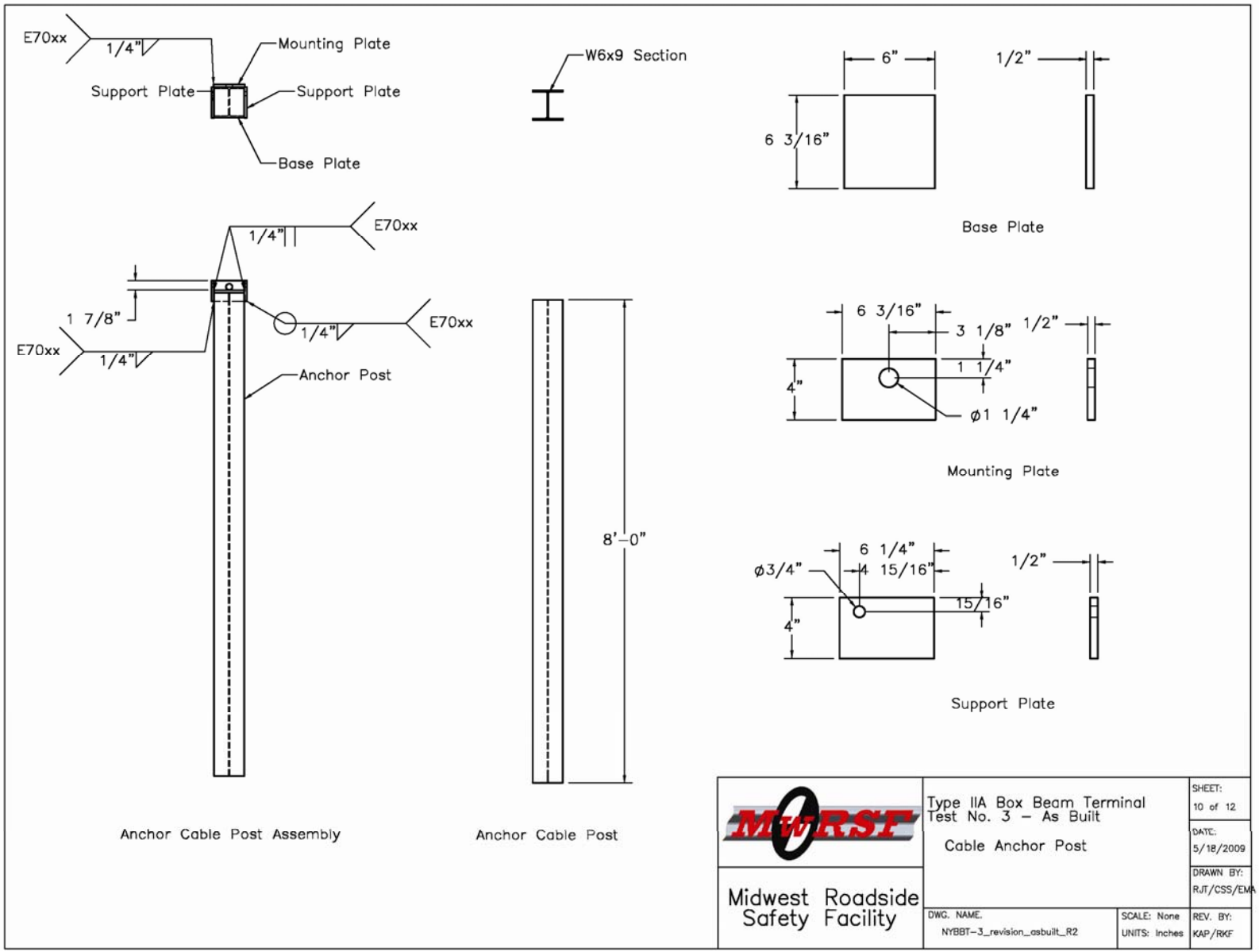


Figure G-22. Type IIA Box Beam Terminal System Details (English), Test No. NYBBT-3

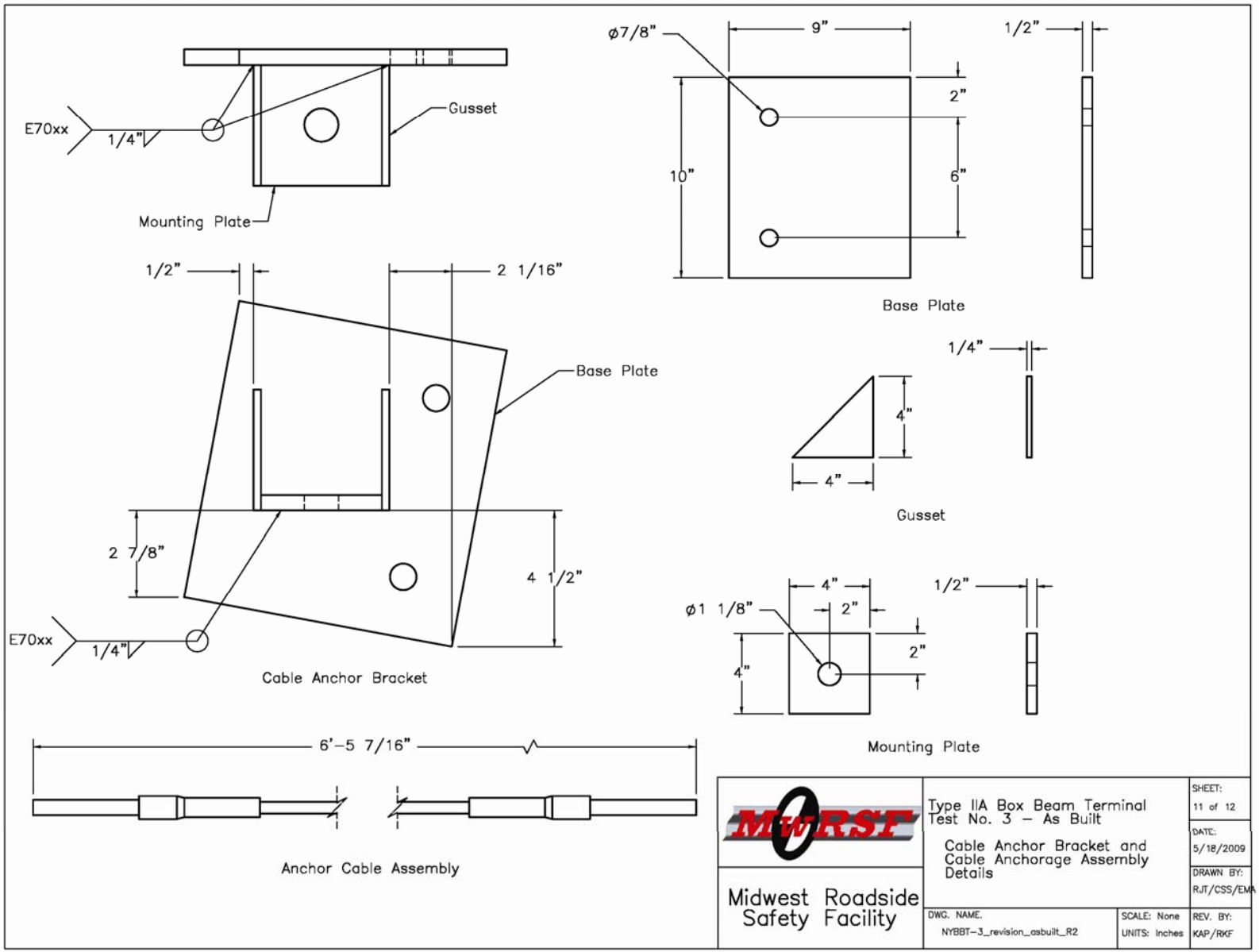


Figure G-23. Type IIA Box Beam Terminal System Details (English), Test No. NYBBT-3

New York Type IIA Box Beam Terminal			
Item No.	QTY.	Description	Material Spec
a1	23	1/4" x 8" x 2' steel soil plate	A36 Steel
a2	24	ø 1/2" coarse thread 2" long hex bolt	ASTM A307
a3	24	ø 1/2" hex nut	ASTM A307
a4	22	5" x 3 1/2" x 3/8" box beam shelf angle	A36 Steel
a5	24	ø 1/2" narrow washer	ASTM A307
a6	22	S3 x 5.7 63" long post	A36 Steel
b1	22	ø 3/8" coarse thread 7 1/2" long hex bolt	ASTM A307
b2	22	ø 3/8" hex nut	ASTM A307
b3	44	ø 3/8" wide washer	ASTM A307
b4	56	ø 3/4" hex nut	ASTM A325
b5	56	ø 3/4" wide washer	ASTM A325
b6	56	ø 3/4" coarse thread 2" long hex bolt	ASTM A307
b7	14	27" x 5 3/8" x 5/8" splice plate	A36 Steel
b8	6	6" x 6" x 3/16" 18' long box beam	ASTM A500 Grade B
c1	1	End assembly horizontal 6" x 6" x 3/16" box beam	ASTM A500 Grade B
c2	1	End assembly diagonal 6" x 6" x 3/16" box beam	ASTM A500 Grade B
c3	1	End assembly 3/16" thick cover plate	A36 Steel
c4	1	5" x 3 1/2" x 3/8" box beam shelf angle	A36 Steel
c5	1	ø 3/4" coarse thread 7 1/2" long hex bolt	ASTM A307
c6	1	S3 x 5.7 47" long post	A36 Steel
c7	1	6" x 6" x 3/16" R35' Curved Box Beam	ASTM A500 Grade B

Midwest Roadside Safety Facility

Type IIA Box Beam Terminal
Test No. 3 – As Built
Bill of Materials

SHEET: 12 of 12
DATE: 5/18/2009
DRAWN BY: RJT/CSS/EMA
REV. BY: KAP/RKF
DWG. NAME: NYBBT-3_revision_asbuilt_R2
SCALE: None
UNITS: Inches

Figure G-24. Type IIA Box Beam Terminal System Details (English), Test No. NYBBT-3

APPENDIX H Accelerometer and Rate Transducer Data Analysis, Test No. NYBBT-2

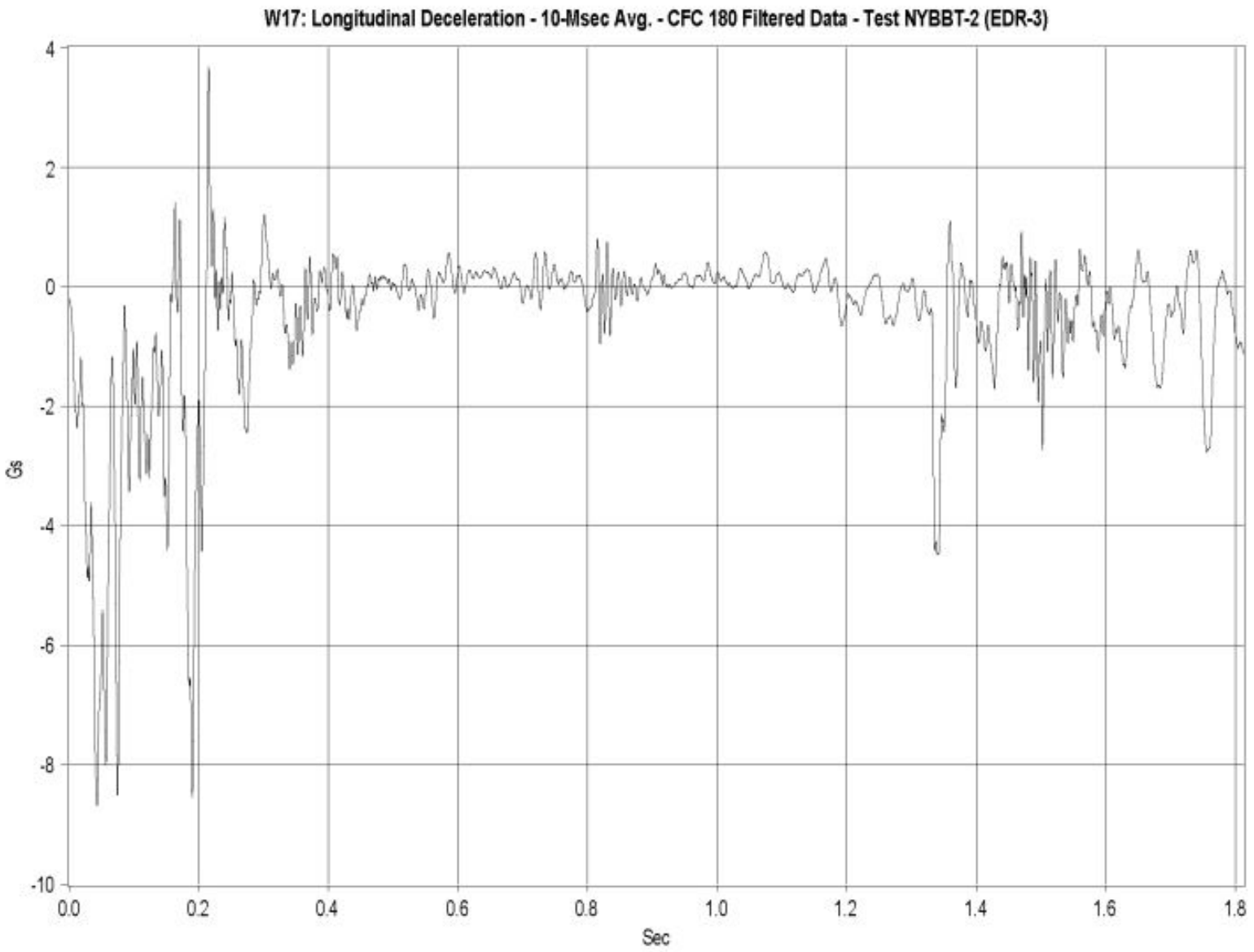


Figure H-1. Graph of Longitudinal Occupant Deceleration (EDR-3), Test No. NYBBT-2

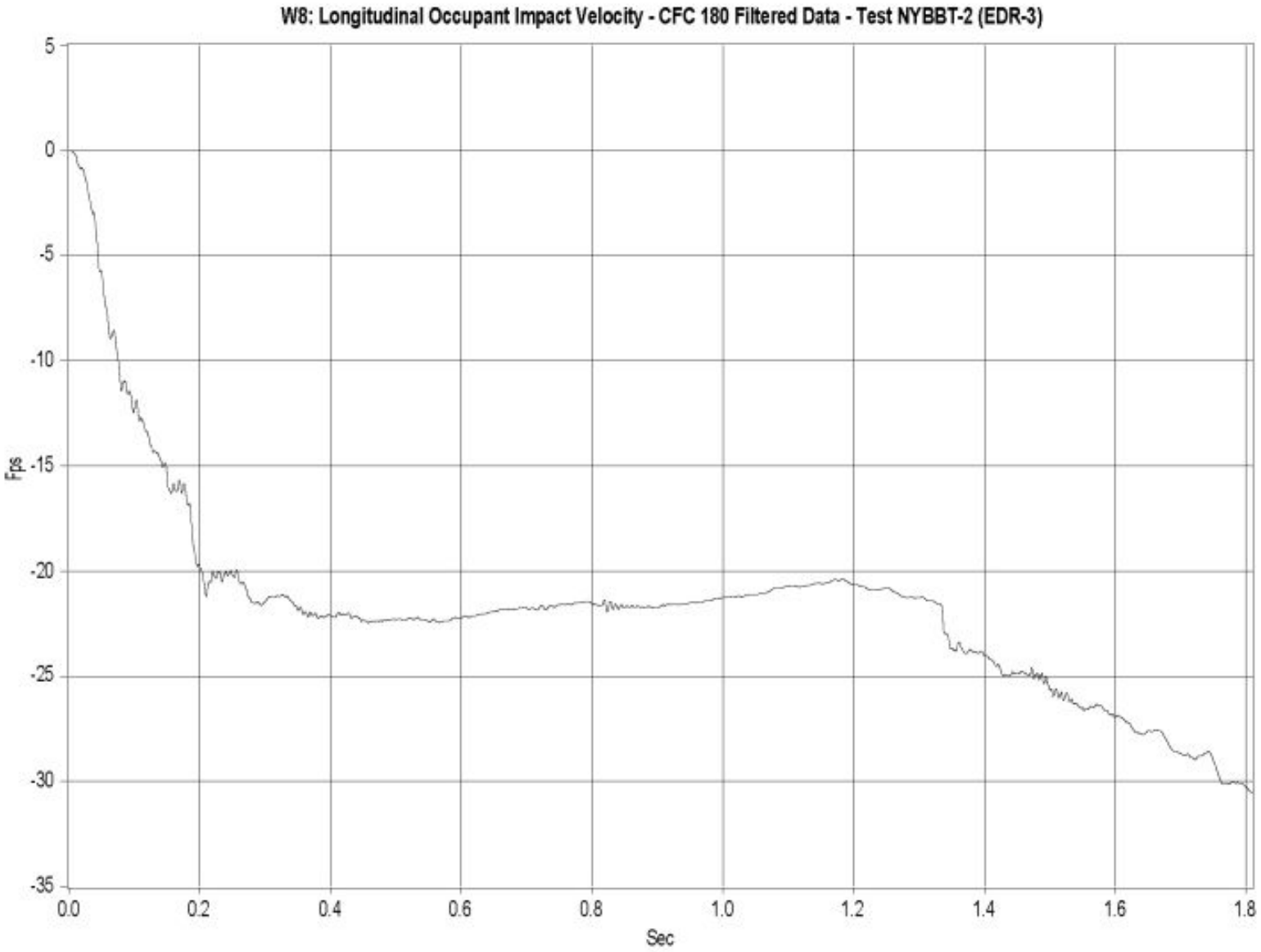


Figure H-2. Graph of Longitudinal Occupant Velocity (EDR-3), Test No. NYBBT-2

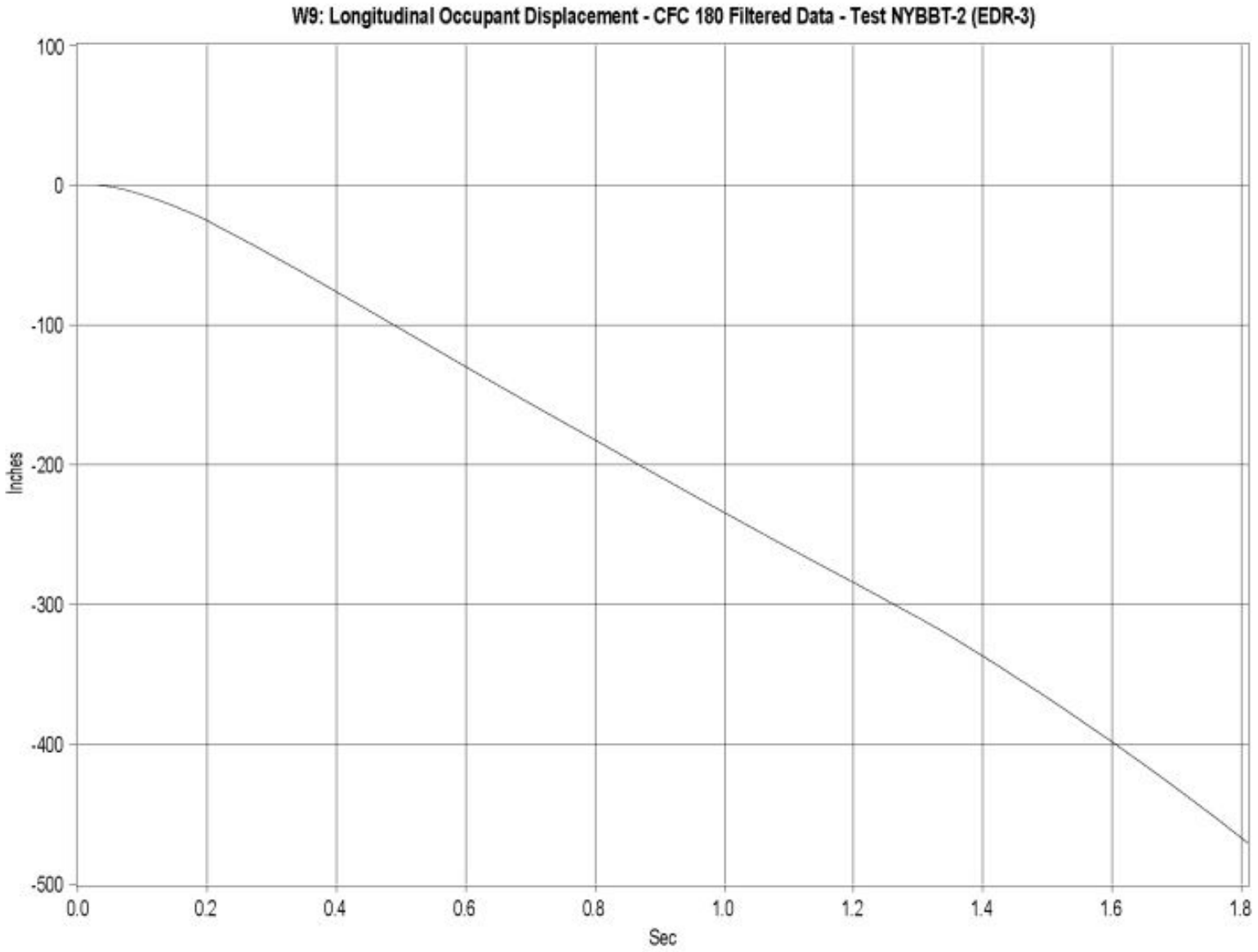


Figure H-3. Graph of Longitudinal Occupant Displacement (EDR-3), Test No. NYBBT-2

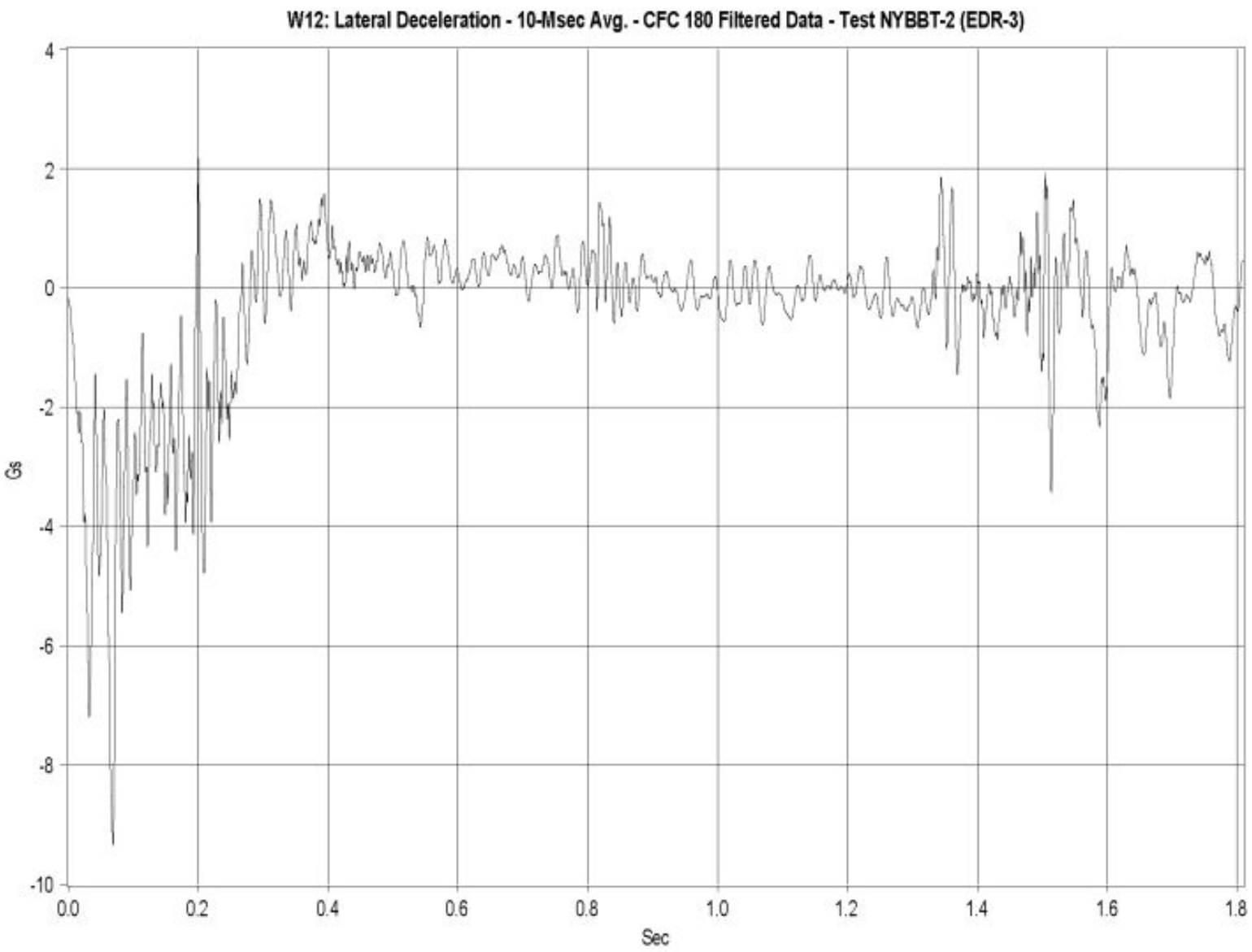


Figure H-4. Graph of Lateral Occupant Deceleration (EDR-3), Test No. NYBBT-2

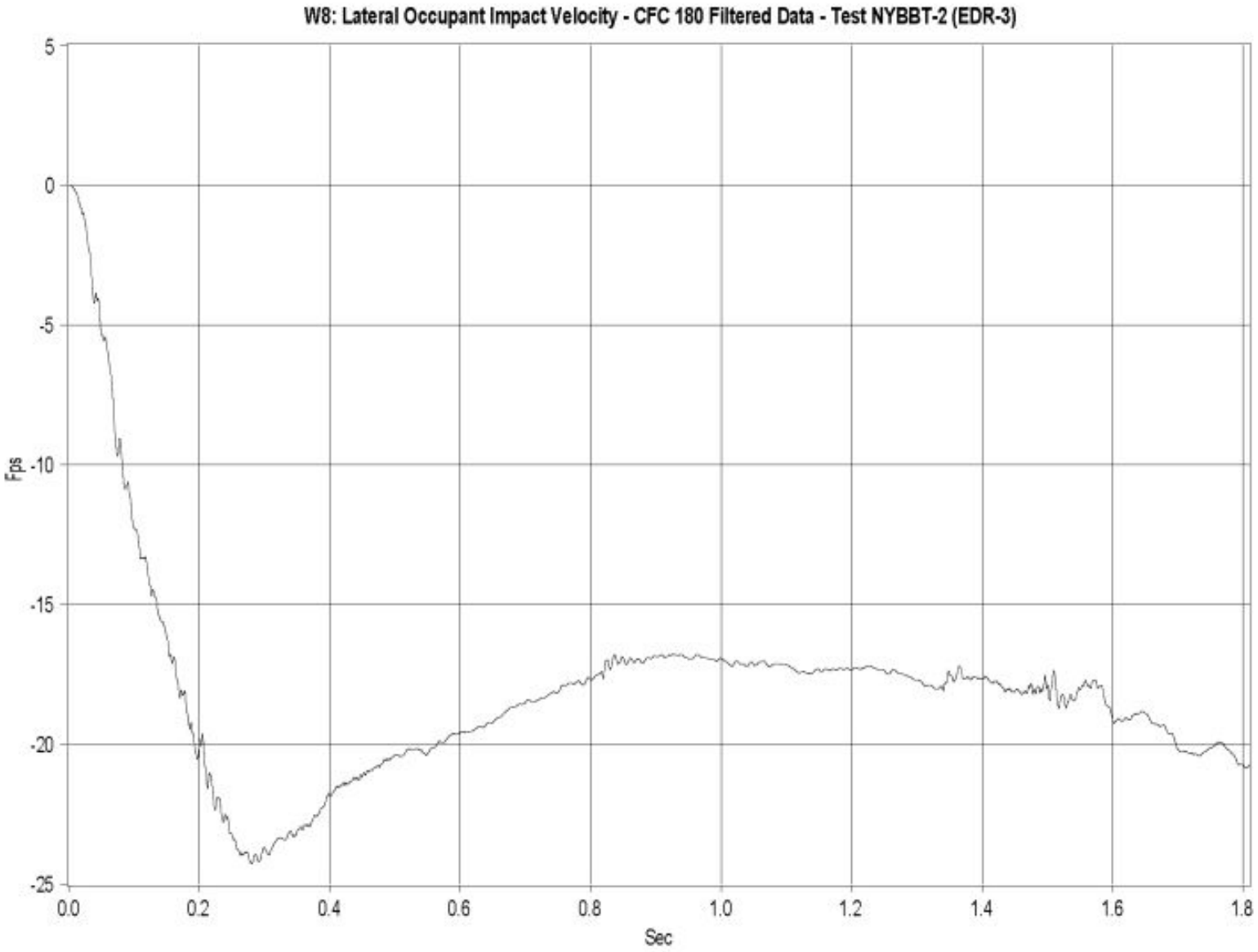


Figure H-5. Graph of Lateral Occupant Impact Velocity (EDR-3), Test No. NYBBT-2

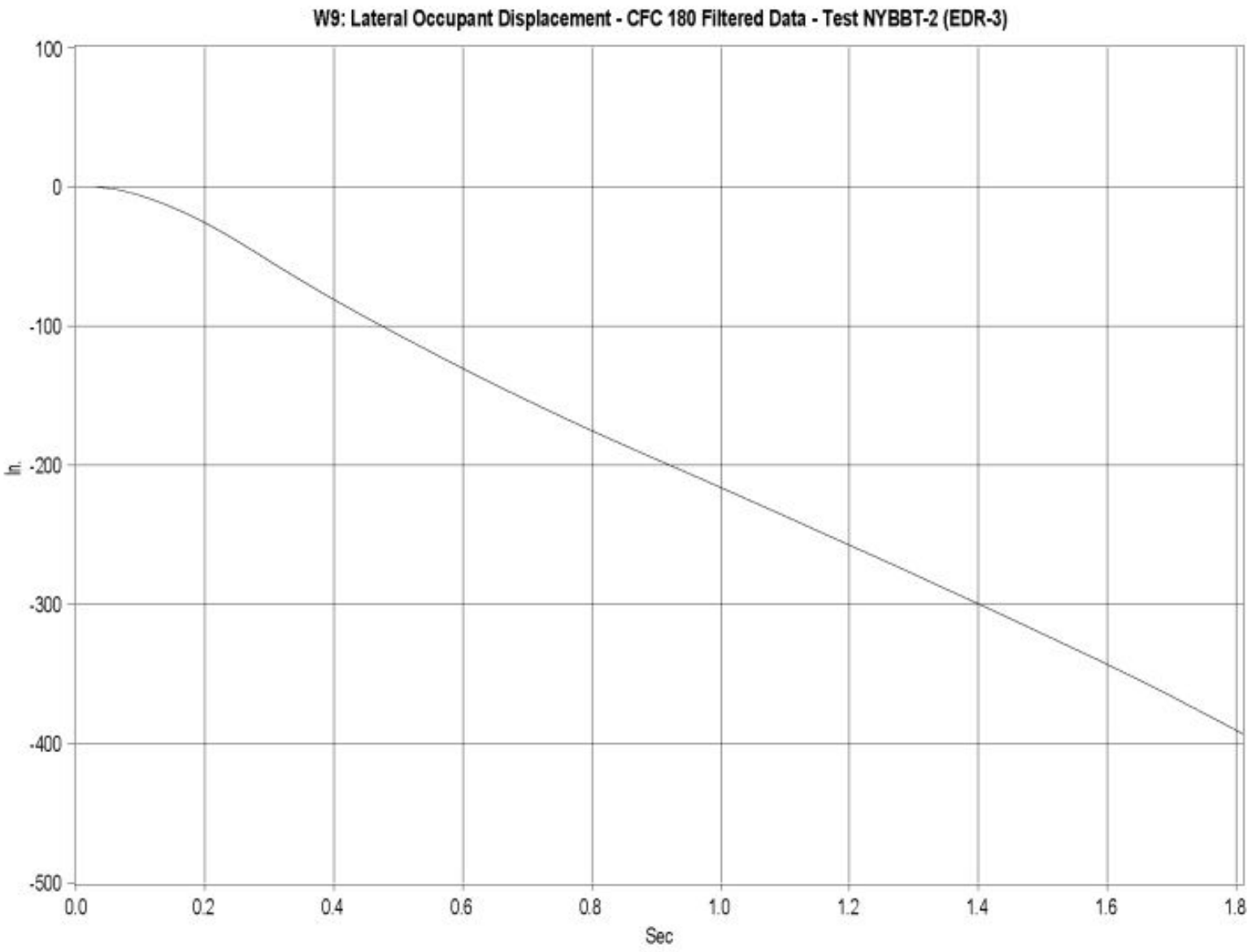


Figure H-6. Graph of Lateral Occupant Displacement (EDR-3), Test No. NYBBT-2

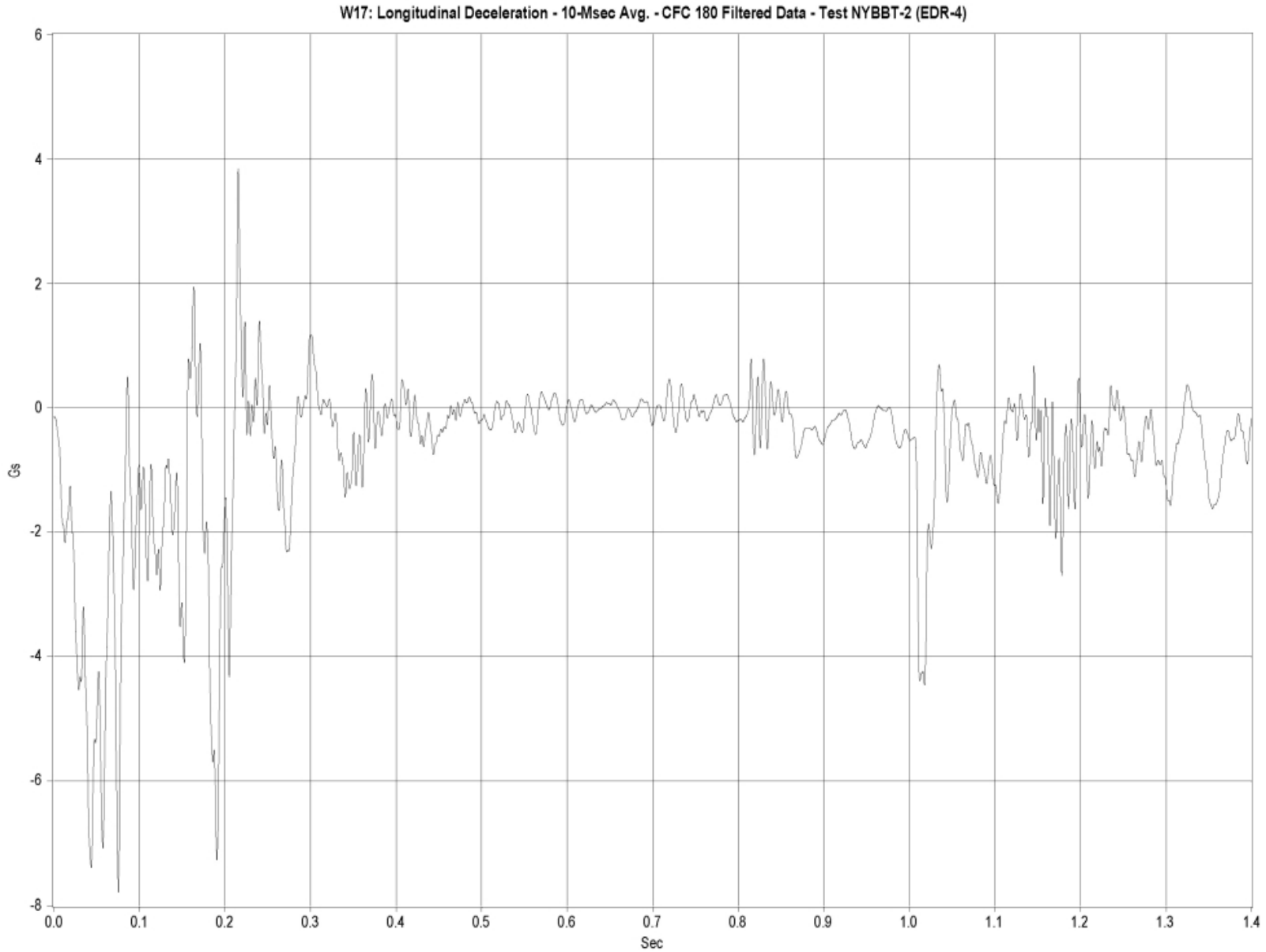


Figure H-7. Graph of Longitudinal Occupant Deceleration (EDR-4), Test No. NYBBT-2

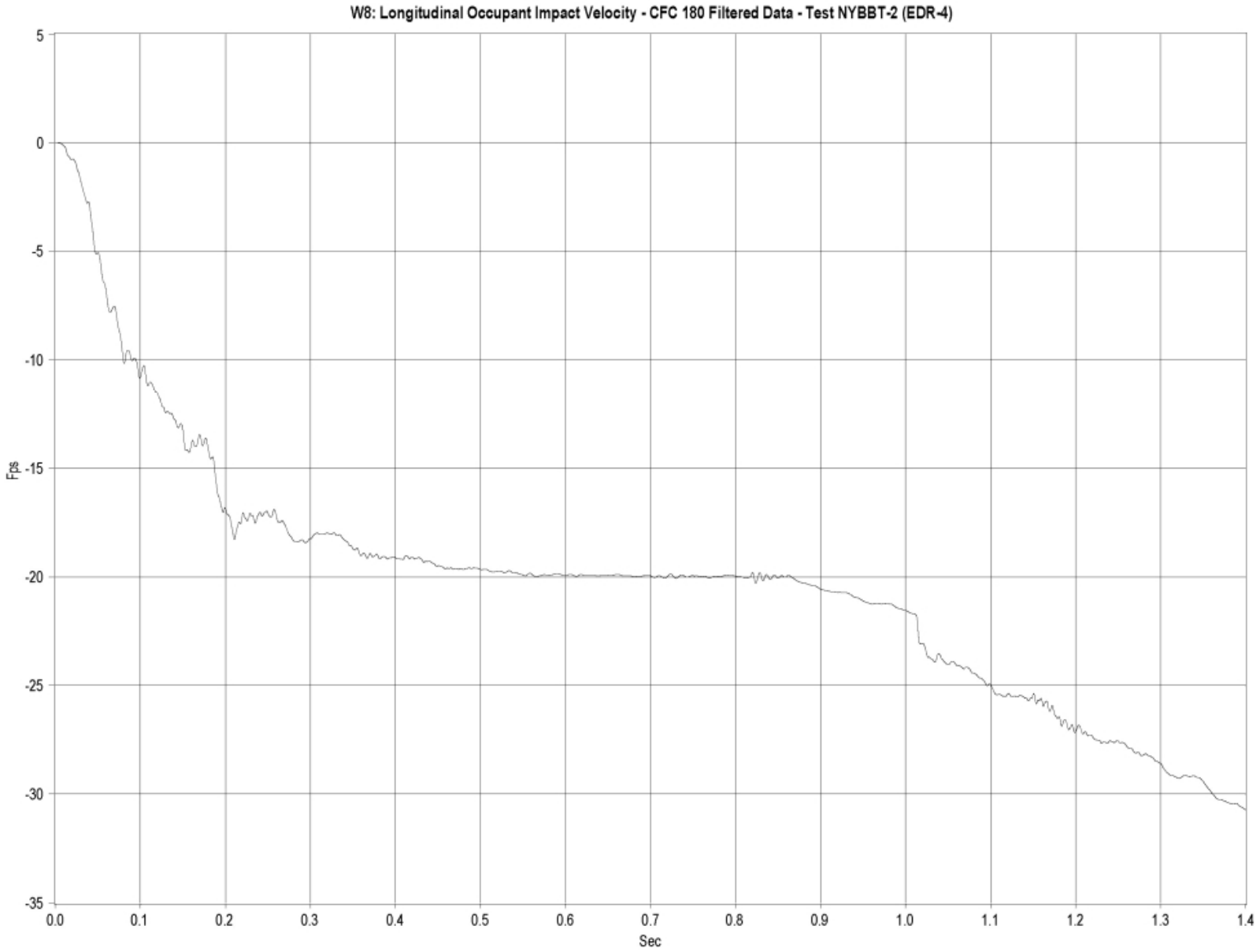


Figure H-8. Graph of Longitudinal Occupant Velocity (EDR-4), Test No. NYBBT-2

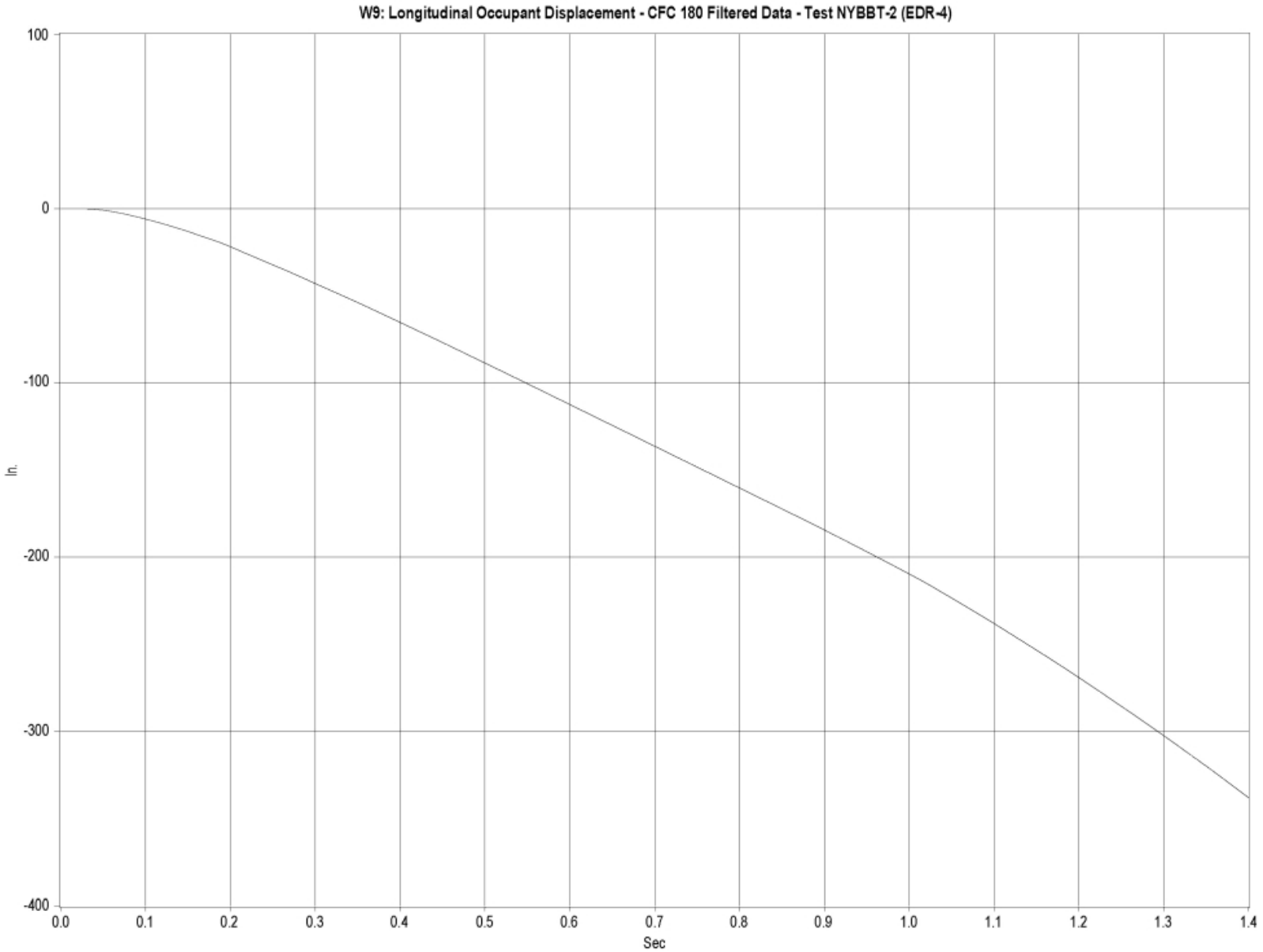


Figure H-9. Graph of Longitudinal Occupant Displacement (EDR-4), Test No. NYBBT-2

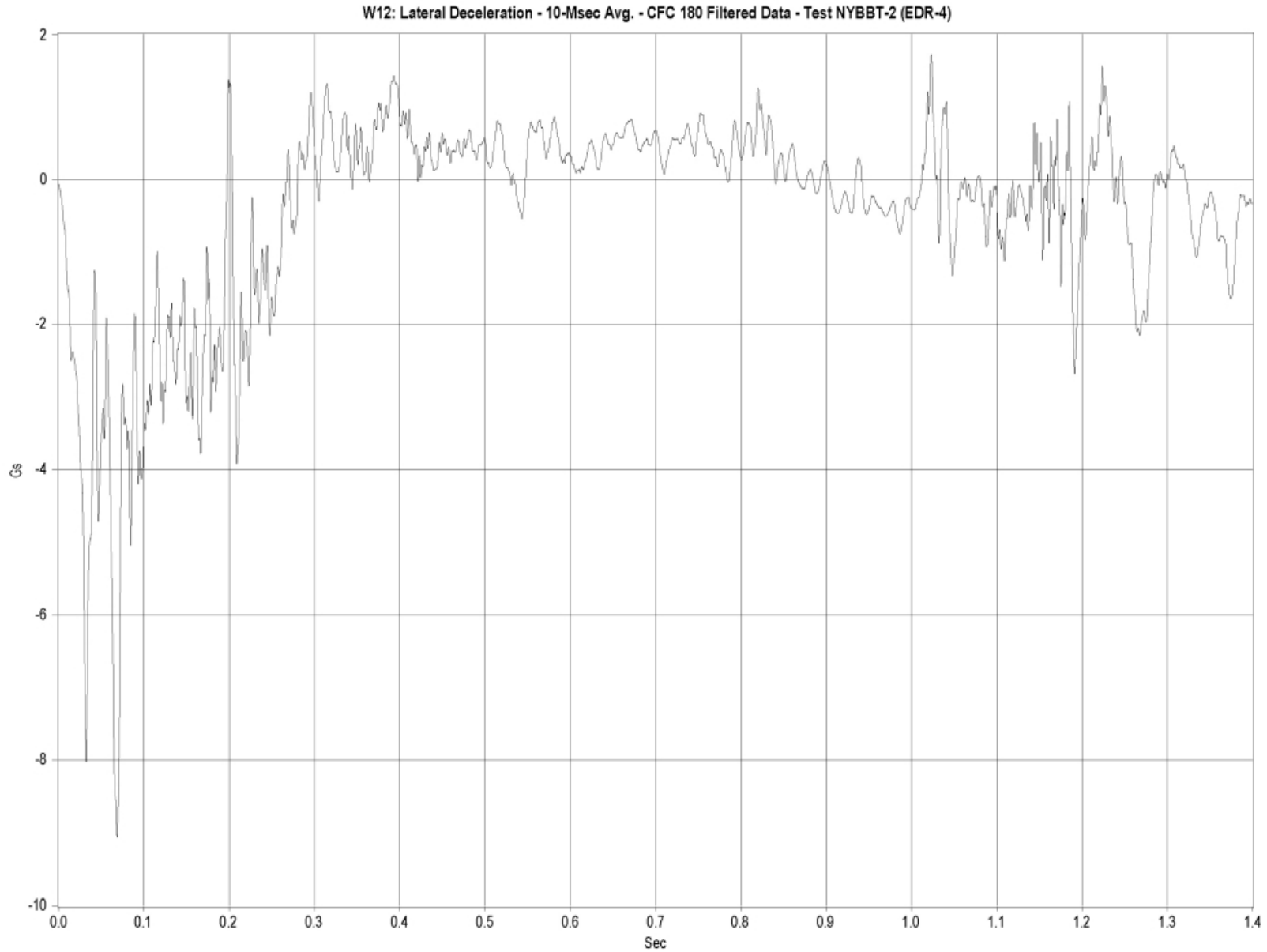


Figure H-10. Graph of Lateral Occupant Deceleration (EDR-4), Test No. NYBBT-2

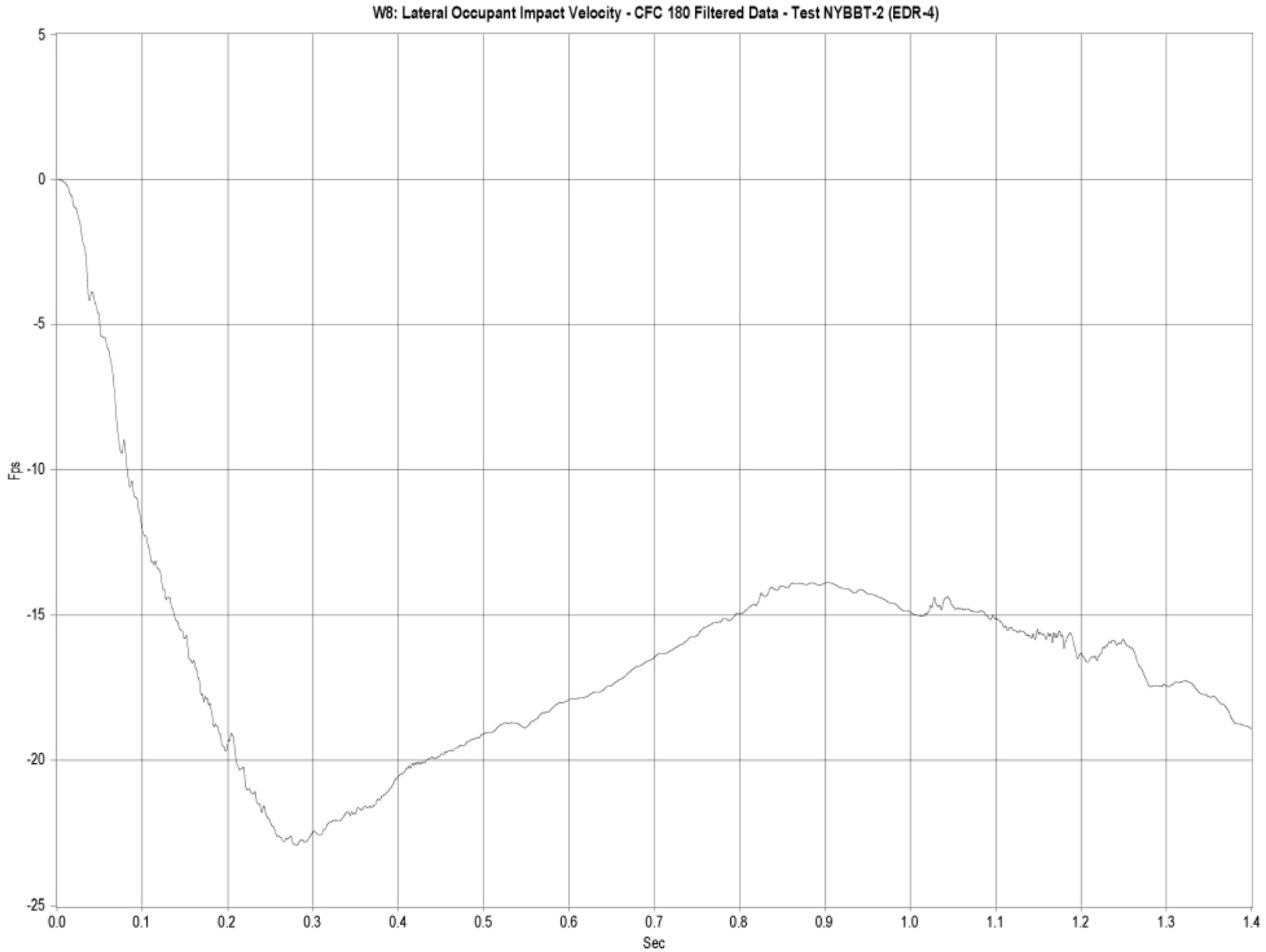


Figure H-11. Graph of Lateral Occupant Impact Velocity (EDR-4), Test No. NYBBT-2

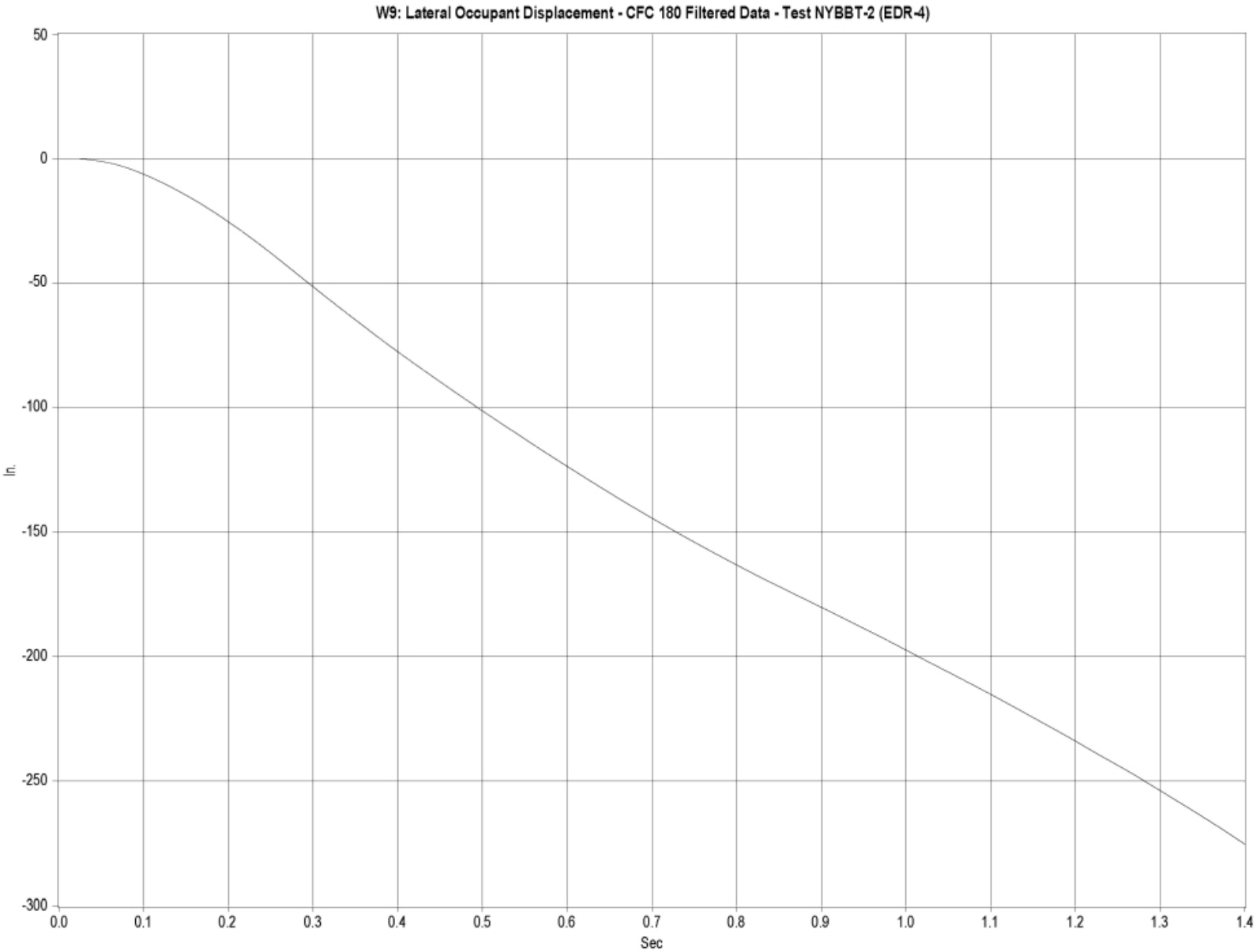


Figure H-12. Graph of Lateral Occupant Displacement (EDR-4), Test No. NYBBT-2

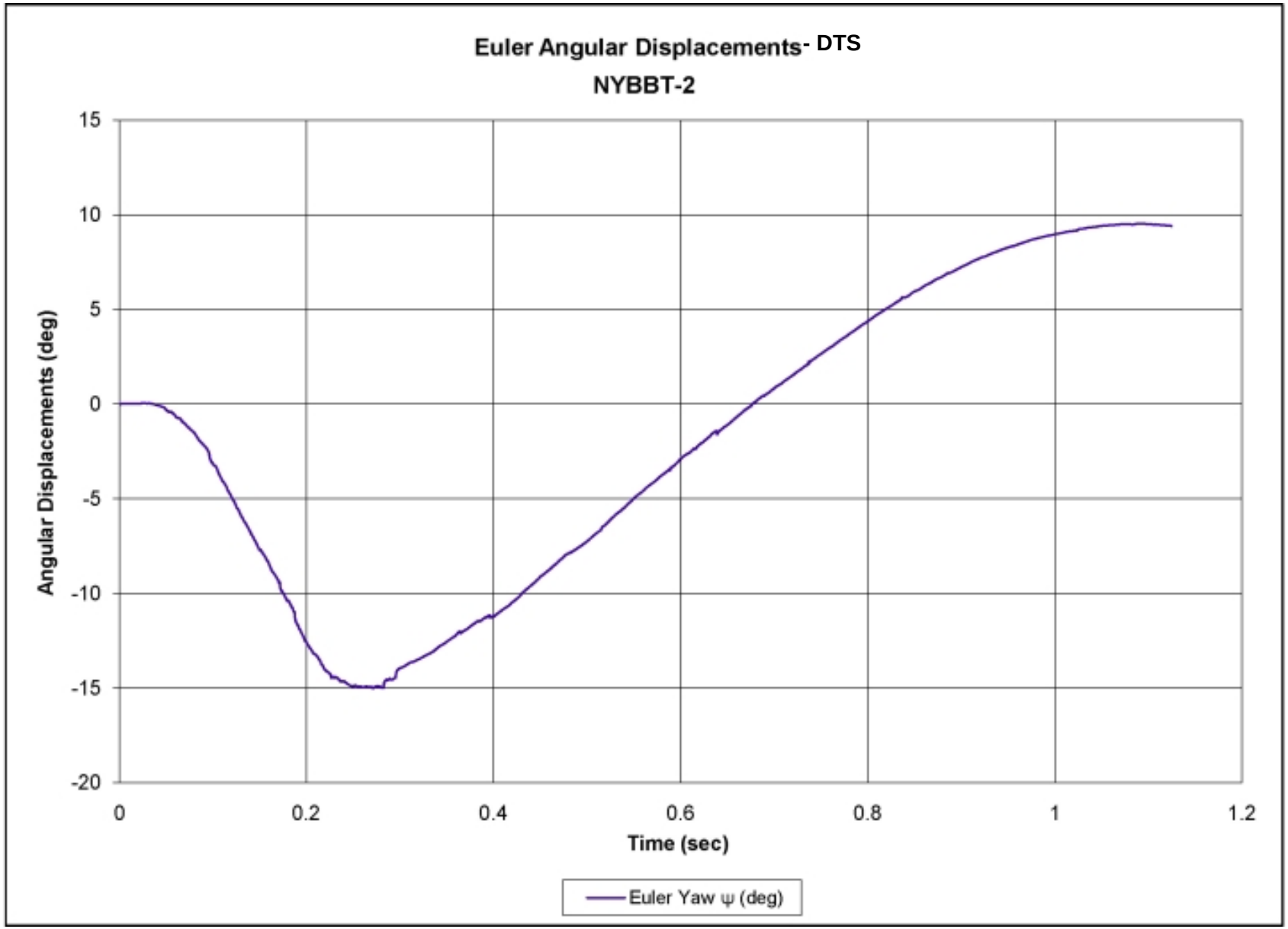


Figure H-13. Graph of Yaw Angular Displacement (DTS), Test No. NYBBT-2

APPENDIX I Accelerometer and Rate Transducer Data Analysis, Test No. NYBBT-3

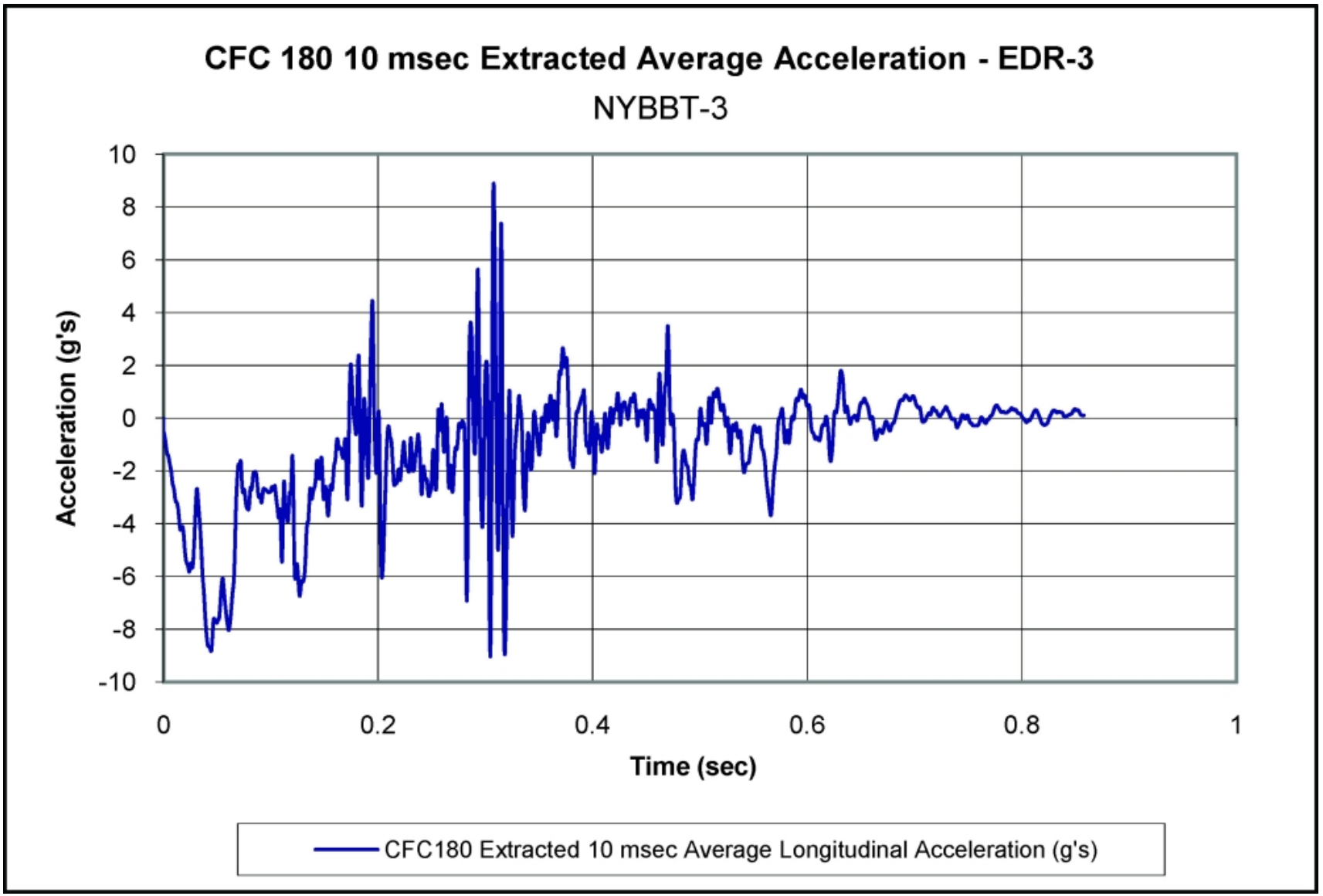


Figure I-1. Graph of Longitudinal Occupant Deceleration (EDR-3), Test No. NYBBT-3

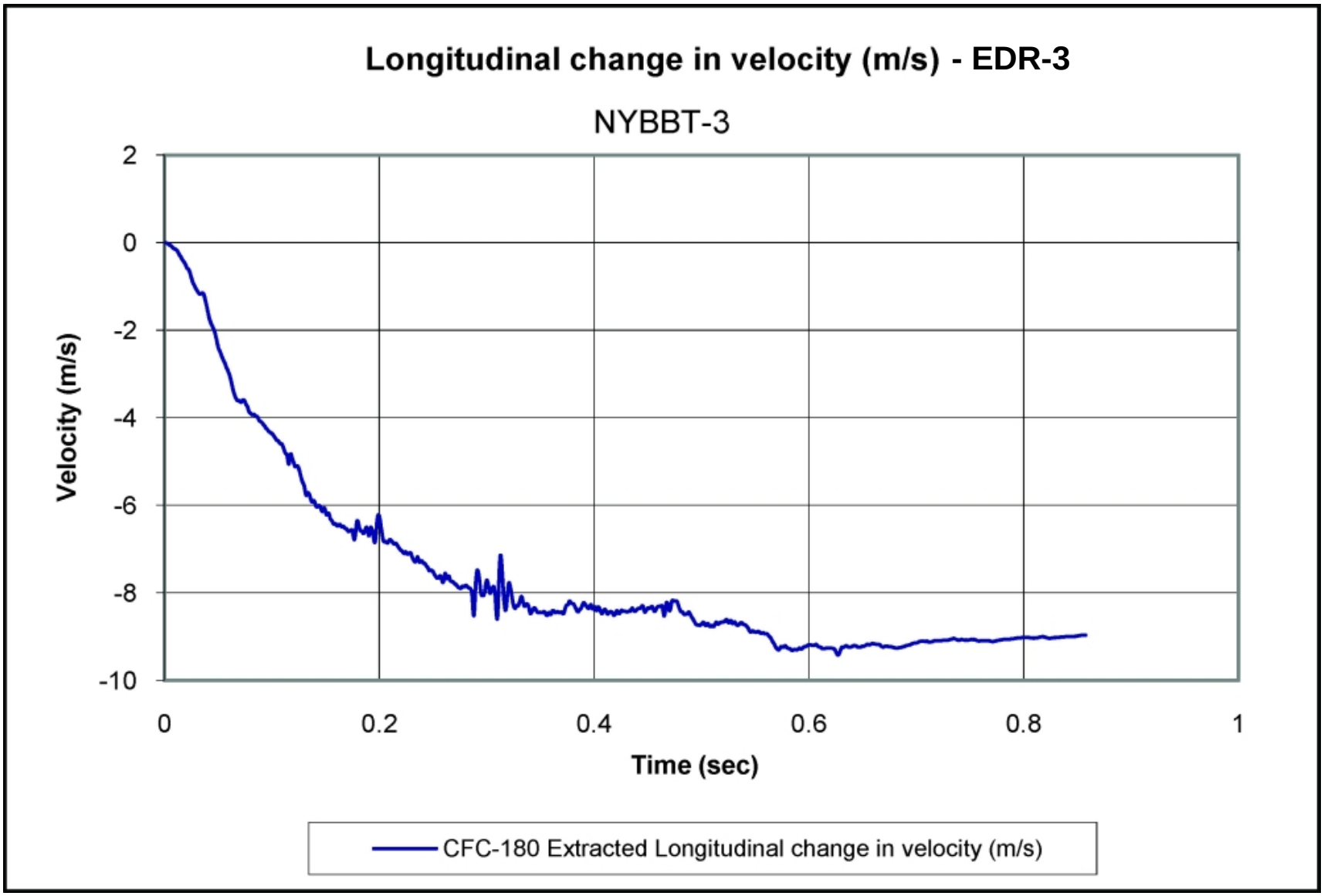


Figure I-2. Graph of Longitudinal Occupant Impact Velocity (EDR-3), Test No. NYBBT-3

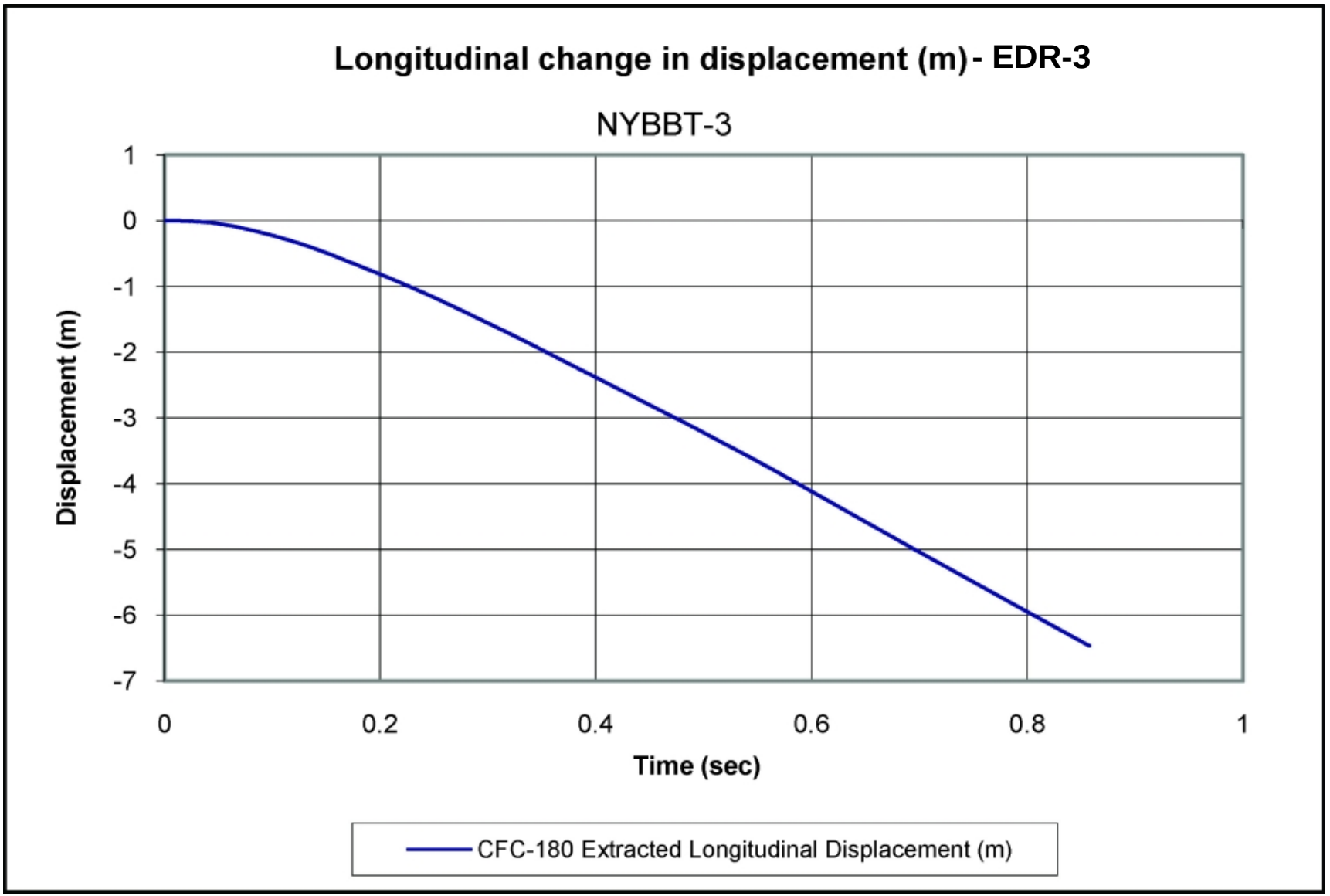


Figure I-3. Graph of Longitudinal Occupant Displacement (EDR-3), Test No. NYBBT-3

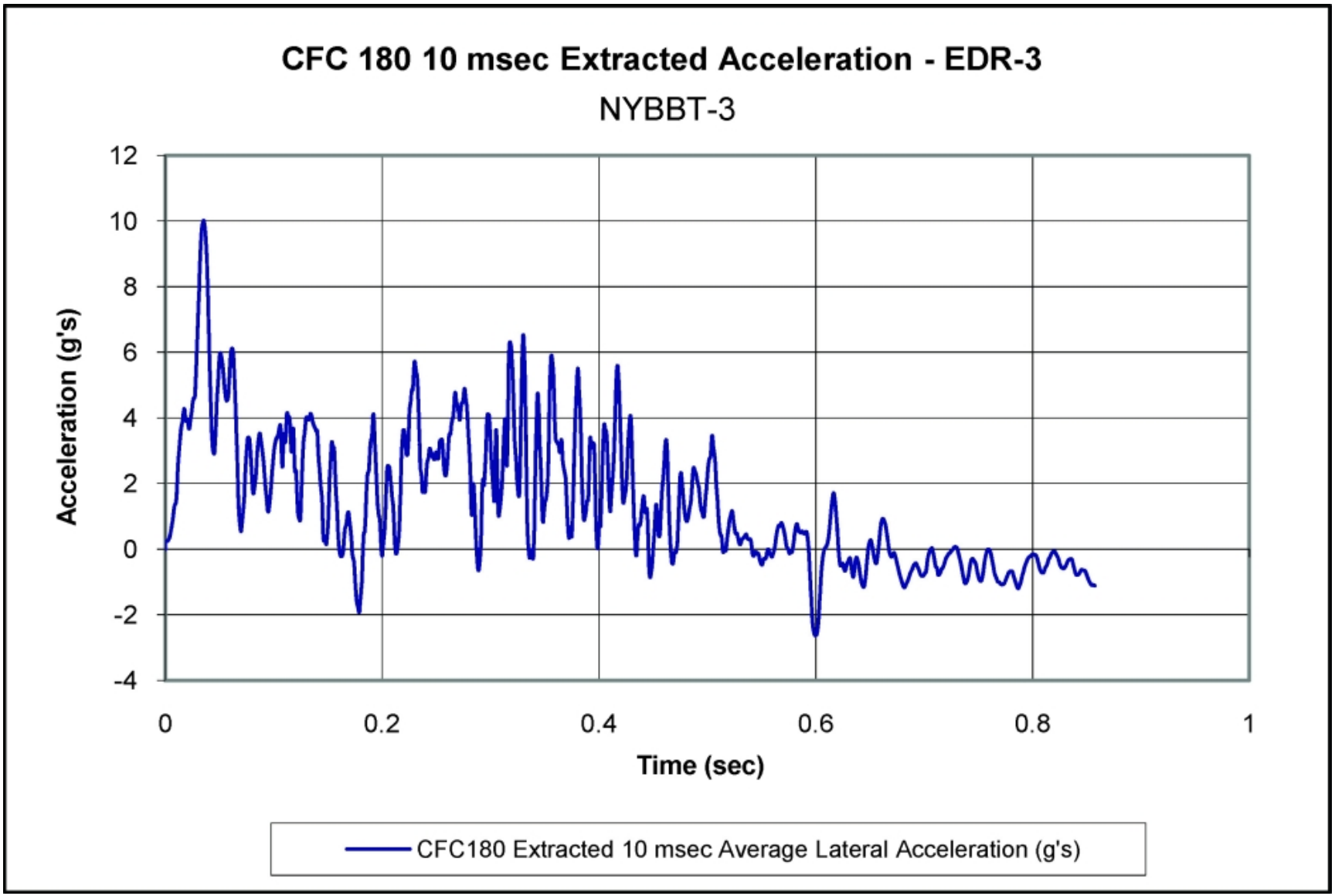


Figure I-4. Graph of Lateral Occupant Deceleration (EDR-3), Test No. NYBBT-3

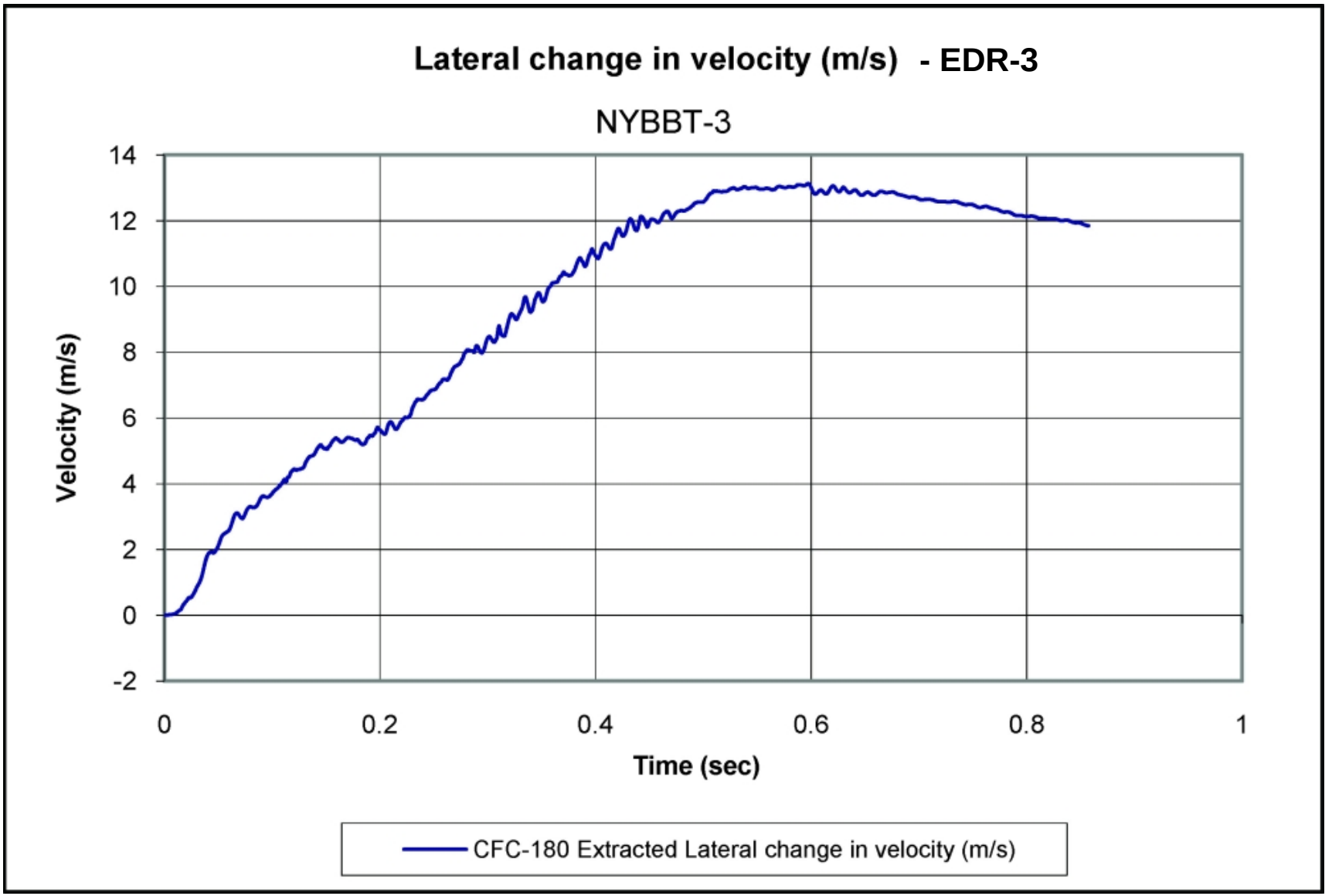


Figure I-5. Graph of Lateral Occupant Impact Velocity (EDR-3), Test No. NYBBT-3

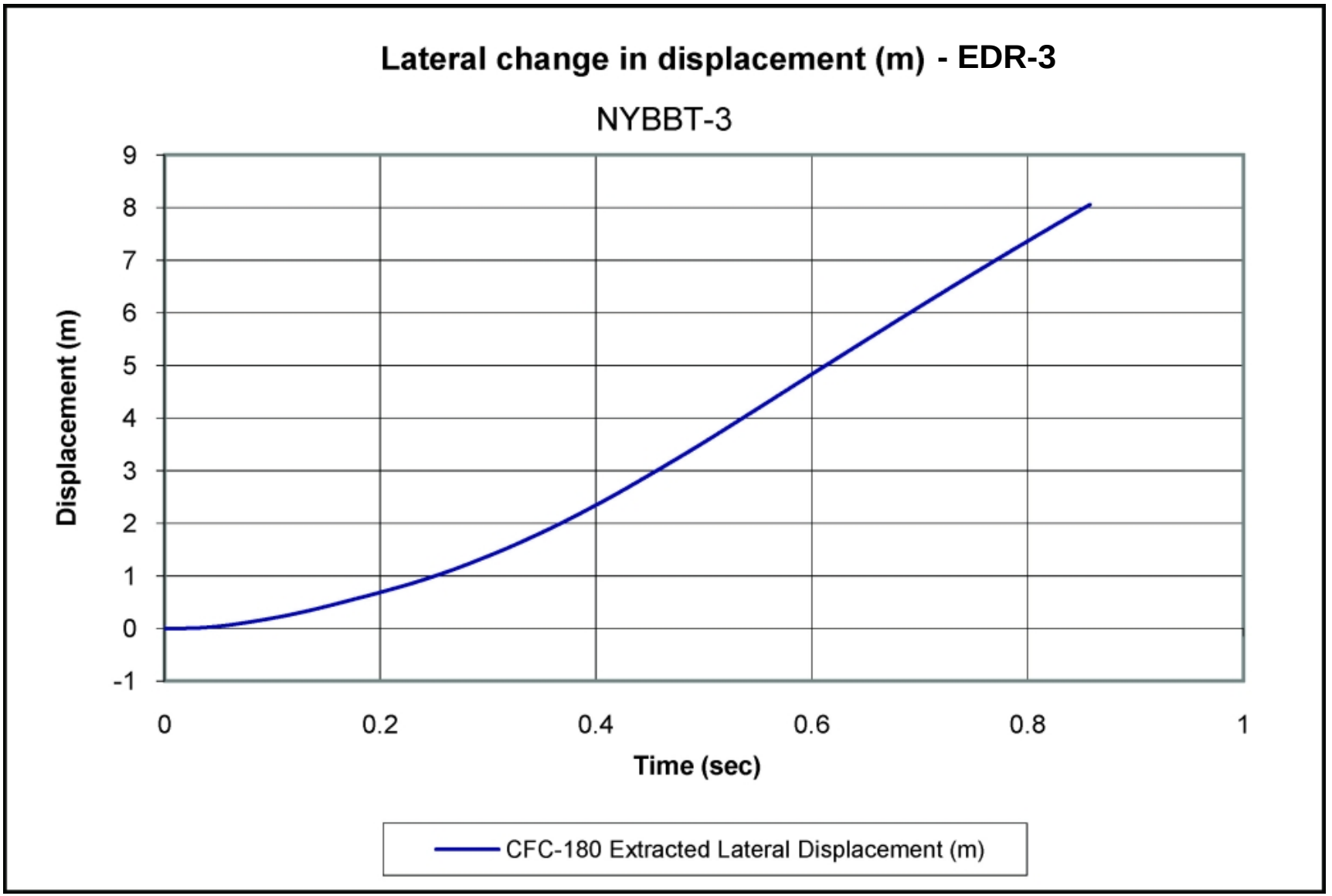


Figure I-6. Graph of Lateral Occupant Displacement (EDR-3), Test No. NYBBT-3

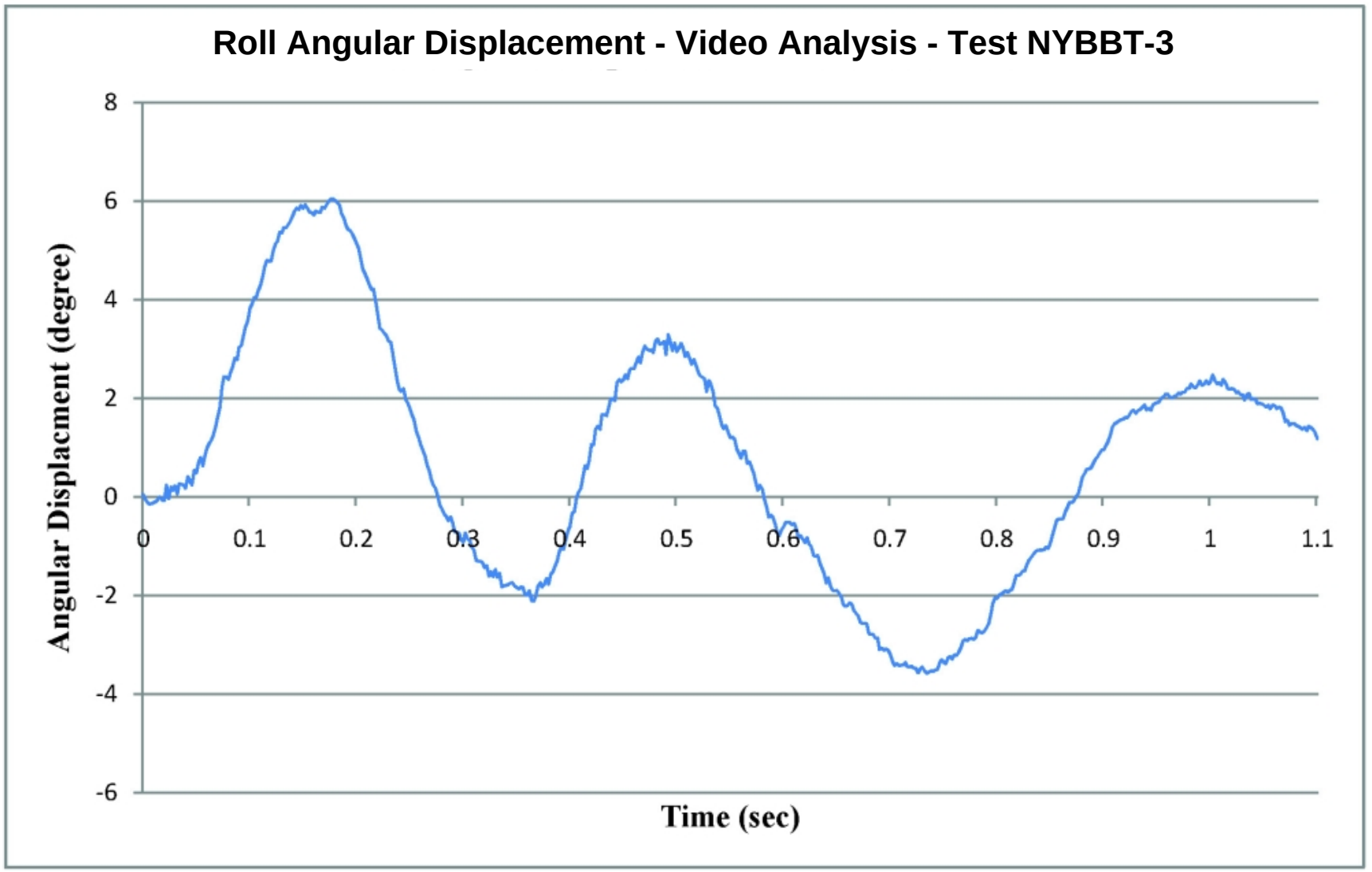


Figure I-7. Graph of Roll Angular Displacement (Video Analysis), Test No. NYBBT-3

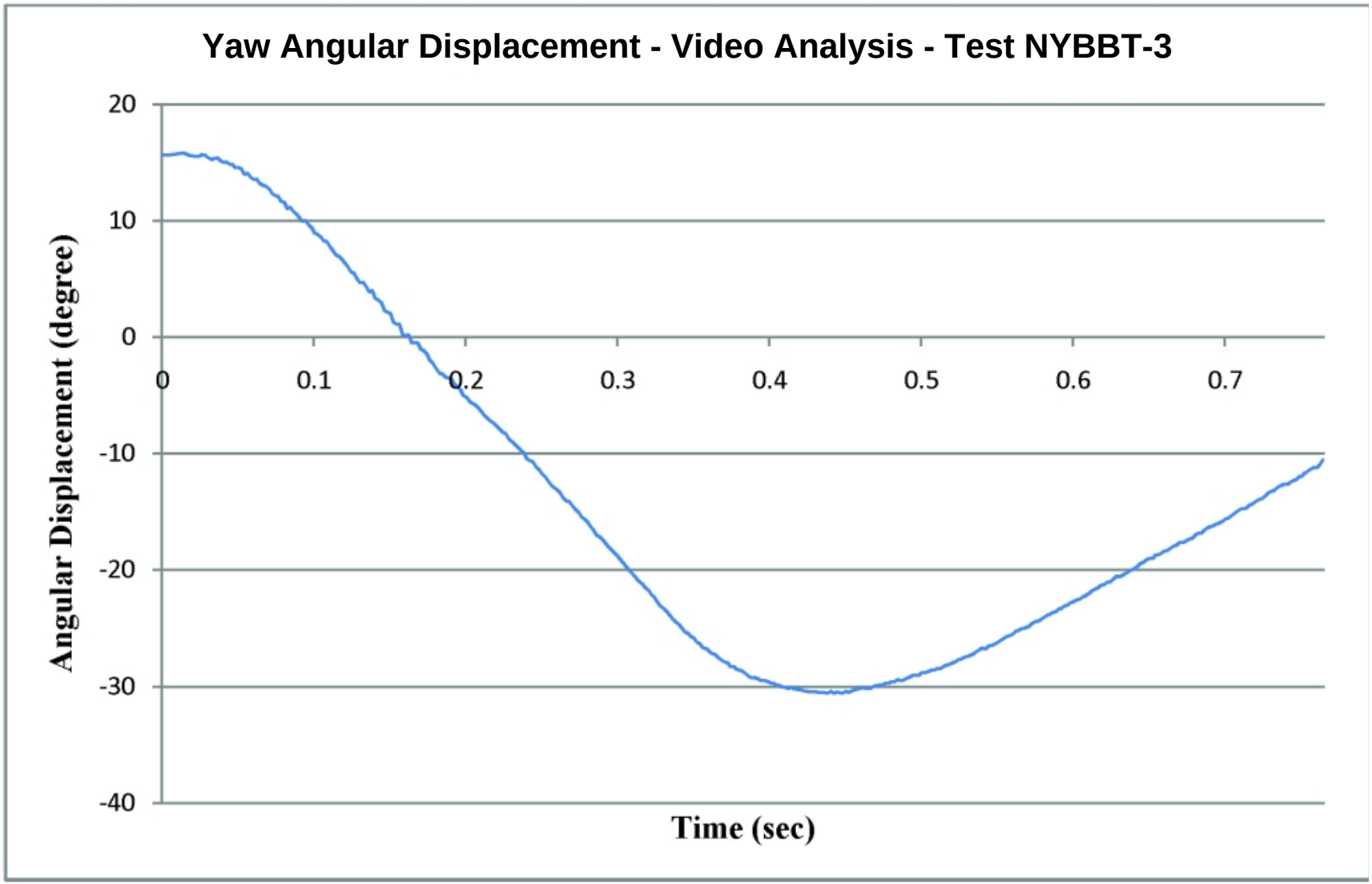


Figure I-8. Graph of Yaw Angular Displacement (Video Analysis), Test No. NYBBT-3

APPENDIX J Modified Type IIA Box Beam Terminal System Details - Metric and English Units, Test No. NYBBT-4

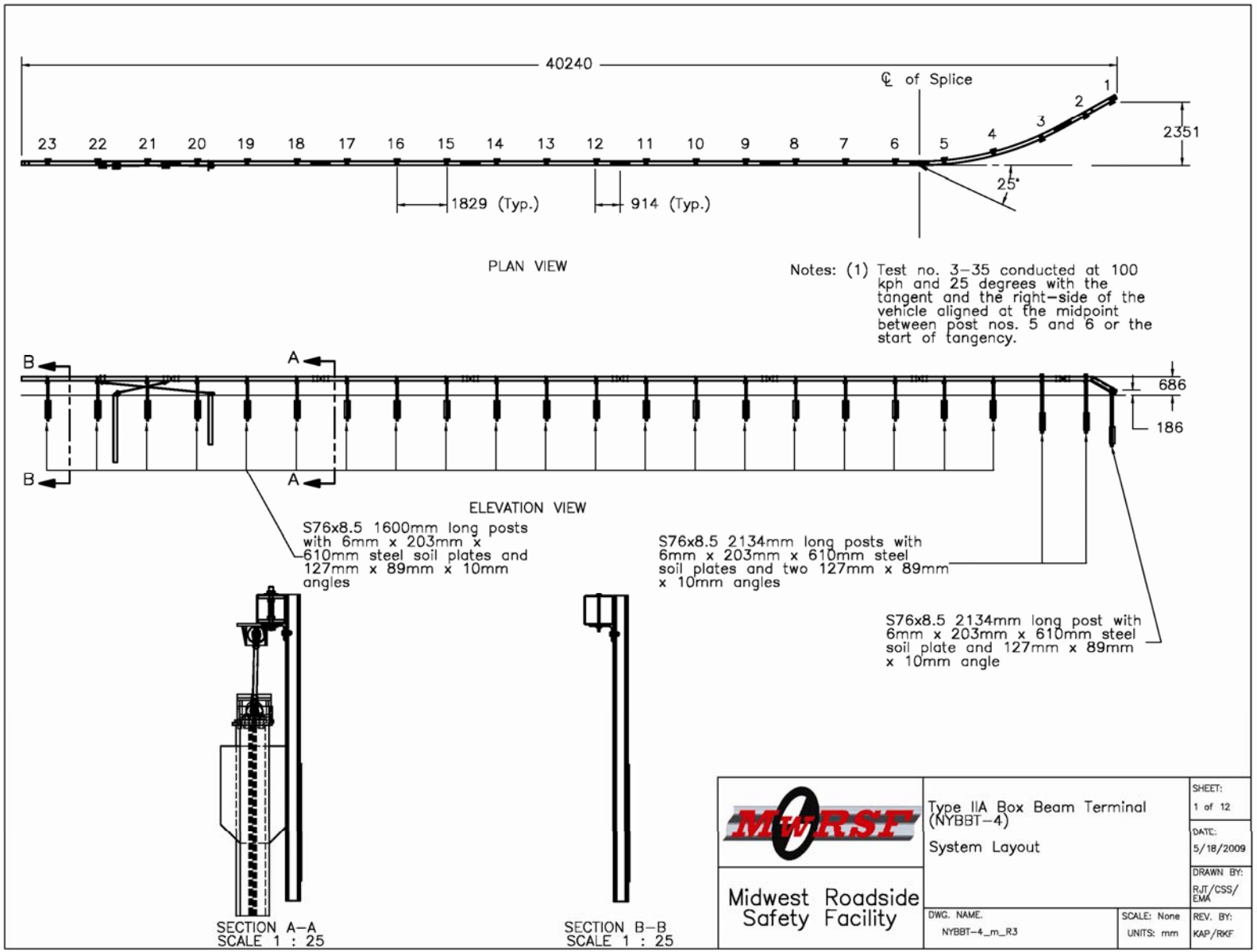


Figure J-1. Modified Type IIA Box Beam Terminal System Details (Metric), Test No. NYBBT-4

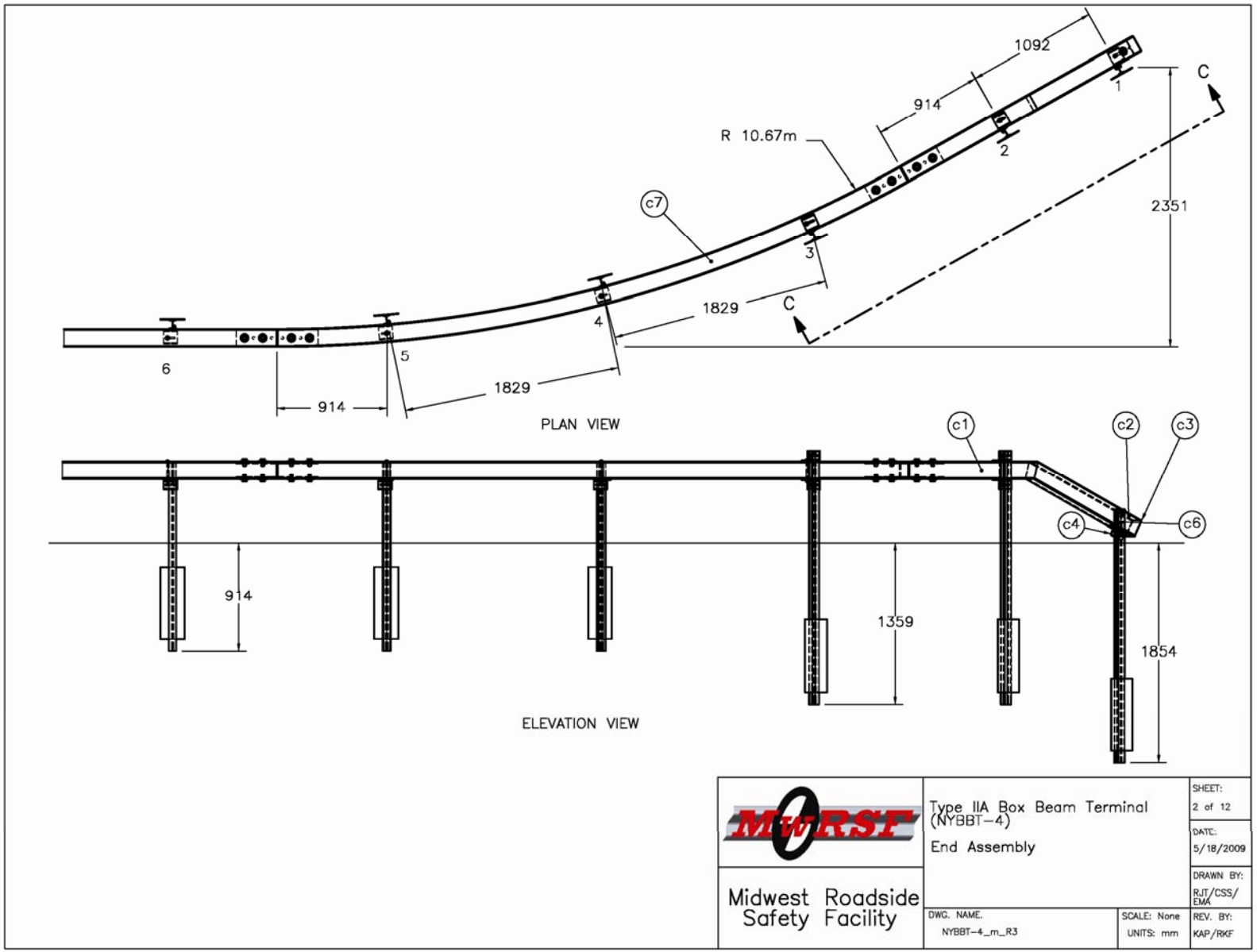


Figure J-2. Modified Type IIA Box Beam Terminal System Details (Metric), Test No. NYBBT-4

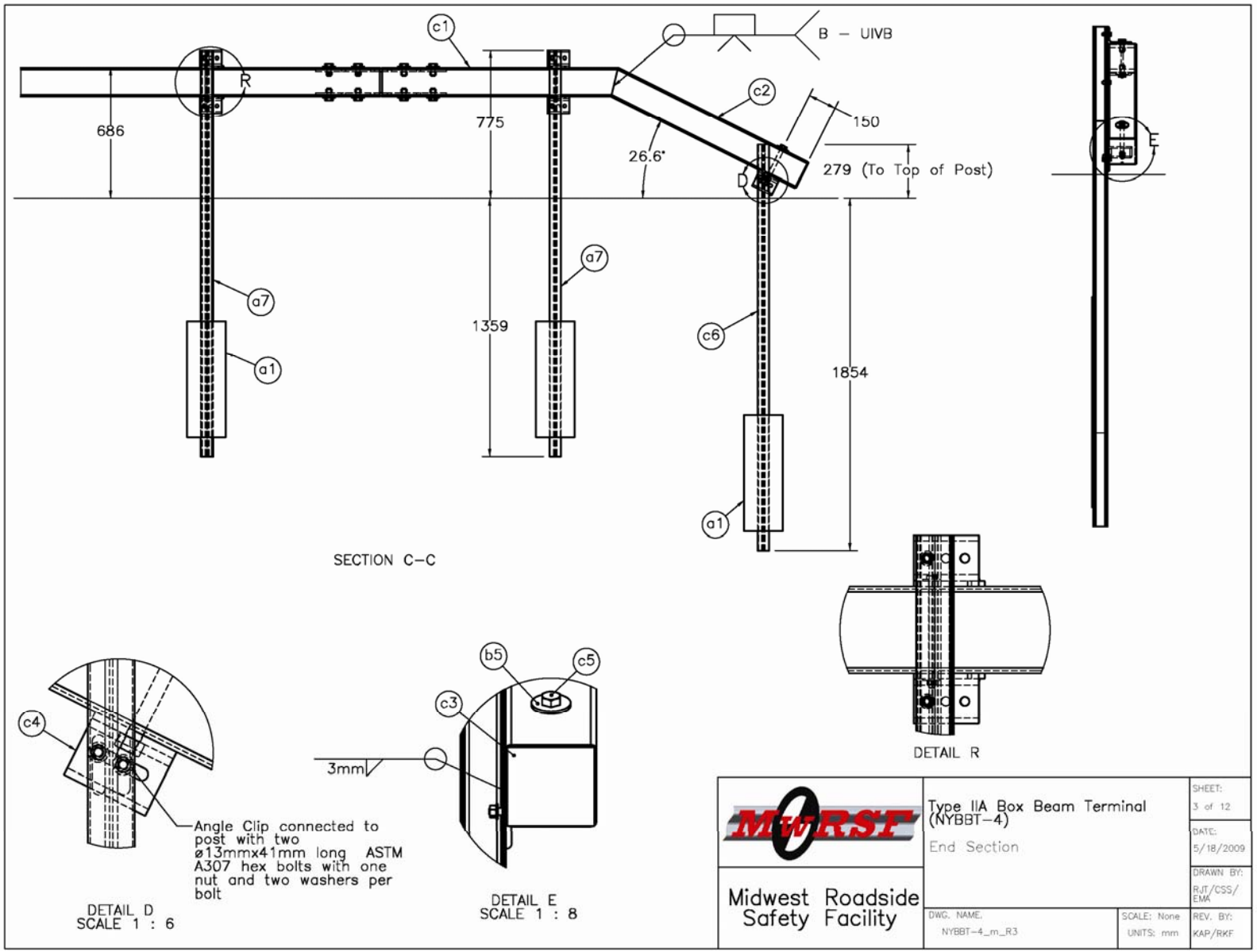


Figure J-3. Modified Type IIA Box Beam Terminal System Details (Metric), Test No. NYBBT-4

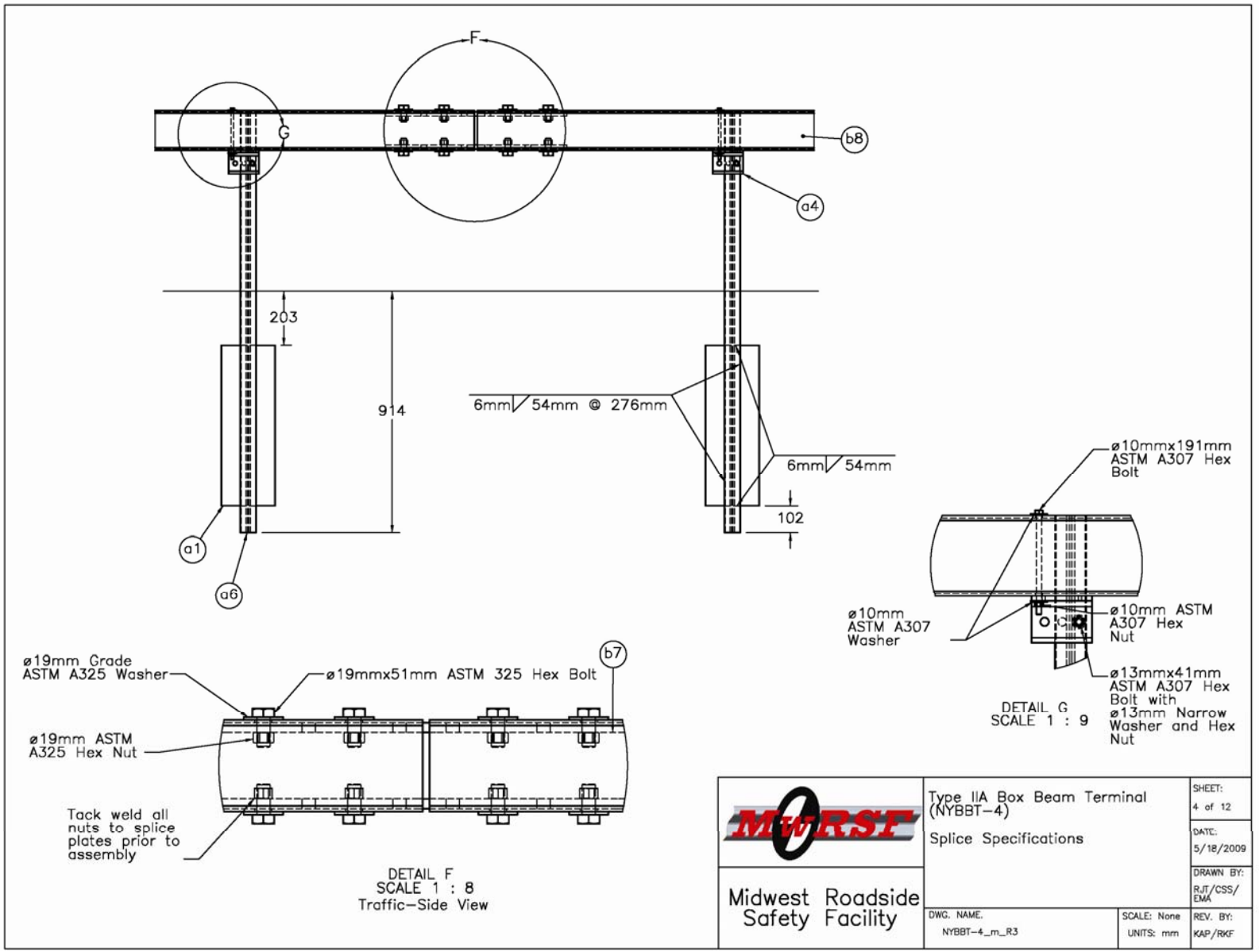


Figure J-4. Modified Type IIA Box Beam Terminal System Details (Metric), Test No. NYBBT-4

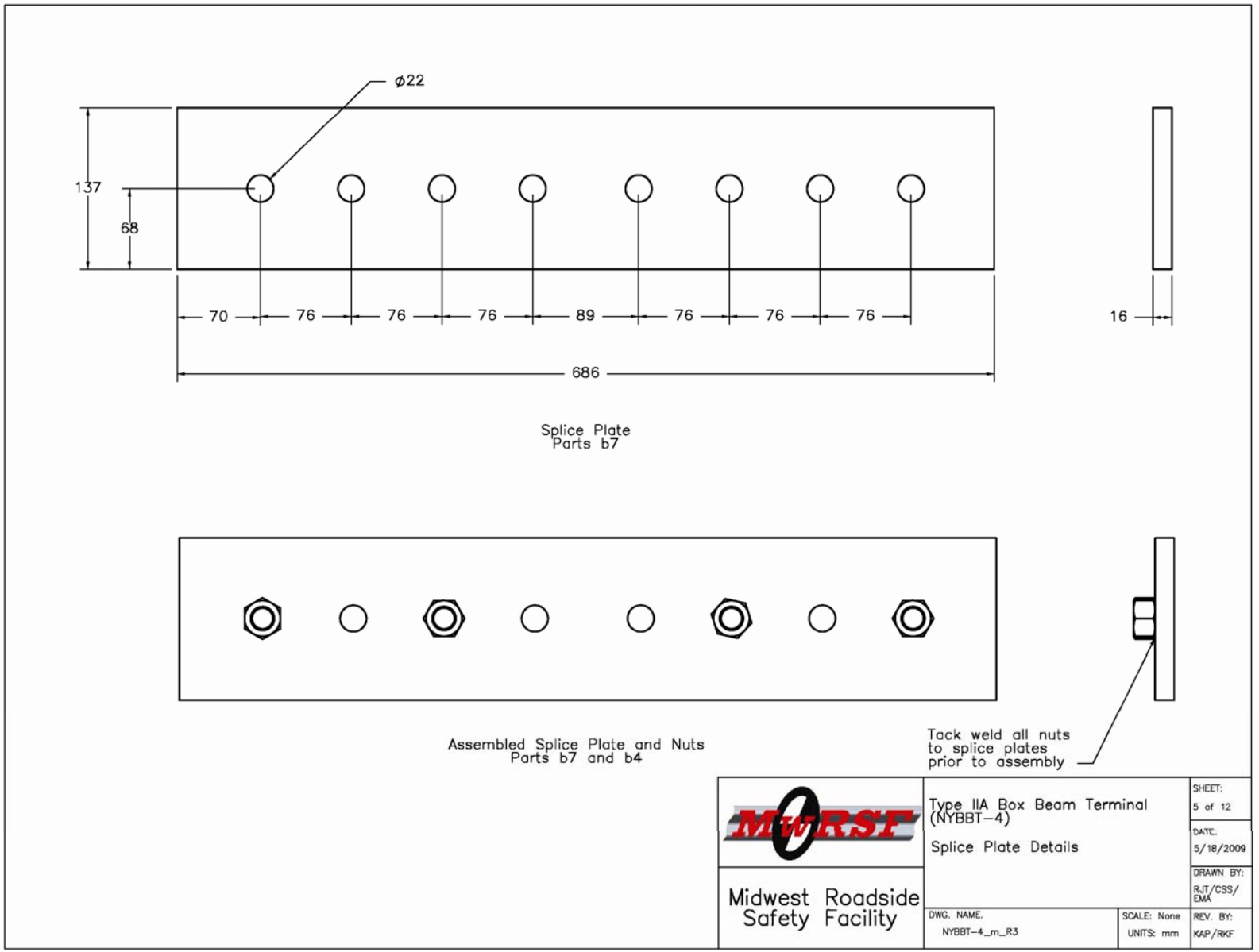


Figure J-5. Modified Type IIA Box Beam Terminal System Details (Metric), Test No. NYBBT-4

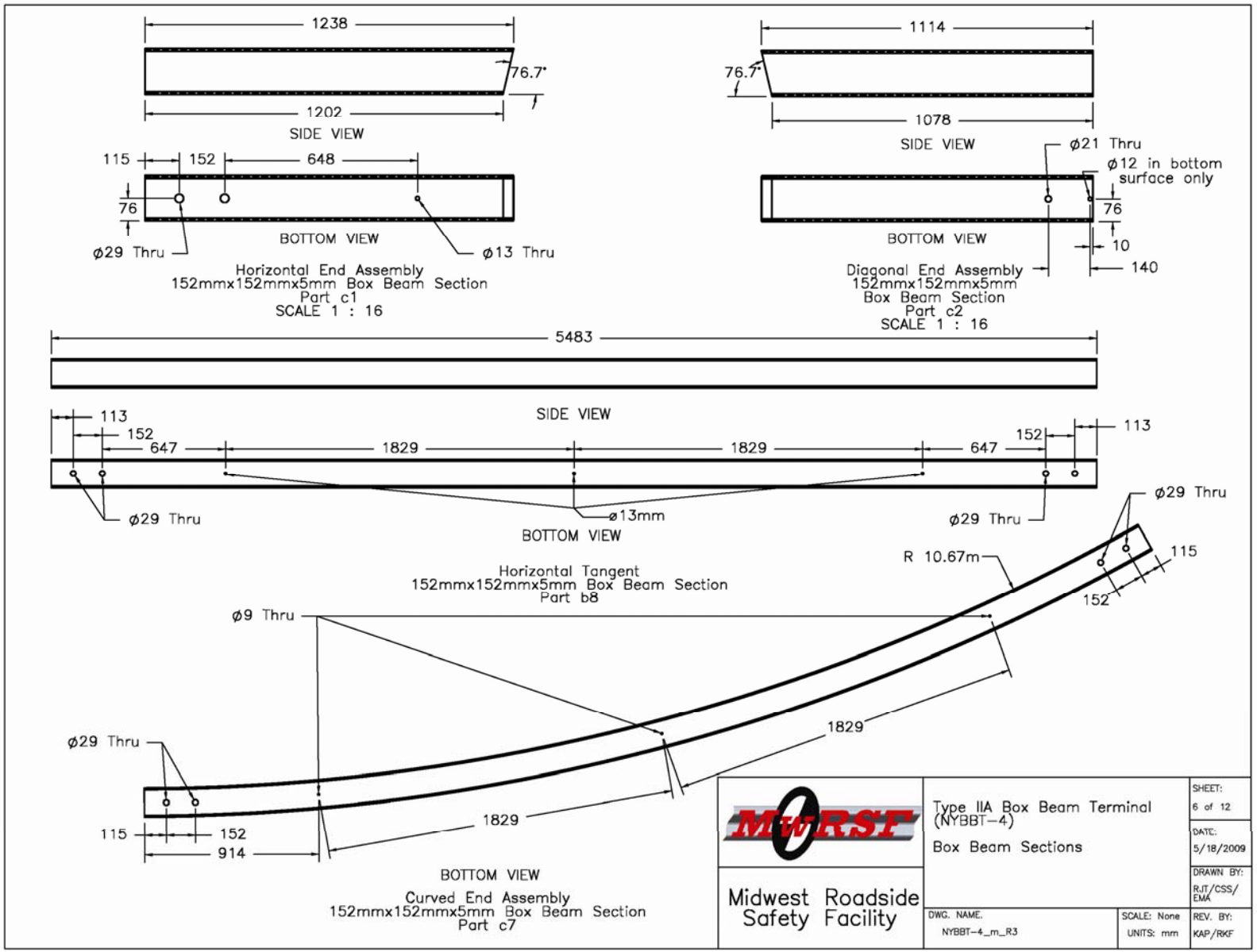


Figure J-6. Modified Type IIA Box Beam Terminal System Details (Metric), Test No. NYBBT-4

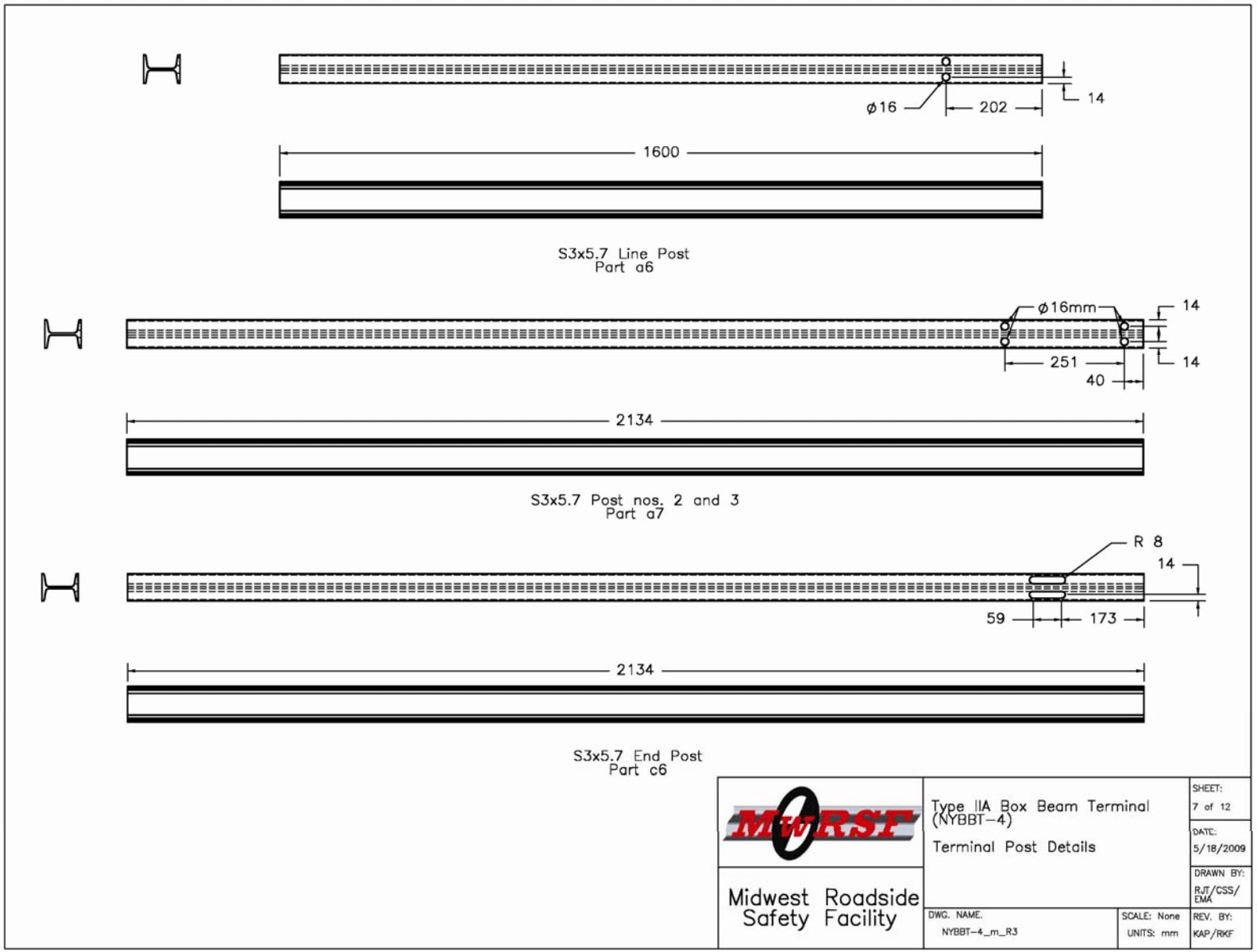


Figure J-7. Modified Type IIA Box Beam Terminal System Details (Metric), Test No. NYBBT-4

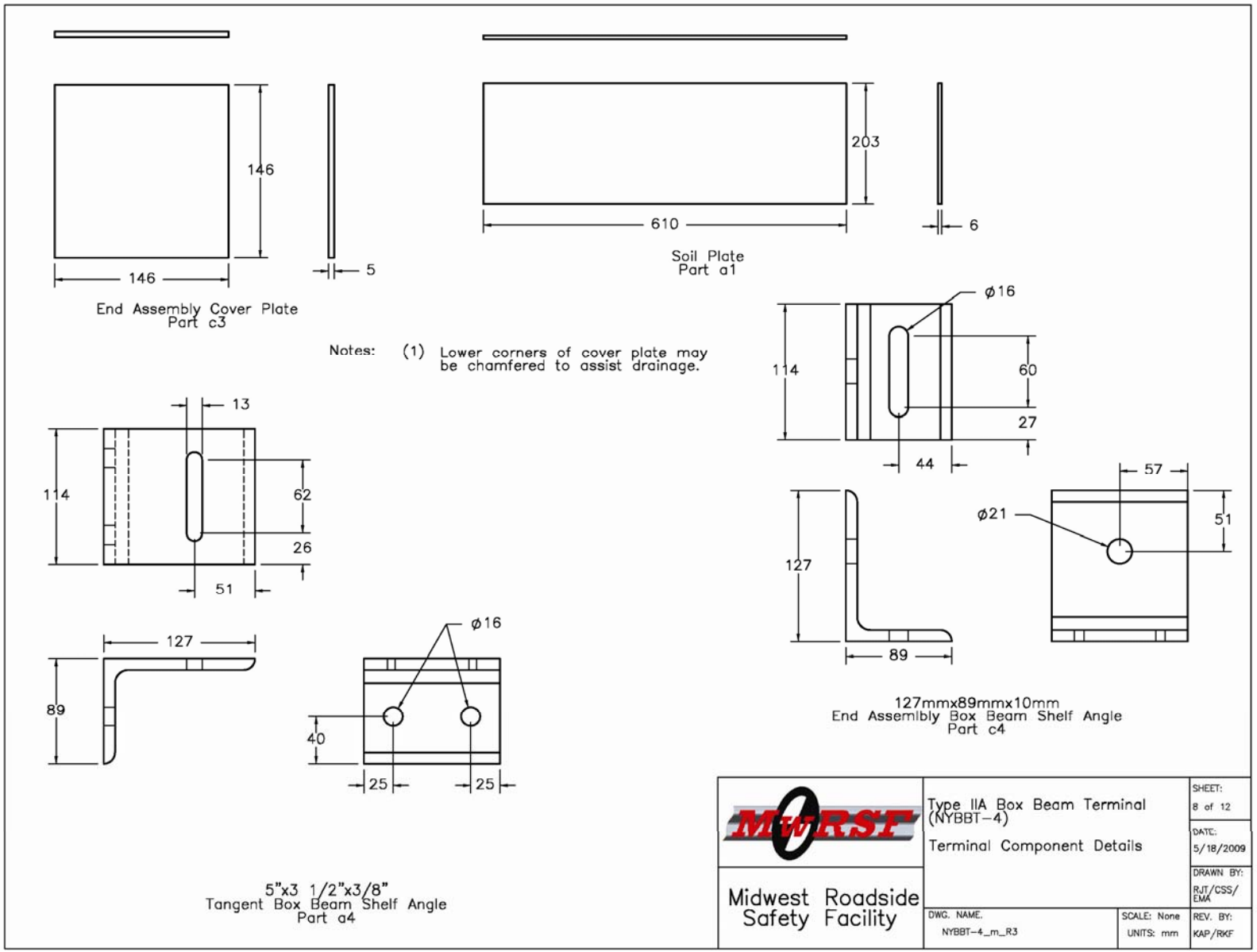


Figure J-8. Modified Type IIA Box Beam Terminal System Details (Metric), Test No. NYBBT-4

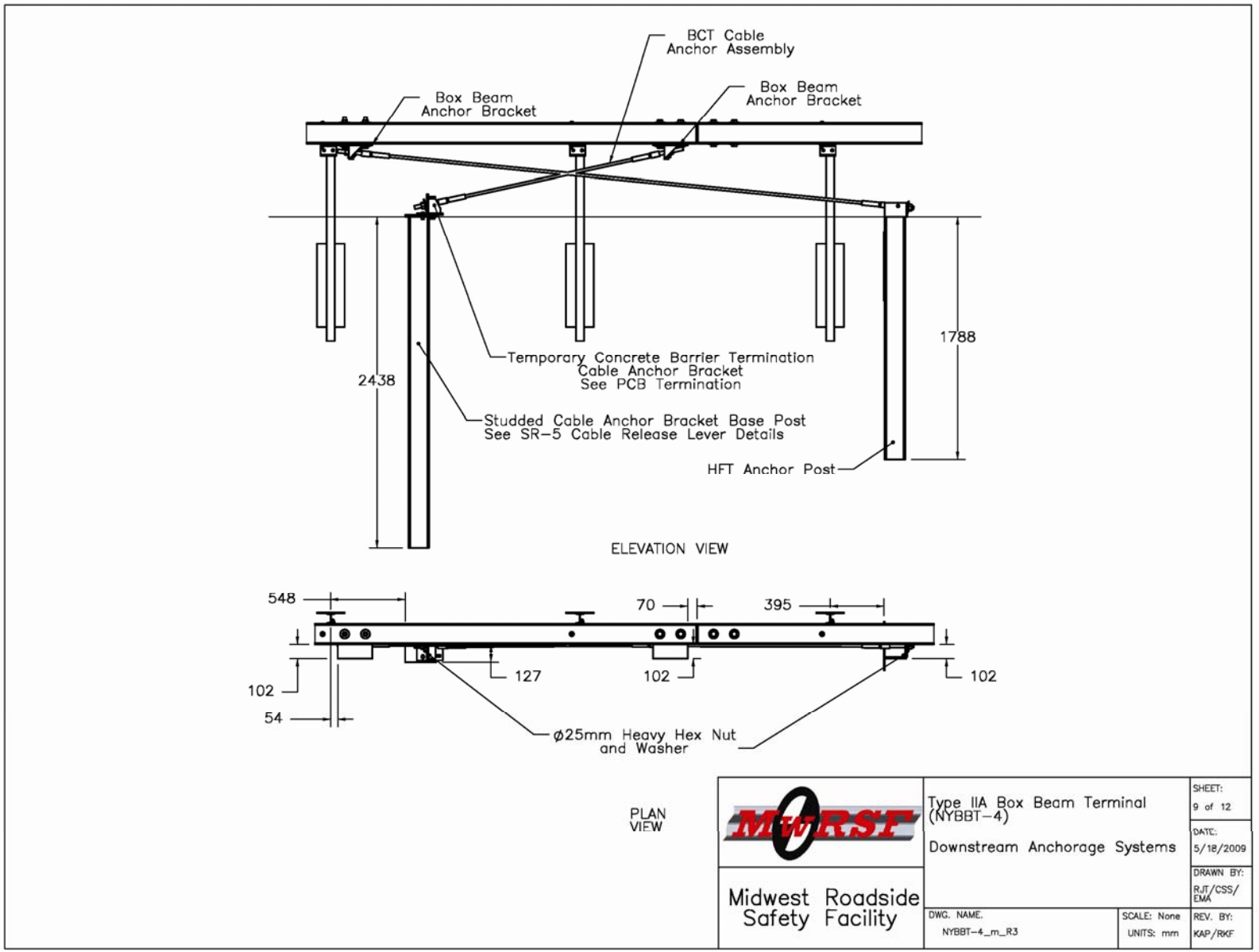


Figure J-9. Modified Type IIA Box Beam Terminal System Details (Metric), Test No. NYBBT-4

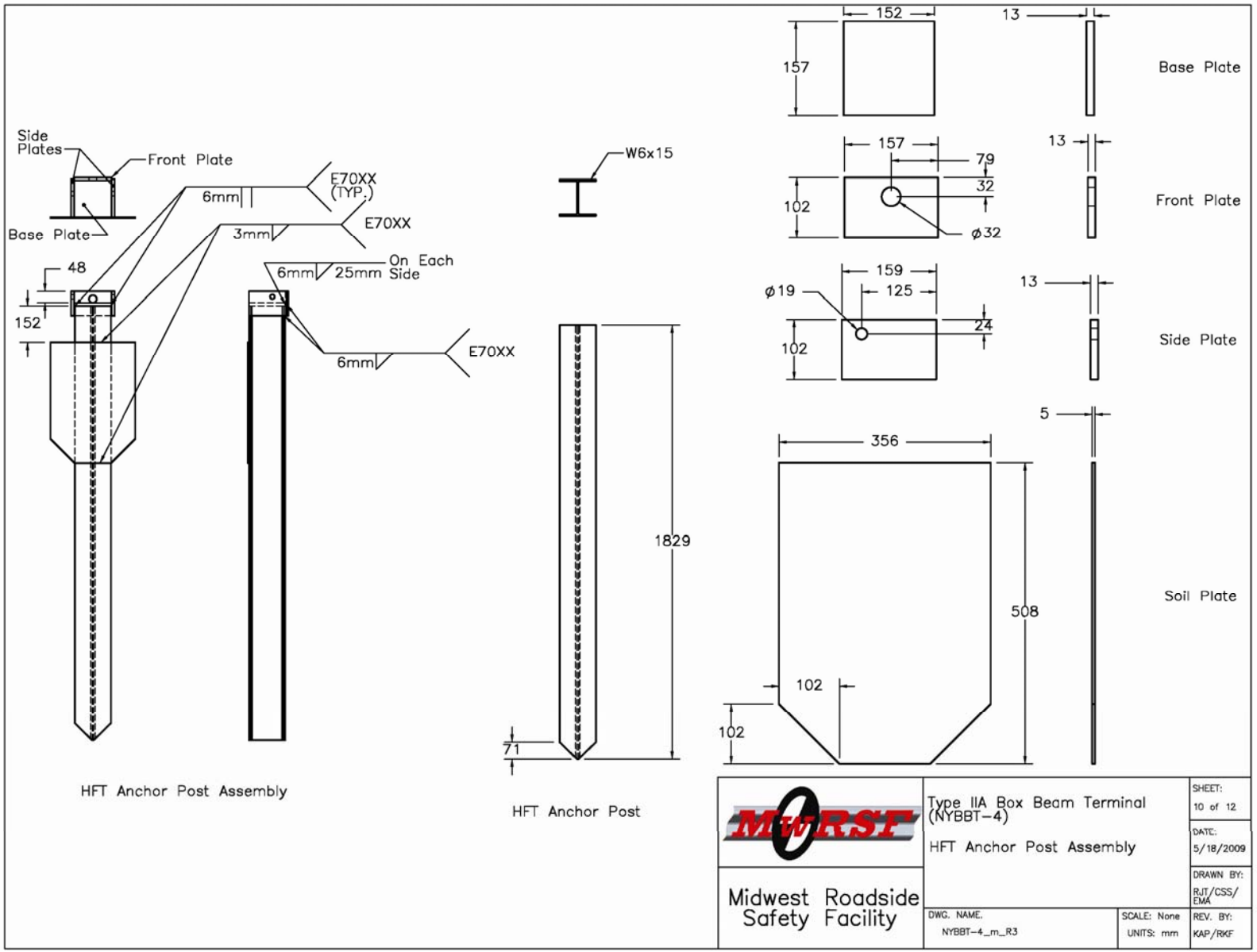


Figure J-10. Modified Type IIA Box Beam Terminal System Details (Metric), Test No. NYBBT-4

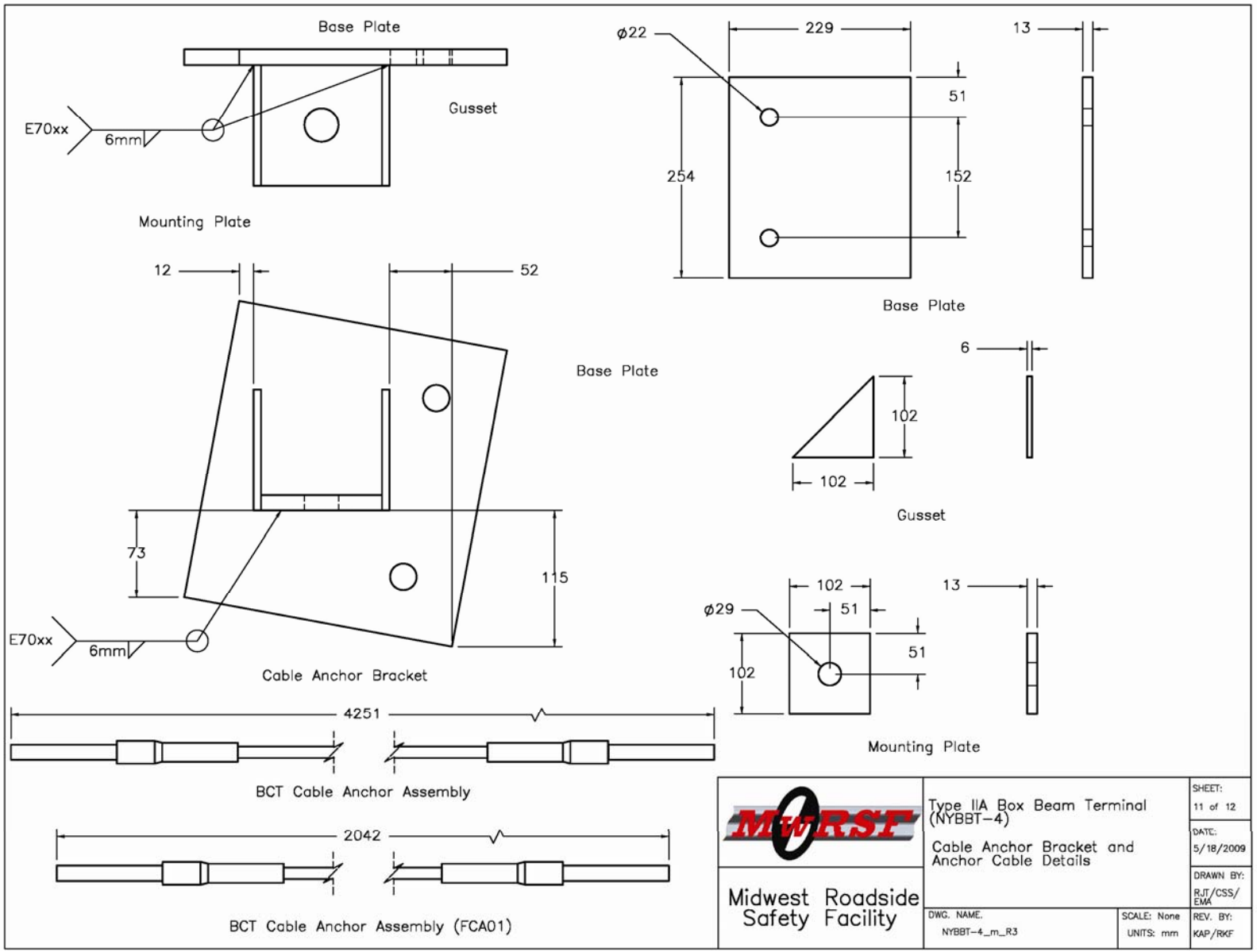


Figure J-11. Modified Type IIA Box Beam Terminal System Details (Metric), Test No. NYBBT-4

NYBBT–4			
Item No.	QTY.	Description	Material Spec
a1	23	6mm x 203mm x 610mm steel soil plate	A36 Steel
a2	26	ø 13mm coarse thread 41mm long hex bolt	ASTM A307
a3	26	ø 13mm hex nut	ASTM A307
a4	24	127mm x 89mm x 10mm box beam shelf angle	A36 Steel
a5	28	ø 13mm narrow washer	ASTM A307
a6	20	S76 x 8.5 1600mm long post	A36 Steel
a7	2	S76 x 8.5 2134mm long post	A36 Steel
b1	22	ø 10mm coarse thread 191mm long hex bolt	ASTM A307
b2	22	ø 10mm hex nut	ASTM A307
b3	44	ø 10mm wide washer	ASTM A307
b4	59	ø 19mm hex nut	ASTM A325
b5	61	ø 19mm wide washer	ASTM A325
b6	56	ø 19mm coarse thread 51mm long hex bolt	ASTM A307
b7	14	686mm x 137mm x 16mm splice plate	A36 Steel
b8	6	152mmx152mmx5mm by 5483mm long box beam	ASTM A500 Grade B
c1	1	End assembly horizontal 152mmx152mmx5mm box beam	ASTM A500 Grade B
c2	1	End assembly diagonal 152mmx152mmx5mm box beam	ASTM A500 Grade B
c3	1	End assembly 5mm thick cover plate	A36 Steel
c4	1	127mm x 89mm x 10mm box beam anchor post shelf angle	A36 Steel
c5	1	ø 19mm coarse thread 197mm long hex bolt	ASTM A307
c6	1	S76 x 8.5 2134mm long post anchor post	A36 Steel
c7	1	152mmx152mmx5mm R 10.67m Curved Box Beam	ASTM A500 Grade B

Midwest Roadside Safety Facility

Type IIA Box Beam Terminal (NYBBT–4)
Bill of Materials

SHEET: 12 of 12
DATE: 5/18/2009
DRAWN BY: RJT/CSS/EMA
REV. BY: KAP/RKF
DWG. NAME. NYBBT–4_m_R3
SCALE: None
UNITS: mm

Figure J-12. Modified Type IIA Box Beam Terminal System Details (Metric), Test No. NYBBT-4

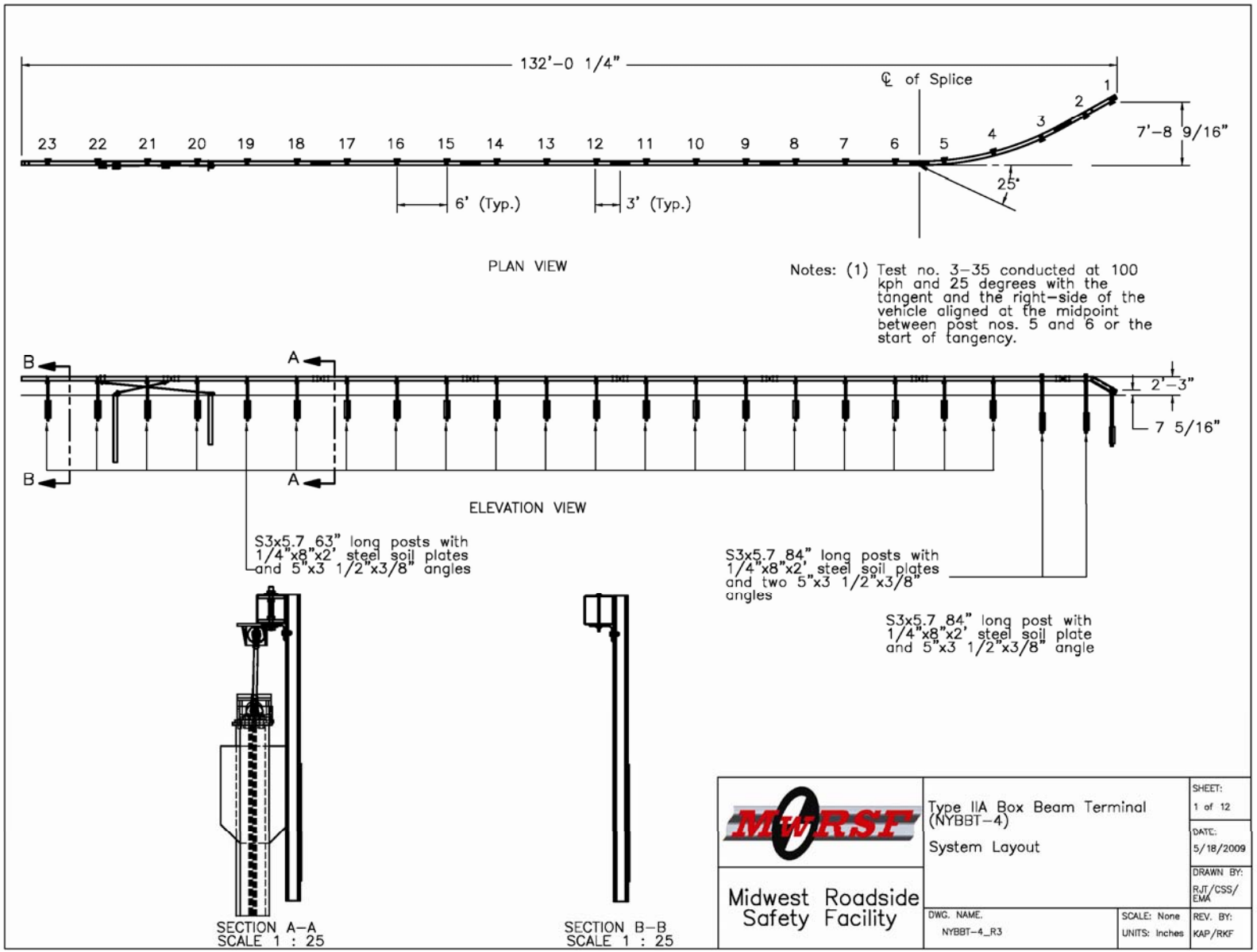


Figure J-13. Modified Type IIA Box Beam Terminal System Details (English), Test No. NYBBT-4

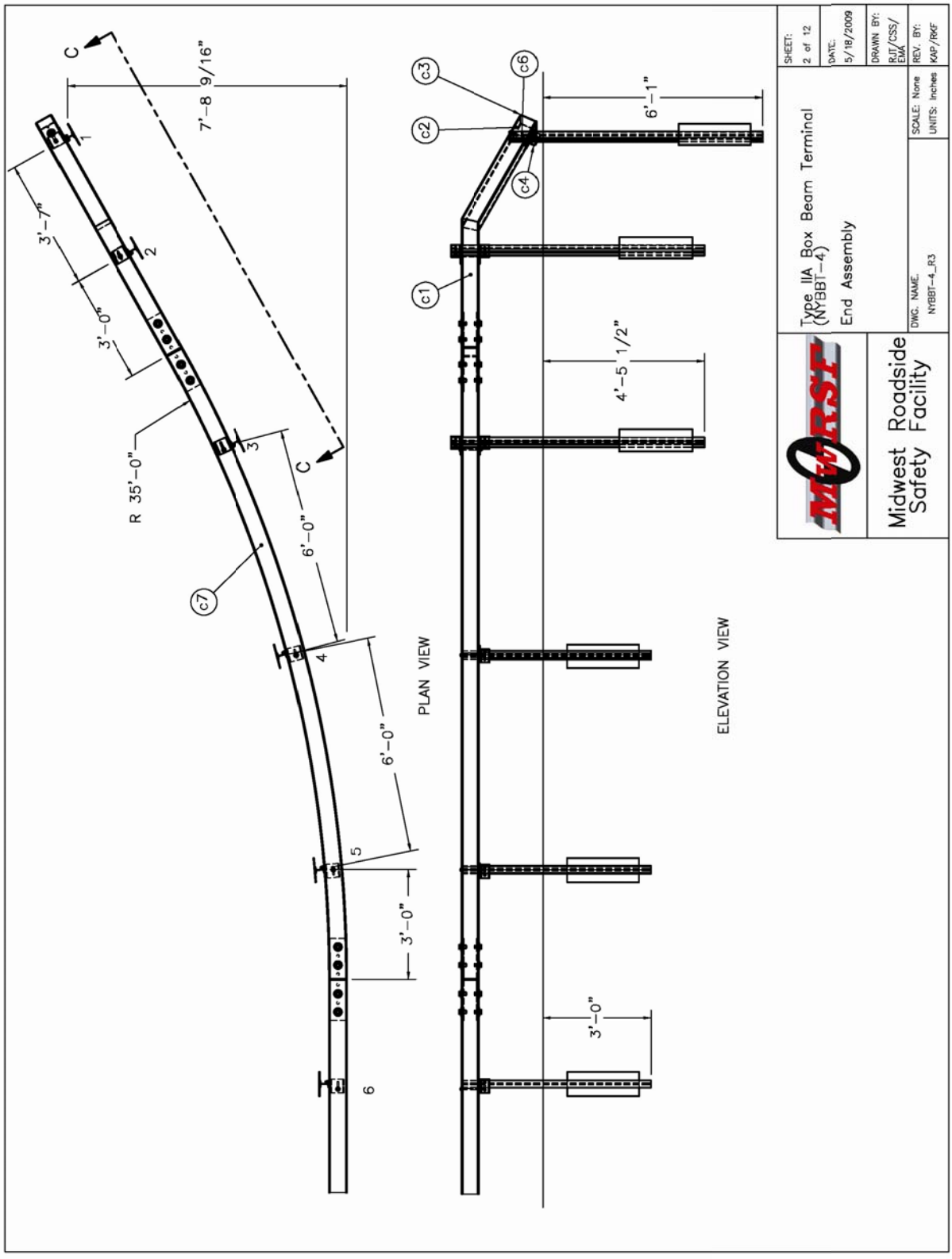


Figure J-14. Modified Type IIA Box Beam Terminal System Details (English), Test No. NYBBT-4

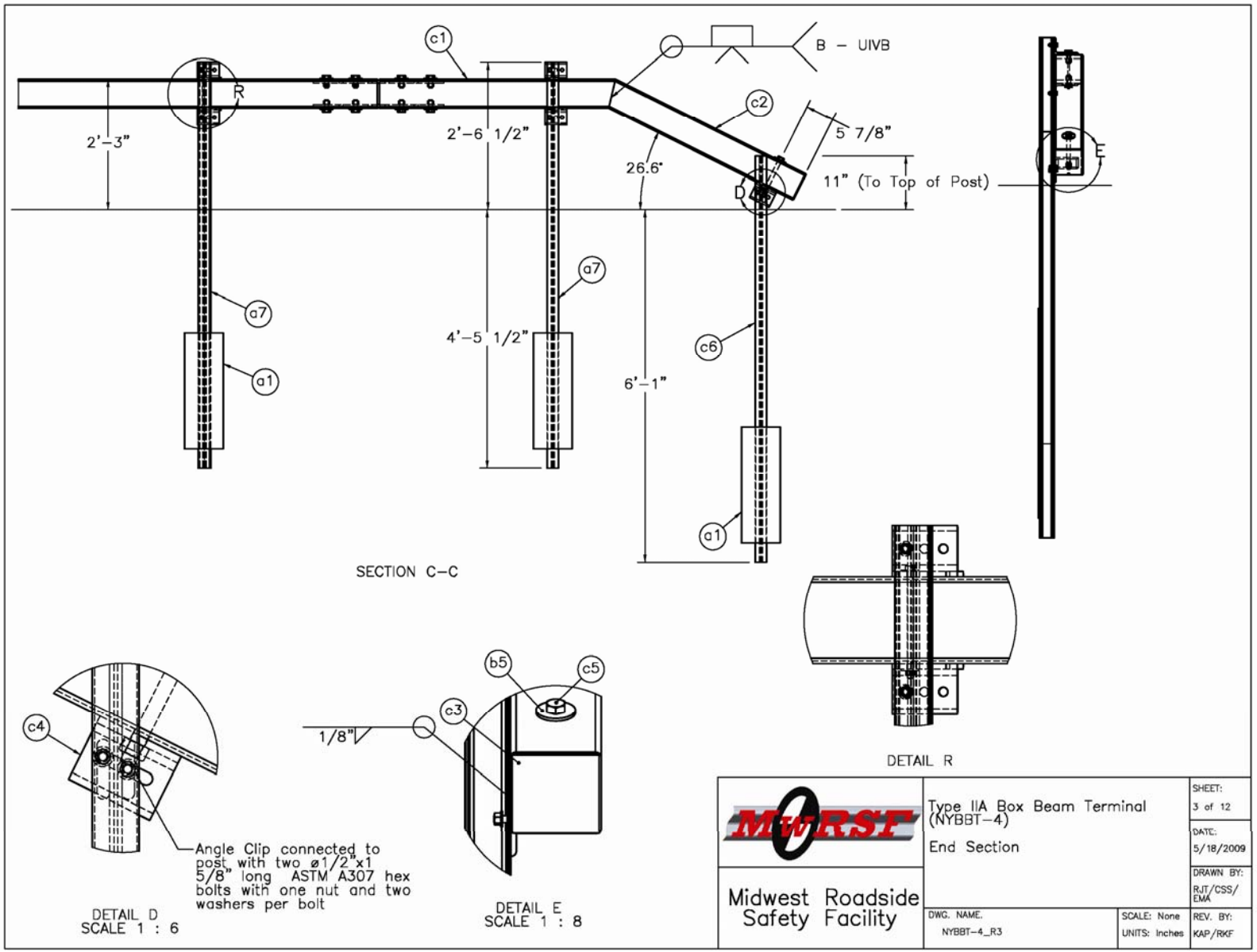


Figure J-15. Modified Type IIA Box Beam Terminal System Details (English), Test No. NYBBT-4

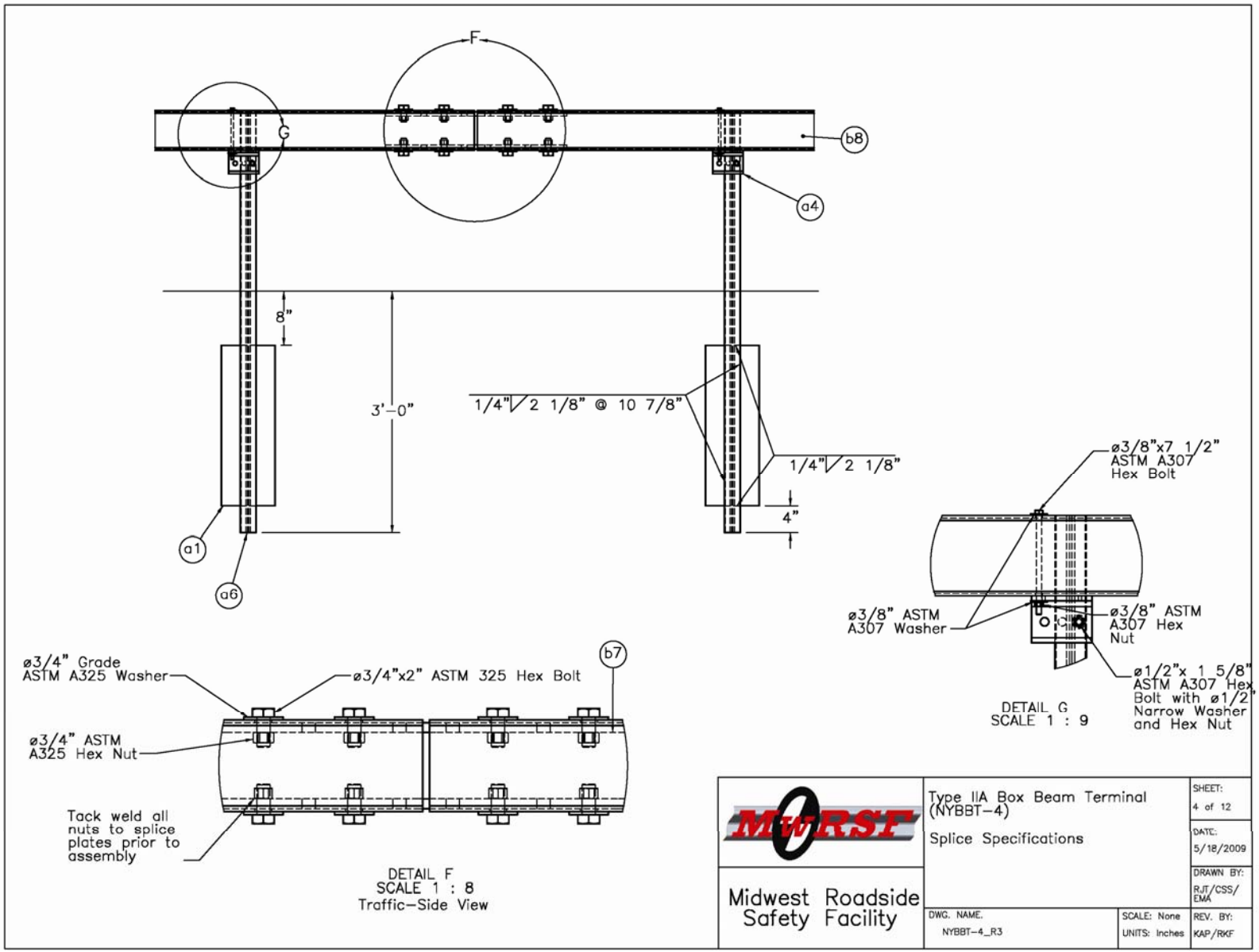


Figure J-16. Modified Type IIA Box Beam Terminal System Details (English), Test No. NYBBT-4

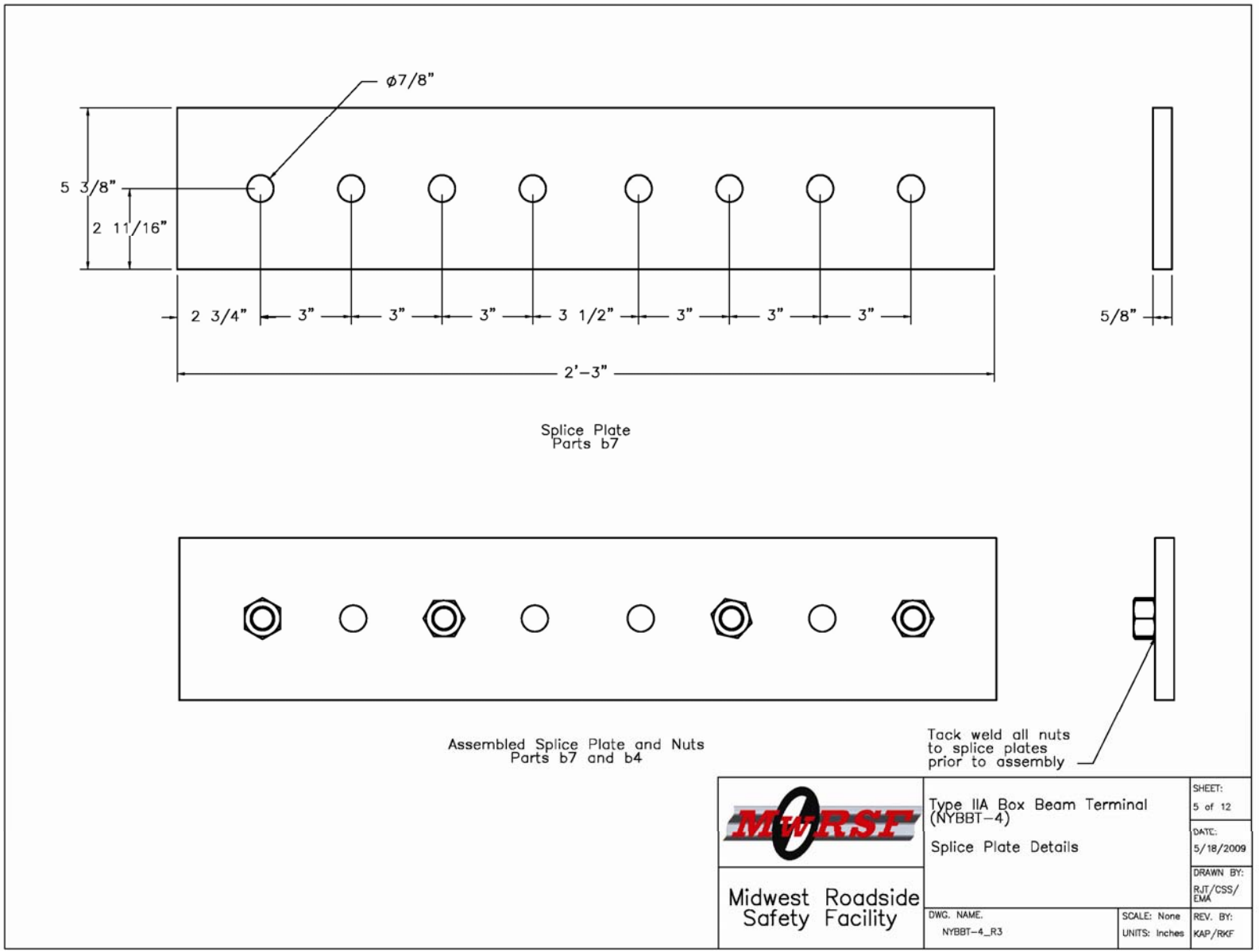


Figure J-17. Modified Type IIA Box Beam Terminal System Details (English), Test No. NYBBT-4

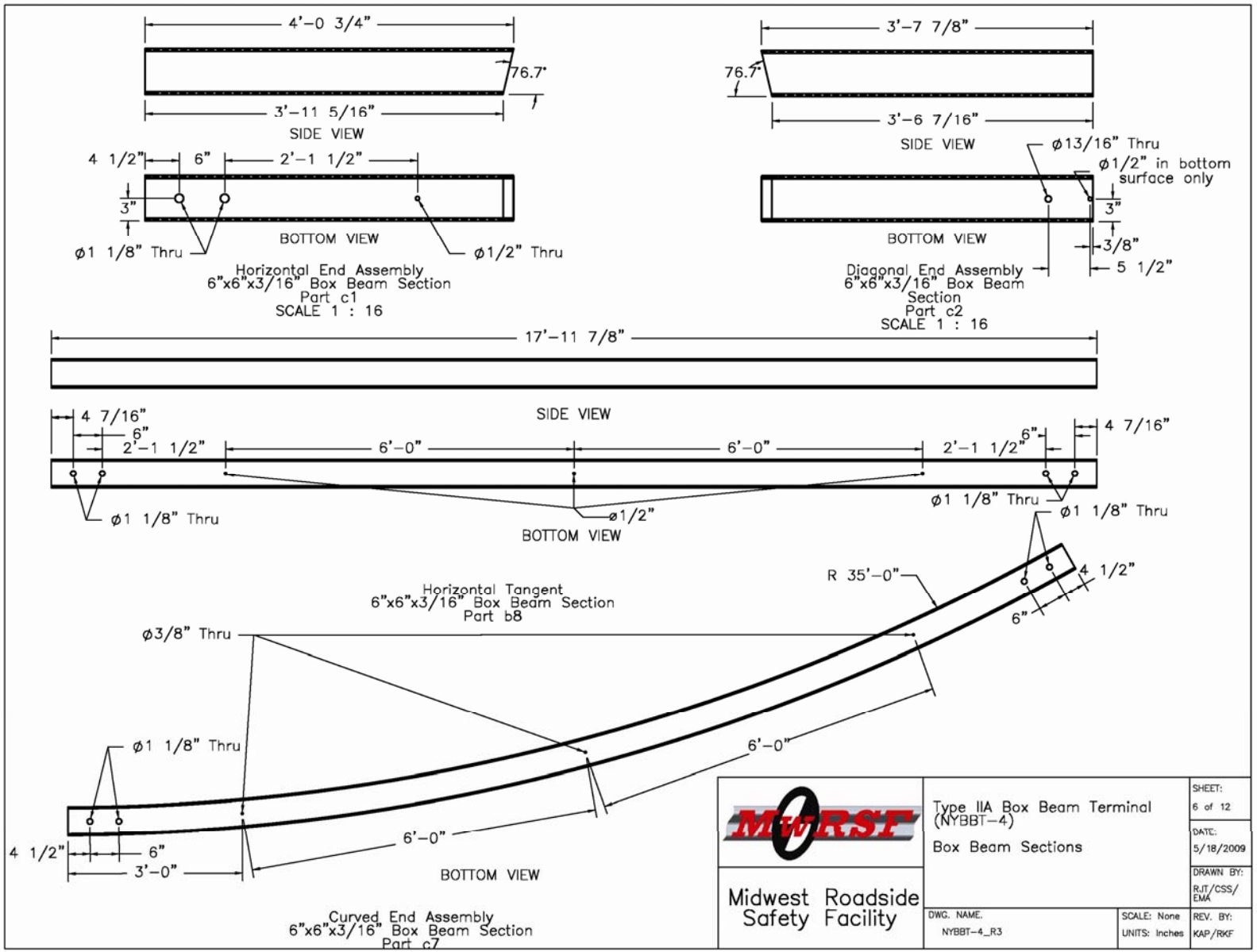


Figure J-18. Modified Type IIA Box Beam Terminal System Details (English), Test No. NYBBT-4

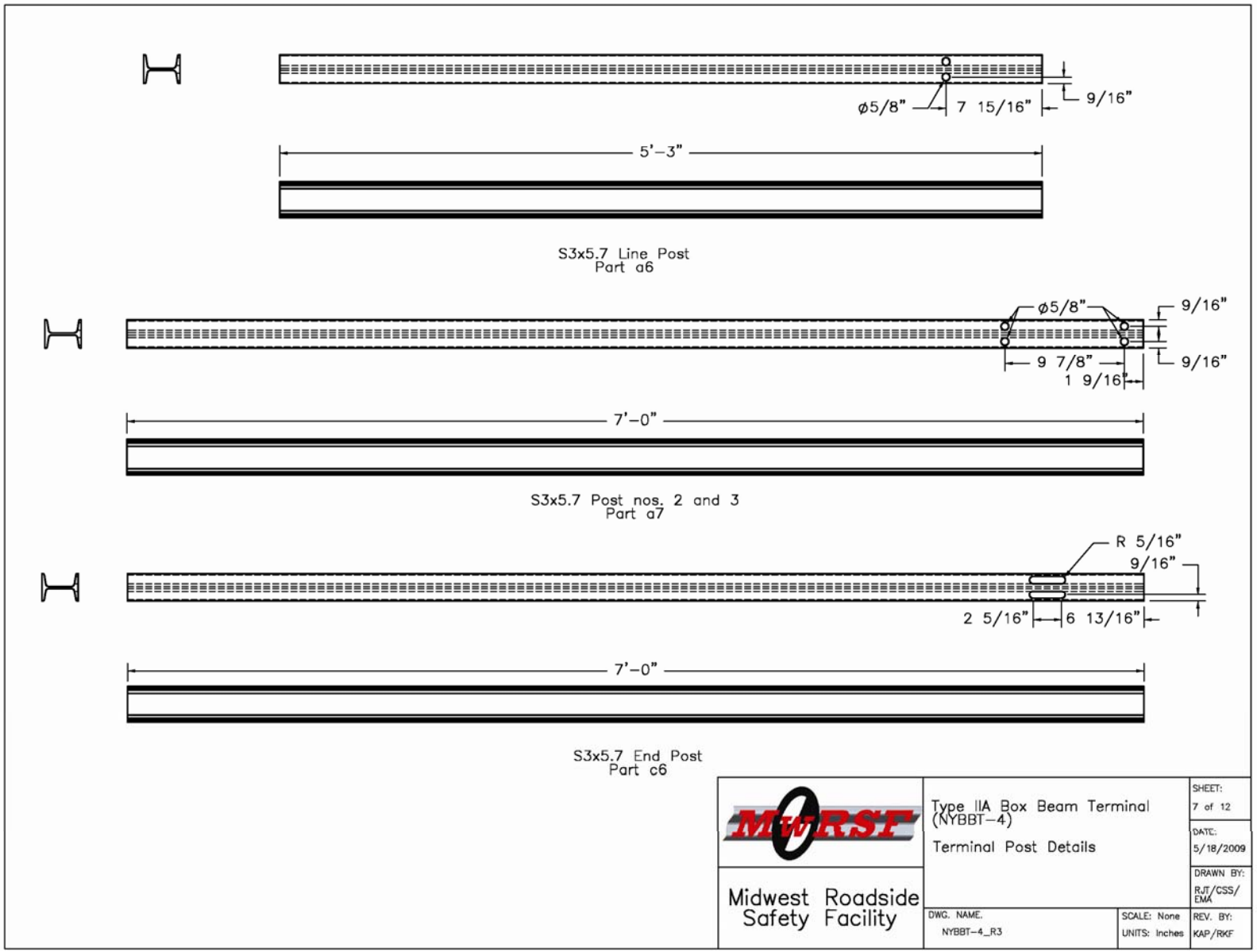


Figure J-19. Modified Type IIA Box Beam Terminal System Details (English), Test No. NYBBT-4

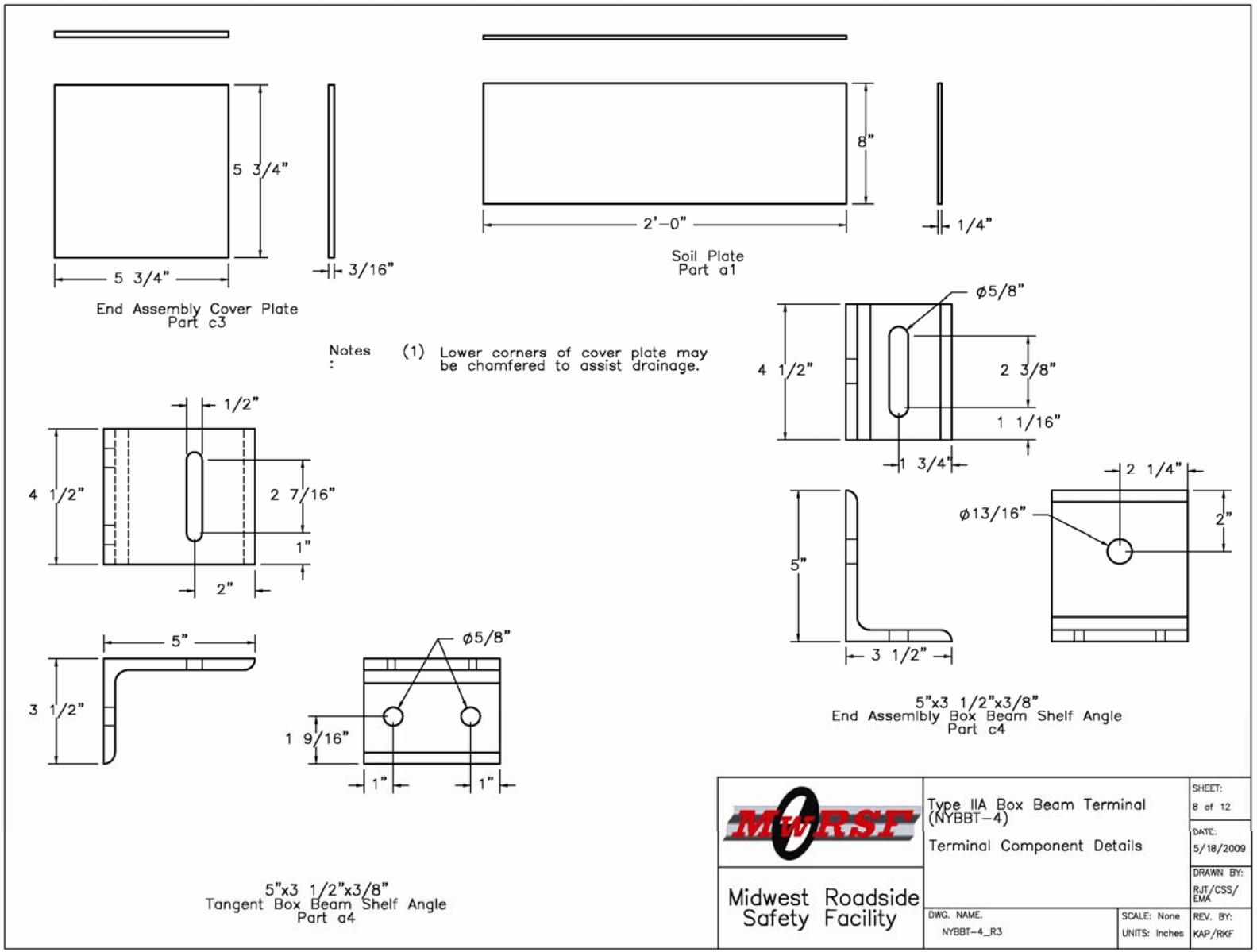


Figure J-20. Modified Type IIA Box Beam Terminal System Details (English), Test No. NYBBT-4

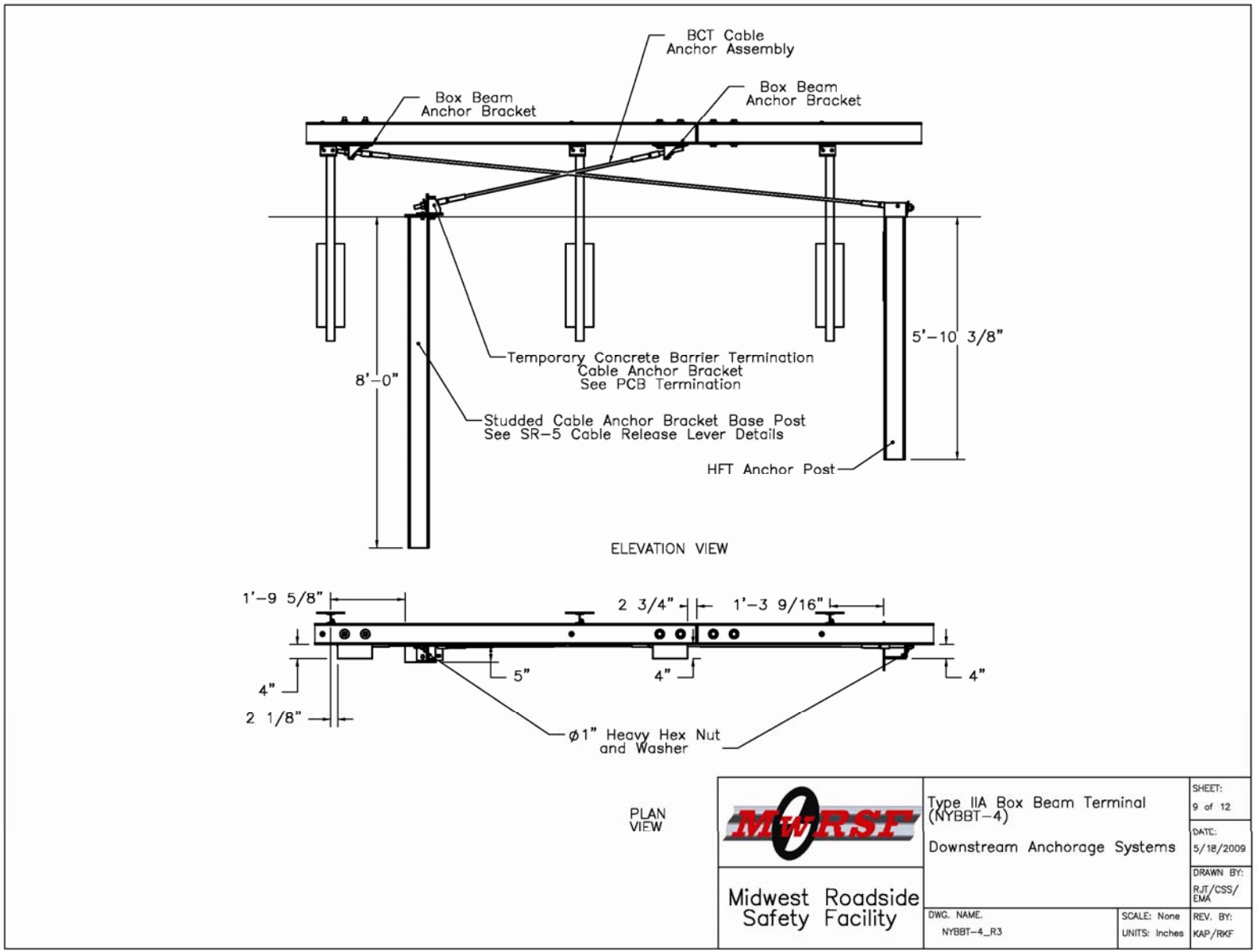


Figure J-21. Modified Type IIA Box Beam Terminal System Details (English), Test No. NYBBT-4

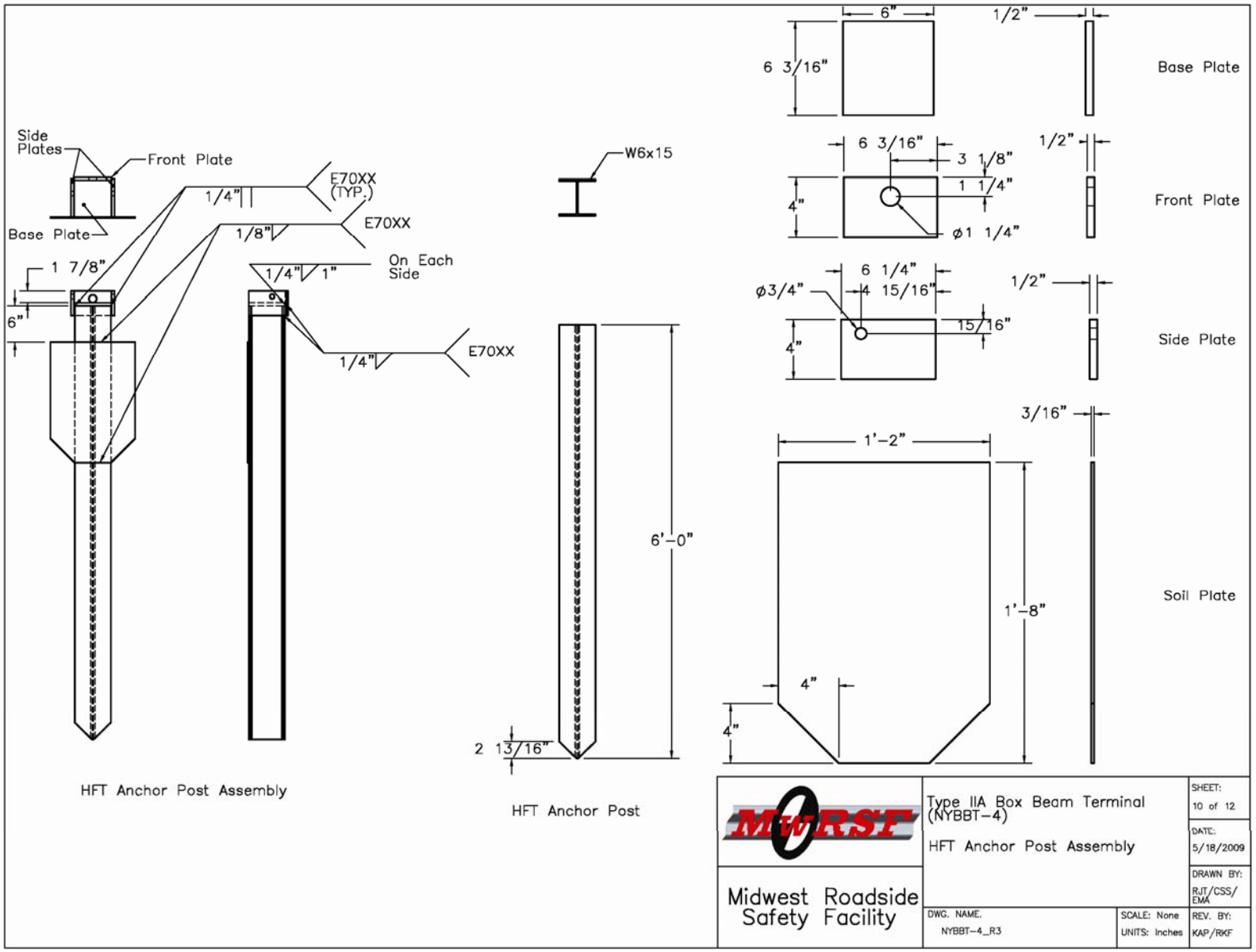


Figure J-22. Modified Type IIA Box Beam Terminal System Details (English), Test No. NYBBT-4

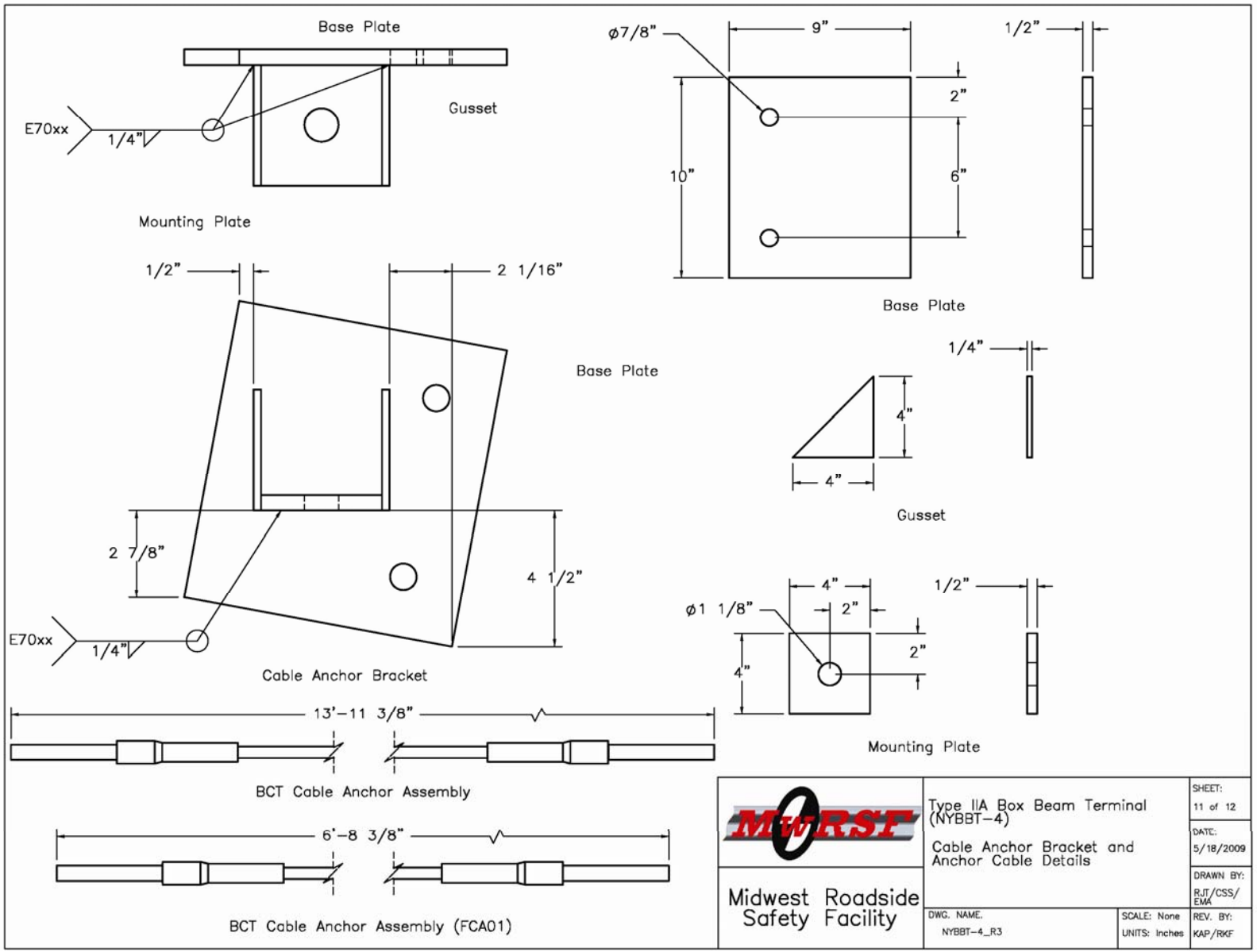


Figure J-23. Modified Type IIA Box Beam Terminal System Details (English), Test No. NYBBT-4

NYBBT–4			
Item No.	QTY.	Description	Material Spec
a1	23	1/4" x 8" x 2' steel soil plate	A36 Steel
a2	26	ø 1/2" coarse thread 1 5/8" long hex bolt	ASTM A307
a3	26	ø 1/2" hex nut	ASTM A307
a4	24	5" x 3 1/2" x 3/8" box beam shelf angle	A36 Steel
a5	28	ø 1/2" narrow washer	ASTM A307
a6	20	S3 x 5.7 63" long post	A36 Steel
a7	2	S3 x 5.7 84" long post	A36 Steel
b1	22	ø 3/8" coarse thread 7 1/2" long hex bolt	ASTM A307
b2	22	ø 3/8" hex nut	ASTM A307
b3	44	ø 3/8" wide washer	ASTM A307
b4	59	ø 3/4" hex nut	ASTM A325
b5	61	ø 3/4" wide washer	ASTM A325
b6	56	ø 3/4" coarse thread 2" long hex bolt	ASTM A307
b7	14	27" x 5 3/8" x 5/8" splice plate	A36 Steel
b8	6	6" x 6" x 3/16" by 17'– 11 7/8" long box beam	ASTM A500 Grade B
c1	1	End assembly horizontal 6" x 6" x 3/16" box beam	ASTM A500 Grade B
c2	1	End assembly diagonal 6" x 6" x 3/16" box beam	ASTM A500 Grade B
c3	1	End assembly 3/16" thick cover plate	A36 Steel
c4	1	5" x 3 1/2" x 3/8" box beam anchor post shelf angle	A36 Steel
c5	1	ø 3/4" coarse thread 7 3/4" long hex bolt	ASTM A307
c6	1	S3 x 5.7 84" long post anchor post	A36 Steel
c7	1	6"x6"x3/16" R 35' Curved Box Beam	ASTM A500 Grade B

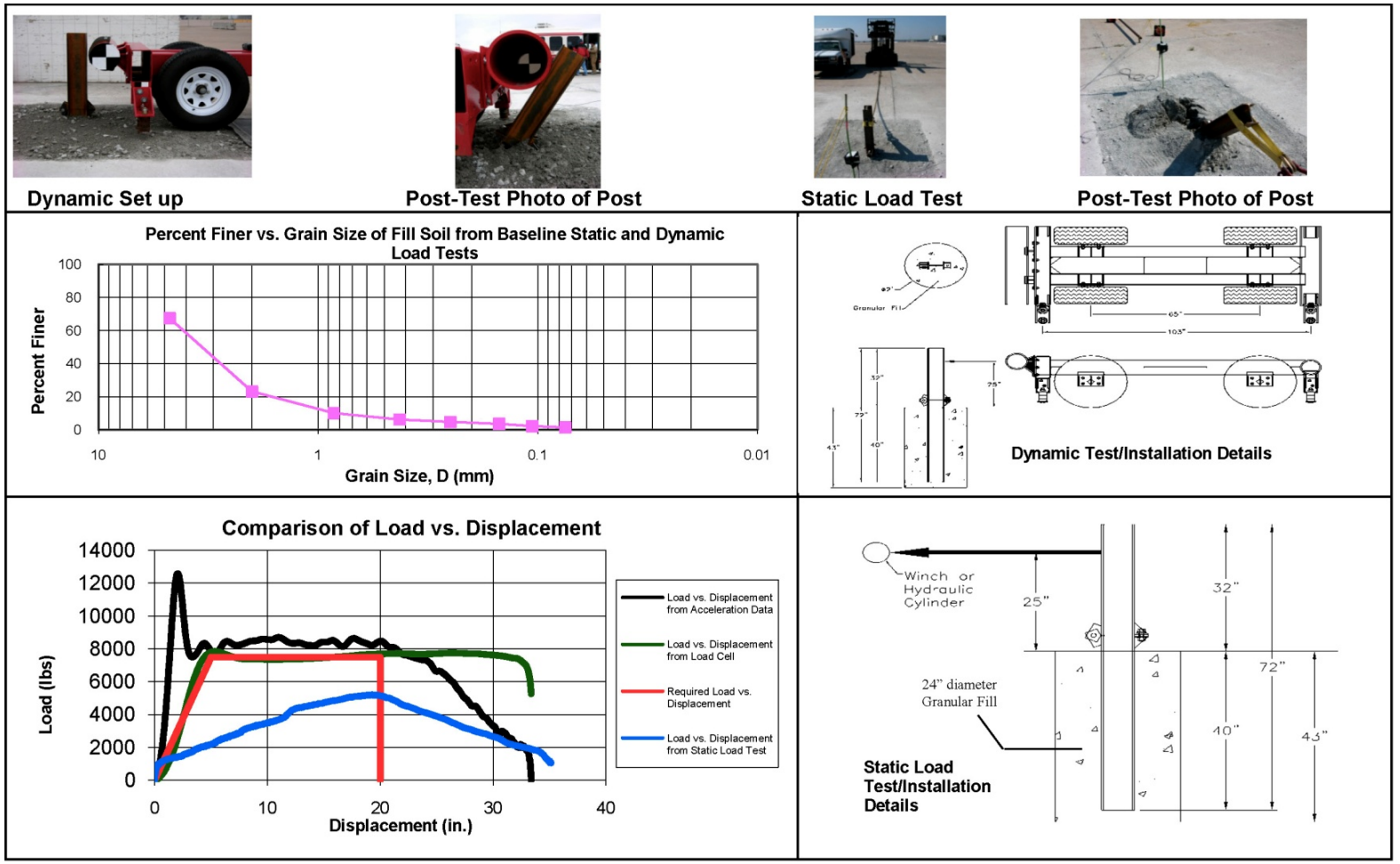
Midwest Roadside Safety Facility

Type IIA Box Beam Terminal (NYBBT–4)
Bill of Materials

SHEET: 12 of 12
DATE: 5/18/2009
DRAWN BY: RJT/CSS/EMA
REV. BY: KAP/RKF
DWG. NAME. NYBBT–4_R3
SCALE: None
UNITS: Inches

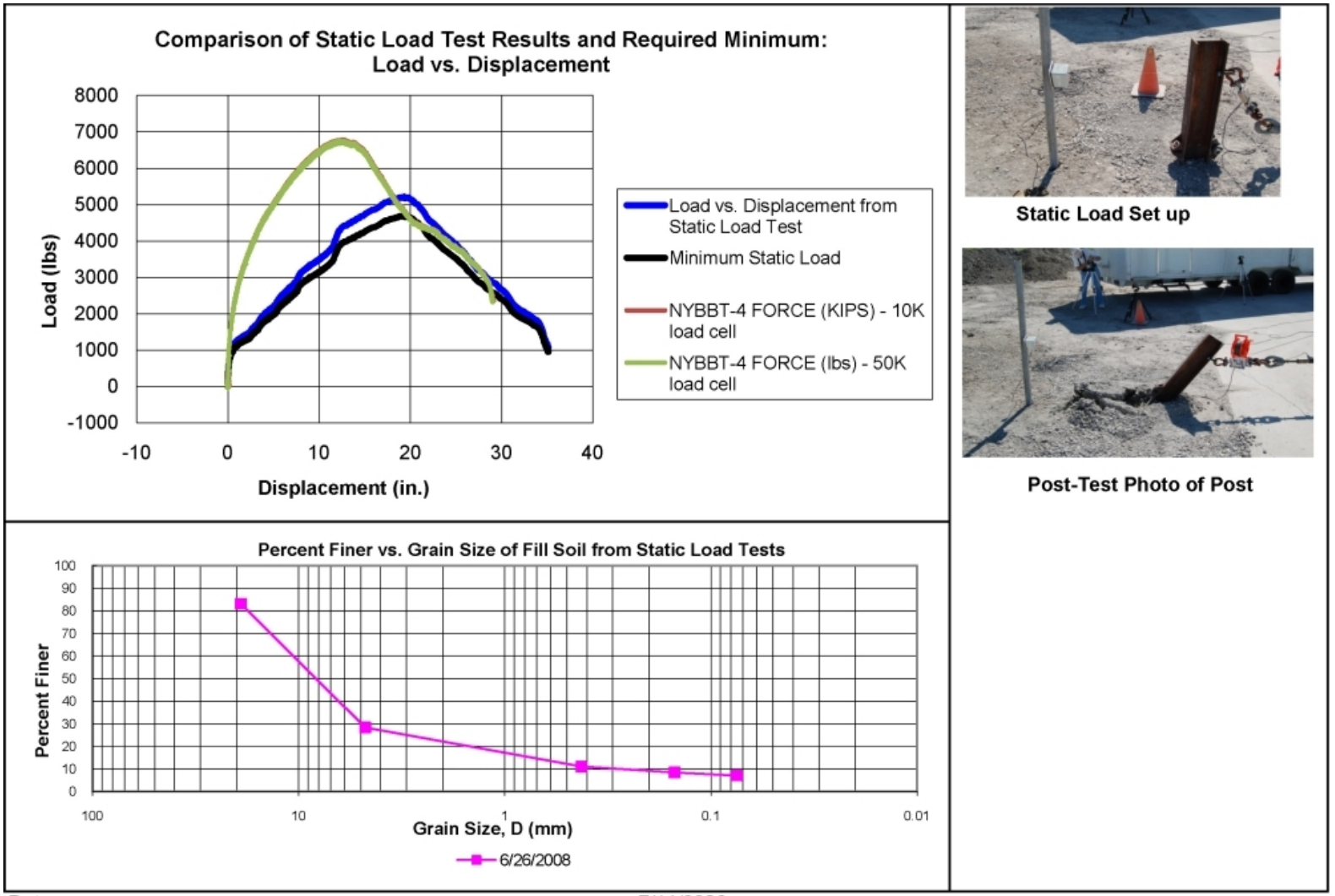
Figure J-24. Modified Type IIA Box Beam Terminal System Details (English), Test No. NYBBT-4

APPENDIX K Static Soil Tests



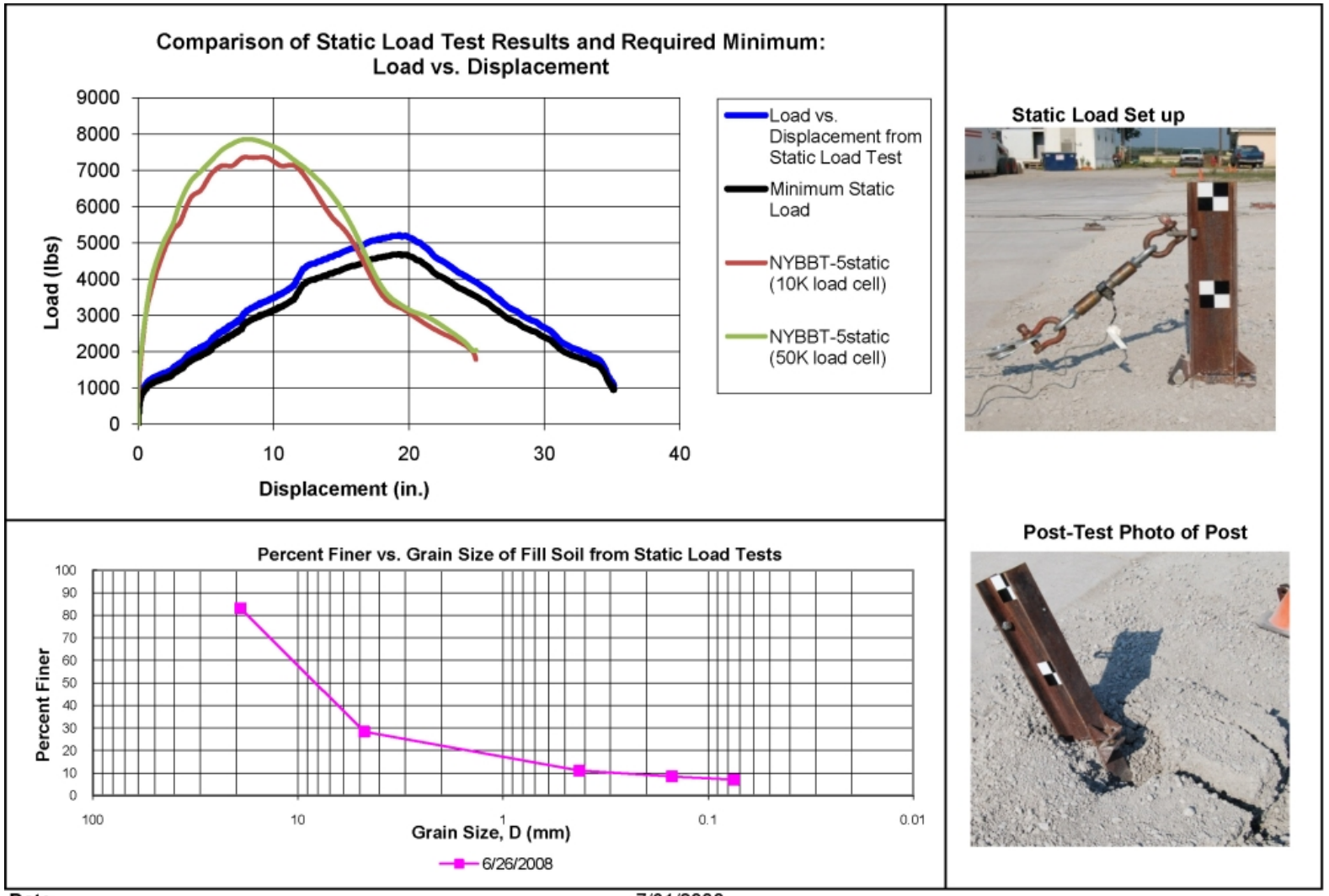
Date	7/7/2005
Test Facility & Site Location	Midwest Road Side Safety Facility (see attached site map)
In situ soil description (ASTM D2487)	Well Graded Gravel (GW)
Fill material description (ASTM D2487) & sieve analysis	Well Graded Gravel (GW)
Description of fill placement procedure	6-inch lifts tamped with a pneumatic compactor
Bogie Weight	1605 lbs
Impact Velocity	19.08 mph

Figure K-1. Soil Strength, Initial Calibration Tests



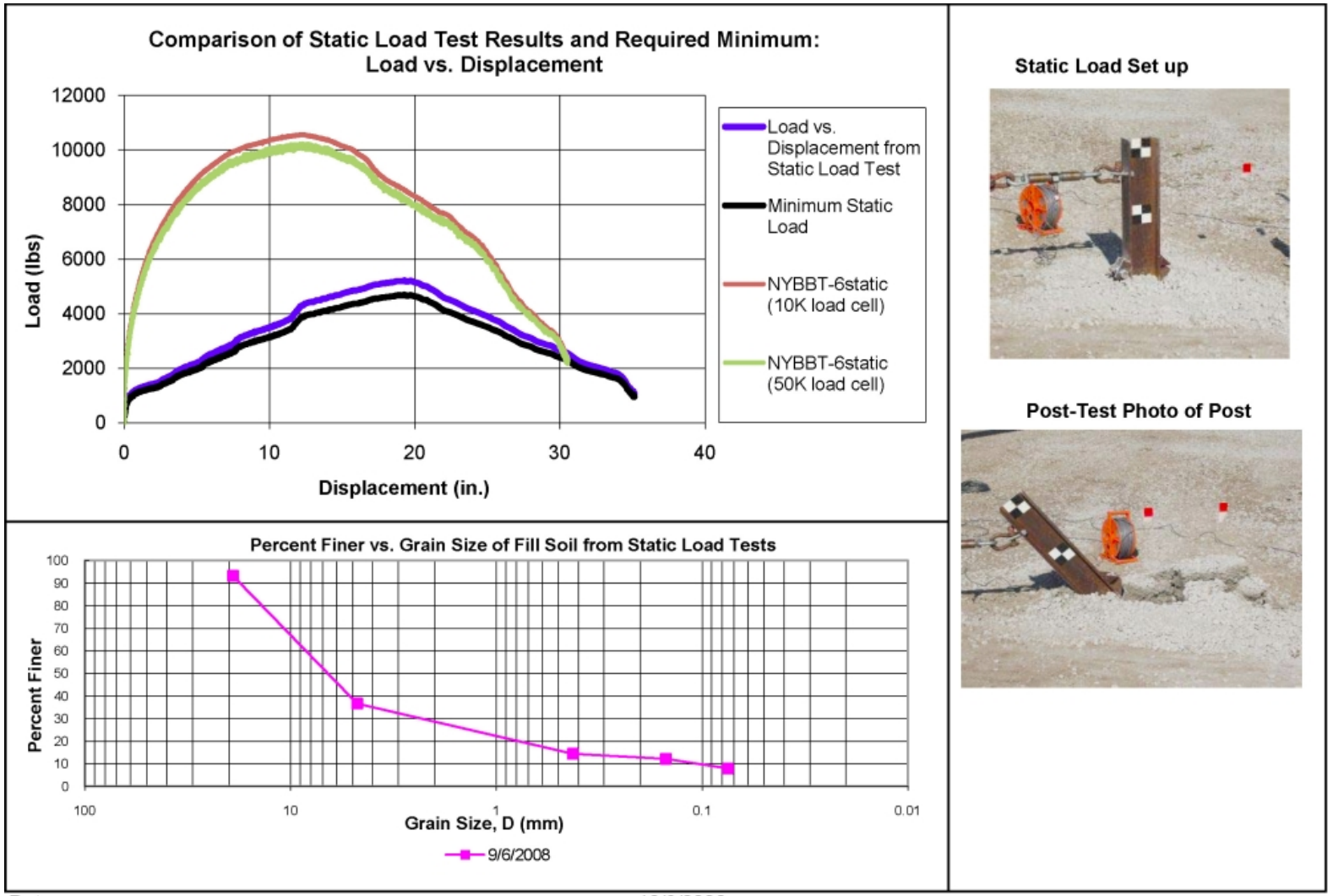
Date	7/11/2008
Test Facility & Site Location	Midwest Road Side Safety Facility
In situ soil description (ASTM D2487)	Low Plasticity Silt (ML)
Fill material description (ASTM D2487) & sieve analysis	Well Graded Gravel (GW) (see sieve analyses above)
Description of fill placement procedure	6-inch lifts tamped with a pneumatic compactor

Figure K-2. Static Soil Test, Test No. NYBBT-4



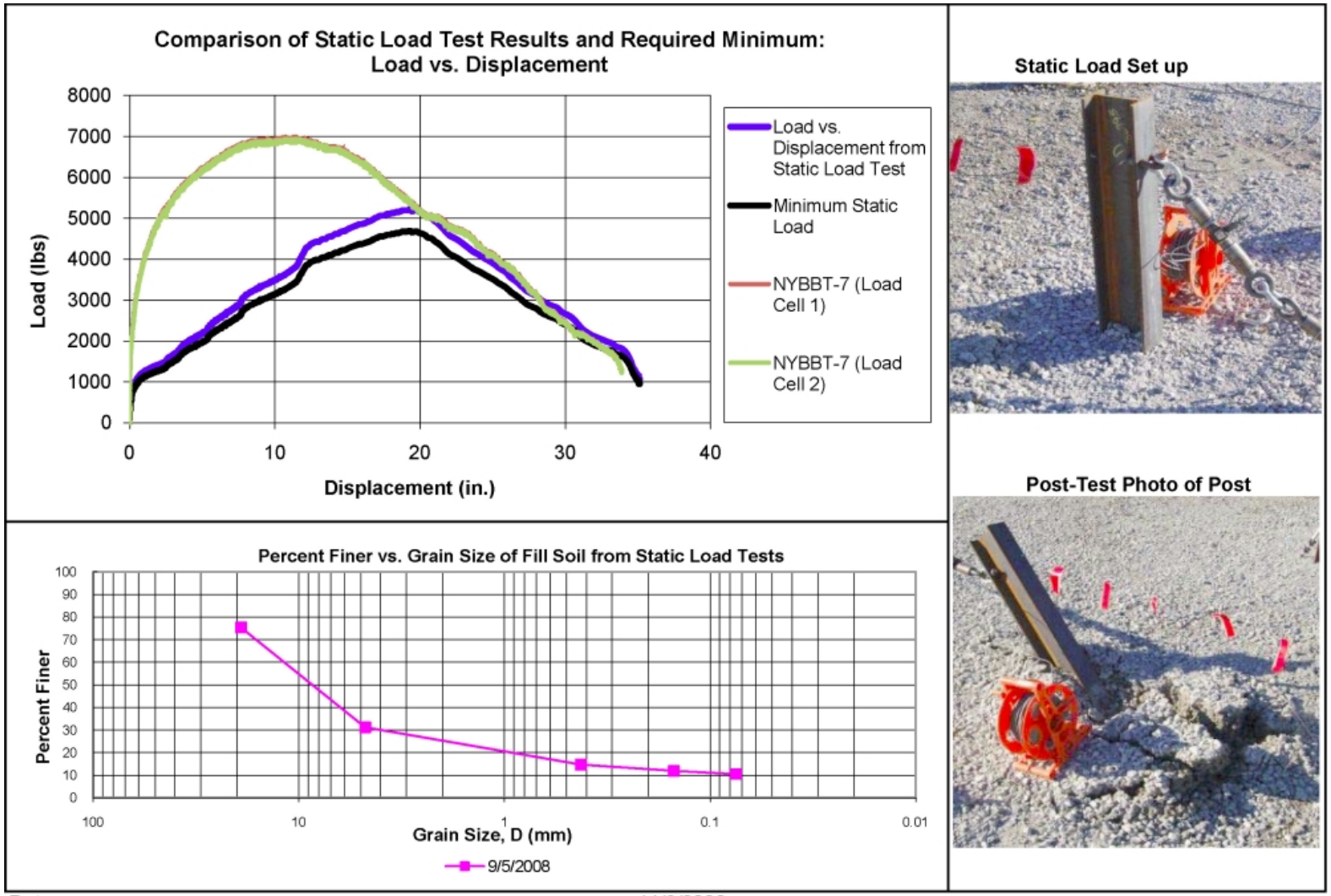
Date	7/31/2008
Test Facility & Site Location	Midwest Road Side Safety Facility
In situ soil description (ASTM D2487)	Low Plasticity Silt (ML)
Fill material description (ASTM D2487) & sieve analysis	Well Graded Gravel (GW) (see sieve analyses above)
Description of fill placement procedure	6-inch lifts tamped with a pneumatic compactor

Figure K-3. Static Soil Test, Test No. NYBBT-5



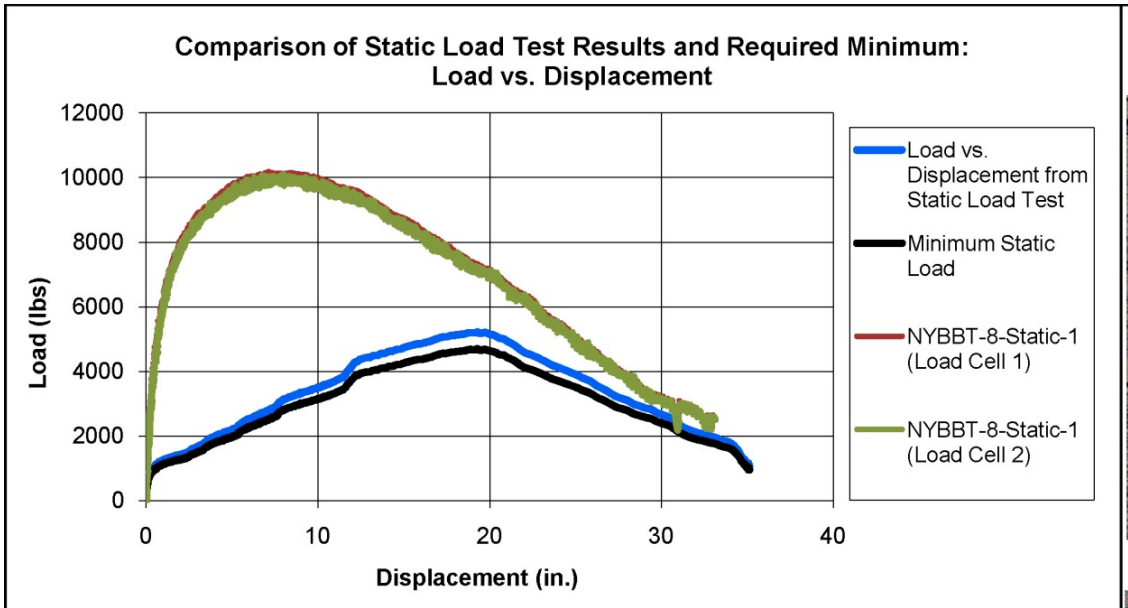
Date	10/3/2008
Test Facility & Site Location	Midwest Road Side Safety Facility
In situ soil description (ASTM D2487)	Well Graded Gravel (GW)
Fill material description (ASTM D2487) & sieve analysis	Well Graded Gravel (GW) (see sieve analyses above)
Description of fill placement procedure	6-inch lifts tamped with a pneumatic compactor

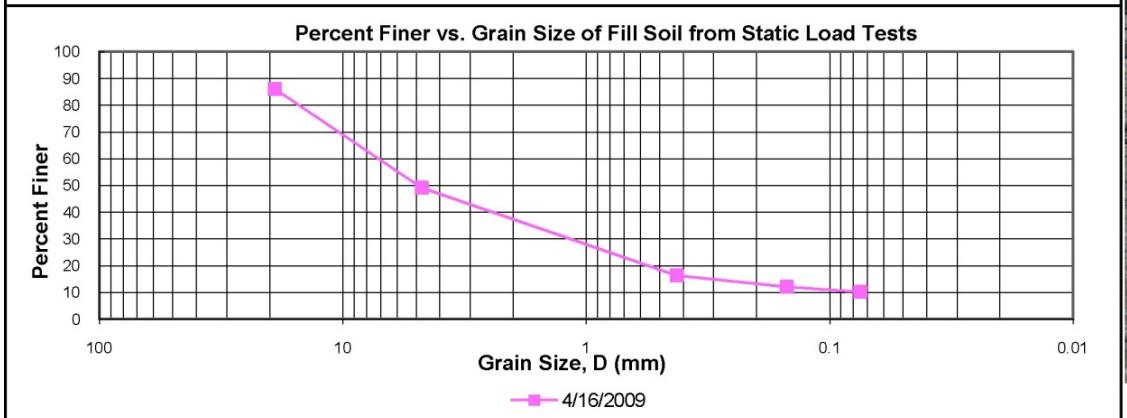
Figure K-4. Static Soil Test, Test No. NYBBT-6



Date	11/3/2008
Test Facility & Site Location	Midwest Road Side Safety Facility
In situ soil description (ASTM D2487)	Low Plasticity Silt (ML)
Fill material description (ASTM D2487) & sieve analysis	Well Graded Gravel (GW) (see sieve analyses above)
Description of fill placement procedure	6-inch lifts tamped with a pneumatic compactor

Figure K-5. Static Soil Test, Test No. NYBBT-7



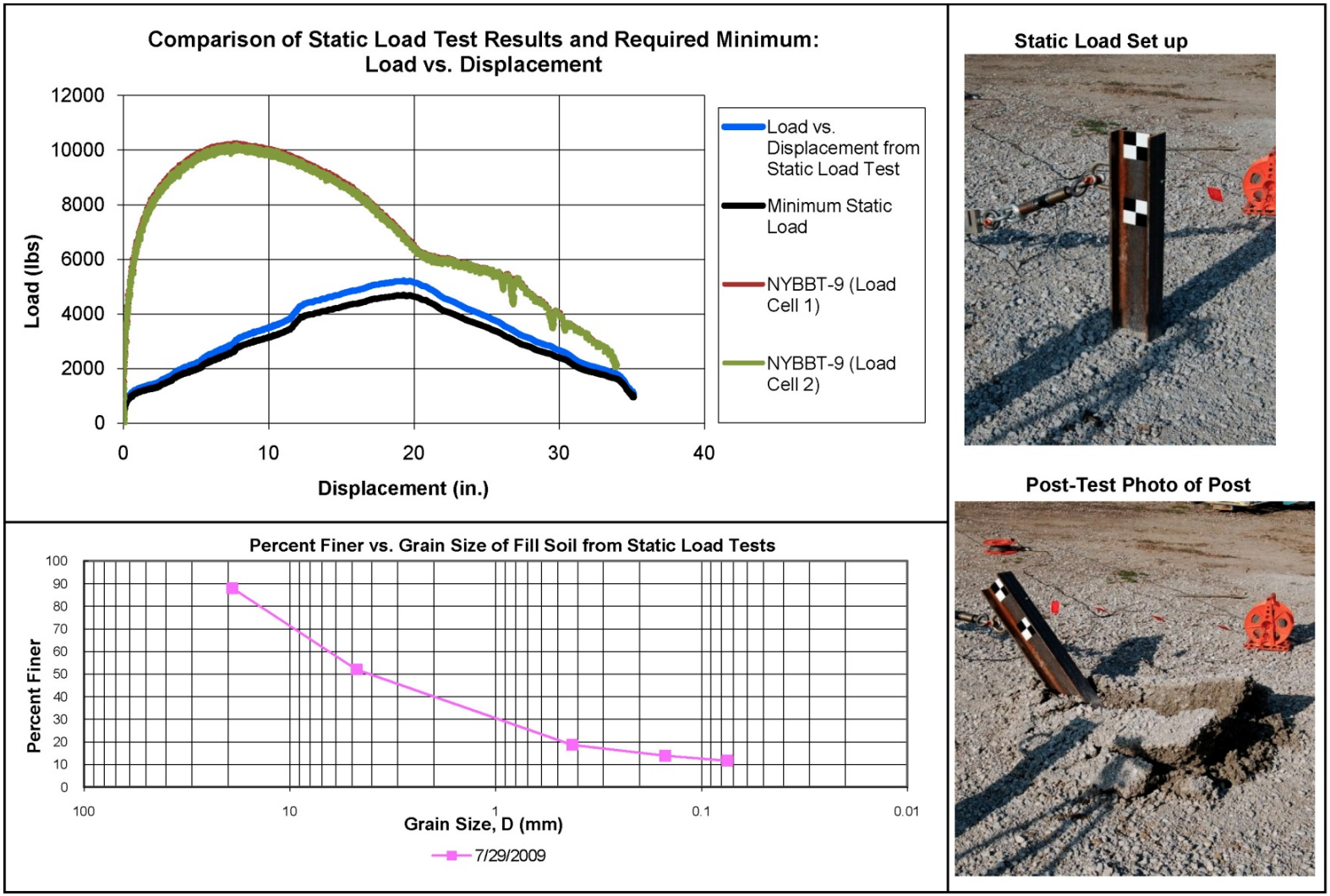


Static Load Set up

Post-Test Photo of Post

Date	7/15/2009
Test Facility & Site Location	Midwest Road Side Safety Facility
In situ soil description (ASTM D2487)	Low Plasticity Silt (ML)
Fill material description (ASTM D2487) & sieve analysis	Well Graded Gravel (GW) (see sieve analyses above)
Description of fill placement procedure	8-inch lifts tamped with a pneumatic compactor

Figure K-6. Static Soil Test, Test No. NYBBT-8



Date	8/6/2009
Test Facility & Site Location	Midwest Road Side Safety Facility
In situ soil description (ASTM D2487)	Low Plasticity Silt (ML)
Fill material description (ASTM D2487) & sieve analysis	Well Graded Gravel (GW) (see sieve analyses above)
Description of fill placement procedure	8-inch lifts tamped with a pneumatic compactor

Figure K-7. Static Soil Test, Test No. NYBBT-9

APPENDIX L Accelerometer and Rate Transducer Data Analysis, Test No. NYBBT-4

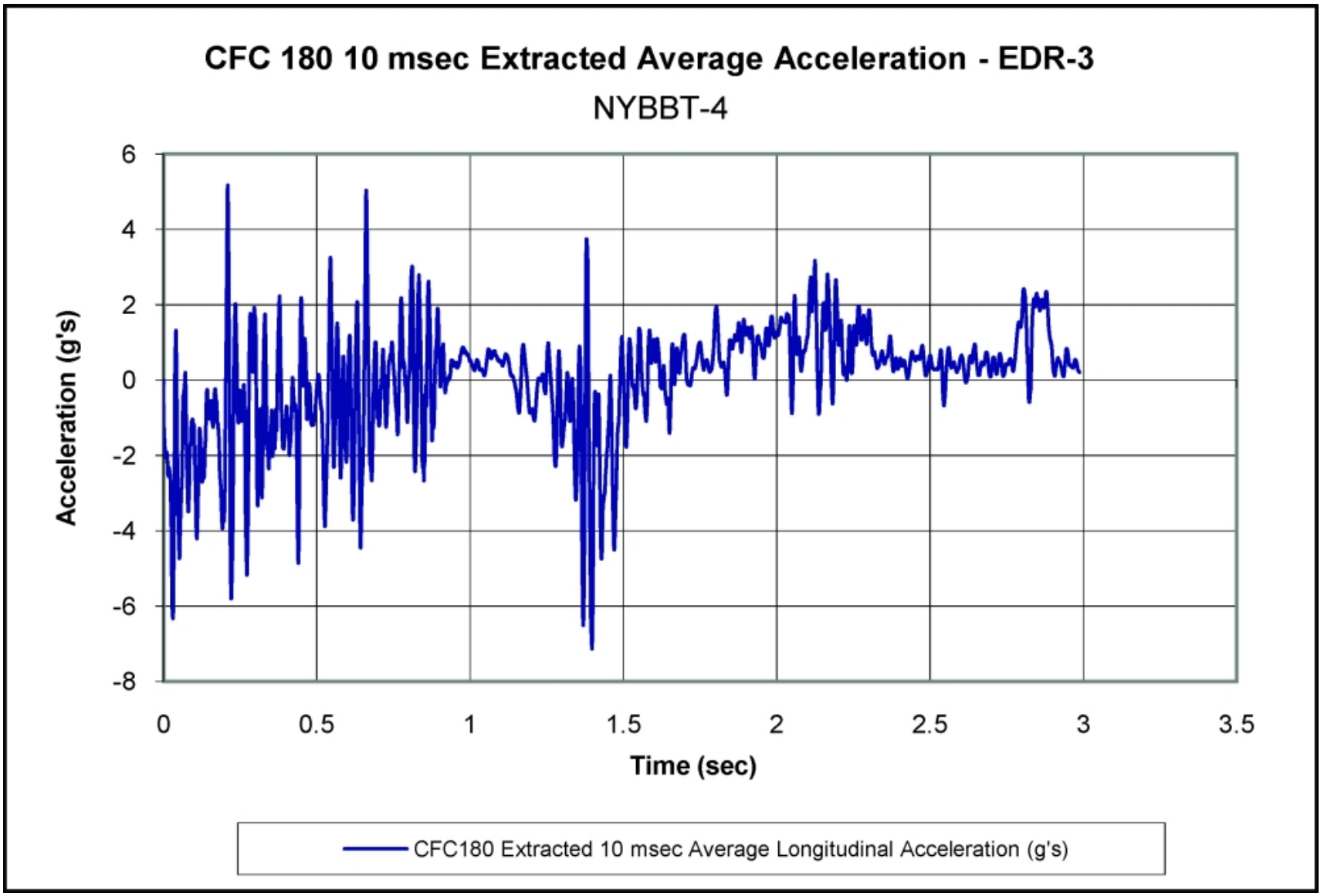


Figure L-1. Graph of Longitudinal Occupant Deceleration (EDR-3), Test No. NYBBT-4

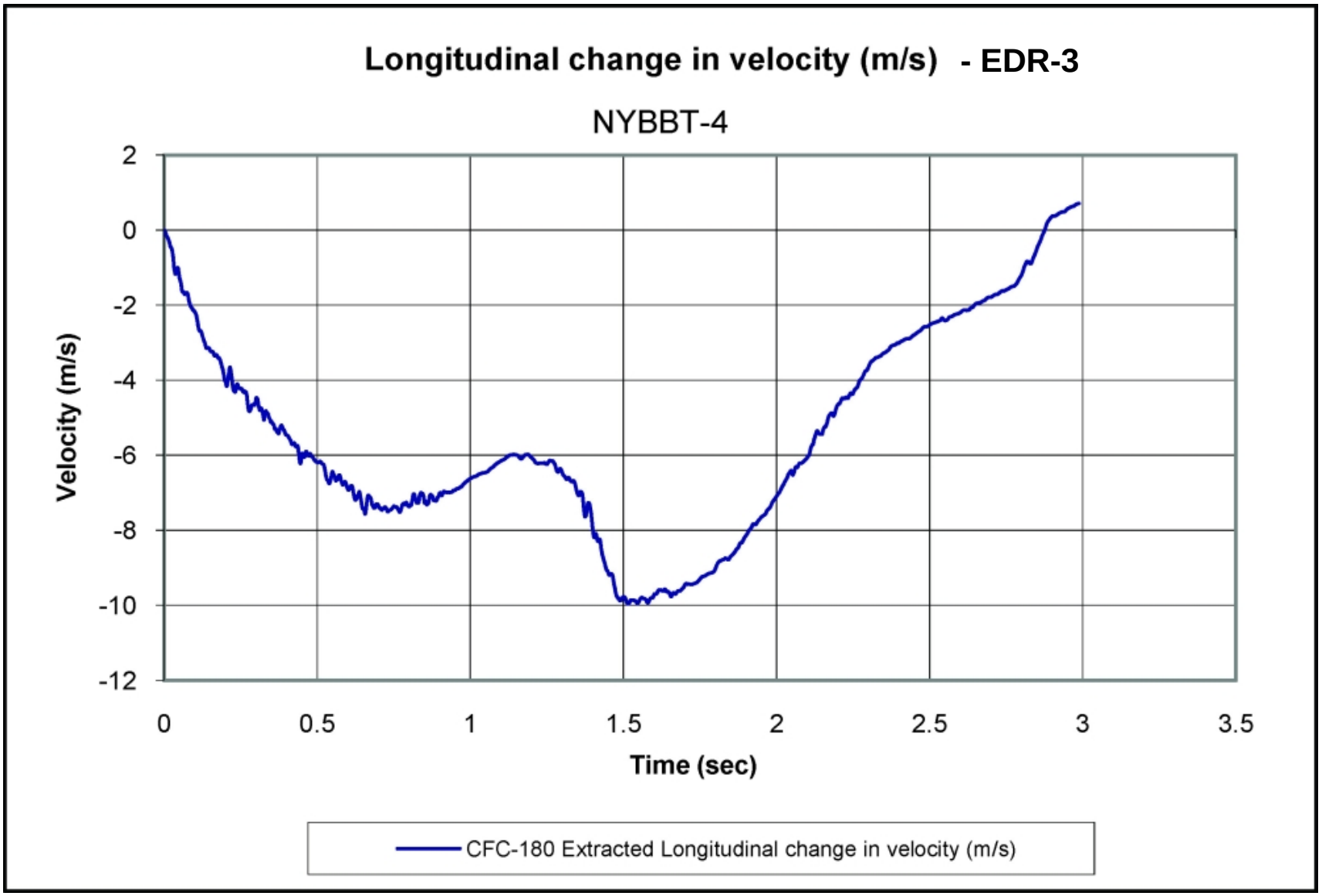


Figure L-2. Graph of Longitudinal Occupant Impact Velocity (EDR-3), Test No. NYBBT-4

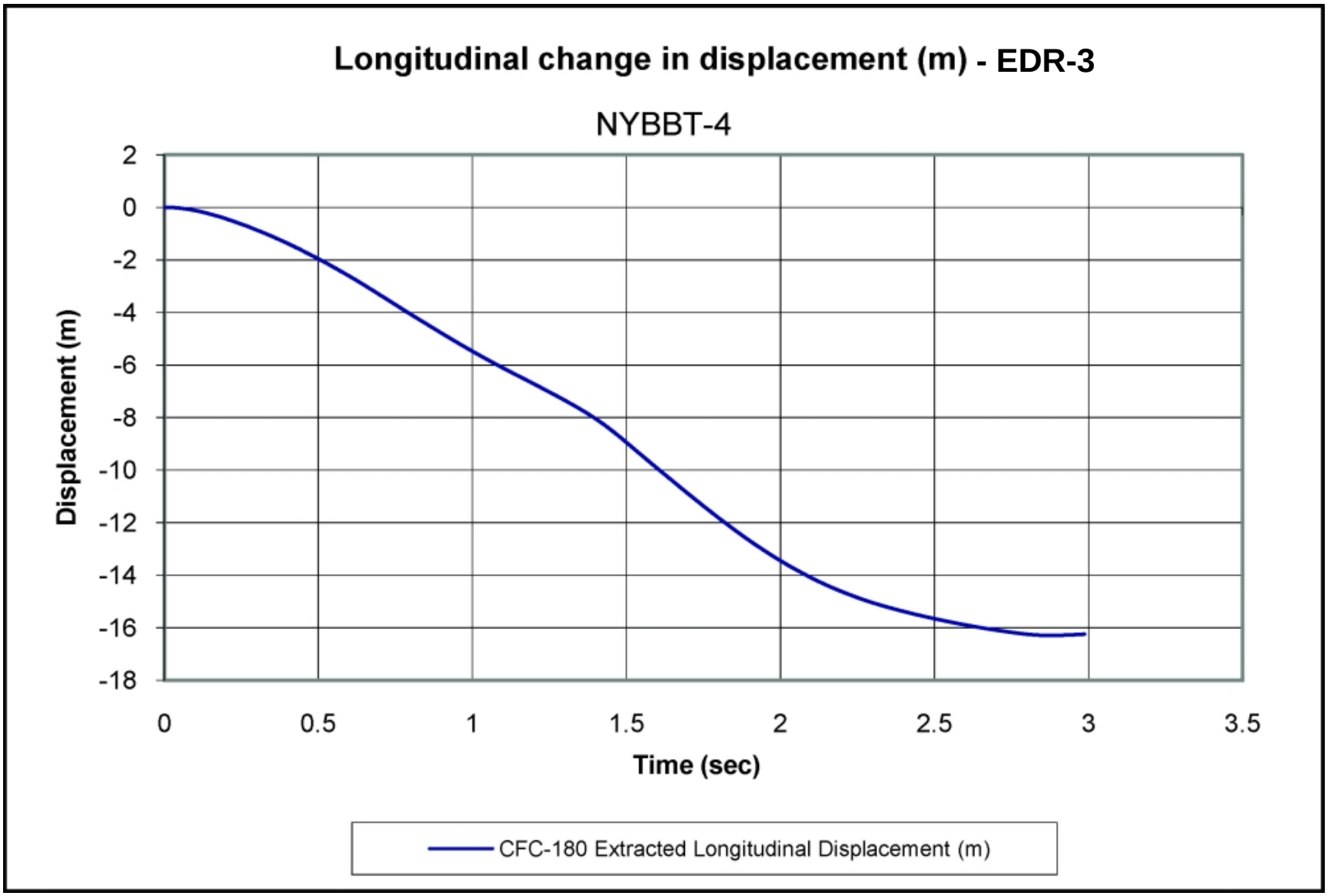


Figure L-3. Graph of Longitudinal Occupant Displacement (EDR-3), Test No. NYBBT-4

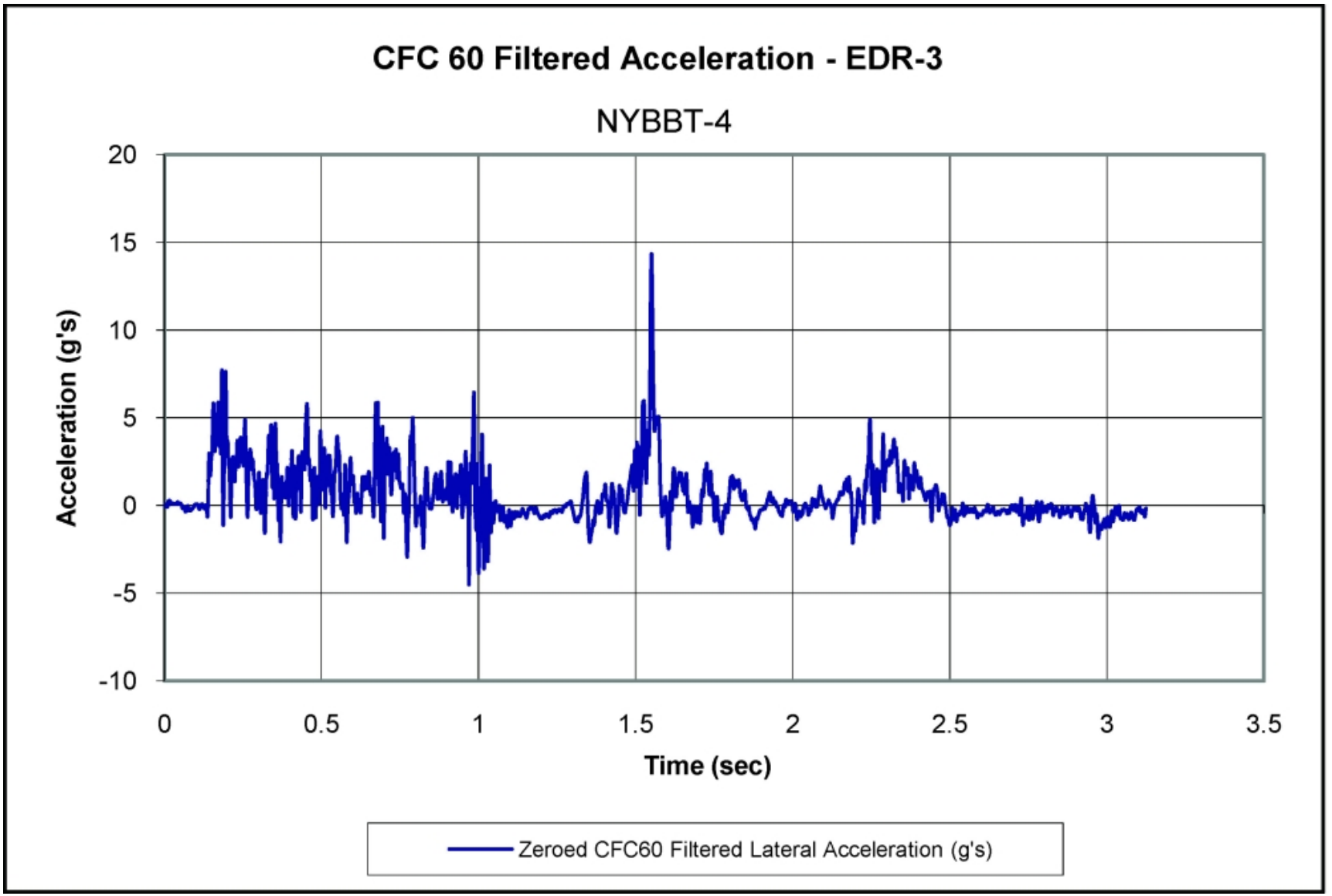


Figure L-4. Graph of Lateral Occupant Deceleration (EDR-3), Test No. NYBBT-4

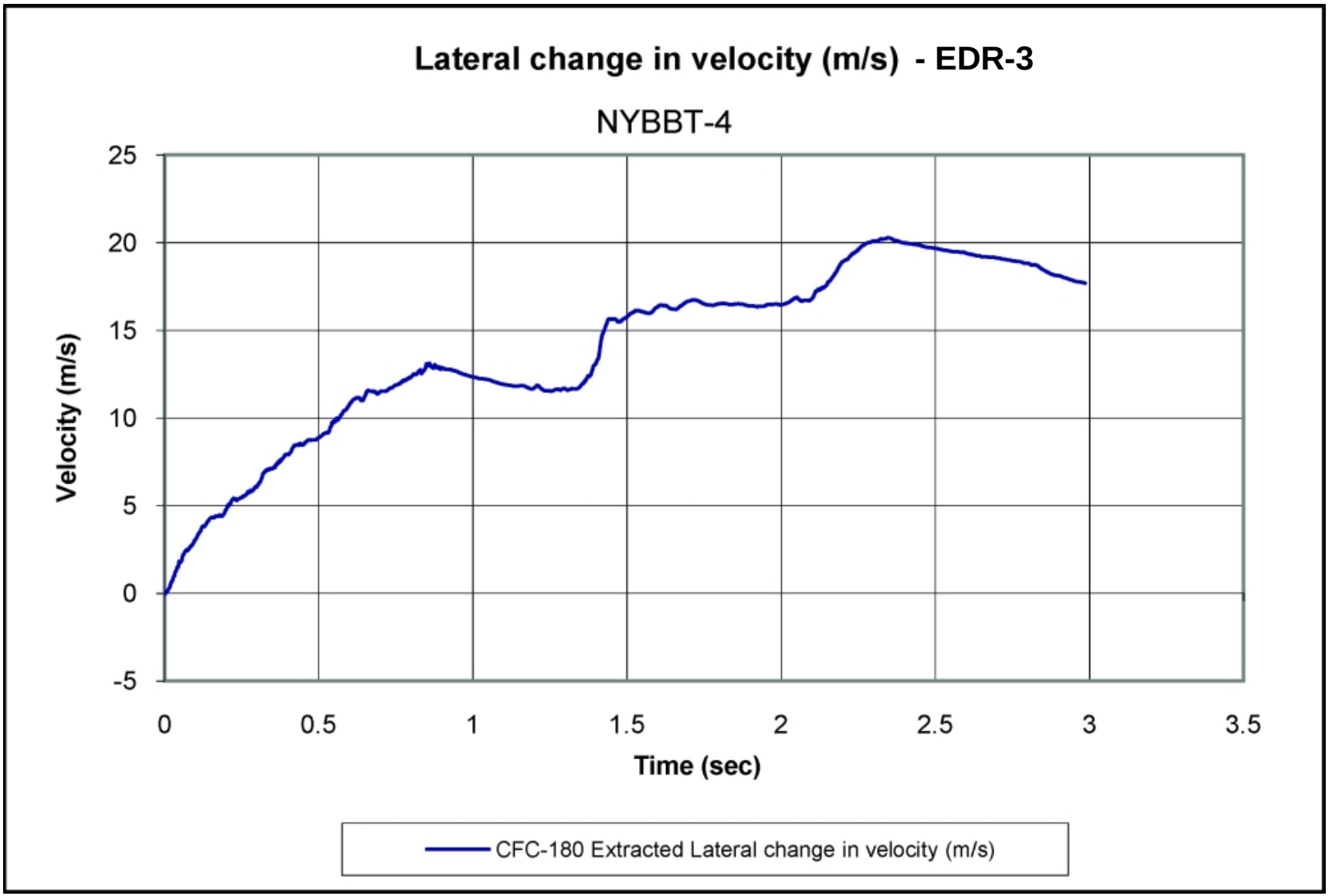


Figure L-5. Graph of Lateral Occupant Impact Velocity (EDR-3), Test No. NYBBT-4

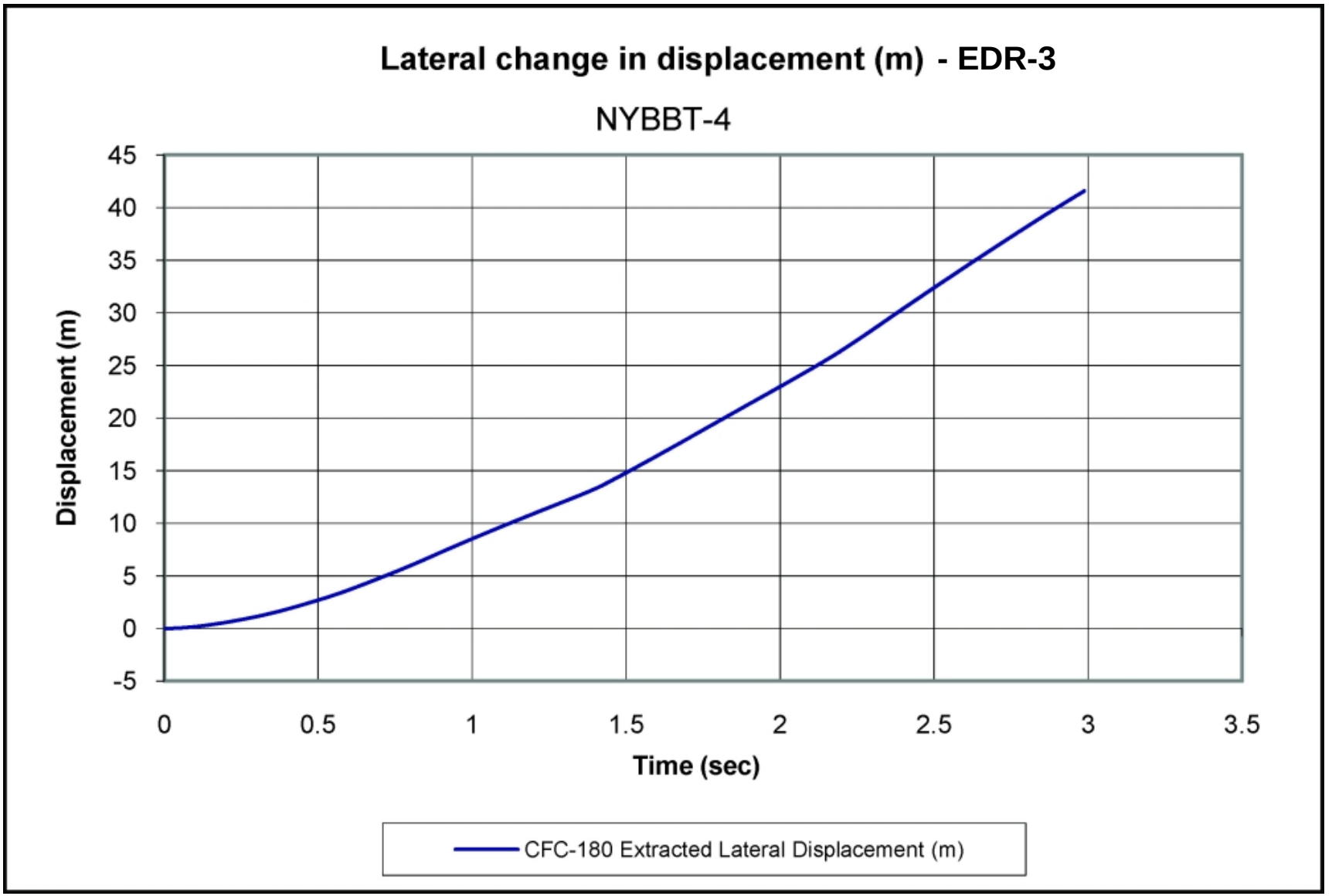


Figure L-6. Graph of Lateral Occupant Displacement (EDR-3), Test No. NYBBT-4

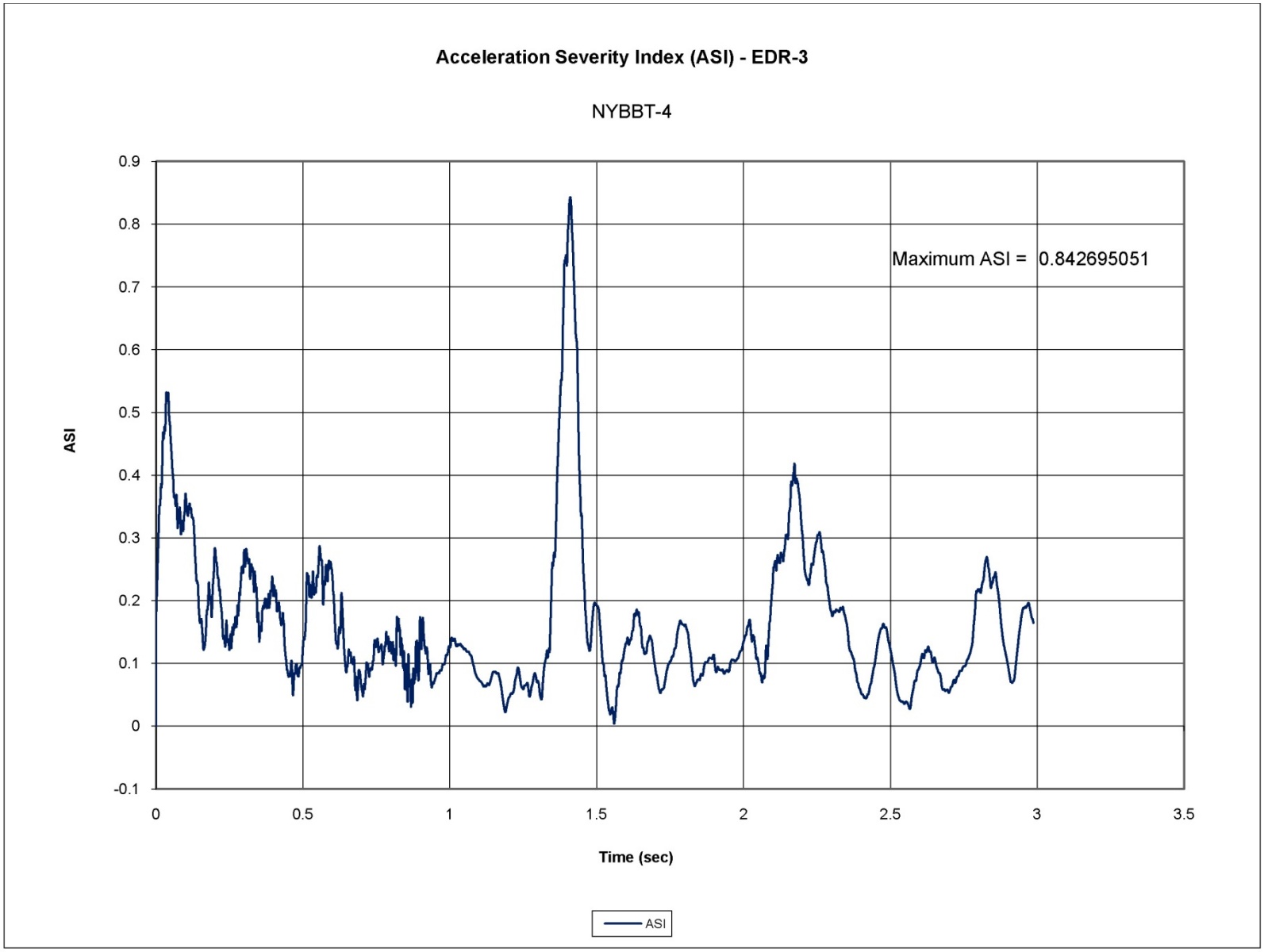


Figure L-7. Graph of Acceleration Severity Index (EDR-3), Test No. NYBBT-4

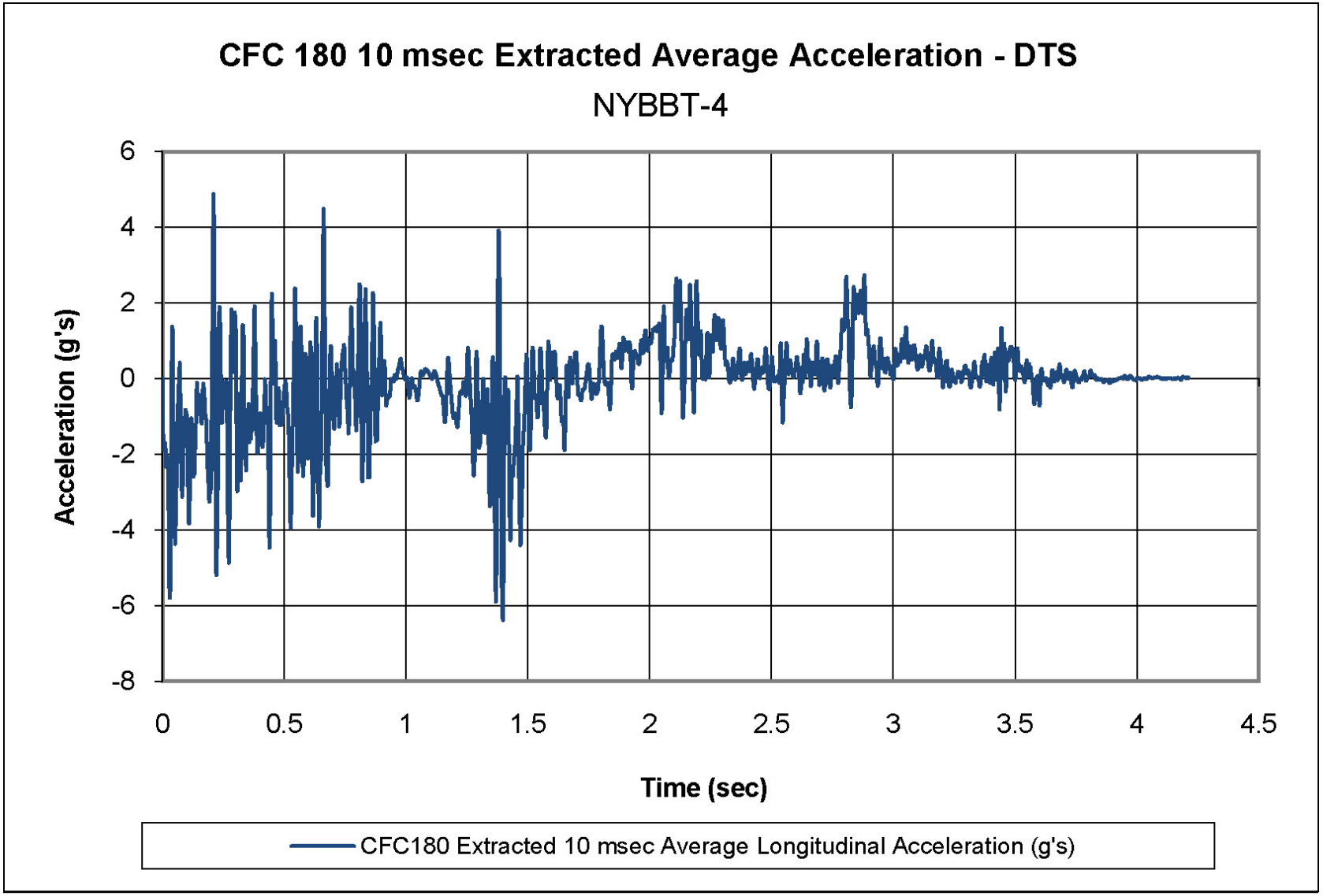


Figure L-8. Graph of Longitudinal Occupant Deceleration (DTS), Test No. NYBBT-4

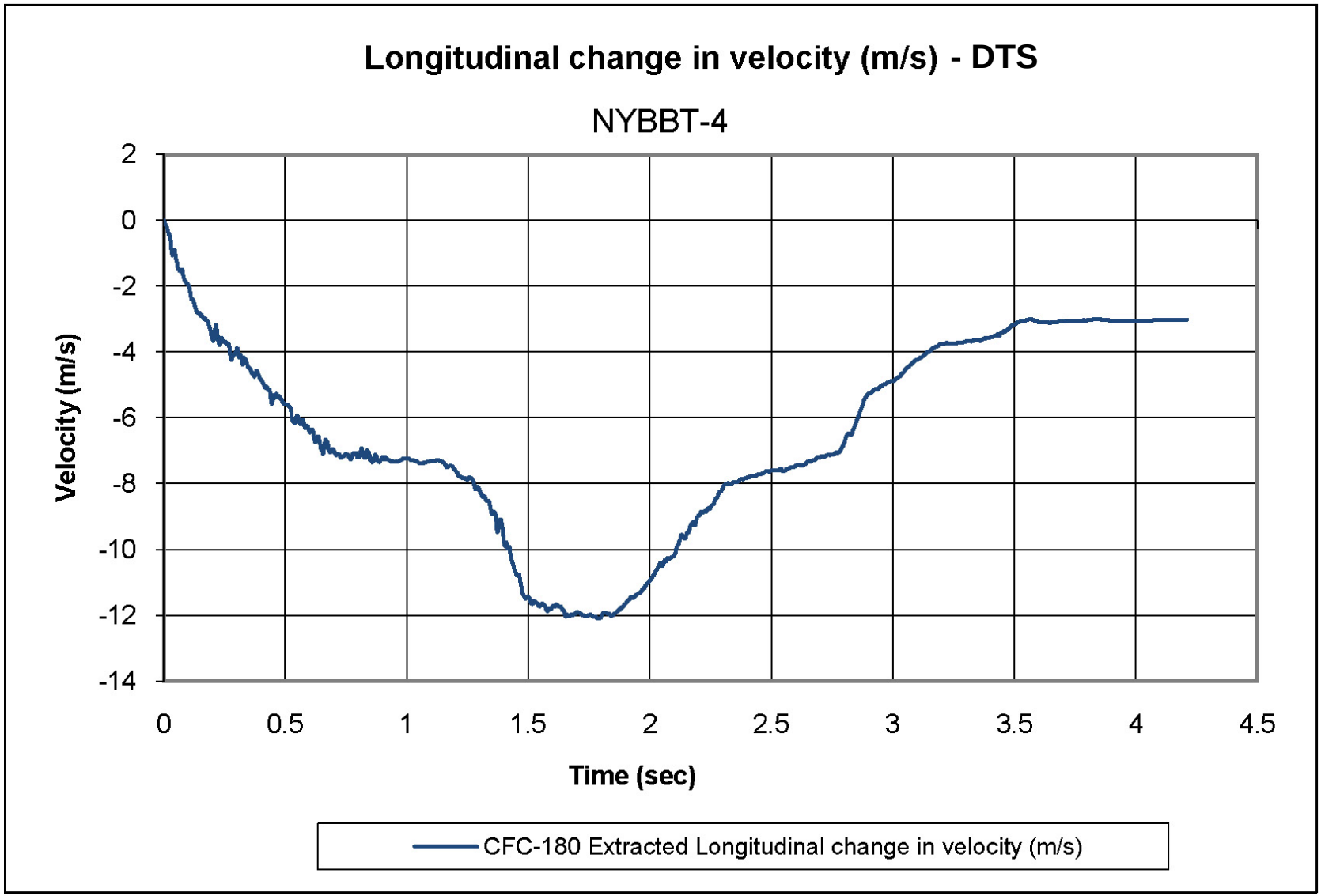


Figure L-9. Graph of Longitudinal Occupant Velocity (DTS), Test No. NYBBT-4

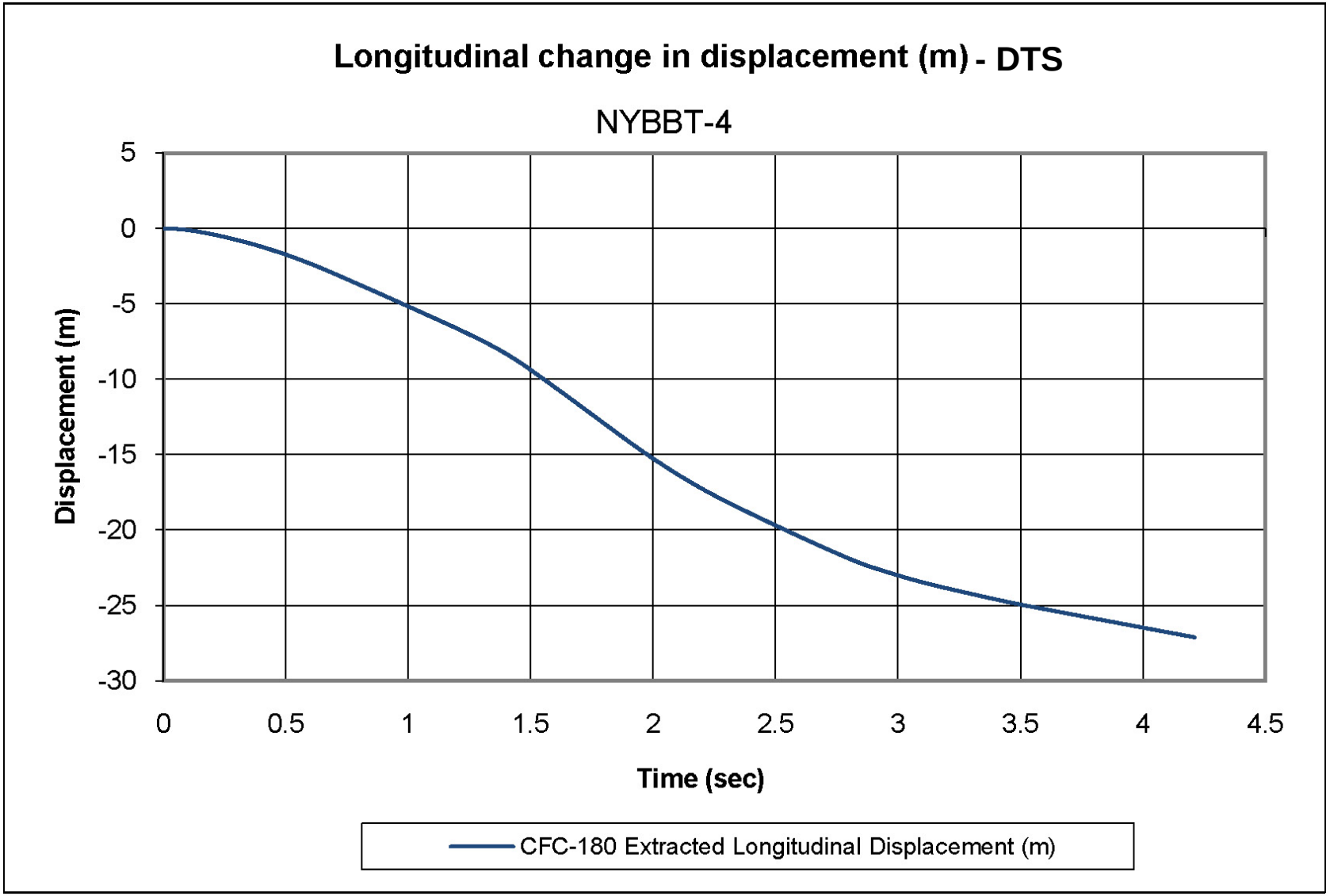


Figure L-10. Graph of Longitudinal Occupant Displacement (DTS), Test No. NYBBT-4

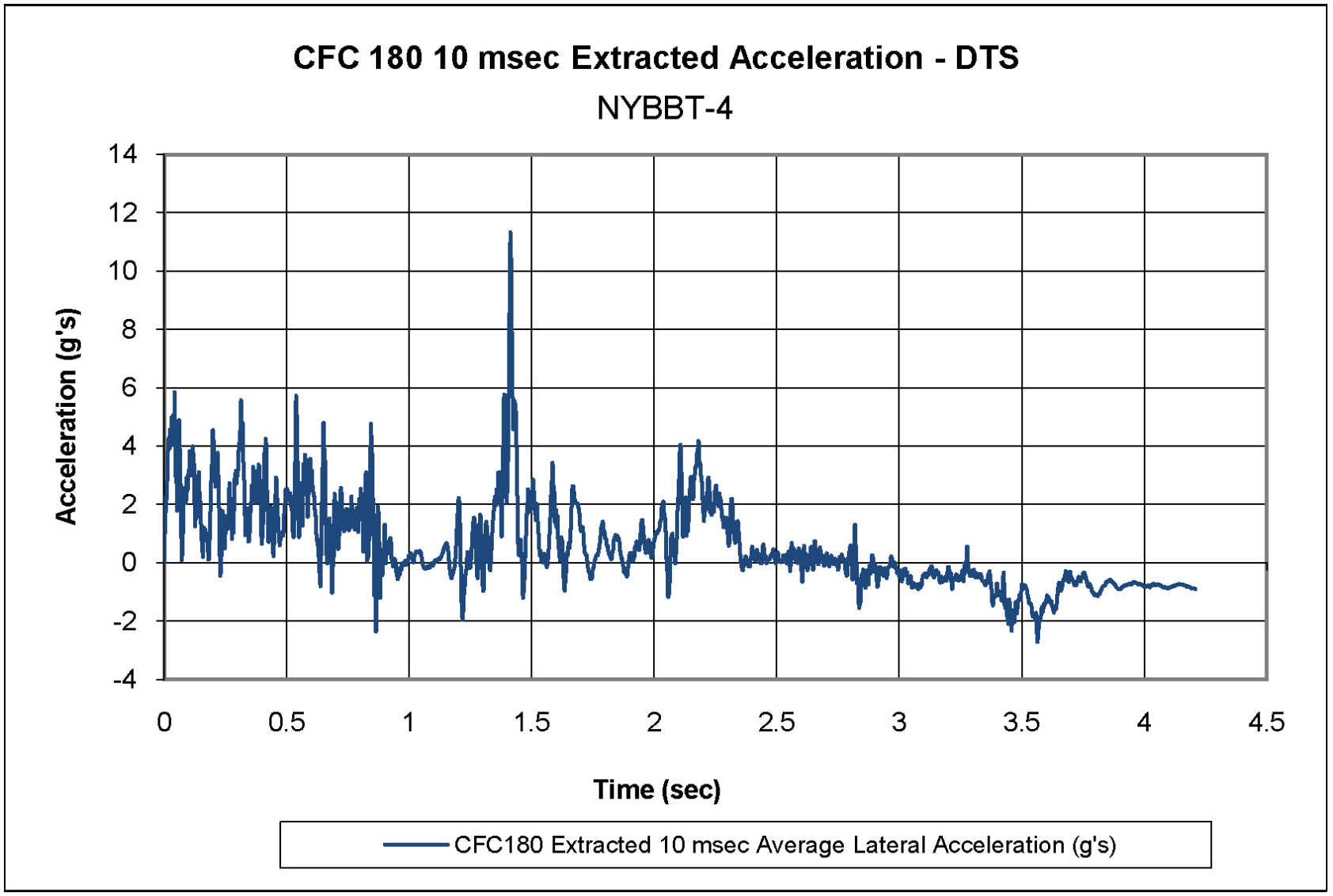


Figure L-11. Graph of Lateral Occupant Deceleration (DTS), Test No. NYBBT-4

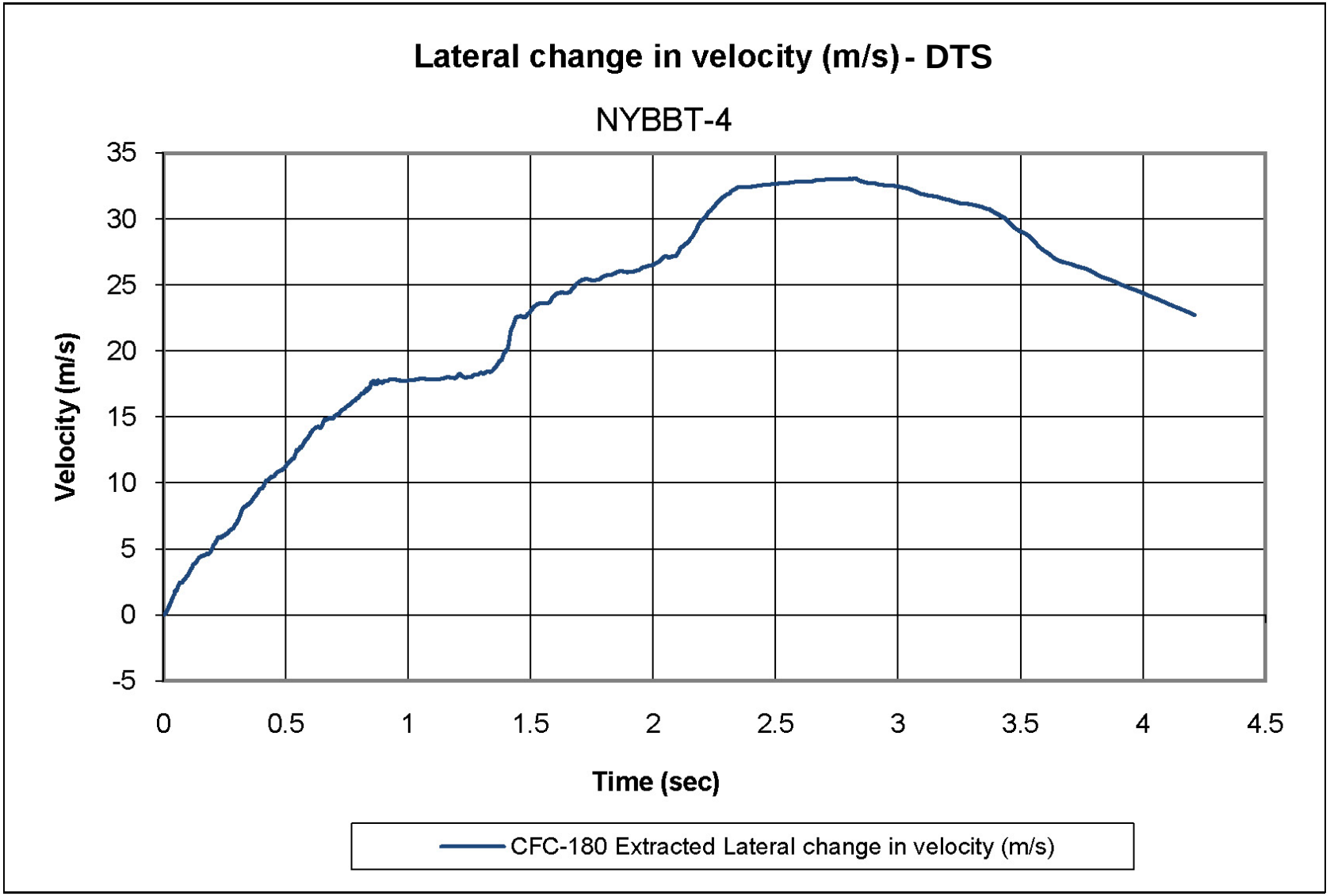


Figure L-12. Graph of Lateral Occupant Impact Velocity (DTS), Test No. NYBBT-4

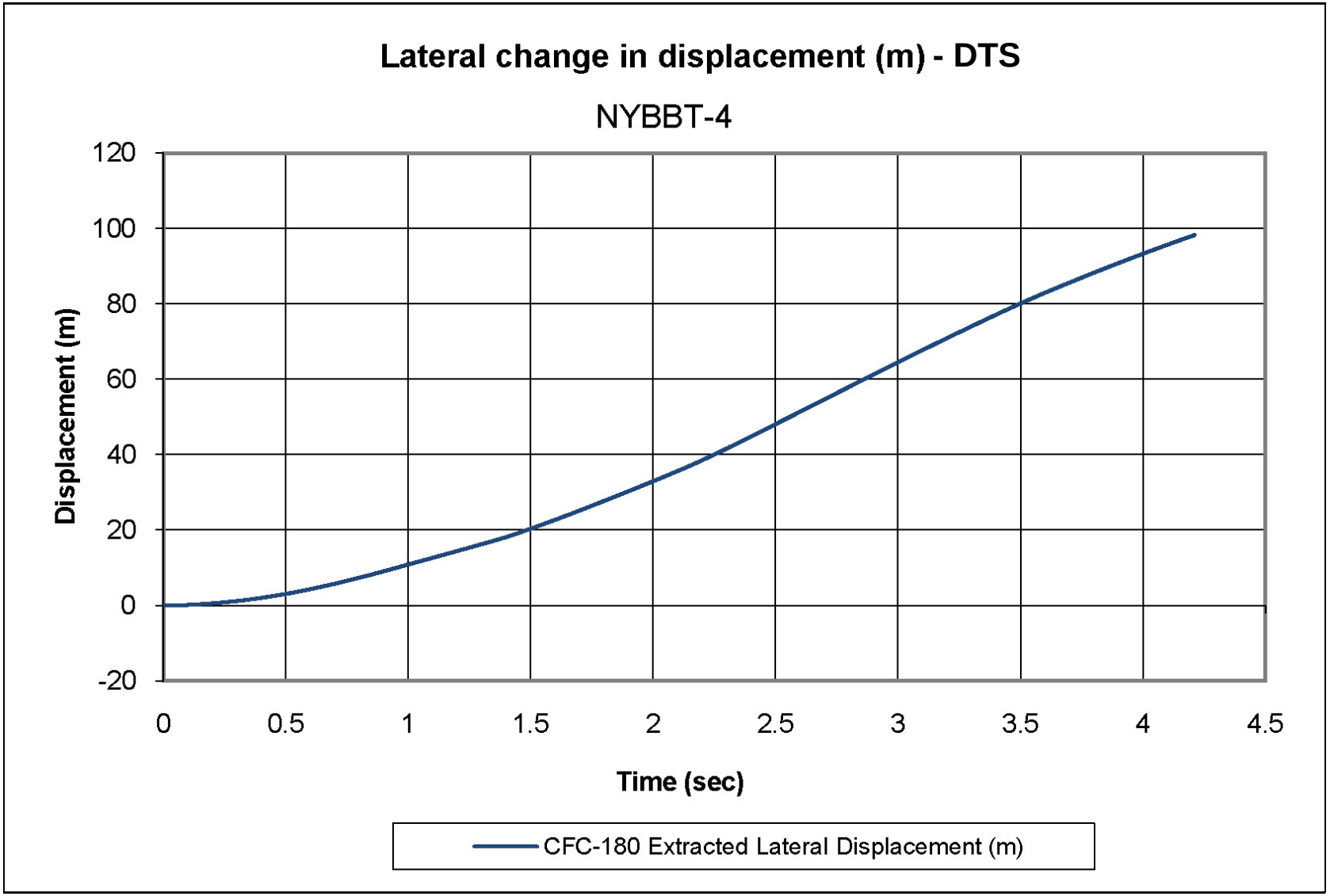


Figure L-13. Graph of Lateral Occupant Displacement (DTS), Test No. NYBBT-4

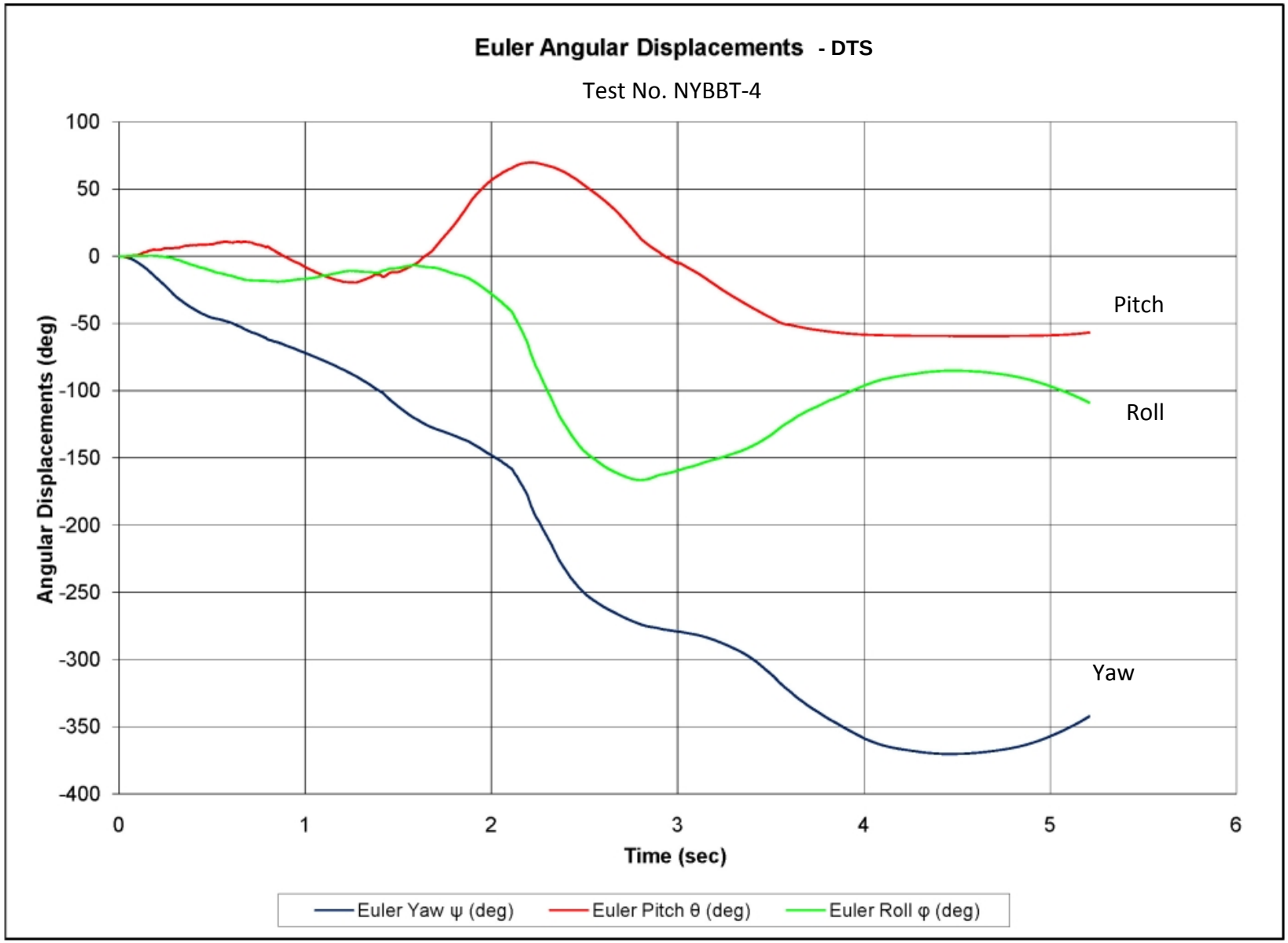


Figure L-14. Graph of Roll, Pitch, and Yaw Angular Displacement (DTS), Test No. NYBBT-4

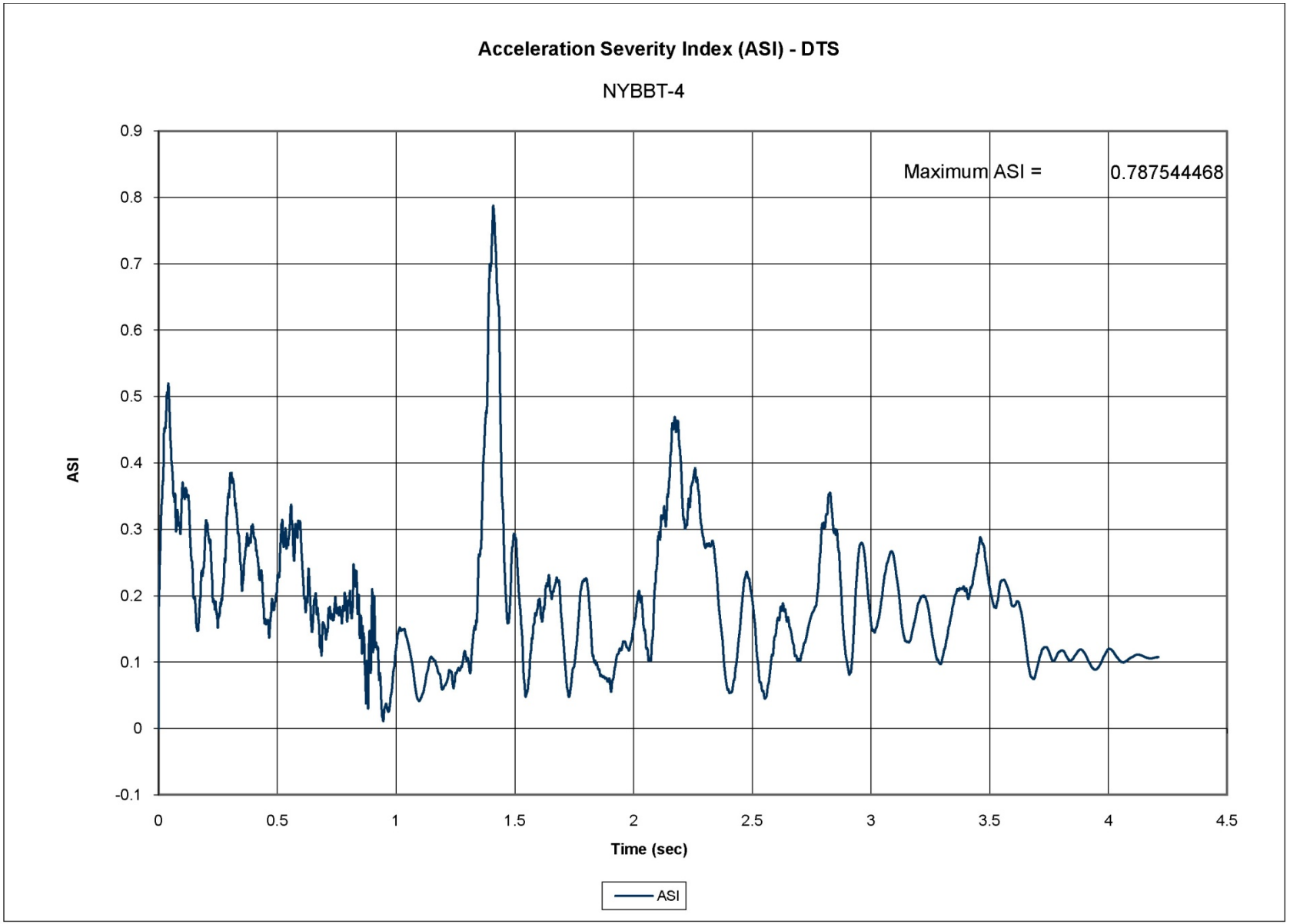


Figure L-15. Graph of Acceleration Severity Index (DTS), Test No. NYBBT-4

APPENDIX M Modified Type IIA Box Beam Terminal System Details - Metric and English Units, Test No. NYBBT-5

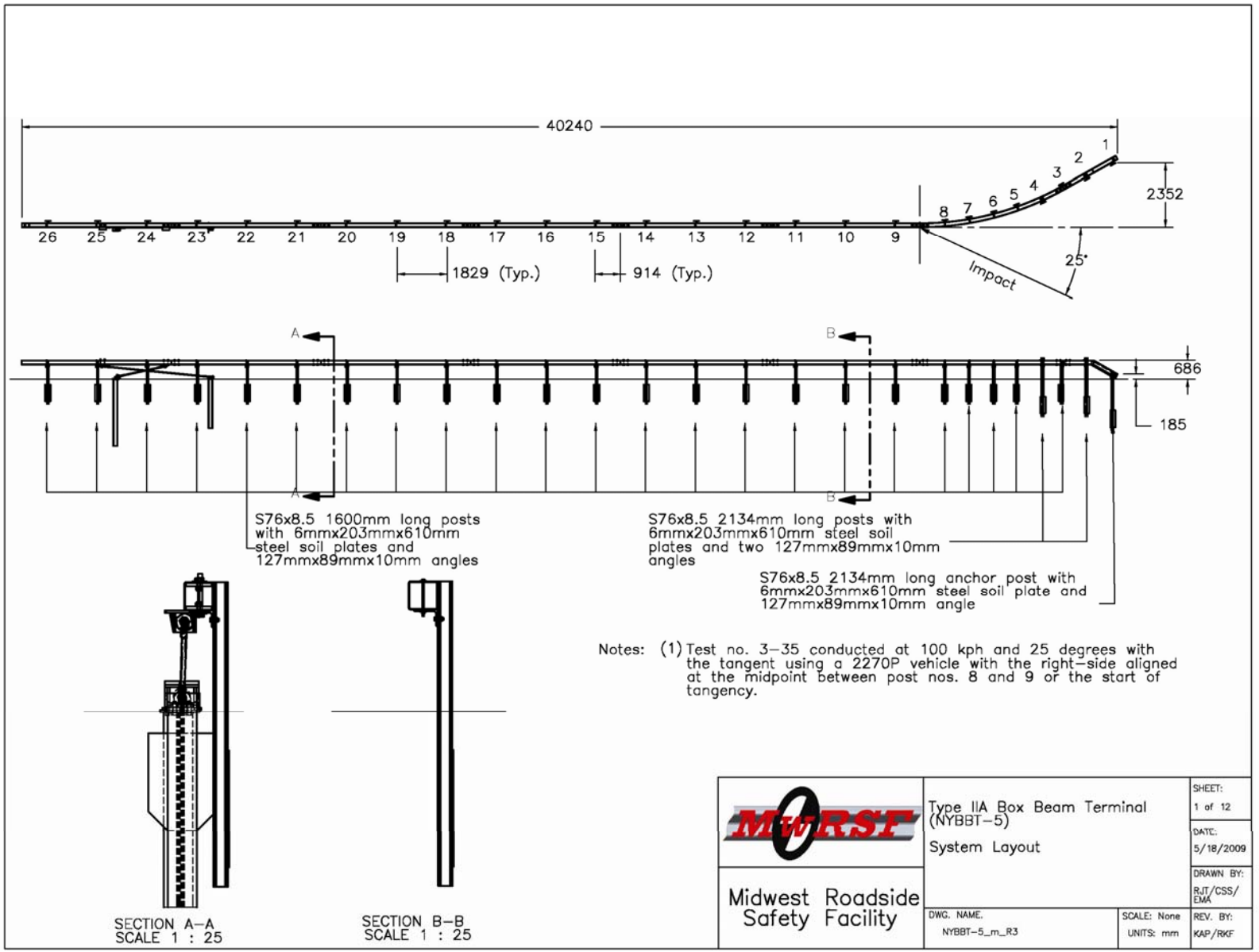


Figure M-1. Modified Type IIA Box Beam Terminal Details (Metric), Test No. NYBBT-5

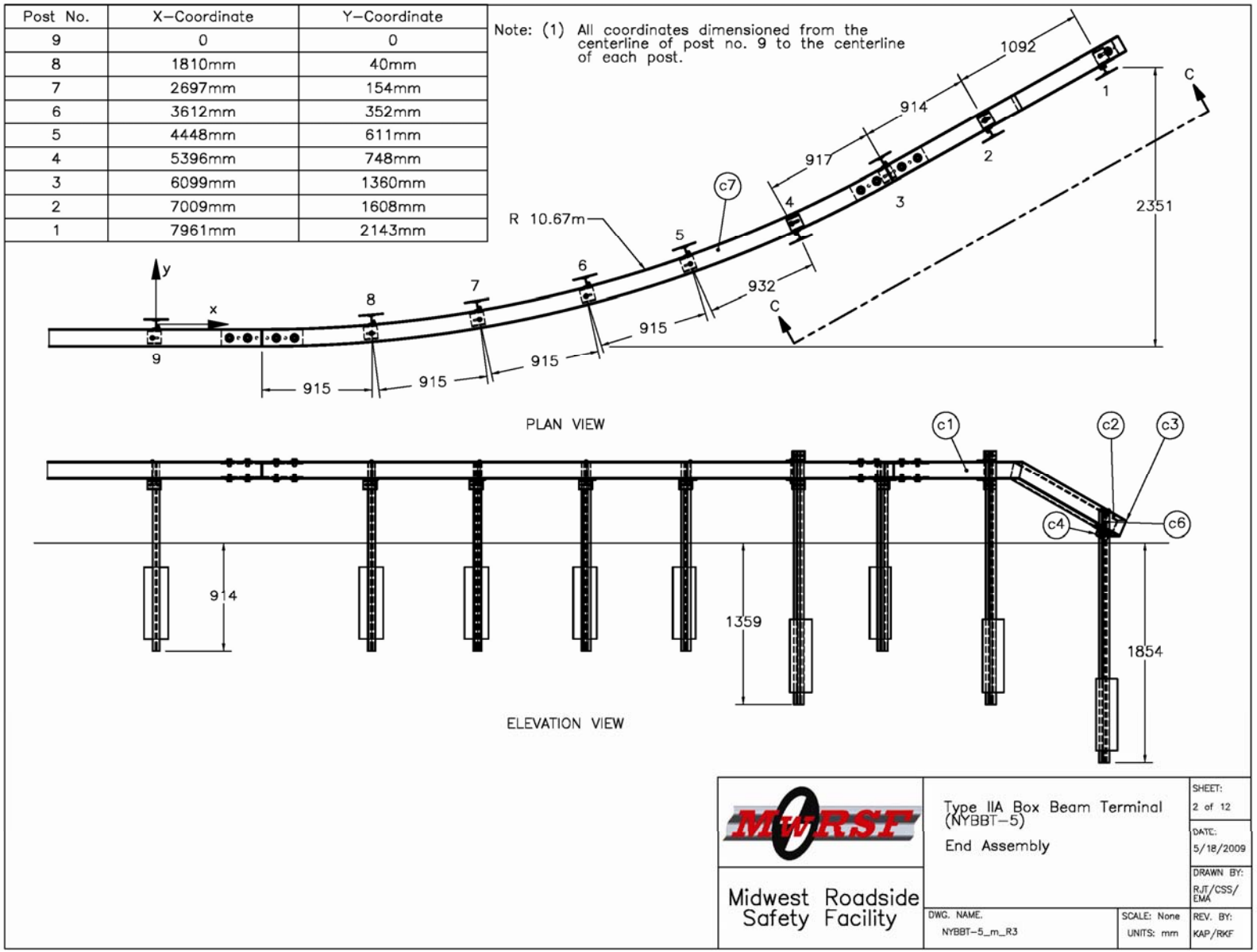


Figure M-2. Modified Type IIA Box Beam Terminal Details (Metric), Test No. NYBBT-5

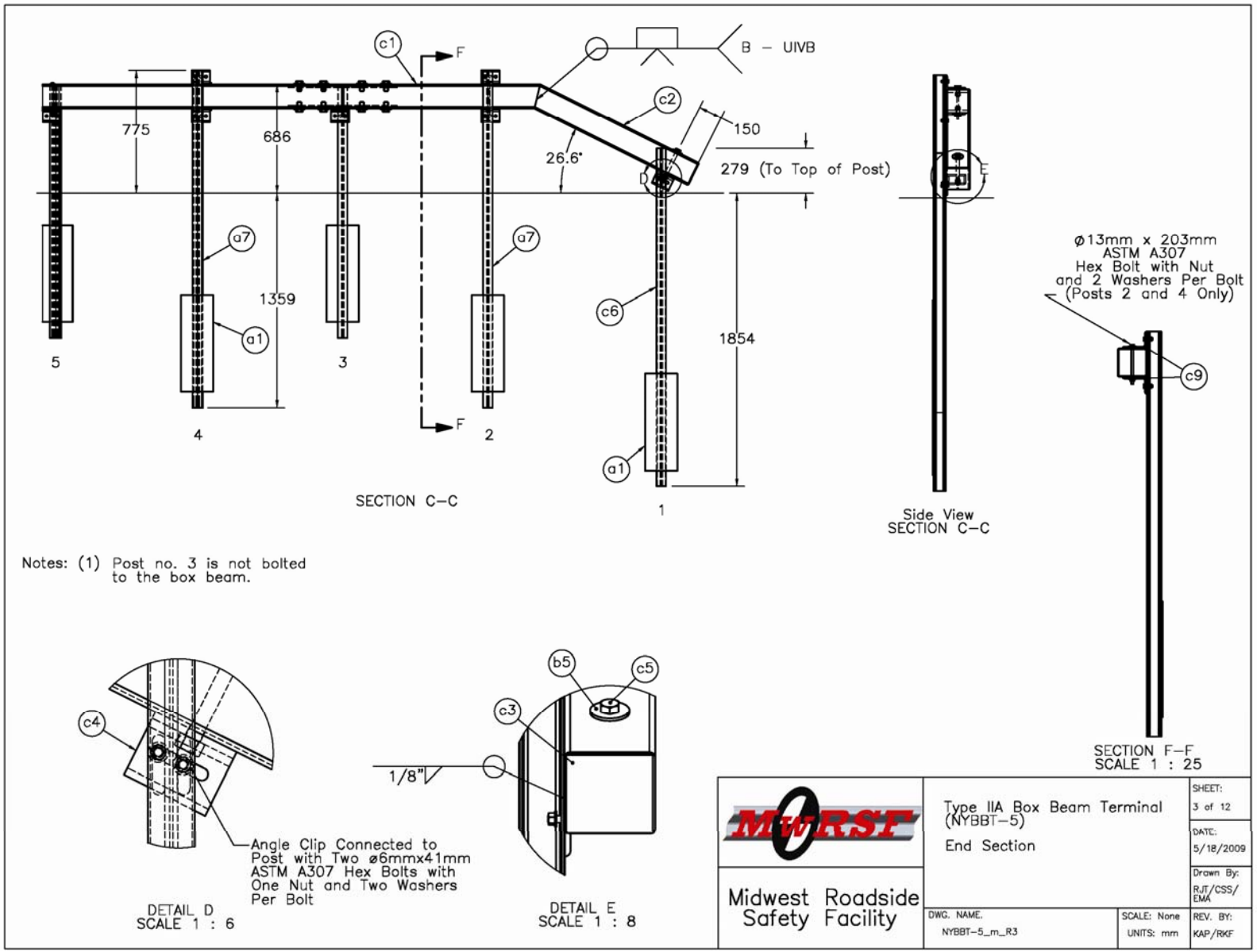


Figure M-3. Modified Type IIA Box Beam Terminal Details (Metric), Test No. NYBBT-5

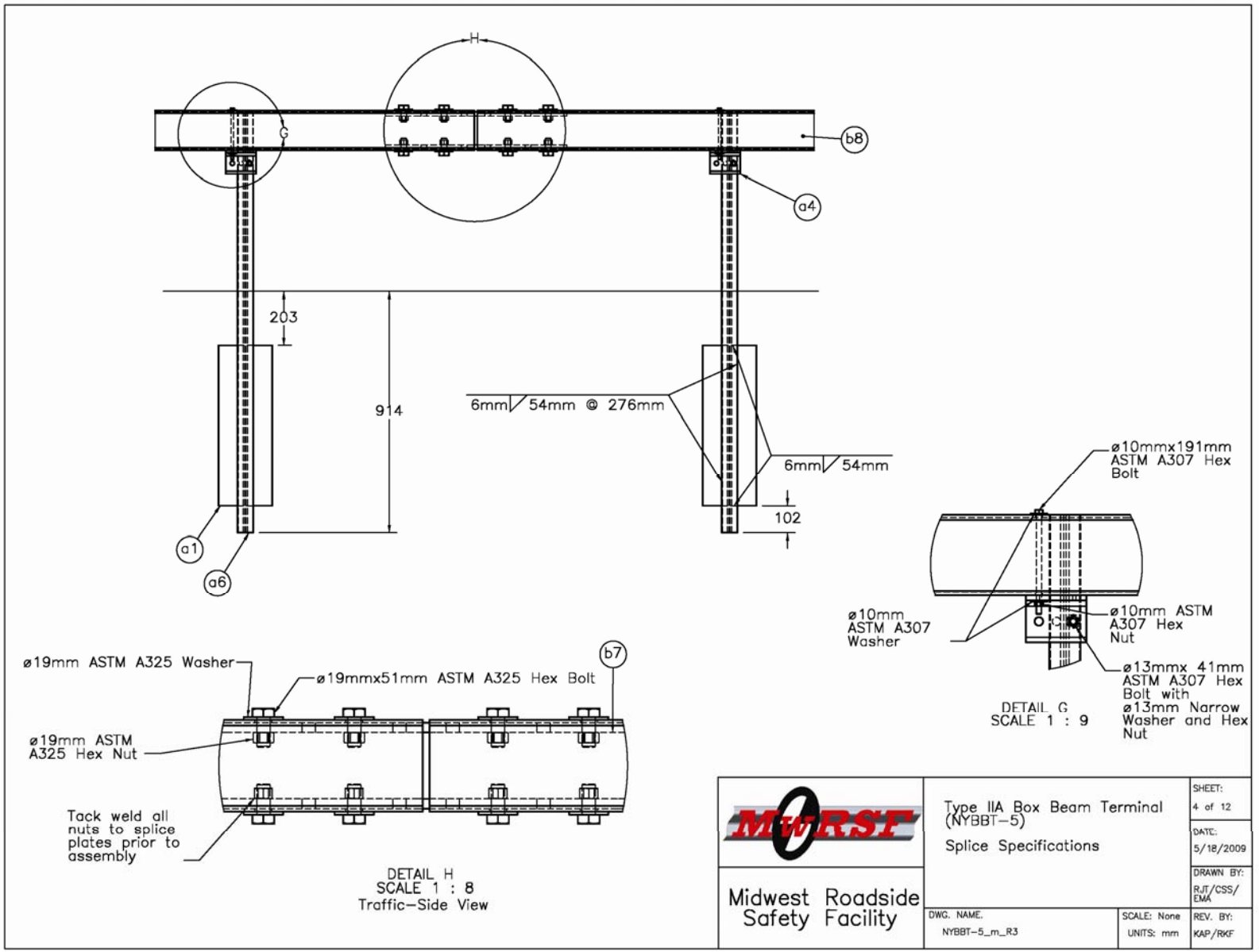


Figure M-4. Modified Type IIA Box Beam Terminal Details (Metric), Test No. NYBBT-5

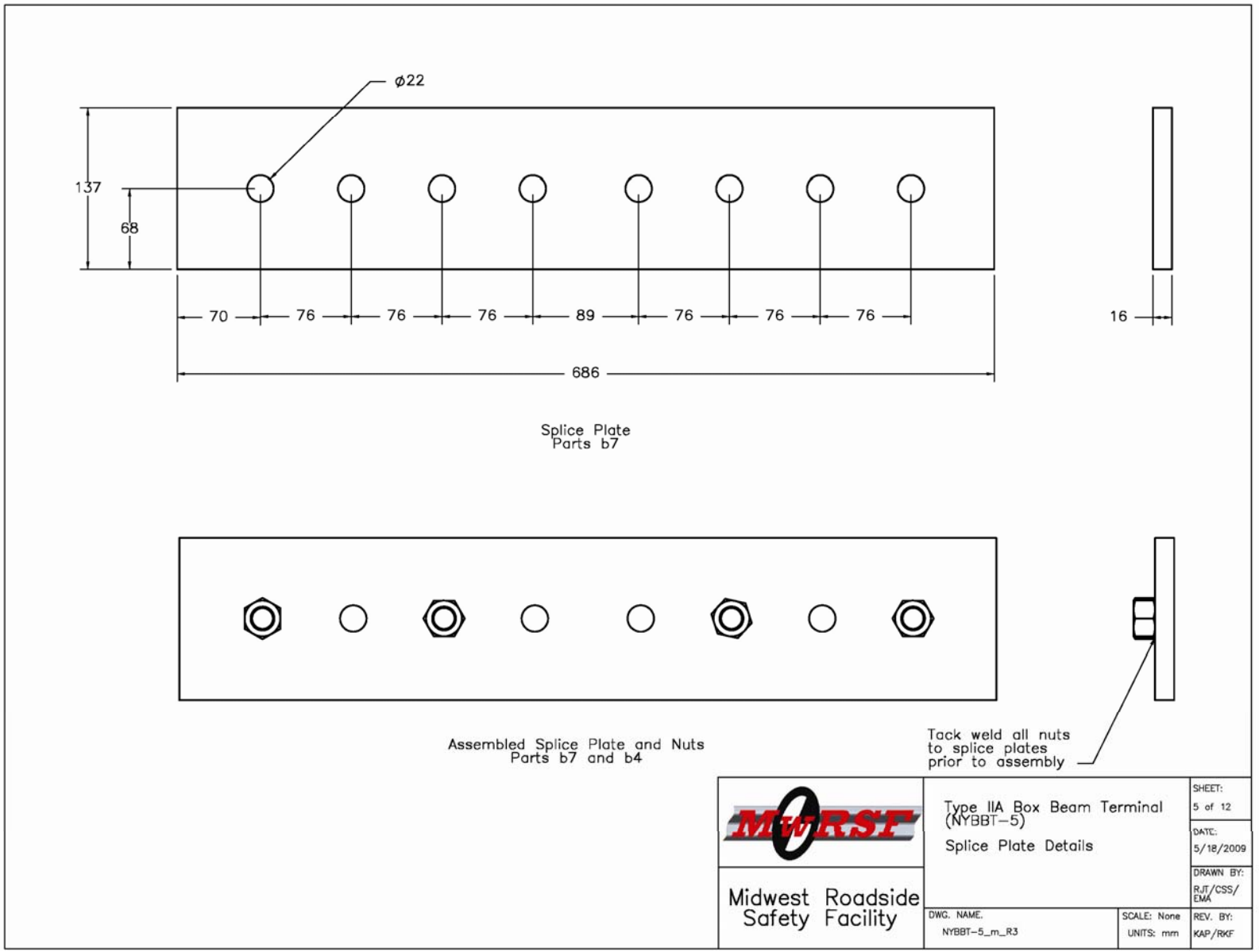


Figure M-5. Modified Type IIA Box Beam Terminal Details (Metric), Test No. NYBBT-5

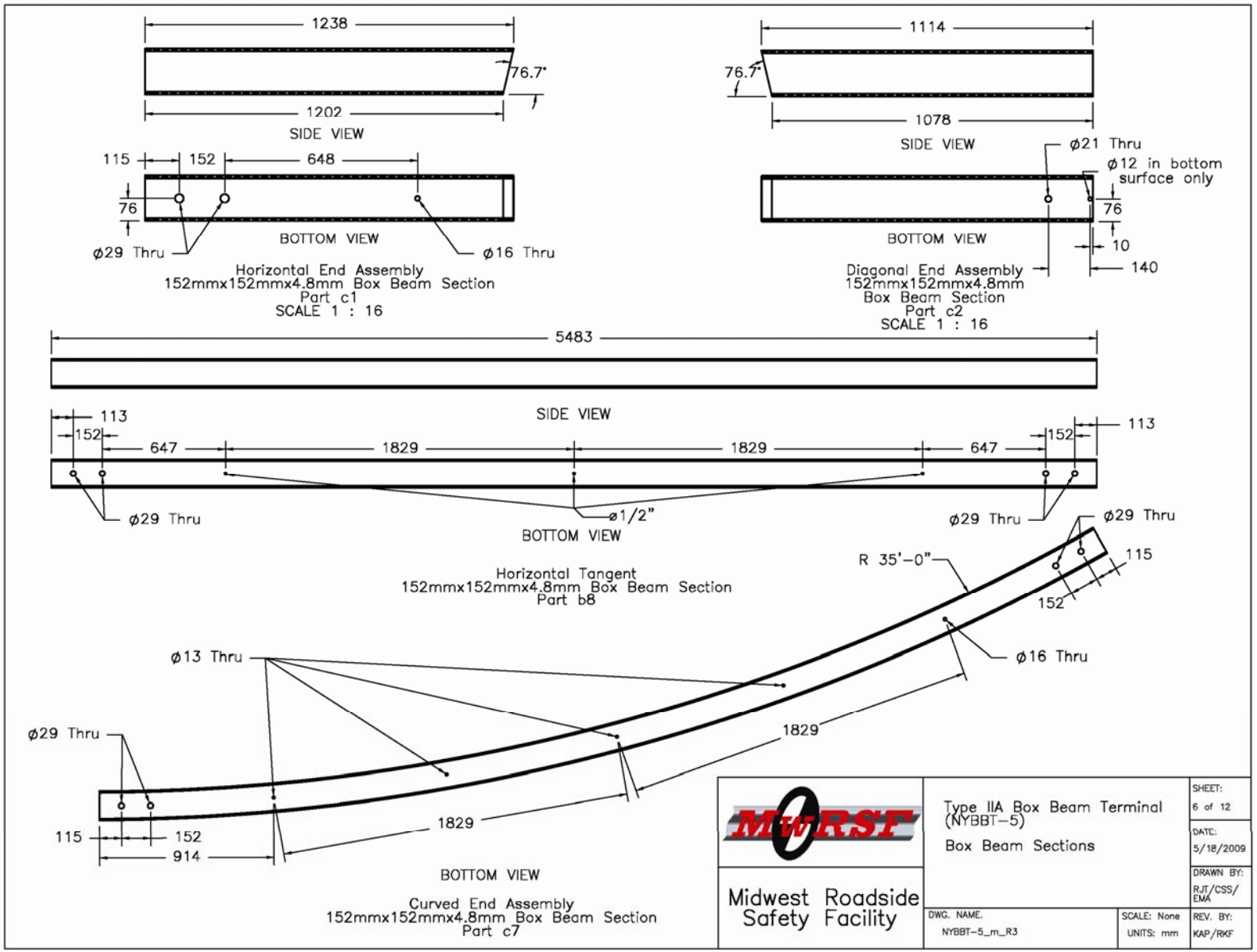


Figure M-6. Modified Type IIA Box Beam Terminal Details (Metric), Test No. NYBBT-5

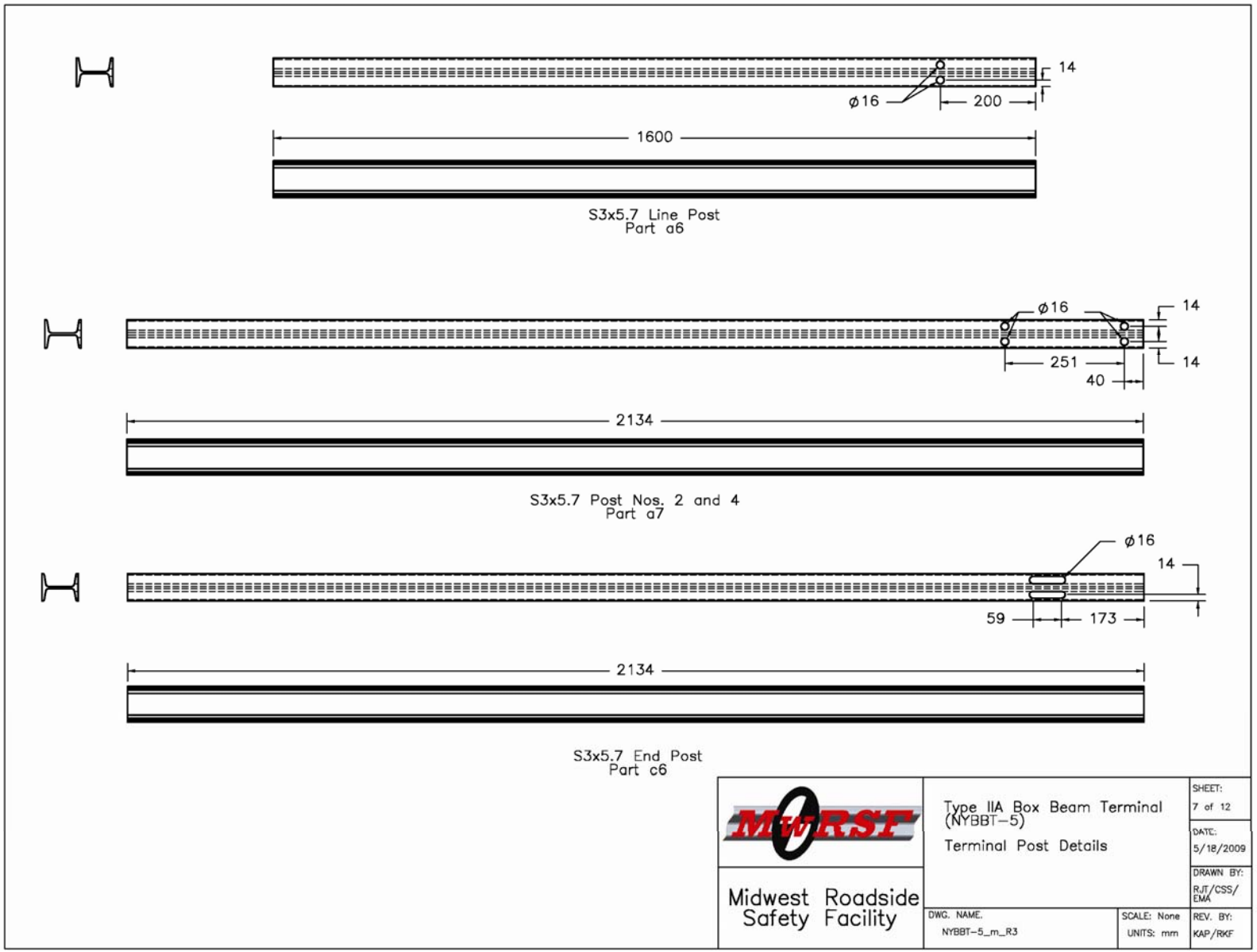


Figure M-7. Modified Type IIA Box Beam Terminal Details (Metric), Test No. NYBBT-5

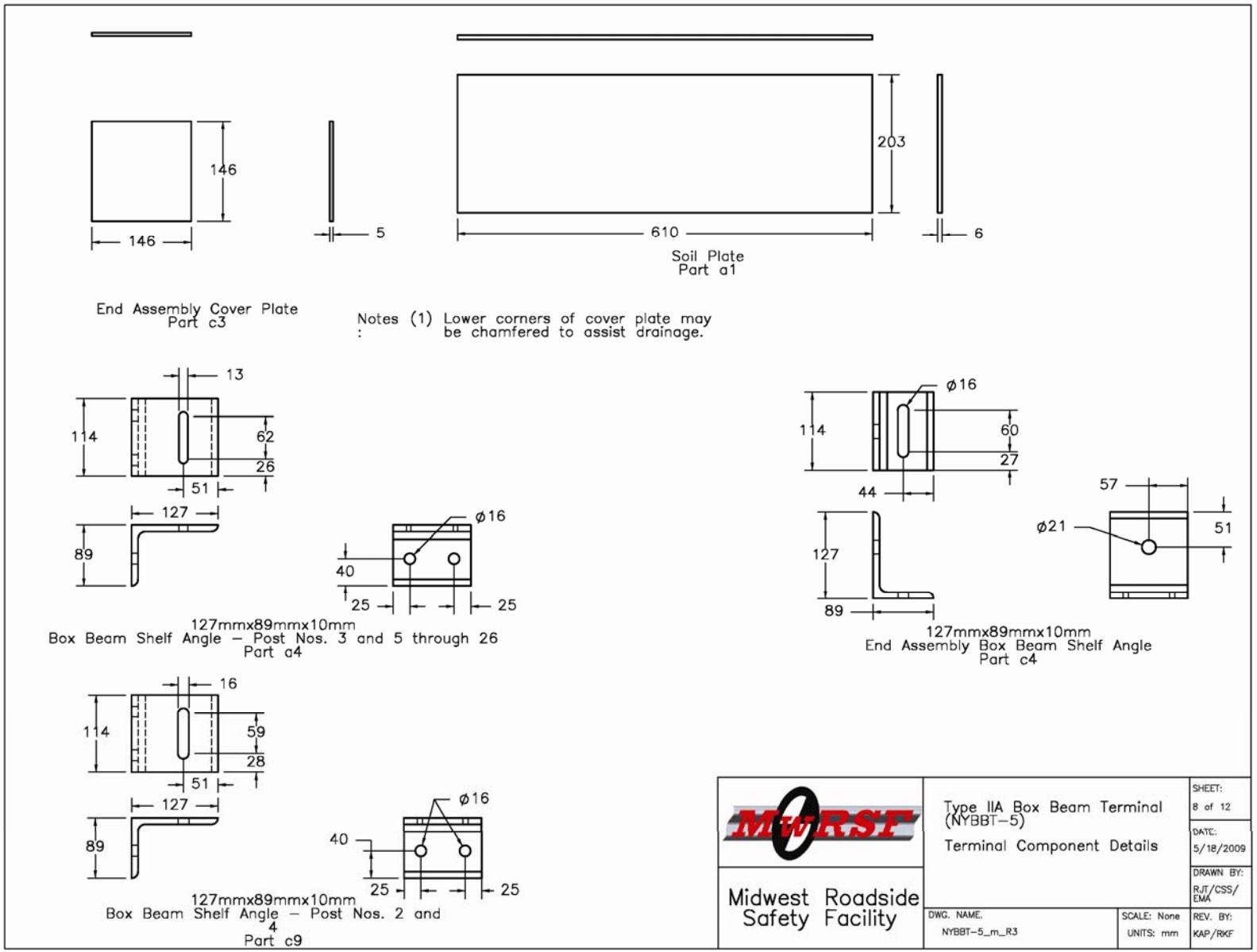


Figure M-8. Modified Type IIA Box Beam Terminal Details (Metric), Test No. NYBBT-5

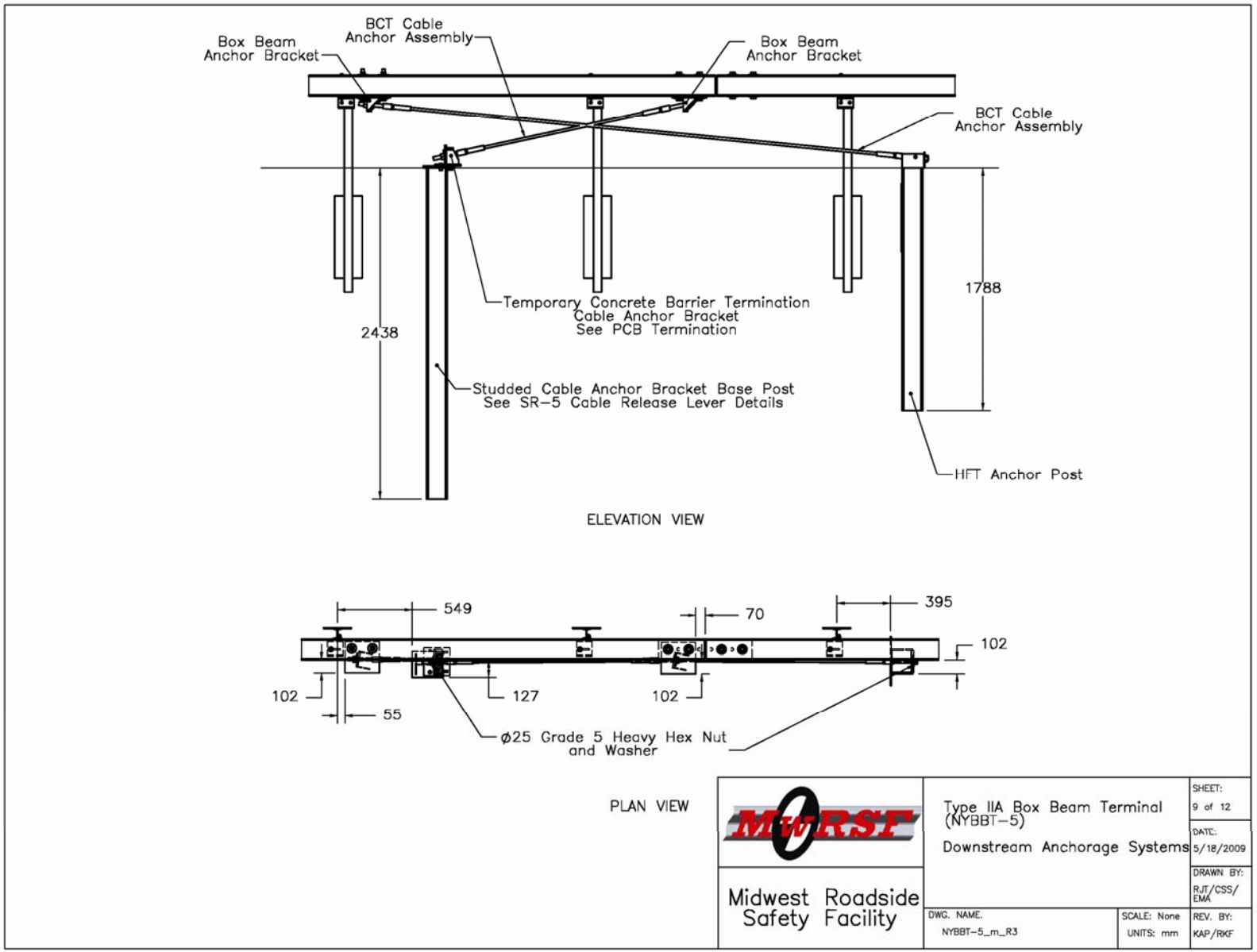


Figure M-9. Modified Type IIA Box Beam Terminal Details (Metric), Test No. NYBBT-5

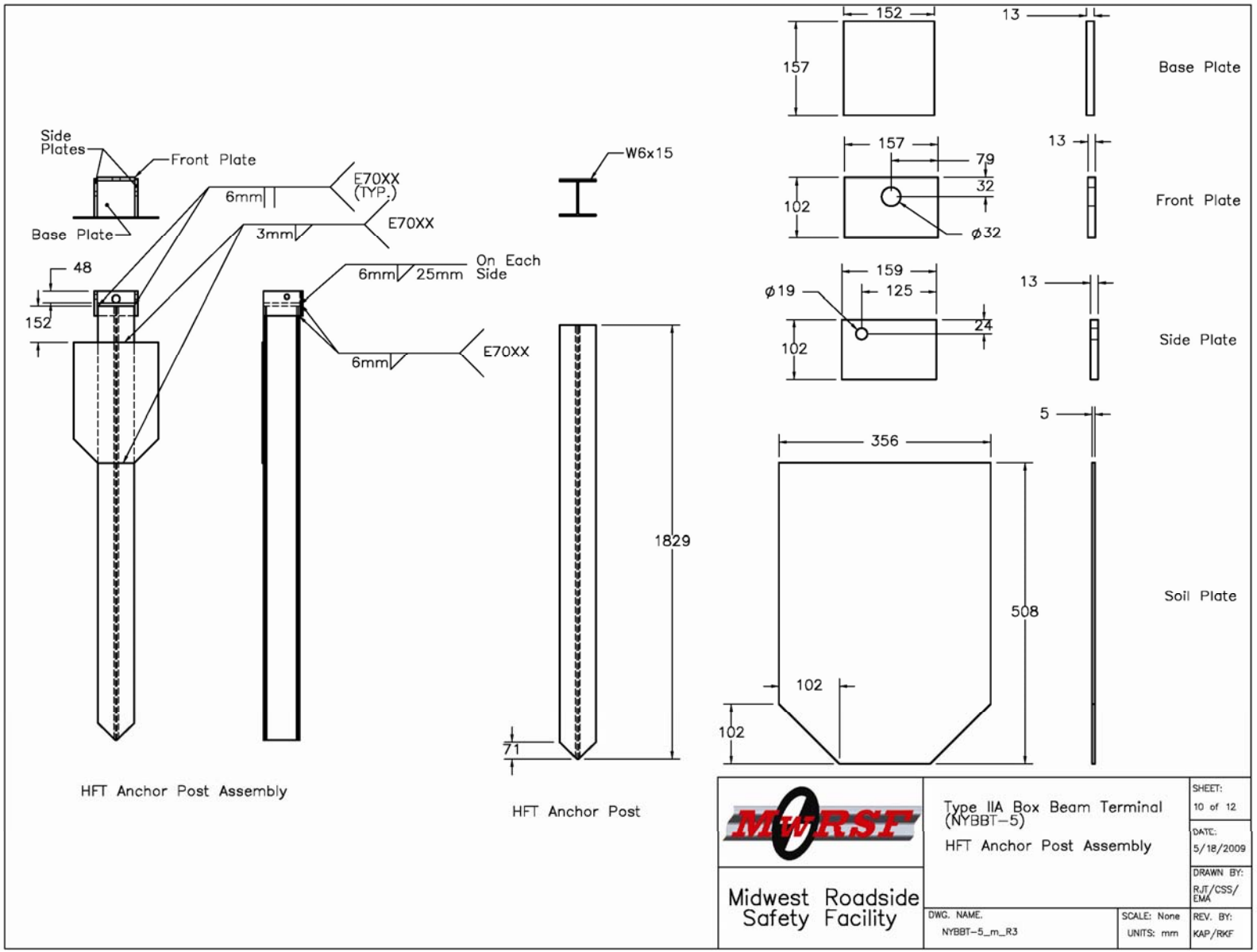


Figure M-10. Modified Type IIA Box Beam Terminal Details (Metric), Test No. NYBBT-5

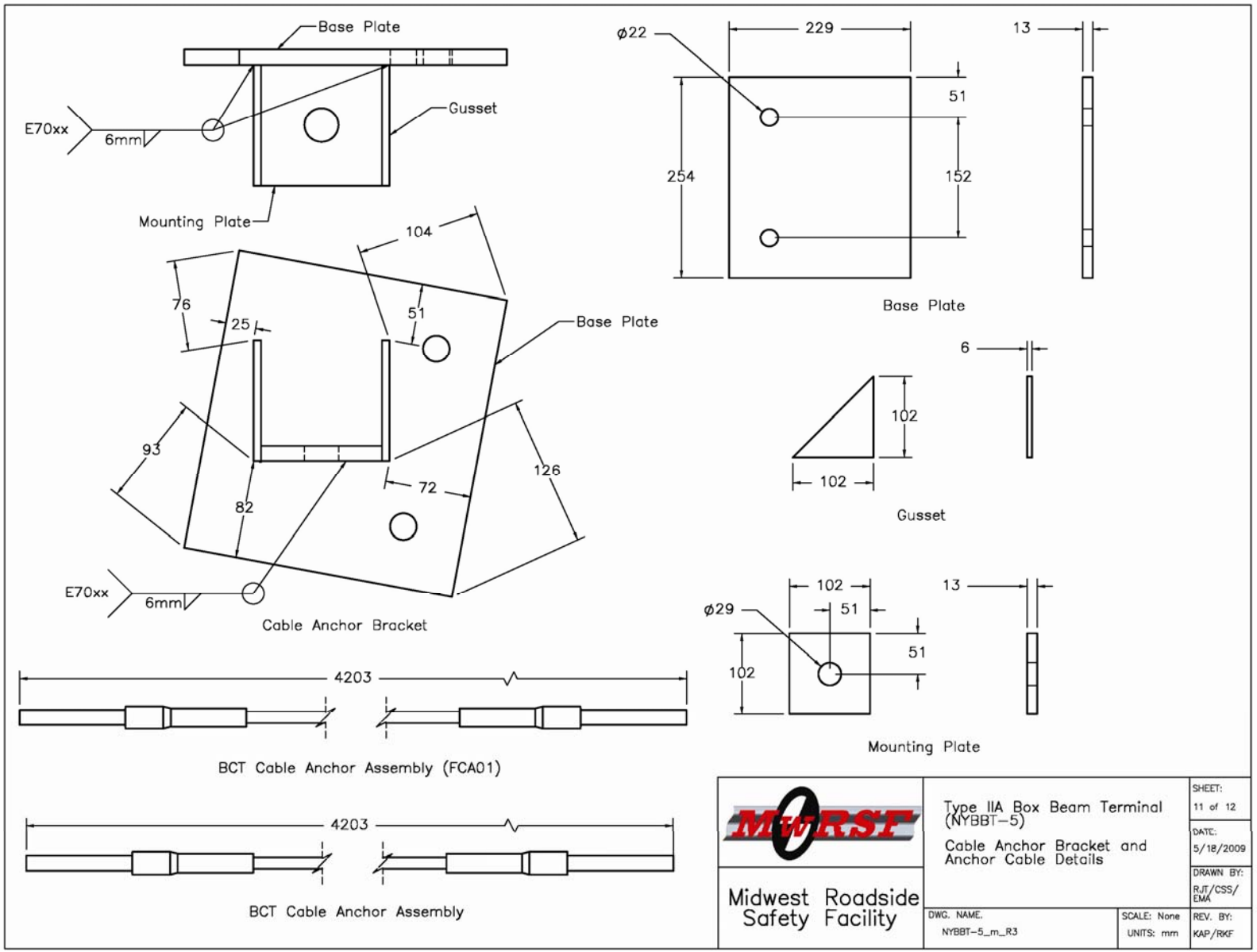


Figure M-11. Modified Type IIA Box Beam Terminal Details (Metric), Test No. NYBBT-5

NYBBT–5			
Item No.	QTY.	Description	Material Spec
a1	26	6mm x 203mm x 610mm steel soil plate	A36 Steel
a2	29	ø 13mm coarse thread 41mm long hex bolt	ASTM A307
a3	31	ø 13mm hex nut	ASTM A307
a4	23	127mm x 89mm x 10mm box beam shelf angle	A36 Steel
a5	31	ø 13mm narrow washer	ASTM A307
a6	23	S76 x 8.5 1600mm long post	A36 Steel
a7	2	S76 x 8.5 2134mm long post	A36 Steel
b1	22	ø 10mm coarse thread 191mm long hex bolt	ASTM A307
b2	22	ø 10mm hex nut	ASTM A307
b3	44	ø 10mm wide washer	ASTM A307
b4	59	ø 19mm hex nut	ASTM A325
b5	61	ø 19mm wide washer	ASTM A325
b6	56	ø 19mm coarse thread 51mm long hex bolt	ASTM A307
b7	14	686mm x 137mm x 16mm splice plate	A36 Steel
b8	6	152mm x 152mm x 4.8mm by 5483mm long box beam	ASTM A500 Grade B
c1	1	End assembly horizontal 152mm x 152mm x 4.8mm box beam	ASTM A500 Grade B
c2	1	End assembly diagonal 152mm x 152mm x 4.8mm box beam	ASTM A500 Grade B
c3	1	End assembly 4.8mm thick cover plate	A36 Steel
c4	1	127mm x 89mm x 10mm box beam anchor post shelf angle	A36 Steel
c5	1	ø 19mm coarse thread 191mm long hex bolt	ASTM A307
c6	1	S76 x 8.5 2134mm long post anchor post	A36 Steel
c7	1	152mm x 152mm x 4.8mm R 10.62m Curved Box Beam	ASTM A500 Grade B
c8	2	ø 13mm coarse thread 203mm long hex bolt	ASTM A307
c9	4	127mm x 89mm x 10mm box beam shelf angle with ø16mm slot	A36 Steel
c10	4	ø 13mm wide washer	ASTM A307

Midwest Roadside Safety Facility

Type IIA Box Beam Terminal (NYBBT–5)
Bill of Materials

SHEET: 12 of 12
DATE: 5/18/2009
DRAWN BY: RJT/CSS/EMA
REV. BY: KAP/RKF
DWG. NAME: NYBBT–5_m_R3
SCALE: None
UNITS: mm

Figure M-12. Modified Type IIA Box Beam Terminal Details (Metric), Test No. NYBBT-5

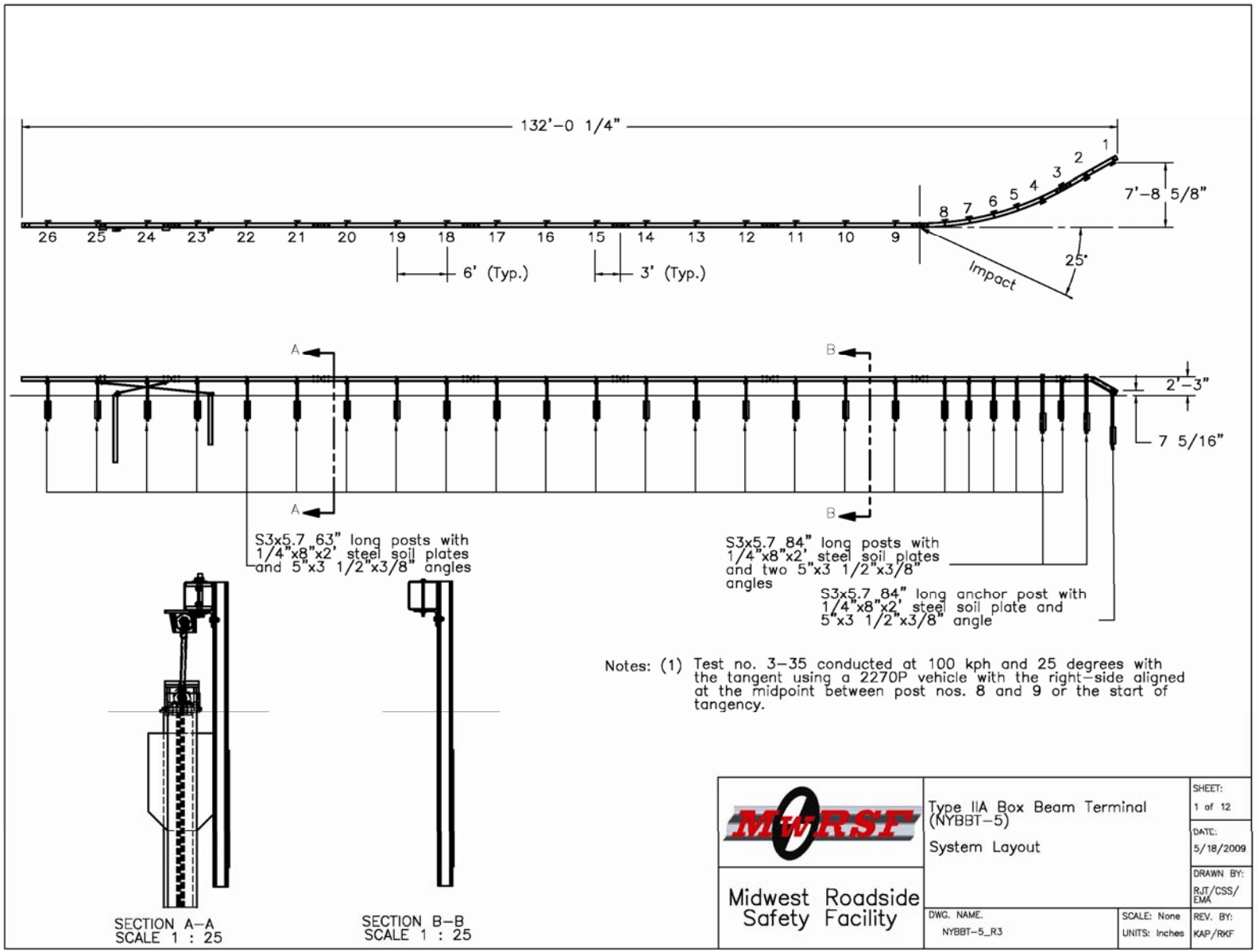


Figure M-13. Modified Type IIA Box Beam Terminal Details (English), Test No. NYBBT-5

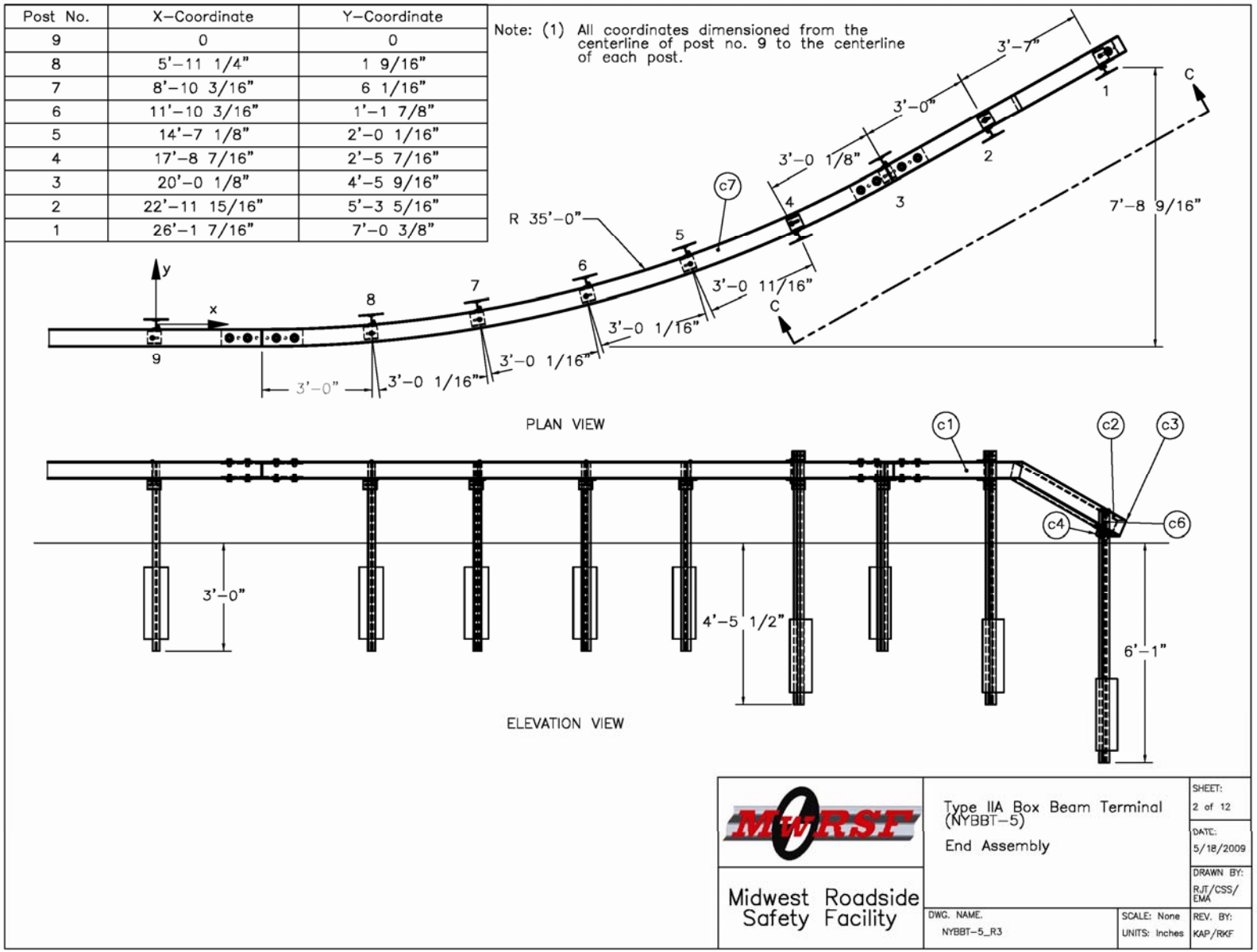


Figure M-14. Modified Type IIA Box Beam Terminal Details (English), Test No. NYBBT-5

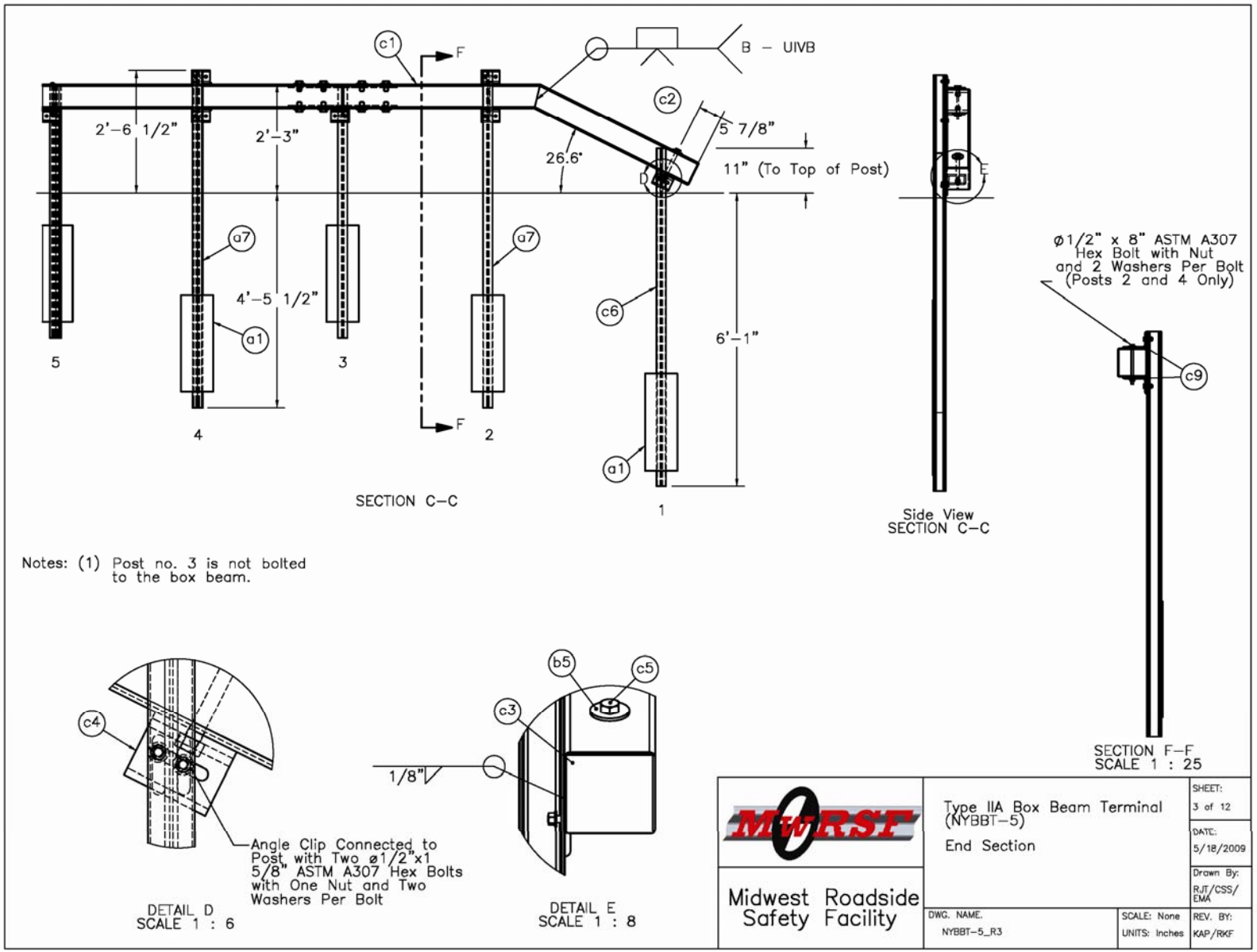


Figure M-15. Modified Type IIA Box Beam Terminal Details (English), Test No. NYBBT-5

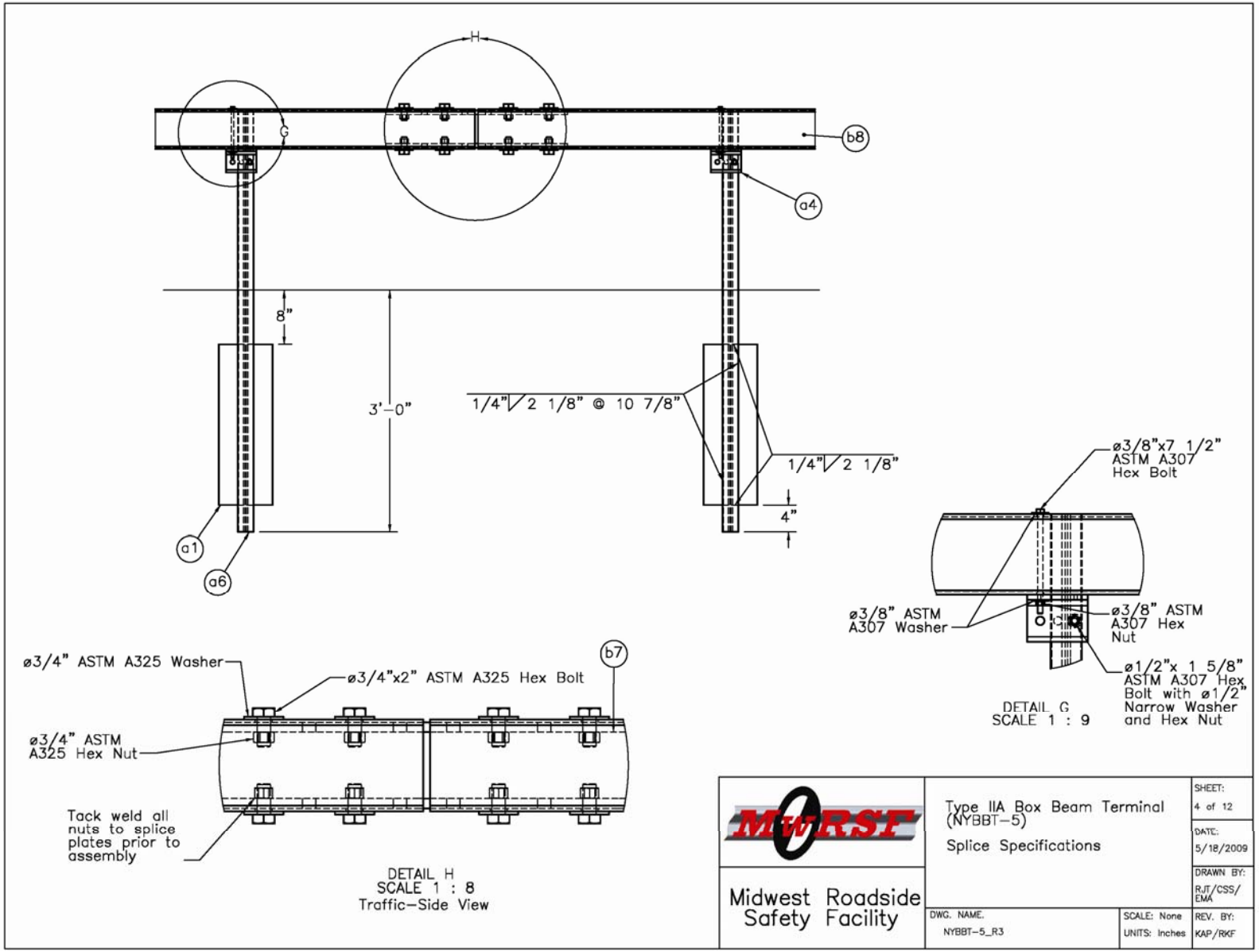


Figure M-16. Modified Type IIA Box Beam Terminal Details (English), Test No. NYBBT-5

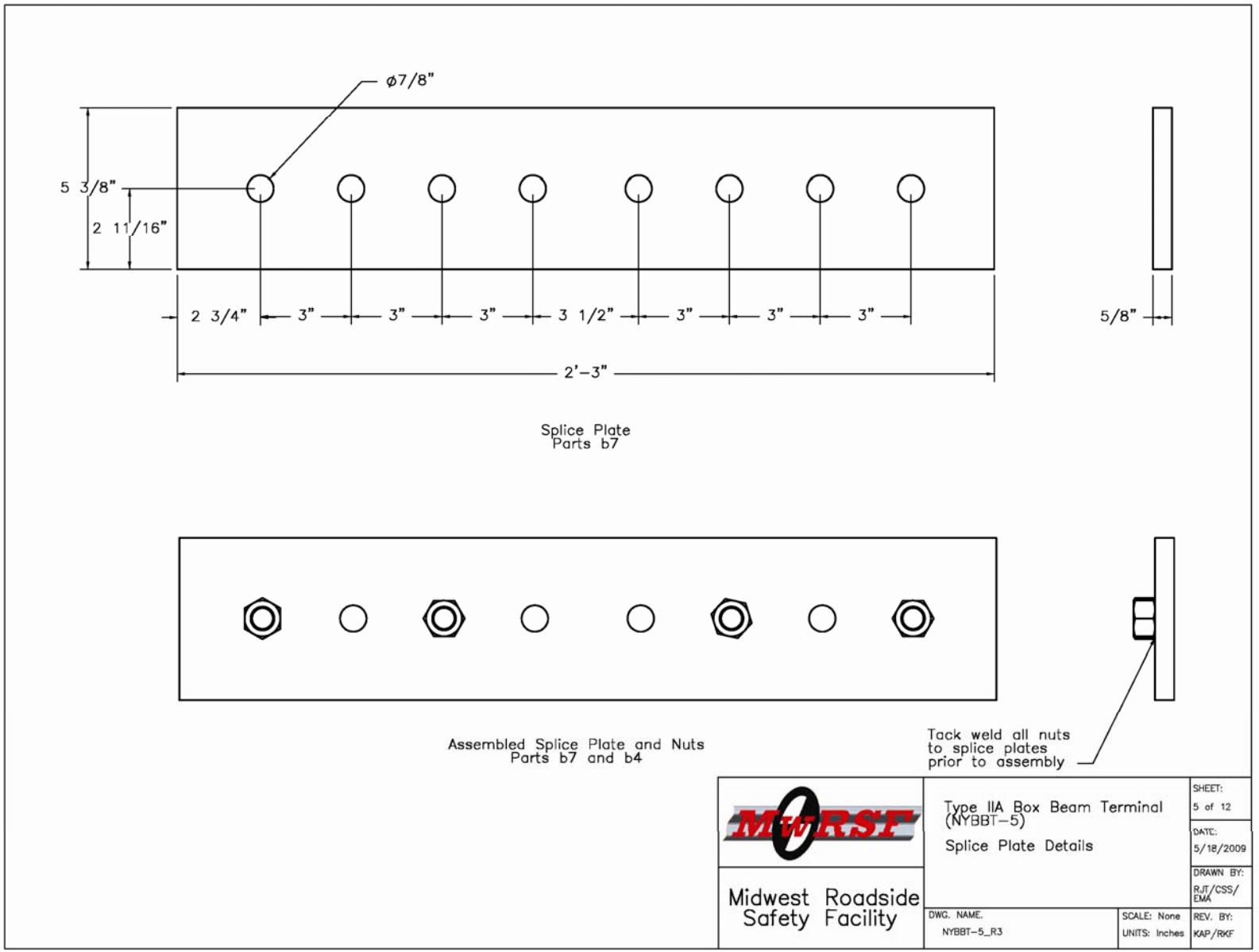


Figure M-17. Modified Type IIA Box Beam Terminal Details (English), Test No. NYBBT-5

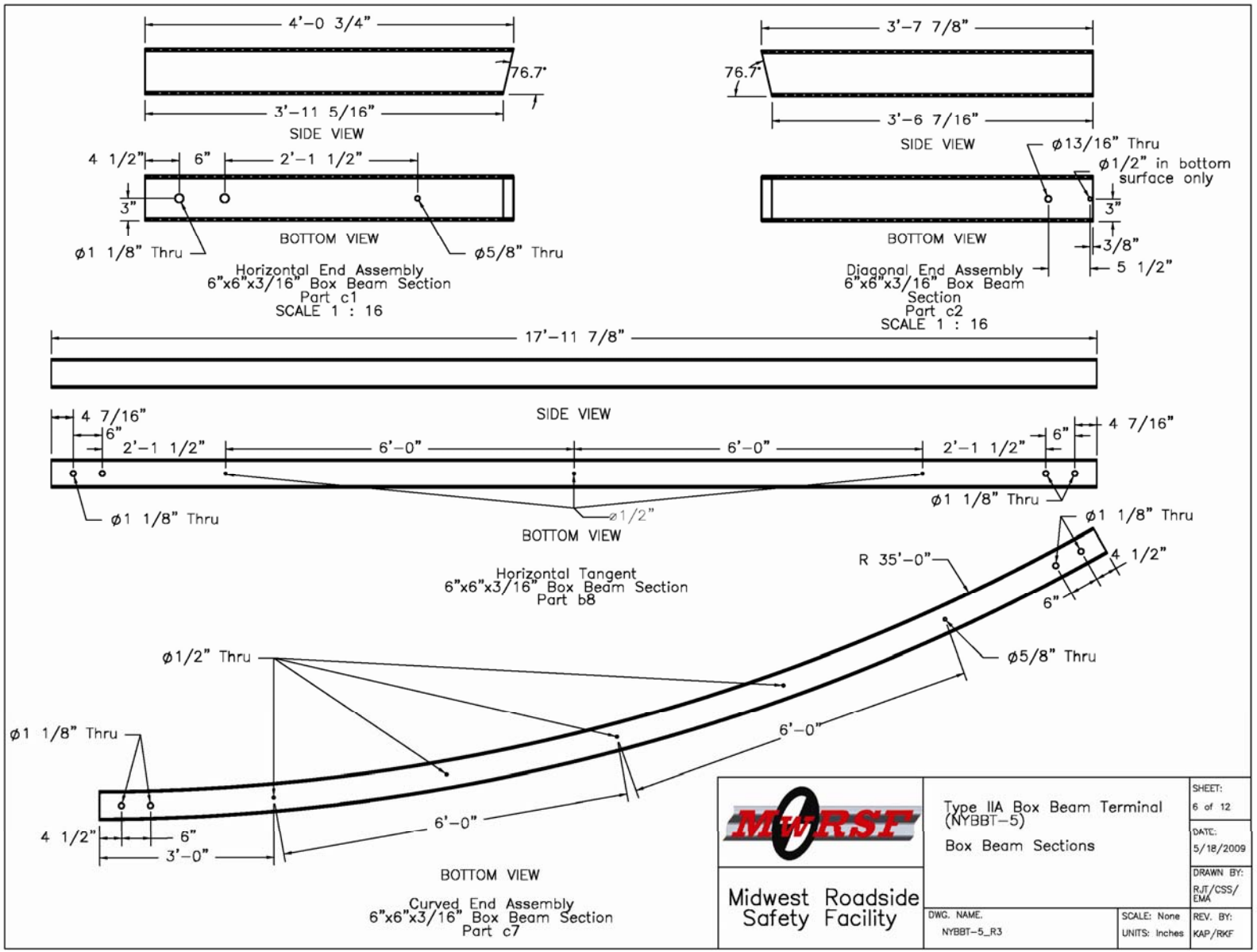


Figure M-18. Modified Type IIA Box Beam Terminal Details (English), Test No. NYBBT-5

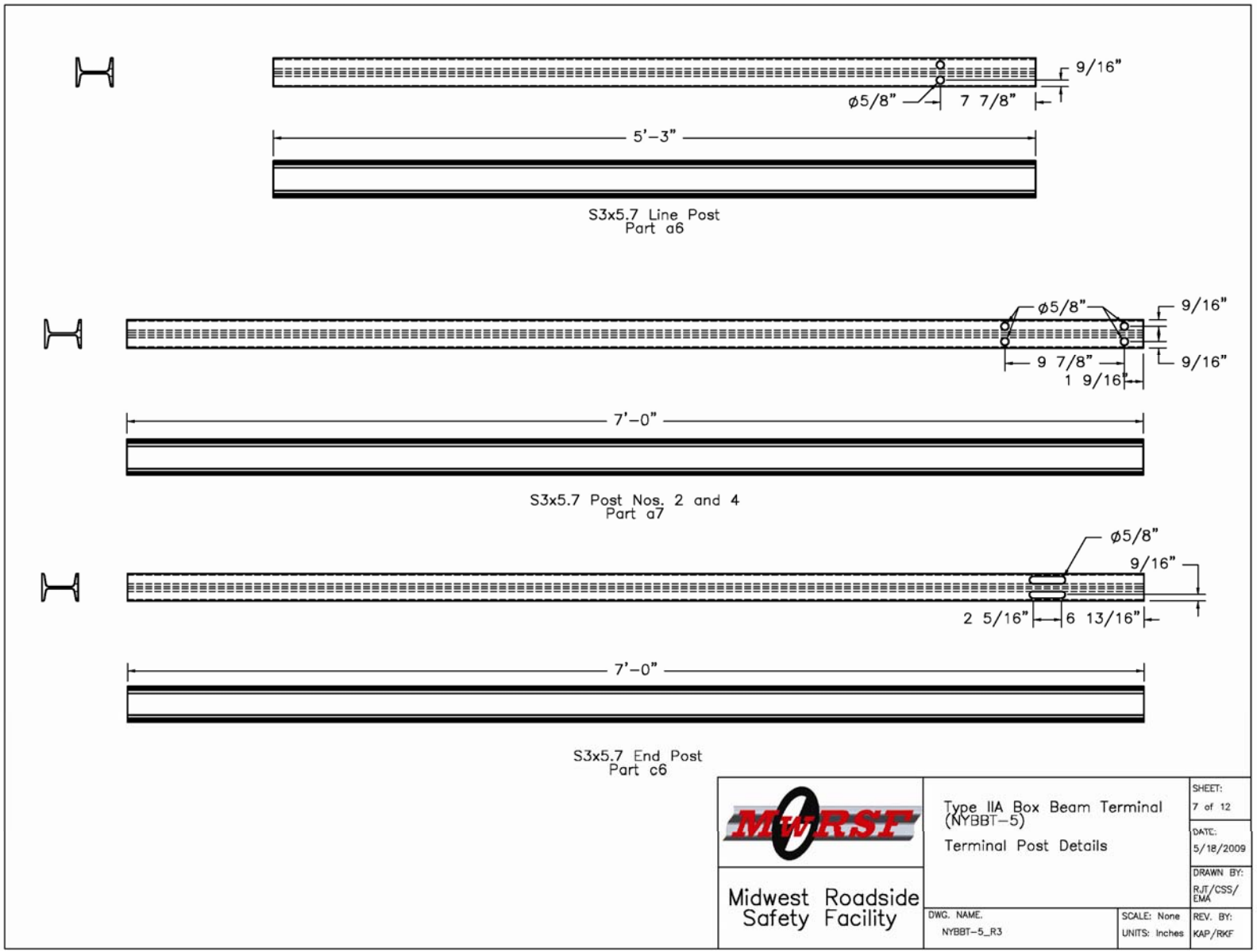


Figure M-19. Modified Type IIA Box Beam Terminal Details (English), Test No. NYBBT-5

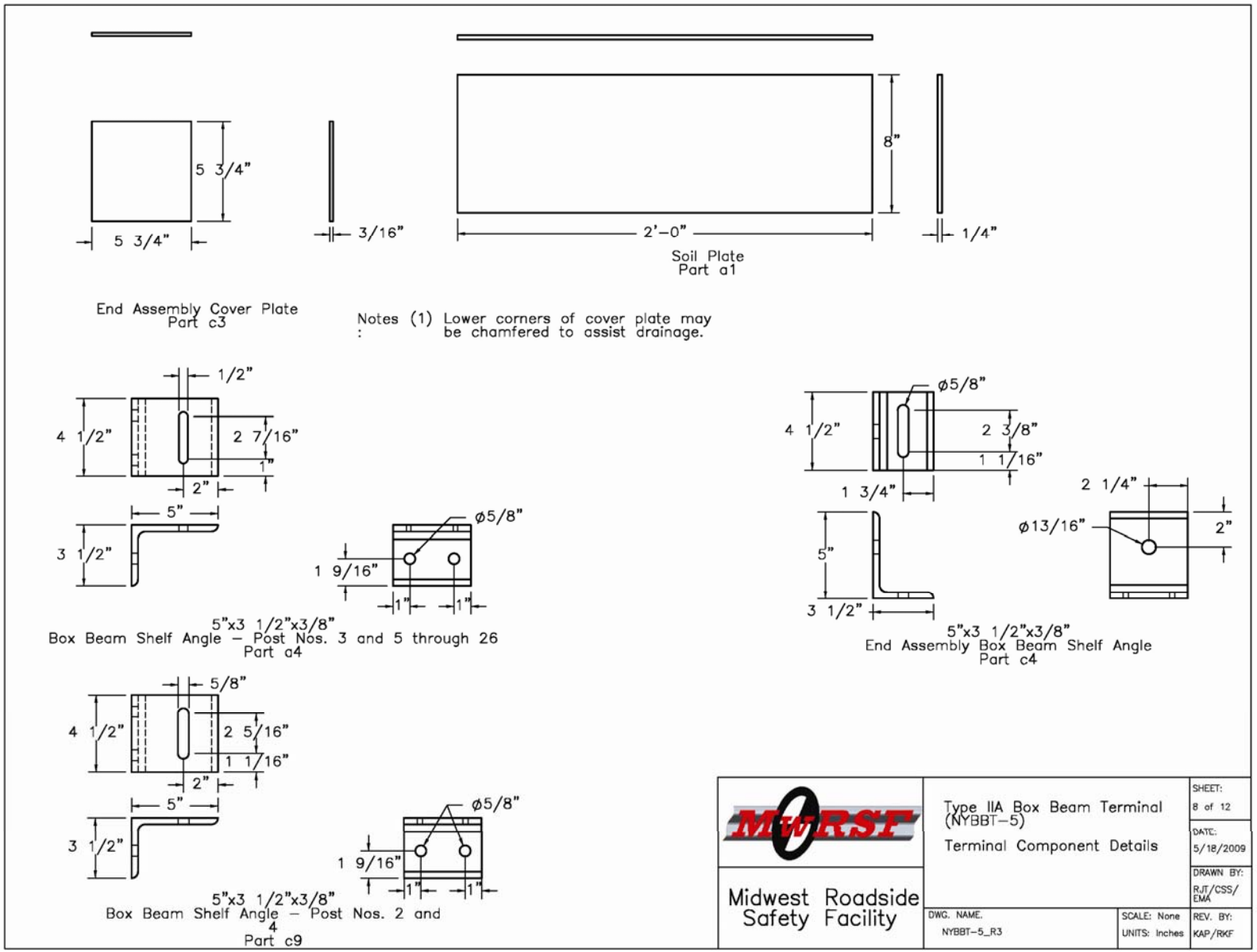


Figure M-20. Modified Type IIA Box Beam Terminal Details (English), Test No. NYBBT-5

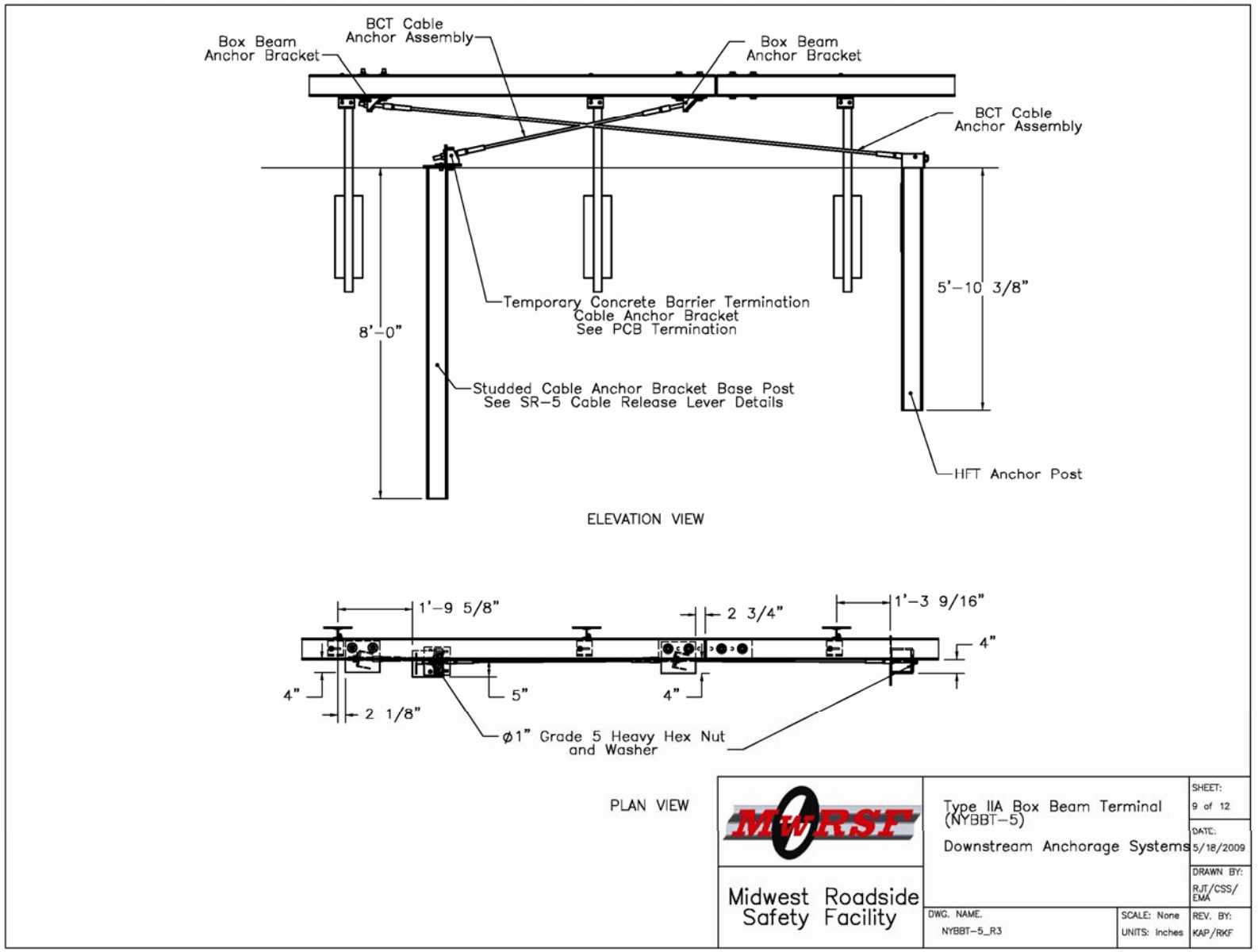


Figure M-21. Modified Type IIA Box Beam Terminal Details (English), Test No. NYBBT-5

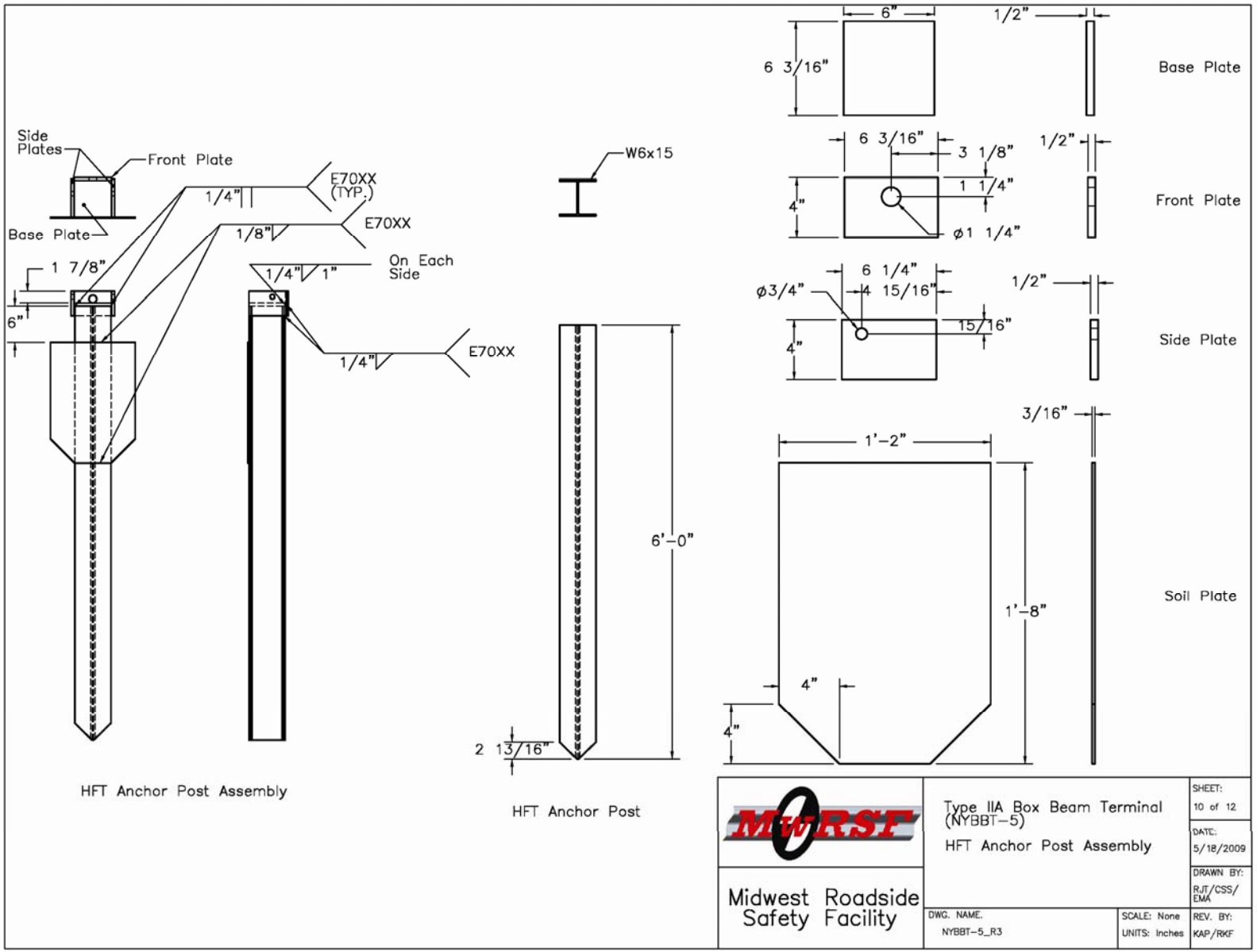


Figure M-22. Modified Type IIA Box Beam Terminal Details (English), Test No. NYBBT-5

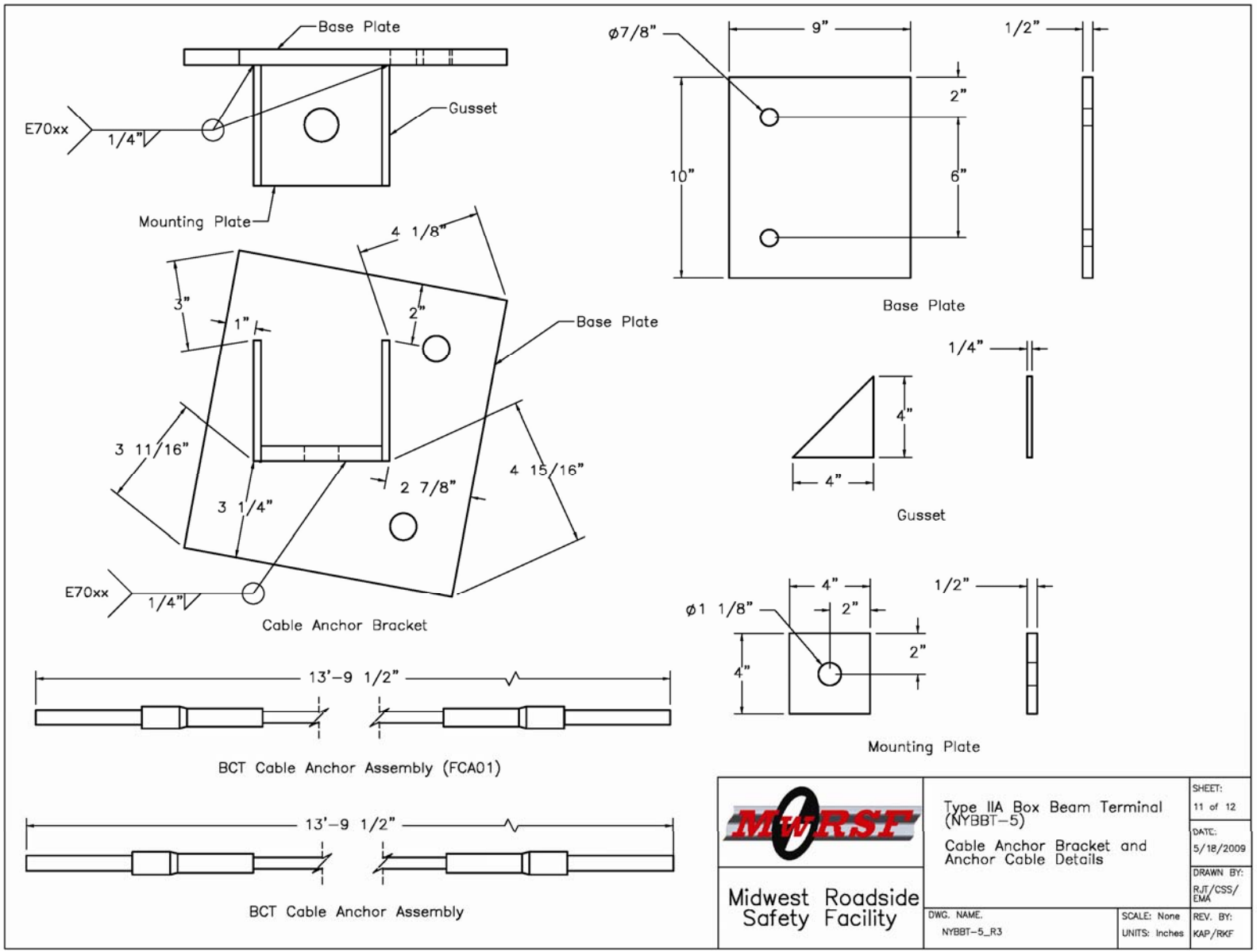


Figure M-23. Modified Type IIA Box Beam Terminal Details (English), Test No. NYBBT-5

NYBBT–5			
Item No.	QTY.	Description	Material Spec
a1	26	1/4" x 8" x 2' steel soil plate	A36 Steel
a2	29	ø 1/2" coarse thread 1 5/8" long hex bolt	ASTM A307
a3	31	ø 1/2" hex nut	ASTM A307
a4	23	5" x 3 1/2" x 3/8" box beam shelf angle	A36 Steel
a5	31	ø 1/2" narrow washer	ASTM A307
a6	23	S3 x 5.7 63" long post	A36 Steel
a7	2	S3 x 5.7 84" long post	A36 Steel
b1	22	ø 3/8" coarse thread 7 1/2" long hex bolt	ASTM A307
b2	22	ø 3/8" hex nut	ASTM A307
b3	44	ø 3/8" wide washer	ASTM A307
b4	59	ø 3/4" hex nut	ASTM A325
b5	61	ø 3/4" wide washer	ASTM A325
b6	56	ø 3/4" coarse thread 2" long hex bolt	ASTM A307
b7	14	27" x 5 3/8" x 5/8" splice plate	A36 Steel
b8	6	6" x 6" x 3/16" by 17'–11 7/8" long box beam	ASTM A500 Grade B
c1	1	End assembly horizontal 6" x 6" x 3/16" box beam	ASTM A500 Grade B
c2	1	End assembly diagonal 6" x 6" x 3/16" box beam	ASTM A500 Grade B
c3	1	End assembly 3/16" thick cover plate	A36 Steel
c4	1	5" x 3 1/2" x 3/8" box beam anchor post shelf angle	A36 Steel
c5	1	ø 3/4" coarse thread 7 3/4" long hex bolt	ASTM A307
c6	1	S3 x 5.7 84" long post anchor post	A36 Steel
c7	1	6"x6"x3/16" R 35' Curved Box Beam	ASTM A500 Grade B
c8	2	ø 1/2" coarse thread 8" long hex bolt	ASTM A307
c9	4	5" x 3 1/2" x 3/8" box beam shelf angle with ø5/8" slot	A36 Steel
c10	4	ø 1/2" wide washer	ASTM A307

Midwest Roadside Safety Facility

Type IIA Box Beam Terminal (NYBBT–5)
Bill of Materials

SHEET: 12 of 12
DATE: 5/18/2009
DRAWN BY: RJT/CSS/EMA
REV. BY: KAP/RKF
DWG. NAME. NYBBT–5_R3
SCALE: None
UNITS: Inches

Figure M-24. Modified Type IIA Box Beam Terminal Details (English), Test No. NYBBT-5

APPENDIX N Accelerometer and Rate Transducer Data Analysis, Test No. NYBBT-5

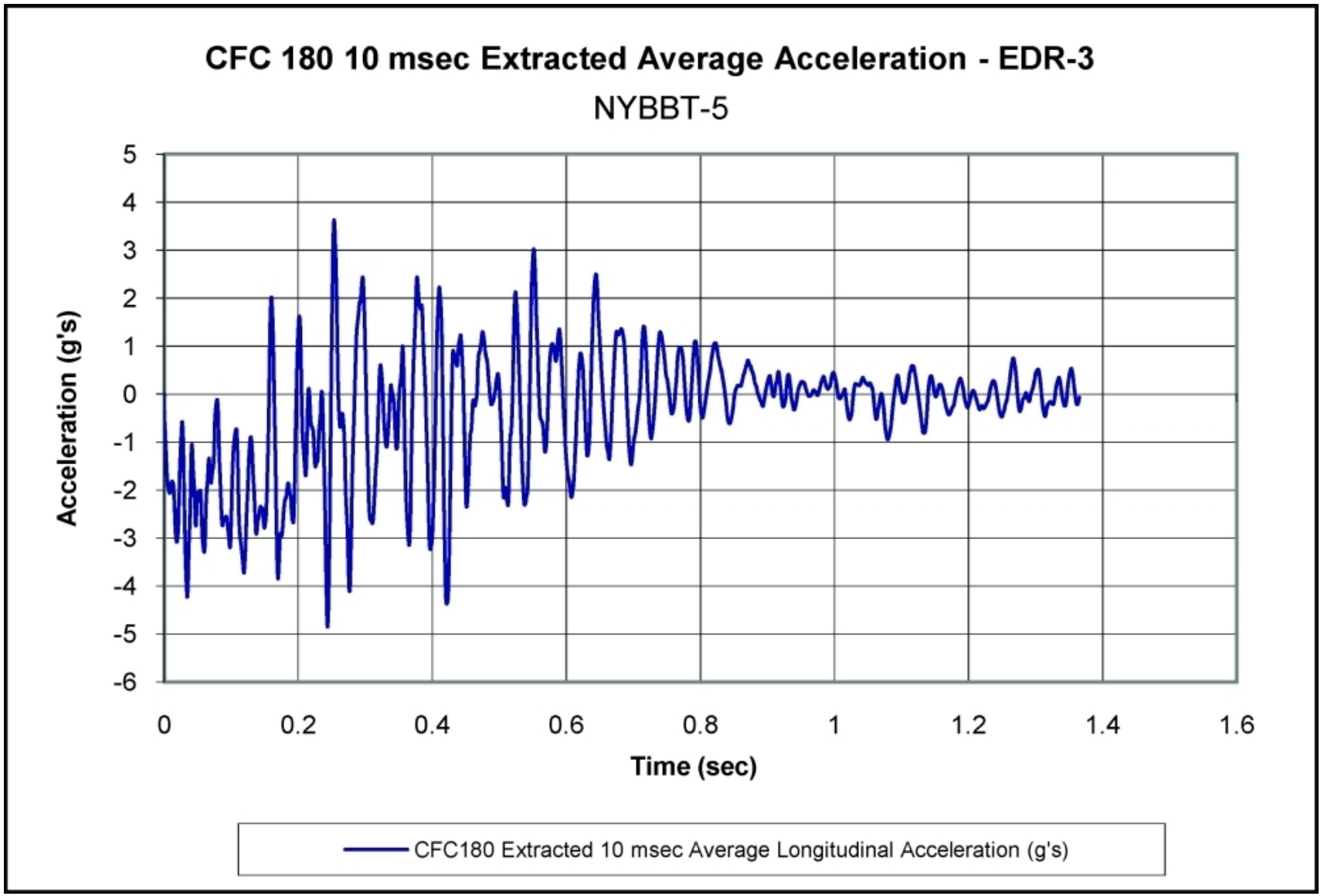


Figure N-1. Graph of Longitudinal Occupant Deceleration (EDR-3), Test No. NYBBT-5

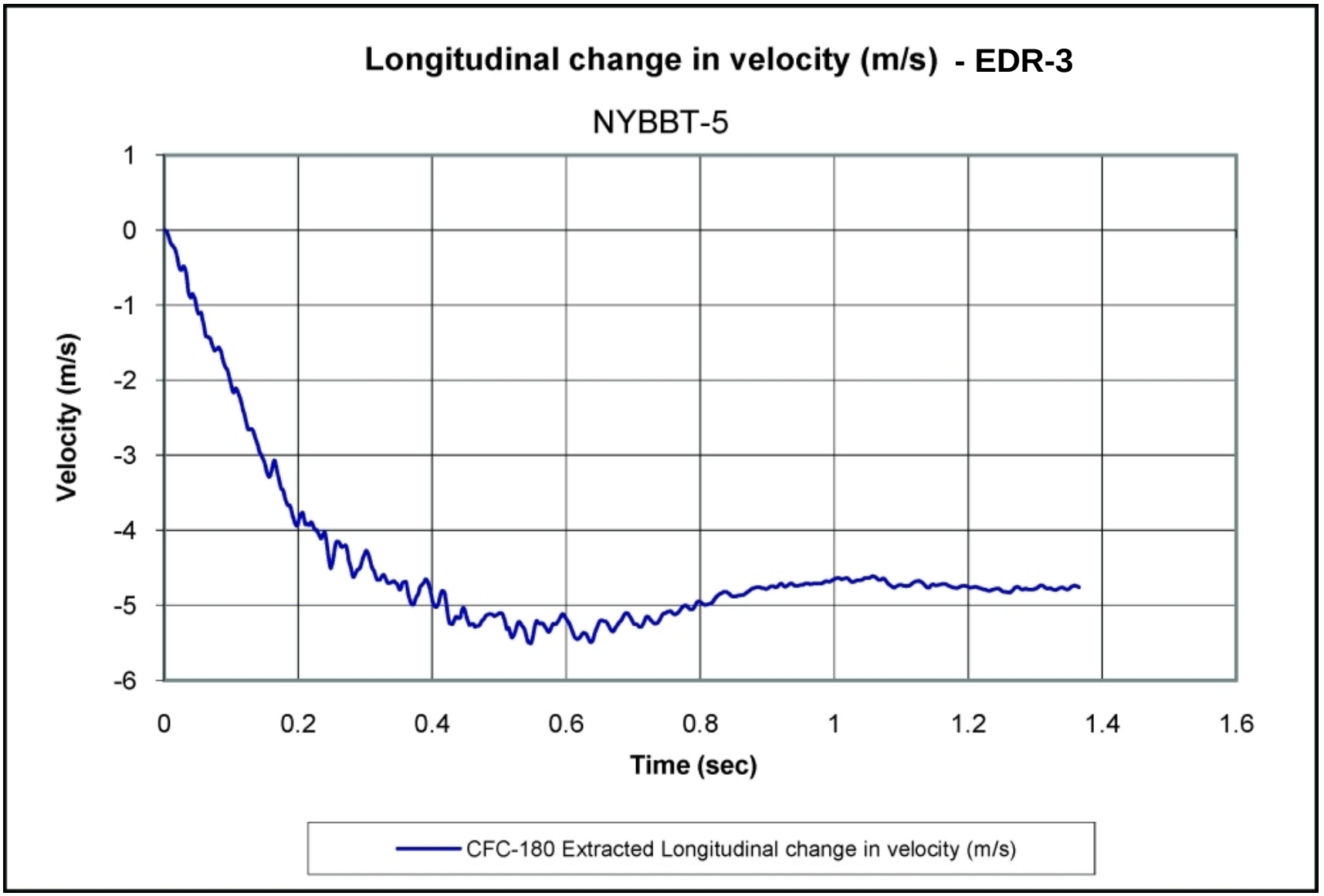


Figure N-2. Graph of Longitudinal Occupant Impact Velocity (EDR-3), Test No. NYBBT-5

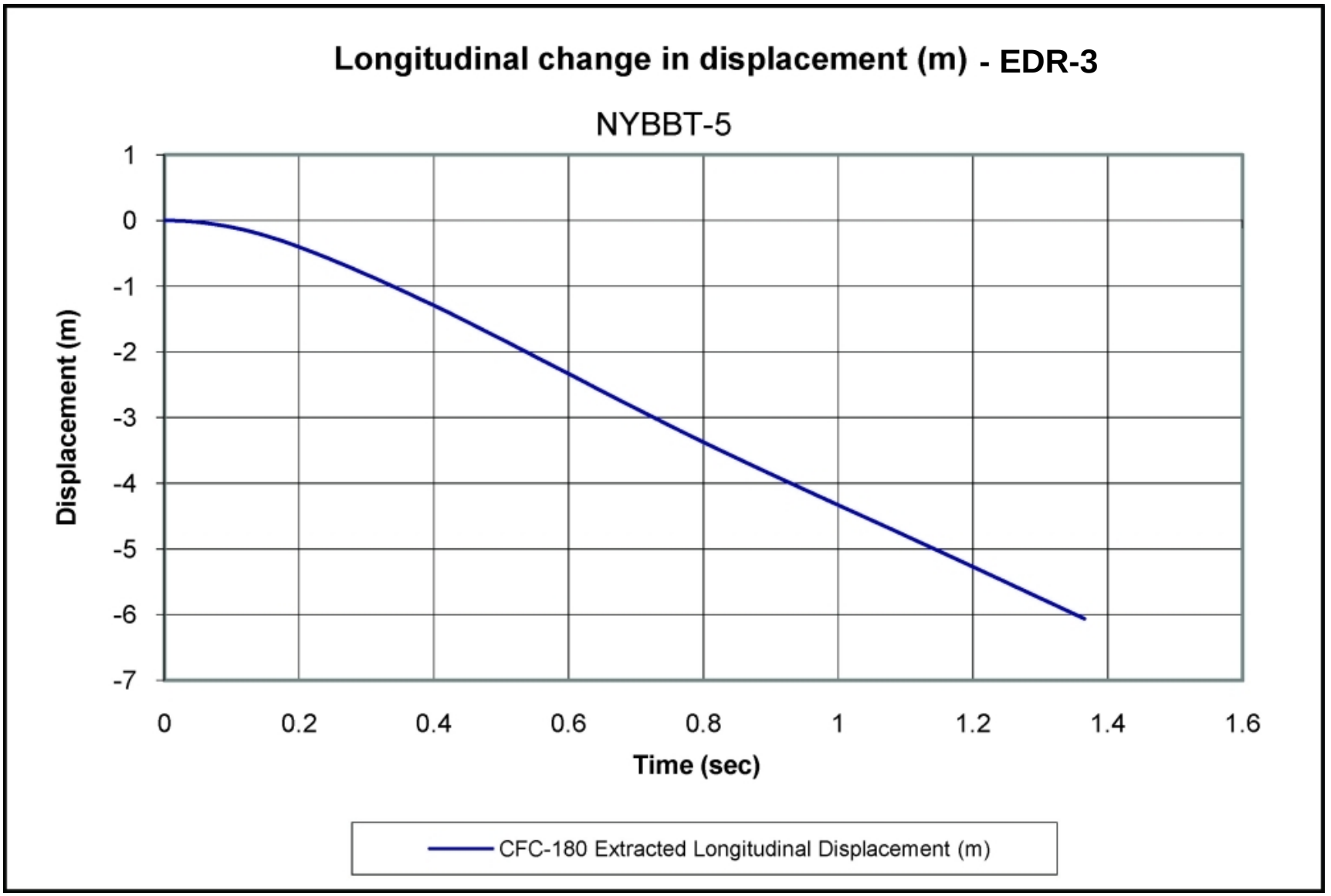


Figure N-3. Graph of Longitudinal Occupant Displacement (EDR-3), Test No. NYBBT-5

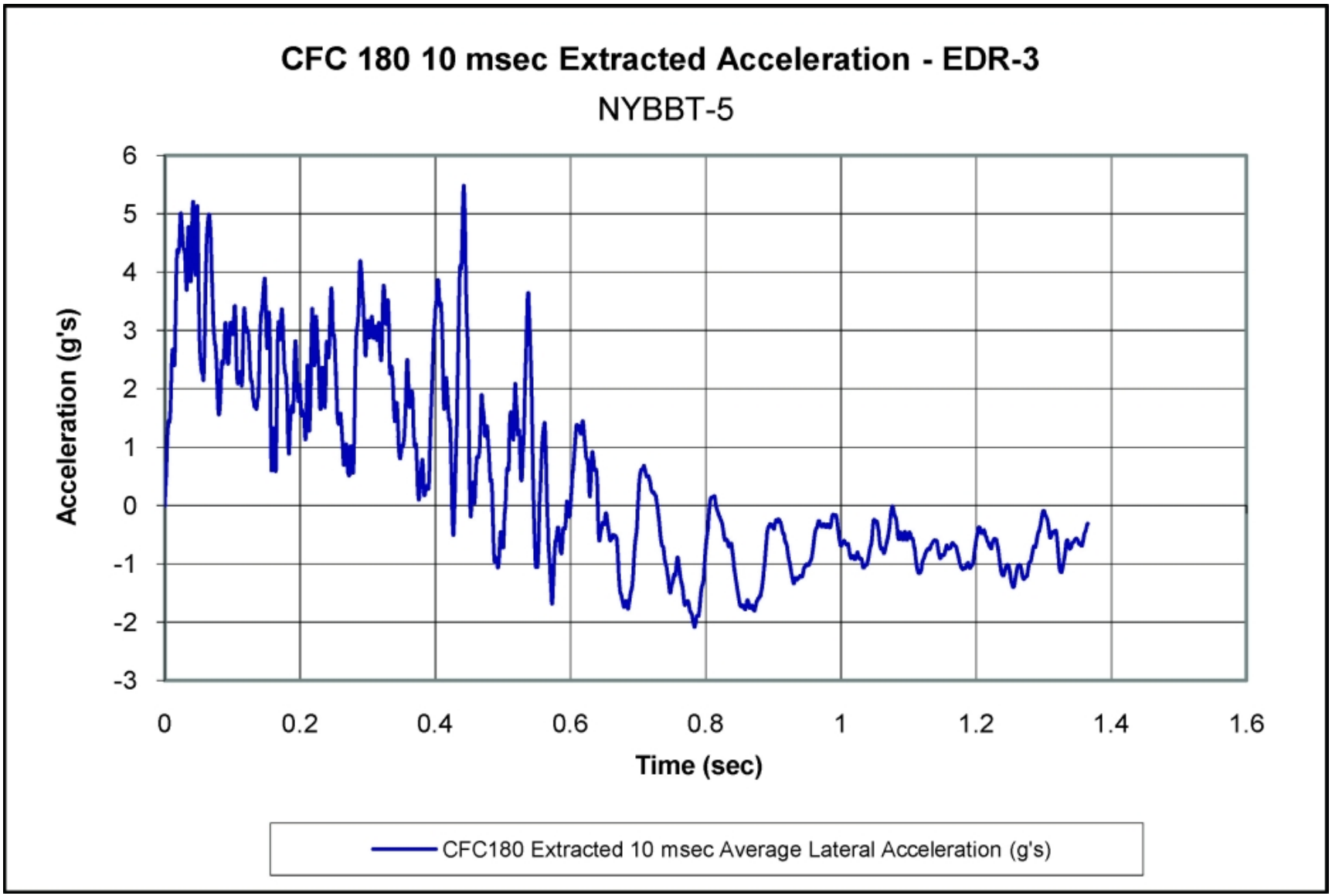


Figure N-4. Graph of Lateral Occupant Deceleration (EDR-3), Test No. NYBBT-5

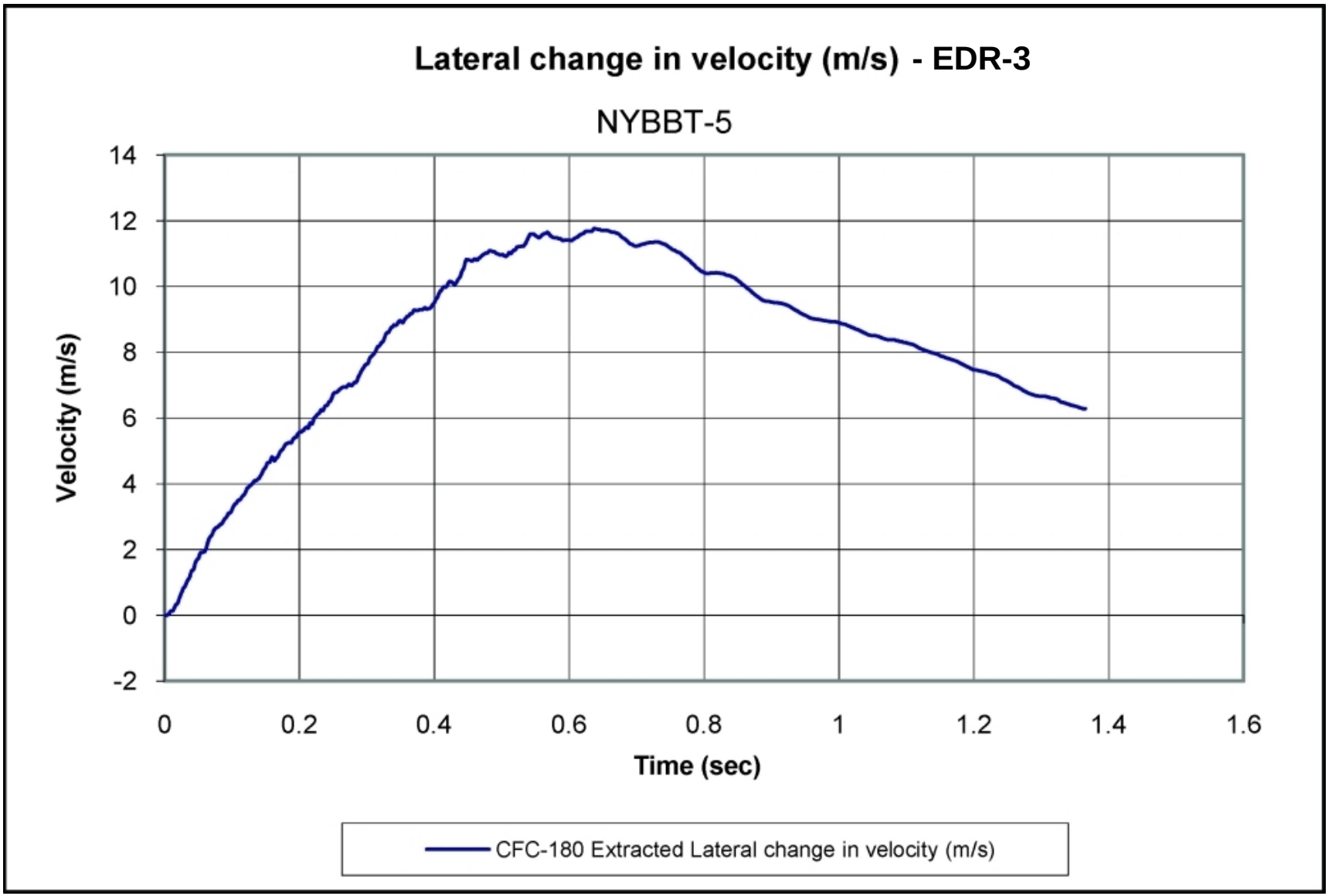


Figure N-5. Graph of Lateral Occupant Impact Velocity (EDR-3), Test No. NYBBT-5

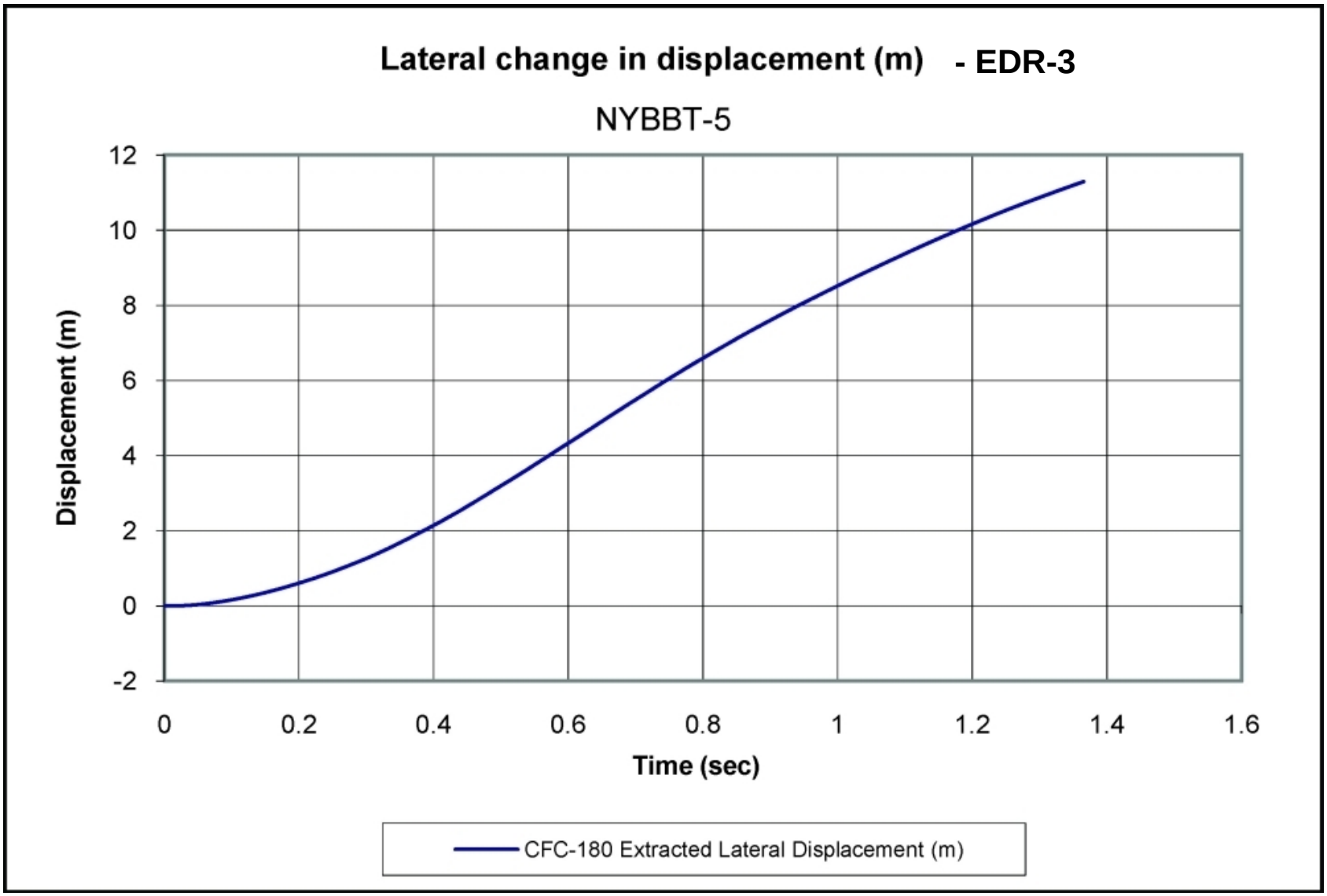


Figure N-6. Graph of Lateral Occupant Displacement (EDR-3), Test No. NYBBT-5

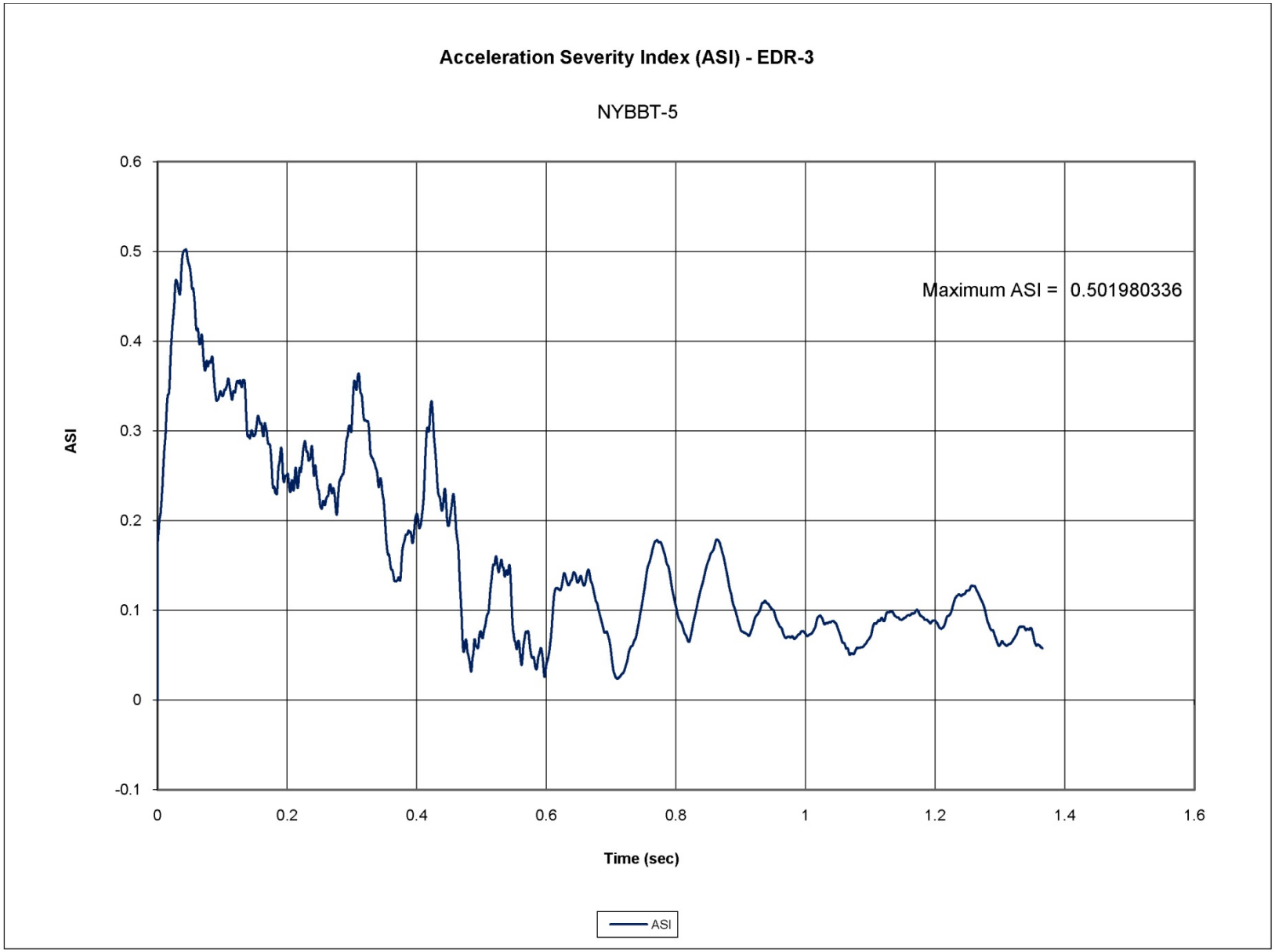


Figure N-7. Graph of Acceleration Severity Index (EDR-3), Test No. NYBBT-5

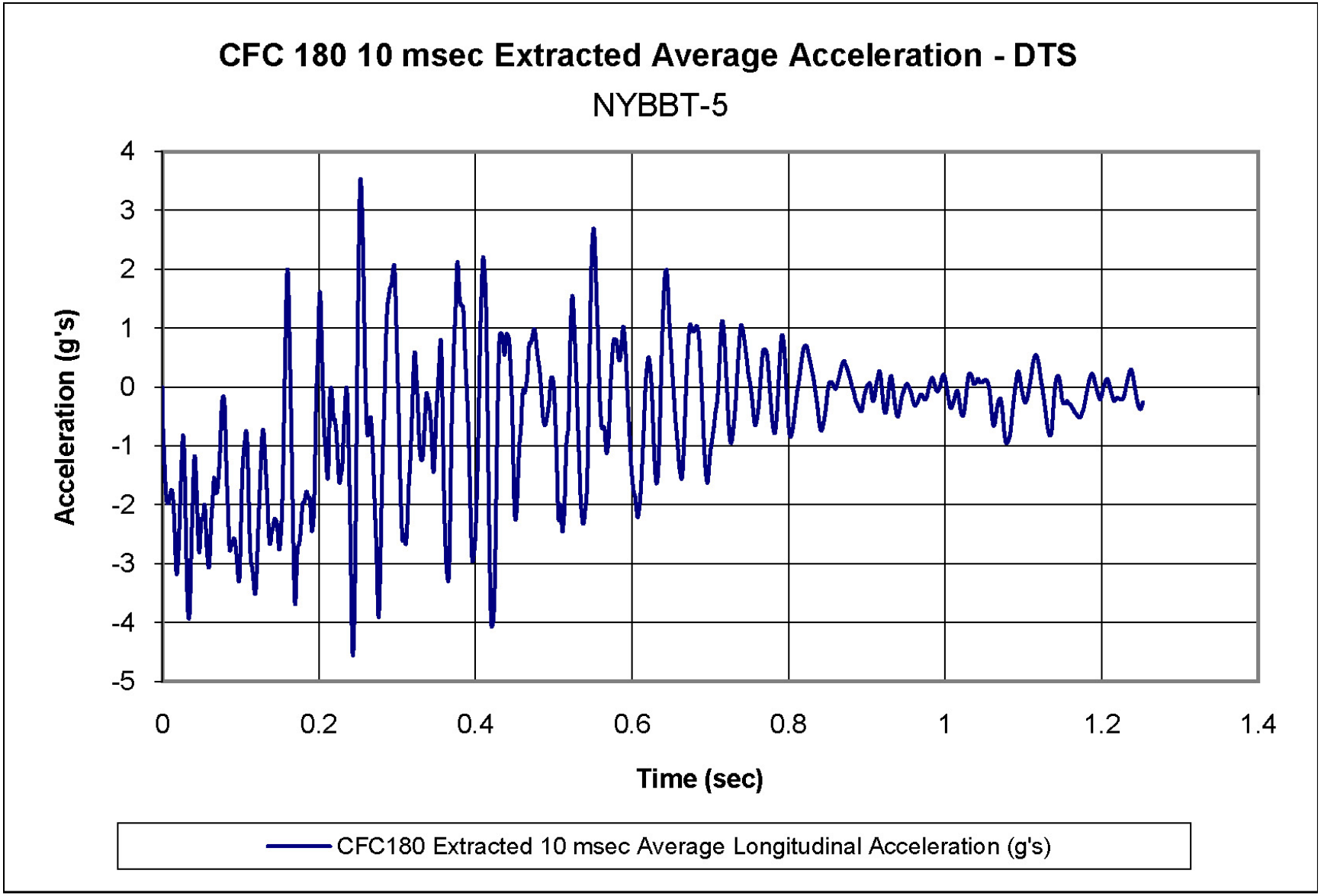


Figure N-8. Graph of Longitudinal Occupant Deceleration (DTS), Test No. NYBBT-5

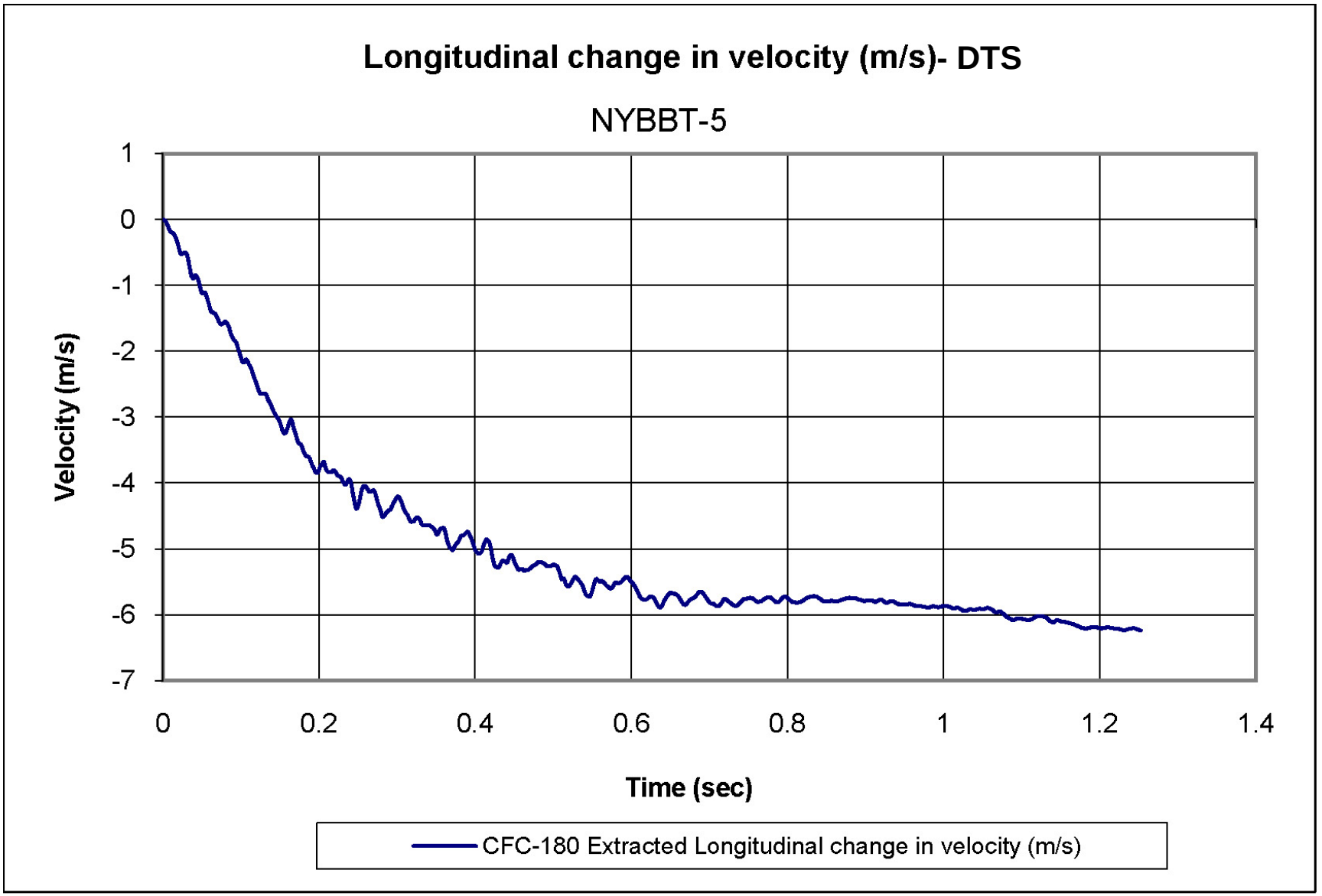


Figure N-9. Graph of Longitudinal Occupant Impact Velocity (DTS), Test No. NYBBT-5

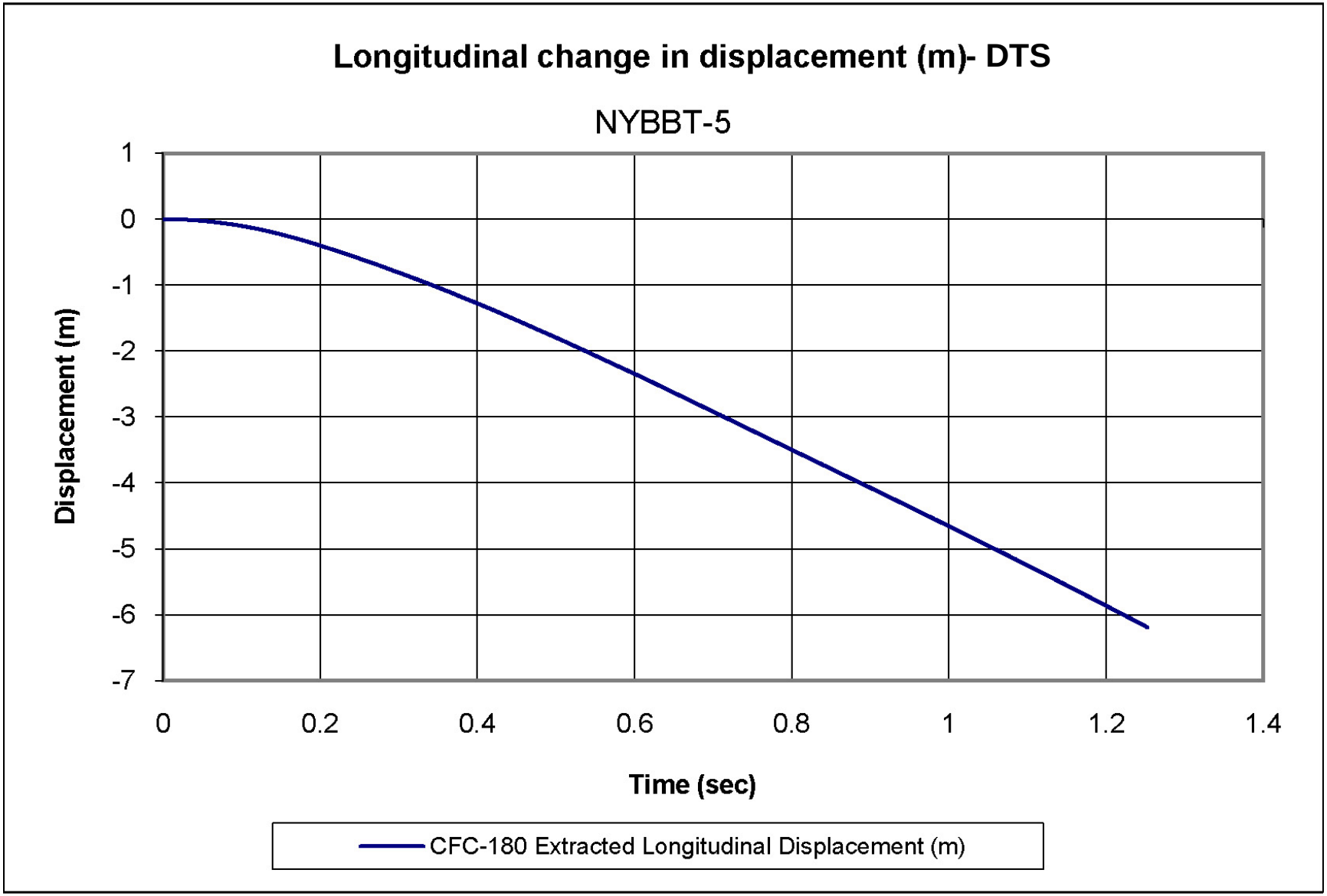


Figure N-10. Graph of Longitudinal Occupant Displacement (DTS), Test No. NYBBT-5

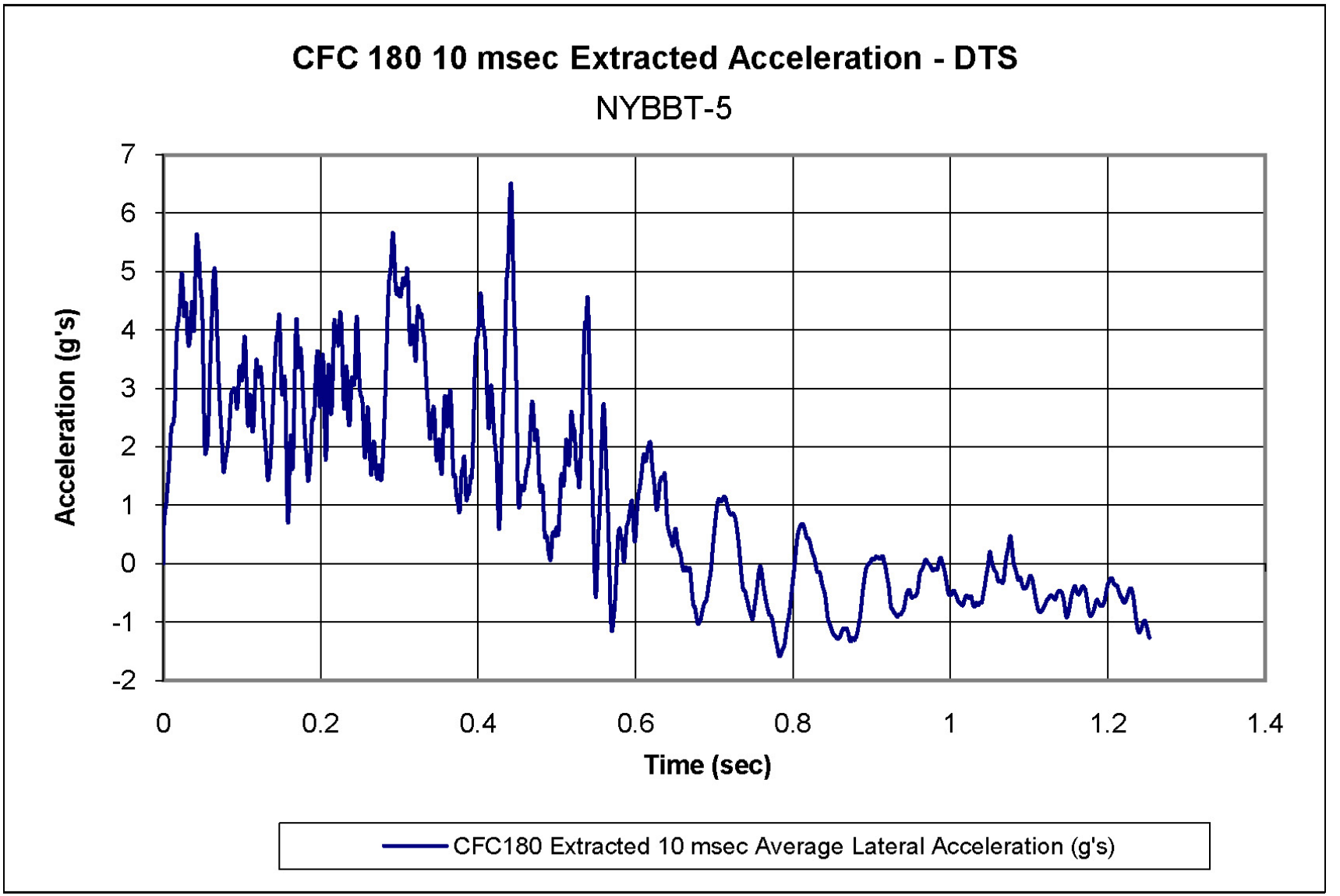


Figure N-11. Graph of Lateral Occupant Deceleration (DTS), Test No. NYBBT-5

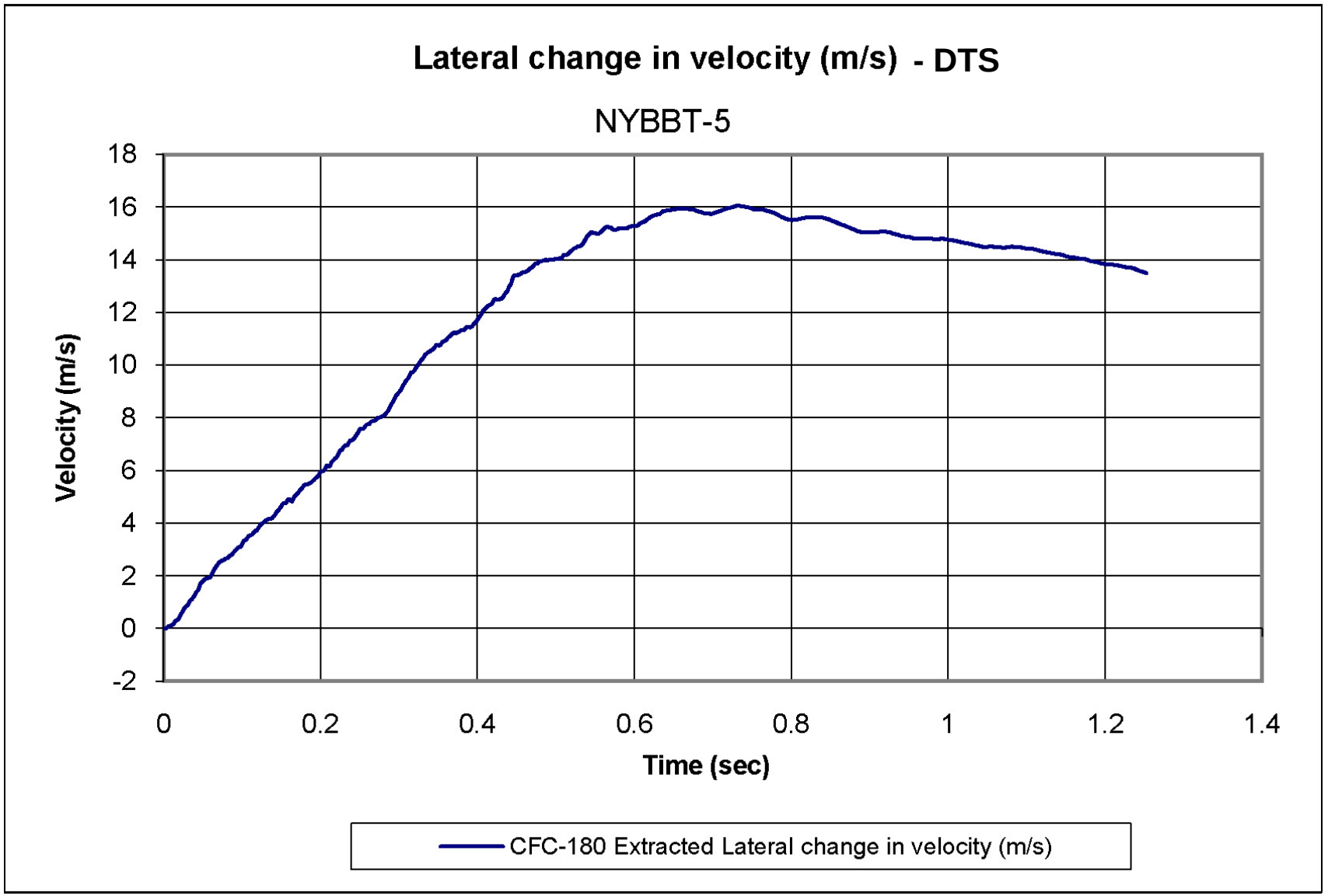


Figure N-12. Graph of Lateral Occupant Impact Velocity (DTS), Test No. NYBBT-5

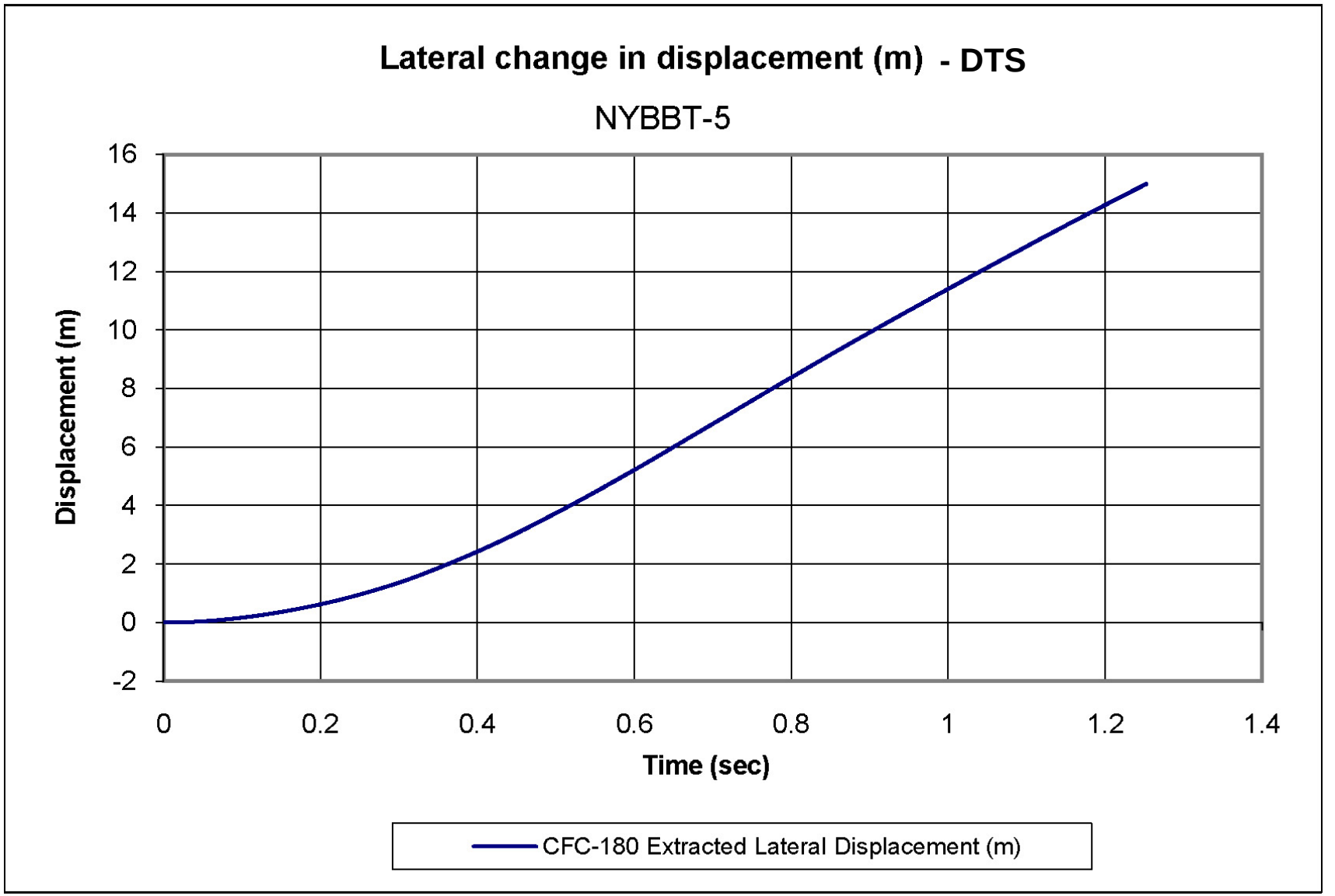


Figure N-13. Graph of Lateral Occupant Displacement (DTS), Test No. NYBBT-5

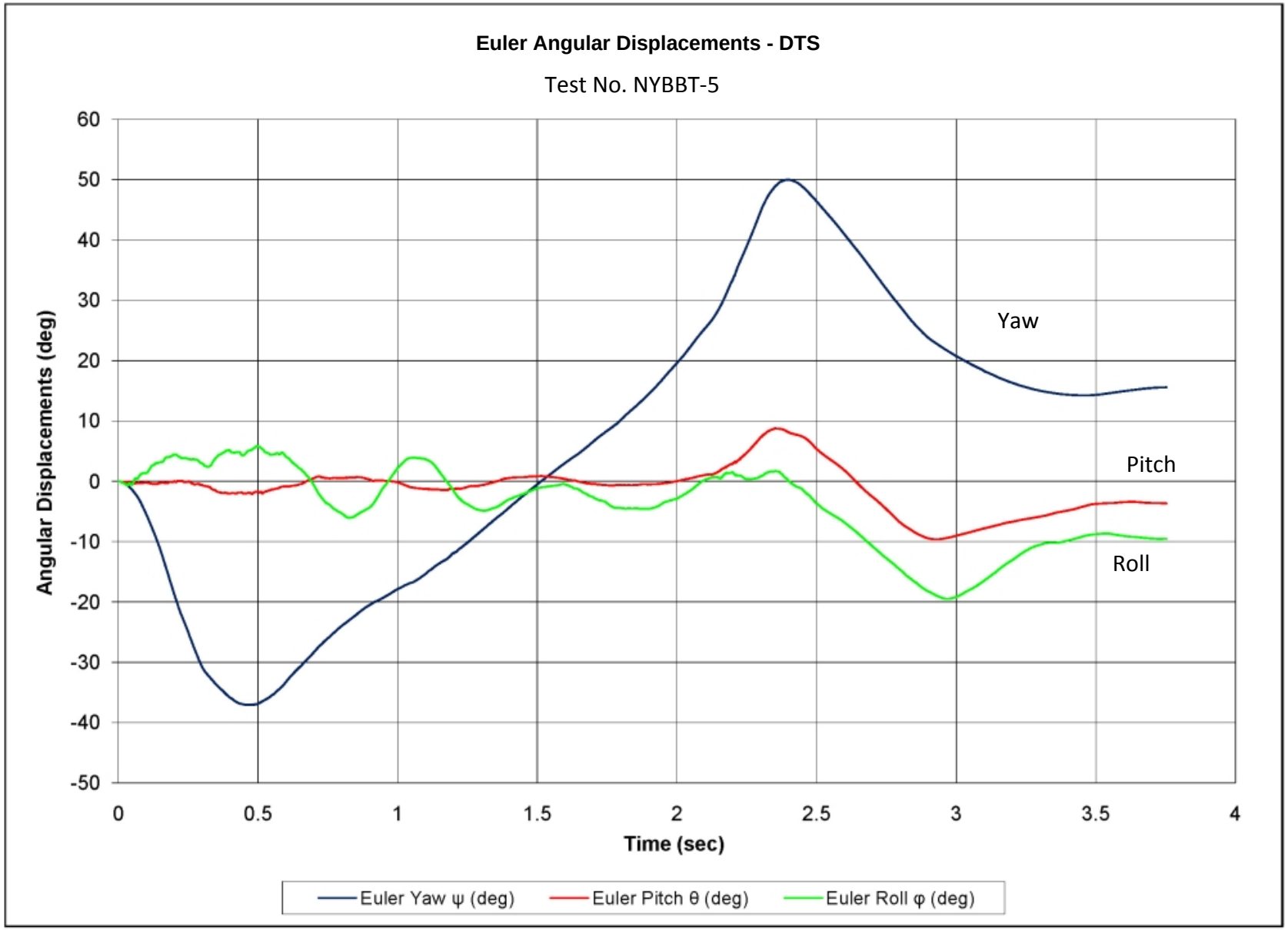


Figure N-14. Graph of Roll, Pitch, and Yaw Angular Displacement (DTS), Test No. NYBBT-5

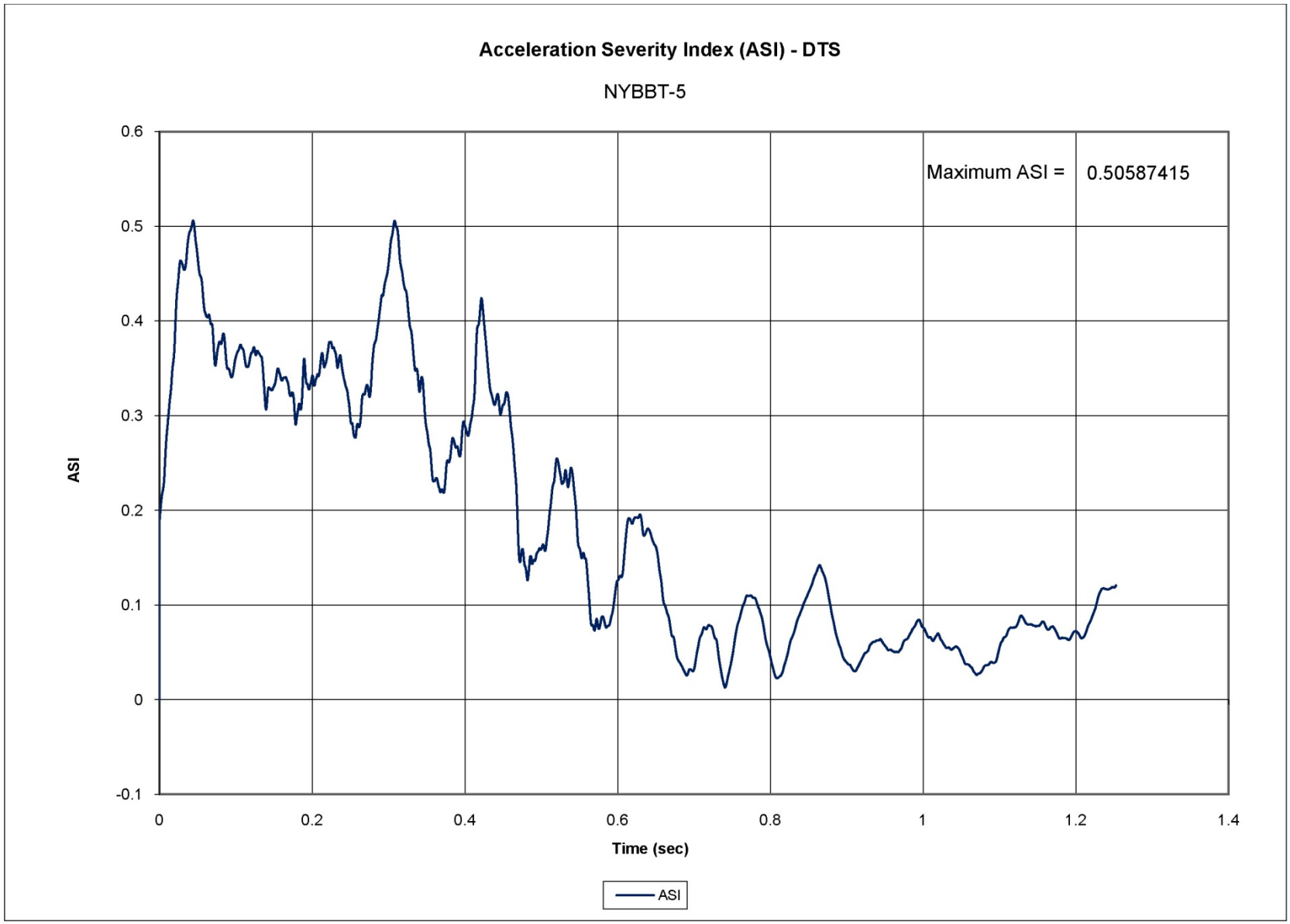


Figure N-15. Graph of Acceleration Severity Index (DTS), Test No. NYBBT-5

APPENDIX O Modified Type IIA Box Beam Terminal in Ditch System Details - English Units, Test No. NYBBT-6

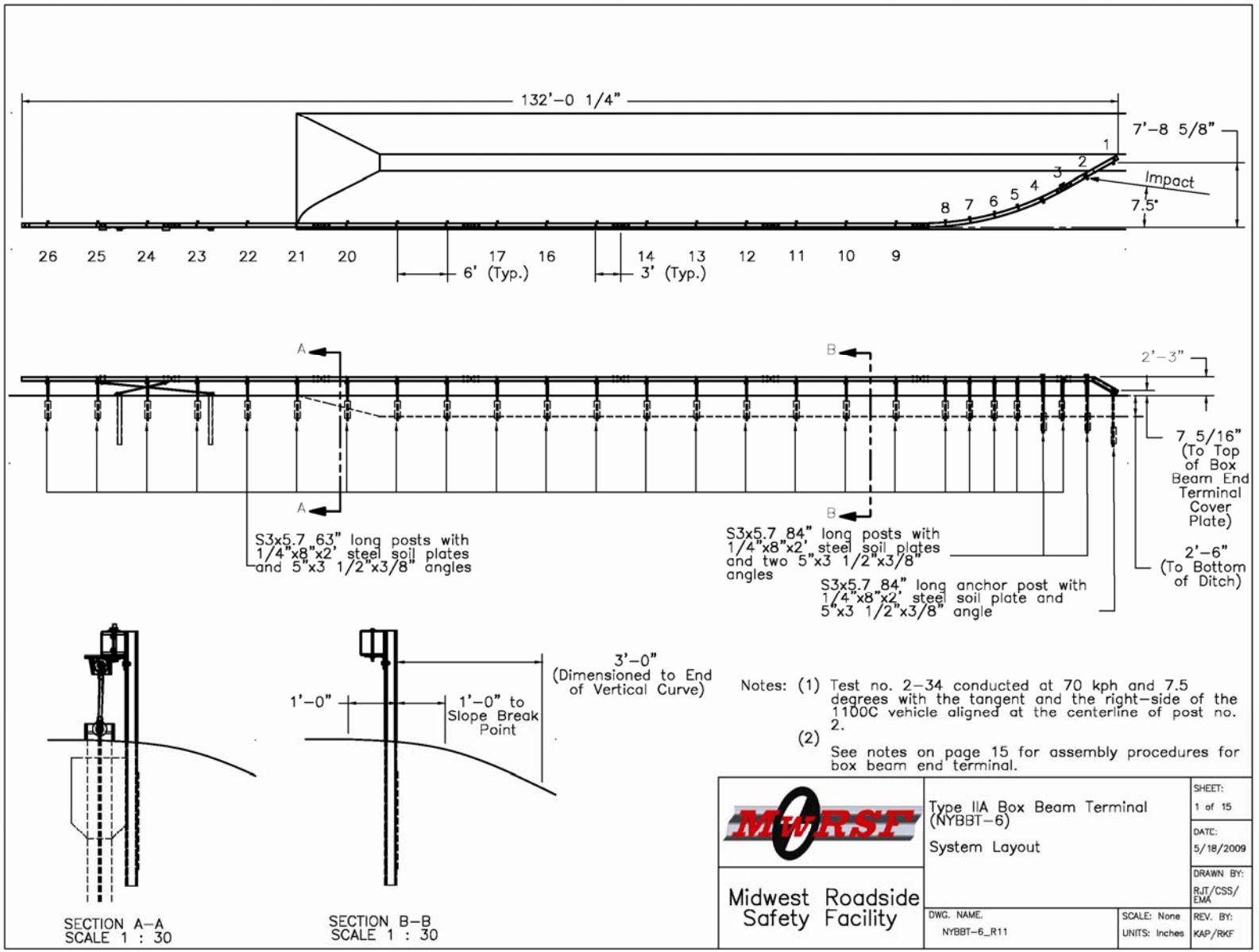


Figure O-1. Modified Type IIA Box Beam Terminal in Ditch System Details (English), Test No. NYBBT-6

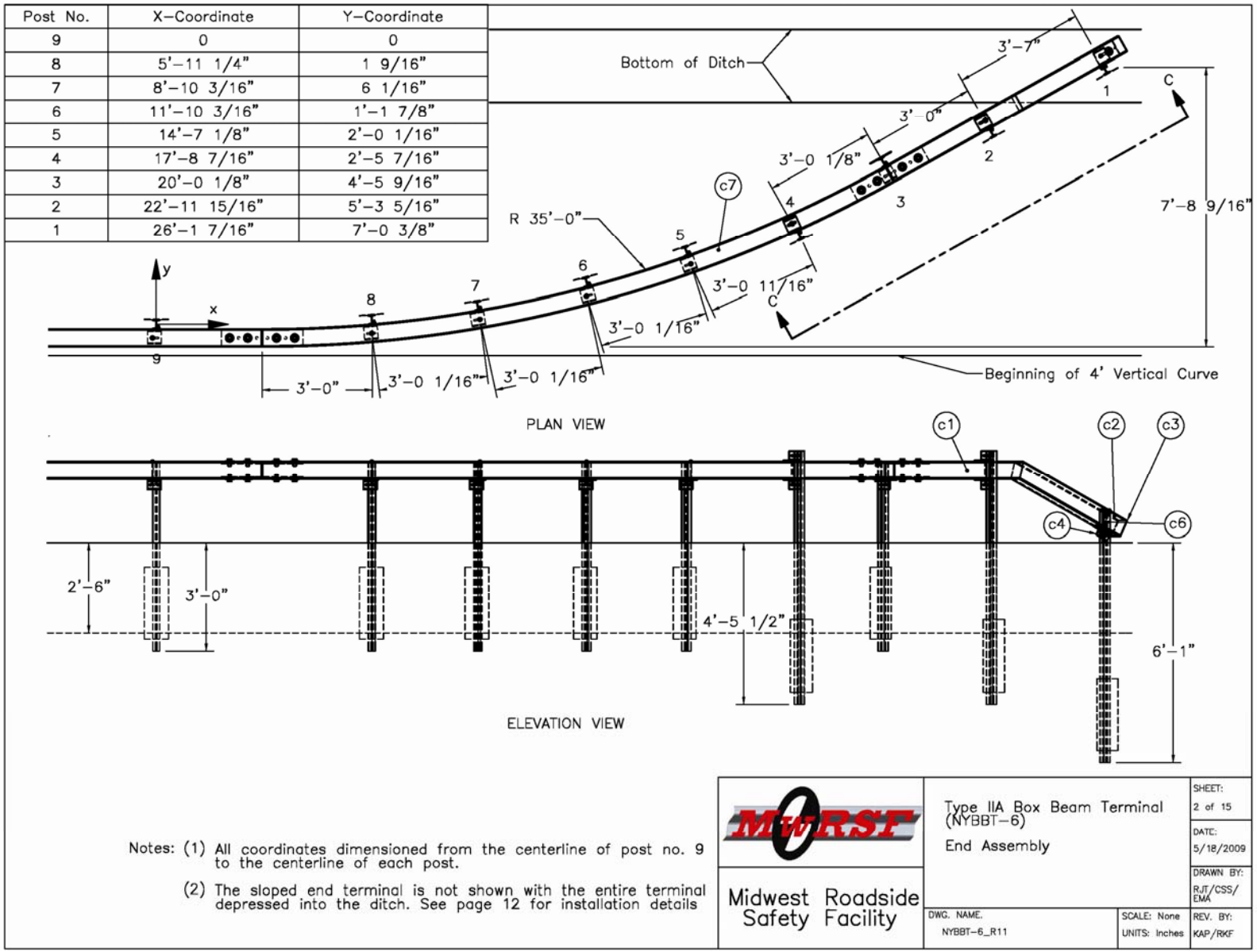


Figure O-2. Modified Type IIA Box Beam Terminal in Ditch System Details (English), Test No. NYBBT-6

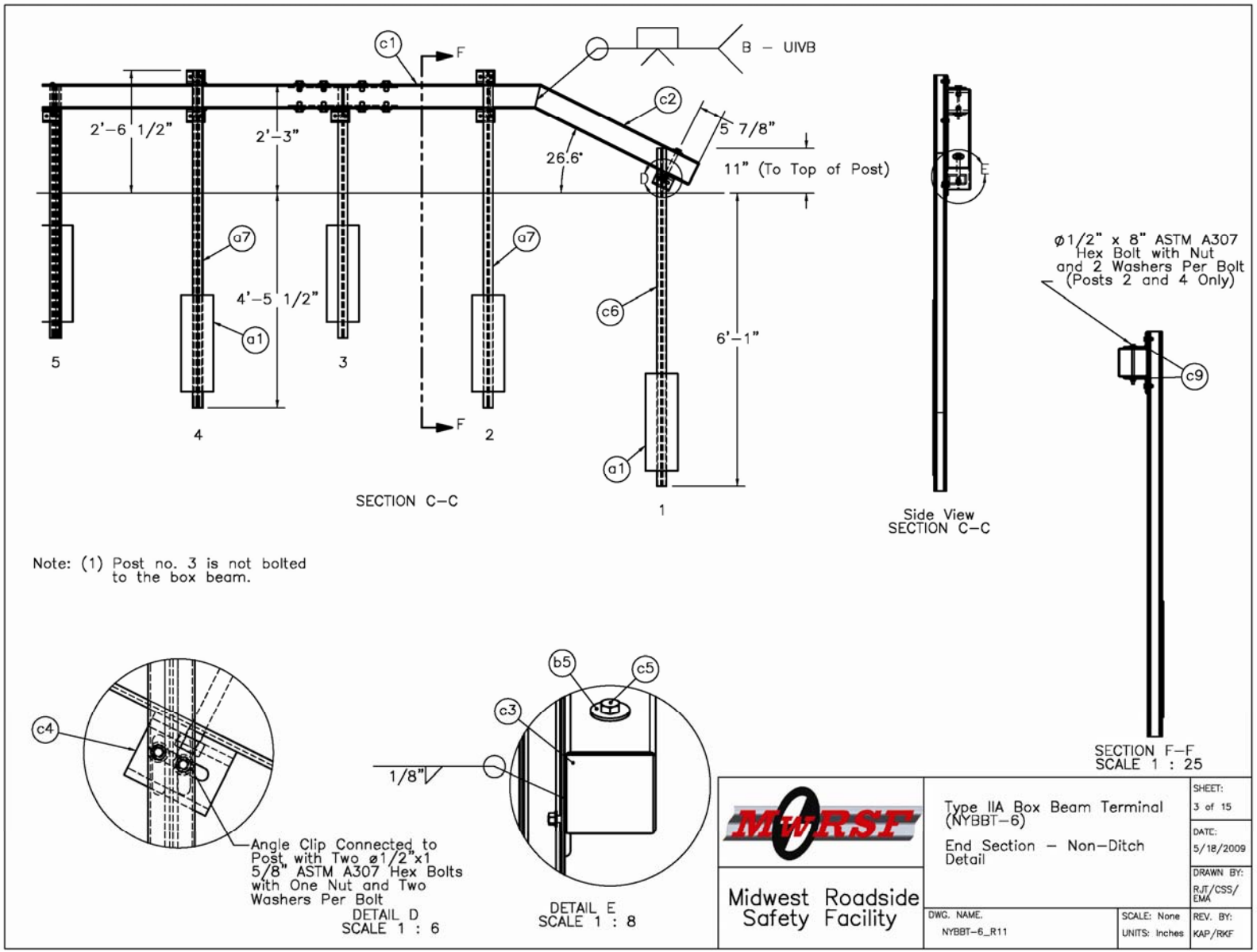


Figure O-3. Modified Type IIA Box Beam Terminal in Ditch System Details (English), Test No. NYBBT-6

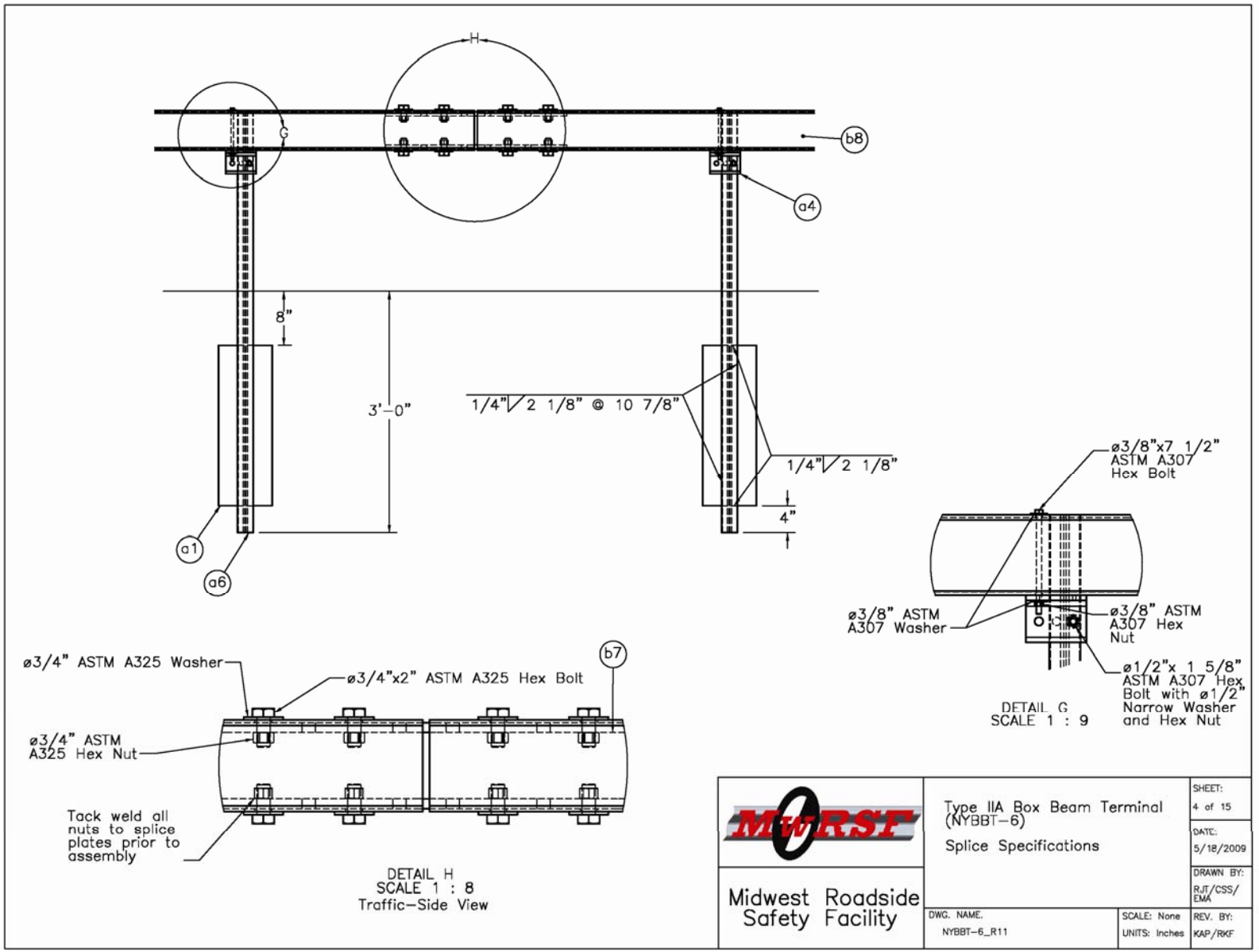


Figure O-4. Modified Type IIA Box Beam Terminal in Ditch System Details (English), Test No. NYBBT-6

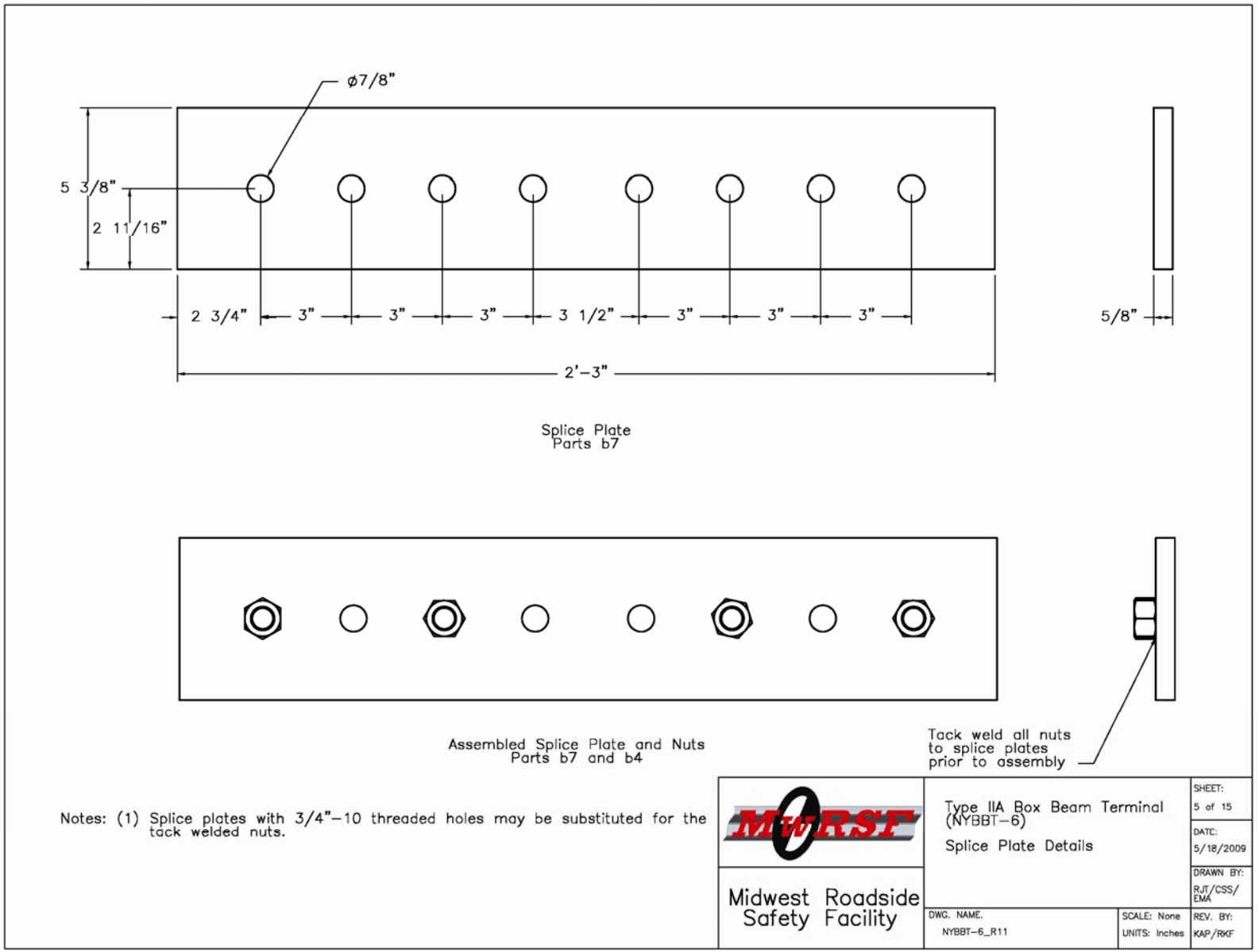


Figure O-5. Modified Type IIA Box Beam Terminal in Ditch System Details (English), Test No. NYBBT-6

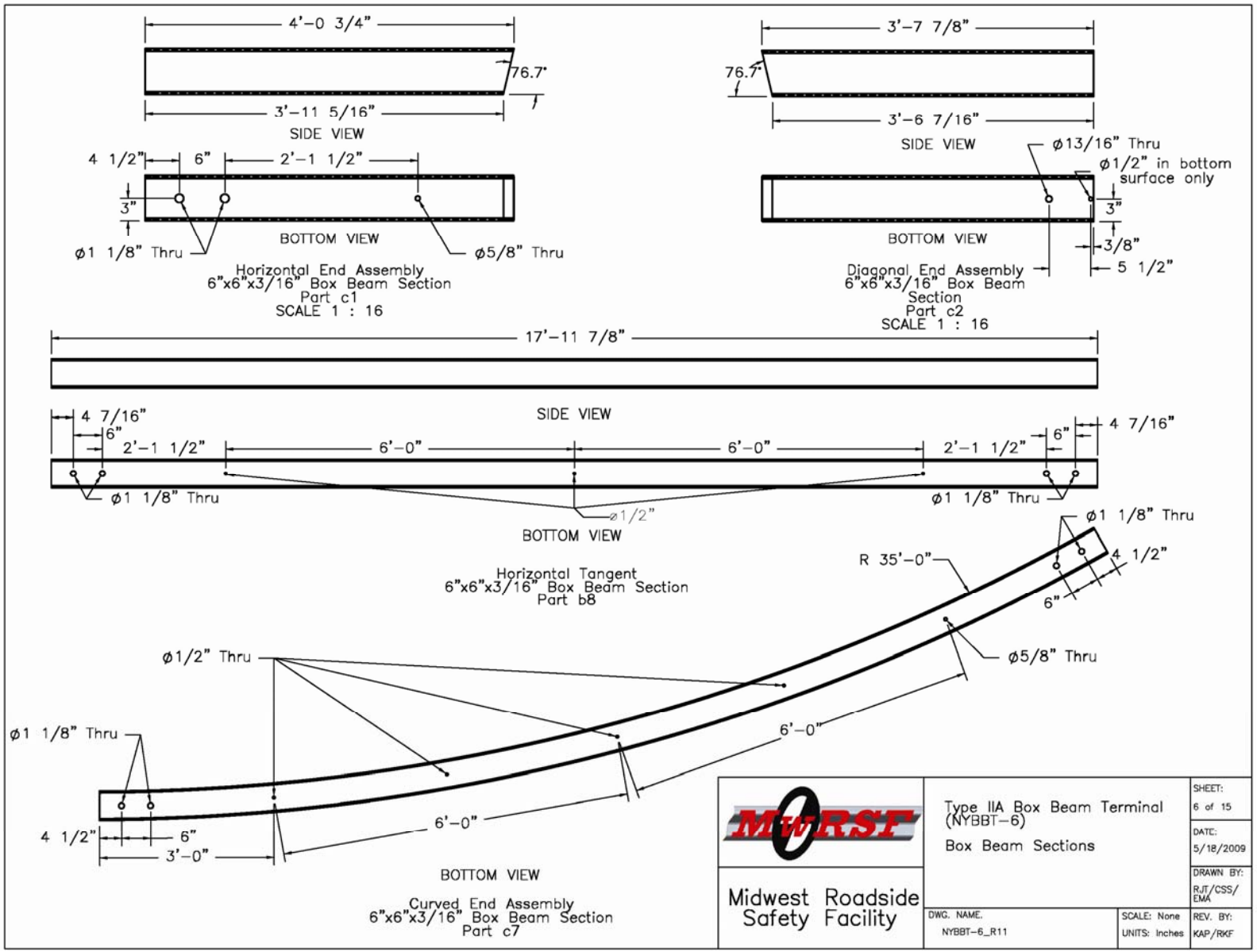


Figure O-6. Modified Type IIA Box Beam Terminal in Ditch System Details (English), Test No. NYBBT-6

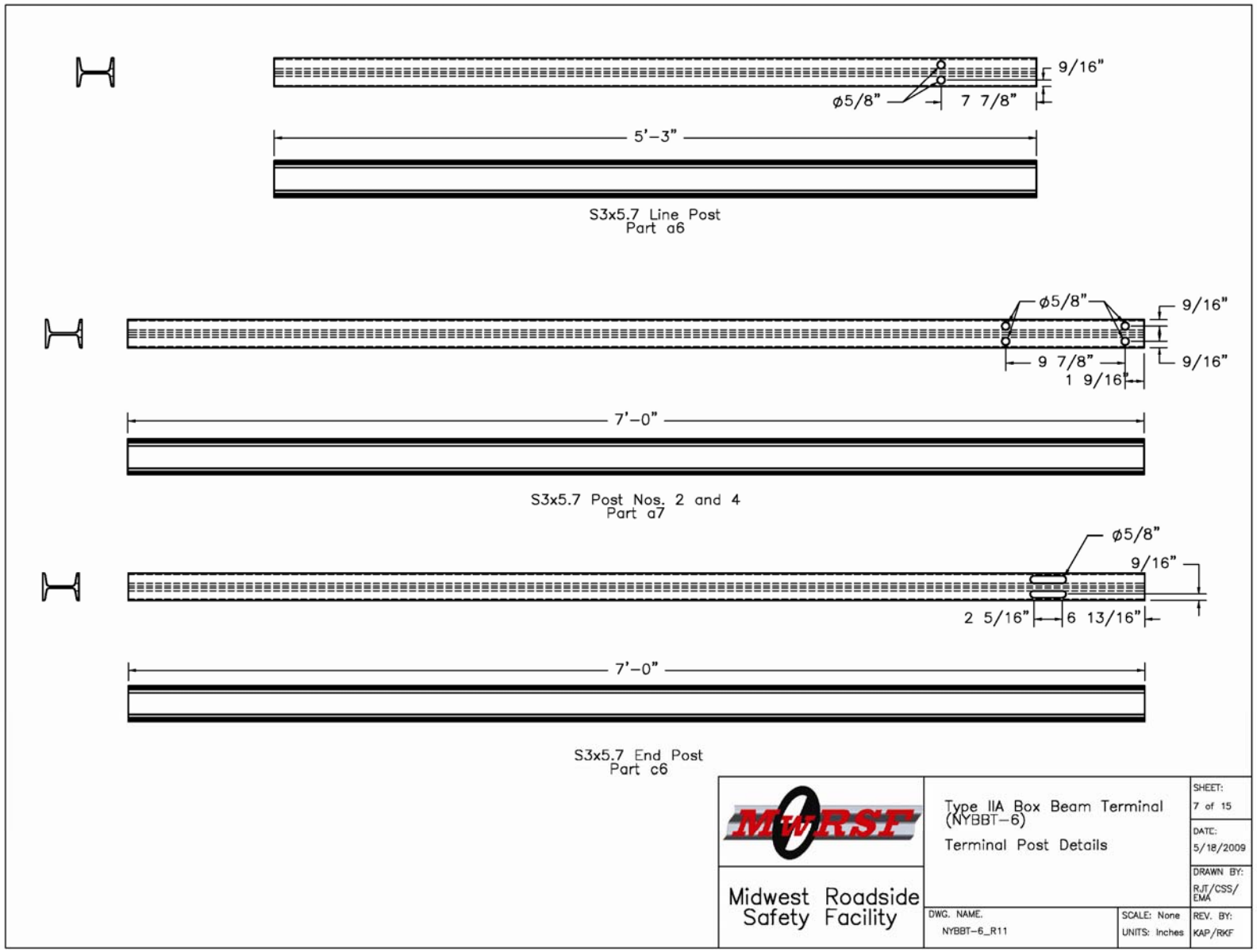


Figure O-7. Modified Type IIA Box Beam Terminal in Ditch System Details (English), Test No. NYBBT-6

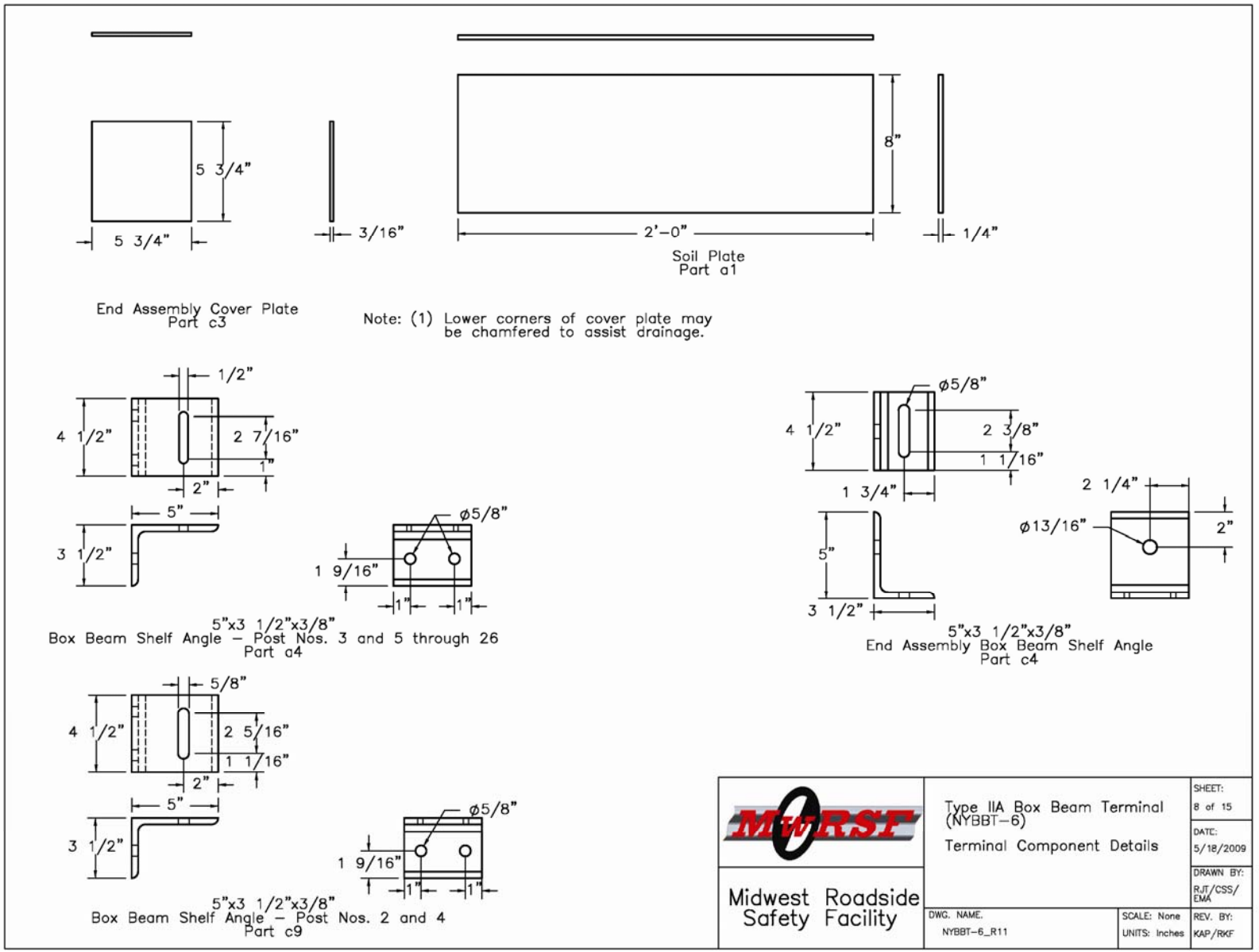


Figure O-8. Modified Type IIA Box Beam Terminal in Ditch System Details (English), Test No. NYBBT-6

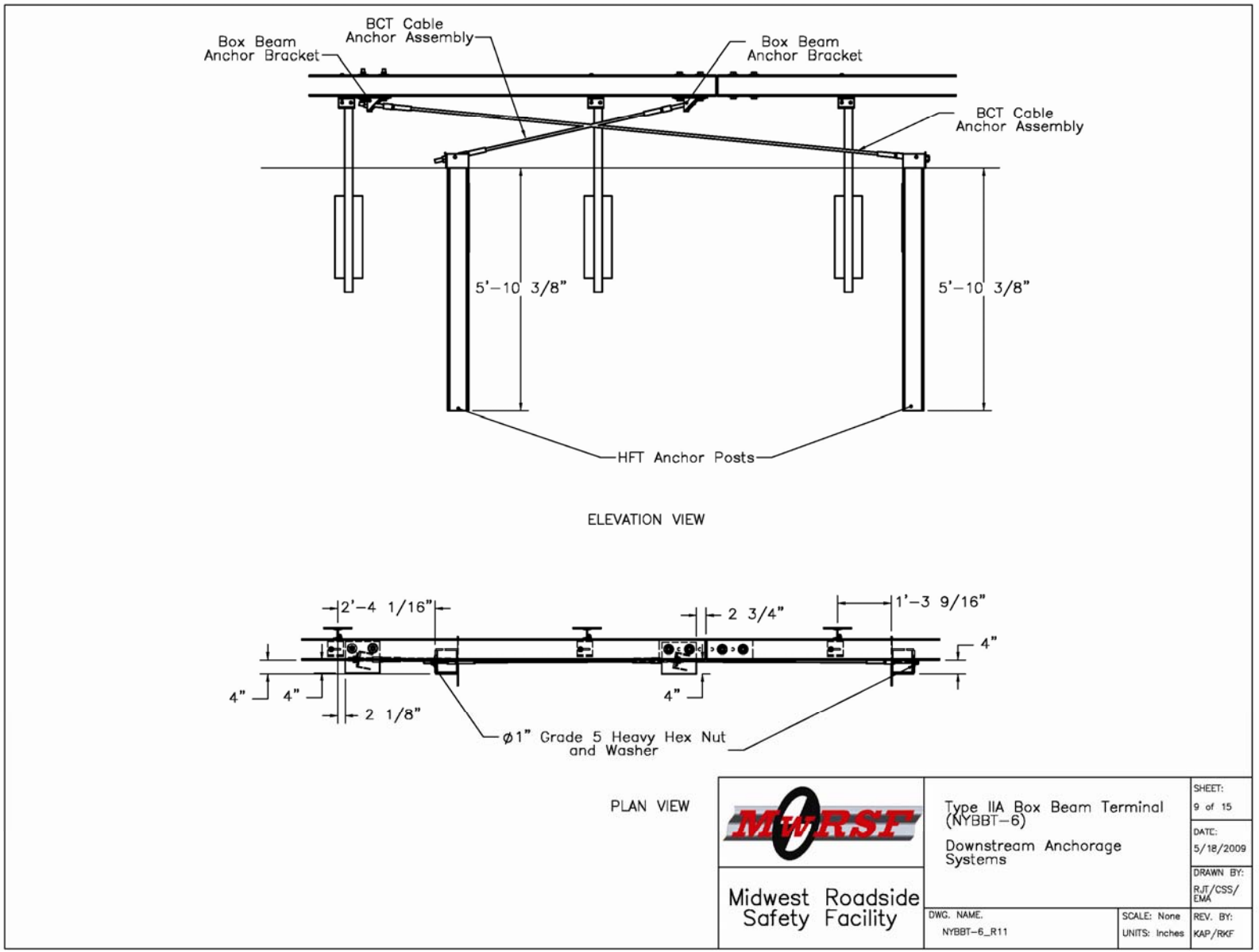


Figure O-9. Modified Type IIA Box Beam Terminal in Ditch System Details (English), Test No. NYBBT-6

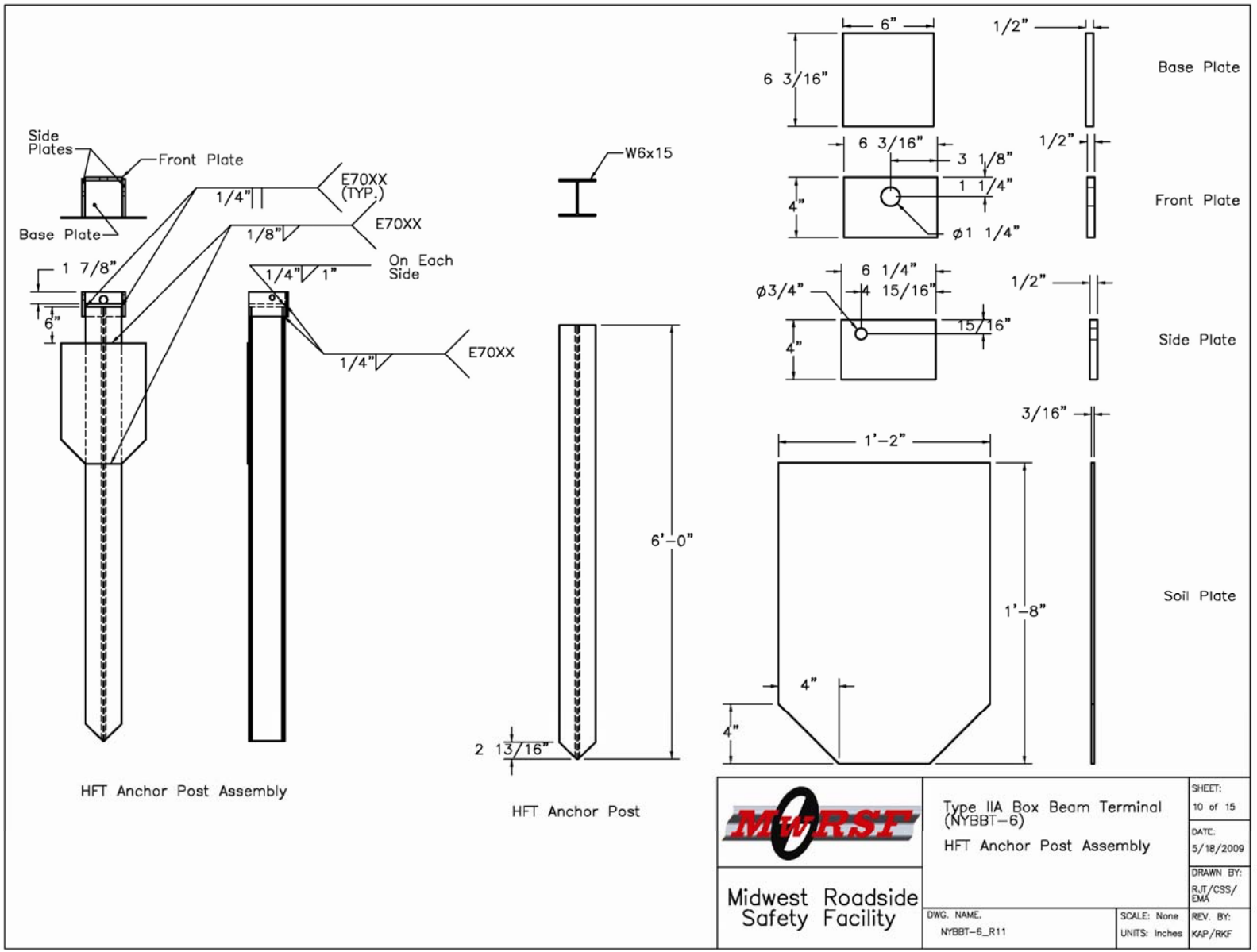


Figure O-10. Modified Type IIA Box Beam Terminal in Ditch System Details (English), Test No. NYBBT-6

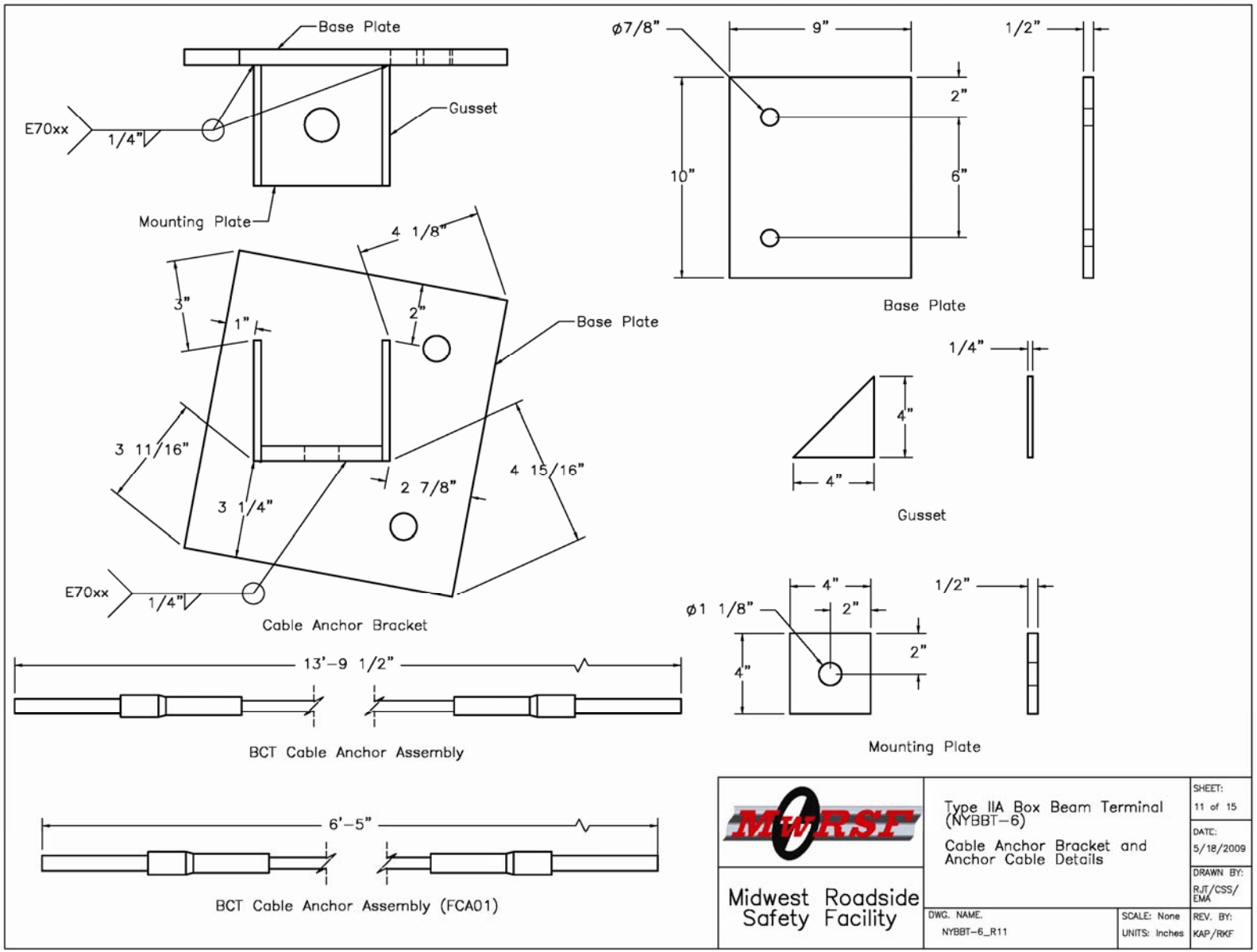
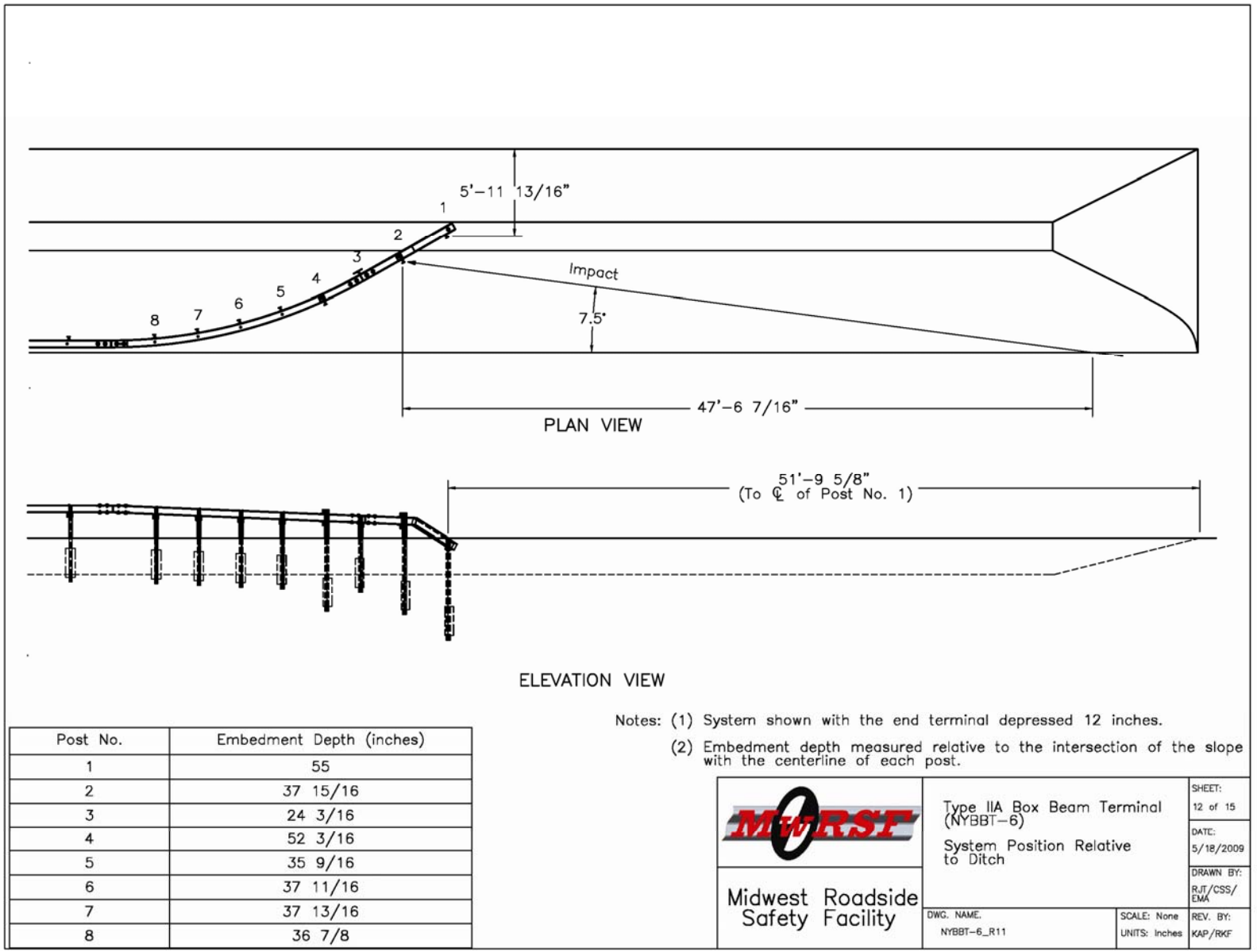


Figure O-11. Modified Type IIA Box Beam Terminal in Ditch System Details (English), Test No. NYBBT-6



Post No.	Embedment Depth (inches)
1	55
2	37 15/16
3	24 3/16
4	52 3/16
5	35 9/16
6	37 11/16
7	37 13/16
8	36 7/8

Notes: (1) System shown with the end terminal depressed 12 inches.

(2) Embedment depth measured relative to the intersection of the slope with the centerline of each post.

MwRSF Midwest Roadside Safety Facility	Type IIA Box Beam Terminal (NYBBT–6) System Position Relative to Ditch	SHEET: 12 of 15 DATE: 5/18/2009 DRAWN BY: RJT/CSS/EMA
DWG. NAME. NYBBT–6_R11	SCALE: None UNITS: Inches	REV. BY: KAP/RKF

Figure O-12. Modified Type IIA Box Beam Terminal in Ditch System Details (English), Test No. NYBBT-6

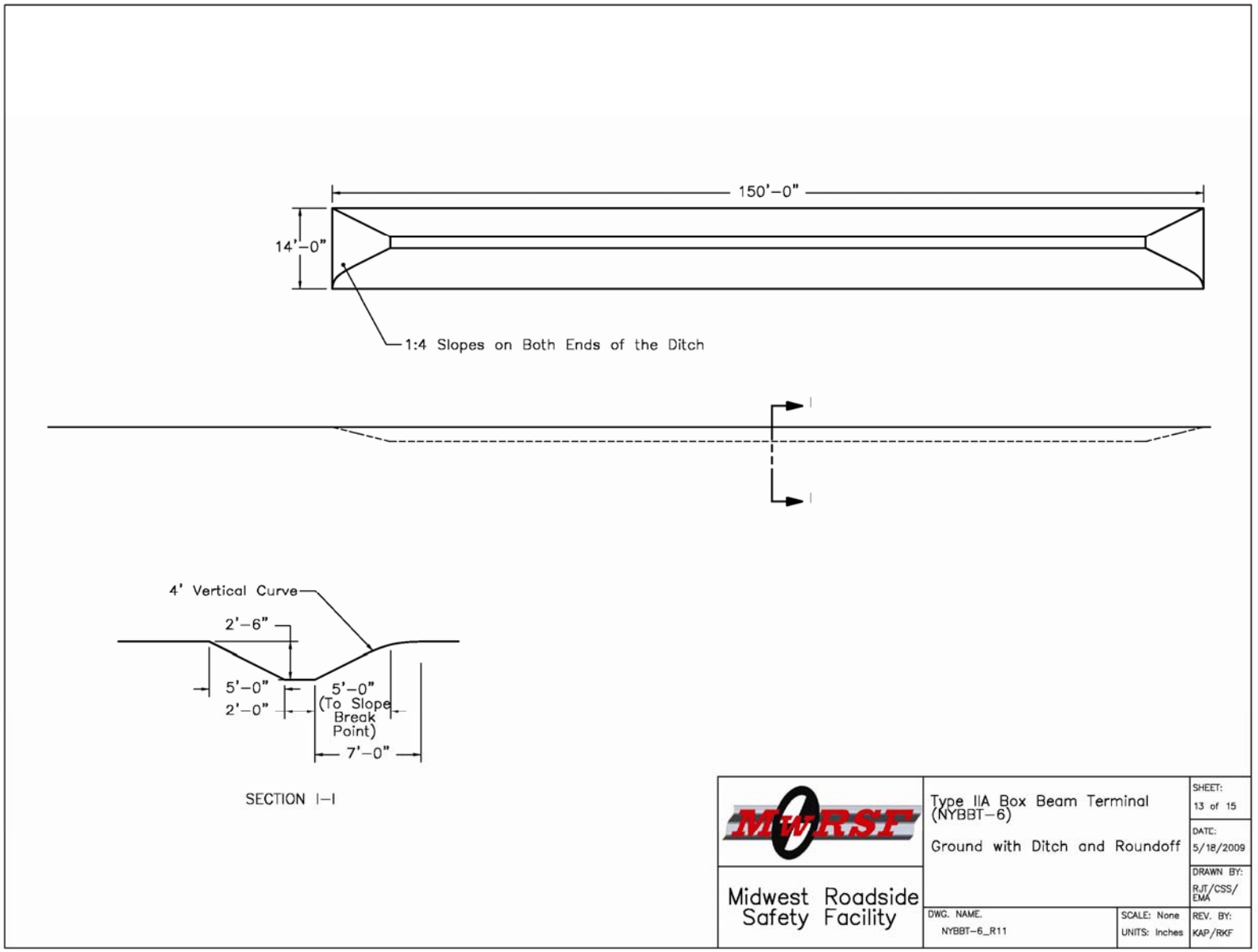


Figure O-13. Modified Type IIA Box Beam Terminal in Ditch System Details (English), Test No. NYBBT-6

NYBBT–6			
Item No.	QTY.	Description	Material Specifications
a1	26	1/4" x 8" x 2' steel soil plate	A36 Steel
a2	29	ø 1/2" coarse thread 1 5/8" long hex bolt	ASTM A307
a3	31	ø 1/2" hex nut	ASTM A307
a4	23	5" x 3 1/2" x 3/8" box beam shelf angle	A36 Steel
a5	31	ø 1/2" narrow washer	ASTM A307
a6	23	S3 x 5.7 63" long post	A36 Steel
a7	2	S3 x 5.7 84" long post	A36 Steel
b1	22	ø 3/8" coarse thread 7 1/2" long hex bolt	ASTM A307
b2	22	ø 3/8" hex nut	ASTM A307
b3	44	ø 3/8" wide washer	ASTM A307
b4	59	ø 3/4" hex nut	ASTM A325
b5	61	ø 3/4" wide washer	ASTM A325
b6	56	ø 3/4" coarse thread 2" long hex bolt	ASTM A307
b7	14	27" x 5 3/8" x 5/8" splice plate	A36 Steel
b8	6	6" x 6" x 3/16" by 17'–11 7/8" long box beam	ASTM A500 Grade B
c1	1	End assembly horizontal 6" x 6" x 3/16" box beam	ASTM A500 Grade B
c2	1	End assembly diagonal 6" x 6" x 3/16" box beam	ASTM A500 Grade B
c3	1	End assembly 3/16" thick cover plate	A36 Steel
c4	1	5" x 3 1/2" x 3/8" box beam anchor post shelf angle	A36 Steel
c5	1	ø 3/4" coarse thread 7 3/4" long hex bolt	ASTM A307
c6	1	S3 x 5.7 84" long post anchor post	A36 Steel
c7	1	6"x6"x3/16" R 35' Curved Box Beam	ASTM A500 Grade B
c8	2	ø 1/2" coarse thread 8" long hex bolt	ASTM A307
c9	4	5" x 3 1/2" x 3/8" box beam shelf angle with ø5/8" slot	A36 Steel
c10	4	ø 1/2" wide washer	ASTM A307

MwRSF

Midwest Roadside Safety Facility

Type IIA Box Beam Terminal (NYBBT–6)

Bill of Materials

SHEET: 14 of 15

DATE: 5/18/2009

DRAWN BY: RJT/CSS/EMA

DWG. NAME. NYBBT–6_R11

SCALE: None

UNITS: Inches

REV. BY: KAP/RKF

Figure O-14. Modified Type IIA Box Beam Terminal in Ditch System Details (English), Test No. NYBBT-6

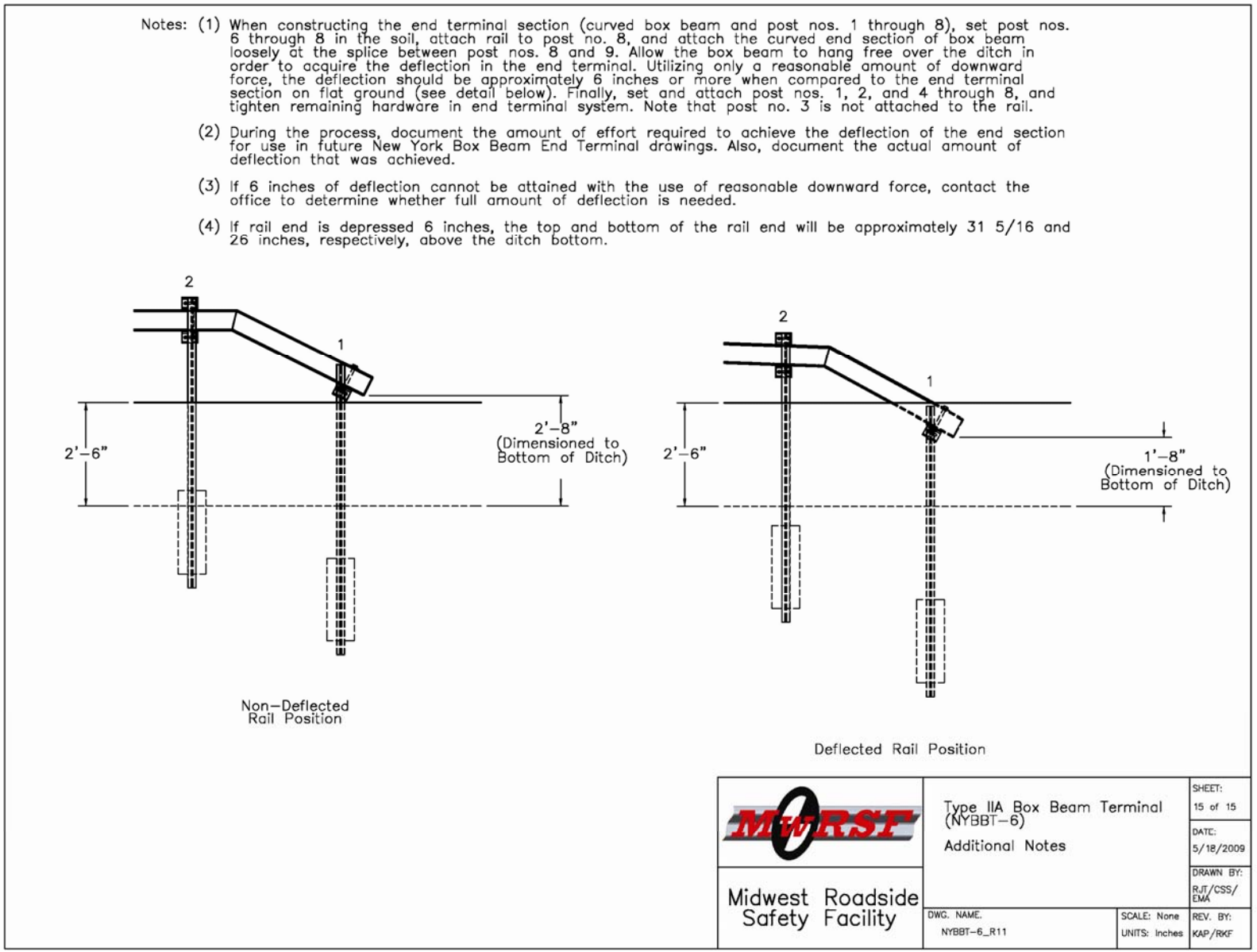


Figure O-15. Modified Type IIA Box Beam Terminal in Ditch System Details (English), Test No. NYBBT-6

APPENDIX P Modified Type IIA Box Beam Terminal in Ditch System Details -Metric and English Units, Test No. NYBBT-7

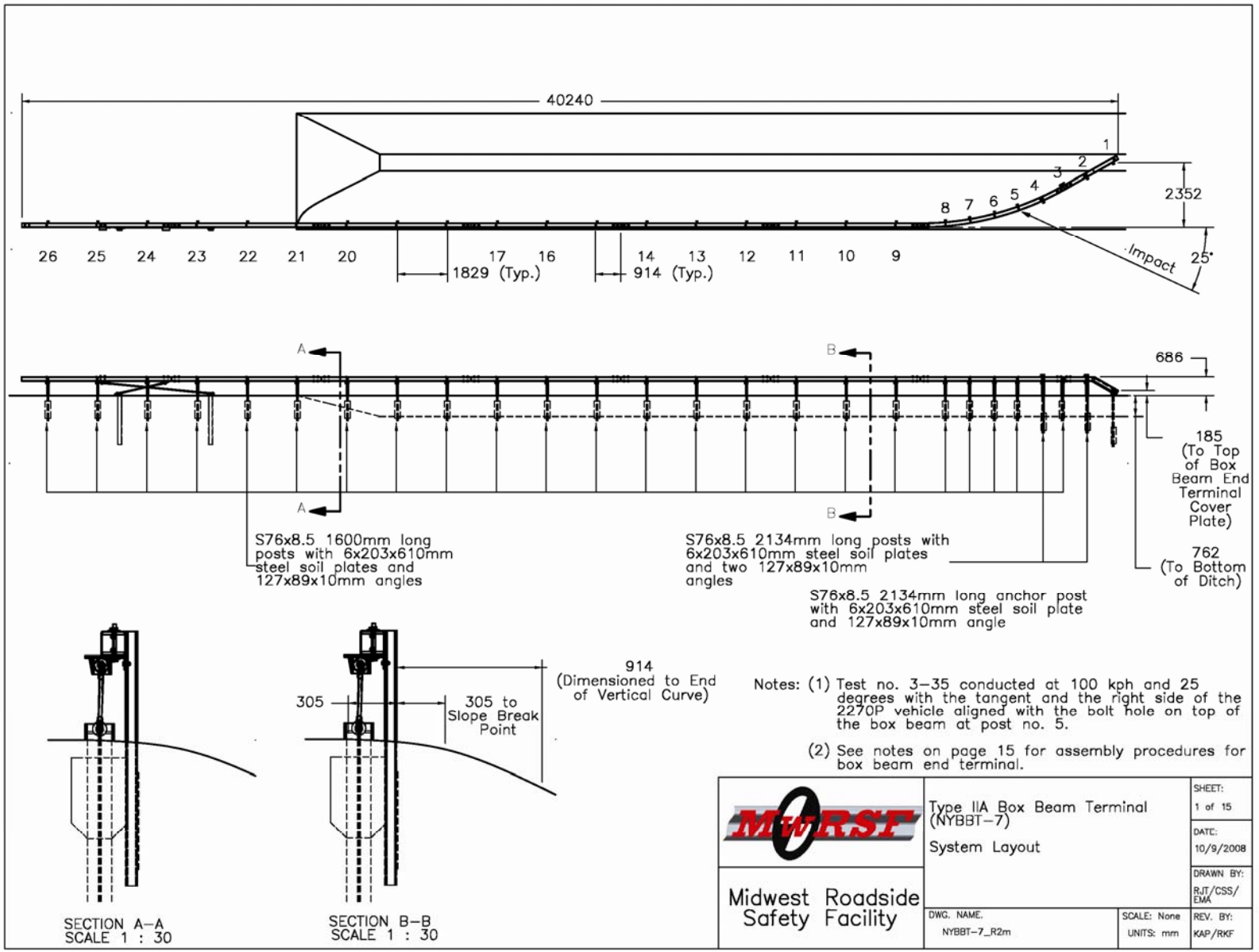


Figure P-1. Modified Type IIA Box Beam Terminal in Ditch System Details (Metric), Test No. NYBBT-7

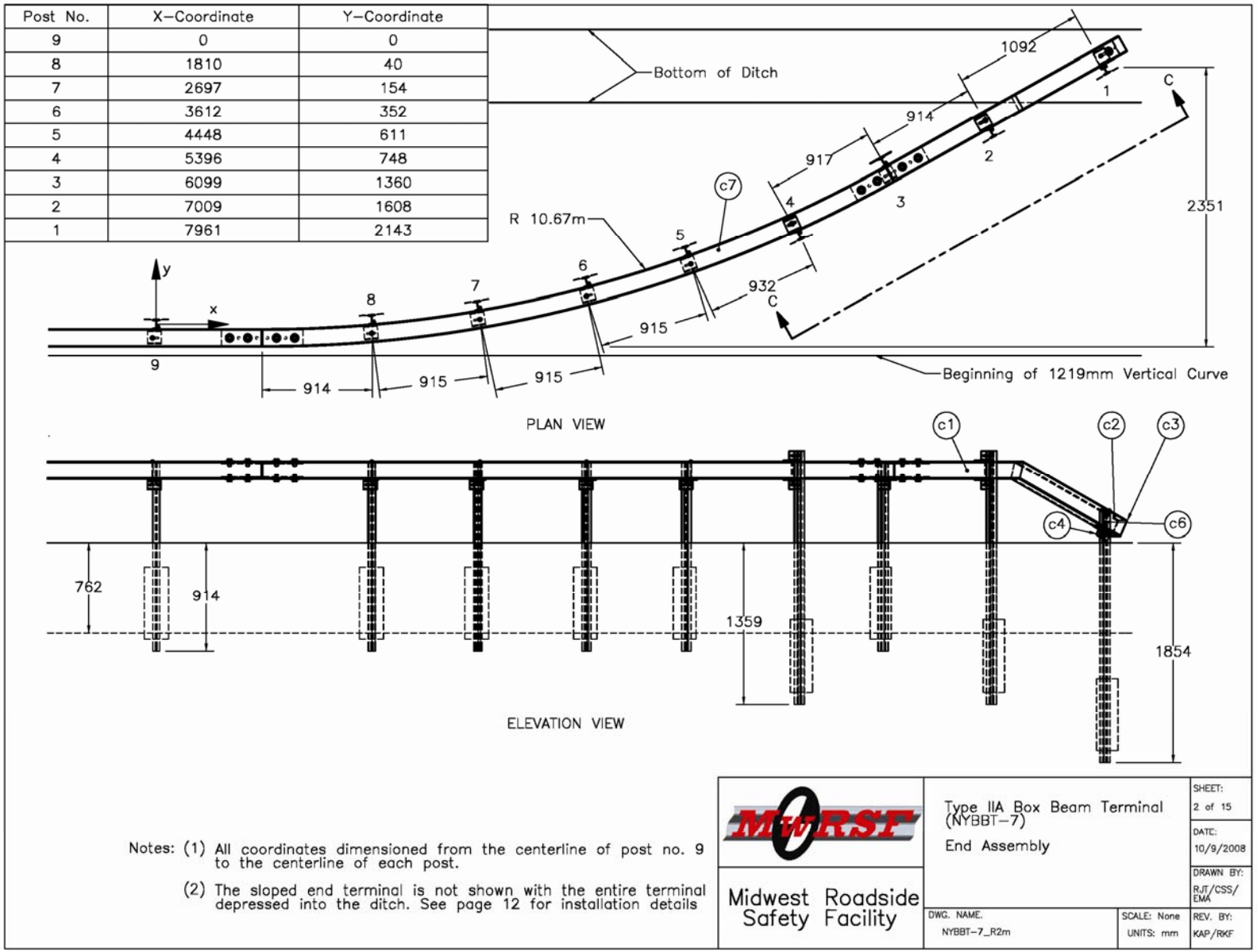


Figure P-2. Modified Type IIA Box Beam Terminal in Ditch System Details (Metric), Test No. NYBBT-7

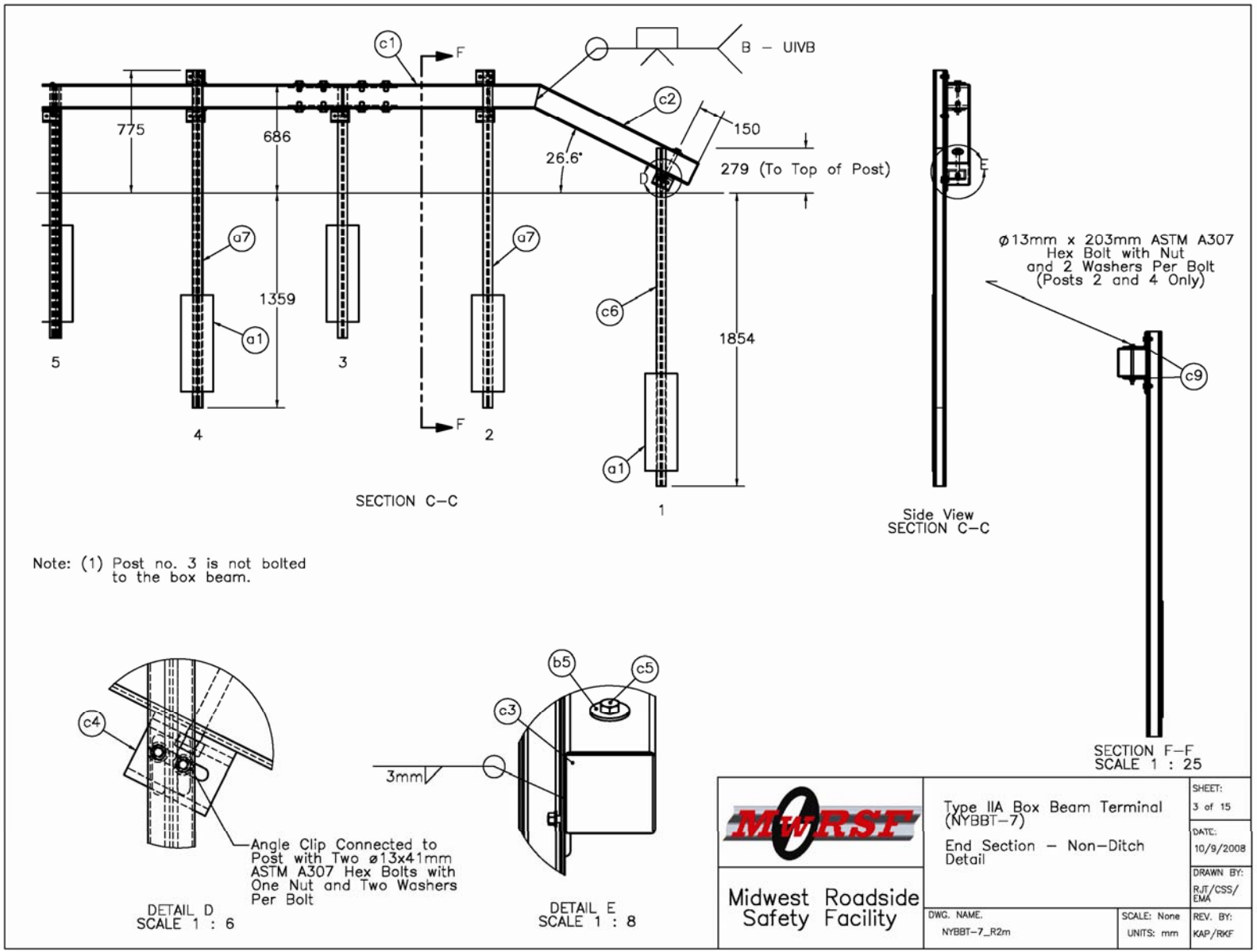


Figure P-3. Modified Type IIA Box Beam Terminal in Ditch System Details (Metric), Test No. NYBBT-7

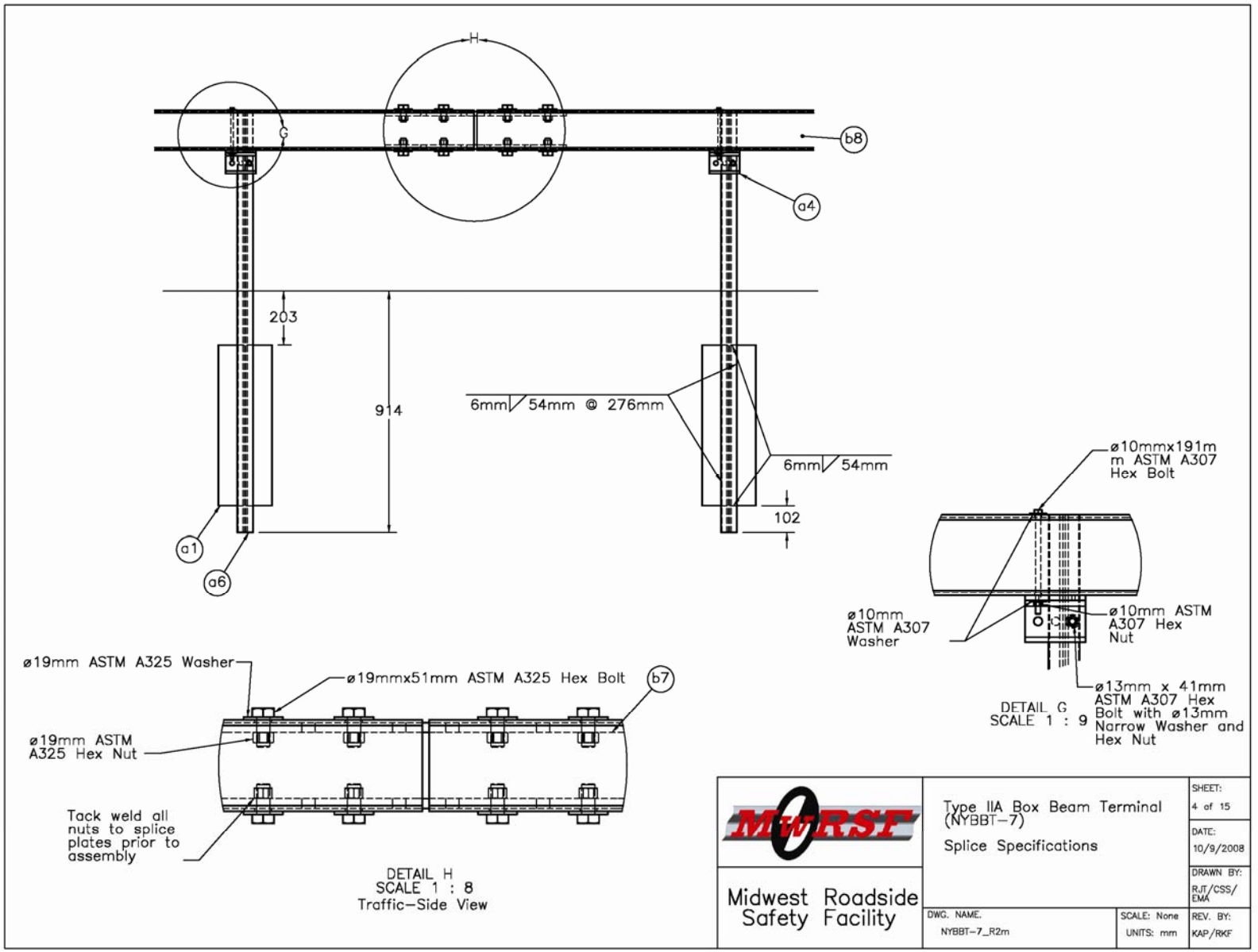


Figure P-4. Modified Type IIA Box Beam Terminal in Ditch System Details (Metric), Test No. NYBBT-7

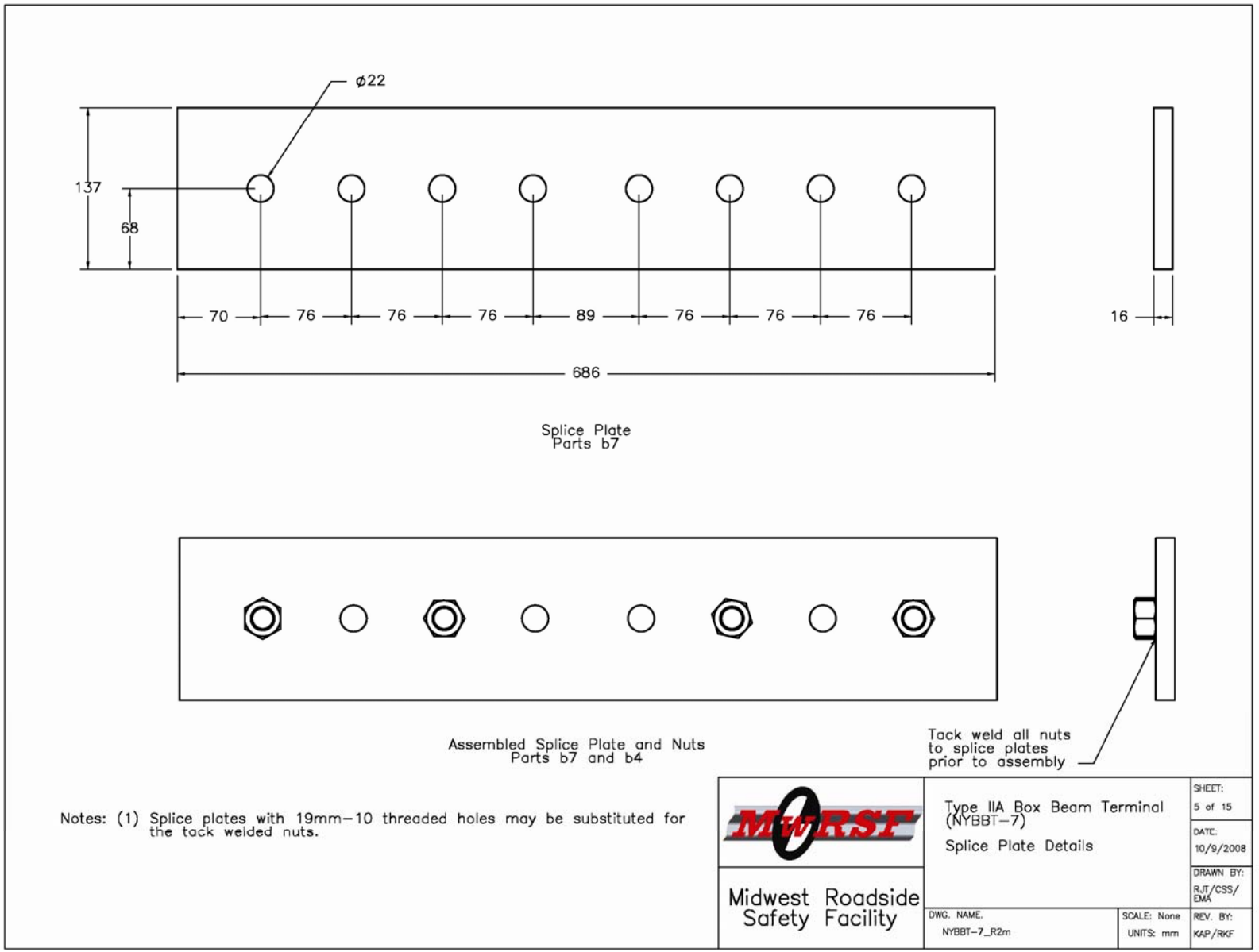


Figure P-5. Modified Type IIA Box Beam Terminal in Ditch System Details (Metric), Test No. NYBBT-7

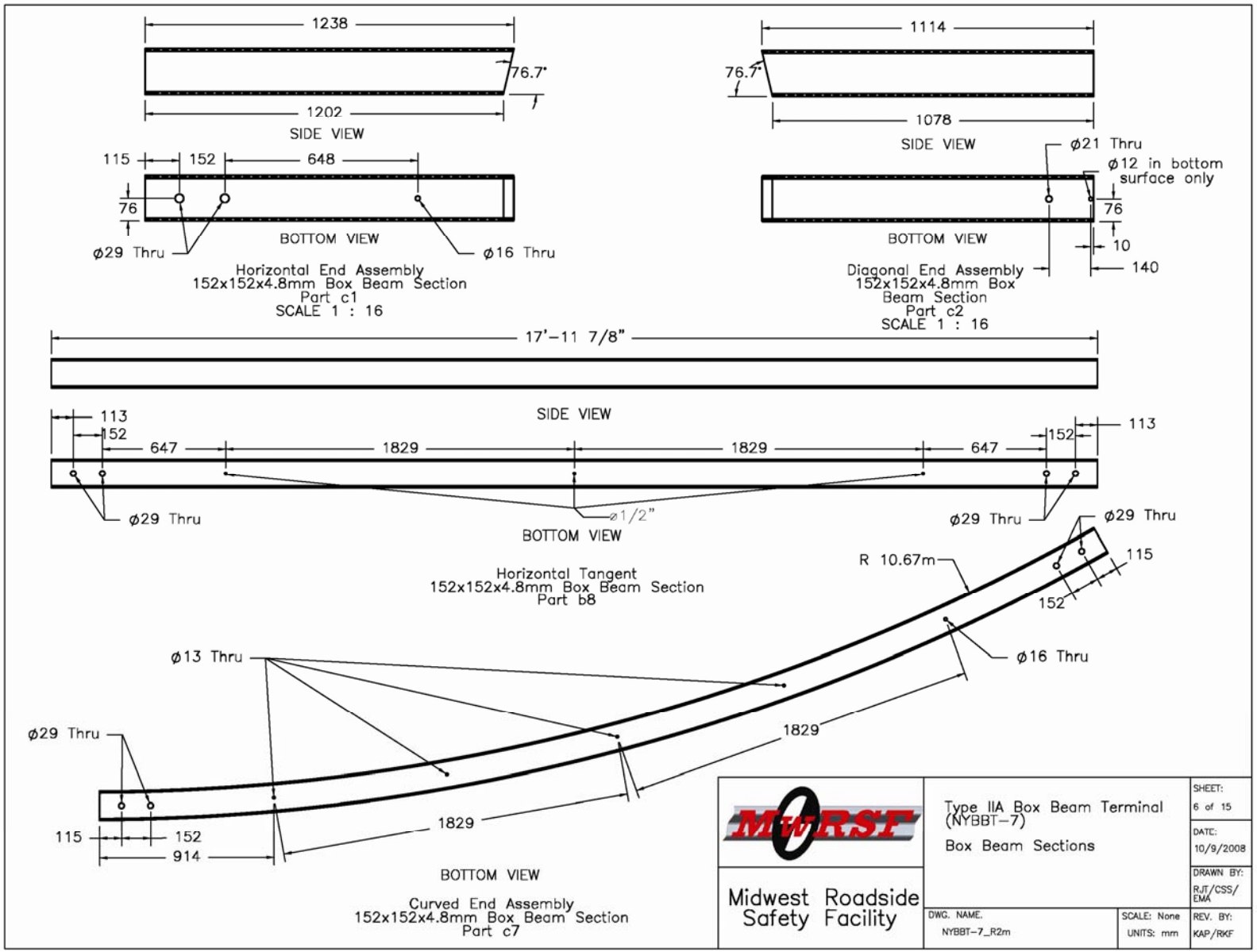


Figure P-6. Modified Type IIA Box Beam Terminal in Ditch System Details (Metric), Test No. NYBBT-7

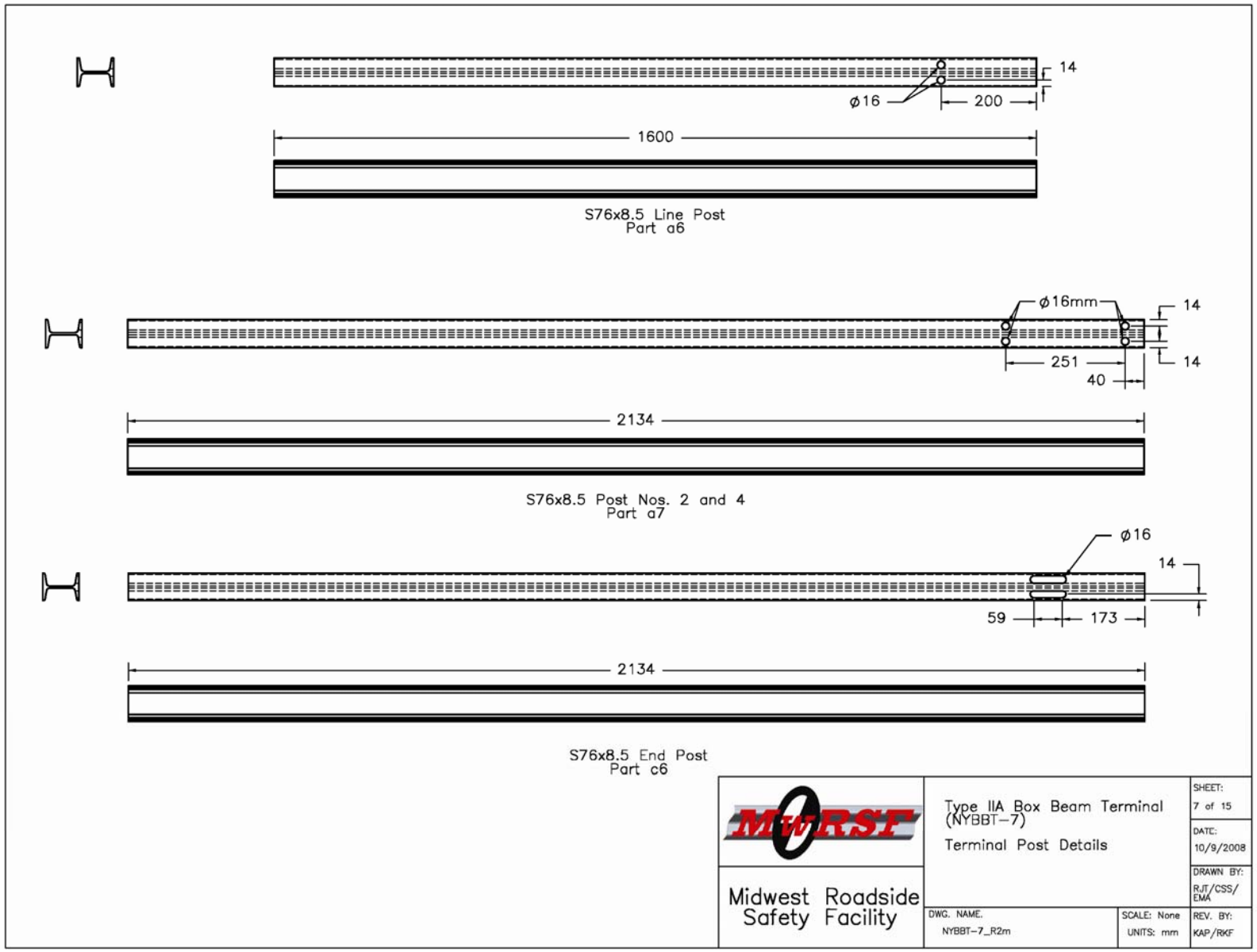


Figure P-7. Modified Type IIA Box Beam Terminal in Ditch System Details (Metric), Test No. NYBBT-7

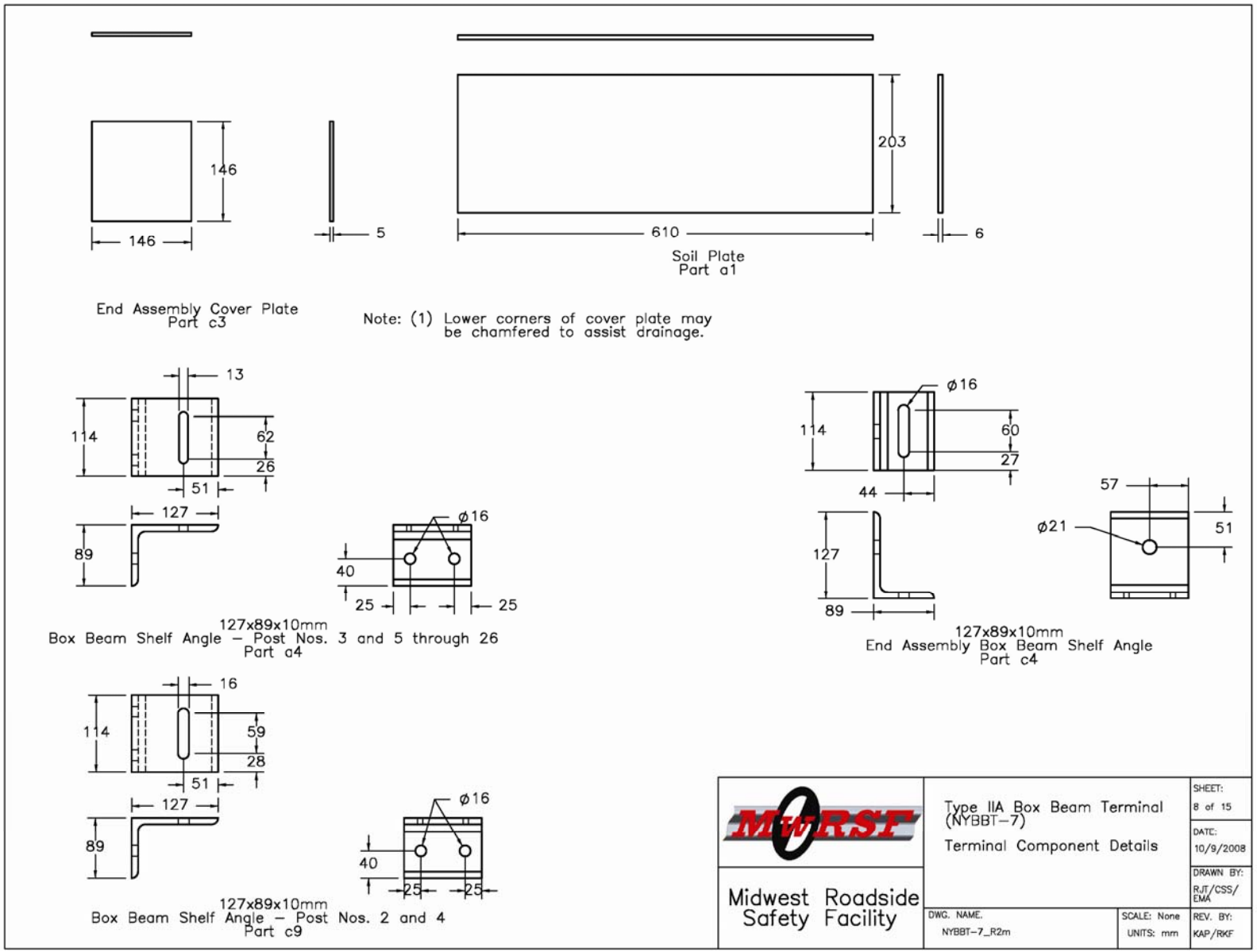


Figure P-8. Modified Type IIA Box Beam Terminal in Ditch System Details (Metric), Test No. NYBBT-7

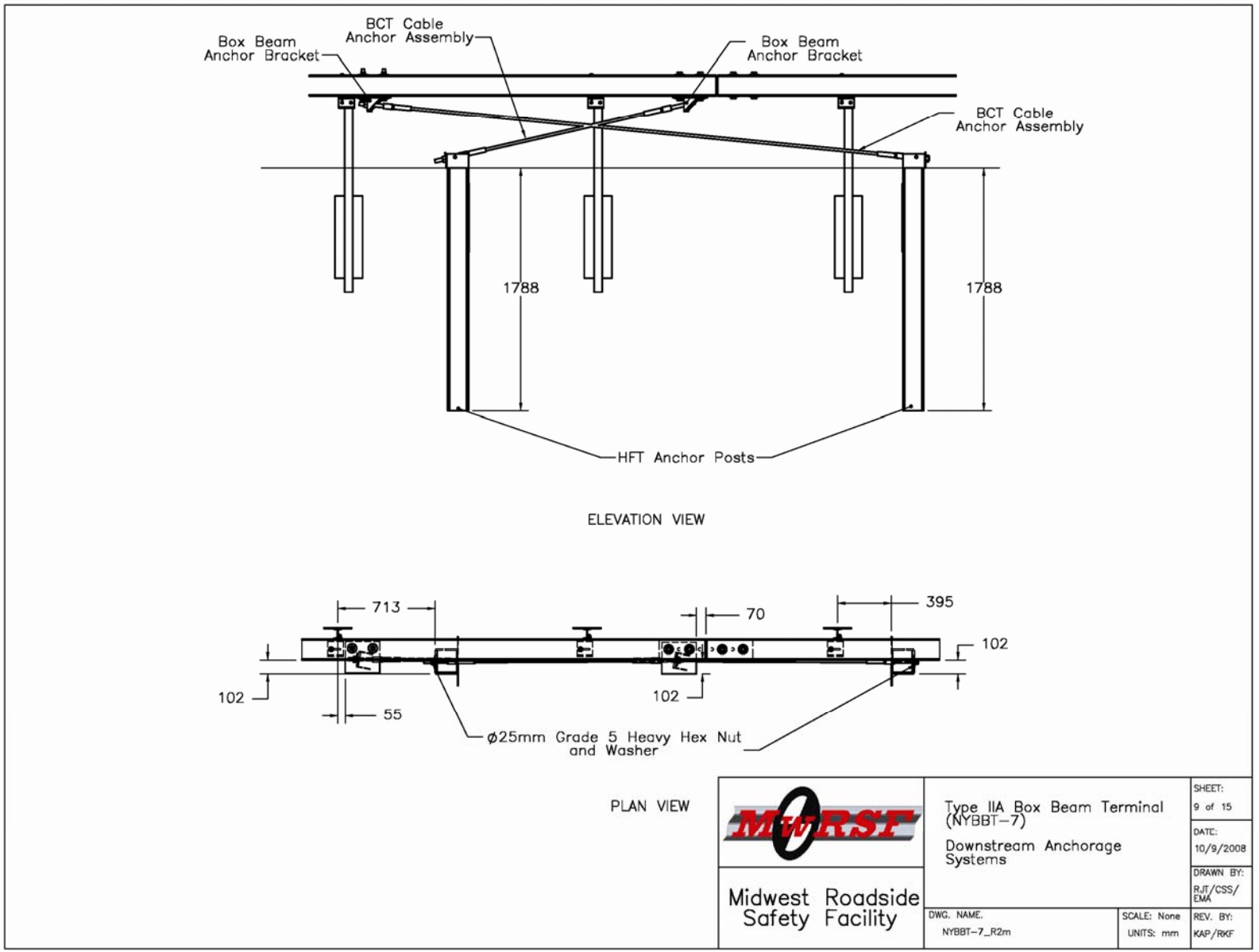


Figure P-9. Modified Type IIA Box Beam Terminal in Ditch System Details (Metric), Test No. NYBBT-7

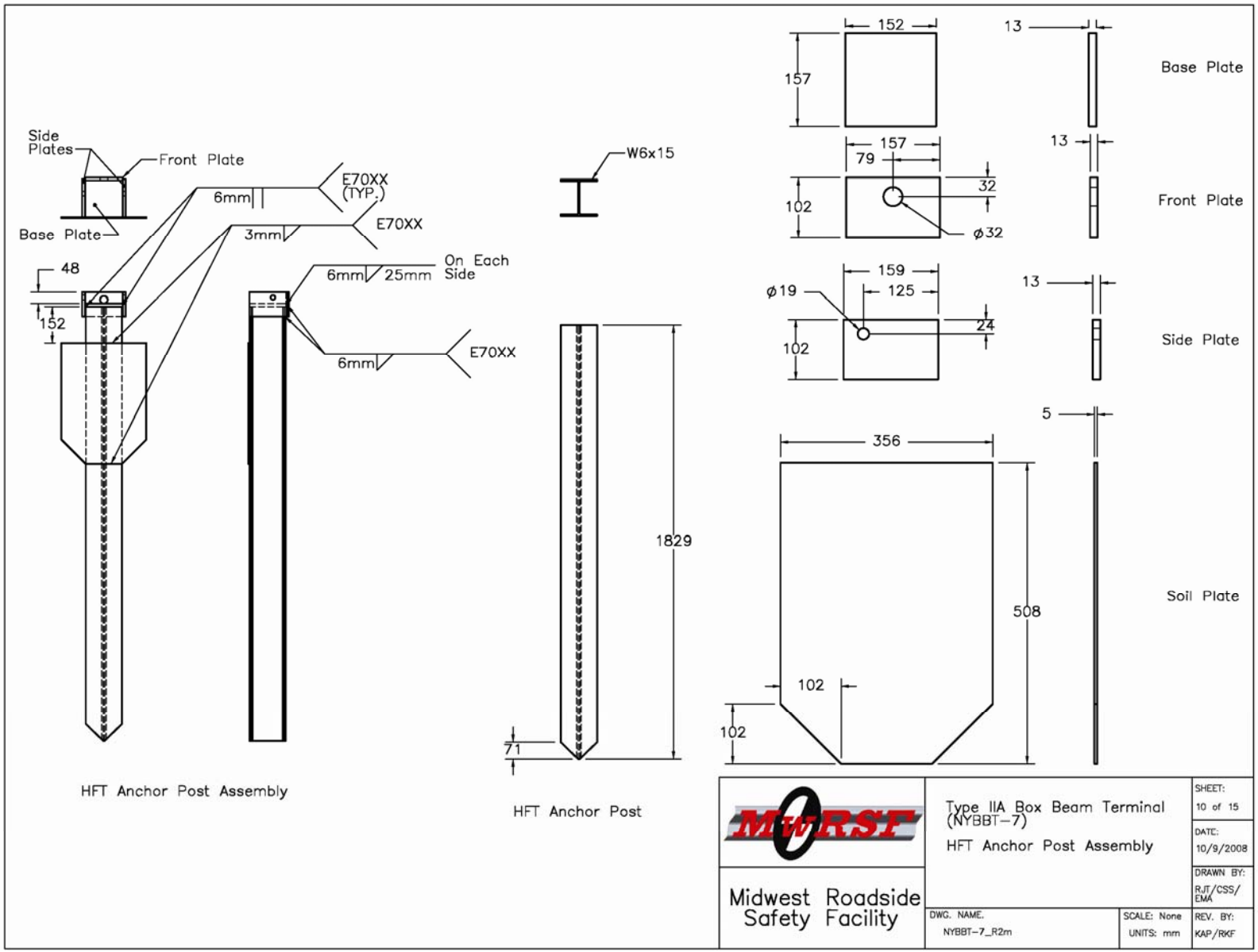


Figure P-10. Modified Type IIA Box Beam Terminal in Ditch System Details (Metric), Test No. NYBBT-7

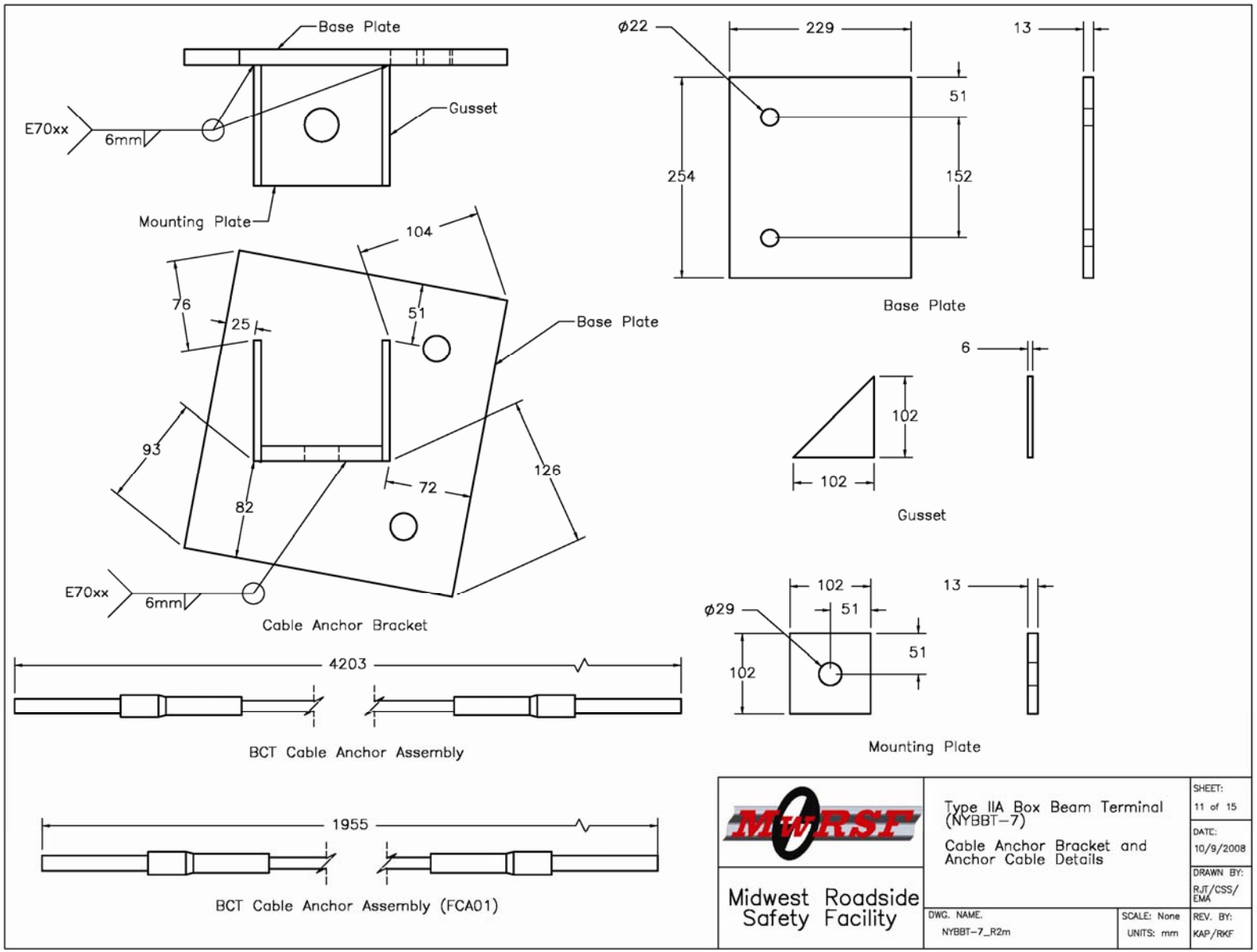
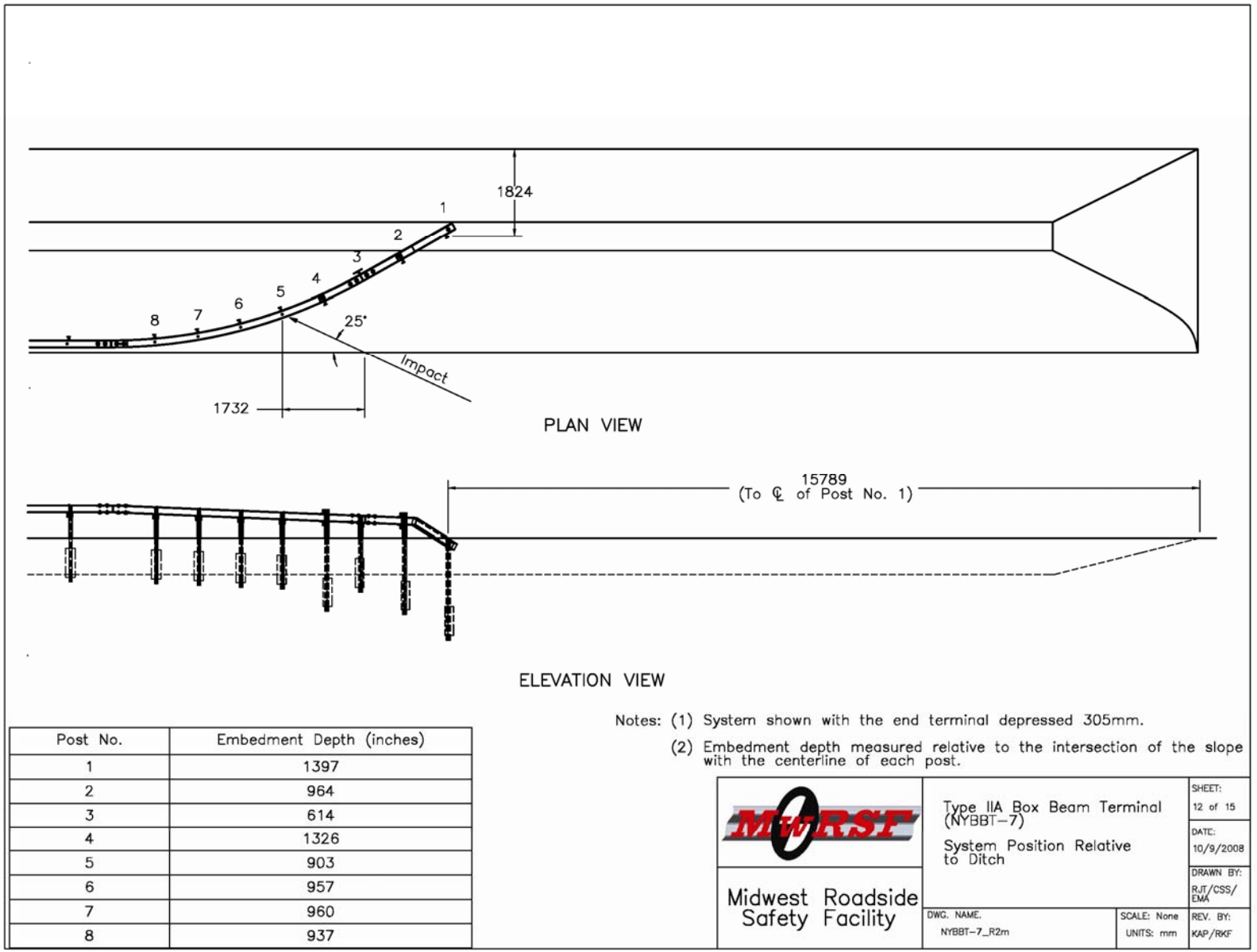


Figure P-11. Modified Type IIA Box Beam Terminal in Ditch System Details (Metric), Test No. NYBBT-7



Post No.	Embedment Depth (inches)
1	1397
2	964
3	614
4	1326
5	903
6	957
7	960
8	937

Figure P-12. Modified Type IIA Box Beam Terminal in Ditch System Details (Metric), Test No. NYBBT-7

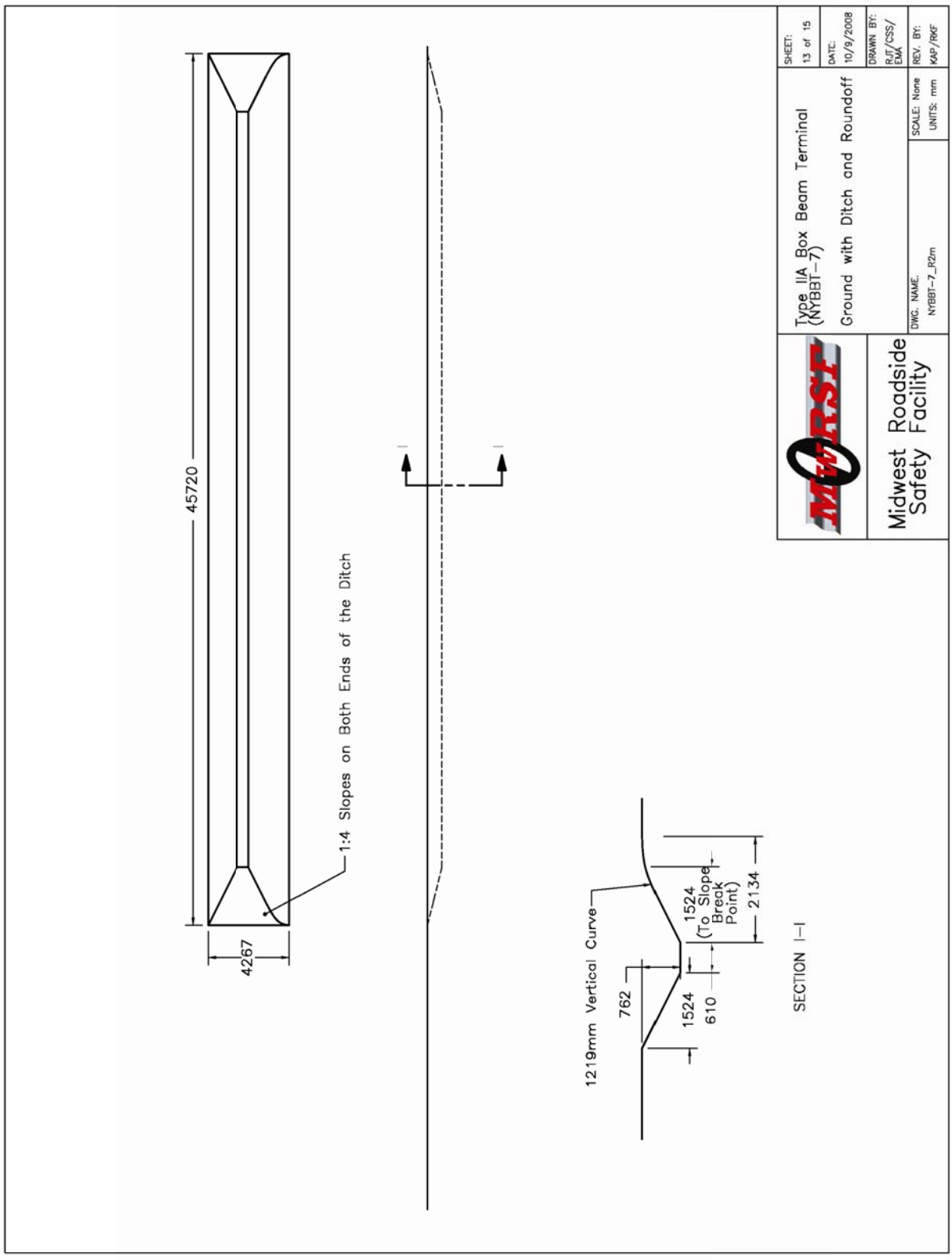


Figure P-13. Modified Type IIA Box Beam Terminal in Ditch System Details (Metric), Test No. NYBBT-7

NYBBT–7			
Item No.	QTY.	Description	Material Specifications
a1	26	6 x 203 x 610mm steel soil plate	A36 Steel
a2	29	ø 13mm coarse thread 41mm long hex bolt	ASTM A307
a3	31	ø 13mm hex nut	ASTM A307
a4	23	127 x 89 x 10mm box beam shelf angle	A36 Steel
a5	31	ø 13mm narrow washer	ASTM A307
a6	23	S76x8.5 1600mm long post	A36 Steel
a7	2	S76x8.5 2134mm long post	A36 Steel
b1	22	ø 10mm coarse thread 191mm long hex bolt	ASTM A307
b2	22	ø 10mm hex nut	ASTM A307
b3	44	ø 10mm wide washer	ASTM A307
b4	59	ø 19mm hex nut	ASTM A325
b5	61	ø 19mm wide washer	ASTM A325
b6	56	ø 19mm coarse thread 51mm long hex bolt	ASTM A307
b7	14	686 x 137 x 16mm splice plate	A36 Steel
b8	6	152 x 152 x 4.8mm by 5483mm long box beam	ASTM A500 Grade B
c1	1	End assembly horizontal 152 x 152 x 4.8mm box beam	ASTM A500 Grade B
c2	1	End assembly diagonal 152 x 152 x 4.8mm box beam	ASTM A500 Grade B
c3	1	End assembly 4.8mm thick cover plate	A36 Steel
c4	1	127 x 89 x 10mm box beam anchor post shelf angle	A36 Steel
c5	1	ø 19mm coarse thread 197mm long hex bolt	ASTM A307
c6	1	S76x8.5 2134mm long post anchor post	A36 Steel
c7	1	152 x 152 x 4.8mm R 10.67m Curved Box Beam	ASTM A500 Grade B
c8	2	ø 13mm coarse thread 203mm long hex bolt	ASTM A307
c9	4	127 x 89 x 10mm box beam shelf angle with ø16mm slot	A36 Steel
c10	4	ø 13mm wide washer	ASTM A307

MwRSF

Midwest Roadside Safety Facility

Type IIA Box Beam Terminal (NYBBT–7)

Bill of Materials

SHEET: 14 of 15

DATE: 10/9/2008

DRAWN BY: RJT/CSS/EMA

REV. BY: KAP/RKF

DWG. NAME. NYBBT–7_R2m

SCALE: None

UNITS: mm

Figure P-14. Modified Type IIA Box Beam Terminal in Ditch System Details (Metric), Test No. NYBBT-7

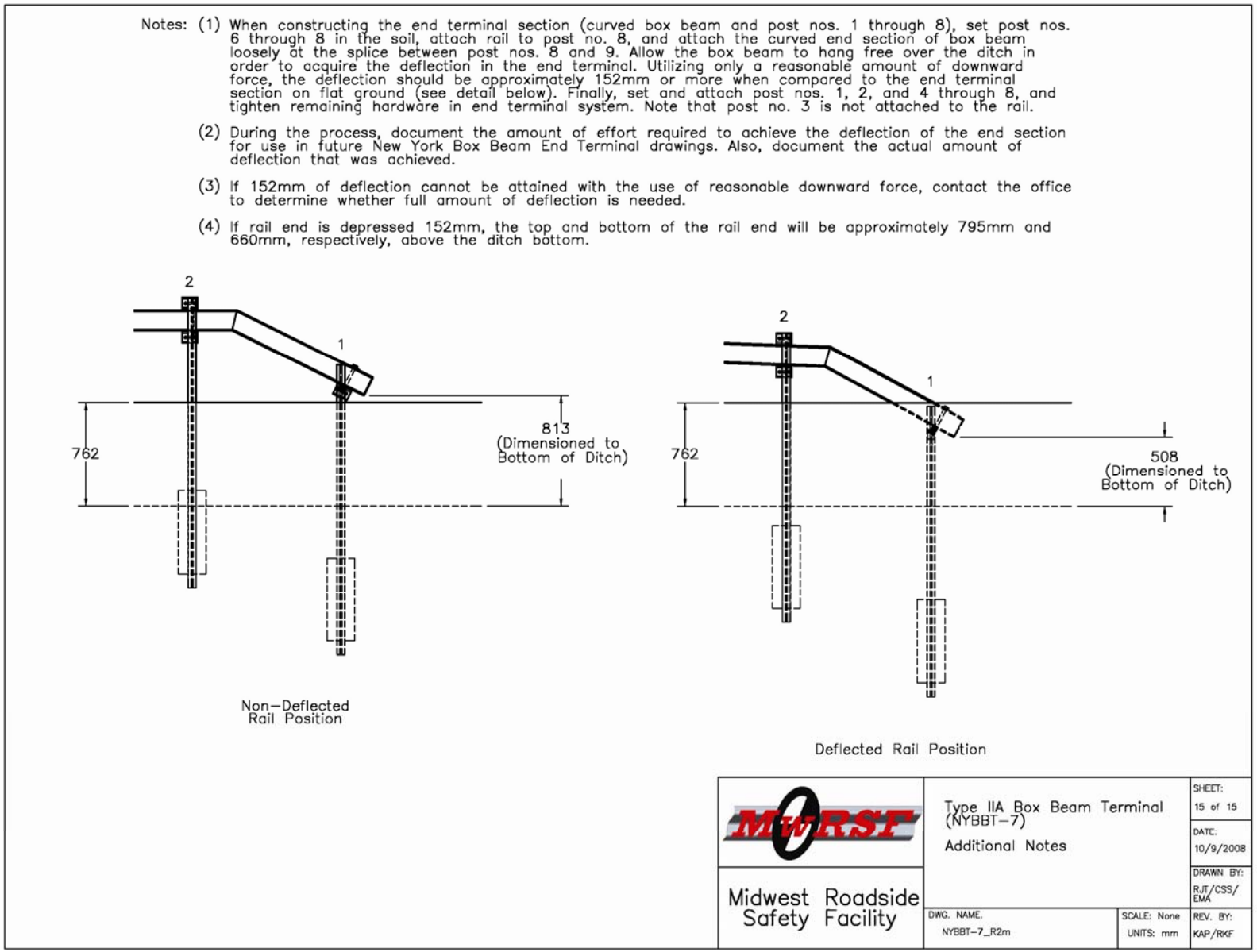


Figure P-15. Modified Type IIA Box Beam Terminal in Ditch System Details (Metric), Test No. NYBBT-7

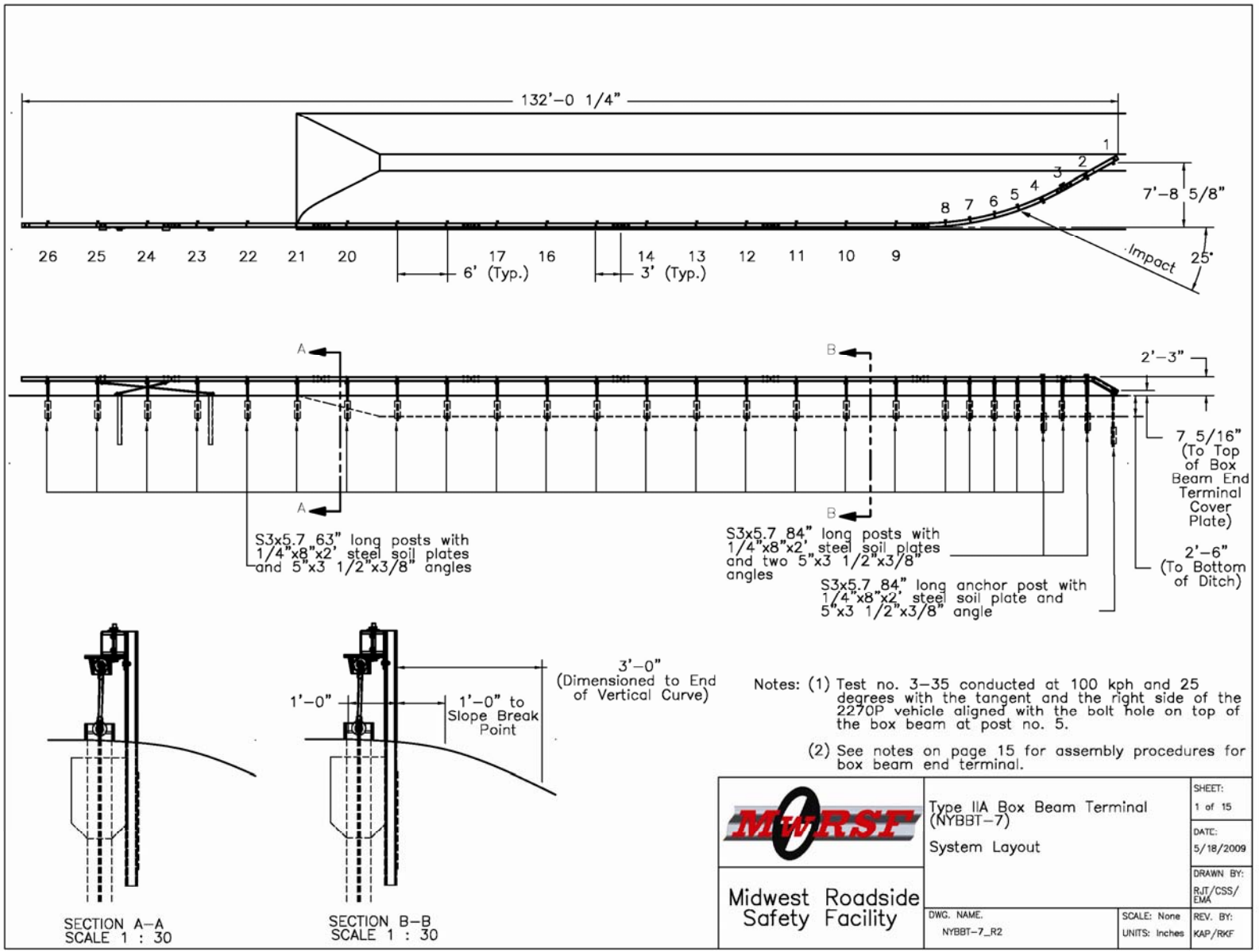


Figure P-16. Modified Type IIA Box Beam Terminal in Ditch System Details (English), Test No. NYBBT-7

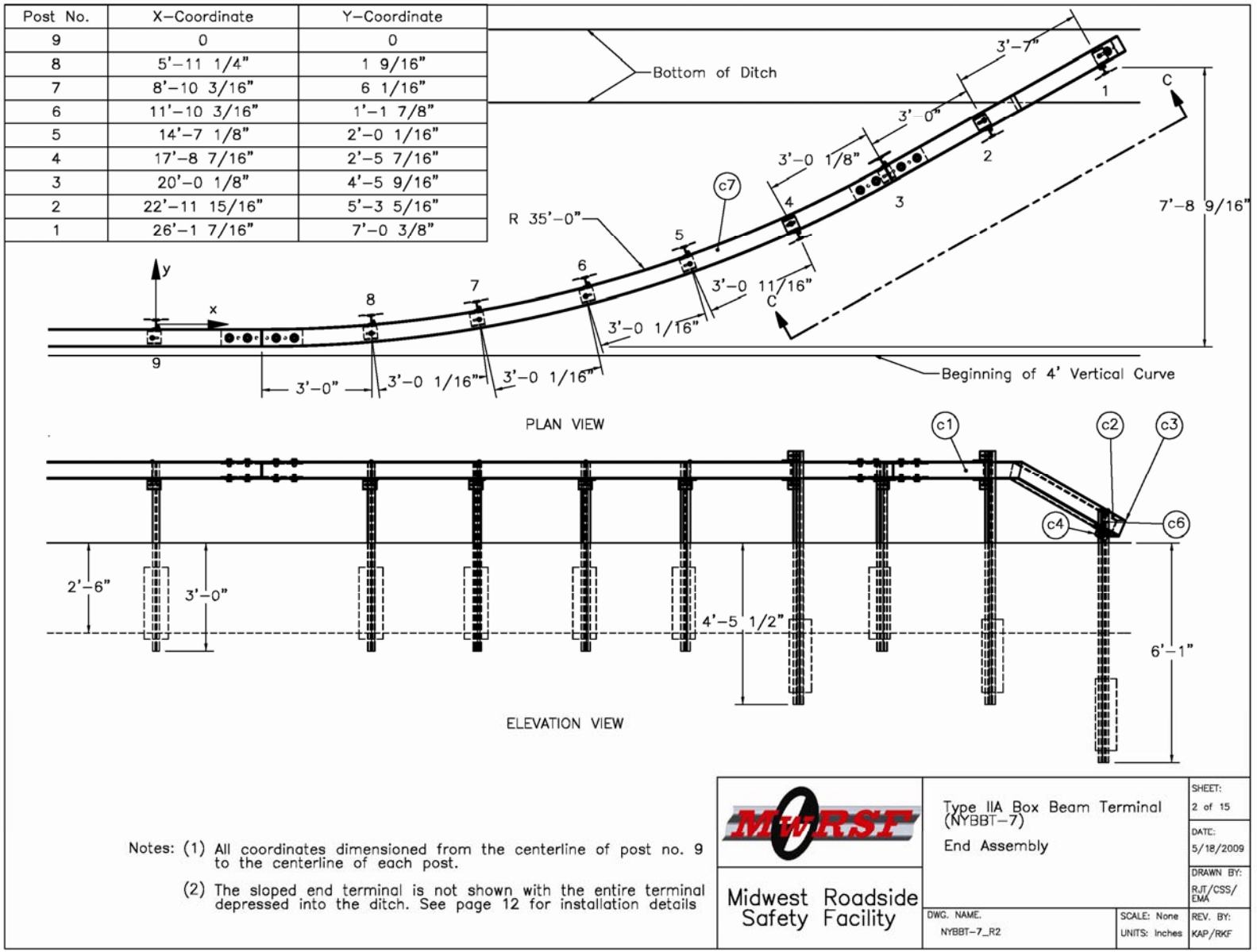


Figure P-17. Modified Type IIA Box Beam Terminal in Ditch System Details (English), Test No. NYBBT-7

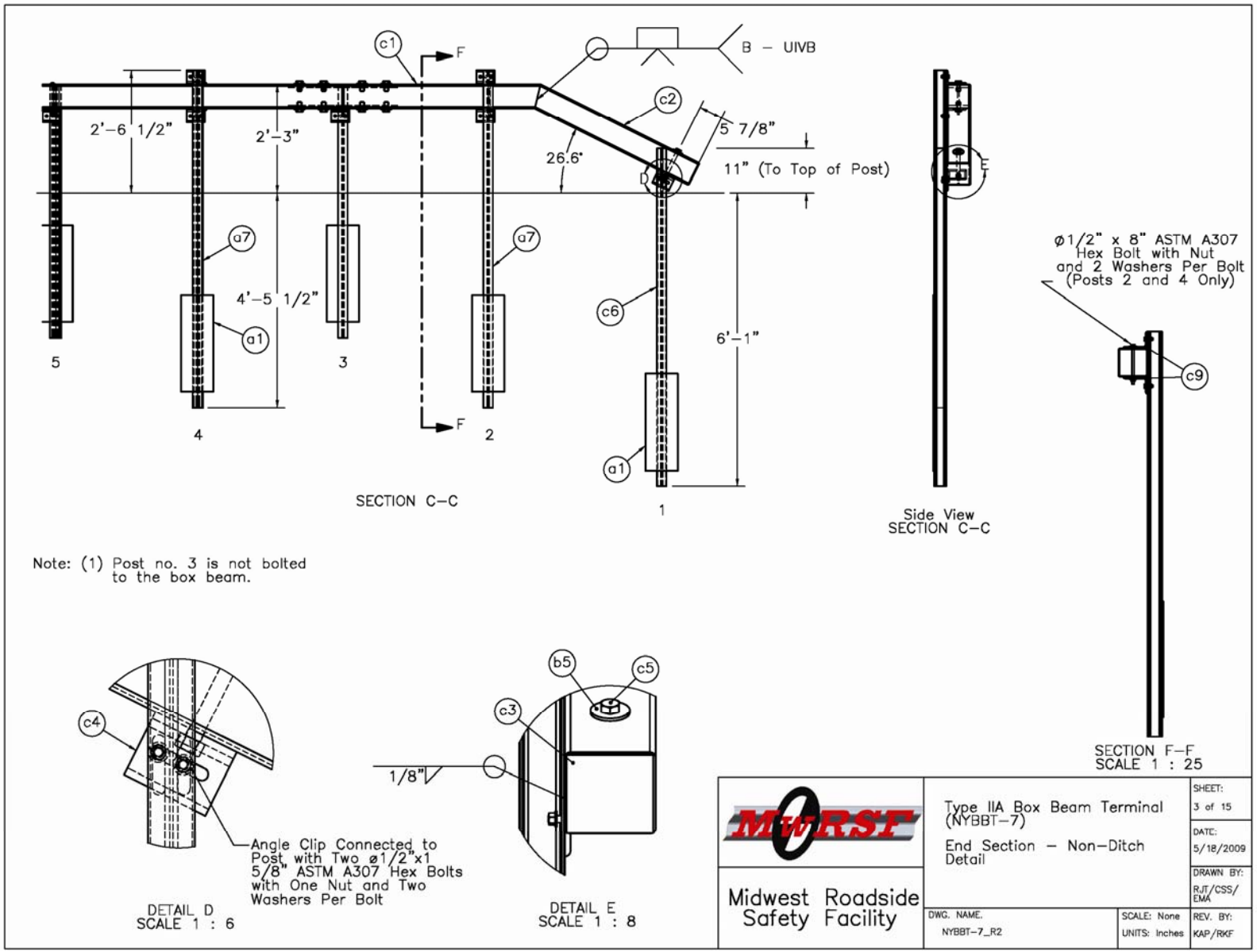


Figure P-18. Modified Type IIA Box Beam Terminal in Ditch System Details (English), Test No. NYBBT-7

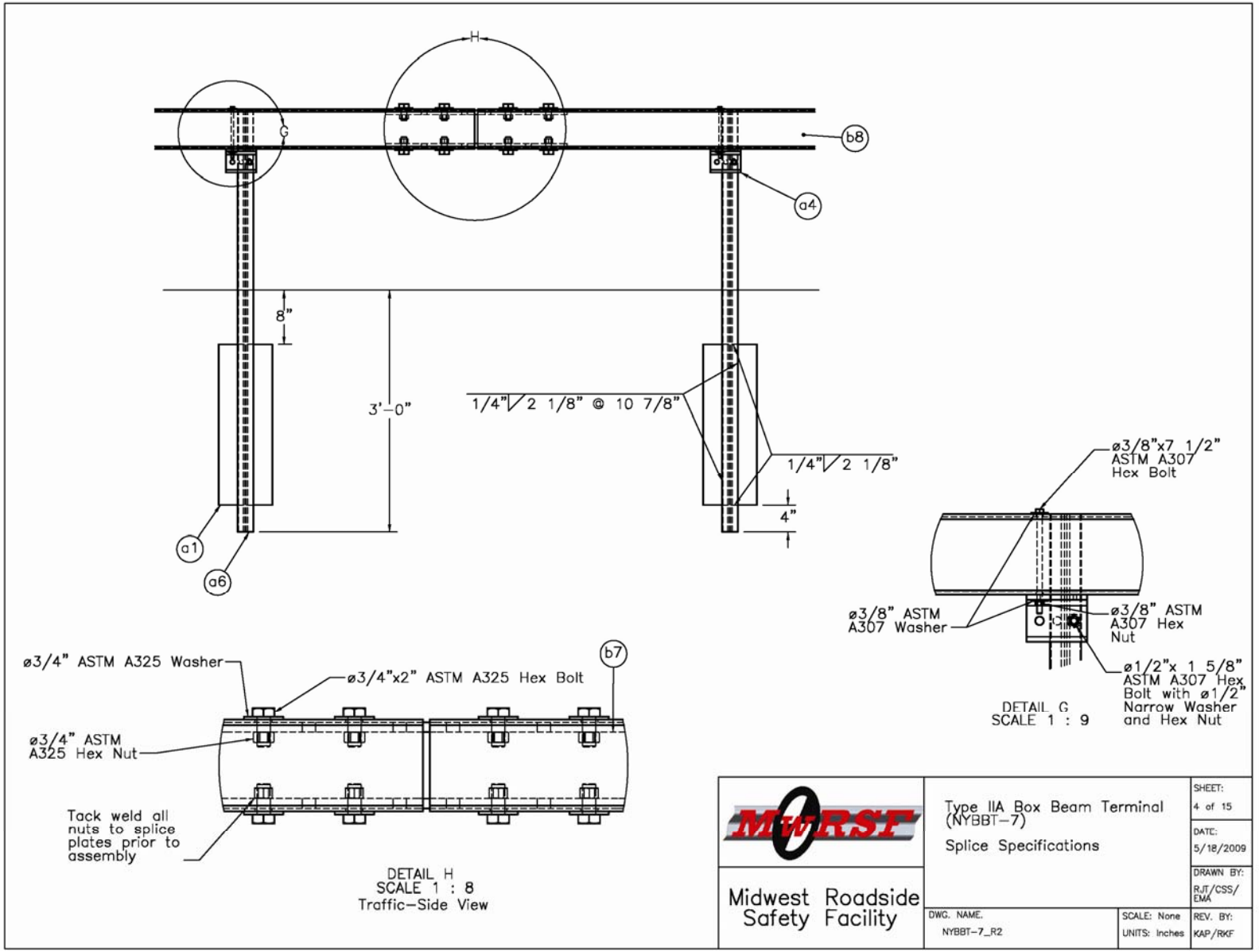


Figure P-19. Modified Type IIA Box Beam Terminal in Ditch System Details (English), Test No. NYBBT-7

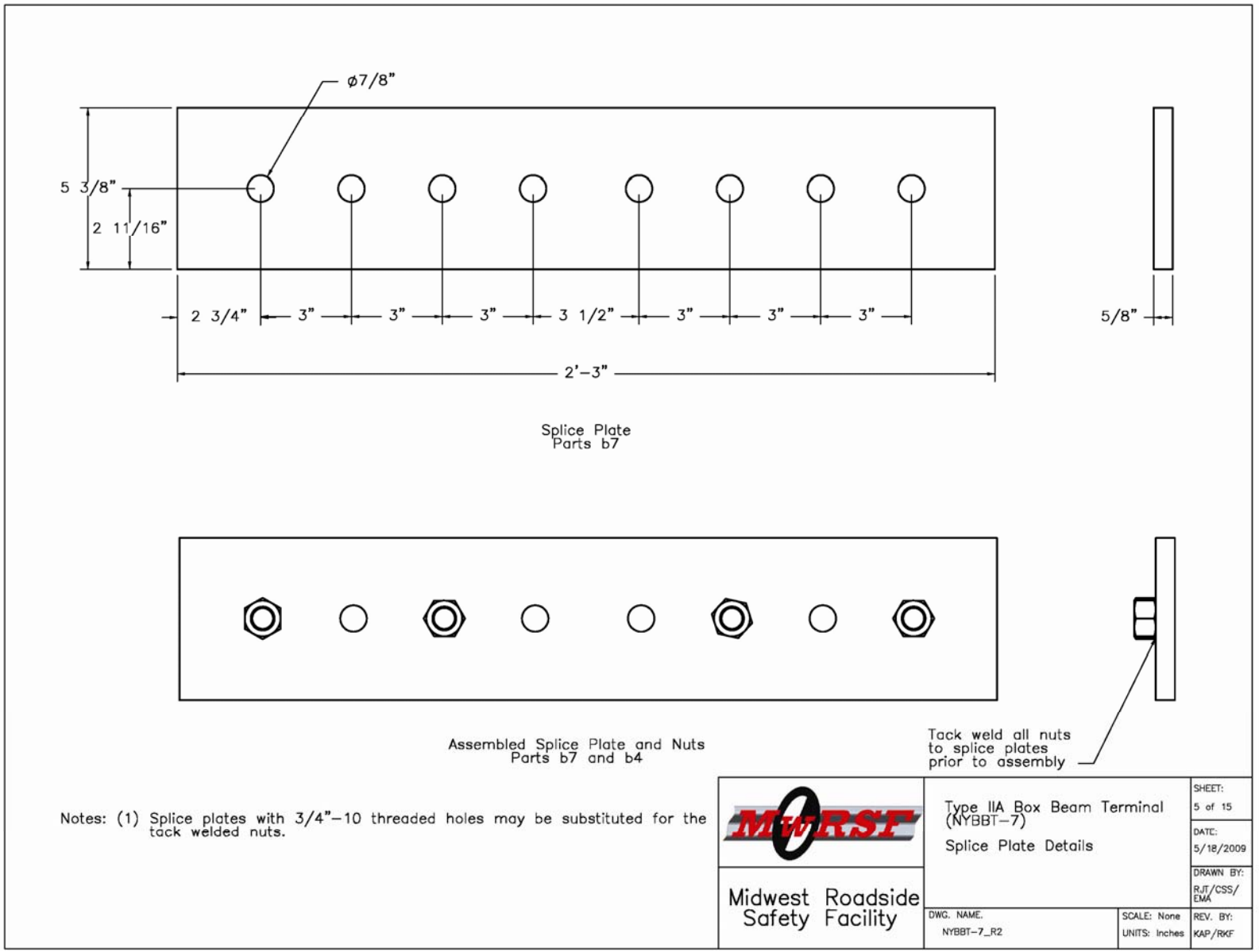


Figure P-20. Modified Type IIA Box Beam Terminal in Ditch System Details (English), Test No. NYBBT-7

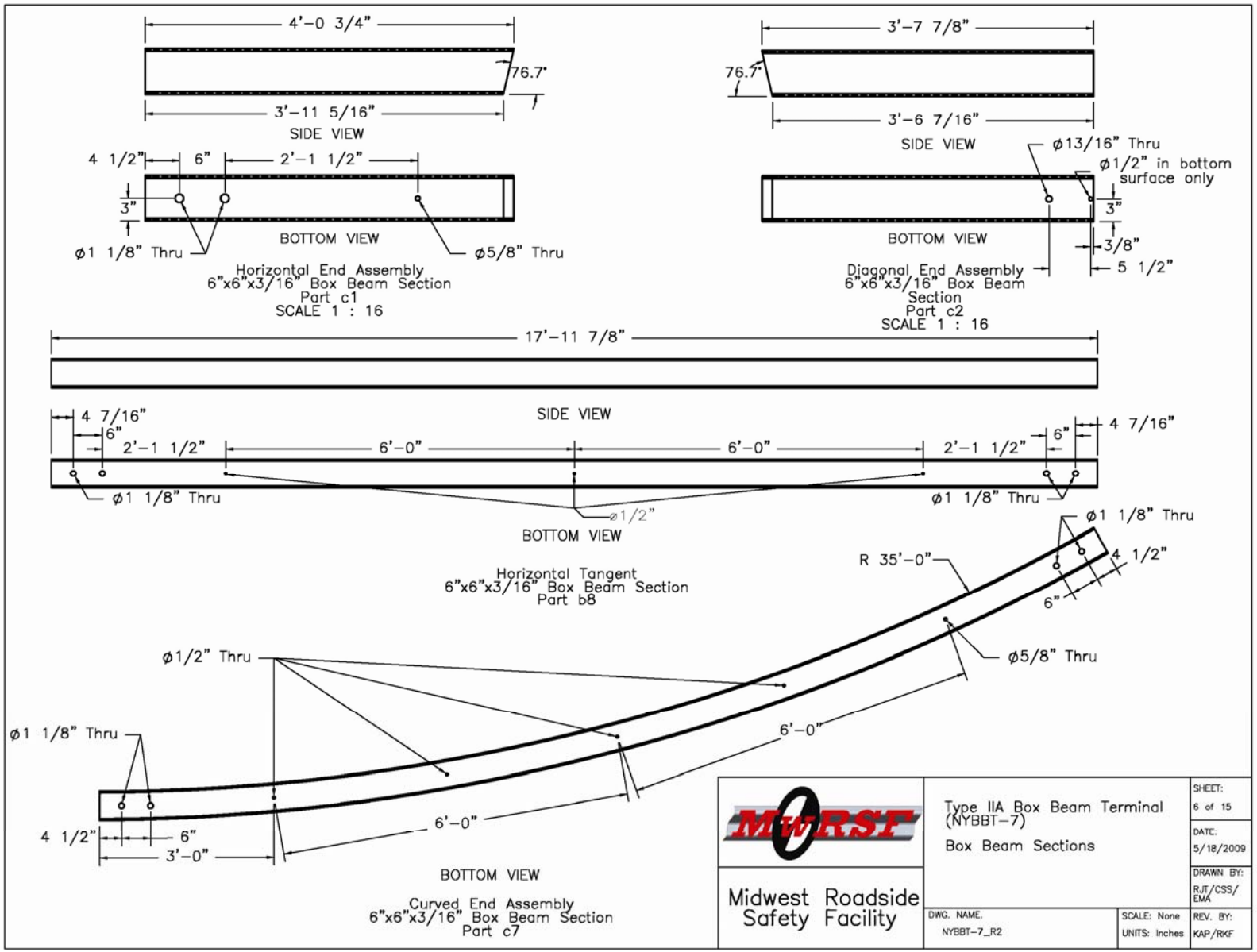


Figure P-21. Modified Type IIA Box Beam Terminal in Ditch System Details (English), Test No. NYBBT-7

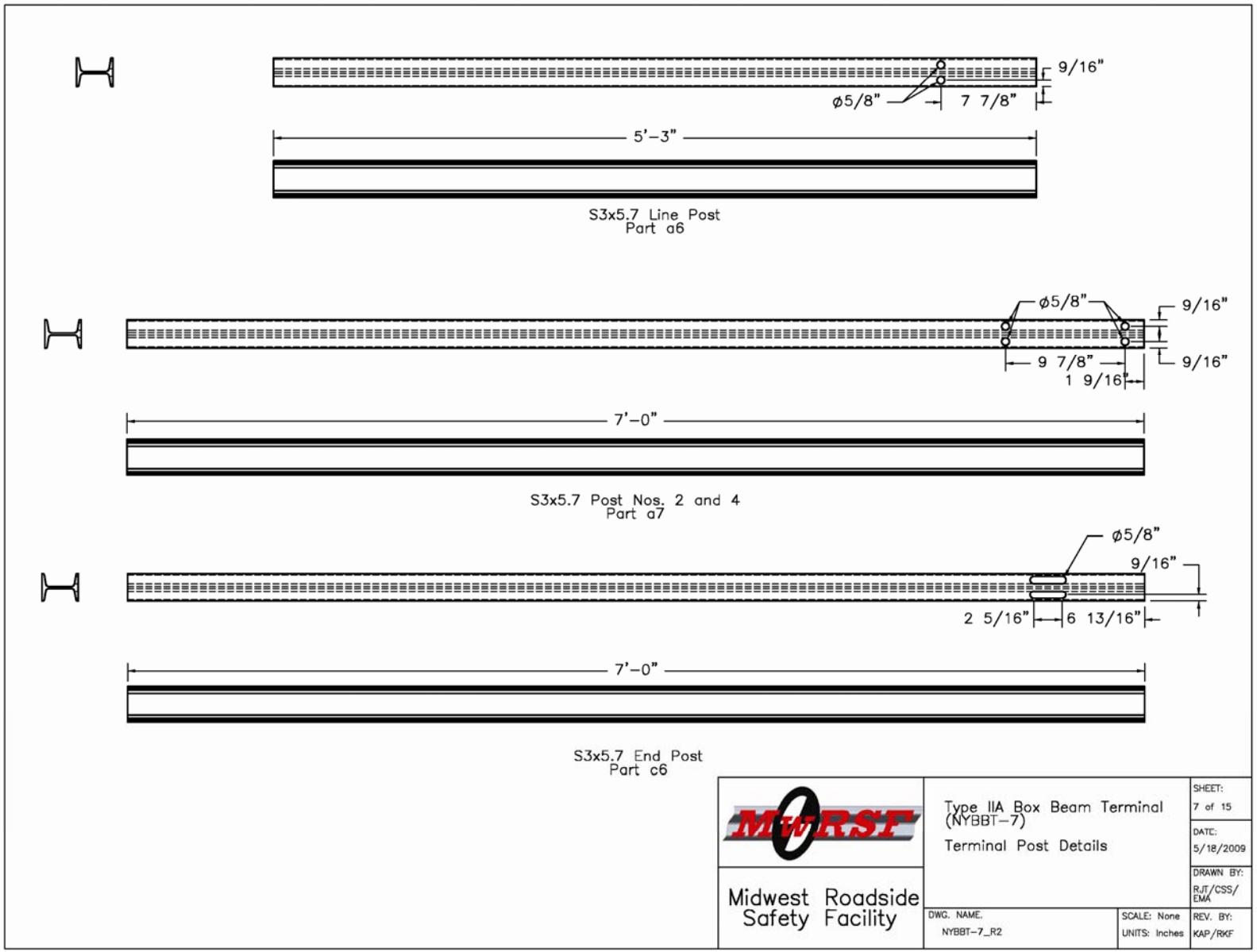


Figure P-22. Modified Type IIA Box Beam Terminal in Ditch System Details (English), Test No. NYBBT-7

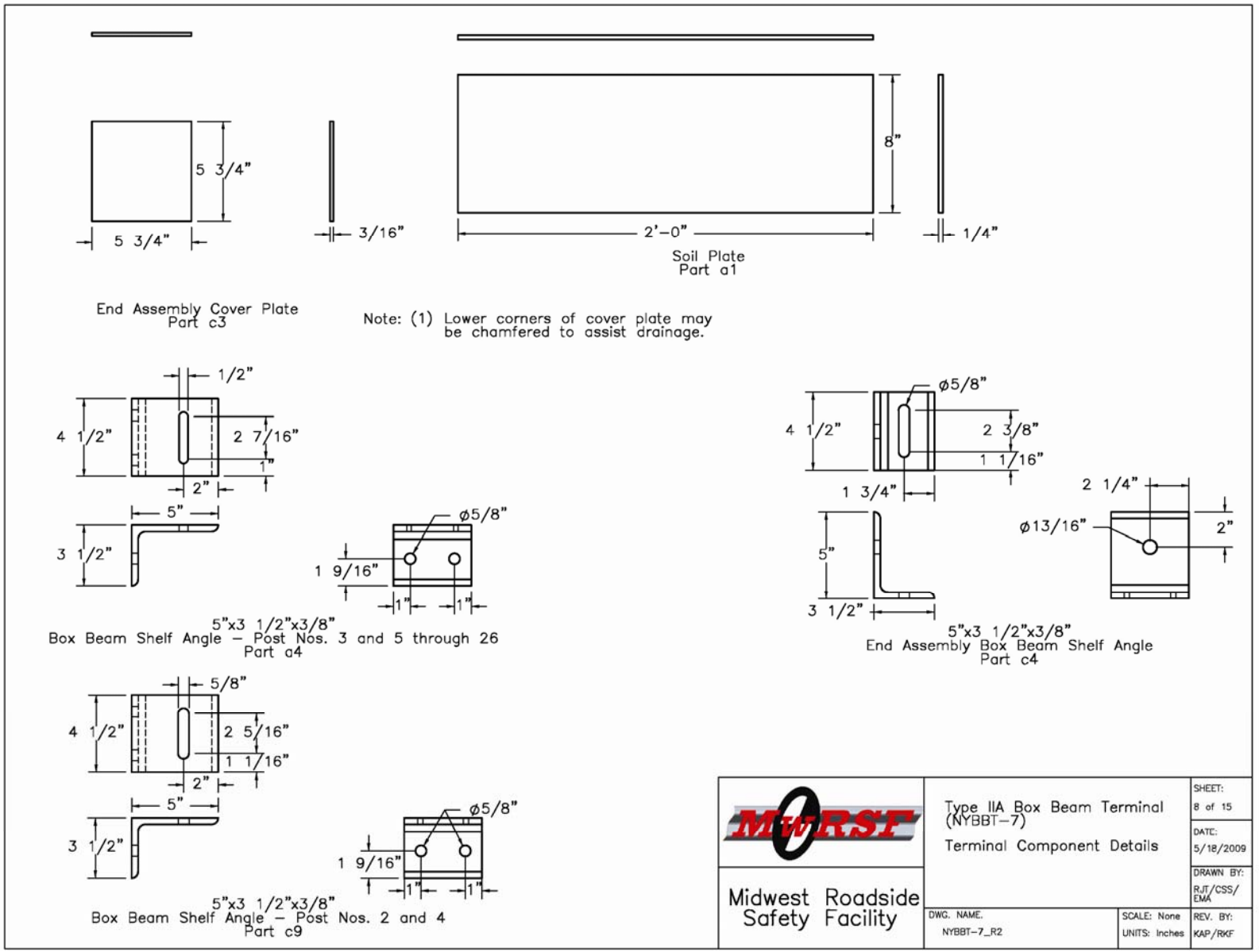


Figure P-23. Modified Type IIA Box Beam Terminal in Ditch System Details (English), Test No. NYBBT-7

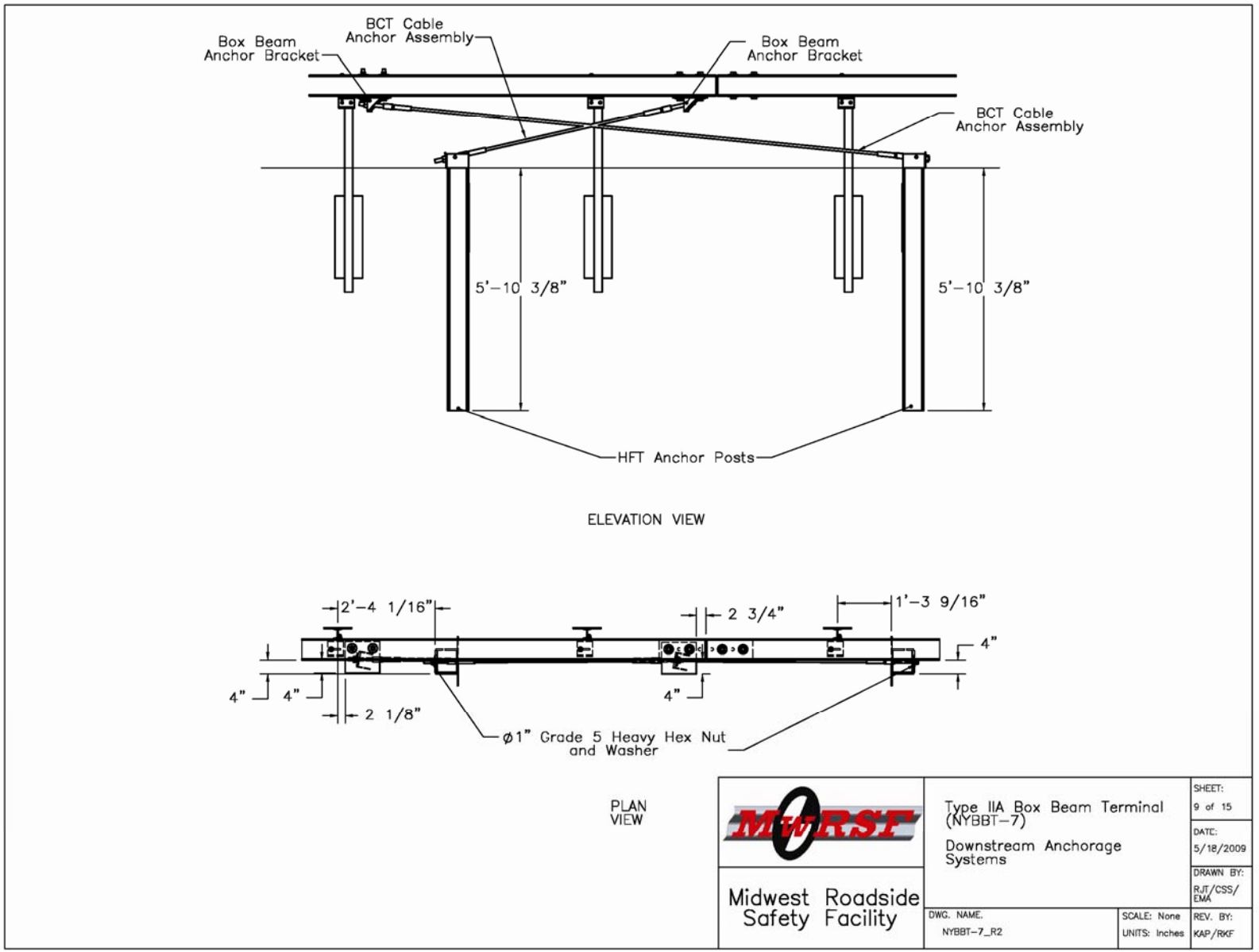


Figure P-24. Modified Type IIA Box Beam Terminal in Ditch System Details (English), Test No. NYBBT-7

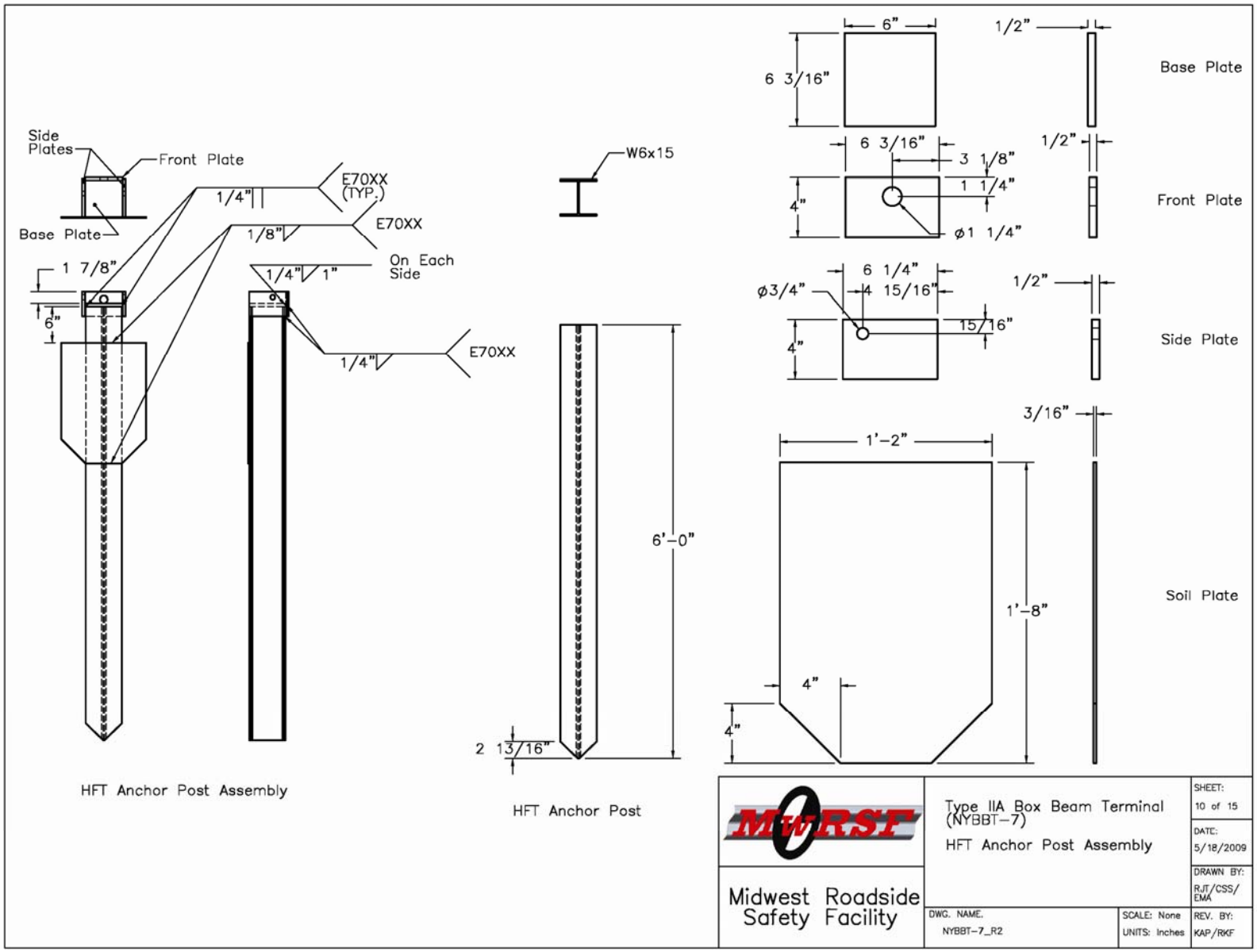


Figure P-25. Modified Type IIA Box Beam Terminal in Ditch System Details (English), Test No. NYBBT-7

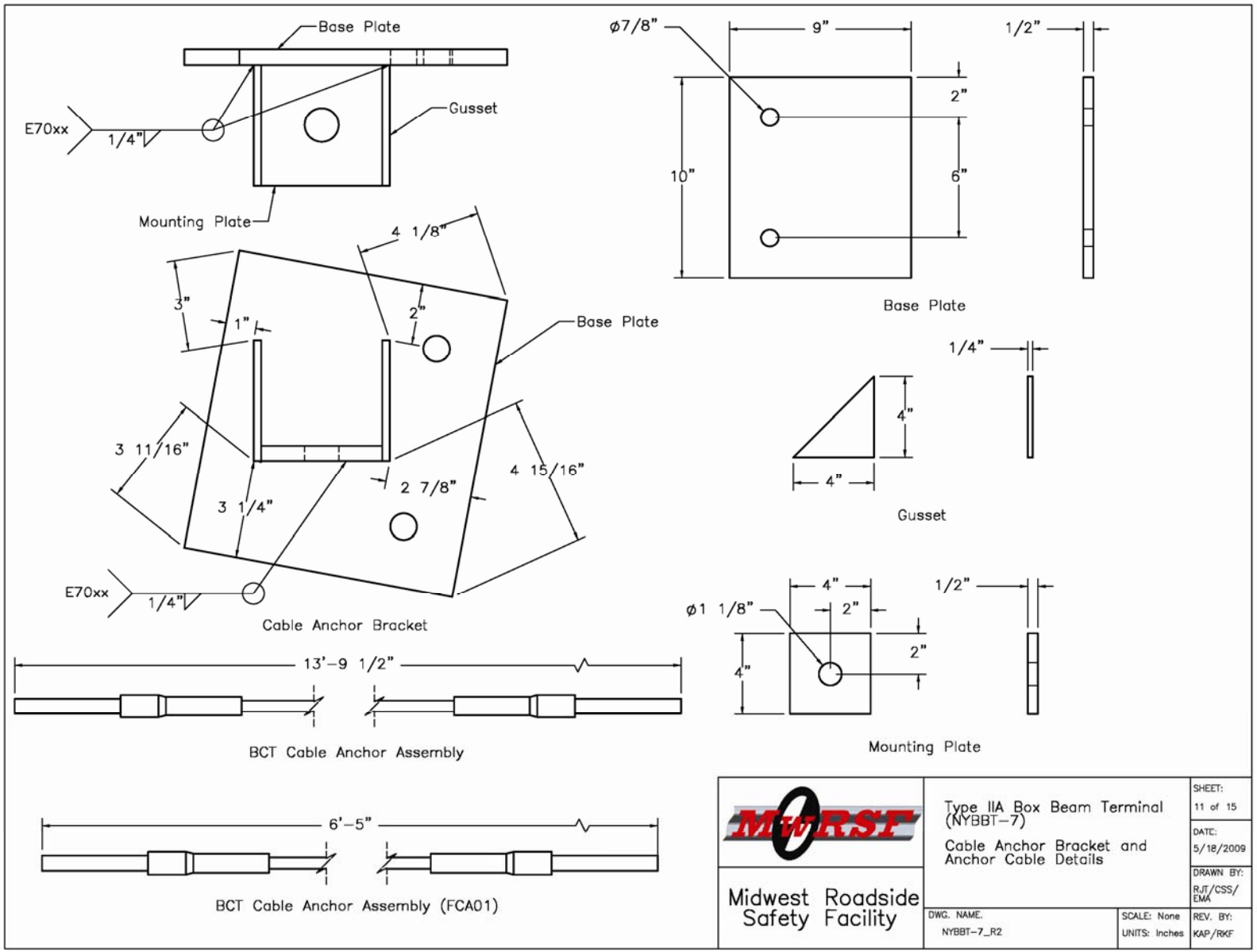
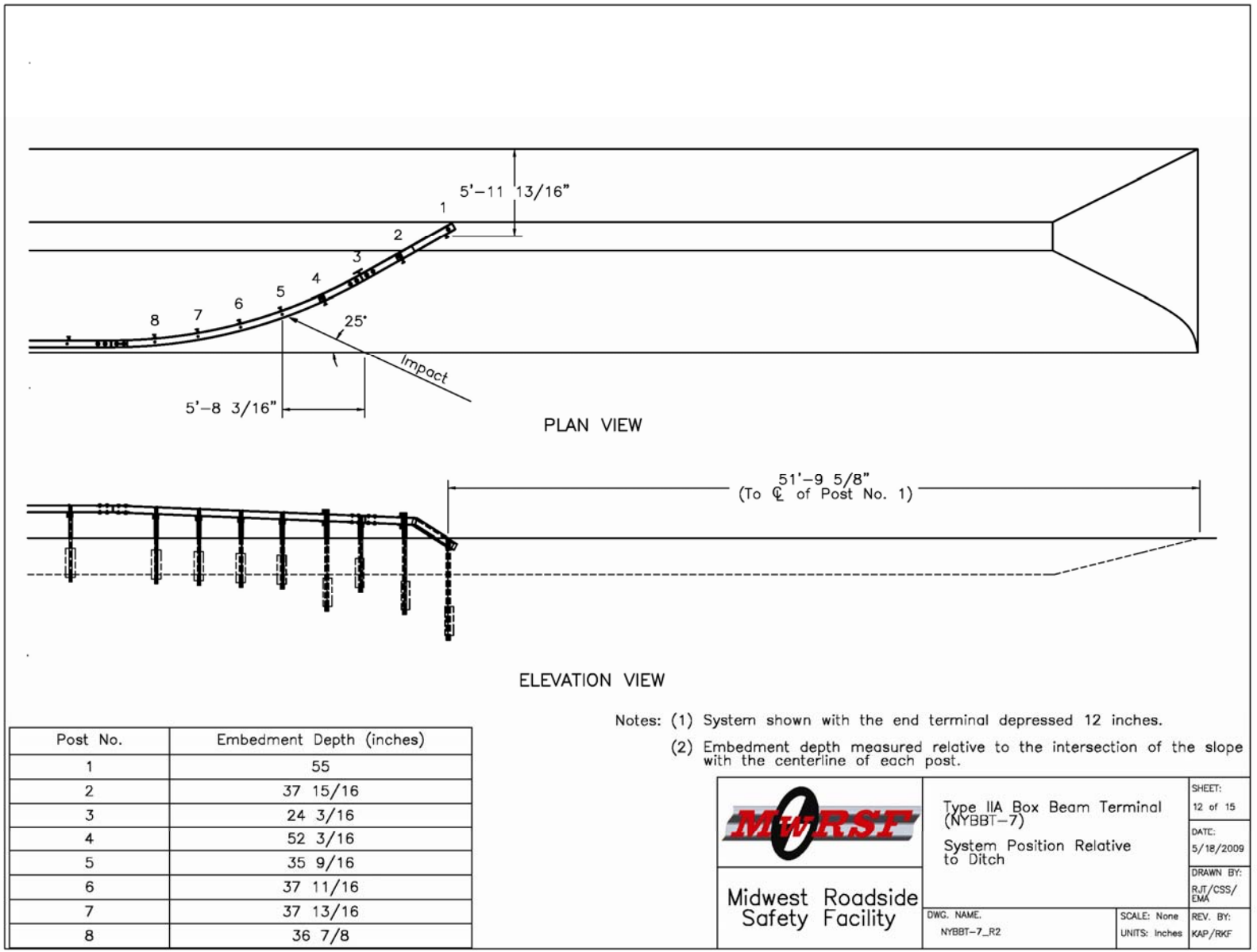


Figure P-26. Modified Type IIA Box Beam Terminal in Ditch System Details (English), Test No. NYBBT-7



Post No.	Embedment Depth (inches)
1	55
2	37 15/16
3	24 3/16
4	52 3/16
5	35 9/16
6	37 11/16
7	37 13/16
8	36 7/8

Figure P-27. Modified Type IIA Box Beam Terminal in Ditch System Details (English), Test No. NYBBT-7

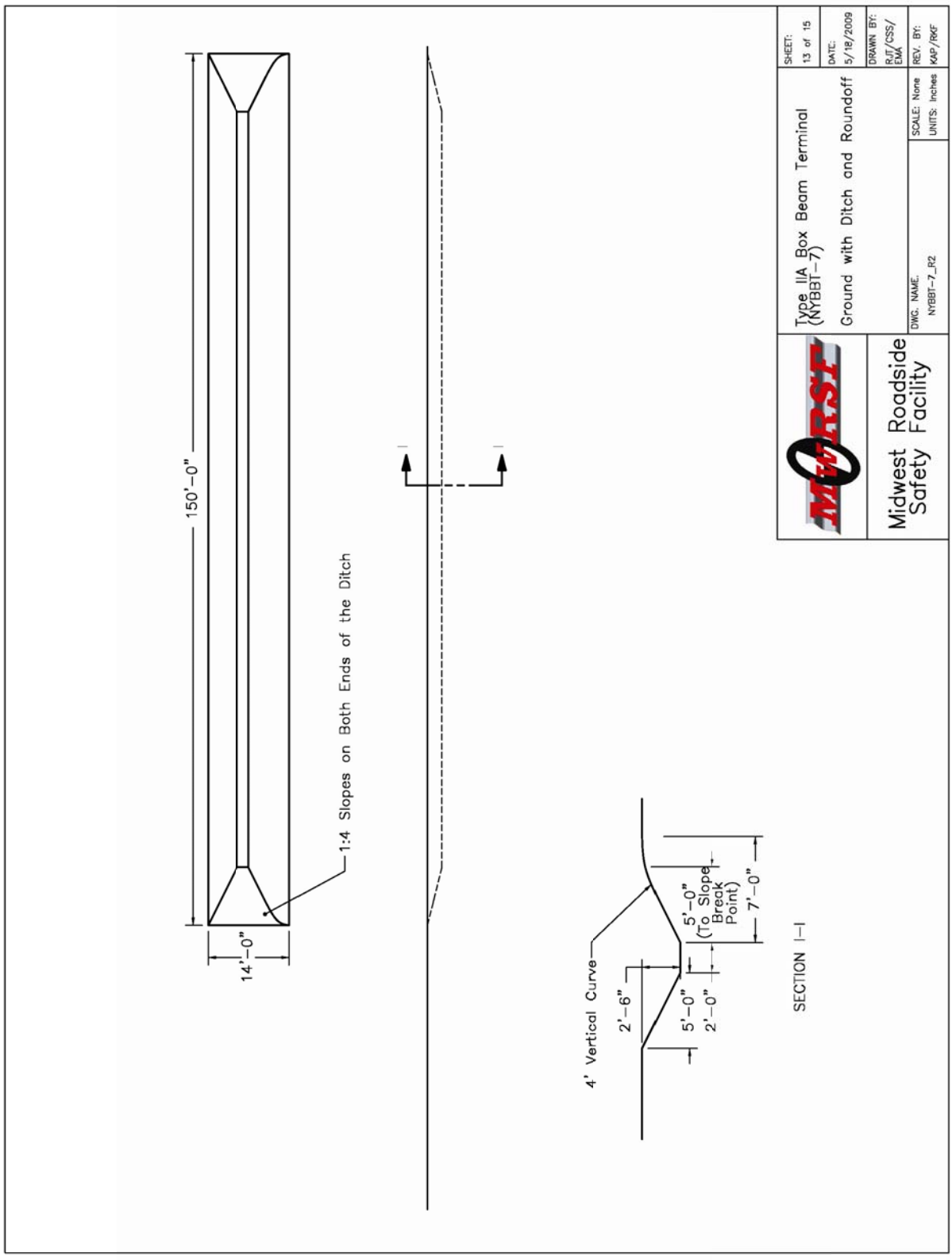


Figure P-28. Modified Type IIA Box Beam Terminal in Ditch System Details (English), Test No. NYBBT-7

NYBBT–7			
Item No.	QTY.	Description	Material Specifications
a1	26	1/4" x 8" x 2' steel soil plate	A36 Steel
a2	29	ø 1/2" coarse thread 1 5/8" long hex bolt	ASTM A307
a3	31	ø 1/2" hex nut	ASTM A307
a4	23	5" x 3 1/2" x 3/8" box beam shelf angle	A36 Steel
a5	31	ø 1/2" narrow washer	ASTM A307
a6	23	S3 x 5.7 63" long post	A36 Steel
a7	2	S3 x 5.7 84" long post	A36 Steel
b1	22	ø 3/8" coarse thread 7 1/2" long hex bolt	ASTM A307
b2	22	ø 3/8" hex nut	ASTM A307
b3	44	ø 3/8" wide washer	ASTM A307
b4	59	ø 3/4" hex nut	ASTM A325
b5	61	ø 3/4" wide washer	ASTM A325
b6	56	ø 3/4" coarse thread 2" long hex bolt	ASTM A307
b7	14	27" x 5 3/8" x 5/8" splice plate	A36 Steel
b8	6	6" x 6" x 3/16" by 17'–11 7/8" long box beam	ASTM A500 Grade B
c1	1	End assembly horizontal 6" x 6" x 3/16" box beam	ASTM A500 Grade B
c2	1	End assembly diagonal 6" x 6" x 3/16" box beam	ASTM A500 Grade B
c3	1	End assembly 3/16" thick cover plate	A36 Steel
c4	1	5" x 3 1/2" x 3/8" box beam anchor post shelf angle	A36 Steel
c5	1	ø 3/4" coarse thread 7 3/4" long hex bolt	ASTM A307
c6	1	S3 x 5.7 84" long post anchor post	A36 Steel
c7	1	6"x6"x3/16" R 35' Curved Box Beam	ASTM A500 Grade B
c8	2	ø 1/2" coarse thread 8" long hex bolt	ASTM A307
c9	4	127 x 89 x 10mm box beam shelf angle with ø16mm slot	A36 Steel
c10	4	ø 1/2" wide washer	ASTM A307

Midwest Roadside Safety Facility

Type IIA Box Beam Terminal (NYBBT–7)
Bill of Materials

SHEET: 14 of 15
DATE: 5/18/2009
DRAWN BY: RJT/CSS/EMA
REV. BY: KAP/RKF
DWG. NAME: NYBBT–7_R2
SCALE: None
UNITS: Inches

Figure P-29. Modified Type IIA Box Beam Terminal in Ditch System Details (English), Test No. NYBBT-7

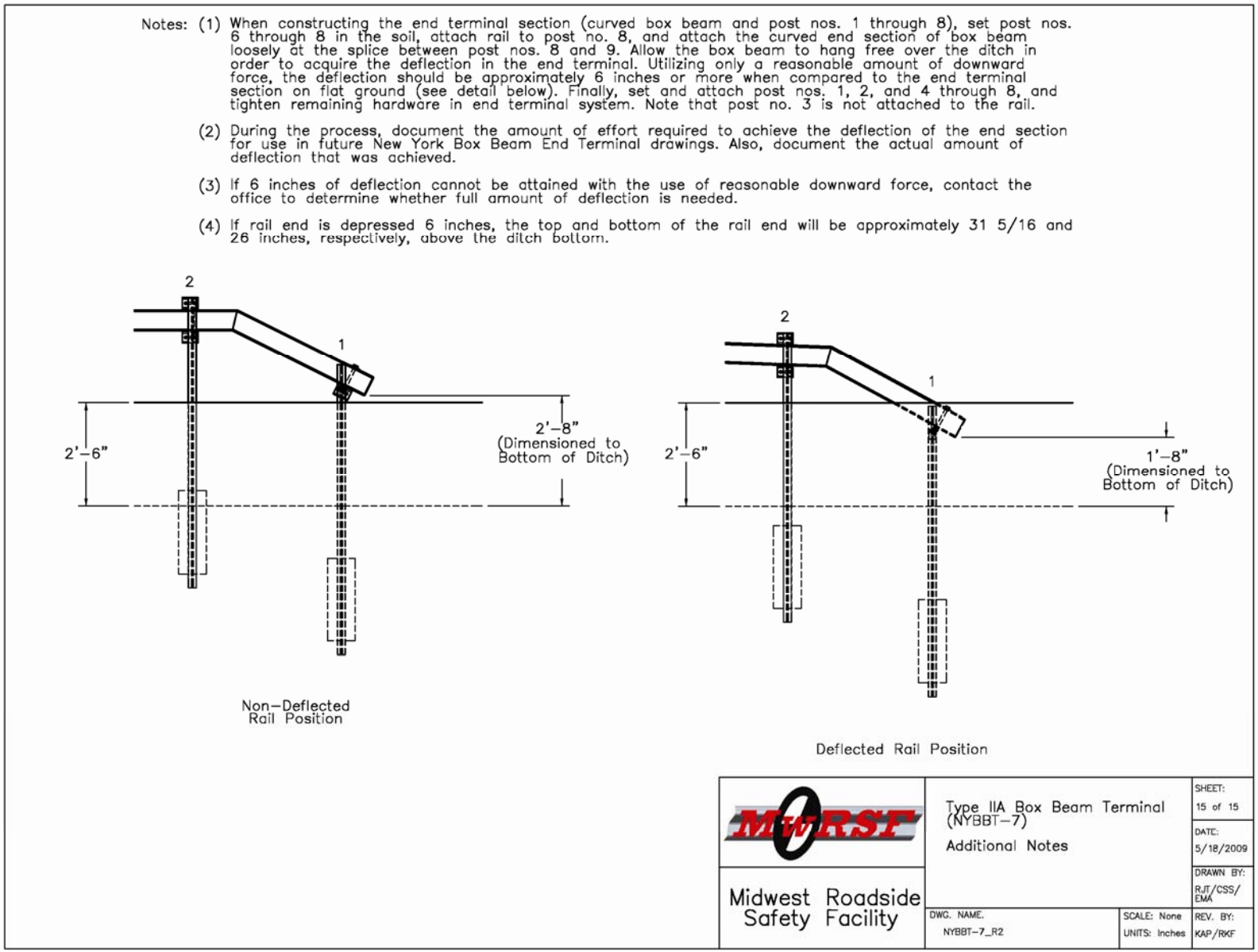


Figure P-30. Modified Type IIA Box Beam Terminal in Ditch System Details (English), Test No. NYBBT-7

APPENDIX Q Accelerometer and Rate Transducer Data Analysis, Test No. NYBBT-6

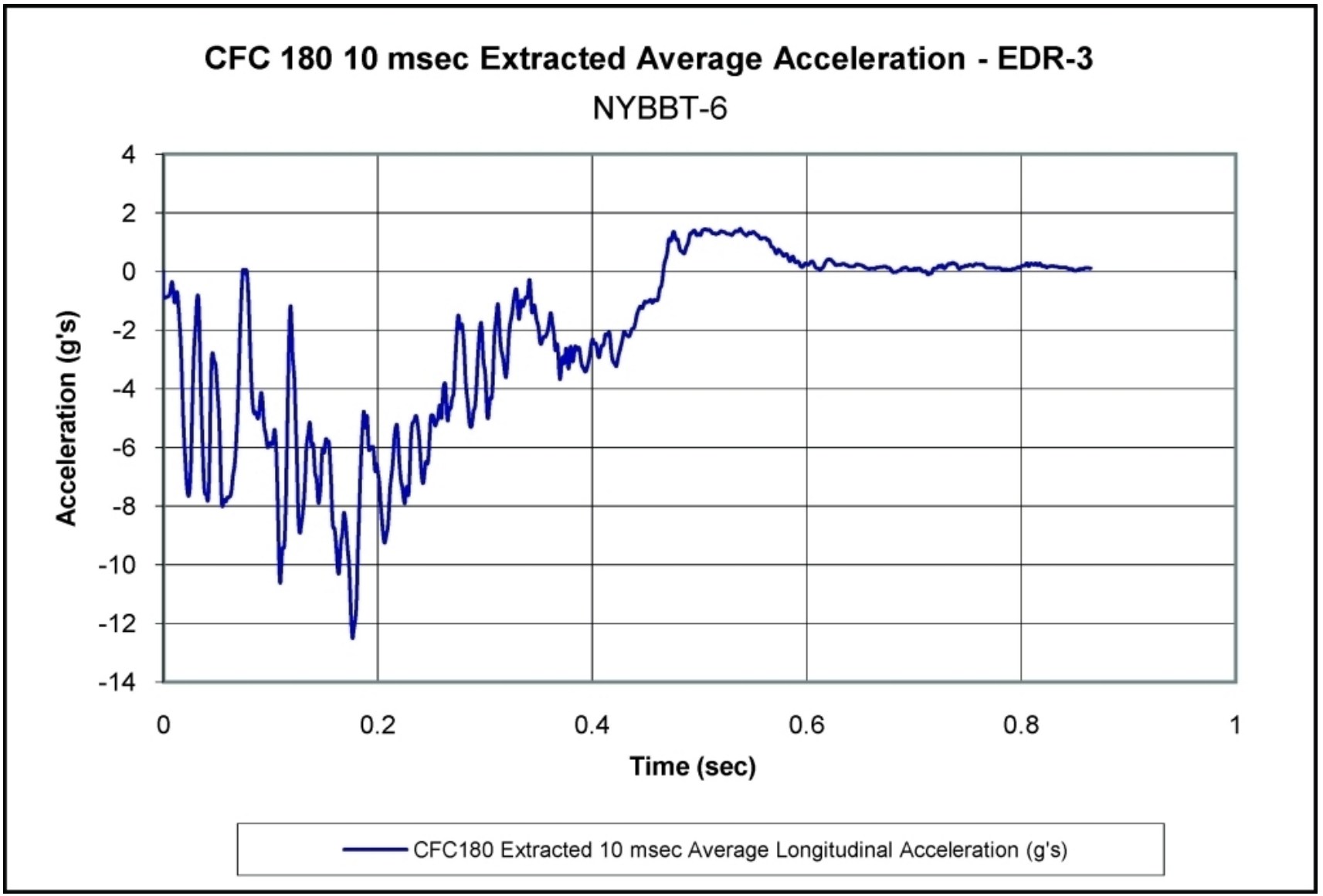


Figure Q-1. Graph of Longitudinal Occupant Deceleration (EDR-3), Test No. NYBBT-6

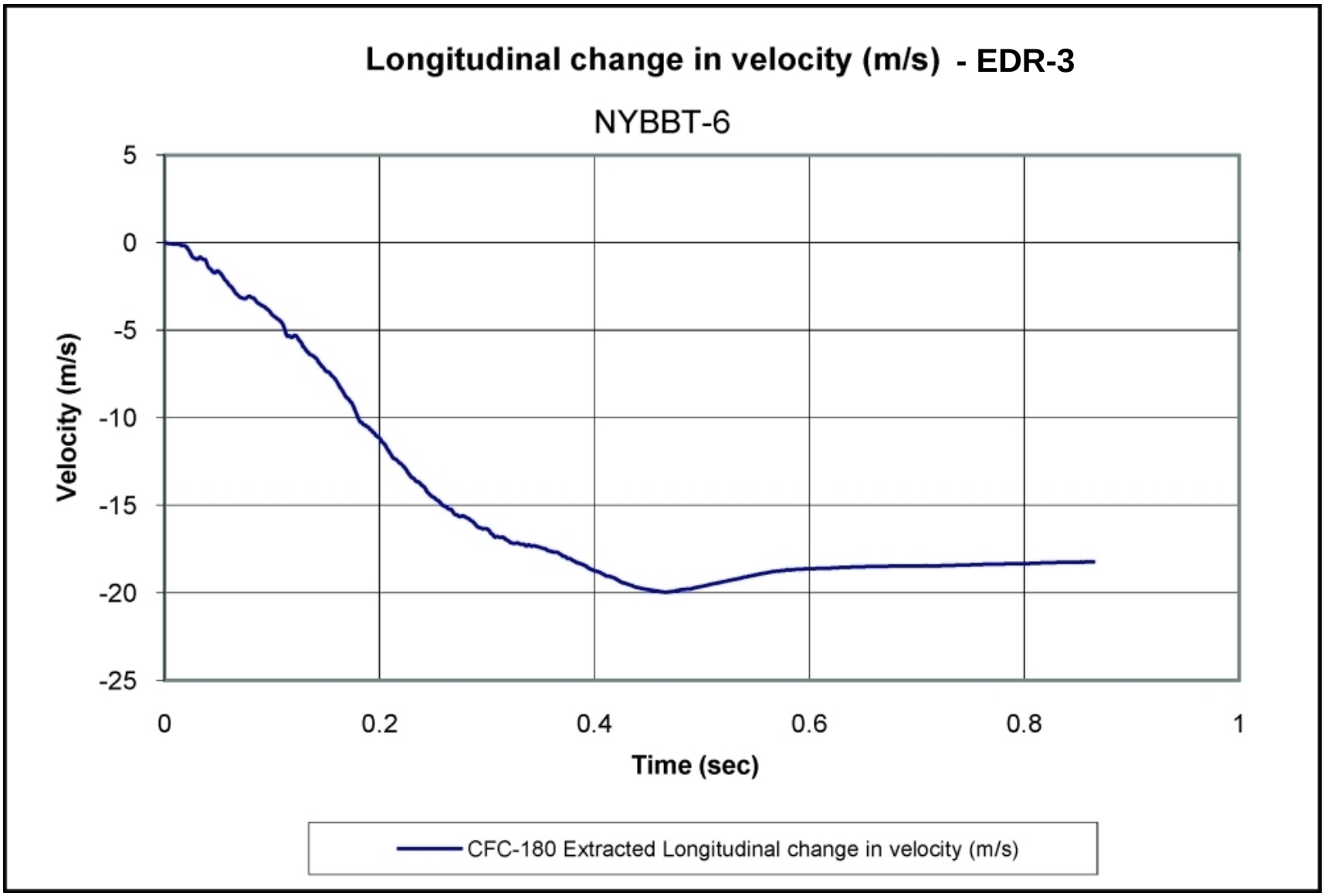


Figure Q-2. Graph of Longitudinal Occupant Impact Velocity (EDR-3), Test No. NYBBT-6

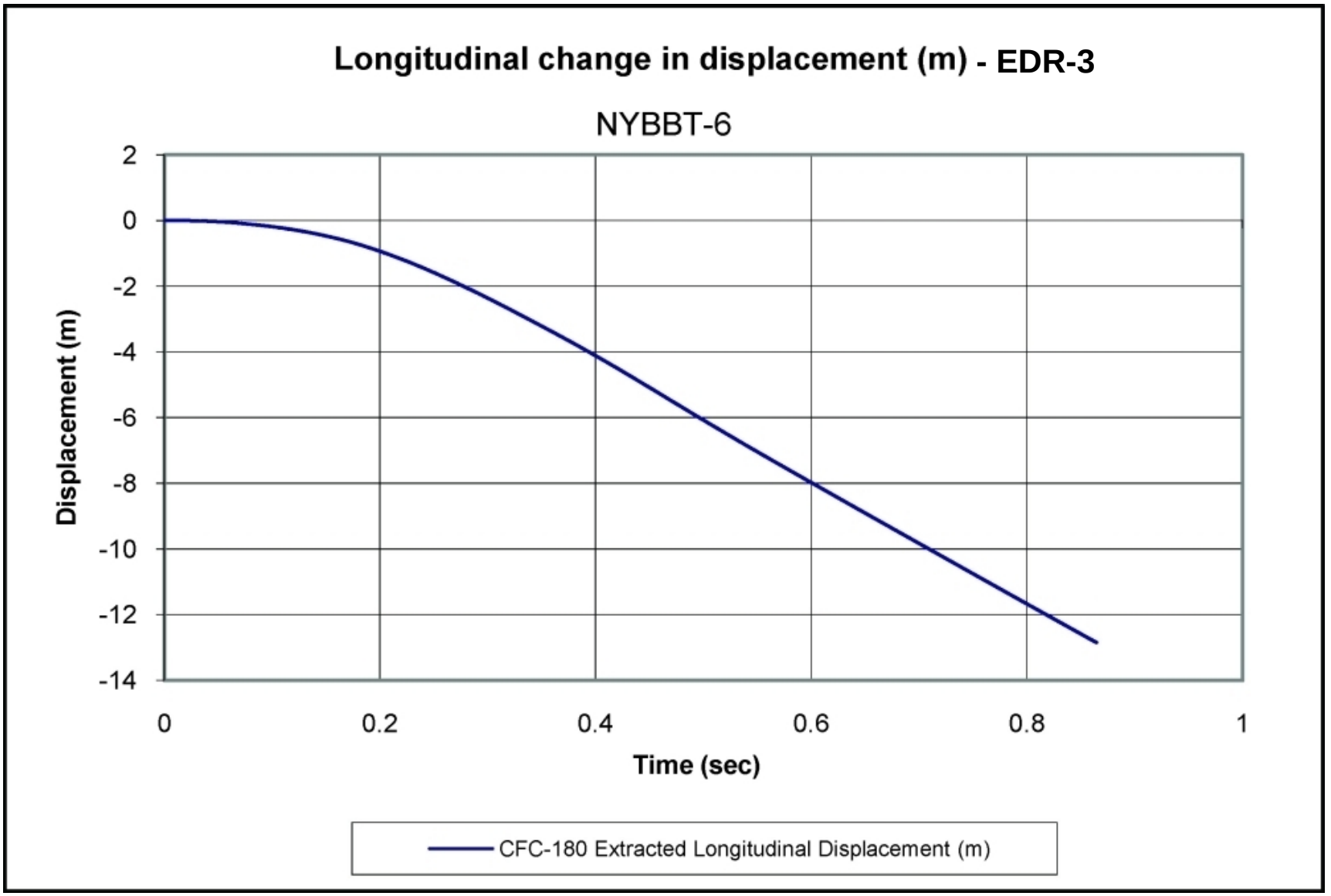


Figure Q-3. Graph of Longitudinal Occupant Displacement (EDR-3), Test No. NYBBT-6

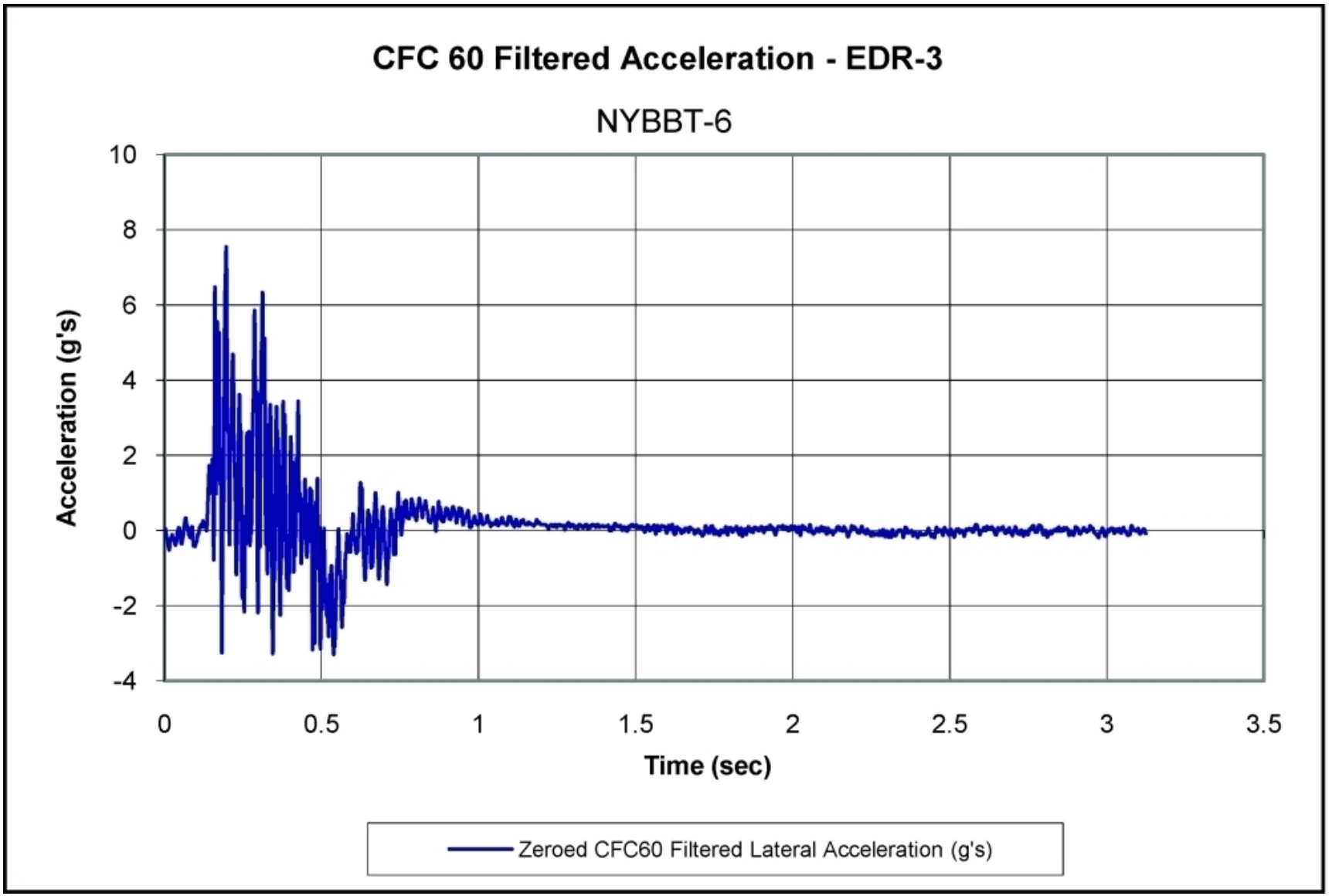


Figure Q-4. Graph of Lateral Occupant Deceleration (EDR-3), Test No. NYBBT-6

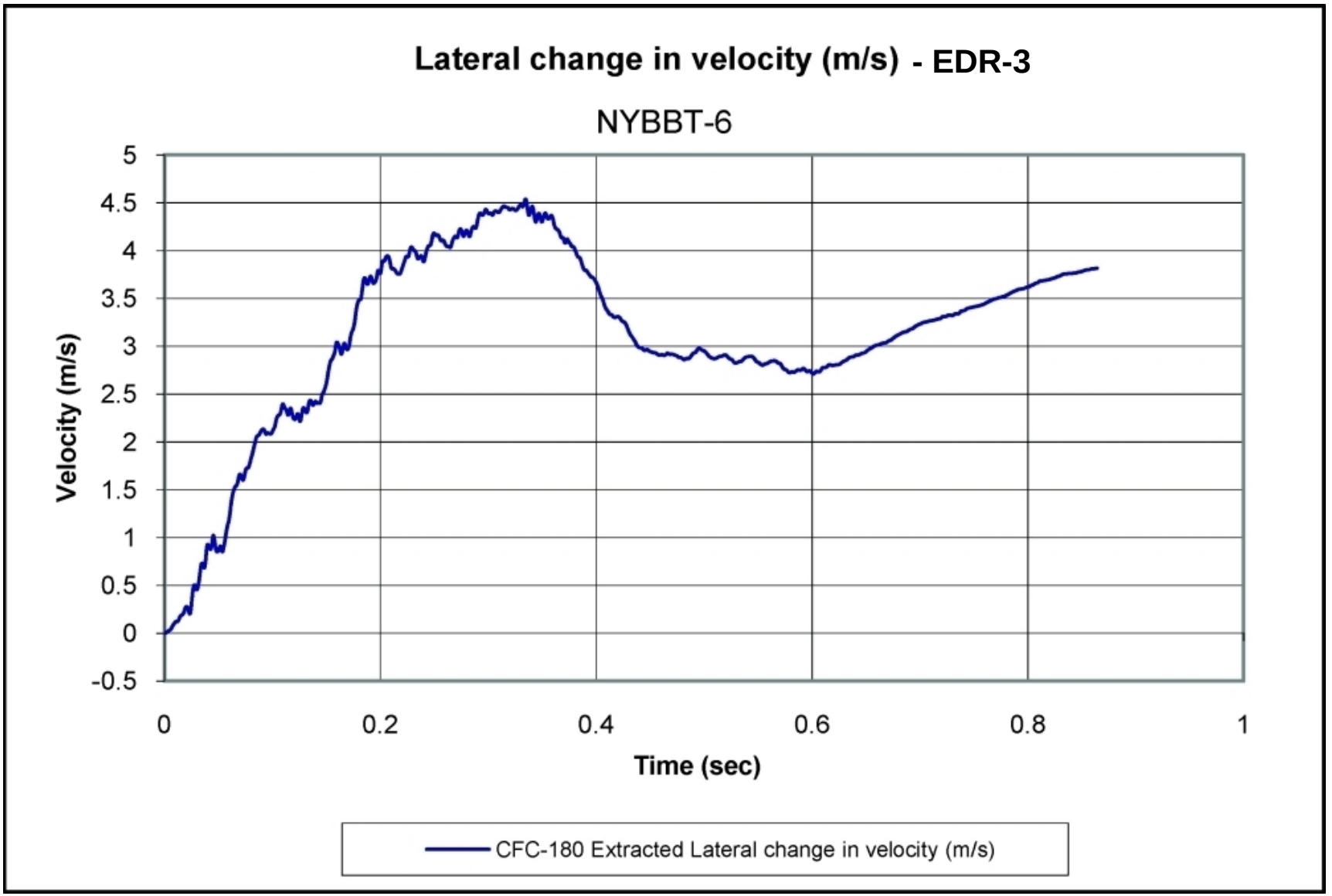


Figure Q-5. Graph of Lateral Occupant Impact Velocity (EDR-3), Test No. NYBBT-6

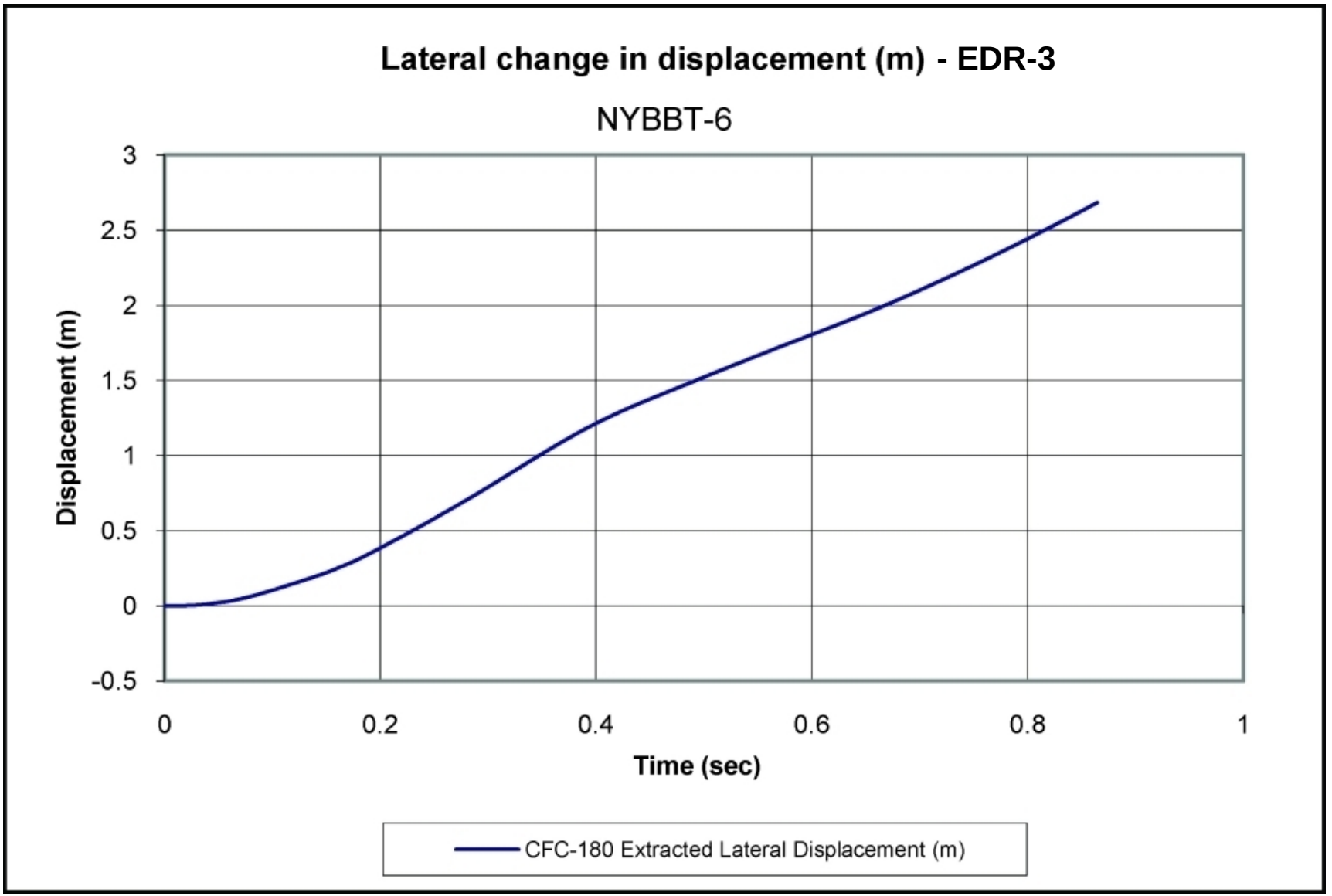


Figure Q-6. Graph of Lateral Occupant Displacement (EDR-3), Test No. NYBBT-6

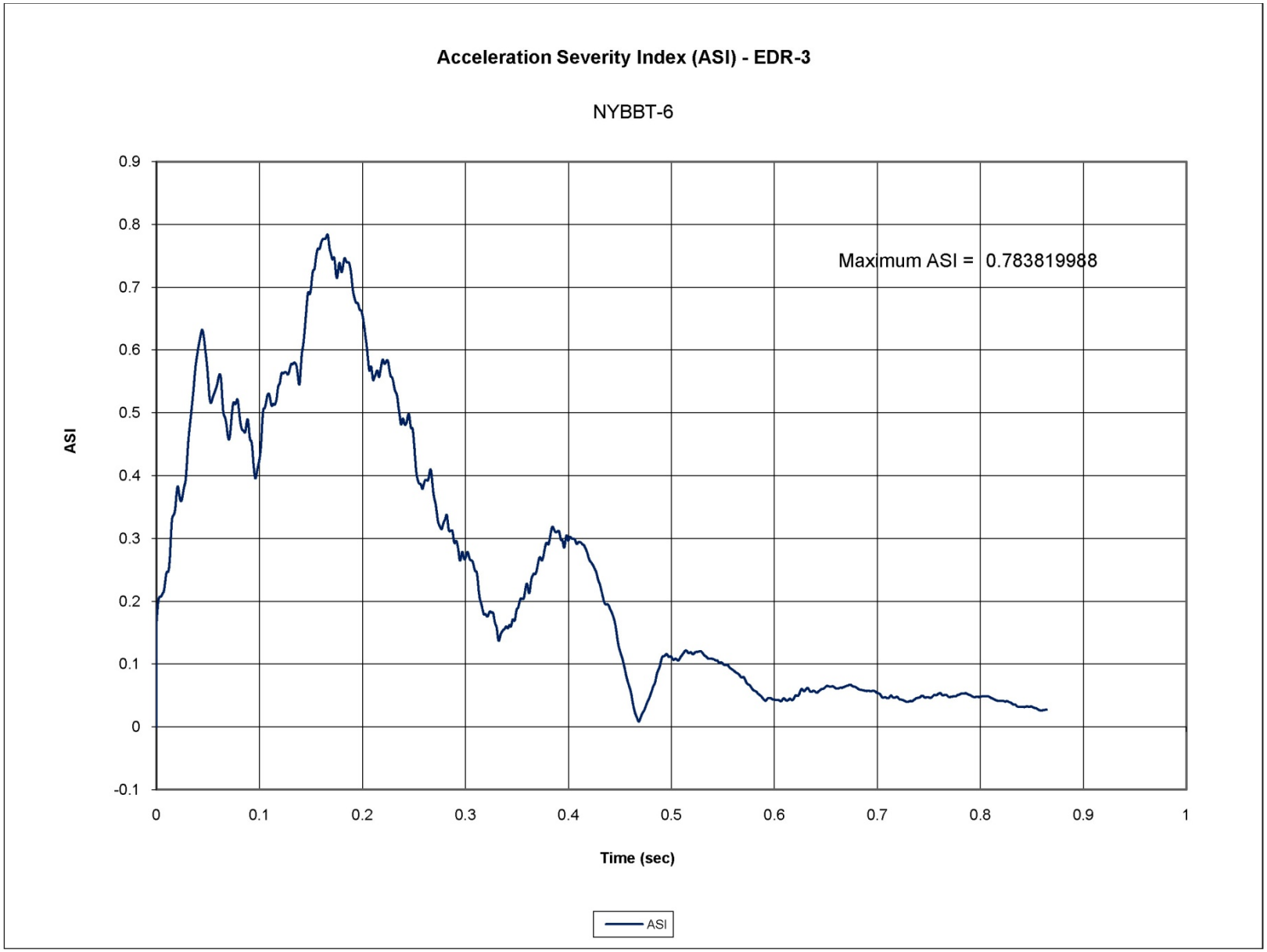


Figure Q-7. Graph of Acceleration Severity Index (EDR-3), Test No. NYBBT-6

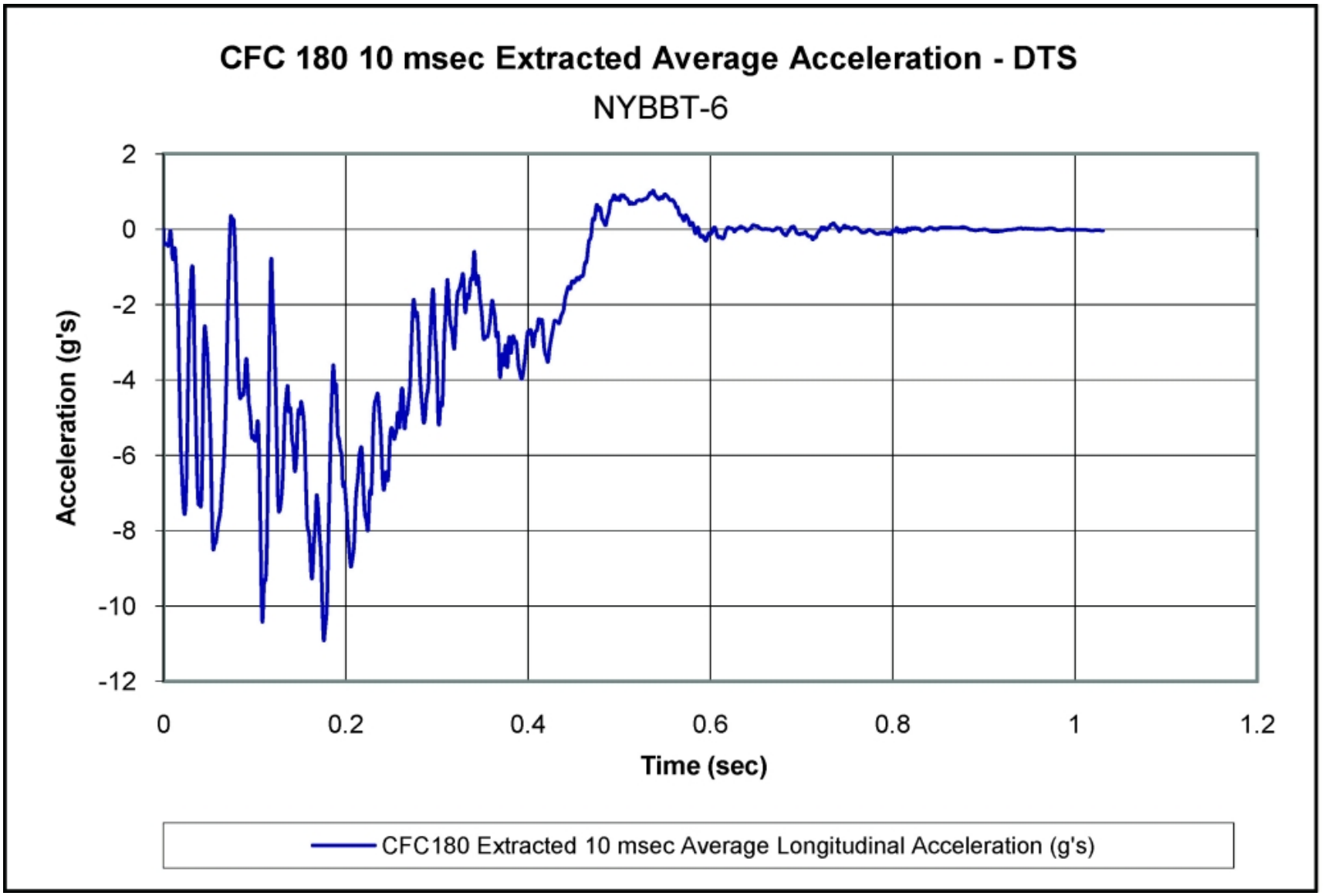


Figure Q-8. Graph of Longitudinal Occupant Deceleration (DTS), Test No. NYBBT-6

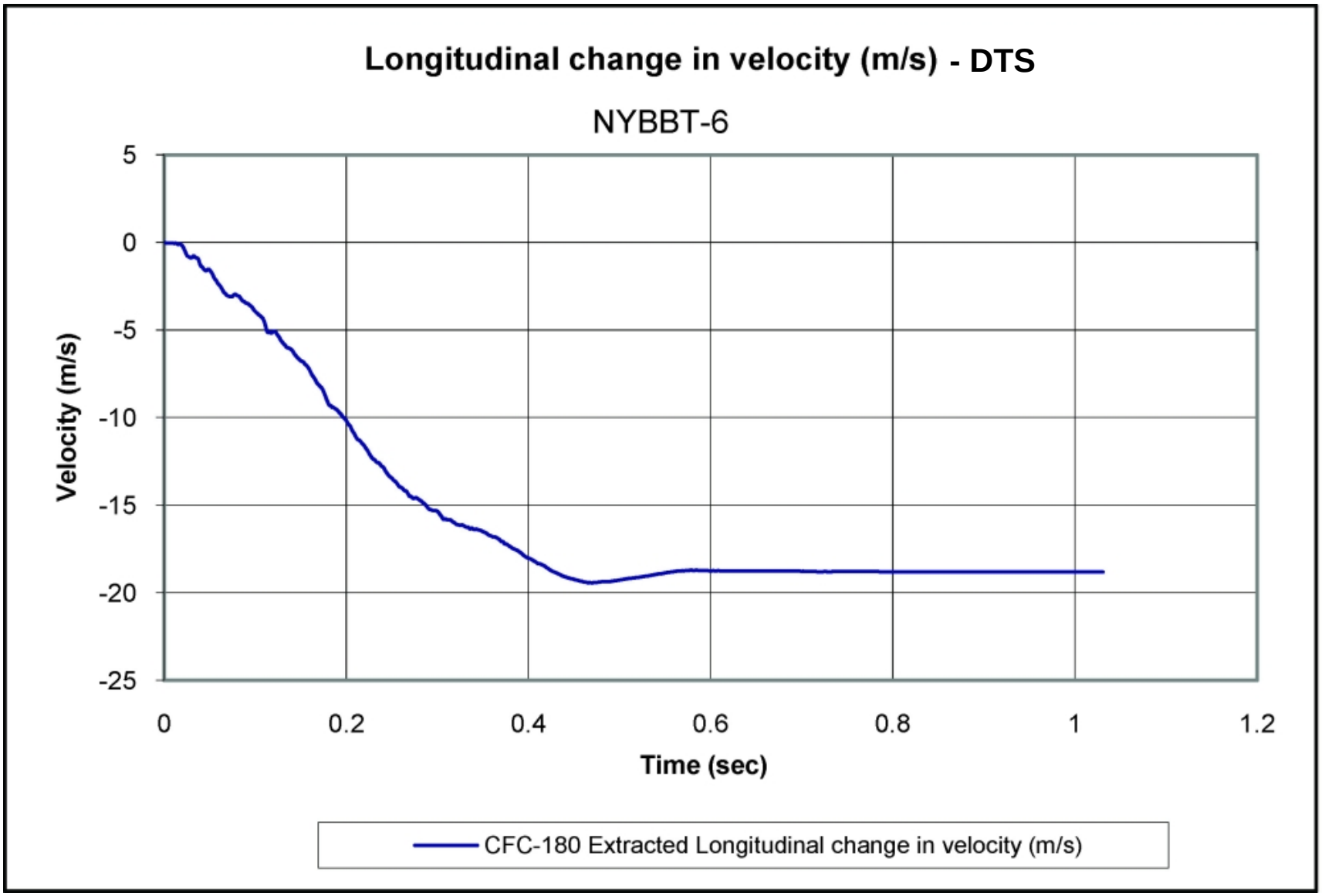


Figure Q-9. Graph of Longitudinal Occupant Impact Velocity (DTS), Test No. NYBBT-6

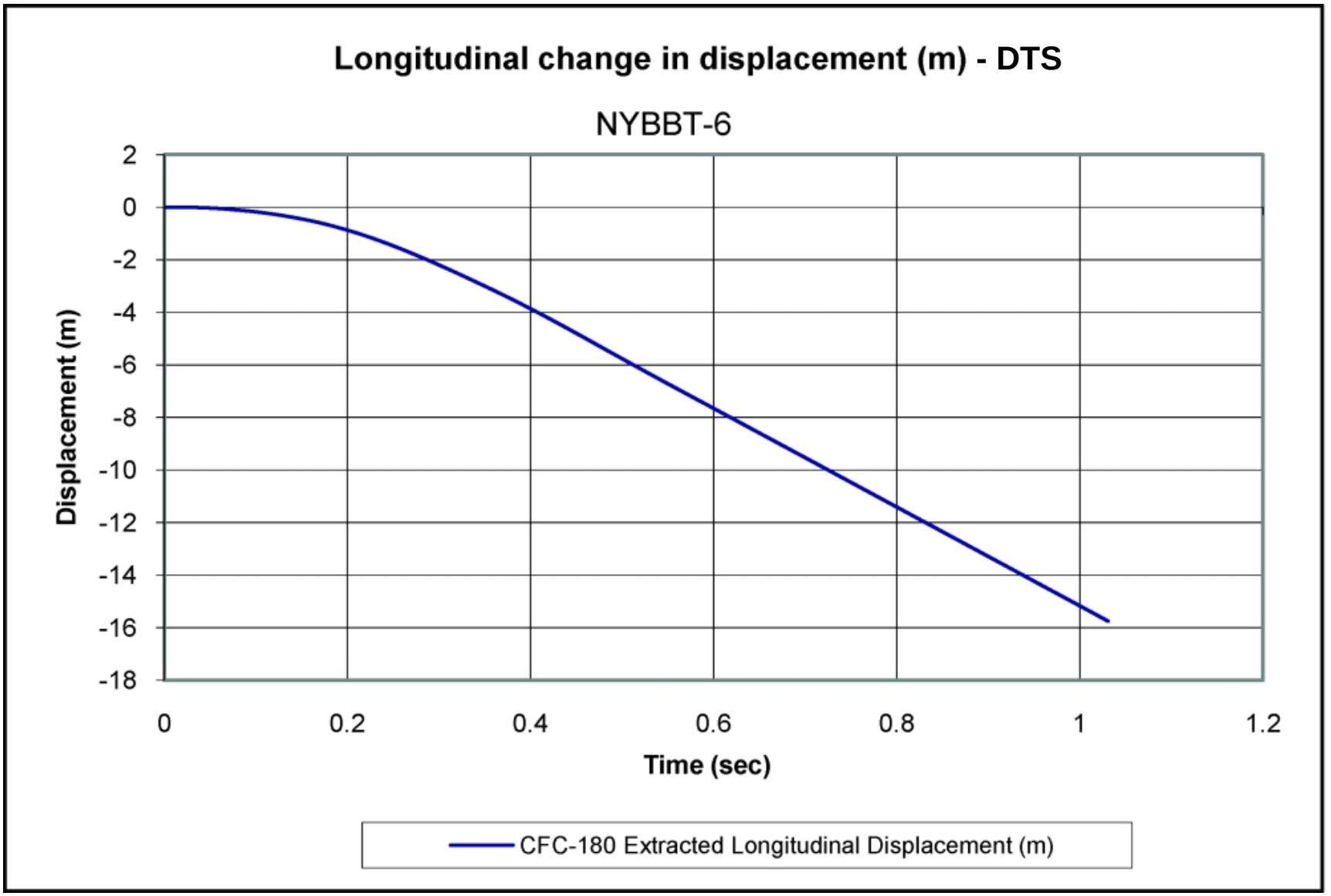


Figure Q-10. Graph of Longitudinal Occupant Displacement (DTS), Test No. NYBBT-6

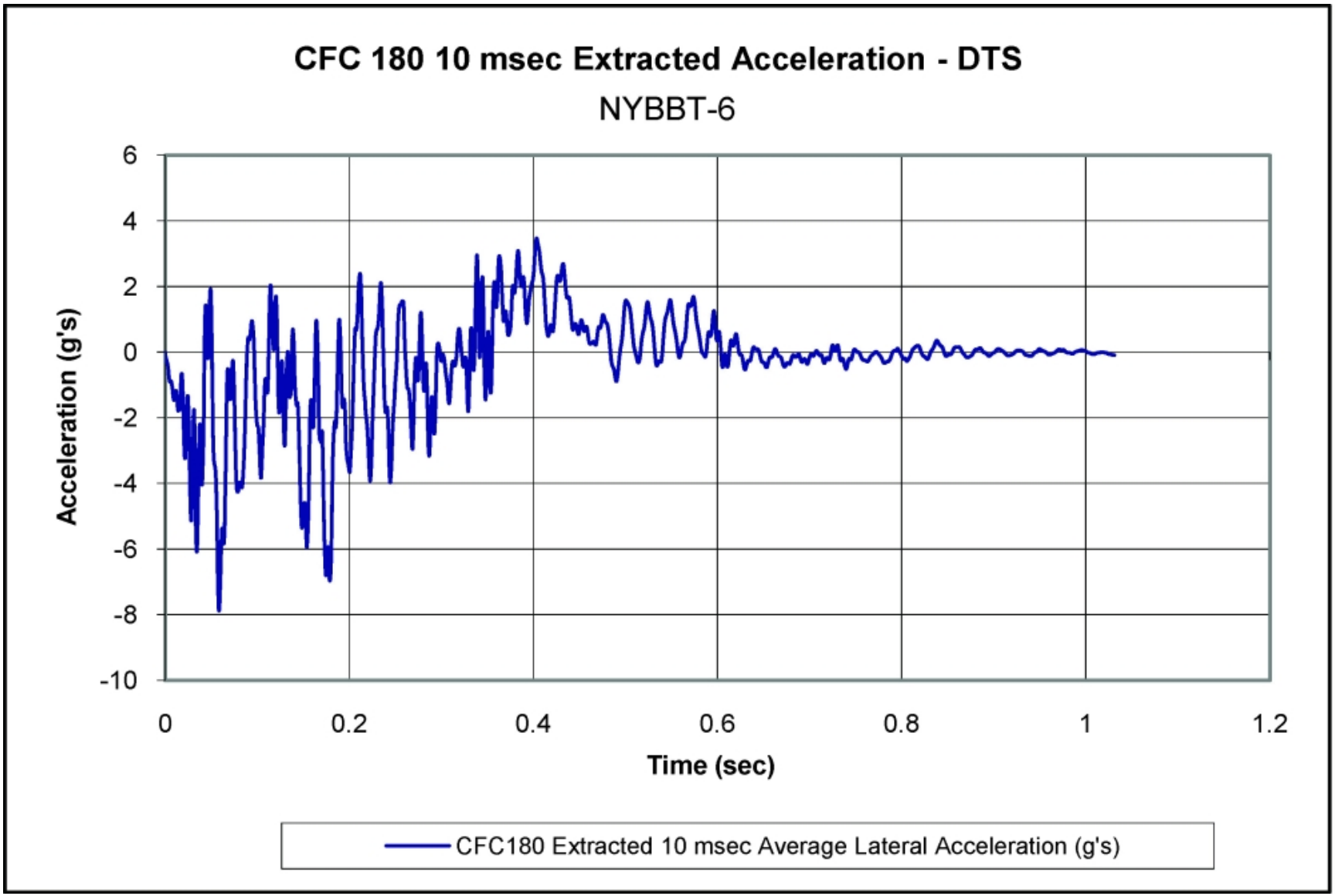


Figure Q-11. Graph of Lateral Occupant Deceleration (DTS), Test No. NYBBT-6

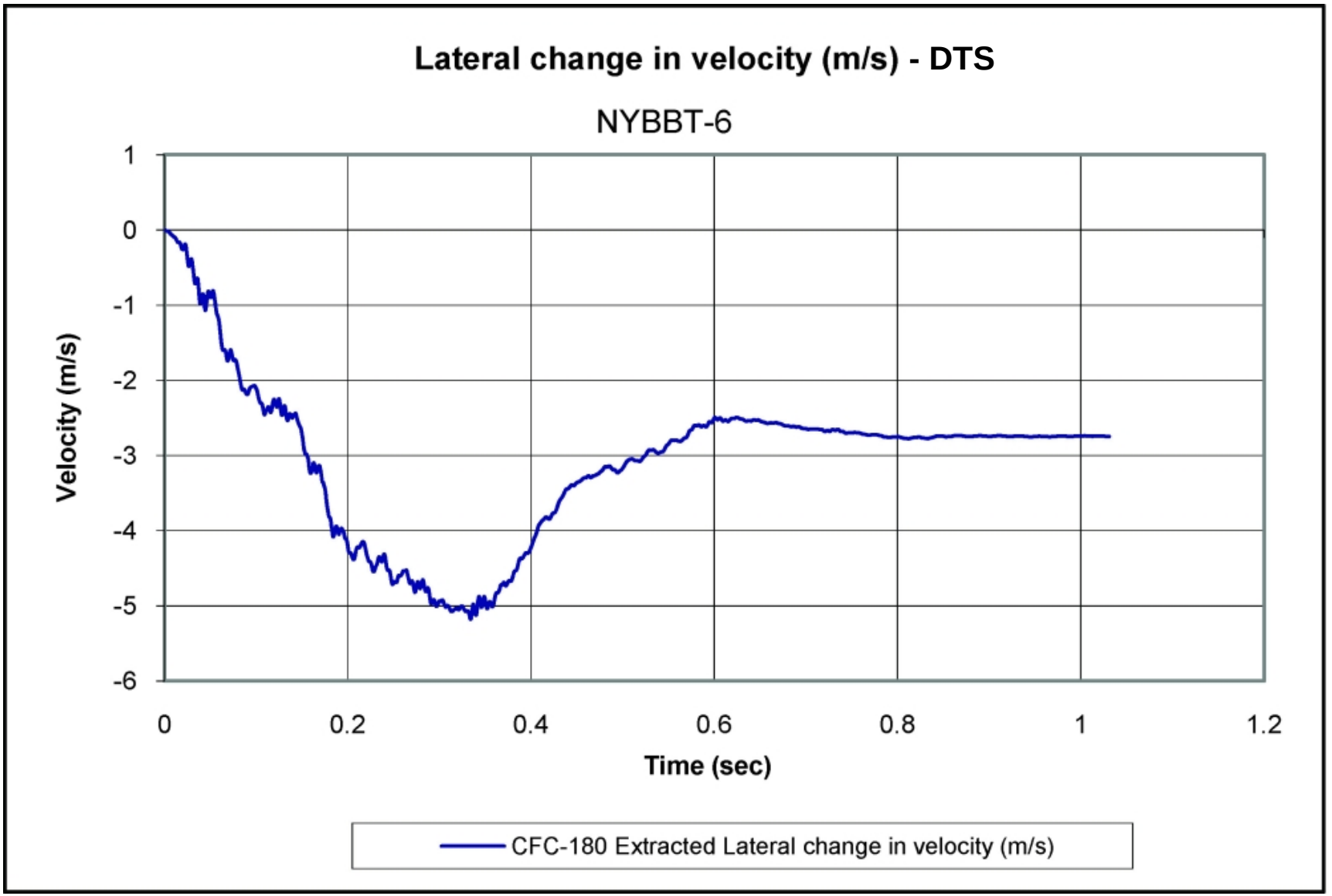


Figure Q-12. Graph of Lateral Occupant Impact Velocity (DTS), Test No. NYBBT-6

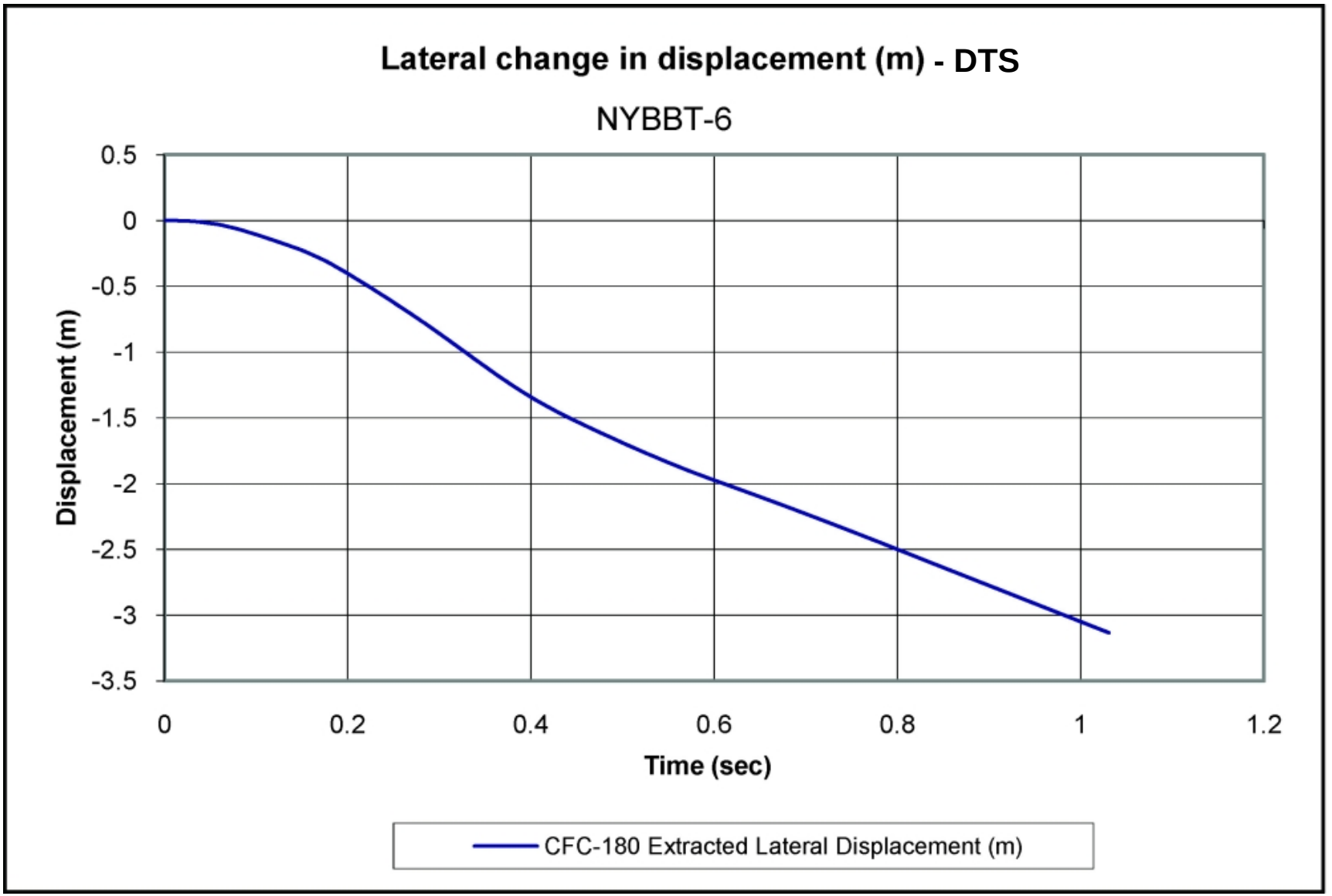


Figure Q-13. Graph of Lateral Occupant Displacement (DTS), Test No. NYBBT-6

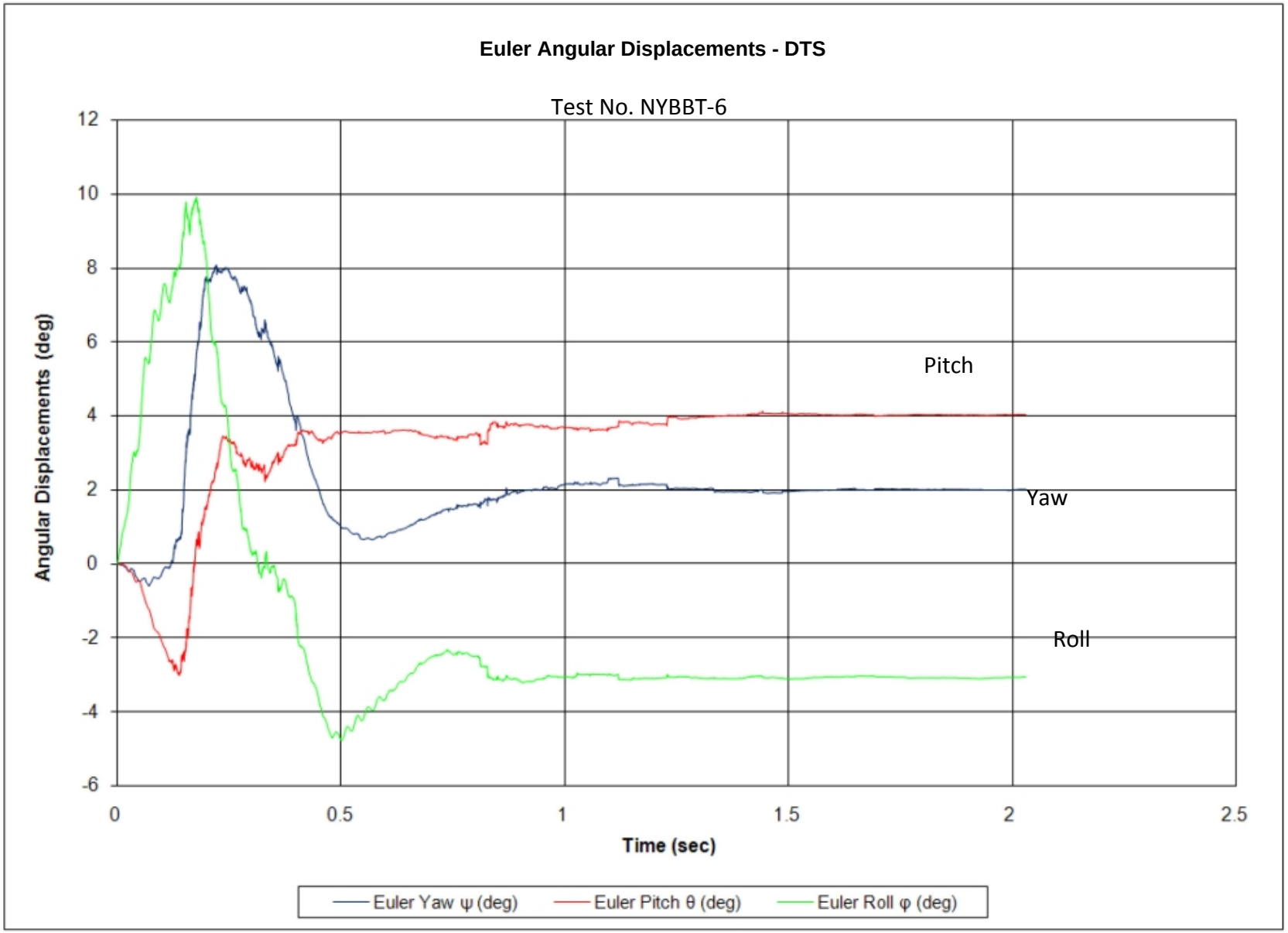


Figure Q-14. Graph of Roll, Pitch, and Yaw Angular Displacement (DTS), Test No. NYBBT-6

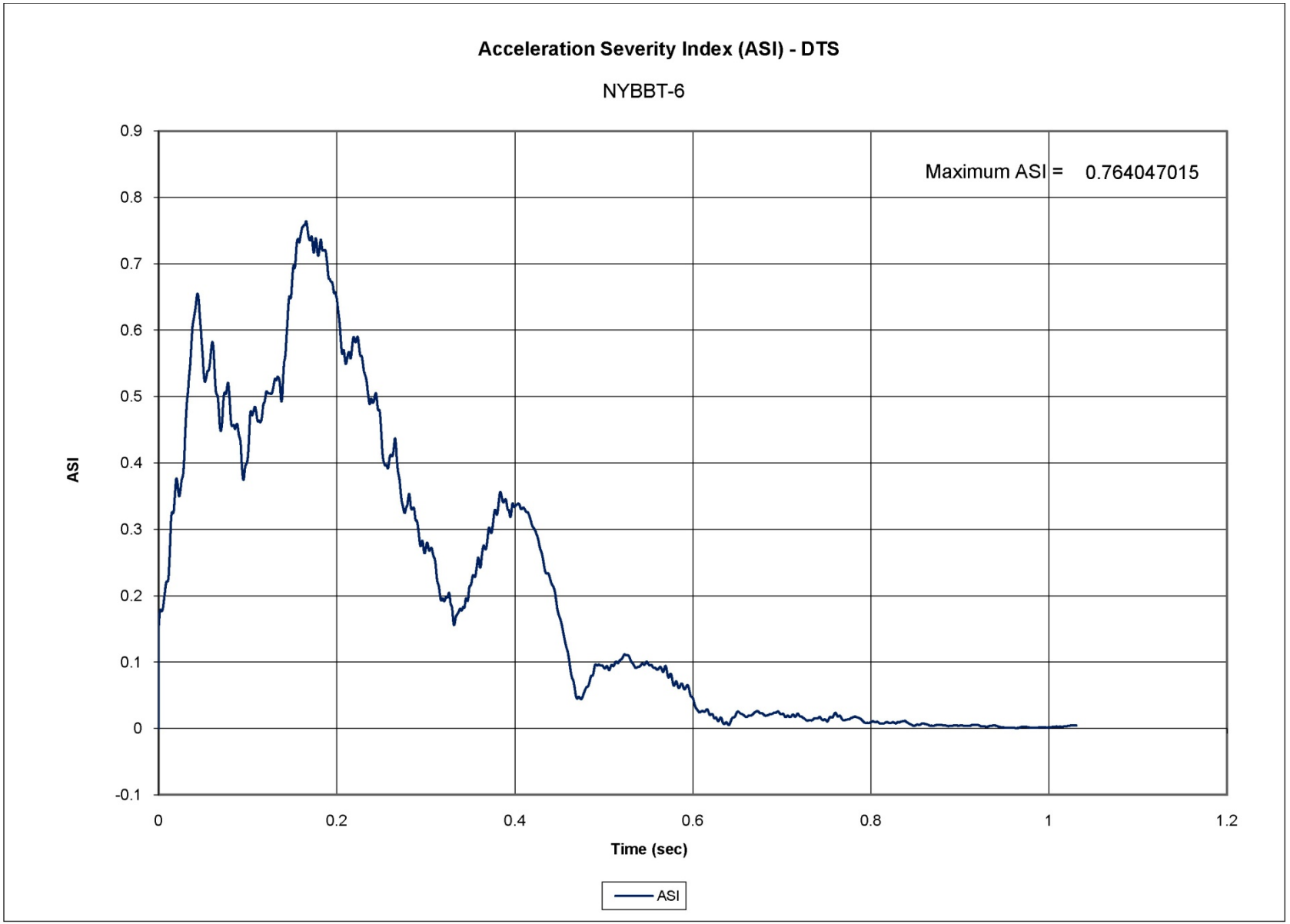


Figure Q-15. Graph of Acceleration Severity Index (DTS), Test No. NYBBT-6

APPENDIX R Accelerometer and Rate Transducer Data Analysis, Test No. NYBBT-7

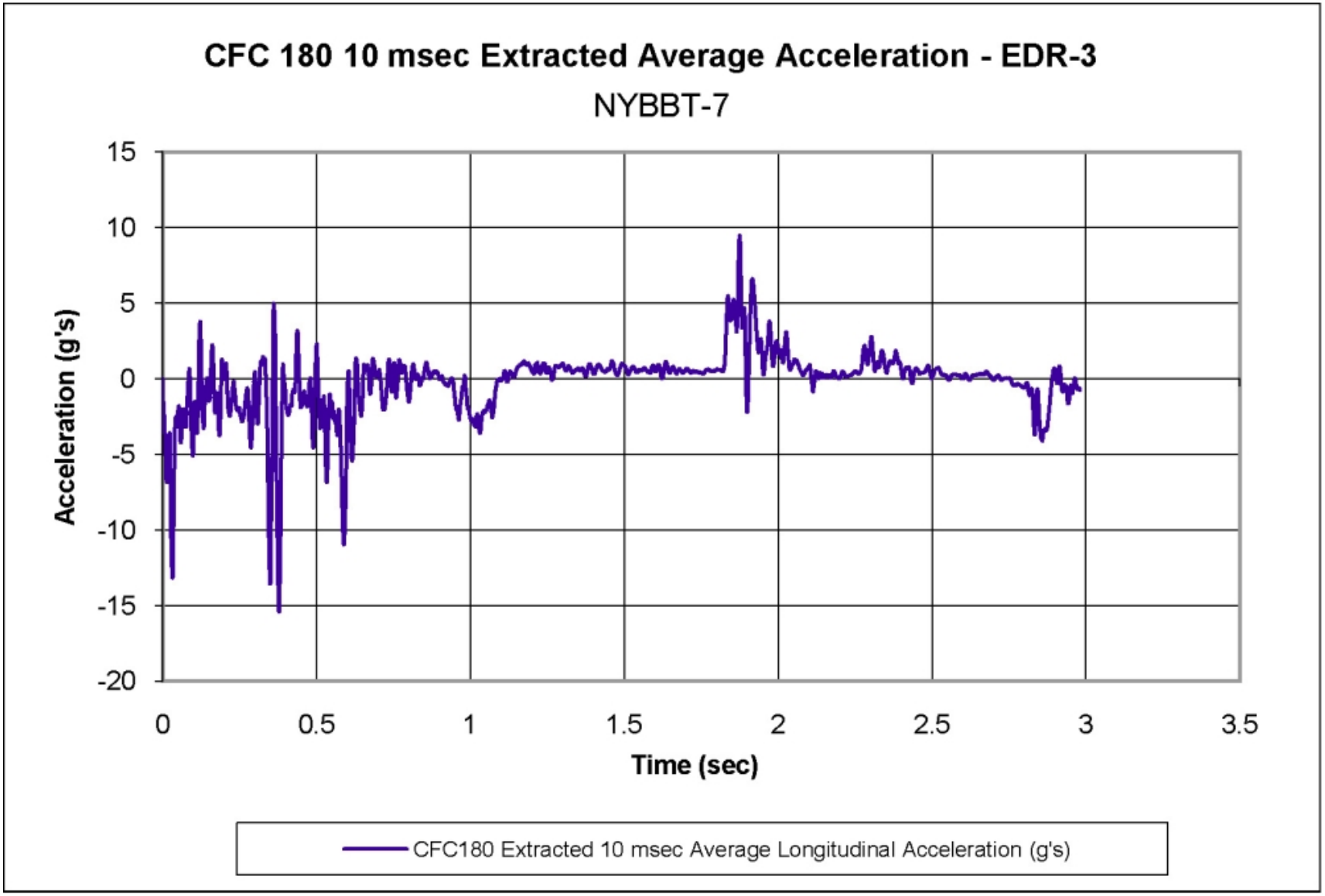


Figure R-1. Graph of Longitudinal Occupant Deceleration (EDR-3), Test No. NYBBT-7

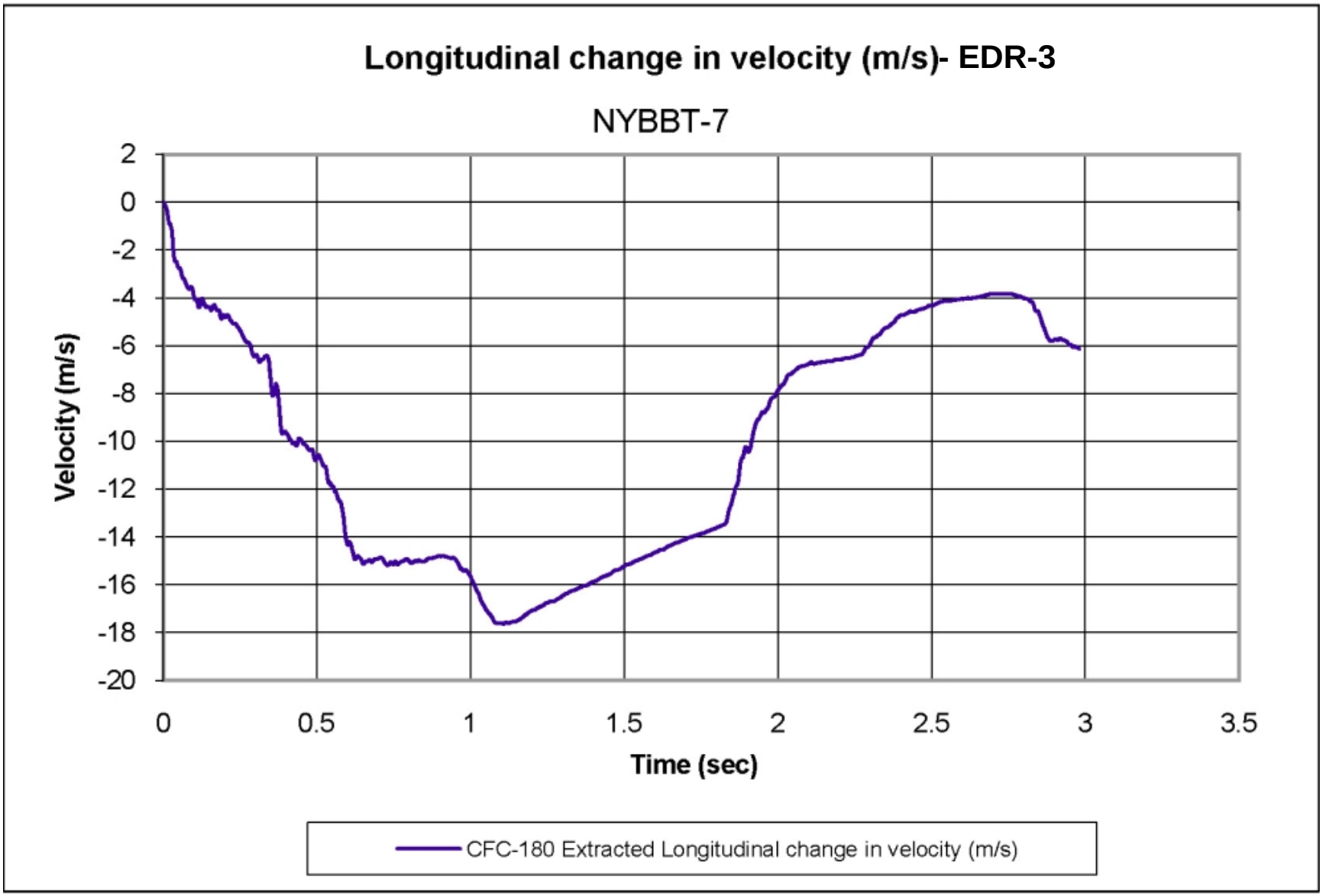


Figure R-2. Graph of Longitudinal Occupant Impact Velocity (EDR-3), Test No. NYBBT-7

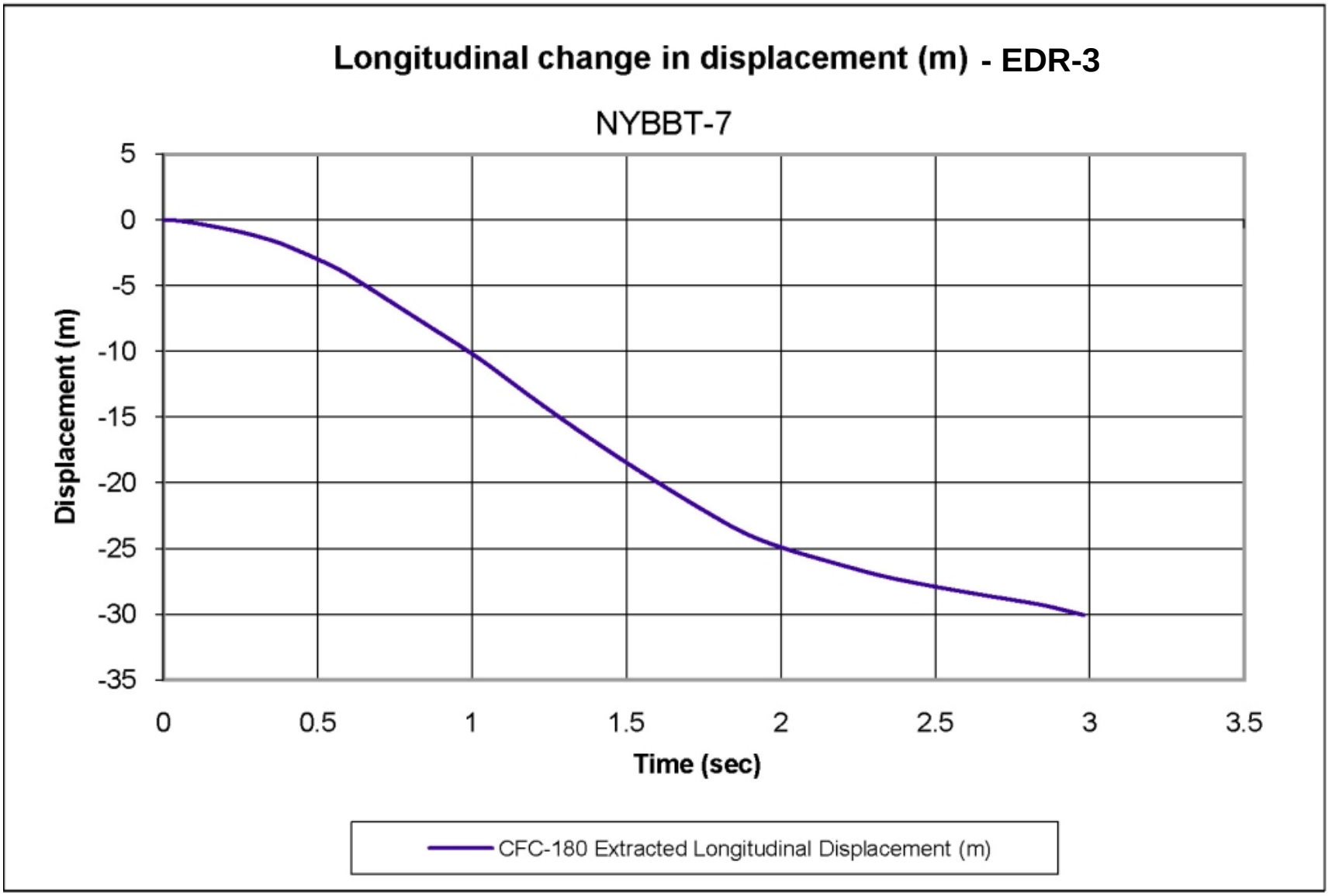


Figure R-3. Graph of Longitudinal Occupant Displacement (EDR-3), Test No. NYBBT-7

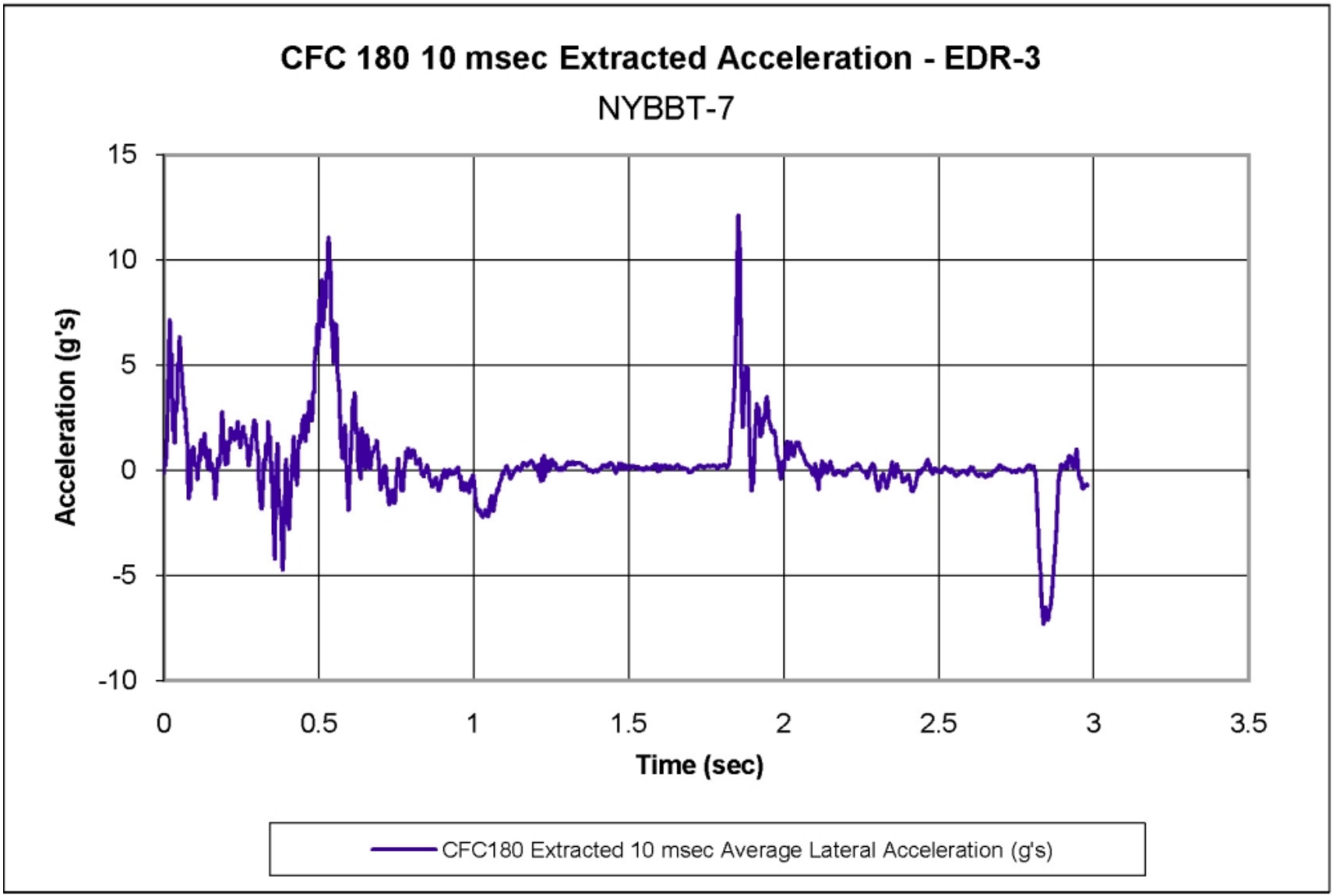


Figure R-4. Graph of Lateral Occupant Deceleration (EDR-3), Test No. NYBBT-7

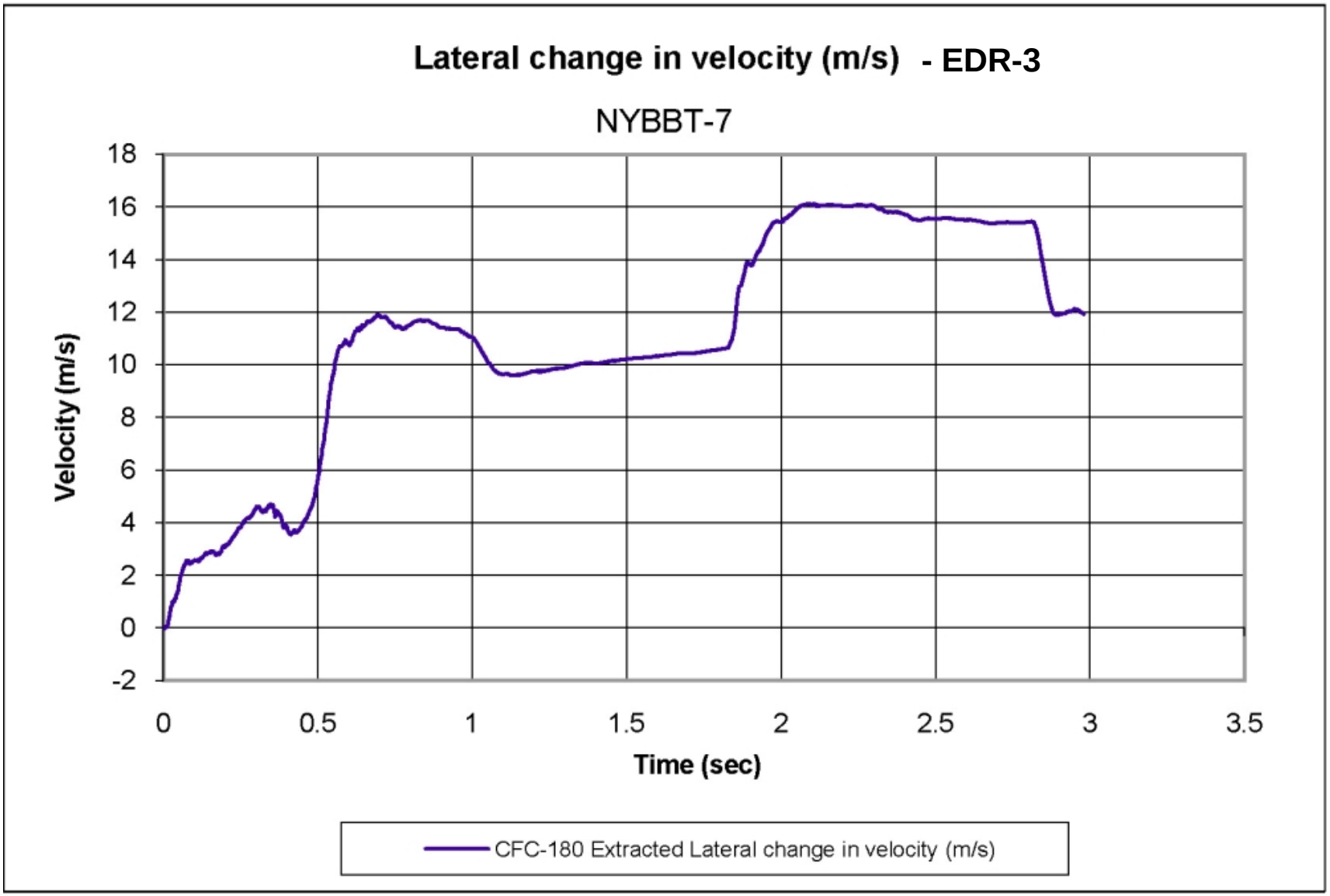


Figure R-5. Graph of Lateral Occupant Impact Velocity (EDR-3), Test No. NYBBT-7

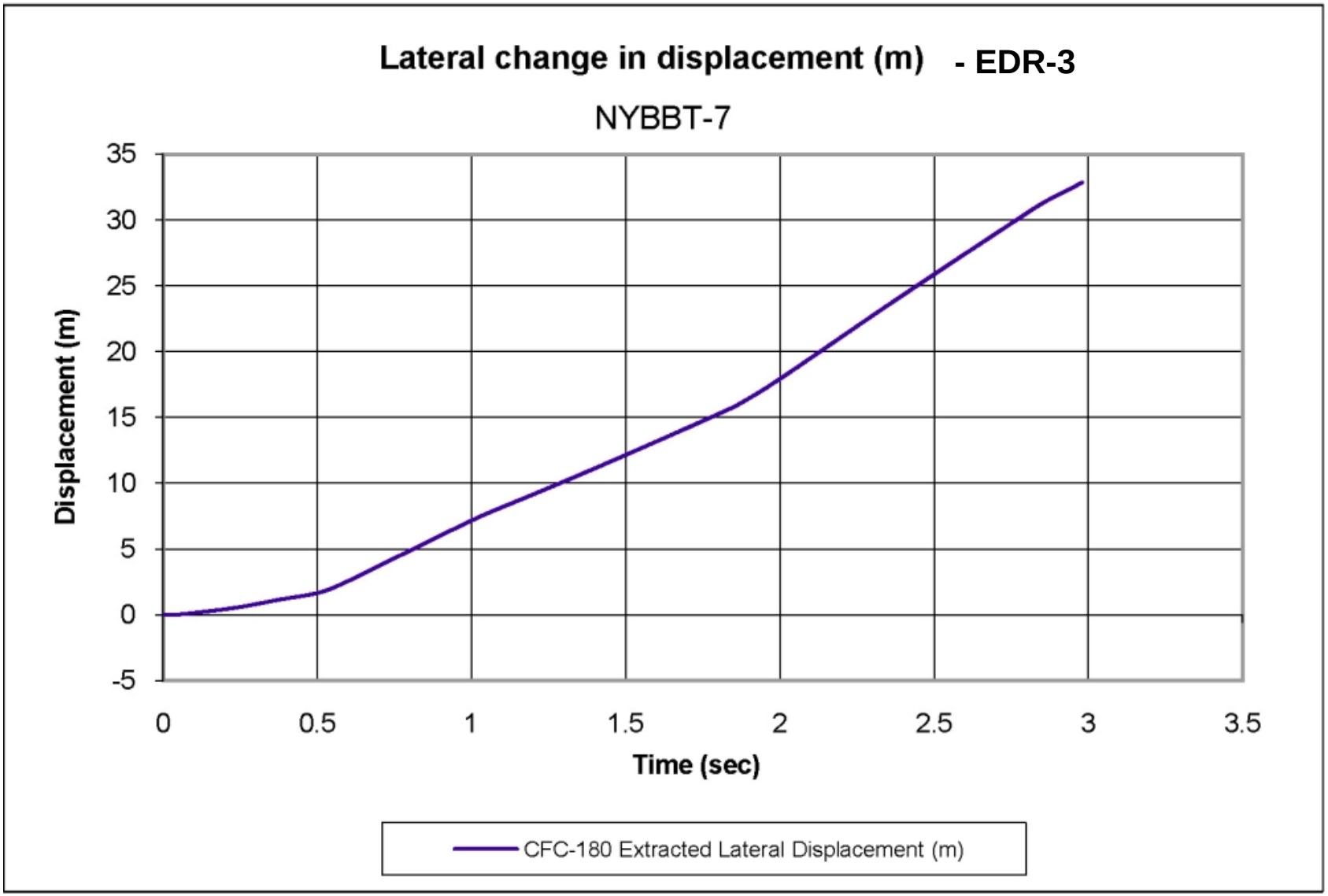


Figure R-6. Graph of Lateral Occupant Displacement (EDR-3), Test No. NYBBT-7

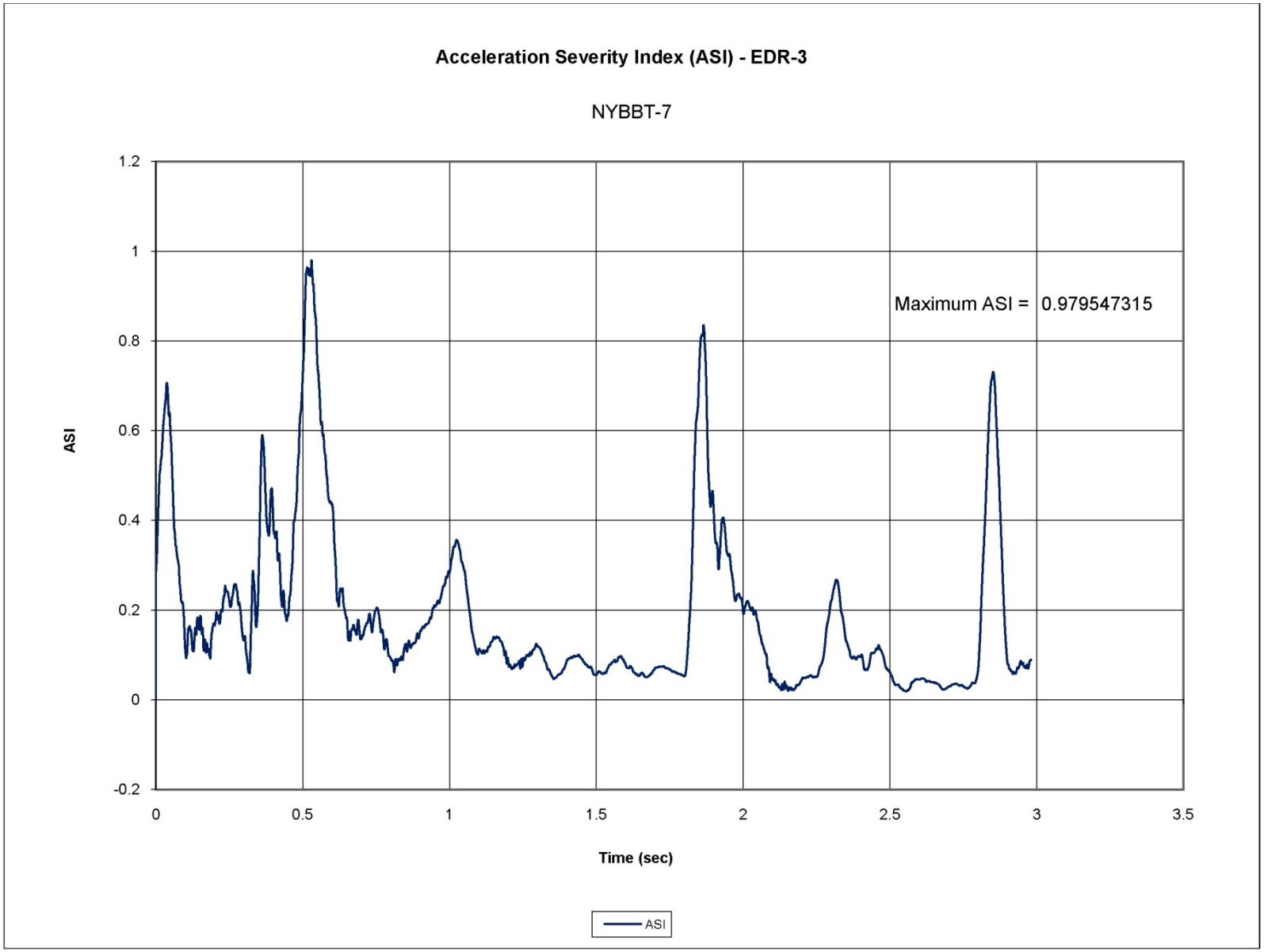


Figure R-7. Graph of Acceleration Severity Index (EDR-3), Test No. NYBBT-7

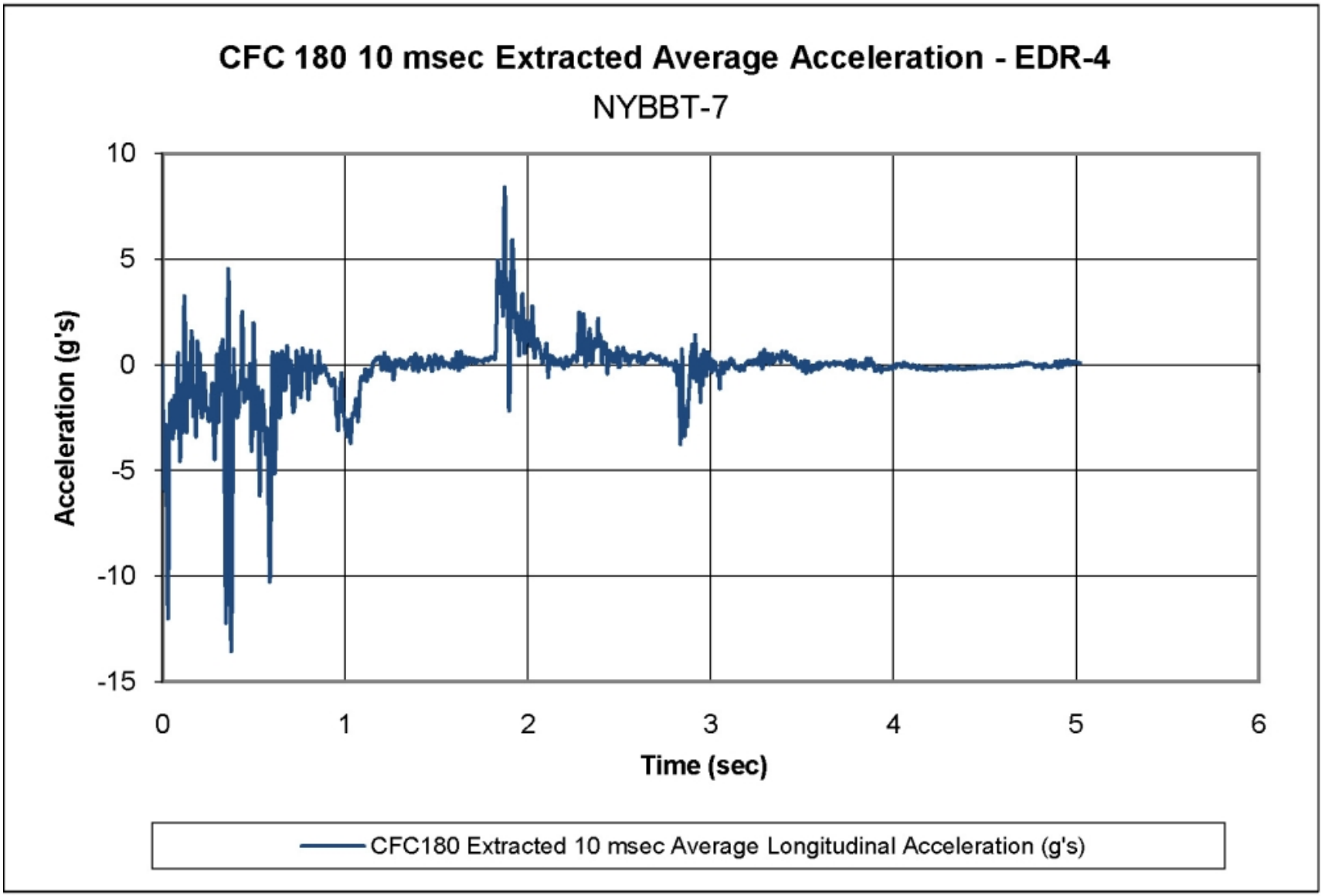


Figure R-8. Graph of Longitudinal Occupant Deceleration (EDR-4), Test No. NYBBT-7

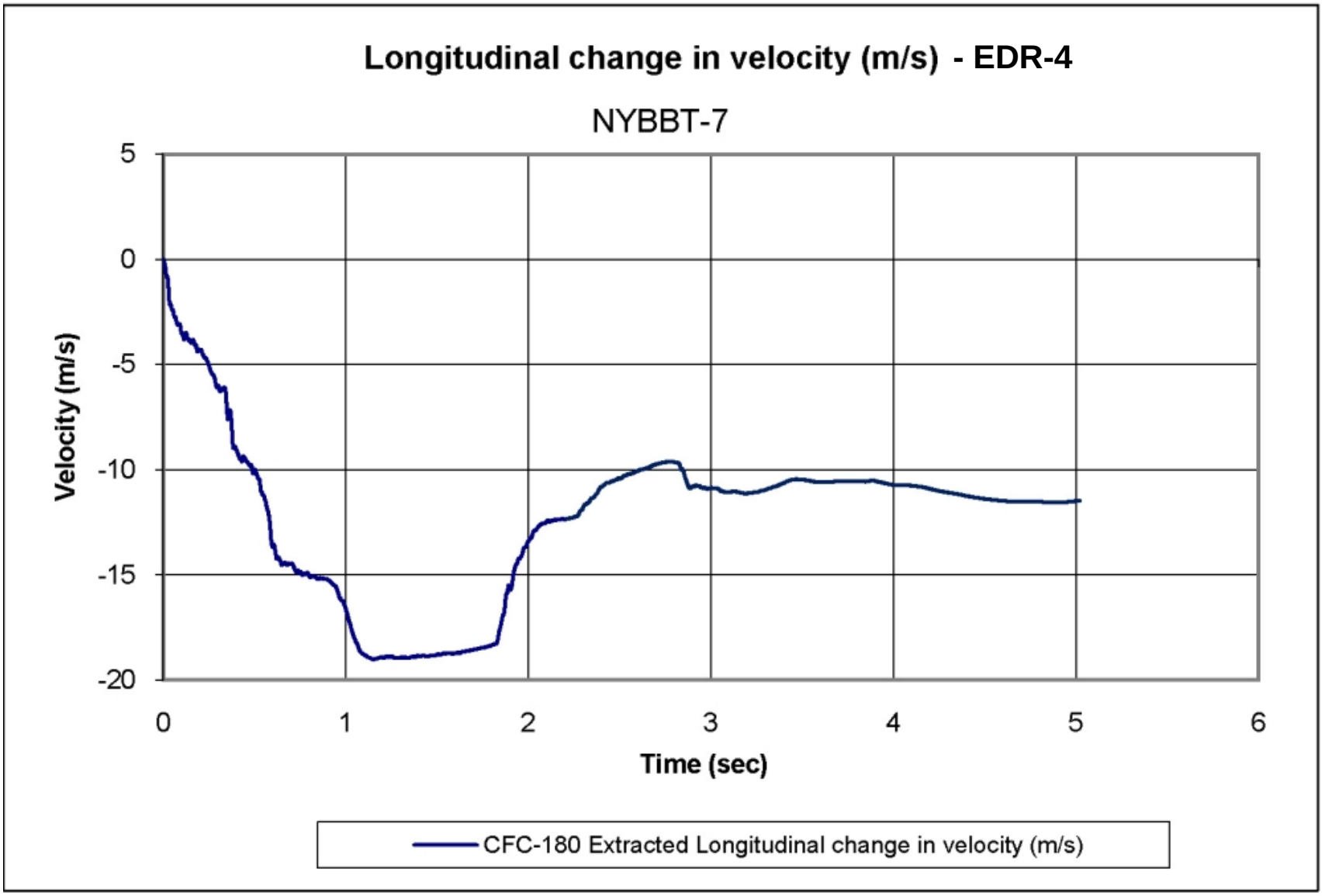


Figure R-9. Graph of Longitudinal Occupant Impact Velocity (EDR-4), Test No. NYBBT-7

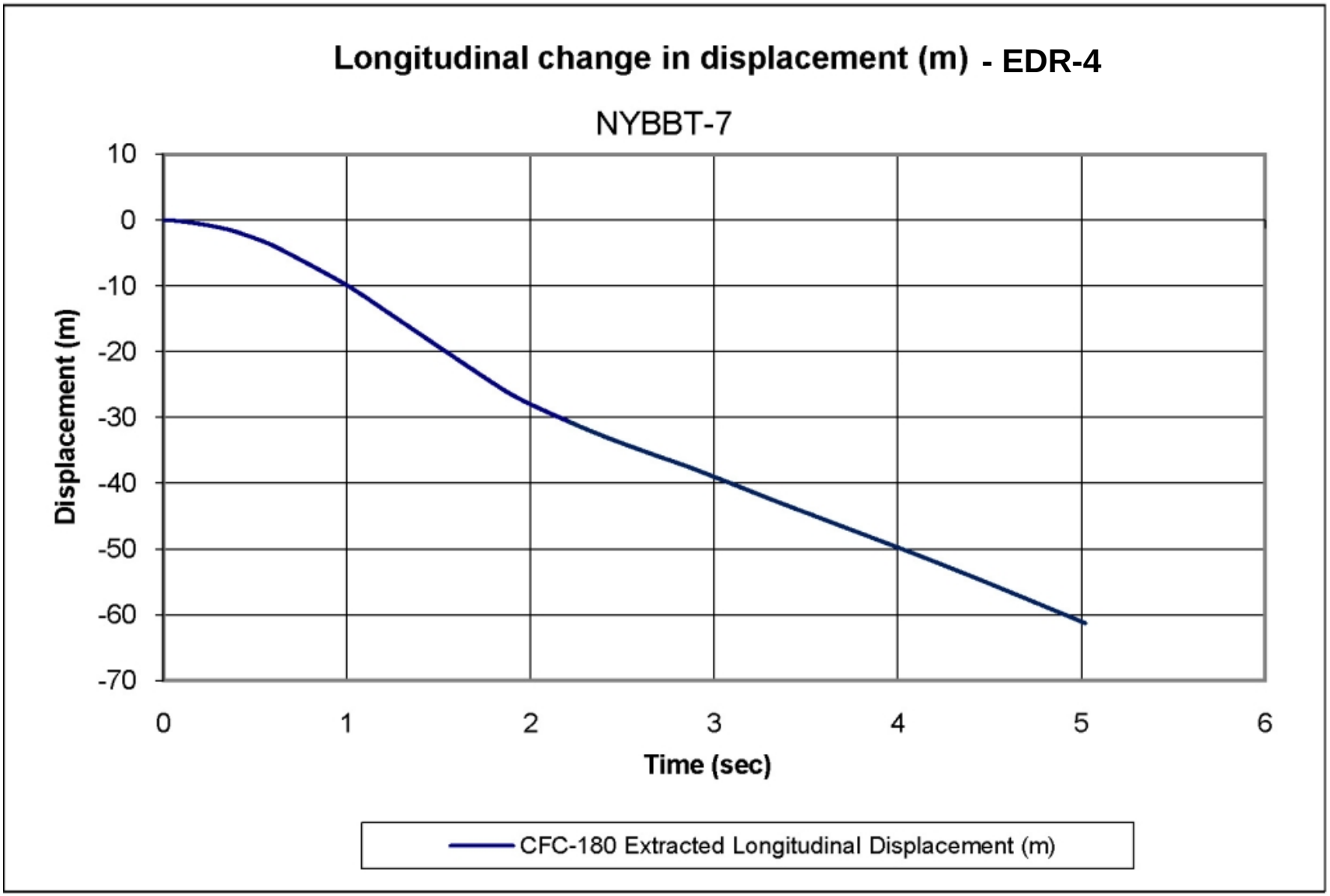


Figure R-10. Graph of Longitudinal Occupant Displacement (EDR-4), Test No. NYBBT-7

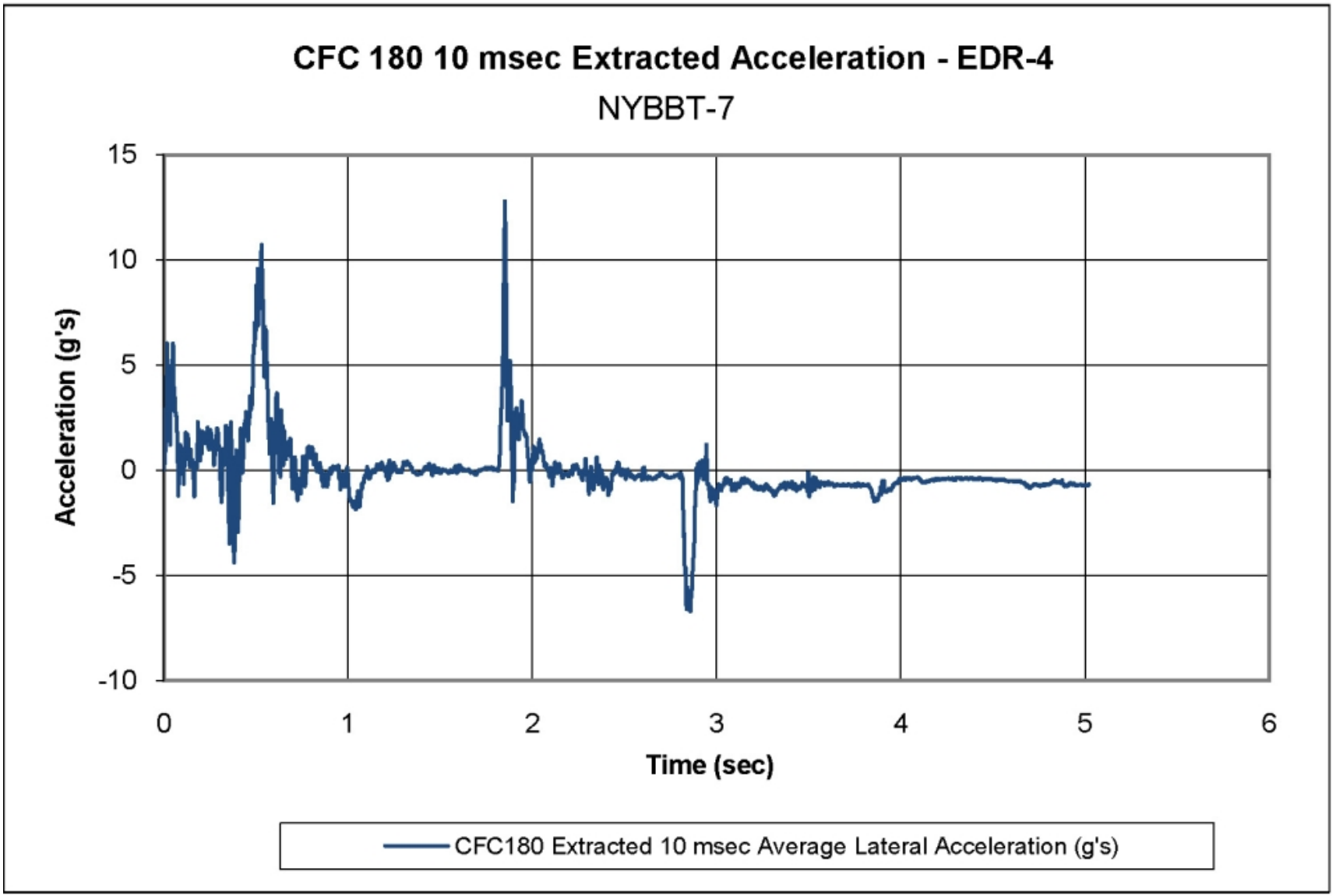


Figure R-11. Graph of Lateral Occupant Deceleration (EDR-4), Test No. NYBBT-7

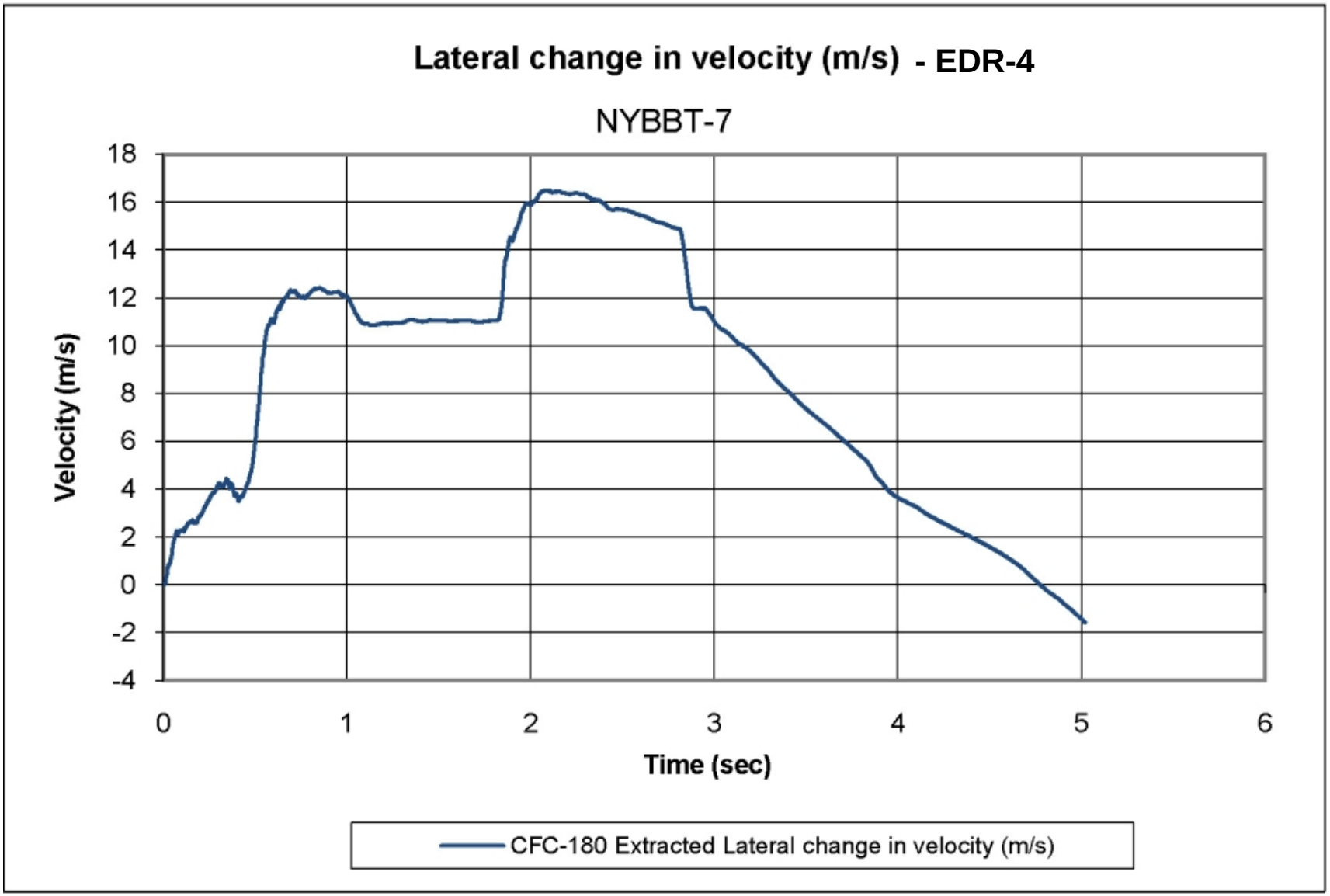


Figure R-12. Graph of Lateral Occupant Impact Velocity (EDR-4), Test No. NYBBT-7

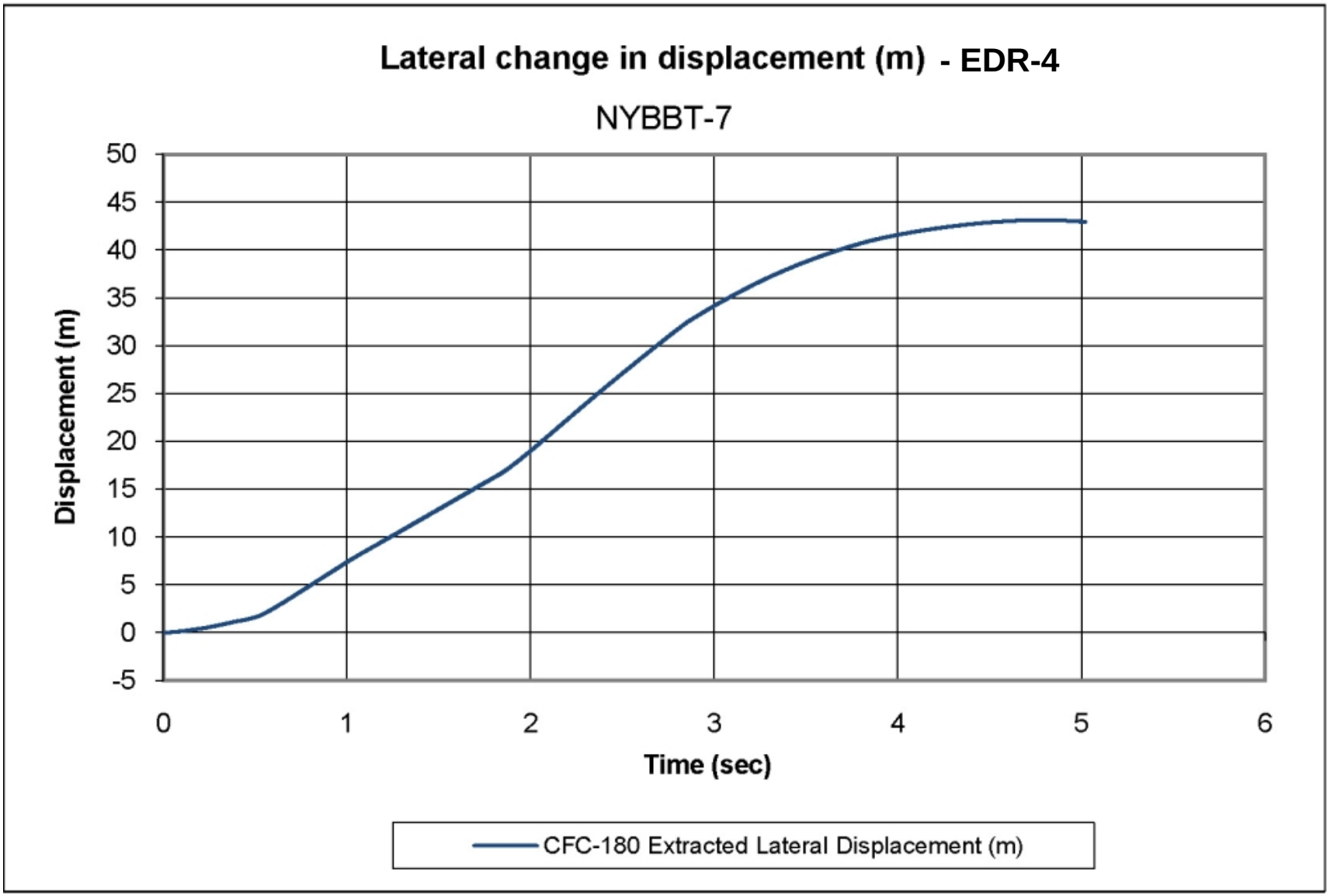


Figure R-13. Graph of Lateral Occupant Displacement (EDR-4), Test No. NYBBT-7

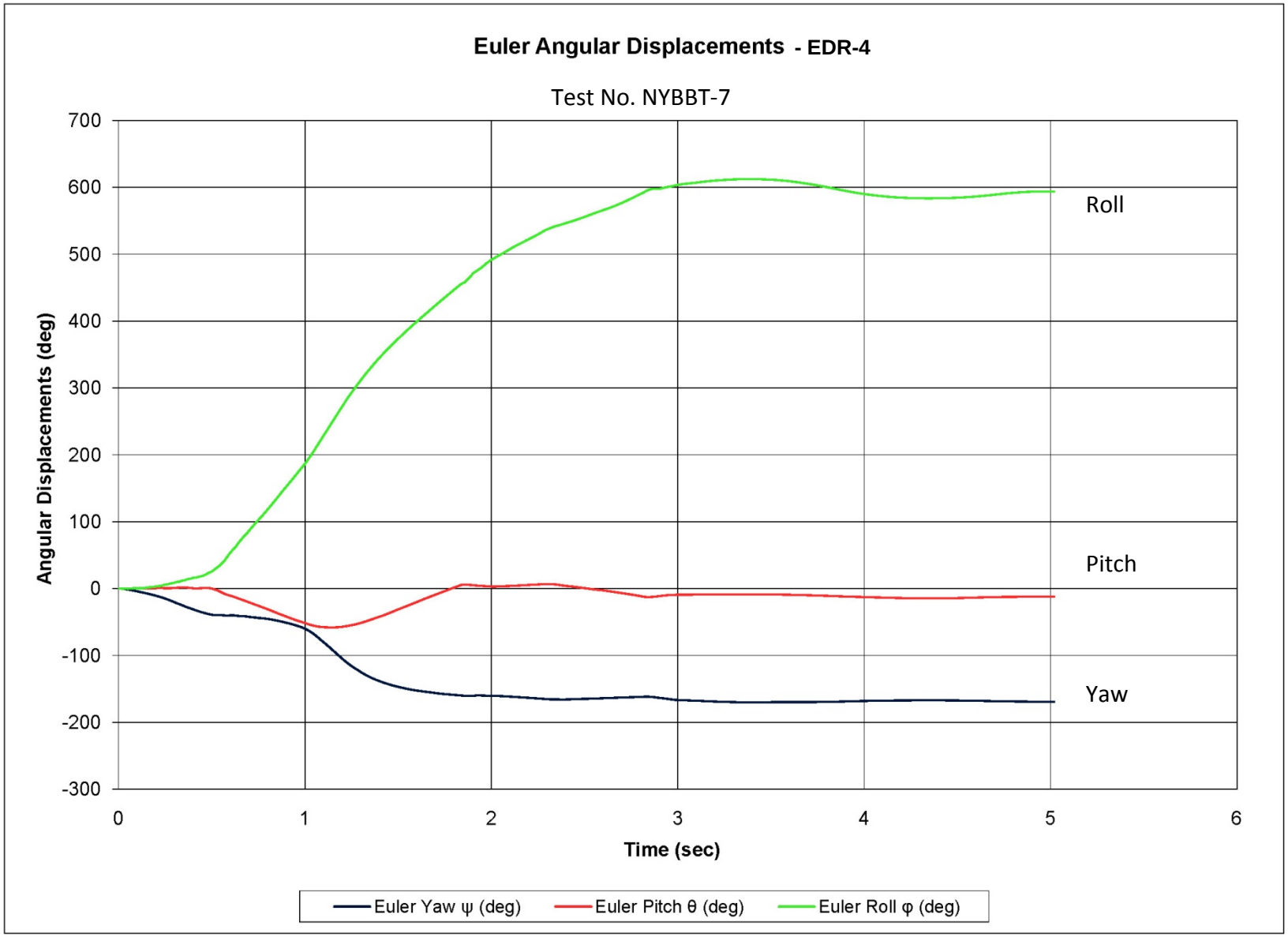


Figure R-14. Graph of Roll, Pitch, and Yaw Angular Displacement (EDR-4), Test No. NYBBT-7

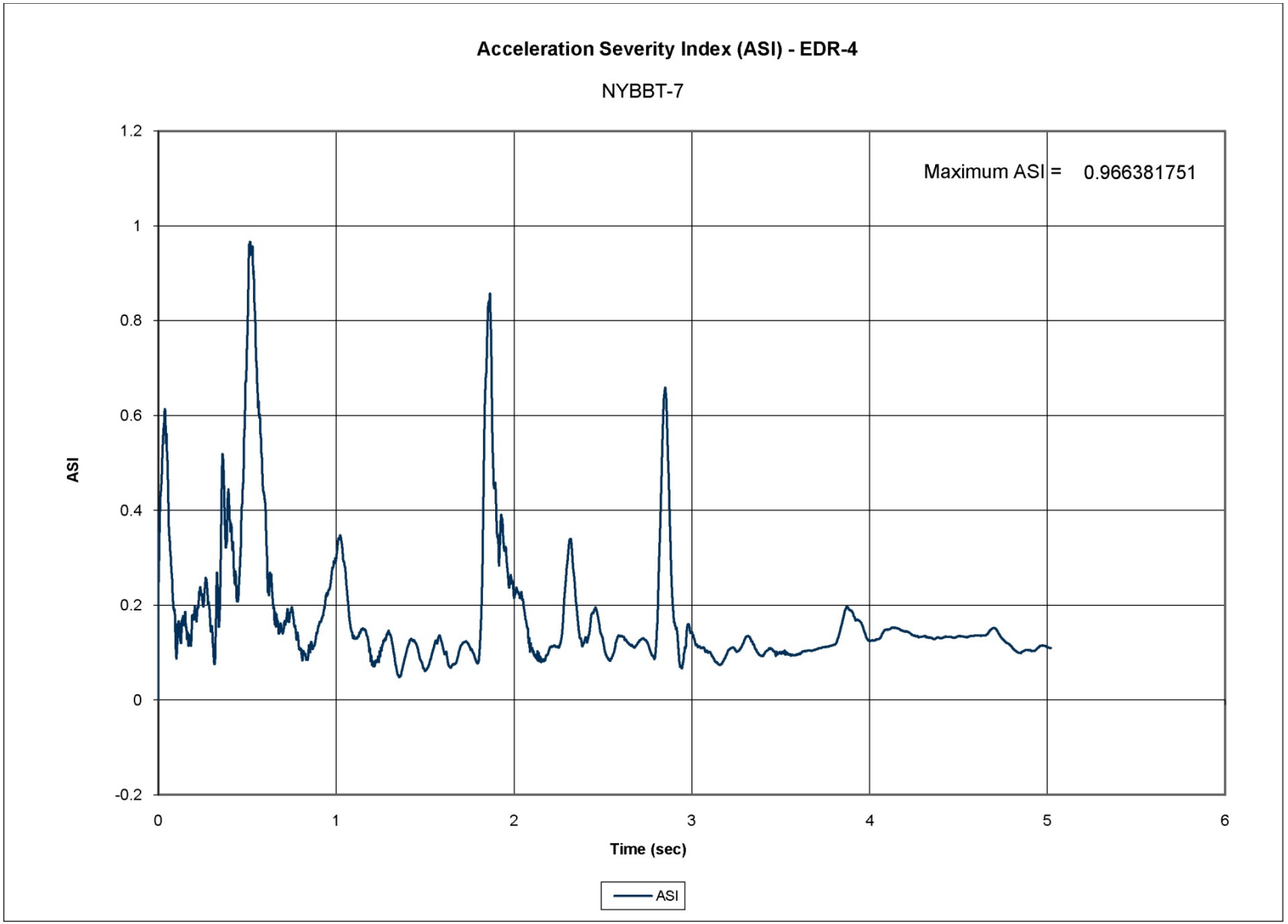


Figure R-15. Graph of Acceleration Severity Index (EDR-4), Test No. NYBBT-7

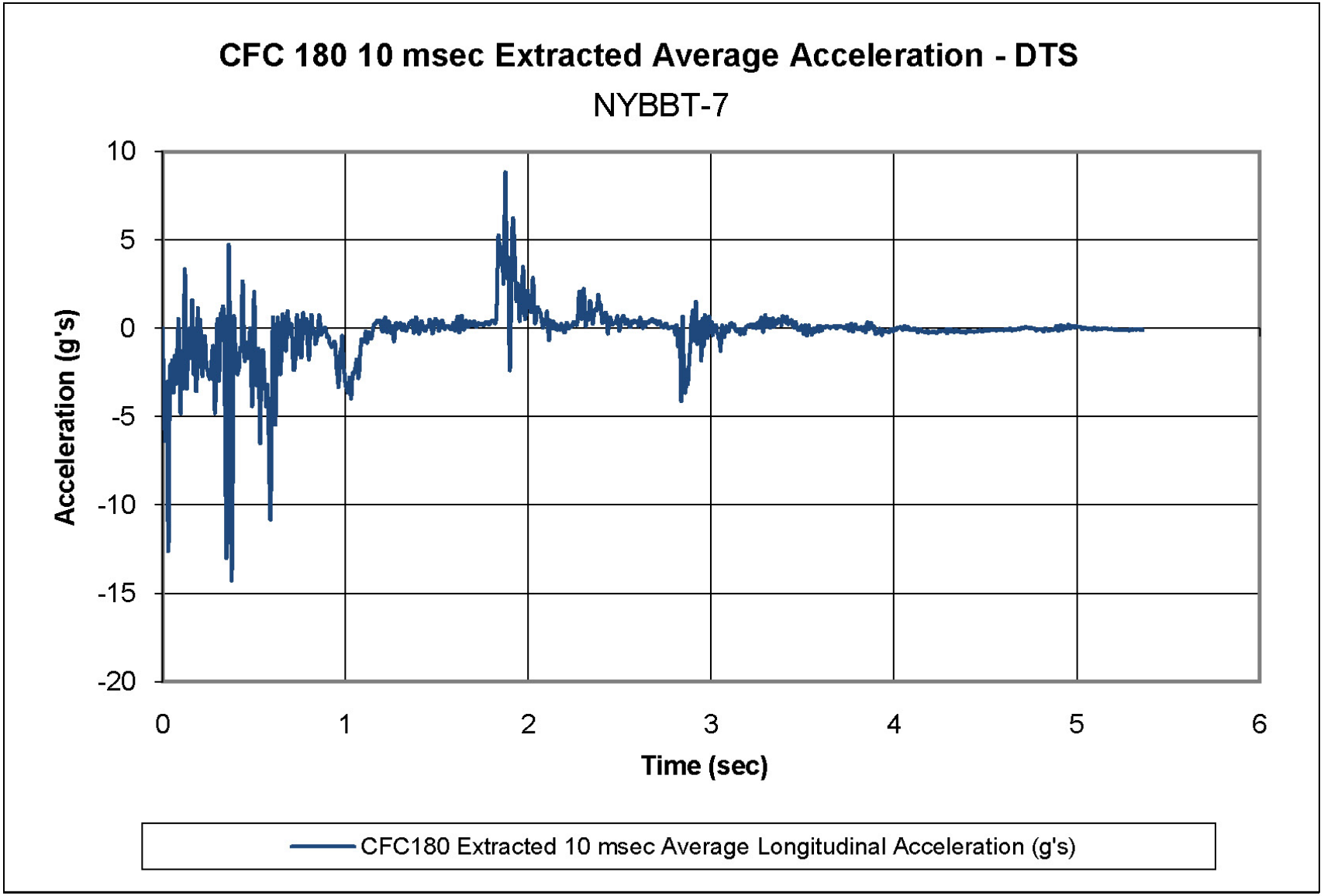


Figure R-16. Graph of Longitudinal Occupant Deceleration (DTS), Test No. NYBBT-7

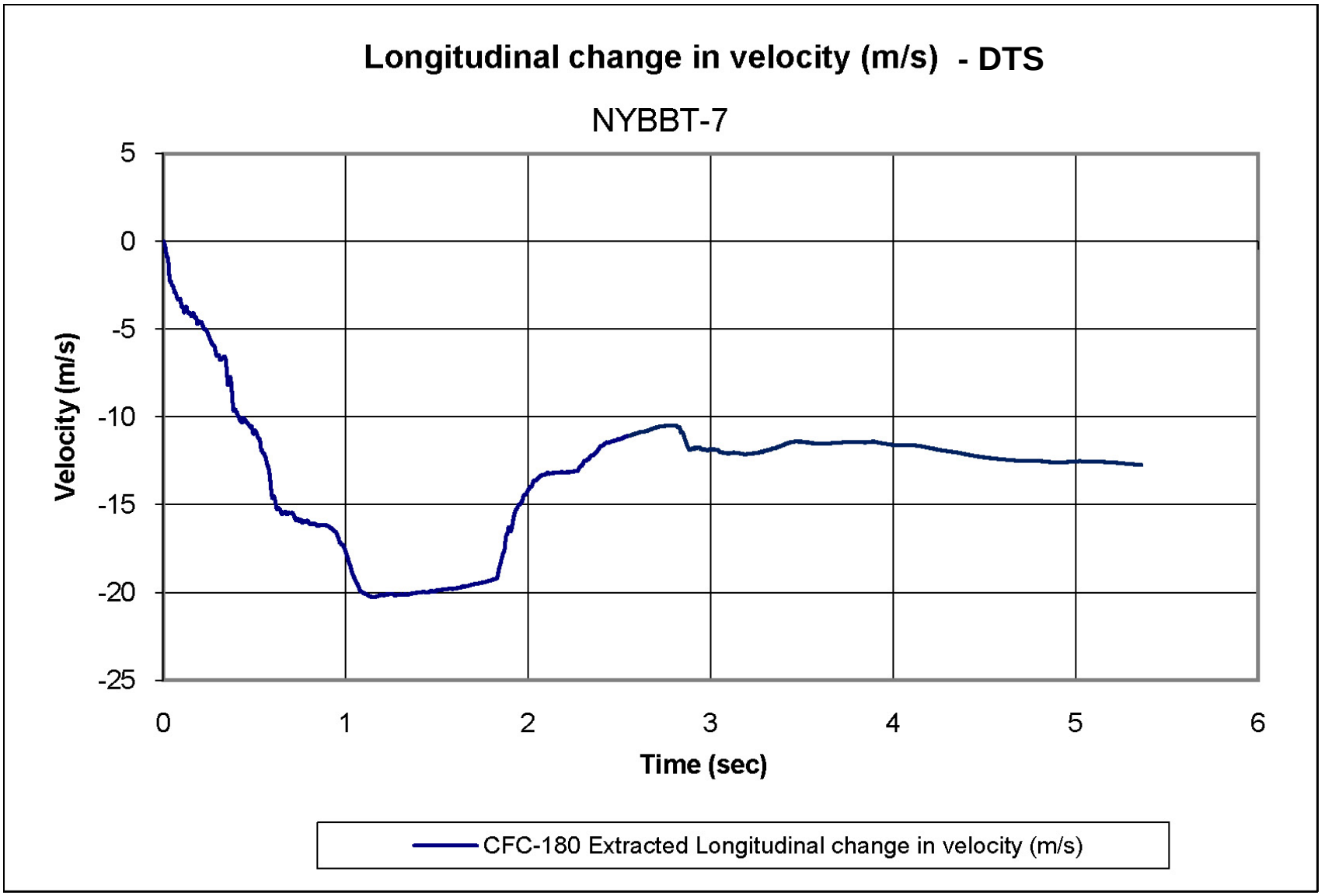


Figure R-17. Graph of Longitudinal Occupant Impact Velocity (DTS), Test No. NYBBT-7

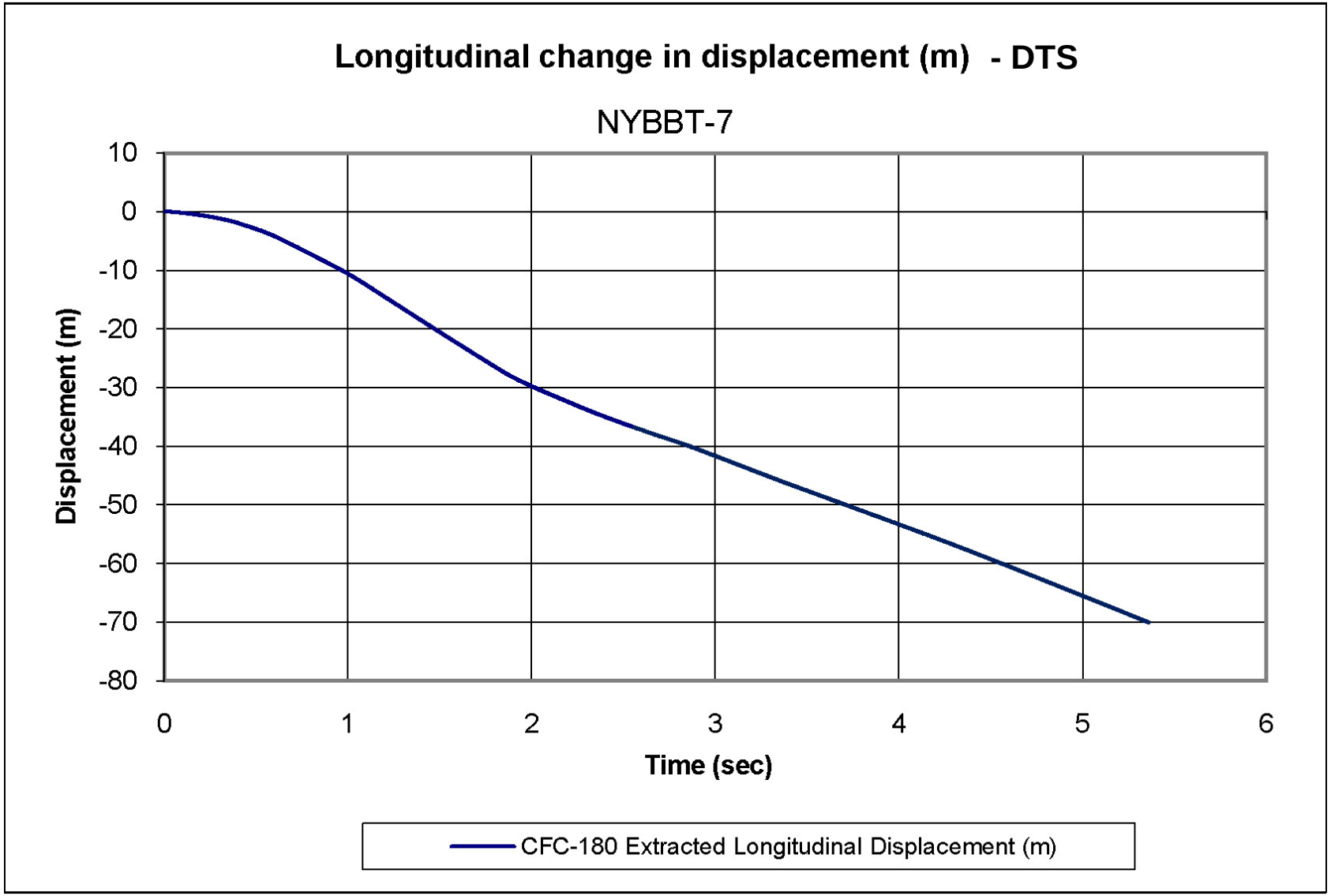


Figure R-18. Graph of Longitudinal Occupant Displacement (DTS), Test No. NYBBT-7

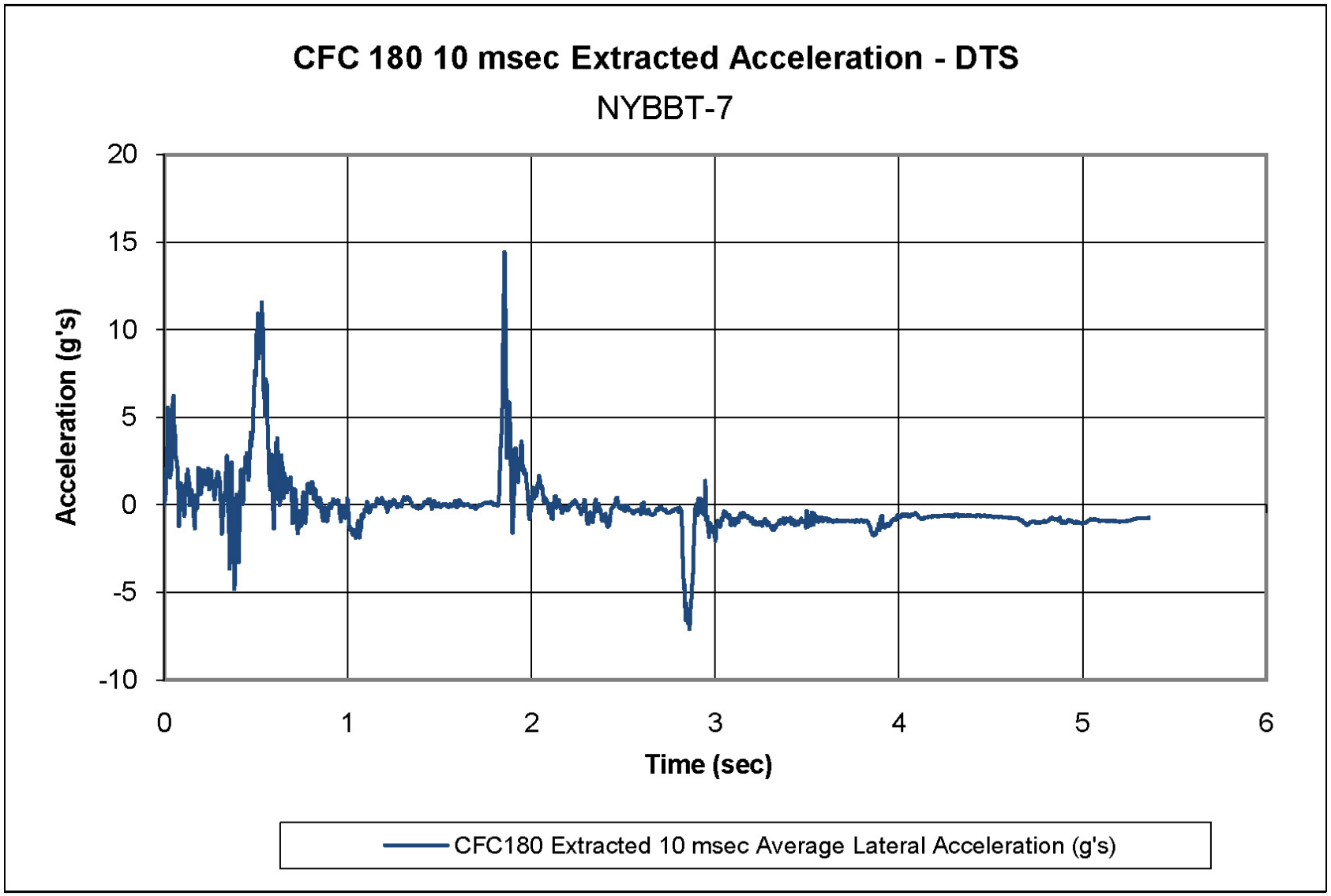


Figure R-19. Graph of Lateral Occupant Deceleration (DTS), Test No. NYBBT-7

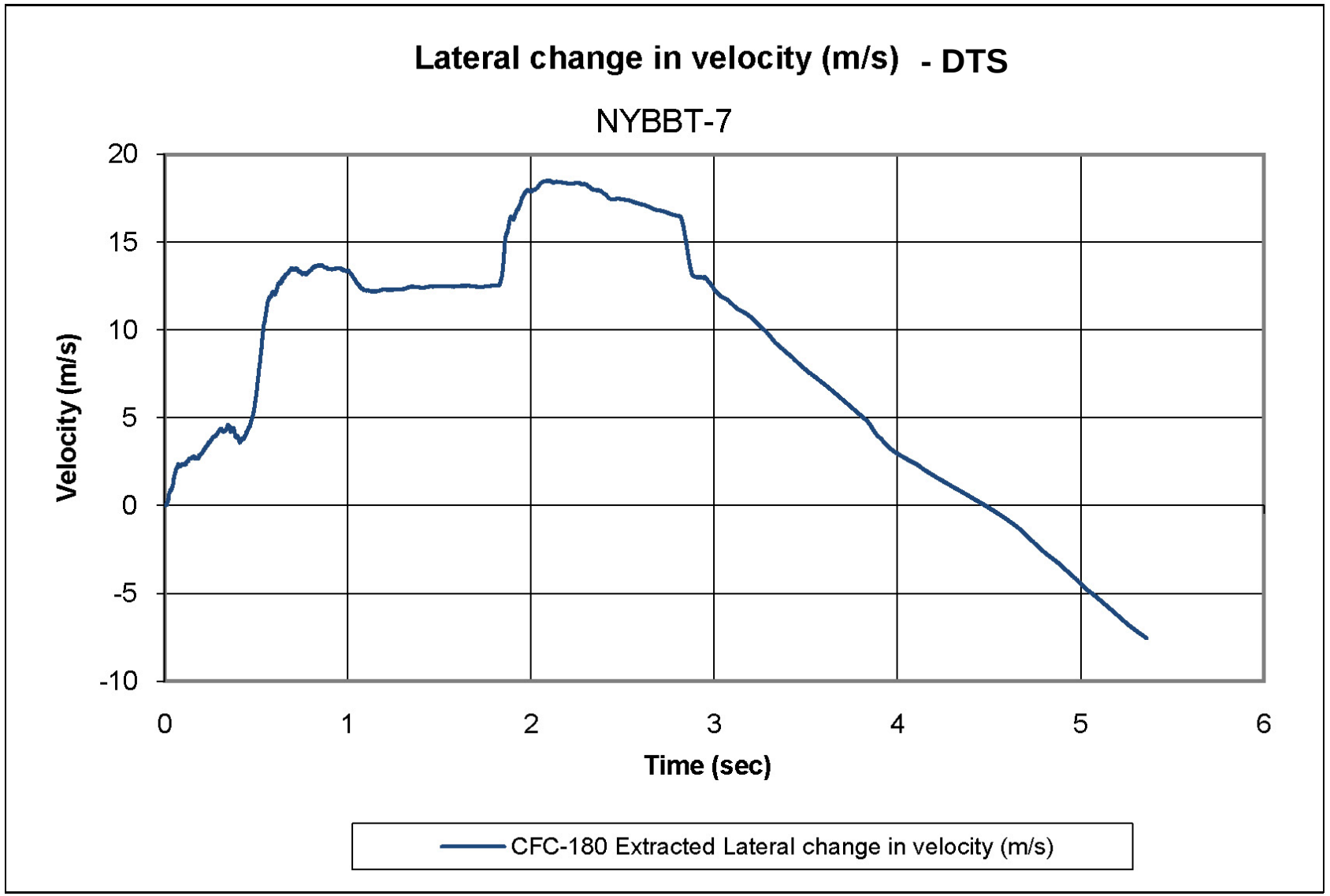


Figure R-20. Graph of Lateral Occupant Impact Velocity (DTS), Test No. NYBBT-7

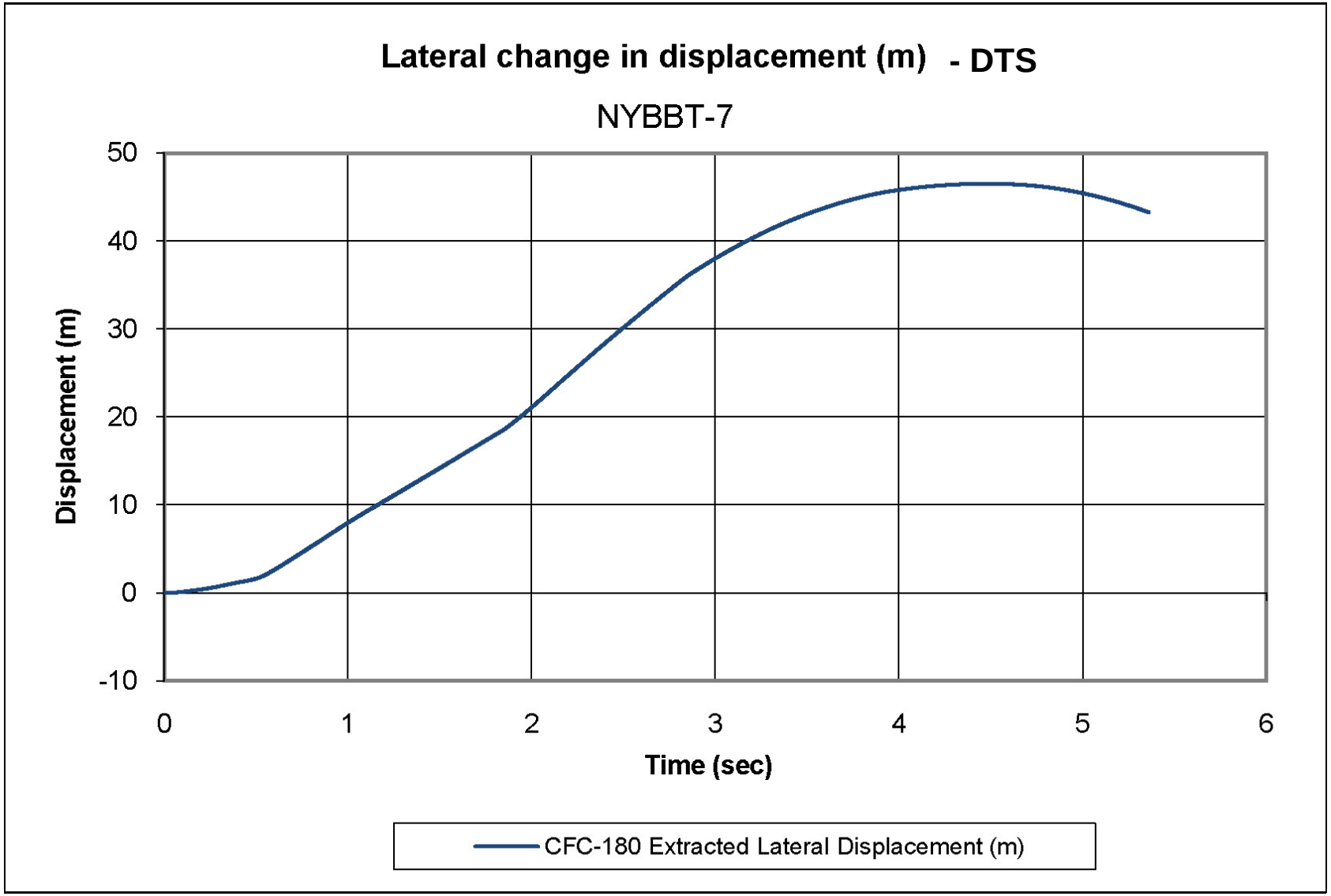


Figure R-21. Graph of Lateral Occupant Displacement (DTS), Test No. NYBBT-7

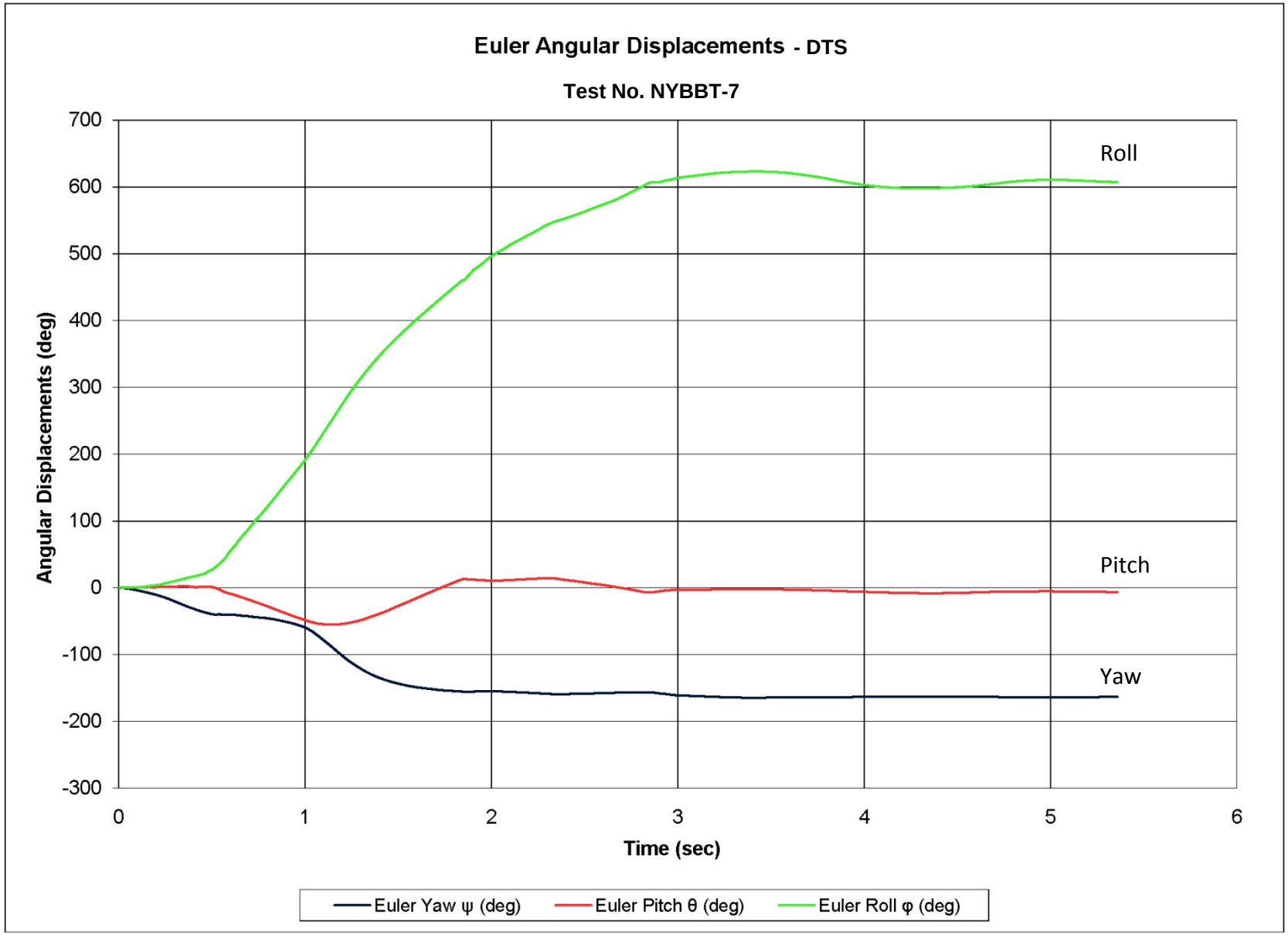


Figure R-22. Graph of Roll, Pitch, and Yaw Angular Displacement (DTS), Test No. NYBBT-7

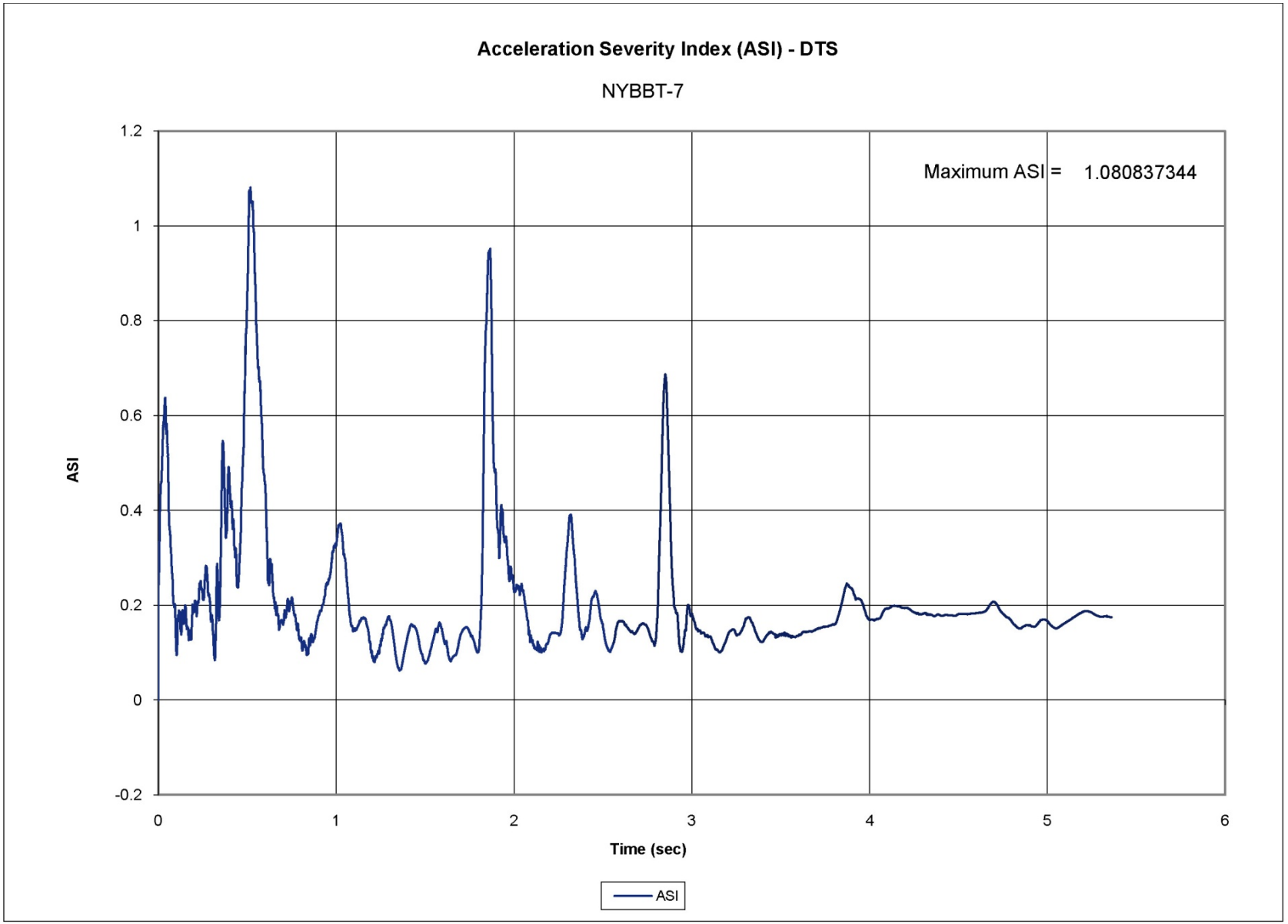


Figure R-23. Graph of Acceleration Severity Index (DTS), Test No. NYBBT-7

APPENDIX S Modified Type IIA Box Beam Terminal System Details -English Units, Test No. NYBBT-8

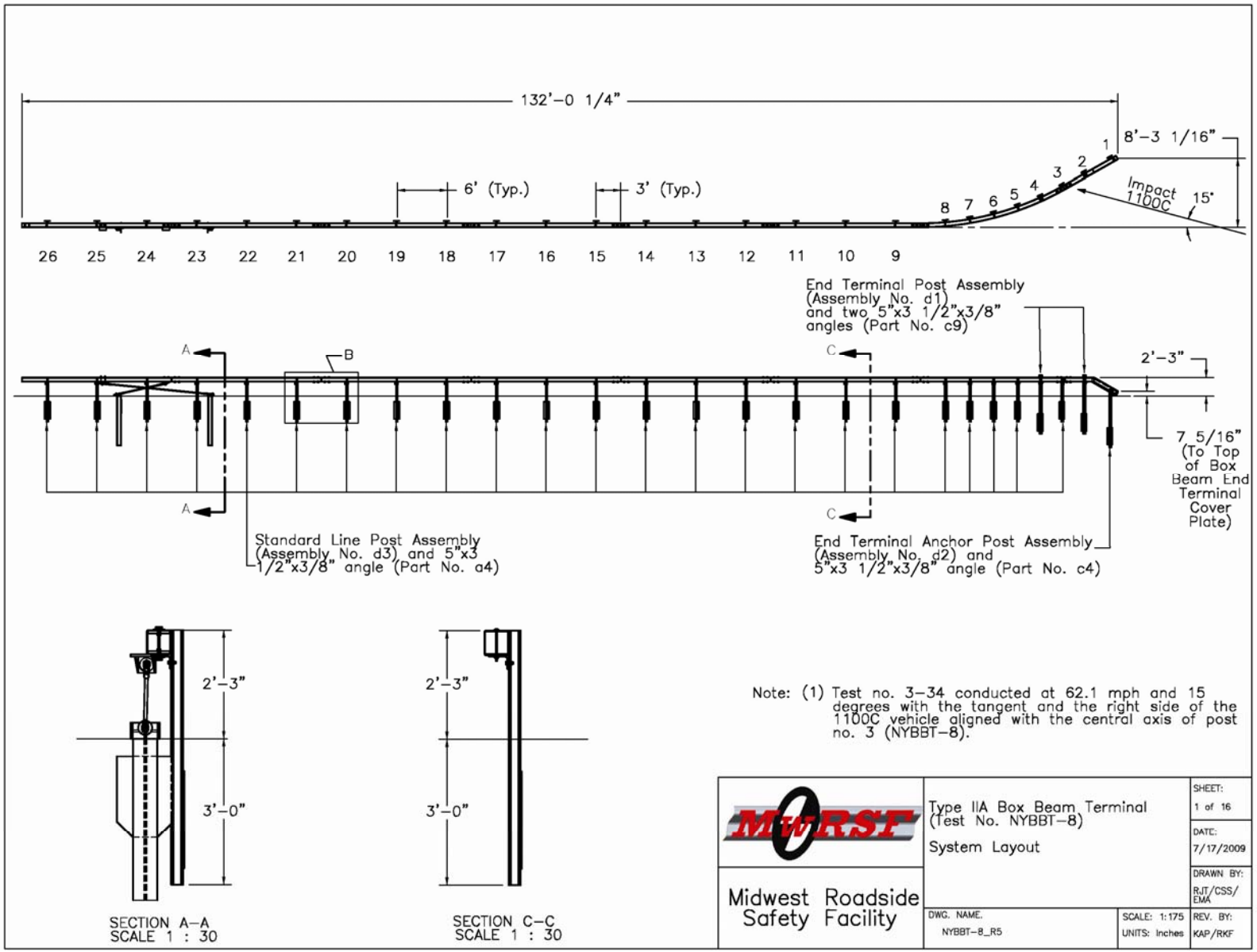


Figure S-1. Modified Type IIA Box Beam Terminal System Details (English), Test No. NYBBT-8

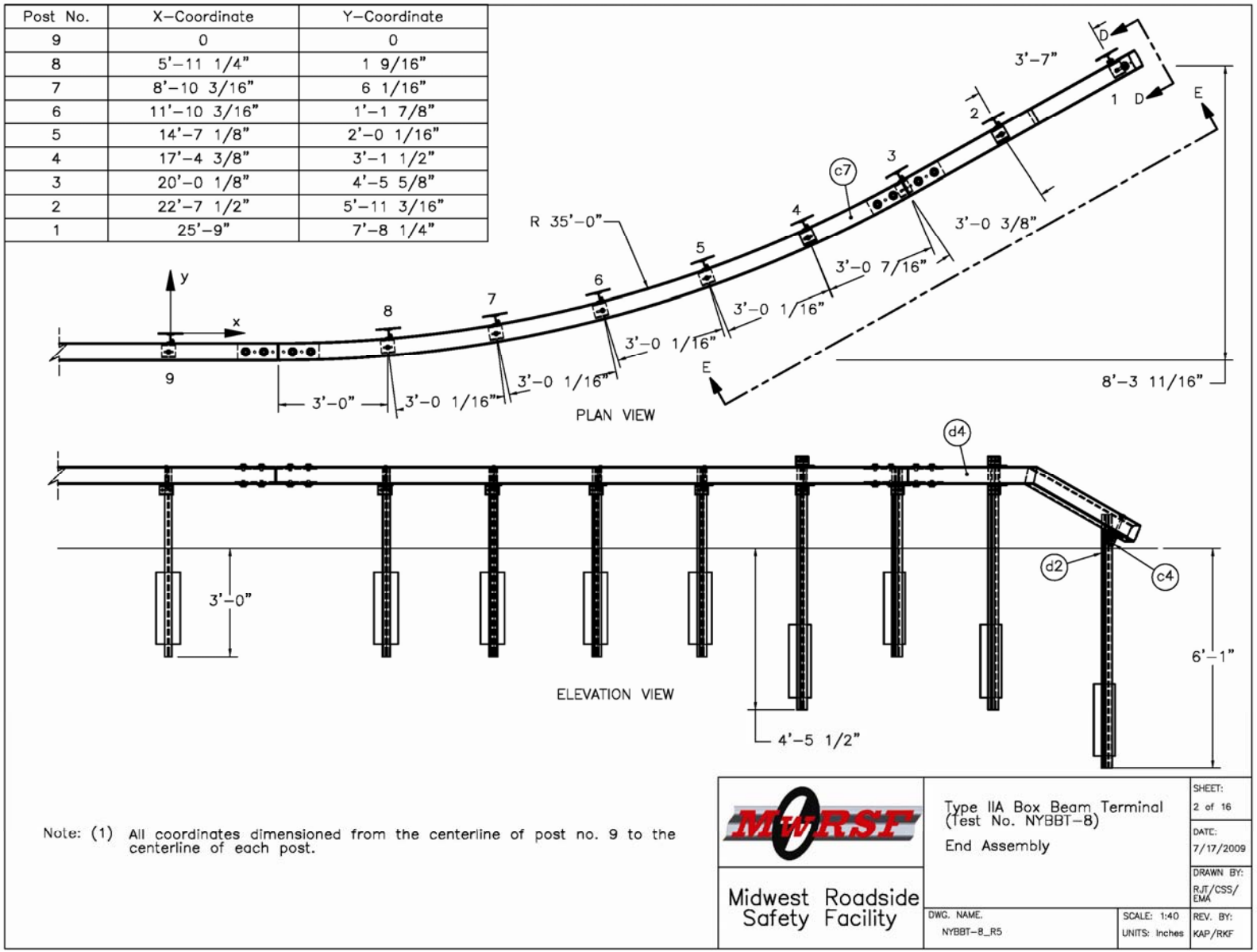


Figure S-2. Modified Type IIA Box Beam Terminal System Details (English), Test No. NYBBT-8

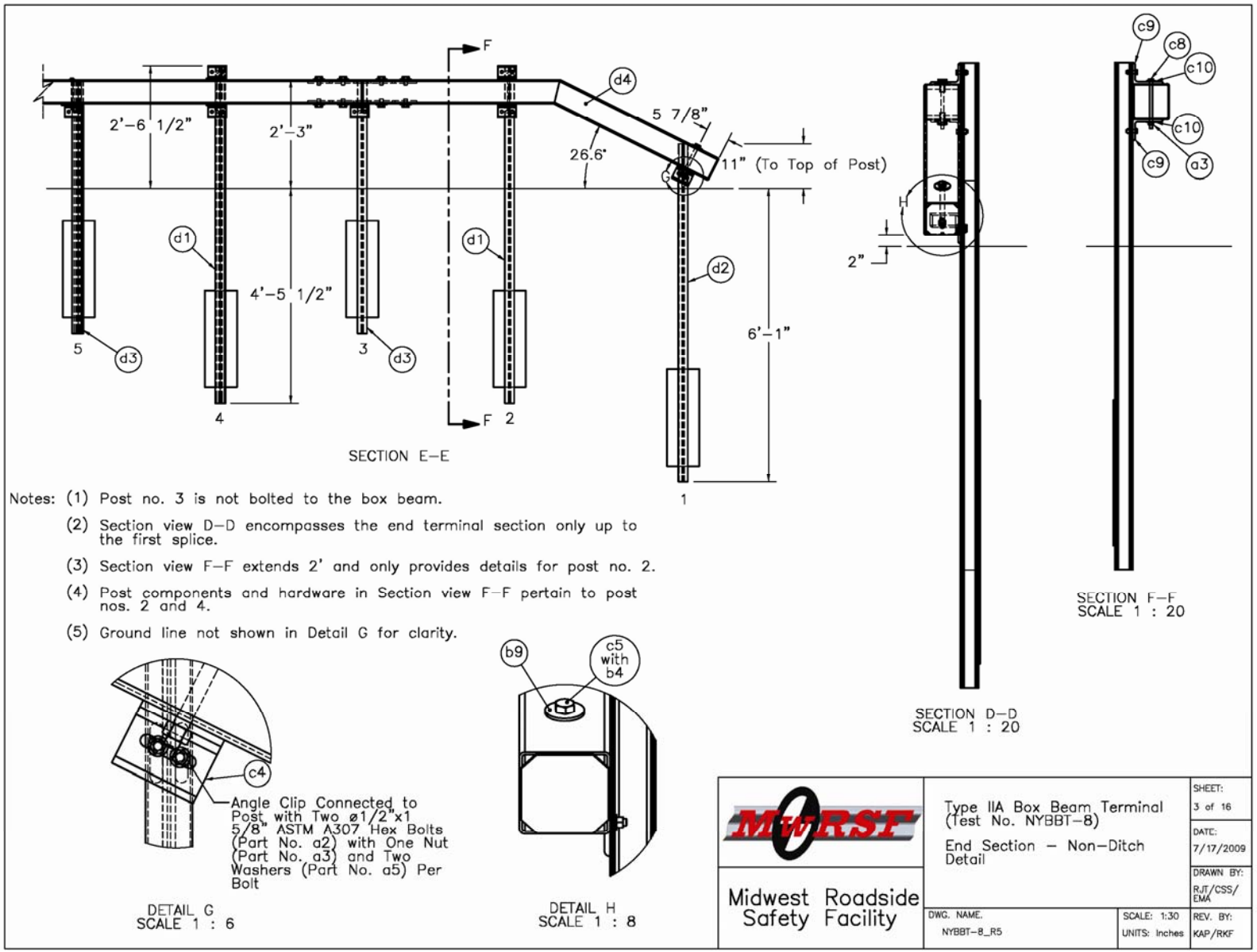


Figure S-3. Modified Type IIA Box Beam Terminal System Details (English), Test No. NYBBT-8

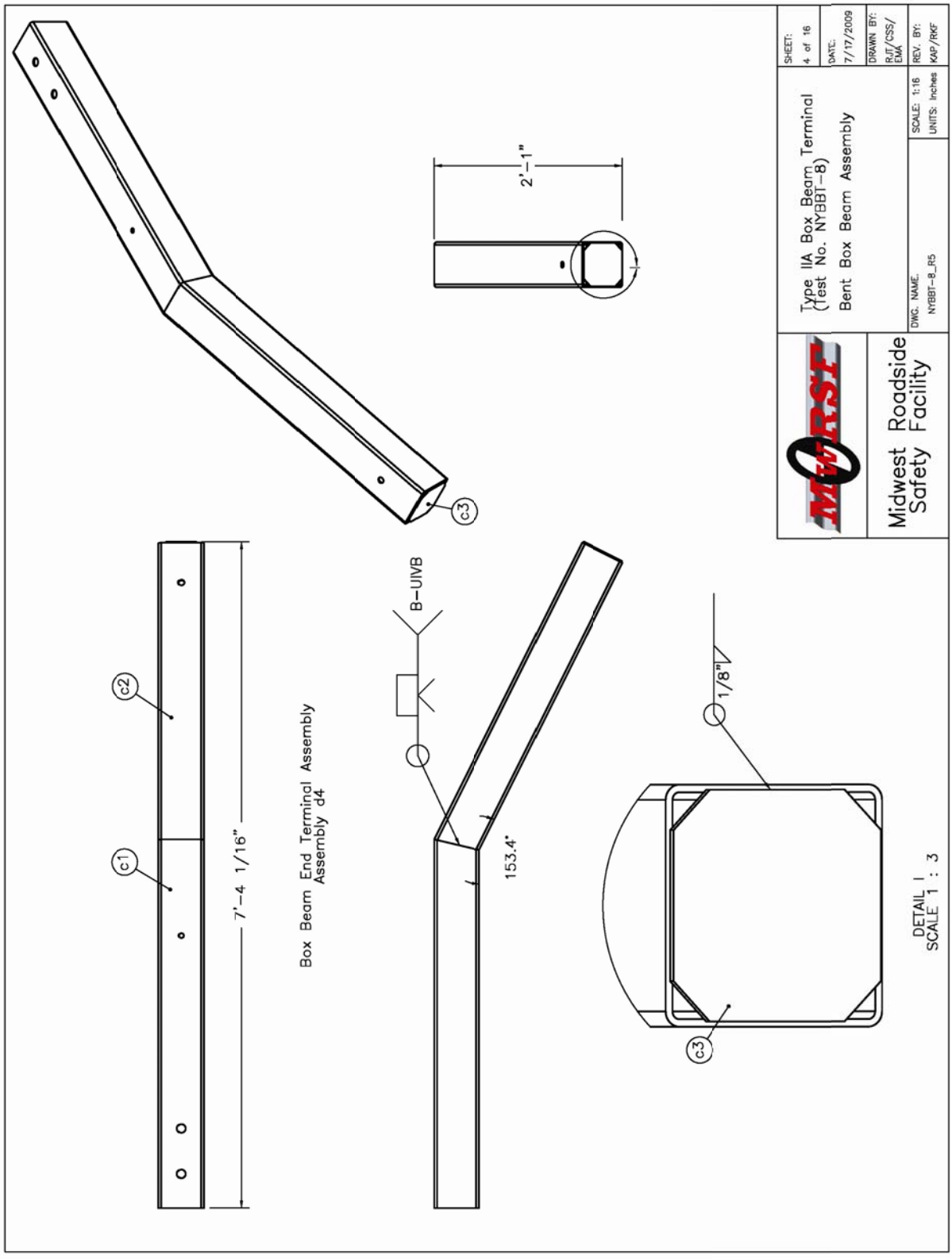


Figure S-4. Modified Type IIA Box Beam Terminal System Details (English), Test No. NYBBT-8

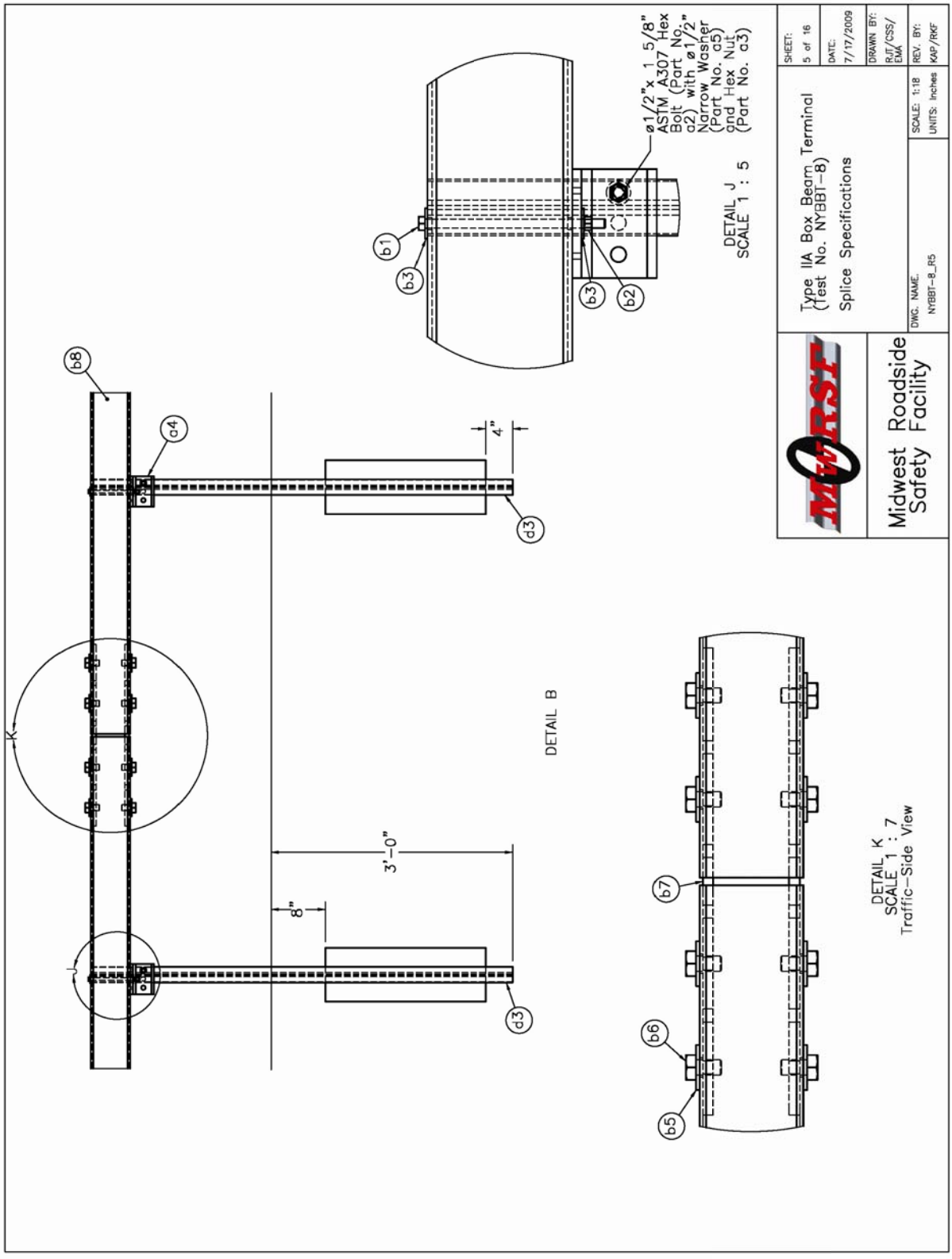


Figure S-5. Modified Type IIA Box Beam Terminal System Details (English), Test No. NYBBT-8

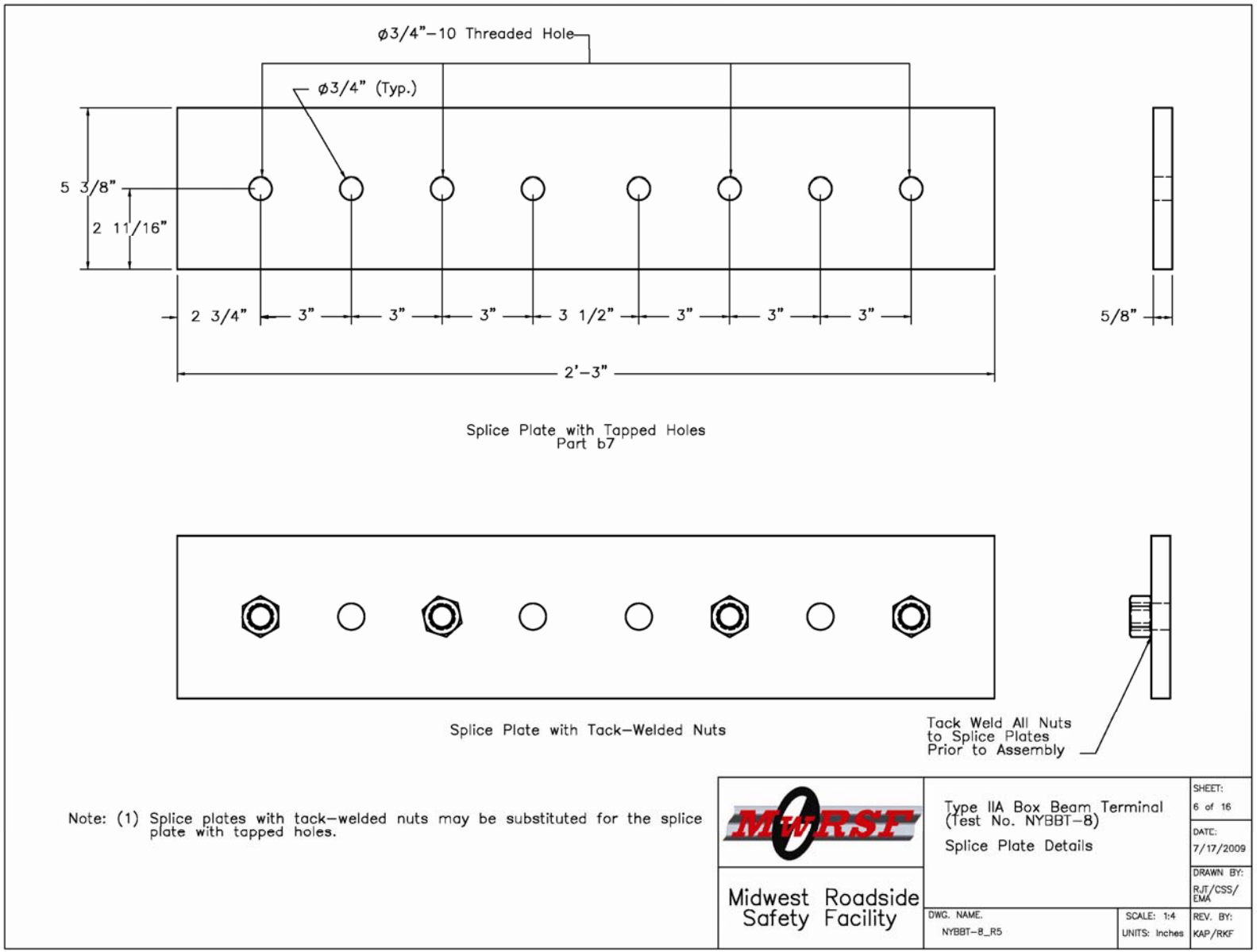


Figure S-6. Modified Type IIA Box Beam Terminal System Details (English), Test No. NYBBT-8

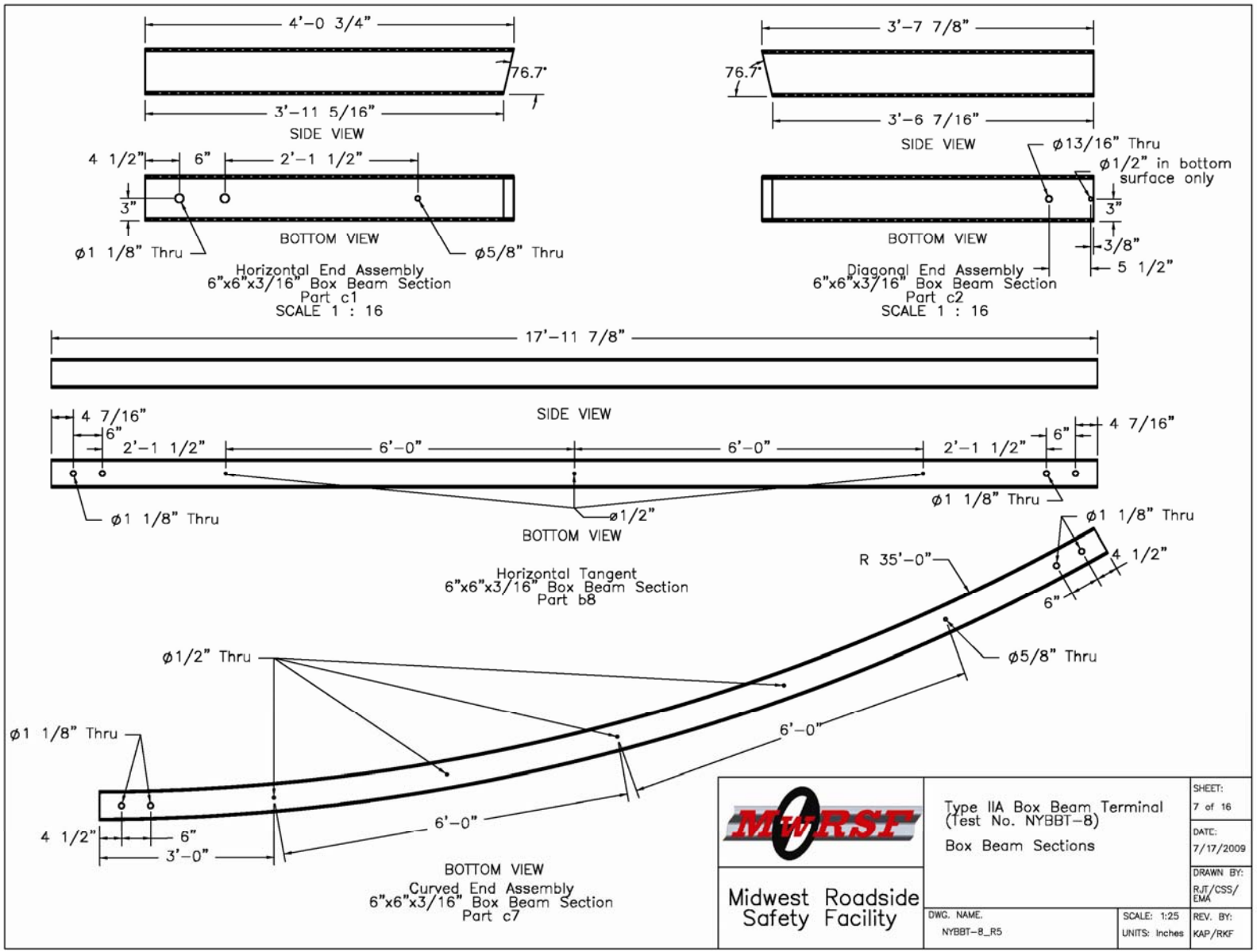


Figure S-7. Modified Type IIA Box Beam Terminal System Details (English), Test No. NYBBT-8

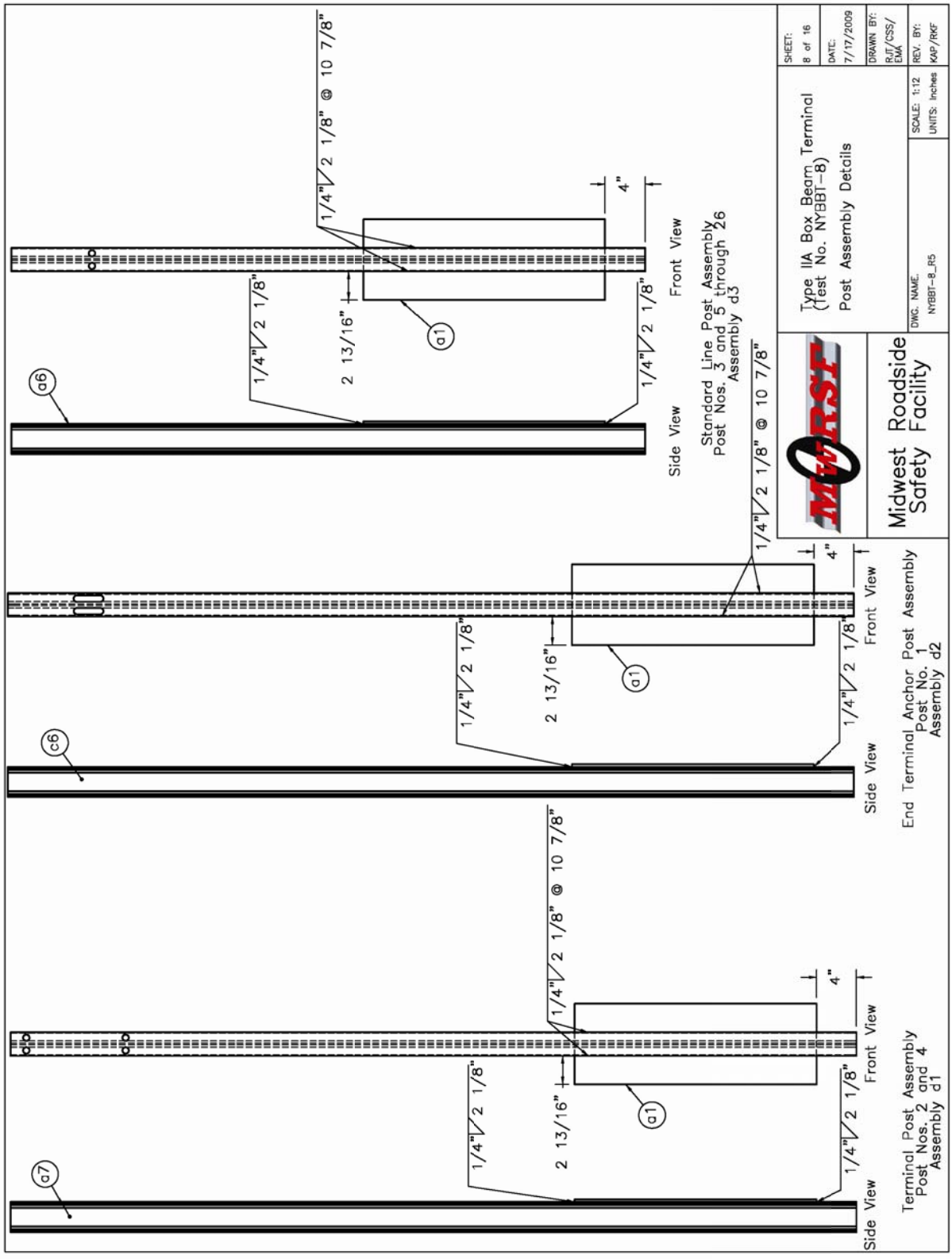


Figure S-8. Modified Type IIA Box Beam Terminal System Details (English), Test No. NYBBT-8

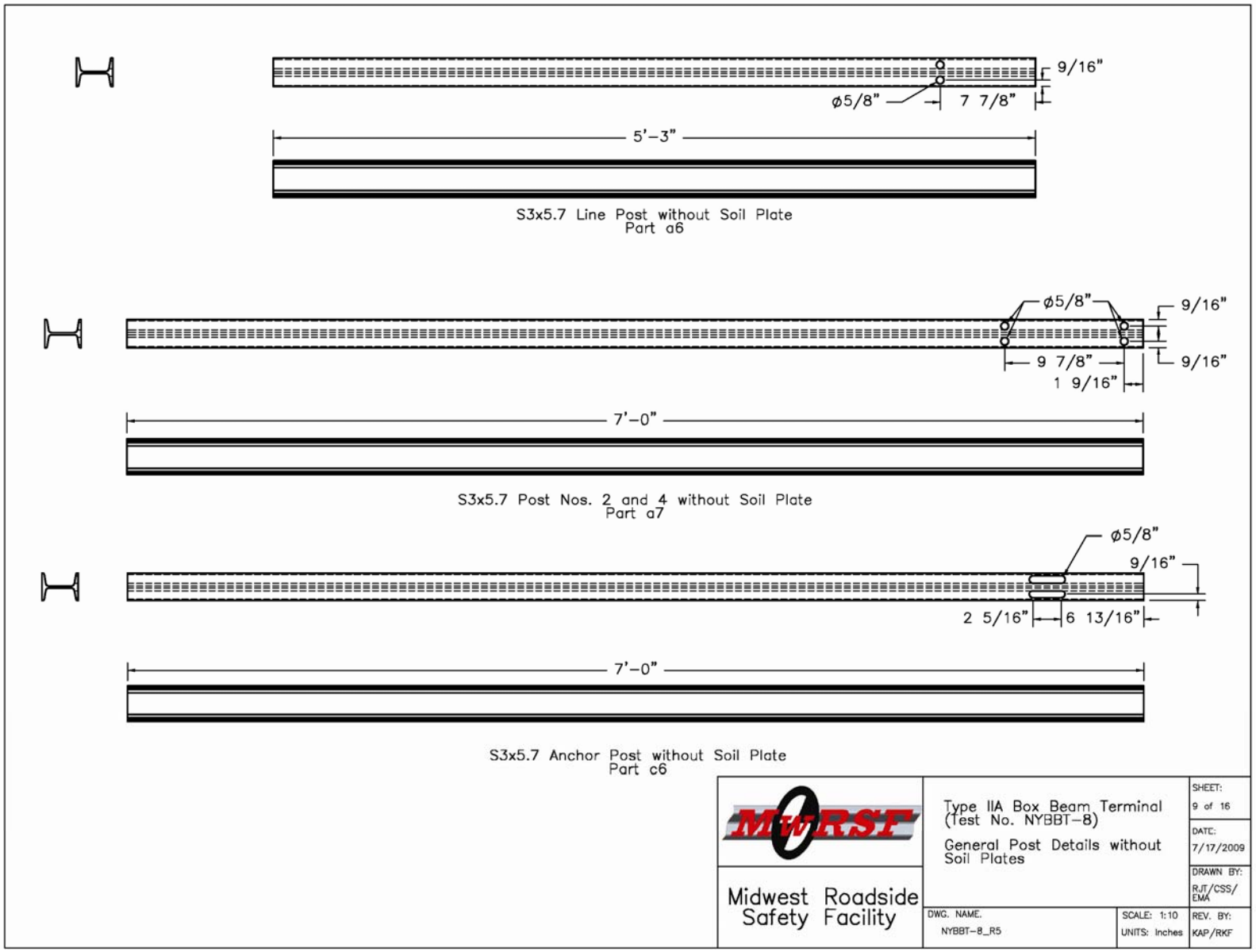


Figure S-9. Modified Type IIA Box Beam Terminal System Details (English), Test No. NYBBT-8

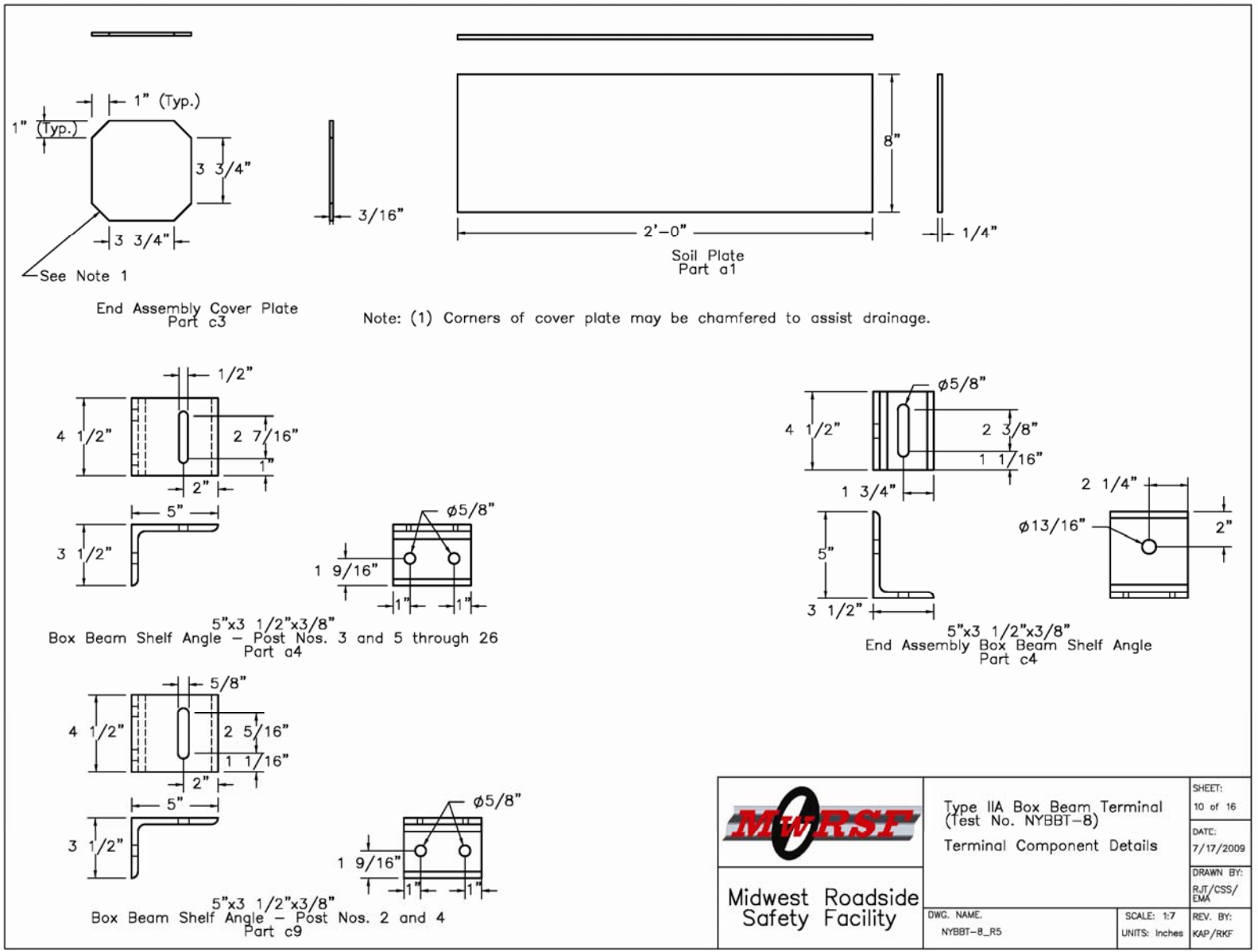


Figure S-10. Modified Type IIA Box Beam Terminal System Details (English), Test No. NYBBT-8

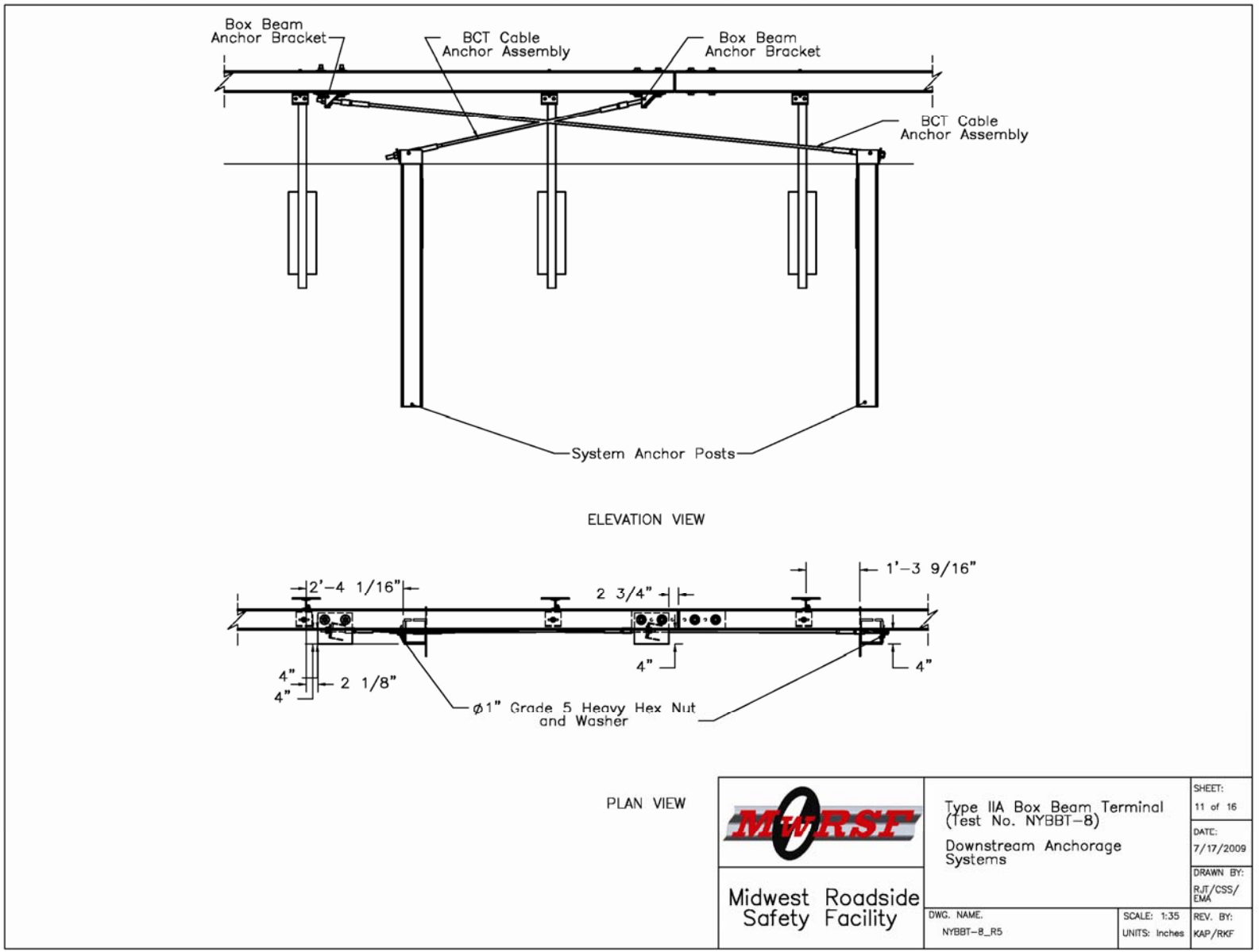


Figure S-11. Modified Type IIA Box Beam Terminal System Details (English), Test No. NYBBT-8

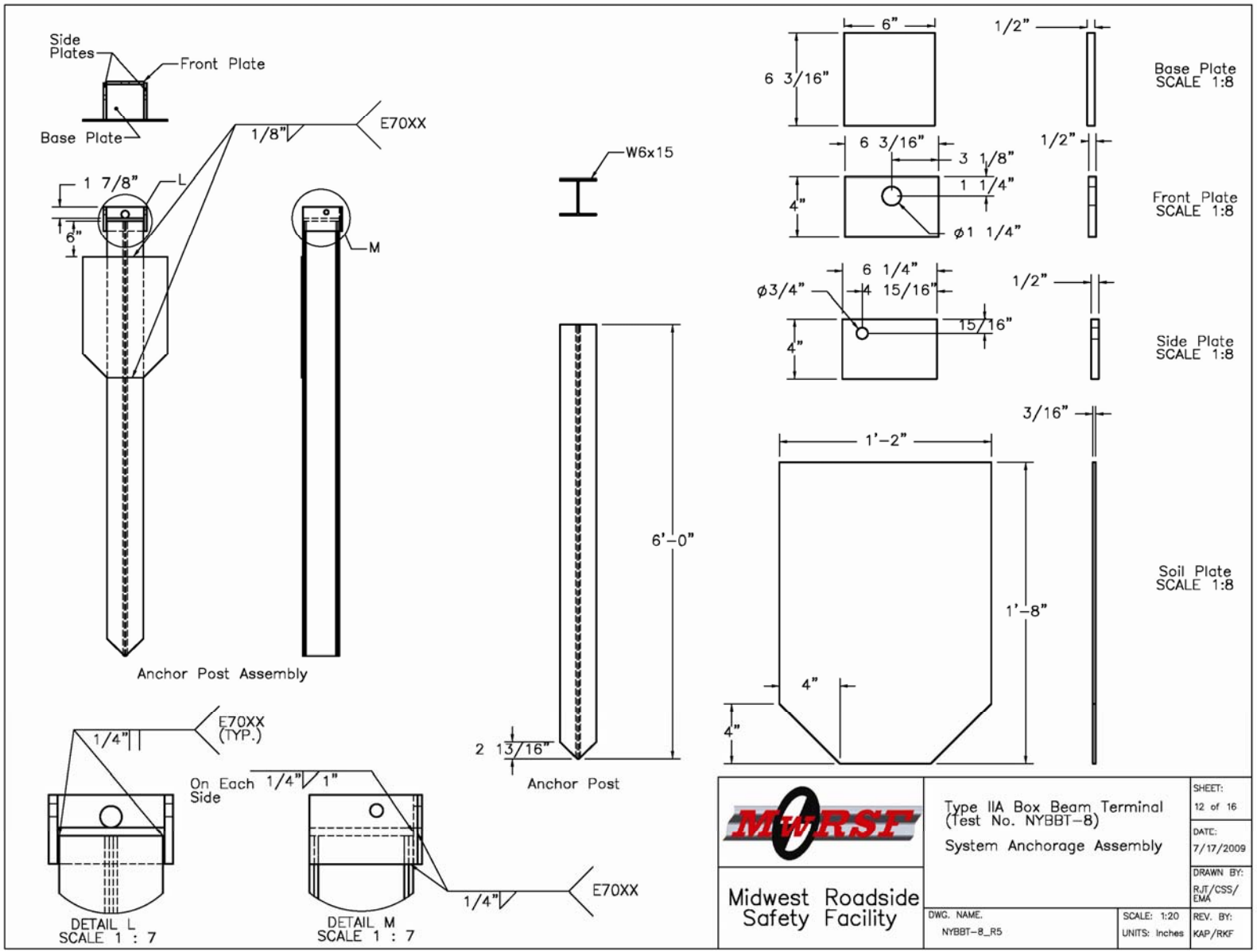


Figure S-12. Modified Type IIA Box Beam Terminal System Details (English), Test No. NYBBT-8

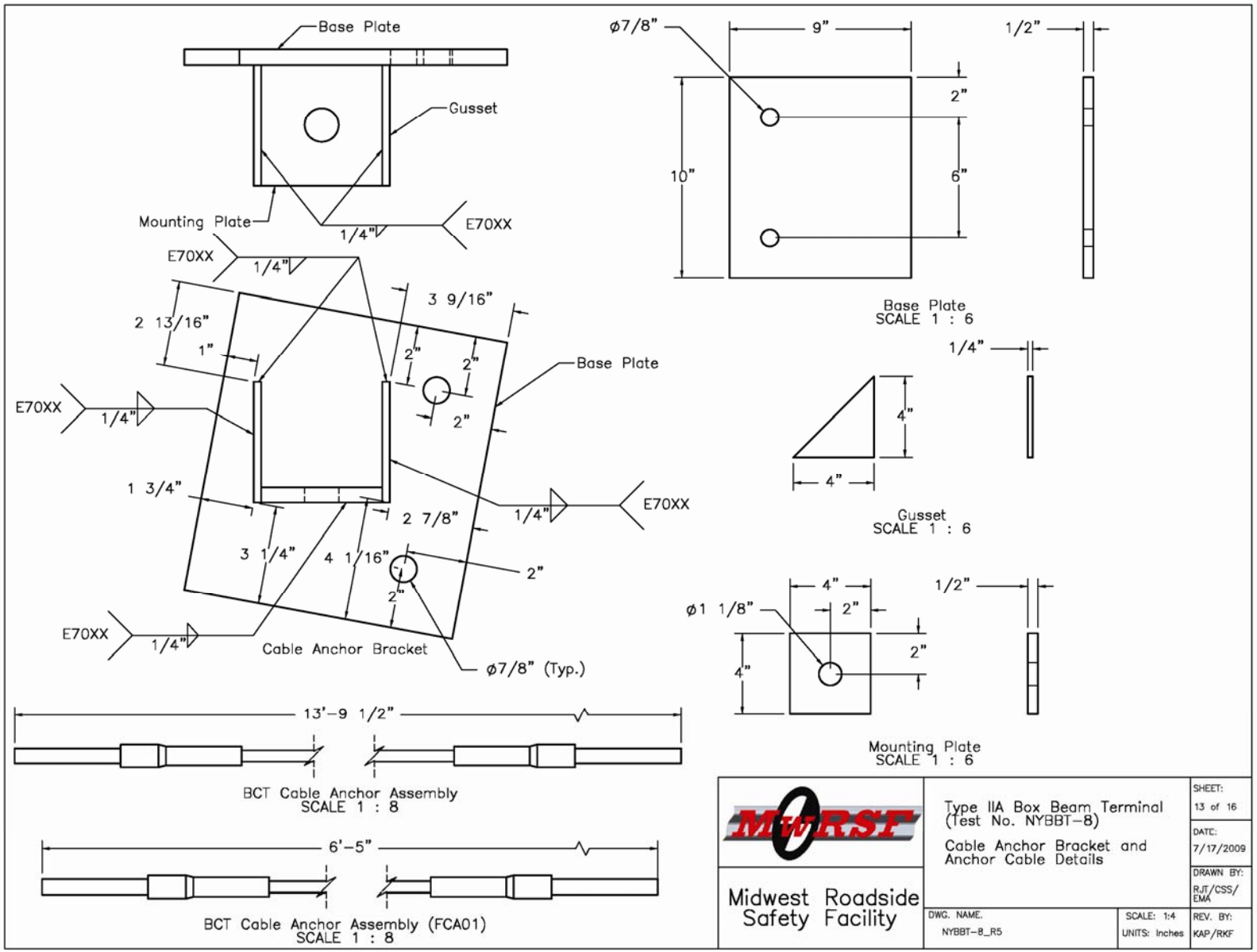


Figure S-13. Modified Type IIA Box Beam Terminal System Details (English), Test No. NYBBT-8

Test No. NYBBT-8			
Item No.	Quantity	Description	Material Specifications
a1	26	1/4" x 8" x 2' steel soil plate	A36 Steel
a2	29	ø 1/2" coarse thread, 1 5/8" long hex bolt	ASTM A307
a3	31	ø 1/2" hex nut	ASTM A307
a4	23	5" x 3 1/2" x 3/8" box beam shelf angle	A36 Steel
a5	31	ø 1/2" narrow washer	ASTM A307
a6	23	S3 x 5.7, 63" long post	A36 Steel
a7	2	S3 x 5.7, 84" long post	A36 Steel
b1	22	ø 3/8" coarse thread, 7 1/2" long hex bolt	ASTM A307
b2	22	ø 3/8" hex nut	ASTM A307
b3	44	ø 3/8" wide washer	ASTM A307
b4	1	ø 3/4" hex nut	ASTM A307
b5	56	ø 3/4" wide washer	ASTM A325
b6	56	ø 3/4" coarse thread, 1 1/2" long hex bolt	ASTM A325
b7	14	27" x 5 3/8" x 5/8" splice plate	A36 Steel
b8	6	6" x 6" x 3/16" by 17'-11 7/8" long box beam	ASTM A500 Grade B
b9	1	ø 3/4" wide washer	ASTM A307
c1	1	End assembly bent 6" x 6" x 3/16" box beam	ASTM A500 Grade B
c2	1	End assembly diagonal 6" x 6" x 3/16" box beam	ASTM A500 Grade B
c3	1	End assembly 3/16" thick cover plate	A36 Steel
c4	1	5" x 3 1/2" x 3/8" box beam anchor post shelf angle	A36 Steel
c5	1	ø 3/4" coarse thread, 8" long hex bolt	ASTM A307
c6	1	S3 x 5.7, 84" long post anchor post	A36 Steel
c7	1	6" x 6" x 3/16", R 35' Curved Box Beam	ASTM A500 Grade B
c8	2	ø 1/2" coarse thread, 8" long hex bolt	ASTM A307
c9	4	5" x 3 1/2" x 3/8" box beam shelf angle with ø 5/8" slot	A36 Steel
c10	4	ø 1/2" wide washer	ASTM A307
d1	2	Terminal Post Assembly	–
d2	1	Terminal Anchor Post Assembly	–
d3	23	Line Post Assembly	–
d4	1	Box Beam End Terminal Assembly	–

Midwest Roadside Safety Facility

Type IIA Box Beam Terminal (Test No. NYBBT-8)
Bill of Materials

SHEET: 14 of 16
DATE: 7/17/2009
DRAWN BY: RJT/CSS/EMA
REV. BY: KAP/RKF
DWG. NAME. NYBBT-8_R5
SCALE: None
UNITS: Inches

Figure S-14. Modified Type IIA Box Beam Terminal System Details (English), Test No. NYBBT-8

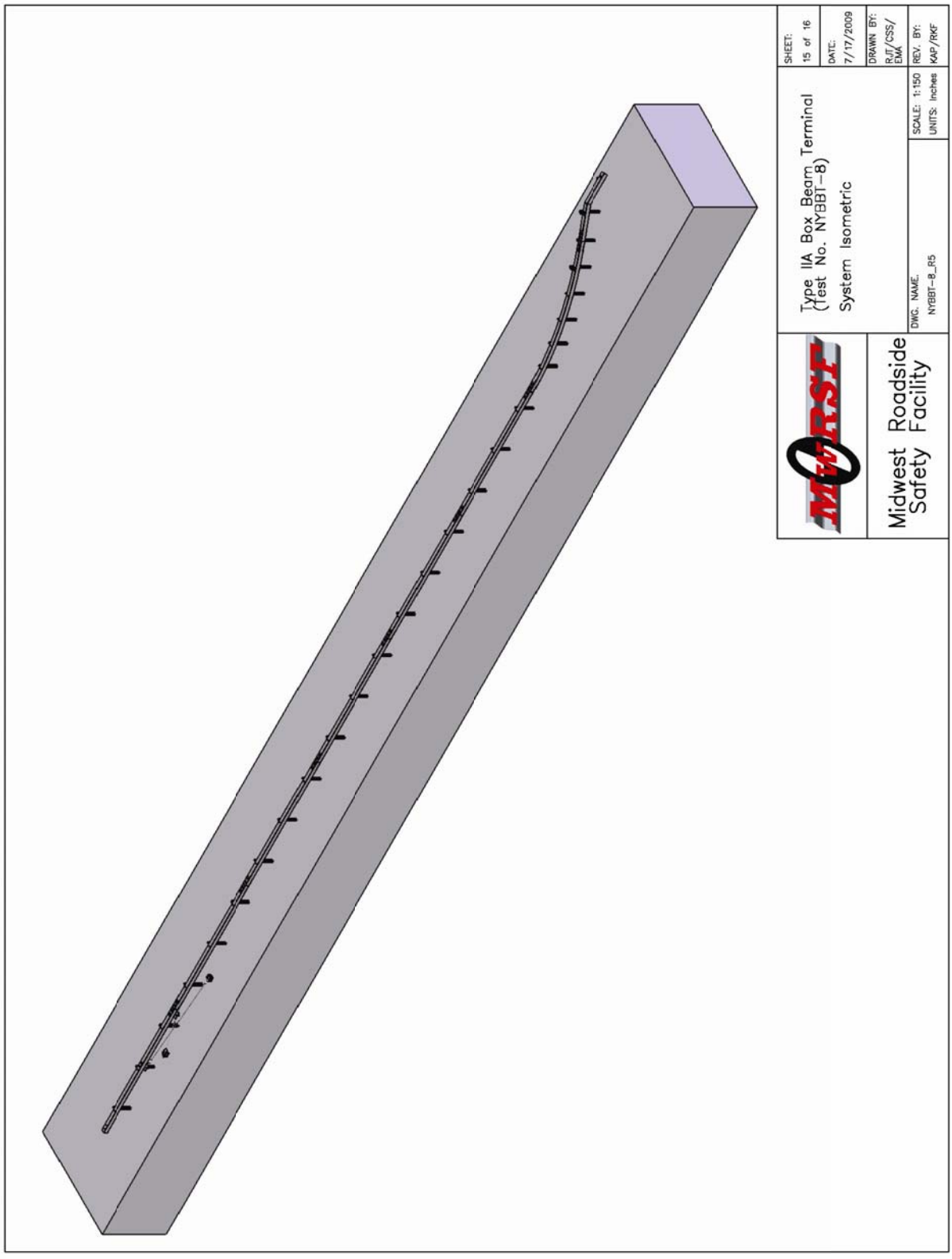


Figure S-15. Modified Type IIA Box Beam Terminal System Details (English), Test No. NYBBT-8

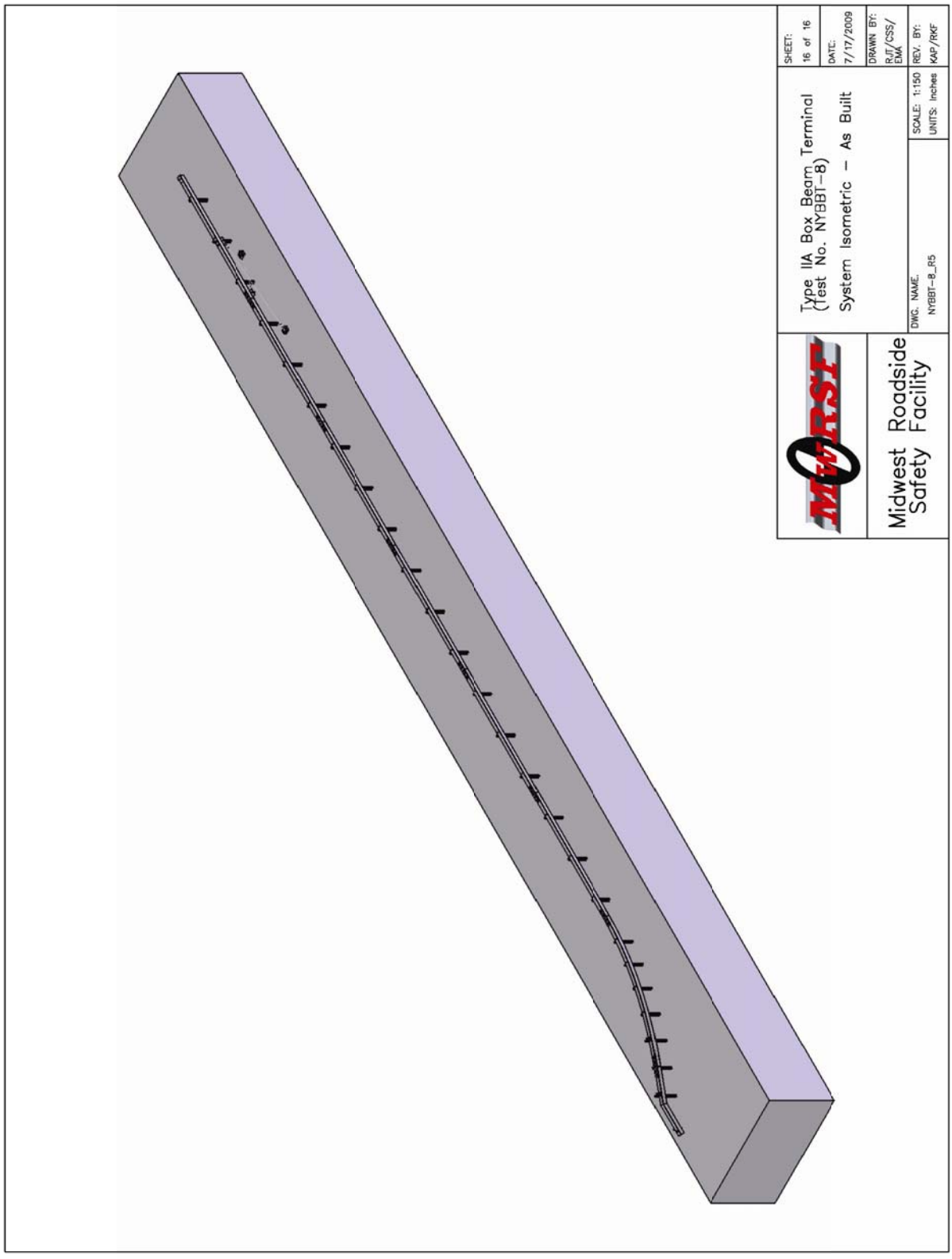


Figure S-16. Modified Type IIA Box Beam Terminal System Details (English), Test No. NYBBT-8

APPENDIX T Modified Type IIA Box Beam Terminal System Details - Metric and English Units, Test No. NYBBT-9

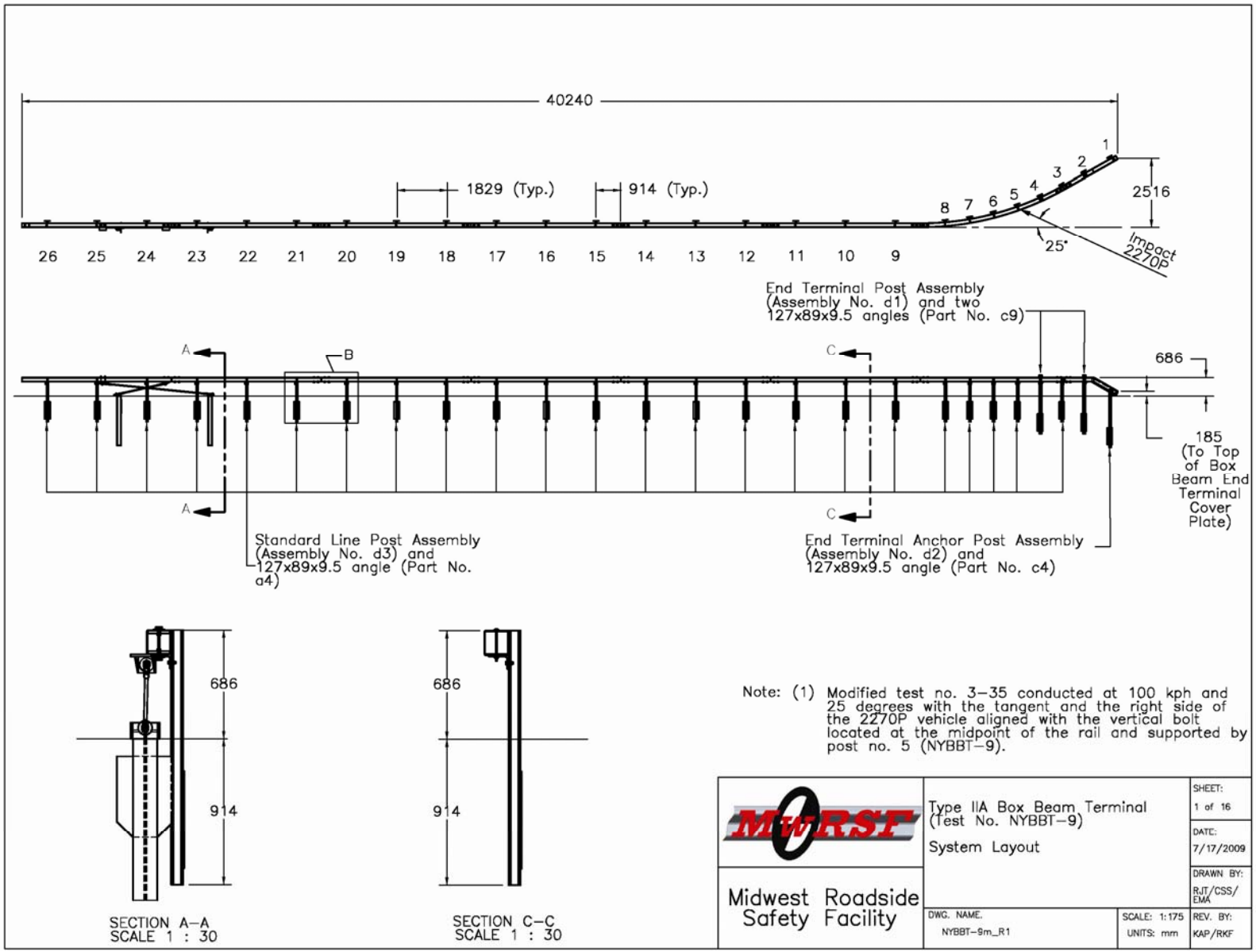


Figure T-1. Modified Type IIA Box Beam Terminal System Details (Metric), Test No. NYBBT-9

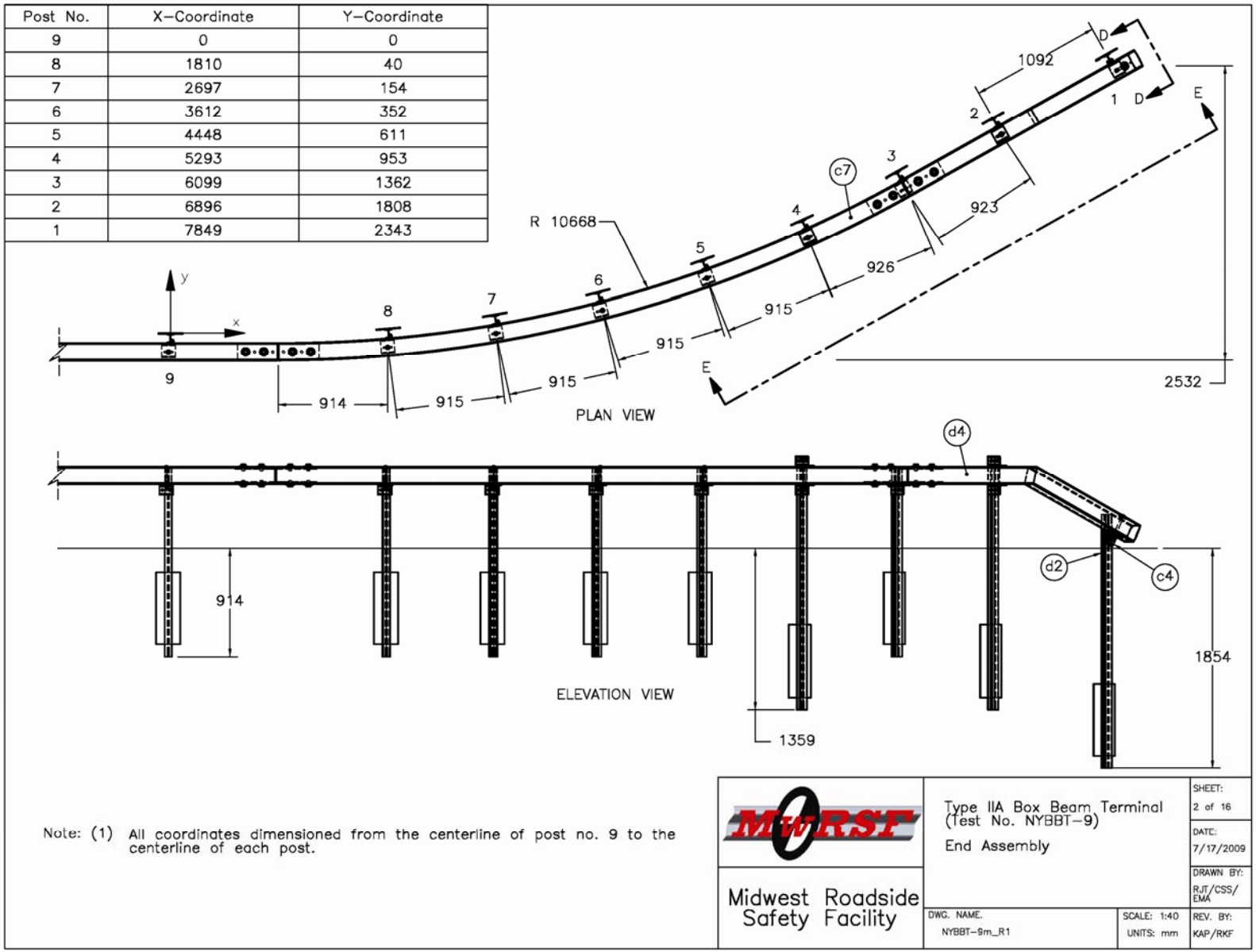


Figure T-2. Modified Type IIA Box Beam Terminal System Details (Metric), Test No. NYBBT-9

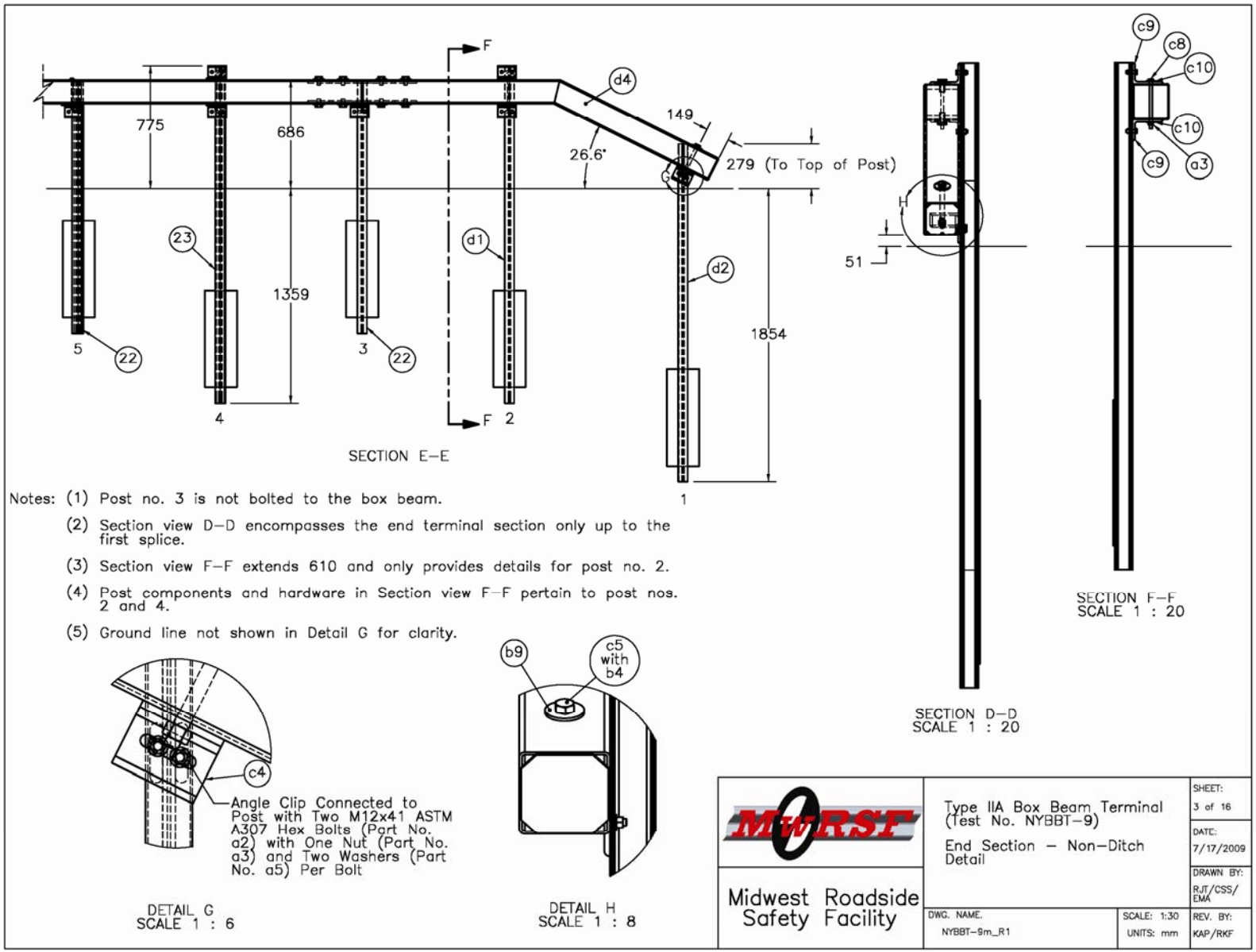


Figure T-3. Modified Type IIA Box Beam Terminal System Details (Metric), Test No. NYBBT-9

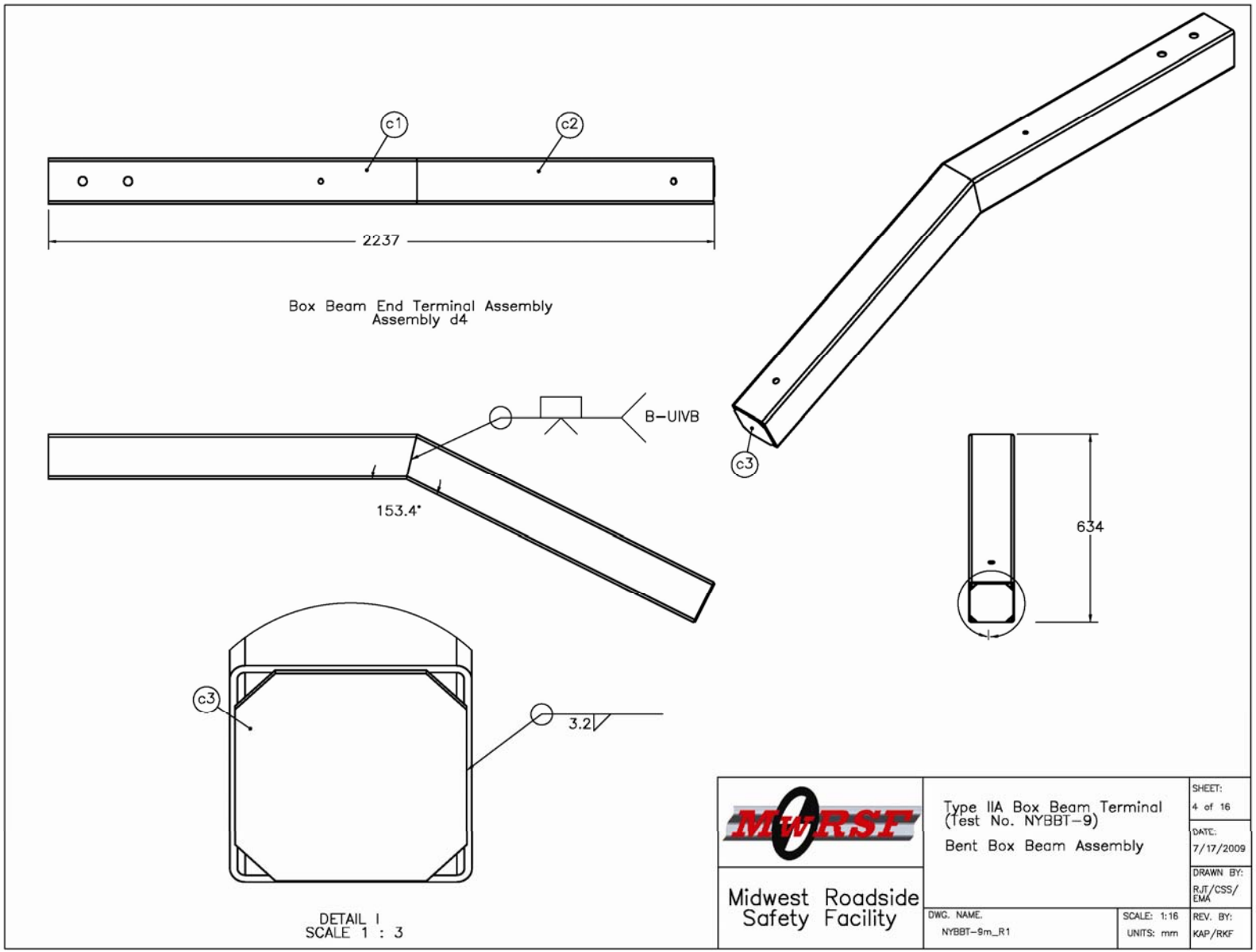


Figure T-4. Modified Type IIA Box Beam Terminal System Details (Metric), Test No. NYBBT-9

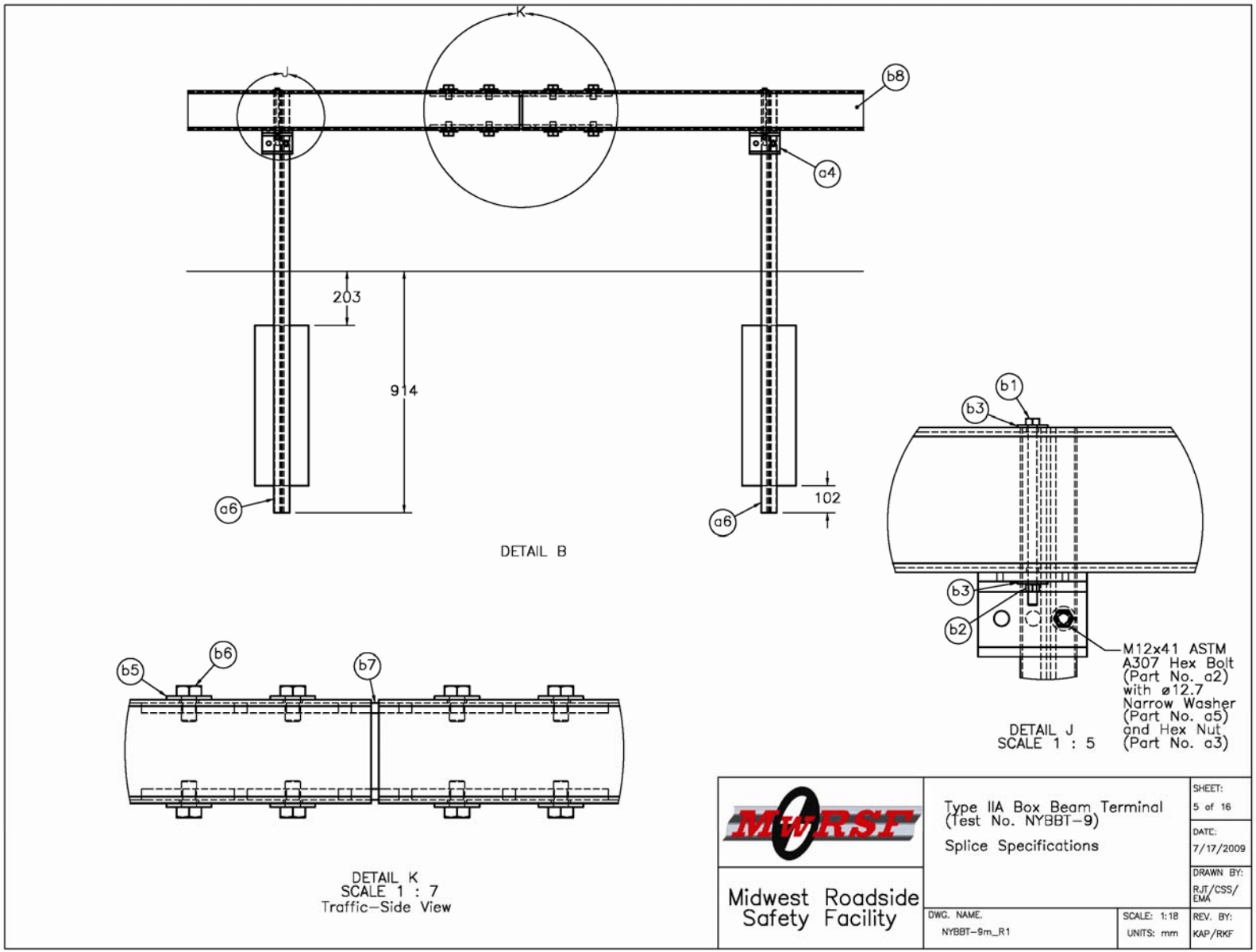


Figure T-5. Modified Type IIA Box Beam Terminal System Details (Metric), Test No. NYBBT-9

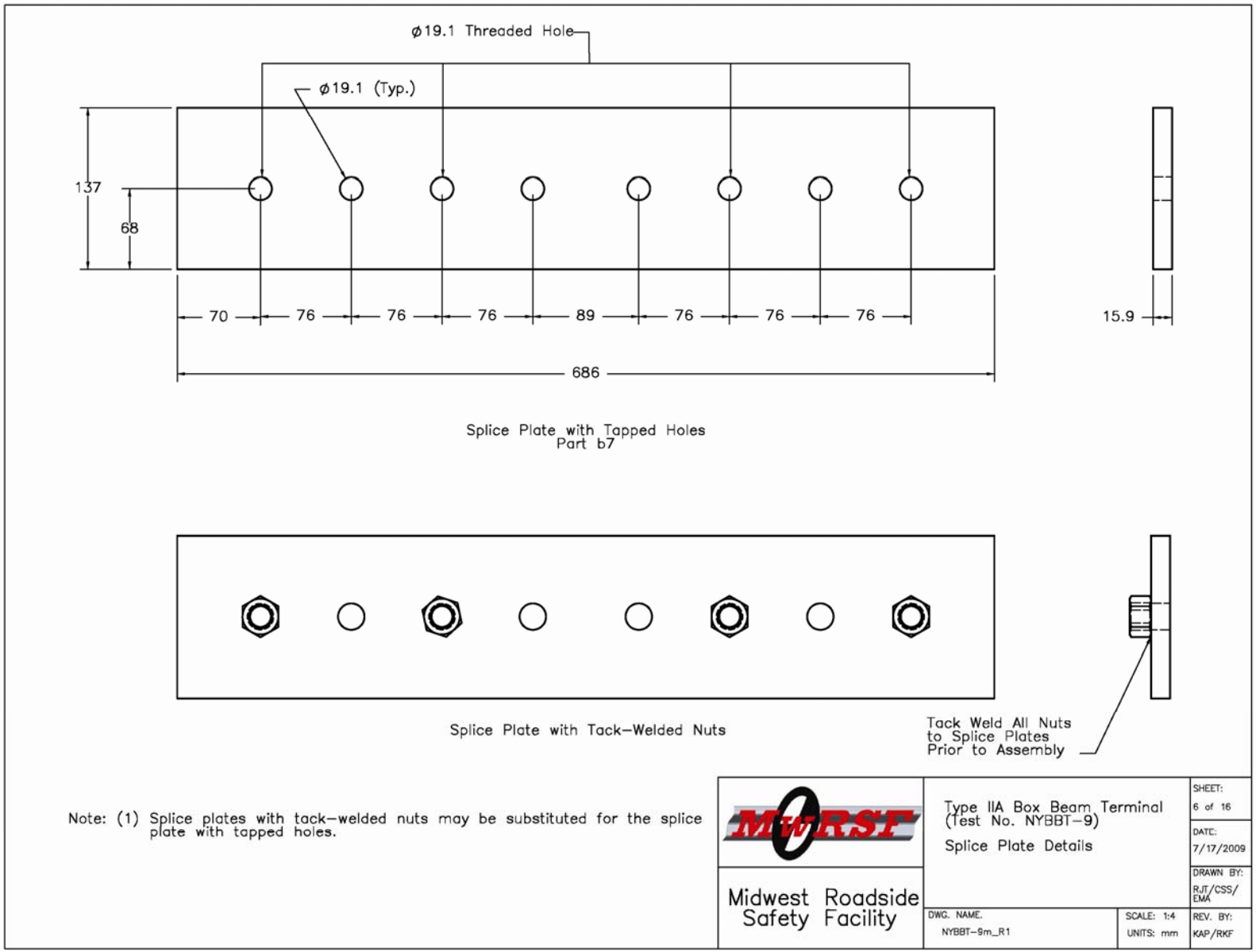


Figure T-6. Modified Type IIA Box Beam Terminal System Details (Metric), Test No. NYBBT-9

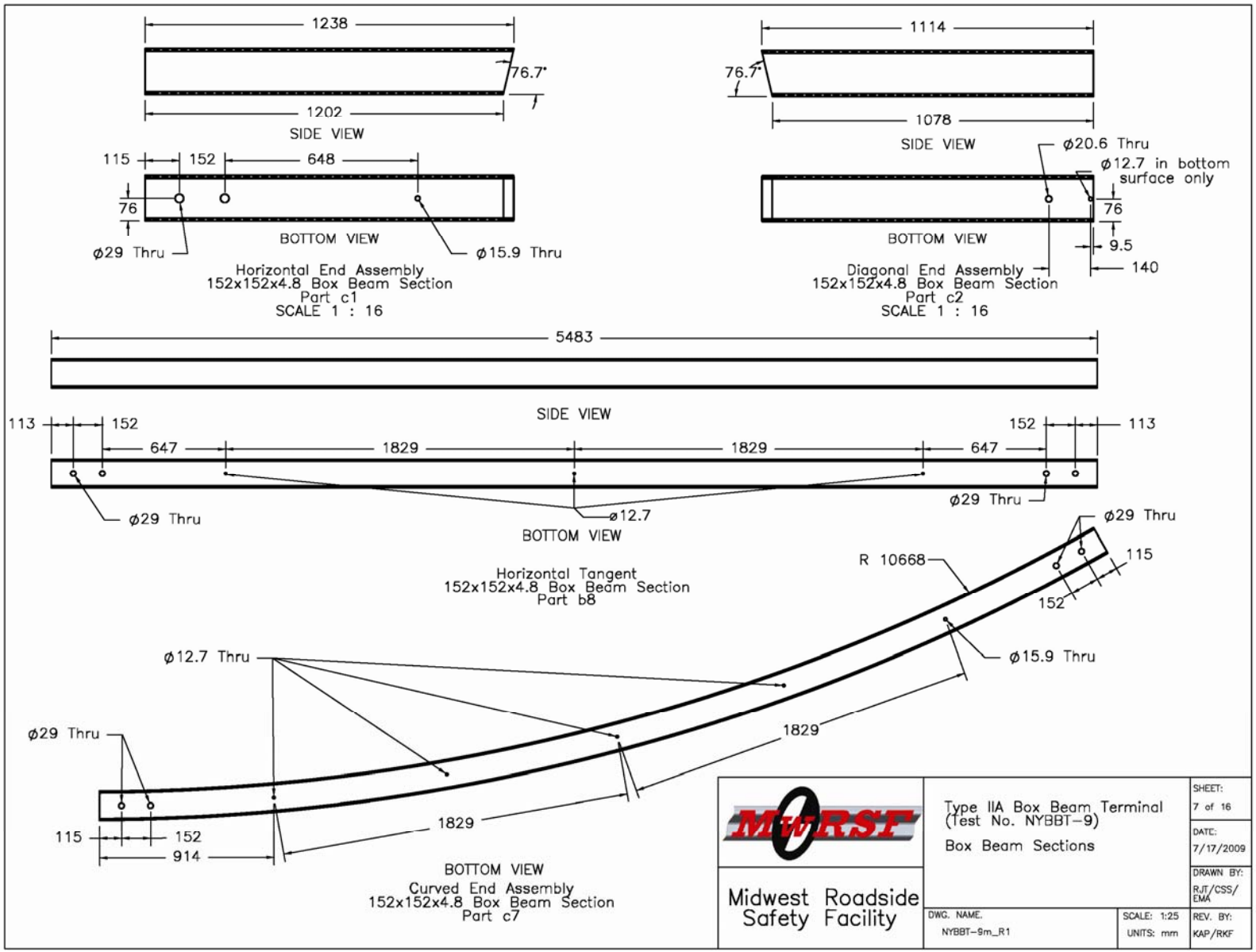


Figure T-7. Modified Type IIA Box Beam Terminal System Details (Metric), Test No. NYBBT-9

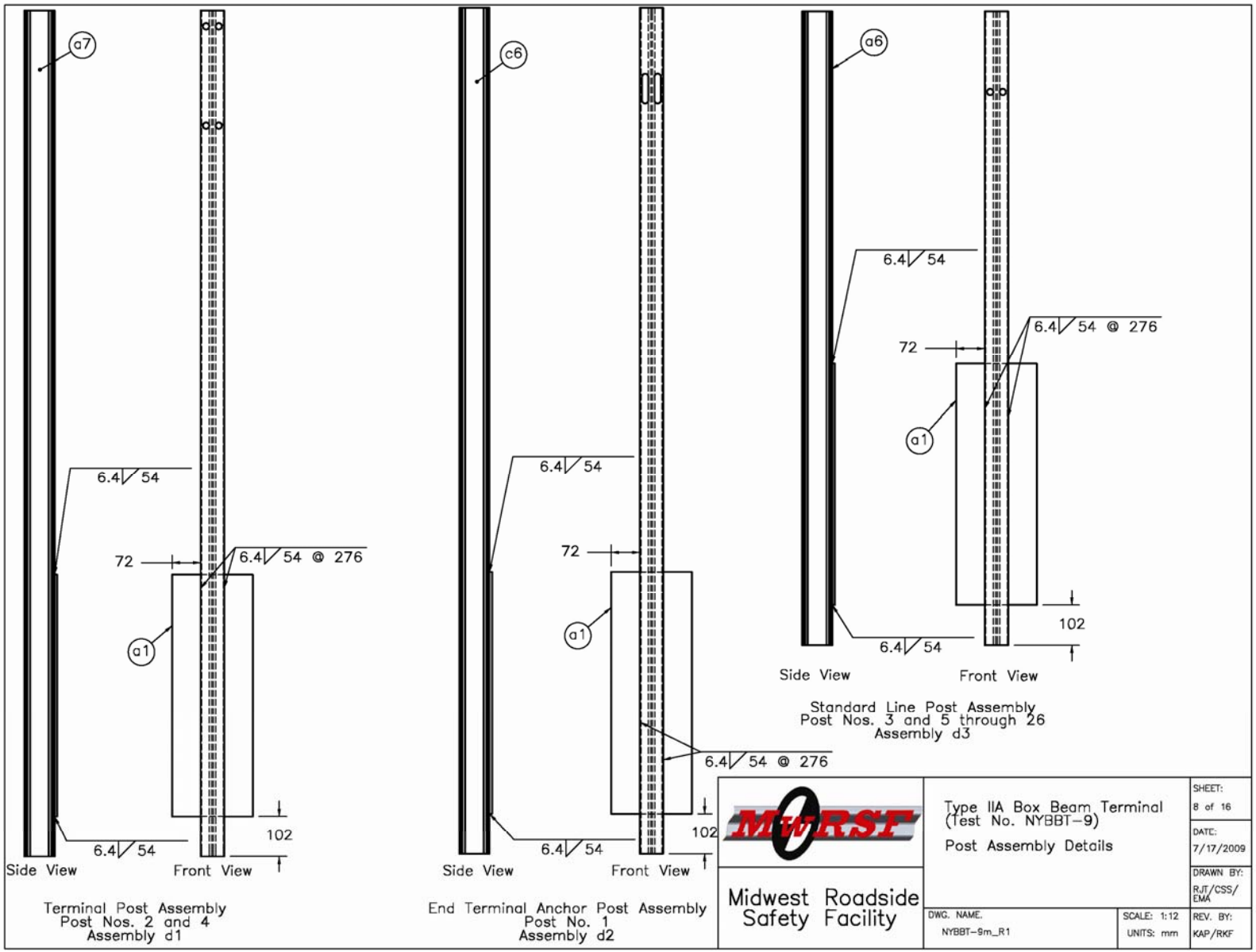


Figure T-8. Modified Type IIA Box Beam Terminal System Details (Metric), Test No. NYBBT-9

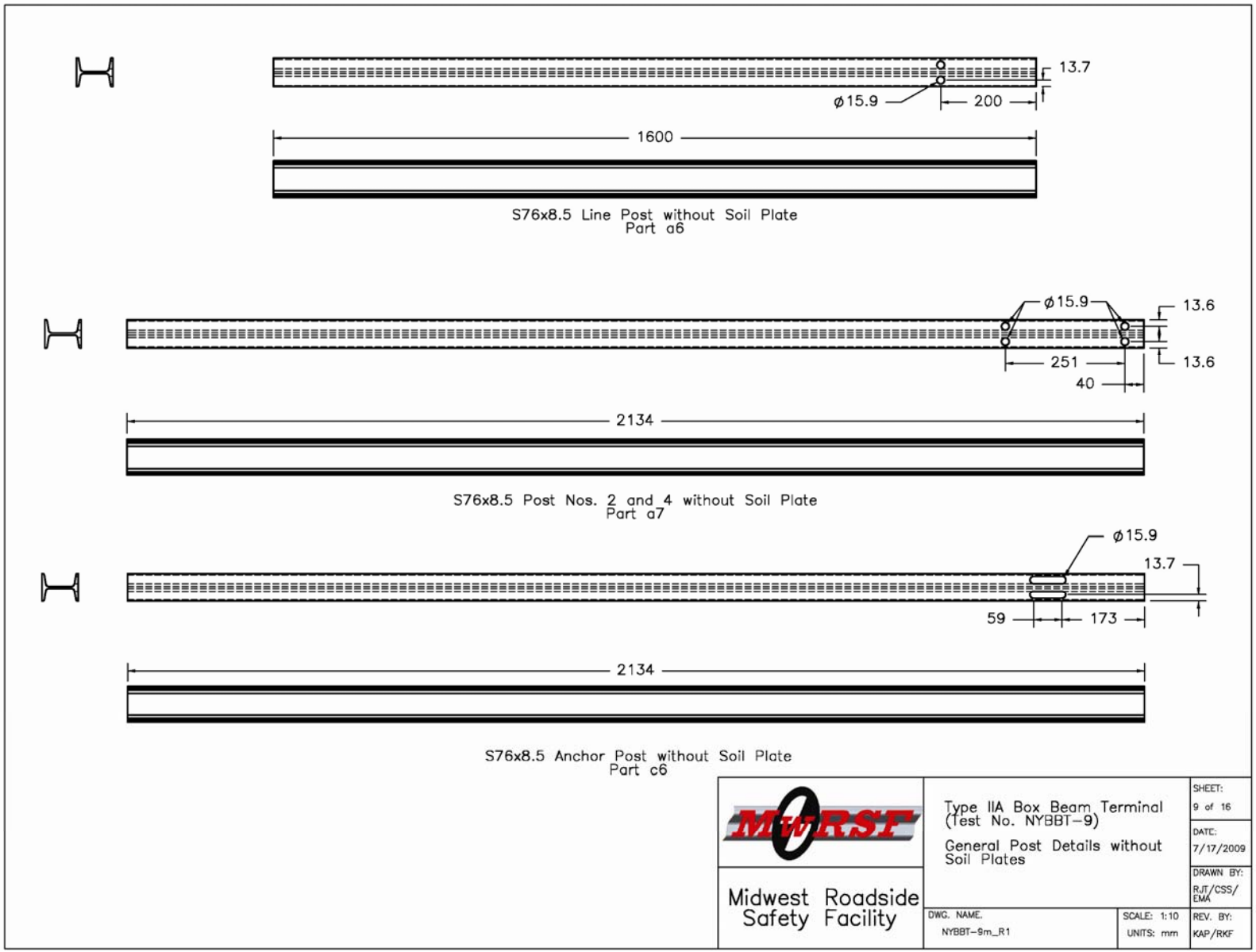


Figure T-9. Modified Type IIA Box Beam Terminal System Details (Metric), Test No. NYBBT-9

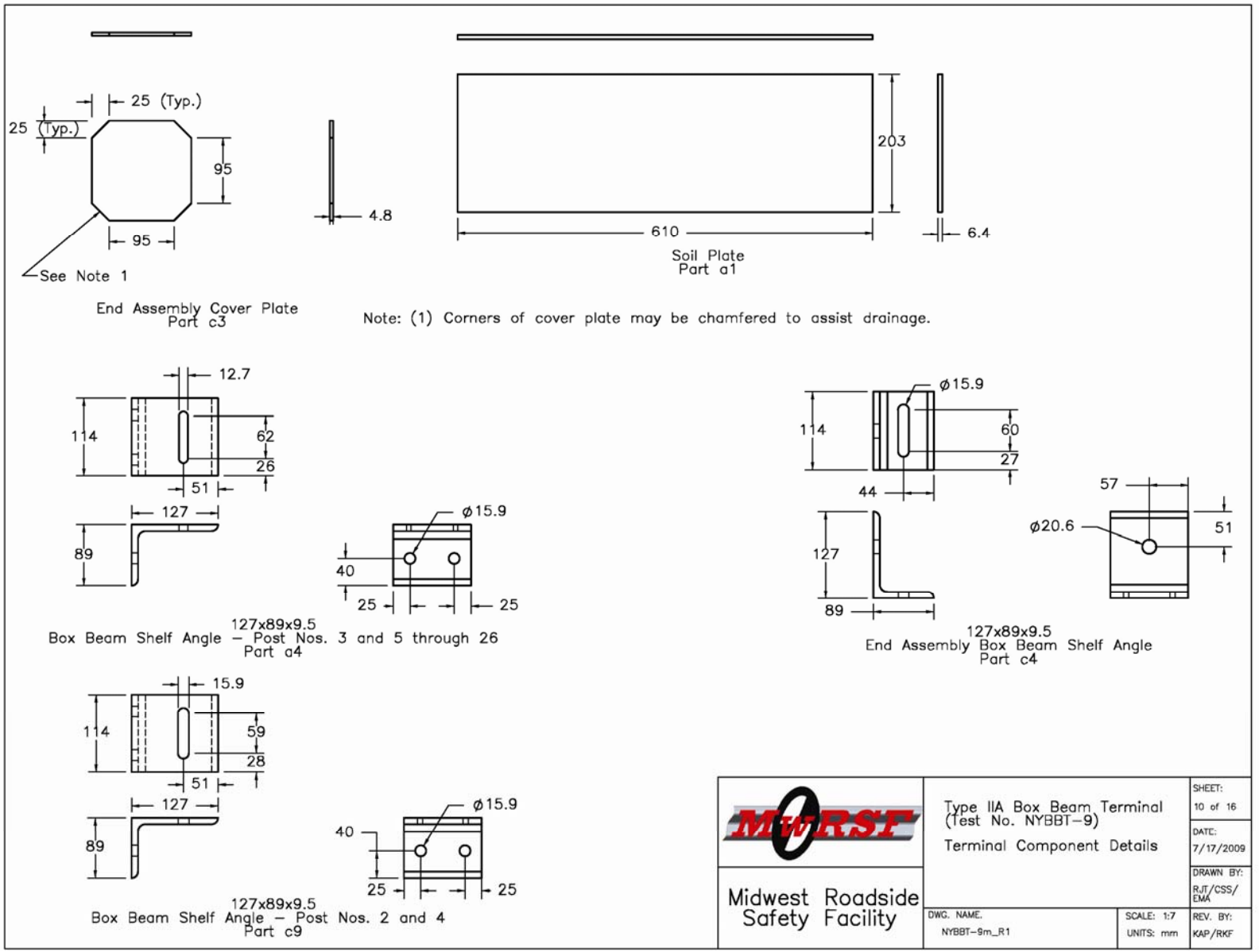


Figure T-10. Modified Type IIA Box Beam Terminal System Details (Metric), Test No. NYBBT-9

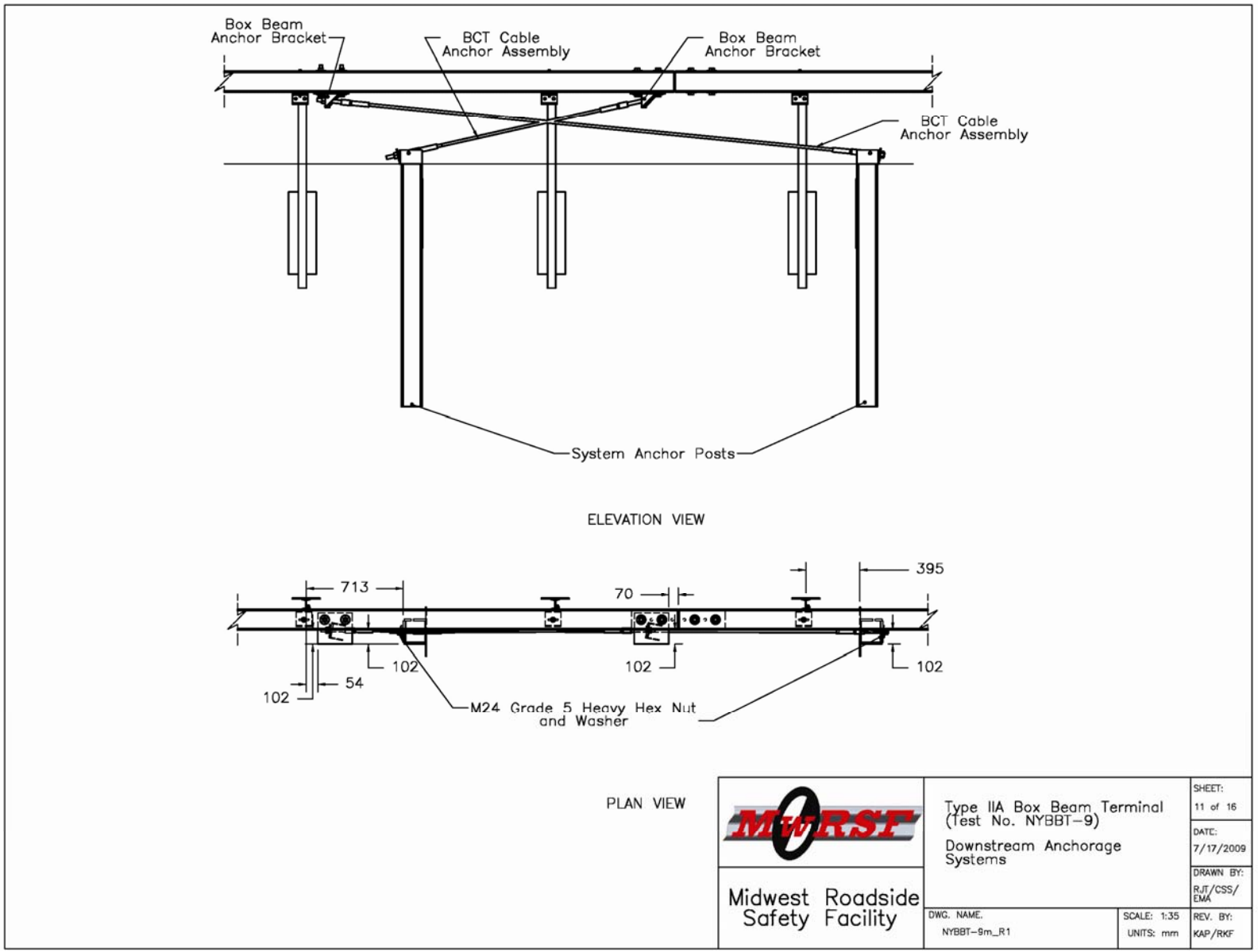


Figure T-11. Modified Type IIA Box Beam Terminal System Details (Metric), Test No. NYBBT-9

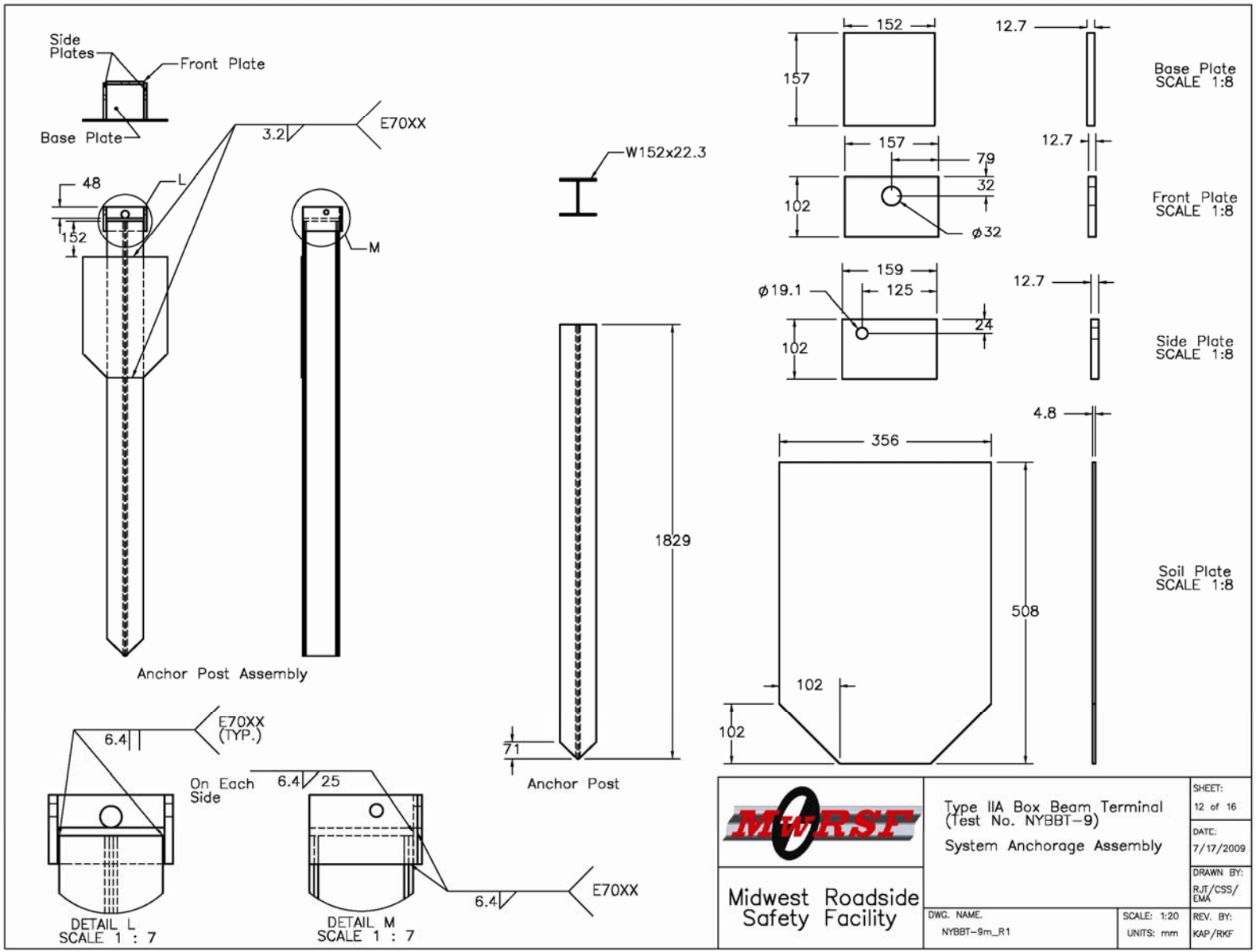


Figure T-12. Modified Type IIA Box Beam Terminal System Details (Metric), Test No. NYBBT-9

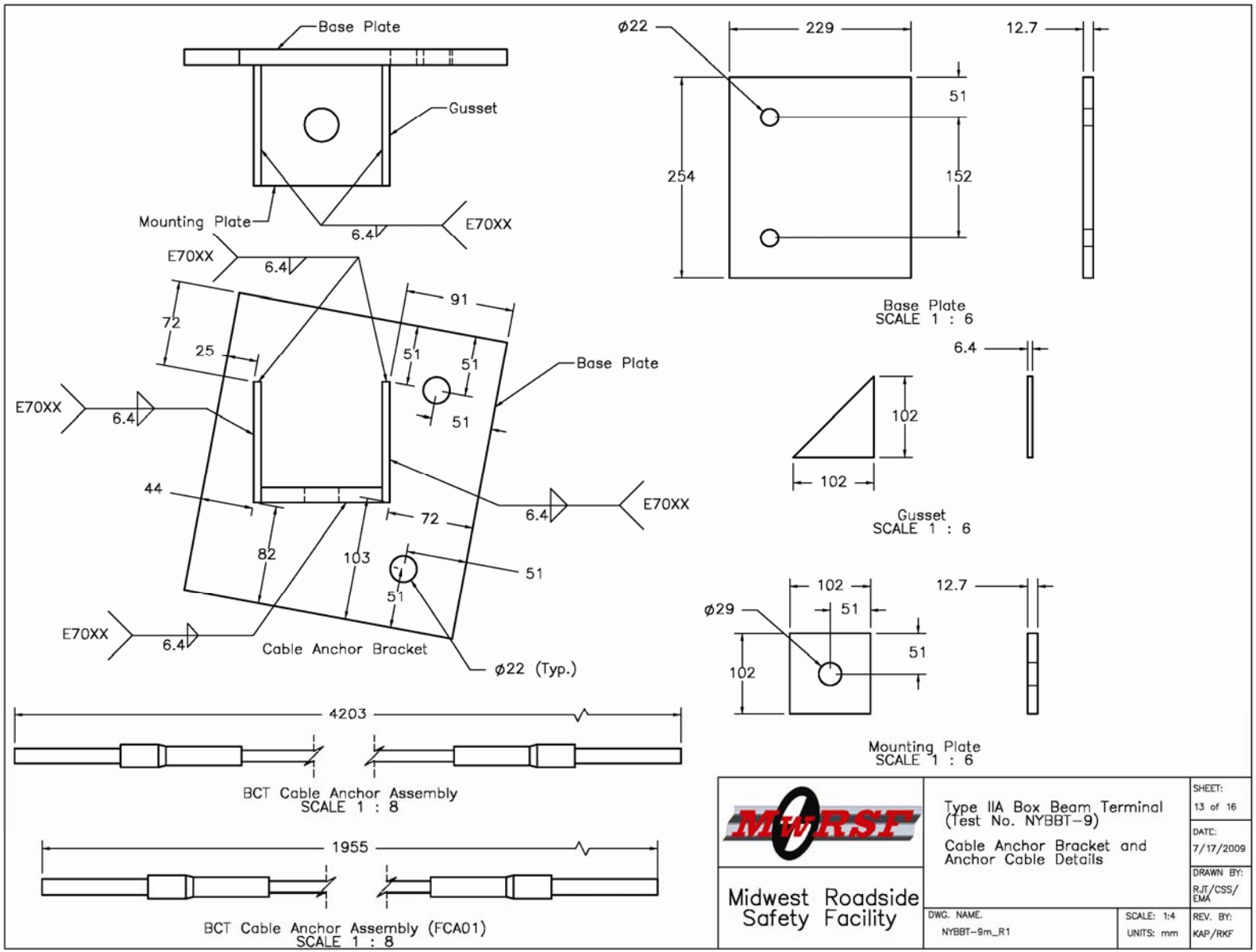


Figure T-13. Modified Type IIA Box Beam Terminal System Details (Metric), Test No. NYBBT-9

Test No. NYBBT-9			
Item No.	Quantity	Description	Material Specifications
a1	26	6.4 x 203 x 610 steel soil plate	A36 Steel
a2	29	M12 coarse thread, 41 long hex bolt	ASTM A307
a3	31	M12 hex nut	ASTM A307
a4	23	127 x 89 x 9.5 box beam shelf angle	A36 Steel
a5	31	M12 narrow washer	ASTM A307
a6	23	S76 x 8.5, 1600 long post	A36 Steel
a7	2	S76 x 8.5, 2134 long post	A36 Steel
b1	22	M10 coarse thread, 191 long hex bolt	ASTM A307
b2	22	M10 hex nut	ASTM A307
b3	44	M10 wide washer	ASTM A307
b4	1	M20 hex nut	ASTM A307
b5	56	M20 wide washer	ASTM A325
b6	56	M20 coarse thread, 38 long hex bolt	ASTM A325
b7	14	686 x 137 x 15.9 splice plate	A36 Steel
b8	6	152 x 152 x 4.8 by 5483 long box beam	ASTM A500 Grade B
b9	1	M20 wide washer	ASTM A307
c1	1	End assembly bent 152 x 152 x 4.8 box beam	ASTM A500 Grade B
c2	1	End assembly diagonal 152 x 152 x 4.8 box beam	ASTM A500 Grade B
c3	1	End assembly 4.8 thick cover plate	A36 Steel
c4	1	127 x 89 x 9.5 box beam anchor post shelf angle	A36 Steel
c5	1	M20 coarse thread, 203 long hex bolt	ASTM A307
c6	1	S76 x 8.5, 2134 long post anchor post	A36 Steel
c7	1	152 x 152 x 4.8, R 10668 Curved Box Beam	ASTM A500 Grade B
c8	2	M12 coarse thread, 203 long hex bolt	ASTM A307
c9	4	127 x 89 x 9.5 box beam shelf angle with ø15.9 slot	A36 Steel
c10	4	M12 wide washer	ASTM A307
d1	2	Terminal Post Assembly	–
d2	1	Terminal Anchor Post Assembly	–
d3	23	Line Post Assembly	–
d4	1	Box Beam End Terminal Assembly	–

Midwest Roadside Safety Facility

Type IIA Box Beam Terminal (Test No. NYBBT-9)
Bill of Materials

SHEET: 14 of 16
DATE: 7/17/2009
DRAWN BY: RJT/CSS/EMA
REV. BY: KAP/RKF
DWG. NAME: NYBBT-9m_R1
SCALE: None
UNITS: mm

Figure T-14. Modified Type IIA Box Beam Terminal System Details (Metric), Test No. NYBBT-9

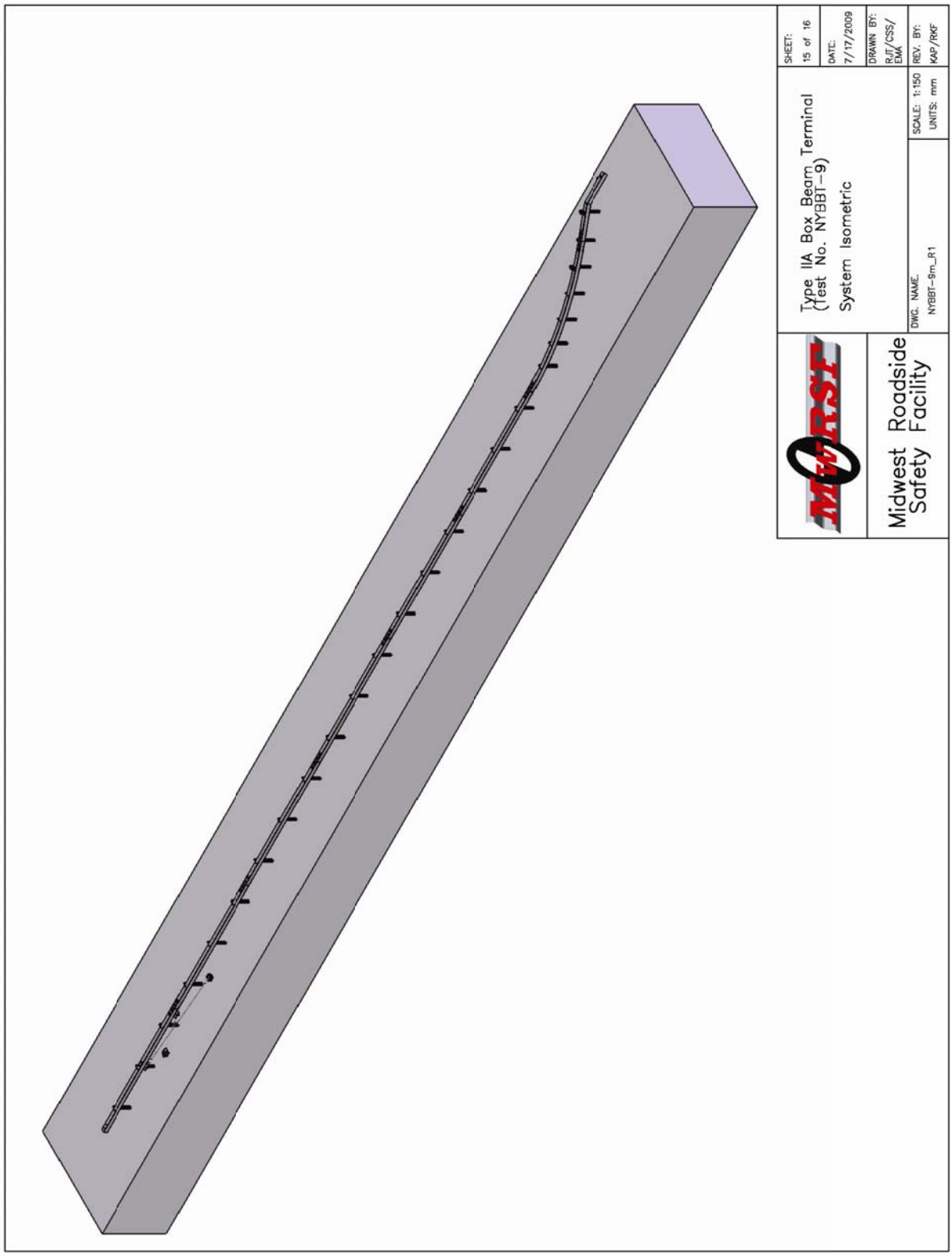


Figure T-15. Modified Type IIA Box Beam Terminal System Details (Metric), Test No. NYBBT-9

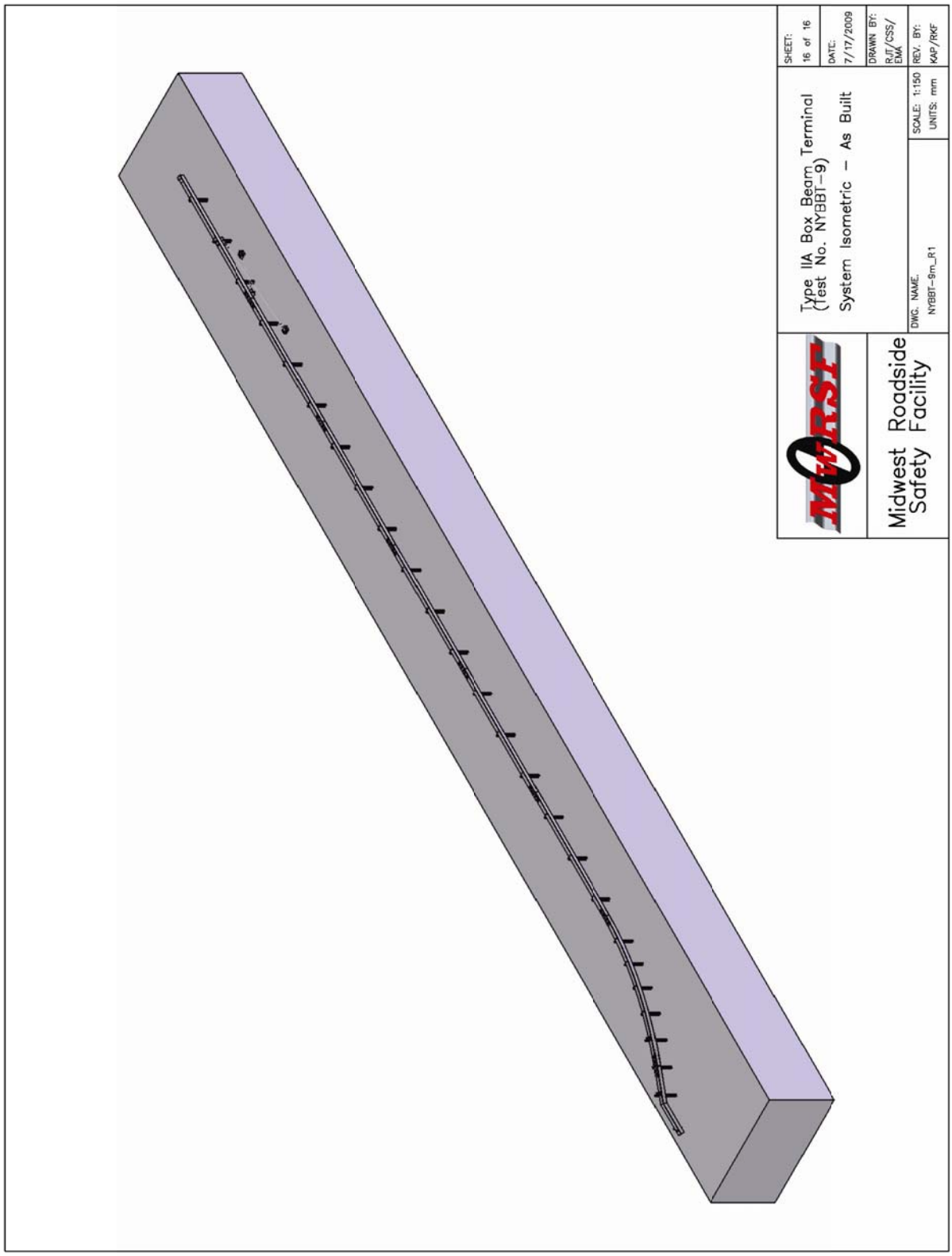


Figure T-16. Modified Type IIA Box Beam Terminal System Details (Metric), Test No. NYBBT-9

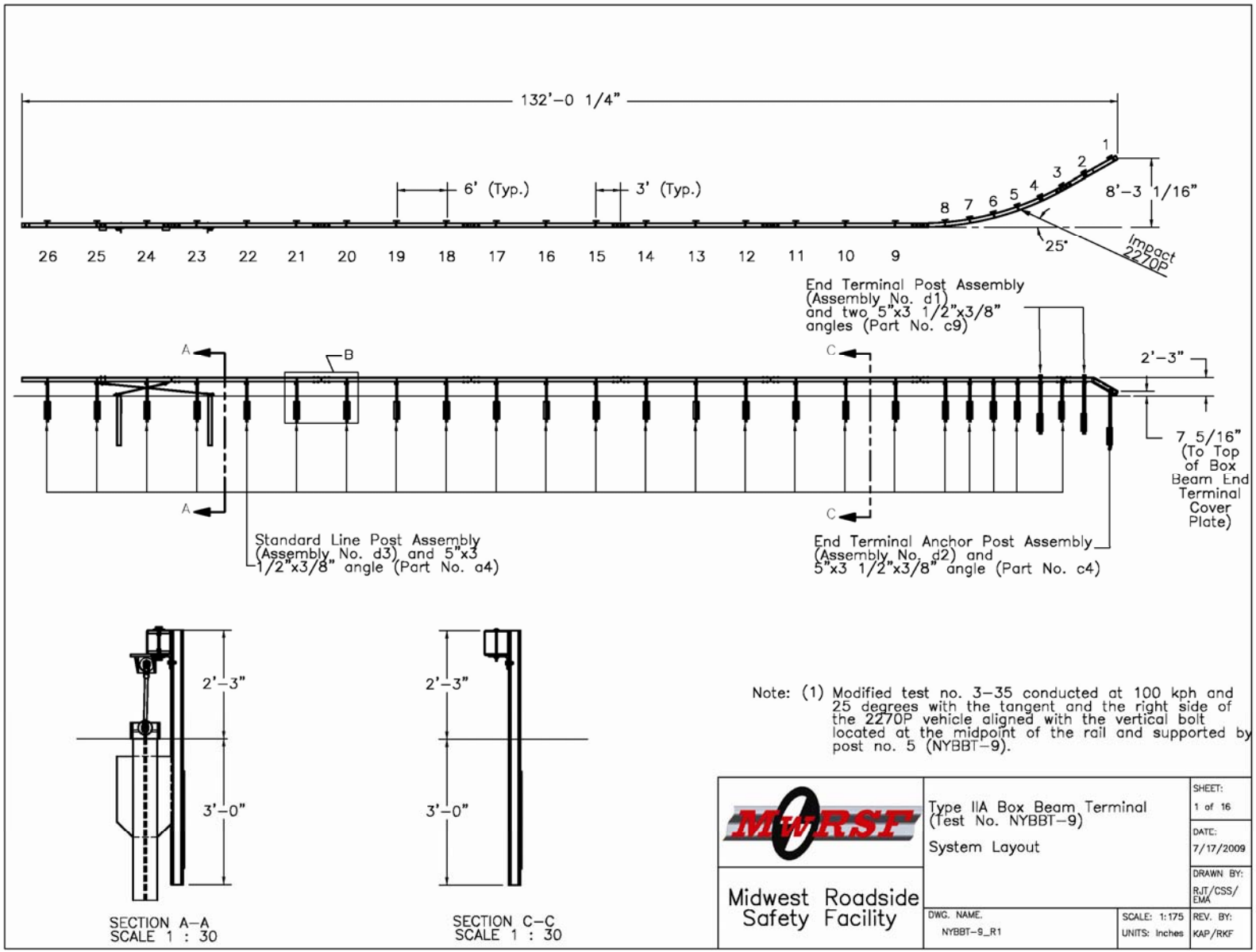


Figure T-17. Modified Type IIA Box Beam Terminal System Details (English), Test No. NYBBT-9

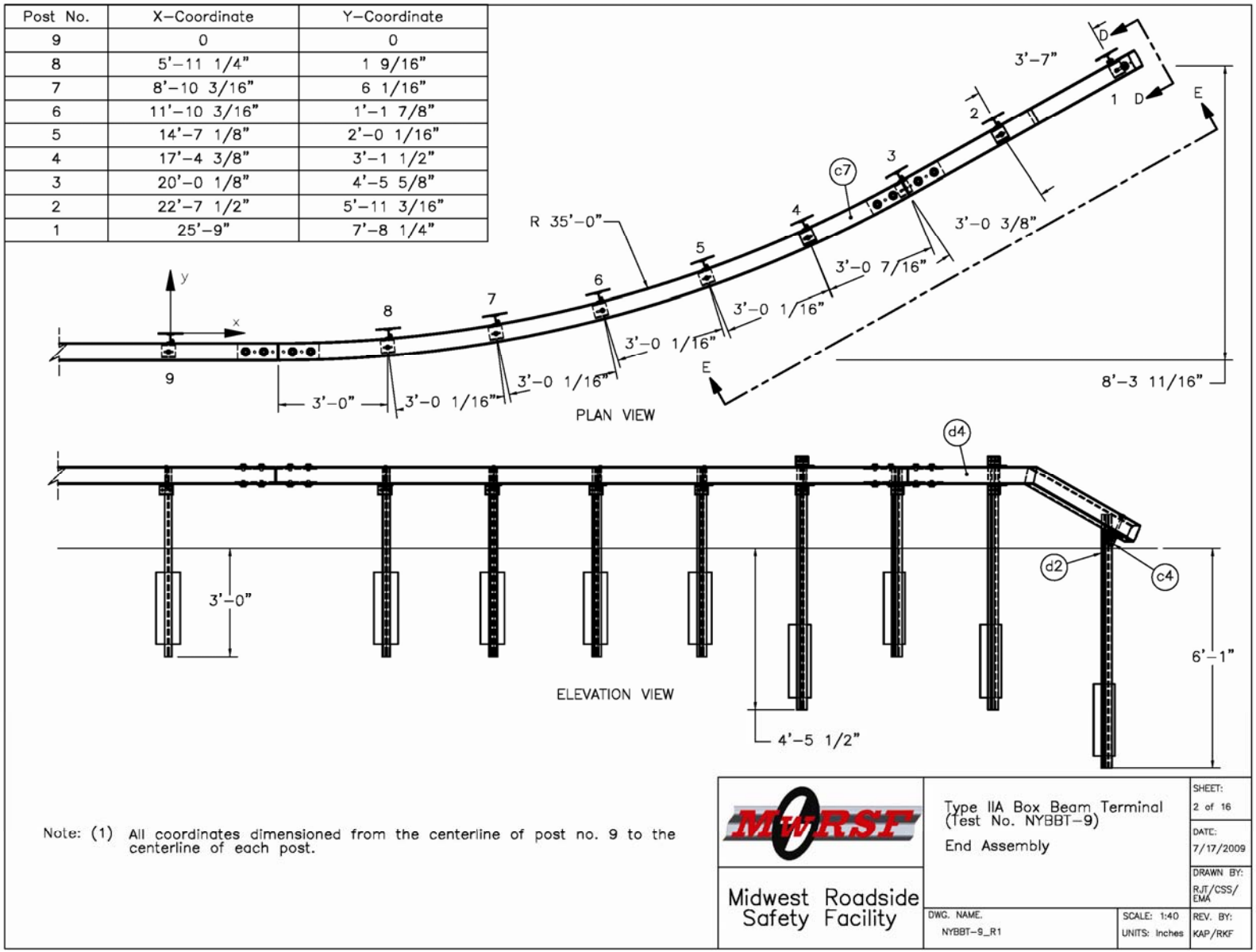


Figure T-18. Modified Type IIA Box Beam Terminal System Details (English), Test No. NYBBT-9

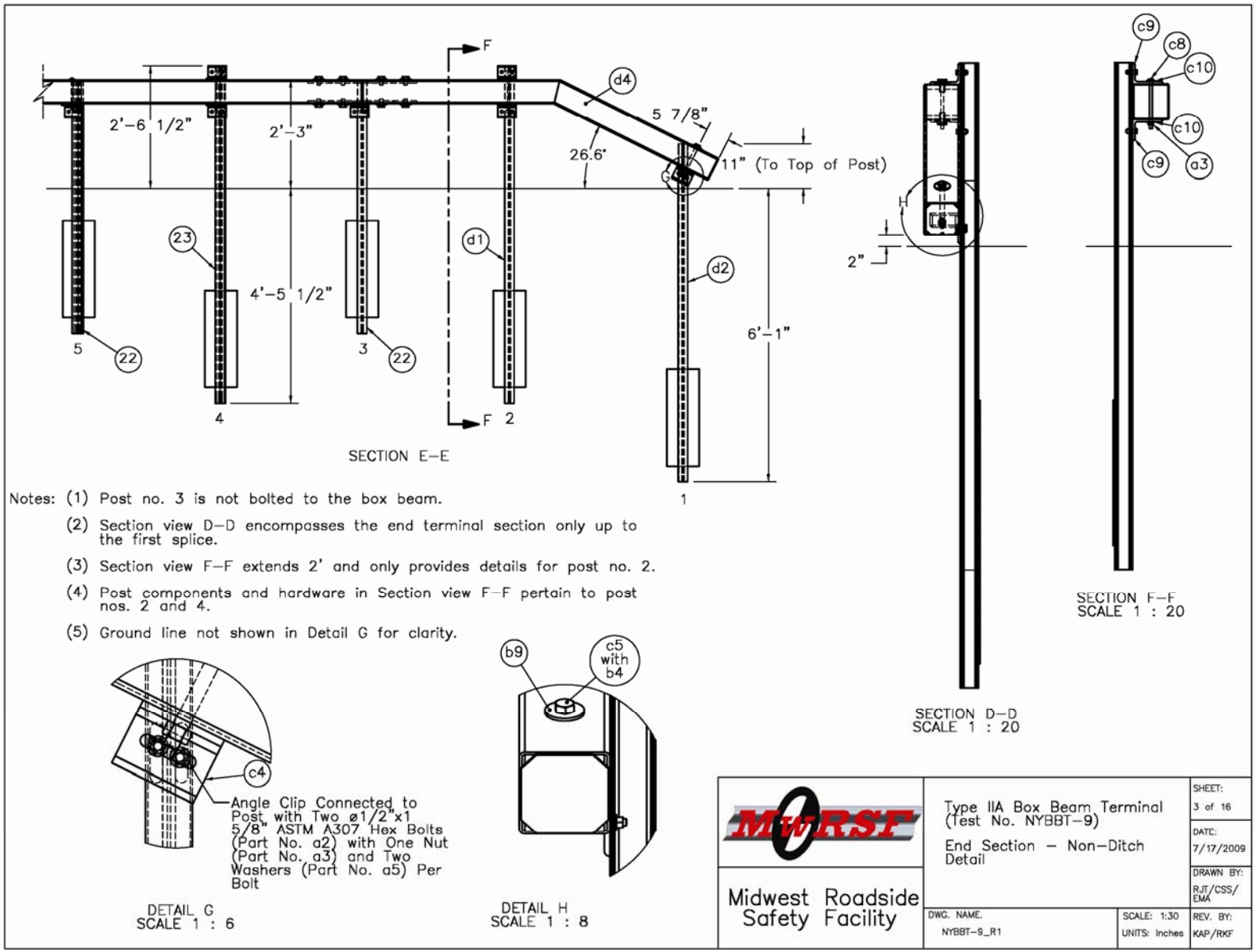


Figure T-19. Modified Type IIA Box Beam Terminal System Details (English), Test No. NYBBT-9

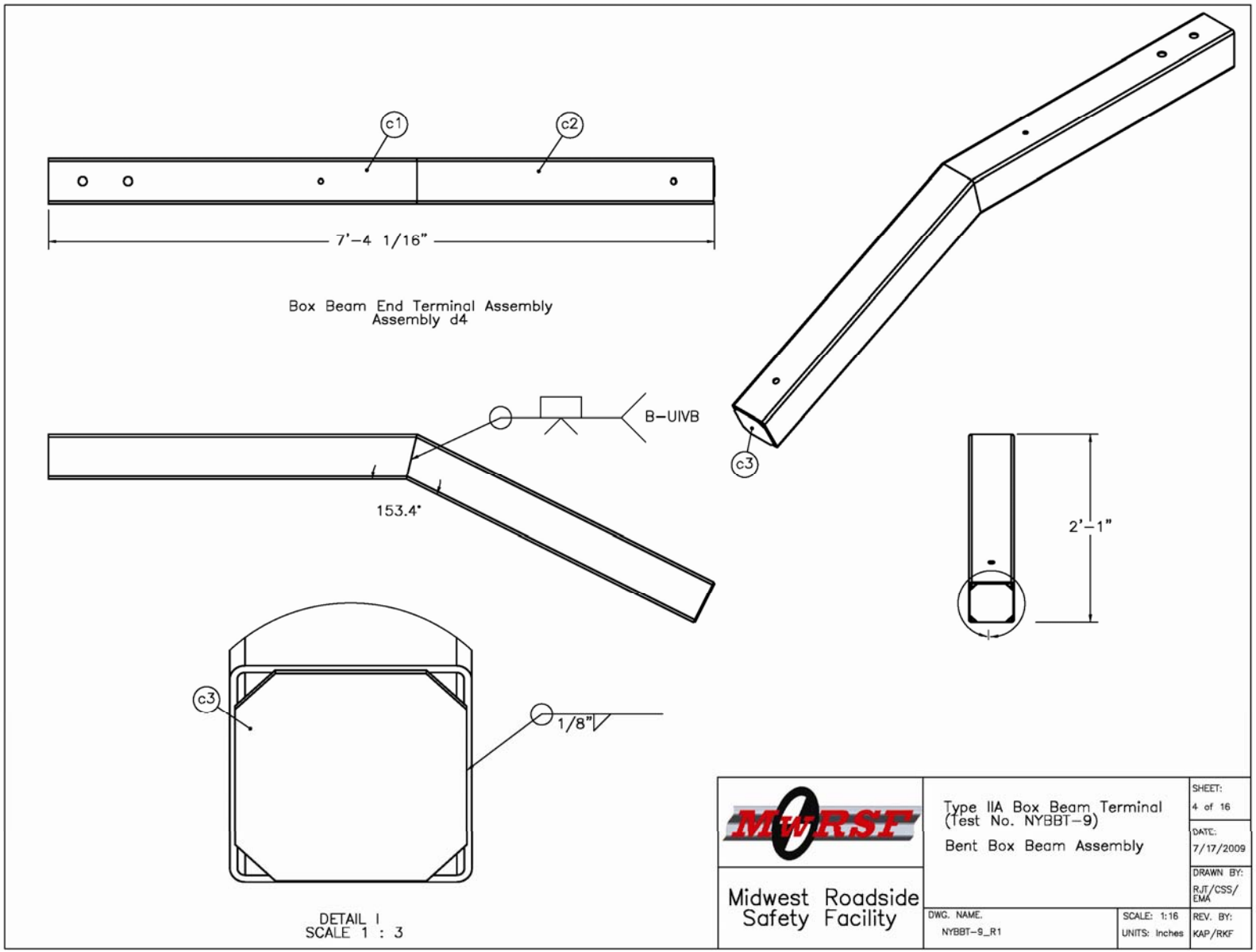


Figure T-20. Modified Type IIA Box Beam Terminal System Details (English), Test No. NYBBT-9

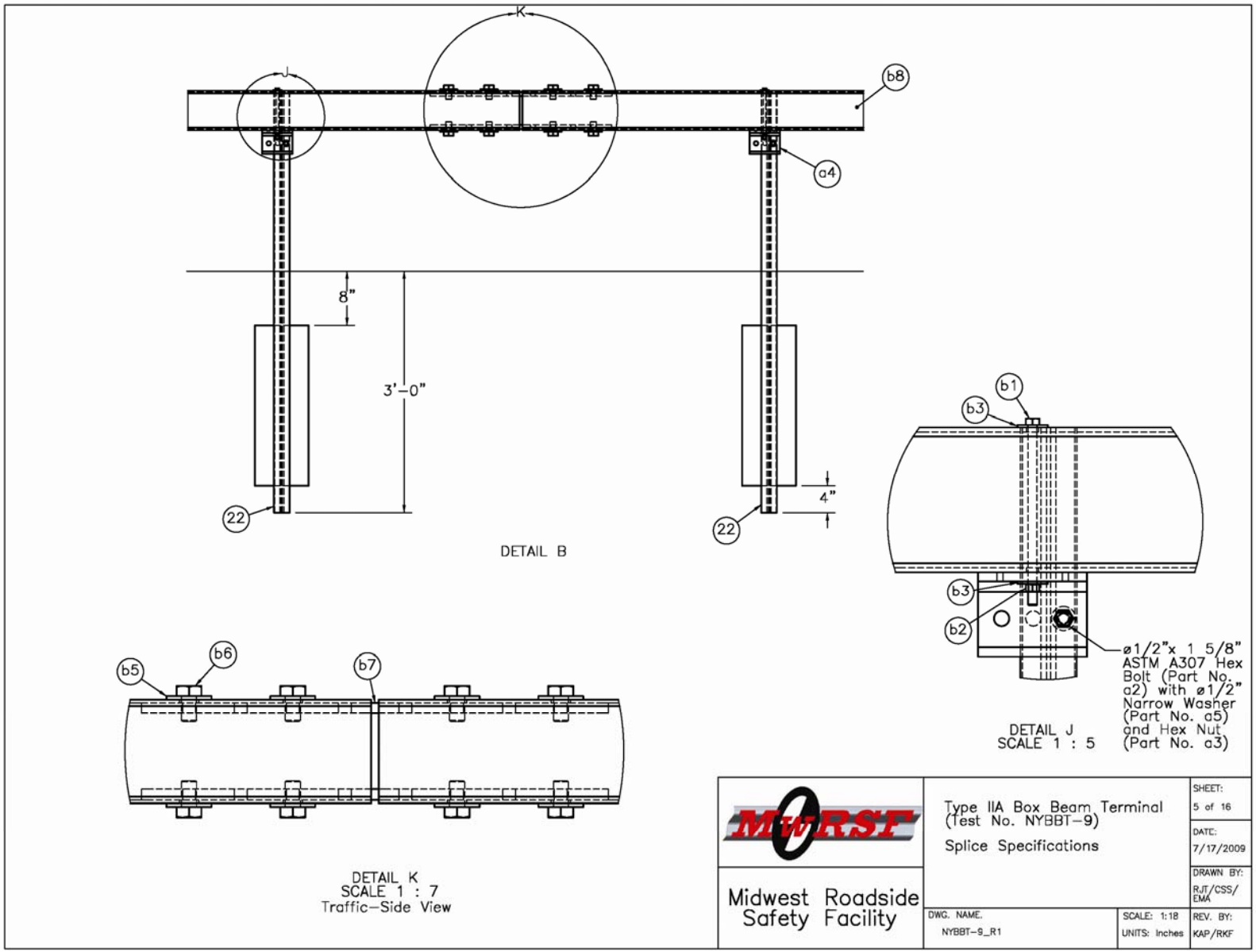


Figure T-21. Modified Type IIA Box Beam Terminal System Details (English), Test No. NYBBT-9

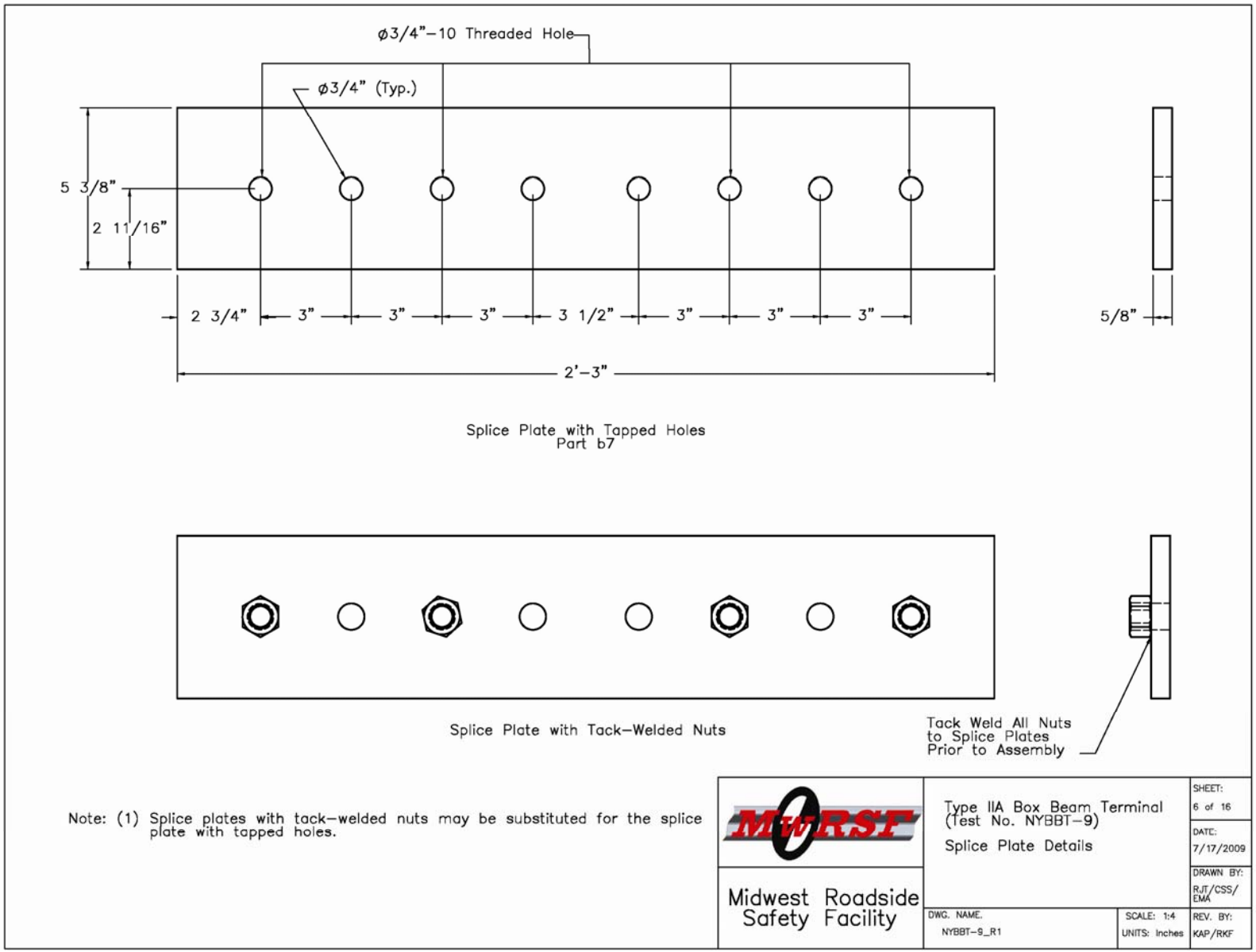


Figure T-22. Modified Type IIA Box Beam Terminal System Details (English), Test No. NYBBT-9

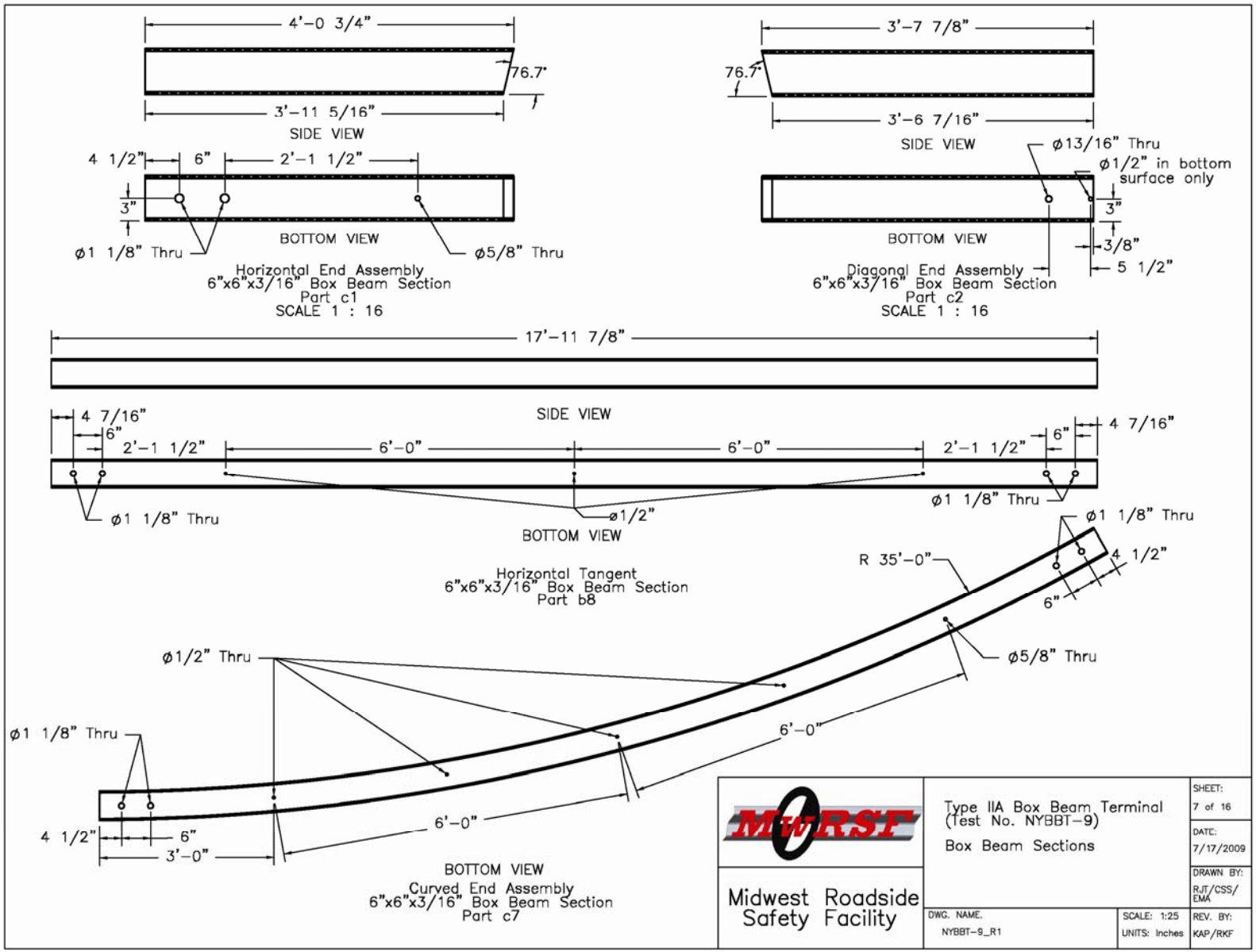


Figure T-23. Modified Type IIA Box Beam Terminal System Details (English), Test No. NYBBT-9

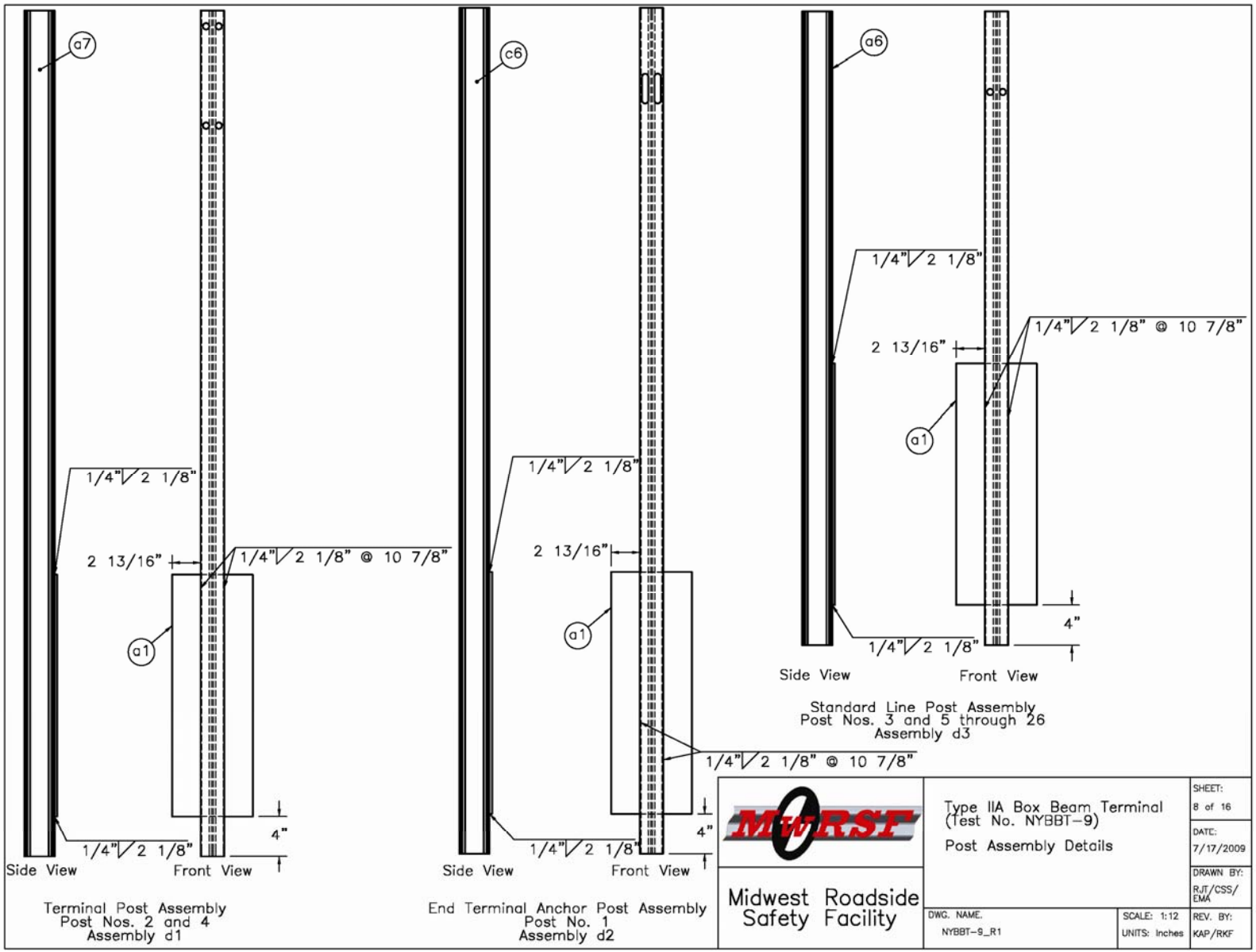


Figure T-24. Modified Type IIA Box Beam Terminal System Details (English), Test No. NYBBT-9

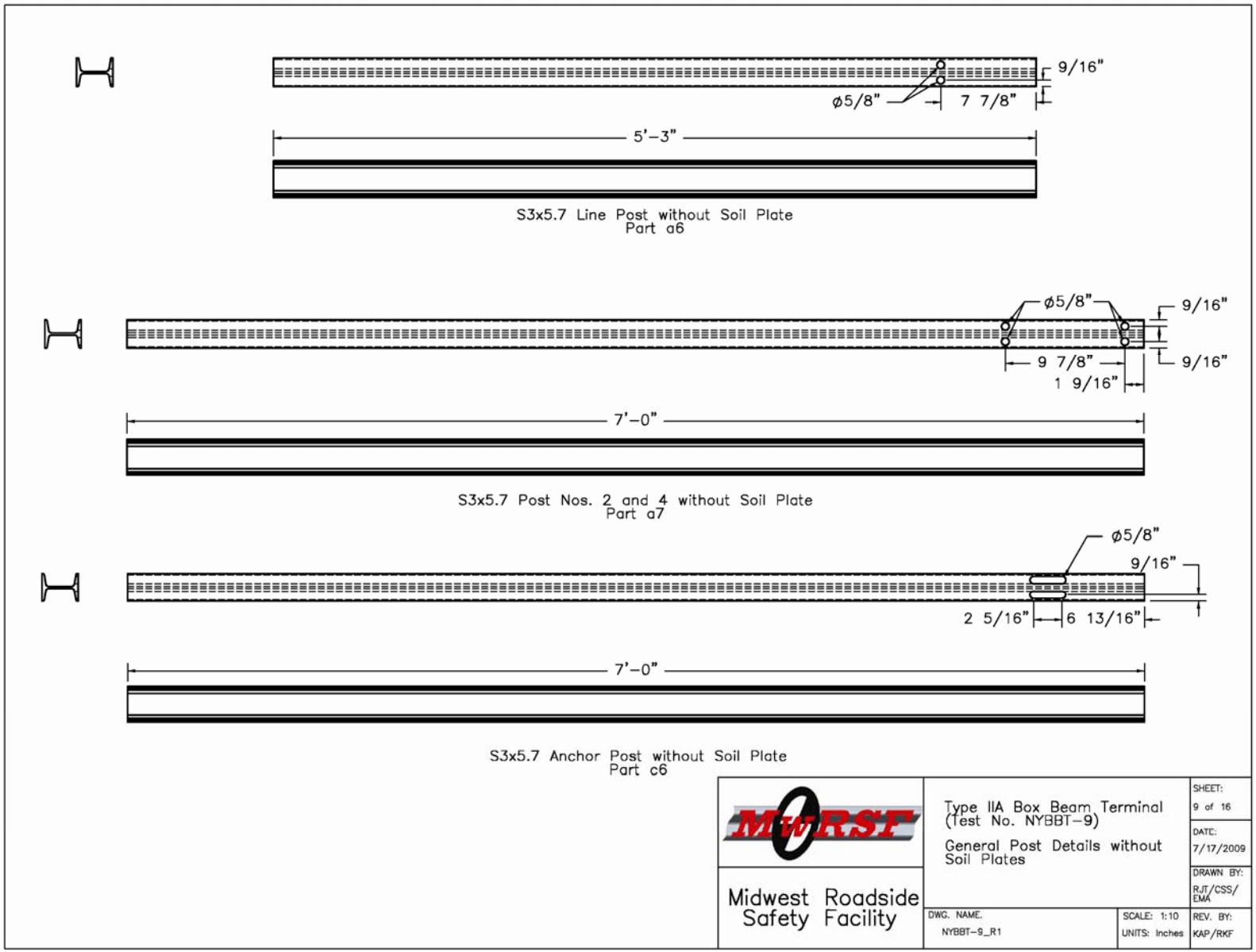


Figure T-25. Modified Type IIA Box Beam Terminal System Details (English), Test No. NYBBT-9

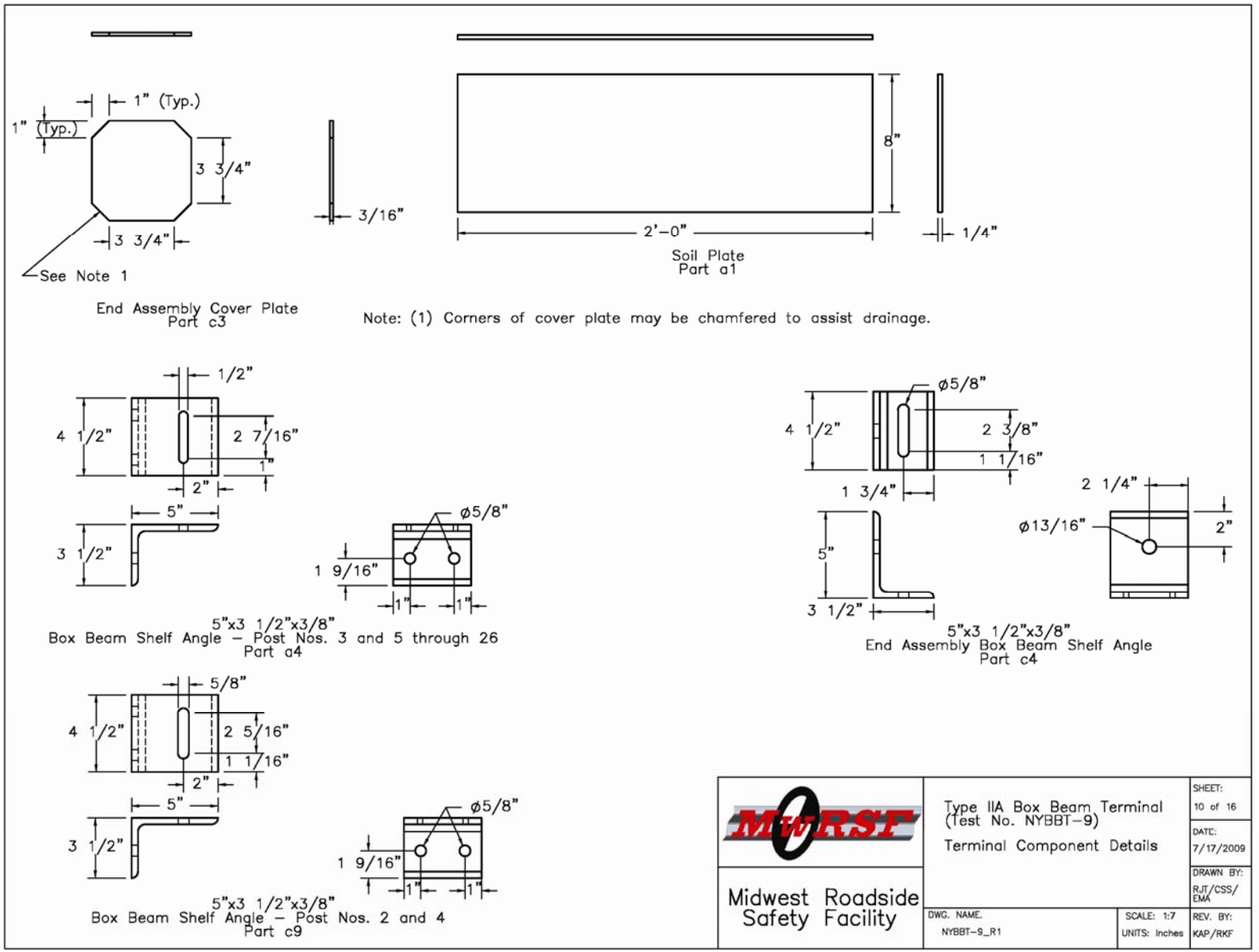


Figure T-26. Modified Type IIA Box Beam Terminal System Details (English), Test No. NYBBT-9

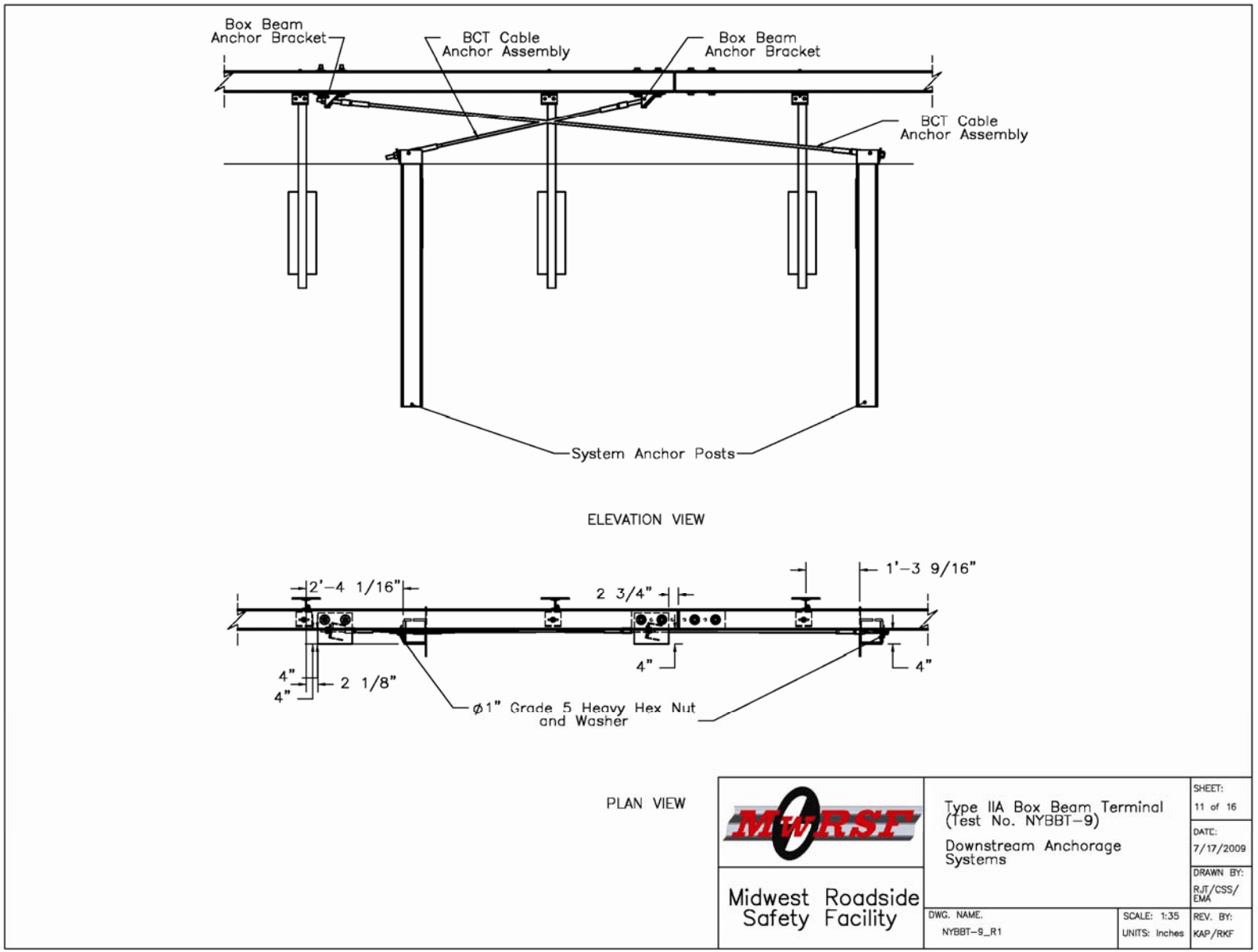


Figure T-27. Modified Type IIA Box Beam Terminal System Details (English), Test No. NYBBT-9

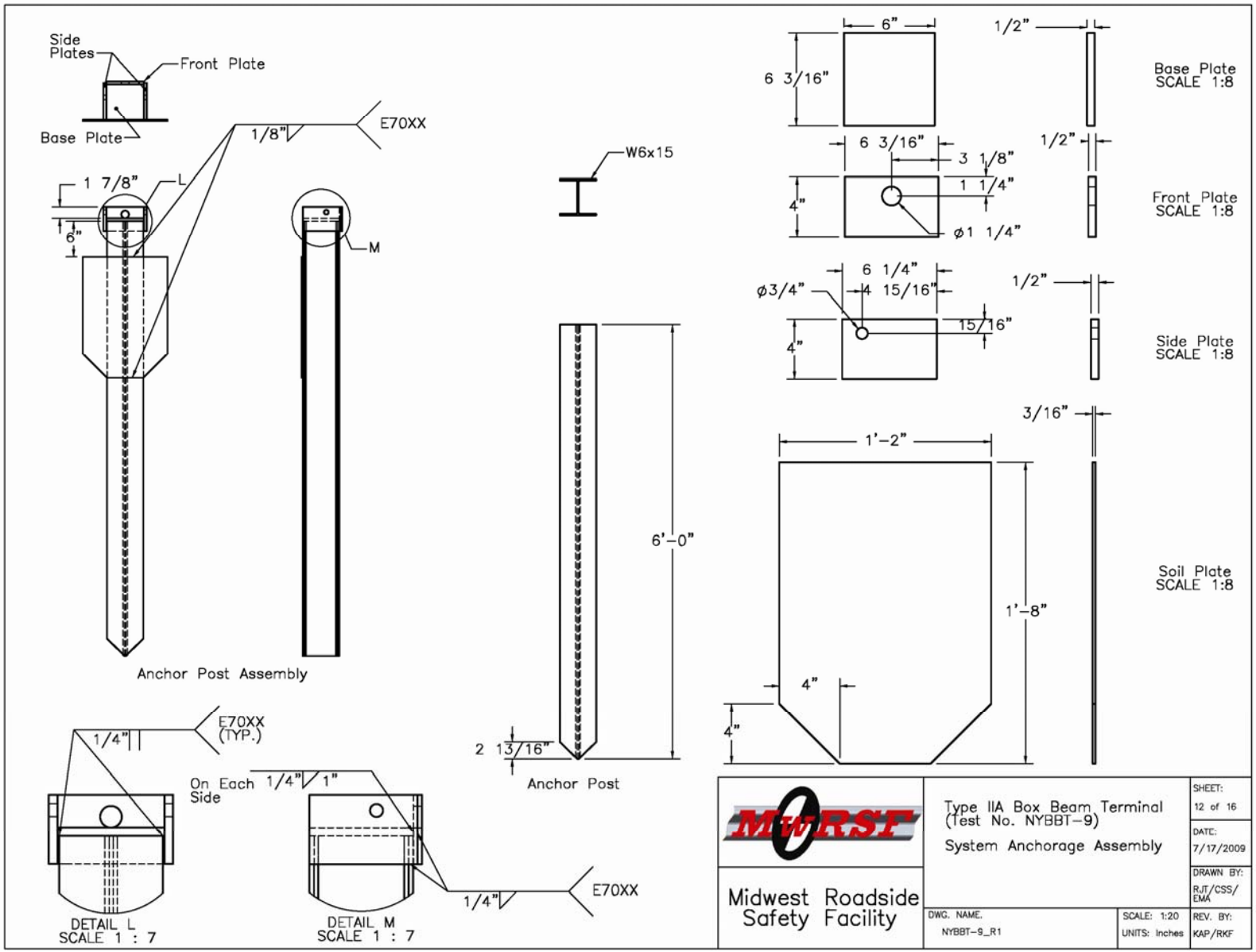


Figure T-28. Modified Type IIA Box Beam Terminal System Details (English), Test No. NYBBT-9

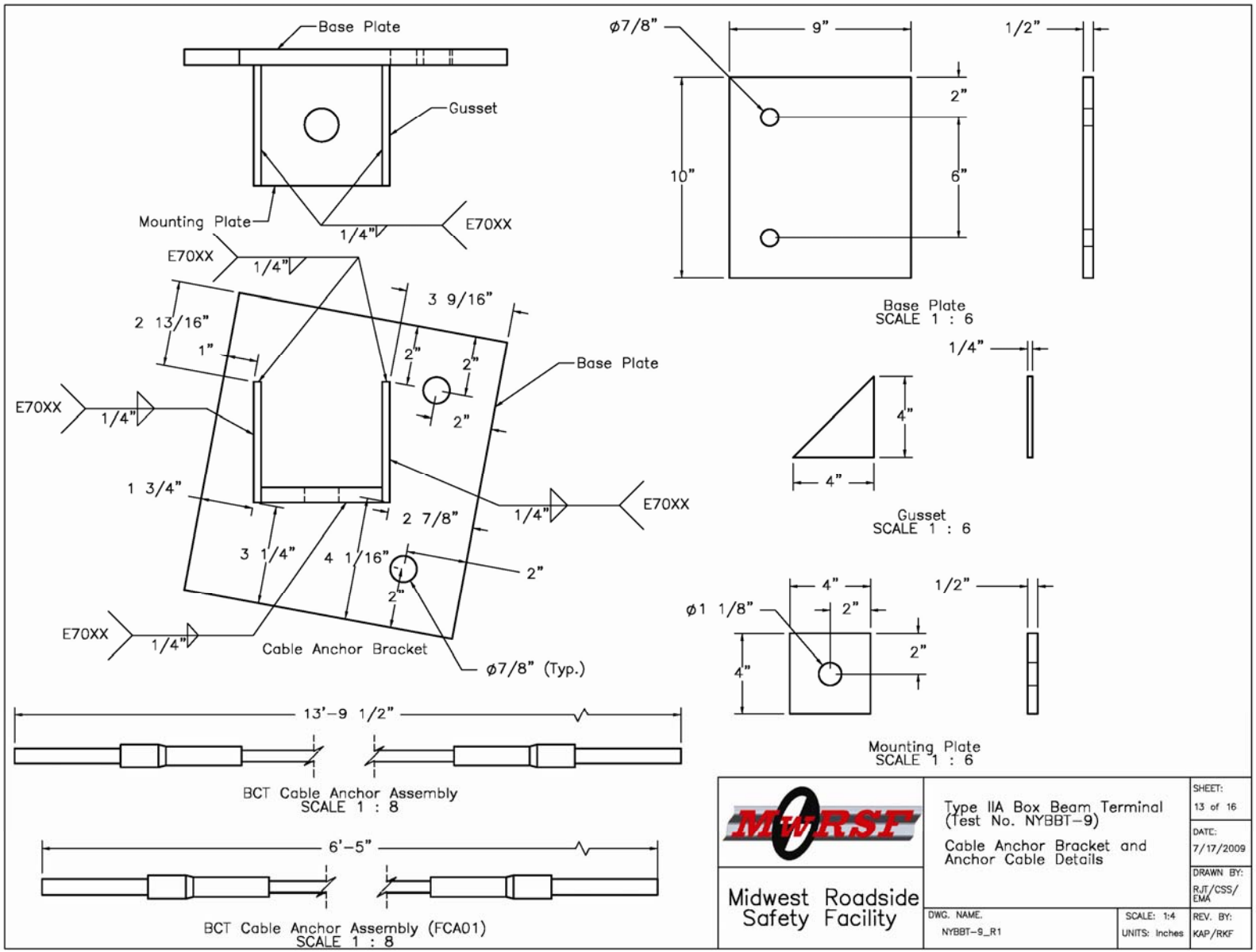


Figure T-29. Modified Type IIA Box Beam Terminal System Details (English), Test No. NYBBT-9

Test No. NYBBT-9			
Item No.	Quantity	Description	Material Specifications
a1	26	1/4" x 8" x 2' steel soil plate	A36 Steel
a2	29	ø 1/2" coarse thread, 1 5/8" long hex bolt	ASTM A307
a3	31	ø 1/2" hex nut	ASTM A307
a4	23	5" x 3 1/2" x 3/8" box beam shelf angle	A36 Steel
a5	31	ø 1/2" narrow washer	ASTM A307
a6	23	S3 x 5.7, 63" long post	A36 Steel
a7	2	S3 x 5.7, 84" long post	A36 Steel
b1	22	ø 3/8" coarse thread, 7 1/2" long hex bolt	ASTM A307
b2	22	ø 3/8" hex nut	ASTM A307
b3	44	ø 3/8" wide washer	ASTM A307
b4	1	ø 3/4" hex nut	ASTM A307
b5	56	ø 3/4" wide washer	ASTM A325
b6	56	ø 3/4" coarse thread, 1 1/2" long hex bolt	ASTM A325
b7	14	27" x 5 3/8" x 5/8" splice plate	A36 Steel
b8	6	6" x 6" x 3/16" by 17'-11 7/8" long box beam	ASTM A500 Grade B
b9	1	ø 3/4" wide washer	ASTM A307
c1	1	End assembly bent 6" x 6" x 3/16" box beam	ASTM A500 Grade B
c2	1	End assembly diagonal 6" x 6" x 3/16" box beam	ASTM A500 Grade B
c3	1	End assembly 3/16" thick cover plate	A36 Steel
c4	1	5" x 3 1/2" x 3/8" box beam anchor post shelf angle	A36 Steel
c5	1	ø 3/4" coarse thread, 8" long hex bolt	ASTM A307
c6	1	S3 x 5.7, 84" long post anchor post	A36 Steel
c7	1	6" x 6" x 3/16", R 35' Curved Box Beam	ASTM A500 Grade B
c8	2	ø 1/2" coarse thread, 8" long hex bolt	ASTM A307
c9	4	5" x 3 1/2" x 3/8" box beam shelf angle with ø 5/8" slot	A36 Steel
c10	4	ø 1/2" wide washer	ASTM A307
d1	2	Terminal Post Assembly	–
d2	1	Terminal Anchor Post Assembly	–
d3	23	Line Post Assembly	–
d4	1	Box Beam End Terminal Assembly	–

Midwest Roadside Safety Facility

Type IIA Box Beam Terminal (Test No. NYBBT-9)
Bill of Materials

SHEET: 14 of 16
DATE: 7/17/2009
DRAWN BY: RJT/CSS/EMA
REV. BY: KAP/RKF
DWG. NAME: NYBBT-9_R1
SCALE: None
UNITS: Inches

Figure T-30. Modified Type IIA Box Beam Terminal System Details (English), Test No. NYBBT-9

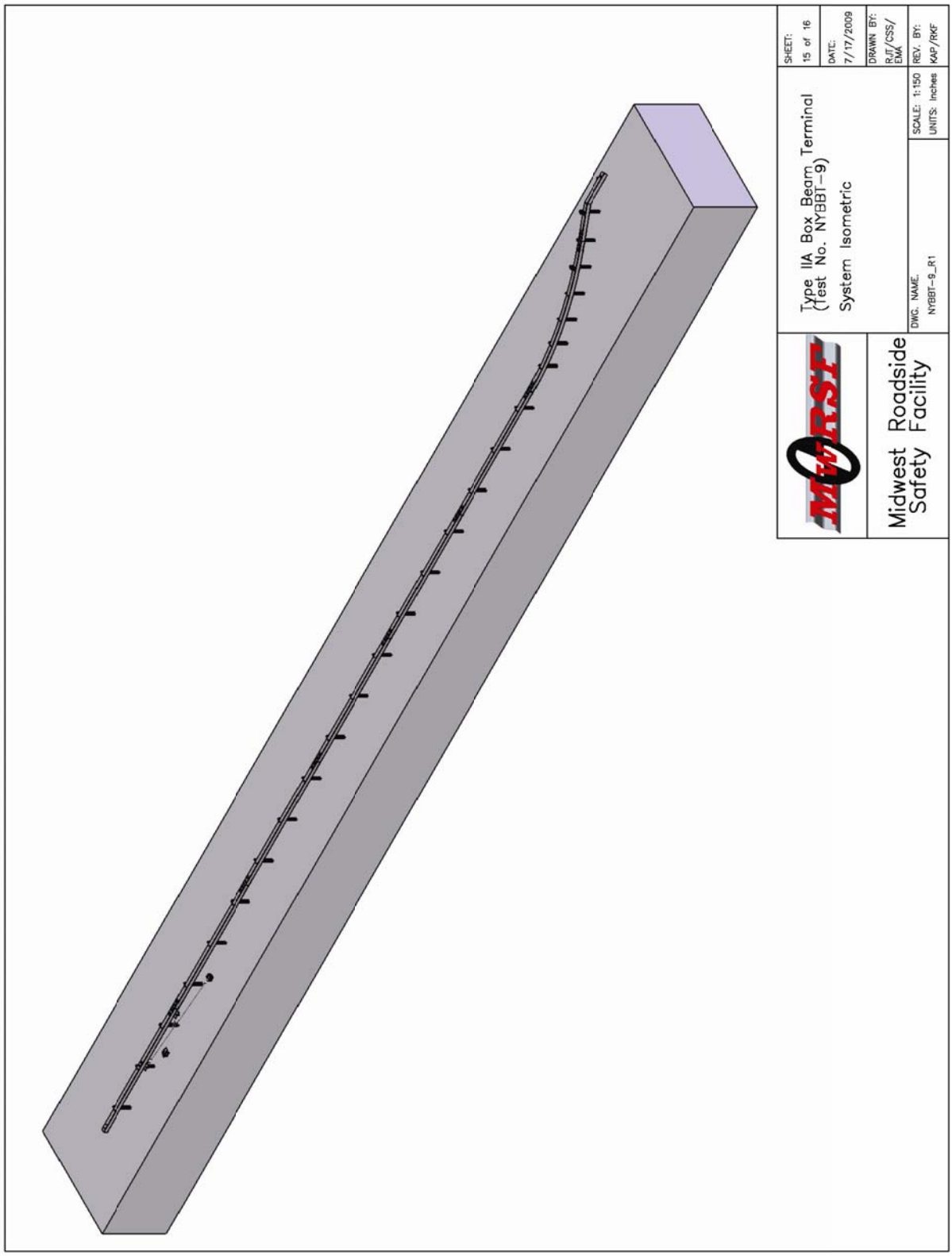


Figure T-31. Modified Type IIA Box Beam Terminal System Details (English), Test No. NYBBT-9

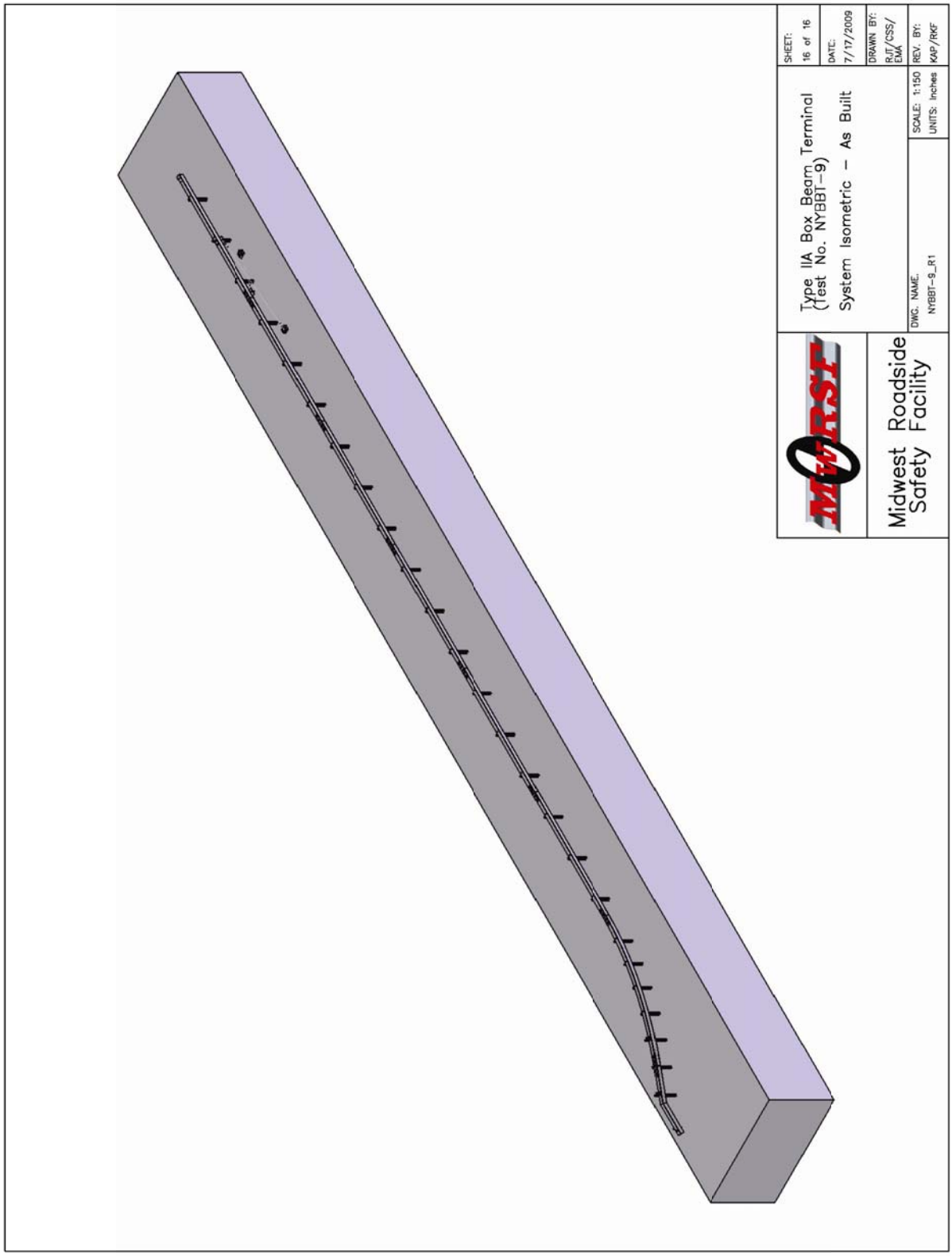


Figure T-32. Modified Type IIA Box Beam Terminal System Details (English), Test No. NYBBT-9

APPENDIX U Accelerometer and Rate Transducer Data Analysis, Test No. NYBBT-8

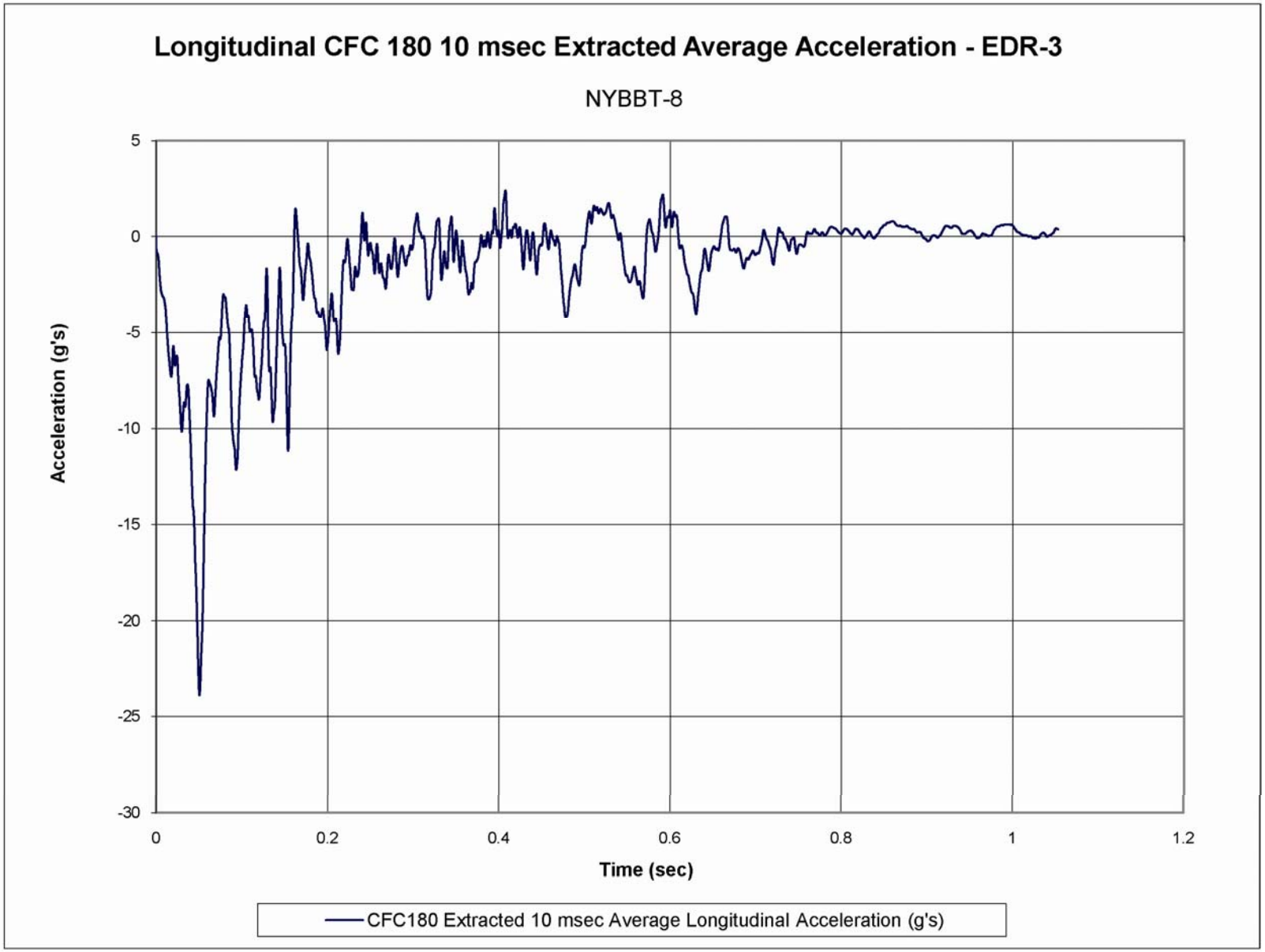


Figure U-1. Graph of Longitudinal Occupant Deceleration (EDR-3), Test No. NYBBT-8

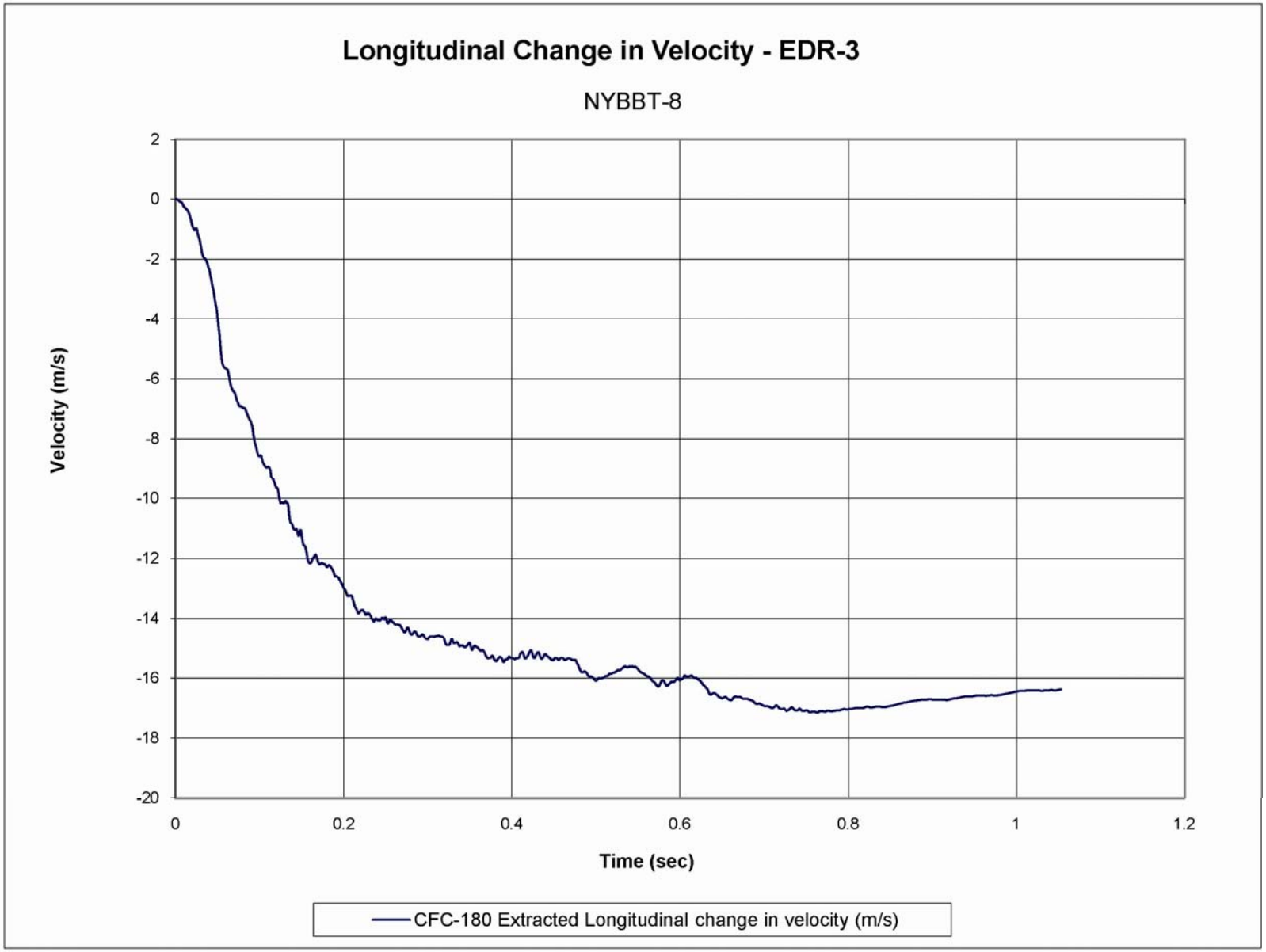


Figure U-2. Graph of Longitudinal Occupant Impact Velocity (EDR-3), Test No. NYBBT-8

Figure U-3. Graph of Longitudinal Occupant Displacement (EDR-3), Test No. NYBBT-8

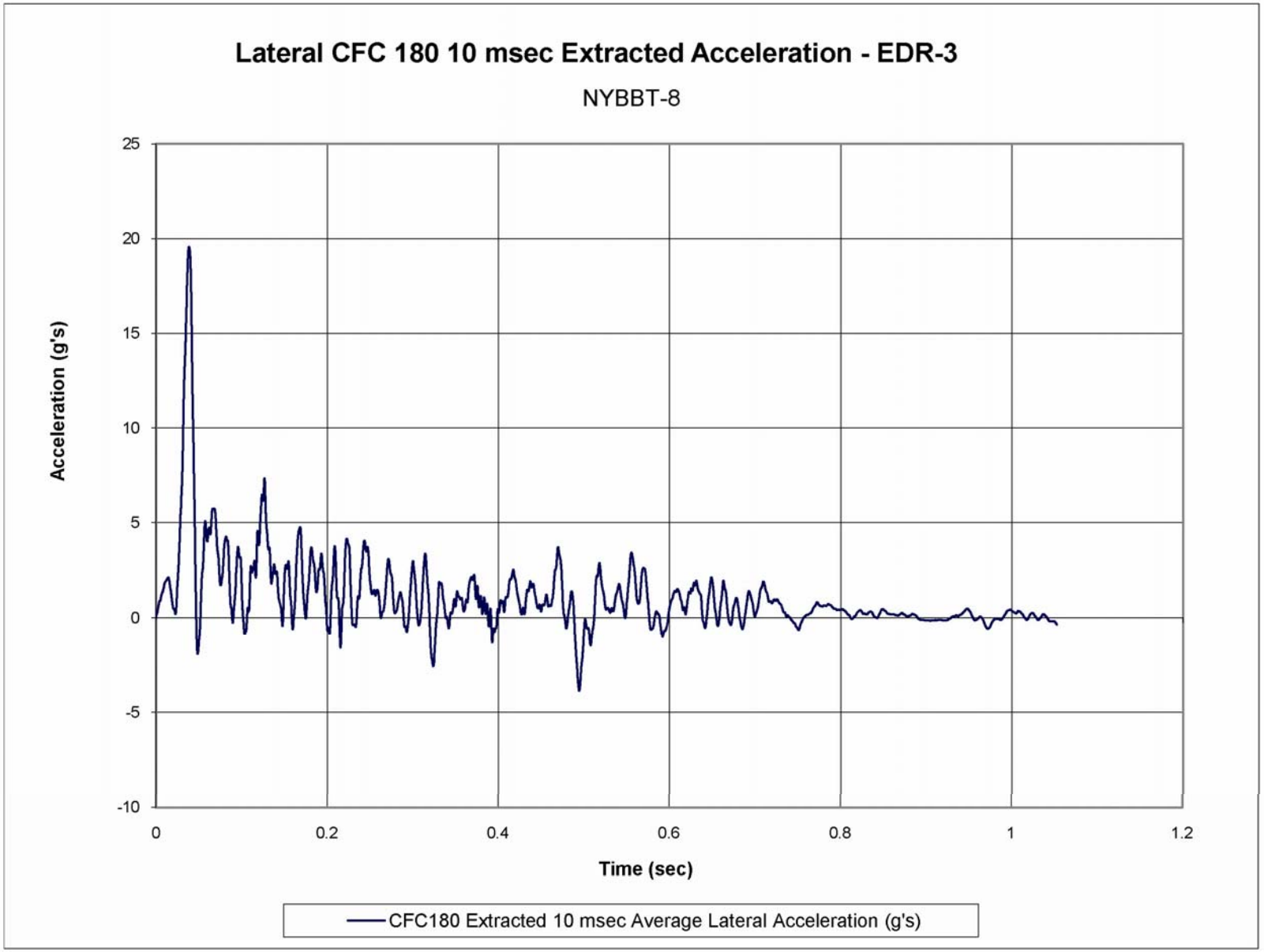


Figure U-4. Graph of Lateral Occupant Deceleration (EDR-3), Test No. NYBBT-8

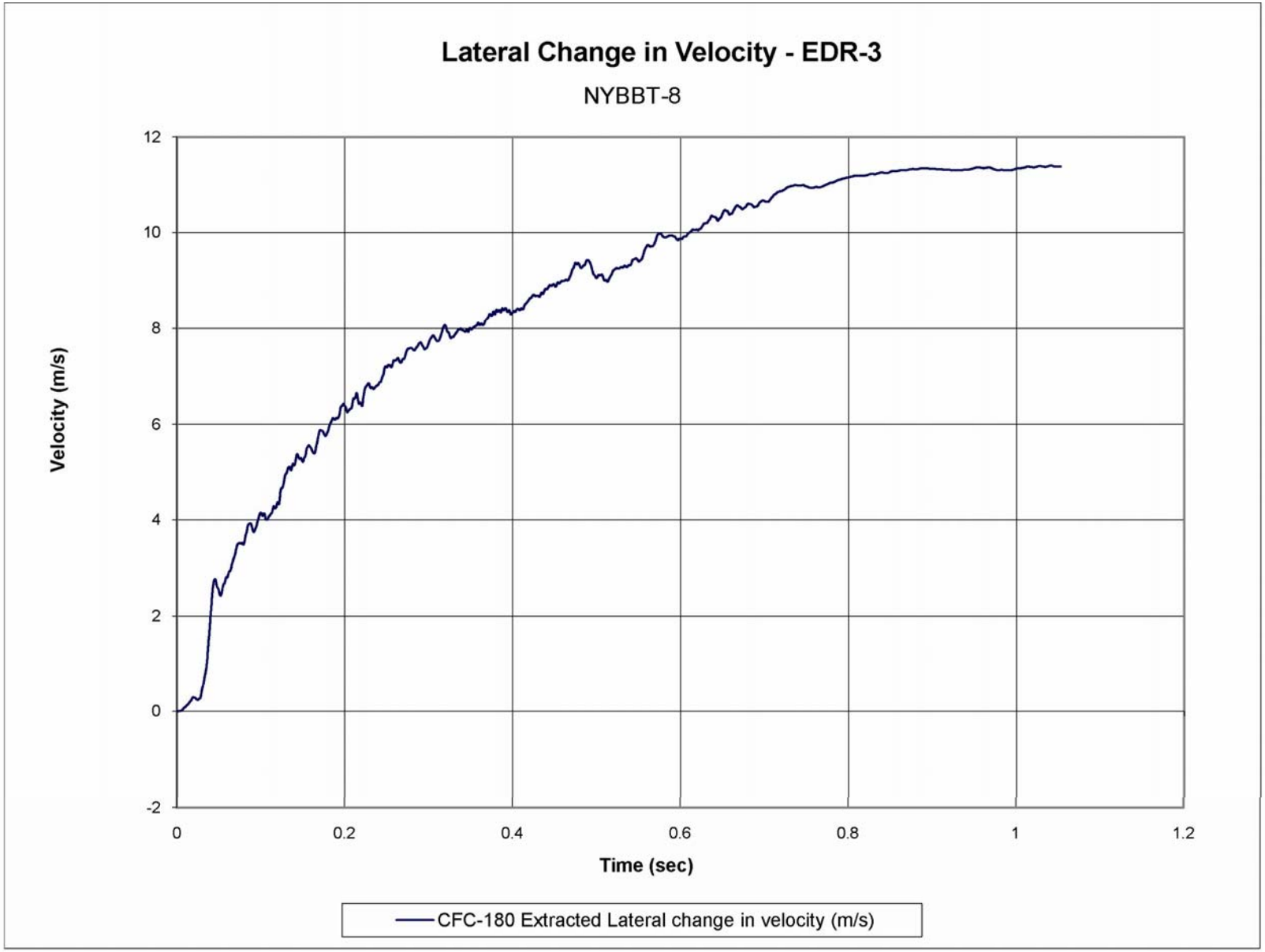


Figure U-5. Graph of Lateral Occupant Impact Velocity (EDR-3), Test No. NYBBT-8

Figure U-6. Graph of Lateral Occupant Displacement (EDR-3), Test No. NYBBT-8

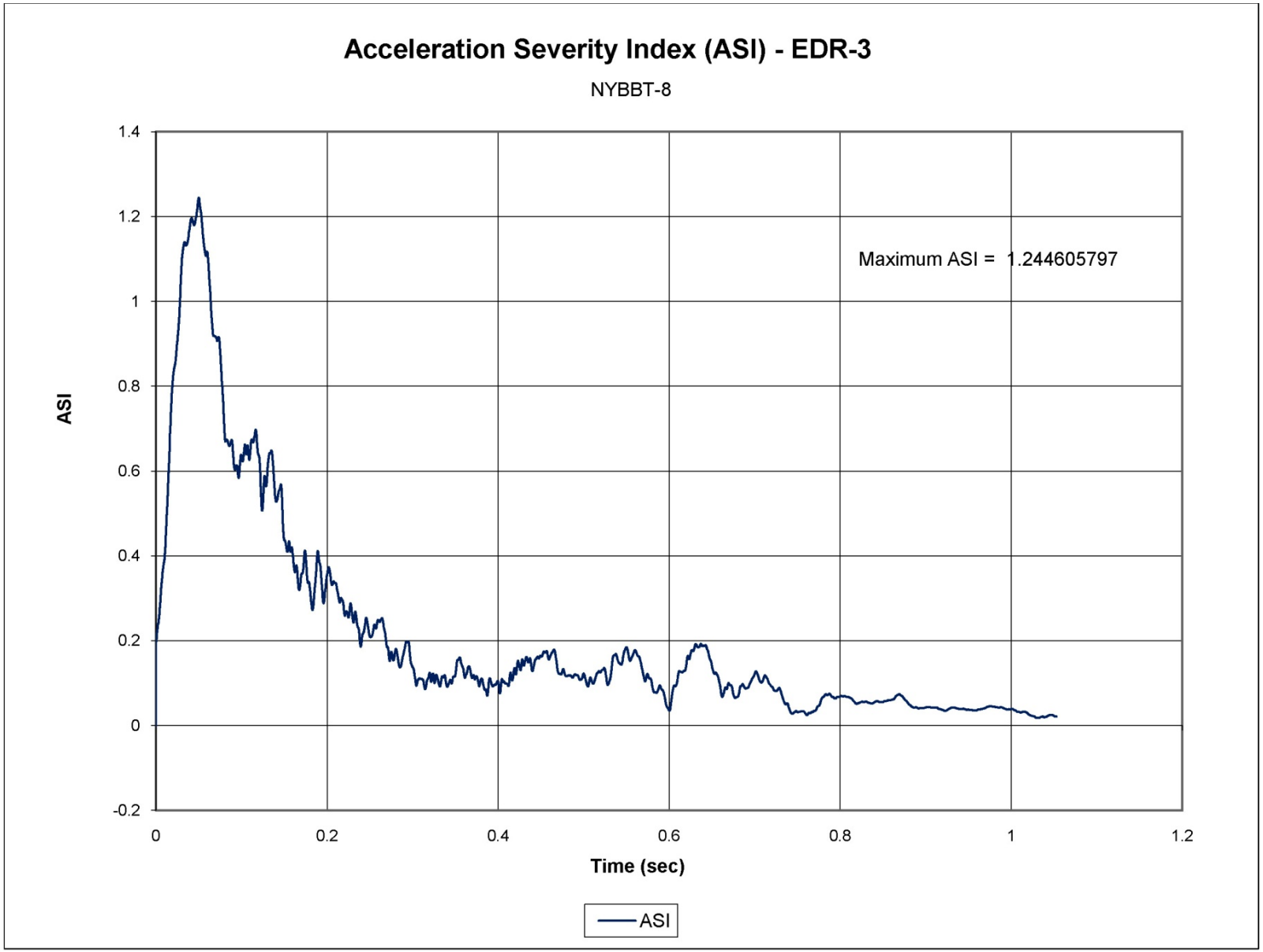


Figure U-7. Graph of Acceleration Severity Index (EDR-3), Test No. NYBBT-8

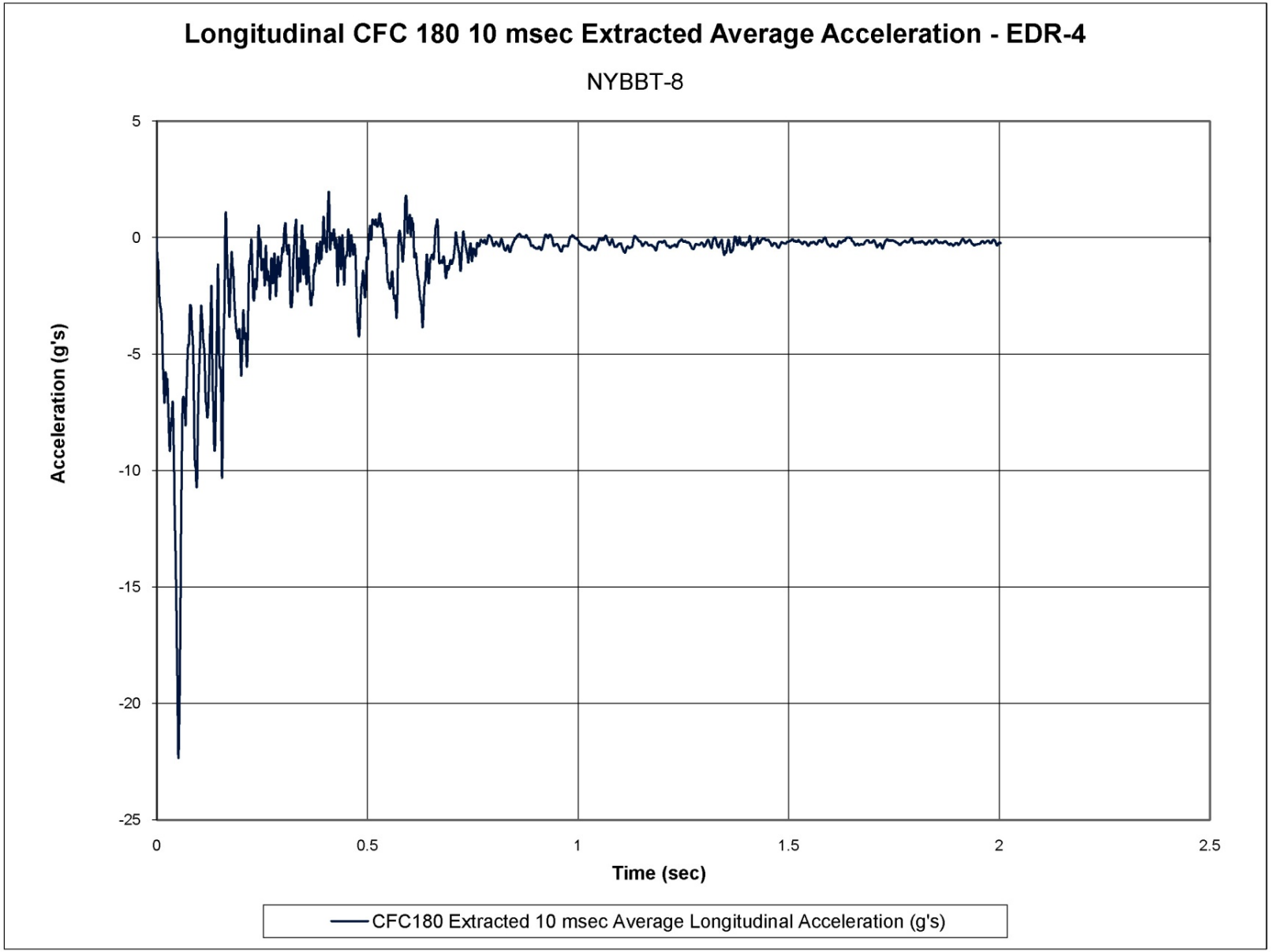


Figure U-8. Graph of Longitudinal Occupant Deceleration (EDR-4), Test No. NYBBT-8

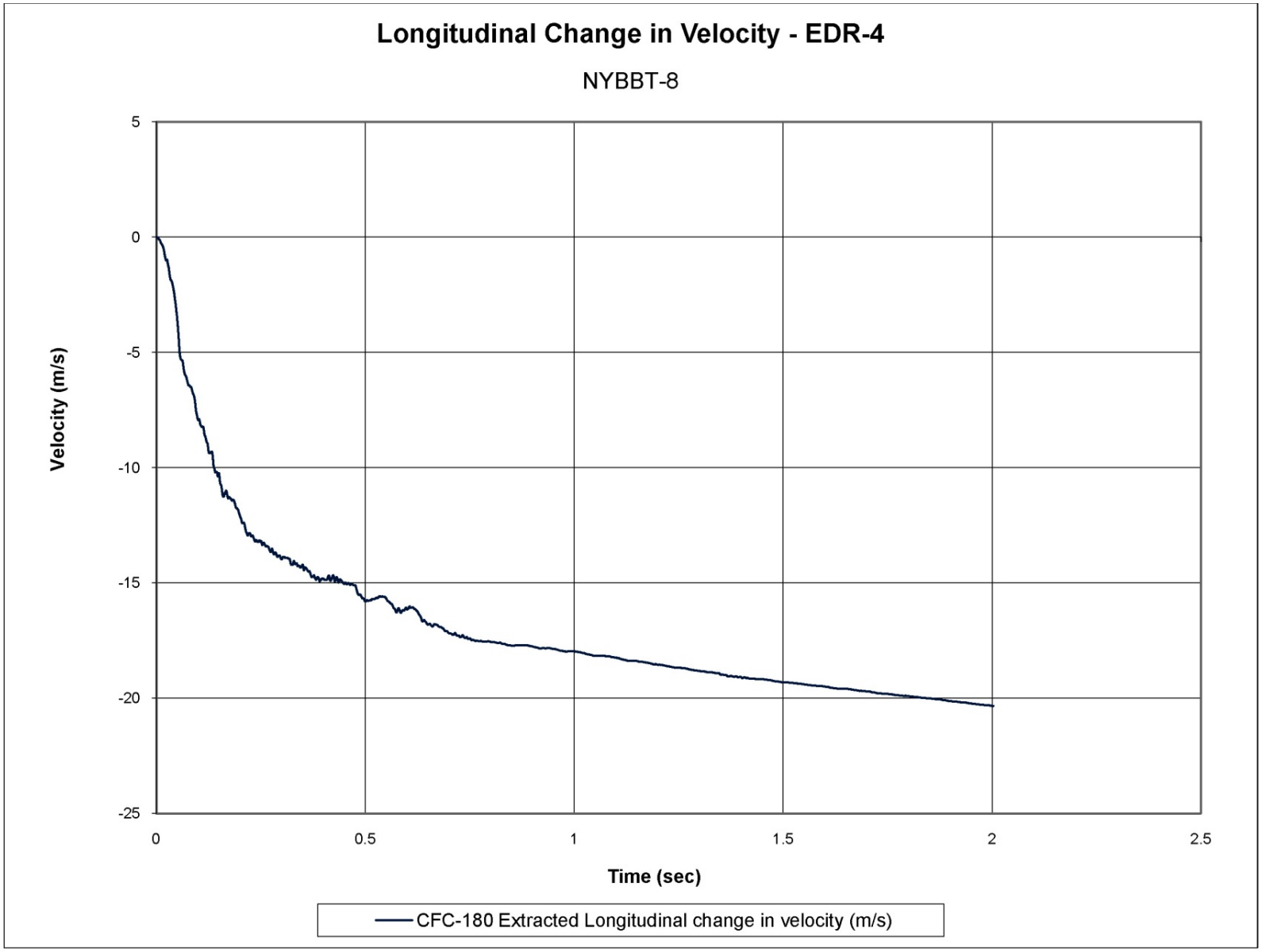


Figure U-9. Graph of Longitudinal Occupant Impact Velocity (EDR-4), Test No. NYBBT-8

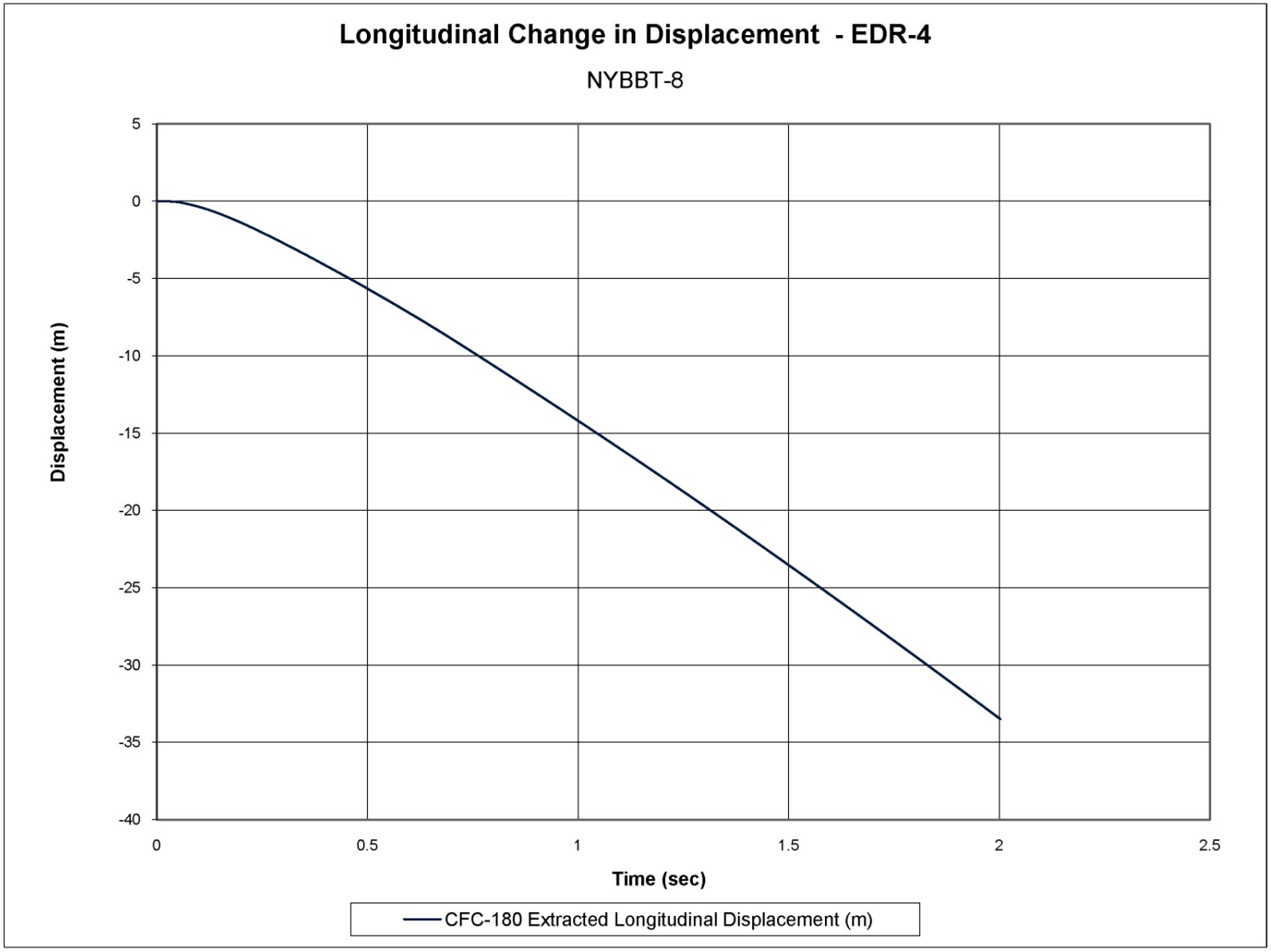


Figure U-10. Graph of Longitudinal Occupant Displacement (EDR-4), Test No. NYBBT-8

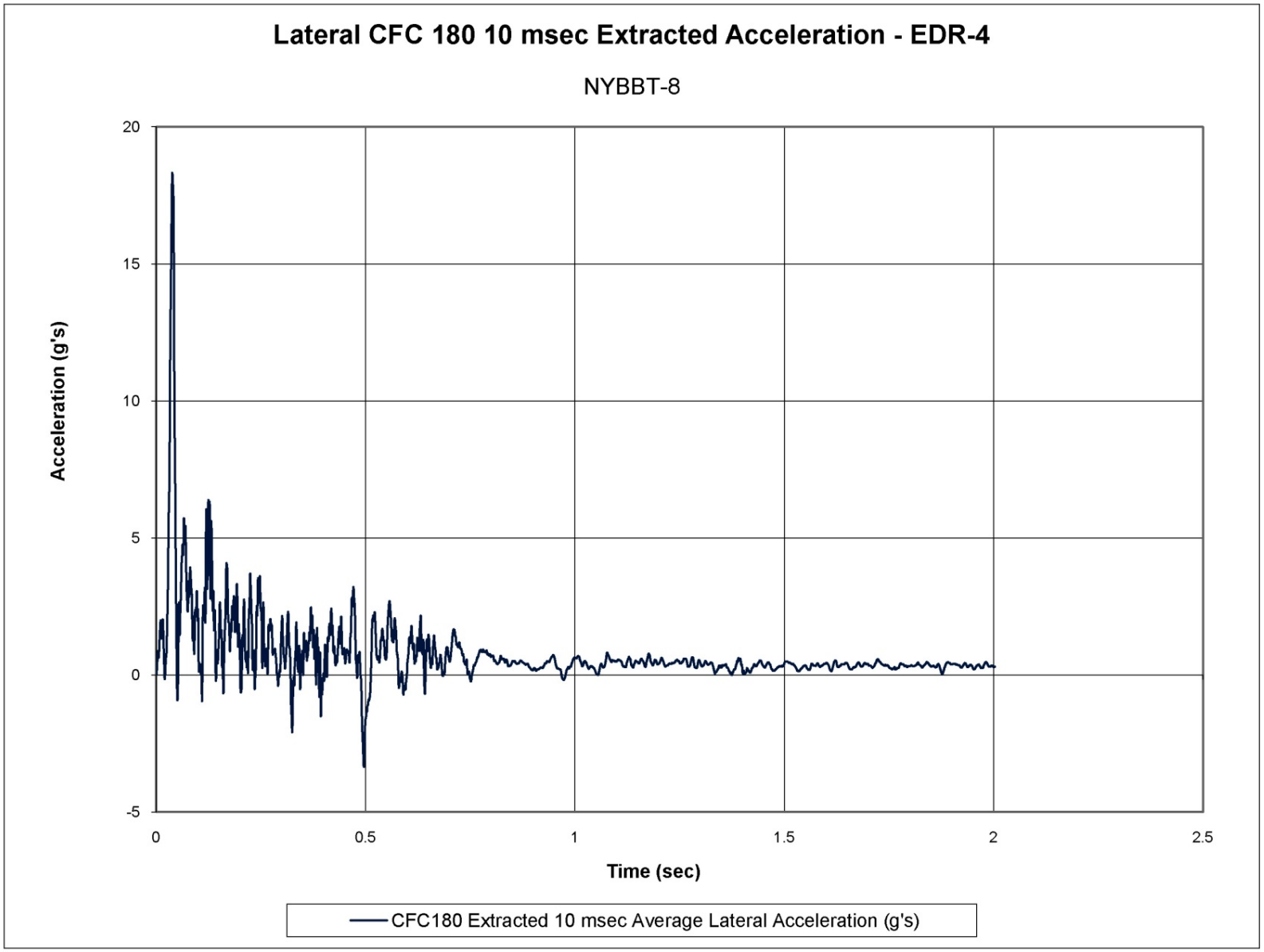


Figure U-11. Graph of Lateral Occupant Deceleration (EDR-4), Test No. NYBBT-8

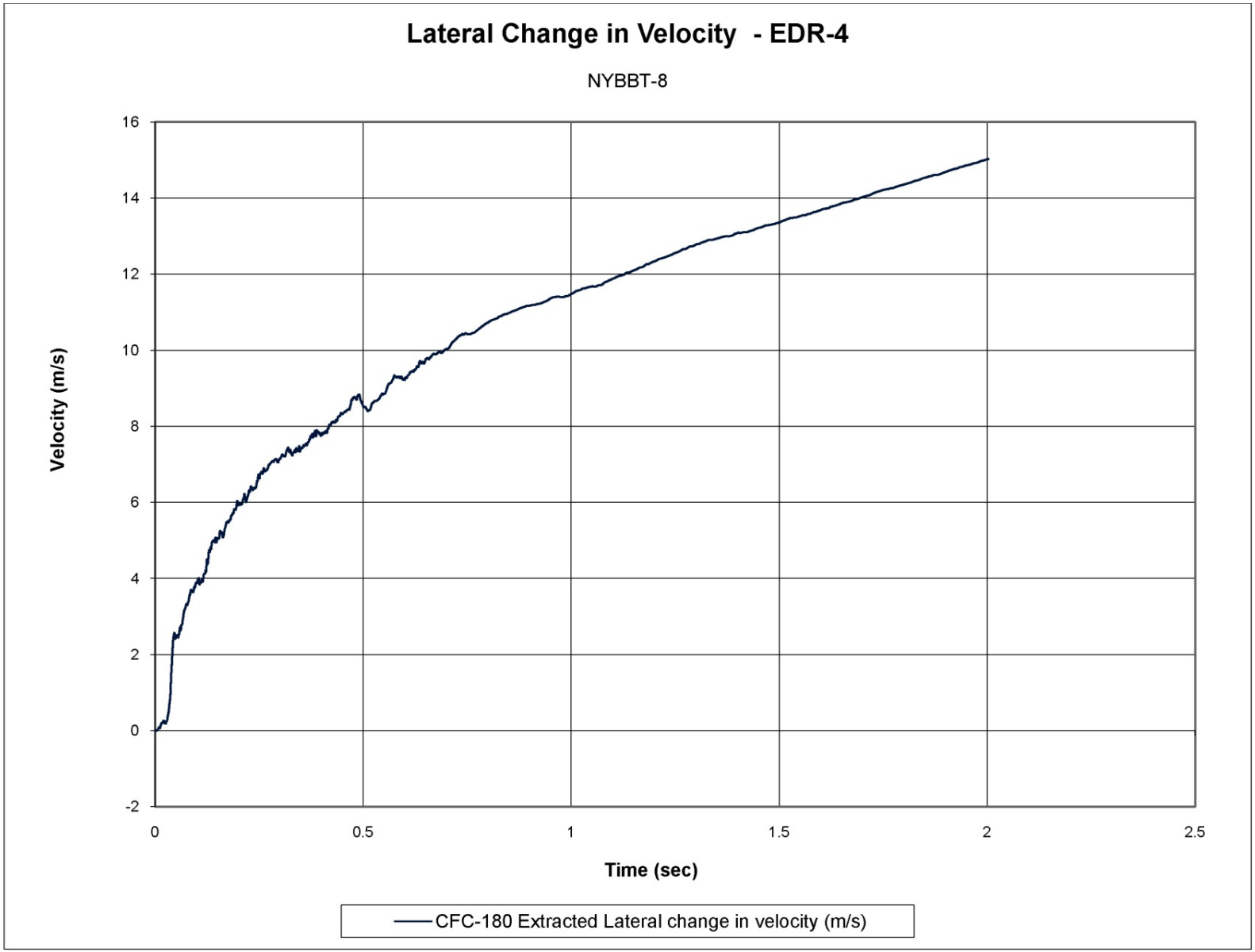


Figure U-12. Graph of Lateral Occupant Impact Velocity (EDR-4), Test No. NYBBT-8

Figure U-13. Graph of Lateral Occupant Displacement (EDR-4), Test No. NYBBT-8

Figure U-14. Graph of Roll, Pitch, and Yaw Angular Displacement (EDR-4), Test No. NYBBT-8

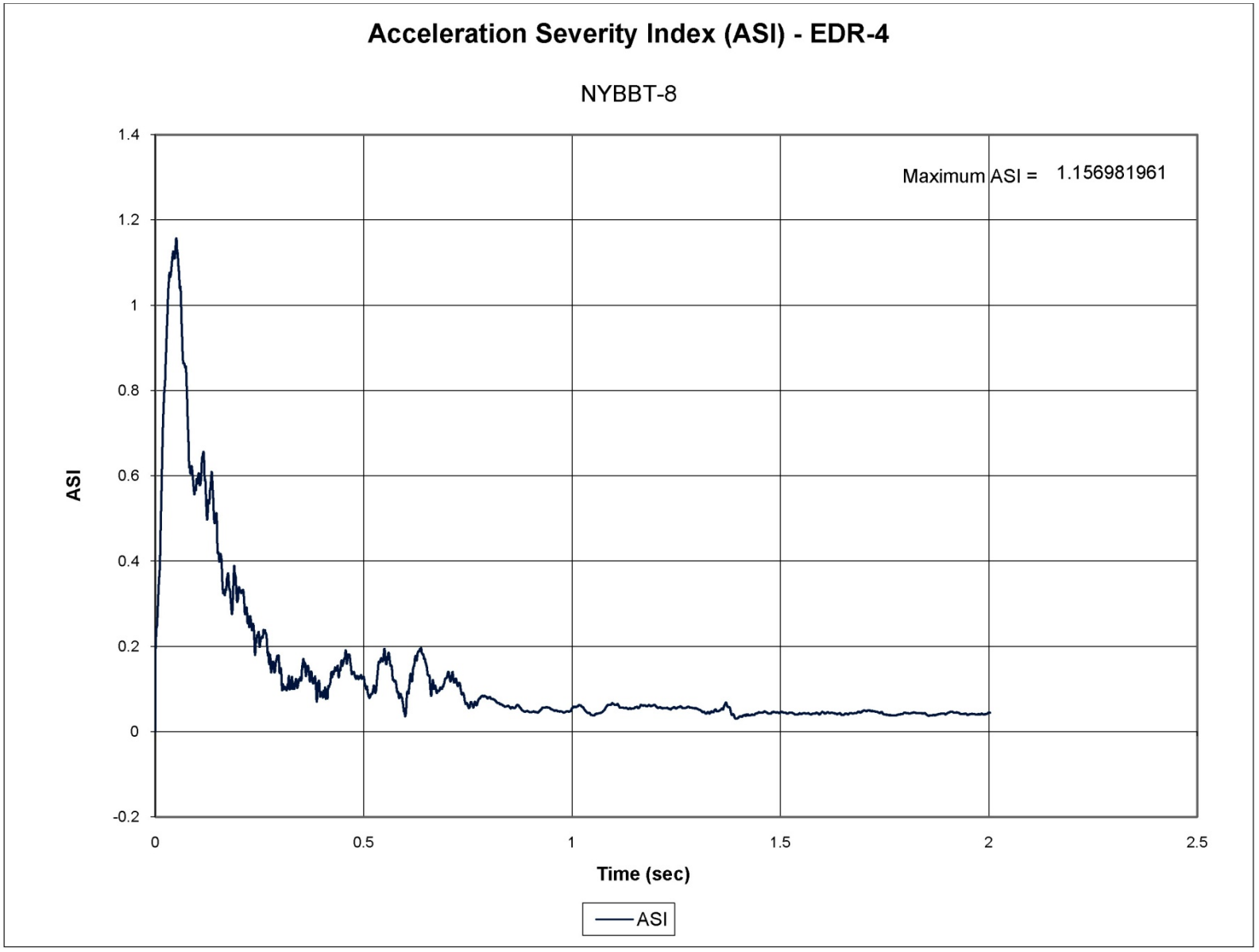


Figure U-15. Graph of Acceleration Severity Index (EDR-4), Test No. NYBBT-8

APPENDIX V Accelerometer and Rate Transducer Data Analysis, Test No. NYBBT-9

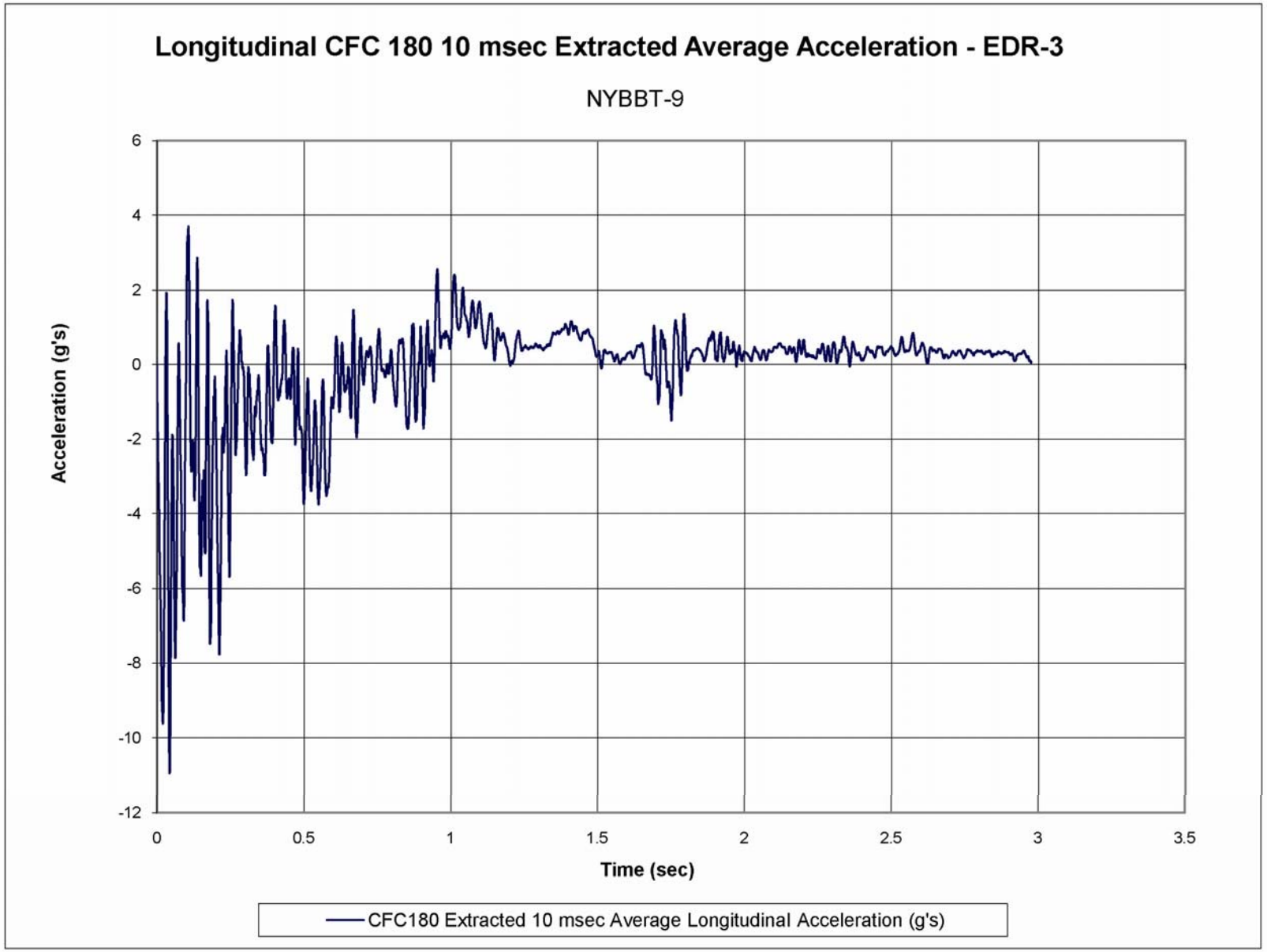


Figure V-1. Graph of Longitudinal Occupant Deceleration (EDR-3), Test No. NYBBT-9

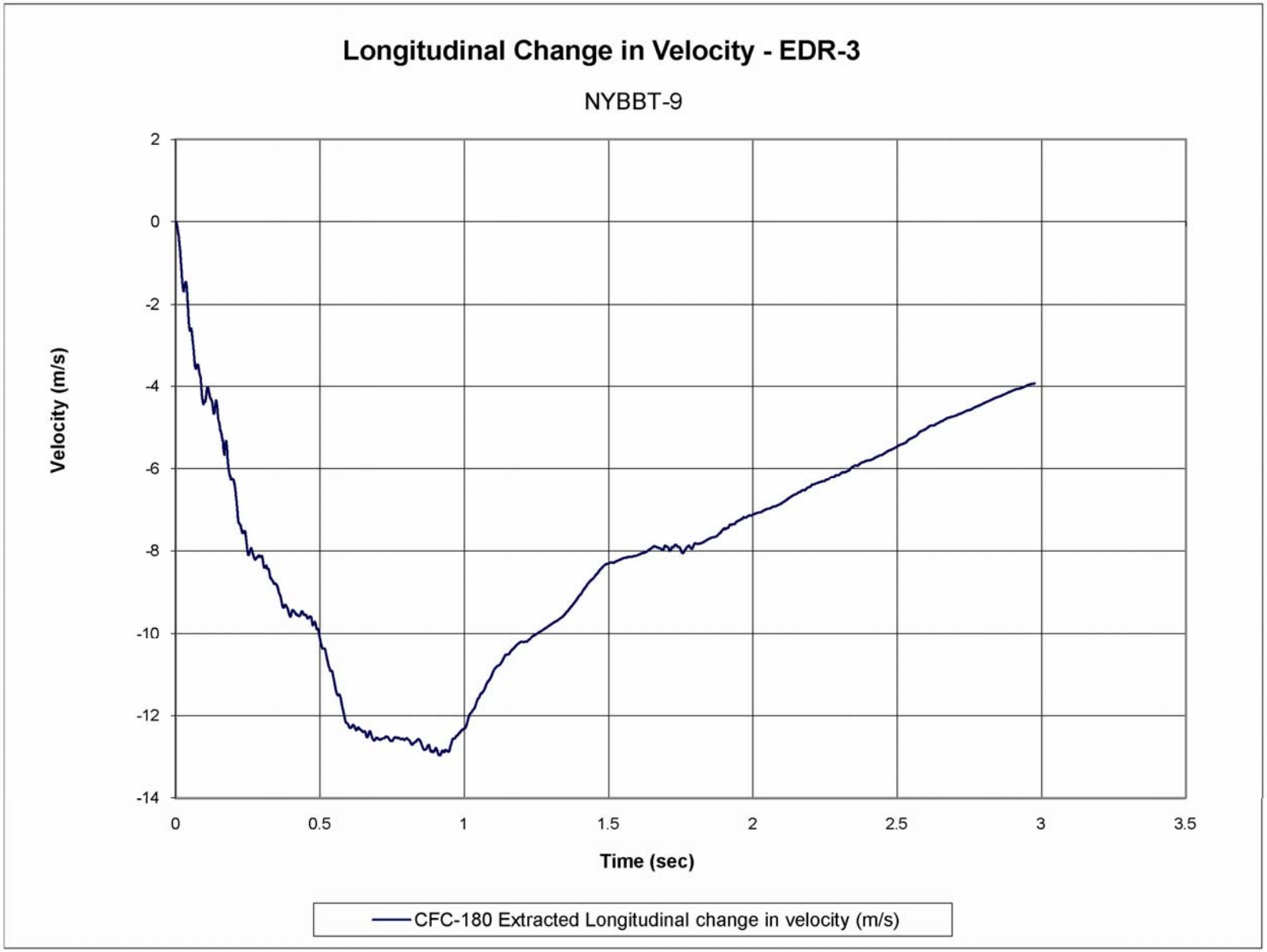


Figure V-2. Graph of Longitudinal Occupant Impact Velocity (EDR-3), Test No. NYBBT-9

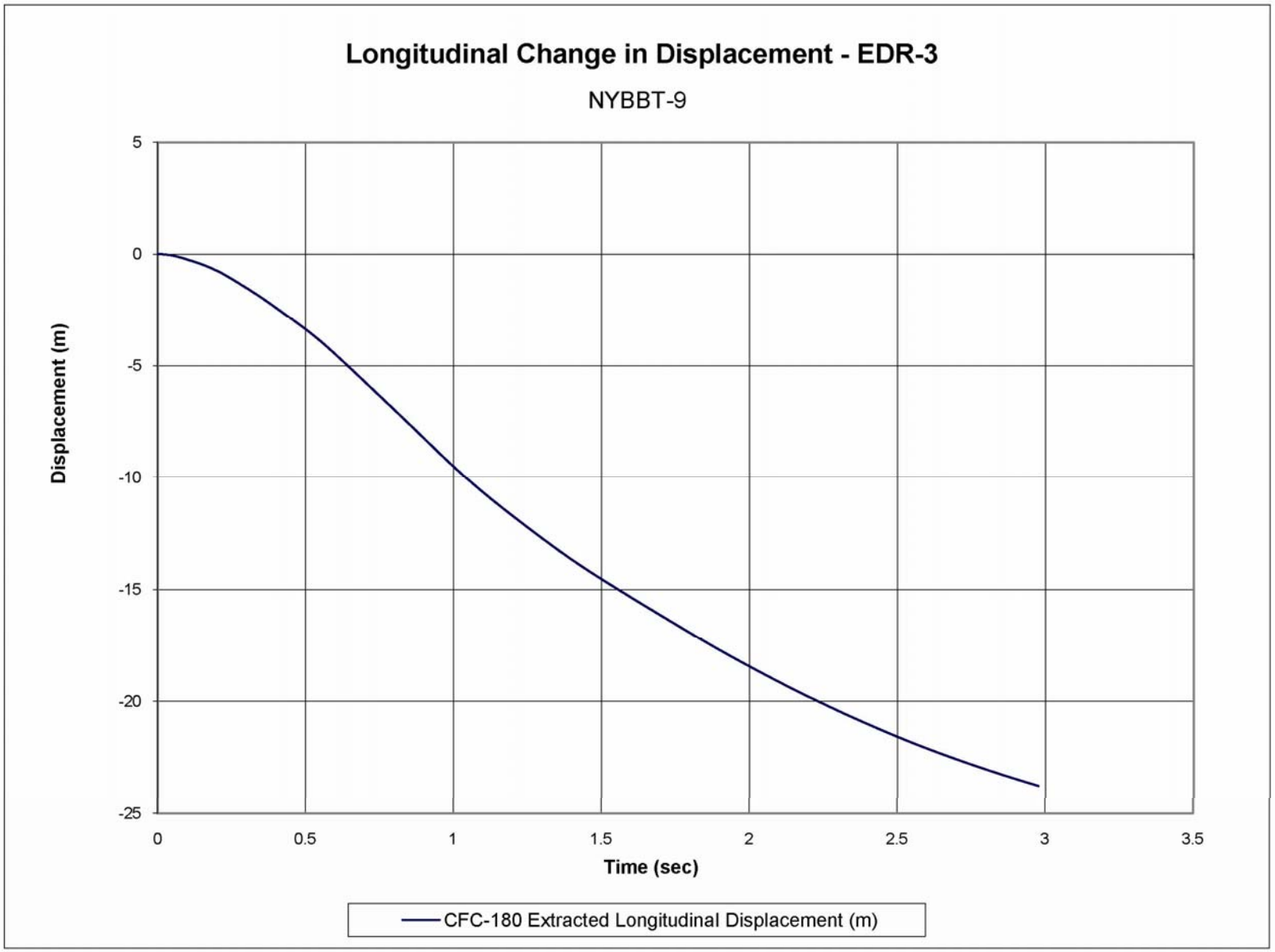


Figure V-3. Graph of Longitudinal Occupant Displacement (EDR-3), Test No. NYBBT-9

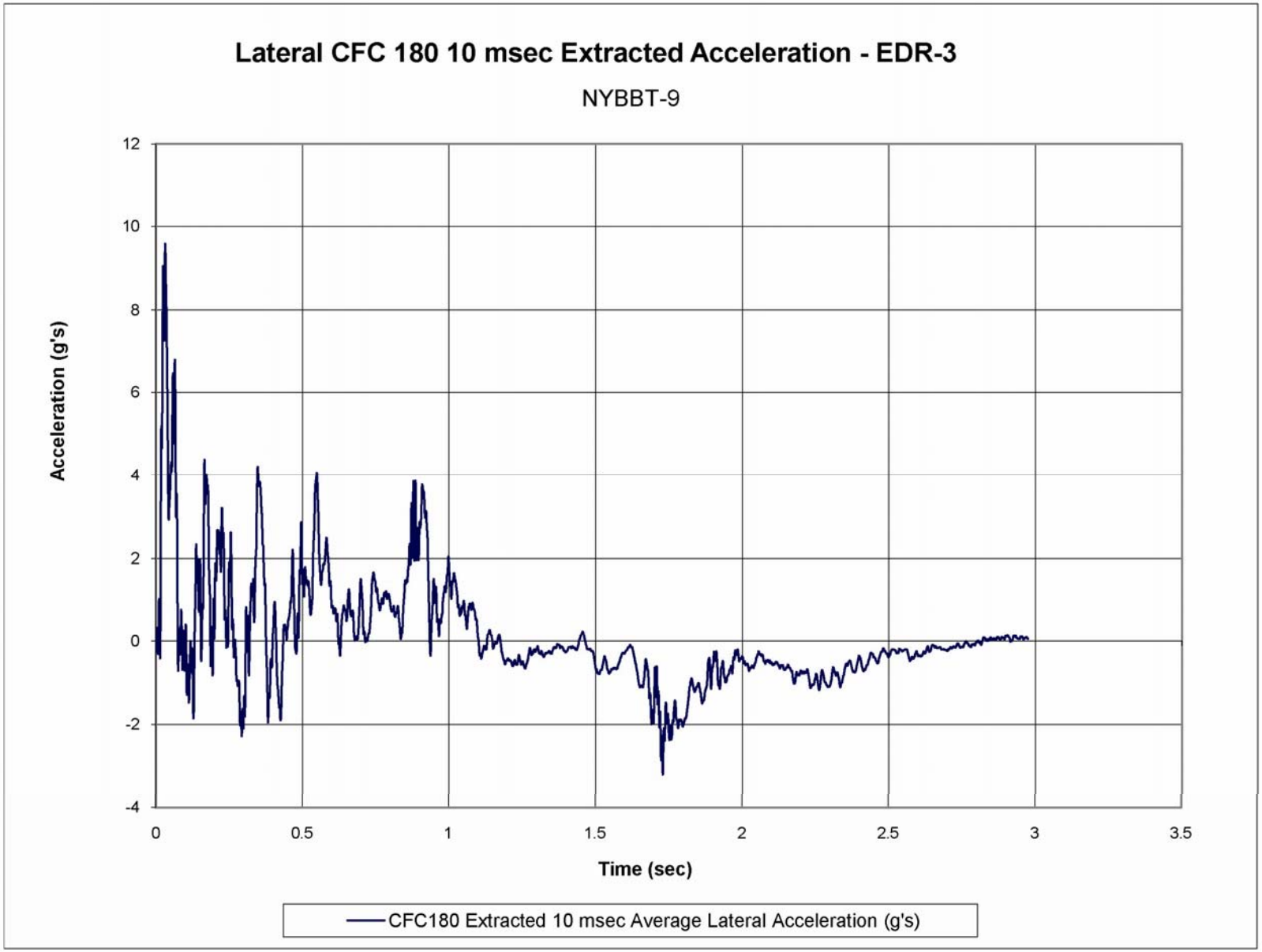


Figure V-4. Graph of Lateral Occupant Deceleration (EDR-3), Test No. NYBBT-9

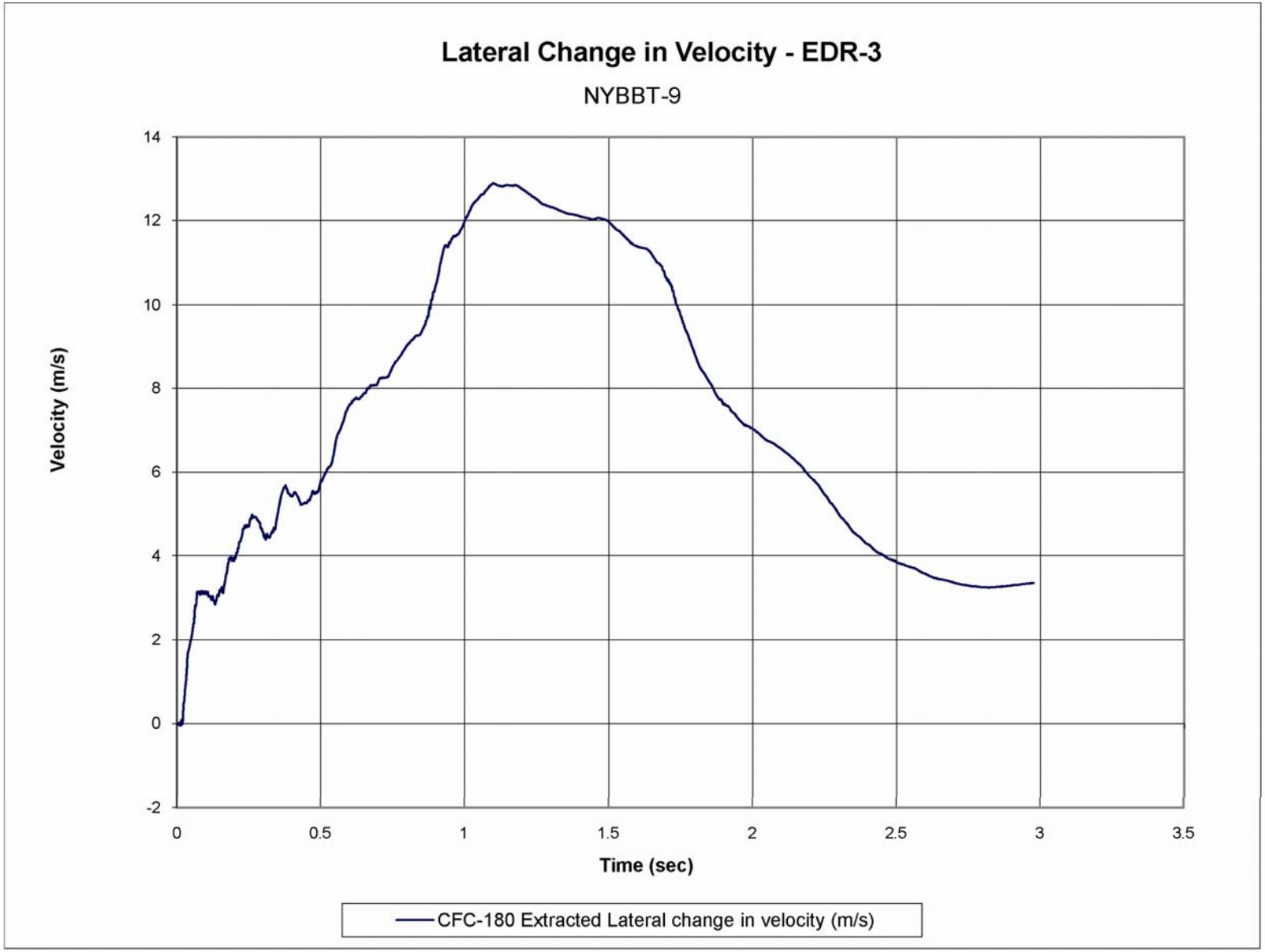


Figure V-5. Graph of Lateral Occupant Impact Velocity (EDR-3), Test No. NYBBT-9

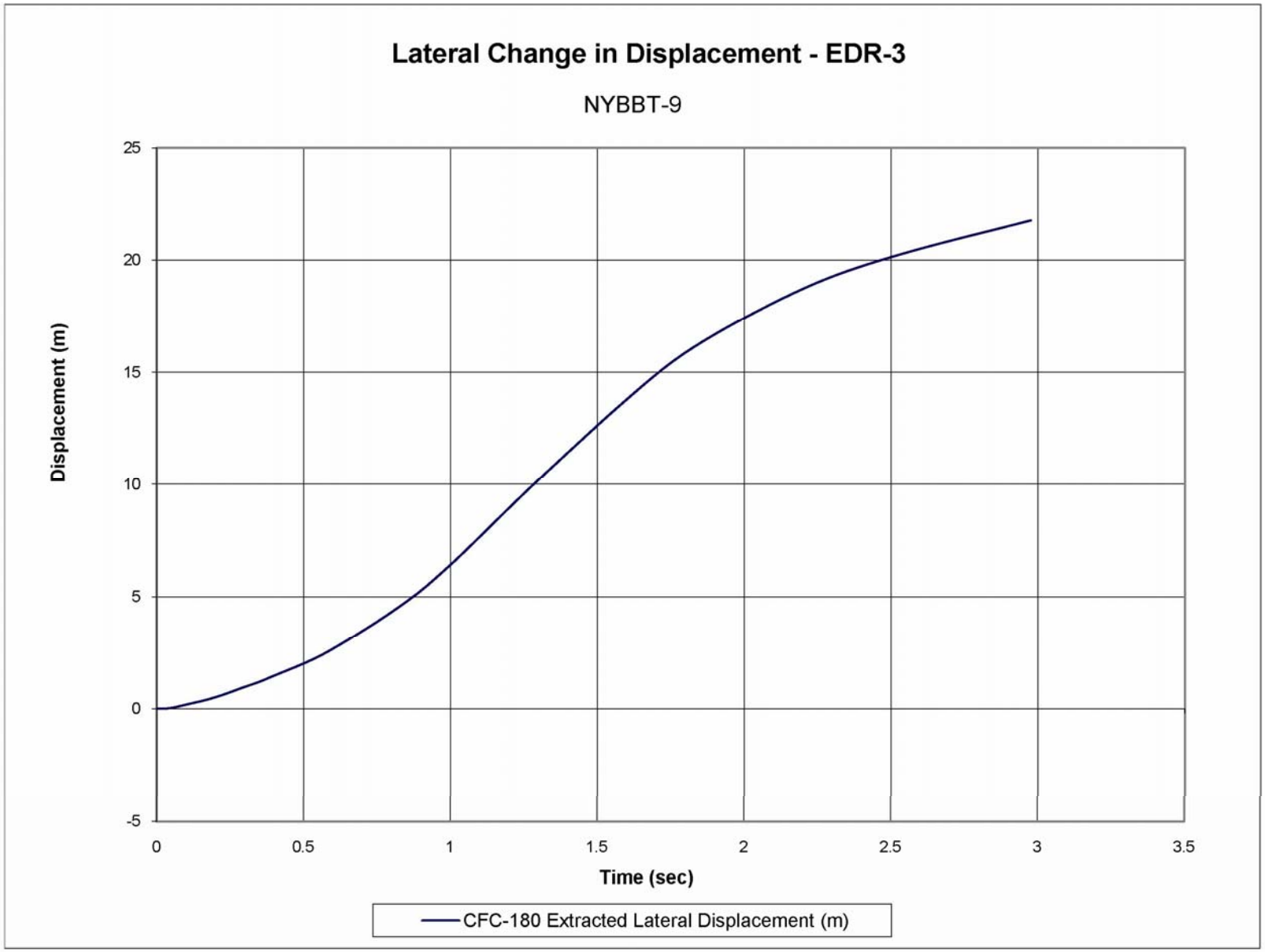


Figure V-6. Graph of Lateral Occupant Displacement (EDR-3), Test No. NYBBT-9

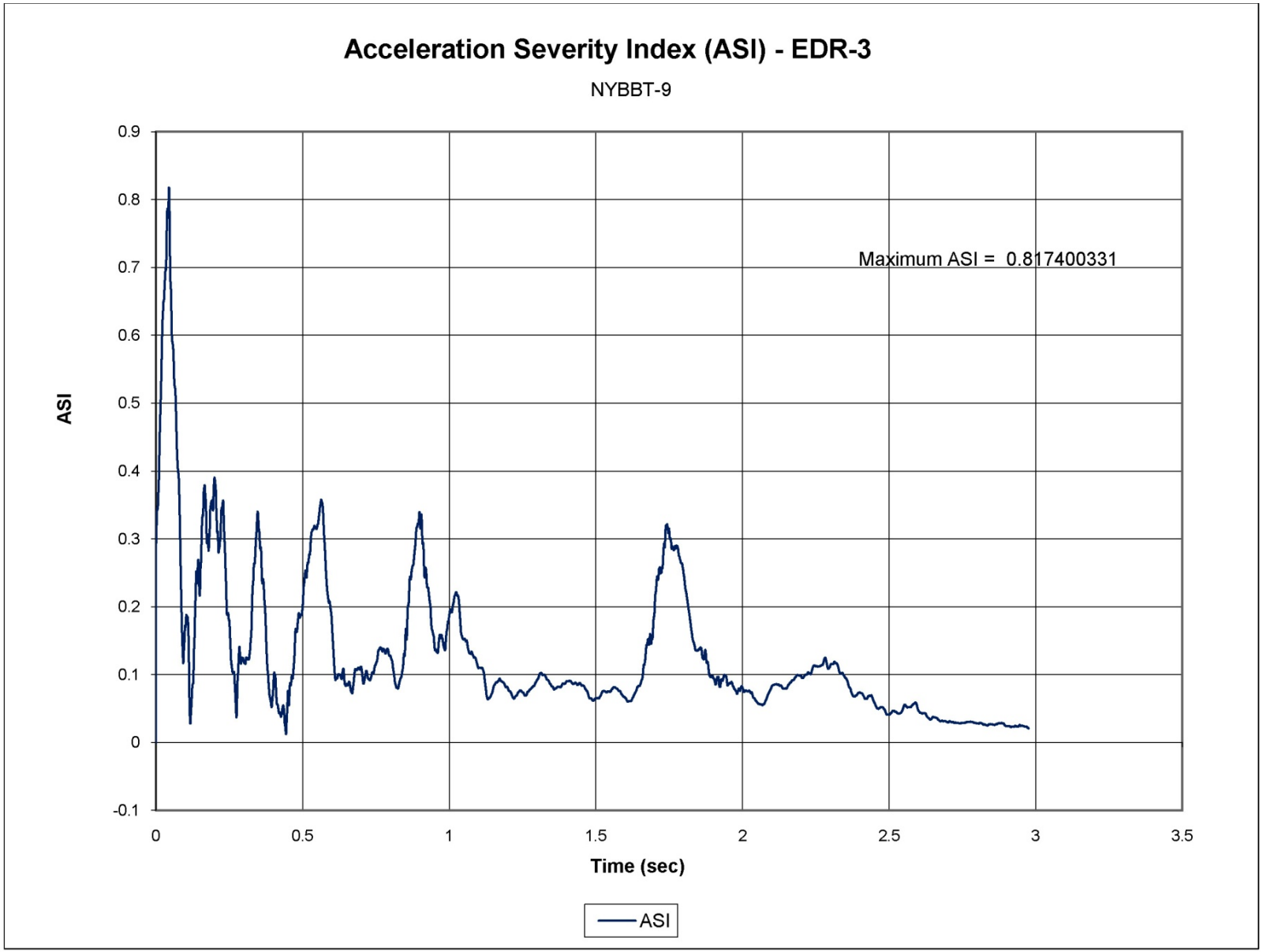


Figure V-7. Graph of Acceleration Severity Index (EDR-3), Test No. NYBBT-9

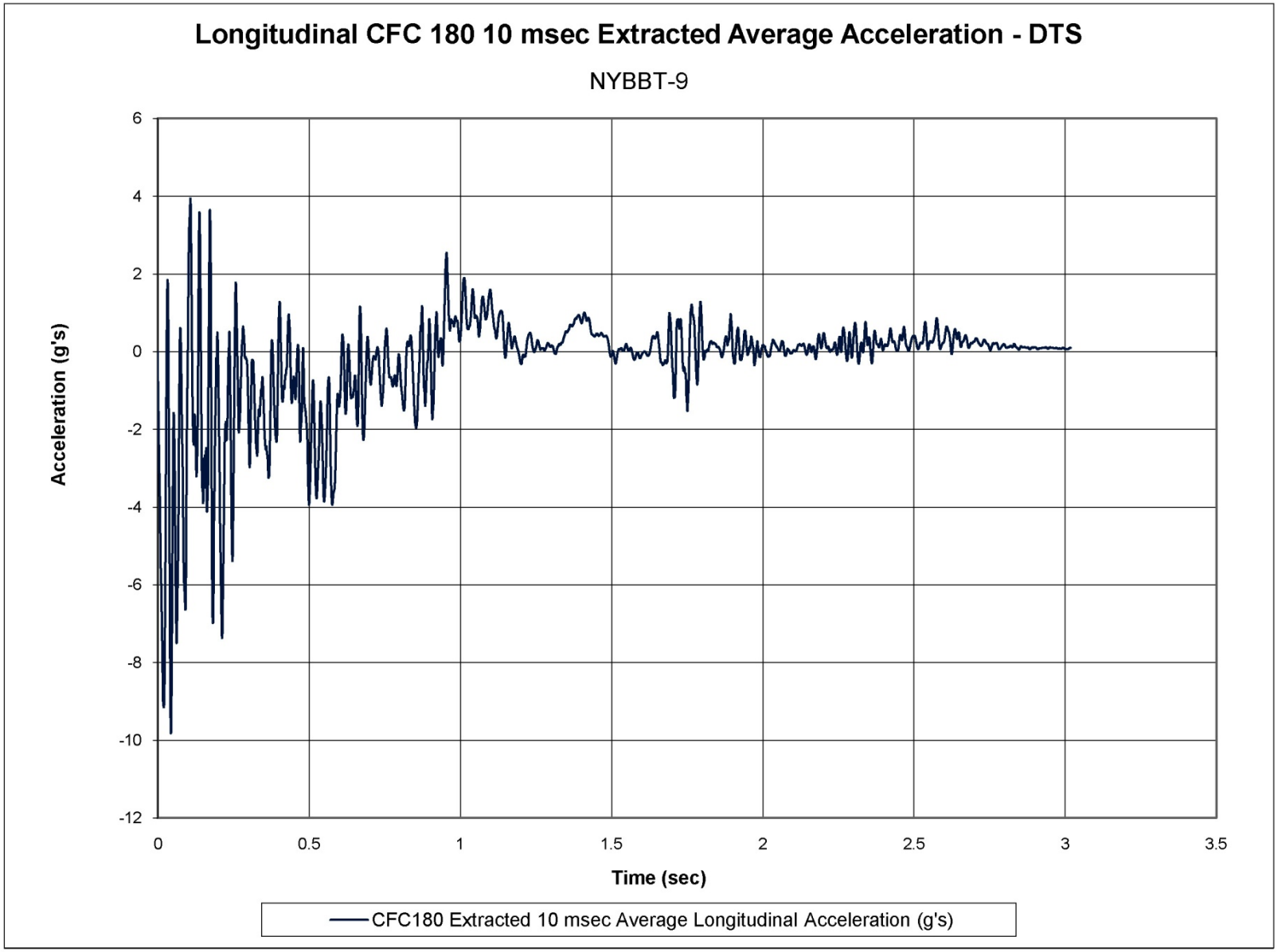


Figure V-8. Graph of Longitudinal Occupant Deceleration (DTS), Test No. NYBBT-9

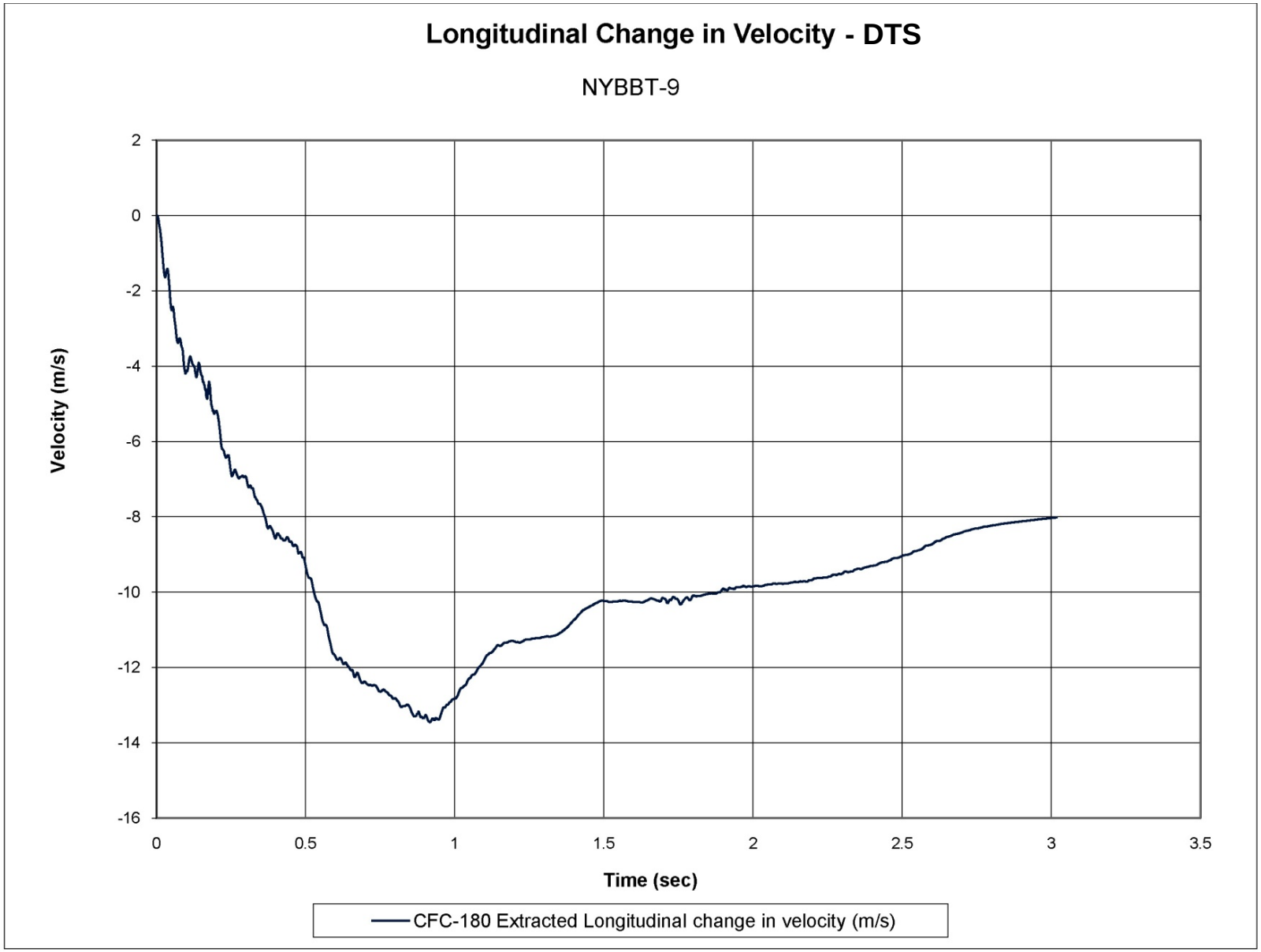


Figure V-9. Graph of Longitudinal Occupant Impact Velocity (DTS), Test No. NYBBT-9

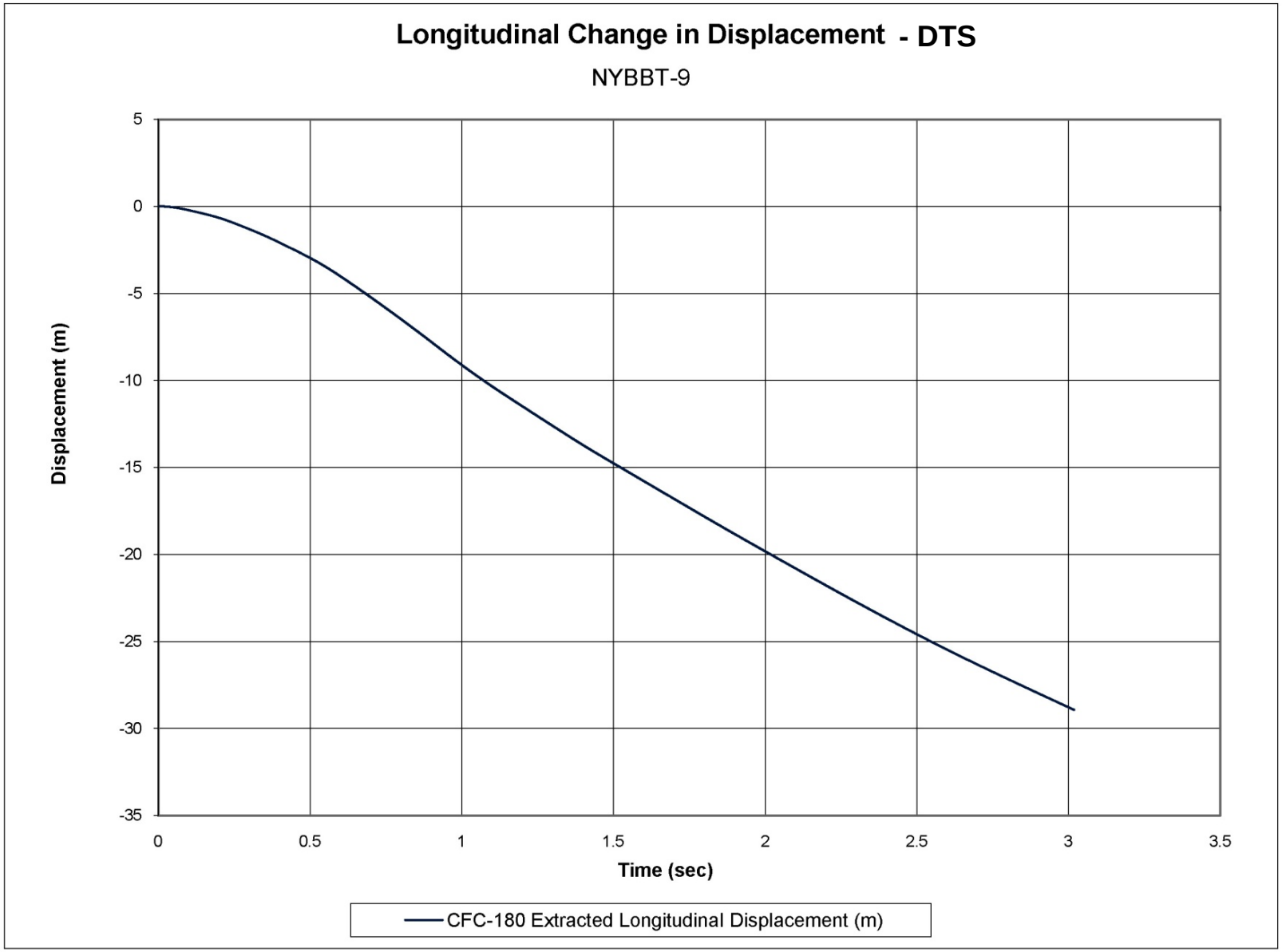


Figure V-10. Graph of Longitudinal Occupant Displacement (DTS), Test No. NYBBT-9

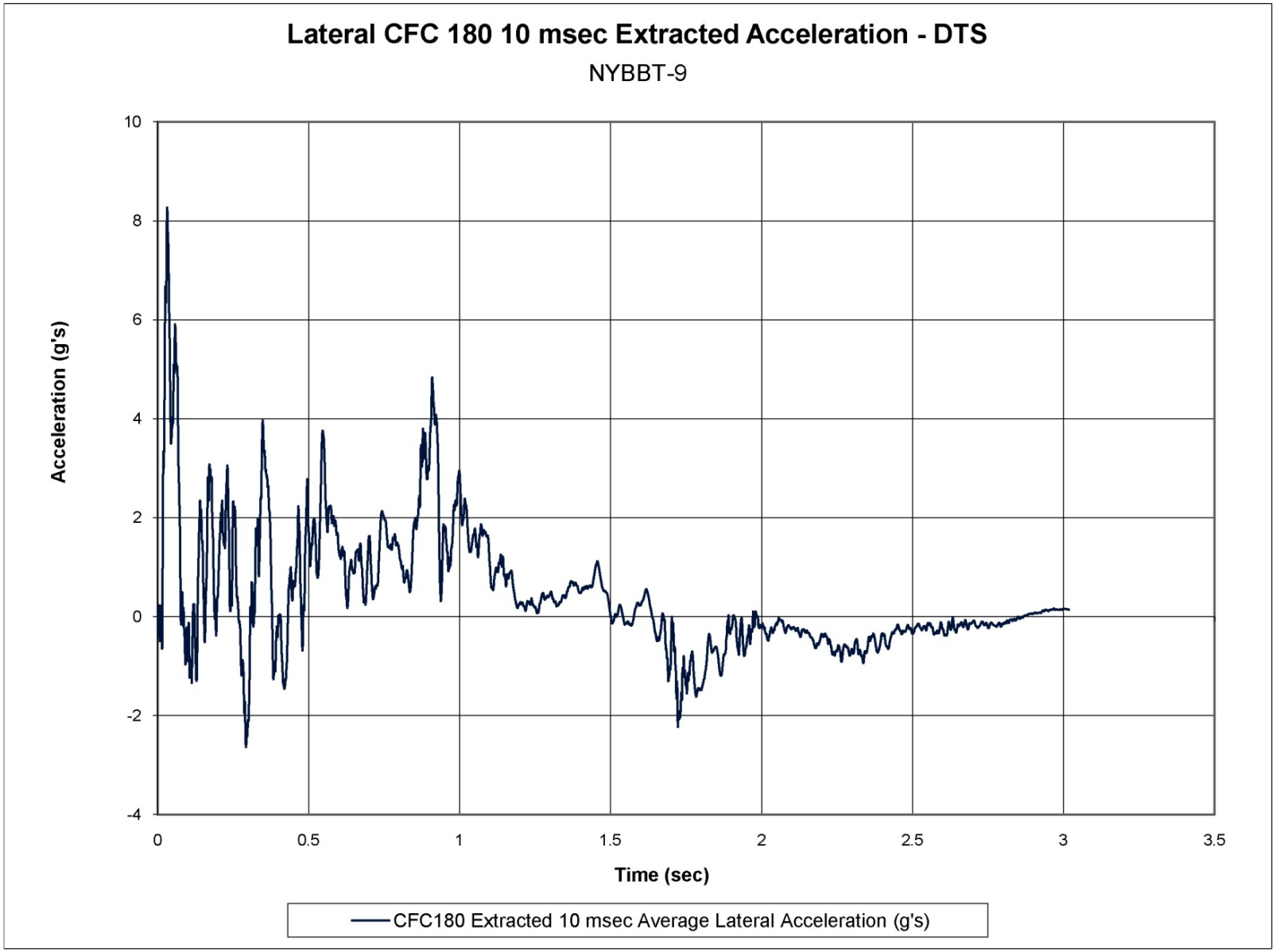


Figure V-11. Graph of Lateral Occupant Deceleration (DTS), Test No. NYBBT-9

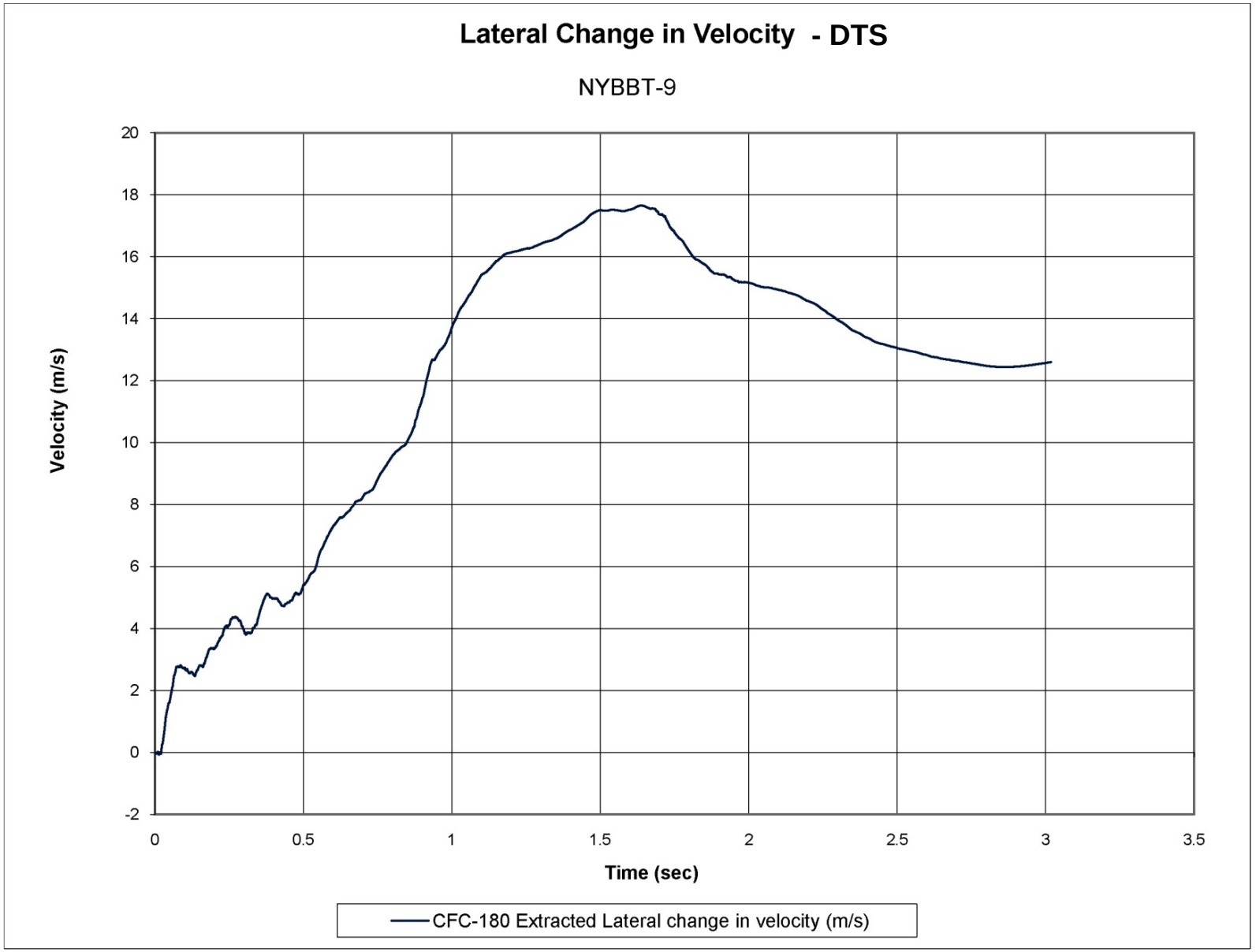


Figure V-12. Graph of Lateral Occupant Impact Velocity (DTS), Test No. NYBBT-9

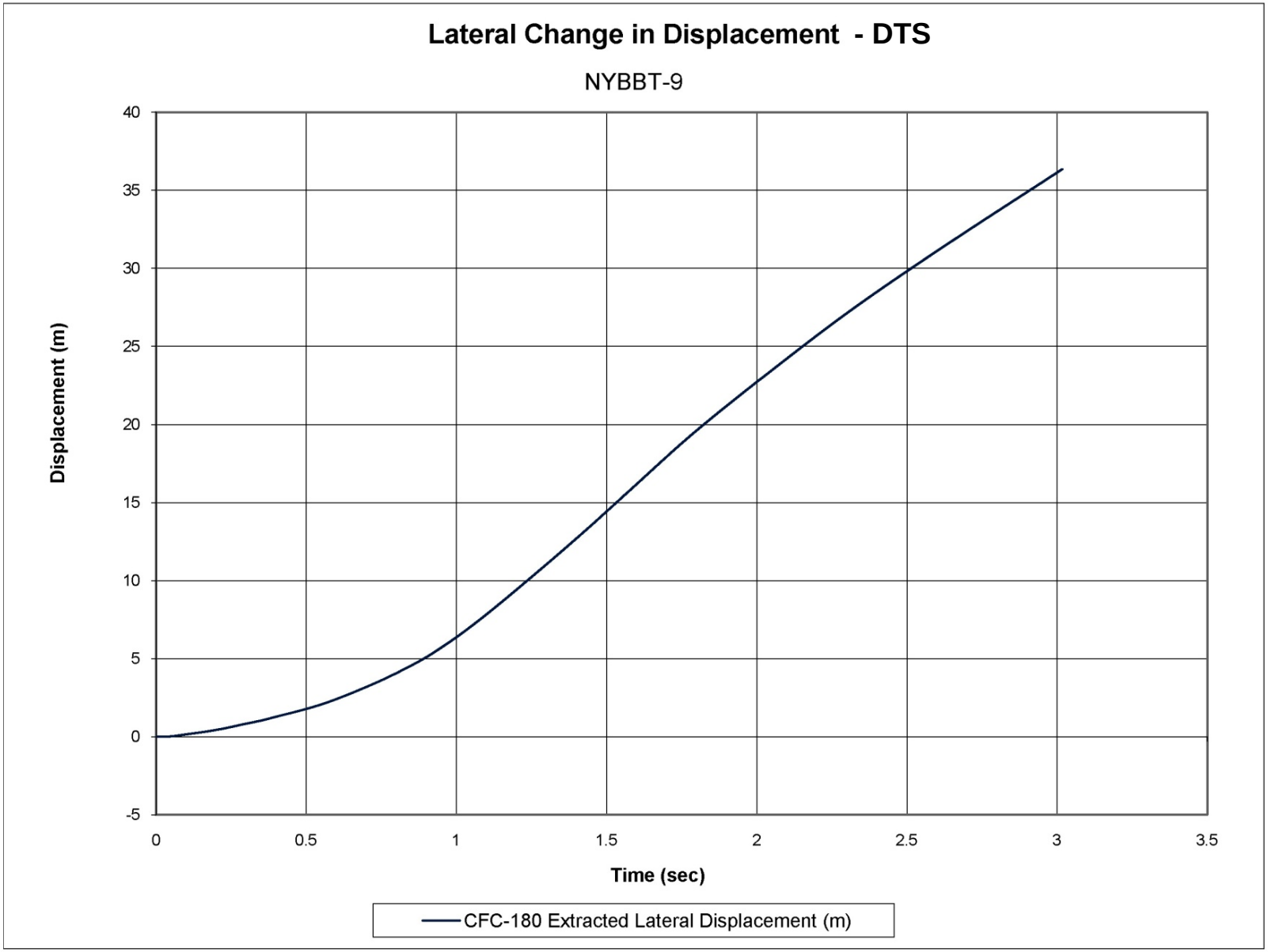


Figure V-13. Graph of Lateral Occupant Displacement (DTS), Test No. NYBBT-9

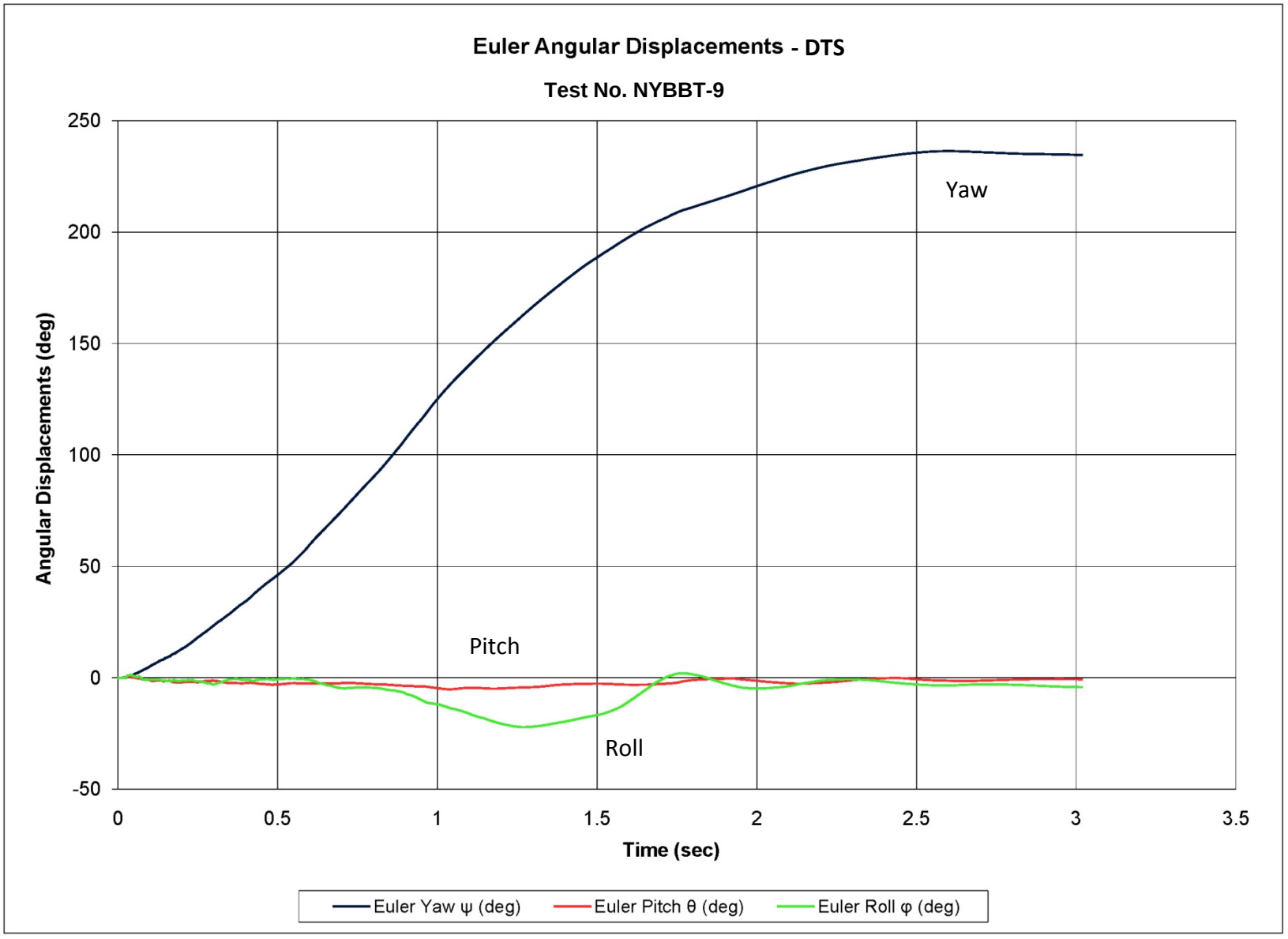


Figure V-14. Graph of Roll, Pitch, and Yaw Angular Displacement (DTS), Test No. NYBBT-9

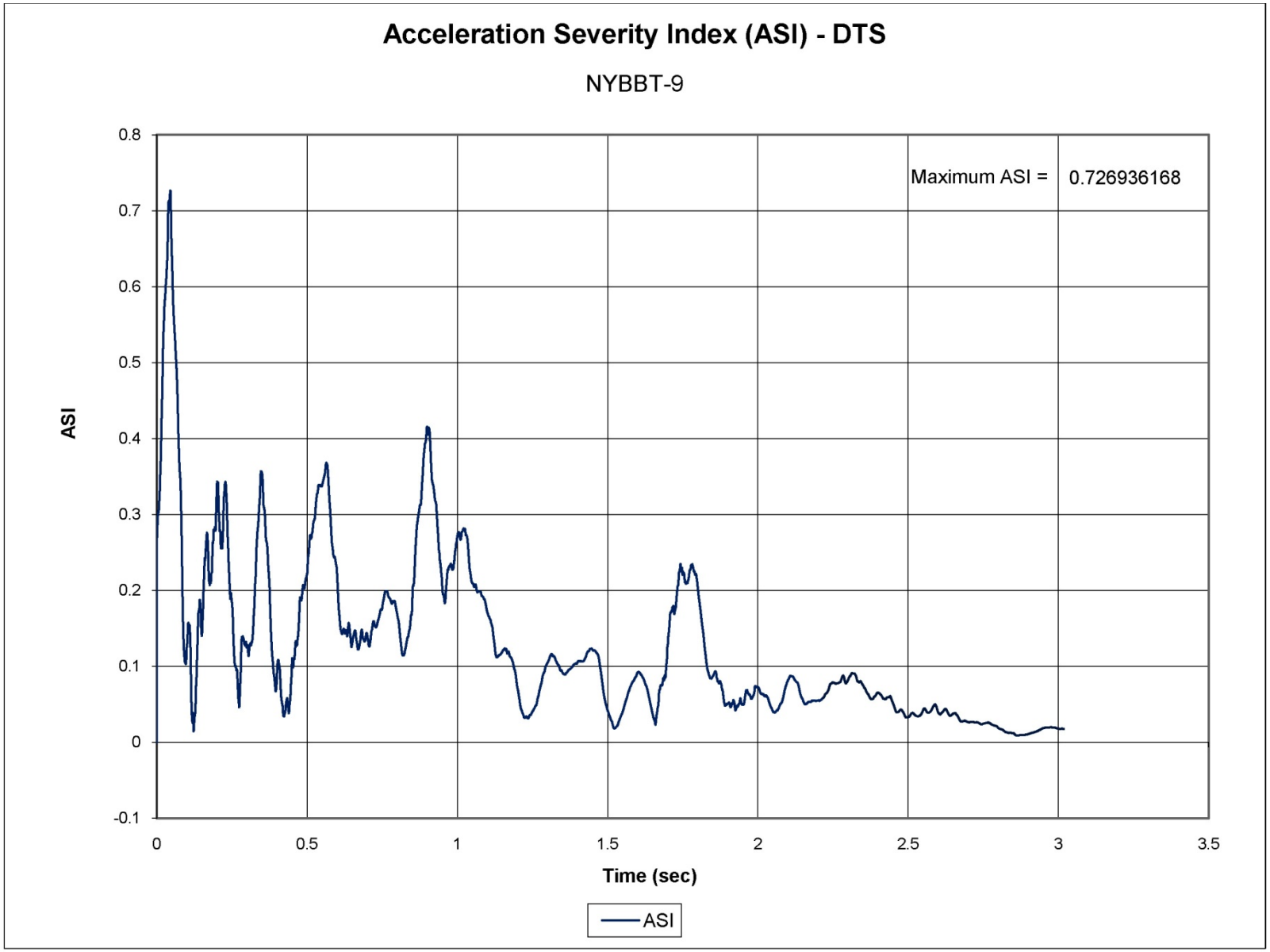


Figure V-15. Graph of Acceleration Severity Index (DTS), Test No. NYBBT-9

APPENDIX W Material Specifications

ACTIVE MEMBER

ELDERLEE, INC.

University of Nebraska-Lincoln
Accounting Dept.
PO Box 880439

Date: August 31, 2007
Order #: 34513
PO #: Per Jim @ Nebraska
Shippers #: 43572
Invoice #: 37729

Certificate of Compliance

The undersigned, being duly authorized by ELDERLEE, INC., Oaks Corners, NY and having reviewed the records of the company, hereby certifies that all material galvanized has been processed in accordance with AASHTO M111 and ASTM A-123 Specifications.

0013.02708	1 Ea.	3" I-Dwy Post w/Slots & Sp 47"
0057.18035	1 Ea.	BB 6x6 18' STD w/35' Rad.
0054.00052	1 Ea.	BB Dwy. Shelf Angle 4-1/2"

RECEIVED
SEP 5 2007

James A. Morlang
Galvanizing Plant Manager

729 Cross Road • Oaks Corners, N.Y. 14518-0010 • Telephone: 315-789-6670 • FAX: 315-789-6615
Quality • Service • Integrity

ACTIVE MEMBER

ELDERLEE, INC.

University of Nebraska-Lincoln
Accounting Dept.
PO Box 880439

Date: July 10, 2007
Order #: 10333
PO #: Ltr. Dtd. 2/4/02
Shippers #: 15135
Invoice #: 0

Certificate of Compliance

The undersigned, being duly authorized by ELDERLEE, INC., Oaks Corners, NY and having reviewed the records of the company, hereby certifies that all material galvanized has been processed in accordance with AASHTO M111 and ASTM A-123 Specifications.

0013.01542	43 Ea.	Post 3" I-Univ. @ 63" w/Spade
0013.02708	1 Ea.	3" I-Dwy Post w/Slots & Sp 47"
0013.02707	2 Ea.	3" I Post Type II End 2'09" w/Sp.
0041.12701	Ea.	BR 3x5 Tube @ 27'5/16" Std.
0054.00018	13 Ea.	BB 6x6x3/16 @ 18'00" Std.
0054.00050	43 Ea.	BB Reg. Shelf Angle 4-1/2"
0054.00052	1 Ea.	BB Dwy. Shelf Angle 4-1/2"
0054.00100	12 Ea.	BB 6x6 Splice Plate 27" (Pair)
0054.00102	1 Ea.	BB 6x6 Splice Plate w/2 Degree (Pair)
0054.00104	1 Ea.	BB 6x6 Splice Plate w/4 Degree (Pair)
0054.01000	1 Ea.	BB 6x6 Type I End Section
0054.02000	1 Ea.	BB 6x6 Type II End Section
0057.18035	1 Ea.	BB 6x6 18' STD w/35' Radius

RECEIVED
JUL 17 2007
UNL ACCOUNTING

James A. Morlang
Galvanizing Plant Manager

729 Cross Road • Oaks Corners, N.Y. 14518-0010 • Telephone: 315-789-6670 • FAX: 315-789-6615
Quality • Service • Integrity

STEEL OF WEST VIRGINIA
HUNTINGTON, WEST VIRGINIA 25726-2547

DATE: January 5, 2007

SOLD TO: Elderlee Inc.
729 Cross Road
Oaks Corner, NY 14518

SHIP TO:
Same

CUSTOMER ORDER: P002162

SWV ORDER: 73028

MATERIAL SPECIFICATION
3" X 5.7 lb/ft I-Beam. SWV Section 2658
LENGTH: 42'. GRADE: ASTM A36-05.
All manufacturing processes for these materials occurred in the U.S.A.

Heat	Yield psi	Tensile psi	Elon % 8"	C	Mn	P	S	Si	Cu	Cr	Ni	Mo	V	Cb
52467	47000	69000	21.5	.13	0.68	.011	.031	.21	.37	.11	.12	.03	.002	.002
52467	45000	69000	22.8	.13	0.68	.011	.031	.21	.37	.11	.12	.03	.002	.002
52472	47000	68000	22.3	.13	0.68	.010	.031	.22	.33	.09	.10	.02	.001	.001
52472	48000	68000	23.7	.13	0.68	.010	.031	.22	.33	.09	.10	.02	.001	.001

This is to certify that the above is a true and correct report as contained in the records of this company.

Steve Fisher
Metallurgist

ELDERLEE, INC.
CERT RECEIVED: 1/8/07
PURCHASE ORDER # P2162
SALES ORDER # 73028
SHIPPED FROM: SWVA

RECEIVED
JUL 17 2007

Certificate of Analysis

No. CT001070
Date 03/05/07

MET CON STEEL, Inc.
P.O. Box 876
Wadsworth, Ohio 44282-0876
(330) 336-3163
fax 334-3296

Customer ELD10
ELDERLEE, INC.
729 Cross Road
Oaks Corner, New York 14518

Ship To: ELD10
ELDERLEE, INC.
STEEL YARD
729 Cross Road
Oaks Corner, NY

Terms	Ship Via	FOB	Work Order No.	Shipper No.	Date Shipped	Slpn
1%10 NET 30	MAWSON	DELVD	903552	BL603471	03/05/07	Al Rady

Tag#	Heat No.	Grade	Gauge	Width	Length	Pcs	Weight	Part No.	P.O No.
903552-07	C39516	A36	.246	8.000	24.00	300	3975		002182
903552-08	C39516	A36	.246	8.000	24.00	300	3975		002182

Chemical Analysis

C .23	Mn .96	P .005	S .006	Si .03	Ti .002	Cr .025	Mo .005	Cu .01	
Al .035	Cb .005	V	Pb	Sn	Ca	Ni .01	B	Co	
Ni	Va	Fe	Zn	Mg					

Physical Properties

Rockwell B88 Olsen | Yield 49150 | Tensile 62690 | Elongation 24% | Grain
Mill GALLATIN

Comments: MELTED & MFG. IN THE USA

We hereby certify the above figures are accurately stated, and are traceable in our records back to the supplier and/or an accredited test laboratory

RECEIVED
JUL 17 2007
ACCOUNTING

(c)2002ApplicationsResearch734 449-430 Rev. 01 (03/17/00)

ELDERLEE, INC.
CERT RECEIVED: 3/6/07
PURCHASE ORDER # P2182
SALES ORDER # SM603444
SHIPPED FROM: Met Con Steel

TEST ACTION TRANSMITTAL
NYSDOT MATERIALS BUREAU

Serial No.: 220564

Test No.: 07MG001
Date Received: 1/12/07

To: Nova Tube, Morrisville, PA; Pennoni, King of Prussia, PA.

The Material represented by the sample submitted with the BR-240 having the above serial number was:

Accepted on 2/2/07.

Note: Originally Accepted on 1/16/07.

For ITEM: 710-21 Box Beam Guide Rail and Median Barrier; Galvanized 6"x6"x3/16"; Heat #422E0371, 372,373

Remarks: For DWTT Properties.

This document serves as the official transmittal of action on the noted sample.
Attached hereto is a digital image of the BR-240 which accompanied same.

JOHN RONDINARO
DIRECTOR, MATERIALS BUREAU

BR 240a (11/74) SAMPLE AND ACCEPTANCE TRANSMITTAL
NYSDOT MATERIALS BUREAU

SERIAL NO. 220564 | DATE REC'D 1/12/07 | TEST NO. 07MG-001

To:

Material Represented by the Sample Described Below Was RECEIVED

On ____________ For ____________

JUL 17 2007

(Action Official) Only When Validated Below By The Materials Bureau

UPPER PORTION FOR MATERIALS BUREAU ONLY — INSPECTOR TO COMPLETE ALL APPLICABLE BOXES BELOW

16. ADDITIONAL INFO. (SEE INSTRUCTIONS ON REAR)
LOGO IMPRINTED NOVA 99
4" LG SAMPLE W/ AGENCY STAMP (P) & LEFT WITH MANUFACTURER
COIL # 890291
TAG # T14940G
Note: Error in Heat Number corrected by Brandon Stanfield on 2/2/07

1. MATERIAL: 6"x6"x0.188 STL BOX BEAM
2. ITEM NO.: 710-21
3. DATE SAMPLED: 12/20/06
4. CONTRACT NO.: STOCK
5. SUPPLIER AND LOCATION: NOVA TUBE & STEEL MORRISVILLE, PA
6. QUANTITY IN LOT: 34,400 FT 800,000 LBS
7. LOT NO.: NOVA 9
8. MANUFACTURER AND LOCATION (IF DIFFERENT THAN ABOVE): ______
9. BATCH NO.: 422E0371, 372, 373
10. DATE OF MFGR.: 12/15/06
11. SAMPLED AT: ☐ MILL ☒ PLANT ☐ JOB
12. TYPE: ☒ CONTROL SAMPLE ☐ INFO. SAMPLE ☐ BPR SAMPLE ☐ APPROVED LIST MAT. ☐ CERTIFIED MAT.
13. SAMPLED FROM: TUBE WAREHOUSE
14. SAMPLED BY (INC. DIST. NO. OR AGENCY): PAI; IA039; AAH
15. CONTRACTOR AND PROJECT LOCATION
MATERIALS BUREAU VALIDATION

RETAIN PINK COPY FOR YOUR RECORDS
FORWARD ALL OTHERS TO MATERIALS BUREAU

TEST ACTION TRANSMITTAL
NYSDOT MATERIALS BUREAU

Serial No.: 216817

To: Atlas Tube, Chicago, IL; R. W. Hunt, Lombard, IL.

Test No.: 06MG46
Date Received: 5/19/06

The Material represented by the sample submitted with the BR-240 having the above serial number was:

Accepted on 6/6/06.

for ITEM: 710-21 Box Beam Guide Railing and Median Barrier; Galvanized 6"x6"x3/16"; Heat #C35955.

Remarks: For DWTT Properties.

This document serves as the official transmittal of action on the noted sample.
Attached hereto is a digital image of the BR-240 which accompanied same.

JOHN RONDINARO
DIRECTOR, MATERIALS BUREAU

SAMPLE AND ACCEPTANCE TRANSMITTAL
NYSDOT MATERIALS BUREAU

SERIAL NO. 216817 DATE REC'D. 5/19/06 TEST NO. 06MG46

To:

Material Represented by the Sample Described Below Was

On For

(Action Official Only When Validated Below By The Materials Bureau)

UPPER PORTION FOR MATERIALS BUREAU ONLY — INSPECTOR TO COMPLETE ALL APPLICABLE BOXES BELOW

1. MATERIAL: 6"x6" x 3/16" SQ. TUBING
2. ITEM NO.: 710-21
3. DATE SAMPLED:
4. CONTRACT NO.: —
5. SUPPLIER: Atlas Tube Inc Chicago, IL
6. QUANTITY/UNIT:
7. LOT NO.: 35955
8. MANUFACTURER AND LOCATION IF DIFFERENT THAN ABOVE:
C35955
DATE OF MFGR.: 5-5-06
11. SAMPLED AT: ☐ MILL ☒ PLANT ☐ JOB
12. TYPE: ☒ CONTROL SAMPLE ☐ INFO. SAMPLE ☐ BSR SAMPLE ☐ APPROVED LIST MAT. ☐ CERTIFIED MAT.
SAMPLED FROM: Stock
SAMPLED BY (NAME, TITLE NO. OR AGENCY):
15. CONTRACTOR AND PROJECT LOCATION
MATERIALS BUREAU VALIDATION

16. ADDITIONAL INFO. INCL. INSTRUCTIONS OR REMARKS:
Heat Identified As #35955
Cut sample with "Sawzall". Verify
Heat No. "H" Sampled on (3) sides.
Left with Manufacturer.
Box Nos: 676119 676123
676120 676124
676121
676122

RETAIN PINK COPY FOR YOUR RECORDS
FORWARD ALL OTHERS TO MATERIALS BUREAU

RECEIVED
JUL 17 2007

BAYOU STEEL CORPORATION
RIVER ROAD P.O. BOX 5000
LA PLACE, LOUISIANA 70069 1156
Telephone (985) 652-4900

MATERIAL CERTIFICATION REPORT

TRIAD METALS INTERNATIONAL
SUITE A-1
WILLOW GROVE, PA 19090

TRIAD METALS
1951 BESSEMER RD.
PETERSBURG, VA 23805
PO:128178

RECEIVED JUL 17 2007 TRIAD METALS

TESTED IN ACCORDANCE WITH: ASTM A6

INVOICE NO.
PRODUCT: UNEQUAL ANGLES
HEAT NO.: 54948 25 Pieces
Length 40'0"

DATE: 03/19/07 Cust T-4200 -0030
GRADE: A3652950 -
SIZE: U 5 X 3-1/2 X 3/8 X 10.40

CHEMICAL ANALYSIS	
C	.14
Mn	.94
P	.012
S	.034
Si	.24
Cu	.30
Ni	.17
Cr	.15
Mo	.047
Cb	.004
V	
B	
Al	
Sn	.020
N	
Ti	
CI	
CE	

MECHANICAL PROPERTIES	TEST 1 IMPERIAL	TEST 1 METRIC	TEST 2 IMPERIAL	TEST 2 METRIC	TEST 3 IMPERIAL	TEST 3 METRIC
YIELD STRENGTH	55,829 PSI	385 MPa	55,198 PSI	381 MPa	PSI	MPa
TENSILE STRENGTH	76,205 PSI	525 MPa	76,363 PSI	527 MPa	PSI	MPa
ELONGATION	29.0 %	29.0 %	26.0 %	26.0 %	%	%
GAUGE LENGTH	8 in	203 mm	8 in	203 mm	in	mm
BEND TEST DIAMETER	d	d	d	d	d	d
BEND TEST RESULTS						
SPECIMEN AREA	sq in	sq mm	sq in	sq mm	sq in	sq mm
REDUCTION OF AREA	%	%	%	%	%	%
IMPACT STRENGTH	ft-lbs	J	ft-lbs	J	ft-lbs	J

IMPACT STRENGTH	IMPERIAL	METRIC	INTERNAL CLEANLINESS		GRAIN SIZE HARDNESS	
AVERAGE	ft-lbs	J	SEVERITY			
TEST TEMP	F	C	FREQUENCY		GRAIN PRACTICE REDUCTION RATIO	
ORIENTATION			RATING			

Customer Grade & Specs: A36-04
44W, CSA50W, A70936
ASME SA36

A529-04 GRADE 50

ELDERSBURG, MD.
CERT RECEIVED: 4/9/07
PURCHASE ORDER # P2246
SALES ORDER # 162079
SHIPPED FROM: Triad Metals

I HEREBY CERTIFY THAT THE MATERIAL TEST RESULTS PRESENTED HERE ARE FROM THE REPORTED HEAT AND ARE CORRECT. ALL TESTS WERE PERFORMED IN ACCORDANCE TO THE SPECIFICATIONS REPORTED ABOVE. ALL STEEL IS ELECTRIC FURNACE MELTED, MANUFACTURED, PROCESSED, AND TESTED IN THE U.S.A WITH SATISFACTORY RESULTS, AND IS FREE OF MERCURY CONTAMINATION IN THE PROCESS.

NOTARIZED UPON REQUEST:
SWORN TO AND SUBSCRIBED BEFORE ME IN AND FOR ST. JOHN PARISH ON THIS _____ DAY OF _____, 20____

Michael E. Soileau, # 81887, Notary Public

SIGNED Mark Edwards
MARK EDWARDS, QUALITY ASSURANCE SUPERVISOR

DIRECT ANY QUESTIONS OR NECESSARY CLARIFICATIONS CONCERNING THIS REPORT TO THE SALES DEPARTMENT.

1-800-535-7692 (USA)

03/19/2007 12:16:44 PM -0500

PAGE 13 OF 19

Steel Dynamics®
Roanoke Bar Division

Steel Dynamics - Roanoke Bar Division
P.O. Box 13948 Roanoke, VA 24038
Office: 540-342-1831 Fax: 540-342-8437

Test and Inspection Report NO. 31814-0

ROANOKE

AMERICAN STEEL & ALUM-LIVERPOOL

P. O. BOX 620
LIVERPOOL NY 13088-0000 Date 1/03/07

HEAT NUMBER	SIZE	1-YIELD Pt. KSI	ULTIMATE KSI	ELONG 8 IN.	BEND TEST	GRADE
JF5962	FLATS 5/8 X 5 3/8	44.4	66.9	34.5		A36
PURCHASE ORDER NUMBER	NUMBER PIECES	2-YIELD PT. KSI	ULTIMATE KSI	ELONG 8 IN.	BEND TEST	GRADE
0865612	180 PIECES 22'07"	43.5	65.7	37.5		A36

HEAT NUMBER	SIZE	1-YIELD Pt. MPA	ULTIMATE MPA	ELONG 203mm	BEND TEST	GRADE
JF5962	FLATS 16 X 137	306.1	461.3	34.5		A36
PURCHASE ORDER NUMBER	NUMBER PIECES	2-YIELD PT. MPA	ULTIMATE MPA	ELONG 203mm	BEND TEST	GRADE
0865612	180 PIECES 22'07"	299.9	453.0	37.5		A36

C	MN	S	P	SI	CR	NI	MO	CU	V	NB
.14	.71	.020	.005	.21	.06	.10	.02	.29	.002	.001

Charpy requirement:
15 ft-lbs @ +40° F

1) 90.0 ft-lbs
2) 74.5 ft-lbs
3) 84.0 ft-lbs

ELDERLEE, INC.
CERT RECEIVED: 1/5/07
PURCHASE ORDER # P2146
SALES ORDER # 31814
SHIPPED FROM: American Steel

MERCURY, RADIUM OR OTHER ALPHA SOURCE MATERIALS IN ANY FORM HAVE NOT BEEN USED IN THE PRODUCTION OF THIS MATERIAL. NO WELD REPAIR HAS BEEN PERFORMED.

RECEIVED
JUL 17 2007
UNL ACCOUNTING

Approved ABS QA Mill. Certificate No. 00NN10108-X.

This material was melted and manufactured in the USA by basic Electric Furnace processes to meet specification: ASTM A36-04 ASME SA36 QQS741D A709-00A GR36
AASHTO M270 GR 36 IMPACTS WAIVED

The tensile values stated in either inch-pound units or SI units are to be regarded as separate as defined in the ASTM scope for this material. Unless a metric specification is ordered, this material has been tested and meets the requirements of the inch-pound ranges.

This is to certify the above to be a true and accurate report as contained in the records of this company.

Engineer of Tests: Charles R. Charlton

TEST ACTION TRANSMITTAL
NYSDOT MATERIALS BUREAU

Serial No.: 251106

Test No.: 06MG29
Date Received: 4/6/06

To: Nova Tube, Morrisville, PA; Pennoni, King of Prussia, PA.

The Material represented by the sample submitted with the BR-240 having the above serial number was:

Accepted on 4/20/06.

for ITEM: 710-21 Box Beam Guide Railing and Median Barrier; Galvanized 6"x6"x3/16"; Heat #401C6411.

Remarks: For DWTT Properties.

This document serves as the official transmittal of action on the noted sample.
Attached hereto is a digital image of the BR-240 which accompanied same.

JOHN RONDINARO
DIRECTOR, MATERIALS BUREAU

BR 240a (11/74) SAMPLE AND ACCEPTANCE TRANSMITTAL NYSDOT MATERIALS BUREAU

SERIAL NO.	DATE REC'D.	TEST NO.
251106	4-6-06	

RECEIVED
JUL 17 2007
UNI ACCOUNTING

To:

Material Represented by the Sample Described Below Was _____

On _____ For _____

(Action Official Only When Validated Below By The Materials Bureau)

UPPER PORTION FOR MATERIALS BUREAU ONLY — INSPECTOR TO COMPLETE ALL APPLICABLE BOXES BELOW

16. ADDITIONAL INFO. (SEE INSTRUCTIONS ON REAR)
LOGO IMPRINTED NOVA 82
4"LG SAMPLE W/AGENCY
STAMP (P) & LEFT WITH
MANUFACTURER
COIL # 814427M
TAG # T12901C

1. MATERIAL	2. ITEM NO.	3. DATE SAMPLED	4. CONTRACT NO.
6"x6"x0.188 STL BOX BEAM	710-21	3/29/06	STOCK

5. SUPPLIER AND LOCATION	6. QUANTITY IN LOT	7. LOT NO.
NOVA TUBE & STEEL MORRISVILLE, PA	30,970 FT 450,080 LBS	Nova 82

8. MANUFACTURER AND LOCATION (IF DIFFERENT THAN ABOVE)	9. BATCH NO.	10. DATE OF MFGR
	401CG411	3/27/06

11. SAMPLED AT	12. TYPE		13. SAMPLED FROM
☐ MILL	☒ CONTROL SAMPLE	☐ BPR SAMPLE	TUBE WAREHOUSE
☒ PLANT	☐ INFO. SAMPLE	☐ APPROVED LIST MAT.	14. SAMPLED BY (INC. DIST. NO. OR AGENCY)
☐ JOB		☐ CERTIFIED MAT.	PAI, IA039, AAN

15. CONTRACTOR AND PROJECT LOCATION

MATERIALS BUREAU VALIDATION

RETAIN PINK COPY FOR YOUR RECORDS
FORWARD ALL OTHERS TO MATERIALS BUREAU

TEST ACTION TRANSMITTAL
NYSDOT MATERIALS BUREAU

Serial No.: 219967

Test No.: 07MG54
Date Received: 3/28/07

To: Nova Tube, Morrisville, PA; Pennoni, King of Prussia, PA.

The Material represented by the sample submitted with the BR-240 having the above serial number was:

Accepted on 4/10/2007

For ITEM: 710-21 Box Beam Guide Rail and Median Barrier; Galvanized 6"x6"x 3/16"; Heat #402H9991

Remarks: For DWTT Properties.

This document serves as the official transmittal of action on the noted sample.
Attached hereto is a digital image of the BR-240 which accompanied same.

JOHN RONDINARO
DIRECTOR, MATERIALS BUREAU

BR 240e (11/74) SAMPLE AND ACCEPTANCE TRANSMITTAL
NYSDOT MATERIALS BUREAU

SERIAL NO.	DATE REC'D	TEST NO.
219967	3/28/07	07MG54

To:

RECEIVED
JUL 17 2007

Material Represented by the Sample Described Below Was

On _____ For _____

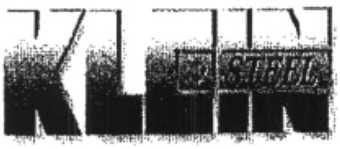
(Action Official Only When Validated Below By The Materials Bureau)

UPPER PORTION FOR MATERIALS BUREAU ONLY — INSPECTOR TO COMPLETE ALL APPLICABLE BOXES BELOW

15. ADDITIONAL INFO (SEE INSTRUCTIONS ON REAR)
LOGO IMPRINTED NOVA 102
4" LONG SAMPLE W/AGENCY STAMP (P), 2" LEFT WITH MANUFACTURER
COIL # 90C39C
TAG # T155486

1. MATERIAL: 6"x6"x0.188 STL BOX BEAM
2. ITEM NO.: 710-21
3. DATE SAMPLED: 3/9/07
4. CONTRACT NO.: STOCK
5. SUPPLIER AND LOCATION: NOVA TUBE & STEEL MORRISVILLE, PA
6. QUANTITY IN LOT: 41,294 PT 600,000 LBS
7. LOT NO.: NOVA 102
8. MANUFACTURER AND LOCATION (IF DIFFERENT THAN ABOVE)
9. BATCH NO.: 402H9991
10. DATE OF MFGR.: 3/7/07
11. SAMPLED AT: ☐ MILL ☒ PLANT ☐ JOB
12. TYPE: ☒ CONTROL SAMPLE ☐ BPR SAMPLE ☐ INFO. SAMPLE ☐ APPROVED LIST MAT. ☐ CERTIFIED MAT.
13. SAMPLED FROM: TUBE WAREHOUSE
14. SAMPLED BY (INC. DIST. NO. OR AGENCY): PAI; IA039; AAN
15. CONTRACTOR AND PROJECT LOCATION
MATERIALS BUREAU VALIDATION

RETAIN PINK COPY FOR YOUR RECORDS
FORWARD ALL OTHERS TO MATERIALS BUREAU



Klein Steel Service Inc.
105 Vanguard Pkwy
Rochester, NY 14606

November 16, 2006

Certified Report of Chemical Analysis and Mechanical Tests

Producing Mill Mittal Steel USA-Cleveland
Product Hot Rolled Sheet Steel
Certification Type; ASTM
Klein PO# JS946 **Code** HC180A36

Gauge	Width	Length	Finish	Surface	Treatment	Quality	Type
3/16	60.000	Various		DRY		A36	

Coil/Lift	Heat#	Tensile	Yield	E-Long%	Hardness	L/Ft
484688	4180445	67,000	49,100	30.0%		

Heat#	4180445		Domestic		
C%	Mn%	P%	S%	Si%	Al%
0.180	0.420	0.009	0.009	0.010	0.036

Heat#			Domestic		
C%	Mn%	P%	S%	Si%	Al%

The above figures are extracts from the original mill records as contained in the records of the company

Prepared by the office of:
Jim Sloan, QA Manager

11Jan07 11: T E S T C E R T I F I C A T E No: 1 16872

Sold By:
THE UNIVERSAL STEEL COMPANY
6600 GRANT AVENUE
CLEVELAND, OH 44105
Tel: 216 883-4972 Fax: 216 341-0421

P/O No JS946Z1
Rel
S/O No 1 119771-001
B/L No 1 107022-002 Shp 11Jan07
Inv No Inv

Sold To: (110053)
KLEIN STEEL
105 VANGURAD PKWY
ROCHESTER NY 14606

Ship To: (001)
KLEIN STEEL
105 VANGURAD PKWY
ROCHESTER NY 14606

Tel: 800-477-6789 Fax: 585-328-7377

CERTIFICATE of ANALYSIS and TESTS Cert. No: 1 16872
11Jan07

Part No 62 P3/6570
Hot Roll Sheet A36
.1790 Min X 60.0000" X 120.0000"

		Pcs	Wgt
		60	23,080

Heat Number	Tag No	Pcs	Wgt
4180445	67807	15	5,770
4180445	67808	15	5,770
4180445	67809	15	5,770
4180445	67810	15	5,770

Heat Number *** Chemical Analysis ***
4180445 C=<.18> Mn=<.42> P=<.009> S=<.009> Si=<.010> Al=<.036> Cu=<.030>
Mo=<.010> Sn=<.0040> V=<.0020> Ca=<.0003> N=<.0044> Cr=<.020>
Ni=<.010> Ti=<.0020> Sb=<.0020>

Page: 1 .... Last

BENNETT BOLT WORKS, INC.

12 Elbridge Street
P.O. Box 922
Jordan, New York 13080

PH 315-689-3981
FX 315-689-3999

CERTIFICATION OF COMPLIANCE

Customer: ELDERLEE, INC.
729 CROSS RD
OAKS CORNERS, NY 14518

We certify that our system and procedures for the control of quality assures that all items furnished on the order will meet applicable tests, process requirements, and inspection requirements as required by the purchase order and applicable specifications.

Customer PO No.: 2214 NG

Date Shipped: 4/20/2007

Invoice No.: 5008241

Purchase Date: 4/19/2007

QUANTITY	DESCRIPTION
100	3/4-10 X 4 1/2 A307 HEX SCREW W/ N & 2 FW HDG (MFG - SILO FAST #3661-A, NUCOR FAST # 213520A, WROUGHT WASHER # 213859, GALV.- UNIVERSAL GALV., NUCOR FAST ., ROGERS BROTHERS GALV.)
1000	3/4 X 8 A307 HEX SCREW W/ N & 2 FW HDG (MFG- BIRMINGHAM FAST, NUCOR FAST, WROUGHT WASHER # 167415, GALV.- BIRMINGHAM FAST., NUCOR FAST., ROGERS BROTHERS GALV.)
1000	3/4 X 8 A307 CARRIAGE BOLT W/ N & FW & LW HDG (MFG- MIDWEST FAB #65061, NUCOR FAST #213520A, WROUGHT WASHER #018139/213859, GALV.- COLUMBUS GALV., NUCOR FAST., ROGERS BROTHERS GALV.)
4800	3/8 X 7 1/2 A307 HEX SCREW W/ N & 2 FW MG (MFG- AUTO BOLT & NUT #15545-1 & 2 , TELEFAST IND #O13699-1-66461, G13935-66988, WROUGHT WASHER #169742, GALV.- MECH GALV. PLATING)
6000	1/2 X 1 1/2 A307 HEX SCREW W/ N & SAE FW HDG (MFG- NUCOR FAST #204059A, TELEFAST IND # R15389, WROUGHT WASHER , GALV.- NUCOR FAST., NORTH AMERICAN GALV., ROGERS BROTHERS GALV.)

M/F: STOCK

All products were melted and manufactured in the U.S.A. This material is in compliance with domesticity requirements, and conforms to ASTM & AASHTO specifications for standardized highway barrier rail and hardware.

James Limbeaux
SUPERVISOR QUALITY ASSURANCE
DATE: 4/23/2007

BENNETT BOLT WORKS, INC.

12 Elbridge Street
P.O. Box 922
Jordan, New York 13080

PH 315-689-3981
FX 315-689-3999

CERTIFICATION OF COMPLIANCE

Customer: ELDERLEE, INC.
729 CROSS RD
OAKS CORNERS, NY 14518

We certify that our system and procedures for the control of quality assures that all items furnished on the order will meet applicable tests, process requirements, and inspection requirements as required by the purchase order and applicable specifications.

Customer PO No.: 2214 NG

Date Shipped: 5/11/2007

Invoice No.: 5008488

Purchase Date: 5/10/2007

QUANTITY	DESCRIPTION
4800	3/4 X 1 1/2 A325 STRUCT BOLT W/USS MIL FW MG (MFG- NUCOR FAST #197920B/184171D/197920C, WROUGHT WASHER #216460, GALV.- NUCOR FAST., WISCONSIN METAL) 80.6005
4800	3/8 X 7 1/2 A307 HEX SCREW W/ N & 2 FW MG (MFG- AUTO BOLT & NUT #155451&2, TELEFAST IND # G13935-66988, WROUGHT WASHER #169742, GALV.- MECH GALV. PLATING) 80.3355

M/F: STOCK

All products were melted and manufactured in the U.S.A. This material is in compliance with domesticity requirements, and conforms to ASTM & AASHTO specifications for standardized highway barrier rail and hardware.

James Limbeaux
SUPERVISOR QUALITY ASSURANCE
DATE: 5/14/2007

NOVA TUBE AND STEEL CORPORATION
600 Dean Sievers Place
Morrisville, PA. 19067
Tel: 215-295-8813 Fax: 215-295-8798

T E S T C E R T I F I C A T E

Sold to: AMERICAN STEEL(LIVERPOOL) DATE SHIPPED: 04/04/07
Ship to: AMERICAN STEEL(LIVERPOOL) B/L #: 149131
BOX 296 CROWN ROAD P.O. #:M0819505
LIVERPOOL,NY SALES ORDER #: 125398

13088
s0p12h10v0s0b3T

Description	Dimensions	Pcs	Mill/Heat Number	Specifications
Hot Rolled Plate	0.250x60x120	20	MIT /412H2031	ASTM A36/SA 36
Hot Rolled Plate	0.250x60x144	8	MIT /412H2031	ASTM A36/SA 36

s0p15h12v0s0b3T

Chemical Analysis

Heat Number	C	Mn	P	S	Si	Cu	Ni	Cr	Cb	Mo	V	Al	N	Sn	B	Ti
MIT/412H2031	0.190	0.680	0.019	0.012	0.010	0.040	0.010	0.030	0.001	0.001	0.001	0.046	0.004	-	-	-
	Melted & Manufactured in U.S.A.															

s0p10h12v0s0b3T

Mechanical Test Results

Heat Number/Size	Yield Strength	Tensile Strength	Elong.%	Hardness
MIT/412H2031	44,300	68,400	33.00	

Heat # Origin
MIT /412H2031 United States

Authorized by Andrew Hurlbrink, Quality Ctrl Dept
APR 4, 2007 14:58:01
s0p10h12v0s0b3T
s0p10h12v0s0b3T

BENNETT BOLT WORKS, INC
P.O. BOX X
JORDAN, NEW YORK 13080

CERTIFICATE OF COMPLIANCE

TO: Elderlee, Inc.
Oaks Corners, NY 14518

We certify that our system and procedures for the control of quality assures that all items furnished on the order will meet applicable tests, process requirements and inspection requirements as required by the purchase order and applicable specifications.

P.O.#: 70024 JCH
DATE SHIPPED: 3/3/99
INVOICE #: 21394
PURCHASE DATE: 2/17/99
GALVANIZER: See Below
GALV. DATE:

QUANTITY, DESCRIPTION & MANUFACTURER:

500 - 1/4 x 1 1/2 Gr 2 Hex Screw w/ N & 2 FW MG (mfg- Nucor Fast. #n106399A, Telefast Ind. #E2416A, Wrought Washer, galv.- Mech Galv. Plating)
5000 - 1/2 x 1 1/2 A307 Hex Screw w/ N & SAE FW MG (mfg- Nucor Fast. #n108712A, Telefast Ind. #M6921-51461, Wrought Washer, galv.- Mech Galv Plating)

All manufacturing processes for this steel have occurred in the USA. This material is in compliance with domesticity requirements and conforms to NYS DOT Engineering Bulletin 83-10.

James Shinbeaux
Supervisor, Quality Control
Date: 3/4/99

BENNETT BOLT WORKS, INC.

12 Elbridge Street
P.O. Box 922
Jordan, New York 13080

PH 315-689-3981
FX 315-689-3999

CERTIFICATION OF COMPLIANCE

Customer: ELDERLEE, INC.
729 CROSS RD
OAKS CORNERS, NY 14518

We certify that our system and procedures for the control of quality assures that all items furnished on the order will meet applicable tests, process requirements, and inspection requirements as required by the purchase order and applicable specifications.

Customer PO No.: 2214 NG

Date Shipped: 3/23/2007

Invoice No.: 5007976

Purchase Date: 3/20/2007

QUANTITY	DESCRIPTION
126	3/8 X 10 A307 HEX SCREW W/ N & 2 FW HDG (MFG- GAFFNEY BOLT #14690, DECKER MFG #05-03-019, WROUGHT WASHER #169742, GALV.- ROGERS BROTHERS GALV., DECKER MFG., WISCONSIN METAL)

M/F: STOCK
80.3700

All products were melted and manufactured in the U.S.A. This material is in compliance with domesticity requirements, and conforms to ASTM & AASHTO specifications for standardized highway barrier rail and hardware.

James Himebaugh
SUPERVISOR QUALITY ASSURANCE
DATE: 3/26/2007

ACTIVE MEMBER

ELDERLEE, INC.

University of Nebraska-Lincoln
Accounting Dept.
PO Box 880439

Date: August 31, 2007
Order #: 34513
PO #: Per Jim @ Nebraska
Shippers #: 43572
Invoice #: 37729

Certificate of Compliance

The undersigned, being duly authorized by ELDERLEE, INC., Oaks Corners, NY and having reviewed the records of the company, hereby certifies that all material galvanized has been processed in accordance with AASHTO M111 and ASTM A-123 Specifications.

0013.02708	1 Ea.	3" I-Dwy Post w/Slots & Sp 47"
0057.18035	1 Ea.	BB 6x6 18' STD w/35' Rad.
0054.00052	1 Ea.	BB Dwy. Shelf Angle 4-1/2"

SEP 5 2007

James A. Morlang
Galvanizing Plant Manager

729 Cross Road • Oaks Corners, N.Y. 14518-0010 • Telephone: 315-789-6670 • FAX: 315-789-6615

Quality • Service • Integrity

STEEL OF WEST VIRGINIA
HUNTINGTON, WEST VIRGINIA 25726-2547

DATE: January 24, 2007

SOLD TO: Elderlee Inc.
729 Cross Road
Oaks Corner, NY 14518

SHIP TO:
Same

CUSTOMER ORDER: P002185 **SWV ORDER:** 74381

MATERIAL SPECIFICATION
3" X 5.7 lb/ft I-Beam. SWV Section 2658
LENGTH: 42'. GRADE: ASTM A36-05.
All manufacturing processes for these materials occurred in the U.S.A.

Heat	Yield psi	Tensile psi	Elon % 8"	C	Mn	P	S	Si	Cu	Cr	Ni	Mo	V	Cb
10438	45000	66000	24.8	.12	0.63	.008	.016	.19	.23	.11	.09	.02	.001	.001
10438	43000	65000	24.0	.12	0.63	.008	.016	.19	.23	.11	.09	.02	.001	.001
19801	47000	70000	22.5	.15	0.68	.018	.029	.23	.28	.22	.08	.02	.002	.001
19801	48000	70000	23.5	.15	0.68	.018	.029	.23	.28	.22	.08	.02	.002	.001
22005	49000	70000	22.1	.13	0.67	.021	.034	.21	.50	.17	.08	.03	.003	.001
22005	48000	70000	24.2	.13	0.67	.021	.034	.21	.50	.17	.08	.03	.003	.001
22686	44000	66000	23.2	.12	0.60	.010	.018	.21	.25	.11	.09	.02	.002	.001
22686	45000	67000	24.8	.12	0.60	.010	.018	.21	.25	.11	.09	.02	.002	.001
85477	45000	66000	26.0	.14	0.72	.007	.018	.21	.23	.08	.08	.02	.003	.002
85477	45000	66000	26.0	.14	0.72	.007	.018	.21	.23	.08	.08	.02	.003	.002

This is to certify that the above is a true and correct report as contained in the records of this company.

Steve Fisher
Metallurgist

ELDE...
CERT RECEIVED: 1/26/07
PURCHASE ORDER # P2185
SALES ORDER # 74381
SHIPPED FROM: SWVA

SEP 5 2007

Certificate of Analysis

No.CT001075
Date 03/21/07

MET CON STEEL, Inc.
P.O. Box 876
Wadsworth, Ohio 44282-0876
(330) 336-3163
fax 334-3296

Customer ELD10
ELDERLEE, INC.
729 Cross Road
Oaks Corner, New York 14518

Ship To: ELD10
ELDERLEE, INC.
STEEL YARD
729 Cross Road
Oaks Corner, NY

Terms	Ship Via	FOB	Work Order No.	Shipper No.	Date Shipped	Slpn
1%10NET30	TRUCK	DELVD			03/20/07	AL RADY

Tag#	Heat No.	Grade	Gauge	Width	Length	Pcs	Weight	Part No	P/O No.
903549-05/10	C39516	A36	.246	8.000	24.00	1500	19625		

Chemical Analaysis

C .23	Mn .96	P .005	S .006	Si .03	Ti .002	Cr .025	Mo .005	Cu .01	
Al .035	Cb .005	V	Pb	Sn	Ca	Ni .01	B	Co	
Ni	Va	Fe	Zn	Mg					

Physical Properties

Rockwell B88 Cisen | Yield 49150 | Tensile 62690 | Elongation 24% | Grain
Mill GALLATIN

Comments: MELTED & MFG. IN THE USA

We hereby certify the above figures are accurately stated, and are traceable in our records back to the supplier and/or an accredited test laboratory

(c)2002ApplicationsResearch734 449-43C Rev. 01 (03/17/00)

RECEIVED SEP 5 2007 ACCOUNTING

ELDERLEE
CERT RECEIVED: 3/22/07
PURCHASE ORDER # P2182
SALES ORDER # QM603444
SHIPPED FROM Met Con Steel

TEST ACTION TRANSMITTAL
NYSDOT MATERIALS BUREAU

Serial No.: 251110

Test No.: 06MG44
Date Received: 5/8/06

To: Nova Tube, Morrisville, PA; Pennoni, King of Prussia, PA.

The Material represented by the sample submitted with the BR-240 having the above serial number was:

Accepted on 5/18/06.

for ITEM: 710-21 Box Beam Guide Railing and Median Barrier; Galvanized 6"x6"x3/16"; Heat #411C2201/2202.

Remarks: For DWTT Properties.

This document serves as the official transmittal of action on the noted sample.
Attached hereto is a digital image of the BR-240 which accompanied same.

RECEIVED
SEP 5 2007
ACCOUNTING

JOHN RONDINARO
DIRECTOR, MATERIALS BUREAU

BR 240a (11/74) SAMPLE AND ACCEPTANCE TRANSMITTAL
NYSDOT MATERIALS BUREAU

SERIAL NO. 251110 | DATE REC'D. 5/8/06 | TEST NO 06MG44

To:

Material Represented by the Sample Described Below Was _____

On _____ For _____

(Action Official Only When Validated Below By The Materials Bureau)

UPPER PORTION FOR MATERIALS BUREAU ONLY — INSPECTOR TO COMPLETE ALL APPLICABLE BOXES BELOW

16. ADDITIONAL INFO. (SEE INSTRUCTIONS ON REAR)
LOGO IMPRINTED NOVA 86
4" LG SAMPLE W/AGENCY STAMP (P) 5" LEFT WITH MANUFACTURER
COIL# 829113
TAG# T131610

7. MATERIAL: 6"x6"x0.188 STL BOX BEAM | 2. ITEM NO.: 710-21 | 3. DATE SAMPLED: 4/28/06 | 4. CONTRACT NO.: STOCK

5. SUPPLIER AND LOCATION: NOVA TUBE & STEEL MORRISVILLE, PA | 6. QUANTITY IN LOT: 34,442 PT 500,000 LBS | 7. LOT NO.: NOVA 86

8. MANUFACTURER AND LOCATION (IF DIFFERENT THAN ABOVE) | 9. BATCH NO.: 411C2201/2202 | 10. DATE OF MFGR.: 4/26/06

11. SAMPLED AT: ☐ MILL ☒ PLANT ☐ JOB

12. TYPE: ☒ CONTROL SAMPLE ☐ INFO. SAMPLE ☐ BPR SAMPLE ☐ APPROVED LIST MAT. ☐ CERTIFIED MAT.

13. SAMPLED FROM: TUBE WAREHOUSE

14. SAMPLED BY (INC. DIST. NO. OR AGENCY): PAI; IA039 AAN

15. CONTRACTOR AND PROJECT LOCATION

MATERIALS BUREAU VALIDATION

RETAIN PINK COPY FOR YOUR RECORDS
FORWARD ALL OTHERS TO MATERIALS BUREAU

GERDAU AMERISTEEL

JACKSON STEEL MILL
801 AMERISTEEL ROAD
JACKSON TN 38305 USA
(731) 424-5600

Chemical and Physical Test Report

MADE IN UNITED STATES

V-611968

PRODUCED IN: JACKSON TN

SHIP TO	INVOICE TO	SHIP DATE
TRIAD METAL 1951 BESSEMER ROAD 804-732-5000 PETERSBURG, VA 23805	TRIAD METALS INTERNATIONAL METAL TRADERS INC 2300 COMPUTER AVE.STE-A-1 WILLOW GROVE, PA 19090	05/08/07 CUST. ACCOUNT NO 40213035

SHAPE + SIZE	GRADE	SPECIFICATION	SALES ORDER	CUST P.O. NUMBER
A2 1/2 X 2 1/2 X 3/16	A36	ASTM A36-05,CSA G40.21-44W	6129053-02	150015-02

HEAT I.D.	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	V	Nb	B	N	Sn	Al	Ti	Zr	Ca	C Eqv
V7-1226	.13	.89	.014	.026	.20	.31	.10	.11	.030	.015	.002	.0003	.0056	.011	.002	.00100	.000	.00000	.308

Mechanical Test: Yield 48900 PSI, 337.15 MPA Tensile: 70250 PSI, 484.36 MPA %El: 32.2/8in, 32.2/200MM
Mechanical Test: Yield 48520 PSI, 335.22 MPA Tensile: 70470 PSI, 485.87 MPA %El: 31.6/8in, 31.6/200MM

SHAPE + SIZE	GRADE	SPECIFICATION	SALES ORDER	CUST P.O. NUMBER
A5 X 3 1/2 X 3/8	A36	ASTM A36-05	7002966-19	151921-13

HEAT I.D.	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	V	Nb	B	N	Sn	Al	Ti	Zr	Ca	C Eqv
V7-1867	.15	.74	.019	.026	.22	.27	.08	.13	.026	.005	.002	.0004	.0021	.010	.001	.00100	.000	.00000	.325

Mechanical Test: Yield 47080 PSI, 324.47 MPA Tensile: 68580 PSI, 472.84 MPA %El: 34.0/8in, 34.0/200MM
Mechanical Test: Yield 48980 PSI, 344.46 MPA Tensile: 71490 PSI, 492.91 MPA %El: 33.2/8in, 33.2/200MM

SHAPE + SIZE	GRADE	SPECIFICATION	SALES ORDER	CUST P.O. NUMBER
A5 X 3 X 1/2	A36	ASTM A36-05	6114924-39	145081-39

HEAT I.D.	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	V	Nb	B	N	Sn	Al	Ti	Zr	Ca	C Eqv
V7-1908	.18	.72	.014	.033	.20	.34	.10	.09	.026	.003	<.008	.0004	.0100	.011	.000	.00100	.000	.00000	.353

Mechanical Test: Yield 47650 PSI, 328.91 MPA Tensile: 70610 PSI, 486.84 MPA %El: 31.2/8in, 31.2/200MM
Mechanical Test: Yield 47300 PSI, 326.12 MPA Tensile: 70450 PSI, 485.74 MPA %El: 31.8/8in, 31.8/200MM

This material, including the billets, was produced and manufactured in the United States of America

Bhaskar Yalamanchili
Quality Director
Gerdau Ameristeel

THE ABOVE FIGURES ARE CERTIFIED EXTRACTS FROM THE ORIGINAL CHEMICAL AND PHYSICAL TEST RECORDS AS CONTAINED IN THE PERMANENT RECORDS OF COMPANY.

Mgr. Metallurg. Svcs.
JACKSON STEEL MILL

RECEIVED
SEP 5 2007
ACCOUNTING

ELDERSLEY, NJ
CERT RECEIVED: 6/14/07
PURCHASE ORDER # P2302
SALES ORDER # 4202
SHIPPED FROM: Triad Metals

BENNETT BOLT WORKS, INC.

12 Elbridge Street
P.O. Box 922
Jordan, New York 13080

PH 315-689-3981
FX 315-689-3999

CERTIFICATION OF COMPLIANCE

Customer: ELDERLEE, INC.
729 CROSS RD
OAKS CORNERS, NY 14518

We certify that our system and procedures for the control of quality assures that all items furnished on the order will meet applicable tests, process requirements, and inspection requirements as required by the purchase order and applicable specifications.

Customer PO No.: 2214 NG

Date Shipped: 4/20/2007

Invoice No.: 5008241

Purchase Date: 4/19/2007

QUANTITY	DESCRIPTION
100	3/4-10 X 4 1/2 A307 HEX SCREW W/ N & 2 FW HDG (MFG - SILO FAST #3661-A, NUCOR FAST # 213520A, WROUGHT WASHER # 213859, GALV.- UNIVERSAL GALV., NUCOR FAST ., ROGERS BROTHERS GALV.)
1000	3/4 X 8 A307 HEX SCREW W/ N & 2 FW HDG (MFG- BIRMINGHAM FAST, NUCOR FAST, WROUGHT WASHER # 167415, GALV.- BIRMINGHAM FAST., NUCOR FAST., ROGERS BROTHERS GALV.)
1000	3/4 X 8 A307 CARRIAGE BOLT W/ N & FW & LW HDG (MFG- MIDWEST FAB #65061, NUCOR FAST #213520A, WROUGHT WASHER #018139/213859, GALV.- COLUMBUS GALV., NUCOR FAST., ROGERS BROTHERS GALV.)
4800	3/8 X 7 1/2 A307 HEX SCREW W/ N & 2 FW MG (MFG- AUTO BOLT & NUT #15545-1 & 2 , TELEFAST IND #O13699-1-66461, G13935-66988, WROUGHT WASHER #169742, GALV.- MECH GALV. PLATING)
6000	1/2 X 1 1/2 A307 HEX SCREW W/ N & SAE FW HDG (MFG- NUCOR FAST #204059A, TELEFAST IND # R15389, WROUGHT WASHER , GALV.- NUCOR FAST., NORTH AMERICAN GALV., ROGERS BROTHERS GALV.)

M/F: STOCK

All products were melted and manufactured in the U.S.A. This material is in compliance with domesticity requirements, and conforms to ASTM & AASHTO specifications for standardized highway barrier rail and hardware.

James Lineberger
SUPERVISOR QUALITY ASSURANCE
DATE: 4/23/2007

RECEIVED
SEP 5 2007
UNL ACCOUNTING

ELDERLEE, INC.
729 CROSS RD.
OAKS CORNERS, NY 14532
Telephone: (315) 789-6670

University of Nebraska-Lincoln
Accounting Dept.
PO Box 880439
Lincoln, NE 68588-0439

Date: August 13, 2008
Order #: 38655
PO #: 4500193110
Shippers #: 48408
Invoice #: 41967

TRANSMITTAL OF CERTIFICATIONS, ETC.:

Attached please find one set of the following:

- X Galvanizing & Material Certifications
- ___ Galvanizing Certifications Only
- ___ Material Certifications Only
- ___ CS-417 (PA) Certifications
- ___ Other:

Very truly yours,

Diane Solt

Diane Solt
Administrative Assistant

ELDERLEE, INC.

ACTIVE MEMBER

University of Nebraska-Lincoln
Accounting Dept.
PO Box 880439

Date: August 13, 2008
Order #: 38655
PO #: 4500193110
Shippers #: 48408
Invoice #: 41967

Certificate of Compliance

The undersigned, being duly authorized by ELDERLEE, INC., Oaks Corners, NY and having reviewed the records of the company, hereby certifies that all material galvanized has been processed in accordance with AASHTO M111 and ASTM A-123 Specifications.

0057.18035	1 Ea.	BB 6x6 18' STD w/35' Radius
0054.01000	1 Ea.	BB 6x6 Type I End Section

RECEIVED
AUG 18 2008
UNLACCOUNTING

James A. Morlang
Galvanizing Plant Manager

729 Cross Road • Oaks Corners, N.Y. 14518-0010 • Telephone: 315-789-6670 • FAX: 315-789-6615
Quality • Service • Integrity

TEST ACTION TRANSMITTAL
NYSDOT MATERIALS BUREAU

Serial No.: 220564

Test No.: 07MG001
Date Received: 1/12/07

To: Nova Tube, Morrisville, PA; Pennoni, King of Prussia, PA.

The Material represented by the sample submitted with the BR-240 having the above serial number was:

Accepted on 2/2/07.

Note: Originally Accepted on 1/16/07.

For ITEM: 710-21 Box Beam Guide Rail and Median Barrier; Galvanized 6"x6"x3/16"; Heat #422E0371, 372,373

Remarks: For DWTT Properties.

This document serves as the official transmittal of action on the noted sample.
Attached hereto is a digital image of the BR-240 which accompanied same.

JOHN RONDINARO
DIRECTOR, MATERIALS BUREAU

BR 240a (11/74) SAMPLE AND ACCEPTANCE TRANSMITTAL
NYSDOT MATERIALS BUREAU

SERIAL NO. 220564 | DATE REC'D 1/12/07 | TEST NO. 07MG001

To:

Material Represented by the Sample Described Below Was

On _____ For _____

(Action Official Only When Validated Below By The Materials Bureau)

UPPER PORTION FOR MATERIALS BUREAU ONLY — INSPECTOR TO COMPLETE ALL APPLICABLE BOXES BELOW

15. ADDITIONAL INFO. (SEE INSTRUCTIONS ON REAR)
LOGO IMPRINTED NOVA 99
4" LG SAMPLE W/ AGENCY STAMP (P) & LEFT WITH MANUFACTURER
COIL # 890291
TAG # T149406
Note: Error in Heat Number corrected by Brandon Stanfield on 2/2/07

1. MATERIAL: 6"x6"x0.188 STL BOX BEAM
2. ITEM NO.: 710-21
3. DATE SAMPLED: 12/20/06
4. CONTRACT NO.: STOCK
5. SUPPLIED AND LOCATION: NOVA TUBE & STEEL MORRISVILLE, PA
6. QUANTITY IN LOT: 34,400 PT 600,000 LBS
7. LOT NO.: NOVA 99
8. MANUFACTURER AND LOCATION (IF DIFFERENT THAN ABOVE):
9. BATCH NO.: 422E0371, 372, 373
10. DATE OF MFGR.: 12/15/06
11. SAMPLED AT: ☐ MILL ☒ PLANT ☐ JOB
12. TYPE: ☒ CONTROL SAMPLE ☐ BPR SAMPLE ☐ INFO. SAMPLE ☐ APPROVED LIST MAT. ☐ CERTIFIED MAT.
13. SAMPLED FROM: TUBE WAREHOUSE
14. SAMPLED BY (INC. DIST. NO. OR AGENCY): PAT - TAO39 - TAN
15. CONTRACTOR AND PROJECT LOCATION
MATERIALS BUREAU VALIDATION

RETAIN PINK COPY FOR YOUR RECORDS
FORWARD ALL OTHERS TO MATERIALS BUREAU

NYSDOT MATERIALS BUREAU

Test No.: 07MG63
Date Received: 4/19/07

To: Nova Tube, Morrisville, PA; Pennoni, King of Prussia, PA.

The Material represented by the sample submitted with the BR-240 having the above serial number was:

Accepted on 4/30/2007

For ITEM: 710-21 Nova Tube & Steel Box Beam; 6"x6"x0.188"; Heat #402H9981

Remarks: For DWTT Properties.

This document serves as the official transmittal of action on the noted sample.
Attached hereto is a digital image of the BR-240 which accompanied same.

JOHN RONDINARO
DIRECTOR, MATERIALS BUREAU

BR-240a (11/74) SAMPLE AND ACCEPTANCE TRANSMITTAL
NYSDOT MATERIALS BUREAU

SERIAL NO. 219970 | DATE REC'D. 4/19/07 | TEST NO. 07MG63

To:

Material Represented by the Sample Described Below Was

On For

(Action Official Only When Validated Below By The Materials Bureau)

UPPER PORTION FOR MATERIALS BUREAU ONLY — INSPECTOR TO COMPLETE ALL APPLICABLE BOXES BELOW

16. ADDITIONAL INFO. (SEE INSTRUCTIONS ON REAR)
LEAD IMPRINTED NOVA 105
4" LONG SAMPLE W/AGENCY STAMP (P), LEFT WITH MANUFACTURER
COIL # 907872
TAG # T1569960

1. MATERIAL: 6"x6"x0.188" STL. BOX BEAM
2. ITEM NO.: 710-21
3. DATE SAMPLED: 3/29/07
4. CONTRACT NO.: STOCK
5. SUPPLIER AND LOCATION: NOVA TUBE, STEEL MORRISVILLE, PA
5. QUANTITY IN LOT: 30,970 FT 450,000 LBS
7. LOT NO.: NOVA 105
8. MANUFACTURER AND LOCATION (IF DIFFERENT THAN ABOVE)
8. BATCH NO.: 402H9981
10. DATE OF MFGR.: 3/23/07
11. SAMPLED AT: ☐ MILL ☒ PLANT ☐ JOB
12. TYPE: ☒ CONTROL SAMPLE ☐ BPA SAMPLE ☐ INFO. SAMPLE ☐ APPROVED LIST MAT. ☐ CERTIFIED MAT.
13. SAMPLED FROM: TUBE WAREHOUSE
14. SAMPLED BY (INC. DIST. NO. OR AGENCY): PAI; IA039; AAN
15. CONTRACTOR AND PROJECT LOCATION
MATERIALS BUREAU VALIDATION

RETAIN PINK COPY FOR YOUR RECORDS
FORWARD ALL OTHERS TO MATERIALS BUREAU

06Sep07 9:53 T E S T C E R T I F I C A T E No: 1 21371

Sold By:
THE UNIVERSAL STEEL COMPANY
6600 GRANT AVENUE
CLEVELAND, OH 44105
Tel: 216 883-4972 Fax: 216 341-0421

P/O No JS1265Z1
Rel
S/O No 1 127370-001
B/L No 1 113440-001 Shp 06Sep07
Inv No Inv

Sold To: (110053)
KLEIN STEEL
105 VANGURAD PKWY
ROCHESTER NY 14606

Ship To: (001)
KLEIN STEEL
105 VANGURAD PKWY
ROCHESTER NY 14606

Tel: 800-477-6789 Fax: 585-328-7377

CERTIFICATE of ANALYSIS and TESTS Cert. No: 1 21371
06Sep07

Part No P316510
Hot Roll Sheet ASTM A36
.1790 Min X 60.0000" X 120.0000" 3/16

Heat Number	Tag No	Pcs	Wgt
		85	32,580
4153565	94949	15	5,750
	YLD=<54.1>/TEN=<75.1>/ELG=<27>		
4153565	94950	15	5,750
	YLD=<54.1>/TEN=<75.1>/ELG=<27>		
4153565	94951	15	5,750
	YLD=<54.1>/TEN=<75.1>/ELG=<27>		
4153565	94952	15	5,750
	YLD=<54.1>/TEN=<75.1>/ELG=<27>		
4153565	94953	15	5,750
	YLD=<54.1>/TEN=<75.1>/ELG=<27>		
4153565	94954	10	3,830
	YLD=<54.1>/TEN=<75.1>/ELG=<27>		

Heat Number *** Chemical Analysis ***
4153565 C=<.2200> Mn=<.7800> P=<.0100> S=<.0070> Si=<.0200> Al=<.0510>
Cu=<.0300> Mo=<.0100> Sn=<.0050> V=<.0020> N=<.0045> Cr=<.0300>
Ni=<.0100> Ti=<.0020> Sb=<.0030> Ca=<.0001>

Page: 1 .... Last

820782

NOVA TUBE AND STEEL CORPORATION
600 Dean Sievers Place
Morrisville, PA, 19067
Tel: 215-295-8813 Fax: 215-295-8798

TEST CERTIFICATE

Sold to: AMERICAN STEEL(LIVERPOOL)
Ship to: AMERICAN STEEL(LIVERPOOL)
BOX 296 CROWN ROAD
LIVERPOOL,NY

DATE SHIPPED: 03/03/08
B/L #: 158204
P.O. #:M0820782
SALES ORDER #: 130630

1/4 x 48 x 120

13088

Description	Dimensions	Pcs	Mill/Heat Number	Specifications
Hot Rolled Plate	0.250x48x120	6	MIT /422J8791	ASTM A36/SA 36

Chemical Analysis

Heat Number	C	Mn	P	S	Si	Cu	Ni	Cr	Cb	Mo	V	Al	N	Sn	B	Ti
MIT 422J8791	0.220	0.770	0.018	0.011	0.011	0.040	0.020	0.040	0.001	0.011	0.002	0.066	0.002	-	-	-
	Melted & Manufactured in the U.S.A.															

Mechanical Test Results

Heat Number/Size or Ser#	Yield	Tensile	Elong.%	N-fact	Crush
422J8791 (Tail)	50,300 PSI	73,200 PSI	30.00(2")		

Heat #	Origin	
422J8791	United States	MITTAL STEEL - SPT

Authorized by Andrew Hurlbrink, Quality Ctrl Dept

MAR 3, 2008N

ELDER
CERT RECEIVED: 3/25/08
PURCHASE ORDER # P2539
SALES ORDER # 0822951
SHIPPED FROM: American Steel

4x4x3/8 NY

Certification 918592 6/10/08 1

Submitted By:	Hanna Steel Corporation Tuscaloosa Division 1701 Boone Blvd P O Box 428 Northport AL 35476	Cust P.O.: Date Shipped: Load Tally Invoice #	P80606SS001 6/10/08 5-20961 000000
Send To:	State Steel of Omaha 13433 CENTECH ROAD P O Box 390745 Omaha NE 68139	Ship To:	State Steel of Omaha 13433 CENTECH ROAD P O Box 390745 Omaha NE 68139

No Item	Heat #	ASTM	Year	Grade	Class	Yield	Tens	Elong	Rock
01 4500212		4 SQ 3/8	HRA500	24.000FT					
3666790	B74033	A500	2003a	B	1	64,000	71,500	25.3	B85

Total Weight 6,217

Heat #	C	Mn	P	S	Si	Al	Cb	Cr	Cu	Mo	Ni	V
B74033	.180	.770	.010	.010	.011	.029	.000	.030	.050	.010	.020	.001

N .0045 Ti .0020 B .0001

Heat# B74033 was melted and manufactured in the USA

CERTIFICATE OF TEST

EMJ

7/16 x 3

Page 01 of 01

Certification Date
15-DEC-2008

CUSTOMER ORDER NUMBER
29288

CUSTOMER PART NUMBER
0001

EARLE M. JORGENSEN COMPANY
1800 N UNIVERSAL AVENUE
KANSAS CITY MO 64120

Invoice Number
T627516

SOLD TO: RIVERS METAL PRODUCTS
3100 N 38TH
LINCOLN NE 68504

SHIP TO: RIVERS METAL PRODUCTS
3100 NORTH 38TH
LINCOLN NE 68504

Description: 1018 CF BAR ASTM A108
7/16 X 3 FLATS X 12' R/L
Line Total: 56 LB
HEAT: 0716363 ITEM: 502898

Specifications:
ASTM A108 03

CHEMICAL ANALYSIS

C	MN	P	S	SI	CU	NI	CR
0.19	0.85	0.01	0.027	0.16	0.17	0.07	0.11

MO	V	SN	TI
0.03	0.006	0.008	0.001

RCPT: R475956
MILL : NUCOR WISCONSIN COLD FINISH COUNTRY OF ORIGIN : USA

STRAND CAST REDUCTION RATIO 17.8 TO 1
MATERIAL IS FREE FROM MERCURY CONTAMINATION

COMMENTS
melt source ameristeel usa
coarse grain
ACCEPTED FOR 1E0065B FOR ALL PF PARTS PER JFG 5-22-08

The above data were transcribed from the manufacturer's Certificate of Test after verification for completeness and specification requirements of the information on the certificate. All test results remain on file subject to examination.

We hereby certify that the material covered by this report will meet the applicable requirements described herein, including any specification forming a part of the description.

The willful recording of false, fictitious, or fraudulent statements in connection with test results may be punishable as a felony under federal statutes.

Material did not come in contact with mercury while in our possession.

LARRY BUSICK

Larry A Busick

Manager, Quality Assurance

7x4+3/16

GERDAU AMERISTEEL

CALVERT CITY STEEL MILL
1035 SHAR-CAL ROAD
CALVERT CITY KY 42029 USA
(270) 395-3100

Chemical and Physical Test Report

MADE IN UNITED STATES

Y-029353

PRODUCED IN: CALVERT CITY

SHIP TO	INVOICE TO	SHIP DATE
STATE STEEL 13433 CENTECH RD P.O. BOX 390745 OMAHA, NE 68139	STATE STEEL SUPPLY CO INC/SC/I PO BOX 3224 SIOUX CITY, IA 51102	03/24/07 CUST. ACCOUNT NO 60005758

SHAPE + SIZE	GRADE	SPECIFICATION	SALES ORDER	CUST P.O. NUMBER
A7 X 4 X 3/8	A36	A36/44W A36/44W ASTM A36-05, ASTM A709 GR36	6110268-01	P61020DE001-01

HEAT I.D.	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	V	Nb	B	N	Sn	Al	Ti	C Eqv
Y700999	.14	.71	.015	.032	.23	.31	.10	.05	.025	.001	<.008	.0005	.0085	.012	.001	.00100	.339

Mechanical Test: Yield 50000 PSI, 344.74 MPA Tensile: 89000 PSI, 475.74 MPA %El: 27.0/8in, 27.0/203.2mm Std Dev:0
Customer Requirements CASTING: STRAND CAST
Mechanical Test: Yield 50000 PSI, 344.74 MPA Tensile: 89000 PSI, 475.74 MPA %El: 23.0/8in, 23.0/203.2mm Std Dev:0
Customer Requirements CASTING: STRAND CAST

SHAPE + SIZE	GRADE	SPECIFICATION	SALES ORDER	CUST P.O. NUMBER
A8 X 6 X 1/2	A36	A36/44/572 A36/44/572 ASTM A36-05, A709 GR36, A572-50, A709 GR50/345	6076635-01	P60629DE011-01

HEAT I.D.	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	V	Nb	B	N	Sn	Al	Ti	C Eqv
Y701324	.17	.96	.017	.019	.28	.30	.09	.08	.022	.019	<.008	.0005	.0092	.011	.001	.00100	.41

Mechanical Test: Yield 54000 PSI, 372.32 MPA Tensile: 78000 PSI, 524 MPA %El: 21.0/8in, 21.0/203.2mm Std Dev:0
Customer Requirements CASTING: STRAND CAST
Mechanical Test: Yield 54000 PSI, 372.32 MPA Tensile: 78000 PSI, 524 MPA %El: 23.0/8in, 23.0/203.2mm Std Dev:0
Customer Requirements CASTING: STRAND CAST
CUST ITEM NUMBER: 2/24

This material, including the billets, was melted and manufactured in the United States of America

Bhaskar Yalamanchili
Quality Director
Gerdau Ameristeel

THE ABOVE FIGURES ARE CERTIFIED EXTRACTS FROM THE ORIGINAL CHEMICAL AND PHYSICAL TEST RECORD AS CONTAINED IN THE PERMANENT RECORDS OF COMPANY.

Mgr. Metallurg. Svcs.
CALVERT CITY STEEL MILL

3" 5.7#

GERDAU AMERISTEEL

CARTERSVILLE STEEL MILL
384 OLD GRASSDALE RD NE
CARTERSVILLE GA 30121 USA
(770) 387-3300

Chemical and Physical Test Report

MADE IN UNITED STATES

G-110968

PRODUCED IN: CARTERSVILLE

SHIP TO	INVOICE TO	SHIP DATE
STATE STEEL 13433 CENTECH RD P.O. BOX 390745 OMAHA, NE 68139	STATE STEEL SUPPLY CO INC/SC/I PO BOX 3224 SIOUX CITY, IA 51102	02/19/08 CUST. ACCOUNT NO 60005758

SHAPE + SIZE	GRADE	SPECIFICATION	SALES ORDER	CUST P.O. NUMBER
W3 X 5.7# S-BEAM	A572/50/992	ASTM A572 GR50-07, ASTM A992 -06A	8020439-04	P80218JT051-04

HEAT I.D.	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	V	Nb	B	N	Sn	Al	Ti	Ca	Zn	C Eqv
G800884	.14	.90	.009	.020	.20	.30	.10	.03	.020	.015	.002	.0003	.0091	.009	.001	.00100	.00090	.00440	.33

Mechanical Test: Yield 52900 PSI, 364.73 MPA Tensile: 72100 PSI, 497.11 MPA %Et: 23.5/8in, 23.5/200MM Std Dev:0 Id Diam: .457
Customer Requirements: CASTING: STRAND CAST
Mechanical Test: Yield 55300 PSI, 381.28 MPA Tensile: 71300 PSI, 491.6 MPA %Et: 23.4/8in, 23.4/200MM Std Dev:0 Id Diam: .457
Customer Requirements: CASTING: STRAND CAST

This material, including the billets, was produced and manufactured in the United States of America

Bhaskar Yalamanchili
Quality Director
Gerdau Ameristeel

THE ABOVE FIGURES ARE CERTIFIED EXTRACTS FROM THE ORIGINAL CHEMICAL AND PHYSICAL TEST RECORDS AS CONTAINED IN THE PERMANENT RECORDS OF COMPANY.

Mgr. Metallurg. Svcs.
CARTERSVILLE STEEL MILL

GERDAU AMERISTEEL

CAMBRIDGE STEEL MILL
160 ORION PLACE
CAMBRIDGE ON N1T 1R9 CAN
(519) 740-2488

Chemical and Physical Test Report

MADE IN CANADA

N-063053

3/16 x 1

PRODUCED IN: CAMBRIDGE

SHIP TO	INVOICE TO	SHIP DATE
NORFOLK IRON & METAL CO INC 3001 NO. VICTORY RD 402-371-1810 NORFOLK, NE 68702	NORFOLK IRON & METAL CO INC ATTN-ACCTS PAYABLE PO BOX 1129 NORFOLK, NE 68702	04/30/08 CUST. ACCOUNT NO 60056348

SHAPE + SIZE	GRADE	SPECIFICATION	SALES ORDER	CUST P.O. NUMBER
F3/16 X 1	A36	ASTM A36/A36M-05; CSA-G40.21-300W-98(44W)	8018284-01	125210-01

HEAT I.D.	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	V	Nb	B	N	Sn	Al	Ti	Zr	Ca	Zn	C Eqv
N802351	.15	.59	.010	.044	.18	.29	.16	.18	.030	.003	.002	.0003	.0081	.017	.001	.00100	.002	.00030	.00300	.32

Mechanical Test: Yield 51381 PSI, 354.26 MPA Tensile: 72048 PSI, 496.74 MPA %El: 23.0/8in, 23.0/200MM Red R 133.7 : 1 Std Dev:0 Idl Diam: .487
Customer Requirements CASTING: STRAND CAST
Mechanical Test: Yield 51038 PSI, 351.89 MPA Tensile: 71225 PSI, 491.08 MPA %El: 22.0/8in, 22.0/200MM Red R 133.7 : 1 Std Dev:0 Idl Diam: .487
Customer Requirements CASTING: STRAND CAST

SHAPE + SIZE	GRADE	SPECIFICATION	SALES ORDER	CUST P.O. NUMBER
F3/8 X 3/4	A36	ASTM A36/A36M-05; CSA-G40.21-300W-98(44W)	8030891-01	125410-01

HEAT I.D.	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	V	Nb	B	N	Sn	Al	Ti	Zr	Ca	Zn	C Eqv
N802370	.13	.58	.013	.039	.13	.28	.12	.18	.040	.003	.002	.0002	.0127	.011	.002	.00100	.002	.00000	.00300	.3

Mechanical Test: Yield 46605 PSI, 321.33 MPA Tensile: 68868 PSI, 474.83 MPA %El: 27.5/8in, 27.5/200MM Red R 89 : 1 Std Dev:0 Idl Diam: .4
Customer Requirements CASTING: STRAND CAST
Mechanical Test: Yield 45595 PSI, 314.37 MPA Tensile: 68158 PSI, 469.93 MPA %El: 27.5/8in, 27.5/200MM Red R 89 : 1 Std Dev:0 Idl Diam: .4
Customer Requirements CASTING: STRAND CAST

This material, including the billets, was produced and manufactured in Canada

Bhaskar Yelamanchili
Quality Director
Gerdau Ameristeel

THE ABOVE FIGURES ARE CERTIFIED EXTRACTS FROM THE ORIGINAL CHEMICAL AND PHYSICAL TEST RECORDS AS CONTAINED IN THE PERMANENT RECORDS OF COMPANY.

Mgr. Metallurg. Svcs.
CAMBRIDGE STEEL MILL

ELDERLEE, INC.
729 CROSS RD.
OAKS CORNERS, NY 14532
Telephone: (315) 789-6670

University Of Nebraska-Lincoln
Accounting Dept.
PO Box 880439
Lincoln, NE 68588-0439

Date: June 24, 2009
Order #: 41980
PO #: 4500206719
Shippers #: 52505
Invoice #: 45748

TRANSMITTAL OF CERTIFICATIONS, ETC.:

Attached please find one set of the following:

- [X] Galvanizing & Material Certifications
- [ ] Galvanizing Certifications Only
- [ ] Material Certifications Only
- [ ] CS-417 (PA) Certifications
- [ ] Other:

Very truly yours,

Diane Solt
Administrative Assistant

ELDERLEE, INC.

ACTIVE MEMBER

University Of Nebraska-Lincoln
Accounting Dept.
PO Box 880439
Lincoln, NE 68588-0439

Date: June 24, 2009
Order #: 41980
PO #: 4500206719
Shippers #: 52505
Invoice #: 45748

Certificate of Compliance

The undersigned, being duly authorized by ELDERLEE, INC., Oaks Corners, NY and having reviewed the records of the company, hereby certifies that all material galvanized has been processed in accordance with AASHTO M111 and ASTM A-123 Specifications.

0013.57400	4 Ea.	Post 3" I Dbl Angle 7' Lg. w/Sapde
0013.57401	2 Ea.	Post 3" I Special End 7' w/Spade
0054.00018	8 Ea.	BB 6x6x3/16 @ 18'00" Std.
0054.00050	42 Ea.	BB Reg. Shelf Angle 4-1/2"
0054.00052	2 Ea.	BB Dwy. Shelf Angle 4-1/2"
0054.00100	10 Ea.	BB 6x6 Splice Plate 27" (Pair)
0054.01000	2 Ea.	BB 6x6 Type I End Section
0057.18035	2 Ea.	BB 6x6x3/16 @ 18' STD w/35' Radius

James A. Morlang
Galvanizing Plant Manager

729 Cross Road • Oaks Corners, N.Y. 14518-0010 • Telephone: 315-789-6670 • FAX: 315-789-6615
Quality • Service • Integrity

STEEL OF WEST VIRGINIA
HUNTINGTON, WEST VIRGINIA 25726-2547

DATE: February 23, 2009

SOLD TO: Elderlee Inc.
729 Cross Road
Oaks Corner, NY 14518

SHIP TO:
Same

CUSTOMER ORDER: P002780

SWV ORDER: 18849

MATERIAL SPECIFICATION
3" X 5.7 lb/ft I-Beam. SWV Section 2658.
LENGTH: 42'. GRADE: ASTM A36-05.
All manufacturing processes for these materials occurred in the U.S.A.

Heat	Yield psi	Tensile psi	Elon % 8"	C	Mn	P	S	Si	Cu	Cr	Ni	Mo	V	Cb
14447	51000	69000	21.8	.14	0.58	.010	.026	.23	.24	.14	.08	.02	.001	.001
14447	52000	70000	20.0	.14	0.58	.010	.026	.23	.24	.14	.08	.02	.001	.001
14448	46000	67000	24.2	.15	0.55	.017	.028	.24	.25	.15	.08	.02	.002	.001
14448	47000	68000	24.8	.15	0.55	.017	.028	.24	.25	.15	.08	.02	.002	.001
26566	52000	69000	21.3	.13	0.70	.011	.021	.23	.24	.14	.10	.02	.003	.001
26566	51000	69000	19.0	.13	0.70	.011	.021	.23	.24	.14	.10	.02	.003	.001

This is to certify that the above is a true and correct report as contained in the records of this company.

Steve Fisher
Metallurgist

ELDERLEE
CERT RECEIVED: 2/25/09
PURCHASE ORDER # P2780
SALES ORDER # 18849
SHIPPED FROM: SWVA

24" Spade A36

CERTIFICATE OF CONFORMANCE

MET CON STEEL INC.
9950 RITTMAN ROAD
WADSWORTH, OH 44282
330-334-3296

3/02/09

Page# 1

TO:
ELDERLEE, INC.
729 CROSS ROAD
OAKS CORNER, NEW YORK 14518

SHIP TO:
ELDERLEE, INC.
STEEL YARD
729 CROSS ROAD
OAKS CORNER, NY

SIZE: .250 X 7.87500 X 23.62500
GRADE: SHEETS HOT ROLLED
A36

Bill/Ladng# 000442 B/L Date 3/02/09 Sales Ordr: 800316 01
Cust. P/O#: 02811 Part No.: 0333.70001

Tag# 50C32603 01 Heat# A47387 MasterTag# C40073771 01
C : .23 Mn: 1.19 P : .010 S : .09 Al: .02 Si: .03
Ti: .C02 Mo: .010 Cr: .04
Rock: B88 Tens: 65100 Yld: 53250 Elng: 23%

Tag# 50034205 01 Heat# A48816 MasterTag# 309536 01
C : .23 Mn: .85 P : .010 S : .009 Al: .040 Si: .23
Cu: .07
Tens: 63200 Yld: 51980 Elng: 24%

Tag# 50034206 01 Heat# A48816 MasterTag# 309536 01
C : .23 Mn: .85 P : .010 S : .009 Al: .040 Si: .23
Cu: .07
Tens: 63200 Yld: 51980 Elng: 24%

Tag# 50034209 01 Heat# A48816 MasterTag# 309536 01
C : .23 Mn: .85 P : .010 S : .009 Al: .040 Si: .23
Cu: .07
Tens: 63200 Yld: 51980 Elng: 24%

MISC INFO: MELTED & MANUFACTURED IN THE USA

WE HEREBY CERTIFY THE ABOVE FIGURES ARE ACCURATELY STATED, MEET YOUR MATERIAL REQUIREMENTS AND ARE TRACEABLE IN OUR RECORDS BACK TO THE PRODUCER AND/OR AN ACCREDITED TEST LABORATORY.

.....
QUALITY ASSURANCE MANAGER

CERT RECEIVED: 3/3/09
PURCHASE ORDER # 02811
SALES ORDER # 800316
SHIPPED FROM: Met Con Steel

TEST ACTION TRANSMITTAL
NYSDOT MATERIALS BUREAU

Serial No.: 266003
Test No.: 08MG105
Date Received: 8/22/08

To: Nova Tube, Morrisville, PA; Pennoni, King of Prussia, PA.

The Material represented by the sample submitted with the BR-240 having the above serial number was:

Accepted on 9/03/2008

For Item: 710-21 Box Beam Guide Rail, 6" x 6" x 3/16"; Heat #421K5071

Remarks: For DWTT Properties.

This document serves as the official transmittal of action on the noted sample.
Attached is a digital image of the BR-240 which accompanied the sample.

JOHN RONDINARO
DIRECTOR, MATERIALS BUREAU

BR 240a (11/74) SAMPLE AND ACCEPTANCE TRANSMITTAL
NYSDOT MATERIALS BUREAU

SERIAL NO. 266003 | DATE REC'D. 8/22/08 | TEST NO. 08MG105

To:

Material Represented by the Sample Described Below Was

On For

(Action Official Only When Validated Below By The Materials Bureau)

UPPER PORTION FOR MATERIALS BUREAU ONLY — INSPECTOR TO COMPLETE ALL APPLICABLE BOXES BELOW

15. ADDITIONAL INFO. (SEE INSTRUCTIONS ON REAR)

1. MATERIAL: 6x6x0.188 | 2. ITEM NO.: 710-21 | 3. DATE SAMPLED: 8/13/08 | 4. CONTRACT NO.: STOCK

5. SUPPLIER AND LOCATION: NOVA TUBE & STEEL MORRISVILLE PA. | 6. QUANTITY IN LOT: 3553 LF 421 PT | 7. LOT NO.: NOVA 125

8. MANUFACTURER AND LOCATION (IF DIFFERENT THAN ABOVE) | 9. BATCH NO.: MIT/421K5071 | 10. DATE OF MFGR.: 8/5/08

11. SAMPLED AT: ☐ MILL ☒ PLANT ☐ JOB

12. TYPE: ☒ CONTROL SAMPLE ☐ INFO. SAMPLE ☐ BPR SAMPLE ☐ APPROVED LIST MAT. ☐ CERTIFIED MAT.

13. SAMPLED FROM: TUBE WAREHOUSE

14. SAMPLED BY (INC. DIST. NO. OR AGENCY): PAI IA C39 TEC #822

16. CONTRACTOR AND PROJECT LOCATION

MATERIALS BUREAU VALIDATION

RETAIN PINK COPY FOR YOUR RECORDS
FORWARD ALL OTHERS TO MATERIALS BUREAU

AUG-04-2008 09:10 From:NOVA TUBE AND STEEL 12152958798 To:315 789 6615 P.1/2

TEST ACTION TRANSMITTAL
NYSDOT MATERIALS BUREAU

Serial No.: 264030
Test No.: 08MG75
Date Received: 7/17/08

To: Nova Tube, Morrisville, PA; Pennoni, King of Prussia, PA.

The Material represented by the sample submitted with the BR-240 having the above serial number was:

Accepted on 7/31/2008

For Item: 710-21 Box Beam Guide Rail, 6" x 6" x 3/16"; Heat #411K7441
Remarks: For DWTT Properties.

This document serves as the official transmittal of action on the noted sample.
Attached is a digital image of the BR-240 which accompanied the sample.

JOHN RONDINARO
DIRECTOR, MATERIALS BUREAU

SAMPLE AND ACCEPTANCE TRANSMITTAL
NYSDOT MATERIALS BUREAU

SERIAL NO. 264030 DATE REC'D 7/17/08 TEST NO. 08MG75

To:

Material Represented by the Sample Described Below Was

On For

(Action Official Only When Validated Below By The Materials Bureau)

UPPER PORTION FOR MATERIALS BUREAU ONLY — INSPECTOR TO COMPLETE ALL APPLICABLE BOXES BELOW

DWTT PROPERTIES ✓ 4" LONG SAMPLE W/ AGENCY STAMP (P) 2" LEFT WITH MANUFACTURER.
COIL# 143262
TAG # T192540

6"x6"x3/16 Str. Box Beam — 710-21 — 7/7/08 — Stock

Nova Tube & Steel, Morrisville, PA

34,293 FT — 122

411K7441 — C/23/08

TUBE MANUFACTURER

MILL / PLANT / JOB — INDEPENDENT SAMPLE / QPL SAMPLE / APPROVED LIST MAT. / CERTIFIED

PA

RETAIN PINK COPY FOR YOUR RECORDS
FORWARD ALL OTHERS TO MATERIALS BUREAU

Steel Dynamics®
Roanoke Bar Division

Steel Dynamics - Roanoke Bar Division
P.O. Box 13948 Roanoke, VA 24038
Office: 540-342-1831 Fax: 540-342-8437

Test and Inspection Report NO. 75372-1

ROANOKE

ELDERLEE, INC.

729 CROSS ROAD
OAKS CORNERS NY 14518-0000

Date 2/09/09

HEAT NUMBER	SIZE	1-YIELD Pt. KSI	ULTIMATE KSI	ELONG 8 IN.	BEND TEST	GRADE
JG8522	FLATS 5/8 X 5 3/8	42.5	63.5	40.0		A36
PURCHASE ORDER NUMBER	NUMBER PIECES	2-YIELD PT. KSI	ULTIMATE KSI	ELONG 8 IN.	BEND TEST	GRADE
P002771	160 PIECES 22'07"	42.5	62.6	40.0		A36

HEAT NUMBER	SIZE	1-YIELD Pt. MPA	ULTIMATE MPA	ELONG 203mm	BEND TEST	GRADE
JG8522	FLATS 16 X 137	293.0	437.8	40.0		A36
PURCHASE ORDER NUMBER	NUMBER PIECES	2-YIELD PT. MPA	ULTIMATE MPA	ELONG 203mm	BEND TEST	GRADE
P002771	160 PIECES 22'07"	293.0	431.6	40.0		A36

C	MN	S	P	SI	CR	NI	MO	CU	V	NB
.15	.75	.020	.009	.20	.07	.10	.02	.28	.002	.001

Commodity # 410008 P

Charpy requirements:
15 ft-lbs @ +40° F

1) 88.0 ft-lbs
2) 100.0 ft-lbs
3) 82.0 ft-lbs

ELDERLEE, INC.
CERT RECEIVED: 2/10/09
PURCHASE ORDER # P2771
SALES ORDER # 75372-0
SHIPPED FROM: Steel Dynamics

MERCURY, RADIUM OR OTHER ALPHA SOURCE MATERIALS IN ANY FORM HAVE NOT BEEN USED IN THE PRODUCTION OF THIS MATERIAL. NO WELD REPAIR HAS BEEN PERFORMED.

Approved ABS QA Mill. Certificate No. 00NN10108-X.

This material was melted and manufactured in the USA by basic Electric Furnace processes to meet specification: ASTM A36-05 ASME SA36 QQS741D A709-06A GR36 AASHTO M270 GR 36 IMPACTS WAIVED

The tensile values stated in either inch-pound units or SI units are to be regarded as separate as defined in the ASTM scope for this material. Unless a metric specification is ordered, this material has been tested and meets the requirements of the inch-pound ranges.

This is to certify the above to be a true and accurate report as contained in the records of this company.

Engineer of Tests: Charles R. Charlton

Customer Name: Elderlee, Inc.
Customer PO#: P002788
Shipper No: 46937
Heat Number: 67284

BAYOU STEEL CORPORATION
RIVER ROAD P.O. BOX 5000
LA PLACE, LOUISIANA 70069-1156
Telephone (985) 652-4900

MATERIAL CERTIFICATION REPORT

TRIAD METALS INTERNATIONAL
1 VILLAGE RD
HORSHAM, PA 19044

TRIAD METALS
3480 GRAND AVE.
NEVILLE ISLAND, PA 15225

TESTED IN ACCORDANCE WITH: ASTM A6

INVOICE NO. BSLP08208340 DATE 12/15/08 PO:10191
PRODUCT UNEQUAL ANGLES Cust T-4200 -0008
HEAT NO. 67284 48 Pcs GRADE A3652950 -
Length 40'0" SIZE U 5 X 3-1/2 X 3/8 X 10.40

CHEMICAL ANALYSIS	
C	.14
Mn	.82
P	.018
S	.039
Si	.20
Cu	.27
Ni	.17
Cr	.15
Mo	.048
Cb	.013
V	.000
B	
Al	
Sn	.009
N	
Ti	

CI	
CE	

MECHANICAL PROPERTIES	TEST 1 IMPERIAL	TEST 1 METRIC	TEST 2 IMPERIAL	TEST 2 METRIC	TEST 3 IMPERIAL	TEST 3 METRIC
YIELD STRENGTH	59,810 PSI	412 MPa	59,330 PSI	409 MPa	PSI	MPa
TENSILE STRENGTH	79,999 PSI	552 MPa	79,990 PSI	552 MPa	PSI	MPa
ELONGATION	31.0 %	31.0 %	32.0 %	32.0 %	%	%
GAUGE LENGTH	8 in	203 mm	8 in	203 mm	in	mm
BEND TEST DIAMETER	d	d	d	d	d	d
BEND TEST RESULTS						
SPECIMEN AREA	sq in	sq mm	sq in	sq mm	sq in	sq mm
REDUCTION OF AREA	%	%	%	%	%	%
IMPACT STRENGTH	ft-lbs	J	ft-lbs	J	ft-lbs	J

IMPACT STRENGTH	IMPERIAL	METRIC	INTERNAL CLEANLINESS		GRAIN SIZE HARDNESS	
AVERAGE	ft-lbs	J	SEVERITY			
TEST TEMP	F	C	FREQUENCY		GRAIN PRACTICE REDUCTION RATIO	FINE 10.5 TO 1
ORIENTATION			RATING			

Customer Grade & Specs: A36
44W, CSA50W, A70936
ASME SA36

A529 GRADE 50

ELDER
CERT RECEIVED: 1/26/09
PURCHASE ORDER # P2788
SALES ORDER # 46937
SHIPPED FR Triad Metals

I HEREBY CERTIFY THAT THE MATERIAL TEST RESULTS PRESENTED HERE ARE FROM THE REPORTED HEAT AND ARE CORRECT. ALL TESTS WERE PERFORMED IN ACCORDANCE TO THE SPECIFICATIONS REPORTED ABOVE. ALL STEEL IS ELECTRIC FURNACE MELTED, MANUFACTURED, PROCESSED, AND TESTED IN THE U.S.A WITH SATISFACTORY RESULTS, AND IS FREE OF MERCURY CONTAMINATION IN THE PROCESS.

SIGNED Mark Edwards
MARK EDWARDS, QUALITY ASSURANCE SUPERVISOR

NOTARIZED UPON REQUEST:
SWORN TO AND SUBSCRIBED BEFORE ME IN AND FOR ST. JOHN PARISH ON THIS _____ DAY OF _____, 20____

Michael E. Soileau, # 81887, Notary Public

DIRECT ANY QUESTIONS OR NECESSARY CLARIFICATIONS CONCERNING THIS REPORT TO THE SALES DEPARTMENT.

1-800-535-7692 (USA)

3/16" Plate A36

NUCOR
NUCOR STEEL TUSCALOOSA, INC.

MILL TEST CERTIFICATE

1700 HOLT RD N.E.
Tuscaloosa, AL 35404-1000
800-827-8872

#358782

Load Number	Tally	Mill Order Number	P.O. Number	Part Number	Certificate Number	Date
358782	00000000337092	N-095012-001	JCR5794		L256079-1	01/30/2009 15:47

Grade	Customer:
Order Description: A36, 0.1875 IN x 96.000 IN x 240.000 IN **Quality Plan Description:** A36/SA36/A70936: ASTM A36-05/A36M/ASME SA36-03/A709-36-07	**Sold TO:** WARREN FABRICATING & MACHINING WARREN OH **Ship TO:** WARREN FABRICATING & MACHINING Hubbard OH

Shipped Item	Heat/Slab Number	Certified By	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Cb	V	Al	Ti	N2	B	Ca	Sn	CEV
9A0242D	B9M5031-03 ***	B9M5031 ✓	0.19	0.87	0.010	0.006	0.06	0.24	0.09	0.06	0.026	0.000	0.003	0.034	0.002	0.011	0.0001	0.0024	0.009	
9A0110C	B9M5014-01 ***	B9M5014 ✓	0.19	0.89	0.011	0.004	0.07	0.36	0.14	0.06	0.028	0.000	0.003	0.031	0.002	0.010	0.0001	0.0021	0.010	
9A0112C	B9M5014-03 ***	B9M5014	0.19	0.89	0.011	0.004	0.07	0.36	0.14	0.06	0.028	0.000	0.003	0.031	0.002	0.010	0.0001	0.0021	0.010	
9A0112E	B9M5014-03 ***	B9M5014	0.19	0.89	0.011	0.004	0.07	0.36	0.14	0.06	0.028	0.000	0.003	0.031	0.002	0.010	0.0001	0.0021	0.010	

Shipped Item	Certified By	Heat Number	Yield ksi	Tensile ksi	Y/T %	ELONGATION % 2"	8"	Bend OK?	Hard HB	Charpy Impacts (ft-lbf) Size mm	1	2	3	Avg	Shear % 1	2	3	Avg	Test Temp
9A0242D	S9A0239FTT	B9M5031 ***	53.1	70.8	75.0	28.3													
9A0242D	S9A0240FTT	B9M5031 ***	50.7	73.3	69.2	31.1													
9A0242D	S9A0239MTT	B9M5031 ***	51.1	68.3	74.8	29.2													
9A0242D	S9A0240MTT	B9M5031 ***	49.3	67.4	73.1	32.5													
9A0110C	S9A0110FTT	B9M5014 ***	51.8	73.9	70.1	29.4													
9A0110C	S9A0110MTT	B9M5014 ***	45.6	68.2	66.9	28.9													
9A0112C	S9A0110FTT	B9M5014 ***	51.8	73.9	70.1	29.4													
9A0112C	S9A0112FTT	B9M5014 ***	46.3	68.3	67.8	31.5													
9A0112C	S9A0110MTT	B9M5014 ***	45.6	68.2	66.9	28.9													
9A0112C	S9A0112MTT	B9M5014 ***	49.6	70.1	70.8	29.1													
9A0112E	S9A0110FTT	B9M5014 ***	51.8	73.9	70.1	29.4													
9A0112E	S9A0112FTT	B9M5014 ***	46.3	68.3	67.8	31.5													
9A0112E	S9A0110MTT	B9M5014 ***	45.6	68.2	66.9	28.9													
9A0112E	S9A0112MTT	B9M5014 ***	49.6	70.1	70.8	29.1													

ELDERSLEE, INC.
CERT RECEIVED: 2/03/09
PURCHASE ORDER # P2821
SALES ORDER # 76275
PURCHASED FROM Ohio Steel

Items: 4 PCS: 37 Weight: 45331 LBS

Mercury has not come in contact with this product during the manufacturing process nor has any mercury been used by the manufacturing process. Certified in accordance with EN 10204 3.1. No weld repair has been performed on this material.
Manufactured to a fully killed fine grain practice. ** Produced from Coil **
ISO 9001:2000 Registered, PED Certified

"***" indicates Heats melted and Manufactured in the U.S.A.

We hereby certify that the product described above passed all of the tests required by the specifications.

Qiulin Yu - Rolling Mill Process Metallurgist

Vendor
ArcelorMittal Cleveland Inc

Heat Number
9504928

1/4" Plate A36

Klein Steel Service Inc.
105 Vanguard Pkwy
Rochester, NY 14606

October 16, 2008

Certified Report of Chemical Analysis and Mechanical Tests

Producing Mill	ArcelorMittal Cleveland Inc.			
Product	Hot Rolled Plate Steel			
Certification Type;	ASTM	A1018		
Klein PO#	JS2097	Code	HC240A36	

Gauge	Width	Length	Finish	Surface	Treatment	Quality	Type
1/4	48.000	Coil		DRY		A36/SA36	

B/L	Coil/Lift	Heat#	Tensile	Yield	E-Long%	Hardness	L/Ft
1271996	697251	4159210	66,900	41,800	29.0		
1269284	696040	4189357	69,000	46,200	35.0		
1272556	697250	9504928	70,400	43,000	36.0		

Heat#	4159210		Domestic		
C%	Mn%	P%	S%	Si%	Al%
0.250	0.660	0.008	0.005	0.020	0.048

Heat#	4189357		Domestic		
C%	Mn%	P%	S%	Si%	Al%
0.210	0.700	0.01	0.006	0.02	0.056

Heat#	9504928		Domestic		
C%	Mn%	P%	S%	Si%	Al%
0.230	0.640	0.01	0.003	0.03	0.036

The above figures are extracts from the original mill records as contained in the records of the company

Prepared by the office of:
Jim Sloan, QA Manager

CERT RECEIVED: 3/23/09
PURCHASE ORDER # P2848
SALES ORDER # 240847
SHIPPED FROM: Klein Steel

BENNETT BOLT WORKS, INC.

12 Elbridge Street
P.O. Box 922
Jordan, New York 13080

PH 315-689-3981
FX 315-689-3999

CERTIFICATION OF COMPLIANCE

Customer: ELDERLEE, INC.
729 CROSS RD
OAKS CORNERS, NY 14518

We certify that our system and procedures for the control of quality assures that all items furnished on the order will meet applicable tests, process requirements, and inspection requirements as required by the purchase order and applicable specifications.

Customer PO No.: 2214 JC

Date Shipped: 6/12/09

Invoice No.: 5015307

Purchase Date: 6/3/09

QUANTITY DESCRIPTION

22 - 3/8-16 X 7 1/2 A307 HEX SCREW MG (MFG- AUTO BOLT & NUT #17785-1, GALV.- MECH GALV. PLATING)
10 - 3/8-16 A563 HEX NUT MG (MFG- TELEFAST IND # 016722-1-71733, GALV.- MECH GALV PLATING)
44 - 3/8 F844 USS FW MG (MFG- WROUGHT WASHER #050045, GALV.- WISCONSIN MECH)
29 - 1/2-13 X 1 1/2 A307 HEX SCREW HDG (MFG & GALV.- NUCOR FAST #241990A)
43 - 1/2-13 A563 HEX NUT HDG (MFG- TELEFAST IND # R17745-73825, GALV.- AZZ GALV.)
31 - 1/2 SAE FW MG (MFG- WROUGHT WASHER #253804, GALV.- WISCONSIN MECH)
4 - 1/2 F844 USS FW MG (MFG- WROUGHT WASHER #37569, GALV.- MECH GALV PLATING)
1 - 1/2-13 X 8 A307 HEX SCREW HDG (MFG- SOUTHEASTERN BOLT #54015, GALV.- METAL PLATE GALV.)
1 - 1/2-13 X 8 GR 5 HEX SCREW HDG (MFG- NUCOR FAST # 178065A, GALV.- VICTAULIC GALV.)
3 - 3/4-10 A563 GR DH HVY HEX NUT HDG (MFG - UNYTITE # NS441, GALV.- ROGERS BROTHERS GALV.)
1 - 3/4-10 X 8 A307 HEX SCREW HDG (MFG- BIRMINGHAM FAST , GALV.- KENNEDY GALV.)
20 - 3/4-10 X 1 1/2 A325 STRUCT BOLT HDG 9 MFG & GALV.- NUCOR FAST #244495A)

M/F: UNIVERSITY OF NEBRASKA PO#4500206719 REPLACE

All products were melted and manufactured in the U.S.A. This material is in compliance with domesticity requirements, and conforms to ASTM & AASHTO specifications for standardized highway barrier rail and hardware.

James Emerick
SUPERVISOR QUALITY ASSURANCE
DATE: 6/15/09

BENNETT BOLT WORKS, INC.

12 Elbridge Street
P.O. Box 922
Jordan, New York 13080

PH 315-689-3981
FX 315-689-3999

CERTIFICATION OF COMPLIANCE

Customer: . ELDERLEE, INC.
729 CROSS RD
OAKS CORNERS, NY 14518

We certify that our system and procedures for the control of quality assures that all items furnished on the order will meet applicable tests, process requirements, and inspection requirements as required by the purchase order and applicable specifications.

Customer PO No.: . 2214 JC

Date Shipped: . 6/12/09

Invoice No.: . 5015306

Purchase Date: . 6/3/09

QUANTITY DESCRIPTION

23 - 3/8 X 7 1/2 A307 HEX SCREW W/ NUT & 2 FW MG (MFG- AUTO BOLT & NUT # 17785-1, TELEFAST IND. #O16722-2-71734, WROUGHT WASHER #050045, GALV.- MECH GALV. PLATING, MGP, WISCONSIN MECH)
27 - 1/2 X 1 1/2 A307 HEX SCREW W/ NUT & SAE FW HDG (MFG- NUCOR FAST #241990A, TELEFAST IND. #R1764-73562, NUCOR FAST #241990A, WROUGHT WASHER, GALV.- NUCOR FAST., AAA GALV, ROGERS BROTHERS GALV.)
5 - 1/2 SAE FW MG (MFG- WROUGHT WASHER #253804, GALV.- WISCONSIN MECH)
1 - 3/4 X 8 A307 HEX SCREW W/ NUT & 2 FW HDG (MFG- BIRMINGHAM FAST # 118976, NUCOR FAST #229487A, WROUGHT WASHER #227934, GALV.- KENNEDY GALV., NUCOR FAST, ROGERS BROTHERS GALV.)
56 - 3/4 X 1 1/2 A325 STRUCT BOLT W/ USS MIL FW MG (MFG- NUCOR FAST # 244495A, PRESTIGE STAMPING #B9023M, GALV.- NUCOR FAST., MECH GALV PLATING)
2 - 1/2-13 X 8 GR 5 HEX SCREW HDG (MFG- NUCOR FAST #178065, GALV.- VICTAULIC GALV.)
2 - 1/2-13 A563 HEX NUT HDG (MFG- TELEFAST IND # R17745-73825, GALV.- AZZ GALV.)
4 - 1/2 F844 USS FW MG (MFG- WROUGHT WASHER # 37569, GALV.- MECH GALV PLATING)

M/F: UNIVERSITY OF NEBRASKA PO#4500206719 NEW UNIT

All products were melted and manufactured in the U.S.A. This material is in compliance with domesticity requirements, and conforms to ASTM & AASHTO specifications for standardized highway barrier rail and hardware.

James Sinnenberg
SUPERVISOR QUALITY ASSURANCE
DATE: . 6/15/09

END OF DOCUMENT