



# Sports Turf Solutions

Athletic Field Testing and Consulting Services

September 25, 2012

Mr. Doug Fielding  
ASFU  
2439 Russell  
Berkeley, CA 94705

Re: Impact Test Results – ASFU Gilman Street Fields

Dear Doug,

On September 24<sup>th</sup> I conducted impact attenuation tests on the two synthetic turf soccer fields at ASFU's Gilman Street complex in Berkeley, CA. The tests were conducted in accordance with ASTM test method F355-A and test specification F1936-10. Section 8.3 of test specification F1936-10 was used to select test point locations. Detailed test results are attached.

The test results reported herein reflect the performance of the points tested, at the time of testing and at the temperatures reported. As recorded in the attached results, **test points #1 and #9 on the north field, and test points #1, #7, and #9 on the south field, failed to meet ASTM's requirement of <200 average g-max**, when tested in accordance with the above listed method and specification. (It should be noted that these results do not imply that an impact-related injury cannot occur if the surface systems comply with ASTM's g-max requirement.)

Thank you for the opportunity to be of service. Please call if you have questions or would like additional copies of the report.

Sincerely,

A handwritten signature in black ink, appearing to read 'Parker Wood'. The signature is fluid and cursive, written over a white background.

Parker Wood  
Sports Turf Solutions

Encl: Impact Test Data (2)  
Test Site Diagram (2)

**Field Location:** ASFU - Gilman Street Fields - North Field  
**Date(s) of Test:** 9/24/2012

**Field Description and Condition:**

Field Layout: Soccer and lacrosse  
 Surface Type: Infilled synthetic turf  
 Manufacturer: FieldTurf USA  
 Date Installed: August, 2008  
 Condition: Mostly clean; dry  
 Orientation: End A is NNW



**Weather Conditions**

General: Overcast; light breeze  
 Temp. (F): 62 °F (avg.)  
 Humidity: 75% Relative

**Primary Contact:**

Name: Doug Fielding  
 Phone #: (510) 597-3533

**Test Method/Specification:** ASTM F1936-10

*Standard Specification for Impact Attenuation of Turf Playing Systems as Measured in the Field*

**Test Performed By:**

Parker Wood, Sports Turf Solutions

**Summary of Test Results**

Location	Vo (m/s)	h (m)	Avg g-max	SI	HIC	Temperatures				Depths		
						Air (°C)	Air (°F)	Turf (°C)	Turf (°F)	Pile (mm)	Infill (mm)	Turf (mm)
Test Point 1	3.47	0.61	211	884.2	764.0	16	61	22	72	32	17	15
Test Point 2	3.46	0.61	184	740.4	636.9	16	61	22	72	37	27	10
Test Point 3	3.48	0.62	156	587.6	505.5	17	63	22	72	42	30	12
Test Point 4	3.46	0.61	154	570.4	492.5	17	63	22	72	36	29	7
Test Point 5	3.48	0.62	154	580.9	500.4	16	61	22	72	44	35	9
Test Point 6	3.47	0.61	195	785.2	674.3	16	61	23	73	32	24	8
Test Point 7	3.45	0.61	191	758.6	652.3	17	63	24	75	40	30	10
Test Point 8	3.46	0.61	181	701.4	604.0	17	63	22	72	43	33	10
Test Point 9	3.46	0.61	228	955.5	819.8	17	63	23	73	24	17	7
Test Point 10	3.46	0.61	195	797.9	685.2	17	63	23	73	33	25	8

Range of g-max averages:	
Highest average reading	228
Lowest average reading	154
Average of the averages	185

Exceptions / Comments:

Section 8.3 of ASTM Specification F1936-10 was used to select test point locations. No site abnormalities were noted, and there were no deviations from standard test procedures. All tests met data integrity requirements. The penalty kick lines have been replaced at both ends of the main field. A small soccer field runs from side to side on each half of the main field. Significant fibrillation and shedding are evident. Infill is showing on the surface of the field in many areas. The turf is matted down in many spots. There was lots of loose fiber on the surface of the field. A small bare spot was noted. No seam problems were observed.



# Impact Test Data



Field Location: ASFU - Gilman Street Fields - North Field  
 Date(s) of Test: 9/24/2012

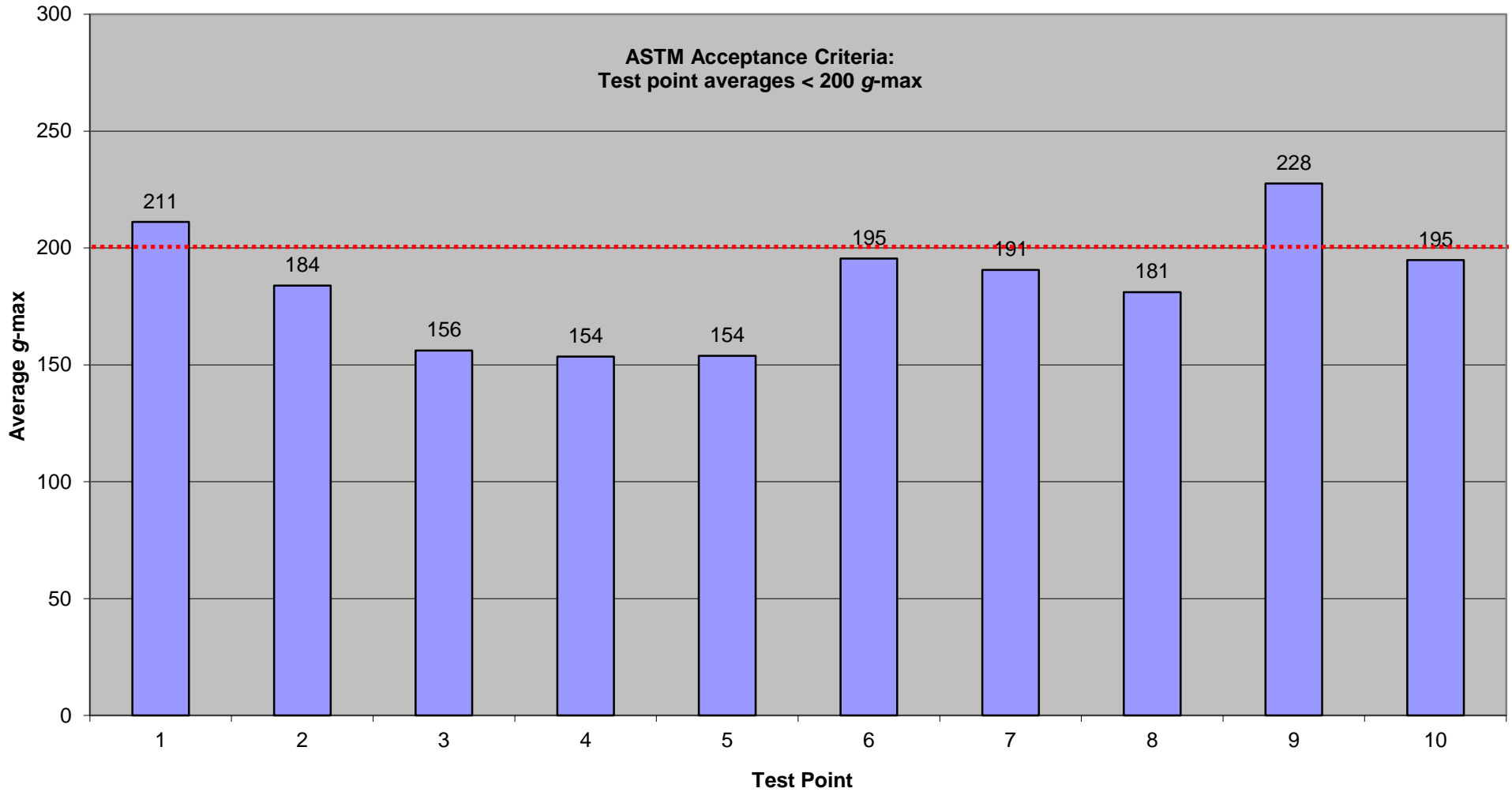
## Detailed Test Results

Location	Drop #	Vo (m/s)	h (m)	g-max	SI	HIC	Temperatures				Depths		
							Air (°C)	Air (°F)	Turf (°C)	Turf (°F)	Pile (mm)	Infill (mm)	Turf (mm)
Test Point 1 <i>Penalty kick line, End A, center of field</i>	1	3.44	0.61	204.9	849.1	734.6							
	2	3.48	0.62	209.1	872.9	754.5							
	3	3.46	0.61	213.2	895.5	773.4							
	Avg 2&3	3.47	0.61	211.1	884.2	764.0	16	61	22	72	32	17	15
Test Point 2 <i>P-box corr, btwn End A &amp; mid field, Side C</i>	1	3.46	0.61	166.6	632.5	544.7							
	2	3.47	0.61	181.7	726.7	625.3							
	3	3.45	0.61	186.2	754.1	648.5							
	Avg 2&3	3.46	0.61	183.9	740.4	636.9	16	61	22	72	37	27	10
Test Point 3 <i>75' from mid-field to End A, 40' from CL to Side C</i>	1	3.49	0.62	142.5	506.3	435.9							
	2	3.47	0.61	154.7	578.5	498.0							
	3	3.48	0.62	157.6	596.7	513.0							
	Avg 2&3	3.48	0.62	156.2	587.6	505.5	17	63	22	72	42	30	12
Test Point 4 <i>Center of the field</i>	1	3.48	0.62	140.3	493.0	426.0							
	2	3.46	0.61	151.2	555.9	480.0							
	3	3.46	0.61	155.9	584.9	505.1							
	Avg 2&3	3.46	0.61	153.6	570.4	492.5	17	63	22	72	36	29	7
Test Point 5 <i>75' from mid-field to End B, 63' from CL to Side D</i>	1	3.45	0.61	137.0	481.0	414.3							
	2	3.51	0.63	151.9	570.3	491.4							
	3	3.46	0.61	155.8	591.4	509.3							
	Avg 2&3	3.48	0.62	153.8	580.9	500.4	16	61	22	72	44	35	9
Test Point 6 <i>Mid-way from top of arc to p-box at End B, on CL</i>	1	3.46	0.61	181.7	699.1	600.3							
	2	3.47	0.61	197.5	802.2	688.7							
	3	3.48	0.62	193.4	768.2	659.8							
	Avg 2&3	3.47	0.61	195.5	785.2	674.3	16	61	23	73	32	24	8
Test Point 7 <i>50' from mid-field to End B, 5' outside Side C</i>	1	3.45	0.61	184.3	720.2	619.8							
	2	3.44	0.60	191.8	768.7	661.0							
	3	3.47	0.61	189.3	748.5	643.7							
	Avg 2&3	3.45	0.61	190.6	758.6	652.3	17	63	24	75	40	30	10
Test Point 8 <i>Corner of the field, End A, Side D</i>	1	3.46	0.61	154.4	542.3	467.8							
	2	3.46	0.61	176.8	677.0	584.5							
	3	3.47	0.61	185.4	725.7	623.5							
	Avg 2&3	3.46	0.61	181.1	701.4	604.0	17	63	22	72	43	33	10
Test Point 9 <i>3' from goal line to mid-field, End A, center of field</i>	1	3.45	0.61	211.0	842.5	723.0							
	2	3.45	0.61	222.8	925.2	796.3							
	3	3.48	0.62	232.3	985.8	843.3							
	Avg 2&3	3.46	0.61	227.6	955.5	819.8	17	63	23	73	24	17	7
Test Point 10 <i>15' from goal line to mid-field, End B, center of field</i>	1	3.47	0.61	177.5	688.8	592.2							
	2	3.47	0.61	194.1	796.0	683.7							
	3	3.46	0.61	195.6	799.8	686.8							
	Avg 2&3	3.46	0.61	194.9	797.9	685.2	17	63	23	73	33	25	8

Note: The accelerometer used to determine g-max values was last calibrated on 9/13/12. The calibration certificate is on file at Sports Turf Solutions. Copies are available upon request.



### ASFU - Gilman Street Fields - North Field Average g-max Levels

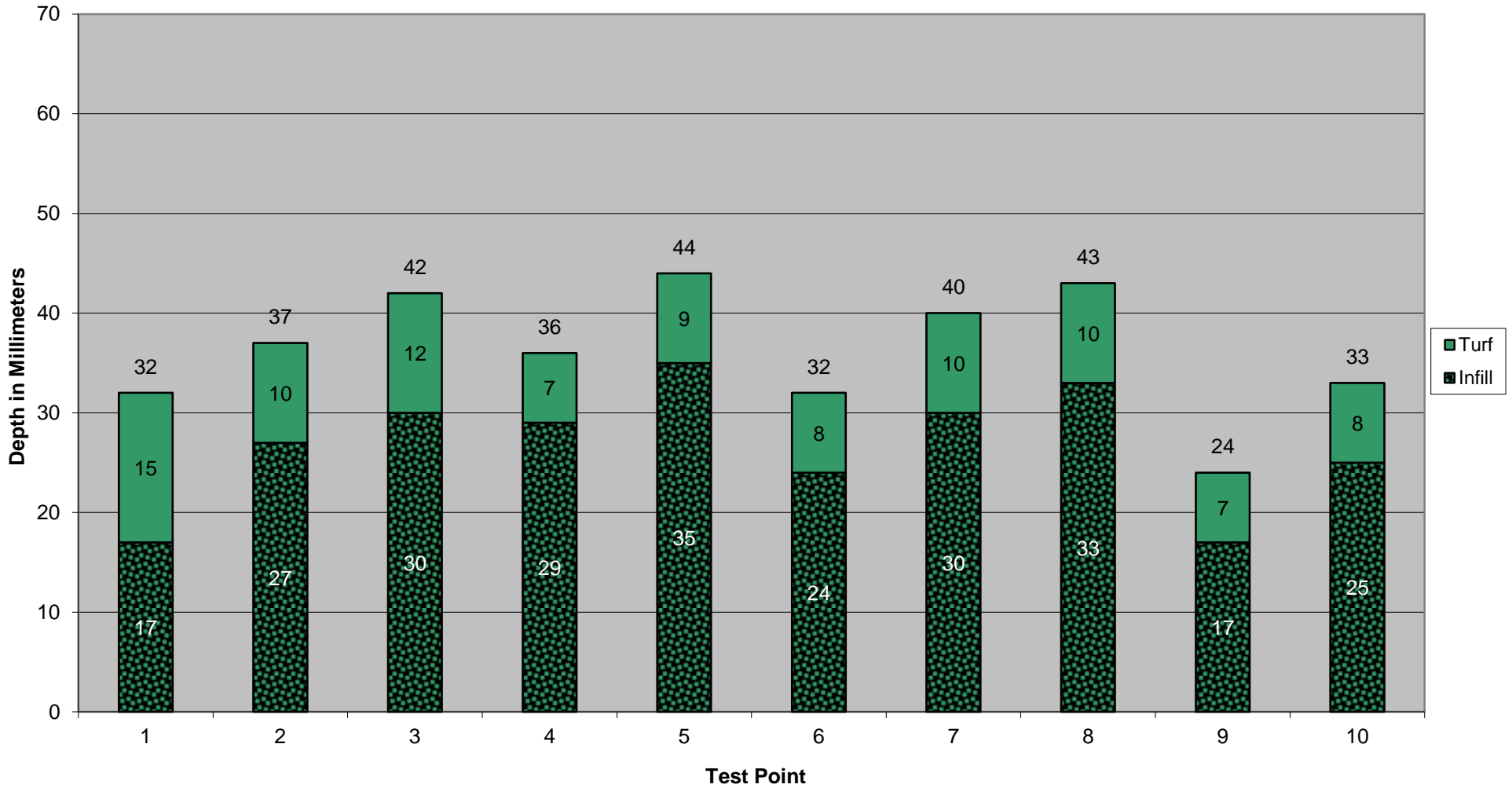




# Impact Test Data



## ASFU - Gilman Street Fields - North Field Test Point Profiles

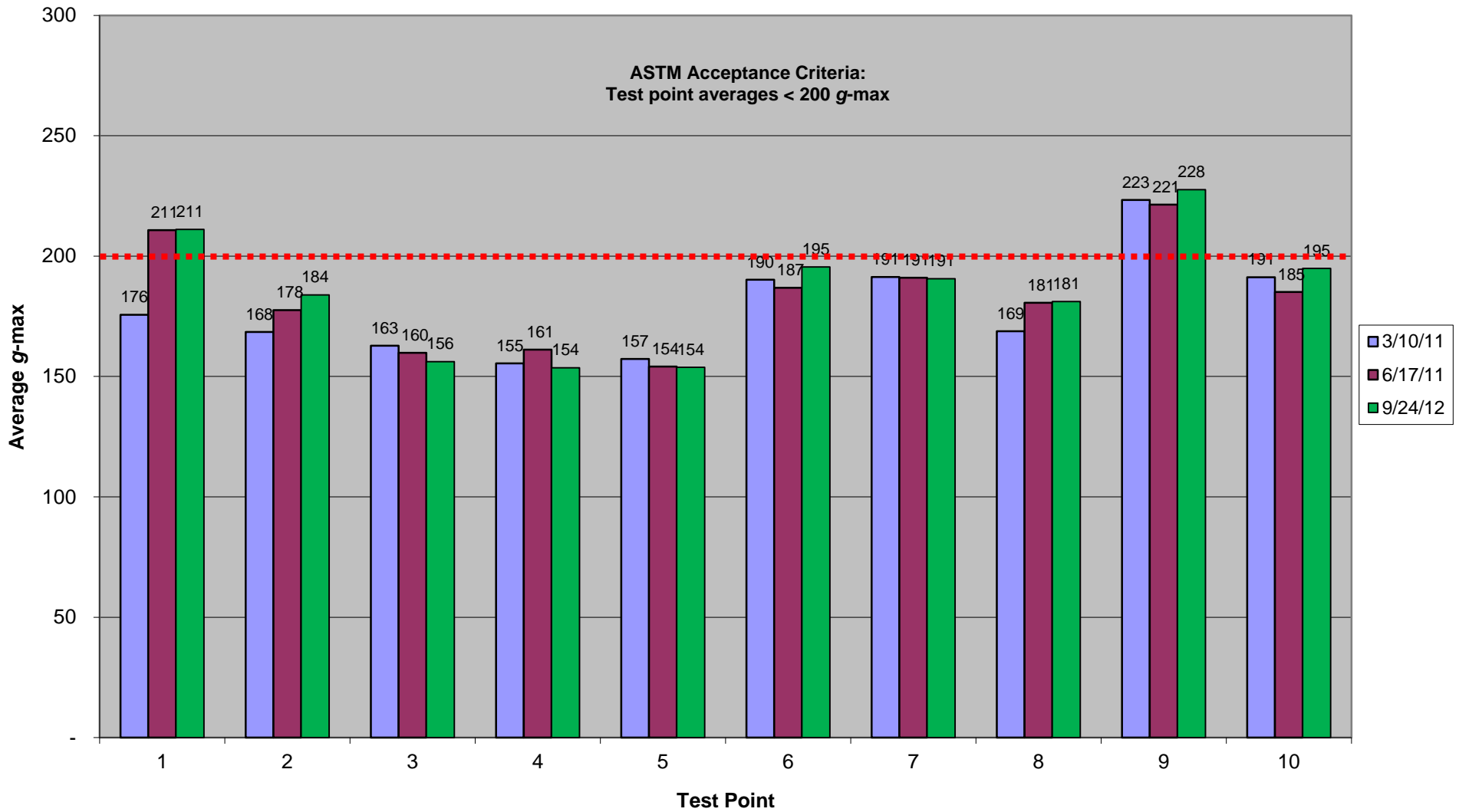




# Impact Test Data



## ASFU - Gilman Street Fields - North Field Comparison of Past and Present g-max Values

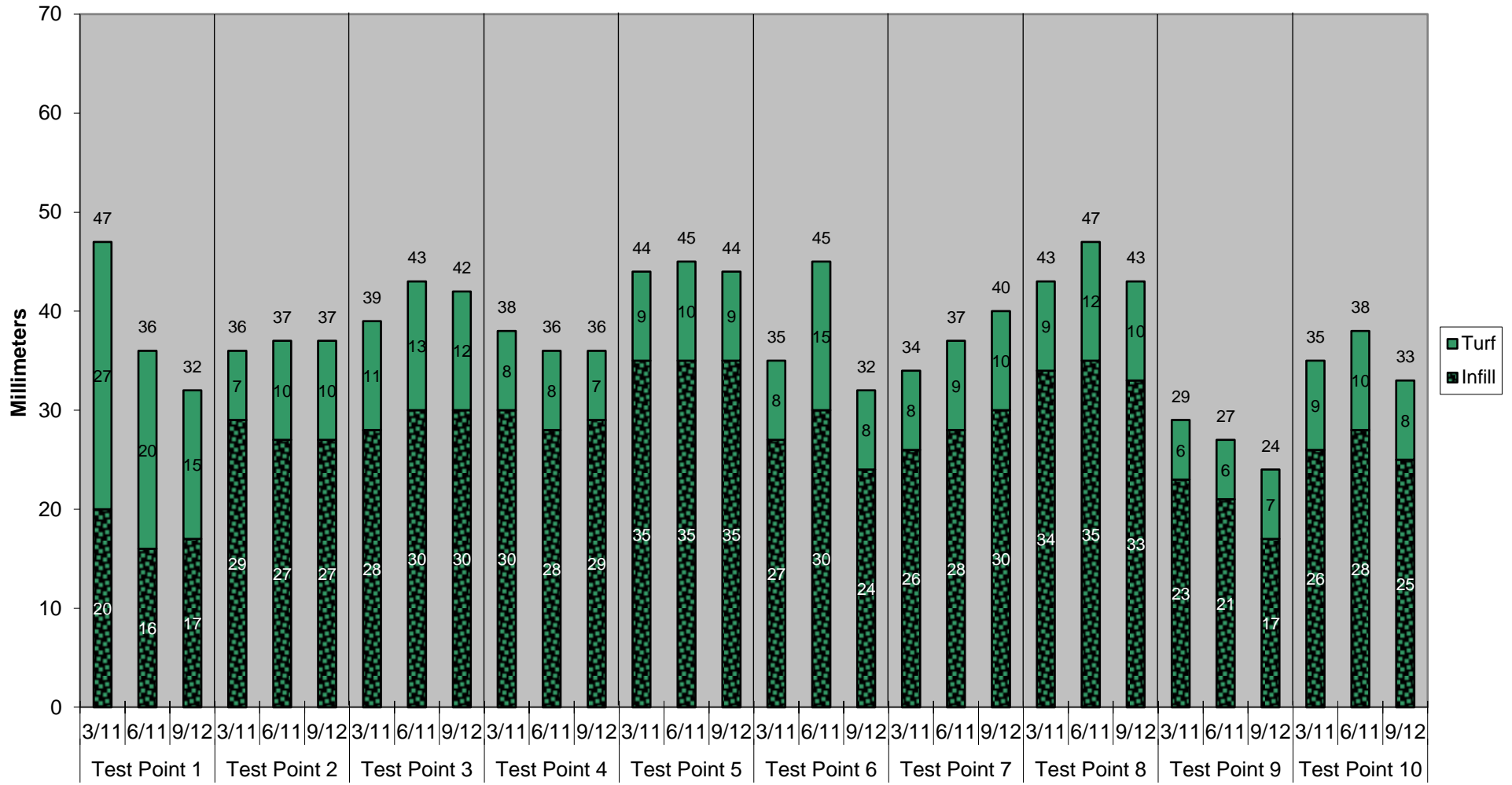




# Impact Test Data



## ASFU - Gilman Street Fields - North Field Comparison of Past and Present Surface Profile Data





# Test Point Reference Guide

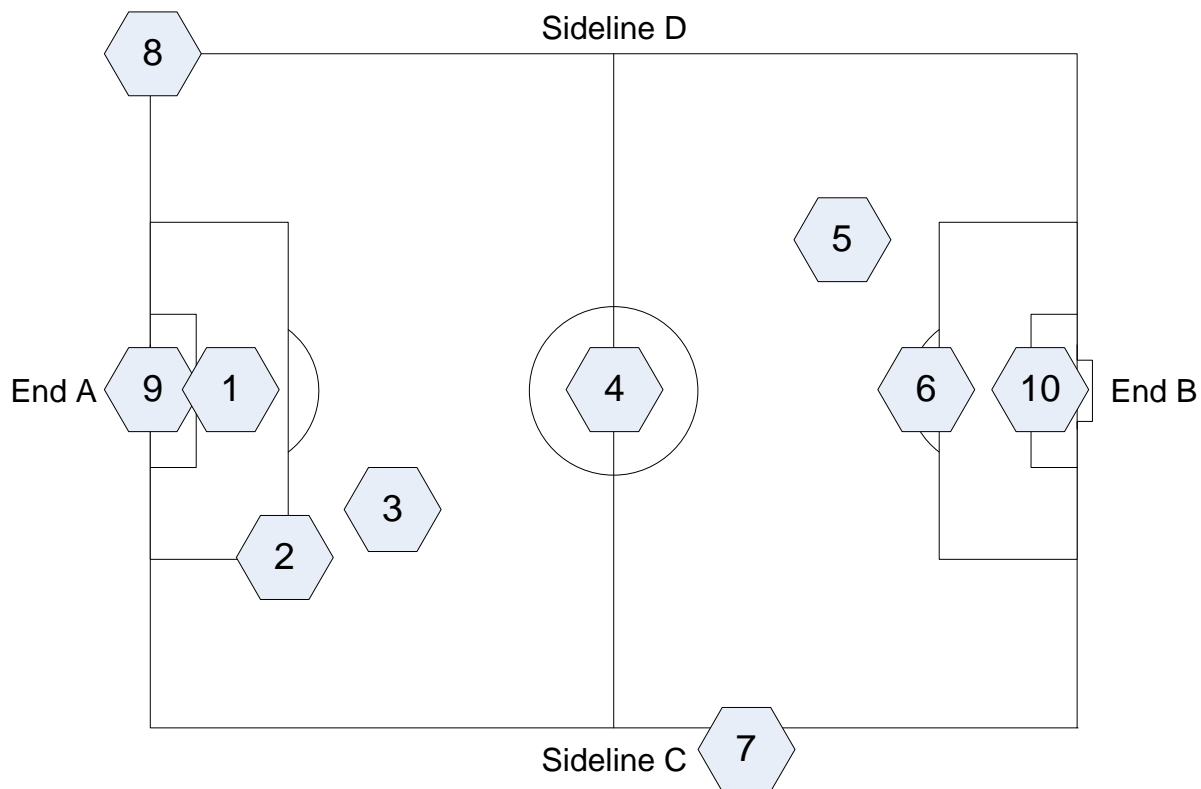
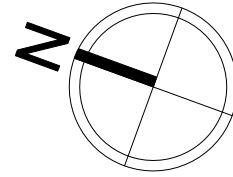


Job Number: 11-065a

Client: ASFU

Field: Gilman Street Fields – North Field

Date Tested: 9/24/2012



## Test Points:

- Point 1 – Penalty kick line, end A, center of field
- Point 2 – Corner of penalty box between end A and mid-field line, closest to sideline C
- Point 3 - 75' from mid-field line to end A, 40' from center of field to sideline C
- Point 4 – Mid-field line, center of field
- Point 5 – 75' from mid-field line to end B, 63' from center of field to sideline D
- Point 6 – Half way from restraining arc to edge of penalty box at end B, center of field
- Point 7 – 50' from mid-field line to end B, 5' outside sideline C
- Point 8 – Corner of the field at end A and sideline D
- Point 9 – 3' from goal line to mid-field line, end A, center of field
- Point 10 – 15' from goal line to mid-field line, end B, center of field

Note: Not to scale. Lacrosse lines and smaller soccer fields not shown.



**Field Location:** ASFU - Gilman Street Fields - South Field  
**Date(s) of Test:** 9/24/2012

**Field Description and Condition:**

Field Layout: Soccer and lacrosse  
 Surface Type: Infilled synthetic turf  
 Manufacturer: FieldTurf USA  
 Date Installed: August, 2008  
 Condition: Mostly clean; dry  
 Orientation: End A is NNW



**Weather Conditions**

General: Overcast; light breeze  
 Temp. (F): 58 °F (avg.)  
 Humidity: 89% Relative

**Primary Contact:**

Name: Doug Fielding  
 Phone #: (510) 597-3533

**Test Method/Specification:** ASTM F1936-10

*Standard Specification for Impact Attenuation of Turf Playing Systems as Measured in the Field*

**Test Performed By:**

Parker Wood, Sports Turf Solutions

**Summary of Test Results**

Location	Vo (m/s)	h (m)	Avg g-max	SI	HIC	Temperatures				Depths		
						Air (°C)	Air (°F)	Turf (°C)	Turf (°F)	Pile (mm)	Infill (mm)	Turf (mm)
Test Point 1	3.46	0.61	208	885.6	768.0	14	57	19	66	46	24	22
Test Point 2	3.46	0.61	185	740.0	637.2	14	57	19	66	37	28	9
Test Point 3	3.46	0.61	139	492.9	425.2	14	57	20	68	47	37	10
Test Point 4	3.46	0.61	149	536.2	464.3	15	59	20	68	39	32	7
Test Point 5	3.47	0.61	157	592.9	511.3	15	59	20	68	43	33	10
Test Point 6	3.46	0.61	177	697.3	601.8	15	59	20	68	35	27	8
Test Point 7	3.44	0.60	209	865.1	745.5	15	59	20	68	44	35	9
Test Point 8	3.46	0.61	164	614.5	530.2	15	59	19	66	47	36	11
Test Point 9	3.46	0.61	255	1108.1	951.9	15	59	20	68	20	15	5
Test Point 10	3.47	0.62	197	792.5	682.7	15	59	20	68	32	23	9

Range of g-max averages:	
Highest average reading	255
Lowest average reading	139
Average of the averages	184

**Exceptions / Comments:**

Section 8.3 of ASTM Specification F1936-10 was used to determine test point locations. No site abnormalities were noted, and there were no deviations from standard test procedures. All tests met data integrity requirements. The penalty kick line at end A has been replaced. A small soccer field runs from side to side on each half of the main field. Significant fibrillation and shedding are evident. Infill is showing on the surface of the field in many areas. The turf is matted down in many spots. There was lots of loose fiber on the surface of the field. A few minor seam problems were noted.



# Impact Test Data



Field Location: ASFU - Gilman Street Fields - South Field  
 Date(s) of Test: 9/24/2012

## Detailed Test Results

Location	Drop #	Vo (m/s)	h (m)	g-max	SI	HIC	Temperatures				Depths		
							Air (°C)	Air (°F)	Turf (°C)	Turf (°F)	Pile (mm)	Infill (mm)	Turf (mm)
Test Point 1 <i>Penalty kick line, End A, center of field</i>	1	3.53	0.64	191.4	770.3	667.5							
	2	3.45	0.61	206.1	873.1	757.4							
	3	3.47	0.61	210.0	898.2	778.7							
	Avg 2&3	3.46	0.61	208.0	885.6	768.0	14	57	19	66	46	24	22
Test Point 2 <i>P-box corr, btwn End A &amp; mid field, Side C</i>	1	3.48	0.62	165.7	620.6	534.8							
	2	3.45	0.61	182.0	721.3	621.4							
	3	3.47	0.61	188.2	758.8	653.0							
	Avg 2&3	3.46	0.61	185.1	740.0	637.2	14	57	19	66	37	28	9
Test Point 3 <i>75' from mid-field to End A, 40' from CL to Side C</i>	1	3.49	0.62	125.8	419.5	361.9							
	2	3.48	0.62	136.3	479.6	413.6							
	3	3.44	0.60	141.1	506.3	436.8							
	Avg 2&3	3.46	0.61	138.7	492.9	425.2	14	57	20	68	47	37	10
Test Point 4 <i>Center of the field</i>	1	3.47	0.61	134.9	456.9	395.7							
	2	3.47	0.61	149.4	536.3	464.0							
	3	3.45	0.61	149.3	536.1	464.6							
	Avg 2&3	3.46	0.61	149.4	536.2	464.3	15	59	20	68	39	32	7
Test Point 5 <i>75' from mid-field to End B, 63' from CL to Side D</i>	1	3.45	0.61	138.6	483.3	417.2							
	2	3.48	0.62	157.3	594.9	513.1							
	3	3.46	0.61	156.9	590.9	509.4							
	Avg 2&3	3.47	0.61	157.1	592.9	511.3	15	59	20	68	43	33	10
Test Point 6 <i>Mid-way from top of arc to p-box at End B, on CL</i>	1	3.46	0.61	164.2	623.2	538.2							
	2	3.47	0.62	176.5	697.8	602.2							
	3	3.45	0.61	176.8	696.8	601.3							
	Avg 2&3	3.46	0.61	176.6	697.3	601.8	15	59	20	68	35	27	8
Test Point 7 <i>50' from mid-field to End B, 5' outside Side C</i>	1	3.44	0.60	192.8	767.8	662.5							
	2	3.45	0.61	208.5	867.5	748.0							
	3	3.44	0.60	208.5	862.7	743.0							
	Avg 2&3	3.44	0.60	208.5	865.1	745.5	15	59	20	68	44	35	9
Test Point 8 <i>Corner of the field, End A, Side D</i>	1	3.47	0.61	144.1	502.3	433.9							
	2	3.48	0.62	162.6	609.3	525.8							
	3	3.45	0.61	164.8	619.6	534.6							
	Avg 2&3	3.46	0.61	163.7	614.5	530.2	15	59	19	66	47	36	11
Test Point 9 <i>3' from goal line to mid-field, End A, center of field</i>	1	3.47	0.61	228.4	926.8	796.3							
	2	3.47	0.61	254.5	1108.5	953.0							
	3	3.45	0.61	256.0	1107.7	950.8							
	Avg 2&3	3.46	0.61	255.2	1108.1	951.9	15	59	20	68	20	15	5
Test Point 10 <i>15' from goal line to mid-field, End B, center of field</i>	1	3.46	0.61	175.2	654.1	563.7							
	2	3.48	0.62	192.5	761.8	656.6							
	3	3.47	0.61	202.0	823.1	708.7							
	Avg 2&3	3.47	0.62	197.2	792.5	682.7	15	59	20	68	32	23	9

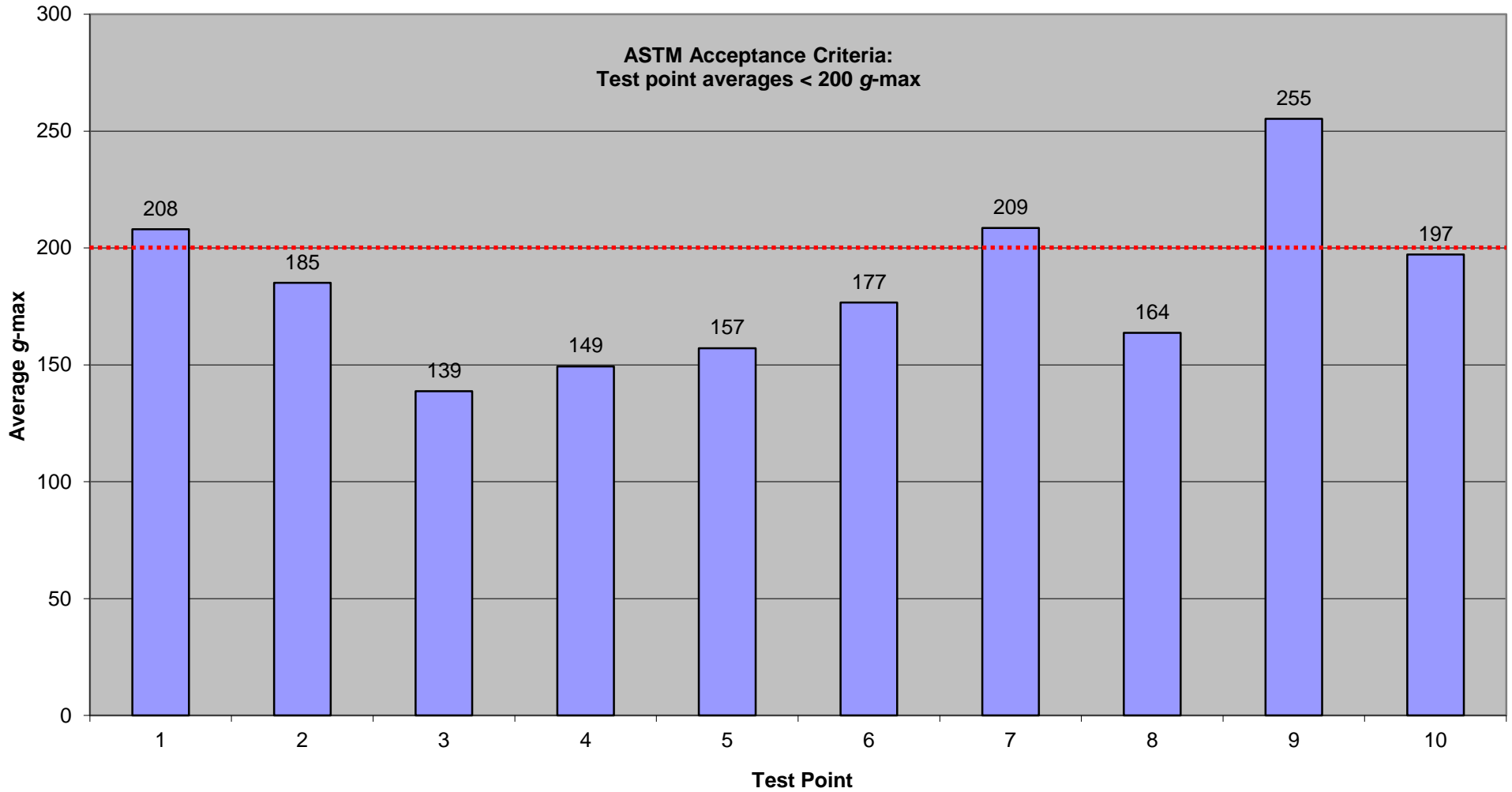
Note: The accelerometer used to determine g-max values was last calibrated on 9/13/12. The calibration certificate is on file at Sports Turf Solutions. Copies are available upon request.



# Impact Test Data



## ASFU - Gilman Street Fields - South Field Average g-max Levels

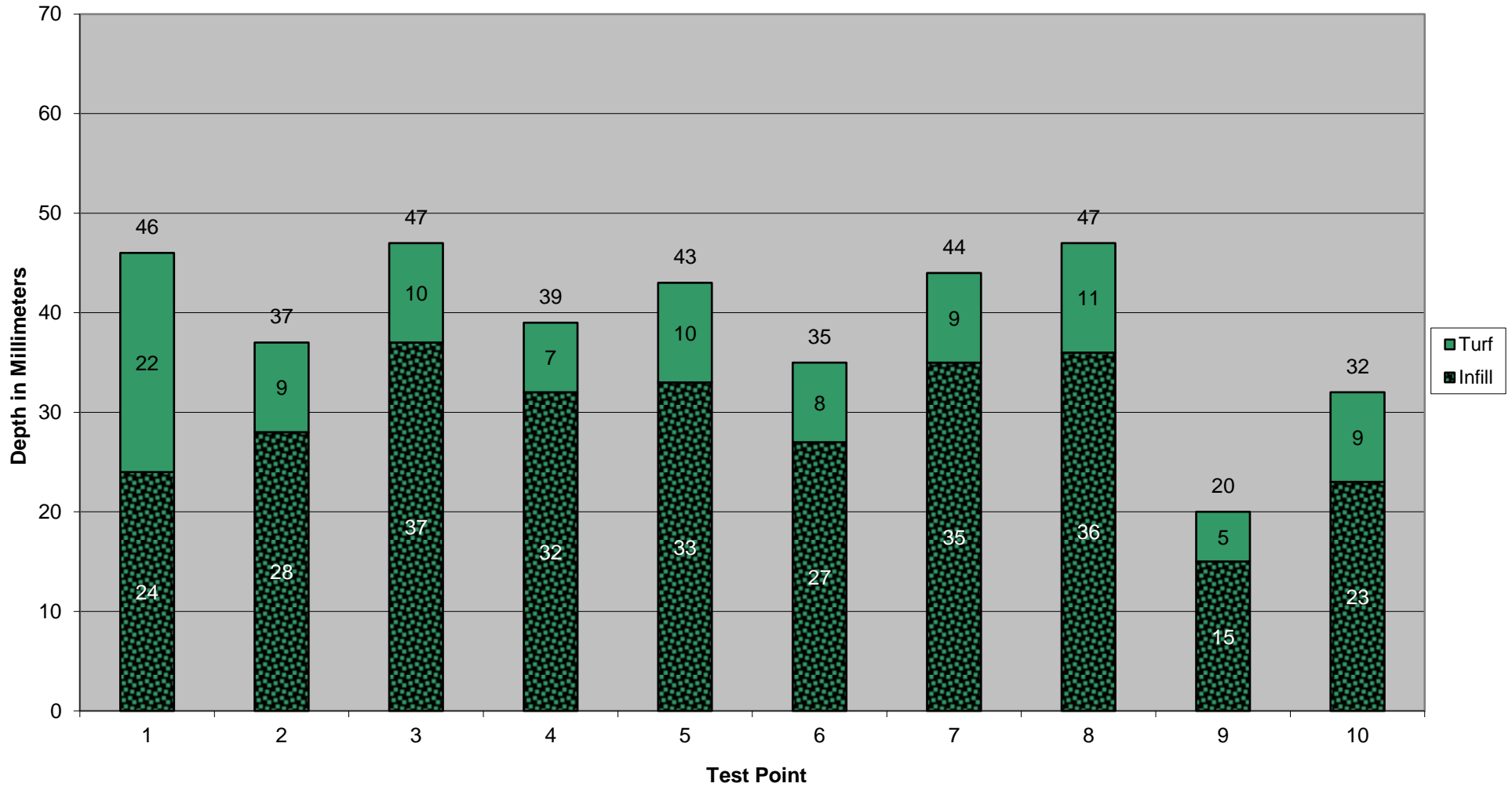




# Impact Test Data



## ASFU - Gilman Street Fields - South Field Test Point Profiles

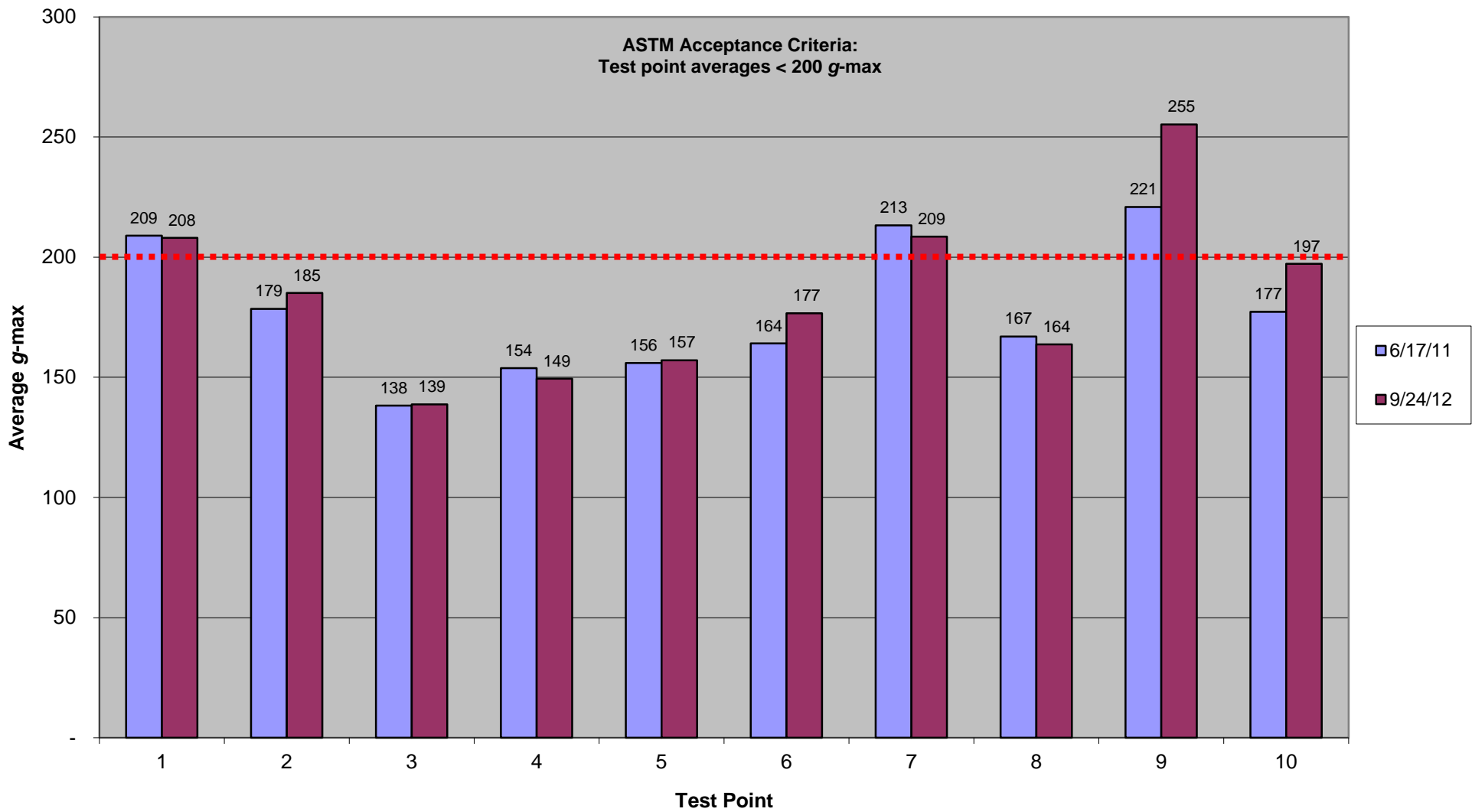




# Impact Test Data



## ASFU - Gilman Street Fields - South Field Comparison of Past and Present g-max Values

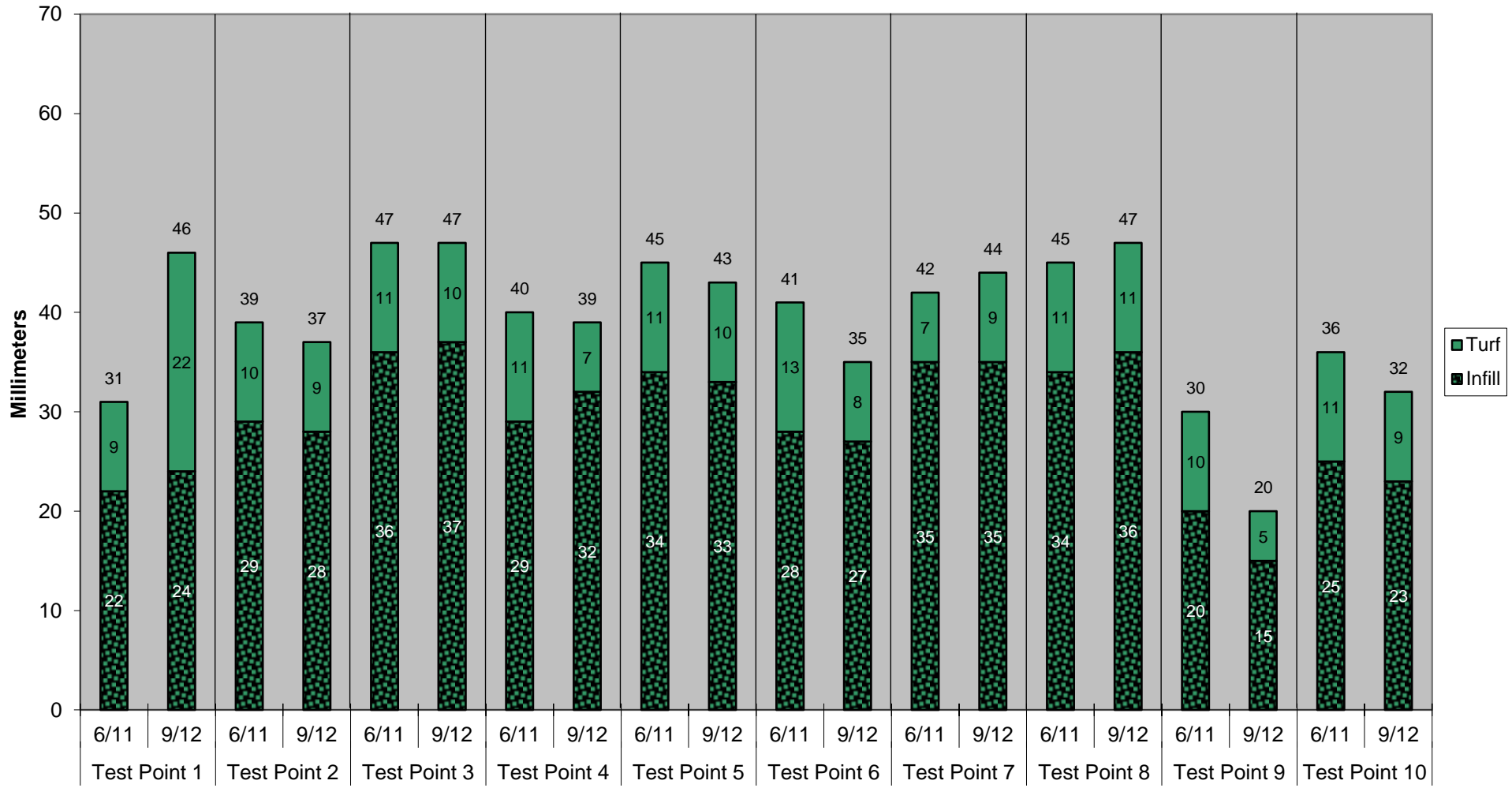




# Impact Test Data



## ASFU - Gilman Street Fields - South Field Comparison of Past and Present Surface Profile Data





# Test Point Reference Guide

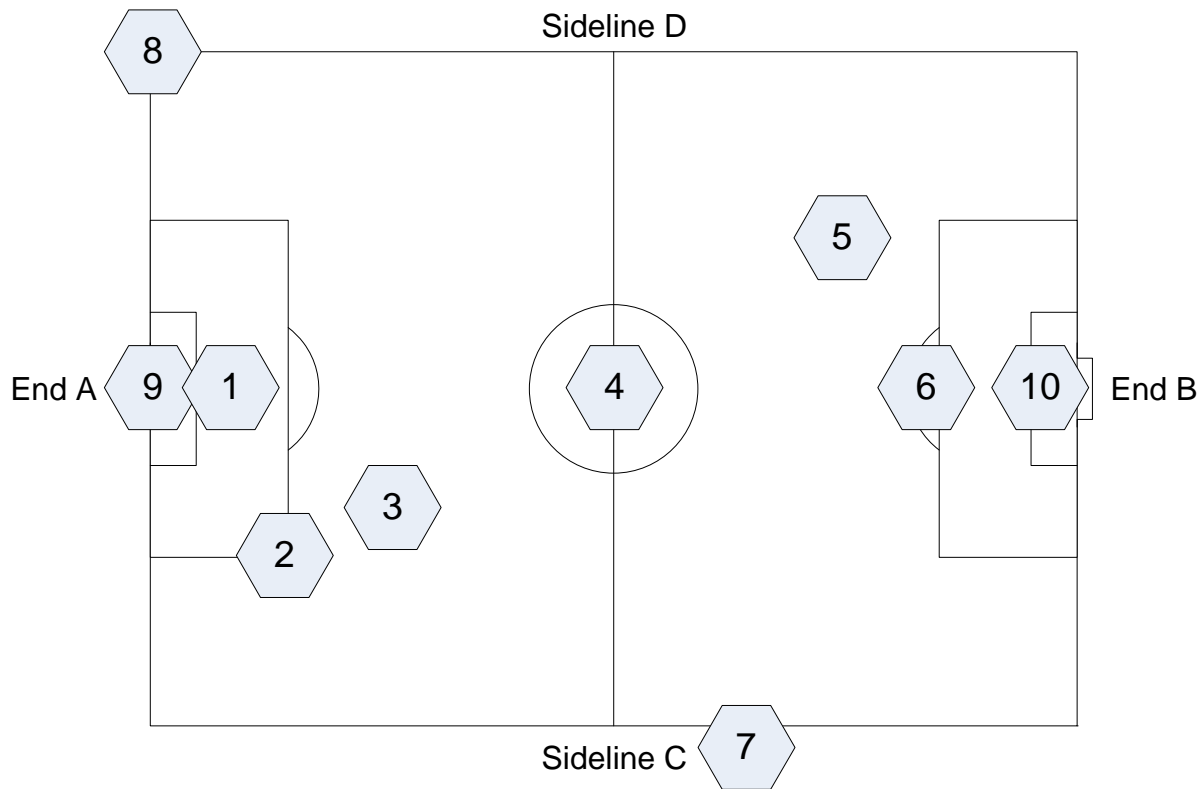
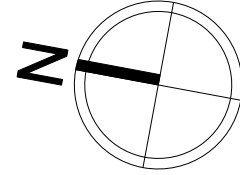


Job Number: 11-065b

Client: ASFU

Field: Gilman Street Fields – South Field

Date Tested: 9/24/2012



### Test Points:

- Point 1 – Penalty kick line, end A, center of field
- Point 2 – Corner of penalty box between end A and mid-field line, closest to sideline C
- Point 3 - 75' from mid-field line to end A, 40' from center of field to sideline C
- Point 4 – Mid-field line, center of field
- Point 5 – 75' from mid-field line to end B, 63' from center of field to sideline D
- Point 6 – Half way from restraining arc to edge of penalty box at end B, center of field
- Point 7 – 50' from mid-field line to end B, 5' outside sideline C
- Point 8 – Corner of the field at end A and sideline D
- Point 9 – 3' from goal line to mid-field line, end A, center of field
- Point 10 – 15' from goal line to mid-field line, end B, center of field

Note: Not to scale. Lacrosse lines and small soccer fields not shown.