Sports Turf Solutions
Athletic Field Testing and Consulting Services

January 31, 2022

Raina Celnik, Field Operations Analyst
San Francisco Recreation and Park Dept.
501 Stanyan Street
San Francisco, CA 94117-1898

Re: Impact Test Results – Crocker Amazon Playground

Dear Raina,

On January 25th, 26th, and 27th I conducted impact attenuation tests on the five (5) synthetic turf soccer pitches at Crocker Amazon Playground. The tests were conducted in accordance with ASTM test method F355-A and test specification F1936-19. Section 8.3 of test specification F1936-19 was used to determine test-point locations. Detailed test results are attached.

The test results attached hereto reflect the condition of the points tested at the time of testing and at the temperatures reported. As recorded in the attached results, **multiple test points on each of the five (5) fields 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 a surface system complies with ASTM's *g*-max requirement.)

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

Sincerely,

Parker Wood
Sports Turf Solutions

Att: Impact Test Data (5)
Test Point Reference Guide (5)
Impact Test Terminology

29001 Falcon Ridge Rd.
www.turftest.com Salinas, CA 93908 pwood@turftest.com
Phone: (831) 484-2138 *Assessing and Improving Safety and Playability* Fax: (831) 484-2139

Impact Test Data

Field Location: **Crocker Amazon Playground - Pitch #1**
Date(s) of Test: **1/25/2022**

Field Description and Condition:
Field Layout: Soccer
Surface Type: Infilled synthetic turf
Manufacturer: Shaw Sportexe
Date Installed: Unk.
Condition: Mostly clean; dry
Orientation: End A is NNE

Test Method/Specification: ASTM F1936-19
Standard Specification for Impact Attenuation of Turf Playing Systems as Measured in the Field

Weather Conditions
General: Mostly clear; light breeze
Temp. (F): 61 °F (avg.)
Humidity: 51% Relative

Primary Contact:
Name Raina Celnik
Phone # (415) 290-0307

Test Performed By:
Parker Wood, Sports Turf Solutions

Summary of Test Results

Location	Vo (m/s)	h (m)	Avg *g*-max	HIC	Temperatures				Depths		
					Air (°C)	Air (°F)	Turf (°C)	Turf (°F)	Pile (mm)	Infill (mm)	Turf (mm)
Test Point 1	3.48	0.62	**161**	554.5	17.2	63	20.5	69	35	21	14
Test Point 2	3.50	0.62	**268**	1049.0	15.9	61	18.4	65	18	13	5
Test Point 3	3.47	0.61	**206**	781.0	15.1	59	19.5	67	30	21	9
Test Point 4	3.49	0.62	**291**	1199.0	15.1	59	19.5	67	13	8	5
Test Point 5	3.47	0.61	**202**	744.0	15.5	60	19.6	67	27	19	8
Test Point 6	3.48	0.62	**265**	1048.5	15.6	60	20.1	68	18	12	6
Test Point 7	3.48	0.62	**220**	885.5	14.9	59	20.4	69	32	25	7
Test Point 8	3.52	0.63	**240**	914.0	19.2	67	21.5	71	16	13	3
Test Point 9	3.48	0.62	**300**	1315.0	17.9	64	23.3	74	11	4	7
Test Point 10	3.48	0.62	**209**	704.5	15.3	60	17.8	64	17	11	6

Range of *g*-max averages:	
Highest avg.	300
Lowest avg.	161
Overall avg.	236

Exceptions / Comments:

Section 8.3 of ASTM Specification F1936-19 was modified for use on a previously tested field lined for soccer. Test points #7 and #8 were selected in accordance with current ASTM guidelines. No site abnormalities were noted, and there were no deviations from standard test procedures. All tests met data integrity requirements. Significant fibrillation and shedding were noted. Lots of infill was visible on the surface of the field. Some sections of turf have been replaced. The turf at test point #9 was badly worn.

Impact Test Data

Field Location: **Crocker Amazon Playground - Pitch #1**
Date(s) of Test: **1/25/2022**

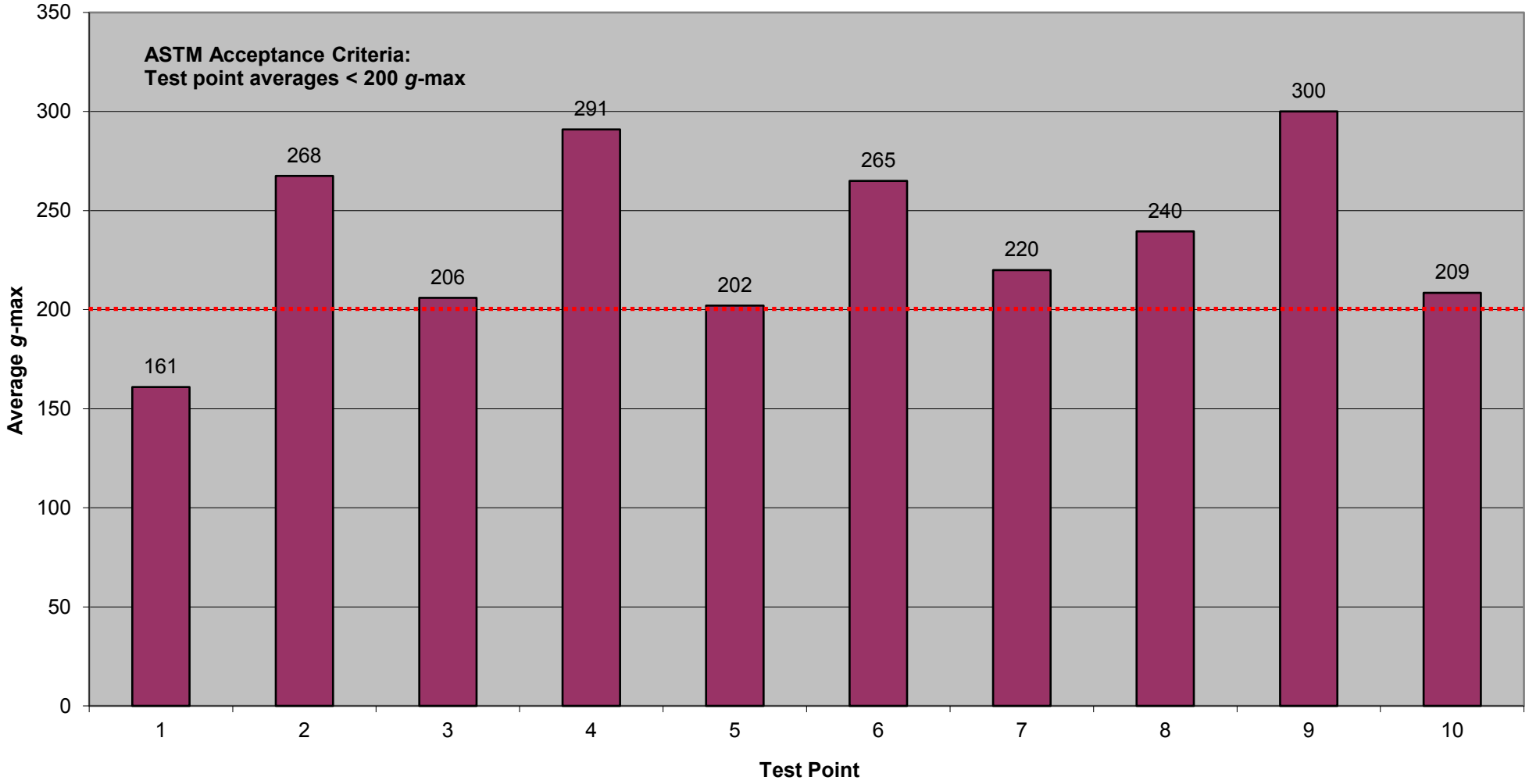
Detailed Test Results

Location	Drop #	Vo (m/s)	h (m)	***g*-max**	HIC	Temperatures				Depths		
						Air (°C)	Air (°F)	Turf (°C)	Turf (°F)	Pile (mm)	Infill (mm)	Turf (mm)
Test Point 1	1	3.47	0.61	145	465							
Penalty kick line,	2	3.48	0.62	158	539							
End A, on center	3	3.47	0.61	164	570							
line (CL)	Avg 2&3	3.48	0.62	**161**	555	17.2	63	20.5	69	35	21	14
Test Point 2	1	3.49	0.62	248	925							
P-box cornr, btwn	2	3.50	0.62	267	1048							
End A & mid field,	3	3.49	0.62	268	1050							
Side C	Avg 2&3	3.50	0.62	**268**	1049	15.9	61	18.4	65	18	13	5
Test Point 3	1	3.47	0.61	185	654							
65' from mid-field	2	3.47	0.61	204	769							
to End A, 40' from	3	3.47	0.61	208	793							
CL to Side C	Avg 2&3	3.47	0.61	**206**	781	15.1	59	19.5	67	30	21	9
Test Point 4	1	3.49	0.62	282	1138							
Center of the field	2	3.48	0.62	290	1202							
	3	3.49	0.62	292	1196							
	Avg 2&3	3.49	0.62	**291**	1199	15.1	59	19.5	67	13	8	5
Test Point 5	1	3.47	0.61	185	640							
65' from mid-field	2	3.47	0.61	201	735							
to end B, 63' from	3	3.47	0.61	203	753							
CL to Side D	Avg 2&3	3.47	0.61	**202**	744	15.5	60	19.6	67	27	19	8
Test Point 6	1	3.48	0.62	248	944							
6' from top of R-Arc	2	3.48	0.62	266	1058							
to top of P-Box,	3	3.48	0.62	264	1039							
End B, on CL	Avg 2&3	3.48	0.62	**265**	1049	15.6	60	20.1	68	18	12	6
Test Point 7	1	3.47	0.61	202	770							
50' from mid-field	2	3.48	0.62	218	876							
to End B, 5' out-	3	3.47	0.61	222	895							
side Side C	Avg 2&3	3.48	0.62	**220**	886	14.9	59	20.4	69	32	25	7
Test Point 8	1	3.51	0.63	226	839							
Corner of the field	2	3.52	0.63	236	894							
at End A and Side	3	3.52	0.63	243	934							
D	Avg 2&3	3.52	0.63	**240**	914	19.2	67	21.5	71	16	13	3
Test Point 9	1	3.48	0.62	291	1252							
3' in front of Goal	2	3.48	0.62	306	1353							
Line, End A, on	3	3.48	0.62	294	1277							
CL	Avg 2&3	3.48	0.62	**300**	1315	17.9	64	23.3	74	11	4	7
Test Point 10	1	3.48	0.62	190	620							
15' in front of Goal	2	3.48	0.62	211	723							
Line, End B, on	3	3.47	0.61	206	686							
CL	Avg 2&3	3.48	0.62	**209**	705	15.3	60	17.8	64	17	11	6

Note: Accelerometer last calibrated on 1/26/21. Recalibration due by 1/26/23. The calibration certificate is on file at Sports Turf Solutions. Copies are available upon request.

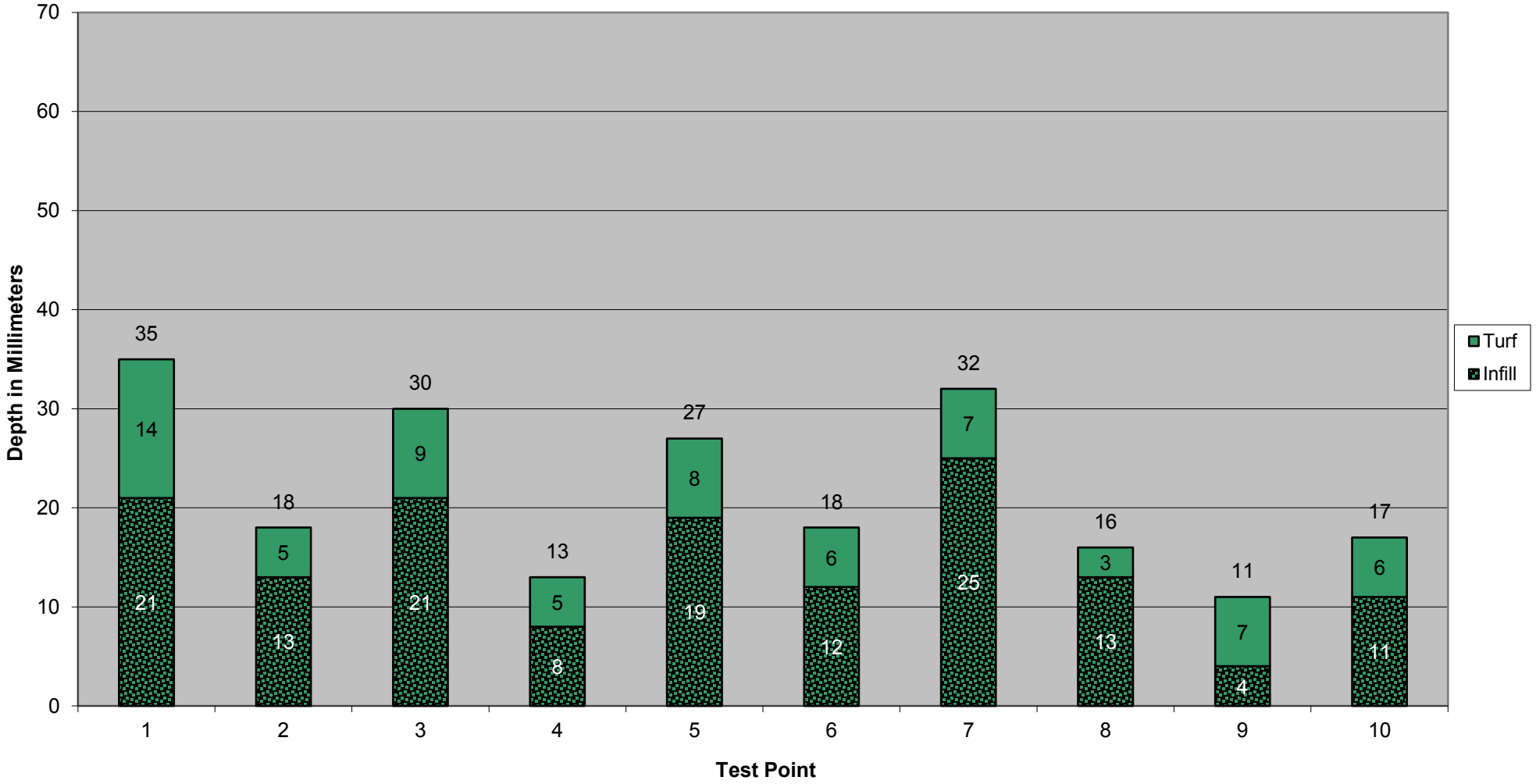
Crocker Amazon Playground - Pitch #1

Average *g*-max Levels

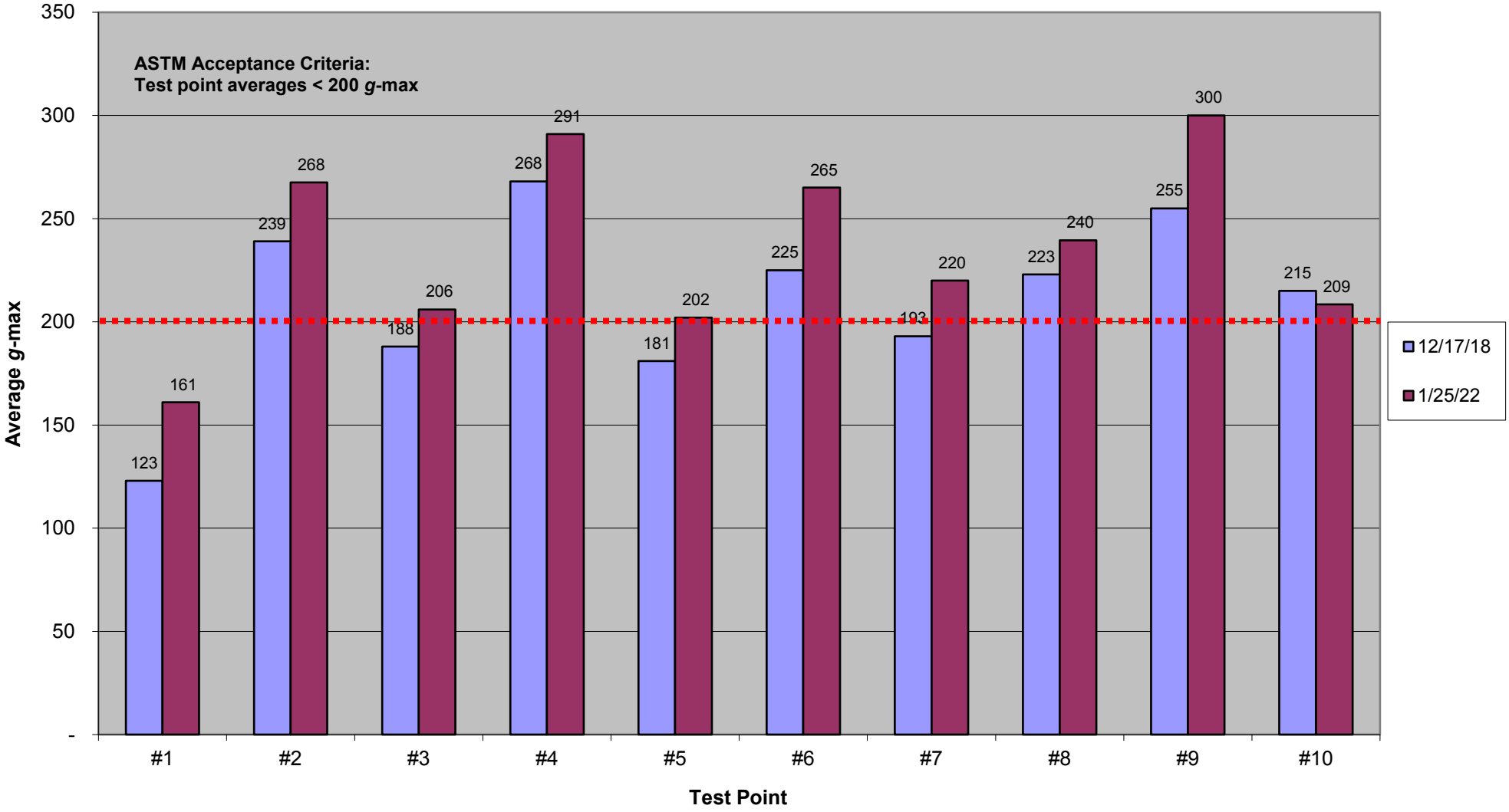


Crocker Amazon Playground - Pitch #1

Test Point Profiles

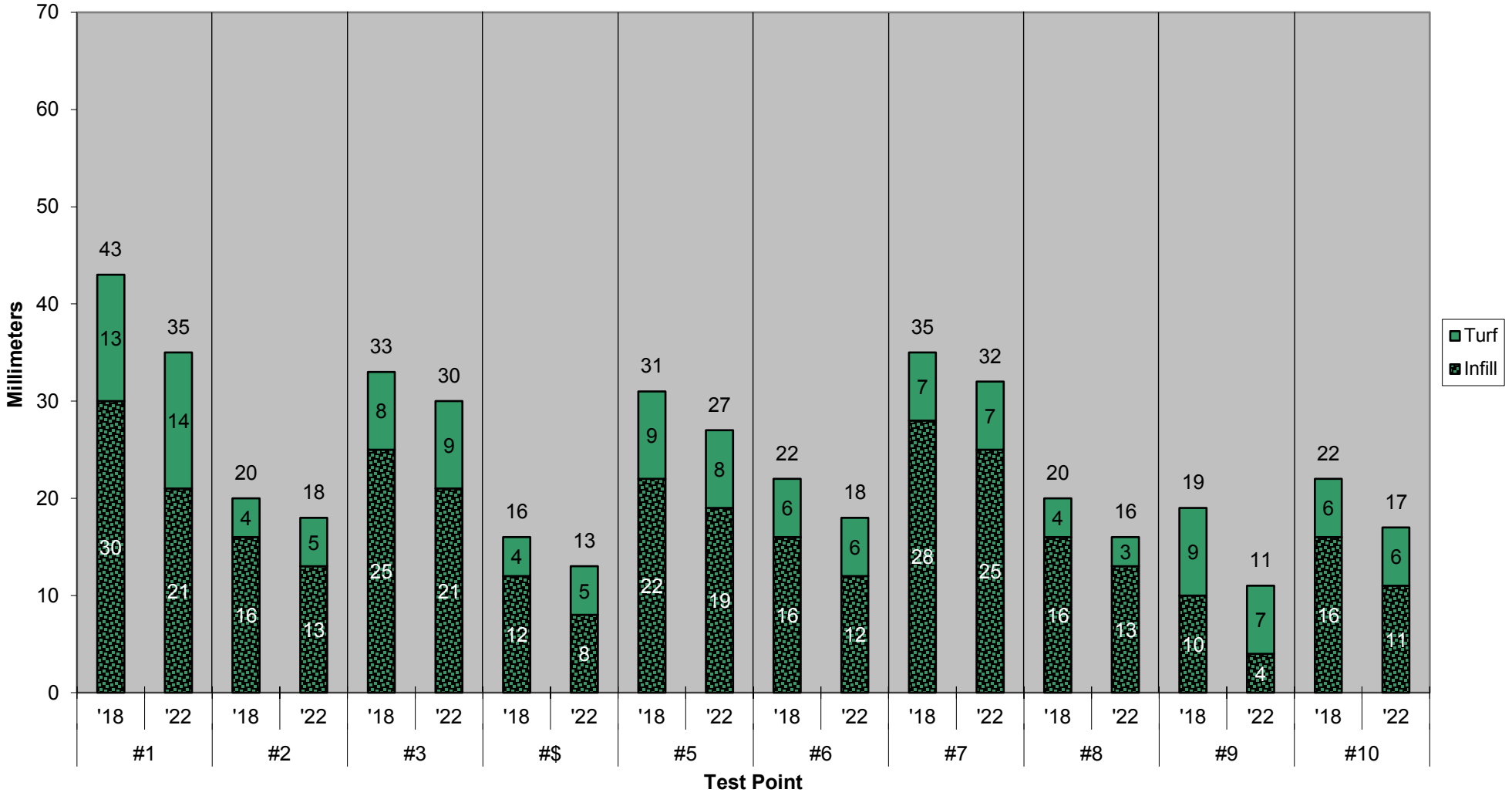


Crocker Amazon Playground - Pitch #1
Comparison of Past and Present g-max Values



Crocker Amazon Playground - Pitch #1

Comparison of Past and Present Surface Profile Data



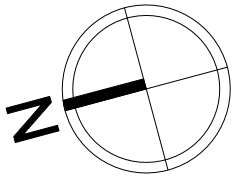
Test Point Reference Guide

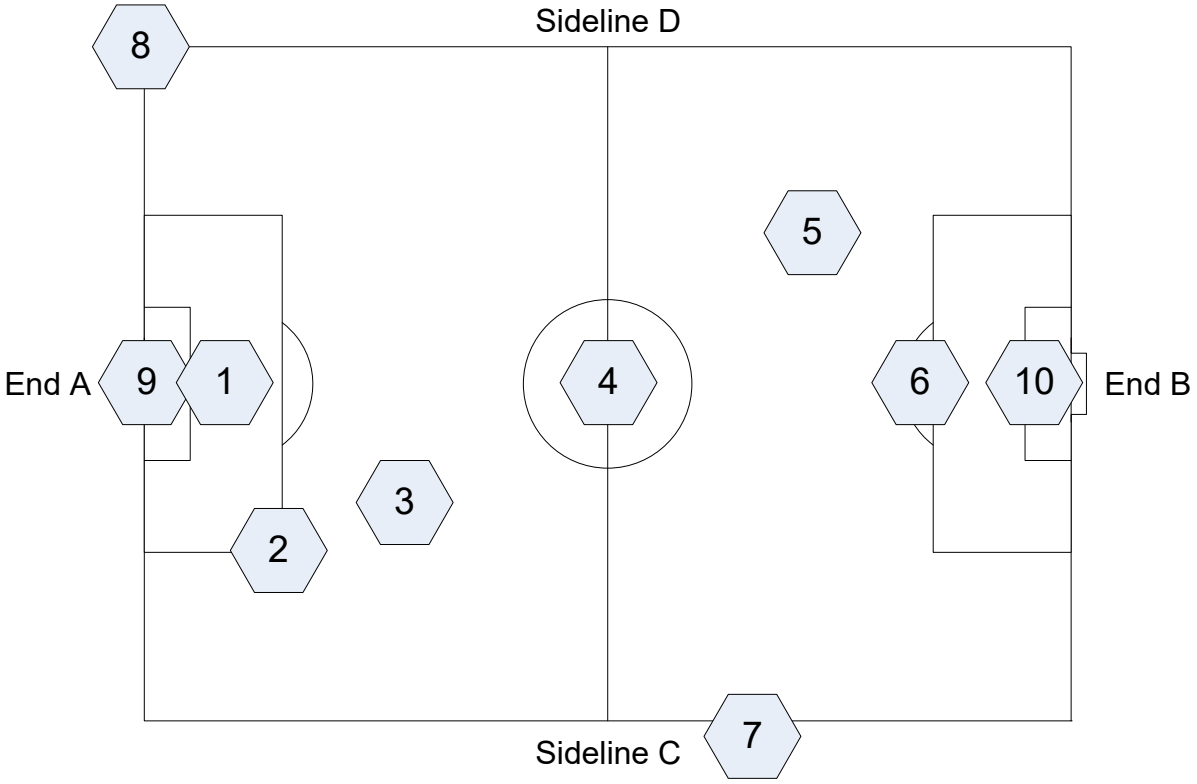
Job Number: 22-001a

Client: San Francisco Recreation and Park Department

Field: Crocker Amazon Playground – Pitch #1

Date Tested: 1/25/2022





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 – 65' 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 – 65' 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. Small soccer pitches not shown.

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Impact Test Data

Field Location: **Crocker Amazon Playground - Pitch #2**
Date(s) of Test: **1/25/2022**

Field Description and Condition:
Field Layout: Soccer
Surface Type: Infilled synthetic turf
Manufacturer: Shaw Sportexe
Date Installed: Unk.
Condition: Mostly clean; dry
Orientation: End A is WNW

Test Method/Specification: ASTM F1936-19
Standard Specification for Impact Attenuation of Turf Playing Systems as Measured in the Field

Weather Conditions
General: Mostly clear; light breeze
Temp. (F): 66 °F (avg.)
Humidity: 43% Relative

Primary Contact:
Name Raina Celnik
Phone # (415) 290-0307

Test Performed By:
Parker Wood, Sports Turf Solutions

Summary of Test Results

Location	Vo (m/s)	h (m)	Avg *g*-max	HIC	Temperatures				Depths		
					Air (°C)	Air (°F)	Turf (°C)	Turf (°F)	Pile (mm)	Infill (mm)	Turf (mm)
Test Point 1	3.49	0.62	201	742.0	20.1	68	21.2	70	22	11	11
Test Point 2	3.48	0.62	236	903.0	19.1	66	19.2	67	15	12	3
Test Point 3	3.48	0.62	192	706.5	18.8	66	20.1	68	28	20	8
Test Point 4	3.48	0.62	275	1122.0	18.4	65	19.7	67	14	10	4
Test Point 5	3.48	0.62	181	640.0	18.1	65	20.4	69	31	21	10
Test Point 6	3.49	0.62	221	784.0	17.1	63	20.1	68	19	13	6
Test Point 7	3.47	0.61	198	735.0	16.4	62	19.0	66	29	23	6
Test Point 8	3.51	0.63	234	917.0	23.7	75	21.8	71	22	18	4
Test Point 9	3.48	0.62	297	1195.5	21.1	70	21.8	71	13	7	6
Test Point 10	3.49	0.62	224	849.0	16.4	62	18.7	66	21	14	7

Range of *g*-max averages:	
Highest avg.	297
Lowest avg.	181
Overall avg.	226

Exceptions / Comments:

Section 8.3 of ASTM Specification F1936-19 was modified for use on a previously tested field lined for soccer. Test points #7 and #8 were selected in accordance with current ASTM guidelines. No site abnormalities were noted, and there were no deviations from standard test procedures. All tests met data integrity requirements. Significant fibrillation and shedding were noted. Lots of infill was visible on the surface of the field. Some sections of turf have been replaced. Test point #1 was on replacement turf.

Impact Test Data

Field Location: **Crocker Amazon Playground - Pitch #2**
Date(s) of Test: **1/25/2022**

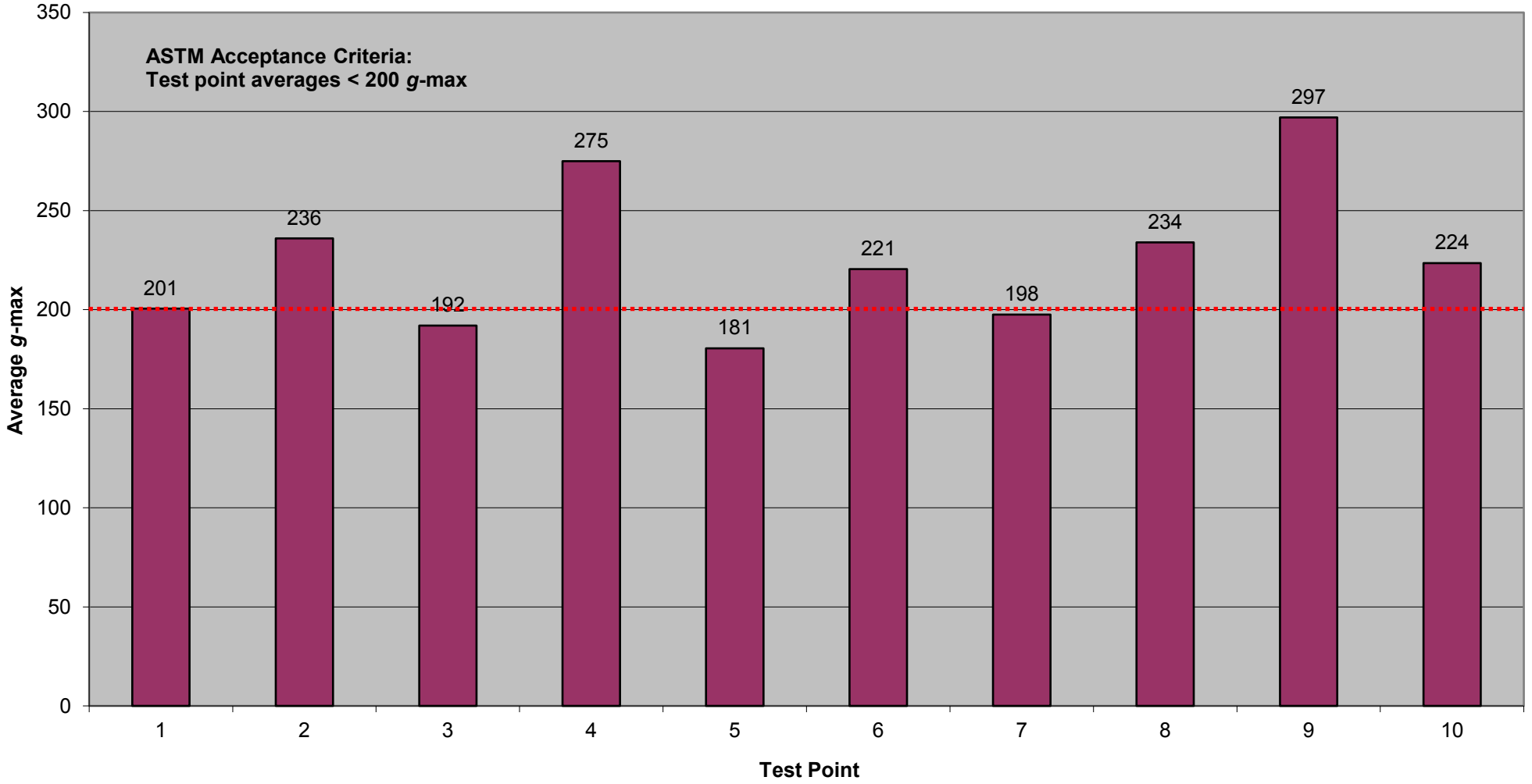
Detailed Test Results

Location	Drop #	Vo (m/s)	h (m)	***g*-max**	HIC	Temperatures				Depths		
						Air (°C)	Air (°F)	Turf (°C)	Turf (°F)	Pile (mm)	Infill (mm)	Turf (mm)
Test Point 1	1	3.48	0.62	185	652							
Penalty kick line,	2	3.48	0.62	196	717							
End A, on center	3	3.49	0.62	205	767							
line (CL)	Avg 2&3	3.49	0.62	**201**	742	20.1	68	21.2	70	22	11	11
Test Point 2	1	3.49	0.62	221	815							
P-box cornr, btwn	2	3.48	0.62	239	923							
End A & mid field,	3	3.48	0.62	233	883							
Side C	Avg 2&3	3.48	0.62	**236**	903	19.1	66	19.2	67	15	12	3
Test Point 3	1	3.47	0.61	173	594							
65' from mid-field	2	3.48	0.62	191	701							
to End A, 40' from	3	3.47	0.61	193	712							
CL to Side C	Avg 2&3	3.48	0.62	**192**	707	18.8	66	20.1	68	28	20	8
Test Point 4	1	3.47	0.61	270	1097							
Center of the field	2	3.47	0.61	277	1137							
	3	3.48	0.62	273	1107							
	Avg 2&3	3.48	0.62	**275**	1122	18.4	65	19.7	67	14	10	4
Test Point 5	1	3.48	0.62	162	540							
65' from mid-field	2	3.48	0.62	178	628							
to end B, 63' from	3	3.48	0.62	183	652							
CL to Side D	Avg 2&3	3.48	0.62	**181**	640	18.1	65	20.4	69	31	21	10
Test Point 6	1	3.49	0.62	204	692							
6' from top of R-Arc	2	3.49	0.62	216	756							
to top of P-Box,	3	3.49	0.62	225	812							
End B, on CL	Avg 2&3	3.49	0.62	**221**	784	17.1	63	20.1	68	19	13	6
Test Point 7	1	3.47	0.61	182	644							
50' from mid-field	2	3.47	0.61	196	729							
to End B, 5' out-	3	3.47	0.61	199	741							
side Side C	Avg 2&3	3.47	0.61	**198**	735	16.4	62	19.0	66	29	23	6
Test Point 8	1	3.51	0.63	218	821							
Corner of the field	2	3.51	0.63	232	906							
at End A and Side	3	3.51	0.63	236	928							
D	Avg 2&3	3.51	0.63	**234**	917	23.7	75	21.8	71	22	18	4
Test Point 9	1	3.48	0.62	297	1205							
3' in front of Goal	2	3.48	0.62	292	1180							
Line, End A, on	3	3.48	0.62	302	1211							
CL	Avg 2&3	3.48	0.62	**297**	1196	21.1	70	21.8	71	13	7	6
Test Point 10	1	3.49	0.62	206	751							
15' in front of Goal	2	3.48	0.62	221	836							
Line, End B, on	3	3.49	0.62	226	862							
CL	Avg 2&3	3.49	0.62	**224**	849	16.4	62	18.7	66	21	14	7

Note: Accelerometer last calibrated on 1/26/21. Recalibration due by 1/26/23. The calibration certificate is on file at Sports Turf Solutions. Copies are available upon request.

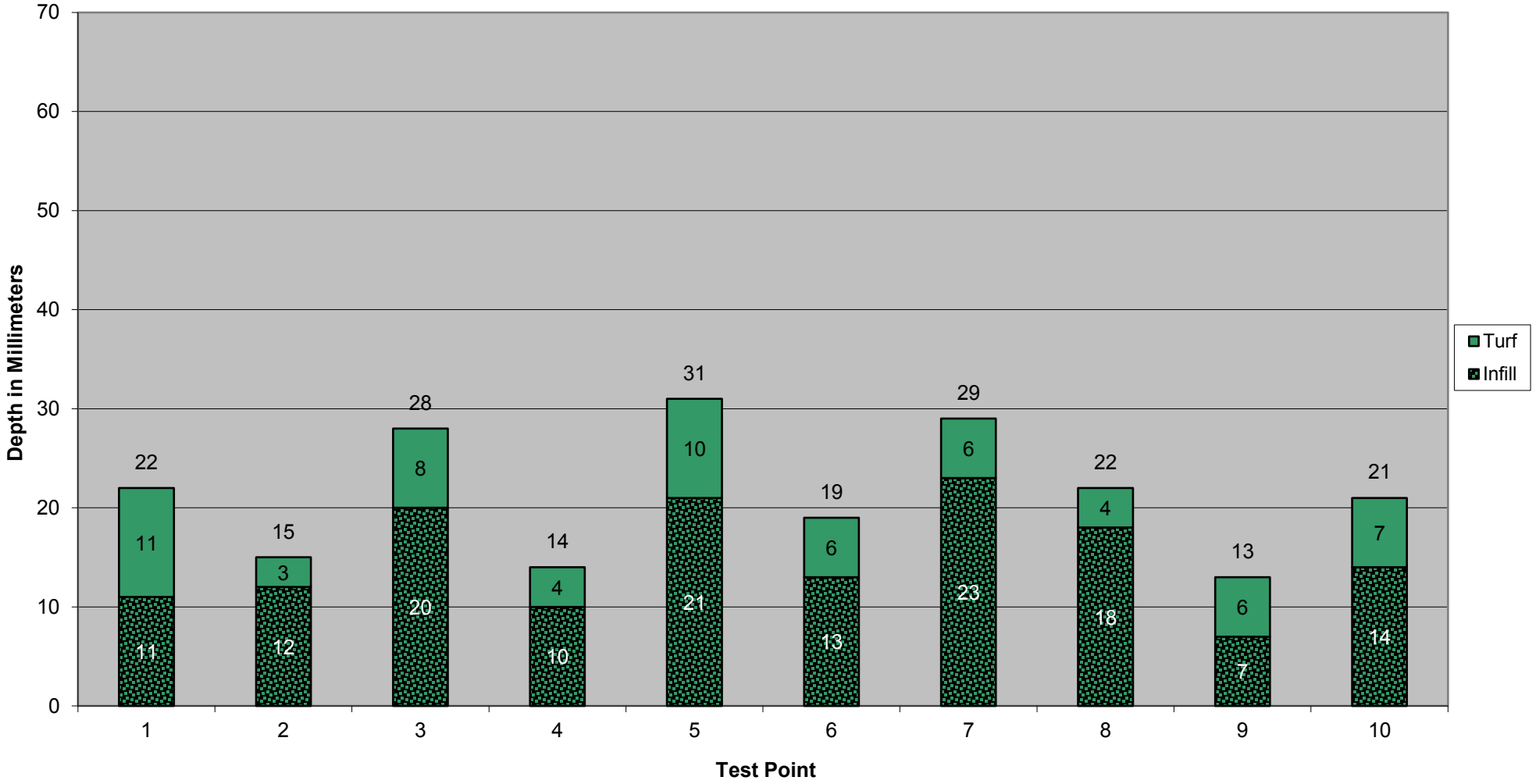
Crocker Amazon Playground - Pitch #2

Average *g*-max Levels

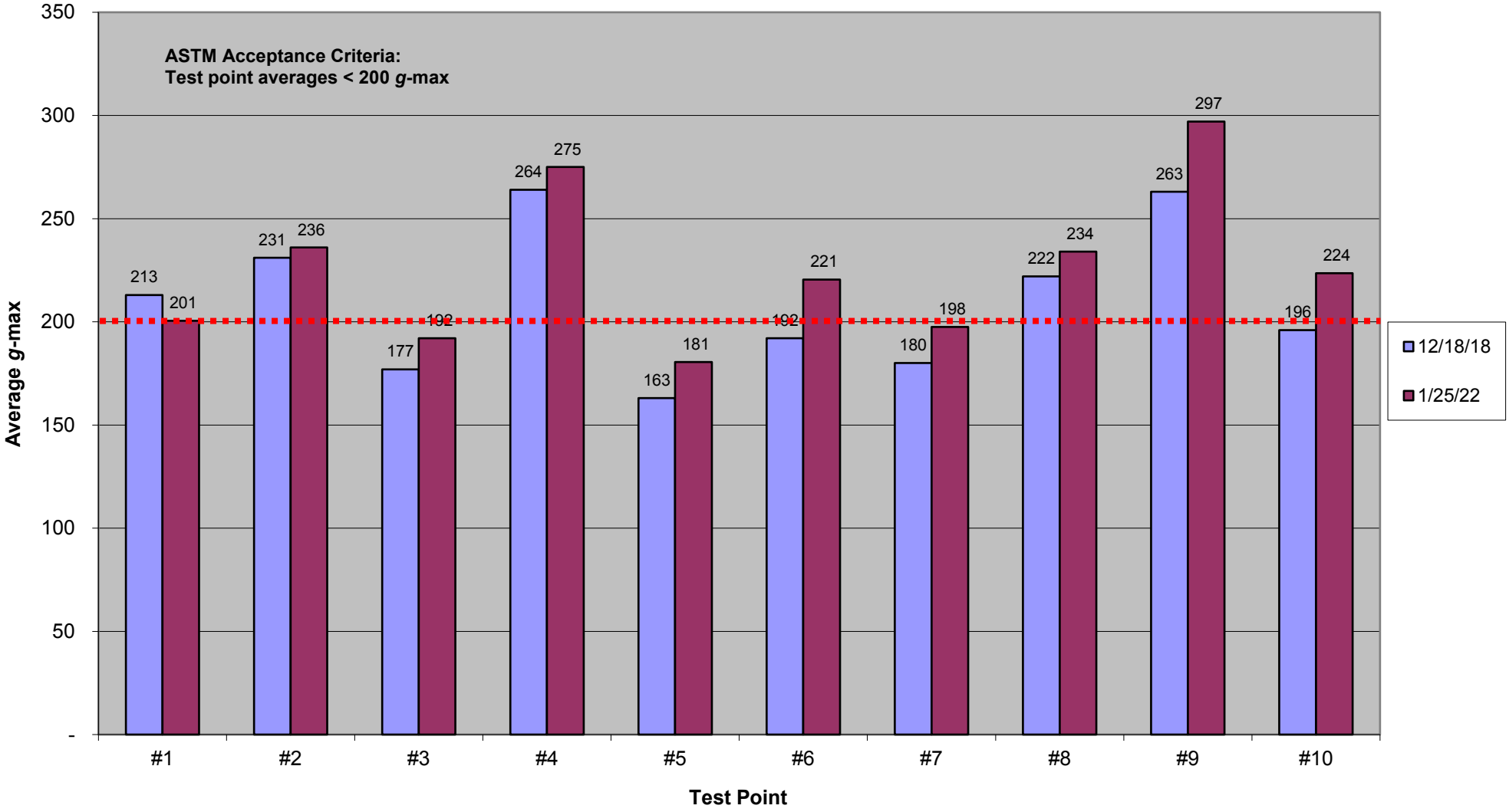


Crocker Amazon Playground - Pitch #2

Test Point Profiles

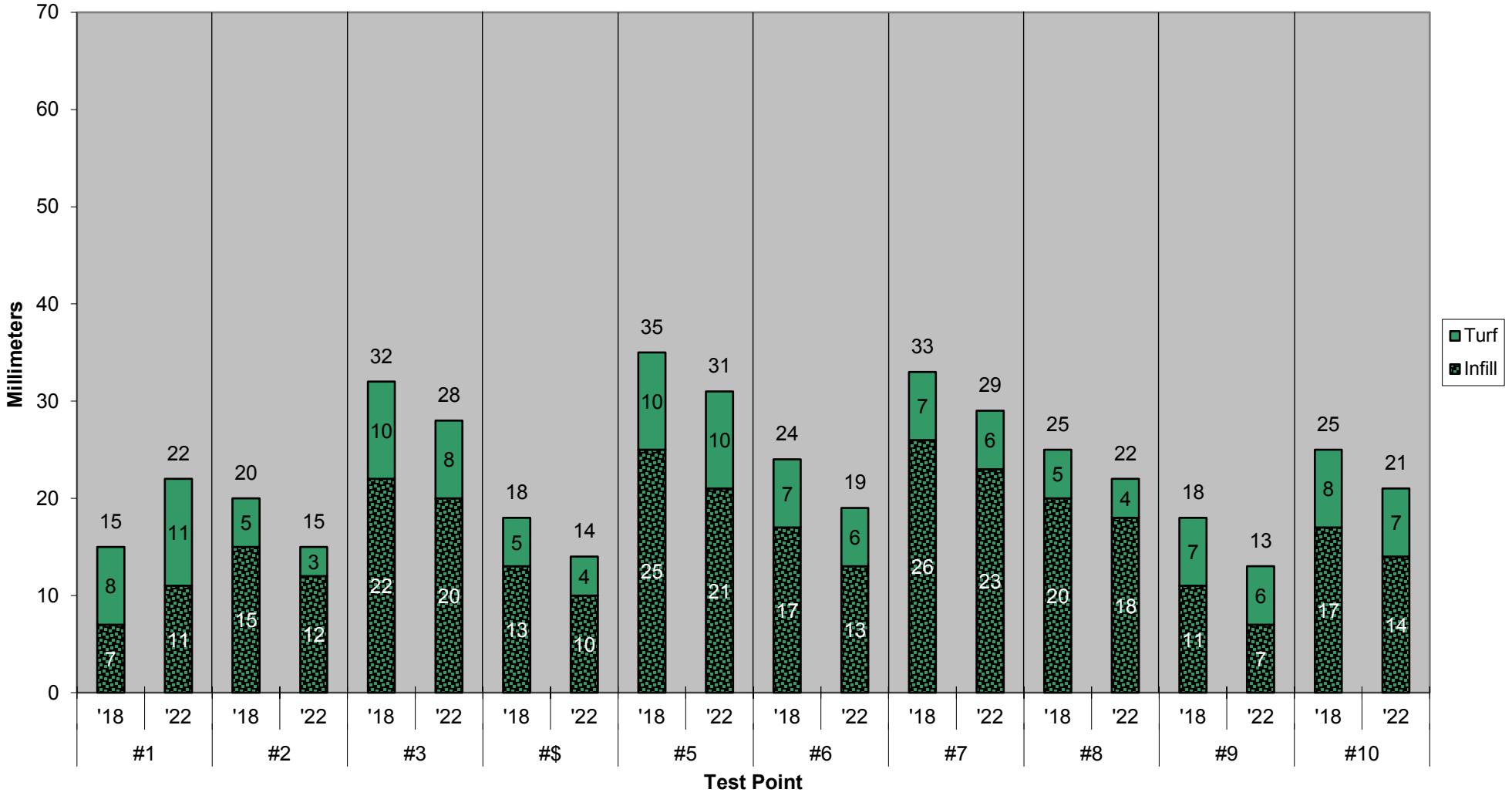


Crocker Amazon Playground - Pitch #2
Comparison of Past and Present g-max Values



Crocker Amazon Playground - Pitch #2

Comparison of Past and Present Surface Profile Data



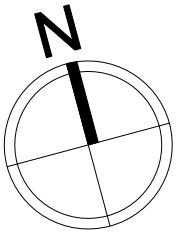
Test Point Reference Guide

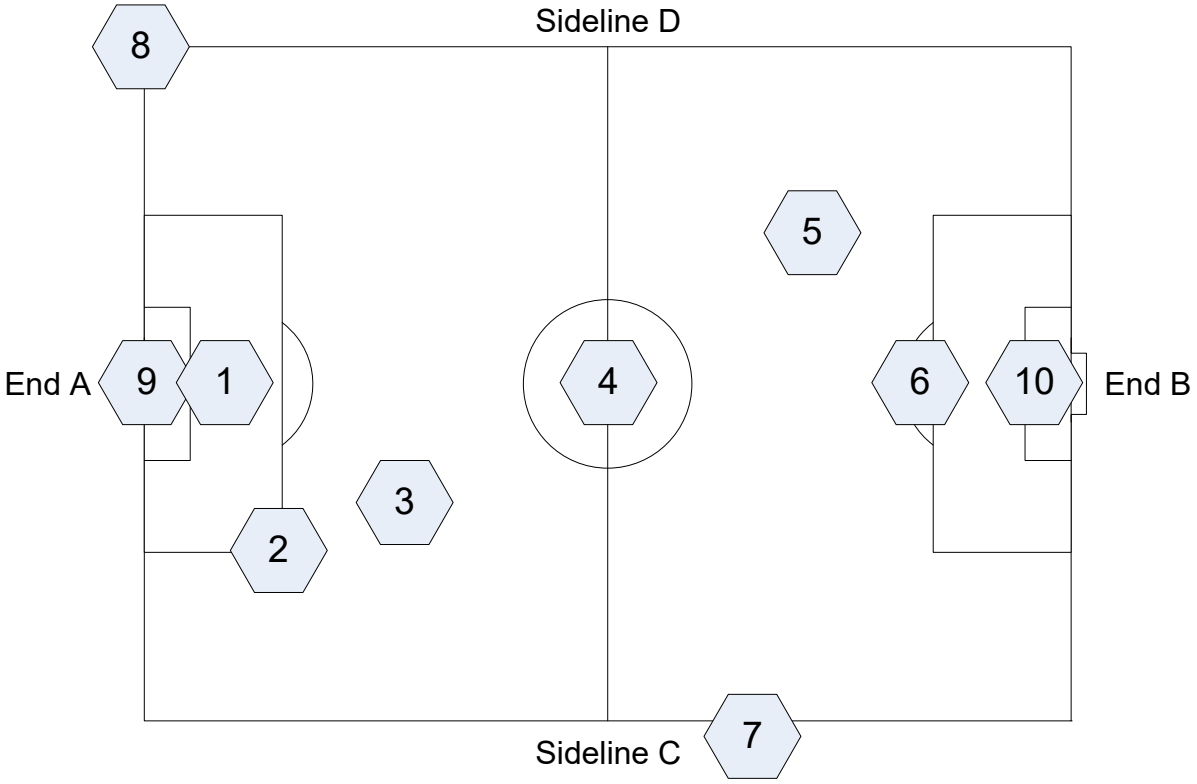
Job Number: 22-001b

Client: San Francisco Recreation and Park Department

Field: Crocker Amazon Playground – Pitch #2

Date Tested: 1/25/2022





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 – 65' 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 – 65' 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. Small soccer pitches not shown.

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Impact Test Data

Field Location: **Crocker Amazon Playground - Pitch #3**
Date(s) of Test: **1/26/2022**

Field Description and Condition:
Field Layout: Soccer and lacrosse
Surface Type: Infilled synthetic turf
Manufacturer: Shaw Sportexe
Date Installed: Unk.
Condition: Mostly clean; damp
Orientation: End A is WNW

Test Method/Specification: ASTM F1936-19
Standard Specification for Impact Attenuation of Turf Playing Systems as Measured in the Field

Weather Conditions
General: Some haze; light breeze
Temp. (F): 52 °F (avg.)
Humidity: 71% Relative

Primary Contact:
Name Raina Celnik
Phone # (415) 290-0307

Test Performed By:
Parker Wood, Sports Turf Solutions

Summary of Test Results

Location	Vo (m/s)	h (m)	Avg *g*-max	HIC	Temperatures				Depths		
					Air (°C)	Air (°F)	Turf (°C)	Turf (°F)	Pile (mm)	Infill (mm)	Turf (mm)
Test Point 1	3.49	0.62	**210**	796.0	11.0	52	12.3	54	26	15	11
Test Point 2	3.49	0.62	**210**	762.0	11.2	52	12.0	54	22	15	7
Test Point 3	3.48	0.62	**191**	677.0	11.6	53	12.3	54	27	19	8
Test Point 4	3.49	0.62	**246**	900.5	11.8	53	12.0	54	16	12	4
Test Point 5	3.48	0.62	**163**	510.0	11.3	52	11.0	52	31	23	8
Test Point 6	3.48	0.62	**220**	787.5	10.7	51	10.0	50	22	17	5
Test Point 7	3.47	0.61	**162**	552.5	11.0	52	13.0	55	36	28	8
Test Point 8	3.49	0.62	**234**	841.5	11.2	52	12.0	54	21	17	4
Test Point 9	3.46	0.61	**249**	910.0	10.9	52	12.5	55	18	11	7
Test Point 10	3.48	0.62	**191**	645.0	10.3	51	9.0	48	29	22	7

Range of *g*-max averages:	
Highest avg.	249
Lowest avg.	162
Overall avg.	207

Exceptions / Comments:

Section 8.3 of ASTM Specification F1936-19 was modified for use on a previously tested field lined for soccer. Test points #7 and #8 were selected in accordance with current ASTM guidelines. No site abnormalities were noted, and there were no deviations from standard test procedures. All tests met data integrity requirements. Significant fibrillation and shedding were noted. Lots of infill was visible on the surface of the field. Some sections of turf have been replaced. Test point #1 was on replacement turf.

Impact Test Data

Field Location: **Crocker Amazon Playground - Pitch #3**
Date(s) of Test: **1/26/2022**

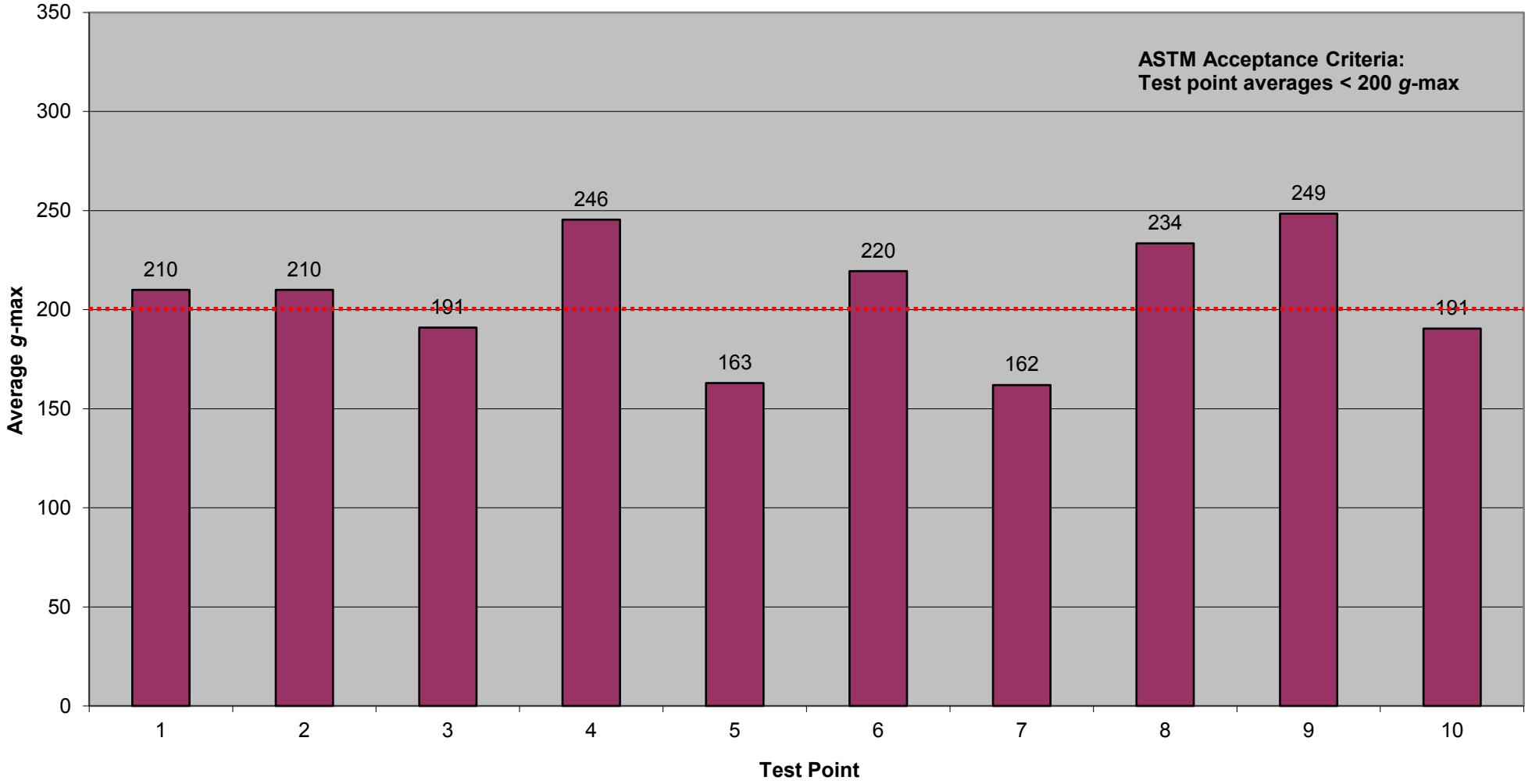
Detailed Test Results

Location	Drop #	Vo (m/s)	h (m)	***g*-max**	HIC	Temperatures				Depths		
						Air (°C)	Air (°F)	Turf (°C)	Turf (°F)	Pile (mm)	Infill (mm)	Turf (mm)
Test Point 1	1	3.48	0.62	184	647							
Penalty kick line,	2	3.49	0.62	208	784							
End A, on center	3	3.49	0.62	212	808							
line (CL)	Avg 2&3	3.49	0.62	**210**	796	11.0	52	12.3	54	26	15	11
Test Point 2	1	3.49	0.62	188	636							
P-box cornr, btwn	2	3.49	0.62	207	749							
End A & mid field,	3	3.48	0.62	213	775							
Side C	Avg 2&3	3.49	0.62	**210**	762	11.2	52	12.0	54	22	15	7
Test Point 3	1	3.48	0.62	173	572							
60' from mid-field	2	3.48	0.62	189	668							
to End A, 40' from	3	3.48	0.62	193	686							
CL to Side C	Avg 2&3	3.48	0.62	**191**	677	11.6	53	12.3	54	27	19	8
Test Point 4	1	3.48	0.62	246	894							
Center of the field	2	3.49	0.62	247	910							
	3	3.48	0.62	244	891							
	Avg 2&3	3.49	0.62	**246**	901	11.8	53	12.0	54	16	12	4
Test Point 5	1	3.47	0.61	148	441							
60' from mid-field	2	3.48	0.62	162	505							
to end B, 63' from	3	3.48	0.62	164	515							
CL to Side D	Avg 2&3	3.48	0.62	**163**	510	11.3	52	11.0	52	31	23	8
Test Point 6	1	3.48	0.62	203	699							
6' from top of R-Arc	2	3.47	0.61	218	780							
to top of P-Box,	3	3.48	0.62	221	795							
End B, on CL	Avg 2&3	3.48	0.62	**220**	788	10.7	51	10.0	50	22	17	5
Test Point 7	1	3.47	0.61	149	482							
50' from mid-field	2	3.47	0.61	161	544							
to End B, 5' out-	3	3.47	0.61	163	561							
side Side C	Avg 2&3	3.47	0.61	**162**	553	11.0	52	13.0	55	36	28	8
Test Point 8	1	3.49	0.62	224	794							
Corner of the field	2	3.49	0.62	236	861							
at End A and Side	3	3.49	0.62	231	822							
D	Avg 2&3	3.49	0.62	**234**	842	11.2	52	12.0	54	21	17	4
Test Point 9	1	3.46	0.61	225	777							
3' in front of Goal	2	3.46	0.61	246	897							
Line, End A, on	3	3.46	0.61	251	923							
CL	Avg 2&3	3.46	0.61	**249**	910	10.9	52	12.5	55	18	11	7
Test Point 10	1	3.49	0.62	174	559							
15' in front of Goal	2	3.48	0.62	189	640							
Line, End B, on	3	3.48	0.62	192	650							
CL	Avg 2&3	3.48	0.62	**191**	645	10.3	51	9.0	48	29	22	7

Note: Accelerometer last calibrated on 1/26/21. Recalibration due by 1/26/23. The calibration certificate is on file at Sports Turf Solutions. Copies are available upon request.

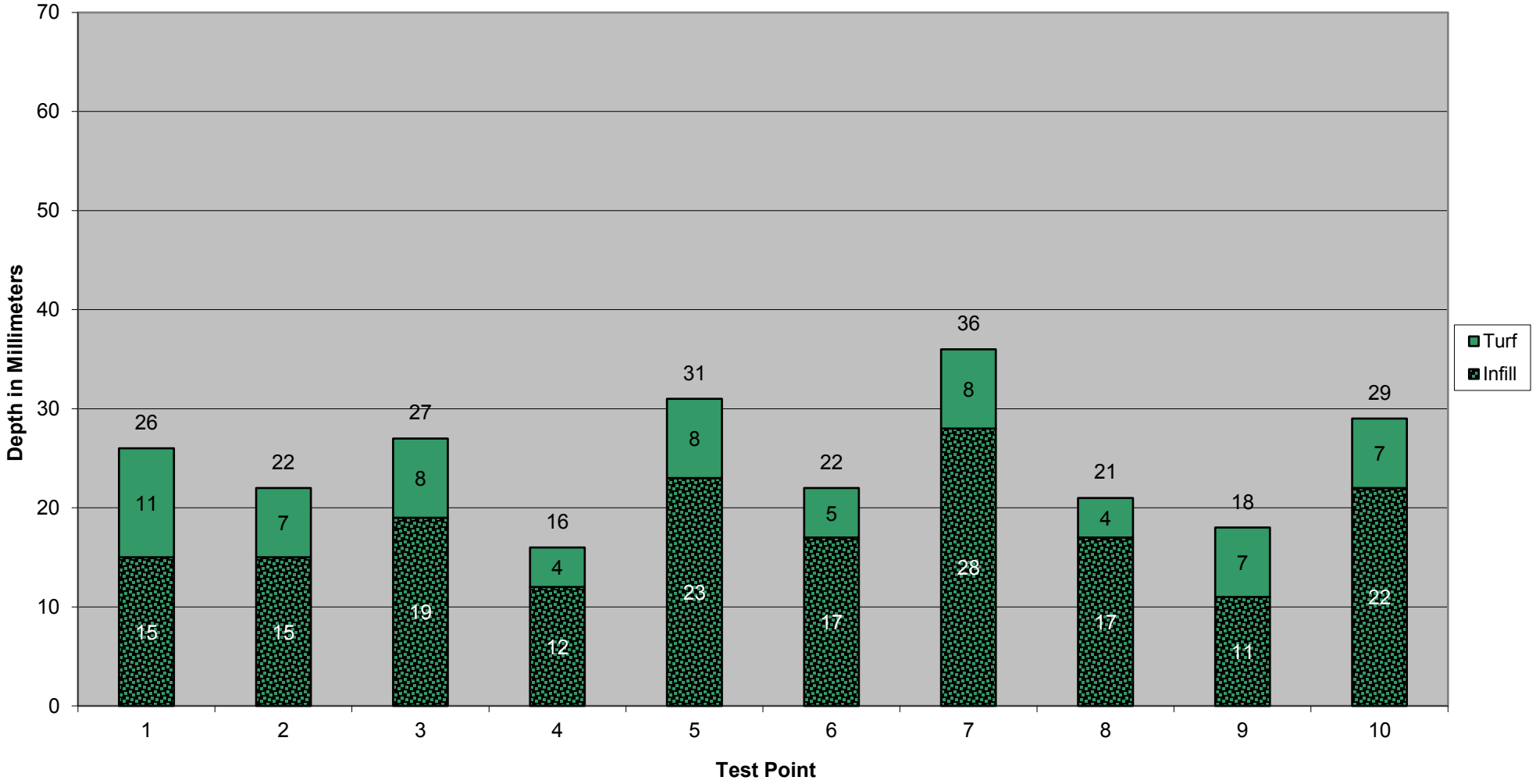
Crocker Amazon Playground - Pitch #3

Average *g*-max Levels



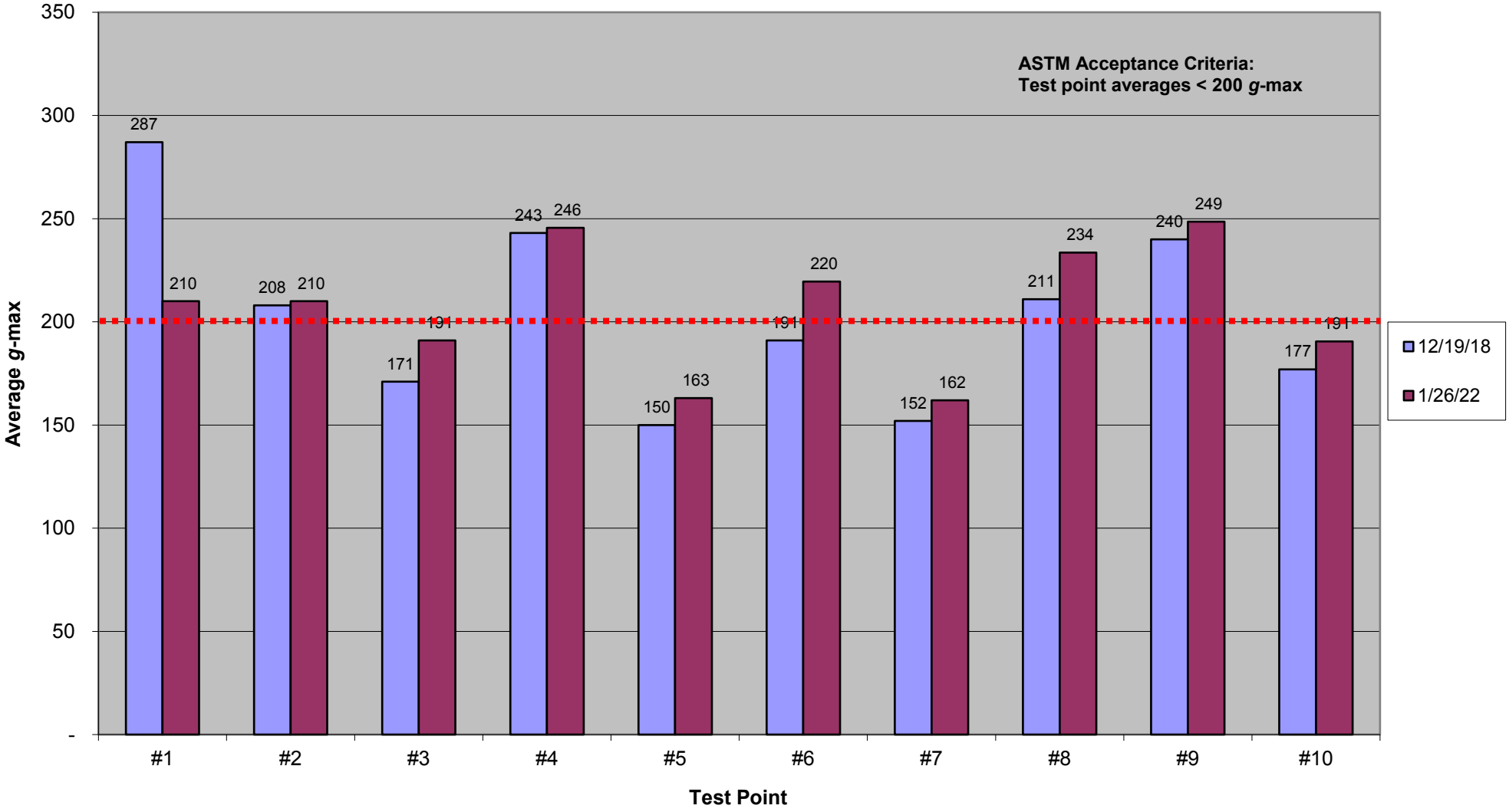
Crocker Amazon Playground - Pitch #3

Test Point Profiles



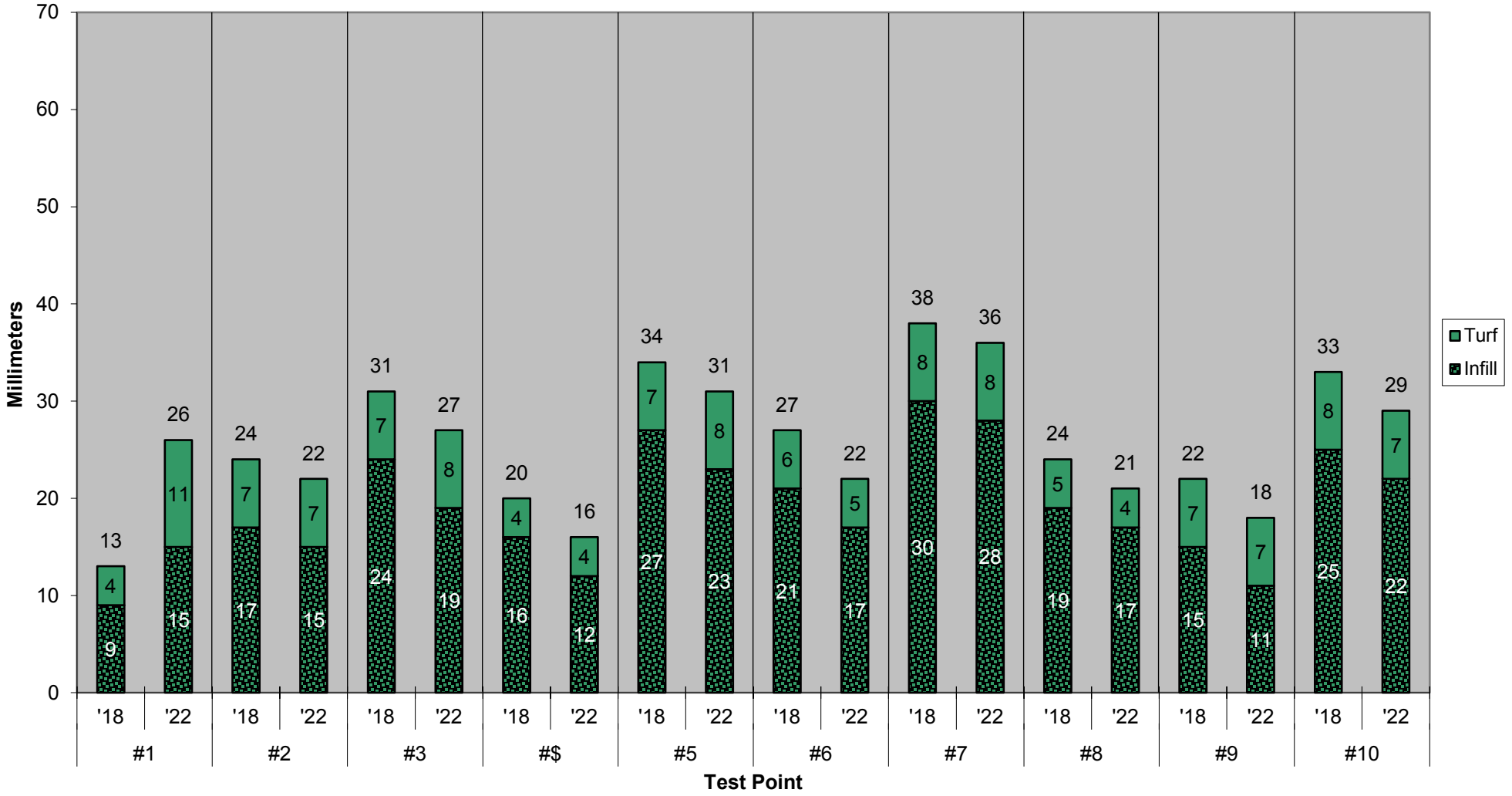
Crocker Amazon Playground - Pitch #3

Comparison of Past and Present g-max Values



Crocker Amazon Playground - Pitch #3

Comparison of Past and Present Surface Profile Data



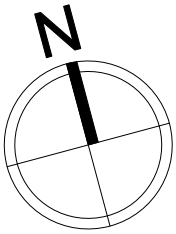
Test Point Reference Guide

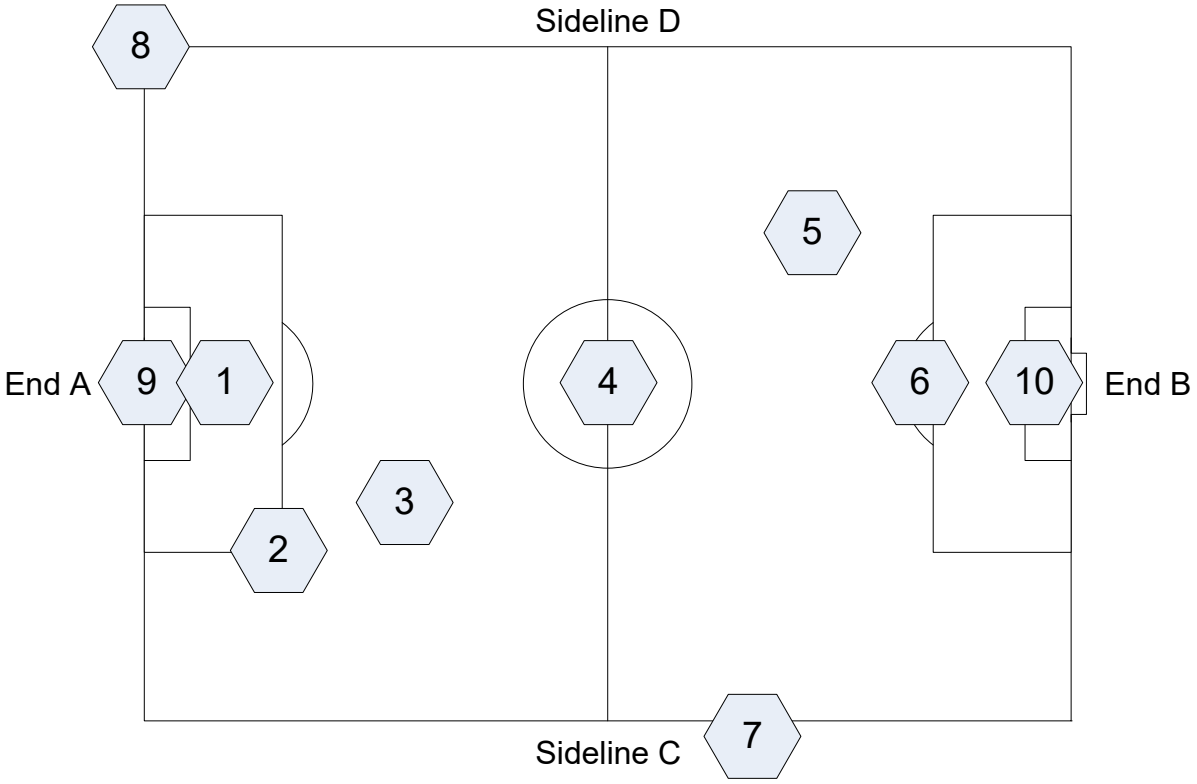
Job Number: 22-001c

Client: San Francisco Recreation and Park Department

Field: Crocker Amazon Playground – Pitch #3

Date Tested: 1/26/2022





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 – 60' 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 – 60' 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 field lines not shown.

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Impact Test Data

Field Location: **Crocker Amazon Playground - Pitch #4**
Date(s) of Test: **1/26/2022**

Field Description and Condition:
Field Layout: Soccer and lacrosse
Surface Type: Infilled synthetic turf
Manufacturer: Shaw Sportexe
Date Installed: Unk.
Condition: Mostly clean; dry
Orientation: End A is WNW

Test Method/Specification: ASTM F1936-19
Standard Specification for Impact Attenuation of Turf Playing Systems as Measured in the Field

Weather Conditions
General: Some overcast; light breez
Temp. (F): 55 °F (avg.)
Humidity: 58% Relative

Primary Contact:
Name Raina Celnik
Phone # (415) 290-0307

Test Performed By:
Parker Wood, Sports Turf Solutions

Summary of Test Results

Location	Vo (m/s)	h (m)	Avg *g*-max	HIC	Temperatures				Depths		
					Air (°C)	Air (°F)	Turf (°C)	Turf (°F)	Pile (mm)	Infill (mm)	Turf (mm)
Test Point 1	3.49	0.62	215	833.0	13.7	57	15.0	59	24	13	11
Test Point 2	3.48	0.62	257	1003.0	13.4	56	9.9	50	20	15	5
Test Point 3	3.48	0.62	199	706.0	12.8	55	12.3	54	28	20	8
Test Point 4	3.49	0.62	258	1037.0	12.8	55	16.5	62	16	11	5
Test Point 5	3.47	0.61	169	582.0	13.5	56	16.1	61	33	24	9
Test Point 6	3.47	0.61	229	901.0	13.5	56	11.8	53	23	17	6
Test Point 7	3.47	0.61	192	687.5	11.8	53	8.0	46	36	29	7
Test Point 8	3.50	0.62	238	957.0	12.9	55	15.4	60	23	20	3
Test Point 9	3.47	0.61	277	1127.0	13.5	56	16.0	61	21	13	8
Test Point 10	3.48	0.62	211	796.5	12.6	55	8.5	47	31	23	8

Range of *g*-max averages:	
Highest avg.	277
Lowest avg.	169
Overall avg.	224

Exceptions / Comments:

Section 8.3 of ASTM Specification F1936-19 was modified for use on a previously tested field lined for soccer. Test points #7 and #8 were selected in accordance with current ASTM guidelines. No site abnormalities were noted, and there were no deviations from standard test procedures. All tests met data integrity requirements. Significant fibrillation and shedding were noted. Lots of infill was visible on the surface of the field. Some sections of turf have been replaced. Test Point #1 was on replacement turf..

Impact Test Data

Field Location: **Crocker Amazon Playground - Pitch #4**
Date(s) of Test: **1/26/2022**

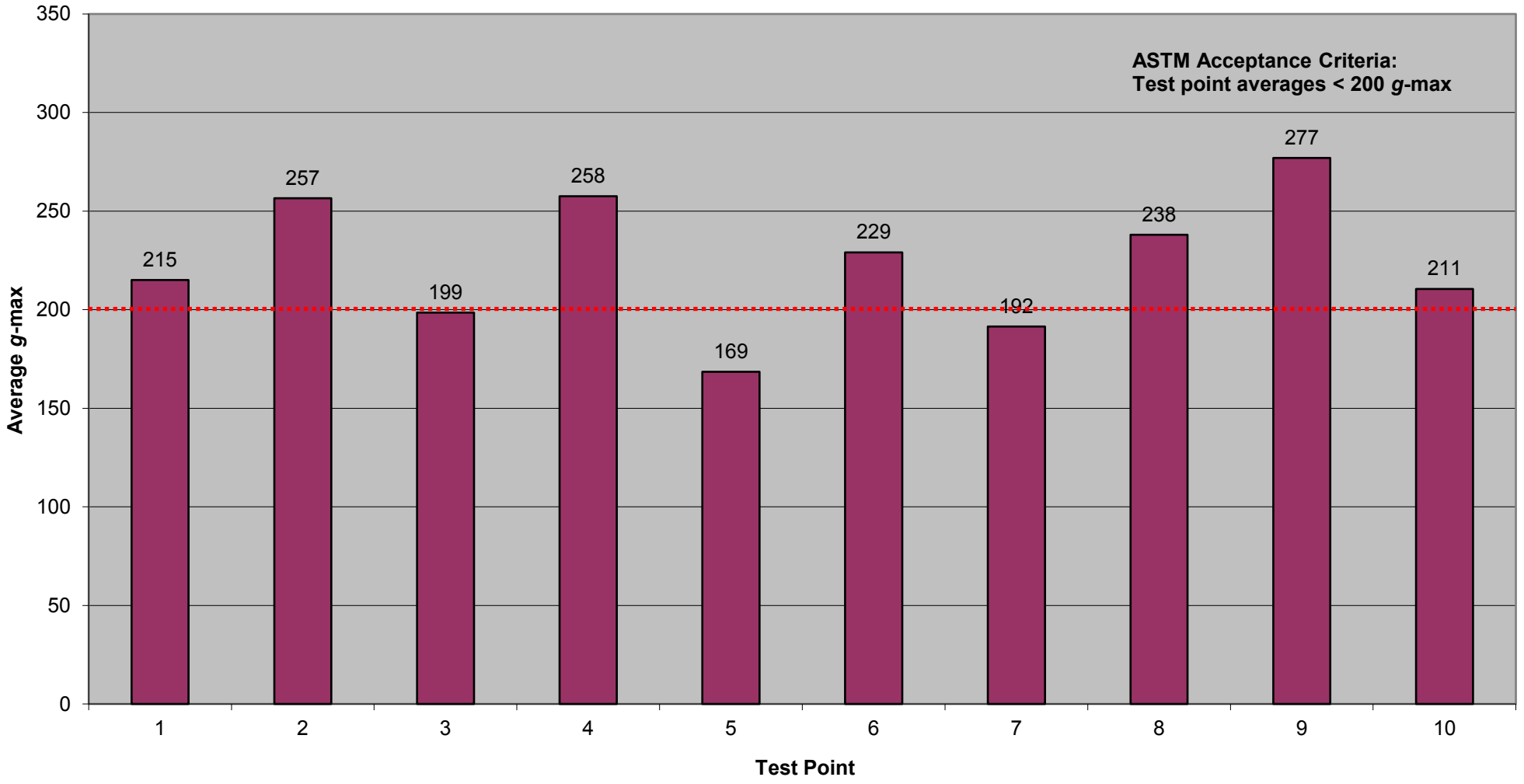
Detailed Test Results

Location	Drop #	Vo (m/s)	h (m)	***g*-max**	HIC	Temperatures				Depths		
						Air (°C)	Air (°F)	Turf (°C)	Turf (°F)	Pile (mm)	Infill (mm)	Turf (mm)
Test Point 1	1	3.48	0.62	195	703							
Penalty kick line,	2	3.49	0.62	216	837							
End A, on center	3	3.49	0.62	214	829							
line (CL)	Avg 2&3	3.49	0.62	**215**	833	13.7	57	15.0	59	24	13	11
Test Point 2	1	3.48	0.62	232	841							
P-box cornr, btwn	2	3.48	0.62	253	982							
End A & mid field,	3	3.48	0.62	260	1024							
Side C	Avg 2&3	3.48	0.62	**257**	1003	13.4	56	9.9	50	20	15	5
Test Point 3	1	3.48	0.62	181	606							
60' from mid-field	2	3.47	0.61	197	698							
to End A, 40' from	3	3.48	0.62	200	714							
CL to Side C	Avg 2&3	3.48	0.62	**199**	706	12.8	55	12.3	54	28	20	8
Test Point 4	1	3.49	0.62	252	999							
Center of the field	2	3.49	0.62	258	1044							
	3	3.49	0.62	257	1030							
	Avg 2&3	3.49	0.62	**258**	1037	12.8	55	16.5	62	16	11	5
Test Point 5	1	3.47	0.61	152	489							
60' from mid-field	2	3.47	0.61	166	567							
to end B, 63' from	3	3.47	0.61	171	597							
CL to Side D	Avg 2&3	3.47	0.61	**169**	582	13.5	56	16.1	61	33	24	9
Test Point 6	1	3.47	0.61	209	777							
6' from top of R-Arc	2	3.47	0.61	229	902							
to top of P-Box,	3	3.47	0.61	229	900							
End B, on CL	Avg 2&3	3.47	0.61	**229**	901	13.5	56	11.8	53	23	17	6
Test Point 7	1	3.48	0.62	175	593							
50' from mid-field	2	3.47	0.61	190	676							
to End B, 5' out-	3	3.47	0.61	193	699							
side Side C	Avg 2&3	3.47	0.61	**192**	688	11.8	53	8.0	46	36	29	7
Test Point 8	1	3.49	0.62	217	828							
Corner of the field	2	3.50	0.62	237	953							
at End A and Side	3	3.49	0.62	239	961							
D	Avg 2&3	3.50	0.62	**238**	957	12.9	55	15.4	60	23	20	3
Test Point 9	1	3.47	0.61	253	975							
3' in front of Goal	2	3.47	0.61	271	1092							
Line, End A, on	3	3.47	0.61	283	1162							
CL	Avg 2&3	3.47	0.61	**277**	1127	13.5	56	16.0	61	21	13	8
Test Point 10	1	3.47	0.61	187	656							
15' in front of Goal	2	3.48	0.62	208	781							
Line, End B, on	3	3.48	0.62	213	812							
CL	Avg 2&3	3.48	0.62	**211**	797	12.6	55	8.5	47	31	23	8

Note: Accelerometer last calibrated on 1/26/21. Recalibration due by 1/26/23. The calibration certificate is on file at Sports Turf Solutions. Copies are available upon request.

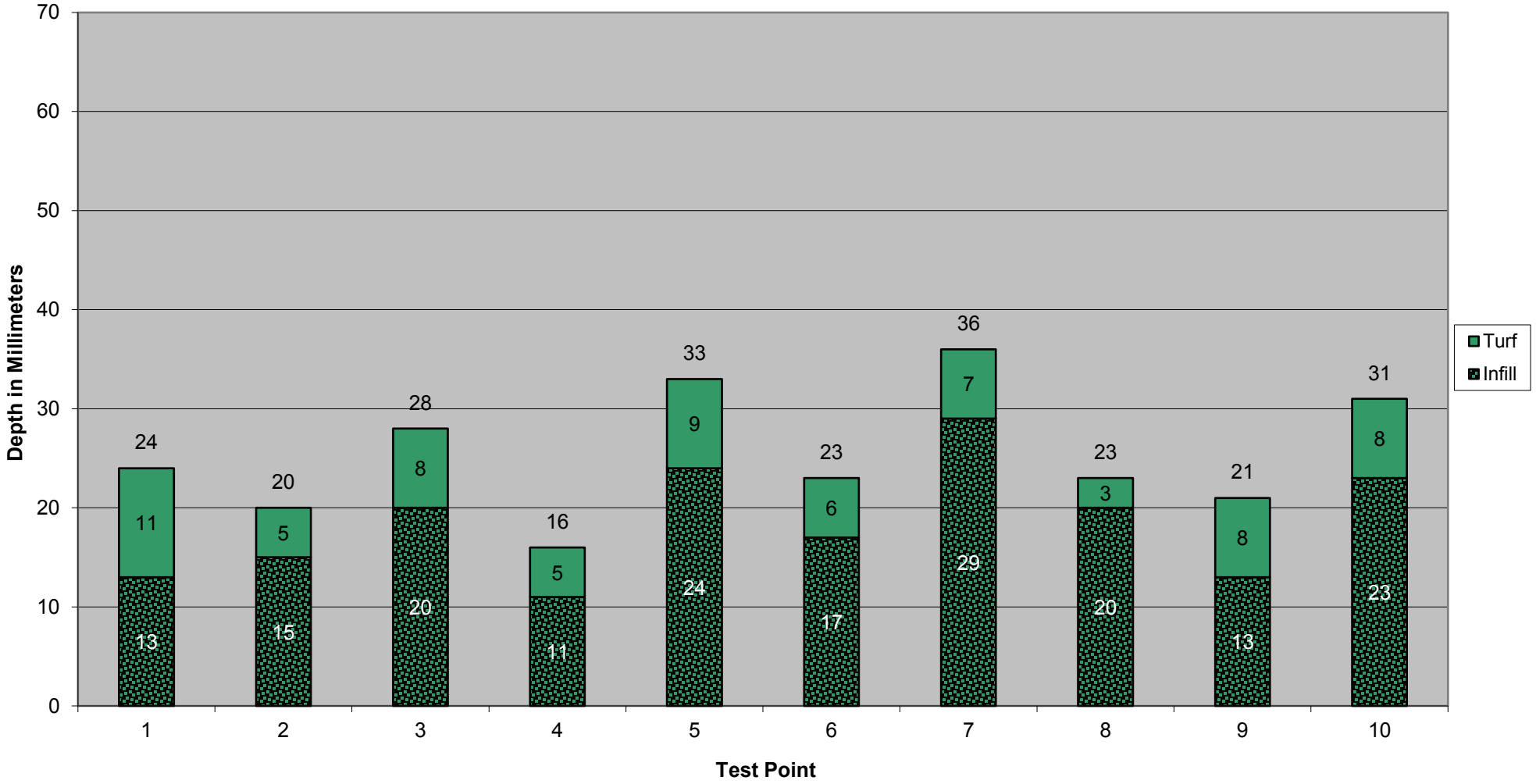
Crocker Amazon Playground - Pitch #4

Average *g*-max Levels



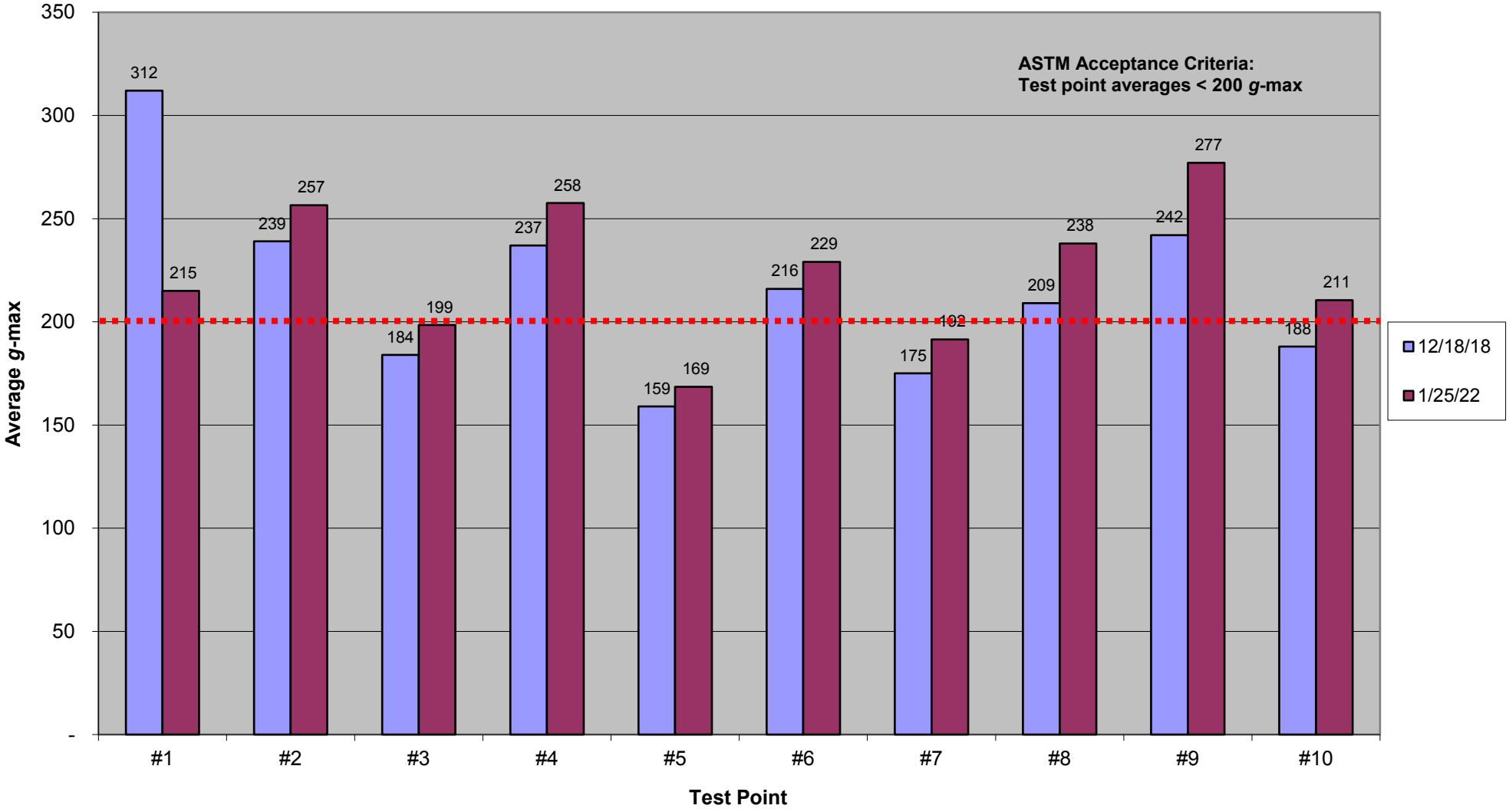
Crocker Amazon Playground - Pitch #4

Test Point Profiles



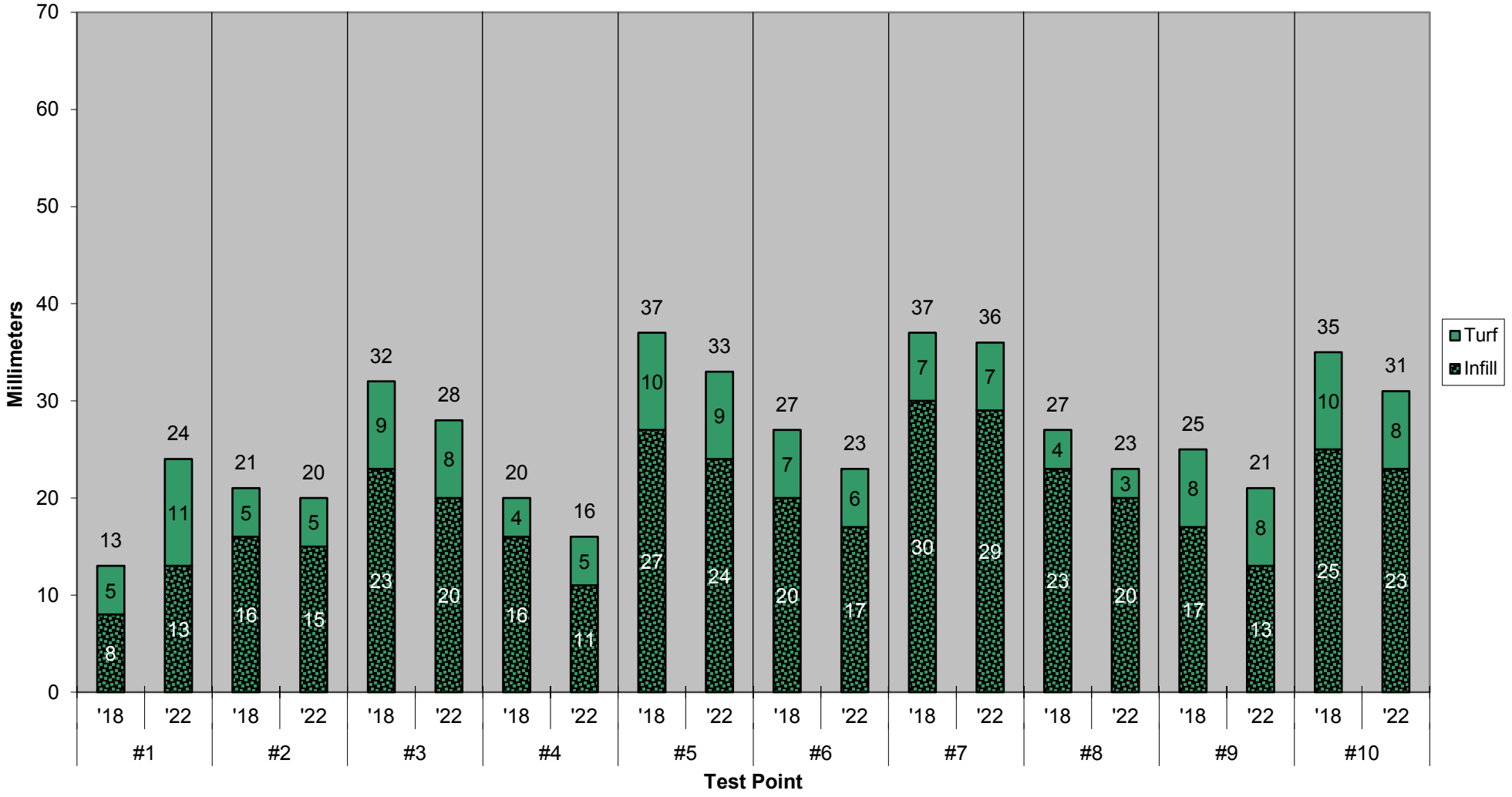
Crocker Amazon Playground - Pitch #4

Comparison of Past and Present g-max Values



Crocker Amazon Playground - Pitch #4

Comparison of Past and Present Surface Profile Data



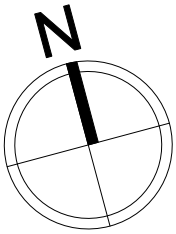
Test Point Reference Guide

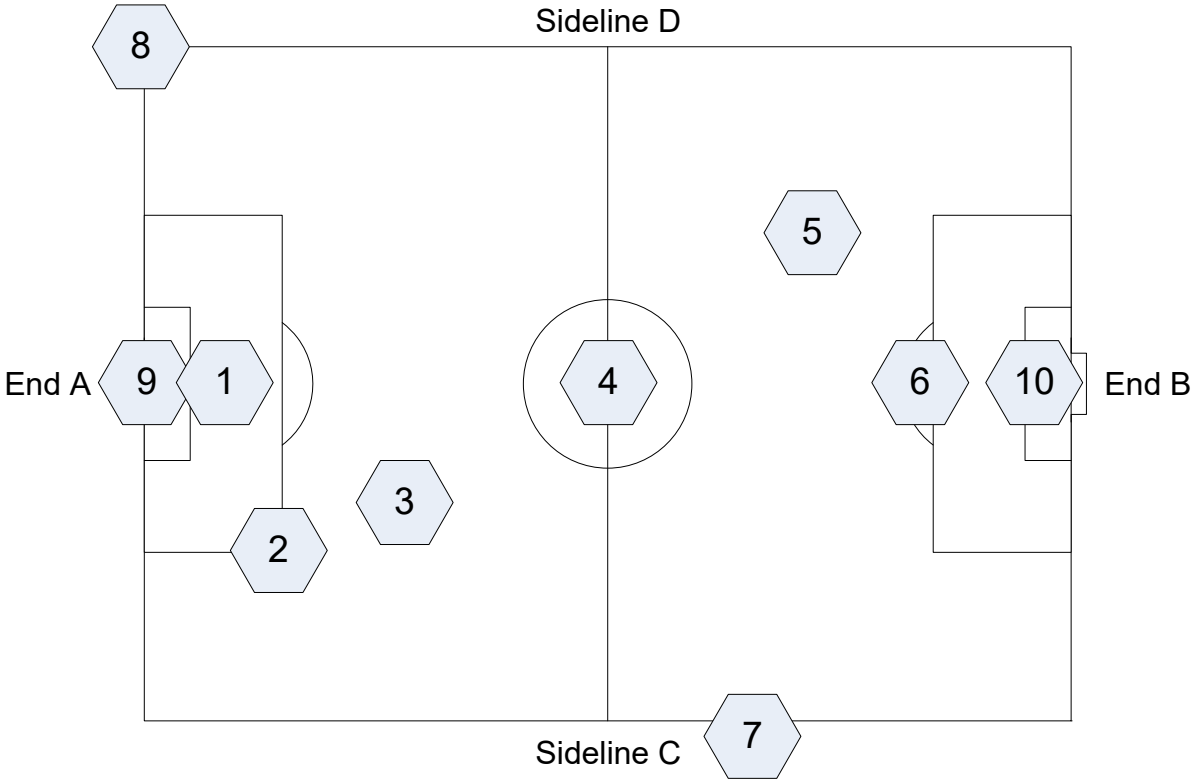
Job Number: 22-001d

Client: San Francisco Recreation and Park Department

Field: Crocker Amazon Playground – Pitch #4

Date Tested: 1/26/2022





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 – 60' 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 – 60' 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. Lines for lacrosse field not shown.

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Impact Test Data

Field Location: **Crocker Amazon Playground - Pitch #5**
Date(s) of Test: **1/27/2022**

Field Description and Condition:
Field Layout: Soccer
Surface Type: Infilled synthetic turf
Manufacturer: Shaw Sportexe
Date Installed: Unk.
Condition: Mostly clean; damp
Orientation: End A is NNE

Test Method/Specification: ASTM F1936-19
Standard Specification for Impact Attenuation of Turf Playing Systems as Measured in the Field

Weather Conditions
General: Clear; light breeze
Temp. (F): 47 °F (avg.)
Humidity: 95% Relative

Primary Contact:
Name Raina Celnik
Phone # (415) 290-0307

Test Performed By:
Parker Wood, Sports Turf Solutions

Summary of Test Results

Location	Vo (m/s)	h (m)	Avg *g*-max	HIC	Temperatures				Depths		
					Air (°C)	Air (°F)	Turf (°C)	Turf (°F)	Pile (mm)	Infill (mm)	Turf (mm)
Test Point 1	3.47	0.61	**191**	661.5	7.8	46	8.4	47	24	16	8
Test Point 2	3.50	0.62	**223**	723.5	9.7	49	8.7	48	20	15	5
Test Point 3	3.47	0.61	**196**	719.5	10.0	50	8.7	48	31	24	7
Test Point 4	3.49	0.62	**304**	1142.0	10.2	50	8.9	48	13	9	4
Test Point 5	3.47	0.61	**176**	615.0	8.0	46	8.4	47	32	25	7
Test Point 6	3.48	0.62	**194**	686.0	7.8	46	7.2	45	28	21	7
Test Point 7	3.47	0.61	**205**	775.5	9.2	49	7.8	46	30	23	7
Test Point 8	3.49	0.62	**220**	808.0	7.1	45	8.0	46	21	17	4
Test Point 9	3.48	0.62	**291**	1159.0	7.6	46	8.0	46	15	9	6
Test Point 10	3.50	0.62	**207**	735.5	7.9	46	6.3	43	26	19	7

Range of *g*-max averages:	
Highest avg.	304
Lowest avg.	176
Overall avg.	220

Exceptions / Comments:

Section 8.3 of ASTM Specification F1936-19 was modified for use on a previously tested field lined for soccer. Test points #7 and #8 were selected in accordance with current ASTM guidelines. No site abnormalities were noted, and there were no deviations from standard test procedures. All tests met data integrity requirements. Significant fibrillation and shedding were noted. Some infill was visible on the surface of the field. Some sections of turf have been replaced. Test point #1 was on replacement turf.

Impact Test Data

Field Location: **Crocker Amazon Playground - Pitch #5**
Date(s) of Test: **1/27/2022**

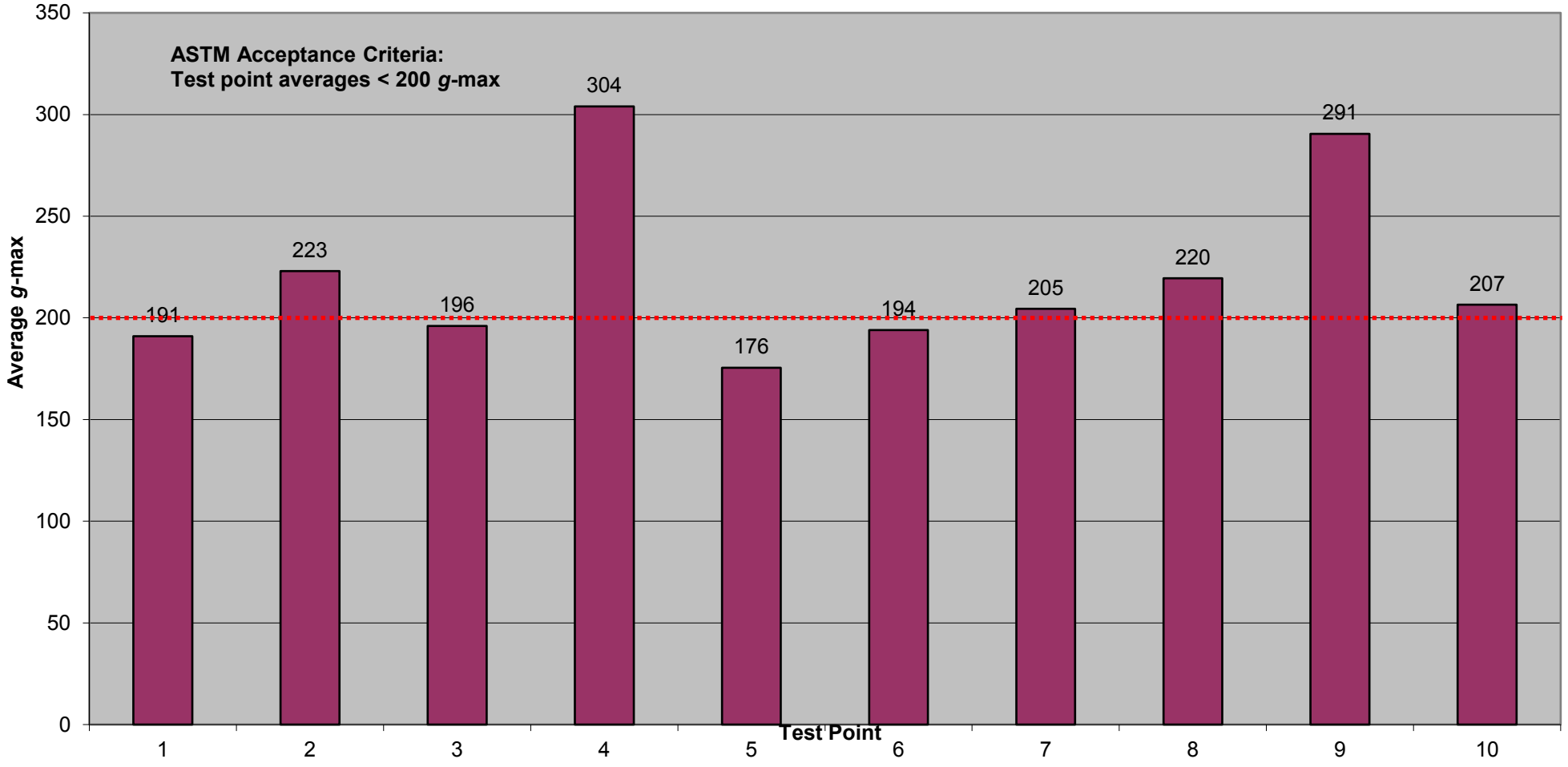
Detailed Test Results

Location	Drop #	Vo (m/s)	h (m)	***g*-max**	HIC	Temperatures				Depths		
						Air (°C)	Air (°F)	Turf (°C)	Turf (°F)	Pile (mm)	Infill (mm)	Turf (mm)
Test Point 1	1	3.47	0.61	180	600							
Penalty kick line,	2	3.47	0.61	189	651							
End A, on center	3	3.47	0.61	193	672							
line (CL)	Avg 2&3	3.47	0.61	**191**	662	7.8	46	8.4	47	24	16	8
Test Point 2	1	3.49	0.62	200	630							
P-box cornr, btwn	2	3.50	0.62	218	703							
End A & mid field,	3	3.50	0.62	228	744							
Side C	Avg 2&3	3.50	0.62	**223**	724	9.7	49	8.7	48	20	15	5
Test Point 3	1	3.47	0.61	174	585							
50' from mid-field	2	3.47	0.61	193	701							
to End A, 40' from	3	3.47	0.61	199	738							
CL to Side C	Avg 2&3	3.47	0.61	**196**	720	10.0	50	8.7	48	31	24	7
Test Point 4	1	3.48	0.62	283	1043							
Center of the field	2	3.49	0.62	303	1139							
	3	3.49	0.62	305	1145							
	Avg 2&3	3.49	0.62	**304**	1142	10.2	50	8.9	48	13	9	4
Test Point 5	1	3.47	0.61	162	538							
50' from mid-field	2	3.47	0.61	175	611							
to end B, 63' from	3	3.47	0.61	176	619							
CL to Side D	Avg 2&3	3.47	0.61	**176**	615	8.0	46	8.4	47	32	25	7
Test Point 6	1	3.47	0.61	176	589							
6' from top of R-Arc	2	3.48	0.62	192	674							
to top of P-Box,	3	3.47	0.61	196	698							
End B, on CL	Avg 2&3	3.48	0.62	**194**	686	7.8	46	7.2	45	28	21	7
Test Point 7	1	3.47	0.61	191	697							
50' from mid-field	2	3.47	0.61	202	762							
to End B, 5' out-	3	3.47	0.61	207	789							
side Side C	Avg 2&3	3.47	0.61	**205**	776	9.2	49	7.8	46	30	23	7
Test Point 8	1	3.50	0.62	208	731							
Corner of the field	2	3.49	0.62	219	806							
at End A and Side	3	3.49	0.62	220	810							
D	Avg 2&3	3.49	0.62	**220**	808	7.1	45	8.0	46	21	17	4
Test Point 9	1	3.47	0.61	266	1008							
3' in front of Goal	2	3.48	0.62	298	1206							
Line, End A, on	3	3.47	0.61	283	1112							
CL	Avg 2&3	3.48	0.62	**291**	1159	7.6	46	8.0	46	15	9	6
Test Point 10	1	3.47	0.61	185	615							
15' in front of Goal	2	3.50	0.62	203	714							
Line, End B, on	3	3.49	0.62	210	757							
CL	Avg 2&3	3.50	0.62	**207**	736	7.9	46	6.3	43	26	19	7

Note: Accelerometer last calibrated on 1/26/21. Recalibration due by 1/26/23. The calibration certificate is on file at Sports Turf Solutions. Copies are available upon request.

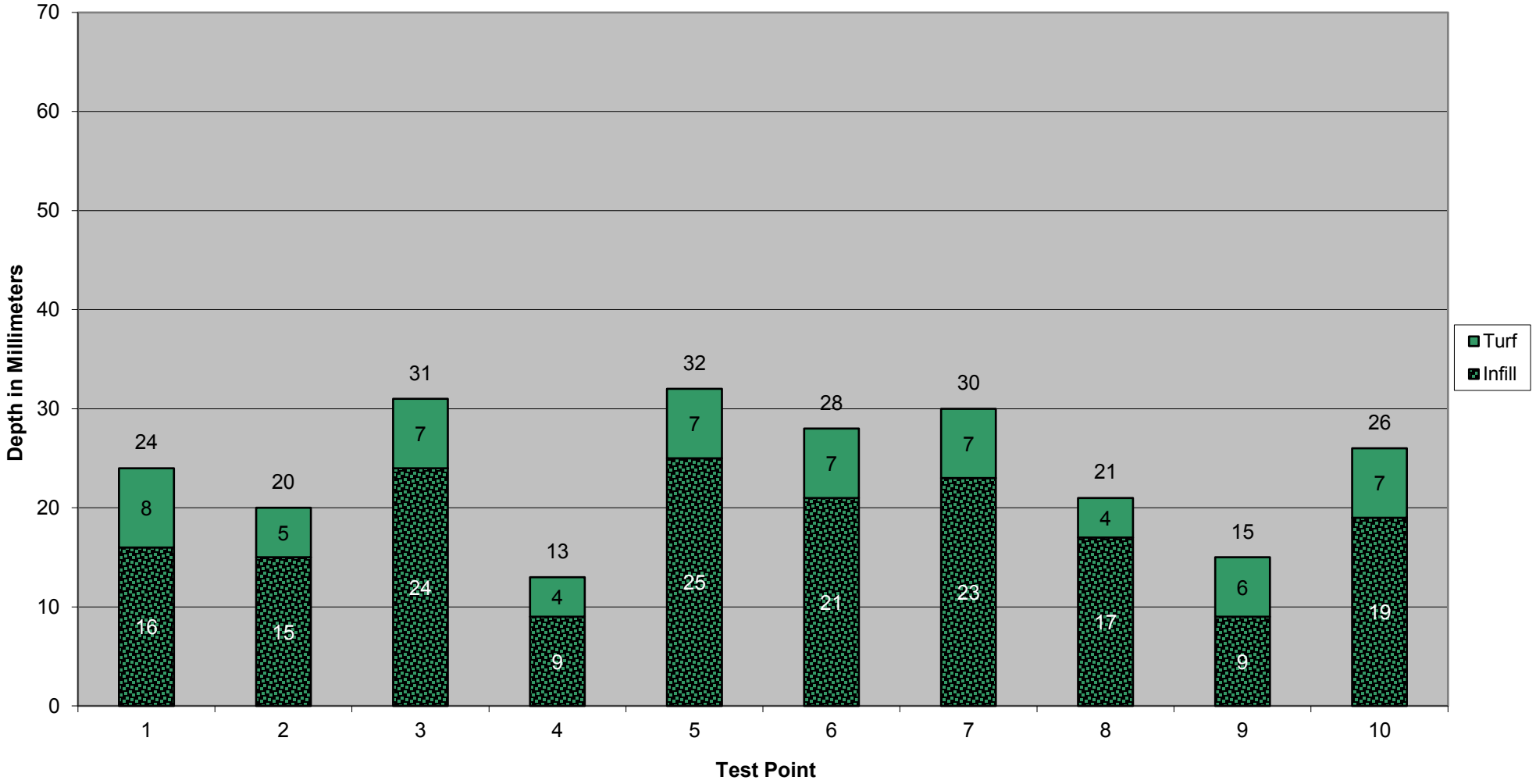
Crocker Amazon Playground - Pitch #5

Average *g*-max Levels



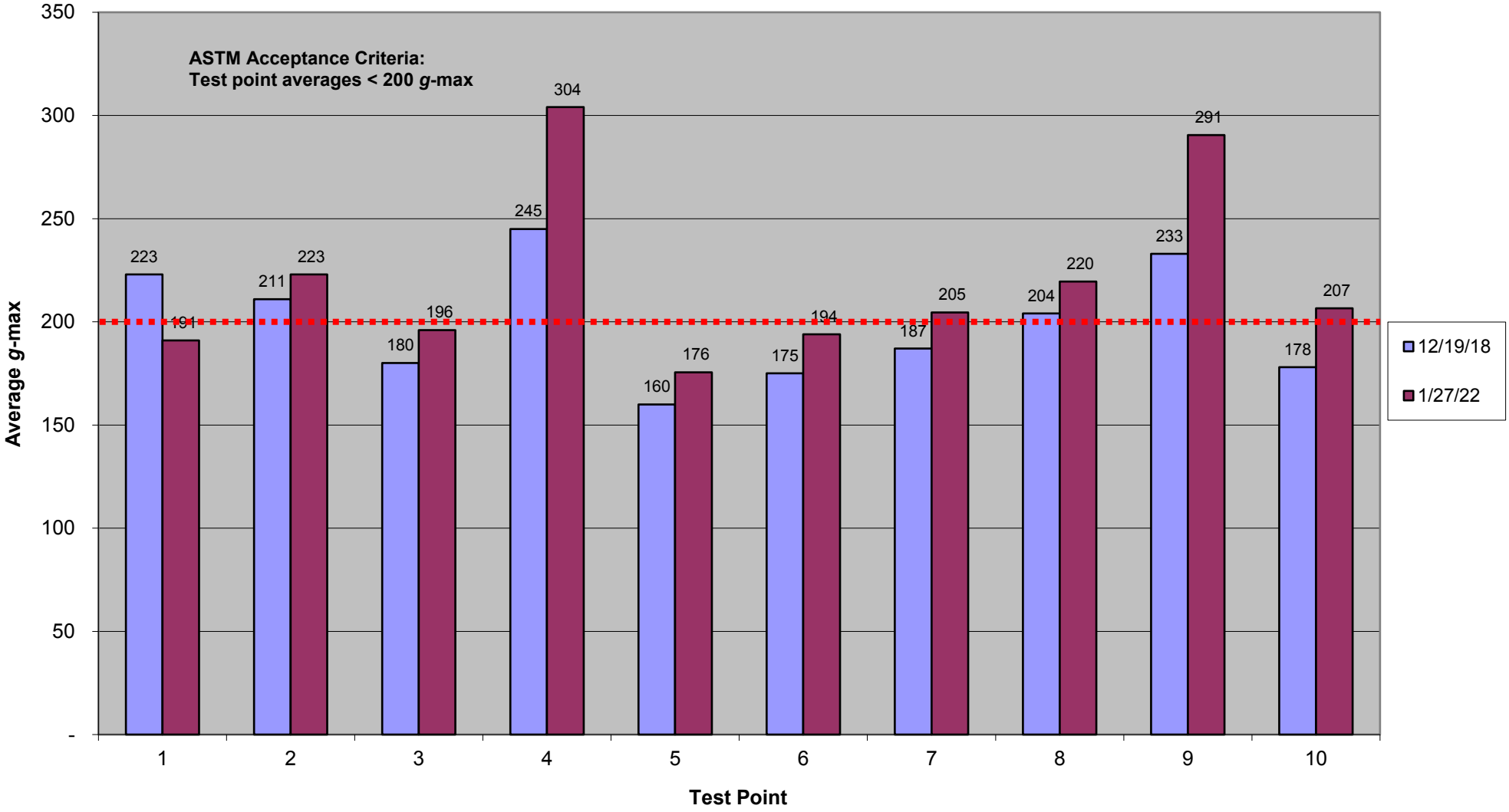
Crocker Amazon Playground - Pitch #5

Test Point Profiles



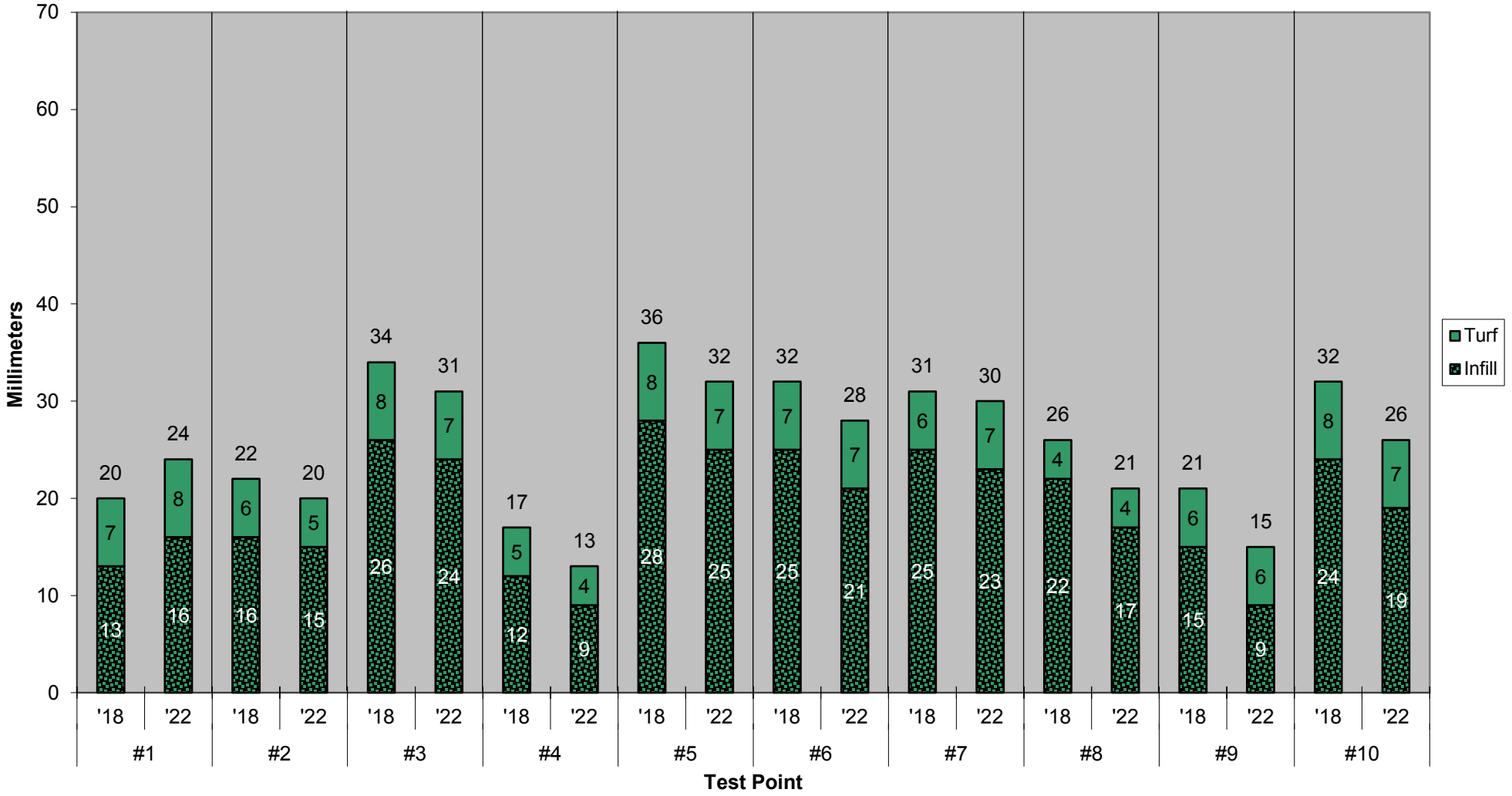
Crocker Amazon Playground - Pitch #5

Comparison of Past and Present g-max Values



Crocker Amazon Playground - Pitch #5

Comparison of Past and Present Surface Profile Data



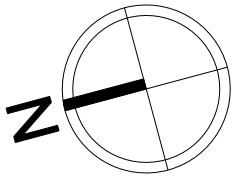
Test Point Reference Guide

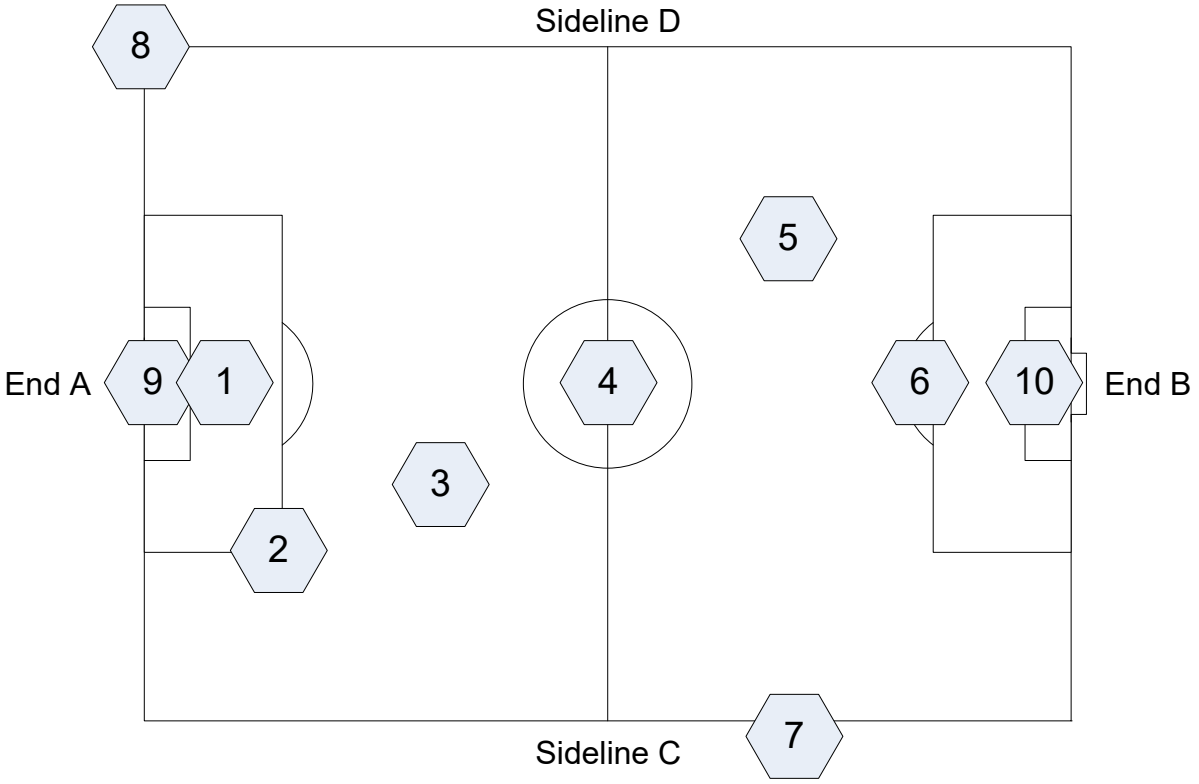
Job Number: 22-001e

Client: San Francisco Recreation and Park Department

Field: Crocker Amazon Playground – Pitch #5

Date Tested: 1/27/2022





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 – 50' 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 – 50' 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.

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Impact Test Terminology

The following terms and symbols appear in the attached test data:

Symbol	Definition
Vo	Velocity of the test missile immediately prior to impact, as measured in meters per second.
h	Theoretical height from which the test missile is dropped, as measured in meters. ("h" is a calculated value, derived from Vo, that enables comparison of test data based on drop height.)
g	The ratio of the magnitude of missile acceleration during impact to the acceleration of gravity, expressed in equivalent units
g-max	The maximum value of *g* encountered during impact.
HIC	Head Injury Criteria – a measure of the injury potential of an impact. Best for estimating the risk of a *diffuse* brain injury. (*)
Air Temp	The ambient air temperature, measured in the shade. Values are reported both in degrees Celsius and degrees Fahrenheit.
Surface Temp	The temperature of the playing surface, measured with a probe inserted ½ inch below the top of the infill material. Values are reported both in degrees Celsius and degrees Fahrenheit.
Pile Depth	The depth of the pile at the test point, measured from the top of the playing surface to the upper surface of the pile backing. Reported values are the average of at least three measurements and are stated in millimeters. (Note: Due to pile layover, curling, and other characteristics of installed turf systems, pile depth will generally be less than the length of pile fibers as measured at the time of manufacture.)
Infill Depth	The depth of the infill material at the test point, measured from the upper surface of the infill material to the upper surface of the pile backing. Reported values are the average of at least three measurements and are stated in millimeters.
Turf Depth	The difference between the pile depth and the infill depth. This is the amount of pile projecting above the infill layer. Values are reported in millimeters. (May also be referred to as "free pile.")

(*) HIC values are reported for the purpose of making year-to-year comparisons of a field's condition. Do not use HIC values determined by Standard Specification F1936 or Standard Test Method F-355A, to decide the safety or acceptability of a field.

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