



Biologically Applied Engineering

Race Track Surface Testing

New York Racing Association



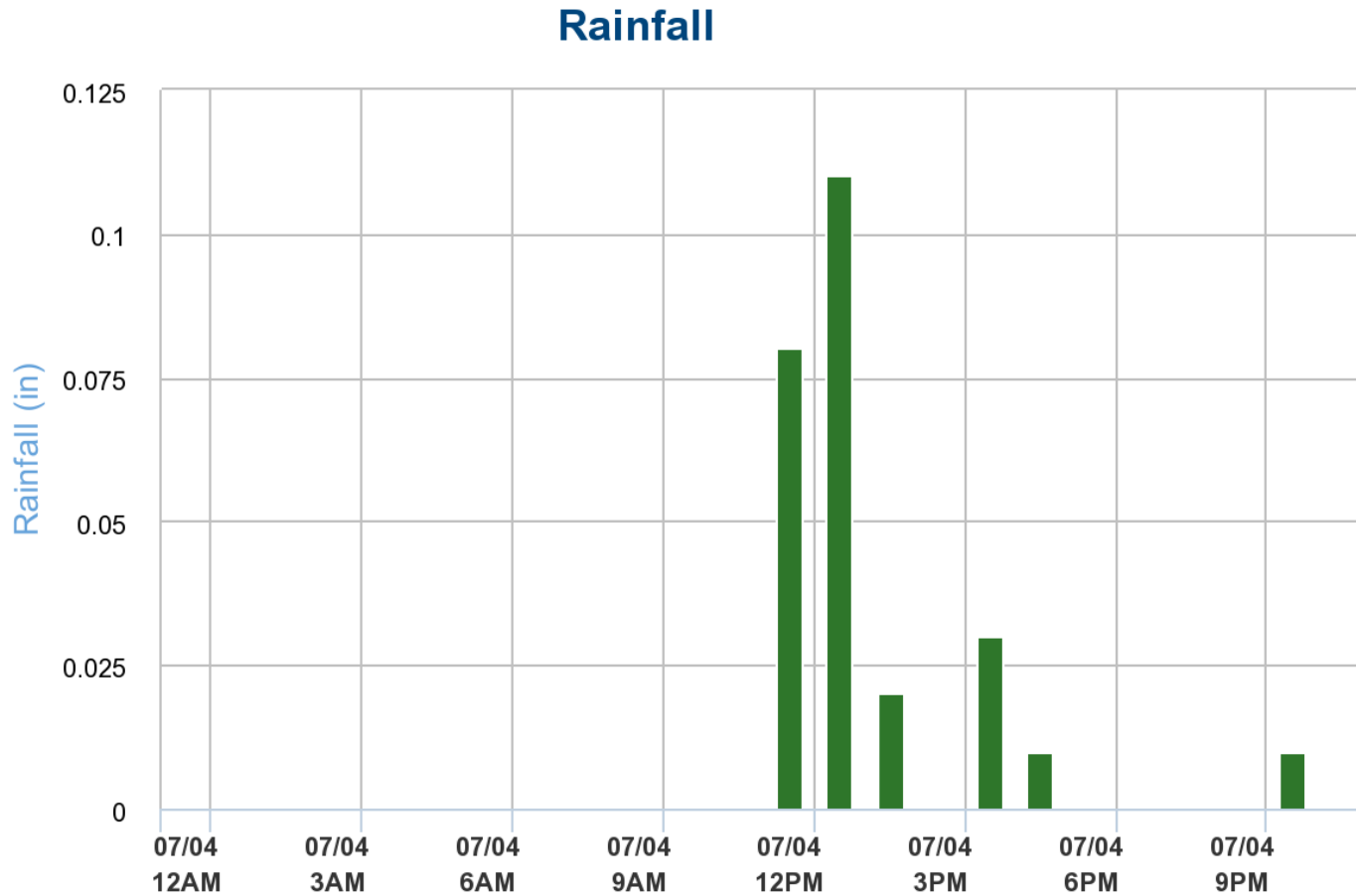
Weather Data

(compiled every 15 minutes)

July 4, 2014 – 0.25" Rainfall

Date	Time	Temp	Dewpt	Heat Index	Windchill	RH	Baro	Avg Wind	Gust	Wind Dir	Rainfall	Batt Volts	Solar Rad.	T1	T2	Source
7/4/2014	05:15pm	64°	0.0°	64.0°	64.0°	0%	29.61"	8.9 mph	22.0 mph	W (270°)	0.01 in.	6.72	67	64°	0°	Station
7/4/2014	05:00pm	64°	0.0°	64.0°	64.0°	0%	29.61"	11.4 mph	28.0 mph	NW (315°)	0.02 in.	6.72	93	63°	0°	Station
7/4/2014	04:45pm	65°	0.0°	65.0°	65.0°	0%	29.61"	10.7 mph	23.0 mph	W (270°)	0.01 in.	6.78	96	64°	0°	Station
7/4/2014	02:45pm	68°	0.0°	68.0°	68.0°	0%	29.62"	9.9 mph	24.0 mph	NW (315°)	0.01 in.	6.9	165	67°	0°	Station
7/4/2014	02:30pm	68°	0.0°	68.0°	68.0°	0%	29.62"	8.9 mph	20.0 mph	WSW (247°)	0.01 in.	6.9	190	67°	0°	Station
7/4/2014	02:15pm	68°	0.0°	68.0°	68.0°	0%	29.63"	8.3 mph	16.0 mph	WNW (292°)	0.00 in.	6.81	130	67°	0°	Station
7/4/2014	02:00pm	67°	0.0°	67.0°	67.0°	0%	29.63"	8.4 mph	17.0 mph	W (270°)	0.02 in.	6.81	125	67°	0°	Station
7/4/2014	01:45pm	67°	0.0°	67.0°	67.0°	0%	29.63"	8.4 mph	16.0 mph	WSW (247°)	0.01 in.	6.78	101	67°	0°	Station
7/4/2014	01:30pm	68°	0.0°	68.0°	68.0°	0%	29.64"	7.2 mph	17.0 mph	W (270°)	0.04 in.	6.72	140	68°	0°	Station
7/4/2014	01:15pm	68°	0.0°	68.0°	68.0°	0%	29.65"	9.0 mph	16.0 mph	W (270°)	0.04 in.	6.72	103	67°	0°	Station
7/4/2014	01:00pm	68°	0.0°	68.0°	68.0°	0%	29.66"	0.0 mph	15.0 mph	WNW (292°)	0.05 in.	6.72	76	67°	0°	Station
7/4/2014	12:45pm	69°	0.0°	69.0°	69.0°	0%	29.66"	7.4 mph	15.0 mph	NW (315°)	0.00 in.	6.69	58	68°	0°	Station
7/4/2014	12:30pm	69°	0.0°	69.0°	69.0°	0%	29.68"	7.0 mph	15.0 mph	NW (315°)	0.01 in.	6.72	46	68°	0°	Station
7/4/2014	12:15pm	70°	0.0°	70.0°	70.0°	0%	29.68"	0.0 mph	21.0 mph	NW (315°)	0.02 in.	6.75	75	69°	0°	Station

Rainfall Chart – July 4, 2014





Turf Damage



Biologically Applied Engineering

Race Track Surface Testing

HOME

Weather

View Maintenance

Enter Maintenance

View GPS Data

Reports

07/05/2014



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Weather Information for Belmont Park : Condition

- Main Track
- Inner Turf Course
- Widener Turf Course
- Training Track
- Cushion-Main Track
- Moisture-Inner Turf Course
- Moisture-Main Track
- Moisture-Widener Turf Course
- Horse Ambulance



Summary

Mir

Computed From Raw Data

Weather Underground Summary

Humidity	Wind Speed	Rainfall
Avg	Avg	Total
61	11.1	0.01

Available

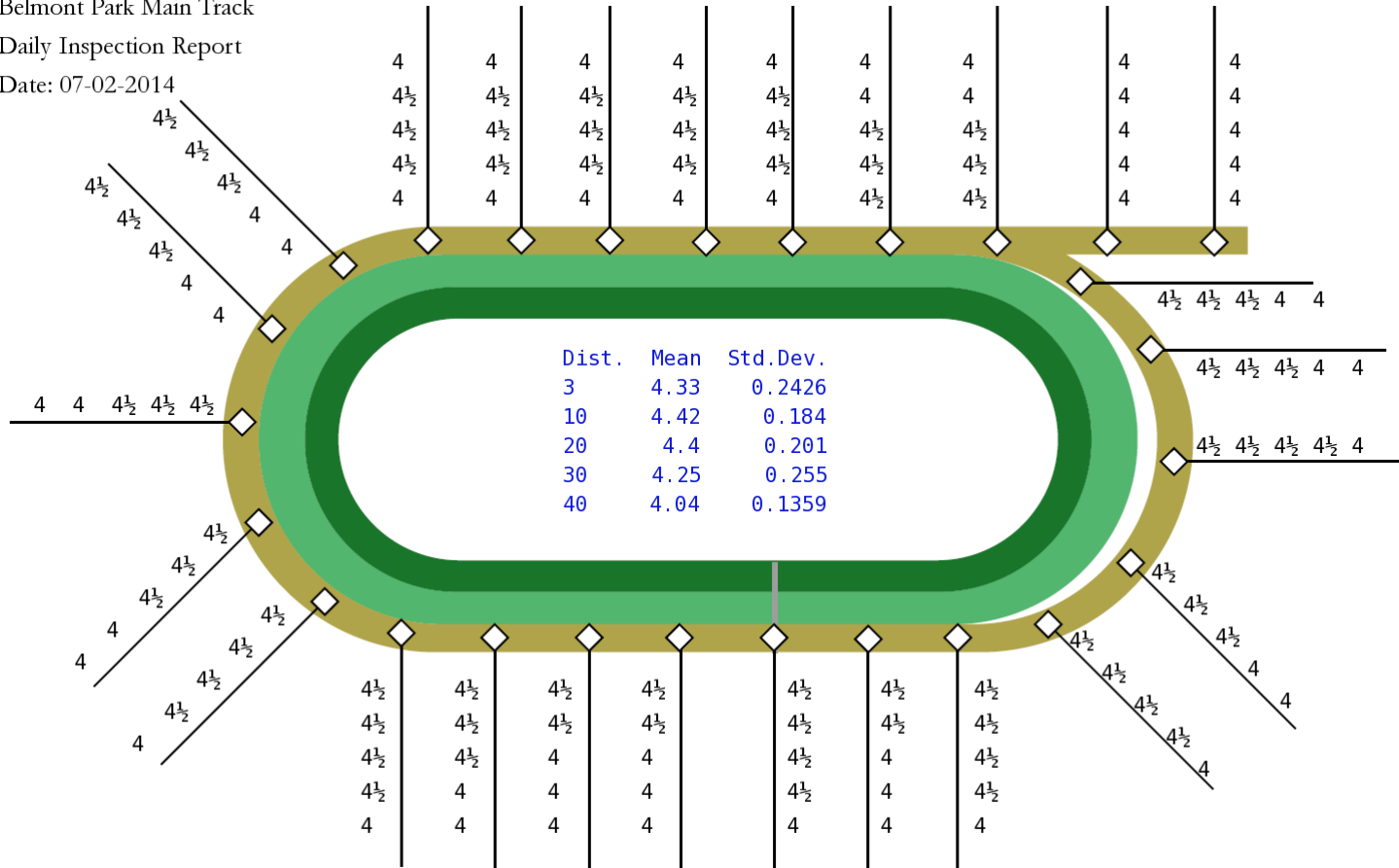
Date	Time	Temp	Dewpt	Heat Index	Windchill	RH	Baro	Avg Wind	Gust	wind Dir	Rainfall	Batt Volts	Solar Rad.	T1	T2	Source
07/05/14	02:15pm	78°	58.4°	78.0°	78.0°	51%	29.86"	10.3 mph	18.0 mph	W (270°)	0.00 in.	7.56	969	82°	0°	Station
07/05/14	02:00pm	77°	56.9°	77.0°	77.0°	50%	29.87"	10.5 mph	20.0 mph	S (180°)	0.00 in.	7.65	970	78°	0°	Station
07/05/14	01:45pm	78°	58.4°	78.0°	78.0°	51%	29.87"	8.9 mph	18.0 mph	SW (225°)	0.00 in.	7.17	219	77°	0°	Station
07/05/14	01:30pm	77°	59.6°	77.0°	77.0°	55%	29.88"	10.4 mph	20.0 mph	W (270°)	0.00 in.	7.65	972	77°	0°	Station
07/05/14	01:15pm	77°	59.1°	77.0°	77.0°	54%	29.87"	10.3 mph	19.0 mph	W (270°)	0.00 in.	7.65	979	77°	0°	Station

Cushion Measurement

Belmont Park Main Track

Daily Inspection Report

Date: 07-02-2014



Maintenance Detail – Main Track

July 3, 2014

Event	Break/	Time	Equipment	Direction	Rounds	Speed	Water x	Yards	Comments	Entered
	Race #					(mph)	1,000 gals.			
Before Training		04:00AM	No equipment	Racing direction					Raining , cones up	7/3/2014 15:11
Before Training		08:15AM	Backrake	Racing direction		6				7/3/2014 15:11
After Training		10:00AM	Backrake	Wrong way		6				7/3/2014 15:12
After Training		10:00AM	Float, double	Wrong way		6				7/3/2014 15:13
Before Race	1	12:45PM	Backrake	Racing direction		6				7/3/2014 15:13
Before Race	2	01:30PM	Backrake	Wrong way		8				7/3/2014 15:18
Before Race	3	02:00PM	Backrake	Racing direction		8				7/3/2014 15:14
Before Race	4	02:30PM	Harrow, Double	Racing direction	1	8				7/3/2014 15:15
Before Race	5	03:00PM	Harrow, Double	Racing direction	1	8				7/3/2014 15:16
Before Race	6	03:30PM	Harrow, Double	Racing direction	1	8				7/3/2014 15:16
Before Race	7	04:00PM	Harrow, Double	Racing direction	1	8				7/3/2014 15:17
Before Race	8	04:30PM	Float, double	Racing direction		8				7/3/2014 15:17
Before Race	9	05:00PM	Float, double	Racing direction		8				7/3/2014 15:18
Before Race	10	05:30PM	No equipment	Racing direction						7/3/2014 19:18
After Racing		06:00PM	Backrake	Racing direction		6				7/3/2014 19:19
After Racing		06:00PM	Roller	Racing direction	3	8			Rolled 3 times	7/3/2014 19:23

Maintenance Detail – Inner Turf

June 22, 2014

Race Day? Race Day # Races

Schooling # Horses Schooled Dist from Rail feet

Turf Condition

Race Lane Race Number

Event	Time	Equipment	Description	Comments	Entered
Before Racing	08:00AM	7210 Mower	Height: 5.00 in	inside rail 0-9	6/22/2014 21:33
After Racing	06:00PM	5700D Sprayer	iprodone 1 gal	1gal. per acre	6/22/2014 21:35
After Racing	06:00PM	5700D Sprayer	Thiophanate Methyl 2 oz	2fl. per 1000sq ft	6/22/2014 21:38
After Racing	06:00PM	5700D Sprayer	Mallet 75 wsp 6.4 oz	6.4 oz. per acre	6/22/2014 21:37
After Racing	06:00PM	5700D Sprayer	Bifen i/t 15 fl	15fl. per acre	6/22/2014 21:39
After Racing	06:00PM	5700D Sprayer	Key Plex 350 66 fl	66fl. per acre	6/22/2014 21:40



Morning Training – “Dogs Up”



Harrow Break – Backraking Cushion



Backraking for Training

Light Float



Used for very wet conditions or when track not properly sealed

Single Float



Mid-weight float, used for general maintenance

Double Float



Heavy float used for better compaction of surface

Roller



Used to prepare cushion for rain events

A-Box/Cutting Harrow



Vertical Pins and ability to add weight for more aggressive cutting

Double Harrow



General Maintenance Harrow, Angled teeth – less aggressive cutting

Set on concrete pad for pin adjustment

Fan Spray



Flotation Tires, 4500 Gallon Tank, 3 spray patterns, used on outside of track and chutes

Boom Truck



38' Boom

Trommel Screen



2mm screens used for silt, clay, sand, and divot mix

Spreader



Used for adding materials to racing surfaces

Compact Grader



Used for inside and outside rails

Mechanical Hoof Tester



Ground Penetrating Radar



Portable Water Reel



Controlled, supplemental irrigation

Sprinkler Patterns



Belmont Turf Widening



Drainage Layer

Belmont Turf Widening



Belmont Turf Widening



Saratoga Turf Widening



Saratoga Turf Widening



Saratoga Turf Widening



Glen,

The following report includes results for onsite testing of the Belmont and Aqueduct tracks using the biomechanical surface tester and ground penetrating radar (GPR). Results also include high spatial resolution moisture readings from a TDR probe used around the tracks.

One of the key pieces of information we measure using the biomechanical surface tester is the maximum loading in the vertical and horizontal directions. The design of this equipment is based on the speed and loads from the front hoof impacting the surface at a gallop. Previous research has demonstrated that the primary influence on the loading of the surface for a dirt track is the amount of moisture in the surface material, while the second most influential variable in a dirt track is the depth of the cushion.

Measurements from the surface tester on both Belmont and Aqueduct surfaces in 2014 show similar results to what we reported last year (Figures 1-2). Belmont's main and training tracks both show an even higher degree of consistency around these surfaces as demonstrated by the decreased standard deviation (the length of the lines around the points on Figures 1-2) and the GPR and TDR results (Figures 3-6). The Aqueduct tracks had very slightly increased variation this year compared to last, but we measured the track on a day with severe wind, which affects evaporation and makes it more difficult to keep the moisture consistent, thus affecting the biomechanical surface tester results. In spite of this, the Aqueduct surfaces were still well within a typical range of values that we measure for both NYRA and other racetracks.

In summary, the dirt surfaces at Belmont and Aqueduct continue to show very good consistency both spatially around the tracks and between the tracks. As we determined in 2013, the Aqueduct surfaces tend to be slightly harder than the Belmont surfaces but the horizontal slide is even more similar this year than last on these surfaces.

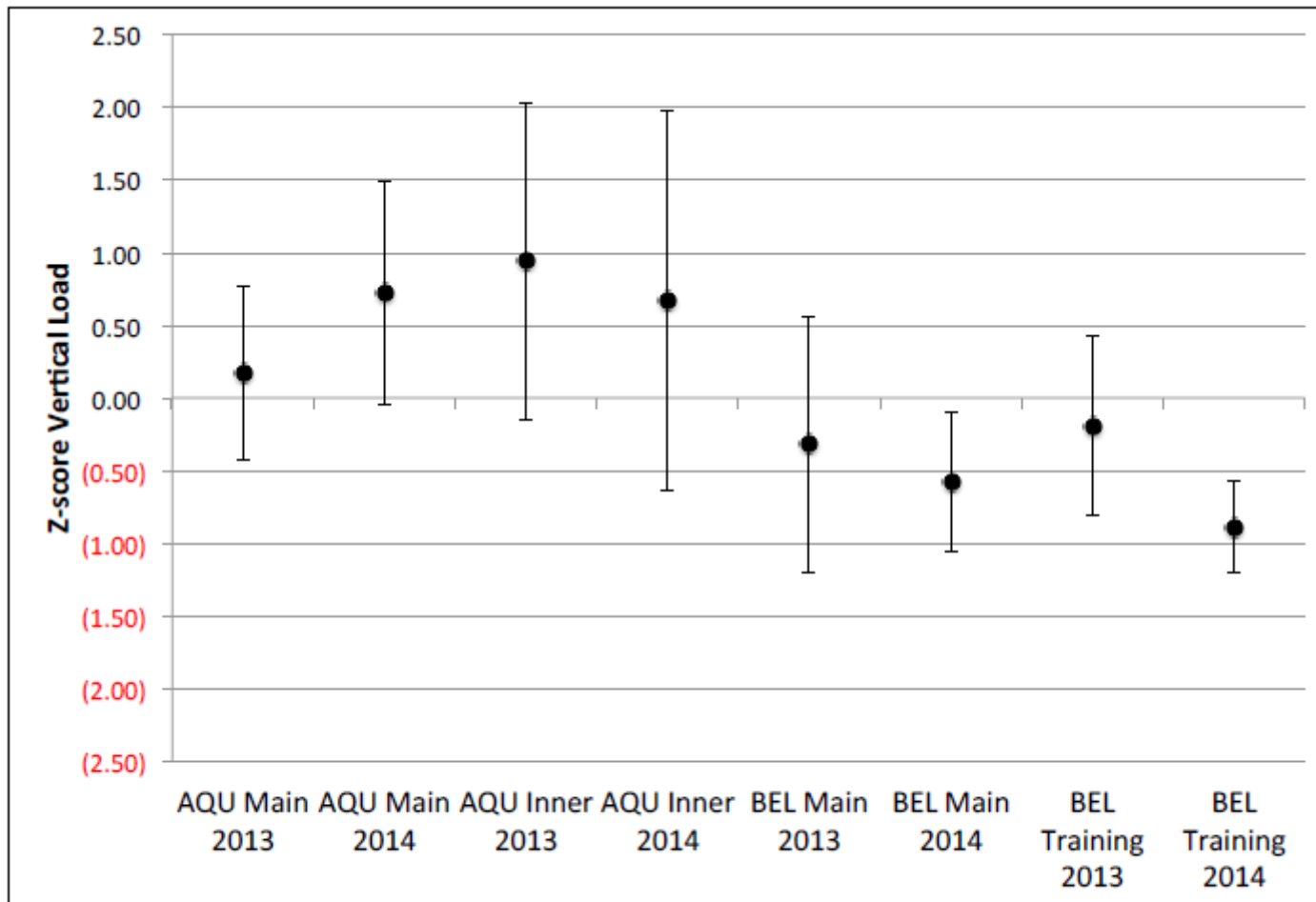


Figure 1. Z-score normalized maximum vertical load from the biomechanical surface tester. Zero is set to match the average value for the entire dataset. The Belmont surfaces are slightly softer than the Aqueduct surfaces.

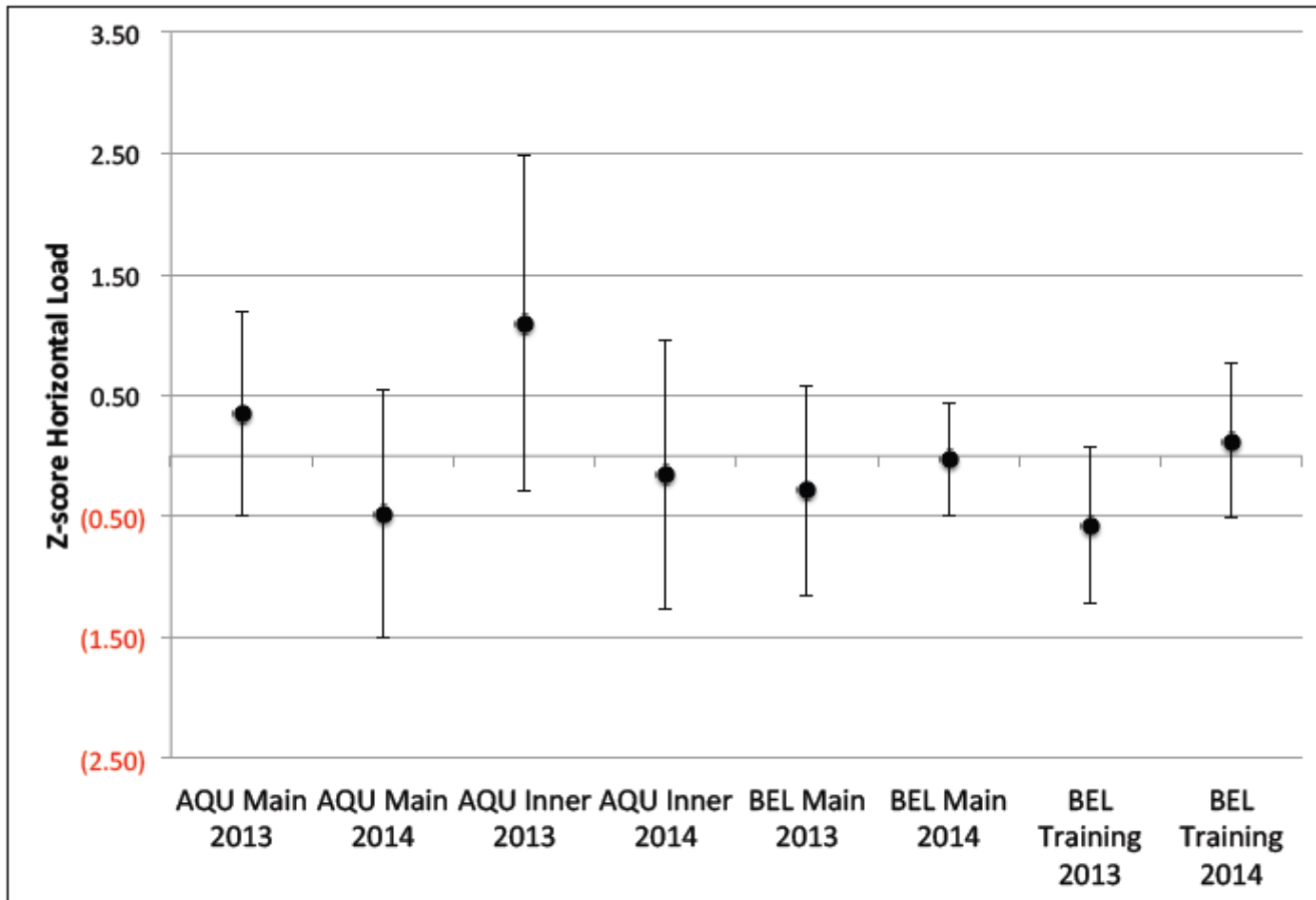


Figure 2. Z-score normalized maximum horizontal load of the biomechanical surface tester. Zero is set to match the average value for the dataset. There was a little more horizontal slide at the Aqueduct tracks in 2014 than in 2013 making these tracks more similar to the slide on the Belmont surfaces (negative values indicate more slide than positive values).