



# **ISA Sport USA**

DMA Sports Design Group

## **Performance Evaluation**

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### **Tampa Bay Rays Practice Facility**

Port Charlotte, Florida

March 30, 2011

#### **Prepared Through:**

*Innovative Base Technologies, LLC*

5030 Seminole Blvd

St Petersburg, FL 33708

Contact: Dave Barlow

#### **Prepared by:**

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Contact: Mr. Jeffery Gentile

March 30, 2011

Innovative Base Technologies, LLC  
5030 Seminole Blvd  
St Petersburg, FL 33708

*Attn: Dave Barlow*

**RE: Tampa Bay Rays Practice facility**  
**Safety and Performance Test Evaluation**

Mr. Barlow,

On March 25, 2011, DMA Sports personnel conducted field tests at the Tampa Bay Rays synthetic baseball practice infield. The purposes of the tests were to evaluate the Safety and Performance of the synthetic grass field.

### Existing Conditions

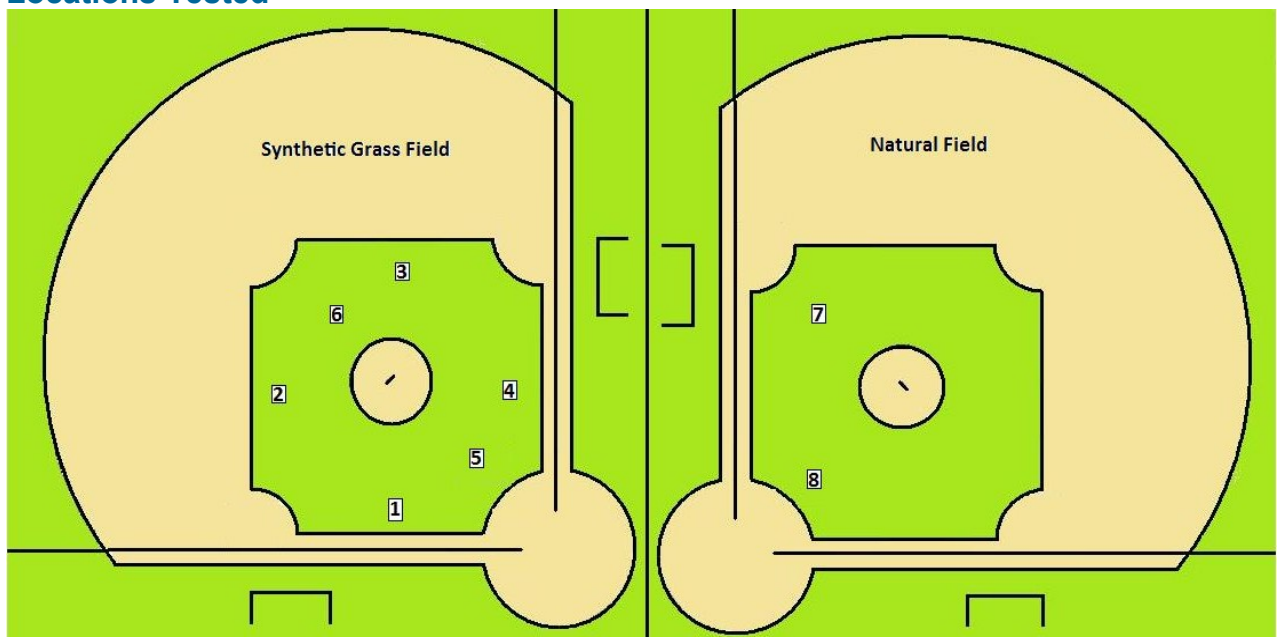
The synthetic surface is an AstroTurf monofilament fiber, sand/rubber infill mix, over an underlayment of UltraBaseSystems panels.

Atmospheric conditions stated below:

Field Testing Date: 3/25/11  
Surface Temp: 129.2° F  
Humidity: 77.5%

Air Temperature: 84.6° F  
Turf Backing Temp: 94.8° F  
Wind Average Speed: 6.7 mph

### Locations Tested



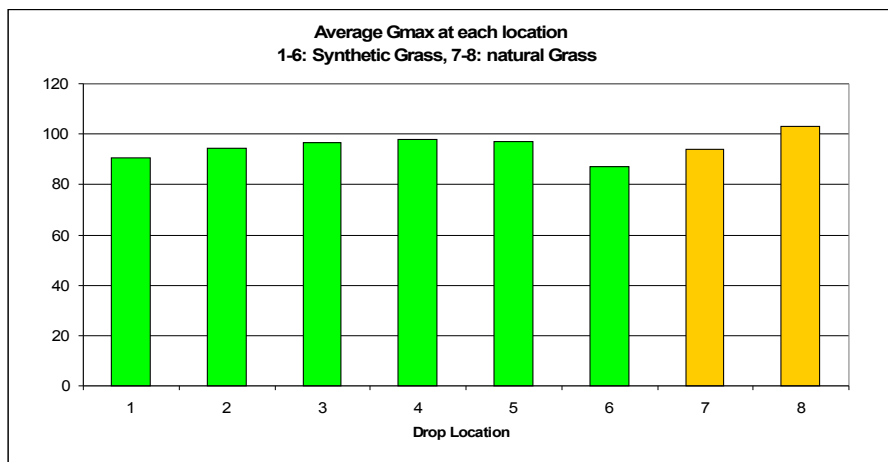
## G<sub>max</sub>

The ASTM F-355 Procedure A and ASTM 1936-10 test methods covers the measurement of certain shock-absorbing characteristics, impact force-time relationships and rebound properties of playing surface systems. The test procedure involves dropping a 20 lb missile three times at the same location under a controlled consistent height of 24 inches. Three consecutive drops were made at each location for each 24" drop height, at roughly 1.5 - 4 minute intervals. The second and third drops are averaged together.

Before the test the Machine was verified to be in good working order on the 140 calibration pad for three drops. The average of the three drops was 139.66.

The  $G_{max}$  test results for the 24-inch drop on the synthetic grass field indicated that the field is well within safe standards, ranging from 87 to 98. The average for synthetic grass field was **93.91**. This range and average meets ASTM Standards. The data for the Head Injury Criterion (HIC) and  $P_{10x}$ , the velocity at impact (ft/sec) of the missile, are also shown on the table.

The adjacent natural turf field was subject to two drop locations for comparison purposes. The average at each location was 94 and 103 with an average of **98.5**.



## TRIAx 2000 - Data Acquisition and Analysis Report

Test Methods: ASTM F-355 Procedure A, ASTM F 1936-10

| Location # | Drop # | Peak/Gmax | Ft. / Sec. | H.I.C | Description of Location  | Location Avg | Rubber Depth | Time (EST) |
|------------|--------|-----------|------------|-------|--|--------------|--------------|------------|
| 1          | 1      | 80        | 11.3       | 200   | Halfway between 3 <sup>rd</sup> and home plate 9ft south of the 3 <sup>rd</sup> base line  | 90.50        | 1.625"       | 1:32 PM    |
|            | 2      | 89        | 11.3       | 228   |  |              |              | 1:33 PM    |
|            | 3      | 92        | 11.3       | 232   |  |              |              | 1:35 PM    |
| 2          | 1      | 87        | 11.3       | 225   | Halfway between 2 <sup>nd</sup> and 3 <sup>rd</sup> base 15ft west of the edge of the turf | 94.50        | 1.5"         | 1:37 PM    |
|            | 2      | 94        | 11.3       | 251   |  |              |              | 1:39 PM    |
|            | 3      | 95        | 11.3       | 254   |  |              |              | 1:40 PM    |
| 3          | 1      | 87        | 11.3       | 214   | Halfway between 1 <sup>st</sup> and 2 <sup>nd</sup> base, 13ft North of the turf edge      | 96.50        | 1.5"         | 1:42 PM    |
|            | 2      | 96        | 11.3       | 251   |  |              |              | 1:43 PM    |
|            | 3      | 97        | 11.3       | 253   |  |              |              | 1:45 PM    |
| 4          | 1      | 91        | 11.3       | 226   | Halfway between 1 <sup>st</sup> base and home plate 9ft east of the edge of the turf       | 98.00        | 1.5"         | 1:47 PM    |
|            | 2      | 94        | 11.3       | 260   |  |              |              | 1:48 PM    |
|            | 3      | 102       | 11.4       | 271   |  |              |              | 1:50 PM    |
| 5          | 1      | 89        | 11.3       | 216   | Halfway between the pitchers mound and home plate  | 97.00        | 1.562 5"     | 1:53 PM    |
|            | 2      | 97        | 11.4       | 250   |  |              |              | 1:54 PM    |
|            | 3      | 97        | 11.4       | 256   |  |              |              | 1:55 PM    |
| 6          | 1      | 79        | 11.3       | 193   | Halfway between the pitchers mound and 2 <sup>nd</sup> base                                | 87.00        | 1.5"         | 1:58 PM    |
|            | 2      | 86        | 11.3       | 218   |  |              |              | 1:59 PM    |
|            | 3      | 88        | 11.3       | 220   |  |              |              | 2:01 PM    |
| 7          | 1      | 82        | 11.3       | 186   | Adjacent natural field 10ft North east of 3 <sup>rd</sup> base                             | 94.00        | N/A          | 2:09 PM    |
|            | 2      | 92        | 11.3       | 222   |  |              |              | 2:10 PM    |
|            | 3      | 96        | 11.3       | 131   |  |              |              | 2:12 PM    |
| 8          | 1      | 92        | 11.3       | 219   | Adjacent natural field, 10ft Northwest of home plate                                       | 103.00       | N/A          | 2:14 PM    |
|            | 2      | 102       | 11.4       | 252   |  |              |              | 2:15 PM    |
|            | 3      | 104       | 11.4       | 257   |  |              |              | 2:16 PM    |

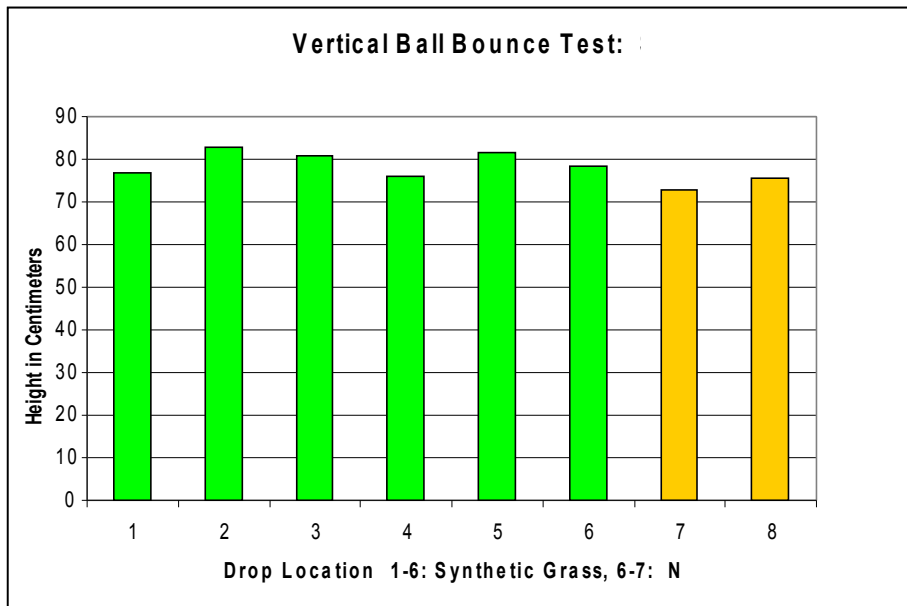
## Vertical Ball Bounce Test: Soccer



This test measures how high the ball bounces when falling vertically onto a synthetic turf field. The results are compared to the standard developed IATS (international Artificial Turf Standards) of 0.60 and 1.00m.

The ball is first calibrated on a level concrete surface to 1.35m. The ball is then dropped in 3 different spots at each location. The average at each location ranged from 0.76m to 0.82m. The average for synthetic grass field was **0.79m**. This range and average meets IATS Standards

The adjacent natural turf field was subject to two drop locations for comparison purposes. The average at each location was 0.73m and 0.76m with an average of **0.74m**. The results are shown on the chart and table below.



| <u>Location #</u> | <u>Drop #</u> | <u>Drop Height in Centimeters</u> | <u>Description of Location</u>   | <u>Location Avg</u> | <u>Rubber Depth</u> |
|-------------------|---------------|-----------------------------------|--|---------------------|---------------------|
| 1                 | 1             | 74                                | Halfway between 3 <sup>rd</sup> and home plate 9ft south of the 3 <sup>rd</sup> base line  | 77.00               | 1.625"              |
|                   | 2             | 76                                |  |                     |                     |
|                   | 3             | 81                                |  |                     |                     |
| 2                 | 1             | 82                                | Halfway between 2 <sup>nd</sup> and 3 <sup>rd</sup> base 15ft west of the edge of the turf | 83.00               | 1.5"                |
|                   | 2             | 83                                |  |                     |                     |
|                   | 3             | 84                                |  |                     |                     |
| 3                 | 1             | 80                                | Halfway between 1 <sup>st</sup> and 2 <sup>nd</sup> base, 13ft North of the turf edge      | 80.67               | 1.5"                |
|                   | 2             | 84                                |  |                     |                     |
|                   | 3             | 78                                |  |                     |                     |
| 4                 | 1             | 82                                | Halfway between 1 <sup>st</sup> base and home plate 9ft east of the edge of the turf       | 76.00               | 1.5"                |
|                   | 2             | 70                                |  |                     |                     |
|                   | 3             | 76                                |  |                     |                     |
| 5                 | 1             | 85                                | Halfway between the pitchers mound and home plate  | 81.67               | 1.5625"             |
|                   | 2             | 80                                |  |                     |                     |
|                   | 3             | 80                                |  |                     |                     |
| 6                 | 1             | 79                                | Halfway between the pitchers mound and 2 <sup>nd</sup> base                                | 78.33               | 1.5"                |
|                   | 2             | 78                                |  |                     |                     |
|                   | 3             | 78                                |  |                     |                     |
| 7                 | 1             | 72                                | Adjacent natural field 10ft North east of 3 <sup>rd</sup> base                             | 73.00               | N/A                 |
|                   | 2             | 74                                |  |                     |                     |
|                   | 3             | 73                                |  |                     |                     |
| 8                 | 1             | 74                                | Adjacent natural field, 10ft Northwest of home plate                                       | 75.67               | N/A                 |
|                   | 2             | 76                                |  |                     |                     |
|                   | 3             | 77                                |  |                     |                     |

## Vertical Ball Bounce Test: Baseball

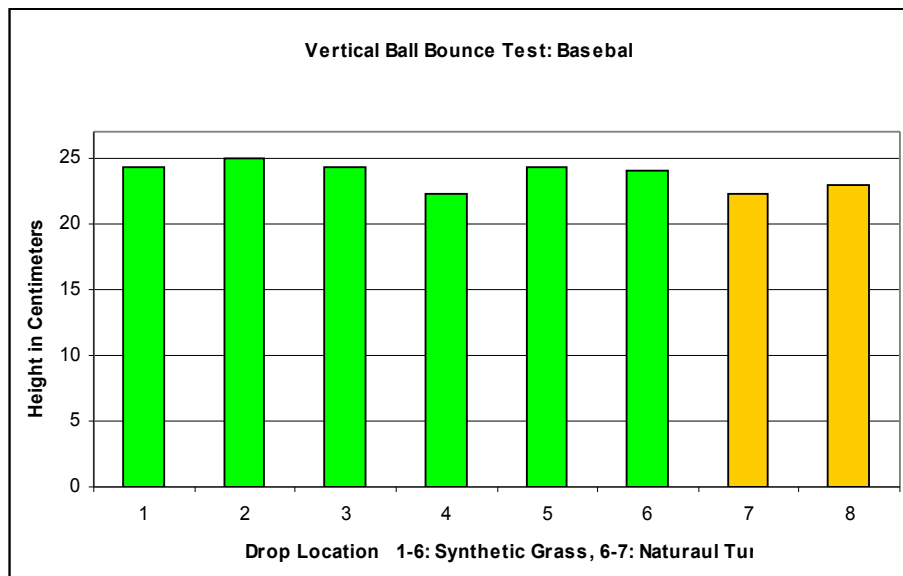


This test measures how high the ball bounces when falling vertically onto a synthetic turf field. The results are compared to the calibration drop on a level concrete surface

The ball is first calibrated on a level concrete surface; the results showed 0.64m all three calibration drops. The ball is then dropped in 3 different spots at each location. The average at each location ranged from 0.223m to 0.25m. The average for synthetic grass field was **0.241m**.

The adjacent natural turf field was subject to two drop locations for comparison purposes. The average at each location was 0.223m and 0.23m with an average of **0.227m**. The results are shown on the chart and table below.

The results are shown on the chart below.



| <u>Location #</u> | <u>Drop #</u> | <u>Drop Height in Centimeters</u> | <u>Description of Location</u>   | <u>Location Avg</u> | <u>Rubber Depth</u> |
|-------------------|---------------|-----------------------------------|--|---------------------|---------------------|
| 1                 | 1             | 24                                | Halfway between 3 <sup>rd</sup> and home plate 9ft south of the 3 <sup>rd</sup> base line  | 24.33               | 1.625"              |
|                   | 2             | 25                                |  |                     |                     |
|                   | 3             | 24                                |  |                     |                     |
| 2                 | 1             | 25                                | Halfway between 2 <sup>nd</sup> and 3 <sup>rd</sup> base 15ft west of the edge of the turf | 25.00               | 1.5"                |
|                   | 2             | 24                                |  |                     |                     |
|                   | 3             | 26                                |  |                     |                     |
| 3                 | 1             | 24                                | Halfway between 1 <sup>st</sup> and 2 <sup>nd</sup> base, 13ft North of the turf edge      | 24.33               | 1.5"                |
|                   | 2             | 24                                |  |                     |                     |
|                   | 3             | 25                                |  |                     |                     |
| 4                 | 1             | 22                                | Halfway between 1 <sup>st</sup> base and home plate 9ft east of the edge of the turf       | 22.33               | 1.5"                |
|                   | 2             | 22                                |  |                     |                     |
|                   | 3             | 23                                |  |                     |                     |
| 5                 | 1             | 25                                | Halfway between the pitchers mound and home plate  | 24.33               | 1.5625"             |
|                   | 2             | 24                                |  |                     |                     |
|                   | 3             | 24                                |  |                     |                     |
| 6                 | 1             | 25                                | Halfway between the pitchers mound and 2 <sup>nd</sup> base                                | 24.00               | 1.5"                |
|                   | 2             | 23                                |  |                     |                     |
|                   | 3             | 24                                |  |                     |                     |
| 7                 | 1             | 22                                | Adjacent natural field 10ft North east of 3 <sup>rd</sup> base                             | 22.33               | N/A                 |
|                   | 2             | 23                                |  |                     |                     |
|                   | 3             | 22                                |  |                     |                     |
| 8                 | 1             | 22                                | Adjacent natural field, 10ft Northwest of home plate                                       | 23.00               | N/A                 |
|                   | 2             | 24                                |  |                     |                     |
|                   | 3             | 23                                |  |                     |                     |



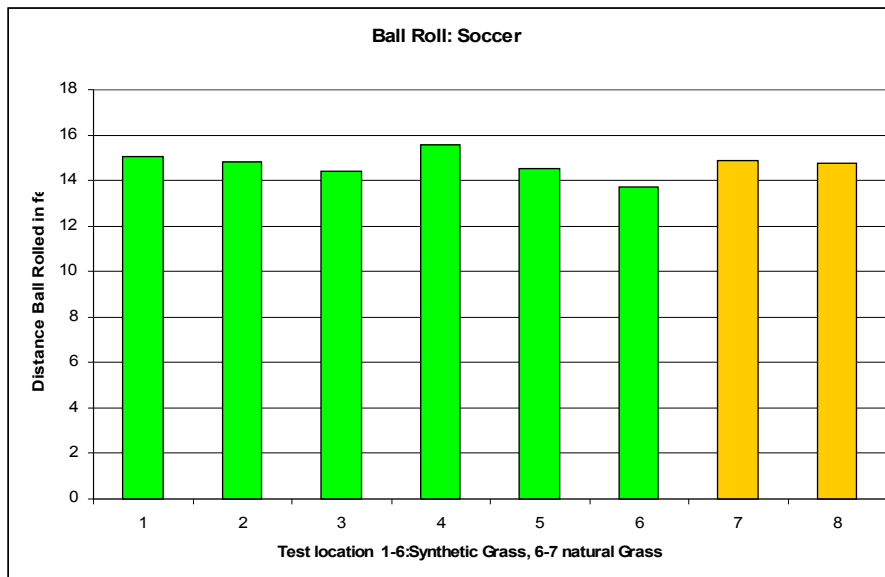
## Ball Roll Test: Soccer



This test measures how far the ball rolls onto synthetic grass compared to natural grass. The results are compared to the standard developed IATS (international Artificial Turf Standards) of between 13.12 feet and 32.81 feet.

The ball is then rolled in 3 different directions at each location. The average at each location ranged from 13.69 feet to 15.6 feet. The average for synthetic grass field was **14.68 feet**.

The adjacent natural turf field was subject to two drop locations for comparison purposes. The average at each location was 14.86 feet and 14.75 feet with an average of **14.8 feet**. The results are shown on the chart and table below.



| <u>Location #</u> | <u>Drop #</u> | <u>Distance of Ball Roll in Feet</u> | <u>Description of Location</u>   | <u>Location Avg</u> | <u>Rubber Depth</u> |
|-------------------|---------------|--------------------------------------|--|---------------------|---------------------|
| 1                 | 1             | 15.08                                | Halfway between 3 <sup>rd</sup> and home plate 9ft south of the 3 <sup>rd</sup> base line  | 15.03               | 1.625"              |
|                   | 2             | 14.67                                |  |                     |                     |
|                   | 3             | 15.33                                |  |                     |                     |
| 2                 | 1             | 14.92                                | Halfway between 2 <sup>nd</sup> and 3 <sup>rd</sup> base 15ft west of the edge of the turf | 14.83               | 1.5"                |
|                   | 2             | 15.42                                |  |                     |                     |
|                   | 3             | 14.17                                |  |                     |                     |
| 3                 | 1             | 13.58                                | Halfway between 1 <sup>st</sup> and 2 <sup>nd</sup> base, 13ft North of the turf edge      | 14.44               | 1.5"                |
|                   | 2             | 14.83                                |  |                     |                     |
|                   | 3             | 14.92                                |  |                     |                     |
| 4                 | 1             | 15.75                                | Halfway between 1 <sup>st</sup> base and home plate 9ft east of the edge of the turf       | 15.56               | 1.5"                |
|                   | 2             | 16.67                                |  |                     |                     |
|                   | 3             | 14.25                                |  |                     |                     |
| 5                 | 1             | 13.83                                | Halfway between the pitchers mound and home plate  | 14.55               | 1.5625"             |
|                   | 2             | 15.58                                |  |                     |                     |
|                   | 3             | 14.25                                |  |                     |                     |
| 6                 | 1             | 13.00                                | Halfway between the pitchers mound and 2 <sup>nd</sup> base                                | 13.69               | 1.5"                |
|                   | 2             | 13.58                                |  |                     |                     |
|                   | 3             | 14.50                                |  |                     |                     |
| 7                 | 1             | 14.83                                | Adjacent natural field 10ft North east of 3 <sup>rd</sup> base                             | 14.86               | N/A                 |
|                   | 2             | 15.58                                |  |                     |                     |
|                   | 3             | 14.17                                |  |                     |                     |
| 8                 | 1             | 15.33                                | Adjacent natural field, 10ft Northwest of home plate                                       | 14.75               | N/A                 |
|                   | 2             | 14.17                                |  |                     |                     |
|                   | 3             | 14.75                                |  |                     |                     |

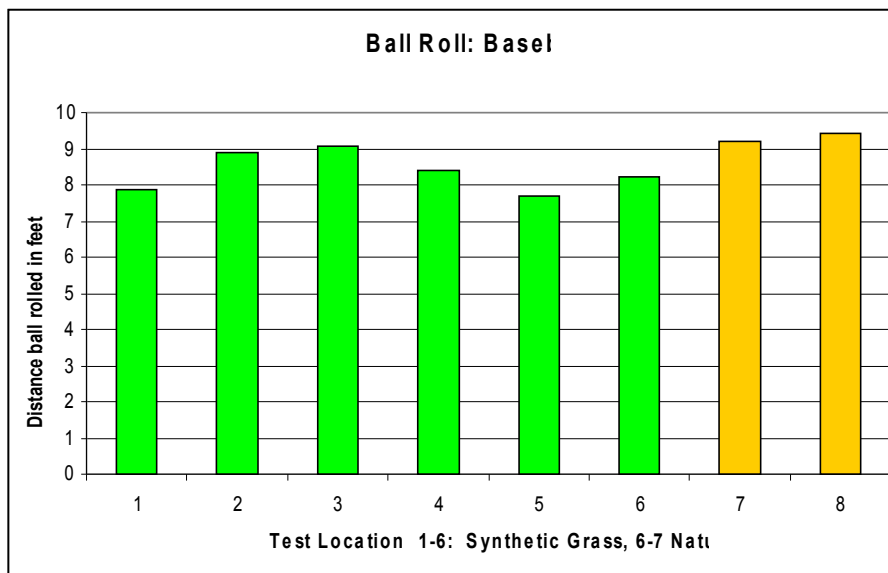
## Ball Roll Test: Baseball



This test measures how far the ball rolls onto synthetic grass compared to natural grass. The results are compared to the standard developed IATS (international Artificial Turf Standards) of between 13.12 feet and 32.81 feet.

The ball is then rolled in 3 different directions at each location. The average at each location ranged from 7.67 feet to 9.06 feet. The average for synthetic grass field was **8.35 feet**.

The adjacent natural turf field was subject to two drop locations for comparison purposes. The average at each location was 9.19 feet and 9.44 feet with an average of **9.32 feet**. The results are shown on the chart and table below.



| <u>Location #</u> | <u>Drop #</u> | <u>Distance of Ball Roll in Feet</u> | <u>Description of Location</u>   | <u>Location Avg</u> | <u>Rubber Depth</u> |
|-------------------|---------------|--------------------------------------|--|---------------------|---------------------|
| 1                 | 1             | 7.83                                 | Halfway between 3 <sup>rd</sup> and home plate 9ft south of the 3 <sup>rd</sup> base line  | 7.86                | 1.625"              |
|                   | 2             | 8.17                                 |  |                     |                     |
|                   | 3             | 7.58                                 |  |                     |                     |
| 2                 | 1             | 9.08                                 | Halfway between 2 <sup>nd</sup> and 3 <sup>rd</sup> base 15ft west of the edge of the turf | 8.89                | 1.5"                |
|                   | 2             | 9.25                                 |  |                     |                     |
|                   | 3             | 8.33                                 |  |                     |                     |
| 3                 | 1             | 9.17                                 | Halfway between 1 <sup>st</sup> and 2 <sup>nd</sup> base, 13ft North of the turf edge      | 9.06                | 1.5"                |
|                   | 2             | 9.75                                 |  |                     |                     |
|                   | 3             | 8.25                                 |  |                     |                     |
| 4                 | 1             | 8.33                                 | Halfway between 1 <sup>st</sup> base and home plate 9ft east of the edge of the turf       | 8.39                | 1.5"                |
|                   | 2             | 8.92                                 |  |                     |                     |
|                   | 3             | 7.92                                 |  |                     |                     |
| 5                 | 1             | 7.58                                 | Halfway between the pitchers mound and home plate  | 7.67                | 1.5625"             |
|                   | 2             | 7.75                                 |  |                     |                     |
|                   | 3             | 7.67                                 |  |                     |                     |
| 6                 | 1             | 8.58                                 | Halfway between the pitchers mound and 2 <sup>nd</sup> base                                | 8.22                | 1.5"                |
|                   | 2             | 8.17                                 |  |                     |                     |
|                   | 3             | 7.92                                 |  |                     |                     |
| 7                 | 1             | 7.67                                 | Adjacent natural field 10ft North east of 3 <sup>rd</sup> base                             | 9.19                | N/A                 |
|                   | 2             | 9.83                                 |  |                     |                     |
|                   | 3             | 10.08                                |  |                     |                     |
| 8                 | 1             | 9.92                                 | Adjacent natural field, 10ft Northwest of home plate                                       | 9.44                | N/A                 |
|                   | 2             | 9.33                                 |  |                     |                     |
|                   | 3             | 9.08                                 |  |                     |                     |

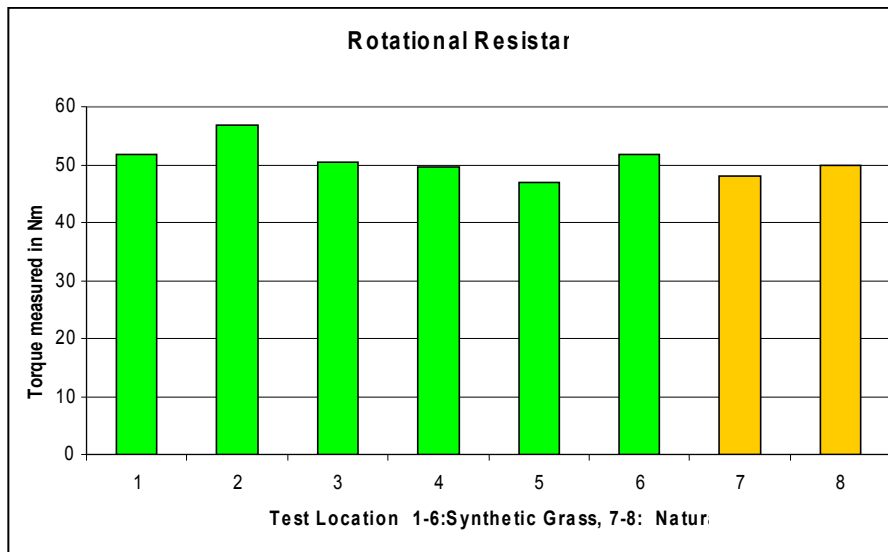
## Rotational Resistance Test



This test measures the interaction between the shoe sole and the surface of artificial grass relating to the ability of a player to change direction. The results are compared to the standard developed IATS (international Artificial Turf Standards) of 25Nm and 50Nm

Three areas are tested at each location. The average at each location ranged from 0.47Nm to 56.67Nm. The average for synthetic grass field was **51.17Nm**.

The adjacent natural turf field was subject to two locations for comparison purposes. There was only one test done at each of these locations as not to damage the natural grass field. The reading at each location was 48Nm and 50Nm with an average of **49Nm**. The results are shown on the chart and table below.



| <u>Location #</u> | <u>Drop #</u> | <u>Amount of Nm to loose traction on turf</u> | <u>Description of Location</u>   | <u>Location Avg</u> | <u>Rubber Depth</u> |
|-------------------|---------------|---|--|---------------------|---------------------|
| 1                 | 1             | 52.00   | Halfway between 3 <sup>rd</sup> and home plate 9ft south of the 3 <sup>rd</sup> base line  | 51.67               | 1.625"              |
|                   | 2             | 52.00   |  |                     |                     |
|                   | 3             | 51.00   |  |                     |                     |
| 2                 | 1             | 54.00   | Halfway between 2 <sup>nd</sup> and 3 <sup>rd</sup> base 15ft west of the edge of the turf | 56.67               | 1.5"                |
|                   | 2             | 56.00   |  |                     |                     |
|                   | 3             | 60.00   |  |                     |                     |
| 3                 | 1             | 49.00   | Halfway between 1 <sup>st</sup> and 2 <sup>nd</sup> base, 13ft North of the turf edge      | 50.33               | 1.5"                |
|                   | 2             | 51.00   |  |                     |                     |
|                   | 3             | 51.00   |  |                     |                     |
| 4                 | 1             | 50.00   | Halfway between 1 <sup>st</sup> base and home plate 9ft east of the edge of the turf       | 49.67               | 1.5"                |
|                   | 2             | 50.00   |  |                     |                     |
|                   | 3             | 49.00   |  |                     |                     |
| 5                 | 1             | 50.00   | Halfway between the pitchers mound and home plate  | 47.00               | 1.5625"             |
|                   | 2             | 50.00   |  |                     |                     |
|                   | 3             | 41.00   |  |                     |                     |
| 6                 | 1             | 52.00   | Halfway between the pitchers mound and 2 <sup>nd</sup> base                                | 51.67               | 1.5"                |
|                   | 2             | 53.00   |  |                     |                     |
|                   | 3             | 50.00   |  |                     |                     |
| 7                 | 1             | 48.00   | Adjacent natural field 10ft North east of 3 <sup>rd</sup> base                             | 48                  | N/A                 |
|                   | 2             | N/A   |  |                     |                     |
|                   | 3             | N/A   |  |                     |                     |
| 8                 | 1             | 50.00   | Adjacent natural field, 10ft Northwest of home plate                                       | 50                  | N/A                 |
|                   | 2             | N/A   |  |                     |                     |
|                   | 3             | N/A   |  |                     |                     |

ISA-Sport USA is here to assist you from evaluation of products through testing in the field to assure a proper installation and performance of your synthetic grass field.

Yours truly,



*Jeffrey T Gentile*

Jeffrey T Gentile  
*Field Testing Coordinator*

*Joseph DiGeronimo*

Joseph DiGeronimo  
*Principal*

## Photos:





