

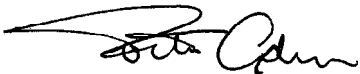
## ASTM F 1951-14 Surface Testing Report

Standard Specification for Determination of Accessibility of  
Surface Systems Under and Around Playground Equipment

### SUMMARY OF RESULTS

Beneficial Designs, Inc. received a surfacing sample from **Grassmat, LTD** classified as subsurface structure with the brand name **Grassmats**. This sample of Grassmats **met** the maneuverability performance requirements of ASTM F 1951-14.

Report prepared by:

  
Peter Axelson, Testing Supervisor

5 June 2015

Date

### TEST SPECIMEN

Manufacturer **Grassmat, LTD**

Name **Grassmats**

Type subsurface structure

Source Kaipattoor, Malady. P.O Pin 683574, Kerala, India

Mfr's lot no. Not Applicable

Date of manufacture 2014

Thickness 1 in.

### TEST DATE

14 May 2014

### TESTING CONDITIONS

Surface temperature 80 deg F

Atmospheric temperature 63 deg F

Relative humidity 27 %

### INSTALLATION, LEVELING & COMPACTION

The Grassmat surface was laid over an existing level lawn area. The Grassmat panels were attached to each other using zip ties. The Grassmat was staked down to the existing lawn using the supplied stakes. The grass in the lawn area was cut to a length of 1.5 to 2.0 inches above the soil 5 days prior to testing.

See attached installation instructions.

### TEST WHEELCHAIR & RIDER

Manufacturer Sunrise Medical/Quickie

ID no. none

Model Quickie II

Weight 31.5 lb.

Weight of test wheelchair rider 173 lb.

Front-to-rear weight distribution  
of wheelchair-rider system 40% - 60 %

## WHEELCHAIR WORK MEASUREMENT METHOD RESULTS

### Straight Propulsion on Grassmats

	Work per meter (N*m)	Trial Time (sec)
Trial 1	62.3	2.2
Trial 2	67.2	2.2
Trial 3	63.3	2.2
Trial 4	58.3	2.1
Trial 5	57.8	2.2

**Average work per meter (n=3) 61.3 N\*m**

### Turning on Grassmats

	Work per meter (N*m)	Trial Time (sec)
Trial 1	54.1	1.7
Trial 2	57.6	1.8
Trial 3	54.5	1.7
Trial 4	47.4	1.6
Trial 5	47.3	1.6

**Average work per meter (n=3) 52.0 N\*m**

### Straight Propulsion on 7.1% Ramp\*

	Work per meter (N*m)	Trial Time (sec)
Trial 1	80.3	2.1
Trial 2	80.0	2.2
Trial 3	81.5	2.1
Trial 4	79.4	2.1
Trial 5	83.8	2.2

**Average work per meter (n=3) 80.6 N\*m**

### Turning on 7.1% Ramp\*

	Work per meter (N*m)	Trial Time (sec)
Trial 1	61.5	1.6
Trial 2	64.5	1.5
Trial 3	65.0	1.5
Trial 4	61.9	1.6
Trial 5	59.0	1.5

**Average work per meter (n=3) 62.6 N\*m**

\* Hard smooth surface with grade of 7.1+/-0.2% (1:14)

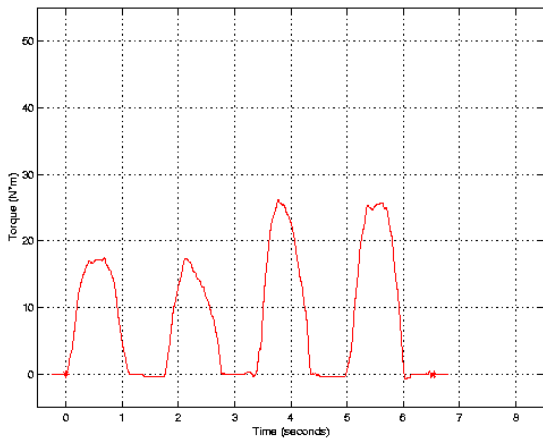
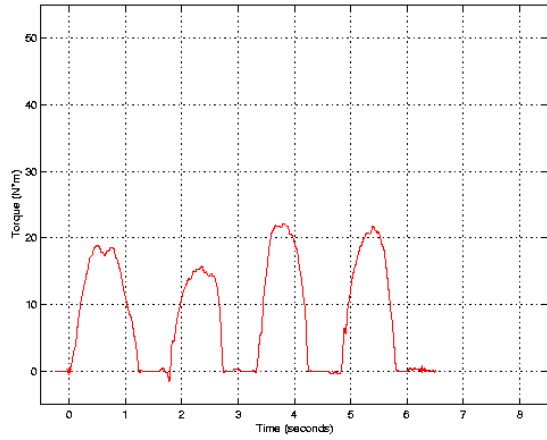
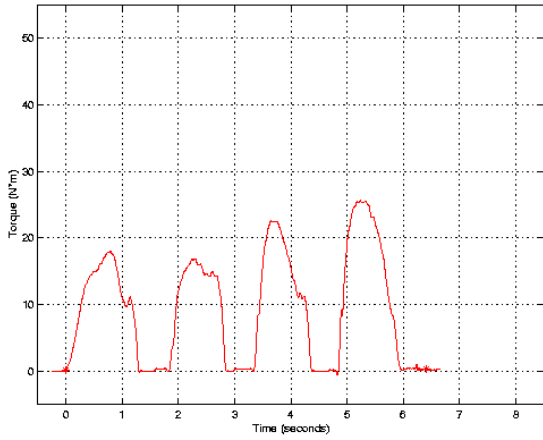
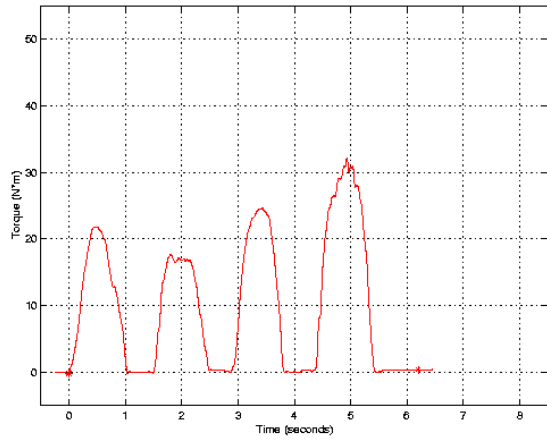
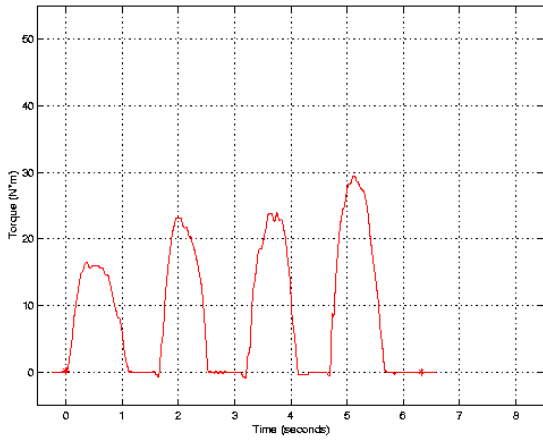
**Straight Propulsion Work Ratio 0.761**

**Turning Work Ratio 0.830**

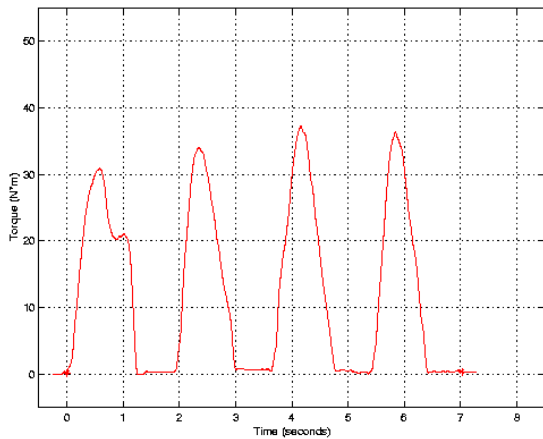
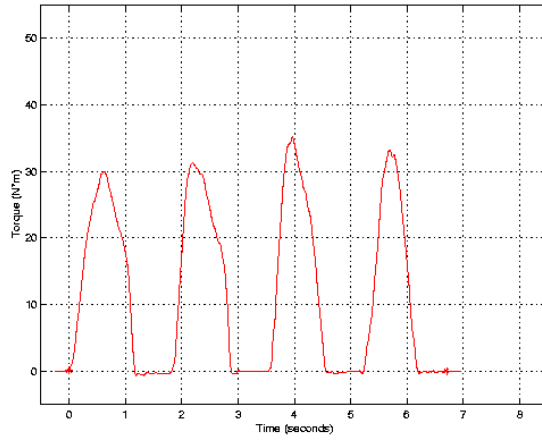
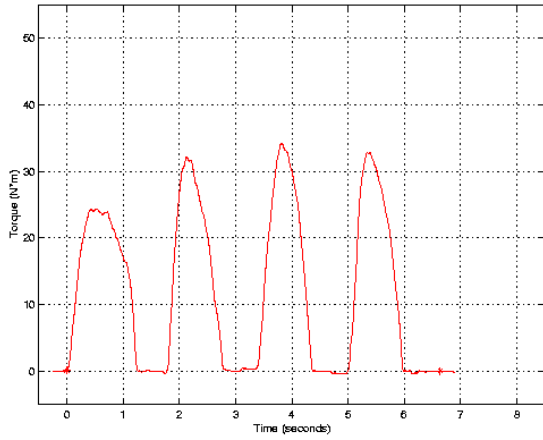
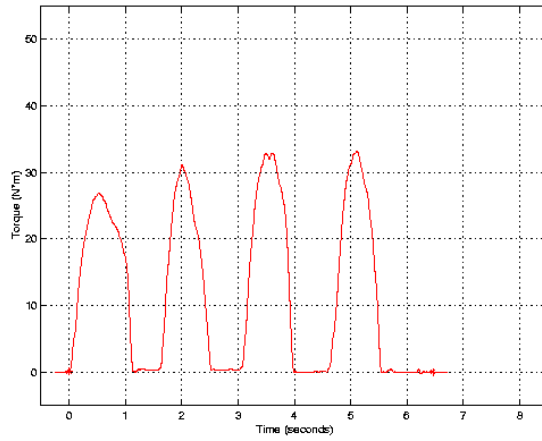
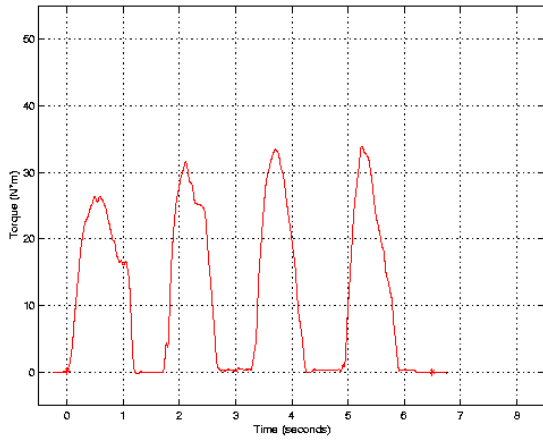
Work ratio = Avg work on surface/Avg work on 7.1% ramp. If both the straight propulsion and turning work ratios are less than 1.00, the surface system meets the performance requirements of F 1951-09b.

# ASTM F1951 – 08 Part 6: Wheelchair Work Measurement Method – Straight Propulsion

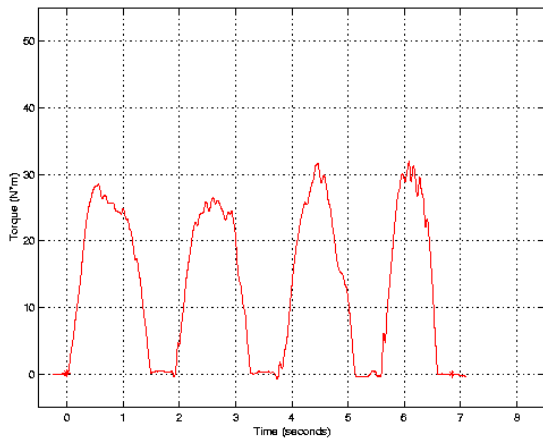
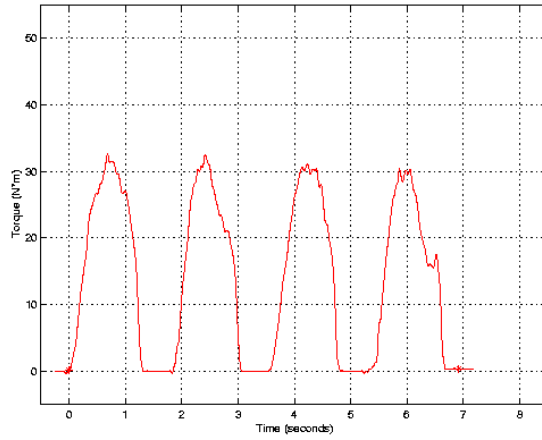
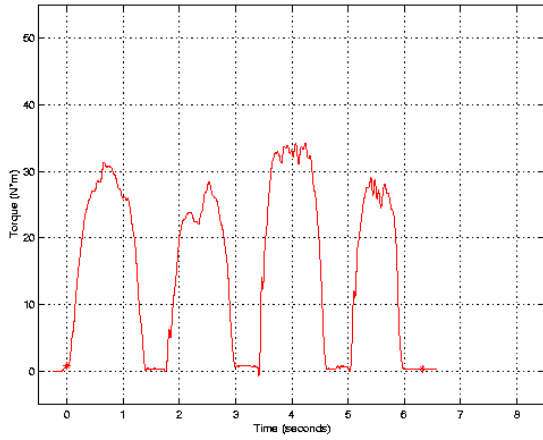
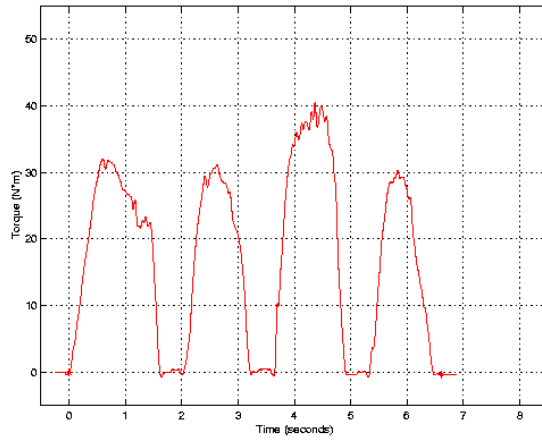
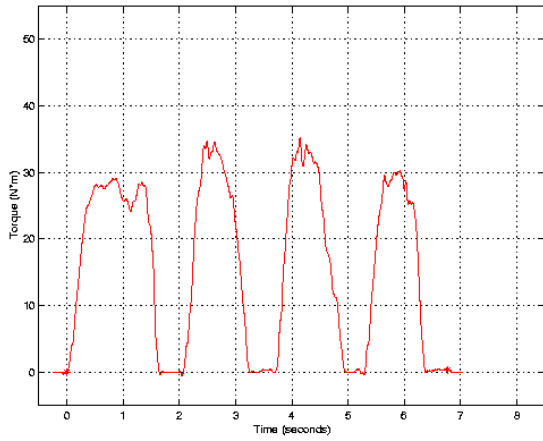
## Grassmat, LTD – Grassmats



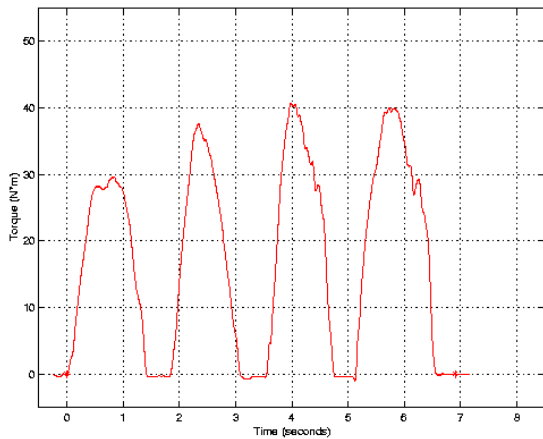
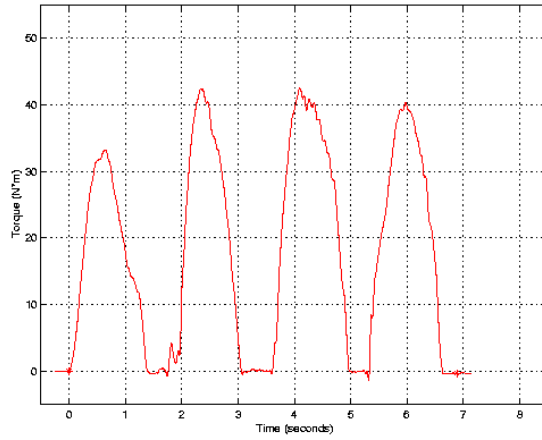
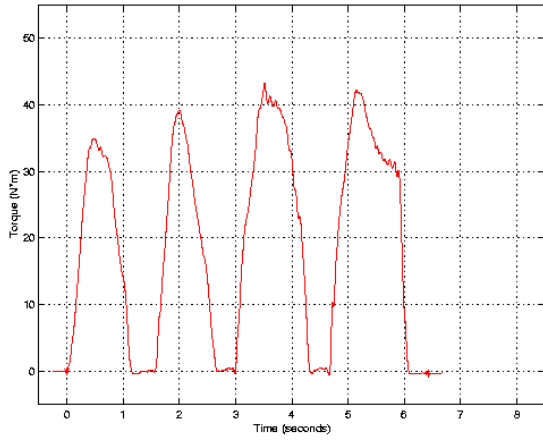
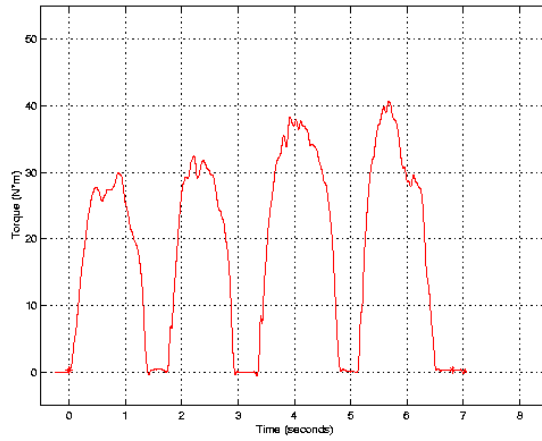
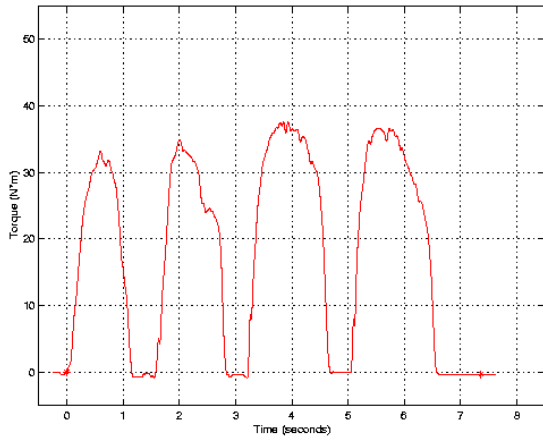
**ASTM F1951 – 08 Part 6: Wheelchair Work Measurement Method – Straight Propulsion**  
**Hard, smooth surface with a grade of  $7.1 \pm 0.2\%$  (1:14)**



# ASTM F1951 – 08 Part 7: Wheelchair Work Measurement Method – Turning Grassmat, LTD – Grassmats



# ASTM F1951 – 08 Part 7: Wheelchair Work Measurement Method – Turning Hard, smooth surface with a grade of $7.1 \pm 0.2\%$ (1:14)



# GRASS MAT INSTALLATION GUIDE

Remove any stones or debris from the area. We recommend using a rake.

Fig. 1

Fold back the perimeter edges of the rectangle of mats and dig a wedge shaped channel around 4" deep.




Fig. 4

Unfold the mats back down and into the channel which now exists. Peg each corner of the mats into the sloped side of the channel before refilling the channel with soil to bring it up to the level.




Fig. 5

Lay out your mats flush to each other, one row at a time, until the desired area is covered.

Fig. 2

The mats now need to be cable tied together on all adjoining edges. As a guide there should be roughly 1 cable tie through every 5th hole.

Fig. 3

You now have a solid rectangle of mats secured at all edges. Peg down mats in the middle of the rectangle as you see necessary.

Fig. 6

