

ASTM F 1951-08 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 **Invisible Structures, Inc.** classified as a subsurface structure with the brand name **Grasspave²**. This sample of **Grasspave²** met the maneuverability performance requirements of ASTM F 1951-08.

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Seanna Kringen, Research Associate

30 October 2008
Date

TEST SPECIMEN

Manufacturer **Invisible Structures, Inc.**
Name **Grasspave²**

Type subsurface structure
Source Invisible Structures, Inc.
Mfr's lot no. H303977
Date of manufacture 05/27/2008
Thickness 9 in

TEST DATE

2 October 2008

TESTING CONDITIONS

Surface water content N/A
Surface temperature 68 deg F
Atmospheric temperature 73 deg F
Relative humidity 34 %

INSTALLATION, LEVELING & COMPACTION

A 6-inch layer of base course (#2 road base) was installed and compacted. One pound of Hydrogrow polymer-fertilizer mixture was sprinkled onto the base course and spread evenly by hand. The 1-inch Grasspave² ring and grid structure was then placed over the base course and Hydrogrow mix, ring side up. The Grasspave² was cut to fit the form, filled with sand and leveled. The sod was sprayed on the back side with water until about 0.25 inch of soil was left. A 2-inch layer of sod was laid over the base course, root side down and cut to fit the form. This layer was wetted and compacted using a hand tamper until the roots were pressed into the sand and then wetted again. The total depth of the installation was 9 inches. This was watered every day and mowed as needed. The grass was cut to a length of 1.25 inches above the soil.

TEST WHEELCHAIR & RIDER

Manufacturer Sunrise Medical/Quickie
ID no. none
Model Quickie II
Weight 31.5 lb.

Weight of test wheelchair rider 168 lb.
Front-to-rear weight distribution
of wheelchair-rider system 40% - 60%

WHEELCHAIR WORK MEASUREMENT METHOD RESULTS

Straight Propulsion on Grasspave²

	Work per meter (N*m)	Trial Time (sec)
Trial 1	83.0	6.8
Trial 2	76.2	7.2
Trial 3	71.6	7.8
Trial 4	62.5	6.8
Trial 5	66.4	7.4

Average work per meter (n=3) 71.4 N*m

Turning on Grasspave²

	Work per meter (N*m)	Trial Time (sec)
Trial 1	47.3	7.3
Trial 2	46.5	6.8
Trial 3	49.9	6.9
Trial 4	49.4	6.9
Trial 5	51.2	6.8

Average work per meter (n=3) 48.9 N*m

Straight Propulsion on 7.1% Ramp*

	Work per meter (N*m)	Trial Time (sec)
Trial 1	73.3	7.9
Trial 2	73.4	7.4
Trial 3	71.7	7.8
Trial 4	72.4	6.9
Trial 5	74.8	7.3

Average work per meter (n=3) 73.0 N*m

Turning on 7.1% Ramp*

	Work per meter (N*m)	Trial Time (sec)
Trial 1	55.3	7.7
Trial 2	54.4	7.9
Trial 3	55.1	7.2
Trial 4	55.9	7.4
Trial 5	56.8	7.0

Average work per meter (n=3) 55.4 N*m

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

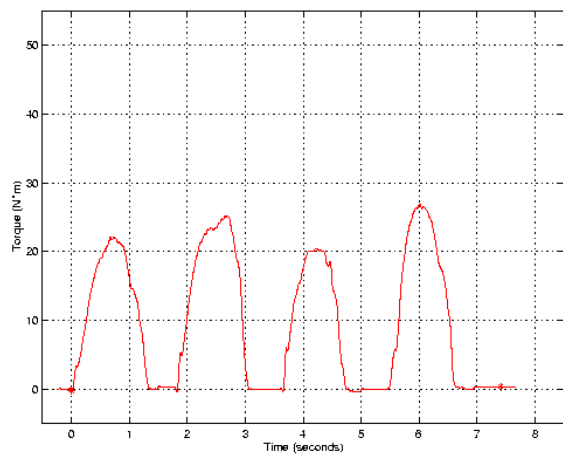
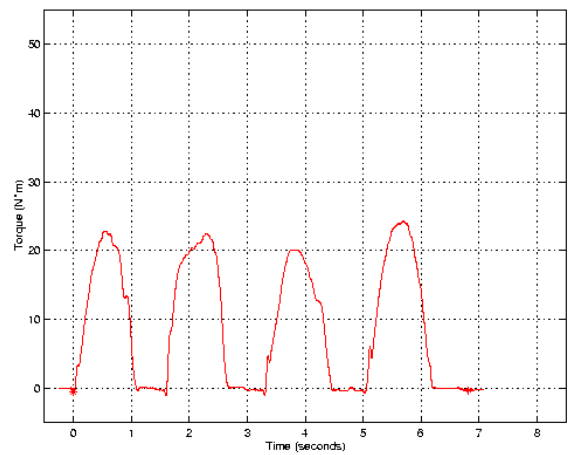
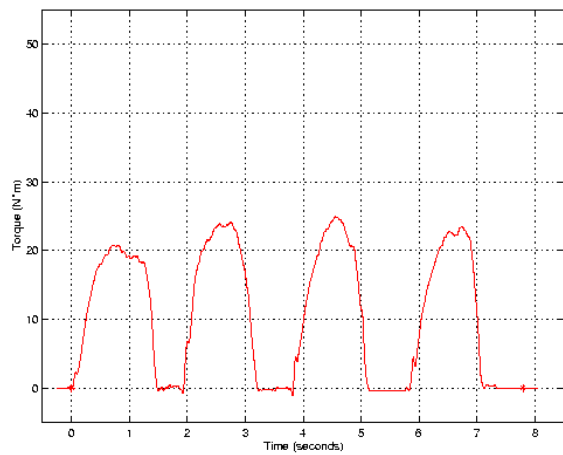
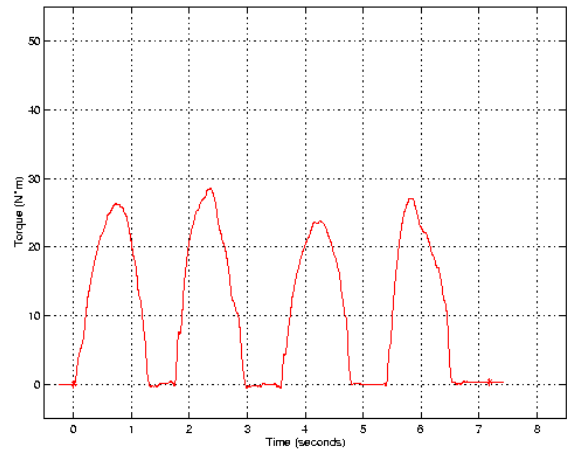
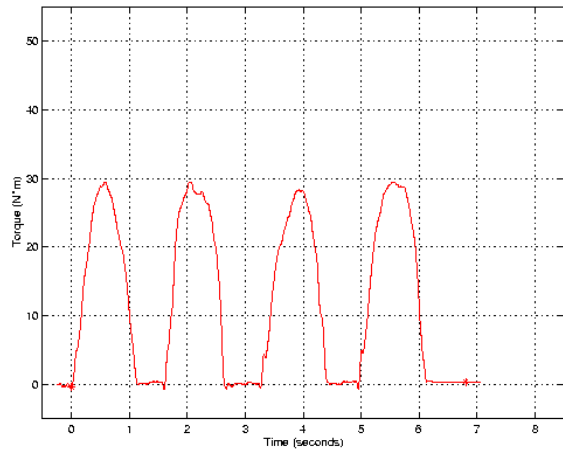
Straight Propulsion Work Ratio 0.978

Turning Work Ratio 0.882

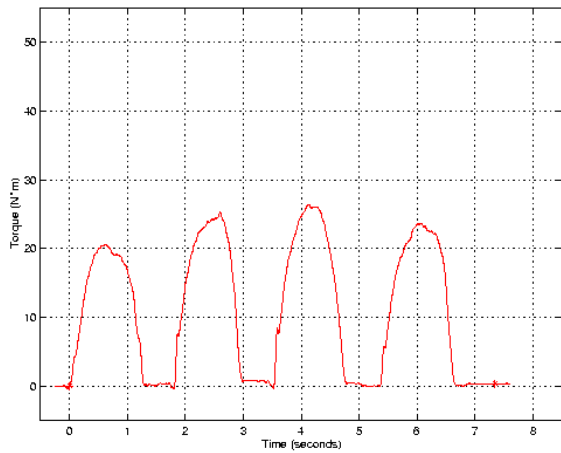
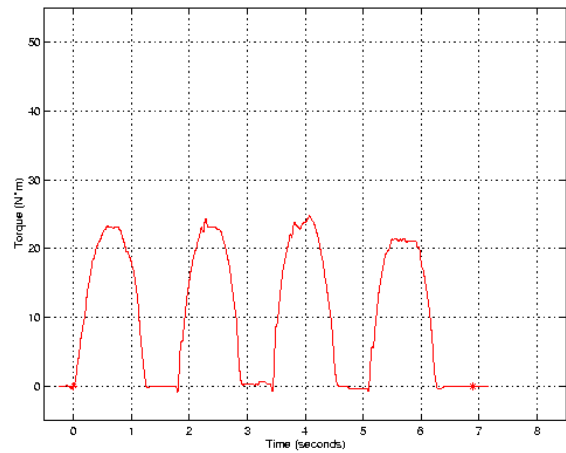
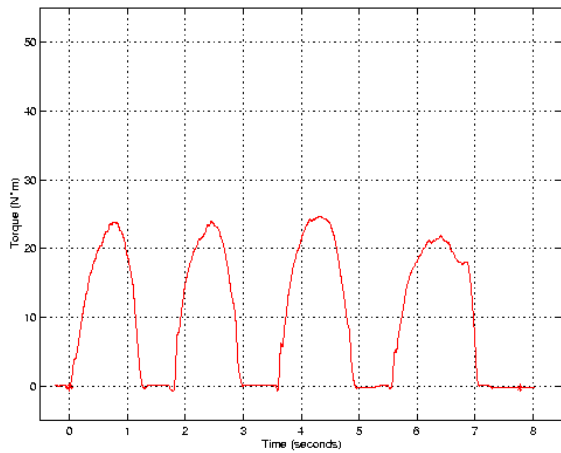
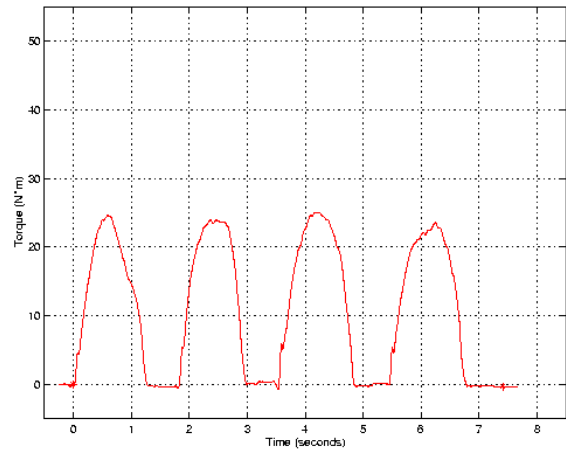
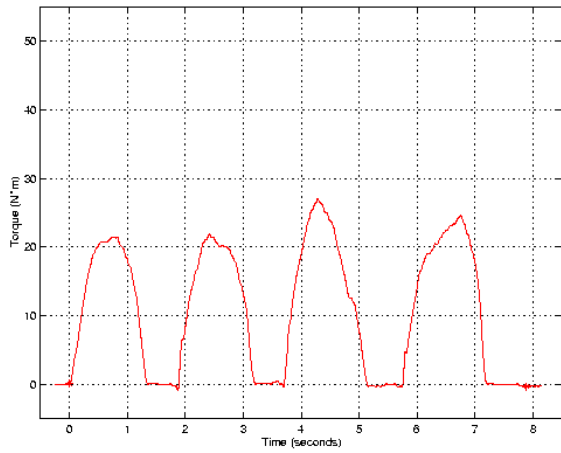
Work ratio = Avg work on surface/Avg work on 7.1% ramp. If both the straight propulsion and turning work ratios are less than 1.00, the surface system meets the performance requirements of F 1951-08.

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

Invisible Structures, Inc. – Grasspave²

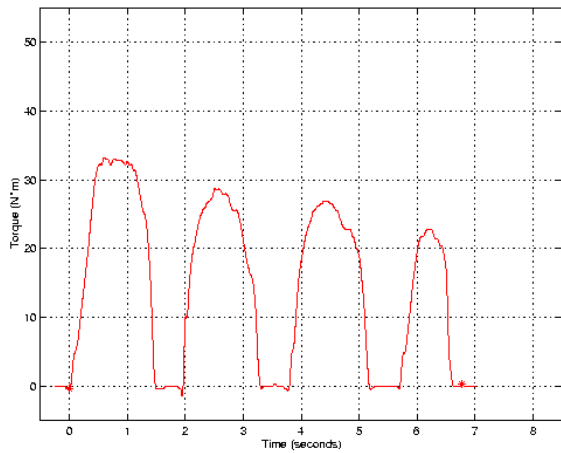
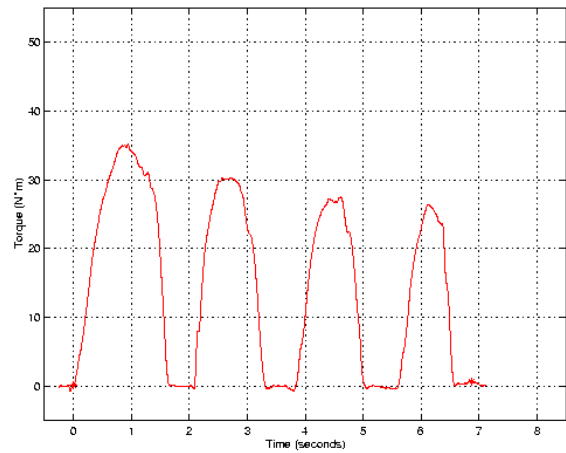
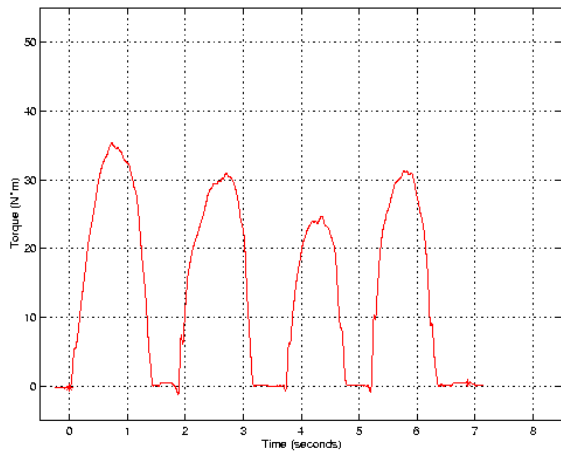
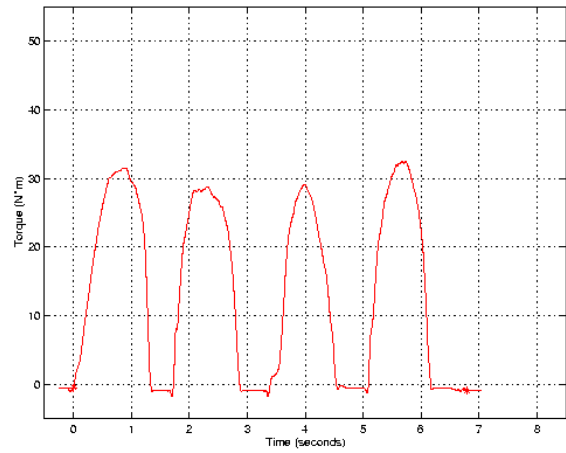
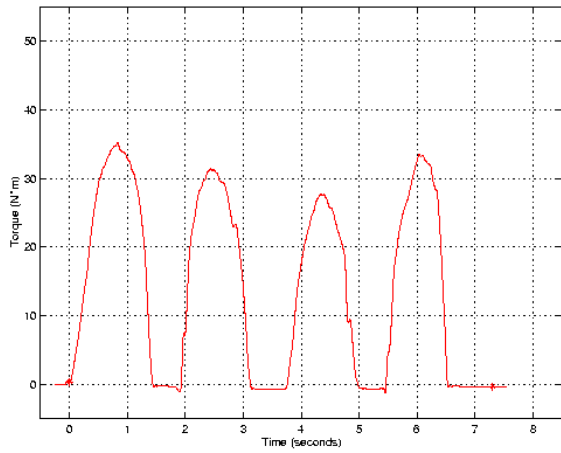


ASTM F1951 – 08 Part 6: Wheelchair Work Measurement Method – Straight Propulsion
Hard, smooth surface with a grade of $7.1 \pm 0.2\%$ (1:14)



ASTM F1951 – 08 Part 7: Wheelchair Work Measurement Method – Turning

Invisible Structures, Inc. – Grasspave²



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

