

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 **NDS, Inc.** classified as subsurface structure with the brand name **EZ Roll Gravel Paver**. This sample of EZ Roll Gravel Paver **met** the maneuverability performance requirements of ASTM F 1951-08.

Report prepared by: *Seanna L. Kringen*
Seanna Kringen, Research Associate

7 July 2010
Date

TEST SPECIMEN

Manufacturer **NDS, Inc.**
Name **EZ Roll Gravel Paver**
Type subsurface structure
Source Lindsay, CA
Mfr's lot no. Not Applicable
Date of manufacture 01/15/2009
Thickness 5.5 in.

TEST DATE

18 June 2010

TESTING CONDITIONS

Surface water content N/A
Surface temperature 71 deg F
Atmospheric temperature 71 deg F
Relative humidity 27 %

INSTALLATION, LEVELING & COMPACTION

A 4.5-inch layer of base course (Type 2 Class B Aggregate Base) was installed and compacted using a vibraplate with a centrifugal force of 1,573 ft-lb. The EZ Roll Gravel Paver grid structure was then placed over the base course and cut to fit the form. The EZ Roll Gravel Paver grid structure was then filled with 3/8 inch Rock Chip. The specification sheet for the aggregate materials used are attached.

TEST WHEELCHAIR & RIDER

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

Weight of test wheelchair rider 169 lb.
Front-to-rear weight distribution
of wheelchair-rider system 40% - 60%

WHEELCHAIR WORK MEASUREMENT METHOD RESULTS

Straight Propulsion on EZ Roll Gravel Paver

	Work per meter (N*m)	Trial Time (sec)
Trial 1	25.9	6.1
Trial 2	28.1	6.1
Trial 3	22.6	6.7
Trial 4	20.1	6.3
Trial 5	22.1	6.2

Average work per meter (n=3) 23.5 N*m

Turning on EZ Roll Gravel Paver

	Work per meter (N*m)	Trial Time (sec)
Trial 1	25.9	6.3
Trial 2	24.3	7.5
Trial 3	32.6	6.9
Trial 4	30.9	6.6
Trial 5	23.3	6.4

Average work per meter (n=3) 27.0 N*m

Straight Propulsion on 7.1% Ramp*

	Work per meter (N*m)	Trial Time (sec)
Trial 1	77.5	6.9
Trial 2	73.3	6.5
Trial 3	74.5	7.4
Trial 4	76.8	7.2
Trial 5	75.3	7.3

Average work per meter (n=3) 75.5 N*m

Turning on 7.1% Ramp*

	Work per meter (N*m)	Trial Time (sec)
Trial 1	64.3	6.6
Trial 2	64.5	7.2
Trial 3	59.3	7.4
Trial 4	67.1	7.4
Trial 5	57.1	7.3

Average work per meter (n=3) 62.7 N*m

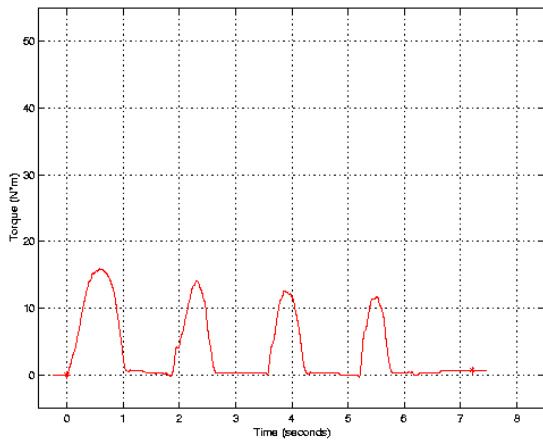
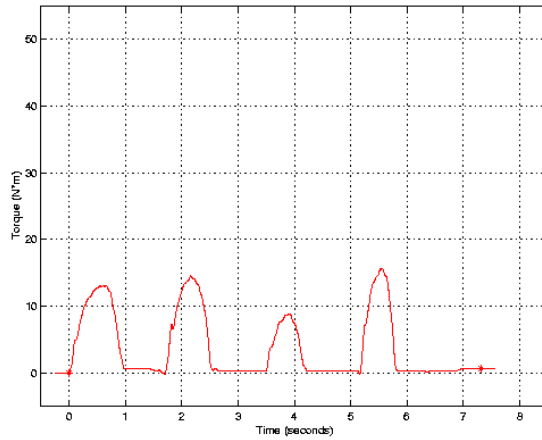
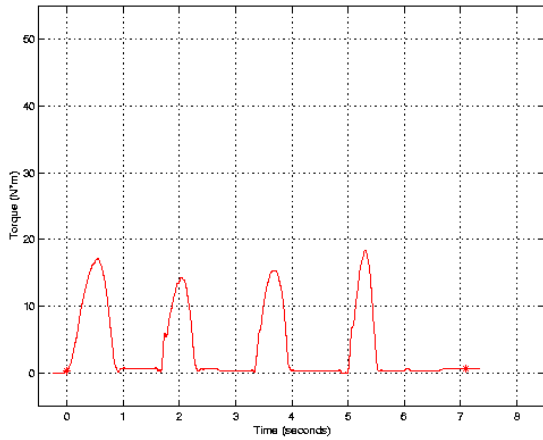
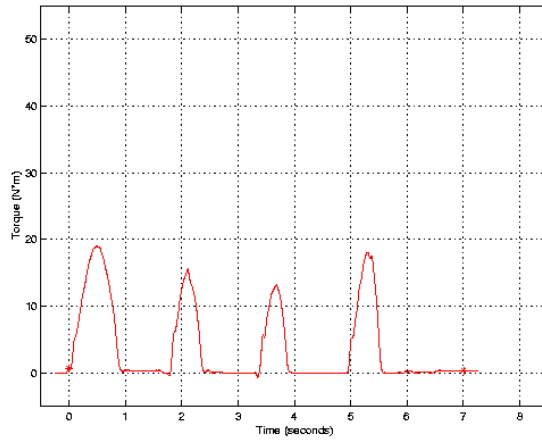
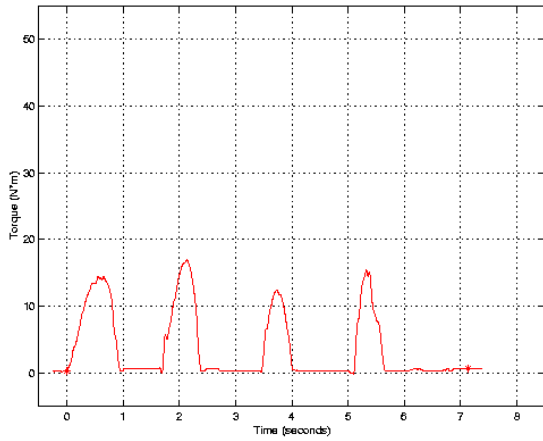
* Hard smooth surface with grade of 7.1+/-0.2% (1:14)

Straight Propulsion Work Ratio 0.312

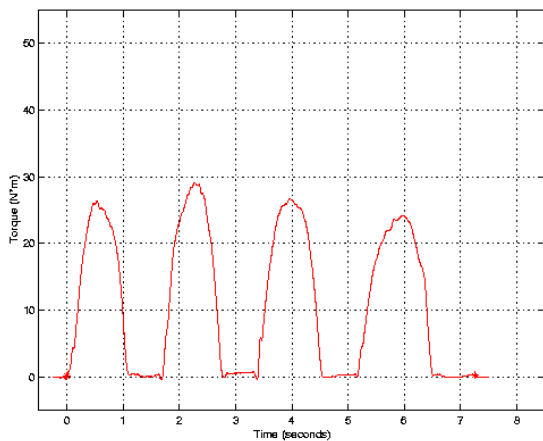
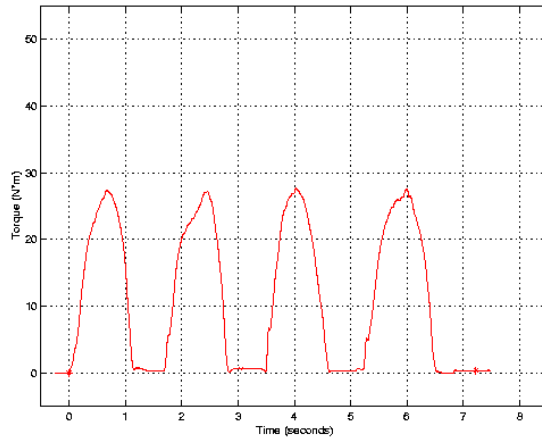
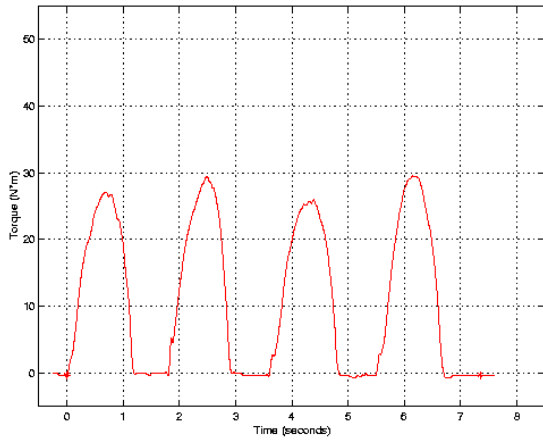
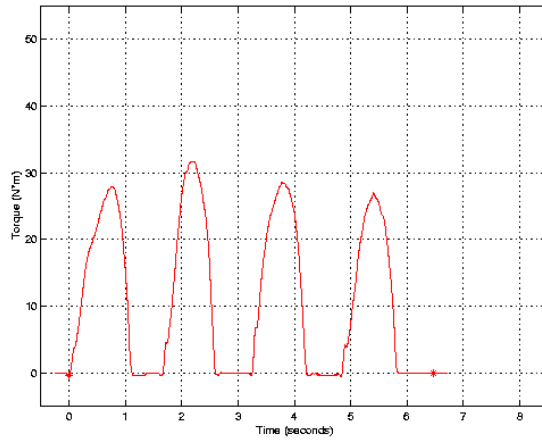
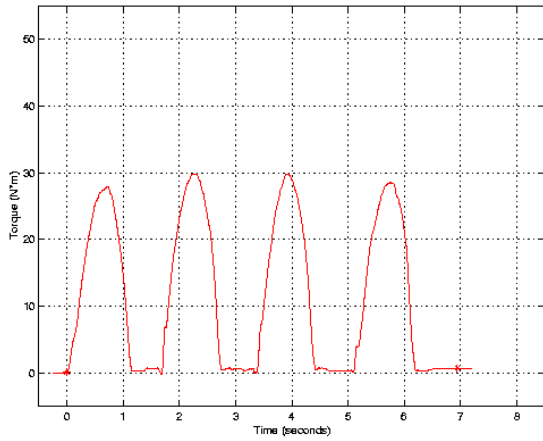
Turning Work Ratio 0.431

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 NDS, Southeast – EZ Roll Gravel Paver

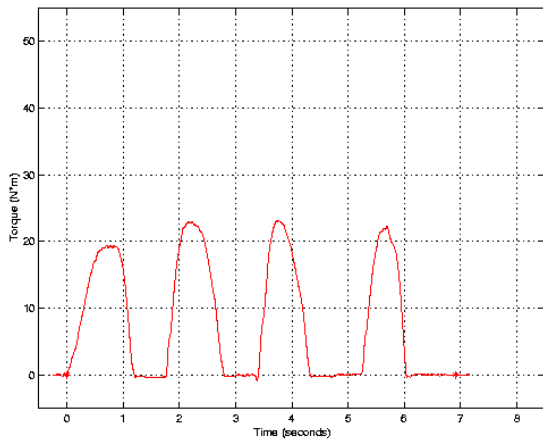
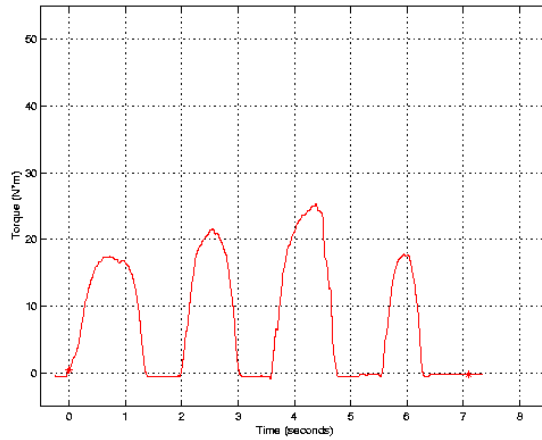
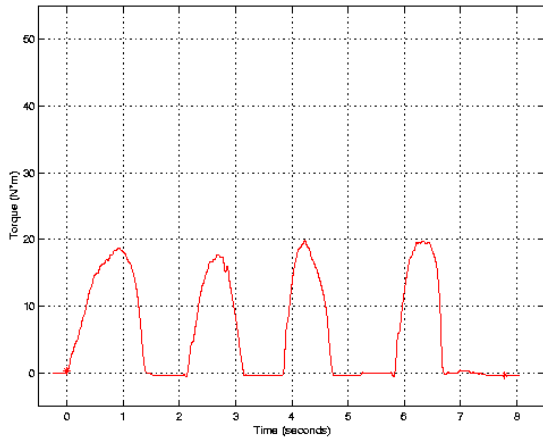
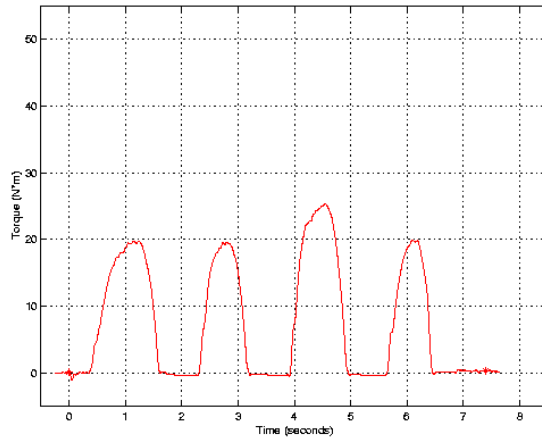
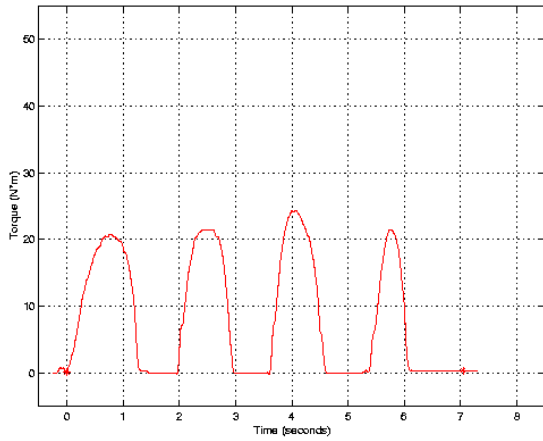


ASTM F1951 – 08 Part 6: Wheelchair Work Measurement Method – Straight Propulsion
Hard, smooth surface with a grade of $7.1 \pm 0.2\%$ (1:14)

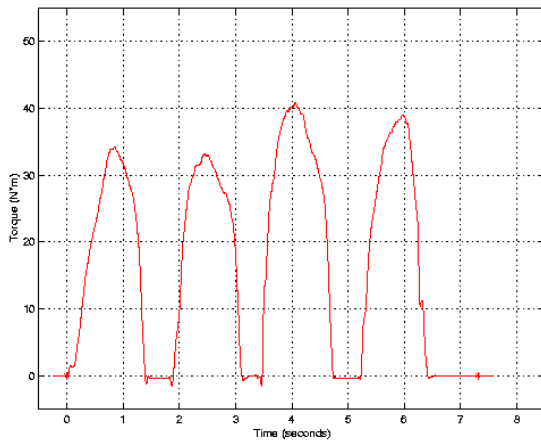
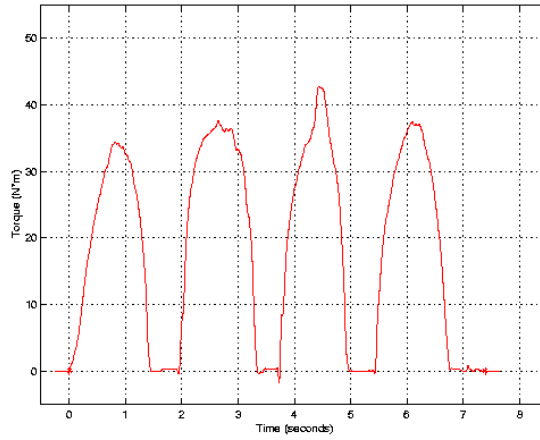
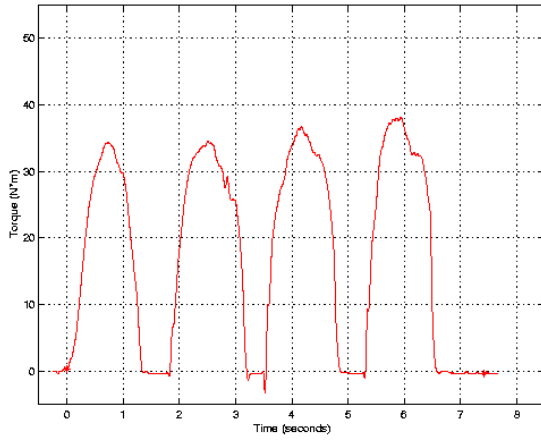
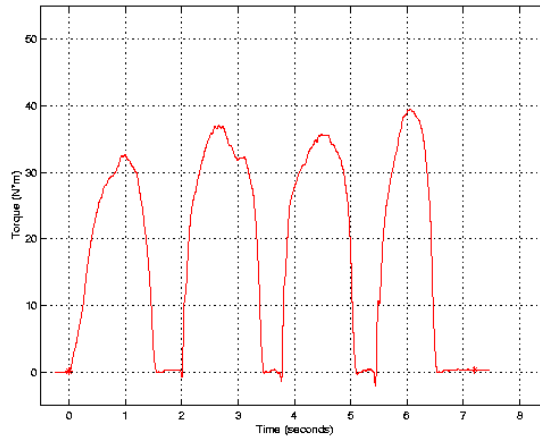
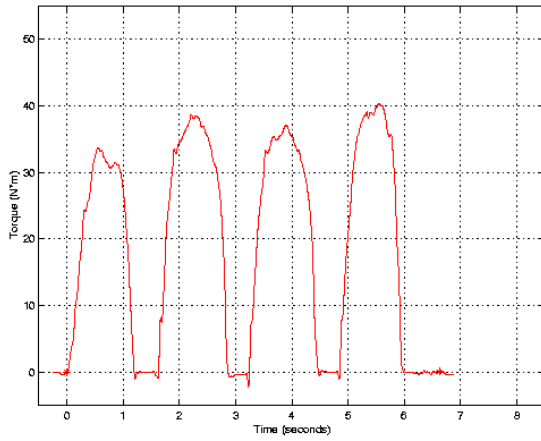


ASTM F1951 – 08 Part 7: Wheelchair Work Measurement Method – Turning

NDS, Southeast – EZ Roll Gravel Paver



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



SS05

BING MATERIALS
P.O. BOX 487
MINDEN
MINDEN, NV 89423
U.S.A.
775-265-3641/FX 5475

of 8:30 Am

LARRY

8-20-09

----- Gradation Worksheet -----
Current aggregate: 3/8" ROCK CHIP Current test: MAIN

Sieve	Cumul Wt	Sieve Wt	Net Cumul Wt	Sieve	% Pass
3/8	6.50	-	6.50	3/8 "	99.3
1/4	572.60	-	572.60	1/4 "	42.7
# 4	903.20	-	903.20	# 4	9.6 ^{9/16"}
# 8	978.10	-	978.10	# 8	2.1
# 10	979.80	-	979.80	# 10	1.9
# 16	983.00	-	983.00	# 16	1.6
# 30	985.40	-	985.40	# 30	1.4
# 40	987.10	-	987.10	# 40	1.2
# 200	992.70	-	992.70	# 200	0.6
	-	-	-		-
	-	-	-		-
	-	-	-		-
Pan	999.10	-	999.10		
Total wt	999.10	Split wt	-	Fineness mod	-