SUMMARY OF RESULTS

Beneficial Designs, Inc. received a surfacing sample from NDS classified as subsurface structure with the brand name EZ Roll Grass Paver. This sample of EZ Roll Grass Paver met the maneuverability performance requirements of ASTM F 1951-09b.

Test Specimen

Manufacturer: NDS
Name: EZ Roll Grass Paver
Type: subsurface structure
Source: Lindsay, CA
Mfr's lot no.: Not Applicable
Date of manufacture: 06/18/2012
Thickness: 6 in.

Installation, Leveling & Compaction

Top soil was installed and compacted every 2 inches using a 10" x 10" hand tamp to a total depth of 4 inches. The EZ Roll surface was rolled out over the compacted top soil. The EZ Roll grid surface was filled with top soil, and then covered with sod. The sod was then compacted into the grid using a 10" x 10" hand tamp. The total depth of the installation was 6 inches. This system was watered every day and mowed as needed. The grass was cut to a length of 1.5 to 2.0 inches above the soil 1 week prior to testing.

See Appendix A for photo.

TESTING CONDITIONS

Surface water content: N/A
Surface temperature: 55 deg F
Atmospheric temperature: 55 deg F
Relative humidity: 48 %

TEST WHEELCHAIR & RIDER

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

Weight of test wheelchair rider: 170 lb.
Front-to-rear weight distribution of wheelchair-rider system: 40% - 60%
## WHEELCHAIR WORK MEASUREMENT METHOD RESULTS

<table>
<thead>
<tr>
<th>Straight Propulsion on EZ Roll Grass Paver</th>
<th>Turning on EZ Roll Grass Paver</th>
</tr>
</thead>
<tbody>
<tr>
<td>Work per meter (N*m)</td>
<td>Trial Time (sec)</td>
</tr>
<tr>
<td>----------------------</td>
<td>-------------------</td>
</tr>
<tr>
<td><strong>Trial 1</strong></td>
<td>54.3</td>
</tr>
<tr>
<td><strong>Trial 2</strong></td>
<td>54.5</td>
</tr>
<tr>
<td><strong>Trial 3</strong></td>
<td>58.0</td>
</tr>
<tr>
<td><strong>Trial 4</strong></td>
<td>48.6</td>
</tr>
<tr>
<td><strong>Trial 5</strong></td>
<td>53.7</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Straight Propulsion on 7.1% Ramp*</th>
<th>Turning on 7.1% Ramp*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Work per meter (N*m)</td>
<td>Trial Time (sec)</td>
</tr>
<tr>
<td>----------------------</td>
<td>-------------------</td>
</tr>
<tr>
<td><strong>Trial 1</strong></td>
<td>75.1</td>
</tr>
<tr>
<td><strong>Trial 2</strong></td>
<td>74.3</td>
</tr>
<tr>
<td><strong>Trial 3</strong></td>
<td>74.9</td>
</tr>
<tr>
<td><strong>Trial 4</strong></td>
<td>71.1</td>
</tr>
<tr>
<td><strong>Trial 5</strong></td>
<td>74.4</td>
</tr>
</tbody>
</table>

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

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

**Straight Propulsion Work Ratio**  
0.727

**Turning Work Ratio**  
0.878

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.
NDS – EZ Roll Grass Paver

Hard, smooth surface with a grade of 7.1 ± 0.2% (1:14)
Hard, smooth surface with a grade of 7.1 ± 0.2% (1:14)