

## Appendix 10-2

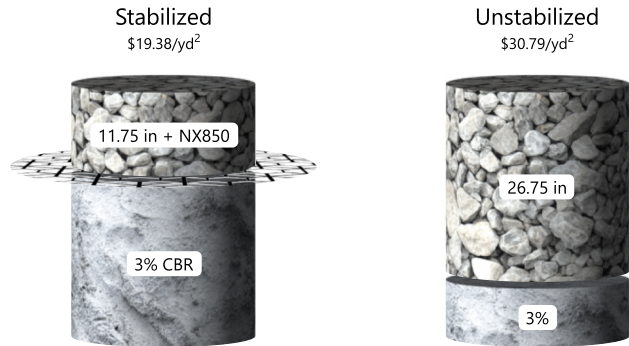
### Road Design Calculations

# Unpaved Road & Subgrade Stabilization Application Suggestion Summary

Design	Typical Gravel Access Road	Reference	
Project	Mill Point Solar	Location	WJ5V+38 Glen, NY, USA
Customer		Designer	Patrick Martin
Company	TRC	Date	June 26, 2024

Design Methodology  
The Lees Approach to Applied Mechanical Stabilization for stabilizing soft subgrades to support construction and in-service traffic by incorporating the true behavior of mechanically stabilized unbound aggregate layers subjected to dynamic stresses from vehicular loading.

## Results



	Stabilized	Unstabilized
Total thickness	11.75 in	26.75 in
Surface rut depth	0.6 in	1.35 in
Enhanced modulus, $M_r$	16,000 psi	
Required 18 kips ESALs	1,320	1,320
Subgrade protection level	IMPROVED	UNPROTECTED
Controlling design	Subgrade protection level	Bearing capacity

Total cost	\$2	\$3
Unit cost	\$19.38/yd <sup>2</sup>	\$30.79/yd <sup>2</sup>
Construction time	0 days	0 days
Dump truck visits	2	2
Fuel required	11 gal	11 gal
Water required	1 gal	2 gal
Carbon emissions	0 tonnes CO <sub>2</sub> e	0 tonnes CO <sub>2</sub> e

## Parameters

Construction Traffic	
Axle load	40 kip
Axle passes	1,200
Tire width	295 mm
Tire pressure	110 psi
Wheel configuration	Dual wheel
Wander	3 ft

In-Service Traffic	
Axle load	32 kip
Axle passes	120
Tire width	295 mm
Tire pressure	110 psi
Wheel configuration	Dual wheel
Wander	3 ft

Aggregate	
Unit weight	135 pcf
Surface rut depth	1.5 in
D <sub>100</sub>	2 in
D <sub>50</sub>	0.4 in

Subgrade	
Soil type	Silt
Plasticity	Low (ML)
CBR	3%
Separation geosynthetic	No
Subgrade protection level	Improved
Design for waterbed effect	No

Dimensions	
Project area	1 ft <sup>2</sup>

Material Costs (Installed)	
Aggregate cost	\$20.00/ton

Geosynthetic Costs (Installed)	
NX850	\$5.85/yd <sup>2</sup>

Grading Requirements	
Grade offset	Meet existing grade
Excavation cost	\$5.00/yd <sup>3</sup>

Specification  
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Supporting Documents  
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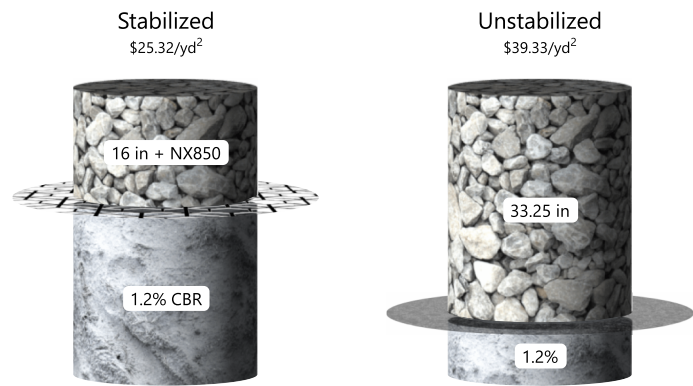
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# Unpaved Road & Subgrade Stabilization Application Suggestion Summary

<b>Design</b>	Stabilized Pervious Access Road - CBR 1.2	<b>Reference</b>	
<b>Project</b>	Mill Point Solar	<b>Location</b>	WJ5V+38 Glen, NY, USA
<b>Customer</b>		<b>Designer</b>	Patrick Martin
<b>Company</b>	TRC	<b>Date</b>	May 23, 2024

**Design Methodology**  
The Lees Approach to Applied Mechanical Stabilization for stabilizing soft subgrades to support construction and in-service traffic by incorporating the true behavior of mechanically stabilized unbound aggregate layers subjected to dynamic stresses from vehicular loading.

## Results



	Stabilized	Unstabilized
<b>Total thickness</b>	16 in	33.25 in
<b>Surface rut depth</b>	0.6 in	1.9 in
<b>Enhanced modulus, <math>M_r</math></b>	16,000 psi	
<b>Required ESALs</b>	1,320	1,320
<b>Subgrade protection level</b>	IMPROVED	UNPROTECTED
<b>Controlling design</b>	Subgrade protection level	Bearing capacity

<b>Total cost</b>	\$3	\$4
<b>Unit cost</b>	\$25.32/yd²	\$39.33/yd²
<b>Construction time</b>	0 days	0 days
<b>Dump truck visits</b>	2	2
<b>Fuel required</b>	11 gal	11 gal
<b>Water required</b>	1 gal	3 gal
<b>Carbon emissions</b>	0 tonnes CO <sub>2</sub> e	0 tonnes CO <sub>2</sub> e

## Parameters

<b>Construction Traffic</b>	
<b>Axle load</b>	40 kip
<b>Axle passes</b>	1,200
<b>Tire width</b>	295 mm
<b>Tire pressure</b>	110 psi
<b>Wheel configuration</b>	Dual wheel
<b>Wander</b>	3 ft

<b>In-Service Traffic</b>	
<b>Axle load</b>	32 kip
<b>Axle passes</b>	120
<b>Tire width</b>	295 mm
<b>Tire pressure</b>	110 psi
<b>Wheel configuration</b>	Dual wheel
<b>Wander</b>	3 ft

<b>Aggregate</b>	
<b>Unit weight</b>	135 pcf
<b>Surface rut depth</b>	2 in
<b>D<sub>100</sub></b>	3 in
<b>D<sub>50</sub></b>	1.2 in

<b>Subgrade</b>	
<b>Soil type</b>	Silt
<b>Plasticity</b>	Low (ML)
<b>CBR</b>	1.2%
<b>Separation geosynthetic</b>	Yes
<b>Subgrade protection level</b>	Improved
<b>Design for waterbed effect</b>	No

<b>Dimensions</b>	
<b>Project area</b>	1 ft²

<b>Material Costs (Installed)</b>	
<b>Aggregate cost</b>	\$20.00/ton

<b>Geosynthetic Costs (Installed)</b>	
<b>NX850</b>	\$5.85/yd²

<b>Grading Requirements</b>	
<b>Grade offset</b>	Meet existing grade
<b>Excavation cost</b>	\$5.00/yd³

**Specification**  
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**Supporting Documents**  
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# Load Support Calculation Summary

## Soil Stabilization Using the GEOWEB System

Unpaved Road and Soft Subgrade Stabilization

<b>Project Name:</b>	Mill Point Solar
<b>Calculation Name:</b>	Stabilized Pervious Access Road - CBR 1.2
<b>Project Location:</b>	Glen, NY
<b>Client:</b>	TRC

<b>Company:</b>	TRC
<b>Designer:</b>	Patrick Martin
<b>Title:</b>	Lead Civil Engineer
<b>Date:</b>	2024-05-22 13:50:58

**Calculation Method:** Bearing capacity evaluation methods consistent with Koerner (2012) and Avesani (2013), including combined effects of lateral confinement, tension membrane effect, and stress dispersion for a GEOWEB®-reinforced layer underlain by a geotextile, with hoop stress analysis for verification of system mechanical properties.

### Calculation Parameters

#### Layer Type

Wear Surface Thickness (in):	2
GEOWEB®-Stabilized Layer (in):	8
Base Layer Thickness (in):	0
Geotextile Type:	Enhanced Woven (4,800 lbs/ft)

#### Subgrade Below GEOWEB®

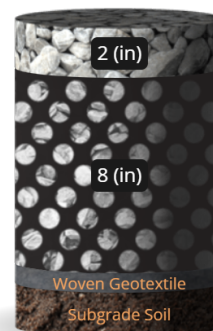
CBR (%):	1.2
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#### GEOWEB® Infill

Type:	Open Graded Aggregate
Unit Weight (lb/ft <sup>3</sup> ):	120
Friction Angle:	30°

#### Required Information

Traffic Load Rating:	AASHTO H/HS25
Wheel Load (lb):	20000
Tire Pressure (psi):	125
Desired Factor of Safety:	1



### Results

#### Bearing Capacity Enhancement

Distributed Stress on Subgrade (psi):	30.83
Allowable Subgrade Stress (psi):	35.94
Calculated Factor of Safety:	1.17

Acceptable

#### Hoop Stress Check (Genuine GEOWEB® Mechanical Properties)

Perforated Cell Wall:	9.64	FoS, Cell Wall Rupture
Internal Juncions (Seams):	14.02	FoS, Resistance to Peel
	21.04	FoS, Resistance to Shear
	16.65	FoS, Resistance to Separation
Mechanical Juncions (ATRA® Key):	3.29	FoS, Resistance to Peel
	5.48	FoS, Resistance to Shear
	4.25	FoS, Resistance to Separation

System Components Meet Load Requirements

### Notes

1. [Refer to the Geoweb Construction Resource Package for a complete description of installation and construction methods.](#) Contact Presto for product selection and to confirm cell size and material gauge.
2. Install above-referenced geotextile type in accordance with Manufacturer recommendations including overlaps based on sub grade CBR.
3. Geoweb panels shall be connected with ATRA keys at each interleaf and end to end connection. Use anchors to keep panels open for infill as required.
4. Infill Materials: Sand should be coarse-grained. Aggregate size shall be maximum of 1/3 the depth of the Geoweb cells. Engineered fill is a mixture of aggregate and topsoil that allows for a vegetated driving surface. On-site salvaged material should be granular with a particle diameter no greater than 1/3 the depth of the Geoweb cells. In all cases, fines should be limited to less than 10%. Contact Presto Geosystems if there are questions about the use of specific materials.

### Limitations

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# Unpaved Road & Subgrade Stabilization Application Suggestion Summary

<b>Design</b>	Stabilized Pervious Access Road - CBR 3.0	<b>Reference</b>	
<b>Project</b>	Mill Point Solar	<b>Location</b>	WJ5V+38 Glen, NY, USA
<b>Customer</b>		<b>Designer</b>	Patrick Martin
<b>Company</b>	TRC	<b>Date</b>	May 23, 2024

**Design Methodology**  
The Lees Approach to Applied Mechanical Stabilization for stabilizing soft subgrades to support construction and in-service traffic by incorporating the true behavior of mechanically stabilized unbound aggregate layers subjected to dynamic stresses from vehicular loading.

## Results

<div><div>Stabilized</div><div>\$20.43/yd<sup>2</sup></div><div><div>11.75 in + NX850</div><div>3% CBR</div></div></div>	<div><div>Unstabilized</div><div>\$31.27/yd<sup>2</sup></div><div><div>26.25 in</div><div>3%</div></div></div>	<table><tr><th></th><th>Stabilized</th><th>Unstabilized</th></tr><tr><td>Total thickness</td><td>11.75 in</td><td>26.25 in</td></tr><tr><td>Surface rut depth</td><td>0.6 in</td><td>2 in</td></tr><tr><td>Enhanced modulus, M<sub>r</sub></td><td>16,000 psi</td><td></td></tr><tr><td>Required ESALs</td><td>1,320</td><td>1,320</td></tr><tr><td>Subgrade protection level</td><td>IMPROVED</td><td>UNPROTECTED</td></tr><tr><td>Controlling design</td><td>Subgrade protection level</td><td>Bearing capacity</td></tr></table> <table><tr><td>Total cost</td><td>\$2</td><td>\$3</td></tr><tr><td>Unit cost</td><td>\$20.43/yd<sup>2</sup></td><td>\$31.27/yd<sup>2</sup></td></tr><tr><td>Construction time</td><td>0 days</td><td>0 days</td></tr><tr><td>Dump truck visits</td><td>2</td><td>2</td></tr><tr><td>Fuel required</td><td>11 gal</td><td>11 gal</td></tr><tr><td>Water required</td><td>1 gal</td><td>2 gal</td></tr><tr><td>Carbon emissions</td><td>0 tonnes CO<sub>2</sub>e</td><td>0 tonnes CO<sub>2</sub>e</td></tr></table>		Stabilized	Unstabilized	Total thickness	11.75 in	26.25 in	Surface rut depth	0.6 in	2 in	Enhanced modulus, M <sub>r</sub>	16,000 psi		Required ESALs	1,320	1,320	Subgrade protection level	IMPROVED	UNPROTECTED	Controlling design	Subgrade protection level	Bearing capacity	Total cost	\$2	\$3	Unit cost	\$20.43/yd <sup>2</sup>	\$31.27/yd <sup>2</sup>	Construction time	0 days	0 days	Dump truck visits	2	2	Fuel required	11 gal	11 gal	Water required	1 gal	2 gal	Carbon emissions	0 tonnes CO <sub>2</sub> e	0 tonnes CO <sub>2</sub> e
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## Parameters

Construction Traffic		Aggregate		Dimensions	
Axle load	40 kip	Unit weight	135 pcf	Project area	1 ft²
Axle passes	1,200	Surface rut depth	2 in	Material Costs (Installed)	
Tire width	295 mm	D100	3 in	Aggregate cost	\$20.00/ton
Tire pressure	110 psi	D50	1.2 in	Geosynthetic Costs (Installed)	
Wheel configuration	Dual wheel	Subgrade		NX850	\$5.85/yd²
Wander	3 ft	Soil type	Silt	Grading Requirements	
In-Service Traffic		Plasticity	Low (ML)	Grade offset	Meet existing grade
Axle load	32 kip	CBR	3%	Excavation cost	\$5.00/yd³
Axle passes	120	Separation geosynthetic	Yes		
Tire width	295 mm	Subgrade protection level	Improved		
Tire pressure	110 psi	Design for waterbed effect	No		
Wheel configuration	Dual wheel				
Wander	3 ft				

**Specification**  
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# Load Support Calculation Summary

## Soil Stabilization Using the GEOWEB System

Unpaved Road and Soft Subgrade Stabilization

<b>Project Name:</b>	Mill Point Solar
<b>Calculation Name:</b>	Stabilized Pervious Access Road - CBR 3.0
<b>Project Location:</b>	Glen, NY
<b>Client:</b>	TRC

<b>Company:</b>	TRC
<b>Designer:</b>	Patrick Martin
<b>Title:</b>	Lead Civil Engineer
<b>Date:</b>	2024-05-22 14:44:29

**Calculation Method:** Bearing capacity evaluation methods consistent with Koerner (2012) and Avesani (2013), including combined effects of lateral confinement, tension membrane effect, and stress dispersion for a GEOWEB®-reinforced layer underlain by a geotextile, with hoop stress analysis for verification of system mechanical properties.

### Calculation Parameters

#### Layer Type

Wear Surface Thickness (in):	2
GEOWEB®-Stabilized Layer (in):	8
Base Layer Thickness (in):	0
Geotextile Type:	Enhanced Woven (2,600 lbs/ft)

#### Subgrade Below GEOWEB®

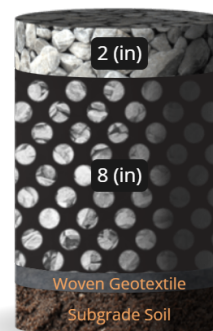
CBR (%):	3.0
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#### GEOWEB® Infill

Type:	Aggregate
Unit Weight (lb/ft <sup>3</sup> ):	120
Friction Angle:	30°

#### Required Information

Traffic Load Rating:	AASHTO H/HS25
Wheel Load (lbf):	20000
Tire Pressure (psi):	125
Desired Factor of Safety:	1.3



### Results

#### Bearing Capacity Enhancement

Distributed Stress on Subgrade (psi):	30.83
Allowable Subgrade Stress (psi):	78.12
Calculated Factor of Safety:	2.53

Acceptable

#### Hoop Stress Check (Genuine GEOWEB® Mechanical Properties)

Perforated Cell Wall:	9.64	FoS, Cell Wall Rupture
Internal Juncions (Seams):	14.02	FoS, Resistance to Peel
	21.04	FoS, Resistance to Shear
	16.65	FoS, Resistance to Separation
Mechanical Juncions (ATRA® Key):	3.29	FoS, Resistance to Peel
	5.48	FoS, Resistance to Shear
	4.25	FoS, Resistance to Separation

System Components Meet Load Requirements

### Notes

1. [Refer to the Geoweb Construction Resource Package for a complete description of installation and construction methods.](#) Contact Presto for product selection and to confirm cell size and material gauge.
2. Install above-referenced geotextile type in accordance with Manufacturer recommendations including overlaps based on sub grade CBR.
3. Geoweb panels shall be connected with ATRA keys at each interleaf and end to end connection. Use anchors to keep panels open for infill as required.
4. Infill Materials: Sand should be coarse-grained. Aggregate size shall be maximum of 1/3 the depth of the Geoweb cells. Engineered fill is a mixture of aggregate and topsoil that allows for a vegetated driving surface. On-site salvaged material should be granular with a particle diameter no greater than 1/3 the depth of the Geoweb cells. In all cases, fines should be limited to less than 10%. Contact Presto Geosystems if there are questions about the use of specific materials.

### Limitations

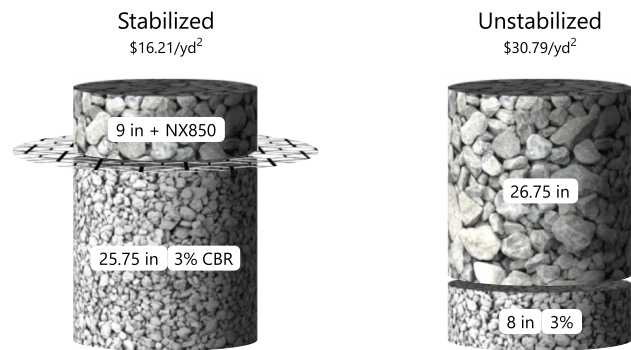
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# Unpaved Road & Subgrade Stabilization Application Suggestion Summary

Design	Vegetated Turnaround	Reference	
Project	Mill Point Solar	Location	WJ5V+38 Glen, NY, USA
Customer		Designer	Patrick Martin
Company	TRC	Date	May 23, 2024

Design Methodology  
The Lees Approach to Applied Mechanical Stabilization for stabilizing soft subgrades to support construction and in-service traffic by incorporating the true behavior of mechanically stabilized unbound aggregate layers subjected to dynamic stresses from vehicular loading.

## Results



	Stabilized	Unstabilized
Total thickness	9 in	26.75 in
Surface rut depth	1.45 in	1.4 in
Enhanced modulus, $M_r$	16,000 psi	
Required ESALs	1,224	1,224
Subgrade protection level	ADEQUATE	UNPROTECTED
Controlling design	Bearing capacity	Bearing capacity

Total cost	\$2	\$3
Unit cost	\$16.21/yd²	\$30.79/yd²
Construction time	0 days	0 days
Dump truck visits	2	2
Fuel required	11 gal	11 gal
Water required	1 gal	2 gal
Carbon emissions	0 tonnes CO <sub>2</sub> e	0 tonnes CO <sub>2</sub> e

## Parameters

Construction Traffic	
Axle load	40 kip
Axle passes	1,200
Tire width	295 mm
Tire pressure	110 psi
Wheel configuration	Dual wheel
Wander	3 ft

In-Service Traffic	
Axle load	32 kip
Axle passes	24
Tire width	295 mm
Tire pressure	110 psi
Wheel configuration	Dual wheel
Wander	3 ft

Aggregate	
Unit weight	135 pcf
Surface rut depth	1.5 in
D <sub>100</sub>	1.5 in
D <sub>50</sub>	0.5 in

Subgrade	
Soil type	Gravel
CBR	3%
Separation geosynthetic	No
Subgrade protection level	Adequate

Dimensions	
Project area	1 ft²

Material Costs (Installed)	
Aggregate cost	\$20.00/ton

Geosynthetic Costs (Installed)	
NX850	\$5.85/yd²

Grading Requirements	
Grade offset	Meet existing grade
Excavation cost	\$5.00/yd³

Specification  
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Load Support Calculation Summary

Soil Stabilization Using the GEOWEB System

Unpaved Road and Soft Subgrade Stabilization

Project Name:	Mill Point Solar	Company:	TRC
Calculation Name:	Vegetated Turnaround	Designer:	Patrick Martin
Project Location:	Glen, NY	Title:	Lead Civil Engineer
Client:	TRC	Date:	2024-05-17 15:59:23

Calculation Method:

Bearing capacity evaluation methods consistent with Koerner (2012) and Avesani (2013), including combined effects of lateral confinement, tension membrane effect, and stress dispersion for a GEOWEB®-reinforced layer underlain by a geotextile, with hoop stress analysis for verification of system mechanical properties.

Calculation Parameters

Layer Type

Wear Surface Thickness (in):	2
GEOWEB®-Stabilized Layer (in):	6
Base Layer Thickness (in):	0
Geotextile Type:	Enhanced Woven (2,600 lbs/ft)

Subgrade Below GEOWEB®

CBR (%):	3.0
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GEOWEB® Infill

Type:	Engineered Infill - Vegetated Surface
Unit Weight (lb/ft <sup>3</sup> ):	120
Friction Angle:	30°

Required Information

Traffic Load Rating:	AASHTO H/HS25
Wheel Load (lbf):	20000
Tire Pressure (psi):	125
Desired Factor of Safety:	1.3



Results

Bearing Capacity Enhancement

Distributed Stress on Subgrade (psi):	51.25	Acceptable
Allowable Subgrade Stress (psi):	78.12	
Calculated Factor of Safety:	1.52	

Hoop Stress Check (Genuine GEOWEB® Mechanical Properties)

Perforated Cell Wall:	9.50	FoS, Cell Wall Rupture	System Components Meet Load Requirements
Internal Junctions (Seams):	12.92	FoS, Resistance to Peel	
	19.37	FoS, Resistance to Shear	
	15.34	FoS, Resistance to Separation	
Mechanical Junctions (ATRA® Key):	3.82	FoS, Resistance to Peel	
	6.86	FoS, Resistance to Shear	
	5.19	FoS, Resistance to Separation	

Notes

1. [Refer to the Geoweb Construction Resource Package for a complete description of installation and construction methods.](#) Contact Presto for product selection and to confirm cell size and material gauge.
2. Install above-referenced geotextile type in accordance with Manufacturer recommendations including overlaps based on sub grade CBR.
3. Geoweb panels shall be connected with ATRA keys at each interleaf and end to end connection. Use anchors to keep panels open for infill as required.
4. Infill Materials: Sand should be course-grained. Aggregate size shall be maximum of 1/3 the depth of the Geoweb cells. Engineered fill is a mixture of aggregate and topsoil that allows for a vegetated driving surface. On-site salvaged material should be granular with a particle diameter no greater than 1/3 the depth of the Geoweb cells. In all cases, fines should be limited to less than 10%. Contact Presto Geosystems if there are questions about the use of specific materials.

Limitations

This calculation summary is for illustrative purposes and is not a detailed design. The information provided is based on product properties specific to GEOWEB® manufactured by Reynolds Presto Products, Inc. All rights reserved. Any use of this information for any geocell product other than that manufactured by Reynolds Presto Products, Inc. is strictly prohibited and makes this information invalid. Reynolds Presto Products, Inc. assumes no liability resulting from the use of this information and the responsibility for determining the suitability of any calculation result rests solely on the user of this calculation tool.