

**STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION**

ADDENDUM NO. 4

FOR

**HALEAKALA HIGHWAY SLOPE AND SHOULDER REPAIR
VICINITY OF AINAKULA ROAD TO KULALANI DRIVE
DISTRICT OF MAKAWAO
ISLAND OF MAUI
PROJECT NO. 377A-01-22M**

SEPTEMBER 5, 2024

This Addendum shall make the following amendment(s) to the Solicitation:

A. SPECIAL PROVISIONS

1. Delete **TABLE OF CONTENTS** dated 04/04/24 in its entirety and replace it with attached **TABLE OF CONTENTS** dated r09/05/24.
2. Delete **SECTION 627 - GEOWEB SOIL STABILIZATION SYSTEM** dated 12/9/21 in its entirety and replace it with attached **SECTION 627 - GEOWEB SOIL STABILIZATION SYSTEM** dated r09/05/24.

B. PLANS

1. Delete **PLAN SHEET NO. 1 – TITLE SHEET** and replace it with attached **PLAN SHEET NO. ADD.1, TITLE SHEET**.
2. Delete **PLAN SHEET NO. 4 – GENERAL NOTES FOR CONSTRUCTION** and replace it with attached **PLAN SHEET NO. ADD.4, GENERAL NOTES FOR CONSTRUCTION**.
3. Delete **PLAN SHEET NO. 21 – SLOPE PROTECTION DETAIL** and replace it with attached **PLAN SHEET NO. ADD.21, SLOPE PROTECTION DETAIL**.
4. Delete **PLAN SHEET NO. 22 – TRAFFIC CONTROL PLAN** and replace it with attached **PLAN SHEET NO. ADD.22, LOW SPEED UNDIVIDED HIGHWAY WORK ZONE SIGNING PLAN, NOTE & DETAILS**.

The following is provided for information:

C. **RESPONSES TO REQUEST FOR INFORMATION**
(RFIs/QUESTIONS)

1. The attached **RESPONSES TO REQUEST FOR INFORMATION** are provided for information.

Please acknowledge receipt of this **ADDENDUM NO. 4** by recording the date of its receipt in the space provided on **PAGE P-4** of the PROPOSAL.



ANNETTE D.H. MATSUDA
District Engineer, Maui

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- Performance Bond
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- Labor and Material Payment Bond
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1 Make the following Section part of the Standard Specifications:

2
3 (I) **Add Section 627 – Geoweb Soil Stabilization System** to read as
4 follows:

5
6 **"SECTION 627 – GEOWEB SOIL STABILIZATION SYSTEM**

7
8 **627.01a Description.**

9 (A) Work Included: This section includes providing all material, labor,
10 tools and equipment for installation of geocell system as shown in
11 the Contract Documents and as specified in this section.

12
13 (B) The geocell system shall be used for slope protection.

14
15 **627.01b References.**

16
17 (A) **American Association of State Highway and Transportation**
18 **Officials (AASHTO).**

19
20 (1) **AASHTO M 218** – Steel Sheet, Zinc-Coated (Galvanized) for
21 Corrugated Steel Pipe.

22
23 (2) **AASHTO M 288** – Geotextile Specification for Highway
24 Applications.

25
26 (B) **American Society of Testing and Materials (ASTM).**

27
28 (1) **ASTM D 1505** – Density of Plastics by the Density-Gradient
29 Technique.

30
31 (2) **ASTM D 1603** – Standard Test for Carbon Black in Olefin
32 Plastics

33
34 (3) **ASTM D 1693** – Environmental Stress-Cracking of Ethylene
35 Plastics.

36
37 (4) **ASTM D 5199** – Measuring Nominal Thickness of
38 Geotextiles and Geomembranes.

39
40 (5) **ASTM D 5394** – Standard Test Method for Environmental
41 Stress-Cracking of Ethylene Plastics

42
43 (6) **ASTM D 5596** – Standard Test Method for Microscopic
44 Evaluation of the Dispersion of Carbon Black in Polyolefin
45 Geosynthetics
46

- (7) **ASTM D 5721** – Standard Practice for Air-Oven Aging of Polyolefin Geomembranes
- (8) **ASTM D 5885** – Standard Test Method for Oxidative Induction Time of Polyolefin Geosynthetics by High-Pressure Differential Scanning Calorimetry
- (9) **ASTM D 6693 (Type IV)** – Standard Test Method for Determining Tensile Properties of Nonreinforced Polyethylene and Nonreinforced Flexible Polypropylene Geomembranes
- (10) **ASTM D 7328** – Standard Test Method for Effect of Exposure of Unreinforced Polyolefin Geomembrane Using Fluorescent UV Condensation Apparatus
- (11) **ASTM E 41** – Terminology Relating to Conditioning.
- (C) **US Army Corps of Engineers (USACE)**
- (1) Technical Report GL-86-19, Appendix A
- (D) **International Organization for Standardization (European Union) (ENISO)**
- (1) **ISO 6721 – Plastics** – Determination of Dynamic Mechanical Properties
- (2) **EN ISO 10319 – Geosynthetics** – Wide-Width Tensile Test
- (3) **EN 12224 – Geotextiles and geotextile-related products** – Determination of the resistance to weathering

627.01c Submittals

- (A) Submit manufacturer's shop drawings in accordance with Section 106.05 Sample Submittals. Submittals including Manufacturer's product data, calculations, drawings and field representative qualifications.
- (B) Manufacturer Calculations. Provide a complete set of project calculations including a description of the static analysis performed to determine the slope and crest anchorage requirements.
- (1) The calculations shall be submitted at the time of bid. The calculation shall be included in an evaluation containing a written summary, plan view, cross section, calculations, and

research and testing documentation. The evaluation shall be based on site specific conditions. Standard graphs and table are not acceptable.

(2) The calculations shall be based on computer software developed through research and testing at an accredited university or research facility based specifically on the product being submitted including geocell infill and panel connection device. Provide third party research summary for the calculation method specific to the manufacturer's material values, infill type and panel connectors.

(3) ATRA Anchor Anchorage Calculations include the following:

(a) The slope stabilization calculations shall be based on slope angle, vertical height, minimum interface friction angle, infill type and weight, sub grade weight, cohesion and friction angle and geocell size and depth.

(b) Standard anchor graphs and tables are not acceptable. Anchorage pattern shall be based on site specific conditions.

(c) The minimum overall factor of safety for crest anchorage, shear and anchors shall be at least 1.40.

(d) Provide geocell size and depth.

(e) If required, provide a description of the geotextile separation layer.

(f) Provide anchor length, diameter, anchor resistance, anchor density and anchor pattern.

(g) Provide crest anchorage embedment depth, depth below crest, slope angle, depth and resulting resisting force.

(h) Provide factor of safety for the crest anchorage and shear.

(i) Provide factor of safety for crest anchorage, shear and anchors.

(j) Provide third party testing on panel connection device showing minimum pull through resistance of 275 lbs.

(4) The stability calculations shall be in Microsoft Excel converted to Adobe PDF format.

(5) At a minimum; include design conditions, slope stability calculations, calculated factors of safety and friction angles. Provide the number of tendons, tendon type, load transfer device and spacing.

(C) Manufacturer's Certificate of Analysis: Manufacturer shall supply certificate of analysis containing the following test results for the geocell material used for project: Base Resin Lot Number(s), Resin Density per ASTM-1505, Production Lot Number(s), Material Thickness, Short Term Seam Peel Strength, and percentage of Carbon Black. Submit qualifications certifying the installer is experienced in the installation of the specified products.

(D) Submit qualifications of Manufacturer's field representative certifying the field representative is experienced in the installation of the specified products.

(E) Submit certificate of compliance that all materials and resins used to produce the specified materials are 100% made by plants located in the United States per public law Build America, Buy America (BABA) included in the Infrastructure Investment and Jobs Act under Title IX, Subtitle A, Part 1.

(F) No material will be considered as an equivalent to the geocell material specified herein unless it meets all requirements of this specification, without exception. Manufacturers seeking to supply what they represent as equivalent material must submit records, data, independent test results, samples, certifications, and documentation deemed necessary by the Engineer to prove equivalency. The Engineer shall approve or disapprove other Manufacturers' materials in accordance with the General Conditions after all information is submitted and reviewed. Any substitute materials submitted shall be subject to independent lab testing at the contractor's expense.

627.01d Quality Assurance and Control

(A) The geocell system material shall be provided from a single Manufacturer for the entire project.

- 184 (B) The Manufacturer's Quality Management System shall be certified
185 and in accordance with ISO 9001:2015 and CE certification. Any
186 substitute materials submitted shall provide a certification that their
187 geocell manufacturing process is part of an ISO program and a
188 certification will be required specifically stating that their testing
189 facility is certified and in accordance with ISO. An ISO certification
190 for the substitute material will not be acceptable unless it is proven
191 it pertains specifically to the geocell manufacturing operations.
192
- 193 (C) The Manufacturer shall provide certification of compliance to all
194 applicable testing procedures and related specifications upon the
195 customer's written request. Request for certification shall be
196 submitted no later than the date of order placement. The
197 Manufacturer shall have a minimum of 20 years' experience
198 producing geocells and accessories.
199
- 200 (D) Pre-Installation Meeting: Prior to installation of any materials,
201 conduct a pre-installation meeting to discuss the scope of work and
202 review installation requirements. The pre-installation meeting shall
203 be attended by all parties involved in the installation of the geocell
204 system.
205
- 206 (E) Manufacturer's Field Representative Qualifications:
207
- 208 (1) Manufacturer shall provide a qualified field representative on
209 site at the start of construction to ensure the system is installed
210 in accordance with the Contract Documents.
- 211 (2) Manufacturer's field representative shall have a minimum 5
212 years installation experience with the specified products in the
213 specified application.
- 214 (3) Manufacturer of any substitute materials to be used shall certify
215 that a representative can meet the above criteria and will be on
216 site for initial construction start up.
217

218 **627.01e Delivery, Storage, and Handling**
219

- 220 (A) Deliver materials to site in Manufacturer's original, unopened
221 containers and packaging, with labels clearly identifying product
222 name and Manufacturer.
223
- 224 (B) The materials shall be stored in accordance with Manufacturer's
225 instructions. The materials shall be protected from damage and
226 away from direct sunlight.
227
- 228 (C) The materials shall be delivered, unloaded and installed in a
229 manner to prevent and minimize damage.

230 **627.01f Warranty**

- 231
- 232 (A) The Manufacturer shall warrant each section that it ships to be free
- 233 from defects in materials and workmanship at the time of
- 234 manufacture. The Manufacturer's exclusive liability under this
- 235 warranty or otherwise will be to furnish without charge to the
- 236 original f.o.b. point a replacement for any section which proves to
- 237 be defective under normal use and service during the 10-year
- 238 period which begins on the date of shipment. The Manufacturer
- 239 reserves the right to inspect any allegedly defective section in order
- 240 to verify the defect and ascertain its cause.
- 241
- 242 (B) This warranty shall not cover defects attributable to causes or
- 243 occurrences beyond the Manufacturer's control and unrelated to
- 244 the manufacturing process, including, but not limited to, abuse,
- 245 misuse, mishandling, neglect, improper storage, improper
- 246 installation, improper alteration or improper application.
- 247
- 248 (C) In no event shall the Manufacturer be liable for any special, indirect,
- 249 incidental or consequential damages for the breach of any express
- 250 or implied warranty or for any other reason, including negligence, in
- 251 connection with the cellular confinement system.
- 252

253 **627.02a Acceptable Manufacturer**

- 254
- 255 (A) Presto Geosystems, PO Box 2399, Appleton, Wisconsin
- 256 54912-2399. Phone: (920) 738-1328. Email: info@prestogeo.com.
- 257 Website: www.prestogeo.com.
- 258

259 **627.02b Geoweb Geocell**

- 260
- 261 (A) **Manufacturing Certification.** The Manufacturer shall have earned
- 262 a certificate of registration, which demonstrates that its quality-
- 263 management system for its Geoweb cellular confinement system is
- 264 currently registered to the ISO 9001:2008 and CE quality
- 265 standards.
- 266
- 267 (B) **Base Materials**
- 268
- 269 (1) **Polyethylene Stabilized with Carbon Black**
- 270
- 271 (a) Density shall be 58.4 to 60.2 pound/ft³ (0.935 to 0.965
- 272 g/cm³) in accordance with ASTM D 1505.
- 273
- 274 (b) Environmental Stress Crack Resistance (ESCR) shall
- 275 be 5000 hours in accordance with ASTM D 1693.

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- (c) Resistance to Oxidation shall be minimum of 100 years in accordance with EN ISO 13438.
 - (d) 100% of original strip tensile strength shall be retained following exposure to accelerated weathering in in accordance with EN 12224.
 - (e) The Flexural Storage Modulus shall be a minimum of 800 MPa in accordance with ISO 6721.
 - (f) Ultra-Violet light stabilization with carbon black.
 - (d) Carbon Black content shall be 1.5 to 2 percent by weight, through addition of a carrier with certified carbon black content.
 - (e) Carbon black shall be homogeneously distributed throughout material.
 - (f) The manufacturer must have an in-place quality control to prevent irregularities in strip material.

299 **(D) Cell Properties**

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- (1) Individual GW30V cells shall be uniform in shape and size when expanded
 - (a) Length shall be 11.3 inches (287 mm).
 - (b) Width shall be 12.6 inches (320 mm).
 - (c) Nominal area shall be 71.3 in² (460 cm²) plus or minus 1%.
 - (d) Nominal depth shall be 3 inches (150 mm)

313 **(E) Strip Properties and Assembly**

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321
- (1) Perforated Textured Strip/Cell
 - (a) Strip sheet thickness shall be 50 mil (1.27 mm), minus 5 percent, plus 10 percent in accordance with ASTM D 5199. Determine thickness flat, before surface disruption.

- (b) Polyethylene strips shall be textured surface with a multitude of rhomboidal (diamond shape) indentations.
- (c) Textured sheet thickness shall be 60 mil plus or minus 6 mil (1.52 mm plus or minus 0.15 mm).
- (d) Indentation surface density shall be 140 to 200 per in² (22 to 31 per cm²).
- (e) Perforated with horizontal rows of 0.4 inch (10 mm) diameter holes.
- (f) Perforations within each row shall be 0.75 inches (19 mm) on-center.
- (g) Horizontal rows shall be staggered and separated 0.50 inches (12 mm) relative to hole centers.
- (h) Edge of strip to nearest edge of perforation shall be a minimum of 0.3 inches (8 mm).
- (i) Centerline of spot weld to nearest edge of perforation shall be a minimum of 0.7 inches (18 mm).
- (j) A slot with a dimension of 3/8 inch x 1-3/8 inch (10 mm x 35 mm) is standard in the center of the non-perforated areas and at the center of each weld.

(2) Assembly of Cell Sections

- (a) Fabricate using strips of sheet polyethylene each with a length of 142 inches (3.61 m) and a width equal to cell depth.
- (b) Connect strips using full depth ultrasonic spot-welds aligned perpendicular to the longitudinal axis of strip.
- (c) Ultrasonic weld melt-pool width shall be 1.0 inch (25 mm) maximum.
- (d) Weld spacing for GW30V-cell sections shall be 17.5 inches plus or minus 0.10 inch (445 mm plus or minus 2.5 mm).

(F) Cell Seam Strength Tests

(1) Minimum seam strengths are required by design and shall be reported in test results. Materials submitted with average or typical values will not be accepted. Written certification of minimum strengths must be supplied to the engineer at the time of submittals.

(2) Short-Term Seam Peel-Strength Test

(a) Cell seam strength shall be uniform over full depth of cell.

(b) Minimum seam peel strength shall be 240 lbf (1,060 N) for 3 inch (75 mm) depth.

(3) Long-Term Seam Peel-Strength Test

(a) Conditions: Minimum of seven (7) days in a temperature-controlled environment that undergoes change on a 1 hour cycle from room temperature to 130 °F (54 °C).

(b) Room temperature shall be in accordance with ASTM E41.

(c) Test samples shall consist of two, four-inch (100 mm) wide strips welded together.

(d) Test sample consisting of two carbon black stabilized strips shall support a 160 pound (72.5 kg) load for test period

(4) Internal Junction Efficiency

(a) Internal junction efficiency (seams) shall be determined as a ratio of junction performance to perforated strip performance, as determined by EN ISO 10319 and EN ISO 13426-1.

(b) Internal junction efficiency (factor of safety) shall be calculated for peel, shear and separation.

(c) Minimum internal junction efficiency shall be ≥ 100 percent.

- 414 (5) Mechanical Junction Efficiency
- 415
- 416 (a) Mechanical junction efficiency (panel to panel
- 417 connection) shall be determined as a ratio of junction
- 418 performance to perforated strip performance, as
- 419 determined by EN ISO 10319 and EN ISO 13426-1.
- 420
- 421 (b) Mechanical junction efficiency (factor of safety) shall
- 422 be calculated for peel, shear and separation.
- 423
- 424 (c) Minimum mechanical junction efficiency shall be \geq
- 425 100 percent.
- 426
- 427 (d) Connection type shall be with integral components as
- 428 designated by the Manufacturer.
- 429
- 430 (6) 10,000-hour Seam Peel Strength Certification
- 431
- 432 (a) Provide data showing that the high-density
- 433 polyethylene resin used to produce the geocell
- 434 sections have been tested using an appropriate
- 435 number of seam samples and varying loads to
- 436 generate data indicating that the seam peel strength
- 437 shall survive a loading of at least 209 lbf (95 kg) for a
- 438 minimum of 10,000 hours.
- 439

440 **627.02c Integral Components**

441

- 442 (A) ATRA® Stake Clip or approved equal
- 443
- 444 (1) The stake clip is a molded, high-strength polyethylene
- 445 device available in standard (0.5 inch) and metric (10–12
- 446 mm) versions.
- 447
- 448 (2) Stake clips shall be installed as an end cap on standard (0.5
- 449 inch) and metric (10–12 mm) steel reinforcing rods to form
- 450 ATRA® Anchors.
- 451
- 452 (B) ATRA® Key or approved equal
- 453
- 454 (1) The key shall be constructed of polyethylene and provide a
- 455 high strength connection with minimum pull-through of 275
- 456 lbs (125 kg).
- 457
- 458 (2) The key shall be used to connect sections together at each
- 459 interleaf and end to end connection.

- 460
- 461 (3) Metal staples, zip ties, and two-piece connectors are not
- 462 allowed.
- 463
- 464 (4) The keys shall include a structurally reinforced handle and
- 465 frictional barbs to enhance interlock with the textured wall
- 466 surface to prevent mechanical joint failure including peel,
- 467 shear and separation.
- 468

469 **627.02d Stake Anchorage**

470

- 471 (A) ATRA® Anchors or approved equal
- 472
- 473 (1) Anchors shall consist of standard (0.5 inch) or metric (10-12
- 474 mm) steel reinforcing rod with an ATRA® Stake Clip
- 475 attached as an end cap.
- 476
- 477 (2) Anchors shall be assembled by inserting the stake clip onto
- 478 the reinforcing rod so that the end is flush with the top of the
- 479 stake clip. Prior to attaching the stake clip, the reinforcing
- 480 rod shall be beveled and free from all burrs
- 481
- 482 (3) The anchor length and placement shall be as shown in the
- 483 Contract Documents.
- 484

485 **627.02e Infill Materials**

486

- 487 (A) Infill material shall be pulverized topsoil for vegetated surfaces and
- 488 shall have an SCS texture of loam, sandy loam or silty loam.
- 489 Topsoil shall be neither excessively acidic nor alkaline.
- 490
- 491 (B) Infill material shall be free of any foreign material.
- 492
- 493 (C) Clays and silts are not acceptable infill material.
- 494
- 495 (D) Infill material shall be free-flowing and not frozen when placed in
- 496 the sections.
- 497

498 **627.02f Additional Components**

499

- 500 (A) Surface Protection
- 501
- 502 (1) Surface protection shall consist of [erosion control blanket]
- 503 [turf reinforcement mat] [hydroseed] as specified in the
- 504 Contract Documents.
- 505

(B) Geotextile

- (1)** If required, the geotextile separation layer shall be as specified in the Contract Documents.

627.03a Examination

- (A)** Verify site conditions are as indicated on the drawings. Notify the Engineer if site conditions are not acceptable. Do not begin preparation or installation until unacceptable conditions have been corrected.

- (B)** Verify layout of structure is as indicated on the drawings. Notify the Engineer if layout of structure is not acceptable. Do not begin preparation or installation until unacceptable conditions have been corrected.

627.03b Installation

- (A)** Prepare sub grade and install slope protection system in accordance with Contract Documents and Manufacturer's installation guidelines.

- (B)** On-site time for installation assistance by the Manufacturer's field representative shall be a minimum 1 day with one trip. All travel and expense costs for Manufacturer's field representative installation assistance shall be included in the base bid price.

(C) Sub Grade Preparation

- (1)** Excavate and shape sub grade per the Contract Documents. If required, install geotextile separation layer in accordance with the Contract Documents and Manufacturer's recommendations including overlaps.

(D) Section Anchorage

- (1)** Anchorage requirements shall be as shown on the Contract Documents.

(2) Anchorage with ATRA® Anchors

- (a)** Excavate the anchor trench at the top of the slope to the depth as shown in the Contract Documents.

- 552 (b) Position the collapsed sections at the crest of the
553 slope.
554
555 (c) Drive Anchors at the crest of the slope to secure the
556 sections and allow expansion of the sections into
557 position.
558
559 (d) After the sections are expanded as desired, drive
560 anchors so the arm of the stake clip engages with the
561 top of the cell wall.
562
563 (e) Connect the sections with ATRA Keys at each
564 interleaf and end-to-end connection. Inset the key
565 through the cell wall I-slot before inserting through the
566 adjacent cell. Turn the key 90 degrees to lock the
567 sections together.
568
569 (f) Fill the anchorage trench with the specified material
570 and compact as required by the Contract Documents.
571
572 (g) Anchorage pattern and anchor length shall be in
573 accordance with the Contract Documents.
574

575 **(E) Topsoil Infill Placement**
576

- 577 (1) Place infill with suitable handling equipment.
578
579 (2) Infill material shall be free-flowing and not frozen when
580 placed in the sections.
581
582 (3) Limit drop height to prevent panel distortion.
583
584 (4) Fill sections from the crest of the slope to toe or in
585 accordance with Contract Documents.
586
587 (5) Evenly spread infill and tamp into place ensuring the infill is
588 flush with top of cell walls per the Contract Documents.
589

590 **(G) Surface Treatment**
591

- 592 (1) Surface protection shall be installed in accordance with the
593 Contract Documents.
594

595 **627.04 Method of Measurement.** The Geoweb soil stabilization system will
596 be paid on a lump sum basis. Measurement for payment will not
597 apply.

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627.05 Basis of Payment. The Engineer will pay for the accepted pay items listed below at the contract price per pay unit, as shown in the proposal schedule. Payment will be full compensation for the work prescribed in this section and the contract documents

The Engineer will pay for the following pay items when included in the proposal schedule:

Pay Item	Pay Unit
Geoweb Soil Stabilization System	Lump Sum”

Appendix A

Short-Term Seam Strength Test Procedure

Frequency of Test

The short-term seam peel strength test (referred to as the 'test' in this section) shall be performed on a geocell section randomly taken directly from the production line each two hours.

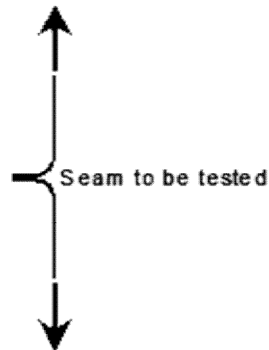


Figure A1

Test Sample Preparation

Randomly choose 10 welds within the selected section and cut those welds from the section such that 10 cm (4 in) of material exist on each side of the weld. The test sample shall have a general appearance as illustrated in Figure A1. Prior to testing, the test samples shall have air cool for a minimum of 30 minutes from the time the selected geocell section was manufactured.

Short-term Seam Peel Strength Test

The apparatus used for testing the short-term seam peel strength shall be of such configuration that the jaws of the clamp shall not over stress the sample during the test period. Load shall be applied at a rate of 12 in (300 mm) per minute and be applied for adequate time to determine the maximum load. The date, time and load shall be recorded.

Short-term seam peel strength shall be defined as the maximum load applied to the test sample. Minimum required short-term seam peel strength shall be:

- 640 lbf (2840 N) for the 8 in (200 mm) depth cell
- 480 lbf (2130 N) for the 6 in (150 mm) depth cell
- 320 lbf (1420 N) for the 4 in (100 mm) depth cell
- 240 lbf (1060 N) for the 3 in (75 mm) depth cell.

647 **Definition of Pass / Failure**

648
649 Two methods shall be used to determine acceptability of the manufactured
650 geocell sections. The successful passing of the short-term seam peel test shall
651 not be used to determine acceptable of the polyethylene for use in manufacturing
652 of the geocell sections. Acceptability of the polyethylene shall be determined
653 through tests conducted in Appendix B.

654
655 **The Tested Value**

656
657 If more than one of the tested seam samples fails to meet the minimum
658 peel strength, all sections manufactured after the previously successful test shall
659 be rejected.
660

Appendix B Long-Term Seam Strength Test Procedure

Frequency of Test

The long-term seam peel strength test (referred to as the 'test' in this section) shall be performed:

- 1) On each new resin lot number if the geocell manufacturer extrudes the sheet or strip used to produce the geocell material.
- 2) On each new order of sheet and/or strip if the geocell manufacturer does not extrude the sheet and/or strip used to produce the geocell material.



Figure B1

Test Sample Preparation

A test sample shall be made using two sets of two strips meeting all aspects of the material portion of this specification. Testing shall be done on non-perforated samples to obtain the true seam strength of the bond. One set of two strips are to be welded in welder position "A" and the other set of two strips are to be welded in welder position "B" producing two 1-cell long sections of geocell product. Welding should be done using a warm welder. The welded samples shall be labeled "A" and "B" and the weld seams of each sample shall be numbered consecutively from left to right starting with the number 1 (one) and corresponding to the welding head number.

The samples shall air cool for a minimum of 30 minutes. Randomly choose 10 welds from samples "A" and "B" and cut those welds from the geocell samples such that 4 in (10 cm) of material exist on each side of the weld. These samples shall be cut to a width of 4 in (10 cm). Properly identify each weld using the sample letter and weld seam number.

These samples are now ready to be tested.

Long-term Seam Peel Strength Test

The long-term seam peel strength test shall take place within an environmentally controlled chamber that undergoes temperature change on a 1-hour cycle from room temperature to 130°F (54°C). Room temperature shall be defined per ASTM E41.

Within the environmentally controlled chamber, one of the ends of the samples (10 samples in total) shall be secured to a stationary upper clamp. The jaws of the clamp shall be of such configuration that the grip does not over stress the sample during the test period. The sample shall be secured so that its axis is vertical and the welds being tested are horizontal as the sample hangs within the environmentally controlled chamber.

A weight of 160 lb (72.5 kg) shall be lifted via a hoist or lift platform and attached to the free lower end, of the sample. The weight shall be lowered in a way so that no impact load occurs on the sample being tested. The weight shall be sufficient distance from the floor of the chamber so that the weight will not touch the floor of the chamber as the sample undergoes creep during the test period. The date and hour the weight is applied shall be recorded.

The temperature cycle shall commence immediately within the environmentally controlled chamber. The test period for the applied load shall be 168 hours.

Definition of Pass / Failure

If any of the 10 seams fail prior to the end of the 168-hour (7-day) period, the date and hour of the failure shall be recorded and the polyethylene resin and strip material shall be considered unsuitable for geocell manufacturing.

END OF SECTION 627

**HALEAKALA HIGHWAY SLOPE AND SHOULDER REPAIR
VICINITY OF AINAKULA ROAD TO KULALANI DRIVE
DISTRICT OF MAKAWAO
ISLAND OF MAUI**

PROJECT NO. 377A-01-22M

**Responses to Request for Information (RFI's/Questions)
HlePRO Solicitation B24003401
(As of September 5, 2024)**

1. Please provide a detail for the transition to end the rub-rail guardrail and starting the MGS guardrail?

RESPONSE: Standard details illustrating the end of rub-rail guardrail and continuation of MGS guardrail are attached to the Addendum.

2. Are flange post mounted Advisory boards required for the project?

RESPONSE: Yes, flange post mounted Advisory signs are required on the project, refer to Standard Specification 645.03.

3. Are post mounted construction signs (road work ahead, end road work, construction area/reduced speed limit/\$ fine, begin/construction area/speed limit/\$fine, end/construction area/speed limit) required for the project? If so, can you please provide a detail and location?

RESPONSE: Yes, post mounted construction signs are required on the project. PLAN SHEET NO. ADD.4 is attached to the Addendum which replaces PLAN SHEET NO. 4. Note 20 requires the Contractor to submit a detailed traffic control plan (TCP) and schedule at least 15 working days before the start of work. PLAN SHEET NO. ADD.22 is attached to the Addendum which replaces PLAN SHEET NO. 22. PLAN SHEET NO. ADD.22 illustrates the construction zone speed limit reduction and appropriate fine signs.

4. If Advisory boards are required on the project, can used flanged posts/anchors be used for the project?

RESPONSE: No, all Advisory and construction signposts shall be new.

5. If post mounted construction signs are required on the project, can used signs, posts and anchors be used for the project?

RESPONSE: Temporary construction signs may be used, only if the signs are in good condition as determined by the construction project manager and inspector. No, all Advisory and construction signposts shall be new.

6. Is the Geoweb cell depth 3-inch (Per Plan Sheet 21) or 6-inch (Per Spec, Section 627.03 (D) Cell Properties (3.d) Nominal Depth Shall Be 6 inches)?

RESPONSE: The Geoweb cell nominal depth shall be 3 inches (150 mm). PLAN SHEET NO. ADD.21 is attached to the Addendum which reflects the current manufacturer's Geoweb slope protection typical section and anchoring details. The updated SECTION 627 - GEOWEB SOIL STABILIZATION SYSTEM Special Provision dated r09/05/24 is attached to the Addendum and replaces SECTION 627 - GEOWEB SOIL STABILIZATION SYSTEM Special Provision dated 12/9/21.

7. Please clarify, is the Geoweb tendon TP-225 (called out in Spec 627.03) or TPP-55 (called out on Plan Page Sheet 21)? Please Note depend on depth of Geoweb 3-inch is GW30V3 and 6-inch is GW30V6.

RESPONSE: PLAN SHEET NO. ADD.21 is attached to the Addendum which reflects the current manufacturer's Geoweb slope protection typical section and anchoring details. The updated SECTION 627 - GEOWEB SOIL STABILIZATION SYSTEM dated r09/05/24 is attached to the Addendum and replaces SECTION 627 - GEOWEB SOIL STABILIZATION SYSTEM dated 12/9/21.