

**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
- Chapter 104, HRS Compliance Certificate
- Certification of Compliance for Employment of State Residents

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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

- 47 (7) **ASTM D 5721** – Standard Practice for Air-Oven Aging of
 48 Polyolefin Geomembranes
 49 (8) **ASTM D 5885** – Standard Test Method for Oxidative
 50 Induction Time of Polyolefin Geosynthetics by High-Pressure
 51 Differential Scanning Calorimetry
 52
 53 (9) **ASTM D 6693 (Type IV)** – Standard Test Method for
 54 Determining Tensile Properties of Nonreinforced
 55 Polyethylene and Nonreinforced Flexible Polypropylene
 56 Geomembranes
 57
 58 (10) **ASTM D 7328** – Standard Test Method for Effect of
 59 Exposure of Unreinforced Polyolefin Geomembrane Using
 60 Fluorescent UV Condensation Apparatus
 61
 62 (11) **ASTM E 41** – Terminology Relating to Conditioning.
 63
 64 (C) **US Army Corps of Engineers (USACE)**
 65
 66 (1) Technical Report GL-86-19, Appendix A
 67
 68 (D) **International Organization for Standardization (European**
 69 **Union) (ENISO)**
 70
 71 (1) **ISO 6721 – Plastics** – Determination of Dynamic
 72 Mechanical Properties
 73
 74 (2) **EN ISO 10319 – Geosynthetics** – Wide-Width Tensile Test
 75
 76 (3) **EN 12224 – Geotextiles and geotextile-related products** –
 77 Determination of the resistance to weathering
 78

79 **627.01c Submittals**
 80

- 81 (A) Submit manufacturer's shop drawings in accordance with Section
 82 106.05 Sample Submittals. Submittals including Manufacturer's
 83 product data, calculations, drawings and field representative
 84 qualifications.
 85
 86 (B) Manufacturer Calculations. Provide a complete set of project
 87 calculations including a description of the static analysis performed
 88 to determine the slope and crest anchorage requirements.
 89
 90 (1) The calculations shall be submitted at the time of bid. The
 91 calculation shall be included in an evaluation containing a
 92 written summary, plan view, cross section, calculations, and

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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.

- 138 (j) Provide third party testing on panel connection device
139 showing minimum pull through resistance of 275 lbs.
140
- 141 (4) The stability calculations shall be in Microsoft Excel
142 converted to Adobe PDF format.
143
- 144 (5) At a minimum; include design conditions, slope stability
145 calculations, calculated factors of safety and friction angles.
146 Provide the number of tendons, tendon type, load transfer
147 device and spacing.
148
- 149 (C) Manufacturer's Certificate of Analysis: Manufacturer shall supply
150 certificate of analysis containing the following test results for the
151 geocell material used for project: Base Resin Lot Number(s), Resin
152 Density per ASTM-1505, Production Lot Number(s), Material
153 Thickness, Short Term Seam Peel Strength, and percentage of
154 Carbon Black. Submit qualifications certifying the installer is
155 experienced in the installation of the specified products.
156
- 157 (D) Submit qualifications of Manufacturer's field representative
158 certifying the field representative is experienced in the installation of
159 the specified products.
160
- 161 (E) Submit certificate of compliance that all materials and resins used
162 to produce the specified materials are 100% made by plants
163 located in the United States per public law Build America, Buy
164 America (BABA) included in the Infrastructure Investment and Jobs
165 Act under Title IX, Subtitle A, Part 1.
166
- 167 (F) No material will be considered as an equivalent to the geocell
168 material specified herein unless it meets all requirements of this
169 specification, without exception. Manufacturers seeking to supply
170 what they represent as equivalent material must submit records,
171 data, independent test results, samples, certifications, and
172 documentation deemed necessary by the Engineer to prove
173 equivalency. The Engineer shall approve or disapprove other
174 Manufacturers' materials in accordance with the General
175 Conditions after all information is submitted and reviewed. Any
176 substitute materials submitted shall be subject to independent lab
177 testing at the contractor's expense.
178

179 **627.01d Quality Assurance and Control**
180

- 181 (A) The geocell system material shall be provided from a single
182 Manufacturer for the entire project.
183

- 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.

(D) Cell Properties

- (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)

(E) Strip Properties and Assembly

- (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.

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- (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).

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(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 (A) ATRA® Stake Clip or approved equal
442
443 (1) The stake clip is a molded, high-strength polyethylene
444 device available in standard (0.5 inch) and metric (10–12
445 mm) versions.
446
447 (2) Stake clips shall be installed as an end cap on standard (0.5
448 inch) and metric (10–12 mm) steel reinforcing rods to form
449 ATRA® Anchors.
450
451 (B) ATRA® Key or approved equal
452
453 (1) The key shall be constructed of polyethylene and provide a
454 high strength connection with minimum pull-through of 275
455 lbs (125 kg).
456
457 (2) The key shall be used to connect sections together at each
458 interleaf and end to end connection.
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- (3) Metal staples, zip ties, and two-piece connectors are not allowed.
- (4) The keys shall include a structurally reinforced handle and frictional barbs to enhance interlock with the textured wall surface to prevent mechanical joint failure including peel, shear and separation.

627.02d Stake Anchorage

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

627.02e Infill Materials

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

627.02f Additional Components

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

- 506 (B) Geotextile
507
508 (1) If required, the geotextile separation layer shall be as
509 specified in the Contract Documents.
510

511 **627.03a Examination**
512

- 513 (A) Verify site conditions are as indicated on the drawings. Notify the
514 Engineer if site conditions are not acceptable. Do not begin
515 preparation or installation until unacceptable conditions have been
516 corrected.
517
518 (B) Verify layout of structure is as indicated on the drawings. Notify the
519 Engineer if layout of structure is not acceptable. Do not begin
520 preparation or installation until unacceptable conditions have been
521 corrected.
522

523
524 **627.03b Installation**
525

- 526 (A) Prepare sub grade and install slope protection system in
527 accordance with Contract Documents and Manufacturer's
528 installation guidelines.
529
530 (B) On-site time for installation assistance by the Manufacturer's field
531 representative shall be a minimum 1 day with one trip. All travel and
532 expense costs for Manufacturer's field representative installation
533 assistance shall be included in the base bid price.
534
535 (C) Sub Grade Preparation
536
537 (1) Excavate and shape sub grade per the Contract Documents.
538 If required, install geotextile separation layer in accordance
539 with the Contract Documents and Manufacturer's
540 recommendations including overlaps.
541
542 (D) Section Anchorage
543
544 (1) Anchorage requirements shall be as shown on the Contract
545 Documents.
546
547 (2) Anchorage with ATRA® Anchors
548
549 (a) Excavate the anchor trench at the top of the slope to
550 the depth as shown in the Contract Documents.
551

- 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”

612 **Appendix A**
613 **Short-Term Seam Strength Test Procedure**

614
615 **Frequency of Test**

616
617 The short-term seam peel strength test (referred to as the 'test' in this
618 section) shall be performed on a geocell section randomly taken directly from the
619 production line each two hours.
620

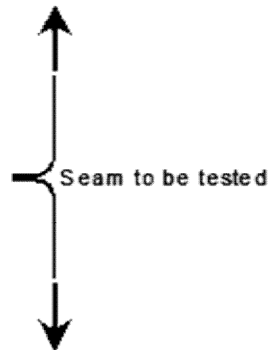


Figure A1

621
622 **Test Sample Preparation**

623
624 Randomly choose 10 welds within the selected section and cut those
625 welds from the section such that 10 cm (4 in) of material exist on each side of the
626 weld. The test sample shall have a general appearance as illustrated in
627 Figure A1. Prior to testing, the test samples shall have air cool for a minimum of
628 30 minutes from the time the selected geocell section was manufactured.
629

630 **Short-term Seam Peel Strength Test**

631
632 The apparatus used for testing the short-term seam peel strength shall be
633 of such configuration that the jaws of the clamp shall not over stress the sample
634 during the test period. Load shall be applied at a rate of 12 in (300 mm) per
635 minute and be applied for adequate time to determine the maximum load. The
636 date, time and load shall be recorded.
637

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

- 641
- 642 • 640 lbf (2840 N) for the 8 in (200 mm) depth cell
 - 643 • 480 lbf (2130 N) for the 6 in (150 mm) depth cell
 - 644 • 320 lbf (1420 N) for the 4 in (100 mm) depth cell
 - 645 • 240 lbf (1060 N) for the 3 in (75 mm) depth cell.
- 646

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

661 **Appendix B**
662 **Long-Term Seam Strength Test Procedure**

663
664 **Frequency of Test**

665
666 The long-term seam peel strength test (referred to as the 'test' in this
667 section) shall be performed:

- 668
669 1) On each new resin lot number if the geocell manufacturer extrudes
670 the sheet or strip used to produce the geocell material.
671
672 2) On each new order of sheet and/or strip if the geocell manufacturer
673 does not extrude the sheet and/or strip used to produce the geocell
674 material.
675



Figure B1

676
677 **Test Sample Preparation**

678
679 A test sample shall be made using two sets of two strips meeting all
680 aspects of the material portion of this specification. Testing shall be done on non-
681 perforated samples to obtain the true seam strength of the bond. One set of two
682 strips are to be welded in welder position "A" and the other set of two strips are to
683 be welded in welder position "B" producing two 1-cell long sections of geocell
684 product. Welding should be done using a warm welder. The welded samples
685 shall be labeled "A" and "B" and the weld seams of each sample shall be
686 numbered consecutively from left to right starting with the number 1 (one) and
687 corresponding to the welding head number.
688

689 The samples shall air cool for a minimum of 30 minutes. Randomly
690 choose 10 welds from samples "A" and "B" and cut those welds from the geocell
691 samples such that 4 in (10 cm) of material exist on each side of the weld. These
692 samples shall be cut to a width of 4 in (10 cm). Properly identify each weld using
693 the sample letter and weld seam number.
694

695 These samples are now ready to be tested.

696

697 **Long-term Seam Peel Strength Test**

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

702

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

709

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

716

717 The temperature cycle shall commence immediately within the
718 environmentally controlled chamber. The test period for the applied load shall be
719 168 hours.

720

721 **Definition of Pass / Failure**

722

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

726

727

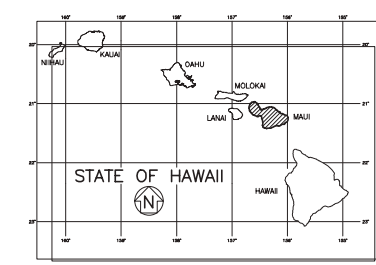
728

END OF SECTION 627

729

INDEX TO DRAWINGS	
SHEET NO.	DESCRIPTION
1	TITLE SHEET
2 - 3	STANDARD PLANS SUMMARY
4	GENERAL NOTES FOR CONSTRUCTION
5	NOTES FOR CONSTRUCTION WITHIN STATE RIGHT-OF-WAY
6 - 8	WATER POLLUTION AND EROSION CONTROL NOTES
9	LEGEND & ABBREVIATIONS
10	TYPICAL PAVEMENT SECTION
11	GENERAL SITE PLAN
12	DEMOLITION AND EROSION CONTROL PLAN
13-15	GUARDRAIL DETAIL AND NOTES
16	ROADWAY PLAN
17	GRADING PLAN
18	SIGNING AND STRIPING PLAN
19	DRAINAGE DETAILS
20	DRAINAGE CHUTE PROFILE
21	SLOPE PROTECTION DETAIL
22	WORK ZONE SIGNING PLAN, NOTE & DETAILS

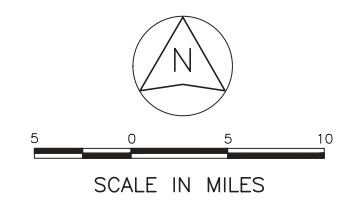
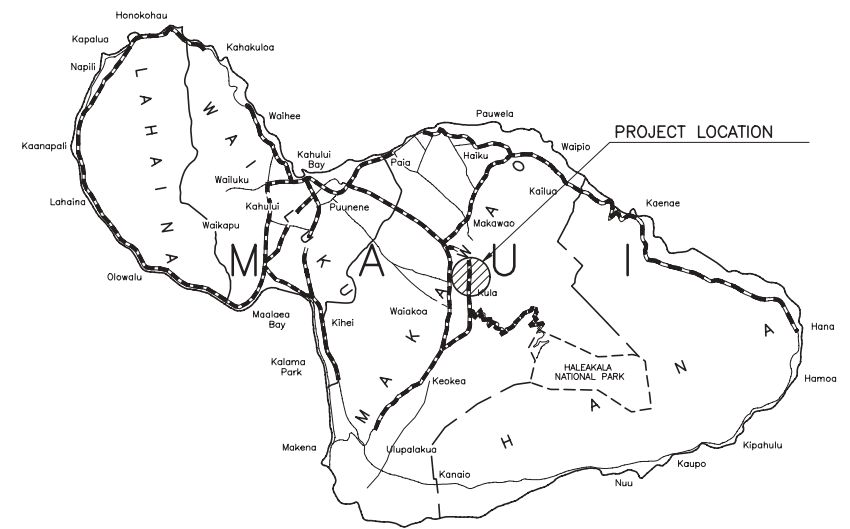
DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MAUI	HAW.	377A-01-22M	2024	ADD.1	22



STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
MAUI DISTRICT

PLANS FOR
HALEAKALA HIGHWAY
SLOPE AND SHOULDER REPAIR
VICINITY OF AINAKULA ROAD TO KULALANI DRIVE
PROJ. NO. 377A-01-22M

DISTRICT OF MAKAWAO
ISLAND OF MAUI



----- FEDERAL AID PROJECTS PREVIOUSLY CONSTRUCTED OR UNDER CONSTRUCTION

MILE POST 5.40 TO MILE POST 5.58 (RTE. 377)

True North
Scale: NTS



LAYOUT PLAN
NOT TO SCALE

GROSS LENGTH OF PROJECT 0.18 MILES
NET LENGTH OF PROJECT 0.03 MILES

Austin Tsutsumi and Associates, Inc. DESIGNED BY
X MANAGED BY
244-8044 PHONE
MAR., 2024 DATE

DEPARTMENT OF TRANSPORTATION
STATE OF HAWAII

APPROVED:
HIGHWAYS ADMINISTRATOR DATE Sep 3, 2024

DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MAUI	HAW.	377A-01-22M	2024	ADD.4	22

GENERAL NOTES:

1. The Scope of Work for this project includes: pavement resurfacing of Haleakala Hwy; replacement of guardrails; installation of a drainage chute, permanent curbing, and slope protection. All roadway and other work required to complete the project shall meet current Federal, State, and County Standards.
2. The Contractor shall perform all applicable construction work in accordance with the "Department of Transportation, Highways Division, Standard Plans", as amended and "Hawaii Standard Specifications for Road and Bridge Construction, 2005", as amended for the State of Hawaii.
3. The Contractor shall verify the location of all existing utilities, whether shown on the plans or not, and shall be responsible for the repair or replacement of the same in the event of damages due to his construction practices, at no cost to the State.
4. All dimensions and details shown on the drawings shall be checked and verified prior to the start of construction, and any discrepancies shall be immediately brought to the attention of the Engineer for clarification.
5. The Contractor's Attention Is Directed To The Following Sections Special Provisions: Section 107 - Legal Relations and Responsibility to Public; and Section 645 - Work Zone Traffic Control.
6. The Contractor is reminded of the requirements of Subsection 105.16 - Subcontracts, which requires him to perform work to not less than 30 percent of the total contract cost less deductible items. Non-compliance with the Subsection may be grounds for rejection of bid.
7. At the end of each day's work, the Contractor shall remove all equipment and other obstructions to permit free and safe passage of public traffic.
8. The existence and location of underground utilities, manholes, monuments and structures as shown on the plans are from the latest available data, but the accuracy is not guaranteed. The encountering of other obstacles during the course of work is possible. The Contractor shall tone for the exact locations and depths of all underground facilities, either shown on or omitted from the plans, in areas where work, such as the placement of sign posts, traffic signal conduits, etc. may affect these properties. Toning shall be considered incidental to the various contract items and will not be paid for separately. The Contractor shall be held liable for any damages incurred to the existing facilities and/or improvements as a result of his operations.
9. When excavating near utility poles, the Contractor shall protect, support, secure and take all other precautions to prevent damage to or leaning of these poles. The Contractor is responsible for all costs associated to repair and/or straighten pole.
10. The Contractor shall indemnify and be solely responsible for the protection of adjacent properties, utilities and existing structures from damages due to construction. Repairing any damage shall be at the Contractor's own expense and to the satisfaction of the Engineer.
11. Existing drainage system will be functional at all times during construction. The Contractor shall furnish materials, equipment, labor, tools and incidentals necessary to maintain flow. This work shall be considered incidental to any culvert work or the various contract items and will not be paid for separately.
12. Smooth riding connections shall be constructed at all limits of project, including the beginning and end of project, connecting approaches, side streets, walkways and driveways as shown on the plans and/or as directed by the Engineer. This work shall be considered incidental to asphalt concrete and will not be paid for separately.
13. The Contractor shall clean and remove any accumulation of aggregates along the roadside within 10 feet of the edge of pavement. This work shall be considered incidental to bulk of work or the various contract items and will not be paid for separately.
14. Removal and disposal of existing asphalt concrete pavement, and any debris shall be considered incidental to their respective bid items.
15. All saw cutting work shall be considered incidental to Roadway Excavation or Asphalt Concrete or various contract items or their respective bid items.
16. The Contractor shall remove and dispose of all existing raised pavement markers, thermoplastic line markings, traffic tape, and epoxy adhesives prior to the overlaying of Asphalt Concrete. This work shall be considered incidental to Asphalt Concrete Pavement, Mix No. V and will not be paid for separately.
17. The Contractor shall make his own arrangements for, and pay for all temporary utilities required for his work.
18. The Contractor shall remove and dispose of all existing guardrail and guardrail posts. This work shall be considered incidental to Guardrail Type MGS W-Beam and Type MGS Transition, and will not be paid for separately.
19. The Contractor shall remove and dispose all silt and debris deposited in drainage facilities, roadways and other areas resulting from his work. The cost incurred for any necessary remedial action ordered by the Engineer shall be paid for by the Contractor.
20. The Contractor shall submit for approval a detailed traffic control plan (TCP) and schedule at least 15 working days before the start of work. All construction signs shall be left in place until all construction items have been completed. Contractor shall obtain prior approval from the Engineer to remove construction signs. △

SURVEY PLOTTED BY	DATE
DRAWN BY	
DESIGNED BY	
CHECKED BY	
ORIGINAL PLAN	
NOTE BOOK	
No.	

△ 07-30-24	ADD 1: New Note Added
DATE	REVISION

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

**GENERAL NOTES FOR
CONSTRUCTION**

*Haleakala Hwy. Slope and Shoulder Repair
Vicinity of Ainakula Road to Kulalani Drive
Project No. 377A-01-22M*

Scale: As Noted Date: March 2024

SHEET No. / OF / SHEETS



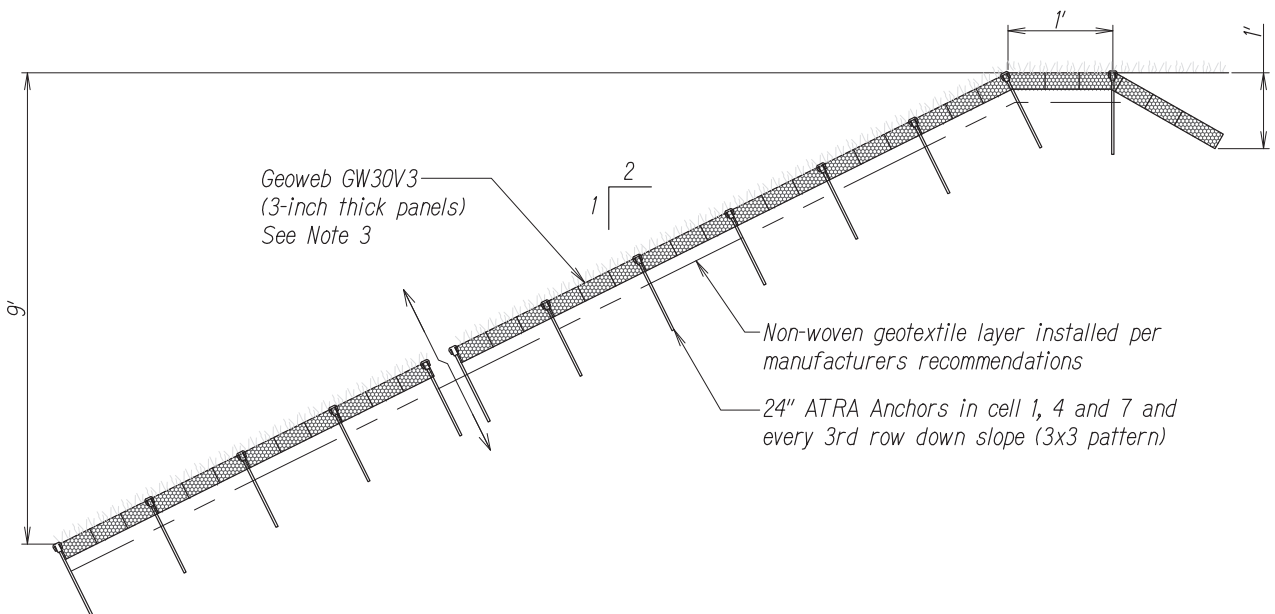
THIS WORK WAS PREPARED BY
ME OR UNDER MY SUPERVISION.

Deanna M.R. Hayashi
APRIL 30, 2024
LIC. EXP. DATE

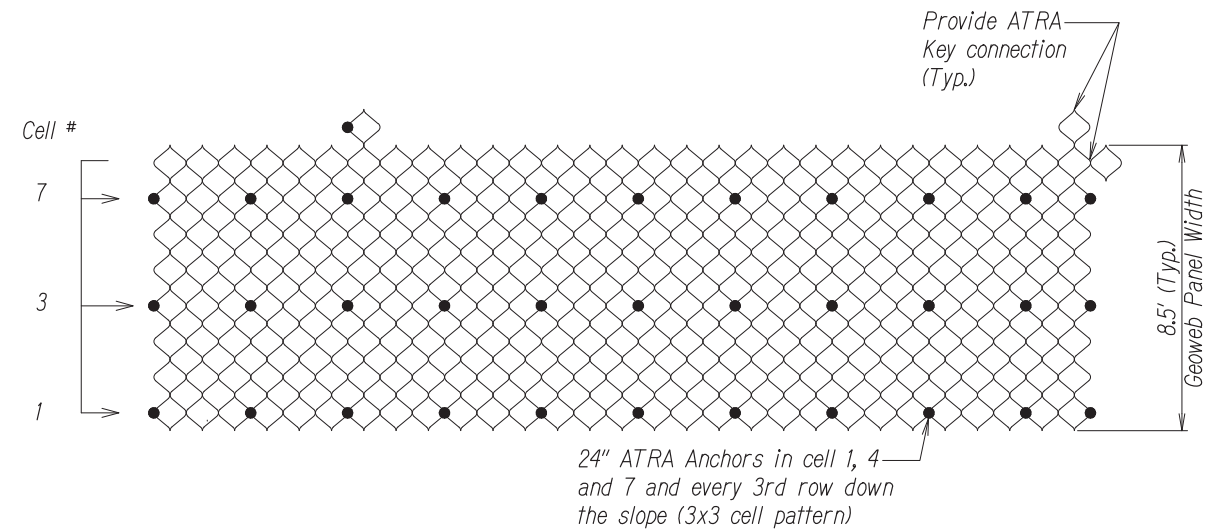
DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MAUI	HAW.	377A-01-22M	2024	ADD.21	22

Notes:

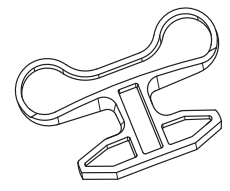
1. Geoweb, ATRA Keys, and ATRA Anchor to be manufactured by Presto Geosystems.
2. The Geoweb panels shall be connected with ATRA Keys at each interleaf and end to end connection.
3. Geoweb infill shall be nutrient rich, pulverized topsoil. Limit the drop of the infill into the Geoweb panels to prevent distortion.



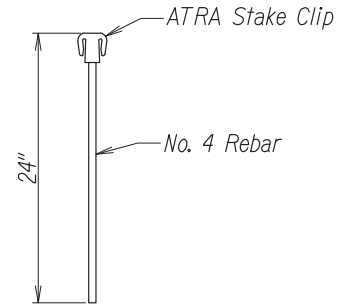
TYPICAL SECTION - GEOWEB SLOPE PROTECTION
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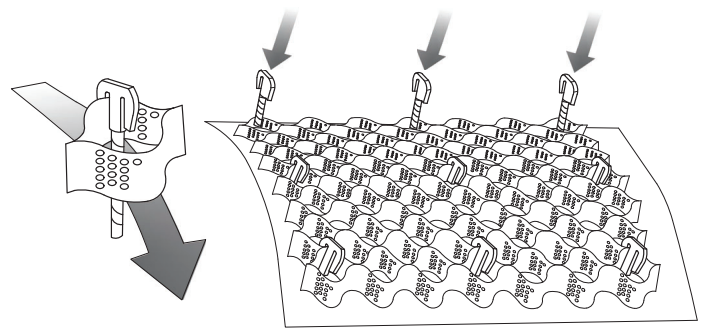
ANCHORING DETAILS
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ATRA KEY



ATRA ANCHOR

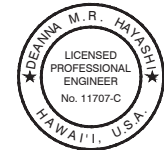


ANCHOR INSTALLATION

SLOPE PROTECTION DETAIL
Scale: Not To Scale

SURVEY PLOTTED BY	DATE
DRAWN BY	
DESIGNED BY	
CHECKED BY	
ORIGINAL PLAN	
NOTE BOOK	
No.	

DATE	REVISION
08-06-24	ADD 1: Revised Geoweb Details



THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.
Deanna M.R. Hayashi
APRIL 30, 2024
LIC. EXP. DATE

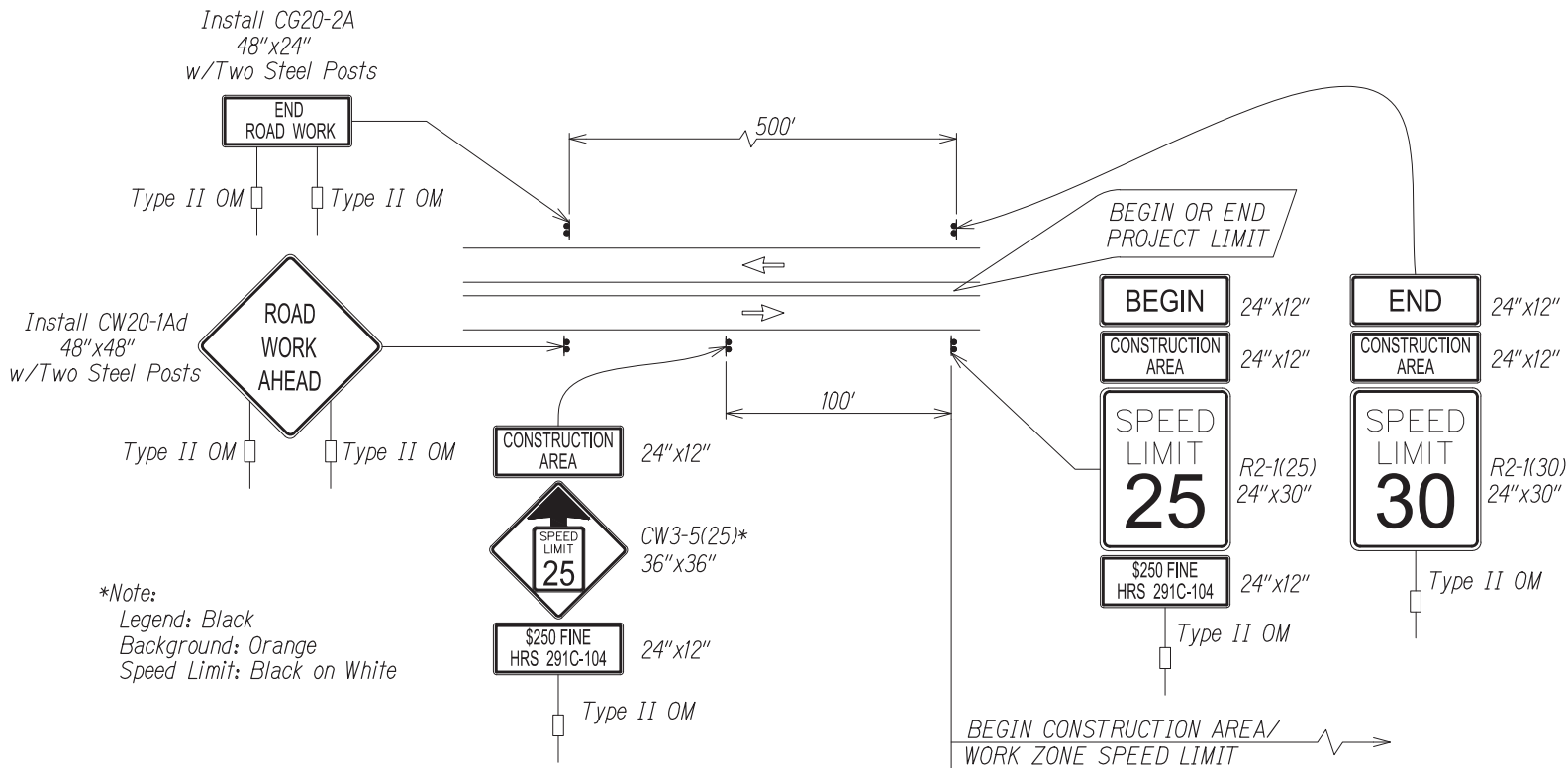
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

SLOPE PROTECTION DETAIL

Haleakala Hwy. Slope and Shoulder Repair
Vicinity of Ainakula Road to Kulalani Drive
Project No. 377A-01-22M

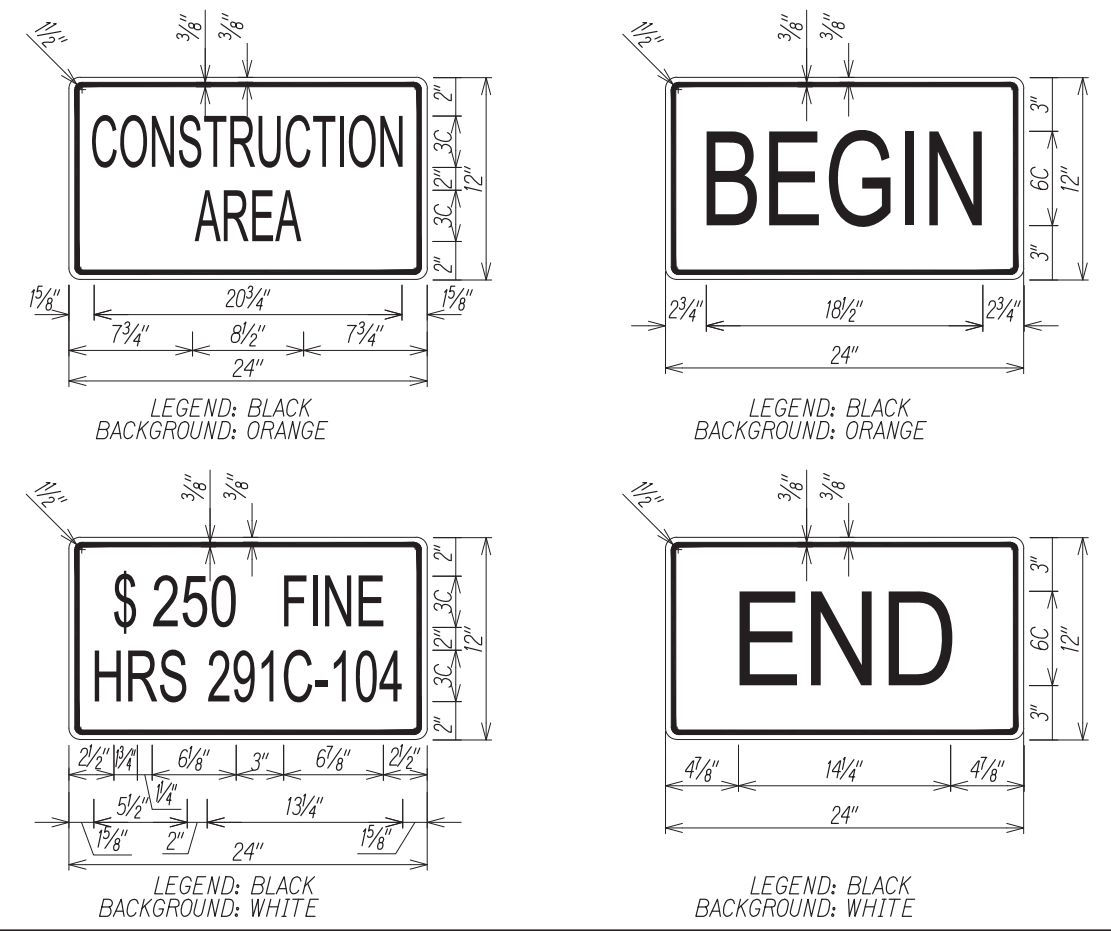
Scale: As Noted Date: March 2024

DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MAUI	HAW.	377A-01-22M	2024	ADD.22	22



*Note:
Legend: Black
Background: Orange
Speed Limit: Black on White

**TYPICAL DETAIL FOR CONSTRUCTION SIGNS
ON TWO LANE OR MULTILANE UNDIVIDED LOW SPEED HIGHWAY**



Work Zone Note:

- Contractor shall submit a Traffic control plan (TCP) at least 15 working days before the start of work per Section 645 of the Standard Specifications.
- This Work Zone Sign Plan is intended for use on long-term stationary work zones/construction phases (3 days or more). All work zones or construction phases less than 3 days duration will use Traffic Control Plans shown in Section 645 of the Standard Specifications.
- All existing regulatory speed limit signs with posts within the work zone/project limits shall be removed and replaced with work zone speed limit sign assemblies (R2-1(25) and R2-5b(25) with "CONSTRUCTION AREA" and "\$250 FINE HRS 291C-104" Supplemental Signs).
- Construction sign assemblies shall be installed on both the approaching and trailing ends of each work zone as shown on this plan.
- Each construction warning sign shall have a minimum of two (2) Type II OM. Each work zone speed limit assembly shall have a minimum of one (1) Type II OM. Installation of each Type II OM shall be considered incidental to Item No. 631.3000, Construction Sign with Post.
- Upon the completion of all physical work or as directed by the Engineer, all construction signs and work zone speed limit assemblies shall be removed. All speed limit signs and posts that were existing at the start of the project within the work zone/project limits shall be restored back to their original locations and configurations.
- Placement of construction signs shall not obstruct the path of pedestrians and bicyclists.
- The removal and restoration of existing regulatory speed limit signs shall be considered incidental to Item No. 631.3000, Construction Sign with Post.
- The installation, maintenance and removal of work zone speed limit sign assemblies shall be paid for under Item No. 631.3000, Construction Sign with Post.
- The work zone speed limit signs shall be new and become the property of the Contractor.

TABLE 1
GUIDELINE FOR ADVANCE PLACEMENT OF SPEED REDUCTION SIGN CW3-5(XX), CONSTRUCTION AREA SPEED LIMIT

EXISTING POSTED SPEED LIMIT (MPH)	XX-NEW CONSTRUCTION AREA SPEED LIMIT (MPH)	D-REDUCED SPEED LIMIT SIGN SPACING TO FIRST CONSTRUCTION AREA SPEED LIMIT SIGN (FEET)
≤ 25		EXIST. SPEED LIMIT TO REMAIN
30	25	100
35	25	175
40	30	175

SURVEY PLOTTED BY: _____ DATE: _____
DRAWN BY: _____
DESIGNED BY: _____
CHECKED BY: _____
ORIGINAL PLAN No. _____
NOTE BOOK No. _____

DATE	REVISION
08-06-24	ADD 1: Replaced Traffic Control Plan

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
LOW SPEED UNDIVIDED HIGHWAY
WORK ZONE SIGNING PLAN, NOTE & DETAILS
Haleakala Hwy. Slope and Shoulder Repair
Vicinity of Ainakula Road to Kulalani Drive
Project No. 377A-01-22M
Scale: As Noted Date: March 2024
SHEET No. 1 OF 1 SHEETS

DEANNA M.R. HAYASHI
LICENSED PROFESSIONAL ENGINEER
No. 11707-C
HAWAII, U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.

**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)
HiEPRO 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.

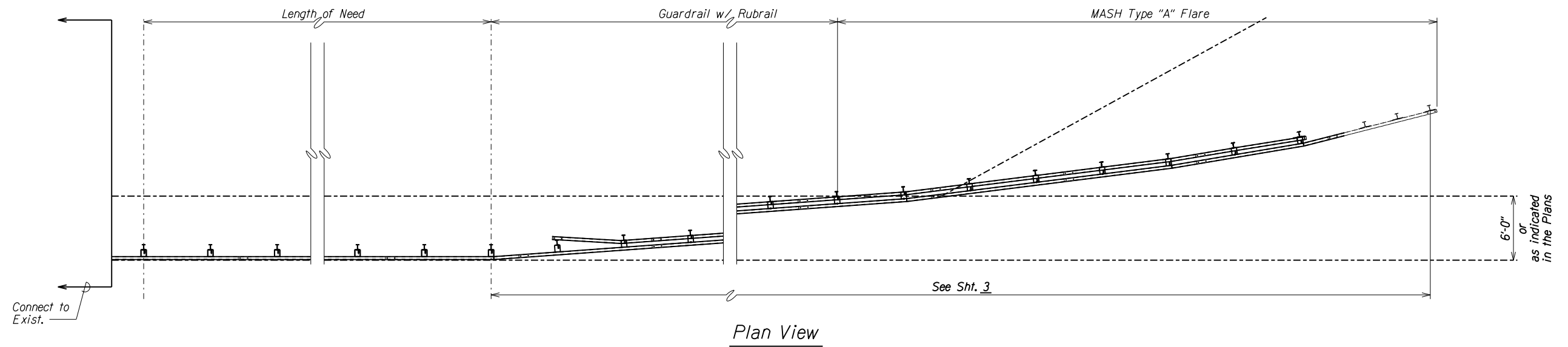
6. Is the Geoweb cell depth 3-inch (Per Plan Sheet 21) or 6-inch (Per Spec, Section 627.03 (D) Cell Properties (3.d) Nominal Depth Shall Be 6 inches)?

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.

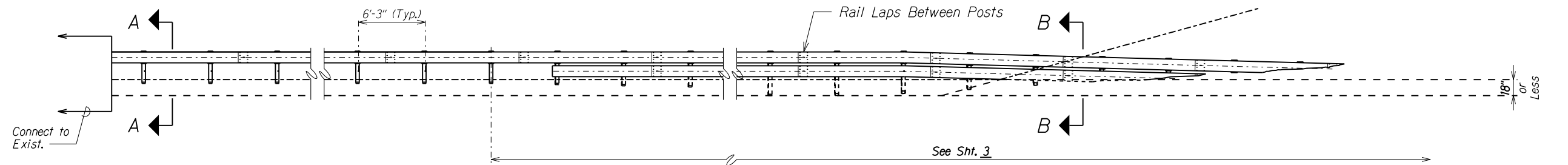
7. Please clarify, is the Geoweb tendon TP-225 (called out in Spec 627.03) or TPP-55 (called out on Plan Page Sheet 21)? Please Note depend on depth of Geoweb 3-inch is GW30V3 and 6-inch is GW30V6.

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.

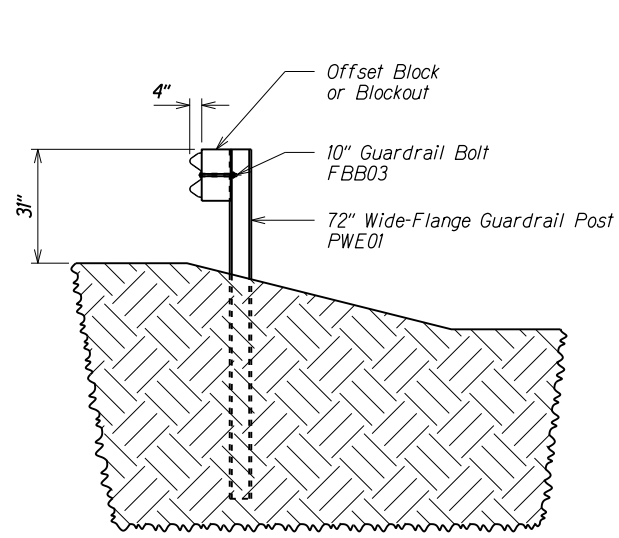
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	X	20XX	0	0



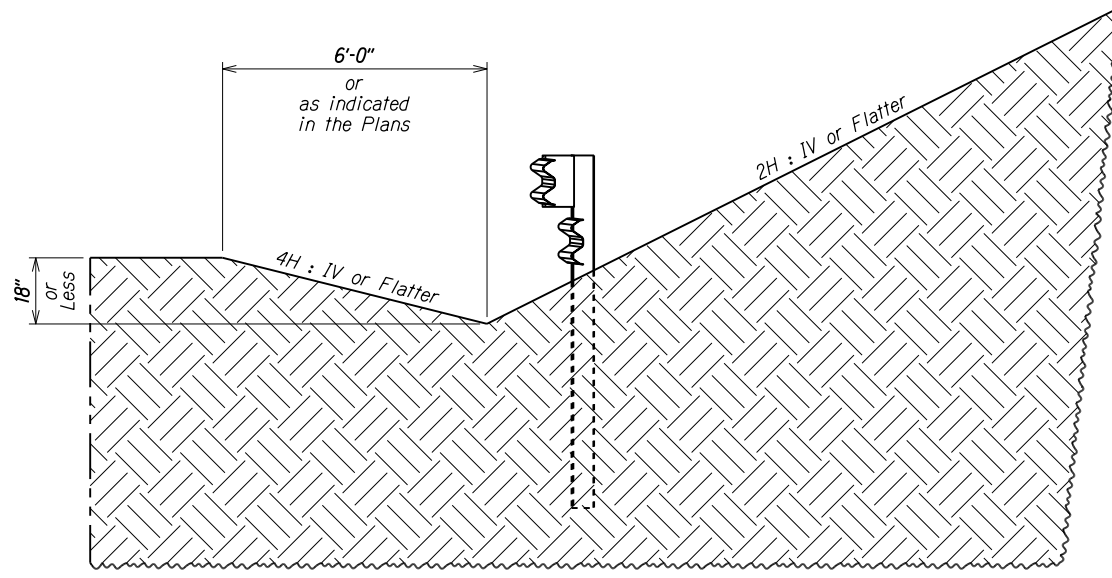
Plan View



Elevation View



Section A-A



Section B-B

TERMINAL PLAN & ELEVATION VIEW AND SECTIONS
(BURIED IN BACKSLOPE)

Notes:

- Backfill Post holes with AASHTO M147-65(2004), Grade B crushed limestone road base, compacted to MASH standard.
- 75" Post spacing typical for LoN and Terminal unless otherwise indicated.

SURVEY PLOTTED BY	DATE
DESIGNED BY	
DESIGNED BY	
QUANTITIES BY	
CHK. X	
CHK. X	
CHK. X	

6/29/22 \\dr\enest\guardrail\109\MASH-A_Flare\109A.dgn

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

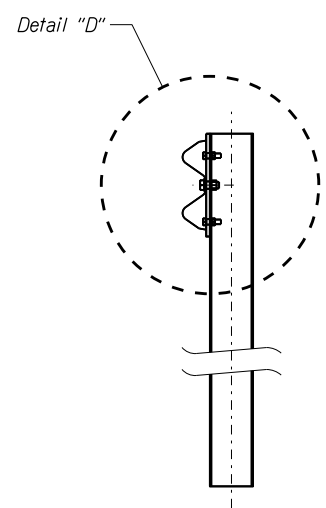
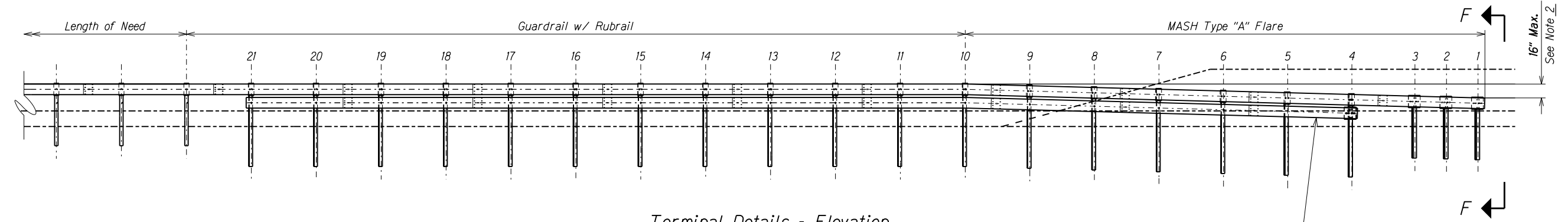
MASH TYPE "A" FLARE

XX
XX
XX

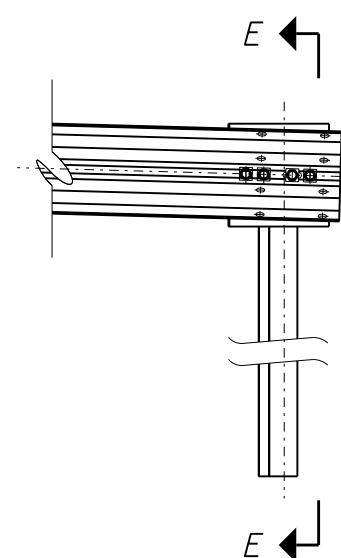
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SHEET No. 1 OF 3 SHEETS

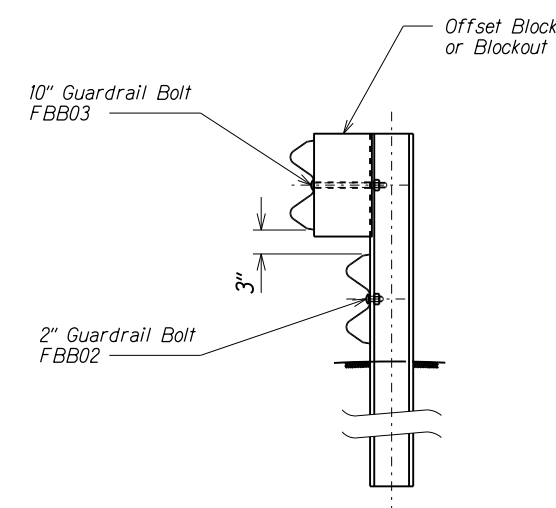
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HAWAII	HAW.	X	20XX	0	0



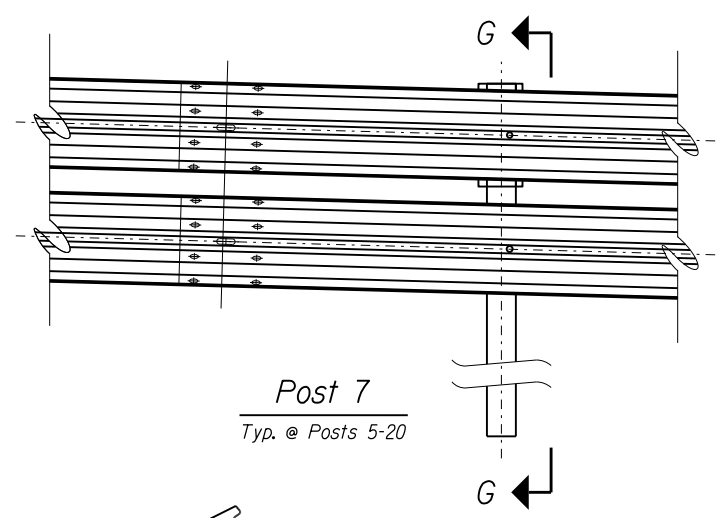
Secton E-E



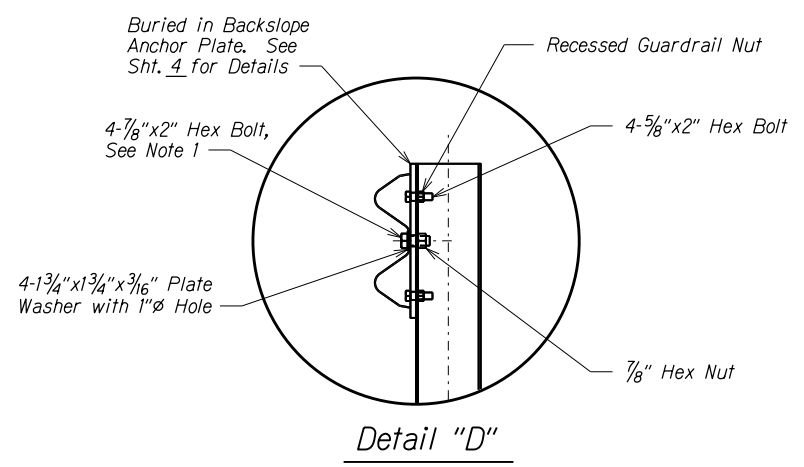
Post 1



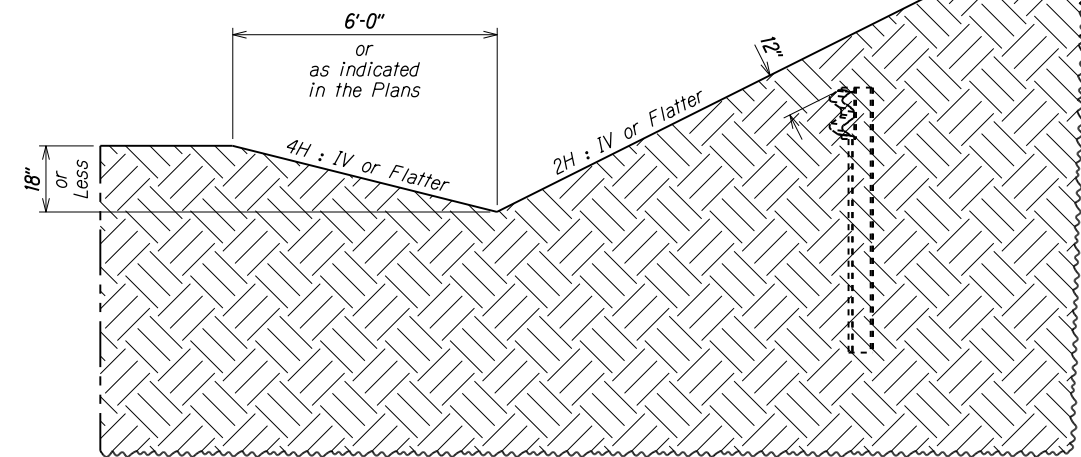
Section G-G



Post 7
Typ. @ Posts 5-20



Detail "D"



Section F-F

- Notes:
1. Recessed Guardrail Nuts typical on all 5/8" Bolts. Anchor Plate and hardware are typical on top rail at Posts 1-3, and rub rail at Post 4. Field drill 1" holes in Guardrail as needed for 7/8" Bolts at Posts 1-4. Hex head bolts are ASTM A307.
 2. Rail height changes 16" Maximum from Post 10 to 1 to achieve 12" of soil coverage at Post 1.

TERMINAL ELEVATION & DETAILS
(BURIED IN BACKSLOPE)

ORIGINAL PLAN	DATE
DESIGNED BY	
DESIGNED BY	
QUANTITIES BY	
CHECKED BY	

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

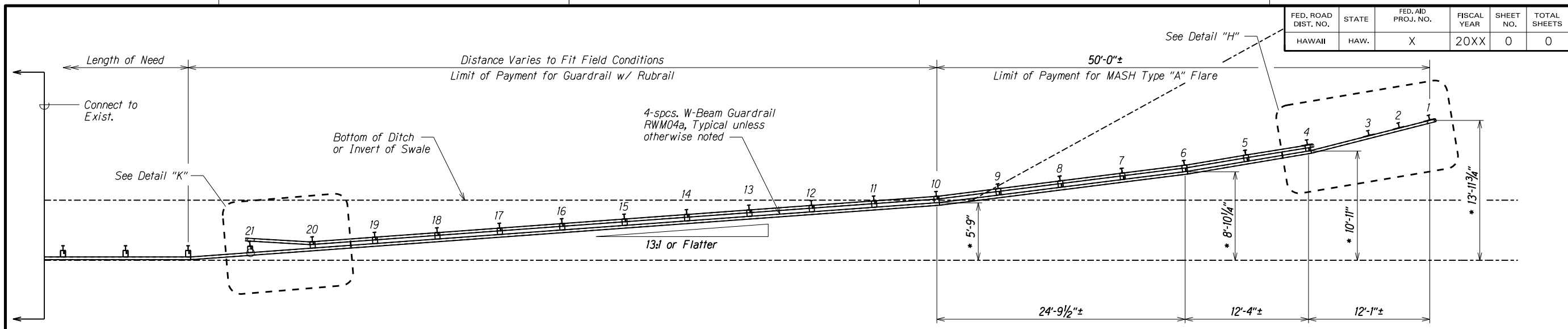
MASH TYPE "A" FLARE

XX
XX
XX

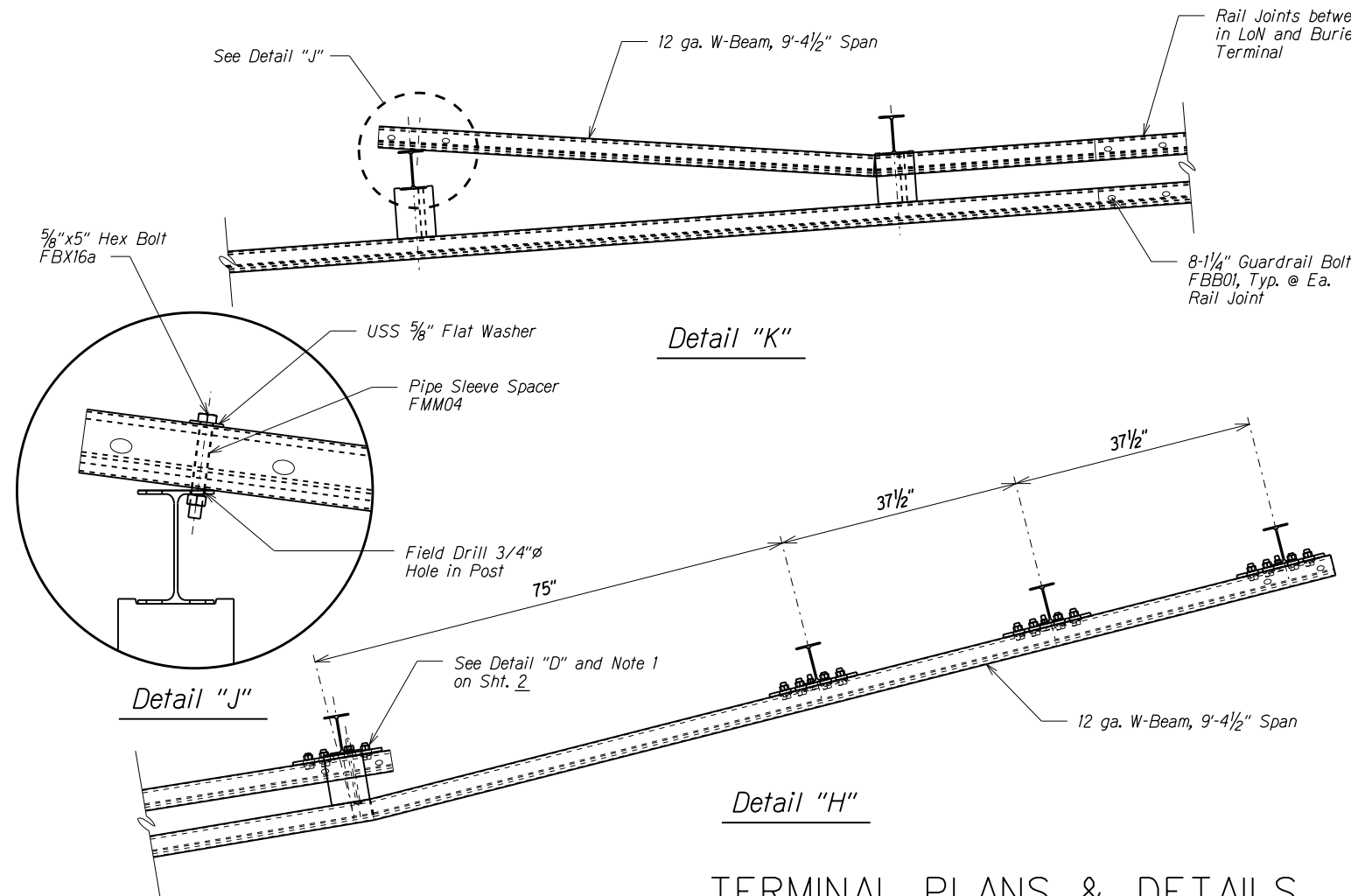
Scale: NTS Date: XX, 202X

SHEET No. 2 OF 3 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	X	20XX	0	0



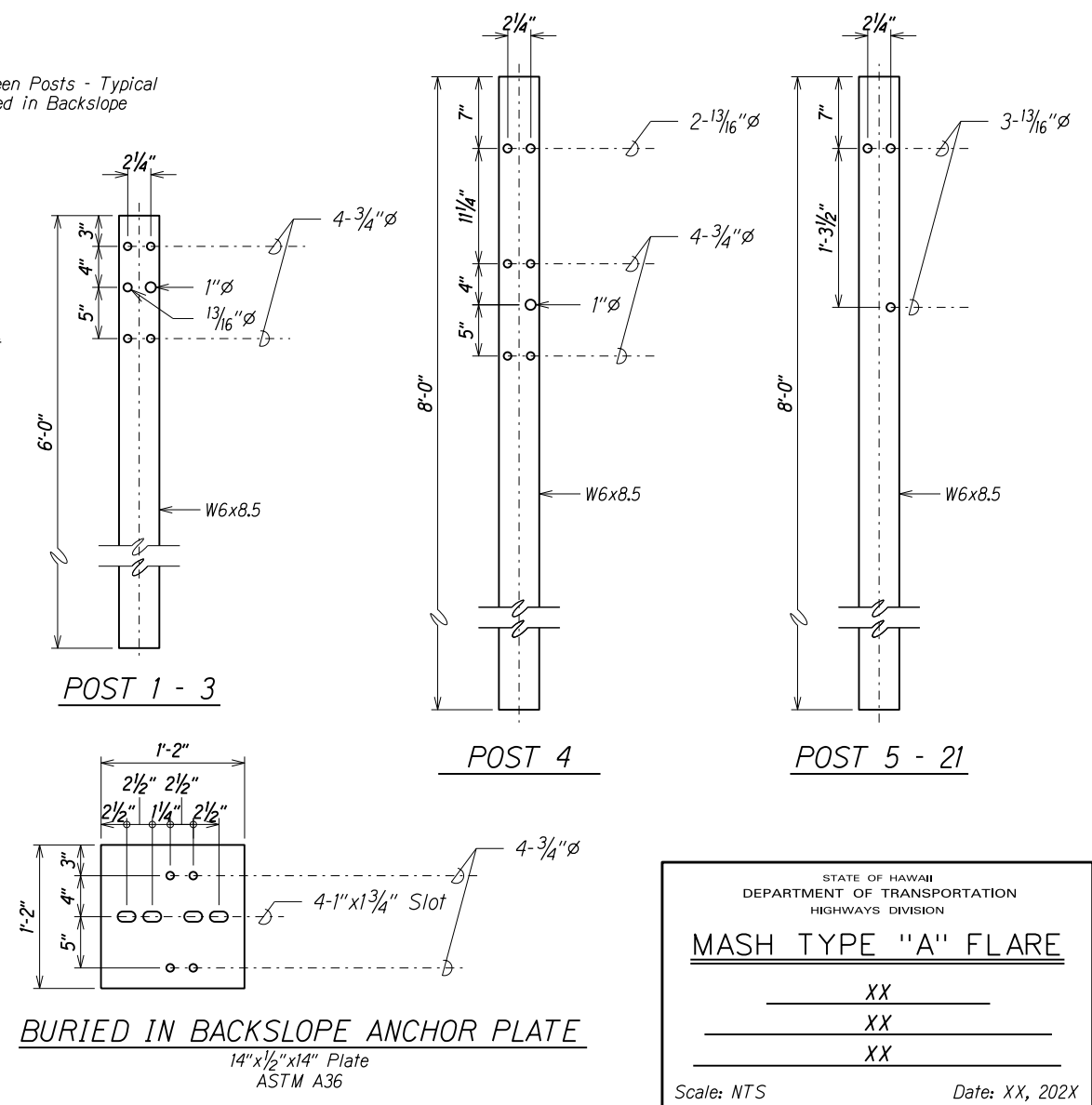
Terminal Details - Plan



Detail "K"

Detail "H"

TERMINAL PLANS & DETAILS
(BURIED IN BACKSLOPE)



POST 1 - 3

POST 4

POST 5 - 21

BURIED IN BACKSLOPE ANCHOR PLATE

14" x 1/2" x 14" Plate
ASTM A36

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

MASH TYPE "A" FLARE

XX
XX
XX

Scale: NTS Date: XX, 202X

SHEET No. 3 OF 3 SHEETS

ORIGINAL PLAN	DATE
DESIGNED BY	
DESIGNED BY	
QUANTITIES BY	
CHK. X	
CHK. X	
CHK. X	

Note:
1. * These dimensions indicate the offset to the back of the Rail at Posts 1, 4, 6 and 10, based on a 6'-0" Wide Ditch or Swale foreslope.

6/29/22
d:\Ernest\guardrail\109\MASH_A flare\109.dgn