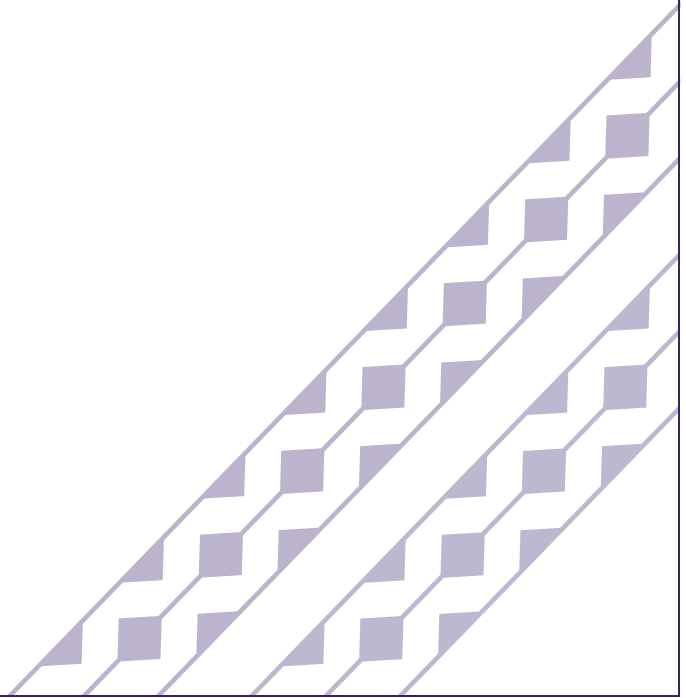




**Hawaiian
Electric**

The information found in this document are general guidelines that may be used to aid in the preparation of your service request proposal. Please be advised that depending on the specific needs and actual conditions of your project, Hawaiian Electric may require your design to comply with different specifications including specifications that include more stringent requirements than those included in these design specification guidelines. For further guidance and clarification on the actual specifications that will apply to your particular project, please refer to instructions issued by Hawaiian Electric's Planner or Engineer who is assigned to your particular (Project/Review Request/...). Additionally, please be advised that Hawaiian Electric reserves the right to require additional modifications to any approved design if it is determined during actual construction that additional modifications must be made to address certain field conditions that were not detected or Hawaiian Electric was unaware of during the design review process.



EXAMPLE OF A SINGLE PHASE TRANSFORMER

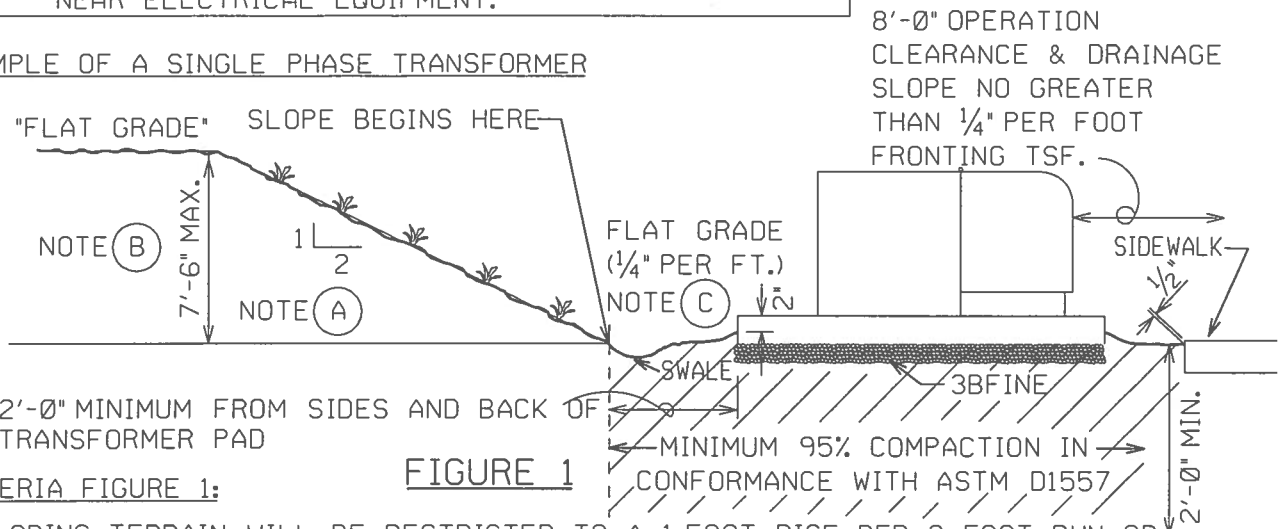


FIGURE 1

CRITERIA FIGURE 1:

- A. SLOPING TERRAIN WILL BE RESTRICTED TO A 1 FOOT RISE PER 2 FOOT RUN OR FLATTER FOR SLOPES ON SIDES OR BACK OF TRANSFORMER. THIS SLOPE IS BASED ON C & C OF HONOLULU'S GRADING PERMIT.
- B. MAXIMUM HEIGHT OF SLOPING TERRAIN SHALL BE 7'-6". THIS HEIGHT IS BASED ON C & C OF HONOLULU'S GRADING PERMIT, WHICH REQUIRES A SOIL REPORT, DRAINAGE PLAN AND EROSION CONTROL PLANS FOR "OTHER USES" 7.5' OR GREATER.
- C. SLOPING TERRAIN SHALL BEGIN 2'-0" FROM THE END OF THE TRANSFORMER PAD AND FROM THE SAME ELEVATION OF THE FLAT GRADES.
- D. SLOPE SHALL BE VEGETATED TO PREVENT SOIL RUNAWAY.
- E. SWALE SHALL DIVERT WATER AROUND TRANSFORMER.

IF THESE CRITERIA CANNOT BE MET A RETAINING WALL SHALL BE INSTALLED

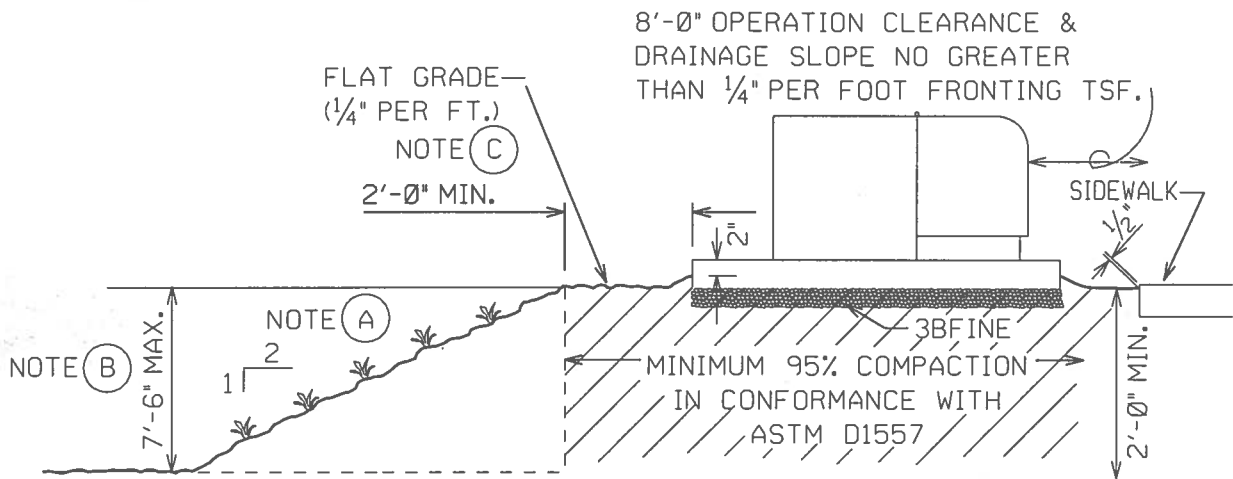


FIGURE 2

CRITERIA FIGURE 2:

- A. SLOPING TERRAIN WILL BE RESTRICTED TO A 1 FOOT RISE PER 2 FOOT RUN OR FLATTER.
- B. MAXIMUM HEIGHT OF SLOPING TERRAIN SHALL BE 7'-6". THIS HEIGHT IS BASED ON C & C OF HONOLULU'S GRADING PERMIT, WHICH REQUIRES A SOIL REPORT, DRAINAGE PLAN AND EROSION CONTROL PLANS FOR "OTHER USES" 7.5' OR GREATER.
- C. SLOPING TERRAIN SHALL BEGIN 2'-0" MINIMUM FROM THE END OF THE TRANSFORMER PAD.
- D. SLOPE SHALL BE VEGETATED TO PREVENT SOIL RUNAWAY.

DATE 11-01-02 03-03
 INITIAL CT DH FK CT
 REVISION

DRAWN CT	DESIGNED DH	APPD FK	REDRAWN
SUPERSEDES		ORIGINAL MARCH 2002	
ENGINEERING STANDARD HAWAIIAN ELECTRIC CO. INC.		SLOPE AND RETAINING WALL REQUIREMENTS AND CLEARANCES	
		30-5002	REV 2
		SHEET 1 of 4	

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SCOPE: THIS STANDARD SHOWS RETAINING WALLS NEAR ELECTRICAL EQUIPMENT.

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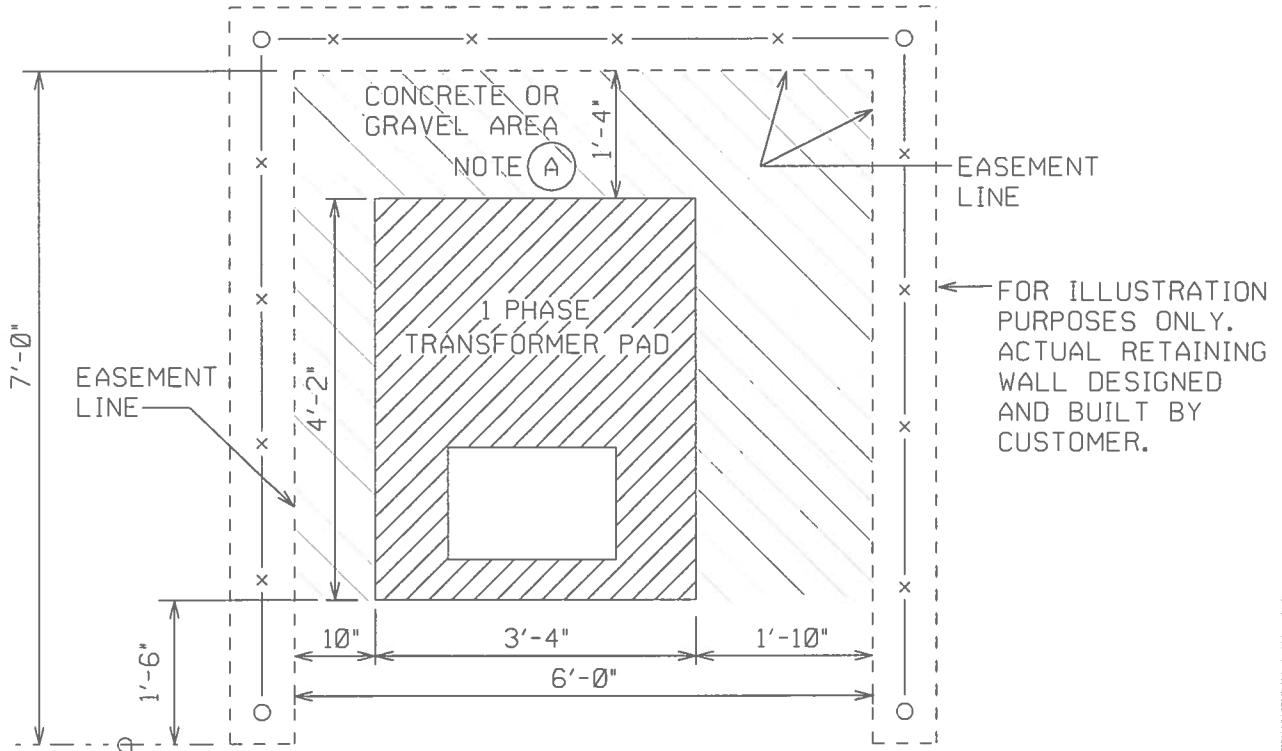


FIGURE 3

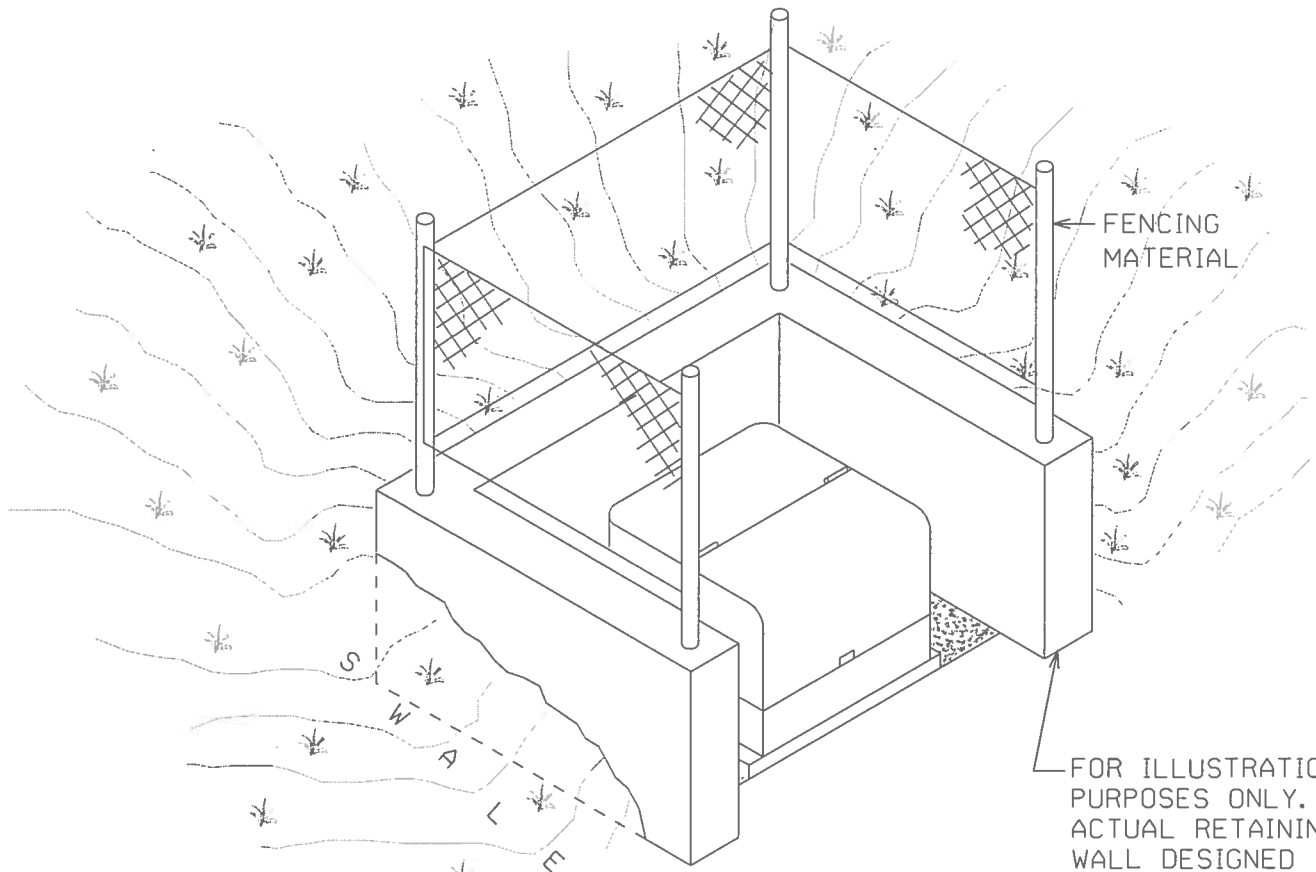


FIGURE 4
ISOMETRIC DRAWING OF FIGURE 1

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SHEET						2 of 4

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SCOPE: THIS STANDARD SHOWS RETAINING WALLS NEAR ELECTRICAL EQUIPMENT WHEN WEEP HOLES ARE REQUIRED.

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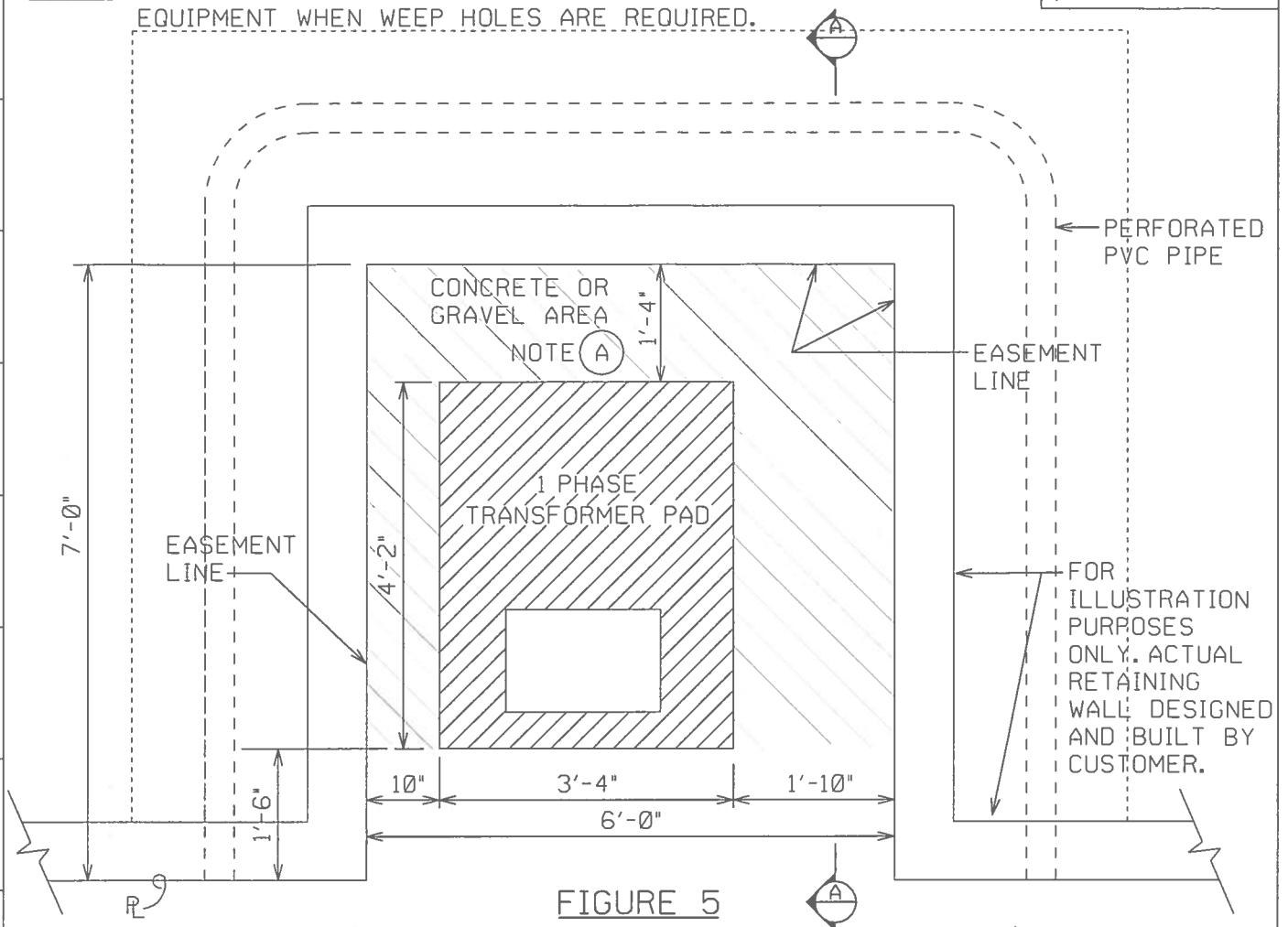
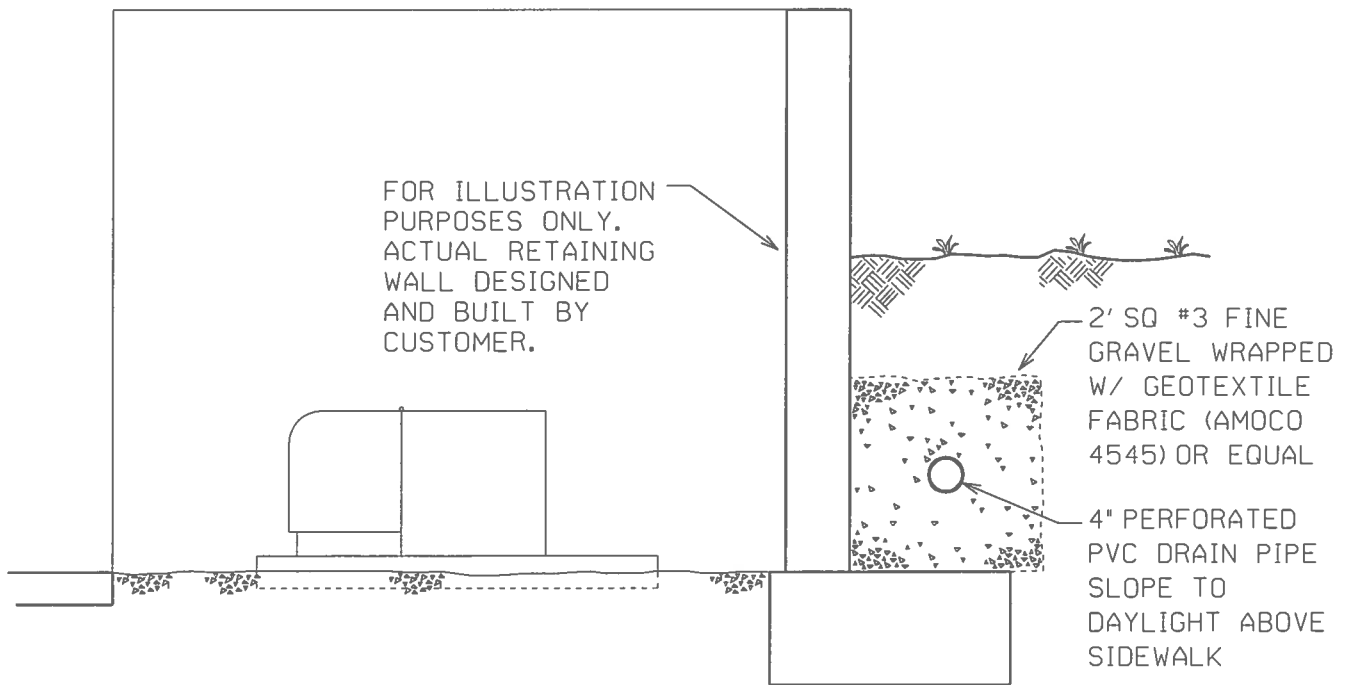


FIGURE 5



SECTION A-A

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SUPERSEDES		ORIGINAL MARCH 2002	
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CRITERIA FIGURE 3:

- A. THE CONCRETE AREA SHALL BE A MINIMUM OF 3½ INCHES THICK. SLOPE THE CONCRETE TOWARD THE FRONT OR SIDEWALK. GRAVEL MAY BE USED INSTEAD OF CONCRETE.
- B. RETAINING WALLS, FENCES AND FOUNDATIONS SHALL BE INSTALLED BY THE CUSTOMER AND SHALL BE OUTSIDE OF THE EASEMENT AREA.
- C. RETAINING WALL SHALL BE OF SUFFICIENT HEIGHT TO PROTECT TRANSFORMER FROM EROSION AND RUN-OFF OF DIRT AND WATER. IN ADDITION, DRAINAGE SWALE BEHIND THE WALL SHALL BE INSTALLED TO DIVERT WATER AROUND THE TRANSFORMER.
- D. RETAINING WALL SHALL MEET ALL STATE AND COUNTY CODES AND REQUIREMENTS FOR RETAINING WALLS.
- E. FOR WALLS TALLER THAN 24" HIGH, ACCEPTABLE PROTECTION SUCH AS FENCES SHALL BE INSTALLED AT THE TOP OF THE WALL TO PREVENT FALLS. ALTERNATIVELY, THE WALL CAN BE EXTENDED TO A SUFFICIENT HEIGHT TO PREVENT FALLS.

CRITERIA FIGURE 5:

- A. WEEP HOLES, IF REQUIRED, SHALL NOT DRAIN INTO AREA OCCUPIED BY COMPANY'S TRANSFORMER.
- B. NOTES FROM CRITERIA 3 ALSO APPLY.

NOTE: THIS EXAMPLE USES A SINGLE PHASE PAD MOUNT TRANSFORMER (TYPICALLY IN RESIDENTIAL SUBDIVISIONS). THE SLOPE AND WALL REQUIREMENTS SHALL APPLY TO OTHER HECO EQUIPMENT SUCH AS 3 PHASE PAD MOUNT TRANSFORMERS, PME, PMH AND PST SWITCHGEARS. FOR THESE APPLICATIONS SLOPES AND/OR WALLS SHALL BE BUILT OUTSIDE THE DESIGNATED CLEAR ZONES FOR THE PARTICULAR EQUIPMENT.

Reference Standards:

Transformer Pads

- Standard 30-5001 1ph Pad Mounted Transformer Pad
- Standard 30-5011 3ph Deadfront Transformer Pad
- Standard 30-5014 Concrete Box-Pad for 3ph Padmounted Transformer
- Standard 30-5010 3ph Padmounted Transformer Installation

Switch Gear Pads

- Standard 30-5033 Concrete Pad Installation 15KV PMH-3 Switch Enclosure
- Standard 30-5040 Concrete Pad Installation 15KV PMH-9 Auto-transfer Switch
- Standard 30-5031 Concrete Pad Installation PME Switch Gear
- Standard 30-5512 Concrete Pad Installation 25 KV PMH-3 Switch Enclosure
- Standard 30-5515 Concrete Pad Installation 25 KV PMH-9 Auto-transfer Switch

Application of Equipment Pad

- Standard 30-5000 Location, Clearance and Protection Details of Padmounted Equipment

DATE
INITIAL

REVISION

DRAWN	CT	DESIGNED	DH	APPD	FK	<i>J. K. [Signature]</i>	REDRAWN
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SUPERSEDES

ENGINEERING STANDARD
HAWAIIAN ELECTRIC CO. INC.

SLOPE AND RETAINING WALL
REQUIREMENTS AND CLEARANCES

ORIGINAL	NOV, 2002
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SHEET 4 of 4	

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