DESIGN CRITERIA

1. Design is based on the assumption that the material, within the reinforced earth volume, meets the requirements of the Reinforced Earth System. The contractor shall ensure that the materials used conform to the specifications provided by the Reinforced Earth Company. The materials shall be supplied by the Reinforced Earth Company.

2. Soil parameters: Soil properties are determined using the soil characteristics of foundation material to be used in the design of the wall system. The contractor shall provide soil design parameters for backwall material, based on the actual soil characteristics utilized in the design, including the values of friction angle (φ), cohesion (c), and total unit weight (γ). These values shall be provided in the shop drawings.

3. The maximum applied bearing pressure at the foundation level shall be equal to the design load. The design load shall be determined in accordance with ASTM A-123. The design load shall be applied to the top of the wall, in front of the wall, and for the necessary fill volume, as determined by the engineer.

4. Any foundation material below the reinforced earth volume, as determined by the engineer, shall be excavated and replaced with suitable material or reinforced as directed by the engineer.

5. Reinforcing strips for reinforced earth walls shall be 1 3/16" in diameter. The strips shall conform to the physical and mechanical properties of ASTM A-572 Grade 50. Galvanization shall be applied in accordance with ASTM A-123.

6. Steel ladders shall be supplied by the Reinforced Earth Company. A precast concrete face panel shall be 3 1/2" in diameter. The ladders shall be directed by the engineer. Ladder reinforcements may be used only on walls with height up to 50 ft unless otherwise directed by the engineer.

7. The minimum factors of safety required for design are:
   - Overspreading: 2.0
   - Bearing: 1.5
   - Internal pullout: 1.5 (allowable deformation = 0.75 in)
   - Overall stability: 1.5
   - Steel wall reinforcement: 0.55 (allowable strain = 0.005)
   - Maximum pullout factor: 1.5 (for sand) = 1.5 (for mud) = 2.0

WALL CONSTRUCTION

8. Reinforced earth walls in curves will form a series of short chords of 4'-11" each, to match the desired wall alignment. The contractor shall be responsible for providing the necessary abutments and connections to maintain the desired alignment.

9. For location and alignment of reinforced earth walls, see retaining wall control plans.

10. If manholes and drop inlets are present, they shall be located at specified wall elevations.

11. If piles are located within the reinforced earth volume, they shall be driven prior to construction of the reinforced earth wall. The contractor shall provide a plan specifying the method of driving the piles to ensure they are acceptable to the engineer.

12. Backfill material shall be compacted in accordance with SEC 548 to a level of 1/2" above the tie strips embedded in the panels. Installation of soil reinforcements shall be permitted only after placement and compaction of the backfill material has reached the required level.

13. If structures in excess of 20 ft in height occur, the finished grade in front of the wall shall be placed and compacted before wall construction starts. The finished grade shall be compacted to 95% of AASHTO T-180 unless otherwise directed by the engineer.

14. It is the contractor's responsibility to determine the location of any guardrail posts behind the Reinforced Earth panels. The contractor shall provide guardrail posts in accordance with the requirements of the Reinforced Earth Company. The guardrail posts shall be marked for the engineer to determine what course of action should be taken.

15. The required level of fall protection shall be provided in the shop drawings.

16. Top panels beneath coping shall have #4 dowels protruding from their top edge. The dowels shall be 5/32" in diameter. The dowels shall be provided with suitable material or otherwise stabilized as directed by the engineer.

17. For other information pertaining to wall construction, please refer to the Reinforced Earth Construction Manual.

18. The contractor shall be responsible for gradually forming the wall, avoiding abrupt changes in the wall alignment. The contractor shall be responsible for providing the necessary abutments and connections to maintain the desired alignment.

19. Normal soil reinforcement lengths shall be calculated based on the design load. The normal soil reinforcement lengths shown in the plans are calculated based on the normal load and are the lengths required by the Reinforced Earth Company.

20. Panel finish:
   - The precast panels for this project shall have a plain steel finish unless otherwise specified on the retaining wall control plans.
   - The panels shall be provided with suitable material or otherwise stabilized as directed by the engineer.

21. Note to contractors:
   - Only the following materials are supplied by the Reinforced Earth Company:
     - Precast concrete facing panels
     - Soil reinforcements
     - Bolt sets for attaching panels to the soil reinforcements
     - Bearing blocks
     - Riser bars
     - Filter cloth and adhesive (for panel joints only)

22. The Reinforced Earth Company supplies precast concrete facing panels and accessories to be used in conjunction with other materials in the construction of the Reinforced Earth retaining walls. The construction and quality control procedures manual furnished by the Reinforced Earth Company is intended to provide a general explanation of the system. It is the contractor's obligation to review and execute the project-specific erection sequence, panel unloading, handling, and bracing system, and fall protection system. The bracing system shown in the construction and quality control procedures manual is general in nature and does not account for project-specific conditions. The contractor is responsible for adhering to the design standards of the Reinforced Earth Company. The contractor shall special order any additional materials required for the specific application.

23. The drawings contained herein are based on information provided by the owner. The Reinforced Earth Company is responsible for the design of the structure only. The structural design, including foundation and slope stability, is the responsibility of other parties.

24. These drawings are certified with respect to the internal stability of reinforced earth structures only.

25. This drawing contains information proprietary to the Reinforced Earth Company and is being furnished for use in conjunction with other projects only. The information contained herein is not to be transmitted to any other organization unless specifically authorized in writing by the Reinforced Earth Company. The Reinforced Earth Company is exclusive licensee in the United States under patents issued to Henry Vidal, and the furnishing of this drawing does not constitute an express or implied license under the Vidal patents.

This system shall be used in slightly or moderately aggressive environments only.

CRUCIFORM AND SQUARE PANELS
### TABLE

<table>
<thead>
<tr>
<th>Panel Thickness</th>
<th>Reinforcement Designation</th>
<th>Panel Reinforcement (No.)</th>
<th>Maximum Allowable Horizontal Stress at Facing (kip)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 1/2&quot;</td>
<td>R4</td>
<td>0.44 Vertical 0.58 Horizontal</td>
<td>1.19</td>
</tr>
<tr>
<td>5 1/2&quot;</td>
<td>R6</td>
<td>0.56 Vertical 0.78 Horizontal</td>
<td>1.46</td>
</tr>
<tr>
<td>5 1/2&quot;</td>
<td>R7</td>
<td>1.18 Vertical 1.78 Horizontal</td>
<td>2.08</td>
</tr>
</tbody>
</table>

*Total area of steel required per "Type A" panel.

### NOTES:

1. Reinforcing steel to be A615 Grade 60.
2. 3/8" x 3/8" chamfer shall be provided on all exposed edges (front face only).
3. All panel types and other related elements will be detailed on shop drawings.
4. All panels shall have two lifting inserts of one-ton capacity each.
5. Panel design thickness is 5 1/2". Thickness of concrete must increase to accommodate any architectural surface finish that may be specified.
6. Actual panel reinforcement for all panel types on this project is designated above. R4 illustrated for information only.

---

**FILTER CLOTH DETAIL**

Partial Elevation - Back Face

**PARTIAL ELEVATION - FRONT FACE**

**TYPICAL PANEL LAYOUT**

**SECTION A-A**

**SECTION C-C**

**SECTION 1-1**

**CONNECTION DETAIL**

**DATE**: 01-01-05

**STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION**

**REINFORCED EARTH WALL**

**REINFORCED WALL SYSTEMS**

**THE REINFORCED EARTH COMPANY**

**INTERIM STANDARD**

**INTERIM STANDARD IN ENGLISH UNITS APPLICABLE TO DESIGN STANDARDS BOOKLET PUBLISHED IN ENGLISH UNITS.**

**STATE STRUCTURES DESIGN ENGINEER**

**INDEX NO. 5015**

**SHEET NOS. 1 - 16 OF 16 ARE A REPLACEMENT OF INDEX NO. 5015 OF THE DESIGN STANDARDS BOOKLET DATED JANUARY 2004.**
EXAMPLE ACUTE CORNER - SKEWED SOIL REINFORCEMENTS UNDER PILE CAP

NOTE:
* - DIMENSION OR ANGLE VARIES, SEE WALL ELEVATION
** - SLIP JOINTS ARE NOT REQUIRED FOR SQUARE PANELS

EXAMPLE ACUTE CORNER - SKEWED SOIL REINFORCEMENTS AT ABUTMENT LEVEL

ACUTE CORNER ELEMENT DETAIL

SOIL REINFORCEMENT
WIRE MESH WITH GEOTEXTILE

SLIP JOINT (TYP.)
PRECAST

CONNECTION DETAIL

THIS SYSTEM SHALL BE USED IN SLIGHTLY OR MODERATELY AGGRESSIVE ENVIRONMENTS ONLY
CASEFORM AND SQUARE PANELS

REINFORCED WALL SYSTEMS
THE REINFORCED EARTH COMPANY
REINFORCED EARTH WALL

DATE: 01-01-05

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION
STATE STRUCTURES DESIGN ENGINEER
WILLIAM N. NICKAS, P.E.
ALL OPEN JOINTS IN THE PRECAST BARRIER SHALL BE FILLED 1'-3/4" ABOVE FINISHED GRADE WITH 3/4" ROUNDED BACKING ROD AND CAULKED WITH SILICONE SEALANT. MATERIALS BY CONTRACTOR.

BACKING ROD * FOR TOP OF LEVELING CONC. ELEVATION SUBTRACT (9") FROM GUTTER LINE ELEVATIONS

CONTRACTOR TO TRIM DOWELS WHERE REQUIRED TO CLEAR TOP OF LEVELING CONCRETE FILL

FOR TOP OF LEVELING CONC. ELEVATION SUBTRACT (3") FROM GUTTER LINE ELEVATIONS

VARIGRID (TYPICAL) WITH STANDARD THROAT

NOTE: 5/8" SHEAR DOWELS WITH ONE END GREASED OR WRAPPED IN TAR PAPER

THE SYSTEM SHALL BE USED IN SLIGHTLY OR MODERATELY AGGRESSIVE ENVIRONMENTS ONLY. CRUCIFORM AND SQUARE PANELS

DATE : 01-01-05

REMARKS

TRAFFIC BARRIER ELEMENT, METHOD OF SUPPORT AND METHOD OF CONSTRUCTION ARE COVERED BY U.S. PATENT NO. 4,494,892

TRAFFIC BARRIER REINFORCEMENT WITH STANDARD THROAT

REFERENCE TO DESIGN STANDARDS PUBLISHED IN ENGLISH UNITS.

THE REINFORCED EARTH COMPANY

THE REINFORCED EARTH WALL

REINFORCED EARTH WALL SYSTEMS

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION

INTERIM STANDARD
**Coping/Barricade**

**Front Face of Joint Covers**

- **2 #9 Shear Dowels - 3' Long** are required at expanded joints if the unit is less than six panels long.
- See Wall Elevations for Panel Types at Steps.
  - Cruciform and Square Panels, see Wall Elevations.

- **Top of Pavement Gutter Line (Elevations shown are to this point)**
  - #5B @ 8" O.C.
  - 3" x 8" O.C.

- **Top of Traffic Barrier Gutter/Edge of Shoulder**
  - #5A @ 16" O.C.

- **Positive Bond Breaker Shall Be Provided Between C.I.P. Conc. & Precast Conc. Panel.**

**Section B-B**

- Standard Barrier: 1 1/2" x 8" Conc. C.I.P.

**Section A-A**

- **Typical Leveling Pad Step Detail** (Leveling pad dimensions are the same for both cruciform and square panels, see wall elevations for panel types at steps).

**Plan View @ Bend (Typ.)**

- **1' x 0" x 6" Unreinforced Conc. Leveling Pad.**

**Slip Joint Cover Detail**

- **Provide 1/2" Joint Material**
  - 1/2" Open Joint

**Typically**

- **18" Filter Cloth As Shown**

**Typical Interim Standard in English Units**

**State of Florida Department of Transportation**

**The Reinforced Earth Company**

**Reinforced Earth Wall**

**Date: 01-01-05**

**Interim Standard**

**State Project No.**

**Sheet No.**

**Financial Project No.**

**State Structures Design Engineer**

**Approved By:**

William N. Nickas, P.E.
LONGITUDINAL BARS SHALL BE AS SHOWN ABOVE
UNIT EITHER SIDE OF LIGHT POLE BARRIER
HAVE THESE DIMENSIONS FOR ONE PRECAST
THE BARRIER JUNCTION SLAB SHALL
#5C @ 8" O.C.
MAINTAIN 2" MIN. CLEARANCE ON ALL BARS,
- ALL LONGITUDINAL BARS ARE #4 AS SHOWN
EXCEPT WHERE SHOWN.

#5C @ 8" O.C.
NOTE B:
THE BARRIER JUNCTION SLAB SHALL
HAVE THESE DIMENSIONS FOR ONE PRECAST
UNIT EITHER SIDE OF LIGHT POLE (BARRIER)
LONGITUDINAL BARS SHALL BE AS SHOWN ABOVE

NOTE C:
2 - #4 SHEAR DOWELS 3'-0" LONG
REFER TO PRECAST BARRIER SHEET

NOTE D:
LIGHT POLE MANUFACTURER IS RESPONSIBLE FOR
PROVIDING ANCHOR BOLTS THAT EFFECTIVELY
TRANSMIT LOADS TO THE PILASTER AND FIT THE
REINFORCING CAGE.

NOTE E:
SEE STANDARD INDEX NO. 1200 FOR ADDITIONAL DETAILS.

#4A
1'-6"
1'-0"
2'-0"
4'-10"
6'-4"
2'-4"
5'-7"
4" CL.
1'-0"
1'-6"
1'-7"
1'-3"
6" CL.
1'-0"
2'-6"

NOTE A:
POSITIVE BOND BREAKER
SHALL BE PROVIDED BETWEEN
C.U.P. CONCRETE AND
CONCRETE PANEL

NOTE B:
THE BARRIER JUNCTION SLAB SHALL
HAVE THESE DIMENSIONS FOR ONE PRECAST
UNIT EITHER SIDE OF LIGHT POLE (BARRIER)
LONGITUDINAL BARS SHALL BE AS SHOWN ABOVE

NOTE C:
2 - #4 SHEAR DOWELS 3'-0" LONG
REFER TO PRECAST BARRIER SHEET

NOTE D:
LIGHT POLE MANUFACTURER IS RESPONSIBLE FOR
PROVIDING ANCHOR BOLTS THAT EFFECTIVELY
TRANSMIT LOADS TO THE PILASTER AND FIT THE
REINFORCING CAGE.

NOTE E:
SEE STANDARD INDEX NO. 1200 FOR ADDITIONAL DETAILS.
PEDESTRIAN BICYCLE RAILING
BARRIER DETAIL @ LIGHT POLE AND SIGNAL

CONCTOR TO ADJUST LIGHT POLE LOCATION FROM THAT SHOWN ON PLANS TO THE CENTER OF THE 20'-0" LONG C.I.P. BARRIER.

BARS 4F1, 2, 3, 4 AND 5

DATE: 01-01-05

THE REINFORCED EARTH COMPANY
REINFORCED EARTH WALL

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION
BARS 4F1, 2 AND 3 (PAIRS)

CONSTRUCTION JOINT

POSITIVE BOND BREAKER SHALL BE PROVIDED BETWEEN C.I.P. 1/2" EXP. JT. MAT'L.

#5H @ 16" O.C.

#5G @ 8" O.C.

ANCHOR BOLTS BY OTHERS, REFER TO FOOT INDEX 1200 FOR CONDUIT AND WEEP HOLE INFORMATION.

- SEE FL INDEX 1200 FOR CONDUIT AND WEEP HOLE INFORMATION.

TOP OF PAVEMENT

2'-0"

BARRIERS DETAIL @ LIGHT POLE AND SIGNAL

CONTRACTOR TO ADJUST LIGHT POLE LOCATION FROM THAT SHOWN ON PLANS TO THE CENTER OF THE 20'-0" LONG C.I.P. BARRIER.
IT IS THE CONTRACTOR'S RESPONSIBILITY TO ENSURE SOIL REINFORCEMENTS ARE PLACED BELOW THE PAVEMENT SECTION.

- 1'-0" 8"
- 1 1/2"
- 2 1/2"
- #4 @ 9 1/2" O.C.
- (SEE FLORIDA INDEX 820)
- #4 BARS 3"
- 2" CL (TYP.)
- 6" SIDEWALK
- MAX.
- PANELS AND C.I.P. CONCRETE REINFORCEMENTS DOWN AS REQUIRED.
- MIN.
- 3" MIN
- 5"
- #4 BARS 3"
- 6" MIN
- ELEVATION SHOWN ON WALL ELEV. VIEW
- FRONT FACE OF R.E. PANEL & HORIZ. CONTROL LINE
- 2'-0" 2'-6"
- 5 1/2"
- 2 1/2" PREMOLDED EXPANSION JOINT MATERIAL (SEAL TOP WITH 3/4" POURED RUBBER) SEE DETAIL "A"
- CONCRETE BARRIER WALL (INDEX NO. 410)
- 1/2" PREMOLDED EXP. MATERIAL
- WITH 3/4" POURED RUBBER)
- C.I.P. PARAPET DETAIL W/ HANDRAIL
- SEAL WITH POURED RUBBER
- CONCRETE BARRIER WALL 3/4"
- 1/2" PREMOLDED EXP. MATERIAL
- DETAIL "A"

THIS SYSTEM SHALL BE USED IN SLIGHTLY OR MODERATELY AGGRESSIVE ENVIRONMENTS ONLY.

- CRUCIFORM AND SQUARE PANELS
- SUB-BASE
- CONCRETE BARRIER WALL
- 6" MIN.
- STABILIZED BASE
- PAVEMENT 6 3/4" 3/4"
- 3/4"
- 1/2" PREMOLDED EXP. MATERIAL
- 1/2"
- 2 1/2" PREMOLDED EXP. MATERIAL
- CONCRETE BARRIER WALL
- 6" MIN.
- STABILIZED BASE
- PAVEMENT

FINANCIAL PROJECT ID |
STATE PMO. NO. | 05015
|
INTERIM STANDARD |
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION
RETAINING WALL SYSTEMS
THE REINFORCED EARTH COMPANY
REINFORCED EARTH WALL

DATE: 01-01-05

SHEET NOS. 1 - 16 OF 16 ARE A REPLACEMENT OF INDEX NO. 5015 OF THE DESIGN STANDARDS BOOKLET PUBLISHED IN ENGLISH UNITS.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION

STATE STRUCTURES DESIGN ENGINEER

SHEET NOS. 1 - 16 OF 16 ARE A REPLACEMENT OF INDEX NO. 5015 OF THE DESIGN STANDARDS BOOKLET PUBLISHED IN ENGLISH UNITS.

SHEET NO. 14 OF 16

04
05015
TYPICAL PANELS

NOTES:
1. REINFORCEMENT SHOWN SHALL COMPLY TO THE ASTM A416, GRADE 60 STANDARD. ALTERNATE REINFORCEMENT MAY BE DEFORMED WELDED WIRE FABRIC AS INDICATED IN THE TABLE BELOW. THIS FABRIC SHALL COMPLY TO ASTM A416. REINFORCEMENT LAYOUT WILL BE DETAIL AND SHOWN ON PANEL SHOP DRAWINGS. IF WELDED FABRIC IS TO BE USED THE SIZE SHOULD BE DETERMINED BASED ON THE PANEL SHAPE AND REQUIRED MINIMUM EDGE DISTANCE.
2. 1/2" x 1/2" CHAMFER SHALL BE PROVIDED ON ALL EXPOSED EDGES (FRONT FACE ONLY).
3. ALL PANEL TYPES AND OTHER RELATED ELEMENTS WILL BE DETAILED ON SHOP DRAWINGS.
4. ALL PANELS EXCEPT TYPES M, N, NII, NJJ, NI & NJ SHALL HAVE TWO BURKE 1-TON SPREAD ANCHORS. PANEL TYPES M, N, NII, NJ, NJ & NJ SHALL HAVE TWO BURKE 2-TON ERECTION HEAD ANCHORS WITH BOTH TENSION AND SHEAR BARS.
5. PANEL DESIGN STRUCTURAL THICKNESS IS 5 1/2" MINIMUM. THIS THICKNESS MUST INCREASE TO ACCOMMODATE ANY ARCHITECTURAL SCULPTURED FINISH.
6. ACTUAL LOCATION OF REBARS WILL BE ADJUSTED TO ACCOMMODATE PANEL CASTING.
7. PANEL REINFORCEMENT SHALL BE PLACED WITH A MINIMUM 1 3/16" CLEARANCE FROM THE TIE STRIPS.

<table>
<thead>
<tr>
<th>PANEL TYPE</th>
<th>&quot;k&quot;</th>
<th>PANEL REINFORCEMENT (FOR PANEL TYPE &quot;A&quot;)</th>
<th>MINIMUM ALLOWABLE HORIZONTAL STRESS AT FACING (KSF)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A &amp; H</td>
<td>4&quot;-10 1/4&quot;</td>
<td>6-#2 VERTICAL 5-#2 HORIZONTAL</td>
<td>1.20</td>
</tr>
<tr>
<td>B &amp; Q</td>
<td>3&quot;-4 1/4&quot;</td>
<td>WIRE MESH ALTERNATE: 6x6 6.2x6.2</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>1&quot;-3/4&quot;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>3&quot;-5 1/4&quot;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E</td>
<td>5&quot;-7 1/2&quot;</td>
<td></td>
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<tr>
<td>F</td>
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</tr>
<tr>
<td>K</td>
<td>0&quot;-5 1/4&quot;</td>
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</tr>
<tr>
<td>N</td>
<td>7&quot;-3 1/4&quot;</td>
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</tbody>
</table>

CONCRETE COVER ON ALL REINFORCEMENT TO BE 2" MIN.