

37/3-97AAA 24 Pine Avenue
(Takoma Park Historic District)

Milford H. Sprecher
24 Pine Avenue
Takoma Park, MD 20912-4611
301-270-6255 (w)
703-876-5036 (h)
e-mail: milfords@aol.com

December 12, 1997

Ms. Perry Kephart
Historic Preservation Commission
Maryland National Capital Park and Planning Commission
8787 Georgia Avenue
Silver Spring, MD 20910

Dear Ms. Kephart:

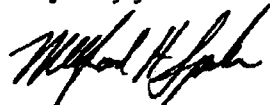
My wife and I own a house in the historic district in Takoma Park. A brick retaining wall that divided our property from our neighbor, 26 Pine, collapsed last spring. We have applied for a permit to replace the wall, which we understand must receive approval from the HPC.

We plan to replace the wall with a Keystone block wall, chosen because of its superior properties and longevity. The section of the wall visible from the street will not be replaced because it is not failing. We are nearing the end of the construction season and waiting until January for approval will delay the project considerably, possibly until next spring. My wife and I are worried about erosion that may occur during the winter, possible collapse of our yard into our neighbor's yard, and potential damage to our house due to the proximity of our house to the property line and wall.

Our house is not historic, having been built around 1960. The wall, while brick, was poorly constructed about 50 years ago, and is not historic. We believe that the replacement of the wall will not adversely affect the neighborhood. It will also only be visible by a few of our neighbors.

We hope you can approve our application quickly.

Very truly yours



Milford H. Sprecher

cc: Fine Earth Landscaping


37/3-97AAA

**THE MARYLAND-NATIONAL CAPITAL PARK AND PLANNING COMMISSION**
8787 Georgia Avenue • Silver Spring, Maryland 20910-3760

DATE: 12-17-97

MEMORANDUM

TO: Historic Area Work Permit Applicants

FROM: Gwen Marcus, Historic Preservation Coordinator
Design, Zoning, and Preservation Division
M-NCPPC 

SUBJECT: Historic Area Work Permit Application - Approval of
Application/ Release of Other Required Permits

Enclosed is a copy of your Historic Area Work Permit application, approved by the Historic Preservation Commission at its recent meeting, and a transmittal memorandum stating conditions (if any) of approval.

You may now apply for a county building permit from the Department of Environmental Protection (DEP), at 250 Hungerford Drive, Second Floor, in Rockville. Please note that although your work has been approved by the Historic Preservation Commission, it must also be approved by DEP before work can begin.

When you file for your building permit at DEP, you must take with you the enclosed forms, as well as the Historic Area Work Permit that will be mailed to you directly from DEP. These forms are proof that the Historic Preservation Commission has reviewed your project. For further information about filing procedures or materials for your county building permit review, please call DEP at 217-6370.

If your project changes in any way from the approved plans, either before you apply for your building permit or even after the work has begun, please contact the Historic Preservation Commission staff at 495-4570.

Please also note that you must arrange for a field inspection for conformance with your approved HAWP plans. Please inform DEP/Field Services at 217-6240 of your anticipated work schedule.

Thank you very much for your patience and good luck with your project!



RETURN TO: Department of Environmental Protection
 Division of Development Services and Regulation
 250 Hungerford Drive, Rockville, Maryland 20850
 (301) 217-6370

Historic Preservation Commission
 (301) 495-4570

**APPLICATION FOR
 HISTORIC AREA WORK PERMIT**

CONTACT PERSON Milford Sprecher
 DAYTIME TELEPHONE NO. (703) 876-5036

TAX ACCOUNT # _____

NAME OF PROPERTY OWNER Milford Sprecher DAYTIME TELEPHONE NO. (703) 876-5036

ADDRESS 24 Pine Ave. Takoma Park MD 20912
CITY STATE ZIP CODE

CONTRACTOR Fine Earth Landscape Inc TELEPHONE NO. (301) 972-8810
 CONTRACTOR REGISTRATION NUMBER 9809

AGENT FOR OWNER Joel Hafner DAYTIME TELEPHONE NO. (301) 972-8810

LOCATION OF BUILDING/PREMISE

HOUSE NUMBER 24 STREET Pine Ave

TOWN/CITY Takoma Park NEAREST CROSS STREET _____

LOT 32 BLOCK 17 SUBDIVISION _____

LIBER _____ FOLIO _____ PARCEL _____

PART ONE: TYPE OF PERMIT ACTION AND USE

1A. CIRCLE ALL APPLICABLE:

<input checked="" type="checkbox"/> Construct	<input type="checkbox"/> Extend	<input type="checkbox"/> Alter/Renovate	<input type="checkbox"/> Repair	<input type="checkbox"/> Move	<input type="checkbox"/> Porch	<input type="checkbox"/> Deck	<input type="checkbox"/> Fireplace	<input type="checkbox"/> Shed	<input type="checkbox"/> Solar	<input type="checkbox"/> Woodburning Stove
<input type="checkbox"/> Wreck/Raze	<input type="checkbox"/> Install	<input type="checkbox"/> Revocable	<input type="checkbox"/> Revision	<input checked="" type="checkbox"/> Fence/Wall (complete Section 4)	<input type="checkbox"/> Single Family	<input type="checkbox"/> Other _____				

1B. CONSTRUCTION COST ESTIMATE \$ 9000.00

1C. IF THIS IS A REVISION OF A PREVIOUSLY APPROVED ACTIVE PERMIT SEE PERMIT # _____

PART TWO: COMPLETE FOR NEW CONSTRUCTION AND EXTEND/ADDITIONS

2A. TYPE OF SEWAGE DISPOSAL 01 WSSC 02 SEPTIC 03 OTHER _____

2B. TYPE OF WATER SUPPLY 01 WSSC 02 WELL 03 OTHER _____

PART THREE: COMPLETE ONLY FOR FENCE/RETAINING WALL

3A. HEIGHT 6 feet _____ inches

3B. INDICATE WHETHER THE FENCE OR RETAINING WALL IS TO BE CONSTRUCTED ON ONE OF THE FOLLOWING LOCATIONS:
 On party line/property line Entirely on land of owner _____ On public right of way/easement _____

I HEREBY CERTIFY THAT I HAVE THE AUTHORITY TO MAKE THE FOREGOING APPLICATION, THAT THE APPLICATION IS CORRECT, AND THAT THE CONSTRUCTION WILL COMPLY WITH PLANS APPROVED BY ALL AGENCIES LISTED AND I HEREBY ACKNOWLEDGE AND ACCEPT THIS TO BE A CONDITION FOR THE ISSUANCE OF THIS PERMIT.

Signature of owner or authorized agent Joel Hafner Date 12/12/99

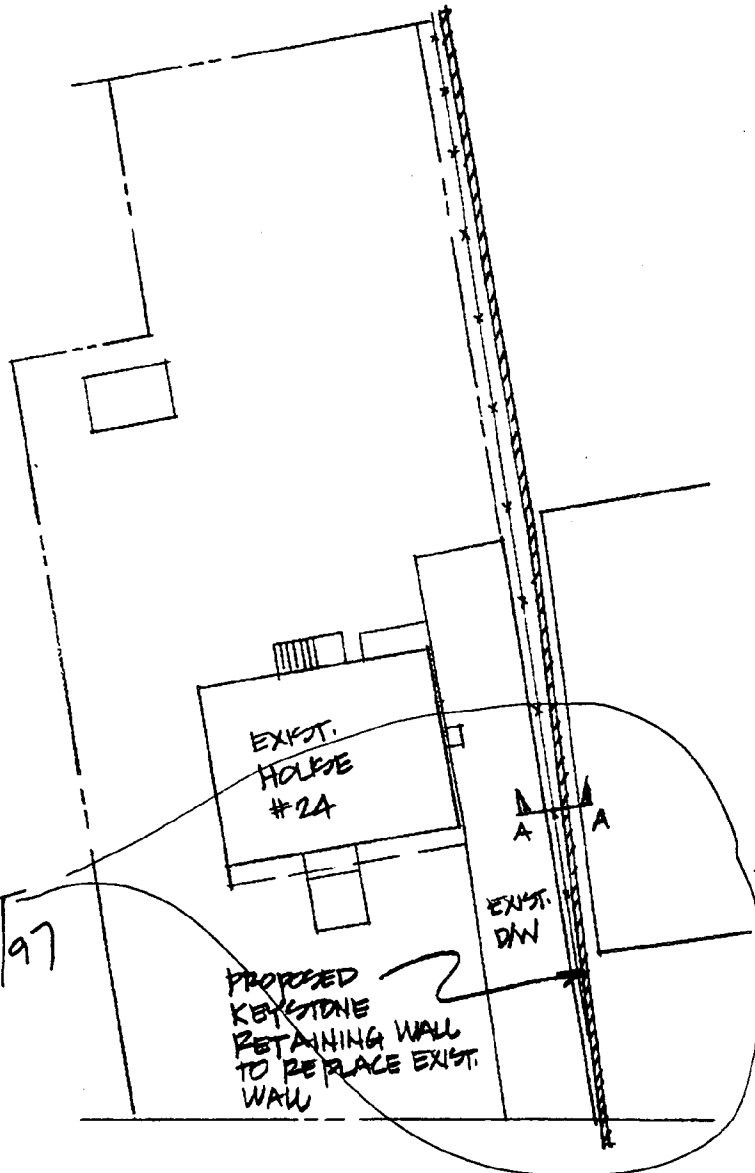
APPROVED with condition For Chairperson, Historic Preservation Commission
 Signature [Signature] Date 12-17-1999

APPLICATION/PERMIT NO: 97121208 63 DATE FILED: _____ DATE ISSUED: _____

SEE REVERSE SIDE FOR INSTRUCTIONS

APPROVED
Montgomery County
Historic Preservation Commission

Handwritten signature
12/17/97



EXIST.
HOLESE
#24

A A
A A

EXIST.
DW

PROPOSED
KEYSTONE
RETAINING WALL
TO REPLACE EXIST.
WALL

*not wall replacement
of front plane of
residence.*

PINE AVENUE

SCHEMATIC SITE/LAYOUT PLAN

NTS

(*NOTE: SEE EXIST. SITE/GRADING
PLAN FOR ADDL INFO.

RKC ENGINEERING, INC.

P.O. BOX 1015, GAINESVILLE, VA 20156 - 703-753-9207

Job Name

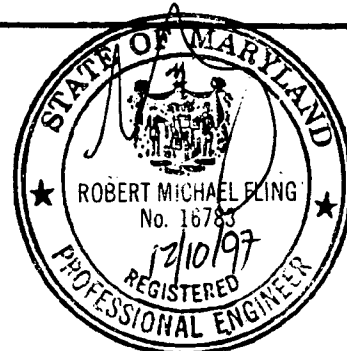
FINE EARTH LANDSCAPE

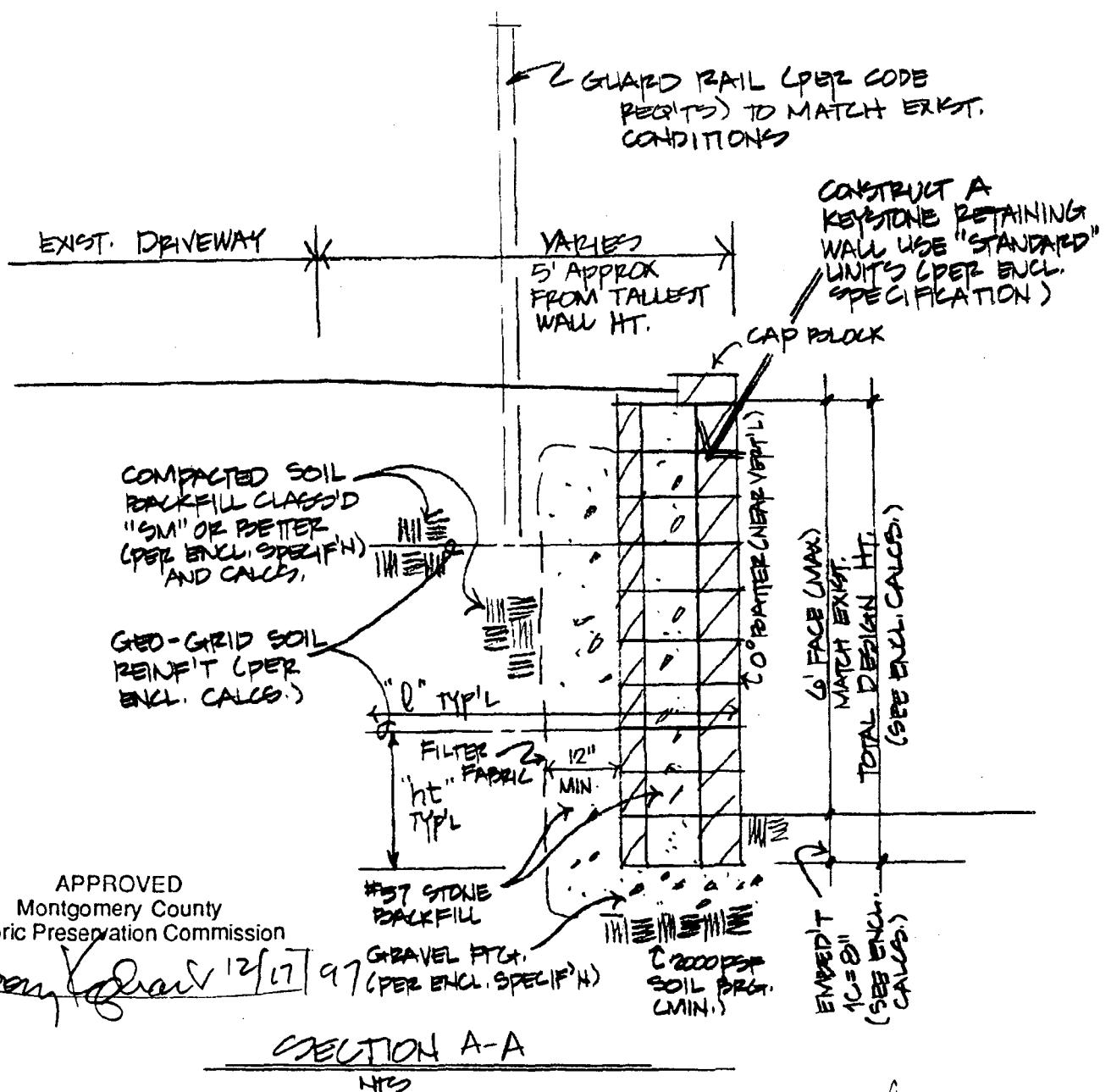
Date 12/10/97

Completed RMF

Job Title PROPOSED
KEYSTONE RETAINING WALL
24 PINE AVENUE
TAKOMA PARK, MD.

Page 1 of 2





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Montgomery County
Historic Preservation Commission

[Signature] 12/17/97

RKC ENGINEERING, INC.

P.O. BOX 1015, GAINESVILLE, VA 20156 - 703-753-9207

Job Name

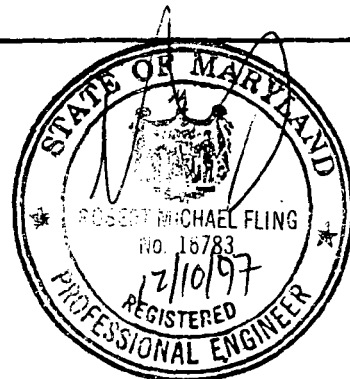
FINE EARTH LANDSCAPE

Date 12/10/97

Completed RMF

Job Title PROPOSED
KEYSTONE RETAINING WALL
24 PINE AVENUE
TAKOMA PARK, MD.

Page 2 of 2



KEYSTONE RETAINING WALL DESIGN
Based on Rankine-w/Batter Methodology
KeyWall Version 3.1b, JAN 97

Project: 24 PINE AVE, TAKOMA PARK, MD

Date: Dec 10, 1997

Proj. No.:

By: RMF

Design Parameters

Soil Parameters	Phi	c	gamma
Reinforced Fill:	28	0	120
Retained Soil:	28	0	120
Foundation Soil:	28	0	120
Reinforce Fill Type: Silts & sands			
Unit Fill: Crushed Stone, 1 inch minus			

Factors of Safety

Sliding: 1.50	Overturning: 2.00	Bearing: 2.00
Pullout: 1.50	Uncertainties: 1.50	
Connection	Peak: 1.50	0.75 in: N/A

Reinforcing Parameters: Mirafi Geogrids

	Tcr	FSdu	FScd	LTDS	FSun	Td	Ci	Cds
Mirafi 2T	1099	1.10	1.20	833	1.50	555	0.80	0.80

Analysis: WALL ALONG D\W

Unit Type: STANDARD Wall Batter: 0.00 degrees

Leveling Pad: Crushed Stone

Wall Ht: 2.7(ft), embedmt =0.7(ft)

Level Backfill

Surcharge: 250.0 (Psf) uniform surcharge

Results: Sliding Overturning Bearing Shear Bending

Factors of Safety: 1.63 8.59 9.48 31.43 6.10

Calculated Bearing Pressure: 484 (Psf)

eccentricity at base: -0.10 (ft)

Reinforcing: ft & lbs/ft

Layer	Ht.	Length	Reinf	: Td	Tension	Tconn	FSpo
1	2.00	5.00	Mirafi 2T:	403	93	403*	6.12

Reinforcing Quantities (no waste included):

Mirafi 2T 0.56 sy/ft

NOTE: THESE CALCULATIONS ARE FOR PRELIMINARY DESIGN ONLY AND SHOULD NOT BE USE FOR CONSTRUCTION WITHOUT REVIEW BY A QUALIFIED ENGINEER

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Historic Preservation Commission

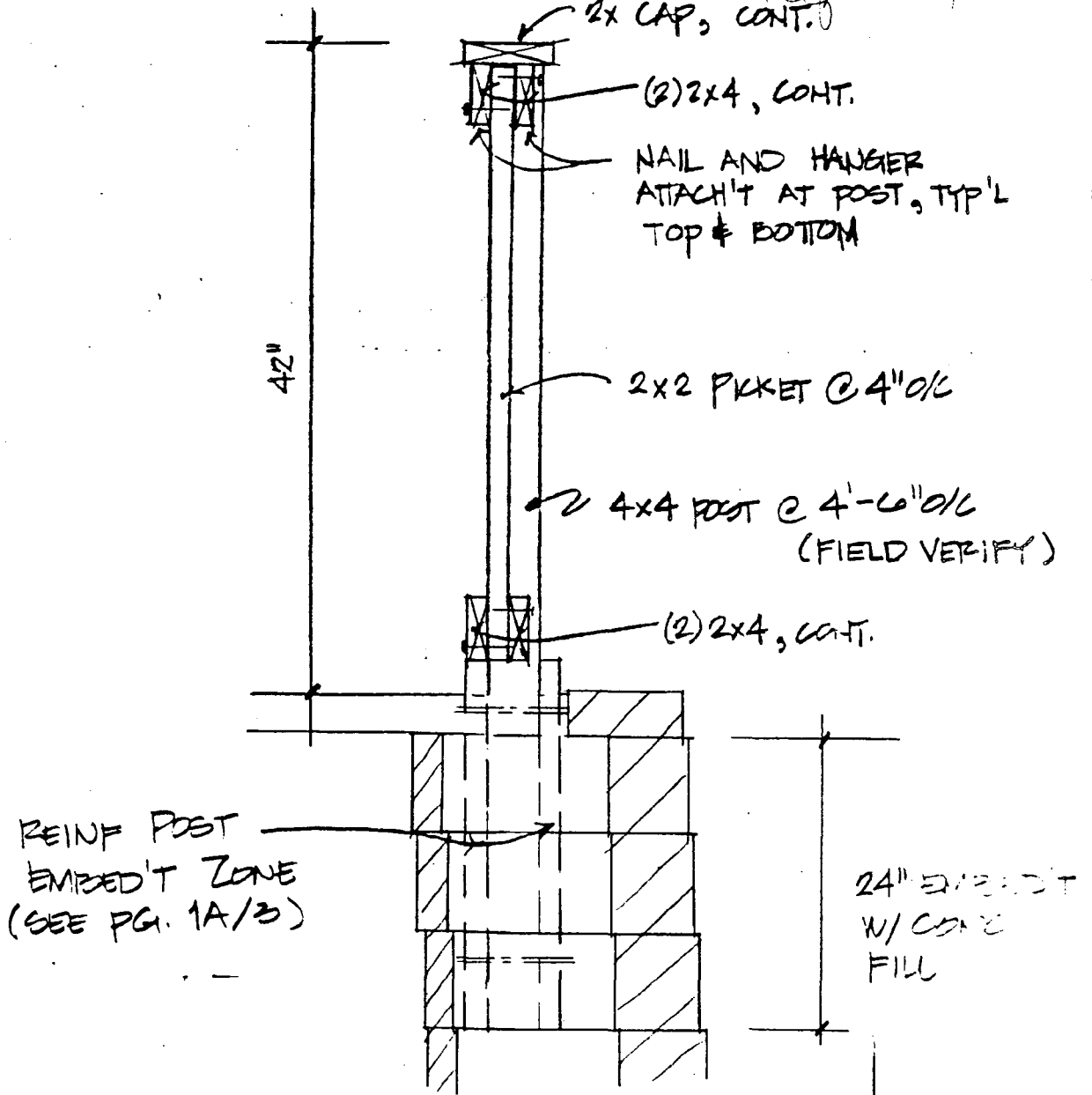
Robert Michael Fling 12/17/97



ALL LUMBER P.T., #2GR STP

APPROVED
Montgomery County
Historic Preservation Commission

Robert Michael Fling 12/17/97



Job Name

KEYSTONE WALL

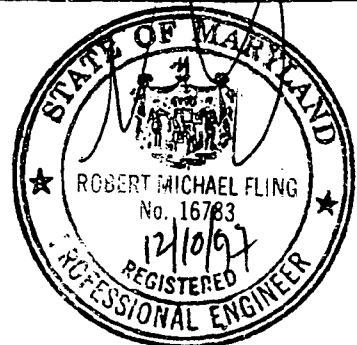
Job Title

GUARDBAIL -
WOOD

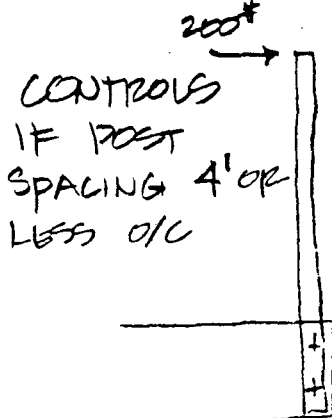
REV. 10/16/97

Date 2/21/97

Computed RMP



WOOD GUARDRAIL



OR

50 PLF ← + 100 PLF ↓

3.5
 \square 2.5 $I_p = 8.93$
 $S_p = 5.10$

42" = 3.5'

$M = 8400$ "# $\checkmark \rightarrow f_b = 1646$ PSI

$F_b = 1300/1500$
 4x4 $S_p = 7.146$

$f_b = 1175$ PSI OK

$\Delta_{TL} = 0.282"$

$E = 1.6$
 $I_p = 12.505$

W/ FULL 4x4
 $f_b = 1322$ ✓
 STU NEEDED #1
SIP

IF SPACE POSTS @ 54" 4.5' O/C

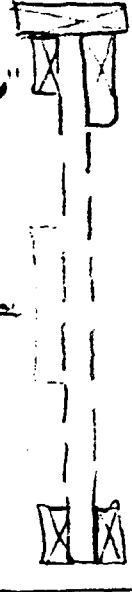
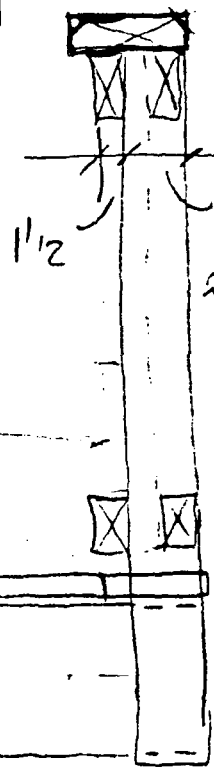
$M = 9450$ "#

$f_b = 1853$ PSI

$E = 1.7$

$P = 225$ "# $\Delta = 0.300"$
 " 3/8"

W/ FULL SECTION
 0.317"



6.25
X 2

12.5/3

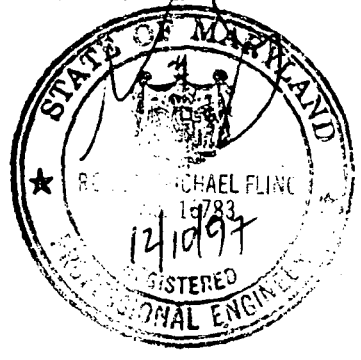
= 4.17' O/C

@ 1/3 PTS

1 1/2" 1/2"

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 Historic Preservation Commission

Way Leggett 12/17/97



Job Name

KEYSTONE WALL

Job Title

GUARDRAIL -
 WOOD

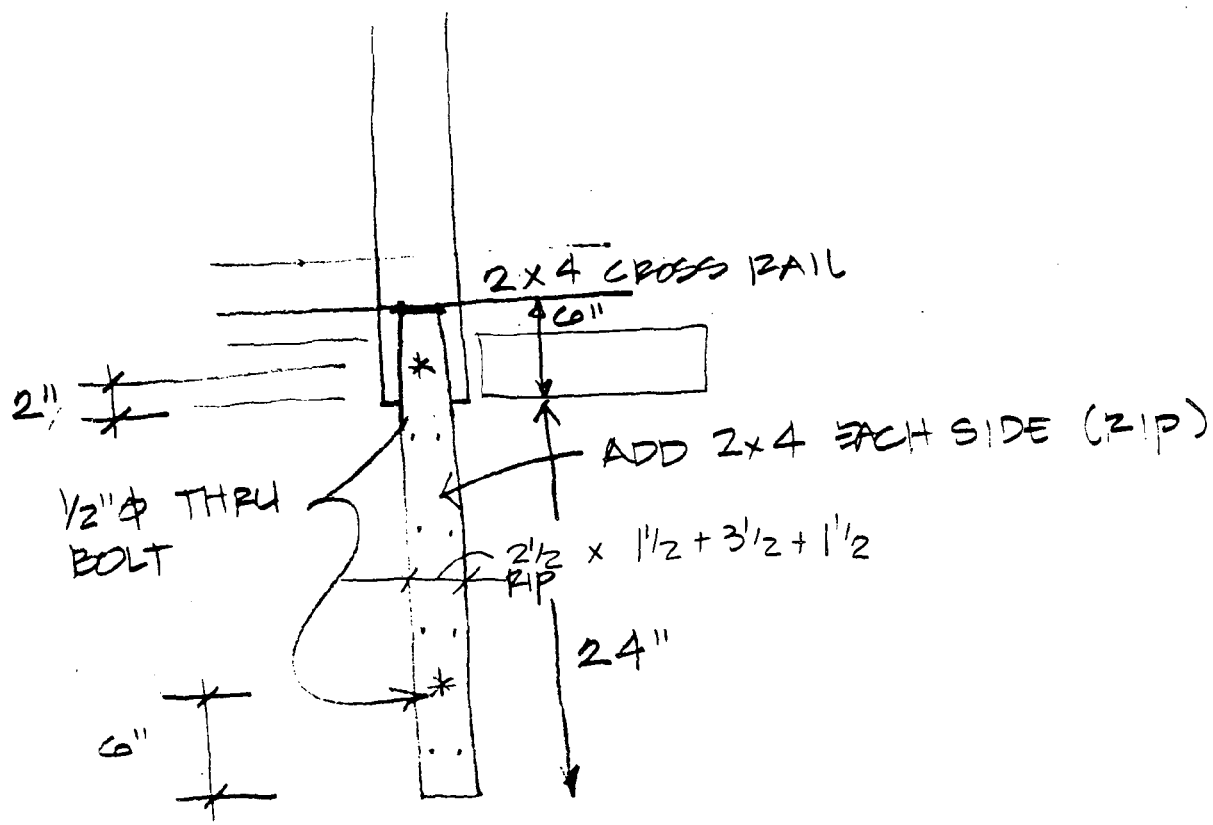
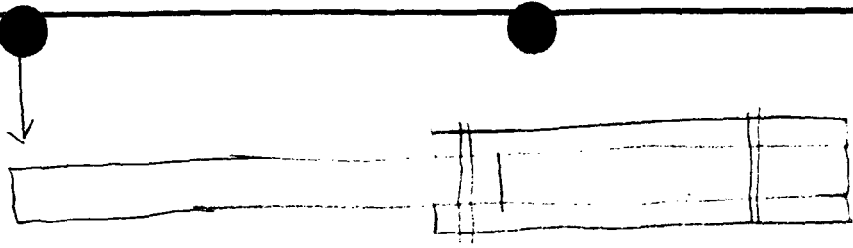
REV. 6/6/97

Date 2/97

Computed RMF

Page 1 of 3

CFC 800 782 2517 CFC 811



POST BASE (EMBED'T ZONE) REINP'T DETAIL

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Montgomery County
Historic Preservation Commission

Tommy [Signature] 12/17/07

Job Name
KEYSTONE WALL

Date 6/6/97 Computed RMP

Job Title
GUARDRAIL

Page 1A of 3

CFC 800 592 2410 C.F. 905

\boxtimes 1 1/2 FLAT $I = 0.984 \checkmark$ $\Delta_H = 0.24''$
 3/2 $S = 1.313 \checkmark$

LATERAL $\frac{\#}{4} = M$ $\frac{M_c(12)}{2(1.313)} = 1300 \sim 1200$
 $\frac{200(l)}{4} = M$ $M_c = 262.6$
 $l = 5.3'$
 OK \checkmark

@ 5' 100 PLF $M = 313 \checkmark$ ← TWO 2x4 VERT $f_b = 612.1 \text{ PSI OK}$
 200 PT # → 250 1# γ 50 PLF → $M = 156.3 \text{ 1K TOP}$

PICKETS 2x2 \boxtimes 1 1/2 x 1 1/2 $I = 0.422$
 $S = 0.563$

$\frac{200 \# (3.33)}{4} = 167 \text{ 1#}$

$A = 2.25$ $V_c = .135 \checkmark$
 $f_v = 90$ 2 PICKETS OK FOR SHEAR

$M_c = 56.3 \text{ 1#}$
 IF $f_b = 1200$ - MUST SPREAD ON 3 PICKETS
 4" O/C

Job Name
 KEYSTONE WALL

Job Title
 GUARDRAIL

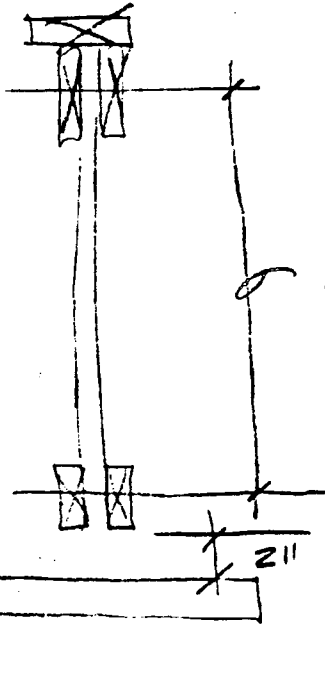
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 Historic Preservation Commission

[Signature] 12/17/97

Date 6/6/97 Computed RME

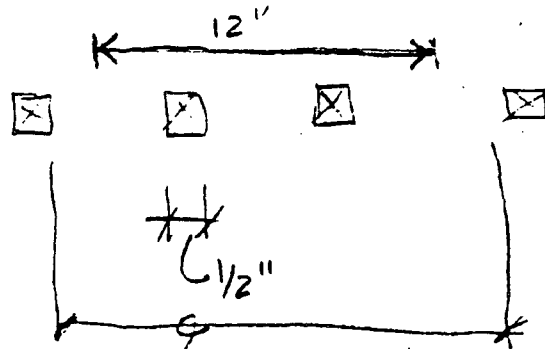
Page 2 of 3

42"



$l = 35.5'' \approx 36''$ $M = 150''^*$

STU NEED 3 PICKETS



4.5" O/C CUT OFF EXACT

Job Name

KEYSTONE WALL

Job Title

GUARDRAIL

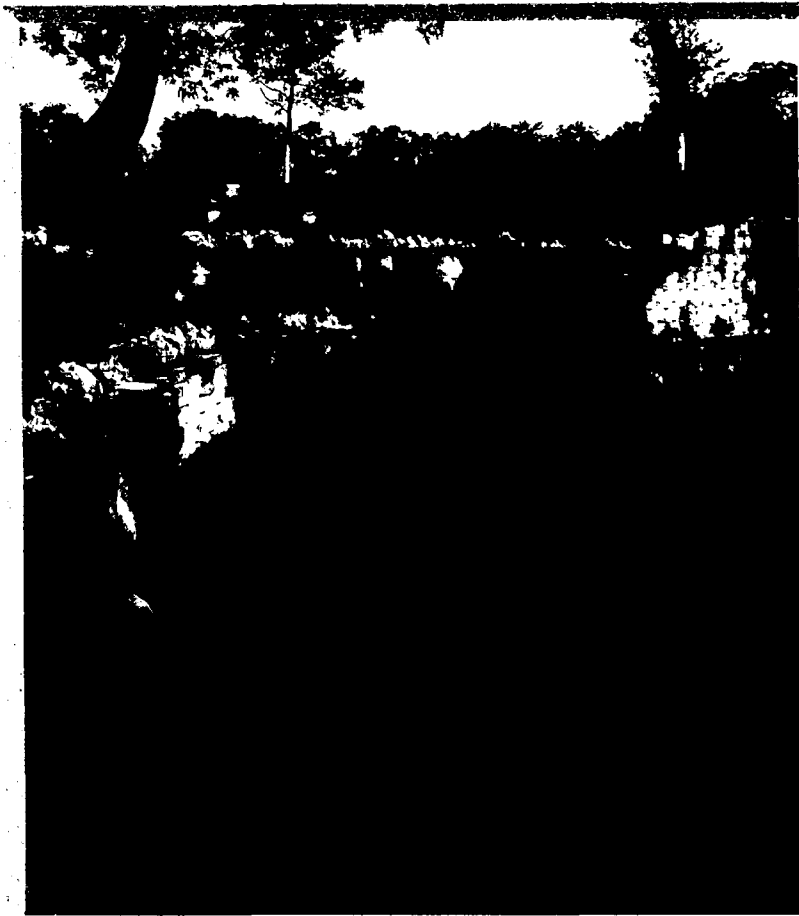
Date 6/6/97 Computed RMT

Page 3 of 3

APPROVED
Montgomery County
Preservation Commission

A116
:02276/KEY
BuyLine 2802

KEYSTONE



RETAINING WALL SYSTEMS

KEYSTONE.
Designed for inner strength and outer beauty.

With KEYSTONE, distinctive looks start at ground level. Graceful curves. Classic lines. Shadows and textures. Geometric patterns. No matter what the application, KEYSTONE Retaining Wall Systems is the preferred choice among architects, engineers, developers and contractors.

You'll discover that the real beauty of KEYSTONE is its inner strength. KEYSTONE's patented interlocking design gives your walls rock-solid stability and performance. Its strong concrete modules and fiberglass pins create maintenance-free walls.

KEYSTONE protects the environment by using non-corrosive, environmentally safe materials.

Installing a KEYSTONE Retaining Wall System is fast and easy. Not to mention the economic benefits and cost-effective advantages of KEYSTONE.

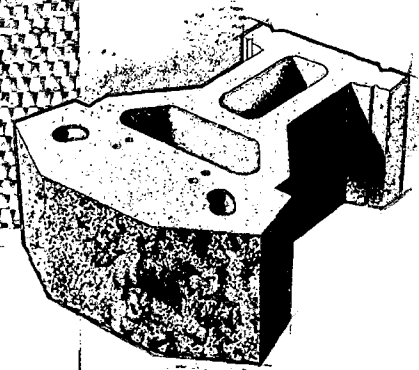
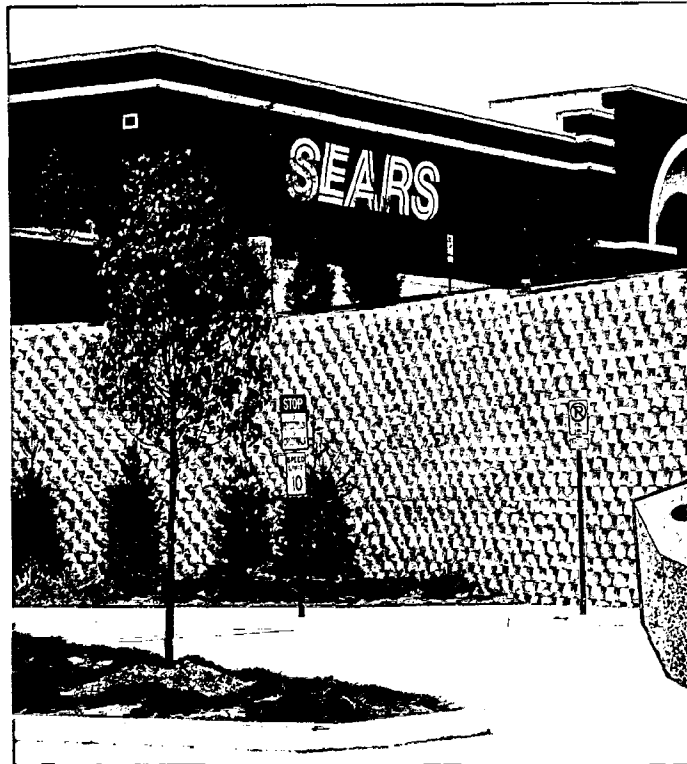
Add up the benefits. The beauty of natural stone, the durability of granite, easy installation... it's all yours with KEYSTONE.

KEYSTONE Retaining Wall Systems. The choice for:

- Civil engineering
- Architecture
- Landscaping
- Commercial
- Governmental
- Residential

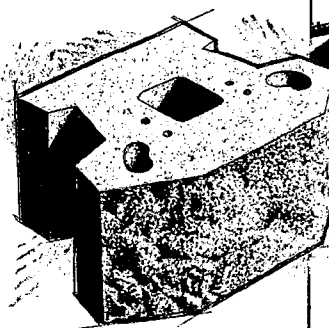
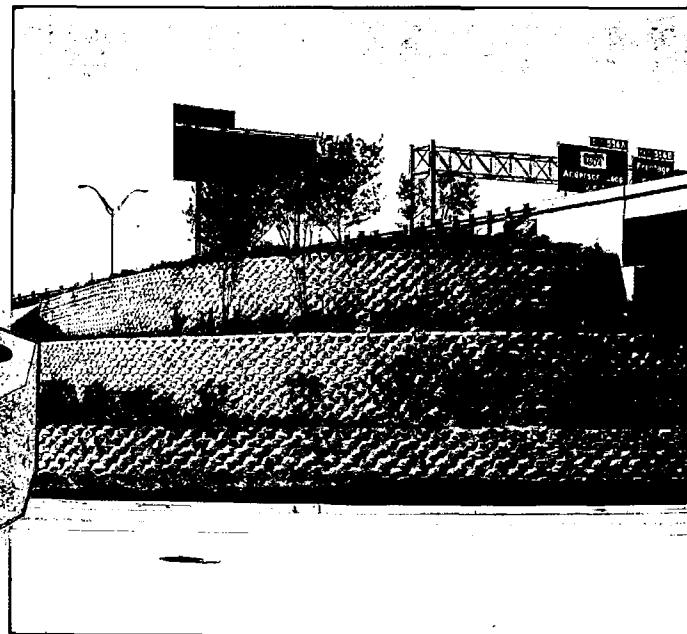
- Compressive strength... 3,000 psi minimum
- Absorption rate 8% maximum
- Composition High-strength, high-density, zero-slump concrete

General Information



- Weight* 95 lbs. (42.75 kg)
- Size* (HxWxD) 8"x18"x21 1/2" (.2032 x .4572 x .5461 m)
- Exposed face area 1 sq. ft. - 8"x18" (.093 sq. m - .2032 x .4572 m)

Standard Unit

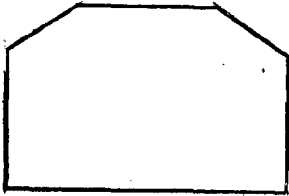


Optional straight face pattern*

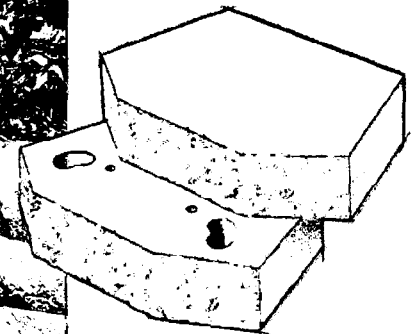
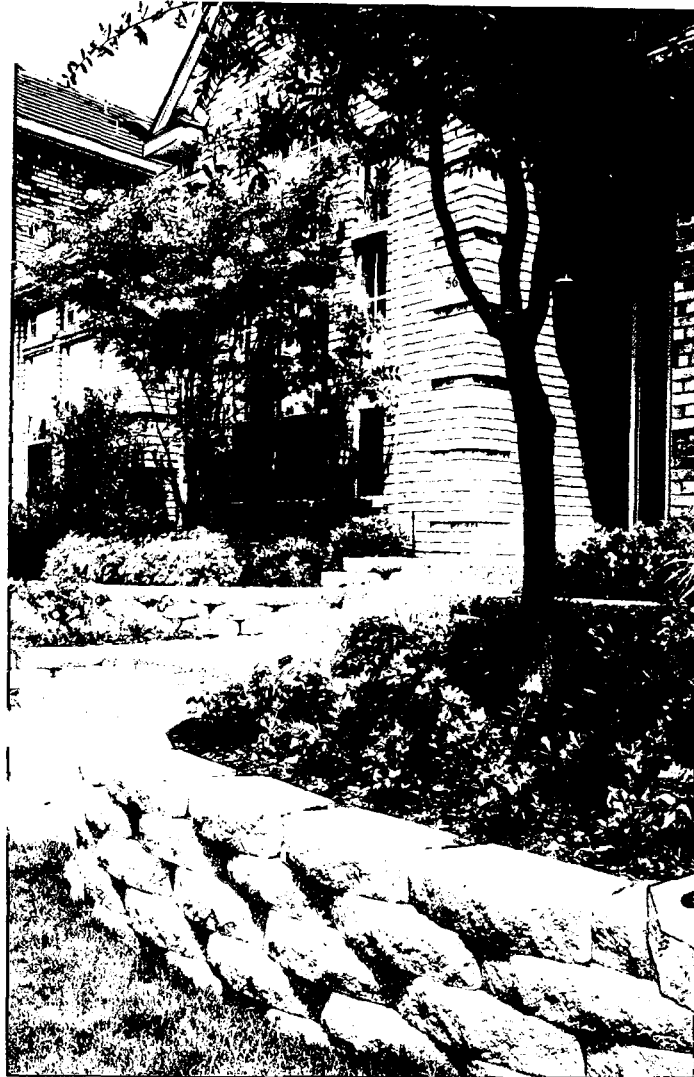
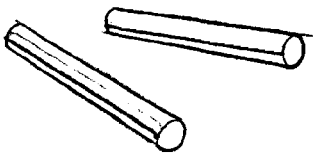
- A beautiful choice for building residential steps.
- Available in all unit types.

International Compac Unit

- Weight* 85 lbs. (38.45 kg)
- Size* (HxWxD) 8"x18"x12" (.2032 x .4572 x .3048)
- Exposed face area 1 sq. ft. - 8"x18" (.093 sq. m - .2032 x .4572 m)



Discover another aesthetically-pleasing option – the straight side cap. The straight side eliminates the triangular space between cap units on straight walls, and reduces the space on concave curves. Convex curves require angular-sided units.



- Weight* 45 lbs. (20.25 kg)
- Size* (HxWxD) 4"x18"x10 1/2" (1016 x .4572 x .2667 m)
- Exposed face area 1/2 sq. ft.–4"x18" (.046 sq. m – .1016 x .4572m)

Mini Unit and Cap Unit

Fiberglass Pins

- All unit types 1/2" x 5 1/4" (High strength pultrusion fiberglass)
- Tensile strength 110,000 psi
- Tensile modulus 4x10⁶ psi
- Flexural strength 128,000 psi
- Flexural modulus 4x10⁶ psi
- Short beam shear strength 6,400 psi
- Specific gravity 1.83 psi

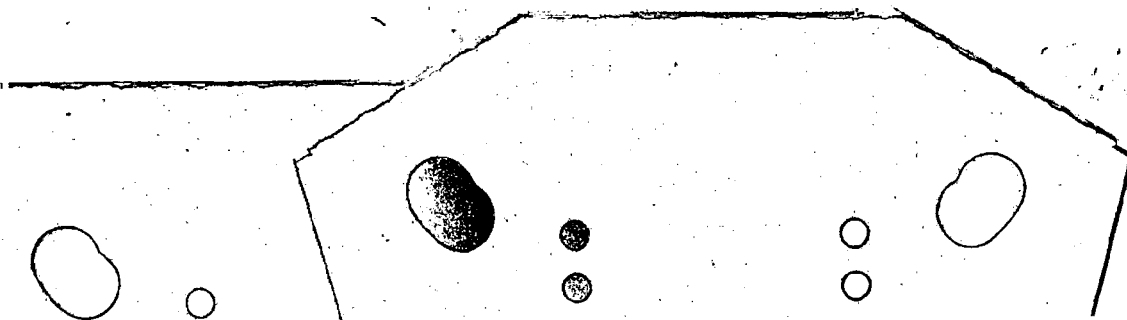
Double pin setback

If you're building a near vertical wall, use the front pinholes. The near vertical setback also allows you to build curves with minimal gapping or overlapping. You can also build corners (90° inside and outside) with near vertical setback units.

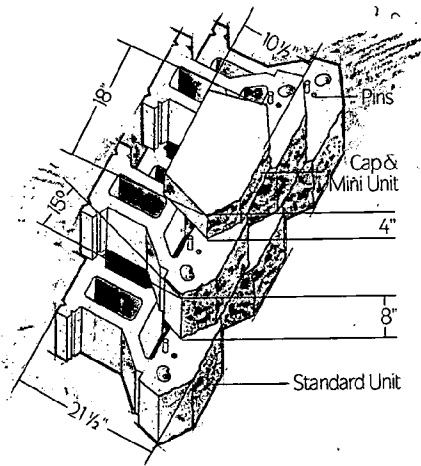
Use back holes (1" setback) for an increased wall batter (1:8). This works effectively on straight walls.

Integrate the near vertical and 1" setback to produce a 1:16 batter.

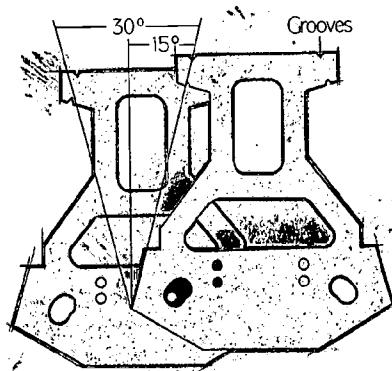
* Actual unit weight, size and availability may vary in your region. See your KEYSTONE representative for more information.



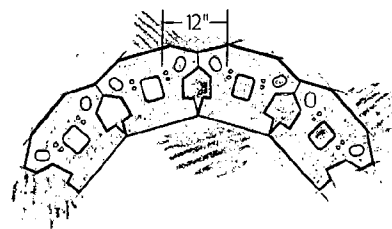
Design criteria



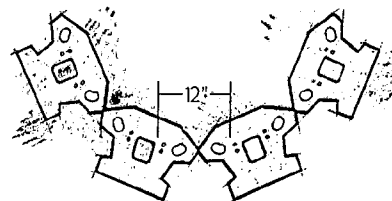
KEYSTONE's patented interlocking system creates a strong, durable retaining wall.



To build extremely tight convex curves, simply remove the extended tail pieces at the grooves. This returns the block shape to its 15° sides.



For convex curves, use near vertical setback. Adjacent units pins should be 12" O.C.



To build concave curves, align units so that pins of adjoining units are 12" O.C. with the near vertical setback procedure.

Concept

Gravity wall systems have been used since the time of the pyramids and rubble stone walls. Gravity and friction resistance (based on material shape) resist lateral earth pressure, which may cause sliding and overturning failure.

KEYSTONE Retaining Wall Systems also resist lateral pressure with their weight and deep embedment shape. KEYSTONE units are connected with pins (not mortar) for a structurally interlocked network. The units also allow drainage to prevent hydrostatic loads.

Non-critical and critical walls

For low, non-critical applications, the KEYSTONE Retaining Wall is effective for gravity wall structures to the following heights:

Maximum wall heights for non-critical walls (without soil reinforcement)

- Standard units6'
- Compac units3'
- Mini units3'
- Standard and mini combination5'
(use 4" shims at tails of Standards)
- Compac and mini combination3'

Assumed parameters for non-critical walls:

- Base soil: minimum 2,500 psf bearing capacity (sandy gravel).
- Retained soil: approximately 32° friction angle (sandy gravel).
- Surcharge: no additional surcharge (slopes, structures, roadways, etc.).
- Drainage: site run-off diverted, water table fluctuation or embankment drainage properly considered.
- Geometry: level backfill and one inch set back position.

For taller or more critical walls, combine KEYSTONE wall units with soil reinforcement. With this combination, you can build walls over 40' high.

Critical structures include one or more of the following:

- Sloping backfill (steeper than 1 to 4)
- Surcharge loads
- High groundwater table
- Multiple tiers
- Wall built on slope
- Low soil shear strength (less than 25° friction angle)

See *geogrid criteria* on page 7 for further information on critical walls.

Applications involving water

KEYSTONE is extremely effective for ponds, creeks, lakes, rivers and run-off channels. It is important to evaluate water level, flow velocity, backfill soil type and foundation soils. KEYSTONE recommends that free-draining crushed rock be used within the core and reinforced fill areas. With the benefit of this free-draining system, the main concern is foundation soil, bearing capacity and wall base protection. KEYSTONE recommends that a qualified hydrological engineer evaluate wave action and scouring effects. In addition, critical applications may require erosion-resistant footing design and riprap protection. See your KEYSTONE representative for further details. A water effects video tape is available upon request.

Curves

To incorporate curves into your KEYSTONE Retaining Wall, use the near vertical setback position. This allows you to build near vertical walls and curves with minimal gapping or overlapping of individual KEYSTONE units. If you have a one-pin location system, contact your KEYSTONE representative for guidelines.

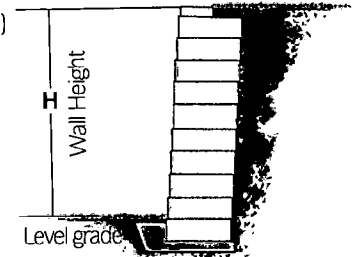
Creative options for distinctive looks

- For the dramatic look of shadows and textures, combine KEYSTONE units of different thicknesses (for example, sizes 8"-4"-8").
- To create interesting geometric patterns, combine KEYSTONE colors.
- For unique variations, combine face textures such as rockface and corduroy, or angular and straight face.

Special applications

- Guard rails, highway barriers, fences, etc. (Vertical steel posts, wood or concrete may be integrated with the KEYSTONE System.)
- 90° corners (inside and outside)
- Sound barriers (double wall with gravel core fill)
- Steps (using KEYSTONE units as tread/riser)
- Water applications
- Coping details
- Landscape lighting integration

No surcharge/level grade

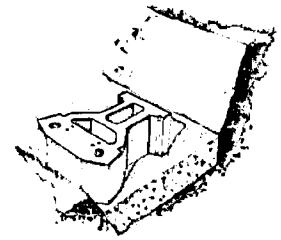


Basic product installation

The KEYSTONE Retaining Wall System was developed with simplicity of construction in mind. These step-by-step instructions will guide you from start to finish. (Instructions apply to all KEYSTONE unit sizes.)

Step 1. Prepare the base leveling pad

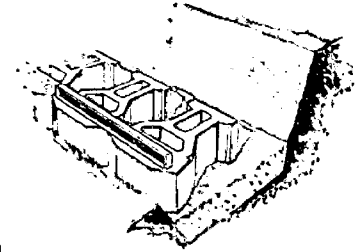
Excavate a shallow trench according to the designed length and width of your KEYSTONE wall. Leave enough space behind the KEYSTONE units for a granular backfill drainage zone. The prepared base should be level, with 6" of well-compacted granular fill (sand, gravel, or $\frac{1}{2}$ " to $\frac{3}{4}$ " crushed stone) at 95% Standard Proctor compaction or greater. KEYSTONE recommends additional trench depth for below grade placement of KEYSTONE units on a ratio of 1" below grade for each 8" of wall height above grade. *Drainage zone may vary due to site, soil or engineering requirements.*



1

Step 2. Install the base course

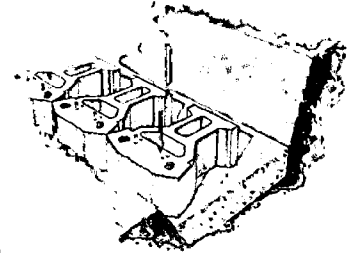
Place the first course of KEYSTONE units side by side (with sides touching) on the prepared base, with the kidney-shaped void facing down and the pin holes facing up. (See illustration.) Make sure each unit is level – side to side and front to back. The first course is critical for accurate and acceptable results. For straight walls, use the pins or the straight back edge of the unit for alignment. For curved walls installation, please see the previous page.



2

Step 3. Install the interlocking pins

Place the reinforced fiberglass pins into the paired holes in each KEYSTONE unit. Each unit requires two pins. (Pins of adjoining units should be 12" on center.) Once in place, the pins create an automatic setback for the additional courses. According to wall requirements and design, place pins in the front holes for near vertical setback and the rear holes for 1" setback.



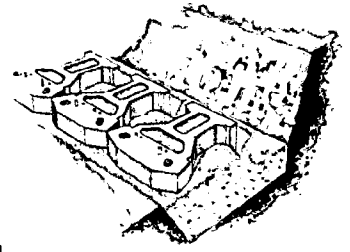
3

Step 4. Install and compact backfill

Fill in all voids – inside, between and behind the KEYSTONE units – using $\frac{1}{2}$ " to $\frac{3}{4}$ " crushed stone or clean, well-draining granular fill. Peagravel is not recommended. Compact the fill to eliminate settling.

Use existing soils for backfill behind the gravel drainage zone. (Heavy clays or organic soils are not recommended due to water-holding properties.) Compact to a minimum of 95% Standard Proctor compaction, placing fill in 8" lifts on a course-by-course basis. (Use only walk-behind mechanical compaction equipment within 3' behind the units.)

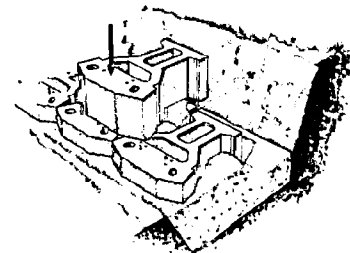
Sweep off any pebbles or debris so the KEYSTONE units rest evenly upon each other.



4

Step 5. Install additional courses

Place the next course of KEYSTONE units over the fiberglass pins, fitting the pins into the kidney-shaped recesses. Center the unit over the two underlying units as shown in diagram 5. Visually sight down in kidney shaped recess for pin positioning. Pull the KEYSTONE module toward the face of the wall until it makes full contact with both pins. For each remaining course, repeat steps 3, 4, and 5.

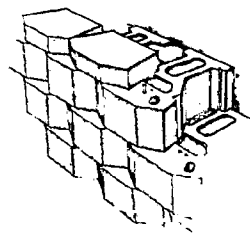


5

Step 6. Install KEYSTONE Caps

Complete your wall with KEYSTONE Caps. In areas of high public usage, apply KapSeal™ Adhesive on the top surface of the last course before applying cap units. Place the KEYSTONE Cap over the pins on the underlying unit. Pull the cap forward to the automatic setback position. Backfill and compact to finish grade.

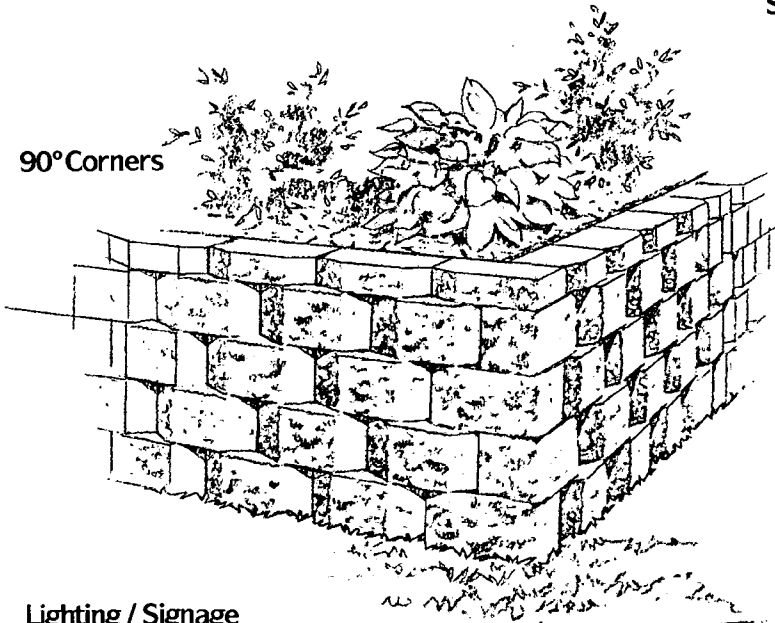
These guidelines do not take into account geological variations in site and soil conditions. Further engineering considerations may be necessary. None of the information enclosed herein should be construed as a construction detail.



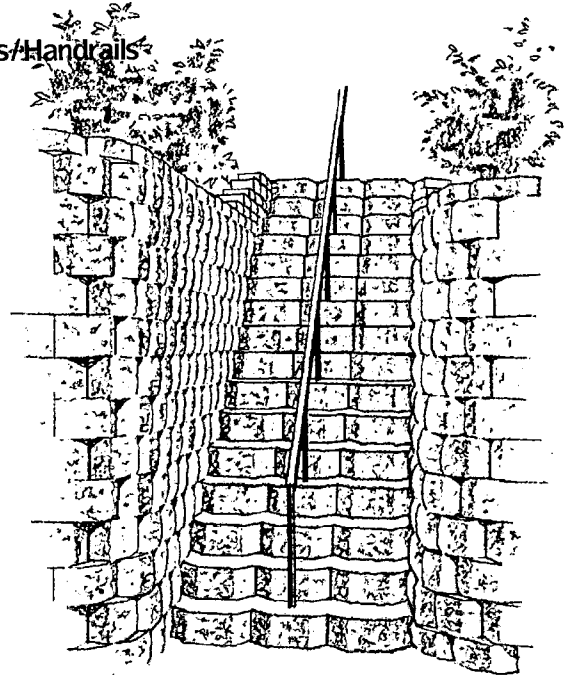
6

Incorporate specialty items
into your design.

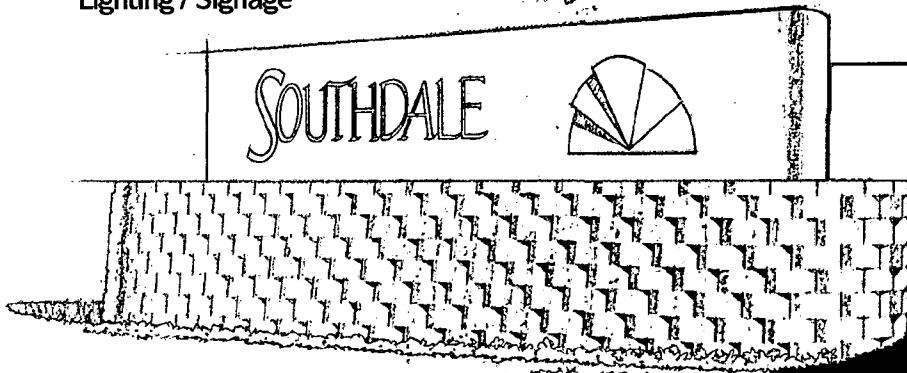
90° Corners



Stairs/Handrails

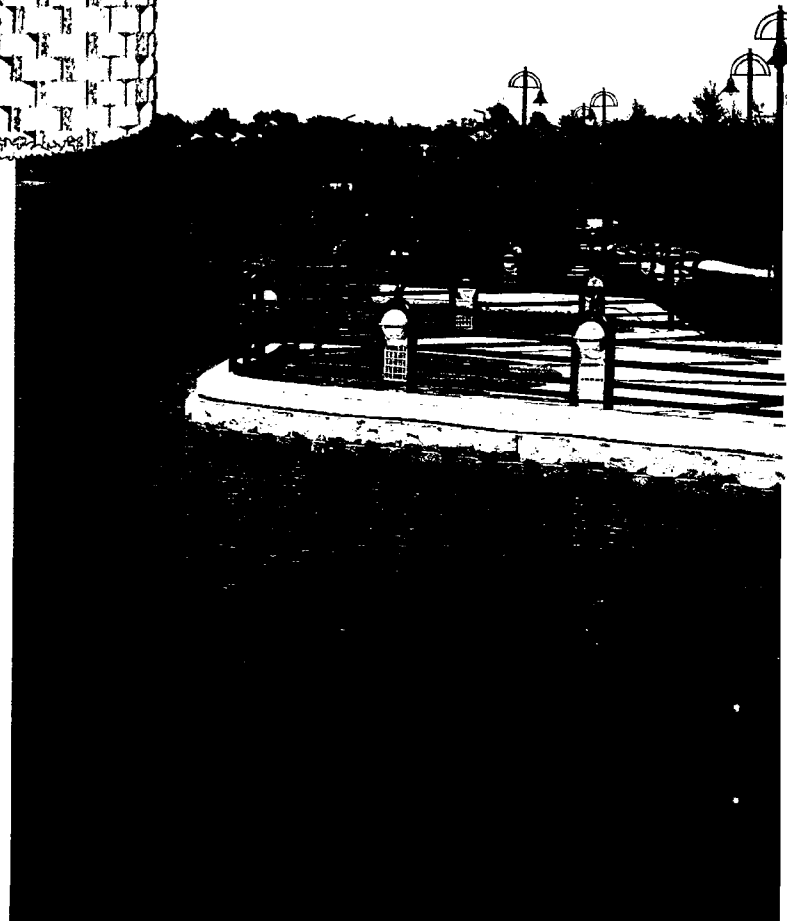
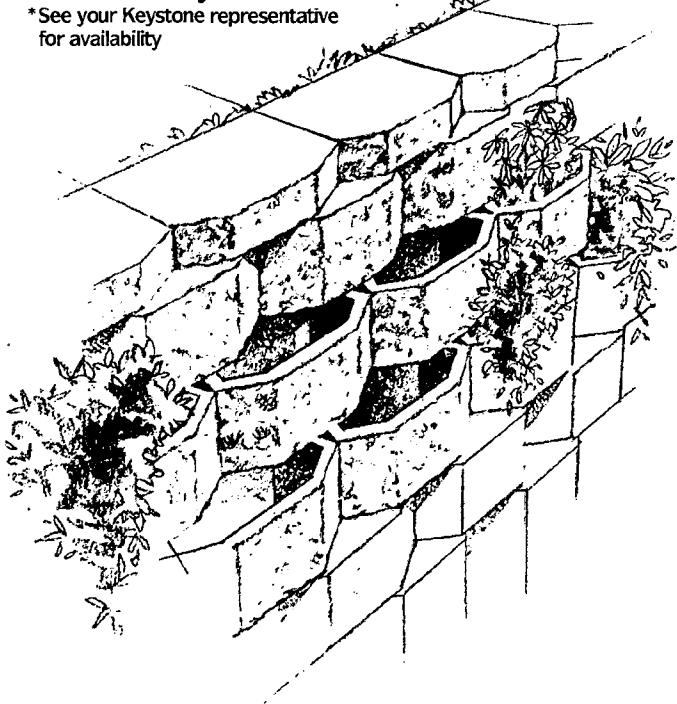


Lighting / Signage

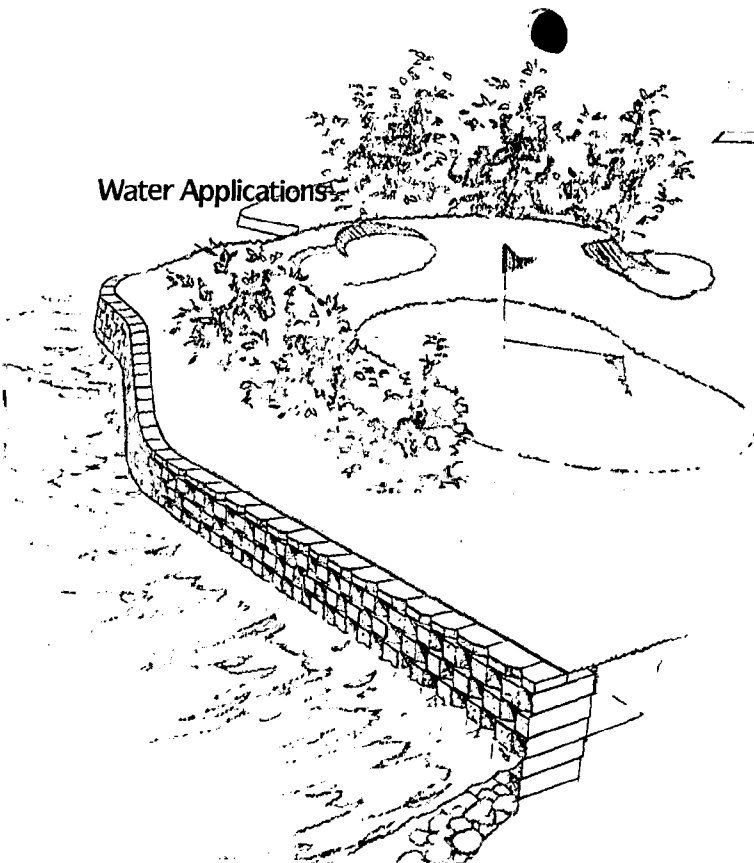


**KEYSTONE
Planter Wall System**

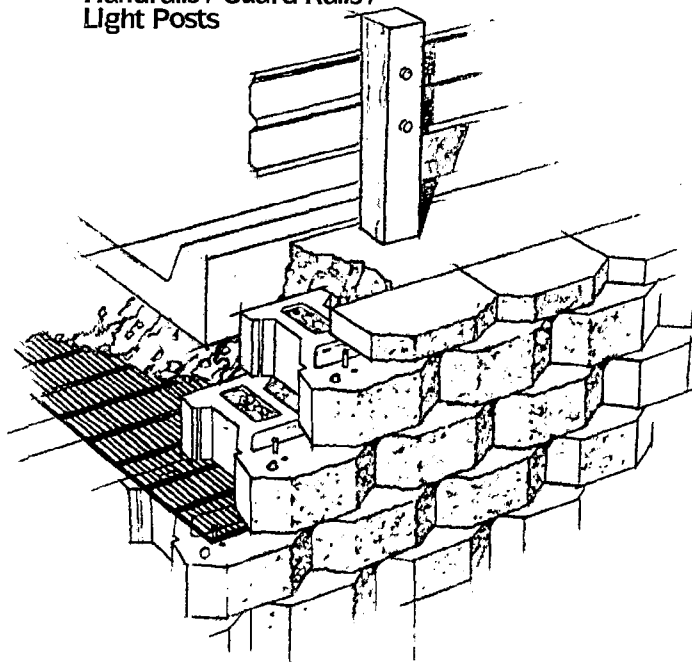
*See your Keystone representative
for availability



Water Applications

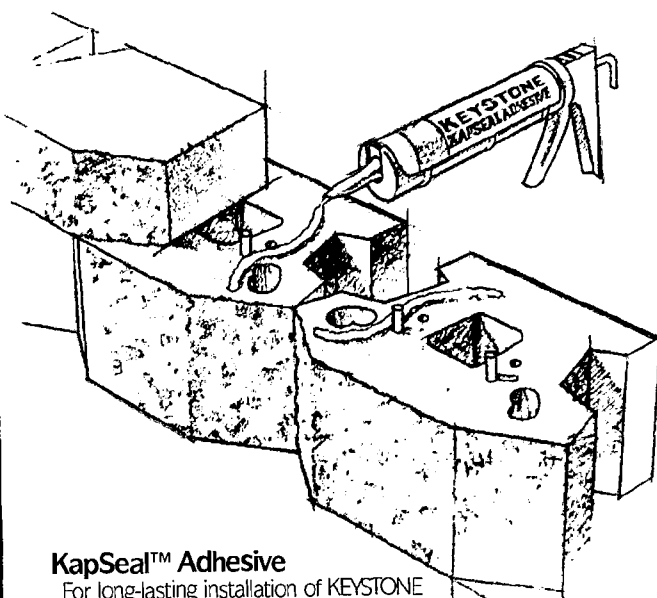


Handrails / Guard Rails / Light Posts



Creative color and texture options

KEYSTONE offers a variety of colors and face textures providing unlimited creative options for your landscaping site. Choose from different face textures including sculptured rockface or corduroy. Or select from Keystone's earthtone colors such as gray, tan or brown. Custom colors are available with special quantity orders. These options may vary by region. See your KEYSTONE representative for details.

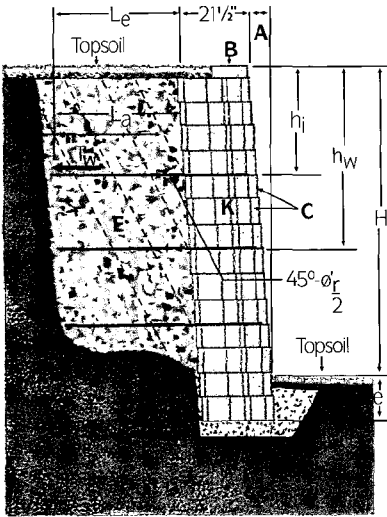


KapSeal™ Adhesive

For long-lasting installation of KEYSTONE Cap units, use KapSeal for professional results. This easy-to-apply adhesive comes in pre-mixed tubes, is water resistant, freeze-thaw stable and cures quickly.

Geogrid criteria

Typical wall section terms



- A. Setback
- B. KEYSTONE Cap Unit 4"H. x 18"W. x 10 1/2"D.
- C. KEYSTONE Standard Unit 8"H. x 18"W. x 21 1/2"D.
- D. Varies: 6" minimum, or equal to H/20.
- E. Compacted reinforced backfill zone ϕ_r c_r γ_r
- F. Retained backfill ϕ_b c_b γ_b
- G. Failure planes to be analyzed
- H. Geogrid attached to fiberglass pins at unit
- I. Base leveling pad
- J. Foundation soil ϕ_f c_f γ_f
- K. Core Fill

Concept

When you combine KEYSTONE concrete wall units with geogrid reinforcement and compacted soil over the geogrid, you get a reinforced soil mass that supports earth pressure and surcharge loads. Essentially this composite forms a larger gravity wall structure.

Geogrid reinforcement

Geogrids are materials made from high density polyethylene or polyester, and manufactured into a grid-like pattern. They are placed horizontally within the soil behind the wall units. With their high-strength, high-modulus features, geogrids create a tensile capacity for shear resistance within the reinforced soil mass.

Advantages

- Geogrids help you save money. In most cases you use existing site soils. You don't need to import select backfill soil.
- Geogrids let you build faster. Walls are built at the rate of the backfill and compaction process. No waiting for shop drawings, forms or steel. No more waiting for concrete to reach cure strength.
- Geogrids give you safer construction. Walls and backfill are built simultaneously – unlike poured-in-place walls, where the walls are built and then backfilled behind the wall, creating a possible landslide hazard.
- Geogrids handle differential settlement due to frost, soil consolidation, etc. They also provide uniform weight distribution over a larger area and avoid localized overstress of foundation soils. Walls can be built without structural footing or base frost protection.
- Geogrids offer continuous performance. They are not affected by water, microorganisms, alkali or acid soils.

Design methodology

When evaluating the design for a geogrid reinforced soil retaining wall, the design engineer analyzes:

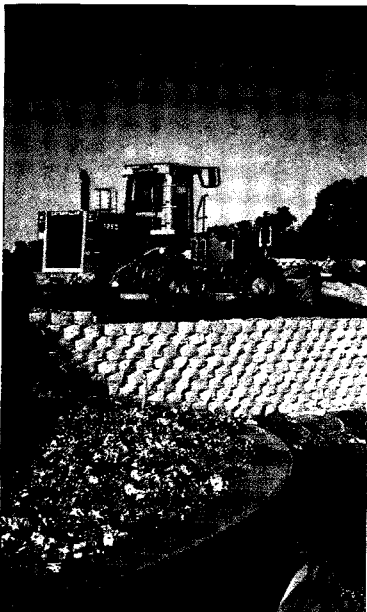
- **Soil properties:** Representative shear strength parameters (angle of internal friction) and moist unit weight for each soil zone should be determined: foundation soil, retained embankment soil, reinforced backfill. Cohesion in soil is typically assumed to be zero in structural analysis. A qualified geotechnical engineer should determine soil properties.
- **External stability:** The four standard modes of failure for external stability should be addressed: sliding (1.5 FS.), overturning (2.0 FS.), bearing capacity (2.0 FS.), and global stability (FS. to be determined by a qualified engineer).
- **Internal stability:** In order to address the three modes of internal stability (pullout, tensile stress and connection strength), these specific geogrid material properties must be known:
 - long-term allowable design strength
 - service life
 - ability to interlock with soil
 - ability to interlock with units

Actual design methods, criteria and engineering analysis are beyond the scope of this document. Consult your KEYSTONE representative for specific geogrid engineering analysis, design strengths and product availability. Design of geogrid soil reinforced walls should be specifically analyzed by a qualified engineer.

Geogrid installation

For taller or more critical walls (where geogrid is required to resist greater lateral earth pressures) follow these guidelines:

- Step 1.** Follow steps 1-4 on product installation (see page 4).
- Step 2.** Excavate the reinforced soil area to the maximum embedment length.
- Step 3.** Cut sections of geogrid to the specified length. Roll out geogrid from the wall toward the embankment. Check manufacturer's criteria for biaxial or uniaxial geogrids.
- Step 4.** Hook geogrid over the KEYSTONE fiberglass pins to ensure a secure connection between the unit and geogrid.
- Step 5.** Pull pinned geogrid taut to eliminate loose folds. Stake or secure back edge of geogrid before and during backfill and compaction.
- Step 6.** Install next course of KEYSTONE retaining wall units.
- Step 7.** Place compacted backfill over geogrid in 8" lifts. Provide minimum 6" soil coverage prior to driving equipment over grid. Avoid driving or turning vehicles directly on grid.
- Step 8.** Continue steps 3-7 until retaining wall is complete.



Geogrid installation cont.

Geogrid quantity

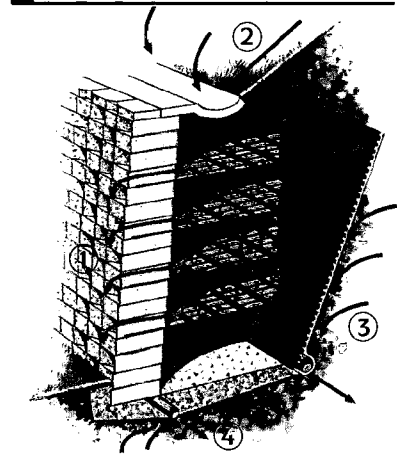
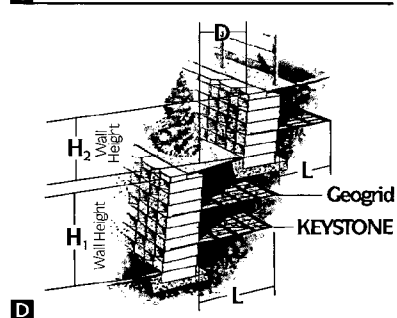
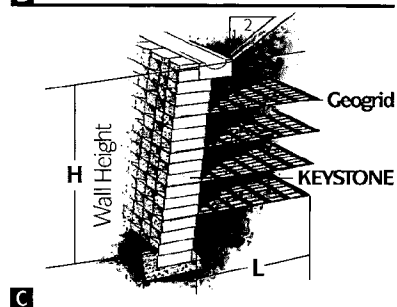
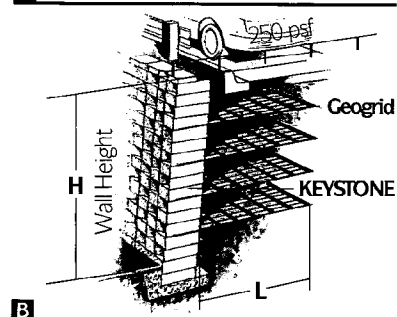
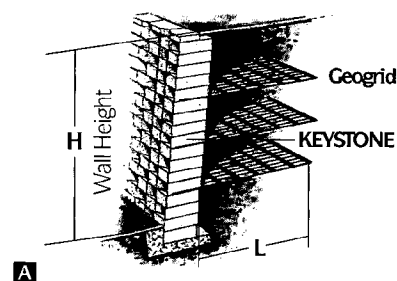
The following factors affect the amount of geogrid required to reinforce the soil behind the wall:

- Wall height (H)
- Geometry (slope above wall and wall batter)
- Geogrid strength properties
- Shear strength of soil
- Hydrostatic loads
- Surcharge loads

Geogrid quantities, embedment lengths (L), and layer frequencies should be adjusted accordingly.

Case A: Basic wall without surcharge

Level grade at top of wall with no surcharge or slope creating additional thrust.



Case B: Constant surcharge load

Parking lots, truck traffic or buildings affect the geogrid design by increasing the load on the reinforced soil mass.

Case C: Sloping hillside surcharge

In most situations, slopes place greater loads on retaining wall than Case B loads. A greater degree of slope may mean an increase in geogrid quantities.

Case D: Tiered walls

Evaluate tiered walls carefully. Closely spaced tiered walls can create stresses on the lower wall section. The designer must determine the pressures exerted by the upper wall. Global stability is the main concern when the total setback is less than 1.5 times the height of the lower wall $D/H_1 < 1.5$.

Drainage considerations

Poor drainage is a leading cause of retaining wall failure. Hydrostatic pressure accumulates, causing a destabilizing force in the reinforced soil mass.

Designers and engineers should provide for external and internal drainage to protect the retaining wall structure. See drainage diagram at lower right for locations of drainage provisions.

Location 1: Basic drainage

With its mortarless, interlocking system, KEYSTONE walls drain naturally. No weep holes are needed.

Location 2: Surface run-off

Divert surface drainage with plastic (clay) soil cap or formed swale (soil or concrete). Redirect run-off by site design where possible.

Location 3: Embankment flow

Use an embankment drain system with outflow pipe at base to intercept water flow into reinforced soil zone.

Location 4: Ground water flow

Offset the effects of rising ground water with a drain zone and outflow pipe beneath the leveling pad and reinforced soil zone.

Specification Guidelines

KEYSTONE Concrete Modular Retaining Wall

Section 02276

Part 1: General

1.01 Description

- A. Work includes furnishing and installing modular block retaining wall units to the lines and grades shown on the construction drawings and as specified herein.
- B. Work includes preparing foundation soil, furnishing and installing leveling pad, unit fill and backfill to the lines and grades shown on the construction drawings.
- C. Work includes furnishing and installing all related materials required for construction of the retaining wall as shown on the construction drawings.

1.02 Related work

- A. Section 02246 – Geogrid soil reinforcement.

1.03 Reference standards

- A. ASTM C90 – Hollow load bearing masonry units.
- B. ASTM C140 – Sampling and testing concrete masonry units.
- C. ASTM C145 – Solid load bearing concrete masonry units.
- D. UN-STD 1804
- E. ASTM 2339
- F. FHA UM-60

1.04 Delivery, storage and handling

- A. Contractor shall check the materials upon delivery to assure that proper materials have been received.
- B. Contractor shall prevent excessive mud, wet cement, epoxy and similar materials (which may affix themselves) from coming in contact with the materials.
- C. Contractor shall protect the materials from damage. Damaged material shall not be incorporated into the retaining wall structure.

1.05 Submittals

- A. Samples of all products used in the work of this section.
- B. Latest edition of manufacturer's specifications for proposed materials, method of installation and list of material proposed for use.

1.06 Quality assurance

- A. Owner will supply soil testing and inspection service for quality control testing during earth work operations.

Part 2: Products

2.01 Concrete units

- A. Masonry units shall be KEYSTONE® Retaining Wall Units as manufactured by _____ in accordance with ASTM C-90 and ASTM C-140.
- B. Concrete wall units shall have a minimum 28-day compressive strength of 3,000 psi. The concrete shall have a maximum moisture absorption of 8%.
- C. Exterior dimensions may vary in accordance with ASTM C90. Standard and Compac units shall have a minimum of 1 sq.ft. face area each. Mini units shall have a minimum ½ sq.ft. face area each.
- D. KEYSTONE Standard units shall provide a minimum of 150 psf of wall face area. Fill which is contained within the dimensions of the units may be considered as 80% effective weight.
- E. Units shall have angled sides capable of concave and convex alignment curves with a minimum radius of 3.5 feet (Where applicable, for straight walls, use non-angled straight side cap units.)
- F. Units shall be interlocked with non-corrosive fiberglass pins.
- G. Units shall be interlocked and provide either a near vertical setback or a built-insetback of 1:8. A setback of 1:16 can be achieved by integrating near vertical and 1" setback units.

2.02 Fiberglass connecting pins

- A. Connecting pins shall be ½" diameter thermoset isophthalic polyester resin-pultruded fiberglass reinforcement rods.
- B. Pins shall have a minimum flexural strength of 128,000 psi and short beam shear of 6,400 psi.

2.03 KEYSTONE KapSeal™ construction adhesive

- A. Material conforms to UN-STD 1804, ASTM 2339-70 and FHA UM-60.

2.04 Base leveling pad material

- A. Material shall consist of compacted sand, gravel, crushed rock or unreinforced concrete as shown on the construction drawing. Peagravel shall not be allowed.

2.05 Unit fill

- A. Fill for units shall be free draining crushed stone or coarse gravel, ¾" to ¾" with (no more than 5% passing the No. 200 sieve). Gradation of the fill shall be approved by the engineer.
- B. Place recommended fill behind the retaining wall units. Peagravel shall not be used.

2.06 Backfill

- A. Material shall be site excavated soils when approved by the engineer unless otherwise specified in the drawings. Unsuitable soils for backfill (heavy clays or organic soils) shall not be used in the backfill or in the reinforced soil mass.
- B. Where borrow fill is required, contractor shall submit sample and specifications to the engineer for approval.

Part 3: Execution

3.01 Excavation

- A. Contractor shall excavate to the lines and grades shown on the construction drawings. Contractor shall be careful not to disturb embankment materials beyond lines shown.

3.02 Foundation soil preparation

- A. Foundation soil shall be excavated as required for leveling pad dimensions shown on the construction drawings, or as directed by the engineer.
- B. Foundation soil shall be approved by the engineer to confirm that the actual foundation soil conditions meet or exceed assumed design strength. Soils not meeting required strength shall be removed and replaced with acceptable material.
- C. Over-excavated areas shall be filled with approved compacted backfill material.

3.03 Base leveling pad

- A. Leveling pad materials shall be placed as shown on the construction drawings, upon approved foundation, to a minimum thickness of 6"
- B. Material shall be compacted so as to provide a level surface on which to place the first course of units. Compaction shall be to 95% of Standard Proctor for sand or gravel type materials. For crushed rock, material shall be densely compacted.
- C. Leveling pad shall be prepared to ensure complete contact of retaining wall unit with base.
- D. Leveling pad materials shall be to the depth and widths shown. Contractor may opt for using reduced depth of sands, gravel or crushed rock using a concrete topping. Concrete shall be unreinforced and a maximum of 3" thick.

3.04 Unit installation

- A. Place first course of concrete wall units on the base leveling pad. The units shall be checked for level and alignment.
- B. Ensure that units are in full contact with base.
- C. Units are placed side by side for full length of wall alignment. Alignment may be done by means of a string line or offset from base line.
- D. Install fiberglass connecting pins and fill all voids at units with unit fill material. Tamp fill.
- E. Sweep all excess material from top of units and install next course. Ensure each course is completely unit filled, backfilled and compacted prior to proceeding to next course.
- F. Lay up each course ensuring that pins protrude into adjoining courses above a minimum of 1". Two pins required per unit. Pull each unit forward, away from the embankment, against pins in the previous course, and backfill as the course is completed. Repeat procedure to the extent of wall height.
- G. As appropriate where the wall changes elevation, units can be stepped with grade or turned into the embankment with a convex return end. Provide appropriate buried units on compacted leveling pad in area of convex return end.

3.05 Cap installation

- A. Place KEYSTONE Cap units over projecting pins from units below. Pull forward to setback position. Backfill and compact to finished grade.
- B. As required, provide permanent mechanical connection to wall units with KEYSTONE KapSeal construction adhesive. Apply adhesive to top surface of unit below, and place cap unit into position.

3.06 Geogrid installation

- A. Follow the requirements of Section 02246, Geogrid Soil Reinforcement.

*specifications subject to change without notice

Specification Guidelines

Geogrid Soil Reinforcement Section 02246

Part 1: General

1.01 Description

- A. Work includes furnishing and installing geogrid reinforcement, wall fill, and backfill to the lines and grades designated on the construction drawings.
- B. Work includes furnishing and installing all related materials required for construction of the geogrid reinforced soil retaining wall as shown on the construction drawings.

1.02 Related work

- A. Section 02276, KEYSTONE Concrete Modular Retaining Wall.

1.03 Reference standards

- A. See specific geogrid manufacturer's reference standards.

1.04 Delivery, storage and handling

- A. Contractor shall check the geogrid upon delivery to assure the proper material has been received.
- B. Geogrids shall be stored at temperatures above -20°F.
- C. Contractor shall prevent excessive mud, wet cement, epoxy and similar materials (which may affix themselves to the gridwork) from coming in contact with the geogrid material.
- D. Rolled geogrid material may be laid flat or stood on end for storage.

1.05 Submittals

- A. Samples of all products used in the work of this section.
- B. Latest edition of manufacturer's specifications for proposed materials, method of installation and list of material proposed for use.

1.06 Quality assurance

- A. Owner will supply soil testing and inspection services for quality control testing during earthwork operation.

Part 2: Products

2.01 Definitions

- A. Geogrid products shall be high-density polyethylene expanded sheet or polyester woven fiber materials, specifically fabricated for use as soil reinforcement.
- B. Concrete retaining wall units are as detailed on the drawings and are specified under Section 02276, KEYSTONE Concrete Modular Retaining Wall.
- C. Unit fill is a free-draining granular material used within the concrete units.
- D. Backfill is the soil which is used as fill for the reinforced soil mass.
- E. Foundation soil is the insitu soil.

2.02 Geogrid

- A. Geogrid shall be the type as shown on the drawings and shall have the property requirements described within the manufacturer's specifications.

2.03 Acceptable manufacturers

- A. A manufacturer's product shall be approved by the engineer prior to bid opening.

Part 3: Execution

3.01 Foundation soil preparation

- A. Foundation soil shall be excavated to the lines and grades as shown on the construction drawings, or as directed by the engineer.
- B. Foundation soil shall be approved by the engineer to assure that the actual foundation soil strength meets or exceeds assumed design strength.
- C. Over-excavated areas shall be filled with approved compacted backfill material.
- D. Foundation soil shall be proof rolled prior to fill and geogrid placement.

3.02 Wall erection

- A. Wall erection shall be as specified under Section 02276, KEYSTONE Concrete Modular Retaining Wall.

3.03 Geogrid installation

- A. The geogrid soil reinforcement shall be laid horizontally on compacted backfill and connected to the concrete wall units by hooking geogrid over fiberglass pins. Pull geogrid taut and anchor before backfill is placed on it.
- B. Slack in the geogrid at the wall unit connections shall be removed.

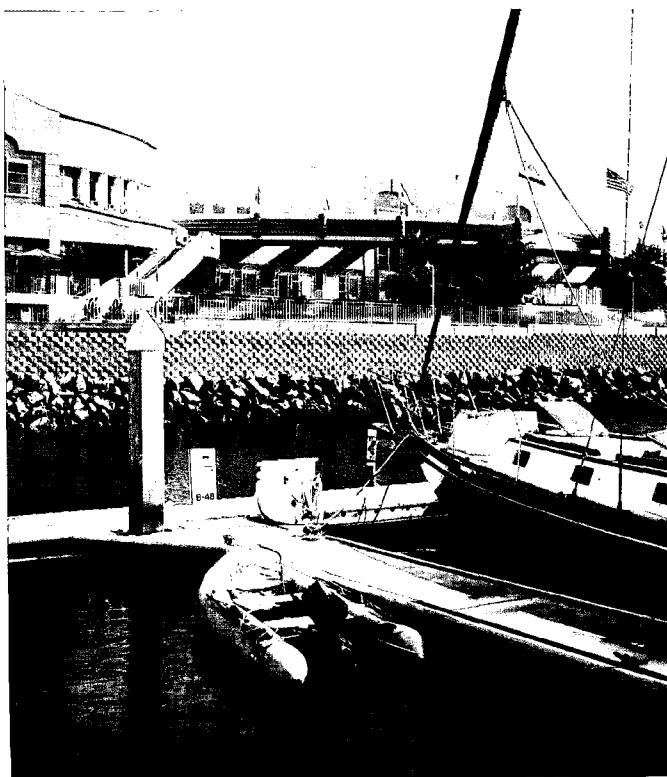
- C. Geogrid shall be laid at the proper elevation and orientation as shown on the construction drawings or as directed by the engineer.
- D. Correct orientation (roll direction) of the geogrid shall be verified by the contractor.
- E. Pull pinned geogrid taut to eliminate loose folds. Stake or secure back edge of geogrid prior to, and during backfill and compaction.
- F. Follow manufacturer's guidelines relative to overlap requirements of uniaxial and biaxial geogrids.

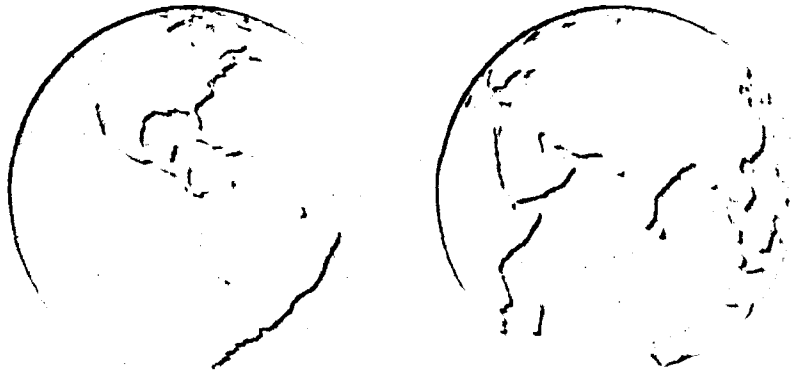
3.04 Fill placement

- A. Backfill material shall be placed in 8" lifts and compacted to 95% of Standard Proctor density.
- B. Backfill shall be placed, spread and compacted in such a manner that minimizes the development of slack or loss of pretension of the geogrid.
- C. Only hand-operated compaction equipment shall be allowed within 3' of the back surface of the KEYSTONE units.
- D. Backfill shall be placed from the wall back into the embankment to ensure that the geogrid remains taut.
- E. Tracked construction equipment shall not be operated directly on the geogrid. A minimum backfill thickness of 6" is required prior to operation of tracked vehicles over the geogrid. Turning of tracked vehicles should be kept to a minimum to prevent tracks from displacing the fill and damaging the geogrid.
- F. Rubber-tired equipment may pass over the geogrid reinforcement at slow speeds, [less than 10 mph.] Avoid sudden braking and sharp turning.

Special considerations

- Geogrid can be interrupted by periodic penetration of column, pier or footing structure.
 - If site conditions will not allow geogrid embedment length, consider these alternatives:
 - KEYSTONE can be designed and built as a reinforced masonry unit wall. Cores will accept vertical reinforcing and grout.
 - Deadman-tie-back anchor option reduces or eliminates excavation and backfill requirements.
 - Increase wall batter by sloping leveling pad or footing (8 to 1, 4 to 1, etc.) Consult your KEYSTONE representative for details.
- *specifications subject to change without notice





KEYSTONE. Serving retaining wall needs across the U.S.A. and world-wide.

Warranty

Each KEYSTONE unit (when manufactured strictly in accordance with the specifications as provided to the licensed manufacturer) will meet or exceed current ASTM standards on compression strength and absorption for concrete masonry for 15 years after proper installation. If a KEYSTONE unit does not meet this warranty standard, please notify KEYSTONE Retaining Walls, Inc. in writing. We will ship you replacement units (which shall be the manufacturer's sole remedy for breach of this warranty). However, neither the manufacturer or KEYSTONE shall have any obligation to install such replacement units.

This warranty shall not apply to any KEYSTONE unit which is damaged, defective or fails to meet the warranty standard due to improper installation, chemical contact, structural design, or excessive and unforeseen site conditions beyond KEYSTONE Retaining Wall Systems, Inc.'s control.

The above warranty is the exclusive warranty. ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, ARE DISCLAIMED.

Distributed by:

BETCO BLOCK & PRODUCTS, INC.
7920 NDTES DRIVE
MANASSAS, VA 20109



Oldcastle®

PRODUCT HOTLINE:

800-486-4011

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Corporate headquarters: **KEYSTONE** Retaining Wall Systems, Inc.

4444 West 78th st • Minneapolis, MN • 55435

612-897-1040 • 1-800-747-8971 • FAX 612-897-3858

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Patented

KEYSTONE Retaining Wall Systems are covered by one or more of U.S. Patent Numbers:

295,790 295,788 296,007 296,365 297,464 297,574 297,767 298,463 299,067 300,253 300,254
301,064 311,444 4,802,320 Re. 34,314 (I.C.B.O. #4599) and Foreign Patents.

KEYSTONE RETAINING WALL SYSTEMS

KEYSTONE PACIFIC NORTHWEST, INC.
10445 S.W. Canyon Rd., Suite 111, Beaverton, OR 97005
(503)733-7470 • (503)644-6248 • FAX: (503)626-1753

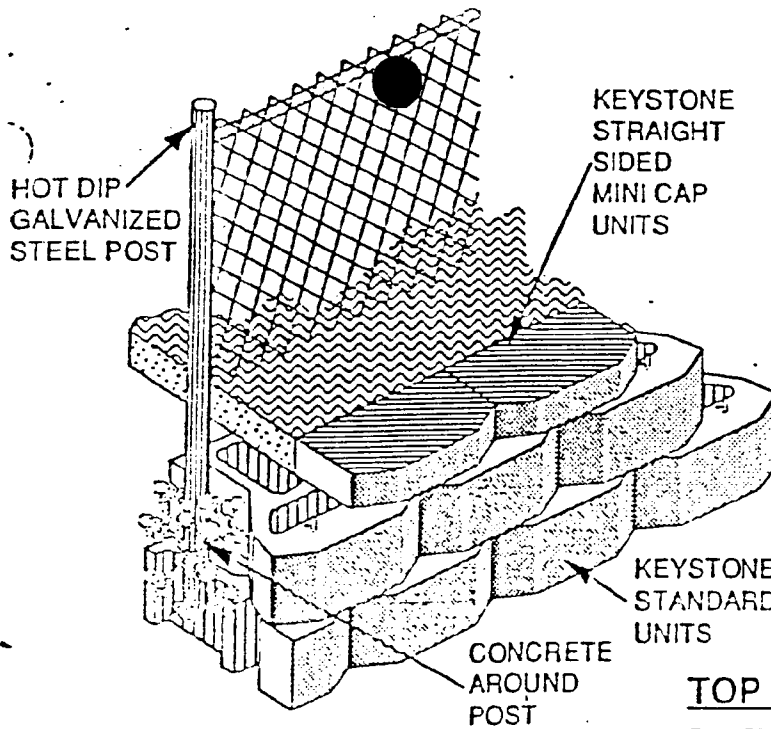
The information contained herein has been compiled by Keystone Retaining Wall Systems, Inc. and, to the best of our knowledge, accurately represents Keystone products use in the applications which are illustrated. Final determination of the suitability of the use contemplated and its manner of use is the sole responsibility of the user. Structural design and analysis shall be by a qualified engineer.

NUM: MD102

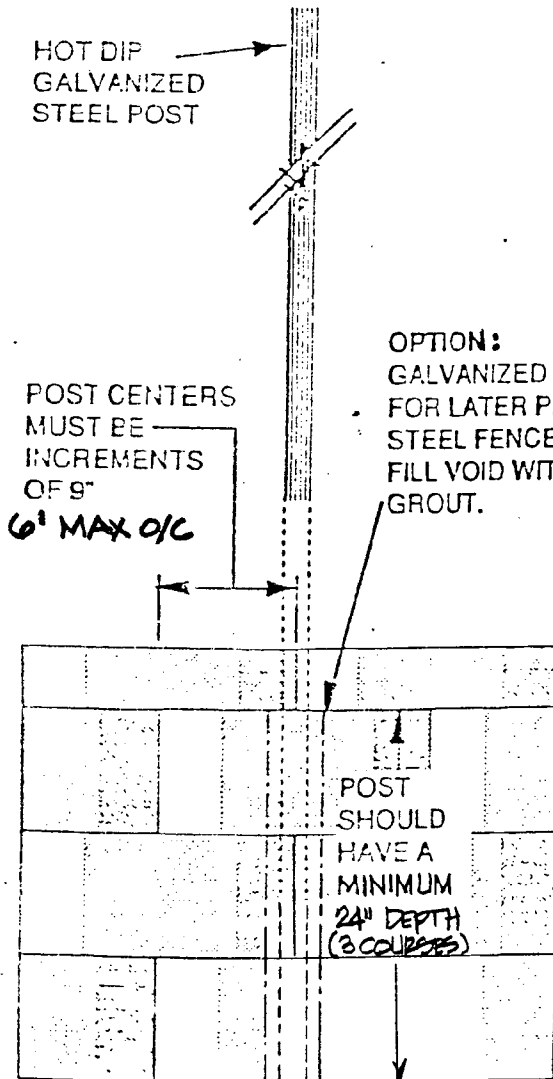
DATE: December 21, 1992

TITLE: Steel fence/rail post connection to Keystone units.

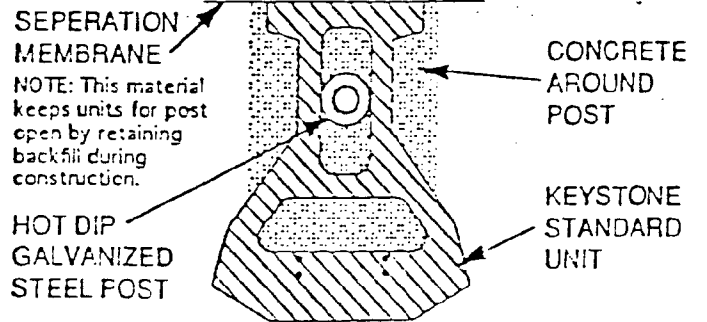
SCALE: NTS



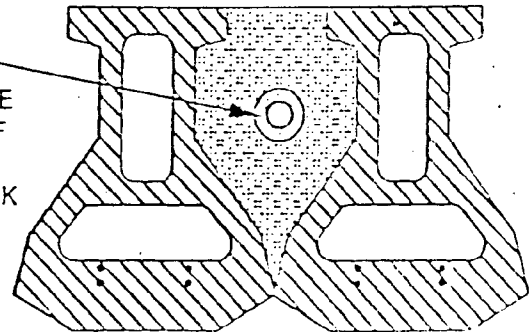
VERTICAL VIEW POST POSITION



TOP VIEW: POST POSITION FIRST COURSE

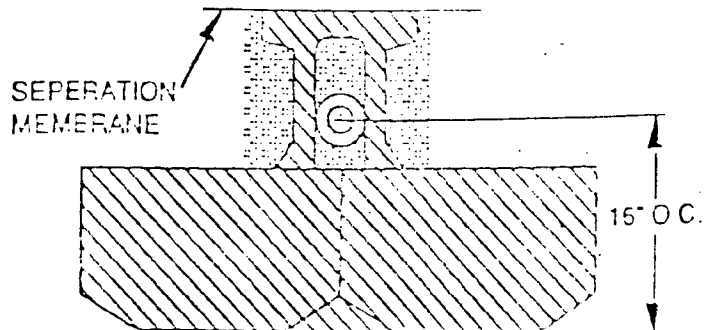


TOP VIEW: POST POSITION ALTERNATE COURSES

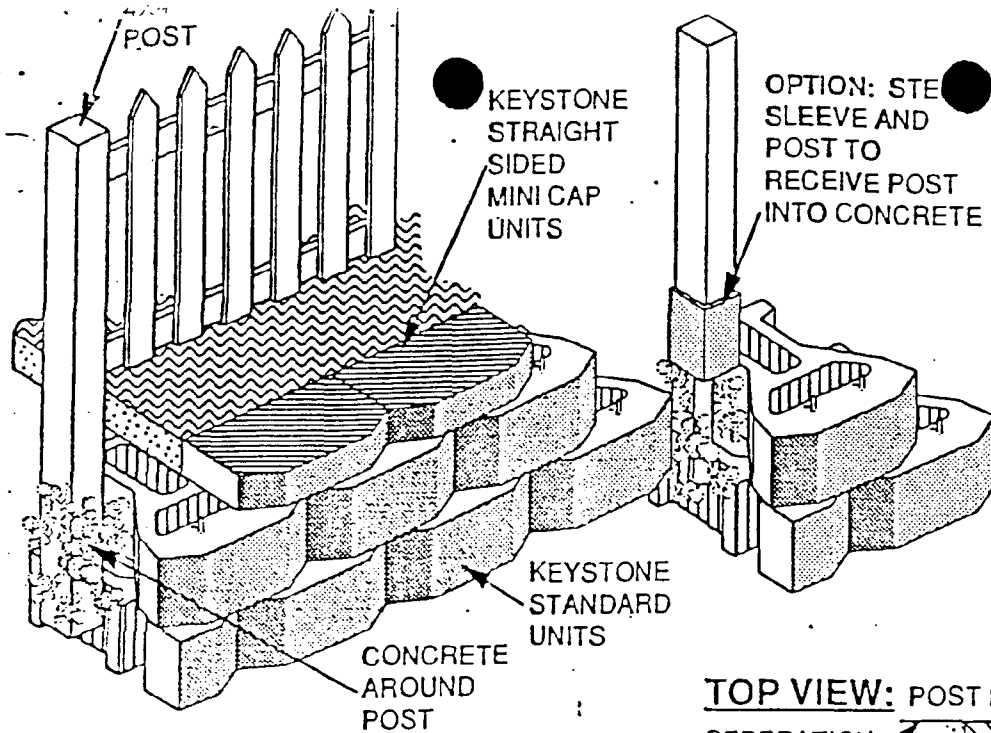


TOP VIEW: POST POSITION ADJACENT TO CAPS

NOTE: When using Compac Units, the post could be placed in the same position but behind the back of the units.



REVISED 5/97



KEYSTONE

RETAINING WALL SYSTEMS

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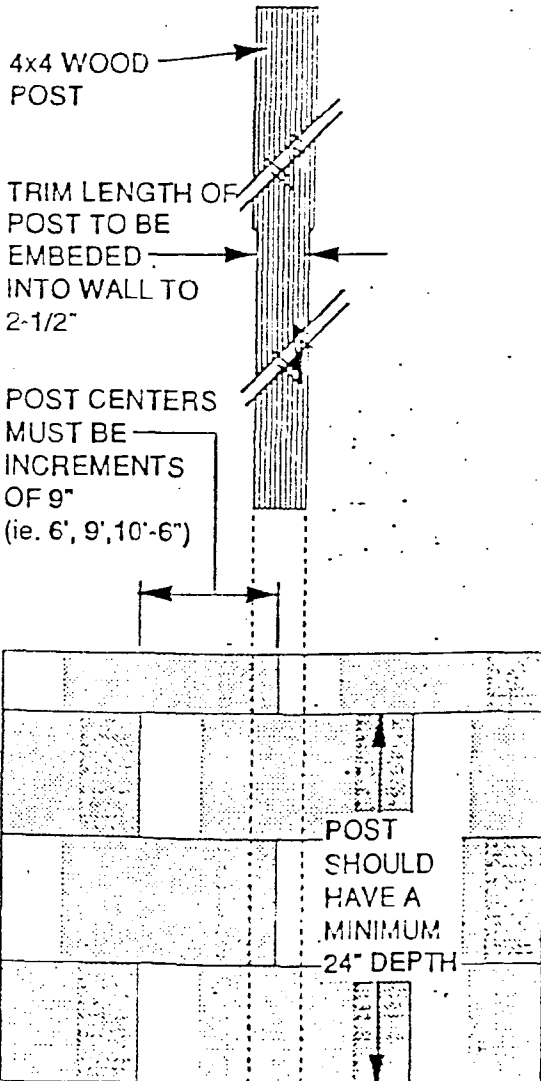
NUM: MD101

DATE: December 21, 1992

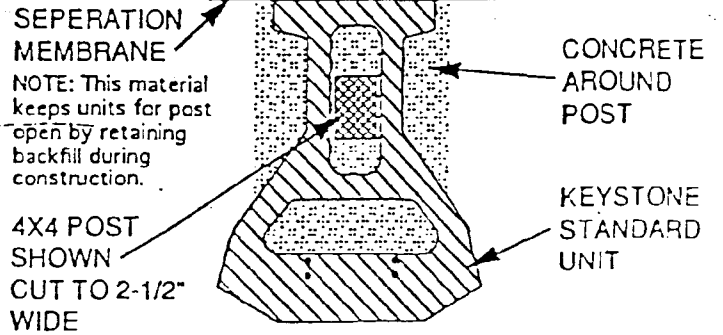
TITLE: Wood fence post connection to Keystone units.

SCALE: NTS

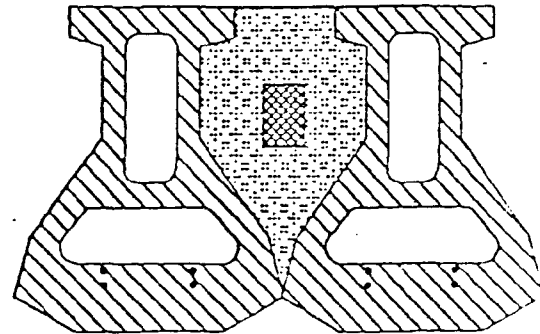
VERTICAL VIEW POST POSITION



TOP VIEW: POST POSITION FIRST COURSE

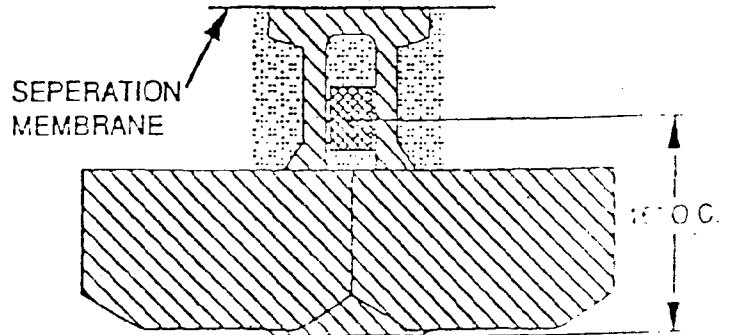


TOP VIEW: POST POSITION ALTERNATE COURSES

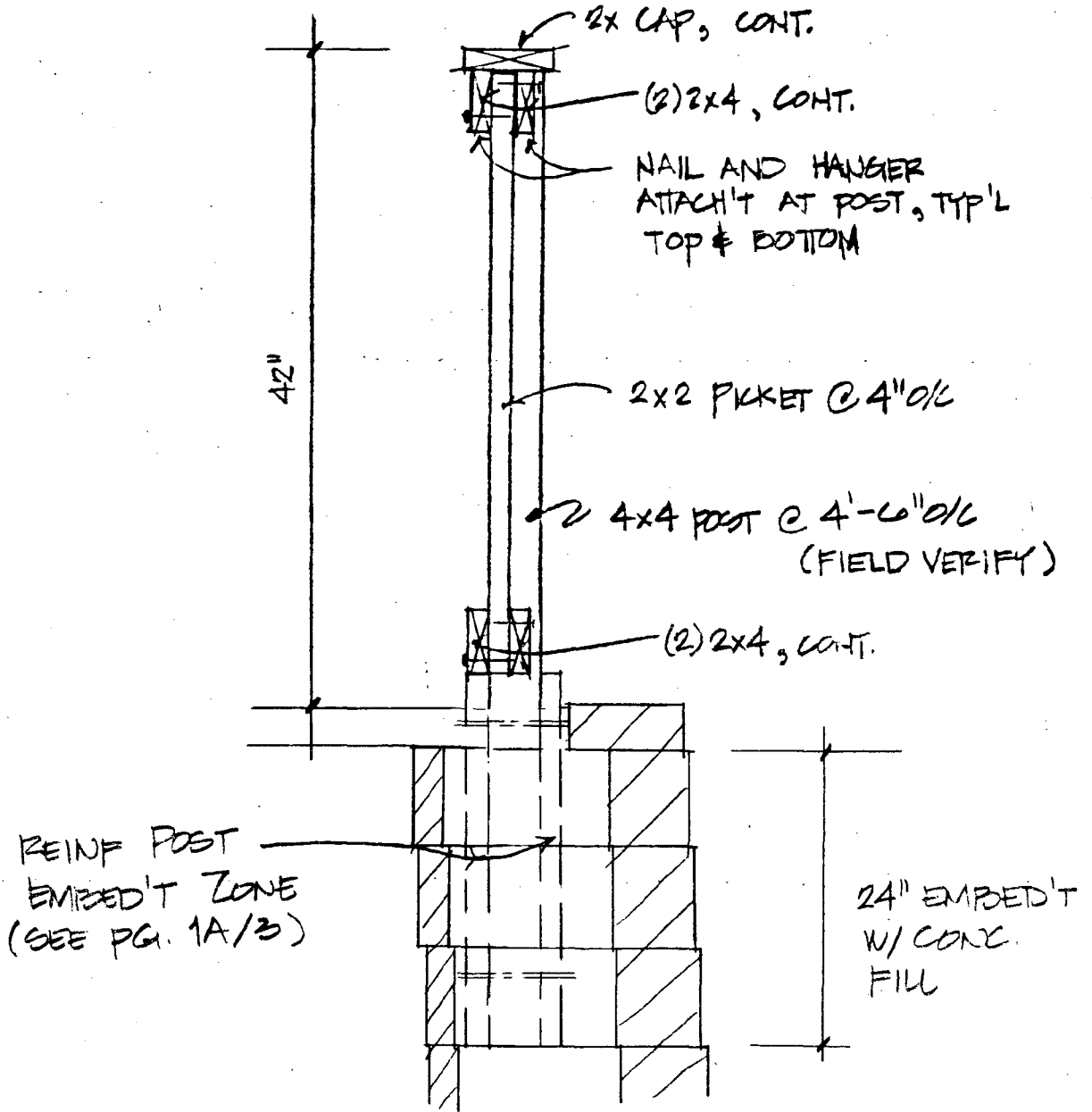


TOP VIEW: POST POSITION ADJACENT TO CORNER

NOTE: When using Compac Units, the post could be placed in the same position but behind the back of the units



ALL LUMBER P.T., #2GR STP



Job Name

KEYSTONE WALL

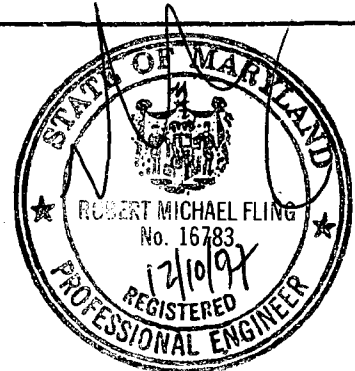
Job Title

GUARDRAIL-
WOOD

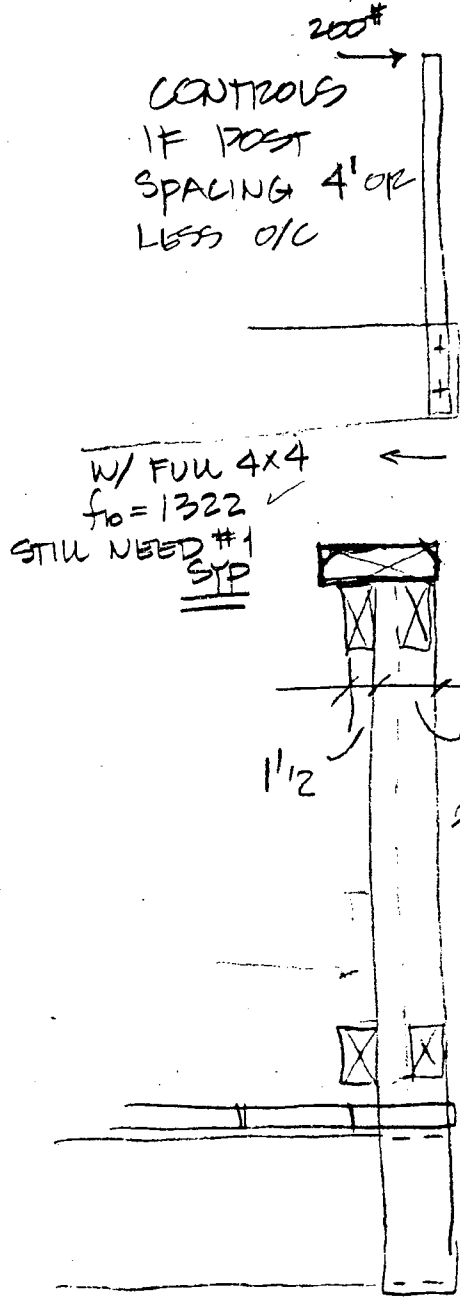
REV. 10/10/97

Date 2/21/97

Computed RMP



WOOD GUARDRAIL



OR

50 PLF ← + 100 PLF ↓

3.5
 \square 2.5 $I_p = 8.93$
 $S_p = 5.10$

42"
 = 3.5'

$M = 8400$ # $f_b = 1646$ PSI

$F_b = 1300/1500$
 4x4 $S_p = 7.146$

$f_b = 1175$ PSI OK

$\Delta TL = 0.282$ "

$E = 1.16$
 $I_p = 12.505$

W/ FULL 4x4
 $f_b = 1322$ ✓
 STILL NEED #1
SYP

IF SPACE POSTS
 @ 54" 4.5' O/C

$M = 9450$ #
 $f_b = 1853$ PSI

$E = 1.17$ ↓
 $P = 225$ # $\Delta = 0.300$ "
 = 3/8"

W/ FULL
 SECTION
 0.317"

0.25
 X 2

12.5/3
 = 4.17' O/C

@ 1/3 PTS

1/2 1/2

Job Name

KEYSTONE WALL

Job Title

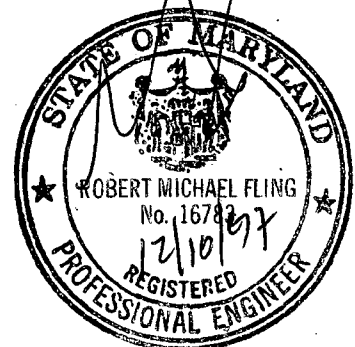
GUARDRAIL -
 WOOD

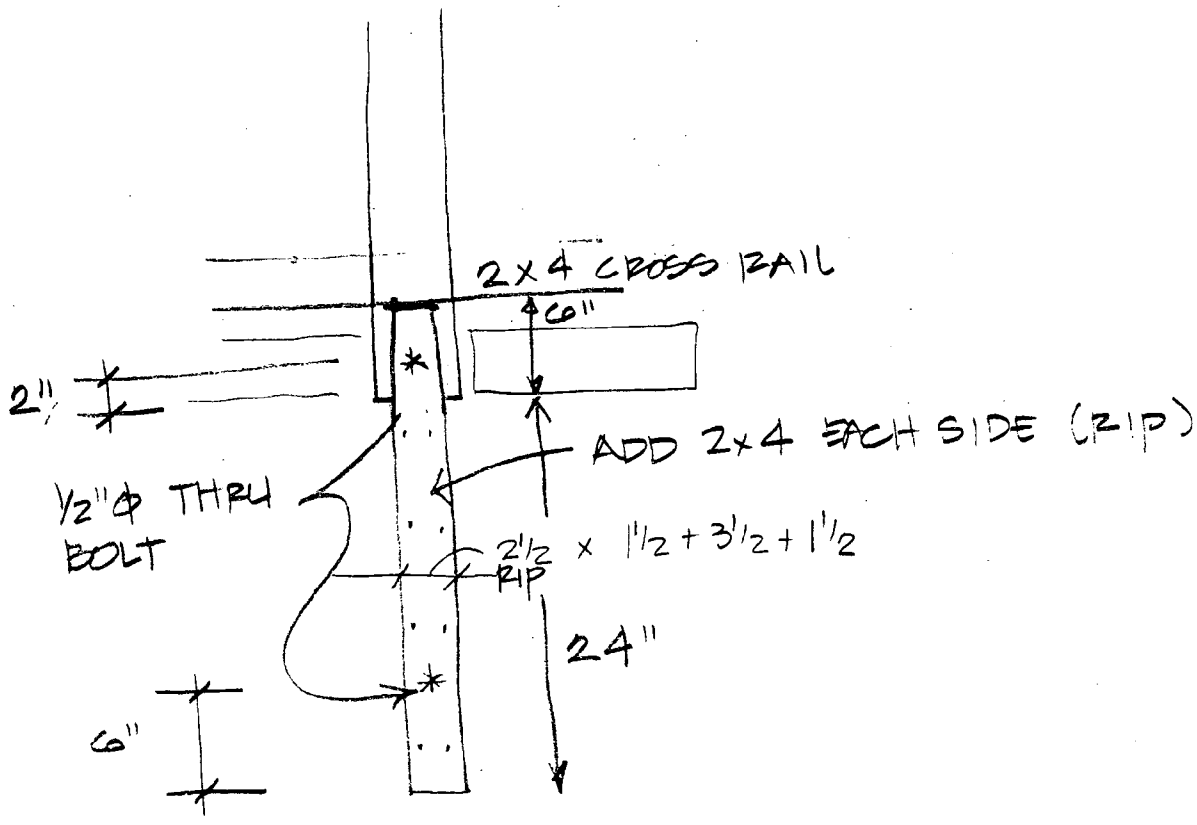
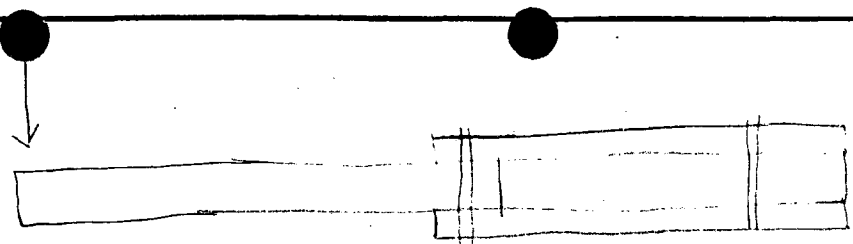
REV. 6/6/97

Date 2/97

Computed RMF

Page 1 of 3





POST BASE (EMBED'T ZONE) REINF'T DETAIL

<p>Job Name KEYSTONE WALL</p>	<p>Job Title GUARDRAIL</p>
<p>Date 6/6/97 Computed RMF</p>	<p>Page 1A of 3</p>

CTC 800 572 2112 CT 1041

\boxtimes 3 1/2 1 1/2 FLAT I = 0.984 ✓
 S = 1.313 ✓ $\Delta_H = 0.24''$

LATERAL $\frac{200(\ell)}{4} = M$ $\frac{M_c(12)}{2(1.313)} = 1300 \sim 1200$
 $\ell = 5.3'$ $M_c = 262.6$
 OK ✓

@ 5' 100 PLF M = 313.1# ← TWO 2x4 VERT
 $f_b = 612.1 \text{ PSI OK}$
 200 PT # → 250 1# > 50 PLF → M = 156.3 1# TOP

PICKETS 2x2 \boxtimes 1 1/2 x 1 1/2 I = 0.422
 S = 0.563

$\frac{200 \# (\leftarrow 40'')}{4} = 167 \#$

$\frac{M_c = 56.3 \#}{\text{IF } f_b = 1200 - \text{MUST SPREAD ON 3 PICKETS}} \leftarrow$
 W/ $f_b = 1200$
 $M_c = 61 \#$
 4" O/C

$A = 2.25$ $V_c = 135 \#$ ✓
 $f_v = 90$ 2 PICKETS OK FOR SHEAR

Job Name

KEYSTONE WALL

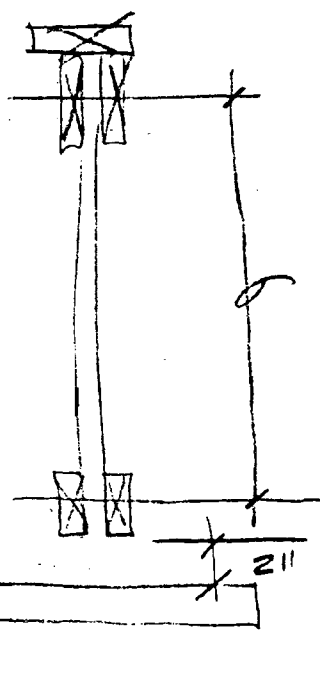
Job Title

GUARDRAIL

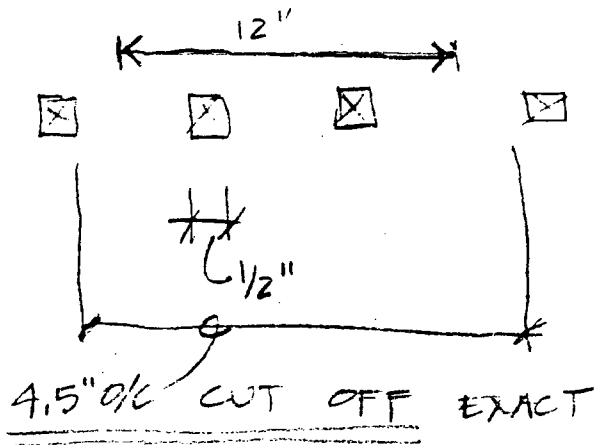
Date 6/6/97 Computed RMF

Page 2 of 3

42"



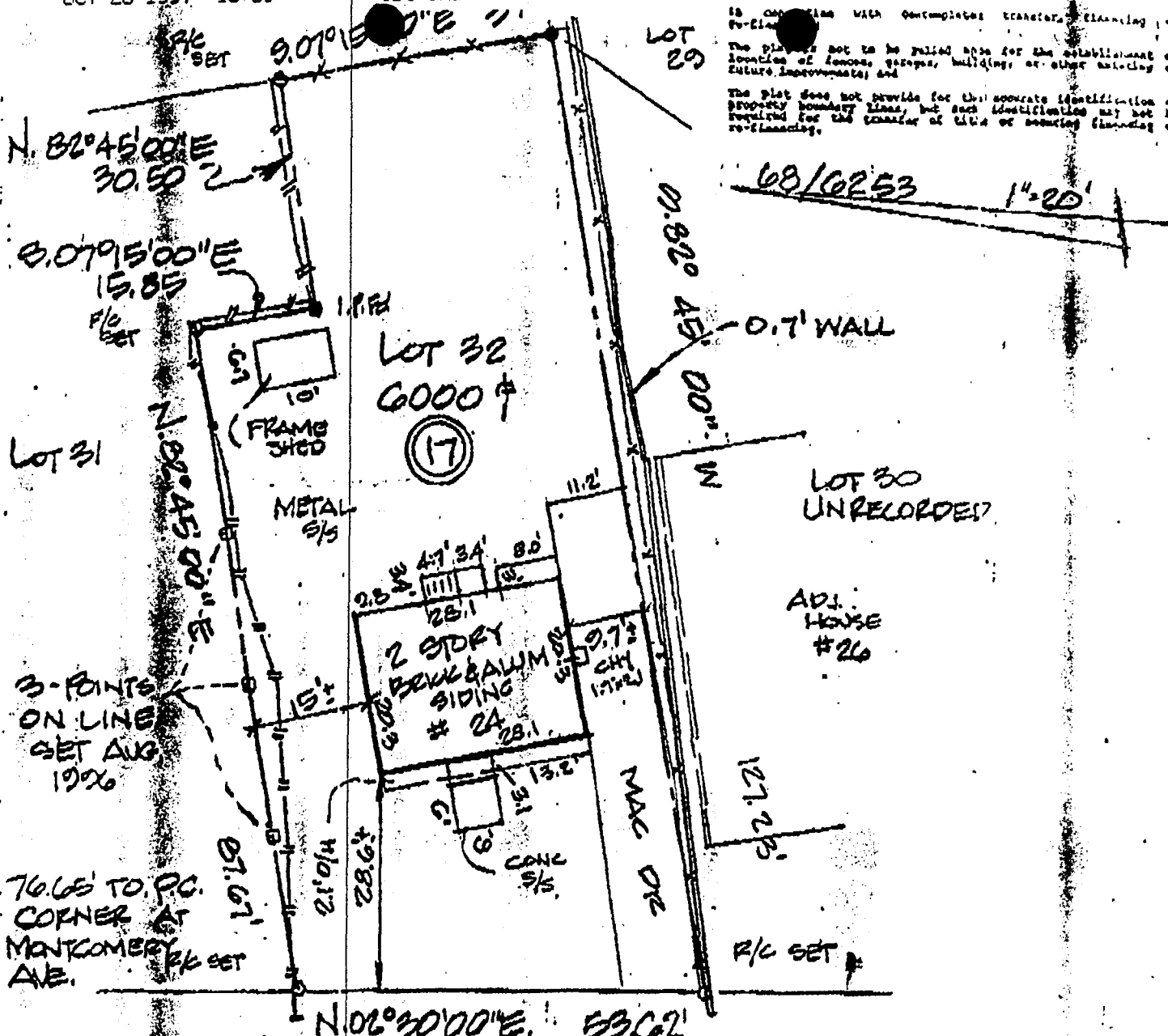
$l = 35.5" \approx 36"$ $M = 150 \text{ lb}$
 STILL NEED 3 PICKETS



<p>Job Name KEYSTONE WALL</p> <p>Date 6/6/97 Computed RMP</p>	<p>Job Title GUARDRAIL</p> <p>Page 3 of 3</p>
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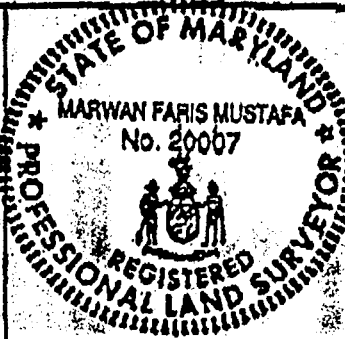
CTC 800 972 2137 CTC 411

is complete with completed transfer, financing, or re-financing.
The plat is not to be relied upon for the establishment or location of fences, garages, buildings, or other existing or future improvements; and
The plat does not provide for the accurate identification of property boundary lines, but such identification may not be required for the transfer of title or securing financing or re-financing.



NOTES: NOT located in a HUD designated Flood Hazard Zone as per FEMA Community Panel No. 240049-02003 H-1833/24
Prepared without the benefit of a title report. F.B. 2013/2
Information shown hereon should not be relied upon for construction of improvements.

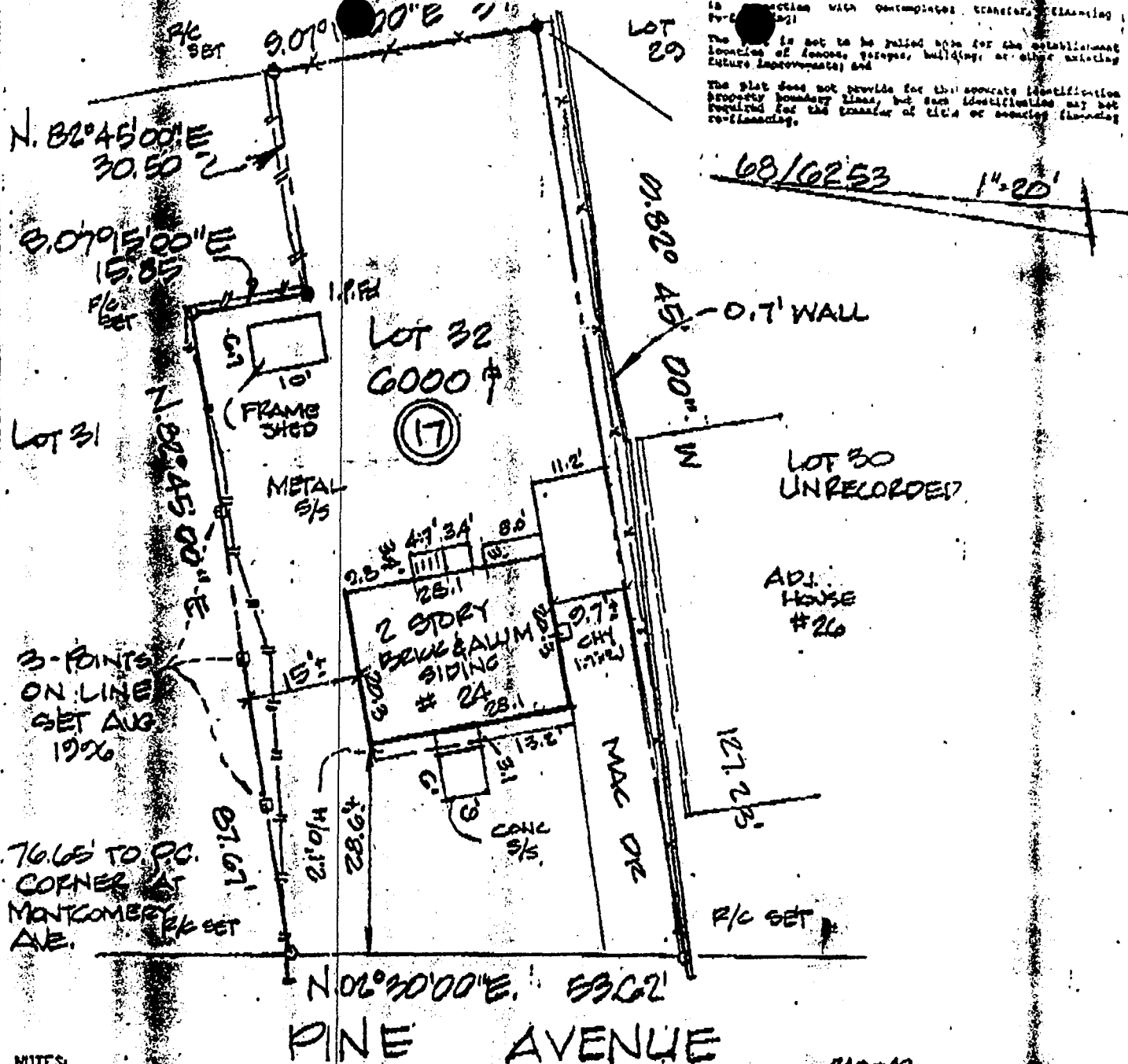
I hereby certify that I have surveyed the property shown hereon for the purpose of locating the improvements only, and the improvements are located as shown. Exact property corners have not been established on set, unless otherwise noted. We assume no responsibility or liability for any rights-of-way or easements recorded or unrecorded not appearing on the record plat.
MARWAN FARIS MUSTAFA
Reg. Prof. Land Surveyor, Md. #20007
Date 3-1-96



LOT IMPROVEMENT SURVEY
24 PINE AVENUE
LOT 32 BLOCK 17
B.F. GILBERTS ADDITION
TAKOMA PARK
WHEATON Election District
MONTGOMERY County, Maryland

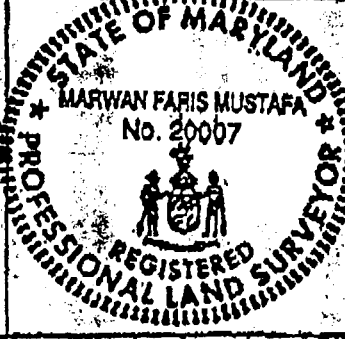
LIGHT, ELLIOTT & ASSOCIATES, INC. 5508 Adelphi Road Adelphi, Maryland 20783 Phone 301-422-8080 Fax 422-8086	Draft: KKL CK:	Plat Book / Page: 08/0253	Case No.:
	Job No.: N4821	Liber / Folio:	File Number: 08/0253B1

In connection with contemplated transfer, planning, or development of the lot is not to be relied upon for the establishment or location of fences, garages, buildings, or other existing or future improvements and the plat does not provide for the accurate identification of property boundary lines, but such identifications may not be required for the transfer of title or recording (surveying or re-surveying).



NOTES: NOT located in a HUD designated Flood Hazard Zone as per FEMA Community Panel No. 240049-0200B. Prepared without the benefit of a title report. Information shown hereon should not be relied upon for construction or improvements. H-1833/24 F.B. 2013/2

I hereby certify that I have surveyed the property shown hereon for the purpose of locating the improvements only, and the improvements are located as shown. Exact property corners have not been established or set, unless otherwise noted. We assume no responsibility or liability for any rights-of-way or easements recorded or unrecorded not appearing on the record plat.
MARWAN FARIS MUSTAFA
Reg. Prof. Land Surveyor, Md. #20007
Date 3-1-96



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24 PINE AVENUE
LOT 32 BLOCK 17
B.F. GILBERTS ADDITION
TAKOMA PARK
WHEATON Election District
MONTGOMERY County, Maryland

LIGHT, ELLIOTT & ASSOCIATES, INC. 8508 Adelphi Road Adelphi, Maryland 20783 Phone: 301-422-6080 Fax: 422-6086	DRAFT: KEL CK:	Plat Book / Page 68/0253	Case No.
		Job No. N4821	File Number SH 25381