

May 18, 2007

Pavestone Company
2720 East Outer Rd.
Scott City, MO 63780

Re: Masterplan Approval (Review Number 70042-07)
Cornerstone Frogstone Retaining Wall

Dear Sir or Madam:

I am pleased to inform you that the plans submitted for review of Cornerstone Frogstone Retaining Wall are approved and the new master plan numbers are as follows:

6 feet high, with up to 1v:5h slope of backfill, no surcharge within 8 feet	713-07-24
6 feet high, with level backfill, and driveway between 3 feet to 8 feet away	713-07-25
2 tiers/4 feet high each, with up to 1v:5h slope of backfill, no surcharge within 8 feet	713-07-26

Please inform your customers of the following procedures that they need to follow when applying for a retaining wall permit with St. Louis County:

1. Submit completed permit application form that includes the master plan number.
2. Submit four (4) copies of site plans showing the location and length of the wall, drawn to scale. Top of wall elevations and bottom of wall elevations must be provided on the site plans. Dimension wall distance to any structures, parking lots, and property lines.
3. Submit four (4) copies of plan view of the walls.
4. Submit four (4) copies of the front elevation views of the walls with dimensions.
5. Submit four (4) copies of cross-section detail of the wall. The detail must show leveling pads dimension, wall height, geogrid type and placements, drainage materials, and slope of backfill.
6. Wall configuration and reinforcements must match the master plan in order for this office to issue a retaining wall permit.
7. Specify the soil condition on the site.

If you have any questions regarding this letter, please feel free to call me. I would be more than happy to guide you through our permit process.

Sincerely,

Heley Zhou

Building Code Review Section
Division of Code Enforcement

General
 This Master Plan has been created to comply with IBC 2003. The contractor shall protect all existing utilities, and shall be responsible for all worker and public safety at the retaining wall site. All installation shall be per the retaining wall manufacturer's construction recommendations and/or as noted herein.

Materials
 The Leveling Pad shall be constructed 1" minus crushed limestone compacted to at least 90% modified proctor with minimum dimensions of 6" thick and 24" wide.

Retaining Wall Units shall be Cornerstone Frogstone. Units must be 12" deep. Concrete wall units shall meet the requirements of ASTM C90-90 and compressive strength shall be a minimum of 3000 psi. The maximum water adsorption shall be limited to 8.0 percent. The concrete shall have adequate freeze thaw resistance in accordance with ASTM 666-90.

The reinforced wall backfill material shall be compacted 1" clean crushed limestone.

Geogrid shall be Raugrid 2/2-20 or Cartridge Mills GX-150 as indicated on the plan, or approved equivalent.

Filter Fabric shall be Cartridge Mills FX35HS or approved equivalent.

The Soil Cap shall consist of compacted low plastic impervious soil above the granular backfill in areas not to be paved.

Wall Foundation Excavation

Foundation soil shall be excavated as required for the leveling pads and the reinforcing zone. We recommend the exposed soils be observed by a qualified geotechnical engineer to confirm the materials are consistent with the design assumptions. Foundation soil must have a minimum bearing capacity of 1500 psf and an effective internal angle of friction of 26 degrees. Retained soils must have an internal angle of friction of 26 degrees. Any soils that are soft, plastic (LL > 50%), frozen, or wet and untested fills shall be removed and recompacted to 90% modified Proctor under the direction of the geotechnical engineer.

Wall Construction
 Install the first course of units on the leveling pad. Install the next course in a running bond stack. Adjust for setback per course. Backfill, install reinforcement as shown and continue construction. Filter fabric shall separate the granular backfill from the retained soil and the soil cap. Filter fabric shall not cover the foundation materials.

Geogrid Reinforcing

The geogrids shall be cut to the design lengths "L" and placed between the blocks at the elevations shown on the plans. Wall heights between the design section heights shall be reinforced in accordance with the next higher design section. The geogrid's primary strength direction shall be perpendicular to the wall face (into the fill). The geogrid shall be placed horizontally and laid flat on the reinforcing fill material. The geogrid shall be placed so that a minimum of 6" of grid is between the block layers. Slack in the geogrid shall be removed prior to placing backfill.

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Wall Backfill
 Backfill material shall be placed in maximum 8' lifts and compacted. Backfill shall be placed in such a manner that minimizes wrinkles and movement of the geogrid. During backfill placement only hand operated equipment shall be used in the 4' zone directly behind the wall. The front of the wall shall be backfilled and compacted to finished grade.

Protection of Work
 The surfaces surrounding the wall shall be graded at the end of each day to provide positive drainage away from the wall. Grading shall include proper contouring of fills in adjacent areas to prevent the flow of excessive surface water toward the wall. Finish grading should be completed in accordance with the approved site development plan.

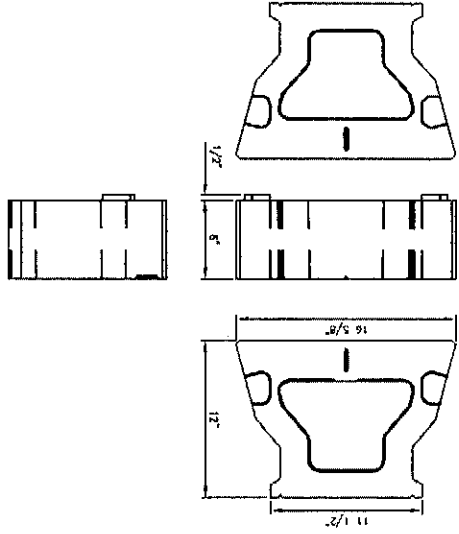
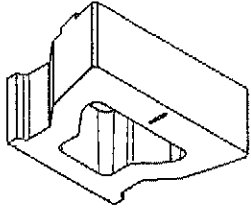
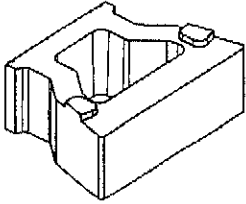
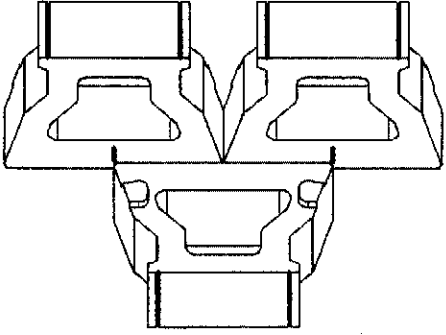
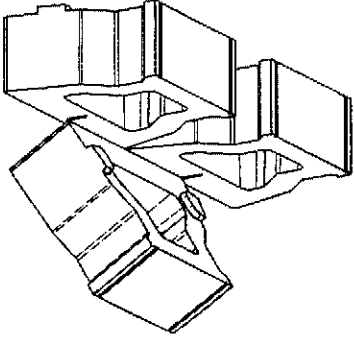
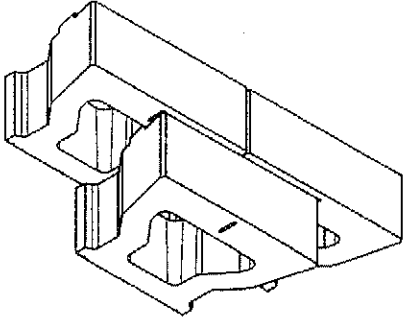
The stability of temporary excavation during wall construction is beyond the scope of this design and are the responsibility of the contractor.

Miscellaneous
 A fence or guardrail should be installed along the top of the wall under a separate plan. We recommend that PVC or sonotube sleeves be placed as the wall is being backfilled to prevent a need to excavate post holes after wall construction which could damage the geogrid.

This Master Plan is for structural design only. A site plan should be submitted in accordance with St. Louis County requirements. Site plans and site details are not within the scope of these plans.

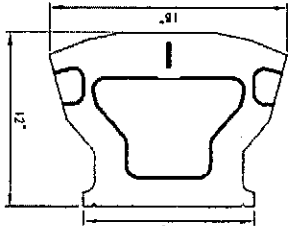
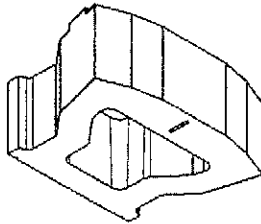
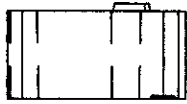
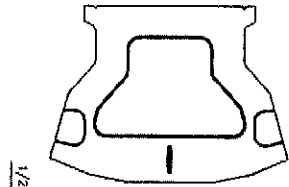
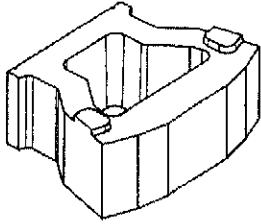
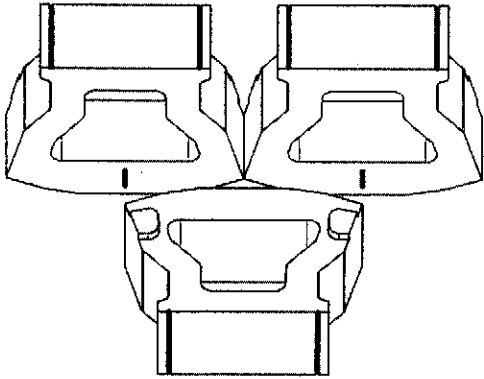
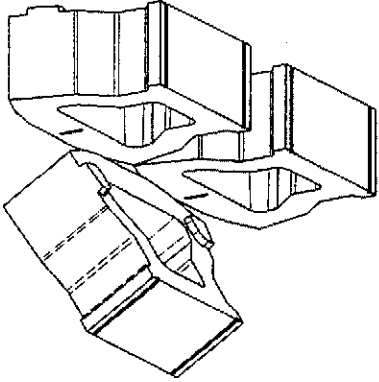
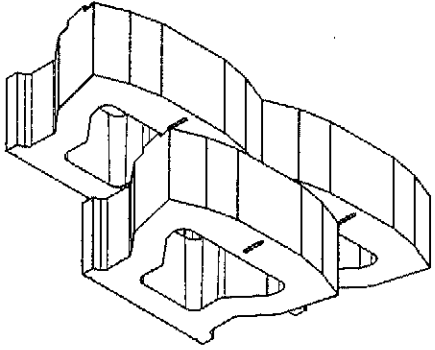
Pavestone Company 2720 East Outer Rd Scott City, Mo. 63780 573-332-8312		Engineering Solutions, P.C.	
SIZE	FSCM NO.	DWG NO.	REV
Specifications		Frogstone Masterplan St. Louis County, Mo.	
SCALE		SHEET 2 of 8	

Engineering Solutions, P.C.		SCALE	SHEET 3 of 8	
Pavestone Company 2720 East Outer Rd Scott City, Mo. 63780 573-332-8312		SIZE	FSCM NO.	DWG NO.
FrogStone Masterplan St. Louis County, Mo.		REV		
Details				



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Engineering Solutions, P.C.		SCALE	SHEET 4 of 8
2720 East Outer Rd Scott City, Mo. 63780 Pavestone Company 573-332-8312	SIZE	FSCM NO.	DWG NO.
FrogStone Masterplan St. Louis County, Mo.		REV	
Details			

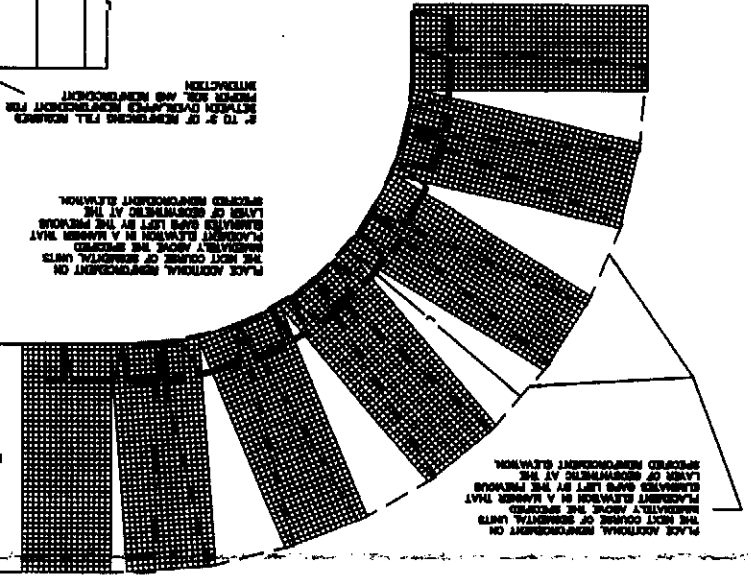
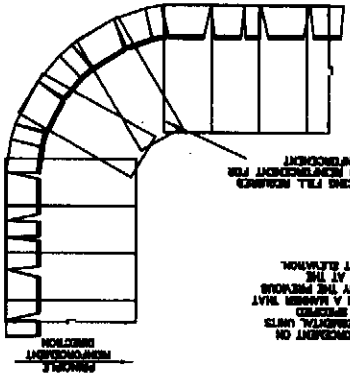
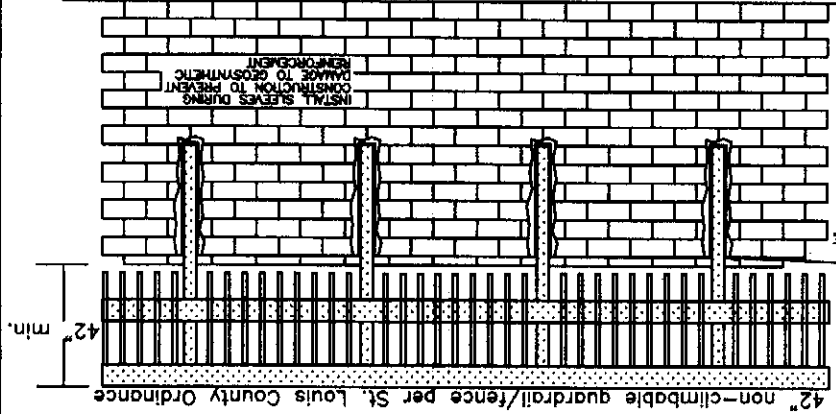
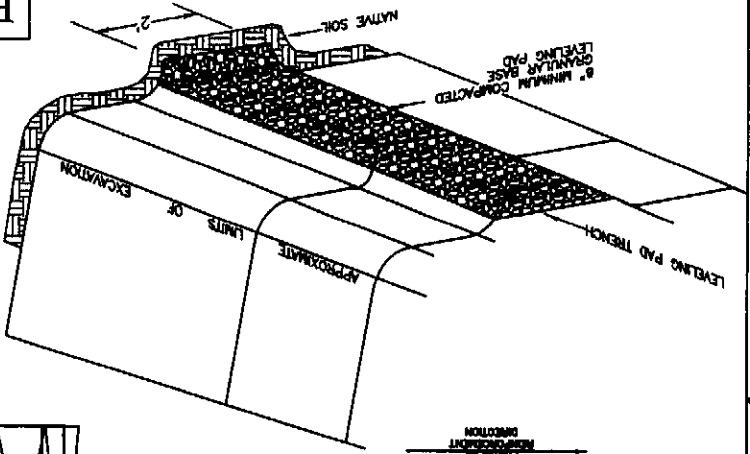
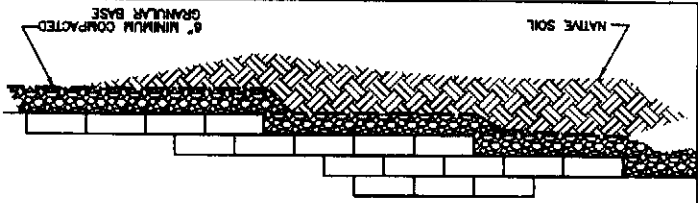


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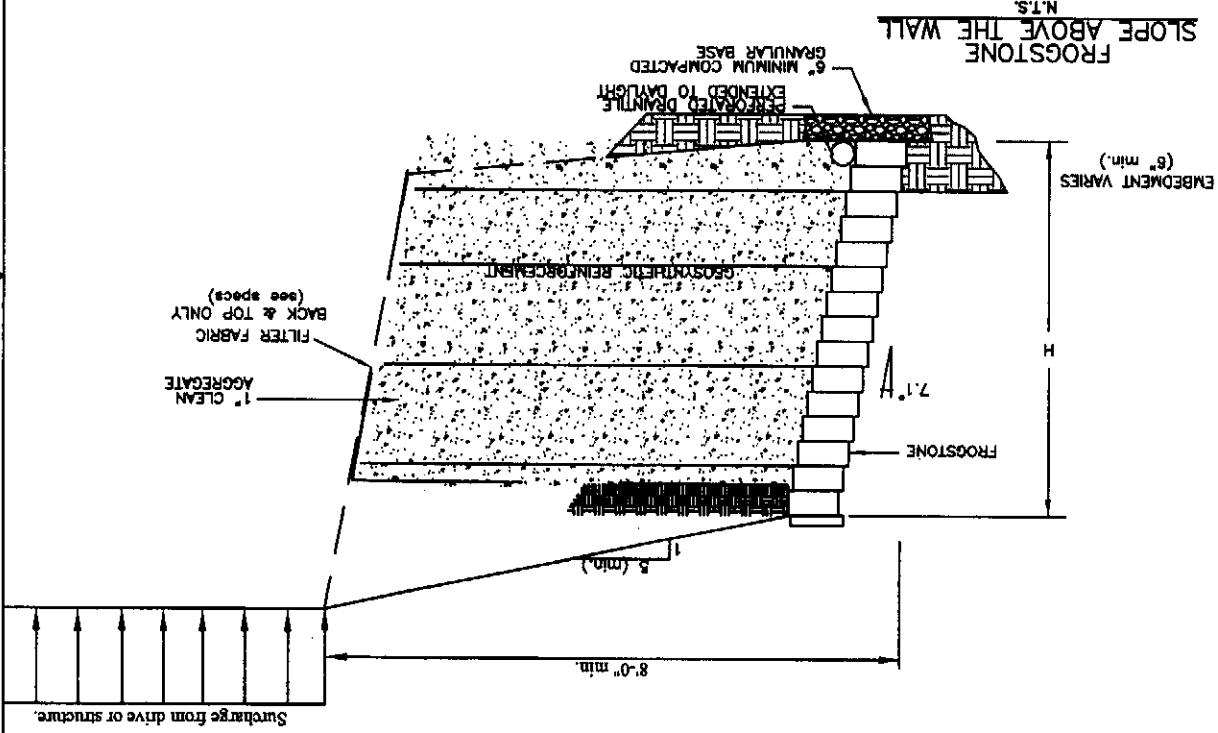
Engineering Solutions, P.C.		SCALE	SHEET 5 of 8	
2720 East Outer Rd Scott City, Mo. 63780 573-332-8312		SIZE	FSCM NO.	DWG NO.
Pavestone Company		FrogStone Masterplan St. Louis County, Mo.		
Details		REV		



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Engineering Solutions, P.C.		SCALE	SHEET 6 of 8	
SIZE	FSCM NO.	DWG NO.	REV	
Pavestone Company 2720 East Outer Rd Scott City, Mo. 63780 573-332-8312		FrogStone Masterplan St. Louis County, Mo.		
Single Tier With Slope Above				

Note: It is recommended that a qualified person observe the soils prior to construction to confirm that they are consistent with the design parameters.



Description	Cohesion (pcf)	Phi Angle (deg)	Unit Weight (pcf)
Retained Soil	26.0	26.0	120.0
Foundation Soil	0	26.0	120.0
1" Clean Reinforcing Soil	-	34.0	110.0

***GX-150 may be substituted for Raugrid 2/2-20
As manufactured by Carriage Hubs and Distributed by Erosion & Drainage Products Inc.

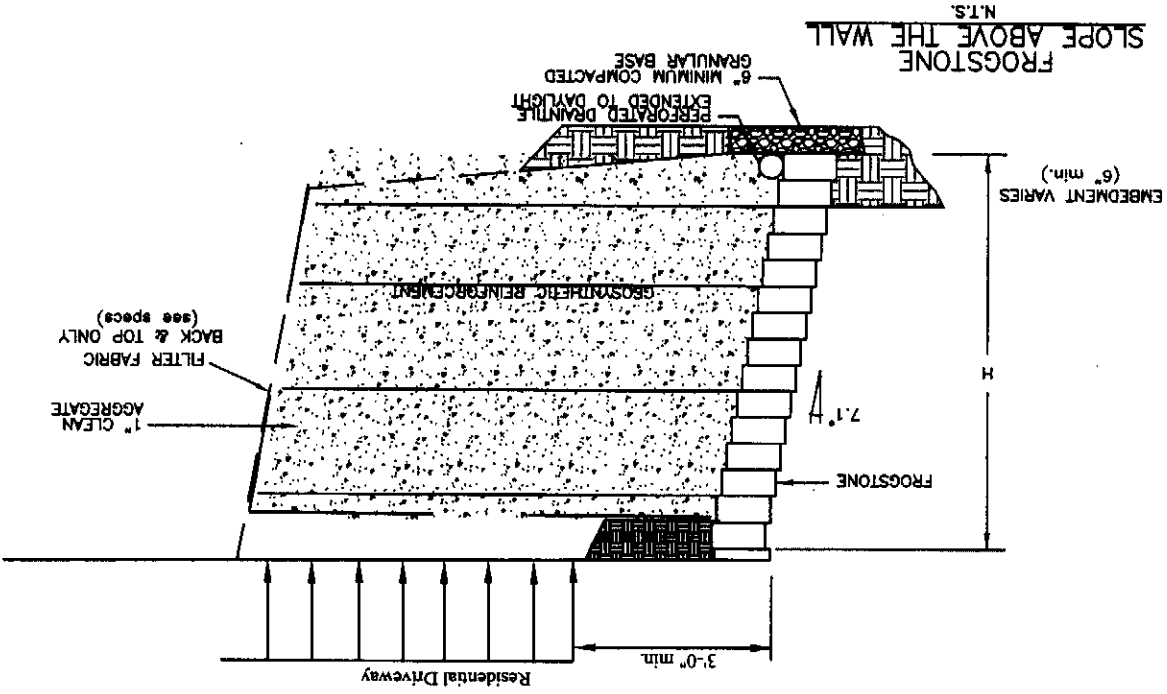
Wall Height (ft)	Geogrid Position (height above leveling pad) (ft)	Geogrid Weight (Raugrid model #)	Length of Geogrid (ft) (measured from wall face)
2	1.0	2/2-30	3.0
3	1.5	2/2-20	4.0
4	1.0	2/2-20	4.5
4.5	2.5	2/2-20	4.5
5	2.5	2/2-20	4.5
5.2	4.0	2/2-20	5.2
5.5	1.5	2/2-20	5.5
6	3.0	2/2-20	5.5
5.8	4.5	2/2-20	5.8

Reinforcement Table

ZONE	REV	DESCRIPTION	DATE	APPROVED
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Engineering Solutions, P.C.		SIZE	FSCM NO.	DWG NO.	REV
Pavestone Company 2720 East Outer Rd Scott City, Mo. 63780 573-332-8312		Frogstone Masterplan St. Louis County, Mo.			
SCALE		SHEET 7 of 8			

Note: It is recommended that a qualified person observe the soils prior to construction to confirm that they are consistent with the design parameters.



Description	Cohesion (pcf)	Phi Angle (pcf)	Unit Weight (pcf)
Retained Soil	Silty Clay	-	120.0
Foundation Soil	Silty Clay	0	120.0
Reinforcing Soil	1" Clean	-	110.0

***GX-150 may be substituted for Rauprd 2/2-20
As manufactured by Cartridge Mills and Distributed by Erosion & Drainage Products Inc.

Wall Height (ft)	Geogrid Position (ft)	Geogrid Weight (lb/ft)	Length of Geogrid (ft)
2	1.0	2/2-30	4.0
3	1.5	2/2-20	4.0
4	1.0	2/2-20	4.5
4.5	2.5	2/2-20	4.5
5	4.0	2/2-20	5.0
5.2	2.5	2/2-20	5.0
5.5	1.5	2/2-20	5.5
5.8	3.0	2/2-20	5.5
4.5	2/2-20		5.8

Reinforcement Table

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Double Tier

Pavestone Company
2720 East Outer Rd
Scott City, Mo. 63780
573-332-8312

Engineering Solutions, P.C.

SIZE	FSCM NO.	DWG NO.	REV
SCALE	SHEET 8 of 8		

Note: It is recommended that a qualified person observe the soils prior to construction to confirm that they are consistent with the design parameters.

Description	Cohesion (pcf)	Pit Angle	Unit Weight
Retained Soil	26.0	12.0	120.0
Shly Clay	-	26.0	120.0
Shly Clay	0	26.0	120.0
1" Clean	-	34.0	110.0

As manufactured by Carriage Mills and Distributed by Erosion & Drainage Products Inc.
***GX-150 may be substituted for Raugrid 2/2-20

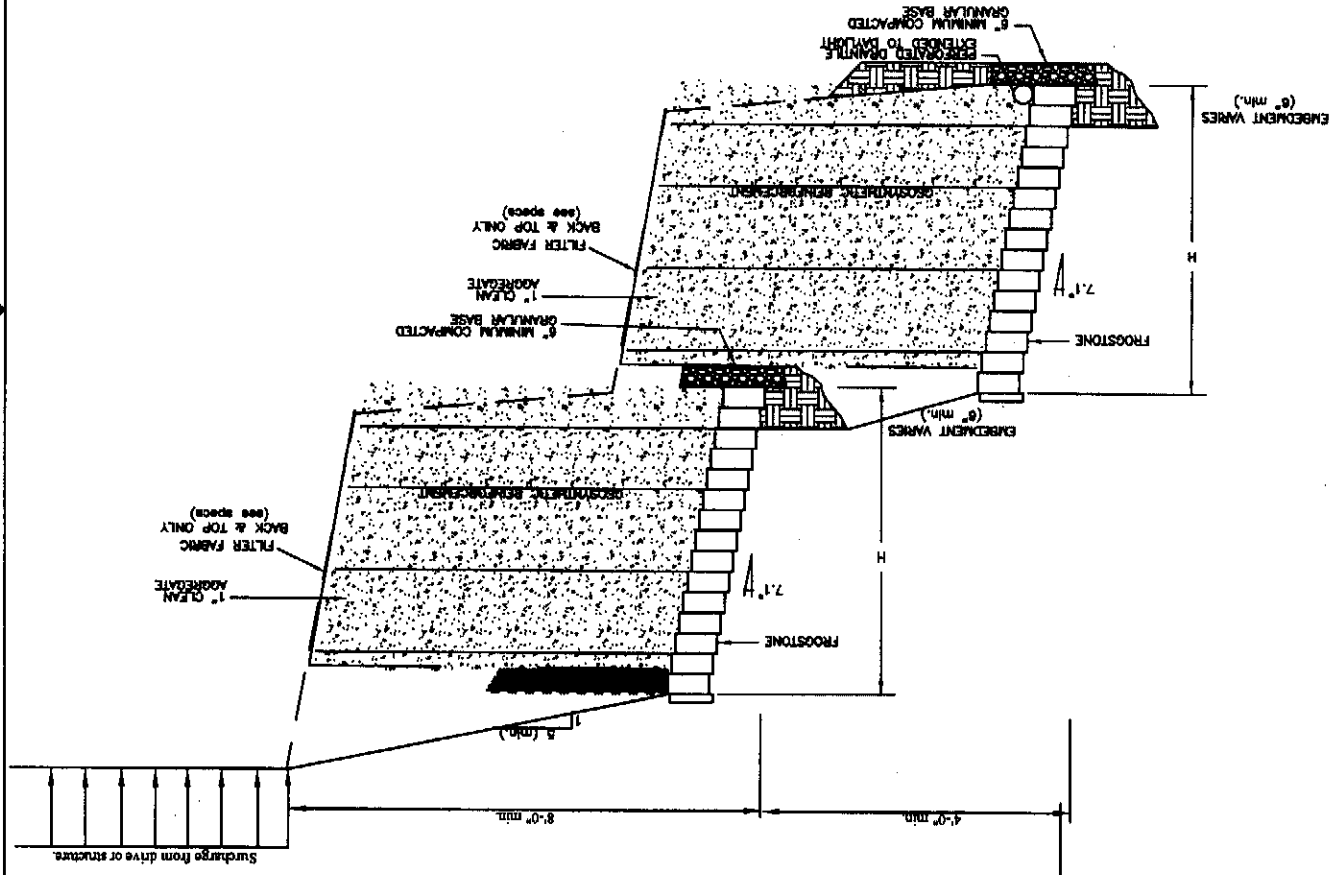
Wall Height	Geogrid Position	Geogrid Weight	Length of Geogrid (ft)	(ft) (height above leveling pad) (ft) (Raugrid model #) (measured from wall face)
2	1.0	2/2-30	5.0	5.0
3	0.5	2/2-20	5.0	5.0
4	1.5	2/2-20	5.5	5.5
5	0.5	2/2-20	5.5	5.5
3	2/2-20	5.5	5.5	

Lower Terrace

As manufactured by Carriage Mills and Distributed by Erosion & Drainage Products Inc.
***GX-150 may be substituted for Raugrid 2/2-20

Wall Height	Geogrid Position	Geogrid Weight	Length of Geogrid (ft)	(ft) (height above leveling pad) (ft) (Raugrid model #) (measured from wall face)
2	1.0	2/2-30	3.0	3.0
3	1.5	2/2-20	4.0	4.0
4	1.0	2/2-20	4.5	4.5
2.5	2/2-20	4.5	4.5	

Reinforcement Table
Upper Terrace



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