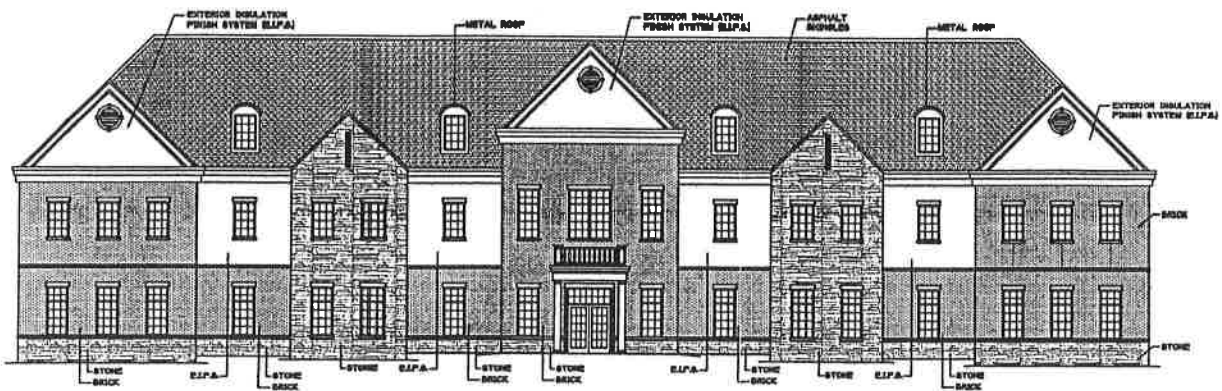
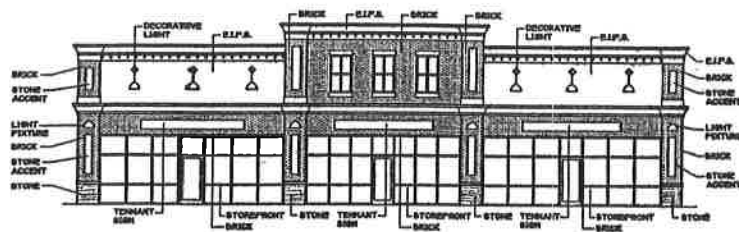


GRAY'S STATION

WEST MAIN STREET
LEBANON, TN



OFFICE BUILDING ELEVATION
SCALE 1/8"=1'-0"



RETAIL BUILDING ELEVATION
SCALE 1/8"=1'-0"

GRAY'S STATION

**WEST MAIN STREET
LEBANON, TN**

RECEIVED

JUN 14 2007

**City of Lebanon
Planning Department**

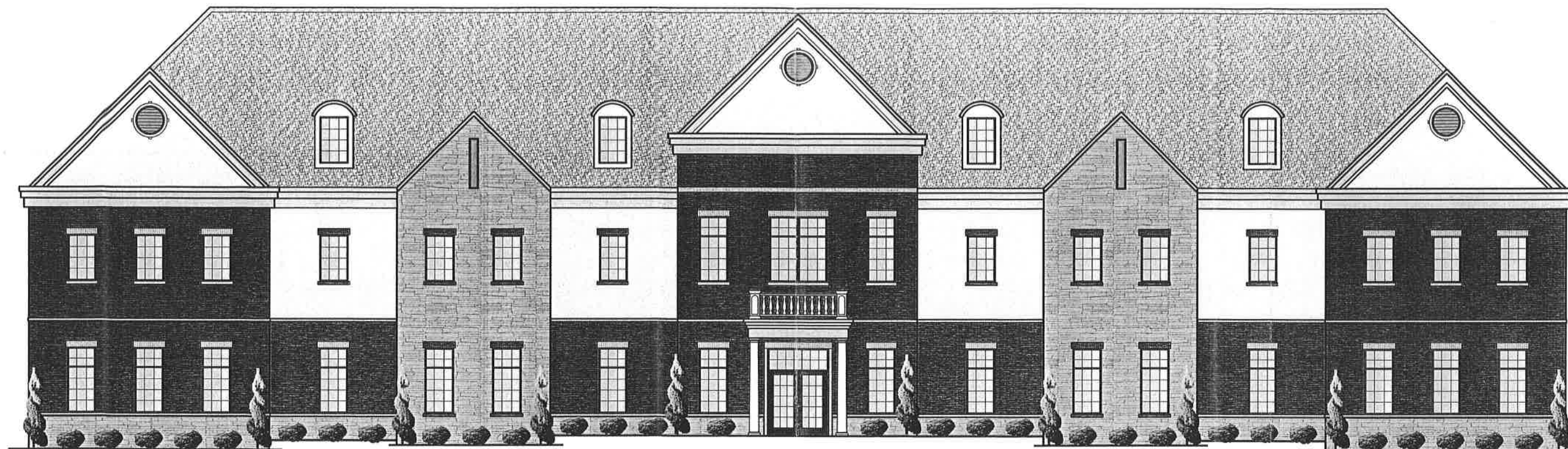
GRAY'S STATION REGULATIONS

The following uses are permitted:

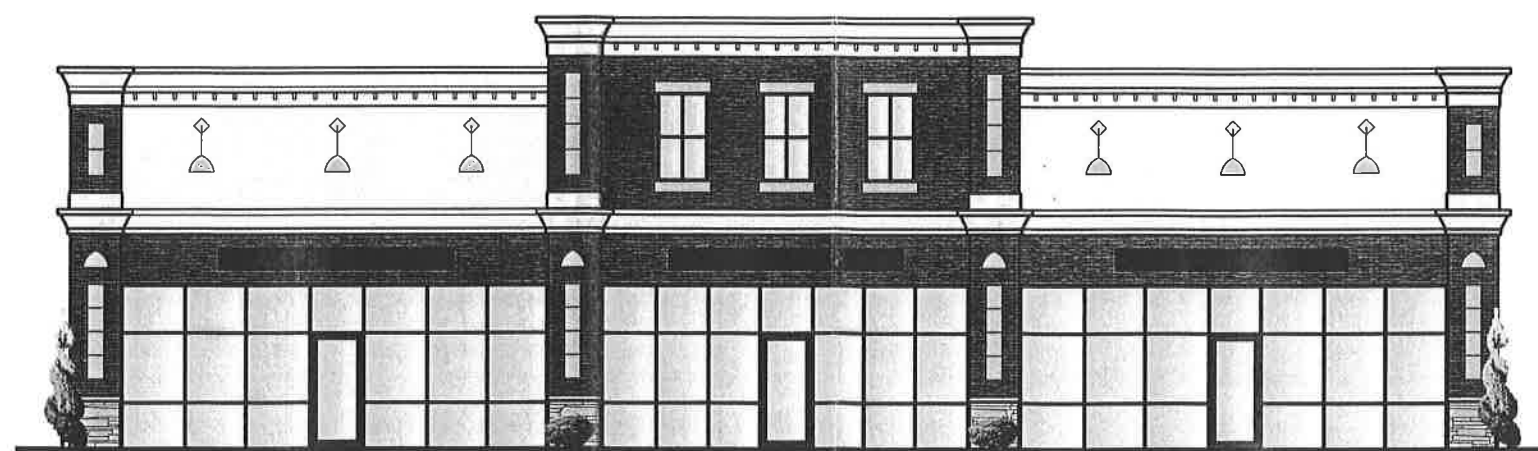
1. Single Family Dwelling – consistent with the covenants and restrictions of Geer's Place
2. Restaurants – (except drive-in)
3. Nursing home
4. Drug store
5. Hardware store
6. Flower shop
7. Office
8. Medical clinic
9. Day care
10. Beauty shop
11. Leather and leather goods shop
12. Dry cleaner's pickup station
13. Funeral parlor
14. Retail bakery outlet
15. Bank
16. Shoe store
17. Haberdashery
18. Jewelry store
19. Gift shop
20. Art shop
21. Furniture store
22. Book and stationery store
23. Music shop
24. Sporting goods store
25. Appliance store

Uses not permitted:

- Multiple-family dwelling and apartment
- Hospital
- Day care center
- Food store
- Hand laundry
- Laundromat
- Motel
- Retail package store



PROFESSIONAL BUILDING ELEVATION



SHOPPES BUILDING ELEVATION

GRAYS STATION
WEST MAIN STREET
LEBANON, TENNESSEE



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DATE: 06/01/2011 TIME: 10:00 AM

BY: [Signature] PROJECT NO. 1000000000

Architect: MCM'S
RETAIL BLDG.
ELEVATIONS

Revisions

REV.	DATE	BY	REMARK

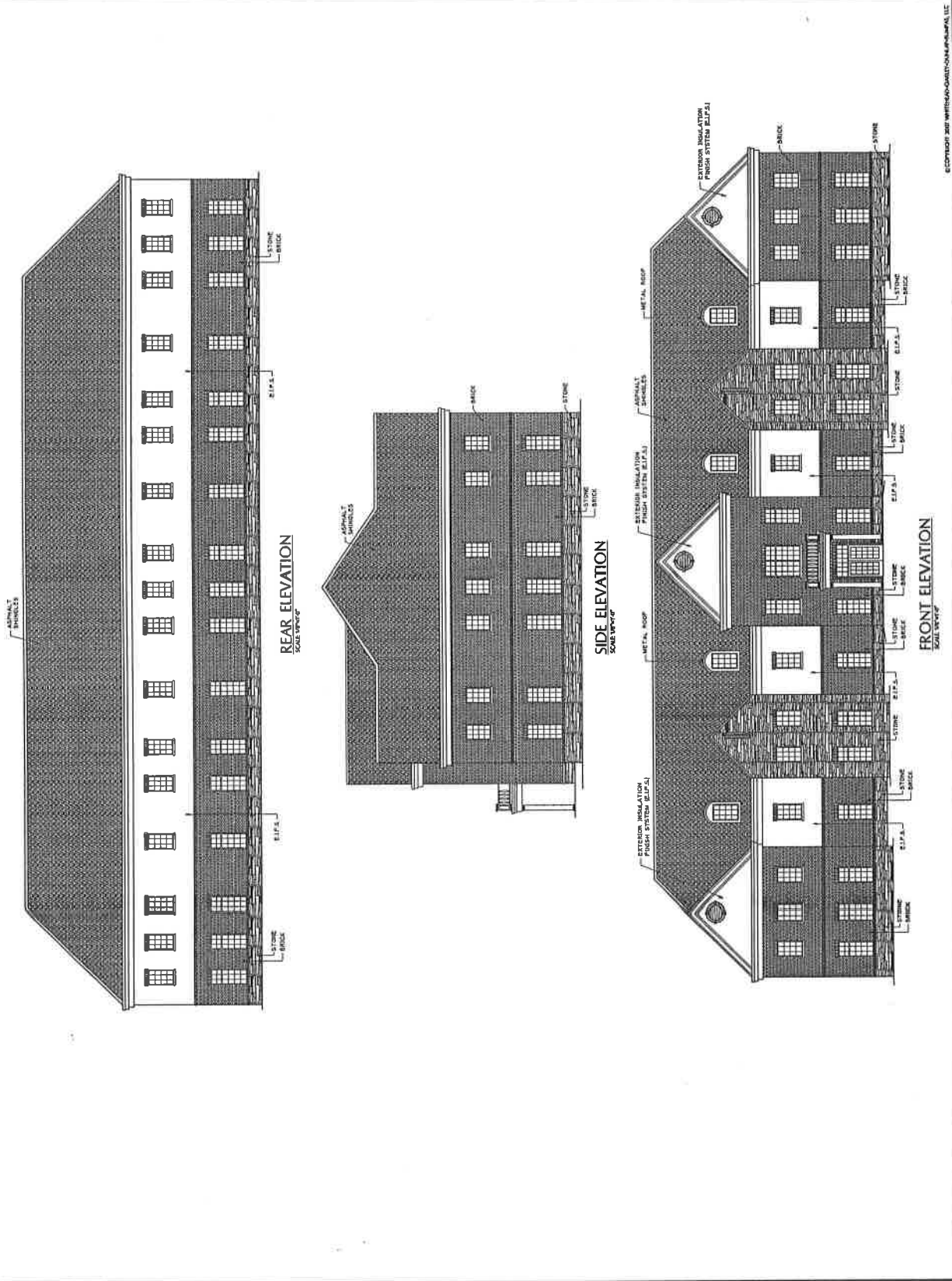
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CONCEPTUAL ELEVATIONS
GRAYS STONE DEVELOPMENT
 WEST MAIN STREET
 LEBANON, TENNESSEE

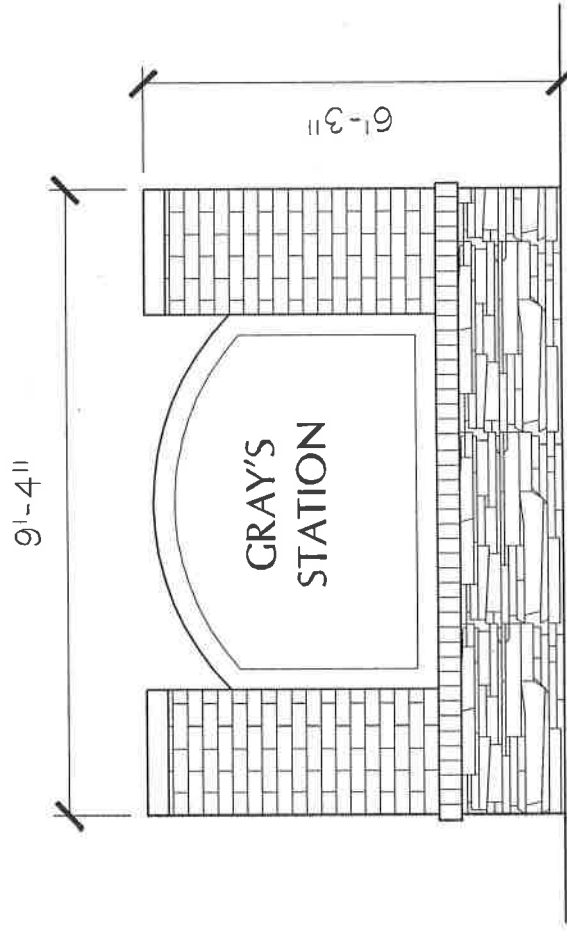
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DATE: 08/01/2017
 BY: [Signature]
 CHECKED: [Signature]
 ELEVATIONS

A1.0



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SIGN ELEVATION

SCALE: 1/4"=1'-0"



DESCRIPTION

Dominated by flat surfaces and strong lines that emphasize the principles of architecture, the *IMPACT* Trapezoid cutoff wall luminaire make it ideal complement to site design. These luminaires are U.L. Listed and CSA Certified for wet location when mounted down and damp location up mounted.

APPLICATION

The *IMPACT's* rugged die-cast construction, full cutoff classified optics is perfect for light restricted zones surrounding schools, office complexes, apartments, and recreational facilities providing facade and security lighting needs.

SPECIFICATION FEATURES

A...Housing

The housing is a two-piece design of die-cast aluminum for precise control of tolerances and repeatability.

B...Mounting

Gasketed and zinc plated rigid steel mounting attachment fits directly to 4" J-Box or wall with "Hook-N-Lock" mechanism for quick installation. Secured with two (2) captive corrosion resistant black oxide coated allen head set screws concealed but accessible from bottom.

C...Optical Modules

All optical modules utilizes high performance 95% reflective sheet. Strong Type II optical module is standard.

D...Ballast

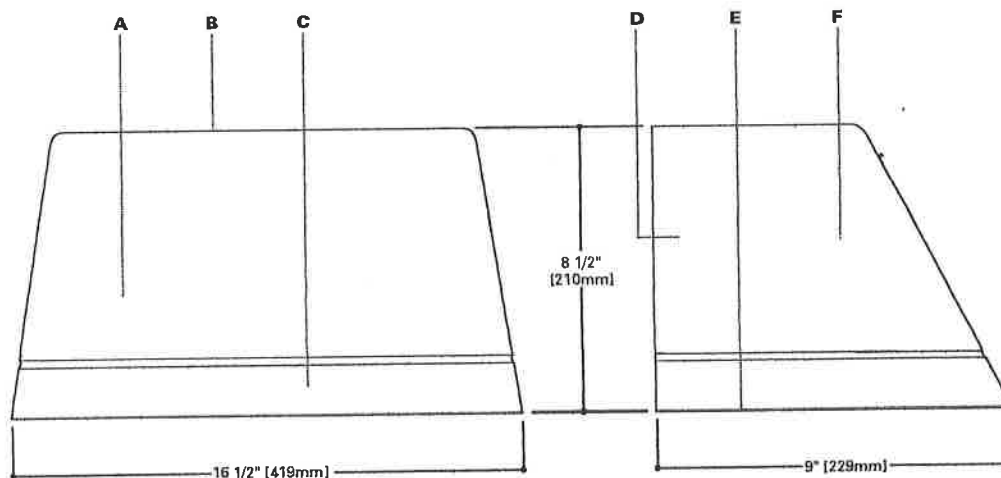
HID luminaires supplied with high power factor ballast with Class H insulation. Minimum starting temperatures are -40°C (-40°F) for HPS and -30°C (-20°F) for MH. Compact Fluorescent luminaires feature program start, high efficient multi-voltage 50/60Hz ballast with -18°C (0°F) minimum starting.

E...Door

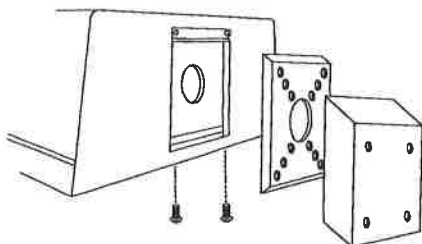
Die-cast door mounted with, 1/8" heat- and impact-resistant clear tempered glass lens, with internal plated steel clips and sealed with EPDM gasketing. Hinged door secured in place via two (2) captive fasteners.

F...Finish

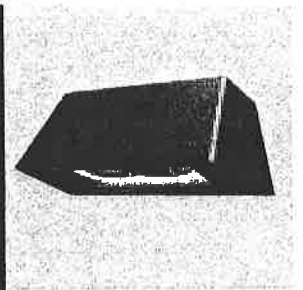
Durable polyester powder coat finish. Standard color is bronze. Optional white, black and silver colors available. Other finish colors available. Consult your Cooper Lighting Representative concerning special color requirements.



HOOK-N-LOCK MOUNTING (Mounting attachment included, J-Box not included.)



COOPER LIGHTING



IP IMPACT TRAPEZOID

50 - 175 W

High Pressure Sodium
Metal Halide

26 - 52 W

Compact Fluorescent

WALL MOUNT
LUMINAIRE

IMPACT™
Cut-off Wall Luminaires

TECHNICAL DATA

25°C Maximum Ambient Temperature
External Supply Wiring 90°C Minimum
Down Mounted—Wet Location
Up Mounted—Damp Location

IES FILES

Metal Halide
175W (MH_17)
High Pressure Sodium
150W (HPL_15)
Compact Fluorescent
26W (PLIP26)
32W (PLIP32)
42W (PLIP42)
52W (PLIP52)

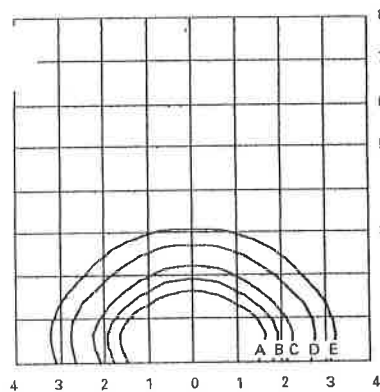
ENERGY DATA

High Reactance Ballast Input Watts
50W HPS HPF (66 Watts)
50W MH HPF (72 Watts)
70W HPS HPF (91 Watts)
70W MH HPF (90 Watts)
100W HPS HPF (130 Watts)
100W MH HPF (129 Watts)
150W HPS HPF (190 Watts)
150W MH HPF (185 Watts)
CWA Ballast Input Watts
175W MH HPF (210 Watts)
Electronic Ballast Input Watts
26W PL HPF (29 Watts)
32W PL HPF (36 Watts)
42W PL HPF (46 Watts)
52W PL HPF (55 Watts)

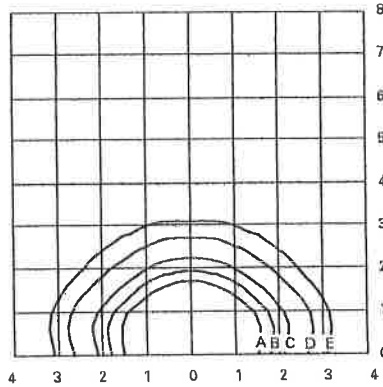
ADH021644



PHOTOMETRICS



MHIP-T-175-MT-LL
175-Watt MH
14,000-Lumen Clear Lamp



HPIP-T-150-MT-LL
150-Watt HPS
16,000-Lumen Clear Lamp

Footcandle Table

Select mounting height and read across for footcandle values of each isofootcandle line. Distance in units of mounting height.

Mounting Height	Footcandle Values for Isofootcandle Lines				
	A	B	C	D	E
10'	4.50	2.25	1.13	0.45	0.23
15'	2.00	1.00	0.50	0.20	0.10
20'	1.12	0.56	0.28	0.11	0.06

ORDERING INFORMATION

SAMPLE NUMBER: MHIP-T-150-MT-LL

IP		T			
Lamp Type	Fixture Type	Fixture Shape	Lamp Wattage	Voltage*	Options (add as suffix)
MH=Metal Halide	IP=IMPACT	T=Trapezoid	HID*	120V	F1=Single Fuse—120, 277 or 347V (Must Specify Voltage)
HP=High Pressure Sodium			50=50W*	208V	F2=Double Fused—208 or 240V (Must Specify Voltage)
PL=Compact Fluorescent			70=70W*	240V	PE=Button Photocontrol (Must Specify Voltage)
			100=100W	277V	Q=Quartz Restrike "
			150=150W	347V	EM/SC=Emergency Separate Circuit "
			175=175W*	480V	TR=Tamper Resistant Screw (Door and Mounting Plate)
			Compact Fluorescent	DT=Dual-Tap*	=Standard Color Bronze
			26/32/42=26, 32, or 42W*	MT=Multi-Tap*	WH=White
				TT=Triple-Tap*	BK=Black
				E=Electronic Ballast**	SY=Silver
					LL=Lamp Included (Must Specify Wattage on PL)

STOCK SAMPLE NUMBER: MHIT17

IT			
Lamp Type	Fixture Type**	Lamp Wattage	
HP=High Pressure Sodium	IT=IMPACT Trapezoid	10=100W	
MH=Metal Halide		15=150W	
		17=175W	

NOTES: Options not available with stock products. Order Accessories as separate items for field installation. Refer to standard ordering information to add options and accessories.

Catalog Number	Lamp Wattage	Lamp Type/Base	Voltage	Ballast Type/Power Factor	Net Wt. (lbs.)	Shipping Volume (cu. ft.)
Wedge						
MHIP-T-50-MT-LL	50	MH/Medium	Dual-Tap	Hi. X/HPF	16	1.64
MHIP-T-70-MT-LL	70	MH/Medium	Multi-Tap	CWA/HPF	16	1.64
HPIP-T-50-DT-LL	50	HPS/Medium	Dual-Tap	Hi. X/HPF	16	1.64
HPIP-T-70-MT-LL	70	HPS/Medium	Multi-Tap	Hi. X/HPF	16	1.64
PLIP-T-26/32/42-E	26/32/42	PL/GX24Q-3&4	120-277V	Electronic	16	1.64
PLIP-T-52-E	52	PL/GX24Q-3	120-277V	Electronic	16	1.64

Stock Catalog Number	Lamp Wattage	Lamp Type/Base	Voltage	Ballast Type/Power Factor	Net Wt. (lbs.)	Shipping Volume (cu. ft.)
HPIT10	100	HPS/Medium	Multi-Tap	Hi. X/HPF	12	1.45
MHIT10	100	MH/Medium	Multi-Tap	Hi. X/HPF	12	1.45
HPIT15	150	HPS/Medium	Multi-Tap	Hi. X/HPF	18	1.45
MHIT17	175	MH/Medium	Multi-Tap	CWA/HPF	17	1.45

NOTES: * All lamps are medium-base. * Available only in 120, 277V and Dual-Tap. * Not available in 480V. * Metal Halide construction only. * (2) 26W quad tube lamps only.

* HID products also available in non-US voltages and 50Hz for international markets. Consult your Cooper Lighting Representative for availability and ordering information.
* Dual-Tap ballast are 120/277V wired 277V. * Multi-Tap ballast are 120/208/240/277V wired 277V. * Triple-Tap ballast are 120/277/347V wired 347V. * Supplied with 120V through 277V 50/60Hz for Compact Fluorescent. ** The power might need to cycle and allow HID lamp to cool in warm climates. Use a 100W maximum HID lamp. ** Painted bronze. Supplied with lamp and Multi-Tap HPF ballast wired 277V.

NOTE: Specifications and dimensions subject to change without notice.

www.cooperlighting.com

COOPER Lighting

Customer First Center 1121 Highway 74 South Peachtree City, GA 30269 770.486.4800 FAX 770.486.4801

ADH021644

DESCRIPTION

The Landau features a formed aluminum, continuously welded housing, finished in dark bronze polyester powder coat for weatherability and abrasion resistance. 75° cutoff angle allows maximum light control without unwanted spill light behind the pole. Rotatable optics allow for side throw in either direction. U.L. 1572 listed for wet locations. CSA certified.

APPLICATION

The Landau's forward throw optical system, low glare and sharp cutoff provide excellent lighting performance for automotive merchandising facilities, roadways, parking areas and recreation areas.

SPECIFICATION FEATURES

A...Reflector

Formed, anodized, specular aluminum cutoff reflector is field-rotatable for forward or side throw illumination.

B...Gasket

High temperature door gasket seals out external contaminants.

C...Door

Extruded aluminum hinged door has impact-resistant tempered glass lens.

D...Socket

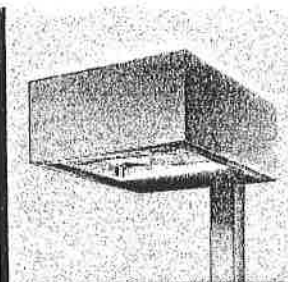
Porcelain socket fits mogul-base metal halide or high pressure sodium lamps.

E...Ballast Tray

Separate ballast tray allows easy removal of electrical components.

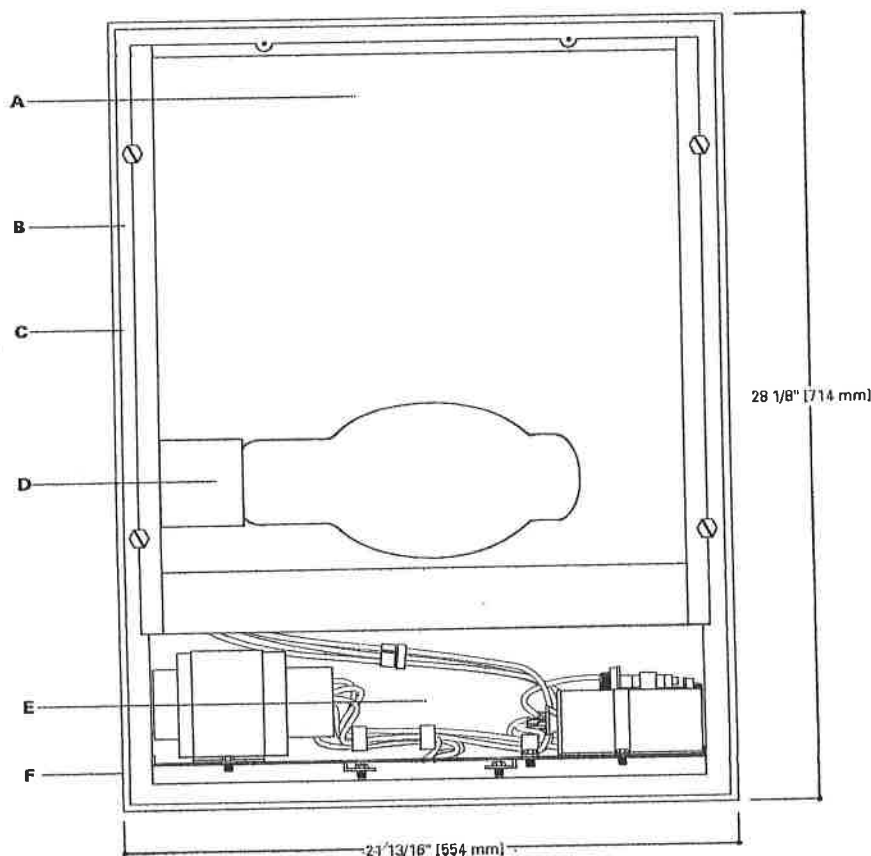
F...Housing

Formed aluminum housing has continuously welded corners and is finished in weather- and abrasion-resistant polyester powder coat.

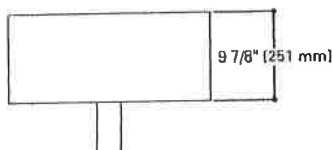


LD LANDAU

320 - 1000 W
High Pressure Sodium
Metal Halide
LARGE AREA LIGHT



FRONT DIMENSION



COOPER LIGHTING

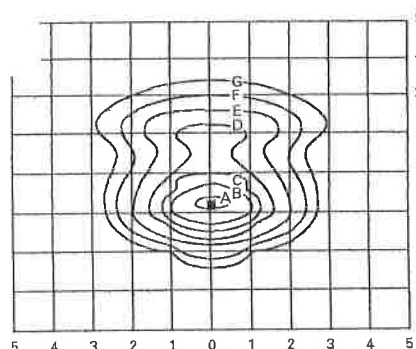
ENERGY DATA

CWA Ballast Input Watts
320W MP HPF (365 Watts)
350W MP HPF (395 Watts)
400W HPS HPF (465 Watts)
400W MP HPF (448 Watts)
400W MH HPF (455 Watts)
600W HPS HPF (665 Watts)
750W MP HPF (850 Watts)
750W HPS HPF (850 Watts)
1000W HPS HPF (1100 Watts)
1000W MH HPF (1085 Watts)

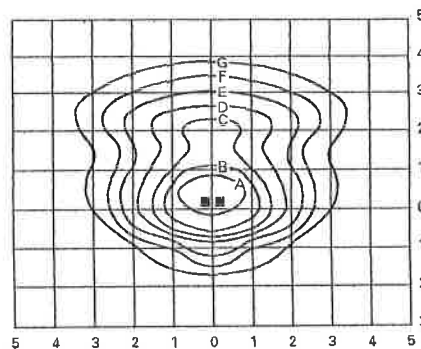
ADH991234



PHOTOMETRICS



MHL-D-FT-1000-MT
1000-Watt MH
107,800-Lumen Clear Lamp



MHL-D-FT-1000-MT (Qty. 2)
1000-Watt MH
107,800-Lumen Clear Lamp

Footcandle Table

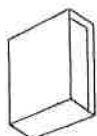
Select mounting height and read across for footcandle values of each isofootcandle line. Distance in units of mounting height.

Mounting Height	Footcandle Values for Isofootcandle Lines						
	A	B	C	D	E	F	G
20'	31.3	15.6	7.81	3.12	1.56	0.78	0.31
25'	20.0	10.0	5.00	2.00	1.00	0.50	0.20
30'	13.9	6.94	3.47	1.39	0.70	0.36	0.14

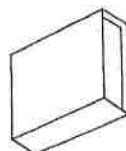
MOUNTING SYSTEMS



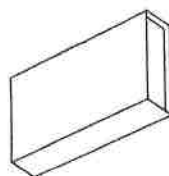
OA1090
Slipfitter for tenon mount 2 3/8" O.D.



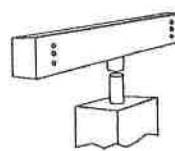
OA1156
6" rectangular arm for square pole



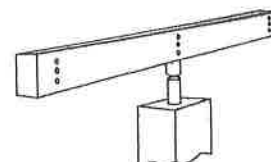
OA1157
12" rectangular arm for square pole



OA1158
18" rectangular arm for square pole



OA1159
Tenon-mounted cross-arm for two units. For 3 1/2" O.D. tenon



OA1160
Tenon-mounted cross-arm for three units. For 3 1/2" O.D. tenon

NOTE: OA1156, OA1157, OA1158 or OA1161 must be ordered for each fixture when ordering OA1159 or OA1160.
Other mounting configurations available. Consult factory.
6" arms (OA1156, OA1167) cannot be used to mount multiple fixtures at 90°.

ORDERING INFORMATION

SAMPLE NUMBER: HPLD-FT-1000-MT

LD				
Lamp Type HP=High Pressure Sodium MH=Metal Halide MP=Pulse Start MH (CWA)* ML=Pulse Start MH (Linear Reactor)*	Distribution FT=Forward Throw 3D=Type III	Voltage* 120V 208V 240V 277V 347V 480V TT=Triple-Tap* MT=Multi-Tap*	Options (add as suffix) PER=NEMA Twistlock Photocontrol Receptacle F1=Single Fuse (120, 277 or 347V) F2=Double Fused (208, 240 or 480V) HS=House Side Shield TGN=Tennis Green	Accessories (order separately) OA1016=Photoelectric Control, 105-285-Volt NEMA Type OA1027=Photoelectric Control, 480-Volt NEMA Type OA1090=Adjustable Slipfitter for 2 3/8" O.D. Vertical Tenon OA1149=Polycarbonate Vandal Shield, Field Installed OA1156=6" Rectangular Arm for Square Pole, .20 EPA OA1157=12" Rectangular Arm for Square Pole, .50 EPA OA1158=18" Rectangular Arm for Square Pole, .70 EPA OA1159=Tenon-mounted Crossarm for Two Units OA1160=Tenon-mounted Crossarm for Three Units OA1161=Direct Crossarm Mounting Set OA1167=6" Rectangular Arm for Round Pole, .20 EPA OA1168=12" Rectangular Arm for Round Pole, .50 EPA OA1169=18" Rectangular Arm for Round Pole, .70 EPA OA1201=Photoelectric Control, 347 Volt NEMA Type LL=Lamp Included
Series LD=Landau				

Catalog Number*	Lamp Type/Base	Lamp Wattage	Ballast Type/Power Factor	Voltage	Distribution	EPA*	Net Wt. (lbs.)	Shipping Volume (cu. ft.)
HPLD-FT-400-MT	HPS/Mogul	400	CWA/HPF	Multi-Tap	Forward Throw	2.5	73	5.0
HPLD-3D-400-MT	HPS/Mogul	400	CWA/HPF	Multi-Tap	Type III	2.5	73	5.0
MHL-D-FT-400-MT	MH/Mogul	400	CWA/HPF	Multi-Tap	Forward Throw	2.5	73	5.0
MHL-D-3D-400-MT	MH/Mogul	400	CWA/HPF	Multi-Tap	Type III	2.5	73	5.0
HPLD-FT-1000-MT	HPS/Mogul	1000	CWA/HPF	Multi-Tap	Forward Throw	2.5	80	5.0
HPLD-3D-1000-MT	HPS/Mogul	1000	CWA/HPF	Multi-Tap	Type III	2.5	80	5.0
MHL-D-FT-1000-MT	MH/Mogul	1000	CWA/HPF	Multi-Tap	Forward Throw	2.5	80	5.0
MHL-D-3D-1000-MT	MH/Mogul	1000	CWA/HPF	Multi-Tap	Type III	2.5	80	5.0

NOTE: *All lamps are mogul-base.

*Pulse Start Metal Halide only.

*Products also available in non-US voltages and 50Hz for international markets. Consult factory for availability and ordering information.

*Multi-Tap ballast is 120/208/240/277V wired 277V. Triple-Tap ballast is 120/277/347V wired 347V. Add desired voltage to end of catalog number.

*EPA rating is for fixture only. Add arm EPA from accessory list above.

*320, 350, 400 & 750W.

*320, 350, & 400W.

*277V only, not available with Q or EM option.

*HPS only.

*HPS & MP only.

NOTE: Specifications and dimensions subject to change without notice.

Visit our web site at www.cooperlighting.com

Customer First Center 1121 Highway 74 South Peachtree City, GA 30269 770.486.4800 FAX 770.486.4801 ADH991234

ARTICLE II

DECLARATION OF COVENANTS, CONDITIONS AND RESTRICTIONS OF GRAY'S STATION COMMERCIAL DISTRICT

THIS DECLARATION, made on the date hereinafter set forth by
GRAY'S STATION hereafter referred to as "Declarant".

WITNESSETH:

WHEREAS, Declarant is the owner of the real property described in
EXHIBIT "A" of this Declaration and desires to create thereon a commercial
development with uses as allowed by the zoning ordinances of the City of Lebanon,
Tennessee, and,

WHEREAS, Declarant desires to provide for the preservation of the
values in said commercial development and, to this end, desires to subject the real
property described in Article I to the covenants, restrictions, easements, hereinafter set
forth; and,

NOW, THEREFORE, the Declarant declares that the real property as
described as the Commercial District parcel attached hereto as Exhibit "A",
is and shall be held, transferred, sold, conveyed and occupied subject to the covenants,
restrictions and easements (sometimes referred to as "Covenants, Conditions and
Restrictions") hereinafter set forth.

SECTION I

DEFINITIONS

The following words, when used herein shall have the following meanings:

1. "Association" shall mean Gray's Station Commercial District Property Owners
Association, a Tennessee non-profit corporation, its successors and assigns, which has, or
will have, as its members all owners of Lots in the Property. (The "Commercial
Property").

2. "Common Area" shall mean all real property (including the improvements
thereto) hereafter conveyed to the association for the common use and benefit of the Lot
Owners. The 100' conservation easement is included in the Common Area

3. "Declaration" in this Article II shall mean the conditions, restrictions,
covenants and conditions set forth in this Article.

4. "Developer" shall mean Gray's Station Commercial District Property Owners Association, its successors and assigns.

5. "Lot" shall mean any parcel or tract of real property subdivided within the Commercial Property (the remaining portion of the Property not subdivided shall collectively constitute a Lot), not including the Common Area.

6. "Lot Owner" shall mean the record owner, whether one or more persons or entities of fee simple title to any Lot, including contract sellers, but not excluding those having such interest merely as security for the performance of an obligation.

7. "Maintenance Plan" shall mean that certain landscaping plan prepared hereafter by CEC, Inc., providing for the landscaping and maintenance for the Common Area, and any and all amendments thereto.

8. "Commercial Property" shall mean the real property described in Exhibit "A" attached hereto and incorporated herein by reference.

9. "Sign" shall mean the sign to be located on the Common Area displaying or designed to display the names of certain Lot Owners, and any or all replacements or additions thereto.

SECTION II

PROPERTY SUBJECT TO DECLARATION AND SUPPLEMENTAL DECLARATION

1. PROPERTY SUBJECT TO THIS DECLARATION. The Developer hereby declares that the Commercial Property shall be held, sold and conveyed subject to the easements, restrictions, covenants and conditions of this Declaration, which are for the purpose of protecting the value and desirability of the Commercial Property and which shall run with the land and be binding on and inure to the benefit of all parties having any right, title or interest in the Commercial Property or any part thereof, and their heirs, devisees, executors, administrators, successors, and assigns.

SECTION III

USE OF COMMON AREA AND SIGN

1. LOT OWNER'S EASEMENTS OF ENJOYMENT. Every Lot Owner shall have a right and easement in and to the Common Area that shall be appurtenant to and shall pass with the title of every Commercial Lot, subject to the right of the Association

to suspend the voting rights and right to use the Common Area for any period during which any assessment against his Commercial Lot remains unpaid.

2. USE OF THE SIGN. Developer, in its discretion, shall install a master sign to identify all Lot Owners of the Commercial Property and, in Developer's sole discretion, may assign Sign display panels to Lot Owners when they purchase their Lots. The number of panels on the sign will be limited. Therefore, no Lot Owner shall have a right to a panel on the Sign, except as assigned in writing in Developer's sole discretion.

SECTION IV

DUTIES OF THE ASSOCIATION

1. MAINTENANCE OF THE COMMON AREA. The Association shall maintain the Common Area in accordance with the Maintenance Plan.

2. MAINTENANCE OF THE SIGN. The Association shall maintain the Sign in good repair and condition.

SECTION V

MEMBERSHIP AND VOTING RIGHTS

1. MEMBERSHIP. Every Lot Owner shall be a member of the Association. Membership shall be appurtenant to and may not be separated from ownership of any Lot which is subject to assessment.

2. VOTING. All Lot Owners, with the exception of the Developer, shall be entitled to one vote for each acre of Property owned. When more than one person or entity holds an interest in any Lot all such persons or entities shall constitute one Lot Owner. Partial acres shall be rounded to the nearest one tenth (1/10th) acre. The vote for such Lot with more than one owner shall be exercised as they may determine, but in no event shall more than one vote per acre be cast with respect to any Lot. The Developer shall be entitled to five (5) votes per acre for each Lot owned; provided, however, that the Developer shall be entitled only to one (1) vote per acre for each Lot owned upon the happening of the following event: When the total votes of the Lot Owners, not counting the votes of the Developer, equal the total votes of the Developer.

SECTION VI

COVENANT FOR MAINTENANCE ASSESSMENTS

1. CREATION OF THE LIEN AND PERSONAL OBLIGATION OF ASSESSMENTS FOR MAINTENANCE OF COMMON AREA. Each Lot Owner, other

than the Developer, by acceptance of a deed therefore, whether or not it shall be so express in such deed, is deemed to covenant and agreed to pay the Association (1) any initial assessment designated by Developer per acre upon the purchase of the Lot, (2) annual assessment or charges, and (3) special assessments for casualty or loss, such assessments to be established and collected as hereinafter provided. The first annual assessment for each Lot Owner will be pro rata and determined by the following formula: The full amount of the annual assessment then due from all Lot Owners multiplied by the fraction created by dividing the number of days from the date the Lot Owner acquired the Lot(s) by 365. The Developer hereby covenants to pay annual and special assessments for each Lot owned. The initial, annual and special assessments, together with interest, costs and reasonable attorney's fees, shall be a charge on the Lot and shall be a continuing lien upon the Lot against which assessment is made from and after the day 30 days from the date the Association gives written notice that same are due and owing if same remains unpaid. Each such assessment, together with interest, costs, and reasonable attorney's fees, shall also be the personal obligation of the person or entity who was the Lot Owner at the time when the assessment fell due. Personal obligation for delinquent assessment shall not pass to a Lot Owner's successors-in-title unless expressly assumed by them.

2. CREATION OF THE LIEN AND PERSONAL OBLIGATIONS OF ASSESSMENTS FOR MAINTENANCE OF THE SIGN. Each Lot Owner, who has its name displayed and maintained on the sign, is deemed to covenant and pay the Association such additional assessments from time to time as are reasonably necessary for the maintenance of the Sign. Such Sign maintenance assessments, together with interest, costs, and reasonable attorney fees, shall be a lien and a personal obligation in the same manner and to the same extent as provided in Section 1.

3. PURPOSE OF ASSESSMENTS. The assessments levied by the Association shall be used exclusively to provide for the landscaping and maintenance of the Common Area in accordance with the Maintenance Plan, the maintenance of the Sign, and to pay any reasonable and necessary administration expenses of the Association.

4. ANNUAL ASSESSMENTS. The Board of Directors of the Association shall fix the annual assessment, which amount shall not exceed the reasonable expense of landscaping and maintaining the Common Area pursuant to the Maintenance Plan, together with reasonable and necessary administration expenses of the Association.

5. SPECIAL ASSESSMENTS. The Board of Directors of the Association may only make special assessments in the event of a loss or casualty with respect to the Common Area; provided, that any such special assessment shall have the consent of two-thirds (2/3) of the vote of the Association members who are voting in person or by proxy at a meeting duly called for a purpose.

6. SIGN ASSESSMENTS. The Board of Directors of the Association shall establish periodic assessments for the maintenance of the Sign in such amounts, as it,

from time to time, reasonably deems necessary to maintain the Sign in good repair and condition. Lot Owners with a panel on the Sign shall be subject to this assessment.

7. NOTICE AND QUORUM FOR ASSOCIATION MEETING PURSUANT TO SECTION 5. Written notice for any meeting called for the purpose of taking any action authorized under Section 5 of the Article V shall be sent to all members not less than 30 days nor more than 60 days in advance of the meeting. At the first such meeting called, the presence of members or of proxies entitled to cast 60% of all votes of the membership shall constitute a quorum. If the required quorum is not present, another meeting may be called subject to the same notice requirement, and a required quorum at the subsequent meeting shall be one-half (1/2) of the required quorum at the proceeding meeting. No such subsequent meeting shall be held more than 60 days following the proceeding meeting.

8. UNIFORM RATE OF ASSESSMENT; PROPORTIONATE RATE OF SIGN ASSESSMENT. Both annual and special assessments must be fixed at a uniform rate per acre for all Lots, based on the acreage in each Lot, and may be collected on a monthly basis. The Sign assessments must be fixed at a rate proportionate to the size of the respective Lot Owner's name display relative to the size of the name display of the other Lot Owners.

9. DATE OF COMMENCEMENT OF ANNUAL ASSESSMENTS DUE DATE. The annual assessments provided for herein shall commence as to the Lots owned by the Developer on the first day of the month following the date hereof. As to Lots purchased by Lot Owners subsequent to the date hereof, the annual assessments shall commence on the first day of the first month following the conveyance of the Lot from the Developer to the Lot Owner. The first annual assessment shall be adjusted according to the number of months remaining in the calendar. The Board of Directors shall fix the amount of the annual assessment against each lot at least 30 days in advance of each annual assessment. Written notice of the annual assessment shall be sent to every Lot Owner subject hereto. The due date shall be established by the Board of Directors. The Association shall, upon demand, and for reasonable charge, furnish a certificate signed by an officer of the Association setting forth whether the assessments on a specified Lot had been paid. The properly executed certificate of the Association as to the status of assessments on a Lot is binding upon the Association as the date of its issuance.

10. EFFECT ON NON-PAYMENT OF ASSESSMENTS; REMEDIES OF THE ASSOCIATION. Any assessment not paid with thirty (30) days after the due date shall be subject to a late charge in the amount established by the Board of Directors and shall bear interest from the due date at the rate of 10% per annum. The Association may bring an action at law against the Lot Owner personally obligated to pay the same, or foreclose the lien against the Lot once said Lien arises, upon giving 30 days prior written notice to said Lot Owner if same remains unpaid. No Lot Owner may waive or otherwise escape liability for the assessments provided for herein by non-use of the Common Area or abandonment of his Lot(s). The Association may remove the name display of any Lot

Owner from the Sign during any period when said Lot Owner is delinquent in the payment of any assessment(s) hereunder.

11. SUBORDINATION OF THE LIEN TO MORTGAGES. The lien of the assessments on any Lot provided for herein shall be subordinate to the lien of any first mortgage now or hereafter placed on the Lot. Sale or transfer of the Lot shall not affect the assessment lien. However, the sale or transfer of any Lot pursuant to mortgage foreclosure or any proceeding in lieu thereof shall extinguish the lien of such assessment as to the payments which became due prior to such sale or transfer. No sale or transfer shall relieve such Lot from any liability for any assessments hereafter becoming due or from the lien thereof.

SECTION VII

INSURANCE AND BONDS

1. INSURANCE. The Association shall keep in force and maintain such liability and other insurance as it shall be reasonably necessary relating to the Common area and the Sign. The Association may also insure any other property, whether real or personal, owned by the Association, against such hazards as may be deemed desirable by the Association. Premiums for all insurance secured by the Association shall be a part of the expenses covered by the annual assessments of the Association.

2. FIDELITY BONDS. Blanket fidelity bonds will be maintained by the Association for all officers, directors, trustees, and employees of the Association handling or responsible for funds of or administered by the Association or any other person handling or responsible for the funds of or administered by the Association. Further, in the event the Association delegates some or all of the responsibility for the handling of funds to a management agent, a blanket fidelity bond will be required for officers, employees, and agents of such management agent handling or responsible for funds of or administer on behalf of, the Association.

The total amount of fidelity bond coverage shall be based upon the best business judgment of the officers of the Association and shall not be less than the estimated maximum of funds, including reserve funds, in the custody of the Association or the management agent, as the case may be, at any given time during the term of each bond. However, in no event may the aggregate amount of such bond be less than the sum equal to three months' aggregate assessment on all Lots plus reserve funds.

All such fidelity bonds shall: (a) name the Association as an obligee; (b) contain waivers by the issuers of the bonds of all defenses based on the exclusion of persons serving without compensation from the definition of "employees" or similar terms or expressions; and (c) shall provide that they may not be cancelled or substantially modified (including cancellation of non-payment of premium) without at least ten (10) days written notice to the Association.

~~Premiums on all such fidelity bonds (except premiums on fidelity bonds~~ maintained by a management agent or its officers, employees, and agents) shall be paid by the Association as a common expense.

SECTION VIII

NOTICES TO MORTGAGEES, ETC.

1. NOTICE. Upon written notice to the Association, identifying the name and address of the holder, insurer, or guarantor of any deed of trust or lien and any property located in the subject development and the lot number or address, any such lien holder or eligible insurer or guarantor shall be entitled to timely written notice of: (a) any condemnation loss or any casualty loss which effects a material portion of the Common Area; (b) any delinquency in the payment of assessments or charges owed by a Lot Owner subject to a first deed of trust lien held, insured or guaranteed by such eligible holder or eligible insurer or guarantor, which remains uncured for a period of sixty (60) days; (c) any lapse, cancellation or material modification of any insurance policy or fidelity bond maintained by the Association; and (d) any proposed action which would require the consent of a specified percentage of deed of trust lien holders.

SECTION IX

Architectural Control, Maintenance and Use Restrictions

1. Architectural Control: Developer shall have sole and complete architectural control as to the design, Style and nature of any structure, dwelling and/or building, fences and other improvements to be constructed and/or design, nature, composition and color of all building materials, square footage, location upon lot, landscaping, fences, driveways and sidewalks, waste disposal facilities, and uniform mailboxes. Commercial development shall be designed as outlined in a) preliminary plat and P.U.D. for Gray's Station (Exhibit "A") and b) conceptual elevations for Gray's Station (Exhibit "B") Such architectural control shall remain vested in Developer until the completion of construction on all lots in the Gray's Station Commercial Development. In the event the ownership interest of Developer in and to Gray's Station Commercial Development should be divested in full prior to the completion of construction on all said lots, the architectural control as hereinabove set out shall pass to and become vested in his successor in ownership as Developer. Upon the completion or original construction on all said lots, the authority for architectural control as hereinabove set out shall survive and thenceforth relate to maintenance, remodeling and reconstruction and such authority shall pass to and become vested in the Gray's Station Commercial District Property Owners Association, Inc.

2. The Developer, the Association, and the individual members of the Association shall not be liable for any act or omission in performing or purporting to perform the functions, duties and responsibilities as indicate approval or disapproval of any lot owner's duly submitted and/or resubmitted, complete plans and specifications within thirty (30) days from the receipt thereof, as evidenced by written acquiescence and all requirements of these Restrictive Covenants shall be deemed to have been fully satisfied or waived as to such individual case. Approval or disapproval by Developer or Association shall not be deemed to constitute any warranty or representation, including without limitation, as to fitness, design, or adequacy of the proposed construction or compliance with applicable statues, codes and regulations. Anything contained in this Article Two or elsewhere to the contrary notwithstanding, Developer and Association are hereby authorized and empowered, at their sole and absolute discretion, respectively, to make and permit reasonable modifications or deviations from any of the requirements of this Declaration relating to the type, kind, quantity or quality of the building materials to be used in the construction of any building or improvement on any lot and of the size and location of any such building improvement when, in their respective sole and final judgment, the grant of such modifications and deviations will be in harmony with existing structures and will not materially detract from the aesthetic appearance of the Property and it's improvements as a whole, provided, however, all such modifications and deviations must remain subject to and in accordance with all applicable ordinances, requirements and regulations as established and promulgated by the Planning Department, Department of Codes Administrations, Fire Department, Health Department and other applicable civil and government authorities of the Wilson County and State of Tennessee.

3. Structural Compliance: All improvements shall be constructed in compliance with the plans and specifications approved by the Developer or the Association. In the event any lot owner should proceed with construction without approval, the Developer or Association may petition a court of competent jurisdiction for an order to cease and desist in such unapproved construction and the lot owner shall be liable for all cost and expenses, including reasonable attorney's fees and court costs which may arise by reason thereof.

4. All buildings shall have masonry foundations with brick, stone, stucco or dryvit to grade. The exterior walls, except a hereinafter specified, shall be a minimum of 100% brick, stone, stone veneer, stucco, or drivit construction.

5. Exterior trim (soffit, fascia, eaves, etc.) shall be of vinyl or aluminum only, in neutral colors only (white, beige, taupe, eggshell) unless otherwise approved in writing by the Architectural Committee.

6. The Architectural Committee reserves the right to allow wood or other synthetic material in dormers, bay windows, box windows or other similar areas.

7. All roofing materials are to be tri-dimensional minimum 25 year shingle in the colors of black, gray or weatherwood, unless otherwise approved in writing by the Architectural Committee.

8. Landscaping and lawn care for Gray's Station will be contracted annually by the Gray's Station Homeowner's Association.

9. Setback Line Restrictions: No building or structure, or any part thereof, **may be located on any lot nearer to the front, side or rear property lines than the** minimum building setback lines set forth on the plan of record or as required by local authorities.

10. Storage Tanks and Refusal Disposal: No exposed ground tanks or receptacles shall be permitted for the storage of fuel, water or any substance, except for garbage and refuse resulting from normal daily use and of a nature which is satisfactory for pickup by the City of Lebanon contractor employed by the Developer or the Gray's Station Association, Inc. All garbage and refuse receptacles shall be concealed from view of roads, streets, open areas, and subject to architectural control as set forth herein. No incinerators shall be permitted.

11. Sidewalks: (a) Public sidewalks, located within applicable easements or rights of way as set forth on the plan of record shall be constructed in accordance with the specifications as set forth by the Developer.

12. Utilities: All utilities, together with such cables, wires, pipes, conduits, as may be appurtenant thereto, shall be underground.

3. LOT RESTRICTIONS. Any structure constructed upon the property shall be subject to these additional restrictions:

(1) no portion of any building shall exceed fifty (50) feet in height, (2) the gross floor area of any building constructed on a Lot shall not exceed the maximum gross floor area which can be built in compliance with applicable rules, regulations, ordinances, and **laws after taking into consideration the parking required hereunder to be maintained** within the boundaries of such Lot; (3) the design of any buildings or other improvements on any Lot shall be architecturally compatible with the other structures in the Commercial Property as approved by the Architectural Control Committee. No chain link fence will be allowed. All fencing shall be made of wood or masonry material.

4. PARKING AREAS. Each Lot shall be required to comply with the Lebanon Zoning Ordinances in relation to parking space requirements.

5. GENERAL MAINTENANCE AND APPEARANCE. Each Lot Owner shall have the following obligations with respect to its Lot.

(a) To keep and maintain, or cause to be kept and maintained, all buildings, signs and improvements on its parcel in good order and condition and state of repair, at its own expense (but it may recover part or all of its expenses from its tenants), including (but without limitation) keeping all sidewalks, walkways, roadways and parking surfaces clean and free from rubbish, dirt, ashes, garbage, excelsior, straw and refuse by cleaning, sweeping and policing such areas on a regular basis and to maintain all drainage basins and retention areas located on its Lot;

(b) To remove promptly, or cause to be removed promptly, to the extent reasonably practical, snow, ice and surface water and to promptly repair cave-ins, repair areas where pools of water collect and repair other impediments;

(c) To keep, or cause to be kept, all marking and directional signs in the parking areas or in traffic areas distinct and legible,

(d) To resurface, replace, or repair and re-stripe and paint as needed the parking areas, lanes, driveways, access drives, spaces, traffic directional indicators and signs, and curbs and walkway ramps so that all driveways, parking areas and sidewalks are level and smooth and evenly surfaced free from settling, chuckholes, fissures and cracks;

(e) To care for, or cause to be cared for, all landscaped areas.

6. SIGNS. All signage on any Lot shall comply with the requirements of the City of Lebanon Zoning Ordinance. All signage shall be professional and shall be limited to one sign per tenant of retail space on the building on each Lot and one sign, per building for professional office use, if permitted by the City of Lebanon Zoning Ordinance. All signage shall be approved in accordance with item 1, in this Section.

SECTION X

EASEMENTS

1. ACCESS/INGRESS/EGRESS EASEMENTS. The Developer shall grant and establish for the benefit of the Lot Owners, their respective employees, agents, contractors, customers, visitors, licensees, concessionaires, tenants, successors and assigns, a perpetual non-exclusive easement for access, ingress and egress for pedestrian and vehicular traffic in common with all other parties having a like right over those driveways, roadways and entrances. The Developer agrees to construct and install the access drives upon the property as shown on the Gray's Station Site Plan and install or authorize the installation of, curb cuts between the Lots for the purposes of implementing the easements herein granted.

The owners of the Lots shall mutually agree upon the reasonable rules and regulations with respect to the traffic flow between the Lots.

2. UTILITY EASEMENTS. The Developer shall grant and establish for the benefit of the Lot Owners, their successors and assigns, a non-exclusive right and easement to install, maintain, repair and replace utility facilities, such as water, gas, electric and telephone lines and storm and sanitary sewers (individually a "Utility Facility" or collectively the "Utility Facilities") under, upon and over the portion of the Developer's Property, at such place as shall be designated on the recorded plat. After such Utility Facilities have been installed, the owner of any lot served by such Utility Facility shall have the right, upon sixty (60) days prior written notice, at any time or from time to time, to move and relocate such Utility Facilities to such place as shall be approved by the owner of the lot upon which such Utility Facilities have been installed; provided, however, that such relocations shall be made at the sole cost and expense of the party giving such notice and in the event it is necessary to enter upon another lot, then and in that event, the foregoing approvals and consents must first be obtained and such entry shall be peaceable and during reasonable hours, taking into account the use of such lot at the particular time and shall not unreasonably interfere with the operation of business thereon. All improvements located on such lot shall be restored to their condition immediately prior to the commencement of work in connection with said easement.

Except for any existing above-ground utility line, all Utility Facilities including lines, systems and facilities shall be underground, except when required to be otherwise placed by a utility company which furnishes such Utility Facility and, in any event, such utility lines shall be located as close as reasonably possible along and adjacent to the boundary line of any part of the Lot Owner's abutting a public street, unless otherwise specified or required by the applicable utility authority, and shall not be located under any building or structure erected on any part of the Lot Owner's Lot. All layouts, construction, installation, maintenance, repair, reconstruction and removal of such lines, systems and facilities shall be at the cost and expense of the owner of the dominant parcel ("Grantee"). Grantee shall, at its cost, obtain all necessary consents and permits as may be required for such work by any utility authority and by all other state, county and municipal authorities having jurisdiction.

3. CONSTRUCTION EASEMENTS. The Developer shall grant and establish for the benefit of the Lot Owners, their successors and assigns such temporary easements on, over and across and under their respective tracts of land as may be reasonable necessary for installing, constructing, repairing, maintaining, relocating and removing any and all Improvements contemplated by this Declaration if such installation, construction, repairs, maintenance, relocation or removal is required or permitted hereunder, provided such work is to be done at the reasonable convenience of Grantor as agreed in writing between such owner in advance, except in the case of an emergency, in which case Grantee shall give Grantor such notice as is reasonably practical. Each Grantee of an easement

granted hereunder shall hold Grantor harmless from all loss, liability, cost or expense incurred in connection with Grantee's exercise of said easement rights.

SECTION XI,

GENERAL PROVISIONS

1. INDEMNIFICATION. Each lot owner ("Indemnitor") shall indemnify, defend and hold harmless the other Lot owners ("Indemnitees") against all claims, demands, causes of action, costs, expenses (including reasonable attorney's fees) losses, damages, injuries and other liabilities arising from the death of or any accident, occurrence, injury, loss, or damage whatsoever caused to any natural person or to the property of any person or entity as shall occur in or about the Lot owned by the Indemnitor, or, to the extent such death, accident, occurrence, injury, loss or damage is caused by the negligent or willful acts or omissions of the employees, officers, servants, agents or contractors of the Indemnitor anywhere within the Owner's Property, from and after the Effective Date hereof, except to the extent such claims arise from any willful or negligent act or omission of an Indemnatee or its employees, servants, agents or contractors. The Indemnitees hereunder shall give the indemnitor notice of any suit or proceeding arising from any of the items for which it is entitled to indemnification as hereinabove provided after an Indemnatee receives such suit or proceeding, and the Indemnitor shall have the obligation to defend the Indemnitees in the suit or proceeding.

2. ENFORCEMENT. The Association, or any Lot Owner, shall have the right to enforce, by any proceeding at law or in equity, all restrictions, conditions, covenants, reservation liens and charges now or hereafter imposed by the provisions of this Declaration. Failure by the Association or any Lot Owner to enforce any covenant or any restriction herein contained shall in no event be deemed a waiver of the right to do so thereafter.

3. SEVERABILITY. Invalidity of any one of these covenants or restrictions by judgment or court order shall in no wise effect any other provision which shall remain in full force and effect.

4. AMENDMENT. The covenants and restrictions of this Declaration shall run and bind the land, for a term of thirty (30) years from the date of this Declaration as recorded after which time there shall be automatically extended for successive periods of ten (10) years unless an instrument signed by a majority of those then owning the Lots has been recorded prior to the expiration of said thirty (30) year period or any said ten (10) year period, as the case may be, agreeing to terminate said covenants or to modify said covenants in whole or in part for the next ten (10) year period. This Declaration may be amended during the first thirty (30) year period by an instrument signed by not less than ninety percent (90%) of all of the votes of the Lot Owners, and thereafter by an instrument signed by not less than seventy-five percent (75%) of all of the votes of the Lot Owners.

Provided, however, no amendment shall be effective during the initial ten (10) years of the term of these Declarations under Article II unless approved by the City of Lebanon Commission. Any and all amendments must be recorded.

Exhibit "A": Preliminary Plat and P.U.D. for Gray's Station
Prepared by: The Lane Company, Inc.
3250 Old Murfreesboro Road
Lebanon, TN 37090

Dated: 03/27/07
Revisions: 05/03/07
06/11/07

Exhibit "B": Conceptual Elevations
Gray's Station Development
Drawing A1.0
Prepared by: Whitehead & Oakley & Dunlap & Bumpas
240 Mayfield Drive
Suite 201
Smyrna, TN 37167

Dated: May 2007

105-C Cedarwood Drive
Lebanon, TN 37087

STOCKTON

Phone: 615.444.1773 • Fax: 615.444.6225
www.stocktonbuilding.com

BUILDING CORPORATION
General Contractor

May 10, 2007

Mrs. Maggie Tilton
City of Lebanon Planning
200 Castle Heights Avenue North
Lebanon, TN 37087

RE: Rezoning and Subdivision of the Witt Property

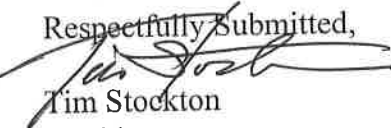
Maggie,

I have submitted for rezoning and subdivision of the Witt Property which is located on West Main Street between Snow White Drive In and Geer's Place. This is to inform you of the parties that are involved in the engineering and selling of this property:

- Engineer: Randy Laine, The Laine Company
- Architect: Wayne Oakley, Whitehead+Oakley+Dunlap+Bumpas
- Seller's Agent: Anita Tate, West Main Realty
- Buyer's Agent: John Hill, Cumberland Real Estate

If you need any further information please let me know.

Respectfully Submitted,



Tim Stockton
President

P. O. Drawer 784
Lebanon, Tn. 37088-0784
Telephone 615-444-3898
Fax 615-444-3980
wittsign@wittsign.com



April 19, 2007

Will Hager, Planner
Members of the Lebanon Municipal Planning Commission
City of Lebanon
200 Castle Heights Avenue North
Suite 300
Lebanon, TN 37087

Dear Mr. Hager and Members of the Lebanon Planning Commission:

I am writing to relate that I and my sister, Kay Sanders, support Mr. Tim Stockton's efforts to develop the property adjacent to the Snow White Drive-In Restaurant.

I have furnished signage for several developments where Mr. Stockton was the general contractor. He has always been fair to deal with, his work has been with quality and I have always found him to do exactly what he said he will do. I have no doubt that he will continue this same business practice with the "Witt Property".

Kay and I do not have plans to develop this land so I am glad we found someone such as Mr. Stockton that will develop it in a manner that will benefit the neighborhood in particular and our community overall.

Best personal regards.

Yours very truly,

Russell H. Witt
President
Witt Sign Co., Inc.

cc: Kay Sanders
Tim Stockton
Anita Tate
John Hill
Mayor Don Fox
Members of the Lebanon City Council

***Proposed Geer's Reserve Development
Preliminary Geotechnical Investigation
Lebanon, Tennessee
GDG Project No. 07092***

Prepared by:



GEOSCIENCES DESIGN GROUP
a **TTL** company

447 Metroplex Drive
Nashville, TN 37211
Phone: (615) 331-7770
Fax: (615) 331-7771

Report
of
Preliminary Geotechnical Investigation

GDG Project No. 07092

June 11, 2007

Proposed Geer's Reserve Development
Lebanon, Tennessee





June 11, 2007

Mr. Tim Stockton
Stockton Building Corporation
P.O. Box 2459
105-C Cedarwood Drive
Lebanon, Tennessee 37087

**Re: *Preliminary Geotechnical Investigation
Proposed Geers Reserve Development
Highway 70
Lebanon, Tennessee
GDG Project No. 07092***

Gentlemen:

Geosciences Design Group has completed a preliminary geotechnical investigation for the above referenced project and herewith presents the data along with our preliminary comments and recommendations. The purposes of this study are to obtain information regarding subsurface conditions within the proposed construction areas. A particular consideration is the presence of sinkholes, and this study is intended to provide information regarding observed geologic hazards and general recommendations for remedial treatments.

The scope of this geotechnical study does not address any environmental aspects of the project. Consequently, this report does not include any information regarding the presence or absence of toxic or hazardous substances.

DESIGN CONSIDERATIONS

The project is in its preliminary stages; however, based on site design drawings prepared by The Laine Company, we understand that the development will consist of residential and commercial structures and supporting infrastructure. Specifically, the southern portion of the planned developed will consist of individual, single-family residential lots. The northern portion of the site will be developed with 1 & 2-story commercial type buildings and associated parking and drive areas. Each area of new development will be situated along a new cul-de-sac extending into the property from adjacent, existing roadways. However, the project is in a very preliminary stage of planning and street locations and lot configurations have not been finalized. We assume that single-family residential structures will be limited to lightly-loaded, wood-framed, with either framed floors or concrete slabs-on-grade. Based on the provided drawings, we understand that the commercial type buildings will range from 3,500 to 10,500 square feet in plan area and are expected to be constructed of either masonry load-bearing walls or steel framing with various types of veneer.

The data developed during this study, our experience within similar geologic settings and the preceding design considerations have been used as a basis for formulating our comments and recommendations. Changes in the proposed development plans for the area may introduce other factors that could influence our assessment and will necessitate our review of the

recommendations that follow. Upon the determination of the final plans, a more thorough geotechnical investigation should be performed to aid in the design of foundation elements and pavements.

EXPLORATION AND TESTING

The subsurface exploration was conducted by utilizing a track mounted backhoe to excavate 20 test pits strategically located across the site. The test pits were roughly located in the field and their approximate locations are shown on the appended Plan. Most of the test pits were excavated as trenches in an effort to expose the bedrock surface across suspected alignments of fracture trends (joints) in the bedrock. Other test pits were located adjacent to obvious sinkholes in order to determine the thickness and consistency of soils in the vicinity of visible karst features and/or randomly throughout the site to assess the general overburden characteristics. Fourteen (14) test pit excavations were advanced to refusal, presumably on the bedrock surface, and the remaining six (6) test pits were terminated within the soil overburden or weathered rock. The soil profile was visually classified as to probable origin and type, and a member of our professional staff logged the bedrock and subsurface conditions exposed by the test pits in the field. Upon completion, the excavations were monitored for the presence of ground water and were subsequently loosely backfilled with the excavated soils.

Soil descriptions are shown on the individual test pit logs contained in the appendix. Selected soil samples were subjected to laboratory testing in order to determine fundamental engineering characteristics. Specifically, tests included determination of the soil's Atterberg limits and natural moisture content; test results are appended. Soil samples not consumed by laboratory testing will remain stored at our Nashville office for 30 days and may then be discarded, unless we are directed otherwise.

SITE CONDITIONS

The proposed development site consists of approximately 13.3± acres of vacant, wooded land with about 600 feet of road frontage on the south side of West Main Street (U.S. Highway 70) in Lebanon, Wilson County, Tennessee. The northwest corner of the site is approximately 405 feet east of the intersection of Geers Court and West Main Street and the site is adjacent to the east of the existing Geers Place residential subdivision. The property contains numerous large to medium-sized hardwood trees with variably thick, mixed undergrowth that suggests that portions of the property were cleared 10 to 20 years ago. Numerous outcrops of bedrock occur throughout upland areas and are roughly located on the "Test Pit Plan". Across the site, the ground surface is undulating and, according to a topographic survey provided to us, there is as much as 35 to 40 feet of topographic relief across the site.

A total of nineteen (19) closed topographic depressions, identified as Sinkholes #1 - #19 on the Site Plan, exist on the property. Many of the sinkholes were observed to contain various items such as construction debris (concrete slabs, bricks, concrete pipes, metal siding, etc.), timbers, wire fencing, scrap metal, tires, general household debris, and other items. Each closed depression was visually examined and determined to be a sinkhole. The size of the features, at the ground surface, varies from 15± feet in diameter and 2 to 3 feet in depth to more than 150±



feet in diameter (within the uppermost closed contour) and 20± feet in depth, such as Sinkhole #14.

At the time of our field reconnaissance, only one of the sinkholes (Sinkhole #19) was observed to contain surface water. Consequently, drainage in the topographically lower area identified as Sinkhole #19 is judged to be poor. Across the balance of the site and at the remaining 18 sinkhole locations, surface water drainage is judged to be fair to good. Based on our visual assessment of the site and the topographic survey, all of the site drainage is internal with respect to surface water leaving the site.

SUBSURFACE CONDITIONS

Overall, the generalized soil profile includes an indistinct zone of topsoil, humus and roots that is often mixed with weathered rock and residual clay. At most of the locations explored, the organic content of the soil extends several feet in depth owing to numerous tree roots and thicker than average accumulations of topsoil within the topographic depressions. Beneath the topsoil, the excavations encountered mixed residual clay and loose slabs and fragments of weathered rock. Eighteen (18) of the test pits were excavated sufficiently to expose the weathered bedrock surface across most, if not all, of the bottom of the excavation. The remaining two (2) test pits, TP-12 & TP-13, were terminated within the soil overburden. Total overburden thickness at the locations explored ranges from less than one foot to in excess of 20 feet. This range in soil thickness reflects the extreme irregularity of the weathered bedrock surface, which is typical of karst areas.

In order to provide a more detailed description of the subsurface conditions across the area studied, we have separated the site into 2 distinct areas: upland areas and topographically depressed areas, referred to as Sinkholes #1 - #19.

Upland Areas

Upland areas consist of the topographically higher ridges and crests situated between and/or around the closed depressions sinkholes. At the eleven (11) test pit locations explored within the upland areas, the generalized soil profile includes a surface interval of topsoil ranging from 0.2 to 2.0 feet in thickness; averaging 0.7 feet. Test pit TP-3 was located across the natural drainage area and revealed a topsoil thickness of 2 feet and test pit TP-19 revealed a soil profile of organic rich topsoil directly overlying bedrock. Beneath the topsoil layer, residual soils consisting of light reddish-brown to tan and dark, dark yellowish-brown, variably silty, clays (CL and CH) varying in thickness from less than a foot to more 19.5 feet were encountered.

Nine of the eleven test pits located within the upland areas encountered refusal, presumably on the rock surface, at depths ranging from 1.0 feet below existing ground (TP-19) to 7.8 feet below existing ground (TP-5), indicating an irregular bedrock surface. The remaining 2 test pits (TP-12 & TP-13) were terminated in the soil overburden at depths of 20 to 16.5 feet below existing ground without encountering the bedrock surface. The *average* overburden thickness across the site is about 8 feet however, if test pits TP-12 and TP-13 are excluded due to their uncommon overburden thickness for the



Lebanon area, the average overburden thickness is 4.4 feet. As previously discussed, numerous outcrops of bedrock occur throughout upland areas.

Upon completion of these eleven (11) test pits, each test pit was dry. The true groundwater table is likely well below the depths explored as is typical within this geologic setting. However, isolated intervals of “perched” or “trapped” water inflow can be expected, particularly near or at the soil/bedrock interface.

Topographically Depressed Areas

During our study, we advanced a test pit across the topographically lower region of the respective feature that was suspected to be the “throat(s)” within Sinkholes #3, #5, #6, #7, #8, #9, #12, #16, and #18, which are discussed separately in the following text. Overall, the sinkholes revealed thicker intervals of topsoil and soft, organic laden clays extending to the bedrock surface and all of the test pits revealed either a soil-fill, enlarged joint(s) and/or opening cavities within the underlying bedrock system. In addition, several of the test pits encountered surficial intervals of miscellaneous fill materials.

Sinkhole #3 – Prior to exploration, sinkhole #3 was estimated to be about 20 feet in diameter and situated in the central portion of a larger, closed depression area that has resulted from erosion and subsidence into sinkhole #3. Test pit TP-9 revealed a surficial interval of topsoil about 4 feet thick underlain by approximately 4 feet of brown, silty clay with organics and limestone boulders to an average depth of about 8 feet below ground surface at the base of the depression. The test pit was advanced adjacent to the east of a limestone outcrop, which revealed a continuous ledge extending greater than 14 feet deep. Along the east, north, and south sides of the test pit, a limestone shelf was encountered at about 8 feet and in the central portion of the excavation, a soil-filled throat, or opening in the bedrock, was observed. The soil-filled throat was estimated to be about 6 feet in diameter and was advanced to about 14 feet bgs before encountering equipment refusal (bucket size was larger than the bedrock opening). At approximately 12 feet in depth, several bricks were encountered within the soils excavated from the soil-filled throat.

Sinkhole #5 – Test pit TP-10 was advanced at sinkhole #5. At the ground surface, sinkhole #5 appeared as a small dropout measuring less than 6 feet in diameter with an open throat. The open throat measured about 18 inches in depth and was situated adjacent to a limestone ledge. Miscellaneous fill materials were observed on the surface within and around the limits of sinkhole #5. During excavation, about 8.0 feet of topsoil, dislodge limestone boulders, and miscellaneous debris was removed. A limestone ledge was exposed along the southern margins of the test pit, which measured about 30 feet in length and extended to a depth of about 7.5 feet. At 7.5 feet, a soil-filled joint was noted to extend southward beneath the limestone ledge. At the south end of the test pit, which was about 50 feet to the west of sinkhole #6, a north-south oriented limestone ledge was encountered. Along the northern margins of the test pit, weathered limestone ledges were revealed at depths varying from 5 to 7 feet. Across the bottom of the excavation, about 05. foot of soft, weathered, slabby limestone was excavated prior to encountering a

continuous limestone surface. A trace amount of water inflow was noted within the slabby, weathered limestone near refusal depth.

Sinkhole #6 – At sinkhole #6, a small surficial depression was observed and estimated to be about 4 feet in diameter and 2 feet deep. The depression was partially filled with miscellaneous debris and no apparent throat was identified. Test pit TP-1 encountered a surficial interval of topsoil and debris to about 3.5 feet bgs underlain by weathered slabby limestone and topsoil to about 7 feet. Several open throats were noted within this zone and at 7 feet, a soil-filled throat was revealed. The throat was revealed to be an irregular shape that tapered to less than 12 inches in width at the northeast and southwest ends and approached 5 feet in width at its widest point. The entire length of the exposed throat was estimated to be about 15 feet in length. Within the throat, which was saturated, topsoil, debris, and organics were encountered to equipment refusal of about 12 feet bgs.

Sinkhole #7 – The surface depression at sinkhole #7 was an “L”-shaped feature that was partially filled with construction rubble, carpet, tires, shingles, metal siding, household trash, and numerous other items, including a rabid raccoon that charged George the intern. Bedrock outcrops were observed at the south end of the sinkhole #7. Test pit TP-4 encountered various fill materials, topsoil, and brown, silty clay to a depth of about 5 feet within sinkhole #7. An enlarged, soil-filled joint was exposed at the southern end of the test pit and trended in a northeast-southwest orientation. The enlarged joint was measured to be about 5 feet in width and tapered to less than 2 feet in width before encountering equipment refusal at a depth of 9 feet bgs. The exposed portion of the enlarged joint extended northeastward from a limestone ledge at the south end of the test pit, which extended from the ground surface to 9+ feet, for about 10 to 12 feet. Upon encountering equipment refusal, the excavation was observed to be dry.

Sinkhole #8 – Sinkhole #8 is situated within a larger closed depression that also includes sinkhole #15. At sinkhole #8, the smaller depression area was estimated to be about 10 to 12 feet in diameter and 4 feet deep with no apparent throat. The western and northern margins of the depressed area consisted of exposed limestone ledges, or shelves. Some construction rubble and other debris was observed within the limits of sinkhole #8. Test pit TP=18 was located within sinkhole #8 that revealed topsoil and detached, slabby limestone to a depth of about 6.5 feet. Along the southern side of the test pit, a 12-inch thick limestone slab was observed to extend across a zone of topsoil and roots, which is assumed to be “cap rock” over a possible bedrock opening situated between sinkhole #8 and #15, which will require verification during planned repairs.

Sinkhole #9 – At sinkhole #9, the feature exhibited a surface depression estimated to be about 20 feet in diameter and as much as 10 feet deep with several bedrock outcrops along the southern and western slopes. The bottom of the depression was noted to consist of soil and leaf-litter and no apparent throats. Test pit TP-11 was advanced within the limits of sinkhole #9, revealing a surficial interval of topsoil to about 2 feet. At a depth of about 2 feet, an interval of large, detached, limestone boulders interbedded with topsoil and light reddish-brown, silty clay was encountered to about 8 feet. At 8 feet, a 2 to 3 foot diameter, open throat was exposed. A metal tape measure was extended about 18



feet into the open throat before encountering resistance. The excavation was extended to a total depth of about 15 feet prior to termination due to unstable sidewalls and the extent of the excavation equipment. Upon termination, no indication of water inflow was observed.

Sinkhole #12 – Sinkhole #12 was explored due to its planned use as an injection well. At the base of the large closed depression that contains sinkhole #12, an open throat measuring about 18 inches in diameter was observed. Along the southern side of the sinkhole, a limestone ledge was observed and extended upwards from the bottom of the depression about 8 to 10 feet in height. As test pit TP-6 was advanced at the location of the “throat”, approximately 8 feet of topsoil and detached limestone slabs was encountered. From 8 to 10 feet, weathered, slabby limestone was encountered prior to exposing a 2-foot diameter and 1-foot diameter open throats that extended more than 5 feet into the bedrock system. Both throats were encountered along the southern side of the test pit, adjacent to the limestone ledge observed at the ground surface, and appeared to trend southwestward beneath the limestone ledge. No water was encountered upon termination of test pit TP-6 at a total depth of 10 feet.

Sinkhole #16 – At sinkhole #16, numerous piles of construction rubble and other miscellaneous debris was observed around the perimeter and within the limits of the closed depression. Along the northern and western margins of the sinkhole, numerous piles of concrete slabs were observed and created a steep drop-off into the base of the closed depression. The closed depression was estimated to be about 35 to 40 feet in diameter and as much as 10 to 12 feet deep. Test pit TP-15 was advanced within the bottom of Sinkhole #16 and revealed about 8 to 10 feet of topsoil and miscellaneous fill (brick, concrete, wire fencing, timbers, steel pipes, scrap metal, shingles, household trash, etc.). Beneath this surficial interval, topsoil and brown silty clay with trace amounts of miscellaneous fill and occasional detached, slabby limestone boulders were encountered to a depth of 19 feet. At a depth of about 14 feet, a 5 to 6 foot diameter open cavity was exposed along the northeastern sidewall of the test pit that extended towards the northeast beneath a limestone ledge. It should be noted that the sidewalls of the excavation pit were very unstable and measurements were roughly estimated. Test pit TP-15 was terminated at a depth of 19 feet within a mixture of topsoil, brown silty clay, and weathered limestone. Upon termination, test pit TP-15 was noted to be dry.

Sinkhole #18 – Sinkhole #18 is situated at the northern end of an elongated, closed depression feature. Across the floor of the closed depression, the ground surface generally slopes downward towards the northeast and drains into Sinkhole #18. Based on our field observations at sinkhole #18, some apparent flooding occurs based on water lines of surrounding trees and the amount of sticks and other litter on the ground surface. Test pit TP-16 was located at the area of sinkhole #18 judged to be the apparent throat and revealed a surficial interval of topsoil and miscellaneous debris (tires, concrete slabs, tree root bulbs, brick, and other general trash) to a depth of about 4 feet. From 4 to 8 feet, the overburden consisted of topsoil and brown silty clay. At about 8 feet, weathered, slabby limestone was encountered and at a 12 feet, an open throat was exposed along the



eastern side of the test pit, about 20 to 25 feet off the eastern property boundary. A metal tape measure was extended down into the opening approximately 7 to 8 feet before encountering resistance. Test pit TP-12 was terminated at a depth of 12 feet and was dry upon completion.

Based on our experience in the area, perched water is likely to accumulate near the soil/bedrock interface and within discontinuities in the bedrock system at times following periods of precipitation. Many of the cavities detected in the bedrock probably serve as conduits for subsurface drainage and may, at times, be filled with water. The routing and interconnection of such subsurface drainage conduits is often complex and unpredictable. Consequently, some water inflows should be expected if excavations are extended into bedrock during or following periods of wet weather. The true ground water table is expected to be below the depths of the exploration.

Based on published geologic data, the subject site is situated near the geologic contact between Ordovician-aged limestone of the Carters and Lebanon formations. Stratigraphically, the Carters Limestone overlies the Lebanon Limestone. The Carters formation is typically a light to medium gray, thinly to very thickly-bedded, shaley, relatively "pure" limestone and weathers to form deep joints and an irregular bedrock surface with a relatively thin, soil overburden, generally less than 5 feet thick. Naturally derived, in-situ soils commonly associated with the Carters Limestone consists primarily of brown clays that may have a moderate to high plasticity. The limestone of the Carters formation is highly susceptible to solution weathering, which is responsible for the development of caves and sinkholes. Based on our visual observations of bedrock outcrops across the site, it appears that most of the shallow bedrock at the site consists of the Carters limestone. During excavation activities, many of the test pits revealed weathered, slabby limestone of the Lebanon formation at depths ranging from 5 to 8 feet, which generally matches the elevation of the contact zone between the Carters and Lebanon formations near 550 MSL according to the published geologic map of the Lebanon, Tennessee quadrangle. The Lebanon limestone generally occurs as a thin to medium bedded, gray limestone that develops sparse intervals of highly plastic residual soil. The limestone of the Lebanon formation is not typically considered highly susceptible to karst features, although solution weathering of the bedrock along enlarged joints and bedding planes can form surface depressions that usually appear as well-defined crevices between exposed ledges of bedrock.

In any event, the solution weathering process is responsible for the development of caves and sinkholes within carbonate bedrock systems. Being composed of calcium carbonate, limestone bedrock undergoes chemical degradation when it is exposed to ground water that has become slightly acidic due to contact with organic soils. The weathering processes are most active along enlarged, pre-existing, essentially vertical, fracture traces (joints) which typically transect the bedrock surface in crisscrossing patterns. The tendency for karst activity to follow pre-existing weaknesses in the rock explains the common development of linear trends evident within and among the visible karst features. Sinkholes often develop along such linear trends, and where two alignments intersect the intensity of karst development is often accentuated. These observable patterns of sinkhole development and the tendencies for karst activity to be in part controlled by the structure of the bedrock allow us some insight as to which



areas of a property might be at greater risk for new sinkholes to appear at the surface. Specifically, areas between and along the linear trends of existing sinkholes are viewed as having greater risk. Nevertheless, the present state-of-the-art of geotechnical engineering does not permit accurate prediction of when or where sinkholes will occur, and essentially any area underlain by soluble limestone is subject to some inherent risk associated with the possibility of ground subsidence due to karst activity. Accordingly, based on the regional geology, together with the results of the subsurface exploration and considering that active sinkholes currently exist on the property, it is our opinion that all of the proposed development area is subject to at least a moderate degree of sinkhole related risk. The risk is considered greater for certain portions of the site located around and between existing sinkholes.

PRELIMINARY COMMENTS AND RECOMMENDATIONS

General

The property is subject to limitations imposed by existing sinkholes and to the risks inherent with construction in a karst area. Nevertheless, it is our opinion that the majority of the subject property can be suitably developed provided prudent engineering and construction practices are employed. To assist in the planning process and to help guide the layout of the development, we have determined that several portions of the property have a “high-risk” based on our understanding of the geologic setting and the results of the subsurface exploration and are considered to be “No-Build” areas. The appended plan illustrates these “High-Risk” zones that we have identified based on our interpretation of the data. Boundaries of the zones are not firmly fixed and the information is intended only as a guide based on the limited data and these areas are considered to be at high risk for future ground subsidence related to sinkhole development; and we recommend that the development plans avoid (or at least minimize) development in these high-risk areas.

In our opinion, the balance of the site is assessed as having moderately-high risk and will require special precautions for site grading and foundation construction. Because of the dearth of soil and the presence of significant karst features, site preparation and foundation construction will vary across the majority of the site. Additionally, substantial subgrade remedial treatment will be required to mitigate risks associated with the possibility of ground subsidence due to the presence of open and clay-filled cavities within the subsurface.

With respect to this site, it is worthwhile to note that the risks related to ground subsidence and loss of foundation support in karst areas is primarily concerned with the potential for soil to collapse or gradually erode into cavities in the bedrock. Much less concern is associated with the stability of the bedrock, and it is rare for structures to be affected by the collapse of bedrock caverns. Consequently, in areas where sinkholes present greater than average risks of ground subsidence, structures supported by rock-bearing foundations are much less likely to be adversely affected by karst activity. Nevertheless, it is prudent practice and we recommend that, to the degree possible, building locations be established to avoid construction above known sinkholes.



Current and future property owners should be informed of the risks associated with construction in karst areas and they should be made aware of the inability of engineers or geologists to predict with **any certainty where or when future sinkholes may develop.**

Karst Considerations

During the course of site grading, additional sinkholes may likely be uncovered or otherwise identified as needing remedial treatment. Based on the area geology and our field observations that identified surficial open throats and soil-filled throats in the bedrock surface within the explored karst features and test holes, we expect that remedial repairs of the features will not be laterally extensive. Remedial treatments must provide for long-term structural integrity of the site improvements and must consider the implications of altering site drainage by filling or modifying existing sinkholes. Exposed sinkholes and where incipient sinkholes are detected, remedial treatment should be performed under the direction of our geotechnical engineer who **will provide recommendations based on inspection of the actual conditions encountered during site activities.**

Additionally, precautions need to be taken to mitigate site conditions that would promote sinkhole development and eventual ground subsidence. To reduce the level of sinkhole related risk, the following engineering practices should be employed:

- Control storm water drainage by properly grading the site to promote complete and rapid runoff of surface water away from construction areas and avoid the ponding of water in open excavations.
- Construct underground and underslab plumbing systems in a leak proof manner.
- To the extent practicable, provide for overland or piped discharge of storm water and limit the flow of water into sinkholes.
- Identify and thoroughly investigate any area of suspected sinkhole development, such as areas of abnormally thick topsoil deposits, depressed areas, locations of soil collapse or voids within the overburden.

In any case, it is important to be aware of the inability of engineers or geologists to predict with **any certainty where or when future sinkholes may develop.**

The State of Tennessee Department of Environment and Conservation (TDEC), Division of Groundwater Management (DGMS) regulates the modification of existing sinkhole drainage features, and a permit is required from their office to construct or operate any injection well or drainage structure that discharges storm water in the subsurface. A Class V Injection Well Permit has been separately submitted to TDEC for repairs and/or modifications to the sinkholes located on the site. The schematic drawings for sinkhole treatment that are appended to this report have been adapted from drawings provided to us by the above-referenced state office. While the schematic designs present a suggested approach to repairing sinkholes in areas of proposed construction, details of the remedial treatment will need to be determined on a case-by-case basis.

During development, TDEC will require all existing sinkholes, whether they are to remain unaltered or are slated to be repaired or modified, must be protected from siltation during site grading. The sinkholes should be encircled with silt fence and straw bales to prevent soil from entering the throat of the sinks and subsurface drainage pathways. Clogging of the existing sinkholes could cause problems related to inadequate site drainage and future localized flooding. From a geotechnical standpoint, and for improved long-term storm water management, we recommend that surface water be routed off-site in conventional fashion without relying upon sinkholes for surface water discharge.

Remedial Treatment of Sinkholes

Based on our understanding of your development plans and our site development meetings, we have included the appended “Details” drawing that includes a table of proposed modification at each respective sinkhole and generalized schematics of the three types of repairs planned at the site: 1) injection well, 2) structural repair, and 3) non-structural repair. Below is a summary table of the planned sinkhole repairs/modifications. The structural repair is to be used to repair sinkholes located beneath proposed structures or infrastructure. The non-structural repair should only be used in areas that are to be repaired, but are deemed within a “No-Build” area.

Sinkhole Repairs		
Sinkhole No.	General Information	Repair Schematic
#1, #2, #9, #10, #11, #13, #14, & #19	Unaltered – High Risk, No-Build Zone	Not Applicable
#3, #12, and #18	To be converted into Stormwater Injection Wells	Injection Well
#4, #5, #6, & #7	To be repaired for Commercial Development Area	Structural Repair
#8 & #15	To be repaired for adjacent Commercial and Residential Development Areas	Non-Structural Repair
#16 & #17	To be repaired within the area designated as “High Risk” and “No Build”	Non-Structural Repair

In order to conduct the necessary remedial treatments, excavation activities will involve removal of all unstable soil overburden and general cleaning of the sinkhole area to expose the opening(s) in the bedrock that would allow soil particles, or small rocks, to be eroded or collapse into the subsurface. Excavation within these features will encounter large boulders, trees, debris, and residual soils. Remedial activities may require “chasing” of the joint(s) in order to expose the entire feature and properly repair the sinkhole. Once the throat(s), or joint(s), are exposed in the bedrock surface, the opening(s) and the surrounding bedrock surfaces should then be cleaned and the appropriate repair recommendation should be constructed, as follows and depicted on the appended drawing.



Injection Well Repair

Upon cleaning out of sinkholes #3, #12, and #18 and prior to the construction of the planned injection wells, we recommend that each feature should be flooded prior to confirm its potential for water intake. Once these sinkholes are determined to be acceptable for receiving the volume of stormwater discharge, the size and specific design of the injection well should be determined by your civil engineer. The exposed openings should be maintained by inserting vertical perforated standpipes to direct water flow. The standpipe should be grouted in-place at its base to the bedrock surface. The area between the standpipe and the surrounding soil and/or rock should be backfilled with No. 2 sized stone to about 3 feet below finished grade and about 12 inches of No. 57 sized stone should then be placed and capped with a geotextile material. Subsequently, the inverted rock filter should be covered with a minimum thickness of 2 feet of topsoil. A sketch depicting the installation of an injection well is attached on the "Sinkhole Repair Summary" drawing.

Based on our subsurface investigation, we expect that excavations depths will be on the order of about 10 to 15 feet to expose the bedrock surface and throat(s) or enlarged joint(s). Excavation depths may increase within the limits of the throat or joint and the contractor should be prepared to extend excavation deeper than 15 feet. Upon exposing the opening in the bedrock surface, the injection well should be constructed in accordance with our recommendations stated above.

Non-Structural Repair

Upon preparation of sinkholes #8, #15, #16, and #17 for repair as discussed above, the sinkhole should be lined with a geotextile fabric and backfilled by constructing an inverted rock filter to prevent future loss of soil into the cavernous bedrock. The inverted filter should consist of an initial interval of blast-fractured rock of sufficient size to "choke-off" the opening in the bedrock surface. The initial intervals of larger sized stone should be followed by progressively smaller gradations of crushed stone and topped with an interval of loosely compacted, dense graded aggregate (DGA), or crusher-run. The inverted rock filter should then be overlain with geotextile filter fabric and the remainder of the excavation should be backfilled with engineered fill in order to achieve final grades. We recommend that the soil backfill consist of compacted clay and that the finished grade in the repaired area be crowned slightly to promote surface drainage away from the repaired sinkhole. A sketch detailing the "Non-Structural Repair" is appended to this report.

Based on our subsurface investigation, which included test pits at Sinkholes #8 and #16, we expect that excavations will vary from about 7 feet to more than 20 feet in depth to achieve stable rock around the throat or enlarged joint for stable repair.

Structural Repair

In order to repair Sinkholes #4, #5, #6, and #7, upon exposing the opening(s) in the bedrock surface and cleaning, the sinkhole should be lined with a geotextile fabric and backfilled by constructing an inverted rock filter in the same manner as stated above. The layers of stone within the inverted filter should not stop short of completely filling the feature up to the rock surface so that an interval of concrete can be placed as a structurally stabilizing "cap". The



minimum thickness of the concrete cap should be 12-inches and, to the extent possible, should engage bedrock around the perimeter of the sinkhole. We recommend that the filter fabric should be folded over the top of the inverted rock filter prior to the placement of the concrete cap. Upon placement of the concrete cap, the remaining excavation should be backfilled with properly placed and compacted shot rock to a depth of about 3.0 feet below grade. The resulting shot rock backfill should then be overlain with a geotextile filter fabric and the remainder of the excavation should be backfilled with engineered fill in order to achieve final grades. We recommend that the soil backfill consist of compacted clay and that the finished grade in the repaired area be crowned slightly to promote surface drainage away from the repaired sinkhole. A sketch detailing the "Structural Repair" is appended to this report.

Based on our subsurface investigation, we expect the excavations for repair of Sinkholes #5, #6, & #7 will vary from 5 to 8.5 feet in order to expose the opening(s) in the bedrock surface. However, excavation depths may increase within the limits of throat or joint. No specific information was obtained during our field study for Sinkhole #4. Accordingly, the contractor should be prepared to extend excavation deeper than 10 to 15 feet.

Site Grading and Foundation Design

During site preparation, all vegetation, trees, debris, and any otherwise unsuitable materials must be stripped from all areas of proposed construction including areas extending at least 10 feet beyond the limits of the proposed construction area. Based on preliminary data, stripping depths are expected to vary from 0.2 to 2.0 feet in order to remove the topsoil and roots from areas proposed for construction. It should be noted that thicker intervals of topsoil should be expected within sinkholes. Objectionable materials should be hauled off site or stockpiled in a designated area on site to prevent their incorporation into any fill.

Subsequent to the stripping operations and prior to fill placement, the exposed subgrade should be proofrolled with heavy, rubber-tired equipment (such as loaded dump truck) in order to delineate zones of soft or unstable soil. Unstable soils revealed by the proofrolling that cannot be stabilized by moisture conditioning and recompaction should be undercut to stable ground. After the subgrade is properly prepared and stabilized, engineered fill can then be placed and compacted, as required, to the desired subgrade elevation. Cut areas should be proofrolled and repaired in a similar fashion upon achieving desired grades. Subgrade repairs should extend at least 10 feet beyond the limits of proposed building envelope and 5 feet beyond the limits of proposed pavement areas.

If construction takes place during the wetter months of the year, undercut quantities will likely increase; in any event, seasonal changes in the soil's moisture content can impact the amount of undercut. Actual quantities will depend on the conditions encountered on the site and can only be determined in the field.

Depending on the proposed grades, three types of fill material will potentially be generated on site; clean soil, mixed soil and rock, and potentially a limited amount of clean rock. The approved soil (low plasticity clay) and any clean shot rock generated may be used as fill anywhere on site. The use of the mixed soil and rock fill as well as highly plastic clays should be limited to use within proposed paved and non-structural areas. Once finished elevations are



established, we can provide recommendations for the placement of mixed soil and rock fill and shot rock fill. However, exploration by using rock coring methods will likely be necessary in order to assess the potential for the generation of shot rock fill.

The on-site, organic-free, silty, lean clay is generally suitable for use as engineered fill. Any off site sources identified must be reviewed and approved by this office prior to their use on site. **Additionally, moisture conditioning may be required to achieve the soils optimum moisture content** depending on the time of year construction takes place. Generally, any soil to be used on site should consist of a low to medium plastic clay ($PI < 30$) and must be free of vegetation, roots, debris, rocks greater than 3 inches and other objectionable material. Engineered soil fill should be placed in maximum 8-inch thick loose lifts and compacted to at least 95% of the maximum dry density as determined by ASTM D 698 (standard Proctor). In any event, the material should be stable under the loads of construction traffic. Further, construction traffic should be limited upon achieving completion.

As previously stated, some of the on-site soils consist of high plasticity clays. These soils have the propensity to demonstrate volume changes (shrink and swell) upon fluctuations in their moisture content. Accordingly, we recommend that fills constructed with highly plastic soil be limited to nonstructural areas of the site. If it is necessary to utilize highly plastic soil as borrow material because of the unavailability of preferred material, the risk associated with volumetric changes can be reduced by maintaining the moisture content of the highly plastic soil at or within 2% above its optimum moisture content while that soil is being placed as fill. Moreover, care should be taken to avoid excessive compaction to the fill to densities greater than 100% of the specified index.

We expect that shallow intervals of the bedrock may be removed by heavy tracked equipment. However, the removal of unweathered bedrock will require blasting or pneumatic hammering. If blasting methods are employed, we recommend that the vibrations induced by blasting be limited to prevent damages to structures within the area. All blasting should be monitored by vibration recording instruments and knowledgeable personnel to document the level of blast vibrations. Generally, a peak particle velocity of 2 inches per second is considered the maximum safe level of vibration for engineered structures. In any event, the contractor must comply with Tennessee blasting laws and all other regulations.

It will be important for the contractor to maintain the site in a positively drained condition both during and after construction. Ponding water can lead to the deterioration of the subgrade surface necessitating over-excavation of the softened soil.

Residual soil and properly constructed soil fills are expected to develop bearing capacities on the order 2,000 to 3,000 psf. Higher bearing capacities ranging from 5,000 to 8,000 psf are possible if the structure is founded on the weathered rock surface or on shot rock fills. The anticipated bearing materials are not expected to be unusually compressible; however, the settlement of foundations will be largely influenced by the site-grading plan. For instance structures founded over thick intervals of fill (>10 feet) will demonstrate the potential for a greater magnitude of settlement. With proper grading practices and knowledgeable monitoring, increments of

settlement for appropriately proportioned spread footings can generally be kept within limits considered tolerable.

Within proposed paved areas we assess the support capabilities of properly prepared subgrade to have a CBR ranging from 4% to 6%. Actual thickness of aggregate base course, asphalt base course, and asphalt surface course can be determined following development of estimated traffic frequencies for light and heavy-duty vehicles and appropriate laboratory testing.

FUTURE GEOTECHNICAL INVESTIGATIONS

Final design recommendations will need to be based upon the results of additional tests performed in response to updated information specific to the proposed development. Detailed recommendations concerning the design of foundations, pavement systems, slabs-on-grade, and other improvements are interdependent with magnitude of loading, sensitivity to movement and other design criteria. Therefore, a comprehensive geotechnical exploration program will need to be developed after building locations are determined and general site grading details are more clearly defined. The study should incorporate an ample number of exploratory locations and laboratory tests to characterize the engineering properties of the overburden and possibly the bedrock (to determine rippability if necessary).

As your geotechnical consultant, Geosciences Design Group will be available to assist you and other members of the design team by providing additional input with regard to preferred building locations. After general site development concepts have been formulated and information about the sizes and locations of proposed buildings is available, we can assist you by providing a recommended scope of work for a detailed geotechnical investigation. In the interim, we look forward to being of continuing service as you move forward with this important project.

LIMITATIONS

The foregoing preliminary recommendations were developed based on observations, analysis of samples, and test data obtained from a limited number of test pits and with the assumption that the materials exposed fairly represent conditions existing across the site. It is possible that different conditions could exist between the explored locations, and such unknown conditions could have an impact on design and construction. Additionally, subsurface conditions can change with the passage of time. Because it is not possible to know every detail of the conditions hidden beneath the surface, our comments and recommendations are presented as opinions and judgments, as opposed to statements of fact. Should any conditions at variance with this report be encountered during construction, this office should be notified immediately so that further studies can be made and supplemental recommendations can be provided. The purpose of this report is to provide information and recommendations for use by the building designers. While the subsurface information may be helpful to contractors, the study is not intended to provide all information that a contractor may need to evaluate construction costs and material quantities. The data and recommendations are specific to the site and project described herein. As noted previously, this report does not provide information concerning the environmental aspects of the site, such as the presence or absence of hazardous or toxic materials in the soil, bedrock, or ground water beneath the site.



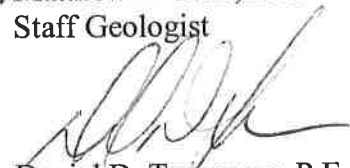
CLOSURE

Geosciences Design Group, a TTL, Inc. company, appreciates this opportunity to be of service to Stockton Building Corporation. If you have any questions or require additional information, please call.

Sincerely,
TTL, Inc., dba,
Geosciences Design Group



Matthew A. Britt, P.G.
Staff Geologist



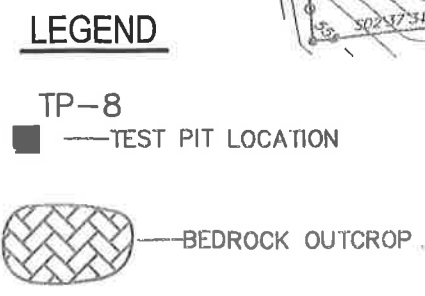
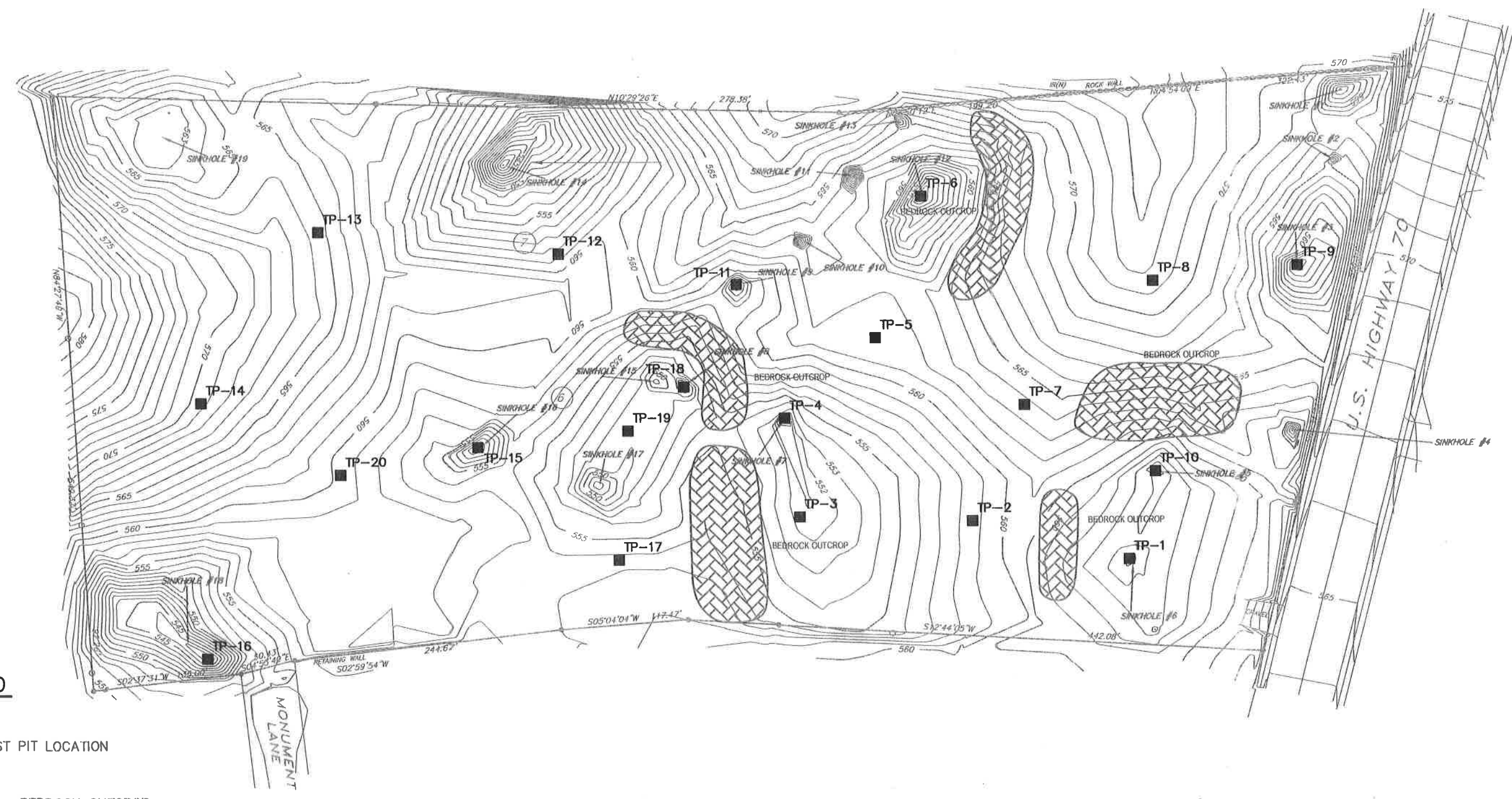
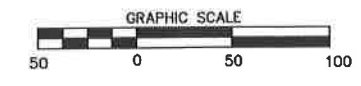
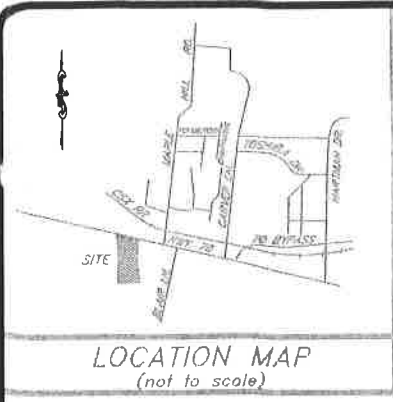
Daniel D. Terranova, P.E.
Geotechnical Group Manager



***Proposed Geer's Reserve Development
Preliminary Geotechnical Investigation
Lebanon, Tennessee
GDG Project No. 07092***

**PLANS
AND
LOGS**





Geosciences Design Group
a **mg** Company

"Working on foundations for the future"

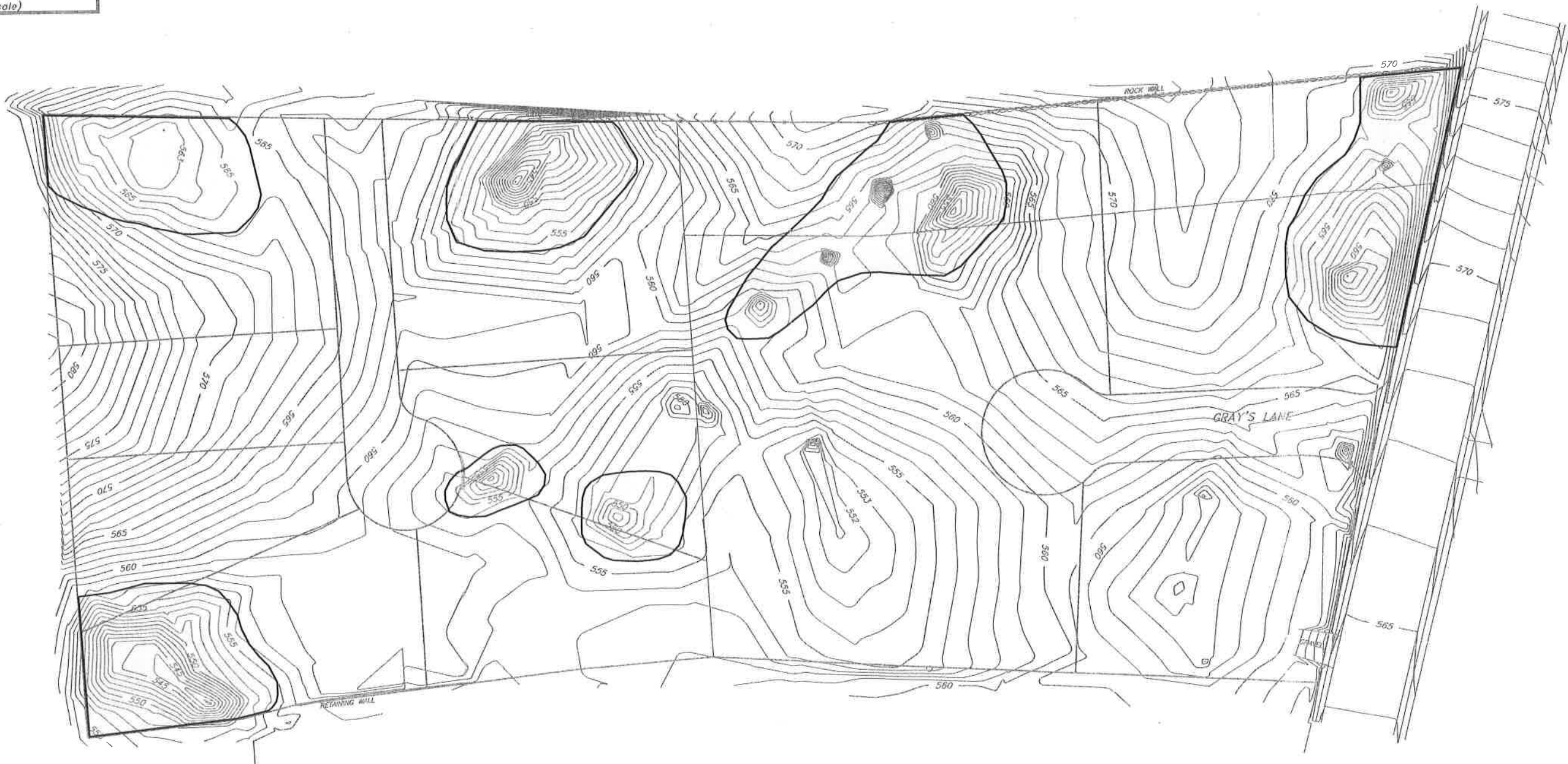
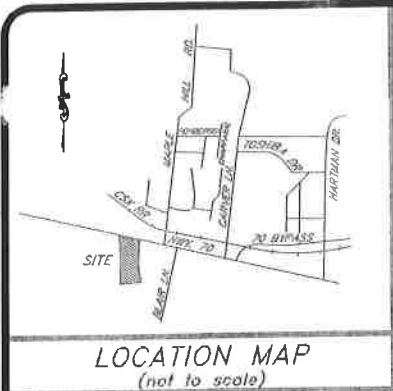
Phone (615) 331-7770
447 Metroplex Drive
Nashville, Tennessee 37211

STOCKTON BUILDING CORPORATION

GEER'S RESERVE
U S HIGHWAY 70
LEBANON, TENNESSEE

Date: JUNE 2007
GDG Project Number: 07092

TEST PIT PLAN



LEGEND

 — HIGH RISK AREAS

STOCKTON BUILDING CORPORATION

GEER'S RESERVE
U S HIGHWAY 70
LEBANON, TENNESSEE



Geosciences Design Group
a  Company

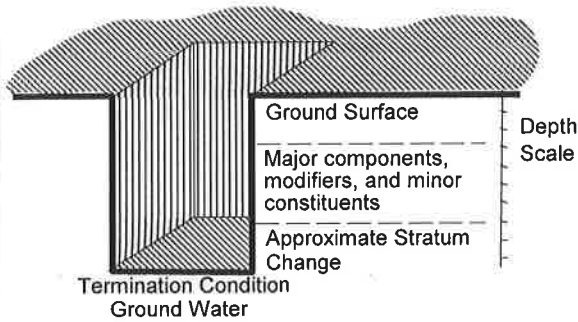
"Working on foundations for the future"

Phone (615) 331-7770
Fax (615) 331-7771
447 Metroplex Drive
Nashville, Tennessee 37211



Date:
JUNE 2007
GDG Project Number:
07092
HIGH RISK
AREA PLAN

TEST PIT RECORD



Project: Geer's Reserve
Location: Lebanon, Tennessee
Project No: 7092
Equipment: Track Mounted Excavator
Date Excavated: May 17-18, 2007

Geosciences Design Group



Surface Elevation: 554±

Remarks: Located at Sinkhole #6

TEST PIT NO. TP-1

DEPTH

1

2

3

4

5

6

7

8

9

10

11

12

Topsoil with root mat and debris

Clay, silty, dark-yellowish brown with occasional black nodules and some debris (timbers, bricks, bottles, scarp metal, etc)

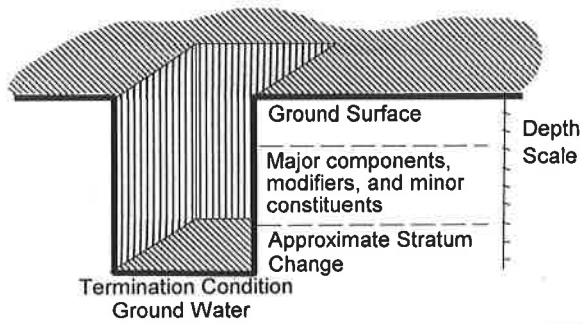
Weathered, slabby limestone with some soil seams and a soil-filled throat

Limestone with a soil filled throat along a NE-SW trending enlarged joint. The enlarged joint was observed to taper at the southwest and northeast ends and the throat was estimated to be about 5 feet in diameter. The throat was observed to be filled with saturated, yellowish-brown, very silty, clay and numerous organics (timbers & tree cuttings).

Terminated @ 12.0 Feet
Saturated Soil within Throat



TEST PIT RECORD



Project: Geer's Reserve
Location: Lebanon, Tennessee
Project No: 7092
Equipment: Track Mounted Excavator
Date Excavated: May 17-18, 2007

Geosciences Design Group



Surface Elevation: 558±
Remarks:

TEST PIT NO. TP-2

DEPTH

1

Topsoil with root mat and debris

2

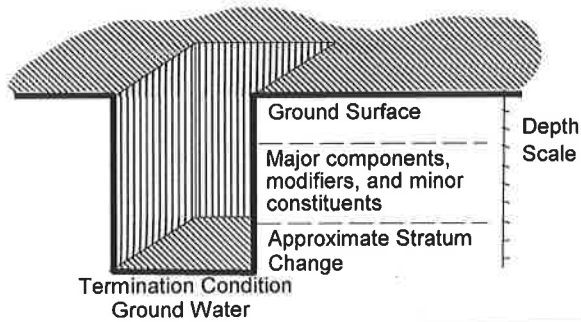
Clay, slightly silty, light reddish-brown with trace chert fragments - soft to medium consistency

3

Clay, trace silt, dark yellowish-brown with trace limestone - medium to stiff consistency

Refusal @ 2.6 Feet
Dry Upon Completion

TEST PIT RECORD



Project: Geer's Reserve
Location: Lebanon, Tennessee
Project No: 7092
Equipment: Track Mounted Excavator
Date Excavated: May 17-18, 2007

Geosciences Design Group



Surface Elevation: 553±

Remarks: Transects a natural drainage swale

TEST PIT NO. **TP-3**

DEPTH

1

Topsoil with root mat and occasional debris (brick and timbers)

2

Weathered limestone slabs (possible fill)

3

4

5

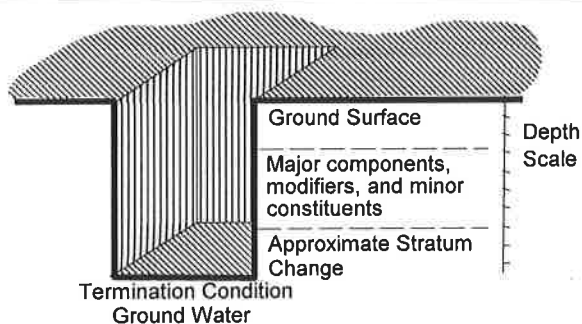
Clay, silty, light reddish-brown - medium to stiff consistency

6

7

Refusal @ 7.5 Feet
Dry Upon Completion

TEST PIT RECORD



Project: Geer's Reserve
Location: Lebanon, Tennessee
Project No: 7092
Equipment: Track Mounted Excavator
Date Excavated: May 17-18, 2007

Geosciences Design Group



Surface Elevation: 550±

Remarks: Located at Sinkhole #7

TEST PIT NO. TP-4

DEPTH

1

2

3

4

5

6

7

8

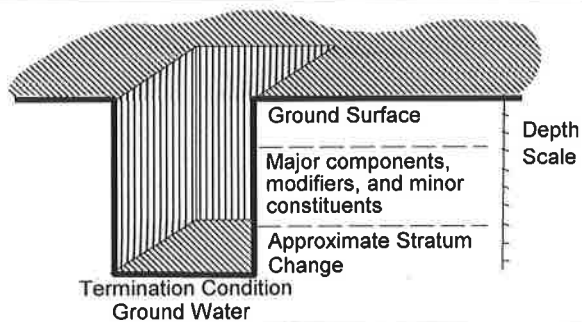
9

Debris within limits of closed debris (tires, concrete slabs, brick, carpet, timbers, scrap metals, general household trash, etc.) mixed with topsoil

Rock ledge encountered at 5-foot along north and south sides of an enlarged joint measuring about 5 feet wide. Enlarged joint trends in a NE-SW orientation and tapers to about 2 foot wide at a depth of 9 foot. Enlarged joint was soil-filled at completion of test pit.

Equipment Refusal @ 9.0 Feet
Dry Upon Completion

TEST PIT RECORD



Project: Geer's Reserve
Location: Lebanon, Tennessee
Project No: 7092
Equipment: Track Mounted Excavator
Date Excavated: May 17-18, 2007

Geosciences Design Group



Surface Elevation: 561±
Remarks:

TEST PIT NO. TP-5

DEPTH

1

2

3

4

5

6

7

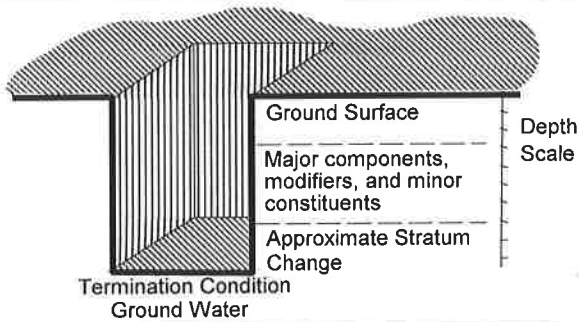
Topsoil with root mat and debris

Clay, slightly silty, light reddish-brown with trace chert fragments and occasional black nodules - soft to medium consistency

Clay, trace silt, dark yellowish-brown with occasional black nodules and trace limestone - stiff consistency

Refusal @ 7.8 Feet
Dry Upon Completion

TEST PIT RECORD



Project: Geer's Reserve
Location: Lebanon, Tennessee
Project No: 7092
Equipment: Track Mounted Excavator
Date Excavated: May 17-18, 2007

Geosciences Design Group



Surface Elevation: 550±

Remarks: Located at Sinkhole #12

TEST PIT NO. TP-6

DEPTH

1

2

3

4

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6

7

8

9

10

Open throat at base of closed depression - approximately 5 feet deep and 12 inches in diameter

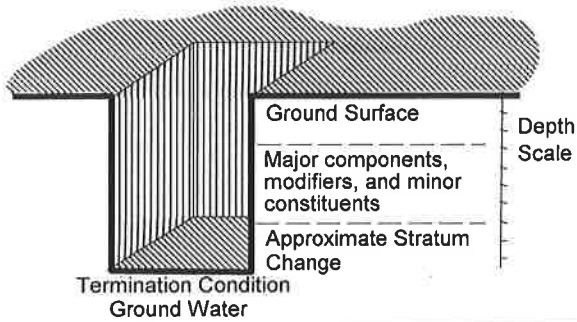
Topsoil and detached limestone boulders and rubble

Weathered limestone slabs. At a depth of 10 feet, a 2-foot diameter open throat was revealed to trend towards west

**Equipment Refusal @ 10.0 Feet
Dry Upon Completion**



TEST PIT RECORD



Project: Geer's Reserve
Location: Lebanon, Tennessee
Project No: 7092
Equipment: Track Mounted Excavator
Date Excavated: May 17-18, 2007

Geosciences Design Group



Surface Elevation: 564±
Remarks:

TEST PIT NO. TP-7

DEPTH	
1	Topsoil with root mat
2	Clay, slightly silty, light reddish-brown with trace chert fragments - soft to medium consistency
3	Clay, trace silt, dark yellowish-brown with trace limestone - medium to stiff consistency

Refusal @ 3.5 Feet
Dry Upon Completion

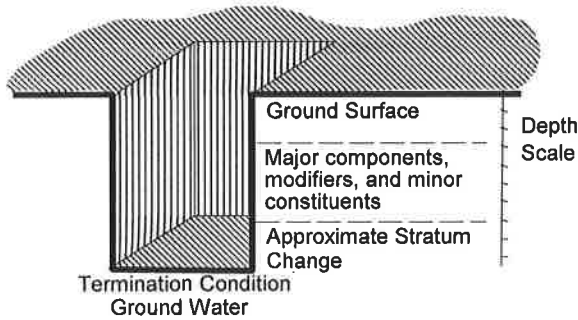
Surface Elevation: 571±
Remarks:

TEST PIT NO. TP-8

DEPTH	
1	Topsoil with root mat
2	Clay, slightly silty, light reddish-brown with trace chert fragments - soft to medium consistency
3	Weathered, slabby limestone with trace yellowish-brown clay

Refusal @ 2.9 Feet
Dry Upon Completion

TEST PIT RECORD



Project: Geer's Reserve
Location: Lebanon, Tennessee
Project No: 7092
Equipment: Track Mounted Excavator
Date Excavated: May 17-18, 2007

Geosciences Design Group



Surface Elevation: 555±

Remarks: Located at Sinkhole #3

TEST PIT NO. TP-9

DEPTH

1

2

3

4

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6

7

8

9

10

11

12

13

14

Topsoil and organics - Limestone ledge along west side of test pit at ground surface and extends to termination depth.

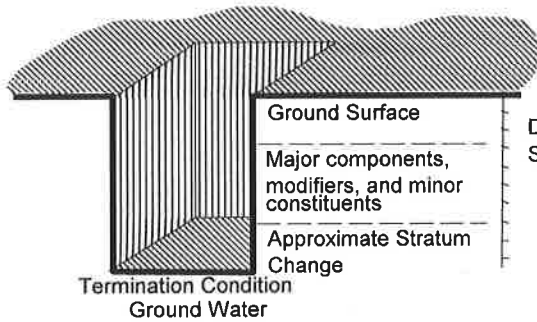
Topsoil and brown, silty, clay with trace organics and occasional, detached limestone boulders and slabs -- Limestone ledges at south and north ends of test pit at depths of 4 to 6 feet.

Encountered a soil-filled throat measuring about 6 feet in diameter at about 5 to 6 feet in depth. The test pit was extended to a total depth of 14 feet bgs prior to equipment refusal. Several bricks were unearthed at about 12 feet in depth. No open throat was encountered prior to termination.



Equipment Refusal @ 10.0 Feet
Dry Upon Completion

TEST PIT RECORD



Depth Scale

Project: Geer's Reserve
Location: Lebanon, Tennessee
Project No: 7092
Equipment: Track Mounted Excavator
Date Excavated: May 17-18, 2007

Geosciences Design Group



Surface Elevation: 555±
Remarks: Located at Sinkhole #5

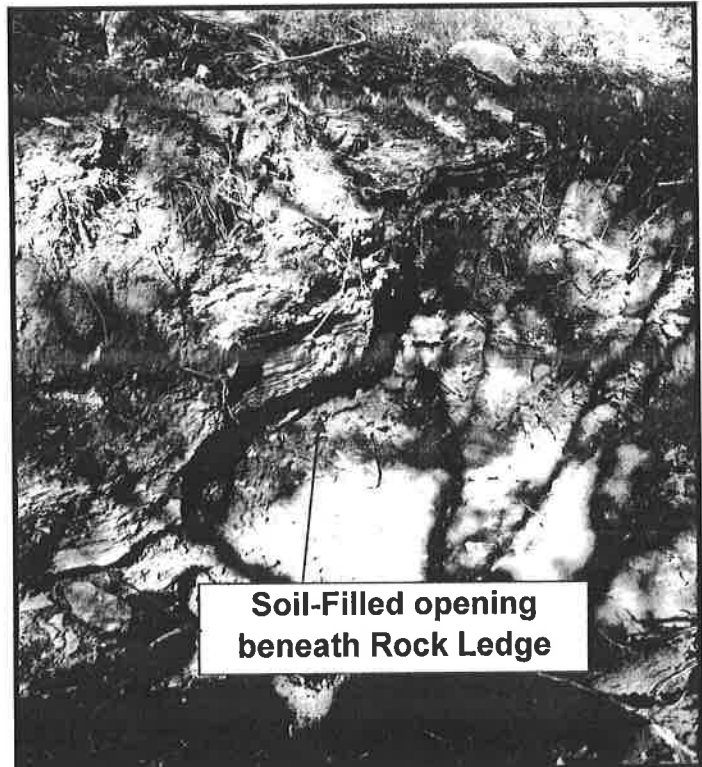
TEST PIT NO. TP-10

DEPTH

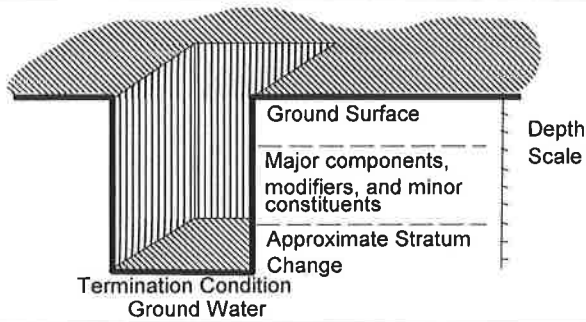
1
2
3
4
5
6
7
8

Limestone ledge exposed along south side of test pit, which was 35 feet in length (east-west) and 10 feet wide (north-south). Topsoil and debris encountered within "throat" (surface depression) to about 5 feet. At 5 feet, topsoil and debris became mixed with limestone slabs and light reddish-brown silty clay to a depth of 8.0 feet. Weathered limestone slabs to 8.5 feet. Across the bottom of the excavation, continuous bedrock was exposed and seam of topsoil, organics, and weathered rock was observed to extend southward beneath the exposed rock ledge along the south side of test pit. Weathered rock ledges were partially exposed at 5 to 7 feet along the west, north, and east sides of test pit.

Refusal @ 8.5 Feet
Dry Upon Completion



TEST PIT RECORD



Project: Geer's Reserve
Location: Lebanon, Tennessee
Project No: 7092
Equipment: Track Mounted Excavator
Date Excavated: May 17-18, 2007

Geosciences Design Group



Surface Elevation: 555±
Remarks: Located at Sinkhole #9

TEST PIT NO. TP-11

DEPTH

1

Topsoil

2

3

4

5

6

7

8

9

10

11

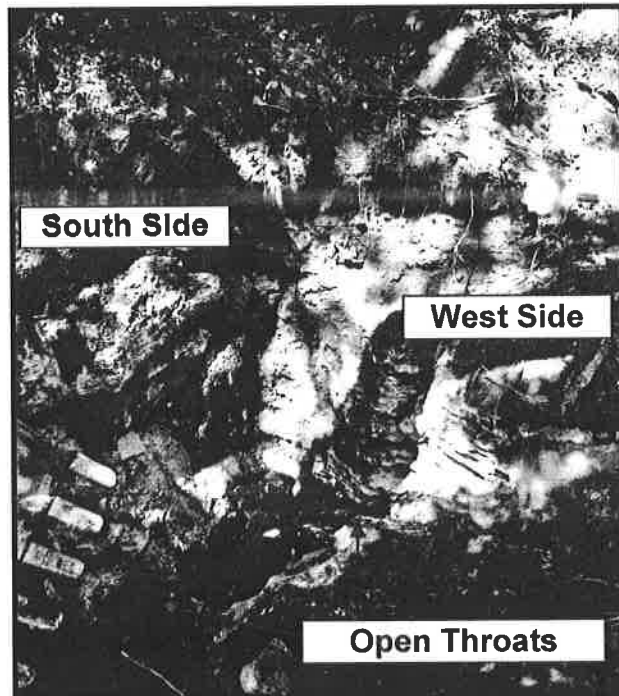
12

13

14

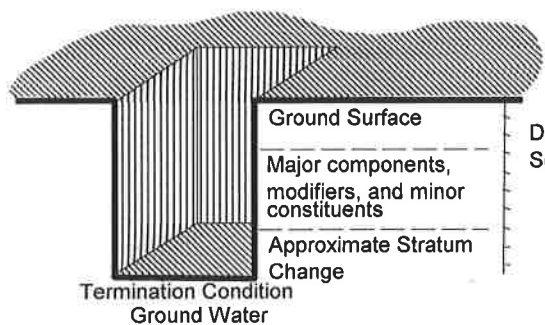
15

Topsoil and detached limestone boulders (up to 8'L x 6W' x 4'H). At 3 feet, a 24-inch diameter open throat was observed and a metal tape measure could be extended 18 feet deep (below bottom of closed depression). During excavation, limestone ledges were exposed at 2 to 5 feet in depth along the west and north margins of the test excavation and clay, silty, light reddish-brown and detached limestone boulders were encountered along the south and east sides of the excavation. The excavation was terminated at 15 feet due to access constraints, but three open throats were observed among the loose soil and limestone boulders in the bottom of the excavation.



Terminated @ 15.0 Feet
Dry Upon Completion

TEST PIT RECORD



Depth
Scale

Project: Geer's Reserve

Location: Lebanon, Tennessee

Project No: 7092

Equipment: Track Mounted Excavator

Date Excavated: May 17-18, 2007

Geosciences Design Group



Surface Elevation: 559±

Remarks:

TEST PIT NO. TP-12

DEPTH

2

4

6

8

10

12

14

16

18

20

Topsoil (0.5 feet)

soft to medium consistency to 4'

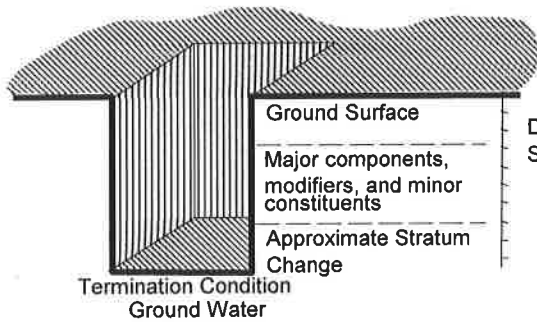
Clay, slightly silty, light reddish-brown and yellowish-brown, mottled with occasional chert fragments and trace black nodules -- medium to stiff consistency

Clay, trace silt, dark yellowish-brown and tan with occasional chert fragments and gravel, black nodules, and black mineral staining - stiff consistency

Terminated @ 20.0 Feet

Dry Upon Completion

TEST PIT RECORD



Depth
Scale

Project: Geer's Reserve

Location: Lebanon, Tennessee

Project No: 7092

Equipment: Track Mounted Excavator

Date Excavated: May 17-18, 2007

Geosciences Design Group



Surface Elevation: 565±
Remarks:

TEST PIT NO. TP-13

DEPTH

2

4

6

8

10

12

14

16

18

20

Topsoil (0.4 feet)

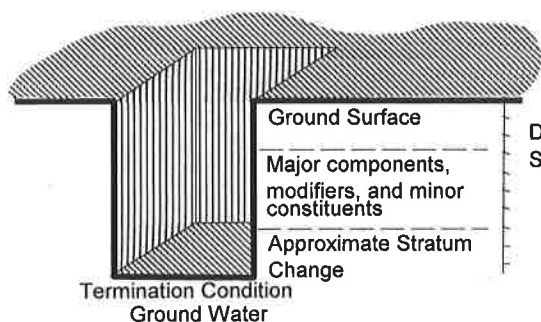
Clay, slightly silty, mottled light reddish-brown and tan with occasional chert fragments and trace black nodules -- soft to medium consistency --
Limestone boulder at 5.5 feet at north end of test pit

Clay, slightly silty, dark yellowish-brown with occasional chert and black nodules -- stiff consistency

Clay, trace silt, mottled, light brown and brown with occasional chert fragments and black nodules -- blocky structure -- stiff to hard consistency

Terminated @ 16.5 Feet
Dry Upon Completion

TEST PIT RECORD



Depth Scale

Project: Geer's Reserve
Location: Lebanon, Tennessee
Project No: 7092
Equipment: Track Mounted Excavator
Date Excavated: May 17-18, 2007

Geosciences Design Group



Surface Elevation: 569±

Remarks:

TEST PIT NO. TP-14

DEPTH

1

2

3

4

5

6

Topsoil (0.6 feet)

Clay, slightly silty, light reddish-brown with occasional roots and trace limestone -- soft to medium consistency

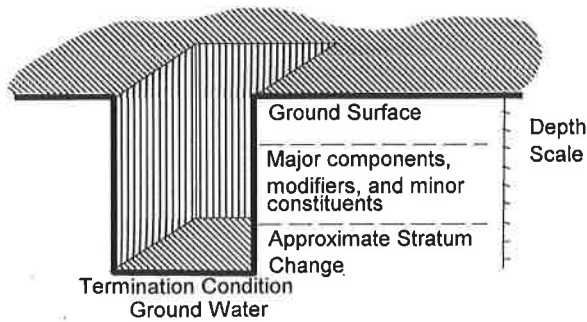
Clay, slightly silty, dark yellowish-brown with numerous limestone slabs and boulders

Weathered limestone, slabby with trace dark yellowish-brown clay

Refusal @ 6.0 Feet

Dry Upon Completion

TEST PIT RECORD



Project: Geer's Reserve
Location: Lebanon, Tennessee
Project No: 7092
Equipment: Track Mounted Excavator
Date Excavated: May 17-18, 2007

Geosciences Design Group



Surface Elevation: 550±
Remarks: Located @ Sinkhole #16

TEST PIT NO. TP-15

DEPTH

2

4

6

8

10

12

14

16

18

Surface depression about 40 feet in diameter and 10 to 12 feet deep

Topsoil and debris (concrete slabs, timbers, carpet, glass, scrap metal, steel pipe, wire mesh & fencing, brick, shingles, and numerous other items) -- very soft and loose

Topsoil, debris, limestone slabs, and clay, silty, brown -- very soft and loose

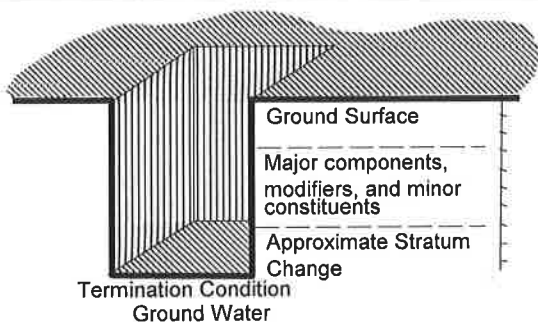
Weathered limestone slabs (Lebanon Limestone), thin bedded with topsoil and debris -- a 5 to 6 foot diameter open throat and cavity was exposed along the northeast side of test pit at a depth of about 14 feet. The cavity appeared to extend about 2 to 3 feet towards the northeast beneath a limestone ledge.

Terminated @ 19.0 Feet
Dry Upon Completion

Test pit was terminated within loose, detached, weathered limestone slabs, topsoil, and debris. **Competent bedrock was not observed** along the sidewalls of the excavation.



TEST PIT RECORD



Depth
Scale

Project: Geer's Reserve

Location: Lebanon, Tennessee

Project No: 7092

Equipment: Track Mounted Excavator

Date Excavated: May 17-18, 2007

Geosciences Design Group



Surface Elevation: 544±

Remarks: Located @ Sinkhole #18

TEST PIT NO. TP-16

DEPTH

1

2

3

4

5

6

7

8

9

10

11

12

Topsoil and debris (tree cuttings, tires, a corroded 30± gallon drum, concrete slabs, brick, hose pipe, wire mesh, chunks of asphalt, oil filters, PVC pipe, scrap metal, household trash, and numerous other items)

Topsoil and clay, silty, brown

Topsoil, clay, silty, brown, and weathered limestone slabs (Lebanon Limestone), thin bedded...exposed an open throat along the eastern margins of the test pit at a depth of about 12 feet and could a metal tape measure about 8 feet into opening without resistance.

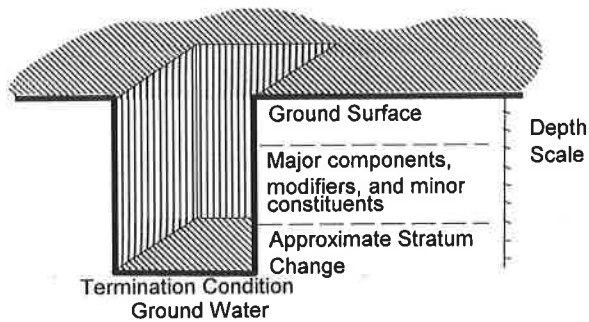
Test pit was terminated within loose, detached, weathered limestone slabs, topsoil, and debris. Competent bedrock was not observed along the sidewalls of the excavation.

Terminated @ 12.0 Feet

Dry Upon Completion



TEST PIT RECORD



Project: Geer's Reserve
Location: Lebanon, Tennessee
Project No: 7092
Equipment: Track Mounted Excavator
Date Excavated: May 17-18, 2007

Geosciences Design Group



Surface Elevation: 556±
Remarks:

TEST PIT NO. TP-17

DEPTH

1

2

3

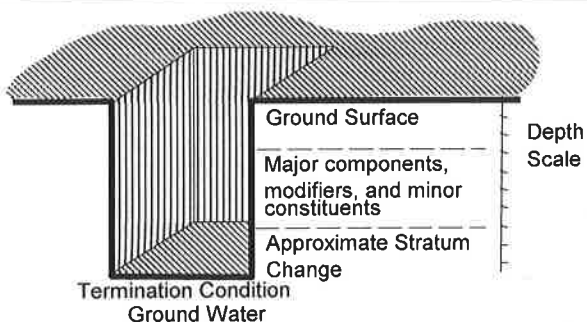
4

Topsoil (0.4 feet)

Clay, slightly silty, light reddish-brown -- medium to stiff consistency

Refusal @ 3.7 Feet
Dry Upon Completion

TEST PIT RECORD



Project: Geer's Reserve
Location: Lebanon, Tennessee
Project No: 7092
Equipment: Track Mounted Excavator
Date Excavated: May 17-18, 2007

Geosciences Design Group



Surface Elevation: 550±

Remarks: Located @ sinkhole #8

TEST PIT NO. TP-18

DEPTH

1

2

3

4

5

6

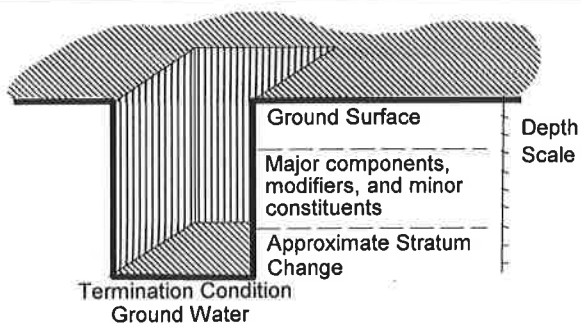
Limestone ledges at ground surface to north and west of the sinkhole.

Topsoil, roots, and weathered limestone slabs to refusal at 6.5 feet. Refusal on continuous limestone slab. Topsoil and roots appear to extend southward into the sidewall towards Sinkhole #15 and beneath an surficial "cap" rock (limestone slab).

**Refusal @ 6.5 Feet
Dry Upon Completion**



TEST PIT RECORD



Project: Geer's Reserve
Location: Lebanon, Tennessee
Project No: 7092
Equipment: Track Mounted Excavator
Date Excavated: May 17-18, 2007

Geosciences Design Group



Surface Elevation: 552±

Remarks: Located between Sinkholes #8 & #17

TEST PIT NO. TP-19

DEPTH

1

Topsoil with root mat

Refusal @ 1.0 Feet

Dry Upon Completion

Surface Elevation: 560±

Remarks:

TEST PIT NO. TP-20

DEPTH

1

2

3

4

5

Topsoil and root mat (0.7 Feet)

Clay, slightly silty, light reddish-brown with trace black nodules

Clay, trace silt, dark yellowish-brown and gray with occasional weathered limestone

Refusal @ 4.9 Feet

Dry Upon Completion

***Proposed Geer's Reserve Development
Preliminary Geotechnical Investigation
Lebanon, Tennessee
GDG Project No. 07092***

**LABORATORY
TEST DATA**



LABORATORY DATA SUMMARY SHEET

Project Name: Geer's Reserve

Project No. 100807092

Location: Lebanon, Tennessee

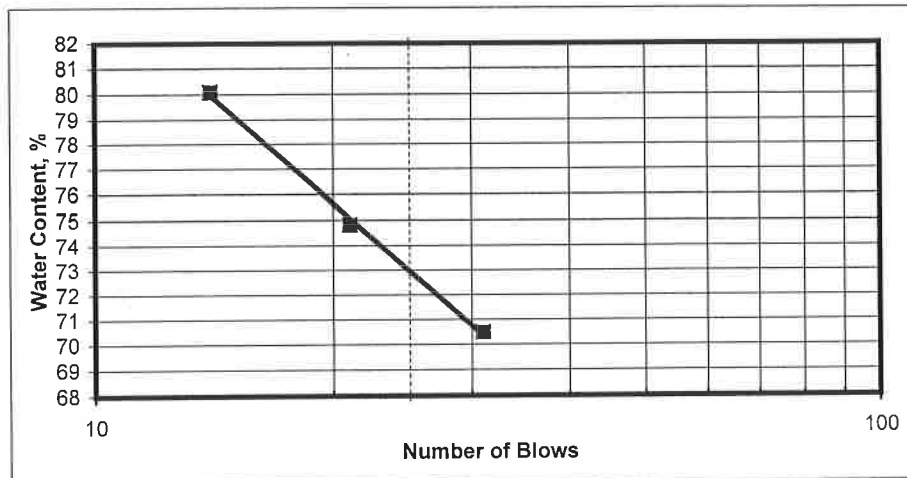
Date 5/28/2007

Boring	Depth (feet)	Natural Moisture Content (%)	Atterberg Limits			USCS Classification	Dry Unit Weight (pcf)	Q _u (ksf)
			LL	PL	PI			
TP-2	1.0	29.5	73	30	43	CH		
TP-2	2.0	28.8	70	31	39	CH		
TP-3	4.0 - 6.0	22.6	34	18	16	CL		

Atterberg Limits

Project Geer's Reserve Proj. No. 100807092 Date 05/28/07
Hole No. TP-2 Sample No. 1 Depth 1.0'

	Liquid Limit			Plastic Limit		Nat'l Moist
Run Number	1	2	3	4	5	6
Container Number	A	B	C	D	E	F
Container + wet soil	35.99	35.02	34.58	29.13	28.24	175.20
Container + dry soil	26.91	25.93	25.34	25.60	25.06	141.08
Water	9.08	9.09	9.24	3.53	3.18	34.12
Container tare	14.03	13.78	13.80	14.16	14.29	25.50
Dry soil	12.88	12.15	11.54	11.44	10.77	115.58
Water content	70.5	74.8	80.1	30.9	29.5	29.5
Number of blows	31	21	14			



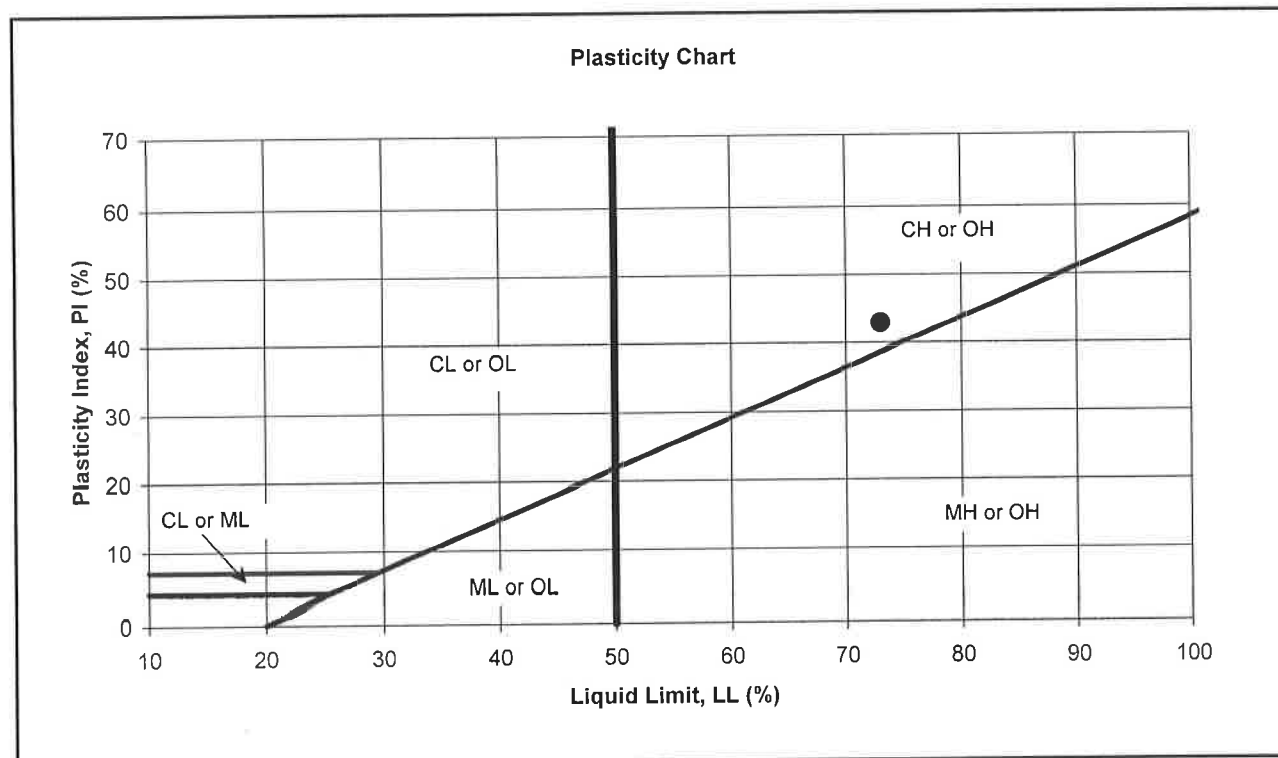
LL 73

PL 30

PI 43

USC CH

Sample Description Clay, slightly silty, reddish-brown



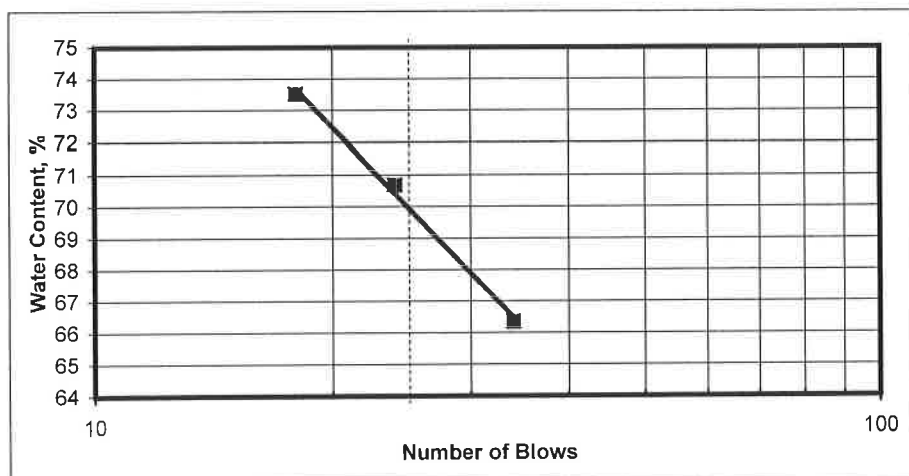
Tested by KS

Checked by MDT

Atterberg Limits

Project Geer's Reserve Proj. No. 100807092 Date 05/28/07
Hole No. TP-2 Sample No. 2 Depth 2.0'

	Liquid Limit			Plastic Limit		Nat'l Moist
Run Number	1	2	3	4	5	6
Container Number	A	B	C	D	E	F
Container + wet soil	40.99	37.53	36.32	32.97	30.16	176.70
Container + dry soil	30.05	27.81	26.83	28.47	26.44	143.00
Water	10.94	9.72	9.49	4.50	3.72	33.70
Container tare	13.56	14.06	13.92	14.02	14.08	26.10
Dry soil	16.49	13.75	12.91	14.45	12.36	116.90
Water content	66.3	70.7	73.5	31.1	30.1	28.8
Number of blows	34	24	18			



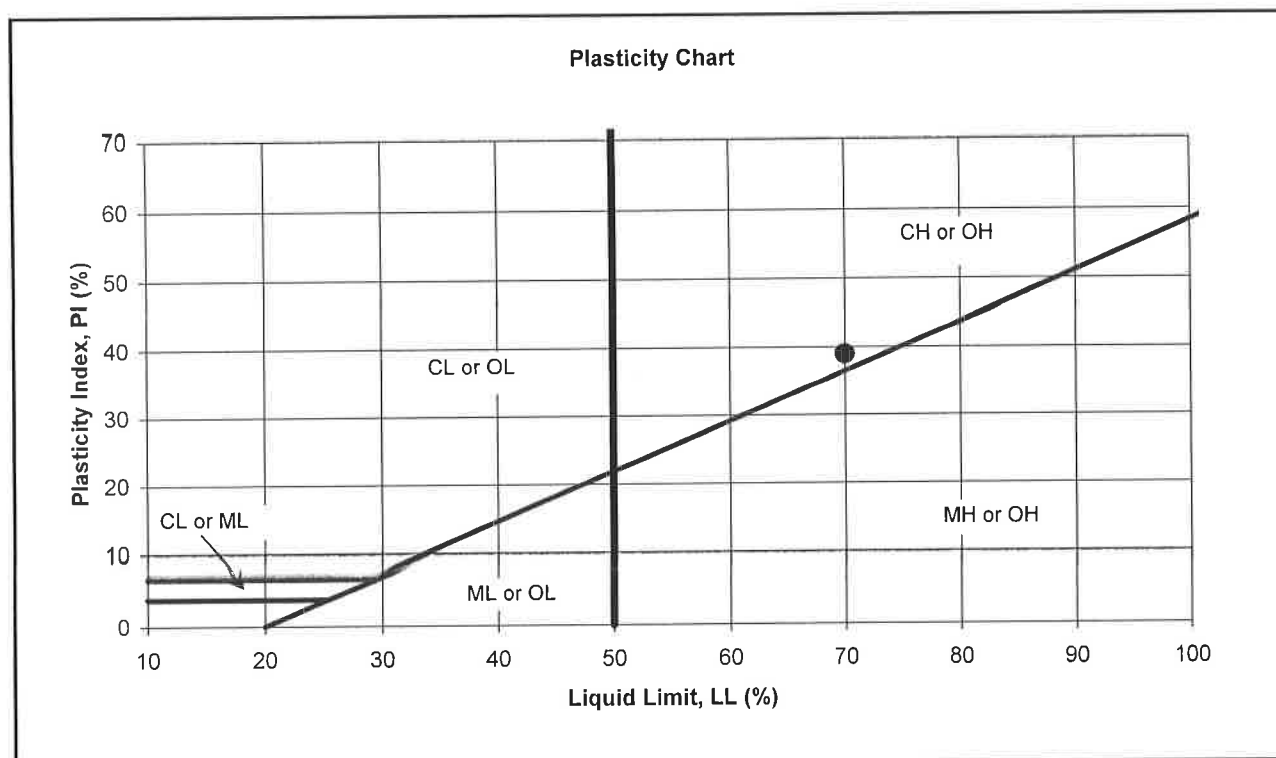
LL 70

PL 31

PI 39

USC CH

Sample Description Clay, slightly silty, yellowish-brown



Tested by KS

Checked by MDT

Atterberg Limits

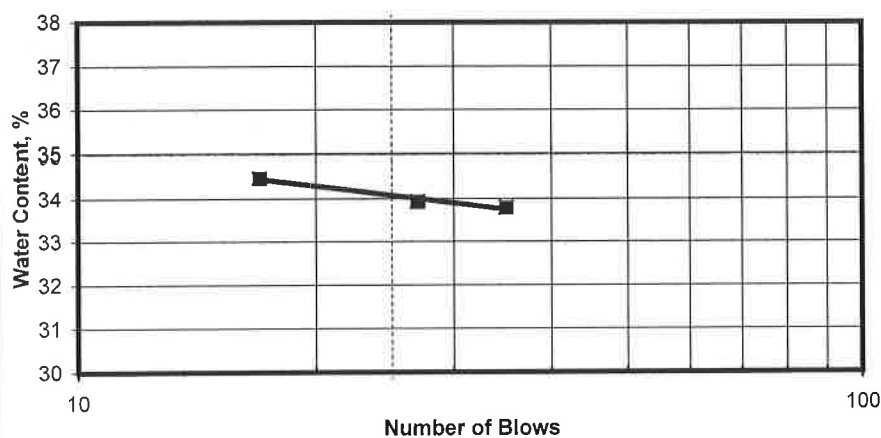
Project Geer's Reserve
Hole No. TP-3

Sample No. 1

Proj. No. 100807092

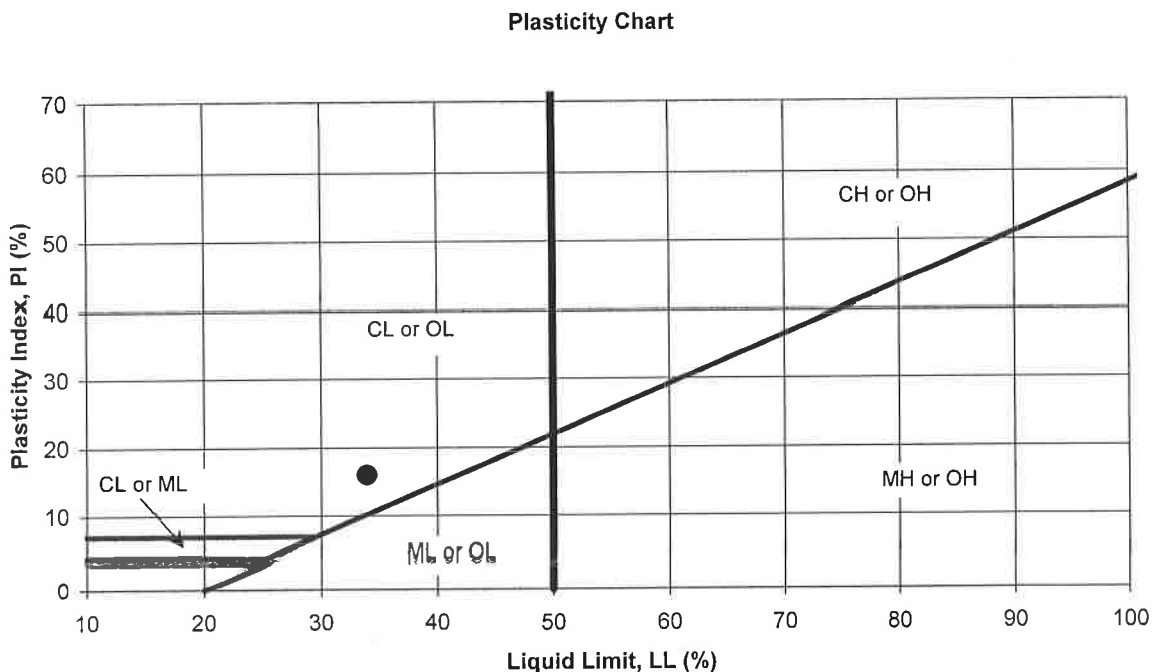
Date 05/28/07
Depth 4.0' - 6.0'

	Liquid Limit			Plastic Limit		Nat'l Moist
Run Number	1	2	3	4	5	6
Container Number	A	B	C	D	E	F
Container + wet soil	38.19	40.57	42.66	25.79	25.37	193.60
Container + dry soil	32.09	33.82	35.32	23.58	23.27	162.66
Water	6.10	6.75	7.34	2.21	2.10	30.94
Container tare	14.04	13.93	14.04	11.13	11.13	25.70
Dry soil	18.05	19.89	21.28	12.45	12.14	136.96
Water content	33.8	33.9	34.5	17.8	17.3	22.6
Number of blows	35	27	17			



LL 34
PL 18
PI 16
USC CL

Sample Description Clay, silty, dark brown



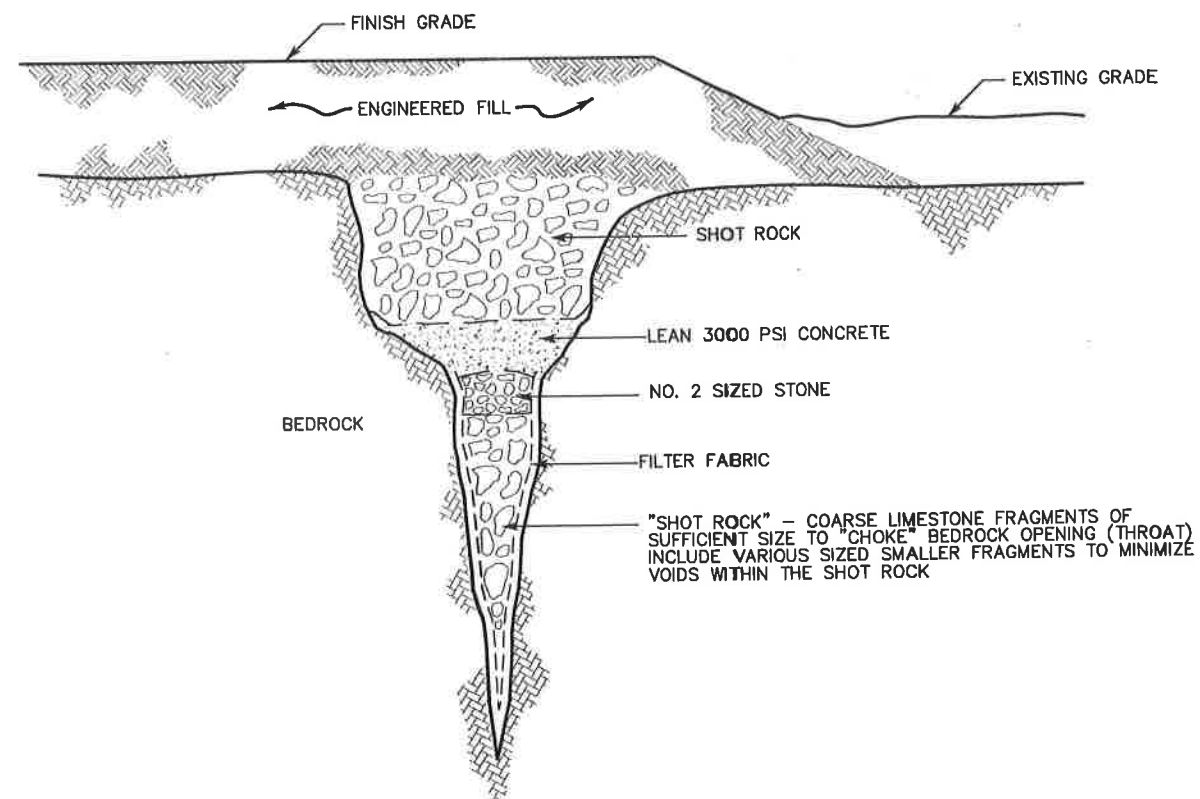
Tested by KS

Checked by MDT

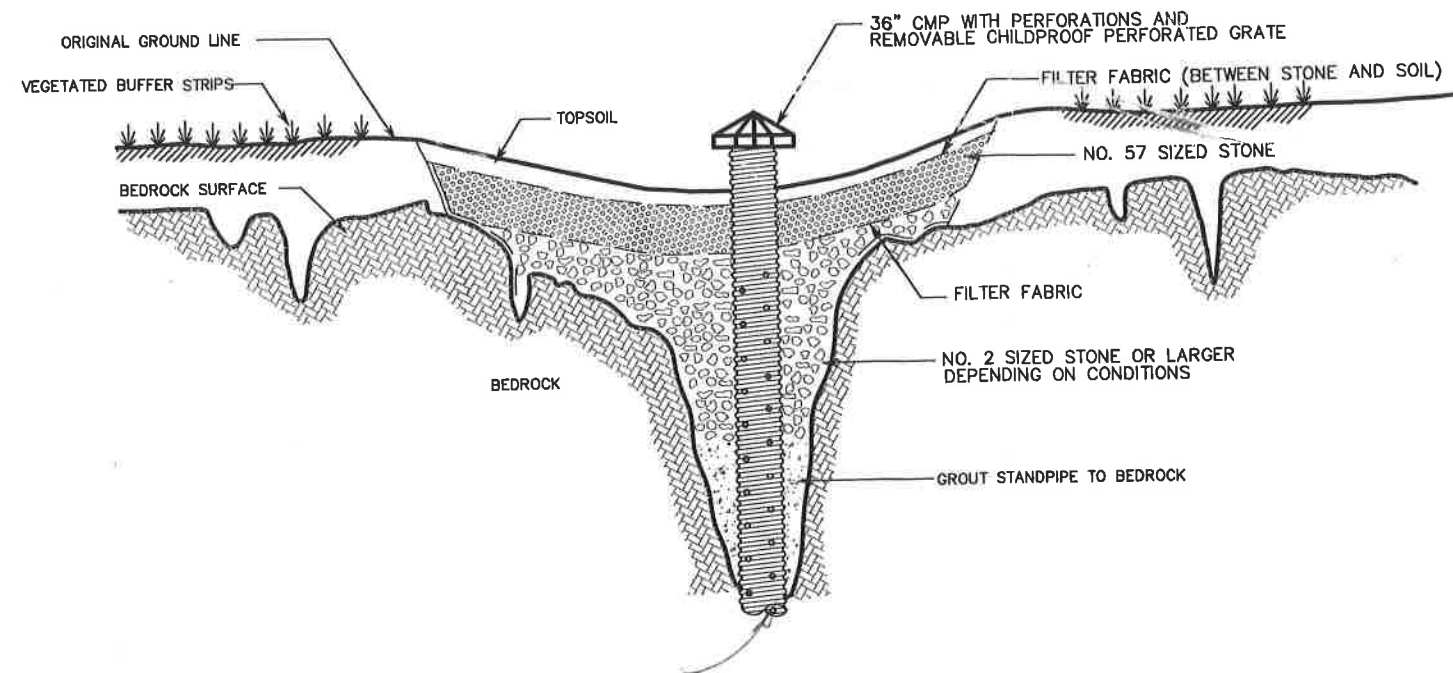
***Proposed Geer's Reserve Development
Preliminary Geotechnical Investigation
Lebanon, Tennessee
GDG Project No. 07092***

DETAILS
Generalized Sinkhole
Repair Schematics

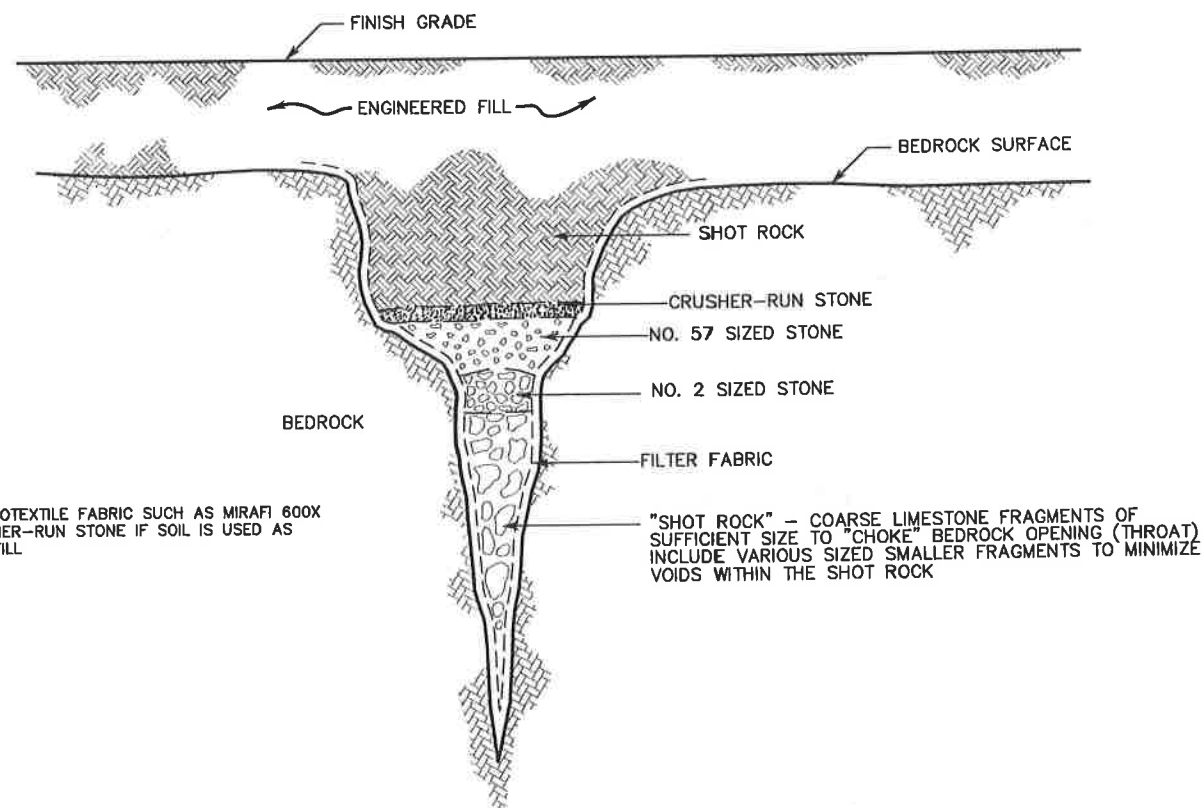




STRUCTURAL SINKHOLE REPAIR



INJECTION WELL SCHEMATIC



NON-STRUCTURAL SINKHOLE REPAIR

NOTE:

INSTALL A GEOTEXTILE FABRIC SUCH AS MIRAFI 600X ABOVE CRUSHER-RUN STONE IF SOIL IS USED AS ENGINEERED FILL

"SHOT ROCK" - COARSE LIMESTONE FRAGMENTS OF SUFFICIENT SIZE TO "CHOKE" BEDROCK OPENING (THROAT) INCLUDE VARIOUS SIZED SMALLER FRAGMENTS TO MINIMIZE VOIDS WITHIN THE SHOT ROCK

NOTE:

ACTUAL DIMENSIONS OF EXCAVATION AND VOLUMES OF BACKFILL MATERIAL WILL BE BASED ON THE GEOTECHNICAL ENGINEERS FIELD OBSERVATIONS DURING THE REPAIR

SINKHOLE REPAIR TABLE		
SINKHOLE NO.	GENERAL INFORMATION	REPAIR SCHMATIC
#1	UNDISTURBED - NO BUILD ZONE	N/A
#2	UNDISTURBED - NO BUILD ZONE	N/A
#3	INJECTION WELL - NO BUILD ZONE	INJECTION WELL
#4	TO BE REPAIRED	STRUCTURAL REPAIR
#5	TO BE REPAIRED	STRUCTURAL REPAIR
#6	TO BE REPAIRED	STRUCTURAL REPAIR
#7	TO BE REPAIRED	STRUCTURAL REPAIR
#8	TO BE REPAIRED	NON-STRUCTURAL REPAIR
#9	NO BUILD ZONE	N/A
#10	NOBUILD ZONE	N/A
#11	UNDISTURBED - NO BUILD ZONE	N/A
#12	INJECTION WELL - NO BUILD ZONE	INJECTION WELL
#13	UNDISTURBED - NO BUILD ZONE	N/A
#14	UNDISTURBED - NO BUILD ZONE	N/A
#15	TO BE REPAIRED	NON-STRUCTURAL REPAIR
#16	TO BE REPAIRED - NO BUILD ZONE	NON-STRUCTURAL REPAIR
#17	TO BE REPAIRED - NO BUILD ZONE	NON-STRUCTURAL REPAIR
#18	INJECTION WELL - NO BUILD ZONE	INJECTION WELL
#19	UNDISTURBED - NO BUILD ZONE	N/A



Geosciences Design Group
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"Working on foundations for the future"

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447 Metroplex Drive



STOCKTON BUILDING CORPORATION

GEER'S RESERVE
U S HIGHWAY 70
LEBANON, TENNESSEE

Date:
JUNE 2007
GDG Project Number:
07092

DETAILS



GEOSCIENCES DESIGN GROUP

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GEOTECHNICAL

Surface Investigations
Sinkhole Evaluation
Groundwater Studies
Engineering/Geology
Seismic Studies

FACILITIES

Distress Studies
Pavement Studies
Building Condition
Mold/Radon

ENVIRONMENTAL

Phase I Studies
Phase II Investigations
Hydrogeology
Lead/Asbestos
Erosion Control Inspections

CONSTRUCTION TESTING

Soil
Concrete
Steel