

# Tri-County Health Department

Serving Adams, Arapahoe and Douglas Counties

Richard L. Vogt, M.D.  
Executive Director

## CERTIFICATION OF INDIVIDUAL SEWAGE DISPOSAL SYSTEM

This certifies that Individual Sewage Disposal System (ISDS) at  
1685 Castlewood Drive Franktown CO 80116  
Subdivision: Castlewood North County: Douglas  
has been permitted and installed in compliance with Tri-County Health  
Department Regulation Number I-96. A file for the ISDS will be kept in  
our Castle Rock office.

### SUMMARY OF INFORMATION

The permit number for the system was: 2001-07-011864

The soils and percolation test was performed by: Hometake Engineering

The design engineer for the system was: Colorado Soil Llc

The system was installed by: Douglas County Septic

The system consists of:

- 1,250 gallon septic tank
- 1,250 gallon dosing tank
- 9,000 square foot absorption area.

The system is sized for 5 bedrooms. If additional bedrooms are  
added, an expansion may be necessary.

#### Maintenance Requirements:

The septic tank must be pumped and inspected every 4 years

If the septic or dosing tank is equipped with an effluent filter, the  
filter must be cleaned annually

If the system has alternating beds or is a drip irrigation system, beds or  
zones must be rotated annually

Additional maintenance requirements may apply. Refer to the operations  
manual or engineer's report for specific requirements.

Signature:

  
HAUBERT, NICOLE

Date: 3-12-02



2001-07-  
PERMIT # 1011864

**TRI-COUNTY HEALTH DEPARTMENT**  
Serving Adams, Arapahoe and Douglas Counties

APPLICATION TO  
 INSTALL(255)  REPAIR(256)  EXPAND(256)  
\$300 \$250 \$250  
AN INDIVIDUAL SEWAGE DISPOSAL SYSTEM

ADDRESS OF PROPERTY SERVED BY PROPOSED SYSTEM:

1685 Castlewood Drive FRANKTOWN  
Street Address City  
80116 DOUGLAS  
Zip Code County

Parcel NW 1/4 Sec NW 1/4 Sec 3 Section 3 Township 8S Range 66W Lot 37 Block \_\_\_\_\_  
Legal Description (if no street address) Principal Meridian = 6

CASTLEWOOD NORTH \_\_\_\_\_  
Subdivision Name Filing (if applicable)

If GPS Information Available/Obtained: Longitude \_\_\_\_\_ Latitude \_\_\_\_\_ Elevation \_\_\_\_\_

Property Owner:  
Name William A. Hall  
Address 14296 E. Whitaker Place #103  
City, State Aurora, Colorado  
Zip 80015 Phone 303-693-9709

Applicant: \* SAME AS Property owner  
Name \_\_\_\_\_  
Address \_\_\_\_\_  
City, State \_\_\_\_\_  
Zip \_\_\_\_\_ Phone \_\_\_\_\_

Systems Contractor: Homestake  
Soils/Percolation Test Engineer Homestake

**TCHD Use Only: License #** \_\_\_\_\_

**TCHD Use Only: FSE #** \_\_\_\_\_

Design Engineer (if applicable) Colo. Soil

Job # 00-1107-1

Job # 01-1408

**TCHD Use Only: FSE #** \_\_\_\_\_

Is this to be an Engineered System?  Yes  No

Lot Size: 10.98 ACRES

Is Lot Marked and Are Perc Holes Staked?  Yes  No

PROPOSED FACILITY:

Single Family (SF)  Multi-Family (MF)  Commercial (CM)  Other (OT) \_\_\_\_\_

WATER SUPPLY: WELL Permit No. #233360

On Site:  Yes  No Community Water  Yes  No If Yes, Supplier \_\_\_\_\_

WELL TO BE DRILLED

Continued on back

*SINGLE FAMILY RESIDENTIAL GENERAL INFORMATION:*

Number of Bedrooms 3 Basement:  Full (F)  Walkout(W)  Partial(P)  None(N)

Basement Plumbed:  Yes  No

Are Additional Bedrooms Planned?  Yes  No Are the premises within 400 ft. of a sewer line?  Yes  No

Is property within boundaries of a sewer district?  Yes  No

If Yes, name of sewer district \_\_\_\_\_

*COMMERCIAL GENERAL INFORMATION:*

Type of Business: \_\_\_\_\_

~~TCHD Use Only SIC Code \_\_\_\_\_~~

~~Number of Employees \_\_\_\_\_~~

~~Design Flow > 3,000 Gallons/Day  Yes  No~~

~~If Yes, has Site Approval been given from CDPHE?  Yes  No~~

~~(Note: Permit cannot be issued until site approval is given from CDPHE)~~

~~Floor Drains  Yes  No~~

~~EPA Shallow Injection Well Inventory Request Form Completed  Yes  No~~

Date Paid: 6-28-01 Received By: ba

Payment Type:  Cash  
 Check (# 103)  
 Charge  
 Other \_\_\_\_\_

Amount Paid \$ 300.00

Applicant's Name William A. Hall  
Please Print

Applicant's Signature William A. Hall Date 20 OCTOBER, 2000

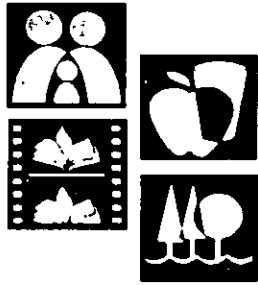
Aurora  
15400 E. 14<sup>th</sup> Place  
Suite 309  
Aurora, CO 80011  
303-341-9370

Castle Rock  
101 3<sup>rd</sup> Street  
Castle Rock, CO 80104  
303-663-7650

Commerce City  
4301 E. 72<sup>nd</sup> Avenue  
Commerce City, CO  
80022  
303-288-6816

Englewood  
4857 S. Broadway  
Englewood, CO 80110  
303-761-1340

Northglenn  
10190 Bannock Street,  
Suite 100  
Northglenn, CO 80221  
303-452-9547



# Tri-County Health Department

Permit # 100-107-011864

Serving Adams, Arapahoe and Douglas Counties  
**PERMIT TO CONSTRUCT**

**AN INDIVIDUAL SEWAGE DISPOSAL SYSTEM**  
Tri-County Health Department

7000 East Belleview Avenue Suite 301  
Englewood, Colorado 80111

Chris J. Wiant, M.P.H., Ph.D.  
Executive Director

Owner **WILLIAM A. HALL**  
Location: **1685 Castlewood Drive Franktown CO 80116**  
Subdivision: **Castlewood North** County: **Douglas**

=====

**Design Requirements:**

Install system per specifications of the Design Engineer

Number of Chambers: Refer to TCHD Form #S-183 Rev Date 12/15/97

**\*\*\*Special Conditions\*\*\***

INSTALL SYSTEM AS PER COLORADO SOILS DESIGN PROJECT #01-1408  
2-1250 GALLON TANKS AND 8800 SQUARE FOOT FIELD.

=====

A Permit to **CONSTRUCT** shall expire **ONE YEAR** from the date of issuance unless extended to a fixed date upon request by the Applicant and approved by the Tri-County Health Department.

This Permit Expires: **07/05/2002**

Issued by: Kleckner, John T., John Kleckner EHS  
Tri-County Health Department on July 5, 2001

OWNER MUST MAKE SURE THAT HIS/HER ENTIRE WASTE DISPOSAL SYSTEM REMAINS OPEN FOR INSPECTION UNTIL IT HAS RECEIVED APPROVAL BY TRI-COUNTY HEALTH DEPARTMENT. TRI-COUNTY HEALTH DEPARTMENT CANNOT ASSUME RESPONSIBILITY IN CASE OF FAILURE OR INADEQUACY OF A WASTE DISPOSAL SYSTEM BEYOND CONSULTING IN GOOD FAITH WITH THE PROPERTY OWNER.

Permit Fee: 300.00 Payment Method Check #103

Received By: on 06/28/2001

( ) Owner Copy ( ) Bldg. Dept. Copy ( ) Installer Copy ( ) H.D.

For Accounting Use Only:  
680-500000

300.00

# **Colorado Soil** **LLC**

March 1, 2002

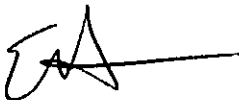
Tri-County Health Department  
101 3<sup>rd</sup> Street  
Castle Rock, CO 80104

Subject: Engineered Septic System Inspection Letter  
1685 Castlewood Drive  
Douglas County, Colorado  
Colorado Soil, LLC Project Number 01-1408

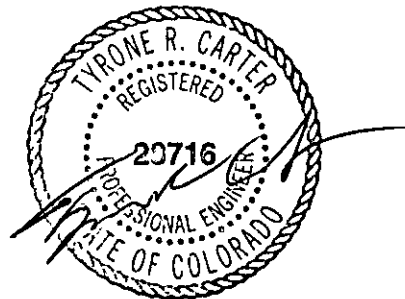
Colorado Soil, LLC made a final inspection of the subject engineered septic system on February 27, 2002. The septic system was low pressure drip irrigation and was installed in accordance with the engineers plans and specifications and Tri-County Health Department Regulations.

If you have any questions regarding this letter, please feel free to contact the undersigned.

Sincerely,



Elaine Gilman  
Inspection Dept. Mgr.



Reviewed by: Tyrone R. Carter, P.E.  
Principal

# ONSITE SYSTEM AS-BUILT DRAWING

*Nicole.*

Property Address 1685 Castlewood Drive

Permit # \_\_\_\_\_

Engineer Job # Colo. Soils 01-1408

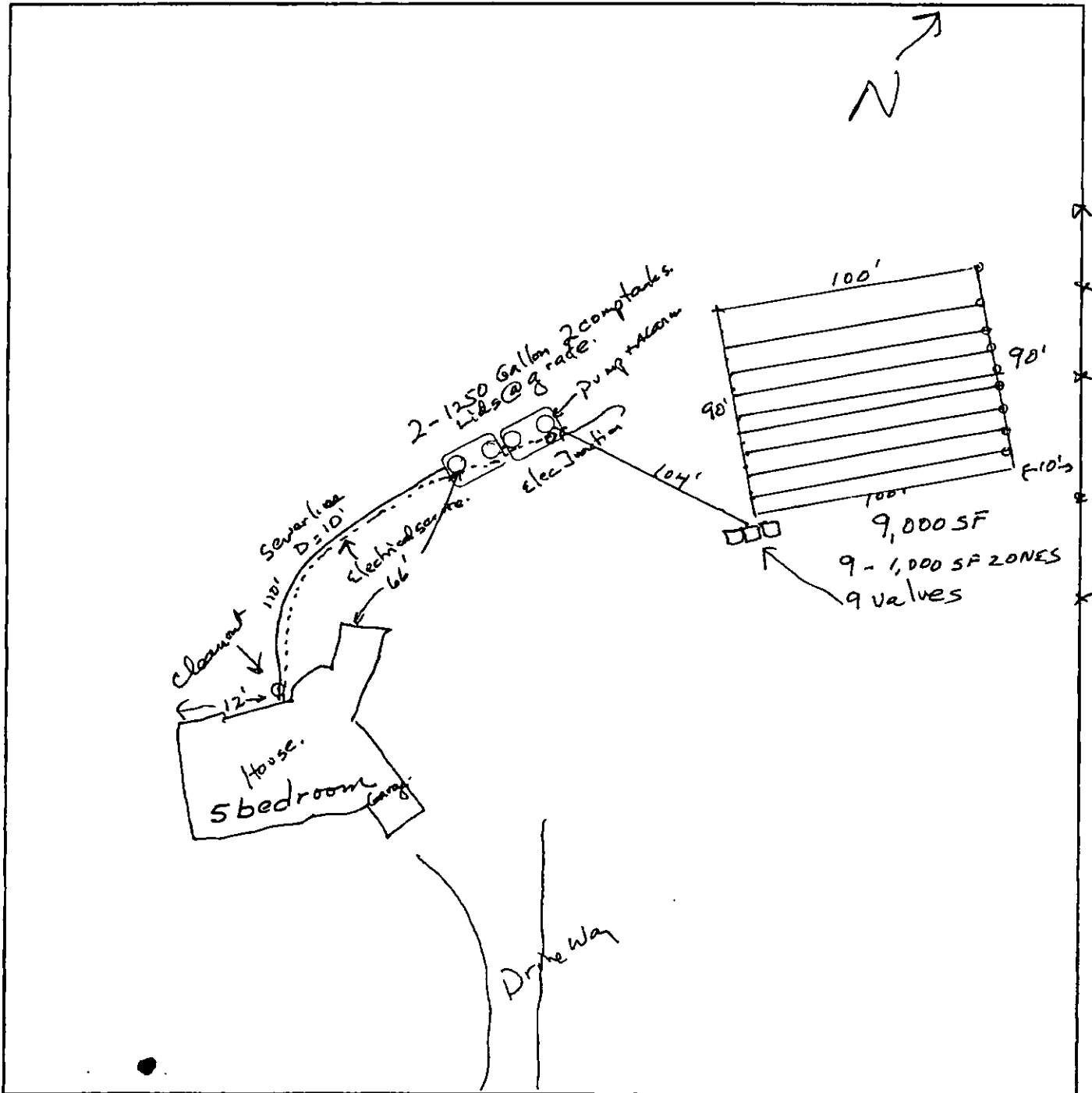
Date system completed 2/28/02.

Installer: Douglas County Septic

10333 Wildlife Way

Littleton, CO 80125

Tel: 303-791-7716



Castlewood Drive.

**ISDS INSPECTION**

Partial

Final

Date: 2-22

Time: 12:25 pm

Date Ready: 2-25 pm

Permit #: \_\_\_\_\_

Address of Property: 1685

Castlewood Dr

Installer: Michael-Doug Co.  
303- Septic

Phone #: 912-3514

Chambers: B or T # Units \_\_\_\_\_

Engi? Colo Soils 8800  
Sq. Ft

Insp. Waived? Y  By: \_\_\_\_\_

**FINAL VISIT WORKSHEET**

Permit Number: 2001-07-011864

Date Printed: July 5, 2001

Property Location: 1685 Castlewood Drive Lot 37

County: Douglas

Owner: William A. Hall

System Installer#: Douglas Co. Septic (This will appear on the Certification Letter)

System sized for 5 Bedrooms

**SITE INFORMATION:**

Keys for completing information on installed tanks:

Usage (D)osing (T)reatment (V)ault

Tank Type: (C)oncrete (PT)Polyethelene (FG)Fiber Glass

**TANK INFORMATION**

Number of Tanks Installed: 2

Tank Size in gallons and Usage:

Tank 1:

Size 1250 Use (D)  (T) (V)  
 Type  (C) (PT) (FG) T's or Baffles (T) (B) Effluent Screen Y  (N)

Tank 2:

Size 1250 Use  (D) (T) (V)  
 Type  (C) (PT) (FG) T's or Baffles (T) (B) Effluent Screen Y  (N)

Tank 3:

Size \_\_\_\_\_ Use (D) (T) (V)  
 Type (C) (PT) (FG) T's or Baffles (T) (B) Effluent Screen Y N

Secondary Treatment System Y  (N) If yes, type: (circle one)

Sand Filter (SF) Constructed Wetlands (CW) Trickling Filter (TF)  
 Aerobic System (AS) Recirculating Sand Filter (RSF) Other (OT)

Final Treatment Type:

Bed (BD) Mound (MD) Trench (T)  
 ET (ET) Pond (PD) Sand Filter (SF)  
 Bed (Chambers) (BD-CH) Trench SB-2 (TR-SB) Drip Irrigation  (DR)  
 Trench (Chambers) (TR-CH) Other (OT)  
 Area Size (s.f.) ~~4500~~ 9000 If Chambers Used, # \_\_\_\_\_ ET Lined Y N

Method of Waste Water Application:

Dosed w/Pump  (DP) Dosed w/Siphon (DS) Gravity (GR)  
 Uniformly Dosed w/ Pump (UDP) Uniformly Dosed w/ Siphon (UDS)

\*\*\*Continued on Next Page\*\*\*



FINAL VISIT WORKSHEET

Permit Number: 2001-07-011864

Date Printed: July 5, 2001

RECORD OF FINAL VISITS:

(It is important to record any extra visits for billing purposes)

Visit 1 Date 2-27-02 By (EHS #) 1365

Visit 2 Date \_\_\_\_\_ By (EHS #) \_\_\_\_\_

Visit 3 Date \_\_\_\_\_ By (EHS #) \_\_\_\_\_

Visit 4 Date \_\_\_\_\_ By (EHS #) \_\_\_\_\_

System Engineer Inspection Y N Date \_\_\_\_\_

Design Engineer # \_\_\_\_\_ (This will appear on Certification Letter)

FINAL SITE VISIT COMMENTS:

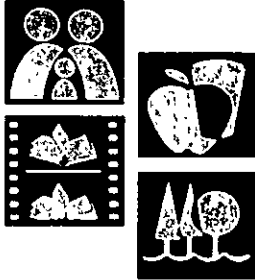
-could not observe inside tanks - they were down

about ~ 10' & had risers & ladders on them

rec'd 3/11/02 rec'd 3/7/02

- need as-built + engr letter

Final Approval Given  Y  N By (EHS #) 1365



# Tri-County Health Department

Serving Adams, Arapahoe and Douglas Counties

Chris J. Want, M.P.H., Ph.D.  
Executive Director

William A. Hall  
14296 E. Whitaker Pl. 103  
Aurora CO 80015

RE: Individual Sewage Disposal System located at:  
1685 Castlewood Drive, Permit # 2001-07-011864

On Feb. 27, 2002, a partial septic system inspection was conducted on the above referenced property. The following item(s) must be completed and/or submitted prior to this Department giving final approval of your Individual Sewage Disposal System installation:

- As-Built Drawing from System Installer
- Final Approval Letter from System Engineer
- System Engineer's Letter Regarding Pump Station
- Signed Plot Plan
- Installation of a Snifter Valve
- Other: \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_

If the Individual Sewage Disposal System is not approved for use by this Department, the file will reflect this and it may prevent the issuance of a Certificate of Occupancy or have an adverse effect on any future sale of this property.

If you have any questions concerning this letter, please call 303/663-7650.

Sincerely,

Environmental Health Specialist  
Tri-County Health Department



# TRI-COUNTY HEALTH DEPARTMENT

## RECORD OF COMMUNICATION

Permit Number and/or Address of System:

---

---

Notes[(indicate date, EHS, person contacted (indicate whether property owner, builder, installer, soils engineer, design engineer, etc.), and what was discussed and agreed upon]:

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

SITE VISIT WORKSHEET

Permit Number: 2001-07-011864

Date Printed: June 28, 2001

Property Location: 1685 Castlewood Drive Lot 37

County: Douglas

Owner: William A. Hall

SITE INFORMATION AS REPORTED BY ENGINEER:

PERC RATE:

Holes:

One 240 Two 120 Three 120 Four \_\_\_\_\_ Five \_\_\_\_\_ Six \_\_\_\_\_ Avg Rate 160 Sizing Rate 160

CIRCLE ONE:

Bedrock Encountered? Yes No If Yes, Type Claystone Depth to Bedrock (ft) 5

Ground Water Encountered? Yes No If Yes, Depth to Groundwater (ft) \_\_\_\_\_

Ground Slope at Absorption Area (%) 2

Max depth of disposal area (in) 30 (not to exceed depth of percolation test holes)

Min depth of disposal area (in) 12

SOIL CLASSIFICATION: Most prohibitive soil below bottom of bed (circle one)

- CL Clay (low-med plasticity) CH Clay (high plasticity) MH Silt
ML Silt ML-CL Silt & Clay SC Clayey Sand
SM-SC Silty Clayey Sand SM Silty Sand SW Sand, Well Graded
SP Sand, Poorly Graded GC Clayey Gravel GM-GC Silty Clayey Gravel
GM Silty Gravel BR Bedrock GW Gravel, Well Graded

FIELD OBSERVATIONS: Test Pit Waived Yes No

Field Observations Consistent with Engineer's Data: Yes No

IF NO, complete below (circle one)

Bedrock Encountered? Yes No If Yes, Type \_\_\_\_\_ Depth to Bedrock (ft) \_\_\_\_\_

Ground Water Encountered? Yes No If Yes, Depth to Groundwater (ft) \_\_\_\_\_

Ground Slope at Absorption Area (%) \_\_\_\_\_

Max depth of disposal area (in) \_\_\_\_\_ (not to exceed depth of percolation test holes)

Min depth of disposal area (in) \_\_\_\_\_

SOIL CLASSIFICATION:

- CL Clay (low-med plasticity) CH Clay (high plasticity) MH Silt
ML Silt ML-CL Silt & Clay SC Clayey Sand
SM-SC Silty Clayey Sand SM Silty Sand SW Sand, Well Graded
SP Sand, Poorly Graded GC Clayey Gravel GM-GC Silty Clayey Gravel
GM Silty Gravel BR Bedrock GW Gravel, Well Graded

CONTINUED ON THE NEXT PAGE

SITE VISIT WORKSHEET

Permit Number: 2001-07-011864

Date Printed: June 28, 2001

RECORD OF SITE VISITS:

(It is important to record any extra visits for billing purposes)

Visit 1 Date 7/2/2001 By (EHS #) 1555

Visit 2 Date \_\_\_\_\_ By (EHS #) \_\_\_\_\_

Visit 3 Date \_\_\_\_\_ By (EHS #) \_\_\_\_\_

Visit 4 Date \_\_\_\_\_ By (EHS #) \_\_\_\_\_

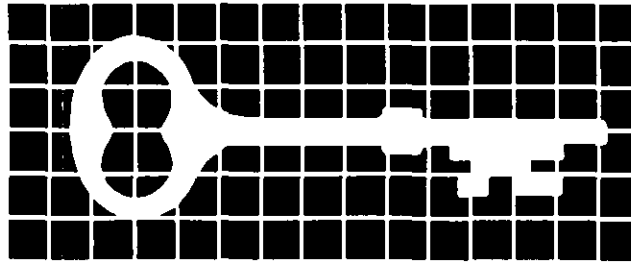
SPECIAL CONDITIONS

Install system as per Colo. Soils design project # 01-1405  
2-1250 Tanks and 8800 sq ft field.

COMMENTS

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Signature TCHD Inspector: John Klebaner Date 7/2/2001



# **HOMESTAKE SOIL TESTING**

Incorporated

**SUBSURFACE INVESTIGATION**

**AND**

**PERCOLATION TEST**

**OF**

**LOT 37, CASTLEWOOD NORTH  
FRANKTOWN, COLORADO  
DOUGLAS COUNTY**

**PREPARED FOR:**

**BILLY HALL  
14296 E. WHITAKER PLACE #103  
AURORA COLORADO 80015**

**REPORT NO. 00-1107-1**

**JULY 18, 2000**

10965 S. Pikes Peak Dr.  
Parker, Colorado 80138  
Telephone (303) 841-5607

## TABLE OF CONTENTS

|   |         |
|---|---------|
| Limited Use Of This Document                                | Page 2  |
| Site Conditions   | Page 2  |
| Conclusions and Foundation Recommendations                  | Page 2  |
| General   | Page 3  |
| Field and Laboratory Investigation                          | Page 3  |
| Design and Construction Details, Slab on Grade Construction | Page 3  |
| Surface Drainage  | Page 5  |
| Subsurface Drainage and Basement Construction               | Page 5  |
| Reinforcing   | Page 6  |
| Variations in Subsurface Conditions                         | Page 6  |
| Details of Foundation Drain System (Figure 1)               | Page 7  |
| Framing Detail (Figure 2)                                   | Page 8  |
| Preferred Method of Drainage (Figure 3)                     | Page 9  |
| Location Map (Figure 4)                                     | Page 10 |
| Log of Test Holes   | Page 11 |
| Swell-Consolidation Tests                                   | Page 12 |
| Atterberg Limits Determination                              | Page 14 |
| Tri-County Health Department Percolation Test               | Page 15 |
| Sieve Analysis and Grain Size Distribution Curve            | Page 19 |

## LIMITED USE OF THIS DOCUMENT

This document is not transferable to any person or entity other than that person or entity whose name appears on this document. This is because the recommendations contained herein are specific to the information provided to Homestake Engineering, P.C. relating to the intended use of this document including but not limited to planned structures, elevations, depth of excavation etc.

No person, entity, government or any other entity shall lawfully accept the recommendations contained in this document unless the name of the person providing this document is the same as the name on the document.

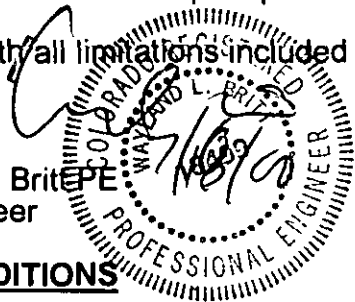
Persons other than the person whose name appears on this document should contact Homestake Engineering, P.C. to obtain additional information relating to the limited use of this information.

Homestake Engineering, P.C. nor any of its agents will accept responsibility in any way for the use of this document by anyone other than the person whose name appears on this document.

The certification below is for Soils and Foundation Engineering only and should not be considered a foundation plan provided by a Structural Engineer.

Certified with all limitations included in this report.

Wayland L. Britton  
Civil Engineer



## SITE CONDITIONS

At the present time the site is undeveloped, and it is our understanding that a residence is planned for this site.

## CONCLUSIONS AND FOUNDATION RECOMMENDATIONS

Due to the amount of settlement of the soil, we recommend that his structure should be supported on grade beams and straight shaft piers (caissons) drilled a minimum length of twenty-four feet (24') and a minimum penetration into the bedrock a depth of ten feet (10'), or to refusal. These drilled piers may be from ten inches (10") to twenty four inches (24") in diameter and should be designed for a maximum end bearing pressure of 10,000 pounds per square foot (psf), a side shear of 1,000 psf, for the lowest ten foot (10') only, and a minimum dead load of 4,000 psf based on pier end area. A void or clear space of four inches (4") shall be provided under the concrete grade beams and between the drilled piers to allow for soil expansion and settlement. The contractor will have casing available for the first few feet of the holes. If water is encountered during the drilling of the piers, casing will be required and Type II cement shall be used. The drilled pier holes should be thoroughly cleaned of all loose soil and filled with concrete immediately after drilling to prevent infiltration of water or loose soil. The concrete piers shall be reinforced for their full length with a minimum of three number five (3, #5) steel bars. This reinforcing steel shall extend into the foundation wall a minimum of two feet (2'). Concrete for each pier shall be formed at the top of the pier with "Sonotube", or equal, to maintain a uniform diameter of the pier. Three inches (3") wide and thick



shear rings at one-foot (1') intervals for the lowest ten feet (10') to be provided. The soils engineer must conduct an inspection during the drilling of the piers.\*

The design of this situation must consider lateral earth pressure. Proper precautions in the design must be taken to assure the walls can withstand an equivalent fluid pressure of 35 psf per foot of depth against the foundation walls.

**\*Due to the complexity of the site, the minimum number of test holes drilled, and the potential for the need of the soils engineer to make adjustments to the recommendations at the site, this report must be supplemented by a drilled pier inspection report provided by the writer of this report. If this requirement is not followed, the Engineer's certification on this report is not valid.**

## **GENERAL**

This report presents the results of data obtained during the subsoil investigation of Lot #37 of Castlewood North subdivision in Franktown, Colorado. This investigation was made to determine the most suitable type and depths of the foundation system, allowable soil bearing pressures, ground water conditions and problems that may be encountered during and after construction due to the soil and ground water conditions.

## **FIELD AND LABORATORY INVESTIGATION**

Two (2) exploratory test holes were drilled on July 11, 2000 at the locations on the site as shown on the Location Map (Figure 4). The test holes were drilled with a four-inch (4") diameter power auger.

At specific intervals, the drilling tools were removed from the test holes and soil samples were obtained with a two-inch (2") inside diameter spoon sampling tube. The depths at which soil samples were taken are shown on the Log of Test Holes.

All soil samples were carefully inspected and classified in the field and laboratory. The samples were subjected to visual inspection and laboratory testing in order to evaluate the physical and mechanical properties of the materials encountered. The natural moisture content and the natural dry density were obtained from relatively undisturbed drive samples of typical materials encountered. Swell-Consolidation tests were also performed on typical samples of soil. These tests indicate the behavior of the soil upon various loading and wetted conditions.

The soil in test hole #1 consisted of silty clay to six-foot (6') depth, light brown silt to twelve-foot (12') depth, siltstone to nineteen-foot (19') depth, and claystone through twenty-foot (20') depth.

The soil in test hole #2 consisted of silty clay to 4-foot (4') depth, gravely stone to nine-foot (9') depth, and sandstone through twenty-foot (20') depth.

Test hole #1 and #2 were drilled to a depth of twenty feet (20'). No free water was encountered during the drilling process.

## **DESIGN AND CONSTRUCTION DETAILS, SLAB ON GRADE CONSTRUCTION**

### **UNFINISHED AREAS:**

The estimated slab settlement is in the order of two to three inches (2"-3"). If the owner is willing to accept the risk of this amount of floor slab movement, the natural soils are suitable for the support of exterior concrete slabs, garage slabs, and unfinished

basement floor slabs. However when these soils have an increase in the moisture content and become wetted, they will settle, thus cracking the concrete slabs. The builder and future owners should be aware of and understand that there is a definite risk of future damage with any slab on grade construction. We recommend the following:

1. Provide reinforcing to the slab sufficient to minimize cracking. The design engineer should feel free to contact the soils engineer for additional information required.
2. Separate the slab from all load bearing members and utility lines to allow for independent movement of the slab. Provide a positive control or slip joint at the construction joint between the slab and foundation walls.
3. Provide frequent scoring of the slabs to provide control joints for possible cracking of the slab. Control joints should be placed to provide approximate slab areas of 200 square feet.
4. The soils that will support the concrete slabs should be kept moist during construction by occasional sprinkling of water and especially a day or so prior to pouring of the slab.
5. Provide compaction of the soil below the slab a minimum of one foot (1') below the bottom of the slab. A sample of the soil must be brought into Homestake's office 24 hours prior to testing. Homestake must test the soil to assure that it has been compacted to 90% of its Standard Proctor Density at 0-4% above optimum moisture content. Please contact our office for further details.

#### **FINISHED AREAS:**

If the builder and future owners are not willing to risk exterior concrete slab, garage slab, or unfinished basement floor slab movement, the following recommended details should be carefully followed during construction of the interior floor slabs. Experience with similar soil conditions has shown that these details will help to prevent wetting of the soils under the slabs and will minimize damage when wetting of the soil does occur. It will also buffer the settlement of the sub-graded soil and manage the moisture in the soil.

1. Provide two and one-half feet (2½') of non-expansive soil below the slabs. Below this elevation there should be placed 6 inches (6") of one and one-half inch (1½") crushed washed rock. This is a requirement. Further, the more non-expansive soil utilized, the less the potential for slab cracking and associated damages.
2. Provide reinforcing to the slab sufficient to minimize cracking. The design engineer should feel free to contact the soils engineer for additional information required.
3. Separate the slab from all load bearing members and utility lines to allow for independent movement of the slab. Provide a positive control or slip joint at the construction joint between the slab and foundation walls.
4. Provide frequent scoring of the slabs to provide control joints for possible cracking of the slab. Control joints should be placed to provide approximate slab areas of 200 square feet.

5. A minimum void or clear space of three inches (3") should be provided at or near the bottom of all non-bearing partitions and furring strips placed over the concrete slabs (see Figure 2). In finished room areas, all drywall and paneling should be stopped about two inches (2") above the top surface of the slab. This will allow some space for upward movement of the slab before pressures are applied to the wall and the upper level of the structure.
6. In the event a hot-water heating system is used, the piping should not be placed beneath the concrete floor slab. In the event a forced air furnace is used, a two-inch (2") collapsible connection should be provided between the furnace and the heat ducts.
7. The soils that will support the concrete slabs should be kept moist during construction by occasional sprinkling of water; especially a day or so prior to pouring of the slab.
8. In the event the builder or future owner desires to provide decorative gravel or bark around the structure, Figure 3 is attached to illustrate one acceptable method of installation. This method will prevent ponding of water near the foundation and provide for proper drainage away from the structure.

For finished basement floors, a structurally supported floor with an air space below the floor is an option. The required space depends upon the swell potential, the type of floor system used, and the moisture changes after construction. We recommend a minimum of 8 inches (8") between the soil and the bottom of floor support at this site. A floor system supported over a crawl space for all non-basement finished living areas is recommended as well. We advocate hanging utility pipes (sewer) below the floor, separated from the soils by a minimum 8-inch air gap. If it is necessary to trench below the pipe to create this gap, the trench can be sloped to drain to the foundation drain. If utility pipes are ground-supported, they should be isolated from the floor and constructed with collapsible connections.

### **SURFACE DRAINAGE**

The backfill soil around the structure should be moistened and well compacted to prevent future settling. The owner should be advised to fill in any settled area to eliminate ponding of water near the structure and to provide adequate slope for proper drainage away from the structure and off of the site at all times.

The finished grade or ground surface near the foundation walls should have adequate slope to provide proper drainage away from the structure and off of the site. A slope of twelve inches (12") in the first twelve feet (12') out from the entire perimeter of the structure is normally considered satisfactory.

Roof downspouts and sill cocks should discharge onto long concrete splashblocks (5 feet long) or into metal gutter extensions to deposit runoff water farther out from the structure and beyond the limits of backfill soil near the foundation walls.

### **SUBSURFACE DRAINAGE AND BASEMENT CONSTRUCTION**

It is possible that a rise in the water table could occur due to inadequate drainage on this site or the surrounding area. Therefore, a foundation drainage system must be installed (see Figure 1).

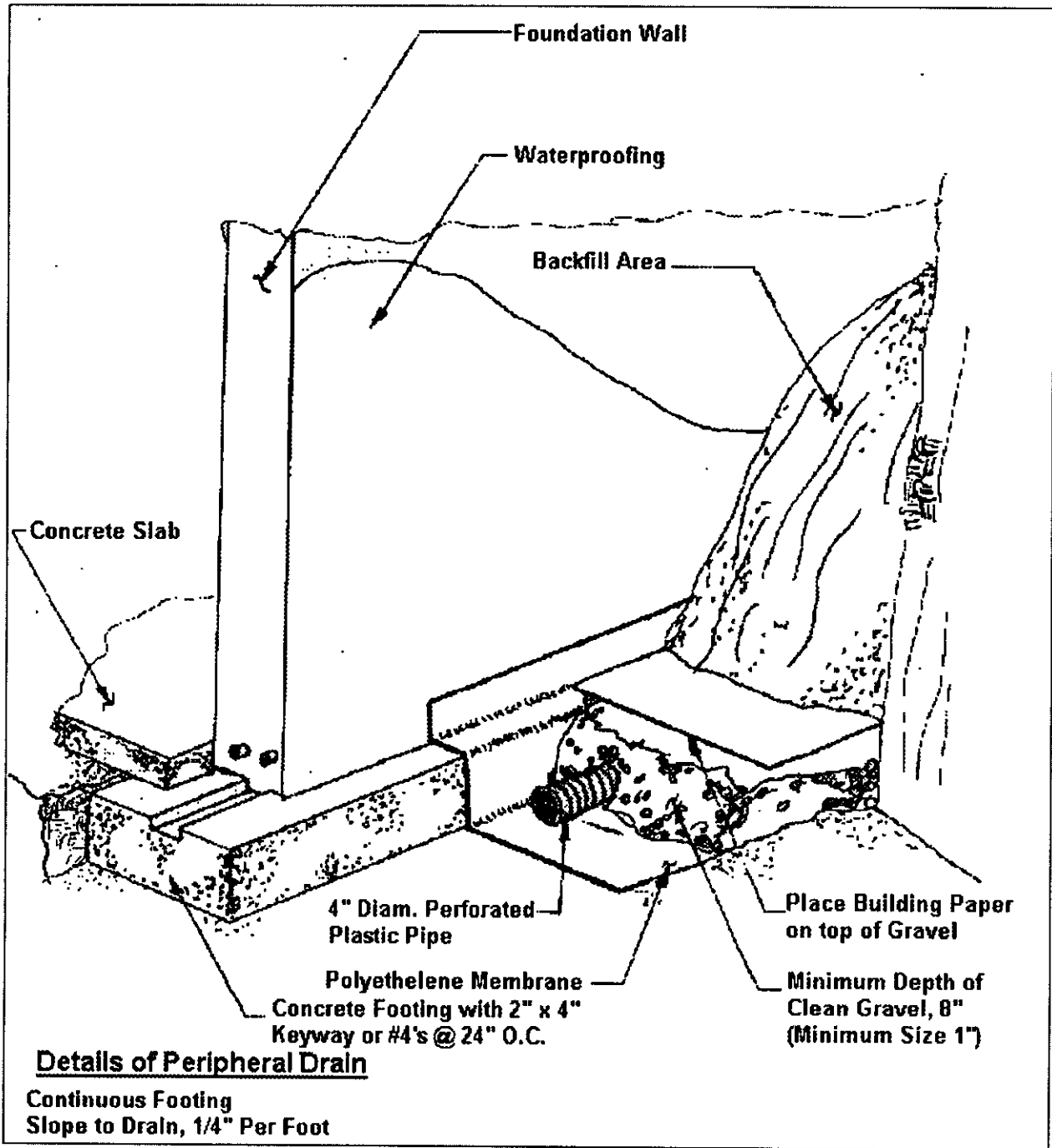
## **REINFORCING**

The concrete foundation walls should be well reinforced at the top and bottom of the walls to clear a span at least a distance of ten feet (10'). This will give the walls beam strength to span or bridge over any soft or loose pockets of soil not found in our exploratory holes or that may develop during construction. This will also help prevent differential movements of the foundation system.

## **VARIATIONS IN SUBSURFACE CONDITIONS**

In any soil investigation it is necessary to assume that the subsurface soil conditions do not vary greatly from the conditions encountered in our field and laboratory testing. Our experience has been that at times soil conditions do change in moisture, groundwater elevation and variations do occur due to the fact that only a nominal number of exploratory holes were drilled. These changes may become apparent at the time of excavation for the foundation system. Soil conditions which may be encountered that are different from the test borings as presented in this report may result in a different or modified foundation system. Consequently, it is required that arrangements be made with our office to inspect the open excavation at your earliest convenience. This inspection is not part of this report and is not included as any part thereof.

**DETAILS OF FOUNDATION DRAIN SYSTEM**



**Figure 1**

## FRAMING DETAIL

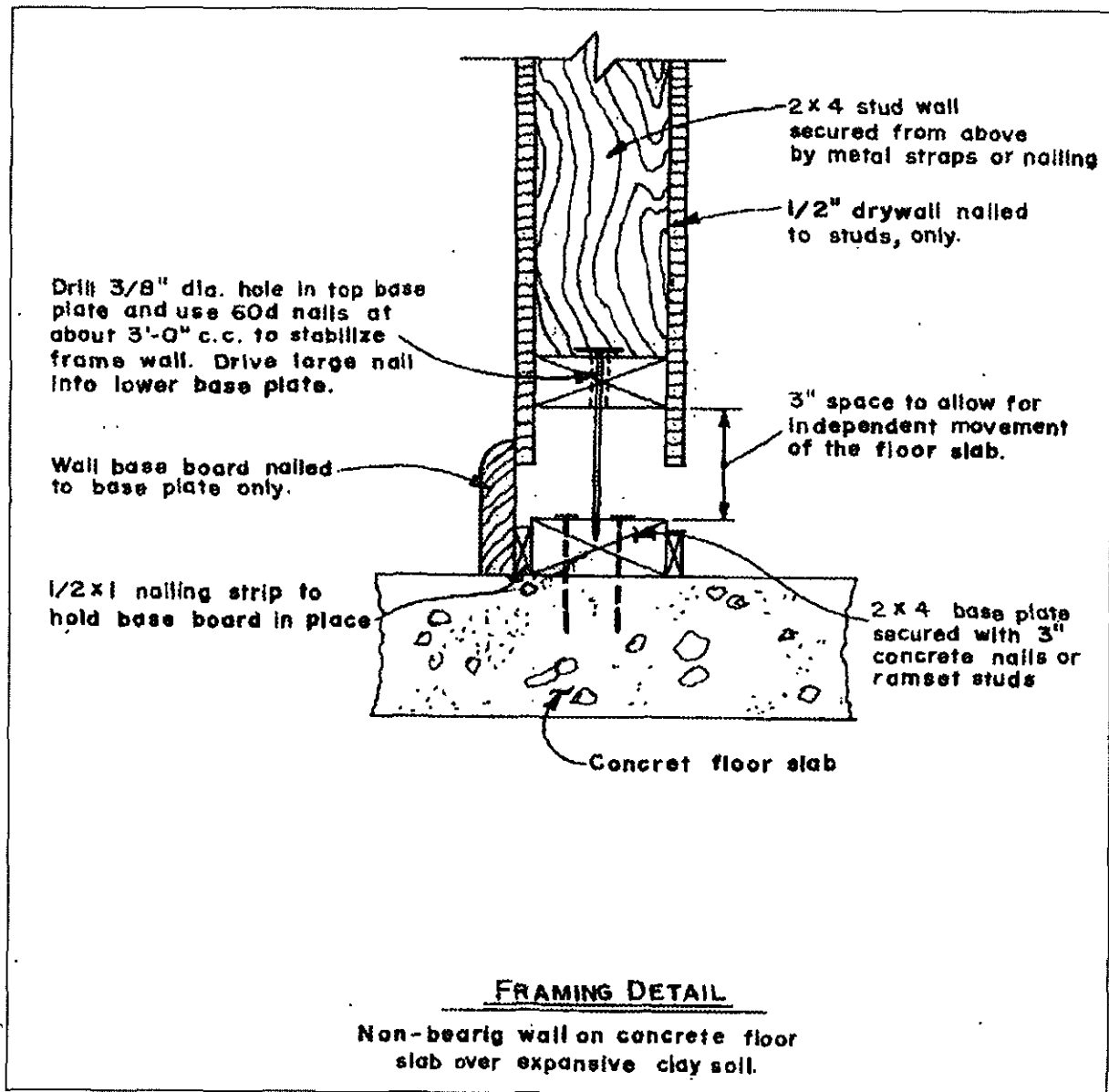


Figure 2

**PREFERRED METHOD OF DRAINAGE**

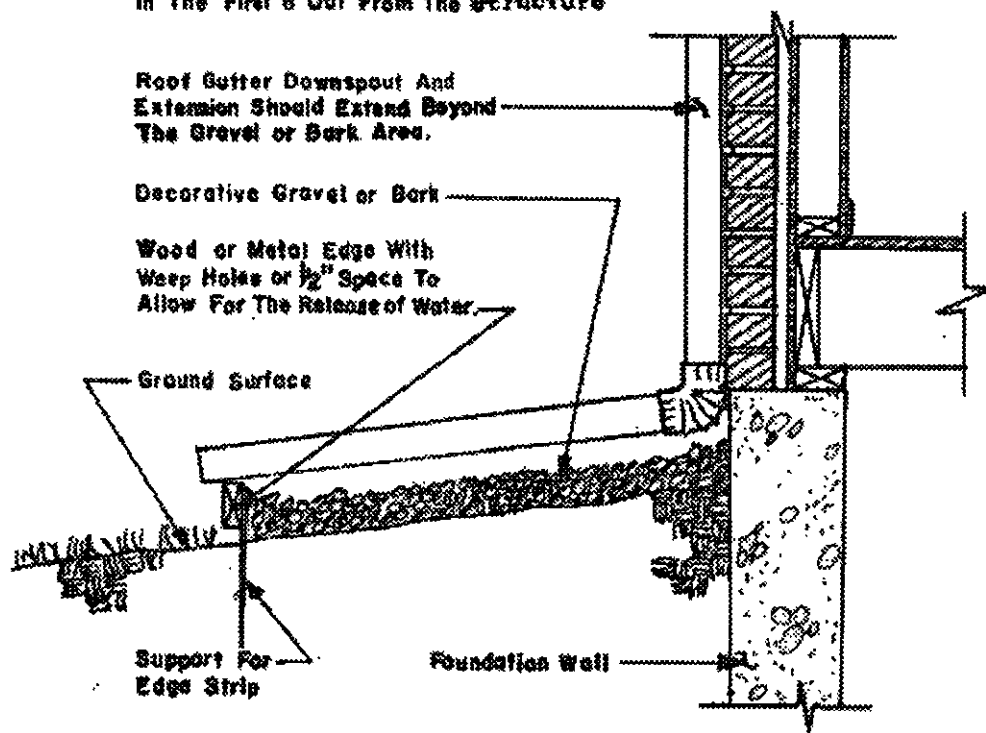
**HOMESTAKE ENGINEERING, PC.**

Provide a Minimum Slope of 6"  
In The First 6' Out From The structure

Roof Gutter Downspout And  
Extension Should Extend Beyond  
The Gravel or Bark Area.

Decorative Gravel or Bark

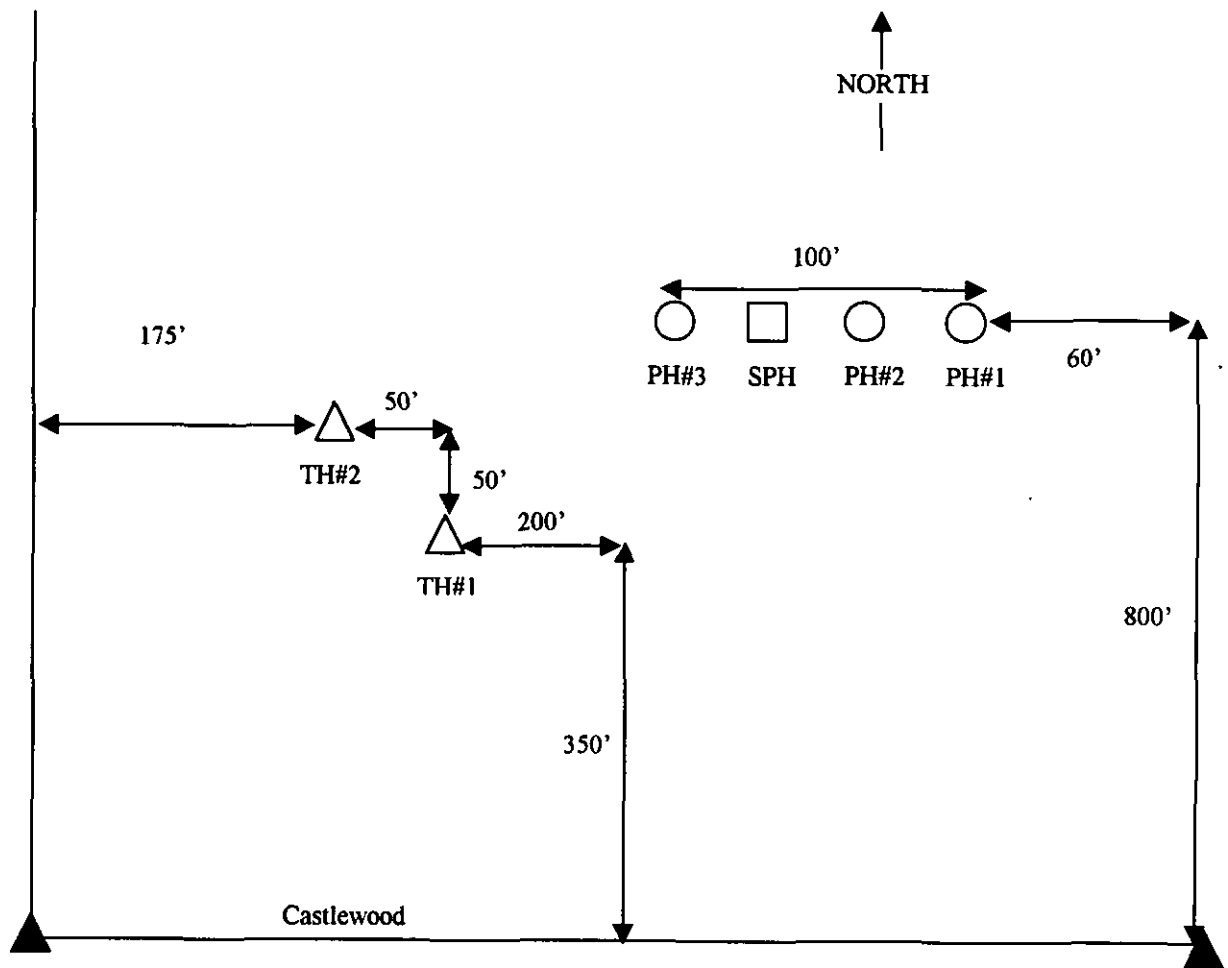
Wood or Metal Edge With  
Weep Holes or  $\frac{1}{2}$ " Space To  
Allow For The Release of Water.



**Figure 3**

## LOCATION MAP

NOTE: SINCE MEETS AND BOUNDS ARE NOT IDENTIFIED ON THE SITE AS A USUAL PRACTICE WE CANNOT BE SURE OF THE ACCURACY OF THIS LOCATION MAP. IT SHOULD BE UTILIZED BY THE OWNER OF THIS REPORT FOR THE SOLE PUPOSE OF FINDING THE LOCATION OF THE HOLES AND ARE ESTIMATED DISTANCE ONLY.



NOTE: NOT TO SCALE

### Legend





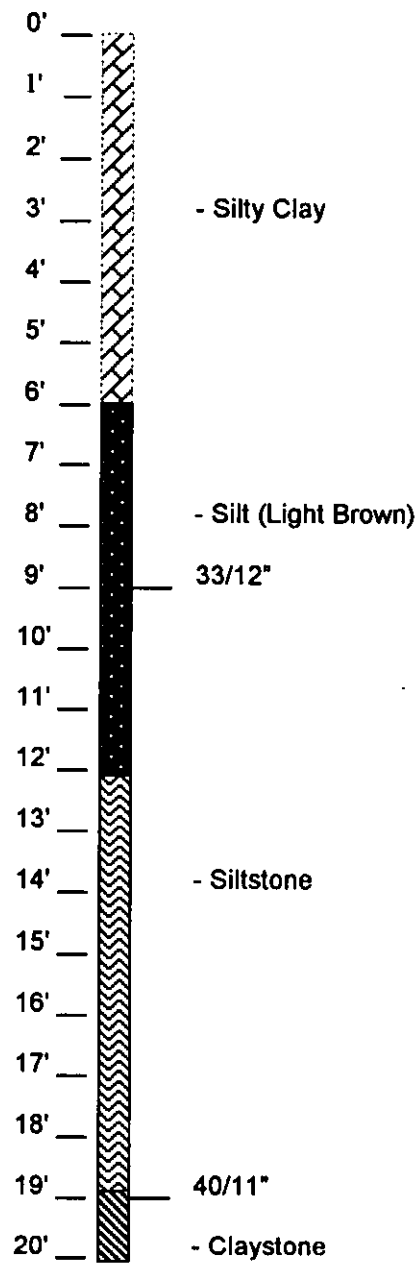
-  FOUNDATION SOIL TEST HOLE
-  SOIL PROFILE HOLE
-  PERCOLATION TEST HOLE
-  PROPERTY CORNER

Figure 4

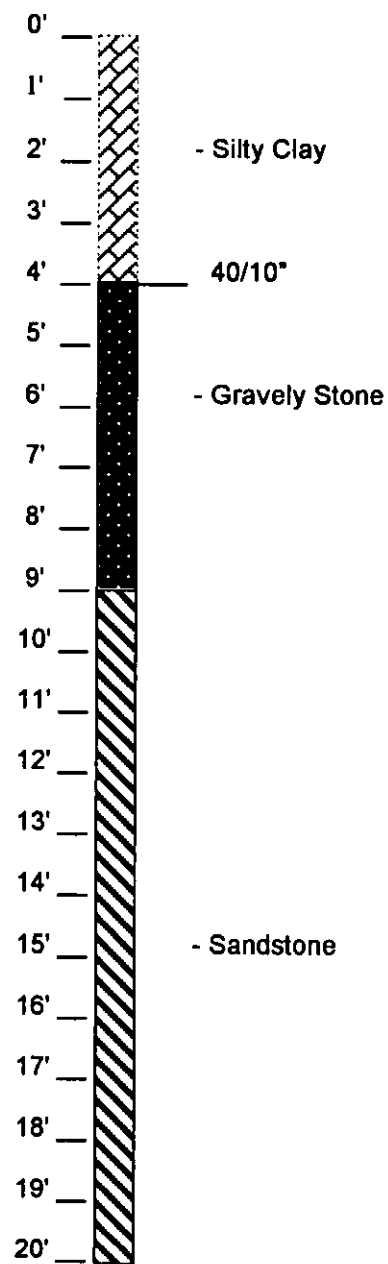


# LOG OF TEST HOLES

Test Hole #1



Test Hole #2



**NOTE:** 28/12" indicates that it took 28 blows from a 140# hammer free falling from 30" to drive a 2" diameter sampling spoon 12". No free water was encountered during drilling.

## SWELL-CONSOLIDATION TESTS

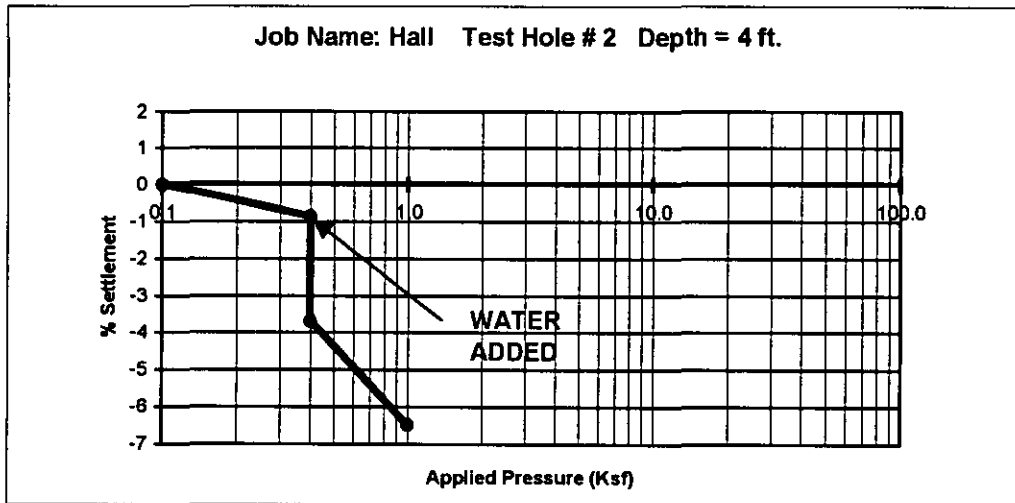
Job # 00-1107-1 Test Hole # 2 Depth = 4 ft  
 Job Name: Hall Date Tested 07/11/2000  
 Soil Description: Silty Clay Machine # 1

| Date       | Clock Time | Load on Sample (ksf) | Dial Reading (in) | Dial Change (in) | Corrected Dial Reading | + %Swell<br>- %Consol. |
|------------|------------|----------------------|-------------------|------------------|------------------------|------------------------|
| 07/11/2000 | 4:00 PM    | 0.1                  | 0.6160            |                  |                        | 0                      |
| 07/12/2000 | 8:00 AM    | 0.4                  | 0.6090            | 0.007            | 0.0064                 | -0.85                  |
| 07/12/2000 | 5:00 PM    | 0.4 W                | 0.5879            | 0.0281           | 0.0275                 | -3.67                  |
| 07/14/2000 | 8:00 AM    | 1.0 W                | 0.5659            | 0.0501           | 0.0486                 | -6.48                  |

Tare No: 26  
 Tare Weight: 15.6 g  
 Wet Weight: 32.2 g  
 Dry Weight: 31.9 g

Moisture Content: 1.84 %

Cylinder/Soil Weight: 412.9 g  
 Cylinder Weight: 113.2 g  
 Soil Weight: 299.7 g  
 Soil Weight: 0.6601 lbs  
 Wet Density: 110.0 lbs/f<sup>3</sup>  
Dry Density: 108.0 lbs/f<sup>3</sup>



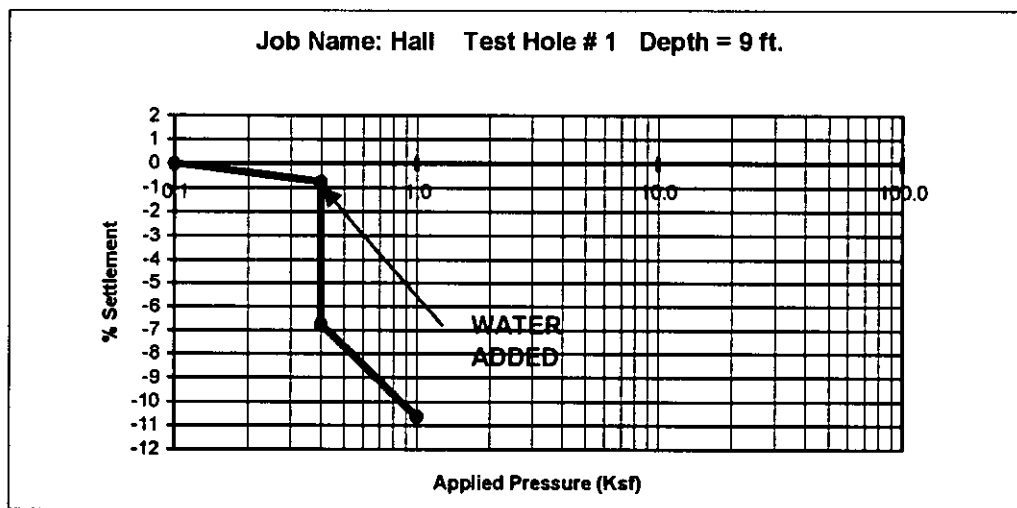
## SWELL-CONSOLIDATION TESTS (continued)

Job # 00-1107-1 Test Hole # 1 Depth = 9 ft  
 Job Name: Hall Date Tested 07/11/2000  
 Soil Description: Silt Machine # 2

| Date       | Clock Time | Load on Sample (ksf) | Dial Reading (in) | Dial Change (in) | Corrected Dial Reading | + %Swell<br>- %Consol. |
|------------|------------|----------------------|-------------------|------------------|------------------------|------------------------|
| 07/11/2000 | 4:00 PM    | 0.1                  | 0.2574            |                  |                        | 0                      |
| 07/12/2000 | 8:00 AM    | 0.4                  | 0.2509            | 0.0065           | 0.0059                 | -0.79                  |
| 07/12/2000 | 5:00 PM    | 0.4 W                | 0.2062            | 0.0512           | 0.0506                 | -6.75                  |
| 07/14/2000 | 8:00 AM    | 1.0 W                | 0.1763            | 0.0811           | 0.0796                 | -10.61                 |

Tare No: 21  
 Tare Weight: 15.6 g  
 Wet Weight: 37.9 g  
 Dry Weight: 36.8 g  
Moisture Content: 5.19 %

Cylinder/Soil Weight: 426.6 g  
 Cylinder Weight: 113.2 g  
 Soil Weight: 313.4 g  
 Soil Weight: 0.6903 lbs  
 Wet Density: 115.1 lbs/f<sup>3</sup>  
Dry Density: 109.4 lbs/f<sup>3</sup>



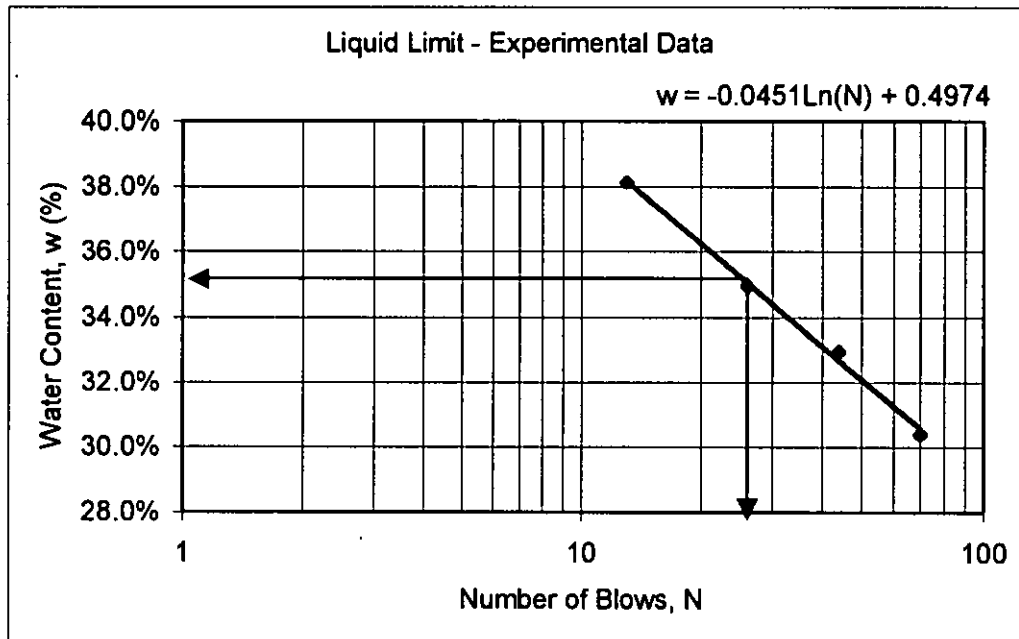
# ATTERBERG LIMITS DETERMINATION

## Liquid Limit Determination

|                     |       |       |       |       |
|---------------------|-------|-------|-------|-------|
| Can #               | 23    | 22    | 29    | 5     |
| Wt. Of can          | 15.3  | 15.5  | 15.5  | 15.6  |
| Wt. Of wet soil+can | 37.6  | 40.6  | 39.3  | 39.5  |
| Wt. Of dry soil+can | 32.4  | 34.1  | 33.4  | 32.9  |
| Wt. Of dry soil     | 17.1  | 18.6  | 17.9  | 17.3  |
| Wt. Of water        | 5.2   | 6.5   | 5.9   | 6.6   |
| Water content       | 30.4% | 34.9% | 33.0% | 38.2% |
| Number of Blows     | 70    | 26    | 44    | 13    |

|    |       |
|----|-------|
| 13 | 38.2% |
| 26 | 34.9% |
| 44 | 33.0% |
| 70 | 30.4% |

Liquid Limit (%)= **35.2%**



## Plastic Limit Determination

|                     |       |       |       |       |
|---------------------|-------|-------|-------|-------|
| Can #               | 2     | 15    | 27    | 33    |
| Wt. Of can          | 15.4  | 15.3  | 15.5  | 15.5  |
| Wt. Of wet soil+can | 25.6  | 25.3  | 25.0  | 25.5  |
| Wt. Of dry soil+can | 23.9  | 23.8  | 23.5  | 24.0  |
| Wt. Of dry soil     | 8.5   | 8.5   | 8.0   | 8.5   |
| Wt. Of water        | 1.7   | 1.5   | 1.5   | 1.5   |
| Water content       | 20.0% | 17.6% | 18.8% | 17.6% |

Plastic Limit (PL) = **18.5%**

## Plasticity Index

PI = LL - PL = **16.7%**

**TRI-COUNTY HEALTH DEPARTMENT PERCOLATION TEST**



**TRI-COUNTY HEALTH DEPARTMENT**

**PERCOLATION TEST RESULT FORM**

Property Address: LOT 37, CASTLEWOOD NORTH, FRANKTOWN, COLORADO

Legal Description: Lot 37, Castlewood North, Franktown, County of Douglas, State of Colorado

Property Owner:

Name: Billy Hall

Address: 14296 E. Whitaker Place #103, Aurora, Colorado 80015

Phone: 303-693-9709

**Note:**

- *Percolation Test Form, Site Plan and Grain Size Distribution Curve of the Sample must be submitted with this form.*
- *For all lots < 5 acres the site plan must include the entire lot. Test locations must be accurately tied to lot corners or other permanent markers.*

|   |   |
|---|---|
| <p><b><u>Saturation and Swelling</u></b></p> <p>Date and time presoak water added:<br/><u>July 11, 2000 at 11:00 AM</u></p> <hr/> <p>Amount of presoak added (gallons):<br/><u>8 Gallons</u></p> <hr/> <p>Date and time percolation test started:<br/><u>July 12, 2000 at 9:00 am</u></p> <hr/> <p>Did water remain in hole after overnight swelling period?</p> <p>Hole 1 Yes ___ No <u>X</u>    Hole 4 Yes ___ No ___</p> <p>Hole 2 Yes ___ No <u>X</u>    Hole 5 Yes ___ No ___</p> <p>Hole 3 Yes ___ No <u>X</u>    Hole 6 Yes ___ No ___</p><br><p>Percolation Rate Measure:</p> <p>Hole 1 <u>240</u>                      Hole 4 _____</p> <p>Hole 2 <u>120</u>                      Hole 5 _____</p> <p>Hole 3 <u>120</u>                      Hole 6 _____</p> <p style="text-align: right;">Average <u>160</u></p> | <p><b><u>Groundwater</u></b></p> <p>Ground water Encountered: Yes: ___ No: <u>X</u></p> <p>If yes, at what depth: _____ feet</p> <p>Estimated depth to maximum seasonal water table if not encountered in profile: <u>Unknown</u></p> <p>Is area believed to be subject to seasonal fluctuations which could result in a seasonal water table within 8' of surface?</p> <p>Yes ___ No ___ Unknown <u>X</u></p> <p>Slope determination in absorption area: <u>2</u> % to the <u>North</u> (direction)</p> <p><b><u>Bedrock</u></b></p> <p>Bedrock encountered:<br/>Yes <u>X</u> No ___</p> <p>If yes, bedrock encountered at <u>5</u> feet.</p> <p>Type of bedrock (if present)</p> <p>Sandstone _____</p> <p>Claystone <u>X</u></p> <p>Siltstone _____</p> <p>Other: _____</p> <p>If present is bedrock fractured or weathered:<br/>Yes ___ No ___ Unknown <u>X</u></p> |
|---|---|

TCHD S-101 Revised 8/98



# TRI-COUNTY HEALTH DEPARTMENT

## PERCOLATION TEST RESULT FORM

| Hole No. | Hole Depth (in.) | Length Of Interval (min.) | Water Depth @ Start of Interval (in.) | Water Depth @ End of Interval (in.) | Drop in Level (in.) | Percolation Rate @ Final Interval (min./in.) |
|----------|------------------|---------------------------|---------------------------------------|-------------------------------------|---------------------|--|
| 1        | 36"              | 30                        | 0                                     | 9 1/8                               | 9 1/8               |  |
| 1        | 36"              | 30                        | 9 1/8                                 | 9 5/8                               | 4/8                 |  |
| 1        | 36"              | 30                        | 9 5/8                                 | 10                                  | 3/8                 |  |
| 1        | 36"              | 30                        | 10                                    | 10 2/8                              | 2/8                 |  |
| 1        | 36"              | 30                        | 10 2/8                                | 10 4/8                              | 2/8                 |  |
| 1        | 36"              | 30                        | 10 4/8                                | 10 6/8                              | 2/8                 |  |
| 1        | 36"              | 30                        | 10 6/8                                | 11                                  | 2/8                 |  |
| 1        | 36"              | 30                        | 11                                    | 11 1/8                              | 1/8                 |  |
| <b>1</b> | <b>36"</b>       | <b>30</b>                 |                                       |                                     | <b>0.125</b>        | <b>240</b>                                   |
| 2        | 36"              | 30                        | 0                                     | 6 6/8                               | 6 6/8               |  |
| 2        | 36"              | 30                        | 6 6/8                                 | 7 5/8                               | 7/8                 |  |
| 2        | 36"              | 30                        | 7 5/8                                 | 8 2/8                               | 5/8                 |  |
| 2        | 36"              | 30                        | 8 2/8                                 | 8 6/8                               | 4/8                 |  |
| 2        | 36"              | 30                        | 8 6/8                                 | 9 2/8                               | 4/8                 |  |
| 2        | 36"              | 30                        | 9 2/8                                 | 9 5/8                               | 3/8                 |  |
| 2        | 36"              | 30                        | 9 5/8                                 | 10                                  | 3/8                 |  |
| 2        | 36"              | 30                        | 10                                    | 10 2/8                              | 2/8                 |  |
| <b>2</b> | <b>36"</b>       | <b>30</b>                 |                                       |                                     | <b>0.25</b>         | <b>120</b>                                   |

**Note:**

1) Field Notes shall be recorded on this form or in this format; typed copies of field records may be submitted on this form.

2) A four hour test must be conducted unless (a) water remains in the hole after the presoak in which case one 30 min. interval is sufficient, (b) the first 6" of water seeps away in <30 minutes in which case a one-hour test of 6-10 minute time intervals may be used, (c) the test is being conducted in sand (SW or SP) in which case a one-hour test of 6-10 minute time intervals may be used, (d) three successive water level drops do not vary by more than 1/16 inch in which case a two hour test may be conducted, (e) test is in Dawson Sands, in which case the test must be run a minimum of four hours until the last three successive water level drops vary by less than 1/16 inch.

TCHD 5-100 1/88 (REVISED 7/98)



# TRI-COUNTY HEALTH DEPARTMENT

## PERCOLATION TEST RESULT FORM

| Hole No. | Hole Depth (in.) | Length Of Interval (min.) | Water Depth @ Start of Interval (in.) | Water Depth @ End of Interval (in.) | Drop in Level (in.) | Percolation Rate @ Final Interval (min./in.) |
|----------|------------------|---------------------------|---------------------------------------|-------------------------------------|---------------------|--|
| 3        | 36"              | 30                        | 0                                     | 8 5/8                               | 8 5/8               |  |
| 3        | 36"              | 30                        | 8 5/8                                 | 9 1/8                               | 4/8                 |  |
| 3        | 36"              | 30                        | 9 1/8                                 | 9 4/8                               | 3/8                 |  |
| 3        | 36"              | 30                        | 9 4/8                                 | 9 6/8                               | 2/8                 |  |
| 3        | 36"              | 30                        | 9 6/8                                 | 10                                  | 2/8                 |  |
| 3        | 36"              | 30                        | 10                                    | 10 2/8                              | 2/8                 |  |
| 3        | 36"              | 30                        | 10 2/8                                | 10 6/8                              | 4/8                 |  |
| 3        | 36"              | 30                        | 10 6/8                                | 11                                  | 2/8                 |  |
| <b>3</b> | <b>36"</b>       | <b>30</b>                 |                                       |                                     | <b>.25</b>          | <b>120</b>                                   |

**Note:**

1) Field Notes shall be recorded on this form or in this format; typed copies of field records may be submitted on this form.

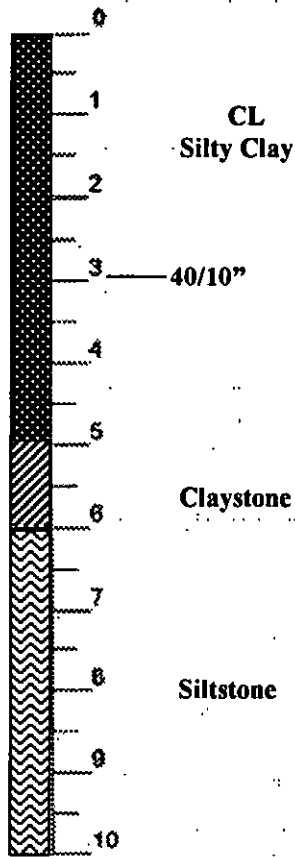
2) A four hour test must be conducted unless (a) water remains in the hole after the presoak in which case one 30 min. interval is sufficient, (b) the first 6" of water seeps away in <30 minutes in which case a one-hour test of 6-10 minute time intervals may be used, (c) the test is being conducted in sand (SW or SP) in which case a one-hour test of 6-10 minute time intervals may be used, (d) three successive water level drops do not vary by more than 1/16 inch in which case a two hour test may be conducted, (e) test is in Dawson Sands, in which case the test must be run a minimum of four hours until the last three successive water level drops vary by less than 1/16 inch.

TCHD S-100 1/88 (REVISED 7/98)

**Profile Hole Information (Continued)**

Soils must be classified using Unified System ASTM D2487

**Profile Hole Log**



Blow Counts at Depth of Bed: 40/10"  
Atterberg Limits:  
PL: 18.5%  
LL: 35.2%  
PI: 16.7%

**Certification**

I certify that the above information is correct and complete to the best of my knowledge and that all tests were performed in accordance with the provisions of Tri-County Health Department Regulation I-96 by myself or under my supervision.

July 18, 2000

Original Signature

Date

Homestake Soil Testing Inc.

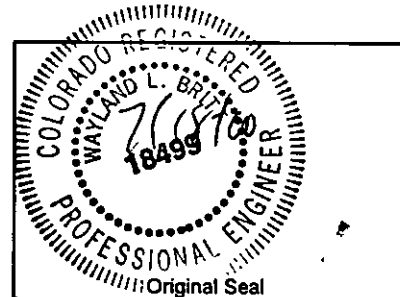
Company Name

10965 S. Pikes Peak Dr. Parker Co. 80138

Address

303-841-5607

Phone





# SIEVE ANALYSIS AND GRAIN SIZE DISTRIBUTION CURVE

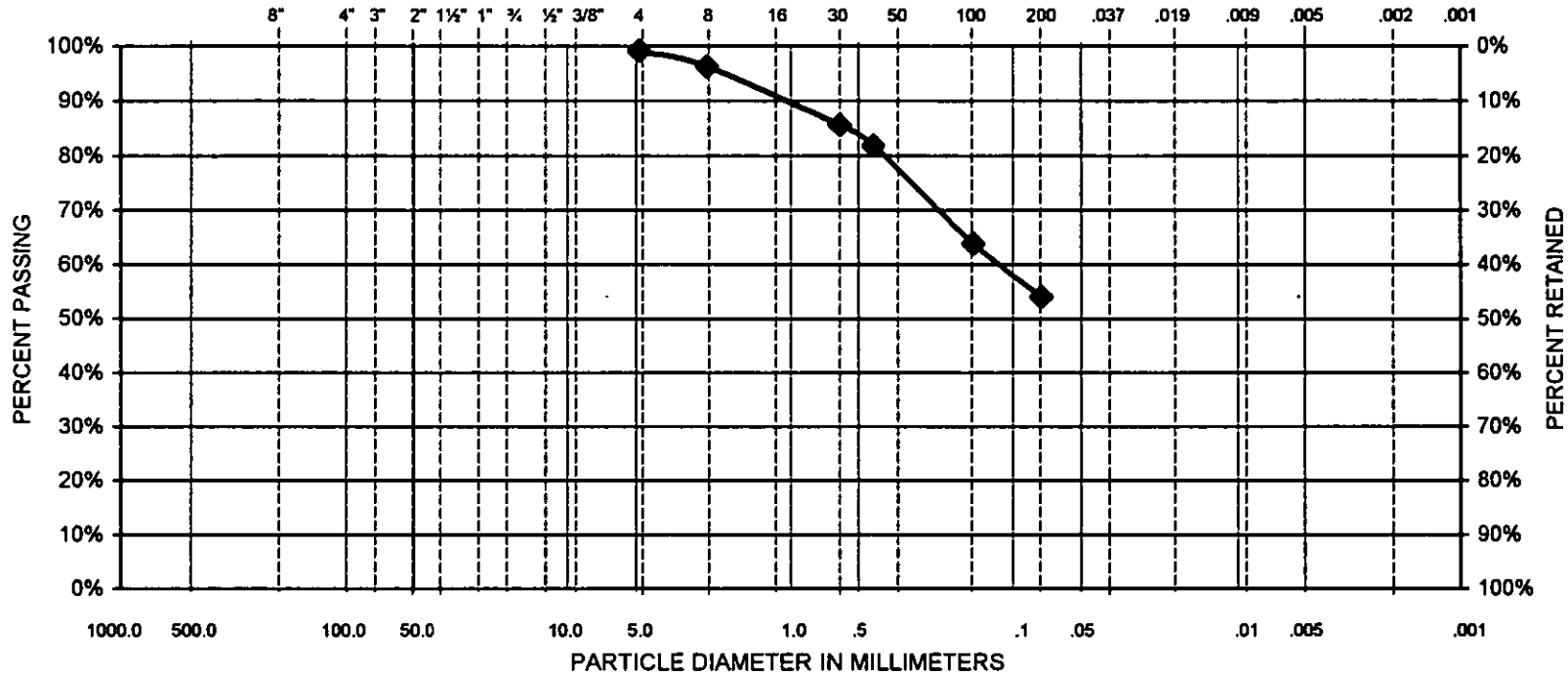
## Sieve Analysis

Analyst name: Keith Wagner  
Test Date: 07/17/00  
Sample Description: Sandy Silt

Total Sample Mass (g) = 497.9

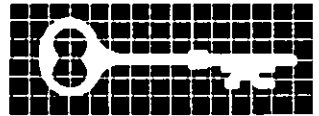
| <u>Sieve opening (mm)</u> | <u>Mass Retained (g)</u> | <u>% Retained</u> | <u>% Passing</u> |
|---------------------------|--------------------------|-------------------|------------------|
| 4                         | 4.76                     | 4.2               | 99.16            |
| 8                         | 2.36                     | 14.1              | 96.32            |
| 30                        | 0.6                      | 52.9              | 85.70            |
| 40                        | 0.425                    | 19.0              | 81.88            |
| 100                       | 0.15                     | 89.5              | 63.91            |
| 200                       | 0.075                    | 49.1              | 54.05            |
| pan                       | 269.1                    | 54.05             | 0.00             |
|                           | 497.9                    |                   |                  |
|                           | 0.00%                    | lost              |                  |

| SIEVE ANALYSIS           |                      | HYDROMETER ANALYSIS              |
|--------------------------|----------------------|----------------------------------|
| Sieve Openings in Inches | U.S. Standard Sieves | Size of Particles in Millimeters |



|                     |        |      |        |        |      |                                      |
|---------------------|--------|------|--------|--------|------|--------------------------------------|
| COBBLES TO BOULDERS | Coarse | Fine | Coarse | Medium | Fine | CLAY (Plastic) TO SILT (Non-Plastic) |
|                     | GRAVEL |      | SAND   |        |      |                                      |

| GRAPH NO. | BORING NO. | SAMPLE NO. | DEPTH (FEET) | NATURAL DRY DENSITY (PCF) | NATURAL MOISTURE (%) | PL | PI | LL | SOIL DESCRIPTION |
|-----------|------------|------------|--------------|---------------------------|----------------------|----|----|----|------------------|
|           |            |            |              |                           |                      |    |    |    |                  |
|           |            |            |              |                           |                      |    |    |    |                  |



**HOMESTAKE  
ENGINEERING**

10965 S. Pikes Peak Dr.  
Parker, Colorado 80138  
Telephone (303) 841-5607  
Fax (303) 841-5631

**CALCULATIONS:**

**FIELD DESIGN**

THE DESIGN IS FOR A 5 -BEDROOM HOUSE. DAILY LOAD (Q) IS 750 GAL.  
AVERAGE PERCOLATION RATE IS 160. (HOMESTAKE SOIL TESTING #00-1107-1)  
MAXIMUM SOIL LOADING RATE (R) IS 0.18.  
AREA OF FIELD IS (Q/R)(1.5)(1.6)(0.75)(1.17) = 8,775 SF USE 8,800 SF

**SEPTIC AND PUMPING TANK DESIGN**

NUMBER OF LATERALS: 8,800 SF/100 LF = 88 LF  
88 LF/2 FT/LATERAL = 44 LATERALS  
PUMP SIZING: 4,400 LF/2' O.C. (HOLE SPACING) = 2,200 HOLES  
2,200 x 0.50 GPM (1/4" DIA. HOLES AT 2' HEAD) = 1,100 GPM AT 10' MAX HEAD  
USE HYDROMATIC SPD50H (1/2 HP), GOULDS WE03L (1/3 HP) OR APPROVED  
SUBSTITUTE. THIS WILL PROVIDE APPROX. 75 GPM AT 10' OF HEAD  
DOSE VOLUME OF 425 GAL. VOLUME OF PIPE SYSTEM IS APPROXIMATELY 403 GAL.  
FIELD (ZONE) PIPE: USE 1.5" OR 2" DIA., Class 200 PVC, 1/4" DIA. HOLES AT 24" O.C.  
DISTRIBUTION PIPE: USE 2" DIA., SCH. 40 PVC

**NOTES:**

A SEPTIC SYSTEM IS VULNERABLE TO DAMAGE IN MANY WAYS.  
EXCESSIVE WATER USE CAN LEAD TO SEVERE DAMAGE TO A SEPTIC  
DRAINAGE FIELD. EXCESSIVE WATER CAN COME FROM LEAKING TOILETS  
AND FAUCETS, DRAINING WATER BEDS OR HOT TUBS OR NUMEROUS  
LOADS OF LAUNDRY IN A DAY. OWNERS ARE ADVISED TO SPACE WATER  
USAGE OUT EVENLY AND KEEP IT TO A MINIMUM.

A SEPARATE SEWER CLEANOUT IS REQUIRED OUTSIDE THE HOUSE, WITHIN  
FIVE FEET OF THE FOUNDATION.

THE SEPTIC DRAIN FIELD IS NOT SUITABLE FOR PARKING OR DRIVING CARS  
OR FOR LIVESTOCK USAGE.

A VACUUM BREAKER IS REQUIRED AT THE HIGH POINT IN THE LINE  
BETWEEN THE PUMP AND THE DRAIN FIELD SO THIS LINE CAN DRAIN TO  
PREVENT FREEZING.

MANY DETAILS OF CONSTRUCTION ARE OMITTED FROM THESE DRAWINGS  
FOR CLARITY. THE INSTALLER MUST REFER TO LOCAL REGULATIONS  
CONCERNING OTHER INSTALLATION REQUIREMENTS.

ELECTRICAL CONNECTIONS ARE NOT PERMITTED IN THE PUMP CHAMBER  
UNLESS THEY ARE FULLY ENCASED IN A WATER TIGHT JUNCTION BOX OR  
SEALED IN A MANNER APPROVED BY THE ENGINEER.

IF THE DRAIN FIELD IS LOCATED AT A HIGHER ELEVATION THAN THE PUMP,  
INSTALL A SEEPAGE COLLAR AROUND THE PIPE TO PREVENT BACK FLOW  
THROUGH THE TRENCH FROM THE FIELD TO THE PUMP.

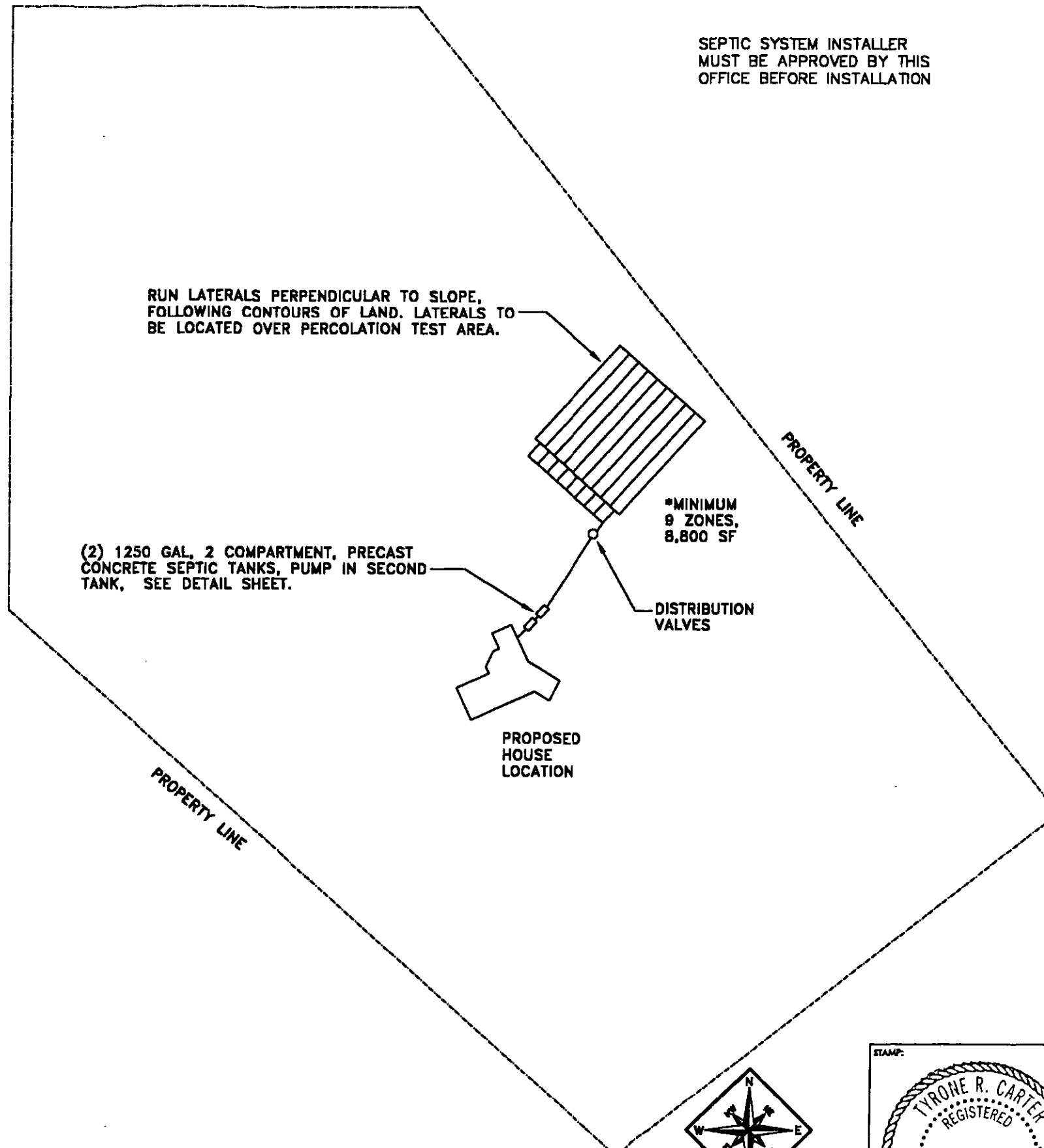
THE USE OF SO-CALLED "SEPTIC SYSTEM REMEDIES" CAN RESULT IN  
SEVERE DAMAGE TO THE SYSTEM. WE SPECIFICALLY RECOMMEND  
AGAINST THEIR USE.

HOMES WITH WATER SOFTENERS SHOULD HAVE A SEPARATE MINIMUM  
ONE CUBIC YARD GRAVEL DRAINAGE BED A MINIMUM OF TEN FEET FROM  
THE FOUNDATION AND THE MAIN SEPTIC DRAIN FIELD TO ACCEPT THE  
FLOW OF REGENERATING BRINE WHICH MAY HAVE AN ADVERSE AFFECT  
ON THE MICROORGANISMS WITHIN THE MAIN SEPTIC SYSTEM.

\*DISTRIBUTION ZONES SHALL BE A MAXIMUM OF 100 FEET LONG BY 10 FEET  
WIDE AND CONTAIN FIVE LATERALS PER ZONE. ZONES MAY BE LESS THAN  
100 FEET LONG AND 10 FEET WIDE, AS LONG AS THE MINIMUM 8,800 SQUARE  
FOOT DISTRIBUTION FIELD IS MET.

NOTIFY THE ENGINEER OF THE TIME AND DATE OF BACKHOE PIT OBSERVATION BY THE HEALTH DEPARTMENT

\*CONTACT COLORADO SOIL, LLC FOR SEPTIC INSPECTION PRIOR TO COVERING SEPTIC COMPONENTS.  
AS-BUILT DRAWING MUST BE PROVIDED TO COLORADO SOIL, LLC BEFORE FINAL INSPECTION APPROVAL.



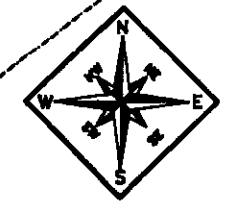
SEPTIC SYSTEM INSTALLER  
MUST BE APPROVED BY THIS  
OFFICE BEFORE INSTALLATION



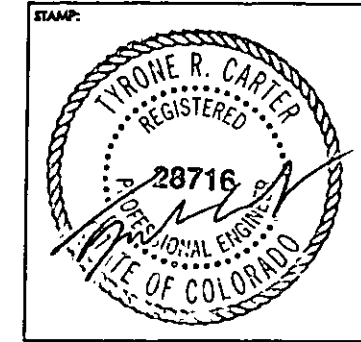
2931 NORTH U.S. HWY 85  
CASTLE ROCK, COLORADO  
80104  
PHONE: (303) 888-8478  
FAX: (303) 814-2484  
E-MAIL:  
colorado\_soil@msn.com

BILLY HALL  
1685 E. WHEATSEY PLACE #105  
AURORA, COLORADO  
80015  
PHONE: 303-770-  
FAX: 303-770-  
303-770-303

SEPTIC DESIGN FOR  
BILLY HALL  
1685 CASTLEWOOD DR.  
DUGLAS COUNTY, COLORADO



**SITE PLAN**  
SCALE: 1" = 100'



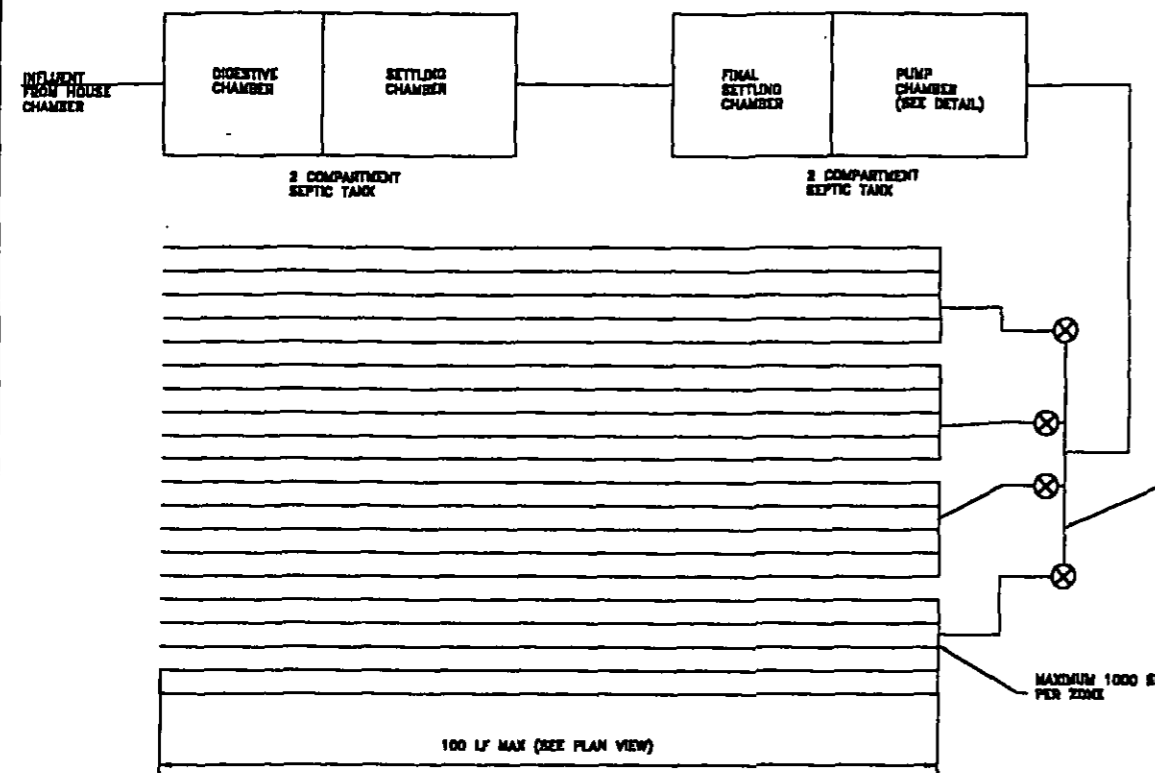
|                   |                |
|-------------------|----------------|
| - PROJECT INFO. - |                |
| CHECKED BY:       | T. CARTER      |
| DRAWN BY:         | K. WORTHINGTON |
| DATE DRAWN:       | 06/21/01       |
| PROJECT NUMBER:   | 01-1408        |
| REVISION:         |                |
| 1.                |                |
| 2.                |                |
| 3.                |                |
| 4.                |                |
| 06/01             | 1200           |
| SHEET NUMBER:     | SP1            |



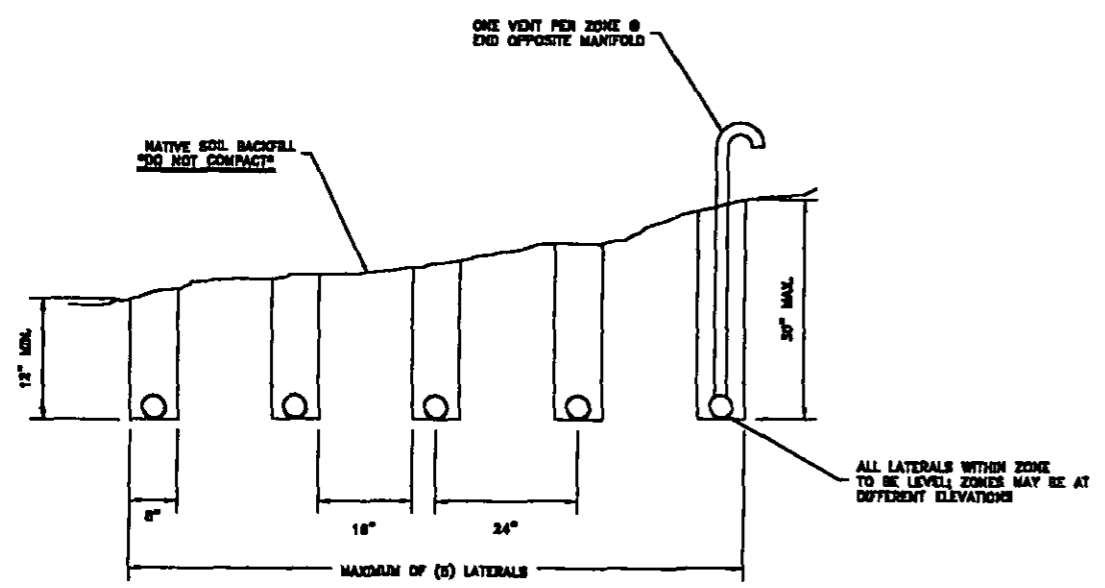
2931 NORTH U.S. HWY 85  
CASTLE ROCK, COLORADO  
80104  
PHONE: (303) 888-9475  
FAX: (303) 814-2484  
E-MAIL: colorado\_soil@msn.com

BILLY HALL  
1429 E. WHEATRIDGE PLACE #103  
AURORA, COLORADO  
80015  
PHONE: 303.997.0707  
FAX: 303.997.0707

SEPTIC DESIGN FOR  
BILLY HALL  
1685 CASTLEWOOD DR.  
DOUGLAS COUNTY, COLORADO

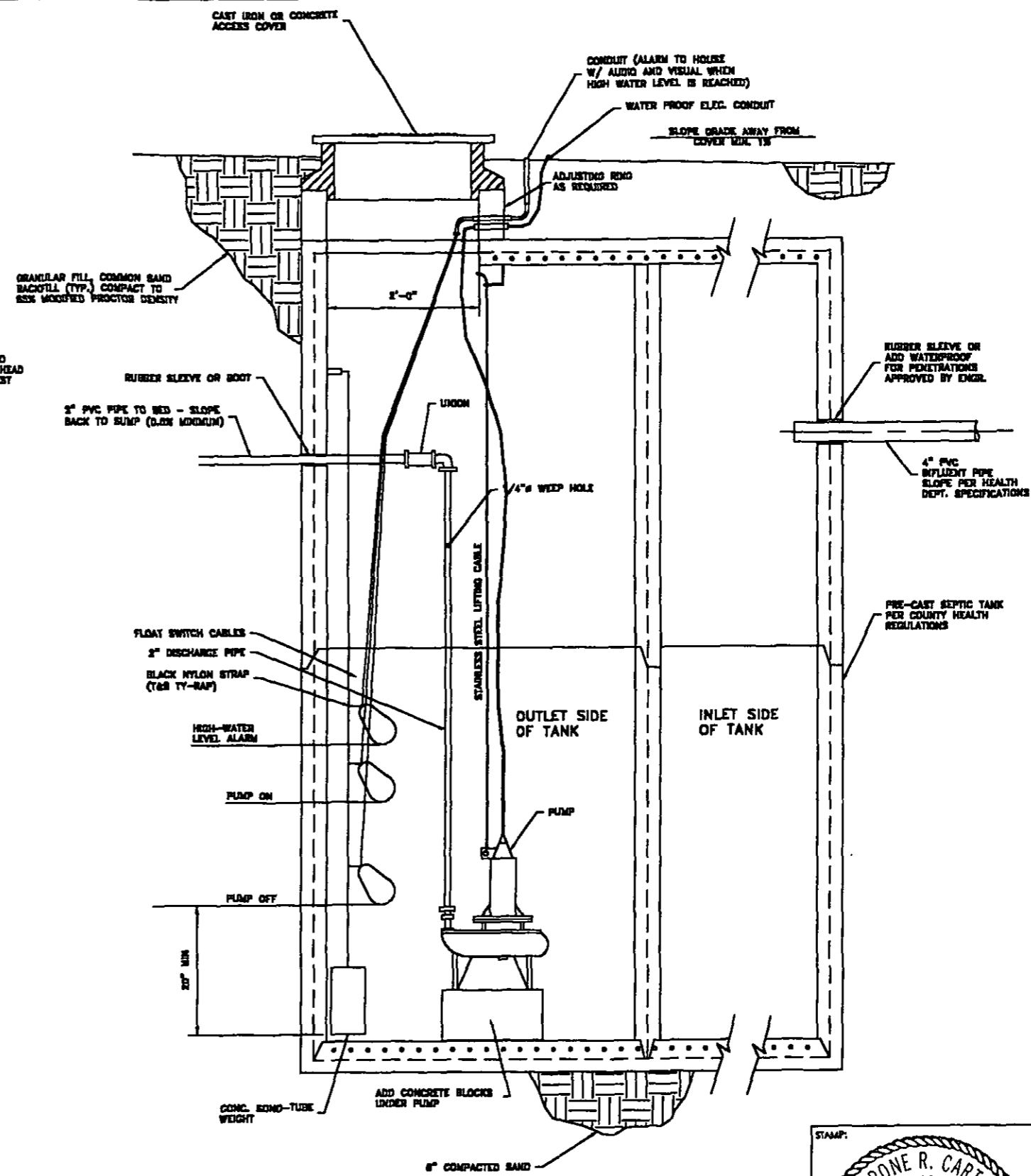


TYPICAL FIELD PLAN  
N.T.S.



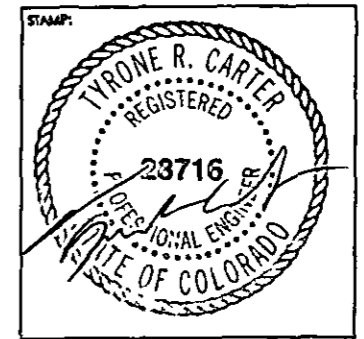
TYPICAL ZONE CROSS SECTION  
N.T.S.

**REST CYCLE NOTE:**  
RESEARCH INDICATES THAT ALLOWING A SEPTIC FIELD TO "REST" FOR SEVERAL MONTHS INCREASES ITS LONG-TERM UTILITY. COLORADO SOIL, LLC RECOMMENDS RESTING EACH ZONE FOR THREE TO SIX MONTHS, SYSTEMATICALLY CYCLING THROUGH EACH ZONE SEQUENTIALLY.



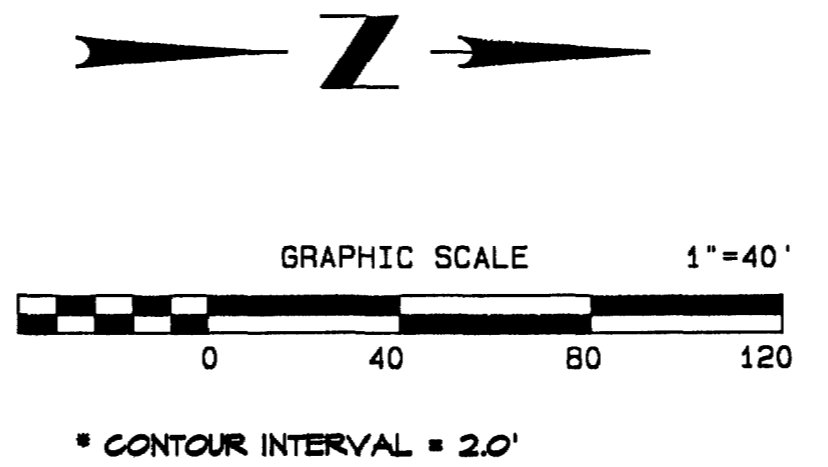
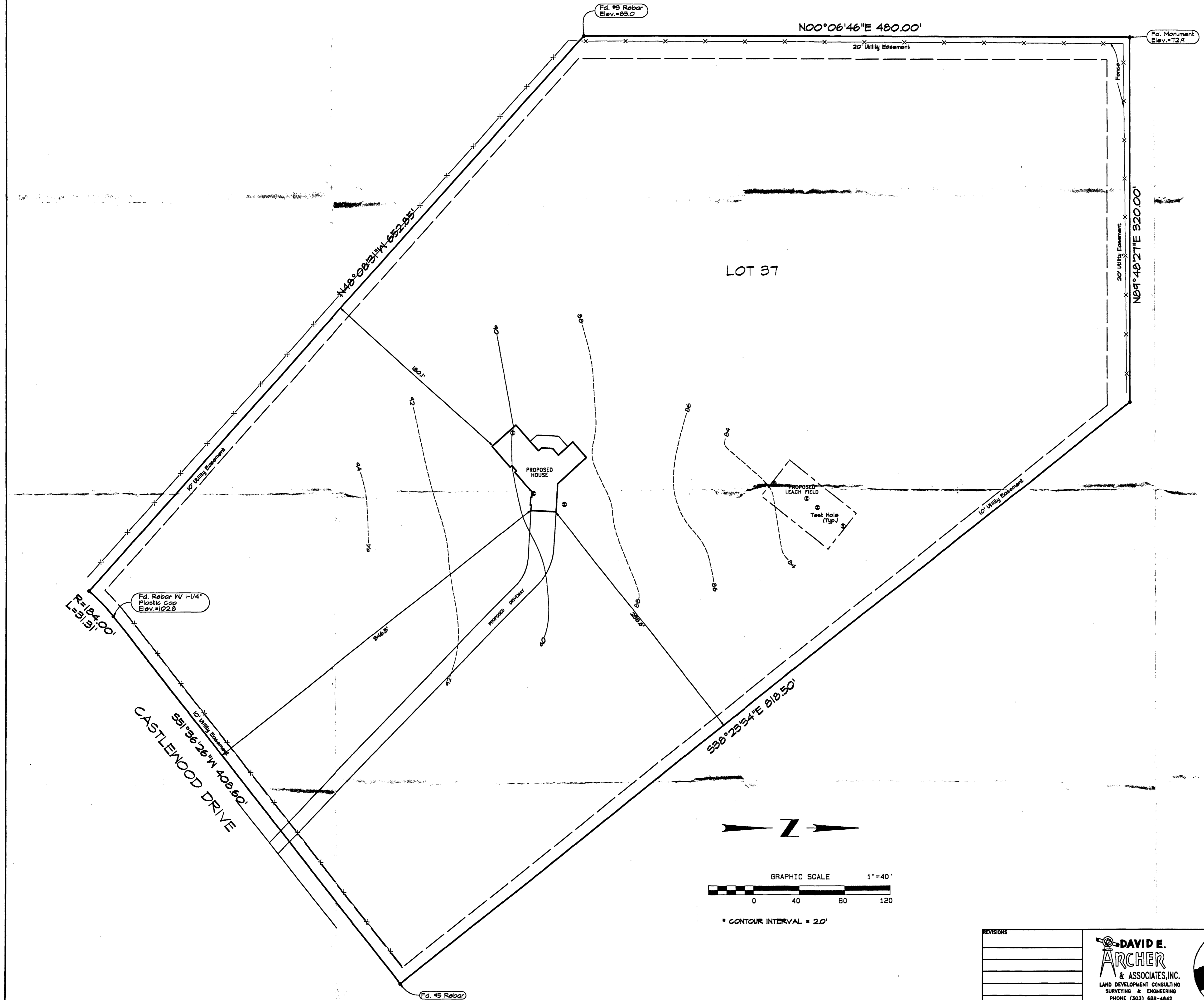
PUMP CHAMBER SECTION  
N.T.S.

\*NOTE: PUMP AND ALARM TO BE ON SEPARATE CIRCUITS



|                   |                |
|-------------------|----------------|
| - PROJECT INFO. - |                |
| CHECKED BY:       | T. CARTER      |
| DRAWN BY:         | K. WORTHINGTON |
| DATE DRAWN:       | 06/21/01       |
| PROJECT NUMBER:   | 01-1408        |
| REVISION:         |                |
| 1.                |                |
| 2.                |                |
| 3.                |                |
| 4.                |                |
| DATE:             | 1200           |
| SHEET NUMBER:     | SP2            |

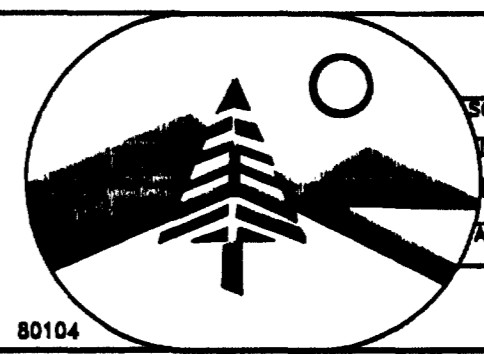
6:\2001\01-04\02\TOPO\pro  
Tue May 29 08:30:54 2001



Prepared by: *[Signature]*  
*William A. Hall* owner/builder

|           |
|-----------|
| REVISIONS |
|           |
|           |
|           |
|           |
|           |

**DAVID E. ARCHER & ASSOCIATES, INC.**  
 LAND DEVELOPMENT CONSULTING  
 SURVEYING & ENGINEERING  
 PHONE (303) 688-4842  
 105 WILCOX ST. CASTLE ROCK, COLORADO 80104



|            |            |
|------------|------------|
| TITLE      | SITE PLAN  |
| SCALE      | 1"=40'     |
| DATE       | 4-30-01    |
| DRN.       | DMH        |
| CRK.       |            |
| APPV.      |            |
| CLIENT     | BILLY HALL |
| JOB NUMBER | 01-0405    |
| Sheet      | 1 of 1     |