

# Tri-County Health Department

Serving Adams, Arapahoe and Douglas Counties

Fiscal Control No. **3474**

## USE PERMIT

For Existing Domestic and Non-Municipal Sewage Disposal Systems

# **4318**

This permit shall remain valid until the property is sold, otherwise altered from stated use, or until the sewage disposal system fails to operate in an approved manner.

Issued to Ronald W. Hoff

Address 7505 Sunset Trail, Parker, CO 80134

Location of System:  
Street Address same as above

Legal Address Lot 66, Butterfield Subdiv., Douglas County

Date Dec. 11, 1986 Health Officer Gary L. Hartzell

*G L Hartzell*

The sewage disposal system, at the time of inspection, appeared to be in working order. The Department assumes no responsibility for the continued satisfactory operation of the sewage disposal system. If, at any time, the system malfunctions, action will be taken against the owner of record pursuant to the regulations of the Department and the statutes of the State of Colorado.

Permit Fee \$ 75.00 Check No. 160 M.O. \_\_\_\_\_ Cash \_\_\_\_\_ Received by sb Date 12-11-86

# TRI-COUNTY DISTRICT HEALTH DEPARTMENT

FISCAL CONTROL NO.

7082

## ENVIRONMENTAL HEALTH DIVISION

### ADAMS CITY

4301 EAST 72ND AVE.  
288-6816

### WEST ADAMS

7475 DAKIN ST.  
SUITE 401  
428-8543

### BRIGHTON

1895 EGBERT ST.  
659-4000

### ENGLEW D

4857 SO. BROADWAY  
761-1340

### AURORA

15400 EAST 14th PLACE  
SUITE 309  
341-9370

### DOUGLAS COUNTY

502 THIRD ST.  
688-5145

# PERMIT

TRI-COUNTY DISTRICT HEALTH DEPARTMENT (FILE) NO. 4318 - Castle Rock (Engl.-4597)  
PERMIT TO (X) CONSTRUCT ( ) REMODEL A NON-MUNICIPAL WASTE DISPOSAL SYSTEM FOR Ron Hoff  
AT Lot 66, Butterfield Subdivision, Douglas County / 7505 E. Sunset Trail (Name)  
(Address or Legal Description)

COMPOSED OF 1250 GALLON SEPTIC TANK AND A SOIL ABSORPTION AREA 1920 SQ. FT.  
OR \_\_\_\_\_

THIS PERMIT SHALL EXPIRE ONE YEAR FROM DATE OF ISSUANCE UNLESS EXTENDED TO A FIXED DATE UPON REQUEST BY THE APPLICANT AND APPROVED BY THE HEALTH OFFICER.

ISSUED BY Fred A. Pearce, Acting Director PUBLIC HEALTH OFFICER, TRI-COUNTY DISTRICT HEALTH DEPARTMENT BY  
Kenneth K. Barber, DATE October 13, 1982  
(Sanitarian)

Proposed leach field must be over test area for P-1, P-2, P-3 and Profile Test hole due to presence of shallow bedrock on the site.

OWNER MUST ASCERTAIN THAT THIS ENTIRE WASTE DISPOSAL SYSTEM REMAINS OPEN FOR INSPECTION UNTIL IT HAS RECEIVED APPROVAL BY THE TRI-COUNTY DISTRICT HEALTH DEPARTMENT. THE HEALTH OFFICER CANNOT ASSUME RESPONSIBILITY IN CASE OF FAILURE OR INADEQUACY OF A WASTE DISPOSAL SYSTEM BEYOND CONSULTING IN GOOD FAITH WITH PROPERTY OWNER. MALFUNCTIONS MAY BE DUE TO IMPROPER MAINTENANCE AND/OR USAGE, VARIABLE GROUND WATER TABLE, SOIL COMPACTION OR OTHER FACTORS. IN THE EVENT THIS SYSTEM MUST BE SAMPLED TO DETERMINE COMPLIANCE WITH STATE STANDARDS, A FEE OF \$ \_\_\_\_\_ PLUS \_\_\_\_\_ MILES AT 10¢ PER MILE WILL BE ASSESSED FOR EACH SAMPLE TAKEN.

PERMIT FEE OF \$ 120.00 FOR NEW SYSTEM. CHECK NO. 2755 M.O. NO. \_\_\_\_\_ CASH \_\_\_\_\_  
RECEIVED BY KRB DATE 10-13-82

TRI-COUNTY DISTRICT HEALTH DEPARTMENT  
ENVIRONMENTAL HEALTH SERVICES

# 1122  
# 4318

APPLICATION FOR USE PERMIT  
FOR EXISTING DOMESTIC AND NON-MUNICIPAL SEWAGE DISPOSAL SYSTEMS

|   |  |   |  |   |
|---|--|---|--|---|
| ADAMS CITY<br>4301 E. 72nd Ave.<br>288-6816 | AURORA<br>15400 E. 14th Pl.<br>Suite 309<br>341-9370 | BRIGHTON<br>22 S. 4th Ave.<br>Suite 301<br>659-8333 | CASTLE ROCK<br>355 S. Wilcox<br>688-5145 | ENGLEWOOD<br>4857 S. Broadway<br>761-1340 |
|---|--|---|--|---|

FORM MUST BE COMPLETED IN FULL

# 4318

Name of Applicant Ronald W. Hoff Phone 841-5542

Mailing Address of Applicant 7505 E. Sunset Trail

Permit to be Sent to:  
Name Ronald W. Hoff

Address 7505 E. Sunset Trail Parker Co 80134  
Street Address & Complete Legal Description of Property for Which Permit is being Requested (Attach legal if necessary) 7505 E. Sunset Trail, Parker, Co, 80134 Lot 66, Butterfield, County of Douglas, State of Colorado

PROVIDE MAP OR DIRECTIONS FOR LOCATING PROPERTY ON REVERSE SIDE OF THIS APPLICATION.  
Source of Water: Private Well  Public (Specify) \_\_\_\_\_

Name of Original Home Owner (If Known) Ronald W. Hoff

Contractor who Installed System (If Known) Paterson

A non-refundable fee of \$50.00 shall be payable when the application is made. The permit issued as a result of this application shall remain valid until the property is sold or otherwise altered from domestic use or until the sewage disposal system fails to operate in an approved manner.

\* \* \* \* \*

OWNER/AGENT CERTIFICATION

(I), Ronald W. Hoff Owner/Agent of the dwelling at the location described in this application do hereby certify that the sewage disposal system has been in continuous use, operating satisfactorily, and without malfunction. The septic tank was pumped May 9, 1986 (Date). REGULATIONS REQUIRE SEPTIC TANKS BE PUMPED EVERY FOUR (4) YEARS.

DATE 5-13-86 SIGNATURE [Signature]

\* \* \* \* \*

Inspection Date 5/14/86 Approved  Denied ( )

Public Health Sanitarian Gary J. Hartzell

Permit Fee \$ 50.00 Check No. 117 M.O. \_\_\_\_\_ Cash \_\_\_\_\_ Rec'd by [Signature] Date 5-13-86

Received in mail 5-13-86

5114186

Inspection made. NO  
apparent malfunctions noted  
this date 80



# Tri-County Health Department

Serving Adams, Arapahoe and Douglas Counties

Hugh Rohrer, M.D. M.P.H.  
Director

May 16, 1986

Ronald W. Hoff  
7505 E. Sunset Trail  
Parker, CO 80134

RE: Lot 66, Butterfield Subdiv.  
Douglas County

Dear Sir:

An inspection has been made, May 14, 1986 of the individual sewage disposal system located on the above listed property.

The system showed no apparent evidence of malfunction at the time of this inspection. The soil absorption area consists of 2720 square feet with a 1250 gallon tank. This system was inspected and approved Jan. 11, 1983 when the system was originally installed.

The septic tank was pumped and cleaned May 9, 1986.

Sincerely,

Gary L. Hartzell, Public Health Sanitarian  
Environmental Health Services

GLH/sb



Tri-County Health Department  
Environmental Health Services

91-245

Application for Loan Inspection  
For Existing Domestic and Non-Municipal Sewage Disposal Systems

FORM MUST BE COMPLETED IN FULL

Name of Applicant Gretchen Mann Phone 693-6086  
Mailing Address of Applicant 16842 E. Prentice Circle Aurora, CO. 80015  
Name of Present Owner Gary & Shirley Mischke  
Loan Inspection Report to be sent to: Name Gretchen Mann  
Closing 11/26 Address 16842 E. Prentice Circle  
m11-20 City Aurora,  
State CO Zip 80015

Address and complete legal description of property -

7505 E. Sunset Trail  
Parker, CO. ~~80015~~ 80134

\* Bedrooms in Home 5 Year House was built 1984  
Source of Water:  Private Well ( ) Public (specify) \_\_\_\_\_  
Name of Original Homeowner (if known) NOT KNOWN  
Is Residence  Occupied  Vacant (specify how long) 1 week  
\*\*\*\*\*

OWNER/AGENT CERTIFICATION

(I), Gretchen Mann Owner/Agent (circle one) of the dwelling at the location described in this application do hereby certify that the sewage disposal system has been operating satisfactorily without malfunction. The septic tank was pumped and inspected on 10-9-91 (date).

11-14-91  
Date Signature

A non-refundable fee of \$75.00 shall be payable to Tri-County Health Dept. when the application is made. If a bacteriological water test is required, please include a SEPARATE CHECK for \$6.00 payable to Colorado Department of Health Labs.

Check # 4731 M.O. \_\_\_\_\_ Cash \_\_\_\_\_ Rec'd by [Signature] Date 11-14-91

# TRI-COUNTY HEALTH DEPARTMENT

## Loan Inspection Report Form

Property Address 7505 E Sunset Jul

Legal Description Lot 66 Butterfield

DEPARTMENTAL RECORD SEARCH: J Angus Conducted By 11-14-91 Date

- (1) Record on File  Yes  No (7) Original Owner: R. Hoff
- (2) Original Permit # 4318-7052 (8) Installer: \_\_\_\_\_
- (3) Date of Final Inspection: 1-11-83 (9) Water Supply: well
- (4) Tank Size: 1250 (10) Loan Inspections Issued: yes  
Dates: 5-14-86 = 12-11-86
- (5) Field Size: 2720 (11) Repair Permits Issued: \_\_\_\_\_  
Dates: \_\_\_\_\_
- (6) # Bedrooms: 3 OR System Capacity: \_\_\_\_\_

### SITE INSPECTION:

- (1) Properly Permitted:  Yes  No
- (2) Soil Conditions at time of Inspection:  Dry  Wet  Snow Covered
- (3) Surfacing Sewage:  Yes  No
- (4) Tank Tees/Baffles: See pumpers report
- (5) # of Bedrooms in Home: 3 OR System Capacity \_\_\_\_\_
- (6) Properly sized based upon number of bedrooms OR system capacity  
 Yes  No (tank)
- (7) Did TCHD representative take a water sample:  Yes  No

### COMMENTS

Septic system showed no apparent evidence of malfunction at time of inspection.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Neither Tri-County Health Department nor any of its agents or employees undertake or assume any liability to the owner of the above property, to any purchaser of the above property or to any lending agency making a loan on the above property in connection with either its examination of the property or in the report.

This inspection was conducted solely for the purpose of detecting health hazards observable at the time of inspection, and does not constitute a warranty that the system is without flaw or that it will continue to function in the future. Inspections requested during periods of rain, snow cover or when a residence is unoccupied may be of questionable value.

Date: 11-15-91 Signature: John Kleckner  
Environmental Health Specialist

TRI-COUNTY DISTRICT HEALTH DEPARTMENT  
ENVIRONMENTAL HEALTH DIVISION

File No. 4318  
Fiscal Control No. 7052

Englewood  
4857 S. Broadway  
761-1340  
  
Aurora  
15400 E. 14th Pl.  
Suite 309  
341-9370

Brighton  
1895 Egbert  
Suite 3  
659-8333

Castle Rock  
353 S. Wilcox  
688-5145

West Adams  
7100 Broadway  
Suite 65  
428-8543

APPLICATION FOR A PERMIT TO  INSTALL ( ) REPAIR ( ) EXPAND AN INDIVIDUAL SEWAGE DISPOSAL SYSTEM

Please Print Clearly

Legal Description/Address: Lot #66 Butterfield Subdivision  
7505 E. Sunset Trail

OWNER: Ron Hoff INSTALLER: \_\_\_\_\_ LIC. NO.: \_\_\_\_\_ YR: \_\_\_\_\_

ADDRESS: 6215 S. Galeway PHONE: N.P. ADDRESS: \_\_\_\_\_ PHONE: \_\_\_\_\_

APPLICANT: Aubrey Harrison Const DESIGN ENGINEER: \_\_\_\_\_ JOB NO.: \_\_\_\_\_

ADDRESS: 803 East Knap Rd PHONE: 795-5318 ADDRESS: \_\_\_\_\_ PHONE: \_\_\_\_\_

LOCATION OF PROPOSED FACILITY: County Douglas County

City or Town (if within City or Town limits) NO Lot size: 5 Acres APPLICATION FEE:

USES TYPE:  Domestic ( ) Non-domestic \_\_\_\_\_ Install  (New) - \$120.00  
Repair, Renodel, Expand

SOURCE AND TYPE OF WATER SUPPLY:  Well ( ) Community ( ) Other \_\_\_\_\_ EFFECTIVE: June 22, 1981

If supplied by community water, give name of supplier: N/A

GENERAL INFORMATION: Number of Bedrooms: 3 Basement Plumbed? Rough - Full bath

SYSTEM DESIGNED FOR \_\_\_\_\_ GALLONS PER DAY

SOILS DATA:

Depth to bedrock: >10' Depth to Ground Water: >10' Percent ground slope: 5 to 7% S-SW

Percolation Rate: #1 47 #2 50 #3 39 #4 \_\_\_\_\_ #5 \_\_\_\_\_ #6 \_\_\_\_\_

AVERAGE PERCOLATION RATE: 46' Is this system within a municipal sewage disposal district? NO

Distance to nearest municipal sewer line: Unknown

TYPE OF INDIVIDUAL SEWAGE DISPOSAL SYSTEM PROPOSED: Tank / Field FINAL DISPOSAL BY: Leaching

DESIGN INFORMATION: Septic Tank: 1250 gallons. Absorption Area: 1920 square feet.

Maximum depth of absorption area: 44 inches (not to exceed depth of percolation test holes)

Filler Material Size: 1/2 inch to 2 1/2 inch diameter. Minimum depth of filler material below distribution pipe 6 inches.  
Minimum depth of filler material over pipe 2 inches. Total depth of rock to be 12 inches.

SPECIAL DESIGN: Proposed leach field must be over test area for P-1, P-2, P-3 and profile test hole due to presence of shallow bedrock on the site  
Will Design Engineer inspect the completed system? NO

I the undersigned hereby certify that all information and data provided is correct and true to the best of my knowledge. Also I agree that the construction of this individual sewage disposal will comply with the TCDHD Regulation #1-80 and all other applicable laws and regulations.

Aubrey Harrison 10-13-82  
Applicant Signature Date

Kenneth R. Baker 10-13-82  
Application reviewed & approved Date

Date system inspected and approved: 1-11-83

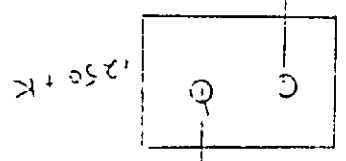
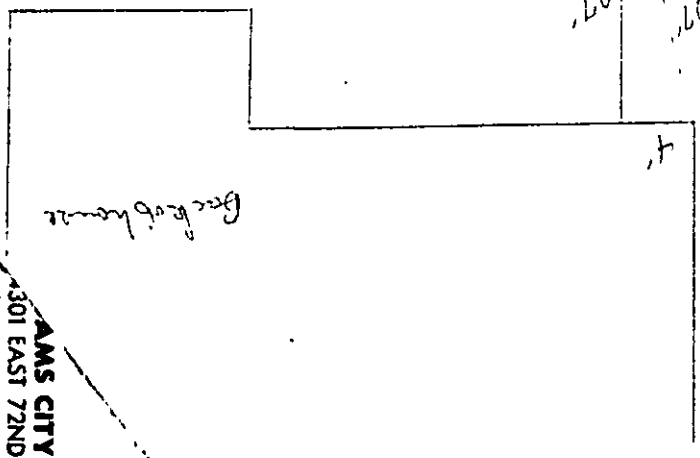
Environmentalist: John K. K. Baker



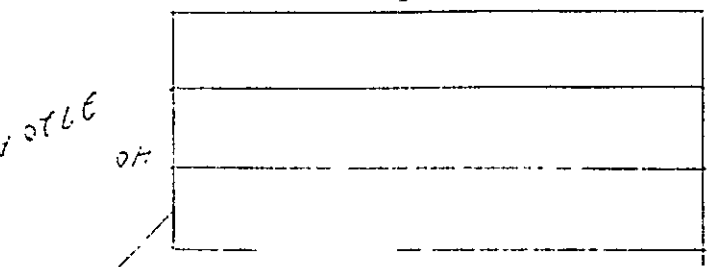
AMS CITY  
4301 EAST 72ND AVE.  
2PR-4816

TRI

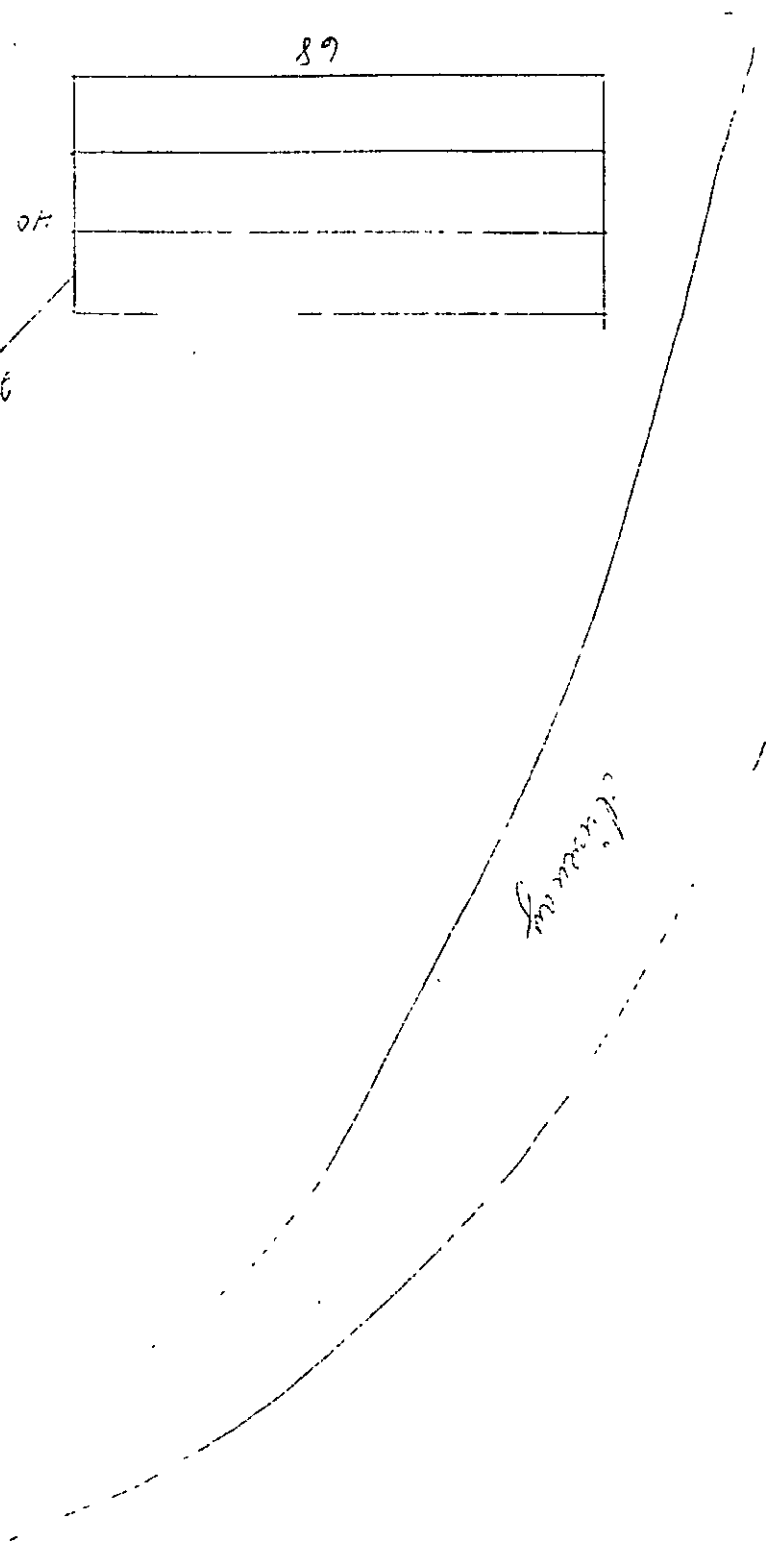
Backhouse



3720-8 ft



offering



# C & P SEPTIC SERVICE

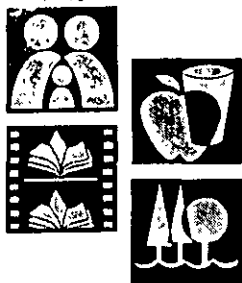
P.O. Box 147  
 ELIZABETH, CO 80107  
 (303) 688-9211

|                               |        |                    |         |
|-------------------------------|--------|--------------------|---------|
| NAME<br>COUNTRY PUMPS         |        | DATE<br>10-9-91    |         |
| ADDRESS<br>7505 E. SUNSET TR. |        |                    |         |
| PHONE<br>BUTTERFIELD          |        |                    |         |
| CASH                          | O.D.D. | CHARGE             | ON ACCT |
| QTY.                          |        | DESCRIPTION        | AMOUNT  |
|                               |        | PUMPED SEPTIC TANK |         |
|                               |        | INLET TEE & OUTLET |         |
|                               |        | TEE LOOK 4 0 0 0.  | 135 00  |
|                               |        | LOCATE & UNCOVER   | 15 00   |
|                               |        |                    | TAX     |
| RECEIVED BY                   |        | TOTAL              | 150 00  |

1872

Thank You

All claims and returned goods MUST be accompanied by this bill



# Tri-County Health Department

Serving Adams, Arapahoe and Douglas Counties

Hugh Rohrer, M.D., M.P.H.  
Director

December 11, 1986

GWF MORTGAGE COMPANY  
5200 DTC Parkway, Suite 150  
Englewood, CO 80111

RE: Lot 66, Butterfield Subdiv.  
AKA 7505 Sunset Trail  
Douglas County

Dear Sirs:

An inspection has been made, December 10, 1986 of the individual sewage disposal system located on the above listed property.

A water sample was taken on the date of this inspection, results will be mailed directly from the lab to you. The well is of approved construction.

The sewage disposal system showed no apparent evidence of malfunction at the time of this inspection, however, there was a covering of snow on the absorption field. The system consists of a 2720 square foot absorption area and a 1250 gallon tank. This system was inspected and approved January 11, 1983 when the system was originally installed.

The septic tank was pumped June, 1986 by John Todd Company of Littleton, Colorado.

Sincerely,

A handwritten signature in cursive script that reads "Gary L. Hartzell".

Gary L. Hartzell, Public Health Sanitarian  
Environmental Health Services

GLH/sb

If a bacteriological water test is required, please include a SEPARATE CHECK FOR \$6.00, payable to COLORADO DEPARTMENT OF HEALTH LABORATORIES.

3474

TRI-COUNTY DISTRICT HEALTH DEPARTMENT  
ENVIRONMENTAL HEALTH SERVICES

APPLICATION FOR USE PERMIT  
FOR EXISTING DOMESTIC AND NON-MUNICIPAL SEWAGE DISPOSAL SYSTEMS

|   |  |   |  |   |
|---|--|---|--|---|
| ADAMS CITY<br>4301 E. 72nd Ave.<br>288-6816 | AURORA<br>15400 E. 14th Pl.<br>Suite 309<br>341-9370 | BRIGHTON<br>22 S. 4th Ave.<br>Suite 301<br>659-8333 | CASTLE ROCK<br>355 S. Wilcox<br>688-5145 | ENGLEWOOD<br>4857 S. Broadway<br>761-1340 |
|---|--|---|--|---|

FORM MUST BE COMPLETED IN FULL

Name of Applicant Ronald W Hoff Phone 841-3962

Mailing Address of Applicant 7505 SUNSET TR PARKER CO 80134

Permit to be Sent to: GWf MORTGAGE CO. PARKER CO 80134  
Name PARKER CO 80134

4318

Address 5200 DTC PARKWAY SUITE 150 ENGLEWOOD CO, 80111

Street Address & Complete Legal Description of Property for Which Permit is being Requested (Attach legal if necessary) 7505 Sunset Trail, Parker 80134

LOT 66 BUTTERFIELD SUBDIV DOUGLAS COUNTY

PROVIDE MAP OR DIRECTIONS FOR LOCATING PROPERTY ON REVERSE SIDE OF THIS APPLICATION.

Source of Water: Private Well (X) Public (Specify) \_\_\_\_\_

Name of Original Home Owner (If Known) Ronald W Hoff

Contractor who Installed System (If Known) HEIR, NORFEN

A non-refundable fee of \$75.00 shall be payable when the application is made. The permit issued as a result of this application shall remain valid until the property is sold or otherwise altered from domestic use or until the sewage disposal system fails to operate in an approved manner.

\* \* \* \* \*

OWNER/AGENT CERTIFICATION

(I), Ronald W Hoff Owner/Agent of the dwelling at the location described in this application do hereby certify that the sewage disposal system has been in continuous use, operating satisfactorily, and without malfunction. The septic tank was pumped JUNE 1986 (Date). REGULATIONS REQUIRE SEPTIC TANKS BE PUMPED EVERY FOUR (4) YEARS. John Todd

DATE 12-8-86 SIGNATURE [Signature]

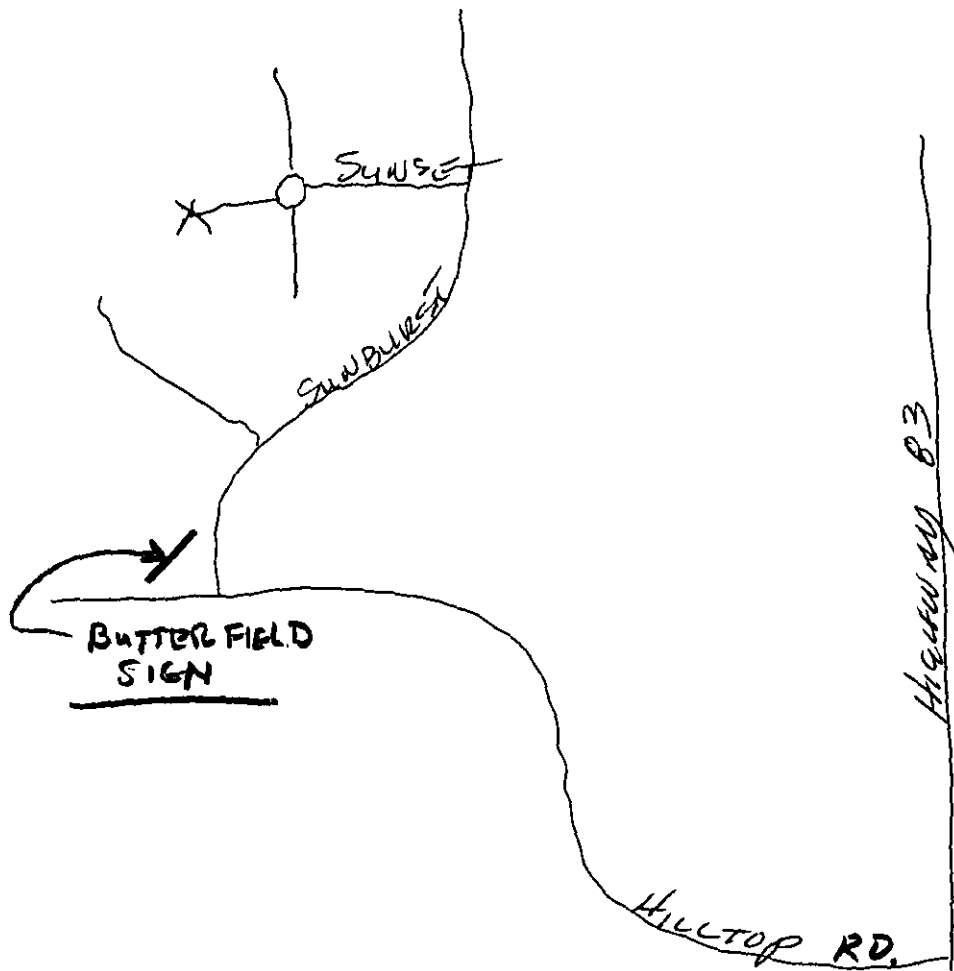
\* \* \* \* \*

Inspection Date 12/10/86 Approved (X) Denied ( )

Public Health Sanitarian [Signature]

Permit Fee \$ 25.00 Check No. 160 M.O. 6.00 Cash 162 Rec'd by [Signature] Date 12-9-86

S



E

W

X 7505 E SUNSET TR.

12/10/86 Inspection made. NO apparent malfunctions noted this date, there is a snow covering over field. H2O sample taken - well of approved construction Co.

N

TRI-COUNTY DISTRICT HEALTH DEPARTMENT  
ENVIRONMENTAL HEALTH DIVISION

File No. 4318  
Fiscal Control No. 7052

Englewood  
4857 S. Broadway  
761-1340  
  
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541-9370

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1895 Egbert  
Suite 3  
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Castle Rock  
355 S. Wilcox  
688-5145

West Adams  
7100 Broadway  
Suite 65  
428-8543

APPLICATION FOR A PERMIT TO  INSTALL ( ) REPAIR ( ) EXPAND AN INDIVIDUAL SEWAGE DISPOSAL SYSTEM

Please Print Clearly

Legal Description/Address: Lot #66 Butterfield Subdivision  
7505 E. SUNSET TRAIL

OWNER: Ron Hoff INSTALLER: \_\_\_\_\_ LIC. NO.: \_\_\_\_\_ YR: \_\_\_\_\_

ADDRESS: 6215 S. Galeway PHONE: N.P. ADDRESS: \_\_\_\_\_ PHONE: \_\_\_\_\_

APPLICANT: Aubrey Harrison Const DESIGN ENGINEER: \_\_\_\_\_ JOB NO.: \_\_\_\_\_

ADDRESS: 803 Front Range Rd PHONE: 795-5318 ADDRESS: \_\_\_\_\_ PHONE: \_\_\_\_\_

LOCATION OF PROPOSED FACILITY: County Douglas County

City or Town (if within City or Town limits) NO Lot size: 5 Acres APPLICATION FEE: \_\_\_\_\_

USES TYPE:  Domestic ( ) Non-domestic \_\_\_\_\_ Install (New) - \$120.00  
Repair, Remodel, Expand

SOURCE AND TYPE OF WATER SUPPLY:  Well ( ) Community ( ) Other \_\_\_\_\_ EFFECTIVE: June 22, 1981

If supplied by community water, give name of supplier: N/A

GENERAL INFORMATION: Number of Bedrooms: 3 Basement Plumbed? Rough - Full bath

SYSTEM DESIGNED FOR \_\_\_\_\_ GALLONS PER DAY

SOILS DATA:

Depth to bedrock: >10' Depth to Ground Water: >10' Percent ground slope: 5 to 7% S-SW

Percolation Rate: #1 47 #2 50 #3 39 #4 \_\_\_\_\_ #5 \_\_\_\_\_ #6 \_\_\_\_\_

AVERAGE PERCOLATION RATE: 46' Is this system within a municipal sewage disposal district? NO

Distance to nearest municipal sewer line: Unknown

TYPE OF INDIVIDUAL SEWAGE DISPOSAL SYSTEM PROPOSED: Tank / Field FINAL DISPOSAL BY: Leaching

SYSTEM DESIGN INFORMATION: Septic Tank: 1250 gallons. Absorption Area: 1920 square feet.

Maximum depth of absorption area: 44 inches (not to exceed depth of percolation test holes)

Filler Material Size: 1/2 inch to 2 1/2 inch diameter. Minimum depth of filler material below distribution pipe 6 inches.  
Minimum depth of filler material over pipe 2 inches. Total depth of rock to be 12 inches.

SPECIAL DESIGN: Proposed, leach field must be over test area for P-1, P-2, P-3 and profile test hole due to presence of shallow bedrock on the site  
Will Design Engineer inspect the completed system? NO

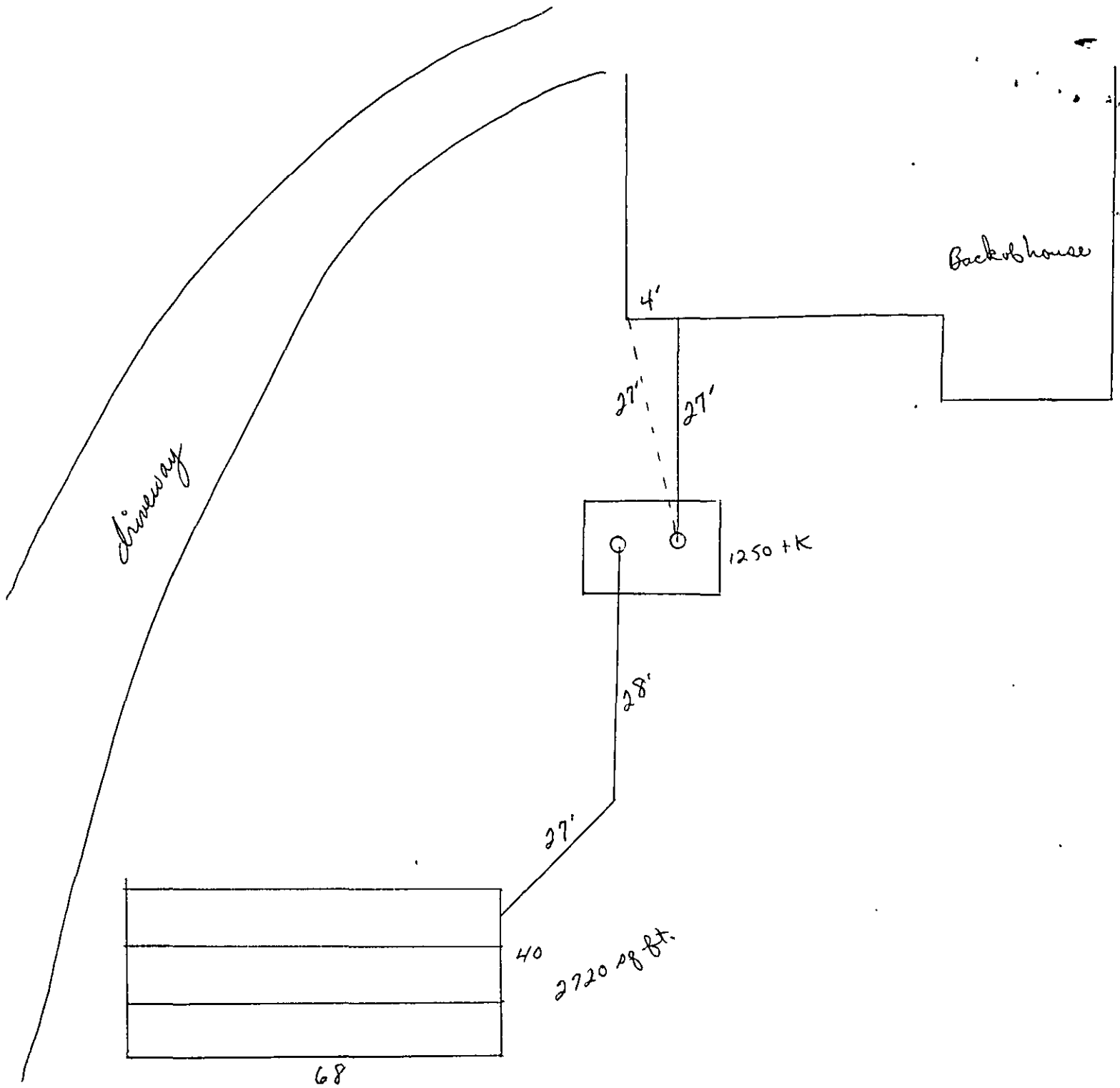
I the undersigned hereby certify that all information and data provided is correct and true to the best of my knowledge. Also I agree that the construction of this individual sewage disposal will comply with the TCDHD Regulation #1-80 and all other applicable laws and regulations.

Aubrey Harrison 10-13-82  
Applicant Signature Date

Kenneth R. Baker 10-13-82  
Application reviewed & approved Date

Date system inspected and approved: 1-11-83

Environmentalist: John Kleckner



7505 Sunset Trail

**SOIL ANALYTICS AND FOUNDATION  
ENGINEERING, INC.**

**MICHAEL A. LAIRD, P. E. President**

Consultants in Civil Engineering  
10450 West Virginia Avenue  
Lakewood, Colorado 80111

Telephone: 986-9171

June 3, 1982

*Eric Butterfield*

Mr. Ron Hoff  
6215 South Galena Way  
Englewood, Colorado 80111

Telephone: Non-pub

Subject: Soil and Foundation Investigation and Percolation Tests for a Proposed Residence to be located on Lot #66, Butterfield Subdivision, Douglas County, Colorado.

Dear Mr. Hoff:

As requested, on May 29, 1982, I conducted a soil and foundation investigation and performed percolation tests at the subject site. The purpose of these tests was to develop recommendations for the most economical and safe foundation system compatible with the subsoil conditions for the planned residence at the site and to develop data for the design of a functional septic sewage disposal system for the same residence.

SITE AND SUBSOIL CONDITIONS

The topography of the site is moderately rolling and sloping and the ground cover consists of native weeds, grasses, and scrub thickets. The residence will be located in a lower area towards the northeast lot corner. The slope in the area of the residence is towards the west-southwest at about 5 to 7 percent. The leaching field will be located about 3 to 7 feet below the residence and about 70 feet to the west-southwest of the house. The ground slope in the leaching field area is about 6 percent towards the west-southwest. Foundation conditions in the area of the residence were investigated by drilling a test boring to a depth of 20'-0" below existing groundlevel.

Subsurface conditions encountered in the foundation test boring consist generally of firm sands from groundlevel to about 1'-0"; compact sand-sandstone materials from about 1'-0" to 5'-4"; and siltstone-sandstone bedrock from 5'-4" to 20'-0", the maximum depth explored. The underlying siltstone-sandstone bedrock materials were found to possess a low to moderate potential for expansion upon wetting. Therefore, special precautions must be used in the design and construction of the foundation system to prevent future damages to the structure.

As noted, the foundation materials at the site possess a moderate to low expansion potential. Expansion in these materials will only occur should they experience post-construction wetting. In the sparsely populated rural environment of the area, the owner can do more to control post-construction wetting of the subssoils than he could do in a heavily populated urban environment. In an urban setting, surface infiltration is greatly increased by runoff from roofs and paved areas while evaporation is greatly decreased by lawns and surface watering. Recommendations for minimizing post-construction wetting of subssoil



are given in a subsequent section of this report.

Based on these considerations, the highest safety factor would be realized by supporting the residential foundation on a system of grade beams and piers. Recommendations are given below for this foundation system.

#### GRADE BEAM AND PIER FOUNDATIONS

If the owner wishes to have the highest margin of safety, it is recommended that the proposed structure be founded on an adequately designed system of grade beams and piers. The piers should be designed for a maximum end pressure of 15,000 psf, a side shear of 1,500 psf for the bottom 4'-0" of the piers in hard bedrock, and a minimum dead load pressure of 7,500 psf. All piers should be a minimum of 12 feet in length. In addition, all piers should penetrate a minimum distance of 8 feet into hard bedrock. In the unlikely event that free groundwater should be encountered, the pier holes should be completely dewatered prior to placing concrete and/or the concrete should be placed in the holes immediately. It must be recognized that some of the piers might have to be drilled deeper than 12'-0" in order to encounter and penetrate hard bedrock.

Drilled pier foundations are very common in the Denver area and are generally the safest foundation system for lightly loaded structures in potentially heaving soils. This support system functions by having the lower portions of the piers located in a zone of relatively stable moisture content, and by making it possible to load the support points sufficiently to resist uplift movements.

The following design and construction details should be followed for the foundation:

1. Piers should be reinforced longitudinally, with one 5/8-inch rod for each 18 inches of pier perimeter (a minimum of two 5/8-inch rods per pier), to prevent breakage of the piers due to uplift on their sides by swelling materials. The upper portions of the piers should be kept smooth to reduce the adhesion between the swelling materials and the piers. Care should be taken to avoid enlargement of the piers at the tops. The bottom 4 feet of piers in hard bedrock should be left in a roughened condition.
2. A 3-inch minimum "air space" should be provided beneath the portions of the grade beams that span the piers.

#### SLAB CONSTRUCTION

The bedrock materials on which the interior concrete slabs will probably be placed are presently stable. However, if these materials should be subjected to increases in moisture content, they could swell. Therefore, it must be understood that there is a risk of possible damage in the future if slab-on-ground construction is used in lieu of a structurally supported floor system. If the lowest floor system is a slab instead of a structurally supported floor, the engineer will not be responsible for future damages due to slab heaving.

If the owner is willing to risk the possibility of some cracking due to interior

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slab movement, then the details outlined below should be carefully followed. Based on experience with expansive soils, it has been found that these measures will help to minimize the damage should some wetting take place and will prevent slab heave from affecting either the structural foundation or the superstructure.

1. Separate the slab from all bearing members and utility lines to allow its independent movement--construct a "floating" slab. Provide positive control joints at the junction of the slab with foundation walls.
2. Construct a minimum 2-inch void space above or below partitions on the slabs. In finished areas, all furring strips, drywall, and paneling should stop 2 inches from the top of the slabs. The 2-inch void space can be covered with a molding strip.
3. Provide flexible connections for all utilities resting on slabs.

To provide uniform and stable slab support, it is recommended that the sub-grade soils be compacted to a minimum of 90 percent of AASHTO T-99 density at or above optimum moisture content for at least 1 foot. Further, it is recommended that the building floor slab be a minimum of 4 inches in depth and be reinforced with a minimum of 6 X 6 W 2.9 X 2.9 welded wire fabric.

#### HIGH PRESSURE FOOTING-PAD FOUNDATIONS

In the event that the owner does not wish to use piers and is willing to assume a risk of post-construction foundation movements, it might be possible to use a high pressure footing-pad design. The soil pressures for design of such a system cannot be given until the completion of the foundation excavation. When the excavation is completed, the soil engineer could inspect it, if requested, to determine if the alternate system is feasible. The costs of such future inspections have not been included in the fee for the original report and the owner will be responsible for the additional charges.

#### BACKFILL AND SURFACE DRAINAGE

For the recommended system to function best, the foundation materials should be prevented from being wetted after construction. This can generally be assisted by using a relatively impervious backfill and compacting the backfill sufficiently so that it does not settle following construction. The backfill should be free of debris and should be moistened and compacted to the extent that it does not experience future consolidation. Sufficient water should be added to the backfill to permit proper compaction; however, the backfill should not be puddled. If compaction is not feasible, a berm may be constructed adjacent to the foundation walls to allow for good slope away from the building even if some settlement should occur.

If any settlement should occur in the backfill, it could adversely affect utility lines which transmit fluids and pass through the grade beam foundation walls. It is not uncommon for such piping to shear at the foundation walls due to movements in the backfill. It is recommended that the pipes pass through slotted openings in the foundation walls or that flexible connections be used to compensate for shifting of the foundation wall backfill. It is also recommended

that all water lines be carefully pressure tested prior to final acceptance and that any leaks detected be repaired.

The final grade should slope well away from the structure on all sides. A minimum slope of 12 inches in the first 10 feet is recommended. All downspouts should empty into splashblocks or extensions which slope away from the foundation walls and extend beyond the limits of all backfill. The point of discharge should be at least 6 feet from the foundation walls and good drainage should be maintained at this point.

All future owners of the residence should be advised of the presence of the underlying expansive materials, their potential detrimental effects to the structure, and the need for keeping moisture away from the foundation and slab-on-ground areas. In no event should an automatic sprinkler system be installed next to the foundation walls. There should be absolutely no watering or irrigation within 6 feet of the foundation walls. The ground surface in the area should be lined with a polyethylene barrier. The polyethylene should be covered with gravel, bark chips, or other materials requiring absolutely no rainfall or irrigation.

#### PERCOLATION TESTS

In addition, I conducted percolation tests on the above-listed property on May 29, 1982. The percolation tests were performed in accordance with the Tri-County Health Department Regulations.

The percolation test holes and the profile hole were drilled with a Simco 2800 Sk-1 multi-purpose exploration drill equipped with a 4-inch auger.

The percolation rates of these tests are reported in minutes of time per inch of water drop. The field percolation rate is the average of all the test holes observed in the proposed leaching field.

The results are as follows:

#### Percolation Test Hole #1 - 40" deep (silt sand)

Percolation rate = 47 minutes per inch

#### Percolation Test Hole #2 - 40" deep (silt sand)

Percolation rate = 50 minutes per inch

#### Percolation Test Hole #3 - 48" deep (silty sand)

Percolation rate = 39 minutes per inch

#### Profile Test Hole

0'-0" - 0'-10"      TOPSOIL, firm, silty, clayey (lean), black, very moist.

0'-10" - 10'-0"      SILT-SAND, firm, more silt than fine sand, some lean clay, beige, light moist.

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According to these results a conventional leaching field may be used at the site. Due to the fact that shallow, adverse bedrock conditions could be present in other areas, it is required that the field be centered over the test holes. Provided that the field is located as stipulated and assuming that the residence will contain both a garbage grinder and an automatic clothes washing machine, I recommend that the absorption area contain a minimum of 490 square feet of leaching area per bedroom. This recommendation is based on the following formula:

$$A = 1.6 \frac{Q \sqrt{t}}{5}$$

Where A = minimum absorption area per bedroom in square feet

Q = estimated design daily sewage flow per bedroom in gallons (225)

t = average percolation rate in minutes per inch (46)

1.6 = factor for increase in size due to garbage grinder and automatic clothes washer

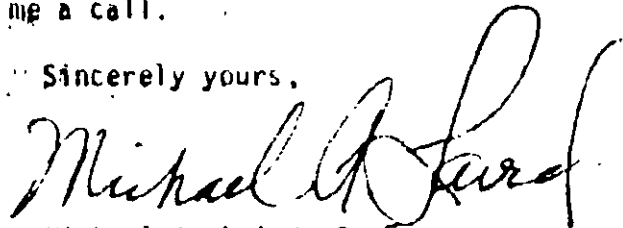
5 = empirical value

It is recommended that the leaching field contain a minimum of 1,600 square feet of bottom bed area, regardless of how few bedrooms are incorporated in the residence.

In addition, the proposed leaching field must be constructed over the test area for P-1, P-2, and P-3, and the Profile Test Hole, due to the presence of shallow dense bedrock materials over other portions of the site.

If you have any questions concerning this report, or if I can be of further service, please do not hesitate to give me a call.

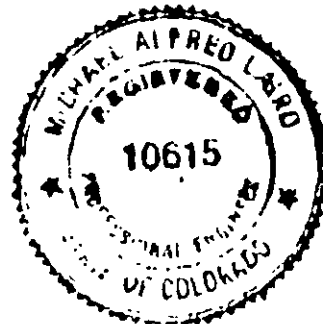
Sincerely yours,



Michael A. Laird, P. E.  
Consulting Engineer

Enclosures

MAL/jak



LOG OF SUBSURFACE CONDITIONS

(See Figure 1 for Test Hole Location)

| <u>DEPTH</u>                  | <u>DESCRIPTION</u>   |
|-------------------------------|--|
| <u>FOUNDATION TEST BORING</u> |  |
| 0'-0" - 1'-0"                 | <u>SAND</u> , firm, silty, light brown, moist.   |
| 1'-0" - 5'-4"                 | <u>SAND-SANDSTONE</u> , compact to very compact, medium with some dense and fine zones, slightly silty, cream-beige to white, light moist.   |
| 5'-4" - 20'-0"                | <u>SILTSTONE-SANDSTONE</u> , dense, fine sand to silt-sized, some lean clay content, gray-brown, to cream-beige with some yellow discolorations in zones of weathering, light moist. |

NOTES

1. The exploratory test boring was drilled on May 29, 1982.
2. The location of the test boring is shown on Figure 1. It is not warranted that the subsurface conditions given above are representative of conditions at other locations and other times. In the event that conditions different from those described above are encountered during construction, the soil engineer must be notified immediately.
3. No groundwater was encountered during the field investigation.

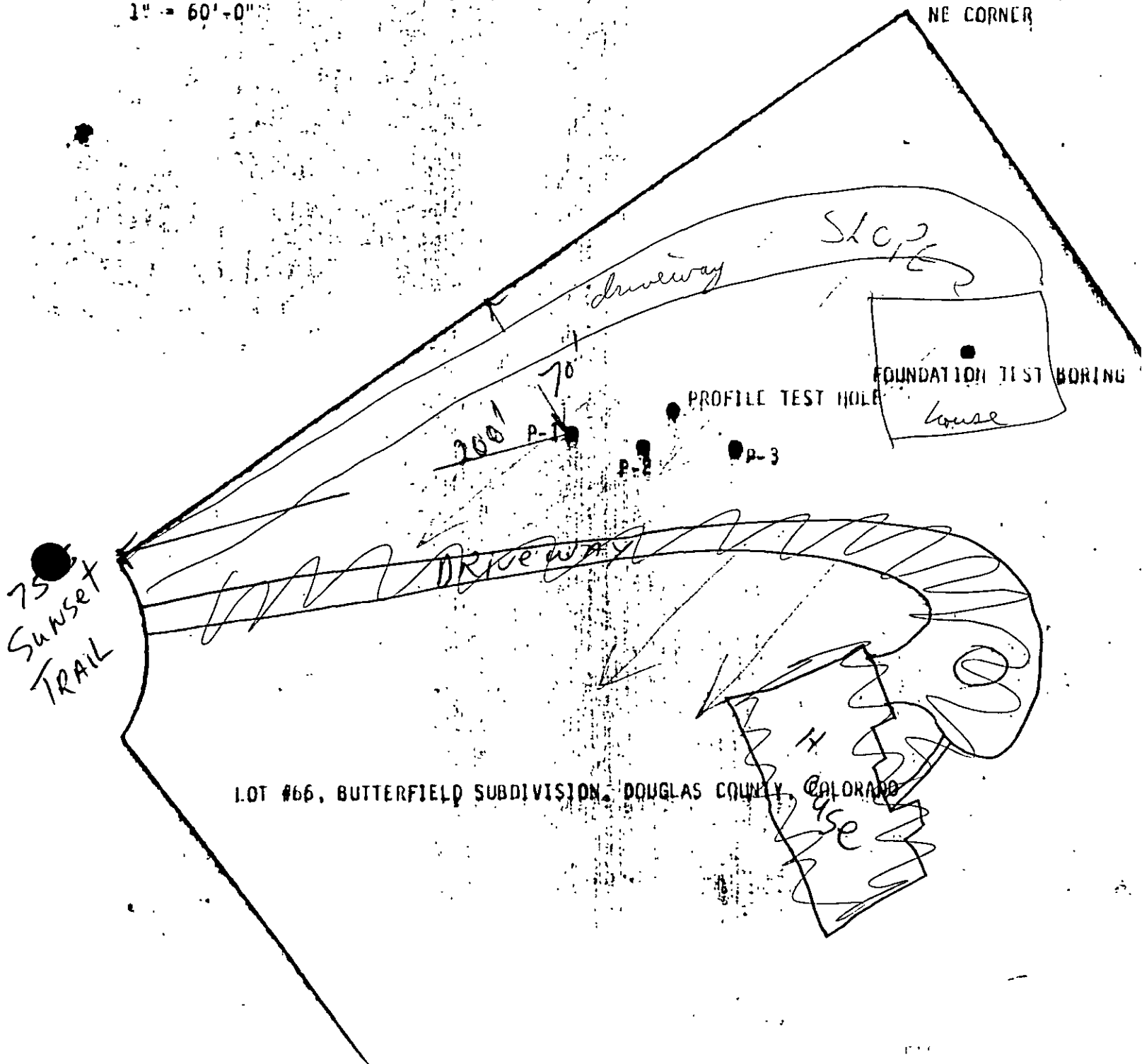
TEST RESULTS

1. Standard Penetration Test at 9'-0": 39 blows/foot
2. Standard Penetration Test at 20'-0": 56 blows/foot

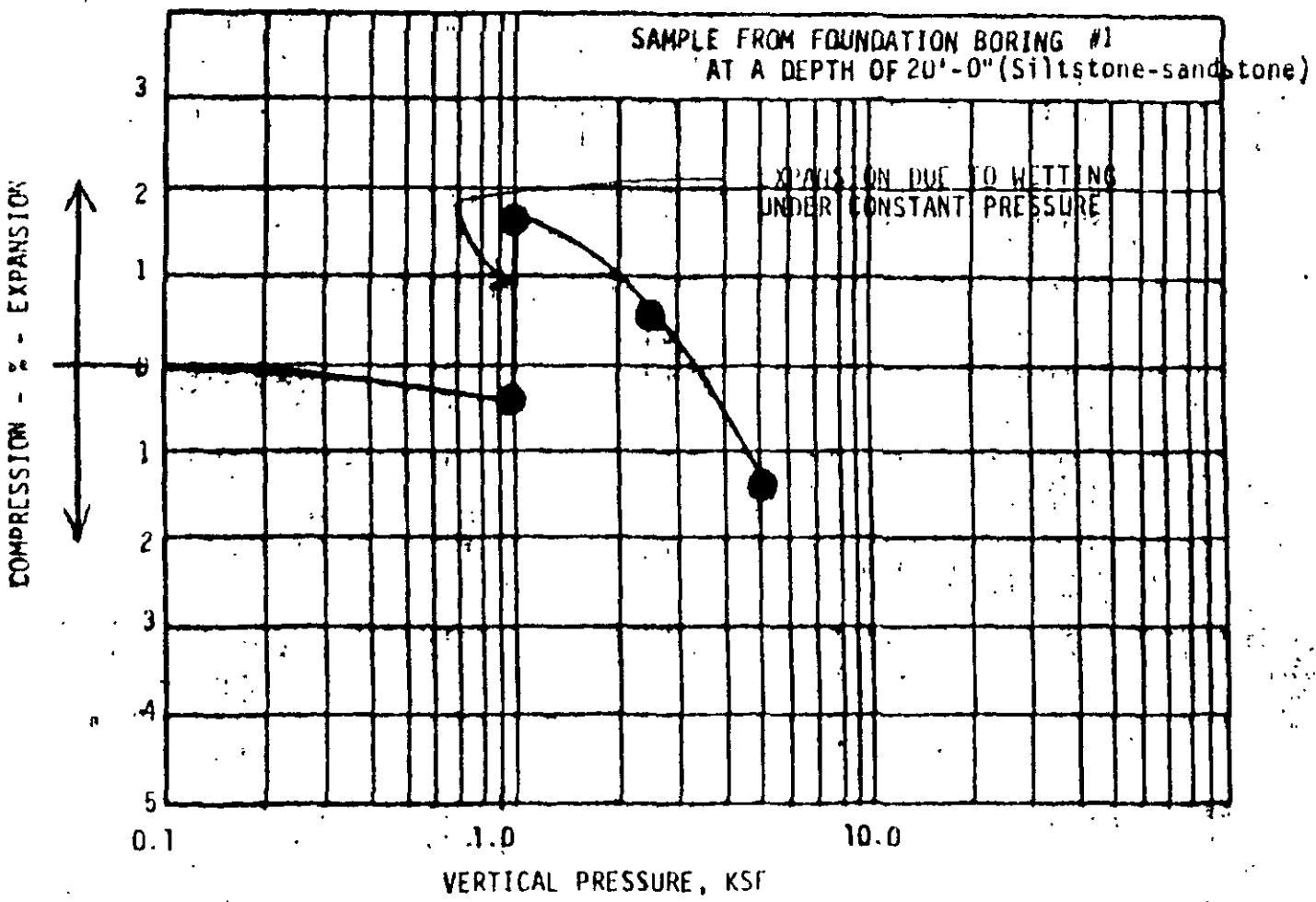
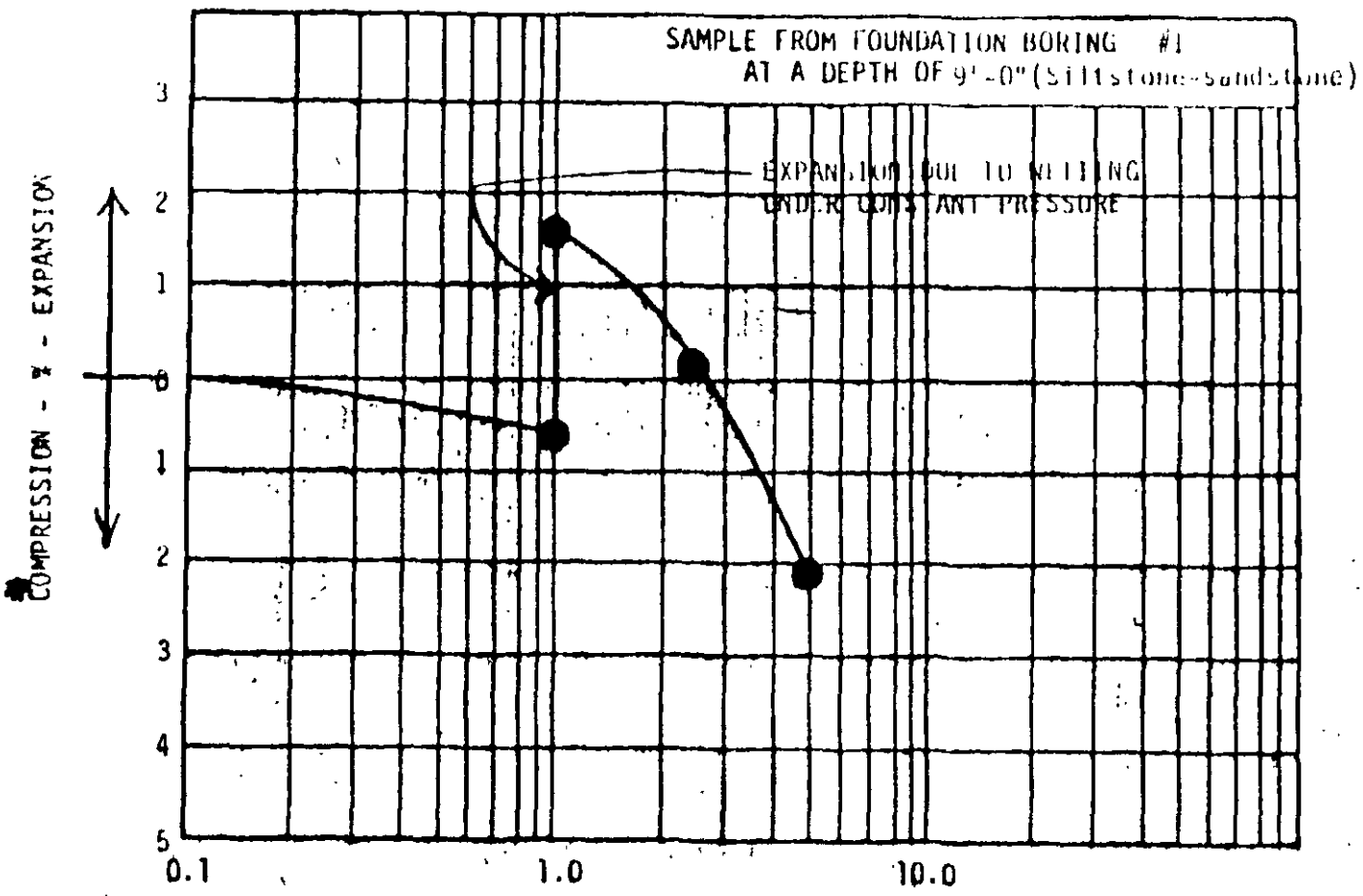


TEST HOLE LOCATION PLAN

1" = 60'-0"



LOT #66, BUTTERFIELD SUBDIVISION, DOUGLAS COUNTY, COLORADO



ONE-DIMENSIONAL CONSOLIDATION TEST

FIGURE 2

