

Should questions arise during the processing of this application please contact:  
Steve Hannula ERO Resources Corp. (208) 373-7983

RECEIVED

OCT 16 2008

STATE OF IDAHO  
DEPARTMENT OF WATER RESOURCES

WATER RESOURCES  
WESTERN REGION

APPLICATION FOR TRANSFER OF WATER RIGHT  
PART 1

AMENDED

Name of applicant Harris Family Limited Partnership Phone (208) 344-1131

Post Office address 4940 E. Mill Station Dr, Boise, ID 83716

A. Purpose of Transfer

1. ☒ Change point of diversion ☒ Add diversion point(s) ☐ Change place of use  
☐ Change nature of use ☐ Change period of use ☐ Other \_\_\_\_\_

2. Describe the reason for the proposed changes To move the point of diversion from an existing well that is no longer owned by the applicant to a series of ponds that intercepts ground water and an existing well.

B. DESCRIPTION OF RIGHT(S) OR PORTION THEREOF, AFTER THE REQUESTED CHANGE

| 1. Right Number | Priority          | Amount<br>(cfs/ac-ft) | Nature<br>of Use  | Period of Use       |
|-----------------|-------------------|-----------------------|-------------------|---------------------|
| <u>63-2973</u>  | <u>12-28-1953</u> | <u>0.42 cfs</u>       | <u>Irrigation</u> | <u>3/1 to 11/15</u> |
| <u>63-7103</u>  | <u>6-25-1968</u>  | <u>1.2 cfs</u>        | <u>Irrigation</u> | <u>4/1 to 11/1</u>  |

NOTE: Irrigation is the listed use on the license 63-2973, but will be changed to include mitigation following an administrative change in lieu of transfer resulting from a mitigation plan submitted in January 2008.

2. Total amount of water being transferred 1.62 cubic feet per second and/or \_\_\_\_\_ acre-feet per annum.  
3. Source of water Ground water tributary to N/A  
4. Point(s) of Diversion:

| Lot | 1/4 | 1/4 | 1/4 | Sec | Twp | Rge | County | Local name for diversion |
|-----|-----|-----|-----|-----|-----|-----|--------|--------------------------|
|     |     | SW  | SE  | 19  | 3N  | 3E  | Ada    | Irrigation Pond          |
|     |     | SW  | SE  | 19  | 3N  | 3E  | Ada    | Detention Pond 1         |
|     |     | NE  | SW  | 19  | 3N  | 3E  | Ada    | Detention Pond 2         |
|     |     | NE  | SW  | 20  | 3N  | 3E  | Ada    | Existing well            |
|     |     | SW  | SE  | 19  | 3N  | 3E  | Ada    | Proposed well            |

5. Lands irrigated or place of use: **(NO CHANGE)**

| Twp | Rge | Sec | NE 1/4 |     |    |    | NW 1/4 |    |    |      | SW 1/4 |    |    |     | SE 1/4 |    |      |      | Totals |
|-----|-----|-----|--------|-----|----|----|--------|----|----|------|--------|----|----|-----|--------|----|------|------|--------|
|     |     |     | NE     | NW  | SW | SE | NE     | NW | SW | SE   | NE     | NW | SW | SE  | NE     | NW | SW   | SE   |        |
| 3N  | 3E  | 19  |        |     |    |    |        |    |    |      | 4      |    |    | 0.5 | 18     |    | 15.7 | 32.5 | 70.7   |
|     |     | 20  |        |     |    |    |        |    |    |      | 7      | 24 | 38 | 20  |        |    |      |      | 89     |
|     |     | 29  |        |     |    |    | 16.7   | 34 | 38 | 17.3 | 19     | 19 | 2  | 8   |        |    |      |      | 154    |
|     |     | 30  | 27     | 7.3 |    | 7  |        |    |    |      |        |    |    |     |        |    |      |      | 41.3   |
|     |     |     |        |     |    |    |        |    |    |      |        |    |    |     |        |    |      |      |        |
|     |     |     |        |     |    |    |        |    |    |      |        |    |    |     |        |    |      |      |        |

SCANNED  
Total acres 355  
FEB 11 2009

**PART 1**

6. General Information:

- a. Description of diversion system Three shallow ponds excavated to below ground water level. Lift pump will pump water from one pond to the pressurized irrigation system. Existing well serves landscape irrigation at one of the lots within the permissible place of use. Proposed well will be less than 200 feet deep to provide water to the development's pressurized irrigation system via the pond.
- b. Are the lands from which you propose to transfer the water right subject to any liens, deeds of trust, mortgages, or contracts? \_\_\_\_\_ Yes X No. If yes, provide a notarized statement from the holder of the lien, deed of trust, mortgage or contract agreeing to the proposed changes.
- c. Describe the affect on the land now irrigated if the place of use is changed pursuant to this transfer: No change to the Place of Use
- d. Remarks: See Attachment 1 for justification that the new points of diversion are tapping the same water source as the original point of diversion. See Figures 1 and 2 for location of project and location of the proposed points of diversion.

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**ACTION OF THE DIRECTOR, DEPARTMENT OF WATER RESOURCES**

This is to certify that I have examined Application for Transfer of Water Rights No. \_\_\_\_\_  
 And said application is hereby \_\_\_\_\_, subject to the following limitations and conditions:

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Witness my hand this \_\_\_\_\_ day of \_\_\_\_\_, 20 \_\_\_\_\_.

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For the Director

STATE OF IDAHO  
DEPARTMENT OF WATER RESOURCES

## APPLICATION FOR TRANSFER OF WATER RIGHT

## PART 2

(Attach one copy for each right)

Attachment A

## A. DESCRIPTION OF RIGHT AS RECORDED

## 1. Right evidenced by:

- a. Decree No. \_\_\_\_\_ Decreed to \_\_\_\_\_  
in case of \_\_\_\_\_ vs. \_\_\_\_\_  
dated \_\_\_\_\_ in \_\_\_\_\_ county of \_\_\_\_\_
- b. License No. 63-2973 issued by the Idaho Department of Water Resources.
- c. Claim No. \_\_\_\_\_ on file with the Idaho Department of Water Resources.
- d. Transfer No. \_\_\_\_\_ which produced this right.

## 2. Attach copy of last year's tax notice for the property to which the water right is appurtenant or other documents which show ownership. Label document as attachment A. Check appropriate box below:

☐ Tax Notice ☐ Warranty Deed ☐ Other \_\_\_\_\_

3. Source of water \_\_\_\_\_

**Entire Water Right Will Be Changed**

4. Date of priority \_\_\_\_\_

## 5. Water is used for the following purpose:

Amount \_\_\_\_\_ for \_\_\_\_\_ purposes from \_\_\_\_\_ to \_\_\_\_\_  
(cfs/ac-ft)

Amount \_\_\_\_\_ for \_\_\_\_\_ purposes from \_\_\_\_\_ to \_\_\_\_\_  
(cfs/ac-ft)

Amount \_\_\_\_\_ for \_\_\_\_\_ purposes from \_\_\_\_\_ to \_\_\_\_\_  
(cfs/ac-ft)

6. Total amount of water under right \_\_\_\_\_ cubic feet per second and/or \_\_\_\_\_ acre-feet per annum.

## 7. Point(s) of Diversion:

| Lot | ¼ | ¼ | ¼ | Sec | Twp | Rge | County | Local name for diversion |
|-----|---|---|---|-----|-----|-----|--------|--------------------------|
|     |   |   |   |     |     |     |        |                          |
|     |   |   |   |     |     |     |        |                          |

## 8. Lands irrigated or place of use:

| Twp | Rge | Sec | NE ¼ |    |    |    | NW ¼ |    |    |    | SW ¼ |    |    |    | SE ¼ |    |    |    | Totals |
|-----|-----|-----|------|----|----|----|------|----|----|----|------|----|----|----|------|----|----|----|--------|
|     |     |     | NE   | NW | SW | SE | NE   | NW | SW | SE | NE   | NW | SW | SE | NE   | NW | SW | SE |        |
|     |     |     |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |    |        |
|     |     |     |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |    |        |
|     |     |     |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |    |        |
|     |     |     |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |    |        |

Total acres \_\_\_\_\_

9. Describe any other water rights used for the same purpose as described above 63-7103, 63-365, 63-8627

**PART 2 (63-2973)**

10. To your knowledge, has any portion of this water right undergone a period of five or more consecutive years of non-use?  
**NO** If yes, describe \_\_\_\_\_

**B. DESCRIPTION OF PORTION OF RIGHT BEING TRANSFERRED**

(If the entire right is to be changed by the applicant, omit part B and C.)

1. Amount \_\_\_\_\_ for \_\_\_\_\_ purposes from \_\_\_\_\_ to \_\_\_\_\_  
 (cfs/ac-ft)  
 Amount \_\_\_\_\_ for \_\_\_\_\_ purposes from \_\_\_\_\_ to \_\_\_\_\_  
 (cfs/ac-ft)  
 Amount \_\_\_\_\_ for \_\_\_\_\_ purposes from \_\_\_\_\_ to \_\_\_\_\_  
 (cfs/ac-ft)

2. Point(s) of Diversion:

| Lot | ¼ | ¼ | ¼ | Sec | Twp | Rge | County | Local name for diversion |
|-----|---|---|---|-----|-----|-----|--------|--------------------------|
|     |   |   |   |     |     |     |        |                          |
|     |   |   |   |     |     |     |        |                          |
|     |   |   |   |     |     |     |        |                          |

3. Lands irrigated or place of use:

| Twp | Rge | Sec | NE ¼ |    |    |    | NW ¼ |    |    |    | SW ¼ |    |    |    | SE ¼ |    |    |    | Totals |
|-----|-----|-----|------|----|----|----|------|----|----|----|------|----|----|----|------|----|----|----|--------|
|     |     |     | NE   | NW | SW | SE | NE   | NW | SW | SE | NE   | NW | SW | SE | NE   | NW | SW | SE |        |
|     |     |     |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |    |        |
|     |     |     |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |    |        |
|     |     |     |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |    |        |

Total acres \_\_\_\_\_

**C. DESCRIPTION OF UNCHANGED PORTION OF RIGHT (omit if there is no change)**

1. Amount \_\_\_\_\_ for \_\_\_\_\_ purposes from \_\_\_\_\_ to \_\_\_\_\_  
 (cfs/ac-ft)  
 Amount \_\_\_\_\_ for \_\_\_\_\_ purposes from \_\_\_\_\_ to \_\_\_\_\_  
 (cfs/ac-ft)  
 Amount \_\_\_\_\_ for \_\_\_\_\_ purposes from \_\_\_\_\_ to \_\_\_\_\_  
 (cfs/ac-ft)

2. Point(s) of Diversion:

| Lot | ¼ | ¼ | ¼ | Sec | Twp | Rge | County | Local name for diversion |
|-----|---|---|---|-----|-----|-----|--------|--------------------------|
|     |   |   |   |     |     |     |        |                          |
|     |   |   |   |     |     |     |        |                          |
|     |   |   |   |     |     |     |        |                          |

3. Lands irrigated or place of use:

| Twp | Rge | Sec | NE ¼ |    |    |    | NW ¼ |    |    |    | SW ¼ |    |    |    | SE ¼ |    |    |    | Totals |
|-----|-----|-----|------|----|----|----|------|----|----|----|------|----|----|----|------|----|----|----|--------|
|     |     |     | NE   | NW | SW | SE | NE   | NW | SW | SE | NE   | NW | SW | SE | NE   | NW | SW | SE |        |
|     |     |     |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |    |        |
|     |     |     |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |    |        |
|     |     |     |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |    |        |

Total acres \_\_\_\_\_

STATE OF IDAHO  
DEPARTMENT OF WATER RESOURCES

APPLICATION FOR TRANSFER OF WATER RIGHT

PART 2

(Attach one copy for each right)

*Attachment B*

A. DESCRIPTION OF RIGHT AS RECORDED

1. Right evidenced by:

- a. Decree No. \_\_\_\_\_ Decreed to \_\_\_\_\_  
in case of \_\_\_\_\_ vs. \_\_\_\_\_  
dated \_\_\_\_\_ in \_\_\_\_\_ county of \_\_\_\_\_
- b. License No. 63-7103 issued by the Idaho Department of Water Resources.
- c. Claim No. \_\_\_\_\_ on file with the Idaho Department of Water Resources.
- d. Transfer No. \_\_\_\_\_ which produced this right.

2. Attach copy of last year's tax notice for the property to which the water right is appurtenant or other documents which show ownership. Label document as attachment A. Check appropriate box below:

☐ Tax Notice ☐ Warranty Deed ☐ Other \_\_\_\_\_

3. Source of water \_\_\_\_\_ tributary to \_\_\_\_\_

4. Date of priority \_\_\_\_\_

5. Water is used for the following purpose:

Amount \_\_\_\_\_ for \_\_\_\_\_ purposes from \_\_\_\_\_ to \_\_\_\_\_  
(cfs/ac-ft)

Amount \_\_\_\_\_ m \_\_\_\_\_ to \_\_\_\_\_  
(cfs/ac-ft)

Amount \_\_\_\_\_ m \_\_\_\_\_ to \_\_\_\_\_  
(cfs/ac-ft)

**Entire Water Right Will Be Changed**

6. Total amount of water under right \_\_\_\_\_ cubic feet per second and/or \_\_\_\_\_ acre-feet per annum.

7. Point(s) of Diversion:

| Lot | 1/4 | 1/4 | 1/4 | Sec | Twp | Rge | County | Local name for diversion |
|-----|-----|-----|-----|-----|-----|-----|--------|--------------------------|
|     |     |     |     |     |     |     |        |                          |
|     |     |     |     |     |     |     |        |                          |

8. Lands irrigated or place of use:

| Twp | Rge | Sec | NE 1/4 |    |    |    | NW 1/4 |    |    |    | SW 1/4 |    |    |    | SE 1/4 |    |    |    | Totals |
|-----|-----|-----|--------|----|----|----|--------|----|----|----|--------|----|----|----|--------|----|----|----|--------|
|     |     |     | NE     | NW | SW | SE | NE     | NW | SW | SE | NE     | NW | SW | SE | NE     | NW | SW | SE |        |
|     |     |     |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |        |
|     |     |     |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |        |
|     |     |     |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |        |
|     |     |     |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |        |

Total acres \_\_\_\_\_

9. Describe any other water rights used for the same purpose as described above 63-2973, 63-365, 63-8627

**PART 2 (63-7103)**

10. To your knowledge, has any portion of this water right undergone a period of five or more consecutive years of non-use?  
**NO** If yes, describe \_\_\_\_\_

**B. DESCRIPTION OF PORTION OF RIGHT BEING TRANSFERRED**

(If the entire right is to be changed by the applicant, omit part B and C.)

1. Amount \_\_\_\_\_ for \_\_\_\_\_ purposes from \_\_\_\_\_ to \_\_\_\_\_  
 (cfs/ac-ft)  
 Amount \_\_\_\_\_ for \_\_\_\_\_ purposes from \_\_\_\_\_ to \_\_\_\_\_  
 (cfs/ac-ft)  
 Amount \_\_\_\_\_ for \_\_\_\_\_ purposes from \_\_\_\_\_ to \_\_\_\_\_  
 (cfs/ac-ft)

2. Point(s) of Diversion:

| Lot | ¼ | ¼ | ¼ | Sec | Twp | Rge | County | Local name for diversion |
|-----|---|---|---|-----|-----|-----|--------|--------------------------|
|     |   |   |   |     |     |     |        |                          |
|     |   |   |   |     |     |     |        |                          |
|     |   |   |   |     |     |     |        |                          |

3. Lands irrigated or place of use:

| Twp | Rge | Sec | NE ¼ |    |    |    | NW ¼ |    |    |    | SW ¼ |    |    |    | SE ¼ |    |    |    | Totals |
|-----|-----|-----|------|----|----|----|------|----|----|----|------|----|----|----|------|----|----|----|--------|
|     |     |     | NE   | NW | SW | SE | NE   | NW | SW | SE | NE   | NW | SW | SE | NE   | NW | SW | SE |        |
|     |     |     |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |    |        |
|     |     |     |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |    |        |
|     |     |     |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |    |        |

Total acres \_\_\_\_\_

**C. DESCRIPTION OF UNCHANGED PORTION OF RIGHT (omit if there is no change)**

1. Amount \_\_\_\_\_ for \_\_\_\_\_ purposes from \_\_\_\_\_ to \_\_\_\_\_  
 (cfs/ac-ft)  
 Amount \_\_\_\_\_ for \_\_\_\_\_ purposes from \_\_\_\_\_ to \_\_\_\_\_  
 (cfs/ac-ft)  
 Amount \_\_\_\_\_ for \_\_\_\_\_ purposes from \_\_\_\_\_ to \_\_\_\_\_  
 (cfs/ac-ft)

2. Point(s) of Diversion:

| Lot | ¼ | ¼ | ¼ | Sec | Twp | Rge | County | Local name for diversion |
|-----|---|---|---|-----|-----|-----|--------|--------------------------|
|     |   |   |   |     |     |     |        |                          |
|     |   |   |   |     |     |     |        |                          |
|     |   |   |   |     |     |     |        |                          |

3. Lands irrigated or place of use:

| Twp | Rge | Sec | NE ¼ |    |    |    | NW ¼ |    |    |    | SW ¼ |    |    |    | SE ¼ |    |    |    | Totals |
|-----|-----|-----|------|----|----|----|------|----|----|----|------|----|----|----|------|----|----|----|--------|
|     |     |     | NE   | NW | SW | SE | NE   | NW | SW | SE | NE   | NW | SW | SE | NE   | NW | SW | SE |        |
|     |     |     |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |    |        |
|     |     |     |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |    |        |
|     |     |     |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |    |        |

Total acres \_\_\_\_\_

**PART 3**

**B. CHANGES IN NATURE OF USE**

| 1. | <u>New Nature of Use</u> | <u>Amount</u><br><u>(cfs/ac-ft)</u> | <u>Hours/days/year</u> | <u>Period of Use</u> |
|----|--------------------------|-------------------------------------|------------------------|----------------------|
|    | _____                    | _____                               | _____                  | _____ to _____       |
|    | _____                    | _____                               | _____                  | _____ to _____       |

2. Quantity and quality of return flows and location of discharge:

\_\_\_\_\_

\_\_\_\_\_

3. Describe effects on other water uses resulting from the proposed change:

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

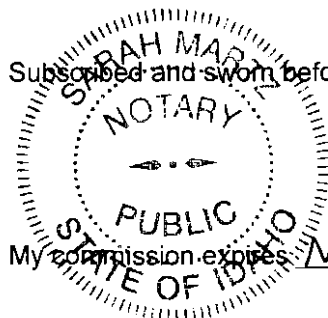
I hereby assert that no one will be injured by such change and that the change does not constitute an enlargement in use of the original right. The information contained in this application is true to the best of my knowledge.

I understand that any willful misrepresentations made in this application may result in voiding its approval.

Felicia Benkhart

(Signature of Applicant)

Subscribed and sworn before me this 14 day of October, 20 08



Sarah Martin

(Notary Public)

My commission expires November 10, 2011

**FOR DEPARTMENT USE ONLY**

Transfer contains 1 pages and 4 attachments \*Attachment 1 includes 2 sided copies

Received by DB Date 10-16-08 Protest filed by \_\_\_\_\_

Prelim. Check by VLM Fee \$290 } per original appl.

Received by JVO Date 1/29/08 W036113

Published in \_\_\_\_\_ Copies of protest forwarded by \_\_\_\_\_

Pub. Dates \_\_\_\_\_ Hearing held by \_\_\_\_\_ Date \_\_\_\_\_

Watermaster recommendation requested on \_\_\_\_\_ Recommended for ☐ approval ☐ denial

\_\_\_\_\_ received \_\_\_\_\_ by \_\_\_\_\_

Copy of transfer sent to lien holder \_\_\_\_\_

## IDAHO DEPARTMENT OF WATER RESOURCES

Adjudication Recommendation Report 63-2973 V2

WATER RIGHT NUMBER: 63-2973 V2

| <u>Owner Type</u> | <u>Name and Address</u>                                                                     |
|-------------------|---------------------------------------------------------------------------------------------|
| Original Owner    | ESTHER V DARKWOOD<br>6020 WARM SPRINGS AVE<br>BOISE, ID 83712<br>(208)344-1961              |
| Original Owner    | ALBERT O DARKWOOD<br>6020 WARM SPRINGS AVE<br>BOISE, ID 83712<br>(208)344-1961              |
| Current Owner     | HARRIS FAMILY LTD PARTNERSHIP<br>4940 E MILL STATION RD<br>BOISE, ID 83716<br>(208)344-1131 |

Priority Date: 12/28/1953

Basis: License

Status: Active

| <u>Source</u> | <u>Tributary</u> |
|---------------|------------------|
| GROUND WATER  |                  |

| <u>Beneficial Use</u> | <u>From</u> <u>To</u>   | <u>Diversion Rate</u> | <u>Annual Volume</u> |
|-----------------------|-------------------------|-----------------------|----------------------|
| IRRIGATION            | 03/01 to 11/15          | 0.420 CFS             | 108.00 AF            |
|                       | <u>Total Diversion:</u> | 0.420 CFS             | 108.00 AF            |

Location of Point(s) of Diversion

|              |            |                                 |
|--------------|------------|---------------------------------|
| GROUND WATER | SE1/4NE1/4 | Sec. 29, Twp 03N, Rge 03E, B.M. |
| ADA County   |            |                                 |

Place of UseIRRIGATION Within ADA County

|                               |                               |
|-------------------------------|-------------------------------|
| T03N R03E S19 Lot 4 NESW 4.0  | T03N R03E S19 Lot 5 SESW 0.5  |
| T03N R03E S19 NESE 18.0       | T03N R03E S19 SWSE 15.7       |
| T03N R03E S19 SESE 32.5       | T03N R03E S20 NESW 7.0        |
| T03N R03E S20 NWSW 24.0       | T03N R03E S20 SWSW 38.0       |
| T03N R03E S20 SESW 20.0       | T03N R03E S29 NENW 16.7       |
| T03N R03E S29 NWNW 34.0       | T03N R03E S29 Lot 5 SWNW 38.0 |
| T03N R03E S29 SENW 17.3       | T03N R03E S29 Lot 3 NESW 19.0 |
| T03N R03E S29 Lot 4 NWSW 19.0 | T03N R03E S29 Lot 4 SWSW 2.0  |
| T03N R03E S29 Lot 3 SESW 8.0  | T03N R03E S30 Lot 9 NENE 27.0 |
| T03N R03E S30 Lot 9 NWNE 7.3  | T03N R03E S30 Lot 8 SENE 7.0  |

Total Acres: 355

Attachment A (p. 1 of 2)

IDAHO DEPARTMENT OF WATER RESOURCES  
Adjudication Recommendation Report 63-2973 V2

Conditions of Approval:

1. R43 The right holder shall provide a means of measurement and lockable controlling works for all authorized points of diversion. The means of measurement and controlling works must be suitable for control of the diversions and acceptable to the watermaster.
2. C18 This partial decree is subject to such general provisions necessary for the definition of the rights or for the efficient administration of the water rights as may be ultimately determined by the Court at a point in time no later than the entry of a final unified decree. Section 42-1412(6), Idaho Code.
3. E61 Use of this right with rights listed below is limited to a total combined diversion rate of 7.1 cfs and to a total combined annual diversion volume of 1597.5 AF. Combined Right Nos.: 63-365, 63-2973, 63-7103 and 63-8627.
4. W45 Use of this right is combined with water from Boise-Kuna Irrigation District.
5. X27 This right is limited to the irrigation of 24 acres within the place of use described above in a single irrigation season.
6. 11 Use of this right with Right Nos. 63-365, 63-7103 and 63-8627 is limited to the irrigation of a combined total of 355 acres in a single irrigation season.

Remarks:

Comments:

1. Vmusic 3/21/2007 OBJECTION RESOLUTION

Comment: SPECIAL MASTER ALLOWED POST 1987 TRANSFER TO BE ACCOMPLISHED THRU THE SRBA. THIS VERSION 2 RECOMMENDATION AND THE SF5 REFLECTS THIS TRANSFER.

Water Supply Bank:

Attachment A (p. 2 of 2)

IDAHO DEPARTMENT OF WATER RESOURCES

Adjudication Recommendation Report 63-7103 V2

WATER RIGHT NUMBER: 63-7103 V2

| <u>Owner Type</u> | <u>Name and Address</u>                                                                     |
|-------------------|---------------------------------------------------------------------------------------------|
| Previous Owner    | DALLAS H HARRIS<br>3051 S WISE WY<br>BOISE, ID 83706<br>(208)344-2573                       |
| Current Owner     | HARRIS FAMILY LTD PARTNERSHIP<br>4940 E MILL STATION RD<br>BOISE, ID 83716<br>(208)344-1131 |

Priority Date: 06/25/1968

Basis: License

Status: Active

| <u>Source</u> | <u>Tributary</u> |
|---------------|------------------|
| GROUND WATER  |                  |

| <u>Beneficial Use</u> | <u>From</u> <u>To</u>   | <u>Diversion Rate</u> | <u>Annual Volume</u> |
|-----------------------|-------------------------|-----------------------|----------------------|
| IRRIGATION            | 04/01 to 11/01          | 1.200 CFS             | 363.00 AF            |
|                       | <u>Total Diversion:</u> | 1.200 CFS             | 363.00 AF            |

Location of Point(s) of Diversion

|              |            |                                 |
|--------------|------------|---------------------------------|
| GROUND WATER | SE1/4NE1/4 | Sec. 29, Twp 03N, Rge 03E, B.M. |
| ADA County   |            |                                 |

Place of Use

IRRIGATION Within ADA County

|                               |                               |
|-------------------------------|-------------------------------|
| T03N R03E S19 Lot 4 NESW 4.0  | T03N R03E S19 Lot 5 SESW 0.5  |
| T03N R03E S19 NESE 18.0       | T03N R03E S19 SWSE 15.7       |
| T03N R03E S19 SESE 32.5       | T03N R03E S20 NESW 7.0        |
| T03N R03E S20 NWSW 24.0       | T03N R03E S20 SWSW 38.0       |
| T03N R03E S20 SESW 20.0       | T03N R03E S29 NENW 16.7       |
| T03N R03E S29 NWNW 34.0       | T03N R03E S29 Lot 5 SWNW 38.0 |
| T03N R03E S29 SENW 17.3       | T03N R03E S29 Lot 3 NESW 19.0 |
| T03N R03E S29 Lot 4 NWSW 19.0 | T03N R03E S29 Lot 4 SWSW 2.0  |
| T03N R03E S29 Lot 3 SESW 8.0  | T03N R03E S30 Lot 9 NENE 27.0 |
| T03N R03E S30 Lot 9 NWNE 7.3  | T03N R03E S30 Lot 8 SENE 7.0  |

Total Acres: 355

Conditions of Approval:

1. W45 Use of this right is combined with water from Boise-Kuna Irrigation District.

Attachment B (p. 1 of 2)

IDAHO DEPARTMENT OF WATER RESOURCES

Adjudication Recommendation Report 63-7103 V2

2. E61 Use of this right with rights listed below is limited to a total combined diversion rate of 7.1 cfs and to a total combined annual diversion volume of 1597.5 AF. Combined Right Nos.: 63-365, 63-2973, 63-7103 and 63-8627.
3. X27 This right is limited to the irrigation of 80.5 acres within the place of use described above in a single irrigation season.
4. R43 The right holder shall provide a means of measurement and lockable controlling works for all authorized points of diversion. The means of measurement and controlling works must be suitable for control of the diversions and acceptable to the watermaster.
5. S39 THE USE OF WATER FOR IRRIGATION UNDER THIS RIGHT MAY BEGIN AS EARLY AS MARCH 1 AND MAY CONTINUE TO AS LATE AS NOVEMBER 15, PROVIDED OTHER ELEMENTS OF THE RIGHT ARE NOT EXCEEDED. THE USE OF WATER BEFORE APRIL 1 AND AFTER NOVEMBER 1 UNDER THIS REMARK IS SUBORDINATE TO ALL WATER RIGHTS HAVING NO SUBORDINATED EARLY OR LATE IRRIGATION USE AND A PRIORITY DATE EARLIER THAN THE DATE A PARTIAL DECREE IS ENTERED FOR THIS RIGHT.
6. E56 The rights listed below are limited to the irrigation of a combined total of 355 acres in a single irrigation season. Combined Right Nos.: 63-365, 63-2973, 63-7103 and 63-8627.
7. C18 This partial decree is subject to such general provisions necessary for the definition of the rights or for the efficient administration of the water rights as may be ultimately determined by the Court at a point in time no later than the entry of a final unified decree. Section 42-1412(6), Idaho Code.

Remarks:

Comments:

1. Vmusic 5/11/2007 OBJECTION RESOLUTION

Comment: SRBA COURT ALLOWED POST 1987 TRANSFER. 2000 TRANSFER 5577 PPU SPLIT INTO 2 PPUs. THIS ONE COMBINED WITH 63-365, 63-2973 LIMITED TO 355 ACRES. 63-8627 ALSO A POU OVERLAP THOUGH NOT A PART OF THE PPU.

Water Supply Bank:

Attachment B (p. 2 of 2)



Figure 2 Harris Family Ltd Partnership Points of Diversion  
(T3N, R3E, Ada County)



Prepared by ERO Resources  
3314 Grace St  
Boise, ID 83703  
(208) 373-7983

ATTACHMENT 1

HYDROLOGIC CONNECTION BETWEEN  
GOLDEN DAWN WELL, SHALLOW GROUND WATER, AND THE BOISE RIVER  
IN SUPPORT OF APPLICATION FOR TRANSFER

## **Introduction**

Water right nos. 63-2973 and 63-7103 are owned by the Harris Family Limited Partnership (Harris Family LP), and authorize the use of ground water to irrigate 24 and 80.5 acres of land, respectively. Each water right currently identifies the same point of diversion (PD) in the SENE Sec 29, T3N, R3E, which is in the Golden Dawn Trailer Estates along Warm Springs Avenue in Boise. The well is better known as the Golden Dawn Well (Figure 1).

In a recent agreement between the Harris Family LP and the Harris Ranch Homeowners Association (HRHOA), the Golden Dawn well was given to the HRHOA for use in their irrigation system. Harris Family LP retained rights 63-2973 and 63-7103. The Harris Family LP no longer has access to that well.

The subject Application for Transfer seeks to move the point of diversion from the Golden Dawn Well to three excavated ponds and two wells. These ponds and wells in cooperation with Boise Kuna Irrigation District will be used to irrigate the Harris Ranch Development. The Harris Ranch Development plan proposes to excavate three ponds that will intercept ground water; two ponds will be in the SWSE Section 19 and one will be in the NESW Section 19 (Figure 1 and 2). Idaho code 42-222 allows a PD to be changed provided that no other water rights are injured and other criteria are satisfied. To successfully change the PD from the Golden Dawn Well to the ponds and the two wells, the following analysis is provided to demonstrate that the Golden Dawn Well, the ponds, and the two wells all divert from the same ground water source.

The following analysis identifies the available data and the basis for the conclusion that the water pumped from the Golden Dawn well is the same water as would be exposed by the proposed shallow ponds and/or pumped by the two wells.

## **Elevations**

As shown in Figure 1, the topography of the Harris Ranch property gently slopes south toward the Boise River across relatively flat pasture. The slope is steeper at the base of the foothills and flattens near the river. Standard practice is to assume that the ground water gradient will follow topography, which is confirmed by the static water elevations described below.

Appendix 1 contains four driller reports of wells located in Section 29 T3N, R3E. IDWR has record of other wells located in the same section, but those cannot be correlated to existing wells, suggesting that either the driller reports did not accurately locate the well, or that the wells no longer exist or their history has been lost. However, the driller report for the well labeled as the Barber Trailer Court located in the NENW Section 29 is included, even though the well itself could not be found. This particular driller report is included because by its name and listed location is assumed to be in close proximity to the Golden Dawn Well, and also that it was completed in the same time period and of similar construction as the Golden Dawn Well. The Golden Dawn Well (also identified

as Barber Trailer Court on the well log) is located in the SENE and was completed on May 2, 1967 to a total depth of 101 feet, similar to the Barber Trailer Court Well in the NENW.

The surface elevation of the Golden Dawn Well is approximately 2,809 feet (Figure 1). No static water level is identified for the Golden Dawn Well. However, the driller report lists the first occurrence of water at approximately 46 feet, which puts the water elevation at approximately 2,763 ft. The elevation of the Boise River at the closest distance from the Golden Dawn Well is approximately 2,758, which is about 5 feet lower than the static water level in the Golden Dawn Well, suggesting a ground water gradient toward the river, consistent with the surface topography.

Similarly, the Idaho Power well located in the SENW Section 29 is 57 feet deep and has a static water depth of 6 feet. The surface elevation at the well is approximately 2,763 ft. The static water elevation is therefore approximately 2,757 ft. The elevation of the Boise River at the closest distance from the Idaho Power well is approximately 2,750, which is about 7 feet lower than the static water level in the well. This head difference supports the idea that the direction of ground water flow is toward the river.

The first water encountered in the Barber Trailer Court irrigation well is approximately 46 feet with a final static level of 40 feet. The lithology from 30 to 100 feet is listed as sand and gravel, suggesting that the first water and the final static should coincide and that the 6 feet of difference is likely a function of drilling conditions and not necessarily an indication of a confined aquifer.

The proposed ponds have a land surface elevation of approximately 2,743 feet. The ponds are proposed to be 20 to 25 feet deep, with a bottom elevation of approximately 2,718 to 2,723 feet. The water level at the pond area is about 4 to 5 feet below land, at an elevation of approximately 2,739. The elevation of the Boise River southwest of the proposed ponds is approximately 2,738 feet, which is consistent with the water level in the test pits. The correlation of water elevations between the Boise River, the test pits, and the Golden Dawn Well demonstrate that they form a contiguous surface.

## **Lithology**

The lithology described in the driller report for the Idaho Power well lists gravel and boulders down to 57 feet. The water bearing zone in the Golden Dawn well (46 to 101 feet) is described as sand and gravel. The clay listed in the Golden Dawn well is only in the upper 30 feet of the borehole and is not interbedded with the gravel or in the water bearing interval. The driller report for the Producers Lumber well located in the SENE Section 29 has gravel listed from 0 to 42 feet.

Strata Inc. ("Strata") conducted a field investigation consisting of shallow test pits and boreholes, located throughout the development (Appendix 2). Strata concluded that the soil conditions in the proposed pond area consist of relatively granular soil with poorly-

graded sand or gravel present at depths of less than 4 feet. However, in other test pits north of Warm Springs Avenue, Strata observed clayey or silty soil extending to 12 feet. A borehole located near the proposed pond area encountered clayey sand and sand in the top 7.5 feet, consistent with the test pit descriptions, and then poorly graded gravel from 7.5 to 26.5 feet where the borehole was terminated. Water level in the borehole was at 6 feet below ground surface.

Strata's observations show the near surface lithology is clay rich, but below 7 feet, poorly graded gravels are encountered to at least 26 feet. This gravel layer will be exposed during the excavation of the ponds and is therefore the water bearing interval.

The presence of sand, gravel and boulders throughout the water bearing zones in the wells and in the shallow excavations, without the presence of any interbedded clay layers is evidence that the local aquifer is unconfined and can be correlated across the Harris property.

### **Wells**

In addition to the ponds, there are two wells listed on the Application for Transfer. One well is the well that serves the home of one of the members of the Harris Family LP (Figure 2). This well was included, because it is located within the permissible place of use of the water rights and is used for irrigation. There is no well log on record in the IDWR electronic database, but based on the construction of nearby wells installed by Dallas Harris, the total depth of the well is expected to be shallow (less than 100 feet).

The second well is proposed to be located adjacent to the proposed ponds and is intended to pump water into the pond to help supply the pressurized irrigation system (Figure 2). This well will be installed only if ground water inflows to the irrigation pond cannot maintain water levels when the irrigation booster pumps are operating. It is hoped that the ground water can flow into the pond at a rate fast enough to maintain pond levels while the irrigation pumps are operating. If not, then the well will be installed and shallow ground water will be pumped into the pond.

The new well will have a total depth no greater than 200 feet to ensure that the source is the same source as what has been historically used at the Golden Dawn Well. The IDWR February 22, 2008 memorandum titled "Processing of Applications to Appropriate Water in the Lower Boise River Basin" distinguishes ground water tributary to the Boise River as that less than 200 feet east of the Star bridge. The new well will be no greater than 200 feet deep to ensure the shallow ground water tributary to the Boise River is used.

### **Other Considerations**

The distance that the Golden Dawn Well and new PDs are offset from the Boise River is roughly the same. Therefore, there should be no significant difference in the timing of impact to the Boise River due to pumping at the pond or pumping at the wells. Similarly, the mitigative effects of retiring acres from irrigation by ground water will be timely to offset the evaporative losses from the ponds.

The proposed ponds and wells are approximately 1 mile northwest of the Golden Dawn Well. This separation distance works to the benefit of the water users near the Golden Dawn Well. However, there are a number of domestic wells in the south half of Section 19 that will then be within a ½ mile radius of the proposed ponds and wells. The drawdown effects due to the evaporative losses and pumping are expected to be negligible because the water bearing interval is composed of transmissive sands and gravel and is in direct hydraulic connection to the Boise River.

### **Conclusions**

The water elevations determined from the depth to water in the Golden Dawn Well and the Idaho Power well, topographic maps, and the subsurface investigation by Strata demonstrate that the ground water gradient is sloping toward the Boise River, consistent with the surface topography.

The lithology listed for the wells in the vicinity of the Golden Dawn Well and the shallow excavations on the Harris Ranch property demonstrates that the aquifer is comprised of sand, gravel, and boulders, with no interbedded clay layers. The depth to water, correlation of lithology, and the observation that the first water encountered matches the final static level leads to the conclusion that the shallow aquifer is unconfined.

The correlation between the static water levels in the wells, shallow excavations and the Boise River along with the contiguous presence of the gravel layer demonstrates that the water bearing interval in the Golden Dawn Well is hydraulically connected to and is the same water interval as what would be exposed in the proposed ponds. The water bearing interval is hydraulically connected to the Boise River.

Moving the PD from the Golden Dawn Well to the proposed ponds and wells will not injure nearby ground water or Boise River water users. Because the ponds and wells are in the same source as the Golden Dawn Well, there will be a zero net effect to the aquifer after this transfer. The similar offset distance from the river suggests that the timing of impacts will be the same for either pumping from the Golden Dawn Well or from the pond and well. Similarly, mitigative effects of retiring acres from irrigation will enjoy the same timing.

## Appendix 1

Driller Reports from Section 29, T3N, R3E, Ada County

835617

**1. WELL TAG NO. D 0041809**

Other IDWR No.

City **Boise** State **ID** Zip **83707**

Sketch map location must agree with written location.

## Depth first Water Encounter 6

## Water

(Sign once if Firm Official & Operator)

ATTACHMENT 1 [P.7 OF 76]

REPORT OF WELL DRILLER  
State of Idaho

RECEIVED  
JUL 27 1967

State law requires that this report shall be filed with the State Engineer within 30 days after completion or abandonment of the well.

WELL OWNER: Dallas Harris  
Name  
Address Barlow Trailer Court  
Boise Idaho

Owner's Permit No. \_\_\_\_\_  
NATURE OF WORK (check): Replacement well ☐  
New well ☒ Deepened ☐ Abandoned ☐  
Water is to be used for: Irrigation  
METHOD OF CONSTRUCTION: Rotary ☐ Cable ☒  
Dug ☐ Other \_\_\_\_\_

(explain)  
CASING SCHEDULE: Threaded \_\_\_\_\_ Welded ☒  
12" Diam. from 0 ft. to 100 ft.  
"Diam. from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.  
"Diam. from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.  
"Diam. from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.  
Thickness of casing: 2.80 WALL Material:  
Steel ☒ concrete ☐ wood ☐ other ☐

(explain)  
PERFORATED? Yes ☒ No ☐ Type of  
perforator used: Mully Knife  
Chute Slot  
Size of perforations: 1 1/2" by 3/8"  
perforations from 81 ft. to 96 ft.  
perforations from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.  
perforations from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.  
perforations from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.

WAS SCREEN INSTALLED? Yes ☐ No ☒  
Manufacturer's name \_\_\_\_\_  
Type \_\_\_\_\_ Model No. \_\_\_\_\_  
Diam. \_\_\_\_\_ Slot size \_\_\_\_\_ Set from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.  
Diam. \_\_\_\_\_ Slot size \_\_\_\_\_ Set from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.

CONSTRUCTION: Well gravel packed? Yes ☐  
No ☐ size of gravel \_\_\_\_\_ Gravel  
placed from \_\_\_\_\_ ft. to \_\_\_\_\_ ft. Surface seal  
provided? Yes ☐ No ☒ To what depth?  
\_\_\_\_\_ ft. Material used in seal: \_\_\_\_\_

Did any strata contain unusable water? Yes ☐  
No ☒ Type of water: \_\_\_\_\_  
Depth of strata \_\_\_\_\_ ft. Method of sealing  
strata off: \_\_\_\_\_

Surface casing used? Yes ☐ No ☒  
Cemented in place? Yes ☐ No ☐

Locate well in section

|  |   |  |
|--|---|--|
|  | X |  |
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LOCATION OF WELL: County ADA  
NE 1/4 NW 1/4 Sec. 29 T. 3 N. R. 3 E W

Size of drilled hole: 12" Total  
depth of well: 101 Standing water  
level below ground: 40 Temp. \_\_\_\_\_  
Fahr. \_\_\_\_\_ Test delivery: \_\_\_\_\_ gpm  
or \_\_\_\_\_ cfs Pump? ☐ Bail ☐  
Size of pump and motor used to make test:  
The well tested by B & M Equipment Co.  
Length of time of test: \_\_\_\_\_ Hrs. Min.  
Drawdown: \_\_\_\_\_ ft. Artesian pressure: ft.  
above land surface \_\_\_\_\_ Give flow \_\_\_\_\_ cfs  
or \_\_\_\_\_ gpm. Shutoff pressure: \_\_\_\_\_  
Controlled by: Valve ☐ Cap ☐ Plug ☐  
No control ☐ Does well leak around casing?  
Yes ☐ No ☒

| DEPTH     |      | MATERIAL                         | WATER     |
|-----------|------|----------------------------------|-----------|
| FROM      | TO   |                                  | YES OR NO |
| FEET FEET |      |                                  |           |
| 0'        | 1'   | top Soil                         | No        |
| 1'        | 15'  | Br. Clay (Four Bands)            | No        |
| 15'       | 20'  | Reddish Br. Clay (very drilling) | No        |
| 20'       | 46'  | Sand & Gravel                    | No        |
| 46'       | 47'  | Coarse Sand & Gravel (SEED)      | Yes       |
| 47'       | 57'  | Gray Muddy Sand & Gravel         | Yes       |
| 57'       | 67'  | Sand & Gravel                    | Yes       |
| 67'       | 77'  | Coarse Sand (Four Bands)         | Yes       |
| 77'       | 87'  | Heavy Gravel (Coarse Sand)       | Yes       |
| 87'       | 97'  | Coarse Sand & Gravel             | Yes       |
| 97'       | 100' | Gravel                           | Yes       |
| 100'      | 101' | Gray Sandy Clay                  | No        |

001319

Work started: March 28, 1967  
Work finished: May 2, 1967  
Well Driller's Statement: This well was  
drilled under my supervision and this report  
is true to the best of my knowledge.  
Name: Don Drake  
Address: 2800 W Boise Ave  
Signed by: James Hill  
License No. 231 Date: July 13-67

Use other side for additional remarks

ATTACHMENT 1 [P.8 OF 76]

USGS

## WELL DRILLER'S REPORT

State law requires that this report be filed with the State Reclamation Engineer within 30 days after completion or abandonment of the well.

*Received  
10-28-69  
Ry Y. Hamilton*

[illegible]

REPORT OF WELL DRILLER  
State of Idaho

RECEIVED  
APR 2 1968  
Department of Reclamation

State law requires that this report shall be filed with the State Engineer within 30 days after completion or abandonment of the well.

WELL OWNER:

Name Dallas Hovine  
Address Barbara Trailer Court  
Boise, Idaho

Owner's Permit No. 63-7103

NATURE OF WORK (check): Replacement well ☐  
New well ☒ Deepened ☐ Abandoned ☐

Water is to be used for: Domestic Purposes

METHOD OF CONSTRUCTION: Rotary ☐ Cable ☒  
Dug ☐ Other ☐ (explain)

CASING SCHEDULE: Threaded ☐ Welded ☒

12 "Diam. from 0 ft. to 100 ft.

"Diam. from     ft. to     ft.

"Diam. from     ft. to     ft.

"Diam. from     ft. to     ft.

Thickness of casing: 250 Material:  
Steel ☒ concrete ☐ wood ☐ other ☐

(explain)  
PERFORATED? Yes ☒ No ☐ Type of  
perforator used: Mills Knife

Size of perforations: 4 " by 10 "

~~perforations~~ from 81 ft. to 96 ft.

perforations from     ft. to     ft.

perforations from     ft. to     ft.

perforations from     ft. to     ft.

WAS SCREEN INSTALLED? Yes ☐ No ☒

Manufacturer's name    

Type     Model No.    

Diam.     Slot size     Set from     ft. to     ft.

Diam.     Slot size     Set from     ft. to     ft.

CONSTRUCTION: Well gravel packed? Yes ☐

No. ☐ size of gravel     Gravel

placed from     ft. to     ft. Surface seal

provided? Yes ☐ No ☐ To what depth?

    ft. Material used in seal:    

Did any strata contain unusable water? Yes ☐

No. ☒ Type of water:    

Depth of strata     ft. Method of sealing

strata off:    

Surface casing used? Yes ☐ No ☒

Cemented in place? Yes ☒ No ☐

Locate well in section

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LOCATION OF WELL: County PLA  
SE x NE x Sec. 29 T. 3 N. R. 30 W

Use other side for additional remarks

Size of drilled hole: 12 " Total  
depth of well: 101 Standing water  
level below ground:     Temp.      
Fahr.     Test delivery:     gpm  
or     cfs Pump? ☒ Bail ☐  
Size of pump and motor used to make test:    

Length of time of test:     Hrs.     Min.  
Drawdown:     ft. Artesian pressure:     ft.  
above land surface Give flow     cfs  
or     gpm. Shutoff pressure:      
Controlled by: Valve ☐ Cap ☐ Plug ☐  
No control ☐ Does well leak around casing?  
Yes ☐ No ☒

| DEPTH |      | MATERIAL           | WATER<br>YES OR NO |
|-------|------|--------------------|--------------------|
| FROM  | TO   |                    |                    |
| FEET  | FEET |                    |                    |
| 0     | 1    | Top Soil           | No                 |
| 1     | 15   | Brown Clay         | No                 |
| 15    | 30   | Reddish Brown Clay | No                 |
| 30    | 40   | Hard Grey Gravel   | No                 |
| 40    | 46   | Sand & Gravel      | No                 |
| 46    | 47   | Sand & Gravel      | Yes                |
| 47    | 101  | Sand & Gravel      | Yes                |

601354

Work started:      
Work finished: May 2 / 67  
Well Driller's Statement: This well was  
drilled under my supervision and this report  
is true to the best of my knowledge.  
Name: Marvin J. Jans  
Address: 2500 W Boise Ave  
Signed by: Donald S. Drake  
License No. 4 Date:    

ATTACHMENT 1 [P.10 OF 76]

USGS

## Appendix 2

### Strata's Subsurface Investigation Report

# ***REPORT***

**Geotechnical Engineering Evaluation  
Harris Ranch Sundivision No.11  
Boise, ID**

**Prepared by**

**Michael G. Woodworth, P.E.  
William H. Holder, P.E.**

**Prepared for**

**Mr. Doug Fowler  
LeNir, LTD  
c/o Mr. David Powell  
RiveRidge Engineering  
3046 S. Brown Way  
Boise, ID 83706**

***STRATA, Inc.***

**8653 West Hackamore Drive  
Boise, Idaho 83709  
P. 208.376.8200  
F. 208.376.8201**

***December 4, 2007***



December 4, 2007  
File: LENLTD B06197D

Mr. Doug Fowler  
LeNir, LTD  
c/o Mr. David Powell  
RiveRidge Engineering  
3046 S. Bown Way  
Boise, Idaho 83706

RE: **REPORT**  
Geotechnical Engineering Evaluation  
Harris Ranch Subdivision No. 11  
Boise, Idaho

---

Gentlemen:

STRATA, Inc. is pleased to present this geotechnical engineering evaluation for the proposed Harris Ranch Subdivision No. 11. Our geotechnical services were performed referencing our proposal dated July 25, 2007.

This report summarizes the results of our research, field evaluation, laboratory testing, and geotechnical recommendations. Our geotechnical services were performed referencing conversations with RiveRidge Engineering regarding the project. The findings and opinions presented herein are focused on our understanding of the site/subsurface conditions relative to the project concept. Other unforeseen site conditions not discussed here may impact proposed construction. We anticipate that the project concept will continue may evolve during continued design, and our continued involvement will be an important element of ongoing project design and construction.

This report has been prepared to provide recommendations for infrastructure design and construction. This report is not intended to be used for indivisal lot development. However, we recommend each indivial lot owner be provided this report for information purposes and consult with STRATA regarding geotechnical evalution relative to individual lot construction.

We appreciate the opportunity to work with you on this project. We remain available to assist the design and development team as the project evolves. Please do not hesitate to contact us if you have any questions or comments.

Sincerely,  
STRATA, Inc.

Michael G. Woodworth, P.E.  
Project Engineer

H. Robert Howard, P.E.  
Senior Reviewer



MGW/kf

ATTACHMENT 1 [P. 13 OF 76]

**REPORT**  
**Geotechnical Engineering Evaluation**  
**Harris Ranch Subdivision No. 11**  
**Boise, Idaho**

**INTRODUCTION**

STRATA is pleased to provide this report as part of our authorized geotechnical engineering evaluation to assist you and RiveRidge Engineering to help characterize the soil and groundwater conditions at the project site. The purpose of this evaluation was to obtain soil and groundwater information across the site and provide geotechnical recommendations to assist in planning, design, and development of the proposed site. Specifically, we have evaluated soil and groundwater conditions with respect to earthwork preparation, utility excavation, recommendations for pavement design, stormwater disposal, and groundwater information. We have also collected a database of subsurface information to assist with planning and design of individual lot development. The following sections present the site description and proposed construction, field exploration, subsurface conditions, laboratory testing, and geotechnical engineering opinions and recommendations.

**PROJECT UNDERSTANDING**

Based on review of plans provided by RiveRidge Engineering and our previous involvement with the project, we understand that the project is anticipated to consist of development of approximately 1,500 acres of foothills and valley terrain. At this time, we understand development will proceed in phases for only the valley areas, and foothill areas will be designed and developed later. We have been contracted to provide geotechnical exploration and recommendations for the approximate 350-acre valley portion of the proposed development. In these areas, the project is anticipated to consist of mixed use commercial and residential development with associated infrastructure. A preliminary grading plan has been developed by RiveRidge Engineering for the valley portion of the development area. Numerous local, collector, and arterial roadways are anticipated throughout the area of the development.



Stormwater is anticipated to be retained on-site via ponds in the western portion of the development area and wetlands fronting the Boise River.

At the request of RiveRidge Engineering, we have provided the following design information for Harris Ranch Subdivision No.11 which occupies the western portion of the overall, approximate 1,500 acre, Harris Ranch Development to be located in Boise, Idaho. Based on review of site plans provided by RiveRidge Engineering, we understand that Harris Ranch No. 11 will consist of approximately 65 acres, with development proposed to consist of mixed commercial and residential lots and Ada County Highway District roadways. Fill of up to 10 feet, and cut of up to 4 feet is planned within and adjacent to proposed roadway areas.

### **SITE DESCRIPTION**

The area occupied by the proposed Harris Ranch Subdivision No. 11 presently exists as relatively gentle to moderately sloping terrain. The northern portion of the site located north of the present Warm Springs Avenue is topographically elevated above the remaining portions of the site, and approximately 70 feet of topographic variability exists from the extreme southern and western portions of the project site to the extreme north eastern part of the project site. Slopes are generally less than 10 percent however, slopes up to approximately 2 feet horizontal to 1 foot vertical (2H:1V) exist in the central portion of the development area located north of the existing Warm Springs Avenue. Additionally several buildings and associated fill stockpiles are present along the existing Wise Way south of Warm Springs Avenue in the southern portion of the proposed development area. Fill stockpiles are up to 12 feet in height in this area. A wet lands area exists in the western portion of the project site and is delineated on the attached Plate 1. The boundaries of the wet lands area shown on Plate 1 are approximate and are provided referencing information from RiveRidge Engineering.



## SOIL AND GEOLOGIC EVALUATION PROCEDURES

This evaluation presents a geotechnical site characterization to provide geotechnical opinions and recommendations to the design team to assist in design and construction of the infrastructure for the proposed project. STRATA has performed this evaluation based on our review of previous geotechnical reports and review of general geologic and geotechnical literature which, in our opinion, is applicable to the proposed development site. Additionally, we have also accomplished subsurface exploration, laboratory testing, and engineering analyses related to the existing soil conditions and proposed construction. Specific aspects of evaluation procedures are described in detail in the following sections.

### Geologic and Geotechnical Literature Review

To prepare this geotechnical engineering evaluation, we reviewed previous geotechnical evaluations pertaining to the project site and adjacent sites which, in our opinion, exhibit similar conditions. Specifically, we have reviewed and researched relevant portions of the following geotechnical reports:

- *Report – Preliminary Soil and Geologic Evaluation For Master Planning, Harris Ranch Development, November 13, 2006, prepared by STRATA, Inc.*
- *Report-Planning Level Soil and Geologic Assessment, Proposed Harris Ranch Subdivision Development, September 23, 1996, prepared by STRATA, Inc.*
- *Preliminary Geotechnical Evaluation Report-Proposed Harris Ranch Subdivision Development Area "A", August 28, 1998, prepared by Kleinfelder, Inc.*
- *Supplemental Geotechnical Evaluation Report-Proposed Harris Ranch Subdivision, Southern Quarter Development Area "A," dated October 30, 1998, prepared by Kleinfelder, Inc.*
- *Report-Limited Soil Sampling Event, Harris Ranch Development, Boise, Idaho, dated July 3, 2000, prepared by Kleinfelder, Inc.*



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As noted, STRATA previously prepared a Soil and Geologic Evaluation for the proposed Harris Ranch Development dated November 13, 2006. This report was prepared for the overall Harris Ranch development, however, subsurface exploration in the area of the proposed Harris Ranch No. 11 subdivision was accomplished as part of our previous evaluation. A total of 13 test pits were advanced in vicinity of the project site in 2006. The locations of these previously advanced test pits are shown on Plate 1, Test Pit Location Plan. The logs of the subsurface conditions encountered are provided in Appendix A.

### **Geologic Reconnaissance**

To establish the geologic environment relative to the proposed site development, STRATA completed geologic reconnaissance for the proposed development in 2006 as part of our Preliminary Soil and Geologic Evaluation. Geologic maps, USDA Soil Survey information, IDWR well logs, and previous geological mapping and aerial photographs were all referenced to assist the evaluation. A professional geologist performed reconnaissance and surface mapping at the site. Geologic maps and detailed description of site geology are presented in our 2006 evaluation.

### **Field Exploration**

In September 2006, STRATA observed the excavation of 13 test pits across the overall Harris Ranch Development area. STRATA observed 35 additional test pits and 8 soil borings in August and September 2007. Of these, 18 test pits and 2 soil borings are within or near the boundaries of Harris Ranch Subdivision No. 11. Approximate test pit and boring locations are provided on Plate 1. Our field engineer evaluated the soils encountered referencing the Unified Soil Classification System (USCS). A brief explanation of the USCS is presented in Appendix A and should be used to interpret the terms used on the test pit and boring logs provided in Appendix A. Select soils were retained for laboratory testing.



At the conclusion of our subsurface evaluation, test pits were loosely backfilled level with the existing ground surface. Test pit locations were documented in the field by the presence of labeled stakes and standpipe piezometers. Test pit locations were also surveyed following exploration. Test pits located beneath the proposed improvements should be re-excavated to native soil and backfilled with structural fill to reduce the potential for future settlement.

### **Laboratory Testing**

Laboratory testing was accomplished on select soil samples obtained from our field exploration. All testing was accomplished referencing ASTM procedures. Laboratory testing included in-situ moisture/density determinations, grain-size distributions, Atterberg limit determinations, consolidation testing, and Resistance R-value testing. Results of laboratory index tests are provided on the individual test pit logs, and the consolidation and R-value test results are attached in Appendix B.

## **SITE GEOLOGIC SETTING**

### **Regional Geology**

The overall Harris Ranch development area consists of relatively level valley areas and gently to steeply sloping hillside areas. The Harris Ranch Subdivision No. 11 area lies within the ancestral floodplain of the Boise River Valley, while the hillside and canyon portions of the proposed development area lie within the Boise Front. A general map of geologic units, has been included in our 2006 *Preliminary Soil and Geologic Evaluation*.

### **Seismicity and Faulting**

Based on the geologic reconnaissance and geologic research performed, numerous faults are mapped within the foothills portion of the proposed development area. These faults are part of a larger fault system within the Boise Front. Breckenridge, et al (2003) has labeled the Boise Front fault system as "Major Tertiary"



faults, with movement within the past 1.6 to 16 million years. These faults are part of the Foothills fault zone, which roughly parallels the Boise Front. The faults do not exhibit a strong surface expression, and the presence and location of faults has been interpreted by others based on geologic mapping and subsurface information. The Boise Front fault system is not known to be active, with no movement occurring within the last 1.6 million years (Breckenridge, et. al, 2003). Mapped faulting does not affect the current project site.

Ground shaking and motion in the Boise area is likely to be a function fault activity of considerable distance from the Boise Valley. The closest active major fault to the project site is the Squaw Creek Fault, located approximately 30 miles north of the project site. The Squaw Creek Fault is considered capable of an approximate magnitude 7.1 earthquake (USGS 2004). Considering the low incidence and large recurrence intervals of seismic activity in the immediate site vicinity, use of International Building Code (IBC) seismic design parameters appears a reasonable approach for seismic design.

## **SUBSURFACE CONDITIONS**

Subsurface conditions within the Harris Ranch Subdivision No. 11 area were observed to be highly variable. However, in general, we observed soil conditions south of Warm Springs Avenue and in proposed stormwater drainage pond areas in the western portion of the site to consist of relatively granular soil with poorly-graded sand or gravel generally present at depths of less than 4 feet. We observed significantly increased silt and clay content in test pits north of Warm Springs Avenue, with clayey or silty soil extending to depths in excess of 12 feet below existing grades. We have provided a generalized discussion of soil conditions for each area below, and specific soil contacts and descriptions are provided on the test pit and boring logs provided in Appendix A.



### **Soil Conditions - Northern Portion of Project Site**

Soil encountered within the test pits in the northern portion of the project site generally consisted of near-surface clay, interbedded clayey sand and silty sand, and poorly-graded sand and poorly-graded gravel with sand. Near-surface clay soil was brown to black, stiff to hard, and moist to saturated, and was noted to extend to depths of up to approximately 3 to 12 feet within the test pits, although clay was generally observed to be interbedded with clayey sand below depths of approximately 3 to 4 feet. Brown to tan, medium dense, clayey and silty sand was generally encountered underlying clay soil, extending to depths of 5 to greater than 12 feet. In select test pits, clayey and silty sand grades to poorly-graded sand and gravel below these depths. Additionally, limited uncontrolled fill was observed to a depth of 2 feet in TP-8. In general, vegetation and organics were observed in the test pits in native soil to a depth of approximately 3 to 6 inches beneath the ground surface.

### **Soil Conditions - Southern and Western Portions of Project Area**

Soil encountered within these areas was noted to generally consist of near-surface silty and clayey sand grading to poorly-graded sand and poorly-graded gravel with sand. Generally, poorly-graded gravel or sand soil was encountered at depths of less than 4 feet below existing grade and extended beyond the termination depth of explorations. Uncontrolled fill was noted in the southern portion of the Phase 1 area, with fill stockpiles present near existing structures along Wise Way. Within the test pits advanced in this portion of the development, uncontrolled fill was observed to extend to depths of approximately 2 to 4 feet. However the potential for additional uncontrolled fill exists adjacent to the existing structures and fill stockpiles of up to approximately 10 to 12 feet in height were observed along the alignment of the proposed Warm Springs Avenue in this area of the project site. Vegetation and organics were generally observed within the upper 3 inches of native soil, within test pits advanced in this portion of the project site.



## **Groundwater**

Groundwater was encountered at depths ranging from approximately 2 to greater than 10 feet below ground surface at the time of our investigation. Groundwater in the site vicinity is associated with precipitation, as well as irrigation within the general area, and will fluctuate with seasonal and yearly variability in precipitation, irrigation, and runoff from Warm Springs Creek and the Boise River. Subsequent groundwater monitoring has been accomplished and groundwater monitoring data is provided in Appendix C.

## **GEOTECHNICAL OPINIONS AND RECOMMENDATIONS**

### **General**

It is our opinion that the site is suitable from a geotechnical standpoint for the proposed development, provided the recommendations in this report are accomplished. The recommendations contained in this report reflect our understanding of the location and configuration of the proposed lots, topography, and subsurface conditions. If design plans change (e.g. grading or layout is significantly different from what we have assumed or were provided), or subsurface conditions between test pit locations vary significantly from what was observed during our subsurface evaluation, we should be notified to review the report recommendations and make any necessary revisions.

The report recommendations reflect a straight-line interpolation and extrapolation of the subsurface conditions between and beyond the test pit locations. However, the soil conditions may vary at the proposed site. The variation in subsurface conditions will not be known until construction, and may cause changes to construction plans and/or costs.

### **Site and Subgrade Preparation**

At the time of the field evaluation significant vegetation and organic material was observed to a depth of approximately 3 to 6 inches, depending on location. We recommend that this topsoil with organic matter be stripped beneath all planned improvements, including structural fill areas. In our opinion, this topsoil is not suitable for use as structural fill and should be wasted or stockpiled on-site for landscape areas. All



uncontrolled fill should be stripped and removed from below all pavement, sidewalk, and building pad areas, as well as structural fill areas. Excavation depths of up to 4 feet should be anticipated for removal of uncontrolled fill in the vicinity of TP-8 and TP-31. Deeper excavation will be required in existing fill stockpile area along Wise Way and the proposed Warm Springs Avenue alignment.

Test pits have been marked in the field by standpipe piezometers. The test pits should be staked prior to any earthwork site grading and any test pits, which are located beneath paving, structural fill, or building lot areas, should be re-excavated and replaced with structural fill in accordance with the recommendations in this report.

The stripped subgrade in proposed structural fill, pavement, residential/commercial lot, and sidewalk areas should be scarified a minimum depth of 6 inches and recompact to a minimum of 95 percent of the maximum dry density, as determined by ASTM D 698. If any weaving or pumping is observed, those areas should be removed to firm soil and replaced with structural fill.

As discussed above, wetlands exist in the western portion of the project site, with groundwater present at or near ground surface. During earthwork operations in this area, dewatering for subgrade preparation must occur in order to render the subsurface soil conditions sufficiently dry to complete the required earthwork. Further, soil disturbance at the subgrade elevation will occur if the site is not adequately dewatered prior to conducting the site earthwork, and if construction equipment that is not suitable for working in moist to wet, dewatered soil conditions is utilized. Disturbed soil areas may require overexcavation to undisturbed soil and backfilling the excavation with drain rock or granular structural fill (as recommended below) to render a stable and uniform soil. To accomplish this work, the groundwater table must be lowered locally.

## **Fill Areas**

As discussed previously, based on review of proposed grading plans prepared by RiveRidge Engineering, we understand that up to 10 feet of fill will be placed in portions of the proposed development, with greatest fill thicknesses anticipated along the proposed



relocated Warm Springs Avenue; north of existing Warm Springs Avenue and near the Walling Ditch in the southern portion of the site.

Near-surface soil across the northern portion of the development generally consists of lean clay overlying clayey sand. Consolidation testing performed on clay and clayey sand soil indicates these soils exhibit a moderate settlement potential under the anticipated loads imparted by the proposed structural fill. In most areas, we anticipate settlement associated with fill will be less than approximately 1 inch, and in our opinion, is anticipated to be within design tolerances. However, in areas north of the existing Warm Springs Avenue, areas of fill of up to 10 feet are anticipated. Based on our analysis, we recommend removal of native clay soil in areas where, greater than 5 feet of structural fill is proposed. In these areas, clay soil, if present, should be excavated to a minimum depth of 2 feet below existing grade prior to placement of fill. Following removal, the native subgrade should be prepared as described above. It will be important to have STRATA observe the subgrade prior to placement of structural fill.

Within the western portion of the development area, groundwater was noted at relatively shallow depths. Specifically, shallow groundwater within the vicinity of TP-8, has been observed to occur at an elevation above the base of the slope located to the southwest of TP-8. We understand up to 10 feet of fill is planned in this vicinity. Structural fill placed in this area will be placed on slopes in excess of 5H:1V (20 percent) and, as such, must be placed on level excavated benches. Additionally, prior to initiation of earthwork in this area, we recommend a drainage trench be constructed within the existing slope to dewater the existing slope and allow for earthwork to proceed. The drainage trench should be constructed parallel to the existing slope face consist of a minimum 6-inch diameter perforated pipe surrounded by drain rock. The pipe should daylight to the southwest, within the pond excavation area. A schematic cross section of the drainage trench is presented as Plate 3. The location of the proposed drainage trench is shown on Plate 1. Additional dewatering recommendations are presented in the *Dewatering Considerations* portion of this report.



## **Structural Fill**

All fill placed to support pavement, sidewalk, and building pad areas should consist of structural fill. Structural fill could consist of previously excavated on-site inorganic silty sand, poorly-graded sand, or poorly-graded gravel. However, in no case should clayey soil with a plasticity index of greater than 15 be utilized for structural fill. Structural fill can consist of soil classified as silt, sand, or gravel in accordance with the USCS (ML, SP, SM, SW, GP, GM, or GW). Clayey sand (SC) and clayey gravel (GC) may also be utilized for structural fill, if the soil meets the above plasticity requirement. Based on our field investigation and laboratory testing, we anticipate the majority of near-surface native soil from the northern portion of the Phase 1 area will not be suitable for use as structural fill unless sufficiently blended with other soil types. Structural fill should not contain particles greater than approximately 6 inches in diameter. All structural fill should be moisture conditioned sufficiently to achieve compaction requirements. If the on-site material is to be used for structural fill, it should be moisture conditioned to near optimum moisture content for compaction. The on-site soil is moisture sensitive and may be difficult to re-use.

Structural fill should be placed to the subgrade elevation in uniform, maximum 8-inch-thick, loose lifts and compacted to a minimum of 95 percent of the maximum dry density of the soil, as determined by ASTM D 698 (Standard Proctor). This assumes that heavy compaction equipment such as rollers with a minimum drum weight of 5 tons is used. The maximum loose-lift thickness should be reduced to 6 inches where smaller and/or lighter compaction equipment is used. We understand STRATA will be retained to perform field density testing of structural fill for the subdivision grading.

## **Borrow Sources**

We understand ponds will be excavated in the western portion of the site and utilized as storm drainage facilities. These ponds are planned to be excavated to depths of approximately 20 to 25 feet below existing grades. Test pits and borings advanced in the vicinity of proposed ponds indicate poorly-graded sand and poorly-graded gravel with sand soil is present below depths of 2 to 4 feet, extending beyond the termination depth of all test pits and borings in this area. These granular soils are suitable for use as structural



fill, as described above. Additionally, sand and gravel soil may be suitable for use as granular subbase or base course within proposed roadway sections. STRATA is available to provide laboratory testing to evaluate the potential use of the native gravel as granular subbase and base course, if desired.

### **Wet Weather/Wet Soil Construction**

We recommend that site construction be undertaken during dry weather conditions. If site construction, particularly grading, is undertaken during wet periods of the year, on-site soils will be susceptible to pumping or rutting when subjected to heavy loads from rubber-tired equipment or vehicles which exert a point load. Wet weather earthwork should be performed by low pressure, track-mounted equipment that spread and reduce the vehicle load. Work should not be performed immediately after rainfall. All soft and disturbed areas should be excavated to undisturbed soil and backfilled with structural fill as recommended in the *Site and Subgrade Preparation* section of this report. Compaction of the fill should be sufficient to preclude pumping of the native soil.

In summary, careful construction procedures are paramount to the successful grading operation if the existing or proposed structural fill soils are wet. Consulting us prior to initiating this type of construction is recommended to maximize earthwork efficiency and achieve a stable subgrade.

### **Utility Excavations**

On-site soils are considered excavatable with conventional earth moving equipment. Shallow excavations that do not exceed 4 feet in depth may be constructed with side slopes approaching vertical. Below this depth, it is recommended that slopes be constructed in accordance with Occupational Safety and Health Administration (OSHA) regulations, section 1926, subpart P. Based on these regulations, on-site soils should be classified as type "C" soil. Excavations within these soils should be constructed at a maximum slope of 1.5H:1V for non-surcharged excavations up to 20 feet in height. Excavations in excess of 20 feet will require additional analysis. Note that these slope angles are considered stable for non-surcharged short-term conditions only, and will not



be stable for long-term conditions. Additionally, the contractor will be responsible for site safety, and all excavations should adhere to OSHA requirements.

We anticipate utility excavations will likely extend below groundwater in numerous areas across the site. Dewatering of excavations should be anticipated. Additionally, silty or clayey soil which is at or near saturation will require drying prior to placement as utility trench backfill. We recommend the contractor consider use of granular structural fill for utility trench backfill to reduce the time required for moisture conditioning of backfill material. All utility trench backfill should consist of soil meeting the requirements for structural fill and must be placed and compacted in accordance with ISPWC standards.

The pipe bedding zone occurs from at least 6 inches below the pipe invert to at least 6 inches above the top of the pipe; trench backfill is above the bedding, extending to the soil subgrade elevation. We recommend that all saturated, loose, or disturbed soil be removed from the base of pipe trenches prior to placing pipe bedding. Bedding should be placed in dewatered conditions, and any localized sloughing must be removed from the trench excavation. Bedding should meet the requirements of the latest edition of the Idaho Standards for Public Works Construction (ISPWC). Backfill above the bedding may be on-site and import soil, as specified in the Structural Fill section. All bedding and backfill should be compacted to structural fill criteria.

### **Dewatering Considerations**

Based on the soil and groundwater conditions encountered during exploration, dewatering will be necessary prior to, as well as during construction. Alluvial sand and gravel encountered at the project site has the potential to produce significant quantities of groundwater. In addition, poorly graded sand, silty sand, and clayey sand soil encountered above alluvial poorly graded gravel have the potential to "flow" when saturated and exposed in an excavation.

We anticipate temporary dewatering will be required in utility excavations, in pond excavations, and in the existing wetland area located in the western portion of the development. Based on our discussions with RiveRidge Engineering and review of grading plans, we anticipate ponds in the western portion of the development will be



excavated to depths of 20 to 25 feet below existing grade. Utility excavations are planned to extend to depths of up to 19 feet near the intersection of Warm Springs Avenue (proposed) and Barber Road, with utility excavations planned to extend to a depth of up to 10 feet in the remainder of the site. We anticipate well point dewatering and/or localized sump pit dewatering may be capable of dewatering the proposed excavations, depending on excavation size. We recommend groundwater levels be maintained a minimum of 2 feet below anticipated subgrade elevation. The contractor should expect large volumes of groundwater during dewatering, due to the site proximity to the Boise River and the hydrogeologic characteristics of the alluvial sand and gravel encountered beneath the site.

The following sections present preliminary concepts or options for site dewatering to assist the contractor in developing a dewatering plan for the proposed utility and pond excavations. We expect the methods implemented to dewater the site will vary based on actual site and hydrogeologic conditions encountered during construction. Consequently, the contractor should be prepared to revise their dewatering plan to achieve and maintain the required dewatered conditions.

### Well Points

Closely spaced well points may be feasible to dewater utility and other excavations. Well points could be drilled or driven into the soil. In the northern portion of the site, the nature of the aquifer will likely result in moderately steep drawdown curves and the groundwater table between well point locations will be higher than at the well location. In our opinion, well points spaced at approximately 20 to 30 feet may be required to achieve dewatering in areas of clayey soil (northern portions of the site). In pond areas, increased well point spacing may be possible; however, very large volumes of water should be anticipated from the native sand and gravel soil, and well point dewatering methods may not be feasible in pond locations.

Advantages to utilizing well points include accomplishing dewatering prior to construction and reducing earthwork challenges associated with wet soil and unstable excavations. Further, if proposed utility excavation locations are dewatered prior to



excavation, excavated soil may be sufficiently dry to allow for compaction as utility trench backfill. However if well points are utilized for dewatering, substantial time may be required to accomplish dewatering, particularly in clay and silty soil. Additionally a large number of well points will likely be required to accomplish dewatering.

#### Localized Sump or Pit Dewatering

Other methods of dewatering are possible, including localized sump or pit dewatering. In proposed utility excavations, localized sump or pit dewatering may occur within an enclosed, braced excavation. Dewatering can occur as excavation occurs to attain the desired utility elevation. This option will require the use of trench boxes. It should be noted that flowing soils and sand boils are likely if excavation is initiated without maintaining the water table at least 2 feet below the bottom of the excavation. Flowing soil may create challenges during utility placement and compaction of utility trench backfill. Additionally, excavated soil will require drying and moisture conditioning to allow for use as trench backfill or structural fill. Considering pond excavations, localized sump or pit dewatering, coupled with excavated "slots" or trenches along the perimeter of the excavation may be feasible, however, large quantities of water should be anticipated.

#### **Pavement Areas**

Recommendations outlined in the *Site and Subgrade Preparation* section of this report should be accomplished in all pavement areas. The pavement subgrade in the majority of the site is anticipated to be at a depth of approximately 12 to 24 inches below existing grade, and is anticipated to consist of native lean clay or clayey sand in the northern portion of the site, and poorly graded gravel in the southern portion of the site. Additionally, in some areas, particularly along portions of the proposed reconstructed Warm Springs Avenue, we understand pit run sand and gravel may be used as structural fill to elevate the site. As such, it appears portions of the subgrade will consist of native lean clay or clayey sand and portions will consist of structural fill or



native sand and gravel. We provide the following two pavement sections for either a lean clay and clayey sand or sand and gravel subgrade.

**Clayey Sand/Lean Clay Subgrade (R-value = 5 or less)**

**Local Roadways - Flexible Pavement (TI=6.0)**

- 2.5"- Type III asphalt concrete top course
- 4.0"- ¾-inch-minus, crushed sand and gravel base course
- 14.0"- Pit-run sand and gravel subbase course

**Collector Roadways - Flexible Pavement (TI=8.0)**

- 3.0"- Type III asphalt concrete top course
- 6.0"- ¾-inch-minus, crushed sand and gravel base course
- 16.0"- Pit-run sand and gravel subbase course

**Structural Fill or Native Sand and Gravel Subgrade (R-value >60)**

**Local Roadways - Flexible Pavement (TI=6.0)**

- 2.5"- Type III asphalt concrete top course
- 4.0"- ¾-inch-minus, crushed sand and gravel base course
- 6.0"- Pit-run sand and gravel subbase course

**Collector Roadways - Flexible Pavement (TI=8.0)**

- 3.0"- Type III asphalt concrete top course
- 6.0"- ¾-inch-minus, crushed sand and gravel base course
- 8.0"- Pit-run sand and gravel subbase course

**Note:** If a minimum of 12 inches of native soil or structural fill with an R-value of greater than 60 exists at pavement subgrade elevation, the subbase course may be eliminated.

We recommend STRATA traverse and observe the roadway alignment when the pavement subgrade is excavated to identify the stations where the above pavement sections apply. RiveRidge Engineering can reference the above sections to plan roadway section thicknesses based on the anticipated subsurface conditions. However, because the subsurface conditions cannot wholly be recognized until the subgrade is excavated; the roadway sections may require modification during construction. Alternatively, RiveRidge Engineering may utilize the pavement section for the clay and clayey sand subgrade and revise the pavement section during construction if gravel soil with an R-value greater than 60 is encountered at the subgrade. If necessary, STRATA can provide R-value testing for the pit run sand and gravel structural fill during construction to verify the R-value is greater than 60. In addition, if structural fill other



than pit run sand and gravel is utilized, STRATA can provide R-value testing during construction to verify the above pavement sections or provide alternative sections.

The above-recommended flexible pavement sections are based on a maximum 20-year design life and a traffic index (TI) of 6.0 for local streets and a TI of 8.0 for collector streets. STRATA performed R-value testing on clayey sand soil encountered in TP-28. An R-value of less than 5 was obtained from the sample. Additionally, we accomplished R-value testing on a bulk sample of poorly graded gravel from TP-33. An R-value of 75 was obtained for this sample.

The subbase should consist of 6-inch-minus, well-graded sand and gravel consistent with Idaho Standards for Public Works Construction (ISPWC) Section 801 and with less than 10 percent passing the No. 200 sieve. The base course should consist of 3/4-inch-minus, well-graded, crushed sand and gravel with less than 9 percent passing the No. 200 sieve and consistent with ISPWC Section 802. The subbase and base course should be compacted in accordance with the Earthwork section of this report.

The asphalt concrete for the flexible pavement area should have material properties as specified in ASTM D 3515 and have a mix design with a maximum aggregate size between 3/4 and 3/8 inch. The asphalt concrete should be compacted as required by ISPWC Sections 809 and 810.

We recommend crack maintenance be accomplished in all pavement areas as needed and at least every three to five years to reduce the potential for surface water infiltration into the pavement section and underlying subgrade.

### **Pond Slope Stability**

STRATA assessed the proposed detention pond configuration as presented by RiveRidge Engineering. The ponds at the project site are planned to be excavated to depths of up to approximately 20 feet below existing grade. The proposed pond configuration is presented on Plate 1. Exploratory test pit and boring locations in the pond areas are also presented on Plate 1.



To evaluate slope stability relative to the soil parameters, we utilized in-situ field blow counts obtained during drilling and in-situ density testing for the soil encountered during exploration. The estimated engineering characteristics of the subsurface soil, based on laboratory testing, our experience and published literature, are presented in Table 1 below.

**Table 1. Soil Engineering Properties**

| Soil Type                     | Moist Unit Weight<br>(pcf) | Soil Friction<br>Angle |
|-------------------------------|----------------------------|------------------------|
| Clayey Sand                   | 100                        | 26°                    |
| Poorly Graded Sand/Silty Sand | 110                        | 30°                    |
| Native Gravel                 | 140                        | 40°                    |

Based on the current pond configuration provided on Plate 1, STRATA evaluated two pond cross-sections relative to slope stability. The cross-sections evaluated are presented on Plate 1 and labeled A-A' and B-B'. Each cross section was evaluated for a full pond condition, rapid drawdown condition, and full pond with pseudostatic (earthquake loading) conditions. The likelihood for rapid drawdown conditions in conjunction with pseudostatic conditions is relatively low, and as such, we did not evaluate slope stability for this condition. Slope stability analyses results are presented in Appendix D.

Our analyses used GeoStudio Slope W and the Morgenstern-Price method for slope stability analyses. Earthquake loading was estimated using a pseudostatic approach. A horizontal seismic coefficient equal to 15 percent of gravitational acceleration ( $k_h$  equals 0.15 g) was used to simulate the anticipated peak ground acceleration (PGA) at the project site. Rapid drawdown conditions represent the situation where the pond is drawn down and the groundwater is perched within the soil. In our opinion, the rapid drawdown configuration is the worst-case conditions for slope stability. Estimated factors of safety for each slope condition are presented in Table 2 below.



**Table 2. Slope Stability Factors of Safety**

| Cross Section | Full Pond Condition | Pseudostatic Conditions | Rapid Drawdown Condition |
|---------------|---------------------|-------------------------|--------------------------|
| A-A'          | 2.4                 | 1.5                     | 1.3                      |
| B-B'          | 2.6                 | 1.4                     | 1.2                      |

Generally accepted minimum safety factors according to the geotechnical standard of practice are 1.5 and 1.1 for static and pseudostatic conditions, respectively. As presented in Table 2, the factors of safety against slope failure are greater than the minimum safety factors according to the current standard of practice. However, the factor of safety assuming the rapid drawdown conditions varies from 1.2 to 1.3. While a factor of safety of 1.1 for short-term (temporary) conditions is generally accepted in engineering practice, an increased probability of slope instability will be realized as the factor of safety approaches 1.0. As pond excavation depths increase, surficial (shallow) slope instability may be observed, particularly in deeper pond excavations. We recommend STRATA be retained to observe excavation and provide a visual evaluation of pond slopes during construction.

The stability of proposed slopes will also be dependent upon soil disturbance. We recommend mass grading take care to avoid disturbing native or cut slopes. Cut slopes should be excavated to maintain as little disturbed soil as possible. Disturbed soil will not maintain engineering soil parameters discussed in Table 1, and were not accounted for in our slope stability analysis. Further, cut slopes above the water table should be revegetated as soon as possible. Slopes that are not revegetated have the potential for surficial sloughing and erosion.

### **Engineering Properties of Soil for Individual Lots**

We anticipate that foundations for the proposed residential and commercial structures will bear on native, lean clay, clayey sand, silty sand or structural fill in the area north of existing Warm Springs Avenue. In the portion of the site south of Warm Springs Avenue, foundations are anticipated to bear on native poorly graded sand or poorly graded gravel or structural fill. Engineering properties of these soil types vary



significantly and specific engineering issues which may pertain to individual lots are discussed below.

### Clay Soil

Near surface soil generally consists of lean clay and clayey sand in the area north of the existing Warm Springs Avenue. Structures supported by these clay soils, if left in-place, may be subject to shrink/swell movement associated with the seasonal moisture fluctuation. This movement may result in distress of pavements, foundations, slabs, and other structures. The shrink/swell is typically a function of seasonal moisture change; mitigation options include soil removal, limiting moisture fluctuation, surcharging of the soil, leaving the soil in place and isolating the improvement from the soil. Further, these clayey soils may be subject to settlement under foundation loading. This settlement may exceed design tolerances and excavation and replacement of clay soil may be required for some lots, depending on location and proposed construction. STRATA is available to utilize our existing database of information to consult with individual lot developers to evaluate earthwork requirements for individual lots.

### Uncontrolled Fill Soil

As previously discussed, uncontrolled fill was observed in the vicinity of TP-8 as well as TP-31 and TP-33 advanced in the southern portion of the site. Significant stockpiles of fill were associated with the existing structures along Wise Way. Construction of improvements over areas of uncontrolled or undocumented fill will increase the risk of potential distress associated with settlement of the uncontrolled fill. The magnitude of any settlement will be proportional to the thickness of the uncontrolled fill, density of uncontrolled fill as well as structural loading. We recommend individual lot owners and developers evaluate the possible presence of uncontrolled fill with respect to the proposed lot developments.



### Frost Susceptible Soil

Near-surface soils throughout the majority of the project site, particularly in the area north of the existing Warm Springs Avenue generally exhibits significant fines content. These soils will be potentially highly frost susceptible. Typical engineering standard of practice requires that foundations for structures extend below the frost line. However, shallow improvements such as slabs, pavements, and sidewalks will be susceptible to frost heave. We recommend that further evaluation of these frost-susceptible soils be considered, as the development plans for each individual lot develop.

### Foundation Drainage

Considering the presence of relatively shallow groundwater throughout the majority of the development area, proper drainage of below-grade elements, including foundations, will be an important part of the proposed planning, design, and construction of each individual lot. Shallow foundations for any structures may be constructed throughout the majority of the site; however, we recommend that consideration be given to foundation drainage in the planning and design of each lot. Further, if below-grade elements or basements are planned in any of the proposed lots, specific consideration with respect to drainage and possible dewatering will be required as part of the design and engineering for the structures.

### Surface Water Management for Individual Lots

Surface water associated with rain, snow and irrigation water can become perched above the relatively impermeable native and structural fill soils which presently exist and is planned beneath the proposed individual lots.

Improper management of near-surface water, by not providing an effective grading and drainage design for each lot, can result in moisture or water entering the crawl spaces or basement areas of proposed structures. Possible sources of near-surface water include pressurized irrigation water, rainwater, snowmelt, or leaking water lines. These water sources can be transmitted to the foundation stem wall and pond



beneath a structure via irrigation, roof downspout discharge, and snow melt. Possible conduits for water to enter into crawl spaces or basements can include loose or porous backfill placed adjacent to foundation walls and loose or porous backfill in utility trenches that extend through or beneath foundations.

Considering the above discussion, and based on our experience working on remediation of trapped moisture and water in crawl spaces and basements, we recommend that consideration be given to the potential for surface water intrusion and be considered during planning, design, and construction of individual lots.

## **RECOMMENDED ADDITIONAL SERVICES**

### **Individual Lot Evaluations**

This report has been prepared to assist with design and construction of infrastructure for the proposed development, and should not be relied on for individual lot development. However, we recommend this report be provided to individual lot owners for information and we further recommend individual owners obtain a lot specific geotechnical evaluation for the proposed residential or commercial development. As part of our geotechnical engineering evaluation for the overall development, we have collected a database of subsurface information to provide geotechnical consultation and recommendations for individual residential and commercial lot design and construction. We recommend STRATA be retained to provide consultation for each individual lot owner with respect to foundation design, earthwork recommendations, and surface and subsurface drainage. We remain available to provide these services as well as specific recommendations for reducing the potential of surface water intrusion during the design phase of each lot.

### **Construction Observation and Testing**

We understand that STRATA will provide construction engineering and construction testing services for the subdivision, including observation and testing during grading. We also recommend that STRATA review the proposed construction of each lot and be retained to provide a specific soil and foundation evaluation for the



proposed construction. The purpose of this proposed service will be to verify that the foundation soil conditions existing at the completion of the earthwork grading phase for the subdivision have not changed, and if they have during the course of the lot construction, that we have verified the adequacy of the soil conditions, as stated in our final report for each lot-specific residential construction. If we do not provide these recommended services, we can not be responsible for lot specific design and construction errors and omissions.

### **Hydrogeologic Services**

We recommend STRATA accomplish groundwater modeling to help evaluate the impact of the proposed development on existing groundwater conditions. The hydrogeologic services will be important to identify groundwater impacts on the proposed development prior to construction and reduce the potential for problems associated with groundwater effects on the completed development.

### **EVALUATION LIMITATIONS**

This report has been prepared to evaluate the subsurface conditions at the site of the proposed Harris Ranch Subdivision No. 11 in Boise, Idaho. This report has been prepared to assist with design and construction of infrastructure for the proposed development, and should not be relied on for individual lot development. Our services consist of professional opinions and recommendations made referencing generally accepted geotechnical engineering principles and practices. This acknowledgment is in lieu of all express or implied warranties.

The opinions and recommendations contained herein are based on the findings and observations made at the time of our site reconnaissance and subsurface evaluation. If, at a later time, conditions are exposed which appear to be different from those observed during our field evaluation and as described in this report, STRATA, Inc. should be notified to consider the possible need for modifications to the geotechnical recommendations and opinions presented herein.



The following plates and appendices accompany and complete this report:

|    |             |                                      |
|----|-------------|--------------------------------------|
| 55 | Plate 1:    | Test Pit Location Plan               |
|    | Plate 2:    | Interpretive Cross Section A-A'      |
|    | Plate 3:    | Drainage Schematic                   |
|    | Appendix A: | Exploratory Test Pit and Boring Logs |
|    | Appendix B: | Laboratory Test Data                 |
|    | Appendix C: | Groundwater Monitoring Data          |
|    | Appendix D: | Slope Stability Analyses             |



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Breckenridge, R.M., Lewis, R.S., Adema, G.W., and Weisz, D.W., 2003, *Miocene and Younger Faults in Idaho*, Geology Map Series, Scale 1:1,000,000, Idaho Geological Survey, Moscow, Idaho.

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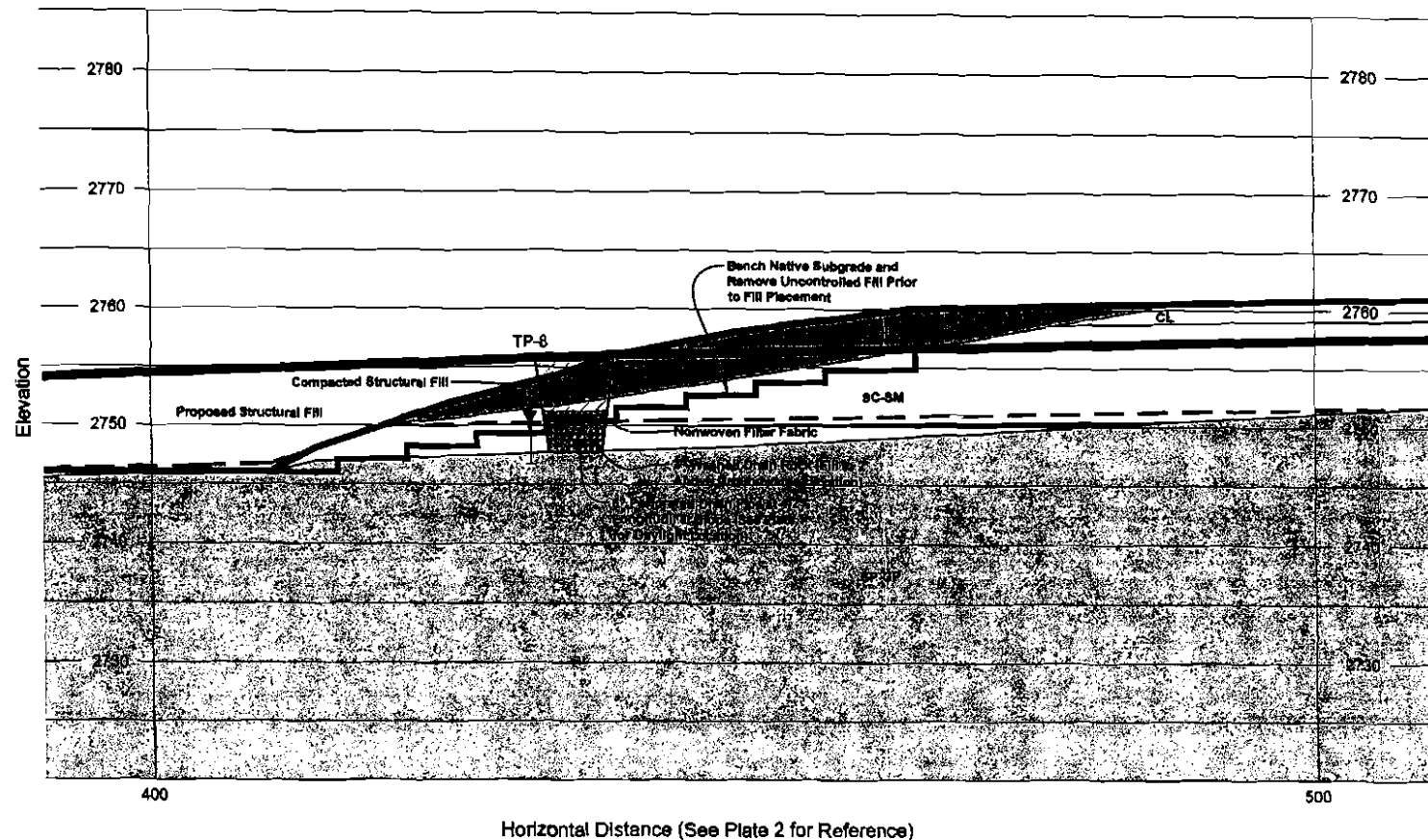
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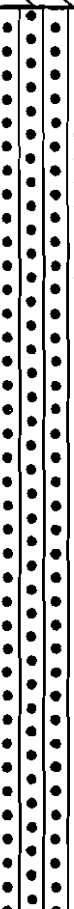




THIS PLAN COMPRISES A PORTION OF STRATA'S PROFESSIONAL REPORT AND THE TEXT OF THE REPORT CONTAINS ESSENTIAL INFORMATION BEFORE UTILIZING THIS PLAN FOR ANY PURPOSE WHATSOEVER. THE REPORT SHOULD BE READ COMPLETELY. THIS PLAN IS INTENDED TO LOCATE APPROPRIATE LOCATIONS OF GEOTECHNICAL INVESTIGATIONS, TESTS, AND OTHER GEOTECHNICAL SERVICES REFERRED TO IN THE REPORT. STRATA'S REPORTS, TESTS, AND SERVICES ARE BASED ON THE INFORMATION PROVIDED BY OTHERS AND NO CHECK OF ACCURACY, CORRECTNESS, APPROPRIATENESS, ETC., OF INFORMATION PROVIDED BY OTHERS WAS PERFORMED. THESE DATA CRITERIA WERE NOT PART OF STRATA'S WORK SCOPE.

# **APPENDIX A**

| USCS Description                                                                | DEPTH<br>(In Feet) | USCS<br>CLASS           | SYMBOL | SAMPLE<br>Type | % Passing<br>No. 200<br>sieve                                                                                                                                                                                | Moisture<br>Content (%) | Dry Density<br>(pcf)                                           | Pocket<br>Penetro-<br>meter(tsf) | REMARKS                                                             |
|---------------------------------------------------------------------------------|--------------------|-------------------------|--------|----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|----------------------------------------------------------------|----------------------------------|---------------------------------------------------------------------|
| Approximate GS Elevation = 2775<br>Lean CLAY with Sand -<br>Brown, hard, moist. |                    | CL                      |        | BG             |                                                                                                                                                                                                              |                         |                                                                | 4.5+                             | Significant vegetation and<br>organics observed to<br>6 inches BGS. |
| Sandy Lean CLAY - brown,<br>hard, moist.                                        | 1                  | CL                      |        |                |                                                                                                                                                                                                              |                         |                                                                | 4.5+                             |                                                                     |
|                                                                                 | 2                  |                         |        |                |                                                                                                                                                                                                              |                         |                                                                | 4.5+                             |                                                                     |
|                                                                                 | 3                  |                         |        |                |                                                                                                                                                                                                              |                         |                                                                | 4.5+                             |                                                                     |
| Silty SAND with Gravel - tan,<br>dense, moist.                                  | 4                  | SM                      |        |                |                                                                                                                                                                                                              |                         |                                                                |                                  | Atterberg Limits =<br>(LL=42, PI=26)                                |
|                                                                                 | 5                  |                         |        |                |                                                                                                                                                                                                              |                         |                                                                |                                  |                                                                     |
|                                                                                 | 6                  |                         |        |                |                                                                                                                                                                                                              |                         |                                                                |                                  |                                                                     |
| 7                                                                               | SP                 |                         |        |                |                                                                                                                                                                                                              |                         |                                                                |                                  |                                                                     |
| Poorly-Graded SAND - tan,<br>dense, moist.                                      | 8                  | CL                      |        | BG             | 60.9                                                                                                                                                                                                         | 14.8                    |                                                                |                                  |                                                                     |
| Sandy CLAY - tan, dense,<br>moist.                                              | 9                  |                         |        |                |                                                                                                                                                                                                              |                         |                                                                |                                  |                                                                     |
|                                                                                 | 10                 |                         |        |                |                                                                                                                                                                                                              |                         |                                                                |                                  |                                                                     |
| Test pit terminated at 11.0<br>feet BGS due to caving<br>conditions.            | 11                 |                         |        |                |                                                                                                                                                                                                              |                         |                                                                |                                  | Standpipe piezometer<br>installed to 11.0 feet<br>BGS.              |
|                                                                                 | 12                 |                         |        |                |                                                                                                                                                                                                              |                         |                                                                |                                  |                                                                     |
|                                                                                 | 13                 |                         |        |                |                                                                                                                                                                                                              |                         |                                                                |                                  |                                                                     |
|                                                                                 | 14                 |                         |        |                |                                                                                                                                                                                                              |                         |                                                                |                                  |                                                                     |
|                                                                                 | 15                 |                         |        |                |                                                                                                                                                                                                              |                         |                                                                |                                  |                                                                     |
| Client: LENLTD                                                                  |                    | Test Pit Number: TP-4   |        |                |  <b>STRATA</b><br><small>GEOTECHNICAL ENGINEERING &amp; MATERIALS TESTING</small><br><i>Integrity from the Ground Up</i> |                         | <b>EXPLORATORY<br/>TEST PIT LOG</b><br><br><b>Sheet 1 of 1</b> |                                  |                                                                     |
| Project: B06197B                                                                |                    | Date Excavated: 9/26/06 |        |                |                                                                                                                                                                                                              |                         |                                                                |                                  |                                                                     |
| Backhoe: DEERE 310 B                                                            |                    | Bucket Width: 1.5'      |        |                |                                                                                                                                                                                                              |                         |                                                                |                                  |                                                                     |
| Depth to Groundwater: N/E                                                       |                    | Logged By: BN           |        |                |                                                                                                                                                                                                              |                         |                                                                |                                  |                                                                     |

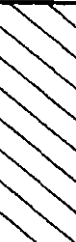
| USCS Description                                             | DEPTH<br>(In Feet) | USCS<br>CLASS | SYMBOL                                                                             | SAMPLE<br>Type | % Passing<br>No. 200<br>sieve | Moisture<br>Content (%) | Dry Density<br>(pcf) | Pocket<br>Penetra-<br>meter(tsf) | REMARKS                                                       |
|--------------------------------------------------------------|--------------------|---------------|------------------------------------------------------------------------------------|----------------|-------------------------------|-------------------------|----------------------|----------------------------------|---------------------------------------------------------------|
| Approximate GS Elevation = 2791                              |                    |               |                                                                                    |                |                               |                         |                      |                                  | Note: BGS = Below Ground Surface                              |
| Sandy Lean CLAY – black, stiff, wet.                         | 1                  | CL            |   | BG             |                               |                         |                      | 0.5–1                            | significant vegetation and organics observed to 6 inches BGS. |
|                                                              | 2                  |               |                                                                                    |                |                               |                         |                      | 0.5–1                            |                                                               |
|                                                              | 3                  |               |                                                                                    | BG             |                               |                         |                      |                                  |                                                               |
| Silty SAND – brown, medium dense, wet.                       | 4                  | SM            |  |                |                               |                         |                      |                                  |                                                               |
|                                                              | 5                  |               |                                                                                    |                |                               |                         |                      |                                  |                                                               |
|                                                              | 6                  |               |                                                                                    |                |                               |                         |                      |                                  |                                                               |
|                                                              | 7                  |               |                                                                                    |                |                               |                         |                      |                                  |                                                               |
|                                                              | 8                  |               |                                                                                    |                |                               |                         |                      |                                  |                                                               |
|                                                              | 9                  |               |                                                                                    |                |                               |                         |                      |                                  |                                                               |
|                                                              | 10                 |               |                                                                                    |                |                               |                         |                      |                                  |                                                               |
|                                                              | 11                 |               |                                                                                    |                |                               |                         |                      |                                  |                                                               |
|                                                              | 12                 |               |                                                                                    |                |                               |                         |                      |                                  |                                                               |
|                                                              | 13                 |               |                                                                                    |                |                               |                         |                      |                                  |                                                               |
| Test pit terminated at 12 feet BGS due to caving conditions. | 14                 |               |                                                                                    |                |                               |                         |                      |                                  | Standpipe piezometer installed to 12 feet BGS.                |
|                                                              | 15                 |               |                                                                                    |                |                               |                         |                      |                                  |                                                               |

|                           |                         |
|---------------------------|-------------------------|
| Client: LENLTD            | Test Pit Number: TP-5   |
| Project: B06197B          | Date Excavated: 9/26/06 |
| Backhoe: DEERE 310 B      | Bucket Width: 1.5'      |
| Depth to Groundwater: 4.6 | Logged By: BN           |



**EXPLORATORY  
TEST PIT LOG**

Sheet 1 of 1

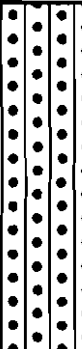
| USCS Description                                                | DEPTH<br>(In Feet) | USCS<br>CLASS | SYMBOL                                                                              | SAMPLE<br>Type | % Passing<br>No. 200<br>sieve                                                        | Moisture<br>Content (%) | Dry Density<br>(pcf) | Pocket<br>Penetro-<br>meter (tsf) | REMARKS                                                    |
|-----------------------------------------------------------------|--------------------|---------------|-------------------------------------------------------------------------------------|----------------|--------------------------------------------------------------------------------------|-------------------------|----------------------|-----------------------------------|------------------------------------------------------------|
| Approximate GS Elevation = 2756                                 |                    |               |                                                                                     |                |                                                                                      |                         |                      |                                   |                                                            |
| Sandy Lean CLAY - black, stiff, wet.                            | 1                  | CL            |    |                |                                                                                      |                         |                      |                                   | Moderate vegetation and organics observed to 6 inches BGS. |
|                                                                 | 2                  |               |                                                                                     |                |                                                                                      |                         |                      |                                   |                                                            |
| Poorly-Graded SAND - gray, medium dense, wet.                   | 3                  | SP            |    | BG             |                                                                                      |                         |                      |                                   |                                                            |
|                                                                 | 4                  |               |                                                                                     |                |                                                                                      |                         |                      |                                   |                                                            |
| Clayey SAND - tan, medium dense, saturated.                     | 5                  | SC            |   | BG             |                                                                                      |                         |                      |                                   |                                                            |
|                                                                 | 6                  |               |                                                                                     |                |                                                                                      |                         |                      |                                   |                                                            |
|                                                                 | 7                  |               |                                                                                     |                |                                                                                      |                         |                      |                                   |                                                            |
|                                                                 | 8                  |               |                                                                                     |                |                                                                                      |                         |                      |                                   |                                                            |
|                                                                 | 9                  |               |                                                                                     |                |                                                                                      |                         |                      |                                   |                                                            |
| Poorly-Graded GRAVEL with Sand - gray, medium dense, saturated. | 10                 | GP            |  |                |                                                                                      |                         |                      |                                   |                                                            |
| Test pit terminated at 11 feet BGS due to caving conditions.    | 11                 |               |                                                                                     |                |                                                                                      |                         |                      |                                   | Standpipe piezometer installed to 11 feet BGS.             |
|                                                                 | 12                 |               |                                                                                     |                |                                                                                      |                         |                      |                                   |                                                            |
|                                                                 | 13                 |               |                                                                                     |                |                                                                                      |                         |                      |                                   |                                                            |
|                                                                 | 14                 |               |                                                                                     |                |                                                                                      |                         |                      |                                   |                                                            |
|                                                                 | 15                 |               |                                                                                     |                |                                                                                      |                         |                      |                                   |                                                            |
| Client: LENLTD                                                  |                    |               |                                                                                     |                | Test Pit Number: TP-6                                                                |                         |                      |                                   |                                                            |
| Project: B06197B                                                |                    |               |                                                                                     |                | Date Excavated: 9/26/06                                                              |                         |                      |                                   |                                                            |
| Backhoe: DEERE 310 B                                            |                    |               |                                                                                     |                | Bucket Width: 1.5'                                                                   |                         |                      |                                   |                                                            |
| Depth to Groundwater: 3.1                                       |                    |               |                                                                                     |                | Logged By: BN                                                                        |                         |                      |                                   |                                                            |
|                                                                 |                    |               |                                                                                     |                |  |                         |                      | EXPLORATORY TEST PIT LOG          |                                                            |
|                                                                 |                    |               |                                                                                     |                |                                                                                      |                         |                      | Sheet 1 of 1                      |                                                            |

| USCS Description                                                | DEPTH<br>(In Feet) | USCS<br>CLASS | SYMBOL | SAMPLE<br>Type | % Passing<br>No. 200<br>sieve | Moisture<br>Content (%) | Dry Density<br>(pcf) | Pocket<br>Penetro-<br>meter(tsf) | REMARKS                                                    |
|-----------------------------------------------------------------|--------------------|---------------|--------|----------------|-------------------------------|-------------------------|----------------------|----------------------------------|------------------------------------------------------------|
| Approximate GS Elevation = 2749                                 |                    |               |        |                |                               |                         |                      |                                  | Note: BGS = Below Ground Surface                           |
| Silty SAND - brown, medium dense, wet.                          | 1                  | SM            |        |                |                               |                         |                      |                                  | Moderate vegetation and organics observed to 6 inches BGS. |
| Poorly-Graded SAND - brown, medium dense, wet.                  | 2                  | SP            |        | BG             |                               |                         |                      |                                  |                                                            |
| Clayey SAND - tan, medium dense, saturated.                     | 3                  | SC            |        |                |                               |                         |                      |                                  |                                                            |
| Poorly-Graded GRAVEL with Sand - gray, medium dense, saturated. | 4                  |               |        |                |                               |                         |                      |                                  |                                                            |
|                                                                 | 5                  |               |        |                |                               |                         |                      |                                  |                                                            |
|                                                                 | 6                  |               |        |                |                               |                         |                      |                                  |                                                            |
|                                                                 | 7                  |               |        |                |                               |                         |                      |                                  |                                                            |
|                                                                 | 8                  |               |        |                |                               |                         |                      |                                  |                                                            |
|                                                                 | 9                  |               |        |                |                               |                         |                      |                                  |                                                            |
|                                                                 | 10                 |               |        |                |                               |                         |                      |                                  |                                                            |
| Test pit terminated at 10 feet BGS due to caving conditions.    | 11                 |               |        |                |                               |                         |                      |                                  | Standpipe piezometer installed to 10 feet BGS.             |
|                                                                 | 12                 |               |        |                |                               |                         |                      |                                  |                                                            |
|                                                                 | 13                 |               |        |                |                               |                         |                      |                                  |                                                            |
|                                                                 | 14                 |               |        |                |                               |                         |                      |                                  |                                                            |
|                                                                 | 15                 |               |        |                |                               |                         |                      |                                  |                                                            |

|                           |                         |                                                                                                                              |                                                                |
|---------------------------|-------------------------|------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------|
| Client: LENLTD            | Test Pit Number: TP-7   | <br><b>STRATA</b><br><small>GEOTECHNICAL, ENGINEERING &amp; MATERIALS TESTING</small><br><i>Integrity from the Ground Up</i> | <b>EXPLORATORY<br/>TEST PIT LOG</b><br><br><b>Sheet 1 of 1</b> |
| Project: B06197B          | Date Excavated: 9/26/06 |                                                                                                                              |                                                                |
| Backhoe: DEERE 310 B      | Bucket Width: 1.5'      |                                                                                                                              |                                                                |
| Depth to Groundwater: 2.5 | Logged By: BN           |                                                                                                                              |                                                                |

| USCS Description                                                | DEPTH<br>(In Feet)      | USCS<br>CLASS | SYMBOL | SAMPLE<br>Type | % Passing<br>No. 200<br>sieve                                                                                               | Moisture<br>Content (%) | Dry Density<br>(pcf)                | Pocket<br>Penetro-<br>meter(tsf) | REMARKS                                                                                                                                             |
|-----------------------------------------------------------------|-------------------------|---------------|--------|----------------|-----------------------------------------------------------------------------------------------------------------------------|-------------------------|-------------------------------------|----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|
| Approximate GS Elevation = 2753                                 |                         |               |        |                |                                                                                                                             |                         |                                     |                                  | Note: BGS = Below Ground Surface                                                                                                                    |
| Sandy Lean CLAY (Fill) – brown, stiff, moist.                   | 1                       | CL            |        |                |                                                                                                                             |                         |                                     |                                  | Significant vegetation and organics observed to 6 inches BGS.<br><br>found glass, pipe, and other debris<br><br>Atterberg Limits:<br>(PI=27, LL=43) |
| Clayey SAND – tan, medium dense, saturated.                     | 2                       | SC            |        | BLK            | 48                                                                                                                          | 25                      |                                     |                                  |                                                                                                                                                     |
|                                                                 | 3                       |               |        |                |                                                                                                                             |                         |                                     |                                  |                                                                                                                                                     |
|                                                                 | 4                       |               |        |                |                                                                                                                             |                         |                                     |                                  |                                                                                                                                                     |
|                                                                 | 5                       |               |        |                |                                                                                                                             |                         |                                     |                                  |                                                                                                                                                     |
| Poorly-Graded GRAVEL with Sand – gray, medium dense, saturated. | 6                       | GP            |        |                |                                                                                                                             |                         |                                     |                                  |                                                                                                                                                     |
| Test pit terminated at 7 feet BGS due to caving conditions.     | 7                       |               |        |                |                                                                                                                             |                         |                                     |                                  | Standpipe piezometer installed to 7 feet BGS.                                                                                                       |
|                                                                 | 8                       |               |        |                |                                                                                                                             |                         |                                     |                                  |                                                                                                                                                     |
|                                                                 | 9                       |               |        |                |                                                                                                                             |                         |                                     |                                  |                                                                                                                                                     |
|                                                                 | 10                      |               |        |                |                                                                                                                             |                         |                                     |                                  |                                                                                                                                                     |
|                                                                 | 11                      |               |        |                |                                                                                                                             |                         |                                     |                                  |                                                                                                                                                     |
|                                                                 | 12                      |               |        |                |                                                                                                                             |                         |                                     |                                  |                                                                                                                                                     |
|                                                                 | 13                      |               |        |                |                                                                                                                             |                         |                                     |                                  |                                                                                                                                                     |
|                                                                 | 14                      |               |        |                |                                                                                                                             |                         |                                     |                                  |                                                                                                                                                     |
|                                                                 | 15                      |               |        |                |                                                                                                                             |                         |                                     |                                  |                                                                                                                                                     |
| Client: LENLTD                                                  | Test Pit Number: TP-8   |               |        |                | <br><b>STRATA</b><br><small>GEOTECHNICAL ENGINEERING &amp; MATERIALS TESTING</small><br><i>Integrity from the Ground Up</i> |                         | <b>EXPLORATORY<br/>TEST PIT LOG</b> |                                  |                                                                                                                                                     |
| Project: B06197B                                                | Date Excavated: 9/27/06 |               |        |                |                                                                                                                             |                         |                                     |                                  |                                                                                                                                                     |
| Backhoe: DEERE 310 B                                            | Bucket Width: 1.5'      |               |        |                |                                                                                                                             |                         |                                     |                                  |                                                                                                                                                     |
| Depth to Groundwater: 3.0                                       | Logged By: BN           |               |        |                |                                                                                                                             |                         |                                     |                                  |                                                                                                                                                     |
|                                                                 |                         |               |        |                |                                                                                                                             |                         | Sheet 1 of 1                        |                                  |                                                                                                                                                     |

| USCS Description                                                            | DEPTH<br>(In Feet)                         | USCS<br>CLASS | SYMBOL                                                                             | SAMPLE<br>Type | % Passing<br>No. 200<br>sieve | Moisture<br>Content (%) | Dry Density<br>(pcf) | Pocket<br>Penetro-<br>meter(tsf) | REMARKS                                                    |
|-----------------------------------------------------------------------------|--------------------------------------------|---------------|------------------------------------------------------------------------------------|----------------|-------------------------------|-------------------------|----------------------|----------------------------------|------------------------------------------------------------|
| Approximate GS Elevation = 2744                                             |                                            |               |                                                                                    |                |                               |                         |                      |                                  | Note: BGS = Below Ground Surface                           |
| Silty SAND - brown, medium dense, wet.                                      | 1<br>2<br>3                                | SM            |   | BG             |                               |                         |                      |                                  | Moderate vegetation and organics observed to 6 inches BGS. |
| Poorly-Graded GRAVEL with Sand and Cobbles - gray, medium dense, saturated. | 4<br>5<br>6<br>7                           | GP            |  |                |                               |                         |                      |                                  | max cable size = 14"                                       |
| Test pit terminated at 7.5 feet BGS due to caving conditions.               | 8<br>9<br>10<br>11<br>12<br>13<br>14<br>15 |               |                                                                                    |                |                               |                         |                      |                                  | Standpipe piezometer installed to 7.5 feet BGS.            |

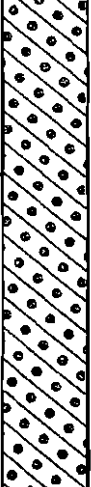
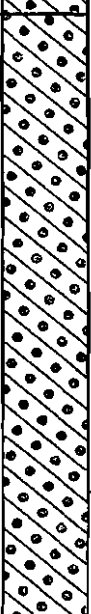
|                           |                         |                                                                                                                                                                                                                  |                                                                |
|---------------------------|-------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------|
| Client: LENLTD            | Test Pit Number: TP-9   | <br><b>STRATA</b><br><small>GEOTECHNICAL ENGINEERING &amp; MATERIALS TESTING</small><br><i>Integrity from the Ground Up</i> | <b>EXPLORATORY<br/>TEST PIT LOG</b><br><br><b>Sheet 1 of 1</b> |
| Project: B06197B          | Date Excavated: 9/27/06 |                                                                                                                                                                                                                  |                                                                |
| Backhoe: DEERE 310 B      | Bucket Width: 1.5'      |                                                                                                                                                                                                                  |                                                                |
| Depth to Groundwater: 2.5 | Logged By: BN           |                                                                                                                                                                                                                  |                                                                |

| USCS Description                                           | DEPTH<br>(In Feet) | USCS<br>CLASS | SYMBOL | SAMPLE<br>Type | % Passing<br>No. 200<br>sieve | Moisture<br>Content (%) | Dry Density<br>(pcf) | Pocket<br>Penetra-<br>meter(tsf) | REMARKS                                                          |
|------------------------------------------------------------|--------------------|---------------|--------|----------------|-------------------------------|-------------------------|----------------------|----------------------------------|------------------------------------------------------------------|
| Approximate GS Elevation = 2805                            |                    |               |        |                |                               |                         |                      |                                  |                                                                  |
| Sandy Lean CLAY - brown,<br>hard, moist.                   | 1                  | CL            |        | BG             |                               | 14                      |                      | 4.5+                             | Moderate vegetation and<br>organics observed to<br>4 inches BGS. |
|                                                            | 2                  |               |        |                |                               |                         |                      | 4.5+                             | Atterberg Limits:<br>LL=42, PI=26                                |
| Clayey SAND - brown,<br>medium dense, moist.               | 3                  | SC            |        |                |                               |                         |                      | 4.5+                             | Max cobble size = 18<br>inches.                                  |
|                                                            | 4                  |               |        |                |                               |                         |                      |                                  |                                                                  |
| Sandy Lean CLAY with<br>Cobbles - tan, very stiff,<br>wet. | 5                  | CL            |        |                |                               |                         |                      |                                  |                                                                  |
|                                                            | 6                  |               |        |                |                               |                         |                      |                                  |                                                                  |
|                                                            | 7                  |               |        |                |                               |                         |                      |                                  |                                                                  |
| Clayey SAND - tan, medium<br>dense, saturated.             | 8                  | SC            |        |                |                               |                         |                      |                                  |                                                                  |
|                                                            | 9                  |               |        |                |                               |                         |                      |                                  |                                                                  |
|                                                            | 10                 |               |        |                |                               |                         |                      |                                  |                                                                  |
|                                                            | 11                 |               |        |                |                               |                         |                      |                                  |                                                                  |
|                                                            | 12                 |               |        |                |                               |                         |                      |                                  |                                                                  |
| Test pit terminated at 12<br>feet BGS.                     | 13                 |               |        |                |                               |                         |                      |                                  | Standpipe piezometer<br>installed to 12 feet<br>BGS.             |
|                                                            | 14                 |               |        |                |                               |                         |                      |                                  |                                                                  |
|                                                            | 15                 |               |        |                |                               |                         |                      |                                  |                                                                  |
|                                                            |                    |               |        |                |                               |                         |                      |                                  |                                                                  |

|                            |                         |                                                                                                                             |                                                                |
|----------------------------|-------------------------|-----------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------|
| Client: LENLTD             | Test Pit Number: TP-20  | <br><b>STRATA</b><br><small>GEOTECHNICAL ENGINEERING &amp; MATERIALS TESTING</small><br><i>Integrity from the Ground Up</i> | <b>EXPLORATORY<br/>TEST PIT LOG</b><br><br><b>Sheet 1 of 1</b> |
| Project: B06197D           | Date Excavated: 8/27/07 |                                                                                                                             |                                                                |
| Backhoe: CAT 416 D         | Bucket Width: 2'        |                                                                                                                             |                                                                |
| Depth to Groundwater: 10.1 | Logged By: BN           |                                                                                                                             |                                                                |

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| USCS Description                                      | DEPTH<br>(In Feet) | USCS<br>CLASS | SYMBOL                                                                             | SAMPLE<br>Type | % Passing<br>No. 200<br>sieve | Moisture<br>Content (%) | Dry Density<br>(pcf) | Pocket<br>Penetro-<br>meter(tsf) | REMARKS                                                    |
|-------------------------------------------------------|--------------------|---------------|------------------------------------------------------------------------------------|----------------|-------------------------------|-------------------------|----------------------|----------------------------------|------------------------------------------------------------|
| Approximate GS Elevation = 2794                       |                    |               |                                                                                    |                |                               |                         |                      |                                  | Note: BGS = Below Ground Surface                           |
| Clayey SAND - dark brown, medium dense, moist to wet. | 1                  | SC            |   | BK<br>RG       | 42                            | 11                      | 100                  | 4.5+                             | Moderate vegetation and organics observed to 3 inches BGS. |
|                                                       | 2                  |               |                                                                                    |                |                               |                         |                      |                                  | Atterberg Limits<br>LL=47, PI=31                           |
|                                                       | 3                  |               |                                                                                    |                |                               |                         |                      |                                  |                                                            |
|                                                       | 4                  |               |                                                                                    |                |                               |                         |                      | 2.0                              |                                                            |
|                                                       | 5                  |               |                                                                                    |                |                               |                         |                      | 0.5                              |                                                            |
| Clayey SAND - tan, medium dense, saturated.           | 6                  | SC            |  |                |                               |                         |                      |                                  |                                                            |
|                                                       | 7                  |               |                                                                                    |                |                               |                         |                      |                                  |                                                            |
|                                                       | 8                  |               |                                                                                    |                |                               |                         |                      |                                  |                                                            |
|                                                       | 9                  |               |                                                                                    |                |                               |                         |                      |                                  |                                                            |
|                                                       | 10                 |               |                                                                                    |                |                               |                         |                      |                                  |                                                            |
| Test pit terminated at 11 feet BGS.                   | 11                 |               |                                                                                    |                |                               |                         |                      |                                  | Standpipe piezometer installed to 11 feet BGS.             |
|                                                       | 12                 |               |                                                                                    |                |                               |                         |                      |                                  |                                                            |
|                                                       | 13                 |               |                                                                                    |                |                               |                         |                      |                                  |                                                            |
|                                                       | 14                 |               |                                                                                    |                |                               |                         |                      |                                  |                                                            |
|                                                       | 15                 |               |                                                                                    |                |                               |                         |                      |                                  |                                                            |

|                           |                         |
|---------------------------|-------------------------|
| Client: LENLTD            | Test Pit Number: TP-21  |
| Project: B06197D          | Date Excavated: 8/27/07 |
| Backhoe: CAT 416 D        | Bucket Width: 2'        |
| Depth to Groundwater: 6.1 | Logged By: BN           |



## EXPLORATORY TEST PIT LOG

Sheet 1 of 1

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| USCS Description                                             | DEPTH<br>(in Feet) | USCS<br>CLASS | SYMBOL | SAMPLE<br>Type | % Passing<br>No. 200<br>sieve | Moisture<br>Content (%) | Dry Density<br>(pcf) | Pocket<br>Penetro-<br>meter(tsf) | REMARKS                                                    |
|--------------------------------------------------------------|--------------------|---------------|--------|----------------|-------------------------------|-------------------------|----------------------|----------------------------------|------------------------------------------------------------|
| Approximate GS Elevation = 2779                              |                    |               |        |                |                               |                         |                      |                                  | Note: BGS = Below Ground Surface                           |
| Lean CLAY with Sand - tan, hard, moist.                      | 1                  | CL            |        | BG             |                               |                         |                      | 4.5+                             | Moderate vegetation and organics observed to 3 inches BGS. |
| Silty SAND - medium dense to dense, moist.                   | 2                  | SM            |        |                |                               |                         |                      |                                  |                                                            |
|                                                              | 3                  |               |        |                |                               |                         |                      |                                  |                                                            |
| Clayey SAND - tan, medium dense, moist to wet.               | 4                  | SC            |        | BG             |                               |                         |                      |                                  |                                                            |
|                                                              | 5                  |               |        |                |                               |                         |                      |                                  |                                                            |
| Poorly-Graded SAND with Clay - tan, medium dense, saturated. | 6                  | SP            |        |                |                               |                         |                      |                                  |                                                            |
|                                                              | 7                  |               |        |                |                               |                         |                      |                                  |                                                            |
|                                                              | 8                  |               |        |                |                               |                         |                      |                                  |                                                            |
|                                                              | 9                  |               |        |                |                               |                         |                      |                                  |                                                            |
| Clayey SAND - tan, medium dense, saturated.                  | 10                 | SC            |        | BG             |                               |                         |                      | 2.0                              |                                                            |
|                                                              | 11                 |               |        |                |                               |                         |                      |                                  |                                                            |
| Test pit terminated at 11 feet BGS.                          | 12                 |               |        |                |                               |                         |                      |                                  | Standpipe piezometer installed to 11 feet BGS.             |
|                                                              | 13                 |               |        |                |                               |                         |                      |                                  |                                                            |
|                                                              | 14                 |               |        |                |                               |                         |                      |                                  |                                                            |
|                                                              | 15                 |               |        |                |                               |                         |                      |                                  |                                                            |
|                                                              |                    |               |        |                |                               |                         |                      |                                  |                                                            |

Client: LENLTD      Test Pit Number: TP-25

Project: B06197D      Date Excavated: 8/27/07

Backhoe: CAT 416 D      Bucket Width: 2'

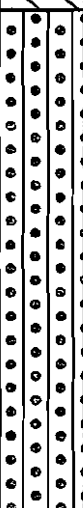
Depth to Groundwater: 7.5      Logged By: BN



**STRATA**  
GEOTECHNICAL ENGINEERING & MATERIALS TESTING  
*Integrity from the Ground Up*

**EXPLORATORY  
TEST PIT LOG**

Sheet 1 of 1

| USCS Description                                          | DEPTH<br>(In Feet) | USCS<br>CLASS | SYMBOL                                                                              | SAMPLE<br>Type | % Passing<br>No. 200<br>sieve | Moisture<br>Content (%) | Dry Density<br>(pcf) | Pocket<br>Penetro-<br>meter(tsf) | REMARKS                                                    |
|-----------------------------------------------------------|--------------------|---------------|-------------------------------------------------------------------------------------|----------------|-------------------------------|-------------------------|----------------------|----------------------------------|------------------------------------------------------------|
| Approximate GS Elevation = 2766                           |                    |               |                                                                                     |                |                               |                         |                      |                                  |                                                            |
| Lean CLAY - brown, stiff, moist.                          | 1                  | CL            |    | RG             |                               |                         |                      |                                  | Moderate vegetation and organics observed to 3 inches BGS. |
|                                                           | 2                  |               |                                                                                     |                |                               |                         |                      |                                  |                                                            |
|                                                           | 3                  |               |                                                                                     |                |                               |                         |                      |                                  |                                                            |
| Silty SAND - brown, medium dense, moist.                  | 4                  | SM            |   | BG             |                               |                         |                      |                                  |                                                            |
|                                                           | 5                  |               |                                                                                     |                |                               |                         |                      |                                  |                                                            |
|                                                           | 6                  |               |                                                                                     |                |                               |                         |                      |                                  |                                                            |
|                                                           | 7                  |               |                                                                                     |                |                               |                         |                      |                                  |                                                            |
|                                                           | 8                  |               |                                                                                     |                |                               |                         |                      |                                  |                                                            |
|                                                           | 9                  |               |                                                                                     |                |                               |                         |                      |                                  |                                                            |
| Poorly-Graded SAND - tan, medium dense, wet to saturated. | 10                 | SP            |  | BK             |                               |                         |                      |                                  |                                                            |
|                                                           | 11                 |               |                                                                                     |                |                               |                         |                      |                                  |                                                            |
|                                                           | 12                 |               |                                                                                     |                |                               |                         |                      |                                  |                                                            |
|                                                           | 13                 |               |                                                                                     |                |                               |                         |                      |                                  |                                                            |
|                                                           | 14                 |               |                                                                                     |                |                               |                         |                      |                                  |                                                            |
| Test pit terminated at 14 feet BGS.                       | 15                 |               |                                                                                     |                |                               |                         |                      |                                  | Standpipe piezometer installed to 14 feet BGS.             |

|                           |                         |                                                                                                                                                                                                        |                                     |
|---------------------------|-------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|
| Client: LENLTD            | Test Pit Number: TP-26  |  <p><b>STRATA</b><br/>GEOTECHNICAL ENGINEERING &amp; MATERIALS TESTING<br/><i>Integrity from the Ground Up</i></p> | <b>EXPLORATORY<br/>TEST PIT LOG</b> |
| Project: B06197D          | Date Excavated: 8/27/07 |                                                                                                                                                                                                        |                                     |
| Backhoe: CAT 416 D        | Bucket Width: 2'        |                                                                                                                                                                                                        |                                     |
| Depth to Groundwater: 9.4 | Logged By: BN           |                                                                                                                                                                                                        |                                     |

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| USCS Description                                | DEPTH<br>(in Feet) | USCS<br>CLASS           | SYMBOL | SAMPLE<br>Type | % Passing<br>No. 200<br>sieve                                                                                                                              | Moisture<br>Content (%) | Dry Density<br>(pcf) | Pocket<br>Penetro-<br>meter (tsf) | REMARKS                                                    |
|-------------------------------------------------|--------------------|-------------------------|--------|----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|----------------------|-----------------------------------|------------------------------------------------------------|
| Approximate GS Elevation = 2777                 |                    |                         |        |                |                                                                                                                                                            |                         |                      |                                   |                                                            |
| Lean CLAY with Sand – brown, very stiff, moist. | 1                  | CL                      |        | BG             |                                                                                                                                                            |                         |                      | 2.0                               | Moderate vegetation and organics observed to 3 inches BGS. |
| Clayey SAND – tan medium dense, moist.          | 2                  | SC                      |        |                |                                                                                                                                                            |                         |                      |                                   |                                                            |
| Sandy Lean CLAY – brown, very stiff.            | 3                  | CL                      |        |                |                                                                                                                                                            |                         |                      |                                   |                                                            |
| Clayey SAND – brown, medium dense, moist.       | 4                  | SC                      |        |                |                                                                                                                                                            |                         |                      |                                   |                                                            |
| Sandy Lean CLAY – tan, stiff, wet to saturated. | 5                  | CL                      |        |                |                                                                                                                                                            |                         |                      |                                   |                                                            |
| Sandy Lean CLAY – tan, very stiff, moist.       | 6                  | CL                      |        |                |                                                                                                                                                            |                         |                      |                                   |                                                            |
|                                                 | 7                  |                         |        |                |                                                                                                                                                            |                         |                      |                                   |                                                            |
|                                                 | 8                  |                         |        |                |                                                                                                                                                            |                         |                      |                                   |                                                            |
|                                                 | 9                  |                         |        |                |                                                                                                                                                            |                         |                      |                                   |                                                            |
| Sandy Lean CLAY – tan, very stiff, moist.       | 10                 | CL                      |        | BG             |                                                                                                                                                            |                         |                      |                                   |                                                            |
|                                                 | 11                 |                         |        |                |                                                                                                                                                            |                         |                      |                                   |                                                            |
|                                                 | 12                 |                         |        |                |                                                                                                                                                            |                         |                      |                                   |                                                            |
|                                                 | 13                 |                         |        |                |                                                                                                                                                            |                         |                      |                                   |                                                            |
| Poorly-Graded SAND – tan, medium dense, moist.  | 13                 | SP                      |        |                | 61                                                                                                                                                         | 21                      |                      |                                   | Atterberg Limits:<br>LL=44, PI=28                          |
|                                                 | 14                 |                         |        |                |                                                                                                                                                            |                         |                      |                                   |                                                            |
| Test pit terminated at 15 feet BGS.             | 15                 |                         |        |                |                                                                                                                                                            |                         |                      |                                   | Standpipe piezometer installed to 15 feet BGS.             |
| Client: LENLTD                                  |                    | Test Pit Number: TP-27  |        |                | <div><b>EXPLORATORY<br/>TEST PIT LOG</b></div> <div>Sheet 1 of 1</div> |                         |                      |                                   |                                                            |
| Project: B06197D                                |                    | Date Excavated: 8/27/07 |        |                |                                                                                                                                                            |                         |                      |                                   |                                                            |
| Backhoe: CAT 416 D                              |                    | Bucket Width: 2'        |        |                |                                                                                                                                                            |                         |                      |                                   |                                                            |
| Depth to Groundwater: N/E                       |                    | Logged By: BN           |        |                |                                                                                                                                                            |                         |                      |                                   |                                                            |

| USCS Description                                               | DEPTH<br>(in Feet) | USCS<br>CLASS           | SYMBOL | SAMPLE<br>Type | % Passing<br>No. 200<br>sieve                                                                                                | Moisture<br>Content (%) | Dry Density<br>(pcf) | Pocket<br>Penetro-<br>meter(tsf) | REMARKS                                                    |
|----------------------------------------------------------------|--------------------|-------------------------|--------|----------------|------------------------------------------------------------------------------------------------------------------------------|-------------------------|----------------------|----------------------------------|------------------------------------------------------------|
| Approximate GS Elevation = 2748                                |                    |                         |        |                |                                                                                                                              |                         |                      |                                  | Note: BGS = Below Ground Surface                           |
| Silty SAND - brown, medium dense, moist.                       | 1                  | SM                      |        | BK             | 24                                                                                                                           |                         |                      | 3.5                              | Moderate vegetation and organics observed to 4 inches BGS. |
| Lean CLAY - brown, very stiff, moist.                          | 2                  | CL                      |        | BG             |                                                                                                                              |                         |                      |                                  |                                                            |
| Silty SAND - brown, medium dense, moist.                       | 3                  | SM                      |        |                |                                                                                                                              |                         |                      |                                  |                                                            |
|                                                                | 4                  |                         |        |                |                                                                                                                              |                         |                      |                                  |                                                            |
| Poorly-Graded GRAVEL with Sand - tan, dense, wet to saturated. | 5                  | GP                      |        |                |                                                                                                                              |                         |                      |                                  |                                                            |
|                                                                | 6                  |                         |        |                |                                                                                                                              |                         |                      |                                  |                                                            |
|                                                                | 7                  |                         |        |                |                                                                                                                              |                         |                      |                                  |                                                            |
|                                                                | 8                  |                         |        | BK             |                                                                                                                              |                         |                      |                                  |                                                            |
| Test pit terminated at 8.5 feet BGS.                           | 9                  |                         |        |                |                                                                                                                              |                         |                      |                                  | Standpipe piezometer installed to 8.5 feet BGS.            |
|                                                                | 10                 |                         |        |                |                                                                                                                              |                         |                      |                                  |                                                            |
|                                                                | 11                 |                         |        |                |                                                                                                                              |                         |                      |                                  |                                                            |
|                                                                | 12                 |                         |        |                |                                                                                                                              |                         |                      |                                  |                                                            |
|                                                                | 13                 |                         |        |                |                                                                                                                              |                         |                      |                                  |                                                            |
|                                                                | 14                 |                         |        |                |                                                                                                                              |                         |                      |                                  |                                                            |
|                                                                | 15                 |                         |        |                |                                                                                                                              |                         |                      |                                  |                                                            |
| Client: LENLTD                                                 |                    | Test Pit Number: TP-28  |        |                | <br><b>STRATA</b><br><small>GEO TECHNICAL ENGINEERING &amp; MATERIALS TESTING</small><br><i>Integrity From the Ground Up</i> |                         |                      |                                  |                                                            |
| Project: B06197D                                               |                    | Date Excavated: 8/27/07 |        |                |                                                                                                                              |                         |                      |                                  |                                                            |
| Backhoe: CAT 416 D                                             |                    | Bucket Width: 2'        |        |                |                                                                                                                              |                         |                      |                                  |                                                            |
| Depth to Groundwater: 2.6                                      |                    | Logged By: BN           |        |                |                                                                                                                              |                         |                      |                                  |                                                            |
|                                                                |                    |                         |        |                | <b>EXPLORATORY TEST PIT LOG</b><br><b>Sheet 1 of 1</b>                                                                       |                         |                      |                                  |                                                            |

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| USCS Description                                                              | DEPTH<br>(in Feet) | USCS<br>CLASS | SYMBOL | SAMPLE<br>Type | % Passing<br>No. 200<br>sieve | Moisture<br>Content (%) | Dry Density<br>(pcf) | Pocket<br>Penetro-<br>meter(tsf) | REMARKS                                                    |
|-------------------------------------------------------------------------------|--------------------|---------------|--------|----------------|-------------------------------|-------------------------|----------------------|----------------------------------|------------------------------------------------------------|
| Approximate GS Elevation = 2746                                               |                    |               |        |                |                               |                         |                      |                                  |                                                            |
| Silty SAND with Gravel - tan, dense, moist.                                   |                    | SM            |        |                |                               |                         |                      |                                  | Moderate vegetation and organics observed to 3 inches BGS. |
| Poorly-Graded GRAVEL with Sand and Cobbles - gray, dense, moist to saturated. | 1                  | GP            |        |                |                               |                         |                      |                                  |                                                            |
|                                                                               | 2                  |               |        |                |                               |                         |                      |                                  |                                                            |
|                                                                               | 3                  |               |        |                |                               |                         |                      |                                  |                                                            |
|                                                                               | 4                  |               |        |                |                               |                         |                      |                                  |                                                            |
|                                                                               | 5                  |               |        |                |                               |                         |                      |                                  |                                                            |
|                                                                               | 6                  |               |        |                |                               |                         |                      |                                  |                                                            |
|                                                                               | 7                  |               |        |                |                               |                         |                      |                                  |                                                            |
|                                                                               | 8                  |               |        |                |                               |                         |                      |                                  |                                                            |
|                                                                               | 9                  |               |        |                |                               |                         |                      |                                  |                                                            |
| Test pit terminated at 9.0 feet BGS.                                          | 10                 |               |        |                |                               |                         |                      |                                  | Standpipe piezometer installed to 9 feet BGS.              |
|                                                                               | 11                 |               |        |                |                               |                         |                      |                                  |                                                            |
|                                                                               | 12                 |               |        |                |                               |                         |                      |                                  |                                                            |
|                                                                               | 13                 |               |        |                |                               |                         |                      |                                  |                                                            |
|                                                                               | 14                 |               |        |                |                               |                         |                      |                                  |                                                            |
|                                                                               | 15                 |               |        |                |                               |                         |                      |                                  |                                                            |

|                           |                         |                                                                                                                             |                                                                |
|---------------------------|-------------------------|-----------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------|
| Client: LENLTD            | Test Pit Number: TP-29  | <br><b>STRATA</b><br><small>GEOTECHNICAL ENGINEERING &amp; MATERIALS TESTING</small><br><i>Integrity from the Ground Up</i> | <b>EXPLORATORY<br/>TEST PIT LOG</b><br><br><b>Sheet 1 of 1</b> |
| Project: B061970          | Date Excavated: 8/27/07 |                                                                                                                             |                                                                |
| Backhoe: CAT 416 D        | Bucket Width: 2'        |                                                                                                                             |                                                                |
| Depth to Groundwater: 2.4 | Logged By: BN           |                                                                                                                             |                                                                |

| USCS Description                                                | DEPTH<br>(In Feet) | USCS<br>CLASS | SYMBOL | SAMPLE<br>Type | % Passing<br>No. 200<br>sieve | Moisture<br>Content (%) | Dry Density<br>(pcf) | Packet<br>Penetro-<br>meter(tsf) | REMARKS                                                    |
|-----------------------------------------------------------------|--------------------|---------------|--------|----------------|-------------------------------|-------------------------|----------------------|----------------------------------|------------------------------------------------------------|
| Approximate GS Elevation = 2743                                 |                    |               |        |                |                               |                         |                      |                                  | Note: BGS = Below Ground Surface                           |
| Silty SAND – tan, medium dense,moist.                           | 1                  | SM            |        | BG             |                               |                         |                      |                                  | Moderate vegetation and organics observed to 2 inches BGS. |
| Clayey SAND – brown, loose, moist to saturated.                 | 2                  | SC            |        | RG             |                               | 33                      |                      | 2.5                              |                                                            |
|                                                                 | 3                  |               |        |                |                               |                         |                      | 1.5                              | 0.8% organic content.                                      |
|                                                                 | 4                  | SP            |        |                |                               |                         |                      | 0.5                              |                                                            |
| Poorly-Graded SAND – gray, medium dense, saturated.             | 5                  |               |        | BG             |                               |                         |                      |                                  |                                                            |
|                                                                 | 6                  |               |        |                |                               |                         |                      |                                  |                                                            |
|                                                                 | 7                  |               |        |                |                               |                         |                      |                                  |                                                            |
| Poorly-Graded GRAVEL with Sand – gray, medium dense, saturated. | 8                  | GP            |        |                |                               |                         |                      |                                  |                                                            |
| Test pit terminated at 8.5 feet BGS.                            | 9                  |               |        |                |                               |                         |                      |                                  | Standpipe piezometer installed to 8.5 feet BGS.            |
|                                                                 | 10                 |               |        |                |                               |                         |                      |                                  |                                                            |
|                                                                 | 11                 |               |        |                |                               |                         |                      |                                  |                                                            |
|                                                                 | 12                 |               |        |                |                               |                         |                      |                                  |                                                            |
|                                                                 | 13                 |               |        |                |                               |                         |                      |                                  |                                                            |
|                                                                 | 14                 |               |        |                |                               |                         |                      |                                  |                                                            |
|                                                                 | 15                 |               |        |                |                               |                         |                      |                                  |                                                            |

|                           |                         |                                                                                                                                                                                                                  |                                     |
|---------------------------|-------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|
| Client: LENLTD            | Test Pit Number: TP-30  | <br><b>STRATA</b><br><small>GEOTECHNICAL ENGINEERING &amp; MATERIALS TESTING</small><br><i>Integrity from the Ground Up</i> | <b>EXPLORATORY<br/>TEST PIT LOG</b> |
| Project: B061970          | Date Excavated: 8/27/07 |                                                                                                                                                                                                                  |                                     |
| Backhoe: CAT 416 D        | Bucket Width: 2'        |                                                                                                                                                                                                                  |                                     |
| Depth to Groundwater: 3.2 | Logged By: BN           |                                                                                                                                                                                                                  |                                     |

Sheet 1 of 1

| USCS Description                                                   | DEPTH<br>(In Feet) | USCS<br>CLASS | SYMBOL                                                                             | SAMPLE<br>Type | % Passing<br>No. 200<br>sieve | Moisture<br>Content (%) | Dry Density<br>(pcf) | Pocket<br>Penetro-<br>meter (tsf) | REMARKS                                                          |
|--------------------------------------------------------------------|--------------------|---------------|------------------------------------------------------------------------------------|----------------|-------------------------------|-------------------------|----------------------|-----------------------------------|------------------------------------------------------------------|
| Approximate GS Elevation = 2747                                    |                    |               |                                                                                    |                |                               |                         |                      |                                   |                                                                  |
| Poorly-Graded GRAVEL with<br>Silt (Fill) - brown, dense,<br>moist. | 1                  | GP-GM         |  |                |                               |                         |                      |                                   | Moderate vegetation and<br>organics observed to<br>3 inches BGS. |
|                                                                    | 2                  |               |                                                                                    |                |                               |                         |                      |                                   |                                                                  |
|                                                                    | 3                  |               |                                                                                    |                |                               |                         |                      |                                   | Found railroad ties,<br>2x4s, pipe and<br>concrete.              |
| Poorly-Graded GRAVEL with<br>Sand - gray, dense,<br>saturated.     | 4                  | GP            |                                                                                    |                |                               |                         |                      |                                   | With Cobbles, max<br>size = 8 inches.                            |
|                                                                    | 5                  |               |                                                                                    |                |                               |                         |                      |                                   |                                                                  |
|                                                                    | 6                  |               |                                                                                    |                |                               |                         |                      |                                   |                                                                  |
|                                                                    | 7                  |               |                                                                                    |                |                               |                         |                      |                                   |                                                                  |
|                                                                    | 8                  |               |                                                                                    |                |                               |                         |                      |                                   |                                                                  |
| Test pit terminated at 8.5<br>feet BGS.                            | 9                  |               |                                                                                    |                |                               |                         |                      |                                   | Standpipe piezometer<br>installed to 8.5 feet<br>BGS.            |
|                                                                    | 10                 |               |                                                                                    |                |                               |                         |                      |                                   |                                                                  |
|                                                                    | 11                 |               |                                                                                    |                |                               |                         |                      |                                   |                                                                  |
|                                                                    | 12                 |               |                                                                                    |                |                               |                         |                      |                                   |                                                                  |
|                                                                    | 13                 |               |                                                                                    |                |                               |                         |                      |                                   |                                                                  |
|                                                                    | 14                 |               |                                                                                    |                |                               |                         |                      |                                   |                                                                  |
|                                                                    | 15                 |               |                                                                                    |                |                               |                         |                      |                                   |                                                                  |

|                           |                         |                                                                                                                                                                                                                  |                                                                |
|---------------------------|-------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------|
| Client: LENLTD            | Test Pit Number: TP-31  | <br><b>STRATA</b><br><small>GEOTECHNICAL ENGINEERING &amp; MATERIALS TESTING</small><br><i>Integrity from the Ground Up</i> | <b>EXPLORATORY<br/>TEST PIT LOG</b><br><br><b>Sheet 1 of 1</b> |
| Project: B06197D          | Date Excavated: 8/27/07 |                                                                                                                                                                                                                  |                                                                |
| Backhoe: CAT 416 D        | Bucket Width: 2'        |                                                                                                                                                                                                                  |                                                                |
| Depth to Groundwater: 4.2 | Logged By: BN           |                                                                                                                                                                                                                  |                                                                |

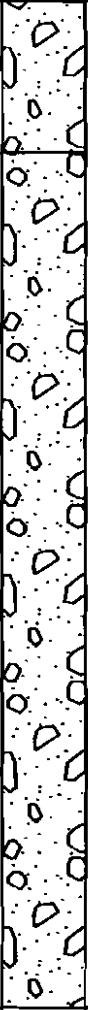
R:\Projects\LENLTD\B06197D\dwg\LENLTD B06197D-TP14-38.dwg, TP-31, 12/3/2007 4:26:58 PM, SRedmon

ATTACHMENT 1 [P. 57 OF 76]

| USCS Description                                                  | DEPTH<br>(In Feet) | USCS<br>CLASS | SYMBOL | SAMPLE<br>Type | % Passing<br>No. 200<br>sieve | Moisture<br>Content (%) | Dry Density<br>(pcf) | Pocket<br>Penetro-<br>meter(1st) | REMARKS                                                                                    |
|-------------------------------------------------------------------|--------------------|---------------|--------|----------------|-------------------------------|-------------------------|----------------------|----------------------------------|--------------------------------------------------------------------------------------------|
| Approximate GS Elevation = 2750                                   |                    |               |        |                |                               |                         |                      |                                  |                                                                                            |
| Clayey SAND - dark gray,<br>medium dense, moist.                  | 1                  | SC            |        | BG             |                               | 27                      | 95                   | 4.5+<br>4.5+                     | Moderate vegetation and<br>organics observed to<br>3 inches BGS.                           |
| Poorly-Graded SAND - gray,<br>dense, moist.                       | 2                  | SP            |        |                |                               |                         |                      |                                  |                                                                                            |
|                                                                   | 3                  |               |        |                |                               |                         |                      |                                  |                                                                                            |
| Poorly-Graded GRAVEL with<br>Sand - gray, dense, moist<br>to wet. | 4                  | GP            |        |                |                               |                         |                      |                                  | Percolation test performed at<br>6 feet BGS.<br>Infiltration rate = >40<br>in/hr measured. |
|                                                                   | 5                  |               |        |                |                               |                         |                      |                                  |                                                                                            |
|                                                                   | 6                  |               |        |                |                               |                         |                      |                                  |                                                                                            |
|                                                                   | 7                  |               |        |                |                               |                         |                      |                                  |                                                                                            |
|                                                                   | 8                  |               |        |                |                               |                         |                      |                                  |                                                                                            |
|                                                                   | 9                  |               |        |                |                               |                         |                      |                                  |                                                                                            |
|                                                                   | 10                 |               |        |                |                               |                         |                      |                                  |                                                                                            |
|                                                                   | 11                 |               |        |                |                               |                         |                      |                                  |                                                                                            |
| Test pit terminated at 11<br>feet BGS.                            | 12                 |               |        |                |                               |                         |                      |                                  | Standpipe piezometer<br>installed to 11 feet<br>BGS.                                       |
|                                                                   | 13                 |               |        |                |                               |                         |                      |                                  |                                                                                            |
|                                                                   | 14                 |               |        |                |                               |                         |                      |                                  |                                                                                            |
|                                                                   | 15                 |               |        |                |                               |                         |                      |                                  |                                                                                            |
|                                                                   |                    |               |        |                |                               |                         |                      |                                  |                                                                                            |

|                           |                         |                                                                                                                             |                                     |
|---------------------------|-------------------------|-----------------------------------------------------------------------------------------------------------------------------|-------------------------------------|
| Client: LENLTD            | Test Pit Number: TP-32  | <br><b>STRATA</b><br><small>GEOTECHNICAL ENGINEERING &amp; MATERIALS TESTING</small><br><i>Integrity from the Ground Up</i> | <b>EXPLORATORY<br/>TEST PIT LOG</b> |
| Project: B061970          | Date Excavated: 8/27/07 |                                                                                                                             |                                     |
| Backhoe: CAT 416 D        | Bucket Width: 2'        |                                                                                                                             |                                     |
| Depth to Groundwater: 3.9 | Logged By: BN           |                                                                                                                             |                                     |

| USCS Description                                             | DEPTH<br>(In Feet) | USCS<br>CLASS | SYMBOL                                                                             | SAMPLE<br>Type | % Passing<br>No. 200<br>sieve | Moisture<br>Content (%) | Dry Density<br>(pcf) | Pocket<br>Penetro-<br>meter(tsf) | REMARKS                                                    |
|--------------------------------------------------------------|--------------------|---------------|------------------------------------------------------------------------------------|----------------|-------------------------------|-------------------------|----------------------|----------------------------------|------------------------------------------------------------|
| Approximate GS Elevation = 2752                              |                    |               |                                                                                    |                |                               |                         |                      |                                  |                                                            |
| Poorly-Graded GRAVEL with Sand (Fill) - brown, loose, moist. | 1                  | GP            |  | BG             |                               | 13                      | 120                  |                                  | Moderate vegetation and organics observed to 3 inches BGS. |
| Poorly-Graded GRAVEL with Sand - gray, dense, moist to wet.  | 2                  | GP            |                                                                                    |                |                               |                         |                      |                                  |                                                            |
|                                                              | 3                  |               |                                                                                    |                |                               |                         |                      |                                  |                                                            |
|                                                              | 4                  |               |                                                                                    |                |                               |                         |                      |                                  |                                                            |
|                                                              | 5                  |               |                                                                                    |                |                               |                         |                      |                                  |                                                            |
|                                                              | 6                  |               |                                                                                    |                |                               |                         |                      |                                  |                                                            |
|                                                              | 7                  |               |                                                                                    |                |                               |                         |                      |                                  |                                                            |
|                                                              | 8                  |               |                                                                                    |                |                               |                         |                      |                                  |                                                            |
|                                                              | 9                  |               |                                                                                    |                |                               |                         |                      |                                  |                                                            |
|                                                              | 10                 |               |                                                                                    |                |                               |                         |                      |                                  |                                                            |
| Test pit terminated at 10 feet BGS.                          | 11                 |               |                                                                                    |                |                               |                         |                      |                                  | Standpipe piezometer installed to 10 feet BGS.             |
|                                                              | 12                 |               |                                                                                    |                |                               |                         |                      |                                  |                                                            |
|                                                              | 13                 |               |                                                                                    |                |                               |                         |                      |                                  |                                                            |
|                                                              | 14                 |               |                                                                                    |                |                               |                         |                      |                                  |                                                            |
|                                                              | 15                 |               |                                                                                    |                |                               |                         |                      |                                  |                                                            |

|                           |                         |                                                                                                                                                                                                                  |                                                                |
|---------------------------|-------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------|
| Client: LENLTD            | Test Pit Number: TP-33  | <br><b>STRATA</b><br><small>GEOTECHNICAL ENGINEERING &amp; MATERIALS TESTING</small><br><i>Integrity from the Ground Up</i> | <b>EXPLORATORY<br/>TEST PIT LOG</b><br><br><b>Sheet 1 of 1</b> |
| Project: B06197D          | Date Excavated: 8/27/07 |                                                                                                                                                                                                                  |                                                                |
| Backhoe: CAT 416 D        | Bucket Width: 2'        |                                                                                                                                                                                                                  |                                                                |
| Depth to Groundwater: 6.2 | Logged By: BN           |                                                                                                                                                                                                                  |                                                                |

| USCS Description                                         | DEPTH<br>(In Feet) | USCS<br>CLASS           | SYMBOL | SAMPLE<br>Type | % Passing<br>No. 200<br>sieve | Moisture<br>Content (%) | Dry Density<br>(pcf) | Pocket<br>Penetro-<br>meter(tsf) | REMARKS                                                    |
|----------------------------------------------------------|--------------------|-------------------------|--------|----------------|-------------------------------|-------------------------|----------------------|----------------------------------|------------------------------------------------------------|
| Approximate GS Elevation = 2763                          |                    |                         |        |                |                               |                         |                      |                                  |                                                            |
| Sandy Lean CLAY - dark brown, very stiff, moist.         | 1                  | CL                      |        |                |                               |                         |                      |                                  | Moderate vegetation and organics observed to 3 inches BGS. |
| Poorly-Graded SAND with Clay - tan, medium dense, moist. | 2                  | SP-SC                   |        | BG             |                               |                         |                      |                                  |                                                            |
|                                                          | 3                  |                         |        |                |                               |                         |                      |                                  |                                                            |
|                                                          | 4                  |                         |        |                |                               |                         |                      |                                  |                                                            |
|                                                          | 5                  |                         |        |                |                               |                         |                      |                                  |                                                            |
|                                                          | 6                  |                         |        |                |                               |                         |                      |                                  |                                                            |
|                                                          | 7                  |                         |        |                |                               |                         |                      |                                  |                                                            |
| Poorly-Graded SAND - tan, medium dense, saturated.       | 8                  | SP                      |        |                |                               |                         |                      |                                  |                                                            |
| Test pit terminated at 9.0 feet BGS.                     | 9                  |                         |        |                |                               |                         |                      |                                  | Standpipe piezometer installed to 9 feet BGS.              |
|                                                          | 10                 |                         |        |                |                               |                         |                      |                                  |                                                            |
|                                                          | 11                 |                         |        |                |                               |                         |                      |                                  |                                                            |
|                                                          | 12                 |                         |        |                |                               |                         |                      |                                  |                                                            |
|                                                          | 13                 |                         |        |                |                               |                         |                      |                                  |                                                            |
|                                                          | 14                 |                         |        |                |                               |                         |                      |                                  |                                                            |
|                                                          | 15                 |                         |        |                |                               |                         |                      |                                  |                                                            |
| Client: LENLTD                                           |                    | Test Pit Number: TP-49  |        |                |                               |                         |                      |                                  |                                                            |
| Project: B06197D                                         |                    | Date Excavated: 9/12/07 |        |                |                               |                         |                      |                                  |                                                            |
| Backhoe: CAT 416B                                        |                    | Bucket Width: 2'        |        |                |                               |                         |                      |                                  |                                                            |
| Depth to Groundwater: 5.3                                |                    | Logged By: BN           |        |                |                               |                         |                      |                                  |                                                            |
| <b>EXPLORATORY TEST PIT LOG</b><br>Sheet 1 of 1          |                    |                         |        |                |                               |                         |                      |                                  |                                                            |

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| USCS Description                                                       | DEPTH<br>(in Feet) | USCS<br>CLASS | SYMBOL | SAMPLE<br>Type | SPT<br>Blows Per<br>6 Inches | SPT<br>N <sub>60</sub> | Dry<br>Density<br>(Pcf) | Moisture<br>Content (%) | POCKET<br>Penetro-<br>meter (tsf) | REMARKS                                                    |
|------------------------------------------------------------------------|--------------------|---------------|--------|----------------|------------------------------|------------------------|-------------------------|-------------------------|-----------------------------------|------------------------------------------------------------|
| Approximate GS Elevation = 2743                                        |                    |               |        |                |                              |                        |                         |                         |                                   |                                                            |
| Clayey SAND - brown, soft, moist.                                      | 1                  | SC            |        |                | 1<br>1<br>1                  | 2                      |                         |                         |                                   | Moderate vegetation and organics observed to 4 inches BGS. |
|                                                                        | 2                  |               |        |                |                              |                        |                         |                         |                                   |                                                            |
|                                                                        | 3                  |               |        |                |                              |                        |                         |                         |                                   |                                                            |
|                                                                        | 4                  |               |        |                |                              |                        |                         |                         |                                   |                                                            |
| Poorly-Graded SAND - tan, medium dense, moist.                         | 5                  | SP            |        |                | 3<br>2<br>1                  | 3                      |                         |                         |                                   |                                                            |
|                                                                        | 6                  |               |        |                |                              |                        |                         |                         |                                   |                                                            |
|                                                                        | 7                  |               |        |                |                              |                        |                         |                         |                                   |                                                            |
| Poorly-Graded GRAVEL with Sand - gray, dense to very dense, saturated. | 8                  | GP            |        |                | 11<br>14<br>21               | 35                     |                         |                         |                                   | Drill Chatter noted from 7.5 to 25 feet BGS.               |
|                                                                        | 9                  |               |        |                |                              |                        |                         |                         |                                   |                                                            |
|                                                                        | 10                 |               |        |                |                              |                        |                         |                         |                                   |                                                            |
|                                                                        | 11                 |               |        |                |                              |                        |                         |                         |                                   |                                                            |
|                                                                        | 12                 |               |        |                | 8<br>18<br>26                | 44                     |                         |                         |                                   | Standpipe piezometer installed to 15 feet BGS.             |
|                                                                        | 13                 |               |        |                |                              |                        |                         |                         |                                   |                                                            |
|                                                                        | 14                 |               |        |                |                              |                        |                         |                         |                                   |                                                            |
|                                                                        | 15                 |               |        |                |                              |                        |                         |                         |                                   |                                                            |
|                                                                        | 16                 |               |        |                |                              |                        |                         |                         |                                   |                                                            |
|                                                                        | 17                 |               |        |                |                              |                        |                         |                         |                                   |                                                            |
|                                                                        | 18                 |               |        |                |                              |                        |                         |                         |                                   |                                                            |
|                                                                        | 19                 |               |        |                |                              |                        |                         |                         |                                   |                                                            |
|                                                                        | 20                 |               |        |                |                              |                        |                         |                         |                                   |                                                            |

|                           |                       |                                                                                                                                                                                                                                |                               |
|---------------------------|-----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|
| Client: LENLTD            | Boring Number: BH-1   | <div><br/><b>STRATA</b><br/><small>GEOTECHNICAL ENGINEERING &amp; MATERIALS TESTING</small><br/><i>Integrity From the Ground Up</i></div> | <b>EXPLORATORY BORING LOG</b> |
| Project: B06197D          | Date Drilled: 9/11/07 |                                                                                                                                                                                                                                |                               |
| Drill Rig: CME 95         | Boring Diameter: 8"   |                                                                                                                                                                                                                                |                               |
| Depth to Groundwater: 3.1 | Logged By: BN         |                                                                                                                                                                                                                                |                               |

Sheet 1 of 2

| USCS Description                                                             | DEPTH<br>(in Feet) | USCS<br>CLASS | SYMBOL | SAMPLE<br>Type | SPT<br>Blows Per<br>6 Inches | SPT<br>N <sub>60</sub> | Dry<br>Density<br>(Pcf) | Moisture<br>Content (%) | POCKET<br>Penetro-<br>meter (tsf) | REMARKS<br><br>Note: BGS = Below Ground<br>Surface |
|------------------------------------------------------------------------------|--------------------|---------------|--------|----------------|------------------------------|------------------------|-------------------------|-------------------------|-----------------------------------|----------------------------------------------------|
| Poorly-Graded GRAVEL with<br>Sand - gray, dense to very<br>dense, saturated. | 21                 | GP            |        |                | 11<br>21<br>40               | 61                     |                         |                         |                                   |                                                    |
|                                                                              | 22                 |               |        |                |                              |                        |                         |                         |                                   |                                                    |
|                                                                              | 23                 |               |        |                |                              |                        |                         |                         |                                   |                                                    |
|                                                                              | 24                 |               |        |                |                              |                        |                         |                         |                                   |                                                    |
|                                                                              | 25                 |               |        |                | 7<br>27<br>47                | 74                     |                         |                         |                                   |                                                    |
| Boring terminated at 26.5<br>feet BGS.                                       | 26                 |               |        |                |                              |                        |                         |                         |                                   |                                                    |
|                                                                              | 27                 |               |        |                |                              |                        |                         |                         |                                   |                                                    |
|                                                                              | 28                 |               |        |                |                              |                        |                         |                         |                                   |                                                    |
|                                                                              | 29                 |               |        |                |                              |                        |                         |                         |                                   |                                                    |
|                                                                              | 30                 |               |        |                |                              |                        |                         |                         |                                   |                                                    |
|                                                                              | 31                 |               |        |                |                              |                        |                         |                         |                                   |                                                    |
|                                                                              | 32                 |               |        |                |                              |                        |                         |                         |                                   |                                                    |
|                                                                              | 33                 |               |        |                |                              |                        |                         |                         |                                   |                                                    |
|                                                                              | 34                 |               |        |                |                              |                        |                         |                         |                                   |                                                    |
|                                                                              | 35                 |               |        |                |                              |                        |                         |                         |                                   |                                                    |
|                                                                              | 36                 |               |        |                |                              |                        |                         |                         |                                   |                                                    |
|                                                                              | 37                 |               |        |                |                              |                        |                         |                         |                                   |                                                    |
|                                                                              | 38                 |               |        |                |                              |                        |                         |                         |                                   |                                                    |
|                                                                              | 39                 |               |        |                |                              |                        |                         |                         |                                   |                                                    |
|                                                                              | 40                 |               |        |                |                              |                        |                         |                         |                                   |                                                    |

|                           |                       |                                                                                                                              |                                                              |
|---------------------------|-----------------------|------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------|
| Client: LENLTD            | Boring Number: BH-1   | <br><b>STRATA</b><br><small>GEO TECHNICAL ENGINEERING &amp; MATERIALS TESTING</small><br><i>Integrity from the Ground Up</i> | <b>EXPLORATORY<br/>BORING LOG</b><br><br><b>Sheet 2 of 2</b> |
| Project: B06197D          | Date Drilled: 9/11/07 |                                                                                                                              |                                                              |
| Drill Rig: CME 95         | Boring Diameter: 8"   |                                                                                                                              |                                                              |
| Depth to Groundwater: 3.1 | Logged By: BN         |                                                                                                                              |                                                              |

| USCS Description                                                              | DEPTH<br>(In Feet) | USCS<br>CLASS | SYMBOL | SAMPLE<br>Type | SPT<br>Blows Per<br>6 inches | SPT<br>N(60) | Dry<br>Density<br>(Pcf) | Moisture<br>Content (%) | POCKET<br>Penetro-<br>meter (tsf) | REMARKS                                                    |
|-------------------------------------------------------------------------------|--------------------|---------------|--------|----------------|------------------------------|--------------|-------------------------|-------------------------|-----------------------------------|------------------------------------------------------------|
| Approximate GS Elevation = 2745                                               |                    |               |        |                |                              |              |                         |                         |                                   |                                                            |
| Clayey SAND - tan, medium dense, moist.                                       | 1                  | SC            |        |                |                              |              |                         |                         |                                   | Moderate vegetation and organics observed to 4 inches BGS. |
|                                                                               | 2                  |               |        |                |                              |              |                         |                         |                                   |                                                            |
| Poorly-Graded SAND - gray, medium dense, moist.                               | 3                  | SP            |        |                | 10<br>14<br>15               | 29           |                         |                         |                                   |                                                            |
| Poorly-Graded GRAVEL with Sand - gray, medium dense to very dense, saturated. | 4                  | GP            |        |                |                              |              |                         |                         |                                   | Drill Chatter noted from 4 to 25 feet BGS.                 |
|                                                                               | 5                  |               |        |                | 11<br>11<br>11               | 22           |                         |                         |                                   |                                                            |
|                                                                               | 6                  |               |        |                |                              |              |                         |                         |                                   |                                                            |
|                                                                               | 7                  |               |        |                |                              |              |                         |                         |                                   |                                                            |
|                                                                               | 8                  |               |        |                |                              |              |                         |                         |                                   |                                                            |
|                                                                               | 9                  |               |        |                |                              |              |                         |                         |                                   |                                                            |
|                                                                               | 10                 |               |        |                | 6<br>19<br>24                | 43           |                         |                         |                                   |                                                            |
|                                                                               | 11                 |               |        |                | 15<br>33<br>37               | 70           |                         |                         |                                   |                                                            |
|                                                                               | 12                 |               |        |                |                              |              |                         |                         |                                   |                                                            |
|                                                                               | 13                 |               |        |                |                              |              |                         |                         |                                   |                                                            |
|                                                                               | 14                 |               |        |                |                              |              |                         |                         |                                   |                                                            |
|                                                                               | 15                 |               |        |                |                              |              |                         |                         |                                   | Standpipe piezometer installed to 15 feet BGS.             |
|                                                                               | 16                 |               |        |                |                              |              |                         |                         |                                   |                                                            |
|                                                                               | 17                 |               |        |                |                              |              |                         |                         |                                   |                                                            |
|                                                                               | 18                 |               |        |                |                              |              |                         |                         |                                   |                                                            |
|                                                                               | 19                 |               |        |                |                              |              |                         |                         |                                   |                                                            |
|                                                                               | 20                 |               |        |                |                              |              |                         |                         |                                   |                                                            |

|                           |                       |                                                                                                                                                                                                                  |                               |
|---------------------------|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|
| Client: LENLTD            | Boring Number: BH-2   | <br><b>STRATA</b><br><small>GEOTECHNICAL ENGINEERING &amp; MATERIALS TESTING</small><br><i>Integrity From the Ground Up</i> | <b>EXPLORATORY BORING LOG</b> |
| Project: B06197D          | Date Drilled: 9/11/07 |                                                                                                                                                                                                                  |                               |
| Drill Rig: CME 95         | Boring Diameter: 8"   |                                                                                                                                                                                                                  |                               |
| Depth to Groundwater: 2.2 | Logged By: BN         |                                                                                                                                                                                                                  |                               |

Sheet 1 of 2

| USCS Description                                                                     | DEPTH<br>(In Feet) | USCS<br>CLASS | SYMBOL | SAMPLE<br>Type | SPT<br>Blows Per<br>6 inches | SPT<br>N <sub>60</sub> | Dry<br>Density<br>(Pcf) | Moisture<br>Content (%) | POCKET<br>Penetro-<br>meter (tsf) | REMARKS<br><br>Note: BGS = Below Ground<br>Surface |
|--------------------------------------------------------------------------------------|--------------------|---------------|--------|----------------|------------------------------|------------------------|-------------------------|-------------------------|-----------------------------------|----------------------------------------------------|
| Poorly-Graded GRAVEL with<br>Sand -- gray, medium dense<br>to very dense, saturated. | 21                 | GP            |        |                | 27<br>50/5                   | 50+                    |                         |                         |                                   |                                                    |
|                                                                                      | 22                 |               |        |                |                              |                        |                         |                         |                                   |                                                    |
|                                                                                      | 23                 |               |        |                |                              |                        |                         |                         |                                   |                                                    |
|                                                                                      | 24                 |               |        |                |                              |                        |                         |                         |                                   |                                                    |
|                                                                                      | 25                 |               |        |                |                              | 22<br>48<br>50         | 98                      |                         |                                   |                                                    |
| Boring terminated at 26.5<br>feet BGS.                                               | 26                 |               |        |                |                              |                        |                         |                         |                                   |                                                    |
|                                                                                      | 27                 |               |        |                |                              |                        |                         |                         |                                   |                                                    |
|                                                                                      | 28                 |               |        |                |                              |                        |                         |                         |                                   |                                                    |
|                                                                                      | 29                 |               |        |                |                              |                        |                         |                         |                                   |                                                    |
|                                                                                      | 30                 |               |        |                |                              |                        |                         |                         |                                   |                                                    |
|                                                                                      | 31                 |               |        |                |                              |                        |                         |                         |                                   |                                                    |
|                                                                                      | 32                 |               |        |                |                              |                        |                         |                         |                                   |                                                    |
|                                                                                      | 33                 |               |        |                |                              |                        |                         |                         |                                   |                                                    |
|                                                                                      | 34                 |               |        |                |                              |                        |                         |                         |                                   |                                                    |
|                                                                                      | 35                 |               |        |                |                              |                        |                         |                         |                                   |                                                    |
|                                                                                      | 36                 |               |        |                |                              |                        |                         |                         |                                   |                                                    |
|                                                                                      | 37                 |               |        |                |                              |                        |                         |                         |                                   |                                                    |
|                                                                                      | 38                 |               |        |                |                              |                        |                         |                         |                                   |                                                    |
|                                                                                      | 39                 |               |        |                |                              |                        |                         |                         |                                   |                                                    |
|                                                                                      | 40                 |               |        |                |                              |                        |                         |                         |                                   |                                                    |

|                           |                       |                                                                                                                             |                                                              |
|---------------------------|-----------------------|-----------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------|
| Client: LENLTD            | Boring Number: BH-2   | <br><b>STRATA</b><br><small>GEOTECHNICAL ENGINEERING &amp; MATERIALS TESTING</small><br><i>Integrity From the Ground Up</i> | <b>EXPLORATORY<br/>BORING LOG</b><br><br><b>Sheet 2 of 2</b> |
| Project: B06197D          | Date Drilled: 9/11/07 |                                                                                                                             |                                                              |
| Drill Rig: CME 95         | Boring Diameter: 8"   |                                                                                                                             |                                                              |
| Depth to Groundwater: 2.2 | Logged By: BN         |                                                                                                                             |                                                              |

# APPENDIX B

# R-VALUE

IDAHO T-8

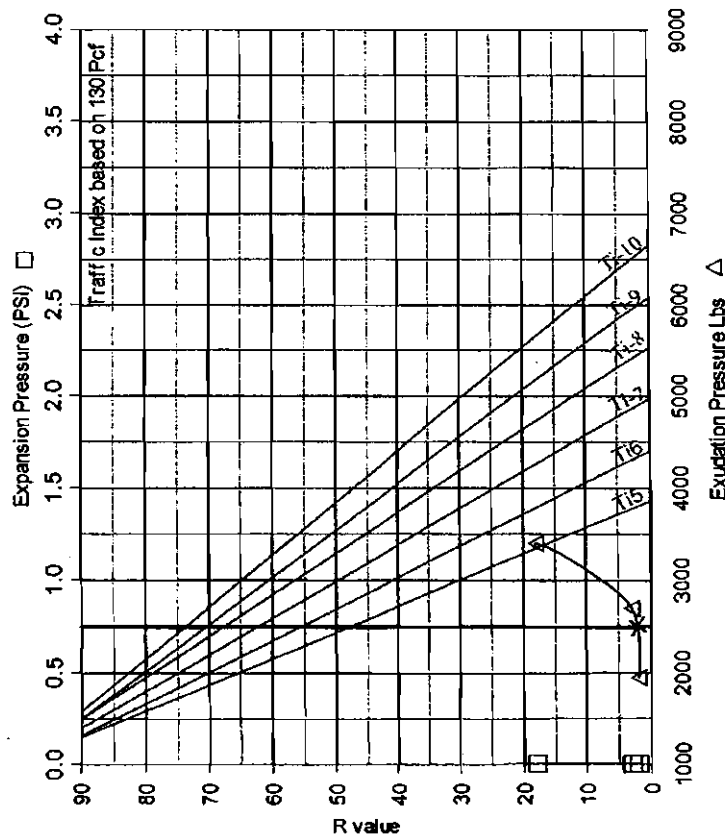
Project: Harris Ranch Subdivision  
 Client: Lenir Limited  
 Sample ID: Subgrade Soil  
 Location: TP-28 @ 1.5 - 2'  
 Soil Description: Clayey Sand

Lab Number: B7L2604K  
 File Name: LENLTD B06197D  
 Date Sampled: 9/12/07  
 Sampled by: BN  
 Date Received: 9/21/07  
 Tested by: PC/Strata

| R VALUE DATA        |         |         |         |
|---------------------|---------|---------|---------|
| Percolation: None   | Point 1 | Point 2 | Point 3 |
| Exudation, PSI      | 155     | 215     | 271     |
| Dry Density, PCF    | 116.1   | 118.1   | 119.4   |
| Moisture Content, % | 14.8    | 14.1    | 13.0    |
| Exp. Pressure, PSI  | 0.00    | 0.00    | 0.00    |

## SOIL CONSTANTS

R VALUE: < 5



Note: This report covers only material as represented by this sample and does not necessarily cover all soil from this layer or source.

Reviewed by:

*Adrian Lascano*

| GRADATION: AASHTO T-11, T27 |                       |                     |
|-----------------------------|-----------------------|---------------------|
| SCREEN SIZE                 | AS RECEIVED % PASSING | AS TESTED % PASSING |
| 4"                          |                       |                     |
| 3"                          |                       |                     |
| 2"                          |                       |                     |
| 1"                          |                       |                     |
| 3/4"                        |                       |                     |
| 1/2"                        |                       |                     |
| 3/8"                        |                       |                     |
| No. 4                       | 100                   | 100                 |
| No. 8                       |                       |                     |
| No. 16                      |                       |                     |
| No. 30                      |                       |                     |
| No. 50                      |                       |                     |
| No. 100                     |                       |                     |
| No. 200                     | 24                    | 24                  |



# R-VALUE

IDAHO T-8

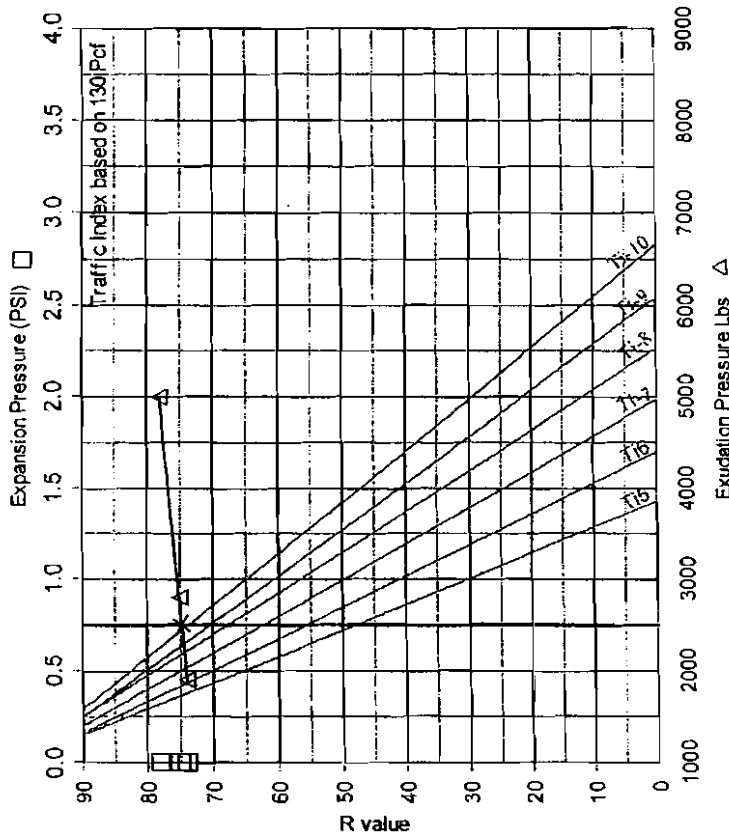
Project: Harris Ranch Subdivision  
 Client: Lenir Limited  
 Sample ID: Subgrade Soil  
 Location: TP-33 @ 8 - 8.5'  
 Soil Description: Gravel with Sand (GP)

Lab Number: B7L2925  
 File Name: LENLTD B06197D  
 Date Sampled: N/R  
 Sampled by: BN/Strata  
 Date Received: 11/6/07  
 Tested by: tc/Strata

| R VALUE DATA               |         |         |         |
|----------------------------|---------|---------|---------|
| Percolation: <b>Medium</b> | Point 1 | Point 2 | Point 3 |
| Exudation, PSI             | 223     | 151     | 398     |
| Dry Density, PCF           | 110.2   | 113.9   | 109.4   |
| Moisture Content, %        | 11.3    | 11.2    | 10.3    |
| Exp. Pressure, PSI         | 0.00    | 0.00    | 0.00    |

## SOIL CONSTANTS

R VALUE: 75



| GRADATION: AASHTO T-11, T27 |                       |                     |
|-----------------------------|-----------------------|---------------------|
| SCREEN SIZE                 | AS RECEIVED % PASSING | AS TESTED % PASSING |
| 8"                          | 100                   |                     |
| 3"                          |                       |                     |
| 2"                          |                       |                     |
| 1"                          | 38                    | 100                 |
| 3/4"                        | 33                    |                     |
| 1/2"                        |                       |                     |
| 3/8"                        |                       |                     |
| No. 4                       | 23                    |                     |
| No. 8                       |                       |                     |
| No. 16                      |                       |                     |
| No. 30                      |                       |                     |
| No. 50                      |                       |                     |
| No. 100                     |                       |                     |
| No. 200                     |                       |                     |

Note: This report covers only material as represented by this sample and does not necessarily cover all soil from this layer or source.

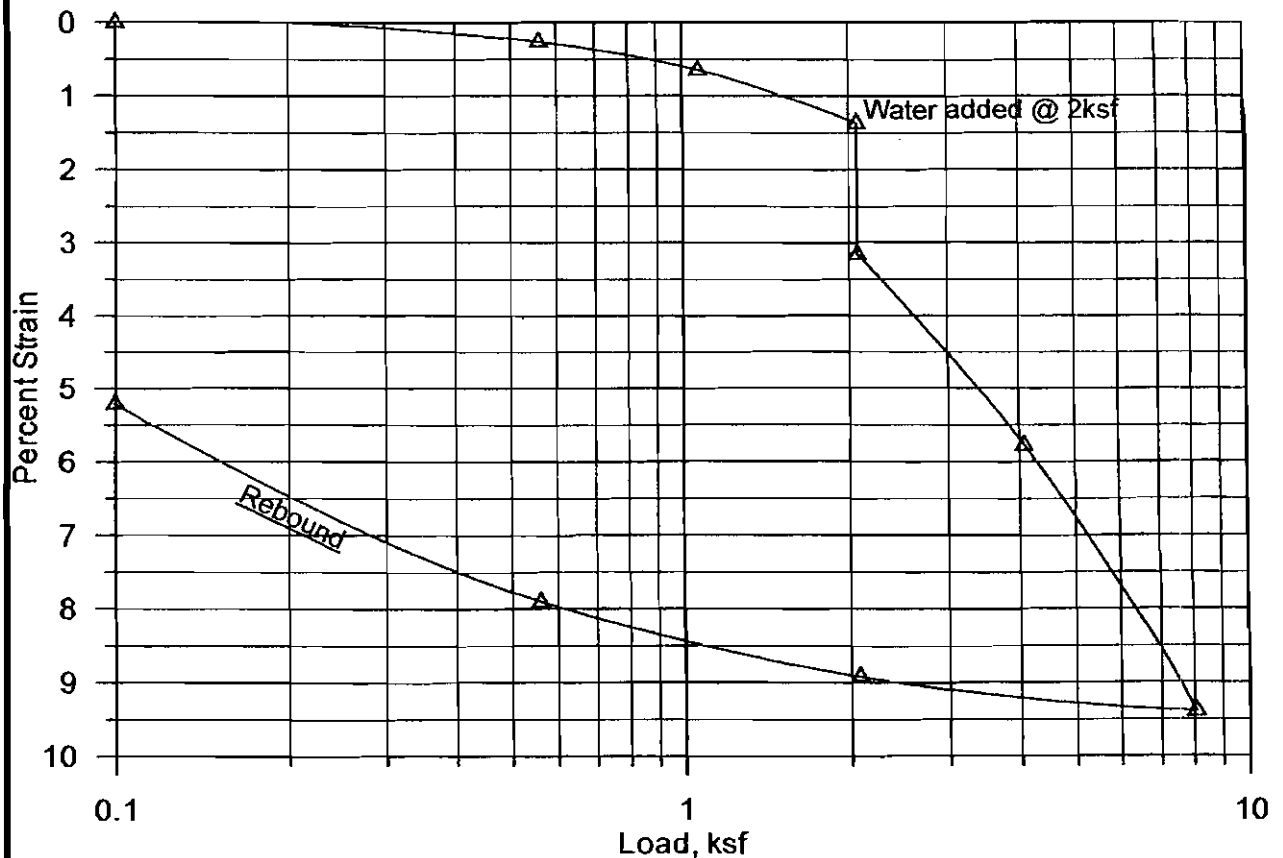
Reviewed by: *Adrian Delascano*



# CONSOLIDATION TEST RESULTS

ASTM D-2435

Project: Harris Ranch Subdivision  
Client: Lenir Limited  
File Name: LENLTD-B06197D  
Date Tested: 9/24/07 By: tc  
Sample Number: B7L2481G  
Sample Location: TP-21 @ 2'  
Sample Description: Clayey Sand  
Initial Test Conditions: In Situ (ring)  
Moisture Content: 11.0%  
Dry Unit Weight: 100.5 pcf  
Passing No. 200 Screen = 42%  
Atterberg Limits: LL = 47, PI = 31



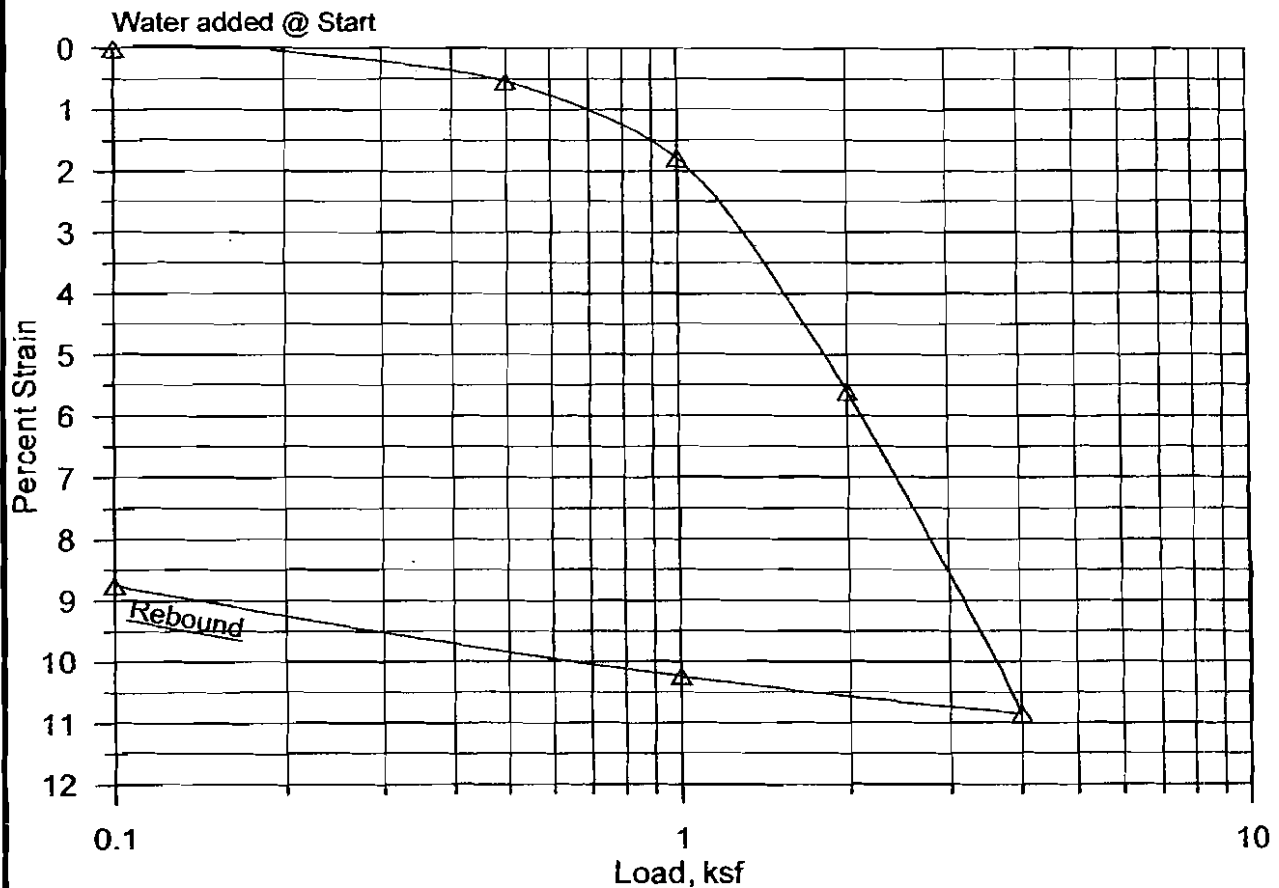
Reviewed By Adrian J. Llanos



# CONSOLIDATION TEST RESULTS

ASTM D-2435

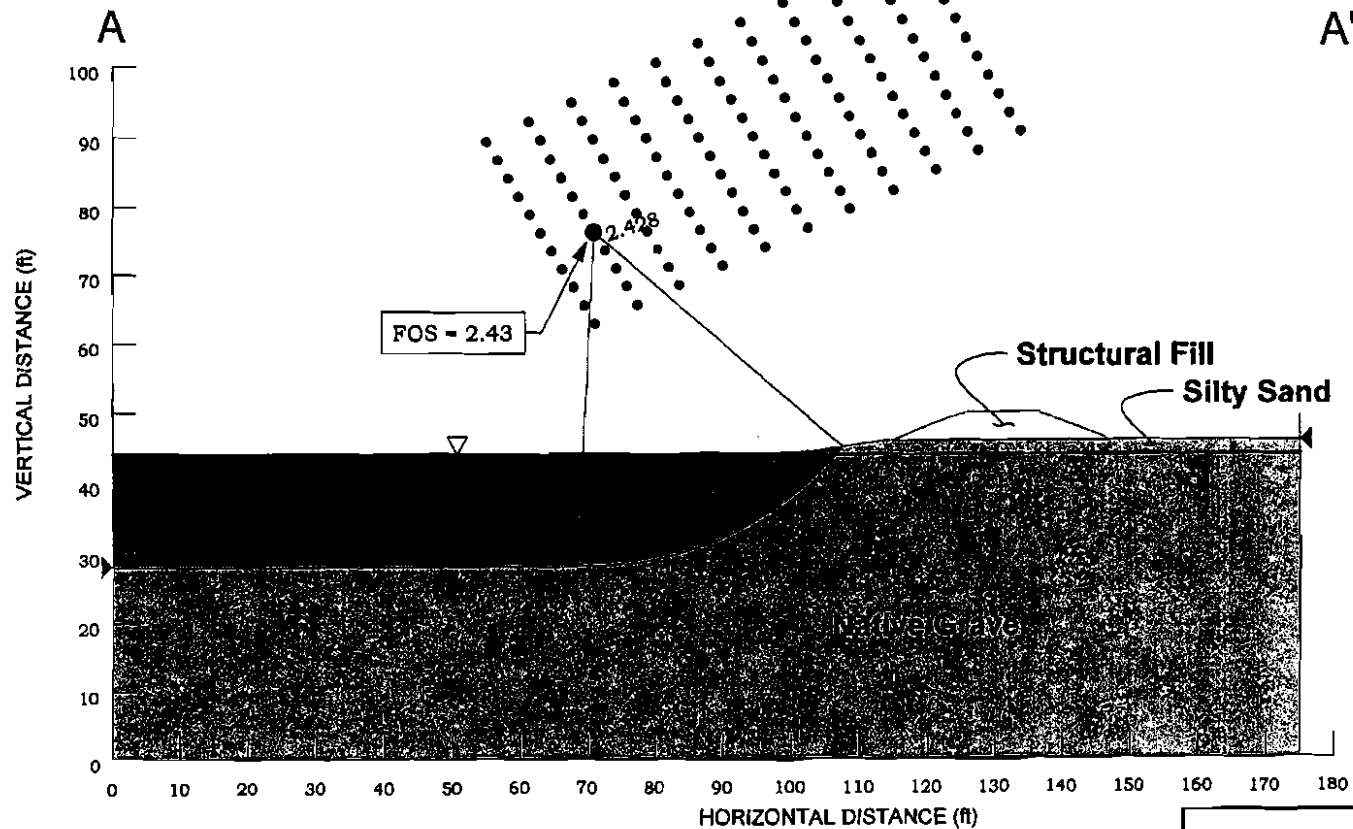
Project: Harris Ranch  
Client: Lenir Limited  
File Name: LENLTD B06197D  
Date Tested: 11/12/07 By: TC  
Sample Number: B7L2925B  
Sample Location: TP-26 @ 2.5 - 3'  
Sample Description: Sandy Clay  
Initial test conditions: In-Situ (Shelby)  
Moisture Content: 28.7%  
Dry Unit Weight: 79.8 pcf  
Atterberg Limits: LL = 48, PI = 24  
Passing No. 200 Screen = 62%



Reviewed By Adnan Alasano



# APPENDIX D



### LEGEND



Silty Sand

Structural Fill

Native Gravel

Groundwater Table or Surface Water

FOS

Factor of Safety (FOS) for Slope Stability



Failure Surface



Water

## STATIC SLOPE STABILITY ANALYSIS Full Pond Static Section A-A'



GEOTECHNICAL ENGINEERING & MATERIALS TESTING

*Integrity from the Ground Up*

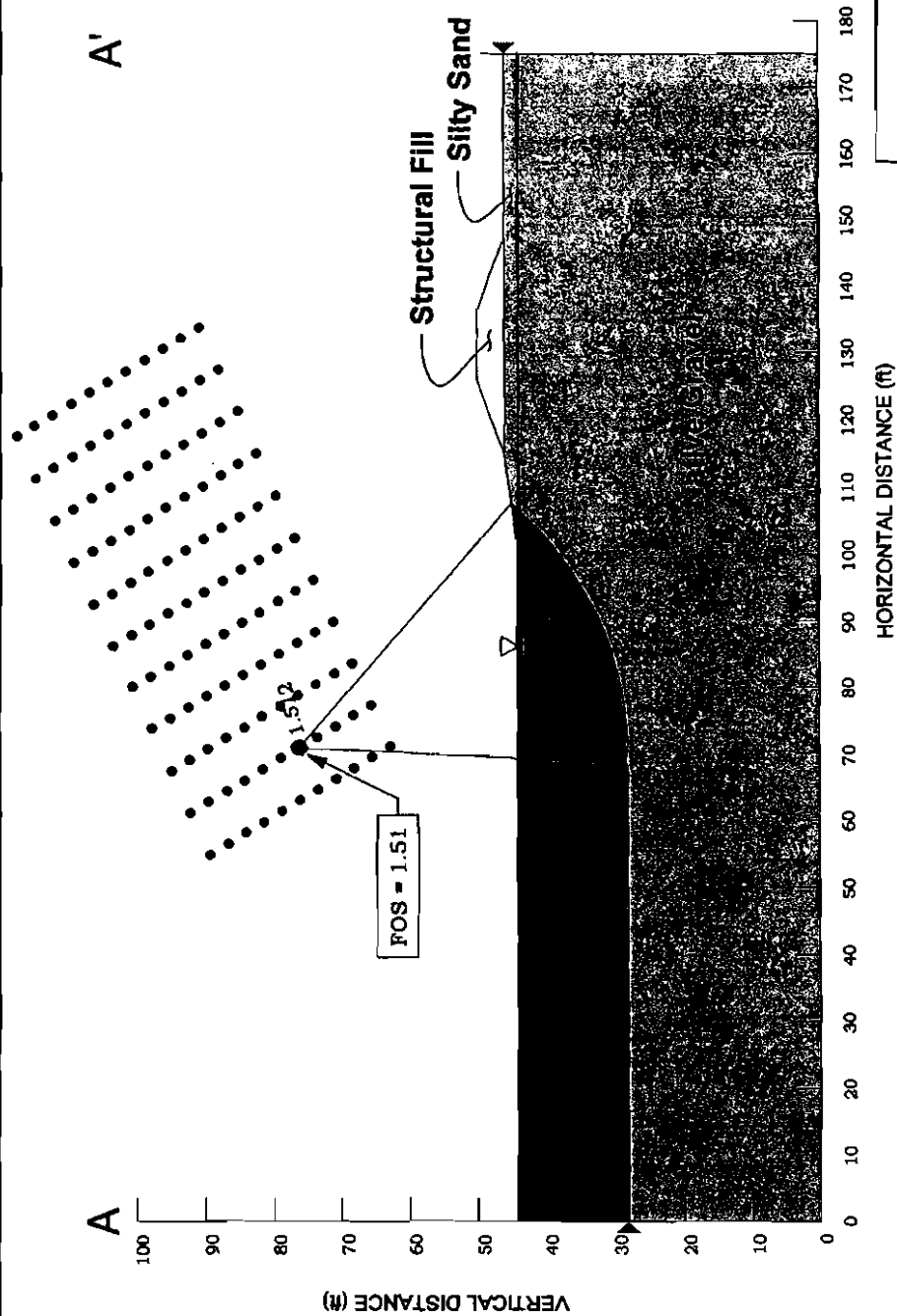
DRAWN BY: JDF

CHECKED BY: MGW

LENLTD B06197D

PLATE: D.1

Reference: Section A - Static.dxf

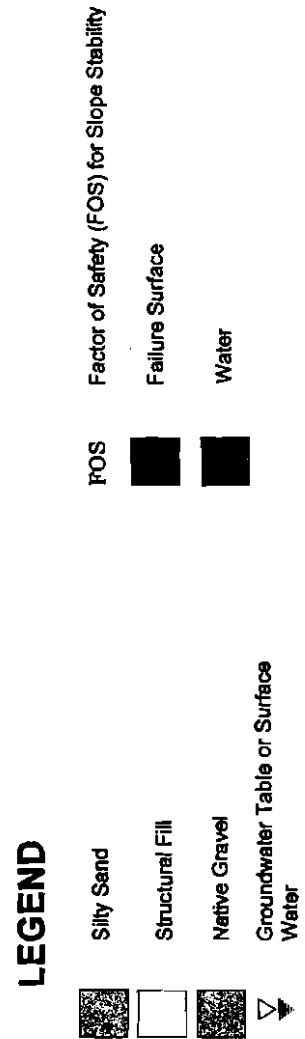


**PSEUDOSTATIC SLOPE  
STABILITY ANALYSIS  
Full Pond with Seismic Ah=0.15  
Section A-A'**

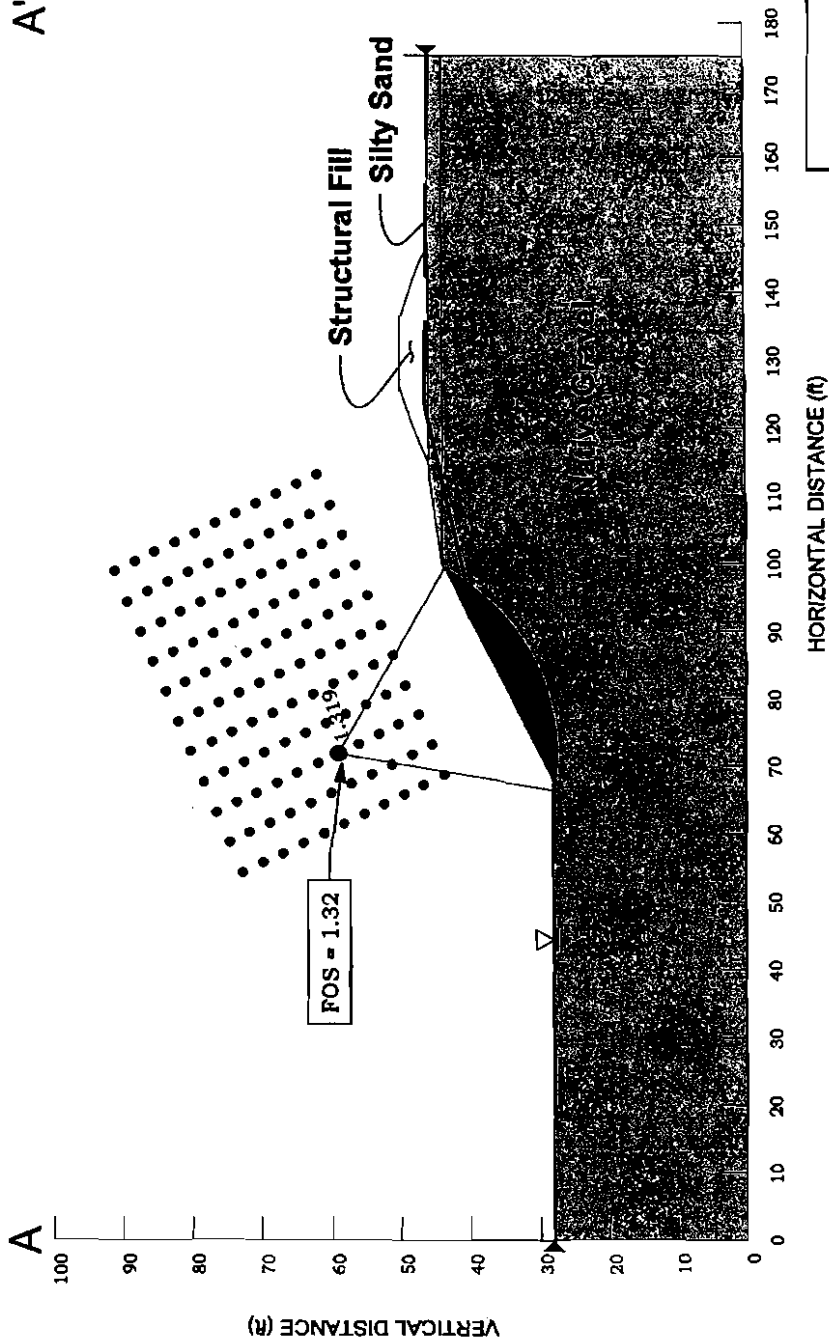


**STRATA**  
GEOTECHNICAL ENGINEERING & MATERIALS TESTING  
*Integrity from the Ground Up*

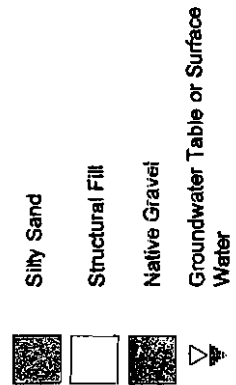
|                |                 |
|----------------|-----------------|
| DRAWN BY: JDF  | CHECKED BY: MGW |
| LENLTD B06197D | PLATE: D.2      |



A'



## LEGEND



FOS Factor of Safety (FOS) for Slope Stability

Failure Surface

Water

## STATIC SLOPE STABILITY ANALYSIS Rapid Drawdown Condition Section A-A'



**STRATA**

GEOTECHNICAL ENGINEERING & MATERIALS TESTING

*Integrity from the Ground Up*

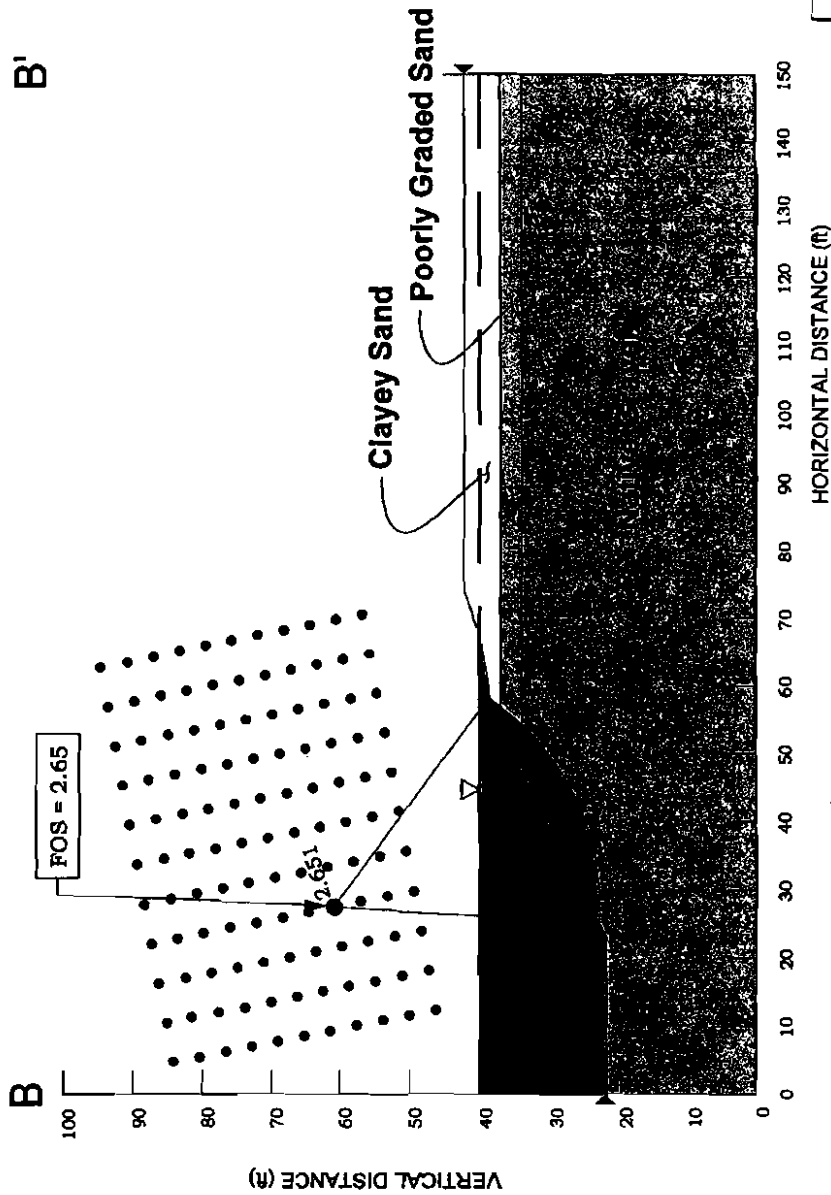
DRAWN BY: JDF

CHECKED BY: MGW

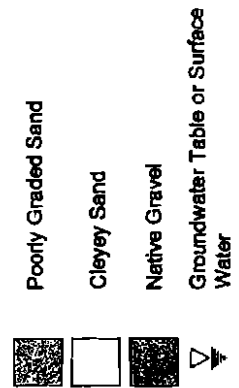
LENLTD B06197D

PLATE: D.3

Reference: Section A - Rapid Drawdown.dwg



## LEGEND



Factor of Safety (FOS) for Slope Stability

POS

Failure Surface

Water

## STATIC SLOPE STABILITY ANALYSIS Full Pond Static Section B-B'

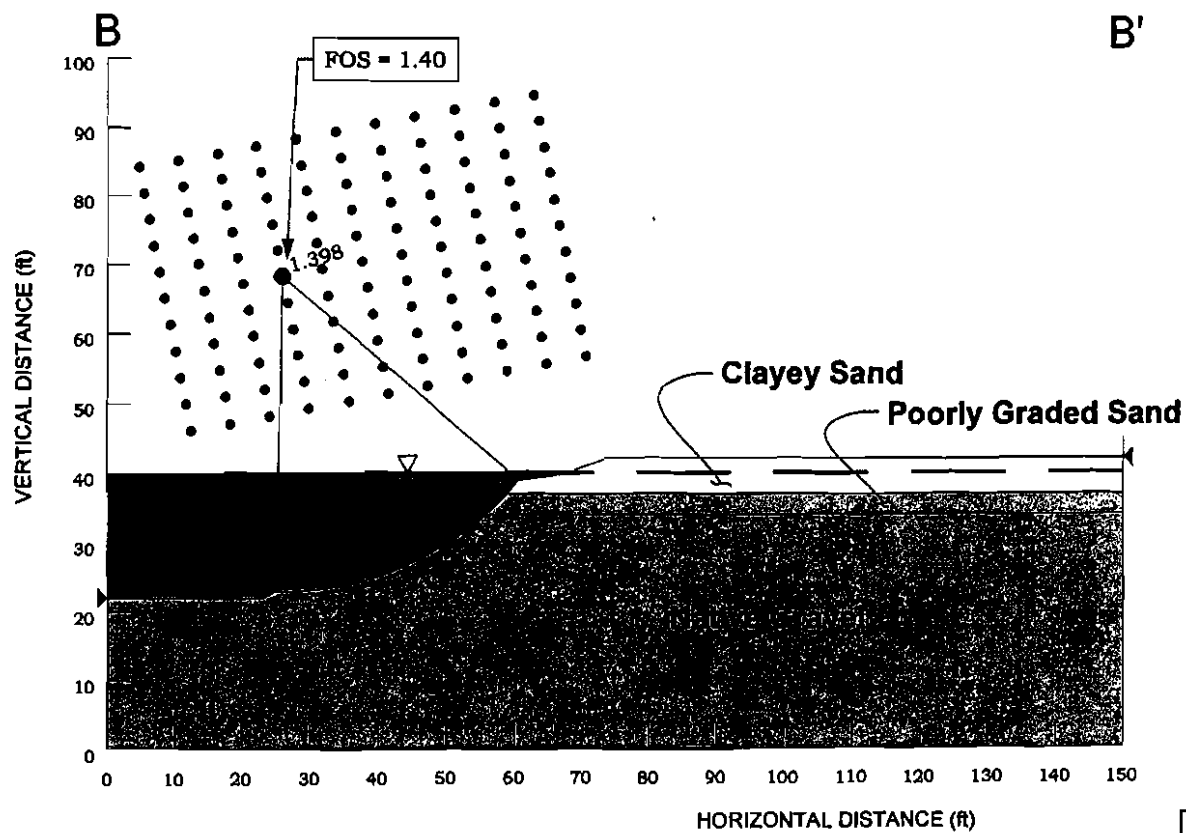


**STRATA**  
GEOTECHNICAL ENGINEERING & MATERIALS TESTING  
*Integrity from the Ground Up*

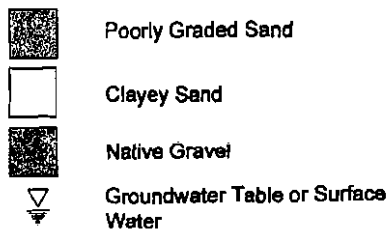
DRAWN BY: JDF  
LENLTD B06197D

CHECKED BY: MGW  
PLATE: D.4

Reference: Section B - Static.dxf



### LEGEND



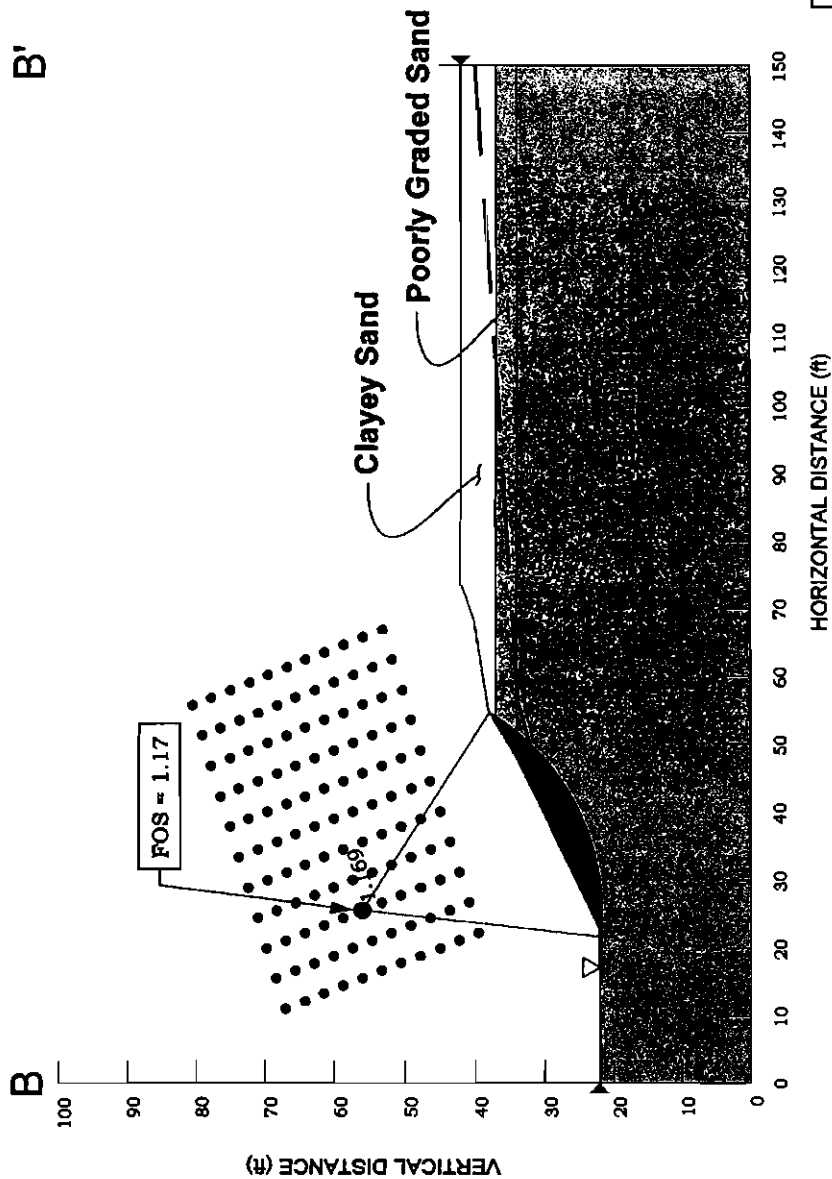
FOS Factor of Safety (FOS) for Slope Stability  
 Failure Surface  
 Water

### PSEUDOSTATIC SLOPE STABILITY ANALYSIS Full Pond with Seismic $A_h=0.15$ Section B-B'



DRAWN BY: JDF  
 LENLTD B06197D

CHECKED BY: MGW  
 PLATE: D.5



## LEGEND

|  |                              |  |                                            |
|--|------------------------------|--|--------------------------------------------|
|  | Poorly Graded Sand           |  | Factor of Safety (FOS) for Slope Stability |
|  | Clayey Sand                  |  | Failure Surface                            |
|  | Native Gravel                |  | Water                                      |
|  | Groundwater Table or Surface |  |                                            |

## STATIC SLOPE STABILITY ANALYSIS Rapid Drawdown Condition Section B-B'



**STRATA**  
GEOTECHNICAL ENGINEERING & MATERIALS TESTING  
*Integrity from the Ground Up*

DRAWN BY: JDF  
LENLTD B06197D

CHECKED BY: MGW  
PLATE: D.8

Reference: Section B - Rapid Drawdown.dwg