



May 12, 2017

**Wastewater Report**  
Jackson Ranch Filing No. 4

The Jackson Ranch Filing No. 4 site is 31.18± acres located in the Northwest one-quarter of Section 21, Township 11 South, Range 66 West of the 6th P.M. In El Paso County, Colorado. The site is generally in the vicinity of the northeast corner of the intersection of Roller Coaster Road and Higby Road. More specifically, the site is located north of proposed Jackson Ranch Filing No. 3, which is on the north side of existing Jackson Ranch Filing No. 2 on the northerly extension of Jackson Ranch Court. The proposed site is bounded on the north by Canterbury West and Canterbury East, both zoned RR-5. Canterbury East is also adjacent along the east side. Tri-State Generation & Transmission Association's electric transmission facilities border the site on the southeast (east of proposed Jackson Ranch Court). Proposed Jackson Ranch Filing No. 3 (RR-2.5), a separate and concurrent Final Plat application, is adjacent to the south. Unplatted land (RR-2.5) borders the site on the west side. Vehicular access to the site is proposed from the northerly extension of Jackson Ranch Court, connecting to Higby Road, just east of Roller Coaster Road. The area of the proposed subdivision is 31.18± acres and will contain 8 new single family residential-rural lots.

The site location, size and zoning of the proposed Jackson Ranch Filing No. 4 is identical to those lots indicated as "Phase 3" on the amended Jackson Ranch Preliminary Plan (SP-16-002), approved by the El Paso County Board of County Commissioners on September 27, 2016 by Resolution Number 16-339, which was recorded under Reception Number 216111379. This Final Plat is consistent with the approved Preliminary Plan and the existing RR-2.5 zoning.

The water supply court decrees and augmentation plans include requirements that occupied lots in the proposed development use individual non-evaporative septic systems as a means of replacing water pumped from the individual on-site water supply wells. Furthermore, a Soil, Geology, Geologic Hazard and Wastewater Study for the site was prepared by Entech Engineering, Inc. as part of the Preliminary Plan approval process. Said study included soil boring data, percolation testing data, a map with two potential on-site waste water treatment sites, and recommendations for the on-site wastewater disposal systems. Excerpts from the Entech study are attached for reference. It was Entech Engineering, Inc.'s opinion that that the site is suitable for individual on-site wastewater treatment systems and that contamination of surface and subsurface water sources should not occur provided the treatment sites are evaluated and installed according to El Paso County and State guidelines and are properly maintained.

Individual septic systems will be constructed by the individual lot owners after subdivision platting and as a part of the residential construction process for each lot. Individual percolation testing is required for each lot at the time of residential construction. Specific treatment sites for each lot will be evaluated in accordance with El Paso County and State of Colorado guidelines. A individual systems shall be installed in accordance with El Paso County and State of Colorado guidelines. The need for designed disposal systems will be evaluated for each lot at the time of residential construction, depending on the presence of shallow, groundwater, shallow bedrock or other adverse conditions encountered at the time of specific lot testing.

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**Engineers • Surveyors**  
**1903 Lelaray Street, Suite 200 • Colorado Springs, CO 80909 • Phone 719-635-5736**  
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THIS ATTACHMENT IS  
EXEMPT OF:



**ENTECH**  
ENGINEERING, INC.

505 ELKTON DRIVE  
COLORADO SPRINGS, CO 80907  
PHONE (719) 531-5599  
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**SOIL, GEOLOGY, GEOLOGIC HAZARD,  
AND WASTEWATER STUDY,  
JACKSON RANCH  
HIGBY ROAD AND ROLLER COASTER ROAD  
EL PASO COUNTY, COLORADO**

Prepared for

**Four Gates Land Development, LLC**  
17435 Roller Coaster Road  
Monument, CO 80132

Attn: Marlene Brown

February 3, 2016

Respectfully Submitted,

ENTECH ENGINEERING, INC.

Kristen A. Andrew-Hoeser, P.G.  
Engineering Geologist

KAH/crf

Encl.

Entech Job No. 152124  
AAprojects/2015/152124 geohaz

CC: Dave Jones

Reviewed by:



into areas below grade. Typical drain details are presented in Figure 8. Structures should not block drainages. Septic fields should not be located in these areas due to the potential for periodic high groundwater conditions.

Areas of fill were observed on site associated with dams and erosion control berms. The dams in the main drainage that bisects the site and the northeastern portion of the site are in designated open spaces and will be avoided by development. The dam/berm in the southern portion of the site (Lot 3, Filing 2) is to be removed. Other minor erosion berms may likely be penetrated by foundations, removed or avoided. Any uncontrolled fill encountered beneath foundations should be removed and recompacted at a minimum of 95% of its maximum Modified Proctor Dry Density, ASTM D-1557.

In summary, development of the site can be achieved if the items mentioned above are mitigated. These items can be mitigated through proper design and construction or through avoidance. Investigation on each lot is recommended prior to construction.

## **7.0 ON-SITE DISPOSAL OF WASTEWATER**

The site was evaluated for individual sewage treatment systems in accordance with El Paso Land Development Code. Eleven (11) percolation tests were performed on the property. Percolation tests may not be located in the exact areas of proposed systems. The approximate locations of the percolation tests are indicated on Figure 4, the Geology Map, Figure 7 and the Septic Suitability Map, Figure 10. A table showing the results of the percolation tests is presented in Table 2. The specific test results are presented in Appendix E of this report.

The Natural Resource Conservation Service (Reference 4), previously the Soil Conservation Service (Reference 5) has been mapped with four soil descriptions. The Soil Survey Map (Reference 4) is presented in Figure 5, and the Soil Survey Descriptions are presented in Appendix D. The soils are described as having rapid to moderate percolation rates.

## **Entech Engineering, Inc.**

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The individual percolation test results ranged from 32 minutes per inch to 107 minutes per inch. Most of the averaged percolation rates are suitable for conventional individual sewage treatment systems, however, some of the individual percolation holes had rates slower than 60 minutes per inch. Three averaged percolation rates were slower than 60 minutes per inch. Areas where the average percolation rates are slower than 60 minutes per inch will require designed systems.

Standard penetration testing, ASTM D-1586, was performed in each profile hole to evaluate the density of the soil and the presence of bedrock. Bedrock was encountered in Profile Hole Nos. 2, 3, 4 and 6 at 13, 8, 8 and 12 feet, respectively. Bedrock was not encountered of the other profile holes which were drilled to 10 to 15 feet, however, the high "blow counts" greater than 40 indicate weathered Dawson soils. Test pits in addition to individual percolation tests will be recommended in areas where high blow counts are measured. Designed systems are generally required in areas of shallow bedrock or where the weathered Dawson formation is encountered.

Leach fields must be maintained a minimum of 4 feet above groundwater. Groundwater was encountered in Profile Holes Nos. 1, 2 and 3 at 14.5, 15 and 14 feet, respectively. Groundwater was not encountered in any of the other profile holes, which were drilled to depths of 10 to 15 feet. Should groundwater be encountered within 6 feet of the surface, shallow leaching fields would be recommended. In areas where groundwater is less than 4 feet, designed systems will be required.

El Paso County guidelines require designed systems for percolation rates that exceed 60 minutes per inch. The average of all of the percolation rates on the site is 58 minutes per inch. The averaged percolation rates in most of the locations are suitable for conventional systems, however, the rates varied on individual holes from 5 to 80 minutes per inch. Three of the averaged percolation rates were slower than 60 minutes per inch. Bedrock was not encountered in any of the profile holes at depths that would affect conventional systems, however, weathered Dawson which may require designed systems was sampled at shallow depths. Where bedrock is encountered above 6 feet, designed systems will be required. A Septic Suitability Map is presented in Figure 10. A possible house location, two potential on site wastewater treatment systems (OWS) and a possible well site for each lot are indicated on Figure 10. Due to the size of the building lots, it is anticipated that suitable areas will be available where systems can be

installed. In areas where suitable percolation rates cannot be found, shallow groundwater exists or shallow bedrock exists, designed systems will be required.

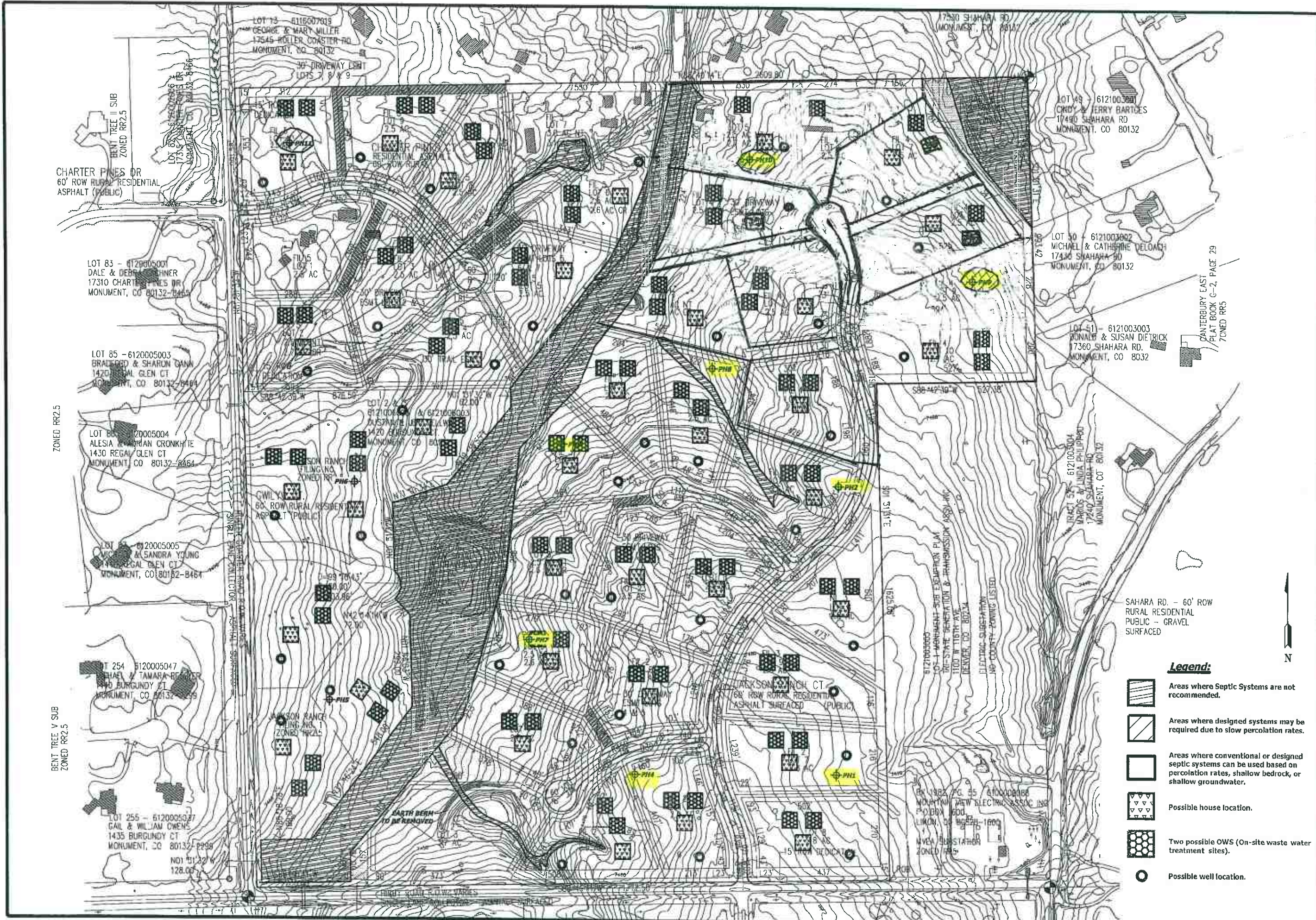
In summary, it is our opinion the site is suitable for individual on site wastewater treatment systems (OWS) and that contamination of surface and subsurface water resources should not occur provided the OWS sites are evaluated and installed according to El Paso County and State Guidelines and properly maintained. Individual percolation testing is required on each lot prior to construction. Septic systems must be located a minimum of 100 feet from any well, including those on adjacent properties. Septic systems must also be located a minimum of 50 feet from any drainages, floodplains or ponded areas and 25 feet from dry gulches.

## **8.0 ECONOMIC MINERAL RESOURCES**

Some of the sandy materials on-site could be considered a low grade sand resource. According to the *El Paso County Aggregate Resource Evaluation Map* (Reference 11), the area is mapped as stream terrace deposits. According to the *Atlas of Sand, Gravel and Quarry Aggregate Resources, Colorado Front Range Counties* distributed by the Colorado Geological Survey (Reference 12), areas of the site are not mapped with any resources. According to the *Evaluation of Mineral and Mineral Fuel Potential* (Reference 13), the area of the site has been mapped as "Little or No Potential" for industrial minerals. It is possible sand and gravel deposits associated with the Palmer Divide Alluvium could be an aggregate resource. However, considering the silty to clayey nature of much of these materials and abundance of similar materials through the region and the close proximity to developed land, they would be considered to have little significance as an economic resource.







According to the *Evaluation of Mineral and Mineral Fuel Potential of El Paso County State Mineral Lands* (Reference 13), the site is mapped within the Denver Basin Coal Region. However, the area of the site has been mapped as "Poor" for coal resources. No active or inactive mines have been mapped in the area of the site. No metallic mineral resources have been mapped on the site (Reference 13).





SAHARA RD. - 60' ROW  
RURAL RESIDENTIAL  
PUBLIC - GRAVEL  
SURFACED

**Legend:**

-  Areas where Septic Systems are not recommended.
-  Areas where designed systems may be required due to slow percolation rates.
-  Areas where conventional or designed septic systems can be used based on percolation rates, shallow bedrock, or shallow groundwater.
-  Possible house location.
-  Two possible OWS (On-site waste water treatment sites).
-  Possible well location.



REVISION	BY

**ENTTECH**  
ENGINEERING, INC.

505 ELKTON DRIVE  
COLORADO SPRINGS, CO. 80907 (719) 531-5599

SEPTIC SUITABILITY MAP  
JACKSON RANCH, CO.  
EL PASO COUNTY, CO.  
FOR: FOUR GATES LAND DEVELOPMENT

DRAWN	AL
CHECKED	KAH
DATE	02/03/16
SCALE	AS SHOWN
JOB NO.	162124
FIGURE No.	10



Table 2: Summary of Percolation Test Results

Percolation Test No.	Percolation Rate (min/in)	Depth to Bedrock (ft.)	Depth to Groundwater (ft.)
1	57	>15	14.5
2	43	13	15
3	54	8	14
4	32	8	>15
5	41	>15	>14
6	39	12	>14
7	54	>10	>10
8	59	>10	>10
9	67	>10	>10
10	80	>10	>10
11	107	>10	>10

Client: Four Gates Land Dev.  
 Test Location: Roller Coaster Rd. & Higby Rd.

Job Number: 131563

**PERCOLATION HOLES-TEST NO. 1**

Date Holes Prepared: 10/29/2013

Date Hole Completed: 10/30/2013

Hole No. 1

Hole No. 2

Hole No. 3

Depth: 38"

Depth: 37"

Depth: 42"

Hole No. 1			Hole No. 2			Hole No. 3		
Trial	Time (min.)	Water Level Change (in.)	Trial	Time (min.)	Water Level Change (in.)	Trial	Time (min.)	Water Level Change (in.)
1	10	1	1	10	0	1	10	1/4
2	10	1	2	10	0	2	10	1/4
3	10	1	3	10	1/8	3	10	1/8

Perc Rate (min./in.): 10

Perc Rate (min./in.): 80

Perc Rate (min./in.): 80

Average Perc Rate (min./in.) 57

**PROFILE HOLE**

Date Profile Hole Completed: 10/29/2013

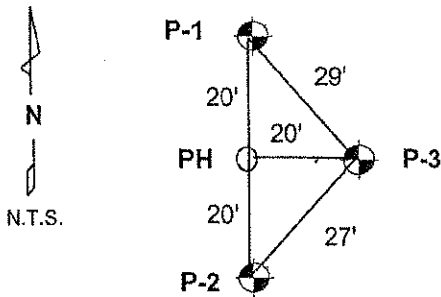
Depth	Visual Classification	Remarks
0-9'	Sand, silty, fine grained, tan	
9-13'	Clay, sandy, tan	No Bedrock
13-15'	Sand, silty, fine to medium grained, tan	Groundwater at 14.5'
	19 Blows / ft. @ 2'	
	29 Blows / ft. @ 4'	
	19 Blows / ft. @ 9'	
	38 Blows / ft. @ 14'	

Required Area of Absorption Field: 1.51 Sq. Ft./gpd sewage volume  
 Required Area of Absorption Field: 340 Sq. Ft./bedroom  
 Required Area of Absorption Field: 544 Sq. Ft./bedroom with garbage disposal and washing machine  
 Remarks:

GPS Coordinates: 39° 04' 46.8" N, 104° 47' 14.6" W

Observer: Graham Espenlaub

By: *[Signature]*



**ENTECH**  
**ENGINEERING, INC.**

505 ELKTON DRIVE  
 COLORADO SPRINGS, COLORADO 80907

**PERCOLATION TEST RESULTS**

DRAWN: DATE: CHECKED: *[Signature]* DATE: 11/13/13

JOB NO.: 131563  
 FIG NO.: E-1



Client: Four Gates Land Dev.  
 Test Location: Roller Coaster Rd. & Higby Rd.

Job Number: 131563

**PERCOLATION HOLES-TEST NO. 2**

Date Holes Prepared: 10/29/2013

Date Hole Completed: 10/30/2013

Hole No. 1  
 Depth: 44"

Hole No. 2  
 Depth: 40"

Hole No. 3  
 Depth: 41"

Hole No. 1			Hole No. 2			Hole No. 3		
Trial	Time (min.)	Water Level Change (in.)	Trial	Time (min.)	Water Level Change (in.)	Trial	Time (min.)	Water Level Change (in.)
1	10	1/4	1	10	1/8	1	10	4 3/4
2	10	1/4	2	10	1/2	2	10	2 3/4
3	10	1/4	3	10	1/8	3	10	1 1/2

Perc Rate (min./in.): 40      Perc Rate (min./in.): 80      Perc Rate (min./in.): 7

Average Perc Rate (min./in.) 43

**PROFILE HOLE**


Date Profile Hole Completed: 10/29/2013

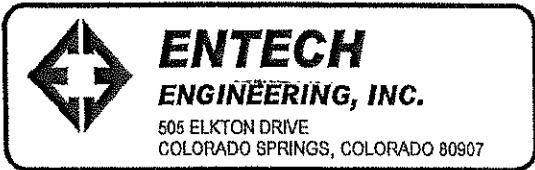
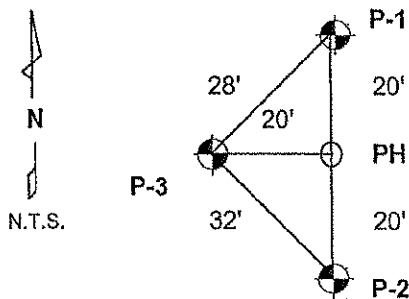
Depth	Visual Classification	Remarks
0-9'	Sand, silty, fine to coarse grained, brown	
9-13'	Clay, sandy, tan	Sandstone Bedrock at 13'
13-15'	Sandstone, silty, fine to medium grained, tan	Groundwater at 15'
	41 Blows / ft. @ 2'	
	35 Blows / ft. @ 4'	
	39 Blows / ft. @ 9'	
	50 Blows / 7" @ 14'	

Required Area of Absorption Field: 1.31 Sq. Ft./gpd sewage volume  
 Required Area of Absorption Field: 295 Sq. Ft./bedroom  
 Required Area of Absorption Field: 472 Sq. Ft./bedroom with garbage disposal and washing machine  
 Remarks:

GPS Coordinates: 39° 04' 55.4" N, 104° 47' 14.6" W

Observer: Graham Espenlaub

By: 



**PERCOLATION TEST RESULTS**

DRAWN:	DATE:	CHECKED:	DATE:
		<i>[Signature]</i>	11/13/13

JOB NO.: 131563  
 FIG NO.: E-2

Client: Four Gates Land Dev.  
 Test Location: Roller Coaster Rd. & Higby Rd.

Job Number: 131563

**PERCOLATION HOLES-TEST NO. 3**

Date Holes Prepared: 10/29/2013

Date Hole Completed: 10/30/2013

Hole No. 1  
 Depth: 39"

Hole No. 2  
 Depth: 33"

Hole No. 3  
 Depth: 42"

Hole No. 1			Hole No. 2			Hole No. 3		
Trial	Time (min.)	Water Level Change (in.)	Trial	Time (min.)	Water Level Change (in.)	Trial	Time (min.)	Water Level Change (in.)
1	10	1/8	1	10	1/4	1	10	1/4
2	10	1/8	2	10	1/2	2	10	1/2
3	10	1/4	3	10	1/8	3	10	1/4

Perc Rate (min./in.): 40

Perc Rate (min./in.): 80

Perc Rate (min./in.): 40

Average Perc Rate (min./in.) 54

**PROFILE HOLE**

Date Profile Hole Completed: 10/29/2013

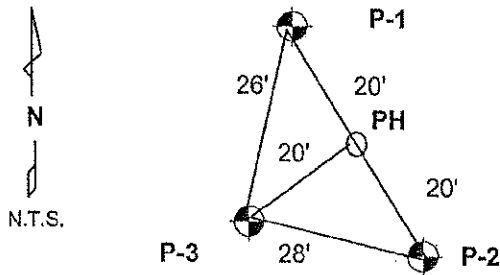
Depth	Visual Classification	Remarks
0-3'	Sand, very clayey, fine grained, tan	
3-8"	Sand, silty, fine to medium grained, tan	Sandstone Bedrock at 8'
8-15'	Sandstone, silty, fine to coarse grained, tan	Groundwater at 14'
22 Blows / ft. @ 2'		
47 Blows / ft. @ 4'		
50 Blows / 10" @ 9'		
50 Blows / 9" @ 14'		

Required Area of Absorption Field: 1.47 Sq. Ft./gpd sewage volume  
 Required Area of Absorption Field: 331 Sq. Ft./bedroom  
 Required Area of Absorption Field: 529 Sq. Ft./bedroom with garbage disposal and washing machine  
 Remarks:

GPS Coordinates: 39° 04' 57.0" N, 104° 47' 25.2" W

Observer: Graham Espenlaub

By: 



**ENTECH**  
**ENGINEERING, INC.**

506 ELKTON DRIVE  
 COLORADO SPRINGS, COLORADO 80907

**PERCOLATION TEST RESULTS**

DRAWN: \_\_\_\_\_ DATE: \_\_\_\_\_ CHECKED: W DATE: 11/13/13

JOB NO.:  
**131563**  
 FIG NO.:  
**E-3**

Client: Four Gates Land Dev.  
 Test Location: Roller Coaster Rd. & Higby Rd.

Job Number: 131563

**PERCOLATION HOLES-TEST NO. 4**

Date Holes Prepared: 10/29/2013

Date Hole Completed: 10/30/2013

Hole No. 1

Hole No. 2

Hole No. 3

Depth: 33"

Depth: 37"

Depth: 44"

Trial	Time (min.)	Water Level		Trial	Time (min.)	Water Level		Trial	Time (min.)	Water Level	
		Change (in.)	Level			Change (in.)	Level			Change (in.)	Level
1	10	0		1	10	1		1	10	2	1/8
2	10	1/8		2	10	1 1/8		2	10	2	1/8
3	10	1/8		3	10	1		3	10	2	1/8

Perc Rate (min./in.): 80

Perc Rate (min./in.): 10

Perc Rate (min./in.): 5

Average Perc Rate (min./in.) 32

**PROFILE HOLE**

Date Profile Hole Completed: 10/29/2013

Depth	Visual Classification	Remarks
0-8'	Sand, silty, fine to coarse grained, red brown	
8-15'	Sandstone, silty, fine to coarse grained, tan	Sandstone Bedrock at 8' No Groundwater

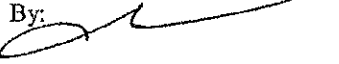
- 12 Blows / ft. @ 2'
- 41 Blows / ft. @ 4'
- 50 Blows / 7" @ 9'
- 50 Blows / 6" @ 14'

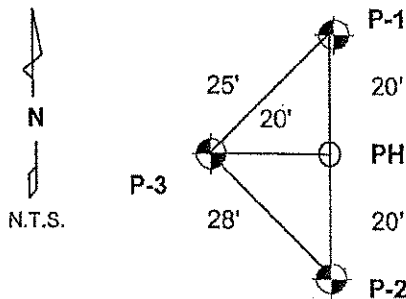
Required Area of Absorption Field: 1.13 Sq. Ft./gpd sewage volume  
 Required Area of Absorption Field: 255 Sq. Ft./bedroom  
 Required Area of Absorption Field: 407 Sq. Ft./bedroom with garbage disposal and washing machine

Remarks:

GPS Coordinates: 39° 04' 46.0" N, 104° 47' 23.7" W

Observer: Blake Leonard

By: 



**PERCOLATION TEST RESULTS**

DRAWN:	DATE:	CHECKED:	DATE:
		<i>W</i>	11/13/13

JOB NO.: 131563  
 FIG NO.: E-4



Client: Four Gates Land Dev.  
 Test Location: Roller Coaster Rd. & Higby Rd.

Job Number: 131563

**PERCOLATION HOLES-TEST NO. 5**

Date Holes Prepared: 10/29/2013

Date Hole Completed: 10/30/2013

Hole No. 1

Hole No. 2

Hole No. 3

Depth: 35"

Depth: 38"

Depth: 35"

Hole No. 1			Hole No. 2			Hole No. 3		
Trial	Time (min.)	Water Level Change (in.)	Trial	Time (min.)	Water Level Change (in.)	Trial	Time (min.)	Water Level Change (in.)
1	10	1/4	1	10	1/8	1	10	1/2
2	10	3/8	2	10	1/8	2	10	5/8
3	10	3/8	3	10	1/8	3	10	5/8

Perc Rate (min./in.): 27

Perc Rate (min./in.): 80

Perc Rate (min./in.): 16

Average Perc Rate (min./in.) 41

**PROFILE HOLE**

Date Profile Hole Completed: 10/29/2013

Depth  
0-15'

Visual Classification  
Sand, clayey, silty, fine grained, tan

Remarks


No Bedrock  
No Groundwater

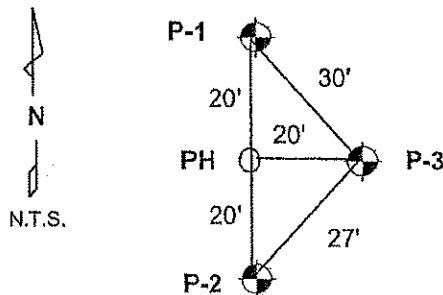
- 21 Blows / ft. @ 2'
- 21 Blows / ft. @ 4'
- 20 Blows / ft. @ 9'
- 24 Blows / ft. @ 14'

Required Area of Absorption Field: 1.28 Sq. Ft./gpd sewage volume  
 Required Area of Absorption Field: 288 Sq. Ft./bedroom  
 Required Area of Absorption Field: 461 Sq. Ft./bedroom with garbage disposal and washing machine  
 Remarks:

GPS Coordinates: 39° 04' 47.3" N, 104° 47' 36.2" W

Observer: Blake Leonard

By: 



**ENTECH**  
ENGINEERING, INC.

505 ELKTON DRIVE  
COLORADO SPRINGS, COLORADO 80907

**PERCOLATION TEST RESULTS**

DRAWN: \_\_\_\_\_ DATE: \_\_\_\_\_ CHECKED: W DATE: 11/13/13

JOB NO.:  
**131563**  
FIG NO.:  
**E-5**

Client: Four Gates Land Dev.  
 Test Location: Roller Coaster Rd. & Higby Rd.

Job Number: 131563

**PERCOLATION HOLES-TEST NO. 6**

Date Holes Prepared: 10/29/2013

Date Hole Completed: 10/30/2013

Hole No. 1

Hole No. 2

Hole No. 3

Depth: 34"

Depth: 37"

Depth: 39"

Trial	Time (min.)	Water		Trial	Time (min.)	Water		Trial	Time (min.)	Water	
		Level	Change (in.)			Level	Change (in.)			Level	Change (in.)
1	10	1/2		1	10	3/8		1	10	3/8	
2	10	1/2		2	10	1/8		2	10	1/2	
3	10	1/2		3	10	1/8		3	10	5/8	

Perc Rate (min./in.): 20

Perc Rate (min./in.): 80

Perc Rate (min./in.): 16

Average Perc Rate (min./in.) 39

**PROFILE HOLE**

Date Profile Hole Completed: 10/29/2013

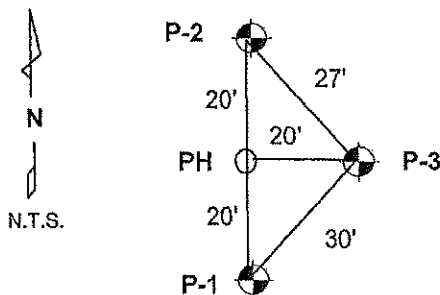
Depth	Visual Classification	Remarks
0-4'	Sand, very clayey, fine grained, tan	
4-12'	Sand, silty, fine to coarse grained, brown to red brown	Sandstone Bedrock at 12'
12-15'	Sandstone, silty, fine to coarse grained, tan	No Groundwater
	22 Blows / ft. @ 2'	
	29 Blows / ft. @ 4'	
	35 Blows / ft. @ 9'	
	50 Blows / 9" @ 14'	

Required Area of Absorption Field: 1.25 Sq. Ft./gpd sewage volume  
 Required Area of Absorption Field: 281 Sq. Ft./bedroom  
 Required Area of Absorption Field: 450 Sq. Ft./bedroom with garbage disposal and washing machine  
 Remarks:

GPS Coordinates: 39° 04' 55.6" N, 104° 47' 34.6" W

Observer: Blake Leonard

By: 



**ENTECH**  
**ENGINEERING, INC.**

505 ELKTON DRIVE  
 COLORADO SPRINGS, COLORADO 80907

**PERCOLATION TEST RESULTS**

DRAWN: DATE: CHECKED: DATE:

*W* 11/13/13

JOB NO.:  
 131563  
 FIG NO.:

E-6

Client: FOUR GATES LAND DEV.  
 Test Location: JACKSON RANCH, FILING 2-5

Job Number: 152124

**PERCOLATION HOLES-TEST NO. 7**

Date Holes Prepared: 12/30/2015

Date Hole Completed: 12/31/2015

Hole No. 1

Depth: 35"

Hole No. 2

Depth: 39"

Hole No. 3

Depth: 39"

Hole No. 1			Hole No. 2			Hole No. 3		
Trial	Time (min.)	Water Level Change (in.)	Trial	Time (min.)	Water Level Change (in.)	Trial	Time (min.)	Water Level Change (in.)
1	10	1/4	1	10	0	1	10	0
2	10	1/4	2	10	0	2	10	1/4
3	10	1/4	3	10	1/8	3	10	1/4

Perc Rate (min./in.): 40

Perc Rate (min./in.): 80

Perc Rate (min./in.): 40

Average Perc Rate (min./in.) 54

**PROFILE HOLE**

Date Profile Hole Completed: 12/30/2015

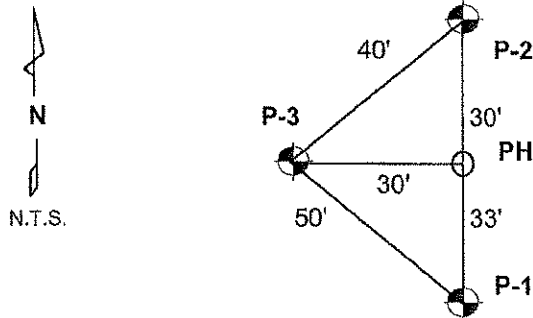
Depth	Visual Classification	Remarks
0-10'	Sand, silty, fine to coarse grained, red brown	
		No Bedrock
		No Groundwater
	22 Blows / ft. @ 2'	
	24 Blows / ft. @ 4'	
	14 Blows / ft. @ 9'	

Required Area of Absorption Field: 1.47 Sq. Ft./gpd sewage volume  
 Required Area of Absorption Field: 331 Sq. Ft./bedroom  
 Required Area of Absorption Field: 529 Sq. Ft./bedroom with garbage disposal and washing machine  
 Remarks:

GPS Coordinates: 39° 04.480' N, 104° 47.261' W

Observer: Stuart Wood

By:



**ENTECH ENGINEERING, INC.**  
 505 ELKTON DRIVE  
 COLORADO SPRINGS, COLORADO 80907

**PERCOLATION TEST RESULTS**

DRAWN: DATE: CHECKED: *AW* 2/3/16 DATE:

JOB NO.:

152124

FIG NO.:

E-7



Client: FOUR GATES LAND DEV.  
 Test Location: JACKSON RANCH, FILING 2-5

Job Number: 152124

**PERCOLATION HOLES-TEST NO. 8**

Date Holes Prepared: 1/14/2016

Date Hole Completed: 1/15/2016

Hole No. 1

Depth: 34"

Hole No. 2

Depth: 37"

Hole No. 3

Depth: 34"

Hole No. 1			Hole No. 2			Hole No. 3		
Trial	Time (min.)	Water Level Change (in.)	Trial	Time (min.)	Water Level Change (in.)	Trial	Time (min.)	Water Level Change (in.)
1	10	1/2	1	10	0	1	10	0
2	10	1/2	2	10	0	2	10	1/8
3	10	5/8	3	10	1/8	3	10	1/8

Perc Rate (min./in.): 16

Perc Rate (min./in.): 80

Perc Rate (min./in.): 80

Average Perc Rate (min./in.) 59

**PROFILE HOLE**

Date Profile Hole Completed: 1/14/2016

Depth

0-10'

Visual Classification

Sand, silty, fine to coarse grained, tan to red brown

Remarks

No Bedrock  
 No Groundwater

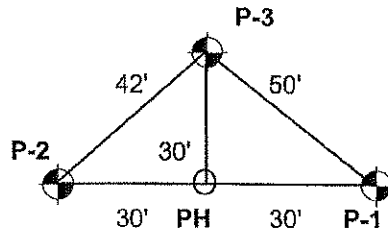
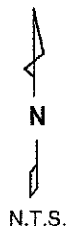
15 Blows / ft. @ 2'  
 6 Blows / ft. @ 4'  
 17 Blows / ft. @ 9'

Required Area of Absorption Field: 1.54 Sq. Ft./gpd sewage volume  
 Required Area of Absorption Field: 346 Sq. Ft./bedroom  
 Required Area of Absorption Field: 553 Sq. Ft./bedroom with garbage disposal and washing machine  
 Remarks:

GPS Coordinates: 39° 04.577' N, 104° 45.201' W

Observer: Graham Espenlaub

By:



**ENTECH  
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505 ELKTON DRIVE  
 COLORADO SPRINGS, COLORADO 80907

**PERCOLATION TEST RESULTS**

DRAWN: DATE: CHECKED: DATE:

*[Signature]* 2/3/16

JOB NO.:

152124

FIG NO.:

E-8

Client: FOUR GATES LAND DEV.  
 Test Location: JACKSON RANCH, FILING 2-5

Job Number: 152124

**PERCOLATION HOLES-TEST NO. 9**

Date Holes Prepared: 12/30/2015

Date Hole Completed: 12/31/2015

Hole No. 1

Depth: 35"

Hole No. 2

Depth: 41"

Hole No. 3

Depth: 35"

Hole No. 1			Hole No. 2			Hole No. 3		
Trial	Time (min.)	Water Level Change (in.)	Trial	Time (min.)	Water Level Change (in.)	Trial	Time (min.)	Water Level Change (in.)
1	10	1/8	1	10	1/2	1	10	1/2
2	10	1/8	2	10	1/4	2	10	1/4
3	10	1/8	3	10	1/8	3	10	1/4

Perc Rate (min./in.): 80

Perc Rate (min./in.): 80

Perc Rate (min./in.): 40

Average Perc Rate (min./in.) 67\*

**PROFILE HOLE**

Date Profile Hole Completed: 12/30/2015

Depth	Visual Classification	Remarks
0-6'	Sand, silty, fine to coarse grained, tan	
6-10'	Sand, very clayey, fine to coarse grained, tan	No Bedrock No Groundwater

5 Blows / ft. @ 2'  
 10 Blows / ft. @ 4'  
 14 Blows / ft. @ 9'

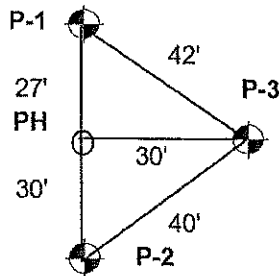
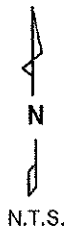
Required Area of Absorption Field: N/A \* Sq. Ft./gpd sewage volume  
 Required Area of Absorption Field: N/A \* Sq. Ft./bedroom  
 Required Area of Absorption Field: N/A \* Sq. Ft./bedroom with garbage disposal and washing machine  
 Remarks:

\* - Due to slow percoation, a designed system is recommended

GPS Coordinates: 39° 04.594' N, 104° 47.126' W

Observer: Graham Espenlaub

By:



**ENTECH**  
**ENGINEERING, INC**  
 505 ELKTON DRIVE  
 COLORADO SPRINGS, COLORADO 80907

**PERCOLATION TEST RESULTS**

DRAWN: DATE: CHECKED: 2/3/16 DATE:

JOB NO.:  
 152124  
 FIG NO.:  
 E-9

Client: FOUR GATES LAND DEV.  
 Test Location: JACKSON RANCH, FILING 2-5

Job Number: 152124

**PERCOLATION HOLES-TEST NO. 10**

Date Holes Prepared: 1/14/2016

Date Hole Completed: 1/15/2016

Hole No. 1  
 Depth: 33"

Hole No. 2  
 Depth: 38"

Hole No. 3  
 Depth: 30"

<u>Trial</u>	<u>Time (min.)</u>	<u>Water Level Change (in.)</u>	<u>Trial</u>	<u>Time (min.)</u>	<u>Water Level Change (in.)</u>	<u>Trial</u>	<u>Time (min.)</u>	<u>Water Level Change (in.)</u>
1	10	0	1	10	1/8	1	10	1/8
2	10	1/8	2	10	1/8	2	10	1/8
3	10	1/8	3	10	1/8	3	10	1/8

Perc Rate (min./in.): 80

Perc Rate (min./in.): 80

Perc Rate (min./in.): 80

Average Perc Rate (min./in.) 80\*

**PROFILE HOLE**

Date Profile Hole Completed: 1/14/2016

<u>Depth</u>	<u>Visual Classification</u>	<u>Remarks</u>
0-4'	Sand, very clayey, fine to coarse grained, tan	
4-10'	Sand, silty, fine to coarse grained, red brown	No Bedrock No Groundwater
	6 Blows / ft. @ 2'	
	13 Blows / ft. @ 4'	
	18 Blows / ft. @ 9'	

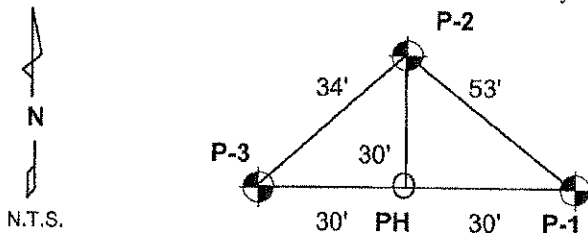
Required Area of Absorption Field: N/A\* Sq. Ft./gpd sewage volume  
 Required Area of Absorption Field: N/A\* Sq. Ft./bedroom  
 Required Area of Absorption Field: N/A\* Sq. Ft./bedroom with garbage disposal and washing machine

Remarks:  
 \* - Due to slow percoation, a designed system is recommended

GPS Coordinates: 39° 05.051' N, 104° 47.187' W

Observer: Graham Espenlaub

By:



N.T.S.



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505 ELKTON DRIVE  
 COLORADO SPRINGS, COLORADO 80907

**PERCOLATION TEST RESULTS**

DRAWN: \_\_\_\_\_ DATE: \_\_\_\_\_ CHECKED: W DATE: 2/3/16

JOB NO.:

152124

FIG NO.:

E-10



Client: FOUR GATES LAND DEV.  
 Test Location: JACKSON RANCH, FILING 2-5

Job Number: 152124

**PERCOLATION HOLES-TEST NO. 11**

Date Holes Prepared: 1/14/2016

Date Hole Completed: 1/15/2016

Hole No. 1  
 Depth: 34"

Hole No. 2  
 Depth: 32"

Hole No. 3  
 Depth: 37"

Trial	Time (min.)	Water Level Change (in.)
1	10	1/4
2	10	1/4
3	10	1/8

Trial	Time (min.)	Water Level Change (in.)
1	10	1/16
2	10	3/16
3	10	1/8

Trial	Time (min.)	Water Level Change (in.)
1	10	1/16
2	10	3/16
3	10	1/16

Perc Rate (min./in.): 80

Perc Rate (min./in.): 80

Perc Rate (min./in.): 160

Average Perc Rate (min./in.) 107\*

**PROFILE HOLE**

Date Profile Hole Completed: 1/14/2016

Depth	Visual Classification	Remarks
0-3'	Sand, silty, clayey, fine to coarse grained, red brown	
3-10'	Sand, silty, fine to coarse grained, red brown	
	32 Blows / ft. @ 2'	No Bedrock
	35 Blows / ft. @ 4'	No Groundwater
	41 Blows / ft. @ 9'	

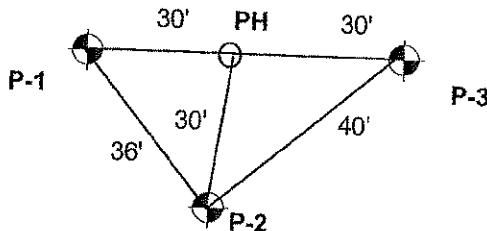
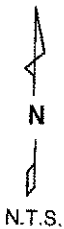
Required Area of Absorption Field: N/A\* Sq. Ft./gpd sewage volume  
 Required Area of Absorption Field: N/A\* Sq. Ft./bedroom  
 Required Area of Absorption Field: N/A\* Sq. Ft./bedroom with garbage disposal and washing machine  
 Remarks:

\* - Due to slow percoation, a designed system is recommended

GPS Coordinates: 39° 05.081' N, 104° 47.370' W

Observer: Stuart Wood

By:



**ENTECH ENGINEERING, INC.**  
 505 ELKTON DRIVE  
 COLORADO SPRINGS, COLORADO 80907

**PERCOLATION TEST RESULTS**

DRAWN:	DATE:	CHECKED:	DATE:
		<i>W</i>	2/3/16

JOB NO.: 152124  
 FIG NO.: E-11

**TABLE 1**  
**SUMMARY OF LABORATORY TEST RESULTS**

CLIENT FOUR GATES LAND DEV.  
PROJECT JACKSON RANCH, FILING 2-5  
JOB NO. 152124

SOIL TYPE	TEST BORING NO.	DEPTH (FT)	WATER (%)	DRY DENSITY (PCF)	PASSING NO. 200 SIEVE (%)	LIQUID LIMIT (%)	PLASTIC INDEX (%)	SULFATE (WT %)	FHA SWELL (PSF)	SWELL/CONSOL (%)	UNIFIED CLASSIFICATION	SOIL DESCRIPTION
1	7	10			11.2						SM-SW	SAND, SLIGHTLY SILTY
1	8	10			16.4			40			SM	SAND, SILTY
1	9	2-3			18.3						SM	SAND, SILTY
1	11	5			17.4						SM	SAND, SILTY
1	1	2-3			33.2						SM	SAND, SILTY
1	2	2-3			20.7						SM	SAND, SILTY
1	4	5			15.9						SM	SAND, SILTY
1	5	5			32.4	22	6				SC-SM	SAND, SILTY, CLAYEY
2	9	10			46.8	22	5				SC-SM	SAND, VERY CLAYEY, SILTY
2	10	2-3			43.0	23	7				SC-SM	SAND, VERY CLAYEY, SILTY
2	1	10	13.0	120.0	70.0	30	14		730	0.1	CL	CLAY, SANDY
2	3	2-3			49.4				880		SC	SAND, VERY CLAYEY
2	6	2-3			49.5				300		SC	SAND, VERY CLAYEY
3	3	15			7.6	NV	NP				SM-SW	SANDSTONE, SLIGHTLY SILTY
3	4	10			16.2						SM	SANDSTONE, SILTY
3	6	15			22.9						SM	SANDSTONE, SILTY

TEST BORING NO. 1  
 DATE DRILLED 10/29/2013  
 Job # 131563

TEST BORING NO. 2  
 DATE DRILLED 10/29/2013  
 CLIENT FOUR GATES LAND DEV.  
 LOCATION ROLLER COASTER & HIGBY

REMARKS	Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type	REMARKS	Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
WATER @ 14.5', 10/30/13							WATER @ 15', 10/30/13						
SAND, SILTY, FINE GRAINED, TAN, MEDIUM DENSE, MOIST	5			19	3.4	1	SAND, SILTY, FINE TO COARSE GRAINED, BROWN, DENSE, MOIST	5			41	8.6	1
	5			29	7.5	1		5			35	2.3	1
CLAY, SANDY, TAN, STIFF, MOIST	10			19	15.4	2	CLAY, SANDY, TAN, VERY STIFF, MOIST	10			39	16.4	2
SAND, SILTY, FINE TO MEDIUM GRAINED, TAN, DENSE, MOIST	15			38	2.7	1	SANDSTONE, SILTY, FINE TO MEDIUM GRAINED, TAN, VERY DENSE, MOIST	15			50 7"	5.9	3
	20							20					



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 505 ELKTON DRIVE  
 COLORADO SPRINGS, COLORADO 80907

TEST BORING LOG

DRAWN: DATE: CHECKED: *[Signature]* DATE: 2/13/16

JOB NO.: 152124  
 FIG NO.: B-1

TEST BORING NO. 3  
 DATE DRILLED 10/29/2013  
 Job # 131563

TEST BORING NO. 4  
 DATE DRILLED 10/29/2013  
 CLIENT FOUR GATES LAND DEV.  
 LOCATION ROLLER COASTER & HIGBY

REMARKS	Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type	REMARKS	Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
WATER @ 14', 10/30/13							DRY TO 15', 10/30/13						
SAND, VERY CLAYEY, FINE GRAINED, TAN, MEDIUM DENSE, MOIST				22	7.3	2	SAND, SILTY, FINE TO COARSE GRAINED, RED BROWN, MEDIUM DENSE TO DENSE, MOIST				12	7.3	1
SAND, SILTY, FINE TO MEDIUM GRAINED, TAN, DENSE, DRY	5			47	1.5	1		5			41	7.3	1
SANDSTONE, SLIGHTLY SILTY, FINE TO COARSE GRAINED, TAN, VERY DENSE, MOIST	10			50 10"	4.6	3	SANDSTONE, SILTY, FINE TO COARSE GRAINED, TAN, VERY DENSE, MOIST	10			50 7"	3.9	3
	15			50 9"	3.0	3		15			50 6"	4.1	3
	20							20					



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505 ELKTON DRIVE  
 COLORADO SPRINGS, COLORADO 80907

TEST BORING LOG

DRAWN: \_\_\_\_\_ DATE: \_\_\_\_\_ CHECKED: *w* DATE: 5/3/16

JOB NO.:

152124

FIG NO.:

B-2

TEST BORING NO. 5  
 DATE DRILLED 10/29/2013  
 Job # 131563

TEST BORING NO. 6  
 DATE DRILLED 10/29/2013  
 CLIENT FOUR GATES LAND DEV.  
 LOCATION ROLLER COASTER & HIGBY

REMARKS	Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type	REMARKS	Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
DRY TO 14', 10/30/13 SAND, SILTY, CLAYEY, FINE GRAINED, TAN, MEDIUM DENSE, MOIST							DRY TO 14', 10/30/13 SAND, VERY CLAYEY, FINE GRAINED, TAN, MEDIUM DENSE, MOIST						
	5			21	5.6	1		5			22	15.2	2
				21	3.7	1	SAND, SILTY, FINE TO COARSE GRAINED, BROWN TO RED BROWN, DENSE, MOIST	5			29	6.6	1
	10			20	5.8	1		10			35	6.2	1
	15			24	14.4	1	SANDSTONE, SILTY, FINE TO COARSE GRAINED, TAN, VERY DENSE, MOIST	15			50 9"	6.9	3
	20							20					



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505 ELKTON DRIVE  
 COLORADO SPRINGS, COLORADO 80907

TEST BORING LOG

DRAWN: DATE: CHECKED: *R* DATE: 8/3/16

JOB NO.:  
 152124

FIG NO.:  
 B-3



TEST BORING NO. 7  
 DATE DRILLED 12/30/2015  
 Job # 152124

TEST BORING NO. 8  
 DATE DRILLED 1/14/2016  
 CLIENT FOUR GATES LAND DEV.  
 LOCATION JACKSON RANCH, FILING 2-5

REMARKS	Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type	REMARKS	Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
DRY TO 10', 12/31/15							DRY TO 10', 1/15/16						
SAND, SILTY TO SLIGHTLY SILTY, FINE TO COARSE GRAINED, TAN TO RED BROWN.	5			22	8.6	1	SAND, SILTY, FINE TO COARSE GRAINED, RED BROWN, LOOSE TO MEDIUM DENSE, MOIST	5			15	8.8	1
				24	6.1	1					6	12.3	1
	10			14	12.5	1		10			17	8.6	1
	15							15					
	20							20					



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505 ELKTON DRIVE  
 COLORADO SPRINGS, COLORADO 80907

TEST BORING LOG

DRAWN:

DATE:

CHECKED: *W*

DATE:

5/3/16

JOB NO.:

152124

FIG NO.:

B-4

TEST BORING NO. 9  
 DATE DRILLED 12/30/2015  
 Job # 152124

TEST BORING NO. 10  
 DATE DRILLED 1/14/2016  
 CLIENT FOUR GATES LAND DEV.  
 LOCATION JACKSON RANCH, FILING 2-5

REMARKS

REMARKS

DRY TO 10', 12/31/15

SAND, SILTY, FINE TO COARSE  
 GRAINED, TAN, LOOSE TO  
 MEDIUM DENSE, MOIST

SAND, VERY CLAYEY, FINE  
 TO COARSE GRAINED, TAN,  
 MEDIUM DENSE, MOIST

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
5			5	9.0	1
5			10	5.0	1
10			14	16.8	2
15					
20					

DRY TO 10', 1/15/16

SAND, VERY CLAYEY, SILTY,  
 FINE TO COARSE GRAINED,  
 TAN, LOOSE, MOIST

SAND, SILTY, FINE TO COARSE  
 GRAINED, RED BROWN,  
 MEDIUM DENSE, MOIST

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
5			6	8.1	2
5			13	6.5	1
10			18	5.4	1
15					
20					



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505 ELKTON DRIVE  
 COLORADO SPRINGS, COLORADO 80907

TEST BORING LOG

DRAWN:

DATE:

CHECKED:

DATE:

*W* 5/13/16

JOB NO.:

152124

FIG NO.:

B-5

TEST BORING NO. 11  
 DATE DRILLED 1/14/2016  
 Job # 152124

TEST BORING NO.  
 DATE DRILLED  
 CLIENT FOUR GATES LAND DEV.  
 LOCATION JACKSON RANCH, FILING 2-5

REMARKS

DRY TO 10', 1/15/16  
 SAND, SILTY, CLAYEY, FINE  
 TO COARSE GRAINED, RED  
 BROWN, DENSE, MOIST  
 SAND, SILTY, FINE TO  
 COARSE GRAINED, RED  
 BROWN, DENSE, MOIST

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
5			32	7.0	1
5			35	8.8	1
10			41	7.4	1

REMARKS

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
5					
10					
15					
20					



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 605 ELKTON DRIVE  
 COLORADO SPRINGS, COLORADO 80907

TEST BORING LOG

DRAWN: DATE: CHECKED: *W* DATE: *1/13/16*

JOB NO.:

152124  
 FIG NO.:  
 B-6