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PRELIMINARY SOIL, GEOLOGY, GEOLOGIC HAZARD, AND WASTEWATER STUDY MEADOWLAKE RANCH 13202 JUDGE ORR ROAD EL PASO COUNTY, COLORADO

Prepared for

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Respectfully Submitted,

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1.0 SUMMARY

Project Location

The project lies in portions Section 32, Township 12 South, Range 64 West of the 6th Principal Meridian in El Paso County, Colorado. The site is located approximately two miles northeast of Falcon, Colorado.

Project Description

Total acreage involved in the project is approximately three hundred and seven acres. The proposed site development consists thirty-eight Rural Residential Lots, three hundred and sixty-two Urban Residential Lots, Commercial Lots, Industrial Lots and Open Space. The development will utilize municipal sewer and water on the Urban Residential, Commercial and Industrial Areas, and individual water wells and on-site wastewater treatment systems on the Rural Residential Lots. The existing house is to remain.

Scope of Report

This report presents the results of our geologic evaluation and treatment of engineering geologic hazard study.

Land Use and Engineering Geology

This site was found to be suitable for the proposed development. Areas were encountered where the geologic conditions will impose some constraints on development and land use. These include areas of shallow bedrock, expansive soils, artificial fill, erosion, floodplain, ponded water, shallow groundwater, seasonal shallow groundwater and potentially seasonally shallow groundwater areas. Based on the proposed development plan, it appears that these areas will have some impact on the development. These conditions will be discussed in greater detail in the report.

In general, it is our opinion that the development can be achieved if the observed geologic conditions on site are either avoided or properly mitigated. All recommendations are subject to the limitations discussed in the report.

2.0 GENERAL SITE CONDITIONS AND PROJECT DESCRIPTION

The site is located in portions Section 32, Township 12 South, Range 64 West of the 6th Principal Meridian in El Paso County, Colorado. The site is located approximately two miles northeast of Falcon, Colorado, north of Highway 24 and Judge Orr Road. The location of the site is as shown on the Vicinity Map, Figure 1.

The topography of the site is generally gradually to moderately sloping to the east-southeast. The drainages on site flow in a southerly direction through the eastern and western portions of the site. Several ponds are located in the western portion of the site along the mapped wetlands area. Water was observed in two ponds, and portions of the drainages in the eastern portion of the site at time of this investigation. Several seasonally wet and potentially seasonal wet areas are located in the eastern and western portions of the site. The site boundaries are indicated on the USGS Map, Figure 2. Previous land uses have included grazing and pasture land. The site contains primarily field grasses, weeds, cacti, and yuccas, with areas of scattered trees along the drainages and ponds. Site photographs, taken June 20, 2018, are included in Appendix A.

Total acreage involved in the proposed development is approximately three hundred and seven acres. Rural and Urban single-family residential lots are proposed along the northern and western portions of the site; Industrial areas are proposed in the east-central portion of the site; Commercial areas are proposed in the southern portion; and open space along the drainage area in the western portion of the site. The one-acre or smaller lots will be serviced municipal sewer and water, and the two and half-acre lots will have individual water wells and on-site wastewater treatment systems. The proposed Sketch Plan is presented in Figure 3.

3.0 SCOPE OF THE REPORT

The scope of the report will include the following:

- A general geologic analysis utilizing published geologic data. Detailed site-specific mapping will be conducted to obtain general information in respect to major geographic and geologic features, geologic descriptions and their effects on the development of the property.

4.0 FIELD INVESTIGATION

Our field investigation consisted of the preparation of a geologic map of any bedrock features and significant surficial deposits. The Natural Resource Conservation Service (NRCS), previously the Soil Conservation Service (SCS) survey was also reviewed to evaluate the site. The position of mappable units within the subject property are shown on the Geologic Map. Our mapping procedures involved both field reconnaissance and measurements and air photo reconnaissance and interpretation. The same mapping procedures have also been utilized to produce the Engineering Geology Map which identified pertinent geologic conditions affecting development. The field mapping was performed by personnel of Entech Engineering, Inc. on June 20, 2016.

Eight Test Borings were drilled on the site to determine general soil and bedrock characteristics. Two Test Pits were excavated in the area of the lots that will have individual on-site wastewater treatment systems. The locations of the test borings and test pits are indicated on the Development Plan/Test Boring Location Map, Figure 3. The Test Boring and Test Pit Logs are presented in Appendix B. Results of this testing will be discussed later in this report.

Laboratory testing was also performed on some of the soils to classify and determine the soils engineering characteristics. Laboratory tests included grain-size analysis ASTM D-422, Atterberg Limits ASTM D-4318, volume change testing using FHA Swell and Swell/Consolidation Tests. Sulfate testing was performed on select samples to evaluate potential for below grade concrete degradation due to sulfate attack. Results of the laboratory testing are included in Appendix C. A Summary of Laboratory Test Results is presented in Table 1.

5.0 SOIL, GEOLOGY AND ENGINEERING GEOLOGY

5.1 General Geology

Physiographically, the site lies in the western portion of the Great Plains Physiographic Province. Approximately seventeen miles to the west of the site is a major structural feature known as the Rampart Range Fault. This fault marks the boundary between the Great Plains

Physiographic Province and the Southern Rocky Mountain Province. The site exists within the southeastern edge of a large structural feature known as the Denver Basin. Bedrock in the area tends to be very gently dipping in a northwesterly direction (Reference 1). The rocks in the area of the site are sedimentary in nature and typically Upper Cretaceous in age. The bedrock underlying the site consists of the Dawson Formation. Overlying this formation are unconsolidated deposits of man-made fill soils, residual soils from in-situ weathering of the bedrock, and alluvial soils of Quaternary Age. The alluvial soils were deposited by water on site and as stream terraces along the drainages located on the site. Man-made soils exist as earthen dams located in the western portion of the site. The site's stratigraphy will be discussed in more detail in Section 5.3.

5.2 Soil Conservation Survey

The Natural Resource Conservation Service (Reference 2), previously the Soil Conservation Service (Reference 3) has mapped two soil types on the site (Figure 4). In general, the soils classify as gravelly sandy loam and sandy loam. The soils are described as follows:

Type	Description
19	Columbine gravelly sandy loam, 0 to 3% slopes
83	Stapleton sandy loam, 3 to 8% slopes

Complete descriptions of each soil type are presented in Appendix D. The soils have generally been described to have rapid to very rapid permeabilities. Possible hazards with soil erosion are present on the site. The erosion potential can be controlled with vegetation. The majority of the soils have been described to have slight to moderate erosion hazards.

5.3 Site Stratigraphy

The Falcon Quadrangle Geology Map showing the site is presented in Figure 5 (Reference 4). The Geology Map prepared for the site is presented in Figure 6. Five mappable units were identified on this site which are described as follows:

Qaf **Artificial Fill of Holocene Age:** These are recent deposits of man-made fill. They are associated with the man-made dams located in the western portion of the site.

These are located within a proposed open space area and will be avoided by future development. Additionally, erosion berms were observed in places on the property that have not been mapped on Figure 6.

Qa_1 **Alluvium One of Late Holocene Age:** These are water deposited sands, gravels and silts with minor clay lenses typically located along active stream channels and low stream-terrace deposits on the site. Alluvium One is correlative to the Post-Piney Creek Alluvium of the Denver area.

Qa_2 **Alluvium Two of Early Holocene Age:** These materials consist of water deposited alluvium, typically classified as a silty to well-graded sand, brown to dark brown in color and of moderate density. Alluvium Two is correlative to the Piney Creek Alluvium of the Denver area.

Qa_3 **Alluvium Three of Late Pleistocene Age:** These materials consist of lower stream terrace deposits, typically classified as silty to clayey gravelly sands. This deposit is usually highly stratified and may contain lenses of silt, clay, or cobbles. Alluvium Three is correlative to the Broadway Alluvium of the Denver area.

Tda **Dawson Arkose of Paleocene to Eocene Age:** The Dawson Arkose typically consists of arkosic sandstone with interbedded fine-grained sandstone, siltstone and claystone. Overlying this formation is a variable layer of residual soil. The residual soils were derived from the in-situ weathering of the bedrock materials on-site. These soils consisted of silty to clayey sands and sandy clays.

The soils listed above were mapped from site-specific mapping, the *Geologic Map of the Falcon Quadrangle* distributed by the Colorado Geological Survey in 2012 (Reference 4), the *Geologic Map of the Pueblo 1^0 x 2^0 Quadrangle*, distributed by the US Geological Survey in 1978 (Reference 5). The Test Borings and Test Pit were also used in evaluating the site and are included in Appendix B. The Geology Map prepared for the site is presented in Figure 6.

5.4 Soil Conditions

The soils encountered in the Test Borings can be grouped into four general soil types. The soils were classified using the Unified Soil Classification System (USCS).

Soil Type 1, classified as silty to slightly silty sand (SM, SM-SW), was encountered in all of the test borings at the existing ground surface and extending to depths ranging from one foot to 19 feet bgs. These soils were encountered at loose to dense states and at moist conditions. The majority of the soils were encountered and medium dense states. Samples tested had 8 to 32 percent of soil size particles passing the No. 200 Sieve. Atterberg Limits Testing resulted in the sand being non-plastic. Sulfate testing resulted in 0.01 percent sulfate by weight indicating the sand exhibits negligible potential for below grade concrete degradation.

Soil Type 2, classified as very clayey sand (SC), was encountered in Test Boring No. 2 at 14 feet and extended to 19 bgs. These soils were encountered at medium dense states and moist conditions. Samples tested had 47 percent of soil size particles passing the No. 200 Sieve. Atterberg Limits Testing resulted in a liquid limit of 30 and a plastic index of 14. FHA Swell testing resulted in expansion pressure of 940 psf, indicating a low to moderate expansion potential.

Soil Type 3, classified as silty to slightly silty sandstone and clayey sandstone (SM, SM-SW, SC), was encountered in six of the eight test borings at depths ranging from one foot to 19 feet bgs and extending to depths ranging from 16 feet to the termination of the test borings (20 feet). The sandstone was encountered at very dense states and at moist conditions. Samples tested had 7 to 42 percent of soil size particles passing the No. 200 Sieve. Atterberg Limits Testing on selected samples resulted a liquid limit of 37 and a plastic index of 15, and non-plastic results. Swell/Consolidation Testing resulted in the sandstone having a consolidation of 0.7 percent. Sulfate testing resulted in 0.00 to 0.01 percent sulfate by weight indicating the sandstone exhibits negligible potential for below grade concrete degradation.

Soil Type 4, classified as sandy to very sandy claystone (CL), was encountered in five of the test borings at depths ranging from 7 to 19 feet bgs and extending to the termination of the test borings (20 feet). The claystone was encountered at hard consistencies and at moist conditions. Samples tested had 53 to 87 percent of soil size particles passing the No. 200 Sieve.

Swell/Consolidation Testing resulted in an expansion of 1.3 percent, which indicates the claystone exhibits a low to moderate expansion potential. Atterberg Limits Testing resulted in a liquid limit of 30 and a plastic index of 11.

The Test Boring Logs are presented in Appendix B. Laboratory Test Results are presented in Appendix C. A Summary of Laboratory Test Results is presented in Table 1. The depth to bedrock is summarized in Table 2.

5.5 Groundwater

Groundwater was encountered in six of the test borings at depths ranging from 8.5 to 12 feet, groundwater was not encountered in the remaining borings which were drilled to 20 feet. Groundwater was encountered in Test Pit No. 2 at 5 feet. The depth to groundwater is summarized on Table 2. Areas of ponded water, seasonal shallow groundwater water, and potential seasonal shallow groundwater have been mapped along the drainages on-site. These areas are discussed in the following sections. Fluctuation in groundwater conditions may occur due to variations in rainfall and other factors not readily apparent at this time.

It should be noted that in the sandy materials on-site, some groundwater conditions might be encountered due to the variability in the soil profile. Isolated sand and gravel layers within the soils, sometimes only a few feet in thickness and width, can carry water in the subsurface. Groundwater may also flow on top of the underlying bedrock. Builders and planners should be cognizant of the potential for the occurrence of such subsurface water features during construction on-site and deal with each individual problem as necessary at the time of construction.

6.0 ENGINEERING GEOLOGY – IDENTIFICATION AND MITIGATION OF GEOLOGIC HAZARDS

As mentioned previously, detailed mapping has been performed on this site to produce an Engineering Geology Map Figure 6. This map shows the location of various geologic conditions of which the developers should be cognizant during the planning, design and construction

stages of the project. These hazards and the recommended mitigation techniques are as follows:

Artificial Fill

These are recent man-made fill deposits associated with the dams located in the western portion of the site. This area is located in a proposed open space area and will be avoided by the development. One dam is in the area of a proposed roadway. It is anticipated that this dam will be removed and replaced with controlled fill during the site grading process. Areas of fill other than these mapped may be encountered, particularly associated with erosion berms.

Mitigation: The earthen dams lie within defined drainages and should be avoided as building sites. The fill on this site is considered uncontrolled for construction purposes. It is anticipated the erosion berms would be mitigated during site grading or could be penetrated by foundations. Any uncontrolled fill encountered beneath foundations will require removal and recompaction at a minimum of 95% of its maximum Modified Procter Dry Density, ASTM D-1557.

Collapsible Soils

The majority of the soils encountered on-site do not exhibit collapsible characteristics, however, areas of loose soils were encountered in the test borings drilled on site. Should loose or collapsible soils be encountered beneath foundations, recompaction and moisture conditioning of the upper 2 feet of soil at 95% of its maximum Modified Proctor Dry Density ASTM D-1557 will be required. Exterior flatwork and parking areas may also experience movement. Proofrolling and recompaction of soft areas should be performed during site work.

Expansive Soils

Expansive soils were encountered in the test borings drilled on site. These occurrences are typically sporadic; therefore, none have been indicated on the maps. These clays and claystones, if encountered at foundation grade, can cause differential movement in structures. These occurrences should be identified and dealt with on an individual basis.

Mitigation Should expansive soils be encountered beneath foundations, mitigation will be necessary. Mitigation of expansive soils will require special foundation design. Overexcavation and replacement with non-expansive soils at a minimum of 95% of its maximum Modified

Proctor Dry Density, ASTM D-1557 is a suitable mitigation, which is common in the area. Floor slabs on expansive soils should be expected to experience movement. Overexcavation and replacement has been successful in minimizing slab movements. The use of structural floors should be considered for basement construction on highly expansive clays. Final recommendations should be determined after additional investigation of each building site.

Shallow Bedrock

Areas of shallow bedrock were encountered in some of the test borings drilled on site. Bedrock depths are summarized in Table 2. Areas of shallow bedrock may be encountered, particularly in areas mapped as Tda – Dawson Arkose Formation. Where shallow sandstone is encountered, higher allowable bearing capacities are anticipated. Shallow claystone may require mitigation of expansive soils. Overexcavation may be required in some areas to provide for soils of similar bearing capacity. The foundations should rest entirely on one soil type. Penetration to sandstone or overexcavation and replacement with compacted structural fill may be necessary in some areas. Excavation extending into the sandstone or claystone bedrock may be difficult and required track-mounted equipment or blasting.

Areas of Erosion

These are areas that are undergoing erosion by water and sheetwash producing minor gullies along some of the drainages on site.

Mitigation: Due to the nature of the soils on this site, virtually all the soils are subject to erosion by wind and water. Minor areas of erosion were observed on site, particularly in some of the drainages on site. Areas of erosion can occur across the entire site, particularly if the soils are disturbed during construction. Vegetation reduces the potential for erosion. Where erosion is actively taking place, check dams, regrading and revegetation using channel lining mats to anchor vegetation may be required. Further recommendations for erosion control are discussed under Section 9.0 "Erosion Control" of this report. Recommendations pertaining to revegetation may require input from a qualified landscape architect and/or the Natural Resource Conservation Service (previously Soil Conservation Service).

Groundwater and Floodplain Areas

Groundwater was encountered at depths ranging from 8.5 to 12 feet in six of the test borings drilled on site. Groundwater was encountered at 5 feet in Test Pit No. 2. Groundwater depths are summarized in Table 2. Areas within the drainages on-site have been identified as areas of seasonally wet and/or seasonally high groundwater areas. Water was observed in the ponds on-site and flowing in portions of the drainages in the eastern portion of the site. The site is not mapped within floodplain zones according to the FEMA Map No. 08041CO575F, Figure 7 (Reference 6), however, floodplain areas are mapped adjacent to the site. There are wetland areas identified by others along portions of the drainages in the eastern and western portions of the site. These areas are discussed as follows:

- *Seasonal Shallow Groundwater Area*
  In these areas, we would anticipate periodic high subsurface moisture conditions and frost heave potential on a seasonal basis. Additional, highly organic soils could be encountered in these areas. The majority of these areas lie within defined drainages and it is anticipated they will be avoided by development. Some areas may be encountered on the site where perched water conditions exist where groundwater flows in permeable upper alluvial terrace materials on top of the impermeable bedrock. Any structures in or adjacent to these areas should follow the mitigation discussed below.

  Mitigation: Foundations must have a minimum 30-inch depth for frost protection. In areas where high subsurface moisture conditions are anticipated periodically, subsurface perimeter drains are recommended to help prevent the intrusion of water into areas below grade. Typical drain details are presented in Figure 8. Any grading in these areas should be done to direct surface flow around construction to avoid areas of ponded water. Structures should not block drainages. All organic material should be completely removed prior to any fill placement. Unstable soil conditions should be expected in areas of shallow groundwater. Where excavations approach the groundwater level, stabilization utilizing shot rock or geogrids may be necessary. Underslab drains or capillary breaks and interceptor drains may be necessary to prevent the intrusion of groundwater into areas below grade. Typical drain details are presented in Figures 9 and 10. Finished floor levels must be located a minimum of one foot above floodplain levels. Specific floodplain locations and drainage studies are beyond the scope of this report.

- *Potentially Seasonal Shallow Groundwater Area*

  In these areas, we would anticipate the potential for periodically high subsurface moisture conditions, frost heave potential and highly organic soils. Many of these areas lie near or within defined drainages which can likely be avoided by the proposed development. In other areas, site grading may raise foundations above the groundwater level. The same mitigation recommendations for the seasonal shallow groundwater areas apply to the potentially seasonal shallow groundwater areas.

- *Areas of Ponded Water*

  These are areas of standing water behind earthen dams on site. These areas are designated as open space and we would not expect development in these areas. Either the dams can be avoided by construction or the areas may be completely regraded. Should complete regrading of the site be considered, all organic matter and soft, wet soils should be completely removed and stabilized before filling. Any drainage into these areas should be rerouted in a non-erosive manner off of the site where it does not create areas of ponded water around proposed structures. Structures adjacent to these areas may required drain systems, as mentioned above, to help prevent the intrusion of water into below grade areas.

6.1 Relevance of Geologic Conditions to Land Use Planning

As mentioned earlier in this report, we understand that the development will be Rural Residential, Urban Residential, Commercial and Industrial lots. It is our opinion that the existing geologic and engineering geologic conditions will impose some constraints on the proposed development and construction. The most significant problems affecting development will be those associated with the major drainages on site that are mitigated by avoidance. The minor drainages are being mitigated by site grading. Other hazards on site may be satisfactorily mitigated through proper engineering design and construction practices.

The upper materials are typically at loose to dense states. The medium dense to dense granular soils encountered in the upper soil profiles of the test borings should provide good support for foundations. Loose soils, if encountered at foundation depth, will require mitigation. Shallow bedrock may be encountered on portions of this site. Higher allowable bearing capacities for foundations can be expected in areas of shallow bedrock. Additionally,

overexcavation may be required to provide for soils of similar bearing capacity. Foundations anticipated for the site are standard spread footings possibly in conjunction with overexcavation in areas of expansive soils or loose soils or to provide similar bearing capacity in areas of shallow bedrock. Excavation is anticipated to be moderate with rubber-tired equipment for the site sand materials and will require track mounted equipment for the dense sandstone. Expansive layers may also be encountered in the soil and bedrock on this site. Areas of expansive soils encountered on site are sporadic; therefore, none have been indicated on the maps. Expansive soils, if encountered, will require special foundation design and/or overexcavation. These soils will not prohibit development.

Areas of seasonal and potentially seasonal high groundwater areas and ponded water were encountered on site. The majority of these areas are located in proposed open space areas and can be avoided by construction. Areas of perched groundwater conditions may be encountered where water flows through permeable sands on top of impermeable bedrock. Many areas will likely be filled during site grading, further raising foundations above the groundwater level. Any organic or soft soils should be removed prior to fill placement on the site. Unstable conditions should be expected where excavations approach the groundwater level. Stabilization using shot rock and geo grids may be necessary. Drains may be necessary for structures in or adjacent to these areas to help prevent the intrusion of water into areas below grade. Typical drain details are presented in Figures 8 through 10. Additional investigation is recommended as development plans are finalized. The water table may be at sufficient depths to minimize the effects on buildings, depending on site grading. The site does not lie within any floodplain zones according to the FEMA Map No. 08041CO575F, dated March 17, 1997 (Figure 7, Reference 6), however, floodplains are mapped adjacent to the site. Finished floor levels must be a minimum of one foot above the floodplain level. Exact locations of floodplain and specific drainage studies are beyond the scope of this report.

Areas of fill were observed on site associated with dams. The dams lie in designated open space and it is anticipated the dams will be avoided by development. An access way is proposed across one of the dams in the central western portion of the site. Proof rolling or recompaction may be required where roadways cross existing dams. Any uncontrolled fill encountered beneath foundations or roadways should be removed and recompacted at a minimum of 95% of its maximum Modified Proctor Dry Density, ASTM D-1557.

It is anticipated that foundations for the urban residential, rural residential, commercial and industrial areas will bear on medium dense sands or sandstone. Shallow spread footing foundations are anticipated. If expansive clay or claystone are encountered over excavation will be required.

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. Additional investigations will be required as development plans are completed.

7.0 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 7), the area is mapped with upland deposits. According to the *Atlas of Sand, Gravel and Quarry Aggregate Resources, Colorado Front Range Counties* distributed by the Colorado Geological Survey (Reference 8), areas of the site are mapped as A3: alluvial fan, sand resource and U4: Upland deposit, probable aggregate resource. According to the *Evaluation of Mineral and Mineral Fuel Potential* (Reference 9), the area of the site has been mapped as "Good" for industrial minerals. However, considering the silty 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 9), 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-site (Reference 9).

The site has been mapped as "Fair" for oil and gas resources (Reference 9). No oil or gas fields have been discovered in the area of the site. The sedimentary rocks in the area may lack the geologic structure for trapping oil or gas; therefore, it may not be considered a significant resource. Hydraulic fracturing is a new method that is being used to extract oil and gas from

rocks. It utilizes pressurized fluid to extract oil and gas from rocks that would not normally be productive. The area of the site has not been explored to determine if the rocks underlying the site would be commercially viable utilizing hydraulic fracturing. The practice of hydraulic fracturing has come under review due to concerns about environmental impacts, health and safety.

8.0 ON-SITE WASTEWATER TREATMENT

The site was evaluated for on-site wastewater treatment systems for the proposed lots in accordance with El Paso Land Development Code. Two (2) tactile test pits were performed in the area of the proposed Rural Residential Lots. Test pits were located in anticipated areas of proposed on-site wastewater treatment systems (OWTS) for the development. The approximate locations of the test pits are indicated on Figure 3 and 6. The locations were chosen to determine a general understanding of the soil, bedrock and groundwater conditions across the site. The results of the test pits are presented in Table 2. There are several existing structures on the lot with existing septic systems. The records for the existing septic systems are included in Appendix E.

The Natural Resource Conservation Service (Reference 2), previously the Soil Conservation Service (Reference 3) has been mapped with two soil descriptions. The Soil Survey Map (Reference 2) is presented in Figure 4, and the Soil Survey Descriptions are presented in Appendix D. The soils are described as having rapid to very rapid percolation rates.

Soils encountered in the tactile test pits consisted of loamy sand to gravelly loamy sand overlying clayey to silty sandstone. The limiting layers encountered in the test pits are the clayey to silty sandstone, which corresponds to an LTAR values of 0.15 to 0.30 gallons per day per square foot. The bedrock was encountered at 2 to 5 feet in the test pits. The conditions encountered in the test pits will require designed systems. Groundwater was encountered at 5 feet in Test Pit No. 2. Absorption fields must be maintained a minimum of 4 feet above groundwater or bedrock. Groundwater was observed in Test Pit No. 2 at 5 feet.

In summary, it is our opinion the site is suitable for individual on-site wastewater treatment systems (OWTS) and that contamination of surface and subsurface water resources should not

occur provided the OWTS sites are evaluated and installed according to El Paso County Guidelines and properly maintained. Based on the testing performed as part of this investigation and the type of project, designed systems will likely be required for the majority of the lots. Designed systems are required in areas of shallow bedrock, shallow groundwater, or low infiltration rates. A Septic Suitability Map is presented in Figure 11. Areas where further investigation are indicated on the map to determine groundwater depths. Absorption fields must be located a minimum of 100 feet from any well, including those on adjacent properties. Absorption fields must also be located a minimum of 50 feet from any ponded areas and 25 feet from dry gulches. It should be noted that additional testing will be required for final submittal once lot layouts have been determined, and for the individual lots prior to construction.

9.0 EROSION CONTROL

The soil types observed on the site are mildly to highly susceptible to wind erosion, and moderately to highly susceptible to water erosion. A minor wind erosion and dust problem may be created for a short time during and immediately after construction. Should the problem be considered severe enough during this time, watering of the cut areas or the use of chemical palliative may be required to control dust. However, once construction has been completed and vegetation re-established, the potential for wind erosion should be considerably reduced.

With regard to water erosion, loosely compacted soils will be the most susceptible to water erosion, residually weathered soils become increasingly less susceptible to water erosion. For the typical soils observed on-site, allowable velocities or unvegetated and unlined earth channels would be on the order of 3 to 4 feet/second, depending upon the sediment load carried by the water. Permissible velocities may be increased through the use of vegetation to something on the order of 4 to 7 feet/second, depending upon the type of vegetation established. Should the anticipated velocities exceed these values, some form of channel lining material may be required to reduce erosion potential. These might consist of some of the synthetic channel lining materials on the market or conventional riprap. In cases where ditch-lining materials are still insufficient to control erosion, small check dams or sediment traps may be required. The check dams will serve to reduce flow velocities, as well as provide small traps for containing sediment. The determination of the amount, location and placement of ditch linings, check dams and of the special erosion control features should be performed by or in

conjunction with the drainage engineer who is more familiar with the flow quantities and velocities.

Cut and fill slope areas will be subjected primarily to sheetwash and rill erosion. Unchecked rill erosion can eventually lead to concentrated flows of water and gully erosion. The best means to combat this type of erosion is, where possible, the adequate re-vegetation of cut and fill slopes. Cut and fill slopes having gradients more than three (3) horizontal to one (1) vertical become increasingly more difficult to revegetate successfully. Therefore, recommendations pertaining to the vegetation of the cut and fill slopes may require input from a qualified landscape architect and/or the Soil Conservation Service.

10.0 CLOSURE

It is our opinion that the existing geologic engineering and geologic conditions will impose some constraints on development and construction of the site. The majority of these conditions can be mitigated through proper engineering design and construction practices or avoidance. The proposed development and use is consistent with anticipated geologic and engineering geologic conditions.

It should be pointed out that because of the nature of data obtained by random sampling of such variable and non-homogeneous materials as soil and rock, it is important that we be informed of any differences observed between surface and subsurface conditions encountered in construction and those assumed in the body of this report. Individual investigations for building sites will be required prior to construction. Construction and design personnel should be made familiar with the contents of this report. Reporting such discrepancies to Entech Engineering, Inc. soon after they are discovered would be greatly appreciated and could possibly help avoid construction and development problems.

This report has been prepared for Dan Ferguson. for application to the proposed project in accordance with generally accepted geologic soil and engineering practices. No other warranty expressed or implied is made.

We trust that this report has provided you with all the information that you required. Should you require additional information, please do not hesitate to contact Entech Engineering, Inc.

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TABLES

TABLE 1

SUMMARY OF LABORATORY TEST RESULTS

CLIENT DAN FERGUSON
PROJECT 13202 JUDGE ORR ROAD
JOB NO. 180517

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	1	2-3			32.0	NV	NP				SM	SAND, SILTY
1	2	10			7.7			0.01			SM-SW	SAND, SLIGHTLY SILTY
1	3	15			18.7						SM	SAND, SILTY
1	5	5			11.2						SM-SW	SAND, SLIGHTLY SILTY
1	7	2-3			22.4						SM	SAND, SILTY
2	2	15			47.1	30	14		940		SC	SAND, VERY CLAYEY
3	8	5			19.7						SM	SANDSTONE, SILTY
3	1	15			41.8	37	15	0.00			SC	SANDSTONE, VERY CLAYEY
3	2	20	14.9	111.5	9.2					-0.7	SM-SW	SANDSTONE, SLIGHTLY SILTY
3	4	15			14.7	NV	NP				SM	SANDSTONE, SILTY
3	5	10			7.4			0.01			SM-SW	SANDSTONE, SLIGHTLY SILTY
4	7	10			86.7	30	11				CL	CLAYSTONE, SANDY
4	6	10	12.5	111.6	52.6					1.3	CL	CLAYSTONE, VERY SANDY

Table 2: Summary of Depth to Bedrock and Groundwater

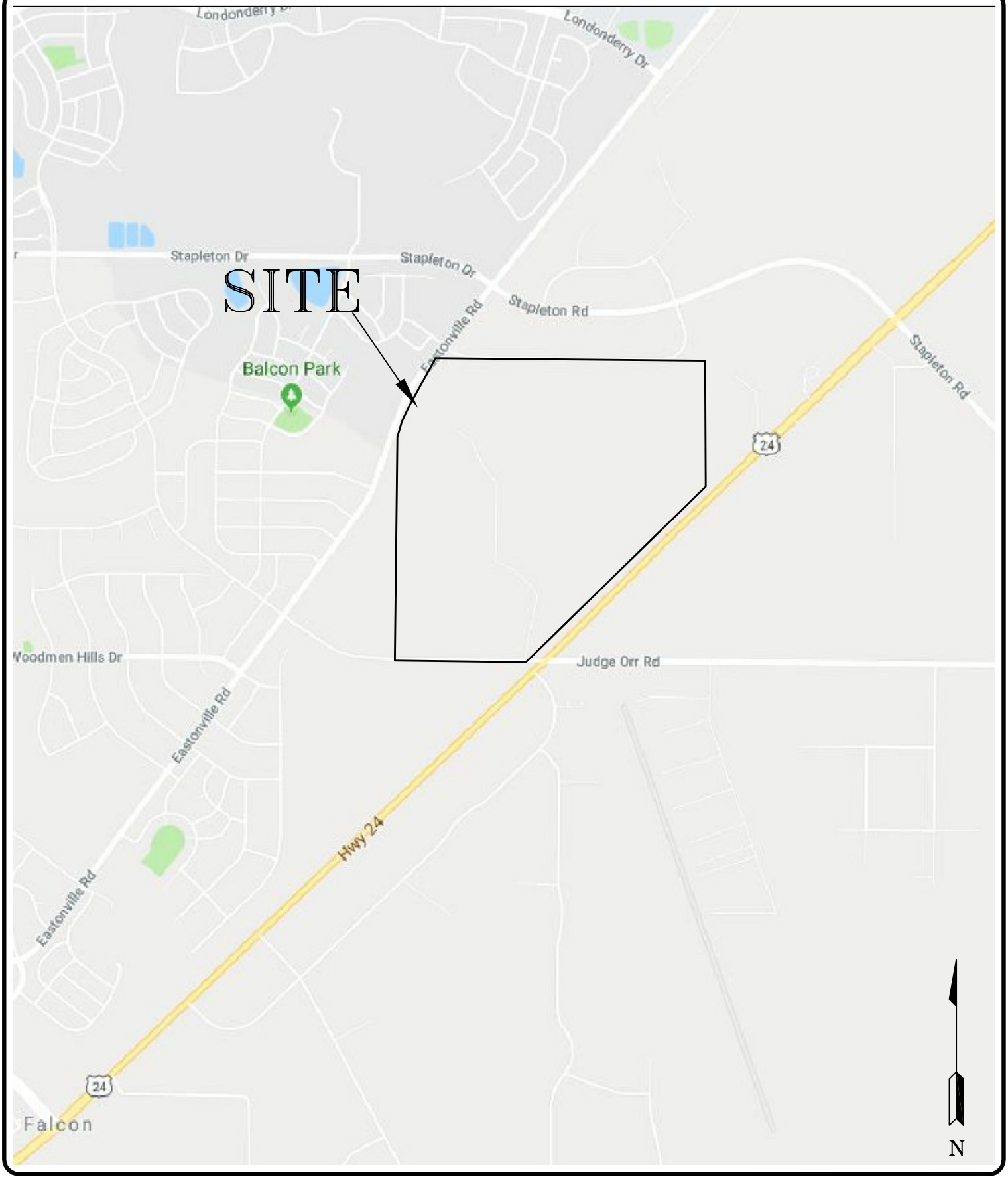
Test Boring No. Test Pit No.	Depth to Bedrock (ft)	Depth to Groundwater (ft)
TB-1	3	12
TB-2	19	11.5
TB-3	15	12
TB-4	1	8.5
TB-5	9	9
TB-6	7	>20
TB-7	4	>20
TB-8	1	9
TP-1	2	>5
TP-2	5	5

Table 3: Summary of Tactile Test Pit Results

Test Pit No.	USDA Soil Type Limiting Layer	LTAR Value	Depth to Bedrock (ft.)	Depth to Groundwater (ft.)
1	3A*	0.30	2	N/A
2	4A*	0.15	5	5

*- Conditions that will require an engineered OWTS

FIGURES



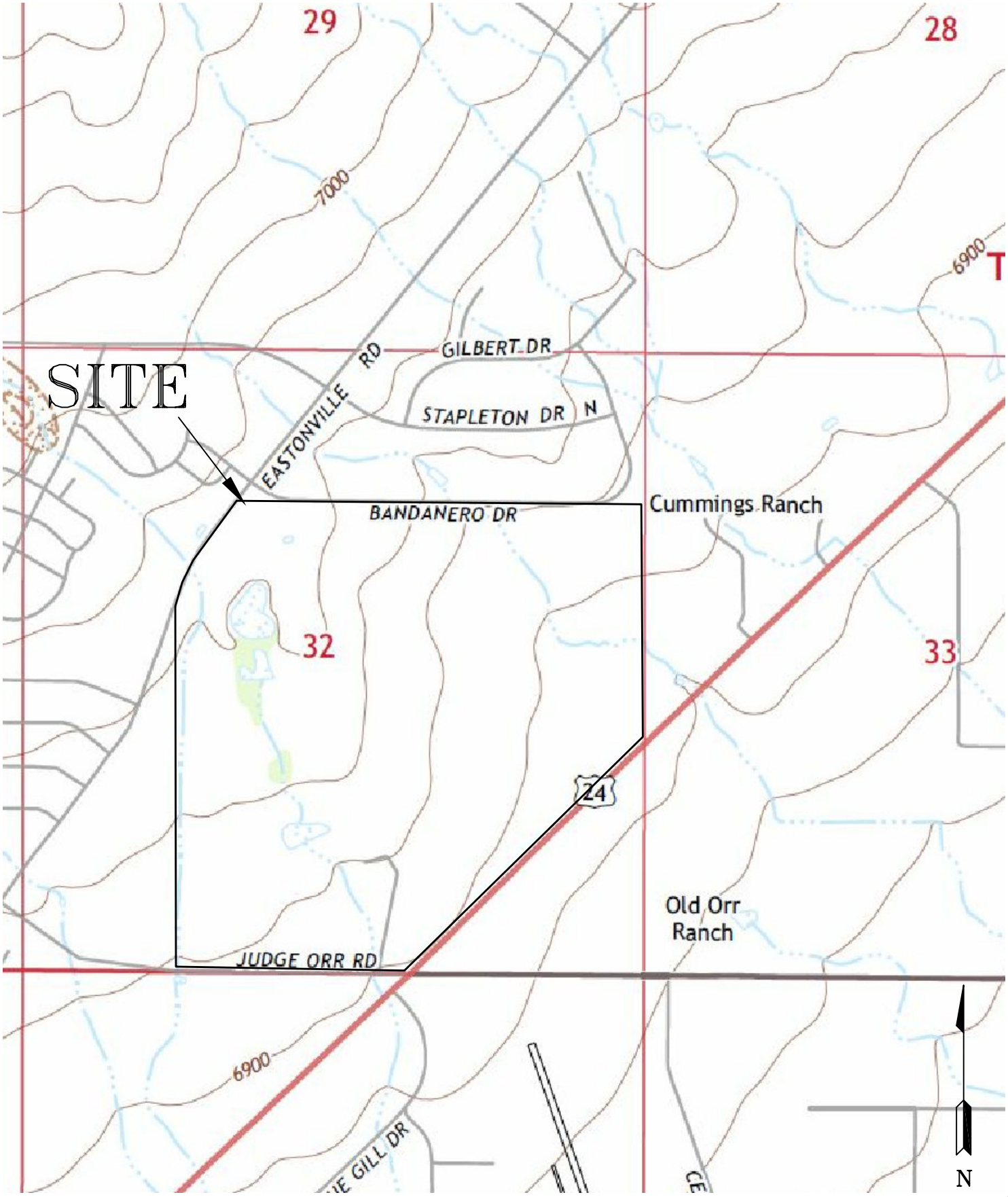
ENTECH ENGINEERING, INC.
505 ELKTON DRIVE
COLORADO SPRINGS, CO. 80907 (719) 531-5599

VICINITY MAP
MEADOWLAKE RANCH
13202 JUDGE ORR ROAD
EL PASO COUNTY, COLORADO
FOR: DAN FERGUSON

DRAWN:	DATE:	CHECKED:	DATE:
LLL	6/22/18		

JOB NO.: 180517

FIG NO.: 1



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

USGS MAP
MEADOWLAKE RANCH
13202 JUDGE ORR ROAD
EL PASO COUNTY, COLORADO
FOR: DAN FERGUSON

DRAWN:	DATE:	CHECKED:	DATE:
LLL	6/22/18		

JOB NO.: 180517

FIG NO.: 2

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COLORADO SPRINGS, CO. 80907

SITE PLAN/TEST BORING LOCATION MAP
MEADOWLAKE RANCH
13202 JUDGE ORR ROAD
EL PASO COUNTY, COLORADO
FOR: DAN FERGUSON

DRAWN	LLL
CHECKED	
DATE	6/22/18
SCALE	AS SHOWN
JOB NO.	180517
FIGURE No.	3

CHURCH
RR-5 ZONE

RURAL RESIDENTIAL
RR 2.5 ZONE
4 WAY RANCH FILING NO. 1
(RECEPTION NO. 206712416)

RURAL RESIDENTIAL
RR 2.5 ZONE
LOT 13
4 WAY RANCH FILING NO. 1
OWNER:
RAMON F AND BETH R GARCIA
(RECEPTION NO. 212141399)

URBAN LOTS

BANDANERO DRIVE
LOCAL ROAD (PUBLIC R.O.W VARIES)

N89°54'32"E 2535.52'

WOODMEN HILLS FILING NO. 11
(RECEPTION NO. 202145126)

Barb Wire Fence

TB-1 TB-6 TP-1 TB-7 TP-2 TB-5 TB-8 TB-4 TB-2 TB-3

P1 P2 P3 P4 P5 P6 P7 P8 P9 P10 P11 P12

RURAL RESIDENTIAL
2.5 AC LOTS
94.3 AC
38 LOTS

AGRICULTURE
A-35 ZONE
OWNER:
DISTINCTIVE MARINE CO.
(BOOK 5002 AT PAGE 1449)

S00°40'41"E 1486.80'

OWNER:
DISTINCTIVE MARINE CO.
(BOOK 5002 AT PAGE 1450)

OS
Wetland Area

URBAN RESIDENTIAL
3.5 UNITS/AC
37.4 AC
131 LOTS

Buffer

INDUSTRIAL
60.6 AC

URBAN LOTS

LOT 1178
WOODMEN HILLS FILING NO. 10
(RECEPTION NO. 214081521)

OWNER:
CATHERINE ST STONES
COMMUNITY CHURCH INC.

VACANT

EATONVILLE ROAD
MINOR ARTERIAL (70' PUBLIC R.O.W)
(RECEPTION NO. 202145126)

RR-5 ZONE
OWNER:
JOSHUA FAULKNER
DONNA ALVERSON-FAULKNER
LOT 1179
WOODMEN HILLS FILING NO. 10
(RECEPTION NO. 215038438)

N00°31'27"W 2604.56'

URBAN RESIDENTIAL
3.5 UNITS/AC
43.5 AC
151 LOTS

OS
Wetland Area

URBAN RESIDENTIAL
3.5 UNITS/AC
22.3 AC
80 LOTS

Building

VACANT
OWNER:
TRINITY FINANCIAL INC.
LOT 1177
WOODMEN HILLS FILING NO. 10
(RECEPTION NO. 208033065)

COMMERCIAL
24.8 AC

Permanent Easement
(Reception No. 217044771)

Temporary Easement
(Reception No. 217044772)

Barb Wire Fence

Split Vinyl Fence

Existing Rock Island Trail
(Offsite County Trail)

S45°45'46"W 3495.41' (C)

E-US HIGHWAY 24
PRINCIPAL ARTERIAL (PUBLIC R.O.W VARIES)

RURAL RESIDENTIAL

VACANT
PUD ZONE

JUDGE ORR ROAD
MINOR ARTERIAL (60' PUBLIC R.O.W)
(ROAD BOOK A PAGE 79)

S89°49'46"W 1705.56'

P2 - APPROXIMATE PHOTOGRAPH LOCATION AND NUMBER

- APPROXIMATE TEST BORING LOCATION AND NUMBER

- APPROXIMATE TEST PIT LOCATION AND NUMBER

N

N

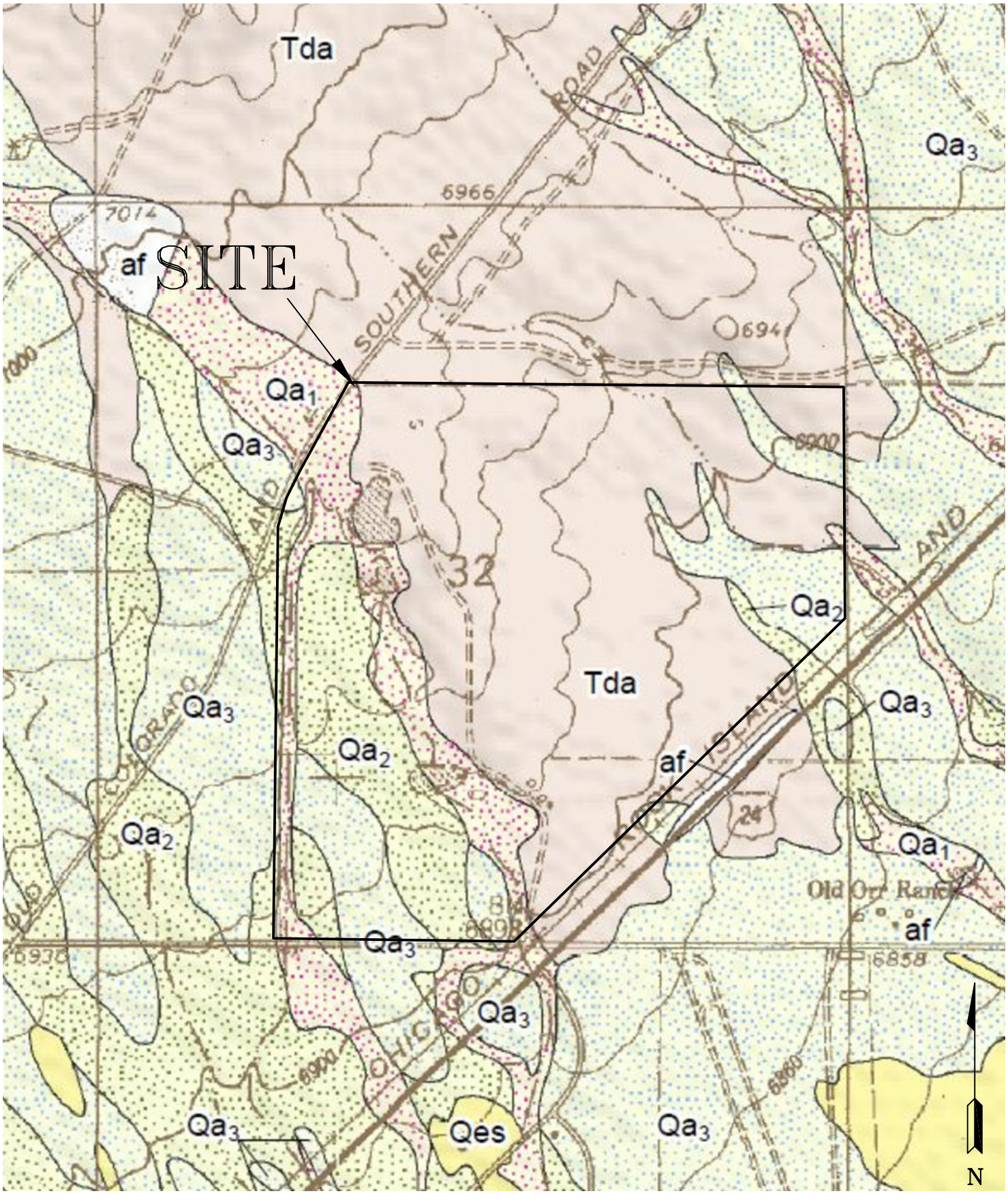
ENTECH
ENGINEERING, INC.
505 ELKTON DRIVE
COLORADO SPRINGS, CO. 80907 (719) 531-5599

SOIL SURVEY MAP
MEADOWLAKE RANCH
13202 JUDGE ORR ROAD
EL PASO COUNTY, CO.
FOR: DAN FERGUSON

DRAWN:	DATE:	CHECKED:	DATE:
LLL	6/22/18		

JOB NO.: 180517

FIG NO.: 4



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

FALCON QUADRANGLE GEOLOGY MAP
MEADOWLAKE RANCH
13202 JUDGE ORR ROAD
EL PASO COUNTY, COLORADO
FOR: DAN FERGUSON

DRAWN:	DATE:	CHECKED:	DATE:
LLL	6/22/18		

JOB NO.: 180517

FIG NO.: 5

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

GEOLOGY MAP/ENGINEERING GEOLOGY
MEADOWLAKE RANCH
13202 JUDGE ORR ROAD
EL PASO COUNTY, COLORADO
FOR: DAN FERGUSON

DRAWN	LLL
CHECKED	
DATE	6/26/18
SCALE	AS SHOWN
JOB NO.	180517
FIGURE No.	6

BANDANERO DRIVE
LOCAL ROAD (PUBLIC R.O.W VARIES)
N89°54'32"E 2635.52'

CHURCH
RR-5 ZONE

RURAL RESIDENTIAL
RR 2.5 ZONE
4 WAY RANCH FILING NO. 1
(RECEPTION NO. 206712416)

RURAL RESIDENTIAL
RR 2.5 ZONE
LOT 13
4 WAY RANCH FILING NO. 1
OWNER:
RAMON F AND BETH R GARCIA
(RECEPTION NO. 212141399)

URBAN LOTS

WOODMEN HILLS FILING NO. 11
(RECEPTION NO. 202145126)

AGRICULTURE
A-35 ZONE
OWNER:
DISTINCTIVE MARINE CO.
(BOOK 5002 AT PAGE 1449)

OWNER:
DISTINCTIVE MARINE CO.
(BOOK 5002 AT PAGE 1450)

S00°40'41"E 1486.80'

RURAL RESIDENTIAL
2.5 AC LOTS
94.3 AC
38 LOTS

URBAN RESIDENTIAL
3.5 UNITS/AC
37.4 AC
131 LOTS

OS
Wetland Area

INDUSTRIAL
60.6 AC

URBAN RESIDENTIAL
3.5 UNITS/AC
22.3 AC
80 LOTS

URBAN RESIDENTIAL
3.5 UNITS/AC
43.5 AC
151 LOTS

COMMERCIAL
24.8 AC

Barb Wire Fence
Buffer
Building
Split Vinyl Fence
Existing Rock Island Trail
(Offsite County Trail)

TB-1 TB-2 TB-3 TB-4 TB-5 TB-6 TB-7 TB-8
TP-1 TP-2

EATONVILLE ROAD
MINOR ARTERIAL (70' PUBLIC R.O.W)
(RECEPTION NO. 202145126)

OWNER:
GATHERING STONES
COMMUNITY CHURCH INC.

WOODMEN HILLS FILING NO. 10
(RECEPTION NO. 214081521)
LOT 1178

VACANT

RR-5 ZONE
OWNER:
JOSHUA FAULKNER
DONNA ALVERSON-FAULKNER
LOT 1179
WOODMEN HILLS FILING NO. 10
(RECEPTION NO. 215038438)

N00°31'27"W 2604.56'

VACANT
OWNER:
TRINITY FINANCIAL INC.
LOT 1177
WOODMEN HILLS FILING NO. 10
(RECEPTION NO. 208033065)

Permanent Easement
(Reception No. 217044771)
Temporary Easement
(Reception No. 217044772)

JUDGE ORR ROAD
MINOR ARTERIAL (60' PUBLIC R.O.W)
(ROAD BOOK A PAGE 79)

S89°49'46"W 1705.56'

PUD

RURAL RESIDENTIAL

US HIGHWAY 24
PRINCIPAL ARTERIAL (PUBLIC R.O.W VARIES)
S45°45'46"W 3495.44' (C)

N

LEGEND:

Qaf - Artificial Fill of Holocene Age:
man-made fill deposits associated with earthen dams on-site

Qa1 - Alluvium One of Late Holocene Age:
water deposited sands and clays, correlative to the Post-Piney Creek Alluvium

Qa2 - Alluvium Two of Early Holocene Age:
water deposited sands and clays, correlative to the Piney Creek Alluvium

Qa3 - Alluvium Three of Late Pleistocene Age:
stream terrace deposited sands, correlative to the Broadway Alluvium

Tda - Dawson Arkose of Paleocene to Eocene Age:
arkosic sandstone with siltstone and claystone lenses

psw - potentially seasoal shallow groundwater area
sw - seasonally wet area
w - water

LEGEND

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A No Base Flood Elevations determined.

ZONE AE Base Flood Elevations determined.

ZONE AH Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.

ZONE AO Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.

ZONE AR Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.

ZONE A99 Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.

ZONE V Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.

ZONE VE Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X Areas determined to be outside the 0.2% annual chance floodplain.

ZONE D Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

- 1% annual chance floodplain boundary
- 0.2% annual chance floodplain boundary
- Floodway boundary
- Zone D boundary
- CBRS and OPA boundary
- Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
- 513 — Base Flood Elevation line and value; elevation in feet*
- (EL. 987) — Base Flood Elevation value where uniform within zone; elevation in feet*

*Referenced to the National Geodetic Vertical Datum of 1929

- A — A — Cross section line
- 23 — 23 — Transect line
- 97°07'30", 32°22'30" — Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere
- 4276000 M — 1000-meter Universal Transverse Mercator grid tick values, zone 4
- 600000 FT — 5000-foot grid tick values: Hawaii State Plane coordinate system, zone 3 (FIPSZONE 5103), Transverse Mercator projection
- DX5510 X — Bench mark (see explanation in Notes to Users section of this FIRM panel)
- M 2 — Coastal Mile marker

MAP REPOSITORY

Refer to listing of Map Repositories on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP

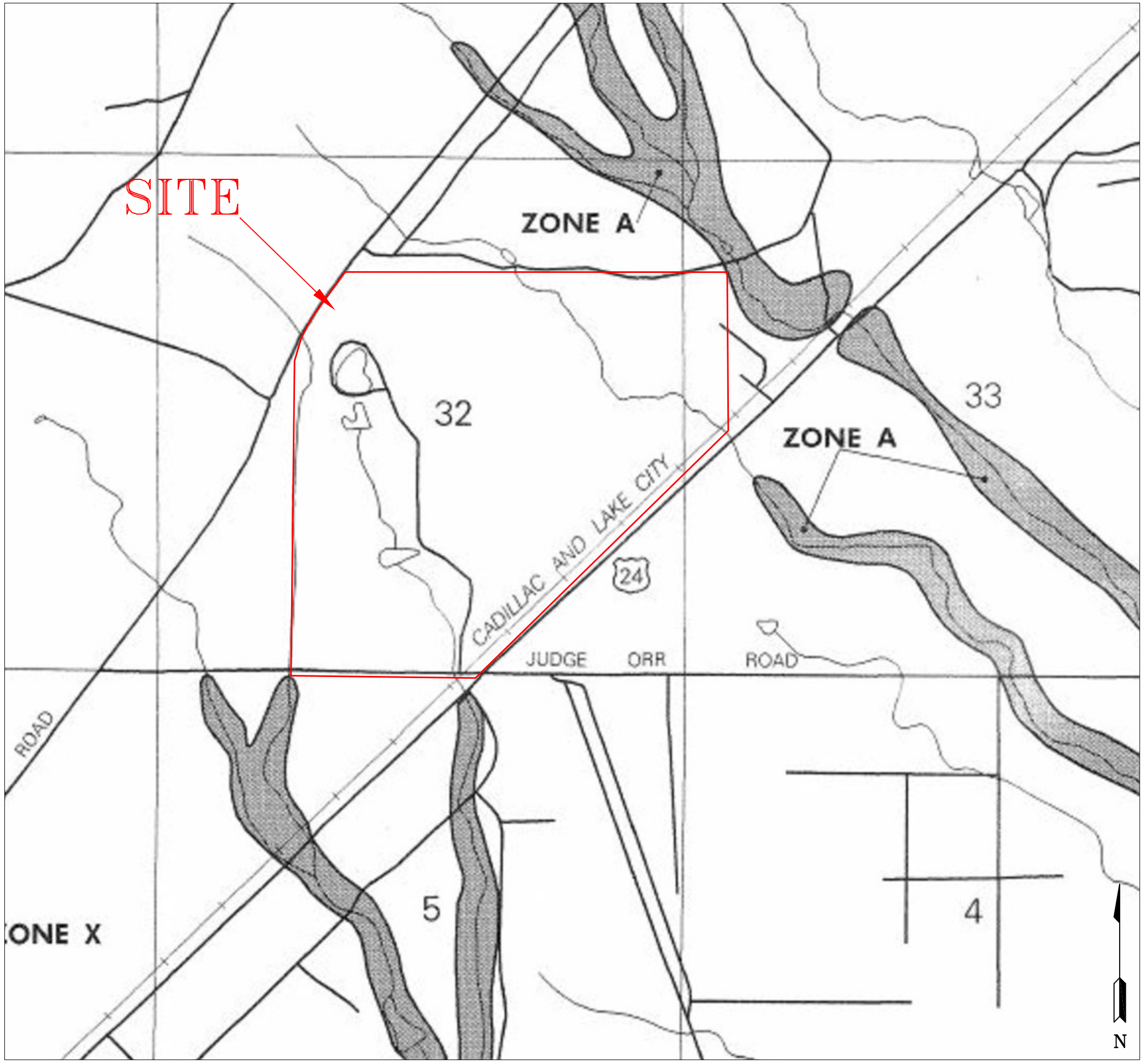
November 20, 2000

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

September 30, 2004 – to change Special Flood Hazard Areas, to update map format, to reflect revised shoreline and to incorporate previously issued Letters of Map Revision.

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.



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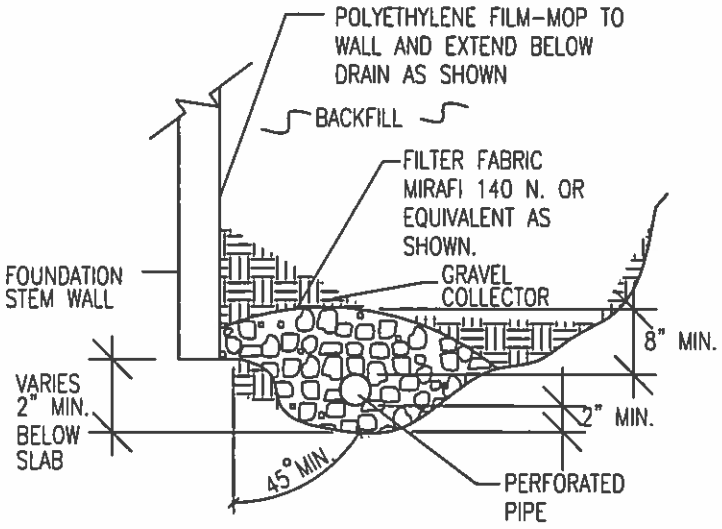
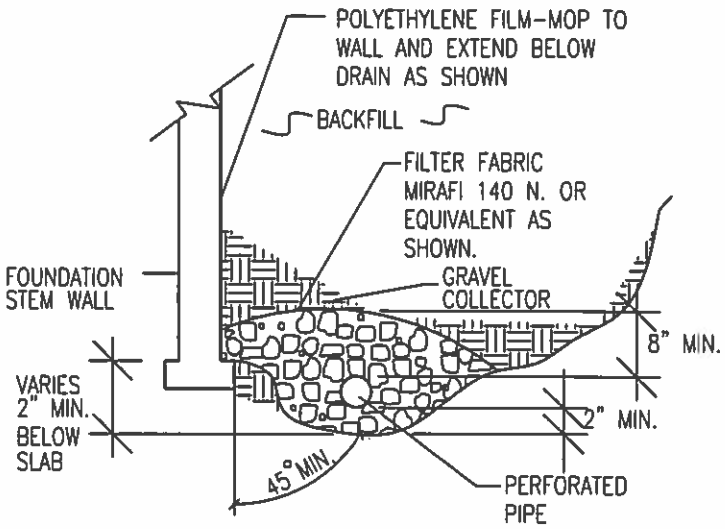
505 ELKTON DRIVE
COLORADO SPRINGS, CO. 80907
(719) 531-5599

FLOODPLAIN MAP
MEADOWLAKE RANCH
13202 JUDGE ORR ROAD
EL PASO COUNTY, COLORADO
FOR: DAN FERGUSON

DRAWN	LLL
CHECKED	
DATE	6/22/18
SCALE	AS SHOWN
JOB NO.	180517
FIGURE No.	7





NOTES:

-GRAVEL SIZE IS RELATED TO DIAMETER OF PIPE PERFORATIONS-85% GRAVEL GREATER THAN 2x PERFORATION DIAMETER.

-PIPE DIAMETER DEPENDS UPON EXPECTED SEEPAGE. 4-INCH DIAMETER IS MOST OFTEN USED.

-ALL PIPE SHALL BE PERFORATED PLASTIC. THE DISCHARGE PORTION OF THE PIPE SHOULD BE NON-PERFORATED PIPE.

-FLEXIBLE PIPE MAY BE USED UP TO 8 FEET IN DEPTH, IF SUCH PIPE IS DESIGNED TO WITHSTAND THE PRESSURES. RIGID PLASTIC PIPE WOULD OTHERWISE BE REQUIRED.

-MINIMUM GRADE FOR DRAIN PIPE TO BE 1% OR 3 INCHES OF FALL IN 25 FEET.

-DRAIN TO BE PROVIDED WITH A FREE GRAVITY OUTFALL, IF POSSIBLE. A SUMP AND PUMP MAY BE USED IF GRAVITY OUT FALL IS NOT AVAILABLE.

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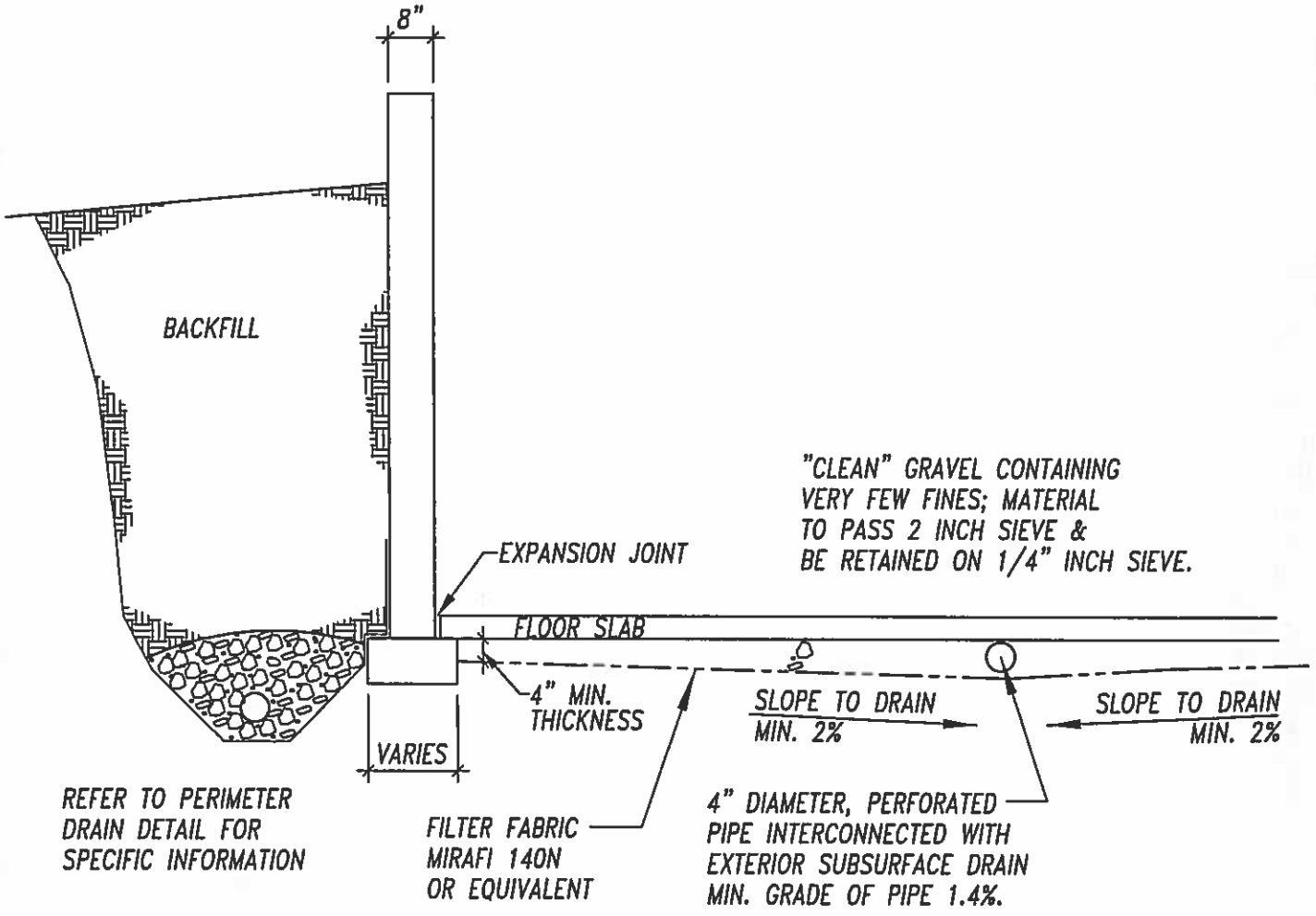
505 ELKTON DRIVE
COLORADO SPRINGS, CO. 80907 (719) 531-5599

PERIMETER DRAIN DETAIL

DRAWN:	DATE DRAWN:	DESIGNED BY:	CHECKED:
		OS	LLL

JOB NO.: 180517

FIG. NO.: 8

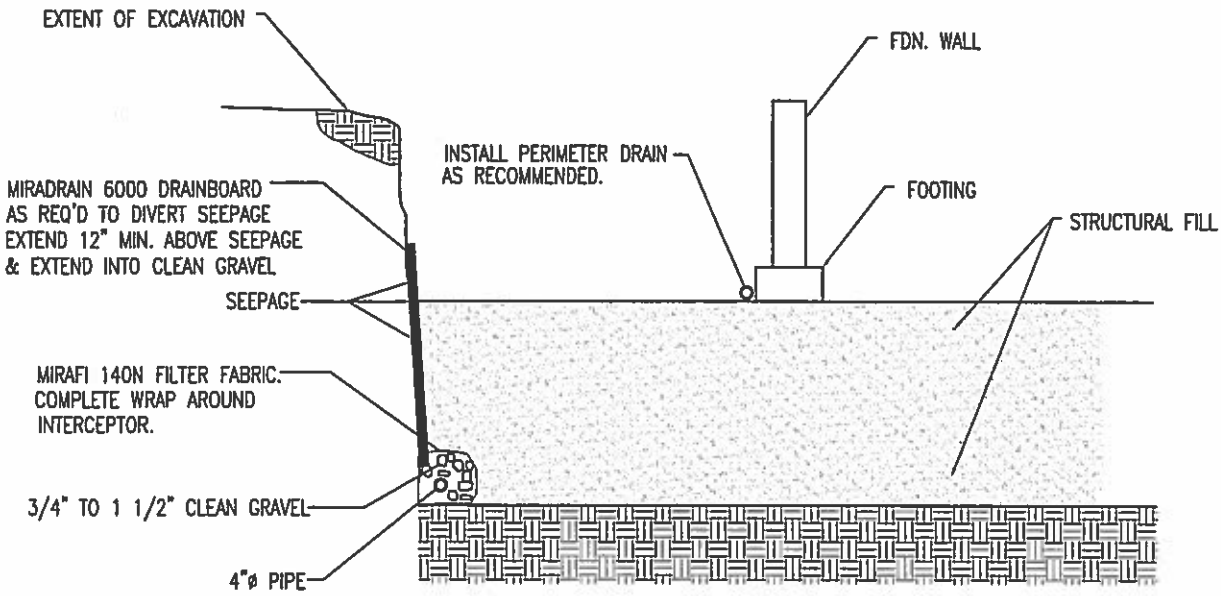


ENTECH
ENGINEERING, INC.
505 ELKTON DRIVE
COLORADO SPRINGS, CO. 80907 (719) 531-5599

TYP. UNDERSLAB DRAINAGE
LAYER (CAPILLARY BREAK)

DRAWN:	DATE:	DESIGNED:	CHECKED:
	7/2/18		

JOB NO.: 180517
FIG NO.: 9



NOTE:
EXTEND INTERCEPTOR DRAIN TO DAYLIGHT

INTERCEPTOR DRAIN DETAIL

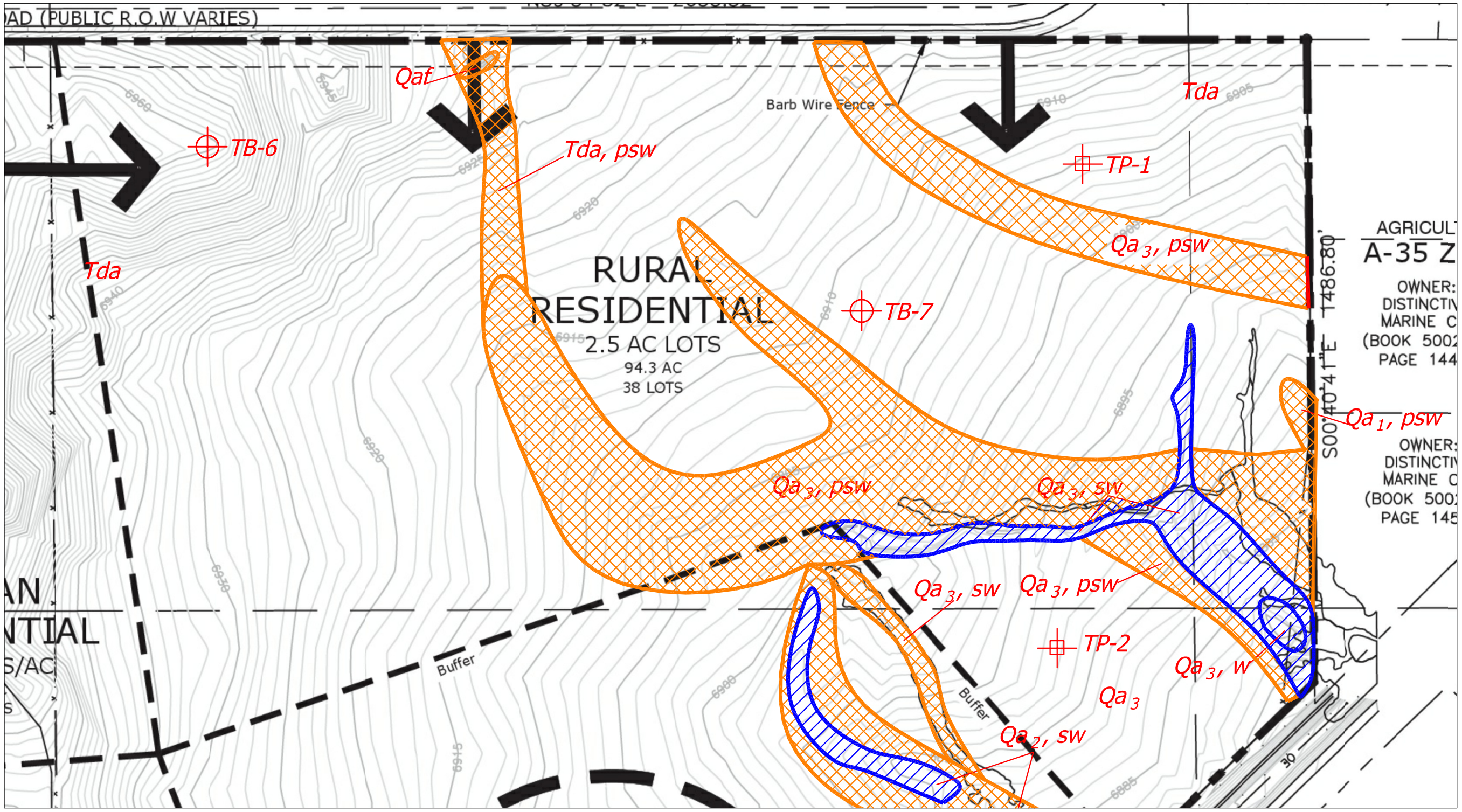
N.T.S.

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

INTERCEPTOR DRAIN DETAIL			
DRAWN BY:	DATE DRAWN:		CHECKED:

JOB NO.: 180517

FIG. NO.: 10



- AREAS OF DEFINED DRAINAGES WHERE OWTS SITES ARE NOT RECOMMEND.

- AREAS WHERE INVESTIGATION IS RECOMMENDED TO DETERMINE GROUNDWATER DEPTHS AND SUITABILITY FOR OWTS SITES.

- AREAS OF DEFINED WHERE CONVENTIONAL SYSTEMS MAY BE USED UNLESS SHALLOW BEDROCK, SHALLOW GROUNDWATER, OR UNSUITABLE INFILTRATION RATES ARE ENCOUNTERED REQUIRING DESIGNED SYSTEMS.

TB-2- APPROXIMATE TEST BORING LOCATION AND NUMBER

TP-2- APPROXIMATE TEST PIT LOCATION AND NUMBER

REVISION	BY

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

SEPTIC SUITABILITY MAP
MEADOWLAKE RANCH
13202 JUDGE ORR ROAD
EL PASO COUNTY, COLORADO
FOR: DAN FERGUSON

DRAWN	LLL/TLC
CHECKED	
DATE	6/26/18
SCALE	AS SHOWN
JOB NO.	180517
FIGURE No.	11

APPENDIX A: Site Photographs

1

Looking west from the northeastern portion of the site.

June 20, 2018

2

Looking southeast from the northeastern portion of the site.

June 20, 2018

Job No. 180517

3

Looking south from the northern portion of the site.

June 20, 2018

4

Looking east from the northern portion of the property.

June 20, 2018

Job No. 180517

5

Looking southwest from the northern portion of the site.

June 20, 2018

6

Looking south along drainage along the western edge of the property.

June 20, 2018

Job No. 180517

7

Looking southeast towards an existing earthen dam in the western portion of the property.

June 20, 2018

8

Looking west from the western central portion of the property.

June 20, 2018

Job No. 180517

9

Looking north along dirt road in the northwestern portion of the site.

June 20, 2018

10

Looking south along existing dirt road in the northwestern portion of the site.

June 20, 2018

Job No. 180517

11

Looking northwest from the northwestern portion of the site

June 20, 2018

12

Looking southwest towards pond in northwestern portion of the site.

June 20, 2018

Job No. 180517

APPENDIX B: Test Boring Logs from the Profile Hole and Test Pit Logs

TEST BORING NO. 1
DATE DRILLED 4/18/2018
Job # 180517

REMARKS	Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
WATER @ 12', 4/30/18						
SAND, SILTY, FINE TO COARSE GRAINED, TAN, MEDIUM DENSE, MOIST				25	9.2	1
SANDSTONE, SILTY, FINE TO COARSE GRAINED, TAN, VERY DENSE, MOIST	5			50/10"	4.6	3
	10			50/11"	9.2	3
SANDSTONE, VERY CLAYEY, FINE TO COARSE GRAINED, BLUE GRAY, VERY DENSE, MOIST	15			50/6"	8.8	3
	20			50/3"	16.7	3

TEST BORING NO. 2
DATE DRILLED 4/19/2018
CLIENT DAN FERGUSON
LOCATION 13202 JUDGE ORR ROAD

REMARKS	Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
WATER @ 11.5', 4/30/18						
SAND, SLIGHTLY SILTY, FINE TO COARSE GRAINED, TAN, MEDIUM DENSE, DRY TO VERY MOIST				11	1.7	1
	5			14	2.0	1
	10			14	7.6	1
SAND, VERY CLAYEY, FINE GRAINED, BLUE GRAY, MEDIUM DENSE, MOIST	15			16	15.1	2
SANDSTONE, SLIGHTLY SILTY, FINE TO COARSE GRAINED, BLUE GRAY, VERY DENSE, VERY MOIST	20			50/6"	14.6	3

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

TEST BORING LOG

DRAWN:	DATE:	CHECKED:	DATE:
			5/22/18

JOB NO.: 180517
FIG NO.: B-1

TEST BORING NO. 3
DATE DRILLED 4/19/2018
Job # 180517

REMARKS

WATER @ 12', 4/30/18

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type	
			7	2.5	1	SAND, SILTY, FINE TO COARSE GRAINED, TAN, LOOSE TO MEDIUM DENSE, MOIST TO VERY MOIST
5			14	4.0	1	
10			14	9.5	1	
15			22	19.0	1	
						CLAYSTONE, SANDY, BLUE GRAY, HARD, MOIST
20			50	17.4	4	

TEST BORING NO. 4
DATE DRILLED 4/19/2018
CLIENT DAN FERGUSON
LOCATION 13202 JUDGE ORR ROAD

REMARKS

WATER @ 8.5', 4/30/18

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type	
					1	SAND, SILTY, TAN
			50/10"	10.5	3	SANDSTONE, SILTY, FINE TO COARSE GRAINED, TAN TO BLUE GRAY, VERY DENSE, MOIST
5			50/7"	11.0	3	
10			50/8"	11.5	3	
15			50/7"	13.3	3	
20			50/7"	17.7	3	

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TEST BORING LOG

DRAWN:	DATE:	CHECKED:	DATE:
			5/22/18

JOB NO.: 180517
FIG NO.: B-2

TEST BORING NO. 5
DATE DRILLED 4/18/2018
Job # 180517

REMARKS

WATER @ 9', 4/30/18

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type	
			40	3.2	1	SAND, SLIGHTLY SILTY, FINE TO COARSE GRAINED, GRAY BROWN, DENSE, MOIST TO VERY MOIST
5			32	12.2	1	
10			50 7"	12.1	3	SANDSTONE, SILTY, FINE TO COARSE GRAINED, GRAY BROWN, VERY DENSE, MOIST
15			50 7"	16.7	3	
20			50 6"	10.5	4	CLAYSTONE, SANDY, BLUE GRAY, HARD, MOIST

TEST BORING NO. 6
DATE DRILLED 4/18/2018
CLIENT DAN FERGUSON
LOCATION 13202 JUDGE ORR ROAD

REMARKS

DRY TO 20', 4/18/18
CAVED TO 17.5', 4/30/18, DRY

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type	
			50 11"	5.2	1	SAND, SILTY, FINE TO COARSE GRAINED, BUFF, VERY DENSE TO MEDIUM DENSE, MOIST TO VERY MOIST
5			19	12.7	1	FINE GRAINED LENSES
10			50 6"	10.7	4	CLAYSTONE, VERY SANDY, GREEN BROWN, HARD, MOIST
15			50 7"	10.4	4	
20			50 5"	15.7	4	

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TEST BORING LOG

DRAWN:	DATE:	CHECKED:	DATE: 5/22/18

JOB NO: 180517
FIG NO: B-3

TEST BORING NO. 7
DATE DRILLED 4/17/2018
Job # 180517

REMARKS	Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
DRY TO 20', 4/17/18						
SAND, SILTY, FINE TO COARSE GRAINED, BUFF, MEDIUM DENSE, MOIST				18	10.2	1
SANDSTONE, SILTY, FINE TO COARSE GRAINED, GRAY BROWN, VERY DENSE, MOIST	5			50/10"	12.5	3
CLAYSTONE, SANDY, GRAY BROWN, HARD, MOIST	10			50	21.6	4
SANDSTONE, CLAYEY, FINE TO COARSE GRAINED, GRAY BROWN, VERY DENSE, MOIST	15			50/7"	12.3	3
CLAYSTONE, SANDY, GRAY BROWN, HARD, MOIST	20			50/7"	16.2	4

TEST BORING NO. 8
DATE DRILLED 4/17/2018
CLIENT DAN FERGUSON
LOCATION 13202 JUDGE ORR ROAD

REMARKS	Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
WATER @ 9', 4/30/18						
SAND, SILTY, TAN						1
SANDSTONE, SILTY, FINE TO COARSE GRAINED, TAN, VERY DENSE, MOIST				50/10"	7.9	3
	5			50/7"	9.6	3
	10			50/9"	12.9	3
CLAYSTONE, SANDY, GRAY BROWN, HARD, MOIST	15			50/6"	13.5	4
	20			50/6"	13.6	4

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TEST BORING LOG

DRAWN:	DATE:	CHECKED:	DATE:
			5/22/18

JOB NO.: 180517
FIG NO.: B-4

TEST PIT NO. 1
DATE EXCAVATED 4/17/2018
Job # 180517

REMARKS	Depth (ft)	Symbol	Samples	Soil Structure Shape	Soil Structure Grade	USDA Soil Type
topsoil, sandy loam, brown	1					
gravelly sandy loam, fine to medium grained, tan	2			gr	w	2A
weathered to formational silty sandstone, fine to coarse grained, gray brown to tan	3			ma		3A
	4					
	5					
	6					
	7					
	8					
	9					
	10					

TEST PIT NO. 2
DATE EXCAVATED 4/17/2018
CLIENT DAN FERGUSON
LOCATION 13202 JUDGE ORR RD

REMARKS	Depth (ft)	Symbol	Samples	Soil Structure Shape	Soil Structure Grade	USDA Soil Type
topsoil, sandy loam, brown	1					
gravelly sandy loam, fine to medium grained, tan	2			gr	w	2A
	3					
	4					
	5					
weathered to formational clayey sandstone, fine to coarse grained, gray brown	6			ma		4A
	7					
*groundwater at 5'	8					
	9					
	10					

Soil Structure Shape
granular - gr
platy - pl
blocky - bl
prismatic - pr
single grain - sg
massive - ma

Soil Structure Grade
weak - w
moderate - m
strong - s
loose - l

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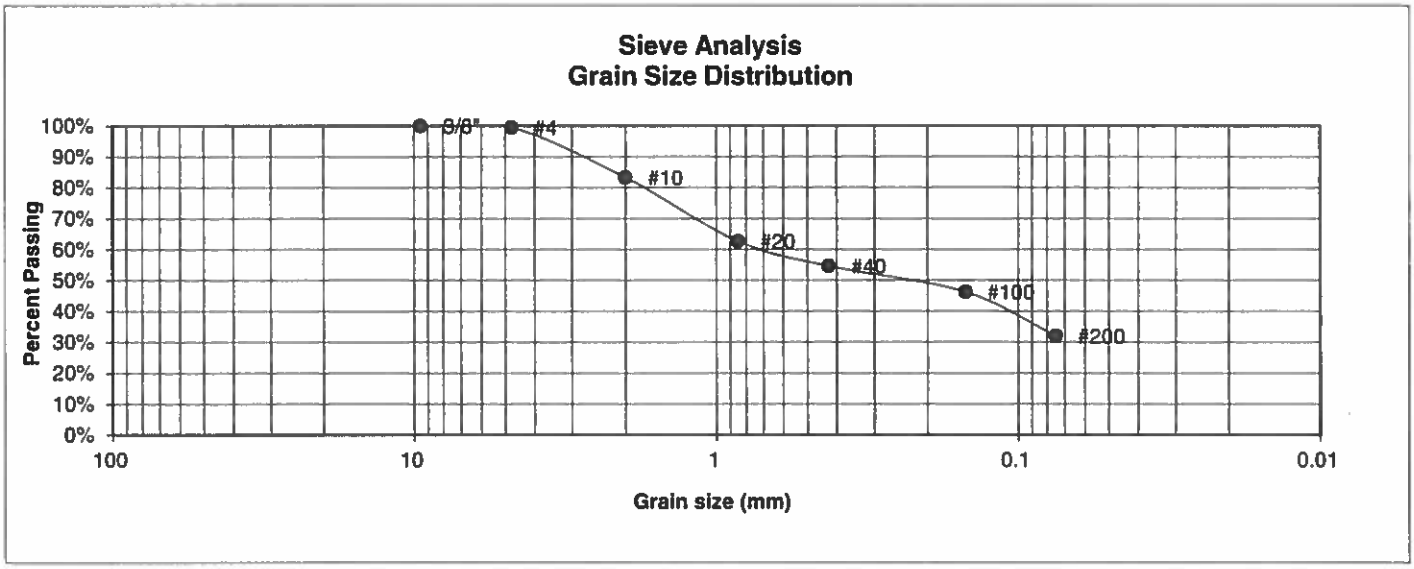
TEST PIT LOG

DRAWN:	DATE:	CHECKED:	DATE:
		LLL	6/20/18

JOB NO.: 180517
FIG NO.: B-5

APPENDIX C: Laboratory Test Results

UNIFIED CLASSIFICATION	SM	CLIENT	DAN FERGUSON
SOIL TYPE #	1	PROJECT	13202 JUDGE ORR ROAD
TEST BORING #	1	JOB NO.	180517
DEPTH (FT)	2-3	TEST BY	BL



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	99.5%
10	83.3%
20	62.7%
40	54.7%
100	46.2%
200	32.0%

Atterberg Limits

Plastic Limit	NP
Liquid Limit	NV
Plastic Index	NP

Swell

Moisture at start	
Moisture at finish	
Moisture increase	
Initial dry density (pcf)	
Swell (psf)	

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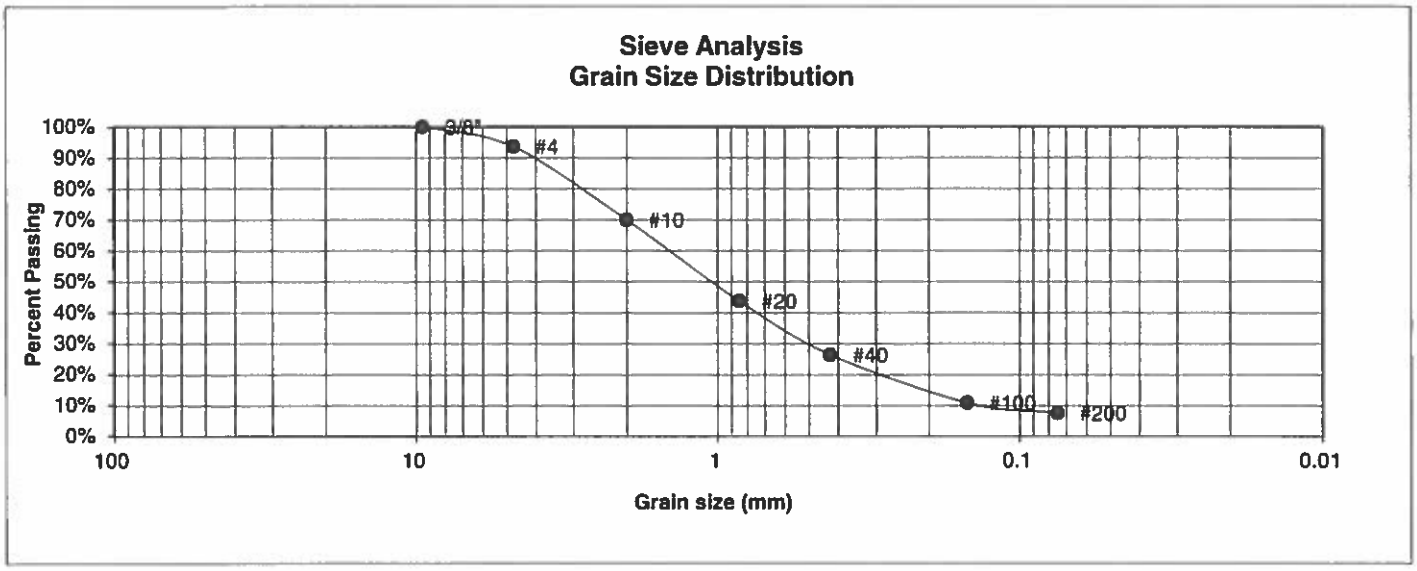
LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE:
			8/22/18

JOB NO.: 180517

FIG NO.: L-1

UNIFIED CLASSIFICATION	SM-SW	CLIENT	DAN FERGUSON
SOIL TYPE #	1	PROJECT	13202 JUDGE ORR ROAD
TEST BORING #	2	JOB NO.	180517
DEPTH (FT)	10	TEST BY	BL



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	93.7%
10	70.0%
20	43.8%
40	26.5%
100	11.0%
200	7.7%

Atterberg Limits
Plastic Limit
Liquid Limit
Plastic Index

Swell
Moisture at start
Moisture at finish
Moisture increase
Initial dry density (pcf)
Swell (psf)

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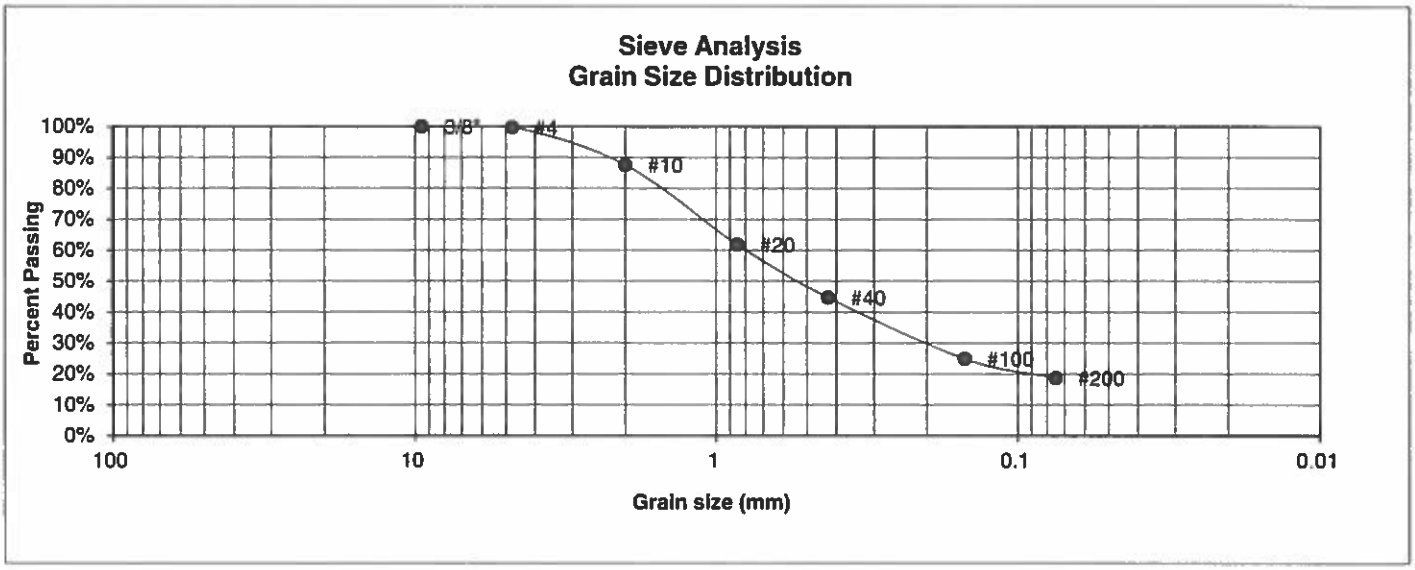
LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE: 9/22/18

JOB NO.: 180517

FIG NO.: C-2

UNIFIED CLASSIFICATION	SM	CLIENT	DAN FERGUSON
SOIL TYPE #	1	PROJECT	13202 JUDGE ORR ROAD
TEST BORING #	3	JOB NO.	180517
DEPTH (FT)	15	TEST BY	BL



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	99.7%
10	87.6%
20	61.8%
40	44.7%
100	24.9%
200	18.7%

Atterberg Limits
Plastic Limit
Liquid Limit
Plastic Index

Swell
Moisture at start
Moisture at finish
Moisture increase
Initial dry density (pcf)
Swell (psf)

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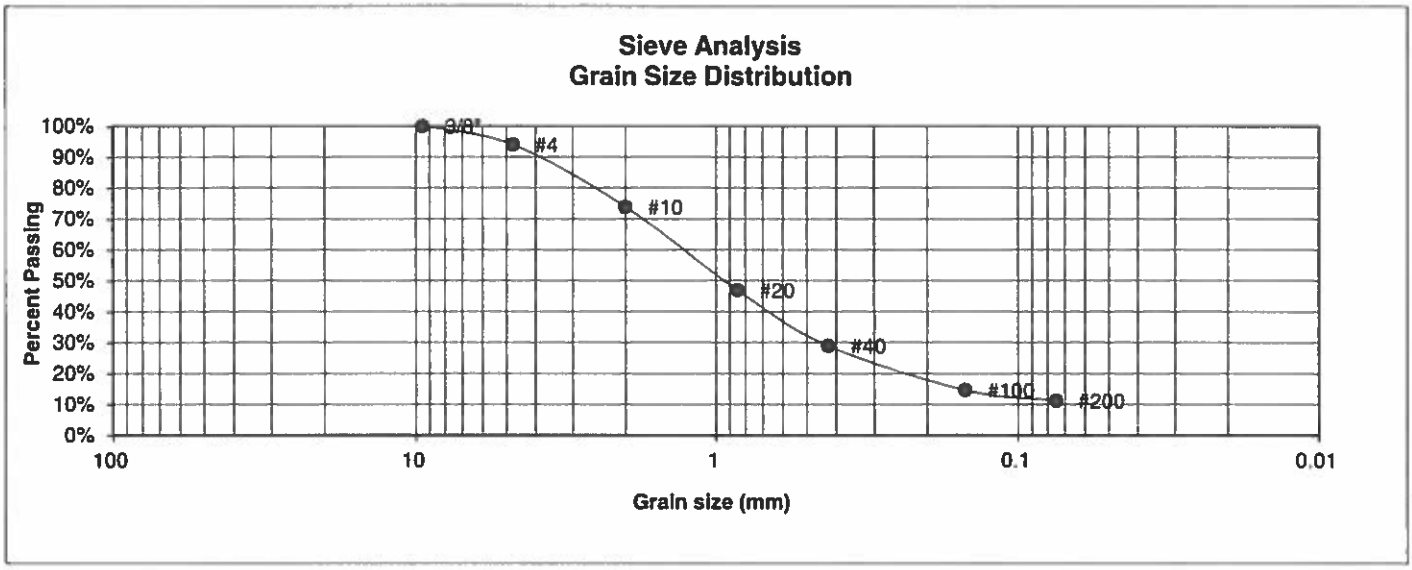
LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE:
			5/22/18

JOB NO.: 180517

FIG NO.: C-3

UNIFIED CLASSIFICATION	SM-SW	CLIENT	DAN FERGUSON
SOIL TYPE #	1	PROJECT	13202 JUDGE ORR ROAD
TEST BORING #	5	JOB NO.	180517
DEPTH (FT)	5	TEST BY	BL



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	94.0%
10	73.9%
20	47.0%
40	28.9%
100	14.6%
200	11.2%

Atterberg Limits
Plastic Limit
Liquid Limit
Plastic Index

Swell
Moisture at start
Moisture at finish
Moisture increase
Initial dry density (pcf)
Swell (psf)

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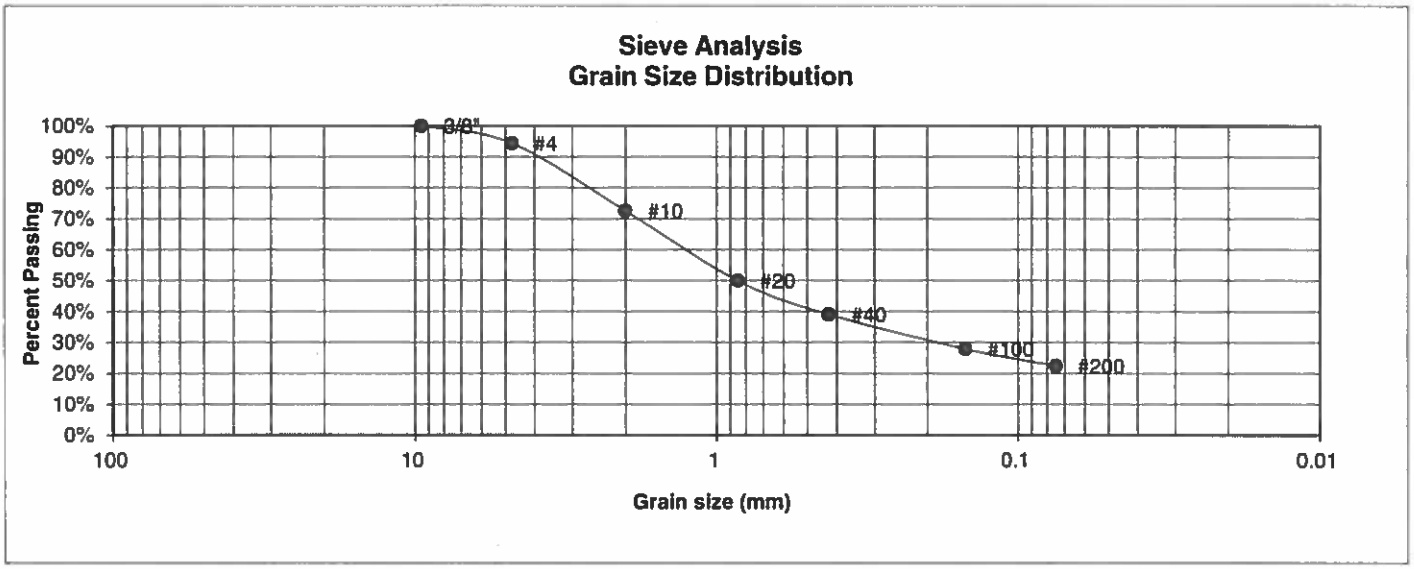
LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE:
			5/22/18

JOB NO.: 180517

FIG NO.: C-4

UNIFIED CLASSIFICATION	SM	CLIENT	DAN FERGUSON
SOIL TYPE #	1	PROJECT	13202 JUDGE ORR ROAD
TEST BORING #	7	JOB NO.	180517
DEPTH (FT)	2-3	TEST BY	BL



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	94.4%
10	72.6%
20	50.0%
40	39.0%
100	27.9%
200	22.4%

Atterberg Limits
Plastic Limit
Liquid Limit
Plastic Index

Swell
Moisture at start
Moisture at finish
Moisture increase
Initial dry density (pcf)
Swell (psf)

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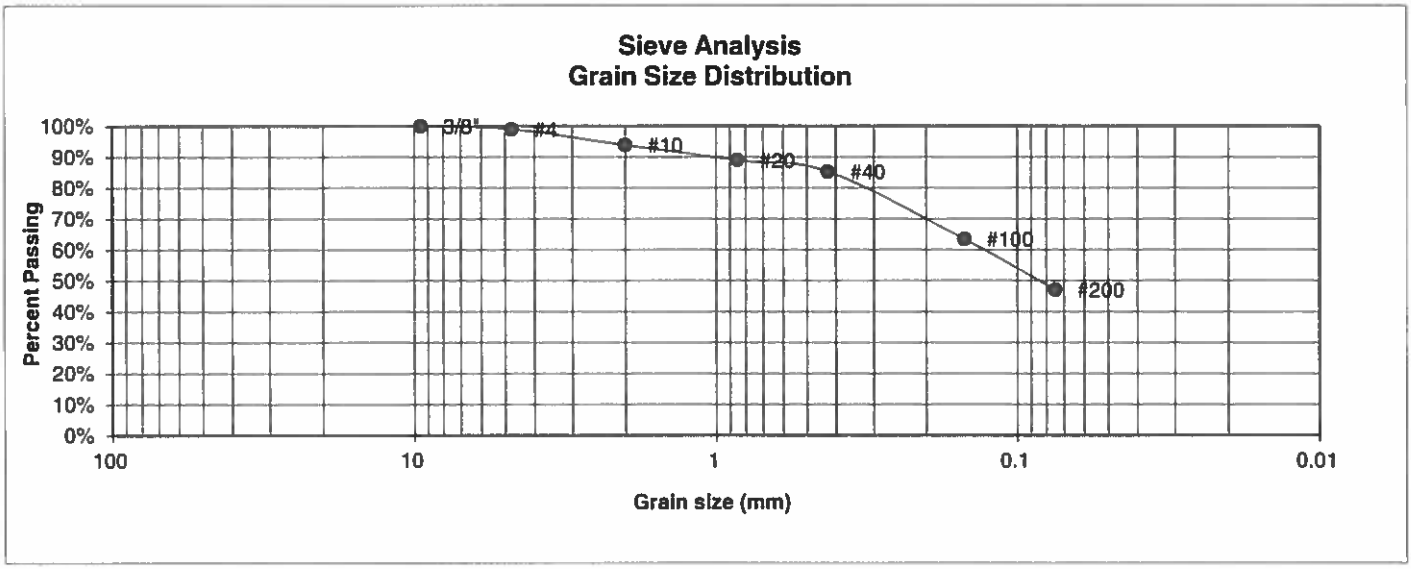
LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE:
			5/22/18

JOB NO.: 180517

FIG NO.: L-4

UNIFIED CLASSIFICATION	SC	CLIENT	DAN FERGUSON
SOIL TYPE #	2	PROJECT	13202 JUDGE ORR ROAD
TEST BORING #	2	JOB NO.	180517
DEPTH (FT)	15	TEST BY	BL



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	99.0%
10	93.9%
20	89.0%
40	85.3%
100	63.5%
200	47.1%

Atterberg Limits	
Plastic Limit	16
Liquid Limit	30
Plastic Index	14

Swell	
Moisture at start	10.4%
Moisture at finish	23.1%
Moisture increase	12.6%
Initial dry density (pcf)	101
Swell (psf)	940

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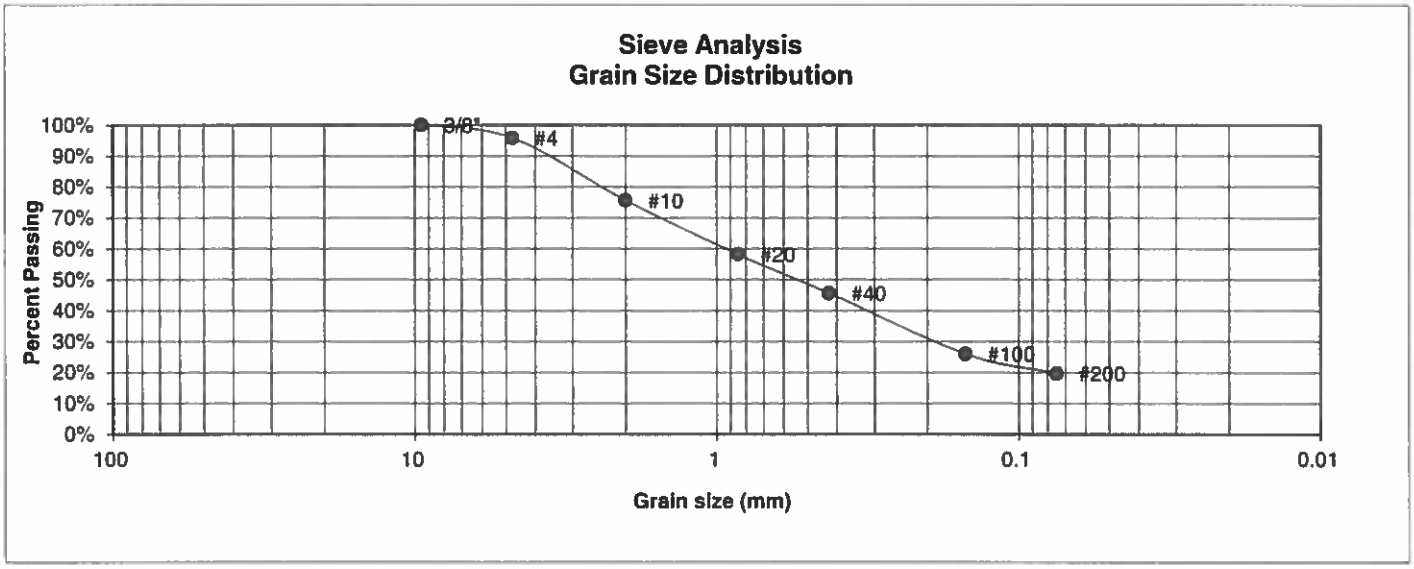
LABORATORY TEST RESULTS

DRAWN	DATE	CHECKED	DATE
			8/22/18

JOB NO.: 180517

FIG NO.: C-5

UNIFIED CLASSIFICATION	SM	CLIENT	DAN FERGUSON
SOIL TYPE #	3	PROJECT	13202 JUDGE ORR ROAD
TEST BORING #	8	JOB NO.	180517
DEPTH (FT)	5	TEST BY	BL



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	95.9%
10	75.7%
20	58.3%
40	45.7%
100	26.0%
200	19.7%

Atterberg Limits
Plastic Limit
Liquid Limit
Plastic Index

Swell
Moisture at start
Moisture at finish
Moisture increase
Initial dry density (pcf)
Swell (psf)

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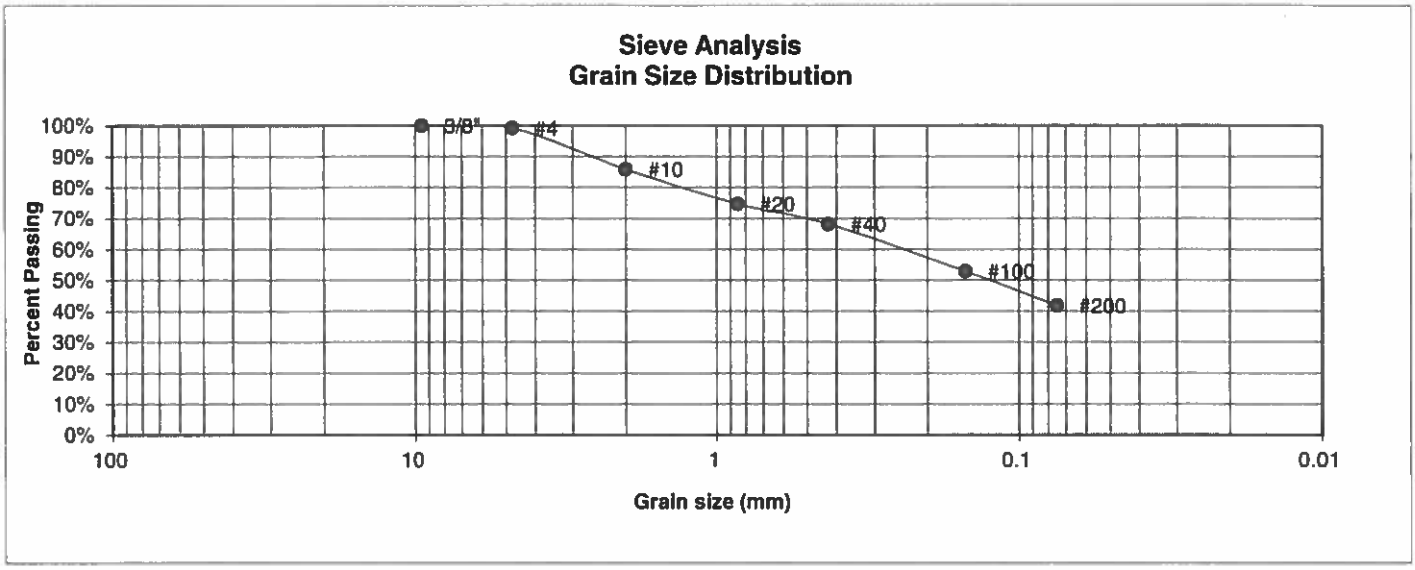
LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE:
			5/22/12

JOB NO.: 180517

FIG NO.: C-6

UNIFIED CLASSIFICATION	SC	CLIENT	DAN FERGUSON
SOIL TYPE #	3	PROJECT	13202 JUDGE ORR ROAD
TEST BORING #	1	JOB NO.	180517
DEPTH (FT)	15	TEST BY	BL



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	99.1%
10	85.9%
20	74.7%
40	68.2%
100	52.9%
200	41.8%

Atterberg Limits

Plastic Limit	22
Liquid Limit	37
Plastic Index	15

Swell

Moisture at start

Moisture at finish

Moisture increase

Initial dry density (pcf)

Swell (psf)

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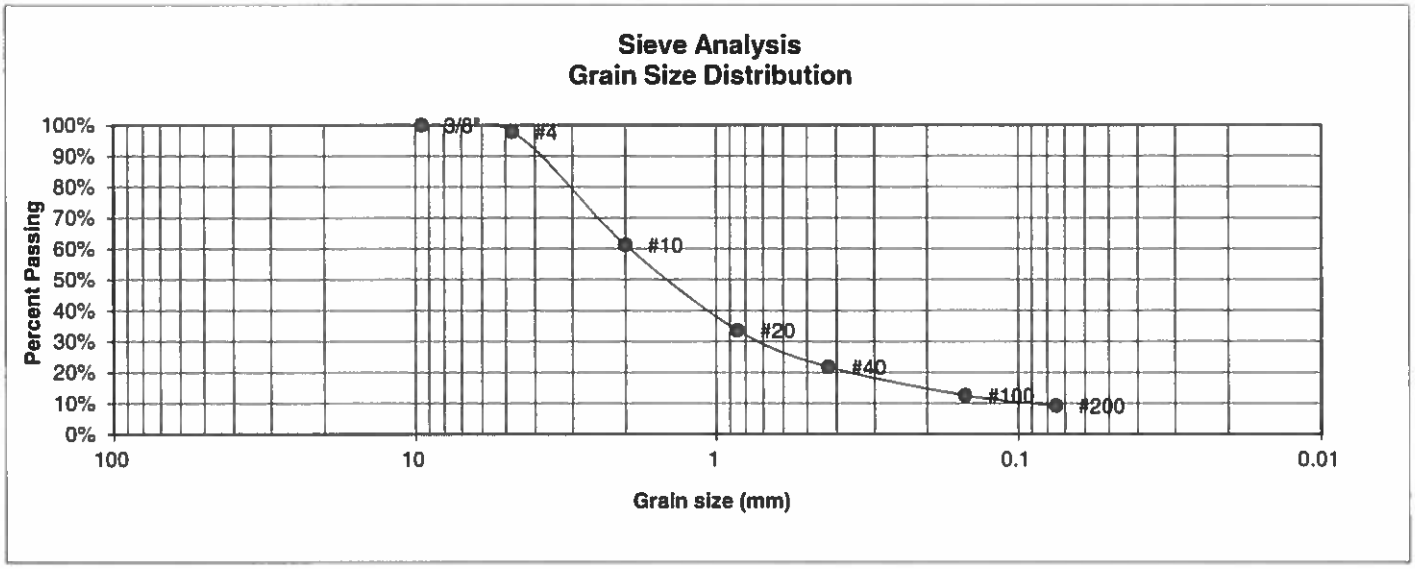
LABORATORY TEST RESULTS

DRAWN:	DATE	CHECKED:	DATE:
			5/22/18

JOB NO.: 180517

FIG NO.: L-7

UNIFIED CLASSIFICATION	SM-SW	CLIENT	DAN FERGUSON
SOIL TYPE #	3	PROJECT	13202 JUDGE ORR ROAD
TEST BORING #	2	JOB NO.	180517
DEPTH (FT)	20	TEST BY	BL



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	97.9%
10	61.2%
20	33.6%
40	21.8%
100	12.6%
200	9.2%

Atterberg Limits
Plastic Limit
Liquid Limit
Plastic Index

Swell
Moisture at start
Moisture at finish
Moisture increase
Initial dry density (pcf)
Swell (psf)

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COLORADO SPRINGS, COLORADO 80907

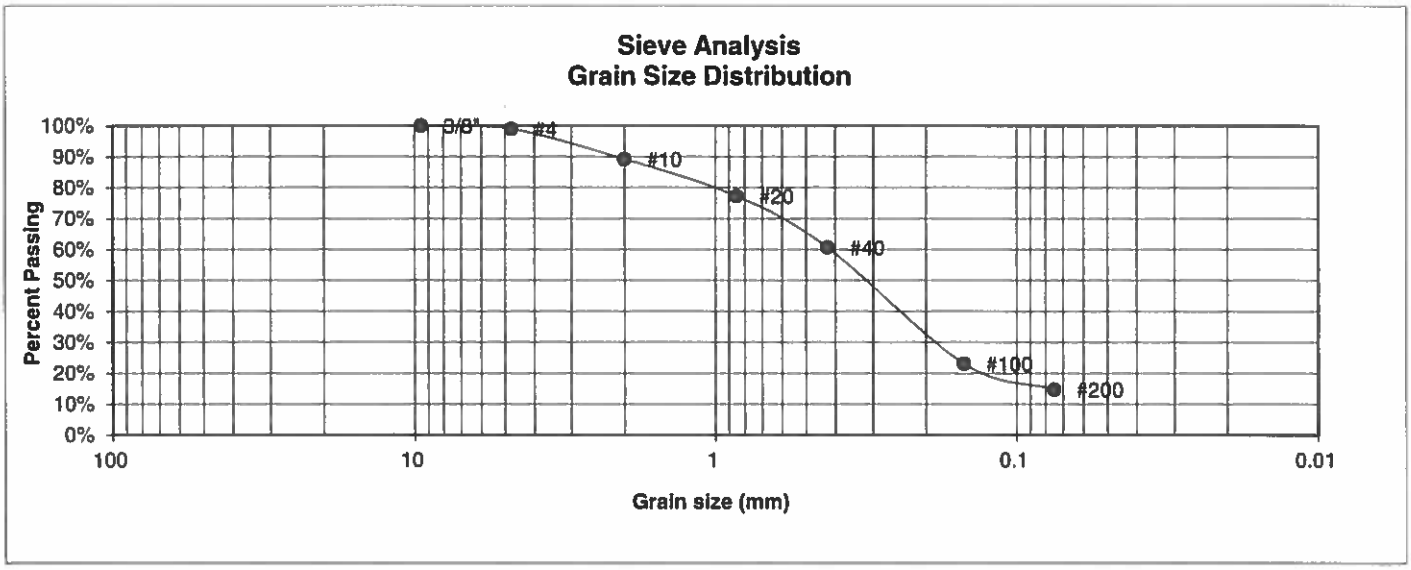
LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE:
			5/22/18

JOB NO.: 180517

FIG NO.: C-8

UNIFIED CLASSIFICATION	SM	CLIENT	DAN FERGUSON
SOIL TYPE #	3	PROJECT	13202 JUDGE ORR ROAD
TEST BORING #	4	JOB NO.	180517
DEPTH (FT)	15	TEST BY	BL



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	99.0%
10	89.2%
20	77.3%
40	60.6%
100	23.1%
200	14.7%

Atterberg Limits

Plastic Limit	NP
Liquid Limit	NV
Plastic Index	NP

Swell

Moisture at start	
Moisture at finish	
Moisture increase	
Initial dry density (pcf)	
Swell (psf)	

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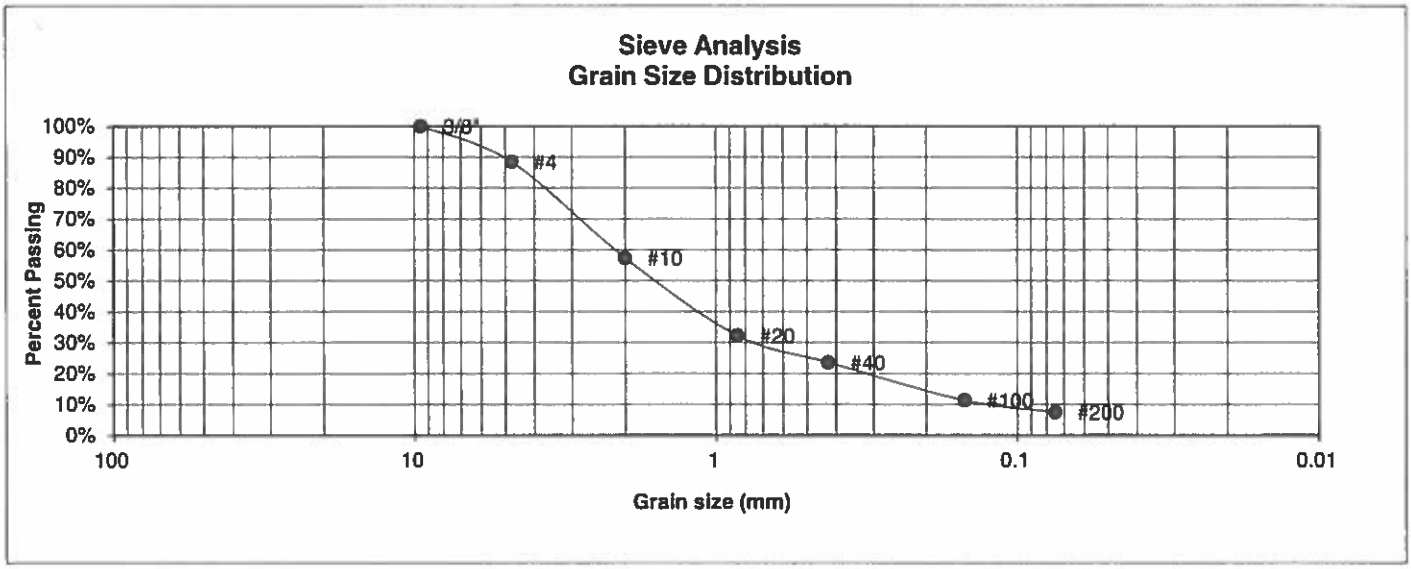
LABORATORY TEST RESULTS

DRAWN	DATE	CHECKED	DATE
			5/22/18

JOB NO.: 180517

FIG NO.: C-9

UNIFIED CLASSIFICATION	SM-SW	CLIENT	DAN FERGUSON
SOIL TYPE #	3	PROJECT	13202 JUDGE ORR ROAD
TEST BORING #	5	JOB NO.	180517
DEPTH (FT)	10	TEST BY	BL



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	88.5%
10	57.3%
20	32.3%
40	23.5%
100	11.3%
200	7.4%

Atterberg Limits
Plastic Limit
Liquid Limit
Plastic Index

Swell
Moisture at start
Moisture at finish
Moisture increase
Initial dry density (pcf)
Swell (psf)

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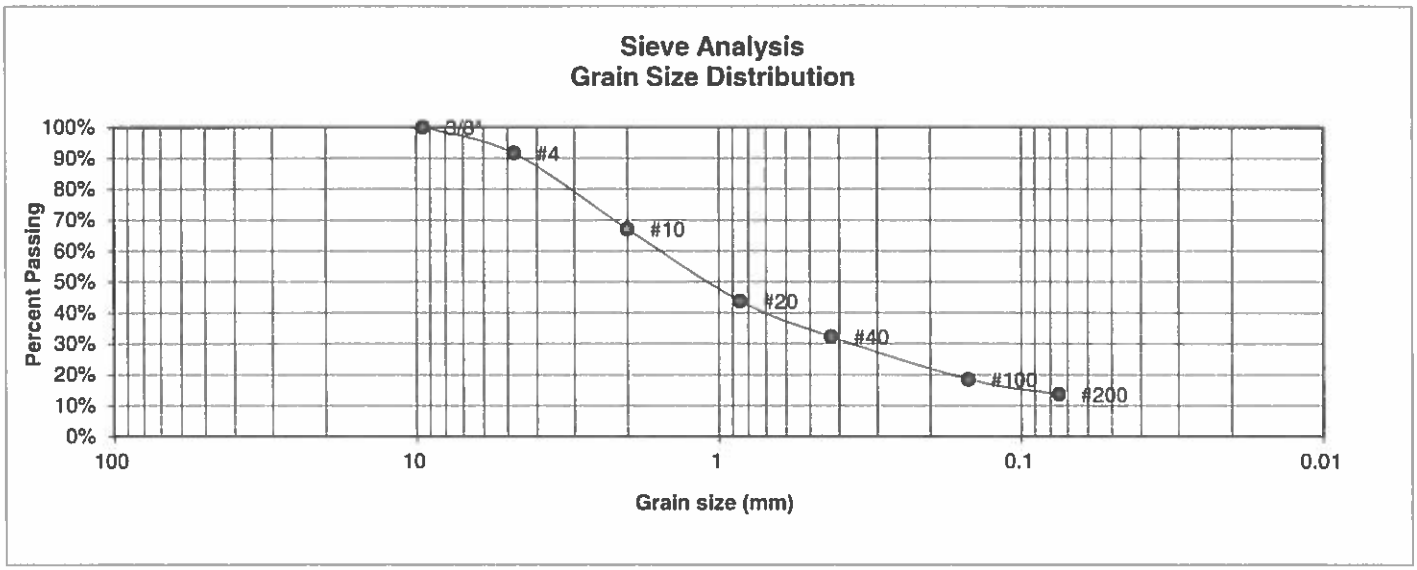
LABORATORY TEST RESULTS

DRAWN	DATE	CHECKED	DATE
			5/22/18

JOB NO.: 180517

FIG NO.: C-10

UNIFIED CLASSIFICATION	SM	CLIENT	DAN FERGUSON
SOIL TYPE #	1	PROJECT	13202 JUDGE ORR ROAD
TEST BORING #	TP-1	JOB NO.	180517
DEPTH (FT)	2-3	TEST BY	BL



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	91.7%
10	67.1%
20	43.8%
40	32.2%
100	18.5%
200	13.6%

Atterberg Limits
Plastic Limit
Liquid Limit
Plastic Index

Swell
Moisture at start
Moisture at finish
Moisture increase
Initial dry density (pcf)
Swell (psf)

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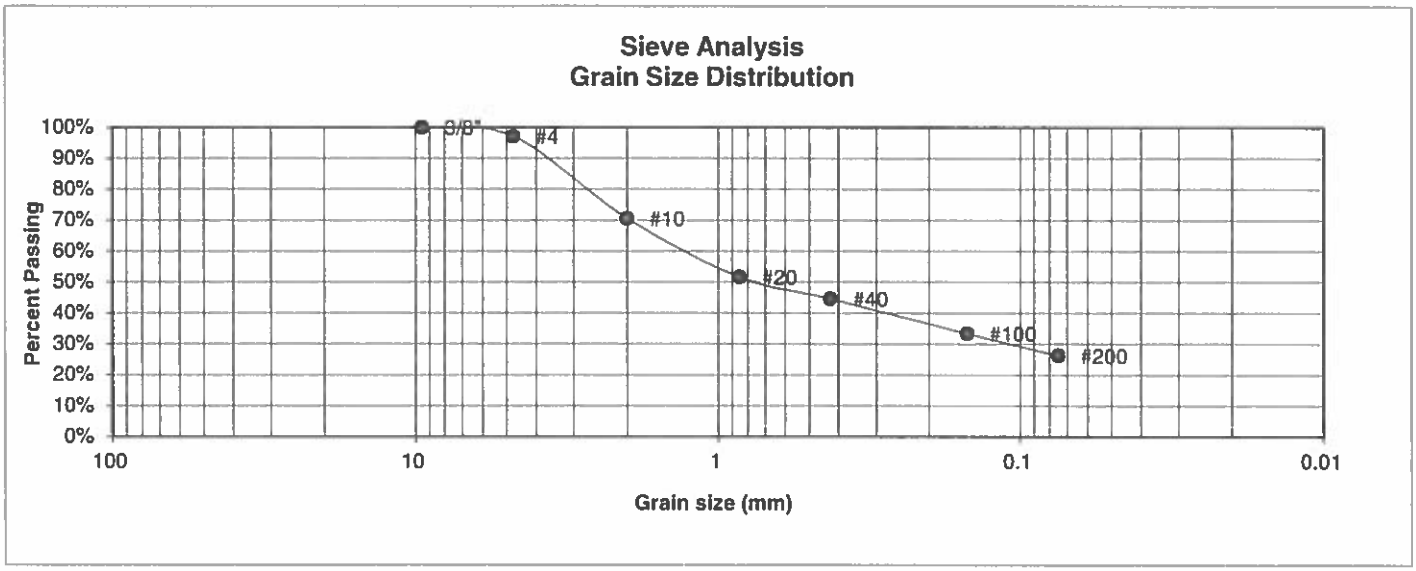
LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE:
		LLL	6/20/19

JOB NO.: 180517

FIG NO.: C-11

UNIFIED CLASSIFICATION	SM	CLIENT	DAN FERGUSON
SOIL TYPE #	1	PROJECT	13202 JUDGE ORR ROAD
TEST BORING #	TP-1	JOB NO.	180517
DEPTH (FT)	5-6	TEST BY	BL



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	97.1%
10	70.6%
20	51.6%
40	44.6%
100	33.4%
200	26.3%

Atterberg Limits
Plastic Limit
Liquid Limit
Plastic Index

Swell
Moisture at start
Moisture at finish
Moisture increase
Initial dry density (pcf)
Swell (psf)

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COLORADO SPRINGS, COLORADO 80907

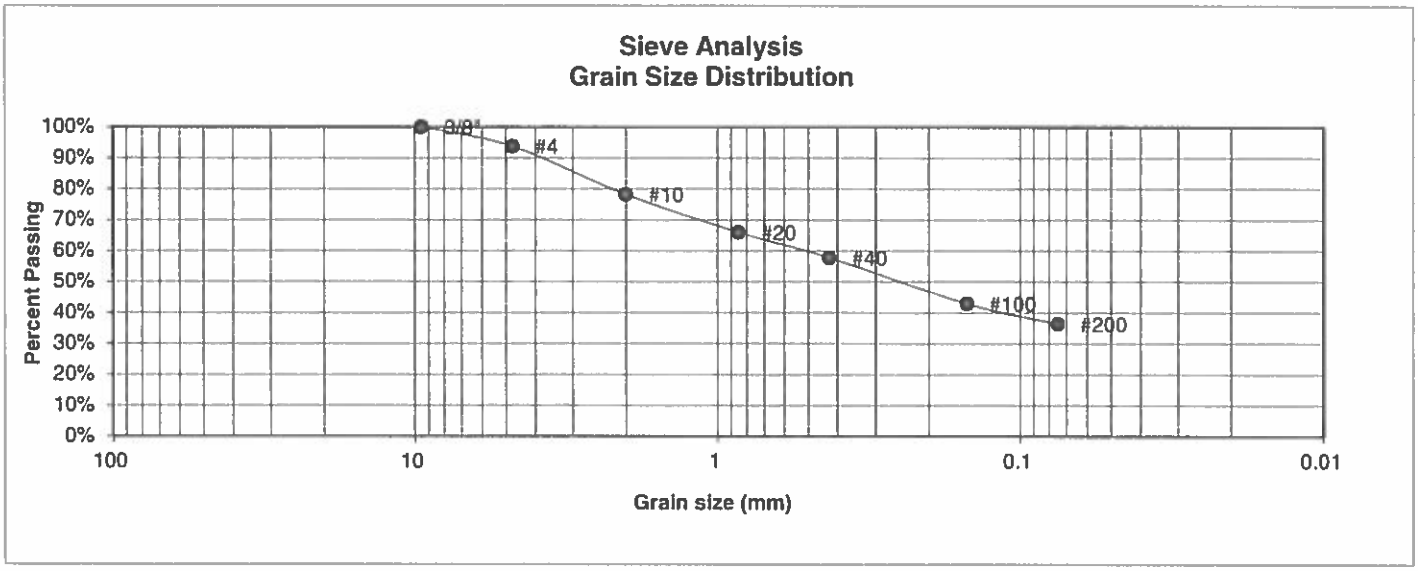
LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE:
		LLL	10/30/18

JOB NO.: 180517

FIG NO.: L-12

UNIFIED CLASSIFICATION	SC	CLIENT	DAN FERGUSON
SOIL TYPE #	2	PROJECT	13202 JUDGE ORR ROAD
TEST BORING #	TP-2	JOB NO.	180517
DEPTH (FT)	6-8	TEST BY	BL



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	93.8%
10	78.2%
20	66.0%
40	57.8%
100	43.0%
200	36.4%

Atterberg Limits
Plastic Limit
Liquid Limit
Plastic Index

Swell
Moisture at start
Moisture at finish
Moisture increase
Initial dry density (pcf)
Swell (psf)

ENTECH ENGINEERING, INC.
505 ELKTON DRIVE
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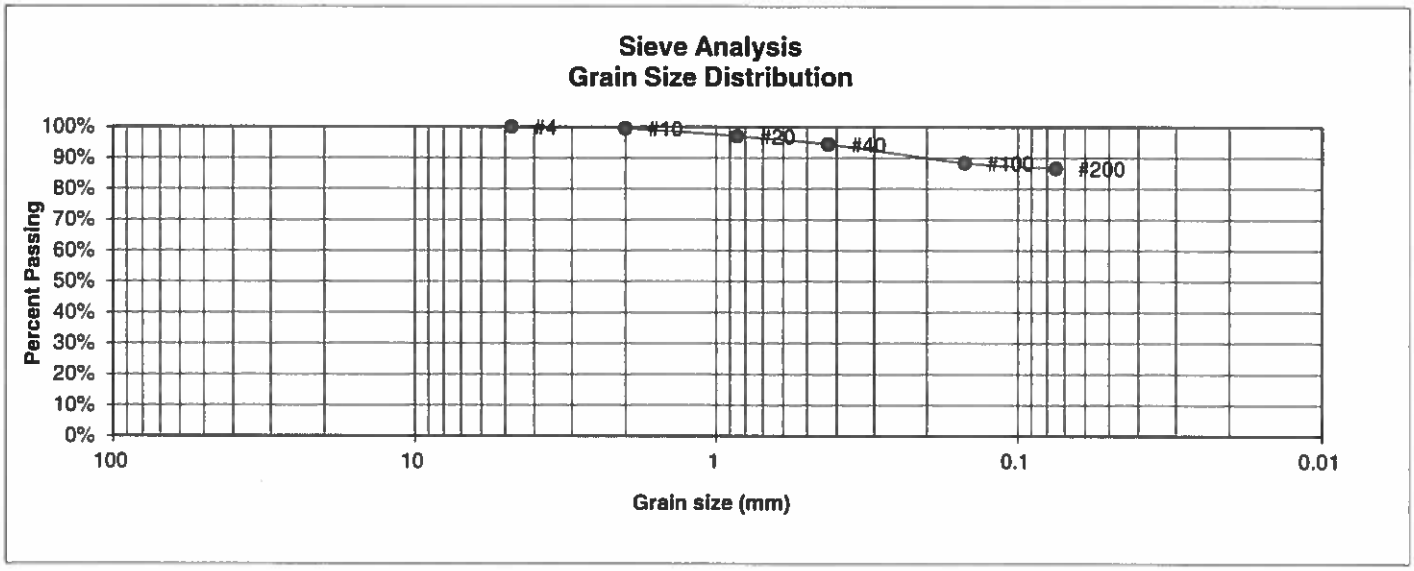
LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE:
		LLL	12/20/18

JOB NO.: 180517

FIG NO.: C-13

UNIFIED CLASSIFICATION	CL	CLIENT	DAN FERGUSON
SOIL TYPE #	4	PROJECT	13202 JUDGE ORR ROAD
TEST BORING #	7	JOB NO.	180517
DEPTH (FT)	10	TEST BY	BL



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	
4	100.0%
10	99.5%
20	97.0%
40	94.4%
100	88.4%
200	86.7%

Atterberg Limits	
Plastic Limit	19
Liquid Limit	30
Plastic Index	11

Swell	
Moisture at start	
Moisture at finish	
Moisture increase	
Initial dry density (pcf)	
Swell (psf)	

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

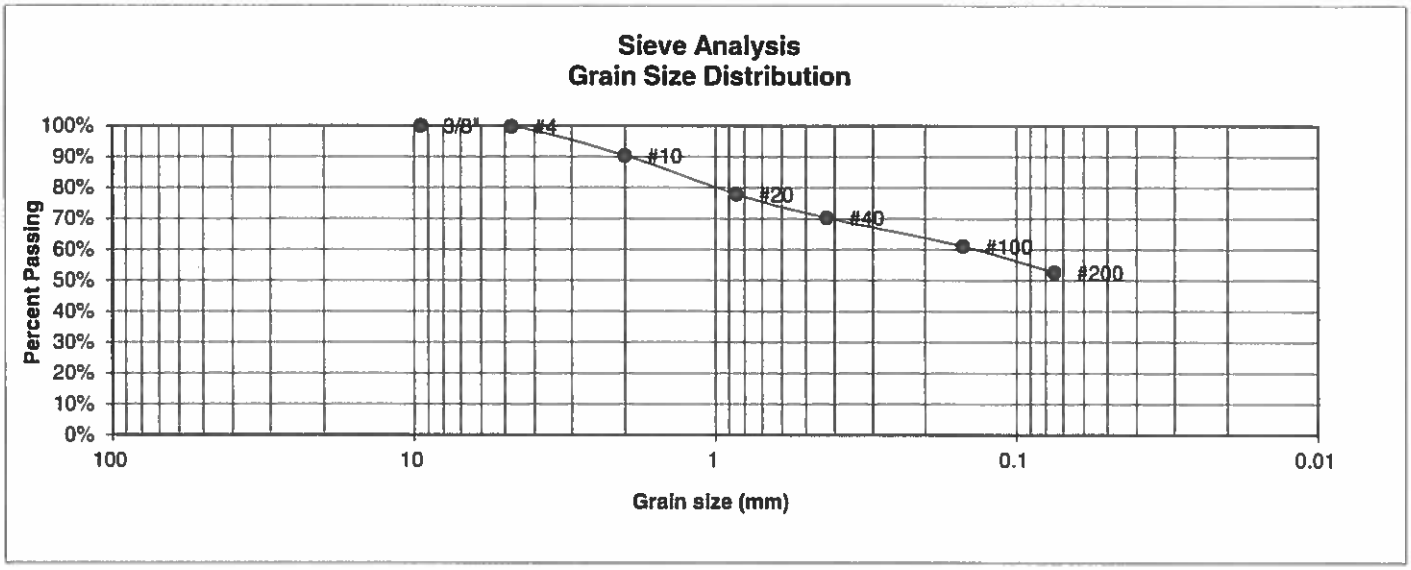
LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE:
			5/22/18

JOB NO.: 180517

FIG NO.: C-14

UNIFIED CLASSIFICATION	CL	CLIENT	DAN FERGUSON
SOIL TYPE #	4	PROJECT	13202 JUDGE ORR ROAD
TEST BORING #	6	JOB NO.	180517
DEPTH (FT)	10	TEST BY	BL



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	99.8%
10	90.4%
20	77.9%
40	70.3%
100	61.1%
200	52.6%

Atterberg Limits
Plastic Limit
Liquid Limit
Plastic Index

Swell
Moisture at start
Moisture at finish
Moisture increase
Initial dry density (pcf)
Swell (psf)

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

LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE: 5/22/18

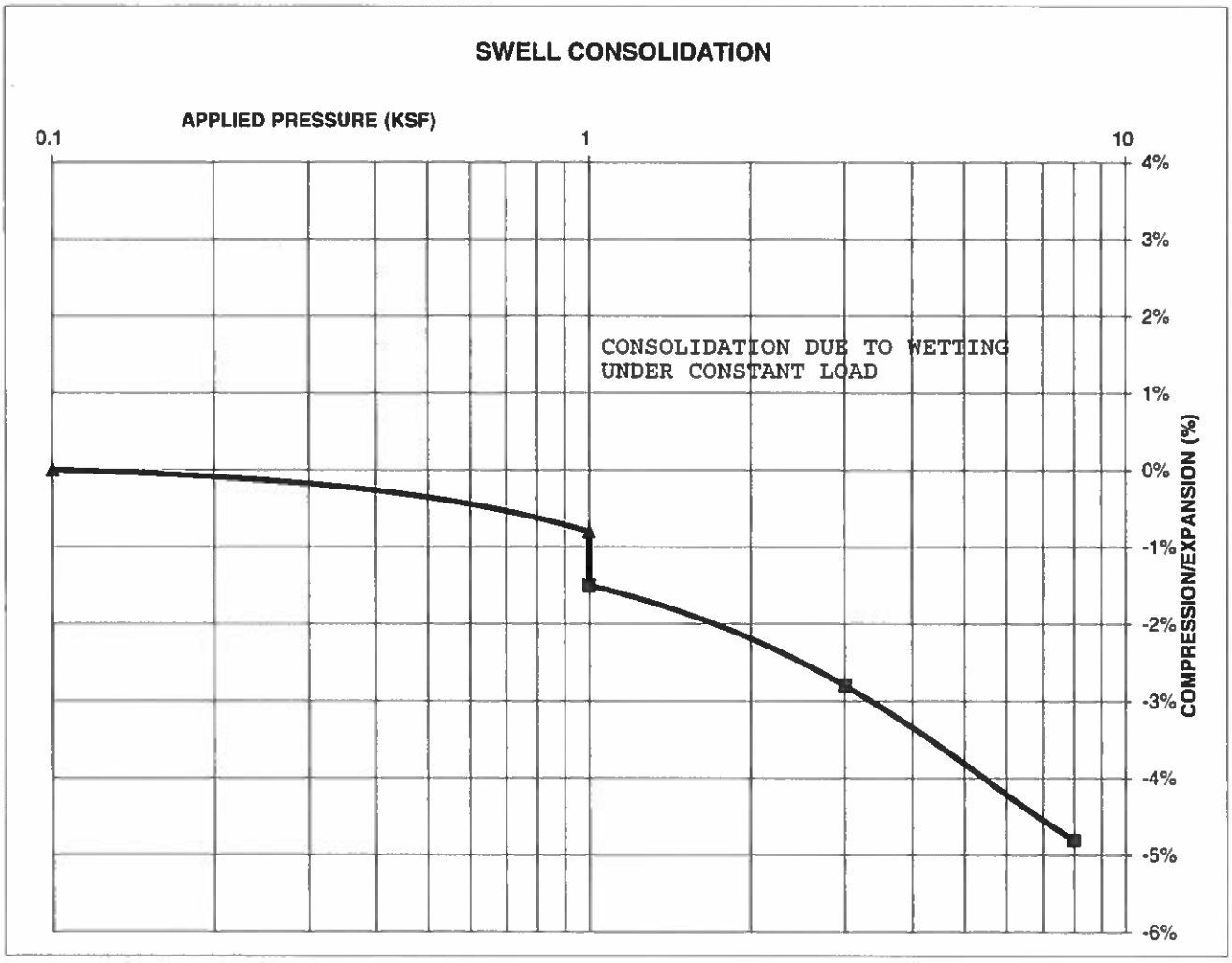
JOB NO: 180517

FIG NO: C-14

CONSOLIDATION TEST RESULTS

TEST BORING #	2	DEPTH(ft)	20
DESCRIPTION	SM-SW	SOIL TYPE	3
NATURAL UNIT DRY WEIGHT (PCF)			112
NATURAL MOISTURE CONTENT			14.9%
SWELL/CONSOLIDATION (%)			-0.7%

JOB NO. 180517
CLIENT DAN FERGUSON
PROJECT 13202 JUDGE ORR ROAD



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

SWELL CONSOLIDATION
TEST RESULTS

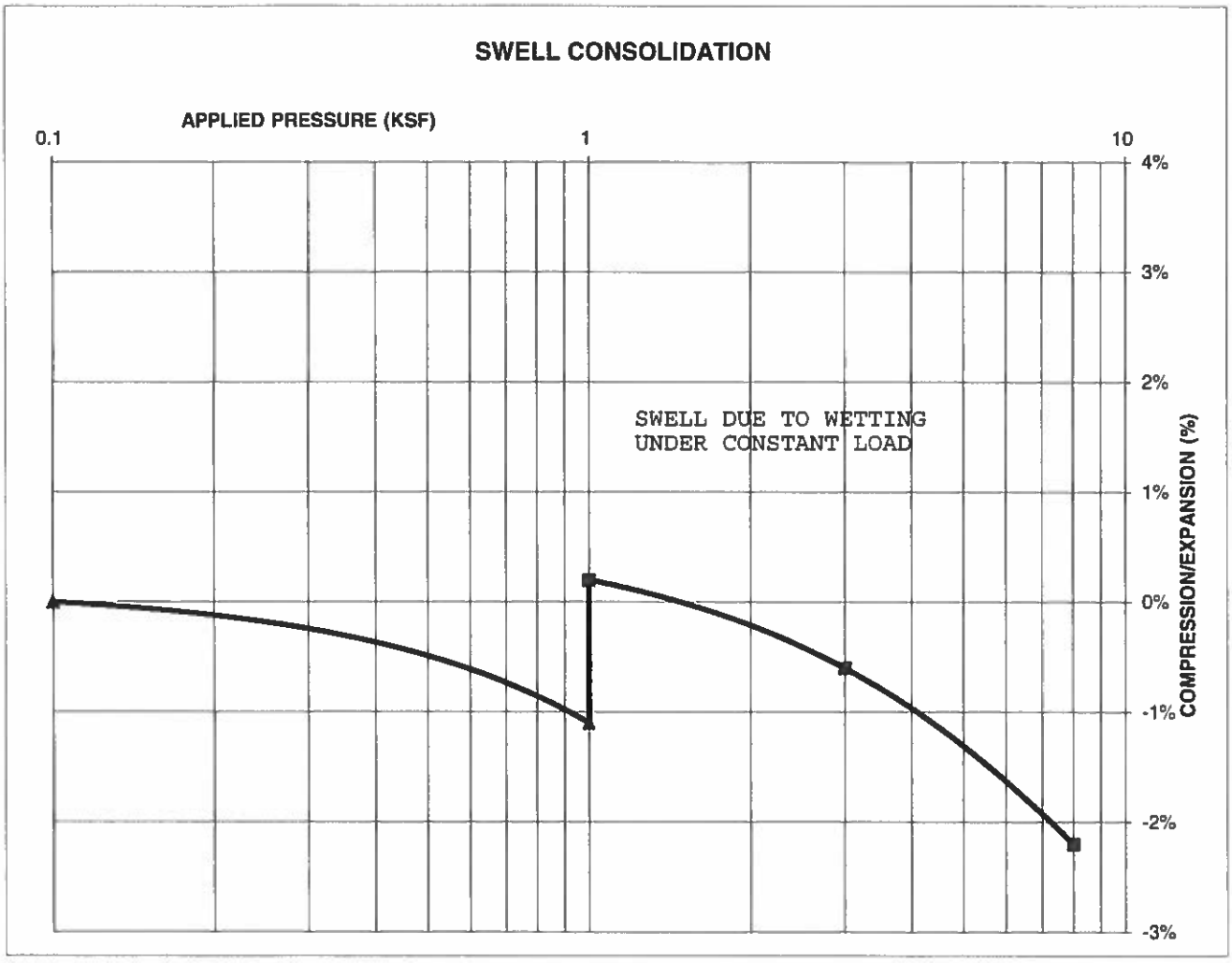
DRAWN:	DATE:	CHECKED:	DATE:
			5/22/18

JOB NO.: 180517
FIG NO.: C-15

CONSOLIDATION TEST RESULTS

TEST BORING #	6	DEPTH(ft)	10
DESCRIPTION	CL	SOIL TYPE	4
NATURAL UNIT DRY WEIGHT (PCF)			112
NATURAL MOISTURE CONTENT			12.5%
SWELL/CONSOLIDATION (%)			1.3%

JOB NO. 180517
CLIENT DAN FERGUSON
PROJECT 13202 JUDGE ORR ROAD



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

SWELL CONSOLIDATION
TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE:
			7/22/18

JOB NO.: 180517
FIG NO.: C-16

CLIENT	DAN FERGUSON	JOB NO.	180517
PROJECT	13202 JUDGE ORR ROAD	DATE	4/30/2018
LOCATION	13202 JUDGE ORR ROAD	TEST BY	BL

BORING NUMBER	DEPTH, (ft)	SOIL TYPE NUMBER	UNIFIED CLASSIFICATION	WATER SOLUBLE SULFATE, (wt%)
TB-1	15	3	SM-SW	0.00
TB-2	10	1	SC	0.01
TB-5	10	3	SM-SW	0.01

QC BLANK PASS

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

LABORATORY TEST
SULFATE RESULTS

DRAWN:	DATE:	CHECKED:	DATE:
			5/22/18

JOB NO.: 180517

FIG NO.: C-17

APPENDIX D: Soil Survey Descriptions

El Paso County Area, Colorado

19---Columbine gravelly sandy loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 367p
Elevation: 6,500 to 7,300 feet
Mean annual precipitation: 14 to 16 inches
Mean annual air temperature: 46 to 50 degrees F
Frost-free period: 125 to 145 days
Farmland classification: Not prime farmland

Map Unit Composition

Columbine and similar soils: 85 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Columbine

Setting

Landform: Fan terraces, fans, flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium

Typical profile

A - 0 to 14 inches: gravelly sandy loam
C - 14 to 60 inches: very gravelly loamy sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Very low (about 2.5 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: A
Ecological site: Gravelly Foothill (R049BY214CO)
Hydric soil rating: No

Minor Components

Fluvaquentic haplaquolls

Percent of map unit:
Landform: Swales

Hydric soil rating: Yes

Other soils

Percent of map unit:
Hydric soil rating: No

Pleasant

Percent of map unit:
Landform: Depressions
Hydric soil rating: Yes

Data Source Information

Soil Survey Area: El Paso County Area, Colorado
Survey Area Data: Version 15, Oct 10, 2017

El Paso County Area, Colorado

83—Stapleton sandy loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 369z
Elevation: 6,500 to 7,300 feet
Mean annual precipitation: 14 to 16 inches
Mean annual air temperature: 46 to 48 degrees F
Frost-free period: 125 to 145 days
Farmland classification: Not prime farmland

Map Unit Composition

Stapleton and similar soils: 80 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Stapleton

Setting

Landform: Hills
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Sandy alluvium derived from arkose

Typical profile

A - 0 to 11 inches: sandy loam
Bw - 11 to 17 inches: gravelly sandy loam
C - 17 to 60 inches: gravelly loamy sand

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 4.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: B
Ecological site: Gravelly Foothill (R049BY214CO)
Hydric soil rating: No

Minor Components

Fluvaquentic haplaquolls
Percent of map unit:
Landform: Swales
Hydric soil rating: Yes

Other soils
Percent of map unit:
Hydric soil rating: No

Pleasant
Percent of map unit:
Landform: Depressions
Hydric soil rating: Yes

Data Source Information

Soil Survey Area: El Paso County Area, Colorado
Survey Area Data: Version 15, Oct 10, 2017

APPENDIX E: El Paso County Health Department Septic Records

EL PASO COUNTY HEALTH DEPARTMENT
INDIVIDUAL SEWAGE DISPOSAL INSPECTION FORM

Permit # 6448 BR

Date 6-12-92 P

#4200000264

APPROVED YES ✓ NO ___ ENVIRONMENTALIST D. Mydlowski

See letter dated 7-6-92

Address 13262 Judge Orr Road A Owner Marta McKinley

Legal Description Section 32 T10S R64W

Residence ✓ Commerical ___ # of Bedrooms 6 System Installer Down to Earth Excavating

SEPTIC TANK

Commercial ✓ Noncommercial ___ Measurements: L ___ W ___ D ___

Construction Material Pre Cast Concrete Liq. Cap. each residence has 1250 gallon tank. (May use 2-1250 gallon tanks per engineer see design)

DISPOSAL FIELD

Exc. Depth ___ Width 32 ft Total Length 100' Sq. Ft. 1125 ft²

Rock Rock/Gravel Depth 12" Under 6" Over 2"

Rockless System: Diameter of Pipe ___

Seepage Pits: Number of rings ___ Lining Material ___ Sq. Ft. ___

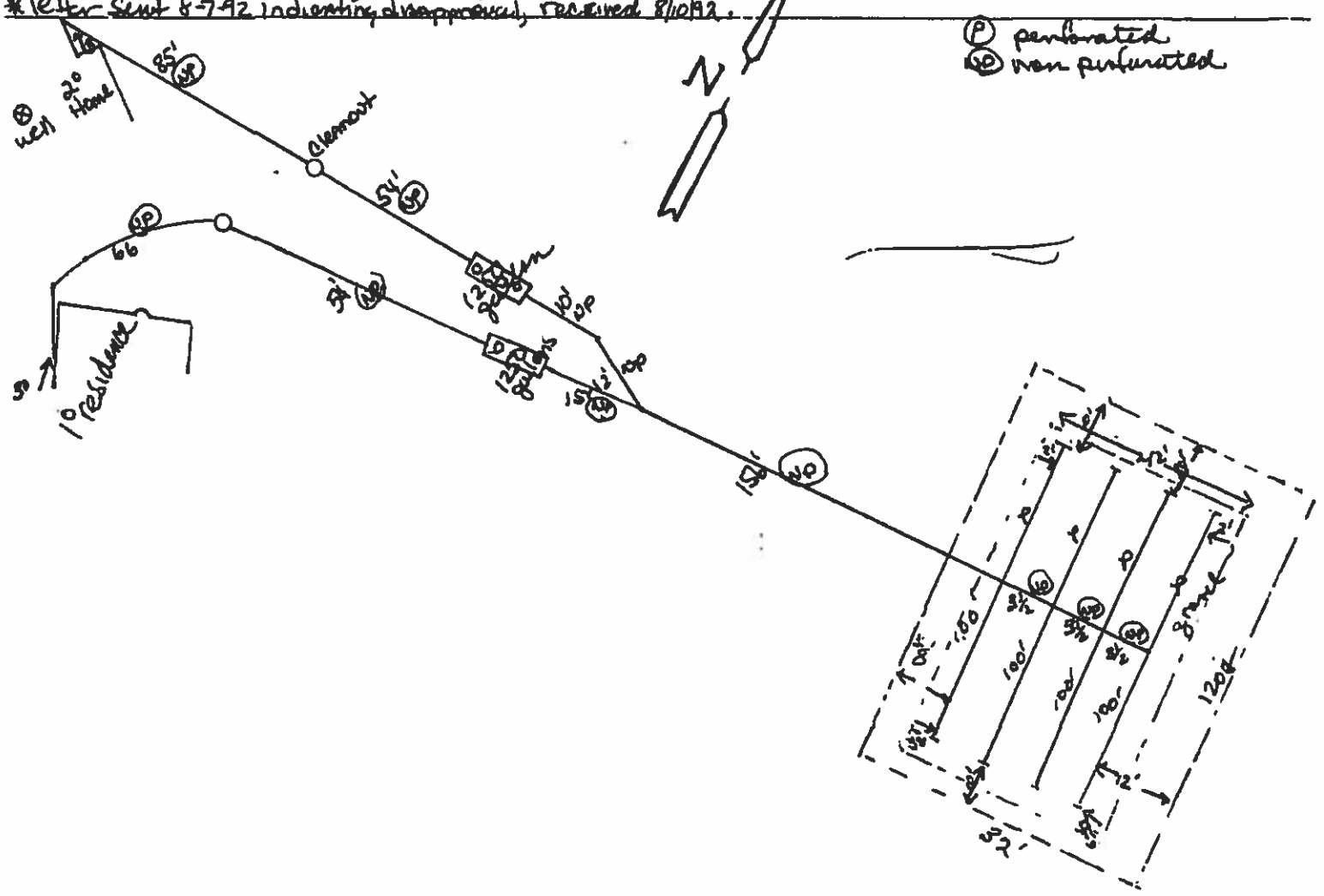
Working Depth ___ Width ___

Engineer Design Yes ✓ Type Mound Engineer Approval Letter Yes ~~No~~

Well 50 feet from Tank Yes 100 feet from leach field Yes

Well Installed at Time of Septic System Inspection Yes ✓ No ___ Public Water ___

*letter sent 8-7-92 indicating disapproval, received 8/10/92.



Acres 3.15

EL PASO COUNTY • COUNTY HEALTH DEPARTMENT Permit No. 5448

501 North Foote Avenue • Colorado Springs, Colorado • 578-3125

Water Supply WELL

Receipt No. 2356

PERMIT

TO CONSTRUCT, ALTER, REPAIR or MODIFY ANY INDIVIDUAL SEWAGE DISPOSAL SYSTEM

Issued To MARTA D. MCKINLEY Date 5-11-92

Address of Property 13202 JUDGE ORR ROAD, Phone 635-0227

(Permit valid at this address only)

Sewage-Disposal System work to be performed by RICK PRING LIC #63 Phone 550-9547

This Permit is issued in accordance with 25-10-106 Colorado Revised Statutes 1973, as amended. PERMIT EXPIRES upon completion-installation of sewage-disposal system or at the end of twelve (12) months from date of issue—whichever occurs first—(unless work is in progress). This permit is revokable if all stated requirements are not met.

—THIS PERMIT DOES NOT DENOTE APPROVAL OF ZONING AND ACREAGE REQUIREMENTS—

$160.00
PERMIT FEE (NOT REFUNDABLE)

DIRECTOR, COUNTY HEALTH DEPARTMENT

5-11-93
DATE OF EXPIRATION

ENVIRONMENTALIST

NOTE: LEAVE ENTIRE SEWAGE-DISPOSAL SYSTEM UNCOVERED FOR FINAL INSPECTION. 48 HOUR ADVANCE NOTICE REQUIRED.

SEPTIC TANK:	TRENCH SYSTEM:	BED SYSTEM:	SEEPAGE PIT SYSTEM:
2 TANKS EACH 1250 gallons	total square feet 1200 ft. of trench inches wide ft. of trench inches wide	total square feet	total square feet rings or diam.x w/d

NOTES: Individual Sewage Disposal System shall be installed per engineer design, and comply with all El Paso County Regulations. All minimum distances are to be met, including depth of system to ground water. Per engineer slope on existing pipes to be less than 1/8 inch fall, if greater new lines to be installed.

The Health Office shall assume no responsibility in case of failure or inadequacy of a sewage-disposal system, beyond consulting in good faith with the property owner or representative. Free access to the property shall be authorized at reasonable times for the purpose of making such inspections as are necessary to determine compliance with requirements of this law.

inspection and approval letter required by engineer prior to final approval.

El Paso County Health Department
501 North Foote Avenue
Colorado Springs, CO 80909-4593
(303) 578-3125

~~Applicant~~ POC - DANIEL & TIA FERGUSON
495-0836

APPLICATION FOR A PERMIT TO CONSTRUCT, REMODEL, OR INSTALL A SEWAGE DISPOSAL SYSTEM

NAME OF OWNER MARTA D. McKINLEY HOME PHONE 635-0227 WORK PHONE —

ADDRESS OF PROPERTY 13202 JUDGE ORR RD, PEYTON CO 80831 DATE 27FEB92

LEGAL DESCRIPTION OF PROPERTY ATTACHED

TAX SCHEDULE NUMBER 42000 00 133 SYSTEM CONTRACTOR RICK PRING Lic #63 Mobile 338-0594 PHONE 550-9547

OWNER'S ADDRESS IF DIFFERENT 3204 LESLIE DR, CO SPRINGS CO 80909

TYPE OF HOUSE CONSTRUCTION LOG & STUCCO SOURCE AND TYPE OF WATER SUPPLY WELL

SIZE OF LOT 3.15 ACRES MAXIMUM POTENTIAL NUMBER OF BEDROOMS 6 Marta D. McKinley BASEMENT (yes or no) YES

PERCOLATION TEST RESULTS ATTACHED (yes or no) NO

Don Stan Crew - 495-3502

A plot plan and accompanying information are essential; it may be drawn on the back of this application or be attached. Please include by measured distance the location of wells including neighbors' wells, springs, water supply lines, cisterns, buildings, proposed structures, property lines, property dimensions, subsoil drains, lakes, ponds, water courses, streams, and dry gulches. Please show the location of the proposed septic system by directions and distances from actual and/or proposed dwellings, structures, or fixed reference objects. Give complete directions to the property from major highways. (ANSWER QUESTIONS ON BACK OF FORM).

Applicant acknowledges that the completeness of the application is conditional upon such further mandatory and additional tests and reports as may be required by the department to be made and furnished by the applicant for purposes of evaluation of the application; and issuance of the permit is subject to such terms and conditions as deemed necessary to ensure compliance with rules and regulations adopted under Article 10, Title 25, C.R.S. 1973 as amended. The undersigned hereby certifies that all statements made, information and reports submitted by the applicant are or will be represented to be true and correct to the best of my knowlege and belief and are designed to be relied on by the El Paso County Health Dept. in evaluating the same for purposes of issuing the permit applied for herein. I further understand that any falsification or misrepresentation may result in the denial of the application or revocation of any permit granted based upon said application and in legal action for perjury as provided by law.

SIGNATURE Marta D. McKinley

HEALTH DEPARTMENT USE ONLY

2350 gallons installed 1000 gallons per dwelling

PERMIT NUMBER 6448 RECEIPT NUMBER 2-1250 plus 100 per H. Dan letter 3/6/92 SENT TO LAND USE DEPARTMENT 2/27/92 attached OK

DESCRIPTION AREA 1200 ft² TANK CAPACITY 2500 gallons Letter to Client DATE OF SITE INSPECTION 5/7/92

REMARKS: an individual sewage disposal system shall be installed per engineer design, and comply with all El Paso County regulations. All measurements listed are to be met including depth of system to ground water. Per engineer slope on trenches/beds to be no less than 1% fall. If greater new trenches to be installed. On inspection and as built letter required by Engineer prior to final approval.

APPLICATION IS APPROVED (✓) DENIED ( ) DATE 5/8/92 ENVIRONMENTALIST D. Myklebust

ANSWER THE FOLLOWING ITEMS AND/OR INCLUDE ON PLOT PLAN.

PROPERTY LINES See Plot Plan

PROPERTY DIMENSIONS 3.5 ACRES

LOCATION OF PROPOSED SEPTIC SYSTEM See Plot

LOCATION OF WELL See Plot

LOCATION OF ADJACENT WELLS N/A

BUILDINGS See Plot

PROPOSED BUILDINGS N/A

WATER SUPPLY LINE N/A

CISTERNS N/A

SPRINGS See Plot

LAKES See Plot

PONDS See Plot

WATER COURSES See Plot

STREAMS See Plot

DRY GULCHES —

SUBSOIL DRAINS See Plot

DIRECTIONS TO PROPERTY FROM MAIN HIGHWAYS:

Property is located at the North East intersection of Judge Orr Road and Highway 24.

NOTE - This proposal is to construct a new system for the existing house. A separate proposal has been submitted to expand the existing septic field which will serve the trailer.

A new system is required for the house, as both house and trailer currently utilize the same tank and field.

[redacted] #4200000264
06/12/1992

(1) E

(1)

MOUND SYSTEM DESIGN

FOR THE FERGUSONS

13262 JUDGE ORR ROAD A

EL PASO COUNTY
COLO.

HENRY W. DANLEY
REGISTERED PROFESSIONAL
6488
ENGINEER
STATE OF COLORADO

SLOPE = 5% ±

AVERAGE PERC. = 27.6 MIN/INCH

DEPTH TO WATER = 3'6" ±

TOTAL DISCHARGE = 4 BEDROOMS
(3 IN HOUSE; 3 IN TRAILER)
X 150 GPD X 1.5 INCREASE
= 1350 GAL/DAY.

415-1350

RECEIVED
MAY - 6 1992
C-CHD
ENV. HEALTH

ABSORBTION BED AREA =

$$\frac{1350 \text{ GPD}}{1.2 \text{ GPD/SF}} = 1125 \text{ SF}$$

BED WIDTH (A) = 1125 SF / 100
= 11.25' SAY 12'

(D) = 1'0" (MIN)

(E) = 1'0" + 12(0.08) = 2'0"

(F) 12" (6" OF GRAVEL BELOW INVERT)

(G) 12" MIN

(H) 18" MIN (USE 24")

(6)

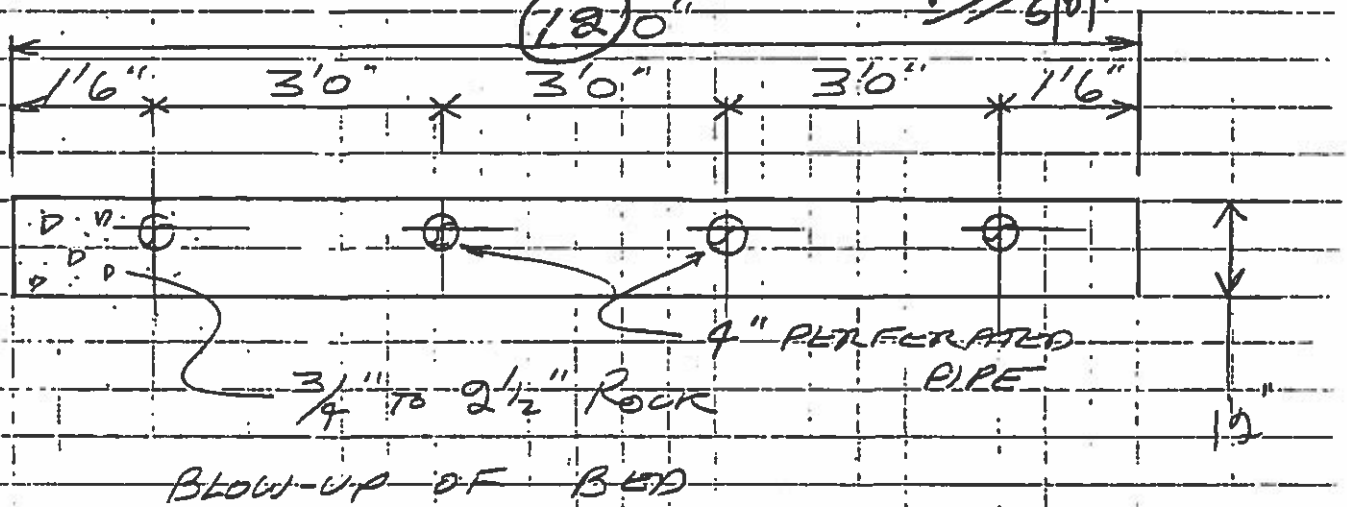
SEPTIC TANK - 1350 G.P.D.

X 2 DAYS = 2600 GAL

MINIMUM SEPTIC TANK = 2600 GAL.

* MAY USE 2 - 1250 GAL TANKS AS PER HEALTH DEPT. REGULATIONS (AND

KW SIBA2



BLOW-UP OF BED

CHANGE OLD FERGUSON SEPTIC SYSTEM DESIGN

13302 JUDGE ORR RD.
EL PASO COUNTY
COLO.

DARLOW ENGR
3405 SINTON RD #138
COLO. SPS., CO
80907

RECEIVED
MAY 11 1992
C-CHD
ENV. HEALTH

NATURAL SOIL INFILTRATION

$= 0.75$ GPD/FT^2

BASAL AREA REQ'D

$$\frac{1350 \text{ GPD}}{0.75 \text{ GPD/FT}^2} = 1800 \text{ SF}$$

31-45 PERC.

$A = 12$

$I = ?$

$B = 100$

$(A + I)(B) = 1800$ SF

$(12 + I)(100) = 1800$ SF

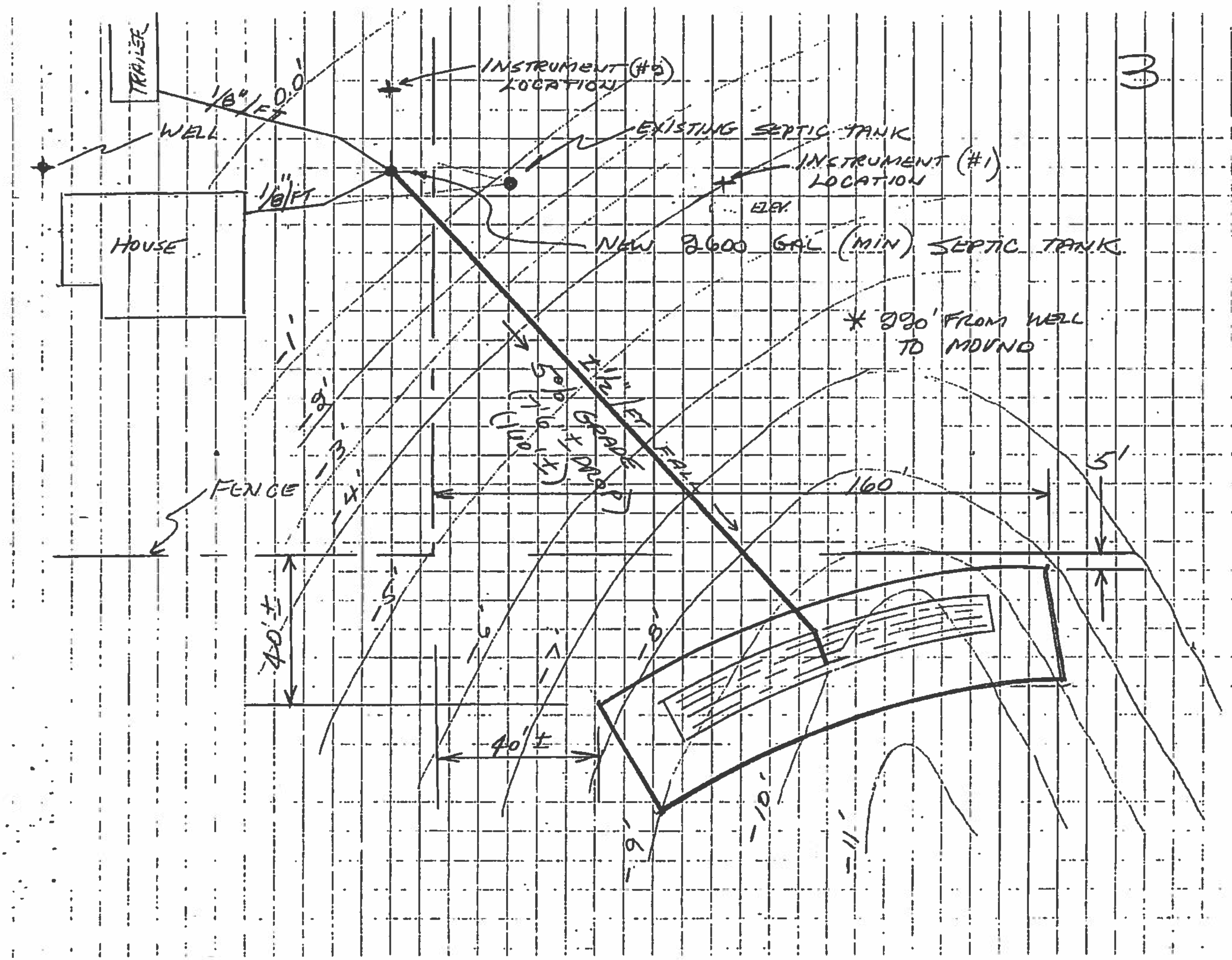
$1200 + 100I = 1800$ $\quad I = 6'$

(FOR 3/1 SLOPE MUST BE 12'0" — USE 12')

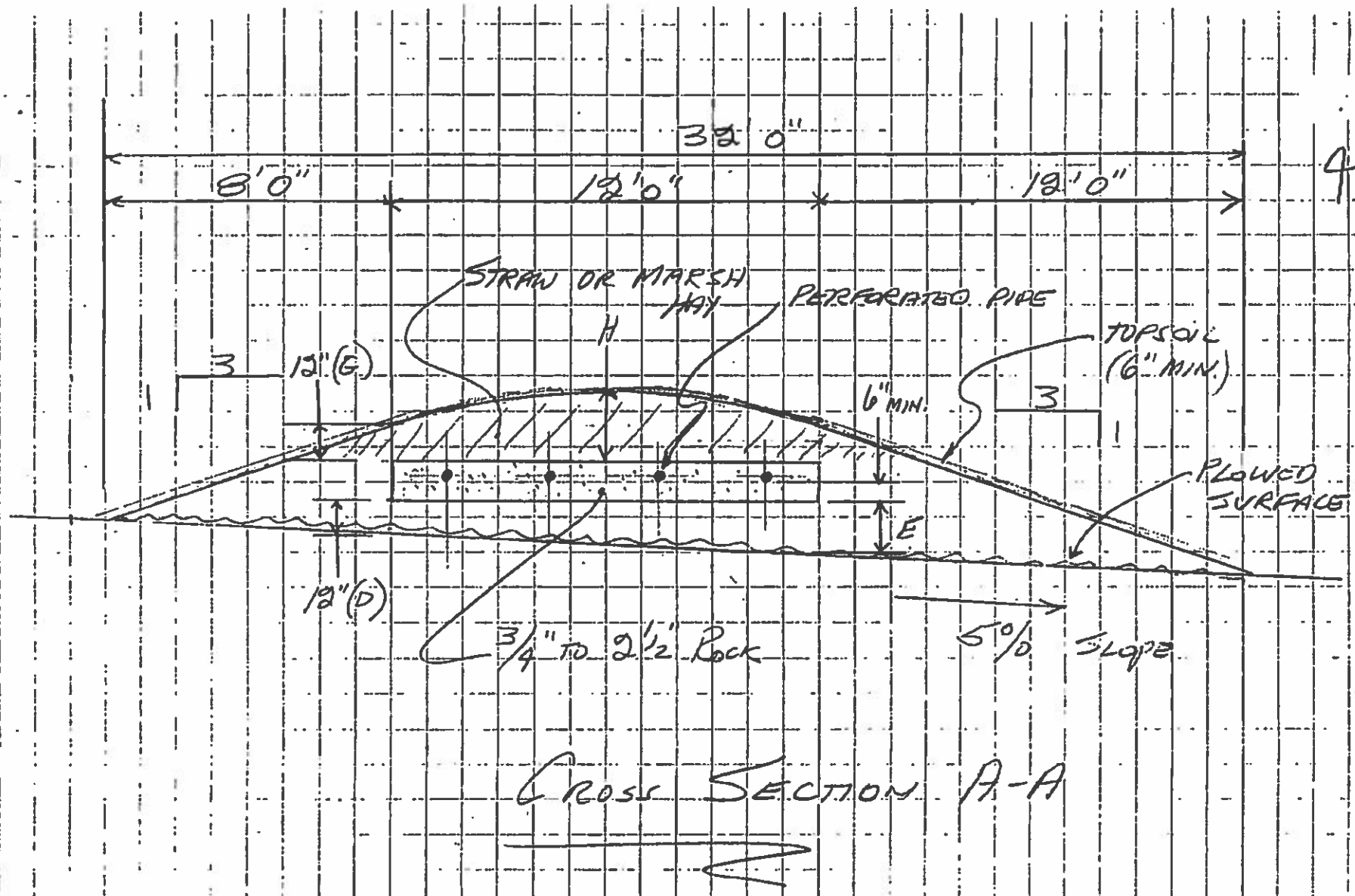
$$J = \left(\frac{1'}{(D)} + \frac{1'}{(E)} + \frac{1'}{(G)}\right) \times 3 = 9' - 1'$$

FROM SLOPE $= 8'$

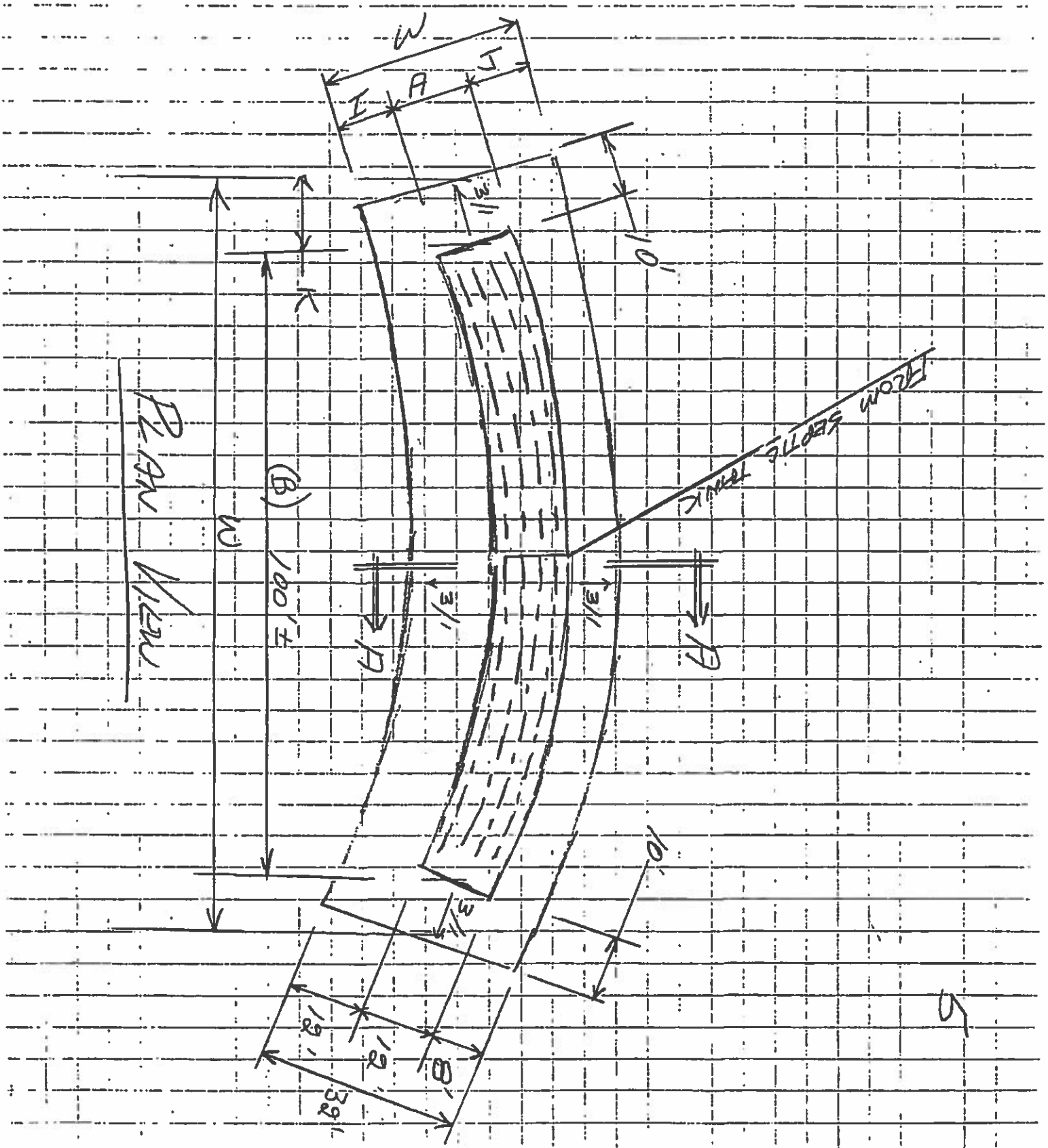
6
12
8
16
36


TRAILER
WELL
1/8"/FT
1/8"/FT
0.0'
INSTRUMENT (#2) LOCATION
EXISTING SEPTIC TANK
INSTRUMENT (#1) LOCATION
ELEV.
HOUSE
NEW 2600 GAL (MIN) SEPTIC TANK
* 220' FROM WELL TO MOUND
1 1/2"/FT FALL
5% GRADE
(7.6'± DROP)
(140'±)
160'
5'
FENCE
40'±
40'±
-1'
-2'
-3'
-4'
-5'
-6'
-7'
-8'
-9'
-10'
-11'

3



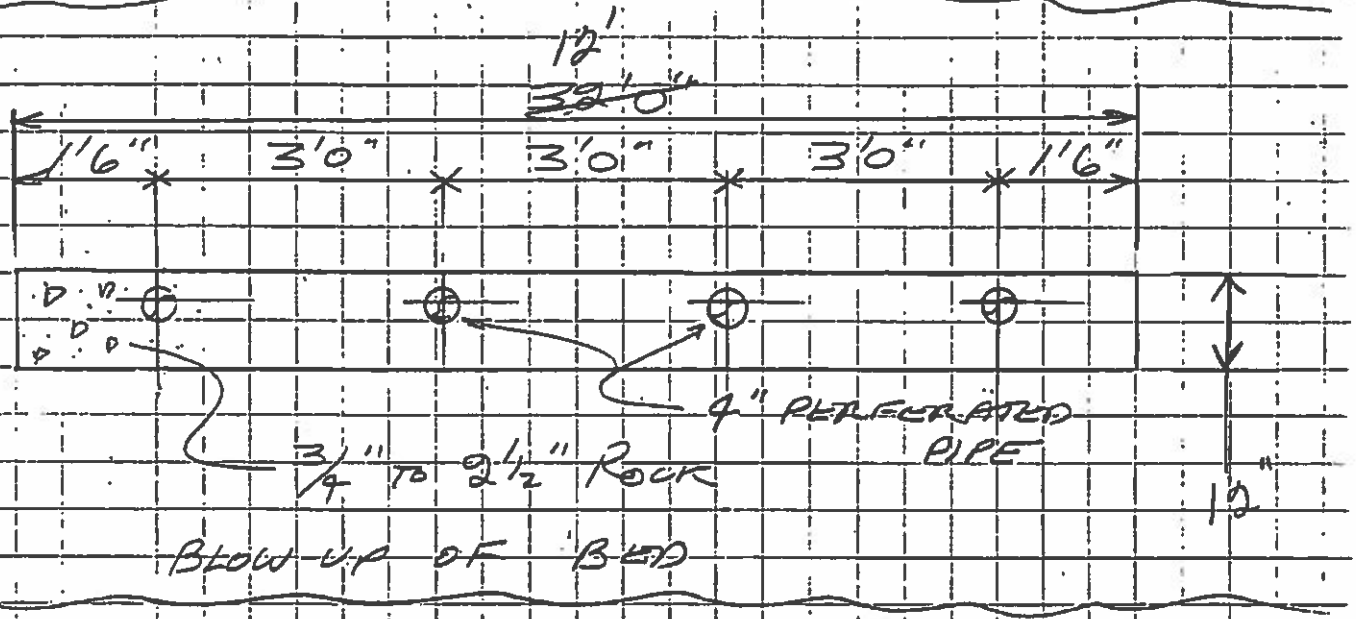
CROSS SECTION A-A


W
I
A
J
K
W
10'
PLAN
(B) 100'±
FROM SEPTIC TANK
3'
3'
W
10'
2'
2'
2'
2'

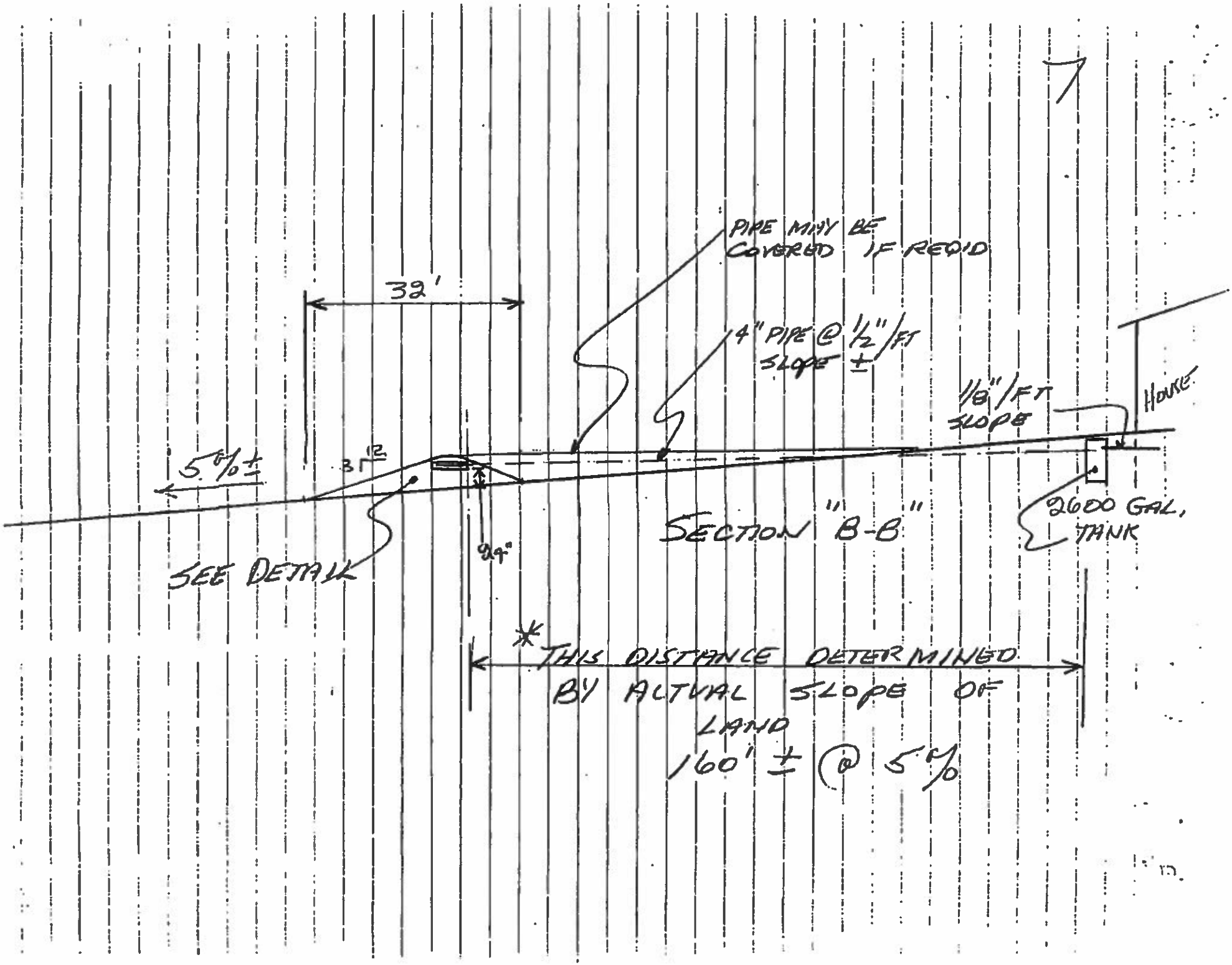
SEPTIC TANK – 1350 G.P.D.

× 2 DAYS = 2600 GAL

MINIMUM SEPTIC TANK = 2600 GAL.



BLOW-UP OF BED


PIPE MAY BE COVERED IF REQ'D
32'
4" PIPE @ 1/2" FT SLOPE ±
1/8" FT SLOPE
HOUSE
5% ±
3 12
24"
SEE DETAIL
SECTION "B-B"
2600 GAL. TANK
* THIS DISTANCE DETERMINED BY ACTUAL SLOPE OF LAND
160' ± @ 5%

General Notes

1) Check slope of existing pipe from house to septic tank.

2) Adjust invert elevation of new septic tank in accordance with depth & slope of existing line from house. (Slope cannot exceed 1/4"/ft.

3) Slope from new septic tank to mound may be any slope 1/4"/ft (or more) Adjust in field after determining elevation of pipe in mound.

DARLOW ENGINEERING CO.
COLORADO SPRINGS, COLORADO
3405 SINTON RD. #138
COLORADO SPRINGS, COLORADO 80907
(719) 633-9449

9

3-4-92

HENRY W. DANLEY REGISTERED PROFESSIONAL 6418 ENGINEER STATE OF COLORADO

PERCULATION TEST REPORT

3 TEST HOLES: 4" DIA. X 30". IN DEPTH
WATER LEVEL 8+3½

8 FT. DEEP SOIL SAMPLE HOLE - RANGE OF EACH LAYER

FT	
0-15"	Loose Loose moderate heavy Sand moderate gravel trace Clay
15-56	Loose trace Sand trace gravel moderate heavy Clay
56-98	Hand packed heavy Clay

TIME	HOLE #1		HOLE #2		HOLE #3	
	IN	DROP	IN	DROP	IN	DROP
1:10	30"	7 7/8"	30"	5 1/4"	30"	1/4"
1:20	"	1/2"	"	4 1/2"	"	3/16"
1:30	"	1/2"	"	3 3/4"	"	3/16"
1:40	"	3/16"	"	3 1/8"	"	1/4"
1:50	"	3/8"	"	3 1/16"	"	3/16"
2:00	"	3/8"	"	3 5/8"	"	3/16"
	MIN/IN 26.7		MIN/IN 28		MIN/IN 53.3	

AVERAGE: MIN/IN= 27.6

CUSTOMER & LOCATION
Don Ferguson
13202 Judge Orr Rd

PRESOAK	FROM	TO
DATE 3-3-92	3:00 pm	1:10 pm

3-4-92

HENRY W. DANLEY P.E.

7.2.4.4 Construction

a. Site Preparation

Good construction techniques are essential if the mound is to function properly. The following techniques should be considered:

Step 1: Rope off the site to prevent damage to the area during other construction activity on the lot. Vehicular traffic over the area should be prohibited to avoid soil compaction.

Step 2: Stake out the mound perimeter and bed in the proper orientation. Reference stakes set some distance from the mound perimeter are also required in case the corner stakes are disturbed.

Step 3: Cut and remove any excessive vegetation. Trees should be cut at ground surface and the stumps left in place.

Step 4: Measure the average ground elevation along the upslope edge of the bed to determine the bottom elevation of the bed.

Step 6: Plow the area within the mound perimeter. Use a two bottom or larger moldboard plow, plowing 7 to 8 in. (18 to 20 cm) deep parallel to the contour. Single bottom plows should not be used, as the trace wheel runs in every furrow, compacting the soil. Each furrow should be thrown upslope. A chisel plow may be used in place of a moldboard plow. Roughening the surface with backhoe teeth may be satisfactory, especially in wooded sites with stumps. Rototilling is not recommended because of the damage it does to the soil structure. However, rototilling may be used in granular soils, such as sands.

Plowing should not be done when the soil is too wet. Smearing and compaction of the soil will occur. If a sample of the soil taken from the plow depth forms a wire when rolled between the palms, the soil is too wet. If it crumbles, plowing may proceed.

b. Fill Placement

Step 1: Place the fill material on the upslope edges of the plowed area. Keep trucks off the plowed area. Minimize traffic on the downslope side.

Step 2: Move the fill material into place using a small track type tractor with a blade. Always keep a minimum of 6 in. of material beneath the tracks of the tractor to minimize compaction of the natural soil. The fill material should be worked in this manner until the height of the fill reaches the elevation of the top of the absorption bed.

Step 3: With the blade of the tractor, form the absorption bed. Hand level the bottom of the bed, checking it for the proper elevation. Shape the sides to the desired slope.

c. Distribution Network Placement

Step 1: Carefully place the coarse aggregate in the bed. Do not create ruts in the bottom of the bed. Level the aggregate to a minimum depth of 6 in. (15 cm).

Step 2: Assemble the distribution network on the aggregate. The manifold should be placed so it will drain between doses, either out the laterals or back into the pump chamber. The laterals should be laid level.

Step 3: Place additional aggregate to a depth of at least 2 in. (5 cm) over the crown of the pipe.

Step 4: Place a suitable backfill barrier over the aggregate.

d. Covering

Step 1: Place a finer textured soil material such as clay or silt loam over the top of the bed to a minimum depth of 6 in. (15 cm).

Step 2: Place 6 in. (15 cm) of good quality topsoil over the entire mound surface.

Step 3: Plant grass over the entire mound using grasses adapted to the area. Shrubs can be planted around the base and up the sideslopes. Shrubs should be somewhat moisture tolerant since the downslope perimeter may become moist during early spring and late fall. Plantings on top of the mound should be drought tolerant, as the upper portion of the mound can become dry during the summer.

7.2.4.5 Operation and Maintenance

a. Routine Maintenance

A properly designed and constructed mound should operate satisfactorily with virtually no regular maintenance.

DARLOW ENGINEERING CO.
COLORADO SPRINGS, COLORADO
3405 SINTON RD. #138
COLORADO SPRINGS, COLORADO 80907
(719) 633-9440

3-4-92

HENRY W. DANLEY REGISTERED PROFESSIONAL ENGINEER 6418 STATE OF COLORADO

PERCULATION TEST REPORT

3 TEST HOLES: 4" DIA. X 30". IN DEPTH
WATER LEVEL 8'+

8 FT. DEEP SOIL SAMPLE HOLE - RANGE OF EACH LAYER

FT	
0-15"	Loose Large moderate heavy Sand moderate gravel trace Clay
15-56	Loose trace Sand trace gravel moderate heavy clay
56-98	Hand packed heavy Clay

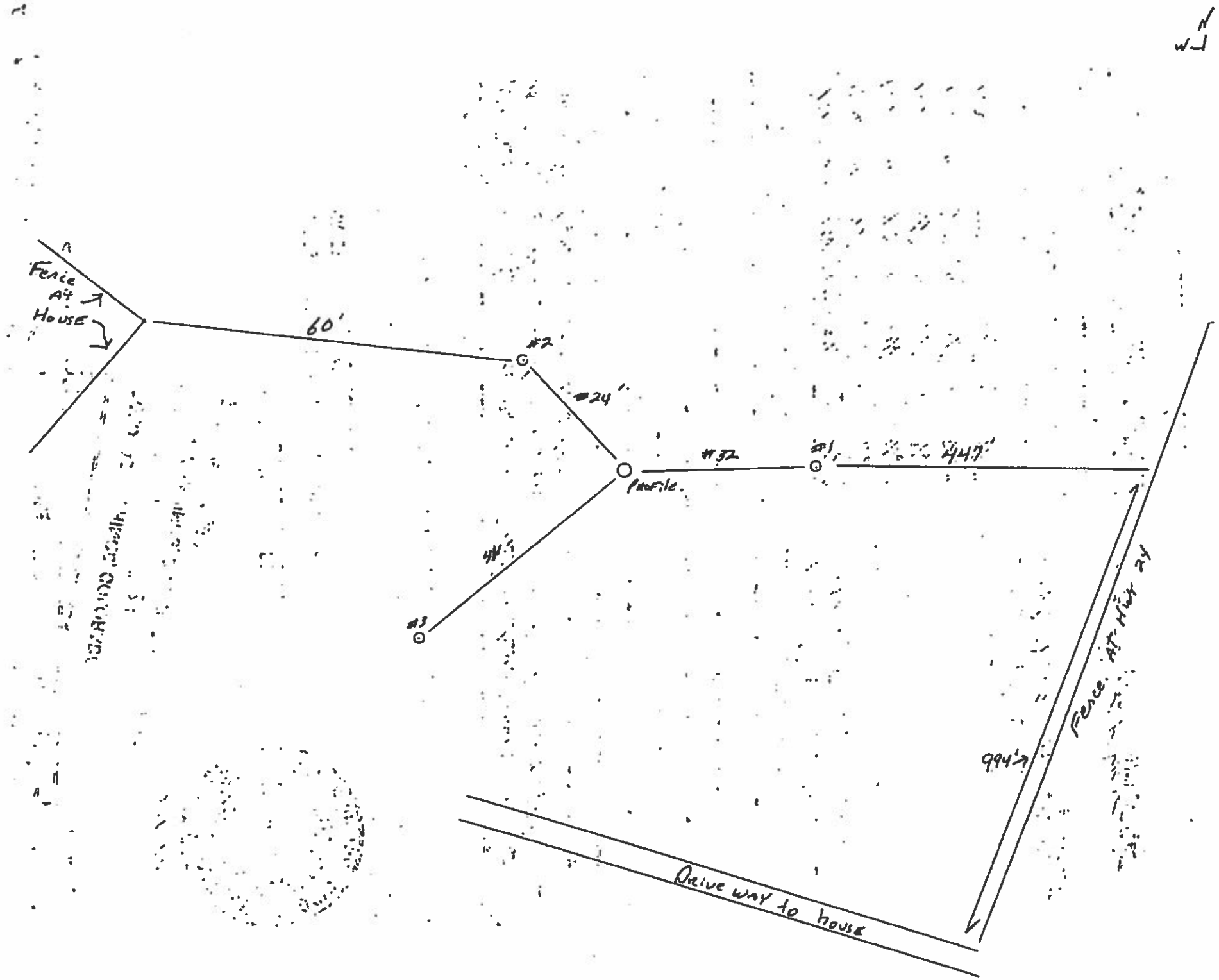
TIME	HOLE #1		HOLE #2		HOLE #3	
	IN	DROP	IN	DROP	IN	DROP
1:10	30"	1 1/4"	30"	5 1/4"	30"	1/4"
1:20	"	1/2"	"	4 1/2"	"	3/16"
1:30	"	1/2"	"	3 3/4"	"	3/16"
1:40	"	7/16"	"	3 5/8"	"	1/4"
1:50	"	3/8"	"	3 11/16"	"	3/16"
2:00	"	7/8"	"	3 5/8"	"	3/16"
	MIN/IN 26.7		MIN/IN 28		MIN/IN 53.3	

AVERAGE: MIN/IN= 27.6

CUSTOMER & LOCATION
Dan Ferguson
13202 Judge Orr Rd

PRESOAK	FROM	TO
DATE 3-3-92	3:00 pm	1:10 pm 3-4-92

HENRY W. DANLEY P.E.


N
Fence At House
60'
#2
#24'
#32
#1
447'
Profile
44'
#3
994'
Fence At Hwy 24
Drive way to house

T-C EXCAVATING, INC.
Chester Hamacher
6430 Burrows Rd. Tel.: 495-2379
Colorado Springs. Colorado 80908

SOIL PERCOLATION DATA SHEET

Date: May 2, 1982

Client: T V Bar Ranch Address: 13202 Judge Orr Road

City: Peyton State: CO Zip Code: Tele.:

County: El Paso Location of Test: 13202 Judge Orr Road
Falcon Area

No. Acres: 350 Water Supply: well

PERCOLATION RATE MEASUREMENT RESULTS

Drilled & Prepared A.M.

	Hole Depth	DEPTH TO WATER						Last ~~XXX~~ Drop	Min. per Inch
		Time: 2:00	Time: 2:30		Time: 3:00		Time: 3:30		
#1	34"	22 1/2	26 3/4	22 5/8	26 7/8	22 9/16	26 13/16	4 1/4	7.05
#2	34"	24	33 1/16	23 7/16	32 3/8	23 7/8	32 3/4	8 7/8	3.38
#3	34"	22 3/16	30 5/16	22 1/4	30 5/16	22 1/2	30 1/2	8	3.75
								Avg.	5

PROFILE

#4	Depth	Soil Description
	0 - 4"	Top soil
	4" - 4'	Sandy w/gravel
	4' - 8'	Clay

Ground Water: none

Bedrock: none

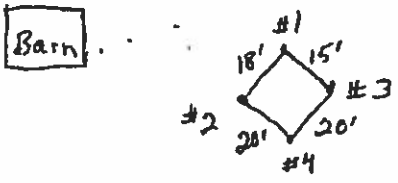
Grade of Site approx 2% to E & S

N

REMARKS:

APPROVED, LEACH SYSTEM MUST BE PLACED 100' FROM ANY WELL

FREDERICK P. BLESSING REGISTERED 10856 PROFESSIONAL ENGINEER STATE OF COLORADO



Mobile Home

EL PASO COUNTY

DEPARTMENT OF

HEALTH AND ENVIRONMENT

501 NORTH FOOTE AVENUE • COLORADO SPRINGS, CO 80909-4598 • (719) 578-3199 • FAX (719) 578-3214

CERTIFIED LETTER P 668 735 746

Martha McKinley
3204 Leslie Drive
Colorado Springs, CO 80909

REFERENCE: Individual Sewage Disposal System failure
Location: 13202 Judge Orr Road, El Paso County, Colorado

Dear Ms McKinley:

On February 6, 1992 an inspection was conducted on the above referenced property by Michele Hanley, El Paso County Department of Health and Environment. Sewage was observed surfacing on the ground in the absorption area.

Discharge of sewage on the ground is in violation of 25-10-105, 106, and III, A, of the El Paso County Department of Health and Environment Individual Sewage Disposal System Regulations of 1990. Section III, A states in part:

> "The owner of any structure where people live, work or congregate shall provide an adequate sewage disposal system in good working order and constructed, installed, and maintained in accordance with these regulations. Under no condition shall sewage contaminated material, sewage or effluent be permitted to be discharged upon the surface of the ground, or into the waters of the state..."

You shall have two (2) business days after receiving this letter to return the enclosed application for a repair permit, and thirty (30) days to obtain a permit to repair the system. You are requested to keep the system pumped as often as necessary to prevent the discharge of sewage on the ground surface until the system is repaired or replaced.

Please contact me if you have any questions regarding this matter.

Sincerely,

Donald A. Mydlowski

FOR THE DIRECTOR
ENVIRONMENTAL HEALTH SERVICES

Donald A. Mydlowski
Environmentalist
Environmental Health Services
719 578-3128

jm:

Enclosures

hc: Dan Fergussen, 13202 Judge Orr Road, Peyton, Colorado

Darlow Engineering
Hank Danley P.E.
3405 Sinton Rd. #138
Colorado Springs, CO 80907
(719) 475-7550

SEPT. 6th, 1992

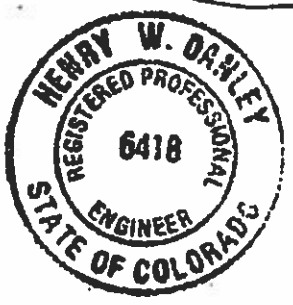
EL PASO COUNTY HEALTH DEPT.
501 No. FOOTE
COLO. SPS., CO

REF: SEPTIC SYSTEM LOCATED AT:
13202 JUDGE ORR RD.
EL PASO COUNTY
CO.

TO WHOM IT MAY CONCERN:

THE ABOVE REFERENCED SEPTIC SYSTEM WAS INSTALLED IN ACCORDANCE WITH EL PASO COUNTY REGULATIONS AND MY DESIGN.

HENRY W DANLEY P.E.
CP. 6418



EL PASO COUNTY

DEPARTMENT OF

HEALTH AND ENVIRONMENT

501 NORTH FOOTE AVENUE • COLORADO SPRINGS, CO 80909-4598 • (719) 578-3199 • FAX (719) 578-3214

August

CERTIFIED LETTER P 767 702 527

Marta D. McKinley
13202 Judge Orr Road
Peyton, Colorado 80831

REFERENCE: Individual Sewage Disposal System located at 13202 Judge Orr Road, Section 33, Township 12 South, Range 64 W of the 6th PM in El Paso County, Colorado

On June 12, 1992 an inspection of the sewage system on the above referenced property was conducted. Construction of the system was completed and the system covered prior to my arrival.

As a result the engineer designed sewage disposal system is not approved. For the sewage system to be approved, a letter is required from Henry W. Danley, PE, indicating the system was installed per his guidelines, and the design was inspected and approved by his office.

Please contact me if you have any questions regarding this matter.

Sincerely,

Donald A. Mydlowski FOR THE DIRECTOR
ENVIRONMENTAL HEALTH SERVICES

Donald A. Mydlowski
Environmentalist
Environmental Health Services
719 578-3128

jm:

El Paso County Health Department
501 North Foote Avenue
Colorado Springs, CO 80909-4593
(303) 578-3125

PROPOSAL 2 OF 2

POC - DANIEL & TIA FERGUSON 495-0836

APPLICATION FOR A PERMIT TO CONSTRUCT, REMODEL, OR INSTALL A SEWAGE DISPOSAL SYSTEM

NAME OF OWNER MARTA D. McKINLEY HOME PHONE 635-0227 WORK PHONE N/A

ADDRESS OF PROPERTY 13202 JUDGE ORR RD, PEYTON CO DATE 27 FEB 92

LEGAL DESCRIPTION OF PROPERTY ATTACHED

TAX SCHEDULE NUMBER 42000 00 133 SYSTEM CONTRACTOR RICK PRING PHONE

OWNER'S ADDRESS IF DIFFERENT 3204 LESLIE DR, CO SPRINGS CO 80907

TYPE OF HOUSE CONSTRUCTION TRAILER W/ADDITION SOURCE AND TYPE OF WATER SUPPLY WELL

SIZE OF LOT 3.15 ACRES MAXIMUM POTENTIAL NUMBER OF BEDROOMS 3 BASEMENT (yes or no) NO

PERCOLATION TEST RESULTS ATTACHED (yes or no) NO

A plot plan and accompanying information are essential; it may be drawn on the back of this application or be attached. Please include by measured distance the location of wells including neighbors' wells, springs, water supply lines, cisterns, buildings, proposed structures, property lines, property dimensions, subsoil drains, lakes, ponds, water courses, streams, and dry gulches. Please show the location of the proposed septic system by directions and distances from actual and/or proposed dwellings, structures, or fixed reference objects. Give complete directions to the property from major highways. (ANSWER QUESTIONS ON BACK OF FORM).

Applicant acknowledges that the completeness of the application is conditional upon such further mandatory and additional tests and reports as may be required by the department to be made and furnished by the applicant for purposes of evaluation of the application; and issuance of the permit is subject to such terms and conditions as deemed necessary to ensure compliance with rules and regulations adopted under Article 10, Title 25, C.R.S. 1973 as amended. The undersigned hereby certifies that all statements made, information and reports submitted by the applicant are or will be represented to be true and correct to the best of my knowlege and belief and are designed to be relied on by the El Paso County Health Dept. in evaluating the same for purposes of issuing the permit applied for herein. I further understand that any falsification or misrepresentation may result in the denial of the application or revocation of any permit granted based upon said application and in legal action for perjury as provided by law.

SIGNATURE Marta D. McKinley

HEALTH DEPARTMENT USE ONLY

PERMIT NUMBER RECEIPT NUMBER DATE TO LAND USE DEPARTMENT attached

ABSORPTION AREA TANK CAPACITY DATE OF SITE INSPECTION

REMARKS:

APPLICATION IS APPROVED ( ) DENIED ( ) DATE ENVIRONMENTALIST

ANSWER THE FOLLOWING ITEMS AND/OR INCLUDE ON PLOT PLAN.

PROPERTY LINES See PLOT

PROPERTY DIMENSIONS 315 ACRES

LOCATION OF PROPOSED SEPTIC SYSTEM See PLOT

LOCATION OF WELL See PLOT

LOCATION OF ADJACENT WELLS N/A

BUILDINGS See PLOT

PROPOSED BUILDINGS N/A

WATER SUPPLY LINE N/A

CISTERNS N/A

SPRINGS See PLOT

LAKES N/A

PONDS See PLOT

WATER COURSES See PLOT

STREAMS See PLOT

DRY GULCHES N/A

SUBSOIL DRAINS See PLOT

DIRECTIONS TO PROPERTY FROM MAIN HIGHWAYS:

PROPERTY IS LOCATED AT THE NORTH EAST INTERSECTION OF JUDGE ORR RD. AND HIGHWAY 2A.

NOTE — THIS PROPOSAL IS TO EXPAND/REPLACE THE CURRENT SEPTIC FIELD. A SEPARATE PROPOSAL TO ESTABLISH A NEW SEPTIC SYSTEM (TANK AND FIELD) FOR THE HOUSE HAS BEEN SUBMITTED. THE CURRENT SYSTEM (AS REMODELED) WILL SERVE THE TRAILER ONLY.

AN EXPANDED FIELD IS REQUIRED TO BYPASS/AUGMENT THE CURRENT FIELD, WHICH IS EXHAUSTED FROM OVER USE (THE CURRENT SEPTIC SYSTEM SERVES BOTH THE HOUSE AND TRAILER, AND IS INADEQUATE).

EL PASO COUNTY DEPARTMENT OF HEALTH AND ENVIRONMENT
INDIVIDUAL SEWAGE DISPOSAL SYSTEM INSPECTION REPORT

Permit Number: 10019
Date: April 4, 1996

#4200000264

APPROVED: YES ENVIRONMENTALIST: James R. Goodwin

Address: 13202 Judge Orr Road B
Legal Description: (See Application)
Residential system approved for five bedrooms.

Owner: Dan Ferguson
System Installer: R. Palmer (R&R Ditching)

SEPTIC TANK

Commercially made tank constructed of precast concrete.
Capacity: 2250 gallons.

DISPOSAL FIELD

Chamber system utilizing Infiltratror brand leaching chambers in a bed (mound) configuration.
number of chambers: 64; sq. ft. per chamber: 18; reduction allowed: 0%;
sq.ft. required: 1152; total sq.ft. installed: 1152.
See engineers design for more details.

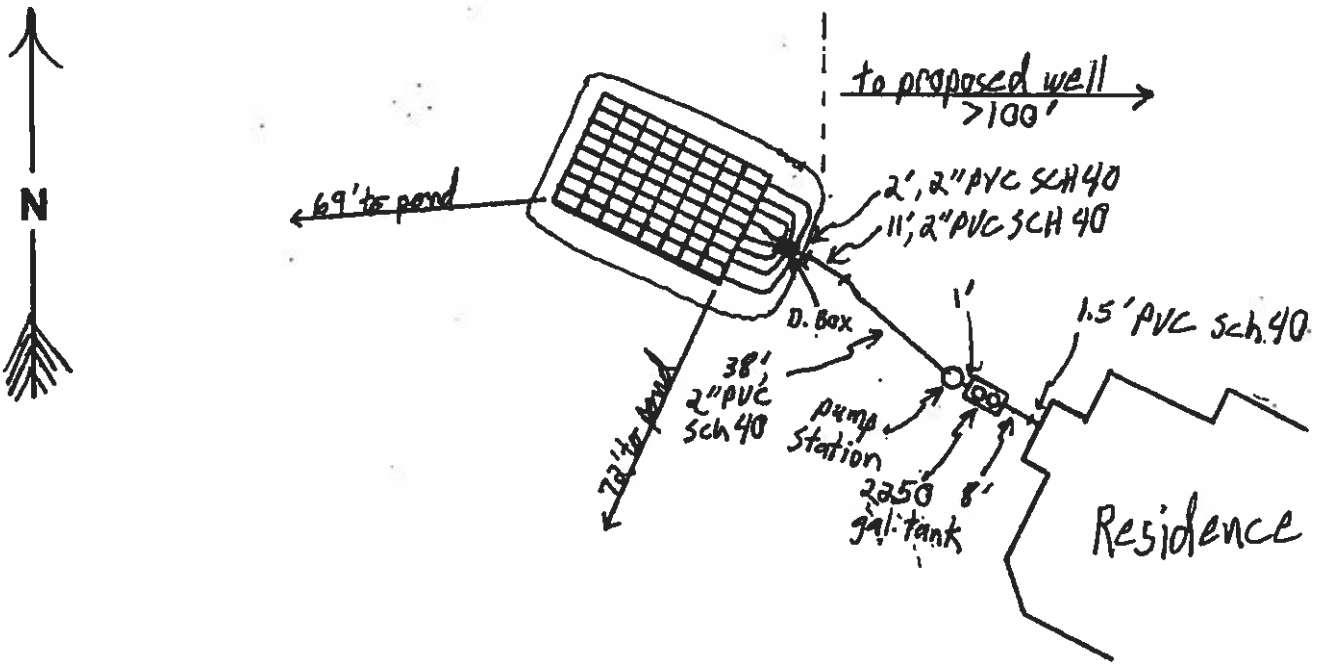
SYSTEM DESIGN

By Engineer: Yes; Name of Design Engineer: John E. Wendt, PE. Approval Letter Provided: Yes ~~No~~.

WATER SUPPLY

Private Water Supply.
Proposed well is ≥ 50 ft.* from tank, and ≥100 ft.* from leach field.
**Approval shall be revoked if in the future these minimum horizontal distances are not maintained.*

NOTES: Per D. Mydlowski, design engineer to inspect for final cover, side slopes, and alarm installation.
Except as noted below, all pipe in 4 inch diameter PVC SDR-35.



Acres 152 EL PASO COUNTY • DEPARTMENT OF HEALTH AND ENVIRONMENT

301 South Union Blvd. • Colorado Springs, Colorado • 578-3125

Water Supply WELL Permit 10019

PERMIT

TO CONSTRUCT, ALTER, REPAIR OR MODIFY ANY INDIVIDUAL SEWAGE DISPOSAL SYSTEM

Receipt No. [illegible]

Issued to DAN FERGUSON Date 3-27-96

Address of Property 13202 JUDGE ORR ROAD, B Phone 495-3526

(Permit valid at this address only)

Sewage-Disposal System work to be performed by R. PALMER-R & R DITCHING Phone 535-9999

This Permit is issued in accordance with 25-10-106 Colorado Revised Statutes 1973, as amended. PERMIT EXPIRES upon completion-installation of sewage-disposal system or at the end of twelve (12) months from date of issue-whichever occurs first-(unless work is in progress): This permit is revokable if all stated requirements are not met.

-THIS PERMIT DOES NOT DENOTE APPROVAL OF ZONING AND ACREAGE REQUIREMENTS-

$150.00
PERMIT FEE (NOT REFUNDABLE)

[signature], M.D.
DIRECTOR, DEPARTMENT OF HEALTH AND ENVIRONMENT

3-27-97
DATE OF EXPIRATION

[signature]
ENVIRONMENTALIST

NOTE: LEAVE ENTIRE SEWAGE-DISPOSAL SYSTEM UNCOVERED FOR FINAL INSPECTION. 48 HOUR ADVANCE NOTICE REQUIRED.

SEPTIC TANK:	TRENCH SYSTEM:	BED SYSTEM:	SEEPAGE PIT SYSTEM:
1750 gallons	total square feet * ____ ft. of trench ____ inches wide ____ ft. of trench ____ inches wide	total square feet ____	total square feet ____ ____ rings or ____ diam.x ____ w/d

NOTES: *INSTALL PER OPTION #1 OF P.E. DESIGN DATED 3/28/96. ENGINEER TO PROVIDE APPROVAL LETTER OF INSTALLATION PRIOR TO HEALTH DEPT. FINAL APPROVAL.

The Health Office shall assume no responsibility in case of failure or inadequacy of a sewage-disposal system, beyond consulting in good faith with the property owner or representative. Free access to the property shall be authorized at reasonable time for the purpose of making such inspections as are necessary to determine compliance with requirements of this law.

Larry

EL PASO COUNTY DEPARTMENT OF HEALTH AND ENVIRONMENT
301 South Union Boulevard
Colorado Springs, CO 80910-3123

APPLICATION FOR A PERMIT TO CONSTRUCT, REMODEL, OR INSTALL A SEWAGE DISPOSAL SYSTEM

Name of Owner DAN FERGUSON Daytime Phone 495-3526

Address of Property 13202 JUDGE ORR ROAD Date 3/18/96

Legal Descripion of Property THAT PART OF SE4NW4 LY SE OF C+S RD EX NLY 60.0', E2SW4, ALL THAT PART OF S2SE4 LY NWLY OF HWY 24, THAT PART OF S 37.0' OF NW4SE4 LY W OF CRI R.R., RESERVING A NON-EXCLUSIVE PERMANENT R/W FOR INGRESS & EGRESS AS DES BY BK 2420-67 SEC 32-12-64

Tax Schedule Number 42000-00-133 Septic Contractor/Phone 535-9999

Type of House Construction FRAME Source of Water WELL

Size of Lot 152 AC ± Basement (Y or (N)) Percolation Test Attached ((Y) or N)

MAXIMUM POTENTIAL NUMBER OF BEDROOMS 5

I have supplied a plot plan as described on the back of this form. I acknowledge the completeness of the application is conditional upon such further mandatory & additional tests & reports as may be required by the Department to be made & furnished by the applicant for purposes of evaluating the application, & issuance of the permit is subject to such terms & conditions as deemed necessary to ensure compliance with rules & regulations adopted pursuant to C.R.S. 1973, 10-25-101 et. seq. I hereby certify all statements made, information and reports submitted by me are or will be represented to be true & correct to the best of my knowledge & belief, & are designed to be relied on by the El Paso County Department of Health in evaluating the same for purposes of issuing the permit applied for herein. I further understand any falsification or misrepresentation may result in the denial of the application or revocation of any permit granted based upon said application & in legal action for perjury as provided by law.

OWNER'S SIGNATURE [signature]

****

DEPARTMENT OF HEALTH USE ONLY

Absorption Area * Tank Capacity 1750 g Date/Site Inspection 3/25/96

Remarks: 2 designs submitted - owner needs to decide on 1 and submit the design.
Note: Contractor notified on site of situation. Owner's phone [illegible] no answer. [illegible]
*Install per option #1 of PE design dated 3/28/96.
[initials] 3/27/96

Application is (✓) approved (X) denied

Environmentalist [signature] Date 3/25/96

****

Permit # 10019 Receipt # [initials] cash 3-27-1996 Date to Planning Dept 3-19-96

Ochal OK Jan-

EHS-10/93

PROPERTY AND PERC HOLES MUST BE CLEARLY MARKED/POSTED

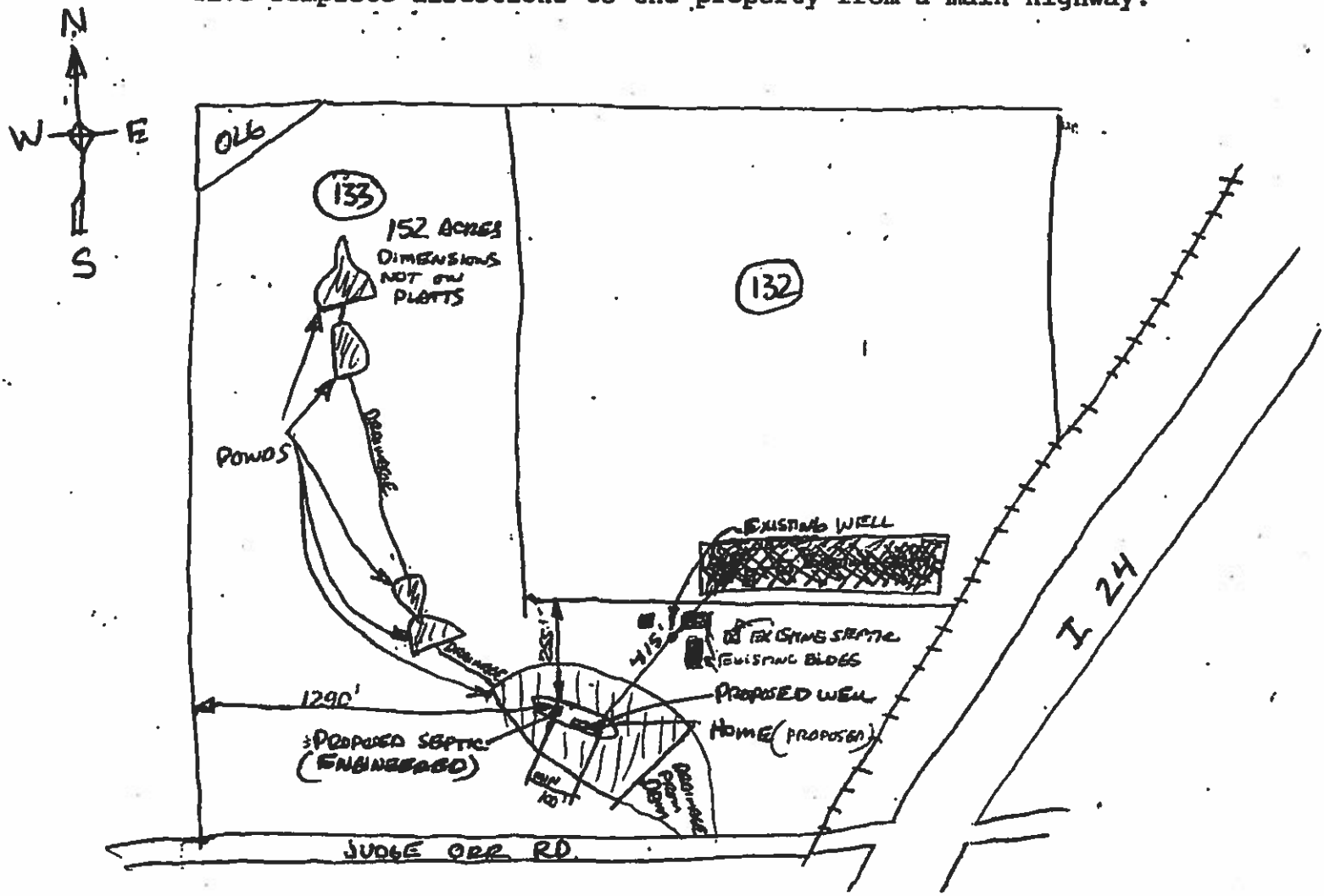
The following information must be on your plot plan.
Please check ( ) the items that apply.

- (✓) Property Lines
- (✓) Property Dimensions ——— NOT ON ANY PLAT PLANS - 152 ACRES
- (✓) Proposed Septic System Site
- (✓) Well(s)
- (✓) Adjacent Well(s)
- (✓) Building(s)
- (✓) Proposed Building(s)
- (✓) Water Line
- (✓) Cistern
- (✓) Subsoil Drain(s)

Are any of these within 100 feet of your proposed septic system (including adjoining property)? Also draw on the plot plan.

Spring(s) _____
Lake(s) _____
Pond(s) YES
Stream(s) YES
Dry Gulch(s) _____
Natural Drainage Course(s) YES

Give complete directions to the property from a main highway.



R & R Ditching, Inc.
105 Netherton Hgts
Colorado Springs, CO 80907
719-535-9999

E

#4200000264
04/04/1996

SOIL PERCOLATION DATA SHEET

Date November 8, 1995

Location of test: 13202 Judge Orr Rd. B
El Paso County

Client: Ferguson

Water supply: Well

No. acres: 20+

PERCOLATION RATE MEASUREMENT RESULTS

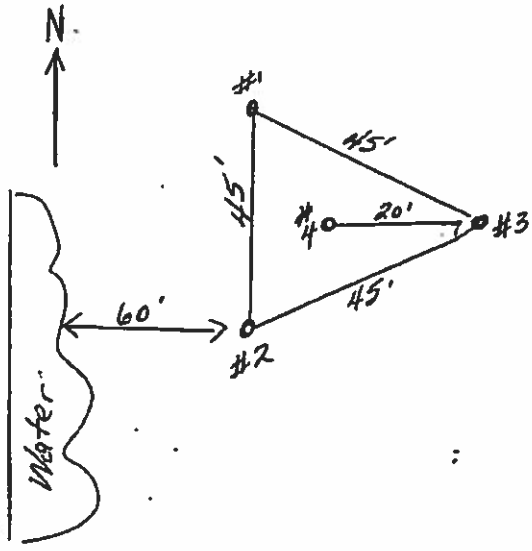
	HOLE DEPTH	DEPTH TO WATER TIME: 2:00	TIME: 2:15	TIME: 2:30	TIME: 2:45	LAST DROP	MIN. PER INCH
#1	36	16 3/4	16 1/2	16 1/4	16 3/8	1/8	120
#2	36	19	19 1/16	19 1/8	19 1/4	1/8	120
#3	36	8	8	8 1/16	8 3/16	1/8	120

AVG. 120

PROFILE

#4	DEPTH	SOIL DESCRIPTION
	0 - 6"	Sandy Clay
	6" - 8"	Clay

GROUND WATER none
BEDROCK none
GRADE OF SITE 3% W



Remarks: Done on knob of hill.
(Highest point)

Needs design

JOHN E. WENDT
REGISTERED
PROFESSIONAL
ENGINEER
STATE OF COLORADO

John E. Wendt P.E.
7410 Tudor Road
Colorado Springs, CO 80919
719-598-7121

March 28, 1996

Blue Sky Construction
6320 Burgess Road
Colorado Springs, Co. 80908

Re: Individual Sewage Disposal System (ISDS) for a 5 Bedroom House at 13202 Judge Orr Road, Colorado Springs, Co. 80831.

PRECOLATION TEST BY:	R & R Ditching, Inc. November 8, 1995
ABSORPTION RATE:	120 Minutes/Inch
SOIL CONTENT:	Clay
WATER SUPPLY:	Well
HOUSE SIZE:	5 Bedroom
AREAS OF SPECIAL CONCERN:	Impervious surface at ground level.

SEPTIC TANK:
Provide: One 2,000 Gallon-- 2 Compartment Tank

WASTEWATER FLOW
5 Bedrooms @ 150 GPD/ BR = 750 GPD
THEREFORE: Design flow shall be base upon: 1,125 GPD

OPTION I

Based upon no percable soil, a mound system may be developed.
A mound bed consisting of a sand/sandy loam mixture will infiltrate 1.0 gallons pr day/square foot. Therefore:

Net bed area of 24' x 48' shall be provided (Use 1,152 S.F).

Gross (basal) dimensions for this mound system shall be: 60' wide by 84' long- (based upon a bed area of 4' deep plus 12" of rockless chambers plus 12" of cover: Total: 6' high; sloping sides at 3:1 slope.

1. Determine house, septic tank and bed locations. Note: This system shall be developed per El Paso County set-back requirements for all elements of the system,

2. Level total (basal) area, remove any trees and other vegetation. For this system, trees should be cut to ground level and stumps left in place. Protect site from any vehicular traffic.

3. Stake out mound bed and gross perimeter. Possible reference stakes may be necessary some distance from site in case corner stakes are disturbed.

4. Determine elevation and location of the delivery pipe from lift station. This should be below frost line or sloped back to lift station so it may drain after dosing.

5. Scarify area within the net mound bed area (24' x 48') approximately 6' to 8" deep. This can be roughened with backhoe teeth.

6. Place fill material (sand/sandy loam) on bed area using a small track type tractor (with blade). Keep a minimum of 6" of soil beneath tracks to minimize compaction. Fill bed area to a height of 4' and level.

7. Lay 8 rockless chamber sections side by side (24') and add 8 chambers to each section (48' long). Cap front and rear. Run distribution pipes to each row of units from a distribution box at the entrance to system and manifold at rear (looped for best distribution). Determine location (and elevation) for an 8 outlet (9 hole) distribution box from the lift station. (again assure return drainage). NOTE: Use a "Tuf-Tite" 9HD2-or equal- distribution box with speed levelers to provide equal flow to each row. Drill a 3/8" hole in top of inlet elbow from lift station to prevent any vacuum effect.

8. Fill side wall area around perimeter and between rows of chambers to top of slots and walk into place. (bank run sand and gravel may be use for this fill).

9. Complete backfill of mound and entire basal area to an approximate 12" to 18" cover. *DO NOT USE WHEELED VEHICLES OF THE BED DURING CONSTRUCTION.

10. Upon completion seed with a mixture of Clover and dry land seed such as El Paso mix to prevent any erosion. Plant perimeter with water seeking shrubs such as Cedars and Lilacs.

OPTION II

EVAPOTRANSPIRATION BED

Full and adequate evapotranspiration (allowing for approximately 250% increase over area "lake evaporation" rate) because of location and plant growth, can be accomplished in a bed of approximately 3,600 SF (60' x 60'--80' x 45' etc.). This type and size of bed must be actively aerobic, well ventilated, well planted and well crowned.

Determine area sizing, level and stake. Remove all vegetation.

Undercut approximately 12" to 18" to form bed. Square up side around perimeter to form bed size.

Lay a 6" layer of ¼" to3/4" gravel on entire bottom of bed and level. In process of laying gravel, place 2" drilled piping (½" drilled holes) approximately every 5' at the 2" level above bottom and 12" level as fill proceeds, vented to surface at both ends. Place a rain cap on vented piping.

Upon gravel place 4" perforated soil and drain piping- holes to gravel- at every 5' to 6' in bed. Manifold entrance and ends together to create a looped system.

Now cover entire bed with washed sand to a 3" crown above original leveled ground surface.

Immediately plant bed with broad-leafed plants and swamp type vegetation. Add evergreens, such as cedar bushes etc. to continue evapotranspiration during winter months.

A well crowned bed, surrounded by storm water drainage swales will provide run-off from system.

System will allow for approximately 20 to 25 days reservoir storage for winter and/or non active working bed times.

LIFT STATION

Provide a lift station downstream from the septic tank.

Lift station shall be capable of evacuating to either system (mound or evapotranspiration) approximately 200 to 300 gallons per pumping cycle and have reserve storage capability of approximately 100 gallons. A high water alarm system shall be installed to alert occupant of any pump failure or other malfunction. The discharge from the station shall be so sloped that upon completion of a dosing cycle wastewater in the pipe shall drain back to chamber. The station tank shall be water tight so no ground water can infiltrate into it. A riser from the access port shall extend a minimum of 6" above ground level to keep surface water from entering chamber

INSTRUCTIONS FOR ISDS USE

One must be aware of and assume responsibility for a continued inspection and maintenance of this entire septic system. Septic tank must be inspected and, if required, pumped on a regular basis (possibly every 18 to 24 months). Non-biodegradable products such as coffee grounds, cigarette butts, hygene products, diapers, plastic products of all kinds etc. shall <u>not</u> be run into system.

Water must be continuously monitored to assure that toilets and sinks are not allowed to run due to inattention or due to faulty or malfunctoning seals.

This design is in no way written guarantee the system will give indefinite trouble free service. Even with proper installation and maintenance, there remain many uncertainties and difficulties can still arise in the operation of the system in the future. Proper maintenance can assist in minimizing uncertainties, but cannot entirely eliminate them.

RESPECTFULLY SUBMITTED

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