On-Site Wastewater Treatment System (OWTS)
Hanover School District – Prairie Heights Elementary School
7930 Indian Village Heights
Lot 110 Midway Ranches Fil No 7
El Paso County, Colorado

Prepared for:

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Kiowa Project No. 24047

EPC Project Number:

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Design Engineer's Statement:

The attached OWTS report was prepared under my direction and supervision and are correct to the best of my knowledge and belief. Said report has been prepared according to the Regulation of the El Paso County Board of Health. I accept responsibility for any liability caused by any negligent acts, errors or omissions on my part in preparing this report.

Kiowa Engineering Corporation, 1604 South 21st Street, Colorado Springs, Colorado 80904

Signature (Affix Seal): ______________________________ ____________________

Todd Cartwright, P.E. No. 33365 Date

El Paso County Statement:

Filed in accordance with the requirements of the Regulation of the El Paso County Board of Health, as amended.

______________________________ ____________________

Date

El Paso County Engineer/ECM Administrator

Conditions:

I. GENERAL LOCATION AND DESCRIPTION

The purpose of this On-Site Wastewater Treatment System (OWTS) is to identify on-site wastewater treatment system components and to safely route wastewater to adequate treatment systems for Prairie Heights Elementary School.

A vicinity map showing the general location of the site is presented in Appendix A. Prairie Heights Elementary School is comprised of 38.56 acres, located in southwest El Paso County. The street address for the site is 7930 Indian Village Heights. The platted name is Lot 110 Midway Ranches Fil No 7. The property is primarily located in Sections 28, Township 17 South, Range 65 West of the 6th Principal Meridian, in El Paso County, Colorado. The site also extends into sections 29, 32 and 33. The school itself is primarily in section 33. The expansion will extend into section 28.

The school currently has an enrollment of 143 students. This project is not intended to increase the school's student capacity. The school has an 18-person staff. The total population of the school is 161 Monday through Friday from approx. 8am to 3pm. The school prepares lunches on site.

There is no proposed improvements within designated floodplain, as indicated on FEMA panel 08041C1170G, effective 12/7/2018. A FEMA firmette for the site is located in Appendix A.

A copy of the USDA Custom Soil Resource Report is located in Appendix A. A geotechnical investigation with percolation test was completed by CTL Thompson. The report is included in Appendix B,

The school is located in the southwest corner of the site. The portable buildings (modulars) will be removed with this project. The school is currently 12,000 sf and will be expanded to 24,000 sf.

II. GENERAL CONCEPT

A. EXISTING OWTS SYSTEM

The school has a functioning OWTS system consisting of a grease interceptor, two in series, 2500-gallon, septic tanks, a dosing pump, two leach fields and the associated sanitary sewer pipes. We are not increasing the school's population, therefore, we are not increasing the capacity of the system. However, the existing grease interceptor's location is not acceptable for the school expansion. Therefore, a new 1500-gallon grease interceptor will be installed north of the existing structure. In addition, the dosing pump will be replaced with a grinder dosing pump.

The current modulars located west of the school have their own septic tank and pipe that connects to the main system just upstream of the dosing pump. This system for the modulars will be removed.

The current system permit is located in appendix D

B. SOILS INVESTIGATION

A soils investigation including a percolation test was conducted on 11/19/2024. Three test pits were used. During the test the percolation rate ranged from 6 to 13 inches per minute. The test netted a design percolation rate of 10 minutes per inch. No new leach field is intended for this project.

C. WASTERWATER FLOW

The school has a population of 161 persons (staff and students). For this report we assumed a flow rate of 20 GPD (annual average daily flow pre capita) resulting in a school average flow rate of 3220 GPD (annual average daily flow) or 2.3 GPM average. Applying a peaking factor of 4 results in a school daily flow of 12,880 GPD or 9.2 GPM.

This flow is expected to have a BOD of 0.08 pounds per day per capita or 12.9 pounds for the school per day.

D. GREASE INTERCEPTOR

A new 1500-gallon grease interceptor will be installed for the kitchen wastewater flow. The design of this GI is included in the plumbing design documents. This GI will be located north of the existing building and west of the expansion.

E. SEPTIC TANKS

There are two 2500-gallon in series septic tanks on site. These tanks will not be modified as a result of this project. These are located west of the school.

F. PUMP

There is a dosing pump located west of the school. This pump will be replaced with a 9.3 gpm grinder pump w 10 feet TDH.

G. LEACH FIELD

There are two leach fields located west of the school. These leach fields will not be modified as a result of this project.

APPENDIX A
Vicinity Map
FEMA Flood Insurance Rate Map

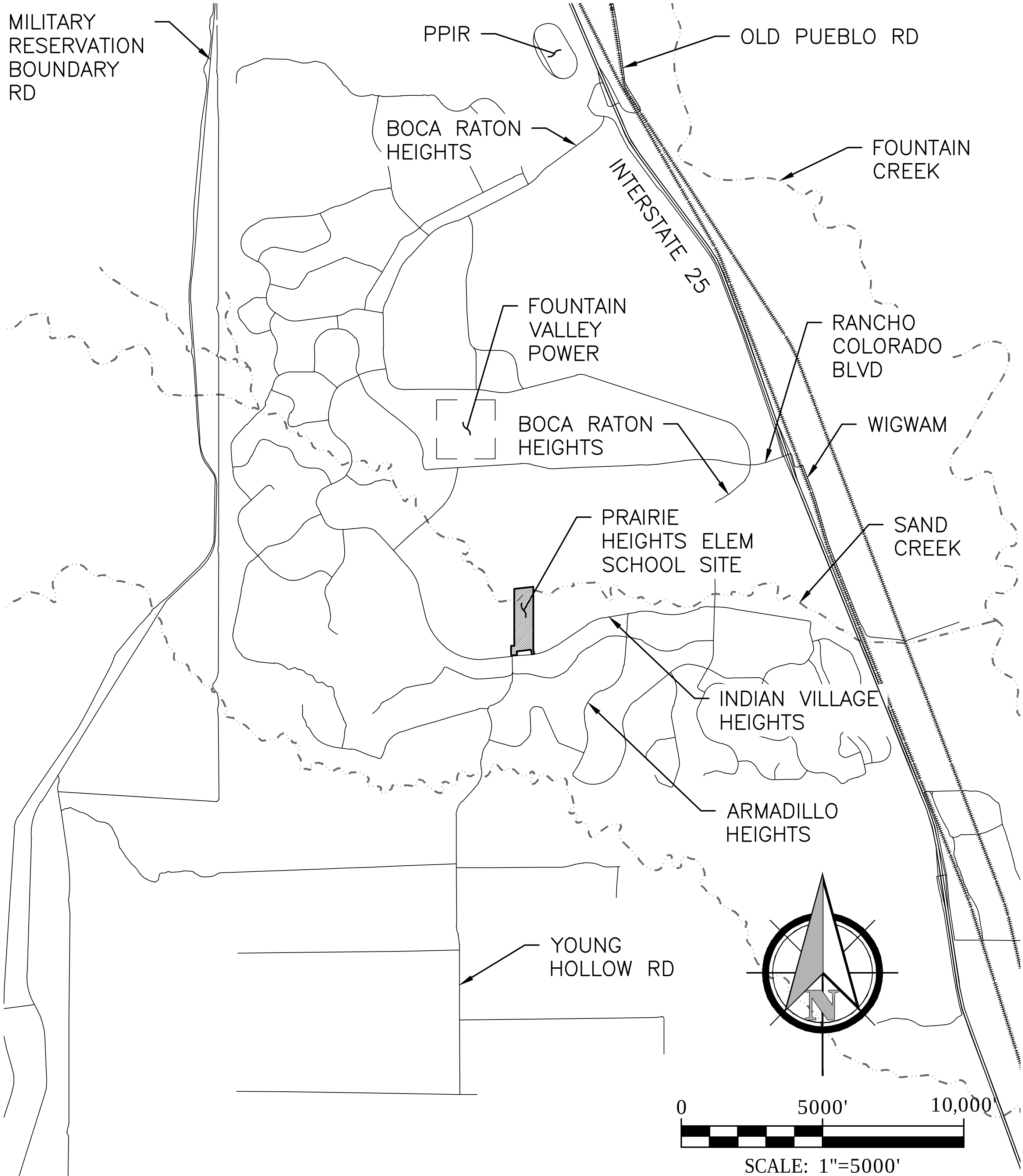


FIGURE 1

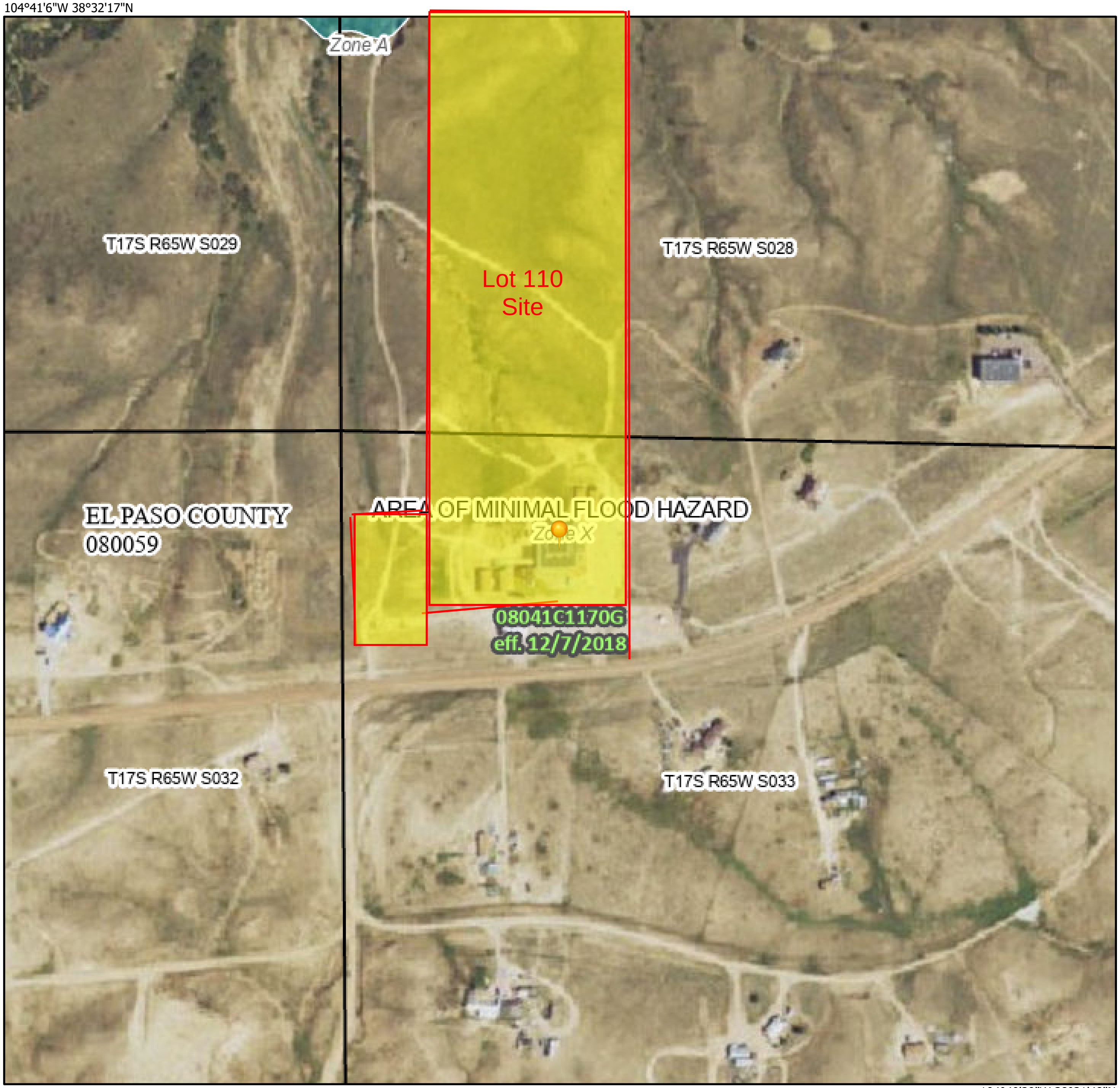
Kiowa Engineering Corporation
1604 South 21st Street
Colorado Springs, Colorado 80904
(719) 630-7342

Vicinity Map
Prairie Heights Elementary School
7930 Indian Village Heights, Fountain, CO 80817

National Flood Hazard Layer FIRMette

FEMA

104°41'6"W 38°32'17"N



Feet
0 250 500 1,000 1,500 2,000

1:6,000

104°40'29"W 38°31'48"N

Basemap Imagery Source: USGS National Map 2023

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- B 20.2 17.5 Cross Sections with 1% Annual Chance Water Surface Elevation
- 8 Coastal Transect
- 513 Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 1/24/2025 at 6:54 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

APPENDIX B

Geotechnical Investigation
Soils Report

United States Department of Agriculture

NRCS

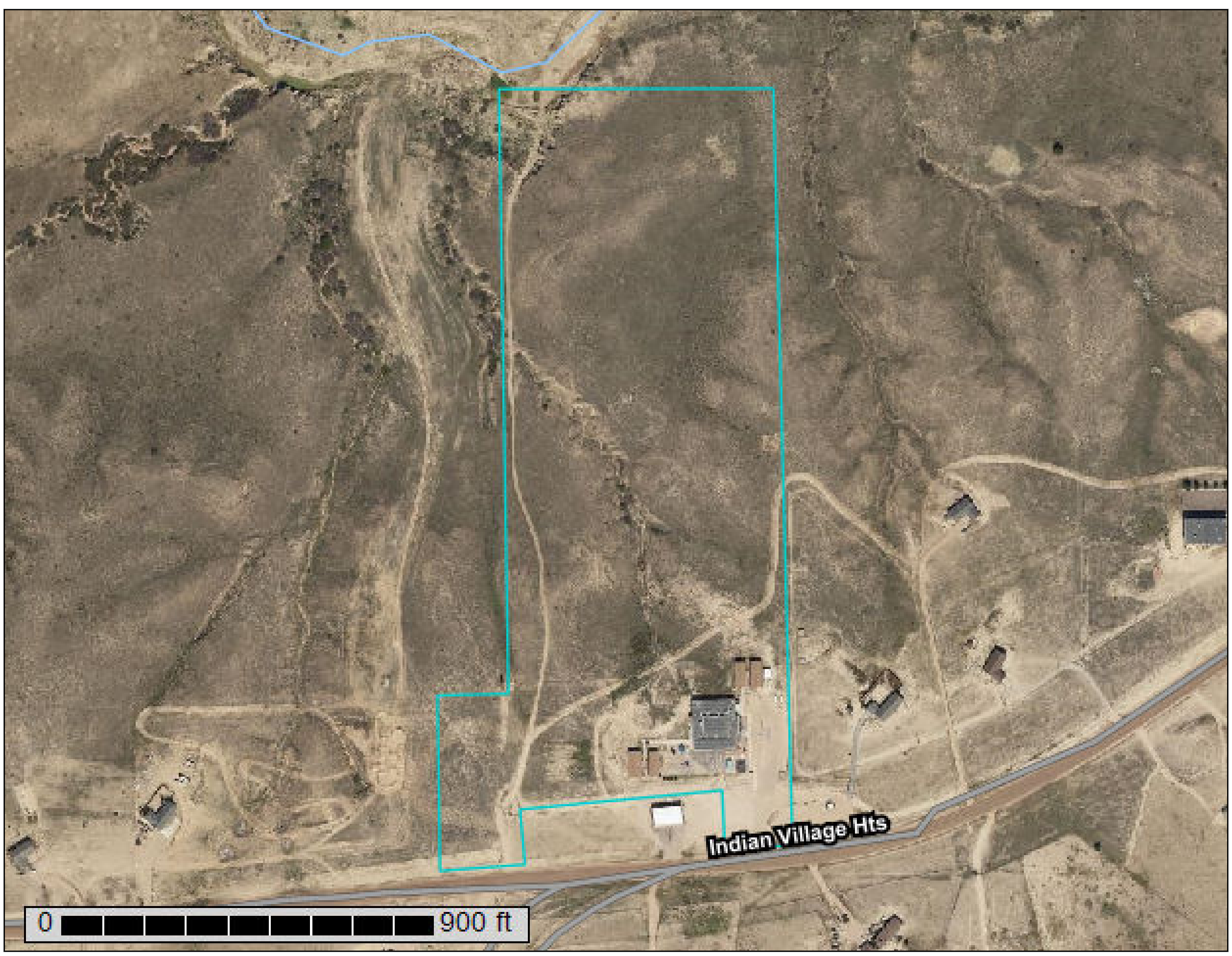
Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for

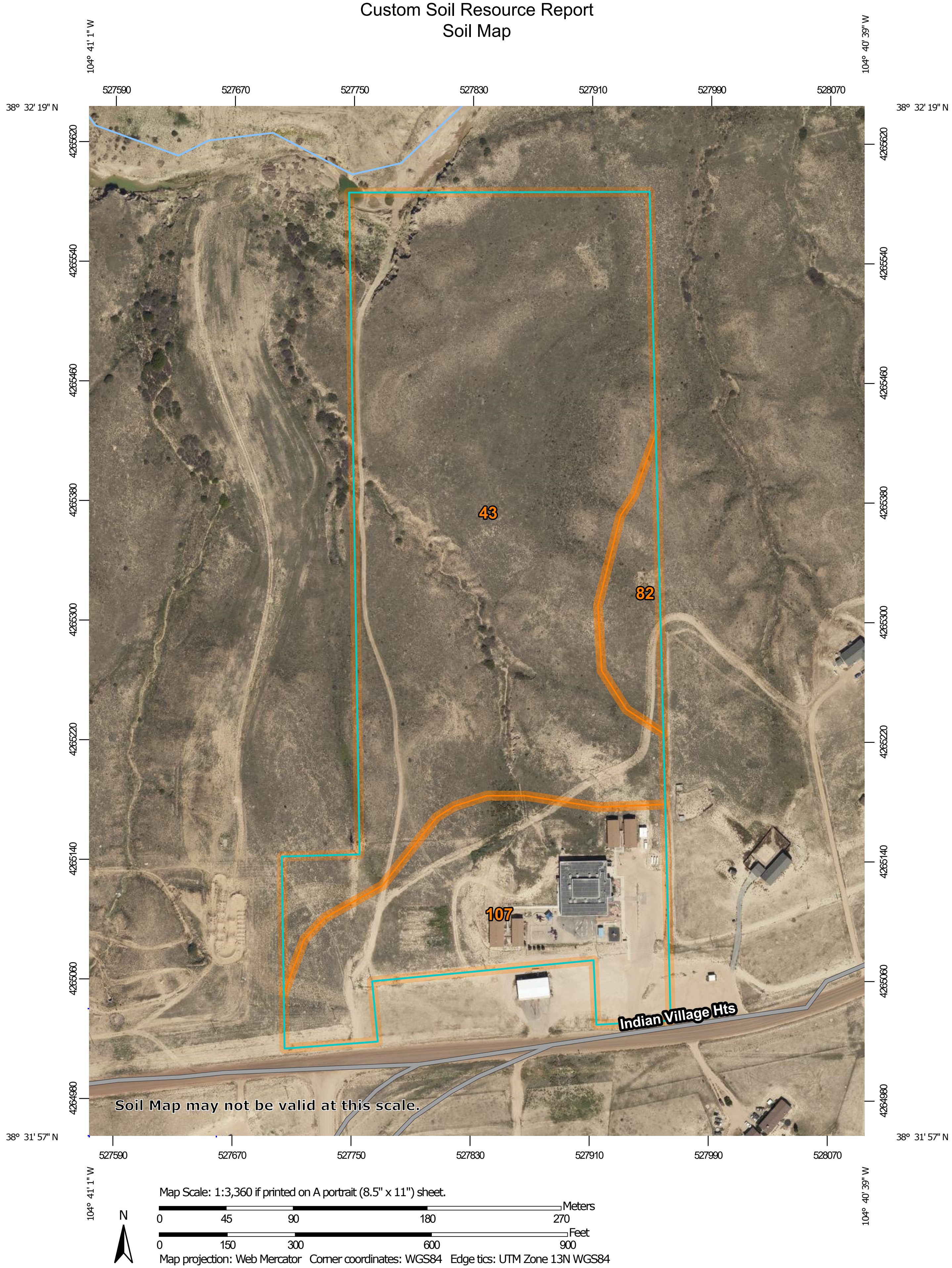
El Paso County Area, Colorado

Prairie Heights Elem School



January 24, 2025

Soil Map


104° 41' 1" W
104° 40' 39" W
38° 32' 19" N
38° 31' 57" N
527590
527670
527750
527830
527910
527990
528070
4265620
4265540
4265460
4265380
4265300
4265220
4265140
4265060
4264980
43
82
107
Indian Village Hts
Soil Map may not be valid at this scale.
Map Scale: 1:3,360 if printed on A portrait (8.5" x 11") sheet.
Meters
0
45
90
180
270
Feet
0
150
300
600
900
N
Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 13N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Map Unit Polygons

Soil Map Unit Lines

Soil Map Unit Points

Special Point Features

Blowout

Borrow Pit

Clay Spot

Closed Depression

Gravel Pit

Gravelly Spot

Landfill

Lava Flow

Marsh or swamp

Mine or Quarry

Miscellaneous Water

Perennial Water

Rock Outcrop

Saline Spot

Sandy Spot

Severely Eroded Spot

Sinkhole

Slide or Slip

Sodic Spot

Spoil Area

Stony Spot

Very Stony Spot

Wet Spot

Other

Special Line Features

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: El Paso County Area, Colorado
Survey Area Data: Version 22, Sep 3, 2024

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Aug 14, 2018—Sep 23, 2018

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
43	Kimera loam, 0 to 5 percent slopes	20.5	71.6%
82	Schamber-Razor complex, 8 to 50 percent slopes	1.3	4.7%
107	Wilid silt loam, 0 to 3 percent slopes	6.8	23.7%
Totals for Area of Interest		**28.6**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

El Paso County Area, Colorado

43—Kimera loam, 0 to 5 percent slopes

Map Unit Setting

National map unit symbol: 2t51v
Elevation: 3,700 to 6,400 feet
Mean annual precipitation: 12 to 14 inches
Mean annual air temperature: 48 to 54 degrees F
Frost-free period: 130 to 170 days

Map Unit Composition

Kimera and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Kimera

Setting

Landform: Hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Old alluvium and/or eolian deposits

Typical profile

A - 0 to 6 inches: loam
Bw - 6 to 16 inches: loam
Bk1 - 16 to 28 inches: clay loam
Bk2 - 28 to 38 inches: loam
Bk3 - 38 to 79 inches: loam

Properties and qualities

Slope: 0 to 5 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.21 to 0.71 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 30 percent
Maximum salinity: Very slightly saline (2.0 to 3.9 mmhos/cm)
Available water supply, 0 to 60 inches: High (about 9.9 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: C
Ecological site: R069XY006CO - Loamy Plains
Forage suitability group: Loamy (G069XW017CO)
Other vegetative classification: Loamy (G069XW017CO), Loamy Plains #6 (069XY006CO_2)

Hydric soil rating: No

Minor Components

Wilid

Percent of map unit: 5 percent
Landform: Hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R069XY006CO - Loamy Plains
Other vegetative classification: Loamy (G069XW017CO), Loamy Plains #6 (069XY006CO_2)
Hydric soil rating: No

Oterodry

Percent of map unit: 5 percent
Landform: Hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R069XY026CO - Sandy Plains
Hydric soil rating: No

Fort

Percent of map unit: 5 percent
Landform: Hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Ecological site: R069XY006CO - Loamy Plains
Other vegetative classification: Loamy (G069XW017CO), Loamy Plains #6 (069XY006CO_2)
Hydric soil rating: No

Travessilla

Percent of map unit: 5 percent
Landform: Scarps
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Crest
Down-slope shape: Convex
Across-slope shape: Linear
Ecological site: R069XY053CO - Sandstone Breaks
Other vegetative classification: Needs Field Review (G069XW050CO), Sandstone Breaks #53 (069XY053CO_2)
Hydric soil rating: No

82—Schamber-Razor complex, 8 to 50 percent slopes

Map Unit Setting

National map unit symbol: 369y
Elevation: 5,500 to 6,500 feet
Mean annual precipitation: 12 to 14 inches
Mean annual air temperature: 48 to 52 degrees F
Frost-free period: 135 to 170 days
Farmland classification: Not prime farmland

Map Unit Composition

Schamber and similar soils: 55 percent
Razor and similar soils: 43 percent
Minor components: 2 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Schamber

Setting

Landform: Breaks
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from granite and/or colluvium derived from granite and/or eolian deposits derived from granite

Typical profile

A - 0 to 5 inches: gravelly loam
AC - 5 to 15 inches: very gravelly loam
C - 15 to 60 inches: very gravelly sand

Properties and qualities

Slope: 8 to 50 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
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
Calcium carbonate, maximum content: 15 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 3.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: A
Ecological site: R069XY064CO - Gravel Breaks
Hydric soil rating: No

Description of Razor

Setting

Landform: Breaks
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Clayey slope alluvium over residuum weathered from shale

Typical profile

A - 0 to 3 inches: clay loam
Bw - 3 to 9 inches: clay loam
Bk - 9 to 31 inches: clay
Cr - 31 to 35 inches: weathered bedrock

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Gypsum, maximum content: 5 percent
Maximum salinity: Moderately saline to strongly saline (8.0 to 16.0 mmhos/cm)
Sodium adsorption ratio, maximum: 15.0
Available water supply, 0 to 60 inches: Low (about 5.5 inches)

Interpretive groups

Land capability classification (irrigated): 6e
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: D
Ecological site: R069XY047CO - Alkaline Plains
Other vegetative classification: ALKALINE PLAINS (069AY047CO)
Hydric soil rating: No

Minor Components

Other soils

Percent of map unit: 1 percent
Hydric soil rating: No

Pleasant

Percent of map unit: 1 percent
Landform: Depressions
Hydric soil rating: Yes

107—Wilid silt loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 2qnmq
Elevation: 4,000 to 6,200 feet
Mean annual precipitation: 12 to 14 inches
Mean annual air temperature: 48 to 54 degrees F
Frost-free period: 125 to 175 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Wilid and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Wilid

Setting

Landform: Interfluves
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loess and/or eolian deposits

Typical profile

A - 0 to 6 inches: silt loam
Bt - 6 to 10 inches: silty clay loam
Btk - 10 to 30 inches: silty clay loam
Bk1 - 30 to 44 inches: silty clay loam
Bk2 - 44 to 79 inches: silt loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 40 percent
Gypsum, maximum content: 2 percent
Maximum salinity: Nonsaline to slightly saline (0.5 to 4.0 mmhos/cm)
Sodium adsorption ratio, maximum: 4.0
Available water supply, 0 to 60 inches: High (about 10.2 inches)

Interpretive groups

Land capability classification (irrigated): 3e

Land capability classification (nonirrigated): 4c
Hydrologic Soil Group: C
Ecological site: R069XY006CO - Loamy Plains
Forage suitability group: Loamy (G069XW017CO)
Other vegetative classification: Loamy (G069XW017CO), Loamy Plains #6 (069XY006CO_2)
Hydric soil rating: No

Minor Components

Minnequa

Percent of map unit: 5 percent
Landform: Ridges, pediments
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Side slope, talf
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R069XY006CO - Loamy Plains
Other vegetative classification: Loamy (G069XW017CO)
Hydric soil rating: No

Almagre

Percent of map unit: 5 percent
Landform: Interfluves
Landform position (two-dimensional): Footslope, summit
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R069XY006CO - Loamy Plains
Other vegetative classification: Loamy Plains #6 (069XY006CO_2), Loamy (G069XW017CO)
Hydric soil rating: No

Manzanola

Percent of map unit: 5 percent
Landform: Depressions, drainageways
Landform position (two-dimensional): Toeslope, footslope
Landform position (three-dimensional): Talf
Down-slope shape: Concave, linear
Across-slope shape: Linear
Ecological site: R069XY006CO - Loamy Plains
Other vegetative classification: Clayey (G069XW001CO), Loamy Plains #6 (069XY006CO_2)
Hydric soil rating: No

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GEOTECHNICAL INVESTIGATION

PRAIRIE HEIGHTS ELEMENTARY SCHOOL ADDITION

7930 INDIAN VILLAGE HEIGHTS
FOUNTAIN, COLORADO

Prepared for:

HANOVER SCHOOL DISTRICT NO. 28
17050 SOUTH PEYTON HIGHWAY
FOUNTAIN, COLORADO 80928

Attention: Mr. Mark McPherson, Superintendent

Project No. CS19910.000-125

DRAFT

CTL|Thompson, Inc.
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SCOPE

This report presents the results of our Geotechnical Investigation for the proposed Prairie Heights Elementary School building addition located at 7930 Indian Village Heights in Fountain, Colorado. The purpose of our investigation was to evaluate subsurface conditions at the site in order to develop geotechnical design criteria for the proposed addition and associated site improvements. This report summarizes the results of our field and laboratory investigation, and presents our design and construction recommendations for foundations, floor systems, and pavement section alternatives, as well as other details influenced by subsurface conditions. We believe the investigation was completed in accordance with our proposal (CTL|T Proposal No. CS-24-0203) dated October 24, 2024. Evaluation of the property for the possible presence of potentially hazardous materials (environmental site assessment) is not included in the scope.

The report was prepared based on conditions disclosed by our exploratory borings, results of laboratory tests, engineering analyses, and our experience. The design criteria presented in the report were based on our understanding of the planned construction. The following section summarizes the report. More detailed descriptions of subsurface conditions, as well as our design and construction recommendations, are presented in the report.

SUMMARY OF CONCLUSIONS

1. Subsurface conditions were explored by advancing five (5) exploratory borings within the approximate footprint of the proposed building addition. Soils encountered within the exploratory borings consisted of suspect quality sand and clay fill underlain by natural, clayey sand, silty sand, and sandy clay extending to the maximum depths explored of 20 to 30 feet. The natural sand and clay are judged to be slightly expansive or non-expansive. Bedrock was not encountered in our exploratory borings.

2. Groundwater was not encountered in our exploratory borings during our drilling operations. Groundwater levels may rise in response to seasonal precipitation and irrigation.

3. The proposed addition to the school building can be constructed using a spread footing foundation system. Footings should be underlain by properly moisture conditioned and densely compacted fill. Suspect quality fills cannot be relied upon as reliable support stratum; therefore, existing fills may not remain in place below new foundations.

4. We believe a low risk of poor slab-on-grade performance will exist for a slab-on-grade floor when underlain by new, properly constructed fill. Suspect quality fills cannot be relied upon for new construction.

5. Surface drainage should be designed and maintained to provide for the rapid removal of runoff away from the proposed building addition to reduce potential subsurface wetting. Water should not be allowed to pond adjacent to the building.

6. The design and construction criteria for foundations and slabs-on-grade included in this report were compiled with the expectation that all recommendations will be incorporated into the project and that the property manager/owner will maintain the structure, use prudent irrigation practices, and maintain surface drainage. It is critical that all recommendations in this report are followed.

SITE CONDITIONS

The school property is located at 7930 Indian Village Heights in Fountain, Colorado. The overall property contains 38.5 acres of land; however, the immediate project area contains about 4 acres of land. The existing school is a single-story building with no below grade construction. Two modular buildings are located to the northeast of the school building. A dirt and gravel surface parking lot, bus lane, and access road are located east of the school building. Indian Village Heights is present adjacent to the south. Large plot residences are present to the east, and vacant lots are present in the immediate vicinity to the north and west. The Hanover Volunteer Fire Department is located immediately south of the school.

The ground surface in the vicinity of the project site and within the immediate area of the proposed building addition are generally graded flat and level. Areas to the north and west, beyond the approximate project site, are slightly to moderately sloping downward and to the north at grades of about 5 to 7 percent. Elevations at the school and proposed addition are approximately 5,420 feet above mean sea level, based on available United States Geological Survey mapping of the area. Areas to the east and south are generally flat and level to slightly sloping toward the north at grades of 1 to 3 percent. The ground surface at the project area is generally covered with weeds and native grasses. The general vicinity of the property and approximate location of the proposed building addition is presented in Fig. 1.

PROPOSED CONSTRUCTION

A building addition is planned to be constructed on the east side of the existing Prairie Heights Elementary School, at the approximate location shown on Fig. 1. The addition is planned as a single-story structure, and will likely be constructed using light gauge metal framing with metal, block veneer, composite exterior finishes, or other similar construction. The structure is planned to contain nearly 18,400 square feet of interior floor space. No below grade construction is planned. Our understanding of the proposed construction is based on discussions with the client, a Geotechnical Engineering Scope of Services prepared by HSD (dated October 17, 2024), and a conceptual site plan prepared by MOA Architecture, October 10, 2024.

INVESTIGATION

Subsurface conditions at the site were investigated by drilling five (5) exploratory borings for the proposed building addition and two (2) shallow subgrade borings in the proximity of the proposed parking lot improvements. A percolation test was performed near the existing leach field, west of the school building. The exploratory borings were drilled at the approximate locations shown on Fig. 1 and advanced to depths of 20 and 30 feet using 4-inch diameter, continuous-flight auger and a truck-mounted drill rig. Subgrade borings were advanced to depths of 4 feet.

Samples of the soil were obtained at 5 to 10-foot intervals using a 2.5-inch diameter (O.D.) modified California barrel sampler driven by blows from a 140-pound hammer falling 30 inches. Subgrade samples consisted of the upper 4 feet of the borings, obtained from two exploratory boring and two subgrade borings. A representative of CTL|Thompson, Inc. was present during drilling to observe drilling operations, log the subsurface conditions encountered in the borings, and obtain samples for laboratory tests.

Samples were returned to our laboratory where they were examined by our engineer and laboratory tests were assigned. Laboratory tests included dry density, moisture content, Atterberg limits, gradation analysis, swell-consolidation testing, and water-soluble sulfate concentration. Swell-consolidation testing was performed by wetting samples under estimated overburden pressures (weight of the overlying soils). Summary logs of the exploratory borings, including results of field penetration resistance tests and a portion of the laboratory data, are presented in Fig. 2. Swell-consolidation test results are presented in Figs. 3 through 7 and gradation test results are presented in Figs. 8 through 10. The laboratory results are summarized on Table 1.

SURFACE CONDITIONS

Subsurface soils encountered in the five (5) borings advanced within the area of the addition consisted of suspect quality, sandy to very sandy clay and very clayey sand fill underlain by natural, sand and clay soils to the maximum depths explored of 25 and 30 feet. Subsurface soils encountered in the two (2) shallow parking lot subgrade borings consisted of about 4 feet of natural, very sandy clay. Bedrock and groundwater were not encountered in our borings. Pertinent engineering characteristics of the soils encountered are described in the following paragraphs.

Fill

Sandy to very sandy clay and very clayey sand fill was encountered at the ground surface in four of the five borings located within the building footprint and extended to depths of between 4 and 10 feet below existing grades. The fill is judged to be loose to medium dense (sand) and stiff to very stiff (clay) based on field penetration resistance testing. Four samples of the fill were subjected to laboratory testing and contained 38 to 75 percent silt and clay-sized particles (percent passing the No. 200 sieve). Two samples of the fill were subjected to Atterberg limits testing resulting in Liquid Limits of 33 and 36 and Plasticity Indices of 15 and 16. Based on the laboratory test results and our experience, we judge the fill to be non-expansive to slightly expansive when wetted.

Natural Soils

Natural, slightly sandy to very sandy clay as well as clayey to very clayey and silty sand were encountered at the ground surface and underlying the existing fill within the building footprint. Near surface materials encountered within the parking lot consisted of sandy and very sandy clay. The natural soils extended to depths of up to 30 feet below existing grades.

Clay soils were encountered at the site and judged to be stiff to very stiff based on field penetration resistance testing. Clay was found at the ground surface and underlying the existing fills in 5 borings. Clays were also encountered underlying the natural clayey and silty sands at depths of between 16 and 23 feet in three of the borings. Five samples of the clay were subjected to laboratory testing and contained 64 to 92 percent silt and clay sized particles. Five samples were subjected to swell-consolidation testing. One sample exhibited 0.2 percent measured swell. Three samples compressed between 0.1 and 1.4 percent, and one sample exhibited no movement when wetted under estimated overburden pressures.

Sand soils encountered at the site are judged to be loose to very dense, based on field penetration resistance testing. The sands were encountered underlying the existing fills and natural clays at depths ranging from 6 to 18 feet. Seven samples were tested in our laboratory and contained 15 to 48 percent silt and clay-sized particles. Three samples were subjected to swell-consolidation testing resulting in 0.8 and 0.5 percent compression and 0.2 percent swell when wetted under estimated overburden pressures. Based on the laboratory test results and our experience, we judge the natural soils to be slightly expansive or non-expansive when wetted.

Groundwater

Groundwater was not encountered in the exploratory borings during our drilling operations. The borings were drilled in the late fall season when groundwater depths typically become deeper. Water levels may rise in response to seasonal precipitation and irrigation.

Seismicity

According to the USGS, Colorado's Front Range and eastern plains are considered low seismic hazard zones. The earthquake hazard exhibits higher risk in western Colorado compared to other parts of the state. The Denver Metropolitan area has experienced earthquakes within the past 100 years, shown to be related to deep drilling, liquid injection, and oil/gas extraction. Naturally occurring earthquakes along faults due to tectonic shifts are rare in this area.

The soil and bedrock at this site are not expected to respond unusually to seismic activity. The 2021 International Building Code (Section 1613.2.2) defers the estimation of Seismic Site Classification to ASCE 7-16, as outlined in the table below.

ASCE 7-16 SITE CLASSIFICATION CRITERIA

Seismic Site Class	$\bar{s}_u$, Average Un-drained Shear Strength (lb/ft^2)	$\bar{N}$, Average Standard Penetration Re-sistance (blows/ft)	$\bar{v}_s$, Average Shear Wave Velocity (ft/s)
A. Hard Rock	N/A	N/A	>5,000
B. Rock	N/A	N/A	2,500 to 5,000
C. Very Dense Soil and Soft Rock	>2,000	>50 blows/ft	1,200 to 2,500
D. Stiff Soil	1,000 to 2,000	15 to 50 blows/ft	600 to 1,200
E. Very Loose Sand or Soft Clay Soil	<1,000	<15 blows/ft	<600
F. Soils requiring Site Re-sponse Analysis	See Section 20.3.1	See Section 20.3.1	See Section 20.3.1

Based on the results of our investigation, we judge a Seismic Site Classification of D (Stiff Soil). The subsurface conditions indicate low susceptibility to liquefaction from a materials and groundwater perspective. If desired, we can provide shear wave velocity testing to evaluate the site classification; however, we believe it is unlikely to result in an improved seismic site classification.

SITE GEOLOGY

Geology of the site generally consists of Verdos Alluvium (Qv) originating from the Pleistocene Geologic Era and includes a granular mix of silty to clayey sand with weathered gravels. The geologic unit is considered to be underlain by Pierre Shale, which generally weathers to claystone and clay. Bedrock was not encountered in the exploratory borings. Geologic conditions at the site were identified following our review of the Pueblo 1 X 2 Quadrangle, South-Central Colorado, prepared by Glen R. Scott, Richard B. Taylor, Rudy C. Epis, and Reinhard A. Wobus, dated 1976.

SITE DEVELOPMENT

The location of the proposed building addition is relatively flat and level to slightly sloping toward the northwest. Materials encountered in the vicinity of the proposed school building addition consists of suspect quality fills and natural, slightly expansive or non-expansive sandy clay and clayey sand. Based on the existing site grading, we expect cuts and fills of less than about 2 to 3 feet will be needed to establish a building pad. Grading plans have not been provided for our review.

Excavation

We believe the near-surface soils can be excavated with conventional, heavy-duty excavation equipment. Excavation will likely remain within the overburden silty sand materials. Based on our investigation and Occupational Safety and Health Administration (OSHA) standards, we believe the fills, clays, and granular materials identified at the site classify as Type C soil. Type C soil requires a maximum slope inclination of 1.5:1 (horizontal to vertical) for dry conditions. Excavation slopes specified by OSHA are dependent upon the types of soil and groundwater conditions encountered. The contractor's "competent person" should identify the soils encountered in the excavation and refer to OSHA standards to determine appropriate slopes. Stockpiles of soils and equipment should not be placed within a horizontal distance equal to one-half the excavation depth, from the edge of the excavation.

Over-Excavation and Building Pad Improvement

Existing fill was identified in 4 of the 5 borings located within the building addition footprint. The fill extended to depths of 4 to 10 feet below existing ground surface elevations. Documentation for the placement of the existing fill was not available for review and zones of loose materials and relatively low densities were identified in our boring logs. These conditions pose a risk of differential movement and associated damages to foundations and the structure. A reliable approach to reduce the risk of differential movement associated with variations of the existing fill includes removal of the fills within the building footprint; however, this may not be feasible adjacent to existing structures. We recommend over-excavation of the existing soils, fill and native, to a depth of at least 4 feet below the lowest bottom of footing elevation and throughout the building footprint. Excavations should extend 5 feet laterally beyond the outside edges of the footings. Over-excavation will improve bearing capacity and establish a more uniform layer of support for shallow foundations. Where existing fills extend deeper than 4 feet below bottom of foundations, our personnel should evaluate the exposed materials within the excavations at the time of construction to determine if removal to more competent materials is necessary. Evaluation may include visual observation, probing, potholing, and field density testing.

Excavations immediately adjacent to the existing building should be sloped away from the foundations at a 1:5 slope. Care should be taken not to undermine existing foundations and excavations should not remain open as long as necessary to complete the excavation and backfill process, especially adjacent to existing foundations.

Over-excavated soils can be reused given they are fee of organics and debris. The materials should be reconstructed as moisture conditioned and densely compacted fill. The materials placed as over-excavation backfill should be moisture conditioned and densely compacted as discussed in the following Fill Placement Section.

Fill Placement

New fill placed at the site will be required to establish a building pad for the building addition and as over-excavation backfill. The properties of the fill will affect the performance of foundations and slabs-on-grade. The near surface soils including the existing suspect quality fills are expected to be suitable to re-use as fill and over-excavation backfill material given the materials are free from vegetation and organics, topsoil, debris, building remnants, and other deleterious materials.

Our experience suggests shrinkage factors of about 10 to 15 percent will exist for the on-site materials. Many variables affect the actual shrinkage-swelling factors of soils and include sample disturbance actual percent compaction of the fill, subsoil profile, compression of the natural soils below the new fill, compression of the deeper fill, rebound of materials cut during site grading, swell after excavated materials are moisture conditioned, etc. The effects of these variables on the shrinkage-swelling factor are difficult to quantify. The actual shrinkage-swelling factor will vary from the estimated percentages.

If imported fill is necessary, it should ideally consist of granular material with 100 percent passing the 2-inch sieve and less than 40 percent passing the No. 200 sieve. The import soil should exhibit low plasticity with a Liquid Limit less than 30 and a Plasticity Index less than 10. Import soils similar to the on-site natural soils may be suitable. A sample of the import material should be submitted to our office for approval before stockpiling at the site.

Prior to fill placement, vegetation, topsoil, and other deleterious material should be removed. Areas to receive fill should be scarified to a depth of 8 inches, moisture conditioned to near optimum moisture content and compacted to high densities.

Fill and backfill should be placed in thin, loose lifts of 8 inches or less. Cohesive materials placed as fill should be moisture conditioned to within 2 percent of optimum moisture contents and compacted to at least 95 percent of maximum standard Proctor dry density (ASTM D

698). Granular materials placed as fill should be moisture conditioned to within 2 percent of optimum moisture contents and compacted to at least 95 percent of maximum modified Proctor dry density (ASTM D 1557). We estimate maximum dry densities for the on-site clay soils to range from 105 to 120 pcf with estimate optimum moisture contents of 12 to 18 percent. A Proctor should be conducted by our laboratory at the time of construction to determine the actual maximum Proctor dry density and optimum moisture content for materials placed as fill. Compaction of backfill should be observed and tested by a representative of our firm during construction.

Water and sewer lines are often constructed beneath slabs and pavements. Compaction of utility trench backfill can have a significant effect on the life and serviceability of floor slabs, pavements, and exterior flatwork. We recommend utility trench backfill in non-building areas be moisture conditioned to within 2 percent of optimum moisture content and compacted to at least 95 percent of maximum standard Proctor dry density (ASTM D 698). Our experience indicates the use of a self-propelled compactor results in more reliable performance compared to trench backfill compacted by a sheepsfoot wheel attachment on a backhoe or trackhoe. The upper portion of the trenches should be widened to allow the use of a self-propelled compactor. The placement and compaction of utility trench backfill should be observed and tested by a representative of our firm during construction.

Fill should not be placed when frozen and should not be placed over top of frozen soils. Once fill is placed, it is important that measures be planned to reduce drying of the near-surface materials. If the fill dries excessively prior to building construction, it may be necessary to rework (scarify, moisture condition, and compact) the upper, drier materials prior to the placement of concrete and forms for the new foundations or floor slabs.

FOUNDATIONS

We understand the desired foundations for the building addition includes the use of spread footings. Based on our exploratory borings and understanding of the proposed construction, we anticipate suspect quality fill and natural, slightly expansive and non-expansive clays and sands are present at elevations that will influence the performance of shallow foundations. Existing fills are considered suspect in quality as no records of the placement are available for review and loose zones were identified during drilling. New foundations cannot be underlain by suspect quality fill. Additionally, the natural materials present across the building addition footprint exhibit variability such as loose soils, slight expansion and consolidation when wetted, resulting in risk of movement and potential structure damage. To reduce risk and establish a layer of reliable foundation support, new foundations should be underlain by new over excavation backfill as described in the Over-Excavation and Building Pad Improvement section. Design and construction criteria for the spread footing foundations are presented in the following section.

Spread Footing Foundations

The following presents our design and construction recommendations for the spread footing foundation option.

1. Existing fill cannot be relied upon and must be over-excavated and reconstructed as moisture conditioned and densely compacted fill per the Fill Placement section of this report. Spread footings for the proposed building addition should be underlain by a minimum 4-foot-thick layer of properly constructed over-excavation fill.

2. Spread footings can be designed for a maximum allowable soil bearing pressure of 3,000 psf when underlain by a layer of properly constructed over-excavation fills.

3. We recommend footings beneath continuous foundation walls be at least 16 inches wide. Footings beneath isolated column pads should be at least 24 inches square. Larger footing sizes may be required to accommodate the anticipated foundation loads.

4. Foundation walls should be well-reinforced. We recommend reinforcement sufficient to span an unsupported distance of at least 10 feet.

5. We recommend designs consider total movement of 1-inch and differential movement of 1/2-inch.

6. Foundations subject to lateral loading may be designed using a coefficient of friction of 0.3.

7. Exterior footings must be protected from frost action. Normally, 30 inches of frost cover is required in the area, according to the Pikes Peak Regional Building Department.

8. A representative of our firm should observe the completed foundation excavation prior to the placement of over excavation backfill to confirm the exposed conditions are similar to those encountered in our exploratory borings. The placement and compaction of below-footing fill and footing subgrade preparation should be observed and tested by a representative of our firm during construction.

9. Excessive wetting of foundation soils during and after construction can cause softening and settlement of foundation soils and result in footing and slab movements. Proper surface drainage around the building is critical to control wetting.

FLOOR SYSTEMS

We understand a slab-on-grade floor is the preferred floor system of the proposed school building addition. The anticipated finished floor elevation of the building addition will likely match the elevation of the existing building floor slab-on-grade. Existing grades within the building addition footprint are near finished floor elevations. We estimate less than about 2 to 3 feet of new fill may be required to establish a finished floor slab-on-grade elevation. Based on our understanding of the proposed construction, near surface materials encountered in our exploratory borings, laboratory test results, and our experience, we believe an undefined risk of differential settlement exists due to the presence of suspect quality fill, loose sands, and inconsistent material types (clay and sand) found within the borings at or near anticipated floor slab-on-grade elevations. We recommend mitigation efforts be performed to reduce risk of settlement as described in the Site Development section and the following section. Design and construction recommendations for slabs-on-grade are presented below.

Slab-on-Grade

An undefined risk of poor slab performance will exist for floor slabs underlain by the existing suspect quality fills and the natural, variable materials. To significantly reduce the risk of settlement, we recommend new floor slabs-on-grade be constructed over a layer of properly constructed over-excavation fill that has been moisture conditioned and densely compacted as described in the Site Development section of this report. Floor slabs-on-grade underlain by at least 4 feet of new fill can be deigned considering a modular of subgrade reaction of 100 pci.

Shallow building foundations will likely settle relative to lightly loaded slab-on-grade floors. We estimate this relative movement between footing foundations and floor slabs could be on the order of 1-inch or less when constructed over a layer of properly placed fills. The settlement can cause cosmetic cracking of finishing products installed throughout the building addition. We recommend the slab-on-grade floors be separated from exterior walls and interior bearing members with joints that allow for free vertical movement of the slab. Slip-joints in slab-bearing partitions should allow for at least 1-1/2 inches of free vertical movement. If the “float” is provided at the tops of partitions, the connection between interior, slab-supported partitions and exterior, foundation-supported walls should be detailed to allow differential movement. These architectural connections are critical to help reduce cosmetic damage when foundations and floor slabs move relative to each other. We have seen instances where these architectural connections were not designed and constructed properly and resulted in moderate cosmetic damage, even though the movement experienced was well within the anticipated range. The architect should pay special attention to these issues and detail the connections accordingly.

All parties must realize that even small movements of the floor slab (less than 1-inch) can damage comparatively brittle floor treatments such as ceramic or stone tile that might be used in restrooms, or impact equipment that is sensitive movement. If some movement of the slab is not acceptable, a structurally supported is recommended. Recommendations for structural floors may be provided upon request.

The 2021 International Building Code (IBC) requires a vapor retarder be placed between base course or the subgrade soils and the concrete slab-on-grade floor, unless the designer of the floor waives this requirement. The merits of installing a vapor retarder below the floor slab depend on the sensitivity of floor coverings and building use to moisture. A properly installed vapor retarder (10 mil minimum) is more beneficial below concrete slab-on-grade floors where floor coverings, painted floor surfaces or products stored on the floor will be sensitive to moisture. The vapor retarder is most effective when concrete is placed directly on top of it, rather than placing a sand or gravel leveling course between the vapor retarder and the floor slab. The placement of concrete on the vapor retarder may increase the risk of shrinkage cracking and curling. Use of concrete with reduced shrinkage characteristics including minimized water content, maximized coarse aggregate content, and reasonably low slump will reduce the risk of shrinkage cracking and curling. Considerations and recommendations for the installation of vapor retarders below concrete slabs are outlined in Section 5.2.3.2 of the 2015 report of the American Concrete Institute (ACI) Committee 302, "Guide for Concrete Floor and Slab Construction (ACI 302.R-15)".

Exterior Flatwork

We recommend exterior flatwork and sidewalks be isolated from the foundations to reduce the risk of transferring heave, settlement, or freeze-thaw movement to the structures. One alternative would be to construct the inner edges of the flatwork on haunches or steel angles bolted to the foundation walls and detail the connections such that movement will cause less distress to the building, rather than tying the slabs directly into the building foundation. Construction on haunches or steel angles and reinforcing the sidewalks and other exterior flatwork will reduce the potential for differential settlement and better allow them to span across wall backfill. Frequent control joints should be provided to reduce problems associated with shrinkage cracking. Panels that are approximately square perform better than rectangular areas.

BELOW-GRADE CONSTRUCTION

It is our understanding that no below-grade construction (habitable or mechanical such as elevator pits) is planned for the proposed school building addition. If plans change and habitable, below-grade areas will be included in the structure, our office should be contacted to assess our shallow foundation recommendations as well as provide design criteria for lateral earth pressures and subsurface drain systems.

PAVEMENTS

We understand the proposed building addition will include the construction of new asphalt and/or concrete paved drive lanes and parking lots. The new parking lot will be located east of the school building and will contain about 21 parking stalls. A pickup and drop-off drive lane as well as a bus lane will be located along the west side of the parking lot. An access drive lane will be constructed to the south, providing access to the parking lot from Indian Village Heights.

Our exploratory borings and understanding of the proposed construction suggest the subgrade soils in the vicinity of the proposed parking lot and access drive consist of sandy to very sandy clay fill and natural sandy to very sandy clay. Subgrade samples of the near surface soils were obtained from two exploratory borings (TH-4 and TH-5) and two subgrade borings (S-1 and S-2) during drilling. The subgrade samples were returned to our laboratory, combined, and assigned laboratory classification testing. Classification testing included gradation analysis and Atterberg Limits. Samples contained 50 to 55 percent silt and clay-sized particles (passing the No. 200 sieve). Atterberg limits testing resulting was performed, resulting in a Liquid Limit of 33 and a Plasticity Index of 15. The pavement subgrade sample classified as CL soils using the Unified Soil Classification System (USCS). According to the American Association of State

Highway Transportation Officials (AASHTO) classification system, the subgrade soils present within the proposed parking lots and drive lanes classify as A-6 soils. These types of materials generally exhibit fair to poor pavement support characteristics. For design purposes, an estimated Hveem Stabilometer ("R") value of 20 was assigned for the existing subgrade materials, based on our laboratory classification testing.

We anticipate the parking lot will be subjected to passenger pick-up trucks, automobiles, school busses, and occasional delivery trucks. We considered a daily traffic number (DTN) of 2 for the automobile parking stalls which correspond to an 18-kip Equivalent Single-Axle Loads (ESAL) of 14,600 for a 20-year flexible pavement design life (asphalt pavement). We considered a DTN of 10 for the drive lanes and access road which corresponds to an 18-kip ESAL of 73,000 for a 20-year flexible pavement design life. We calculated an 18-kip ESAL for rigid pavement (concrete), considering a 50-year design life of 36,500 and 182,500 for the parking stalls and drive lanes, respectively. Parking lot pavement alternatives are presented in the following table. If the estimated DTN values are significantly different, we should be contacted to revise our calculations to reflect the different values.

RECOMMENDED PAVEMENT DESIGN SECTION ALTERNATIVES

Street/Parking Lot	ESAL Asphalt/Concrete	Asphalt Section (AC) Inches	Asphalt Pavement + Aggregate Base Course (AC + ABC) Inches	Plain Portand Cement Concrete (PCC) Inches
Automobile Parking Stalls	14,600 / 36,500	4.5	3 + 6	6
Drive Lanes/Access Drive	73,000 / 182,500	5.5	4 + 6	6

We recommend a concrete pad be provided at the trash dumpster site, if included in the proposed construction. The pad should be at least 8 inches thick and long enough to support the entire length of the trash truck and dumpster. Joints between concrete and asphalt pavements should be sealed with a flexible compound.

Our design considers pavement construction will be completed in accordance with the City Fountain or El Paso County Specifications. The specifications contain requirements for the pavement materials (asphalt, base course, and concrete) as well as the construction practices used (compaction, materials sampling, and proof-rolling). Of particular importance are those recommendations directed toward subgrade and basecourse compaction and proof-rolling. During proof-rolling, attention should be directed toward the areas of confined backfill compaction such as utility trenches. Soft or loose subgrade or areas that pump excessively should be stabilized prior to pavement construction. Subgrade areas that pass the proof-roll should be stable enough to pave. A representative of our office should be present at the site during placement of fill and construction of pavements to perform density testing.

PEROLATION TESTING

We understand the existing leach field may be expanded to accommodate a larger on-site wastewater system. The location of the existing on-site wastewater system is located west of the existing school building. Our office performed field percolation testing at the site to assess the percolation rate of the near surface soils in the vicinity of the proposed leach field expansion. A profile hole was advanced to a depth of 10 feet near the center of the test location and samples were obtained for classification. A total of three, six-inch diameter holes were advanced to depths of about 3 feet below existing grades using a truck mounted drill rig and continuous flight auger at the location indicated on Fig. 1. Slotted PVC pipe was installed into the three holes and the holes were presoaked. We returned on the following day to perform the percolation test by taking measurements of the water depth on a periodic basis. Measurements were taken and recorded in the field. A design infiltration rate of 10 minutes per inch was determined for percolation test location P-1. Test results are summarized in the table presented in Fig. 11 of this report.

CONCRETE

Concrete in contact with soil can be subject to sulfate attack. We measured water-soluble sulfate concentration of less than 0.1 percent in a sample obtained from the site. As indicated in our tests and ACI 318-19, the sulfate exposure class is *not applicable* or S0.

SULFATE EXPOSURE CLASSES PER ACI 318-19

Exposure Classes		Water-Soluble Sulfate (SO_4) in Soil [A] (%)
Not Applicable	S0	< 0.10
Moderate	S1	0.10 to 0.20
Severe	S2	>0.20 to 2.00
Very Severe	S3	> 2.00

A) Percent sulfate by mass in soil determined by ASTM C1580

For this level of sulfate concentration, ACI 318-19, *Building Code Requirements for Structural Concrete*, indicates there are no special cement type requirements for sulfate resistance as indicated in the table below.

CONCRETE DESIGN REQUIREMENTS FOR SULFATE EXPOSURE PER ACI 318-19

Exposure Class		Maximum Water/ Cement Ratio	Minimum Compressive Strength (psi)	Cementitious Material Types [A]			Calcium Chloride Admixtures
				ASTM C150/ C150M	ASTM C595/ C595M	ASTM C1157/ C1157M	
S0		N/A	2500	No Type Restrictions	No Type Restrictions	No Type Restrictions	No Restrictions
S1		0.50	4000	II [B]	Type with (MS) Designation	MS	No Restrictions
S2		0.45	4500	V [B]	Type with (HS) Designation	HS	Not Permitted
S3	Option 1	0.45	4500	V + Pozzolan or Slag Cement [C]	Type with (HS) Designation plus Pozzolan or Slag Cement [C]	HS + Pozzolan or Slag Cement [C]	Not Permitted
S3	Option 2	0.4	5000	V [D]	Type with (HS) Designation	HS	Not Permitted

A) Alternate combinations of cementitious materials shall be permitted when tested for sulfate resistance meeting the criteria in section 26.4.2.2(c).

B) Other available types of cement such as Type III or Type I are permitted in Exposure Classes S1 or S2 if the C3A contents are less than 8 or 5 percent, respectively.

C) The amount of the specific source of pozzolan or slag to be used shall not be less than the amount that has been determined by service record to improve sulfate resistance when used in concrete containing Type V cement. Alternatively, the amount of the specific source of the pozzolan or slab to be used shall not be less than the amount tested in accordance with ASTM C1012 and meeting the criteria in section 26.4.2.2(c) of ACI 318.

D) If Type V cement is used as the sole cementitious material, the optional sulfate resistance requirement of 0.040 percent maximum expansion in ASTM C150 shall be specified.

Superficial damage may occur to the exposed surfaces of highly permeable concrete. To control this risk and to resist freeze-thaw deterioration, the water-to-cementitious materials ratio should not exceed 0.50 for concrete in contact with soils that are likely to stay moist due to surface drainage or high-water tables. Concrete should have a total air content of 6 percent ± 1.5 percent. We advocate damp-proofing of all foundation walls and grade beams in contact with the subsoils.

SURFACE DRAINAGE

Performance of the foundation system, floor slabs, pavements, and concrete flatwork to be constructed at this site will be influenced by the moisture conditions existing within the near-surface soils. Overall surface drainage patterns must be planned to provide for the rapid removal of storm runoff. Water should not be allowed to pond adjacent to foundations or over pavements or concrete flatwork. We recommend the following precautions be observed during construction and maintained at all times after the building is completed.

1. Excessive wetting or drying of the open foundation excavation should be avoided.

2. Foundation wall backfill should be graded to provide for the rapid removal of runoff. We recommend a slope equivalent to at least 6 inches in the first 10 feet. In flatwork areas adjacent to the structure, the slope may be reduced to comply with ADA requirements.

3. Backfill around foundations should be moistened and compacted to 95 percent of standard Proctor dry density, according to criteria presented in Fill Placement.

4. Roof downspouts and drains should discharge well away from the building. Downspout extensions and/or splash blocks should be provided to help reduce infiltration into the backfill adjacent to the structure.

5. Landscaping concepts should concentrate on use of plantings that require little or no supplemental irrigation after the vegetation is established. Irrigated sod, if it is included in the landscaping plan, should not be located within 6 feet of the foundation walls. Irrigation should be limited to the minimum amount sufficient to maintain vegetation. Application of more water will increase likelihood of slab and foundation movements.

6. Backfill around foundations should be moistened and compacted according to criteria presented in Fill Placement.

CONSTRUCTION OBSERVATIONS

We recommend that CTL|Thompson, Inc. provide construction observation services to allow us the opportunity to confirm subsurface conditions are consistent with those found during this investigation. If others perform these observations, they must accept responsibility to judge whether the recommendations in this report remain appropriate.

GEOTECHNICAL RISK

The concept of risk is an important aspect with any geotechnical evaluation primarily because the methods used to develop geotechnical recommendations do not comprise an exact science. We never have complete knowledge of subsurface conditions. Our analysis must be tempered with engineering judgment and experience. Therefore, the recommendations presented in any geotechnical evaluation should not be considered risk-free. Our recommendations represent our judgment of those measures that are necessary to increase the chances that the structures will perform satisfactorily. It is critical that all recommendations in this report are followed during construction. The owner must assume responsibility for maintaining the structure and use appropriate practices regarding drainage.

LIMITATIONS

This report has been prepared for the exclusive use of the Hanover School District No. 28 and NV5 for the purpose of providing geotechnical design and construction criteria for the proposed Prairie Heights Elementary School building addition and associate site improvements located at 7930 Indian Village Heights in Fountain, Colorado. The information, conclusions, and recommendations presented herein are based upon consideration of many factors including, but not limited to, the type of structure proposed, the geologic setting, and the subsurface conditions encountered. The conclusions and recommendations contained in the report are not valid for use by others. Standards of practice continuously evolve in the area of geotechnical engineering. The recommendations provided are appropriate for about three years. If the project is not constructed within about three years, we should be contacted to determine if we should update this report.

Our borings were spaced to obtain a reasonably accurate picture of foundation conditions below the proposed building addition area. The data are representative of conditions encountered only at the exact boring locations. Variations in the subsurface conditions not indicated by our borings are possible. Representatives of our firm should periodically visit the site during construction to perform observation and testing services.

We believe this investigation was conducted in a manner consistent with that level of skill and care normally used by geotechnical engineers practicing in this area at this time. No warranty, express or implied, is made.

If we can be of further service in discussing the contents of this report or in the analysis of the influence of the subsoil conditions on design of the building, please call.

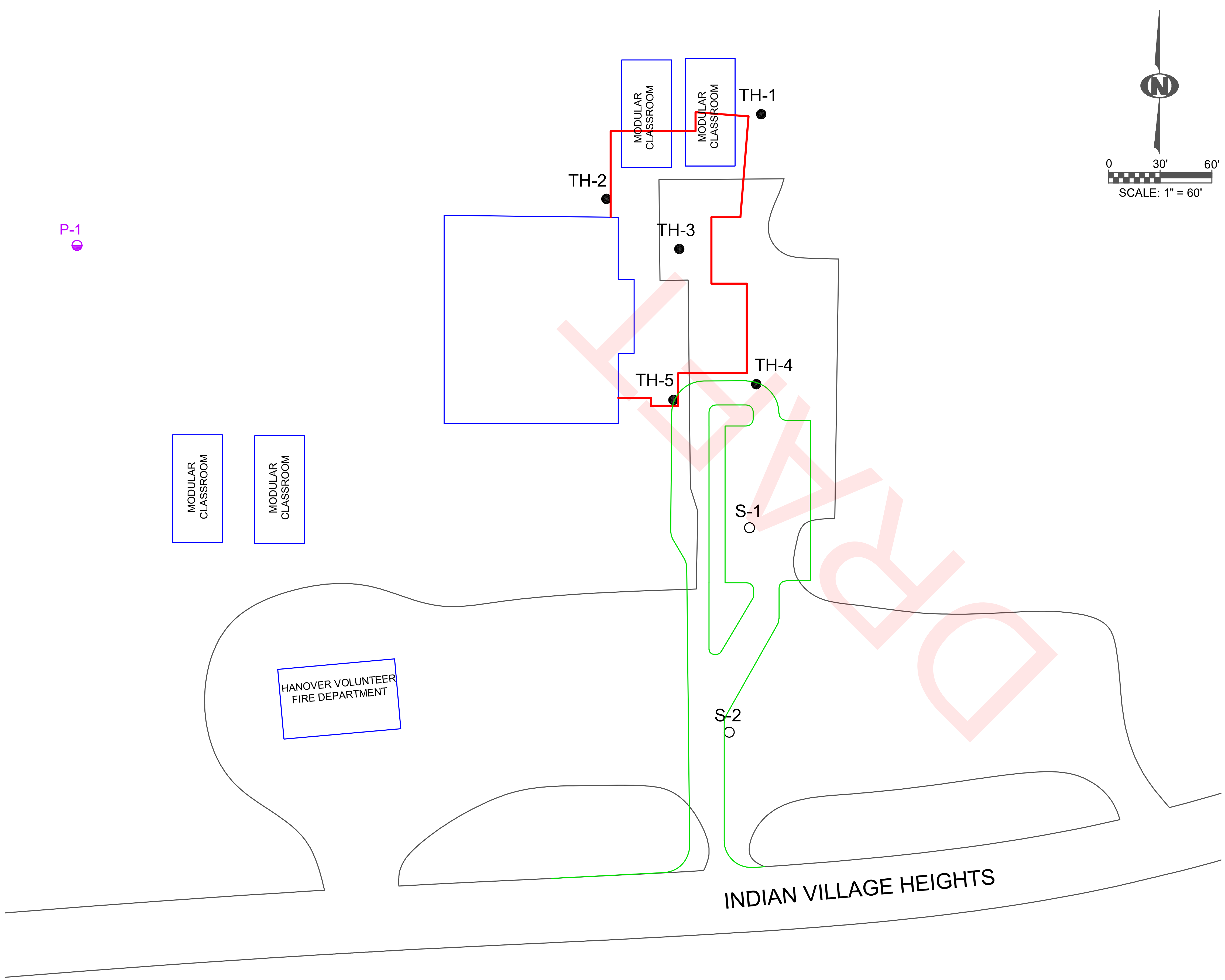
CTL|THOMPSON, INC.

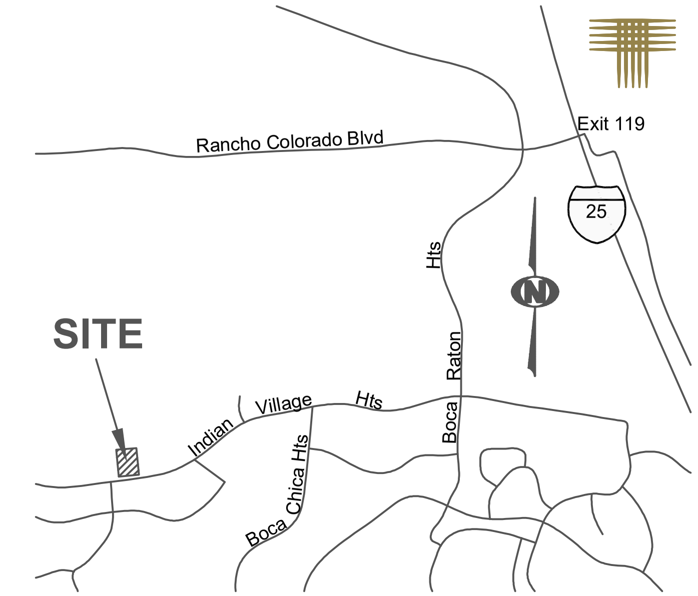
Patrick Foley, E.I.
Staff Engineer

Reviewed by:

Jeffrey M. Jones, P.E.
Associate Engineer

PF:JMJ:cw
Via e-mail: Steve.Horn@nv5.com





VICINITY MAP

(NOT TO SCALE)

LEGEND:

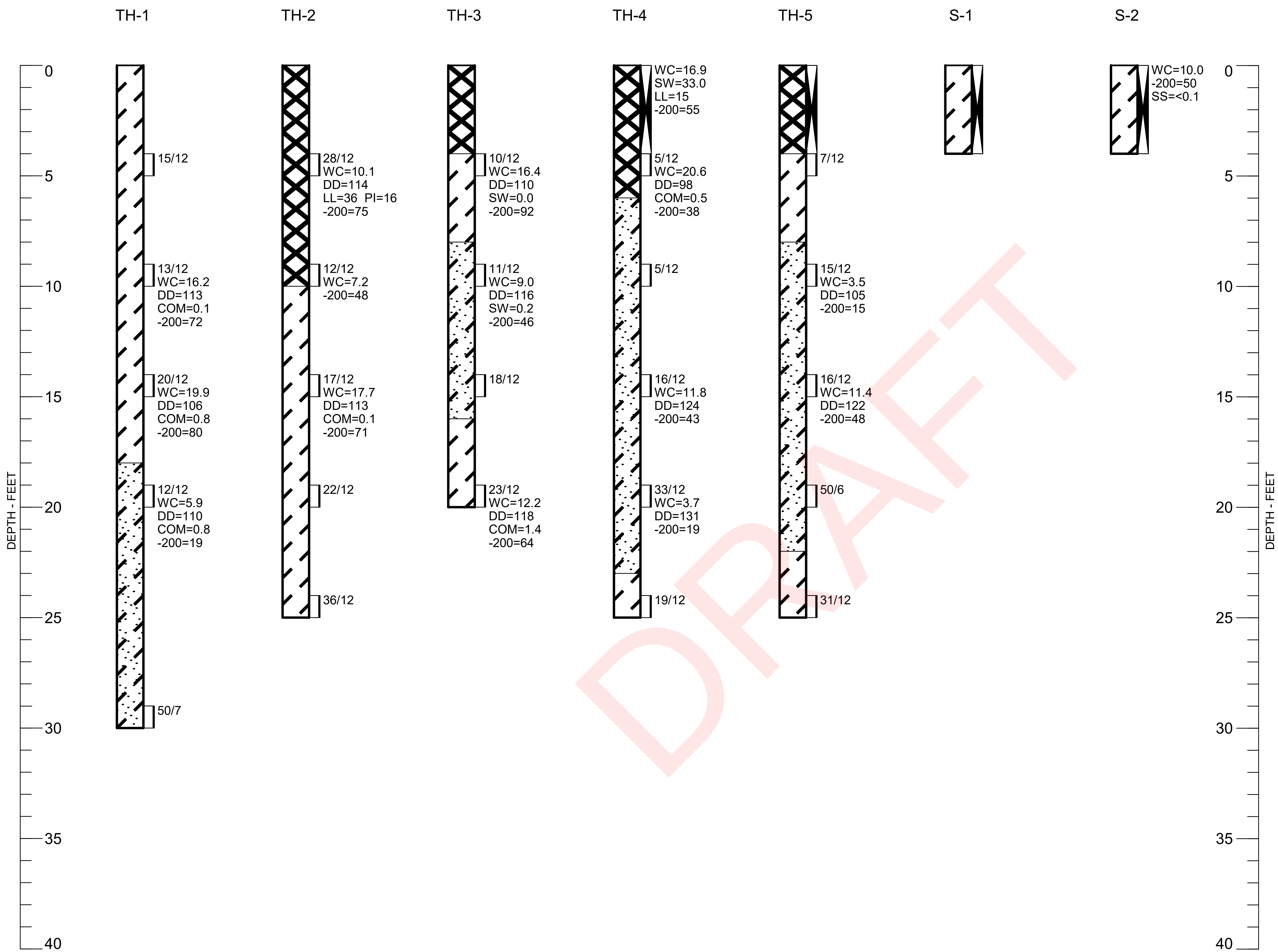
TH-1 ●	APPROXIMATE LOCATION OF EXPLORATORY BORING.
S-1 ○	APPROXIMATE LOCATION OF SUBGRADE SAMPLE.
P-1 ◒	APPROXIMATE LOCATION OF PERCOLATION TEST.
(blue line)	LOCATION OF EXISTING BUILDING FOOTPRINT.
(red line)	LOCATION OF PROPOSED BUILDING ADDITION FOOTPRINT.
(gray line)	LOCATION OF EXISTING STREETS, PARKING LOT, AND DRIVE LANES.
(green line)	LOCATION OF PROPOSED PARKING LOT AND DRIVE LANES.

NOTE:
BASE DRAWING WAS PROVIDED BY NV5 (PREPARED BY MOA ARCHITECTURE, DATED OCTOBER 10, 2024).

HANOVER SCHOOL DISTRICT NO. 28
PRAIRIE HEIGHTS ELEMENTARY SCHOOL ADDITION
CTL|T PROJECT NO. CS19910.000-125

Location of Exploratory Borings

FIG. 1



LEGEND:

FILL, CLAY, SANDY TO VERY SANDY AND SAND, VERY CLAYEY, VERY STIFF (CLAY), SLIGHTLY GRAVELLY, MEDIUM DENSE (SAND), MOIST, BROWN.

CLAY, SLIGHTLY SANDY TO VERY SANDY, STIFF TO VERY STIFF, MOIST TO VERY MOIST, BROWN, OCCASIONAL GRAVELS (CL).

SAND, CLAYEY TO VERY CLAYEY AND SILTY, SLIGHTLY GRAVELLY TO GRAVELLY, LOOSE TO VERY DENSE, LIGHT BROWN TO BROWN (SC, SM).

DRIVE SAMPLE. THE SYMBOL 15/12 INDICATES 15 BLOWS OF A 140-POUND HAMMER FALLING 30 INCHES WERE REQUIRED TO DRIVE A 2.5-INCH O.D. SAMPLER 12 INCHES.

INDICATES BULK SAMPLE OBTAINED FROM AUGER CUTTINGS.

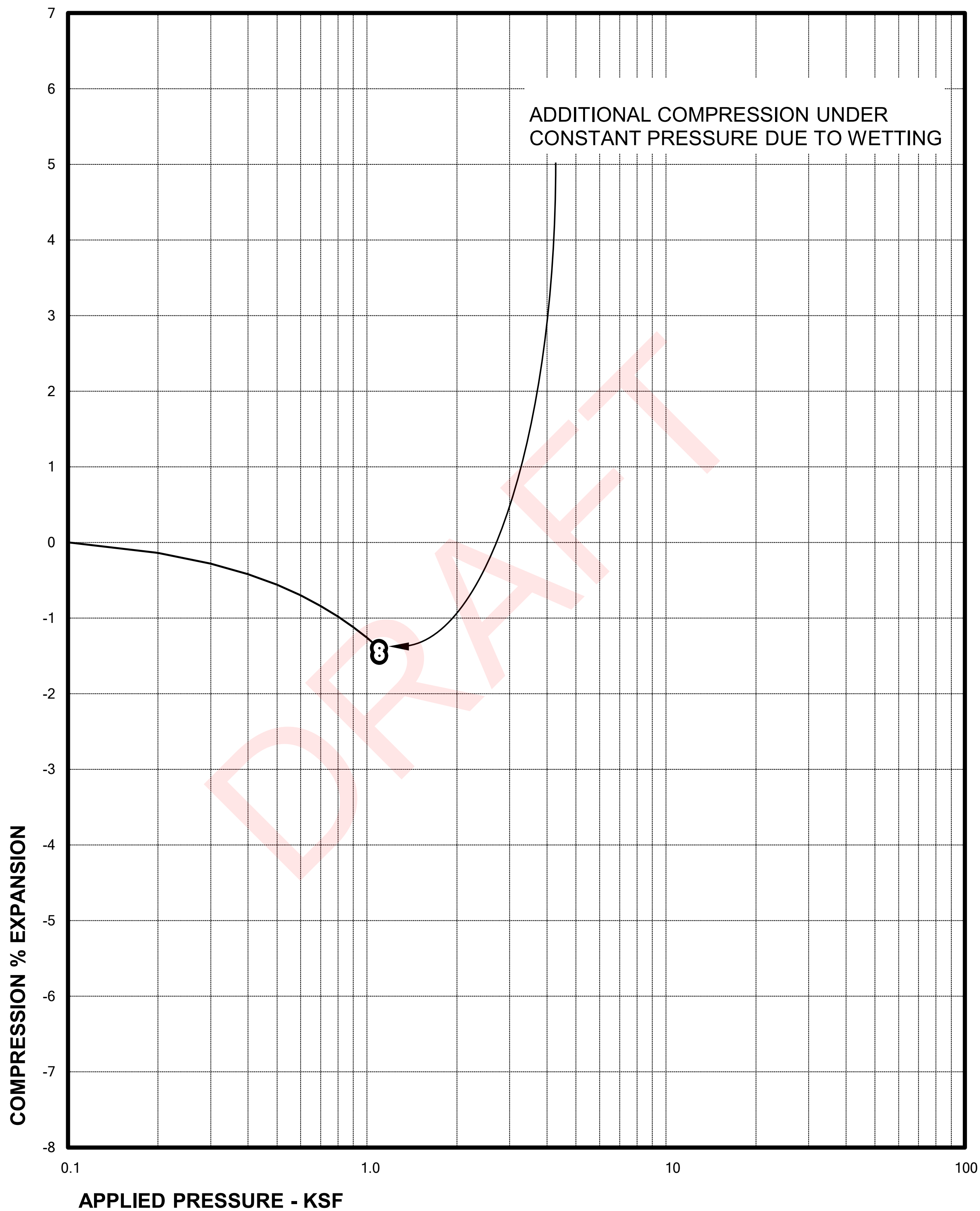
NOTES:

1. THE BORINGS WERE DRILLED NOVEMBER 18, 2024 USING A 4-INCH DIAMETER, CONTINUOUS-FLIGHT AUGER AND A CME-55, TRUCK-MOUNTED DRILL RIG.
2. THESE LOGS ARE SUBJECT TO THE EXPLANATIONS, LIMITATIONS, AND CONCLUSIONS AS CONTAINED IN THIS REPORT.
3. GROUNDWATER WAS NOT ENCOUNTERED IN THE EXPLORATORY BORINGS DURING THIS INVESTIGATION.
4. WC - INDICATES MOISTURE CONTENT. (%)
   DD - INDICATES DRY DENSITY. (PCF)
   SW - INDICATES SWELL WHEN WETTED UNDER APPROXIMATE OVERBURDEN PRESSURE. (%)
   COM - INDICATES COMPRESSION WHEN WETTED UNDER APPROXIMATE OVERBURDEN PRESSURE. (%)
   LL - INDICATES LIQUID LIMIT. (NV : NO VALUE)
   PI - INDICATES PLASTICITY INDEX. (NP : NON-PLASTIC)
   -200 - INDICATES PASSING NO. 200 SIEVE. (%)
   SS - INDICATES WATER-SOLUBLE SULFATE CONTENT. (%)

HANOVER SCHOOL DISTRICT NO. 28
PRAIRIE HEIGHTS ELEMENTARY SCHOOL ADDITION
CTL|T PROJECT NO. CS19910.000-125

Summary Logs of Exploratory Borings

FIG. 2

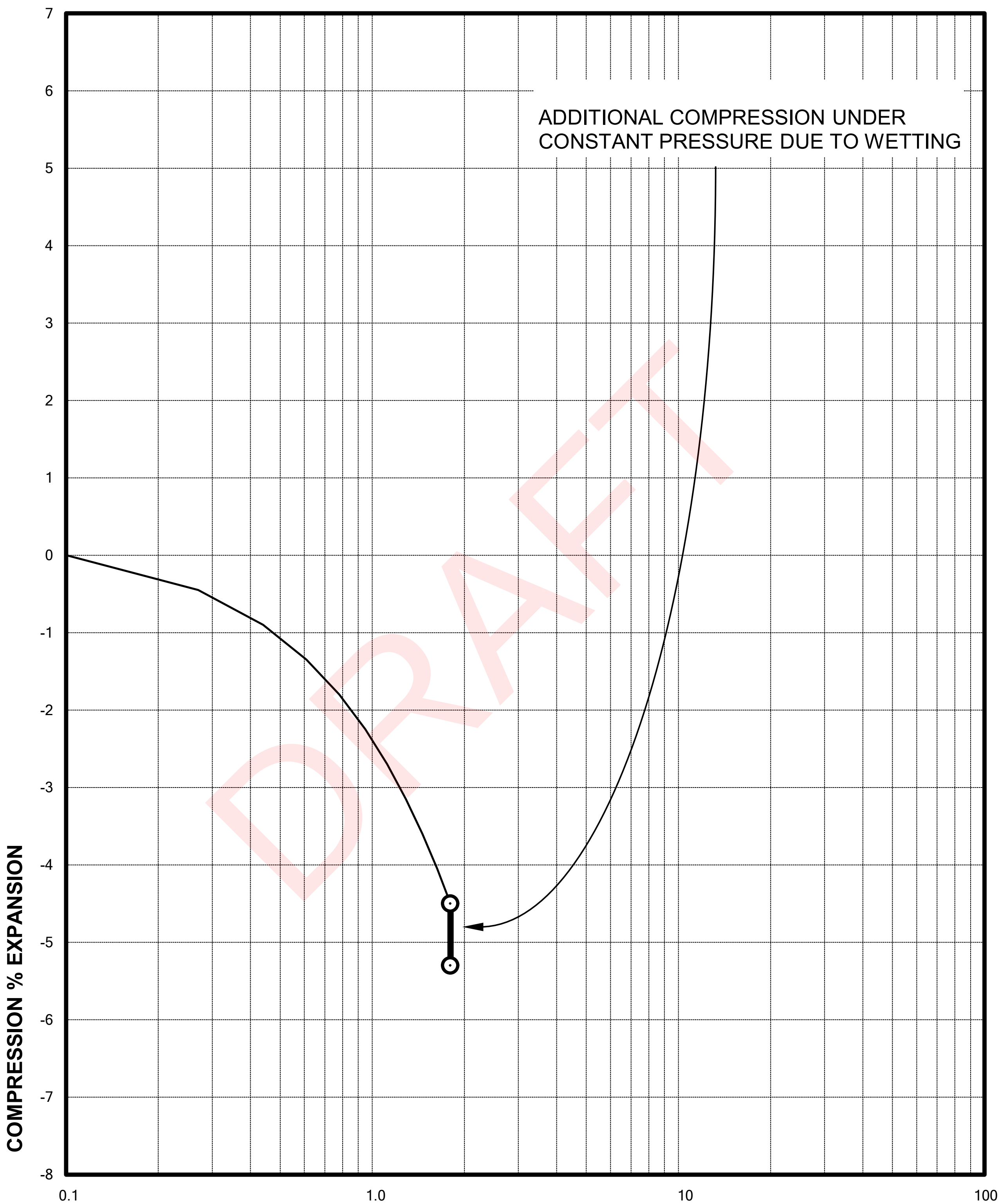


Sample of	CLAY, SANDY (CL)	DRY UNIT WEIGHT=	113	PCF
From	TH-1 AT 9 FEET	MOISTURE CONTENT=	16.2	%

HANOVER SCHOOL DISTRICT NO. 28
PRAIRIE HEIGHTS ELEMENTARY SCHOOL ADDITION
CTL|T PROJECT NO. CS19910.000-125

Swell Consolidation Test Results

FIG. 3

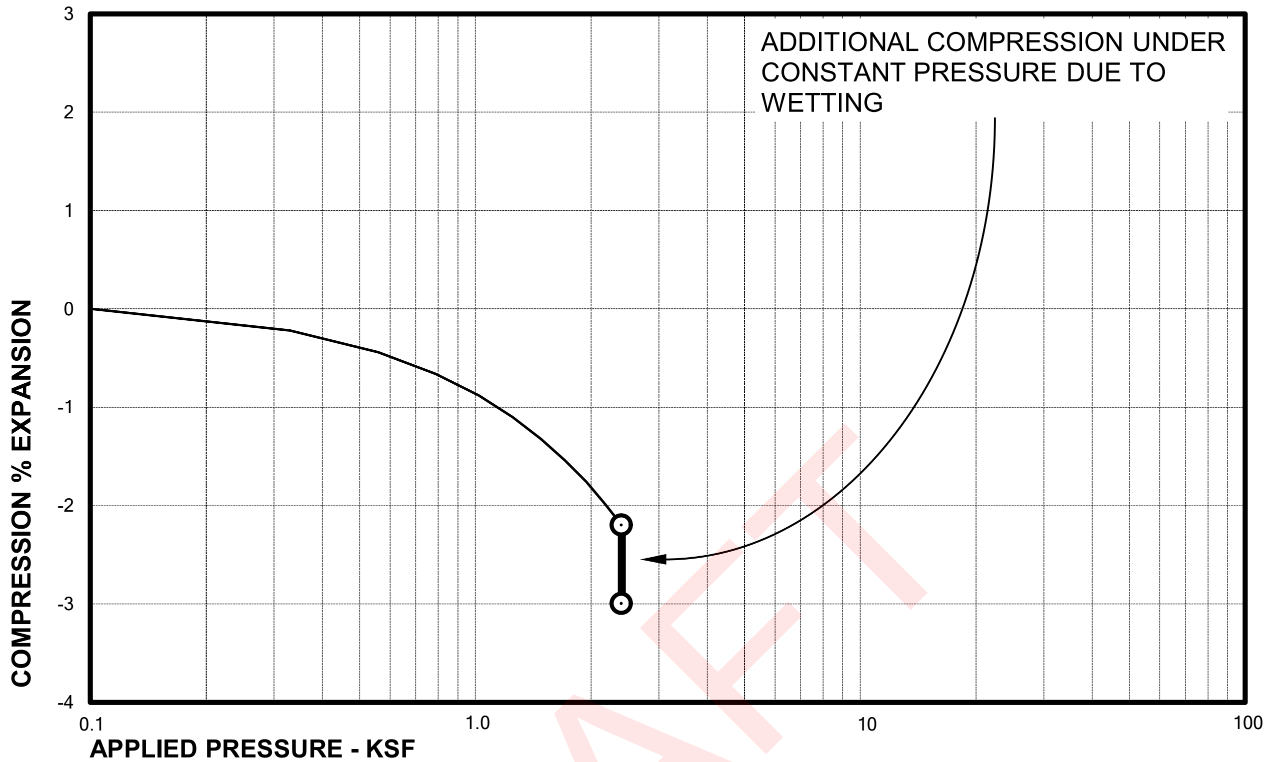


Sample of	CLAY, SANDY (CL)		DRY UNIT WEIGHT=	106	PCF
From	TH-1 AT 14 FEET		MOISTURE CONTENT=	19.9	%

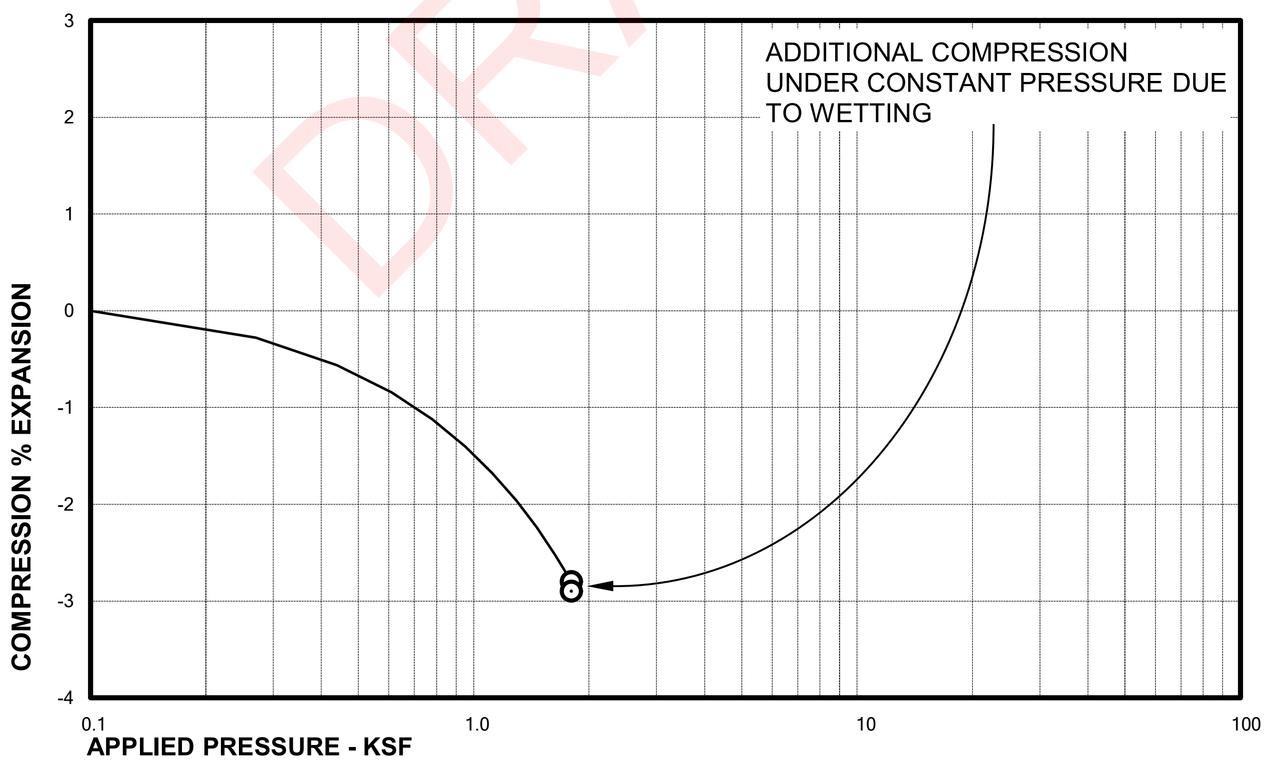
HANOVER SCHOOL DISTRICT NO. 28
PRAIRIE HEIGHTS ELEMENTARY SCHOOL ADDITION
CTL|T PROJECT NO. CS19910.000-125

Swell Consolidation Test Results

FIG. 4



Sample of	SAND, SILTY (SM)	DRY UNIT WEIGHT=	110	PCF
From	TH-1 AT 19 FEET	MOISTURE CONTENT=	5.9	%

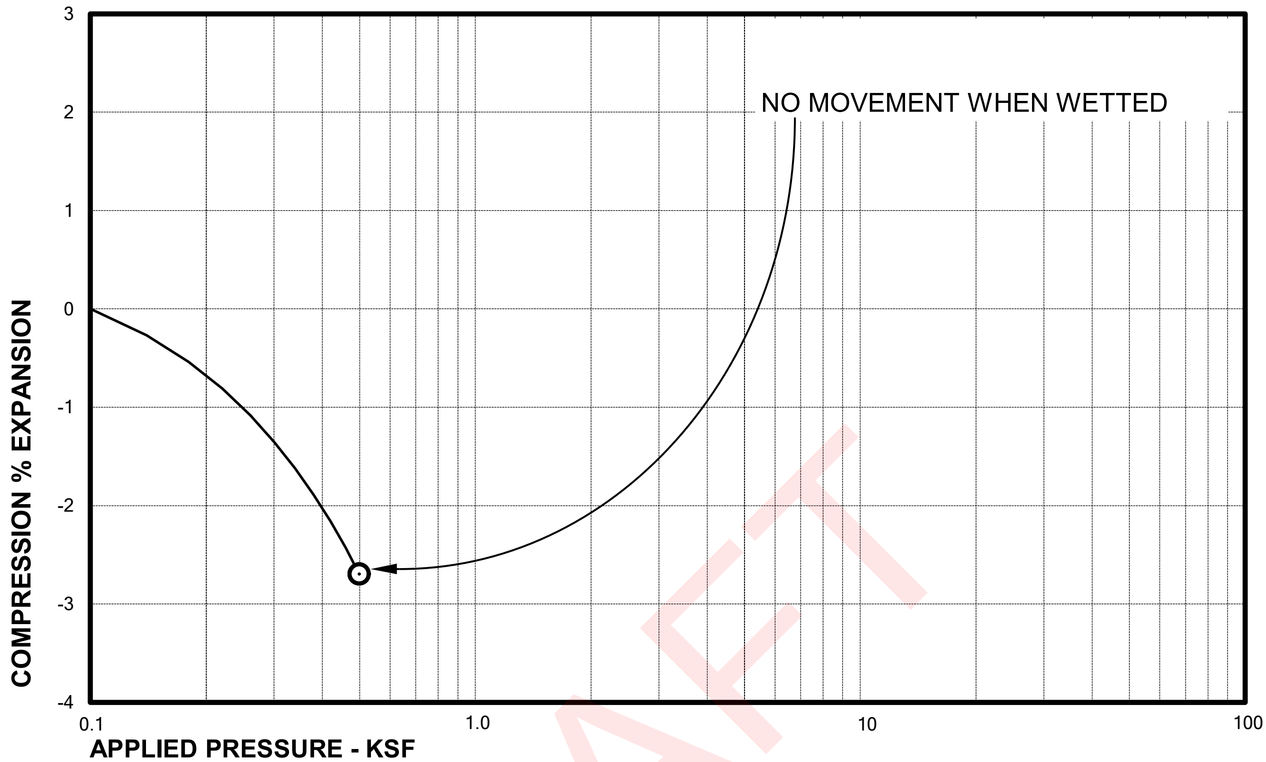


Sample of	CLAY, SANDY (CL)	DRY UNIT WEIGHT=	113	PCF
From	TH-2 AT 14 FEET	MOISTURE CONTENT=	17.7	%

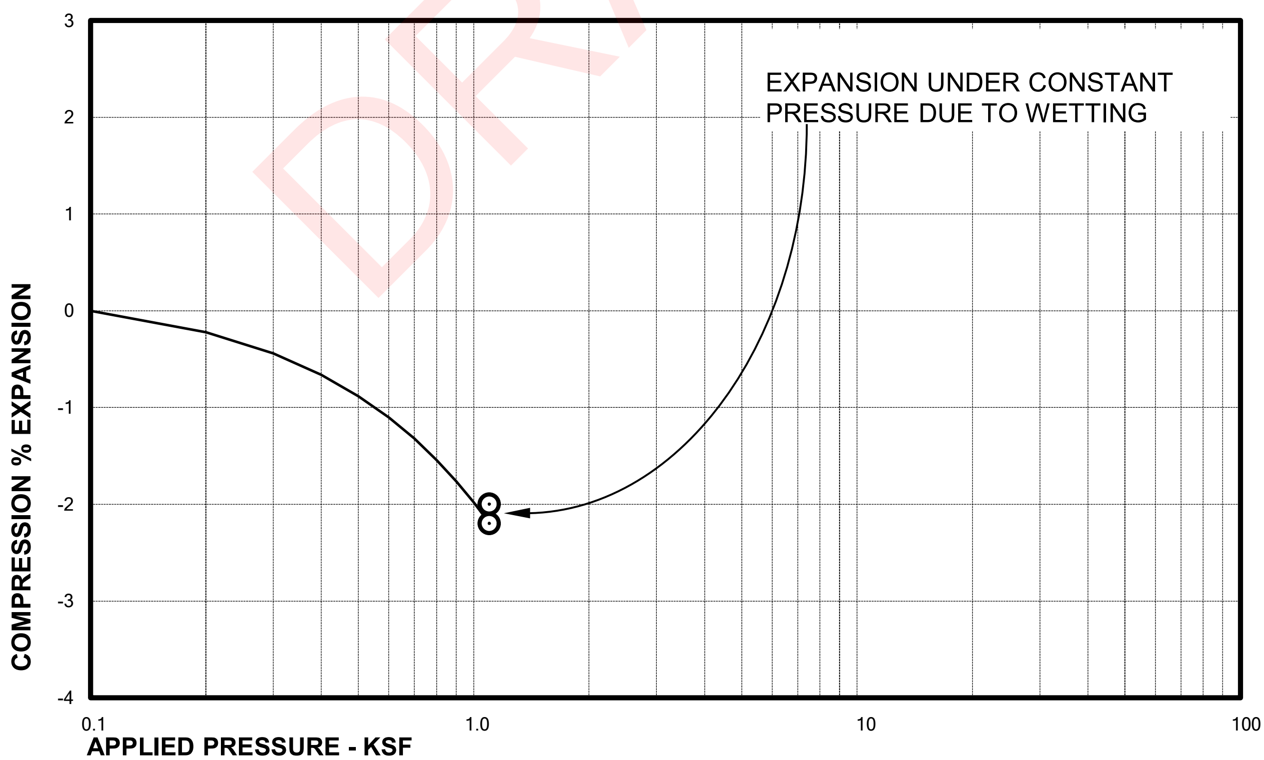
HANOVER SCHOOL DISTRICT NO. 28
PRAIRIE HEIGHTS ELEMENTARY SCHOOL ADDITION
CTL|T PROJECT NO. CS19910.000-125

Swell Consolidation Test Results

FIG. 5



Sample of	CLAY, SLIGHTLY SANDY (CL)	DRY UNIT WEIGHT=	110	PCF
From	TH-3 AT 4 FEET	MOISTURE CONTENT=	16.4	%

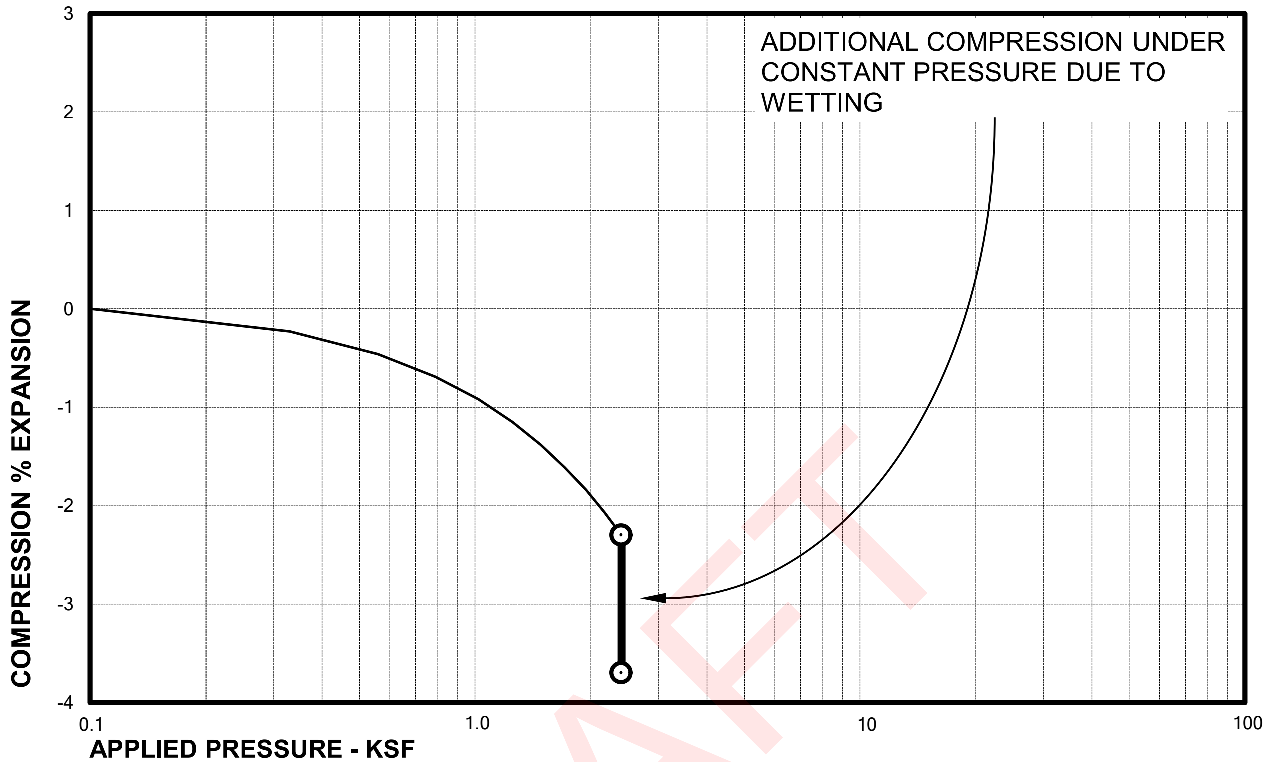


Sample of	SAND, VERY CLAYEY (SC)	DRY UNIT WEIGHT=	116	PCF
From	TH-3 AT 9 FEET	MOISTURE CONTENT=	9.0	%

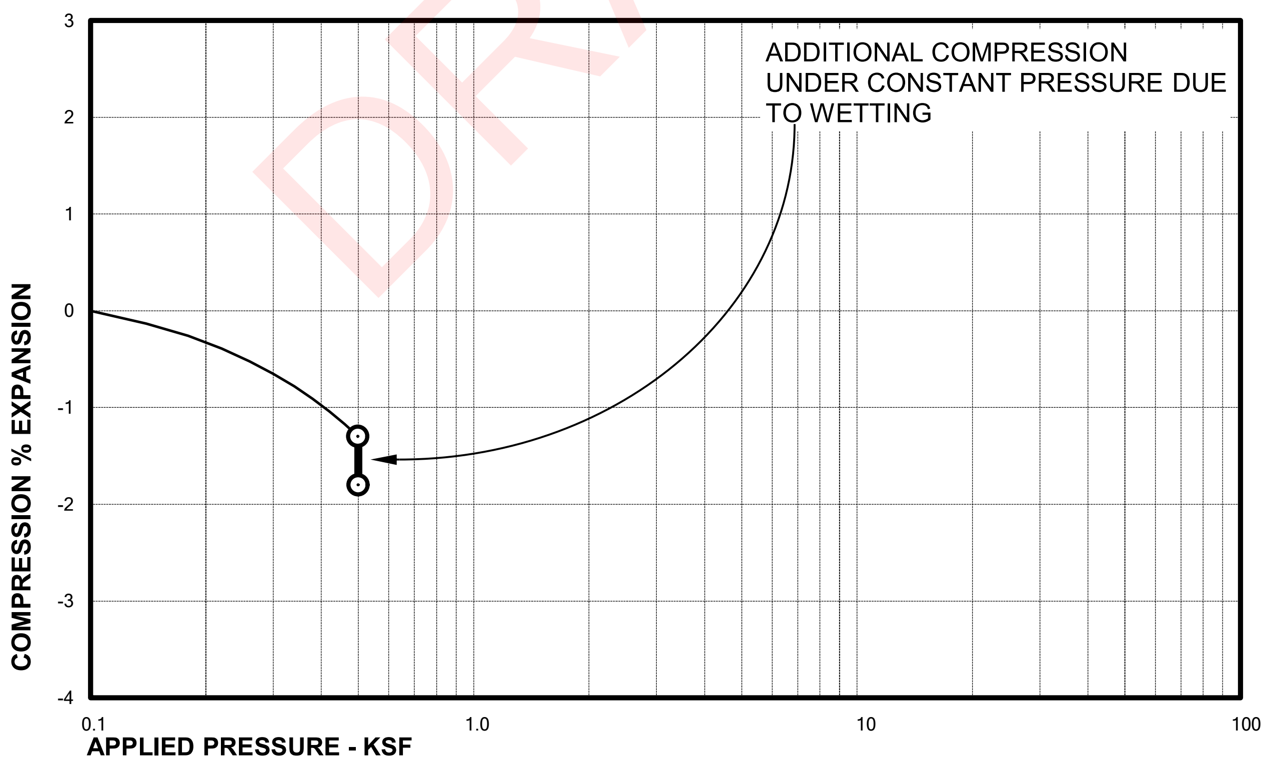
HANOVER SCHOOL DISTRICT NO. 28
PRAIRIE HEIGHTS ELEMENTARY SCHOOL ADDITION
CTL|T PROJECT NO. CS19910.000-125

Swell Consolidation Test Results

FIG. 6



Sample of CLAY, VERY SANDY (CL) DRY UNIT WEIGHT= 118 PCF
From TH-3 AT 19 FEET MOISTURE CONTENT= 12.2 %

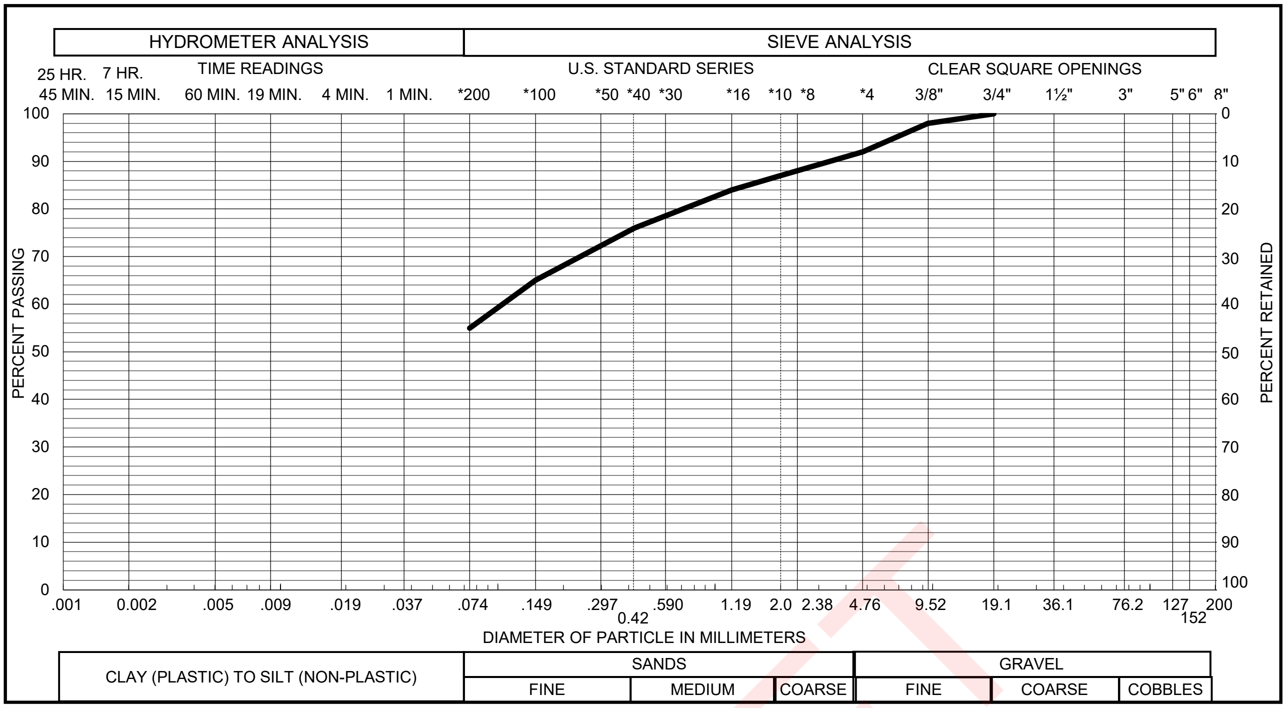


Sample of SAND, VERY CLAYEY (SC) DRY UNIT WEIGHT= 98 PCF
From TH-4 AT 4 FEET MOISTURE CONTENT= 20.6 %

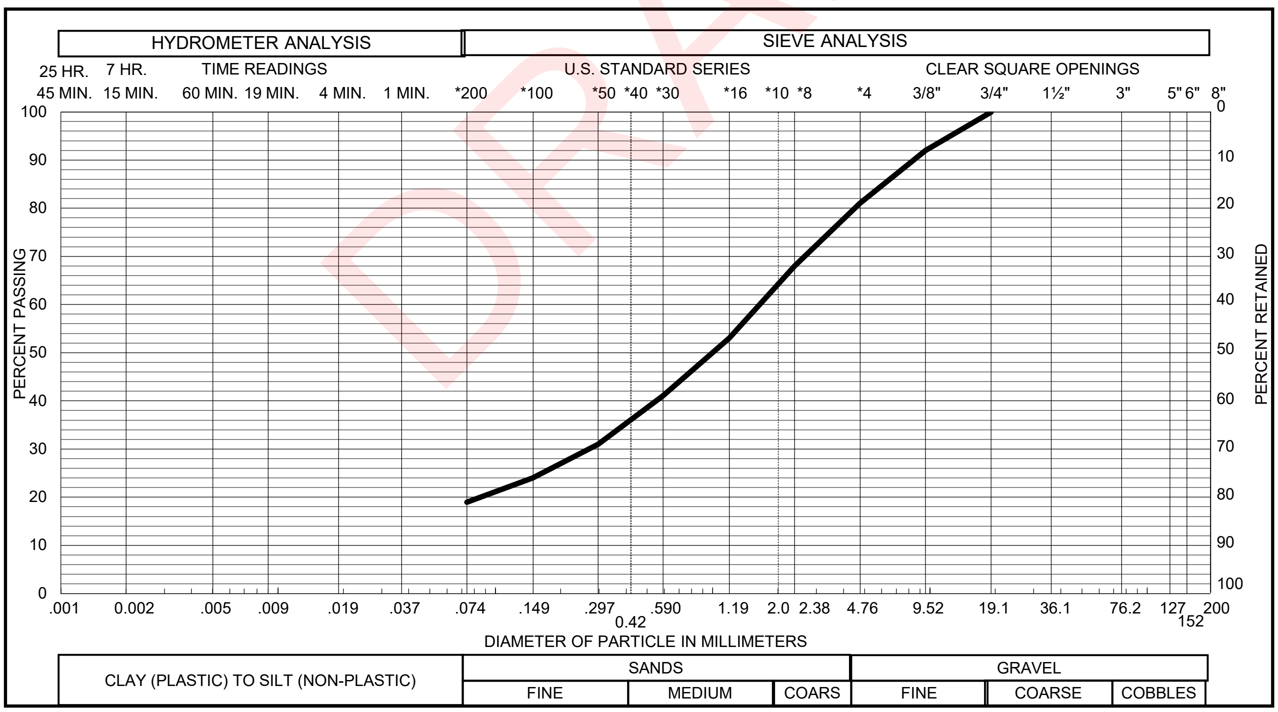
HANOVER SCHOOL DISTRICT NO. 28
PRAIRIE HEIGHTS ELEMENTARY SCHOOL ADDITION
CTL|T PROJECT NO. CS19910.000-125

Swell Consolidation Test Results

FIG. 7



Sample of	FILL, SAND, SILTY	GRAVEL	8 %	SAND 37 %
From	TH - 4 AT 0 FEET	SILT & CLAY	55 %	LIQUID LIMIT 33
		PLASTICITY INDEX		15

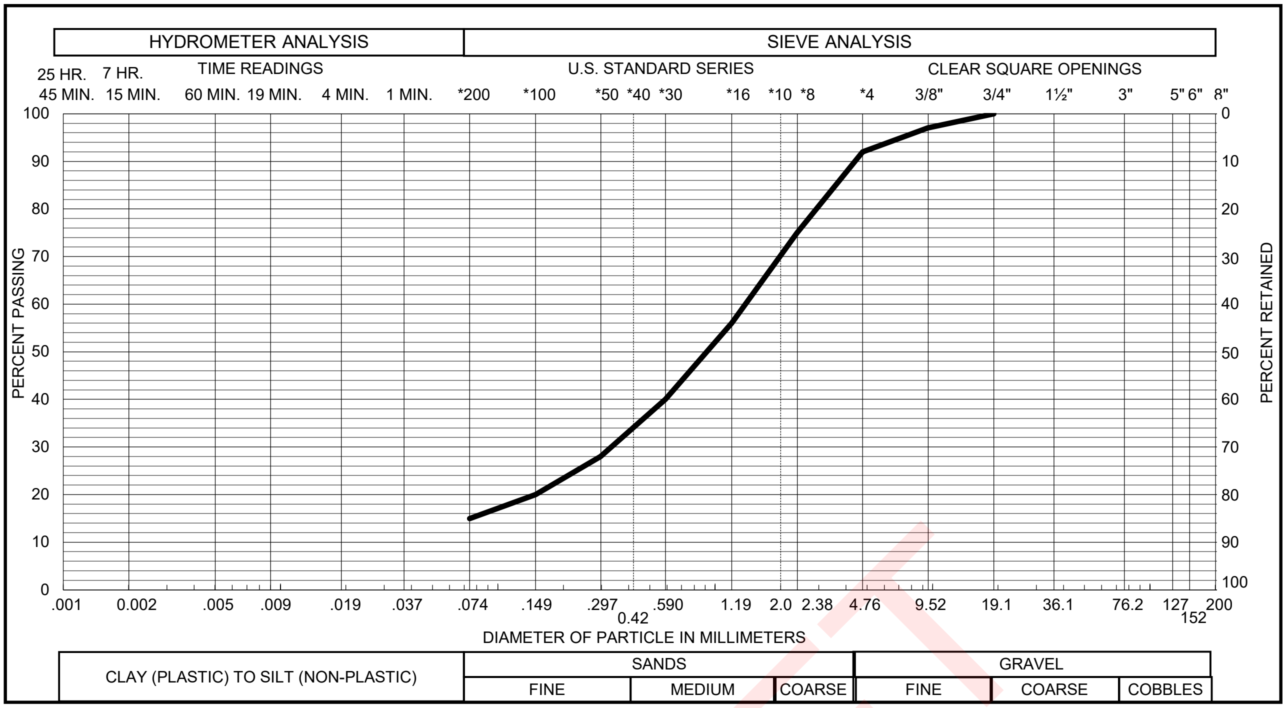


Sample of	SAND, SILTY (SM)	GRAVEL	19 %	SAND 62 %
From	TH - 4 AT 19 FEET	SILT & CLAY	19 %	LIQUID LIMIT
		PLASTICITY INDEX		

HANOVER SCHOOL DISTRICT NO. 28
PRAIRIE HEIGHTS ELEMENTARY SCHOOL ADDITION
CTL|T PROJECT NO. CS19910.000-125

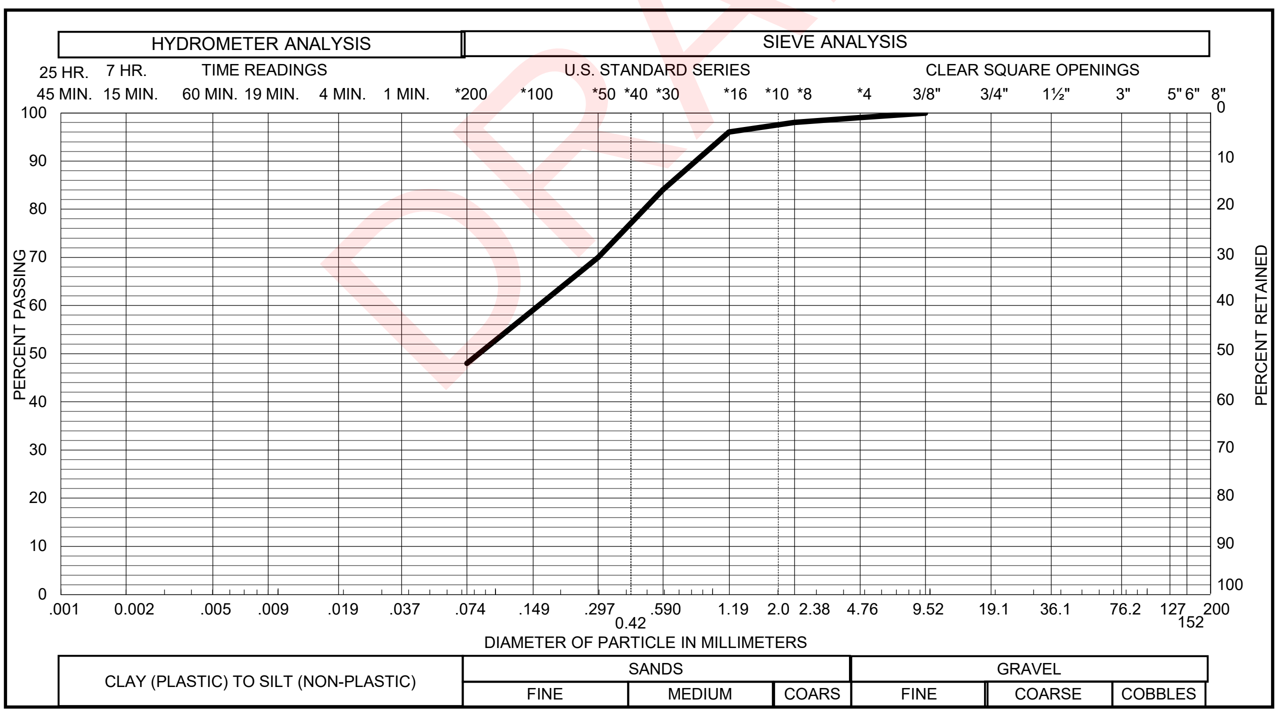
Gradation Test Results

FIG. 8



Sample of SAND, SILTY (SM)
From TH - 5 AT 9 FEET

GRAVEL 8 % SAND 77 %
SILT & CLAY 15 % LIQUID LIMIT
PLASTICITY INDEX



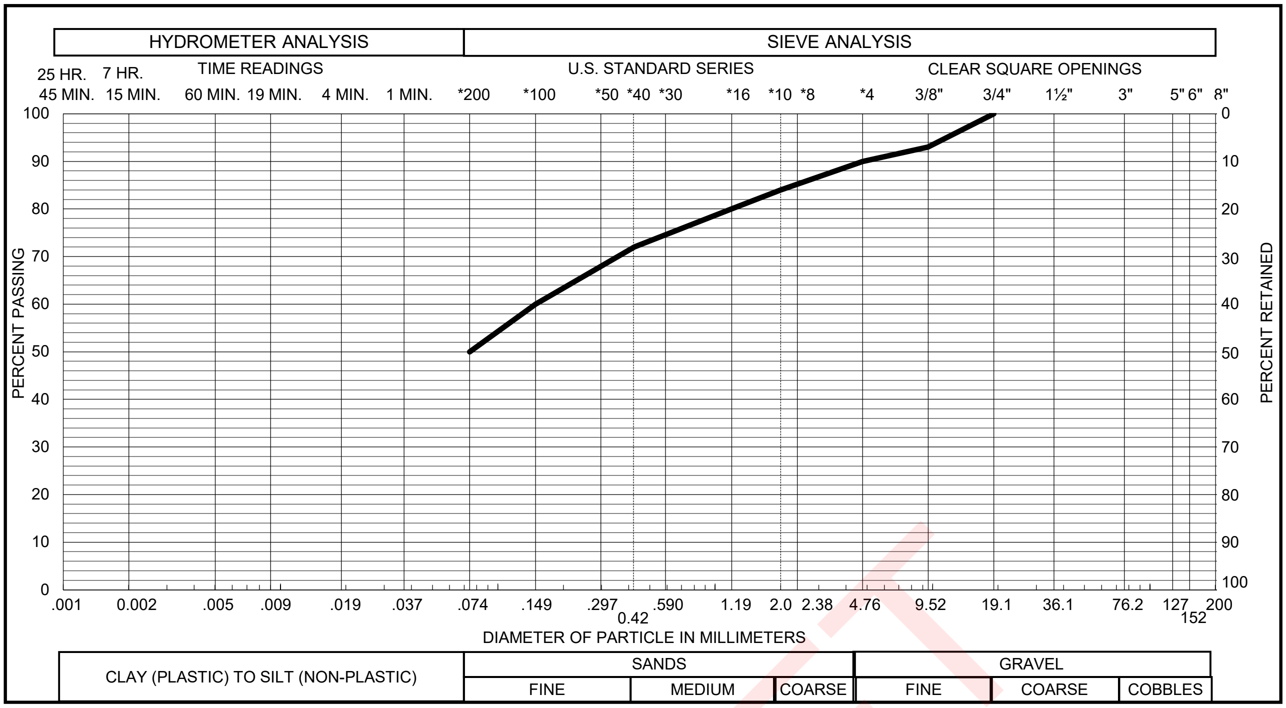
Sample of SAND, VERY CLAYEY (SC)
From TH - 5 AT 14 FEET

GRAVEL 1 % SAND 51 %
SILT & CLAY 48 % LIQUID LIMIT
PLASTICITY INDEX

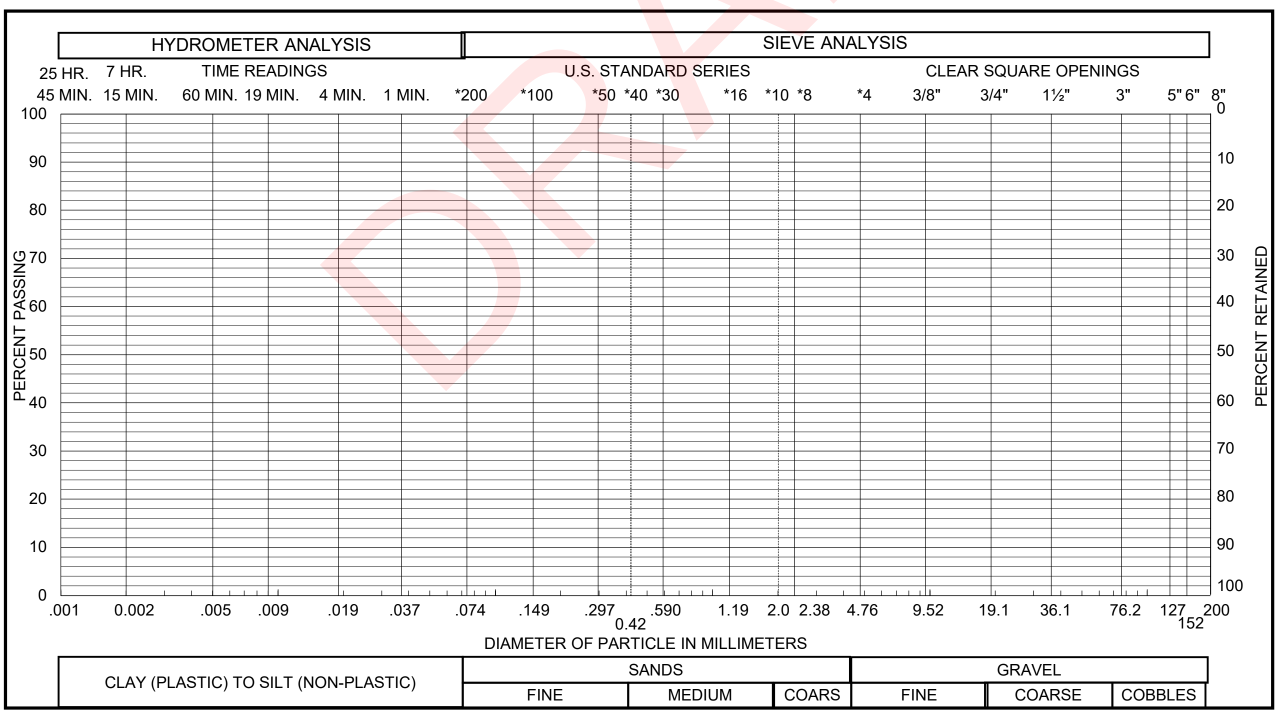
HANOVER SCHOOL DISTRICT NO. 28
PRAIRIE HEIGHTS ELEMENTARY SCHOOL ADDITION
CTL|T PROJECT NO. CS19910.000-125

Gradation Test Results

FIG. 9



Sample of	CLAY, VERY SANDY (CL)	GRAVEL 10 %	SAND 40 %
From	S - 2 AT 0 FEET	SILT & CLAY 50 %	LIQUID LIMIT
		PLASTICITY INDEX	



Sample of		GRAVEL %	SAND %
From		SILT & CLAY %	LIQUID LIMIT
		PLASTICITY INDEX	

HANOVER SCHOOL DISTRICT NO. 28
PRAIRIE HEIGHTS ELEMENTARY SCHOOL ADDITION
CTL|T PROJECT NO. CS19910.000-125

Gradation Test Results

FIG. 10

CTL | THOMPSON

PERCOLATION TEST DATA

Project: Prairie Heights Elementary School Addition
Location: 7930 Indina Village Heights
Pre-Soaked Date: November 18, 2024 **Time:** 1 PM

Project #: CS19910.000-125
Technician/Engineer: KD
Date of Test: November 19, 2024

Percolation Test Hole: 1
Depth of Hole: 36 inches **Pipe Length: 60 inches**

Time (hrs:min)	Time Interval (hrs:min)	Depth to Water* (in)	Change in Water Depth (in)	Perc. Rate (min/in)
10:28 AM	-------	28		
10:38 AM	0:10	29 1/2	1 1/2	7
10:48 AM	0:10	31	1 1/2	7
10:58 AM	0:10	32 1/8	1 1/8	9
11:08 AM	0:10	32 7/8	3/4	13
11:18 AM	0:10	33 5/8	3/4	13
11:28 AM	0:10	34 3/8	3/4	13

Rate = 10

Percolation Test Hole: 2
Depth of Hole: 36 inches **Pipe Length: 61 inches**

Time (hrs:min)	Time Interval (hrs:min)	Depth to Water* (in.)	Change in Water Depth (in)	Perc. Rate (min/in)
10:38 AM	-------	26 1/2		
10:48 AM	0:10	27 1/2	1	10
10:58 AM	0:10	28 3/8	7/8	11
11:08 AM	0:10	29 1/8	3/4	13
11:18 AM	0:10	29 7/8	3/4	13
11:28 AM	0:10	30 5/8	3/4	13

Rate = 12

Percolation Test Hole: 3
Depth of Hole: 36 inches **Pipe Length:59 inches**

Time (hrs:min)	Time Interval (hrs:min)	Depth to Water* (in.)	Change in Water Depth (in)	Perc. Rate (min/in)
12:12 PM	---------	26		
12:22 PM	0:10	27 3/4	1 3/4	6
12:32 PM	0:10	29 1/2	1 3/4	6
12:42 PM	0:10	31	1 1/2	7
12:52 PM	0:10	32 1/2	1 1/2	7
1:02 PM	0:10	34	1 1/2	7

Rate = 6

Average Calculated Percolation Rate = 10 min/in

*Note: The depth to water was measured from the top of pipe.

TABLE I

SUMMARY OF LABORATORY TESTING
CTL|T PROJECT NO. CS19910.000-125

BORING	DEPTH (FEET)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	ATTERBERG LIMITS		SWELL TEST RESULTS*		PASSING NO. 200 SIEVE (%)	WATER SOLUBLE SULFATES (%)	DESCRIPTION
				LIQUID LIMIT	PLASTICITY INDEX	SWELL (%)	SWELL PRESSURE (PSF)			
TH-1	9	16.2	113			-0.1		72		CLAY, SANDY (CL)
TH-1	14	19.9	106			-0.8		80		CLAY, SANDY (CL)
TH-1	19	5.9	110			-0.8		19		SAND, SILTY (SM)
TH-2	4	10.1	114	36	16			75		FILL, CLAY, SANDY
TH-2	9	7.2						48		FILL, SAND, VERY CLAYEY
TH-2	14	17.7	113			-0.1		71		CLAY, SANDY (CL)
TH-3	4	16.4	110			0.0		92		CLAY, SLIGHTLY SANDY (CL)
TH-3	9	9.0	116			0.2		46		SAND, VERY CLAYEY (SC)
TH-3	19	12.2	118			-1.4		64		CLAY, VERY SANDY (CL)
TH-4	0	16.9		33	15			55		FILL, CLAY, VERY SANDY
TH-4	4	20.6	98			-0.5		38		SAND, VERY CLAYEY (SC)
TH-4	14	11.8	124					43		SAND, VERY CLAYEY (SC)
TH-4	19	3.7	131					19		SAND, SILTY (SM)
TH-5	9	3.5	105					15		SAND, SILTY (SM)
TH-5	14	11.4	122					48		SAND, VERY CLAYEY (SC)
S-2	0	10.0						50	<0.1	CLAY, VERY SANDY (CL)
P-1	4	7.7	106	27	11			64		CLAY, VERY SANDY (CL)

* SWELL MEASURED UNDER ESTIMATED IN-SITU OVERBURDEN PRESSURE.
NEGATIVE VALUE INDICATES COMPRESSION.

APPENDIX C
OWTS Site Map

ON-SITE WASTEWATER TREATMENT SYSTEM (OWTS)

FOR

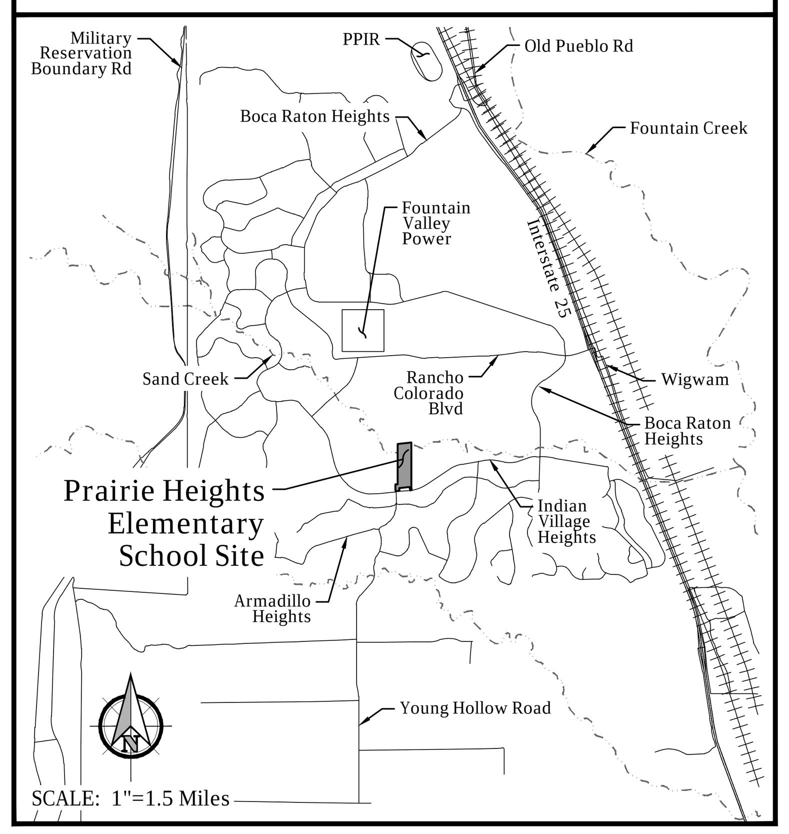
PRAIRIE HEIGHTS SCHOOL

LOCATED AT

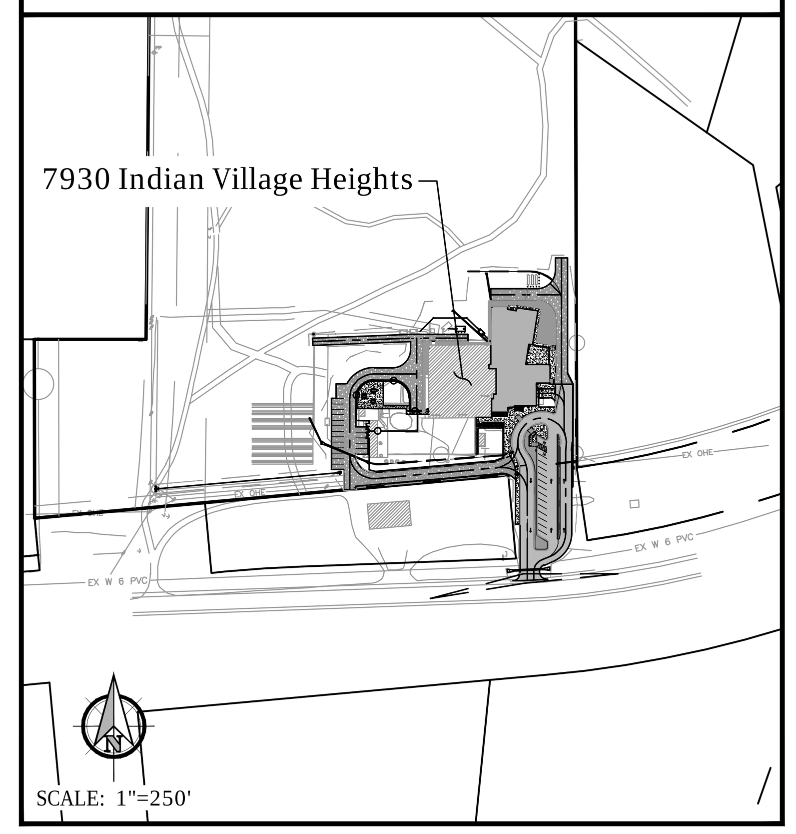
7930 INDIAN VILLAGE HEIGHTS

FOUNTAIN, COLORADO

VICINITY MAP



SITE MAP



SHEET INDEX

O1	COVER
O2	UTILITY PLAN

Know what's **below.**
Call before you dig.

Kiowa Engineering Corporation
1604 South 21st Street
Colorado Springs, Colorado 80904
(719) 630-7342

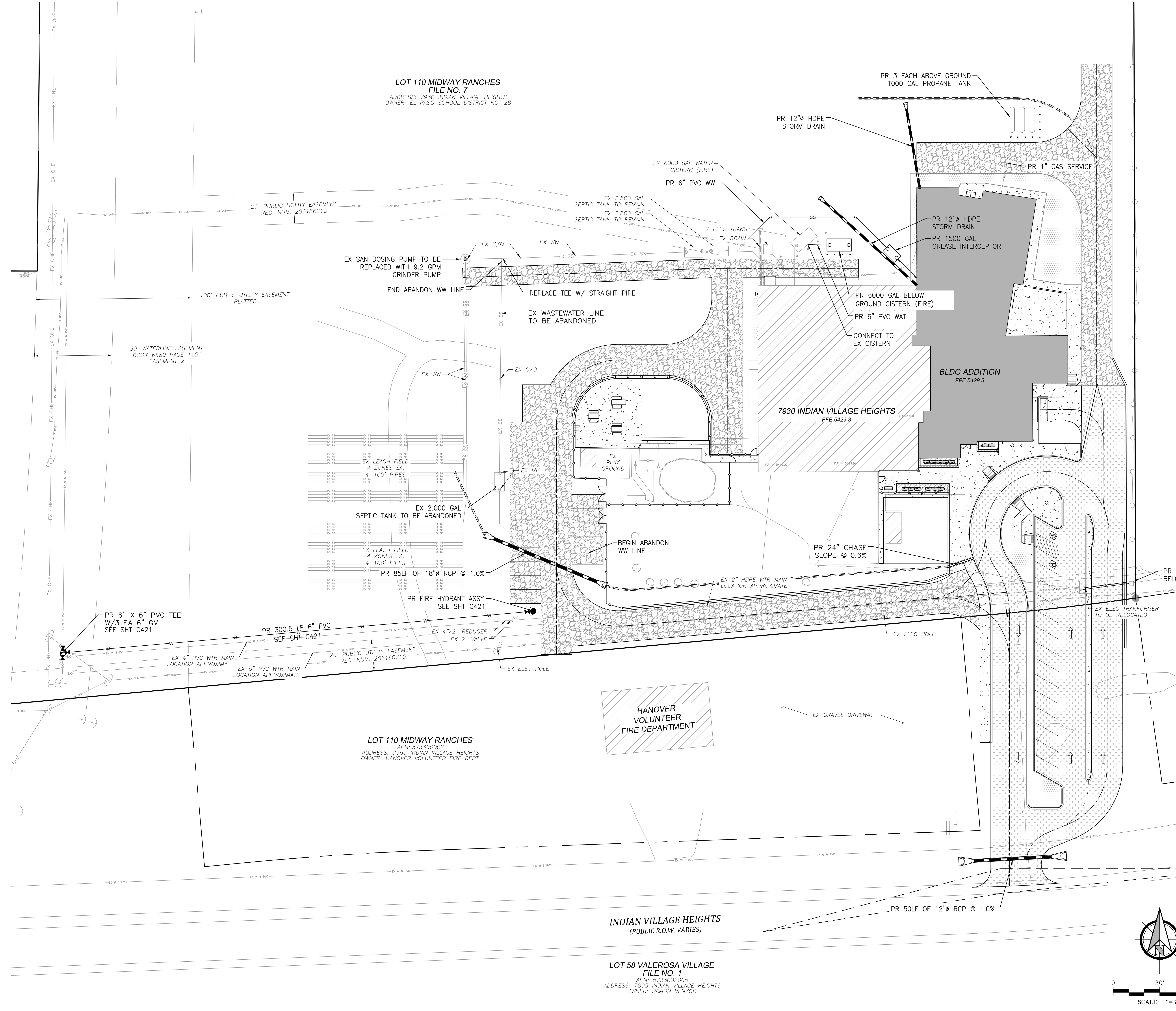
ON-SITE WASTEWATER TREATMENT SYSTEM (OWTS)
PRAIRIE HEIGHTS SCHOOL
COVER
FOUNTAIN, COLORADO

Project No.:	24047
Date:	1/25/25
Design:	TAC
Drawn:	TEG
Check:	-
Revisions:	

SHEET

O1

OF _ SHEETS



UTILITY LEGEND

	EXISTING SANITARY MANHOLE
	EXISTING FIRE HYDRANT
	PROPOSED FIRE HYDRANT
	EXISTING WATER VALVE
	PROPOSED WATER VALVE
EV	EXISTING ELECTRIC VAULT
ETR	EXISTING ELECTRIC TRANSFER STATION
FO	EXISTING FIBER OPTIC VAULT
T	EXISTING TELEPHONE PEDESTAL
	EXISTING LANDSCAPE TREE
	EXISTING SIGN
5871	EXISTING CONTOUR
5871	PROPOSED CONTOUR
W	PROPOSED WATER LINE
SS	PROPOSED SANITARY SEWER
EX W	EXISTING WATER LINE
EX SS	EXISTING SANITARY SEWER
EX G	EXISTING GAS MAIN
EX UGE	EXISTING ELECTRIC LINE (UNDERGROUND)
EX OHE	EXISTING ELECTRIC LINE (OVERHEAD)
EX FO	EXISTING FIBEROPTIC LINE
X	EXISTING FENCE
	EXISTING CURB & GUTTER
	EXISTING BUILDING
	EXISTING TO BE DEMOLISHED

NOTES:

1. WATER MAIN LOCATIONS SHOWN AT SOUTH PROPERTY LINE ARE APPROXIMATE.

Kiowa
Engineering Corporation
1604 South 21st Street
Colorado Springs, Colorado 80904
(719) 630-7342

ON-SITE WASTEWATER TREATMENT SYSTEM (OWTS)
PRAIRIE HEIGHTS SCHOOL
UTILITY PLAN
FOUNTAIN, COLORADO

Project No.:	24047
Date:	1/25/25
Design:	TAC
Drawn:	TEG
Check:	-
Revisions:	

SHEET
02
OF _ SHEETS

K:\2024\24047 Prairie Hts school\Drawings\Exhibits\OWTS\24047-OWTS.dwg Jan 25, 2025 - 4:53pm

APPENDIX D
Current OWTS Permit

El Paso County, CO
Public Health
Prevent • Promote • Protect

Environmental Health Division
1675 W. Garden of the Gods Rd., Suite 2044
Colorado Springs, CO 8090
(719) 578-3199 phone
(719) 575-8664 fax
www.elpasocountyhealth.org

ON-SITE WASTEWATER SYSTEM INSPECTION FORM

TAX # 5728004015

PERMIT # ON0033001
DATE 7/19/13

APPROVED YES [X] NO [ ] Environmental Health Specialist: Nel Mayes
Address: 7930 Indian Village Hts Fountain, CO 80817 Owner Hanover School District 28
Residence____ #Bedrooms____ Commercial ✓ System Installer Backhoe Services
SEPTIC TANK: Construction Material Concrete Capacity Gallon 2000 w/ effluent filter

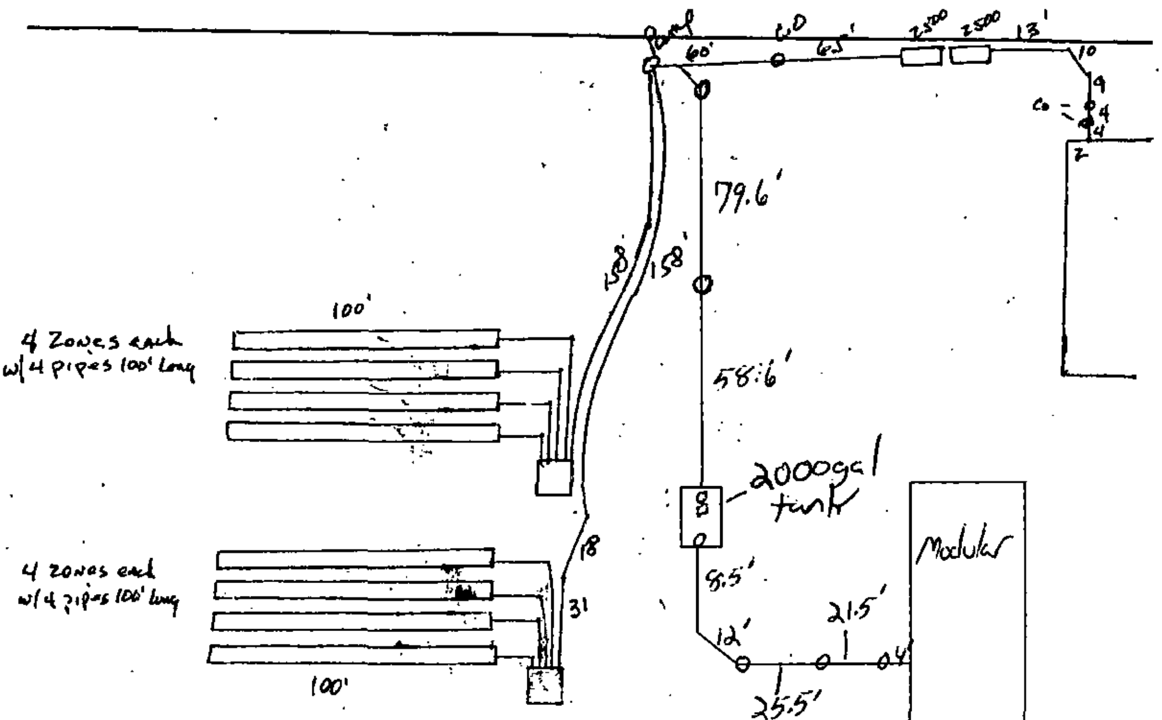
DISPOSAL FIELD:
Trench: Depth (Range)____ Width____ Total Length____ Sq. Ft.____
Bed: Depth (Range)____ Width____ Total Length____ Sq. Ft.____
Depth of Rock____ Under PVC____ Type of cover on Rock____
DRYWELLS: # of Pits____ Rings(Pit 1)____ Rings(Pit2)____ Working Depth #1____ #2____
Size (L x W) #1____ #2____ Total Sq. Ft.____

ROCKLESS SYSTEMS:
Standard Chamber: Type____ #Chambers____ Sq. Ft./Chamber____ Bed____ Trench____
High Profile Units: Type____ #Chambers____ Sq. Ft./Chamber____ Bed____ Trench____
Reduction Allowed____% Sq. Ft. Required____ Depth (Range)____
Sq. Ft. Installed____ Equivalent Sq. Ft. Installed with Reduction____

Engineer Design: Y[X] N[ ] *Engineering Firm* Church OWC, LLC **Approval Letter Provided:** Y[ ] N[ ]
Well installed at time of septic inspection: Y[ ] N[X] **Public Water:** Y[X] N[ ]

**Approval will be revoked if in the future the well is found to be within 50 feet of the septic tank and/or 100 feet of the disposal field.*

Notes: Major repair consisted of adding new modular to existing Soil Treatment area along with a septic tank.



Notify Environmental Health of any change of ownership, type of business activity, business name, or billing address by calling (719) 578-3199. Failure to notify Environmental Health may result in late penalties, Permit/License denial or revocation, and business closure. PERMITS/LICENSES TO OPERATE AND ANNUAL FEE PAYMENTS ARE NOT TRANSFERABLE. Permits become void on change of ownership. New owners must apply and pay for a new Permit(s)/License(s) prior to beginning operation.

Attn: HANOVER SCHOOL DISTRICT 28
7930 INDIAN VILLAGE HTS
FOUNTAIN, CO 80817

El Paso County, CO Public Health
Prevent • Promote • Protect

EL PASO COUNTY PUBLIC HEALTH
ENVIRONMENTAL HEALTH DIVISION
1675 W. GARDEN OF THE GODS ROAD, SUITE 2044
COLORADO SPRINGS, CO 80907
PHONE: (719) 578-3199 FAX: (719) 578-3188
www.elpasocountyhealth.org

MINOR REPAIR PERMIT - OWTS

Valid From 7/8/2013 To 7/8/2014

PERMITEE : HANOVER SCHOOL DISTRICT 28
7930 INDIAN VILLAGE HTS
FOUNTAIN, CO 80817

OWNER NAME : **HANOVER SCHOOL DISTRICT 28**

Onsite ID: ON0033001
Tax Schedule # : 5728004015
Permit Issue Date: 07/08/2013
Dwelling Type: COMMERCIAL
# of Bedrooms (if Res):
Proposed Use (if Comm): SCHOOL
Designed Gallons/Day: 1,501-2,000 GALLONS
Water Source: PUBLIC WATER

System Installation Requirements :

- **Install septic tank and sewer lines as per proposal from Church On-site Wastewater Consultants LLC., Job B982, dated June 27, 2013.**
- **Inspection of the installation of these components by the EPCPH and the design engineer is required.**
- **A certification letter from the design engineer referencing the installation of these components is required prior to final permit approval by EPCPH.**

Septic Tank Capacity Required: 2000 **(Gallons)** **Soil Treatment Area Required:** 0 **(SQ. Feet)**

The Health Officer shall assume no responsibility in case of failure or inadequacy of an Onsite Wastewater Treatment System, beyond consulting in good faith with the property owner or representative. Access to the property shall be authorized at reasonable time for the purpose of making such inspections as are necessary to determine compliance with the requirements of this law (permit)

Installer inspection request line: Call (719) 575-8699 before 8:30 a.m. of the day that the inspection is requested Weekends & Holidays excluded.

This permit is issued in accordance with 25-10-106 Colorado Revised Statutes. The PERMIT EXPIRES upon completion/installation of the Onsite Wastewater Treatment System, or at the end of twelve (12) months from date of issue, whichever occurs first. If both a Building Permit and an Onsite Wastewater Treatment System Permit are issued for the same property and construction has not commenced prior to the expiration date of the Building Permit, the Onsite Wastewater Permit shall expire at the same time as the Building Permit. This permit is revocable if all stated requirements are not met. Onsite Wastewater Treatment System to be installed by an El Paso County Licensed System Contractor, or the property owner.

Authorized By: Environmental Health Specialist

El Paso County, CO
Public Health

cell 719-660-7410

Prevent • Promote • Protect

Environmental Health Division
1675 W. Garden of the Gods Rd., Suite 2044
Colorado Springs, CO 80907
(719) 578-3199 phone
(719) 578-3188 fax
www.elpasocountyhealth.org

APPLICATION FOR AN ON-SITE WASTEWATER TREATMENT SYSTEM PERMIT

FA0001611
AR0002306
SR0000510

☐ NEW PERMIT ☐ MAJOR REPAIR PERMIT ☒ MINOR REPAIR PERMIT

Owner HANOVER SCHOOL DIST 28 Daytime Phone 719-683-2247 x115
System Installer out to bid Daytime Phone ______
Property Address 7930 INDIAN VILLAGE HEIGHTS, FOUNTAIN, CO 80817
Owners Mailing Address 17050 SOUTH PEYTON HWY CO SPGS, CO 80928
Email Address pmccarty@hanoverhornets.org Fax # 719 683-3805
Tax Schedule # 5728004015 ✓ Lot Size 38.56 ACRES
Site Located Inside City Limits ☐ Yes ☒ No Primary Contact ☒ Owner ☐ Contractor
Proposed Use: ☐ Single Family ☐ Multi-Family ☒ Commercial SCHOOL
Water Supply: ☐ Well ☐ Cistern ☒ Municipal Number of Bedrooms ______
☐ Pick up: ______ ☐ Fax: ______ ☒ Email: ______

CURRENT FEES AS APPROVED BY THE El PASO COUNTY BOARD OF HEALTH

New Permit: $440.00 (EPCPH Charge) + $147.00 (EPC Planning Dept. Surcharge) + $23.00 (CDPHE Surcharge) = $610.00
Major Repair Permit: $494.00 (EPCPH Charge) + $23.00 (CDPHE Surcharge) = $517.00
Minor Repair Permit: $188.00 (EPCPH Charge) + $23.00 (CDPHE Surcharge) = $211.00

- **All Payments are due at the time of application submittal; by cash, check or major credit card (Visa / MC)**
- **This permit will expire one year from the date of issuance.**

I certify that the information provided on this application is in compliance with Section 8.3, Chapter 8 of the Onsite Wastewater System (OWS) Regulations of the El Paso County Board of Health. I also authorize the assigned representative of El Paso County Public Health to enter onto this property in order to obtain information necessary for the issuance of a permit.

Applicants Signature: Paul McCarty Date: 7/1/13

Site Insp. Date: ______ Perc. Rate: ______ **Permit #** ON0033001
E.H.S. Review Notes: ______

Date to: E.P.C. Development Services ______ Flood Plain and Enumerations ______

Permit Requirements: ______

Min. Septic Tank Capacity ______ Min. Absorption Area ______

E.H. Specialist ______ Date ______ ☐ Approved ☐ Denied

emailed kcarney@cowc.info
- Paul McCarty 7/10/13 @ 9:45 AM

Neil

1) We require an original copy of your PERCOLATION TEST with a licensed engineer's (P.E.) stamp and signature as well as a plot plan of the test hole locations with measurements from a fixed reference point.

2) Property address or lot number must be posted and clearly visible from the road. The percolation holes must be clearly marked or an additional charge for a return trip to the site may be assessed.

3) A plot plan must be drawn on an 8 ½" x 11" sheet of paper and shall include the following items:
   a) North Arrow
   b) Property Lines
   c) Property Dimensions
   d) All Existing and Proposed Buildings
   e) Proposed Septic System Site
   f) Alternate Septic System Site
   g) Driveway & Name of Adjoining Street
   h) Distance of Percolation Test to Two Property Lines.

4) Additional items that shall be included on the plot plan if they apply to your site:
   a) Proposed &/or Existing Wells
   b) Wells on Adjacent Properties
   c) Water Lines
   d) Bodies of water (ie: Lake, Pond)
   e) Drainage Ways; Existing or Proposed (ie: Streams, Dry Gulch, etc…)
   f) Subsoil Drains

5) Please provide below complete and accurate directions to the property from a main highway.

CHURCH OWC, LLC
Onsite Wastewater Consultants

June 27, 2013

Hanover School District #28
Mr. Paul McCarty, Superintendent
17050 South Peyton Highway
Colorado Springs, CO 80928

Subject: Onsite Wastewater Treatment System **Addition** Design
Prairie Heights Elementary
7930 Indian Village Heights
El Paso County, Colorado
Job No. B982

Mr. McCarty,

As requested, CHURCH Onsite Wastewater Consultants (COWC) has prepared an onsite wastewater treatment system (OWTS) design for the addition of two-relocatable classroom modules at the subject site. The design was prepared for Individual Sewage Disposal System (ISDS) permit submittal to El Paso County Public Health (ECPH).

Note that the design for this onsite wastewater system shall include both the written report and the design figures. The OWTS design incorporates the County ISDS/OWTS regulations, as currently amended, by this reference.

COWC recommends that when soliciting for costs of equipment, the complete design package be submitted to suppliers to allow them to understand the design and provide the correct components/equipment.

It is the responsibility of the installer to have sufficient knowledge and experience installing systems of this type to be able to review the entire set of design documents and understand the system concept and the intent of the design. If the installer does not understand the design intent and the system concept, the system installation should not be bid. If there are items in the design that are not clear, or if errors are noted during the installer's review of the design package, the installer should call CHURCH OWC, before bidding, to clarify and correct.

The county permit issued for this site is specific to the engineered design documents as submitted. No changes to the system design are allowed without written permission from the design engineer, If at any time, the installer changes any portion of the design without written permission from the design engineer, there is the risk that the engineer may reject the changes and that the changed item(s) will have to be removed and/or reworked to conform with the permitted design documents at the installer's own expense.

SITE CONDITIONS

The site is a 36.4-acre parcel, as indicated on Figure 1. The subject site is located in an area where

OWTS are used because there is no public sewer service. The site is gently sloping in the area of the proposed drainfield, and slopes down gently to the north with a slope of 4 percent or less. The site is currently undeveloped ground and is vegetated with sparse native vegetation.

A 12,200 square foot elementary school and two 24-feet by 60-feet modular teaching trailers exist in the southeast area of the subject site, as indicated on Figures 1 and 2. The school is served by an onsite wastewater treatment system that was designed by Church Onsite Wastewater Consultants in 2006. The initial capacity of the school was estimated at 120 students and 30 staff. Records from the school indicate that actual numbers have ranged from 37 to 93 students and 10 staff. There are currently 103 students enrolled and 10 staff anticipated for the 2013-2014 school year.

Wastewater is primarily generated from toilets and the cafeteria. The locations of OWTS components for the school are indicated on Figure 1.

The school is served by a potable water main located along the public utility easement south of the school footprint by Wigwam Mutual Water Company.

PROPOSED CONSTRUCTION

Two additional 24-feet by 60-foot modular teaching trailers are proposed to the southwest of the existing school.

WASTEWATER FLOWS

The original OWTS design was based on 10 gallons per day (GPD). The same flow volume is proposed for the design of the Hanover-Midway Elementary School OWTS for the additional classrooms. Assuming 150 students and staff, the wastewater loading is projected to be 1500 GPD average loading and 2250 GPD design loading. Water records indicate actual use at approximately 5 gallons per person per day. The average flow to the existing OWTS is approximately 520 GPD. Adding two additional modular buildings containing two classrooms that each could allow up to 100 additional students and 8 staff total for both modulars. Realistically these numbers will not occur. The addition of 108 people at 5 gallons per person per day would add 540 GPD for a total of 1060 GPD. This flow is still almost 500 GPD less than the original design flow for the OWTS, which means that the original tanks and field have been designed to handle the proposed flows.

RECOMMENDATIONS

The results of the investigation indicate that the two modular buildings can be added to the OWTS by installing building sewer pipes from the new modulars to new septic tanks, and extending discharge pipes from the new tanks to the pipe entering the existing septic tank. COWC has provided a design to ensure that the new connections to the existing OWTS are adequate. Substitutions of components or materials will not be allowed without the written approval of the design engineer.

Building Sewer: Sewer pipes shall be 4-inch Schedule 40 PVC pipe installed with a minimum slope of 2% to the tank. Joints shall be solvent welded or gasketed bell & spigot. Cleanouts are required 1) at the stubout from the building, within 5-feet of the face of the building 2) at spacing not to exceeding 100 feet, and 3) upslope of two or more bends closer than ten feet in the sewer pipe, within 2-feet above the upslope bend. Bends in the sewer pipe are not to exceed 45 degrees. The pipe should be properly bedded per the typical trench detail presented on the design drawings.

The location of the sewer stub-out from the structure is unknown. The septic tank should; 1) be located down gradient of the building, 2) be buried with no more than three feet of soil cover over the lid, and 3) at a location accessible for pumping and maintenance at the tank. Horizontal distance from pumper tank access point to the tank shall not exceed 100-feet and vertical distance shall not exceed 11-feet. The installer must coordinate with the general contractor regarding elevation of the stubout. A septic tank deeper than 3 feet will not be allowed. In lieu of a deep septic tank, an ejector pump must be installed in the lower level to discharge wastewater to a sewer pipe at a higher level. If COWC can assist with locating the septic tank after the stub-out location is identified, please call.

Septic Tank: The both modular trailers shall flow into a single 2,000-gallon, two-compartment septic tank with an Orenco Systems, Inc. Biotube screened effluent filter with 1/8-inch openings in the second compartment. The tanks and lids must conform to current County ISDS regulations. The tanks shall be installed with watertight access risers with lids that can be secured. No mid-seam or mid-baffle, flow through tanks shall be allowed. The effluent filter handle must extend to between six and twelve inches of the lid. A diagram of the proposed septic tank configuration is presented on Figure 3. Schedule 40 PVC pipe connections shall be used.

Discharge Piping: The discharge piping from the septic tank to the pipe between the existing septic tanks and dosing tanks shall be 4-inch schedule 40 PVC. Pothole for, locate and expose the existing effluent point in the area of the proposed connection. The contractor shall verify the elevation of the pipe to ensure that at least 1% slope in the proposed effluent pipe is maintained. The pipe shall be properly bedded per the typical trench detail presented on the design drawings.

INSTALLATION OBSERVATIONS

The installation of the building sewer pipe and cleanouts shall be observed by the design engineer. A minimum of one observation is required after the building sewer with cleanouts, septic tanks and effluent piping have been installed from both buildings and connected to the existing building sewer piping preceding the first existing septic tank. Our office should be called at 720-898-3434 to observe the installation of the OWTS at least 24 hours in advance. These observations, any repeat observations, OWTS design revisions, restaking of drainfields or additional site visit requirements are not included in the scope of work of this design and will be invoiced at an additional unit rate fee.

OPERATION AND PREVENTATIVE MAINTENANCE SCHEDULE

The goal of an operation and maintenance schedule is to observe the system function, operation, and perform minor maintenance to the onsite wastewater system to allow for proper, long term functioning of the system.

All proprietary equipment will require some level of monitoring and maintenance to ensure it is functioning within the manufacturer's specifications and the intent of the design documents. The owner should obtain the manufacturer's Operations and Maintenance Manual for each piece of proprietary equipment in the system, and ensure that the equipment/component is properly services per the manufacturer's recommendations. To ensure that the equipment/component is functioning properly, the system owner can periodically check the equipment, or can hire a trained and certified maintenance provider.

Septic tanks: The scum and sludge accumulation in the septic tanks should be monitored yearly. Once the cumulative scum or sludge thickness reaches 25% of the tank liquid depth, the entire tank should be pumped. A pumping frequency of 1 to 3 years at design flows is common. An alternative is a regular pumping frequency of every 2 years

Filter and Effluent Pumping System: The effluent filter at the septic tank discharge should be cleaned (hosed off) at the time of pumping or as needed. The effluent pumps should be checked semi-annually to ensure pumps are functioning properly. If the alarm sounds, the pumps and floats should be checked and/or serviced immediately. The filter should be pulled and observed every six-months for at least the first 18-months to establish a cleaning frequency. If the filter is observed to be relatively clean after a six-month interval, then the interval can be extended to 9-12 months between cleanings. If the filter is observed to be relatively clogged after a six-month interval, then the observation and cleaning frequency should be shortened to 3-4 months.

Drainfield: The surface area around the fields is to be observed monthly for signs of failure such as lush vegetation growth, effluent ponding, and liquid in the observation pipe.

General: System users must realize an onsite wastewater system is different from public sewer service. There are daily considerations such as not putting plastic or other nonbiodegradable material into the system. Water use should be monitored so toilets are not allowed to leak when seals malfunction. Allowing fixtures to flow continuously to prevent water lines from freezing is not acceptable. Washing loads of laundry should be spread out over the week to prevent hydraulically overloading the field. Although the proposed system can accommodate variable flows, spreading water use over several hours and eliminating peak flows is recommended. To illustrate the point, a malfunctioning toilet can discharge in excess of 1000 GPD. Excessive daily loading could flood and irreparably harm the OWTS.

COWC cautions against installation of a water softener that discharges to the septic tank and drainfield. The chemical and hydraulic loading from the backwash of a water softener may be detrimental to the OWTS and a separate drywell should be constructed for the backwash waste, if a softener is installed. The design of the OWTS is based on the treatment of domestic sewage only. Swimming pool or spa water should not be discharged into the OWTS. The proposed OWTS design is based on the flows noted in the report. Increased flows may hydraulically or organically overload the OWTS, causing premature failure.

LIMITATIONS

Our investigation, layout, design, and recommendations are based on data submitted. If conditions considerably different from those described in this report are encountered, COWC should be called to observe the conditions and make design changes if necessary. If proposed construction is changed, COWC should be notified to evaluate the effect of the changes on the wastewater system. All construction is to be in accordance with the current ISDS regulations. Pipe type and size, burial requirements, septic tank construction, and other specifications, which are not depicted in our report, are to conform to the requirements of the ISDS regulations. The installer of the system is to be licensed by the county health department and have demonstrated knowledge of the ISDS regulations and requirements.

This onsite wastewater system design is intended to be used only for the wastewater load specified in the drainfield calculations and for the site indicated on the subject line. Any other application of this design is not authorized by CHURCH Onsite Wastewater Consultants, LLC. Use of this design for any other area on the subject lot than designated, on any other lot or for wastewater volumes or strengths not indicated, constitutes a misapplication of the design and voids all liabilities on the part of COWC.

COWC encourages homeowners of OWTS to http://www.elpasocountyhealth.org/service/septic-site-wastewater-systems, www.nsfc.edu or www.cpow.info to learn how they should operate and maintain their OWTS. If there are questions or if we may be of further service, please call.

Sincerely,

CHURCH Onsite Wastewater Consultants, LLC

Reviewed By:

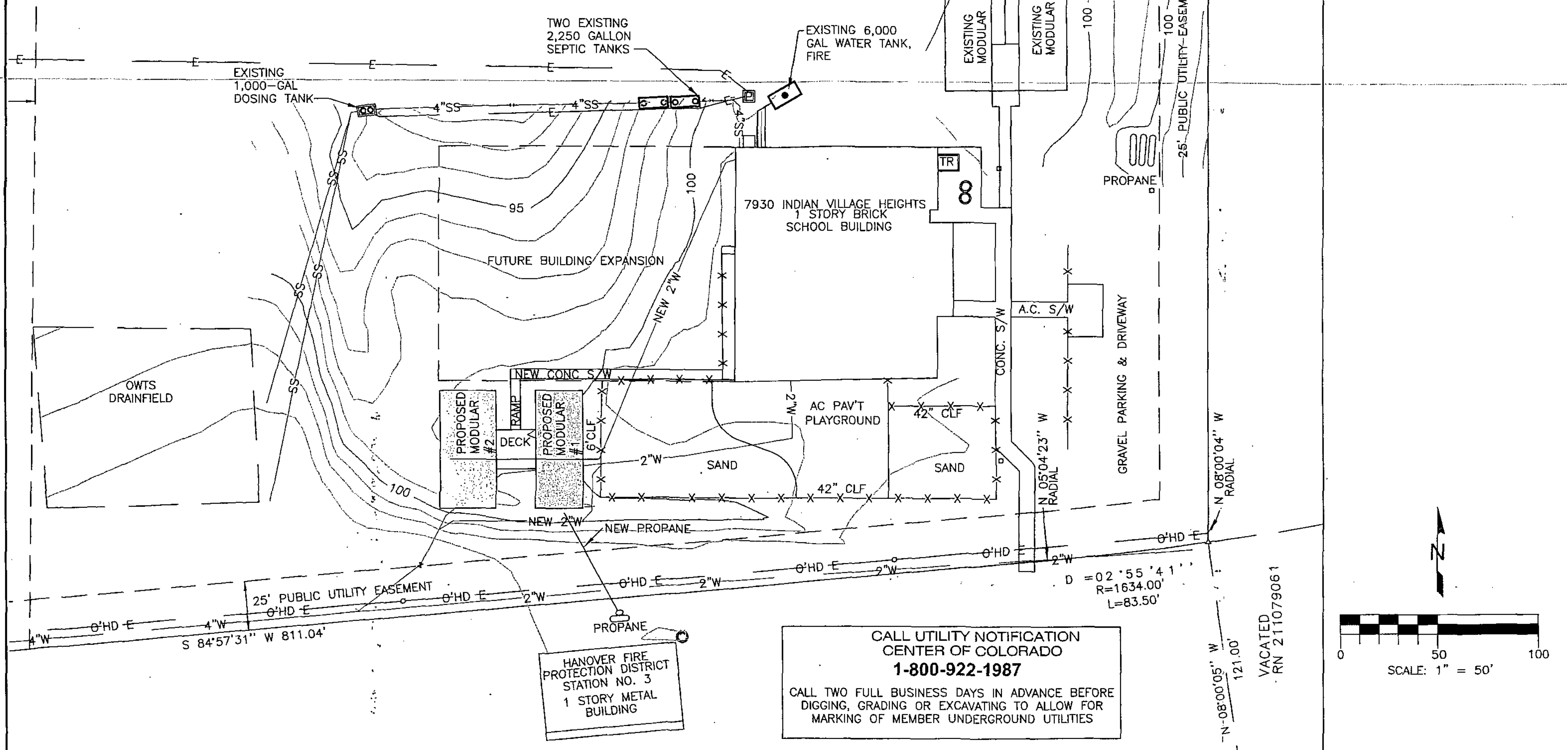
Kathryn E. Carney, M.S, P.E.
Principal
3 copies sent

Robert W. Wright, P.E.
Principal

7930 INDIAN VILLAGE HEIGHTS
EL PASO COUNTY, COLORADO

THE LOCATIONS OF EXISTING AND PROPOSED IMPROVEMENTS SHOWN HEREIN & THE WELL &/OR DRAINFIELD LOCATIONS STAKED AT THE SITE ARE NOT THE RESULT OF A PROPERTY SURVEY. IMPROVEMENT LOCATIONS ARE APPROXIMATE. IT IS THE PROPERTY OWNER'S RESPONSIBILITY TO DEFINE PROPERTY BOUNDARIES & ENSURE ALL ONSITE IMPROVEMENTS ARE LOCATED WITHIN THE PLATTED SITE & OUT OF INAPPROPRIATE EASEMENTS. ALL SEPARATION DISTANCES ARE TO BE VERIFIED PRIOR TO EXCAVATION.

THIS DESIGN INCLUDES BOTH THE DRAWINGS AND THE WRITTEN REPORT: REVIEW BOTH BEFORE BIDDING.



CALL UTILITY NOTIFICATION CENTER OF COLORADO
1-800-922-1987
CALL TWO FULL BUSINESS DAYS IN ADVANCE BEFORE DIGGING, GRADING OR EXCAVATING TO ALLOW FOR MARKING OF MEMBER UNDERGROUND UTILITIES

CHURCH OWC, LLC
Onsite Wastewater Consultants
Onsite Wastewater Engineering-Civil Engineering
P.O. Box 5146, Golden, CO 80401
Voice: (720) 898-3434 Fax: (720) 898-3455

PRAIRIE HEIGHTS ELEMENTARY OWTS ADDITION

SITE PLAN

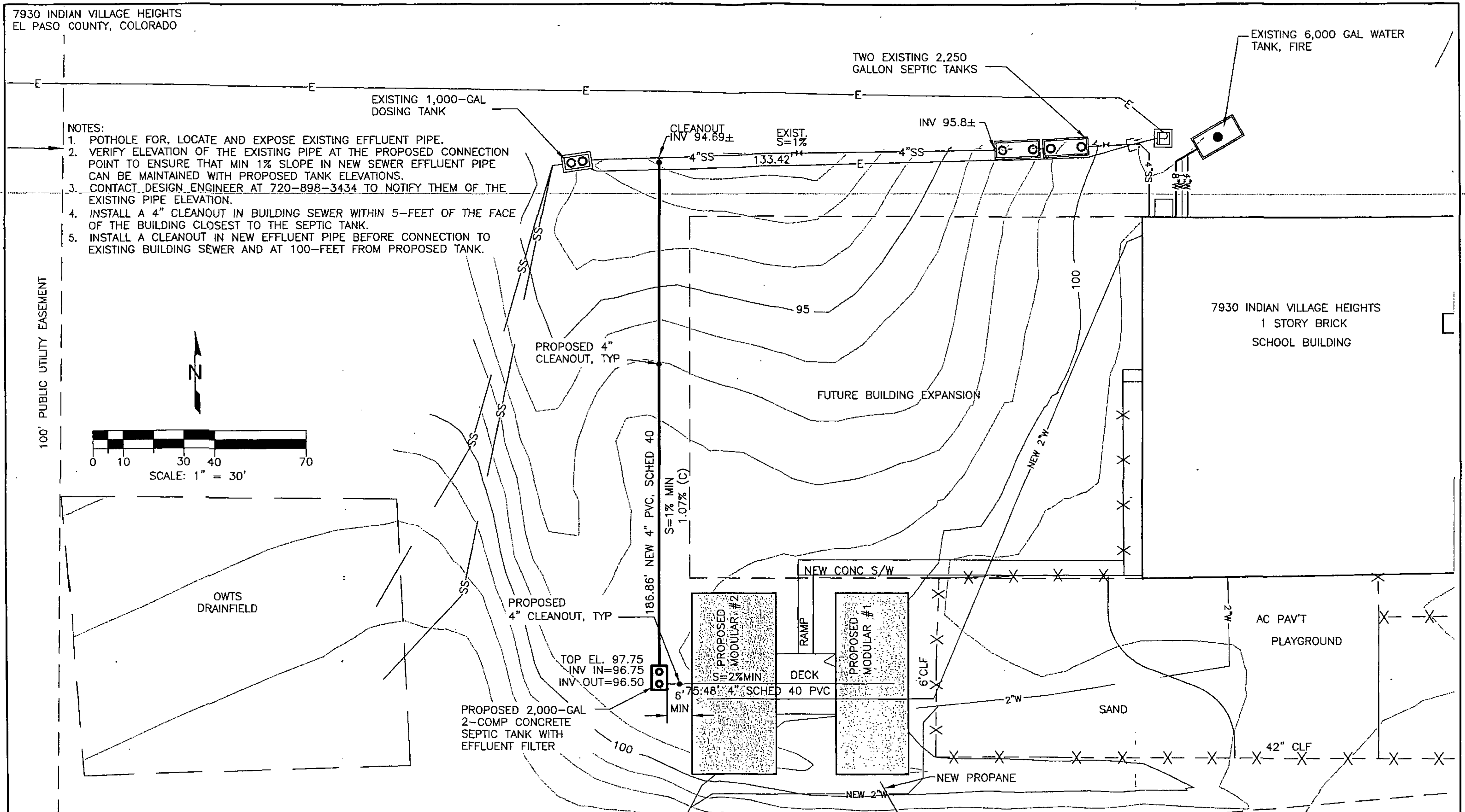
No.	Revision	Date

DESIGNED BY: KEC
DRAWN BY: KEC
CHECKED BY: RWW
DATE: 06/27/2013

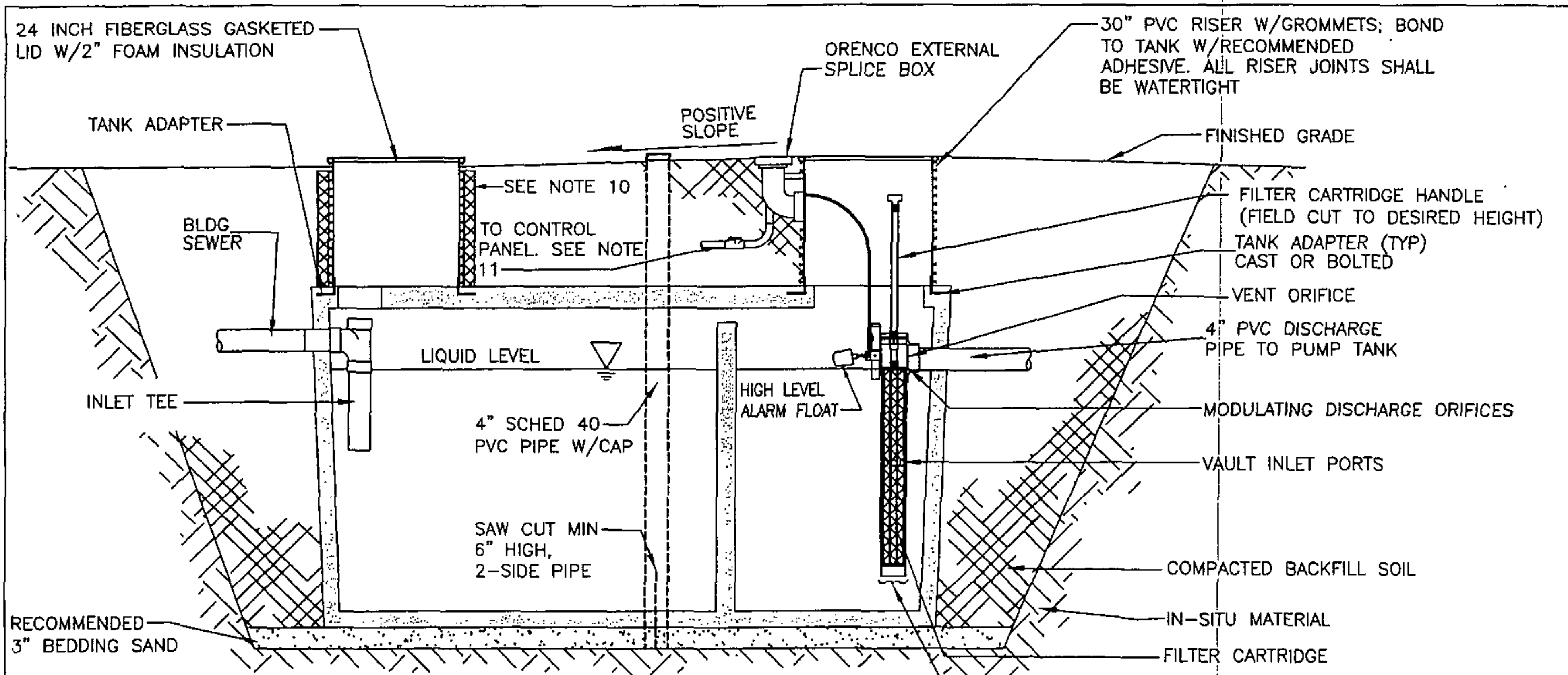
JOB NO. B982

Figure 1 of 4

NOTES:
1. POTHOLE FOR, LOCATE AND EXPOSE EXISTING EFFLUENT PIPE.
2. VERIFY ELEVATION OF THE EXISTING PIPE AT THE PROPOSED CONNECTION POINT TO ENSURE THAT MIN 1% SLOPE IN NEW SEWER EFFLUENT PIPE CAN BE MAINTAINED WITH PROPOSED TANK ELEVATIONS.
3. CONTACT DESIGN ENGINEER AT 720-898-3434 TO NOTIFY THEM OF THE EXISTING PIPE ELEVATION.
4. INSTALL A 4" CLEANOUT IN BUILDING SEWER WITHIN 5-FEET OF THE FACE OF THE BUILDING CLOSEST TO THE SEPTIC TANK.
5. INSTALL A CLEANOUT IN NEW EFFLUENT PIPE BEFORE CONNECTION TO EXISTING BUILDING SEWER AND AT 100-FEET FROM PROPOSED TANK.



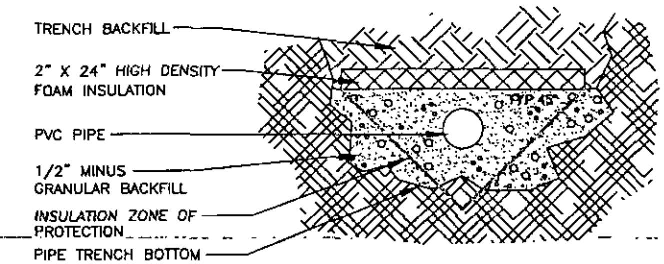
CHURCH OWC, LLC Onsite Wastewater Consultants Onsite Wastewater Engineering-Civil Engineering P.O. Box 5146, Golden, CO 80401 Voice: (720) 898-3434 Fax: (720) 898-3455	PRAIRIE HEIGHTS ELEMENTARY OWTS ADDITION **PROPOSED OWTS ADDITION LOCATION**	No.	Revision	Date	DESIGNED BY: KEC DRAWN BY: KEC CHECKED BY: RWW DATE: 06/27/2013 **JOB NO. B982** **Figure 2 of 4**



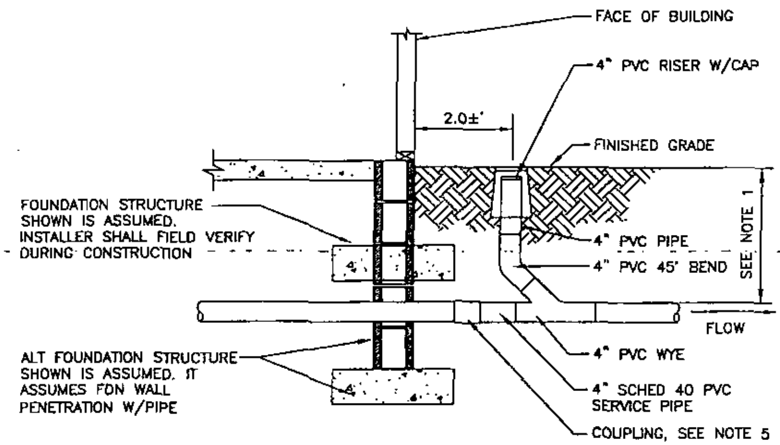
GENERAL SEPTIC TANK NOTES:

1. ALTERNATE TANK CONFIGURATIONS ARE POSSIBLE WITH PRIOR WRITTEN APPROVAL OF DESIGN ENGINEER.
2. SLOPE FINISHED GRADE AWAY FROM TANK LIDS AT MIN 5% FOR 5-FEET. MIN SLOPE THEREAFTER IS 2% AWAY FROM TANK.
3. EXTEND ALL RISERS TO 1" ABOVE SURFACE AT FINISHED GRADE.
4. PROOF ROLL SUBGRADE PRIOR TO PLACING BEDDING. COMPACT BEDDING TO MIN 95% MAX DRY DENSITY.
5. PROVIDE EXCAVATION FOR TANK IN ACCORDANCE W/OSHA REGULATIONS TO FURNISH A SAFE WORKING ENVIRONMENT FOR INSTALLERS.
6. PROVIDE A STABLE SUBGRADE FOR TANK. OVEREXCAVATE ALL SOFT & YIELDING MAT'L. BACKFILL W/3/4" MINUS SAND. BACKFILL & COMPACT IN LIFTS TO BOT PIPES BEFORE INSTALLING PIPES. COMPACT ALL SUBGRADE & SOIL TO MIN 95% MAX DRY DENSITY PER ASTM D698.
7. NO MID-SEAM OR MID-FLOW THROUGH BAFFLE TANKS SHALL BE ALLOWED.
8. BACKFILL IN MAX 12" LIFTS AROUND TANK TO BOTTOM OF INLET AND OUTLET PIPES BEFORE PLACING PIPES. BED PIPES BEFORE PLACING.
9. INSTALL GROUND WATER MONITORING PIPE IN TANK EXCAVATION, ADJACENT TO TANK WALL AT MIDPOINT.
10. INSTALL MIN 2" CLOSED CELL FOAM INSULATION ALL AROUND EA RISER AND TO BOT RISER LIDS.
11. EXTEND CONDUIT FULL LENGTH TO CONTROL PANEL. FURNISH & INSTALL A CONDUIT SEAL IN CONDUIT TO CONTROL PANEL.
12. EXTEND EFFLUENT FILTER HANDLE TO WITHIN 6" OF LID.

CHURCH OWC, LLC Onsite Wastewater Consultants Onsite Wastewater Engineering-Civil Engineering P.O. Box 5146, Golden, CO 80401 Voice: (720) 898-3434 Fax: (720) 898-3455	PRAIRIE HEIGHTS ELEMENTARY OWTS ADDITION **2,000-GALLON 2-COMPARTMENT GRAVITY DISCHARGE SEPTIC TANK**	DESIGNED BY: KEC DRAWN BY: KEC CHECKED BY: RWW DATE: 6/25/2013 JOB NO. B982 FIGURE 3 of 4



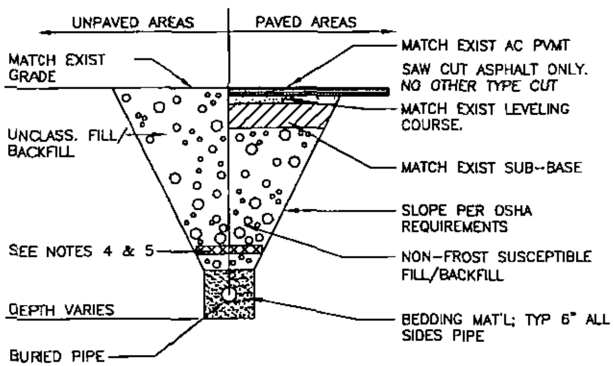
NOTES:
1. CENTER WIDTH OF INSULBOARD OVER CROWN OF PIPE
2. COMPACT BEDDING TO BOTTOM OF PIPE ELEVATION BEFORE PLACING PIPE.
3. FURNISH AND INSTALL MIN 3" OF BEDDING BELOW BOTTOM OF PIPE.
4. ZONE OF PROTECTION IS APPROXIMATE FOR AVERAGE WINTER FROST PENETRATION.



NOTES:
1. MIN DEPTH OF BURY SHALL BE IN ACCORDANCE WITH COUNTY BUILDING DEPARTMENT REGULATIONS TO PREVENT FREEZING OF PIPE.
2. FOR EACH FOOT LESS THAN COUNTY MANDATED MINIMUM BURY, INSTALL MIN 1" THICKNESS OF HIGH DENSITY CLOSED CELL FOAM INSULATION. MIN INSULATION WIDTH SHALL BE 24", CENTERED OVER CROWN OF PIPE.
3. CLEANOUT RISER IN HDPE VAULT SHOWN IS OPTIONAL. ALTERNATE IS TO EXTEND CLEANOUT MIN 18" ABOVE FINISHED GRADE AND CAP. SE ALTERNATE RISER & CAP DETAIL ABOVE.
4. CLEANOUT RISER SHALL BE HIGH DENSITY POLYETHYLENE.
5. FURNISH & INSTALL (F&I) AN APPROVED TRANSITION COUPLING BETWEEN BUILDING WASTEWATER PIPING AND BUILDING SEWER TO TANK.
6. FOR AREAS SUBJECT TO TRAFFIC OVER CLEANOUT, F&I A CAST OR DUCTILE IRON, TRAFFIC RATED FRAME & LID.

BUILDING SEWER CLEANOUT

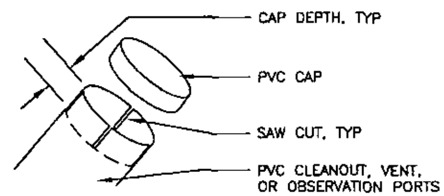
NTS



BUILDING SEWER/DISCHARGE PIPE SECTION

NTS

TRENCH NOTES:
1. PLACE & COMPACT BEDDING MATERIAL TO BOTTOM OF PIPE ELEVATION BEFORE INSTALLING PIPE.
2. BEDDING SHALL BE IN PLACE, COMPACTED & PIPE INSTALLED AT TIME OF COWC INSTALLATION OBSERVATION.
3. BURY DEPTH MEANS DISTANCE FROM FINISHED GRADE TO THE PIPE CROWN.
4. FOR ALL SITUATIONS WHERE THE MIN PIPE BURY DEPTH PER COUNTY REQUIREMENTS CANNOT BE MET, A MIN OF 1" OF HIGH DENSITY CLOSED CELL FOAM INSULATION CAN BE SUBSTITUTED FOR EA 12" OF SOIL COVER THAT IS LACKING. A MIN OF 2" OF FOAM INSULBOARD SHALL BE REQUIRED. STYROFOAM BEAD BOARD IS NOT ACCEPTABLE.
5. MINIMUM INSULATION WIDTH IS 24", CENTERED OVER CROWN OF PIPE.
6. ALL COMPACTION SHALL BE IN ACCORDANCE WITH ASTM D-698. COMPACT FILL & BACKFILL OUTSIDE RIGHT OF WAY TO MIN 90% MAX DRY DENSITY. COMPACT FILL & BACKFILL INSIDE RIGHT OF WAY TO MIN 95% MAX DRY DENSITY.



RISER PIPE CAP NOTES:
1. SAW CUT THE TOP OF THE PIPE THE DEPTH OF THE CAP, ON THE QUADRANTS OF THE PIPE TO ALLOW EASE OF CAP REMOVAL IN THE FUTURE.
2. DETAIL APPLIES TO ALL OBSERVATION PORTS AND RISER PIPES

VENT AND CLEANOUT CAP

NTS

CHURCH OWC, LLC
Onsite Wastewater Consultants
Onsite Wastewater Engineering-Civil Engineering
P.O. Box 5146, Golden, CO 80401
Voice: (720) 898-3434 Fax: (720) 898-3455

PRAIRIE HEIGHTS ELEMENTARY OWTS ADDITION

TRENCH, PIPE CAP AND CLEANOUT DETAILS

No	Revision	Date

DESIGNED BY: KEC
DRAWN BY: KEC
CHECKED BY: RWW
DATE: 6/25/2013

JOB NO. B982

Figure 4 of 4

APPENDIX A
WATER USAGE RECORDS

JOB NO. B982

The Hanover School

Excellence in Education

Student and Staff Population for Prairie Heights Elementary

2007-2008	Students: 71	Staff: 10
2008-2009	Students: 55	Staff: 10
2009-2010	Students: 37	Staff: 10
2010-2011	Students: 93	Staff: 10
2011-2012	Students: 79	Staff: 10
2012-2013	Students: 92	Staff: 10

The data above was taken directly from the Student October Count Report that is filed with CDE on October 1st every year. This report reflects actual student enrollment counts that are used to determine funding for the year.

Currently, as of May 17, 2013, there are 103 students enrolled at Prairie Heights Elementary and 10 staff members. We anticipate a high return of currently enrolled students for the 2013-2014 school year plus the addition of another grade level.

Hanover School District #28
17050 Peyton Highway
Colorado Springs, CO 80928-9418
(719) 683-2247 Fax (719) 683-3805

SELECTED Data

Vendor History (Expense Detail)

Arranged by: Vendor ID

Date Range: 01/01/2012 thru 01/31/2013

ID	Name / Check	CheckDate / Account	Inv Num	P/O Num	Description / Description	Usage	Avg. Daily	Amount
Wigwam	Wigwam Mutual Water Co							
	18361	01/13/2012	104901 DEC		PHE water			
		10-711-00-2600-0411-000-0000			PH Water	15700	523	276.44
	18418	02/10/2012	FEB 2012		PHE Water usage			
		10-711-00-2600-0411-000-0000			PH Water	19600	653	312.32
	18471	03/09/2012	March 2012		PHE water usage			
		10-711-00-2600-0411-000-0000			PH Water	15400	481	273.68
	18526	04/17/2012	April 2012		PHE Water			
		10-711-00-2600-0411-000-0000			PH Water	14200	490	262.64
	18591	05/11/2012	7930a		PHE Water usage			
		10-711-00-2600-0411-000-0000			PH Water	13200	440	253.44
	18662	06/11/2012	June 2012		PHE Water usage chg			
		10-711-00-2600-0411-000-0000			PH Water	14600	456	266.32
	18734	07/19/2012	June-July		Water Usage			
		10-711-00-2600-0411-000-0000			PH Water	24500	817	410.95
	18778	08/10/2012	Aug 2012		PHE Water Meter Read			
		10-711-00-2600-0411-000-0000			PH Water	9500	328	219.40
	18849	09/13/2012	Sept 2012	7948	PHE Water			
		10-711-00-2600-0411-000-0000			PH Water	14300	447	263.56
	18899	10/12/2012	Oct. 2012		PHE Water Usage			
		10-711-00-2600-0411-000-0000			PH Water	19100	616	307.72
	18953	11/08/2012	Nov. 2012		PHE Water usage			
		10-711-00-2600-0411-000-0000			PH Water	15500	500	274.60
	19003	12/07/2012	Dec 2012		PHE Water services			
		10-711-00-2600-0411-000-0000			PH Water	13900	463	259.88
	19053	01/11/2013	Jan 2013		PHE water reading		490	
		10-711-00-2600-0411-000-0000			PH Water	14700		267.24
		Vendor Totals:						3,648.19
		Report Totals:						3,648.19

Meter History Report for Meter: 05258165

Hanover Public Schools
17050 Peyton Hwy
Colorado Springs CO 80928-9418

WIGWAM MUTUAL WATER COMPANY

Print Date: 5/16/2013

Meter #	Start Date	End Date	Start Reading	End Reading	Usage	Days Billed	Usage Cost
05258165	3/28/2013	4/29/2013	1018800	01037300	18500	32	$170.20
05258165	2/28/2013	3/28/2013	1004000	01018800	14800	28	$136.16
05258165	1/28/2013	2/28/2013	988400	01004000	15600	31	$143.52
05258165	12/28/2012	1/28/2013	971400	00988400	17000	31	$156.40
05258165	11/28/2012	12/28/2012	956700	00971400	14700	30	$135.24
05258165	10/29/2012	11/28/2012	942800	00956700	13900	30	$127.88
05258165	9/28/2012	10/29/2012	927300	00942800	15500	31	$142.60
05258165	8/28/2012	9/28/2012	908200	00927300	19100	31	$175.72
05258165	7/27/2012	8/28/2012	893900	00908200	14300	32	$131.56
05258165	6/28/2012	7/27/2012	884400	00893900	9500	29	$87.40
05258165	5/29/2012	6/28/2012	859900	00884400	24500	30	$278.95
05258165	4/27/2012	5/29/2012	845300	00859900	14600	32	$134.32
05258165	3/28/2012	4/27/2012	832100	00845300	13200	30	$121.44
05258165	2/28/2012	3/28/2012	817900	00832100	14200	29	$130.64
05258165	1/27/2012	2/28/2012	802500	00817900	15400	32	$141.68
05258165	12/28/2011	1/27/2012	782900	00802500	19600	30	$180.32
05258165	11/28/2011	12/28/2011	767200	00782900	15700	30	$144.44
05258165	10/28/2011	11/28/2011	751100	00767200	16100	31	$148.12
05258165	9/28/2011	10/28/2011	727800	00751100	23300	30	$253.63
05258165	8/29/2011	9/28/2011	702800	00727800	25000	30	$289.50
05258165	7/28/2011	8/29/2011	685200	00702800	17600	32	$161.92
05258165	6/28/2011	7/28/2011	681500	00685200	3700	30	$34.04
05258165	5/26/2011	6/28/2011	675800	00681500	5700	33	$52.44
05258165	4/28/2011	5/26/2011	655700	00675800	20100	28	$186.11
05258165	3/28/2011	4/28/2011	633500	00655700	22200	31	$230.42
05258165	2/28/2011	3/28/2011	617300	00633500	16200	28	$149.04
05258165	1/28/2011	2/28/2011	600600	00617300	16700	31	$153.64
05258165	12/28/2010	1/28/2011	582000	00600600	18600	31	$171.12
05258165	11/29/2010	12/28/2010	566400	00582000	15600	29	$143.52
05258165	10/28/2010	11/29/2010	547800	00566400	18600	32	$171.12
05258165	9/28/2010	10/28/2010	527300	00547800	20500	30	$194.55
05258165	8/27/2010	9/28/2010	503300	00527300	24000	32	$268.40
05258165	7/28/2010	8/27/2010	486500	00503300	16800	30	$154.56

Hanover Public Schools
17050 Peyton Hwy
Colorado Springs CO 80928-9418

WIGWAM MUTUAL WATER COMPANY

Print Date: 5/16/2013

Meter #	Start Date	End Date	Start Reading	End Reading	Usage	Days Billed	Usage Cost
05258165	6/28/2010	7/28/2010	482700	0486500	3800	30	$34.96
05258165	5/28/2010	6/28/2010	478700	0482700	4000	31	$36.80
05258165	4/28/2010	5/28/2010	467500	0478700	11200	30	$103.04
05258165	3/29/2010	4/28/2010	456800	0467500	10700	30	$98.44
05258165	2/26/2010	3/29/2010	448200	0456800	8600	31	$79.12
05258165	1/28/2010	2/26/2010	437100	0448200	11100	29	$102.12
05258165	12/29/2009	1/28/2010	426900	0437100	10200	30	$93.84
05258165	11/27/2009	12/29/2009	418900	0426900	8000	32	$73.60
05258165	10/28/2009	11/27/2009	409800	0418900	9100	30	$83.72
05258165	9/28/2009	10/28/2009	398100	0409800	11700	30	$107.64
05258165	8/28/2009	9/28/2009	386500	0398100	11600	31	$106.72
05258165	7/28/2009	8/28/2009	375000	0386500	11500	31	$105.80
05258165	6/29/2009	7/28/2009	371500	0375000	3500	29	$32.20
05258165	5/28/2009	6/29/2009	366200	0371500	5300	32	$48.76
05258165	4/28/2009	5/28/2009	348700	0366200	17500	30	$161.00
05258165	3/30/2009	4/28/2009	333700	0348700	15000	29	$138.00
05258165	2/27/2009	3/30/2009	319400	0333700	14300	31	$131.56
05258165	1/28/2009	2/27/2009	300300	0319400	19100	30	$175.72
05258165	12/29/2008	1/28/2009	286200	0300300	14100	30	$129.72
05258165	11/28/2008	12/29/2008	272200	0286200	14000	31	$128.80
05258165	10/28/2008	11/28/2008	255100	0272200	17100	31	$157.32
05258165	9/29/2008	10/28/2008	235600	0255100	19500	29	$179.40
05258165	8/28/2008	9/29/2008	215800	0235600	19800	32	$182.16
05258165	7/23/2008	8/28/2008	199900	0215800	15900	36	$146.28
05258165	6/27/2008	7/23/2008	195900	0199900	4000	26	$36.80
05258165	5/28/2008	6/27/2008	0187200	0195900	8700	30	$80.04
05258165	4/28/2008	5/28/2008	0168800	0187200	18400	30	$169.28

CHURCH OWC, LLC
Onsite Wastewater Consultants

July 20, 2013

Hanover School District #28
Mr. Paul McCarty, Superintendent
17050 South Peyton Highway
Colorado Springs, CO 80928

Subject: OWTS Design Installation Observation
Prairie Heights Elementary
7930 Indian Village Heights
El Paso County, Colorado
Job No. B982

Mr. McCarty,

As requested, CHURCH Onsite Wastewater Consultants, LLC (COWC) performed a site visit to observe the installation of the onsite wastewater treatment system (OWTS) at the subject site. COWC prepared OWTS design documents under Job No. B982 dated June 27, 2013.

A site visit was performed on July 15, 2013, at the request of Mr. Travis Church, of Backhoe Services, Bennett, Inc, the contractor of record. At the time of the site visit, the 4-inch Schedule 40 building sewer pipe was installed with >2% slope to the septic tank. The pipe was bedded. Three cleanouts were present in the building sewer piping. The buildings were not yet in place, so the building sewer was not yet connected to the buildings.

The 2,000-gallon Valley Precast concrete septic tank was installed level with an inlet tee in the first compartment of the tank and an effluent filter on site for installation in the second compartment of the tank. The 4-inch Schedule 40 PVC effluent pipe was installed with >2% slope from the tank. The pipe was bedded and contained a cleanout approximately halfway between the tank and the connection to the existing piping to the existing dosing tank. There was no cleanout installed at the connection to the existing piping.

Mr. Church sent photos of a cleanout installed at the connection to the existing piping on July 18, 2013.

The observed components of the OWTS appear to be installed in general conformance with the CHURCH OWTS design, plans and specifications.

This letter provides information from observations made during one visit to the subject site by COWC. COWC observed installed components of the OWTS. COWC did not observe the installer's methods or the equipment selected by the installer and/or client. Neither the observations nor the contents of this letter imply a warrantee or guarantee of materials or workmanship. Without continuous observation of the installation process, COWC is not able to assure that elements of the system comply with the intended functionality of the design documents.

P.O. Box 5146, Golden, CO 80401 Voice **720-898-3434** FAX: 720-898-3455

If there are questions, please call.

Sincerely,

CHURCH Onsite Wastewater Consultants, LLC

COLORADO LICENSED
KATHRYN ELIZABETH CARNEY
47072
7/20/13
PROFESSIONAL ENGINEER

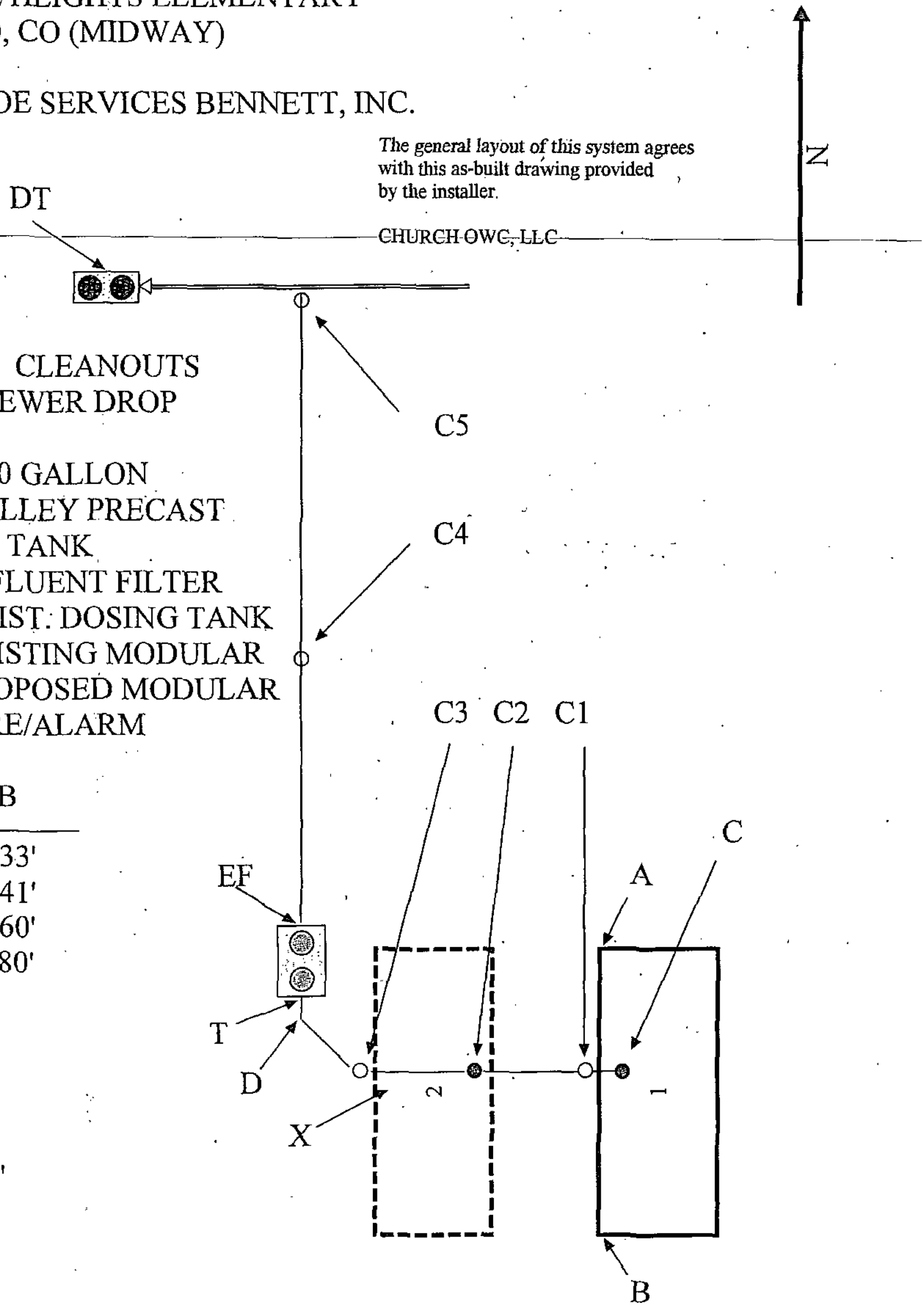
Kathryn E. Carney, E.I.
Principal

Copy sent via email:
El Paso County Public Health at JoeLomeli@elpasoco.com
Hanover School District #28, Attn: Mr. Paul McCarty at pmccarty@hanoverhornets.org
Backhoe Services Bennett at backhoepro@aol.com
Mr. Henry Reitwiesner at phreit@comcast.net & hpreit@comcast.net

PRAIRIE HEIGHTS ELEMENTARY
PUEBLO, CO (MIDWAY)
7/15/13
BACKHOE SERVICES BENNETT, INC.

The general layout of this system agrees with this as-built drawing provided by the installer.

~~CHURCH OWC, LLC~~



C1,3,4,5 CLEANOUTS
C,C2 SEWER DROP
D 1/8
T 2000 GALLON VALLEY PRECAST 2/C TANK
EF EFFLUENT FILTER
DT EXIST. DOSING TANK
1 EXISTING MODULAR
2 PROPOSED MODULAR
W WIRE/ALARM

	A	B
C1	27'	33'
C2	37'	41'
C3	57'	60'
T	60'	80'

C1-C2	22'
C2-C3	26'
C3-D	10'
D-T	5'
EF-C4	61'
C4-C5	81'