FRONT RANGE GEOTECHNICAL INC.

P.O. Box 1351
Monument, CO 80132
719 481-4560
Fax 481-9204

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Subject: Preliminary Geology, Surface Soils, and Sewage Disposal Evaluation
Walden Preserve Subdivision
El Paso County, Colorado

INTRODUCTION

The following report presents the results of a Preliminary Geologic, Surface Soils, and Sewage Disposal Evaluation for the proposed Walden Preserve Subdivision in El Paso County, Colorado. The report presents discussions of site geology and surface soils and our opinions of the potential effect of these conditions on development and sewage disposal. The information included in this report has been compiled from analysis of aerial photographs, a field reconnaissance and mapping of the site, review of studies on sites in close proximity, geologic research and analysis, and our experience in the area. Geologic conditions were mapped and evaluated by John Himmelreich & Associates. Front Range Geotechnical, Inc. (Front Range) performed 20 percolation tests on the site. In addition, Front Range drilled three test borings in an area of small lot development proposed in the southeast portion of the site. Conditions disclosed by additional surface, subsurface investigations and/or laboratory analysis might make revisions of the conclusions of this report appropriate.

PROPOSED DEVELOPMENT

The site is proposed for construction of a residential subdivision, with 87 residential lots with sizes of about 2.5 acres, and 73 smaller lots (see Figure 2). The larger (2.5-acre) lots will be served by individual wells and individual sewage disposal systems. The smaller lots will be served by both central water and wastewater systems.

SITE DESCRIPTION

The proposed Walden Preserve subdivision is located southeast of Walker Road and Highway 83 (see Figure 1). The site is an irregular-shaped parcel located in portions of Sections 14, 15, 22, and 23 Township 11 South, Range 66 West of the Sixth Principal Meridian. The Wastewater Treatment Plant for the Walden Development lies to the north of the site. Property to the east and west is currently rural residential. The property to the south is currently vacant.

Topographically, the site consists of a series of low ridges separated by swales and drainageways. Most of the slopes on the site range from about 3 to 20 percent with some small areas of slopes in excess of 30%. The site has numerous 'contour terraces' that parallel the contours of the land. A major drainageway runs through and borders the eastern part of the site. Two sizable ponds are located in this drainageway. The site is located in the West Cherry Creek drainage basin.

The majority of the site is dominated by grassland or prairie-type vegetation. Areas of dense to scattered ponderosa pine dominate the northeast part of the site. A few areas of lush grass are located in some of the smaller swales and drainageways, and in numerous locations in the larger drainageway. The site appears to have been used for grazing in the past with a few areas of disturbed ground and fill.

SITE GEOLOGY

The site is underlain by bedrock consisting of the Dawson Arkose (Figure 2). This formation consists primarily of discontinuous and lenticular beds of arkosic sandstone and claystone. Although the Dawson sandstones are commonly only slightly to moderately cemented, they are typically very dense. Few good outcrops (bedrock exposures) were observed on-site. The regional dip of the strata is very gentle to the north. Our experience in this area indicates the rocks are not highly fractured.

Overlying the bedrock are residual soils (weathered in-place), alluvium (water transported materials), and colluvium (slopewash). Some of the finer grained colluvial soils may be of wind-blown origin.

SITE GEOLOGY (CONTINUED)

Alluvial deposits are continuing to form to this day in the swales and drainageways. The alluvium and colluvium consists of poorly sorted silty to clayey sand and gravel, sandy silt, and sandy/silty clay. Based on the profile holes drilled for the percolation tests, the alluvium and colluvium ranges from a few feet to greater than 10 feet thick on the site.

The site is located in the Dawson Arkose (bedrock aquifer) in the Denver groundwater basin. This aquifer serves as the water supply for most wells in the immediate area. A perched water table is also often encountered in the alluvial deposits in the swales and drainageways, at least on a seasonal basis. The Soil Conservation Service (SCS) indicates that four mapping units are present on the subject site (71-Pring coarse sandy loam, 21-Cruckton sandy loam, 25-Elbeth sandy loam, and 92-Tomah-Crowfoot loamy sands). The SCS map is included as Figure 5.

RECOVERABLE RESOURCES

Under the provision of House Bill 1529, it was made a policy of the State of Colorado to preserve for extraction any commercial mineral resource located in a populous county. The El Paso County Aggregate Resource Evaluation (Map 1) October 1995 indicates that potential sand and gravel aggregate resources are located on the site; however, site observations and gradation test results of selected samples of the soil materials indicate these deposits are not likely to be an economic resource.

GEOLOGIC HAZARDS AND CONSTRAINTS

We believe that the subject site is relatively free from serious geologic hazards. The more significant geologic hazards recognized on the site are: 1) potential expansive soils/bedrock, 2) the potential for erosion, 3) and the potential for flooding. Other potential hazards include the stability of cut slopes, potential settlement of the surficial deposits, and the presence of corrosive minerals.

GEOLOGIC HAZARDS & CONSTRAINTS (CONTINUED)

Certain regional conditions (seismicity and radiation) also affect the site. The geologic hazards identified on this site are relatively common to the region and are mitigated by employing proper planning, investigation, design, and construction practices.

Geologic characteristics and constraints that will influence the location and design of individual sewage disposal systems include percolation rate, shallow bedrock, shallow groundwater, and slope. These constraints can be mitigated with engineered designed systems.

Construction and Development Considerations

There are geotechnical conditions that will influence development and construction on this site. While none of the conditions are believe to present an unacceptable risk, they should be considered. The following sections discuss our opinions of the conditions.

Trenching/Slopes

The sandy and silty soils underlying the site generally lack cohesion and therefore are prone to caving and sloughing on steep slopes and in excavations. Permanent cut slopes should either be laid back or supported with a retaining structure. Excavations in the surficial soils or areas where seepage is encountered may expose material which is poorly consolidated and which may be wet at least on a seasonal basis. Cuts in these soils should be treated with caution, especially in utility trenches.

Soil and Geotechnical Considerations

The surficial soils that underlie the site will have variable properties with regard to foundation support. The surficial soils are commonly of low-density and prone to settlement if heavily loaded. Hence low foundation bearing pressures are typically appropriate. Comparatively low bearing pressures normally are not a major concern for relatively light residential and commercial structures.

Soil and Geological Considerations (continued)

The silt and clay soils may be subject to hydrocompaction if heavily loaded or if they become saturated. Heavy concentrated loads may need to utilize deep foundations founded in the underlying bedrock. These factors are normally addressed in site-specific soil and foundation studies for each structure.

Some of the soils on the site are clay and probably possess expansion potential. The Dawson Arkose also contains lenses and layers of claystone. When in the presence of water, the clay minerals absorb the water and expand in volume. Pressures resulting from this expansion are commonly of a magnitude they could damage foundations or flatwork. Expansive soils are rather common in the Front Range of Colorado and techniques for mitigation are fairly well developed. It is therefore important that each structure be analyzed individually so the potential problem can be assessed and individual design measures taken to mitigate the hazard.

Corrosive minerals may be present in the soils, bedrock, or groundwater. Corrosive minerals can have detrimental effects on concrete and buried metals. This condition is normally addressed in a soils and foundation study for each structure.

Flooding and Erosion

As shown on the Preliminary Geologic Map (Figure 2), alluvium/colluvium is found in a band paralleling the swales and drainageways on site. Although the smaller drainageways do not appear to carry surface water most of the time, it appears that erosion and flooding from thunderstorm runoff occasionally occurs. It should be noted that no drainage study was performed as part of this report and the flood plain and hazard zone should be defined by a more detailed drainage report. The simplest mitigation for flooding is avoidance, although channelization or elevation of structures may be appropriate in some areas. The larger drainageway on the site is being avoided by development except for two road crossings.

Flooding and Erosion

The soils on the site are susceptible to erosion by both wind and water because the sandy and silty soils commonly have low cohesion. The potential for erosion should be addressed in an erosion control plan, which was not part of our scope of work. Disturbed areas should be re-vegetated as soon as possible after construction. The existing 'contour terraces' serve to reduce the potential for erosion. These features should be retained where possible.

Subsurface Drainage

The swales and drainageways on the site sometimes exhibit problems with subsurface drainage. The variable permeability characteristics of the surficial soils are such that the cleaner sands carry water, perched on lower permeability layers. Subsurface seepage will move laterally along the top of the lower permeability layers (commonly clay layers or bedrock) and either daylight on a slope (or in a foundation excavation), or follow the buried bedrock in the swales. Swales and drainageways are the areas where subsurface drainage is likely to be concentrated.

For individual structures, mitigation of subsurface drainage problems usually takes the form of perimeter drains around foundations. A gravity daylight for the perimeter drains is recommended if possible. The need for and capacity of these individual subsurface drainage systems should be based on an individual site analysis for each specific structure. The observation of the subsurface soil and moisture conditions in excavations for foundations should take seasonal variations and permeability characteristics of the subsurface materials into account.

Seismic Activity

This area, like most of central Colorado, is subject to a degree of seismic risk. The Colorado Geological Survey considers this area of Colorado to be in Seismic Risk Zone 2. We understand design for seismic forces is not required for residential structures in this zone. Wind loading may govern structural design.

Radiation Activity

There is not believed to be any unusual hazard from naturally occurring sources of radioactivity on this site. Most of Colorado is located in a geologic setting that is considered 'high' and all rocks contain some natural radioactive minerals. Small bodies of uranium-bearing rock have been found within the lower part of the Dawson Arkose in the southern portion of the Black Forest in Northgate, Kettle Creek Ranch, Briargate, and Wolf Ranch areas (Himmelreich, 1996 and 1997, and Himmelreich and Flynn, 1994). When encountered these deposits are usually small and of relatively low grade.

The principle hazard produced by soil and bedrock of the types that underlie the site are usually associated with radon gas, build-ups of which can be mitigated by providing increased ventilation of perimeter drains, basements and crawl spaces, and sealing of joints. Radon hazards are best mitigated at the building design and construction phases.

SEWAGE DISPOSAL

It is planned to use individual treatment systems for sewage disposal on the larger (2.5-acre) lots on this site. In areas that are unacceptable for standard soil absorption systems, alternate systems such as self contained systems, raised systems, or mounded systems may be used. There don't appear to be situations where an alternate disposal system cannot be utilized for lot sizes on the order of those proposed for this subdivision.

In order to evaluate site characteristics geologic mapping was performed and 20 percolation tests were performed (22% of the 87 lots). Drill Hole and test locations are shown on the attached Figure 2. Visual logs of the profile holes, a summary of percolation test results, and soil laboratory testing data can be found in Appendix A. Figure 3 is "Sewage Disposal Characteristics Map" and also shows slopes of 30% and greater.

Percolation Testing Procedure and Regulations:

The procedure for percolation testing for each hole location was to drill one four inch diameter profile hole to a maximum depth of 10 feet, and to drill an adjacent hole to a depth of approximately 30 inches for percolation testing. To aid in identifying site conditions, two additional soil profile borings were also drilled in the small lot area, but without performing percolation tests. Holes were drilled by a power driven auger drill rig. Visual logs of soil and bedrock profiles were obtained from drill cuttings, and Standard Penetration Tests (ASTM D-1586) were performed to obtain samples for visual examination and to verify bedrock depths. Selected samples were also tested in the laboratory (see Gradation Test Results with the Drill Logs).

The percolation test holes were filled with water and saturated prior to testing. The test procedure consisted of filling the hole with approximately six inches of water and measuring the drop in water level and corresponding time interval until the percolation rate stabilized. This type of percolation test is for the purpose of defining the overall general, but typical, percolation characteristics. Three-hole tests must be made on each lot prior to construction of the individual sewage disposal systems.

The Health Department regulations indicate that certain conditions must be satisfied for installation of soil absorption systems without special design. These are:

- The minimum depth allowed by the El Paso County Health Department is 21 inches from the ground surface to the bottom of a seepage bed or absorption trench. Bedrock or water tables must be at least four feet deeper. Therefore, bedrock or groundwater within approximately six feet of the surface constitutes unacceptable conditions for a standard absorption system.
- Unless designed by a Registered Professional Engineer and approved by the Health Department, no soil absorption system is permitted where the ground slope is in excess of 30%.
- Colorado State and El Paso County Health Department Regulations indicate that percolation rates faster than five minutes per inch or slower than sixty minutes per inch are unacceptable for soil absorption systems without special design.

Percolation Testing Procedures & Regulations (continued)

Percolation rates are controlled by soil characteristics that include grain size and gradation, amount of silt and clay, and density. Coarse, clean soils with little or no fine particles have fast percolation rates. Clayey sands, clays, silts and dense materials such as bedrock commonly have slower percolation rates.

Soil Conditions:

Based upon the geologic characteristics and constraints as observed, profile holes, and experience, sewage disposal characteristics and limitations have been analyzed. These various areas and limitations are shown on Figure 2 and 3, and a discussion of these follows.

Area I (Qc-Tda): Area I consists of that portion of the site characterized by thin to thicker surficial deposits and variable (but generally acceptable) percolation rates. These areas has been mapped as Qc-Tda on the enclosed Figure2 and are characterized by colluvial soils over the Dawson Arkose. With some exploration, it is felt that in most cases it will be possible to locate an acceptable soil absorption system in the Area I lots, although local slow percolation rates or shallow soils may be encountered in these areas and thus will require some form of alternate system.

Area II (Tda): Area II consists of that portion of the site interpreted to be underlain by shallow soils over weathered bedrock (mapped as Tda on Figure 2). In most of this area it is felt that bedrock may be too shallow and/or too impermeable for conventional soil absorption systems, and alternate systems will be required.

Area III (Qac), (sw): Area III consists of that portion of the site identified as being underlain by deeper soils (Qac on Figure 2), but might be characterized by seasonally wet conditions (sw) or shallow ground water, at least on a seasonal basis. In areas that are found to be outside the flood plain and possess shallow ground water, alternate systems will be required. Percolation rates are likely to be variable. The seasonally wet areas were mapped based on analysis of aerial photographs and

field observations. Additional areas of shallow groundwater may also be encountered on the site. The percolation rate measurements and depth to weathered bedrock are summarized on Table I (below). The results of the profile holes are also summarized below. No ground water was encountered in any of the profile holes.

TABLE I

Percolation Test Number	Percolation Rate	Depth to Weathered Bedrock
TH-1	53.3 minutes per inch	Greater than 10 feet
TH-2	26.7 minutes per inch	Greater than 10 feet
TH-3	22.9 minutes per inch	Greater than 10 feet
TH-4	14.5 minutes per inch	Greater than 10 feet
TH-5	160 minutes per inch	Greater than 10 feet
TH-6	22.9 minutes per inch	Greater than 10 feet
TH-7	32 minutes per inch	Greater than 10 feet
TH-8	20 minutes per inch	4 feet
TH-9	32 minutes per inch	Greater than 10 feet
TH-10	13.3 minutes per inch	Greater than 10 feet
TH-11	17.8 minutes per inch	Greater than 10 feet
TH-12	17.8 minutes per inch	Greater than 10 feet
TH-13	53.3 minutes per inch	2 feet
TH-14	53.3 minutes per inch	Greater than 10 feet
TH-15	20 minutes per inch	1 foot
TH-16	16 minutes per inch	2 feet
TH-17	26.7 minutes per inch	4 feet
TH-18	17.8 minutes per inch	8 feet
TH-19	13.3 minutes per inch	4 feet
TH-20	17.8 minutes per inch	Greater than 10 feet
TH-21	16 minutes per inch	3.5 feet

Only one percolation rate was measured as greater than 60 minutes per inch. The subsurface materials encountered in the profile holes consisted of deep to shallow surficial and residually weathered soils ranging from 1 to greater than 10 feet deep. Soil and residually weathered material consisted of silty to clayey sands, silts, and sandy clays. The underlying bedrock materials consisted of sandstones. No groundwater was encountered during drilling in any of the profile holes.

Slopes

Slopes in excess of 30% are shown on the attached Figure 3. Proper performance of conventional soil absorption systems requires that they be constructed on relatively shallow slopes. The El Paso County Health Department "Individual Sewage Disposal System Regulations" (1996) consider that on slopes in excess of 30%, soil absorption systems require special design in order to take into account the effect of the steeper topography. Few slopes in excess of 30% exist on the site. The El Paso County Subdivision Regulations (Interim Performance Guidelines) classify slopes in excess of 10% as being unique topographic conditions. Where acceptable percolation rate and depth to bedrock are found in these areas of steeper slopes (greater than 30%), disposal fields using special designs will be required.

Relationship to Surrounding Areas

The site's relationship to surrounding areas is shown on Figure 1. The Wastewater Treatment Plant for the Walden Development lies to the north of the site. West Cherry Creek is located about one-quarter to one-half miles to the west of the site. Two surface water ponds are located along the larger drainageway on the site. The developed portions of the Walden subdivision are located adjacent to the north and east of the site. A school lies adjacent to the smaller lot area in the northeast. The Walden III subdivision lies west of the site. Streams, lakes and other features in the area of the site are shown on Figure 1.

The closest proposed residence to the larger lot portion of the site will likely be a single family dwelling approximately 150 feet away. Potential leach fields across this subdivision would probably be located no closer than about 100 feet from proposed residences or existing residences. Adequate separation between wells and septic systems needs to be provided.

Since the underlying topography is largely controlled by the bedrock, sewage effluent is likely to flow in the subsurface toward the swales and drainageways, then off site in the subsurface soils. The individual sewage disposal systems constructed on the site will add effluent ('water') to the shallow

Relationshipes to Surrounding Area (continued)

subsurface. This shallow subsurface water (which includes the seasonally wet areas) is considered to be "surface water" and/or tributary to surface streams (West Cherry Creek). The seasonally wets areas are likely to increase in extent and duration on and down gradient from the site. It is not thought that with proper design, installation, and operation/maintenance of these systems that there will be adverse effects on or off the site.

Relationship to On-site Wells

Individual wells are proposed for the larger lots in the subdivision. The smaller lots will be served by a central water supply from wells within the area. The locations of listed wells in the immediate area are shown on Figure 4. The well data for these wells indicates that most (if not all) of the wells withdraw water from the bedrock aquifer. Our experience indicates that the Dawson is not recharged by surface waters (like sewage effluent). As long as adequate surface seals are (were) provided during well design and construction to prevent surface water from impacting the bedrock aquifers, and required setbacks are maintained, it appears that the potential for sewage effluent to contaminate the bedrock aquifers is low. As indicated previously, sewage effluent is likely to impact surface water and/or shallow groundwater. If any domestic-use wells in the immediate area withdraw from the alluvial aquifer, the water may have to be treated for parameters such as nitrates and phosphates.

Discussion:

At the time of house siting on each individual lot, it is extremely important that the engineer performing the percolation tests properly identifies all the geologic and soil related design factors that influence sewage disposal (percolation rate, depth to bedrock, and depth to groundwater). It is this combination of factors that determines the general type of individual sewage disposal system best suited for the site. It is also the responsibility of the testing engineer to evaluate soil properties and continuity of the materials for the total depth of the profile hole (and within the area of the proposed system).

Discussion (continued)

In most cases where sandstone bedrock was encountered in the profile holes, it was weathered and contained low to no cementation. Under these conditions, it is uncommon for open fractures to develop in bedrock of this type. Observed excavations in bedrock in other areas of the Black Forest confirm this.

In the context of this report, the term "weathered bedrock" denotes that this material has been derived from the weathering (in place) of the underlying bedrock formation (the Dawson Arkose). That is, the materials have not been transported to their position by geologically recent erosional and depositional processes like the surficial soil deposits have. Although soil-like in appearance, from the standpoint of sewage disposal characteristics, the weathered bedrock is different than the surficial soil deposits because it is usually found at a higher in-place density. Although easily drillable with commonly used drilling equipment, this higher density commonly results in slower percolation rates than the overlying surficial deposits. Cemented bedrock (the type of bedrock that would contain open fractures, and hence, not treat the effluent) was not encountered in any of the profile holes drilled on-site. Since the weathered bedrock is soil-like in terms of most of its physical properties, it is judged to be a suitable stratum for disposal of sewage effluent (assuming it exhibits acceptable percolation rates).

The El Paso County Regulations do not specifically prohibit absorption systems in weathered bedrock (assuming all other conditions are acceptable) and historically the Health Department has permitted absorption systems under these conditions.

Our experience has shown that unless a) one is very familiar with the geologic units; b) utilizes and analyzes fugitive drilling information (ease of drilling, etc.); c) observes and analyzes color and other physical material changes during drilling; d) verifies interpretations with standard penetration or other types of tests; and/or e) performs deeper percolation tests; the presence, position, and sewage disposal characteristics of weathered bedrock can be misinterpreted. This misinterpretation could

Discussion (continued)

Have a significant impact on the sewage disposal system designed and ultimately, the performance. As part of the percolation testing (as with all other tests in other subdivisions), the testing engineer needs to provide an evaluation of the weathered bedrock's acceptability for sewage disposal. Acceptable percolation rates in weathered bedrock materials were measured on this site and have been observed in similar geologic settings. Depth to weathered bedrock has been indicated on Table 1 and on the Drill Logs (Appendix A).

Sewage Disposal Conclusions:

In general, all the lots within the proposed development are suitable for installation of some type of on-site wastewater system. However, because of local areas of shallow bedrock and isolated slow percolation rates, many lots will require engineer-designed systems.

Based upon our experience in the Black Forest area, it is our opinion that the Walden Preserve property is similar to and typical of many developed subdivision regions in the Black Forest. The task of the engineers and builders in the Black Forest region has become one of matching the disposal process and approved systems with prevalent field conditions. With knowledgeable builders, proper siting and testing techniques, and some exploration on each lot, it is felt that on all lots two disposal fields can be located and will be able to utilize soil absorption type systems for individual sewage disposal in this subdivision. In all cases methods are available for an individual sewage disposal system on each and every lot in the subdivision. **It should be emphasized that due to the geologic characteristics and other constraints on this site many systems are likely to consist of an engineer-designed system.**

Potential buyers and builders of lots within the subdivision should be provided with a copy of this report so that they can be apprised of site conditions, constraints and recommendations.

LIMITATIONS

The opinions presented in this report were developed from review of aerial photographs, topographic and geologic maps, site reconnaissance, profile holes and percolation tests, and research of published and unpublished information. Should additional surface or subsurface data become available, the conclusions and recommendations contained in this report shall not be considered valid unless the data are reviewed and the conclusions of this report are modified or approved in writing. If you have questions or require additional information, please contact us.

Respectfully,

FRONT RANGE GEOTECHNICAL, INC. &

JOHN HIMMELREICH & ASSOCIATES

John W. Himmelreich, Jr., P.G.

Engineering Geologist

Jeff Houchin

Geologist

COLORADO REGISTERED
MICHAEL F. REYNOLDS
16479
8/30/04
PROFESSIONAL ENGINEER

Michael F. Reynolds, P.E.

Civil Engineer

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NORTH

1" = 2000'

VICINITY MAP

FIGURE 1

FIGURE # 2

FIGURE # 3

Are located in the rear pocket of this folder.

PHYSICAL SETTING SOURCE MAP - 1018694.1s

County Boundary
Major Roads
Contour Lines
Earthquake epicenter, Richter 5 or greater
Water Wells
Public Water Supply Wells
Cluster of Multiple Icons

0 1/4 1/2 1 Mile

Groundwater Flow Direction
Indeterminate Groundwater Flow at Location
Groundwater Flow Varies at Location
Oil, gas or related wells

TARGET PROPERTY:	Walden Village	CUSTOMER:	John Himmelreich & Associates
ADDRESS:	Pond View Place	CONTACT:	John Himmelreich
CITY/STATE/ZIP:	Colorado Springs CO 80908	INQUIRY #:	1018694.1s
LAT/LONG:	39.0876 / 104.7605	DATE:	July 25, 2003 1:09 pm

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FIGURE 4

LEGEND

21 - CRUCKTON SANDY LOAM, 1-9% SLOPES

25 - ELBETH SANDY LOAM, 3-8% SLOPES

71 - PRING COARSE SANDY LOAM, 3-8% SLOPES

92 - TOMAH - LOAMY SANDS, 3-8% SLOPES

N

1" = 2000'

SCS SOILS MAP

FIGURE 5

21—Cruckton sandy loam, 1 to 9 percent slopes. This deep, well drained soil formed in arkosic sandy loam deposits on uplands. Elevation ranges from 7,200 to 7,600 feet. The average annual precipitation is about 17 inches, the average annual air temperature is about 43 degrees F, and the average frost-free period is about 115 days.

Typically, the surface layer is dark grayish brown sandy loam about 4 inches thick. The subsoil is grayish brown sandy loam about 24 inches thick. The substratum is pale brown loamy coarse sand.

Included with this soil in mapping are small areas of Peyton sandy loam, 1 to 5 percent slopes, Peyton sandy loam, 5 to 9 percent slopes, and Pring coarse sandy loam, 3 to 8 percent slopes.

Permeability of this Cruckton soil is moderately rapid. Effective rooting depth is 60 inches or more. Available water capacity is moderate to high. Surface runoff is slow to medium, and the hazard of erosion is moderate. In places runoff from snowmelt in spring causes rills and small gullies to form in cultivated fields.

Most of this soil is in native grass that is used for grazing livestock. A small acreage on some of the more gentle slopes is used for small grain and corn for silage.

Native vegetation is mainly mountain muhly, bluestem, mountain brome, needleandthread, and blue grama. The soil is subject to invasion by Kentucky bluegrass and Gambel oak. Noticeable forbs are hairy goldenrod, geranium, milkvetch, low larkspur, fringed sage, and buckwheat.

Proper location of livestock watering facilities helps to control grazing. Timely deferment of grazing is needed to protect the plant cover.

Windbreaks and environmental plantings are generally suited to this soil. Soil blowing is the main limitation to the establishment of trees and shrubs. This limitation can be overcome by cultivating only in the tree rows and leaving a strip of vegetation between the rows. Supplemental irrigation may be needed when planting and during dry periods. Trees that are best suited and have good survival are Rocky Mountain juniper, eastern redcedar, ponderosa pine, Siberian elm, Russian-olive, and hackberry. Shrubs that are best suited are skunkbush sumac, lilac, and Siberian peashrub.

This soil is suited to wildlife habitat. It is best suited to habitat for openland and rangeland wildlife. Rangeland wildlife, such as pronghorn antelope, can be encouraged by developing livestock watering facilities, properly managing livestock grazing, and reseeding range where needed.

This soil has good potential for use as homesites. Special design of roads and streets is needed because of frost action. Installation of drains helps to control surface runoff and keeps soil losses to a minimum. Capability subclass VIe.

25—Elbeth sandy loam, 3 to 8 percent slopes. This deep, well drained soil formed in material transported from arkose deposits on uplands. Elevation ranges from 7,300 to 7,600 feet. The average annual precipitation is about 18 inches, the average annual air temperature is about 43 degrees F, and the average frost-free period is about 120 days.

Typically the surface layer is very dark grayish brown sandy loam about 3 inches thick. The subsurface layer is light gray loamy sand about 20 inches thick. The subsoil is brown sandy clay loam about 45 inches thick. The substratum is light brown sandy clay loam.

Included with this soil in mapping are small areas of Tomah-Crowfoot loamy sands, 3 to 8 percent slopes; Kettle gravelly loamy sand, 3 to 8 percent slopes; and Peyton-Pring complex, 3 to 8 percent slopes.

Permeability of this Elbeth soil is moderate. Effective rooting depth is 60 inches or more. Available water capacity is high. Surface runoff is slow to medium, and the hazard of erosion is moderate.

This soil is used for woodland, limited livestock grazing, recreation, wildlife habitat, and homesites.

This soil is suited to the production of ponderosa pine. It is capable of producing about 2,240 cubic feet, or 4,900 board feet (International rule), of merchantable timber per acre from a fully stocked, even-aged stand of 80-year-old trees. Conventional methods can be used for harvesting, but operations may be restricted during wet periods. Reforestation, after harvesting, must be carefully managed to reduce competition of undesirable understory plants.

Woodland wildlife, such as mule deer and wild turkey, is attracted to this soil because of its potential to produce ponderosa pine, Gambel oak, and various grasses and shrubs. Water developments, such as guzzlers, would enhance populations of wild turkey as well as other kinds of wildlife. Where wildlife and livestock share the same range, proper grazing management is needed to prevent overuse and to reduce competition. Livestock watering facilities would also benefit wildlife on this soil.

This soil has good potential for homesites. The main limitation is the moderate shrink-swell potential in the subsoil. Special road design is necessary on this soil to overcome the limitations of shrink-swell potential and frost action. Special planning is needed on this soil to minimize site disturbance and tree and seedling damage. During seasons of low precipitation, fire may become a hazard to homesites on this soil. The hazard can be minimized by installing firebreaks and reducing the amount of potential fuel on the forest floor. Capability subclass VIe.

71—Pring coarse sandy loam, 3 to 8 percent slopes. This deep, noncalcareous, well drained soil formed in sandy sediment derived from arkosic sedimentary rock on valley side slopes and on uplands. Elevation ranges from 6,800 to 7,600 feet. The average annual precipitation is about 17 inches, the average annual air temperature is about 43 degrees F, and the average frost-free period is about 120 days.

Typically, the surface layer is dark grayish brown coarse sandy loam about 4 inches thick. The substratum is dark grayish brown coarse sandy loam about 10 inches thick over pale brown gravelly sandy loam that extends to a depth of 60 inches or more.

Included with this soil in mapping are small areas of Alamosa loam, 1 to 3 percent slopes, along drainageways; Cruckton sandy loam, 1 to 9 percent slopes; Peyton sandy loam, 1 to 5 percent slopes; Peyton sandy loam, 5 to 9 percent slopes; and Tomah-Crowfoot loamy sands, 3 to 8 percent slopes. In some places arkose beds of sandstone and shale are at a depth of 0 to 40 inches.

Permeability of this Pring soil is rapid. Effective rooting depth is 60 inches or more. Available water capacity is moderate. Surface runoff is medium, and the hazard of erosion is moderate.

Almost all areas of this soil are used as rangeland. Some areas previously cultivated have been reseeded to grass. This soil is also used for wildlife habitat and homesites.

This soil is well suited to the production of native vegetation suitable for grazing by cattle and sheep. Rangeland vegetation is mainly mountain muhly, little bluestem, needleandthread, Parry oatgrass, and junegrass.

Deferment of grazing in spring helps to maintain vigor and production of the cool-season bunchgrasses. Fencing and properly locating livestock watering facilities help to control grazing.

Windbreaks and environmental plantings generally are suited to this soil. The hazard of soil blowing is the main limitation to the establishment of trees and shrubs. This limitation can be overcome by cultivating only in the tree rows and leaving a strip of vegetation between the rows. Supplemental irrigation may be needed when planting and during dry periods. Trees that are best suited and have good survival are Rocky Mountain juniper, eastern redcedar, ponderosa pine, Siberian elm, Russian-olive, and hackberry. Shrubs that are best suited are skunkbush sumac, lilac, and Siberian peashrub.

This soil is suited to habitat for openland and rangeland wildlife. Rangeland wildlife, such as pronghorn antelope, can be encouraged by developing livestock watering facilities, properly managing livestock grazing, and reseeding range where needed.

This soil is well suited for use as homesites. Erosion control practices are needed to control soil blowing and water erosion on construction sites where the ground cover has been removed. Capability subclass IVe.

92—Tomah-Crowfoot loamy sands, 3 to 8 percent slopes. These gently sloping to moderately sloping soils are on alluvial fans, hills, and ridges in the uplands. Elevation ranges from about 7,300 to 7,600 feet. The average annual precipitation is about 17 inches, the average annual air temperature is about 42 degrees F, and the average frost-free period is about 120 days.

The Tomah soil makes up about 50 percent of the complex, the Crowfoot soil about 30 percent, and other soils about 20 percent.

Included with these soils in mapping are areas of Elbeth sandy loam, 3 to 8 percent slopes; Kettle gravelly loamy sand, 3 to 8 percent slopes; and Pring coarse sandy loam, 3 to 8 percent slopes.

The Tomah soil is deep and well drained. It formed in alluvium or residuum derived from arkose beds. Typically, the surface layer is dark grayish brown loamy sand about 10 inches thick. The subsurface layer is very pale brown coarse sand about 12 inches thick. The subsoil, about 26 inches thick, is a matrix of very pale brown coarse sand in which are embedded many thin bands and lamellae of pale brown coarse sandy clay loam. The substratum is very pale brown coarse sand to a depth of 60 inches or more.

Permeability of the Tomah soil is moderately rapid. Effective rooting depth is 60 inches or more. Available water capacity is moderate. Surface runoff is slow, and the hazard of erosion is slight to moderate.

The Crowfoot soil is deep and well drained. It formed in sediment weathered from arkosic sandstone. Typically, the surface layer is grayish brown loamy sand about 12 inches thick. The subsurface layer is very pale brown sand about 11 inches thick. The subsoil is light yellowish brown sandy clay loam about 13 inches thick. The substratum is very pale brown coarse sand to a depth of about 68 inches.

Permeability of the Crowfoot soil is moderate. Effective rooting depth is 60 inches or more. Available water capacity is moderate. Surface runoff is slow, and the hazard of erosion is slight to moderate.

This complex is used as rangeland, for wildlife habitat, and as homesites.

Native vegetation is mainly mountain muhly, bluestem, mountain brome, needleandthread, and blue grama. These soils are subject to invasion by Kentucky bluegrass and Gambel oak. Noticeable forbs are hairy goldenrod, geranium, milkvetch, low larkspur, fringed sage, and buckwheat.

Properly locating livestock watering facilities helps to control grazing. Timely deferment of grazing is needed to protect the plant cover.

Windbreaks and environmental plantings are fairly well suited to these soils. Blowing sand and moderate available water capacity are the principal limitations for the establishment of trees and shrubs. The soils are so loose that trees need to be planted in shallow furrows and plant cover needs to be maintained between the rows. Supplemental irrigation may be needed to insure survival. Trees that are best suited and have good survival are Rocky Mountain juniper, eastern redcedar, ponderosa pine, and Siberian elm. Shrubs that are best suited are skunkbush sumac, lilac, and Siberian peashrub.

These soils are best suited to habitat for openland wildlife such as pronghorn antelope and sharp-tailed grouse. Although sharp-tailed grouse are not plentiful, they could be encouraged on these soils, especially where brush species are interspersed with grasses and forbs. If these soils are used as rangeland, wildlife production can be increased by managing livestock grazing to preclude overuse of the more desirable grass species and depletion of the various brush species.

These soils have good potential for use as homesites. The main limitation of the Crowfoot soil is frost-action potential. Roads and streets need to be designed to minimize frost-heave damage. Maintaining the existing vegetation on building sites during construction helps to control erosion. Capability subclass IVe.

APPENDIX A

FRONT RANGE GEOTECHNICAL INC.

DRILL LOGS

JOB#: 11411

TEST BORING NO.: TH-1

DATE: 05/12/2003

0-6" TOPSOIL

6"-10' SILT

fine grained

moderate density

moderate-high moisture content

moderate sand content

low plasticity

dark grey color

density decreases w/depth

DEPTH (in ft.)	SYMBOL	SAMPLES	BLOW COUNT	WATER %	SOIL TYPE
2					
4			40/12"	11.7	
6					
8					
10			20/12"	6.0	ML
12					
14					
16					
18					
20					

JOB#:

TEST BORING NO.:

DATE:

DEPTH (in ft.)	SYMBOL	SAMPLES	BLOW COUNT	WATER %	SOIL TYPE
2					
4					
6					
8					
10					
12					
14					
16					
18					
20					

FRONT RANGE GEOTECHNICAL INC.

GRADATION TEST RESULTS

CLAY TO SILT	SAND			GRAVEL		COBBLES
	FINE	MEDIUM	COARSE	FINE	COARSE	

CLASSIFICATION ML

GRAVEL 0.0 %

SAND 45.5 %

FINES 54.5 %

SAMPLE# 1 HOLE# TH-1 DEPTH 10 FEET

NOTES: 6.0 % Moisture content

LL = 23.6 %

PL = 20.7 %

PI = 2.9 %

Job #: 11411 By: KO 05/13/2003

FRONT RANGE GEOTECHNICAL INC.

DRILL LOGS

JOB#: 11411

TEST BORING NO.: TH-2

DATE: 05/12/2003

0-6" TOPSOIL

6"-10' SAND

fine grained

moderate density

moderate-high moisture content

moderate clay content

moderate plasticity

tan color

density decreases w/depth

DEPTH (in ft.)	SYMBOL	SAMPLES	BLOW COUNT	WATER %	SOIL TYPE
2					
4			26/12"	13.4	SM/SC
6					
8					
10			10/12"	12.7	
12					
14					
16					
18					
20					

JOB#:

TEST BORING NO.:

DATE:

DEPTH (in ft.)	SYMBOL	SAMPLES	BLOW COUNT	WATER %	SOIL TYPE
2					
4					
6					
8					
10					
12					
14					
16					
18					
20					

FRONT RANGE GEOTECHNICAL INC.

GRADATION TEST RESULTS

CLAY TO SILT	SAND			GRAVEL		COBBLES
	FINE	MEDIUM	COARSE	FINE	COARSE	

CLASSIFICATION SM/SC

GRAVEL 0.2 %

SAND 55.3 %

FINES 44.5 %

SAMPLE# 1 HOLE# TH-2 DEPTH 4 FEET

NOTES: 13.4 % Moisture content

LL = 23.4 %

PL = 18.6 %

PI = 4.8 %

Job #: 11411 By: KO 05/13/2003

FRONT RANGE GEOTECHNICAL INC.

DRILL LOGS

JOB#: 11411

TEST BORING NO.: TH-3

DATE: 05/12/2003

0-6" TOPSOIL

6"-3' SILT

very-fine grained

low density

moderate moisture content

moderate sand content

moderate plasticity

dark grey color

3'-10' SAND

fine grained

moderate density

moderate moisture content

low clay content

low plasticity

tan color

DEPTH (in ft.)	SYMBOL	SAMPLES	BLOW COUNT	WATER %	SOIL TYPE
2					
4			24/12"	7.9	SM
6					
8					
10			25/12"	10.9	SM
12					
14					
16					
18					
20					

JOB#:

TEST BORING NO.:

DATE:

DEPTH (in ft.)	SYMBOL	SAMPLES	BLOW COUNT	WATER %	SOIL TYPE
2					
4					
6					
8					
10					
12					
14					
16					
18					
20					

FRONT RANGE GEOTECHNICAL INC.

GRADATION TEST RESULTS

CLAY TO SILT	SAND			GRAVEL		COBBLES
	FINE	MEDIUM	COARSE	FINE	COARSE	

CLASSIFICATION SM

GRAVEL 0.1 %

SAND 63.4 %

FINES 36.5 %

SAMPLE# 1 HOLE# TH-3 DEPTH 4 FEET

NOTES: 7.9 % Moisture content

LL = COULD NOT BE DETERMINED

PL = NON PLASTIC

CLAY TO SILT	SAND			GRAVEL		COBBLES
	FINE	MEDIUM	COARSE	FINE	COARSE	

CLASSIFICATION SM

GRAVEL 3.7 %

SAND 61.0 %

FINES 35.3 %

SAMPLE# 1 HOLE# TH-3 DEPTH 10 FEET

NOTES: 10.9 % Moisture content

LL = 20.4 %

PL = 16.8 %

PI = 3.6 %

Job #: 11411 By: KO 5/13/2003

FRONT RANGE GEOTECHNICAL INC.

DRILL LOGS

JOB#: 11411

TEST BORING NO.: TH-4

DATE: 05/12/2003

DEPTH (in ft.)	SYMBOL	SAMPLES	BLOW COUNT	WATER %	SOIL TYPE
2					
4			39/12"	7.2	SC
6					
8					
10			18/12"	10.0	
12					
14					
16					
18					
20					

0-6" TOPSOIL

6"-10' SAND

fine grained

high density

moderate moisture content

moderate clay content

moderate plasticity

tan color

density decreases w/depth

JOB#:

TEST BORING NO.:

DATE:

DEPTH (in ft.)	SYMBOL	SAMPLES	BLOW COUNT	WATER %	SOIL TYPE
2					
4					
6					
8					
10					
12					
14					
16					
18					
20					

FRONT RANGE GEOTECHNICAL INC.

GRADATION TEST RESULTS

CLAY TO SILT	SAND			GRAVEL		COBBLES
	FINE	MEDIUM	COARSE	FINE	COARSE	

CLASSIFICATION SC

GRAVEL 2.3 %

SAND 52.8 %

FINES 44.9 %

SAMPLE# 1 HOLE# TH-4 DEPTH 10 FEET

NOTES: 10.0 % Moisture content

LL = 28.2 %

PL = 20.0 %

PI = 8.2 %

Job #: 11411 By: KO 5/13/2003

FRONT RANGE GEOTECHNICAL INC.

DRILL LOGS

JOB#: 11411

TEST BORING NO.: TH-5

DATE: 05/12/2003

0-6" TOPSOIL

6"-5' SILT

fine grained

low-moderate density

moderate moisture content

moderate sand content

low plasticity

tan color

5'-10' SILTY/CLAY

fine grained

low-moderate density

moderate-high moisture content

moderate sand content

moderate plasticity

olive brown color

DEPTH (in ft.)	SYMBOL	SAMPLES	BLOW COUNT	WATER %	SOIL TYPE
2		■	10/12"	13.7	ML
4		■	13/12"	7.4	
6					
8					
10		■	11/12"	14.5	CL/ML
12					
14					
16					
18					
20					

JOB#:

TEST BORING NO.:

DATE:

DEPTH (in ft.)	SYMBOL	SAMPLES	BLOW COUNT	WATER %	SOIL TYPE
2					
4					
6					
8					
10					
12					
14					
16					
18					
20					

FRONT RANGE GEOTECHNICAL INC.

GRADATION TEST RESULTS

CLAY TO SILT	SAND			GRAVEL		COBBLES
	FINE	MEDIUM	COARSE	FINE	COARSE	

CLASSIFICATION ML

GRAVEL 0.0 %

SAND 49.1 %

FINES 50.9 %

SAMPLE# 1 HOLE# TH-5 DEPTH 2 FEET

NOTES: 13.7 % Moisture content

LL = 21.6 %

PL = 18.7 %

PL = 2.9 %

CLAY TO SILT	SAND			GRAVEL		COBBLES
	FINE	MEDIUM	COARSE	FINE	COARSE	

CLASSIFICATION CL/ML

GRAVEL 0.0 %

SAND 36.5 %

FINES 63.5 %

SAMPLE# 1 HOLE# TH-5 DEPTH 10 FEET

NOTES: 14.5 % Moisture content

LL = 27.0 %

PL = 21.0 %

PI = 6.0 %

Job #: 11411 By: KO 5/13/2003

FRONT RANGE GEOTECHNICAL INC.

DRILL LOGS

JOB#: 11411

TEST BORING NO.: TH-6

DATE: 05/12/2003

0-6" TOPSOIL

6"-10' CLAY

fine grained

moderate density

moderate moisture content

ow sand content

moderate plasticity

tan color

density decreases w/depth

DEPTH (in ft.)	SYMBOL	SAMPLES	BLOW COUNT	WATER %	SOIL TYPE
2					
4			13/12"	12.7	
6					
8					
10			8/12"	14.4	CL
12					
14					
16					
18					
20					

JOB#:

TEST BORING NO.:

DATE:

DEPTH (in ft.)	SYMBOL	SAMPLES	BLOW COUNT	WATER %	SOIL TYPE
2					
4					
6					
8					
10					
12					
14					
16					
18					
20					

FRONT RANGE GEOTECHNICAL INC.

GRADATION TEST RESULTS

CLAY TO SILT	SAND			GRAVEL		COBBLES
	FINE	MEDIUM	COARSE	FINE	COARSE	

CLASSIFICATION CL

GRAVEL 0.3 %

SAND 39.5 %

FINES 60.2 %

SAMPLE# 1 HOLE# TH-6 DEPTH 10 FEET

NOTES: 14.4 % Moisture content

LL = 26.3 %

PL = 17.9 %

PI = 8.4 %

Job #: 11411 By: KO 05/13/2003

FRONT RANGE GEOTECHNICAL INC.

DRILL LOGS

JOB#: 11411

TEST BORING NO.: TH-7

DATE: 05/12/2003

0-6" TOPSOIL

6"-10' SILT

fine grained

moderate denstiy

moderate moisture content

low sand content

low plasticity

tan color

DEPTH (in ft.)	SYMBOL	SAMPLES	BLOW COUNT	WATER %	SOIL TYPE
2					
4			21/12"	9.7	ML
6					
8					
10			18/12"	6.8	
12					
14					
16					
18					
20					

JOB#:

TEST BORING NO.:

DATE:

DEPTH (in ft.)	SYMBOL	SAMPLES	BLOW COUNT	WATER %	SOIL TYPE
2					
4					
6					
8					
10					
12					
14					
16					
18					
20					

FRONT RANGE GEOTECHNICAL INC.

GRADATION TEST RESULTS

CLAY TO SILT	SAND			GRAVEL		COBBLES
	FINE	MEDIUM	COARSE	FINE	COARSE	

CLASSIFICATION ML

GRAVEL 0.5 %

SAND 30.2 %

FINES 69.3 %

SAMPLE# 1 HOLE# TH-7 DEPTH 4 FEET

NOTES: 9.6 % Moisture content

LL = 25.4 %

PL = 24.0 %

PI = 1.4 %

Job #: 11411 By: KO 05/13/2003

FRONT RANGE GEOTECHNICAL INC.

DRILL LOGS

JOB#: 11411

TEST BORING NO.: TH-8

DATE: 05/12/2003

0-6" TOPSOIL

6"-4' SAND

fine grained

moderate density

moderate moisture content

low clay content

low plasticity

tan color

4'-10' SANDSTONE

fine-medium grained

very-high density

moderate moisture content

low clay content

low plasticity

buff color

DEPTH (in ft.)	SYMBOL	SAMPLES	BLOW COUNT	WATER %	SOIL TYPE
2					
4			46/12"	6.5	SM
6					
8					
10			54/12"	7.3	
12					
14					
16					
18					
20					

JOB#:

TEST BORING NO.:

DATE:

DEPTH (in ft.)	SYMBOL	SAMPLES	BLOW COUNT	WATER %	SOIL TYPE
2					
4					
6					
8					
10					
12					
14					
16					
18					
20					

FRONT RANGE GEOTECHNICAL INC.

GRADATION TEST RESULTS

CLAY TO SILT	SAND			GRAVEL		COBBLES
	FINE	MEDIUM	COARSE	FINE	COARSE	

CLASSIFICATION SM

GRAVEL 14.3 %

SAND 64.7 %

FINES 21.0 %

SAMPLE# 1 HOLE# TH-8 DEPTH 4 FEET

NOTES: 6.5 % Moisture content

LL = 20.6 %

PL = 17.9 %

PI = 2.7 %

Job #: 11411 By: KO 05/13/2003

FRONT RANGE GEOTECHNICAL INC.

DRILL LOGS

JOB#: 11411

TEST BORING NO.: TH-9

DATE: 05/12/2003

DEPTH (in ft.)	SYMBOL	SAMPLES	BLOW COUNT	WATER %	SOIL TYPE
2					
4			13/12"	11.5	
6					
8					
10			13/12"	15.8	CL
12					
14					
16					
18					
20					

0-6" TOPSOIL

6"-10' CLAY

very-fine grained

moderate density

moderate-high moisture content

low sand content

moderate plasticity

tan color

JOB#:

TEST BORING NO.:

DATE:

DEPTH (in ft.)	SYMBOL	SAMPLES	BLOW COUNT	WATER %	SOIL TYPE
2					
4					
6					
8					
10					
12					
14					
16					
18					
20					

FRONT RANGE GEOTECHNICAL INC.

GRADATION TEST RESULTS

CLAY TO SILT	SAND			GRAVEL		COBBLES
	FINE	MEDIUM	COARSE	FINE	COARSE	

CLASSIFICATION CL

GRAVEL 1.0 %

SAND 36.2 %

FINES 62.8 %

SAMPLE# 1 HOLE# TH-9 DEPTH 10 FEET

NOTES: 15.8 % Moisture content

LL = 28.6 %

PL = 21.1 %

PI = 7.5 %

Job #: 11411 By: KO 05/11/2003

FRONT RANGE GEOTECHNICAL INC.

DRILL LOGS

JOB#: 11411

TEST BORING NO.: TH-10

DATE: 05/12/2003

0-6" TOPSOIL

6"-10' SAND

fine-medium grained

moderate density

moderate moisture content

moderate clay content

moderate plasticity

tan color

DEPTH (in ft.)	SYMBOL	SAMPLES	BLOW COUNT	WATER %	SOIL TYPE
2					
4			20/12"	7.3	
6					
8					
10			22/12"	9.7	SC
12					
14					
16					
18					
20					

JOB#:

TEST BORING NO.:

DATE:

DEPTH (in ft.)	SYMBOL	SAMPLES	BLOW COUNT	WATER %	SOIL TYPE
2					
4					
6					
8					
10					
12					
14					
16					
18					
20					

FRONT RANGE GEOTECHNICAL INC.

GRADATION TEST RESULTS

CLAY TO SILT	SAND			GRAVEL		COBBLES
	FINE	MEDIUM	COARSE	FINE	COARSE	

CLASSIFICATION SC

GRAVEL 16.9 %

SAND 60.3 %

FINES 22.8 %

SAMPLE# 1 HOLE# TH-10 DEPTH 10 FEET

NOTES: 9.7 % Moisture content

LL = 26.4 %

PL = 19.2 %

PI = 7.2 %

Job #: 11411 By: KO 05/13/2003

FRONT RANGE GEOTECHNICAL INC.

DRILL LOGS

JOB#: 11411

TEST BORING NO.: TH-11

DATE: 05/12/2003

0-6" TOPSOIL

6"-10' SAND

fine-medium grained

low-moderate density

moderate moisture content

low clay content

low plasticity

tan color

density decreases w/depth

DEPTH (in ft.)	SYMBOL	SAMPLES	BLOW COUNT	WATER %	SOIL TYPE
2					
4			30/12"	3.2	SM
6					
8					
10			10/12"	11.7	
12					
14					
16					
18					
20					

JOB#:

TEST BORING NO.:

DATE:

DEPTH (in ft.)	SYMBOL	SAMPLES	BLOW COUNT	WATER %	SOIL TYPE
2					
4					
6					
8					
10					
12					
14					
16					
18					
20					

FRONT RANGE GEOTECHNICAL INC.

GRADATION TEST RESULTS

CLAY TO SILT	SAND			GRAVEL		COBBLES
	FINE	MEDIUM	COARSE	FINE	COARSE	

CLASSIFICATION SM

GRAVEL 2.7 %

SAND 71.7 %

FINES 25.6 %

SAMPLE# 1 HOLE# TH-11 DEPTH 4 FEET

NOTES: 3.2 % Moisture content

LL = 21.1 %

PL = 19.7 %

PI = 1.4 %

CLAY TO SILT	SAND			GRAVEL		COBBLES
	FINE	MEDIUM	COARSE	FINE	COARSE	

CLASSIFICATION SM

GRAVEL 3.3 %

SAND 62.9 %

FINES 33.8 %

SAMPLE# 1 HOLE# TH-11 DEPTH 10 FEET

NOTES: 11.7 % Moisture content

LL = Could Not Be Determined

PL = Non-Plastic

Job #: 11411 By: KO 05/13/2003

FRONT RANGE GEOTECHNICAL INC.

DRILL LOGS

JOB#: 11411

TEST BORING NO.: TH-12

DATE: 05/12/2003

0-6" TOPSOIL

6"-10' SILTY/CLAY

very-fine grained

moderate density

moderate-high moisture content

low sand content

moderate plasticity

dark brown color

DEPTH (in ft.)	SYMBOL	SAMPLES	BLOW COUNT	WATER %	SOIL TYPE
2					
4			14/12"	12.5	CL/ML
6					
8					
10			18/12"	11.3	
12					
14					
16					
18					
20					

JOB#:

TEST BORING NO.:

DATE:

DEPTH (in ft.)	SYMBOL	SAMPLES	BLOW COUNT	WATER %	SOIL TYPE
2					
4					
6					
8					
10					
12					
14					
16					
18					
20					

FRONT RANGE GEOTECHNICAL INC.

GRADATION TEST RESULTS

CLAY TO SILT	SAND			GRAVEL		COBBLES
	FINE	MEDIUM	COARSE	FINE	COARSE	

CLASSIFICATION CL/ML

GRAVEL 1.5 %

SAND 36.6 %

FINES 61.9 %

SAMPLE# 1 HOLE# TH-12 DEPTH 4 FEET

NOTES: 12.5 % Moisture content

LL = 23.4 %

PL = 18.1 %

PI = 5.3 %

Job #: 11411 By: KO 05/13/2003

FRONT RANGE GEOTECHNICAL INC.

DRILL LOGS

JOB#: 11411

TEST BORING NO.: TH-13

DATE: 05/12/2003

0-6" TOPSOIL

6"-2' SAND

fine grained

moderate density

moderate moisture content

low clay content

low plasticity

tan

2'-10' SANDSTONE

fine-medium grained

very-high density

moderate moisture content

low clay content

low plasticity

tan color

density increases w/depth

DEPTH (in ft.)	SYMBOL	SAMPLES	BLOW COUNT	WATER %	SOIL TYPE
2					
4			51/12"	6.7	SM
6					
8					
10			100/12"	7.7	
12					
14					
16					
18					
20					

JOB#:

TEST BORING NO.:

DATE:

DEPTH (in ft.)	SYMBOL	SAMPLES	BLOW COUNT	WATER %	SOIL TYPE
2					
4					
6					
8					
10					
12					
14					
16					
18					
20					

FRONT RANGE GEOTECHNICAL INC.

GRADATION TEST RESULTS

CLAY TO SILT	SAND			GRAVEL		COBBLES
	FINE	MEDIUM	COARSE	FINE	COARSE	

CLASSIFICATION SM

GRAVEL 1.5 %

SAND 65.3 %

FINES 33.2 %

SAMPLE# 1 HOLE# TH-13 DEPTH 4 FEET

NOTES: 6.7 % Moisture content

LL = 15.8 %

PL = 15.5 %

PI = 0.3 %

Job #: 11411 By: KO 05/13/2003

FRONT RANGE GEOTECHNICAL INC.

DRILL LOGS

JOB#: 11411

TEST BORING NO.: TH-14

DATE: 05/12/2003

0-6" TOPSOIL

6"-10' CLAY

fine grained

moderate density

moderate-highmoisture moisture content

low sand content

moderate plasticity

red-brown color

DEPTH (in ft.)	SYMBOL	SAMPLES	BLOW COUNT	WATER %	SOIL TYPE
2					
4			14 / 12"	13.1	
6					
8					
10			16 / 12"	14.3	CL
12					
14					
16					
18					
20					

JOB#:

TEST BORING NO.:

DATE:

DEPTH (in ft.)	SYMBOL	SAMPLES	BLOW COUNT	WATER %	SOIL TYPE
2					
4					
6					
8					
10					
12					
14					
16					
18					
20					

FRONT RANGE GEOTECHNICAL INC.

GRADATION TEST RESULTS

CLAY TO SILT	SAND			GRAVEL		COBBLES
	FINE	MEDIUM	COARSE	FINE	COARSE	

CLASSIFICATION CL

GRAVEL 0.0 %

SAND 25.0 %

FINES 75.0 %

SAMPLE# 1 HOLE# TH-14 DEPTH 10 FEET

NOTES: 14.3 % Moisture content

LL = 27.7 %

PL = 19.2 %

PI = 8.5 %

Job #: 11411 By: KO 05/13/2003

FRONT RANGE GEOTECHNICAL INC.

DRILL LOGS

JOB#: 11411

TEST BORING NO.: TH-15

DATE: 05/12/2003

DEPTH (in ft.)	SYMBOL	SAMPLES	BLOW COUNT	WATER %	SOIL TYPE
0-6" TOPSOIL					
6"-12" SAND					
fine grained					
low density					
moderate moisture content			40/12"	6.9	
low clay content					
low plasticity					
buff color					
12"-10' SANDSTONE					
fine-medium grained					
high density			70/12"	8.2	SC
moderate moisture content					
moderate clay content					
moderate plasticity					
buff color					
oxidized soil					
density increases w/depth					

JOB#:

TEST BORING NO.:

DATE:

DEPTH (in ft.)	SYMBOL	SAMPLES	BLOW COUNT	WATER %	SOIL TYPE

FRONT RANGE GEOTECHNICAL INC.

GRADATION TEST RESULTS

CLAY TO SILT	SAND			GRAVEL		COBBLES
	FINE	MEDIUM	COARSE	FINE	COARSE	

CLASSIFICATION SC

GRAVEL 12.2 %

SAND 64.3 %

FINES 23.5 %

SAMPLE# 1 HOLE# TH-15 DEPTH 10 FEET

NOTES: 8.2 % Moisture content

LL = 33.6 %

PL = 21.5 %

PI = 12.1 %

Job #: 11411 By: KO 05/13/2003

FRONT RANGE GEOTECHNICAL INC.

DRILL LOGS

JOB#: 11411

TEST BORING NO.: TH-16

DATE: 05/12/2003

0-6" TOPSOIL

6"-2' SAND

fine-coarse grained

moderate density

moderate moisture content

low clay content

low plasticity

tan color

2'-10' SANDSTONE

fine-coarse grained

high density

moderate moisture content

moderate sand content

moderate plasticity

buff color

DEPTH (in ft.)	SYMBOL	SAMPLES	BLOW COUNT	WATER %	SOIL TYPE
2					
4			45/12"	4.9	SC
6					
8					
10			40/12"	9.1	SC
12					
14					
16					
18					
20					

JOB#:

TEST BORING NO.:

DATE:

DEPTH (in ft.)	SYMBOL	SAMPLES	BLOW COUNT	WATER %	SOIL TYPE
2					
4					
6					
8					
10					
12					
14					
16					
18					
20					

FRONT RANGE GEOTECHNICAL INC.

GRADATION TEST RESULTS

CLAY TO SILT	SAND			GRAVEL		COBBLES
	FINE	MEDIUM	COARSE	FINE	COARSE	

CLASSIFICATION SC

GRAVEL 19.4 %

SAND 68.6 %

FINES 12.0 %

SAMPLE# 1 HOLE# TH-16 DEPTH 4 FEET

NOTES: 4.9 % Moisture content

LL = 31.4 %

PL = 23.0 %

PI = 8.4 %

CLAY TO SILT	SAND			GRAVEL		COBBLES
	FINE	MEDIUM	COARSE	FINE	COARSE	

CLASSIFICATION SC

GRAVEL 6.4 %

SAND 68.6 %

FINES 25.0 %

SAMPLE# 1 HOLE# TH-16 DEPTH 10 FEET

NOTES: 9.1 % Moisture content

LL = 30.9 %

PL = 20.8 %

PI = 10.1 %

Job #: 11411 By: KO 05/13/2003

FRONT RANGE GEOTECHNICAL INC.

DRILL LOGS

JOB#: 11411

TEST BORING NO.: TH-17

DATE: 05/12/2003

0-6" TOPSOIL

6"-4' SAND

fine grained

moderate density

moderate moisture content

low clay content

low plasticity

red-brown color

4'-10' SANDSTONE

very-coarse grained

high density

moderate moisture content

moderate sand content

moderate plasticity

tan color

DEPTH (in ft.)	SYMBOL	SAMPLES	BLOW COUNT	WATER %	SOIL TYPE
2					
4			45/12"	4.9	
6					
8					
10			40/12"	7.6	SC
12					
14					
16					
18					
20					

JOB#:

TEST BORING NO.:

DATE:

DEPTH (in ft.)	SYMBOL	SAMPLES	BLOW COUNT	WATER %	SOIL TYPE
2					
4					
6					
8					
10					
12					
14					
16					
18					
20					

FRONT RANGE GEOTECHNICAL INC.

GRADATION TEST RESULTS

CLAY TO SILT	SAND			GRAVEL		COBBLES
	FINE	MEDIUM	COARSE	FINE	COARSE	

CLASSIFICATION SC

GRAVEL 13.3 %

SAND 63.8 %

FINES 22.9 %

SAMPLE# 1 HOLE# TH-17 DEPTH 10 FEET

NOTES: 7.6 % Moisture content

LL = 31.3 %

PL = 20.3 %

PI = 11.0 %

Job #: 11411 By: KO 05/13/2003

FRONT RANGE GEOTECHNICAL INC.

DRILL LOGS

JOB#: 11411

TEST BORING NO.: TH-18

DATE: 05/12/2003

0-4" TOPSOIL

4"-8' SAND

fine-medium grained

moderate density

low-moderate moisture content

moderate clay content

moderate plasticity

tan color

8'-12' SANDSTONE

fine-medium grained

moderate-high density

moderate moisture content

low clay content

low plasticity

brown color

density increases w/depth

DEPTH (in ft.)	SYMBOL	SAMPLES	BLOW COUNT	WATER %	SOIL TYPE
2					
4			13/12"	4.5	SM
6					
8					
10			58/12"	6.0	
12					
14					
16					
18					
20					

JOB#:

TEST BORING NO.:

DATE:

DEPTH (in ft.)	SYMBOL	SAMPLES	BLOW COUNT	WATER %	SOIL TYPE
2					
4					
6					
8					
10					
12					
14					
16					
18					
20					

FRONT RANGE GEOTECHNICAL INC.

GRADATION TEST RESULTS

CLAY TO SILT	SAND			GRAVEL		COBBLES
	FINE	MEDIUM	COARSE	FINE	COARSE	

CLASSIFICATION SM

GRAVEL 8.8 %

SAND 72.5 %

FINES 18.7 %

SAMPLE# 1 HOLE# TH-18 DEPTH 4 FEET

NOTES: 4.5 % Moisture content

LL = 24.3 %

PL = 21.2 %

PI = 3.1 %

Job #: 11411 By: KO 05/13/2003

FRONT RANGE GEOTECHNICAL INC.

DRILL LOGS

JOB#: 11411

TEST BORING NO.: TH-19

DATE: 05/12/2003

0-6" TOPSOIL

6"-4' SAND

fine-medium grained

moderate density

moderate moisture content

moderate clay content

oderate plasticity

tan color

4'-10' SANDSTONE

fine-medium grained

moderate density

moderate moisture content

moderate clay content

moderate plasticity

buff color

density increases w/depth

DEPTH (in ft.)	SYMBOL	SAMPLES	BLOW COUNT	WATER %	SOIL TYPE
2					
4			33/12"	8.5	SC
6					
8					
10			60/12"	9.7	
12					
14					
16					
18					
20					

JOB#:

TEST BORING NO.:

DATE:

DEPTH (in ft.)	SYMBOL	SAMPLES	BLOW COUNT	WATER %	SOIL TYPE
2					
4					
6					
8					
10					
12					
14					
16					
18					
20					

FRONT RANGE GEOTECHNICAL INC.

GRADATION TEST RESULTS

CLAY TO SILT	SAND			GRAVEL		COBBLES
	FINE	MEDIUM	COARSE	FINE	COARSE	

CLASSIFICATION SC

GRAVEL 10.2 %

SAND 71.2 %

FINES 18.6 %

SAMPLE# 1 HOLE# TH-19 DEPTH 4 FEET

NOTES: 8.5 % Moisture content

LL = 30.3 %

PL = 21.1 %

PI = 9.2 %

Job #: 11411 By: KO 05/13/2003

FRONT RANGE GEOTECHNICAL INC.

DRILL LOGS

JOB#: 11411

TEST BORING NO.: TH-20

DATE: 05/12/2003

0-6" TOPSOIL

6"-3' SILT

very fine grained

low density

moderate moisture content

moderate clay content

moderate plasticity

buff color

3'-12' SAND

fine-medium grained

moderate density

moderate-high moisture content

moderate clay content

moderate plasticity

buff-brown color

DEPTH (in ft.)	SYMBOL	SAMPLES	BLOW COUNT	WATER %	SOIL TYPE
2					
4			19/12"	13.2	SM
6					
8					
10			18/12"	7.5	
12					
14					
16					
18					
20					

JOB#:

TEST BORING NO.:

DATE:

DEPTH (in ft.)	SYMBOL	SAMPLES	BLOW COUNT	WATER %	SOIL TYPE
2					
4					
6					
8					
10					
12					
14					
16					
18					
20					

FRONT RANGE GEOTECHNICAL INC.

GRADATION TEST RESULTS

CLAY TO SILT	SAND			GRAVEL		COBBLES
	FINE	MEDIUM	COARSE	FINE	COARSE	

CLASSIFICATION SM

GRAVEL 0.0 %

SAND 62.3 %

FINES 37.7 %

SAMPLE# 1 HOLE# TH-20 DEPTH 4 FEET

NOTES: 13.2 % Moisture content

LL = Could Not Be Determined

PL = Non-Plastic

Job #: 11411 By: KO 05/13/2003

FRONT RANGE GEOTECHNICAL INC.

DRILL LOGS

JOB#: 11411

TEST BORING NO.: TH-21

DATE: 05/12/2003

0-6" TOPSOIL

6"-3'6" SAND

fine-medium grained

moderate density

low moisture content

low clay content

low plasticity

buff color

3'6"-12' SANDSTONE

fine-medium grained

moderate-high density

moderate moisture content

low clay content

non-plastic

buff/weathered color

density increases w/depth

DEPTH (in ft.)	SYMBOL	SAMPLES	BLOW COUNT	WATER %	SOIL TYPE
4		■	28/12"	6.5	SM
10		■	34/12"	11.3	

JOB#:

TEST BORING NO.:

DATE:

DEPTH (in ft.)	SYMBOL	SAMPLES	BLOW COUNT	WATER %	SOIL TYPE

FRONT RANGE GEOTECHNICAL INC.

GRADATION TEST RESULTS

CLAY TO SILT	SAND			GRAVEL		COBBLES
	FINE	MEDIUM	COARSE	FINE	COARSE	

CLASSIFICATION SM

GRAVEL 10.6 %

SAND 72.2 %

FINES 17.2 %

SAMPLE# 1 HOLE# TH-21 DEPTH 4 FEET

NOTES: 6.5 % Moisture content

LL = Could Not Be Determined

PL = Non-Plastic

Job #: 11411 By: KO 05/13/2003

FRONT RANGE GEOTECHNICAL INC.

DRILL LOGS

JOB#: 11411

TEST BORING NO.: TH-22

DATE: 05/12/2003

0-16" TOPSOIL

16"-24" CLAY

fine grained

low density

moderate moisture content

moderate clay content

oderate plasticity

tan color

24"-10' SANDSTONE

fine-medium grained

very-high density

moderate moisture content

moderate clay content

moderate plasticity

buff color

DEPTH (in ft.)	SYMBOL	SAMPLES	BLOW COUNT	WATER %	SOIL TYPE
2					
4			46/12"	12.0	SC
6					
8					
10			54/12"	9.9	
12					
14					
16					
18					
20					

JOB#:

TEST BORING NO.:

DATE:

DEPTH (in ft.)	SYMBOL	SAMPLES	BLOW COUNT	WATER %	SOIL TYPE
2					
4					
6					
8					
10					
12					
14					
16					
18					
20					

FRONT RANGE GEOTECHNICAL INC.

GRADATION TEST RESULTS

CLAY TO SILT	SAND			GRAVEL		COBBLES
	FINE	MEDIUM	COARSE	FINE	COARSE	

CLASSIFICATION SC

GRAVEL 3.0 %

SAND 68.6 %

FINES 28.4 %

SAMPLE# 1 HOLE# TH-22 DEPTH 4 FEET

NOTES: 12.0 % Moisture content

LL = 29.4 %

PL = 18.4 %

PI = 11.0 %

Job #: 11411 By: KO 05/13/2003

FRONT RANGE GEOTECHNICAL INC.

DRILL LOGS

JOB#: 11411

TEST BORING NO.: TH-23

DATE: 05/12/2003

DEPTH (in ft.)	SYMBOL	SAMPLES	BLOW COUNT	WATER %	SOIL TYPE
0-24" TOPSOIL					
24"-36" SAND					
fine grained					
moderate density					
moderate moisture content			41/12"	9.1	SC
moderate clay content					
moderate plasticity					
tan color					
36"-15' SANDSTONE					
fine-medium grained					
very-high density			72/12"	6.9	
moderate moisture content					
moderate clay content					
moderate plasticity					
rust-oxidized color					
density increases w/depth					

2 4 6 8 10 12 14 16 18 20

JOB#:

TEST BORING NO.:

DATE:

DEPTH (in ft.)	SYMBOL	SAMPLES	BLOW COUNT	WATER %	SOIL TYPE

2 4 6 8 10 12 14 16 18 20

FRONT RANGE GEOTECHNICAL INC.

GRADATION TEST RESULTS

CLAY TO SILT	SAND			GRAVEL		COBBLES
	FINE	MEDIUM	COARSE	FINE	COARSE	

CLASSIFICATION SC

GRAVEL 0.5 %

SAND 50.3 %

FINES 49.2 %

SAMPLE# 1 HOLE# TH-23 DEPTH 4 FEET

NOTES: 9.1 % Moisture content

LL = 26.0 %

PL = 16.4 %

PI = 9.6 %

Job #: 11411 By: KO 05/13/2003

DEVELOPMENT DATA
LAND USE | SM LOTS | LG LOTS | TOTAL | % OF TOTAL
SINGLE FAMILY RESIDENTIAL | 73 | 87 | 160 |
SINGLE FAMILY RESIDENTIAL
OPEN SPACE (TRACTS A THRU F)
UTILITY COMPANY (TRACTS G THRU 1)
ROAD ROW (LF)
ROAD ROW (AC)
TOTAL | 100%
MINIMUM SMALL LOT SIZE - 0.5 AC
MINIMUM LARGE LOT SIZE - 2.5 AC
ADJOINING PROPERTY OWNERS
DEVELOPMENT NOTES
SYMBOLS
80'X80' POTENTIAL BUILDING ENVELOP
FINAL ENVELOP TO BE DETERMINED AT TIME OF PLOT PLAN APPROVAL
CULVERT (SEE PREL DRAINAGE REPORT)
DRAINAGE EASEMENT (SEE PREL DRAINAGE PLAN)
VICINITY MAP
SITE
TYPICAL ROADWAY SECTION WALDEN WAY - RURAL COLLECTOR
TYPICAL ROADWAY SECTION 60' ROW - RESIDENTIAL
NORTH
SCALE 1" = 200'
CONT. INT. = 1'
OCTOBER 24, 2003
REVISED JUNE 28, 2004
PRELIMINARY PLAN
EL PASO COUNTY, COLORADO
WALDEN PRESERVE SUBDIVISION
DEVELOPED BY: CUSTOM CASTLE, INC., 17145 COLONIAL PARK DR., MONUMENT, CO. 80132
LRA
LAND RESOURCE ASSOCIATES
8730 MOUNTAIN RD.
COLORADO SPRINGS, CO. 80809
719/683-2088
PRELIMINARY GEOLOGIC MAP
LEGEND
Qal - RECENT ALLUVIUM IN FLOODPLAIN
Qc - COLLUVIUM (SLOPEWASH)
Qac - MIXED ALLUVIUM AND COLLUVIUM
Tda - DAWSON ARKOSE FORMATION
SW - SEASONALLY WET AREAS
DA - DISTURBED AREA
FILL - MAN-PLACED FILL
2● - LOCATION AND NUMBER OF PERCOLATION TEST

FIGURE 2

LAND DESCRIPTION

A Tract of Land located in Sections 14, 15, 22 and 23, Township 11 South, Range 66 West of the 6th P.M., County of El Paso, State of Colorado. More particularly described as follows:

Beginning at the Center Quarter Corner (C1/4) of said Section 15; Thence N 00°28'47" E, along the Easterly Line of a Tract of Land as described in Book 4721 at page 1302 of the Records of the Clerk and Recorder Office of El Paso County, a distance of 1,041.62 feet, to a point on the Southerly Right-of-Way line of Pioneer Crossing;
N 89°15'20" E, along said southerly Right-Of-Way line of said Highway, a distance of 715.31 feet; Thence along the easterly line of a Tract of Land as described in Book 5045 at 0611312" S, along said southerly Right-Of-Way line of said Highway, a distance of 715.31 feet; Thence along the easterly line of a Tract of Land as described in Book 5045 at page 1302 of said records:
(1) Thence S 07°00'00" W, 139.23 feet;
(2) Thence S 12°45'00" W, 330.23 feet;
(3) Thence S 07°00'00" W, 330.23 feet;
(4) Thence S 01°15'00" E, 264.66 feet;
(5) Thence S 07°15'00" E, 164.66 feet;
(6) Thence S 07°15'00" E, 164.66 feet;
(7) Thence S 07°15'00" E, 132.91 feet;
(8) Thence S 07°45'00" E, 156.78 feet;
(9) Thence S 07°45'00" E, 131.00 feet;
to a point at the Southeast corner of said Tract.

Thence along the Westerly Line of Walden II Filing 2 as recorded in Plat book K-3 at page 40 of said records the following (5) eight courses:
(1) Thence S 07°45'00" E, 6.13 feet;
(2) Thence S 07°45'00" E, 330.00 feet;
(3) Thence S 07°45'00" E, 346.64 feet;
(4) Thence S 07°15'00" E, 330.00 feet;
(5) Thence S 07°15'00" E, 330.00 feet;
(6) Thence S 07°45'00" E, 54.20 feet;
(7) Thence S 07°45'01" E, 66.47 feet;
(8) Thence S 07°45'00" E, 35.07 feet;
to a point on the south boundary of the name of Walden II Filing 3 as recorded in Book 5-2 at page 49 of said records;

Thence along the Westerly Line of said Walden II Filing 3 the following (4) four courses:
(1) Thence S 04°00'00" E, 223.87 feet;
(2) Thence S 04°00'00" E, 224.30 feet;
(3) Thence S 04°00'00" E, 224.08 feet;
(4) Thence S 00°28'00" E, 384.04 feet;
to a point at the Northwest corner of Lot 1, Thomas Subdivision as recorded in Plat Book O-3 at page 13 of said records;

Thence S 00°28'00" E, 1061.28 feet to a point at the Northwest corner of a Tract of land described in Book 3837 at page 486 of said records; Thence along the Northerly and Westerly Line of said Tract the following (4) four courses:
(1) Thence S 00°28'00" E, 261.00 feet;
(2) Thence S 07°41'01" E, 110.00 feet;
(3) Thence S 00°28'00" E, 261.00 feet;
(4) Thence along the arc of a non-tangential curve to the right, having a central angle of 30°00'00", a radius of 140.00 feet, an arc length of 73.67 feet, whose chord bears S 17°00'00" E, to a point at the Northwest corner of Tract A in Walden II Filing 4, as recorded in Plat Book S-3 at page 48;

Thence along the arc of a curve to the left, having a central angle of 02°30'00", a radius of 100.00 feet, and an arc length of 243.00 feet, to a point on the Northerly line of a Tract of land described in Book 3837 at page 1848 of said records; Thence N 89°00'00" W, 208.02 feet; Thence S 00°00'00" W, 1,000.00 feet; Thence S 00°00'00" W, 1,064.66 feet; Thence N 89°00'00" W, 1,000.00 feet; Thence N 00°00'00" E