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GEOTECHNICAL STUDY
BLOSSOM MEADOWS
1700 WEST 100 SOUTH
LEHI, UTAH

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Prepared for:

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January 15, 2007

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1.0 INTRODUCTION

This report presents the results of a geotechnical study for a proposed residential development to be located at about 100 South 1700 West in Lehi, Utah. The approximate location of the proposed development is shown on Figure No. 1, *Vicinity Map*, at the end of this report.

The purposes of this investigation were to 1) evaluate the subsurface soil conditions at the site, 2) assess the engineering characteristics of the subsurface soils, and 3) provide geotechnical recommendations for general site grading, and the design and construction of foundations, concrete floor slabs, miscellaneous concrete flatwork, and asphalt pavement sections. The scope of work completed for this study included field reconnaissance, subsurface investigation, field and laboratory soil testing, engineering analysis, and the preparation of this report.

2.0 CONCLUSIONS

The following is a brief summary of our findings and conclusions:

1. High groundwater and potentially liquefiable subsurface soil layers are present on this site.

2. Soil conditions encountered at the test pit locations consisted of approximately 15 to 18 inches of topsoil followed by Fat Clay (CH), Lean Clay (CL), Silt (ML), and Sand (SC, SM, SP) layers extending to the maximum depths explored of approximately 7¼ to 9½ feet below the existing surface.

3. Groundwater was encountered at depths of about 6 to 8 feet below the existing surface. We do not recommend subgrade floor slabs, but if subgrade floor slabs are constructed, foundation drains should be installed.

4. The site is located in an area mapped as having high liquefaction potential. Loose to medium dense saturated sand layers were encountered in the test pits. These soils are estimated to have moderate to high liquefaction and settlement potential during an earthquake.

5. Depending on the time of construction and groundwater depths, near surface soils could be wet and require stabilization. Recommendations are provided in Section 8.5.

6. Footings may be constructed entirely on undisturbed, firm, uniform native soils, or entirely on a minimum 18 inches of properly placed and compacted structural fill placed on undisturbed firm native soils. A maximum bearing capacity of 1,500 psf may be used for design of the footings. More details regarding foundation design and drainage can be found in Sections 10.0 and 12.0 of this report.

These findings and conclusions should not be relied upon without reading and consulting this entire report for a more detailed description of the geotechnical evaluation and recommendations contained herein.

3.0 PROPOSED CONSTRUCTION

It is our understanding that the site will be developed with single family residences. We estimate that foundation loads for the proposed residences will not exceed 4 kips per linear foot for bearing walls and 150 pounds per square foot for floor slabs. If structural loads will be greater our office should be notified so that we may review our recommendations and, if necessary, make modifications.

In addition to the construction described above, we anticipate that utilities will be installed to service the proposed residences, that exterior concrete flatwork will be placed in the form of curb, gutter, sidewalks, and driveways, and that asphalt paved residential streets will be constructed.

4.0 SURFACE OBSERVATIONS

At the time our subsurface soil investigation was conducted most of the site was a field vegetated with grass and weeds. There was a residence and several barns in the northeast corner

of the site. Site grade sloped gently downward to the south. The site was bordered on the north, south, and west by residential development, and on the east by 1700 West street.

5.0 SUBSURFACE INVESTIGATION

The subsurface soil conditions at the site were assessed by a member of our geotechnical staff who supervised the excavation of 5 exploratory test pits on January 2, 2007. The test pits were excavated with a rubber tire backhoe at the approximate locations shown on Figure No. 2, and extended about 7¼ to 9½ feet below the existing surface.

The soils exposed in the test pits were classified by visual examination using the guidelines of the Unified Soil Classification System (USCS). Disturbed bag samples and relatively undisturbed block samples of the major soil layers were collected. Samples will be retained in our laboratory for 30 days following the date of this report and then discarded unless a written request for additional holding time is received prior to the disposal date.

5.0 LABORATORY TESTING

Selected soil samples were tested in the laboratory to assess pertinent engineering properties and to aid in classification. Laboratory testing consisted of natural moisture content and dry density tests, one-dimensional consolidation tests, Atterberg limits determinations, mechanical gradation analyses, and California Bearing Ratio (CBR) testing. The table on the following page presents the results of the laboratory testing. Test results are also given on the enclosed test pit logs at the respective sample depths, and on Figure Nos. 9 through 11, *Consolidation-Swell Test*, and Figure Nos. 12 and 13, *California Bearing Ratio Test*.

Table No. 1: Laboratory Test Results

TEST PIT NO.	DEPTH (ft.)	NATURAL MOISTURE (%)	NATURAL DRY DENSITY (pcf)	ATTERBERG LIMITS		GRAIN SIZE DISTRIBUTION (%)			SOIL TYPE
				LIQUID LIMIT	PLASTICITY INDEX	GRAVEL #4	SAND	SILT/ CLAY #200	
TP-1	1½	5	---	31	15	0	13	87	CL
TP-1	4	30	89	26	10	---	---	---	CL
TP-1	6¾	26	---	---	---	0	52	48	SM
TP-2	4½	26	89	23	16	---	---	---	CL
TP-3	2	18	95	22	3	---	---	---	ML
TP-3	7½	33	---	56	39	---	---	---	CH
TP-4	1½	4	---	25	9	2	51	47	SC
TP-4	5	25	---	28	12	---	---	---	CL
TP-5	5	4	---	---	---	5	91	4	SP

7.0 SUBSURFACE CONDITIONS

7.1 Soil Types

At the test pit locations the surface of the site was covered with topsoil which we observed to be about 15 to 18 inches in depth. Below the topsoil we encountered layers of Lean Clay (CL), Sandy Silt (ML), Fat Clay (CH), Clayey Sand (SC), Silty Sand (SM), and Poorly Graded Sand (SP) extending to the maximum depths explored of approximately 7¼ to 9½ feet below the existing surface.

Graphical representations and detailed descriptions of the soils encountered are shown on Figure Nos. 3 through 7, *Test Pit Log* at the end of this report. The stratification lines shown on the logs represent the approximate boundary between soil units; the actual transition may be gradual. Due to potential natural variations inherent in soil deposits, care should be taken in interpolating between and extrapolating beyond exploration points. A key to the symbols and terms on the logs is presented on Figure No. 8, *Legend.*

7.2 Groundwater Conditions

Groundwater was encountered in the test pits at approximate depths of 6 to 8 feet below the ground surface. Due to the variation in recharge time of the differing soil layers, these levels may not represent the natural static groundwater level. Previous investigations Earthtec has conducted in the immediate vicinity of the site encountered groundwater as shallow as 3½ feet.

The site is mapped by Utah County[1] in an area having shallow or surface groundwater. Groundwater depths will fluctuate in response to the season, precipitation, irrigation, and other on and off site influences. Precisely quantifying these fluctuations would require long term monitoring which is beyond the scope of this investigation. Due to the uncertainties in current and future groundwater elevations, and given that groundwater in the immediate vicinity of the site has been encountered as shallow as 3½ feet below the surface, we recommend that floor slabs not be placed below grade.

8.0 SITE GRADING

8.1 General Site Grading

Unsuitable soils and vegetation should be removed from below areas which will ultimately support structural loads. These areas include those below foundations, floor slabs, exterior concrete flatwork, and pavements. Unsuitable soils consist of topsoil, organic soils, undocumented fill, soft, loose, or disturbed native soils, and any other inapt materials. We encountered topsoil on the surface of the site which extended about 15 to 18 inches below the existing surface. The topsoil should be completely removed, even if found to extend deeper, along with any soil containing roots ¼ inch in diameter or larger, and any other unsuitable soils if encountered.

[1]Utah County Base Map Series, Wetlands, Utah County Government, 2001

Placing more than 3 feet of grading fill at the site (to raise general site grade) could induce consolidation of the native soils and settlement of the fill. If more than 3 feet of grading fill is planned, Earthtec should be notified so that appropriate recommendations can be provided. Such recommendations may include surcharging the site for several weeks or months to allow settlement to occur prior to construction. Stabilization, as discussed in Section 8.5 below, may be required to facilitate grading and construction operations.

8.2 Excavations

For excavations into the native soils or structural fill, less than five feet in depth, slopes should not be made steeper than 0.5:1.0 (horizontal:vertical). Excavations extending up to ten feet in depth should not be made steeper than 1:1. If unstable conditions or groundwater seepage are encountered flatter slopes or shoring or bracing may be required. We do not anticipate excavations deeper than 8 feet. Water will likely be encountered in utility excavations.

Because of shallow groundwater and clay soils, we recommend that excavations be made with a smooth blade bucket to minimize disturbance and that excavations be as shallow as possible.

8.3 Fill Material

Near surface native soils do not meet the requirements for structural fill presented below, and should not be used as structural fill, but may be stockpiled for use as fill in landscape areas.

Regular structural fill, if needed, should consist of imported material meeting the following requirements:

Maximum particle size:	4 inches
Percent retained on the 3/4 inch sieve (coarse gravel):	30 maximum
Percent passing the No. 200 sieve (fines):	15 maximum
Liquid Limit of fines:	35 maximum
Plasticity Index of fines:	15 maximum

In some situations, particles larger than 4 inches and/or more than 30 percent coarse gravel may be acceptable, however, compaction and compaction testing may be more difficult. As a result more strict quality control measures than normally used may be required. Such measures may include using thinner lifts, and increased or full time observation of fill placement.

Utility trench fill below structures, concrete flatwork, and asphalt should consist of structural fill as defined above. In other areas, utility trenches can be backfilled with soils, however, native fine grained soils may be difficult to compact due to problems controlling the moisture content. All backfill soil should meet the following requirements:

Maximum particle size:	4 inches
Liquid Limit of fines:	35 maximum
Plasticity Index of fines:	15 maximum

Fill in submerged areas should consist of free draining granular material (sand and/or gravel) meeting the following requirements:

Maximum particle size:	3 inches
Percent passing the No. 10 sieve:	25 maximum
Percent passing the No. 40 sieve:	15 maximum
Percent passing the No. 200 sieve (fines):	5 maximum

Three inch minus washed rock (sometimes called river rock or drain rock) and pea gravel meet these requirements and may be used as free draining fill. If free draining fill will be placed adjacent to soil containing a significant amount of sand or silt, precautions should be taken to prevent the migration of fine soil into the free draining fill. Such precautions should include either placing a filter fabric between the free draining fill and the adjacent material, or using a well graded, free draining fill material approved by the geotechnical engineer.

8.4 Fill Placement and Compaction

The thickness of each lift should be appropriate for the compaction equipment that is used. We recommend a maximum lift thickness of 4 inches for hand operated equipment, 6 inches for most "trench compactors", and 8 inches for larger rollers, unless it can be demonstrated by in-place density tests that the required compaction can be obtained throughout a thicker lift. The full thickness of each lift of structural fill placed should be compacted to at least the following percentages of the maximum dry density, as determined by ASTM D-1557:

In landscape areas not supporting structural loads:	90%
Less than 5 feet of fill below foundations, flatwork and pavements:	95%
Five or more feet of fill below foundations, flatwork and pavements:	98%

Generally, placing and compacting fill at a moisture content within 2% of the optimum moisture content, as determined by ASTM D-1557, will facilitate compaction. Typically, the further the moisture content is from the optimum the more difficult it will be to achieve the required compaction.

We recommend that fill be tested frequently during placement. Early testing is recommended to demonstrate that placement and compaction methods are achieving the required compaction. It is the contractors responsibility to ensure that fill materials and compaction efforts are consistent so that tested areas are representative of the entire fill.

8.5 Stabilization

Wet sands and/or fine-grained soils susceptible to rutting and pumping may be encountered in excavations. The likelihood of rutting and/or pumping, and the depth of disturbance, is proportional to the moisture content in the soil, the load applied to the ground surface, and the frequency of the load. Consequently, rutting and pumping can be minimized by avoiding concentrated traffic, minimizing the load applied to the ground surface by using lighter

equipment and/or partial loads, by working in dry times of the year, or by providing a working surface for equipment.

The soil in any obvious soft spots should be removed and replaced with granular material. If rutting or pumping occurs traffic should be stopped in the area of concern. The soil in rutted areas should be removed and replaced with granular material. In areas where pumping occurs the soil should either be allowed to sit until pore pressures dissipate (several hours to several days) and the soil firms up, or be removed and replaced with granular material. Typically, we recommend removal to a minimum depth of 18 inches. Removal and replacement to a greater depth, or the use of fabric as discussed below, may be required.

For granular material, we recommend using angular well-graded gravel, such as pit run, or crushed rock with a maximum particle size of four inches. We suggest that the initial lift be approximately 12 inches thick and be compacted with a static roller-type compactor. A finer granular material such as sand, gravelly sand, sandy gravel or road base may also be used. The more angular and coarse the material, the thinner the lift that will be required. We recommend that the fines content (percent passing the no. 200 sieve) be less than 15%, the liquid limit be less than 35, and the plasticity index be less than 15.

Using a geosynthetic fabric, such as Mirafi 500X or equivalent, may also reduce the amount of material required and avoid mixing of the granular material and the subgrade. If a fabric is used, following removal of disturbed soils and water, the fabric should be placed over the bottom and up the sides of the excavation a minimum of 18 inches. The fabric should be placed in accordance with the manufacturer's recommendations, including proper overlaps. The granular material should then be placed over the fabric in compacted lifts. Again, we suggest that the initial lift be approximately 12 inches thick and be compacted with a static roller-type compactor.

9.0 SEISMIC CONSIDERATIONS

9.1 Faulting

Based on published data no active faults are known to traverse the site and no surficial evidence of faulting was observed during our field investigation. The nearest mapped fault trace is one of a group of faults[2] located beneath Utah Lake and is approximately 2 miles south of the site. The Wastach Fault is located approximately 7 miles east-northeast of the site.

9.2 Liquefaction Potential

The site is located within an area which has been mapped by the Utah Geological Survey[3] as having high liquefaction potential. As a part of this investigation, the potential for liquefaction to occur in the soils we observed was assessed. Liquefaction is a phenomenon where a soil loses intergranular strength due to an increase in soil pore water pressures during a dynamic event such as an earthquake. The potential for liquefaction is based on several factors, including 1) the grain size distribution of the soil, 2) the plasticity of the fine fraction of the soil (material passing the No. 200 sieve), 3) relative density of the soil, 4) earthquake strength (magnitude) and duration, and 5) overburden pressures. In addition, the soils must be saturated for liquefaction to occur.

Loose, saturated sands are most susceptible to liquefaction. However, soft, sensitive silt soils also have the potential to experience failure and movement during a seismic event. Sensitive silt soils typically have moisture contents much higher than the liquid limit. We did encounter saturated sands layers in the test pits which we estimated to be in a loose to medium dense state. We estimate moderate to high liquefaction potential for these layers. If liquefaction were to occur residences constructed at this site would likely experience additional settlement. Additional subsurface exploration would be required to further assess the liquefaction potential

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[2]Hecker, S., 1993, Quaternary Faults and Folds, Utah, Utah Geologic Survey, Bulletin 127.

[3]Liquefaction Potential Map, Utah Geological Survey, Public Information Series 28. 1994.

and quantify the possible settlement. See Section 10.2 for additional information on potential settlement.

9.3 IRC Seismic Design Category

The Seismic Design Categories in the International Residential Code (IRC) are based upon the short period design accelerations determined using the seismic provisions of the International Building Code (IBC) and the soil properties in the upper 100 feet of the soil profile. These properties are determined from SPT blow counts and undrained shear strength measurements. The IBC code also states that "Where site specific data are not available to a depth of 100 feet, appropriate soil properties may be estimated by the registered design professional preparing the soils report...." Due to the presence of potentially liquefiable soil layers, the IBC Code requires the site to be designated Site Class F which would require additional subsurface exploration. However, there is a provision for structures with periods of vibration less than or equal to 0.5 seconds which allows Site Class to be determined without regard to liquefaction. A structural engineer would need to determine building period.

If building periods are less than or equal to 0.5 seconds, the site overall may be classified as Site Class E. The site is located at approximately 40.39 degrees north latitude and about -111.88 degrees west longitude. For Site Class E, Fa is 0.90 and $S_{DS} = 0.73$. The Seismic Design Category is D_1.

10.0 FOUNDATIONS

10.1 General

The foundation recommendations presented in this report are based on the soil conditions encountered at the site, the results of field testing of the native soils, the site grading recommendations presented in this report, and the foundation loading conditions presented in Section 3.0, *Proposed Construction*, of this report. If loading conditions are significantly

different, we should be notified in order to re-evaluate our design parameters and estimates, and to provide additional recommendations if necessary.

We recommend that foundations be constructed entirely on undisturbed, uniform, firm native soils, or entirely on a minimum 18 inches of properly placed and compacted structural fill. If loose soil remains in the completed excavation, it should be rolled with a smooth drum roller without vibration to provide a firm surface. If foundation soils exposed in excavations are soft and/or wet, we recommend the use of a geotextile below structural fill or other granular material as recommended in Section 8.5. If a fabric is used, we recommend placement of an initial 12 inch lift over the fabric and static compaction, followed by the remaining 6 inches of structural fill placed as recommended in Section 8.4. For design of conventional strip and spread footings, the following parameters are recommended:

Minimum embedment for frost protection:	30 inches
Minimum strip footing width:	20 inches
Minimum spot footing width:	30 inches
Maximum allowable net bearing pressure:	1,500 psf
Bearing pressure increase for transient loading:	33 percent

Foundations should not be installed on disturbed soils, undocumented fill, debris, frozen soil, or in ponded water. If foundation soils become disturbed during construction they should be recompacted to the requirements for structural fill presented in this report.

Structural fill used below foundations should extend laterally a minimum of 6 inches for every 12 vertical inches of structural fill placed. For example, if 18 inches of structural fill are required to bring the excavation to footing grade, the structural fill should extend laterally a minimum of 9 inches beyond the edge of the footings.

10.2 Estimated Settlement

If the proposed foundations are properly designed and constructed using the parameters provided above, total estimated settlement is less than one inch for non-seismic conditions. Differential settlement is anticipated to be one-half of the total settlement over a 25-foot length of foundation.

Additional differential settlement would likely occur during a seismic event. Precisely predicting when liquefaction may occur and quantifying the magnitude of possible settlement is difficult due to the many variables invloved. It may be possible to account for the additional settlement by tying foundations together and adding additional reinforcement to foundations such as that equivalent to a simply supported span of 15 feet. A qualified structural engineer should determine if these measures are appropriate. The developer and potential homeowners must accept full responsibility for the potential risks outlined above.

Additional settlement could also occur if more than 3 feet of grading fill is placed above the existing site grade.

11.0 SUBSURFACE DRAINAGE

According to Section R405 of the 2003 International Residential Code, "Drains shall be provided around all concrete or masonry foundations that retain earth and enclose habitable or usable spaces located below grade." An exception is allowed when the foundation is installed on well drained ground consisting of Group 1 soils. These soils include those defined by the Unified Soil Classification System as GW, GP, SW, SP, GM, and SM. We do not recommend placing floor slabs at any depth below the existing surface, but if they are, a foundation drain should be installed.

12.0 FLOOR SLABS

Because of the groundwater conditions encountered in the test pits, and uncertainties in both current and future groundwater levels, we recommend that floor slabs not extend below the existing ground surface. If it is desired that floor slabs be placed at any depth below the existing surface, a test pit should be excavated on each lot to a sufficient depth to encounter the groundwater. The test pit should be allowed to remain open for at least 24 hours and the water level measured. The floor slab should be kept at least 3 feet above the measured groundwater level.

To facilitate construction, act as a capillary break, and aid in distributing floor loads we recommend that all at-grade slabs and exterior flatwork be underlain by four inches of free-draining granular material such as "pea" gravel or three-quarters to one-inch minus clean gravel supported on competent native soils or structural fill.

To help control normal shrinkage and stress cracking the floor slabs should have the following features:

1. Adequate reinforcement for the anticipated floor loads with the reinforcement continuous through interior floor joints;
2. Frequent crack control joints; and
3. Non-rigid attachment of the slabs to foundation and bearing walls.

Special precautions should be taken during placement and curing of all concrete slabs and flatwork. Excessive slump (high water-cement ratios) of the concrete and/or improper finishing and curing procedures used during hot or cold weather conditions may lead to excessive shrinkage, cracking, spalling, or curling of slabs. We recommend all concrete placement and curing operations be performed in accordance with American Concrete Institute (ACI) codes and practices.

13.0 MOISTURE CONTROL AND SURFACE DRAINAGE

As part of good construction practices, precautions should be taken during and after construction to reduce the potential for saturation of foundation soils. We recommend the following:

1. Adequate compaction of foundation backfill should be provided i.e. a minimum of 90% of ASTM D-1557. **Water consolidation methods should not be used.**

2. The ground surface should be graded to drain away from the residences in all directions. We recommend a minimum fall of 6 inches in the first 10 feet.

3. Roof runoff should be collected in rain gutters with down spouts designed to discharge well outside of the backfill limits and at least 10 feet from structures.

4. Sprinklers should be aimed away from foundation walls. Sprinkler systems should be designed with proper drainage and well maintained. Over-watering should be avoided.

5. Other precautions which may become evident during design and construction should be taken.

14.0 PAVEMENT DESIGN

We understand that residential streets will be constructed as part of the development. Pavement design in Lehi City is based upon the results of California Bearing Ratio (CBR) tests conducted on samples of the soils which will support the pavement section. Accordingly, we collected samples of the near surface soils in Test Pits 1 and 4 for CBR testing. Test results are prcsented on Figure Nos. 12 and 13 and indicate a CBR value of 10. Using the tested CBR value and the Lehi City pavement design chart for a local street, the following pavement section is required:

Table No. 2: Pavement Section Design

ASPHALT THICKNESS (in)	COMPACTED ROADBASE THICKNESS (in)	COMPACTED SUBBASE THICKNESS (in)
3.0	6.0	6.0

Additional subbase may be required for stabilization. All base material and asphalt should conform to local requirements regarding thickness, gradation, oil content, and any other requirements pertaining to the project. We recommend that all roadbase and subbase be properly processed, moisture conditioned, and compacted to a minimum of 95% of the maximum dry density as determined by ASTM-D 1557. All asphalt should be compacted to a minimum of 95% of the laboratory Marshal mix design density.

15.0 GENERAL CONDITIONS

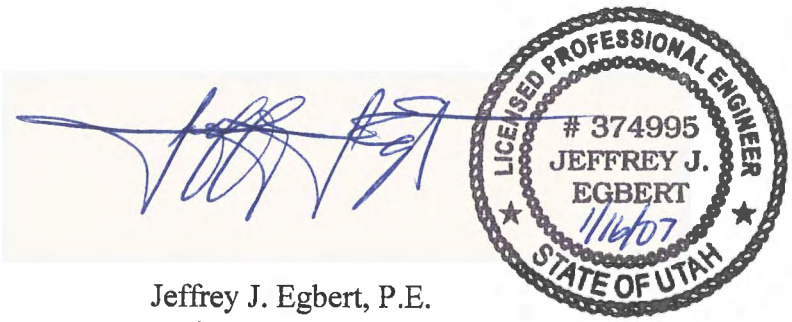
The exploratory data presented in this report was collected to provide geotechnical design recommendations for this project. The test pits may not be representative of subsurface conditions outside the study area or between points explored and thus have a limited value in depicting subsurface conditions for contractor bidding. Variations from the conditions portrayed in the test pits may occur and which may be sufficient to require modifications in the design. If during construction, conditions are different than presented in this report, please advise us so that the appropriate modifications can be made.

The geotechnical study as presented in this report was conducted within the limits prescribed by our client, with the usual thoroughness and competence of the engineering profession in the area. No other warranty or representation, either expressed or implied, is intended in our proposals, contracts or reports.

We appreciate the opportunity of providing our services on this project. If we can answer questions or be of further service, please call.

Respectfully;

EARTHTEC TESTING AND ENGINEERING, P.C.

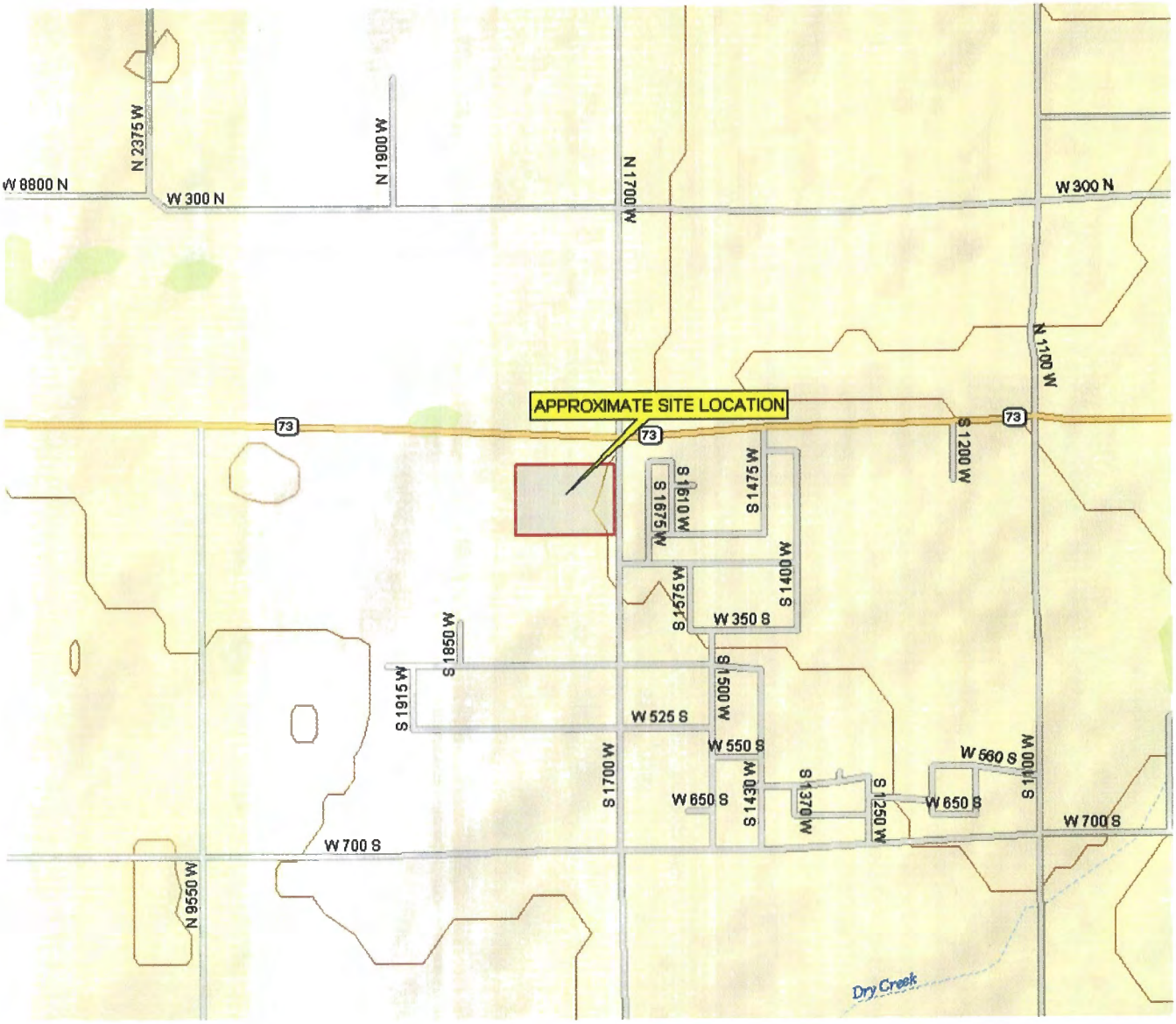


Jeffrey J. Egbert, P.E.
Project Geotechnical Engineer

William G. Turner, P.E.
Senior Geotechnical Engineer

VICINITY MAP

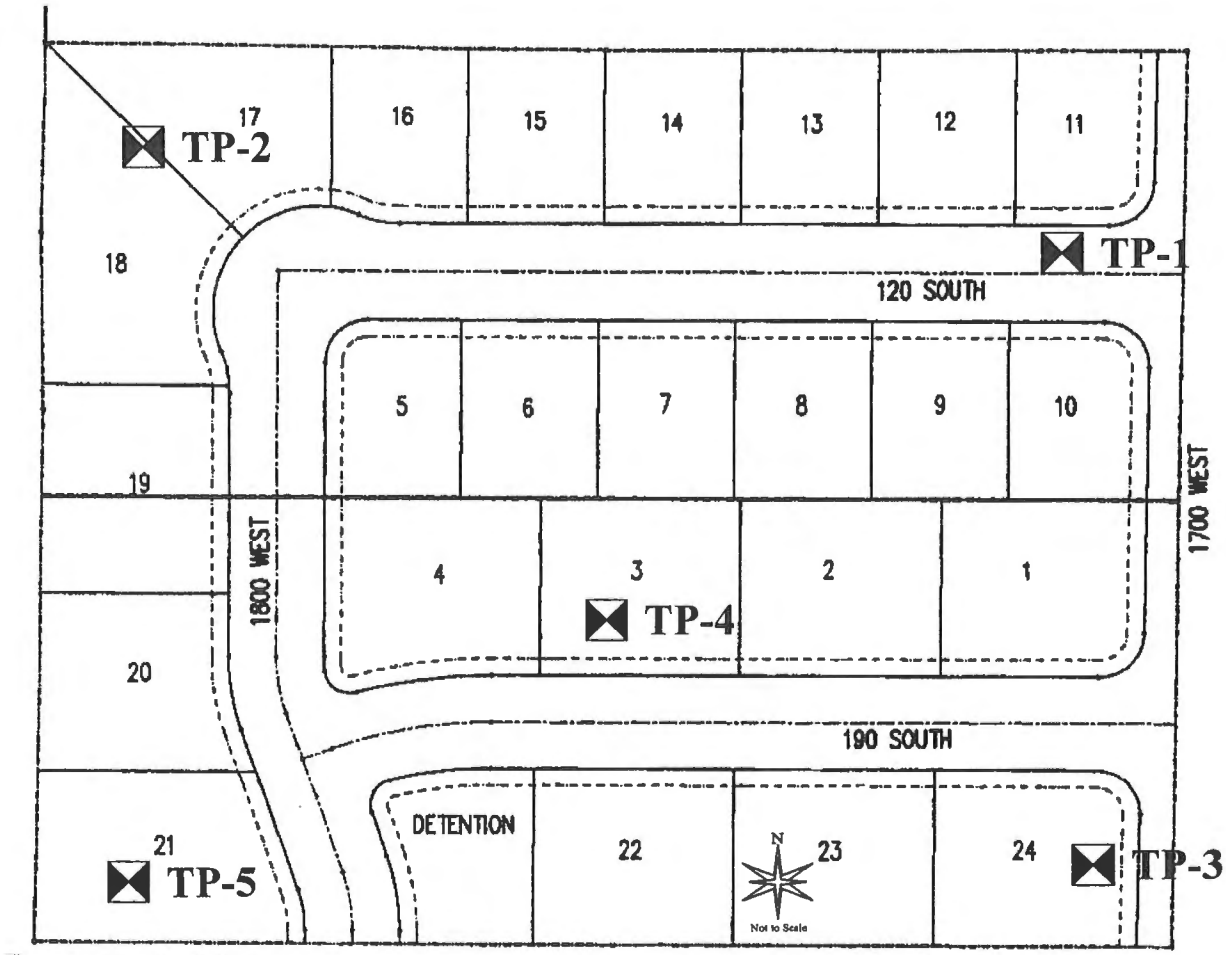
BLOSSOM MEADOWS



PROJECT NO.: 063589	Earthtec Testing and Engineering, P.C.	FIGURE NO.: 1

SITE PLAN & LOCATION OF TEST PITS

BLOSSOM MEADOWS



Approximate Test Pit Location

PROJECT NO.: 063589	Earthtec	FIGURE NO.: 2

TEST PIT LOG
NO.: TP-1

PROJECT:	Blossom Meadows	**PROJECT NO.:**	063589
CLIENT:	Patterson Construction	**DATE:**	01/02/07
LOCATION:	Refer to Figure 2.	**ELEVATION:**	NM
OPERATOR:	Halls	**LOGGED BY:**	B.S.
EQUIPMENT:	RTB		

DEPTH TO WATER; INITIAL ▽ : 6.5 ft. **AT COMPLETION ▼ :**

Depth (Ft.)	Graphic Log	USCS	Description	Samples	TEST RESULTS: Water Cont. (%)	Dry Dens. (pcf)	LL	PI	Gravel (%)	Sand (%)	Fines (%)	Other Tests
0			TOPSOIL: Clay, roots, moist, dark brown.									
2			LEAN CLAY, some sand, medium stiff, moist, brown.	X	5		31	15	0	13	87	CBR
4		CL		■	30	89	26	10				C
7		SM	SILTY SAND, loose, wet, brown.	X	26				0	52	48	
10			Bottom at approximately 7.25 feet.									

Notes:

Tests Key

CBR = California Bearing Ratio
C = Consolidation
R = Resistivity
DS = Direct Shear
SS = Soluble Sulfates
UC = Unconfined Compressive Strength

PROJECT NO.: 063589

Earthtec Testing and Engineering, P.C

FIGURE NO.: 3

LOG OF TESTPIT 063589.GPJ EARTHTEC.GDT 1/15/07

TEST PIT LOG
NO.: TP-2

PROJECT: Blossom Meadows
CLIENT: Patterson Construction
LOCATION: Refer to Figure 2.
OPERATOR: Halls
EQUIPMENT: RTB
DEPTH TO WATER; INITIAL ▽ : 6.75 ft.

PROJECT NO.: 063589
DATE: 01/02/07
ELEVATION: NM
LOGGED BY: B.S.
AT COMPLETION ▼ :

Depth (Ft.)	Graphic Log	USCS	Description	Samples	TEST RESULTS: Water Cont. (%)	Dry Dens. (pcf)	LL	PI	Gravel (%)	Sand (%)	Fines (%)	Other Tests
0			TOPSOIL: Clay with sand, roots, moist, brown.									
1												
2		SP	POORLY GRADED SAND, coarse grained, medium dense, moist, light brown.	X								
3												
4		SM	SILTY SAND, fine-grained, medium dense, moist, brown.	X								
5		CL	LEAN CLAY, layers of silty sand, soft, moderate pinholes in upper foot, moist to wet, brown.	■	26	89	23	16				C
6												
7			▽									
8		CH	FAT CLAY, stiff, moist, red-brown.	X								
9			Bottom at approximately 8.5 feet.									
10												

Notes:

Tests Key
CBR = California Bearing Ratio
C = Consolidation
R = Resistivity
DS = Direct Shear
SS = Soluble Sulfates
UC = Unconfined Compressive Strength

PROJECT NO.: 063589

Earthtec Testing and Engineering, P.C.

FIGURE NO.: 4

LOG OF TESTPIT 063589.GPJ EARTHTEC.GDT 1/12/07

TEST PIT LOG
NO.: TP-3

PROJECT: Blossom Meadows
CLIENT: Patterson Construction
LOCATION: Refer to Figure 2.
OPERATOR: Halls
EQUIPMENT: RTB
DEPTH TO WATER; INITIAL ▽ : 6.75 ft.

PROJECT NO.: 063589
DATE: 01/02/07
ELEVATION: NM
LOGGED BY: B.S.
AT COMPLETION ▼ :

Depth (Ft.)	Graphic Log	USCS	Description	Samples	TEST RESULTS: Water Cont. (%)	Dry Dens. (pcf)	LL	PI	Gravel (%)	Sand (%)	Fines (%)	Other Tests
0			TOPSOIL: Clay with sand, roots, moist, brown.									
2		ML	SILT with sand, moderate pinholes, stiff, moist, light brown.		18	95	22	3				C
4		SM	SILTY SAND, medium dense, mosit, brown.									
5		CL	LEAN CLAY, stiff to medium stiff, moist to wet, brown. ▽									
8		CH	FAT CLAY, stiff, moist, red-brown.		33		56	39				
9			Bottom at approximately 8.5 feet.									

Notes:

Tests Key
CBR = California Bearing Ratio
C = Consolidation
R = Resistivity
DS = Direct Shear
SS = Soluble Sulfates
UC = Unconfined Compressive Strength

PROJECT NO.: 063589

Earthtec Testing and Engineering, P.C.

FIGURE NO.: 5

LOG OF TESTPIT 063589.GPJ EARTHTEC.GDT 1/12/07

TEST PIT LOG
NO.: TP-4

PROJECT:	Blossom Meadows	**PROJECT NO.:**	063589
CLIENT:	Patterson Construction	**DATE:**	01/02/07
LOCATION:	Refer to Figure 2.	**ELEVATION:**	NM
OPERATOR:	Halls	**LOGGED BY:**	B.S.
EQUIPMENT:	RTB		

DEPTH TO WATER; INITIAL ▽ : 8 ft. **AT COMPLETION ▼ :**

Depth (Ft.)	Graphic Log	USCS	Description	Samples	TEST RESULTS: Water Cont. (%)	Dry Dens. (pcf)	LL	PI	Gravel (%)	Sand (%)	Fines (%)	Other Tests
0			TOPSOIL: Clay with sand, roots, moist, brown.									
2		SC	CLAYEY SAND, fine grained, trace gravel, medium dense, moist, light brown.	X	4		25	9	2	51	47	CBR
5		CL	LEAN CLAY, stiff, moist, light brown.	X	25		28	12				
8		CH ▽	FAT CLAY, stiff, moist, red-brown.									
9		SM	SILTY SAND with gravel, dense, wet, gray.	X								
10			Bottom at approximately 9.5 feet.									

Notes: Groundwater still rising when measured.

Tests Key

CBR = California Bearing Ratio
C = Consolidation
R = Resistivity
DS = Direct Shear
SS = Soluble Sulfates
UC = Unconfined Compressive Strength

PROJECT NO.: 063589

Earthtec Testing and Engineering, P.C.

FIGURE NO.: 6

LOG OF TESTPIT 063589.GPJ EARTHTEC.GDT 1/12/07

TEST PIT LOG
NO.: TP-5

PROJECT: Blossom Meadows
PROJECT NO.: 063589
CLIENT: Patterson Construction
DATE: 01/02/07
LOCATION: Refer to Figure 2.
ELEVATION: NM
OPERATOR: Halls
LOGGED BY: B.S.
EQUIPMENT: RTB
DEPTH TO WATER; INITIAL ▽ : 6 ft.
AT COMPLETION ▼ :

Depth (Ft.)	Graphic Log	USCS	Description	Samples	TEST RESULTS: Water Cont. (%)	Dry Dens. (pcf)	LL	PI	Gravel (%)	Sand (%)	Fines (%)	Other Tests
0			TOPSOIL: Silty sand, roots, moist, dark brown.									
2		SM	SILTY SAND, fine grained, medium dense, moist, brown.	X								
4		SP	POORLY GRADED SAND, some gravel, trace silt, medium dense, moist to wet, gray.	X	4				5	91	4	
8		CL	LEAN CLAY, medium stiff, moist, gray.	X								
9			Bottom at approximately 9 feet.									

Notes:

Tests Key
CBR = California Bearing Ratio
C = Consolidation
R = Resistivity
DS = Direct Shear
SS = Soluble Sulfates
UC = Unconfined Compressive Strength

PROJECT NO.: 063589

Earthtec Testing and Engineering, P.C.

FIGURE NO.: 7

LOG OF TESTPIT 063589.GPJ EARTHTEC.GDT 1/12/07

LEGEND

PROJECT: Blossom Meadows **DATE:** 01/02/07
CLIENT: Patterson Construction **LOGGED BY:** B.S.

UNIFIED SOIL CLASSIFICATION SYSTEM

MAJOR SOIL DIVISIONS			USCS SYMBOL	TYPICAL SOIL DESCRIPTIONS
COARSE GRAINED SOILS (More than 50% retaining on No. 200 Sieve)	GRAVELS (More than 50% of coarse fraction retained on No. 4 Sieve)	CLEAN GRAVELS (Less than 5% fines)	GW	Well Graded Gravel, May Contain Sand, Very Little Fines
			GP	Poorly Graded Gravel, May Contain Sand, Very Little Fines
		GRAVELS WITH FINES (More than 12% fines)	GM	Silty Gravel, May Contain Sand
			GC	Clayey Gravel, May Contain Sand
	SANDS (50% or more of coarse fraction passes No. 4 Sieve)	CLEAN SANDS (Less than 5% fines)	SW	Well Graded Sand, May Contain Gravel, Very Little Fines
			SP	Poorly Graded Sand, May Contain Gravel, Very Little Fines
		SANDS WITH FINES (More than 12% fines)	SM	Silty Sand, May Contain Gravel
			SC	Clayey Sand, May Contain Gravel
FINE GRAINED SOILS (More than 50% passing No. 200 Sieve)	SILTS AND CLAYS (Liquid Limit less than 50)		CL	Lean Clay, Inorganic, May Contain Gravel and/or Sand
			ML	Silt, Inorganic, May Contain Gravel and/or Sand
			OL	Organic Silt or Clay, May Contain Gravel and/or Sand
	SILTS AND CLAYS (Liquid Limit Greater than 50)		CH	Fat Clay, Inorganic, May Contain Gravel and/or Sand
			MH	Elastic Silt, Inorganic, May Contain Gravel and/or Sand
			OH	Organic Clay or Silt, May Contain Gravel and/or Sand
HIGHLY ORGANIC SOILS			PT	Peat, Primarily Organic Matter

SAMPLER DESCRIPTIONS

- SPLIT SPOON SAMPLER (1 3/8 inch inside diameter)
- MODIFIED CALIFORNIA SAMPLER (2 inch outside diameter)
- SHELBY TUBE (3 inch outside diameter)
- BLOCK SAMPLE
- BAG/BULK SAMPLE

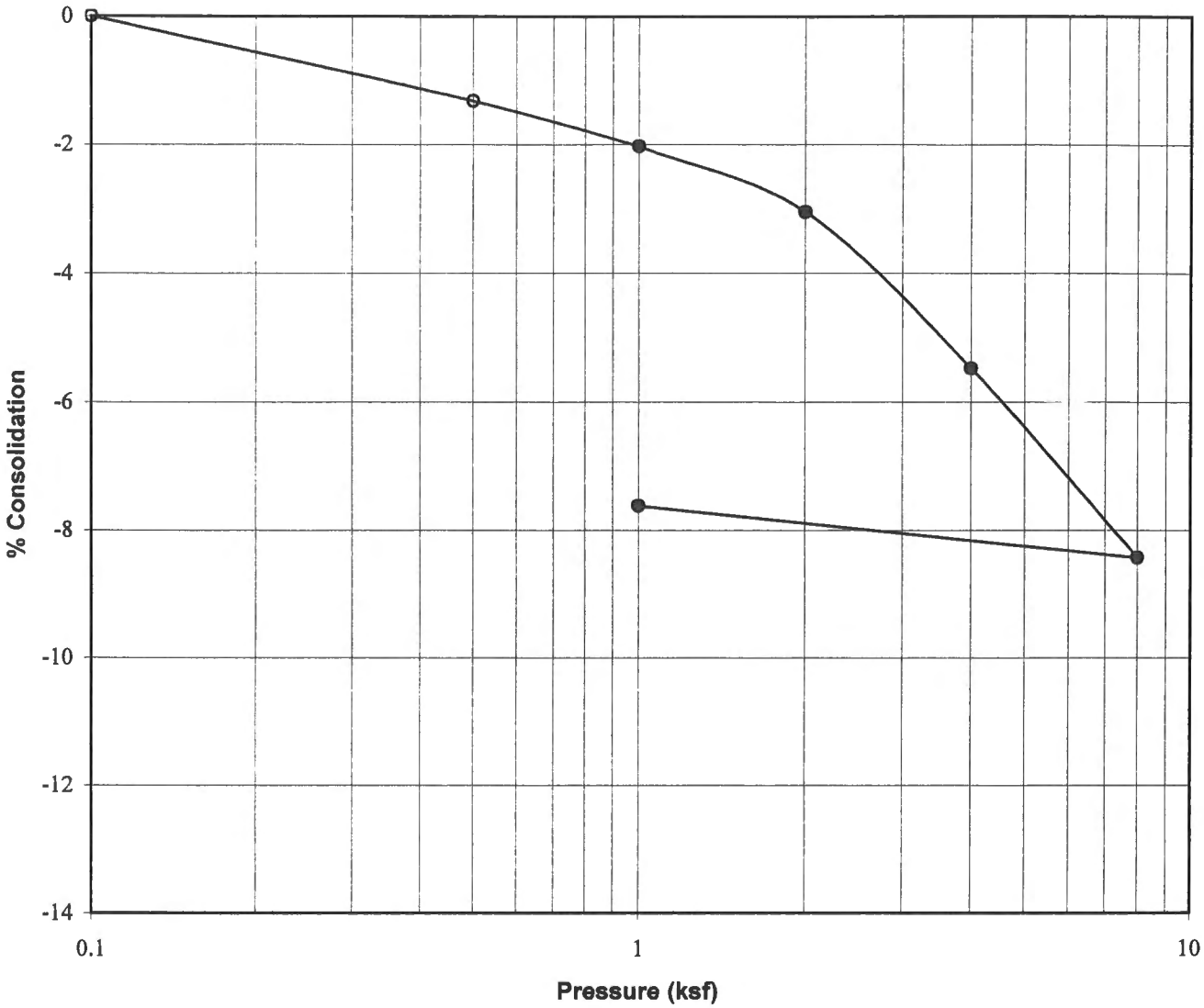
WATER SYMBOLS

- ▽ Water level encountered during field exploration
- ▼ Water level encountered at completion of field exploration

NOTES:
1. The logs are subject to the limitations, conclusions, and recommendations in this report.
2. Results of tests conducted on samples recovered are reported on the logs and any applicable graphs.
3. Strata lines on the logs represent approximate boundaries only. Actual transitions may be gradual.
4. In general, USCS symbols shown on the logs are based on visual methods only: actual designations (based on laboratory tests) may vary.

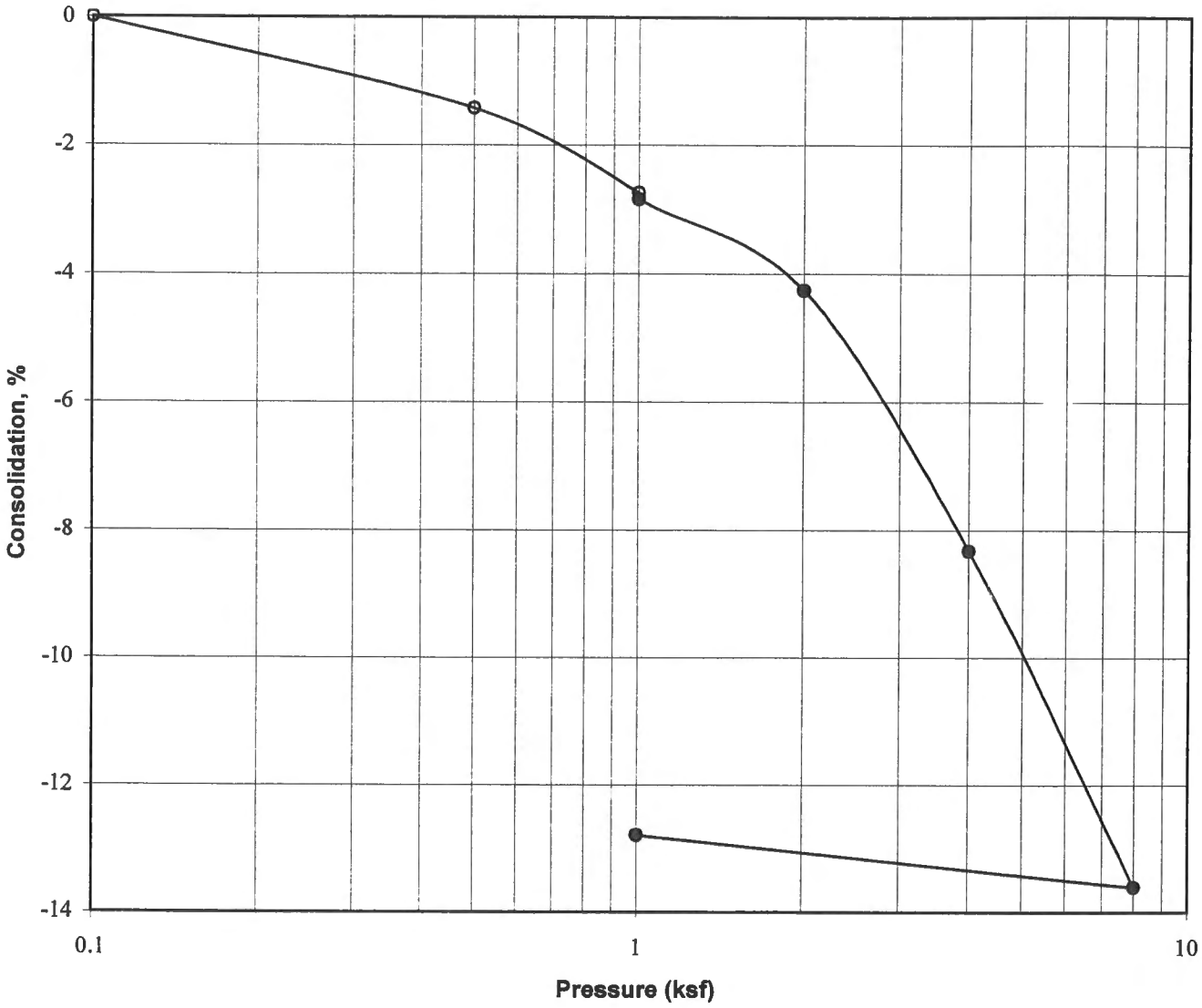
PROJECT NO.: 063589 | Earthtec Testing and Engineering, P.C. | **FIGURE NO.:** 8

CONSOLIDATION - SWELL TEST



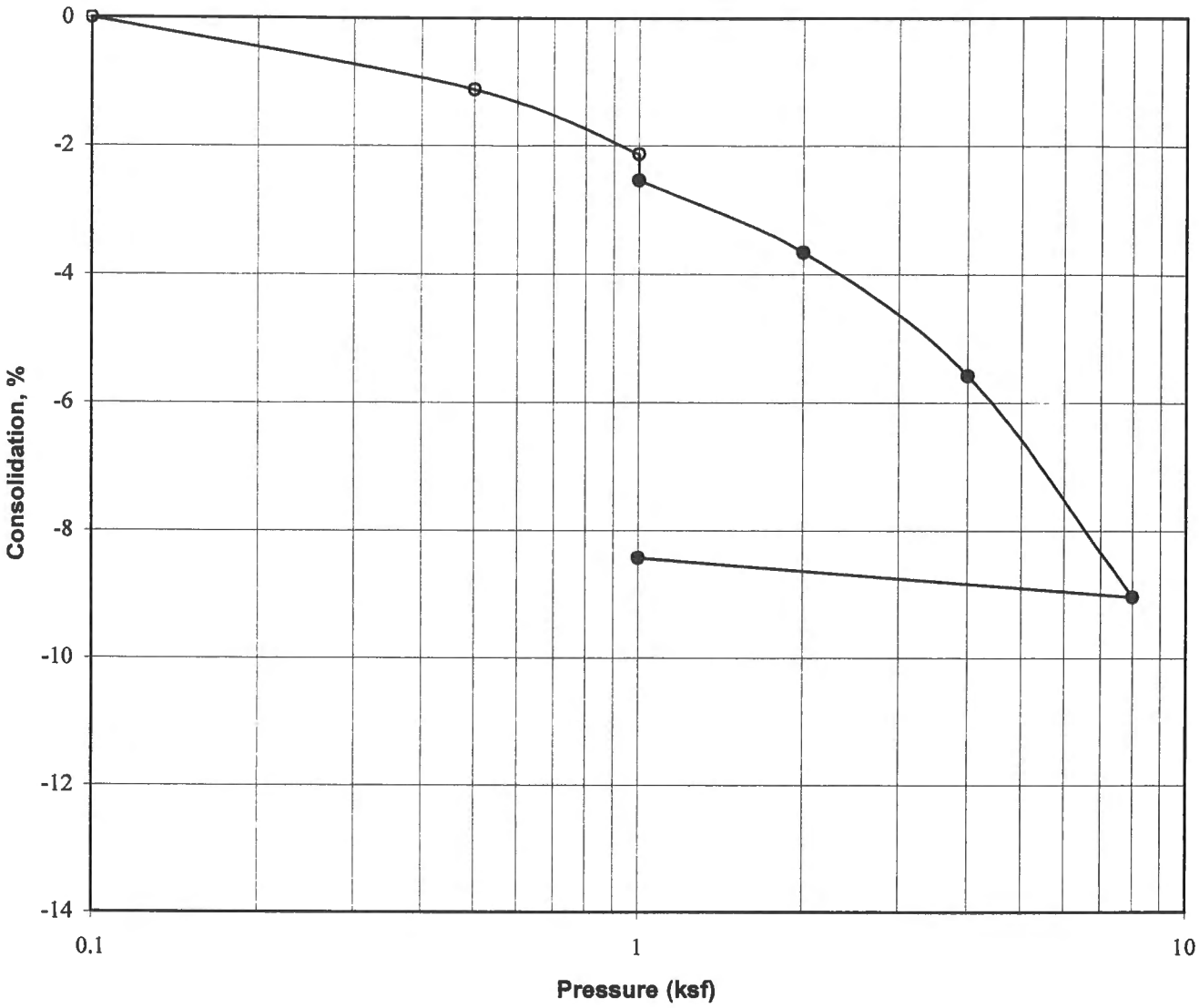
Project:	Blossom Meadows
Location:	TP-1
Sample Depth:	4
Description:	Block
Soil Type:	LEAN CLAY (CL)
Dry Density, pcf:	90
Natural Moisture, %:	30
Liquid Limit:	26
Plasticity Index:	10
Water Added at:	1 ksf

CONSOLIDATION - SWELL TEST



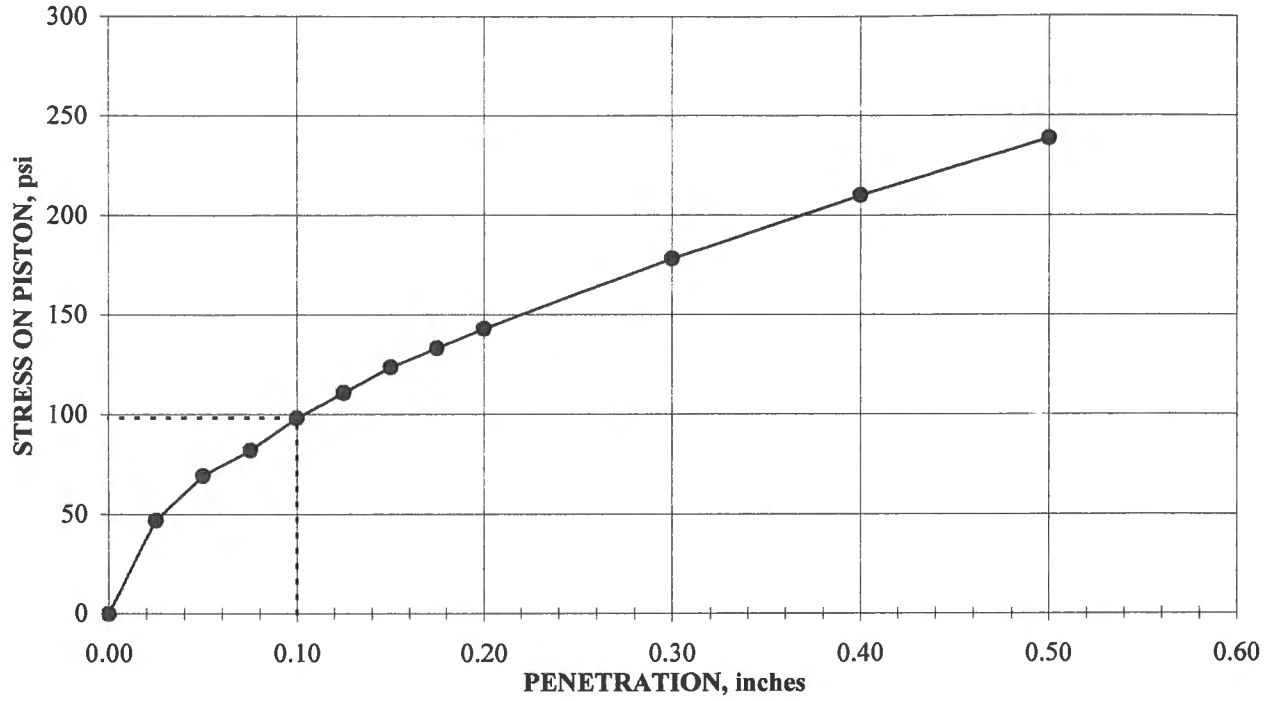
Project:	Blossom Meadows
Location:	TP-2
Sample Depth:	4½
Description:	Block
Soil Type:	LEAN CLAY (CL)
Dry Density, pcf:	89
Natural Moisture, %:	26
Liquid Limit:	23
Plasticity Index:	16
Water Added at:	1 ksf
Percent Collapse:	0.1

CONSOLIDATION - SWELL TEST



Project:	Blossom Meadows
Location:	TP-3
Sample Depth:	2
Description:	Block
Soil Type:	SILT with sand (ML)
Dry Density, pcf:	95
Natural Moisture, %:	18
Liquid Limit:	22
Plasticity Index:	3
Water Added at:	1 ksf
Percent Collapse:	0.4

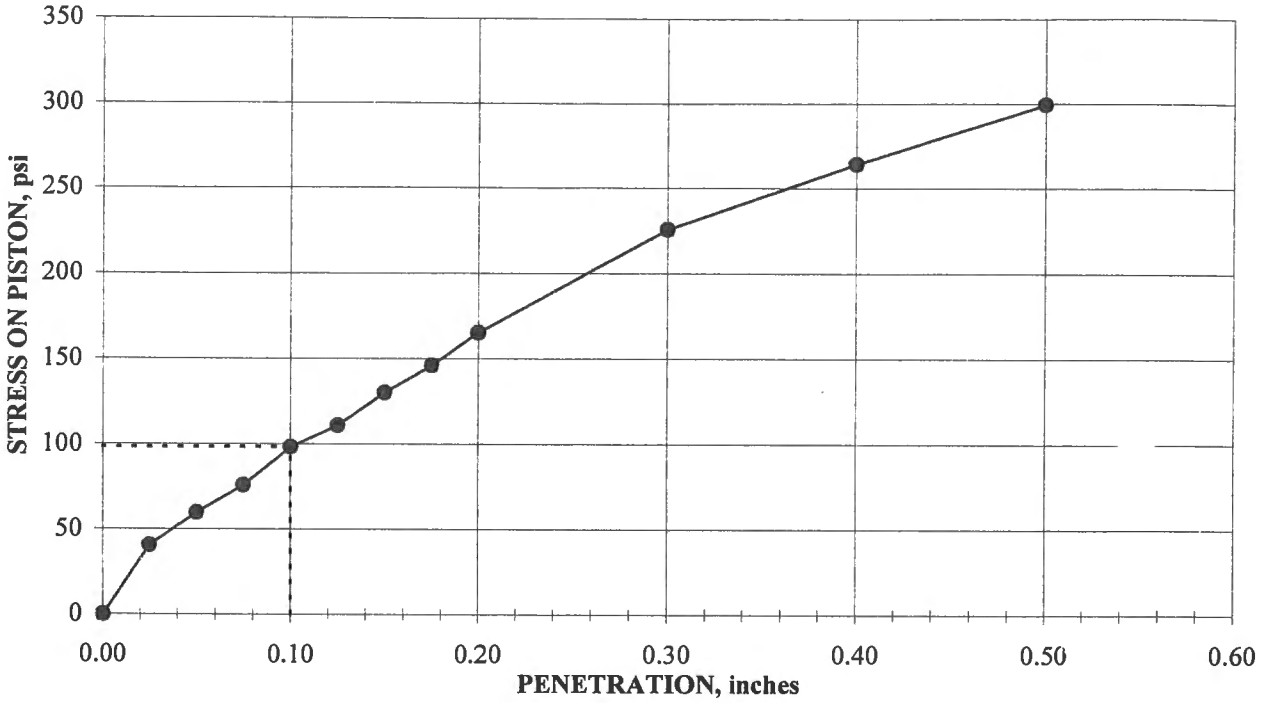
CALIFORNIA BEARING RATIO TEST



Project:	**Blossom Meadows**
Compaction Method:	**ASTM D698 Method A**
Sample Identification:	**TP-1 at 1.5 ft**
Maximum Dry Density, pcf:	**104.8**
Optimum Moisture Content, %:	**19.1**
Dry Density Before Soaking, pcf:	**105.8**
Dry Density After Soaking, pcf:	**---**
Relative Compaction, %:	**101**
Moisture Content Before Compaction, %:	**5.6**
Moisture Content At Compaction, %:	**18.6**

Quantities;	Gravel, %:	**0**
	Sand, %:	**13**
	Silt/Clay, %:	**87**
Liquid Limit:		**31**
Plasticity Index:		**15**
Material Description:		**LEAN CLAY (CL)**
Surcharge Weight, lb:		**10**
Soaking Period, hr:		**96**
Swell, %:		**0.5**
CBR Value, %:		**9.8**

CALIFORNIA BEARING RATIO TEST



Project:	**Blossom Meadows**
Compaction Method:	**ASTM D698 Method A**
Sample Identification:	**TP-4 at 1.5 ft**
Maximum Dry Density, pcf:	**113.5**
Optimum Moisture Content, %:	**14.2**
Dry Density Before Soaking, pcf:	**113.7**
Dry Density After Soaking, pcf:	**---**
Relative Compaction, %:	**100**
Moisture Content Before Compaction, %:	**4.2**
Moisture Content At Compaction, %:	**14.4**

Quantities;	Gravel, %:	**2**
	Sand, %:	**51**
	Silt/Clay, %:	**47**
Liquid Limit:		**25**
Plasticity Index:		**9**
Material Description:		**CLAYEY SAND (SC)**
Surcharge Weight, lb:		**10**
Soaking Period, hr:		**96**
Swell, %:		**0.2**
CBR Value, %:		**9.8**