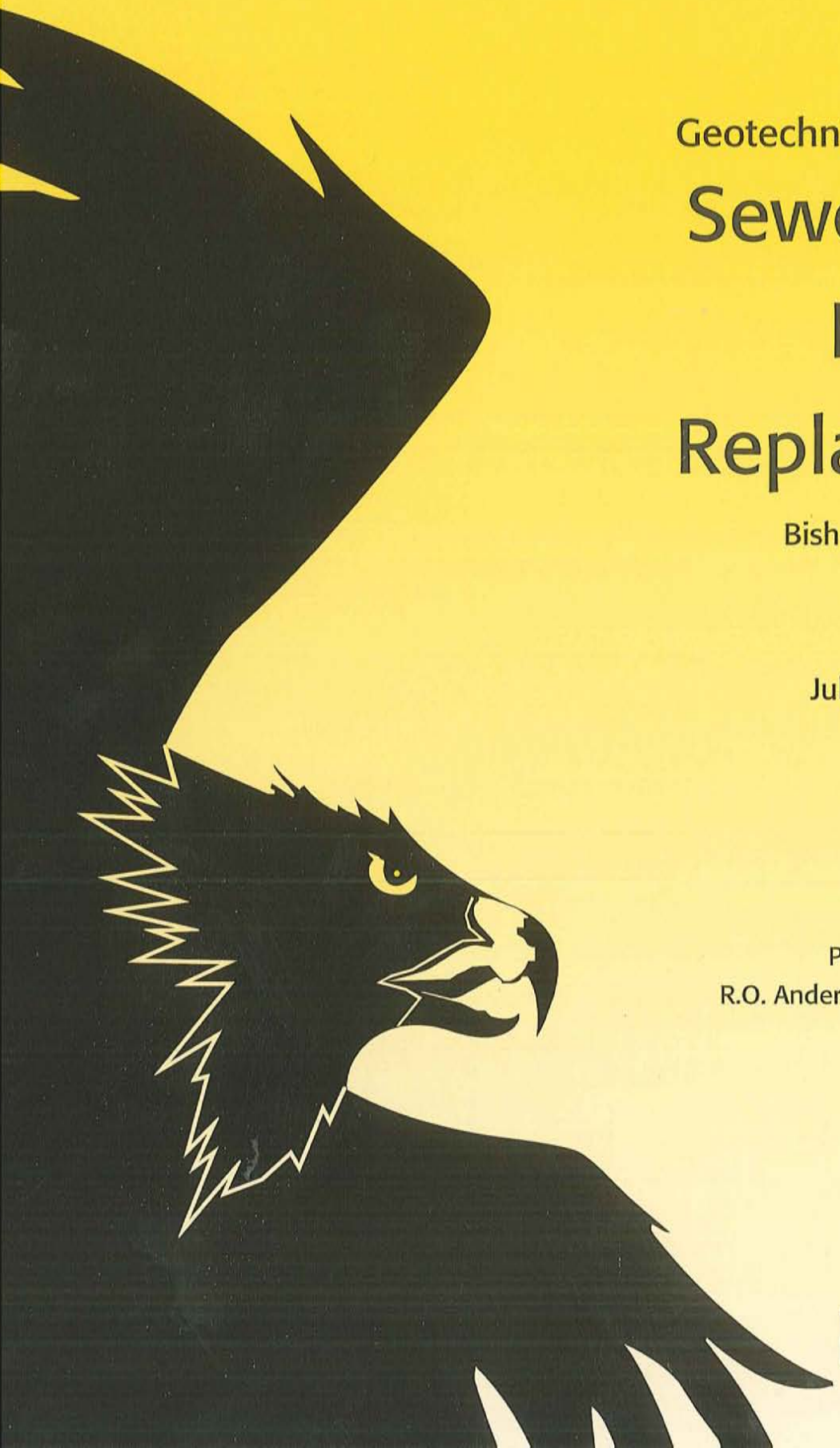
Black Eagle Consulting, Inc.



Geotechnical Investigation

Sewer Trunk Line Replacement

Bishop, California

July 16, 2012

Prepared for
R.O. Anderson Engineering, Inc.

Black Eagle Consulting, Inc.
Geotechnical & Construction Services

Mr. Kent Neddenriep, P.E.
R.O. Anderson Engineering, Inc.
1603 Esmeralda Avenue
Minden, NV 89423

July 16, 2012
Project No.: 0127-85-1

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RE: Geotechnical Investigation
Sewer Trunk Line Replacement
Bishop, California

Dear Mr. Neddenriep:

Black Eagle Consulting, Inc. is pleased to present the results of our geotechnical investigation for the proposed sewer trunk line replacement project in Bishop, California. Our investigation consisted of research, field exploration, laboratory testing, and engineering analysis to allow formulation of geotechnical conclusions and recommendations for design and construction of the proposed sewer line replacement project.

The proposed project will consists of the installation of 2,500± feet of new underground sewer trunk line to carry wastewater from the City of Bishop to the wastewater treatment plant located east of the city. The proposed trunk line will replace the existing 15 to 27 inch diameter. The new sewer line will be installed south of the existing alignment (parallel in most areas) and will be tied into the existing manhole just along the western edge of the Bishop Creek Canal. The trunk line may use an inverted siphon where it crosses under the canal. A total of approximately seven manholes will be installed along the line for maintenance. An unimproved road will be graded along the alignment for construction and maintenance access. The invert of the proposed sewer trunk alignment will be less than approximately 5 feet over most of the alignment and may drop to approximately 10 feet below existing grade near the canal. Locally, the invert of the pipe may rise as much as 2 feet above existing grade, so that short segments of the alignment will require placement of fill. No other site grading is anticipated in this project.

The proposed sewer line alignment is underlain by fine-grain silt and silty sand soils and sandy soils that will be suitable to use as final backfill material in the sewer trench, provided organics and gravel greater than ¾ inch in size are excluded. Initial backfill around the sewer pipes will require imported sand. Ground water was encountered at depths of approximately 9 to 11 feet near the Bishop Creek Canal and at 6.5 feet about 600 feet east of the canal. Dewatering is anticipated in the sewer line construction within and near the canal and some dewatering may be necessary in the western third of the alignment depending on the season of the construction and the final invert elevations of the pipes. Native soils more than a few feet below the existing

grade in the western half of the alignment are likely above the optimum moisture content and will be difficult to compact. Dry sandy soils (with very few fines) in the eastern third of the sewer line alignment will slough and cave during trench excavation. Compaction test results for two types of native soils are included for the use in compaction control during construction. The design of the proposed siphon near the canal may need to account for buoyancy forces.

We appreciate having the opportunity to work with you on this project. If you have any questions regarding the content of the attached report, please do not hesitate to contact us.

Sincerely,

Black Eagle Consulting, Inc.

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Introduction

Presented herein are the results of the Black Eagle Consulting, Inc. (BEC) geotechnical investigation, laboratory testing, and associated geotechnical design recommendations for the proposed sewer trunk line replacement project to be located in Bishop, California. These recommendations are based on surface and subsurface conditions encountered in our explorations, and on details of the proposed project as described in this report. The objectives of this study were to:

1. Determine general soil and ground water conditions pertaining to design and construction of the proposed underground sewer trunk line.

2. Provide recommendations for design and construction of the project, as related to these geotechnical conditions.

The area covered by this report is shown on Plate 1 (Plot Plan). Our investigation included field exploration, laboratory testing, and engineering analysis to determine the physical and mechanical properties of the various on-site materials. Results of our field exploration and testing programs are included in this report and form the basis for all conclusions and recommendations.

The services described above were conducted in accordance with the BEC Professional Geotechnical Agreement dated December 19, 2011, that was signed by Mr. Kent Neddenriep of R. O. Anderson Engineering, Inc.

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Project Description

The proposed project will consists of the installation of 2,500± feet of new underground sewer trunk line to carry wastewater from the City of Bishop to the wastewater treatment plant located east of the city. The proposed trunk line will replace the existing 15 to 27 inch diameter. The new sewer line will be installed south of the existing alignment (parallel in most areas) and will be tied into the existing manhole just along the western edge of the Bishop Creek Canal. The new polyvinyl chloride (PVC) SDR 35 sewer pipes will have an internal diameter ranging from 18 to 24 inches and will be installed at an approximate 0.15 percent slope. The trunk line may use an inverted siphon where it crosses under the canal. The siphon will be constructed of PVC or ductile iron with either 2 or 3 pipes in a common trench. The pipe diameters will be 12 to 18 inch diameter, pending final design. Four 48 inch diameter and three 60 and 84 inch manholes will be installed along the line for maintenance. The larger manholes will be near the canal and related to the inverted siphon and potential diversions and interties with existing sewer lines. An unimproved road will be graded along the alignment for construction and maintenance access.

The invert of the proposed sewer trunk alignment will be less than approximately 5 feet over most of the alignment and may drop to approximately 10 feet below existing grade near the canal. The sewer pipe may be encased in Portland cement concrete (PCC) or otherwise protected where it is too shallow. Locally, the invert of the pipe may rise as much as 2 feet above existing grade, so that short segments of the alignment will require placement of fill. No other site grading is anticipated in this project.

Site Conditions

Most of the proposed sewer line alignment falls within undeveloped land except for the short eastern and western-end segments. The western-end segment of the alignment crosses an unimproved road and the existing Bishop Creek Canal. A horse barn is located east of the access roadway followed by undeveloped land. The eastern-end segment is located within the City of Bishop wastewater treatment facility. The alignment crosses gated wire fence lines at three locations; east of the unimproved road, east of horse barn, and the western perimeter of the wastewater treatment facility. The existing underground sewer trunk is located approximately up to 50 feet north of the proposed replacement line alignment. No other structures are present crossing the new alignment.

The Bishop Creek Canal flows north to south and is approximately 10 to 15 feet wide and 5 feet deep at the proposed crossing. The water level in the canal was approximately 3 to 4 feet below the adjacent grade of the unimproved roadway during our exploration.

The native ground along the sewer alignment slopes to the east at approximately 1.5 percent in the western half and is nearly flat with less than a 0.5 percent slope in the eastern half. Elevations vary from 4,128 feet above mean sea level (msl) near the canal to approximately 4,120 msl in the eastern half of the alignment.

Bishop Creek Canal (Western End of Sewer Line Alignment)

The undeveloped land east of the horse barn is forested with mature trees and brush. The density of the vegetation reduces towards the waste water treatment plan; the treatment plant premise is free of any vegetation. Although numerous large mature trees are present between the barn and the treatment facility, none were noted along the proposed alignment.

Exploration

Test Pits

The sewer truck line alignment was explored on May 31, 2012 by excavating 5 test pits using a Case® 580 Super L rubber tire backhoe. Locations of the test pits are shown on Plate 1. The maximum depth of exploration was 12.5 feet below the existing ground surface. Bulk samples for index testing were collected from the trench wall sides at specific depths in each soil horizon. Pocket penetrometer testing was performed in exposed, fine-grained soil interbeds to evaluate in-place, unconfined compressive strength for evaluating trench stability.

Test Pit Excavation (TP-05)

Material Classification

A civil engineer examined and identified all soils in the field in accordance with ASTM D 2488. During drilling, representative bulk samples were placed in sealed plastic bags and returned to our Reno, Nevada laboratory for testing. Additional soil classification was subsequently performed in accordance with ASTM 2487 (Unified Soil Classification System [USCS]) upon completion of laboratory testing as described in the **Laboratory Testing** section. Logs of the test borings are presented as Plate 2 Boring Logs, and a USCS chart has been included as Plate 3 (Graphic Soils Classification Chart).

Laboratory Testing

All soils testing performed in the BEC soils laboratory is conducted in accordance with the standards and methodologies described in Volume 4.08 of the ASTM Standards.

Index Tests

Samples of each significant soil type were analyzed to determine their in situ moisture content (ASTM D 2216), grain size distribution (ASTM D 422), and plasticity index (ASTM D 4318). The results of these tests are shown on Plate 4 (Index Test Results). Test results were used to classify the soils according to ASTM D 2487 and to verify field logs, which were then updated as appropriate. Classification in this manner provides an indication of the soil's mechanical properties and can be correlated with published charts (Bowles, 1996; Naval Facilities Engineering Command [NAVFAC], 1986a and b) to evaluate soil strength parameters.

Laboratory Moisture-Density Relation Tests

Two moisture-density relation tests (ASTM D 1557) were performed on representative native soils that can potentially be used for final backfill in the sewer trenches. During construction, the maximum density shown by these tests and any additional moisture-density tests can be compared with field densities to determine the percent relative compaction. The moisture density curves are included as Plate 5 (Compaction Test Reports) and the test results are summarized below in Table 1 (Compaction Test Results Summary).

TABLE 1 - COMPACTION TEST RESULTS SUMMARY

Test Pit No.	Sample Depth (feet)	Soil Type	Maximum Dry Density (pcf)	Optimum Moisture Content (%)
TP-02	0.5-5.0	Poorly Graded Sand with Silt (SP-SM); 9 percent non-plastic fines.	113.4	11.8
TP-05	2.0-9.0	Silty Sand (SM); 41 percent non-plastic fines	114.1	14.4

pcf - pounds per cubic foot.

Chemical Tests

Chemical testing was performed on fine-grain native soil samples to evaluate the site materials' potential to corrode steel and Portland cement concrete in contact with the ground. The samples were tested for pH, resistivity, redox potential, soluble sulfates and sulfides. The results of the chemical tests are shown on Plate 6 (Chemical Test Results). Chemical testing was performed by Sierra Environmental Monitoring, Inc. (SEM) of Reno, Nevada.

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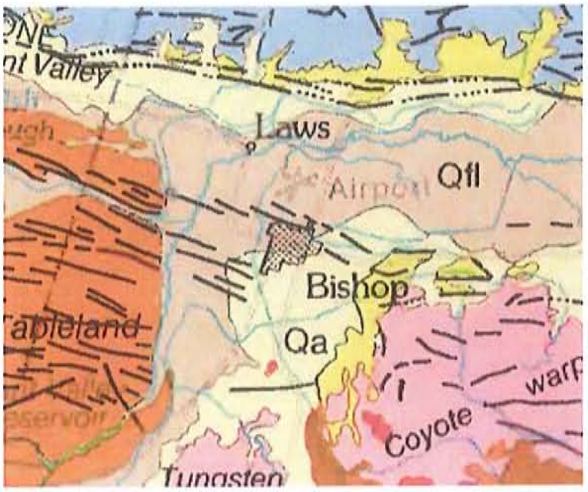
Geologic and General Soil Conditions

Geologic mapping by United States Geological Survey (USGS) indicates the proposed sewer line alignment lies on soils described as Younger (Quaternary age) alluvial fan deposits associated with the Owens Valley (Hollett J.K. et al., 1991). The surficial deposits (Qa) in the area are described by USGS as consisting of *poorly sorted, unconsolidated gravel, sand, silt and clay.*



Geologic Map

Approximately 2 feet of fill (silty sand with gravel) is present in the unimproved roadway crossing the sewer alignment near the canal. Approximately one foot of sandier fill material (possibly locally sourced) is also present within the wastewater treatment facility. The fill at these locations and all other sewer alignment areas is underlain by native silt, sand, and gravel alluvial fan deposits, aptly described by the USGS.

The alluvial fan deposits in the western half of the alignment are finer (interbeded fine sand and silt soils) within approximately 7 to 9 feet below existing grade and become coarse sand and gravels in the eastern half approaching the wastewater treatment facility. Sand and gravel soils were encountered below the fine-grain soils in the western half of the alignment. The upper finer soils in the west-half (test pit TP-03 through TP-05) are described as slightly moist to very moist, medium dense or stiff silty sand or sandy silt and contain approximately 26 to 55 percent non-plastic to low plasticity fines, 50 to 74 percent fine to coarse sand, and a trace amount of fine gravel. The underlying sandy soils in the west-half of the alignment are described as wet, dense poorly graded sand with gravel (and silt) and contain approximately 0 to 10 percent non-plastic fines, 60 to 80 percent fine to coarse sand, and 20 to 30 percent subrounded fine to coarse gravel. The eastern half of the alignment is underlain by dry to slightly moist, loose to medium dense poorly graded sand soils that consists of approximately 0 to 10 percent non-plastic fines and 90 to 95 percent fine to medium sand. Sandy soils in the eastern end of the alignment contain as much as 35 percent of unconsolidated subrounded to rounded fine to coarse gravel starting at an approximate depth of 2.5 feet below existing grade. The wet gravelly soils at depth and unconsolidated gravel soils in the western and eastern end

segments of the sewer line alignment, respectively, caved-in during the test pit excavation.

During the exploration, static ground water level was measured approximately 6.75 and 11 feet below existing grade in test pits TP-04 and TP-05, respectively, in the western third of the sewer alignment. Ground water started to seep in approximately 9 feet below existing grade, during excavation of test pit TP-05, at the interface of fine-grain soils and coarse sandy soils. The water level stabilized at a depth of 11 feet. No ground water was encountered in the eastern three test pits that were extended to a maximum of 8 feet below existing grade.

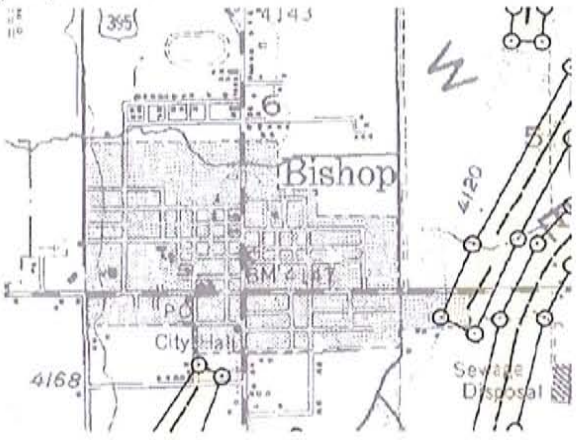
Ground water levels in west-half of the sewer line alignment, especially near the Bishop Creek Canal, may raise or fall depending on the flow and depth of water within canal, which can vary seasonally and depending on the irrigation in the area. The elevation of ground water nearer the canal will approximate the level of water in the canal. At the time of exploration, water level in the canal was at an approximate elevation of 4126 to 4127 feet above msl. Initial seepage into test pit TP-05 was at elevation 4120 feet and later stabilized at about 4118 feet msl. Test pit TP-05 that was located about 25 feet east of the east bank of the Bishop Canal.

Geologic Hazards

Seismicity, Faulting and Ground Rupture

The Bishop area lies within an area with a potential for strong earthquake shaking (California Building Standards Commission [CBSC], 2010) due to the nearby presence of potentially active Owens Valley Fault Zone and White Mountain Fault Zone. The Alquist-Priolo Earthquake Fault Zoning Act was originally signed into law in 1972 as the Alquist-Priolo Geologic Hazard Zones Act in order to prohibit the location of most structures for human occupancy across the traces of active faults and to thereby mitigate the hazard of fault rupture (California Geological Survey [CGS], 2010). Under this act, the State Geologist is required to delineate Earthquake Fault Zones (EFZs), and counties affected by the zones must withhold development permits for sites within the zones until geologic investigations demonstrate the sites are not threatened by surface displacement from future faulting. As defined by this act, a fault is a fracture or zone of closely associated fractures along which rocks on one side have been displaced with respect to those on the other side; a fault zone has significant width, ranging from a few feet to several miles; an active fault is one which has had surface displacement within Holocene time (about the last 11,000 years); and a potentially active fault is one with evidence of displacement during Quaternary time (within the last 1.6 million years) and exhibits a relatively high potential for ground rupture (it is sufficiently active and well-defined). Classification of a fault as potentially active requires investigation, analysis, and judgment by a qualified geologist (CGS, 2010).

The proposed sewer line alignment crosses two EFZs defined by Alquist-Priolo Earthquake Fault Zoning Act, as shown on the map for Bishop SW ¼ Quadrangle (CGS, 2010). These EFZs are associated with the Holocene active fault splays of the Keoug Hot springs section of the Owens Valley Fault Zone. The mentioned Holocene fault splays have a normal fault mechanism with an approximate 1 to 5 millimeters per year movement (USGS, 2012). However, the sewer alignment is not a structure for human occupancy and there are no regulations in California or other states requiring fault investigations for utility crossings. Further, any damages to underground sewer lines due to fault rupture would not be



Fault Zone Map

life threatening. If rupture occurs at these faults, the sewer line should be inspected for probable damage and repaired as necessary. Automatic shutoff valves could be considered upslope of the fault to minimize sewage spill.

Ground Motion and Liquefaction

Mapping by the United States Geological Survey (USGS, 2011) indicates that there is a 2 percent probability that a *bedrock* ground acceleration of 0.59g will be exceeded in any 50-year interval. Some amplification of ground motion would be expected during an earthquake depending on the depth and density of the alluvial valley fill within the Owens Valley.

A detailed liquefaction analysis of the site was well beyond the scope of this geotechnical investigation and unnecessary for subsurface utilities. The presence of unconsolidated sand and gravel alluvial fan deposits and shallow ground water suggest a potential for soil liquefaction in the project area. Damages to underground sewer lines associated with settlement (or flotation) induced by soil liquefaction are not life threatening.

Flood Plains

The Federal Emergency Management Agency (FEMA) has identified the entire sewer line alignment site as lying in shaded Zone X, which is defined as an area of 0.2 percent annual chance of flooding, areas of one percent chance of flooding with average depths of less than one foot or with drainage areas less than one square mile, and areas protected by levees from one percent annual chance flood (FEMA, 2011).

Other Geologic Hazards

A moderate potential for dust generation is present if construction is performed in dry weather. Ground water within the western third of the sewer alignment is as shallow as 6.5 feet below existing grade. Sandy soils in the eastern third of the proposed alignment will slough and cave in excavated trenches. No other geologic hazards were identified.

Discussion and Recommendations

General Information

The proposed sewer line alignment is underlain by fine-grain silt and silty sand soils, and sandy soils that will be suitable to use as final backfill material in the sewer trench, provided organics and gravel greater than ¾ inch in size are excluded. Initial backfill around the sewer pipes will require imported sand. All of the dryer excavated materials can be used to construct fills in areas where the pipe lies above existing grade.

Ground water was encountered at depths of approximately 9 to 11 feet near the Bishop Creek Canal and at 6.5 feet about 600 feet east of the canal. Dewatering is anticipated in the sewer line construction within and near the canal and some dewatering may be necessary in the western third of the alignment depending on the season of the construction and the final invert elevations of the pipes. Native soils more than a few feet below the existing grade in the western half of the alignment are likely above the optimum moisture content and will be difficult to compact. Dry sandy soils (with very few fines) in the eastern third of the sewer line alignment will slough and cave during trench excavation. Compaction test results for two types of native soils are included for the use in compaction control during construction. The design of the proposed siphon near the canal may need to account for buoyancy forces.

The recommendations provided herein, and particularly under **Geotechnical, Civil Engineering and Construction Recommendations** and **Quality Control**, are intended to minimize risks of structural distress related to consolidation or expansion of native soils and/or structural fills. These recommendations, along with proper design and construction of the structure and associated improvements, work together as a system to improve overall performance. If any aspect of this system is ignored or poorly implemented, the performance of the project will suffer. Sufficient quality control should be performed to verify that the recommendations presented in this report are followed.

Structural areas referred to in this report include the siphon, unimproved roadway and all areas of buildings, concrete slabs, asphalt pavements, as well as pads for any minor structures. All compaction requirements presented in this report are relative to ASTM D 1557:

- Fine-grained soils are defined as those with more than 40 percent by weight passing the number 200 sieve, and a plastic index lower than 15.
- Clay soils are defined as those with more than 30 percent passing the number 200 sieve, and a plastic index greater than 15.
- Granular soils are those not defined by the above criteria.

Any evaluation of the site for the presence of surface or subsurface hazardous substances is beyond the scope of this investigation. When suspected hazardous substances are encountered during routine geotechnical investigations, they are noted in the exploration logs and immediately reported to the client. No such substances were revealed during our exploration.

Geotechnical, Civil Engineering and Construction Recommendations

Buoyancy

Seasonal high ground water is likely shallower than the ground water depth measured in test pit TP-05 during our exploration, approximately 9 feet below existing grade. A design ground water level of 6 feet below existing grade is appropriate for the siphon design, considering the seasonal changes and the invert of the canal. Depending on the location and invert depth of the siphon, buoyancy forces may need to be considered in the design.

Trenching and Excavation

Temporary trenches within the relatively dry sand and gravel soils (with very few fines) in the eastern third of the alignment, will likely slough and cave in at depths as shallow as 2.5 feet below existing grade. Temporary trenches with near-vertical sidewalls should be stable in the western two-thirds of the alignment to a depth of approximately 4 feet. Temporary trenches are defined as those that will be open for less than 24 hours. Excavations to greater depths will require shoring or laying back of sidewalls to maintain adequate stability. Regulations contained in Part 1926, Subpart P, of Title 29 of the Code of Federal Regulations (CFR) (January 1, 2010) require that temporary sidewall slopes be no greater than those presented in Table 2 (Maximum Allowable Temporary Slopes).

TABLE 2 - MAXIMUM ALLOWABLE TEMPORARY SLOPES	
Soil or Rock Type	**Maximum Allowable Slopes[1] for Deep Excavations less than 20 Feet Deep[2]**
Stable Rock	Vertical (90 degrees)
Type A[3]	3H:4V (53 degrees)
Type B	1H:1V (45 degrees)
Type C	3H:2V (34 degrees)
Notes:	
1. *Numbers shown in parentheses next to maximum allowable slopes are angles expressed in degrees from the horizontal. Angles have been rounded off.*	
2. *Sloping or benching for excavations greater than 20 feet deep shall be designed by a registered professional engineer.*	
3. *A short-term (open 24 hours or less) maximum allowable slope of 1H:2V (63 degrees) is allowed in excavation in Type A soils that are 12 feet or less in depth. Short-term maximum allowable slopes for excavations greater than 12 feet in depth shall be 3H:4V (53 degrees).*	

The State of California, Department of Industrial Relations, Division of Occupational Safety and Health Administration (Cal/OSHA), has adopted and strictly enforces these regulations, including the classification system and the maximum slopes. In general, Type A soils are cohesive, non-fissured soils, with an unconfined compressive strength of 1.5 tons per square foot (tsf) or greater. Type B are cohesive soils with an unconfined compressive strength between 0.5 and 1.5 tsf. Type C soils have an unconfined compressive strength below 0.5 tsf. Numerous additional factors and exclusions are included in the formal definitions. The client, owner, design engineer, and contractor shall refer to Appendix A and B of Subpart P of the previously referenced Federal Register for complete definitions and requirements on sloping and benching of trench sidewalls. Appendices C through F of Subpart P apply to requirements and methodologies for shoring.

On the basis of our exploration, native fine-grain silt and sand soil to an approximate depth of 7 to 9 feet below existing grade in the western half of the sewer alignment shall be considered Type B. All the sand and gravel soils below the fine-grain soils in the western half and all the soils in the eastern half of the alignment should be considered Type C. All trenching should be performed and stabilized in accordance with local, state, and Cal/OSHA standards. Any area in question should be assumed Type C unless examined by the project geotechnical engineer or geologist.

Dewatering

Based on the maximum excavation depth and the ground water depths, dewatering is anticipated for the construction of sewer line near the Bishop Creek canal. Depending on the construction season and the sewer line invert depths, some dewatering may also be necessary in the segment between test pits TP-04 and TP-05. Dewatering shall be performed in accordance with Section 1-4 of City of Bishop *Specifications for Domestic Water and Sanitary Sewer Systems* (1991). The project bidding shall consider the measured ground water and possible seasonal changes within the western third of the alignment. It should not be assumed that our measurements represent seasonal maximums since the proceeding winter was unusually dry.

Stabilization

Native soils at the bottom grade of the western third of the alignment will be well above the optimum moisture and will be impossible to compact. In soft, wet soils, an over-excavation depth of 18 inches below grade line is recommended in City of Bishop *Specifications for Domestic Water and Sanitary Sewer Systems* (1991). Adequate stabilization may be achieved by bedding the pipe in compacted drain rock that is placed within the limit of soft, wet soil over-excavation. Caltrans Class 1 or 2 permeable material, aggregate base, screened gravels from the native soils or approved pit-run materials should be placed as bedding and initial backfill, to the high water level or at least 12 inches above top of pipe. A non-woven geotextile, such as Mirafi® *140N* or equal, should separate backfill from the drain rock.

Grading

Within the sewer line alignment, existing fill material in the unimproved roadway areas shall be excavated and stockpiled to use as fill material near the surface (to match the existing section). Where design dictates an invert elevation above existing grade, the pipeline will be constructed in a strip of fill. Following stripping, native soils should be densified to a least 90 percent relative compaction and to a minimum depth of 12 inches. Fill can consist of any trench spoils dry enough to achieve proper compaction. All fill should be densified to a minimum of 90 percent relative compaction for stability and erosion resistance. Side slopes of 3 horizontal to 1 vertical (3H:1V) can be used if they are to be stabilized by hydro-seeding with an appropriate seed mix. Slopes of 5H:1V or flatter may not require stabilization depending on local regulations. Slopes steeper than 3:1 may require rip-rap and could present an "attractive nuisance" to off road vehicles. The crest of the fill should be no less than 6 feet in width and may need to be wider for construction equipment. The pipe will need to be bedded and

backfilled in the normal manner so that it is likely a contractor will build the fill first and then trench it. If imported structural fill is required on this project, it should meet the specifications of Table 3 (Guideline Specification for Imported Structural Fill).

TABLE 3 - GUIDELINE SPECIFICATION FOR IMPORTED STRUCTURAL FILL

Sieve Size	Percent by Weight Passing	
4 Inch	100	
3/4 Inch	70 – 100	
No. 40	15 – 70	
No. 200	5 – 30	
Percent Passing No. 200 Sieve	**Maximum Liquid Limit**	**Maximum Plastic Index**
5 – 10	50	20
11 – 20	40	15
21 – 30	35	10

These recommendations are intended as guidelines to specify a readily available, prequalified material. Adjustments to the recommended limits can be provided to allow the use of other granular, non-expansive material. Any such adjustments must be made and approved by the geological engineer, in writing, prior to importing fill to the site.

Structural fill within the unimproved access way should be placed in maximum 8-inch-thick (loose) lifts, each densified to, at least, 90 percent relative compaction. Nonstructural fill should be densified to, at least, 85 percent relative compaction to minimize consolidation and erosion. The finished surface should be smooth, firm, and show no signs of deflection.

Utility Trench Backfill

Bedding and initial backfill 12 inches over the pipe (pipe zone) will require import of sand that meet the specifications contained in Section 1-5 of City of Bishop *Specifications for Domestic Water and Sanitary Sewer Systems* (1991). Clean sandy soils encountered along the sewer alignment do not meet the specifications for final backfill. Bedding and initial backfill should be densified to at least 90 percent relative compaction. Native soils will satisfy the requirement for selected native material for

trench backfill (final backfill) specified in Section 1-8 of City of Bishop *Specifications for Domestic Water and Sanitary Sewer Systems* (1991), provided organic and particles larger than ¾ inches are excluded. Gravel greater than ¾ inch in size in the native sand soils can be screened and used in the wet soil stabilization. Final trench backfill should be placed in maximum 8-inch-thick loose lifts that are densified to a minimum of 90 percent relative compaction within the unimproved roadway areas near the canal and 85 percent relative compaction in all other areas. Two laboratory compaction test results are included for native fine-grain silty sand soils or sandy soils (granular soils) for the use in the testing of final backfill during construction. During construction, additional compaction tests will be necessary since the soils are variable.

In the western half of the alignment, native soils more than about 3 feet below the surface (or near the surface in wet weather) will be over optimum moisture. Even at optimum moisture, these finer grain soils will be difficult to properly compact within the confines of a trench. Compaction will be impossible even for granular soil that is over optimum. This condition will occur for several feet above the water table level. Native soils could be air-dried, if cost and schedule permits.

In the eastern half of the alignment, sandy soils are likely too dry and will require uniform moisture conditioning before placing as compacted final backfill in the sewer line trench.

Below the anticipated seasonal high ground water levels in the western third of the sewer line alignment (see **Dewatering** section above), bedding and backfill should consist of compacted Caltrans Class 1 or 2 permeable material (Caltrans, 2010). Permeable materials with greater than 30 percent retained on the 3/4-inch sieve should be placed in maximum 12-inch-thick loose lifts, with each lift densified by at least five complete passes with approved compaction equipment and until no deflection is observed. A separator geotextile such as Mirafi® *140N* should be placed between the drain rock and all native soil or backfill.

Metal Pipes

Laboratory testing was performed to evaluate the corrosion potential of the site soil with respect to metal pipes or other components in contact with the ground. The results of the laboratory testing indicate that the site foundation soils exhibit minimal corrosion potential (American Water Works Association, 1999). As a result, metal pipe in contact with the ground will not require corrosion protection.

Portland Cement Concrete Flatwork

The project may include minor PCC flatwork. We recommend that all placement and curing be performed in accordance with procedures outlined by the American Concrete Institute (2008).

Soluble sulfate content has been determined for a representative sample of the site soil near the canal, and the results of the testing indicate that concrete in contact with the site foundation soils will experience moderate degradation due to reaction with soil sulfate (CBC, 2010). Therefore, Type II cement shall be used for all concrete work in contact with soils. Concrete mix designs for this project should develop a minimum compressive strength of 4,000 pounds per cubic inch and exhibit a maximum water to cement ratio of 0.50.

Access Road

It is our understanding the construction and maintenance access road will be graded but otherwise unimproved. An unimproved road will not provide good all weather access in this area, ranging from soft, wet soils in the winter to dry loose sand in the summer. An all weather road could be provided by placing a woven geotextile such as Mirafi® 500x (or equal), on properly prepared subgrade, followed by at least 8 inches of compacted, Class 2 aggregate base. The subgrade should be densified to at least 90 percent (8-inch depth) and the base to no less than 95 percent relative compaction.

Anticipated Construction Problems

Ground water level is anticipated at or above the proposed sewer line invert elevation near the Bishop Creek Canal and possibly the western third of the alignment depending on the season of construction. Dewatering is anticipated in the sewer line construction near the canal. Native soils in the western half of the sewer line alignment will often be over optimum moisture and generally difficult to compact as backfill, without air drying.

Quality Control

All plans and specifications should be reviewed for conformance with this geotechnical report and approved by the geotechnical engineer prior to submitting them to the building department for review.

The recommendations presented in this report are based on the assumption that sufficient field testing and construction review will be provided during all phases of construction. We should review the final plans and specifications to check for conformance with the intent of our recommendations. Prior to construction, a pre-job conference should be scheduled to include, but not be limited to, the owner, architect, civil engineer, the general contractor, earthwork and materials subcontractors, building official, and geotechnical engineer. The conference will allow parties to review the project plans, specifications, and recommendations presented in this report and discuss applicable material quality and mix design requirements. All quality control reports should be submitted to and reviewed by the geotechnical engineer.

During construction, we should have the opportunity to provide sufficient on-site observation of preparation and grading, over-excavation, fill placement, foundation installation, and paving. These observations would allow us to verify the geotechnical conditions are as anticipated and the contractor's work is in conformance with the approved plans and specifications.

Standard Limitations Clause

This report has been prepared in accordance with generally accepted geotechnical practices. The analyses and recommendations submitted are based on field exploration performed at the locations shown on Plate 1 of this report. This report does not reflect soils variations that may become evident during the construction period, at which time re-evaluation of the recommendations may be necessary. We recommend our firm be retained to perform construction observation in all phases of the project related to geotechnical factors to ensure compliance with our recommendations. The owner shall be responsible for distributing this geotechnical investigation to all designers and contractors whose work is related to geotechnical factors.

Equilibrium water level readings were made on the date shown on Plate 2 of this report. Fluctuations in the water table may occur due to rainfall, temperature, seasonal runoff or adjacent irrigation practices. Construction planning should be based on assumptions of possible variations in the water table.

This report has been produced to provide information allowing the architect or engineer to design the project. The owner is responsible for distributing this report to all designers and contractors whose work is affected by geotechnical aspects. In the event there are changes in the design, location, or ownership of the project from the time this report is issued, recommendations should be reviewed and possibly modified by the geotechnical engineer. If the geotechnical engineer is not granted the opportunity to make this recommended review, he or she can assume no responsibility for misinterpretation or misapplication of his or her recommendations or their validity in the event changes have been made in the original design concept without his or her prior review. The geotechnical engineer makes no other warranties, either expressed or implied, as to the professional advice provided under the terms of this agreement and included in this report.

References

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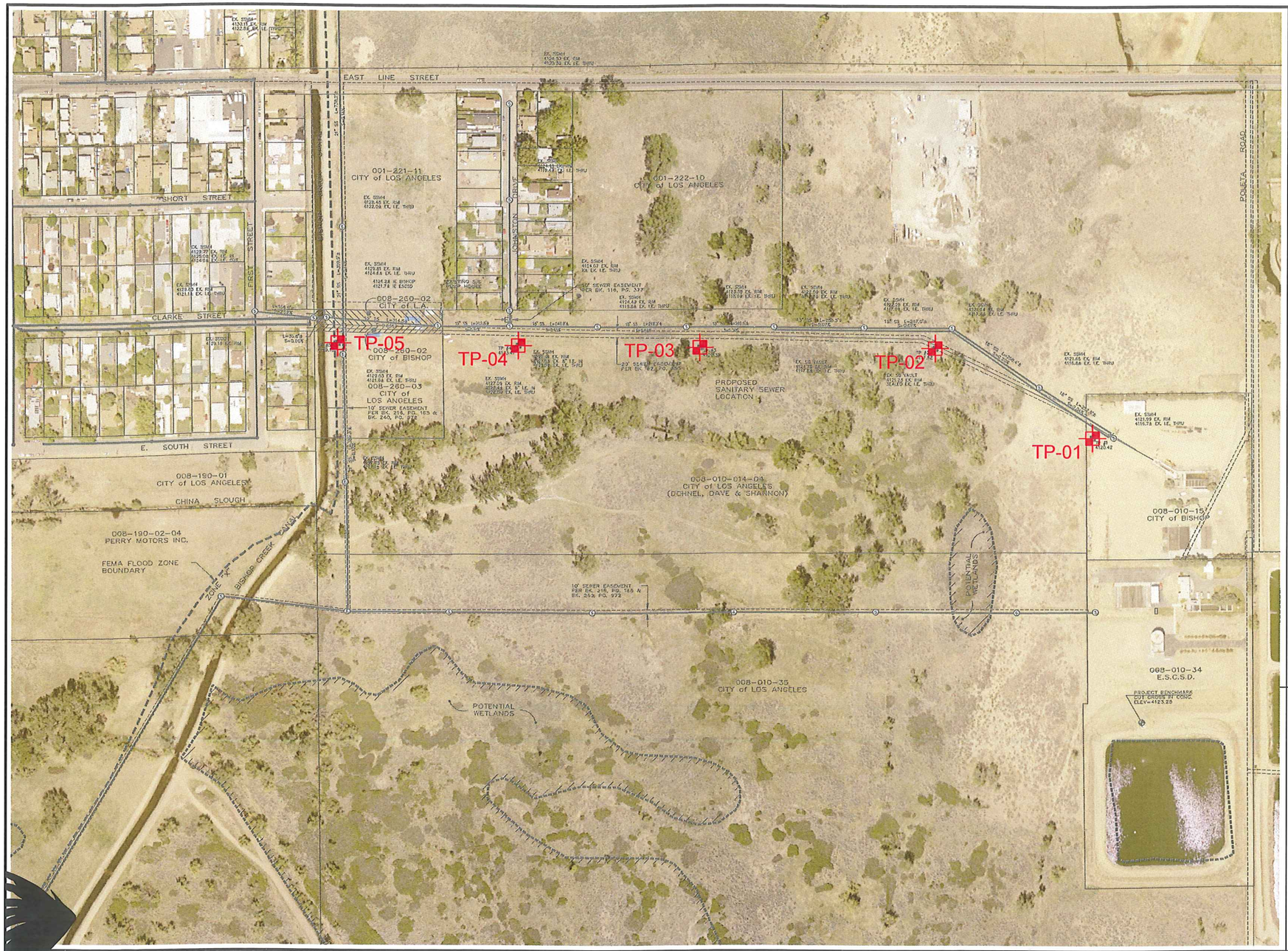
PLATES



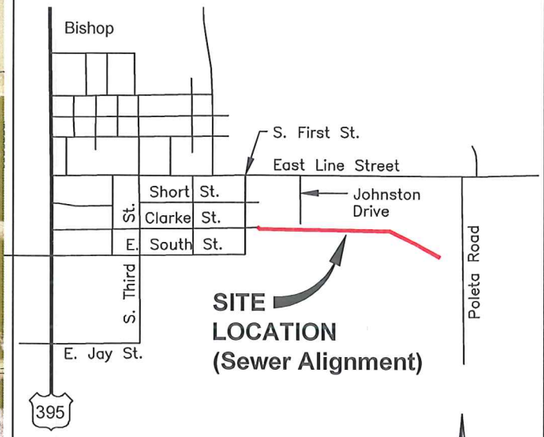
SCALE: 1"=300'

LEGEND

TP-01 TEST PIT LOCATION

NOTES

1. BASE MAP PROVIDED BY R. O. ANDERSON ENGINEERING, INC.
2. TEST PIT LOCATION SURVEY BY R. O. ANDERSON ENGINEERING, INC.



SITE LOCATION MAP

N.T.S.

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Geotechnical & Construction Services
1345 Capital Boulevard, Suite A
Reno, Nevada 89502-7140
Telephone: 775/359-6600
Facsimile: 775/359-7766

R. O. ANDERSON ENGINEERING, INC.

PLOT PLAN

SEWER TRUNK LINE REPLACEMENT

BISHOP, CALIFORNIA

Project No.
0127-85-1

Plate 1

TEST PIT LOG

TEST PIT NO.: TP-01 | DATE: 5/31/2012

TYPE OF HOE: Case 580 Super L | DEPTH TO GROUND WATER (ft): NE

LOGGED BY: PV | GROUND ELEVATION (ft): 4,120.42 (SURVEY)

SAMPLE NO.	SAMPLE TYPE	PENETROMETER (tsf)	MOISTURE (%)	PLASTICITY INDEX	DEPTH (ft)	USCS SYMBOL	LITHOLOGY	DESCRIPTION
A	GRAB				0	SP-SM		0.0' - 1.0': **Poorly Graded Sand with Silt and Gravel (Fill)** Light brown, dry, medium dense with estimated 10% non-plastic fines, 75% fine to coarse sand and 15% fine to coarse subrounded to rounded gravels. Fill material within the waste water treatment facility.
B	GRAB				2	SP-SM		1.0' - 2.5': **Poorly Graded Sand with Silt** Light brown, brown, slightly moist, medium dense with estimated 5-10% non-plastic fines and 90-95% fine to medium sand.
					4	SP		2.5' - 7.5': **Poorly Graded Sand with Gravel** Brown, light brown, slightly moist, loose to medium dense with estimated 0-5% non-plastic fines, 65-70% fine to coarse sand and 35% fine to coarse subrounded to rounded gravel. Gravelly sand soil slough-in below 3 feet depth.
					6			
					8			
					10			
					12			
					14			

Within northwest corner of the treatment plant premises.

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R.O.Anderson Engineering, Inc.

Sewer Trunk Line Replacement

Bishop, California

PROJECT NO.: 0127-85-1

PLATE: 2

SHEET 1 OF 1

BORING_LOG 0127851.GPJ BLKEAGLE.GDT 6/20/2012

TEST PIT LOG

TEST PIT NO.: TP-02 | DATE: 5/31/2012

TYPE OF HOE: Case 580 Super L | DEPTH TO GROUND WATER (ft): NE

LOGGED BY: PV | GROUND ELEVATION (ft): 4,117.82 (SURVEY)

SAMPLE NO.	SAMPLE TYPE	PENETROMETER (tsf)	MOISTURE (%)	PLASTICITY INDEX	DEPTH (ft)	USCS SYMBOL	LITHOLOGY	DESCRIPTION
Bulk	BULK		2.8	NP	0	SP-SM		0.0' - 6.5': **Poorly Graded Sand with Silt** Light brown, brown, dry to slightly moist, loose to medium dense with 9% non-plastic fines and 91% fine to medium sand. Minor (dry) roots within upper 1 foot. A large dead root at approximately 5 feet depth.
A	GRAB				6	SP		6.5' - 8.0': **Poorly Graded Sand** Orange brown, moist, medium dense with estimated 0-5% non-plastic fines, 85-90% fine to coarse sand amd 10% subangular to subrounded gravels to 1".
					8			
					10			
					12			
					14			

Just passing the eastern gate (and dense tree area).

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Sewer Trunk Line Replacement

Bishop, California

PROJECT NO.: 0127-85-1

PLATE: 2

SHEET 1 OF 1

BORING_LOG 0127851.GPJ BLKEAGLE.GDT 6/20/2012

TEST PIT LOG

TEST PIT NO.: TP-03

DATE: 5/31/2012

TYPE OF HOE: Case 580 Super L

DEPTH TO GROUND WATER (ft): NE

LOGGED BY: PV

GROUND ELEVATION (ft): 4,120.35 (SURVEY)

SAMPLE NO.	SAMPLE TYPE	PENETROMETER (tsf)	MOISTURE (%)	PLASTICITY INDEX	DEPTH (ft)	USCS SYMBOL	LITHOLOGY	DESCRIPTION
A	GRAB				2	SC-SM		0.0' - 3.5': **Silty, Clayey Sand** Dark brown, slightly moist, medium dense to dense with estimated 45% low to medium plasticity fines and 55% fine to medium sand. Roots common to 4 feet depth.
B	GRAB				4	SM		3.5' - 6.5': **Silty Sand** Brown, orange brown, gray, moist, medium dense with estimated 30% low plasticity fines and 70% fine to medium sand. Fine content was estimated to be as much as 50% at some isolated areas of the test pit wall .
C	GRAB				6	ML		6.5' - 8.0': **Sandy Silt** Brown, olive, moist to very moist, stiff with estimated 50% non-plastic to low plasticity fines and 50% fine sand.
					8			Average pocket penetrometer reading is 2 tsf.
					10			
					12			
					14			

Between large trees (dense tree area).

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Sewer Trunk Line Replacement

Bishop, California

PROJECT NO.: 0127-85-1

PLATE: 2

SHEET 1 OF 1

BORING_LOG 0127851.GPJ BLKEAGLE.GDT 6/20/2012

TEST PIT LOG

TEST PIT NO.: TP-04

DATE: 5/31/2012

TYPE OF HOE: Case 580 Super L

DEPTH TO GROUND WATER (ft): 6.75

LOGGED BY: PV

GROUND ELEVATION (ft): 4,123.41 (SURVEY)

SAMPLE NO.	SAMPLE TYPE	PENETROMETER (tsf)	MOISTURE (%)	PLASTICITY INDEX	DEPTH (ft)	USCS SYMBOL	LITHOLOGY	DESCRIPTION
A	GRAB		13.7	4		SM		0.0' - 2.0': **Silty Sand** Dark brown, slightly moist, medium dense to dense with 45% low plasticity fines and 55% fine to medium sand. Roots common within upper 1 foot.
					2			
Bulk	BULK		14.7	NP	4	SM		2.0' - 6.5': **Silty Sand** Brown, orange brown, moist to wet, medium dense with 26% low plasticity fines and 74% fine to coarse sand. Less than 6 inches thick **Sandy Silt** interbeds within the Silty Sand soil profile.
					6			
B	GRAB				8	SP		6.5' - 9.0': **Poorly Graded Sand with Gravel** Gray, brown, wet, dense with extimated 0-5% non-plastic fines, 75-80% fine to coarse sand and 20% subrounded to rounded gravels to 3". Sand and gravel soil layer cave-in below 8 feet depth.
					10			Groundwater was measured at 6.5 feet depth during the test pit excavation and dropped to 6.75 feet at the end. Groundwater seepage was noticed at the west end of the test pit at approximately 6 feet depth.
					12			
					14			

Just passing the horse barn.

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Sewer Trunk Line Replacement

Bishop, California

PROJECT NO.: 0127-85-1

PLATE: 2

SHEET 1 OF 1

BORING_LOG 0127851.GPJ BLKEAGLE.GDT 6/20/2012

TEST PIT LOG

TEST PIT NO.: TP-05 | DATE: 5/31/2012

TYPE OF HOE: Case 580 Super L | DEPTH TO GROUND WATER (ft): 11

LOGGED BY: PV | GROUND ELEVATION (ft): 4,129.18 (SURVEY)

SAMPLE NO.	SAMPLE TYPE	PENETROMETER (tsf)	MOISTURE (%)	PLASTICITY INDEX	DEPTH (ft)	USCS SYMBOL	LITHOLOGY	DESCRIPTION
Bulk 1	BULK				0	SM		0.0' - 2.0': **Silty Sand with Gravel (Fill)** Dark brown, slightly moist, loose to medium dense with estimated 20% low plasticity fines, 65% fine to coarse sand and 15% fine to coarse subrounded gravel. Roots common. Small pieces of glass and plastic debris within upper one foot.
					2			2.0' - 9.0': **Silty Sand** Brown, gray, orange, moist to wet, medium dense with 41% non-plastic fines, 58% fine to coarse sand, and 1% very fine gravel. Less than 1 foot thick **Sandy Silt** interbeds with as much as 55% low plastcity fines within the Silty Sand soil profile. Average pocket penetrometer reading within the sandy silt interbeds is 3.5 tsf.
Bulk 2	BULK		17.2	NP	4	SM		
					6			
					8			
A	GRAB				10	SP-SM		9.0' - 12.5': **Poorly Graded Sand with Silt and Gravel** Gray, wet, dense with estimated 10% non-plastic fines, 60% fine to coarse sand and 30% subrounded gravels to 3". Sand and gravel soil layer cave-in below 10 feet depth.
					12			Groundwater was measured at 9 feet depth during the test pit excavation and dropped to 11 feet at the end. Groundwater appear to seep through the silty sand/sand soil interface. Water level in the adjacent channel was approximately 3 feet below the existing roadway grade.
					14			

Near the Bishop Creek Canal.

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Sewer Trunk Line Replacement

Bishop, California

PROJECT NO.: 0127-85-1

PLATE: 2

SHEET 1 OF 1

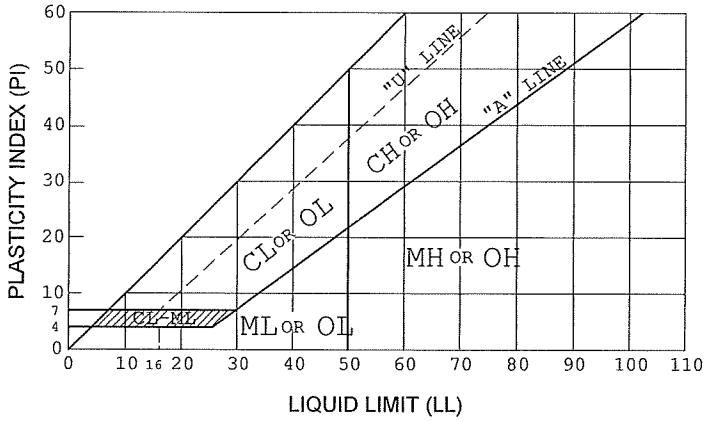
BORING_LOG 0127851.GPJ BLKEAGLE.GDT 6/20/2012

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS GRAPH	SYMBOLS LETTER	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS (MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE)	GRAVEL AND GRAVELLY SOILS (MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE)	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
				GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
	SAND AND SANDY SOILS (MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE)	CLEAN SANDS (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
				SP	POORLY-GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES
		SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND - SILT MIXTURES
				SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS (MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE)	SILTS AND CLAYS (LIQUID LIMIT LESS THAN 50)			ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS (LIQUID LIMIT GREATER THAN 50)			MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS
FILL MATERIAL				--	FILL MATERIAL, NON-NATIVE

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS.

PLASTICITY CHART



FOR CLASSIFICATION OF FINE-GRAINED SOILS AND FINE-GRAINED FRACTION OF COARSE-GRAINED SOILS

EXPLORATION SAMPLE TERMINOLOGY

Sample Type	Sample Symbol	Sample Code
Auger Cuttings		Auger
Bulk (Grab) Sample		Grab
Modified California Sampler		MC
Shelby Tube		SH or ST
Standard Penetration Test		SPT
Split Spoon		SS
No Sample		

GRAIN SIZE TERMINOLOGY

Component of Sample	Size Range
Boulders	Over 12 in. (300mm)
Cobbles	12 in. to 3 in. (300mm to 75mm)
Gravel	3 in. to #4 sieve (75mm to 2mm)
Sand	# 4 to #200 sieve (2mm to 0.074mm)
Silt or Clay	Passing #200 sieve (0.074mm)

RELATIVE DENSITY OF GRANULAR SOILS

N - Blows/ft	Relative Density
0 - 4	Very Loose
5 - 10	Loose
11 - 30	Medium Dense
31 - 50	Dense
greater than 50	Very Dense

CONSISTENCY OF COHESIVE SOILS

Unconfined Compressive Strength, psf	N - Blows/ft	Consistency
less than 500	0 - 1	Very Soft
500 - 1,000	2 - 4	Soft
1,000 - 2,000	5 - 8	Firm
2,000 - 4,000	9 - 15	Stiff
4,000 - 8,000	16 - 30	Very Stiff
8,000 - 16,000	31 - 60	Hard
greater than 16,000	greater than 60	Very Hard

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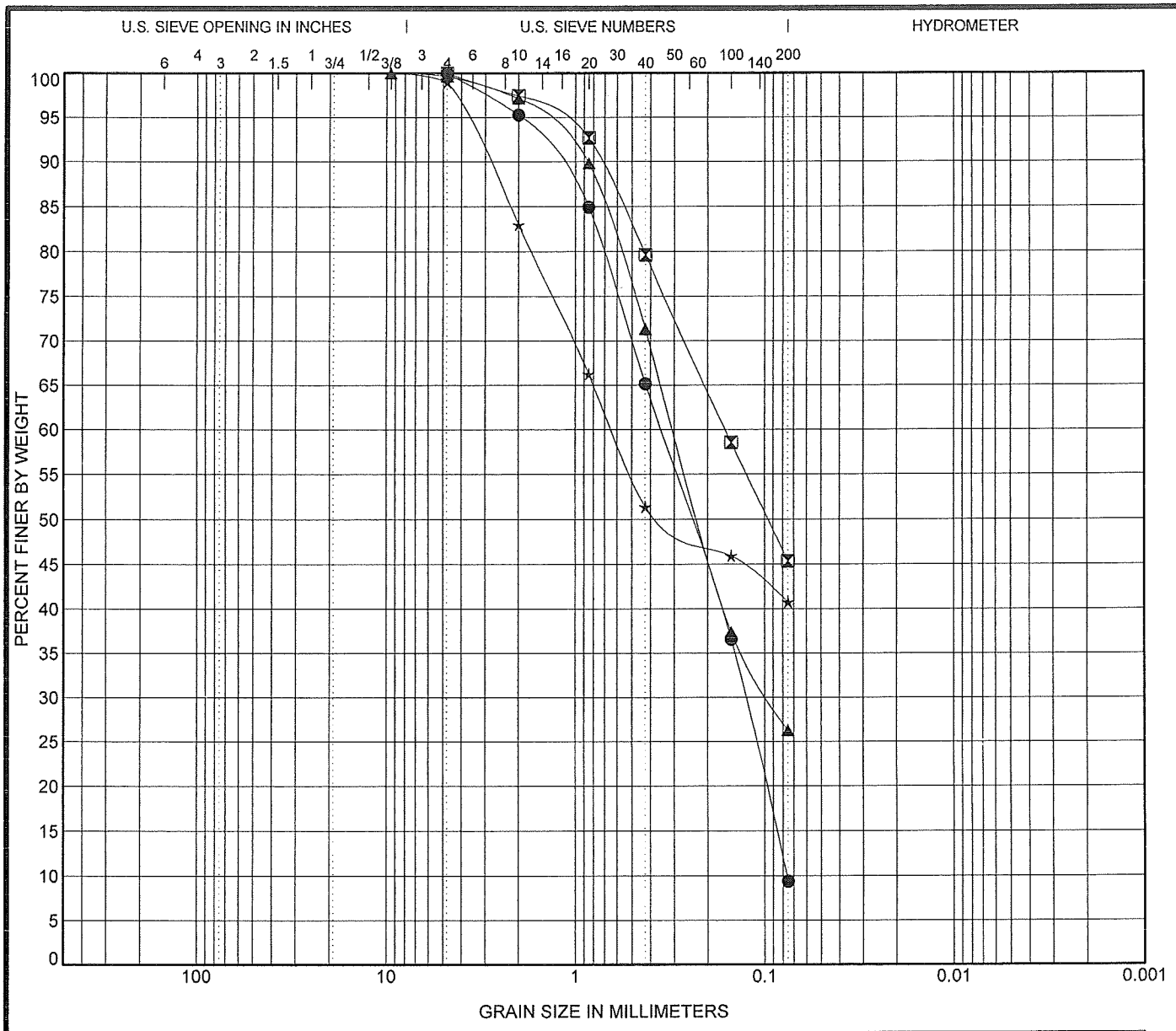
USCS Soil Classification Chart

Project: Sewer Trunk Line Replacement
Location: Bishop, California
Project Number: 0127-85-1 Plate: 3



Specimen Identification		USCS Classification	LL	PL	PI	Cc	Cu
● TP-02	0.5'	POORLY GRADED SAND with SILT (SP-SM)	NP	NP	NP	0.60	4.62
⊠ TP-04	0.0'	SILTY SAND (SM)	30	26	4		
▲ TP-04	2.0'	SILTY SAND (SM)	NP	NP	NP		
★ TP-05	2.0'	SILTY SAND (SM)	NP	NP	NP		

Specimen Identification		D100	D60	D30	D10	MC %	%Gravel	%Sand	%Silt	%Clay
● TP-02	0.5'	4.75	0.352	0.127	0.076	2.8	0.0	90.6	9.4	
⊠ TP-04	0.0'	4.75	0.161			13.7	0.0	54.6	45.4	
▲ TP-04	2.0'	9.5	0.3	0.095		14.7	0.4	73.4	26.2	
★ TP-05	2.0'	9.5	0.635			17.2	1.0	58.2	40.7	

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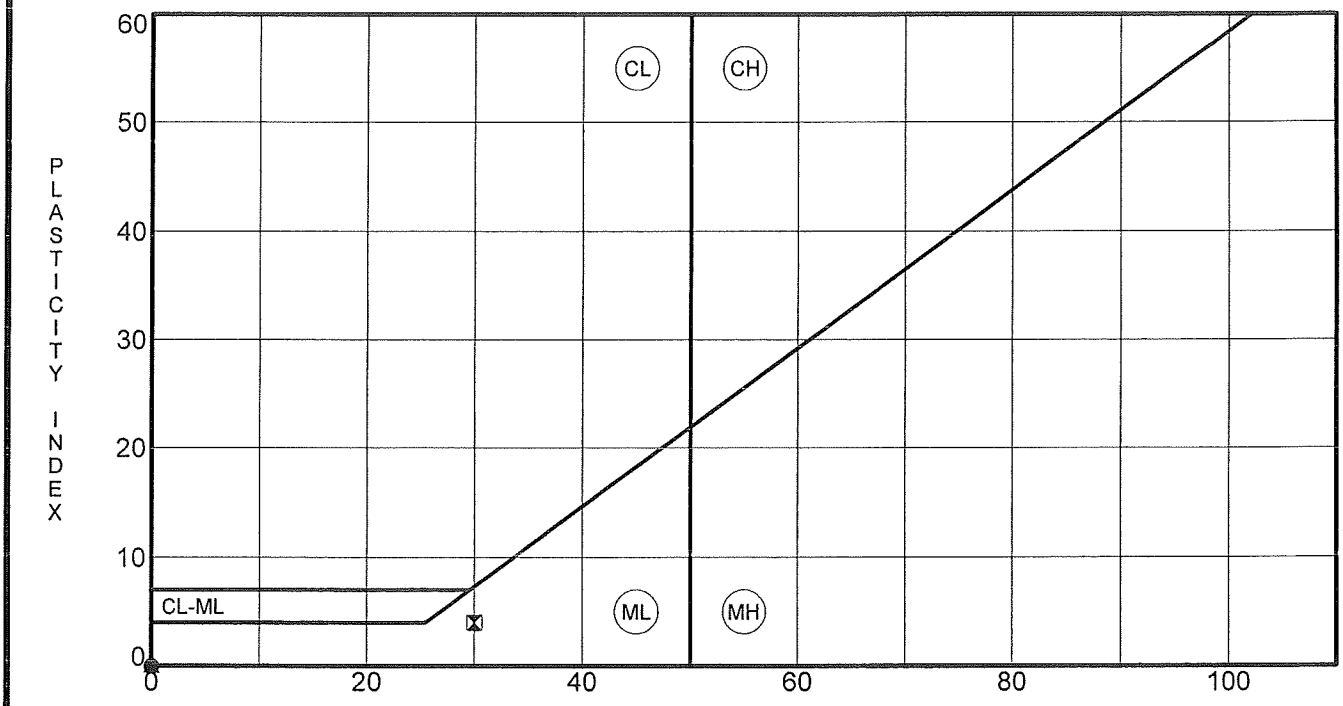
GRAIN SIZE DISTRIBUTION

Project: Sewer Trunk Line Replacement
Location: Bishop, California
Project Number: 0127-85-1 Plate: 4a

US GRAIN SIZE2 0127851.GPJ US LAB.GDT 6/13/2012



Specimen Depth in Feet.

Specimen Identification			LL	PL	PI	Fines	USCS Classification
● TP-02	Bulk	0.5'	NP	NP	NP	9	POORLY GRADED SAND with SILT (SP-SM)
⊠ TP-04	A	0.0'	30	26	4	45	SILTY SAND (SM)
▲ TP-04	Bulk	2.0'	NP	NP	NP	26	SILTY SAND (SM)
★ TP-05	Bulk 2	2.0'	NP	NP	NP	41	SILTY SAND (SM)

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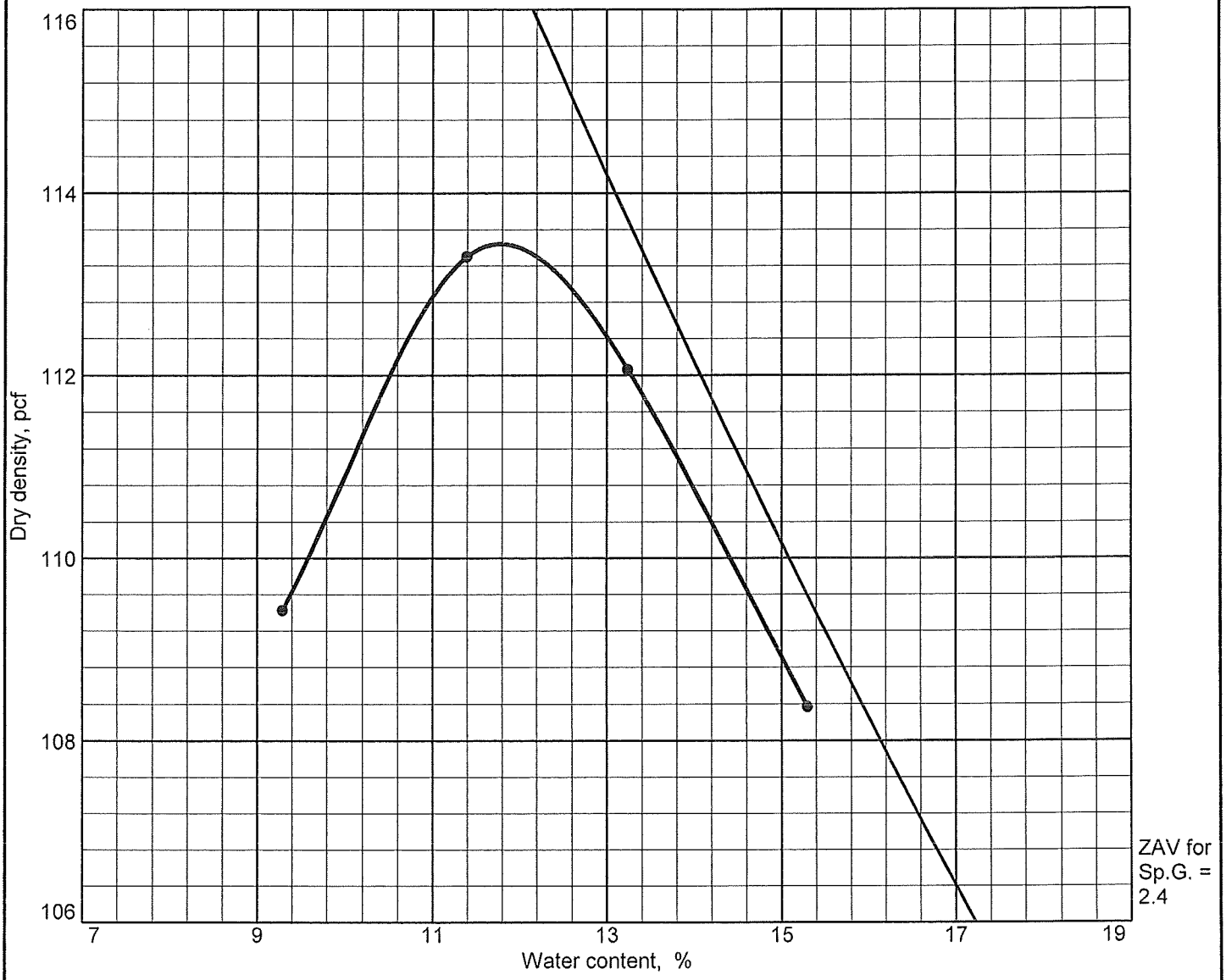
ATTERBERG LIMITS RESULTS

Project: Sewer Trunk Line Replacement
Location: Bishop, California
Project Number: 0127-85-1 Plate: 4b

COMPACTION TEST REPORT



Test specification: ASTM D 1557-91 Procedure B Modified

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > 3/8 in.	% < No.200
	USCS	AASHTO						
0.5' - 5.0'	SP - SM				No Value	Non Plastic	0	9.4

TEST RESULTS

Maximum dry density = 113.4 pcf

Optimum moisture = 11.8 %

MATERIAL DESCRIPTION

Poorly Graded Sand with Silt
medium brown

Project No. 0127-85-1 **Client:** RO Anderson

Project: Sewer Trunk Line Replacement

● **Source:** TP 02 **Sample No.:** Bulk **Elev./Depth:** 0.5' - 5.0'

Remarks:

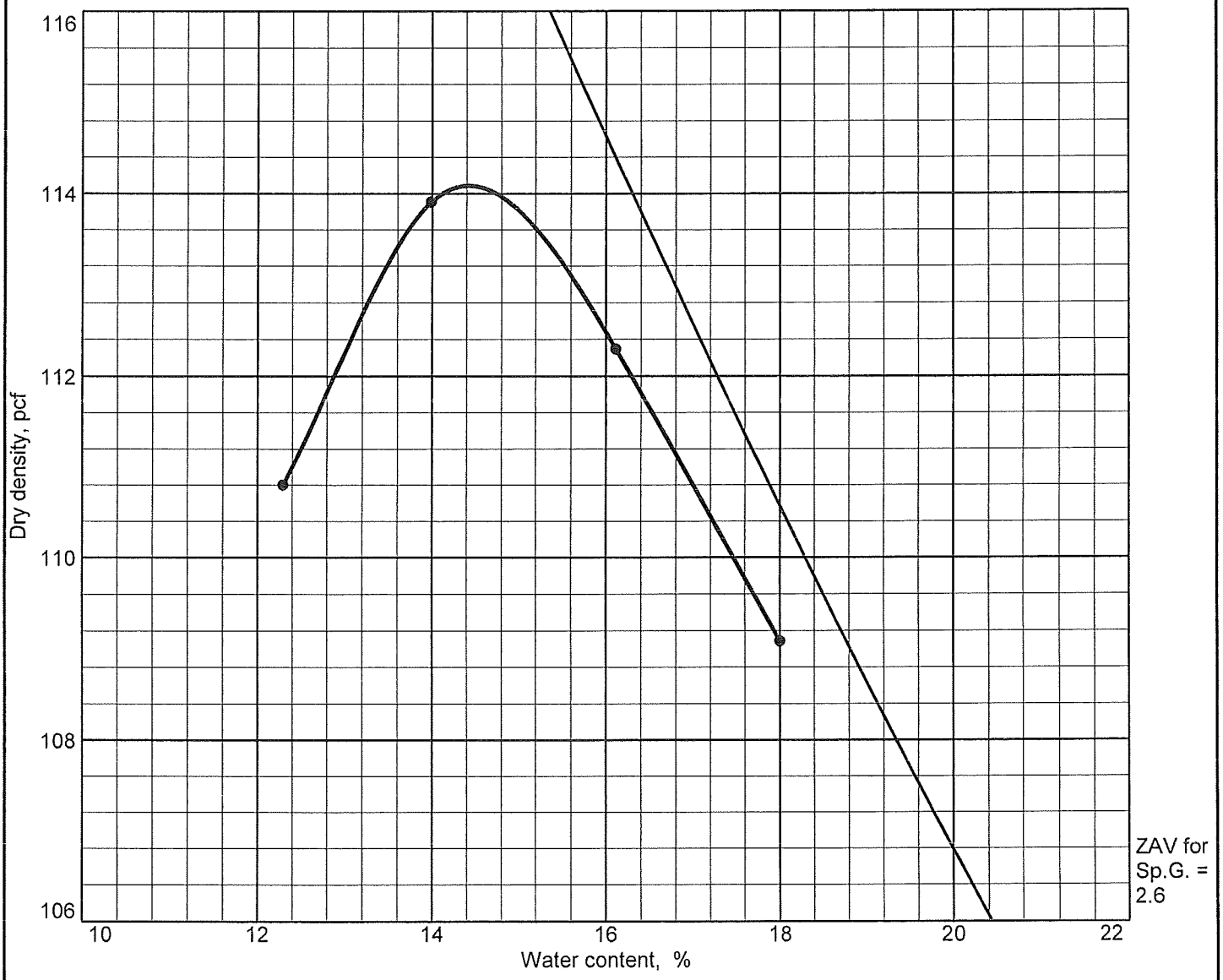
Laboratory Number 2676

BLACK EAGLE CONSULTING, INC.

Reno, Nevada

Figure 5a

COMPACTION TEST REPORT



Test specification: ASTM D 1557-91 Procedure B Modified

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > 3/8 in.	% < No.200
	USCS	AASHTO						
2.0' - 9.0'	SM				No Value	Non Plastic	0	40.7

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 114.1 pcf Optimum moisture = 14.4 %	Silty Sand medium brown

Project No. 0127-85-1 **Client:** RO Anderson

Project: Sewer Trunk Line Replacement

● **Source:** TP 05 **Sample No.:** Bulk **Elev./Depth:** 2.0' - 9.0'

Remarks:
Laboratory Number 2676

BLACK EAGLE CONSULTING, INC.

Reno, Nevada

Figure 5b

Laboratory Report
Report ID: 121181

Sierra Environmental Monitoring, Inc.

Black Eagle Consulting, Inc.
Attn: Pat Pilling
1345 Capital Blvd., Suite A
Reno, NV 89502-7140

Date: 6/13/2012
Client: BEC-100
Taken by: V. Vimalarat
PO #:

Analysis Report

Laboratory Sample ID	Customer Sample ID	Date Sampled	Time Sampled	Date Received
S201206-0369	Bishop Sewer Line TP-05 Bulk 2 @ 2'-9'	5/31/2012	9:00 AM	6/6/2012

Parameter	Method	Result	Units	Reporting Limit	Analyst	Date Analyzed	Data Flag
pH - Saturated Paste	SW-846 9045A	8.96	pH Units		Faulstich	6/13/2012	
pH - Temperature	SW-846 9045A	21.3	°C		Faulstich	6/13/2012	
Redox Potential	SM 2580 B	368	MV		Faulstich	6/13/2012	
Resistivity	EPA 120.1	2400	ohm cm		Faulstich	6/13/2012	
Sulfate - Ion Chromatography	EPA 300.0	200	mg/Kg	2	Faulstich	6/8/2012	
Sulfide	EPA 376.1	Negative	Pos/Neg	1	Seher	6/12/2012	

Data Flag Legend:

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Laboratory Director

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Quality Assurance Manager