GEOTECHNICAL EVALUATION

RIO GRANDE STORM WATER PROJECT
RIO GRANDE PLACE
ASPEN, COLORADO
JOB NO. 3123JT140

Western Technologies Inc.
The Quality People
Since 1955

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Prepared for:

WRC ENGINEERING

December 2, 2003

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December 2, 2003

WRC Engineering
950 South Cherry, Suite 404
Denver, Colorado 80246

Attn: Mr. Rodger Mieden

Re: Geotechnical Evaluation
Rio Grande Storm Water Project
Aspen, Colorado

Job No. 3123JT140

Western Technologies Inc. has completed the geotechnical evaluation for the proposed Rio Grande Storm Water Project to be located in Aspen, Colorado. This study was performed in general accordance with our proposal number 3123PT120 dated October 22, 2003. The results of our study, including the boring location diagram, laboratory test results, boring logs, and the geotechnical recommendations are attached.

We have appreciated being of service to you in the geotechnical engineering phase of this project and are prepared to assist you during the construction phases as well. If design conditions change, or if you have any questions concerning this report or any of our testing, inspection, design and consulting services, please do not hesitate to contact us. We look forward to working with you on future projects.

Sincerely,
WESTERN TECHNOLOGIES INC.
Geotechnical Engineering Services

Lawrence E. Cynova

Lawrence E. Cynova, P.E.

Copies to: Addressee (3)

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GEOTECHNICAL EVALUATION
RIO GRANDE STORM WATER PROJECT
ASPEN, COLORADO
JOB NO. 3123JT140

1.0 PURPOSE

This report contains the results of our geotechnical evaluation for the proposed Rio Grande Storm Water project to be located north of Rio Grande Place and east of Mill Street in Aspen, Colorado. The purpose of these services is to provide information and recommendations regarding:

- Earthwork, including site preparation, fill placement, and suitability of existing soils for fill materials
- drainage
- corrosivity
- excavation

2.0 PROJECT DESCRIPTION

Project information supplied by Mr. Rodger Mieden on September 17, 2003 indicates the proposed storm water project will consist of multiple water retention ponds that will be both decorative and functional. The ponds will retain water for about 24 hours before being released. A permanent pool about 2 feet in depth and several hundred feet in area will be located within one of the retention ponds. The permanent pool will have a PVC or clay liner. The ponds will be located east/northeast of the existing rugby field and west/southwest of the Roaring Fork River. The water control dikes to be placed will be 300 to 400 feet long and 5 to 10 feet in height. Should these assumptions be incorrect, we request that the Client notify WT immediately.

3.0 SCOPE OF SERVICES

3.1 Field Exploration

Fifteen borings were drilled to depths ranging from 2.5 to 16 feet below existing site grade in proposed pond areas. The borings were at the approximate locations shown on the attached boring location diagram. Logs of the borings are presented in Appendix A. Subsoils encountered during drilling were examined visually and sampled at selected depth intervals.

A field log was prepared for each boring. These logs contain visual classifications of the materials encountered during drilling as well as interpolation of the subsurface conditions between samples. Final logs, included in Appendix A, represent our interpretation of the field logs and include modifications based on laboratory observations and tests of the field samples.

The final logs describe the materials encountered, their thickness, and the locations where samples were obtained.

The Unified Soil Classification System was used to classify soils. The soil classification symbols appear on the boring logs and are briefly described in Appendix A.

3.2 Laboratory Analyses

Laboratory analyses were performed on representative soil samples to aid in material classification and to estimate pertinent engineering properties of the on-site soils for preparation of this report. Testing was performed in general accordance with applicable ASTM specifications. The following tests were performed and the results are presented in Appendix B.

- Water content
- Dry density
- Consolidation
- Gradation
- Plasticity
- Maximum density and optimum moisture

3.3 Analyses and Report

This report is for the exclusive purpose of providing geotechnical engineering and/or testing information and recommendations. The scope of services for this project does not include, either specifically or by implication, any environmental assessment of the site or identification of contaminated or hazardous materials or conditions. If the owner is concerned about the potential for such contamination, other studies should be undertaken. We are available to discuss the scope of such studies with you.

4.0 SITE CONDITIONS

4.1 Surface

Previous site development consisted of sidewalks, rugby field, bridges, basketball court, skate park, amphitheater, water retention ponds, recycle center and snow dump area. Vegetation consisted of lawns, cottonwood trees, aspen trees and evergreen trees. Site drainage was generally to the north on a gradual slope. The area is covered with rolling humps. The Roaring Fork River is located on the north side of the site and curves around to the east side of the site.

4.2 Subsurface

As presented on Logs of Borings, surface fill soils to depths of 2 to 8 feet in Borings 1, 2, 3, 4, 10 and 11 were found to be silty or sandy clay and gravel of low to medium plasticity. The surface and near surface soils to depths of 2 to 14 feet in Borings 2, 5, 8, 9, 12 and 13 were found to be silty or sandy clay and/or gravel of firm to hard consistency and low to medium plasticity. The surface and near surface materials to depths of 4.5 to 11.5 feet in Borings 1, 2, 5, 6, 7, 9, 10, 11, 12, 13,14 and 15 and extending to the full depth of exploration consisted of gravel/cobbles and silty or clayey sand of medium density and nil to low plasticity. The near surface materials to depths of 4 to 15 feet in Borings 3, 4 and 8 and extending to the full depth of exploration consisted of gravel/cobbles and sandy clay of stiff to hard consistency and low to medium plasticity

Refusal may result from hard cemented and/or welded material, coarse gravel or boulders. Special drilling procedures are needed to determine the character, integrity and continuity of the refusal materials.

The existing fill on the site is sandy or silty clay and gravel or clayey sand and gravel of variable consistency and damp water contents. Our records do not indicate that the fill was placed under the observation and testing of a geotechnical engineer.

4.3 Groundwater

Groundwater was not encountered in any test boring at the time of exploration. These observations represent the groundwater conditions at the time of measurements and may not be indicative of other times. Groundwater levels can be expected to appear with varying seasonal and weather conditions, waterline leaks and other factors.

4.4 Geology

The surface of this site consists of soils and rock derived from a multitude of different sources. Surface silts, clays and sands have been weathered out of the Permian Maroon Formation, and possibly the Cretaceous aged Mancos Formation.

These existing soils were then downcut and modified by a combination of Quaternary Glacial and River Activity. Glaciers and the Roaring Fork River have both transported materials to the Aspen area from up-valley intrusive granitic rocks and deposited it as quaternary aged river deposits and glacial drift. It was in the cobbles and boulders of these river and glacial deposits that our subsurface penetration was terminated.

5.0 GEOTECHNICAL PROPERTIES AND ANALYSIS

5.1 Laboratory Tests

Field and laboratory test results indicate that native subsoils near bottom of dike level exhibit low to moderate compressibility at existing water contents. Low to moderate additional compression is likely to occur when the water content is increased.

Near surface soils are of medium plasticity. The maximum density and optimum moisture content was determined in accordance with ASTM D698.

6.0 RECOMMENDATIONS

6.1 General

Recommendations contained in this report are based on our understanding of the project criteria described in Section 2.0, Project Description, and the assumption that the soil and subsurface conditions are those disclosed by the borings. Others may change the plans, final elevations, number and type of structures, and bottom of pond levels during design or construction. Substantially different subsurface conditions from those described herein may be encountered or become known. Any changes in the project criteria or subsurface conditions shall be brought to our attention in writing.

6.2 Embankments

Passed experience indicates that the native clayey subsoils consist of silty and sandy clay or clayey sand which are suitable for the construction of embankments and pond bottoms. The proposed embankments may be constructed using on-site soils from the proposed pond areas, and may be satisfactorily supported upon properly prepared subgrade.

6.2.1 Liner for permanent pool

During construction, replace any granular materials encountered with properly compacted on-site silty/sandy clay soils to a minimum thickness of 2 feet. As an alternate, the placement of a manufactured liner material could be used to retain water.

6.3 Embankment Erosion

The erosion potential of the site is expected to be moderate to severe based on the site topography and the soils encountered. Final design plans should minimize interference with existing drainage patterns at the site. Based on available information and the subsurface materials, we recommend, as a minimum, that the exterior faces of all embankments adjacent to drainage be compacted to specifications outlined in the **"Placement and Compaction"** section of this report. When hydrologic studies have been completed, and information regarding flow rates and other hydrologic data have been determined, additional analyses may be required to provide recommendations for adequate protection of embankments. These recommendations may include the placement of rip-rap material along the embankment face, planting grass, chemical treatment of embankment soils, placement of geotextile materials, and/or the placement of gabion structures. We are able to assist you in this matter if needed.

6.4 Corrosivity

We recommend a Type II portland cement be used for all concrete on and below grade.

7.0 EARTHWORK

7.1 General

The conclusions contained in this report for the proposed construction are contingent upon compliance with recommendations presented in this section. Any excavating, trenching, or disturbance which occurs after completion of the earthwork must be backfilled, compacted and tested in accordance with the recommendations contained herein. It is not reasonable to rely upon our conclusions and recommendations if any future unobserved and untested trenching, grading or backfilling occurs.

7.2 Site Clearing

Strip and remove existing vegetation, organic topsoils, debris, any structural remnants and any other deleterious materials from the pond and dike areas. All exposed surfaces should be free of mounds and depressions which could prevent uniform compaction.

Sloping areas steeper than 5:1 (horizontal:vertical) should be benched to reduce the potential for slippage between existing slopes and fills. Benches should be level and wide enough to accommodate compaction and earth moving equipment.

7.3 Mass Grading and Site Preparation

Construction of embankments across the site should consist of proper base preparation, constructing embankment benching when necessary, disposition of strippings, and proper fill placement and compaction.

Any organics, topsoil, soft surface soils, uncontrolled fill, construction debris, soil stockpiles and loose soils beneath planned fill areas should be thoroughly stripped and removed prior to fill placement and/or pond preparation. Clean construction strippings can be stockpiled for future use in revegetating exposed slopes to minimize erosion potential. These materials are not to be used as structural fill material. However, these materials can be used in non-structural fill areas or where the embankment fill sections do not exceed 5 feet in height.

Fill slopes should be constructed no steeper than 2.5:1 (horizontal:vertical) to limit erosion, and to provide slope protection. Natural slopes exceeding a 5:1 (horizontal to vertical) slope configuration, should be benched prior to fill placement. Natural slopes which will support fill embankments should be benched at a maximum 5:1 slope.

Cut slopes should be constructed no steeper that 2:1 (horizontal : vertical) to limit erosion, and to provide slope protection. Specific slope stability analyses were beyond the scope of this evaluation. However, our experience indicates that 2.5:1 compacted fill or 2:1 cut slopes should be stable up to moderate heights of about 15 to 20 feet. Slopes of 3:1 or flatter may be desirable for landscaping and maintenance. We are available for additional consultation or more detailed analysis when grading plans have been developed.

After fill areas have been cleared and in final cut areas, the natural exposed soils within each entire pond should be scarified and recompacted. If soft or unstable soils are encountered, scarifying, drying and/or deeper overexcavation and replacement with suitable granular materials may be required.

Particular attention should be paid to compaction of the exterior faces of cut and fill slopes (i.e., cut/fill slope faces should be compacted to the minimum percent of relative compaction as recommended in this report).

7.4 Excavation

We anticipate that excavations in soil for the proposed construction can be accomplished with conventional equipment. Excavations penetrating the underlying cobbles and any boulders may require the use of heavy-duty, specialized equipment, possibly together with drilling and blasting, to facilitate rock break up and removal.

On-site soils will pump or become unworkable at high water contents. Workability may be improved by scarifying and drying. Overexcavation of wet zones and replacement with granular materials may be necessary. The use of lightweight excavation and compaction equipment may be required to minimize subgrade pumping. Dewatering may be required in some areas if a high artificial water table is encountered.

Temporary unsurcharged construction excavations should be sloped or shored. Slopes should not be steeper than 1 to 1 in sands and gravels and 1/2 to 1 (horizontal to vertical) in fine-grained soils. Slopes may need to be flattened depending on conditions exposed during construction. If there is not enough space for sloped excavations, shoring should be used. Exposed slopes should be kept moist (not saturated) during construction. Traffic and surcharge loads should be at least 10 feet from the top of the excavation.

7.5 Materials

a. Clean on-site native soils or imported materials may be used as fill material for the following:

- embankment areas
- backfill

b. Frozen soils should not be used as fill or backfill.

c. Oversize material, greater than 6 inches, may be used in the outer portions of the embankments, provided that the particles are distributed throughout the fill and no nesting of oversize material occurs. Acceptance of the quantity of oversize material shall be at the discretion of the geotechnical engineer.

d. Imported soils should conform to the following:

- Gradation (ASTM C136): percent finer by weight

6"	100
4"	70-100
No. 4 Sieve	50-100
No. 200 Sieve	35 (max)

- Maximum expansive potential(%)* 1.5

- Maximum soluble sulfates(%) 0.10

* Measured on a sample compacted to approximately 95 percent of the ASTM D698 maximum dry density at about 3 percent below optimum water content. The sample is confined under a 100 psf surcharge and submerged.

7.6 Placement and Compaction

a. Place and compact fill in horizontal lifts, using equipment and procedures that will produce recommended water contents and densities throughout the lift.

b. Uncompacted fill lifts should not exceed 8 inches.

c. No fill should be placed over frozen ground.

d. The materials utilized for the embankments should be compacted to at least 95 percent of the maximum dry density as determined in accordance with ASTM D698. Any miscellaneous backfill located outside the perimeter of the lagoon should be compacted to at least 90 percent of the maximum dry density as determined in accordance with ASTM D698.

e. On-site clay soils should be compacted with a moisture content in the range of 1 percent below to 3 percent above optimum. Imported soils should be compacted with a moisture content in the range of 3 percent below to 3 percent above optimum.

7.7 Compliance

Recommendations for compacted fills or prepared subgrade depend upon compliance with **"Earthwork"** recommendations. To assess compliance, observation and testing should be performed under the direction of a geotechnical engineer.

8.0 LIMITATIONS

This report has been prepared based on our understanding of the project criteria as described in Section 2.0. Others may make changes in the project criteria during design or construction, and substantially different subsurface conditions may be encountered or become know. The conclusions and recommendations presented herein shall not continue to be valid unless all variations are brought to our attention in writing, and we have has an opportunity to assess the effect such variations may have on our conclusions and recommendations and respond in writing.

The recommendations presented are based upon data derived from a limited number of samples obtained from widely spaced borings. The attached logs are indicators of subsurface conditions only at the specific locations and times noted. The geotechnical engineer necessarily makes assumptions as to the uniformity of the geology and soil structures between borings, but variations can exist. Accordingly, whenever any deviation or change is encountered or become known during design or construction, the conclusions and recommendations presented herein shall not continue to be valid unless WT in notified in writing, has actually reviewed the matter, and has issued a written response.

This report does not provide information relative to construction methods or sequences. Any person reviewing this report must draw his own conclusions regarding site conditions as they relate to the employment or development of construction techniques. This report is valid for one year after the date of issuance unless there is a change in circumstances or discovered variations justifying an earlier expiration of validity. After expiration, no person or entity has any right to rely on this report without further review and reporting by WT under a separate contract.

9.0 OTHER SERVICES

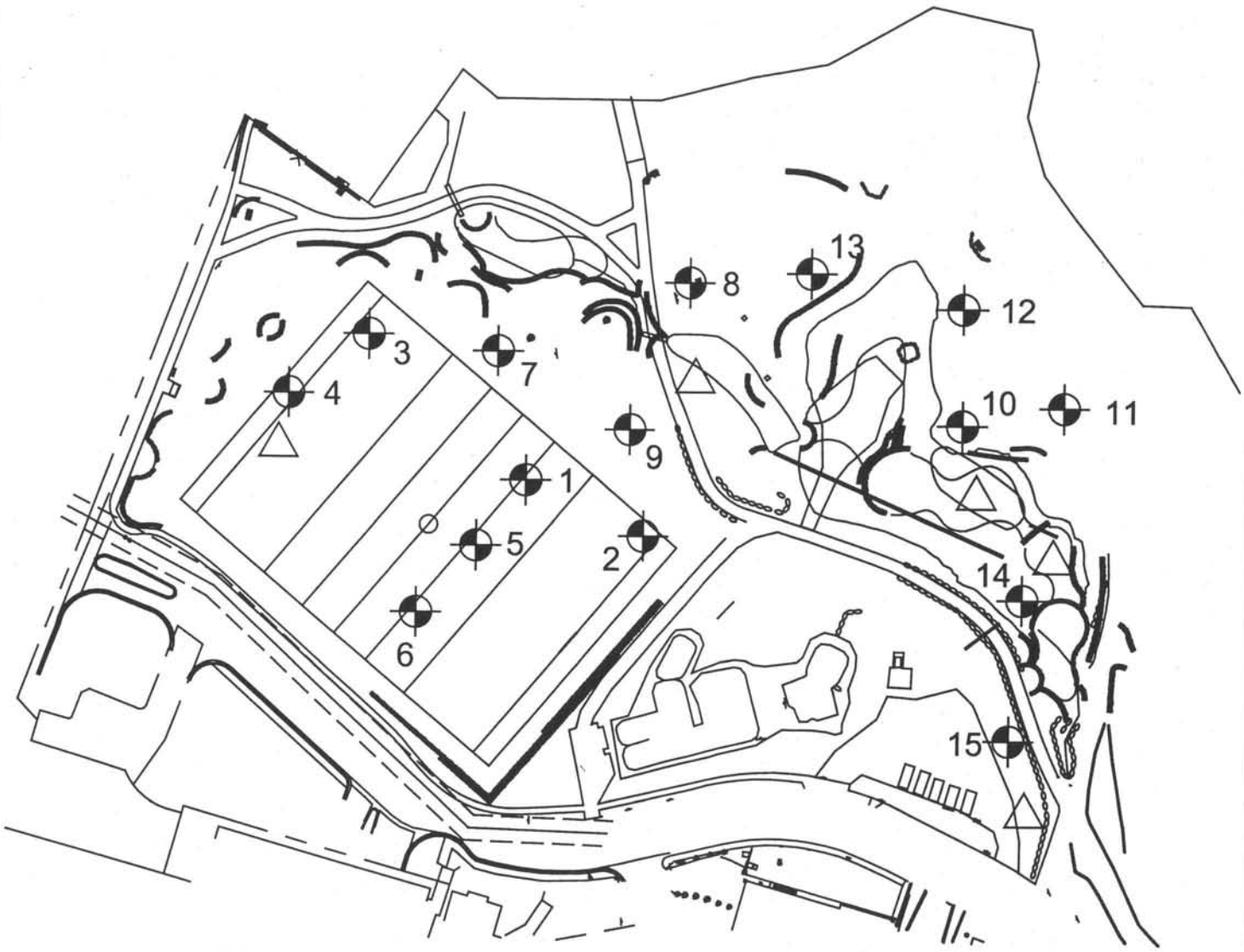
The geotechnical engineer should be retained for a general review of final plans and specifications to determine compliance with our recommendations.

The geotechnical engineer should also be retained to provide observation and testing services during excavation, earthwork operations, and foundation construction phases of the project. Observation of footing excavations should be performed prior to placement of reinforcing and concrete to confirm that satisfactory bearing materials are present.

10.0 CLOSURE

We have prepared this report as an aid to the designers of the proposed project. The comments, statements, recommendations, and conclusions set forth in this report reflect the opinions of the authors. These opinions are based upon conditions at the location of specific tests and observations, and on the data developed to satisfy the scope of services defined by the contract documents. Work on your project was performed in accordance with generally accepted industry standards and practices by professionals providing similar services in this locality. No other warranty, express or implied, is made.

RIO GRANDE STORM WATER PROJECT	
Vicinity Map	
Western Technologies Inc.	
Job No.: 3123JT118	Plate: 1



N No Scale

Approximate Test Boring Location

BM-Assumed elevation 100.0'
Five different locations

RIO GRANDE STORM WATER PROJECT	
Boring Location Diagram	
Western Technologies, Inc.	
Job No.: 3123JT140	Plate: 2

Allowable Soil Bearing Capacity	The recommended maximum contact stress developed at the interface of the foundation element and the supporting material.
Backfill	A specified material placed and compacted in a confined area.
Base Course	A layer of specified material placed on a subgrade or subbase.
Base Course Grade	Top of base course.
Bench	A horizontal surface in a sloped deposit.
Caisson	A concrete foundation element cast in a circular excavation which may have an enlarged base. Sometimes referred to as a cast-in-place pier.
Concrete Slabs-on-Grade	A concrete surface layer cast directly upon a base, subbase or subgrade.
Crushed Rock Base Course	A base course composed of crushed rock of a specified gradation.
Differential Settlement	Unequal settlement between or within foundation elements of a structure.
Engineered Fill	Specified material placed and compacted to specified density and/or moisture conditions under observations of a representative of a soil engineer.
Existing Fill	Materials deposited through the action of man prior to exploration of the site.
Existing Grade	The ground surface at the time of field exploration.
Expansive Potential	The potential of a soil to expand (increase in volume) due to absorption of moisture.
Fill	Materials deposited by the actions of man.
Finished Grade	The final grade created as a part of the project.
Gravel Base Course	A base course composed of naturally occurring gravel with a specified gradation.
Heave	Upward movement
Native Grade	The naturally occurring ground surface.
Native Soil	Naturally occurring on-site soil.
Rock	A natural aggregate of mineral grains connected by strong and permanent cohesive forces. Usually requires drilling, wedging, blasting or other methods of extraordinary force for excavation.
Sand & Gravel Base	A base course of sand and gravel of a specified gradation.
Sand Base Course	A base course composed primarily of sand of a specified gradation.
Scarify	To mechanically loosen soil or break down existing soil structure.
Settlement	Downward movement.
Soil	Any unconsolidated material composed of discrete solid particles, derived from the physical and/or chemical disintegration of vegetable or mineral matter, which can be separated by gentle mechanical means such as agitation in water.
Strip	To remove from present location.
Subbase	A layer of specified material placed to form a layer between the subgrade and base course.
Subbase Grade	Top of subbase.
Subgrade	Prepared native soil surface.

RIO GRANDE STORM WATER PROJECT	
Definition of Terminology	
Western Technologies Inc.	
Job No.: 3123JT140	Plate: A-1

COARSE-GRAINED SOILS

LESS THAN 50% FINES*

GROUP SYMBOLS	DESCRIPTION	MAJOR DIVISIONS
GW	WELL-GRADED GRAVELS OR GRAVEL-SAND MIXTURES, LESS THAN 5% FINES	GRAVELS MORE THAN HALF OF COARSE FRACTION IS LARGER THAN NO. 4 SIEVE SIZE
GP	POORLY-GRADED GRAVELS OR GRAVEL-SAND MIXTURES, LESS THAN 5% FINES	
GM	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES, MORE THAN 12% FINES	
GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES, MORE THAN 12% FINES	
SW	WELL-GRADED SANDS OR GRAVELLY SANDS, LESS THAN 5% FINES	SANDS MORE THAN HALF OF COARSE FRACTION IS SMALLER THAN NO. 4 SIEVE SIZE
SP	POORLY-GRADED SANDS OR GRAVELLY SANDS, LESS THAN 5% FINES	
SM	SILTY SANDS, SAND-SILT MIXTURES, MORE THAN 12% FINES	
SC	CLAYEY SANDS, SAND-CLAY MIXTURES, MORE THAN 12% FINES	

NOTE: Coarse-grained soils receive dual symbols if they contain 5% to 12% fines (e.g., SW-SM, GP-GC).

FINE-GRAINED SOILS

MORE THAN 50% FINES

GROUP SYMBOLS	DESCRIPTION	MAJOR DIVISIONS
ML	INORGANIC SILTS, VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS	SILTS AND CLAYS LIQUID LIMIT LESS THAN 50
CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS	
OL	ORGANIC SILTS OR ORGANIC SILT-CLAYS OF LOW PLASTICITY	
MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SANDS OR SILTS, ELASTIC SILTS	SILTS AND CLAYS LIQUID LIMIT MORE THAN 50
CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS	
OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY	
PT	PEAT, MUCK AND OTHER HIGHLY ORGANIC SOILS	HIGHLY ORGANIC SOILS

NOTE: Fine-grained soils may receive dual classification based upon plasticity characteristics.

SOIL SIZES

COMPONENT	SIZE RANGE
BOULDERS	Above 12 in.
COBBLES	3 in. – 12 in.
GRAVEL	No. 4 – 3 in.
Coarse	3/4 in. – 3 in.
Fine	No. 4 – 3/4 in.
SAND	No. 200 – No. 4
Coarse	No. 10 – No. 4
Medium	No. 40 – No. 10
Fine	No. 200 – No. 40
*Fines (Silt or Clay)	Below No. 200

NOTE: Only sizes smaller than three inches are used to classify soils

CONSISTENCY

CLAYS & SILTS	BLOWS PER FOOT*
VERY SOFT	0 – 2
SOFT	2 – 4
FIRM	4 – 8
STIFF	8 – 16
VERY STIFF	16 – 32
HARD	Over 32

RELATIVE DENSITY

SANDS & GRAVELS	BLOWS PER FOOT*
VERY LOOSE	0 – 4
LOOSE	4 – 10
MEDIUM DENSE	10 – 30
DENSE	30 – 50
VERY DENSE	Over 50

*Number of blows of 140 pound hammer falling 30 inches to drive a 2 inch O.D. (1 3/8 inch ID) split spoon (ASTM D1586).

PLASTICITY OF FINE GRAINED SOILS

PLASTICITY INDEX	TERM
0	NON-PLASTIC
1 – 7	LOW
8 – 25	MEDIUM
Over 25	HIGH

DEFINITION OF WATER CONTENT

DRY
SLIGHTLY DAMP
DAMP
MOIST
WET
SATURATED

RIO GRANDE STORM WATER PROJECT

Method of Soil Classification

Western Technologies Inc.

Job No.: 3123JT140 | Plate: A-2

The number shown in **"BORING NO."** refers to the approximate location of the same number indicated on the "Boring Location Diagram" as positioned in the field by measurements from property lines and/or existing features.

"ELEVATION" refers to ground surface elevation at the boring location established by measurements with an engineer's level from a bench mark (BM) shown on the "Boring Location Diagram".

"TYPE SIZE BORING", refers to the exploratory equipment used in the boring wherein **HSA = hollow stem auger.**

"N" in Blows/Foot" refers to the number of blows of a 140-pound weight, dropped 30 inches, required to advance a two-inch-outside-diameter split-barrel sampler a distance of 1 foot, Standard Penetration Test (ASTM D1586). Refusal to penetration is defined as more than 100 blows per foot.

"R" in Blows/Foot" refers to the number of blows of a 140-pound weight, dropped 30 inches, required to advance a 2.42-inch-inside-diameter ring sampler a distance of 1 foot. Refusal to penetration is considered more than 50 blows per foot.

"Sample Type" refers to the form of sample recovery, in which N = **Split-barrel sample, R = Ring sample, G = Grab Sample.**

"Dry Density, pcf" refers to the laboratory-determined dry density in pounds per cubic foot.

"Water Content, %" refers to the laboratory-determined moisture content in percent ASTM D2216.

"Unified Classification" refers to the soil type as defined by "Method of Soil Classification". The soils were classified visually in the field and, where appropriate, classifications were modified by visual examination of samples in the laboratory and/or by appropriate tests.

These notes and boring logs are intended for use in conjunction with the purposes of our services defined in the text. Boring log data should not be construed as part of the construction plans nor as defining construction conditions.

Boring logs depict our interpretations of subsurface conditions at the locations and on the dates noted. Variations in subsurface conditions and soil characteristics may occur between borings. Groundwater may fluctuate due to seasonal variations and other factors.

RIO GRANDE STORM WATER PROJECT	
Boring Log Notes	
Western Technologies Inc.	
Job No.: 3123JT140	Plate: A-3

DATE DRILLED: **11-05-2003**

DRILL RIG TYPE: **CME-75**

BORING TYPE/SIZE: **HSA/7"**

BORING NO. 1

LOCATION: **See Boring Location Diagram**

ELEVATION: **98.5 Feet**

FIELD ENGR: **L. Kaltenback**

WATER CONTENT (%)	DRY DENSITY (LBS/CU.FT)	SAMPLE TYPE	SAMPLE	BLOWS/FT. R or N	BLOWS/FT. C	DEPTH	USCS	GRAPHIC	SOIL DESCRIPTION
		G							FILL 0 TO 3.5 FEET SANDY CLAY; brown, damp, some sand, some gravel and trace of cobbles.
		N		21					
							SC		CLAYEY SAND; brown to red, medium dense, damp, some gravel, trace of cobbles.
		N		46		5			
		N		22		10			
							CL		SANDY CLAY; brown, firm to stiff, damp.
							SC		CLAYEY SAND; brown to red, medium dense, damp, some gravel and cobbles.
		N		50/1"		15	GC		COBBLES; brown to red, dense, damp, clayey sand.
									Auger Refusal At 16 Feet
						20			

GROUNDWATER ENCOUNTERED NO: X YES:____ DEPTH:____ DATE: 11-05-2003

NOTES

RIO GRANDE STORM WATER PROJ.

Boring Log

Western Technologies Inc.

Job No.: **3123JT140** Plate: **A-4**

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

DATE DRILLED: **11-05-2003**

DRILL RIG TYPE: **2000 Diedrich D-50**

BORING TYPE/SIZE: **HSA/7"**

BORING NO. 2

LOCATION: **See Boring Location Diagram**

ELEVATION: **101.2 Feet**

FIELD ENGR: **L. Kaltenback**

WATER CONTENT (%)	DRY DENSITY (LBS/CU.FT)	SAMPLE TYPE	SAMPLE	BLOWS/FT. R or N	BLOWS/FT. C	DEPTH	USCS	GRAPHIC	SOIL DESCRIPTION
		G							FILL 0 TO 8 FEET SANDY CLAY; brown, damp, some gravel and cobbles, some bark and wood at the bottom of the fill.
		N		15					
		N		17		5			
							CL		SANDY CLAY; brown, firm to stiff, damp, some roots, some gravel.
		N		7		10			
							GW		GRAVEL/COBBLES; brown to orange, medium dense to dense, damp, some sand.
		N		50/2"		15			
									Auger Refusal At 15.5 Feet
						20			

GROUNDWATER ENCOUNTERED NO: X YES:____ DEPTH:____ DATE: 11-05-2003

NOTES

RIO GRANDE STORM WATER PROJ.

Boring Log

Western Technologies Inc.

Job No.: **3123JT140** Plate: **A-5**

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

DATE DRILLED: **11-05-2003**

DRILL RIG TYPE: **2000 Diedrich D-50**

BORING TYPE/SIZE: **HSA/7"**

BORING NO. 3

LOCATION: **See Boring Location Diagram**

ELEVATION: **98.4 Feet**

FIELD ENGR: **L. Kaltenback**

WATER CONTENT (%)	DRY DENSITY (LBS/CU.FT)	SAMPLE TYPE	SAMPLE	BLOWS/FT. R or N	BLOWS/FT. C	DEPTH	USCS	GRAPHIC	SOIL DESCRIPTION
		G							FILL 0 TO 2 FEET SANDY CLAY; brown, damp, some gravel.
		N		13			CL		SANDY CLAY; brown to red, damp, firm to stiff, some gravel and cobbles.
		N		9		5			
							CL		SANDY CLAY; brown, firm to hard, damp, some gravel, some cobbles.
						10			
8.2	118	R		6					
							GC		COBBLES; brown, hard, damp, some sandy clay.
						15			**Auger Refusal At 15 Feet**
						20			

GROUNDWATER ENCOUNTERED NO: X YES:____ DEPTH:____ DATE: 11-05-2003

NOTES **Broke auger at 15 feet.**

RIO GRANDE STORM WATER PROJ.

Boring Log

Western Technologies Inc.

Job No.: **3123JT140** Plate: **A-6**

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

DATE DRILLED: **11-06-2003**

DRILL RIG TYPE: **2000 Diedrich D-50**

BORING TYPE/SIZE: **HSA/7"**

BORING NO. 4

LOCATION: **See Boring Location Diagram**

ELEVATION: **99.7 Feet**

FIELD ENGR: **L. Kaltenback**

WATER CONTENT (%)	DRY DENSITY (LBS/CU.FT)	SAMPLE TYPE	SAMPLE	BLOWS/FT. R or N	BLOWS/FT. C	DEPTH	USCS	GRAPHIC	SOIL DESCRIPTION
		G							FILL 0 TO 3.5 FEET SANDY CLAY; brown to black, damp, frozen, some silt lenses about 1 to 2 inches thick, some gravel.
							GW		GRAVEL; brown, loose to medium dense, damp, some sand, fine to coarse grained sand, some cobbles.
		N		7		5			
							GC		GRAVEL; brown, stiff to hard, damp, some sandy clay, some cobbles.
									Auger Refusal At 8 Feet
						10			
						15			
						20			

GROUNDWATER ENCOUNTERED NO: X YES:____ DEPTH:____ DATE:11-06-2003

NOTES

RIO GRANDE STORM WATER PROJ.

Boring Log

Western Technologies Inc.

Job No.: **3123JT140** Plate: **A-7**

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

DATE DRILLED: **11-06-2003**

DRILL RIG TYPE: **2000 Diedrich D-50**

BORING TYPE/SIZE: **HSA/7"**

BORING NO. 5

LOCATION: **See Boring Location Diagram**

ELEVATION: **100.9 Feet**

FIELD ENGR: **L. Kaltenback**

WATER CONTENT (%)	DRY DENSITY (LBS/CU.FT)	SAMPLE TYPE	SAMPLE	BLOWS/FT. R or N	BLOWS/FT. C	DEPTH	USCS	GRAPHIC	SOIL DESCRIPTION
		G					CL		SANDY CLAY; brown to red, stiff to hard, damp, frozen to 1 foot,
		N		22					
							GW		COBBLES; brown, medium dense to dense, damp.
									Auger Refusal At 4 Feet
						5			
						10			
						15			
						20			

GROUNDWATER ENCOUNTERED NO: X YES: ____ DEPTH: ____ DATE: 11-06-2003

NOTES

RIO GRANDE STORM WATER PROJ.

Boring Log

Western Technologies Inc.

Job No.: **3123JT140** Plate: **A-8**

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

DATE DRILLED: **11-06-2003**

DRILL RIG TYPE: **2000 Dietrich D-50**

BORING TYPE/SIZE: **HSA/7"**

BORING NO. 6

LOCATION: **See Boring Location Diagram**

ELEVATION: **102.7 Feet**

FIELD ENGR: **L. Kaltenback**

WATER CONTENT (%)	DRY DENSITY (LBS/CU.FT)	SAMPLE TYPE	SAMPLE	BLOWS/FT. R or N	BLOWS/FT. C	DEPTH	USCS	GRAPHIC	SOIL DESCRIPTION
		G					SC		CLAYEY SAND; brown, loose to medium dense, damp, some gravel and cobbles.
		N		25			GW		COBBLES; brown, medium dense, damp, some sand, fine to coarse grained sand, some gravel.
						5			**Auger Refusal At 4.5 Feet**
						10			
						15			
						20			

GROUNDWATER ENCOUNTERED NO: X YES:____ DEPTH:____ DATE:11-06-2003

NOTES

RIO GRANDE STORM WATER PROJ.

Boring Log

Western Technologies Inc.

Job No.: **3123JT140** Plate: **A-9**

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

DATE DRILLED: **11-06-2003**

DRILL RIG TYPE: **2000 Dietrich D-50**

BORING TYPE/SIZE: **HSA/7"**

BORING NO. 7

LOCATION: **See Boring Location Diagram**

ELEVATION: **97.7 Feet**

FIELD ENGR: **L. Kaltenback**

WATER CONTENT (%)	DRY DENSITY (LBS/CU.FT)	SAMPLE TYPE	SAMPLE	BLOWS/FT. R or N	BLOWS/FT. C	DEPTH	USCS	GRAPHIC	SOIL DESCRIPTION
		G					SC		CLAYEY SAND; brown, loose to medium dense, damp, some gravel and cobbles.
		N		17					
							SM		SILTY SAND; brown, loose to medium dense, damp, fine to coarse grained sand, some gravel and cobbles, some roots, some 1/4 to 1/2 inch thick clay lenses.
		N		6		5			
		N		19		10	GW		COBBLES; brown, medium dense, damp, some sand. **Auger Refusal At 11.5 Feet**
						15			
						20			

GROUNDWATER ENCOUNTERED NO: X YES:____ DEPTH:____ DATE: 11-06-2003

NOTES

RIO GRANDE STORM WATER PROJ.

Boring Log

Western Technologies Inc.

Job No.: **3123JT140** Plate: **A-10**

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

DATE DRILLED: **11-06-2003**

DRILL RIG TYPE: **2000 Dietrich D-50**

BORING TYPE/SIZE: **HSA/7"**

BORING NO. 8

LOCATION: **See Boring Location Diagram**

ELEVATION: **98.2 Feet**

FIELD ENGR: **L. Kaltenback**

WATER CONTENT (%)	DRY DENSITY (LBS/CU.FT)	SAMPLE TYPE	SAMPLE	BLOWS/FT. R or N	BLOWS/FT. C	DEPTH	USCS	GRAPHIC	SOIL DESCRIPTION
		G					CL		SANDY CLAY; brown, stiff to hard, damp to moist, organics, trace of gravel.
		N		5			CL		SILTY CLAY; red to brown, firm to stiff, damp to moist, some gravel and cobbles.
							GC		COBBLES; red to brown, hard, damp, some clay.
									Auger Refusal At 4 Feet
						5			
						10			
						15			
						20			

GROUNDWATER ENCOUNTERED NO: X YES:____ DEPTH:____ DATE: 11-06-2003

NOTES

RIO GRANDE STORM WATER PROJ.

Boring Log

Western Technologies Inc.

Job No.: **3123JT140** Plate: **A-11**

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

DATE DRILLED: **11-06-2003**

DRILL RIG TYPE: **2000 Dietrich D-50**

BORING TYPE/SIZE: **HSA/7"**

BORING NO. 9

LOCATION: **See Boring Location Diagram**

ELEVATION: **102.8 Feet**

FIELD ENGR: **L. Kaltenback**

WATER CONTENT (%)	DRY DENSITY (LBS/CU.FT)	SAMPLE TYPE	SAMPLE	BLOWS/FT. R or N	BLOWS/FT. C	DEPTH	USCS	GRAPHIC	SOIL DESCRIPTION
		G					CL		SANDY CLAY; brown, stiff to hard, damp, some roots, some gravel.
		N		14			SM		SILTY SAND; brown to black, medium dense, damp, trace of cobbles and gravel.
		N		11		5			
		G					CL-ML		CLAYEY SILT; brown, firm to stiff, damp, some gravel, some sand lenses about 1/4 inch thick.
							GW		COBBLES; brown, medium dense, damp, some sand.
									Auger Refusal At 8.5 Feet
						10			
						15			
						20			

GROUNDWATER ENCOUNTERED NO: X YES:____ DEPTH:____ DATE: 11-06-2003

NOTES

RIO GRANDE STORM WATER PROJ.

Boring Log

Western Technologies Inc.

Job No.: **3123JT140** Plate: **A-12**

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

DATE DRILLED: **11-06-2003**

DRILL RIG TYPE: **2000 Dietrich D-50**

BORING TYPE/SIZE: **HSA/7"**

BORING NO. 10

LOCATION: **See Boring Location Diagram**

ELEVATION: **100.8 Feet**

FIELD ENGR: **L. Kaltenback**

WATER CONTENT (%)	DRY DENSITY (LBS/CU.FT)	SAMPLE TYPE	SAMPLE	BLOWS/FT. R or N	BLOWS/FT. C	DEPTH	USCS	GRAPHIC	SOIL DESCRIPTION
		G							FILL 0 TO 2 FEET GRAVEL; brown, damp, some sandy clay, some cobbles.
		N		25					FILL 2 TO 4.5 FEET CLAYEY SAND; brown, damp, some gravel.
		N		44		5	GW		GRAVEL/COBBLES; brown, medium dense, damp, some sand, some tree branches at the top of this layer.
									Auger Refusal At 7 Feet
						10			
						15			
						20			

GROUNDWATER ENCOUNTERED NO: X YES: ____ DEPTH: ____ DATE: 11-06-2003

NOTES

RIO GRANDE STORM WATER PROJ.

Boring Log

Western Technologies Inc.

Job No.: **3123JT140** Plate: **A-13**

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

DATE DRILLED: **11-06-2003**

DRILL RIG TYPE: **2000 Dietrich D-50**

BORING TYPE/SIZE: **HSA/7"**

BORING NO. 11

LOCATION: **See Boring Location Diagram**

ELEVATION: **105.3 Feet**

FIELD ENGR: **L. Kaltenback**

WATER CONTENT (%)	DRY DENSITY (LBS/CU.FT)	SAMPLE TYPE	SAMPLE	BLOWS/FT. R or N	BLOWS/FT. C	DEPTH	USCS	GRAPHIC	SOIL DESCRIPTION
		G							FILL 0 TO 2 FEET SILTY CLAY; brown, damp, some thin sand lenses, some organics.
		N		21			SM		SILTY SAND; brown, loose to medium dense, damp to moist, some gravel.
		N		6		5			
							CL		SANDY CLAY; brown, soft to firm, moist.
							SC		CLAYEY SAND; brown, medium dense, damp, some cobbles and gravel.
		N		18		10			
							GW		COBBLES; brown, medium dense, damp, some sand.
									Auger Refusal At 11.5 Feet
						15			
						20			

GROUNDWATER ENCOUNTERED NO: X YES:____ DEPTH:____ DATE: 11-06-2003

NOTES

RIO GRANDE STORM WATER PROJ.

Boring Log

Western Technologies Inc.

Job No.: **3123JT140** Plate: **A-14**

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

DATE DRILLED: **11-06-2003**

DRILL RIG TYPE: **2000 Dietrich D-50**

BORING TYPE/SIZE: **HSA/7"**

BORING NO. 12

LOCATION: **See Boring Location Diagram**

ELEVATION: **100.5 Feet**

FIELD ENGR: **L. Kaltenback**

WATER CONTENT (%)	DRY DENSITY (LBS/CU.FT)	SAMPLE TYPE	SAMPLE	BLOWS/FT. R or N	BLOWS/FT. C	DEPTH	USCS	GRAPHIC	SOIL DESCRIPTION
		G					CL		SANDY CLAY; brown, firm to stiff, damp, some organics.
		N		20			GW		COBBLES; brown, medium dense, damp, some sand.
									Auger Refusal At 3.5 Feet
						5			
						10			
						15			
						20			

GROUNDWATER ENCOUNTERED NO: X YES: ____ DEPTH: ____ DATE: 11-06-2003

NOTES

RIO GRANDE STORM WATER PROJ.

Boring Log

Western Technologies Inc.

Job No.: **3123JT140** Plate: **A-15**

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

DATE DRILLED: **11-06-2003**

DRILL RIG TYPE: **2000 Dietrich D-50**

BORING TYPE/SIZE: **HSA/7"**

BORING NO. 13

LOCATION: **See Boring Location Diagram**

ELEVATION: **100.5 Feet**

FIELD ENGR: **L. Kaltenback**

WATER CONTENT (%)	DRY DENSITY (LBS/CU.FT)	SAMPLE TYPE	SAMPLE	BLOWS/FT. R or N	BLOWS/FT. C	DEPTH	USCS	GRAPHIC	SOIL DESCRIPTION
		G					CL		SILTY CLAY; brown, firm to stiff, damp to moist, some scattered sand lenses about 1/4 inch thick.
		N		34			SC		CLAYEY SAND; brown, medium dense, damp, some gravel and cobbles.
							ML		SANDY SILT; red to brown, firm, damp, some cobbles and gravel.
		N		10		5			
							GW		COBBLES; brown, medium dense, damp, some sand.
									Auger Refusal At 7 Feet
						10			
						15			
						20			

GROUNDWATER ENCOUNTERED NO: X YES:____ DEPTH:____ DATE: 11-06-2003

NOTES

RIO GRANDE STORM WATER PROJ.

Boring Log

Western Technologies Inc.

Job No.: **3123JT140** Plate: **A-16**

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

DATE DRILLED: **11-06-2003**

DRILL RIG TYPE: **2000 Dietrich D-50**

BORING TYPE/SIZE: **HSA/7"**

BORING NO. 14

LOCATION: **See Boring Location Diagram**

ELEVATION: **101.9 Feet**

FIELD ENGR: **L. Kaltenback**

WATER CONTENT (%)	DRY DENSITY (LBS/CU.FT)	SAMPLE TYPE	SAMPLE	BLOWS/FT. R or N	BLOWS/FT. C	DEPTH	USCS	GRAPHIC	SOIL DESCRIPTION
		G					SC		CLAYEY SAND; brown, loose to medium dense, damp, some gravel, trace of cobbles.
							GW		COBBLES; brown, dense, damp, tree roots.
									Auger Refusal At 2.5 Feet

5

10

15

20

GROUNDWATER ENCOUNTERED NO: X YES:____ DEPTH:____ DATE: 11-06-2003

NOTES

RIO GRANDE STORM WATER PROJ.

Boring Log

Western Technologies Inc.

Job No.: **3123JT140** Plate: **A-17**

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

DATE DRILLED: **11-06-2003**

DRILL RIG TYPE: **2000 Dietrich D-50**

BORING TYPE/SIZE: **HSA/7"**

BORING NO. 15

LOCATION: **See Boring Location Diagram**

ELEVATION: **99.4 Feet**

FIELD ENGR: **L. Kaltenback**

WATER CONTENT (%)	DRY DENSITY (LBS/CU.FT)	SAMPLE TYPE	SAMPLE	BLOWS/FT. R or N	BLOWS/FT. C	DEPTH	USCS	GRAPHIC	SOIL DESCRIPTION
		G					GW		GRAVEL/COBBLES; brown, loose to medium dense, damp, some silty sand, trace of boulders.
		N		59					
		N		50/0"		5			**Auger Refusal At 6 Feet**
						10			
						15			
						20			

GROUNDWATER ENCOUNTERED NO: X YES:____ DEPTH:____ DATE: 11-06-2003

NOTES

RIO GRANDE STORM WATER PROJ.

Boring Log

Western Technologies Inc.

Job No.: **3123JT140** Plate: **A-18**

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

SOIL PROPERTIES

BORING NO.	DEPTH (FEET)	SOIL CLASSIFICATION	SOIL PROPERTY		COMPRESSION / CONSOLIDATION		EXPANSION			REMARKS
			INITIAL DRY DENSITY (PCF)	INITIAL WATER CONTENT (%)	SURCHARGE (KSF)	TOTAL COMPRESSION (%)	SURCHARGE (KSF)	EXPANSION (%)	MAXIMUM SWELL PRESSURE (KSF)	
3	12-13	CL	118	8.2	0.6	-0.7				
					1.1	-1.1				
					2.2	-1.6				
					2.2	-3.8				2
					4.4	-6.0				2
					8.8	-8.6				2

NOTE: Initial Dry Density and Initial Water Content are in-situ values unless otherwise noted.

REMARKS:
1. Compacted Density (approximately 95% of ASTM D698 maximum density at moisture content slightly below optimum).
2. Submerged to approximate saturation.
3. Dry Density determined from one ring of a multi-ring sample.
4. Visual Classification.

* Sandstone

RIO GRANDE STORM WATER PROJECT

Soil Properties

Western Technologies Inc.

Job No.: 3123JT140 | Plate: B-1

SOIL PROPERTIES

BORING NO.	DEPTH (FEET)	SOIL CLASSIFICATION	SOIL PROPERTY		SHEAR STRENGTH		PERMEABILITY	SPECIFIC GRAVITY	WATER SOLUBLE MATTER (PPM)		REMARKS
			INITIAL DRY DENSITY (PCF)	INITIAL WATER CONTENT (%)	C (KSF)	Ø (DEGREES)	K (CM/SECOND)		SALTS	SULFATES	
14	1-2	SC							90		

NOTE: Initial Dry Density and Initial Water Content are in-situ values unless otherwise noted.

LEGEND:

SHEAR STRENGTH TEST METHOD

DS Direct Shear
DS Direct Shear (Saturated)
UC Unconfined Compression
UU Unconsolidated Undrained
CU Consolidated Undrained with Pore Pressure
CU Consolidated Undrained
CD Consolidated Drained

REMARKS:

1. Compacted Density (approximately 95% of ASTM D698 at moisture value slightly below optimum).
2. Visual Classification.
3. Constant Head.
4. Falling Head.

RIO GRANDE STORM WATER PROJECT

Soil Properties

Western Technologies Inc.

Job No.: 3123JT140 | Plate: B-2

PHYSICAL PROPERTIES

BORING NO.	DEPTH (FEET)	SOIL CLASSIFICATION	PARTICLE SIZE DISTRIBUTION % PASSING BY WEIGHT					ATTERBERG LIMITS		MOISTURE-DENSITY RELATIONSHIP			'R' VALUE	REMARKS
			3 IN.	NO. 4	NO. 10	NO. 40	NO. 200	LL	PI	DRY DENSITY (PCF)	OPTIMUM MOISTURE (%)	METHOD		
4	1-2	CL	100	89	82	64	51.0	40	11					2
7	2-3.5	SC	100	75	67	50	32.6	35	11					2
10	0.5-1.5	GC								132.2	8.3	C		2,4
11	5-6.5	SM	100	65	52	32	28.5	22	2					2

REMARKS:

CLASSIFICATION / PARTICLE SIZE

1. Visual
2. Laboratory Tested
3. Minus No. 200 Only

MOISTURE-DENSITY RELATIONSHIP

4. Tested ASTM D698 / AASHTO T99
5. Tested ASTM D1557 / AASHTO T180

NOTE: **NP** Nonplastic

RIO GRANDE STORM WATER PROJECT

Physical Properties

Western Technologies Inc.

Job No.: 3123JT140 | Plate: B-3