Huddleston-Berry
Engineering & Testing, LLC

GEOTECHNICAL INVESTIGATION
LINCOLN PARK STADIUM IMPROVEMENTS
GRAND JUNCTION, COLORADO
PROJECT#00214-0013

FCI CONSTRUCTORS, INC.
PO BOX 1767
GRAND JUNCTION, COLORADO 81502

DECEMBER 29, 2010

Huddleston-Berry Engineering and Testing, LLC
640 White Avenue, Unit B
Grand Junction, Colorado 81501

SUMMARY OF CONCLUSIONS AND RECOMMENDATIONS

As part of the engineering design process, a geotechnical investigation was conducted for the proposed Lincoln Park Stadium Improvements in Grand Junction, Colorado. The project location is shown on Figure 1 – Site Location Map. The purpose of the investigation was to evaluate the subsurface conditions at the site with respect to foundation design and earthwork for the proposed construction. This summary has been prepared to include the information required by civil engineers, structural engineers, and contractors involved in the project.

Subsurface Conditions (p. 2)

The subsurface investigation consisted of five borings, drilled on December 9th, 2010. The locations of the borings are shown on Figure 2 – Site Plan. The borings generally encountered soft clay soils above dense gravel and cobble soils. The top of gravel and cobble soils was encountered at depths ranging from 44.0 and 51.0 feet. Groundwater was encountered in the borings at depths of between 5.0 and 6.5 feet. The native clay soils were determined in the laboratory to be slightly to moderately plastic and slightly collapsible. However, the native clay soils are expected to generally consolidate under loading.

Summary of Foundation Recommendations

- *Foundation Type* – Driven Piles, Screw Piles, or Geopiers and Shallow Foundations for Grandstands. Driven Piles, Screw Piles, Geopiers and Shallow Foundations, or Shallow Foundations above structural fill for Restroom Building.

Driven Piles

- *Pile Type* - Minimum 10¾ inch diameter pipe piles (p.3)
- *Anticipated Length* – 47 to 61 feet. (p. 3)
- *Axial Capacity* – 40 tons for 10¾ inch pipe piles without pile load testing.(p.3)

Screw Piles

- *Anticipated Length* – 47 to 61 feet. (p. 4)
- *Axial Capacity* – Dependent upon pile load testing; however, 80 tons may be achievable. (p. 4)

Geopiers

- Geopier design and installation criteria should be established by the Geopier Foundation Company. (p. 4)

Shallow Foundations (restroom building)

- *Foundation Type* – Spread Footings or Monolithic (turndown) Structural Slabs. (p. 4)
- *Structural Fill* – Minimum of 24-inches below foundations. The native soils are not suitable for reuse as structural fill. Imported structural fill should consist of pit-run, crusher fines, CDOT Class 6 base course, or other granular material approved by the engineer. (p. 5)
- *Maximum Allowable Bearing Capacity* – 1,500 psf. (p. 5)
- *Subgrade Modulus* – 250 pci for pit-run, crusher fines, or CDOT Class 6 base course. (p. 5)

General

- *Seismic Design* – Site Class D (p. 6)
- *Lateral Earth Pressure* – 50 pcf (p. 7)

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1.0 INTRODUCTION

As part of continued improvements to their facilities, the City of Grand Junction proposes to build new grandstands at Lincoln Park Stadium. As part of the engineering design process, Huddleston-Berry Engineering and Testing, LLC (HBET) was retained by FCI Constructors, Inc. to conduct a geotechnical investigation at the site.

The field investigation, laboratory testing, and analyses were designed to identify most of the geologic hazards common to the area including unstable slopes, swelling or collapsible soils and/or bedrock, soluble sulfates, and shallow groundwater. These issues can impact construction and will be discussed if present.

1.1 Scope

As discussed above, a geotechnical investigation was conducted for the proposed Lincoln Park Stadium improvements in Grand Junction, Colorado. The scope of the investigation included the following components:

- Conducting a subsurface investigation to evaluate the subsurface conditions at the site.
- Collecting soil samples and conducting laboratory testing to determine the engineering properties of the soils at the site.
- Providing recommendations for foundation type and subgrade preparation.
- Providing recommendations for bearing capacity.
- Providing recommendations for lateral earth pressure.
- Providing recommendations for drainage, grading, and general earthwork.

The investigation and report were prepared by a Colorado registered professional engineer in accordance with generally accepted engineering practices. This report has been prepared for the exclusive use of FCI Constructors, Inc. and the City of Grand Junction.

1.2 Site Location and Description

The site is located east of 12th Street, south of North Avenue, in Grand Junction, Colorado. The project location is shown on Figure 1 – Site Location Map.

At the time of the investigation, the site was occupied by an existing football stadium and baseball/softball field. Existing restroom and locker room facilities were present in the northern portion of the site. A large parking lot was present south of the existing stadium/ball field and a small parking lot was present north of the existing stadium/ball field. The site was nearly level with a general slight slope down to the south. Vegetation consisted of the ball field grasses and landscaped areas. The site was bordered by North Avenue to the north, by 12th Street to the west, by the Lincoln Park Golf Course to the east, and by the Lincoln Park Barn, Lincoln Park Pool, and parking lots to the south.

1.3 Proposed Construction

The construction is anticipated to include new grandstands and a new restroom building. The grandstands will likely be a steel and concrete structure. The restroom building is anticipated to be single story and may be constructed of masonry, wood framing, or steel.

2.0 SUBSURFACE INVESTIGATION

The subsurface investigation consisted of five geotechnical borings, drilled on December 9th, 2010. The locations of the borings are shown on Figure 2 – Site Plan. The borings were located in the field relative to existing landmarks. Typed boring logs are included in Appendix A. Samples of the subsurface soils were collected using Standard Penetration Testing (SPT) and bulk sampling methods at the depths shown on the boring logs.

The borings were drilled to depths of between 45.5 and 52.0 feet below the existing ground surface with a truck-mounted drill rig. As indicated on the logs, the subsurface conditions at the site were fairly consistent. The borings generally encountered thin asphalt, topsoil, or fill materials above brown, moist to wet, very soft to stiff lean clay soils to depths of between 44.0 and 51.0 feet. The clay was underlain by brown, wet, dense to very dense sandy gravel and cobbles to the bottoms of the borings. Groundwater was encountered in the borings at depths of between 5.0 and 6.5 feet.

Due to soft soils below the water table, the boreholes collapsed during drilling. Therefore, deep sampling of the soils was unable to be conducted. However, in Borings B-1 and B-4, the drill rods were advanced to the gravel and cobble soils and blow counts were recorded for each foot of penetration. In Borings B-2, B-3, and B-5, the augers were advanced to the gravel and cobble soils.

3.0 LABORATORY TESTING

Selected soil samples collected from the borings were tested in the Huddleston-Berry Engineering and Testing LLC geotechnical laboratory for natural moisture and density, gradation, Atterberg limits, swell/consolidation, soluble sulfates, and optimum moisture/maximum dry density (Proctor). The laboratory testing results are included in Appendix B. The soil descriptions included in the typed boring logs reflect the information obtained in the laboratory testing program.

The laboratory testing results indicate that the native clay soils at the site are slightly to moderately plastic. In addition, the soils were determined to be slightly collapsible with up to approximately 0.3% collapse measured in the laboratory. However, the native soils are anticipated to generally tend to consolidate under loading. Water soluble sulfates were detected in the site soils in a concentration of 0.2%.

4.0 CONCLUSIONS AND RECOMMENDATIONS

4.1 Grandstand Foundations

The subsurface investigation indicated that soft soils are present at the site. In addition, the bearing stratum is fairly deep. Based upon the magnitude of the anticipated loading, typical shallow foundation systems are impractical for the proposed grandstands. Continuous and/or discreet spread footings would need to be very large to limit settlement of the structure. In general, driven steel piles are the common foundation type in the Grand Valley where soft soils raise concerns about excessive settlements. However, screw piles have been used as an acceptable alternative in the vicinity of the subject site. In addition, ground improvement techniques such as the Geopier system have been used on other projects in the Grand Junction area. Driven piles, screw piles, and Geopiers are all appropriate foundation alternatives and each alternative is discussed below.

4.1.1 Driven Steel Piles

It is anticipated that most of the axial pile capacity will be developed in end bearing in the dense gravel and cobble soils. Therefore, concrete filled pipe piles are recommended.

Based upon the anticipated working loads and pile driving conditions, pipe piles should be a minimum of 10¾ inch diameter. The piles should penetrate the soft clay soils and bear into the dense gravel and cobble soils. The actual penetration of individual piles will be dependent upon driving conditions and size of pile used; however, it is anticipated that the piles will reach refusal within 3 to 10 feet of the top of the gravel and cobble layer. As indicated in the boring logs, the gravel and cobble soils were encountered at depths of between 44.0 and 51.0 feet. Therefore, pile lengths of up to approximately 61 feet may be possible.

The refusal criterion for driven piles is dependent upon the type and size of the hammer. However, the refusal criteria should be established as the number of blows required for the last few inches of penetration. For a hammer delivering 20,000 foot-pounds of energy to a 10¾ inch pipe pile, we would expect refusal to be at approximately 5 to 8 blows per inch. However, the contractor should coordinate with HBET to develop specific pile refusal criteria. Due to the nature of the gravel and cobble soils, to reduce the possibility of excessive tip deflection and tip damage, pile tip reinforcement is recommended.

For 10¾-inch diameter, concrete filled pipe piles driven to refusal, HBET recommends an allowable geotechnical capacity of 40 tons. However, it is recommended that the capacity of the piles be verified by pile load testing. In general, a minimum 3/8-inch wall thickness is recommended. However, ¼-inch wall thickness may be utilized provided the structural engineer and/or contractor can verify that the driving stresses will not damage the thinner walled piles. The lateral capacity of the piles should consider the low lateral support provided by the soft clay soils.

To eliminate reductions in capacity from group effects, the minimum center-to-center spacing of piles should be 3 pile diameters. Group effects should be considered for piles grouped less than 3 diameters apart.

With regard to the pile cap, the bottom of pile cap elevation should be a minimum of 18-inches below the finished grade for frost protection. In addition, it is recommended that a minimum of 1 foot of soil cover be maintained above the tops of the pile caps.

4.1.1 Screw Piles

Screw piles are a proprietary system from Alpine Site Services in Denver, Colorado. Therefore, the precise type, size, and quantity of screw piles should be established by the contractor in conjunction with the structural engineer. However, HBET provides the following design comments.

In general, as for driven piles, screw piles should be designed to penetrate the soft upper soils and bear into the dense gravel and cobble soils. In addition, to eliminate reductions in capacity from group effects, screw piles should be spaced a distance equal to three times the diameter of the largest helix. As for driven piles, it is anticipated that the screw piles will reach refusal within 3 to 10 feet of the top of the gravel and cobble layer. Therefore, pile lengths of up to approximately 61 feet may be possible.

Based upon the results of pile load testing conducted on test screw piles in similar soil conditions in other areas of Grand Junction, allowable axial capacities of as high as 80 tons may be achievable. However, the actual allowable capacity should be determined based upon the results of pile load testing conducted in the vicinity of the proposed grandstands. Also as for driven piles, the design of screw piles should consider the low lateral support provided by the soft native soils.

With regard to the pile cap, the bottom of pile cap elevation should be a minimum of 18-inches below the finished grade for frost protection. In addition, it is recommended that a minimum of 1 foot of soil cover be maintained above the tops of the pile caps.

4.1.1 Shallow Foundations and Geopiers

The other proprietary system considered feasible for the grandstands is Geopiers. Geopiers are rammed aggregate piers designed to improve the strength of the surrounding soils and provide support for shallow foundations and floor slabs. Geopiers are likely appropriate for the proposed construction; however, as a proprietary system using specialized design criteria, Geopier design and specifications for construction should be developed by the Geopier Foundation Company.

4.2 Restroom Foundations

Given the soft soil conditions encountered at the site, the foundation recommendations above for the Grandstands are appropriate for the new restroom building. However, for a single-story structure, the use of deep foundations or Geopiers may not be cost effective. As an alternative, shallow foundations such as spread footings or monolithic structural slabs may be utilized for the restroom building. It is recommended that shallow foundations be constructed above a minimum of 24-inches of structural fill.

In general, due to their plasticity and high moisture content, it is recommended that the native soils not be reused as structural fill. Imported structural fill should consist of a granular, non-expansive, non-free draining material such as pit run, crusher fines, or CDOT Class 6 base course. However, if pit-run is used as structural fill, a minimum of six inches of Class 6 base course or crusher fines should be placed on top of the pit-run to prevent large point stresses on the bottoms of the foundations due to large particles in the pit-run.

Prior to placement of structural fill, it is recommended that the bottoms of the foundation excavations be scarified to a depth of 6 to 8-inches, moisture conditioned, and re-compacted to a minimum of 95% of the standard Proctor maximum dry density, within ±2% of the optimum moisture content as determined in accordance with ASTM D698. However, as discussed previously, soft soil conditions were encountered at the site and compaction of the subgrade may be difficult. It may be necessary to utilize geotextile and/or geogrid in conjunction with additional structural fill to stabilize the subgrade. Dewatering may also be necessary. HBET should be contacted to provide specific recommendations for subgrade stabilization based upon the actual conditions in the bottoms of the foundation excavations.

Structural fill should extend laterally beyond the edges of the foundation a distance equal to the thickness of structural fill. Structural fill should be moisture conditioned, placed in maximum 8-inch loose lifts, and compacted to a minimum of 95% of the standard Proctor maximum dry density for fine grained materials or 90% of the modified Proctor maximum dry density for coarse grained materials, within ±2% of the optimum moisture content as determined in accordance with ASTM D698 or D1557C, respectively. Pit-run should be proofrolled to the Engineer's satisfaction.

For foundation building pad preparation as recommended with structural fill consisting of imported granular materials, a maximum allowable bearing capacity of 1,500 psf may be used. In addition, a modulus of subgrade reaction of 250 pci may be used for structural fill consisting of pit-run, crusher fines, or base course. It is recommended that the bottoms of exterior foundations be at least 18-inches below the final grade for frost protection.

4.3 Seismic Design Criteria

As discussed above, the subsurface profile at the site generally consists of soft clay soils above dense gravel and cobble soils. Based upon the results of the subsurface investigation and upon our experience in the vicinity of the subject site, HBET recommends that the site be classified as Site Class D in accordance with the *International Building Code*. The classification of the site may be revised depending on the results of a seismic shear wave velocity survey of the site. However, HBET does not believe that a seismic shear wave velocity survey at the site will result in a Site Class better than D.

4.4 Lateral Resistance for Seismic and Wind Loads

In general, as discussed above, the native clay soils are soft to very soft and are anticipated to provide limited lateral capacity for deep foundations. In order to provide adequate lateral capacity for wind and seismic loads, battered piles may be required. HBET understands that lateral capacity analyses will be performed using LPILE.

Based upon the results of the subsurface investigation, the following soil parameters are recommended for the LPILE analyses:

Depth from Grade (in).	0 to 120	120+
Soil Type	Soft Clay	Soft Clay
Density (pci)	0.0637	0.0318
Cohesion (psi)	3	3
Friction Angle (ϕ)	0	0
ε_{50} (in/in)	0.02	0.02
K (pci)	200	200
Modulus – K_h (tcf)	15	15

4.5 Floor Slabs and Exterior Flatwork

As mentioned previously, the shallow native soils are potentially collapsible. However, they are anticipated to generally consolidate under loading. Therefore, to reduce the potential for excessive settlement of slabs-on-grade, it is recommended that floor slabs be constructed above a minimum of 24-inches of structural fill and exterior slabs-on-grade be constructed above a minimum of 12-inches of structural fill.

Subgrade preparation, structural fill materials, and structural fill placement should be in accordance with the *Restroom Foundations* section of this report.

4.6 Water Soluble Sulfates

As discussed previously, soluble sulfates were detected in the site soils in a concentration of 0.2%. This concentration of soluble sulfates represents a severe degree of potential sulfate attack on concrete exposed to these materials. Therefore, Type V sulfate resistant cement is recommended for construction at this site in accordance with the *International Building Code*. However, Type V cement can be difficult to obtain in Western Colorado. Where Type V cement is unavailable, Type I-II sulfate resistant cement is recommended.

4.7 Lateral Earth Pressures

Stemwalls, grade beams, and any retaining walls should be designed to resist lateral earth pressures. For backfill consisting of the native soils, or imported granular, non-free draining, non-expansive material, we recommend that the walls be designed for an equivalent fluid unit weight of 50 pcf in areas where no surcharge loads are present. Lateral earth pressures should be increased as necessary to reflect any surcharge loading behind the walls.

4.8 Drainage

The success of the foundations, floor slabs, and exterior flatwork is dependent upon proper drainage. Therefore, grading at the site should be designed to carry precipitation and runoff away from the structures. It is recommended that the finished ground surface drop at least six inches within the first ten feet away from the structures.

Downspouts should empty beyond the backfill zone. It is recommended that landscaping within five feet of the structures include primarily desert plants with low water requirements. In addition, it is recommended that irrigation within ten feet of foundations be minimized or controlled with automatic shut off valves.

4.9 Excavations

Excavations in the native soils at the site may stand for short periods of time but should not be considered to be stable. Trenching and excavations should be sloped back, shored, or shielded for worker protection in accordance with applicable OSHA standards. The site soils generally classify as Type C soil with regard to OSHA's *Construction Standards for Excavations*. For Type C soils, the maximum allowable slope in temporary cuts is 1.5H:1V.

As discussed previously, shallow groundwater and soft soils were encountered at the site. These conditions may cause difficulties for deep utility trenches and dewatering and/or shoring may be required. In addition, subgrade stabilization using geotextile and/or geogrid in conjunction with granular fill may be required in trenches. HBET should be contacted to provide specific recommendations for dewatering, shoring, and/or subgrade stabilization based upon the actual conditions in the utility trenches.

5.0 GENERAL

The recommendations included above are based upon the results of the subsurface investigation and on our local experience. These conclusions and recommendations are valid only for the proposed construction.

As discussed previously, the subsurface conditions at the site were fairly consistent. Although HBET believes that the investigation was sufficient to adequately characterize the range of subsurface conditions at the site, the precise nature and extent of subsurface variability may not become evident until construction. Therefore, it is recommended that a representative of HBET be retained to provide engineering oversight and construction materials testing services during the foundation, utility, and earthwork phases of the construction. This is to verify compliance with the recommendations included in this report or permit identification of variations in the subsurface conditions which may require modification of the recommendations.

Huddleston-Berry Engineering and Testing, LLC is pleased to be of service to your project. Please contact us if you have any questions or comments regarding the contents of this report.

Respectfully Submitted:
Huddleston-Berry Engineering and Testing, LLC

COLORADO REGISTERED
MICHAEL ALAN BERRY
39010
12/29/10
PROFESSIONAL ENGINEER

Michael A. Berry, P.E.
Vice President of Engineering

FIGURES

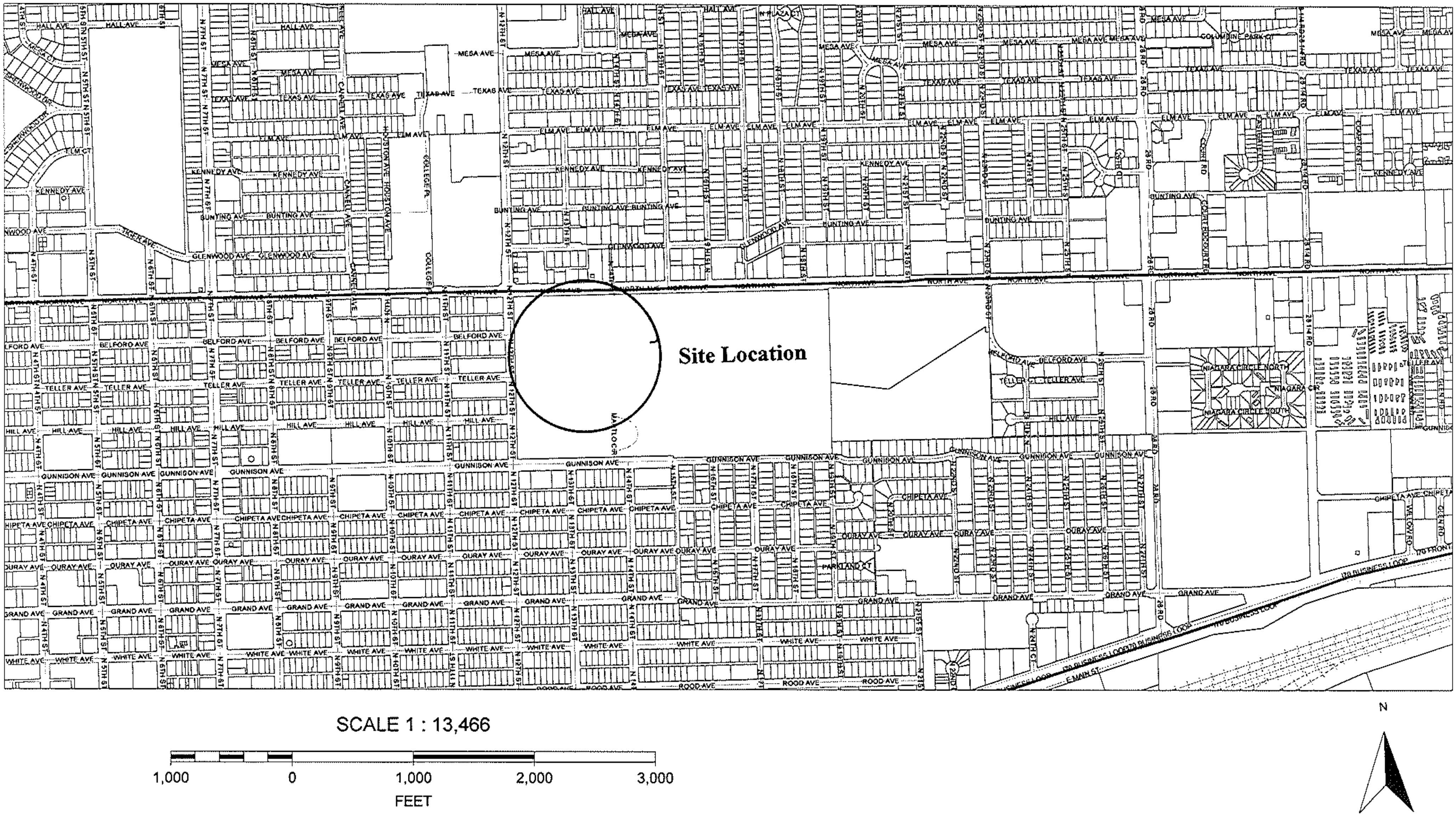

FIGURE 1
Site Location Map

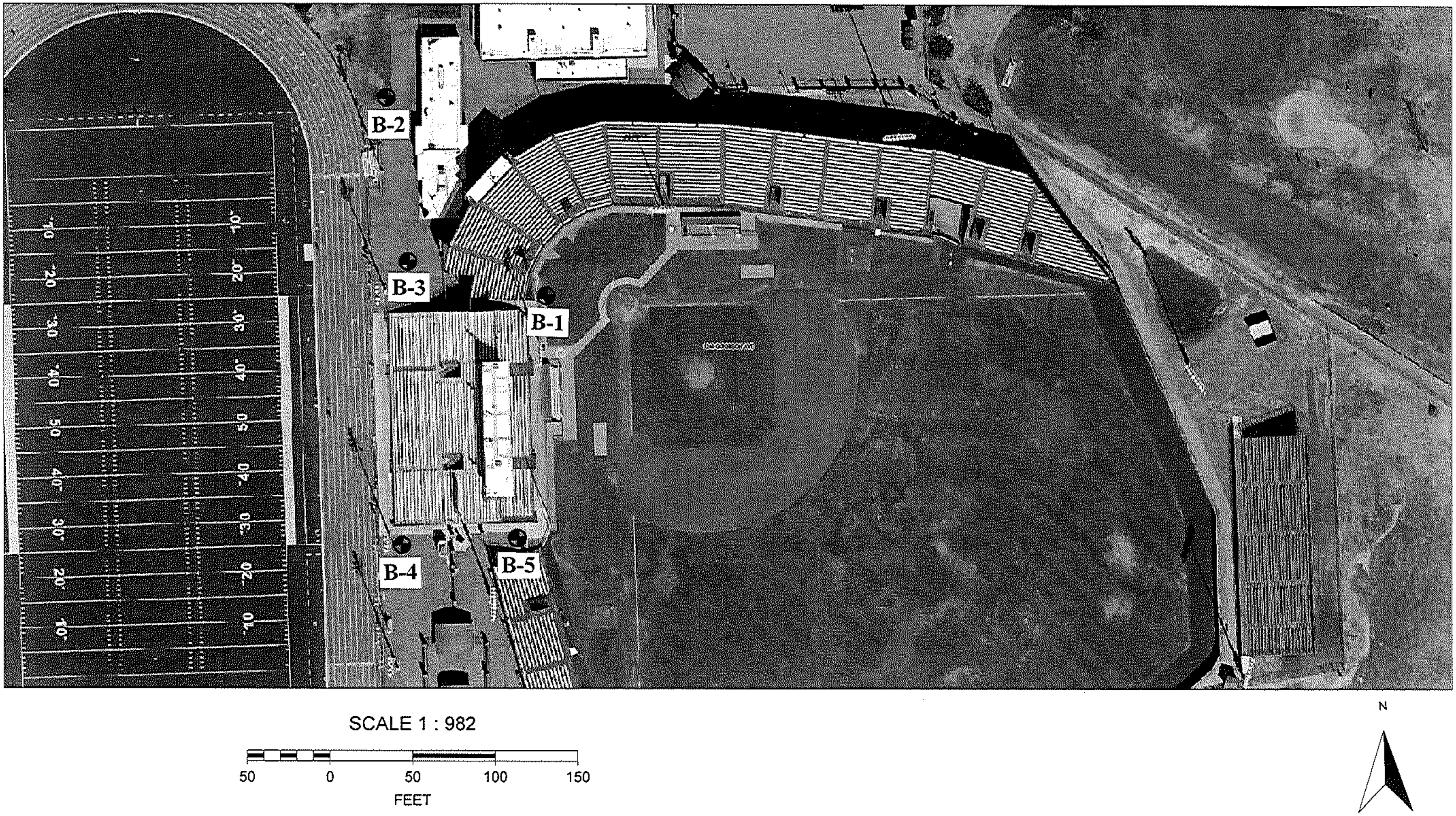

FIGURE 2
Site Plan

APPENDIX A
Typed Boring Logs

Huddleston-Berry Engineering & Testing, LLC
640 White Avenue, Unit B
Grand Junction, CO 81501
970-255-8005
970-255-6818

BORING NUMBER B-1

CLIENT FCI Constructors, Inc.
PROJECT NAME Lincoln Park Stadium Improvements
PROJECT NUMBER 00214-0013
PROJECT LOCATION Grand Junction, CO
DATE STARTED 12/9/10 COMPLETED 12/9/10
GROUND ELEVATION HOLE SIZE 4"
DRILLING CONTRACTOR S. McKracken
GROUND WATER LEVELS:
DRILLING METHOD Simco 2000 Truck Rig
AT TIME OF DRILLING 5.0 ft
LOGGED BY MAB CHECKED BY MAB
AT END OF DRILLING 5.0 ft
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		Sandy CLAY with Gravel (FILL), brown, moist										
		Lean CLAY (cl), Silty Sand lenses, brown, moist to wet, very soft to stiff	MC 1	56	4-5-4 (9)		110	15				
			SS 1	100	0-1-0-1 (1)							
10												
			SS 2	0	0-1-0-0 (1)							
20												
30												
40												
50												
		Sandy GRAVEL and COBBLES (gw), brown, wet, dense to very dense										
		Bottom of hole at 51.5 feet.										

Huddleston-Berry Engineering & Testing, LLC
640 White Avenue, Unit B
Grand Junction, CO 81501
970-255-8005
970-255-6818

BORING NUMBER B-2

CLIENT FCI Constructors, Inc. | PROJECT NAME Lincoln Park Stadium Improvements
PROJECT NUMBER 00214-0013 | PROJECT LOCATION Grand Junction, CO
DATE STARTED 12/9/10 COMPLETED 12/9/10 | GROUND ELEVATION | HOLE SIZE 4"
DRILLING CONTRACTOR S. McKracken | GROUND WATER LEVELS:
DRILLING METHOD Simco 2000 Truck Rig | AT TIME OF DRILLING 5.5 ft
LOGGED BY MAB CHECKED BY MAB | AT END OF DRILLING 5.5 ft
NOTES | AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (%)
0		Lean CLAY with Organics (TOPSOIL), brown, moist										
		Lean CLAY (cl), Silty Sand lenses, brown, moist to wet, soft to very soft	MC 1	78	1-2-1 (3)							
			SS 1	83	0-1-1-0 (2)							
10												
20												
30												
40												
50												
		Sandy GRAVEL and COBBLES (gw), brown, wet, dense to very dense										
		Bottom of hole at 52.0 feet.										

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Grand Junction, CO 81501
970-255-8005
970-255-6818

BORING NUMBER B-3

CLIENT FCI Constructors, Inc.
PROJECT NAME Lincoln Park Stadium Improvements
PROJECT NUMBER 00214-0013
PROJECT LOCATION Grand Junction, CO
DATE STARTED 12/9/10 COMPLETED 12/9/10
GROUND ELEVATION HOLE SIZE 4"
DRILLING CONTRACTOR S. McKracken
GROUND WATER LEVELS:
DRILLING METHOD Simco 2000 Truck Rig
AT TIME OF DRILLING 6.5 ft
LOGGED BY MAB CHECKED BY MAB
AT END OF DRILLING 6.5 ft
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (%)
0		ASPHALT PAVEMENT										
		Lean CLAY (CL), brown, moist to wet, very soft to medium stiff	SS 1	44	3-2-3 (5)							
		GB1: Lab Classified	GB 1					13	28	16	12	87
	▼		SS 2	63	0-1-0-1 (1)							
10												
			SS 3	67	0-0-1-0 (1)							
20												
30												
40												
50												
		Sandy GRAVEL and COBBLES (gw), brown, wet, dense to very dense										
		Bottom of hole at 52.0 feet.										

Huddleston-Berry Engineering & Testing, LLC
640 White Avenue, Unit B
Grand Junction, CO 81501
970-255-8005
970-255-6818

BORING NUMBER B-4

CLIENT FCI Constructors, Inc. | PROJECT NAME Lincoln Park Stadium Improvements

PROJECT NUMBER 00214-0013 | PROJECT LOCATION Grand Junction, CO

DATE STARTED 12/9/10 COMPLETED 12/9/10 | GROUND ELEVATION ___ HOLE SIZE 4"

DRILLING CONTRACTOR S. McKracken | GROUND WATER LEVELS:

DRILLING METHOD Simco 2000 Truck Rig | ▽ AT TIME OF DRILLING 5.5 ft

LOGGED BY MAB CHECKED BY MAB | ▼ AT END OF DRILLING 5.5 ft

NOTES ___ | AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (%)
0		ASPHALT PAVEMENT										
		Lean CLAY (CL), brown, moist to wet, soft to very soft	MC 1	89	1-2-1 (3)		101	20				
	▼											
		SS1: Lab Classified	SS 1	63	0-0-1-1 (1)			29	37	17	20	98
10												
20												
30												
40												
		Sandy GRAVEL and COBBLES (gw), brown, wet, dense to very dense										
		Bottom of hole at 45.5 feet.										

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970-255-8005
970-255-6818

BORING NUMBER B-5

CLIENT FCI Constructors, Inc.
PROJECT NAME Lincoln Park Stadium Improvements
PROJECT NUMBER 00214-0013
PROJECT LOCATION Grand Junction, CO
DATE STARTED 12/9/10 COMPLETED 12/9/10
GROUND ELEVATION
HOLE SIZE 4"
DRILLING CONTRACTOR S. McKracken
GROUND WATER LEVELS:
DRILLING METHOD Simco 2000 Truck Rig
AT TIME OF DRILLING 5.5 ft
LOGGED BY MAB CHECKED BY MAB
AT END OF DRILLING 5.5 ft
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		ASPHALT PAVEMENT										
		Lean CLAY (cl), brown, moist to wet, soft to very soft										
10												
20												
30												
40												
		Sandy GRAVEL and COBBLES (gw), brown, wet, dense to very dense										
50		Bottom of hole at 50.0 feet.										

Lincoln Park Stadium Improvements
Grand Junction, Colorado
Project #00214-0013

Continuous Blow Counts

Boring B-1

Top Depth (ft)	Bottom Depth (ft)	N-Value
14.5	15.5	1
15.5	16.5	1
16.5	17.5	3
17.5	18.5	4
18.5	19.5	4
19.5	20.5	5
20.5	21.5	4
21.5	22.5	6
22.5	23.5	5
23.5	24.5	7
24.5	25.5	7
25.5	26.5	8
26.5	27.5	8
27.5	28.5	8
28.5	29.5	10
29.5	30.5	11
30.5	31.5	11
31.5	32.5	11
32.5	33.5	12
33.5	34.5	13
34.5	35.5	16
35.5	36.5	17
36.5	37.5	16
37.5	38.5	17
38.5	39.5	22
39.5	40.5	22
40.5	41.5	27
41.5	42.5	29
42.5	43.5	32
43.5	44.5	42
44.5	45.5	53
45.5	46.5	53
46.5	47.5	58
47.5	48.5	52
48.5	49.5	50
49.5	50.5	56
50.5	51.5	100

Boring B-4

Top Depth (ft)	Bottom Depth (ft)	N-Value
22.5	23.5	2
23.5	24.5	8
24.5	25.5	7
25.5	26.5	9
26.5	27.5	9
27.5	28.5	10
28.5	29.5	12
29.5	30.5	13
30.5	31.5	16
31.5	32.5	17
32.5	33.5	15
33.5	34.5	20
34.5	35.5	20
35.5	36.5	21
36.5	37.5	23
37.5	38.5	25
38.5	39.5	25
39.5	40.5	28
40.5	41.5	28
41.5	42.5	29
42.5	43.5	38
43.5	44.5	50
44.5	45.5	65
45.5	45.6	50/1"

APPENDIX B
Laboratory Testing Results

Huddleston-Berry Engineering & Testing, LLC
640 White Avenue, Unit B
Grand Junction, CO 81501
970-255-8005
970-255-6818

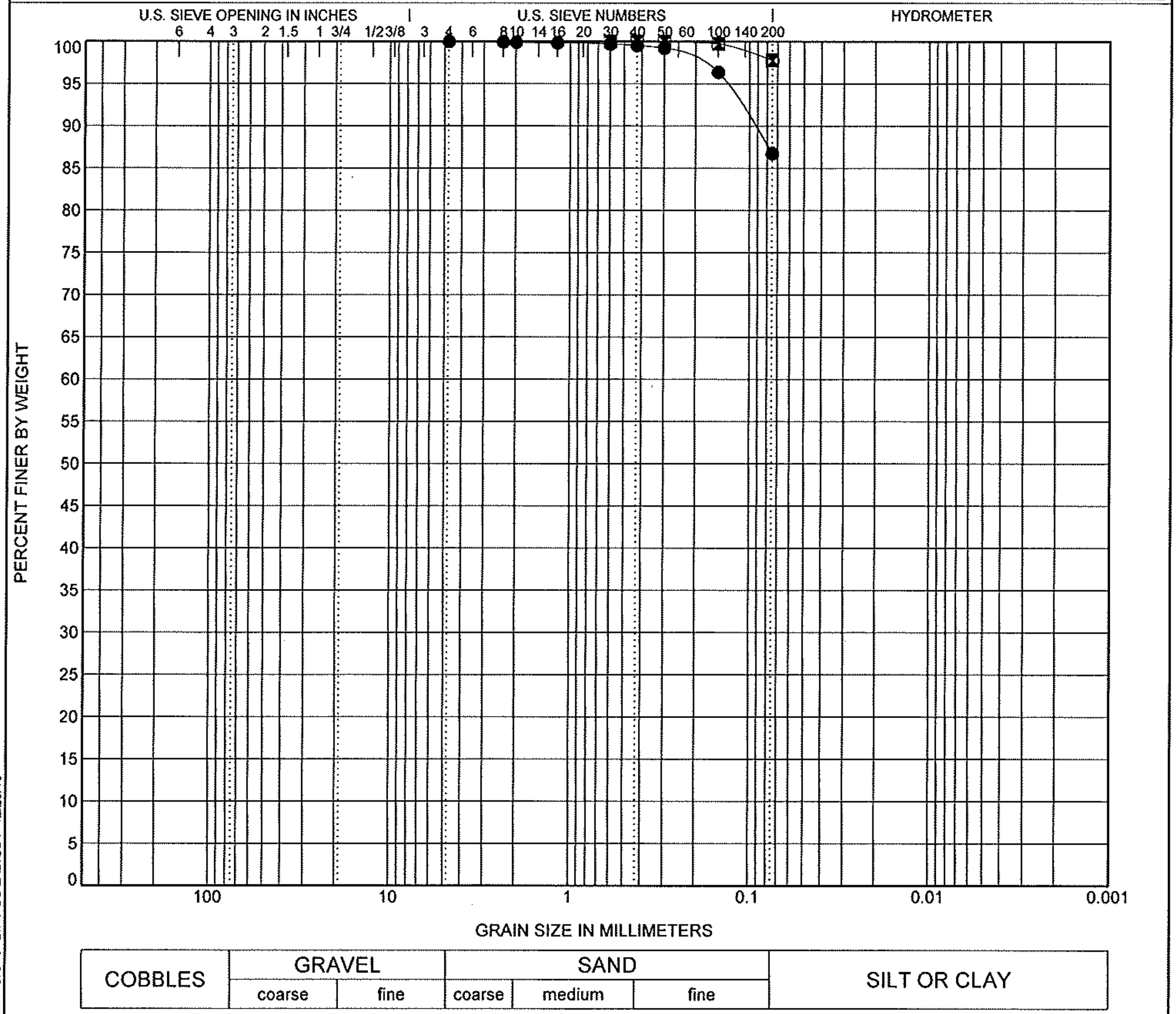
GRAIN SIZE DISTRIBUTION

CLIENT FCI Constructors, Inc.

PROJECT NAME Lincoln Park Stadium Improvements

PROJECT NUMBER 00214-0013

PROJECT LOCATION Grand Junction, CO



Specimen Identification			Classification	LL	PL	PI	Cc	Cu
●	B-3 GB-1	12/2010	LEAN CLAY(CL)	28	16	12		
⊠	B-4 SS-1	12/2010	LEAN CLAY(CL)	37	17	20		

Specimen Identification			D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	B-3 GB-1	12/2010	4.75				0.0	13.2	86.8	
⊠	B-4 SS-1	12/2010	0.6				0.0	2.2	97.8	

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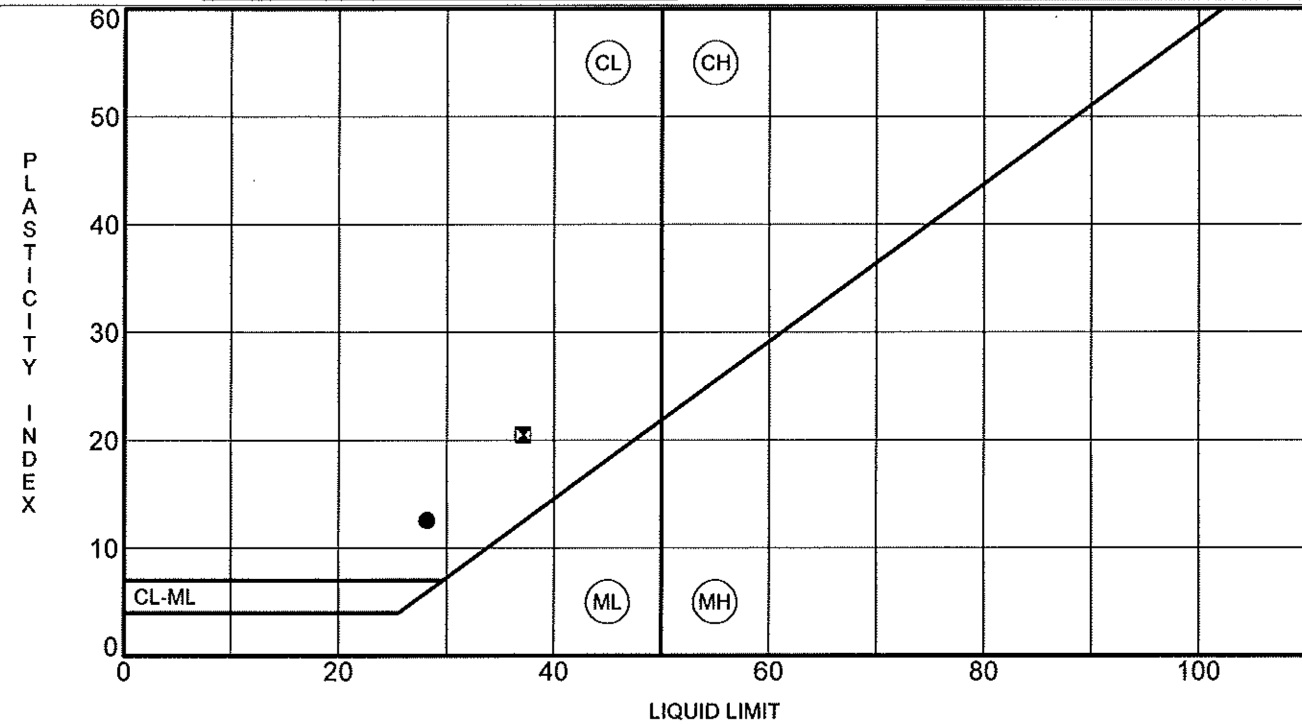
ATTERBERG LIMITS' RESULTS

CLIENT FCI Constructors, Inc. PROJECT NAME Lincoln Park Stadium Improvements

PROJECT NUMBER 00214-0013 PROJECT LOCATION Grand Junction, CO



	Specimen Identification		LL	PL	PI	#200	Classification
●	B-3 GB-1	12/2010	28	16	12	87	LEAN CLAY(CL)
⊠	B-4 SS-1	12/2010	37	17	20	98	LEAN CLAY(CL)

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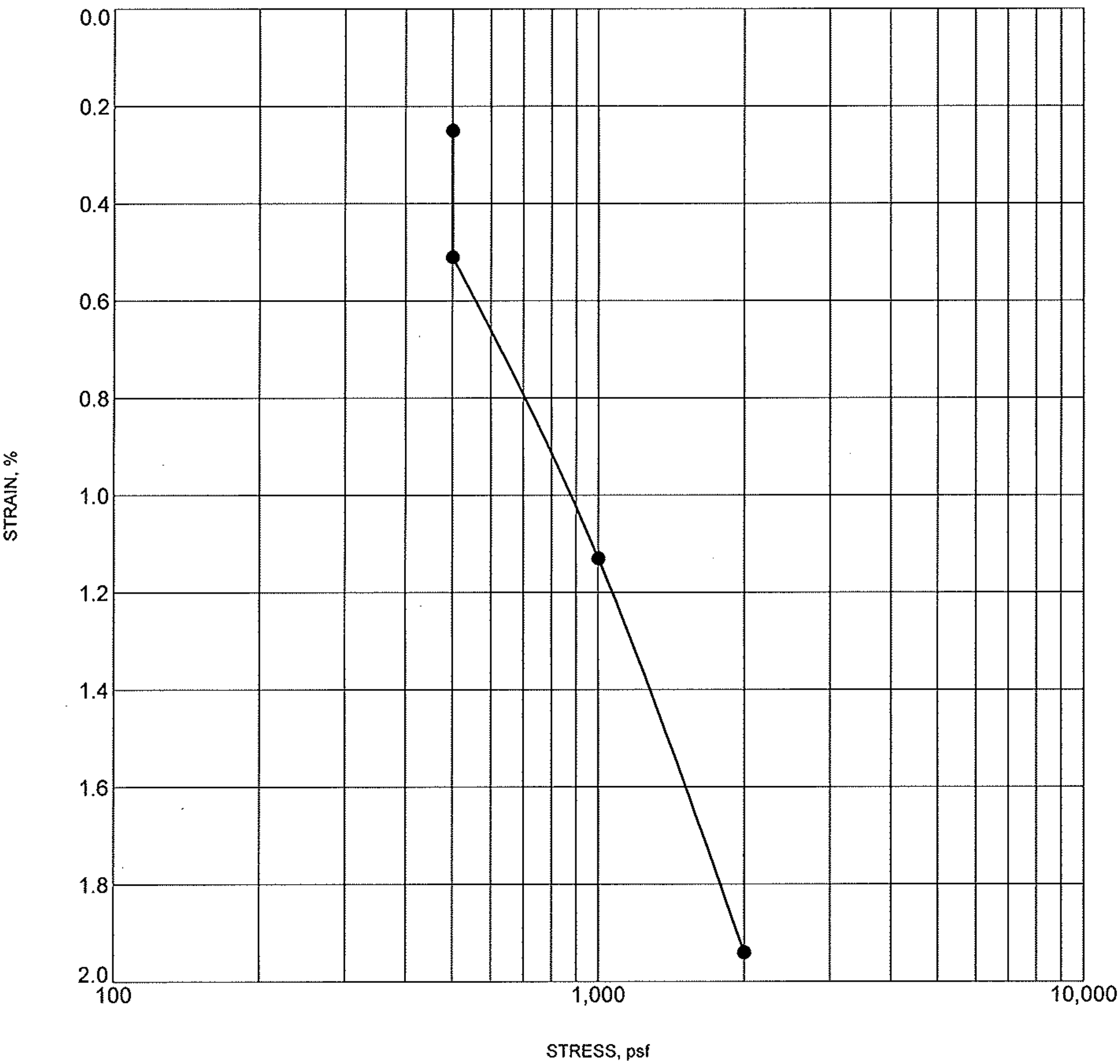
CONSOLIDATION TEST

CLIENT FCI Constructors, Inc.
PROJECT NAME Lincoln Park Stadium Improvements
PROJECT NUMBER 00214-0013
PROJECT LOCATION Grand Junction, CO



	Specimen Identification		Classification	γ_d	MC%
●	B-1	2.0		110	15

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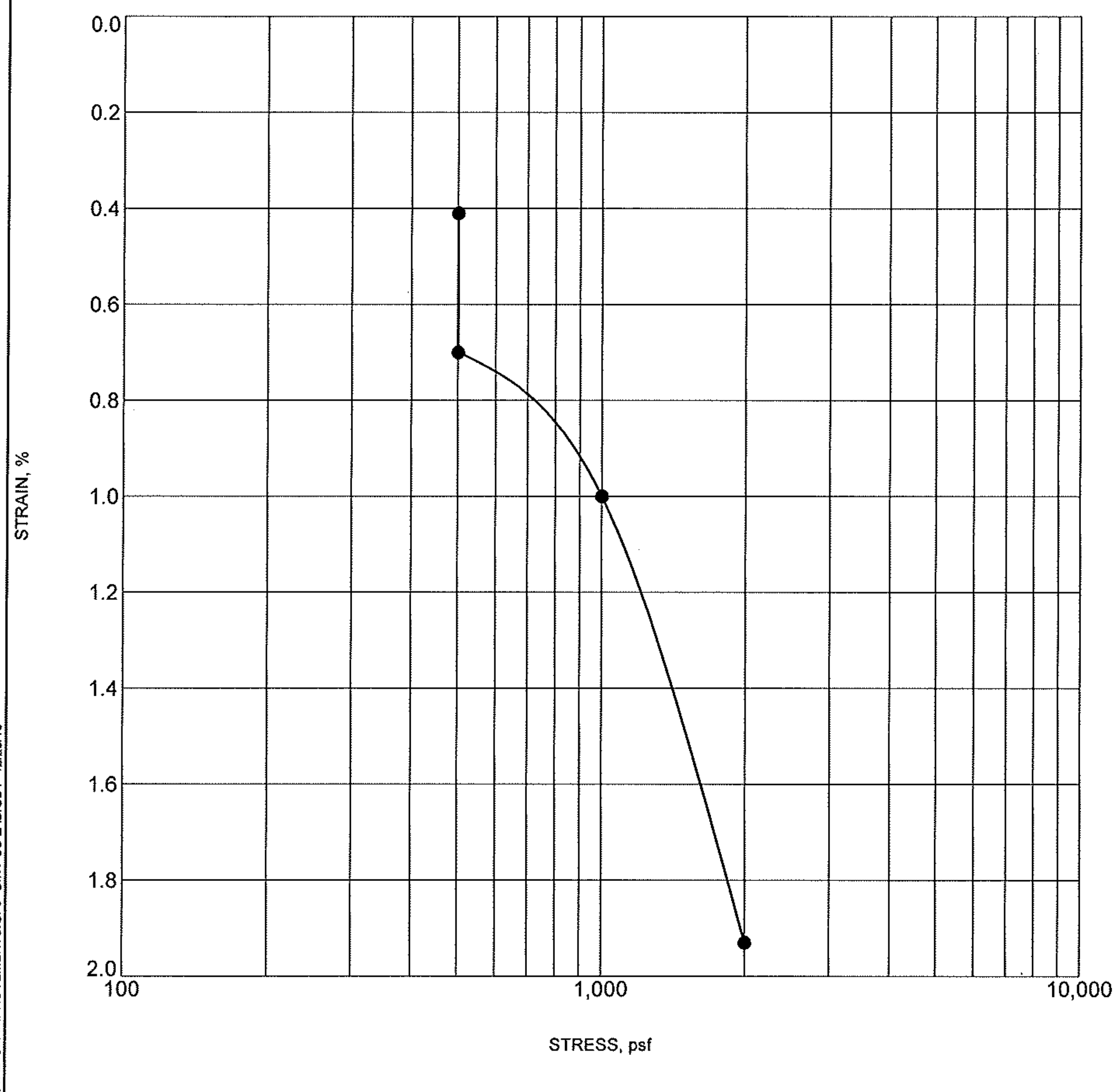
CONSOLIDATION TEST

CLIENT FCI Constructors, Inc.
PROJECT NAME Lincoln Park Stadium Improvements
PROJECT NUMBER 00214-0013
PROJECT LOCATION Grand Junction, CO



	Specimen Identification		Classification	γ_d	MC%
●	B-4	2.0		101	20

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MOISTURE-DENSITY RELATIONSHIP

CLIENT FCI Constructors, Inc.

PROJECT NAME Lincoln Park Stadium Improvements

PROJECT NUMBER 00214-0013

PROJECT LOCATION Grand Junction, CO

Sample Date:	12/16/2010
Sample No.:	1
Source of Material:	B-3
Description of Material:	LEAN CLAY(CL)
Test Method:	ASTM D698B

TEST RESULTS

Maximum Dry Density 114.5 PCF

Optimum Water Content 14.1 %

GRADATION RESULTS (% PASSING)

#200	#4	3/4"
87	100	100

ATTERBERG LIMITS

LL	PL	PI
28	16	12

Curves of 100% Saturation for Specific Gravity Equal to:

2.80

2.70

2.60