R. W. Gillespie & Associates, Inc.
Geotechnical Engineering • Geohydrology • Materials Testing Services

07 July 2003

Mr. John DeStefano
DeStefano & Associates, Inc.
2458 Lafayette Road
Portsmouth, NH 03801

Subject: Geotechnical Investigation
Portland Sports Center at Joker's
Portland, Maine
RWG&A Project No. 823-06

Dear John:

In accordance with our agreement, we have conducted a geotechnical investigation at the above referenced site. The purpose of the investigation was to obtain information regarding subsurface soil conditions and properties on which to base recommendations for design and construction of foundations, slab-on-grade floors, and pavements.

Briefly, subsoils consist of a fill underlain by fine to medium sand underlain, in turn, by silty clay. The clay is followed by a dense sand and/or a refusal surface interpreted to be bedrock. Groundwater is at depths of less than 1 to about 5 feet. The clay stratum is medium stiff to very soft and its compressibility influences foundation types and settlement control measures.

The Rubb building which will cover the playing surface should be supported on driven steel H-piles while the connector between the Rubb building and existing structure can be supported on spread footings. The accompanying report presents our findings, conclusions, and recommendations. The latter two are the result of several discussions and meetings relating to the impact of project schedule on site improvement techniques as they relate to subsurface conditions.

We appreciate the opportunity to be of service, and if you have any questions, please contact us.

Very truly yours,
R.W. GILLESPIE & ASSOCIATES, INC.

Robert W. Gillespie, P.E.

STATE OF MAINE
ROBERT W. GILLESPIE
4975
REGISTERED PROFESSIONAL ENGINEER

RWG:ci
In duplicate
cc: David Price, P.E., Price Structural Engineers
Ben Walter, AIA, CWS Architects, Inc.

Report
of
GEOTECHNICAL INVESTIGATION
for the
PORTLAND SPORTS CENTER AT JOKER'S
PORTLAND, MAINE

Prepared
for
DESTEFANO ASSOCIATES, INC.
PORTSMOUTH, NEW HAMPSHIRE

Prepared
by
R. W. GILLESPIE & ASSOCIATES, INC.
SACO, MAINE

RWG&A Project No. 823-06

July 2003

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1.0 INTRODUCTION

The proposed addition to Joker's on Warren Avenue in Portland, Maine, will be called the Portland Sports Center and support indoor field athletics such as soccer and field hockey. The main structure will be a Rubb space frame with dimensions of 180 by 250 feet; maximum arch height is on the order of 60 feet. The balance of the addition will be traditional steel frame with stud infill. The Rubb building will be connected to Joker's by one of the steel frame additions along the north side of the existing building. The other traditional frame addition will be located at the west side of the Rubb structure but will not be constructed until 2004. Finished floor of all structures is Elevation 70. Loads are primarily generated by uplift forces on the space frame and snow load on the framed additions. Maximum bent and column loads are in the range of 90 to 120 kips as provided by Price Structural Engineering. Parking to the east of the project will be reconstructed, and a new parking field will be placed north of the Rubb building under the CMP power lines.

2.0 FIELD and LABORATORY INVESTIGATIONS

2.1 Field

Eleven borings were drilled to depths of 17 to 90 feet at the locations shown on Figure 1 attached. Borings were drilled with a track-mounted drill rig using casing and rotary wash techniques. Standard penetration resistance tests were made at 5-foot intervals or the geologist's discretion, and thin wall tube samples of cohesive soils were obtained for laboratory testing. Recovered SPT and thin wall tube samples were placed in appropriate containers for transport to our laboratory. Recovered samples and cuttings were used to classify soils in general accordance with the procedures of the Unified Soil Classification System. Locations of borings were determined by pacing from landmarks, and elevations were interpolated from contours on the site plan provided to us. Locations and elevations should be considered accurate only to the degree implied by the methodology used to locate them.

Undrained shear strength estimates were obtained using field vane apparatus. During the procedure, both undisturbed and remolded strength data were obtained for use in engineering evaluations. Groundwater was observed as drilling progressed and measured at the completion of each boring. Annotations are provided on each log.

2.2 Laboratory

All samples were visually examined in the laboratory and, when necessary, reclassified using the procedures of the *ASTM D2487, Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System)*. Three one-dimensional consolidation tests were performed to provide a basis for evaluating settlement, and undrained shear strength values were

obtained using the Geonor miniature vane. An undisturbed value was obtained and recorded, followed by additional turns of the vane until a stabilized residual strength was measured. Two sets of Atterberg limits were also performed for aid in classification and for comparison with vane shear remolded strengths.

Boring logs are presented in Appendix A while laboratory results are provide in Appendix B and on the logs as appropriate.

3.0 SITE and SUBSURFACE CONDITIONS

3.1 Site

The site is located on the south side of Warren Avenue at the south end of the existing Joker's facility in Portland, Maine. The site is bounded by the Maine Turnpike on the west, a CMP power line on the south, and parking fields on the east. Topography is relatively flat with less than 1 to 2 feet of elevation change across the site. Drainage swales associated with the Turnpike run along the west and south edges of the site boundaries. Vegetation is limited to scattered patches of grass and a few bushes.

3.2 Subsurface

Subsoils consist of occasional fill and silty sand underlain by silty clay which is, in turn, underlain by sand, glacial till, and/or bedrock. The sand is fine to medium, silty, and loose based on standard penetration resistance (N) values. Thickness ranges from 4 to 9 feet at boring locations with most in the range of 4 to 6 feet. The underlying silty clay is a low to moderate plasticity material with consistencies of medium stiff to very soft. The medium stiff zone, or "crust," is about 3 to 6 feet thick but thins to the south and west as illustrated on Figure, *Exploration Location Plan,* attached. The soft to very soft portion of the stratum extends to depths of 40 to 80 feet with increasing thickness to the south. Based on consolidation testing, the stratum is lightly overconsolidated while the medium stiff zone is moderately overconsolidated. Sensitivity of the soft zone is high with residual shear strength being 10 to 15 times lower than undisturbed values.

3.3 Groundwater

Groundwater was encountered in all borings at depths of less than 1 to about 5 feet below adjacent grade at the time of drilling. Fluctuations of the groundwater level may occur due to variations in rainfall, temperature, construction activities, and other factors not evident at the time measurements were made and reported herein. An evaluation of these factors is beyond the scope of this investigation.

4.0 EVALUATION OF GEOTECHNICAL DATA

The evaluation of geotechnical data which leads to recommendations for design and construction was influenced by project schedule in that occupancy of the building is scheduled for October 2003. Shortly after field work had been completed, we advised DeStefano & Associates, Inc., of potentially difficult subsurface conditions and discussed options with you; a subsequent meeting with the concerned parties was held shortly thereafter. We were instructed to further evaluate options and time to implement them appropriately. On 22 May 2003 a preliminary report was issued based on a critical path with 80 days for surcharging using wick drains to expedite the consolidation process and pile foundations for the Rubb structure. Between 22 May and 18 June 2003 further evaluations were made in concert with the structural engineer and a meeting was held on 18 June 2003 to present the results of those additional evaluations. The following paragraphs present the technical basis for evolution of the final evaluation and the recommendations which are presented in Section 6.0.

Settlement estimates were based on a fill height of 2 to 3 feet and column loads of 30 to 120 kips. Original estimates were based on assumptions of overconsolidation for certain depths and normal consolidation thereafter. The magnitudes for either case were larger than what would be considered tolerable, especially for the traditional framed additions. Completion of laboratory consolidation testing indicated the clay profile was at least lightly overconsolidated and settlement would be limited to recompression. However, the magnitudes were still larger than what was considered tolerable. Therefore, preliminary recommendations for installation of wick drains and surcharging were provided. Consequent discussions indicated the time for effective use of surcharge was too long in terms of project schedule. Preliminary recommendations were modified to include supporting the structure on piles and surcharging the interior of the building. However, the schedule again became unworkable in terms of surcharge effectiveness. At this time, final loads for the Rubb structure and the connecting addition became available, and fill heights had been finalized at 1.5 to 2 feet versus the original 2 to 3 feet; our evaluations were performed again with these data in hand. The final evaluation indicated the Rubb building should be supported on driven H-piles while column lines O, P, Q, R, and S could be supported on spread footings. Surcharge of the interior portion of the Rubb building would not be needed if the associated settlements and time-rate of settlement could be tolerated by the owner. The results were presented in a meeting on 18 June 2003, and we were advised that the recommendations and settlements presented in the meeting were acceptable. Briefly, settlements and time-rate of settlement can be summarized as follows:

- Spread Footings: 1/2 inch within six months; 1 inch± over the next one to two years.
- Playing Surface: 1 to 2 inches in the first two years; 1 to 3 inches in the next seven to 10 years.
- Pile Foundations: <1/4 inch.

Since settlement of the clay will occur over time, negative skin friction, or downdrag, will develop along a portion of the pile length. Based on settlement amounts and time-rate of settlement, down drag forces are estimated at 5 tons per pile.

5.0 RECOMMENDATIONS

The following recommendations are provided for use in soil and foundation design of the project. Foundation requirements are significantly affected by the subsurface conditions present at the project site. It is recommended that foundation design and construction be in accordance with all applicable criteria of The IBC 2000 Code.

5.1 Site Preparation

1. All topsoil, organic material, and unwanted vegetation should be removed within the limits of the proposed construction. The removed topsoil should be stockpiled for reuse in landscape areas.

2. Fill should be a sand and gravel mixture meeting the following gradation requirements:

Screen or Sieve Size	Percent Passing
No. 4	90 - 100
No. 40	35 - 70
No. 200	0 - 5

Note: Maximum dry unit weight should be 110 pcf or less.

3. Fill should be placed in uniform lifts not exceeding 8 inches in uncompacted thickness and compacted to at least 92 percent of the maximum dry density as determined by ASTM D 1557. In confined areas and within 4 feet of foundation walls, lift thickness should be reduced to six inches and compacted with hand-operated compaction equipment.

5.2 Spread Footing Foundations

4. The proposed connector addition along column line O, P, Q, R, and S may be supported on spread footing foundations bearing on naturally deposited soils. The footings should be designed for a maximum allowable contact pressure of 2 kips per square foot (ksf). Footings should be at least 2.5 feet wide.

Exterior footings should be founded at least 4 feet below adjacent ground surface for frost protection. At heated interior locations, footings may bear a minimum of 2 feet below top of ground floor slab. If exposure to freezing is anticipated, either during or following construction, then interior footings should be lowered in accordance with the recommendations for exterior footings. Caution should be exercised to ensure that excavations for under slab utilities and for equipment foundations do not undermine building footings and ground floor slabs.

5. In accordance with IBC 2000 Code, the soil class of this site is E. This classifications should be used in conjunction with a building's design occupancy to determine the seismic hazard exposure group and seismic performance category.

6. Preparation of footing subgrades should include removal of any inappropriate, loose, or disturbed soils and compaction with hand-guided equipment immediately before installation of form work and placement of reinforcing and concrete.

7. Lateral loads from wind and earthquake may be resisted by friction between footing bottoms and supporting soil and by earth pressure against the sides of the foundation. A friction coefficient of 0.4 and an equivalent fluid pressure of 175 pcf should be used in design.

8. Footing and slab subgrades should not be allowed to freeze. The naturally deposited soils are considered moderately to highly frost-susceptible. Freezing of subgrade soils beneath footings and floor slabs may result in frost heaving and post-construction settlement. Every effort should be made to prevent freezing of subgrade soils. In the event frost penetration occurs, all frozen soils should be removed and replaced with compacted structural fill. At no time should frozen material be placed as fill.

5.3 Pile Foundations

9. The Rubb building should be supported on driven steel HP8x36 piles designed for a net allowable capacity of 30 tons; the net capacity reserves 5 tons for downdrag forces.

10. Piles should be driven with a single or double acting air or diesel hammer to a final resistance of 4 blows per inch for 2 inches (consecutive) or 5 blow for 1 inch.

11. All piles should be equipped with a driving shoe such as the Pruyn "Hard Bite."

12. Piles may be battered as steep as 2H:12V for resistance of lateral loads.

13. Uplift resistance of piles should be developed using an adhesion value of 100 psf over the length of the pile, excluding the top 2 feet.

5.4 Ground Floor Slabs

14. Ground floor slabs may be slab-on-grade construction bearing on a minimum of 12 inches of structural fill. A subgrade modulus of 150 kips per cubic foot should be used for slab design.

15. Exterior slabs at locations such as entrances should be underlain by at least 2 feet of free draining material such as crushed stone or structural fill. The surrounding areas should be pitched to drain surface water away from these areas in order to reduce available moisture for ice and frost lens generation.

5.5 Foundation Drainage

16. The anticipated seasonal high groundwater level for design of the proposed building is near existing ground surface; therefore, a perimeter foundation drainage system and dampproofing measures are recommended. These measures are intended to reduce the risk of moisture infiltrating through the floors. The foundation drains should be provided with a minimum of two outlets so as not to be reliant upon a single flow path. The drainage system should be designed to discharge water by gravity to a surface drainage feature or storm drain.

17. Perimeter foundation drains should be installed along the outside walls of the structure. The drains should be placed at the bottoms of footings and consist of 4-inch diameter perforated pipe bedded in 2 cubic feet of 3/4-inch crushed stone per linear foot. The drainage stone should be completely wrapped in a filter fabric such as Mirafi 140N. The pipes should be drained by gravity to a surface drainage feature, storm drain, or sump.

5.6 Bituminous Paving

18. The following table shows our recommendations for flexible pavement thicknesses.

	Thickness, Inches
Component	Auto Parking*
Wearing Surface (MDOT 703.09 Grading C)	1 1/4
Bituminous Base (MDOT 703.09 Grading B)	1 3/4
Crushed Base (MDOT 703.06 Modified Type A)	6
Subbase (MDOT 703.06 Modified Type D)	15
Totals	24

*AASHTO and AI minimum section

19. Prior to the start of pavement construction, we recommend a thorough evaluation of the parking/drive area subgrade. The evaluation should include proof rolling of the parking/ drive area subgrade with a 7 to 11 ton roller operating in static mode. Any unstable areas encountered should be repaired. Repairs should consist of excavation of the soft material(s) and replacement with compacted fill. Consideration should be given to staged construction wherein placement of the wearing course is delayed until spring 2004.

5.7 Utilities

20. Utilities may be earth supported. Bedding placed between the utility and subgrade should meet the utility and manufacturer requirements for the type of conduit or pipe being installed.

21. Dewatering of utility trenches by predrainage methods (i.e., wells and/or wellpoints) may be needed. Trench backfill beneath floor slabs and pavements should be systematically compacted in lifts to reduce post-construction settlement of the slab or pavement surface.

5.8 Temporary Excavations

22. Soils encountered within the anticipated depth of excavation at this site consist of naturally deposited sands, silts and clays. We anticipate that foundation and utility excavations can be accomplished using sloped, open-cut techniques. We also anticipate that groundwater will be encountered in excavations. If excavation depths below groundwater are required, dewatering will be required to remove inflow from groundwater, as well as precipitation and surface runoff. We anticipate that dewatering can be accomplished using sumps and open pumping methods to depths of 1 to 2 feet below groundwater. Dewatering to greater depths will require use of wells and/or wellpoints. Where predrainage is used, excavation should not begin until it is demonstrated (note: by observation wells or test pits) that water levels are below the bottom of trench level.

    It is anticipated that the contractor will design, install, operate and maintain the dewatering system. Details of the proposed dewatering system should be submitted to allow review of its components prior to installation. The submittal should provide information on sources of power to be used (minimum of two if electric drive pumps) in addition to the locations of sumps, pumps (minimum of two if engine drive), wells, wellpoints and header pipes, and other features including discharge points. Sumps, wells and wellpoints should be provided with filtered screens to avoid pumping soil with the groundwater and subsequent loss of ground. Regardless of the method chosen, the dewatering system should operate continuously until excavations are backfilled above the groundwater level.

The Contractor should be aware that slope height, slope inclination, or excavation depths (including utility trench excavations) should in no case exceed those specified in local, state, or federal safety regulations, e.g., OSHA Health and Safety Standards for Excavations, 29 CFR Part 1926, or successor regulations. Such regulations are strictly enforced and, if they are not followed, the Owner, Contractor, and/or earthwork and utility subcontractors could be liable for substantial penalties.

As a safety measure, it is recommended that all vehicles and spoil piles be kept a minimum lateral distance from the top of excavations equal to no less than 100 percent of the slope height. The exposed slope face should be protected against the elements.

5.9 Geotechnical Observation

The geotechnical recommendations provided as the basis for design of this project were developed using limited numbers of observations and tests. The Owner should be sensitive to the potential need for adjustment in the field. We recommend that the Owner retain RWG&A to observe geotechnical construction aspects of the project. These services should include observing general compliance with the design concepts, specifications, and recommendations, and assisting in development of design changes should subsurface conditions differ from those anticipated prior to the start of construction. Observation improves the likelihood that the design intent will be carried out during construction. In addition, it allows RWG&A to confirm its design recommendations.

For this project, geotechnical observation of the following aspects is recommended:

- Stripping, compaction, and fill placement
- Monitoring of pile installation
- Preparation of foundation subgrades and backfilling

In addition to geotechnical observation, RWG&A can also provide full service construction inspection and materials testing. This would include soils, portland cement and asphaltic concrete, structural steel and welding inspections, destructive and non-destructive testing, and special inspection services in fulfillment of building code requirements.

6.0 CLOSURE

This report has been prepared for specific application to the proposed Portland Sports Center at Joker's in Portland, Maine, for the exclusive use of DeStefano Associates, Inc. This work has been completed in accordance with generally accepted soil and foundation engineering practices. No other warranty, expressed or implied, is made. In the event any changes are made in the nature,

design, or location of the proposed facility, the conclusions and recommendations of this report should be reviewed by RWG&A.

The recommendations presented are based on the results of widely spaced explorations. The nature of variations between the explorations may not become evident until construction has begun. If variations are encountered, it will be necessary for RWG&A to re-evaluate the recommendations presented in this report. RWG&A requests the opportunity for a general review of the final design and specifications in order to determine that earthwork and foundation recommendations have been interpreted in the manner in which they were intended.

APPENDIX A

TEST BORING LOGS

Geotechnical Investigation
Portland Sports Center at Joker's
Portland, Maine

BORING LOG B-1

Project: Portland Sports Center
Location: Portland, Maine

Approximate Surface Elevation: 68'±
Ground Water Depth: 2'

Client: DeStefano Associates, Inc.

Date: 14 April 2003

Project No. 823-06

DEPTH, FT.	SYMBOL	SAMPLES	SAMPLE #	DESCRIPTION OF MATERIAL	SAMPLE RECOVERY, IN.	BLOWS PER 6"	SPT-N BLOWS PER FT.	MOISTURE CONTENT	Lab Tests
0			S-1	SAND (SP); loose to medium dense, moist then wet, medium to fine sand, little to trace silt, trace gravel, brown.	2	2 5 8 7	12		
5			S-2		12	2 3 1 1	4		
				SILTY CLAY (CL); soft, wet, gray.					
10			S-3		24	2 1 1/ 12"	1		
15			S-4		24	WOR			
20			S-5	-GLACIAL MARINE DEPOSITS-					
				Probed with "A" rod and hydraulic push from 22' to 61.5'.					
25									
30									
35									

R.W. Gillespie & Associates
Saco, Maine

BORING LOG B-1

Project: Portland Sports Center
Location: Portland, Maine

Approximate Surface Elevation: 68'±
Ground Water Depth: 2'

Client: DeStefano Associates, Inc.

Date: 14 April 2003

Project No. 823-06

DEPTH, FT.	SYMBOL	SAMPLES	SAMPLE #	DESCRIPTION OF MATERIAL	SAMPLE RECOVERY, IN.	BLOWS PER 6"	SPT-N BLOWS PER FT.	MOISTURE CONTENT	Lab Tests
40									
45									
50									
55									
60				Depth per ft. Blows per ft. 61.5 - 61.8 75+ Bottom of Exploration at 61.8': probe refusal.					
65									
70									

R.W. Gillespie & Associates
Saco, Maine

BORING LOG B-2

Project: Portland Sports Center
Location: Portland, Maine

Approximate Surface Elevation: 68'±
Ground Water Depth: 2'

Client: DeStefano Associates, Inc.

Date: 14 April 2003

Project No. 823-06

DEPTH, FT.	SYMBOL	SAMPLES	SAMPLE #	DESCRIPTION OF MATERIAL	SAMPLE RECOVERY, IN.	BLOWS PER 6"	SPT-N BLOWS PER FT.	MOISTURE CONTENT	Lab Tests
0			S-1	SILTY SAND (SM); loose, moist then wet, medium to fine sand, little silt, brown.	15	2 3 6 6	9		
5			S-2		24	3 4 6 6	10		
				SILTY CLAY (CL); stiff, wet, olive brown. Pocket Penetrometer: Undrained Shear Strength Su = 2.0 - 2.5 ksf					
10			FV	Field Vane: Undrained Shear Strength; Su = 0.43 ksf, Residual = 0.03.					
			FV	Field Vane					
15			FV	Field Vane: Undrained Shear Strength; Su = 0.39 ksf, Residual = 0.02					
			FV	Field Vane					
20			FV	Field Vane: Undrained Shear Strength = 0.32 ksf, Residual = 0.02					
			FV	Field Vane.					
				-GLACIAL MARINE DEPOSITS-					
				Bottom of Exploration at 22': not refusal.					
25									
30									
35									

R.W. Gillespie & Associates
Saco, Maine

BORING LOG B-3

Project: Portland Sports Center
Location: Portland, Maine

Approximate Surface Elevation: 68'±
Ground Water Depth:

Client: DeStefano Associates, Inc.

Date: 14 April 2003

Project No. 823-06

DEPTH, FT.	SYMBOL	SAMPLES	SAMPLE #	DESCRIPTION OF MATERIAL	SAMPLE RECOVERY, IN.	BLOWS PER 6"	SPT-N BLOWS PER FT.	MOISTURE CONTENT	Lab Tests
0			S-1	SILTY SAND (SM); loose to medium dense, moist then wet, fine sand and silt, brown.	15	1 7 8 9	15		
5			S-2	SILTY CLAY (CL); stiff, wet, gray. Pocket Penetrometer: Undrained Shear Strength; Su = 1.5 ksf.	24	1 3 3 4	6		
10			S-3		24	WOR			
15			FV FV	Field Vane: Undrained Shear Strength; Su = 0.38 ksf, Residual = 0.02 Field Vane					
20			FV FV	Field Vane: Undrained Shear Strength; Su = 0.33 ksf, Residual = 0.02 Field Vane. Probed with "A" rod and hydraulic push from 22 to 58.5'.					
25				-GLACIAL MARINE DEPOSITS-					
30									
35									

BORING LOG B-3

Project: Portland Sports Center
Location: Portland, Maine

Approximate Surface Elevation: 68'±
Ground Water Depth:

Client: DeStefano Associates, Inc.

Date: 14 April 2003

Project No. 823-06

DEPTH, FT.	SYMBOL	SAMPLES	SAMPLE #	DESCRIPTION OF MATERIAL	SAMPLE RECOVERY, IN.	BLOWS PER 6"	SPT-N BLOWS PER FT.	MOISTURE CONTENT	Lab Tests
40									
45									
50									
55									
60				SAND (SP); (logged from change in probe resistance and hammer blow count). Depth per ft — Blows per ft 58.5 - 59.5 — 3.0 59.5 - 60.5 — 9.0 60.5 - 61.5 — 20.0 61.5 - 62.5 — 22.0 62.5 - 63.5 — 25.0 -GLACIAL MARINE DEPOSITS- Bottom of Exploration at 63.5': not refusal.					
65									
70									

R.W. Gillespie & Associates
Saco, Maine

BORING LOG B-4

Project: Portland Sports Center
Location: Portland, Maine

Approximate Surface Elevation: 68'±
Ground Water Depth: 3'

Client: DeStefano Associates, Inc.

Date: 14 April 2003

Project No. 823-06

DEPTH, FT.	SYMBOL	SAMPLES	SAMPLE #	DESCRIPTION OF MATERIAL	SAMPLE RECOVERY, IN.	BLOWS PER 6"	SPT-N BLOWS PER FT.	MOISTURE CONTENT	Lab Tests
0			S-1	SILTY SAND (SM); medium dense, moist then wet, medium to fine sand, some silt, brown.	18	1 4 10 10	14		
5			S-2	SILTY CLAY (CL); soft, wet, gray. Pocket Penetrometer: Undrained Shear Strength; Su = 0.51 ksf -GLACIAL MARINE DEPOSITS-	24	1 1 2 3	3		
10			S-3		24	WOH			
15			S-4		24	WOR			
				Bottom of Exploration at 17': not refusal.					
20									
25									
30									
35									

R.W. Gillespie & Associates
Saco, Maine

BORING LOG B-5

Project: Portland Sports Center
Location: Portland, Maine

Approximate Surface Elevation: 68'±
Ground Water Depth: 0.5'±

Client: DeStefano Associates, Inc.

Date: 14 April 2003

Project No. 823-06

DEPTH, FT.	SYMBOL	SAMPLES	SAMPLE #	DESCRIPTION OF MATERIAL	SAMPLE RECOVERY, IN.	BLOWS PER 6"	SPT-N BLOWS PER FT.	MOISTURE CONTENT	Lab Tests
0			S-1	TOPSOIL AND ORGANIC MATERIAL (12").	18	1 1	5		
				SAND (SP); loose to medium dense, moist then wet, medium to fine sand, little to trace silt, brown.		4			
			S-2		18	6	7		
						3 3			
						4			
5			S-3		20	6	5		
						1 2			
						3 3			
				SILTY CLAY (CL); soft, wet, gray.					
10			S-4		24	WOH			
				Probed with "A" rod and hydraulic push from 12 to 88'.					
15									
20									
25									
30									
35									

R.W. Gillespie & Associates
Saco, Maine

BORING LOG B-5

Project: Portland Sports Center
Location: Portland, Maine

Approximate Surface Elevation: 68'±
Ground Water Depth: 0.5'±

Client: DeStefano Associates, Inc.

Date: 14 April 2003

Project No. 823-06

DEPTH, FT.	SYMBOL	SAMPLES	SAMPLE #	DESCRIPTION OF MATERIAL	SAMPLE RECOVERY, IN.	BLOWS PER 6"	SPT-N BLOWS PER FT.	MOISTURE CONTENT	Lab Tests
40									
45									
50									
55									
60									
65									
70									

R.W. Gillespie & Associates
Saco, Maine

BORING LOG B-5

Project: Portland Sports Center
Location: Portland, Maine

Approximate Surface Elevation: 68'±
Ground Water Depth: 0.5'±

Client: DeStefano Associates, Inc.

Date: 14 April 2003

Project No. 823-06

DEPTH, FT.	SYMBOL	SAMPLES	SAMPLE #	DESCRIPTION OF MATERIAL	SAMPLE RECOVERY, IN.	BLOWS PER 6"	SPT-N BLOWS PER FT.	MOISTURE CONTENT	Lab Tests
75									
80									
85									
90				SAND OR TILL (logged from change in probe resistance and hammer blow count). Depth per ft — Blows per ft 88.0 - 89.0 — 33.0 89.0 - 90.0 — 53.0 90.0 - 90.0 — 25/0" Bottom of Exploration at 90': probe refusal.					
95									
100									
105									

R.W. Gillespie & Associates
Saco, Maine

BORING LOG B-6

Project: Portland Sports Center
Location: Portland, Maine

Approximate Surface Elevation: 68'±
Ground Water Depth: 0.5'±

Client: DeStefano Associates, Inc.

Date: 14 April 2003

Project No. 823-06

DEPTH, FT.	SYMBOL	SAMPLES	SAMPLE #	DESCRIPTION OF MATERIAL	SAMPLE RECOVERY, IN.	BLOWS PER 6"	SPT-N BLOWS PER FT.	MOISTURE CONTENT	Lab Tests
0			S-1	TOPSOIL AND ORGANIC MATERIAL (8").	16	1	4		
				SILTY SAND (SM); loose, wet, medium to fine sand, some to little silt, brown.		1			
			S-2		19	3	6		
						6			
						3			
5			S-3		24	3	4		
						4			
				SILTY CLAY (CL); soft, wet, gray.		3			
						1			
						3			
10			U-1		24/	4			
					24				
			FV	Field Vane: Undrained Shear Strength; Su =0.36 ksf, Residual = 0.02					
			FV	Field Vane: Undrained Shear Strength; Su =0.35 ksf, Residual = 0.02					
15			FV	Field Vane: Undrained Shear Strength; Su = 0.31 ksf, Residual = 0.01					
			FV	Field Vane: Undrained Shear Strength; Su =0.31 ksf, Residual = 0.01					
20			U-2		NR				
			U-2		14/				
					24				
25			FV	Field Vane: Undrained Shear Strength; Su =0.36 ksf, Residual = 0.02					
			FV	Field Vane: Undrained Shear Strength; Su =0.47 ksf, Residual = 0.03					
				-GLACIAL MARINE DEPOSITS-					
30				Probed with "A" rod and hydraulic push from 28 to 77.5'.					
35									

R.W. Gillespie & Associates
Saco, Maine

BORING LOG B-6

Project: Portland Sports Center
Location: Portland, Maine

Approximate Surface Elevation: 68'±
Ground Water Depth: 0.5'±

Client: DeStefano Associates, Inc.

Date: 14 April 2003

Project No. 823-06

DEPTH, FT.	SYMBOL	SAMPLES	SAMPLE #	DESCRIPTION OF MATERIAL	SAMPLE RECOVERY, IN.	BLOWS PER 6"	SPT-N BLOWS PER FT.	MOISTURE CONTENT	Lab Tests
40									
45									
50									
55									
60									
65									
70									

R.W. Gillespie & Associates
Saco, Maine

BORING LOG B-6

Project: Portland Sports Center
Location: Portland, Maine

Approximate Surface Elevation: 68'±
Ground Water Depth: 0.5'±

Client: DeStefano Associates, Inc.

Date: 14 April 2003

Project No. 823-06

DEPTH, FT.	SYMBOL	SAMPLES	SAMPLE #	DESCRIPTION OF MATERIAL	SAMPLE RECOVERY, IN.	BLOWS PER 6"	SPT-N BLOWS PER FT.	MOISTURE CONTENT	Lab Tests
75									
80				SAND OR TILL (SP); (logged from change in probe resistance and hammer blow count). Depth per ft. — Blows per ft. 77.5 - 78.5 — 32.0 78.5 - 79.5 — 34.0 79.5 - 80.3 — 30.0 80.3 - 80.3 — 25/0" Bottom of Exploration at 80.3': probe refusal.					
85									
90									
95									
100									
105									

R.W. Gillespie & Associates
Saco, Maine

BORING LOG B-7

Project: Portland Sports Center
Location: Portland, Maine

Approximate Surface Elevation: 68'±
Ground Water Depth: 2.5'±

Client: DeStefano Associates, Inc.

Date: 14 April 2003

Project No. 823-06

DEPTH, FT.	SYMBOL	SAMPLES	SAMPLE #	DESCRIPTION OF MATERIAL	SAMPLE RECOVERY, IN.	BLOWS PER 6"	SPT-N BLOWS PER FT.	MOISTURE CONTENT	Lab Tests
0			S-1	TOPSOIL AND ORGANIC MATERIAL (4").	14	1 2	7		
				SAND (SP); loose to medium dense, moist, medium to fine sand, trace silt, brown.		5 6			
	▽		S-2		18	5 7	12		
				SILTY SAND (SM); loose to medium dense, moist then wet, medium to fine sand, some silt, brown.		5 3			
5			S-3		18	1 2	4		
						2 2			
				SILTY CLAY (CL); soft, wet, gray.					
10			S-4		24	WOR			
15			S-5		24	WOH			
				Bottom of Exploration at 17': not refusal.					
20									
25									
30									
35									

R.W. Gillespie & Associates
Saco, Maine

BORING LOG B-8

Project: Portland Sports Center
Location: Portland, Maine

Approximate Surface Elevation: 68'±
Ground Water Depth: 4'±

Client: DeStefano Associates, Inc.

Date: 15 April 2003

Project No. 823-06

DEPTH, FT.	SYMBOL	SAMPLES	SAMPLE #	DESCRIPTION OF MATERIAL	SAMPLE RECOVERY, IN.	BLOWS PER 6"	SPT-N BLOWS PER FT.	MOISTURE CONTENT	Lab Tests
0			S-1	TOPSOIL AND ORGANIC MATERIAL (12").	14	2 2 3 6	5		
				SAND (SP); loose to medium dense, moist then wet, medium to fine sand, little to trace silt, brown.					
5			S-2		20	3 7 8 8	15		
10			S-3	SILTY CLAY (CL); soft, wet, gray.	24	1/ 12" 1/ 12"	1		
15			FV	Field Vane: Undrained Shear Strength; Su = , Residual =					
			FV	Field Vane					
20			FV	Field Vane: Undrained Shear Strength; Su = , Residual =					
			FV	Field Vane					
				-GLACIAL MARINE DEPOSITS- Probed with "A" rod and hydraulic push from 22 to 64'.					
25									
30									
35									

R.W. Gillespie & Associates
Saco, Maine

BORING LOG B-8

Project: Portland Sports Center
Location: Portland, Maine

Approximate Surface Elevation: 68'±
Ground Water Depth: 4'±

Client: DeStefano Associates, Inc.

Date: 15 April 2003

Project No. 823-06

DEPTH, FT.	SYMBOL	SAMPLES	SAMPLE #	DESCRIPTION OF MATERIAL	SAMPLE RECOVERY, IN.	BLOWS PER 6"	SPT-N BLOWS PER FT.	MOISTURE CONTENT	Lab Tests
40									
45									
50									
55									
60									
65				SAND (SP); (logged from change in probe resistance and hammer blow count) . Depth per ft — Blows per ft 64.0 - 65.0 — 25.0 65.0 - 66.0 — 24.0 66.0 - 67.0 — 19.0 67.0 - 68.0 — 25.0					
70				Bottom of Exploration at 68': not refusal.					

R.W. Gillespie & Associates
Saco, Maine

BORING LOG B-9

Project: Portland Sports Center
Location: Portland, Maine

Approximate Surface Elevation: 68'±
Ground Water Depth:

Client: DeStefano Associates, Inc.

Date: 15 April 2003

Project No. 823-06

DEPTH, FT.	SYMBOL	SAMPLES	SAMPLE #	DESCRIPTION OF MATERIAL	SAMPLE RECOVERY, IN.	BLOWS PER 6"	SPT-N BLOWS PER FT.	MOISTURE CONTENT	Lab Tests
0			S-1	FILL: Gravelly Sand, loose, moist, medium to fine sand, little gravel, trace silt, brown.	20	3 5 3 5	8		
				SAND (SP); loose, moist, medium to fine sand, trace to little silt, brown.					
5			S-2	SILTY CLAY (CL); very stiff, wet, olive brown. Pocket Penetrometer: Undrained Shear Strength; Su = 2.0 ksf	24	2 3 2 3	5		
			U-1		24/ 24				
10			FV FV	Field Vane: Undrained Shear Strength; Su = 1.18 ksf, Residual = 0.06 ksf Field Vane					
15			U-2		24/ 24				
			FV FV	Field Vane: Undrained Shear Strength; Su = 0.37 ksf, Residual = 0.01 ksf Field Vane.					
20			FV FV	Field Vane: Undrained Shear Strength; Su = 0.38 ksf, Residual = 0.01 ksf Field Vane.					
25			U-3		9/24				
30			FV FV	Field Vane: Undrained Shear Strength; Su = 0.49 ksf, Residual = 0.01 ksf Field Vane.					
35									

R.W. Gillespie & Associates
Saco, Maine

BORING LOG B-9

Project: Portland Sports Center
Location: Portland, Maine

Approximate Surface Elevation: 68'±
Ground Water Depth:

Client: DeStefano Associates, Inc.

Date: 15 April 2003

Project No. 823-06

DEPTH, FT.	SYMBOL	SAMPLES	SAMPLE #	DESCRIPTION OF MATERIAL	SAMPLE RECOVERY, IN.	BLOWS PER 6"	SPT-N BLOWS PER FT.	MOISTURE CONTENT	Lab Tests
40			FV	Field Vane: Undrained Shear Strength; Su = 0.49 ksf, Residual = 0.02 ksf					
				-GLACIAL MARINE DEPOSITS-					
				Probed with hydraulic push from 41 to 43'.					
45				SAND OR TILL (logged from change in probe resistance and hammer blow count).					
				Depth per ft. — Blows per ft. 43.0 - 44.0 — 8.0 44.0 - 45.0 — 13.0 45.0 - 46.0 — 18.0 46.0 - 47.0 — 12.0 47.0 - 48.0 — 25/0"					
50				Bottom of Exploration at 47': probe refusal.					
55									
60									
65									
70									

R.W. Gillespie & Associates
Saco, Maine

BORING LOG B-10

Project: Portland Sports Center
Location: Portland, Maine

Approximate Surface Elevation: 68'±
Ground Water Depth: 4'±

Client: DeStefano Associates, Inc.

Date: 15 April 2003

Project No. 823-06

DEPTH, FT.	SYMBOL	SAMPLES	SAMPLE #	DESCRIPTION OF MATERIAL	SAMPLE RECOVERY, IN.	BLOWS PER 6"	SPT-N BLOWS PER FT.	MOISTURE CONTENT	Lab Tests
0			S-1	SAND (SP); loose to medium dense, moist, medium to fine sand, little to trace silt, brown.	15	2 4 5 3	9		
5				SILTY CLAY (CL); very stiff, moist, olive brown. Pocket Penetrometer: Undrained Shear Strength; Su = 3.0 to 3.5 ksf.					
10			FV FV	Becomes soft, wet, gray. Field Vane: Undrained Shear Strength; Su = 1.65 ksf, Residual = 0.1 ksf. Field Vane.					
15			FV FV	Field Vane: Undrained Shear Strength; Su = 0.46 ksf, Residual = 0.03 ksf. Field Vane.					
20				-GLACIAL MARINE DEPOSITS- Probed with "A" rod and hydraulic push from 17 to 50.5'.					
25									
30									
35									

BORING LOG B-10

Project: Portland Sports Center
Location: Portland, Maine

Approximate Surface Elevation: 68'±
Ground Water Depth: 4'±

Client: DeStefano Associates, Inc.

Date: 15 April 2003

Project No. 823-06

DEPTH, FT.	SYMBOL	SAMPLES	SAMPLE #	DESCRIPTION OF MATERIAL	SAMPLE RECOVERY, IN.	BLOWS PER 6"	SPT-N BLOWS PER FT.	MOISTURE CONTENT	Lab Tests
40									
45									
50				SAND OR TILL (logged from change in probe resistance and hammer blow count).					
55				Depth per ft. — Blows per ft. 50.5 - 51.5 — 2.0 51.5 - 52.5 — 7.0 52.5 - 53.5 — 11.0 53.5 - 54.5 — 20.0 54.5 - 55.5 — 21.0 55.5 - 56.5 — 41.0 56.5 - 57.5 — 33.0					
60				Bottom of Exploration at 57.5': not refusal.					
65									
70									

R.W. Gillespie & Associates
Saco, Maine

BORING LOG B-11

Project: Portland Sports Center
Location: Portland, Maine

Approximate Surface Elevation: 68'±
Ground Water Depth:

Client: DeStefano Associates, Inc.

Date: 15 April 2003

Project No. 823-06

DEPTH, FT.	SYMBOL	SAMPLES	SAMPLE #	DESCRIPTION OF MATERIAL	SAMPLE RECOVERY, IN.	BLOWS PER 6"	SPT-N BLOWS PER FT.	MOISTURE CONTENT	Lab Tests
0			S-1	FILL: Gravelly Sand, loose to medium dense, moist, medium to fine sand, little gravel, trace silt, brown.	18	5 8 7 8	15		
				SAND (SP); medium dense, moist then wet, medium to fine sand, trace silt, brown.					
5			S-2	SILTY CLAY (CL); very stiff, wet, olive brown. Pocket Penetrometer: Undrained Shear Strength; Su = 2.75 to 3.01 ksf.	24	3 4 5 5	9		
10			FV FV	Becomes medium stiff, wet, gray. Field Vane: Undrained Shear Strength, Su = 1.49 ksf, Residual = 0.1 ksf Field Vane.					
15			FV FV	Becomes soft. Field Vane: Undrained Shear Strength; Su = 0.45 ksf, Residual = 0.03 ksf. Field Vane					
				-GLACIAL MARINE DEPOSIT- Probed with "A" rod and hydraulic push from 17 to 45'.					
20									
25									
30									
35									

R.W. Gillespie & Associates
Saco, Maine

BORING LOG B-11

Project: Portland Sports Center
Location: Portland, Maine

Approximate Surface Elevation: 68'±
Ground Water Depth:

Client: DeStefano Associates, Inc.

Date: 15 April 2003

Project No. 823-06

DEPTH, FT.	SYMBOL	SAMPLES	SAMPLE #	DESCRIPTION OF MATERIAL	SAMPLE RECOVERY, IN.	BLOWS PER 6"	SPT-N BLOWS PER FT.	MOISTURE CONTENT	Lab Tests
40									
45				SAND OR TILL (logged from change in probe resistance and hammer blow count).					
50				Depth per ft. Blows per ft. 45.0 - 46.0 2.0 46.0 - 47.0 10.0 47.0 - 48.0 22.0 48.0 - 49.0 24.0					
55				Bottom of Exploration at 49': no refusal.					
60									
65									
70									

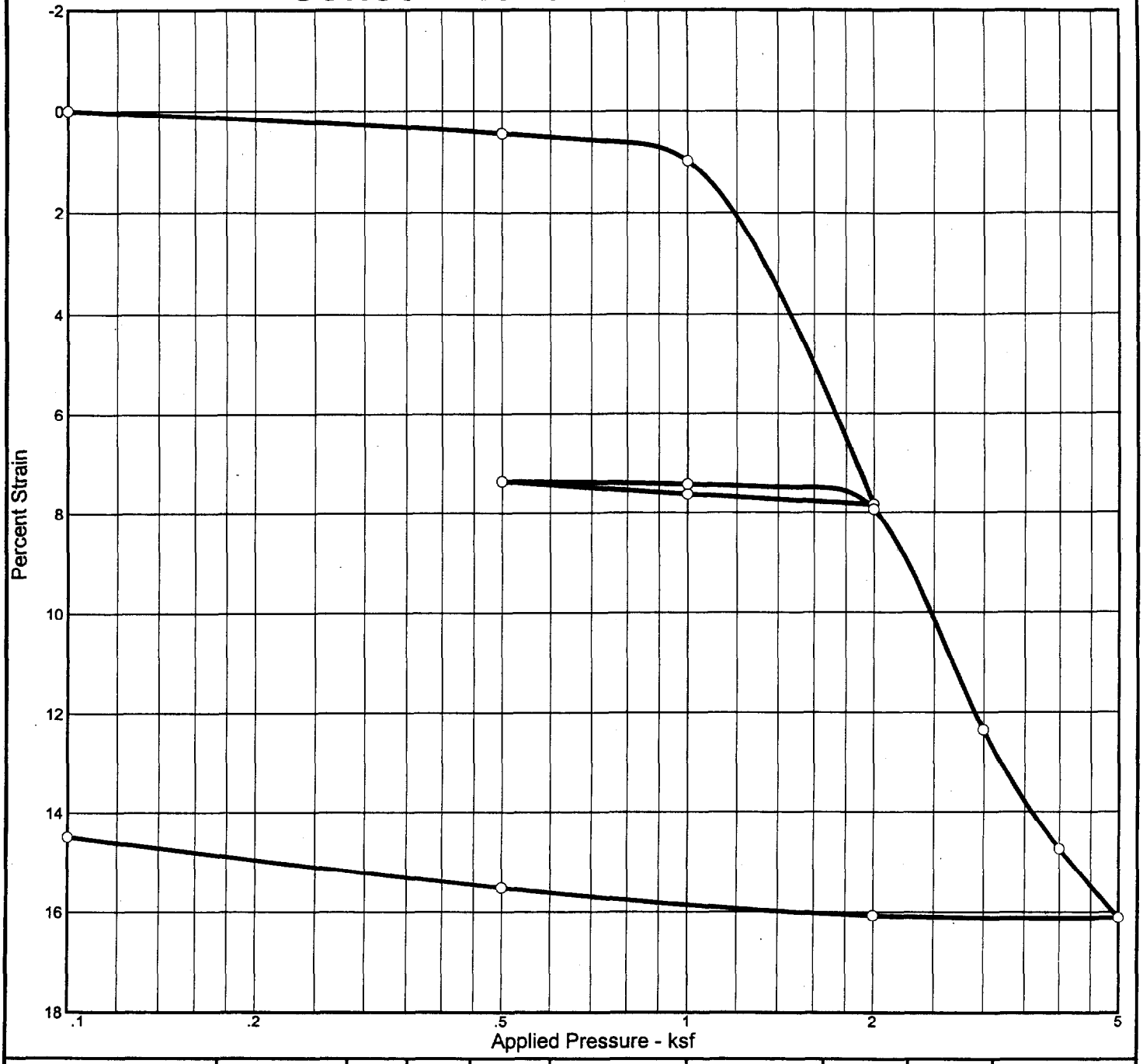
R.W. Gillespie & Associates
Saco, Maine

APPENDIX B

LABORATORY TESTING

Geotechnical Investigation
Portland Sports Center at Joker's
Portland, Maine

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (ksf)	P_c (ksf)	C_c	C_r	Initial Void Ratio
Saturation	Moisture									
100.9 %	46.4 %	76.0	36	14	2.77		1.16	0.62	0.03	1.275

MATERIAL DESCRIPTION	USCS	AASHTO

Project No. 823-06 **Client:** DeStefano Associates

Project: New Soccer Arena

Location: B-6, U-2

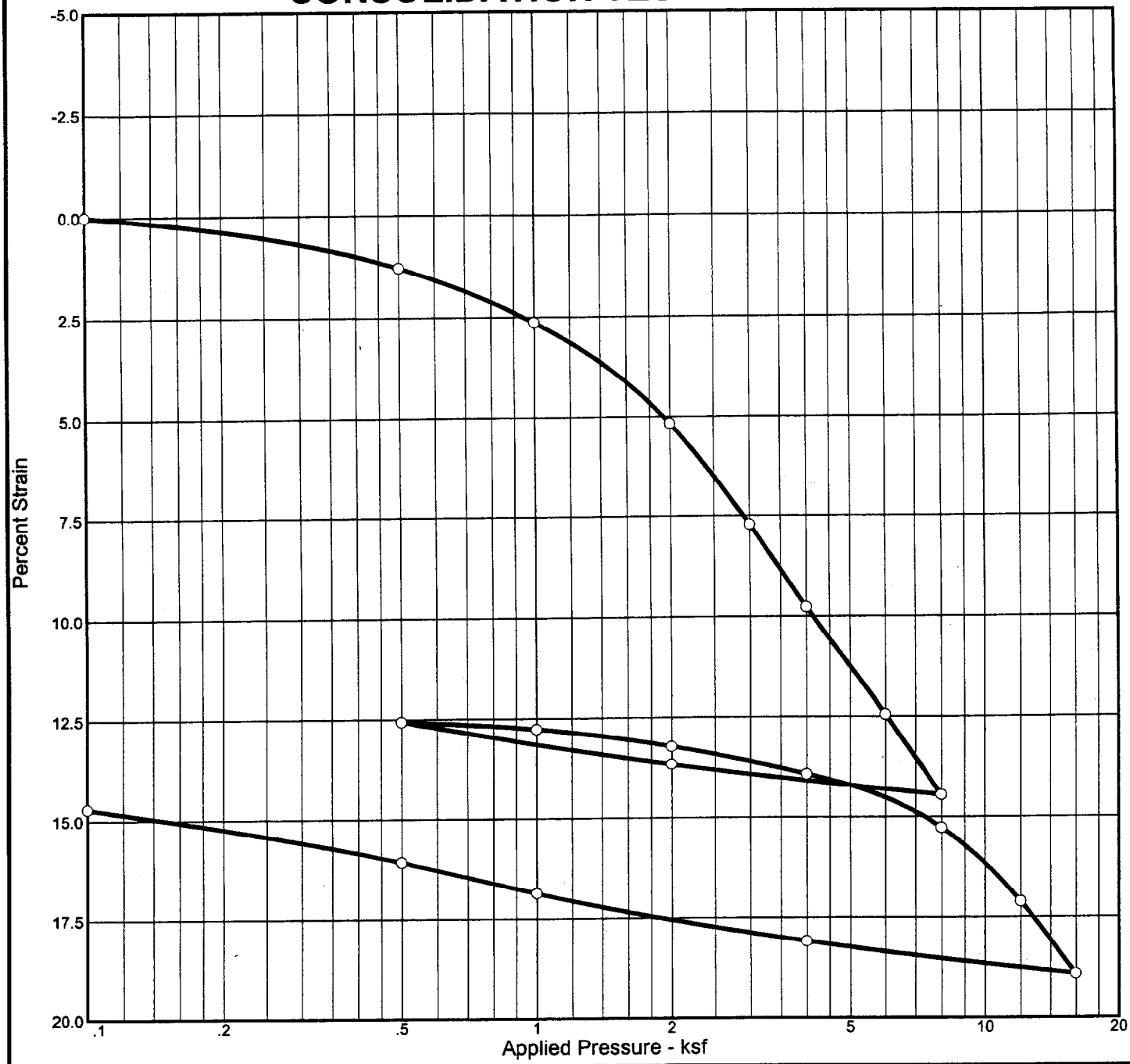
Remarks:
Tested by MPL

CONSOLIDATION TEST REPORT

R.W. Gillespie & Associates, Inc.

Lab No. 6556B

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (ksf)	P_c (ksf)	C_c	C_r	Initial Void Ratio
Saturation	Moisture									
99.2 %	43.8 %	77.7	43	18	2.77		1.76	0.35	0.04	1.224

MATERIAL DESCRIPTION	USCS	AASHTO

Project No. 823-06 **Client:** DeStefano Associates

Project: New Soccer Arena

Location: B-9, U-2

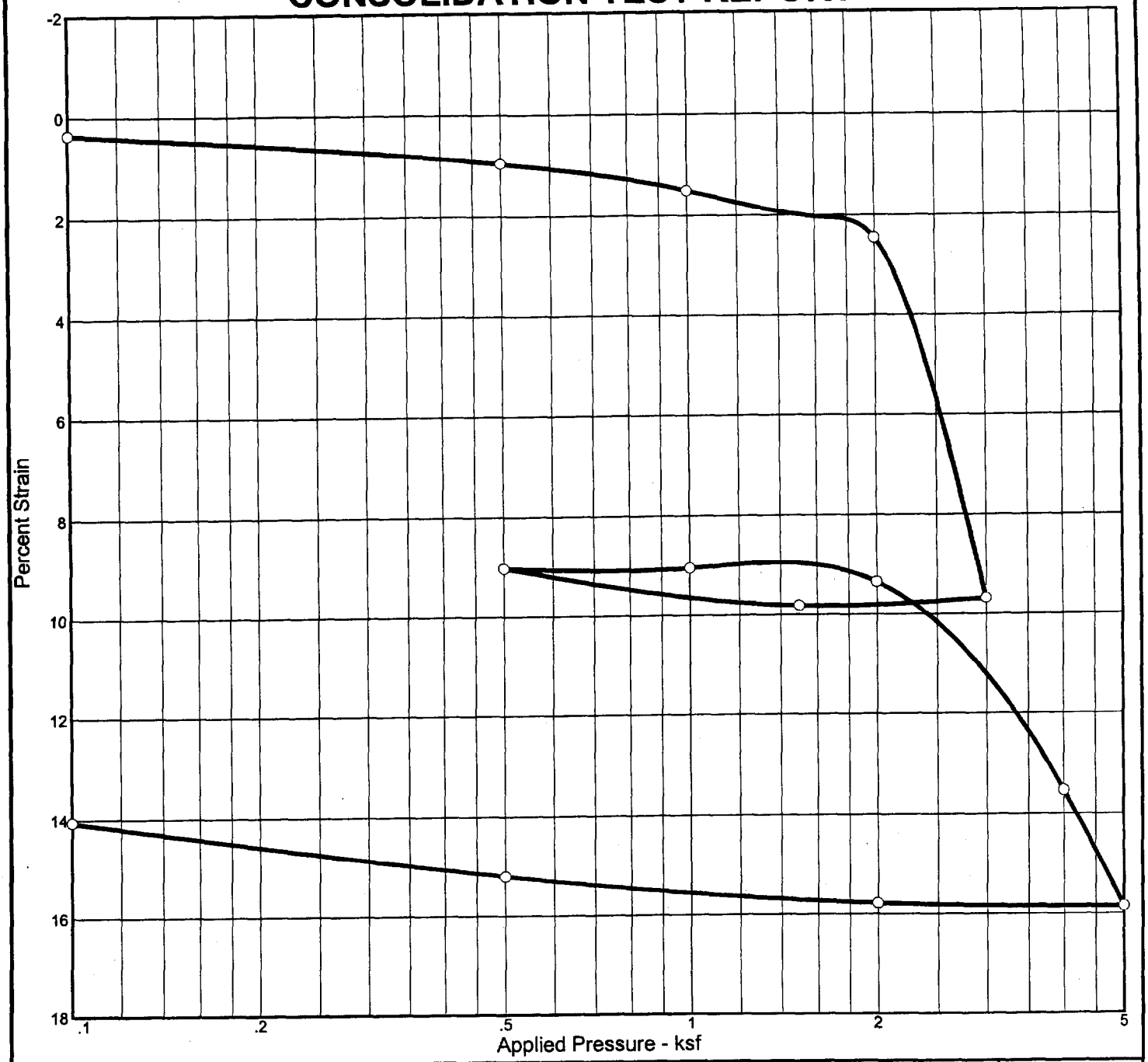
Remarks:
Tested by MPL

CONSOLIDATION TEST REPORT

R.W. Gillespie & Associates, Inc.

Lab No. 6556D

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (ksf)	P_c (ksf)	C_c	C_r	Initial Void Ratio
Saturation	Moisture									
99.9 %	48.7 %	73.6			2.77		2.17	1.13	0.06	1.351

MATERIAL DESCRIPTION	USCS	AASHTO
Silty Clay		

Project No. 823-06 **Client:** DeStefano Associates

Project: New Soccer Arena

Location: B-9, U-3

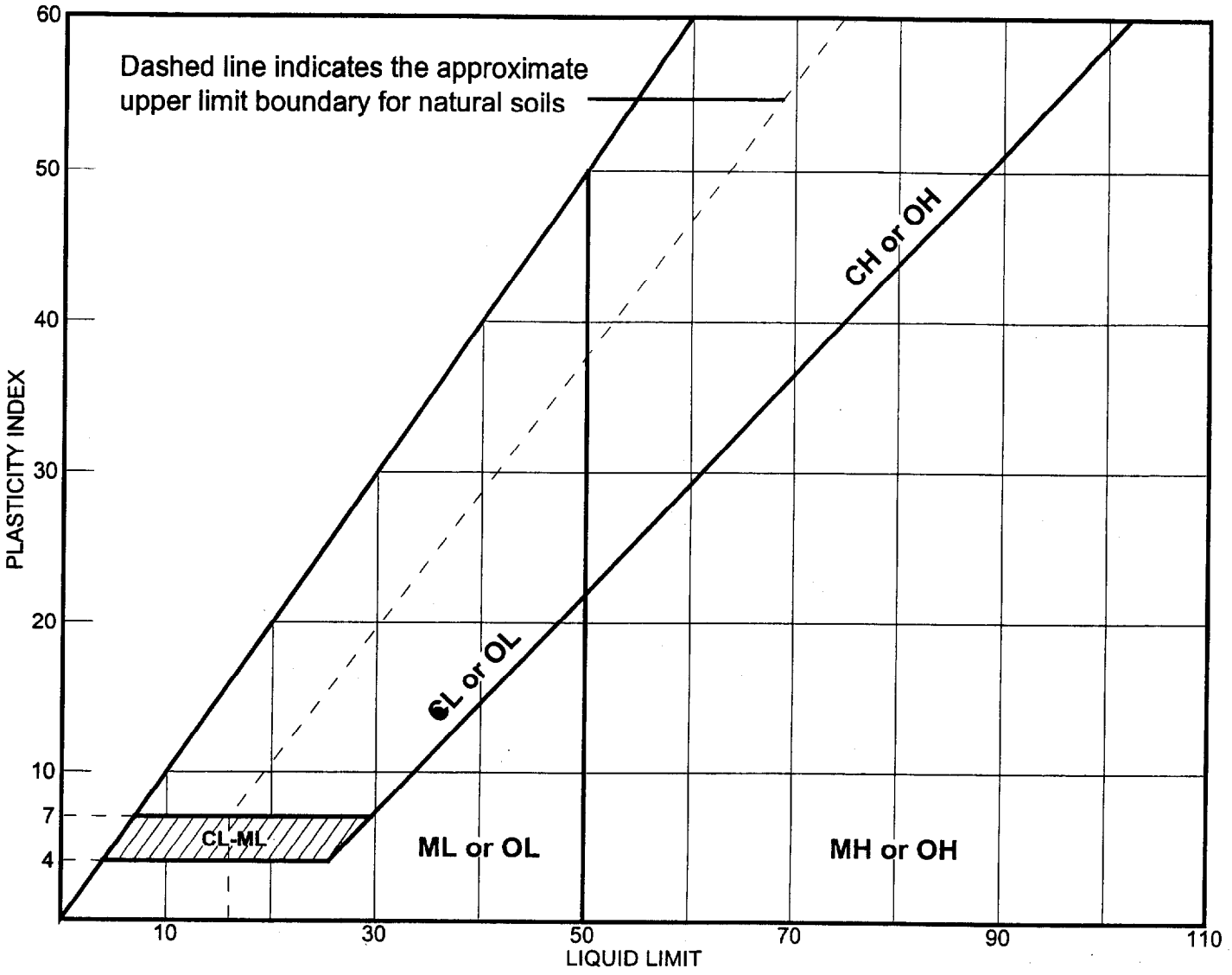
Remarks:
Tested by MPL

CONSOLIDATION TEST REPORT

R.W. Gillespie & Associates, Inc.

Lab No. 6556E

LIQUID AND PLASTIC LIMITS TEST REPORT



SOIL DATA								
SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
●	B-6	6556B	23' - 25'	51.3	22	36	14	

LIQUID AND PLASTIC LIMITS TEST REPORT

R.W. Gillespie & Associates, Inc.

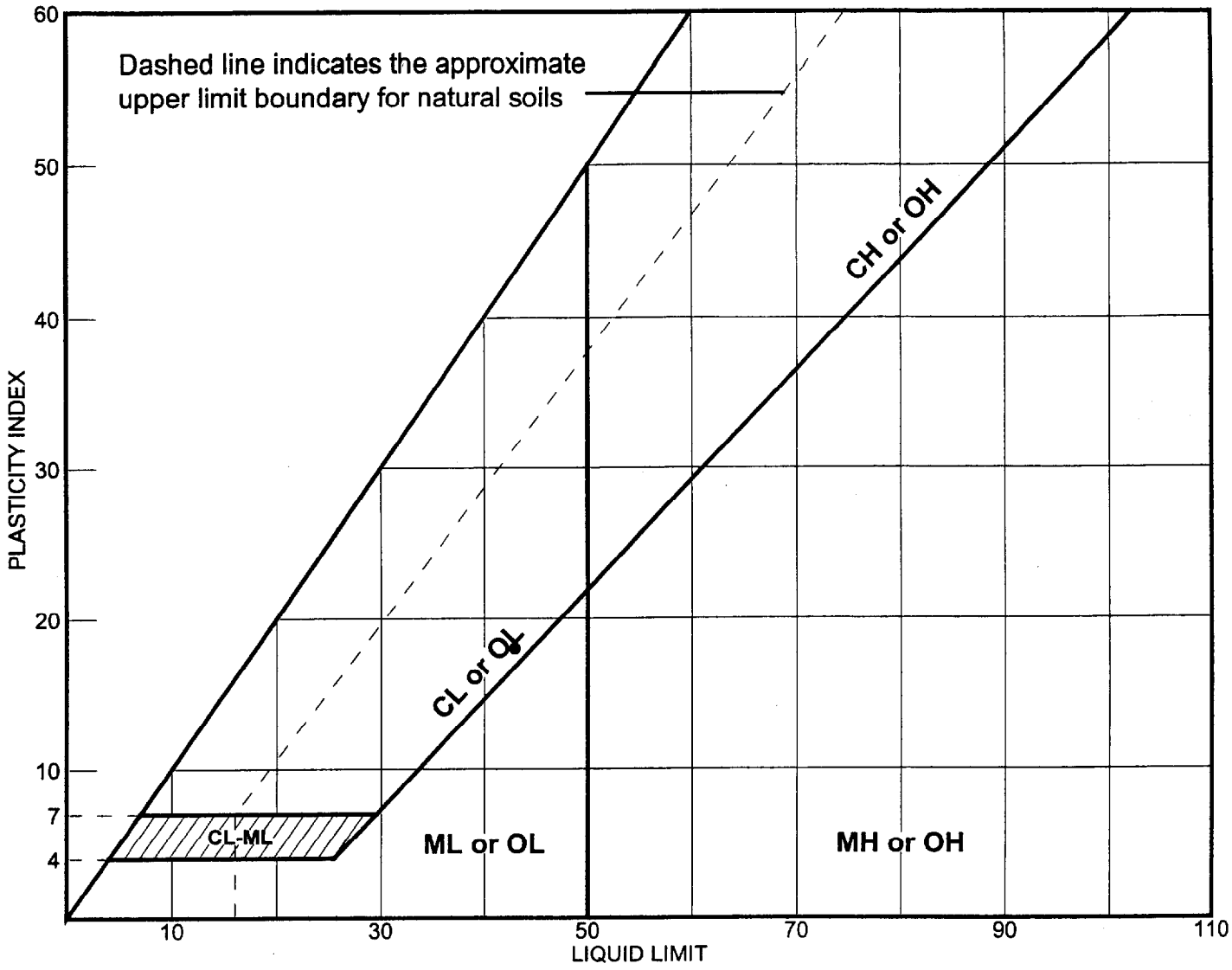
Client: DeStefano Associates

Project: New Soccer Arena

Project No.: 823-06

Lab No. 6556B

LIQUID AND PLASTIC LIMITS TEST REPORT



SOIL DATA								
SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
●	B-9	6556D	15' - 17'	49.1	25	43	18	

LIQUID AND PLASTIC LIMITS TEST REPORT

R.W. Gillespie & Associates, Inc.

Client: DeStefano Associates

Project: New Soccer Arena

Project No.: 823-06 **Lab No.** 6556D

Laboratory Vane Shear Test Results

Project: New Soccer Arena
Project No.: 823-06

Client: DeStefano Associates

Boring No.	B-6	**Lab No.**	6556A
Sample No.	U-1 (10' - 12')		
Test No.	**S_u (Undisturbed)**	**S_u (Residual)**	**Moisture Content**
1	160 psf	0 psf	32.8%
2	200 psf	10 psf	30.6%
3	150 psf	10 psf	28.5%

Laboratory Vane Shear Test Results

Project: New Soccer Arena
Project No.: 823-06

Client: DeStefano Associates

Boring No.	B-6	**Lab No.**	6556B
Sample No.	U-2 (23' - 25')		
Test No.	**S_u (Undisturbed)**	**S_u (Residual)**	**Moisture Content**
1	170 psf	0 psf	41.8%
2	260 psf	0 psf	51.3%

Laboratory Vane Shear Test Results

Project: New Soccer Arena
Project No.: 823-06

Client: DeStefano Associates

Boring No.	B-9	**Lab No.**	6556C
Sample No.	U-1 (8' - 10')		
Test No.	**S_u (Undisturbed)**	**S_u (Residual)**	**Moisture Content**
1	2040 psf	400 psf	32.7%
2	2200 psf	400 psf	30.7%
3	2440 psf	400 psf	31.1%

Laboratory Vane Shear Test Results

Project: New Soccer Arena
Project No.: 823-06

Client: DeStefano Associates

Boring No.	B-9	**Lab No.**	6556D
Sample No.	U-2 (15' - 17')		
Test No.	**S_u (Undisturbed)**	**S_u (Residual)**	**Moisture Content**
1	320 psf	20 psf	47.8%
2	340 psf	20 psf	46.7%
3	360 psf	10 psf	49.1%

Statement of Special Inspections

Project:	Portland Sports Center at Jokers – Foundations and Service Wing Structure
Location:	Warren Avenue; Portland, Maine
Architect:	Ben Walter, AIA CWS Architects 434 Cumberland Avenue Portland, ME 04101
Structural Engineer of Record:	David A. Price, P.E. Price Structural Engineers, Inc. 75 Farms Edge Road North Yarmouth, ME 04097

This *Statement of Special Inspections* is submitted as a condition for permit issuance in accordance with the Special Inspection requirements of the Building Code. It includes a Schedule of Special Inspection Services applicable to this project as well as the name of the Special Inspector and the identity of other approved agencies intended to be retained for conducting these inspections. This statement includes the necessary inspections for the entire foundation and the service wing but does not include special inspections for the pre-engineered Rubb Building which will be provided by others.

The Special Inspector will keep inspection records provided by the approved agencies. Discrepancies discovered by the approved agencies will be brought to the immediate attention of the Contractor for correction. If such discrepancies are not corrected, the discrepancies will be brought to the attention of the Building Official, Structural Engineer of Record, and Architect. The Special Inspection program does not relieve the Contractor of his or her responsibilities.

When requested, interim reports will be submitted to the Building Code Official, Owner, Structural Engineer of Record, and Architect of Record.

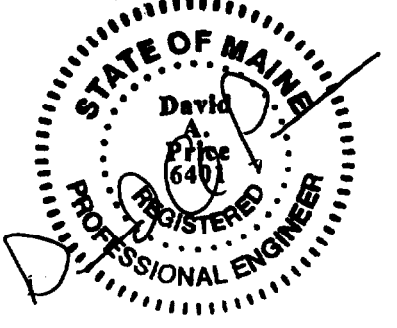
Job site safety and means and methods of construction are solely the responsibility of the Contractor.

Prepared by: David A. Price, P.E.

D A P 7/18/03

Signature Date

Design Professional Seal



Building Official's Acceptance:

Signature Date

SCHEDULE OF SPECIAL INSPECTIONS
Portland Sports Center at Jokers
Portland, Maine

Note to Inspectors: All discrepancies shall be brought to the immediate attention of the Contractor and the Special Inspector for correction. If not corrected, discrepancies shall be brought to the attention of the Architect and the Building Official.

I. Special Inspector: Price Structural Engineers, Inc.
II. Structural Fill Testing Laboratory: R.W. Gillespie & Associates, Inc.
III. Concrete Testing Laboratory: R.W. Gillespie & Associates, Inc.
IV. Structural Steel Testing Laboratory: Quality Assurance Laboratory, Inc.

Item	Inspector Number	Scope
Structural Fill:		
Controlled Structural Fill	II	Observe compacted fill operations to document that fill material, lift thickness, and level of compaction are in conformance with the requirements of the construction documents and the recommendations of the geotechnical engineer.
	II	Perform in-place density (compaction) tests at interval of one test per 2500 square feet per lift within slab areas and one test per 50 lineal feet of foundation backfill per lift. At least one laboratory grain size analysis and modified Proctor test will be performed on each fill type used.
Shallow Foundations	II	Observe that subbase below spread footings and wall strip footings is acceptable and consistent with recommendations of geotechnical engineer.
Piles	II	Observe pile installation and review pile records prepared by pile contractor. Detailed pile records to include pile number, tip elevation, cut off elevation, splice elevation, length, blows per foot during driving, blows per inch for final set, measurements for heave at completion of each

Piles (continued)		pile cap, and notes regarding plumbness during driving and deviation from horizontal location. Pile records shall also include hammer information and stroke during final set. Verify final set criteria are consistent with that developed by geotechnical engineer.
	I	Welders shall submit photocopy of AWS certification to the Special Inspector indicating that it is current.
	IV	The tension splice for at least one location shall be tested by an independent certified welding inspector (test method at the discretion of the welding inspector). Field welds shall be inspected by a certified welding inspector.
Cast in Place Concrete:		
Concrete Mix Design & Steel Reinf. Shop Drawings	I	Review for compliance with construction documents.
Material Certification	I	Review for compliance with construction documents.
Reinforcement Installation	III	Review the installation of the reinforcing steel for compliance with construction documents and the approved shop drawings. Field measure bar diameters and bar spacing at 100% of pile caps, grade beams, piers, and spread footings. Field measure bar diameter and bar spacing at 15% of concrete at other areas at random locations.
	III	Random review of construction procedures.
Formwork Geometry	III	Provide comment of formwork dimensions when reviewing steel reinforcement installation.
Concrete Placement	III	Random review of construction procedures.
Evaluation of Concrete Strength	III	Obtain one set of four standard cylinders for each compressive strength test. See project specifications for additional requirements.

Curing and Protection	III	Provide comment on curing and protection methods being used at the job site, particularly during hot and cold weather conditions.
Structural Steel: Structural Steel Shop Drawings	I	Review for compliance with construction documents.
Steel Fabrication Quality Control	I I IV	Steel fabricator to provide certificate indicating it is currently a member of Structural Steel Fabricators of New England. Review mill certificates for plates and shapes. Review bolt manufacturer's certificate for compliance of high strength bolts. Review steel fabricator's written quality control procedures.
Bolts	IV IV	At 10% of bolts (at random locations), field verify that bolt material, quantity, diameter, and spacing conform with the structural drawings and approved shop drawings. Provide additional inspection at more bolts if any of the bolts are found not to conform. At 100% of bolts, field verify that the tip of the "TC" bolts has been twisted off indicating that the bolt has been fully pretensioned.
Field welding	I IV IV	Erector to provide certificates indicating that those performing field welding have an AWS certificate that is current. All field welds for bracing shall be visually inspected by a certified welding inspector to be sure that welding is performed in accordance with AWS D1.1 Perform visual inspection of 5% of the welds at roof decking (random locations) to verify conformance with the construction documents. Provide additional inspection at more welds if any of the welds are found not to conform.

Structural Details	IV	Provide comment that structural steel member sizes, locations, and connections appear to be in general conformance with the structural drawings and approved shop drawings.