



**MAGNUM ENGINEERING INC**  
GEOTECHNICAL ENGINEERING CONSULTANTS

GEOTECHNICAL ENGINEERING REPORT

BUCKHORN CREEK BRIDGE  
WAKULLA COUNTY, FLORIDA

PREPARED FOR:

**PREBLE-RISH, INC.  
203 ABERDEEN PARKWAY  
PANAMA CITY, FLORIDA 32405**

**P.O. BOX 877  
LYNN HAVEN, FLORIDA 32444  
TELEPHONE (850) 258.0994 FAX (850) 248.0994**



**MAGNUM ENGINEERING INC**  
GEOTECHNICAL ENGINEERING CONSULTANTS

June 25, 2009

Preble-Rish, Inc.  
203 Aberdeen Parkway  
Panama City, Florida 32405

ATTENTION: Mr. Travis Justice, P.E.

PROJECT: Buckhorn Creek Bridge Replacement – Geotechnical Services  
Wakulla County, Florida  
MEI Project No: M109-100-068

Dear Mr. Justice:

This letter forwards the results of our Geotechnical exploration performed for the proposed development. The purpose of this exploration was to evaluate the subsurface conditions present and to provide foundation recommendations for support of the proposed bridge. Our exploration consisted of two (2) 21 foot to 35 foot deep Standard Penetration Test (SPT) borings. Upon completion of the boring, the soil samples were brought back to the office for visual inspection, classification, and analysis by our engineering staff.

**Project Information**

Based on information provided, we understand that an existing single lane bridge will be replaced with a pre-cast concrete bridge span supported on shallow spread footings. You have indicated the abutment footings will be 5 foot by 15 foot and will carry a design load of 60 kips each. We have assumed the finished grade of the abutments will be within 2 feet of existing grades. The borings were performed at each proposed abutment.

If any of the project information noted above is incorrect or has changed, please inform Magnum Engineering so that we may amend the recommendations presented in this report, if necessary.

**Subsurface Conditions**

Figure #1 shows the Logs of Borings of the two 21 foot to 35 foot deep Standard Penetration Test (SPT) borings. Boring B-1 was drilled on the south side of the existing Buckhorn Creek and Boring B-2 was performed on the north side of the existing Buckhorn Creek. The subsurface conditions encountered are provided below.

The borings generally encountered loose sands, slightly silty sands, and silty fine sands from the ground surface to roughly 13 ½ feet below existing grade underlain by weathered limerock with clay to the bottom of the 21 to 35 foot deep borings.

Please refer to the attached logs of borings presented as Figure #2 for a more detailed description of the soils encountered.

The groundwater was encountered approximately 8 feet to 8 ½ feet below existing grade at the time of drilling which was during a period of below normal seasonal rainfall. Groundwater levels will fluctuate with rainfall and could vary several feet during typical seasonal fluctuations. Larger fluctuations are possible under severe weather conditions. We recommend that the Contractor verify the actual groundwater levels at the time of construction to determine potential impacts groundwater will have on construction procedures.

### **Foundation Recommendations**

With proper subgrade preparation and compaction/densification as described herein, the site soils should be capable of supporting the proposed structure on shallow foundations. The existing near surface soils and fill soils should be prepared as previously recommended to improve foundation support and reduce total and differential settlements.

Based on the anticipated construction and site preparation requirements recommended herein, it is our opinion that the building can be supported on shallow foundations designed for a net maximum allowable bearing pressure of 2,000 pounds per square foot (psf). The following geotechnical related recommendations should be used for design and construction of the foundations.

- The foundation should bear on properly improved existing subgrade or on properly placed and compacted cohesionless (sand) fill.
- The soils to a depth of one foot below the footings and all new fill should be compacted to 95 percent of the soil's Modified Proctor (ASTM D-1557) density.
- All footings should be constructed in a "dry" fashion.
- Structural elements should be centered on the footings such that the load is transferred evenly unless the footings are proportioned for eccentric loads.

### **Settlement**

The settlement of shallow foundations supported on sandy soils should occur rapidly after loading. The majority of expected settlement should occur during construction as dead loads are imposed. Total settlements of footings are estimated to be less than 1 inch. Total settlements of these magnitudes are usually considered tolerable for the anticipated construction; however, the tolerance of the proposed structures to the predicted total settlements should be confirmed by the structural engineer.

### **Warranty and Limitations of Study**

Our professional services have been performed, our findings obtained, and our recommendations prepared in accordance with generally accepted geotechnical engineering principles and practices. This warranty is in lieu of all other warranties, either expressed or implied. Magnum Engineering, Inc. is not responsible for the independent conclusions, opinions or recommendations made by others based on the field exploration and laboratory test data presented in this report.

We wish to point out that a geotechnical study is inherently limited in that the engineering recommendations are developed from information obtained from test borings that only depict subsurface conditions at the specific locations, times and depth shown on the logs. Soil conditions at other locations may differ from those encountered in the test borings, and the passage of time may cause the soils conditions to change from those described in this report.

The nature and extent of variation and change in the subsurface conditions at the site may not become evident until the course of construction. Construction monitoring by the geotechnical engineer or his representative is therefore considered necessary to verify the subsurface conditions and to check that the soils connected construction phases are properly carried out. If significant variations or changes are in evidence, it may be necessary to reevaluate the recommendations in this report.

**Buckhorn Creek Bridge Replacement – Geotechnical Services**

**Preble-Rish, Inc**

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Furthermore, if the project characteristics are altered significantly from those discussed in this report, if the project information contained in this report is incorrect or if additional information becomes available, a review must be made by this office to determine if any modifications in the recommendations will be necessary.

We hope that this letter provides sufficient information for the present time. If there are any questions, please feel free to contact us at your convenience.

Sincerely,

**MAGNUM ENGINEERING, INC.**



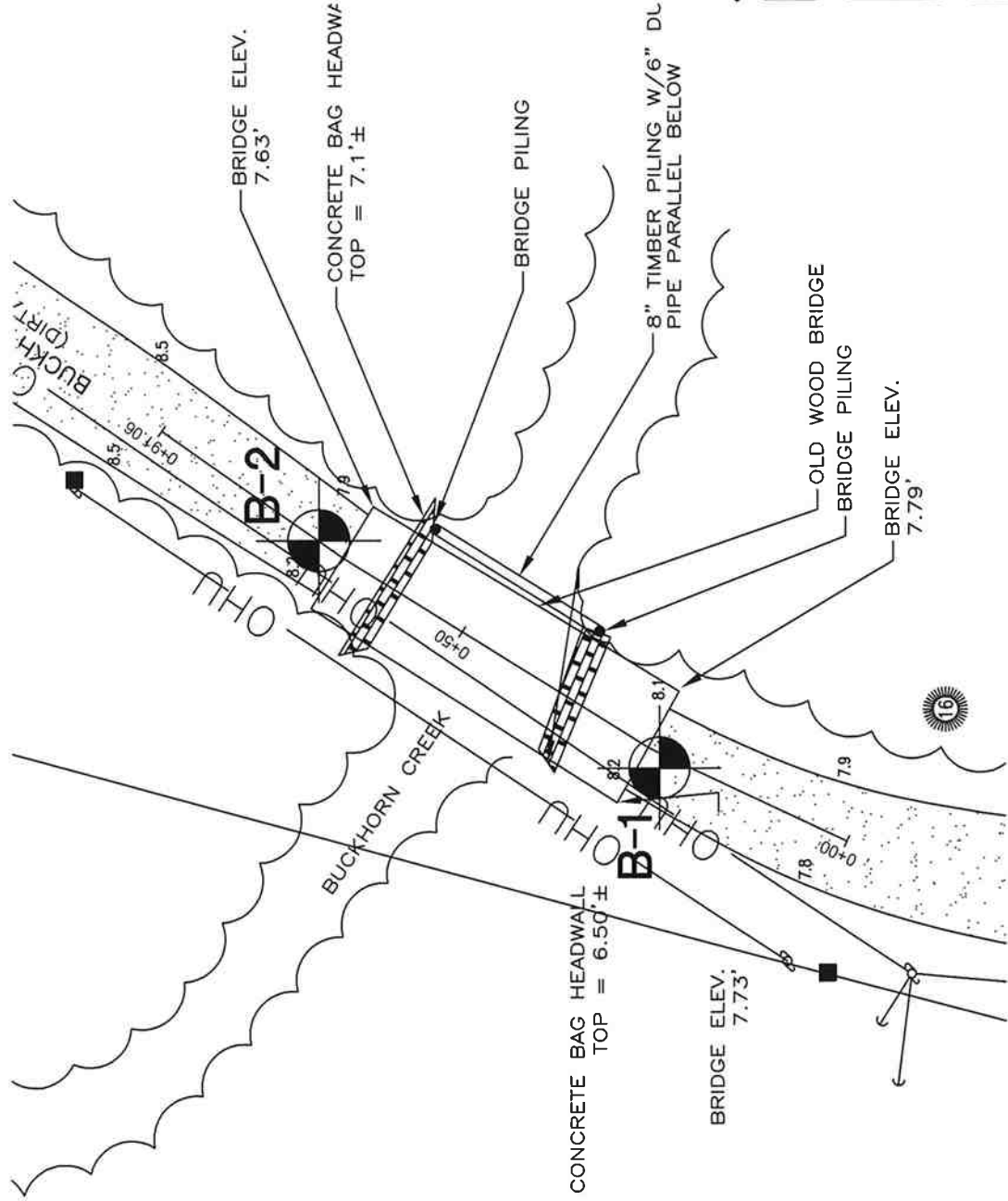
JAMES T. VICKERS, P.E.

Principal Engineering Consultant/ Sr. Geotechnical Engineer

Florida Reg. #56813

6/25/09

Attachments: Figure 1 – Boring Location Plan  
Figure 2 – Log of Borings



MAGNUM ENGINEERING INC  
Civil, Mechanical, Electrical, Structural, and Environmental Engineers

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Project Name and Address:  
Buckhorn Creek Bridge  
2033 Aberdeen Parkway  
Panama City, Florida 32405

Project #	Sheet
A108-100-008	FIG-1
Date	Drawn
June 24, 2009	
Scale	
NOT TO SCALE	



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## **LOGS OF BORING**

**FIGURE # 2**



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**BORING NUMBER B-1 (South)**

CLIENT Preble-Rish, Inc. PROJECT NAME Buckhorn Creek Bridge  
 PROJECT NUMBER M109-100-068 PROJECT LOCATION Wakulla County, Florida  
 DATE STARTED 5/28/09 COMPLETED 5/28/09 GROUND ELEVATION \_\_\_\_\_ HOLE SIZE \_\_\_\_\_  
 DRILLING CONTRACTOR Fontaine Drilling Inc GROUND WATER LEVELS:  
 DRILLING METHOD Standard Penetration Test (SPT)  DEPTH TO GROUNDWATER AT TIME OF DRILLING 8.0 ft  
 LOGGED BY C.Wilson CHECKED BY J.Vickers ESTIMATED SEASONAL HIGH GWT ---  
 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			FINES CONTENT (%)
									LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
0		Orange/ tan loose silty fine SAND (SM)	SS 1		5-5-5 (10)							
		Gray/ tan loose fine SAND (SP)	SS 2		5-4-4 (8)							
5		Gray loose fine SAND (SP)	SS 3		4-4-4 (8)							
		Gray/ orange/ tan loose fine SAND with trace of clayey SAND (SP-SC)	SS 4		4-3-2 (5)							
10		Orange/ tan very loose silty SAND with trace of clay fines (SC-SM)	SS 5		2-2-2 (4)							
15		Tan/ gray medium dense weathered limerock partially cemented (LIMEROCK)	SS 6		4-8-6 (14)							
20		Tan/ gray very soft silty CLAY with trace of limerock partially cemented (ML)	SS 7		3-0-0 (0)							
25		Tan/ light gray loose weathered limerock partially cemented (LIMEROCK)	SS 8		12-4-4 (8)							
30		Tan/ light gray loose weathered limerock partially cemented (LIMEROCK)	SS 9		4-1-7 (8)							
35		Tan/ light gray medium dense weathered limerock partially cemented (LIMEROCK)	SS 10		6-7-9 (16)							
		Boring Termination Depth at 35.0 feet.										

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**BORING NUMBER B-2 (North)**

CLIENT Preble-Rish, Inc. PROJECT NAME Buckhorn Creek Bridge  
 PROJECT NUMBER M109-100-068 PROJECT LOCATION Wakulla County, Florida  
 DATE STARTED 5/28/09 COMPLETED 5/28/09 GROUND ELEVATION \_\_\_\_\_ HOLE SIZE \_\_\_\_\_  
 DRILLING CONTRACTOR Fontaine Drilling Inc GROUND WATER LEVELS:  
 DRILLING METHOD Standard Penetration Test (SPT) ∇ DEPTH TO GROUNDWATER AT TIME OF DRILLING 8.5 ft  
 LOGGED BY C.Wilson CHECKED BY J.Vickers ESTIMATED SEASONAL HIGH GWT ---  
 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			FINES CONTENT (%)
									LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
0		Tan/ orange/ gray medium dense silty fine SAND (SM)	SS 1		6-6-9 (15)							
		Gray/ tan medium dense silty fine SAND with trace of weathered limerock (SM)	SS 2		8-8-6 (14)							
5		Gray/ tan loose fine SAND (SP)	SS 3		6-3-3 (6)							
		Gray/ dark gray loose silty fine SAND (SM)	SS 4		3-3-3 (6)							
10		Gray/ dark gray very loose slighty silty fine SAND with trace of organics (SP-SM)	SS 5		2-2-2 (4)							
15		Gray/ tan loose weathered limerock partially cemented (LIMEROCK)	SS 6		3-4-4 (8)							
20		Tan/ gray very soft silty CLAY with trace of limerock partially cemented (ML)	SS 7		3-0-0 (0)							
		Tan/ light gray medium dense weathered limerock partially cemented (LIMEROCK)	SS 8		12-8-6 (14)							
		Boring Termination Depth at 21.5 feet.										

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