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REPORT OF SUBSURFACE
EXPLORATION AND
GEOTECHNICAL EVALUATION
PROPOSED CAUSEWAY
RESTAURANT
BALDWIN COUNTY, ALABAMA
SES PROJECT NO: 98-064

Southern Earth Sciences, Inc.
strives to fully satisfy our clients
by providing quality service in the fields of
Environmental Science,
Geotechnical Engineering,
Construction Materials Testing,
Underground Storage Tanks,
Environmental Site Assessments,
Asbestos Surveys,
Drilling,
Geology and
Groundwater Hydrology.

Southern Earth Sciences, Inc.
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February 27, 1998

BUDDY RICHMOND, ARCHITECT
332 Fairhope Avenue
Fairhope, AL 36532

ATTENTION: Mr. Buddy Richmond

SUBJECT: Report of Subsurface Exploration and Engineering Evaluation
Proposed Causeway Restaurant
Baldwin County, Alabama
SES Project No: 98-064

Dear Mr. Richmond:

Southern Earth Sciences, Inc. has completed the subsurface exploration and engineering evaluation for the referenced project. Authorization to proceed was given us by you and Mr. Harry Johnson. This report describes our field testing techniques, includes data obtained during the investigation and presents our soil-related recommendations with regard to subsurface conditions and site preparation for support of the proposed structure.

PROJECT INFORMATION

Based upon information provided, we understand the proposed project consists of design and construction of a single-story, wood-frame structure to be used as a restaurant. We also understand the restaurant will be elevated on piles or columns. No additional detailed structural loading or site grading information was available at the writing of this report.

NOTE: If for any reason, the structural information described above does not conform with your understanding of project Plans and Specifications, SES should be contacted for additional geotechnical analysis; revisions to site preparation and/or foundation design recommendations may be required.

FIELD INVESTIGATIVE PROCEDURES

Soil Test Borings: Southern Earth Sciences, Inc. drilled one (1) soil test boring at the project site. The soil test boring was made at the site at location designated by you as shown on the attached Test Location Plan. The boring location was established in the field by our drill crew using a 100 foot tape and reference from existing landmarks. The soil boring was drilled to a depth of 51.5 feet below ground surface. Soil sampling and penetration testing were performed in accordance with ASTM Specification D 1586-84 (1992).

The soil boring was advanced by rotary wash drilling techniques with a truck-mounted BK-66 drill rig. At regular intervals, the drilling rods were removed and soil samples were obtained with a standard 1.4 inch I.D., 2 inch O.D. split tube sampler. The sampler was first seated 6 inches, to penetrate any loose cuttings; then driven an additional foot with blows of a 140 pound hammer falling 30 inches. The number of hammer blows, required to drive the sampler the final foot, was recorded and is designated the "penetration resistance". The penetration resistance, when properly evaluated, is an index to the soil strength, density and ability to support foundations.

Representative portions of each soil sample obtained during the investigation were placed in plastic bags and transported to our laboratory. In the laboratory, the samples were examined, by an engineer, to verify the driller's field classifications. A Log of Boring sheet is attached, graphically showing the soil descriptions, boring depths and penetration resistances.

SITE AND SOIL CONDITIONS

Soils encountered at the subject site by our test boring may be categorized, for discussion purposes, into three (3) general strata. Beneath the surficial veneer of reddish and tan clayey sand fill material is stratum one which extends to a depth of about 18 feet. This stratum consists mostly of soft gray silty clays having a standard penetration resistance value of 2 blows per foot.

Stratum two extends below stratum one to a depth of about 43 feet. This stratum consists predominately of very loose to loose gray silty clayey sands with organics and soft to stiff black silty clays with organics. Standard penetration resistance values varied from 3 to 12 blows per foot.

Stratum three extends below stratum two to the termination of the soil test boring. This stratum consists mainly of dense gray sands having a standard penetration resistance value between 37 and 38 blows per foot.

A detailed description of materials encountered at each boring location is presented on the Log of Boring sheets in the Appendix of this report.

At the time of our investigation, the ground water level was measured to be about 2' 6" below ground surface. Ground water levels will fluctuate with changes in rainfall and other seasonal conditions and should be verified prior to construction.

FOUNDATION RECOMMENDATIONS

Our evaluation of foundation conditions has been based on structural information described earlier in this report and subsurface data obtained during the investigation. In evaluating the soil test boring, we have used empirical correlations previously made between standard penetration resistances and foundation stabilities observed in soil conditions similar to those encountered at the subject site.

In general, the soils encountered in the upper reaches of the subject site are rather poor and non-uniform bearing materials for support of the proposed structure on shallow foundations. These soils are susceptible to local shear failure and long term consolidation type settlements when stressed by foundation and/or fill loadings. If stresses imposed by the weight of fill and structures exceed the shearing resistance of the foundation soils, failure could result. These stability failures can occur rapidly (within minutes) or over a long period of time (months) depending on the type of failure involved.

Technically, several alternatives are available to minimize the risk of foundation failure due to weak foundation soils. However, due to economic and operational considerations, we judge that a pile supported foundation system offers the best foundation alternative for this project. A pile foundation offers the principal advantages of relatively little required excavation and positive foundation support. Piles would transfer foundation loads to more competent bearing materials which exist below the poor soils at the site. In evaluating pile foundations for this project, we have only considered tapered timber and steel H-section piles.

Our analysis of tensile and compressive pile capacities was based on empirical data gathered from model studies and interpreted in accordance with accepted geotechnical engineering procedures. Generally, using our analytical approach to pile capacity computations, the ultimate pile capacity at a given penetration depth is determined as the sum of pile shaft (skin friction) load and pile end bearing (point) load. Tables 1 through 4 in the Appendix summarize results of our computations for both compressive and tensile pile capacities. These capacities represent the allowable capacity based on soil-pile interaction and do not consider the structural pile capacity. If you desire additional capacities on other pile sizes or types, please feel free to contact us.

We recommend a tentative driving resistance be computed prior to production pile placement using a dynamic pile driving formula. We consider the Hiley Formula to be well suited since it attempts to account for hammer energy losses which occur during driving. In computing the required resistance, we recommend using an ultimate capacity of at least two times the design capacity in the dynamic formula.

Prior to production pile installation, we recommend a test pile program which includes placing and load testing at least one pile. The test pile section, equipment and installation procedures should be the same as those planned for use in the foundation.

The test section should be installed in accordance with installation procedures describe above, then load tested. The compressive load test procedures should be as described in ASTM Specification D 1143. Load test results would be used to verify the placement procedures and the pile section produces the desired design capacity. Adjustments to the installation procedures may be made, based on the load test results.

GENERAL COMMENTS

The soil samples obtained during the subsurface investigation will be retained for a period of thirty days. If no instructions are received, they will be disposed of at that time.

This report has been prepared in order to aid in the evaluation of this project and to assist the architects and engineers in the structural design. It is intended for use with regard to the specific project discussed herein and any substantial changes in the project, loads, locations, or assumed grades should be brought to our attention so that we may determine how such changes may affect our conclusions and recommendations. We would appreciate the opportunity to review the plans and specifications for construction to ensure that our conclusions and recommendations are interpreted correctly.

Professional judgments on design alternatives and criteria are presented in this report. These are based partly on our evaluations of technical information gathered, partly on our understanding of the characteristics of the project being planned, and partly on our general experience with subsurface conditions in the area. We do not guarantee performance of the project in any respect, only that our engineering work and judgments rendered meet the standard of care of our profession.

While the borings are representative of subsurface conditions at their respective locations and for their respective vertical reaches, local variations characteristic of the subsurface materials of the region are anticipated and may be encountered. The boring logs and related information are based on the driller's logs and visual examination of selected samples in the laboratory. The delineation between soil types shown on the logs is approximate and the description represents our interpretation of subsurface conditions at the designated boring locations and on the particular date drilled.

Southern Earth Sciences, Inc. appreciates this opportunity to be of service. If you have any questions concerning this report, please call.

Very truly yours,

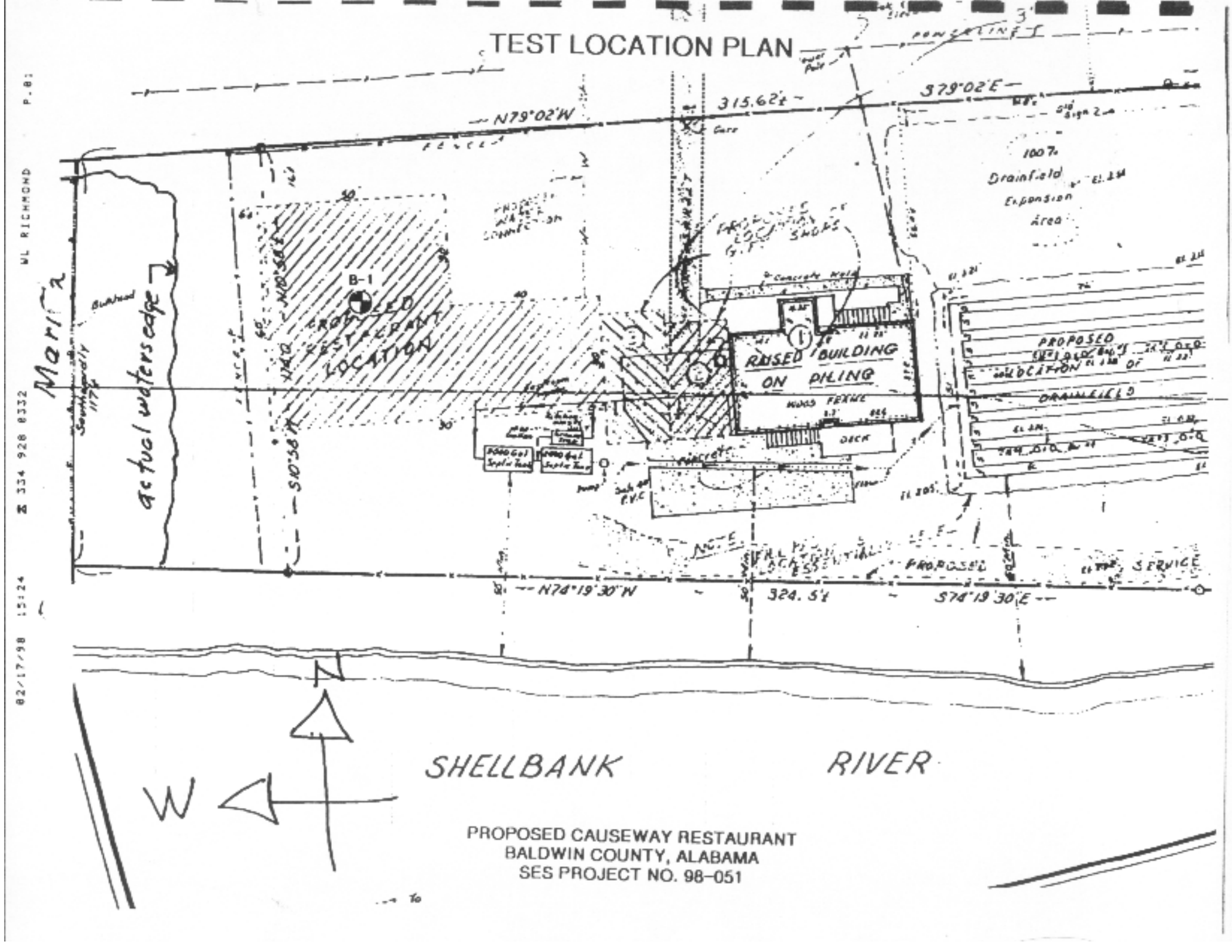
SOUTHERN EARTH SCIENCES, INC.

Scott H. Slaughter, P.E.
Project Engineer
Registered, Alabama 21631

William H. Brenner, P.G.
Registered, Alabama 227

SHS/WHB/bb

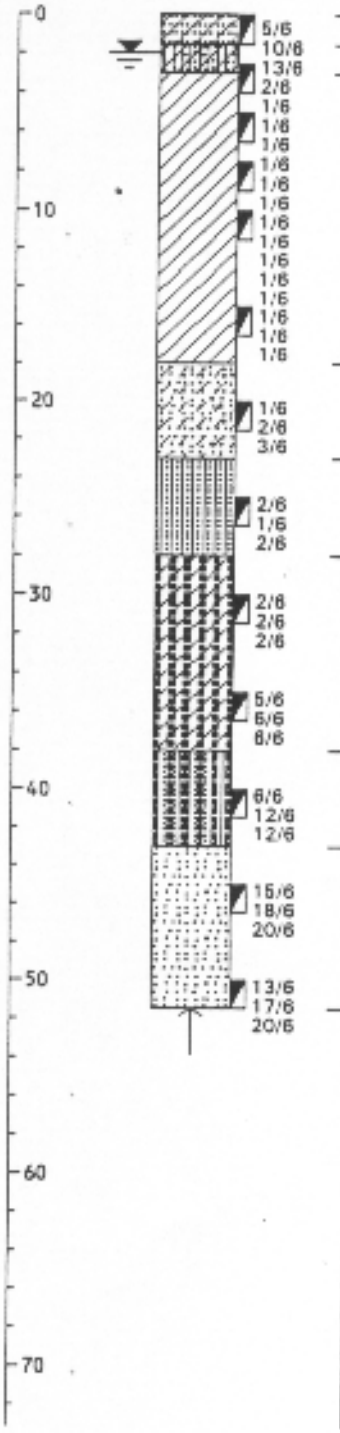
attachments


TEST LOCATION PLAN
N79°02'W
315.62'±
S79°02'E
100% Drainfield Expansion Area
B-1
PROPOSED TEST LOCATION
RAISED BUILDING ON PILING
DECK
PROPOSED DRAINFIELD
PROPOSED SERVICE
N74°19'30"W
324.5'±
S74°19'30"E
actual wateredge
SHELLBANK RIVER
W
PROPOSED CAUSEWAY RESTAURANT
BALDWIN COUNTY, ALABAMA
SES PROJECT NO. 98-051

SOIL BORING LOG

BORING B-1

PROJECT: PROPOSED CAUSEWAY RESTAURANT **JOB No:** 98-064
PROJECT LOCATION: BALDWIN COUNTY, ALABAMA
BORING NUMBER: B-1 **BORING ELEVATION:** UNKNOWN (EXISTING GROUND)
BORING LOCATION: SEE TEST LOCATION PLAN
DATE DRILLED: 2/18/98 **METHOD:** ROTARY WASH
WATER LEVEL WAS: 2'6" **ON:** 2/18/98



ELEVATION/ DEPTH	USCS	DESCRIPTION	SPT N	NM %	LL %	200 %
	SC	Very Firm Reddish and Tan Clayey SAND (fill)	23			
	SM-SC	Very Loose Gray and Tan Silty Clayey SAND	2			
	CL	Soft Gray Silty CLAY	2			
			2			
			2			
	SP-SC	Loose Gray Silty Clayey SAND	5			
	SM	Very Loose Gray Silty SAND	3			
	CL	Soft to Stiff Black Silty CLAY with Organics	4			
			12			
	SM	Very Firm Gray Silty SAND with Organics	24			
	SP	Dense Gray SAND	38			
			37			

TABLE I

PENETRATION DEPTH VS ALLOWABLE COMPRESSIVE CAPACITY
PROPOSED CAUSEWAY RESTAURANT
BALDWIN COUNTY, ALABAMA
SES PROJECT NO: 98-064

ALLOWABLE COMPRESSIVE CAPACITY (TONS)
TAPERED TIMBER PILE SECTION
F.S.= 2.0

PENETRATION (FEET)	PILE TIP DIAMETER (INCHES) 6	8	10	12
45	9.3	13.9	19.4	25.8
47	10.4	15.3	21.3	28.2

NOTE: PILE CAPACITIES ARE BASED ON SOIL-PILE INTERACTION AND DO NOT CONSIDER THE STRUCTURAL ASPECTS OF THE PILE

NOTE: PILE LENGTHS AND PENETRATION DEPTHS ARE MEASURED FROM EXISTING GROUND SURFACE ELEVATION. PILE LENGTHS SHOULD BE ADJUSTED SO AS TO MAINTAIN PROPER "TIP ELEVATION" AS PILE BUTT ELEVATIONS ARE ADJUSTED.

TABLE 2

PENETRATION DEPTH VS ALLOWABLE TENSILE CAPACITY
PROPOSED CAUSEWAY RESTAURANT
BALDWIN COUNTY, ALABAMA
SES PROJECT NO: 98-064

ALLOWABLE TENSILE CAPACITY (TONS)
TAPERED TIMBER PILE SECTION
F.S.= 2.0

PENETRATION (FEET)	PILE TIP DIAMETER (INCHES) 6	8	10	12
45	4.4	5.5	6.6	7.6
47	5.0	6.2	7.4	8.6

NOTE: PILE CAPACITIES ARE BASED ON SOIL-PILE INTERACTION AND DO NOT CONSIDER THE STRUCTURAL ASPECTS OF THE PILE

NOTE: PILE LENGTHS AND PENETRATION DEPTHS ARE MEASURED FROM EXISTING GROUND SURFACE ELEVATION. PILE LENGTHS SHOULD BE ADJUSTED SO AS TO MAINTAIN PROPER "TIP ELEVATION" AS PILE BUTT ELEVATIONS ARE ADJUSTED.

TABLE 3

PENETRATION DEPTH VS ALLOWABLE COMPRESSIVE CAPACITY
PROPOSED CAUSEWAY RESTAURANT
BALDWIN COUNTY, ALABAMA
SES PROJECT NO: 98-064

ALLOWABLE COMPRESSIVE CAPACITY (TONS)
STEEL H-SECTION PILE
F.S.= 2.0

PENETRATION (FEET)	PILE SIZE (INCHES)	
	HP 10X42	HP 12X53
45	11.9	9.8
47	13.6	11.2

NOTE: PILE CAPACITIES ARE BASED ON SOIL-PILE INTERACTION AND DO NOT CONSIDER THE STRUCTURAL ASPECTS OF THE PILE

NOTE: PILE LENGTHS AND PENETRATION DEPTHS ARE MEASURED FROM EXISTING GROUND SURFACE ELEVATION. PILE LENGTHS SHOULD BE ADJUSTED SO AS TO MAINTAIN PROPER "TIP ELEVATION" AS PILE BUTT ELEVATIONS ARE ADJUSTED.

TABLE 4

PENETRATION DEPTH VS ALLOWABLE TENSILE CAPACITY
CAUSEWAY RESTAURANT
BALDWIN COUNTY, ALABAMA
SES PROJECT NO: 98-064

ALLOWABLE TENSILE CAPACITY (TONS)
STEEL H-SECTION PILE
F.S.= 2.0

PENETRATION (FEET)	PILE SIZE (INCHES)	
	HP10X42	HP 12X53
45	8.1	6.8
47	9.2	7.7

NOTE: PILE CAPACITIES ARE BASED ON SOIL-PILE INTERACTION AND DO NOT CONSIDER THE STRUCTURAL ASPECTS OF THE PILE

NOTE: PILE LENGTHS AND PENETRATION DEPTHS ARE MEASURED FROM EXISTING GROUND SURFACE ELEVATION. PILE LENGTHS SHOULD BE ADJUSTED SO AS TO MAINTAIN PROPER "TIP ELEVATION" AS PILE BUTT ELEVATIONS ARE ADJUSTED.