SECTION 02300

PERFORMANCE DESIGN, DESIGN-BUILD PILE FOUNDATIONS

PART 1 GENERAL

1.01 RELATED DOCUMENTS:

A. Drawings and general provisions of the contract, including General and Supplementary Conditions and Division I Specification sections apply to work of this section.

B. The drawings and general conditions of the contract including General and Supplementary Conditions and other Division 1 Specification sections apply to work of this section.

C. Examine all other sections of the Specifications for requirements which affect work of this Section whether or not such work is specifically mentioned in this Section.

D. Coordinate work with that of all trades affecting or affected by work of this Section. Cooperate with such trades to assure the steady progress of all work under the Contract.

1.02 DEFINITIONS

A. Design-Build Contractor: Pizzagalli Construction Company

1.03 DESCRIPTION OF WORK

A. PERFORMANCE DESIGN: The complete pile design shall be the responsibility of the Pile Subcontractor. The Pile Subcontractor's Engineer shall be the Engineer of Record for the pile foundations. Submittals prepared by the Pile Subcontractor's Engineer shall be signed and sealed. The Pile Subcontractor's Engineer shall be licensed in the State of Maine at the time of project bidding and for the duration of the project.

B. The work covered by this Section, without limiting the generality thereof, consists of labor, equipment, and material and performing all operations in connection with the furnishing and installing 70 ton (140 kips) minimum net allowable axial capacity piles at the locations and to the lines and grades shown on the drawings. Additional requirements are indicated within this specification.

C. If a pile spacing greater than indicated on the Drawings is required for the Design Build Pile design and/or installation purposes, notify the Design-Build Contractor at time of bidding.

D. Suitable pile types are indicated here within.

1.04 RELATED WORK:

1. Cast-in-Place Concrete: Section 03300

2. Structural Steel: Section 05120

1.05 QUALITY ASSURANCE

A. Codes and Standards: Comply with provisions of the latest edition of the following except where more stringent requirements are shown or specified:

1. IBC: “International Building Code, 2003 edition”, as published by the International Code Council

2. ASTM: Specifications of the American Society for Testing and Materials.

3. AWS: Standard Code for Welding in Building Construction, of the American Welding Society,

4. AISC: Specification of the American Institute of Steel Construction.

5. ACI: Specification of the American Concrete Institute

6. PCI: Precast, Prestressed Concrete Institute

7. “Code of Federal Regulations, Part 1926” per the Occupational Safety and Health Administration (OSHA), Department of Labor (Latest Revision).

B. Comply with all rules, regulations, laws and ordinances of the City of Portland, and of all other authorities having jurisdiction, including State and Federal laws including OSHA. All labor, materials, equipment and services necessary to make work comply with such requirements shall be provided without additional cost to Design-Build Contractor.

C. All welding shall be performed by operators who have been previously qualified by tests as prescribed in the AWS D1.1 “Standard Code for Welding in Building Construction". Evidence that welders meet qualification requirements shall be submitted to the Design-Build Contractor’s Representative (Testing & Inspection Agency) before welding has begun. The Design-Build Contractor’s Representative (Testing & Inspection Agency) may require a weld test for each operator.

D. Field Monitoring and Testing

1. Full-time monitoring of pile driving operations shall be provided by the Design-Build Contractor’s Representative (Geotechnical Consultant and Testing & Inspection Agency). No piles shall be driven except in the presence of the Design-Build Contractor’s Representative (Geotechnical Consultant and Testing & Inspection Agency).

2. Monitoring of welding and weld testing (if applicable) will be performed by the Design-Build Contractor’s Representative (Testing & Inspection Agency). The Pile Installation Subcontractor and Design-Build Contractor shall fully cooperate with the agency to facilitate inspection, notifying it in advance when welding operations are to be performed. Welds which do not conform to applicable specifications shall be repaired as directed by the Design-Build Contractor’s Representative (Geotechnical Consultant and Testing & Inspection Agency).

    a. Visual Inspection: All pile splice welds shall be visually inspected.

    b. Ultrasonic Testing: Ultrasonic testing of welded pile spices shall be performed on the first 5 pile splices, and on of 15 percent of the pile splices throughout the project.

3. Certification of quality of pile materials to be used in the work shall be furnished, in a form acceptable to the Design-Build Contractor’s Representative (Testing & Inspection Agency), at the time of delivery of materials to the site. Pile materials shall also be subject to on-site observation for conformance with specifications.

4. Approvals given by the Design-Build Contractor’s Representative (Geotechnical Consultant and Testing & Inspection Agency) shall not relieve the Pile Subcontractor and Design-Build

Contractor of their responsibility for performing the work in accordance with the Contract Documents.

5. Instrumentation for Pile Installation

    a. Diesel Hammers: Open-type diesel hammers shall be equipped with a gauge for measuring ram height at the top of the stroke. Closed-type diesel hammers shall be equipped with an output energy gauge, calibrated for measurement of the total hammer energy. One spare output gauge shall be maintained at the site.

6. The Design-Build Contractor's Representative (Geotechnical Consultant and Testing & Inspection Agency) shall submit an installation summary. An installation summary given by the Design-Build Contractor's Representative (Geotechnical Consultant and Testing & Inspection Agency) shall not relieve the Pile Subcontractor and Design-Build Contractor of their responsibility for performing the work in accordance with the Contract Documents. Installation summary shall include the following:

    A. Project name and number.
    B. Name of Contractor.
    C. Pile location in pile group and designation of pile group.
    D. Sequence of driving in pile group.
    E. Pile dimensions, plumbness and offset.
    F. Ground elevation.
    G. Elevation of tips after driving.
    H. Final tip and cutoff elevations of piles after driving pile group.
    I. Records of redriving.
    J. Elevation of splices.
    K. Type, make, model, and rated energy of hammer.
    L. Weight and stroke of hammer.
    M. Type of pile-driving cap used.
    N. Cushion material and thickness.
    O. Actual stroke and blow rate of hammer.
    P. Pile-driving start and finish times, and total driving time.
    Q. Time, pile-tip elevation, and reason for interruptions.
    R. Number of blows for each 12 inches of penetration, and number of blows per for set criteria.
    S. Pile deviations from location and plumb.
    T. Weld testing and inspection results.
    U. Unusual occurrences during pile driving.

1.06 SUBMITTALS

A. Unless otherwise specified, submittals required in this section shall be submitted to the Design-Build Contractor for review. The Design Build Contractor will forward the submittals to the Design-Build Contactor's Representative (Geotechnical Consultant). Submittals shall be prepared and submitted in accordance with this section and Division 1.

B. Design-Build Contractor shall submit a Submittal Schedule to the engineer within 30 days after they have received the Notice to Proceed.

C. All submittals shall be reviewed by the Design-Build Contactor's Representative (Geotechnical Consultant) and returned to the Design-Build Contractor within 10 working days following receipt by the Design-Build Contactor's Representative (Geotechnical Consultant).

D. INCOMPLETE SUBMITTALS WILL NOT BE REVIEWED. SUBMITTALS NOT BEARING AN ENGINEERING SEAL AND SIGNATURE WHEN REQUIRED WILL BE REJECTED AND RETURNED WITHOUT REVIEW.

E. Submittals not reviewed by the Design-Build Contractor prior to submission to the Design-Build Contractor's Representative (Geotechnical Consultant) will not be reviewed. Include on the submittal statement or stamp of approval by Design-Build Contractor, representing that the Design-Build Contractor has seen and examined the submittal and that all requirements listed in Division 1 have been complied with.

F. The Design-Build Contractor's Representative (Geotechnical Consultant) will review submittals a maximum of two review cycles as part of their normal services. If submittals are incomplete or otherwise unacceptable and re-submitted, Design-Build Contractor shall compensate Design-Build Contractor's Representative (Geotechnical Consultant) for additional review cycles.

G. PERFORMANCE DESIGN: Performance design shall be prepared by an Engineer registered in the State of Maine, retained by the Pile Subcontractor. The Performance Design submittal shall bear the Engineer's seal and signature. The Pile Subcontractor's Engineer shall be the Engineer of Record for the pile foundations. The Performance Design is subject to the review of the Design-Build Contractor's Representative (Geotechnical Consultant) prior to equipment mobilization.

1. All project piles shall be of uniform section and material

2. Acceptable Pile Materials and Sections:

    a. Steel HP Piles, HP12 or HP14 nominal section, ASTM A992 or A572, Grade 50 Materal.

    b. Square, Solid Core, Precast, Prestressed Concrete Piles, 12 or 14 inches square, minimum 5,000 psi 28-day Concrete Compressive Strength and minimum 700 psi effective prestressing.

    c. ICP High Performance, Pretensioned Spun Concrete Piles, 9.8 or 11.8 inch diameter (proprietary design).

    d. Concrete filled Steel Pipe Piles: Minimum 10" nominal diameter, steel ASTM A252 or ASTM A283, minimum yield stress 36 ksi and concrete minimum 3,000 psi.

    e. Alternate Pile Sections: Pile Sections not indicated are subject to the approval of the Design-Build Contractor's Representative (Geotechnical Consultant).

3. Design Requirements: Unless noted otherwise the piles shall meet the following design requirements:

    a. Minimum net allowable axial pile load: 70 tons (140 kips). Net capacity shall be determined after including the effects of downward frictional forces imposed on pile from subsiding soil strata(s) (down drag).

    b. Minimum factor of safety for ultimate capacity: 2.0 after all reductions including soil down drag, corrosion reduction and as indicated in the IBC Code.

    c. Building Code Requirements: The pile design shall meet the requirements of Chapter 18 of the International Building Code, 2003 Edition, except where more stringent requirements are noted here within and/or on the Documents.

d. Material Stresses: Material Stresses indicated in the Code shall not be increased without the approval of the Design Build Contractor's Representative (Geotechnical Consultant).

e. Splices: Splices shall develop the full engineering and material properties of the spliced sections. Submit evidence of compliance to this requirement.

f. Cut offs and connection to pile cap: The Pile Contractor is responsible for cutting off and disposing of pile waste, and providing sufficient tie-in to pile caps. Connection to pile cap will be determined by the Structural Engineer once a pile design is submitted. Reinforcement from pile may be required to be embedded within the pile cap.

g. Pile Interaction: Pile spacing shall be as shown on Drawings. Pile design shall account for pile-to-pile interaction. Design shall be such that interaction effects shall not reduce the net capacity of the piles. If a pile spacing greater than indicated on the Drawings is required for the Design Build Pile design and/or installation purposes, notify the Design-Build Contractor at time of bidding.

4. Corrosion Allowance:

a. Steel Sections: 1/8 inch Corrosion Allowance

b. Alternate to Corrosion Allowance for Steel Piles: Coating may be permitted as an alternate to a corrosion allowance. When acceptable, coating is required at the fill levels anticipated at the upper strata of the soils. Coating system is subject to the review of the Design-Build Contractor's Representative (Geotechnical Consultant).

c. Concrete Pile Corrosion Protection: Reinforcement for prestressing steel and pile reinforcement shall have a cover of not less than 1 1/2".

d. Splices: Splice made within the upper fill soil strata shall have adequate corrosion protection. Submit proposed corrosion protection for review by the Design-Build Contractor's Representative (Geotechnical Consultant).

5. Determination of Allowable Geotechnical Capacity/Driving Criteria

a. Submit information on proposed pile driving system and procedures for review by the Design-Build Contractor's Representative (Geotechnical Consultant) prior to equipment mobilization. The system should be capable of installing the piles to the specified minimum ultimate geotechnical capacity without exceeding the allowable driving stresses.

b. Proposed 'set' or stop driving criteria determined the Pile Subcontractor using information obtain from the pile load testing.

c. Submit a Wave Equation Analysis which indicates the selected pile hammer can drive the piles to the required minimum ultimate capacity without overstressing or damaging piles. Minimum ultimate pile factor of safety shall be 2.0.

d. Soil Down Drag: Determine soil down drag anticipated from site soil subsidence. Include soil down drag in design when determining net pile capacity. The determination of down drag is the responsibility of the Pile Subcontractor's Engineer. Calculations of down drag shall be included in the signed and sealed submittal.

e. Submit driving tip product information for driving tip to be utilized for pile installation, if applicable.

6. Load Tests: Per the requirements of Chapter 18 of the IBC Code, pile load test(s) shall be a requirement of this work. The proposed load testing procedures shall be included in the pile design submission.

a. Load Testing shall be the responsibility of the Pile Subcontractor.

b. The Design-Build Contractor shall engage a qualified firm with a minimum of 5 years experience in such testing to perform dynamic load testing if utilized.

c. Static Load Tests: Per ASTM D1143; If static load testing methods are employed, at least one pile shall be load tested in each area of uniform soil conditions.

d. Dynamic Load Tests: Per ASTM D4945; If dynamic load testing methods are employed, at a minimum a total of 10 piles shall be tested. A minimum of 5, single piles shall be tested in unique pile groups of 3 or more. All test piles shall be re-struck and tested after 24 hours to verify the effects of soil relaxation.

e. Additional tests and testing requirements may be required by the Building Code Official. The Design-Build Contractor shall with the Pile Subcontractor and the Build Code Official to coordinate load testing.

f. Load Tests shall be continuously documented by the Design-Build Contractor's Representative (Geotechnical Consultant).

H. Shop Drawings

1. Pile location plan: A plan, prepared by the Pile Installation Subcontractor, showing the location and designation of piles by an identification system shall be submitted prior installation. Detailed records for piles shall bear an identification corresponding to that shown on the plan. The pile location plan should indicate which piles are to be designated as test piles.

2. Shop Drawings showing sizes, tip details, and details for splice and shear connections, and other items pertinent to pile design.

3. Information on proposed pile driving system for review by the Design-Build Contractor's Representative (Geotechnical Consultant) prior to equipment mobilization. The system should be capable of installing the piles to the specified minimum ultimate geotechnical capacity without exceeding the allowable driving stresses. Review by the Design-Build Contractor's Representative (Geotechnical Consultant) shall not relieve the Pile Installation Subcontractor and Design-Build Contractor of their responsibility for performing the work in accordance with the Contract Documents.

4. Details of equipment and procedures.

I. Manufacturer's literature, including technical and performance literature for pile driving hammer, cushions, driving tips and other equipment for piles.

J. Mill certificates stating the chemical composition, yield point and ultimate strength of the steel and/or concrete strength data.

K. Qualifications for Welding Work: Qualify welding processes and welding operators in accordance with AWS D1.1 "Standard Qualification Procedure."

1. Provide certification that welders to be employed in work have satisfactorily passed AWS qualification tests.

2. If re-certification of welders is required, retesting will be the Contractor's responsibility.

L. As-Driven Pile Location Data:

1. Submit pile location two days after individual pile or pile cluster is completed.

2. All survey information to locate pile locations, elevations and offsets shall be supplied by the Design-Build Contractor.

3. At the completion of pile driving, submit final as-driven pile location plan with tabulated lengths, certified by a Registered Land Surveyor or Registered Professional Engineer.

M. Pile Installation Summary

1.07 JOB CONDITIONS

A. Site and Subsurface Conditions

1. Subsurface investigation data are available from the Design-Build Contractor in the report "Geotechnical Engineering Services, Proposed Housing, 84Marginal Way, Portland Maine" dated September 7, 2006 prepared by SW Cole Engineering. Prior to submitting a bid, the Pile Installation Subcontractor shall review and understand the information contained in the report. The geotechnical investigation report is made available to the Pile Installation Subcontractor for information on factual data only and shall not be interpreted as a warranty for subsurface conditions whether interpreted from written text, boring logs, or other data.

B. Adjacent properties

1. Pre-driving survey: The Pile Subcontractor shall perform a pre-driving survey on structures adjacent to the project. The pre-driving survey shall include photographs and the installation of crack monitors as appropriate to establish a base line prior to the start of pile driving activities.

2. The Pile Subcontractor shall protect adjacent property, public utilities and structures, and completed work, from damage associated with the pile driving operation. All damage due to any pile driving operations shall be repaired by the Pile Subcontractor at the Subcontractor's own expense.

1.08 PRODUCT DELIVERY, STORAGE AND HANDLING

A. The Contractor shall deliver piles at times and in sequence to assure continuity of pile driving.

B. Piles shall be handled, transported, stacked and protected to prevent damage to piles.

1.09 LINES AND GRADES

A. The Pile Subcontractor shall stake the pile locations and establish all elevations required. A baseline and benchmark located on or close to the site will be provided by the Design-Build Contractor. The Pile Subcontractor shall be responsible for the maintenance and protection of the baseline and benchmark, and all pile location stakes.

B. The Design-Build Contractor shall employ a licensed Registered Land Surveyor familiar with pile installation, who shall verify driven pile. Locations of the centers of as-driven piles shall be shown on a drawing in relation to the design location and submitted to the Design-Build Contractor within two days after the individual pile or pile group is completed. Drawings shall include the following:

1. Base line and north arrow.

2. Each pile identified by a separate number.

3. Elevation of each top of pile prior to cutting, to nearest 0.1 foot.

4. Deviation in inches, to the nearest one-fourth inch, from plan location at cutoff elevation.

C. Within one week after the completion of all pile driving, the Surveyor shall provide to the Design-Build Contractor a plan, certified by said Surveyor or Engineer, showing the as-driven location of all piles. Plan shall be immediately distributed to Structural Engineer.

PART 2 EXECUTION

2.01 SEQUENCE OF OPERATIONS AND EQUIPMENT REQUIREMENTS

A. The Pile Subcontractor shall provide equipment to maintain the schedule as developed by the Design-Build Contractor, and shall mobilize additional equipment, if necessary, to complete the work on schedule.

B. Pile Load Test: As indicated in this specification.

C. When piles are located in an area where excavation is to be made, the piles shall not be driven until the excavation has been completed.

D. The Design-Build Contractor shall coordinate his pile driving operations with other work on the project.

2.02 EQUIPMENT

A. Piles shall be installed with modern equipment as approved by the Design-Build Contractor's Representative (Geotechnical Consultant), per the Performance Design. Approval shall be obtained from the Design-Build Contractor's Representative (Geotechnical Consultant) a minimum of one week prior to commencement of pile driving.

B. The leads of the pile driving rig shall be fixed at two points; the points shall be at least half the length of the leads apart in order to maintain the pile and hammer in axial alignment at the correct plan location during the entire driving operation. The leads shall extend down to the lowest point at which the hammer must operate.

C. Piles may be driven with a single acting, double acting, or differential acting hammer.

D. In the case of diesel hammers, the Pile Installation Subcontractor will be required to provide an apparatus, approved by the Design-Build Contractor's Representative (Geotechnical Consultant), to measure gas pressures inside the hammer for closed hammers or ram bounce height in the case of open hammers.

E. An aluminum micarta cushion block, or other cushion material approved by the Design-Build Contractor's Representative (Geotechnical Consultant), shall be used in the hammer for driving piles. The cushion shall be replaced when, burned or otherwise worn. The introduction of fresh hammer cushion or pile cushion material just prior to final penetration

F. The use of followers will not be permitted unless authorized in writing by the Design-Build Contractor's Representative (Geotechnical Consultant).

2.03 OBSTRUCTIONS AND OUT-OF-TOLERANCE PILES

A. The Pile Installation Subcontractor shall make reference to the test boring and test pit logs and available plans showing the site conditions.

B. Piles abandoned because of obstructions encountered or out of tolerance shall be cut off or pulled out at the discretion of the Design-Build Contractor's Representative (Geotechnical Consultant) and the hole filled with sand.

C. Removal of obstructions by spudding, augering, drilling, etc. is not recommended, however, may be allowed in certain conditions with the approval of the Design-Build Contractor's Representative (Geotechnical Consultant).

2.04 INSTALLATION

A. Driving

1. As part of the preparation for driving, each pile shall be marked at one-foot intervals. In addition, the footage shall be marked and designated at five-foot intervals, starting from the tip of the pile.

2. All Piles shall be driven at the locations and orientations shown on the drawings. Pile location shall be checked during driving and appropriate measures taken, as necessary, to maintain the correct pile position.

3. Each pile shall be driven to the Pile Subcontractor's set criteria to achieve the required capacity of the Performance Design. Pile driving shall be continuous and without interruption for the final 20 feet of penetration. The set criteria shall be as determined in the approved Pile Performance Design. An abrupt increase in driving resistance shall be evaluated by the Pile Subcontractor. All production piles shall be restruck as determined by the dynamic load test report.

4. Immediately after a pile in a pile group is driven, the Contractor shall establish a reference point and its elevation on the pile for the purpose of checking uplift of the pile tip.

5. After all piles within the radius of uplift have been driven, the Pile Subcontractor shall determine the elevation of the reference points on each of the piles in the group. If uplift determined to be unacceptable by the Design-Build Performance Design has occurred, the pile shall be re-driven to its original elevation, and deeper if necessary to the specified final driving resistance. After re-driving each pile, the Pile Subcontractor shall re-establish the

elevation of the reference point. Re-driving shall be repeated as often as necessary until the measured uplift on any pile is within the acceptable limit of the design.

6. The radius of uplift is defined as the maximum distance between piles such that pile driving causes uplift of an amount greater than that indicated in the Design-Build Performance Design, in the affected pile. Survey instruments used to establish the reference elevations shall be carefully checked and adjusted as necessary to insure accurate readings. Uplift measurements shall be submitted to the Design-Build Contractor Representative (Geotechnical Consultant).

B. Splicing

1. A maximum of 2 pile splices shall be allowed for any pile type

2. No splices will be permitted in the upper 10 feet of the embedded portion of the pile.

3. The strength of all splices, in compression, tension, and bending, shall be equal to or greater than the ultimate capacities of the pile section.

4. Piles may be spliced in the leads. The sections of piles to be spliced shall be secured in alignment such that there is no eccentricity between the axes of the two spliced lengths, or angle between them, after the splice has been completed.

5. Welded steel sections shall be spliced by continuous, butt-joint, 45 degree bevel; or vee, complete penetration, arc welding around the entire circumference, to produce joints developing 100 percent of the pile section strength.

   a. Electrodes conforming to ASTM A233, E-70 series, compatible with the pile steel, shall be used.

   b. Welds which do not conform to specifications shall be gouged and repaired as directed by the inspector.

6. Mechanical drive-fit splices shall not be used.

C. Cutting off Piles

1. Pile tops shall be cut off square within one inch of the elevations shown on the drawings. The pile cut-offs shall become the property of the Pile Installation Subcontractor and shall be removed from the site. Strands or reinforcement may be required to be exposed to allow embedment into the pile cap.

2. When piles are driven below the design cut-off grade, due to unexpected penetration, a limited number of build-ups will be permitted in accordance with designs provided by the Pile Installation Subcontractor and reviewed by the Design-Build Contractor's Representative (Geotechnical Consultant). Build up costs shall be the responsibility of the Pile Installation Subcontractor.

2.05 TOLERANCES AND CRITERIA FOR ACCEPTANCE

A. Piles shall be driven as close as practicable to the plan location. Allowable maximum deviations shall be as follows:

1. Lateral deviation from column centerline and centroid of pile or pile group for single piles and groups of two piles: 3 inches.

2. Lateral deviations from column centerline and centroid of pile group for groups of three or more piles: 5 inches.

3. Design cut off elevations: 1 inch.

4. Plumbness of a driven pile measured on the projection above ground: 3 inches in 10 feet.

B. Structural Engineer shall be immediately informed of out-of-tolerance piles. The Structural Engineer will evaluate out-of-tolerance piles and recommend remedial action if required.

C. Pile damage: The Design-Build Contractor's Representative (Geotechnical Consultant) will note if a pile is likely to have been unacceptably damaged based on his knowledge of the subsurface conditions and comparison of the subject piles driving performance with that of other driven piles. In the case of a questionable pile, the pile shall be considered rejected unless the pile can be proven intact by methods approved by the Design-Build Contractor's Representative (Geotechnical Consultant).

D. Piles indicating sudden or peculiar decrease in penetration resistance during driving will be assumed to be broken and will be rejected unless Design-Build Contractor's Representative (Geotechnical Consultant) review of available data indicates that sudden decrease in driving resistance is due to natural, subsurface conditions and continued acceptable driving behavior is observed. In the case of a questionable pile, the pile shall be considered rejected unless the pile can be proven intact by methods approved by the Design-Build Contractor's Representative (Geotechnical Consultant).

E. Except in the case of obstructions, piles that are rejected because of damage, mis-location or misalignment, or failure to meet the driving criteria, shall be cut off below the limits of the structure and abandoned, and additional piles shall be driven as directed by the Design-Build Contractor's Representative or the Structural Engineer. New piles required due to piles driven out-of-tolerance shall be provided at the Pile Installation Subcontractor's expense.

F. When otherwise acceptable, the Design-Build Contractor shall provide an accurate survey to the Structural Engineer of installed piles exceeding the specified tolerances as specified. The maximum compressive load on any pile due to mis-location shall not exceed 110 percent of the minimum net allowable axial capacity. If the load on any pile exceeds 110 percent of the minimum net allowable axial capacity, corrections shall be made in accordance with a design provided by the Structural Engineer.

G. The installation of replacement piles and other corrective measures shall in all cases be in accordance with designs provided by the Structural Engineer.

PART 3 MEASUREMENT AND PAYMENT

3.01 MEASUREMENT

A. Piles will be measured for payment on the basis of length along the axis of the pile in place below the design cutoff elevation.

3.02 BASIS OF PAYMENT

A. Work included under this contract shall include installation of the piles. The amount of such work shall include, but not by way of limitation, location of, design, furnishing and driving the piles, load testing, splicing, pile tips, and all work incidental thereto, and mobilization and demobilization which

shall include job set-up, moving, equipment including pile driving rigs on and off the project, establishing and dismantling the Pile Installation Subcontractor's field administration forces and equipment, and all other work incidental thereto.

B. The footage of foundation piles for payment shall be the sum of the lengths of the piles below design cutoff grade actually driven and accepted.

C. Piles rejected in accordance with the provisions of these Specifications and which result in the judgment of the Design-Build Contractor's Representative (Geotechnical Consultant and Testing & Inspection Agency) or Structural Engineer, from the Pile Installation Subcontractor's violation of the Specifications or his other error, will not be paid for. If one or more replacement piles are required by the Design-Build Contractor's Representative (Geotechnical Consultant and Testing Agency) or Structural Engineer to compensate for a rejected pile, the Pile Installation Subcontractor will be paid at the Contract unit price per foot for only the longer of the replacement piles and not for the rejected pile. Additional piles required to compensate for production piles or replacement piles driven out of design location or tolerance due to Pile Installation Subcontractor error will be installed at no additional cost to the Design-Build Contractor.

D. Piles rejected, in the judgment of the Design-Build Contractor's Representative (Geotechnical Consultant) due to causes other than the Pile Installation Subcontractor's violation of the Specifications or his other error, will be measured and included in the aggregate footage of piles for payment.

E. Whenever, in the judgment of the Design-Build Contractor's Representative (Geotechnical Consultant) and/or Structural Engineer, misalignment or rejection of a pile or piles caused by the Pile Installation Subcontractor's violation of the specifications or his other error necessitates structural redesign of the pile cap, and the redesigned pile cap requires greater quantities of concrete and reinforcing steel, the quantities required shall be compared with quantities required for the pile cap for the design pile group configuration, and the additional cost for pile cap concrete, reinforcing steel and form work shall be deducted from the contract price, in addition to redesign cost. Whenever, in the judgment of the Design Build Contractor's Representative (Geotechnical Consultant) and/or Structural Engineer, misalignment or rejection of a pile or piles caused by the Pile Installation Subcontractor's violation of the specifications or his other error necessitates structural redesign, the cost of such redesign shall be deducted from sums otherwise due to the Pile Installation Subcontractor under the contract.

F. No payment will be made for pile cut-offs, splices and pile buildups.

END OF SECTION