PART 4

PERMITS

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
Division of Water Resource Management
2600 Blair Stone Road - Mail Station 3522
Tallahassee, Florida 32399-2400
(850) 245-8336

PERMIT NUMBER: MO-45 AR (Corrected)

PERMITTEE

City of Key West
c/o Michael R. Barnett, P.E.
Tetra Tech, Inc.
61 St. Joseph Street, Suite 550
Mobile, AL 36602

NOTICE TO PROCEED AND CORRECTED PERMIT FOR CONSTRUCTION OR OTHER ACTIVITIES PURSUANT TO SECTION 161.052, FLORIDA STATUTES

FINDINGS OF FACT: An application for authorization to conduct the activities seaward of the 50-foot setback line was approved by the Department of Environmental Protection on May 8, 2017. Subsequent to issuance of the permit, the Department staff identified certain items within the permit which needed corrections.

CONCLUSIONS OF LAW: After considering the merits of the proposal and any written objections from affected persons, the Department finds that upon compliance with the permit conditions, the activities indicated in the project description of this corrected permit are of such a nature that they will result in no significant adverse impacts to the beach/dune areas or to adjacent properties; that the work is not expected to adversely impact nesting sea turtles, their hatchlings, or their habitat; that the work is expendable in nature and/or is appropriately designed in accordance with Chapter 62B-33, Florida Administrative Code (F.A.C.). Based on the foregoing considerations, the Department approves the application; authorizes construction and/or activities at the location indicated below in strict accordance with the project description, the approved plans (if any) and the General Permit Conditions which are attached and are by this reference incorporated herein, and any additional conditions shown below, pursuant to Section 161.052, Florida Statutes, and Rule 62B-33, (F.A.C.).

EXPIRATION DATE: May 8, 2020

LOCATION: Between approximately 283 feet north and 377 feet south of the DEP's referenced monument MOV-413, in Monroe's County. Project address: Atlantic Boulevard, Key West.

PROJECT DESCRIPTION:

Cantilevered Steel Sheetpile Bulkhead

1. Perpendicular location relative to 50-foot setback line: Varies from 14.0 feet to 38 ~~17~~ feet seaward at the north and south ends, respectively.

2. Length of the bulkhead: Approximately 695 ~~650~~ feet.

3. Top of cap elevation: +3.0 feet (NAVD).

4. Bottom elevation of bulkhead: -10.0 feet (NAVD) (minimum).

5. Length of return wall: 35 feet on the north end.

6. Length of return wall: 10 feet on the south end.

Excavation/Fill

1. Volume of excavation relative to 50-foot setback line: Approximately 66 cubic yards.

    1.1. Volume of non-sandy material: Approximately 12 cubic yards.

    1.2. Volume of sandy beach material: Approximately 54 cubic yards.

2. Location of excavation: At the location of bulkhead.

3. Volume of fill to be placed: Approximately 54 cubic yards.

4. Location of fill to be placed: As backfill landward of the bulkhead.

Other Activities

1. Demolition to include but not limited to the removal of existing sidewalk sections.

2. Construction of new sidewalk sections landward of the bulkhead near the south end.

3. Plantings of native species in the areas landward of the bulkhead.

SPECIAL PERMIT CONDITIONS:

1. Prior to commencement of construction activity authorized by this permit, a preconstruction conference shall be held at the site among the contractor, the owner or authorized agent, and a staff representative of the Department to establish an understanding among the parties as to the items specified in the special and general conditions of the permit. The proposed locations of the structures shall be staked out for the conference. **Contact Jennifer Cowart at (941) 492-0701 to schedule a conference.**

2. All sand material excavated for installation of the bulkhead shall be placed in the immediate vicinity of the bulkhead seaward of the coastal construction control line. All sand material excavated for installation of the bulkhead from the seaward side of the wall shall be placed back on the seaward side of the bulkhead and not used a s backfill material.

3. All backfill material shall be obtained from a source landward of the 50-foot setback line and shall consist of sand which is similar to that already on the site in both grain size and coloration. This fill material shall be free of construction debris, rocks, or other foreign matter. A sample of the sand shall be provided to the staff representative of the Department during the preconstruction conference.

4. All rubble, debris, and damaged or broken concrete on the site resulting from this construction shall be removed and relocated landward of the 50-foot setback line.

5. If work occurs during April 15 through August 30th, any sea turtle nests deposited within the project area shall be left in place and marked for avoidance. All nests shall be marked with a series of stakes with highly-visible survey ribbon or string to establish a 10-foot diameter around the nest. The permittee is responsible for ensuring that all nesting survey and protection work is conducted by persons authorized to conduct such activities through a valid permit issued by the FWC. Mr. Ralph Capone, the FWC-authorized Marine Turtle Permit Holder for Rest Beach, can be contacted at 305-517-6164 or denise1213122@gmail.com. Contact FWC's Marine Turtle Management Program in Tequesta at MTP@myfwc.com for any questions or issues related to the marine turtle permit holder in this area.

6. No activity shall occur within the marked area; nor shall any activity occur within a 10-foot buffer adjacent to the marked area that could result in direct or indirect impacts to the nest (such as driving heavy equipment or driving sheet pile or pilings, etc.). Nest sites shall be inspected daily by the Marine Turtle Permit Holder to ensure nest markers remain in place and that the nest has not been disturbed by the project activity. If the 10-foot diameter and 10-foot buffer area around the nest cannot be avoided during construction, the FWC shall be notified immediately at (850-922-4330) and MarineTurtle@myfwc.com.

7. Staging areas for construction equipment or materials shall be located off the beach. No nighttime storage of equipment on the beach is allowed. All activity on the beach shall cease prior to sunset each day, including but not limited to: removing equipment from the beach, debris removal, and smoothing disturbances in the sand (such as ruts, depressions, tracks, holes, or mounds using hand tools).

8. Any impacts to a nest or marine turtles that inadvertently occur during project work shall be immediately reported to FWC's Imperiled Species Management Section and all work shall stop unless otherwise authorized by the Department and FWC. No temporary lighting of the construction area is authorized at any time during the marine turtle nesting season. No additional exterior lighting is authorized.

9. Permittee shall submit compliance reports as specified in Special and General Permit Conditions of this permit. General Permit Conditions 1(q), and 1(s) pertain to written reports which must be submitted to the Department of Environmental Protection at specified times. The forms for the reports: 1(q) Periodic Progress Report (DEP Form 73-111), and 1(s) Final Certification (DEP Form 73-115B) are available by clicking on the following link http://www.dep.state.fl.us/beaches/forms.htm#CCCL. Each form may be submitted electronically. The periodic reports are due in the office on a monthly basis. No progress reports are required until such time as construction activities have started.

GENERAL PERMIT CONDITIONS

(1) The following general permit conditions shall apply, unless waived by the Department or modified by the permit:

(a) The permittee shall carry out the construction or activity for which the permit was granted in accordance with the plans and specifications that were approved by the Department as part of the permit. Deviations therefrom, without written approval from the Department, shall be grounds for suspension of the work and revocation of the permit pursuant to Section 120.60(7), F.S., and shall result in assessment of civil fines or issuance of an order to alter or remove the unauthorized work, or both. No other construction or activities shall be conducted. No modifications to project size, location, or structural design are authorized without prior written approval from the Department. A copy of the notice to proceed shall be conspicuously displayed at the project site. Approved plans shall be made available for inspection by a Department representative.

(b) The permittee shall conduct the construction or activity authorized under the permit using extreme care

to prevent any adverse impacts to the beach and dune system, marine turtles, their nests and habitat, or adjacent property and structures.

(c) The permittee shall allow any duly identified and authorized member of the Department to enter upon the premises associated with the project authorized by the permit for the purpose of ascertaining compliance with the terms of the permit and with the rules of the Department until all construction or activities authorized or required in the permit have been completed and all project performance reports, certifications, or other documents are received by the Department and determined to be consistent with the permit and approved plans.

(d) The permittee shall hold and save the State of Florida, the Department, and its officers and employees harmless from any damage, no matter how occasioned and no matter what the amount, to persons or property that might result from the construction or activity authorized under the permit and from any and all claims and judgments resulting from such damage.

(e) The permittee shall allow the Department to use all records, notes, monitoring data, and other information relating to construction or any activity under the permit, which are submitted, for any purpose necessary except where such use is otherwise specifically forbidden by law.

(f) Construction traffic shall not occur and building materials shall not be stored on vegetated areas seaward of the control line unless specifically authorized by the permit. If the Department determines that this requirement is not being met, positive control measures, such as temporary fencing, designated access roads, adjustment of construction sequence, or other requirements, shall be provided by the permittee at the direction of the Department. Temporary construction fencing shall not be sited within marine turtle nesting habitats.

(g) The permittee shall not disturb existing beach and dune topography and vegetation except as expressly authorized in the permit. Before the project is considered complete, any disturbed topography or vegetation shall be restored as prescribed in the permit with suitable fill material or revegetated with appropriate beach and dune vegetation.

(h) All fill material placed seaward of the control line shall be sand which is similar to that already existing on the site in both coloration and grain size. All such fill material shall be free of construction debris, rocks, clay, or other foreign matter; shall be obtained from a source landward of the coastal construction control line; and shall be free of coarse gravel or cobbles.

(i) If surplus sand fill results from any approved excavation seaward of the control line, such material shall be distributed seaward of the control line on the site, as directed by the Department, unless otherwise specifically authorized by the permit.

(j) Any native salt-tolerant vegetation destroyed during construction shall be replaced with plants of the same species or, by authorization of the Department, with other native salt-tolerant vegetation suitable for beach and dune stabilization. Unless otherwise specifically authorized by the Department, all plants installed in beach and coastal areas – whether to replace vegetation displaced, damaged, or destroyed during construction or otherwise – shall be of species indigenous to Florida beaches and dunes, such as sea oats, sea grape, saw palmetto, panic grass, saltmeadow hay cordgrass, seashore saltgrass, and railroad vine, and grown from stock indigenous to the region in which the project is located.

(k) All topographic restoration and revegetation work is subject to approval by the Department, and the status of restoration shall be reported as part of the final certification of the actual work performed.

(l) If not specifically authorized elsewhere in the permit, no operation, transportation, or storage of equipment or materials is authorized seaward of the dune crest or rigid coastal structure during the marine turtle nesting season. The marine turtle nesting season is May 1 through October 31 in all counties except Brevard, Indian River, St. Lucie, Martin, Palm Beach, and Broward counties where leatherback turtle nesting occurs during the period of March 1 through October 31.

(m) If not specifically authorized elsewhere in the permit, no temporary lighting of the construction area is authorized at any time during the marine turtle nesting season and no additional permanent exterior lighting is authorized.

(n) All windows and glass doors visible from any point on the beach must be tinted to a transmittance value (light transmission from inside to outside) of 45% or less through the use of tinted glass or window film.

(o) The permit has been issued to a specified property owner and is not valid for any other person unless formally transferred. An applicant requesting transfer of the permit shall sign two copies of the permit transfer agreement form, agreeing to comply with all terms and conditions of the permit, and return both copies to the Department. The transfer request shall be provided on the form entitled "Permit Transfer Agreement" – DEP Form 73-103 (Revised 1/04), which is hereby adopted and incorporated by reference. No work shall proceed under the permit until the new owner has received a copy of the transfer agreement approved by the Department. A copy of the transfer agreement shall be displayed on the construction site along with the permit. An expired permit shall not be transferred.

(p) The permittee shall immediately inform the Department of any change of mailing address of the permittee and any authorized agent until all requirements of the permit are met.

(q) For permits involving major structures or activities, the permittee shall submit to the Department periodic progress reports on a monthly basis beginning at the start of construction and continuing until all work has been completed. If a permit involves either new armoring or major reconstruction of existing armoring, the reports shall be certified by an engineer licensed in the State of Florida. The permittee or engineer, as appropriate, shall certify that as of the date of each report all construction has been performed in compliance with the plans and project description approved as a part of the permit and with all conditions of the permit, or shall specify any deviation from the plans, project description, or conditions of the permit. The report shall also state the percent of completion of the project and each major individual component. The reports shall be provided to the Department using the form entitled "Periodic Progress Report" – DEP Form 73-111 (Revised 6/04), which is hereby adopted and incorporated by reference. Permits for minor structures or activities do not require submittal of periodic reports unless required by special permit condition.

(r) For permits involving habitable major structures, all construction on the permitted structure shall stop when the foundation pilings have been installed. At that time the foundation location form shall be submitted to and accepted by the Department prior to proceeding with further vertical construction above the foundation. The form shall be signed by a professional surveyor, licensed pursuant to Chapter 472, F.S., and shall be based upon such surveys performed in accordance with Chapter 472, F.S., as are necessary to determine the actual configuration and dimensioned relationship of the installed pilings to the control line. The information shall be provided to the Department using the form entitled "Foundation Location Certification" – DEP Form 73-114B (Revised 9/05), which is hereby adopted and incorporated by reference. Phasing of foundation certifications is acceptable. The Department shall notify the permittee of approval or rejection of the form within seven (7) working days after staff receipt of the form. All survey information upon which the form is based shall be made available to the Department upon request. Permits for repairs or additions to existing structures with nonconforming foundations are exempt from this condition.

(s) For permits involving major structures, the permittee shall provide the Department with a report by an engineer or architect licensed in the State of Florida within thirty (30) days following completion of the work. The report shall state that all locations specified by the permit have been verified and that other construction and activities authorized by the permit have been performed in compliance with the plans and project description approved as a part of the permit and all conditions of the permit; or shall describe any deviations from the approved plans, project description, or permit conditions, and any work not performed. Such report shall not relieve the permittee of the provisions of paragraph 62B-33.0155(1)(a), F.A.C. If none of the permitted work is performed, the permittee shall inform the Department in writing no later than 30 days following expiration of the permit. The report shall be provided on the form entitled "Final Certification" DEP Form 73-115B (Revised 9/05), which is hereby adopted and incorporated by reference.

(t) Authorization for construction of armoring or other rigid coastal structures is based on an engineering review and assessment of the design and anticipated performance and impact of the structure as a complete unit. Construction of any less than the complete structure as approved by the Department is not authorized and shall result in the assessment of an administrative fine and the issuance of an order to remove the partially constructed structure. Modifications to the project size, location, or structural design shall be authorized by the Department in accordance with Rule 62B-33.013, F.A.C.

(2) The permittee shall not commence any excavation, construction, or other physical activity on or encroaching on the sovereignty land of Florida seaward of the mean high water line or, if established, the erosion control line until the permittee has received from the Board of Trustees of the Internal Improvement Trust Fund the required lease, license, easement, or other form of consent authorizing the proposed use.

(3) The permittee shall obtain any applicable licenses or permits required by Federal, state, county, or municipal law.

(4) This permit does not authorize trespass onto other property.

(5) In the event of a conflict between a general permit condition and a special permit condition, the special permit condition shall prevail.

(6) Copies of any forms referenced above can be obtained by writing to the Department of Environmental Protection, 2600 Blair Stone Road, MS 3522, Tallahassee, Florida 32399-2400, or by telephoning (850)245-8336.

This corrected permit, with the referenced attachments, comprises the entire permit, and supersedes the permit as previously issued.

Approved plans are incorporated into this permit by reference.

Executed in Tallahassee, Florida.
STATE OF FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION

_____
Tony D. McNeal, P.E., Administrator
Coastal Construction Control Line Program

CERTIFICATE OF SERVICE

The undersigned duly designated deputy clerk hereby certifies that this permit and all copies were sent on the filing date below to the following listed persons:

James Scholl, City Manager, City of Key West, jscholl@cityofkeywest-fl.gov
Michael R. Barnett, P.E., Agent, Michael.Barnett@tetratech.com
Jennie Cowart, Field Inspector, Jennie.Cowart@dep.state.fl.us

FILING AND ACKNOWLEDGMENT
FILED, on this date, pursuant to Section 120.52, F. S., with the designated Department Clerk, receipt of which is hereby acknowledged.

Sandra K Rogers
Clerk

05/10/2017
Date

NOTICE OF RIGHTS

This action is final and effective on the date filed with the Clerk of the Department unless a petition for an administrative hearing is timely filed under sections 120.569 and 120.57, Florida Statutes, before the deadline for filing a petition. On the filing of a timely and sufficient petition, this action will not be final and effective until further order of the Department. Because the administrative hearing process is designed to formulate final agency action, the hearing process may result in a modification of the agency action or even denial of the application.

Petition for Administrative Hearing
A person whose substantial interests are affected by the Department's action may petition for an administrative proceeding (hearing) under sections 120.569 and 120.57, Florida Statutes. Pursuant to rule 28-106.201, Florida Administrative Code, a petition for an administrative hearing must contain the following information:

(a) The name and address of each agency affected and each agency's file or identification number, if known;
(b) The name, address, any e-mail address, any facsimile number, and telephone number of the petitioner, if the petitioner is not represented by an attorney or a qualified representative; the name, address, and telephone number of the petitioner's representative, if any, which shall be the address for service purposes during the course of the proceeding; and an explanation of how the petitioner's substantial interests will be affected by the agency determination;
(c) A statement of when and how the petitioner received notice of the agency decision;
(d) A statement of all disputed issues of material fact. If there are none, the petition must so indicate;
(e) A concise statement of the ultimate facts alleged, including the specific facts that the petitioner contends warrant reversal or modification of the agency's proposed action;
(f) A statement of the specific rules or statutes the petitioner contends require reversal or modification of the agency's proposed action, including an explanation of how the alleged facts relate to the specific rules or statutes; and
(g) A statement of the relief sought by the petitioner, stating precisely the action petitioner wishes the agency to take with respect to the agency's proposed action.

The petition must be filed **(received by the Clerk)** in the Office of General Counsel of the Department at 3900 Commonwealth Boulevard, Mail Station 35, Tallahassee, Florida 32399-3000. Also, a copy of the petition shall be mailed to the applicant at the address indicated above at the time of filing.

Time Period for Filing a Petition
In accordance with rule 62-110.106(3), Florida Administrative Code, petitions for an administrative hearing by the applicant must be filed within 21 days of receipt of this written notice. Petitions filed by any persons other than the applicant, and other than those entitled to written notice under section 120.60(3), Florida Statutes, must be filed within 21 days of publication of the notice or within 21 days of receipt of the written notice, whichever occurs first. Under section 120.60(3), Florida Statutes, however, any person who has asked the Department for notice of agency action may file a petition within 21 days of receipt of such notice, regardless of the date of publication. The failure to file a petition within the appropriate time period shall constitute a waiver of that person's right to request an administrative determination (hearing) under sections 120.569 and 120.57, Florida Statutes, or to intervene in this proceeding and participate as a party to it. Any subsequent intervention (in a proceeding initiated by another party) will be only at the discretion of the presiding officer upon the filing of a motion in compliance with rule 28-106.205, Florida Administrative Code.

Extension of Time
Under rule 62-110.106(4), Florida Administrative Code, a person whose substantial interests are affected by the Department's action may also request an extension of time to file a petition for an administrative hearing. The Department may, for good cause shown, grant the request for an extension of time. Requests for extension of time must be filed with the Office of General Counsel of the Department at 3900 Commonwealth Boulevard, Mail Station 35, Tallahassee, Florida 32399-3000, before the applicable deadline for filing a petition for an administrative hearing. A timely request for extension of time shall toll the running of the time period for filing a petition until the request is acted upon.

Mediation
Mediation is not available in this proceeding.

Judicial Review
Once this decision becomes final, any party to this action has the right to seek judicial review pursuant to section 120.68, Florida Statutes, by filing a Notice of Appeal pursuant to rules 9.110 and 9.190, Florida Rules of Appellate Procedure, with the Clerk of the Department in the Office of General Counsel, 3900 Commonwealth Boulevard, M.S. 35, Tallahassee, Florida 32399-3000; and by filing a copy of the Notice of Appeal accompanied by the applicable filing fees with the appropriate District Court of Appeal. The Notice of Appeal must be filed within 30 days from the date this action is filed with the Clerk of the Department.

Newspaper Publication
The Agency will not publish or require the person requesting a permit to publish in a newspaper a notice of receipt of the permit application or notice of Agency action granting or denying the permit.

Persons receiving a permit are advised that interested parties who become aware of Agency action approving or denying the permit, or who observe work on the project within certain time frames without any prior notice, may have rights to petition for an administrative hearing under Chapter 120, F.S. For this reason, it may be in the best interest of the person proposing the activity to publish, at its expense, a one-time "Notice of Permit Issuance" in a newspaper of general circulation in the county where the activity is located meeting the requirements of Chapter 50, F.S. Agency staff can provide persons with the information for such a notice upon request. Persons who are substantially affected by the proposed action may petition for an administrative hearing within the time frames specified in the notice and Chapter 120, F.S.

PART 5

REPORT OF GEOTECHNICAL EXPLORATION

SUBSURFACE EXPLORATION AND ENGINEERING EVALUATIONS BEACH RESTORATION ANTLANTIC BLVD & WHITE STREET KEY WEST, FL APRIL 18, 2016 FILE NO.: 16-2528

Ardaman & Associates, Inc.

OFFICES

Orlando – 8008 S. Orange Avenue, Orlando Florida 32809 – Phone (407) 855-3860
Alexandria – 3609 Mac Lee Drive, Alexandria, Louisiana 71302 – Phone (318) 443-2888
Bartow – 1525 Centennial Drive, Bartow, Florida 33830 – Phone (863) 533-0858
Baton Rouge – 316 Highlandia Drive, Baton Rouge, Louisiana 70884 – Phone (225) 752-4790
Cocoa – 1300 N. Cocoa Blvd., Cocoa, Florida 32922 – Phone (321) 632-2503
Fort Myers – 9970 Bavaria Road, Fort Myers, Florida 33913 – Phone (239) 768-6600
Miami – 2608 W. 84th Street, Hialeah, Florida 33016 – Phone (305) 825-2683
Monroe – 1122 Hayes Street, West Monroe, Louisiana 71292 – Phone (318) 387-4103
New Orleans – 1305 Distributors Row, Suite I, Jefferson, Louisiana 70123 – Phone (504) 835-2593
Port St. Lucie – 460 Concourse Place NW, Unit 1, Port St. Lucie, Florida 34986 – Phone (772) 878-0072
Sarasota – 78 Sarasota Center Blvd., Sarasota, Florida 34240 – Phone (941) 922-3526
Shreveport – 7222 Greenwood Road, Shreveport, Louisiana 71119 – Phone (318) 636-3673
Tallahassee – 3175 West Tharpe Street, Tallahassee, Florida 32303 – Phone (850) 576-6131
Tampa – 3925 Coconut Palm Drive, Suite 115, Tampa, Florida 33619 – Phone (813) 620-3389
West Palm Beach – 2200 North Florida Mango Road, Suite 101, West Palm Beach, Florida 33409 – Phone (561) 687-8200

Ardaman & Associates, Inc.
Geotechnical, Environmental and
Materials Consultants

April 18, 2016
File No. 16-2528

Mr. Stuart McGahee, P.E.
Tetra Tech
759 S. Federal Highway, Suite 314
Stuart, FL 34994

RE: Beach Restoration
Atlantic Blvd & White Street
Key West, FL

Dear Mr. McGahee:

As requested and authorized, we have completed a shallow subsurface soil exploration for the subject project. The purposes of performing this exploration were to evaluate the general subsurface conditions within the 600 feet long beach front included within the project area. This report documents our findings and presents our engineering recommendations.

SITE LOCATION AND SITE DESCRIPTION

The site for the proposed beach restoration is located on the South side of Atlantic Blvd, east of White Street. The beach is adjacent to a Community Park that was developed between the dune and Atlantic Blvd. The beach front has eroded the dune in the West part of the beach, and organic silty soils have replaced the sand at sea level. The site is located in Key West, Florida. The general site location is shown in Figure 1.

FIELD EXPLORATION PROGRAM

SPT Borings and Grab Samples

The field exploration program included performing two (2) Standard Penetration Test (SPT) borings. The SPT borings were advanced to depths of 20 feet below the ground surface using the methodology outlined in ASTM D-1586. A summary of this field procedure is included in the Appendix. Split-spoon and core soil samples recovered during performance of the borings were visually classified in the field and representative portions of the samples were transported to our laboratory in sealed sample jars.

The groundwater level at each of the boring locations was measured during drilling. The borings were backfilled with soil cuttings.

2608 W. 84 Street, Hialeah, Florida 33016 Phone (305) 825-2683 FAX (305) 825-2686
Louisiana: Alexandria, Baton Rouge, Monroe, New Orleans, Shreveport
Florida: Bartow, Cocoa, Fort Myers, Miami, Orlando, Port St. Lucie, Sarasota, Tallahassee, Tampa, W. Palm Beach

Grab samples were collected from the dune sand at three locations along the beach, between the surface and about 2 feet below grade. The sample taken at the West end of the dune (D-1) appears to be limerock fill and not beach sand. This is quite different from samples D-2 and D-3.

Test Locations

The approximate locations of the borings are schematically illustrated on a site plan shown on Figure 2. These locations were determined in the field by tape measuring/estimating distances from existing site features and should be considered accurate only to the degree implied by the method of measurement used. Boring locations should be considered accurate only to the degree implied by the method of locating used.

LABORATORY PROGRAM

Representative soil samples obtained during our drilling effort and dune sampling operation were packaged and transferred to our laboratory for further visual examination testing and classification. The resulting soil descriptions are shown on the soil boring logs presented in Appendix I. The grain size distribution and statistics analysis are included in Appendix II.

A summary of the Laboratory tests completed for this project is presented in Table 1 below:

Table 1 Laboratory Analysis

Sample ID	Test	No. of Tests
Grab Samples from Dune	Grain Size Distribution	3
Core Samples from borings	Unconfined compression	4
Grab Samples from Dune	Organic Content	1
Grab Samples from Dune	Carbonate Content	2

Sieve analysis were performed using sieves: 1 ½", 1 ¾", ½", 3/8", 4, 5, 7, 14, 18, 25, 35, 45, 60, 80, 120, 170, and 230. The graduation test results were used to perform statistical analysis, using the "GRANPLOTS" program. The results are included in Appendix II. A summary of the results is presented in Table 2.

Table 2. Summary of Laboratory Tests Results

Sample	Munsell Color	Mean (ø Units)	Median (ø Units)	Standard Deviation (ø Units)	Carbonate Content (%)	Organic Content (%)
Dune 1	HUE 10YR 8/2	-1.009	-1.8610	2.6009	99.6	0.5
Dune 2	HUE 7.5YR 6/2	1.2164	1.1255	1.1797	-	-
Dune 3	HUE 7.5YR 6/2	1.404	1.2269	0.949	60.2	-

Unconfined compression tests were performed on core samples retrieved from the two boring locations. The samples were selected from the largest fragments retrieved from the cores. A summary of the core results and unconfined compression tests is presented in Table 3.

Table 3. Summary of Core and Unconfined Compression Results

Boring	Depth	Recovery (%)	RQD (%)	Test #	Unconfined Compression (psi)
1	10 – 15	57	23	1	400
	10 – 15			2	365
	15 – 20	48	25	3	420
2	10 – 15	20	7	-	-
	15 – 20	24	15	4	285

GENERAL SUBSURFACE CONDITIONS

General Soil Profile

The results of the field exploration and laboratory programs are graphically summarized on the soil boring logs presented on the Appendix. The stratification of the boring logs represents our interpretation of the field boring logs and the results of laboratory examinations of the recovered samples. The stratification lines represent the approximate boundary between soil types. The actual transitions may be more gradual than implied.

The results of the borings indicate the following general soil profile:

Depth Below Ground Surface (feet)	Description
0 – 4	Dense sand at Boring B-1 appears as limerock fill.
4 – 30	Limestone

The above soil profile is outlined in general terms only. Please refer to the boring logs for soil profile details.

Groundwater Level

The groundwater level was measured in the boreholes during drilling (on the day drilled after stabilization of the downhole water level). As shown on boring logs, groundwater was encountered at depths that ranged from 1 to 4.1 feet below the existing ground surface on the dates indicated. Fluctuations in groundwater levels should be anticipated throughout the year primarily due to tidal fluctuations.

CLOSURE

The analyses and recommendations submitted herein are based on the data obtained from the soil borings presented in the Appendix and the assumed loading conditions. This report does not reflect any variations which may occur adjacent to or between the borings. The nature and extent of the variations between the borings may not become evident until during construction. If variations then appear evident, it will be necessary to re-evaluate the recommendations presented in this report after performing on-site observations during the construction period and noting the characteristics of the variations.

This study does not include an evaluation of the environmental (ecological or hazardous/toxic material related) condition of the site and subsurface.

This report has been prepared for the exclusive use of Tetra Tech in accordance with generally accepted geotechnical engineering practices. No other warranty, expressed or implied, is made.

We are pleased to be of assistance to you on this phase of the project. When we may be of further service to you or should you have any questions, please contact us.

Very truly yours,
ARDAMAN & ASSOCIATES, INC.

FL Certificate No. 0005950

Evelio Horta 4/18/16

Evelio Horta, Ph.D., P.E., G.E.
Senior Geotechnical Engineer
FL Reg. No. 46625

SITE PLAN
and
BORING LOGS

Ardaman & Associates, Inc. Geotechnical, Environmental and Materials Consultants	SUBSURFACE EXPLORATION REPORT BEACH RESTORATION White Street and Atlantic Blvd. KEY WEST, FLORIDA	SITE LOCATION PLAN Figure No. 1	File No.: 16-2528 Prepared By: EHJr Date: 04/12/16

LEGEND: Grab Boring

Ardaman & Associates, Inc. Geotechnical, Environmental and Materials Consultants	SUBSURFACE EXPLORATION REPORT BEACH RESTORATION White Street and Atlantic Blvd. KEY WEST, FLORIDA	BORING LOCATION PLAN Figure No. 2	File No.: 16-2528 Prepared By: EHJr Date: 04/12/16

APPENDIX

STANDARD PENETRATION TEST BORING LOGS

Our borings describe subsurface conditions only at the locations drilled and at the time drilled. They provide no information about subsurface conditions below the bottom of the boreholes. At locations not explored, surface conditions that differ from those observed in the borings may exist and should be anticipated.

The information reported on our boring logs is based on our drillers' logs and on visual examination in our laboratory of disturbed soil samples recovered from the borings. The distinction shown on the logs between soil types is approximate only. The actual transition from one soil to another may be gradual and indistinct.

The groundwater depth shown on our boring logs is the water level the driller observed in the borehole when it was drilled. These water levels may have been influenced by the drilling procedures, especially in borings made by rotary drilling with bentonitic drilling mud. An accurate determination of groundwater level required long-term observation of suitable monitoring wells. Fluctuations in groundwater levels throughout the year should be anticipated.

The absence of a groundwater level on certain logs indicates that no groundwater data is available. It does not mean that no groundwater will be encountered at the boring location.

STANDARD PENETRATION TEST BORINGS

The Standard Penetration Test is a widely accepted method of testing foundation soils in place. The N-Value obtained from the test has been correlated empirically with various soil properties. These empirical correlations allow satisfactory estimates to be made of how the soil is likely to behave when subjected to foundation loads. Tests are usually performed in the boreholes at intervals of five feet. In addition, our Firm performs tests continuously in the interval directly below the expected foundation bearing grade where the soils will be most highly stressed.

Boreholes where Standard Penetration Tests will be performed are drilled with a truck-mounted CME 45A drill rig. The boreholes are advanced by rotary drilling with a winged bit that makes a hole about three inches in diameter. A bentonitic drilling mud is recirculated in order to remove the cuttings and support the walls of the borehole. The drag bit is specially modified to direct the mud upward and reduced disturbance of the soil ahead of the bit.

Occasionally, running or squeezing ground is encountered that cannot be stabilized by the drilling mud alone. In addition, drilling mud may be lost into the soil or rock strata that are unusually pervious. In such cases, flush-coupled steel casing with an outside diameter of about 3.5 inches is driven as a liner for the borehole.

After the borehole has been advanced to the depth where a Standard Penetration Test will be performed, the soil sampler used to run the test is attached to the end of the drill rods and lowered to the bottom of the borehole. The testing procedure used conforms closely to the methods recommended in ASTM D-1586. The sampler used has a split-barrel 24 inches long and an outside diameter of 2.0 inches. It is driven into the ground below the bottom of the borehole using a hammer that weighs 140 pounds and falls 30 inches. The driller records the number of hammer blows need to advance the sampler the second and third six-inch increments constitutes the test result; that is, the N-Value at the depth. The test is completed after the sampler has been driven not more than 24 inches or when refusal is encountered, whichever occurs first. Refusal occurs when 50 hammer blows advance the sampler six inches or less. After the test is completed, the sampler is removed from the borehole and opened.

The driller examined and classified the soil recovered by the sampler. He places representative soil specimens from each test in closed glass jars and takes them to our laboratory. In the laboratory, additional evaluations and tests are performed, if needed. The driller's classifications may be adjusted, if necessary, to conform more closely to the United Soil Classification systems, ASTM D-2487. Jar samples are retrained in our laboratory for sixty days, then discarded unless our clients request otherwise.

After completion of a test boring, the water level in the borehole is recorded.

STANDARD PENETRATION TEST BORING LOG

BORING 1

PROJECT: Beach Restoration
White Street & Atlantic Blvd, Key West, FL

FILE No.: 16-2528

BORING LOCATION: SEE PLAN

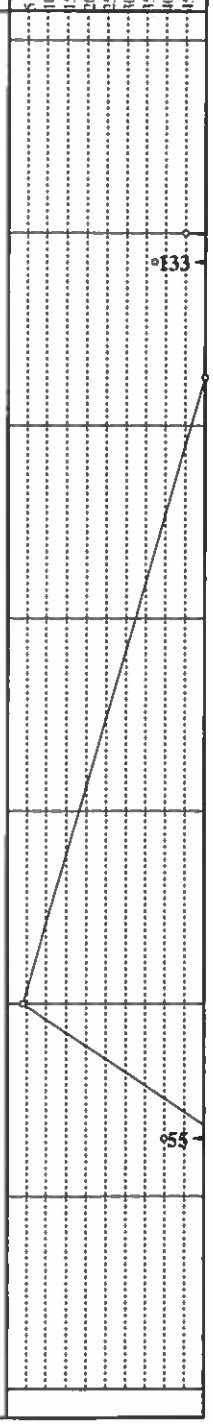
DRILL CREW: EG/FCH

WATER OBSERVED AT DEPTH 4.08'

DATE DRILLED: 03/29/16

DEPTH (FEET)	SYMBOLS FIELD TEST DATA	SOIL DESCRIPTION	SAMPLE No.	N VALUE
0	5/6 9/6 36/6	SAND, with gravel, white	1	
		LIMESTONE, medium cemented, pale brown	2	
5	60/6 69/6 64/6			45 133
	22/6 21/6 29/6			50
10		CORE retrieved between 10' and 15' Recovery= 57% RQD= 23%	3	
15		Core retrieved between 15' and 20' Recovery= 48% RQD= 25%	4	
20	2/6 2/6 2/6	LIMESTONE, poorly to well cemented, pale brown	5	
25				4
	27/6 31/6 24/6			55
30				
35				

N VALUE



NOTES:

FIELD TEST DATA ARE "BLOWS"/"INCHES DRIVEN" 140-LB HAMMER, 30-INCH FALL. (ASTM D-1586)

STANDARD PENETRATION TEST BORING LOG

BORING 2

PROJECT: Beach Restoration
White Street & Atlantic Blvd, Key West, FL

FILE No.: 16-2528

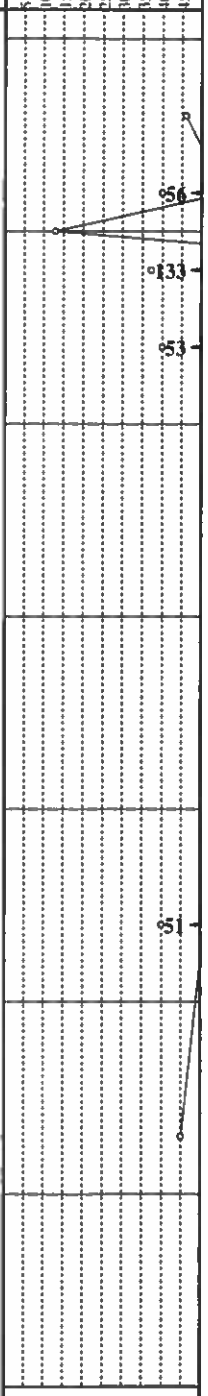
BORING LOCATION: SEE PLAN

DRILL CREW: EG/FCH

WATER OBSERVED AT DEPTH 1'

DATE DRILLED: 03/28/16

DEPTH (FEET)	SYMBOLS FIELD TEST DATA	SOIL DESCRIPTION	SAMPLE No.	N VALUE
0	2/6 9/6 4/6	SAND, fine grained, pinkish gray	1	
	9/6 24/6 22/6	SAND, fine grained, pinkish grey, with shell fragments	2	46
5	20/6 25/6 31/6	LIMESTONE, medium to well cemented, pale brown	3	56 13
	64/6 69/6 64/6			133
	20/6 26/6 27/6			53
10		CORE retrieved between 10' and 15' Recovery= 20% RQD= 7%	4	
15		CORE retrieved between 15' and 20' Recovery= 24% RQD= 15%	5	
20				
	24/6 20/6 31/6			51
25				
	25/6 24/6 21/6			45
30				
35				



NOTES:

FIELD TEST DATA ARE "BLOWS"/"INCHES DRIVEN" 140-LB HAMMER, 30-INCH FALL. (ASTM D-1586)

APPENDIX II

Sample I.D.: Dune 3 - Total Sample

Sample I.D.:	Dune 3	Sampled by: EHorta Jr		Start Sieve Size (phi):	-2.25
Sample Date:	3/30/2016	Analyzed by: Ehorta		End Sieve Size (phi):	4
Fraction Sieved (Tot. Sample -- Carbonate Fraction -- Silicic Fraction)-->		Total Sample		Pan Sieve Size (phi):	4.5
Longitude:	Latitude:	Datum:		Sieve Interval (phi):	0.5
Surface Elev:	Datum:	Water Depth:		Number of Splits:	0
Sample Depth in Core: 1 ft	Compaction Corrected?	% Compaction:		Grab Sample ?	y
Original Sample Dried? yes	Air Dried no	Oven Dried yes	Original Dry Sample Wt.:	590.150	grams

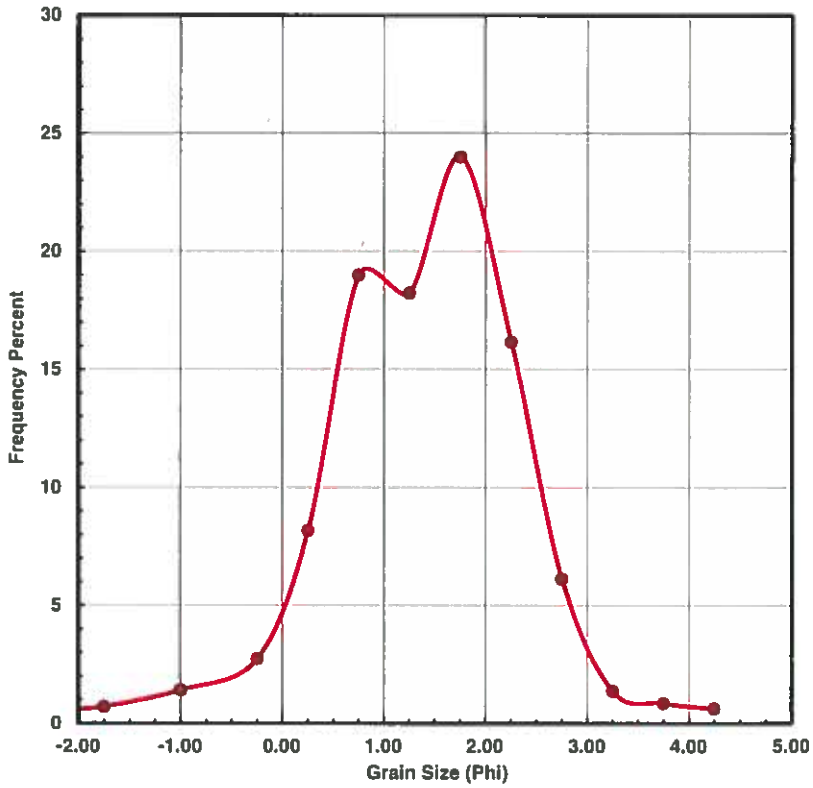
Sample Wet Sieved?	no	Comments:
Mass of Sample Remaining:	grams	
Dry Sieved Sand Wt.:	590.150	
Dry Sieved Fines Wt.:	0.000 grams	Sample from dune
Wet Sieved Fines Wt.:	grams	
Wet Sieved Silt Wt.:	grams	
Wet Sieved Clay Wt.:	grams	
Final Total Sample Wt.:	590.150 grams	

Sieve Size (phi)	Sieve Midpoint (phi)	Weight (grams)	Freq Weight %	Cumulative Weight %
-2.00	-2.155	3.530	0.5982	0.5982
-1.50	-1.75	4.220	0.7151	1.3132
-0.50	-1	8.370	1.4183	2.7315
0.00	-0.25	16.120	2.7315	5.4630
0.50	0.25	48.190	8.1657	13.6287
1.00	0.75	112.030	18.9833	32.6120
1.50	1.25	107.590	18.2310	50.8430
2.00	1.75	141.620	23.9973	74.8403
2.50	2.25	95.330	16.1535	90.9938
3.00	2.75	36.190	6.1323	97.1262
3.50	3.25	8.120	1.3759	98.5021
4.00	3.75	5.090	0.8625	99.3646
4.50	4.25	3.750	0.6354	100.0000
4.50	4		0.0000	100.0000
4.75	4.5		0.0000	100.0000
5.25	5		0.0000	100.0000
5.75	5.5		0.0000	100.0000
6.25	6		0.0000	100.0000
6.75	6.5		0.0000	100.0000
7.25	7		0.0000	100.0000
7.75	7.5		0.0000	100.0000
8.25	8		0.0000	100.0000
8.75	8.5		0.0000	100.0000
9.25	9		0.0000	100.0000
9.75	9.5		0.0000	100.0000
10.25	10		0.0000	100.0000
10.75	10.5		0.0000	100.0000
11.25	11		0.0000	100.0000
11.75	11.5		0.0000	100.0000
12.25	12		0.0000	100.0000
12.75	12.5		0.0000	100.0000
13.25	13		0.0000	100.0000
13.75	13.5		0.0000	100.0000
14.25	14		0.0000	100.0000
14.75	14.5		0.0000	100.0000
15.25	15		0.0000	100.0000
15.75	15.5		0.0000	100.0000
16.25	16		0.0000	100.0000
16.75	16.5		0.0000	100.0000
17.25	17		0.0000	100.0000
17.75	17.5		0.0000	100.0000

Statistical Results

Measure	Original Data in ϕ Units		Transformed Data		Original Data in Millimeters	
Mean:	1.4004	ϕ	0.3788	mm	0.4866	mm
Standard Deviation:	0.9490	phi-units	MV		0.4956	mm
Skewness:	-0.4482	NU	MV		4.9132	NU
Kurtosis:	4.5011	NU	MV		34.1602	NU
5th Moment Measure:	-6.261	NU	MV		42.90	NU
6th Moment Measure:	38.910	NU	MV		226.73	NU
Median:	1.2269	ϕ	0.4272	mm	0.4285	mm
Relative Dispersion:	MV		MV		1.0185	NU

Mean, std dev, skewness, kurtosis, 5th & 6th MM calculated using method of moments.
MV = meaningless value; NU = no units (*i.e.*, dimensionless)
Transformed data are calculated using the phi-transformation: mm = $2^{-\phi}$

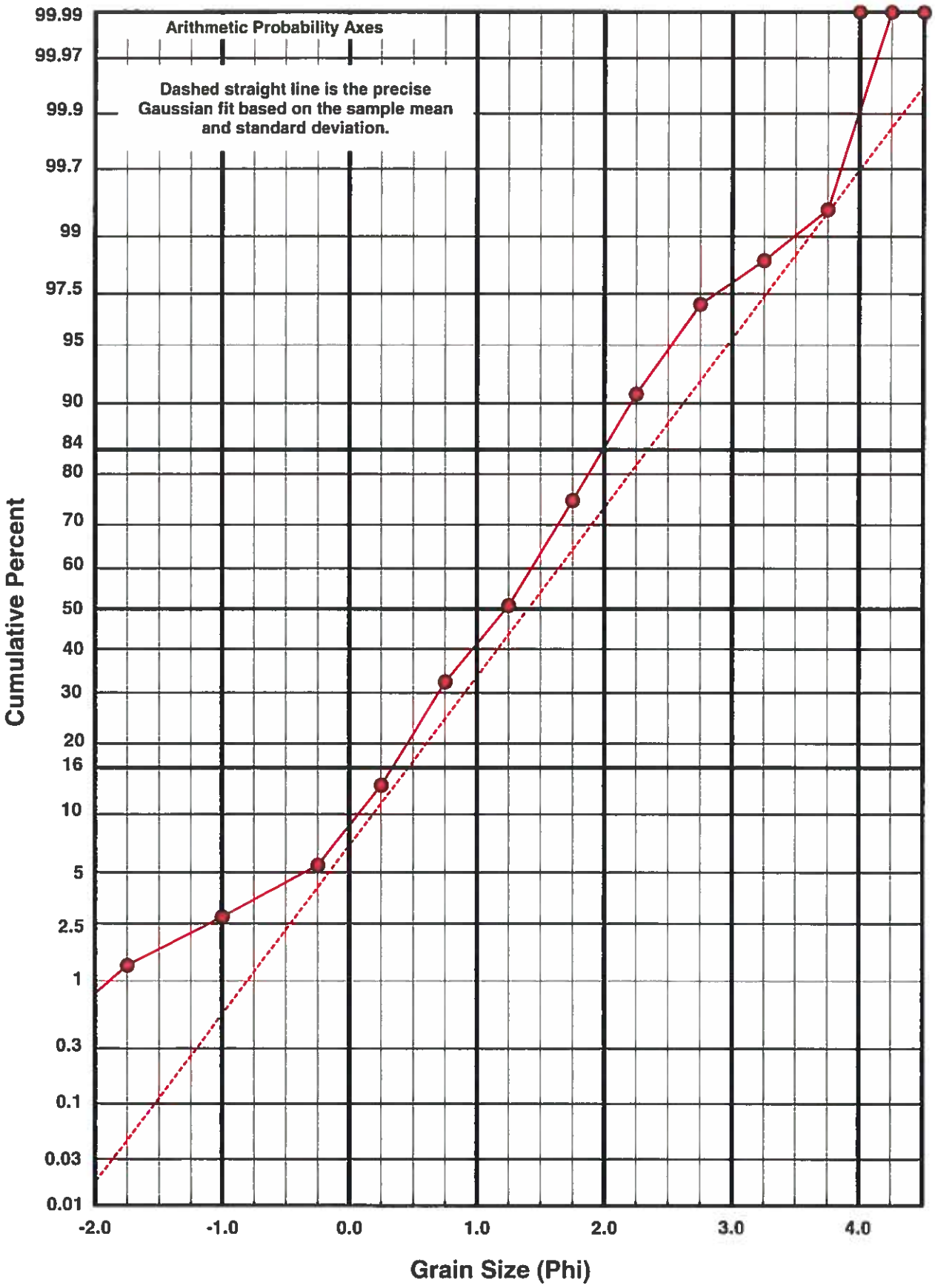


Tweak ACUMPLOT X-axis here:

X-axis minimum	0
X-axis maximum	5

Relative Disperison Scale	
< 0.5	Excellent homogeneity (*e.g.* beaches)
0.5 to 1.0	Good homogeneity
1.0 to 1.33	Fair homogeneity
> 1.33	Poor homogeneity

Sample I.D.: Dune 3 - Total Sample

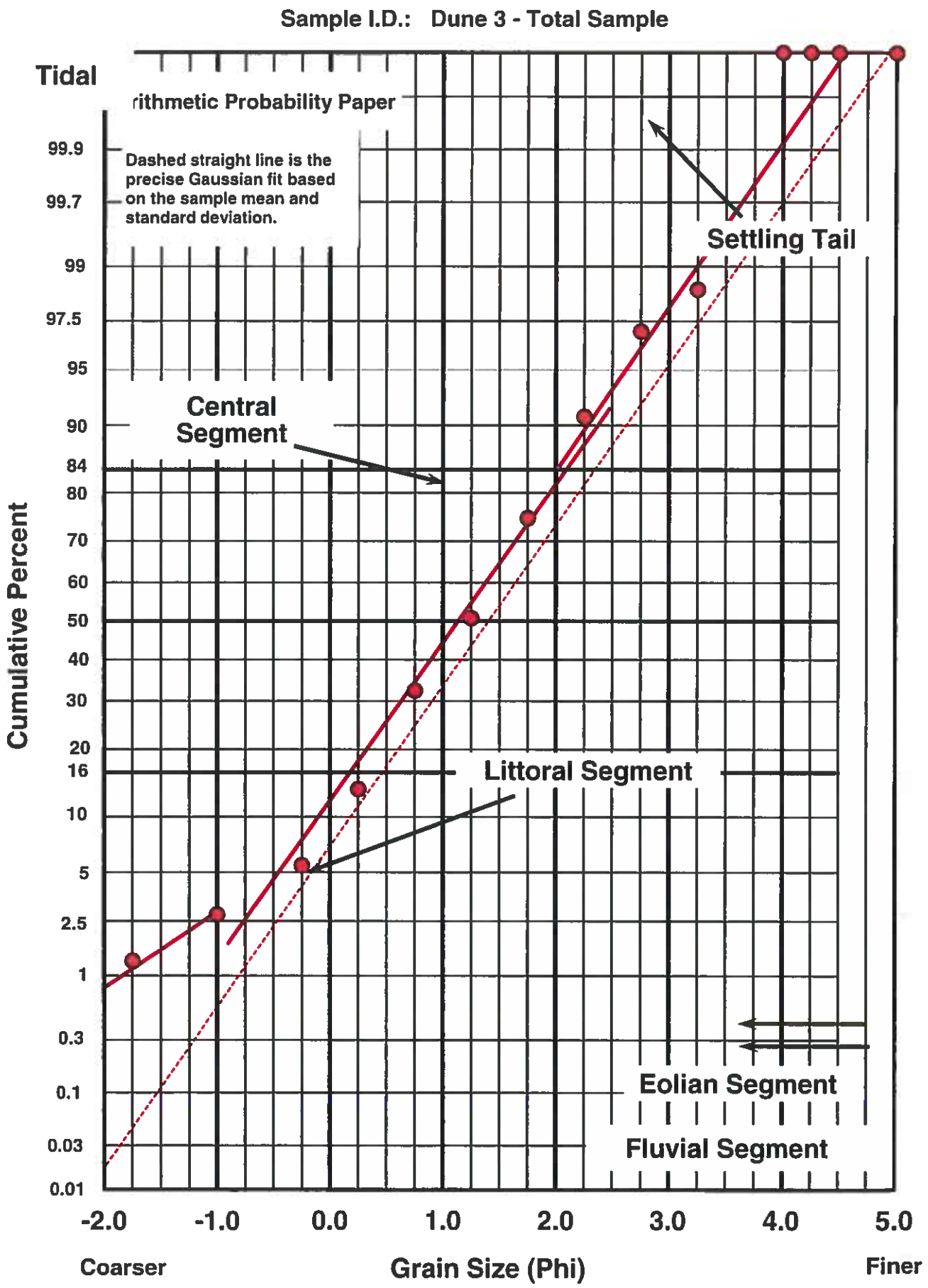


Statistical results can vary greatly depending upon how the pan fraction, if present, is treated. Results for various pan mid-points are listed below. If the pan fraction is large or the pan mid-point value is large, and the means significantly increase in value from left to right, the pan fraction needs further analysis (*e.g.*, Sedigraph, pipette, Coulter Counter) and moment measures reassessed.

	Pan Excluded	Pan at 4.5	Pan at 5.0	Pan at 5.5	Pan at 6.0	Pan at 6.5
Mean	1.3734	1.4004	1.4020	1.4036	1.4051	1.4067
% Diff[1]		1.928	2.040	2.150	2.261	2.371

[1]% difference between pan excluded mean and pan means.

If the progressive trend of the % difference is small, say less than 1.0 or 2.0% (perhaps even larger, depending on the sample) of the pan excluded mean value, then further processing of the pan fraction is not needed and sample moment measures stand as representative.


Sample I.D.: Dune 3 - Total Sample
Tidal
rithmetic Probability Paper
Dashed straight line is the precise Gaussian fit based on the sample mean and standard deviation.
Settling Tail
Central Segment
Littoral Segment
Eolian Segment
Fluvial Segment
Cumulative Percent
99.9
99.7
99
97.5
95
90
84
80
70
60
50
40
30
20
16
10
5
2.5
1
0.3
0.1
0.03
0.01
-2.0
-1.0
0.0
1.0
2.0
3.0
4.0
5.0
Coarser
Grain Size (Phi)
Finer

Sample I.D.: Dune 2 - Total Sample

Sample I.D.:	Dune 2	Sampled by:		Start Sieve Size (phi):	-2.25
Sample Date:	3/30/2016	Analyzed by:		End Sieve Size (phi):	4
Fraction Sieved (Tot. Sample -- Carbonate Fraction -- Silicic Fraction)-->		Total Sample		Pan Sieve Size (phi):	4.5
Longitude:	Latitude:	Datum:		Sieve Interval (phi):	0.5
Surface Elev:	Datum:	Water Depth:		Number of Splits:	0
Sample Depth in Core:	Compaction Corrected?	% Compaction:		Grab Sample ?	
Original Sample Dried? yes	Air Dried no	Oven Dried yes	Original Dry Sample Wt.:	593.43	grams

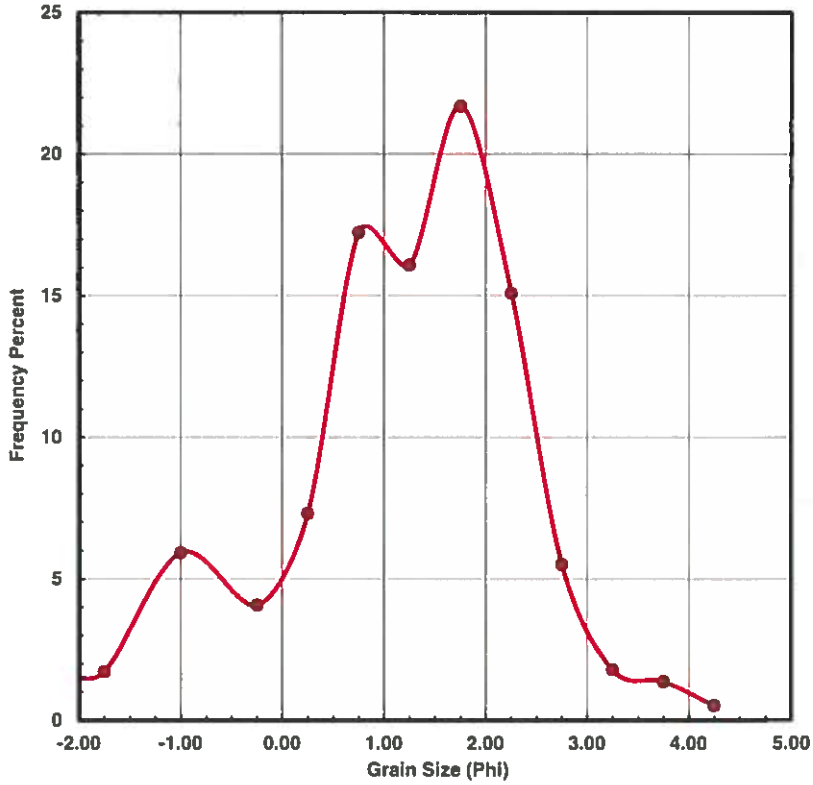
Sample Wet Sieved?	no	Comments:
Mass of Sample Remaining:	grams	
Dry Sieved Sand Wt.:	593.430	
Dry Sieved Fines Wt.:	0.000 grams	sieved 01/25/2006
Wet Sieved Fines Wt.:	grams	
Wet Sieved Silt Wt.:	grams	
Wet Sieved Clay Wt.:	grams	
Final Total Sample Wt.:	593.430 grams	

Sieve Size (phi)	Sieve Midpoint (phi)	Weight (grams)	Freq Weight %	Cumulative Weight %
-2.00	-2.155	9.870	1.6632	1.6632
-1.50	-1.75	10.230	1.7239	3.3871
-0.50	-1	35.140	5.9215	9.3086
0.00	-0.25	24.180	4.0746	13.3832
0.50	0.25	43.330	7.3016	20.6848
1.00	0.75	102.280	17.2354	37.9202
1.50	1.25	95.450	16.0845	54.0047
2.00	1.75	128.720	21.6908	75.6955
2.50	2.25	89.560	15.0919	90.7875
3.00	2.75	32.710	5.5120	96.2995
3.50	3.25	10.620	1.7896	98.0891
4.00	3.75	8.160	1.3751	99.4641
4.50	4.25	3.180	0.5359	100.0000
4.50	4		0.0000	100.0000
4.75	4.5		0.0000	100.0000
5.25	5		0.0000	100.0000
5.75	5.5		0.0000	100.0000
6.25	6		0.0000	100.0000
6.75	6.5		0.0000	100.0000
7.25	7		0.0000	100.0000
7.75	7.5		0.0000	100.0000
8.25	8		0.0000	100.0000
8.75	8.5		0.0000	100.0000
9.25	9		0.0000	100.0000
9.75	9.5		0.0000	100.0000
10.25	10		0.0000	100.0000
10.75	10.5		0.0000	100.0000
11.25	11		0.0000	100.0000
11.75	11.5		0.0000	100.0000
12.25	12		0.0000	100.0000
12.75	12.5		0.0000	100.0000
13.25	13		0.0000	100.0000
13.75	13.5		0.0000	100.0000
14.25	14		0.0000	100.0000
14.75	14.5		0.0000	100.0000
15.25	15		0.0000	100.0000
15.75	15.5		0.0000	100.0000
16.25	16		0.0000	100.0000
16.75	16.5		0.0000	100.0000
17.25	17		0.0000	100.0000
17.75	17.5		0.0000	100.0000

Statistical Results

Measure	Original Data in ϕ Units		Transformed Data		Original Data in Millimeters	
Mean:	1.2164	ϕ	0.4304	mm	0.6380	mm
Standard Deviation:	1.1797	phi-units	MV		0.7627	mm
Skewness:	-0.6234	NU	MV		3.1506	NU
Kurtosis:	3.6173	NU	MV		13.9139	NU
5th Moment Measure:	-4.657	NU	MV		32.18	NU
6th Moment Measure:	19.935	NU	MV		132.72	NU
Median:	1.1255	ϕ	0.4583	mm	0.4638	mm
Relative Dispersion:	MV		MV		1.1953	NU

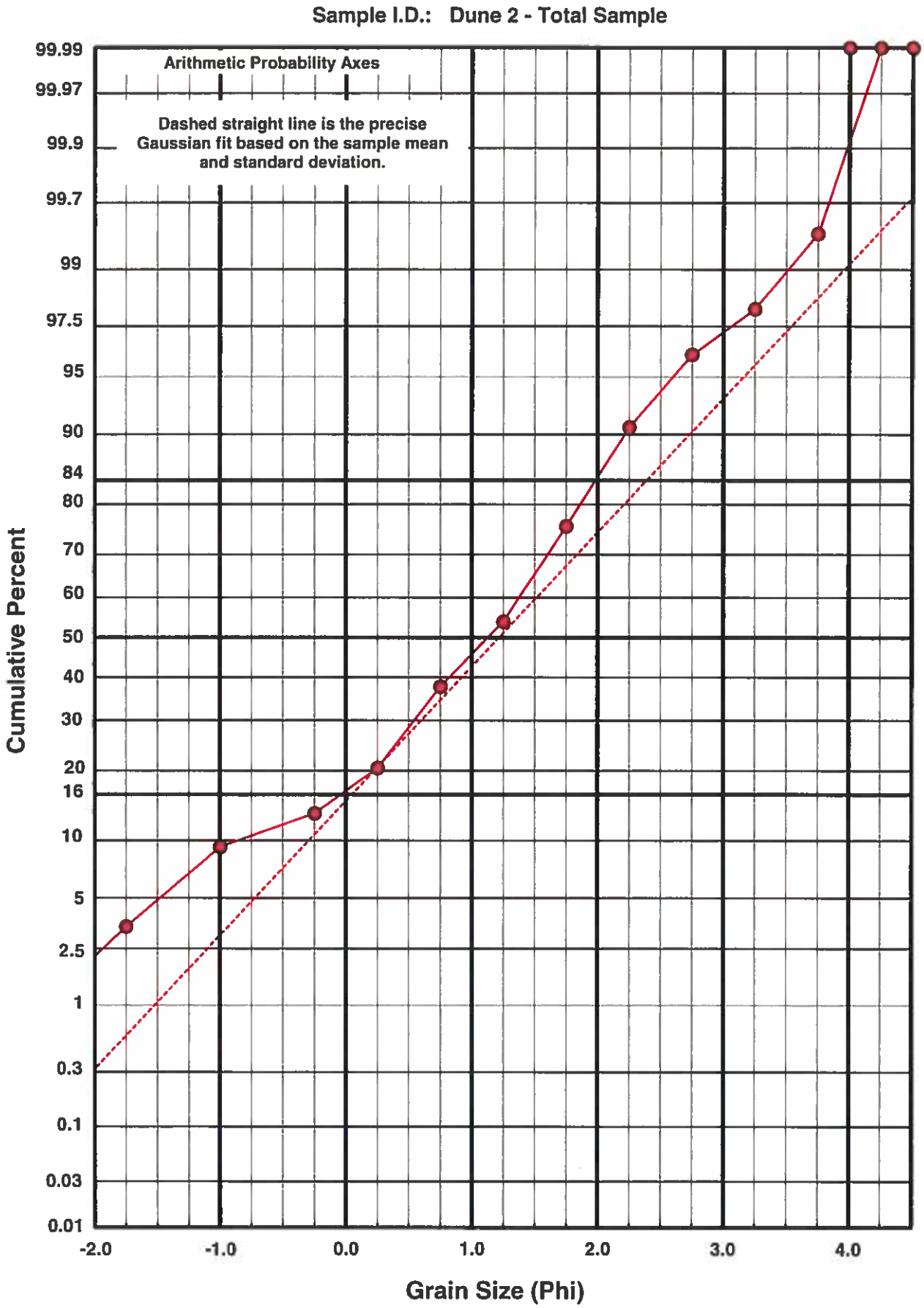
Mean, std dev, skewness, kurtosis, 5th & 6th MM calculated using method of moments.
MV = meaningless value; NU = no units (*i.e.*, dimensionless)
Transformed data are calculated using the phi-transformation: mm = $2^{-\phi}$



Tweak ACUMPLOT X-axis here:

X-axis minimum	0
X-axis maximum	5

Relative Disperison Scale	
< 0.5	Excellent homogeneity (*e.g.* beaches)
0.5 to 1.0	Good homogeneity
1.0 to 1.33	Fair homogeneity
> 1.33	Poor homogeneity

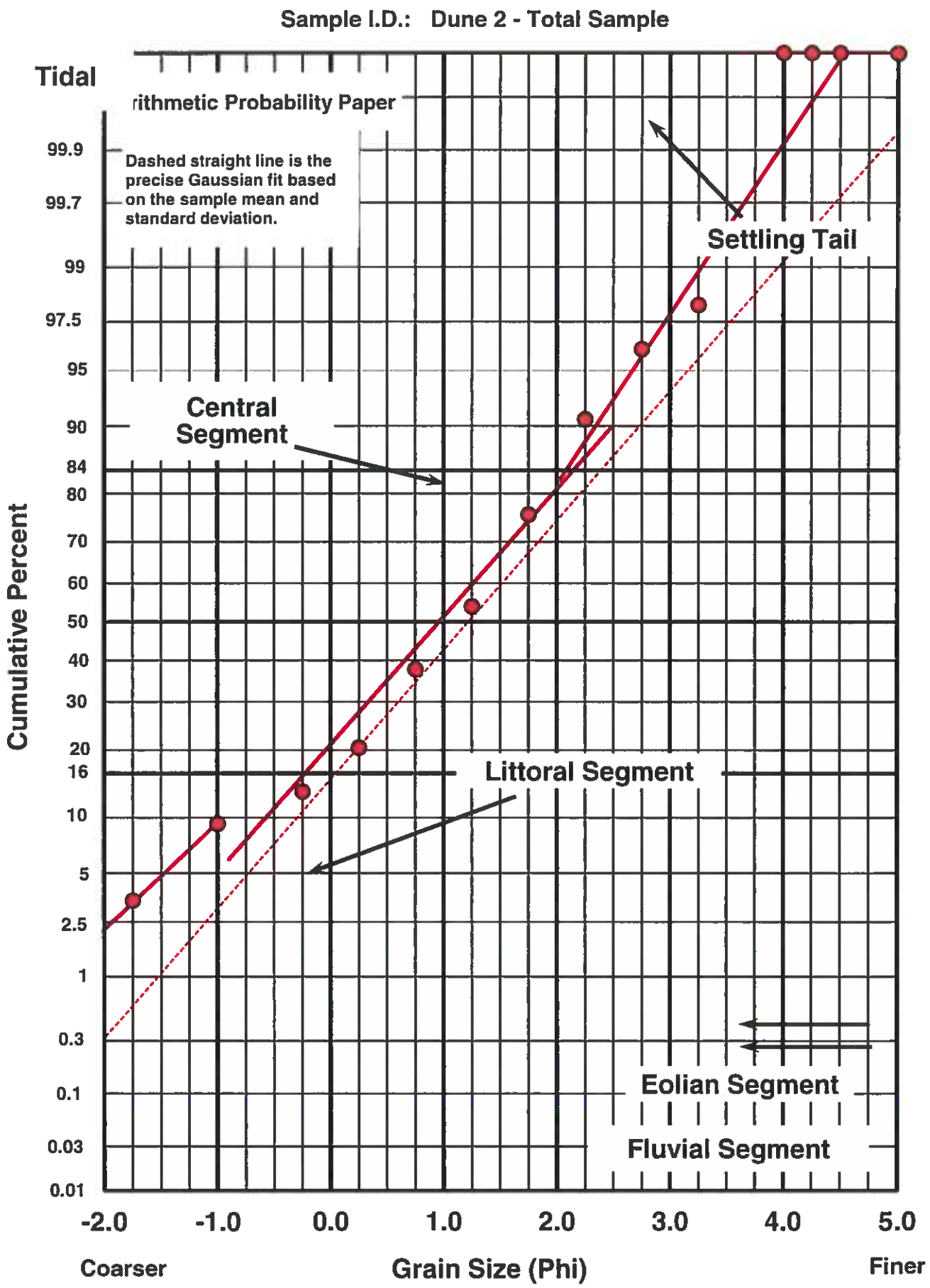

Sample I.D.: Dune 2 - Total Sample
Arithmetic Probability Axes
Dashed straight line is the precise Gaussian fit based on the sample mean and standard deviation.
Cumulative Percent
99.99
99.97
99.9
99.7
99
97.5
95
90
84
80
70
60
50
40
30
20
16
10
5
2.5
1
0.3
0.1
0.03
0.01
-2.0
-1.0
0.0
1.0
2.0
3.0
4.0
Grain Size (Phi)

Statistical results can vary greatly depending upon how the pan fraction, if present, is treated. Results for various pan mid-points are listed below. If the pan fraction is large or the pan mid-point value is large, and the means significantly increase in value from left to right, the pan fraction needs further analysis (*e.g.*, Sedigraph, pipette, Coulter Counter) and moment measures reassessed.

	Pan Excluded	Pan at 4.5	Pan at 5.0	Pan at 5.5	Pan at 6.0	Pan at 6.5
Mean	1.1936	1.2164	1.2177	1.2191	1.2204	1.2218
% Diff[1]		1.872	1.980	2.088	2.195	2.303

[1]% difference between pan excluded mean and pan means.

If the progressive trend of the % difference is small, say less than 1.0 or 2.0% (perhaps even larger, depending on the sample) of the pan excluded mean value, then further processing of the pan fraction is not needed and sample moment measures stand as representative.


Sample I.D.: Dune 2 - Total Sample
Tidal
rithmetic Probability Paper
Dashed straight line is the precise Gaussian fit based on the sample mean and standard deviation.
Settling Tail
Central Segment
Littoral Segment
Eolian Segment
Fluvial Segment
Cumulative Percent
99.9
99.7
99
97.5
95
90
84
80
70
60
50
40
30
20
16
10
5
2.5
1
0.3
0.1
0.03
0.01
-2.0
-1.0
0.0
1.0
2.0
3.0
4.0
5.0
Coarser
Grain Size (Phi)
Finer

Sample I.D.: Dune 1 - Total Sample

Sample I.D.:	Dune 1	Sampled by: EHorta Jr		Start Sieve Size (phi):	-4.67
Sample Date:	3/30/2016	Analyzed by: Ehorta		End Sieve Size (phi):	4
Fraction Sieved (Tot. Sample -- Carbonate Fraction -- Silicic Fraction)-->		Total Sample		Pan Sieve Size (phi):	4.5
Longitude:	Latitude:	Datum:		Sieve Interval (phi):	0.5
Surface Elev:	Datum:	Water Depth:		Number of Splits:	0
Sample Depth in Core: 1 ft	Compaction Corrected?	% Compaction:		Grab Sample ?	y
Original Sample Dried? yes	Air Dried no	Oven Dried yes	Original Dry Sample Wt.:	1914.520	grams

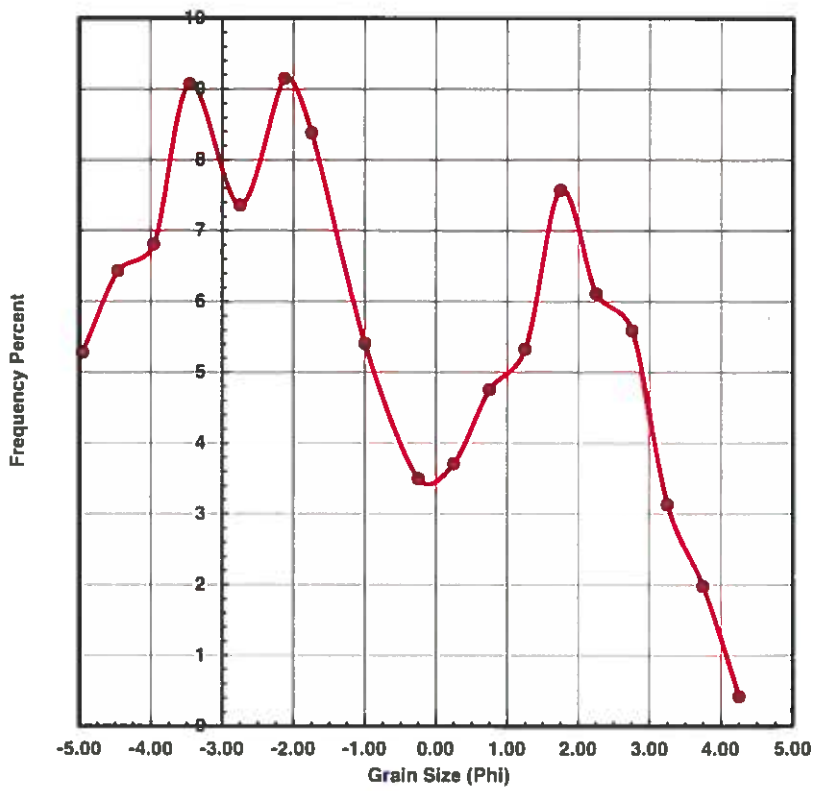
Sample Wet Sieved?	no	Comments:
Mass of Sample Remaining:	grams	
Dry Sieved Sand Wt.:	#######	
Dry Sieved Fines Wt.:	0.000 grams	Sample from dune
Wet Sieved Fines Wt.:	grams	
Wet Sieved Silt Wt.:	grams	
Wet Sieved Clay Wt.:	grams	
Final Total Sample Wt.:	####### grams	

Sieve Size (phi)	Sieve Midpoint (phi)	Weight (grams)	Freq Weight %	Cumulative Weight %
-4.67	-4.96	101.150	5.2833	5.2833
-4.25	-4.46	123.180	6.4340	11.7173
-3.67	-3.96	130.350	6.8085	18.5258
-3.25	-3.46	173.650	9.0702	27.5960
-2.25	-2.75	140.890	7.3590	34.9550
-2.00	-2.125	175.110	9.1464	44.1014
-1.50	-1.75	160.440	8.3802	52.4816
-0.50	-1	103.560	5.4092	57.8908
0.00	-0.25	67.000	3.4996	61.3903
0.50	0.25	71.000	3.7085	65.0988
1.00	0.75	91.000	4.7531	69.8520
1.50	1.25	102.000	5.3277	75.1797
2.00	1.75	145.000	7.5737	82.7534
2.50	2.25	117.000	6.1112	88.8646
3.00	2.75	107.000	5.5889	94.4534
3.50	3.25	60.000	3.1339	97.5874
4.00	3.75	38.000	1.9848	99.5722
4.50	4.25	8.190	0.4278	100.0000
4.33	4.08		0.0000	100.0000
4.83	4.58		0.0000	100.0000
5.33	5.08		0.0000	100.0000
5.83	5.58		0.0000	100.0000
6.33	6.08		0.0000	100.0000
6.83	6.58		0.0000	100.0000
7.33	7.08		0.0000	100.0000
7.83	7.58		0.0000	100.0000
8.33	8.08		0.0000	100.0000
8.83	8.58		0.0000	100.0000
9.33	9.08		0.0000	100.0000
9.83	9.58		0.0000	100.0000
10.33	10.08		0.0000	100.0000
10.83	10.58		0.0000	100.0000
11.33	11.08		0.0000	100.0000
11.83	11.58		0.0000	100.0000
12.33	12.08		0.0000	100.0000
12.83	12.58		0.0000	100.0000
13.33	13.08		0.0000	100.0000
13.83	13.58		0.0000	100.0000
14.33	14.08		0.0000	100.0000
14.83	14.58		0.0000	100.0000
15.33	15.08		0.0000	100.0000

Statistical Results

Measure	Original Data in ϕ Units		Transformed Data		Original Data in Millimeters	
Mean:	-1.0090	ϕ	2.0125	mm	6.5744	mm
Standard Deviation:	2.6009	phi-units	MV		8.5431	mm
Skewness:	0.1866	NU	MV		1.5521	NU
Kurtosis:	1.7367	NU	MV		4.5035	NU
5th Moment Measure:	0.699	NU	MV		2475.10	NU
6th Moment Measure:	3.741	NU	MV		20057.13	NU
Median:	-1.8610	ϕ	3.6327	mm	3.6592	mm
Relative Dispersion:	MV		MV		1.2995	NU

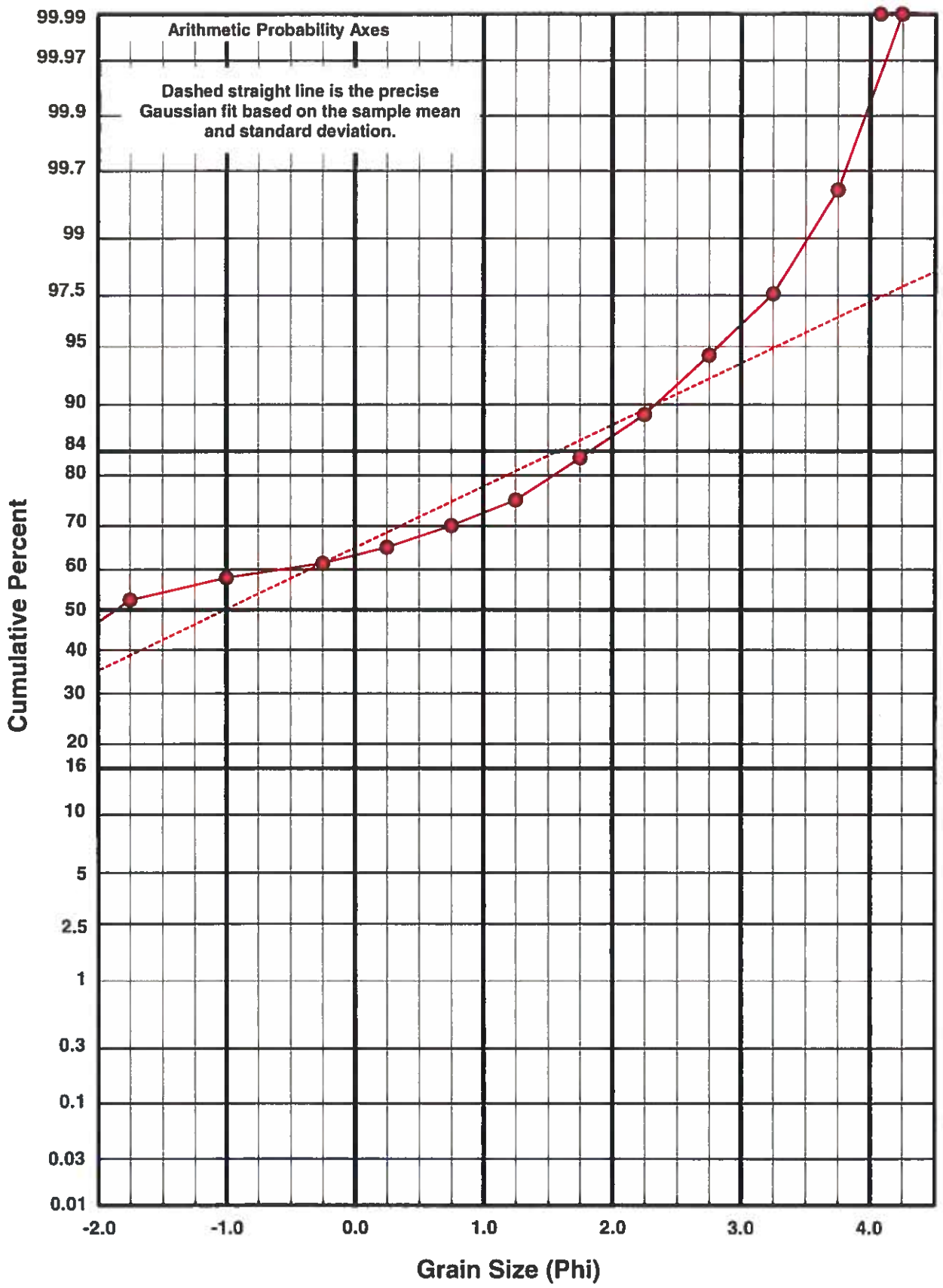
Mean, std dev, skewness, kurtosis, 5th & 6th MM calculated using method of moments.
MV = meaningless value; NU = no units (*i.e.*, dimensionless)
Transformed data are calculated using the phi-transformation: mm = $2^{-\phi}$



Tweak ACUMPLOT X-axis here:

X-axis minimum	0
X-axis maximum	5

Relative Disperison Scale	
< 0.5	Excellent homogeneity (*e.g.* beaches)
0.5 to 1.0	Good homogeneity
1.0 to 1.33	Fair homogeneity
> 1.33	Poor homogeneity

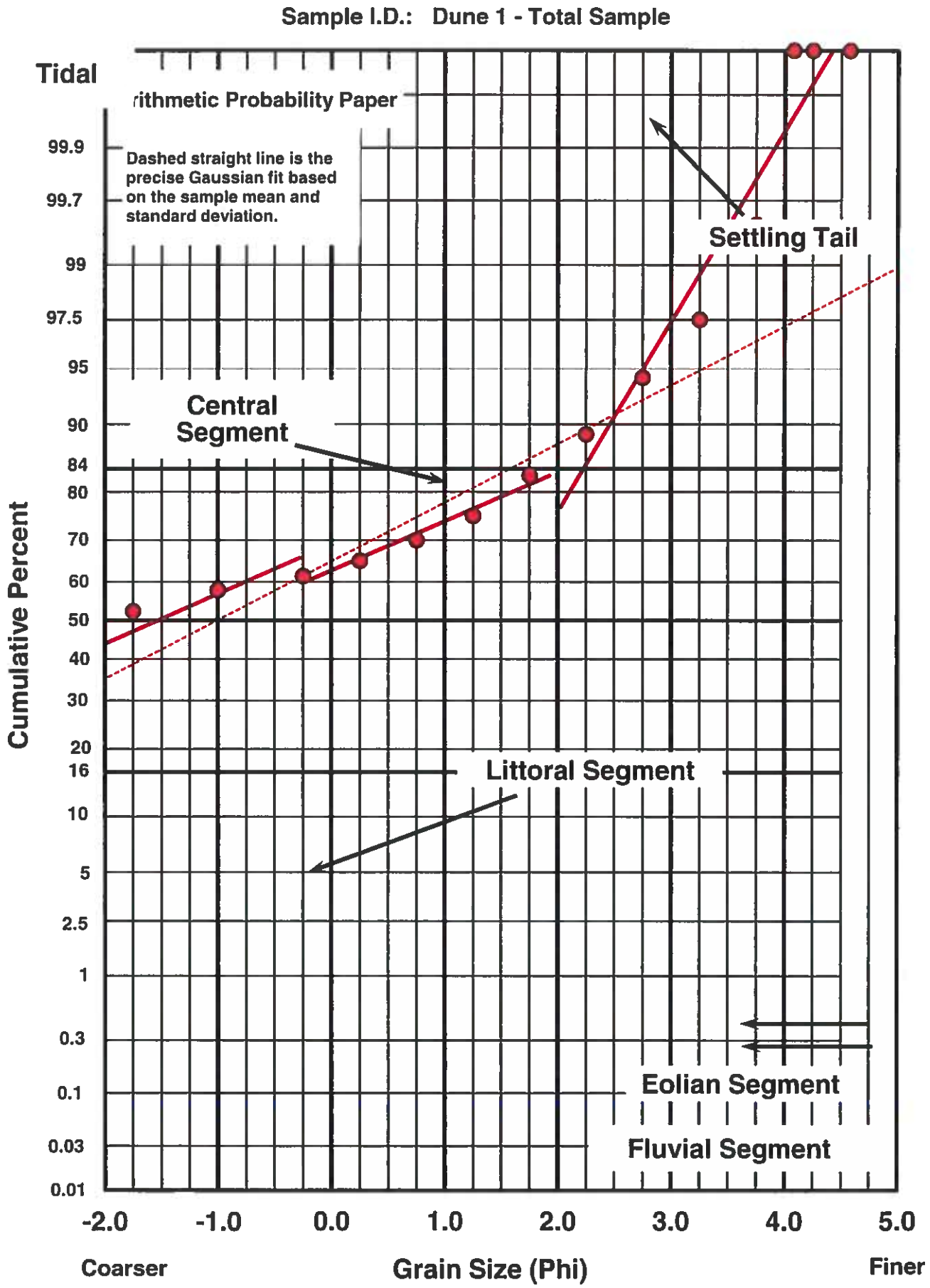

Arithmetic Probability Axes
Dashed straight line is the precise Gaussian fit based on the sample mean and standard deviation.
Cumulative Percent
99.99
99.97
99.9
99.7
99
97.5
95
90
84
80
70
60
50
40
30
20
16
10
5
2.5
1
0.3
0.1
0.03
0.01
-2.0
-1.0
0.0
1.0
2.0
3.0
4.0
Grain Size (Phi)

Statistical results can vary greatly depending upon how the pan fraction, if present, is treated. Results for various pan mid-points are listed below. If the pan fraction is large or the pan mid-point value is large, and the means significantly increase in value from left to right, the pan fraction needs further analysis (*e.g.*, Sedigraph, pipette, Coulter Counter) and moment measures reassessed.

	Pan Excluded	Pan at 4.5	Pan at 5.0	Pan at 5.5	Pan at 6.0	Pan at 6.5
Mean	-1.0090	-1.0090	-1.0090	-1.0090	-1.0090	-1.0090
% Diff[1]		0.000	0.000	0.000	0.000	0.000

[1]% difference between pan excluded mean and pan means.

If the progressive trend of the % difference is small, say less than 1.0 or 2.0% (perhaps even larger, depending on the sample) of the pan excluded mean value, then further processing of the pan fraction is not needed and sample moment measures stand as representative.


Sample I.D.: Dune 1 - Total Sample
Tidal
rithmetic Probability Paper
Dashed straight line is the precise Gaussian fit based on the sample mean and standard deviation.
Settling Tail
Central Segment
Littoral Segment
Eolian Segment
Fluvial Segment
Cumulative Percent
99.9
99.7
99
97.5
95
90
84
80
70
60
50
40
30
20
16
10
5
2.5
1
0.3
0.1
0.03
0.01
-2.0
-1.0
0.0
1.0
2.0
3.0
4.0
5.0
Coarser
Grain Size (Phi)
Finer

PART 6

ENGINEERING DESIGN STANDARDS

4. Engineering Design Standards

ENGINEERING DESIGN STANDARDS

REST BEACH STEEL SHEETPILE INSTALLATION

PROJECT ID: HU1701G01

KEY WEST, FLORIDA

TECHNICAL SPECIFICATIONS

12/07/17

Tetra Tech, Inc.
759 South Federal Highway, Suite 314
Stuart, Florida 34994
Phone: (772) 781-3400
Fax: (772)781-3411
Certificate of Authorization: 2429

MICHAEL ROBERT BARNETT
LICENSE
No. 44625
12/7/17
STATE OF
FLORIDA
PROFESSIONAL ENGINEER

Michael R. Barnett, PE
FL No. 44625

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END OF DIRECTORY

SECTION 01 11 00

SUMMARY OF WORK

PART 1 GENERAL

1.1 WORK COVERED BY CONTRACT DOCUMENTS

1.1.1 Project Information and Description of Work

The work includes the furnishing of all materials, equipment and labor needed for the installation of approximately 702.1 LF of steel sheetpile with a 707 LF reinforced concrete cap and all incidental work necessary to provide a complete and serviceable project and restoration of the project site after construction is complete. Sheets shall be EZ-95 ASTM A572, Grade 50. Each sheet shall be a minimum of 12 feet long, with 337 sheets required. The top of the concrete cap shall be set at an elevation of +3' NAVD-88. The steel sheetpile will be set in straight line segments with the horizontal location of the sheetpile varying by no more than 3 feet at the inflection points shown on the plan set.

The Contractor shall provide alternate bids for the following;

- Bid Option #1: Furnish and installation of EZ-95 ASTM A690 Grade 50 sheetpile.
- Bid Option #2: Coating of all steel sheets with a coal tar epoxy coating of 16 mils.
- Bid Option #3: Furnish and installation of steel sheetpile points to all sheets.

A summary of the activities involved with this project include, but are not limited to the following:

a. Obtaining all necessary permits
b. Submittal of shop drawings
c. Preparation and maintenance of a submittal register
d. Field staking the sheetpile alignment and obtaining City/Engineer approval prior to initiating site preparation activities
e. Securing site and staging area(s): Includes the installation of barriers/fencing/signs to keep pedestrians safely out of the construction site, and the installation of sediment barriers to keep construction debris within the construction zone
f. Maintenance of traffic along Atlantic Blvd
g. Demolition and disposal of 22 sf of concrete sidewalk (1 location)
h. Removal and disposal of trees & vegetation within the planting plan limits (16,750 sf)
i. Removal and relocation of trees and bushes that would inhibit or otherwise become damaged by construction activities
j. Removal, relocation, and/or maintenance of any sign that would inhibit or otherwise become damaged by construction activities
k. Excavation (15 cy) and fill (100 cy)/grading to provide smooth transition from concrete cap to existing topography
l. Excavation to existing limestone to accommodate installation of concrete stairs
m. Driving of steel sheet pile along field staked alignment approved by the City/Engineer
n. Filling void between steel sheet pile and existing concrete ramp with marine concrete
o. Forming, placing reinforcement and casting new concrete seawall cap (707 lf, ~118 cy)
p. Forming, placing reinforcement and casting new concrete stairs and landing pad
q. Installation of 1,685 sf of new concrete sidewalk
r. Installation of 35 lf of new aluminum handrail

s. Installation of 740 lf of new wooden post & rope fence
t. Repair of an existing section of concrete sidewalk (36 sf)
u. Installation of landscaping (4,064 plants each 1 gallon per planting plan)
v. Construction of a treated timber picnic pavilion with a cast in place concrete floor and a metal roof
w. Restoration of all site areas utilized by the Contractor to equal or better condition
x. Maintenance of as-built records and submittal of as-built survey

1.1.2 Location

The work is located at the C.B. Harvey Rest Beach Park adjacent to Atlantic Boulevard, as indicated on the plans. The address is White Street and Atlantic Blvd, Key West, FL 33040.

1.2 OCCUPANCY OF PREMISES

The adjacent fishing pier and residential building(s) will be occupied during performance of work under this Contract.

Before work is started, arrange with the City of Key West to provide a sequence of construction, means of access, space for storage of materials and equipment, and use of roads, parking, and all other facilities that will be impacted by the work and provide this plan at the pre-construction meeting.

1.3 EXISTING WORK

a) The Contractor shall preserve and protect all structures, equipment, and vegetation (such as trees, shrubs, and grass) on or adjacent to the work site, which are not to be removed and which do not unreasonably interfere with the work required under this contract. The Contractor shall only remove trees when specifically authorized to do so, and shall avoid damaging vegetation that will remain in place. If any limbs or branches of trees are broken during contract performance, or by the careless operation of equipment, or by workmen, the Contractor shall trim those limbs or branches with a clean cut and paint the cut with a tree-pruning compound as directed by the CITY.

b) The Contractor shall protect from damage all existing improvements and utilities (1) at or near the work site and (2) on adjacent property of a third party, the locations of which are made known to or should be known by the Contractor. The Contractor shall repair any damage to those facilities, including those that are the property of a third party, resulting from failure to comply with the requirements of this contract or failure to exercise reasonable care in performing the work. If the Contractor fails or refuses to repair the damage promptly, the CITY may have the necessary work performed and charge the cost to the Contractor.

c) Remove or alter existing work in such a manner as to prevent injury or damage to any portions of the existing work which remain.

d) Repair or replace portions of existing work which have been altered during construction operations to match existing or adjoining work, as approved by the CITY. At the completion of operations, existing work must be in a condition equal to or better than that which existed before new work started.

1.4 LOCATION OF UNDERGROUND UTILITIES

Obtain digging permits prior to start of demolition activities, and comply with installation requirements for locating and marking underground utilities. Contact local utility locating service a minimum of 48 hours prior to excavating, to mark utilities, and within sufficient time required if work occurs on a Monday or after a Holiday. Verify existing utility locations indicated on contract drawings, within area of work.

Identify and mark all other utilities not managed and located by the local utility companies. It may be necessary to scan the construction site with Ground Penetrating Radar (GPR), electromagnetic, or sonic equipment, and mark the surface of the ground or paved surface where existing underground utilities or utilities encased in pier structures are discovered. Verify the elevations of existing piping, utilities, and any type of underground or encased obstruction not indicated, or specified to be removed, that is indicated or discovered during scanning, in locations to be traversed by piping, ducts, and other work to be conducted or installed. Verify elevations before installing new work closer than nearest manhole or other structure at which an adjustment in grade can be made.

1.4.1 Notification Prior to Excavation

Notify the CITY at least two work days prior to driving sheetpiling.

1.5 SALVAGE MATERIAL AND EQUIPMENT

CONTRACTOR responsible for collection, storage and disposal of all demolished materials at approved location off-site. No debris shall be buried anywhere on the project site.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

-- End of Section --

SECTION 01 33 00

SUBMITTAL PROCEDURES

PART 1 GENERAL

1.1 DEFINITIONS

1.1.1 Submittal Descriptions (SD)

Submittals requirements are specified in the technical sections. Submittals are identified by Submittal Description (SD) numbers and titles as follows:

SD-01 Preconstruction Submittals

Submittals which are required prior to construction:

- Certificates of insurance
- Surety bonds
- List of proposed subcontractors
- List of proposed products
- Construction progress schedule
- Submittal register
- Schedule of prices or Earned Value Report
- Health and safety plan
- Work plan
- Quality control(QC) plan
- Environmental protection plan
- Severe storm (hurricane) preparedness plan

Plans submitted may be in written (paragraph) or graphical (drawing) form depending on the needs of the City's Representative. Plans written in paragraph from shall be detailed enough to adequately described the plan of action for the work item. Plans and shop drawings prepared in graphical form shall be clear, concise and drawn to scale if possible. Drawings not drawn to scale shall be clearly identified as such.

SD-02 Shop Drawings

Shop drawings are defined as drawings, diagrams and schedules specifically prepared to illustrate some portion of the work. The shop drawings for the steel sheet pile selection, landscaping, concrete mix design, post & rope fence, curbs and any other materials utilized on the job will be submitted to the CITY and the City's Representative for approval.

Diagrams and instructions from a manufacturer or fabricator for use in producing the product and as aids to the Contractor for integrating the product or system in the project should be included as a reference.

SD-03 Product Data

Catalog cuts, illustrations, schedules, diagrams, performance charts, instructions and brochures illustrating size, physical appearance and other characteristics of materials, systems or equipment for some portion of the work.

Samples of warranty language when the contract requires extended product warranties.

SD-04 Samples

Fabricated or unfabricated physical examples of materials, equipment or workmanship that illustrate functional and aesthetic characteristics of a material or product and establish standards by which the work can be judged.

Field samples and mock-ups constructed on the project site establish standards by which the ensuing work can be judged. Includes assemblies or portions of assemblies which are to be incorporated into the project and those which will be removed at conclusion of the work.

SD-05 Design Data

Design calculations, mix designs, analyses or other data pertaining to a part of work.

SD-06 Manufacturer's Instructions

Preprinted material describing installation of a product, system or material, including special notices and (MSDS) concerning impedances, hazards and safety precautions.

SD-07 Operation and Maintenance Data

Data that is furnished by the manufacturer, or the system provider, to the equipment operating and maintenance personnel, including manufacturer's help and product line documentation necessary to maintain and install equipment. This data is needed by operating and maintenance personnel for the safe and efficient operation, maintenance and repair of the item.

This data is intended to be incorporated in an operations and maintenance manual or control system.

SD-08 Closeout Submittals

Documentation to record compliance with technical or administrative requirements or to establish an administrative mechanism.

Submittals required for Guiding Principle Validation (GPV) or Third Party Certification (TPC).

Special requirements necessary to properly close out a construction contract. For example, Record Drawings and as-built drawings. Also, submittal requirements necessary to properly close out a major phase of construction on a multi-phase contract.

1.1.2 Approving Authority

Office or designated person authorized to approve submittals is the City of Key West Engineering Department and/ or the City's designated Representative.

1.1.3 Work

As used in this section, on- and off-site construction required by contract documents, including labor necessary to produce submittals, construction, materials, products, equipment, and systems incorporated or to be incorporated in such construction.

1.2 SUBMITTALS

CITY approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. Submit the following in accordance with this section.

SD-01 Preconstruction Submittals

Submittal Register; G

1.3 SUBMITTAL CLASSIFICATION

Submittals are classified as follows:

1.3.1 CITY Approved (G)

City approval is required for critical materials, deviations, and other items as designated by the City and/or its representative.

1.3.2 For Information Only

Submittals not requiring City approval will be for information only.

1.4 PREPARATION

1.4.1 Transmittal Form

Transmit each submittal using the Contractor's standard cover sheet and form.

1.4.2 Identifying Submittals

When submittals are provided by a Subcontractor, the Prime Contractor is to prepare, review, and stamp with Contractor's approval all specified submittals prior to submitting for City approval. Identifying submittals, except sample installations and sample panels, with the following information permanently adhered to or noted on each separate component of each submittal and noted on transmittal form. Mark each copy of each submittal identically, with the following:

a) Project title and location.

b) Construction contract number.
c) Date of the drawing and revisions.
d) Name, address, and telephone number of subcontractor, supplier, manufacturer and any other subcontractor associated with the submittal.
e) Section number of the specification section by which submittal is required.
f) Submittal description (SD) number of each component of submittal.
g) When a resubmission, add alphabetic suffix on submittal description, for example, submittal 18 would become 18A, to indicate resubmission.
h) Product identification and location in project.

1.5 INFORMATION ONLY SUBMITTALS

Normally submittals for information only will not be returned. Approval of the CITY is not required on information only submittals. The CITY reserves the right to require the Contractor to resubmit any item found not to comply with the contract. This does not relieve the Contractor from the obligation to furnish material conforming to the plans and specifications; will not prevent the CITY from requiring removal and replacement of nonconforming material incorporated in the work; and does not relieve the Contractor of the requirement to furnish samples for testing by the CITY laboratory or for check testing by the CITY in those instances where the technical specifications so prescribe.

1.6 SUBMITTAL REGISTER

Prepare and maintain submittal register, as the work progresses.

Thereafter, the Contractor is to track all submittals by maintaining a complete list, including dates on which submittals are received and returned by the CITY. Deliver one copy of submittal register updated by Contractor to CITY with each payment application.

1.7 VARIATIONS

Variations from contract requirements require both Engineer of Record (EOR) and CITY approval and will be considered where advantageous to CITY.

1.7.1 Considering Variations

Discussion with CITY prior to submission, after consulting with the EOR, will help ensure functional and quality requirements are met and minimize rejections and re-submittals. When contemplating a variation which results in lower cost, consider submission of the variation as a Value Engineering Change Proposal (VECP).

Specifically point out variations from contract requirements in transmittal letters. Failure to point out deviations may result in the CITY requiring rejection and removal of such work at no additional cost to the CITY.

1.7.2 Proposing Variations

When proposing variation, deliver written request to the CITY, with documentation of the nature and features of the variation and why the variation is desirable and beneficial to CITY, including the EOR's written analysis and approval. If lower cost is a benefit, also include an estimate of the cost savings. In addition to documentation required for variation, include the submittals required for the item. Clearly mark the proposed variation in all documentation.

1.7.3 Warranting that Variations are Compatible

When delivering a variation for approval, Contractor, including its Engineer(s) of Record, shall warrant that this contract has been reviewed to establish that the variation, if incorporated, will be compatible with other elements of work.

1.7.4 Review Schedule Extension

In addition to normal submittal review period, a period of 10 working days will be allowed for consideration by the CITY of submittals with variations.

1.8 SCHEDULING

Schedule and submit concurrently submittals covering component items forming a system or items that are interrelated. Include certifications to be submitted with the pertinent drawings at the same time. No delay damages or time extensions will be allowed for time lost in late submittals.

a. Coordinate scheduling, sequencing, preparing and processing of submittals with performance of work so that work will not be delayed by submittal processing. Allow for potential resubmittal of requirements.

b. Submittals called for by the contract documents will be listed on the register. If a submittal is called for but does not pertain to the contract work, the Contractor is to include the submittal in the register and annotate it "N/A" with a brief explanation. Approval by the CITY does not relieve the Contractor of supplying submittals required by the contract documents but which have been omitted from the register or marked "N/A."

c. Re-submit register and annotate monthly by the Contractor with actual submission and approval dates. When all items on the register have been fully approved, no further re-submittal is required.

d. Carefully control procurement operations to ensure that each individual submittal is made on or before the Contractor scheduled submittal date shown on the approved "Submittal Register."

1.9 CITY APPROVING AUTHORITY

When approving authority is CITY’s Resident Project Representative (RPR), the CITY’s RPR will:

a. Note date on which submittal was received.

b. Review submittals for approval within scheduling period specified and only for conformance with project design concepts and compliance with contract documents.

c. Identify returned submittals with one of the actions defined in paragraph REVIEW NOTATIONS and with markings appropriate for action indicated.

Upon completion of review of submittals requiring CITY approval, stamp and date submittals. Two copies of the submittal will be retained by the CITY and two copies of the submittal will be returned to the Contractor.

1.9.1 Review Notations

Submittals will be returned to the Contractor with the following notations:

a. Submittals marked "approved" or "accepted" authorize the Contractor to proceed with the work covered.

b. Submittals marked "approved as noted" or "approved, except as noted, resubmittal not required," authorize the Contractor to proceed with the work covered provided he takes no exception to the corrections.

c. Submittals marked "not approved" or "disapproved," or "revise and resubmit," indicate noncompliance with the contract requirements or design concept, or that submittal is incomplete. Resubmit with appropriate changes. No work shall proceed for this item until resubmittal is approved.

d. Submittals marked "not reviewed" will indicate submittal has been previously reviewed and approved, is not required, does not have evidence of being reviewed and approved by Contractor, or is not complete. A submittal marked "not reviewed" will be returned with an explanation of the reason it is not reviewed. Resubmit submittals returned for lack of review by Contractor or for being incomplete, with appropriate action, coordination, or change.

1.10 DISAPPROVED OR REJECTED SUBMITTALS

Make corrections required by the CITY's RPR. If the Contractor considers any correction or notation on the returned submittals to constitute a change to the contract drawings or specifications; notice is to be given to the CITY. Contractor is responsible for the dimensions and design of connection details and construction of work. Failure to point out deviations may result in the CITY requiring rejection and removal of such work at the Contractor's expense.

If changes are necessary to submittals, make such revisions and submission of the submittals in accordance with the procedures above. No item of work requiring a submittal change is to be accomplished until the changed submittals are approved.

1.11 APPROVED OR ACCEPTED SUBMITTALS

Approval or acceptance will not relieve the Contractor of the responsibility for any error which may exist, as the Contractor under the Contractor Quality Control (CQC) requirements of this contract is responsible for.

After submittals have been approved or accepted by the CITY's RPR, no resubmittal for the purpose of substituting materials or equipment will be considered unless accompanied by an explanation of why a substitution is necessary.

1.12 APPROVED SAMPLES

Approval of a sample is only for the characteristics or use named in such approval and is not be construed to change or modify any contract requirements. Before submitting samples, the Contractor is to assure that the materials or equipment will be available in quantities required in the project. No change or substitution will be permitted after a sample has been approved.

Match the approved samples for materials and equipment incorporated in the work. If requested, approved samples, including those which may be damaged in testing, will be returned to the Contractor, at his expense, upon completion of the contract. Samples not approved will also be returned to the Contractor at its expense, if so requested.

Failure of any materials to pass the specified tests will be sufficient cause for refusal to consider, under this contract, any further samples of the same brand or make of that material. CITY (and the City's RPR) reserve(s) the right to disapprove any material or equipment which previously has proved unsatisfactory in service.

Samples of various materials or equipment delivered on the site or in place may be taken by the CITY for testing. Samples failing to meet contract requirements will automatically void previous approvals. Contractor to replace such materials or equipment to meet contract requirements.

Approval of the Contractor's samples by the CITY does not relieve the Contractor of his responsibilities under the contract.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

-- End of Section --

SECTION 01 50 00

TEMPORARY CONSTRUCTION FACILITIES AND CONTROLS

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

FLORIDA DEPARTMENT OF TRANSPORTATION (FDOT)

FDOT Standard Specifications for Road and Bridge Construction (January 2018)

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 241	(2013; Errata 2015) Standard for Safeguarding Construction, Alteration, and Demolition Operations
NFPA 70	(2017) National Electric Code (2011) National Electric Code

U.S. FEDERAL AVIATION ADMINISTRATION (FAA)

FAA AC 70/7460-1	(2007; Rev K) Obstruction Marking and Lighting

U.S. FEDERAL HIGHWAY ADMINISTRATION (FHWA)

MUTCD	(2009) Manual on Uniform Traffic Control Devices

1.2 SUBMITTALS

CITY approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Construction Site Plan; G
Hurricane Preparedness Plan; G

1.3 CONSTRUCTION SITE PLAN

Prior to the start of work, submit a site plan showing the locations and dimensions of temporary facilities (including layouts and details, equipment and material storage area (onsite and offsite), and access and haul routes, avenues of ingress/egress to the fenced area and details of the fence installation. Identify any areas which may have to be graveled to prevent the tracking of mud. Indicate

if the use of a supplemental or other staging area beyond that provided by the City will be utilized, and location of same. Show locations of safety and construction fences, site trailers, construction entrances, trash dumpsters, temporary sanitary facilities, and worker parking areas.

1.4 HURRICANE CONDITION OF READINESS

Unless directed otherwise, comply with:

a. Condition FOUR Sustained winds of 50 knots or greater expected within 72 hours: Normal daily jobsite cleanup and good housekeeping practices. Collect and store in piles or containers scrap lumber, waste material, and rubbish for removal and disposal at the close of each work day. Maintain the construction site including storage areas, free of accumulation of debris. Stack form lumber in neat piles less than 4 feet high. Remove all debris, trash, or objects that could become missile hazards.

b. Condition THREE Sustained winds of 50 knots or greater expected within 48 hours: Maintain "Condition FOUR" requirements and commence securing operations necessary for "Condition ONE" which cannot be completed within 18 hours. Cease all routine activities which might interfere with securing operations. Commence securing and stow all gear and portable equipment. Make preparations for securing buildings. Review requirements pertaining to "Condition TWO" and continue action as necessary to attain "Condition THREE" readiness. Contact CITY for weather and Condition of Readiness (COR) updates and completion of required actions.

c. Condition TWO Sustained winds of 50 knots or greater expected within 24 hours: Curtail or cease routine activities until securing operation is complete. Reinforce or remove form work and scaffolding. Secure machinery, tools, equipment, materials, or remove from the jobsite. Expend every effort to clear all missile hazards and loose equipment from general base areas. Contact CITY for weather and COR updates and completion of required actions.

d. Condition ONE. Sustained winds of 50 knots or greater expected within 12 hours: Secure the jobsite, and leave CITY premises.

PART 2 PRODUCTS

2.1 TEMPORARY SIGNAGE

2.1.1 Bulletin Board

Immediately upon beginning of work, provide a weatherproof glass-covered bulletin board not less than 36 by 48 inches in size for displaying the Equal Employment Opportunity poster, Wage Rate Information poster, and other information approved by the CITY.

2.1.2 Project and Safety Signs

The requirements for the signs, their content, and location are as indicated. Erect signs within 15 days after receipt of the notice to proceed. Correct the data required by the safety sign daily, with light colored metallic or non-metallic numerals.

2.2 TEMPORARY TRAFFIC CONTROL

2.2.1 Fencing

Provide fencing along the construction site to restrict public access to the construction site.

a) Enclose the project work area and Contractor staging areas with a 6 ft high chain link fence. Remove the fence upon completion and acceptance of the work. Intent is to block (screen) public view of the construction as well as to limit public access to the construction site.
b) Safety fencing must be a high visibility orange colored, high density polyethylene grid or approved equal, a minimum of 48 inches high and maximum mesh size of 2 inches, supported and tightly secured to posts located on maximum 10 foot centers. Install fencing to be able to restrain a force of at least 250 pounds against it.
c) In addition, prior to the start of work and as necessary, enclose those areas at the construction site which are not within the construction fence with a temporary safety fence, including gates and warning signs, to protect the public from construction activities. Remove the fence from the work site upon completion of the contract.

PART 3 EXECUTION

3.1 EMPLOYEE PARKING

Contractor employees will park privately owned vehicles in an area designated by the CITY. This area will be within reasonable walking distance of the construction site. Contractor employee parking must not interfere with the City's existing and established parking requirements.

3.2 TEMPORARY BULLETIN BOARD

Locate the bulletin board at the project site in a conspicuous place easily accessible to all employees, as approved by the CITY.

3.3 AVAILABILITY AND USE OF UTILITY SERVICES

3.3.1 Temporary Utilities

Provide temporary utilities required for construction. Materials may be new or used, must be adequate for the required usage, not create unsafe conditions, and not violate applicable codes and standards.

3.3.2 Sanitation

Provide and maintain within the construction area minimum field-type sanitary facilities approved by the CITY and periodically remove waste to a commercial facility. Any penalties and/or fines associated with improper discharge will be the responsibility of the Contractor. Maintain these conveniences at all times without nuisance. Include provisions for pest control and elimination of odors. CITY toilet facilities will not be available to Contractor's personnel.

3.3.3 Telephone

Make arrangements and pay all costs for communications and internet facilities desired.

3.3.4 Obstruction Lighting of Cranes

Provide a minimum of 2 aviation red or high intensity white obstruction lights on temporary structures (including cranes) over 100 feet above ground level. Light construction and installation must comply with FAA AC 70/7460-1. Lights must be operational during periods of reduced visibility, darkness, and as directed by the CITY.

3.3.5 Fire Protection

Provide temporary fire protection equipment for the protection of personnel and property during construction. Remove debris and flammable materials daily to minimize potential hazards.

3.4 TRAFFIC PROVISIONS

3.4.1 Maintenance of Traffic

a. Conduct operations in a manner that will not close any thoroughfare or interfere in any way with traffic on roads or highways except with written permission of the CITY at least 15 calendar days prior to the proposed modification date. Contractor may move oversized and slow-moving vehicles to the worksite provided requirements of the highway authority have been met.

b. Conduct work so as to minimize obstruction of traffic, and maintain traffic on at least half of the roadway width at all times. Obtain approval from the CITY prior to starting any activity that will obstruct traffic.

c. Provide, erect, and maintain, at Contractor’s expense, lights, barriers, signals, passageways, detours, and other items, that may be required by the Life Safety Signage, overhead protection authority having jurisdiction.

3.4.2 Protection of Traffic

Maintain and protect traffic on all affected roads during the construction period except as otherwise specifically directed by the CITY. Measures for the protection and diversion of traffic, including the provision of watchmen and flagmen, erection of barricades, placing of lights around and in front of equipment, the work, and the erection and maintenance of adequate warning, danger, and direction signs, will be as required by the State and local authorities having jurisdiction. Protect the traveling

public from damage to person and property. Minimize the interference with public traffic on roads selected for hauling material to and from the site. Investigate the adequacy of existing roads and their allowable load limit. Contractor is responsible for the repair of any damage to roads caused by construction operations.

3.4.3 Rush Hour Restrictions

Do not interfere with the peak traffic flows preceding and during normal operations without notification to and approval by the CITY.

3.4.4 Dust Control

Dust control methods and procedures must be approved by the CITY. Treat dust abatement on access roads with applications of calcium chloride, water sprinklers, or similar methods or treatment.

3.5 CONTRACTOR'S TEMPORARY FACILITIES

3.5.1 Safety

Protect the integrity of any installed safety systems or personnel safety devices. If entrance into systems serving safety devices is required, the Contractor must obtain prior approval from the CITY. If it is temporarily necessary to remove or disable personnel safety devices in order to accomplish contract requirements, provide alternative means of protection prior to removing or disabling any permanently installed safety devices or equipment and obtain approval from the CITY.

3.5.2 Storage Area

Construct a temporary 6 foot high chain link fence around trailers and materials. Include plastic strip inserts, colored green, so that visibility through the fence is obstructed. Fence posts may be driven, in lieu of concrete bases, where soil conditions permit. Do not place or store Trailers, materials, or equipment outside the fenced area unless such trailers, materials, or equipment are assigned a separate and distinct storage area by the CITY away from the vicinity of the construction site but within the installation boundaries. Trailers, equipment, or materials must not be open to public view with the exception of those items which are in support of ongoing work on any given day. Do not stockpile materials outside the fence in preparation for the next day's work. Park mobile equipment, such as tractors, wheeled lifting equipment, cranes, trucks, and like equipment within the fenced area at the end of each work day.

3.5.3 Appearance of Trailers

a. Trailers utilized by the Contractor for administrative or material storage purposes must present a clean and neat exterior appearance and be in a state of good repair. Trailers which, in the opinion of the CITY, require exterior painting or maintenance will not be allowed on installation property.

b. Maintain the temporary facilities. Failure to do so will be sufficient reason to require their removal.

3.5.4 Maintenance of Storage Area

Keep fencing in a state of good repair and proper alignment. Grassed or unpaved areas, which are not established roadways, will be covered with a layer of gravel as necessary to prevent rutting and the tracking of mud onto paved or established roadways, should the Contractor elect to traverse them with construction equipment or other vehicles; gravel gradation will be at the Contractor's discretion. Mow and maintain grass located within the boundaries of the construction site for the duration of the project. Grass and vegetation along fences, buildings, under trailers, and in areas not accessible to mowers will be edged or trimmed neatly.

3.5.5 Security Provisions

Provide adequate outside security lighting at the Contractor's temporary facilities. The Contractor will be responsible for the security of its own equipment; in addition, the Contractor will notify the appropriate law enforcement agency requesting periodic security checks of the temporary project field office.

3.5.6 Weather Protection of Temporary Facilities and Stored Materials

When a warning of gale force winds is issued, take precautions to minimize danger to persons, and protect the work and nearby CITY property. Precautions must include, but are not limited to, closing openings; removing loose materials, tools and equipment from exposed locations; and removing or securing temporary work surfaces and/or enclosures; and general good housekeeping. Close openings in the work when storms of lesser intensity pose a threat to the work or any nearby CITY property.

3.6 FIELD OFFICE

3.6.1 Trailer-Type Mobile Office

The Contractor may, at its option, furnish and maintain a trailer-type mobile office acceptable to the CITY and providing as a minimum the facilities specified above. Securely anchor the trailer to the ground at all four corners to guard against movement during high winds.

3.7 TEMPORARY PROJECT SAFETY FENCING

As soon as practicable, but not later than 15 days after the date established for commencement of work, furnish and erect temporary project safety fencing at the work site. Maintain the safety fencing during the life of the contract and, upon completion and acceptance of the work, will become the property of the Contractor and be removed from the work site.

3.8 CLEANUP

Remove construction debris, waste materials, packaging material and the like from the work site daily. Any dirt or mud which is tracked onto paved or surfaced roadways must be cleaned away. Store any salvageable materials resulting from demolition activities within the fenced area described above or at the supplemental storage area. Neatly stack stored materials not in trailers, whether new or salvaged.

3.9 RESTORATION OF STORAGE AREA

Upon completion of the project, remove the bulletin board, signs, barricades, haul roads, and any other temporary products from the site. After removal of trailers, materials, and equipment from within the fenced area, remove the fence that will become the property of the Contractor. Restore areas used by the Contractor for the storage of equipment and/or materials, or other use to the original or better condition. Remove gravel used to traverse grassed areas and restore the area to its original condition, including top soil, seeding and sod as necessary.

-- End of Section –

SECTION 01 57 19

TEMPORARY ENVIRONMENTAL CONTROLS

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

29 CFR 1910.120	Hazardous Waste Operations and Emergency Response
40 CFR 112	Oil Pollution Prevention
40 CFR 122.26	Storm Water Discharges (Applicable to State NPDES Programs, see section 123.25)
40 CFR 261	Identification and Listing of Hazardous Waste
40 CFR 261.7	Residues of Hazardous Waste in Empty Containers
40 CFR 263	Standards Applicable to Transporters of Hazardous Waste
40 CFR 268	Land Disposal Restrictions
40 CFR 273	Standards for Universal Waste Management
40 CFR 279	Standards for the Management of Used Oil
40 CFR 403	General Pretreatment Regulations for Existing and New Sources of Pollution
40 CFR 60	Standards of Performance for New Stationary Sources
40 CFR 63	National Emission Standards for Hazardous Air Pollutants for Source Categories
49 CFR 171	General Information, Regulations, and Definitions
49 CFR 172	Hazardous Materials Table, Special Provisions, Hazardous Materials Communications, Emergency Response Information, and Training Requirements

49 CFR 173	Shippers - General Requirements for Shipments and Packaging
52 CFR 236-7	Permits and Responsibilities

1.2 DEFINITIONS

1.2.1 Class I and II Ozone Depleting Substance (ODS)

Class I ODS is defined in Section 602(a) of The Clean Air Act. A list of Class I ODS can be found on the EPA website at the following weblink. http://www.epa.gov/ozone/science/ods/classone.html.

Class II ODS is defined in Section 602(s) of The Clean Air Act. A list of Class II ODS can be found on the EPA website at the following weblink. http://www.epa.gov/ozone/science/ods/classtwo.html.

1.2.2 Contractor Generated Hazardous Waste

Contractor generated hazardous waste is materials that, if abandoned or disposed of, may meet the definition of a hazardous waste. These waste streams would typically consist of material brought on site by the Contractor to execute work, but are not fully consumed during the course of construction. Examples include, but are not limited to, excess paint thinners (i.e., methyl ethyl ketone, toluene), waste thinners, excess paints, excess solvents, waste solvents, excess pesticides, and contaminated pesticide equipment rinse water.

1.2.3 Electronics Waste

Electronics waste is discarded electronic devices intended for salvage, recycling, or disposal.

1.2.4 Environmental Pollution and Damage

Environmental pollution and damage is the presence of chemical, physical, or biological elements or agents which adversely affect human health or welfare; unfavorably alter ecological balances of importance to human life; affect other species of importance to humankind; or degrade the environment aesthetically, culturally or historically.

1.2.5 Environmental Protection

Environmental protection is the prevention/control of pollution and habitat disruption that may occur to the environment during construction. The control of environmental pollution and damage requires consideration of land, water, and air; biological and cultural resources; and includes management of visual aesthetics; noise; solid, chemical, gaseous, and liquid waste; radiant energy and radioactive material as well as other pollutants.

1.2.6 Hazardous Debris

As defined in paragraph Solid Waste, debris that contains listed hazardous waste (either on the debris surface, or in its interstices, such as pore structure) in accordance with 40 CFR 261. Hazardous debris also includes debris that exhibits a characteristic of hazardous waste in accordance with 40 CFR 261.

1.2.7 Hazardous Materials

Hazardous materials as defined in 49 CFR 171 and listed in 49 CFR 172.

Hazardous material is any material that: Is regulated as a hazardous material in accordance with 49 CFR 173; or requires a Safety Data Sheet (SDS) in accordance with 29 CFR 1910.120; or during end use, treatment, handling, packaging, storage, transportation, or disposal meets or has components that meet or have potential to meet the definition of a hazardous waste as defined by 40 CFR 261 Subparts A, B, C, or D. Designation of a material by this definition, when separately regulated or controlled by other sections or directives, does not eliminate the need for adherence to that hazard-specific guidance which takes precedence over this section for "control" purposes. Such material includes ammunition, weapons, explosive actuated devices, propellants, pyrotechnics, chemical and biological warfare materials, medical and pharmaceutical supplies, medical waste and infectious materials, bulk fuels, radioactive materials, and other materials such as asbestos, mercury, and polychlorinated biphenyls (PCBs).

1.2.8 Hazardous Waste

Hazardous Waste is any material that meets the definition of a solid waste and exhibit a hazardous characteristic (ignitability, corrosivity, reactivity, or toxicity) as specified in 40 CFR 261, Subpart C, or contains a listed hazardous waste as identified in 40 CFR 261, Subpart D.

1.2.9 Land Application

Land Application means spreading or spraying discharge water at a rate that allows the water to percolate into the soil. No sheeting action, soil erosion, discharge into storm sewers, discharge into defined drainage areas, or discharge into the "waters of the United States" must occur. Comply with federal, state, and local laws and regulations.

1.2.10 Municipal Separate Storm Sewer System (MS4) Permit

MS4 permits are those held by installations to obtain NPDES permit coverage for their stormwater discharges.

1.2.11 National Pollutant Discharge Elimination System (NPDES)

The NPDES permit program controls water pollution by regulating point sources that discharge pollutants into waters of the United States.

1.2.12 Oily Waste

Oily waste are those materials that are, or were, mixed with Petroleum, Oils, and Lubricants (POLs) and have become separated from that POLs. Oily wastes also means materials, including wastewaters, centrifuge solids, filter residues or sludges, bottom sediments, tank bottoms, and sorbents which have come into contact with and have been contaminated by, POLs and may be appropriately tested and discarded in a manner which is in compliance with other state and local requirements.

This definition includes materials such as oily rags, "kitty litter" sorbent clay and organic sorbent material. These materials may be land filled provided that: It is not prohibited in other state regulations or local ordinances; the amount generated is "*de minimus*" (a small amount); it is the result of minor leaks or spills resulting from normal process operations; and free-flowing oil has been removed to the practicable extent possible. Large quantities of this material, generated as a result of a major spill or in lieu of proper maintenance of the processing equipment, are a solid waste. As a solid waste, perform a hazardous waste determination prior to disposal. As this can be an expensive process, it is recommended that this type of waste be minimized through good housekeeping practices and employee education.

1.2.13 Regulated Waste

Regulated waste are solid wastes that have specific additional federal, state, or local controls for handling, storage, or disposal.

1.2.14 Sediment

Sediment is soil and other debris that have eroded and have been transported by runoff water or wind.

1.2.15 Solid Waste

Solid waste is a solid, liquid, semi-solid or contained gaseous waste. A solid waste can be a hazardous waste, non-hazardous waste, or non-Resource Conservation and Recovery Act (RCRA) regulated waste. Types of solid waste typically generated at construction sites may include:

1.2.15.1 Debris

Debris is non-hazardous solid material generated during the construction, demolition, or renovation of a structure that exceeds 2.5-inch particle size that is: a manufactured object; plant or animal matter; or natural geologic material (for example, cobbles and boulders), broken or removed concrete, masonry, and rock asphalt paving; ceramics; concrete formwork. Inert materials may be reinforced with or contain ferrous wire, rods, accessories and weldments. A mixture of debris and other material such as soil or sludge is also subject to regulation as debris if the mixture is comprised primarily of debris by volume, based on visual inspection.

1.2.15.2 Green Waste

Green waste is the vegetative matter from landscaping, land clearing and grubbing, including, but not limited to, grass, bushes, scrubs, small trees and saplings, tree stumps and plant roots. Marketable trees, grasses and plants that are indicated to remain, be re-located, or be re-used are not included.

1.2.15.3 Material not Regulated as Solid Waste

Material not regulated as solid waste is nuclear source or byproduct materials regulated under the Federal Atomic Energy Act of 1954 as amended; suspended or dissolved materials in domestic sewage effluent or irrigation return flows, or other regulated point source discharges; regulated air emissions; and fluids or wastes associated with natural gas or crude oil exploration or production.

1.2.15.4 Non-Hazardous Waste

Non-hazardous waste is waste that is excluded from, or does not meet, hazardous waste criteria in accordance with 40 CFR 263.

1.2.15.5 Recyclables

Recyclables are materials, equipment and assemblies such as doors, windows, door and window frames, plumbing fixtures, glazing and mirrors that are recovered and sold as recyclable, and structural components. It also includes used fuel oil, textiles, high-grade paper products and corrugated cardboard, stackable pallets in good condition, clean crating material, and clean rubber/vehicle tires. Metal meeting the definition of lead contaminated or lead based paint contaminated may not be included as recyclable if sold to a scrap metal company. Paint cans that meet the definition of empty containers in accordance with 40 CFR 261.7 may be included as recyclable if sold to a scrap metal company.

1.2.15.6 Surplus Soil

Surplus soil is existing soil that is in excess of what is required for this work, including aggregates intended, but not used, for on-site mixing of concrete, mortars, and paving.

1.2.15.7 Scrap Metal

This includes scrap and excess ferrous and non-ferrous metals such as reinforcing steel, structural shapes, pipe, and wire that are recovered or collected and disposed of as scrap. Scrap metal meeting the definition of hazardous material or hazardous waste is not included.

1.2.15.8 Wood

Wood is dimension and non-dimension lumber, plywood, chipboard, hardboard. Treated or painted wood that meets the definition of lead contaminated or lead based contaminated paint is not included. Treated wood includes, but is not limited to, lumber, utility poles, crossties, and other wood products with chemical treatment.

1.2.16 Surface Discharge

Surface discharge means discharge of water into drainage ditches, storm sewers, creeks or "waters of the United States". Surface discharges are discrete, identifiable sources and require a permit from the governing agency. Comply with federal, state, and local laws and regulations.

1.2.17 Wastewater

Wastewater is the used water and solids from a community that flow to a treatment plant.

1.2.17.1 Stormwater

Stormwater is any precipitation in an urban or suburban area that does not evaporate or soak into the ground, but instead collects and flows into storm drains, rivers, and streams.

1.2.18 Waters of the United States

Waters of the United States means Federal jurisdictional waters, including wetlands, that are subject to regulation under Section 404 of the Clean Water Act or navigable waters, as defined under the Rivers and Harbors Act.

1.2.19 Universal Waste

The universal waste regulations streamline collection requirements for certain hazardous wastes in the following categories: batteries, pesticides, mercury-containing equipment (for example, thermostats), and lamps (for example, fluorescent bulbs). The rule is designed to reduce hazardous waste in the municipal solid waste (MSW) stream by making it easier for universal waste handlers to collect these items and send them for recycling or proper disposal. These regulations can be found at 40 CFR 273.

1.3 SUBMITTALS

CITY approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals
- Environmental Protection Plan; G
- Stormwater Notice of Intent (for NPDES general permit for construction); G

SD-08 Closeout Submittals
- Stormwater Pollution Prevention Plan Compliance Notebook; G
- Stormwater Notice of Termination (for NPDES general permit for construction); G

1.4 ENVIRONMENTAL PROTECTION REQUIREMENTS

Provide and maintain, during the life of the contract, environmental protection as defined. Plan for and provide environmental protective measures to control pollution that develops during construction practice. Plan for and provide environmental protective measures required to correct conditions that develop during the construction of permanent or temporary environmental features associated with the project. Protect the environmental resources within the project boundaries and those affected outside the limits of permanent work during the entire duration of this Contract. Comply with federal, state, and local regulations pertaining to the environment, including water, air, solid waste, hazardous waste and substances, oily substances, and noise pollution.

Tests and procedures assessing whether construction operations comply with Applicable Environmental Laws may be required. Analytical work must be performed by qualified laboratories; and where required by law, the laboratories must be certified.

1.5 SPECIAL ENVIRONMENTAL REQUIREMENTS

Comply with the special environmental requirements listed here and attached at the end of this section.

1.6 QUALITY ASSURANCE

1.6.1 Preconstruction Survey and Protection of Features

This paragraph supplements the Contract Clause **PROTECTION OF WORK AND PROPERTY**. Prior to the start of any onsite construction activities, perform a Preconstruction Confirmation Survey of the project site with the CITY, and take photographs showing existing environmental conditions in and adjacent to the site. Submit a report for the record. Include in the report a plan describing the features requiring protection under the provisions of the Contract Clauses, which are not specifically identified on the drawings as environmental features requiring protection along with the condition of trees, shrubs and grassed areas immediately adjacent to the site of work and adjacent to the Contractor's assigned storage area and access route(s), as applicable. The Contractor and the CITY will sign this survey report upon mutual agreement regarding its accuracy and completeness. Protect those environmental features included in the survey report and any indicated on the drawings, regardless of interference that their preservation may cause to the work under the Contract.

1.6.2 Regulatory Notifications

Provide regulatory notification requirements in accordance with federal, state and local regulations. In cases where the CITY will also provide public notification (such as stormwater permitting), coordinate with the CITY. Submit copies of regulatory notifications to the CITY within 14 days prior to commencement of work activities. Typically, regulatory notifications must be provided for the following (this listing is not all-inclusive): demolition, renovation, NPDES defined site work, construction, removal or use of a permitted air emissions source, and remediation of controlled substances (e.g., asbestos, hazardous waste, lead paint).

1.6.3 Environmental Brief

Provide the following information: types, quantities, and use of hazardous materials that will be brought onto the installation; and types and quantities of wastes/wastewater that may be generated during the Contract. Discuss the results of the Preconstruction Survey at this time.

Prior to initiating any work on site, meet with the CITY and EOR to discuss the proposed Environmental Protection Plan (EPP). Develop a mutual understanding relative to the details of environmental protection, including measures for protecting natural and cultural resources, required reports, required permits, permit requirements (such as mitigation measures), and other measures to be taken.

1.6.4 Non-Compliance Notifications

The CITY will notify the Contractor in writing of any observed noncompliance with federal, state or local environmental laws or regulations, permits, and other elements of the Contractor's EPP. After receipt of such notice, inform the CITY of the proposed corrective action and take such action when approved by the CITY. The CITY may issue an order stopping all or part of the work until satisfactory corrective action has been taken. No time extensions will be granted or equitable adjustments allowed for any such suspensions. This is in addition to any other actions the CITY may take under the contract, or in accordance with the Federal Acquisition Regulation or Federal Law.

1.7 ENVIRONMENTAL PROTECTION PLAN (EPP)

The purpose of the EPP is to present an overview of known or potential environmental issues that must be considered and addressed during construction. Incorporate construction related objectives and targets from the installation's EMS into the EPP. Include in the EPP measures for protecting natural and cultural resources, required reports, and other measures to be taken. Meet with the CITY or CITY Representative to discuss the EPP and develop a mutual understanding relative to the details for environmental protection including measures for protecting natural resources, required reports, and other measures to be taken. Submit the EPP within 14 days after notice to proceed and not less than 10 days before the start of construction. Revise the EPP throughout the project to include any reporting requirements, changes in site conditions, or contract modifications that change the project scope of work in a way that could have an environmental impact. No requirement in this section will relieve the Contractor of any applicable federal, state, and local environmental protection laws and regulations. During Construction, identify, implement, and submit for approval any additional requirements to be included in the EPP. Maintain the current version onsite.

The EPP includes, but is not limited to, the following elements:

1.7.1 General Overview and Purpose

1.7.1.1 Descriptions

A brief description of each specific plan required by environmental permit or elsewhere in this Contract such as stormwater pollution prevention plan, spill control plan, solid waste management plan, wastewater management plan, contaminant prevention plan, a historical, archaeological, cultural resources, biological resources and wetlands plan, traffic control plan, Non-Hazardous Solid Waste Disposal Plan, borrowing material plan, etc.

1.7.1.2 Duties

The duties and level of authority assigned to the person(s) on the job site who oversee environmental compliance, such as who is responsible for adherence to the EPP, who is responsible for spill cleanup and training personnel on spill response procedures, who is responsible for manifesting hazardous waste to be removed from the site (if applicable), and who is responsible for training the Contractor's environmental protection personnel.

1.7.1.3 Procedures

A copy of any standard or project-specific operating procedures that will be used to effectively manage and protect the environment on the project site.

1.7.1.4 Communications

Communication and training procedures that will be used to convey environmental management requirements to Contractor employees and subcontractors.

1.7.1.5 Contact Information

Emergency contact information (office phone number, cell phone number, and e-mail address).

1.7.2 General Site Information

1.7.2.1 Drawings

Drawings showing locations of staging areas, material storage areas, structures, sanitary facilities, maintenance of existing storm drains and conveyances, and stockpiles of excess soil.

1.7.2.2 Work Area

Work area plan showing the proposed activity in each portion of the area and identify the areas of limited use or nonuse. Include measures for marking the limits of use areas, including methods for protection of features to be preserved within authorized work areas and methods to control runoff and to contain materials on site, and a traffic control plan.

1.7.2.3 Documentation

A letter signed by an officer of the firm appointing the Environmental Manager (Foreman) and stating that person is responsible for managing and implementing the Environmental Program as described in this contract. Include in this letter the Environmental Manager's authority to direct the removal and replacement of non-conforming work.

1.7.3 Management of Natural Resources

a. Land resources
b. Tree protection
c. Replacement of damaged landscape features
d. Temporary construction
e. Fish and benthic resources

1.7.4 Protection of Historical and Archaeological Resources

a. Objectives
b. Methods

1.7.5 Stormwater Management and Control

a. Ground cover
b. Erodible soils
c. Temporary measures
(1) Structural Practices
(2) Temporary and permanent stabilization
d. Effective selection, implementation and maintenance of Stormwater Best Management Practices (BMPs).

1.7.6 Protection of the Environment from Waste Derived from Contractor Operations

Control and disposal of solid and sanitary waste. Control and disposal of hazardous waste.

This item consists of the management procedures for hazardous waste to be generated. The elements of those procedures will coincide with the Installation Hazardous Waste Management Plan. The CONTRACTOR will provide a copy of the Installation Hazardous Waste Management Plan. As a minimum, include the following:

a. List of the types of hazardous wastes expected to be generated

b. Procedures to ensure a written waste determination is made for appropriate wastes that are to be generated

c. Sampling/analysis plan, including laboratory method(s) that will be used for waste determinations and copies of relevant laboratory certifications

d. Methods and proposed locations for hazardous waste accumulation/storage (that is, in tanks or containers)

e. Management procedures for storage, labeling, transportation, and disposal of waste (treatment of waste is not allowed unless specifically noted)

f. Management procedures and regulatory documentation ensuring disposal of hazardous waste complies with Land Disposal Restrictions (40 CFR 268)

g. Management procedures for recyclable hazardous materials such as lead-acid batteries, used oil, and similar

h. Used oil management procedures in accordance with 40 CFR 279; Hazardous waste minimization procedures

i. Plans for the disposal of hazardous waste by permitted facilities; and Procedures to be employed to ensure required employee training records are maintained.

1.7.7 Prevention of Releases to the Environment

Procedures to prevent releases to the environment.

Notifications in the event of a release to the environment.

1.7.8 Regulatory Notification and Permits

List what notifications and permit applications must be made. Some permits require up to 180 days to obtain. Demonstrate that those permits have been obtained or applied for by including copies of applicable environmental permits. The EPP will not be approved until the permits have been obtained.

1.7.9 Clean Air Act Compliance

1.7.9.1 Haul Route

Submit truck and material haul routes along with a Dirt and Dust Control Plan for controlling dirt, debris, and dust on Installation roadways. As a minimum, identify in the plan the subcontractor and equipment for cleaning along the haul route and measures to reduce dirt, dust, and debris from roadways.

1.7.9.2 Pollution Generating Equipment

Identify air pollution generating equipment or processes that may require federal, state, or local permits under the Clean Air Act. Determine requirements based on any current installation permits and the impacts of the project. Provide a list of all fixed or mobile equipment, machinery or operations that could generate air emissions during the project to the Installation Environmental Office (Air Program Manager).

1.7.9.3 Stationary Internal Combustion Engines

Identify portable and stationary internal combustion engines that will be supplied, used or serviced. Comply with 40 CFR 60 Subpart IIII, 40 CFR 60 Subpart JJJJ, 40 CFR 63 and local regulations as applicable. At minimum, include the make, model, serial number, manufacture date, size (engine brake horsepower), and EPA emission certification status of each engine. Maintain applicable records and log hours of operation and fuel use. Logs must include reasons for operation and delineate between emergency and non-emergency operation.

1.7.9.4 Refrigerants

Identify management practices to ensure that heating, ventilation, and air conditioning (HVAC) work involving refrigerants complies with 40 CFR 82 requirements. Technicians must be certified, maintain copies of certification on site, use certified equipment and log work that requires the addition or removal of refrigerant.

1.7.9.5 Air Pollution-engineering Processes

Identify planned air pollution-generating processes and management control measures (including, but not limited to, spray painting, abrasive blasting, demolition, material handling, fugitive dust, and fugitive emissions). Log hours of operations and track quantities of materials used.

1.7.9.6 Monitoring

For the protection of public health, monitor and control contaminant emissions to the air from Hazardous, Toxic, and Radioactive Waste remedial action area sources to minimize short-term risks that might be posed to the community during implementation of the remedial alternative in accordance with the following.

a. Perimeter Air Contaminant of Concern (TBD if necessary).
b. Time Averaged Perimeter Action Levels (TBD if necessary).

Concentration	(TBD if necessary)
Time	(TBD if necessary)

c. Perimeter Sampling/Monitoring Location[s] (TBD if necessary).
d. Monitoring Instruments/Sampling and Analysis Methods (TBD if necessary).
e. Staffing (TBD if necessary).

1.7.9.7 Compliant Materials

Provide the CITY a list of MSDSs for all hazardous materials proposed for use on site. Materials must be compliant with all Clean Air Act regulations for emissions including solvent and volatile organic compound contents, and applicable National Emission Standards for Hazardous Air Pollutants requirements. The CITY may alter or limit use of specific materials as needed to meet installation permit requirements for emissions.

1.8 LICENSES AND PERMITS

Obtain licenses and permits required for the construction of the project and in accordance with 48 CFR 52.236-7. Notify the CITY of all general use permitted equipment the Contractor plans to use on site. This paragraph supplements the Contractor's responsibility under FAR 52.236-7.

a. The following permits have been obtained by the CITY:
   (1) FDEP File No.: MO-45 AR, Monroe County

1.9 ENVIRONMENTAL RECORDS BINDER

Maintain on-site a separate three-ring Environmental Records Binder and submit at the completion of the project. Make separate parts within the binder that correspond to each submittal listed under paragraph CLOSEOUT SUBMITTALS in this section.

1.10 SOLID WASTE MANAGEMENT PERMIT

Provide the CITY with written notification of the quantity of anticipated solid waste or debris that is anticipated or estimated to be generated by construction. Include in the report the locations where various types of waste will be disposed or recycled. Include letters of acceptance from the receiving location or as applicable; submit one copy of the receiving location state and local Solid Waste Management Permit or license showing such agency's approval of the disposal plan before transporting wastes off property.

1.10.1 Solid Waste Management Report

Monthly, submit a solid waste disposal report to the CITY. For each waste, the report will state the classification (using the definitions provided in this section), amount, location, and name of the business receiving the solid waste.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.1 PROTECTION OF NATURAL RESOURCES

Minimize interference with, disturbance to, and damage to fish, wildlife, and plants, including their habitats. Prior to the commencement of activities, consult with the CITY and EOR regarding rare species or sensitive habitats that need to be protected. The protection of rare, threatened, and endangered animal and plant species identified, including their habitats, is the Contractor's responsibility.

Preserve the natural resources within the project boundaries and outside the limits of permanent work. Restore to an equivalent or improved condition upon completion of work that is consistent with the requirements of the CITY or as otherwise specified. Confine construction activities to within the limits of the work indicated or specified.

3.1.1 Flow Ways

Do not alter water flows or otherwise significantly disturb the native habitat adjacent to the project and critical to the survival of fish and wildlife, except as specified and permitted.

3.1.2 Vegetation

Except in areas to be cleared for the installation of the sheetpile, do not remove, cut, deface, injure, or destroy trees or shrubs without the CITY's permission. Do not fasten or attach ropes, cables, or guys to existing nearby trees for anchorages unless authorized by the CITY. Where such use of attached ropes, cables, or guys is authorized, the Contractor is responsible for any resultant damage.

Protect existing trees that are to remain to ensure they are not injured, bruised, defaced, or otherwise damaged by construction operations. Remove displaced rocks from uncleared areas. Coordinate with the CITY to determine appropriate action for trees and other landscape features scarred or damaged by equipment operations.

3.2 STORMWATER

Generally, do not discharge stormwater from construction sites to the sanitary sewer. If the water is noted or suspected of being contaminated, it may only be released to the storm drain system if the discharge is specifically permitted. Obtain authorization in advance from the CITY for any release of contaminated water.

3.2.1 Construction General Permit

Under the terms and conditions of the permit, install, inspect, maintain BMPs, prepare stormwater erosion and sediment control inspection reports, and submit SWPPP inspection reports. Maintain

construction operations and management in compliance with the terms and conditions of the general permit for stormwater discharges from construction activities.

3.2.1.1 Stormwater Pollution Prevention Plan

The SWPPP must meet the requirements of 40 CFR 122.26 and the State General Permit for stormwater discharges from construction sites.

Include the following:

a. Comply with terms of the FDEP NPDES general permit for stormwater discharges from construction activities. Prepare SWPPP in accordance with state requirements.

b. Select applicable BMPs from EPA Fact Sheets located at http://water.epa.gov/polwaste/npdes/swbmp/Construction-Site-StormWater-Run-Off-Control.cfm or in accordance with applicable state or local requirements.

c. Include a completed copy of the Notice of Intent, BMP Inspection Report Template, and Stormwater Notice of Termination, except for the effective date.

3.2.1.2 Stormwater Notice of Intent for Construction Activities

Prepare and submit the Notice of Intent for NPDES coverage under the general permit for construction activities to the CITY for review and approval.

Prepare and submit a Notice of Intent as a co-permittee to the CITY, for review and approval.

Submit the approved NOI and appropriate permit fees onto the appropriate federal or state agency for approval. No land disturbing activities may commence without permit coverage. Maintain an approved copy of the SWPPP at the onsite construction office, and continually update as regulations require, reflecting current site conditions.

3.2.1.3 Inspection Reports

Submit "Inspection Reports" to the CITY in accordance with the State of Florida Construction General Permit.

3.2.1.4 Stormwater Pollution Prevention Plan Compliance Notebook

Create and maintain a three ring binder of documents that demonstrate compliance with the Construction General Permit. Include a copy of the permit Notice of Intent, proof of permit fee payment, SWPPP and SWPPP update amendments, inspection reports and related corrective action records, copies of correspondence with the State Permitting Agency, and a copy of the permit Notice of Termination in the binder. At project completion, the notebook becomes property of the CITY. Provide the compliance notebook to the CITY.

3.2.1.5 Stormwater Notice of Termination for Construction Activities

Submit a Notice of Termination to the CITY for approval once construction is complete and final stabilization has been achieved on all portions of the site for which the permittee is responsible. Once approved, submit the Notice of Termination to the appropriate state or federal agency.

3.2.2 Erosion and Sediment Control Measures

Provide erosion and sediment control measures in accordance with state and local laws and regulations. Preserve vegetation to the maximum extent practicable.

Erosion control inspection reports may be compiled as part of a stormwater pollution prevention plan inspection reports.

3.2.2.1 Erosion Control

Prevent erosion. Stabilize slopes by combination of methods necessary for effective erosion control. Use of hay bales is prohibited.

3.2.2.2 Sediment Control Practices

Implement sediment control practices to divert flows from exposed soils, temporarily store flows, or otherwise limit runoff and the discharge of pollutants from exposed areas of the site. Implement sediment control practices prior to soil disturbance and prior to creating areas with concentrated flow, during the construction process to minimize erosion and sediment laden runoff.

3.2.3 Work Area Limits

Mark the areas that need not be disturbed under this Contract prior to commencing construction activities. Mark or fence isolated areas within the general work area that are not to be disturbed. Protect monuments and markers before construction operations commence. Where construction operations are to be conducted during darkness, any markers must be visible in the dark. Personnel must be knowledgeable of the purpose for marking and protecting particular objects.

3.2.4 Contractor Facilities and Work Areas

Place field offices, staging areas, stockpile storage, and temporary buildings in areas designated on the drawings or as directed by the CITY. Move or relocate the Contractor facilities only when approved by the CITY. Provide erosion and sediment controls for onsite borrow and spoil areas to prevent sediment from entering nearby waters. Control temporary excavation and embankments for plant or work areas to protect adjacent areas.

3.2.5 Municipal Separate Storm Sewer System (MS4) Management

Comply with the Installation's MS4 permit requirements.

3.3 SURFACE AND GROUNDWATER

3.3.1 Cofferdams, Diversions, and Dewatering

NOT USED.

3.3.2 Waters of the United States

Do not enter, disturb, destroy, or allow discharge of contaminants into waters of the United States except as authorized herein. The protection of waters of the United States shown on the drawings in accordance with paragraph LICENSES AND PERMITS is the Contractor's responsibility. Authorization to enter specific waters of the United States identified does not relieve the Contractor from any obligation to protect other waters of the United States within, adjacent to, or in the vicinity of the construction site and associated boundaries.

3.4 PROTECTION OF CULTURAL RESOURCES

3.4.1 Historical Resources

Contractor shall protect any historical resources encountered during the Project and is responsible for their preservation during the life of the Contract.

3.5 WASTE MINIMIZATION

Minimize the use of hazardous materials and the generation of waste. Include procedures for pollution prevention/ hazardous waste minimization in the Hazardous Waste Management Section of the EPP. Obtain a copy of the installation's Pollution Prevention/Hazardous Waste Minimization Plan for reference material when preparing this part of the EPP. If no written plan exists, obtain information by contacting the CITY. Describe the anticipated types of the hazardous materials to be used in the construction when requesting information.

3.5.1 Salvage, Reuse and Recycle

Identify anticipated materials and waste for salvage, reuse, and recycling. Describe actions to promote material reuse, resale or recycling. To the extent practicable, all scrap metal must be sent for reuse or recycling and will not be disposed of in a landfill.

Include the name, physical address, and telephone number of the hauler, if transported by a franchised solid waste hauler. Include the destination and, unless exempted, provide a copy of the state or local permit (cover) or license for recycling.

3.6 WASTEWATER

Do not allow wastewater from construction activities, such as onsite material processing, concrete curing, concrete clean-up, water used in concrete trucks, and forms to enter water ways or to be discharged prior to being treated to remove pollutants. Dispose of the construction- related waste water off-CITY property in accordance with 40 CFR 403, state, regional, and local laws and regulations.

3.7 PREVIOUSLY USED EQUIPMENT

Clean previously used construction equipment prior to bringing it onto the project site. Equipment must be free from soil residuals, egg deposits from plant pests, noxious weeds, and plant seeds. Consult with the U.S. Department of Agriculture jurisdictional office for additional cleaning requirements.

3.8 PETROLEUM, OIL, LUBRICANT (POL) STORAGE AND FUELING

POL products include flammable or combustible liquids, such as gasoline, diesel, lubricating oil, used engine oil, hydraulic oil, mineral oil, and cooking oil. Store POL products and fuel equipment and motor vehicles in a manner that affords the maximum protection against spills into the environment. Manage and store POL products in accordance with EPA 40 CFR 112, and other federal, state, regional, and local laws and regulations. Use secondary containments, dikes, curbs, and other barriers, to prevent POL products from spilling and entering the ground, storm or sewer drains, stormwater ditches or canals, or navigable waters of the United States. Describe in the EPP (see paragraph ENVIRONMENTAL PROTECTION PLAN) how POL tanks and containers must be stored, managed, and inspected and what protections must be provided.

3.8.1 Used Oil Management

Manage used oil generated on site in accordance with 40 CFR 279. Determine if any used oil generated while onsite exhibits a characteristic of hazardous waste. Used oil containing 1,000 parts per million of solvents is considered a hazardous waste and disposed of at the Contractor's expense. Used oil mixed with a hazardous waste is also considered a hazardous waste. Dispose in accordance with paragraph HAZARDOUS WASTE DISPOSAL.

3.8.2 Oil Storage Including Fuel Tanks

Provide secondary containment and overfill protection for oil storage tanks. A berm used to provide secondary containment must be of sufficient size and strength to contain the contents of the tanks plus 5 inches freeboard for precipitation. Construct the berm to be impervious to oil for 72 hours that no discharge will permeate, drain, infiltrate, or otherwise escape before cleanup occurs. Use drip pans during oil transfer operations; adequate absorbent material must be onsite to clean up any spills and prevent releases to the environment. Cover tanks and drip pans during inclement weather. Provide procedures and equipment to prevent overfilling of tanks. If tanks and containers with an aggregate aboveground capacity greater than 1320 gallons will be used onsite (only containers with a capacity of 55 gallons or greater are counted), provide and implement a SPCC plan meeting the requirements of 40 CFR 112. Do not bring underground storage tanks to the installation for Contractor use during a project. Submit the SPCC plan to the CITY for approval.

Monitor and remove any rainwater that accumulates in open containment dikes or berms. Inspect the accumulated rainwater prior to draining from a containment dike to the environment, to determine there is no oil sheen present.

3.9 INADVERTENT DISCOVERY OF PETROLEUM-CONTAMINATED SOIL OR HAZARDOUS WASTES

If petroleum-contaminated soil, or suspected hazardous waste is found during construction that was not identified in the Contract documents, immediately notify the CITY. Do not disturb this material until authorized by the CITY.

3.10 POST CONSTRUCTION CLEANUP

Clean up areas used for construction in accordance with Contract Clause: **CLEANING UP**. Unless otherwise instructed in writing by the CITY, remove traces of temporary construction facilities such as haul roads, work area, structures, foundations of temporary structures, stockpiles of excess or waste materials, and other vestiges of construction prior to final acceptance of the work. Grade parking area and similar temporarily used areas to conform with surrounding contours.

-- End of Section --

SECTION 01 74 19

CONSTRUCTION AND DEMOLITION WASTE MANAGEMENT

PART 1 GENERAL

1.1 CITY POLICY

CITY policy is to apply sound environmental principles in the design, construction and use of facilities. As part of the implementation of that policy: (1) practice efficient waste management when sizing, cutting, and installing products and materials and (2) use all reasonable means to divert construction and demolition waste from landfills and incinerators and to facilitate their recycling or reuse. If possible, divert project solid waste from the landfill.

1.2 MANAGEMENT

Develop and implement a waste management program. Take a pro-active, responsible role in the management of construction and demolition waste and require all subcontractors, vendors, and suppliers to participate in the effort. Construction and demolition waste includes products of demolition or removal, excess or unusable construction materials, packaging materials for construction products, and other materials generated during the construction process but not incorporated into the work. In the management of waste, consider the availability of viable markets, the condition of the material, the ability to provide the material in suitable condition and in a quantity acceptable to available markets, and time constraints imposed by internal project completion mandates. Implement any special programs involving rebates or similar incentives related to recycling of waste. Revenues or other savings obtained for salvage, or recycling accrue to the Contractor. Appropriately permit firms and facilities used for recycling, reuse, and disposal for the intended use to the extent required by federal, state, and local regulations. Also, provide on-site instruction of appropriate separation, handling, recycling, salvage, reuse, and return methods to be used by all parties at the appropriate stages of the project.

1.3 MEETINGS

If necessary, conduct Construction Waste Management meetings. After award of the Contract and prior to commencement of work, schedule and conduct a meeting with the CITY to discuss the proposed Waste Management Plan and to develop a mutual understanding relative to the details of waste management. The requirements for this meeting may be fulfilled during the coordination and mutual understanding meeting outlined in Section QUALITY CONTROL. At a minimum, discuss environmental and waste management goals and issues at the following additional meetings:

a. Pre-bid meeting.
b. Preconstruction meeting.
c. Regular site meetings.
d. Work safety meetings.

1.4 WASTE MANAGEMENT PLAN

Submit a waste management plan within 15 days after notice to proceed and not less than 10 days before the preconstruction meeting. The plan demonstrates how to meet the project waste diversion goal. Also, include the following in the plan:

It is understood that the mooring piles and portions of the docks will be removed, stored and replaced. Only the existing concrete cap will need to be managed as a part of the demolition.

a. Name of individuals on the Contractor's staff responsible for waste prevention and management. (FOREMAN)

b. Actions that will be taken to reduce solid waste generation, including coordination with subcontractors to ensure awareness and participation.

c. Description of the regular meetings to be held to address waste management.

d. Description of the specific approaches to be used in recycling/reuse of the various materials generated, including the areas on site and equipment to be used for processing, sorting, and temporary storage of wastes.

e. Characterization, including estimated types and quantities, of the waste to be generated.

f. Name of landfill and/or incinerator to be used and the estimated costs for use, assuming that there would be no salvage or recycling on the project.

g. Identification of local and regional reuse programs, including non-profit organizations such as schools, local housing agencies, and organizations that accept used materials such as materials exchange networks and Habitat for Humanity. Include the name, location, and phone number for each reuse facility to be used, and provide a copy of the permit or license for each facility.

h. List of specific waste materials that will be salvaged for resale, salvaged and reused on the current project, salvaged and stored for reuse on a future project, or recycled. Identify the recycling facilities by name, location, and phone number, including a copy of the permit or license for each facility.

i. Identification of materials that cannot be recycled/reused with an explanation or justification, to be approved by the CITY.

j. Description of the means by which any waste materials identified in item (h) above will be protected from contamination.

k. Description of the means of transportation of the recyclable materials (whether materials will be site-separated and self-hauled to designated centers, or whether mixed materials will be collected by a waste hauler and removed from the site).

l. Anticipated net cost savings determined by subtracting Contractor program management costs and the cost of disposal from the revenue generated by sale of the materials and the incineration and/or landfill cost avoidance.

Revise and resubmit Plan as required by the CITY. Approval of Contractor's Plan will not relieve the Contractor of responsibility for compliance with applicable environmental regulations or meeting project cumulative waste diversion requirement. Distribute copies of the Waste Management Plan to each subcontractor, the Quality Control Manager, and the CITY.

1.5 RECORDS

Maintain records to document the quantity of waste generated; the quantity of waste diverted through sale, reuse, or recycling; and the quantity of waste disposed by landfill or incineration. Make the records available to the CITY during construction, and deliver to the CITY upon completion of the construction, a copy of the records.

1.6 COLLECTION

Separate, store, protect, and handle at the site identified recyclable and salvageable waste products in a manner that maximizes recyclability and salvagability of identified materials. Provide the necessary containers, bins and storage areas to facilitate effective waste management and clearly and appropriately identify them. Provide materials for barriers and enclosures around recyclable material storage areas which are nonhazardous and recyclable or reusable. Locate out of the way of construction traffic. Provide adequate space for pick-up and delivery and convenience to subcontractors. Recycling and waste bin areas are to be kept neat and clean, and handle recyclable materials to prevent contamination of materials from incompatible products and materials. Clean contaminated materials prior to placing in collection containers. Use cleaning materials that are nonhazardous and biodegradable. Handle hazardous waste and hazardous materials in accordance with applicable regulations and coordinate with Section 01 57 19 TEMPORARY ENVIRONMENTAL CONTROLS. Separate materials by one of the following methods:

1.6.1 Source Separated Method.

Separate waste products and materials that are recyclable from trash and sorted as described below into appropriately marked separate containers and then transported to the respective recycling facility for further processing. Deliver materials in accordance with recycling or reuse facility requirements (e.g., free of dirt, adhesives, solvents, petroleum contamination, and other substances deleterious to the recycling process). Separate materials into the following category types as appropriate to the project waste and to the available recycling and reuse programs in the project area:

a. Land clearing debris.
b. Asphalt.
c. Concrete and masonry.
d. Metal (e.g., banding, stud trim, ductwork, piping, rebar, roofing, other trim, steel, iron, galvanized, stainless steel, aluminum, copper, zinc, lead brass, bronze).
    (1) Ferrous.
    (2) Non-ferrous.

e. Wood (nails and staples allowed).
f. Debris.
g. Paper.
   (1) Bond.
   (2) Newsprint.
   (3) Cardboard and paper packaging materials.
h. Non-hazardous paint and paint cans.
i. Beverage containers.

1.6.2 Co-Mingled Method.

Place waste products and recyclable materials into a single container and then transport to a recycling facility where the recyclable materials are sorted and processed.

1.6.3 Other Methods.

Other proposed methods may be used when approved by the CITY.

1.7 DISPOSAL

Control accumulation of waste materials and trash. Recycle or dispose of collected materials off-site at intervals approved by the CITY and in compliance with waste management procedures. Except as otherwise specified in other sections of the specifications, dispose of in accordance with the following:

1.7.1 Reuse.

Give first consideration to salvage for reuse since little or no re-processing is necessary for this method, and less pollution is created when items are reused in their original form. Coordinate reuse with the CITY. Consider sale or donation of waste suitable for reuse.

1.7.2 Recycle.

Recycle waste materials not suitable for reuse, but having value as being recyclable. Arrange for timely pickups from the site or deliveries to recycling facilities in order to prevent contamination of recyclable materials.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

-- End of Section --

SECTION 01 78 00

CLOSEOUT SUBMITTALS

PART 1 GENERAL

1.1 DEFINITIONS

1.1.1 As-Built Drawings

As-built drawings are developed and maintained by the Contractor and depict actual conditions, including deviations from the Contract Documents. These deviations and additions may result from coordination required by, but not limited to: contract modifications; official responses to Contractor submitted Requests for Information; direction from the CITY; designs which are the responsibility of the Contractor, and differing site conditions. Maintain the as-builts throughout construction as red-lined hard copies on site. These files serve as the basis for the creation of the record drawings.

1.1.2 Record Drawings

The record drawings are the final compilation of actual conditions reflected in the as-built drawings.

1.2 SOURCE DRAWING FILES

Request the full set of electronic drawings, in the source format, for Record Drawing preparation, after award and at least 30 days prior to required use.

1.2.1 Terms and Conditions

Data contained on these electronic files must not be used for any purpose other than as a convenience in the preparation of construction drawings and data for the referenced project. Any other use or reuse shall be at the sole risk of the Contractor and without liability or legal exposure to the CITY. The Contractor must make no claim and waives to the fullest extent permitted by law, any claim or cause of action of any nature against the CITY, its agents or sub consultants that may arise out of or in connection with the use of these electronic files. The Contractor must, to the fullest extent permitted by law, indemnify and hold the CITY harmless against all damages, liabilities or costs, including reasonable attorney's fees and defense costs, arising out of or resulting from the use of these electronic files.

These electronic CAD drawing files are not construction documents. Differences may exist between the CAD files and the corresponding construction documents. The CITY makes no representation regarding the accuracy or completeness of the electronic CAD files, nor does it make representation to the compatibility of these files with the Contractor hardware or software. In the event that a conflict arises between the signed and sealed construction documents prepared by the CITY and the furnished Source drawing files, the signed and sealed construction documents govern. The Contractor is responsible for determining if any conflict exists. Use of these Source Drawing files does not relieve the Contractor of duty to fully comply with the contract documents, including and without limitation, the need to check, confirm and coordinate the work of all contractors for the project. If the Contractor

uses, duplicates or modifies these electronic source drawing files for use in producing construction drawings and data related to this contract, remove all previous indicia of ownership (seals, logos, signatures, initials and dates).

1.3 SUBMITTALS

CITY approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-08 Closeout Submittals
- Final Approved Shop Drawings; G
- As-Built Drawings; G
- Record Drawings; G

1.4 WARRANTY MANAGEMENT

1.4.1 Warranty Management Plan

Develop a warranty management plan which contains information relevant to the Contract Clause: **CORRECTION OF DEFECTIVE WORK DURING WARRANTY PERIOD**. Include within the warranty management plan all required actions and documents to assure that the CITY receives all warranties to which it is entitled. The plan must be in narrative form and contain sufficient detail to render it suitable for use by future maintenance and repair personnel, whether tradesmen, or of engineering background, not necessarily familiar with this contract. The term "status" as indicated below must include due date and whether item has been submitted or was accomplished. Warranty information made available during the construction phase must be submitted to the CITY for approval prior to each monthly pay estimate. Assemble approved information in a binder and turn over to the CITY upon acceptance of the work. The construction warranty period will begin on the date of project acceptance and continue for the full product warranty period. Include within the warranty management plan, but not limited to, the following:

a. Roles and responsibilities of all personnel associated with the warranty process, including points of contact and telephone numbers within the organizations of the Contractors, subcontractors, manufacturers or suppliers involved.

b. Furnish with each warranty the name, address, and telephone number of each of the guarantor's representatives nearest to the project location.

c. Listing and status of delivery of all Certificates of Warranty for extended warranty items, to include workmanship, corrosion, coatings, fasteners, etc.

d. A list for each warranted equipment, item, and feature of construction or system indicating:

   (1) Name of item.
   (2) Location where installed.
   (3) Name and phone numbers of manufacturers or suppliers.

(4) Names, addresses and telephone numbers of sources of suppliers.
(5) Warranties and terms of warranty. Include one-year overall warranty of construction, including the starting date of warranty of construction. Items which have extended warranties must be indicated with separate warranty expiration dates.
(8) Cross-reference to warranty certificates as applicable.
(9) Starting point and duration of warranty period.
(10) Summary of maintenance procedures required to continue the warranty in force.
(11) Organization, names and phone numbers of persons to call for warranty service.
(12) Typical response time and repair time expected for various warranted equipment.

e. Procedure and status of tagging of all equipment covered by extended warranties.

1.4.2 Performance Bond

The Performance Bond must remain effective throughout the construction period.

a. In the event the Contractor fails to commence and diligently pursue any construction warranty work required, the CITY will have the work performed by others, and after completion of the work, will charge the remaining construction warranty funds of expenses incurred by the CITY while performing the work, including, but not limited to administrative expenses.

b. In the event sufficient funds are not available to cover the construction warranty work performed by the CITY at the Contractor's expense, the CITY will have the right to recoup expenses from the bonding company.

c. Following oral or written notification of required construction warranty repair work, respond in a timely manner. Written verification will follow oral instructions. Failure to respond will be cause for the CITY to proceed against the Contractor.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.1 AS-BUILT DRAWINGS

3.1.1 Markup Guidelines

Make comments and markup the drawings complete without reference to letters, memos, or materials that are not part of the As-Built drawing. Show what was changed, how it was changed, where items(s) were relocated and change related details. These working as-built markup prints must be neat, legible and accurate as follows:

a. Use base colors of red, green, and blue. Color code for changes as follows:

(1) Special (Blue) - Items requiring special information, coordination, or special detailing or detailing notes.

(2) Deletions (Red) - Over-strike deleted graphic items (lines), lettering in notes and leaders.

(3) Additions (Green) - Added items, lettering in notes and leaders.

b. Provide a legend if colors other than the "base" colors of red, green, and blue are used.

c. Add and denote any additional equipment or material facilities, service lines, incorporated under As-Built Revisions if not already shown in legend.

d. Use frequent written explanations on markup drawings to describe changes. Do not totally rely on graphic means to convey the revision.

e. Use legible lettering and precise and clear digital values when marking prints. Clarify ambiguities concerning the nature and application of change involved.

f. Wherever a revision is made, also make changes to related section views, details, legend, profiles, plans and elevation views, schedules, notes and call out designations, and mark accordingly to avoid conflicting data on all other sheets.

g. For deletions, cross out all features, data and captions that relate to that revision.

h. For changes on small-scale drawings and in restricted areas, provide large-scale inserts, with leaders to the applicable location.

i. Indicate one of the following when attaching a print or sketch to a markup print:

1) Add an entire drawing to contract drawings.
2) Provided for reference only to further detail the initial design.

j. Incorporate all shop and fabrication drawings into the markup drawings.

3.1.2 As-Built Drawings Content

Submit 2 sets of paper copies from PDF drawings to show the as-built conditions by red-line process during the execution of the project. Keep these working as-built markup drawings current on a weekly basis. Submit the working as-built markup drawings for approval prior to submission of each pay request. Show on the as-built drawings, but not limited to, the following information:

a. The actual location, kinds and sizes of all sub-surface utility lines. In order that the location of these lines and appurtenances may be determined in the event the surface openings or indicators become covered over or obscured, show by offset dimensions to two permanently fixed surface features the end of each run including each change in direction on the record drawings. Locate valves, splice boxes and similar appurtenances by dimensioning along the utility run from a reference point. Also record the average depth below the surface of each run.

b. The location and elevation of the top of the installed sheetpile along its alignment and at a minimum at each of the inflection and end points.

c. The location and dimensions of any changes within the limits of construction.

d. Layout and schematic drawings of electrical circuits and piping.

e. Correct grade, elevations, cross section, or alignment of roads, earthwork, structures or utilities if any changes were made from contract plans.

f. Changes in details of design or additional information obtained from working drawings specified to be prepared and/or furnished by the Contractor; including but not limited to shop drawings, fabrication, erection, installation plans and placing details, pipe sizes, insulation material, dimensions of equipment foundations, etc.

g. The topography, invert elevations and grades of drainage installed or affected as part of the project construction.

h. Changes or Revisions which result from the final inspection.

i. Where contract drawings or specifications present options, show only the option selected for construction on the working as-built markup drawings.

j. If borrow material for this project is from sources on CITY property, or if CITY property is used as a spoil area, furnish a contour map of the final borrow pit/spoil area elevations.

k. Systems designed or enhanced by the Contractor, such as HVAC controls, fire alarm, fire sprinkler, and irrigation systems.

l. Changes in location of equipment and architectural features.

m. Modifications (include within change order price the cost to change working as-built markup drawings to reflect modifications).

n. Actual location of anchors, construction and control joints, etc., in concrete.

o. Unusual or uncharted obstructions that are encountered in the contract work area during construction.

3.2 RECORD DRAWINGS

Prepare final record drawings after the completion of the following phases of work:

a. Driving of steel sheetpile.
b. Pouring of concrete cap.
c. Completion of landscape planting.
d. Upon substantial completion.

Transfer the changes from the approved working as-built markup drawings to the original electronic CAD drawing files. Modify the as-built CAD drawing files to correctly show the features of the project

as-built by bringing the working CAD drawing set into agreement with approved working as-built markup drawings, and adding such additional drawings as may be necessary.

If additional drawings are required, prepare them using AutoCAD Civil3D Release 2014. The title block and drawing border to be used for any new final record drawings must be identical to that used on the contract drawings. Accomplish additions and corrections to the contract drawings using CAD files. Provide all program files and hardware necessary to prepare final PDF record drawings. The City will review final PDF record drawings for accuracy and return them to the Contractor for required corrections, changes, additions, and deletions.

When final revisions have been completed, show the wording "RECORD DRAWINGS / AS-BUILT CONDITIONS" followed by the name of the Contractor in letters at least 3/16 inch high on the cover sheet drawing. Mark all other Contract Drawings either "Record" drawing denoting no revisions on the sheet or "Revised Record" denoting one or more revisions. Date original Contract Drawings in the revision block.

Within 10 days after City approval of the working record drawings for a phase of work, the CONTRACTOR shall prepare the final CAD record drawings for that phase of work and submit two sets of prints of these drawings for City review and approval. The City will promptly return one set of prints annotated with any necessary corrections. Within 10 days of receipt of City corrections, the CONTRACTOR shall revise the CAD files accordingly and submit one set of final prints for the completed phase of work to the City. Within 20 days of substantial completion of all phases of work, the Contractor shall submit the final record drawing package for the entire Project. The CONTRACTOR shall submit one set of electronic files on compact disc, three sets of prints and one set of the approved working record drawings. They must be complete in all details and identical in form and function to the contract drawing files supplied by the City. Any transactions or adjustments necessary to accomplish this are the responsibility of the CONTRACTOR. The City reserves the right to reject any drawing files it deems incompatible with their CAD system. Paper prints, drawing files and storage media submitted will become the property of the City upon final approval. Failure to submit final record drawing files and marked prints as specified will be cause for withholding any payment due the CONTRACTOR under this Contract. Approval and acceptance of final record drawings must be accomplished before final payment is made to the CONTRACTOR.

-- End of Section --

SECTION 02 41 00

DEMOLITION AND DECONSTRUCTION

PART 1 GENERAL

1.1 PROJECT DESCRIPTION

1.1.1 Demolition/Deconstruction Plan

Prepare a combined Demolition and Deconstruction Plan and submit proposed salvage, demolition, deconstruction, and removal procedures for approval before work is started. Include in the plan procedures for careful removal and disposition of materials specified to be salvaged, coordination with other work in progress, a disconnection schedule of utility services, a detailed description of methods and equipment to be used for each operation and of the sequence of operations. Plans shall be approved by CITY prior to work beginning.

1.1.2 General Requirements

Do not begin demolition or deconstruction until authorization is received from the CITY. Remove rubbish and debris from the project site; do not allow accumulations to occur near the water. The work includes demolition, deconstruction, salvage of identified items and materials, and removal of resulting rubbish and debris. Remove rubbish and debris from CITY property daily, unless otherwise directed. Store materials that cannot be removed daily in areas specified by the CITY.

1.2 ITEMS TO REMAIN IN PLACE

Take necessary precautions to avoid damage to existing items to remain in place, to be reused, or to remain the property of the CITY. Repair or replace damaged items as approved by the CITY. Coordinate the work of this section with all other work indicated. Construct and maintain shoring, bracing, and supports as required. Ensure that structural elements are not overloaded. Increase structural supports or add new supports as may be required as a result of any cutting, removal, deconstruction, or demolition work performed under this contract. Do not overload structural elements. Provide new supports and reinforcement for existing construction weakened by demolition, deconstruction, or removal work. Repairs, reinforcement, or structural replacement require approval by the CITY prior to performing such work.

1.2.1 Existing Construction Limits and Protection

Do not disturb existing construction beyond the extent indicated or necessary for installation of new construction. Provide temporary shoring and bracing for support of building components to prevent settlement or other movement. Provide protective measures to control accumulation and migration of dust and dirt in all work areas. Remove dust, dirt, and debris from work areas daily.

1.2.2 Weather Protection

For portions of the site to remain, protect from the weather when possible during deconstruction. Where removal of existing overburden or concrete is necessary to accomplish work, have materials and workmen ready to provide adequate and temporary covering of exposed areas.

1.2.3 Trees

Protect trees within the project site which might be damaged during demolition or deconstruction, and which are indicated to be left in place, by a fence. Erect and secure fence a minimum of 5 feet from the trunk of individual trees or follow the outer perimeter of branches or clumps of trees. Replace any tree designated to remain that is damaged during the work under this contract with like-kind or as approved by the CITY.

1.2.4 Utility Service

Maintain existing utilities indicated to stay in service and protect against damage during demolition and deconstruction operations.

1.2.5 Facilities

Protect electrical and mechanical services and utilities. Where removal of existing utilities and pavement is specified or indicated, provide approved barricades, temporary covering of exposed areas, and temporary services or connections for electrical and mechanical utilities. Any structural components that are designed and constructed to stand without lateral support or shoring, and are determined to be in stable condition, must remain standing without additional bracing, shoring, or lateral support until demolished or deconstructed, unless directed otherwise by the CITY. Ensure that no elements determined to be unstable are left unsupported and place and secure bracing, shoring, or lateral supports as may be required as a result of any cutting, removal, deconstruction, or demolition work performed under this contract.

1.3 BURNING

The use of burning at the project site for the disposal of refuse and debris will not be permitted.

1.4 AVAILABILITY OF WORK AREAS

Areas in which the work is to be accomplished will be available in accordance with the following schedule:

Staging Areas & Limits of Construction	Date: 7-days after the NTP

1.5 SUBMITTALS

CITY approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Demolition & Deconstruction Plan; G

1.6 QUALITY ASSURANCE

Submit timely notification of demolition, deconstruction, and renovation projects to Federal, State, Regional, and CITY authorities. Notify the FDEP and the CITY in writing 10 working days prior to the commencement of work. Comply with federal, state, and local hauling and disposal regulations. Use of explosives will not be permitted.

1.6.1 Dust and Debris Control

Prevent the spread of dust and debris and avoid the creation of a nuisance in the surrounding area. Do not use water if it results in hazardous or objectionable conditions such as, but not limited to, flooding, or pollution. Clean the work area daily. Sweep pavements as often as necessary to control the spread of debris that may result in foreign object damage potential to vehicular and/or pedestrian.

1.7 PROTECTION

1.7.1 Traffic Control Signs

a. Where pedestrian and driver safety is endangered in the area of removal work, use barricades with flashing lights. Anchor barricades in a manner to prevent displacement by wind. Notify the CITY prior to beginning such work. Tripping or fall hazards should not be left unprotected overnight.

b. Provide a minimum of 2 FAA type L-810 steady burning red obstruction lights on temporary structures (including cranes) over 100 feet above ground level. The use of LED based obstruction lights are not permitted.

1.7.2 Protection of Personnel

Before, during and after the demolition and deconstruction work continuously evaluate the condition of the structure being demolished and deconstructed and take immediate action to protect all personnel working in and around the project site. No area, section, or component of floors, roofs, walls, columns, pilasters, or other structural element will be allowed to be left standing without sufficient bracing, shoring, or lateral support to prevent collapse or failure while workmen remove debris or perform other work in the immediate area.

1.8 RELOCATIONS

Perform the removal and reinstallation of relocated items as indicated with workmen skilled in the trades involved. Repair or replace items to be relocated which are damaged by the Contractor with new undamaged items as approved by the CITY.

1.9 EXISTING CONDITIONS

This item is provided for use by the Contractor to verify the existing conditions described by the CITY. Before beginning any demolition or deconstruction work, survey the site and examine the drawings and specifications to determine the extent of the work. Record existing conditions in the presence of the CITY showing the condition of structures and other facilities adjacent to areas of alteration or removal. Photographs sized 4 inch will be acceptable as a record of existing conditions. Include in the record the elevation of the top of foundation walls, finish floor elevations, possible conflicting electrical conduits, plumbing lines, alarms systems, the location and extent of existing cracks and other damage and description of surface conditions that exist prior to before starting work. It is the Contractor's responsibility to verify and document all required outages which will be required during the course of work, and to note these outages on the record document. Submit survey results.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

3.1 EXISTING FACILITIES TO BE REMOVED

Inspect and evaluate existing structures onsite for reuse. Existing construction scheduled to be removed for reuse shall be disassembled. Dismantled and removed materials are to be separated, set aside, and prepared as specified, and stored or delivered to a collection point for reuse, remanufacture, recycling, or other disposal, as specified. Materials shall be designated for reuse onsite whenever possible.

3.1.1 Paving and Slabs

Remove concrete and asphaltic concrete paving and slabs including aggregate base as required. Provide neat sawcuts at limits of removal. Pavement and slabs designated to be recycled and utilized in this project shall be moved, ground and stored as directed by the CITY. Pavement and slabs not to be used in this project shall be removed from the Installation at Contractor's expense.

3.1.2 Concrete Sidewalks

Saw concrete along neat, straight lines. Make each cut parallel with the existing joints. Concrete shall be removed from the site and disposed of at the Contractor’s expense.

3.1.3 Miscellaneous Metal

Salvage light-gage and cold-formed metal pieces, such as steel studs, sections of steel sheet pile, accessories and similar items. Scrap metal shall become the Contractor's property. Recycle scrap metal as part of demolition and deconstruction operations. Provide separate containers to collect scrap metal and transport to a scrap metal collection or recycling facility, in accordance with the Waste Management Plan.

3.1.4 Carpentry

Salvage for reuse lumber, millwork items, and finished boards, and sort by type and size. Chip or shred and recycle salvaged wood unfit for reuse, except stained, painted, or treated wood.

3.1.5 Mechanical Equipment and Fixtures

Disconnect mechanical hardware at the nearest connection to existing services to remain, unless otherwise noted. Disconnect mechanical equipment and fixtures at fittings. Do not remove equipment until approved.

3.2 CONCURRENT EARTH-MOVING OPERATIONS

Do not begin excavation, filling, and other earth-moving operations that are sequential to demolition or deconstruction work in areas occupied by structures to be demolished or deconstructed until all demolition and deconstruction in the area has been completed and debris removed. Fill holes, open basements and other hazardous openings.

3.3 DISPOSITION OF MATERIAL

3.3.1 Title to Materials

Except for salvaged items specified in related Sections, and for materials or equipment scheduled for salvage, all materials and equipment removed and not reused or salvaged, shall become the property of the Contractor and shall be removed from CITY property. Title to materials resulting from demolition and deconstruction, and materials and equipment to be removed, is vested in the Contractor upon approval by the CITY of the Contractor's demolition, deconstruction, and removal procedures, and authorization by the CITY to begin demolition and deconstruction. The CITY will not be responsible for the condition or loss of, or damage to, such property after contract award. Showing for sale or selling materials and equipment on site is prohibited.

3.3.2 Reuse of Materials and Equipment

Remove and store materials in the Demolition and Deconstruction Plan to be reused or relocated to prevent damage, and reinstall as the work progresses.

3.3.3 Salvaged Materials and Equipment

Remove materials in the Demolition and Deconstruction Plan specified to be removed by the Contractor and that are to remain the property of the CITY, and deliver to a storage site as directed.

a. Salvage items and material to the maximum extent possible.

b. Store all materials salvaged for the Contractor as approved by the CITY and remove from CITY property before completion of the contract. On site sales of salvaged material is prohibited.

c. Remove salvaged items to remain the property of the CITY in a manner to prevent damage, and packed or crated to protect the items from damage while in storage or during shipment. Items damaged during removal or storage must be repaired or replaced to match existing items. Properly identify the contents of containers.

d. Remove historical items in a manner to prevent damage. Store the historical items for reuse in the project.

3.3.4 Unsalvageable and Non-Recyclable Material

Dispose of unsalvageable and non-recyclable noncombustible material in the disposal area approved to accept the waste. Dispose of unsalvageable and non-recyclable combustible material in the sanitary fill in this approved area.

3.4 CLEANUP

Remove debris and rubbish from basement and similar excavations. Remove and transport the debris in a manner that prevents spillage on streets or adjacent areas. Apply local regulations regarding hauling and disposal.

3.5 DISPOSAL OF REMOVED MATERIALS

3.5.1 Regulation of Removed Materials

Dispose of debris, rubbish, scrap, and other non-salvageable materials resulting from removal operations with all applicable federal, state and local regulations as contractually specified in the Waste Management Plan. Storage of removed materials on the project site is prohibited.

3.5.2 Burning on CITY Property

Burning of materials removed from demolished and deconstructed structures will not be permitted on CITY property.

3.5.3 Removal from CITY Property

Transport waste materials removed from demolished and deconstructed structures, except waste soil, from CITY property for legal disposal. Dispose of waste soil as directed.

3.6 REUSE OF SALVAGED ITEMS

Recondition salvaged materials and equipment designated for reuse before installation. Replace items damaged during removal and salvage operations or restore them as necessary to usable condition.

-- End of Section --

SECTION 02 42 91

REMOVAL AND SALVAGE OF CONSTRUCTION MATERIALS

PART 1 GENERAL

1.1 PROJECT DESCRIPTION

The work includes removal and salvage of construction materials, and removal of resulting rubbish and debris. General demolition of materials and removal of resulting rubbish and debris shall comply with the requirements of Section 02 41 00 DEMOLITION AND DECONSTRUCTION. Materials to be salvaged or recycled shall be stored daily in areas and manner specified by the CITY. In the interest of conservation, salvage and recycling shall be pursued to the maximum extent possible.

1.1.1 Dust Control

The amount of dust resulting from removal, salvage and demolition operations shall be controlled to prevent the spread of dust to occupied portions of the construction site and to avoid creation of a nuisance in the surrounding area. Use of water to control dust will not be permitted when it will result in, or create, damage to existing building materials and hazardous or objectionable conditions such as ice, flooding and pollution.

1.1.2 Protection

1.1.2.1 Protection of Existing Property

Before beginning any removal, salvage or demolition work, survey the site and examine the drawings and specifications to determine the extent of the work. Take necessary precautions to avoid damage to existing items that are to remain in place, to be reused, or to remain the property of the CITY. Repair or restore items damaged by the Contractor to original condition, or replaced, as approved by the CITY. Coordinate the work of this section with all other work and construct and maintain shoring, bracing and supports, as required. Ensure that structural elements are not overloaded and shall provide additional supports as may be required as a result of any cutting, removal, or demolition work performed under this contract.

1.1.2.2 Protection from the Weather

Salvageable materials shall be protected from the weather at all times. Salvaged materials shall be stored out of contact with the ground and under weathertight covering if possible.

1.1.2.3 Environmental Protection

The Contractor shall coordinate with the CITY for any additional environmental protection measures that arise as a result of the implementation of this specification.

1.2 SUBMITTALS

CITY approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals
Work Plan; G

1.3 QUALIFICATIONS

Provide qualified workers trained and experienced in recycling, removal and salvage of materials. A current point-of-contact for identified references shall be provided.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.1 SALVAGED ITEMS

Salvage items to the maximum extent possible. Prior to any demolition work, items to be salvaged shall be removed from the demolition area. Removal of salvageable items shall be accomplished by hand labor to the maximum extent possible. Care shall be taken to not damage portions of the structure to remain or items identified for salvage. Materials not scheduled for salvage or recycling shall be removed prior to any salvaging procedures. Keep a complete recording of all salvaged materials including the condition of such materials before, and after, salvage operations.

3.1.1 Site Work

The following site items shall be removed intact and salvaged if deemed in good condition by the CITY: signs, wooden post & rope fence, and any other items identified by the CITY.

3.1.2 Concrete

The following concrete items shall be removed intact and salvaged: Contractor shall coordinate with the CITY to confirm the disposition of the concrete slab and sidewalks. For bidding purposes, the Contractor should plan to demolish, remove, and dispose of the concrete slab and sidewalks only at the locations shown on the Drawings, and to otherwise preserve, protect and replace in-kind or better those slab and sidewalk sections damaged during Contractor activities within the designated limits of work.

3.1.3 Wood

The following materials shall be removed intact and salvaged: wooden fence posts. No wood that appears to have been damaged during the deconstruction process shall be reused. CITY inspection and

approval is required to reuse the wooden posts. For bidding purposes, the Contractor should plan to demolish, remove, and dispose of the posts.

3.1.4 Signs

The following items shall be removed intact and temporarily relocated and maintained throughout construction as needed: signs.

3.1.5 Storm water systems

All existing storm drainage and other upland facilities will be protected.

3.2 RECYCLED MATERIALS

The following materials may be recycled (if possible): dimensional lumber and scrap wood from form work. Recycle materials to the maximum extent possible. Removal of recyclable materials shall be accomplished by hand labor wherever possible. Items identified for salvage shall not be damaged while removing materials for recycling.

3.3 DISPOSITION OF MATERIALS

Title to materials and equipment to be demolished, is vested in the Contractor upon receipt of notice to proceed. The CITY will not be responsible for the condition, loss or damage to such property after notice to proceed.

3.3.1 Material Salvaged for the Contractor

Temporarily store salvaged material as approved by the CITY and remove from CITY property before completion of the contract. Sale of salvaged material on the site is prohibited.

3.3.2 Items Salvaged for the CITY

Salvaged items to remain the property of the CITY shall be removed in a manner to prevent damage, packed or crated to protect the items from damage, or as directed by the CITY. Items damaged during removal or storage shall be repaired or replaced to match existing items. Containers shall be properly identified as to contents. The following items reserved as property of the CITY shall be delivered to the areas designated: To be determined (TBD). Contractor shall coordinate with CITY if materials are salvaged and not used on the project.

3.4 CLEAN-UP

Upon completion of the work, portions of structure to remain and adjacent areas and structures shall be cleaned of dust, dirt, and debris caused by salvage and demolition operations. Debris and rubbish shall be removed and transported in a manner that prevents spillage on streets or adjacent areas. Local regulations regarding hauling and disposal shall apply.

-- End of Section –

SECTION 03 10 00

CONCRETE FORMWORK

PART 1 - GENERAL

1.01 THE REQUIREMENT

a. The Contractor shall design and furnish all materials for concrete formwork, bracing, and supports and shall design and construct all falsework, all in accordance with the provisions of the Contract Documents.

1.02 RESPONSIBILITY

a. The design and engineering of the formwork as well as safety considerations are the responsibility of the Contractor.

1.03 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

a. Without limiting the generality of other requirements of these Specifications, all work specified herein shall conform to or exceed the requirements of the Florida Building Code and the applicable requirements of the following documents to the extent that the provisions of such documents are not in conflict with the requirements of this Section.

1. Codes and Standards

   The Building Code, as referenced herein, is the Florida Building Code (FBC).

2. Government Standards

   PS 1 U.S. Product Standard for Concrete Forms, Class I.

3. Commercial Standards

   ACI 347 Recommended Practice for Concrete Formwork.

   ACI 318-14 Building Code Requirements for Structural Concrete.

1.04 QUALITY ASSURANCE

a. The variation from established grade or lines shall not exceed 1/4 inch in 10 feet and there shall be no offsets or visible bulges or waviness in the finished surface. All tolerances shall be within the "Suggested Tolerances" specified in ACI 347. The Contractor shall grind smooth all fins and projections between formwork panels as directed by the Engineer.

b. Curved forms shall be used for curved and circular structures that are cast-in-place. Straight panels will not be acceptable for forming curved structures.

PART 2 - PRODUCTS

2.01 FORM MATERIALS

a. Except as otherwise expressly accepted by the Engineer, all lumber brought on the job site for use as forms, shoring, or bracing shall be new material. All forms shall be smooth surface forms and shall be of the following materials:

   Slabs -Plywood
   All other work -Steel panels, plywood or tongue and groove lumber

b. Materials for concrete forms, formwork, and falsework shall conform to the following requirements:

   1. Lumber shall be Southern Pine, construction grade or better, in conformance with U.S. Product Standard PS20.

   2. Plywood for concrete formwork shall be new, waterproof, synthetic resin bonded, exterior type Douglas Fir or Southern Pine plywood manufactured especially for concrete formwork and shall conform to the requirements of PS I for Concrete Forms, Class I, and shall be edge sealed. Thickness shall be as required to support concrete at the rate it is placed, but not less than 5/8-inch thick.

2.02 PREFABRICATED FORMS

Form materials shall be metal, wood, plywood, or other acceptable material that will not adversely affect the concrete and will facilitate placement of concrete to the shape, form, line, and grade indicated. Metal forms shall be an acceptable type that will accomplish such results. Wood forms for surfaces to be painted shall be Medium Density Overlaid plywood, MDO Ext. Grade.

2.03 FORMWORK ACCESSORIES

a. Exterior corners in concrete members shall be provided with 1-inch chamfers. Re-entrant corners in concrete members shall not have fillets unless otherwise shown.

b. Form ties shall be provided with a plastic cone or other suitable means for forming a conical hole to insure that the form tie may be broken off back of the face of the concrete. The maximum diameter of removable cones for rod ties, or of other removable form-tie fasteners having a circular cross-section, shall not exceed 1-1/2 inches; and all such fasteners shall be such as to leave holes of regular shape for reaming.

c. Form ties for water-retaining structures shall have integral waterstops. Removable taper ties may be used when acceptable to the Engineer. Taper ties shall not be used to cast water retaining structural walls. At other locations, a preformed neoprene or polyurethane tapered plug sized to seat at the center of the wall shall be inserted in the hole left by the removal of the taper tie.

d. Form release agent shall be a blend of natural and synthetic chemicals that employs a chemical reaction to provide quick, easy and clean release of concrete from forms. It shall not stain the concrete and shall leave the concrete with a paintable surface. Formulation of the form release agent shall be such that it would minimize formation of "Bug Holes" in cast- in-place concrete.

PART 3 - EXECUTION

3.01 EXAMINATION

a. Forms to confine the concrete and shape it to the required lines shall be used wherever necessary. The Contractor shall assume full responsibility for the adequate design of all forms, and any forms which are unsafe or inadequate in any respect shall promptly be removed from the Work and replaced at the Contractor's expense. A sufficient number of forms of each kind shall be provided to permit the required rate of progress to be maintained. The design and inspection of concrete forms and falsework, shall comply with applicable local, state and Federal regulations. Plumb and string lines shall be installed before concrete placement and shall be maintained during placement. Such lines shall be used by Contractor's personnel and by the Engineer and shall be in sufficient number and properly installed. During concrete placement, the Contractor shall continually monitor plumb and string line form positions and immediately correct deficiencies.

b. Concrete forms shall conform to the shape, lines, and dimensions of members as called for on the Drawings, and shall be substantially, free from surface defects, and sufficiently tight to prevent leakage. Forms shall be properly braced or tied together to maintain their position and shape under a load of freshly-placed concrete.

c. All forms shall be true in every respect to the required shape and size, shall conform to the established alignment and grade, and shall be of sufficient strength and rigidity to maintain their position and shape under the loads and operations incident to placing and vibrating the concrete. Suitable and effective means shall be provided on all forms for holding adjacent edges and ends of panels and sections tightly together and in accurate alignment so as to prevent the formation of ridges, fins, offsets, or similar surface defects in the finished concrete. Plywood, 5/8 inch and greater in thickness, may be fastened directly to studding if the studs are spaced close enough to prevent visible deflection marks in the concrete. The forms shall be tight so as to prevent the loss of water, cement and fines during placing and vibrating of the concrete. Specifically, the bottom of wall forms that rest on concrete footings or slabs shall be provided with a gasket to prevent loss of fines and paste during placement and vibration of concrete. Such gasket may be a 1 to 1-1/2-inch diameter polyethylene rod held in position to the underside of the wall form. Adequate clean-out holes shall be provided at the bottom of each lift of forms. The size, number, and location of such clean-outs shall be as acceptable to the Engineer.

d. Concrete construction joints will not be permitted at locations other than those shown or specified, except as may be acceptable to the Engineer. When a second lift is placed on hardened concrete, special precautions shall be taken in the way of the number, location, and tightening of ties at the top of the old lift and bottom of the new to prevent any unsatisfactory effect whatsoever on the concrete. Pipe stubs and anchor bolts shall be set in the forms where required.

3.02 EARTH FORMS

All vertical surfaces of concrete members shall be formed, except where placement of the concrete against the ground is called for on the Drawings. Not less than 1 inch of concrete shall be added to the thickness of the concrete member as shown where concrete is permitted to be placed against trimmed ground in lieu of forms. Such permission will be granted only for members of comparatively limited height and where the character of the ground is such that it can be trimmed to the required lines and will stand securely without caving or sloughing until the concrete has been placed.

3.03 FOOTINGS, SLAB EDGES AND GRADE BEAMS

Provide wood side forms for all footings, slab edges and grade beams.

3.04 APPLICATION - FORM RELEASE AGENT

Apply form release agent on formwork in accordance with manufacturer's recommendations.

3.05 INSERTS, EMBEDDED PARTS AND OPENINGS

Embedded Form Ties: Holes left by the removal of form tie cones shall be reamed with suitable toothed reamers so as to leave the surface of the holes clean and rough before being filled with mortar as specified for in Section 03350 entitled "Concrete Finishes". Wire ties for holding forms will not be permitted. No form-tying device or part thereof, other than metal, shall be left embedded in the concrete. Ties shall not be removed in such manner as to leave a hole extending through the interior of the concrete members. The use of snap-ties which cause spalling of the concrete upon form stripping or tie removal will not be permitted. If steel panel forms are used, rubber grommets shall be provided where the ties pass through the form in order to prevent loss of cement paste. Where metal rods extending through the concrete are used to support or to strengthen forms, the rods shall remain embedded and shall terminate not less than 1-inch back from the formed face or faces of the concrete.

3.06 FORM CLEANING

Forms may be reused only if in good condition and only if acceptable to the Engineer. Light sanding between uses will be required wherever necessary to obtain uniform surface texture on all exposed concrete surfaces. Exposed concrete surfaces are defined as surfaces which are permanently exposed to view. Unused tie rod holes in forms shall be covered with metal caps or shall be filled by other methods acceptable to the Engineer.

3.07 FORMWORK TOLERANCES

Formwork shall be constructed to insure that finished concrete surfaces will be in accordance with the tolerances listed in ACI 347.

The following construction tolerances are hereby established and apply to sidewalks and slabs unless otherwise shown in the Drawings:

Item	Tolerance
Variation of the constructed Variation of the constructed linear outline from the established position in plan	In 10 feet: 1/4 inch; In 20 feet or more: 1/2 inch
Variation from the level or from the grades shown on the Drawings	In 10 feet: 1/4 inch; In 20 feet or more: 1/2 inch
Variation from the plum	In 10 feet: 1/4 inch; In 20 feet or more: 1/2 inch
Variation in the thickness of slabs and walls	Minus 1/4 inch; Plus 1/2 inch
Variation in the locations and sizes of slab and wall openings	Plus or minus 1/4 inch

3.08 FORM REMOVAL

a. Remove top forms on sloping surfaces of concrete as soon as removal operations will not allow the concrete to sag. Perform any needed repairs or treatment required on sloping surfaces at once and follow immediately with the specified curing.

b. The Contractor shall be responsible for the removal of forms and shores. Forms or shores shall not be removed before test cylinders have reached the specified minimum 28 day comprehensive strength for the class of concrete specified in Section 03300 entitled "Cast- in-Place Concrete", nor sooner than listed below:

1. Grade beam side forms ..... 3 days
2. Wall forms ..... 3 days
3. Column forms ..... 3 days
4. Beam and girder side forms ..... 3 days
5. Beam bottoms and slab forms/shores ..... 14 days

3.09 MAINTENANCE OF FORMS

Forms shall be maintained at all times in good condition, particularly as to size, shape, strength, rigidity, tightness, and smoothness of surface. Forms, when in place, shall conform to the established alignment and grades. Before concrete is placed, the forms shall be thoroughly cleaned. The form surfaces shall be treated with a nonstaining mineral oil or other lubricant acceptable to the Engineer. Any excess lubricant shall be satisfactorily removed before placing the concrete. Where field oiling of forms is required, the Contractor shall perform the oiling at least two weeks in advance of their use. Care shall be exercised to keep oil off the surfaces of steel reinforcement and other metal items to be embedded in concrete.

-- End of Section –

SECTION 03 30 00

CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.01 THE REQUIREMENT

a. The Contractor shall furnish all materials for concrete in accordance with the provisions of this Section and shall form, mix, place, cure, repair, finish, and do all other work as required to produce finished concrete, all in accordance with the requirements of the Contract Documents.
b. The requirements in this section shall apply to the following types of concrete:

1. Portland Cement - Class NS Concrete: NS concrete used for concrete sidewalks.
2. Portland Cement Concrete: Concrete used for slabs.
3. Marine Concrete: used for seawall cap, concrete steps and landing pad, and gap between steel sheetpile and existing concrete ramp.

1.02 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

a. Without limiting the generality of other requirements of these Specifications, all work specified herein shall conform to or exceed the requirements of the Florida Building Code (FBC) and the applicable requirements of the following documents to the extent that the provisions of such documents are not in conflict with the requirements of this Section.
b. Codes and Standards
   1. The Building Code, as referenced herein, shall be the Florida Building Code.
   2. Florida Department of Transportation (FDOT) Standard Specifications for Road and Bridge Construction (January 2018, as referenced herein, shall be FDOT Specifications.
c. Federal Specifications
   1. UU-B-790A (Int. Amd. 1) Building Paper, Vegetable Fiber (Kraft, Waterproofed, Water Repellant and Fire Resistant).
d. Commercial Standards

ACI 214.1 R-81	Recommended Practice for Evaluation of Strength Test Results of Concrete.
ACI 318-14	Building Code Requirements for Structural Concrete.
ACI 301	Specifications for Structural Concrete for Buildings.
ACI 315R	Details and Detailing of Concrete Reinforcement.
ACI 347R	Recommended Practice for Concrete Formwork.
ACI 357.3R-14	Guide for Design and Construction of Waterfront and Coastal Concrete Marine Structures
ASTM C 31	Methods of Making and Curing Concrete Test Specimens in the Field.
ASTM C 33	Specification for Concrete Aggregates.
ASTM C 39	Test Method for Compressive Strength of Cylindrical Concrete Specimens.
ASTM C 94	Specification for Ready-Mixed Concrete.
ASTM C 114	Method for Chemical Analysis of Hydraulic Cement.
ASTM C 136	Method for Sieve Analysis of Fine and Coarse Aggregate.

ASTM C 143	Test Method for Slump of Portland Cement Concrete.
ASTM C 150	Specification for Portland Cement.
ASTM C 156	Test Method for Water Retention by Concrete Curing Materials.
ASTM C 157	Test Method for Length Change of Hardened Cement Mortar and Concrete.
ASTM C 192	Method of Making and Curing Concrete Test Specimens in the Laboratory.
ASTM C 260	Specification for Air-Entraining Admixtures for Concrete.
ASTM C 494	Specification for Chemical Admixtures for Concrete.

1.03 SUBMITTALS

City approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals
Quality Control Plan; G
Laboratory Accreditation

SD-05 Design Data
Mixture Proportions; G

1.04 CONTRACTOR QUALITY CONTROL

Submit a concrete quality control plan in accordance with the guidelines of ACI 121R and as specified herein. Identify the approved laboratories. Provide direct oversight for the concrete qualification program inclusive of associated sampling and testing. Provide all quality control reports to the CITY. Maintain a copy of ACI SP-15 and CRSI 10MSP at the Project site.

The CITY will require the Contractor to sample and provide test results to determine compliance with the specifications.

1.05 CITY INSPECTION

Day to day inspection and testing is the responsibility of the Contractor. However, representatives of the CITY and Engineer can and will inspect construction as considered appropriate and will monitor operations. Failure to detect defective work or material will not prevent rejection later when a defect is discovered nor will it obligate the CITY for final acceptance.

1.06 FIELD SAMPLES

a. Field Compression Tests

1. Compression test specimens shall be taken during construction from the first placement of each class of concrete specified herein and at intervals thereafter as selected by the Engineer to insure continued compliance with these Specifications. At least one set of test specimens shall be made for each 50 yards

of concrete placed. Each set of test specimens shall be a minimum of 5 cylinders.

2. Compression test specimens for concrete shall be made in accordance with ASTM C 31. Specimens shall be 6-inch diameter by 12-inch high cylinders.
3. Compression test shall be performed in accordance with ASTM C 39. One cylinder tested at three days, one test cylinders will be tested at 7 days and 2 at 28 days. The remaining cylinder will be held to verify test results, if needed.

b. Evaluation and Acceptance of Concrete

1. Evaluation and acceptance of the compressive strength of concrete shall be according to the requirements of ACI 318, Chapter 5 "Concrete Quality Mixing and Placing", and as specified herein.
2. If any concrete fails to meet these requirements, immediate corrective action shall be taken to increase the compressive strength for all subsequent batches of the type of concrete affected.
3. All concrete which fails to meet the ACI requirements and these specifications, is subject to removal and replacement at the cost of the Contractor.

PART 2 - PRODUCTS

2.01 CONCRETE MIX

2.0.1.1 SIDEWALKS

Concrete for sidewalks shall be Portland Cement – Class NS Concrete and meet FDOT Specification Section 347.

2.0.1.2 SLABS

Concrete for slabs shall be Portland Cement Concrete and meet FDOT Specification Section 346.

2.0.1.3 CONCRETE CAP

See Specification Section 03 31 01 Marine Concrete.

2.0.1.4 CONCRETE STEPS & LANDING PAD

See Specification Section 03 31 01 Marine Concrete.

PART 3 - EXECUTION

3.01 PREPARATION

a. Earth surfaces shall be thoroughly wetted by sprinkling, prior to the placing of any concrete, and these surfaces shall be kept moist by frequent sprinkling up to the time of placing concrete thereon. A vapor barrier specified in Section 07190 entitled "Vapor Barrier" shall be placed. The surface shall be free from standing water, mud, and debris at the time of placing concrete.

b. No concrete shall be placed until the reinforcement steel and formwork have been erected in a manner acceptable to the Engineer. The Contractor shall notify the Engineer not less than two working days prior to Concrete Placement, allowing one day for review and any corrective measures which are required.

c. Joints in Concrete

1. Concrete surfaces upon or against which concrete is to be placed shall be given a roughened surface for good bond and a bonding agent shall be placed.
2. After the surfaces have been prepared all approximately horizontal construction joints shall be covered with a layer of mortar approximately one-inch thick. The mortar shall have the same proportions of cement and sand as the regular concrete mixture. The water-cement ratio of the mortar in place shall not exceed that of the concrete to be placed upon it, and the consistency of the mortar shall be suitable for placing and working in the manner hereinafter specified. The mortar shall be spread uniformly and shall be worked thoroughly into all irregularities of the surface. Wire brooms shall be used where possible to scrub the mortar into the surface. Concrete shall be placed immediately upon the fresh mortar.

d. Placing Interruptions

When placing of concrete is to be interrupted long enough for the concrete to take a set, the working face shall be given a shape by the use of forms or other means, that will secure proper union with subsequent work; provided that construction joints shall be made only where acceptable to the Engineer. Cold joints will be sufficient cause for rejection of the work.

e. Embedded Items

1. No concrete shall be placed until all formwork, installation of parts to be embedded, reinforcing steel, and preparation of surfaces involved in the placing have been completed and accepted by the Engineer at least four hours before placement of concrete. All surfaces of forms and embedded items that have become encrusted with dried grout from concrete previously placed shall be cleaned of all such grout before the surrounding or adjacent concrete is placed.

2. All inserts or other embedded items shall conform to the requirements herein.

f. All reinforcement, anchor bolts, sleeves, inserts, and similar items shall be set and secured in the forms where shown on the Drawings or by shop drawings and shall be acceptable to the Engineer before any concrete is placed. Accuracy of placement is the responsibility of the Contractor.

g. All anchor bolts called for on the drawings shall be cast-in-place in the concrete. Drilled, impact, adhesive or other types of anchors shall not be substituted for anchor bolts unless otherwise shown on the Drawings.

h. Casting New Concrete Against Old

Where concrete is to be cast against old concrete (any concrete which is greater than 60 days of age), the surface of the old concrete shall be thoroughly cleaned and roughened by sand-blasting (exposing aggregate) to an amplitude of ¼" prior to the application of an epoxy bonding agent.

i. No concrete shall be placed in any structure until all water entering the space to be filled with concrete has been properly cut off or has been diverted by pipes, or other means, and carried out of the forms, clear of the work. No concrete shall be deposited underwater, nor shall the Contractor allow still water to rise on any concrete until the concrete has attained its initial set. Water shall not be permitted to flow over the surface of any concrete in such manner and at such velocity as will injure the surface finish of the concrete. Pumping or other necessary dewatering operations for removing ground water, if required, will be subject to the review of the Engineer.

j. Corrosion Protection

1. Pipe, conduit, dowels, and other ferrous items required to be embedded in concrete construction shall be so positioned and supported prior to placement of concrete that there will be a minimum of 2 inches clearance between said items and any part of the concrete reinforcement. Securing such items in position by wiring or welding them to the reinforcement will not be permitted.

2. Openings for pipes, inserts for pipe hangers and brackets, and the setting of anchors shall, where practicable, be provided for during the placing of concrete.

3. Anchor bolts shall be accurately set, and shall be maintained in position by templates while being embedded in concrete.

4. The surfaces of all metalwork to be in contact with concrete shall be thoroughly cleaned of all dirt, grease, loose scale and rust, grout, mortar, and other foreign substances immediately before the concrete is placed.

3.02 PLACING CONCRETE

Placing of concrete shall conform to the applicable requirements of Chapter 8 of ACI 301 and the requirements of this Section.

a. Non-Conforming Work or Materials

Concrete which upon or before placing is found not to conform to the requirements specified herein shall be rejected and immediately removed from the Work. Concrete which is not placed in accordance with these Specifications, or which is of inferior quality, shall be removed and replaced by and at the expense of the Contractor.

b. Unauthorized Placement

No concrete shall be placed except in the presence of duly authorized representative of the CITY. The Contractor shall notify the CITY at least 24 hours in advance of placement of any concrete.

c. Placement in Wall Forms

1. Concrete shall not be dropped through reinforcement steel or into any deep form, whether reinforcement is present or not, causing separation of the coarse aggregate from the mortar on account of repeatedly hitting rods or the sides of the form as it falls, nor shall concrete be placed in any form in such a manner as to leave accumulation of mortar on the form surfaces above the placed concrete. In such cases, some means such as the use of hoppers and, if necessary, vertical ducts of canvas, rubber, or metal shall be used for placing concrete in the forms in a manner that it may reach the place of final deposit without separation. In no case shall the free fall of concrete exceed 4 feet below the ends of ducts, chutes, or buggies.

2. Concrete shall be uniformly distributed during the process of depositing and in no case after depositing shall any portion be displaced in the forms more than 6 feet in horizontal direction. Concrete in forms shall be deposited in uniform horizontal layers not deeper than 2 feet; and care shall be taken to avoid inclined layers or inclined construction joints except where such are required for sloping members. Each layer shall be placed while the previous layer is still soft. The rate of placing concrete in forms shall not exceed 5 feet of vertical rise per hour.

d. Casting New Concrete Against Old

An epoxy adhesive bonding agent shall be applied to set surfaces of construction joints according to the manufacturer's written recommendations.

e. Conveyor Belts and Chutes

All ends of chutes, hopper gates, and all other points of concrete discharge throughout the Contractor's conveying, hoisting and placing system shall be so designed and arranged that concrete passing from them will not fall separated into whatever receptacle immediately receives it. Conveyor belts, if used, shall be of a type acceptable to the Engineer. Chutes longer than 50 feet will not be permitted. Minimum slopes of chutes shall be such that concrete of the specified consistency will readily flow in them. If a conveyor belt is used, it shall be wiped clean by a device operated in such a manner that none of the mortar adhering to the belt will be wasted. All conveyor belts and chutes shall be covered. Sufficient illumination shall be provided in the interior of all forms so that the concrete at the places of deposit is visible from the deck or runway.

f. Placement in Slabs

Concrete placed in sloping slabs shall proceed uniformly from the bottom of the slab to the top, for the full width of the pour. As the work progresses, the concrete shall be vibrated and carefully

worked around the slab reinforcement, and the surface of the slab shall be screeded in an up-slope direction.

g. Temperature of Concrete

The temperature of concrete when it is being placed shall be not more than 90 degrees Fahrenheit. Concrete ingredients shall not be heated to a temperature higher than that necessary to keep the temperature of the mixed concrete, as placed, from falling below the specified minimum temperature. If concrete is placed when the weather is such that the temperature of the concrete would exceed 90 degrees Fahrenheit, the Contractor shall employ effective means, such as precooling of aggregates and mixing water using ice or placing at night, as necessary to maintain the temperature of the concrete, as it is placed, below 90 degrees F. The Contractor shall be entitled to no additional compensation on account of the foregoing requirements. During summer months concrete pours shall be scheduled in the morning or early part of the day when temperatures are cooler.

k. Pumping Equipment

Pumping equipment and procedures if used shall conform to the recommendations contained in the report of ACI Committee 304 on Placing Concrete by Pumping Methods, ACI 304.2R. The specified slump shall be measured at the point of discharge. The loss of slump in pumping shall not exceed 1-1/2 inches.

1. The order of placing concrete in all parts of the work shall be acceptable to the Engineer. In order to minimize the effects of shrinkage, the concrete shall be placed in units as bounded by construction joints shown on the Drawings. The placing of units shall be done by placing alternate units in a manner such that each unit placed shall have cured at least 7 days before the contiguous unit or units are placed, except that the corner sections of vertical walls shall not be placed until the 2 adjacent wall panels have cured at least 14 days.

The surface of the concrete shall be level whenever a run of concrete is stopped. To insure a level, straight joint on the exposed surface of walls, a wood strip at least 3/4-inch thick shall be tacked to the forms on these surfaces. The concrete shall be carried about 1/2-inch above the underside of the strip. About one hour after the concrete is placed, the strip shall be removed and any irregularities in the edge formed by the strip shall be leveled with a trowel.

As concrete is placed in the forms or in excavations, it shall be thoroughly settled and compacted, throughout the entire depth of the layer which is being consolidated, into a dense, homogeneous mass, filling all corners and angles, thoroughly embedding the reinforcement, eliminating rock pockets, and bringing only a slight excess of water to the exposed surface of concrete during placement. Vibrators shall be high speed power vibrators (8,000 to 10,000 rpm) of an immersion type in sufficient number and with (at least one) standby units as required.
Care shall be used in placing concrete around waterstops. The concrete shall be carefully worked by rodding and vibrating to make sure that all air and rock pockets have been eliminated. Where flat-strip type waterstops are placed horizontally, the concrete shall be worked under the waterstops by hand, making sure that all air and rock pockets have been eliminated. Concrete

surrounding the waterstops shall be given additional vibration, over and above that used for adjacent concrete placement to assure complete embedment of the waterstops in the concrete.

Concrete in walls shall be internally vibrated and at the same time, stirred, or worked with suitable appliances, tamping bars, shovels, or forked tools until it completely fills the forms or excavations and closes snugly against all surfaces. Subsequent layers of concrete shall not be placed until the layers previously placed have been worked thoroughly as specified. Vibrators shall be provided in sufficient numbers, with standby units as required, to accomplish the results herein specified within 15 minutes after concrete of the prescribed consistency is placed in the forms. The vibrating head shall be kept from contact with the surfaces of the forms. Care shall be taken not to vibrate concrete excessively or to work it in any manner that causes segregation of its constituents.

3.03 CONCRETE FINISHING

Concrete finishes are specified in Section 03 35 0 entitled "Concrete Finishes".

3.04 ORDER OF PLACING CONCRETE

a. In order to minimize the effects of shrinkage, the concrete shall be placed in units as bounded by construction joints shown on the Drawings and maximum lengths as indicated on Drawings. The placing of units shall be done by placing alternate units in a manner such that each unit placed shall be have cured at least seven days before the contiguous unit or units are placed, except that the corner sections of vertical walls shall not be placed until the two adjacent wall panels have cured at least 14 days.
b. The surface of the concrete shall be level whenever a run of concrete is stopped.

3.05 DEFECTIVE CONCRETE

a. As soon as forms are removed, all exposed surfaces shall be carefully examined and any irregularities shall be immediately rubbed or ground in a satisfactory manner in order to secure a smooth, uniform, and continuous surface. Plastering or coating of surfaces to be smoothed will not be permitted. No repairs shall be made until reviewed by the Engineer. In no case will extensive patching of honeycombed concrete be permitted. Concrete containing minor voids, holes, honeycombing, or similar depression defects shall have them repaired as specified herein. Concrete containing extensive voids, holes, honeycombing, or similar depression defects, shall be completely removed and replaced. All repairs and replacements herein specified shall be promptly executed by the Contractor at its own expense.
b. Defective surfaces to be repaired as specified in Article 3.06, Paragraph A of this Section, shall be cut back from trueline a minimum depth of 1/2 inch over the entire area. Feathered edges will not be permitted. Where chipping or cutting tools are not required in order to deepen the area properly, the surface shall be prepared for bonding by the removal of all laitance or soft material, and not less than 1/32-inch depth of the surface film from all hard portions. The material used for repair proposed shall consist of a mixture of one sack of cement to 3 cubic feet of sand. For exposed walls, the cement shall contain such a proportion of Atlas white portland cement as is required to make the color of the patch match the color of the surrounding concrete.
c. Holes left by tie-rod cones shall be repaired in an acceptable manner with dry-packed cement grout or premixed patching material as accepted by the Engineer.

d. All repairs shall be built up and shaped in such a manner that the completed work will conform to the requirements of Article 3.04 or 3.06 of this Section, as applicable, using acceptable methods which will not disturb the bond, cause sagging, or cause horizontal fractures. Surfaces of said repairs shall receive the same kind and amount of curing treatment as required for the concrete in the repaired section.
e. Prior to backfilling, all cracks that may have developed shall be "vee'd" and filled with sealant conforming to the manufacturer's requirements. This repair method shall be done on the faces of members in contact with fill.

3.06 CARE AND REPAIR OF CONCRETE

The Contractor shall protect all concrete against injury or damage from excessive heat, lack of moisture, overstress, or any other cause until final acceptance by the Owner. Particular care shall be taken to prevent the drying of concrete and to avoid roughening or otherwise damaging the surface. Any concrete found to be damaged, or which may have been originally defective, or which becomes defective at any time prior to the final acceptance of the completed work, or which departs from the established line or grade, or which, for any other reason, does not conform to the requirements of the Contract Documents, shall be satisfactorily repaired or removed and replaced with acceptable concrete at the Contractor's expense.

3.07 CONCRETE SEALER

Contractor shall apply to the top surface of all finished concrete slabs and sidewalks a sealer.

-- End of Section –

SECTION 03 31 01

MARINE CONCRETE

PART 1 – GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN CONCRETE INSTITUTE (ACI)

ACI 117	(1990; R 2002) Standard Tolerances for Concrete Construction and Materials & Commentary
ACI 201.2R	(2001) Guide to Durable Concrete
ACI 211.1	(1991; R 2002) Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete
ACI 301	(1999) Specifications for Structural Concrete for Buildings
ACI 304.2R	(1996) Placing Concrete by Pumping Methods
ACI 304R	(2000) Guide for Measuring, Mixing, Transporting, and Placing Concrete
ACI 305R	(1999) Hot Weather Concreting
ACI 306.1	(1990; R 2002) Standard Specification for Cold Weather Concreting
ACI 308	(2001) Guide to Curing Concrete
ACI 309R	(1996) Guide for Consolidation of Concrete
ACI 318	(2014) Building Code Requirements for Structural Concrete
ACI 347R	(2003) Guide to Formwork for Concrete
ACI 357 3R 14	(2014) Guide for Design and Construction of Waterfront and Coastal Concrete Marine Structures

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

AASHTO M 182	(1991; R 2000) Burlap Cloth Made from Jute or Kenaf
AASHTO T 259	(2002) Resistance of Concrete to Chloride Ion Penetration

AMERICAN SOCIETY FOR TESTING MATERIALS (ASTM)

ASTM A 185	(2002) Steel Welded Wire Reinforcement, Plain, for Concrete
ASTM A 496	(2002) Steel Wire, Deformed, for Concrete Reinforcement
ASTM A 497	(2002) Steel Welded Wire Reinforcement, Deformed, for Concrete
ASTM A 615/A 615M	(2004b) Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
ASTM A 82	(2002) Steel Wire, Plain, for Concrete Reinforcement
ASTM C 1017	(1992) Chemical Admixtures for Use in Producing Flowing Concrete
ASTM C 1077	(2003a) Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation
ASTM C 1107	(2002) Packaged Dry, Hydraulic-Cement Grout (Nonshrink)
ASTM C 1157	(2003) Hydraulic Cement
ASTM C 1202	(2005) Electrical Indication of Concrete's Ability to Resist Chloride Ion Penetration

ASTM C 1240	(2004) Silica Fume Used in Cementitious Mixtures
ASTM C 1260	(2001) Potential Alkali Reactivity of Aggregates (Mortar-Bar Method)
ASTM C 143	(1998) Slump of Hydraulic Cement Concrete
ASTM C 150	(2004a) Portland Cement
ASTM C 171	(2003) Sheet Materials for Curing Concrete
ASTM C 227	(2003) Potential Alkali Reactivity of Cement-Aggregate Combinations (Mortar-Bar Method)
ASTM C 260	(2001) Air-Entraining Admixtures for Concrete
ASTM C 295	(2003) Petrographic Examination of Aggregates for Concrete
ASTM C 309	(2003) Liquid Membrane-Forming Compounds for Curing Concrete
ASTM C 33	(2003) Concrete Aggregates
ASTM C 39	(1993a) Compressive Strength of Cylindrical Concrete Specimens
ASTM C 441	(2002a) Effectiveness of Pozzolans or Ground Blast-Furnace Slag in Preventing Excessive Expansion of Concrete Due to the Alkali-Silica Reaction
ASTM C 494	(1992) Chemical Admixtures for Concrete
ASTM C 59/C 59M5	(2000; Rev A) Blended Hydraulic Cements
ASTM C 618	(2003) Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete
ASTM C 881	(1999) Epoxy-Resin-Base Bonding Systems for Concrete
ASTM C 920	(2002) Elastomeric Joint Sealants
ASTM C 94	(1994) Ready-Mixed Concrete
ASTM C 989	(2004) Ground Granulated Blast-Furnace Slag for Use in Concrete and Mortars
ASTM D 1179	(2004) Fluoride Ion in Water
ASTM D 1190	(1997) Concrete Joint Sealer, Hot-Applied Elastic Type
ASTM D 1339	(1984) Sulfite Ion in Water
ASTM D 1751	(1999) Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)
ASTM D 1752	(2004a) Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction
ASTM D 3867	(2004) Nitrite-Nitrate in Water
ASTM D 512	(2004) Chloride Ion in Water
ASTM D 516	(2002) Sulfate Ion in Water

1.2 DEFINITIONS

1.2.1 Blending Size

Blending size is an aggregate that complies with the quality requirements in ASTM C 33 and paragraph entitled "Aggregates" and as modified herein and can be blended with coarse and fine aggregate to produce a well graded combined grading.

1.2.2 Cementitious Material

Cementitious material as used herein shall include portland cement, pozzolan, fly ash, ground granulated blast-furnace slag, and silica fume.

1.2.3 Design Strength

Design strength (f'c) is the specified compressive strength of concrete to meet structural design criteria.

1.2.4 Marine Concrete

Marine concrete is that concrete that will be in contact with or subject to submersion, tidal variations, splash, or spray from salt or brackish water.

1.2.5 Mixture Proportioning

Mixture proportioning is a description of the proportions of a concrete mixture that were selected to enable it to meet the performance durability requirements, constructability requirements, and the initial and life-cycle cost goals.

1.2.6 Mixture Proportions

Mixture proportions is the concrete supplier's by-mass proportions to replicate the mixture design.

Pozzolan is a silicious or silicious and aluminous material, which in itself possesses little or no cementitious value but will, in finely divided form and in the presence of moisture, chemically react with calcium hydroxide at ordinary temperatures to form compounds possessing cementitious properties.

1.2.7 Field Test Strength

Field test strength (fcr) is the required compressive strength of concrete to meet structural and durability criteria. Determine (fcr) during mixture proportioning process.

1.2.8 Engineer

Engineer shall be defined as the owner’s designated representative who will be performing the construction observation.

1.2.9 Engineer of Record

Engineer of Record shall be defined as the person whose signature and professional engineering seal is affixed to the drawings and specifications.

1.3 SUBMITTALS

The following submittals shall be submitted to the Engineer at least ten days prior to ordering the material or casting the concrete.

City approval is required for submittals with a “G” designation; submittals not having a “G” designation are for information only. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals
Concrete Mixture Design; G
Expansion & Contraction Joint Detail; G

1.3.1 Concrete Mixture Design

Provide a detailed design of all concrete mixtures showing the amounts and types of cement, water, fly ash, pozzolan, slag, silica, additives, and other components of the mix design. Submit copies of test reports by test labs conforming to ASTM C 1077 showing that mixtures have been successfully tested to produce concrete with the properties specified and that the mixtures will be suitable for the job conditions. Test reports shall be submitted along with the concrete mixture proportions.

1.3.2 Fly Ash and Natural Pozzolan

Submit manufacturer's data or certification demonstrating that fly ash and pozzolans comply with ASTM C 618.

1.3.3 Blast-Furnace Slag

Submit manufacturer's data or certification demonstrating that blast furnace slag complies with ASTM C 989.

1.3.4 Silica Fume

Submit manufacturer's data or certification demonstrating that silica fume complies with ASTM C 1240.

1.3.5 Aggregates

Submit manufacturer's data or certification that aggregates comply with ASTM C 33. Submit the gradation curves for aggregates used in the concrete mixtures. Aggregates shall conform to ASTM C 295 for results of petrographic examination. Where there is potential for alkali-silica reaction, provide results of tests conducted in accordance with ASTM C 227 or ASTM C 1260.

1.3.6 Admixtures, Air-Entraining Agents, Corrosion Inhibitors, and Permeability Calculations

Submit manufacturer's data or certification that concrete admixtures comply with ASTM C 494/ASTM C 1017 and air-entraining agents comply with ASTM C 260. Submit manufacturer's literature and test reports for corrosion inhibitors and anti-washout admixtures. Submit calculations, test results, or manufacturer's information that the additives will produce concrete with the specified permeability. Submit a letter from the concrete mix designer stating that all admixtures are compatible.

1.3.7 Fiber-Reinforced Concrete

Submit manufacturer's data or certification that concrete has a flexural toughness index I5 in accordance with ASTM C 1116.

1.3.8 Cement

Submit manufacturer's data or certification that Portland cement complies with ASTM C 150 and blended cement complies with ASTM C 59/C 59M5 and ASTM C 1157.

1.3.9 Water for Concrete Mixture

Submit manufacturer's data or certification that water for use in the concrete mixtures complies with ASTM D 512 and ASTM D 516.

1.3.10 Concrete Curing

Submit proposed materials and methods for curing concrete elements.

1.3.11 Reinforcement

Submit manufacturer's certification that reinforcement meets ASTM A615 Grade 60 requirements.

1.3.12 Reinforcement Protective Coating

Provide coating manufacturer's and coating applicator's test data sheets certifying that applied coating meets the requirements of ASTM A 934/A 934M.

1.3.13 Expansion and Contraction Joints

Provide a detail of all expansion joints, contraction joints, or construction joints to be utilized during construction that are not detailed in the drawings.

PART 2 – PRODUCTS

2.1 CONCRETE

2.1.1 Durability and Strength

For structural elements to be exposed in a marine environment, the minimum concrete 28-day strength (f'c) shall be 5000 psi unless otherwise specified. Mixture proportions and additives shall comply with ACI 201.2R and ACI 211.1.

2.1.2 Contractor-Furnished Mixture Proportions

a. Strength and Water-Cementitious Materials Ratio. Strength requirements shall be based on 28-day compressive strength determined on 6 by 12 inch cylindrical specimens in accordance with ASTM C 39. The specified compressive strength of the concrete (f'c) for each portion of the structure shall meet the requirements in the contract documents.

b. The mixture proportions for marine concrete shall be developed by the Contractor to produce the design strength (f'c) and to provide durability, workability, and mixture consistency to facilitate

placement, compaction into the forms and around reinforcement without segregation or bleeding. The requirements for durability consideration specified in Table 1 and within this specification shall be incorporated in the mixture proportions.

Table 1 - Concrete Quality Requirements

Zone	Exposure Condition	Maximum W/CM	Minimum Quantity of Cementitious material lb/yd3	Minimum quantity of Portland cement lb/yd3
Submerged (1) and tidal (2)	(a) directly exposed to salt water	0.40	675	505
	(b) subject to severe abrasion	0.40	675	505
Splash (3)	(a) directly exposed to salt water	0.40	675	505
Atmospheric (4)	(a) directly exposed to marine atmosphere	0.40	675	505
	(b) protected from direct exposure to marine atmosphere	0.45	607	505

c. The maximum mass of fly ash, natural pozzolans, ground granulated blast-furnace slag, or silica fume that is included in the calculation of water-to-cementitious materials ratio shall not exceed the following limits:

1. Fly ash shall not be used for more than 25 percent by mass of the cementitious material. The fly ash and other pozzolans present in a Type IP or IPM blended cement, ASTM C 59/C 59M5, shall be included in the calculated percentage. If fly ash or other pozzolan is used in concrete with slag, the portland cement shall not be less than 50 percent of the total mass of cementitious materials. A higher percentage of fly ash may be used if tests are made using actual job materials to ascertain the early and later age strengths and durability performance specified, and the use is approved by the Engineer.

2. The weight of ground granulated blast-furnace slag conforming to ASTM C 989 shall not exceed 50 percent of the weight of cement. The slag used in manufacture of a Type IS or ISM blended hydraulic cement conforming to ASTM C 59/C 59M5 shall be included in the calculated percentage. Higher percentage of ground granulated blast-furnace slag may be used if tests are made using actual job materials to ascertain the early and later age strengths and durability performance specified, and the use is approved by the owner.

3. The maximum silica fume content shall not exceed 10 percent by mass of the cementitious material. The silica fume shall originate from the manufacture of silicon metal and ferro-silicon alloys. A high-range water reducer shall be used with silica fume for proper dispersion of the silica fume.

4. The minimum amount of portland cement is 50 percent of the total mass of cementitious material.

d. Air Content. Concrete that will be subject to destructive exposure (other than loading and wear in a passive environment) such as freezing and thawing, severe weathering, or deicing chemicals shall be air entrained and shall conform to the air limits specified in ACI 301.

e. Slump. The concrete mixture shall be proportioned to have a slump of 3-8 inches as determined by ASTM C 143. Where an ASTM C 494, Type F or G admixture is used, the slump after the addition of the admixture shall be no less than 6 inches nor greater than 8 inches. Slump tolerances shall comply with the requirements of ACI 117.

f. Permeability - Chloride Ion Penetration. To ensure the durability of concrete in marine environment, concrete shall be proportioned to have the chloride ion penetration test in accordance with ASTM C 1202, and be below 1000 coulombs for concrete specimens tested at 28 days. Alternatively, a ponding test in accordance with AASHTO T 259 may be performed to validate chloride ion penetration in accordance with ASTM C 1202.

2.2 MATERIALS

2.2.1 Cement

NOTE: Acceptable types of cement are as follows:

ASTM C 150 Portland	ASTM C 59/C 59M5 Blended	
Type II	Type IP(MS) or Type IS(MS)	For general use in construction where concrete is exposed to

Material shall comply with ASTM C 150, Type II and/or ASTM C 59/C 59M5, Type IP(MS) or IS(MS) and ASTM C 1157, Type MS blended cement except as modified herein. The tricalcium aluminate (C3A) content shall not be less than 4 percent to provide protection for the reinforcement and shall not be more than 10 percent to obtain concrete that is resistant to sulfate attack. Blended cements shall consist of a mixture of ASTM C 150 cement and one of the following materials: ASTM C 618 pozzolan or fly ash, or ASTM C 989 ground granulated blast-furnace slag. Use one manufacturer for each type of cement, ground slag, fly ash, and pozzolan.

2.2.2 Fly Ash and Pozzolan

Materials shall comply with ASTM C 618, Type N, F, or C, except that the maximum allowable loss on ignition shall be 6 percent for Types N and F. Add with cement.

2.2.3 Ground Iron Blast-Furnace Slag

Material shall comply with ASTM C 989, Grade 120.

2.2.4 Silica Fume

Material shall comply with ASTM C 1240.

2.2.5 Water

Water shall comply with the requirements of ASTM C 94 and the chloride and sulfate limits in accordance with ASTM D 512 and ASTM D 516. Mixing water shall not contain more than 500 parts per million of chlorides as Cl and not more than 100 parts per million of sulfates as SO4. Water shall be free from injurious amounts of oils, acids, alkalies, salts, and organic materials. Where water from reprocessed concrete is proposed for use in the work, submit results of tests to verify that the treatment has negated adverse effects of deleterious materials.

2.2.6 Aggregates

Material shall comply with ASTM C 33, except as modified herein.

a. The combined aggregates in the mixture (coarse, fine, and blending sizes) shall be well graded from the coarsest to the finest with not more than 18 percent nor less than 8 percent, unless otherwise permitted, of the combined aggregate retained on any individual sieve with the exceptions that the No. 50 may have less than 8 percent retained, sieves finer than No. 50 shall have less than 8 percent retained, and the coarsest sieve may have less than 8 percent retained. Use blending sizes where necessary, to provide a well graded combined aggregate. Reports of individual aggregates shall include standard concrete aggregate sieve sizes including 1 1/2 inches, one inch, 3/4 inch, 1/2 inch, 3/8 inch, No. 4, No. 8, No. 16, No. 30, No. 50, and No. 100.

b. Provide aggregates for exposed concrete from one source per ASTM C 227. Do not provide aggregates that react deleteriously with alkalies in cement. Refer to appendix, paragraph entitled "Test Method C227" of ASTM C 33 for expansion limits. Provide aggregate containing no deleterious material properties as identified by ASTM C 295.

c. Where a size designation is indicated, that designation indicates the nominal maximum size of the coarse aggregate.

d. Aggregate may contain materials deleteriously reactive with alkalies in the cement, if cement contains less than 0.60 percent alkalies (percent Na2O plus .658 percent K2O). Provide a material such as fly ash, slag, or silica fume as specified to be effective in preventing harmful expansion due to alkali-aggregate reaction by ASTM C 441.

e. Where historical data is used, provide aggregates from the same sources having the same size ranges as those used in the concrete represented by historical data.

f. Marine aggregate may be used when conforming to ASTM C 33 and if it has been washed by fresh water so that the total chloride and sulfate content of the concrete mixture does not exceed the limits defined herein.

2.2.7 Nonshrink Grout

Material shall comply with ASTM C 1107.

2.2.8 Admixtures

a. Provide chemical admixtures that comply with the requirements shown below and in accordance with manufacturer's recommendations, and appropriate for the climatic conditions and the construction needs. Do not use calcium chloride or admixtures containing chlorides from other than impurities from admixture ingredients.

b. Provide minimum concentrations of corrosion-inducing chemicals as shown in Table 2 below. For concrete that may be in contact with prestressing steel tendons, the concentration shall not exceed 60 percent of the limits given in Table 2. For the concentration in grout for prestressing ducts, do not exceed 25 percent of the limits in Table 2.

Table 2 - Limits on Corrosion-Inducing Chemicals

Chemical*	Limits, Percent**	Test Method
Chlorides	0.10	ASTM D 512
Fluorides	0.10	ASTM D 1179
Sulfides	0.13	ASTM D 1339
Nitrates	0.17	ASTM D 3867
* Limits refer to water-soluble chemicals ** Limits are expressed as a percentage of the mass of the total cementitious materials.		

c. Provide anti-washout admixtures for underwater placement with a proven record of performance and compatible with the chosen cement.

d. The total alkali content shall not increase the total sodium-oxide equivalent alkali content of the concrete by more than 0.5 lb/yd3.

2.2.9 Air Entraining Admixture

Provide air entraining admixtures conforming to ASTM C 260. Provide the admixture of such a type and dosage that the total air content in the hardened concrete can be readily maintained within the limits specified in Table 3.

Table 3 - Air Content

Nominal maximum size of coarse aggregate, inch(es)	Size Number	Total Air Content, Percent by Volume

3/8	8	6-10
½	7	5-9
¾	67	4-8
1	57	3.5-6.5
1 ½	467	3-6
2	357	2.5-5.5
3	-	1.5-4.5

2.2.10 Accelerating Admixture

Material shall comply with ASTM C 494, Type C.

2.2.11 Retarding Admixture

Material shall comply with ASTM C 494, Type B, D, or G.

2.2.12 Water Reducing

Material shall comply with ASTM C 494, Type A, E, or F.

2.2.13 High Range Water Reducer (HRWR)

Material shall comply with ASTM C 494, Type F and ASTM C 1017.

2.2.14 Materials for Forms

Provide wood, plywood, or steel. Use plywood or steel forms where a smooth form finish is required. Lumber shall be square edged or tongue-and-groove boards, free of raised grain, knotholes, or other surface defects. Plywood: PS-1, B-B concrete form panels or better. Steel form surfaces shall not contain irregularities, dents, or sags.

a. Form Ties and Form-Facing Material.

    1. Provide a form tie system that does not leave mild steel after break-off or removal any closer than 2 inches from the exposed surface. Do not use wire alone. Form ties and accessories shall not reduce the effective cover of the reinforcement.

    2. Form-facing material shall be structural plywood or other material that can absorb air trapped in pockets between the form and the concrete and some of the high water-cementitious materials ratio surface paste. Maximum use is three times. Provide forms with a form treatment to prevent bond of the concrete to the form.

    3. As an alternate to using an absorptive wood form contact face as a form liner, use "Zendrain" or an approved equal in strict accordance with the manufacturer's recommendations.

2.2.15 Reinforcement

a. Reinforcing Bars. Material shall comply with ASTM A 615/A 615M Grade 60.

b. Welded Wire Fabric. Material shall comply with ASTM A 185 or ASTM A 497. Provide flat sheets of welded wire fabric for slabs and toppings.

c. Wire. Material shall comply with ASTM A 82 or ASTM A 496.

2.2.16 Materials for Curing Concrete

a. Impervious Sheeting. Material shall comply with ASTM C 171; waterproof paper, clear or white polyethylene sheeting, or polyethylene-coated burlap.

b. Pervious Sheeting. Material shall comply with AASHTO M 182.

c. Liquid Membrane-Forming Compound. Material shall comply with ASTM C 309, white-pigmented, Type 2, Class B.

2.2.17 Liquid Chemical Sealer-Hardener Compound

Provide magnesium fluosilicate compound which when mixed with water seals and hardens the surface of the concrete. Do not use on exterior slabs exposed to freezing conditions. Compound shall not reduce the adhesion of resilient flooring, tile, paint, roofing, waterproofing, or other material applied to concrete.

2.2.18 Expansion/Contraction Joint Filler

Material shall comply with ASTM D 1751 or ASTM D 1752 and shall be 1/2 inch thick, unless otherwise indicated.

2.2.19 Joint Sealants

a. Horizontal Surfaces, 3 Percent Slope, Maximum. Material shall comply with ASTM D 1190 or ASTM C 920, Type M, Class 25, Use T.

b. Vertical Surfaces Greater Than 3 Percent Slope. Material shall comply with ASTM C 920, Type M, Grade NS, Class 25, Use T.

2.2.20 Epoxy Bonding Compound

Material shall comply with ASTM C 881. Provide Type I for bonding hardened concrete to hardened concrete; Type II for bonding freshly mixed concrete to hardened concrete; and Type III as a binder in epoxy mortar or concrete, or for use in bonding skid-resistant materials to hardened concrete. Provide Grade 1 or 2 for horizontal surfaces and Grade 3 for vertical surfaces. Provide Class A if placement temperature is below 40 degrees F; Class B if placement temperature is between 40 and 60 degrees F; or Class C if placement temperature is above 60 degrees F.

PART 3 – EXECUTION

3.1 FORMS

3.1.1 General

Concrete for footings may be placed in excavations without forms upon inspection and approval by the Engineer. Set forms mortar-tight and true to line and grade. Chamfer above grade exposed joints, edges, and external corners of concrete 1-inch unless otherwise indicated. Forms submerged in water shall be watertight.

Provide formwork with clean-out openings to permit inspection and removal of debris. Formwork shall be gasketed or otherwise rendered sufficiently tight to prevent leakage of paste or grout under heavy, high-frequency vibration. Use a release agent that does not cause surface dusting. Limit reuse of plywood to no more than three times. Reuse may be further limited by the Engineer if it is found that the pores of the plywood are clogged with paste to the degree that the wood does not absorb the air or the high water-cementitious materials ratio concrete surface. Patch form tie holes with a nonshrink patching material in accordance with the manufacturer's recommendations and subject to approval.

3.1.2 Form Coating

Before concrete placement, coat the contact surfaces of forms with a nonstaining mineral oil, nonstaining form coating compound, or two coats of nitrocellulose lacquer. Do not use mineral oil on forms for surfaces to which adhesive, paint, or other finish material is to be applied.

3.1.3 Removal of Forms and Support

After placing concrete, forms shall remain in place for the time periods specified in ACI 347R, except for concrete placed underwater, forms shall remain in place 48 hours. Prevent concrete damage during form removal.

Special Requirements for Reduced Time Period

Forms may be removed earlier than specified if ASTM C 39 test results of field-cured samples from a representative portion of the structure or other approved and calibrated non-destructive testing techniques show that the concrete has reached a minimum of 85 percent of the design strength.

3.1.4 Reshoring

Do not allow construction loads to exceed the superimposed load which the structural member, with necessary supplemental support, is capable of carrying safely and without damage. Reshore concrete elements where forms are removed prior to the specified time period. Do not permit elements to deflect or accept loads during form stripping or reshoring.

3.2 PLACING REINFORCEMENT AND JOINTS

3.2.1 General

Remove rust, scale, oil, grease, clay, or foreign substances from reinforcing that would reduce the concrete bond with reinforcing. Do not tack weld.

3.2.2 Reinforcement Supports

Place reinforcement and secure with non-corrodible chairs, spacers, or metal hangers. Support reinforcement on the ground with concrete or other non-corrodible material, having a compressive strength equal to or greater than the concrete being placed.

3.2.3 Reinforcement Bar Splicing

Unless noted otherwise, minimum lap splices for reinforcing bars shall be 34 bar diameters for #3 - #6 bars and 42 bar diameters for bars #7 and larger.

3.2.4 Cover

Concrete cover for reinforcement shall be 3 inches unless noted otherwise.

3.2.5 Construction Joints

Locate joints to least impair strength. Continue reinforcement across joints unless otherwise indicated.

3.2.6 Expansion Joints and Contraction Joints

Provide expansion joints at edges of slabs on grade abutting vertical surfaces, and as indicated. Make expansion joints 1/2 inch wide unless indicated otherwise. Completely fill joints exposed to weather with joint filler material and joint sealant. Do not extend reinforcement or other embedded metal items bonded to the concrete through any expansion joint unless an expansion sleeve is used. Place contraction joints, either formed or saw cut or cut with a jointing tool, to the indicated depth after the surface has been finished. Sawed joints shall be completed within 4 to 12 hours after concrete placement. Protect joints from intrusion of foreign matter.

3.3 PLACING CONCRETE

Place concrete as soon as practicable after the forms and the reinforcement have been inspected and approved. Do not place concrete when weather conditions prevent proper placement and consolidation; in uncovered areas during periods of precipitation; or in standing water. Prior to placing concrete, remove dirt, construction debris, water, snow, and ice from within the forms. Deposit concrete as close as practicable to the final position in the forms. Do not exceed a free vertical drop of 3 feet from the point of discharge. Place concrete in one continuous operation from one end of the structure towards the other or lifts for vertical construction. Position grade stakes on 20 foot centers maximum in each direction when pouring slabs.

3.3.1 Transporting

Transport concrete from the mixer to the forms as rapidly as practicable. Prevent segregation or loss of ingredients. Clean transporting equipment thoroughly before each batch. Do not use aluminum pipe or chutes. Remove concrete which has segregated in transporting and dispose of as directed.

3.3.2 Vibration

Comply with the requirements of ACI 309R and ASTM A 934/A 934M using vibrators with a minimum frequency of 9000 vibrations per minute (VPM). Use only high cycle or high frequency vibrators. Motor-in-head 60 cycle vibrators may not be used. For walls and deep beams, use a minimum of two vibrators with the first to melt down the mixture and the second to thoroughly consolidate the mass. Provide a spare vibrator at the casting site whenever concrete is placed. Place concrete in 18 inch maximum vertical lifts. Insert and withdraw vibrators approximately 18 inches apart. Penetrate at least 8 inches into the previously placed lift with the vibrator when more than one lift is required. Extract the vibrator using a series of up and down motions to drive the trapped air out of the concrete and from between the concrete and the forms.

For slab construction use vibrating screeds designed to consolidate the full depth of the concrete. Where beams and slabs intersect, use an internal vibrator to consolidate the beam. Do not vibrate concrete placed with anti-washout admixtures. Vibrators shall be equipped with rubber vibrator heads.

3.3.3 Application of Epoxy Bonding Compound

Apply a thin coat of compound to dry, clean surfaces. Scrub compound into the surface with a stiff-bristle brush. Place concrete while compound is tacky. Do not permit compound to harden prior to concrete placement. Follow manufacturer's instructions regarding safety and health precautions when working with epoxy resins.

3.3.4 Pumping

Pumping of concrete shall comply with ACI 304R and ACI 304.2R. Pumping shall not result in separation or loss of materials nor cause interruptions sufficient to permit loss of plasticity between successive increments. Loss of slump in pumping equipment shall not exceed 2 inches. Do not use pipe made of aluminum or aluminum alloy. Avoid rapid changes in pipe sizes. Limit maximum size of coarse aggregate to 33 percent of the diameter of the pipe. Take samples for testing at both the point of delivery to the pump and at the discharge end.

3.3.5 Cold Weather

ACI 306.1. Do not allow concrete temperature to decrease below 50 degrees F. Obtain approval prior to placing concrete when ambient temperature is below 40 degrees F or when concrete is likely to be subjected to freezing temperatures within 24 hours. Cover concrete and provide sufficient heat to maintain 50 degrees F minimum adjacent to both the formwork and the structure while curing. Limit the rate of cooling to 5 degrees F in any one hour and 50 degrees F per 24 hours after heat application.

3.3.6 Hot Weather

Placement of concrete in hot weather shall comply with ACI 305R. Maintain required concrete temperature using Figure 2.1.5, "Effect of Concrete Temperatures, Relative Humidity, and Wind Velocity on the Rate of Evaporation of Surface Moisture From Concrete" in ACI 305R to prevent the evaporation rate from exceeding 0.2 pound of water per square foot of exposed concrete per hour. Cool ingredients before mixing or use other suitable means to control concrete temperature and prevent rapid drying of newly placed concrete. Shade the fresh concrete as soon as possible after placing. Start curing when the surface of the fresh concrete is sufficiently hard to permit curing without damage. Provide water hoses, pipes, spraying equipment, and water hauling equipment, where job site is remote to water source, to maintain a moist concrete surface throughout the curing period. Provide burlap cover or other suitable, permeable material with fog spray or continuous wetting of the concrete when weather conditions prevent the use of either liquid membrane curing compound or impervious sheets. For vertical surfaces, protect forms from direct sunlight and add water to top of structure once concrete is set.

3.4 SURFACE FINISHES (EXCEPT SIDEWALKS AND WALKING SURFACES)

3.4.1 General

Provide form facing material producing a smooth, hard, uniform texture on the concrete. Arrange facing material in an orderly and symmetrical manner and keep seams to a practical minimum. Support forms as necessary to meet required tolerances. Material with raised grain, torn surfaces, worn edges, patches, dents, or other defects which will impair the texture of the concrete surface shall not be used. The surface of the concrete shall not vary more than the allowable tolerances of ACI 347R. Exposed surfaces shall be uniform in appearance and finished to a smooth form finish unless otherwise indicated. Patch tie holes and defects and completely remove fins.

3.4.2 Defects

Repair formed surfaces by removing minor honeycombs, pits greater than one square inch surface area or 0.25 inch maximum depth, or otherwise defective areas. Provide edges perpendicular to the surface and patch with nonshrink grout. Patch tie holes and defects when the forms are removed. Concrete with extensive honeycomb including exposed steel reinforcement, cold joints, entrapped debris, separated aggregate, or other defects which affect the serviceability or structural strength will be rejected, unless correction of defects is approved. Obtain approval of corrective action prior to repair.

3.5 FINISHES FOR HORIZONTAL (WALKING) CONCRETE SURFACES

3.5.1 Finish

Place, consolidate, and immediately strike off concrete to obtain proper contour, grade, and elevation before bleedwater appears. Permit concrete to attain a set sufficient for floating and supporting the weight of the finisher and equipment. If bleedwater is present prior to floating the surface, drag excess water off or remove by absorption with porous materials. Do not use dry cement to absorb bleedwater.

3.5.2 Floated

After the concrete has been placed, consolidated, struck off, and leveled, do not work the concrete further, until ready for floating. Whether floating with a wood, magnesium, or composite hand float, with a bladed power trowel equipped with float shoes, or with a powered disc, float shall begin when the surface has stiffened sufficiently to permit the operation. For concrete containing silica fume, finish using magnesium floats or darbies.

3.5.3 Broomed Finish

Perform a floated finish, then draw a broom or burlap belt across the surface to produce a coarse scored texture. Permit surface to harden sufficiently to retain the scoring or ridges. Broom transverse to traffic or at right angles to the slope of the slab.

3.6 CURING AND PROTECTION

3.6.1 General

Concrete shall be cured in accordance with ACI 301 and ACI 308 unless otherwise specified. Prevent concrete from drying by misting surface of concrete. Begin curing immediately following final set. Avoid damage to concrete from vibration created by blasting, pile driving, movement of equipment in the vicinity, disturbance of formwork or protruding reinforcement, by rain or running water, adverse weather conditions, and any other activity resulting in ground vibrations. Protect concrete from injurious action by sun, rain, flowing water, frost, mechanical injury, tire marks, and oil stains.

Do not allow concrete to dry out from time of placement until the expiration of the specified curing period. Do not use membrane-forming compound on surfaces where appearance would be objectionable, on any surface to be painted, where coverings are to be bonded to the concrete, or on concrete to which other concrete is to be bonded. If forms are removed prior to the expiration of the curing period, provide another curing procedure specified herein for the remaining portion of the curing period. Provide moist curing for those areas receiving liquid chemical sealer-hardener or epoxy coating. For concrete slabs or wide beams containing silica fume, fog spray and install wind breaks to ensure 100 percent relative humidity until wet curing is started.

Do not allow construction loads to exceed the superimposed load which the structural member, with necessary supplemental support, is capable of carrying safely and without damage.

3.6.2 Moist Curing Alternatives

a. Ponding or Immersion. Continually immerse the concrete throughout the curing period. Water shall not be 20 degrees F less than the temperature of the concrete. For temperatures between 40 and 50 degrees F, increase the curing period by 50 percent.

b. Fog Spraying or Sprinkling. Apply water uniformly and continuously throughout the curing period. For temperatures between 40 and 50 degrees F, increase the curing period by 50 percent.

c. Pervious Sheeting. Completely cover surface and edges of the concrete with two thicknesses of wet sheeting. Overlap sheeting 6 inches over adjacent sheeting. Sheeting shall be at least as long as the width of the surface to be cured. During application, do not drag the sheeting over the

finished concrete nor over sheeting already placed. Wet sheeting thoroughly and keep continuously wet throughout the curing period.

d. Impervious Sheeting. Wet the entire exposed surface of the concrete thoroughly with a fine spray of water and cover with impervious sheeting throughout the curing period. Lay sheeting directly on the concrete surface and overlap edges 12 inches minimum. Provide sheeting not less than 18 inches wider than the concrete surface to be cured. Secure edges and transverse laps to form closed joints. Repair torn or damaged sheeting or provide new sheeting. Cover or wrap columns, walls, and other vertical structural elements from the top down with impervious sheeting; overlap and continuously tape sheeting joints; and introduce sufficient water to soak the entire surface prior to completely enclosing.

3.6.3 Liquid Membrane-Forming Curing Compound

Seal or cover joint openings prior to application of curing compound. Prevent curing compound from entering the joint. Apply in accordance with the recommendations of the manufacturer immediately after any water sheen which may develop after finishing has disappeared from the concrete surface. Provide and maintain compound on the concrete surface throughout the curing period. Do not use this method of curing where the use of Figure 2 .1.5, "Effect of Concrete Temperatures, Relative Humidity, and Wind Velocity on the Rate of Evaporation of Surface Moisture from Concrete" in ACI 305R indicates that hot weather conditions will cause an evaporation rate exceeding 0.2 pound of water per square foot per hour.

Mechanically agitate curing compound thoroughly during use. Use approved power-spraying equipment to uniformly apply two coats of compound in a continuous operation. The total coverage for the two coats shall be 200 square feet maximum per gallon of undiluted compound unless otherwise recommended by the manufacturer's written instructions. The compound shall form a uniform, continuous, coherent film that will not check, crack, or peel. Immediately apply an additional coat of compound to areas where the film is defective. Respray concrete surfaces subjected to rainfall within 3 hours after the curing compound application.

Prohibit pedestrian and vehicular traffic and other sources of abrasion at least 72 hours after compound application. Maintain continuity of the coating for the entire curing period and immediately repair any damage.

3.6.4 Liquid Chemical Sealer-Hardener

Apply the sealer-hardener in accordance with manufacturer's recommendations. Seal or cover joints and openings in which joint sealant is to be applied as required by the joint sealant manufacturer. The sealer-hardener shall not be applied until the concrete has been moist cured and has aged for a minimum of 30 days. Apply a minimum of two coats of sealer-hardener.

3.6.5 Curing Periods

Moist cure concrete using potable water for a minimum of 7 days. Continue additional curing for a total period of 21 days. Begin curing immediately after placement. Protect concrete from premature drying, excessively hot temperatures, and mechanical injury; and maintain minimal moisture loss at a relatively

constant temperature for the period necessary for hydration of the cement and hardening of the concrete. The materials and methods of curing shall be subject to approval by the Engineer.

--End of Section--

SECTION 03 35 00

CONCRETE FINISHING

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN CONCRETE INSTITUTE INTERNATIONAL (ACI)

ACI 301(2010; ERTA 2015) Specifications for Structural Concrete

FLORIDA DEPARTMENT OF TRANSPORTATION (FDOT)

FDOT Standard Specifications for Road and Bridge Construction (January 2018)

1.2 SUBMITTALS

CITY approval is required for submittals with a "G" designation; submittals not having a "G" designation are for [information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the CITY. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-04 Samples

Field Test Panels; G

1.3 QUALITY ASSURANCE

1.3.1 Field Test Panels

Construct field test panels prior to beginning of work using the materials and procedures proposed for use on the job, to demonstrate the results to be attained. The quality and appearance of each panel is subject to the approval of the CITY, and, if not judged satisfactory, construct additional panels until approval is attained. Formed or finished surfaces in the completed structure must match the quality and appearance of the approved field example.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

3.1 FINISHING FORMED SURFACES

Forms, form materials, and form construction are specified in Section 03 10 00 CAST-IN-PLACE CONCRETE FORMING. Finish formed surfaces as specified herein. Unless another type of architectural or special finish is specified, leave surfaces with the texture imparted by the forms except that defective surfaces must be repaired.

Maintain uniform color of the concrete by use of only one mixture without changes in materials or proportions for any structure or portion of structure Class A finish. The form panels used to produce the finish must be orderly in arrangement, with joints between panels planned in approved relation to openings, building corners, and other architectural features.

Do not reuse forms if there is any evidence of surface wear or defects that would impair the quality of the surface.

3.1.1 Concrete Sidewalk and Slabs

Finish in accordance with FDOT Specification Section 522.

3.2 REPAIRS

Repair in accordance with ACI 301, Section 5.

-- End of Section --

SECTION 06 13 00

TIMBER STRUCTURES

PART 1 GENERAL

1.1 DESCRIPTION

Furnish and erect **t**imber, treated timber, and miscellaneous construction materials into picnic pavilion.

PART 2 PRODUCTS

2.1 MATERIALS

Meet the following requirements:

TIMBER FRAMING
- Timber: Douglas fir, Hem-fir, or Southern Pine at Contractor's option.
- Preservative Treatment: Pressure treat timber with waterborne solution for above ground use, complying with AWPA U1, category UC3B above ground use.

FLOOR
- Concrete: FDOT Class II
- Reinforcing Bars: ASTM A615, Grade 60
- Welded wire fabric: ASTM A-185
- Vapor Barrier: Black 6-mil polyethylene

ROOF
- 3" x 6" T&G wood decking
- 30# asphalt impregnated fiberglass felt underlayment
- Standing seam metal roof (24 GA Steel or 0.032 Aluminum) w/ Kynar 500 finish

PART 3 EXECUTION

3.1 TIMBER HANDLING

Handle treated timber with rope slings, without sudden dropping, breaking of outer fibers, bruising, or penetration of the surface with tools. Do not use cant dogs, hooks, or pike poles.

3.2 CUTTING AND FRAMING

Before treatment, cut and frame all timbers which are shown by the Plans to be furnished in special lengths or framed to detailed dimensions. Limit the cutting of treated timber to minor fitting which might be necessary and that is authorized by the Engineer. For all places where the surface is broken, by cutting or otherwise, thoroughly coat with the preservatives and by the methods specified in AWPA M4.

3.3 BOLT HOLES

The Contractor may drill holes in the field. For timbers originally treated with pentachlorophenol, creosote, creosote solutions, or waterborne preservatives, field treat all cuts, abrasions, bolt holes, and recesses that occur after treatment with two liberal applications of a compatible preservative in accordance with the requirements specified in AWPA Standard M4, Standard for the Care of Pressure-Treated Wood Products.

3.4 FRAMING

Cut and frame truss and bent timbers to a close fit in such manner that they will have even bearing over the entire contact surface of the joint. Do not perform blocking or shimming of any kind in making the joints. The Engineer will not accept open joints.

3.5 HOLES FOR BOLTS, DOWELS, RODS AND LAG SCREWS

Bore holes to the diameters shown in the following table:

Hole use	Hole Diameter
Drift Bolts and Dowels	1/16 inch less in diameter than the bolt or dowel to be used
Machine Bolts	same diameter as the bolt
Rods	1/16 inch greater in diameter than the rod
Lag Screws	not larger than the body of the screw at the base of the thread

3.6 STRINGERS

The Contractor may use butt joints for outside stringers, but shall frame interior stringers to bear over the full width of floor beam or cap at each end. Separate the ends at least 1/2 inch to allow circulation of air, and securely fasten the ends to the timber on which they rest.

3.7 HARDWARE

3.7.1 GENERAL

Use hardware, including bolts, drift pins, dowels, rods, nuts, washers, spikes, nails and all similar incidental metal items, necessary to complete the work in accordance with the details shown in the Plans. Use common wire nails as commercially manufactured. Use ogee washers of cast or malleable iron. The Contractor may use other hardware of steel, iron, or any similar material ordinarily used in the manufacture of such articles.

3.7.2 CCA, ACQ-D, and CA-C, Treated Timber Structures

Use the fasteners and connectors as described in the following table:

TABLE – HARDWARE REQUIREMENTS FOR TREATED TIMBER		
Environmental condition where structure will be located	Fasteners	Connectors
Permanent wood foundations and/or where salt spray if prevalent	304 or 316 Stainless Steel	304 or 316 Stainless Steel
Structures that will be exposed to standing water or rainwater	304 or 316 Stainless Steel	304 or 316 Stainless Steel
Structures that will be situated indoors and remain dry in service	304 or 316 Stainless Steel Hot-dipped galvanized fasteners meeting ASTM A-153 requirements	304 or 316 Stainless Steel Hot-dipped galvanized connectors meeting the requirements of ASTM A-653 Class G185 sheet or better
Do not use aluminum in direct contact with treated wood.		

3.7.3 Bolts

Use bolts of the sizes shown in the Plans with square heads and nuts and with screw threads that make close fits in the nuts. Upon completion of the installation, check all nuts for tightness, and cut off protruding bolt ends so that not more than 1/4 inch extends beyond the nut.

3.7.4 Inspection

The Engineer will inspect the hardware for quality of manufacture and accuracy of size prior to use on wood structures.

3.7.5 Countersinking

Perform countersinking wherever the heads of screws or bolts would otherwise interfere with the assembly of the work. Fill recesses formed by countersinking with hot asphalt.

-- End of Section --

SECTION 31 23 00

EXCAVATION AND FILL

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM C136/C136M	(2014) Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
ASTM C33/C33M	(2013) Standard Specification for Concrete Aggregates
ASTM D1140	(2014) Amount of Material in Soils Finer than the No. 200 (75-micrometer) Sieve
ASTM D1556/D1556M	(2015; E 2016) Standard Test Method for Density and Unit Weight of Soil in Place by Sand-Cone Method
ASTM D1557	(2012; E 2015) Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3) (2700 kN-m/m3)
ASTM D1883	(2014) CBR (California Bearing Ratio) of Laboratory-Compacted Soils
ASTM D2487	(2011) Soils for Engineering Purposes (Unified Soil Classification System)
ASTM D4318	(2010; E 2014) Liquid Limit, Plastic Limit, and Plasticity Index of Soils
ASTM D4759	(2011) Determining the Specification Conformance of Geosynthetics
ASTM D5084	(2010) Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter
ASTM D6938	(2015) Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)
ASTM D698	(2012; E 2014; E 2015) Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/cu. ft. (600 kN-m/cu. m.))

U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA)

EPA SW-846.3-3	(1999, Third Edition, Update III-A) Test Methods for Evaluating Solid Waste: Physical/Chemical Methods

1.2 DEFINITIONS

1.2.1 Degree of Compaction

Degree of compaction is expressed as a percentage of the maximum density obtained by the test procedure presented in [ASTM D698][ASTM D1557], for general soil types, abbreviated as percent laboratory maximum density.

1.2.2 Hard Materials

Weathered rock, dense consolidated deposits, or conglomerate materials which are not included in the definition of "rock" but which usually require the use of heavy excavation equipment, ripper teeth, or jack hammers for removal.

1.2.3 Rock

Solid homogeneous interlocking crystalline material with firmly cemented, laminated, or foliated masses or conglomerate deposits, neither of which can be removed without systematic drilling and blasting, drilling and the use of expansion jacks or feather wedges, or the use of backhoe-mounted pneumatic hole punchers or rock breakers; also large boulders, buried masonry, or concrete other than pavement exceeding 1/2 cubic yard in volume.

1.3 SUBMITTALS

CITY approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the CITY. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Work Plan; G

1.4 DELIVERY, STORAGE, AND HANDLING

Perform in a manner to prevent contamination or segregation of materials.

1.5 CRITERIA FOR BIDDING

Base bids on the following criteria:

a. Surface elevations are as indicated.

b. Pipes or other artificial obstructions, except those indicated, will not be encountered.

c. Ground water elevations indicated by the boring log were those existing at the time subsurface investigations were made and do not necessarily represent ground water elevation at the time of construction.

d. Ground water elevation is 1-4 feet below existing surface elevation.

e. Material character is indicated by the boring logs.

f. Hard materials will be encountered in 100 percent of the excavations starting at the surface and continuing to full depth of drive below existing surface elevations.

g. Suitable backfill, if required, is available from local suppliers.

h. Blasting will not be permitted. Remove material in an approved manner.

1.6 REQUIREMENTS FOR OFF SITE SOIL

Fill material shall be predominately of carbonate, quartz or similar material with a particle size distribution ranging between 0.062 mm and 4.76 mm (classified as sand by either the Unified Soils or Wentworth classification), shall be similar in color and grain size distribution to the material in the existing coastal system and shall not contain:

- greater than 5 percent, by weight, silt, clay or colloids passing the #230 sieve;
- greater than 5 percent, by weight, fine gravel retained on the #4 sieve;
- coarse gravel, cobbles or material retained on the ¾ inch sieve; and,
- construction debris, toxic material or other foreign matter.

1.7 QUALITY ASSURANCE

1.7.1 Work Plan

Work plan shall indicate location and depths of all excavation areas anticipated by the Contractor. Work plan shall list all equipment utilized in the conduct of the work.

1.7.2 Utilities

Movement of construction machinery and equipment over pipes and utilities during construction shall be at the Contractor's risk. Excavation made with power-driven equipment is not permitted within two feet of known CITY-owned utility or subsurface construction. For work immediately adjacent to or for excavations exposing a utility or other buried obstruction, excavate by hand. Start hand excavation on each side of the indicated obstruction and continue until the obstruction is uncovered or until clearance for the new grade is assured. Report damage to utility lines or subsurface construction immediately to the CITY.

PART 2 PRODUCTS

2.1 SOIL MATERIALS

2.1.1 Satisfactory Materials

Any materials classified by ASTM D2487 as SW or SP, free of debris, roots, wood, scrap material, vegetation, refuse, soft unsound particles, and deleterious, toxic, or objectionable materials. Material specifications for all fill adjacent to (landward and seaward of) the seawall and concrete cap shall meet the requirements of Section 31 23 00, Part 1.6. Unless specified otherwise, the maximum particle diameter shall be specified by the engineer of record and shown on the plans for that location.

2.1.2 Unsatisfactory Materials

Materials which do not comply with the requirements for satisfactory materials. Unsatisfactory materials also include man-made fills, trash, refuse, construction debris, or backfills from previous construction. Unsatisfactory material also includes material classified as satisfactory which contains root and other organic matter, and stones larger than 3 inches. The CITY shall be notified of any contaminated materials.

2.1.3 Select Material

Provide materials classified as GW, GP, SW, SP, by ASTM D2487 where indicated. Coefficient of permeability shall be a minimum of 0.002 feet per minute when tested in accordance with ASTM D5084.

Bearing Ratio: At 0.1 inch penetration, the bearing ratio shall be determined in accordance with ASTM D1883 for a laboratory soaking period of not less than 4 days. The combined material shall conform to the following sieve analysis:

Sieve Size	Percent Passing by Weight
2 1/2 inches	100
No. 4	40 - 85
No. 10	20 - 80
No. 40	10 - 60
No. 200	5 - 25

2.2 POROUS FILL FOR CAPILLARY WATER BARRIER

Not Used.

2.3 BORROW

Obtain borrow materials required in excess of those furnished from excavations from sources outside of CITY property.

Obtain borrow materials required in excess of those furnished from excavations from sources outside of CITY property, except that borrow materials conforming to satisfactory material may be obtained

from local suppliers. Dispose of materials from clearing and grubbing operations at the landfill indicated. If satisfactory borrow is used, strip top 12 inches of soil material and stockpile. After removal of borrow material, regrade borrow pit using stockpiled soil material to contours which will blend in with adjacent topography. Maximum side slopes shall be two horizontal to one vertical. Excavation and backfilling of borrow pit shall ensure proper drainage.

PART 3 EXECUTION

3.1 PROTECTION

3.1.1 Drainage and Dewatering

Provide for the collection and disposal of surface and subsurface water encountered during construction.

3.1.1.1 Drainage

So that construction operations progress successfully, completely drain construction site during periods of construction to keep soil materials sufficiently dry. The Contractor shall establish/construct storm drainage features at the earliest stages of site development, and throughout construction grade the construction area to provide positive surface water runoff away from the construction activity. When unsuitable working platforms for equipment operation and unsuitable soil support for subsequent construction features develop, remove unsuitable material and provide new soil material as specified herein. It is the responsibility of the Contractor to assess the soil and ground water conditions presented by the plans and specifications and to employ necessary measures to permit construction to proceed. Excavated slopes and backfill surfaces shall be protected to prevent erosion and sloughing. Excavation shall be performed so that the site, the area immediately surrounding the site, and the area affecting operations at the site shall be continually and effectively drained.

3.1.1.2 Dewatering

Groundwater flowing toward or into excavations shall be controlled to prevent sloughing of excavation slopes and walls, boils, uplift and heave in the excavation and to eliminate interference with orderly progress of construction. French drains, sumps, ditches or trenches will not be permitted within 3 feet of the foundation of any structure, except with specific written approval, and after specific contractual provisions for restoration of the foundation area have been made. Control measures shall be taken by the time the excavation reaches the water level in order to maintain the integrity of the in situ material. While the excavation is open, the water level shall be maintained continuously, at least 1 feet below the working level.

3.1.2 Underground Utilities

Location of the existing utilities indicated is approximate. The Contractor shall physically verify the location and elevation of the existing utilities indicated prior to starting construction. The Contractor shall contact the "Sunshine 811 One-Call of Florida (www.sunshine811.com)" and or the local Public Works Department for assistance in locating existing utilities.

3.1.3 Machinery and Equipment

Movement of construction machinery and equipment over pipes during construction shall be at the Contractor's risk. Repair, or remove and provide new pipe for existing or newly installed pipe that has been displaced or damaged.

3.2 SURFACE PREPARATION

3.2.1 Clearing and Grubbing

Unless indicated otherwise, remove trees, stumps, logs, shrubs, brush and vegetation and other items that would interfere with construction operations within the clearing limits. Remove stumps entirely. Grub out matted roots and roots over 2 inches in diameter to at least 9 inches below existing surface.

3.2.2 Stripping

Strip suitable soil from the site where excavation or grading is indicated and stockpile separately from other excavated material.

3.2.3 Unsuitable Material

Remove vegetation, debris, decayed vegetable matter, sod, mulch, and rubbish underneath paved areas or concrete slabs.

3.3 EXCAVATION

Excavate as necessary to install the seawall cap at the lines and grades indicated. Reuse excavated materials that meet the specified requirements for the material type required at the intended location. Keep excavations free from water. Excavate soil disturbed or weakened by Contractor's operations, soils softened or made unsuitable for subsequent construction due to exposure to weather. Excavations below indicated depths will not be permitted except to remove unsatisfactory material. Unsatisfactory material encountered below the grades shown shall be removed as directed. Refill with satisfactory material and compact to 95 percent of ASTM D698 maximum density. Unless specified otherwise, refill excavations cut below indicated depth with satisfactory material 95 percent of ASTM D698 maximum density. Satisfactory material removed below the depths indicated, without specific direction of the CITY, shall be replaced with satisfactory materials to the indicated excavation grade; except as specified for spread footings. Determination of elevations and measurements of approved overdepth excavation of unsatisfactory material below grades indicated shall be done under the direction of the CITY.

3.3.1 Excavated Materials

Satisfactory excavated material required for fill or backfill shall be placed in the proper section of the permanent work required or shall be separately stockpiled if it cannot be readily placed. Satisfactory material in excess of that required for the permanent work and all unsatisfactory material shall be disposed of as specified in Paragraph "DISPOSITION OF SURPLUS MATERIAL."

3.3.2 Final Grade of Surfaces to Support Concrete

Excavation to final grade shall not be made until just before concrete is to be placed. Only excavation methods that will leave the foundation rock in a solid and unshattered condition shall be used. Approximately level surfaces shall be roughened, and sloped surfaces shall be cut as indicated into rough steps or benches to provide a satisfactory bond. Shales shall be protected from slaking and all surfaces shall be protected from erosion resulting from ponding or flow of water.

3.4 SUBGRADE PREPARATION

Unsatisfactory material in surfaces to receive fill or in excavated areas shall be removed and replaced with satisfactory materials as directed by the CITY. The surface shall be scarified to a depth of 6 inches before the fill is started. Sloped surfaces steeper than 1 vertical to 4 horizontal shall be plowed, stepped, benched, or broken up so that the fill material will bond with the existing material. When subgrades are less than the specified density, the ground surface shall be broken up to a minimum depth of 6 inches, pulverized, and compacted to the specified density. When the subgrade is part fill and part excavation or natural ground, the excavated or natural ground portion shall be scarified to a depth of 12 inches and compacted as specified for the adjacent fill. Material shall not be placed on surfaces that are muddy, frozen, or contain frost. Compaction shall be accomplished by equipment well suited to the soil being compacted. Material shall be moistened or aerated as necessary to provide the moisture content that will readily facilitate obtaining the specified compaction with the equipment used. Minimum subgrade density shall be as specified herein.

3.5 FILLING AND BACKFILLING

Fill and backfill back to existing grade at 5H:1V unless otherwise indicated on the plan set. Compact each lift before placing overlaying lift.

3.5.1 Common Fill Placement

Use satisfactory materials. Place in 6 inch lifts. Compact areas not accessible to rollers or compactors with mechanical hand tampers. Aerate material excessively moistened by rain to a satisfactory moisture content. Finish to a smooth surface by blading, rolling with a smooth roller, or both.

3.5.2 Backfill and Fill Material Placement

Provide for paved areas and under concrete slabs, except where select material is provided. Place in 6 inch lifts. Do not place over wet or frozen areas. Place backfill material adjacent to structures as the structural elements are completed and accepted. Backfill against concrete only when approved. Place and compact material to avoid loading upon or against the structure.

3.5.3 Select Material Placement

Provide under porous fill of structures not pile supported. Place in 6 inch lifts. Backfill adjacent to structures shall be placed as structural elements are completed and accepted. Backfill against concrete only when approved. Place and compact material to avoid loading upon or against structure.

3.5.6 Trench Backfilling

Backfill as rapidly as construction, testing, and acceptance of work permits. Place and compact backfill in 6 inch lifts to top of trench.

3.6 COMPACTION

Determine in-place density of existing subgrade; if required density exists, no compaction of existing subgrade will be required. Density requirements specified herein are for cohesionless materials. When cohesive materials are encountered or used, density requirements may be reduced by 5 percent.

3.6.1 General Site

Compact underneath areas designated for vegetation and areas outside the 5 foot line of the paved area or structure to 90 percent of ASTM D698.

3.6.2 Structures, Concrete Slabs, and Sidewalks

Compact top 12 inches of subgrades to 95 percent of ASTM D698. Compact select material to 95 percent of ASTM D698.

3.6.3 Adjacent Area

Compact areas within 5 feet of structures to 90 percent of ASTM D698.

3.7 FINISH OPERATIONS

3.7.1 Grading

Finish grades as indicated within one-tenth of one foot. Grade areas to drain water away from structures. Maintain areas free of trash and debris. For existing grades that will remain but which were disturbed by Contractor's operations, grade as directed.

3.7.2 Protection of Surfaces

Protect newly backfilled, graded, and/or topsoiled areas from traffic, erosion, and settlements that may occur. Repair or reestablish damaged grades, elevations, or slopes.

3.8 DISPOSITION OF SURPLUS MATERIAL

Remove from CITY property surplus or other soil material not required or suitable for filling or backfilling, and brush, refuse, stumps, roots, and timber.

3.9 FIELD QUALITY CONTROL

3.9.1 Sampling

Take the number and size of samples required to perform the following tests.

3.9.2 Testing

Perform one of each of the following tests for each material used. Provide additional tests for each source change.

3.9.2.1 Fill and Backfill Material Testing

Provide certifications from material supplier or test fill and backfill material in accordance with ASTM C136/C136M for conformance to ASTM D2487 gradation limits; ASTM D1140 for material finer than the No. 200 sieve; ASTM D4318 for liquid limit and for plastic limit; ASTM D698 or ASTM D1557 for moisture density relations, as applicable.

3.9.2.2 Select Material Testing

Provide certifications from the material supplier, or test select material in accordance with ASTM C136/C136M for conformance to ASTM D2487 gradation limits; ASTM D1140 for material finer than the No. 200 sieve; ASTM D698 or ASTM D1557 for moisture density relations, as applicable.

3.9.2.3 Porous Fill Testing

Test porous fill in accordance with ASTM C136/C136M for conformance to gradation specified in ASTM C33/C33M.

3.9.2.4 Density Tests

Test density in accordance with ASTM D1556/D1556M, or ASTM D6938.

-- End of Section --

SECTION 31 41 16

STEEL SHEET PILING

PART 1 GENERAL

1.1 UNIT PRICES

1.1.1 EZ-95 Steel Sheet Piling, Type ASTM A572, Grade 50

1.1.1.1 Payment

Payment for sheet piling quantities will be lump sum for fully furnished and installed project wall. Payment will cover all cost of shipping, furnishing, handling, storing and installing piling including placing, driving, cutting holes and other materials and work incident thereto.

1.1.1.2 Measurement

Lump sum.

1.1.1.3 Unit of Measure

Unit of measure: lump sum.

1.1.2 Cut-Offs

1.1.2.1 Payment

When pilings which have not been driven to penetration depths shown are directed to be cut off, including cut-offs due to excessive battering, no payment will be made for cutting off each piling.

1.1.2.2 Measurement

No payment will be made for cut-off portions of pilings.

1.1.2.3 Unit of Measure

Unit of measure: N/A.

1.1.3 Splices

1.1.3.1 Payment

Payment will be lump sum part of wall installation.

1.1.3.2 Measurement

Lump sum.

1.1.3.3 Unit of Measure

Unit of measure: each.

1.2 ESTIMATED QUANTITIES

The quantity of sheet piling required is 332 12-foot sections, 691.5 linear feet of 25” wide sheet pile. Installed quantities will consist of all piling including fabricated sections driven between the required top and bottom elevations of pilings plus any additions thereto resulting from changes in design or alignment as provided in paragraph DRIVING.

1.3 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN WELDING SOCIETY (AWS)

AWS D1.1/D1.1M	(2015; Errata 2015) Structural Welding Code - Steel

ASTM INTERNATIONAL (ASTM)

ASTM A6/A6M	(2014) Standard Specification for General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling
ASTM A690/A690M	(2013a) Standard Specification for High-Strength Low-Alloy Nickel, Copper, Phosphorus Steel H-Piles and Sheet Piling with Atmospheric Corrosion Resistance for Use in Marine Environments

1.4 SUBMITTALS

CITY approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Sheet Pile Field Layout
SD-02 Shop Drawings
- Metal Sheet Piling; G

SD-03 Product Data
- Driving
- Pile Driving Equipment; G
- Pulling and Redriving; G

SD-08 Closeout Submittals
- Pile Driving Record

1.5 Sheet Pile Field Layout

Contractor shall field stake the sheet pile alignment at the inflection points shown on the plans for CITY inspection and approval.

1.6 DELIVERY, STORAGE, AND HANDLING

Materials delivered to the site shall be new and undamaged and shall be accompanied by certified test reports. Provide the manufacturer's logo and mill identification mark on the sheet piling as required by the referenced specifications. Store and handle sheet piling in the manner recommended by the manufacturer to prevent permanent deflection, distortion or damage to the interlocks; as a minimum, support on level blocks or racks spaced not more than 10 feet apart and not more than 2 feet from the ends. Storage of sheet piling should also facilitate required inspection activities and prevent damage to coatings and corrosion prior to installation.

PART 2 PRODUCTS

2.1 METAL SHEET PILING

Submit detail drawings for sheet piling, including fabricated sections, showing complete piling dimensions and details, driving sequence and location of installed piling.

a. Include in the drawings details of top protection, special reinforcing tips, tip protection, lagging, splices, fabricated additions to plain piles, cut-off method, corrosion protection, and dimensions of templates and other temporary guide structures for installing piling. Provide details of the method for handling piling to prevent permanent deflection, distortion or damage to piling interlocks.

b. Metal sheet piling shall be EZ-95, Type ASTM A572, Grade 50.

2.1.1 Interlocks

The interlocks of sheet piling shall be free-sliding, provide a swing angle suitable for the intended installation but not less than 5 degrees when interlocked, and maintain continuous interlocking when installed.

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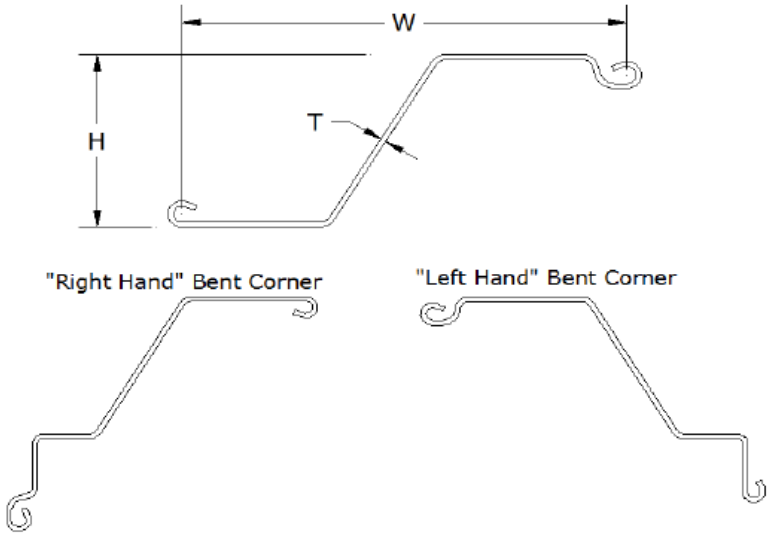
2.1.2 General Requirements

SAMUEL 1855
ROLL FORM GROUP

EZ-95 Steel Sheet Piling



ASTM A572 Grade 50 Steel

Section	Width W in / mm	Height H in / mm	Thickness T in / mm	Cross Sectional Area in^2/ft / cm^2/m	Weight Pile lb/ft / kg/m	Weight Wall lb/ft^2 / kg/m^2	Section Modulus in^3/ft / cm^3/m	Moment of Inertia in^4/ft / cm^4/m	Coating Area Both Sides ft^2/ft / m^2/m
EZ-95	25.00 635	10.81 275	0.375 9.50	14.40 92.7	48.90 72.8	23.50 115	24.40 1310	131.00 17900	5.60 1.71

Roll Form Group, a division of Samuel
945 Center Street * Green Cove Springs * Florida * 32043
(904) 287-8000 Fax (904) 529-7757
sales@pilingproducts.com www.pilingproducts.com

2.2 APPURTENANT METAL MATERIALS

Provide metal plates, shapes, bolts, nuts, rivets and other appurtenant fabrication and installation materials conforming to manufacturer's standards and to the requirements specified in the respective sheet piling standards.

2.3 TESTS, INSPECTIONS, AND VERIFICATIONS

Requirements for material tests, workmanship and other measures for quality assurance shall be as specified.

2.3.1 Materials Tests

Submit certified materials tests reports showing that sheet piling and appurtenant metal materials meet the specified requirements, for each shipment and identified with specific lots prior to installing materials. Material test reports shall meet the requirements of ASTM A6/A6M. Perform materials tests conforming to the following requirements. Sheet piling and appurtenant materials shall be tested and certified by the manufacturer to meet the specified chemical, mechanical and section property requirements prior to delivery to the site. Testing of sheet piling for mechanical properties shall be performed after the completion of all rolling and forming operations. Testing of sheet piling shall meet the requirements of ASTM A6/A6M.

PART 3 EXECUTION

3.1 EARTHWORK

Perform all earthwork in accordance with Section 31 23 00 EXCAVATION AND FILL. Pre-excavation will not be permitted. Backfill as indicated.

3.2 INSTALLATION

3.2.1 Pile Driving Equipment

Submit complete descriptions of sheet piling driving equipment including hammers (and vibratory hammers), extractors, protection caps and other installation appurtenances, prior to commencement of work. Descriptive information includes manufacturer's name, model numbers, capacity, rated energy, hammer details, cushion material, helmet, and templates. Provide pile driving equipment conforming to the following requirements.

3.2.1.1 Driving Hammers

Hammers shall be steam, air, or diesel drop, single-acting, double-acting, differential-acting, or vibratory type. The driving energy of the hammers shall be selected by the contractor according to the sheet selection and as recommended by the manufacturer for the piling weights and subsurface materials to be encountered. Repair damage to piling caused by use of a pile hammer with excess delivered force or energy.

3.2.1.2 Jetting Equipment

Jetting will not be permitted.

3.2.2 Placing and Driving

3.2.2.1 Placing

Any excavation required within the area where sheet pilings are to be installed shall be completed prior to placing sheet pilings. Pilings properly placed and driven shall be interlocked throughout their length with adjacent pilings to form a continuous diaphragm throughout the length or run of piling wall.

a. Pilings shall be carefully located as indicated. Pilings shall be placed plumb with out-of-plumbness not exceeding 1/4 inch per foot of length and true to line. Place the pile so the face will not be more than 6 inches from vertical alignment at any point. Top of pile at elevation of cut-off shall be within 1/2 inch horizontally and 2 inches vertically of the location indicated. Manipulation of piles to force them into position will not be permitted. Check all piles for heave. Re-drive all heaved piles to the required tip elevation.

b. Provide temporary wales, templates, master pilings or guide structures to ensure that the pilings are placed and driven to the correct alignment. Use a system of structural framing sufficiently rigid to resist lateral and driving forces and to adequately support the sheet piling until design tip elevation is achieved. Use two templates, at least, when placing each piling not less than 20 feet apart. Templates shall not move when supporting sheet piling. Fit templates with wood blocking to bear against the web of each alternate sheet pile and hold the sheet pile at the design location alignment. Provide outer template straps or other restraints as necessary to prevent the sheets from warping or wandering from the alignment. Mark template for the location of the leading edge of each alternate sheet pile. If in view, also mark the second level to assure that the piles are vertical and in position. If two guide marks cannot be seen, other means shall be used to keep the sheet pile vertical along its leading edge.

3.2.2.2 Driving

Submit records of the completed sheet piling driving operations, including a system of identification which shows the disposition of approved piling in the work, driving equipment performance data, piling penetration rate data, piling dimensions and top and bottom elevations of installed piling. The format for driving records shall be as directed. Prior to driving pilings in water, paint a horizontal line on both sides of each piling at a fixed distance from the bottom so that it will be visible above the water line after installation. This line shall indicate the profile of the bottom elevation of installed pilings and potential problem areas can be identified by abrupt changes in its elevation. Drive pilings with the proper size hammer and by approved methods so as not to subject the pilings to damage and to ensure proper interlocking throughout their lengths.

a. Maintain driving hammers in proper alignment during driving operations by use of leads or guides attached to the hammer. Caution shall be taken in the sustained use of vibratory hammers when a hard driving condition is encountered to avoid interlock-melt or damages. Discontinue the use of vibratory hammers and impact hammers employed when the penetration rate due to vibratory loading is one foot or less per minute.

b. Employ a protecting cap in driving when using impact hammers to prevent damage to the tops of pilings. Remove and replace pilings damaged during driving or driven out of interlock at the Contractor's expense.

c. Drive pilings without the aid of a water jet. Before commencing the driving of the final 5 feet, firmly seat the pile in place by the application of a number of reduced energy hammer blows.

d. Take adequate precautions to ensure that pilings are driven plumb. Where possible, drive Z-pile with the ball end leading. If an open socket is leading, a bolt or similar object placed in the bottom of the interlock will minimize packing material into it and ease driving for the next sheet. If at any time the forward or leading edge of the piling wall is found to be out-of-plumb in the plane of the wall the piling being driven shall be driven to the required depth and tapered pilings shall be provided and driven to interlock with the out-of-plumb leading edge or other approved corrective measures shall be taken to insure the plumbness of succeeding pilings. The maximum permissible taper for any tapered piling shall be 1/8 inch per foot of length.

e. Pilings in each run or continuous length of piling wall shall be driven alternately in increments of depth to the required depth or elevation. No piling shall be driven to a lower elevation than those behind it in the same run except when the pilings behind it cannot be driven deeper. Incrementally sequence driving of individual piles such that the tip of any sheet pile shall not be more than 4 feet below that of any adjacent sheet pile. When the penetration resistance exceeds five blows per inch, the tip of any sheet pile shall not be more than 2 feet below any adjacent sheet pile. If the piling next to the one being driven tends to follow below final elevation it may be pinned to the next adjacent piling.

f. If obstructions restrict driving a piling to the specified penetration, the obstructions shall be removed or penetrated with a chisel beam. If the Contractor demonstrates that removal or penetration is impractical, make changes in the design alignment of the piling structure as directed to ensure the adequacy and stability of the structure. Pilings shall be driven to depths shown and shall extend up to the elevation indicated for the top of pilings. Piling driven to rock shall be seated individually on the rock. Pilings shall not be driven within 100 feet of concrete less than 7 days old.

g. Pre-augering or spudding of piles may be permitted if approved in writing by the CITY.

3.2.3 Cutting-Off and Splicing

Pilings driven to refusal or to the point where additional penetration cannot be attained and are extending above the required top elevation in excess of the specified tolerance shall be cut off to the required elevation. Pilings driven below the required top elevation and pilings damaged by driving and cut off to permit further driving shall be extended as required to reach the top elevation by splicing when directed at no additional cost to the CITY.

a. Pilings adjoining spliced pilings shall be full length unless otherwise approved. Splicing of pilings shall be as indicated. Ends of pilings to be spliced shall be squared before splicing to eliminate dips or camber. Pilings shall be spliced together with concentric alignment of the interlocks so that there are no discontinuities, dips or camber at the abutting interlocks. Spliced pilings shall be free sliding and able to obtain the maximum swing with contiguous pilings. Shop and field welding, qualification of welding procedures, welders, and welding operators shall be in accordance with AWS D1.1/D1.1M.

b. The tops of pilings excessively battered during driving shall be trimmed when directed, at no cost to the CITY. Piling cut-offs shall become the property of the Contractor and shall be removed from the site.

c. Cut holes in pilings for bolts, rods, drains or utilities in a neat and workmanlike manner, as shown or as directed. Use a straight edge in cuts made by burning to avoid abrupt nicks. Bolt holes in steel piling shall be drilled or may be burned and reamed by approved methods which will not damage the surrounding metal. Holes other than bolt holes shall be reasonably smooth and the proper size for rods and other items to be inserted. Do not use explosives for cutting.

3.2.4 Inspection of Driven Piling

Perform continuous inspection during pile driving. Inspect all piles for compliance with tolerance requirements. Bring any unusual problems which may occur to the attention of the CITY. Inspect the interlocked joints of driven pilings extending above ground. Pilings found to be out of interlock shall be removed and replaced at the Contractor's expense.

3.2.5 Pulling and Redriving

Submit the proposed method of pulling sheet piling, prior to pulling any piling. Pull, as directed, selected pilings after driving to determine the condition of the underground portions of pilings. Any piling so pulled and found to be damaged, to the extent that its usefulness in the structure is impaired, shall be removed and replaced at the Contractor's expense. Pilings pulled and found to be in satisfactory condition shall be redriven when directed.

3.3 REMOVAL

The removal of sheet pilings shall consist of pulling, sorting, cleaning the interlocks, inventorying and storing previously installed sheet pilings as shown and directed.

3.3.1 Pulling

The method of pulling piling shall be approved. Provide pulling holes in pilings, as required. Extractors shall be of suitable type and size. Care shall be exercised during pulling of pilings to avoid damaging piling interlocks and adjacent construction. If the CITY determines that adjacent permanent construction has been damaged during pulling, the Contractor will be required to repair this construction at no cost to the CITY. Pull pilings one sheet at a time. Pilings fused together shall be separated prior to pulling, unless the Contractor demonstrates, to the satisfaction of the CITY, that the pilings cannot be separated. The Contractor will not be paid for the removal of pilings damaged beyond structural use due to proper care not being exercised during pulling.

3.3.2 Sorting, Cleaning, Inventorying and Storing

Pulled pilings shall be sorted, cleaned, inventoried and stored by type into groups as:

a. Piling usable without reconditioning.

b. Piling requiring reconditioning.

c. Piling damaged beyond structural use.

3.4 INSTALLATION RECORDS

Maintain a pile driving record for each sheet pile driven. Indicate on the installation record: installation dates and times, type and size of hammer, rate of operation, total driving time, dimensions of driving helmet and cap used, blows required per foot for each foot of penetration, or number of feet per minute if vibratory hammer is used, final driving resistance in blows for final 6 inches, pile locations, tip elevations, ground elevations, cut-off elevations, and any reheading or cutting of piles. Record any unusual pile driving problems during driving. Submit complete records to the CITY.

-- End of Section –

SECTION 32 96 00

TRANSPLANTING EXTERIOR PLANTS

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICANHORT (AH)

ANSI/ANLA Z60.1	(2004) American Standard for Nursery Stock

FLORIDA DEPARTMENT OF TRANSPORTATION (FDOT)

Design Index No. 533	(2016) Landscape Installation

TREE CARE INDUSTRY ASSOCIATION (TCIA)

TCIA A300P1	(2008) ANSI A300 Part1: Tree Care Operations - Trees, Shrubs and Other Woody Plant Maintenance Standard Practices – Pruning
TCIA Z133.1	(2006) American National Standard for Arboricultural Operations – Pruning, Repairing, Maintaining, and Removing Trees, and Cutting Brush – Safety Requirements

1.2 SUBMITTALS

City approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

FNGLA Certified Landscape Contractor’s License & Tree Relocation References

Photographs

SD-02 Shop Drawings

Transplanting Plan; G

Mulch; G

1.3 QUALITY ASSURANCE

1.3.1 State Landscape Contractor's License & Tree Relocation References

All tree relocation work shall be performed by a professional tree moving company certified as a Florida Nursery, Growers and Landscape Association (FNGLA) Certified Landscape Contractor and have a minimum of 10 years in tree relocation experience. Submit a copy of the license and 3 references of tree relocation work in the past 5 years.

1.3.2 Permits

Tree relocation permits shall be obtained by the City.

1.3.3 Photographs

The contractor shall provide a clear 4 inch by 6 inch minimum size color photograph of the plant material to be relocated. Trees shall be documented by an individual photograph of each. Photographs shall indicate the date and species of each plant on the back or front of each photo.

1.3.4 Transplanting Plan

A transplanting plan shall be submitted showing existing and proposed locations of transplanted material. The plan shall also delineate methods, dates, and times for root pruning, digging, balling, removing, storing, transporting, planting, watering, and maintenance to ensure survivability. The plan shall also include equipment and anti-desiccant to be used. A listing of the plant material to be transplanted shall be provided by common name and botanical name as listed under "Nomenclature" in ANSI/ANLA Z60.1; classification; caliper; and height.

1.3.5 Pre-Installation Meeting

Convene a pre-installation meeting a minimum of one week prior to commencing work of this section. Require attendance of parties directly affecting work of this section. Review conditions of operations, procedures and coordination with related work. Agenda shall include the following:

a. Tour, inspect, and discuss conditions of planting materials.

b. Review planting schedule and maintenance.

c. Review required inspections.

d. Review environmental procedures.

1.4 PLANT MATERIAL IDENTIFICATION

Plant material to be transplanted shall be tagged and numbered. Transplanted plant material shall be delivered with attached, durable, waterproof labels and weather-resistant ink or imprinted tags, stating the correct botanical and common plant name and size.

1.5 INSPECTION OF MATERIALS

The City reserves the right to refuse any unacceptable plant material. All rejected plant material shall be remove from the job site on the day of rejection.

1.6 HANDLING OF PLANT MATERIALS

Materials shall not be dropped from vehicles. Plant material shall be transported without scarring trunks or deforming crown branching. Materials found to be in unacceptable condition shall be replaced at no additional cost to the City.

1.7 TIME LIMITATION

The time limitation from digging, removing, transporting, to installing transplanted plant material shall be the same day. The time limitation between installing the plant material and placing the mulch shall be a maximum 48 hours. If project conditions prevent the Contractor from transplanting and installing plant material on the same day, plant materials shall be boxed or heeled in as required. Plant material shall be maintained and protected by the Contractor.

1.8 GUARANTEE

Transplanted plant material shall have a guarantee period of 1-year. All plants that die or have 25

percent or more of their branches that die during the construction operations or the guarantee period, shall be replaced in kind in relation to size and species during the planting season.

1.9 Underground Utilities

The location of underground utilities and facilities at both the removal and installing sites shall be verified and marked. Damage to underground utilities and facilities shall be repaired at the Contractor's expense.

1.10 Protecting Existing Vegetation

When there are established lawns at either the removal or installing sites, the turf shall be protected during the operation. Existing trees, shrubs, and plant beds at the removal and installing sites that are to be preserved shall be barricaded and protected from damage by a tree barricade or other measure. Damage to existing plant material shall be mitigated by the Contractor at no additional cost to the City.

Damage shall be assessed by a state certified arborist or other approved professional using the National Arborist Association's tree valuation guideline.

1.11 Protection of Plant Material to be Transplanted

Contractor shall protect plant material slated for transplanting that is not transplanted at the beginning of construction operations. Prior to construction operations, Contractor shall tag plants to be transplanted with plastic or vinyl tape tied to the plant caliper. Plants to be transplanted shall be protected from root compaction and any other damage (with barrier of metal poles a maximum of 8 feet on center with plastic fluorescent netting) at a minimum of 20 foot diameter from outside of the plant's trunk prior to the start of any construction operations. Where tree drip lines are greater than 10 feet from the tree's trunk, locate barrier fencing at the drip line of the tree. Plastic tape and barrier fencing shall not be removed until transplanting operations are ready to begin and or instructed by the City. Contractor shall water and prune plant material as necessary to keep healthy and vigorous. Contractor shall be responsible for watering existing plant material to be transplanted from the start of construction operations until the maintenance period is over. Outside storage locations shall be continually shaded and protected from the wind. Bare root plants shall be heeled in. Plants stored on the project shall be protected from any drying at all times covering the balls or roots with moist sawdust, wood chips, shredded bark, peat moss, or other similar mulching material.

1.12 Protection of Plant Material During Transplanting

Plant material shall be protected during transplanting to prevent desiccation and damage to the branches, trunk, and root system. Branches of shrubs, palms, vines shall be protected by tying-in. Exposed branches shall be covered during transport. Plant material shall be undamaged, vigorous and healthy with a well-branched root system, free from disease, harmful insects and insect eggs, sun-scald injury, disfigurement or abrasion after transplanting. Plant material showing desiccation, abrasion, sun scald injury or structural branching damage shall be replaced at no cost to the government.

PART 2 PRODUCTS

2.1 TOPSOIL

Existing soil shall be used as topsoil.

2.2 MULCHES TOPDRESSING

Mulch shall be free from noxious weeds, mold, pesticides, or other deleterious materials. Submit mulch product for City approval.

2.3 WATER

Water shall be the responsibility of the Contractor.

PART 3 EXECUTION

3.1 PLANT MATERIAL PREPARATION AND HANDLING

3.1.1 Pruning

3.1.1.1 Root Pruning

Large canopy and specimen plant material shall be root pruned a minimum of 6 weeks before transplanting. Minimum root ball sizes shall be in accordance with ANSI/ANLA Z60.1.

3.1.1.2 Canopy Pruning

Canopy pruning shall conform to TCIA A300P1.

3.1.2 Plant Material Preparation

Plant material designated for transplanting shall be watered thoroughly several days before root pruning, digging or moving. Broken or interfering growth shall be pruned. Large canopy and specimen plant material shall be wire balled and burlapped. Mark north side of plants prior to excavation. Relocate in new location with north facing same direction.

3.1.3 Palms

In preparation for relocation, remove all dead and green fronds below a horizontal position with clean, sterilized equipment and tools. All fronds above horizontal shall be lifted and tied together in two locations around the crown in an upright position with a light weight cotton rope. Removal of fronds and tying shall be completed prior to digging the root ball. Palms trimmed or pruned shall retain a minimum 6 inches of foliage at the crown as a means of determining plant health.

3.2 SITE PREPARATION

3.2.1 Protection

Protect existing and proposed landscape features, elements, and sites from damage or contamination. Protect trees, vegetation, and other designated features by erecting high-visibility, reusable construction fencing. Locate fence no closer to trees than the drip line. Plan equipment and vehicle access to minimize and confine soil disturbance and compaction to areas indicated on Drawings.

3.2.2 Finish Grade and Topsoil

The Contractor shall verify that finish grades are as indicated on drawings, and that the placing of topsoil, the smooth grading, and the compaction requirements have been completed in accordance with Section 31 23 00 EXCAVATION AND FILL, prior to the commencement of the transplanting operation.

3.2.3 Layout

Relocate plant material at the locations designated by the City.

3.2.4 Erosion Control

Provide erosion control in accordance with Section 01 57 19 TEMPORARY ENVIRONMENTAL CONTROLS.

3.3 SITE EXCAVATION

3.3.1 Obstructions Above or Below Ground

When obstructions above or below ground affect the work, shop drawings showing proposed adjustments to plant material location, and planting method shall be submitted for City approval.

3.3.2 Turf Removal and Replacement

Do not disturb topsoil and vegetation in areas outside those indicated on the Drawings. Where the installation operation occurs in an existing lawn area, the turf shall be removed from the excavation area to a depth that will ensure the removal of the entire root system.

3.3.3 Plant Pits

Plant pits shall be dug to a depth equal to the height of the root ball as measured from the base of the ball to the base of the plant trunk. Plant pits shall be dug a minimum of 2 times the diameter of the root system to allow for root expansion. The pit shall be constructed with sides sloping towards the base as a cone, to encourage well-aerated soil to be available to the root system for favorable root growth. Cylindrical pits with vertical sides shall not be used. Pits shall be dug immediately before plants are placed in the pit.

3.4 INSTALLATION

3.4.1 Setting Plant Material

Plant material shall be set plumb and held in position until sufficient top soil has been firmly placed around root system or ball. In relation to the surrounding grade, the plant material shall be set even with the grade at which it was grown. The root system shall be spread out and arranged in its natural position. Damaged or girdled roots shall be removed with a clean cut. The beginning of the root flare shall be visible at soil level when the tree is planted, since it is critical not to plant the tree too deep. The following shall be performed:

a. Plumb plant materials and backfill half of the hole with topsoil.

b. Prior to backfilling, all metal, wood, and synthetic products shall be removed from the ball or root system avoiding damage to the root system. Biodegradable burlap and tying material shall be carefully opened and folded back from the top a minimum 1/3 depth from the top of the root ball.

c. Water the hole to collapse air pockets.

d. Backfill and gently firm topsoil.

e. Clear soil mounded against trunk.

f. An earth berm, consisting of backfill soil mixture, shall be formed with a minimum 4 inch height around the edge of the plant pit to aid in water retention and to provide soil for settling adjustments.

3.4.2 Watering

A regular watering schedule shall be established. Slow deep watering shall be used. Plant pits and plant beds shall be watered immediately after backfilling, until completely saturated. Run-off and puddling shall be prevented. Watering of other plant material or adjacent areas shall be prevented.

3.4.3 Staking and Guying

Staking and guying shall be conducted in accordance with the requirements of FDOT Design Index No. 533.

3.5 FINISHING

All planting operations shall conform to TCIA Z133.1.

3.5.1 Plant Material

Prior to placing mulch, the installed area shall be uniformly edged to provide a clear division line between the planted area and the adjacent turf area, shaped as indicated. The installed area shall be raked and smoothed while maintaining the earth berms.

3.5.2 Placing Mulch

The placement of mulch shall occur a maximum of 48 hours after planting. Mulch, used to reduce soil water loss, regulate soil temperature and prevent weed growth, shall be spread to cover the installed area with a minimum 3 inch uniform thickness. Mulch shall be kept out of the crowns of shrubs, ground cover, and vines and shall be kept off buildings, sidewalks and other facilities.

3.5.3 Pruning

Pruning shall be accomplished by a certified arborist. The pruning of trees and palms shall be in accordance with TCIA A300P1. Only dead or broken material shall be pruned from installed plants. The typical growth habit of individual plant material shall be retained. Broken branches shall be removed.

3.6 RESTORATION AND CLEAN UP

3.6.1 Restoration

Turf areas containing ruts or dead turf, as a result of work under this contract, shall be graded smooth and sodded with the same species or as approved by the City. All pavements and facilities that have been damaged from the transplanting operation shall be restored to original condition at the Contractor's expense.

3.6.2 Backfill Removal Site Plant Pits

The Contractor shall ensure that all remaining holes from the removal site have been backfilled with on-site soil, tamped to 90 percent compaction, leveled and finished to meet existing grade after settling. Adjacent trees, shrubs, vines and groundcover destroyed by transplanting or construction operations shall be replaced in kind in relation to size and species and shall be installed in accordance with FDOT Index No. 533. Turf shall be replaced with sod.

3.6.3 Clean Up

Excess and waste material shall be removed from the site and shall be disposed offsite at an approved landfill, recycling center, or composting center. Adjacent paved areas shall be cleared.

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